

**DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
CARLSBAD FIELD OFFICE**

**Project: July 2014 Competitive Oil and Gas Lease Sale  
EA Log Number: DOI-BLM-NM-P020-2014-0492-EA  
Location: Various Locations in Eddy and Lea County, New Mexico.**

**Finding of No Significant Impact**

Based on the analysis of potential environmental impacts contained in the attached environmental assessment (EA), I have determined the Preferred Alternative is not expected to have significant impacts on the environment. The impacts of leasing the fluid minerals estate in the areas described with this EA have been previously analyzed in the Carlsbad Resource Area Resource Management Plan (RMP) and Final Environmental Impact Statement (BLM February 1986) and the Carlsbad Resource Area Resource Management Plan Amendment (RMPA) and Final Environmental Impact Statement for Oil and Gas Resources (BLM January 1997), which were approved as the Final RMP and RMPA for the BLM-CFO by the Record of Decisions (ROD), signed September 30, 1988 and October 10, 1997, respectively. The Special Status Species RMPA Record of Decision was signed on May 2, 2008, and amends the RMP and 1997 RMPA in portions of Chaves, Eddy, Lea and Roosevelt Counties, New Mexico, with reference to Planning Areas as described in that document; and the lease stipulations that accompany the tracts proposed for leasing would mitigate the impacts of future development on these tracts. Therefore, preparation of an Environmental Impact Statement is not warranted.

Prepared by:

/s/\_\_\_\_\_Date\_\_\_\_\_  
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Reviewed By:

/s/\_\_\_\_\_Date\_\_\_\_\_  
James Stovall, Field Manager

Approved by:

/s/\_\_\_\_\_Date\_\_\_\_\_  
Jesse Juen, State Director

**ENVIRONMENTAL ASSESSMENT FOR  
July 2014 COMPETITIVE OIL AND GAS LEASE SALE  
DOI-BLM-NM-P020-2014-0492-EA**

## **INTRODUCTION**

It is the policy of the Bureau of Land Management (BLM) as derived from various laws, including the Mineral Leasing Act of 1920 (MLA), as amended [30 U.S.C. 181 *et seq.*], and the Federal Land Policy and Management Act of 1976 (FLPMA), as amended, to make mineral resources available for disposal and to manage for multiple resources which include the development of mineral resources to meet national, regional, and local needs.

The BLM New Mexico State Office (NMSO) conducts a quarterly competitive lease sale to offer available oil and gas lease parcels in New Mexico, Oklahoma, Texas, and Kansas. A Notice of Competitive Lease Sale (NCLS), which lists lease parcels to be offered at the auction, is published by the NMSO at least 90 days before the auction is held. Lease stipulations applicable to each parcel are specified in the Sale Notice. The decision as to which public lands and minerals are open for leasing and what leasing stipulations are necessary, based on information available at the time, is made during the land use planning process. Surface management of non-BLM administered land overlaying federal minerals is determined by the BLM in consultation with the appropriate surface management agency or the private surface owner.

In the process of preparing a lease sale the NMSO sends a draft parcel list to any Field Offices in which parcels are located. Field office staff then review the legal descriptions of the parcels to determine if they are in areas open to leasing; if new information has become available which might change any analysis conducted during the planning process; if appropriate consultations have been conducted; what appropriate stipulations should be included; and if there are special resource conditions of which potential bidders should be made aware. The parcels nominated for this sale, along with the appropriate stipulations from the 1988 Carlsbad Resource Management Plan (RMP) and subsequent amendments, are posted online for a two week public scoping period. Comments received are reviewed and incorporated into the Environmental Assessment (EA).

Once the draft parcel review is completed and returned to the NMSO, a list of nominated lease parcels with specific, applicable stipulations is made available through the NCLS. On rare occasions, additional information obtained after the publication of the NCLS may result in deferral of certain parcels prior to the lease sale.

This EA documents the Carlsbad Field Office (CFO) review of the 39 parcels nominated for the July 2014 Competitive Oil and Gas Lease Sale that are under the administration of the CFO. It serves to verify conformance with the approved land use plan, provides the rationale for deferring or dropping parcels from a lease sale, as well as providing rationale for attaching lease stipulations to specific parcels.

The parcels and applicable stipulations were posted online for a two week public scoping period starting on December 30, 2013. No comments were received. In addition, this EA is made

available for public review and comment for 30 days beginning February 10, 2014. One parcel, - 057, was added to the parcels being considered on February 18, 2014 due to a recommendation from the BLM NMSO fluid geologist who documented that drainage of the lease parcel was occurring. The public comment period was extended an additional eight days and concluded on March 19, 2014. Comments were received from WildEarth Guardians and incorporated into the EA as appropriate (see Appendix 4).

## **1.0 Purpose and Need**

The purpose is to consider opportunities for private individuals or companies to explore for and develop oil and gas resources on public lands through a competitive leasing process.

The need of the action is established by the BLM's responsibility under the MLA, as amended, to promote the development of oil and gas on the public domain. The MLA also establishes that deposits of oil and gas owned by the United States are subject to disposition in the form and manner provided by the MLA under the rules and regulations prescribed by the Secretary of the Interior, where consistent with the FLPMA, the National Environmental Policy Act (NEPA) of 1969, as amended (Public Law 91-90, 42 USC 4321 iet seq.), and other applicable laws, regulations, and policies.

The BLM will decide whether or not to lease the nominated parcels and, if so, under what terms and conditions.

## **1.1 Conformance with Applicable Land Use Plan and Other Environmental Assessments**

The applicable land use plan for this action is the 1988 Carlsbad RMP and Final Environmental Impact Statement (BLM February 1986) and the Carlsbad Resource Management Plan Amendment (RMPA) and Final Environmental Impact Statement for Oil and Gas Resources (BLM January 1997), which were approved as the Final RMP and RMPA for the BLM-CFO by the Record of Decisions (ROD), signed September 30, 1988 and October 10, 1997, respectively. The Special Status Species RMPA Record of Decision was signed on May 2, 2008, and amends the RMP and 1997 RMPA. The RMP designated approximately 4.1 million acres of federal minerals open for continued oil and gas development and leasing under Standard Terms and Conditions. The RMP and RMPAs also describe specific stipulations that would be attached to new leases offered in certain areas. Therefore, it is determined that the alternatives considered conform to fluid mineral leasing decisions in the RMP and subsequent amendments and are consistent with the goals and objectives for natural and cultural resources.

The CFO Resource Management Plan is currently undergoing a revision with a draft EIS anticipated in the first quarter of 2015. The EIS is analyzing four action alternatives, of which one will eventually be selected as the preferred, that will guide the agency in making new management decisions for all the resources and resource uses under the BLM's authority to manage. Guidance found in the land use planning handbook directs the agency to carefully consider approving ongoing actions that may limit the choice of reasonable alternatives being considered in the RMP EIS. For oil and gas leasing, the new RMP will allocate areas within the planning area that will either be closed, open, open subject major constraints, or open subject to minor constraints. By conducting a preliminary vetting of the parcels, it was determined that

leasing parcels discussed below in alternatives section, would not limit the choice of reasonable alternatives being considered in the draft EIS. The lease parcels being deferred are those that were found to potentially conflict with a leasing management decision in at least one of the alternatives in the draft EIS.

Pursuant to 40 Code of Federal Regulations (CFR) 1508.28 and 1502.21, this EA is tiered to and incorporates by reference the information and analysis contained in the RMP and RMPAs and their Final Environmental Impact Statements. While it is unknown precisely when, where, or to what extent well sites or roads would be proposed, the analysis of projected surface disturbance impacts, should a lease be developed, is based on well spacing requirements at each parcel location. While an appropriate level of site-specific analysis of individual wells or roads would occur when a lease holder submits an Application for Permit to Drill (APD), assumptions based on the full lease development will be used in the analysis of impacts in this EA.

FLPMA established guidelines to provide for the management, protection, development, and enhancement of public lands (Public Law 94-579). Section 103(e) of FLPMA defines public lands as any lands and interest in lands owned by the U.S. For split-estate lands where the mineral estate is an interest owned by the U.S., the BLM has no authority over use of the surface by the surface owner; however, the BLM is required to declare how the federal mineral estate will be managed in the RMP, including identification of all appropriate lease stipulations. (43 CFR 3101.1 and 43 CFR 1601.0-7(b); BLM Manual Handbook 1601.09 and 1624-1).

## **1.2 Federal, State or Local Permits, Licenses or Other Consultation Requirements**

Purchasers of oil and gas leases are required to comply with all applicable federal, state, and local laws and regulations, including obtaining all necessary permits required should lease development occur.

The New Mexico Department of Game and Fish is invited to attend all IDT Lease Sale reviews at the CFO. If any of the proposed parcels fall within a couple miles of any other Federal agencies surface regulated properties, they are also invited to attend the IDT lease Sale review.

In preparation for the 1997 RMPA, the U.S. Fish and Wildlife Service (USFWS) concurred with CFO biologists with a determination of no effect or not likely to adversely affect threatened or endangered species. The USFWS response (Cons. # 2-22-96-F-128) is found in Appendix 4 of the ROD for the 1997 RMPA, dated 30 April 1997. No further consultation with the USFWS is needed at this stage for any of the proposed parcels.

In April 2008, the BLM Pecos District Special Status Species RMPA amended the Carlsbad RMP in portions of the CFO with references to the Planning Area, as described in that document, to ensure continued habitat protection of two special status species, the lesser prairie-chicken (*Tympanuchus pallidicinctus*) (LPC) and the sand dune lizard (*Sceloporus arenicolus*) (SDL). This action is in compliance with threatened and endangered species management outlined in the September 2006 (Cons. #22420-2007-TA-0033) Biological Assessments and in accordance with the requirements of FLMPA and NEPA. However, on March 27, 2014, the USFWS published in the Federal Register the final rule to list the lesser prairie-chicken as threatened under the Endangered Species Act. It is anticipated that this rule will be effective 30 days from the date of

publication on March 27, 2014. In light of this ruling, the CFO has initiated a Biological Assessment for 17 lease parcels being considered for sale that have suitable habitat, but are within the Isolated Population Area as identified in the 2008 RMPA. Pending the outcome of the assessment, consultation with the USFWS may be required. The 17 lease parcels being considered for sale will not be leased until the BLM has completed a Biological Assessment and any required consultation with the USFWS has been completed.

For all the parcels outside of the lesser prairie-chicken habitat, the professional opinion of BLM biologists, using BLM inventory and monitoring data, is that no federally listed threatened, endangered, or proposed species would be adversely affected by sale of the lease parcels. Additional review and analysis would occur when site specific proposals for development are received.

Federal regulations and policies require the BLM to make its public land and resources available on the basis of the principle of multiple-use. At the same time, it is BLM policy to conserve special status species and their habitats, and to ensure that actions authorized by the BLM do not contribute to the need for the species to become listed as threatened or endangered by the USFWS.

Compliance with Section 106 responsibilities of the NHPA are adhered to by following the Protocol Agreement between New Mexico BLM and New Mexico State Historic Preservation Officer (Protocol Agreement), which is authorized by the National Programmatic Agreement between BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers, and other applicable BLM handbooks. Compliance with BLM Instructional Memorandums NM-2004-035 (Consultations with Indian Tribes Regarding Traditional Cultural Properties and Sacred Sites in the Fluid Minerals Program), WO-2012-061 (Revised Programmatic Agreement Regarding the Manner in which the Bureau of Land Management will meet its Responsibilities under the National Historic Preservation Act), and WO-2012-062 (Implementation of the Department of Interior Tribal Consultation Policy) are adhered to by providing interested Native American tribes with parcel information and maps with offers to visit knowledgeable individuals and/or visit the parcels in order to identify tribal concerns.

Native American consultation is conducted by certified mail regarding each lease sale activity. If Traditional Cultural Properties (TCP) or heritage-related issues are identified, such parcels are withheld from the sale while letters requesting information, comments, or concerns are sent to the Native American representative. If the same draft parcels appear in a future sale, a second request for information is sent to the same recipients and the parcels will be held back again. If no response to the second letter is received, the parcels are allowed to be offered in the next sale.

If responses are received, BLM cultural resources staff will discuss the information or issues of concern with the Native American representative to determine if all or portions of a parcel need to be withdrawn from the sale, or if special stipulations need to be attached as lease stipulations. Native American consultation letters for the July 2014 Lease Sale were sent on 09 January 2014. To date, no responses have been received from the tribes.

In Section 1835 of the Energy Policy Act of 2005 (43 U.S.C. 15801), Congress directed the Secretary of the Interior to review current policies and practices with respect to management of federal subsurface oil and gas development activities and their effects on the privately owned surface. The Split Estate Report, submitted in December 2006, documents the findings from consultation on the split estate issue with affected private surface owners, the oil and gas industry, and other interested parties.

In 2007, the Legislature of the State of New Mexico passed the Surface Owners Protection Act. This Act requires operators to provide the surface owner at least five business days notice prior to initial entry upon the land for activities that do not disturb the surface; and provide at least 30 days notice prior to conducting actual oil and gas operations. At the New Mexico Federal Competitive Oil and Gas Lease Sale conducted on October 17, 2007, the BLM announced the implementation of this policy. Included in this policy is the implementation of a Notice to Lessees (NTL), a requirement of lessees and operators of onshore federal oil and gas leases within the State of New Mexico to provide the BLM with the names and addresses of the surface owners of those lands where the Federal Government is not the surface owner, not including lands where another federal agency manages the surface.

The BLM NMSO would then contact the surface owners and notify them of the expression of interest and the date the oil and gas rights would be offered for competitive bidding. The BLM would provide the surface owners with its website address so they may obtain additional information related to the oil and gas leasing process, the imposition of any special stipulations on that lease parcel, federal and state regulations, and best management practices (BMPs). The surface owners may elect to protest the leasing of the minerals underlying their surface.

If the BLM receives a protest, the parcel would remain on the lease sale; however, the BLM would resolve any protest prior to issuing an oil and gas lease for that parcel. If the protest is upheld, the BLM would return the payments received from the successful bidder for that parcel. After the lease sale has occurred, the BLM would post the results on its website and the surface owner may access the website to learn the results of the lease sale.

### **1.3 Identification of Issues**

The July 2014 parcel list was received by the CFO on 22 November 2013. The CFO Interdisciplinary Team (IDT) reviewed the parcels for approximately three weeks. The IDT met on 16 December 2013 to identify and consider potentially affected resources and associated issues. The parcels were also reviewed for conformance with the RMP and lease stipulations were attached to the parcels recommended for leasing. The IDT developed the Preferred Alternative, presented in section 2.3 below, to address the unresolved conflicts related to the Proposed Action.

The proposed parcels along with the appropriate stipulations were posted online at [http://www.blm.gov/style/medialib/blm/nm/programs/0/og\\_sale\\_notices\\_and/2014/july\\_2014.Pa.r.99331.File.dat/Carlsbad\\_July%202014%20Draft%20Parcel%20List.pdf](http://www.blm.gov/style/medialib/blm/nm/programs/0/og_sale_notices_and/2014/july_2014.Pa.r.99331.File.dat/Carlsbad_July%202014%20Draft%20Parcel%20List.pdf) for a two week scoping period from 30 December 2013 through 13 January 2014. One parcel, -057, was added to the parcels being considered on February 18, 2014 due to a recommendation from the BLM NMSO fluid geologist who documented that drainage of the lease parcel was occurring.

The CFO met with the NMSO on 08 January 2014 to discuss the proposed parcels and to provide rationale for attaching stipulations or for deferring parcels.

Based on these efforts, the following issues have been determined relevant to the analysis of this action:

- *What effect will the proposed action have on Air Quality of Southeastern New Mexico?*
- *What effect will the proposed action have on Global Climate Change?*
- *What effect will the proposed action have on Wetlands and Riparian areas?*
- *What effect will the proposed action have on vegetation and forage for grazing and wildlife?*
- *What effect will the proposed action have on spreading of Noxious Weeds?*
- *What effect will the proposed action have on Raptors or their nests?*
- *What effect will the proposed action have on Environmental Justice?*
- *What effect will the proposed action have on recreation opportunities?*
- *What effect will the proposed action have on significant Cave and Karst Resources?*
- *What effect will the proposed action have on known heritage resources eligible for listing on the National Register of Historic Places?*
- *What effect will the proposed action have on known paleontological resources?*
- *What effect will the proposed action have on slopes or fragile soils?*
- *What effect will the proposed action have on Playas or Alkali lakes?*
- *What effect will the proposed action have on Potash resources?*
- *What effect will the proposed action have on the water resources?*
- *What effect will the proposed action have on the Aplomado Falcon and its habitat?*
- *What effect will the proposed action have on Lesser Prairie Chickens and their habitat?*
- *What effect will the proposed action have on Dunes Sagebrush Lizards and their habitat?*
- *What effect will the proposed action have on Wildlife Habitat projects with the parcel?*
- *Are any of the parcels located on lands nominated for special designation such as ACEC?*
- *What effect will the proposed action have on Visual Resource Management?*

The following elements are not present as determined by the IDT: Prime or Unique Farmlands, Wild and Scenic Rivers, Wilderness or Wilderness Study Areas, and Wild Horses and Burros.

After reviewing BLM's inventory of lands with wilderness characteristics (LWC), existing case file for wilderness inventory and other sources of information related to authorized livestock grazing range improvements, rights-of-wells, oil and gas authorizations, updated aerial imagery, etc., the FO has confirmed that no changes have occurred which would have changed (improved) the naturalness and outstanding opportunities for solitude/primitive and unconfined recreation. This review confirms that the previous determination that the lands within the project area lack wilderness characteristics remains valid and up-to-date. Since LWC are not present within the lands nominated, further analysis is not warranted in order to make a reasoned choice between

alternatives or to determine the significance of impacts. See Appendix 2 for documentation of the review.

## **PROPOSED ACTIONS AND ALTERNATIVES**

### **2.0 Alternatives Including the Proposed Action**

#### **2.1 Alternative A – No Action**

The BLM NEPA Handbook (H-1790-1) states that for EAs on externally initiated proposed actions, the no action alternative generally means that the proposed action would not take place. In the case of a lease sale, this would mean that an expression of interest to lease (parcel nomination) would be deferred, and the thirty-nine (39) parcels totaling 14,246.17 acres would not be offered for lease during the July 2014 Competitive Oil and Gas Lease Sale. One parcel, -057 (40 acres), was added to the No Action Alternative on February 18, 2014, due to a recommendation from the BLM NMSO fluid geologist who documented that drainage of the lease parcel was occurring. Surface management and any ongoing oil and gas development on surrounding federal, private, and state leases would continue under current guidelines and practices. Selection of the no action alternative would not preclude these parcels from being nominated and considered in a future lease sale.

#### **2.2 Alternative B – Proposed Action**

The Proposed Action is to lease twenty-five (25) parcels as nominated and five (5) parcels as modified of federal minerals nominated by the public that are in conformance with the RMP and Amendments, covering approximately 11,894 acres administered by the CFO, for oil and gas exploration and development. Standard terms and conditions as well as stipulations listed in the RMP and RMPAs would apply. One parcel, -057 (40 acres), was added to the Proposed Action on February 18, 2014, due to a recommendation from the BLM NMSO fluid geologist who documented that drainage of the lease parcel was occurring. Complete descriptions of these parcels, including stipulations, are provided in Appendix 1. Six (6) parcels were nominated for lease but were eliminated from analysis under the Proposed Action, along with portions of the three (3) parcels that were modified. The rationale for not leasing these parcels is described in Section 2.4, Alternatives Eliminated from Detailed Analysis.

All thirty (30) parcels contain a special Cultural Resources Lease Notice stating that all development activities proposed under the authority of these leases are subject to compliance with Section 106 of the NHPA and Executive Order (EO) 13007.

The lease purchaser would have the exclusive right to use as much of the leased lands as would be necessary to explore and drill for oil and gas within the lease boundaries, subject to: stipulations attached to the lease; restrictions deriving from specific, nondiscretionary statutes; and such reasonable measures as may be required by the authorized officer to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed (43 CFR 3101). Oil and gas leases are issued for a 10-year period and continue for as long thereafter as oil or gas is produced in paying quantities. If a lease holder fails to produce oil and gas, does not make annual rental payments, does not comply with the



terms and conditions of the lease, or relinquishes the lease, exclusive right to develop the leasehold reverts back to the federal government and the lease can be reoffered in another lease sale.

Drilling of wells on a lease would not be permitted until the lease owner or operator meets the site specific requirements specified in 43 CFR 3162. A permit to drill would not be authorized until site-specific NEPA analysis is conducted.

In addition to the above, the following would apply to the proposed action:

Lease Stipulation SENM-S-34 Plan of Development/Shinnery Oak Sand Dune Habitat

Applying stipulation SENM-S-34 provides an opportunity for up front planning that helps in the orderly development of the lease. This stipulation applies to those lease parcels that fall within habitat for the Lesser Prairie Chicken. This stipulation is designed to help us better plan for management of this special status species. This stipulation would be applied to parcels -029, -031, -035, -036, -037, -038, -039, -040, -043, -045, -046, -047, -048, -049, -050, and -051.

Lease Stipulation SENM-S-39 Plan of Development

Applying stipulation SENM-S-39 provides an opportunity for up front planning that helps in the orderly development of the lease. This stipulation would be applied to parcels -001, -002, -006, -008, -009, -010, -012, -014, and -015.

Lease Stipulation SENM-S-46 Plan of Development/Survey Dunes Sagebrush Lizard

Applying stipulation SENM-S-46 provides an opportunity for up front planning that helps in the orderly development of the lease. This stipulation applies to those lease parcels that fall within habitat for the Dunes Sagebrush Lizard. This stipulation is designed to help us better plan for management of this special status species. This stipulation would be applied to parcels -025, -026, and -038.

Lease Stipulation SENM-S-47

Various lands within the CFO have been developed during historic oil and gas activity. These properties may contain wells that were not plugged and well pads, roads and/or facilities that were abandoned and not removed or reclaimed to current standards. Some of these areas no longer have a responsible party to reclaim these lands. These lands need to be reclaimed to help stabilize soils, improve vegetative communities, reduce impacts to watersheds, and to improve or defragment wildlife habitat. In some cases the erosion potential of these lands have increased by not having these lands reclaimed.

Lease Stipulation SENM-S-47 Lease Reclamation was developed by the Pecos District to mitigate existing impacts by requiring the potential lessee to either put the existing facilities or surface disturbance to a beneficial and direct use or to reclaim the facilities within two years of lease issuance. Lease parcels -039, -043, -045, and -047 would have Lease Stipulation SENM-S-47 attached to the parcel.

Parcel -039 contains 1 well location that has an old reserve pit and well pad location that was not properly reclaimed. The well location is the Gulf 29 Federal # 1: 2018' FNL and 700' FWL of section 29, of Township 24 South, Range 35 East, located in the SW1/4NW1/4 of Section 29. The only portions within the lease parcel that would need to be reclaimed is the old reserve pit, the well pad and the access road. The portion of the reserve pit, well pad location and access road that needs to be reclaimed is approximately 3.4 acre in size. Reclamation could most likely be accomplished by removing the caliche surface material from the old well pad location and access road and placing it on the old reserve pit. Then the soil would need to be blended and reseeded.

Parcel -043 contains 1 well location that has an old well pad location that was not properly reclaimed. The well location is the Mounsey Federal B: 660' FSL and 660' FWL of section 05, of Township 25 South, Range 35 East, located in the SW1/4SW1/4 of Section 05. The only portions within the lease parcel that would need to be reclaimed is the old well pad and the access road. The portion of the well pad location and access road that needs to be reclaimed is approximately 2.1 acres in size. Reclamation could most likely be accomplished by removing the caliche surface material from the old well pad location and access road and reseeding the entire area of disturbance.

Parcel -045 contains 1 well location that has an old reserve pit and well pad location that was not properly reclaimed. The well location is the Mounsey Federal # 1: 480' FNL and 670' FWL of section 06, of Township 25 South, Range 35 East, located in the NW1/4NW1/4 of Section 06. The only portions within the lease parcel that would need to be reclaimed is the old reserve pit, the well pad and the access road. The portion of the reserve pit, well pad location and access road that needs to be reclaimed is approximately 3.2 acres in size. Reclamation could most likely be accomplished by removing the caliche surface material from the old well pad location and access road and placing it on the old reserve pit. Then the soil would need to be blended and reseeded.

Parcel -047 contains two well locations that both have an old reserve pit , well pad location, and associated access roads that were not properly reclaimed. The first well location is the Mounsey Feder C: 1980' FNL and 660' FWL of section 20, of Township 25 South, Range 35 East, located in the NW1/4SW1/4 of Section 20. The portions of this location that would need to be reclaimed would be the reserve pit, caliche removed from the pad location and access road. The portion of the well location that needs to be reclaimed is approximately 4.6 acres. The reclamation could be accomplished by removing the caliche from the well location and access road and reseeding the entire area. The second well location is the Jamaica Gulf Federal # 1: 660' FNL and 660' FWL of section 20, of Township 25 South, Range 35 East, located in the NW1/4NW1/4 of Section 20. The portions of this location that would need to be reclaimed would be the reserve pit, caliche removed from the pad location and access road. This well location is approximately 11.8 acres that would need to be reclaimed. The reclamation could be accomplished by removing the caliche from the well location and access road capping the old reserve pit. The soils would need to be blended over the old reserve pit and the entire area of disturbance would need to be reseeded.

The following table describes lease parcels that are in conformance with the applicable land use plan and amendments.

**Alternative B – Proposed Action**

Parcel	Comments	Acres
<b><u>NM-201407-001</u></b>  T.0180S, R.0230E, NM PM, NM Sec. 025 ALL;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-31 Northern Aplomado Falcon SENM-S-39 Plan of Development	640.000
<b><u>NM-201407-002</u></b>  T.0190S, R.0230E, NM PM, NM Sec. 001 LOTS 1-4; 001 S2N2,S2; 002 LOTS 3,4; 002 S2NW,S2; 003 LOTS 1-4; 003 S2N2,S2;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-31 Northern Aplomado Falcon SENM-S-39 Plan of Development	1760.700
<b><u>NM-201407-006</u></b>  T.0210S, R.0240E, NM PM, NM Sec. 011 SE;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave-Karst Occurrence Area SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management SENM-S-39 Plan of Development	160.000
<b><u>NM-201407-008</u></b>  T.0210S, R.0250E, NM PM, NM Sec. 004 LOTS 1-16; 004 SW,N2SE,SWSE; 009 N2NW;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave-Karst Occurrence Area SENM-S-15 Wildlife Water SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management SENM-S-39 Plan of Development	956.800

<b><u>NM-201407-009</u></b>  T.0210S, R.0250E, NM PM, NM Sec. 008 NE,W2,N2SE,SWSE;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave-Karst Occurrence Area SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management SENM-S-39 Plan of Development	600.000
<b><u>NM-201407-010</u></b>  T.0210S, R.0250E, NM PM, NM Sec. 009 SESW,S2SE;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave-Karst Occurrence Area SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management SENM-S-39 Plan of Development	120.000
<b><u>NM-201407-012</u></b>  T.0220S, R.0250E, NM PM, NM Sec. 005 LOTS 1-4; 005 S2N2,S2;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave-Karst Occurrence Area SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-39 Plan of Development	639.600
<b><u>NM-201407-013</u></b>  T.0220S, R.0250E, NM PM, NM Sec. 006 LOTS 3-5; 006 SENW;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-17 Slopes or Fragile Soils SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management	158.050
<b><u>NM-201407-014</u></b>  T.0220S, R.0250E, NM PM, NM Sec. 008 SENE;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave-Karst Occurrence Area SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-39 Plan of Development	40.000

<p><b><u>NM-201407-015</u></b></p> <p>T.0220S, R.0250E, NM PM, NM Sec. 018 E2;</p>	<p><u>Lease with the following Stipulations:</u>  NM-LN-11 Lease Notice – Special Cultural  Resource Lease Notice  SENM-LN-1 Lease Notice – Cave-Karst  Occurrence Area  SENM-S-17 Slopes or Fragile Soils  SENM-S-18 Streams, Rivers, Floodplains  SENM-S-21 Caves and Karst  SENM-S-39 Plan of Development</p>	<p>320.000</p>
<p><b><u>NM-201407-023</u></b></p> <p>Acres  T.0170S, R.0290E, NM PM,  NM  Sec. 012  N2SW,SESW,N2SE,SWSE;  012 ALL  FORMATIONS EXCEPT;  012 THE  GRAYBURG FORMATION;  T.0170S, R.0300E, NM PM,  NM  Sec. 007 LOTS 3,4;  007 ALL  FORMATIONS EXCEPT;  007 THE  GRAYBURG FORMATION;</p>	<p><u>Lease with the following Stipulations:</u>  NM-LN-11 Lease Notice – Special Cultural  Resource Lease Notice  SENM-S-22 Prairie Chicken</p>	<p>314.730</p>
<p><b><u>NM-201407-024</u></b></p> <p>T.0260S, R.0290E, NM PM,  NM  Sec. 003 N2NW;  004 NENE;</p>	<p><u>Lease with the following Stipulations:</u>  NM-LN-11 LN Specials Cultural Resource notice</p>	<p>120.000</p>
<p><b><u>NM-201407-027</u></b></p> <p>T.0230S, R.0300E, NM PM,  NM  Sec. 005 LOTS 3,4;  005 S2NW,SW;</p>	<p><u>Lease with the following Stipulations:</u>  NM-LN-11 Lease Notice – Special Cultural  Resource Lease Notice  SENM-LN-6 Lease Notice - Potash  SENM-LN-1 Lease Notice – Cave-Karst  Occurrence Area  SENM-S-1 Potash  SENM-S-17 Slopes or Fragile Soils  SENM-S-19 Playas and Alkali Lakes  SENM-S-21 Caves and Karst</p>	<p>320.850</p>

<p><b><u>NM-201407-028</u></b></p> <p>T.0230S, R.0300E, NM PM, NM Sec. 020 SE;</p>	<p><u>Lease with the following Stipulations:</u>  NM-LN-11 Lease Notice – Special Cultural  Resource Lease Notice  SENM-LN-1 Lease Notice – Cave-Karst  Occurrence Area  SENM-LN-6 Lease Notice - Potash  SENM-S-1 Potash  SENM-S-17 Slopes or Fragile Soils  SENM-S-21 Caves and Karst</p>	160.000
<p><b><u>NM-201407-030 (modified – 280 acres out of 960 within a HEA)</u></b></p> <p>T.0200S, R.0320E, NM PM, NM Sec. 008  NWNE,E2W2,NWSE,S2SE;  009 ALL;</p>	<p><u>Lease with the following Stipulations:</u>  NM-LN-11 Lease Notice – Special Cultural  Resource Lease Notice  SENM-LN-6 Lease Notice - Potash  SENM-S-1 Potash</p>	680.000
<p><b><u>NM-201407-031 (modified – 62 acres out of 320 within a HEA)</u></b></p> <p>T.0210S, R.0320E, NM PM, NM Sec. 025 S2;</p>	<p><u>Lease with the following Stipulations:</u>  NM-LN-11 Lease Notice – Special Cultural  Resource Lease Notice  SENM-LN-6 Lease Notice - Potash  SENM-S-1 Potash  SENM-S-22 Prairie Chicken  SENM-S-34 Plan of Development – Shinnery Oak  Sand Dune Habitat</p>	258.000
<p><b><u>NM-201407-036 (modified – 80 acres out of 360 within a HEA)</u></b></p> <p>T.0220S, R.0330E, NM PM, NM Sec. 020 N2;</p>	<p><u>Lease with the following Stipulations:</u>  NM-LN-11 Lease Notice – Special Cultural  Resource Lease Notice  SENM-S-22 Prairie Chicken  SENM-S-34 Plan of Development – Shinnery Oak  Sand Dune Habitat</p>	240.000
<p><b><u>NM-201407-037</u></b></p> <p>T.0250S, R.0340E, NM PM, NM Sec. 023 ALL;</p>	<p><u>Lease with the following Stipulations:</u>  NM-LN-11 Lease Notice – Special Cultural  Resource Lease Notice    SENM-S-22 Prairie Chicken  SENM-S-34 Plan of Development – Shinnery Oak  Sand Dune Habitat</p>	640.000

<b><u>NM-201407-038</u></b>  T.0200S, R.0350E, NM PM, NM Sec. 005 LOTS 3,4; 005 S2NW,SW;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-2 Lease Notice – Protection of Dunes Sagebrush Lizard SENM-S-17 Slopes or Fragile Soils SENM-S-22 Prairie Chicken SENM-S-23 Sand Dune Lizard SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat SENM-S-46 POD – Dunes Sagebrush Lizard	322.320
<b><u>NM-201407-039</u></b>  T.0240S, R.0350E, NM PM, NM Sec. 029 W2;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-18 Streams, Rivers, Floodplains SENM-S-20 Spring, Seeps, and Tanks SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat SENM-S-47 Lease Reclamation	320.000
<b><u>NM-201407-040 (modified – Parcels 40, 41 and 42 combined)</u></b>  Acres T.0240S, R.0350E, 23 PM, NM Sec. 031 LOTS 2,4; 031 E2;	<u>Lease with the following Stipulations:</u> NM-11-LN Special Cultural Resource SENM-S-16 Raptor Nest SENM-S-22 Prairie Chickens SENM-S-34 Zone 3 - POD	400.730
<b><u>NM-201407-043 (modified – Parcels 43 and 44 combined)</u></b>  T.0250S, R.0350E, 23 PM, NM Sec. 005 LOTS 1,3; 005 SENE,SENW,S2S2,NESE;	<u>Lease with the following Stipulations:</u> NM-11-LN Special Cultural Resource SENM-S-22 Prairie Chickens SENM-S-34 Zone 3 - POD SENM-S-47 Reclamation	361.400
<b><u>NM-201407-045</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 006 LOTS 4,5;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat SENM-S-47 Lease Reclamation	80.480

<b><u>NM-201407-046</u></b>  Acres T.0250S, R.0350E, NM PM, NM Sec. 007 E2SW;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	80.000
<b><u>NM-201407-047</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 020 N2NE,W2,SE;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-16 Raptor Nest SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat SENM-S-47 Lease Reclamation	560.000
<b><u>NM-201407-048</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 021 E2,NESW;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	360.000
<b><u>NM-201407-049</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 029 ALL;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-16 Raptor Nest SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	640.000
<b><u>NM-201407-050</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 031 LOTS 1,2; 031 NE,E2NW;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-16 Raptor Nest SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	320.320
<b><u>NM-201407-051</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 033 SWNE,NW,N2SW;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	280.000
<b><u>NM-201407-057 (added 2/18/2014)</u></b>  T.0250S., R.0340E., NMPM Sec. 09: SWSW;	<b><u>Lease with the following Stipulations:</u></b> NM-11-LN Special Cultural Resources NM-10 Drainage SENM-S-22 Prairie Chickens SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat	40.00



## **2.3 Alternative C – Preferred Alternative**

The Preferred Alternative is to lease twenty (20) parcels as nominated and two (2) parcels as modified of federal minerals with lease stipulations and notices. The twenty-two (22) nominated parcels total 7,716.38 acres. The Preferred Alternative is in conformance with the 1988 Carlsbad RMP and Amendments. One parcel, -057 (40 acres), was added to the Preferred Alternative on February 18, 2014 due to a recommendation from the BLM NMSO fluid geologist who documented that drainage of the lease parcel was occurring.

Six (6) parcels along with portions of three (3) parcels that were modified were nominated for lease but were eliminated from analysis under the Proposed Action,. The rationale for not leasing these parcels is described in Section 2.4, Alternatives Eliminated from Detailed Analysis. In addition to the parcels not analyzed, the BLM would defer five (5) parcels as nominated and three (3) parcels as modified. The eight (8) deferred parcels are covering 4,177.6 acres administered by the CFO. Below is the rationale for deferring these eight (8) parcels:

Parcels -001, -002, -013, -024, -027 are located within in an area nominated as a potential Area of Critical Environmental Concern (ACEC). These parcels are being deferred until the Resource Management Plan Amendment is completed and alternatives and management decisions for the RMPA within the nominated area is completed.

Parcel -030 has portions of the parcel that fall just outside of a Habitat Evaluation Area (HEA) and the entire parcel also is located within an area nominated as a potential Area of Critical Environmental Concern (ACEC). This parcel is being deferred until the Resource Management Plan Amendment is completed and alternatives and management decisions for the RMPA within the nominated area is completed and until we can finish an environmental assessment that will decide alternatives and management decisions for the properties outside the HEA.

Parcels -031, and -036 have a portion of the parcel that falls just outside the boundary of a Habitat Evaluation Area. These parcels are being deferred until we can finish an environmental assessment that will decide alternatives and management decisions for the properties outside the HEA.

Parcel numbers, locations, stipulations, and acreages for the twenty-two (22) parcels are listed in the table below. Standard terms and conditions as well as stipulations would apply. Lease stipulations (as required by Title 43 CFR 3101.3) would be added to the twenty-two (22) parcels to address site specific concerns.

Once sold, the lease purchaser would have the exclusive right to use as much of the leased lands as would be necessary to explore and drill for all of the oil and gas within the lease boundaries, subject to: stipulations attached to the lease; restrictions deriving from specific, nondiscretionary statutes; and such reasonable measures as may be required by the authorized officer to minimize

adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed (43 CFR 3101).

Oil and gas leases are issued for a 10-year period and continue for as long thereafter as oil or gas is produced in paying quantities. If a lease holder fails to produce oil and gas, does not make annual rental payments, does not comply with the terms and conditions of the lease, or relinquishes the lease, exclusive right to develop the leasehold reverts back to the federal government and the lease can be reoffered in another lease sale.

Drilling of wells on a lease is not permitted until the lease owner or operator secures approval of a drilling permit and a surface use plan specified under Onshore Oil and Gas Orders listed in Title 43 CFR 3162. A permit to drill would not be authorized until site-specific NEPA analysis is conducted.

The twenty-two (22) parcels contain a special Cultural Resources Lease Notice stating that all development activities proposed under the authority of these leases are subject to compliance with Section 106 of the NHPA and Executive Order (EO) 13007. Standard terms and conditions, special stipulations listed in the RMP, and any new stipulations developed through the parcel review and analysis process to address site specific concerns or new information not identified in the land use planning process would apply as appropriate to each lease. In addition, site specific mitigation measures and BMPs would be attached as Conditions of Approval (COAs) for each proposed exploration and development activity authorized on a lease. Other than differences noted here, the preferred alternative is the same as the proposed alternative.

The twenty-two (22) nominated parcels recommended for leasing under the Preferred Alternative with stipulations are presented in the tables below:

**Alternative C: Preferred Alternative Parcels**

Parcel	Comments	Acres
<b><u>NM-201407-006</u></b>  T.0210S, R.0240E, NM PM, NM Sec. 011 SE;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave-Karst Occurrence Area SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management SENM-S-39 Plan of Development	160.000
<b><u>NM-201407-008</u></b>  T.0210S, R.0250E, NM PM, NM Sec. 004 LOTS 1-16;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave-Karst Occurrence Area SENM-S-15 Wildlife Water	956.800

004 SW,N2SE,SWSE; 009 N2NW;	SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management SENM-S-39 Plan of Development	
<b><u>NM-201407-009</u></b>  T.0210S, R.0250E, NM PM, NM Sec. 008 NE,W2,N2SE,SWSE;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave-Karst Occurrence Area SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management SENM-S-39 Plan of Development	600.000
<b><u>NM-201407-010</u></b>  T.0210S, R.0250E, NM PM, NM Sec. 009 SESW,S2SE;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave-Karst Occurrence Area SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management SENM-S-39 Plan of Development	120.000
<b><u>NM-201407-012</u></b>  T.0220S, R.0250E, NM PM, NM Sec. 005 LOTS 1-4; 005 S2N2,S2;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave-Karst Occurrence Area SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-39 Plan of Development	639.600
<b><u>NM-201407-014</u></b>  T.0220S, R.0250E, NM PM, NM Sec. 008 SENE;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave-Karst Occurrence Area SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-39 Plan of Development	40.000

<p><b><u>NM-201407-015</u></b></p> <p>T.0220S, R.0250E, NM PM, NM Sec. 018 E2;</p>	<p><u>Lease with the following Stipulations:</u>  NM-LN-11 Lease Notice – Special Cultural  Resource Lease Notice  SENM-LN-1 Lease Notice – Cave-Karst  Occurrence Area  SENM-S-17 Slopes or Fragile Soils  SENM-S-18 Streams, Rivers, Floodplains  SENM-S-21 Caves and Karst  SENM-S-39 Plan of Development</p>	<p>320.000</p>
<p><b><u>NM-201407-023</u></b></p> <p>Acres  T.0170S, R.0290E, NM PM,  NM  Sec. 012  N2SW,SESW,N2SE,SWSE;  012 ALL  FORMATIONS EXCEPT;  012 THE  GRAYBURG FORMATION;  T.0170S, R.0300E, NM PM,  NM  Sec. 007 LOTS 3,4;  007 ALL  FORMATIONS EXCEPT;  007 THE  GRAYBURG FORMATION;</p>	<p><u>Lease with the following Stipulations:</u>  NM-LN-11 Lease Notice – Special Cultural  Resource Lease Notice  SENM-S-22 Prairie Chicken</p>	<p>314.730</p>
<p><b><u>NM-201407-028</u></b></p> <p>T.0230S, R.0300E, NM PM,  NM  Sec. 020 SE;</p>	<p><u>Lease with the following Stipulations:</u>  NM-LN-11 Lease Notice – Special Cultural  Resource Lease Notice  SENM-LN-1 Lease Notice – Cave-Karst  Occurrence Area  SENM-LN-6 Lease Notice - Potash  SENM-S-1 Potash  SENM-S-17 Slopes or Fragile Soils  SENM-S-21 Caves and Karst</p>	<p>160.000</p>
<p><b><u>NM-201407-037</u></b></p> <p>T.0250S, R.0340E, NM PM,  NM  Sec. 023 ALL;</p>	<p><u>Lease with the following Stipulations:</u>  NM-LN-11 Lease Notice – Special Cultural  Resource Lease Notice    SENM-S-22 Prairie Chicken  SENM-S-34 Plan of Development – Shinnery Oak  Sand Dune Habitat</p>	<p>640.000</p>

<p><b><u>NM-201407-038</u></b></p> <p>T.0200S, R.0350E, NM PM, NM Sec. 005 LOTS 3,4; 005 S2NW,SW;</p>	<p><u>Lease with the following Stipulations:</u>  NM-LN-11 Lease Notice – Special Cultural  Resource Lease Notice  SENM-LN-2 Lease Notice – Protection of Dune  Sagebrush Lizard  SENM-S-17 Slopes or Fragile Soils  SENM-S-22 Prairie Chicken  SENM-S-23 Sand Dune Lizard  SENM-S-34 Plan of Development – Shinnery Oak  Sand Dune Habitat  SENM-S-46 POD – Dunes Sagebrush Lizard</p>	<p>322.320</p>
<p><b><u>NM-201407-039</u></b></p> <p>T.0240S, R.0350E, NM PM, NM Sec. 029 W2;</p>	<p><u>Lease with the following Stipulations:</u>  NM-LN-11 Lease Notice – Special Cultural  Resource Lease Notice  SENM-S-18 Streams, Rivers, Floodplains  SENM-S-20 Spring, Seeps, and Tanks  SENM-S-22 Prairie Chicken  SENM-S-34 Plan of Development – Shinnery Oak  Sand Dune Habitat  SENM-S-47 Lease Reclamation</p>	<p>320.000</p>
<p><b><u>NM-201407-040 (Modified – Parcels 40, 41 and 42 were combined)</u></b></p> <p>Acres T.0240S, R.0350E, 23 PM, NM Sec. 031 LOTS 2,4; 031 E2;</p>	<p><u>Lease with the following Stipulations:</u>  NM-11-LN Special Cultural Resource  SENM-S-16 Raptor Nest  SENM-S-22 Prairie Chickens  SENM-S-34 Zone 3 - POD</p>	<p>400.730</p>
<p><b><u>NM-201407-043 (Modified – Parcels 43 and 44 were combined)</u></b></p> <p>T.0250S, R.0350E, 23 PM, NM Sec. 005 LOTS 1,3; 005 SENE,SENW,S2S2,NESE;</p>	<p><u>Lease with the following Stipulations:</u>  NM-11-LN Special Cultural Resource  SENM-S-22 Prairie Chickens  SENM-S-34 Zone 3 - POD  SENM-S-47 Reclamation</p>	<p>361.400</p>
<p><b><u>NM-201407-045</u></b></p> <p>T.0250S, R.0350E, NM PM, NM Sec. 006 LOTS 4,5;</p>	<p><u>Lease with the following Stipulations:</u>  NM-LN-11 Lease Notice – Special Cultural  Resource Lease Notice  SENM-S-22 Prairie Chicken  SENM-S-34 Plan of Development – Shinnery Oak  Sand Dune Habitat  SENM-S-47 Lease Reclamation</p>	<p>80.480</p>

<b><u>NM-201407-046</u></b>  Acres T.0250S, R.0350E, NM PM, NM Sec. 007 E2SW;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	80.000
<b><u>NM-201407-047</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 020 N2NE,W2,SE;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-16 Raptor Nest SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat SENM-S-47 Lease Reclamation	560.000
<b><u>NM-201407-048</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 021 E2,NESW;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	360.000
<b><u>NM-201407-049</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 029 ALL;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-16 Raptor Nest SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	640.000
<b><u>NM-201407-050</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 031 LOTS 1,2; 031 NE,E2NW;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-16 Raptor Nest SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	320.320
<b><u>NM-201407-051</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 033 SWNE,NW,N2SW;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	280.000
<b><u>NM-201407-057 (added 2/18/2014)</u></b>  T.0250S., R.0340E., NMPM Sec. 09: SWSW;	<b><u>Lease with the following Stipulations:</u></b> NM-11-LN Special Cultural Resources NM-10 Drainage SENM-S-22 Prairie Chickens SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat	40.00

## **2.4 Reasonably Foreseeable Development under Alternatives B and C**

At the leasing stage, it is uncertain if Applications for Permit to Drill on leased parcels would be received, nor is it known if or to what extent development would occur. Such development may include constructing a well pad and access road, drilling a well using a conventional pit system or closed-loop system, hydraulically fracturing the well, installing pipelines and/or hauling produced fluids, regularly monitoring the well, and completing work-over tasks throughout the life of the well. In Carlsbad, typically, all of these actions are undertaken during development of an oil or gas well; it is reasonably foreseeable that they may occur on leased parcels. See Appendix 1 for a complete description of the phases of oil and gas development.

Drilling of wells on a lease would not be permitted until the lease owner or operator secures approval of a drilling permit and a surface use plan as specified under Onshore Oil and Gas Orders (43 CFR 3162). A permit to drill would not be authorized until site-specific NEPA analysis is conducted.

Standard terms and conditions, stipulations listed in the Carlsbad RMP, and any new stipulations would apply as appropriate to each lease. In addition, site specific mitigation measures and BMPs would be attached as Conditions of Approval (COAs) for each proposed exploration and development activity authorized on a lease.

## 2.5 Alternatives Eliminated from Detailed Analysis

The alternatives considered but eliminated from detailed analysis identify those parcels that are not in conformance with the current land use plans. Therefore this alternative will not be carried through the remainder of this environmental assessment. The table below identifies those nominated parcels that are not in conformance with current land use plans, and also describes why these parcels were not carried forward into either the proposed action alternative or the preferred alternative. In many cases, the reason for deferral is associated with the ongoing evaluation of the HEAs and therefore, leasing is inconsistent with the Special Status Species RMPA, which states that leasing must be deferred until determination of a Habitat Area.

Parcel	Comments	Acres
<b><u>NM-201407-007</u></b>  T.0220S, R.0240E, NM PM, NM Sec. 026 ALL;	<u>Reason Parcel is Eliminated:</u> This parcel is located within the McKittrick Hills Special Management Area and is closed to leasing per the 1997 CFO RMPA.	640.000
<b><u>NM-201407-011</u></b>  T.0210S, R.0250E, NM PM, NM Sec. 030 LOTS 5-8;	<u>Reason Parcel is Eliminated:</u> This parcel is currently leased, therefore, it is not available for leasing.	168.100
<b><u>NM-201407-025</u></b>  T.0160S, R.0300E, NM PM, NM Sec. 013 NE;	<u>Reason Parcel is Eliminated:</u> Defer parcel due to Mescalero Sands – Habitat Evaluation Area (HEA). CFO is currently in the process of reviewing the HEA to see if it will be converted into a Habitat Area (HA). If the HEA is determined to have the necessary habitat type present the HEA will be considered as part of the evaluation process to be converted and managed as an HA. This is consistent with the Special Status Species 2008 RMPA.	160.000
<b><u>NM-201407-026</u></b>  T.0160S, R.0300E, NM PM, NM Sec. 013 N2SW,SWSW;	<u>Reason Parcel is Eliminated:</u> Defer parcel due to Mescalero Sands – Habitat Evaluation Area (HEA). CFO is currently in the process of reviewing the HEA to see if it will be converted into a Habitat Area (HA). If the HEA is determined to have the necessary habitat type present the HEA will be considered as part of the evaluation process to be converted and managed as an HA. This is consistent with the Special Status Species 2008 RMPA.	120.000



<p><b><u>NM-201407-029</u></b></p> <p>T.0190S, R.0320E, NM PM, NM Sec. 006 LOTS 3,4; 006 E2SW;</p>	<p><b><u>Reason Parcel is Eliminated:</u></b> Defer parcel due to South Paw – Habitat Evaluation Area (HEA). CFO is currently in the process of reviewing the HEA to see if it will be converted into a Habitat Area (HA). If the HEA is determined to have the necessary habitat type present the HEA will be considered as part of the evaluation process to be converted and managed as an HA. This is consistent with the Special Status Species 2008 RMPA.</p>	162.090
<p><b><u>NM-201407-030 (modified – 280 acres out of 960 acres nominated within a HEA)</u></b></p> <p>T.0200S, R.0320E, NM PM, NM Sec. 008 NWNE,E2W2,NWSE,S2SE; 009 ALL;</p>	<p><b><u>Reason Parcel is Eliminated:</u></b> Defer parcel due to Laguna – Habitat Evaluation Area (HEA). CFO is currently in the process of reviewing the HEA to see if it will be converted into a Habitat Area (HA). If the HEA is determined to have the necessary habitat type present the HEA will be considered as part of the evaluation process to be converted and managed as an HA. This is consistent with the Special Status Species 2008 RMPA.</p>	280.000
<p><b><u>NM-201407-031 (modified – 62 acres out of 320 acres nominated within a HEA)</u></b></p> <p>T.0210S, R.0320E, NM PM, NM Sec. 025 S2;</p>	<p><b><u>Reason Parcel is Eliminated:</u></b> Defer parcel due to Bilbrey – Habitat Evaluation Area (HEA). CFO is currently in the process of reviewing the HEA to see if it will be converted into a Habitat Area (HA). If the HEA is determined to have the necessary habitat type present the HEA will be considered as part of the evaluation process to be converted and managed as an HA. This is consistent with the Special Status Species 2008 RMPA.</p>	62.000
<p><b><u>NM-201407-035</u></b></p> <p>T.0220S, R.0330E, NM PM, NM Sec. 020 SWSE; 029 ALL;</p>	<p><b><u>Reason Parcel is Eliminated:</u></b> Defer parcel due to Paduca – Habitat Evaluation Area (HEA). CFO is currently in the process of reviewing the HEA to see if it will be converted into a Habitat Area (HA). If the HEA is determined to have the necessary habitat type present the HEA will be considered as part of the evaluation process to be converted and managed as an HA. This is consistent with the Special Status Species 2008 RMPA.</p>	680.000
<p><b><u>NM-201407-036 (modified – 80 acres out of 360 acres nominated within a HEA)</u></b></p> <p>T.0220S, R.0330E, NM PM, NM</p>	<p><b><u>Reason Parcel is Eliminated:</u></b> Defer parcel due to San Simon – Habitat Evaluation Area (HEA). CFO is currently in the process of reviewing the HEA to see if it will be converted into a Habitat Area (HA). If the HEA is determined to have the necessary habitat type present the HEA will be considered as part of the</p>	80.000

Sec. 020 N2;	evaluation process to be converted and managed as an HA. This is consistent with the Special Status Species 2008 RMPA.	
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## **AFFECTED ENVIRONMENT**

### **3.0 Introduction**

This section describes the environment that would be affected by implementation of the alternatives described in Section 2. Elements of the affected environment described in this section focus on the relevant resources and issues. Only those elements of the affected environment that have the potential to be significantly impacted are described in detail.

#### **Air Resources**

Air quality and climate are components of air resources which may be affected by BLM applications, activities, and resource management. Therefore, the BLM must consider and analyze the potential effects of BLM and BLM-authorized activities on air resources as part of the planning and decision making process. Much of the information referenced in this section is incorporated from the Air Resources Technical Report for BLM Oil and Gas Development in New Mexico, Kansas, Oklahoma, and Texas (herein referred to as Air Resources Technical Report, USDI BLM 2013). This document summarizes the technical information related to air resources and climate change associated with oil and gas development and the methodology and assumptions used for analysis.

#### **3.1. Air Quality**

The state of New Mexico has divided the state into 12 air quality regions. The Carlsbad Field Office planning area lies in region 155 (New Mexico Environment Department--Air Quality Bureau, 2010). The Pecos-Permian Basin Intrastate Air Quality Control Region 155 (AQCR 155) is composed of Quay, Curry, De Baca, Roosevelt, Chaves, Lea, and Eddy Counties. Generally, it includes the areas known as the Southern High Plains and the Middle Pecos River drainage basin (New Mexico Environment Department--Air Quality Bureau, 2010).

The Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality, including six nationally regulated ambient air pollutants. These criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), particulate matter (PM<sub>10</sub> & PM<sub>2.5</sub>), sulfur dioxide (SO<sub>2</sub>) and lead (Pb). EPA has established National Ambient Air Quality Standards (NAAQS) for criteria pollutants. The NAAQS are protective of human health and the environment. EPA has approved New Mexico's State Implementation Plan and the state enforces state and federal air quality regulations on all public and private lands within the state except for tribal lands and within Bernalillo County. The Carlsbad area attains all national ambient air quality standards.

The area of the analysis is considered a Class II air quality area by the EPA. There are three classifications of areas that attain national ambient air quality standards, Class I, Class II and

Class III. Congress established certain national parks and wilderness areas as mandatory Class I areas where only a small amount of air quality degradation is allowed. All other areas of the US are designated as Class II, which allow a moderate amount of air quality degradation. No areas of the US have been designated Class III, which would allow more air quality degradation. This class is assigned to attainment areas to allow maximum industrial growth while maintaining compliance with NAAQS. The primary sources of air pollution are dust from blowing wind on disturbed or exposed soil, exhaust emissions from motorized equipment, oil and gas development, agriculture, and industrial sources.

Air quality in a given region can be measured by its Air Quality Index value. The air quality index (AQI) is reported according to a 500-point scale for each of the major criteria air pollutants, with the worst denominator determining the ranking. For example, if an area has a CO value of 132 on a given day and all other pollutants are below 50, the AQI for that day would be 132. The AQI scale breaks down into six categories: good (AQI<50), moderate (50-100), unhealthy for sensitive groups (100-150), unhealthy (>150), very unhealthy and hazardous. The AQI is a national index, the air quality rating and the associated level of health concern is the same everywhere in the country. The AQI is an important indicator for populations sensitive to air quality changes.

### Current Pollution Concentrations

Information on some pollutants is limited. Carlsbad field office has completed an air emissions inventory for the New Mexico portion of the Permian Basin. (AES, 2011) This report can be found at the Carlsbad field office. More detailed information on current conditions will become available in the future.

AQCR 155 is classified as an attainment area for all criteria pollutants, indicating that the area satisfies all NAAQS. Data for lead and carbon monoxide is not available in the area; however concentrations of these pollutants are expected to be low in rural areas and are therefore not monitored. The New Mexico Environment Department discontinued monitoring for SO<sub>2</sub> in Eddy County due to very low monitored concentrations. Monitoring data for PM<sub>10</sub> and PM<sub>2.5</sub> in southeastern New Mexico are not available due to incomplete data collection.

“Design Concentrations” are the concentrations of air pollution at a specific monitoring site that can be compared to the NAAQS. The 2011 design concentrations of criteria pollutants are listed below.

**Figure 1. 2011 Design Concentrations of Criteria pollutants in Lea, Chaves, and Eddy counties (EPA, 2012)**

Pollutant	Design Value	Averaging period	NAAQS	NMAAQS
O <sub>3</sub>	0.069 ppm (Lea County)	8-hour	0.075 ppm <sup>1</sup>	
	0.061 ppm (Eddy County)			
NO <sub>2</sub>	6 ppb (Lea County)	Annual	53 ppb	50 ppb
	3 ppb (Eddy County)			
NO <sub>2</sub>	42 ppb	1-hour	100 ppb <sup>2</sup>	

<sup>1</sup> Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years

<sup>2</sup> 98th percentile, averaged over 3 years

Mean AQI values for the CFO region were generally in the good range (AQI<50) in 2011. In Chaves County, 95% of the days in 2011 were classified as “good”; in Eddy County, 75% of the days in 2011 were classified as “good”; and in Lea County, 85% of the days in 2011 were classified as “good”.

**Figure 2 2011 Mean and Max AQI Values (EPA, 2012a)**

2011 AQI Values		
	Median AQI	Max AQI
Chavez	20	71
Eddy	42	101
Lea	39	106

Although the AQI in the region has reached the level considered unhealthy for sensitive groups several times in the last decade, there are no patterns or trends to the occurrences (Figure 3). In all years not listed below, the AQI never exceeded the threshold .

**Figure 3 Number of Days Classified as “unhealthy for sensitive groups” (AQI 101-150) (EPA, 2012a)**

	2002	2003	2005	2006	2009
Lea		1*	3	3	3
Eddy	4	1		6	
Chavez		1			

\*this day was indicated as unhealthy for all groups (AQI>150)

### 3.2 Climate

The planning area is located in a semiarid portion of the Chihuahua Desert, typified by dry windy conditions and limited rainfall (Trewartha and Horn 1980). Components of climate that could affect air quality in the region are summarized below.

Climate Component	Temperature
Mean maximum summer temperatures	95°F
Mean minimum winter temperatures	30.9°F
Mean annual temperature	63.2°F
Mean annual precipitation	12.2 inches
Mean annual snowfall	6.4 inches
Mean annual wind speed	9.3 mile per hour (mph)
Prevailing wind direction	South

In addition to the air quality information in the RMP, new information about greenhouse gases (GHGs) and their effects on national and global climate conditions has emerged since the RMP was prepared. Global mean surface temperatures have increased nearly 1.0°C (1.8°F) from 1890

to 2006 (Goddard Institute for Space Studies, 2007). However, observations and predictive models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Without additional meteorological monitoring and modeling systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions; what is known is that increasing concentrations of GHGs are likely to accelerate the rate of climate change.

Greenhouse gases that are included in the US Greenhouse Gas Inventory are: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>). CO<sub>2</sub> and methane (CH<sub>4</sub>) are typically emitted from combustion activities or are directly emitted into the atmosphere. On-going scientific research has identified the potential impacts of greenhouse gas emissions (including CO<sub>2</sub>; CH<sub>4</sub>; nitrous oxide (N<sub>2</sub>O); and several trace gasses) on global climate. Through complex interactions on regional and global scales, these greenhouse gas emissions cause a net warming effect of the atmosphere (which makes surface temperatures suitable for life on Earth), primarily by decreasing the amount of heat energy radiated by the Earth back into space. Although greenhouse gas levels have varied for millennia (along with corresponding variations in climatic conditions), recent industrialization and burning of fossil carbon sources have caused CO<sub>2</sub> concentrations to increase dramatically, and are likely to contribute to overall climatic changes. Increasing CO<sub>2</sub> concentrations may also lead to preferential fertilization and growth of specific plant species.

In 2007, the Intergovernmental Panel on Climate Change (IPCC) predicted that by the year 2100, global average surface temperatures would increase 1.4 to 5.8°C (2.5 to 10.4°F) above 1990 levels. The National Academy of Sciences (2006) supports these predictions, but has acknowledged that there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature will not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures are more likely than increases in daily maximum temperatures. It is not, however, possible at this time to predict with any certainty the causal connection of site specific emissions from sources to impacts on the global/regional climate relative to the proposed lease parcels and subsequent actions of oil and gas development.

Mean annual temperatures have risen across New Mexico and the southwestern U.S. since the early 20th century. When compared to baseline information, periods between 1991 and 2005 show temperature increases in over 95% of the geographical area of New Mexico. Warming is greatest in the northwestern, central, and southwestern parts of the state. Recurrent research has indicated that predicting the future effects of climate change and subsequent challenges of managing resources in the Southwest is not feasible at this time (IPCC, 2007; CCSP, 2008). However, it has been noted that forests at higher elevations in New Mexico, for example, have been exposed to warmer and drier conditions over a ten year period. Should the trend continue, the habitats and identified drought sensitive species in these forested areas and higher elevations may also be affected by climate change (Enquist and Gori, 2008).

A number of activities contribute to the phenomenon of climate change, including emissions of GHGs (especially carbon dioxide and methane) from fossil fuel development, large wildfires,

activities using combustion engines, changes to the natural carbon cycle, and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs will have a sustained climatic impact over different temporal scales due to their differences in global warming potential (described above) and lifespans in the atmosphere.

### **3.3 Heritage Resources**

#### **3.3.1 Cultural Resources**

The project area identified in this environmental document is located in southeastern New Mexico. Geographically, the area is bounded on the west by the eastern flanks of the Guadalupe Mountains, on the east by the Llano Estacado or ‘Staked Plain’, and is bisected by the Southern Pecos River Valley and Mescalero Plains. Five archaeological regions (the Sacramento Section, Pecos Valley, Southwest Pecos Valley, Mescalero Plains, and Llano Estacado archaeological regions) characterize the cultural resources located within the project area.

Parcels -001, -002, -006, -008, -009, -010, and -024 are located within the Pecos River Valley archaeological region.

Parcels -012, -013, -014, and -015 are located within the Sacramento archaeological region.

Parcels -023, -027, -028, -030, -031, -036, -037, -038, -039, -040, -043, -045, -046, -047, -048, -049, -050, -051, and -057 are located in the Mescalero Plain archaeological region.

Archaeological sites in Southeastern New Mexico are the reflection of human adaptations to changing environmental conditions. As the environmental conditions changed, the distribution and availability of food (plant and animal) also changed. Archaeological sites often reflect these adaptations in their technology (artifact assemblages), geographical location, and the duration of occupation. Rough chronological sequences have been created that reflect these cultural adaptations, allowing archaeologists to place a site into a cultural tradition or period. These are the Paleoindian (ca. 12,000-8,000 B.C.), Archaic (ca. 8000 B.C. –A.D. 950), Formative (ca. A.D. 600-1540) Protohistoric (ca. A.D. 1400-1821), and Historic (ca. A.D. 1822 to early 20th century) periods. Sites representing any or all of these periods exist within these archaeological regions (Sebastian & Larralde 1989 and Hogan 2006).

The Permian Basin MOA is an optional method of compliance with Section 106 of the National Historic Preservation Act for energy related projects in a 28-quadrangle area of the Carlsbad Field Office. The MOA is a form of off-site mitigation which allows industry to design projects to avoid known National Register of Historic Places eligible cultural resources, and to contribute to a mitigation fund in lieu of paying for additional archaeological inventory in an area that has received adequate previous survey. Funds received from the Permian Basin MOA will be utilized to conduct archaeological research and outreach in Southeastern New Mexico. Research will include archaeological excavation of significant sites, predictive modeling, targeted research activities, and professional and public presentations on the results of the investigations.

#### **3.3.2 Paleontological Resources**

Paleontological resources preserved in marine and terrestrial sediments may be found in rocks formed during the late Paleozoic, Mesozoic, and Cenozoic Ages. Detailed data in southeastern New Mexico concerning Pennsylvanian and Permian Age fossils is available because of intense oil and gas exploration where such data is necessary for stratigraphic correlation (age dating) of producing formations. Such information is lacking in nonproducing areas.

Paleontological remains found in isolated Cenozoic terrestrial sediments are perhaps the best known vertebrate fossils found in the Pecos District. These Pleistocene-Holocene fossils are usually associated with lake deposits, caves, or early man's hunting sites. The extent of known paleontological resources in the area is minimal when compared to the amount of sedimentary rocks which may contain fossil remains.

There are no parcels located in the vicinity of known paleontological resources.

### **3.4 Water Resources**

Surface water within the proposed lease sale area is affected by geology, precipitation, and water erosion. Activities that currently affect surface water resources include livestock grazing management, oil and gas development, recreation, and brush control treatments. Surface water is located in perennial and ephemeral springs, ephemeral playas, and stock tanks. The Pecos River is the only water quality impaired stream presently found within the CFO as per the 2008-2010 State of New Mexico Integrated Clean Water Act 303(d) and 305(b) Report. The designated use listed as not supported is warm water fishery. Listed probable sources of impairment include natural sources (the Malaga salt dome), irrigation, loss of riparian habitat, flow alterations from water diversions, rangeland grazing, and stream bank modifications and destabilization.

Groundwater within the CFO is affected by geology and precipitation. Activities that currently affect groundwater resources include livestock grazing management, oil and gas development, and groundwater pumping. Groundwater within the CFO can be obtained from groundwater aquifers located within the Rustler, Castile, Tansill, Yates, Seven Rivers, Queen, Grayburg, Artesia, Ogallala, and Chinle Formations, the Capitan and San Andres Limestones, the Glorieta and Santa Rosa Sandstones, and the Dockum Group. Most of the groundwater exists in unconfined aquifers, although confined groundwater aquifers exists under artesian conditions in the San Andres Formation. The depth to shallow unconfined groundwater varies from 1 foot to 400 feet throughout the CFO (New Mexico Office of the State Engineer data). The depth to confined groundwater can be greater than 400 feet. Most of the groundwater is used for agricultural, industrial, rural, domestic, and livestock purposes.

Sinks and playas could be located within a proposed lease boundary that may hold water after infrequent heavy rains. Intermittent drainages may also cut across one or more of the proposed lease boundaries.

Known playas are located within a portion of the following parcel or within 200 meters of the boundary of parcel -027.

Known streams, rivers, or floodplains are located within a portion of the following parcels or within 200 meters of the boundary of parcels -006, -008, -009, -010, -012, -014, -015, and -039.

Known springs, seeps or dirt tanks are located within a portion of the following parcel or within 200 meters of proposed parcel -039.

### **3.5 Wetlands, Riparian and Floodplains**

Most often ephemeral in desert watersheds, floodplains range in width from under one-half mile to over one full mile. In desert watersheds, including the CFO, floodplains may appear to be little more than gentle draws. However, they can quickly become dangerous torrents in periods of monsoonal rainstorms. Regardless, they are important water sources for animals and plants in the Chihuahuan Desert. For administrative purposes, the 100-year floodplain serves as the basis for floodplain management on public lands. The Federal Emergency Management Agency (FEMA) defines the 100-year floodplain. These are in general relatively narrow areas along natural drainage ways that carry large quantities of runoff following periods of high precipitation.

Playas are ephemeral, round hollows in the ground located mainly on the Southern High Plains of the United States. They are important water sources for animals and plants in the Chihuahuan Desert. After rainstorms, freshwater collects in the round depressions of the otherwise flat landscape of West Texas, Oklahoma, New Mexico, Colorado, and Kansas. There are also many saltwater-filled playas in the CFO, known as alkali lakes. These are fed by water from underlying aquifers, which brings salt with it as it percolates up through the soil. As the water evaporates, the salt is left behind in the increasingly salty playas.

Springs and seeps are fed by groundwater from shallow aquifers. Their emergence is a function of hydro-geological, geological, and topographical conditions and interrelation among them. Earthen tanks are drainage catchments normally used for livestock watering; however, in the Chihuahuan Desert, they also offer isolated and limited water for plants, wildlife, and domestic and commercial purposes.

Known playas are located within a portion of the following parcel or within 200 meters of the boundary of parcel -027.

Known streams, rivers, or floodplains are located within a portion of the following parcels or within 200 meters of the boundary of parcels -006, -008, -009, -010, -012, -014, -015, and -039.

Known springs, seeps or dirt tanks are located within a portion of the following parcel or within 200 meters of proposed parcel -039.

### **3.6 Soils**

The Carlsbad Resource Management Area can be divided into four general soil types as referenced in the following Soil Surveys: Eddy Area, and Lea County, New Mexico. These are shallow, loamy, sandy, and gypsum.

The shallow type is primarily soils of the Ector and Upton series. Several other minor soil mapping units are found in this type. These soils are shallow to very shallow, well-drained,



calcareous, stony and rocky loams over limestone and caliche. Topography ranges from nearly level ridgetops to steep side slopes to cliffs and escarpments. Permeability is moderate, water-holding capacity is very low to low, and runoff is rapid after the soils become saturated. They are subject to water erosion, but the stones and rock outcrops help to stabilize the soils on nearly level to gently sloping areas.

Loamy soils are mainly in the Reagan, Reeves, and Anthony series, while other minor soil mapping units also exist within this type. Generally these soils are deep, well-drained, moderately dark colored, calcareous, and loamy, located on gently undulating plains and in the broader valleys of the hills and mountains. Permeability is moderate, water-holding capacity is moderate to high, and runoff is likely after prolonged or heavy rains.

The sandy type has predominately soils from the Pyote, Kermit, Berino, Pajarito, and Wink series. Other soil mapping units make up a minor part of this type. Typically, these soils are deep, well-drained to excessively drained, non-calcareous to weakly calcareous sands. They are found on undulating plains and low hills in the “sand country” east of the Pecos River. Permeability is moderate to very rapid, water-holding capacity is low to moderate, with little runoff.

Gypsum soils are primarily in the Cottonwood and Gypsum land series. These soils have a loamy surface layer, with gypsiferous materials starting at a depth of 1 to 10 inches. They are found on gently undulating uplands, with steep, broken gypsum outcrops.

Permeability varies from very low to moderate, water-holding capacity is very low to low, and runoff rapid to very rapid. Soil fertility and the rooting zone are limited by the underlying gypsiferous material.

All of the aforementioned soil types are susceptible to wind erosion and careful management is needed to maintain a cover of desirable forage plants and to control erosion. Revegetation is difficult once the native plant cover is lost, due to high temperatures and unpredictable rainfall.

Biological soil crusts are scattered throughout the proposed lease sale area in nutrient-poor areas between plant clumps. These include cyanobacteria, squamulose lichens, and gelatinous lichens. Because they lack a waxy epidermis, they tend to leak nutrients into the surrounding soil. Vascular plants such as grasses and forbs can then utilize these nutrients. They also function in the nutrient cycle by fixing atmospheric nitrogen, contributing to soil organic matter, and maintaining soil moisture. In addition, they can act as living mulch that discourages the establishment of annual or invasive weeds.

Cyanobacteria are the most common in the proposed lease sale area. These soil crusts are important in binding loose soil particles together to stabilize the soil surface and reduce erosion. Cyanobacteria are mobile, and can often move up through disturbed sediments to reach light levels necessary for photosynthesis. Structurally, cyanobacteria form an uneven, rough carpet that reduces raindrop impact and slows surface runoff. Lichens, rhizines, and cyanobacterial filaments act to bind the soil surface particles just below and at the surface. Disturbed crusts, particularly lichens, can take from 10 to as many as 100 years to recover.

Parcels -006, -008, -012, -013, -015, -027, -028, -029, and -038 contain fragile soils or open dunelands.

### **3.7 Vegetation**

In general, the lease parcels are grassland sites with warm season mid and short grasses. There is a fair scattering of shrubs and half-shrubs throughout the landscape, although in some places shrubs have invaded to the point of dominating the vegetative component. Forb production fluctuates from season to season and year to year.

The majority of shallow soil types are made up of the gravelly, shallow, very shallow, and limestone hills range sites. The potential plant community consists primarily of grasses such as black grama, sideoats grama, hairy grama, muhlys, dropseeds, and tridens, with shrubs such as cresote bush, mesquite, mariola, and catclaw mimosa as well. Yucca, sacahuista, mariola, and catclaw mimosa become more prevalent on north and east slopes. In deteriorated condition, this type of site will show an increase in woody plants and grasses such as three-awns, fluffgrass, and hairy tridens.

Range sites such as loamy, swale, bottomland, and draws make up most of the loamy type. The potential plant community consists of blue grama, black grama, sideoats grama, and tobosa. Fourwing saltbush, tarbush, and yucca are the principal shrubs. Forbs include croton, filaree, globemallow, and desert holly. Invasive species such as three-awns, burrograss, snakeweed, mesquite, creosote, and cholla cactus spread as ecological conditions decrease.

Sandy soil types are dominated by deep sand, sand hills, and sandy range sites. The potential plant community consists of dropseeds (sand, spike, and mesa), bluestems, and black grama. Yucca, fourwing saltbush, and shinnery oak are the principle shrub species. If environmental conditions deteriorate, plants such as three-awns and mesquite will increase and soil hummocking will occur.

Gypsum soil types are dominated by gypsum hills and gypsum flats range sites. The potential plant community located in gypsum consists of gyp grama, gyp dropseed, coldenia, yucca, and ephedra. Black grama, blue grama, alkali sacaton, tobosa, and fourwing saltbush can be found in the loamy pockets included in the gypsum areas. Tarbush, broom snakeweed, and mesquite invade in disturbed areas.

### **3.8 Noxious Weeds**

All field-going CFO personnel continually inventory the presence of species described in the Noxious Weed List for the State of New Mexico (NMDA, 1999). The inventory process is ongoing in order to detect invasive populations when they are small. Once a population is found, the Bureau coordinates with various agencies, lease operators, and the land user to remove or control the population.

Populations of noxious weeds, primarily African rue and Malta star thistle, are scattered throughout the proposed lease sale area. Project activities, even with preventative management

actions, could result in the establishment and spread of noxious weeds on disturbed sites throughout portions of the area. Most of the noxious weeds exist mainly along the shoulders of county roads, lease and private roads, and on production pads within the area.

### **3.9 Special Status Species**

Special status species of concern in this area include the lesser prairie-chicken (LPC) and sand dune lizard (SDL), which are considered “candidate species” for listing under the Federal Endangered Species Act (ESA) by the USFWS.

#### Lesser Prairie-Chicken

Sand shinnery communities extend across the Southern Great Plains, occupying sandy soils in portions of north and west Texas, west Oklahoma, and southeast New Mexico. Portions of Eddy, Lea and Chaves counties consist largely of sand shinnery habitat and are intermixed with areas of mesquite to a lesser degree. The characteristic feature of these communities is co-dominance by shinnery oak and various species of grasses. In New Mexico, shinnery oak inhabits sandy soil areas, often including sand dunes.

In New Mexico, the lesser prairie-chicken (LPC) formerly occupied a range that encompassed the easternmost one-third of the state, extending to the Pecos River, and 48 kilometers west of the Pecos near Fort Sumner. This covered about 38,000 square kilometers. By the beginning of the 20th century, populations still existed in nine eastern counties (Union, Harding, Chaves, De Baca, Quay, Curry, Roosevelt, Lea, and Eddy). The last reliable records from Union County are from 1993. Currently, populations exist only in parts of Lea, Eddy, Curry, Chaves, and Roosevelt counties, comprising about 23 percent of the historical range.

LPCs are found throughout dry grasslands that contain shinnery oak or sand sagebrush. Currently, they most commonly are found in sandy-soiled, mixed-grass vegetation, sometimes with shortgrass habitats with clayey or loamy soils interspersed. They occasionally are found in farmland and smaller fields, especially in winter. Shinnery oak shoots are used as cover and produce acorns, which are important food for LPCs and many other species of birds, such as the scaled quail, northern bobwhite, and mourning dove. Current geographic range of shinnery oak is nearly congruent with that of the lesser prairie-chicken, and these species sometimes are considered ecological partners. Population densities of LPC are greater in shinnery oak habitat than in sand sagebrush habitat.

LPCs use a breeding system in which males form display groups. These groups perform mating displays on arenas called leks. During mating displays, male vocalizations, called booming, attract females to the lek. Leks are often on knolls, ridges, or other raised areas, but in New Mexico, leks are just as likely to be on flat areas such as roads, abandoned oil drill pads, dry playa lakes, or at the center of wide, shallow depressions. Leks may be completely bare, covered with short grass, or have scattered clumps of grass or short tufts of plants. An important physical requirement for the location of leks is the visibility of surroundings, but the most important consideration is proximity of suitable nesting habitat, breeding females and the ability to hear male vocalizations.

In the late 1980s, there were 35 documented active booming grounds known to exist within the CFO. Due to population decreases and unpredictable weather cycles the LPC is currently a candidate for federal listing, and potentially may become extirpated from Eddy and southern Lea counties.

In June 1998, the USFWS issued a statement regarding their status review of the lesser prairie-chicken. It stated, "Protection of the lesser prairie-chicken under the Federal Endangered Species Act (ESA) is warranted but precluded which means that other species in greater need of protection must take priority in the listing process." Given the current Federal Candidate status of this species, the BLM is mandated to carry out management consistent with the principles of multiple use, for the conservation of candidate species and their habitats, and shall ensure that actions authorized, funded, or carried out do not contribute to the need to list any of these species as Threatened or Endangered (Bureau Manual 6840.06).

On November 30, 2012, the USFWS published in the Federal Register a proposal to list the lesser prairie-chicken as federally threatened under the ESA of 1973.. On March 27, 2014 the USFWS published in the Federal Register the final rule to list the lesser prairie-chicken as threatened under the Endangered Species Act. It is anticipated that this rule will be effective 30 days from the date of publication on March 27, 2014 (See Section 1.2 Federal, State or Local Permits, Licenses or Other Consultation Requirements for more information).

Parcels -023, -030, -031, -036, -037, -038, -039, -040, -043, -045, -046, -047, -048, -049, -050, -051, and -057 include suitable habitat for lesser prairie-chicken. All seventeen (17) of these parcels are located within the Isolated Population Area (IPA). The RMPA defines occupied habitat as "all areas within 1.5 miles of an active lesser prairie chicken site, regardless of vegetation that has been active for one out of the last 5 years." The boundaries of all seventeen (17) lease parcels discussed are greater than 1.5 miles from an LPC siting or an LPC lek. Therefore leasing of these parcels is in conformance with the management decisions, criterion, and appropriate lease stipulations (see table above under 2.0 of Preferred alternative) for leasing within the IPA as set forth in the 2008 Special Status Species RMPA.

#### Dunes Sagebrush Lizard

The dunes sagebrush lizard (DSL) is a species with a limited geographic range including parts of Chaves, Eddy, Lea and Roosevelt Counties of southeastern New Mexico and four counties in Texas. The DSL is a habitat specialist, found exclusively in association with shinnery oak dune complexes. These complexes are patchworks of shinnery oak and scattered sand sagebrush interspersed with areas of open sand and wind-created sandy blowouts. These complexes create ideal habitat for the DSL.

The DSL may also require specific sand particle size. Research has shown that there are significant differences in the composition of sand between sites that are occupied and unoccupied by DSLs. Occupied sites have slightly coarser sand than unoccupied sites. This suggests that the DSL may not inhabit areas with high percentages of sand particles smaller than 250 micrometers (Fitzgerald et al, 1997).

The USFWS were petitioned on May 28, 2002 by The Center for Biological Diversity and Chihuahuan Desert Conservation Alliance to list the DSL as an endangered species under the

Endangered Species Act. In May 2005 the USFWS issued a statement regarding their status review of the DSL. It stated, "Protection of the sand dune lizard under the Federal Endangered Species Act (ESA) is warranted but precluded, which means that other species in greater need of protection must take priority in the listing process." Given the current Federal Candidate status of this species, the BLM is mandated to carry out management, consistent with the principles of multiple use, for the conservation of candidate species and their habitats and shall ensure that actions authorized, funded, or carried out do not contribute to the need to list any of these species as Threatened or Endangered (Bureau Manual 6840.06). On December 13, 2010, the USFWS published in the Federal Register a proposal to list the sand dune lizard (dunes sagebrush lizard) as federally endangered under the Endangered Species Act of 1973. On June 13, 2012, the USFWS published in the Federal Register notice that the proposed rule to list the dunes sagebrush lizard as endangered was withdrawn based on their conclusion that the threats to the species as identified in the proposed rule no longer are as significant as believed at the time of the proposed rule. The conclusion was based on their analysis of current and future threats and conservation efforts. They found the best scientific and commercial data available indicate that the threats to the species and its habitat have been reduced to the point that the species does not meet the statutory definition of an endangered or threatened species.

Parcel -038 is located within suitable habitat for the Dune Sagebrush Lizard. Therefore potential surface locations will be limited.

### **3.10 Threatened and Endangered Species**

Under Section 7 of the Endangered Species Act (ESA) of 1973 (as amended), the BLM is required to consult with the U.S. Fish and Wildlife Service (FWS) on any proposed action which may affect Federal listed threatened or endangered species or species proposed for listing. A biological assessment was conducted for public lands in 1995 and 1996 in preparation for the 1997 Carlsbad RMPA. The USFWS concurred with the Carlsbad Resource Area with a determination of no effect or not likely to adversely effect T&E species.

The USFWS response is found in Appendix 4 of the Record of Decision for the RMPA. In 2003, BLM Carlsbad Field Office received concurrence from the FWS on a standard list of conservation measures for oil and gas developments in suitable aplomado falcon habitat. Those measures are discussed under the Environmental Consequences section.

#### **Northern Aplomado Falcon (Falco femoralis septentrionalis)**– Experimental Population, Non-Essential

The northern aplomado falcon (falcon) once extended from Trans-Pecos Texas, southern New Mexico and southeastern Arizona in the United States, south through Chiapas and the northern Yucatán along the gulf coast of México, and along the pacific slope of Central America north of Nicaragua (Howell 1972). According to the historical distribution map of 1900 contained in the recovery plan for this species (Northern Aplomado Falcon Recovery Plan, 1990), the falcon once inhabited the southern 1/3 of the CFO, although this species is now very rare in New Mexico. In 2001, 2002 and 2003, falcon nesting was documented south of Deming, NM. Previously, the last documented falcon nest in New Mexico was in 1952. Mainly due to recovery projects such as controlled releases, sightings of birds are increasing in the southwestern U.S. Sightings in New Mexico have increased in recent years, with several observances across the western half of CFO

in the last five years (data available on request). Although breeding populations are known to exist less than 200 km from the U.S. border in México, successful release projects in Texas and New Mexico have increased the potential for breeding pairs to occupy nests in the U.S. (Montoya et al., 1997).

The falcon is a long-tailed falcon. The size of the falcon is intermediate between the American kestrel (kestrel) and prairie falcon. The back and dorsal side of the wings are blue-gray with a pronounced white trailing edge across the wing. The upper breast is white to creamy with variable amounts of black streaking, depending on the sex. There is a distinct broad dark or blackish band on the lower breast, which at close range may show faint white barring. The lower abdomen and undertail feathers are rufous (red), the tail striped. Unique to this falcon and useful to field identification is a pronounced white stripe above the eye.

Falcons appear to be year-long residents across most of their northern range where populations currently exist in México. Nesting primarily occurs from March to June in northern Chihuahua, México. Falcons typically use stick nests constructed by other large birds such as Swainson's hawks, white-tailed hawks, red-tailed hawk, Chihuahuan ravens, and possibly white-tailed kites. Nests are usually situated in soap-tree yuccas (Montoya et al. 1997), the tops of mesquite trees, manmade structures, or any other structure tall enough to avoid predation from animals such as coyotes and skunks. As such, nests are typically found at a height greater than five feet.

In September of 2002, a habitat suitability model was released by the New Mexico State University Coop Unit (Young et al. 2002). The model identified many areas throughout the CFO as suitable habitat for the falcon. Primarily, the habitat was centered around Hope, NM, and across the Indian Basin and Bogle flats south of Hope. The effort resulted in the CFO designation of the Hope Study Area for falcon habitat. Rangeland restoration to resemble historic grassland conditions and falcon survey efforts are concentrated in this area. Conservation measures for oil and gas development were developed with the help of the FWS specifically for the Area.

The Hope Study Area is made up of expansive grassland flats and elongated grassy bottoms bordered by limestone ridges. The vegetative makeup consists primarily of tobosa grass, burro grass, black and sideoats grama, soap-tree yucca, little-leaf sumac, American tarbush and a variety of other grasses and forbs intermingled throughout the grassland flats and bottoms. The limestone ridges are dominated by creosote, tarbush, catclaw acacia, broom snakeweed, beargrass, and a variety of grasses and forbs. Falcons inhabit open grasslands with scattered yuccas and mesquites. Although yuccas and mesquite are important, large unfragmented grasslands are key to the survival of the prey base for the species and thus the species itself.

Prey species of the falcon vary from small birds to insects (Hector 1985). Avian prey species include meadowlarks, common nighthawks, northern mockingbirds, western king birds, brown-headed cowbirds, Scott's oriole, mourning doves, cactus wrens, and pyrrhuloxia. Migratory bird numbers in New Mexico and the Chihuahuan Desert as a whole have declined and the Hope Study Area is no exception. Native brush encroachment and agricultural development, including pesticide contamination, account for much of the declining condition of desert grasslands and coastal prairies within the former range of the falcon. Within the historic falcon range of CFO, brush encroachment is mainly due to two main factors: historical overgrazing and wild fire

suppression. Long term efforts to reduce the density of native brush and restore historic grasslands have occurred and is planned to continue in the falcon area.

On July 26, 2006, a new ruling concerning the falcon was published in the Federal Register (Vol. 71, No. 143, Pg. 42298). "The falcon is being re-established under section 10(j) of the Endangered Species Act of 1973, as amended (Act), and would be classified as a nonessential experimental population (NEP). The geographic boundary of the NEP includes all of New Mexico and Arizona." The notice also defines the falcon status on BLM managed lands as "threatened" under the Endangered Species Act for the purposes of Section 9 (Prohibited Acts).

Parcels -001, and -002 contain suitable habitat for the northern aplomado falcon.

### **3.11 Wildlife**

Mammals known to live throughout the Field Office include various species of bats, desert cottontail, black-tailed jackrabbit, spotted ground squirrel, rock squirrel, pocket gopher, porcupine, coyote, gray fox, bobcat, raccoon, striped skunk, spotted skunk, mule deer, pronghorn, wood rat, and various other small rodents. Upland game bird species may include scaled quail, bobwhite quail, mourning dove, and lesser prairie-chicken. Several raptors inhabit the area, including Harris hawks, Swainson's hawks, and western burrowing owls.

Several raptor species use the southeastern New Mexico region as either migratory or permanent resident. Potential nesting habitat includes but is not limited to escarpments, cliff faces, and any tree large enough to support a nest. Nesting territories of some raptors remain remarkably stable from year to year. Furthermore, several species seldom build new nests, but repeatedly repair and reuse old ones. Alternate nest sites are contained within territories; therefore a specific nest site may change annually. Limits of territories remain essentially constant (Newton 1979). The grasslands, riparian, and xeric-riparian areas provide hunting grounds. The area has an abundant food base to support a substantial population of raptors year round in most years.

#### Migratory Birds

Executive order #13186 titled "Responsibilities of Federal Agencies to Protect Migratory Birds" signed 1/10/01 requires that the BLM evaluate the effects of federal actions on migratory birds. A migratory bird inventory has not been completed for this area. Common migratory birds which may use the area as habitat include various species of song birds, owls, ravens, hawks, finches, doves, thrashers, and meadowlarks.

Parcel -008 has a wildlife habitat projects within the parcel boundary or within 200 meters of the parcel boundary. The wildlife habitat projects within the CFO consist of passive collection structures which collects precipitation and provides additional sources of water, used by wildlife. Associated with these structures are wildlife exclosure areas which excludes livestock grazing and provides habitat in the means of cover, and forage for wildlife.

Parcels -040, -047, -049, and -050 have known raptor nests located within the parcel boundary or within 200 meters of the parcel boundary.

### **3.12 Range**

The lease sale covers all or parts of eighteen (18) grazing allotments that are with the proposed alternative; Antelope Sink, Rock House, Three Twins North, Golden Eagle, Three Twins, Rain Springs, McGruder Hill, Turkey Track (out of Roswell), Rusteler Breaks, Nash Draw, Clayton Basin, Salt Lake, Antelope Ridge, San Simon, Red Tank, Jackson East, Sand Dune, and Medlin Wells. Seven (7) of these range allotments are on the West side of the Pecos River (Antelope Sink, Rock House, Three Twins North, Golden Eagle, Three Twins, Rain Springs, and McGruder Hill). The remainder of the range allotments are all located on the East side of the river. The allotments are run as a year-long cow-calf operation. Most of the grazing permittees follow some type of deferred-use rotation system, in which one or more pastures within the allotment receive some growing rest. Range improvement projects such as windmills, water delivery systems (pipelines, storage tanks, and water troughs), earthen reservoirs, fences, and brush control projects are located within the proposed lease sale area. In general, an average rating of the rangeland within this area is six acres per animal unit month (AUM). One cow needs about 72 acres per year, allowing about nine cows per section.

### **3.13 Visual Resources**

There are four categories of Visual Resource Management Objectives. Each of the different class objectives are described below with the appropriate lease parcels noted.

Class I Objective: The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.

The following leases parcels are within Class I Objectives: None

Class II Objective: The objective to this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

The following lease parcels are within Class II Objectives: None

Class III Objective: The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

The following lease parcel is within Class III Objectives: Parcel -006, -008, -009, -010, and -013.



Class IV Objective: The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

The remaining lease parcels are located in areas managed under Class IV Objectives.

### **3.14 Recreation**

The proposed lease parcels are all within dispersed recreation areas subject to public use. Dispersed recreation areas are areas that are used by recreationists as they desire. The CFO is flanked on the west by the Guadalupe Mountains, the Pecos River Valley which cuts the resource area roughly in half, and the sand dunes which dominate the eastern half of the Field Office. The river is favored by the public for fishing, camping, hunting, and other outdoor recreation activities. The sand dunes east of Carlsbad include two Off-Highway Vehicle (OHV) sites used mainly for four-wheeling. The Guadalupe Mountains provide various hiking and hunting opportunities. Activities from hunting and four-wheeling to hiking, horseback riding and bird watching are popular in dispersed recreation areas.

### **3.15 Cave/Karst**

Portions of this project are located in gypsum karst terrain, a landform that is characterized by underground drainage through solutionally enlarged conduits. Gypsum karst terrain may contain sinkholes, sinking streams, caves, and springs. Sinkholes leading to underground drainages and voids are common. These karst features, as well as occasional fissures and discontinuities in the bedrock, provide the primary sources for rapid recharge of the groundwater aquifers of the region.

The BLM categorizes all areas within the CFO as having either low, medium, high or critical cave potential based on geology, occurrence of known caves, density of karst features, and potential impacts to fresh water aquifers. A high karst zone is defined as an area occurring in known soluble rock types and containing a high frequency of significant caves and karst features such as sinkholes, bedrock fractures that provide rapid recharge of karst aquifers, and springs that provide riparian habitat. A medium karst zone is defined as an area occurring in known soluble rock types but may have a shallow insoluble overburden. These areas may contain isolated karst features such as caves and sinkholes. Groundwater recharge may not be wholly dependent on karst features but the karst features still provide the most rapid aquifer recharge in response to surface runoff.

Sinkholes and cave entrances collect water and can accumulate rich organic materials and soils. This, in conjunction with the stable microclimate near cave entrances, support a greater diversity and density of plant life which provides habitat for a greater diversity and density of wildlife such as raptors, rodents, mammals, and reptiles.

The interior of the caves support a large variety of troglobitic, or cave environment-dependent species. The troglobitic species have adapted specifically to the cave environment due to constant temperatures, constant high humidity, and total darkness. Many of the caves in this area contain fragile cave formations known as speleothems.

Parcels -012, -013, and -015 are located within a critical cave/karst zone.

Parcels -006, -008, -009, -010, -012, -014, -027, and -028 are located within a high cave/karst zone.

All remaining parcels are located within a low cave/karst zone.

### **3.16 Socioeconomics and Environmental Justice**

Executive Order 12898, issued on February 11, 1994, addresses concerns over disproportionate environmental and human health impacts on minority and low-income populations. The impetus behind environmental justice is to ensure that all communities, including minority, low-income, or federally recognized tribes, live in a safe and healthful environment. The July 2013 Oil and Gas Lease Sale will not be out of conformance with this executive order.

Portions of the City of Carlsbad and the City of Hobbs consist of minorities with some low-income populations. However, none of the leases nominated fall within the city limits of either city. Most of the populations that lie near these leases are employed by the agricultural or mining sector and do not fall under the coverage of this executive order.

### **3.17 Potash**

Potash resources in southeast New Mexico are located in an area governed by the rules of the Secretary of the Interior's 1986 Order dated October 21, 1986. This area is commonly called the Secretary's Potash Area. The Secretary's 1986 Order establishes rules for concurrent prospecting, development, or production operations of oil and gas and potash deposits owned by the United States. The Potash Area completely encompasses the Known Potash Leasing Area, which was established by the Secretary of Interior for the administration of potassium leasing.

The Secretary's Potash Area is comprised of four classifications respective to the density of core holes or geophysical inference. These classifications are: Measured Ore (Potash Enclave), Indicated Ore, Inferred Ore, and Barren of Potash Ore.

Measured Ore are potash resources for which tonnage is computed from dimensions revealed in workings and drill holes. The grade is computed from the results of detailed sampling. Measured ore will be delineated by data points no more than 1½ miles apart if geologic inference shows these projections to be reasonable. Measured ore will not be delineated by fewer than three data points that meet all other distance, thickness and grade criteria. Measured ore is not projected further than one-half mile from a data point which meets thickness and quality standards where no projection or geologic inference data exists.

Indicated Potash Reserves are identified as potash resources that are computed partly from specific measurements, samples, or production data and partly from projection for a reasonable

distance on geologic evidence. The sites available for inspection, measurement, and sampling are too widely or otherwise inappropriately spaced to permit the mineral bodies to be outlined completely or the grade established throughout.

Inferred Potash resources are identified as potash resources which are probable, but tonnage and grade cannot be computed due to the absence of specific data. Lithologic descriptions and Gamma logs indicate probable mineralization, and the data can be reasonably correlated.

Barren and/or minor potash mineralization areas are composed of sub economic resources that would require a substantially higher market value or major cost reducing technology for economical production. Sub economic resources also include other minerals not presently being recovered.

Lease Parcels -027, -028, -030, and -031 are located within the Secretary's Potash Area. All of these parcels have the majority of the parcel boundary located within the R-111-P Boundary also known as the (KPLA) and will require special casing design to protect the salt from objective oil and gas formations below.

### **3.18 Proposed ACEC**

Proposed ACECs are being evaluated during the Carlsbad Field Office Resource Management Plan (RMP) revision. The five (5) proposed ACECs that have nominated lease parcels located within their boundaries are the Chihuahuan Desert Rivers ACEC, Birds of Prey ACEC, Cave Resources ACEC, Salt Playas ACEC, and the Laguna Plata ACEC. The relevant and importance criteria being looked at during the RMPA for all of the proposed ACECs are listed below:

An ACEC is defined in the FLPMA as an area within the public lands where special management attention is required to protect and prevent irreparable damage to important historical, cultural, and scenic values; fish and wildlife and other natural systems or processes; and to protect life and safety from natural hazards. The BLM prepared regulations for implementing the ACEC provisions of FLPMA. These regulations are found at 43 CFR 1610.7-2(b).

The ACEC designation indicates to the public that the BLM recognizes that an area has significant values and has established special management measures to protect those values. In addition, ACEC designation also serves as a reminder that significant values or resources exist that must be accommodated when future management actions and land use proposals. Designation may also support a funding priority. Although Federal, State, and private lands may be located within the boundaries of an ACEC, only BLM-managed lands are managed under the ACEC prescriptions.

The ACEC designation is an administrative designation that is accomplished through the land use planning process. It is unique to the BLM in that no other agency uses this form of designation. The intent of Congress in mandating the designation of ACECs through FLPMA was to give priority to the designation and protection of areas containing unique and significant resource values. ACECs differ from other special management designations, such as Wilderness Study Areas, in that ACEC designation by itself does not automatically prohibit or restrict uses.

An area meets the relevance criteria if it contains one or more of the following:

- A **significant historic, cultural, or scenic value** such as rare or sensitive archeological resources and religious or cultural resources important to Native Americans.
- A **fish and wildlife resource** such as habitat for endangered, sensitive, or threatened plant species; or habitat essential for maintaining species diversity.
- A **natural process or system** such as endangered, sensitive, or threatened plant species; rare, endemic, or relic plants; plant communities that are terrestrial, aquatic, or riparian–wetland; or rare geological features.
- **Natural hazards** such as areas of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs. A hazard caused by human action may meet the relevance criteria if it is determined that the hazard has become part of a natural process.

The value, resource, system, process, or hazard previously described must have substantial significance and values to satisfy the importance criteria. This generally means that the value, resource, system, process, or hazard is characterized by one or more of the following:

- It has more than locally significant qualities that give it special worth, consequence, meaning, distinctiveness, or cause for concern, especially compared to any similar resource.
- It has a quality or circumstance that makes it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change.
- It has been recognized as warranting protection in order to satisfy national priority concerns or to carry out the mandates of FLPMA.
- It has qualities that warrant highlighting to satisfy public or management concerns about safety and public welfare.

#### Birds of Prey ACEC

The Birds of Prey ACEC meets both the relevance and importance value because of the following; Fish or Wildlife Resource

#### Cave Resources

The Cave Resources ACEC meets both the relevance and importance value because of the following; Historic, Natural System or Process,

#### Chihuahuan Desert Rivers ACEC

The Chihuahuan Desert Rivers ACEC meets both the relevance and importance value because of the following: Historic, Cultural, Scenic, Fish and Wildlife Resource, and Natural Systems or Process and Natural Hazards.

#### Salt Playas ACEC

The Salt Playas ACEC meets both the relevance and importance value because of the following: , Cultural, and Fish or Wildlife Resources.

#### Laguna Plata ACEC

The Laguna Plata ACEC meets both the relevance and importance value because of the following: Cultural, and Fish or Wildlife Resource

Parcels -001, -002, -013, -024, -027, and -030 are located within proposed ACEC's.

## **ENVIRONMENTAL IMPACTS**

### **4.0 Environmental Consequences**

#### **4.1 Assumptions for Analysis**

The act of leasing parcels would, by itself, have no impact on any resources in the CFO. All impacts would be linked to as yet undetermined future levels of lease development.

If lease parcels were developed, short-term impacts would be stabilized or mitigated within five years and long-term impacts are those that would substantially remain for more than five years. Potential impacts and mitigation measures are described below.

Assumptions used in the analysis regarding resource impacts are based on past development knowledge and practices and resource concerns specific to each individual parcel.

Cumulative impacts include the combined effect of past projects, specific planned projects and other reasonably foreseeable future actions such as other infield wells being located within these leases. Potential cumulative effects may occur should an oil and gas field be discovered if these parcels are drilled and other infield wells are drilled within these leases or if these leases become part of a new unit. All actions, not just oil and gas development may occur in the area, including non-federal actions.

#### **4.2 Effects from the No Action Alternative**

Under the No Action Alternative, the thirty-six (36) parcels totaling 14, 246.17 acres nominated for sale in the July 2014 Oil & Gas Lease sale would be deferred and not offered for sale. There would be no subsequent impacts from oil and/or gas construction, drilling, and production activities. The No Action Alternative would result in the continuation of the current land and resource uses in the proposed lease areas.

##### **4.2.1 Mineral Resources**

There would be no new impacts from oil and gas production on the proposed parcel land. Oil and gas development of federal, state, private, and Indian minerals would continue on the land surrounding the proposed parcels. No additional natural gas or crude oil from the proposed parcels would enter the public markets and no royalties would accrue to the federal or state treasuries. An assumption is that the No Action Alternative (no lease option) would not affect current domestic production of oil and gas. However, this may result in reduced Federal and State royalty income, and the potential for Federal land to be drained by wells on adjacent private or state land. Oil and gas consumption is driven by a variety of complex interacting factors including energy costs, energy efficiency, availability of other energy sources, economics, demography, and weather or climate. If the BLM were to forego leasing and potential development of the proposed parcels, the assumption is that the public's demand for the resource would not be expected to change. Instead, the mineral resource foregone would be

replaced in the short- and long-term by other sources that may include a combination of imports, using alternative energy sources (e.g. wind, solar), and other domestic production. This offset in supply would result in a no net gain for oil and gas domestic production.

#### **4.2.2 Environmental Justice**

By not leasing the proposed parcels under the No Action Alternative, there may be negative effects on the overall employment opportunities related to the oil and gas and service support industry, as well as a loss of the economic benefits to state and county governments related to royalty payments and severance taxes. However, there would be no increase in activity and noise associated with these proposed leases unless the land is used for other purposes.

#### **4.2.3 All Other Resources**

No other resources would be affected under the No Action Alternative, as there would be no surface disturbance that could detrimentally affect these resources. The No Action Alternative would result in the continuation of the current land and resource uses on the parcels. However, the selection of the no action alternative would not preclude these parcels from being nominated and considered in a future lease sale, which would result in impacts as described under the action alternatives.

### **4.3 Analysis of the Action Alternatives**

#### **4.3.1 Air Quality Impacts from All Action Alternatives**

Leasing the subject tracts would have no direct impacts to air quality. Any potential effects to air quality from sale of lease parcels would occur at such time that the leases were developed. Potential impacts of development would include increased air borne soil particles blown from new well pads or roads, exhaust emissions from drilling equipment, compressor engines, vehicles, flares, exhaust and fugitive dust emissions from operation and maintenance, and dehydration and separation facilities, and volatile organic compounds during drilling or production activities.

In order to reasonably quantify emissions associated with well exploration and production activities, certain types of information are needed. Such information includes a combination of activity data such as the types of equipment needed if a well were to be completed successfully (e.g. compressor, separator, dehydrator), the technologies which may be employed by a given company for drilling any new wells, area of disturbance for each type of activity (e.g. roads, pads, electric lines, compressor station), number of days to complete each kind of construction, number of days for each phase of drilling process, type(s), size, number of heavy equipment used for each type of construction (backhoe, dozer, etc.), number of wells of all types (shallow, deep, exploratory, etc.), compression per well (sales, field booster), or average horsepower for each type of compressor. The degree of impact will also vary according to the characteristics of the geologic formations from which production occurs. Currently, it is not feasible to directly quantify emissions; however, presented below are the potential development scenarios that could result from selection of the proposed action or the preferred alternative. What can be said is that exploration and production would contribute to incremental increases in overall air quality

emissions associated with oil and gas exploration and production into the atmosphere.

The most significant criteria pollutants emitted by oil and gas development and production are VOCs, particulate matter and NO<sub>2</sub>. VOCs and NO<sub>2</sub> contribute to the formation of ozone, which is the pollutant of most concern to the CFO. The vast majority of VOCs emissions in the CFO come from biogenic (the plant community) rather than anthropogenic sources (AES, 2011). The additional NO<sub>2</sub> and VOCs emitted from any oil and gas development on these leases are likely too small to have a significant effect on the overall ozone levels of the area.

Although the hydraulic fracturing of wells within a lease parcel is hard to predict, it is anticipated that with more wells being drilled, there will be an increase in the amount of wells being hydraulically fractured and completed (see Appendix 3). There is a higher probability of dust particulates in the atmosphere from the increase in vehicular traffic due to the increase in the number of wells hydraulically fractured.

#### **Potential Mitigation:**

The BLM encourages industry to incorporate and implement BMPs, which are designed to reduce impacts to air quality by reducing emissions, surface disturbances, and dust from field production and operations. Typical measures include: adherence to BLM's NTL 4(a) concerning the venting and flaring of gas on Federal leases for natural gas emissions that cannot be economically recovered, flare hydrocarbon gases at high temperatures in order to reduce emissions of incomplete combustion; water dirt roads during periods of high use in order to reduce fugitive dust emissions; collocate wells and production facilities to reduce new surface disturbance; implementation of directional drilling and horizontal completion technologies whereby one well provides access to petroleum resources that would normally require the drilling of several vertical wellbores; suggest that vapor recovery systems be maintained and functional in areas where petroleum liquids are stored; and perform interim reclamation to revegetate areas of the pad not required for production facilities and to reduce the amount of dust from the pads. In addition, the BLM encourages industry to participate in the Gas STAR program that is administered by EPA. The Natural Gas STAR program is a flexible, voluntary partnership that encourages oil and natural gas companies to adopt proven, cost-effective technologies and practices that improve operational efficiency and reduce natural gas emissions.

The CFO recently purchased an infrared camera designed to detect natural gas leaks on and around well pad and pipeline facilities. CFO inspection personnel have been trained to operate the camera and CFO is currently developing a strategy to implement the use of the camera in cooperation with oil and gas operators to detect and eliminate natural gas leaks in well pad and pipeline infrastructure.

In October 2012, USEPA promulgated air quality regulations for completion of hydraulically fractured gas wells. These rules require air pollution mitigation measures that reduce the emissions of volatile organic compounds during gas well completions.

#### **4.3.2 Climate**

The assessment of GHG emissions, their relationship to global climatic patterns, and the resulting impacts is an ongoing scientific process. It is currently not feasible to know with

certainty the net impacts from the proposed action on climate—that is, while BLM actions may contribute to the climate change phenomenon, the specific effects of those actions on global climate are speculative given the current state of the science. The BLM does not have the ability to associate a BLM action’s contribution to climate change with impacts in any particular area. The science to be able to do so is not yet available. The inconsistency in results of scientific models used to predict climate change at the global scale coupled with the lack of scientific models designed to predict climate change on regional or local scales, limits the ability to quantify potential future impacts of decisions made at this level and determining the significance of any discrete amount of GHG emissions is beyond the limits of existing science. When further information on the impacts to climate change is known, such information would be incorporated into the BLM’s planning and NEPA documents as appropriate.

Leasing the subject tracts would have no direct impacts on climate as a result of GHG emissions. There is an assumption, however, that leasing the parcels would lead to some type of development that would have indirect effects on global climate through GHG emissions. However, those effects on global climate change cannot be determined. (Refer to the cumulative effects section, Chapter 4 for additional information.) It is unknown whether the petroleum resources specific to these leases in the Proposed Action are gas or oil or a combination thereof.

Oil and gas production in New Mexico is concentrated in the northwest corner, the San Juan Basin, and the southeast corner, the Permian Basin. Production in the San Juan Basin is mostly natural gas while production in the Permian Basin is mostly oil. Production statistics developed from EPA and New Mexico Oil Conservation Division for 2010 are shown in table below for the US, New Mexico and for wells on federal leases in each basin.

#### **2010 Oil and Gas Production**

<b>Location</b>	<b>Oil (bbl)</b>	<b>% U.S. Total</b>	<b>Gas (MMcf)</b>	<b>% U.S. Total</b>
United States	1,999,731,000	100	26,836,353	100
New Mexico	65,380,000	3.27	1,341,475	5.00
Federal leases in New Mexico	31,533,000	1.58	824,665	3.07
Federal leases in San Juan Basin	1,468,000	0.07	630,060	2.35
Federal leases in Permian Basin	30,065,000	1.5	194,065	0.73

In order to estimate the contribution of Federal oil and gas leases to greenhouse gases in New Mexico it is assumed that the percentage of total U.S. production is comparable to the percentage of total emissions. Therefore, emissions are estimated based on production starting with total emissions for the United States from EPA’s *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010* (EPA, 2012b), and applying production percentages to estimate emissions for the Permian Basin. It is understood that this is a rather simplistic technique and assumes similar emissions in basins that may have very different characteristics and operational procedures, which could be reflected in total emissions. This assumption is adequate for this level of analysis due to the unknown factors associated with eventual exploration and development of the leases. However, the emissions estimates derived in this way, while not precise will give some insight into the order of magnitude of emissions from federal oil and gas leases administered by



the Bureau of Land Management (BLM) and allow for comparison with other sources in a broad sense.

#### 2010 Oil and Gas Field Production Potential Emissions

Location	Oil (Metric tons of CO <sub>2</sub> <sup>e</sup> )		Gas (Metric tons of CO <sub>2</sub> <sup>e</sup> )		Total O&G Production (Metric tons CO <sub>2</sub> e)	%U.S. Total GHG emissions
	CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>		
United States	300,000	30,600,000	10,800,000	126,000,000	167,700,000	2.6
New Mexico	9,810	1,000,620	540,000	6,300,000	7,850,430	0.12
Federal leases in New Mexico	4,740	483,480	331,560	3,868,200	4,687,980	0.07
Federal leases in San Juan Basin	210	21,420	253,800	2,961,000	3,236,430	0.05
Federal leases in Permian Basin	4,500	459,000	78,840	919,800	1,462,140	0.03

The table above shows the estimated greenhouse gas emissions for oil and gas field production for the U.S., New Mexico, and Federal leases by basin. Because oil and gas leaves the custody and jurisdiction of the BLM after the production phase and before processing or refining, only emissions from the production phase are considered here. It should also be remembered that following EPA protocols, these numbers do not include fossil fuel combustion which would include such things as truck traffic, pumping jack engines, compressor engines and drill rig engines. Nor does it include emissions from power plants that generate the electricity used at well sites and facilities. The estimates are only for operations, not for construction and reclamation of the facilities, which may have a higher portion of a projects GHG contribution. Note that units of Metric tons CO<sub>2</sub>e have been used in the table above to avoid very small numbers. CO<sub>2</sub>e is the concentration of CO<sub>2</sub> that would cause the same level of radiative forcing as a given type and concentration of greenhouse gas.

The table above provides an estimate of direct emissions that occur during production of oil and gas. This phase of emissions represents a small fraction of overall emissions of CO<sub>2</sub><sup>e</sup> from the life cycle of oil and gas. For example, acquisition (drilling and development) for petroleum is responsible for only 8% of the total CO<sub>2</sub>e emissions, whereas transportation of the petroleum to refineries represents about 10% of the emissions, and final consumption as a transportation fuel represents fully 80% of emissions (U.S.DOE, NETL, 2008)

To estimate the potential emissions from the proposed lease sale, an estimate of emission per well is useful. To establish the exact number of Federal wells in the Permian Basin is

problematic due to the ongoing development of new wells, the abandonment of unproductive wells, land sales and exchanges, and incomplete or inaccurate data bases. CFO determined that the most transparent and publicly accessible method of estimating the number of active federal wells in the New Mexico portion of the Permian Basin was to utilize the BLM New Mexico Geographic Information System (GIS) and the New Mexico Conservation Division ONGARD Data Search Page. ONGARD was searched for all Active, New, and Temporarily Abandoned wells in NM, then refined the search to include only Lea, Eddy, and Chavez counties (25,298), and finished the search by limiting the results to Federal wells (11,216).

**Potential Greenhouse Gas Emissions Resulting from Proposed Lease Sale  
Referenced to Latest Available Estimates from 2010**

Total U.S. GHG Emissions From All Sources	6,372,900,000 metric tons	100.00 %
Total U.S. GHG Emissions From Oil & Gas Field Production	167,700,000 metric tons	2.6%
Total New Mexico Emissions From Oil & Gas Field Production	7,850,430 metric tons	.12%
Total San Juan Basin Emissions From Oil & Gas Field Production (15,811 wells)	4,384,230 metric tons	.07%
Total Permian Basin Emissions From Oil & Gas Field Production (11,216)	3,175,830 metric tons	.05%
Total Potential GHG Emissions From Oil & Gas Field Production at Full Development For Proposed Action (328 Wells)	92856.8 metric tons	0.00001%
Total Potential GHG Emissions From Oil & Gas Field Production at Full Development For Preferred Alternative (211 Wells)	59734.1 metric tons	0.000009%

The table above estimated that the total emissions from Federal leases in the Permian in 2010 were 3,175,830 metric tons CO<sub>2</sub>e. Therefore, the estimate of emission per well is 283.1 metric tons CO<sub>2</sub>e annually (See Section 5: Cumulative Impacts for more information).

Environmental impacts of GHG emissions from oil and gas consumption are not effects of the proposed action as defined by the Council on Environmental Quality, and thus are not required to be analyzed under NEPA. Greenhouse gas emissions from consumption of oil and gas are not

direct effects under NEPA because they do not occur at the same time and place as the action. They are also not indirect effects because oil and gas leasing and production would not be a proximate cause of greenhouse gas emissions resulting from consumption.

#### **Potential Mitigation:**

The EPA's inventory data describes "Natural Gas Systems" and "Petroleum Systems" as the two major categories of total US sources of GHG gas emissions. The inventory identifies the contributions of natural gas and petroleum systems to total CO<sub>2</sub> and CH<sub>4</sub> emissions (natural gas and petroleum systems do not produce noteworthy amounts of any of the other greenhouse gases). Within the larger category of "Natural Gas Systems", the EPA identifies emissions occurring during distinct stages of operation, including field production, processing, transmission and storage, and distribution. "Petroleum Systems" sub-activities include production field operations, crude oil transportation and crude oil refining. Within the two categories, the BLM has authority to regulate only those field production operations that are related to oil and gas measurement, and prevention of waste (via leaks, spills and unauthorized flaring and venting).

The EPA data show that improved practices and technology and changing economics have reduced CO<sub>2</sub> emissions from oil and gas exploration and development (Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2006 (EPA,2012b)). One of the factors in this improvement is the adoption by industry of the BMPs proposed by the EPA's Natural Gas Energy Star program. The Field Office will work with industry to facilitate the use of the relevant BMPs for operations proposed on Federal mineral leases where such mitigation is consistent with agency policy. While EPA data shows that methane emissions increased from oil and gas exploration and development from 1990-2010, reductions in methane emissions from oil and gas exploration and development should occur in future years as a result of EPA's recently finalized oil and gas air emissions regulations.

### **4.3.3 Heritage Resources**

#### **4.3.3.1 Cultural Resources**

There will be no immediate consequences to cultural resources as a result of the leasing of any of these parcels. This document deals only with lease sale actions; any subsequent realty or oil and gas projects or development will be subject to a separate NEPA analysis, as well as compliance with Section 106 of the National Historic Preservation Act (NHPA). Native American consultation was conducted by certified mail regarding lease sale activities and no Traditional Cultural Properties were identified. No specific heritage-related issues have been identified during the consultation process. The BLM does acknowledge that the potential exists for the Native American community to identify heritage-related issues in the future as specific actions are proposed.

As oil and gas development actions or associated realty actions are proposed, the areas of potential effect will be defined and assessments of the impacts upon cultural resources will be undertaken. All undertakings must comply with NEPA and NHPA Section 106. In the event that cultural resources are identified within a lease parcel, an evaluation of significance will occur and steps will be taken to mitigate impacts to that resource. Mitigation most frequently

involves site avoidance, but may rarely include data recovery or compensation. The BLM has discretionary control over mitigation stipulations or avoidance measures imposed on a project.

The BLM may require development activities to be moved if necessary to protect cultural resources. This should allow nearly all sites to be avoided. Sites that cannot be avoided will be evaluated for listing in the National Register of Historic Places, and mitigation measures will be instituted, if the site is eligible. If development activities uncover subsurface sites, the lessee will halt all work until the site can be evaluated and proper mitigation and avoidance measures identified.

Under the Preferred Alternative parcels -001, -002, -013, -024, -027, -030, -031, and -036 would not be leased.

All lease parcels contain the Special Cultural Resource Lease Notice Stipulation (NM-LN-11).

**Potential Mitigation:**

Depending on the nature of the lease developments being proposed and the cultural resources potentially affected, compliance with NHPA Section 106 and Executive Order 13007 could require intensive cultural resource inventories, Native American consultation, and other mitigation measures to avoid adverse effects, the costs for which will be borne by the lessee. In addition, the BLM may require modifications to, or disapprove of, proposed activities that are likely to affect Traditional Cultural Places or sacred sites for which no mitigation measures are possible.

**4.3.3.2 Paleontological Resources**

While the act of leasing Federal minerals would produce no direct impacts to paleontological resources, subsequent development of a lease may produce impacts. Construction can directly impact fossil resources and newly built roads can open previously inaccessible areas to illegal collecting and vandalism of fossil resources. Scientifically noteworthy fossils and localities containing them are rare and not uniformly distributed throughout the geologic deposits. Loss of fossil resources or rare and scientifically important localities may have an unforeseen cumulative effect. Development could, however, increase the potential for discovering scientifically noteworthy fossil resources, if the nature and significance of the paleontological material is recognized. Adequate measures would be applied to ensure proper treatment and recovery of fossil resources.

These areas can be identified by referring to detailed geologic maps on a case-by-case basis. Should construction activities reveal any new paleontological sites, construction would be delayed until salvage efforts are undertaken. Construction could also be relocated, if the site were judged to have enough significance to warrant moving the activity.

There are no known paleontological resources located on any of the lease parcels.

Proposed Action and Preferred Alternative impacts would be the same.

**Potential Mitigation:**

BLM may require inventory for paleontological resources or the modifications to, or disapproval of, proposed activities that are likely to affect paleontological resources.

#### **4.3.4 Water Resources**

While the act of leasing Federal minerals would produce no direct impacts to water resources, subsequent development of a lease may produce impacts. Potential causes of impacts to water resources from drilling operations include the loss of drilling fluids, which sometimes contain heavy metals and other chemicals, or cement. This may pollute groundwater recharge areas and adversely impact water quality. Additionally, cementing operations could plug some of the underground drainages and restrict groundwater flow, thereby reducing the recharge quality and quantity of springs, resurgences, and water tables and reducing the natural flow from seeps, springs, and water wells.

Potential causes of impacts from well production include the introduction of hydrocarbons or other chemicals into underground drainages and recharge areas as a result of leaks or spills from well casings, storage tanks, mud pits, pipelines, or other production facilities. This may also degrade water quality. In addition, drilling an oil or gas well may require large quantities of water, especially when drilling through porous and permeable formations. Fresh water is a scarce resource in the CFO and depending on the source used, natural flow from seeps, springs, and water wells could be reduced.

With any surface disturbance there will be decreased infiltration rates which may lead to more rapid runoff responses to precipitation events. The cumulative impacts of surface disturbance could lead to: 1) increased occurrence and magnitude of flood events, 2) increased erosion, 3) higher sediment loads in downstream surface waters, and 4) decreased groundwater recharge.

Potential impacts from the hydraulic fracturing of a well could arise from the chemicals that are used at the well pad location (see Appendix 3). If the well location was within close proximity to water sources a potential impact to the waters could arise due to the chemicals being used during the hydraulic fracturing process. A more site specific analysis would take place during the APD review and subsequent NEPA analysis. There also is the potential for illegal dumping of waste products into fresh water pits used during the hydraulic fracturing purposes. If this illegal dumping was to occur there is the potential to impact migratory birds and other wildlife species.

Contamination of groundwater could occur without adequate cementing and casing of the proposed well bore. Casing specifications are designed and submitted to the BLM. The BLM independently verifies the casing program, and the installation of the casing and cementing operations are witnessed by certified Petroleum Engineering Technicians. Surface casing setting depth is determined by regulation. Adherence to APD COAs and other design measures would minimize potential effects to groundwater quality.

The water used for hydraulic fracturing in the Carlsbad Field Office generally comes from permitted groundwater wells. Because large volumes of water are needed for hydraulic fracturing, the use of groundwater for this purpose might contribute to the drawdown of groundwater aquifer levels. Groundwater use is permitted and managed by the New Mexico

Office of the State Engineer, and these water rights have already been designated. In addition, the use of water for hydraulic fracturing is one of many uses of groundwater in the Carlsbad Field Office. Other uses include irrigation, industrial mining operations, and domestic and livestock use.

Known playas are located within a portion of the following parcel or within 200 meters of the boundary of parcel -027.

Known streams, rivers, or floodplains are located within a portion of the following parcels or within 200 meters of the boundary of parcels -006, -008, -009, -010, -012, -014, -015, and -039.

Known springs, seeps or dirt tanks are located within a portion of the following parcel or within 200 meters of proposed parcel -039.

Proposed Action and Preferred Alternative impacts would be the same.

#### **Potential Mitigation:**

Mitigation will be deferred to the site-specific APD stage of development. Best Management Practices, such as moving a surface disturbing activity up to 200 meters to avoid impacts to water resources, would be incorporated into COAs.

#### **4.3.5 Wetlands, Riparian and Floodplains**

While the act of leasing Federal minerals would produce no direct impacts to wetlands, riparian areas, and floodplains, subsequent development of a lease may produce impacts. However, no adverse impacts are expected for wetlands, floodplains, or riparian areas, as stipulations for a minimum 200-meter buffer from the edge of the floodplain or wetland is applied to these parcels. By moving pads, roads, and rights-of-way away from the edge of wetland or riparian areas, the values these areas provide should be protected.

The risk of hydrocarbon spills or seepage from any pits containing hydrocarbons or brines could threaten water resources. Poor cement jobs or corroded or bad casing or tubing during production operations can allow hydrocarbons to enter potentially viable aquifers. These events can propagate downstream and damage or destroy these fragile environments, which contain lush grasses, aquatic birds and their nesting environment, and aquatic life such as fishes and crustaceans.

Potential impacts from the hydraulic fracturing of a well could arise from the chemicals that are used at the well pad location (see Appendix 3). If the well location was within close proximity to water sources a potential impact to the waters could arise due to the chemicals being used during the hydraulic fracturing process. A more site specific analysis would take place during the APD review and subsequent NEPA analysis. There also is the potential for illegal dumping of waste products into fresh water pits used during the hydraulic fracturing purposes. If this illegal dumping was to occur there is the potential to impact migratory birds and other wildlife species.

The hydraulic fracturing of a well can potentially result in an increase of surface disturbances associated with equipment needed to complete the process. Part of the increase in surface

disturbance is associated with a location within the lease used to place a centrally located frack pond or frack tank farm. Frack ponds are used to hold fresh water as part of the hydraulic fracturing process, and frack tank farms are used to hold fresh water in enclosed tanks, as part of the hydraulic fracturing process.

Known playas are located within a portion of the following parcel or within 200 meters of the boundary of parcel -027.

Known streams, rivers, or floodplains are located within a portion of the following parcels or within 200 meters of the boundary of parcels -006, -008, -009, -010, -012, -014, -015, and -039.

Known springs, seeps or dirt tanks are located within a portion of the following parcel or within 200 meters of proposed parcel -039.

Under the preferred alternative parcel -027 would not be leased.

#### **Potential Mitigation:**

The mitigation measures addressed below are meant to protect wetlands and riparian areas of concern. Surface-disturbing activities will be moved up to 200 meters from wetlands, floodplains and riparian areas. Some lease parcels may have unidentified windmills for livestock watering purposes and would require a COA for a 200-meter buffer at the APD stage. Site-specific COAs will be incorporated at the APD stage of development.

#### **4.3.6 Soils**

While the act of leasing Federal minerals would produce no direct impacts to soils, subsequent development of a lease may produce impacts. Soils would be impacted during the construction, operation, and rehabilitation phases of lease development. Off-road travel, excavation of caliche for road and pad construction, and associated rights-of-way construction would cause soil particles to become unconsolidated and would remove vegetative cover. This would increase the susceptibility of the soil to both wind and water erosion. Soil horizons directly below caliche-capped roads and pads would be protected from erosion, but would not receive any infiltration. Nearby soils would be more susceptible to water erosion due to increased runoff from these caliche covered surfaces.

Additional wells would reduce the acreage available for grazing purposes, increase erosion, and decrease available vegetation for all proposed parcels. There would be the increased risk of hydrocarbon spills within the lease as well. Increased surface disturbance would also increase the risk of noxious weed invasion and spread.

Potential impacts from the hydraulic fracturing of a well could arise from the chemicals that are used at the well pad location (see Appendix 3). If chemicals being used during the hydraulic fracturing process were spilled on the location potential to pollute or change the soil chemistry could exist. A more site specific analysis would take place during the APD review and subsequent NEPA analysis. There also is the additional surface disturbance to the soils associated with the increase in hydraulic fracturing equipment.

Parcels -006, -008, -012, -013, -015, -027, -028, -029, and -038 contain fragile soils or open dunelands.

Under the Preferred Alternative parcel -013, -027, and -029 would not be leased.

**Potential Mitigation:**

Mitigation measures will be deferred to the site-specific APD stage of development. Best management practices (BMPs) would be incorporated into Conditions of Approval (COAs).

#### **4.3.7 Vegetation**

While the act of leasing Federal minerals would produce no direct impacts to vegetation, subsequent development of a lease may produce impacts. Vegetation would be lost within the construction areas of pads, roads, and rights-of-way. Those areas covered in caliche, such as pads and roads, would have no vegetation for the life of the well. Rights-of-way could revegetate in one to two years with proper reclamation and adequate precipitation. Poor reclamation practices followed by inadequate precipitation over several growing seasons could result in loss of vegetative cover, leading to weed invasion and deterioration of native vegetation.

Impacts to vegetation depend on development. These acres would produce no vegetation, because of caliche covered surfaces with each well in production. These acres should be in adequate vegetative cover in three to five growing seasons, if proper reclamation procedures are followed and adequate precipitation is received after the well is plugged.

Potential impacts from the hydraulic fracturing of a well could arise from the chemicals that are used at the well pad location (See Appendix 3). If chemicals being used during the hydraulic fracturing process were spilled on the location or nearby vegetation it could potentially pollute or damage the nearby vegetation. A more site specific analysis would take place during the APD review and subsequent NEPA analysis.

**Potential Mitigation:**

Impacts from either the Proposed Action or the Preferred Alternative will be addressed with mitigation measures when site specific development proposals are received and will be incorporated as COAs.

#### **4.3.8 Noxious Weeds**

While the act of leasing Federal minerals would produce no direct impacts to noxious weeds, subsequent development of a lease may produce impacts. Any surface disturbance could establish new populations of invasive nonnative species, although the probability of this happening cannot be predicted using existing information. At the APD stage, BLM requirements for use of weed control strategies would minimize the potential for the spread of these species.

**Potential Mitigation:**

New infestations of noxious weeds would be prevented or kept to small localized areas on drill pads if stipulations for proper control methods are followed; however, as current populations of noxious weeds do exist, surface disturbance associated with lease development could allow the populations to increase in size or spread to other sites. Weed seeds may be picked up on the tires



of vehicles and then spread across the landscape. If noxious weeds are detected, abatement measures would be implemented. These include weed inventory surveys, weed monitoring programs, and a spraying program.

The spraying program would reduce or eliminate existing populations, control the spread of current populations, or prevent the establishment of new populations. Measures to ensure the prevention of the spread of noxious weeds will be in place, such as the washing of vehicles before leaving infested areas. The CFO works closely with the surrounding communities and the oil and gas industry to monitor and chemically treat heavily infested areas before habitat areas are invaded.

All surface disturbing activities that could result from the Competitive Oil and Gas Lease Sale will have the following COA: The operator will be held responsible if noxious weeds become established within the areas of operations. Weed control will be required on the disturbed land where noxious weeds exist, which includes the roads, pads, associated infrastructure, and adjacent land affected by the establishment of weeds due to the action. The operator must consult with the Authorized Officer for acceptable weed control methods, which include following EPA and BLM requirements and policies.

Impacts from either the Proposed Action or the Preferred Alternative will be addressed with mitigation measures when site specific development proposals are received and will be incorporated as COAs.

#### **4.3.9 Special Status Species**

While the act of leasing Federal minerals would produce no direct impacts to special status species, subsequent development of a lease may produce impacts. Impacts could result from increased habitat fragmentation, noise, or other disturbance during development. In addition, special status species may be disturbed while hydraulic fracturing or other completion and stimulation operations are occurring, as these activities involve many vehicles, heavy equipment, and a workover rig. These impacts would be limited to the timeframe during which drilling operations associated with hydraulic fracturing occur, typically several weeks (see Appendix 3).

##### Lesser Prairie-Chicken

Development of leases with suitable habitat could potentially impact local populations of lesser prairie-chicken (LPC). Construction of the location and around-the-clock noise generated from drilling could impact the lesser prairie-chicken by reducing the establishment of seasonal "booming grounds" or leks, thus possibly reducing reproductive success in the species. It is believed that the noise generated by drilling rigs or unmuffled propane- or diesel-operated pumpjack motors could mask the booming of the male prairie-chicken. Female LPCs, unable to hear the males, would not arrive at the booming ground, causing courtship interaction and reproduction to decrease. Decreased reproduction and the loss of recruitment into the local population would result in an absence of younger males to replace mature males once they expire, eventually causing the lek to disband and become inactive. Additionally, habitat fragmentation caused by development could decrease the habitat available for nesting, brooding and feeding activities.

Parcels -023, -030, -031, -036, -037, -038, -039, -040, -043, -045, -046, -047, -048, -049, -050, -051, and -057 include suitable habitat for lesser prairie-chicken. All seventeen (17) of these parcels are located within the Isolated Population Area (IPA). The RMPA defines occupied habitat as “all areas within 1.5 miles of an active lesser prairie chicken site, regardless of vegetation that has been active for one out of the last 5 years.” The boundaries of all seventeen (17) lease parcels discussed are greater than 1.5 miles from an LPC siting or an LPC lek. Therefore leasing of these parcels is in conformance with the management decisions, criterion, and appropriate lease stipulations (see table above under 2.0 of Preferred alternative) for leasing within the IPA as set forth in the 2008 Special Status Species RMPA.

Under the Preferred Alternative parcels -030, -031, and -036, would not be leased.

#### Dunes Sagebrush Lizards

If dunes sagebrush lizards are present impacts to dunes sagebrush lizards, if any, would be minimal because parcels that contain suitable habitat will contain a stipulation requiring a buffer up to 200 meters. Construction in sand dune complexes that are suitable habitat or occupied habitat could reduce the size of habitat available to the species or extirpate dunes sagebrush lizard populations from the area. This could be avoided as long as infrastructure associated with oil and gas development is moved out of occupied or suitable dunes sagebrush lizard habitat.

Parcel -038 is located within potentially suitable habitat for the dunes sagebrush lizard

Proposed Action and Preferred Alternative impacts would be the same.

#### **Potential Mitigation:**

##### Special Status Species RMPA

Parcels nominated in these areas are reviewed by the State Director for concurrence based on the Record of Decision and Approved Resource Management Plan Amendment of April 2008. The BLM will continue to require oil and gas lessees to operate in a manner that will minimize adverse impacts to wildlife and special status species. To that end, the BLM will continue to apply reasonable measures to all oil and gas activities.

Leasing with requirements for Plans of Development (PODs) or Conditions of Approval (COAs) to ensure orderly development within a minimum of surface impact in lesser prairie-chicken and dunes sagebrush lizards habitats will be considered on a case-by-case basis, providing impacts from exploration and development will not cause unnecessary or undue impact to efforts to restore habitat. PODs may not be required for every existing lease on the Planning Area, but are required when requested by the BLM.

#### Lesser Prairie-Chicken

The Pecos District Special Status Species Resource Management Plan Amendment of 2008 affords lesser prairie-chickens specific protection measures pertaining to new drilling. The protections include a ban on new drilling during the breeding season (between March 1 and June 15) and a restriction on other production activities, such as land survey and construction, between the hours of 3 a.m. and 9 a.m. These restrictions apply to areas that contain lesser prairie-chicken habitat consisting of tall bunchgrasses (*Andropogon* spp., *Sporobolus* spp.), sand sagebrush (*Artemisia filifolia*), and typically shinny oak (*Quercus havardii*). Exceptions to the stipulations will be considered under the criteria set forth in the special status species RMPA.

In addition, raptors have been observed using plugged and abandoned well markers as perches. Artificial perches may increase raptor presences in a given area. Furthermore, artificial perches may provide strategically located vantage points and may improve the hunting efficiency of raptors. In order to improve the probability of maintaining a stable lesser prairie-chicken population, a low-profile COA for plugged and abandoned well markers will be attached to all APDs located within lesser prairie-chicken habitat. The well marker must be approximately 2 inches above ground level and contain the operator's name, lease name, well number, and location, including unit letter, section, township, and range. This information must be welded, stamped, or otherwise permanently engraved into the metal of the marker.

In New Mexico, a combination CCA and CCAA are in place and continue to be established covering the lesser prairie-chicken. In 2008, the Service, the BLM and the Center of Excellence in Hazardous Materials Management (CEHMM) partnered to develop a Candidate Conservation Agreement (CCA) and Candidate Conservation Agreement with Assurances (CCAA) for the conservation of the lesser prairie-chicken. These agreements allow oil and gas producers and the ranching industry to participate in the conservation measures outlined in the agreement, while ensuring that their activities can continue if the lesser prairie-chicken is listed. The CCA covers activities on federal lands, and the CCAA covers activities on non-federal lands. Participating cooperators from the oil and gas industry follow conservation measures at each drill site, and also pay into a conservation fund that is used to restore habitat for the lesser-prairie chicken. CEHMM, a New Mexico-based 501(c)(3) organization whose mandate includes conservation, holds the permit for the CCAA and administers conservation programs in the CCA and CCAA. As of October 1, 2012, thirty oil and gas companies are enrolled in the CCAA for a total of 816,000 acres (the participating Federal agency in this case is the BLM). In addition, forty-one New Mexico ranchers have enrolled a combined 1.5 million acres of rangeland in the CCAA and the New Mexico State Land Office has enrolled 248,000 acres in the CCAA.

#### **4.3.10 Threatened and Endangered Species**

Northern aplomado falcons (falcons) are located in intact, productive grasslands with low human activity levels in core population areas in Chihuahua, Mexico. This suggests that they have limited tolerance for modification to their habitat. Impacts to falcons in the localized area, specifically while drilling the well and during construction of the drilling pad, access road, and associated infrastructures, may include but are not limited to: disruptions in breeding cycles, habitat degradation and fragmentation, avoidance of habitat during construction, and a decrease in prey base. These actions cause temporary disturbances due to the general increase in human activity and noise in the area. Longer term impacts would be due to the direct removal of habitat the size of the project's footprint causing a reduction in habitat for prey and fragmenting previously contiguous foraging area for falcons.

The affects of oil and gas development on avian prey varies with each species. Numerous studies indicate that fragmentation, edge effects, and habitat isolation result in loss of breeding habitat for certain avian species. Increasing the loss of breeding habitat for prey species will, over time, lower the overall availability of prey species for the falcon, thus reducing the suitability of the habitat for falcons. A reduction in falcon suitability may cause falcons to avoid the project area

for the duration of the project with no guarantee that the species will return following final abandonment.

Any proposed development of the proposed lease parcels will potentially cause the destruction of small passerine nests. Various passerines and other avian species are the prey for the aplomado falcon. Currently there is limited information regarding how and at what level oil and gas development affects the prey base and thus the falcon. Therefore, impact analysis is based on the best currently available data.

Special conservation measures, applied to this project either as conditions-of-approval on the application or as lease stipulations, were designed to reduce impacts to potential falcon habitat and nesting structures. For example, yuccas over five feet in height will not be damaged by any activity associated with the project. Avoiding the yuccas will ensure that nesting structures will remain available for future nest sites. All active raptor nests will be avoided by a minimum of 400 meters and inactive raptor nests by a minimum of 200 meters by all activities associated with the project.

To reduce the cumulative footprint of the project, the well pad size will not exceed 300 ft x 390 ft (2.68 acres), unless multiple wells are drilled on the same location, and roads will not exceed 30 ft in width. Infrastructure, such as roads, pipelines, and powerlines have been designed in corridors to reduce fragmentation. To reduce the potential for mortality for both falcons and prey species, reserve pits are not allowed unless they can be effectively netted. Steel circulation tanks are recommended instead. After drilling activities are complete, interim reclamation is required to return unused disturbed portions of the site to pre-construction conditions. The reclamation protocol follows the final abandonment and reclamation protocol and includes removing caliche and seeding with a seed mix incorporating plant species found in the local area as found below in the mitigations section.

By following the described conservation measures, this project may affect, but is not likely to adversely affect northern aplomado falcon. This determination has received concurrence from the FWS through the Section 7, interagency process.

BLM Natural Resource Specialists and Wildlife Biologists will work with the applicant to locate the well and infrastructure in a location that minimizes potential impacts to aplomado falcon habitat and nesting structures, during the APD stage of development.

Proposed Action: Parcels -001, and -002 contain suitable habitat for the Northern aplomado falcon. Due to the habitat present within the parcels, development can be managed effectively with the Aplomado falcon stipulation SENM-S-31.

Under the preferred Alternative parcels -001, and -002 would not be leased.

### **Potential Mitigation:**

#### **Northern Aplomado Falcon**

Development of these leases could potentially impact local populations of northern aplomado falcon. Mitigations for those areas that possess suitable falcon habitat include (for specific detail, see attached stipulation):

- A plan of development for the entire lease must be submitted prior to any development

- Special well pad construction and reclamation measures must be implemented
- Utilize existing well pads where possible
- Earthen tanks for drilling and disposal are not allowed unless they can be effectively netted. Otherwise, a steel tank circulation system must be used
- All yuccas and/or other nesting structure >5' tall must be avoided
- All development activities will avoid inactive raptor/raven nests by >200m and active raptor/raven nests by >400m.

Based on the current levels of grazing, brush treatment efforts and the mitigative efforts to alleviate potential oil and gas impacts to avian species, a "not likely to adversely affect" situation exists.

#### **4.3.11 Wildlife**

While the act of leasing Federal minerals would produce no direct impacts to wildlife, subsequent development of a lease may produce impacts. Impacts could result from increased habitat fragmentation, noise, or other disturbance during development. The severity of effects depends on the sensitivity of the species affected. The species present in these areas tend to vacate traditional habitats under continued and increasing pressure from petroleum activities. Additional wells would increase the risk to wildlife in the developing area as a result of noise and visual impacts from compressor stations, an increased number of operating pumpjacks, powerlines (which can hum in the wind), drilling rigs, and increased vehicular traffic, among others. In addition, wildlife may be disturbed while hydraulic fracturing or other completion and stimulation operations are occurring, as these activities involve many vehicles, heavy equipment, and a workover rig. These impacts would be limited to the timeframe during which drilling operations associated with hydraulic fracturing occur, typically several weeks (see Appendix 3). This could cause wildlife to avoid these areas, including wildlife watering units, and relocate to other, less-developed, areas. Disturbance to the surface itself could potentially degrade or fragment habitat to such a degree that it may become unusable for certain species.

Other forms of surface disturbance could take place on developing leases, such as the installation of caliche pits, the addition of oil- and gas field infrastructure such as powerlines, pipelines, tank batteries or other storage facilities, and the construction of new roads fragment habitat and increase the risk of collision between vehicles and wildlife. Effects on raptor nests or heronries could result in a reduction of nesting habitat for raptors or herons, thus reducing the likelihood of sustaining the local population.

The affects of human-associated disturbance is a primary threat to raptor populations. The construction and development associated with oil and gas exploration and/or development may adversely affect potential nest sites and associated foraging area that support the pairs nesting effort. The specific effects and tolerance limits to disturbance on raptors vary among and within raptor species. This is due to the broad range of direct and indirect human-associated impacts and the fluctuating levels of sensitivity for individual raptors, depending on life stage and time of year. Behavioral data suggests that adults that become sensitized to human presence are less than normally attentive to their young, which can reduce fledging success. Furthermore, behavioral data suggests that raptors have the tendency to shift or expand their home ranges, or move to new areas (Anderson et al. 1990). Disruption of foraging areas can result in lowered hunting success, increased intraspecific encounters, and reduced food intake (Anderson 1984).

Raptors displaced from foraging areas may have increased energy expenditures and less time available for other activities, and their productivity could be adversely affected (Stalmaster and Kaiser 1997). The noise caused by pump jack engines could cause potential abandonment of nests or a shift or expansion of home range. Adherence to the conditions of approval and mitigation measures (Sec. 2.1) is critical for the protection of this resource.

In order to minimize human disturbance spatial and/or temporal buffer zones can protect raptors during periods of extreme sensitivity. Raptors may tolerate considerable noise close to their nests if they are familiar with it, especially if humans are not visible or otherwise obviously associated with it (Schueck et al. 2001). Potentially, if a disturbance is periodic and ongoing when adults first arrive at their nests and not perceived as threatening, raptors may habituate to them.

Parcel -008 has a wildlife habitat projects within the parcel boundary or within 200 meters of the parcel boundary. The wildlife habitat projects within the CFO consist of passive collection structures which collects precipitation and provides additional sources of water, used by wildlife. Associated with these structures are wildlife exclosure areas which excludes livestock grazing and provides habitat in the means of cover, and forage for wildlife.

Parcels -040, -047, -049, and -050 have known raptor nests located within the parcel boundary or within 200 meters of the parcel boundary.

Proposed Action and Preferred Alternative impacts would be the same.

#### **Potential Mitigation:**

The BLM will continue to require oil and gas lessees to operate in a manner that will minimize adverse impacts to wildlife. To that end, the BLM will continue to apply reasonable measures to all oil and gas activities.

Site-specific COAs or BMPs may be developed at the APD stage to further mitigate direct and indirect effects.

#### **4.3.12 Range**

While the act of leasing Federal minerals would produce no direct impacts to livestock grazing, subsequent development of a lease may produce impacts.

The construction of pads, pits, roads, and rights-of-way would cause forage to be lost on portions of all eighteen (18) grazing allotments. On average, the grazing of vegetation by livestock takes approximately 6 acres of vegetation per Animal Unit Month (AUM), which is the amount of forage needed to support one cow for one month. In total, the proposed action could result in the loss of 722 acres, and the preferred action could result in the the loss of 464 acres of forage. These totals for losses of available forage are based on the amount of Federal mineral estate in correlation with the amount of Federal surface used to determine the amount of available forage within each individual grazing allotment. (Example; *Even though there may be a Federal grazing allotment, it could be predominately made up of State lands. The locations or placement of well pads and infrastructure on state lands would not create a impact to the amount of available forage calculated for Federal acreage within the grazing allotment. However there*

*will be a loss of available forage within the State portion of the grazing allotment.*

There are occasional livestock injuries or deaths due to accidents such as collisions with vehicles, falls into mud pits or other excavations, or ingestions of plastic or other materials present at work sites. Construction activities can damage range improvements such as fences and pipelines. These impacts make day-to-day livestock management actions more difficult. Potential impacts from the hydraulic fracturing of a well could impact grazing allotments if the grazing permittee chose to sell fresh water to the operator of an oil and gas well and they did not have enough water present to water their livestock. A more site specific analysis would take place during the APD review and subsequent NEPA analysis.

**Proposed Action:**

Parcels -001, -002, -006, -008, -009, -010, -012, -013, -014, -015, -023, -024, -027, -028, -030, -031, -036, -037, -038, -039, -040, -043, -045, -046, -047, -048, -049, -050, -051, and -057 would be leased under this alternative. The potential surface disturbance for each of the affected allotments is as follows:

Antelope Sink: Parcel -001 would impact 37.4 acres.

Antelope Sink: Parcel -002 would impact 110 acres.

Rock House: Parcel -006 would impact 2.2 acres.

ThreeTwins North/ Golden Eagle: Parcel -008 would impact 55 acres.

Three Twins North/ Rock House: Parcel -009 would impact 35.2 acres.

Three Twins North: Parcel -010 would impact 8.8 acres.

Three Twins/ Rain Springs: Parcel -012 would impact 35.2 acres.

Rain Springs: Parcel -013 would impact 8.8 acres.

Three Twins: Parcel -014 would impact 4.4 acres.

Three Twins/ McGruder Hill: Parcel -015 would impact 19.8 acres.

Turkey Track (out of Roswell): Parcel -023 would impact 17.6 acres

Rustler Breaks: Parcel -024 would impact 8.8 acres.

Nash Draw: Parcel -027 would impact 19.8 acres.

Nash Draw: Parcel -028 would impact 11 acres.

Clayton Basin/ Salt Lake: Parcel -030 would impact 41.8 acres.

Antelope Ridge: Parcel -031 would impact 15.4 acres.

San Simon: Parcel -036 would impact 15.4 acres.

Red Tank: Parcel -037 would impact 39.6 acres.

Red Tank: Parcel -057 would impact 4.4 acres

Jackson East: Parcel -038 would impact 19.8 acres.

Sand Dune: Parcel -039 would impact 19.8 acres.

Sand Dune: Parcel -040 would impact 24.2 acres.

Sand Dune: Parcel -043 would impact 22 acres.

Sand Dune: Parcel -045 would impact 6.6 acres.

Sand Dune: Parcel -046 would impact 6.6 acres.

Medlin Wells: Parcel -047 would impact 33 acres.

Medlin Wells: Parcel -048 would impact 22 acres.

Medlin Wells: Parcel -049 would impact 39.6 acres.

Medlin Wells: Parcel -050 would impact 19.8 acres.

Medlin Wells: Parcel -051 would impact 17.6 acres.

**Preferred Alternative:**

Under the Preferred Alternative parcels -001, -002, -013, -024, -027, -030, -031, and -036 would not be leased, reducing the acres disturbed to 464 acres.

**Potential Mitigation:**

Mitigation will be deferred until the site-specific APD stage of development. The BLM currently consults grazing permittees on a site-by-site basis as part of the APD process. Best Management Practices will be incorporated into COAs.

**4.3.13 Visual Resource Management**

While the act of leasing Federal minerals would produce no direct impacts to visual resources, subsequent development of a lease may produce impacts. Oil and gas development can create many visual scars on the landscape. Development can create contrast to the landscape's natural form, line, color, and texture. Pads, tanks, roads, powerlines, and pipelines introduce unnatural forms into the landscape. Clearing for pads, roads, and pipelines create unnatural color, line and texture changes. Tanks and poles add vertical trends to generally flat landscapes. The more prominent these visual contrasts, the more a project will stand out and distract from the natural



view of the landscape. The more unnatural distractions added to a landscape, the more unpleasing the landscape will look.

Each surface development visually impacts the landscape. Each project may meet or exceed the area's Visual Resource Management (VRM) objectives; however, as an entire oil field is developed, small visual impacts would accumulate to create harsh scars on the landscape. The cumulative effects would degrade the visual esthetics and public's appreciation for their surrounding environment. To avoid this result, all projects (regardless of VRM class) should be hidden, masked, and reclaimed as best as possible with BMPs and COAs.

Parcels -006, -008, -009, -010, and -013 are located within a visual resource management III area. All remaining parcels are located with a VRM IV area.

Under the Preferred Alternative parcel -013 would not be leased.

### **Potential Mitigation:**

Mitigation measures to reduce impacts of development and maintain Visual Resource Class Objectives will include landform considerations such as moving locations to areas with less slope, changing road width and grade, changing alignment to follow existing grades, and prohibiting dumping of excess material on downhill slopes. Earthwork COAs may include rounding or warping slopes, retaining rocks, trees and drainage, adding mulch, hydromulch, or topsoil, shaping cuts and fills to appear as natural forms, cutting rock areas so forms are irregular, designing to take advantage of natural screens (i.e., vegetation, land forms), and grass seeding of cuts and fills.

Topography considerations may require locating projects away from prominent topographic features and designing projects to blend with topographic forms in shape and placement. Additional COAs for retaining vegetation may include using retaining walls on fill slopes, reducing surface disturbance, protecting roots from damage during excavations, mulching cleared areas, controlling planting times, furrowing slopes, planting holes on cut and fill slopes, choosing native plant species, stockpiling and reusing topsoil, fertilizing, mulching, and watering vegetation, utilizing existing roads, limiting work within construction area, selecting type of equipment to be used and minimizing clearing size.

Permanent structures are impacts for the life of the project. To minimize the number of visible structures, COAs will be applied, requiring use of earth-tone paints and stains and natural stone surfaces, burying all or part of the structure, selecting paint finishes with low levels of reflectivity (i.e., flat), redesigning structures to blend with surroundings, and relocating structures.

Interim reclamation measures for the working life of the pad may be implemented to reduce visual impacts, such as partial revegetation of the pad after initial drilling is complete to allow only necessary surface use and access requirements. COAs will be added to the site-specific APD stage of development.

COAs may require utilities and rights-of-way related to the development of the proposed lease parcels to be stipulated by making crossings at right angles of corridors, setting structures a

maximum distance from the crossing, leaving vegetation along the roadside, minimizing viewing time, and utilizing natural screening.

#### **4.3.14 Recreation**

While the act of leasing Federal minerals would produce no direct impacts to recreation, subsequent development of a lease may produce impacts. Potential impacts could affect dispersed recreation activities such as big game hunting in certain pastures of individual parcels, but these effects cannot be determined until site-specific development proposals are received at the APD stage.

Additional wells would reduce the acreage available for recreation in open space on public land. Dispersed recreation activities, such as off-road driving, hunting, and hiking could be impacted by increased traffic, visual intrusions, noise, trash, and other related results of oil and gas development. Additional aboveground facilities fragment open space and reduce the natural setting of areas. Some recreation pursuits could be limited by additional hazards created by facilities and infrastructure related to development.

In addition, any recreationists in the area may be disturbed while hydraulic fracturing or other completion and stimulation operations are occurring, as these activities involve many vehicles, heavy equipment, and a workover rig. These impacts would be limited to the timeframe during which drilling operations associated with hydraulic fracturing occur, typically several weeks (see Appendix 3).

Proposed Action and Preferred Alternative impacts would be the same.

#### **Potential Mitigation:**

Mitigations for impacts to recreation will be determined when specific sites for development are determined. Mitigations may include moving locations, increased safety precautions during construction, relocating existing trails, reducing visual impacts, implementing noise control devices on facilities, and co-locating facilities and corridors to reduce surface disturbance.

#### **4.3.15 Cave/Karst**

While the act of leasing Federal minerals would produce no direct impacts to cave or karst resources, subsequent development of a lease may produce impacts. Cave and karst features provide direct conduits leading to groundwater. These conduits can quickly transport surface and subsurface contaminants directly into underground water systems and freshwater aquifers without filtration or biodegradation as a result of the development of oil and gas leases. In addition, contaminants spilled or leaked into or onto cave/karst zone surfaces and sub-surfaces may lead directly to the disruption, displacement, or extermination of cave species and critical biological processes. In extreme or rare cases, a buildup of hydrocarbons in cave systems due to surface leaks or spills could potentially cause underground ignitions or asphyxiation of wildlife or humans within the cave.

In cave and karst terrains, rainfall and surface runoff is directly channeled into natural underground water systems and aquifers. Changes in geologic formation integrity, runoff

quantity/quality, drainage course, rainfall percolation factors, vegetation, surface contour, and other surface factors can negatively impact cave ecosystems and aquifer recharge processes. Blasting, heavy vibrations, and focusing of surface drainages can lead to slow subsidence, sudden collapse of subsurface voids, and/or cave ecosystem damage.

The construction of roads, pipelines, well pads and utilities can impact bedrock integrity and reroute, impede, focus, or erode natural surface drainage systems. Increased silting and sedimentation from construction can plug downstream sinkholes, caves, springs, and other components of aquifer recharge systems and result in adverse impacts to aquifer quality and cave environments. Any contaminants released into the environment during or after construction can impact aquifers and cave systems. A possibility exists for slow subsidence or sudden surface collapse during construction operations due to collapse of underlying cave passages and voids. This would cause associated safety hazards to the operator and the potential for increased environmental impact. Subsidence processes can be triggered by blasting, intense vibrations, rerouting of surface drainages, focusing of surface drainage, and general surface disturbance.

Blasting fractures in bedrock can serve as direct conduits for transfer of contaminants into cave and groundwater systems. Blasting also creates an expanded volume of rock rubble that cannot be reclaimed to natural contours, soil condition, or native vegetative condition. As such, surface and subsurface disruptions from blasting procedures can lead to permanent changes in vegetation, rainfall percolation, silting/erosion factors, aquifer recharge, and freshwater quality and can increase the risk of contaminant migration from drilling/production facilities built atop the blast area.

During drilling, previously unknown cave and karst features could be encountered. If a void is encountered while drilling and a loss of circulation occurs, lost drilling fluids can directly contaminate groundwater recharge areas, aquifers, and groundwater quality. Drilling operations can also lead to sudden collapse of underground voids. Cementing operations may plug or alter groundwater flow, potentially reducing the water quantity at springs and water wells. Inadequate subsurface cementing, casing, and cave/aquifer protection measures can lead to the migration of oil, gas, drilling fluids, and produced saltwater into cave systems and freshwater aquifers.

Parcels -012, -013, and -015 are located within a Critical cave/karst zone.

Parcels -006, -008, -009, -010, -012, -014, -027, and -028 are located within a High cave/karst zone.

All remaining parcels are located within a low cave/karst zone.

Under and Preferred Alternative parcels -013, and -027 would not be leased.

#### **Potential Mitigation:**

Potential mitigations that could be developed during the APD and lease development stages may include: changes in drilling operations, special casing and cementing programs, modification in surface activities, cave/karst avoidance or other reasonable measures.

#### **4.3.16 Socioeconomics and Environmental Justice**

Issuing any or all of these leases may result in a major hydrocarbon discovery. Increased employment in Hobbs or Carlsbad would aid minority and low-income populations. Otherwise, the lease sale does not have potential to disproportionately affect minority or low-income populations. A major discovery of hydrocarbons resulting from this Oil and Gas Lease Sale could increase the populations of the Cities of Hobbs and Carlsbad, placing stress on housing, schools, commerce, and emergency services in Chaves, Eddy, and Lea Counties.

In addition, any nearby residents may be disturbed while hydraulic fracturing or other completion and stimulation operations are occurring, as these activities involve many vehicles, heavy equipment, and a workover rig. These impacts would be limited to the timeframe during which drilling operations associated with hydraulic fracturing occur, typically several weeks (see Appendix 3).

**Potential Mitigation:**

No mitigation would be required as a result of this project.

**4.3.17 Potash Resources**

Potential impacts of drilling operations to potash resources could include migration of hydrocarbons through impermeable formations or fractures within the formations that might provide a conduit to mine workings from improperly cased wells.

Potassium reserves would be lost because mine workings must leave a support pillar of sufficient size around well bores in order to prevent damaging subsidence.

Proposed projects can be expected to be relocated to minimize impacts to potash resources while allowing drainage of remote areas within the potash enclave. BLM processes APDs within the Secretary's Potash Area through an Interim Processing Guidelines directive issued by the State Director. This directive provides guidance concerning the processing of APDs in the Potash Area, prior to the completion of the "potash enclave standards" review, which was ordered by the Interior Board of Land Appeals (IBLA) in IBLA 2003-334, et al. (IMC Kalium Carlsbad, Inc., et al.).

Lease Parcels -027, -028, -030, and -031 are located within the Secretary's Potash Area. All of these parcels have the majority of the parcel boundary located within the R-111-P Boundary also known as the (KPLA) and will require special casing design to protect the salt from objective oil and gas formations below.

Under the preferred alternative parcels -027, -030 and -031 would not be leased.

**Potential Mitigation:** The Secretary of the Interior recognized that there would be some loss of potash resources when oil and gas wells were drilled in the potash area. The Secretary's 1986 Order states that the successful applicant for a noncompetitive oil and gas lease and any party awarded a competitive lease, for lands included in the designated Potash Area, is required, as a condition to the issuance of such lease, to execute a stipulation to the lease as follows:

Drilling for oil and gas shall be permitted only in the event that the lessee established to the satisfaction of the authorized officer, Bureau of Land Management, that such drilling will not interfere with the mining and recovery of potash deposits, or the interest of the United States will best be served by permitting such drilling.

No wells shall be drilled for oil or gas at a location which in the opinion of the authorized officer, would result in undue waste of potash deposits or constitute a hazard to or unduly interfere with mining operations being conducted for the extraction of potash deposits.

When the authorized officer determines that unitization is necessary for orderly oil and gas development and proper protection of potash deposits, no well shall be drilled for oil or gas except pursuant to a unit plan approved by the authorized officer.

The drilling or the abandonment of any well on said lease shall be done in accordance with applicable oil and gas operating regulations including such requirements as the authorized officer may prescribe as necessary to prevent the infiltration of oil, gas or water into formations containing potash deposits or into mines or workings being utilized in the extraction of such deposits.

#### **4.3.18 Proposed ACEC**

While the act of leasing Federal minerals would produce no direct impacts to the proposed ACECs subsequent development of a lease may produce impacts. Impacts could result from oil and gas development that could potentially impact the relevant and important values identified as part to the proposed ACEC designation. Additional oil and gas activities associated with a lease such as increased surface disturbances associated with access roads, well pad locations, electrical lines, oil and gas flowlines, could potentially have an impact to the relevant and important values identified within the proposed ACEC.

Under the proposed action Parcels -001, -002, -013, -024, -027, and -030 would be leased. The act of leasing these parcels would not produce any direct impact to the proposed ACEC relevant and important values. However, leasing them under this alternative could effect the range of alternatives being looked at under the Carlsbad RMPA.

Under the preferred alternative none of the parcels within the five (5) proposed ACEC would be leased so not impact would occur to the relevant and important values of the proposed ACEC. There would also be no impact to the range of alternatives being discussed within the Carlsbad RMPA.

#### **Potential Mitigation:**

Mitigation will be deferred until the site-specific APD stage of development. The BLM would look at the relevant and important values on a site-by-site basis as part of the APD process. Best Management Practices will be incorporated into COAs in order to protect the relevant and important values identified within the proposed ACEC.

## **5.0 Cumulative Impacts**

The NMSO manages approximately 41 million acres of Federal mineral estate. Of the 41 million acres, 35 million acres are available for oil and gas leasing. Approximately 16% of the 35 million acres is currently leased (73% of the leases are in production and 63% of the lease acres are in production). The NMSO received 52 parcel nominations (23,287 acres) for consideration in the July 16, 2014 Oil & Gas Lease Sale, and is proposing to lease 32 (15,003 acres) of the 52 parcels. If these 32 parcels were leased, the percentage of Federal minerals leased would not change.. The Carlsbad and Roswell Field Office parcels are analyzed under separate EAs.

**Table 5A. Actual - Acres of Federal Minerals/Acres Available/Acres Leased:**

State	Federal O&G Mineral Ownership	Acres Available	Acres Leased	Percent Leased
KS	744,000	614,586	125,091	20%
NM	34,774,457	29,751,242	4,839,255	16%
OK	1,998,932	1,668,132	324,072	19%
TX	3,404,298	3,013,207	425,511	14%
Totals/Average	40,921,687	35,058,167	5,713,929	16%

**Table 5B. Parcels Nominated & Offered in the July 2014 Oil & Gas Lease Sale:**

Field Office	No. of Nominated Parcels	Acres of Nominated Parcels	No. of Parcels to be Offered	Acres of Parcels to be Offered
Carlsbad	39	14,246	22	7,716
Roswell	16	8,600	10	5,880
Totals	55	22,846	32	13,596

**Table 5C. Foreseeable - Acres of Federal Minerals/Acres Available/Acres Leased:**

State	Federal O&G Mineral Ownership	Acres Available	Acres Leased	Percent Leased
KS	744,000	614,586	125,091	20%
NM	34,774,457	29,751,242	4,852,851	16%
OK	1,998,932	1,668,132	324,072	19%
TX	3,404,298	3,013,207	425,511	14%
Totals/Average	40,921,687	35,067,167	5,728,932	16%

Assumptions of total surface disturbance is based on estimating the maximum potential that could be developed within the nominated lease parcel relative to past development knowledge and practices and resource concerns within the parcels. Exploration and development of hydrocarbon resources outside of well-developed areas increases the distance required for roads, pipelines, and power lines.

The surface disturbance assumptions shown in the following tables estimate impacts associated with oil and gas exploration and development drilling activities that could occur at each lease parcel if it were fully developed. The CFO randomly sampled 70 new wells that had been drilled within the last 4 years to determine surface disturbance created by constructing an access road. The average length of new road required to drill a new well based on our random sample is 570 feet. The average surface disturbance of an oil or gas well pad is 300 feet by 300 feet.

Estimations for surface disturbance:

- Access Roads: = 0.2 acres disturbance per access road (14 foot-wide x 570 feet travel way)
- Drill Pads: = 2 acres disturbance per well pad (300 feet x 300 feet)

**Proposed Action:**

Parcel	Comments	Parcel	Potential Wells	Potential Acres Disturbed
		Parcel Acreage		
<b><u>NM-201407-001</u></b>  T.0180S, R.0230E, NM PM, NM Sec. 025 ALL;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-31 Northern Aplomado Falcon SENM-S-39 Plan of Development	640.000	17	37.4
<b><u>NM-201407-002</u></b>  T.0190S, R.0230E, NM PM, NM Sec. 001 LOTS 1-4; 001 S2N2,S2; 002 LOTS 3,4; 002 S2NW,S2; 003 LOTS 1-4; 003 S2N2,S2;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-31 Northern Aplomado Falcon SENM-S-39 Plan of Development	1760.700	50	110
<b><u>NM-201407-006</u></b>  T.0210S, R.0240E, NM PM, NM Sec. 011 SE;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave-Karst Occurrence Area SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management SENM-S-39 Plan of Development	160.000	1	2.2
<b><u>NM-201407-008</u></b>  T.0210S, R.0250E, NM PM, NM	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave-Karst Occurrence Area	956.800	25	55

Sec. 004 LOTS 1-16; 004 SW,N2SE,SWSE; 009 N2NW;	SENM-S-15 Wildlife Water SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management SENM-S-39 Plan of Development			
<b><u>NM-201407-009</u></b>  T.0210S, R.0250E, NM PM, NM Sec. 008 NE,W2,N2SE,SWSE;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave- Karst Occurrence Area SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management SENM-S-39 Plan of Development	600.000	16	35.2
<b><u>NM-201407-010</u></b>  T.0210S, R.0250E, NM PM, NM Sec. 009 SESW,S2SE;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave- Karst Occurrence Area SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management SENM-S-39 Plan of Development	120.000	4	8.8
<b><u>NM-201407-012</u></b>  T.0220S, R.0250E, NM PM, NM Sec. 005 LOTS 1-4; 005 S2N2,S2;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave- Karst Occurrence Area SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-39 Plan of Development	639.600	16	35.2
<b><u>NM-201407-013</u></b>	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice	158.050	4	8.8



T.0220S, R.0250E, NM PM, NM Sec. 006 LOTS 3-5; 006 SENW;	SENM-S-17 Slopes or Fragile Soils SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management			
<b><u>NM-201407-014</u></b>  T.0220S, R.0250E, NM PM, NM Sec. 008 SENE;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave- Karst Occurrence Area SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-39 Plan of Development	40.000	2	4.4
<b><u>NM-201407-015</u></b>  T.0220S, R.0250E, NM PM, NM Sec. 018 E2;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave- Karst Occurrence Area SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-39 Plan of Development	320.000	9	19.8
<b><u>NM-201407-023</u></b>  Acres T.0170S, R.0290E, NM PM, NM Sec. 012 N2SW,SESW,N2SE,SWSE; 012 ALL FORMATIONS EXCEPT; 012 THE GRAYBURG FORMATION; T.0170S, R.0300E, NM PM, NM Sec. 007 LOTS 3,4; 007 ALL FORMATIONS EXCEPT; 007 THE GRAYBURG FORMATION;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-22 Prairie Chicken	314.730	8	17.6
<b><u>NM-201407-024</u></b>	<u>Lease with the following Stipulations:</u>	120.000	4	8.8

T.0260S, R.0290E, NM PM, NM Sec. 003 N2NW; 004 NENE;	NM-LN-11 LN Specials Cultural Resource notice			
<b><u>NM-201407-027</u></b>  T.0230S, R.0300E, NM PM, NM Sec. 005 LOTS 3,4; 005 S2NW,SW;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-6 Lease Notice - Potash SENM-LN-1 Lease Notice – Cave- Karst Occurrence Area SENM-S-1 Potash SENM-S-17 Slopes or Fragile Soils SENM-S-19 Playas and Alkali Lakes SENM-S-21 Caves and Karst	320.850	9	19.8
<b><u>NM-201407-028</u></b>  T.0230S, R.0300E, NM PM, NM Sec. 020 SE;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave- Karst Occurrence Area SENM-LN-6 Lease Notice - Potash SENM-S-1 Potash SENM-S-17 Slopes or Fragile Soils SENM-S-21 Caves and Karst	160.000	5	11
<b><u>NM-201407-030</u></b>  T.0200S, R.0320E, NM PM, NM Sec. 008 NWNE,E2W2,NWSE,S2SE; 009 ALL;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-6 Lease Notice - Potash SENM-S-1 Potash	680.000	19	41.8
<b><u>NM-201407-031</u></b> (modified – 62 acres out of 320 within a HEA)  T.0210S, R.0320E, NM PM, NM Sec. 025 S2;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-6 Lease Notice - Potash SENM-S-1 Potash SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	258.000	7	15.4
<b><u>NM-201407-036</u></b> (modified –	<u>Lease with the following Stipulations:</u>	240.000	7	15.4

<b>80 acres out of 360 within a HEA)</b>  T.0220S, R.0330E, NM PM, NM Sec. 020 N2;	NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat			
<u><b>NM-201407-037</b></u>  T.0250S, R.0340E, NM PM, NM Sec. 023 ALL;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice  SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	640.000	18	39.6
<u><b>NM-201407-038</b></u>  T.0200S, R.0350E, NM PM, NM Sec. 005 LOTS 3,4; 005 S2NW,SW;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-2 Lease Notice – Protection of Dunes Sagebrush Lizard SENM-S-17 Slopes or Fragile Soils SENM-S-22 Prairie Chicken SENM-S-23 Sand Dune Lizard SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat SENM-S-46 POD – Dunes Sagebrush Lizard	322.320	9	19.8
<u><b>NM-201407-039</b></u>  T.0240S, R.0350E, NM PM, NM Sec. 029 W2;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-18 Streams, Rivers, Floodplains SENM-S-20 Spring, Seeps, and Tanks SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat SENM-S-47 Lease Reclamation	320.000	9	19.8

<b><u>NM-201407-040 (modified – Parcels 40, 41 and 42 combined)</u></b>  Acres T.0240S, R.0350E, 23 PM, NM Sec. 031 LOTS 2,4; 031 E2;	<b><u>Lease with the following Stipulations:</u></b> NM-11-LN Special Cultural Resource SENM-S-16 Raptor Nest SENM-S-22 Prairie Chickens SENM-S-34 Zone 3 - POD	400.730	11	24.2
<b><u>NM-201407-043 (modified – Parcels 43 and 44 combined)</u></b>  T.0250S, R.0350E, 23 PM, NM Sec. 005 LOTS 1,3; 005 SENE,SENW,S2S2,NESE;	<b><u>Lease with the following Stipulations:</u></b> NM-11-LN Special Cultural Resource SENM-S-22 Prairie Chickens SENM-S-34 Zone 3 - POD SENM-S-47 Reclamation	361.400	10	22
<b><u>NM-201407-045</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 006 LOTS 4,5;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat SENM-S-47 Lease Reclamation	80.480	3	6.6
<b><u>NM-201407-046</u></b>  Acres T.0250S, R.0350E, NM PM, NM Sec. 007 E2SW;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	80.000	3	6.6
<b><u>NM-201407-047</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 020 N2NE,W2,SE;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-16 Raptor Nest SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat SENM-S-47 Lease Reclamation	560.000	15	33
<b><u>NM-201407-048</u></b>  T.0250S, R.0350E, NM PM,	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice	360.000	10	22

NM Sec. 021 E2,NESW;	SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat			
<b><u>NM-201407-049</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 029 ALL;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-16 Raptor Nest SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	640.000	18	39.6
<b><u>NM-201407-050</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 031 LOTS 1,2; 031 NE,E2NW;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-16 Raptor Nest SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	320.320	9	19.8
<b><u>NM-201407-051</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 033 SWNE,NW,N2SW;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	280.000	8	17.6
<b><u>NM-201407-057</u></b>  T.0250S., R.0340E., NMPM Sec. 09: SWSW;	Lease with the following Stipulations: NM-11-LN Special Cultural Resources NM-10 Drainage SENM-S-22 Prairie Chickens SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat	40.00	2	4.4
<b>Total</b>		<b>11,894.00</b>	<b>328</b>	<b>721.6</b>

**Preferred Alternative:**

Cumulative Impact Table (Based on Full Field Development of the Preferred Alternative)

Parcel	Comments	Parcel	Potential Wells	Potential Acres Disturbed
		Parcel Acreage		
<b><u>NM-201407-006</u></b>  T.0210S, R.0240E, NM PM, NM	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave- Karst Occurrence Area	160.000	1	2.2

Sec. 011 SE;	SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management SENM-S-39 Plan of Development			
<b><u>NM-201407-008</u></b>  T.0210S, R.0250E, NM PM, NM Sec. 004 LOTS 1-16; 004 SW,N2SE,SWSE; 009 N2NW;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave- Karst Occurrence Area SENM-S-15 Wildlife Water SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management SENM-S-39 Plan of Development	956.800	25	55
<b><u>NM-201407-009</u></b>  T.0210S, R.0250E, NM PM, NM Sec. 008 NE,W2,N2SE,SWSE;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave- Karst Occurrence Area SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management SENM-S-39 Plan of Development	600.000	16	35.2
<b><u>NM-201407-010</u></b>  T.0210S, R.0250E, NM PM, NM Sec. 009 SESW,S2SE;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave- Karst Occurrence Area SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-25 Visual Resource Management SENM-S-39 Plan of Development	120.000	4	8.8
<b><u>NM-201407-012</u></b>	<u>Lease with the following Stipulations:</u>	639.600	16	35.2

<p>T.0220S, R.0250E, NM PM, NM Sec. 005 LOTS 1-4; 005 S2N2,S2;</p>	<p>NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave- Karst Occurrence Area SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-39 Plan of Development</p>			
<p><b><u>NM-201407-014</u></b></p> <p>T.0220S, R.0250E, NM PM, NM Sec. 008 SENE;</p>	<p><u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave- Karst Occurrence Area SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-39 Plan of Development</p>	40.000	2	4.4
<p><b><u>NM-201407-015</u></b></p> <p>T.0220S, R.0250E, NM PM, NM Sec. 018 E2;</p>	<p><u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave- Karst Occurrence Area SENM-S-17 Slopes or Fragile Soils SENM-S-18 Streams, Rivers, Floodplains SENM-S-21 Caves and Karst SENM-S-39 Plan of Development</p>	320.000	9	19.8
<p><b><u>NM-201407-023</u></b></p> <p>Acres T.0170S, R.0290E, NM PM, NM Sec. 012 N2SW,SESW,N2SE,SWSE; 012 ALL FORMATIONS EXCEPT; 012 THE GRAYBURG FORMATION; T.0170S, R.0300E, NM PM, NM Sec. 007 LOTS 3,4; 007 ALL</p>	<p><u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-22 Prairie Chicken</p>	314.730	8	17.6

FORMATIONS EXCEPT; 007 THE GRAYBURG FORMATION;				
<b><u>NM-201407-028</u></b>  T.0230S, R.0300E, NM PM, NM Sec. 020 SE;	Lease with the following Stipulations: NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-1 Lease Notice – Cave- Karst Occurrence Area SENM-LN-6 Lease Notice - Potash SENM-S-1 Potash SENM-S-17 Slopes or Fragile Soils SENM-S-21 Caves and Karst	160.000	5	11
<b><u>NM-201407-037</u></b>  T.0250S, R.0340E, NM PM, NM Sec. 023 ALL;	Lease with the following Stipulations: NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice  SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	640.000	18	39.6
<b><u>NM-201407-038</u></b>  T.0200S, R.0350E, NM PM, NM Sec. 005 LOTS 3,4; 005 S2NW,SW;	Lease with the following Stipulations: NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-LN-2 Lease Notice – Protection of Dunes Sagebrush Lizard SENM-S-17 Slopes or Fragile Soils SENM-S-22 Prairie Chicken SENM-S-23 Sand Dune Lizard SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat SENM-S-46 POD – Dunes Sagebrush Lizard	322.320	9	19.8
<b><u>NM-201407-039</u></b>  T.0240S, R.0350E, NM PM, NM Sec. 029 W2;	Lease with the following Stipulations: NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-18 Streams, Rivers, Floodplains SENM-S-20 Spring, Seeps, and Tanks SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat SENM-S-47 Lease Reclamation	320.000	9	19.8



<b><u>NM-201407-040</u></b> (Modified – <b>Parcels 40, 41 and 42 were  combined</b> )  Acres T.0240S, R.0350E, 23 PM, NM Sec. 031 LOTS 2,4; 031 E2;	<u>Lease with the following Stipulations:</u> NM-11-LN Special Cultural Resource SENM-S-16 Raptor Nest SENM-S-22 Prairie Chickens SENM-S-34 Zone 3 - POD	400.730	11	24.2
<b><u>NM-201407-043</u></b> (Modified – <b>Parcels 43 and 44 were  combined</b> )  T.0250S, R.0350E, 23 PM, NM Sec. 005 LOTS 1,3; 005 SENE,SENW,S2S2,NESE;	<u>Lease with the following Stipulations:</u> NM-11-LN Special Cultural Resource SENM-S-22 Prairie Chickens SENM-S-34 Zone 3 - POD SENM-S-47 Reclamation	361.400	10	22
<b><u>NM-201407-045</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 006 LOTS 4,5;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat SENM-S-47 Lease Reclamation	80.480	3	6.6
<b><u>NM-201407-046</u></b>  Acres T.0250S, R.0350E, NM PM, NM Sec. 007 E2SW;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	80.000	3	6.6
<b><u>NM-201407-047</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 020 N2NE,W2,SE;	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-16 Raptor Nest SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat SENM-S-47 Lease Reclamation	560.000	15	33
<b><u>NM-201407-048</u></b>	<u>Lease with the following Stipulations:</u> NM-LN-11 Lease Notice – Special	360.000	10	22

T.0250S, R.0350E, NM PM, NM Sec. 021 E2,NESW;	Cultural Resource Lease Notice SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat			
<b><u>NM-201407-049</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 029 ALL;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-16 Raptor Nest SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	640.000	18	39.6
<b><u>NM-201407-050</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 031 LOTS 1,2; 031 NE,E2NW;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-16 Raptor Nest SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	320.320	9	19.8
<b><u>NM-201407-051</u></b>  T.0250S, R.0350E, NM PM, NM Sec. 033 SWNE,NW,N2SW;	<b><u>Lease with the following Stipulations:</u></b> NM-LN-11 Lease Notice – Special Cultural Resource Lease Notice SENM-S-22 Prairie Chicken SENM-S-34 Plan of Development – Shinnery Oak Sand Dune Habitat	280.000	8	17.6
<b><u>NM-201407-057</u></b>  T.0250S., R.0340E., NMPM Sec. 09: SWSW;	<b><u>Lease with the following Stipulations:</u></b> NM-11-LN Special Cultural Resources NM-10 Drainage SENM-S-22 Prairie Chickens SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat	40.00	2	4.4
<b>Total</b>		<b>7,716.38</b>	<b>211</b>	<b>464.2</b>

Analysis of cumulative impacts for the Proposed Action and the Preferred Alternative for the development of oil and gas wells on public lands in the CFO is based on location of the parcels and the potential mineral estate that could be developed.

### **Climate Change**

This section incorporates an analysis of the contributions of the proposed action to GHG emissions and a general discussion of potential impacts to climate.

The EPA's Inventory of US Greenhouse Gas Emissions and Sinks found that in 2009, total U.S. GHG emissions were almost 7 billion (6,639.7 million) metric tons and that total U.S. GHG emissions have increased by 7.4% from 1990 to 2009 (EPA, 2011). Emissions declined from

2008 to 2009 by 6.0% (422.2 million metric tons CO<sub>2</sub><sup>e</sup>). The primary causes of this decrease were the reduced energy consumption during the economic downturn and increased use of natural gas relative to coal for electricity generation (EPA, 2011).

On-going scientific research has identified the potential effects of anthropogenic GHG emissions such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and several trace gasses; changes in biological carbon sequestration; and other changes due to land management activities on global climate. Through complex interactions on a global scale, GHG emissions cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although natural GHG atmospheric concentration levels have varied for millennia (along with corresponding variations in climatic conditions), industrialization and burning of fossil carbon sources have caused GHG concentrations to increase.

This incremental contribution to global GHG gases cannot be translated into effects on climate change globally or in the area of this site-specific action. As oil and gas production technology continues to improve, and because of the potential development of future regulation or legislation, one assumption is that reductions in the rate or total quantity of GHG emissions associated with oil and gas production are likely. As stated in the direct/indirect effects section under climate change, the assessment of GHG emissions and the resulting impacts on climate is an ongoing scientific process. It is currently not feasible to know with certainty the net impacts from the proposed action on global or regional climate—that is, while BLM actions may contribute to the climate change phenomenon, the specific effects of those actions on global climate are speculative given the current state of the science. Therefore, the BLM does not have the ability to associate an action's contribution in a localized area to impacts on global climate change. Further, an IPCC assessment states that difficulties remain in attributing observed temperature changes at smaller than continental scales. It is currently beyond the scope of existing science to predict climate change on regional or local scales resulting from specific sources of GHG emissions.

Currently, global climate models are inadequate to forecast local or regional effects on resources (IPCC, 2007; CCSP, 2008). However, there are general projections regarding potential impacts to natural resources and plant and animal species that may be attributed to climate change from GHG emissions over time; however these effects are likely to be varied, including those in the southwestern United States (Karl et al., 2009). For example, if global climate change results in a warmer and drier climate, increased particulate matter impacts could occur due to increased windblown dust from drier and less stable soils. Cool season plant species' spatial ranges are predicted to move north and to higher elevations, and extinction of endemic threatened/endangered plants may be accelerated. Due to loss of habitat or competition from other species whose ranges may shift northward, the population of some animal species may be reduced or increased. Less snow at lower elevations would likely impact the timing and quantity of snowmelt, which, in turn, could impact water resources and species dependant on historic water conditions (Karl et al., 2009).

The New Mexico Greenhouse Gas Inventory and Reference Case Projection 1990-2020 (Inventory) estimates that approximately 17.3 million metric tons of GHGs from the natural gas industry and 2.3 million metric tons of GHGs from the oil industry are projected in 2010 as a result of oil and natural gas production, processing, transmission and distribution (NMED, 2006). As of 2008, there were 23,196 oil wells and 27, 778 gas wells in New Mexico (NMOCD,

2010b).<sup>1</sup>

When compared to the total GHG emission estimates from the total number of oil and gas wells in the State, the average number of oil and gas wells drilled annually in the Field Office and associated GHG emission levels, represent an incremental contribution to the total regional and global GHG emission levels. The number of oil and gas wells that would eventually result from the proposed action would therefore likely represent an even smaller incremental contribution to GHGs emissions on a global scale.

The impact of climate change on BLM resources depends upon the location of the affected resource, its vulnerability and resiliency to change, and its relationship to the human environment. There will be positive and negative impacts of climate change, even within a single region. For example, warmer temperatures may bring longer growing seasons in some regions, benefiting farmers who can adapt to new conditions, but potentially harming native plant and animal species. In general, the larger and faster the changes in climate are, the more difficult it will be for human and natural systems to adapt.

Based on current assumptions for climate change, the CFO could see effects to water quantity, quality, and seasonal availability; agriculture and grazing; disease and pest outbreaks; shifting of seasons; shifts in plant and animal population, range, species diversity, and migration patterns; forest quality; and frequency, duration, and location of extreme weather events. Within the CFO itself, there may be local variations.

Climate change also is likely to exacerbate the effects of natural and altered disturbance regimes, including wildfire, insect outbreaks, flooding, and erosion, across all New Mexico's habitat types and may prompt abrupt ecological changes. This is particularly true in ecosystems such as grasslands, riparian areas, and forests where the effects of past management and land use change are substantial (McCarty, 2008).

Most of the CFO is desert and semi-desert shrub and grassland, and these regions may be best adapted for higher temperatures and less rainfall (Price et al. 2005). However, they are still subject to potentially serious climate change impacts, made worse by the large amount of human development and disturbance that has already occurred. Grasslands are affected by two known climate change effects, changes in the timing of precipitation (from summer- to winter-dominated rainfall) and increased CO<sub>2</sub> concentrations (Brown et al. 1997, Morgan et al. 2007). Not only do these factors favor the encroachment of woody shrubs and loss of perennial grass cover, but they may act synergistically with human-linked land use changes in grasslands and elsewhere (Hansen et al. 2002, Peters et al. 2004, Burkett et al. 2005, Jetz et al. 2007, Enquist & Gori in press). In addition, increasingly high temperatures produce greater evaporative demands on soils, plants, streams, rivers, and reservoirs in every season (McCarty, 2008).

A number of activities contribute to the phenomenon of climate change, including emissions of GHGs (especially carbon dioxide and methane) from fossil fuel development, large wildfires,

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<sup>1</sup> In 2000, approximately 17 million metric tons and 2.3 million metric tons were respectively attributed to natural gas and oil activities. As of 2002, the Inventory indicates that there approximately 21,771 oil wells and 23,261 gas wells in the State. Significant uncertainties remain with respect to: the quality of historical field data, processing, and pipeline use of natural gas, does not factor in reclaimed wells and total number of new wells drilled per year; CO<sub>2</sub> emissions from enhanced oil recovery, which have not been estimated; and refinery fuel use-EIA indicates less than half the refinery fuel use as indicated by refinery permit data.

activities using combustion engines, changes to the natural carbon cycle, and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs will have a sustained climatic impact over different temporal scales due to their differences in global warming potential (described above) and life spans in the atmosphere.

New Mexico's gross GHG emissions have increased steadily from the year 2000, reaching 89 MMtCO<sub>2</sub>e in 2010, or 8 percent above year 2000 levels. The increase between 2000 and 2010 is less than New Mexico's 21 percent increase in GHG emissions between 1990 and 2000 (NMED, 2006).

Emissions from oil and gas production have been declining nationally. The EPA reports that emissions from Natural Gas Systems in 2008 have decreased from 1990 levels by 26 percent for NH<sub>4</sub> and by 20 percent for CO<sub>2</sub>. This decrease is attributed to improved management practices, technology, and replacement of older equipment. (Hoadley, 2010 and EPA, 2010).

Although greenhouse gas emissions from the oil and gas industry have decreased nationally, in New Mexico they have increased slightly since 1990. This is consistent with rapid increases in gas production through the mid-1990s followed by a slow decline. Statewide oil production has shown a steady decline since the mid 1980s (Hoadley, 2010 and NM OCD, 2010).

By 2020, GHG emissions are expected to climb 14 percent over 2010 levels to 102 MMtCO<sub>2</sub>e, a total increase of 23 percent above year 2000 levels (NMED, 2006).

### **Cultural Resources**

Federal laws and regulations protect cultural resources on public lands, including archaeological sites and historic properties. Development activities must comply with these protective regulations, and BLM requires the completion of cultural resource inventories prior to surface disturbing activities. These inventories identify sites potentially eligible for inclusion in the National Register of Historic Places, sites on which the BLM has required past exploration and development activities to avoid.

Because Class III cultural resource inventories must be completed, the potential for increased impacts on cultural artifacts will be minimized. By avoiding known cultural and historical sites during the layout of drill sites, access roads, pipeline corridors, and other realty actions, the potential for incremental increases in cumulative impacts will be avoided.

Completion of cultural resource inventories would have a beneficial, cumulative impact on the level of cultural information about the proposed lease area. Some unintentional damage to subsurface resources could occur during grading or excavation activities. Newly built roads could open previously inaccessible areas to illegal collection or vandalism of archaeological resources; however, implementation of resource protection and mitigation would protect such resources upon discovery.

### **Noxious Weeds**

Cumulative adverse effects to resource values because of noxious weeds would be dependent on the amount of surface disturbance within lease parcel boundary during the well production phase

of the lease. Increasing the amount of disturbed ground increases the risk of noxious weed invasion and spread.

### **Wildlife**

The cumulative adverse effects of full development of oil and gas resources in the proposed lease area could result in a decrease in wildlife populations. Development operations could reduce or eliminate habitat for some species.

### **Range**

Adverse cumulative effects would include reduced acreages for grazing purposes or other detriments, such as increased risk of weed encroachment onto rangelands caused by increased road traffic (seed dispersion), which would reduce desirable vegetation species and, as a result, reduce stocking rates.

## **6.0 Consultation/Coordination**

This section includes individuals or organizations from the public and its' users, external agencies, the interdisciplinary team, and permittees that were contacted during the development of this document.

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Holly Houghton	THPO	Mescalero Apache Tribe
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Michael Burgess	Chairman	Comanche Indian Tribe
Ron Twohatchet	Chairman	Kiowa Tribe of Oklahoma
Leroy Ned Shingoitewa	Chairman	Hopi Tribal Council
Frank Paiz	Governor	Ysleta del Sur Pueblo

On 08 January 2014 a briefing for the BLM NM State Director was held at the Carlsbad Field Office to review Field Office recommendations for nominated parcels. The State Office participated via Web-Ex and teleconference.

## 6.1 Public Involvement

The parcels nominated for this sale, along with the appropriate stipulations from the RMP, were posted online for a two week review period 30 December 2013 through 13 January 2014. No comments were received.

This EA will be made available for public review and comment for 30 days beginning February 10, 2014. One parcel, -057, was added to the parcels being considered on February 18, 2014 due to a recommendation from the BLM NMSO fluid geologist who documented that drainage of the lease parcel was occurring. The public comment period was extended an additional 8 days and concluded on March 19, 2014. Comments were received from WildEarth Guardians and incorporated into the EA as appropriate (see Appendix 4).

## 7.0 References

Anderson, D.E. 1984. Military training and the ecology of raptor populations at Fort Carson, Colorado. M.Sc. thesis, University of Wisconsin, Madison, WI.

Anderson, D.E., O.J. Rongstad, and W.R. Mytton. 1990. Home-range changes in raptors exposed to increase human activity levels in southeastern Colorado. Wildlife Society Bulletin 18: 134-142.

BLM2010. New Mexico's Permian Basin Cumulative Air Quality Impact Analysis--Draft Emissions inventory. Carlsbad: BLM.

Brown, J. H., T.J. Valone, C.G. Curtin. 1997. Reorganization of an arid ecosystem in response to recent climate change. *Proceedings of the National Academy of Sciences (USA)* 94: 9729-9733.

Bureau of Business and Economic Research. (2008). New Mexico County Population Projections July, 1 2005 to July 1, 2035. University of New Mexico.

Burkett, V.R., D.A. Wilcox, R. Stottlemeyer, W. Barrow, D. Fagre, J. Baron, J. Price, J.L. Nielsen,

C.D. Allen, D.L. Peterson, G. Ruggerone, T. Doyle. 2005. Nonlinear dynamics in ecosystem response to climatic change: case studies and policy implications. *Ecological Complexity* 2: 357-394.

CCSP, 2008: *Climate Models: An Assessment of Strengths and Limitations*. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research [Bader D.C., C. Covey, W.J. Gutowski Jr., I.M. Held, K.E. Kunkel, R.L. Miller, R.T. Tokmakian and M.H. Zhang (Authors)]. Department of Energy, Office of Biological and Environmental Research, Washington, D.C., USA, 124 pp.

Chernoff, B., R.R. Miller, and C.R. Gilbert. 1982. *Notropis orca* and *Notropis simus*, cyprinid fishes from the American Southwest, with description of a new subspecies. *Univ. Mich. Mus. Zool., Occ. Papers* 698:1-44.

Cook, E.R., C.A. Woodhouse, C.M.Eakin, D.M. Meko, and D.W. Stahle. 2004. Long-term aridity changes in the western United States. *Science* 306: 1015.

Enquist, C.A.F. and D.F. Gori. 2008. Application of an expert system approach for assessing grassland status in the U.S.-Mexico borderlands: implications for conservation and management. *Natural Areas Journal*, in press (scheduled October 2008)

Environmental Protection Agency. 2011. Technology Transfer Network: Clearinghouse for Inventories and Emissions Factors. <http://www.epa.gov/ttn/chief/eiinformation.html>.

Environmental Protection Agency. 2011a. 2005 National-Scale Air Toxics Assessment. Summary of Results. <http://www.epa.gov/ttn/atw/nata2005>.

Environmental Protection Agency. 2010a. The Green Book Non Attainment Areas for Criteria Pollutants. <http://www.epa.gov/airquality/greenbk/> (Accessed 3/03/2011).

Environmental Protection Agency, 2012. Air Trends: Design Values. <http://www.epa.gov/airtrends/valutes.html> (Accessed 1/4/2013).



Environmental Protection Agency. 2012a. Air Data: AQI Report.  
[http://www.epa.gov/airdata/ad\\_rep\\_aqi.html](http://www.epa.gov/airdata/ad_rep_aqi.html). (Accessed 1/4/2013).

Environmental Protection Agency. 2012b. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010. EPA 430-R-12-001.  
<http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html>. (Accessed 1/7/2013).

Environmental Protection Agency, Washington, D.C., Natural Gas Star Program (2006 data) at:  
<http://www.epa.gov/gasstar/accomplish.htm>.

AES. Applied Environmental Solutions Inc., 2011. Southeast New Mexico Inventory of Air Pollutant Emissions and Cumulative Air Impact Analysis 2007. Available in the Carlsbad Field Office.

Gilbert, C.R. 1980. *Notropis simus* (Cope), bluntnose shiner. N.C. Biol. Sur. Pub. 1980-12:310.

Goddard Institute for Space Studies. 2007. Annual Mean Temperature Change for Three Latitude Bands. Datasets and Images. GISS Surface Temperature Analysis, Analysis Graphs and Plots. New York, New York. Available on the Internet:  
<http://data.giss.nasa.gov/gistemp/graphs/Fig.B.lrg.gif>.

Grissino-Meyer, H.D. and T.W. Swetnam. 2000. Century-scale climate forcing of fire regimes in the American Southwest. *Holocene* 10: 207-214

Gutzler, D. and G. Garfin. 2006. Observed and predicted impacts of climate change on New Mexico's water supplies. Pages 4-32 in A. Watkins, editor. *The Impact of Climate Change on New Mexico's Water Supply and Ability to Manage Water Resources*. The New Mexico Office of the State Engineer/Interstate Stream Commission, July 2006.  
<http://www.nmdrought.state.nm.us/>

Hansen, A.J., R.P. Neilson, V.H. Dale, C.H. Flather, L.R. Iverson, D.J. Currie, S. Shafer, R. Cook, P.J. Bartlein. 2001. Global change in forests: responses of species, communities, and biomes. *BioScience* 51(9): 765-779.

Hoadley, J. Speilman, J. 2010. Estimating Greenhouse Gas Emissions from Oil and Gas Development on BLM Lands in New Mexico. Bureau of Land Management

Hogan, Patrick. 2006. Southeastern New Mexico Regional Research Design and Cultural Resource Management Strategy. Office of Contract Archeology, University of New Mexico, and Bureau of Land Management.

Intergovernmental Panel on Climate Change (IPCC). 2007. *Climate Change 2007: The Physical Basis (Summary for Policymakers)*. Cambridge University Press. Cambridge, England and New York, New York. Available on the Internet: <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf>

Intergovernmental Panel on Climate Change (IPCC). Climate Change 2007, Synthesis Report. A Report of the Intergovernmental Panel on Climate Change.

Jetz, W., D.S. Wilcove, A.P. Dobson. 2007. Projected impacts of climate and land use change on the global diversity of birds. *PLoS* 6: 1211-1219.

Karl, Thomas L., Jerry M. Melillo, and Thomas C. Peterson, (eds.). Global Climate Change Impacts in the United States, Cambridge University Press, 2009.

Lenart, M. and B. Crawford. 2007. Global warming in the southwest: an overview. Pages 2-5 in M. Lenart (editor). Global warming in the Southwest: projections, observations, and impacts. Climate Assessment for the Southwest (CLIMAS), University of Arizona.  
<http://geo.ispe.arizona.edu/climas/publications/pdfs/GWSouthwest.pdf>.

McCarthy, P. D., C. A. F. Enquist, and G. Garfin. 2008. Mitigating Climate Change in the American Southwest, *Eos Trans. AGU*, 89(1), doi:10.1029/2008EO010004.

Morgan, J.A., D.G. Milchunas, D.R. LeCain, M. West, and A.R. Mosier. 2007. Carbon dioxide enrichment alters plant community structure and accelerates shrub growth in the shortgrass steppe. *Proceedings of the National Academy of Sciences (USA)* 104: 14724-14729.  
Woodhouse, C. 2004. A paleo perspective on hydroclimatic variability in the western United States. *Aquatic Sciences* 66: 346-356.

National Academy of Sciences. 2006. Understanding and Responding to Climate Change: Highlights of National Academies Reports. Division on Earth and Life Studies. National Academy of Sciences. Washington, D.C. Available on the Internet:  
<http://dels.nas.edu/basc/Climate-HIGH.pdf>.

New Mexico Department of Game and Fish, (Santa Fe, NM 87503). 1988. Handbook of Species Endangered in New Mexico, C-141:1-2.

New Mexico Department of Game and Fish. September, 1995. Recommended Changes: List of Endangered Species in New Mexico. pp. 1-12.

New Mexico Environment Department--Air Quality Bureau. (2010). Air Dispersion Modeling Guidelines. Retrieved August 5, 2010, from  
[http://www.nmenv.state.nm.us/aqb/modeling/documents/NM\\_AirDispersionModelingGuidelines\\_Apr082010.pdf](http://www.nmenv.state.nm.us/aqb/modeling/documents/NM_AirDispersionModelingGuidelines_Apr082010.pdf)

New Mexico Environmental Department (NMED). 2006. Appendix D New Mexico Greenhouse Gas Inventory and Reference Case Projections, 1990-2020. Center for Climate Strategies

New Mexico Oil Conservation Division 2010b. Statistics, Production Summary Report. Available at  
<http://www.emnrd.state.nm.us/ocd/statistics/Production/ProductionSummaryReport.aspx>

Newton, I. 1979. Population ecology of raptors. Buteo Books, Vermillion, SD.

Peters, D.P.C., R.A. Pielke, B.T. Bestelmeyer, C.D. Allen, S. Munson-McGee, and K.M. Havstad. 2004. Cross-scale interactions, nonlinearities, and forecasting catastrophic events. Proceedings of the National Academy of Sciences (USA) 101: 15130-15135.

Price, J., H. Galbraith, M. Dixon, J. Stromberg, T. Root, D. MacMykowski, T. Maddock, and K. Baird. 2005. Potential impacts of climate change on ecological resources and biodiversity in the San Pedro Riparian National Conservation Area, Arizona. Technical Report, U.S. Environmental Protection Agency, American Bird Conservancy.

Schueck, L.S., J.M. Marzluff, and K. Steenhof. 2001. Influence of military activities on raptor abundance and behavior. The Condor 103: 606-615.

Sebastian, Lynne, and Larralde, Signa. 1989. Living on the Land: 11,000 years of Human Adaptation in Southeastern New Mexico. Bureau of Land Management, Santa Fe, NM.

Sheppard, P.R., A.C. Comrie, G.D. Packin, K. Angersbach, M.K. Hughes. 2002. The climate of the U.S. Southwest. Climate Research 21: 219-238.

Stalmaster, M. V., and J.L. Kaiser. 1997. Flushing responses of wintering bald eagles to military activity. Journal of Wildlife Management 61: 1307-1313.

Trewartha, Glenn T., Horn, Lyle H. 1980. An Introduction to Climate. 5th edition, McGraw Hill, New York.

U.S. Department of Agriculture, U.S. Forest Service. 2008. The Southwest Region and Climate Change.

U.S. Department of the Interior, Bureau of Land Management. 2007. Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development: The Gold Book (4<sup>th</sup> ed), P-417.

U.S. Department of the Interior, Bureau of Land Management. 2008. Special Status Species Resource Management Plan Amendment and Record of Decision. Roswell, New Mexico.  
U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001. The Federal Land Policy and Management Act, as amended. Public Law 94-579.

Hector, D.P. 1987. The decline of the Aplomado Falcon in the United States. American Birds. Vol 41 No 3: 381-389.

Herkert, J.R. The effects of habitat fragmentation on midwestern grassland bird communities. Ecological applications : a publication of the Ecological Society of America. v. 4(3) p. 461-471.

Howell, T.R. 1972. Birds of the lowland pine savanna of northeastern Nicaragua. Condor 74:316-340.

Johnson, D. H. and L. D. Igl. 2001. Area Requirements of Grassland Birds: A Regional Perspective. *The Auk*. Vol 118, Issue 1, pp. 24-34.

Macias-Duarte, A., A. B. Montoya, W. G. Hunt, A. Lafon-Terrazas, and R. Tapanelli. 2004. Reproduction, prey, and habitat of the aplomado falcon (*Falco femoralis*) in the desert grasslands of Chihuahua, Mexico. *The Auk* 121(4):1081–1093.

Meyer, R. 2005. Avian communities and aplomado falcon potential prey in southeastern New Mexico grasslands, 2004-2005. Unpub. Report for Bureau of Land Management, Carlsbad, NM. 36pp.

Montoya, A.B., P.J. Zwank, and M. Cardenas. 1997. Breeding biology of aplomado falcons in desert grasslands of Chihuahua, Mexico. *Journal of Field Ornithology* 68:135-143.

Northern Aplomado Falcon Recovery Plan. 1990. U.S. Fish and Wildlife Service. Albuquerque, New Mexico. 58pp.

Sauer, J. R., J. E. Hines, and J. Fallon. 2008. The North American Breeding Bird Survey, Results and Analysis 1966 - 2007. Version 5.15.2008. *USGS Patuxent Wildlife Research Center*, Laurel, MD

BLM Manual 6840 - Special Status Species Management. 2008.

## **8.0 Authorities**

Code of Federal Regulations (CFR) 3100

40 CFR All Parts and Sections inclusive Protection of Environment, Revised as of July 1, 2001.

43 CFR, All Parts and Sections inclusive - Public Lands: Interior. Revised as of October 1, 2000.

US Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001. The Federal Land Policy and Management Act, as amended. Public Law 94-579.

## Appendix 1

### Carlsbad Parcels for Review - July 16, 2014

NM-201407-001                640.000 Acres

T.0180S, R.0230E, NM PM, NM

Sec. 025    ALL;

Eddy County

Carlsbad FO

NMNM 98794, NMNM 103842

Formerly Lease No.

Stipulations:

Defer Proposed ACEC - Birds of Prey

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-S-31 Northern Aplomado Falcon

SENM-S-39 Plan of Development

NM-201407-002                1760.700 Acres

T.0190S, R.0230E, NM PM, NM

Sec. 001    LOTS 1-4;

001    S2N2,S2;

002    LOTS 3,4;

002    S2NW,S2;

003    LOTS 1-4;

003    S2N2,S2;

Eddy County

Carlsbad FO

NMNM 14747, NMNM 103843, NMNM 106901

Formerly Lease No.

Stipulations:

Defer Proposed ACEC - Birds of Prey

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-S-31 Northern Aplomado Falcon

SENM-S-39 Plan of Development

NM-201407-006                160.000 Acres

T.0210S, R.0240E, NM PM, NM

Sec. 011    SE;

Eddy County

Carlsbad FO

NMNM 101560

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-LN-1 Lease Notice - Cave-Karst Occurrence Area

SENM-S-17 Slopes or Fragile Soils

SENM-S-18 Streams, Rivers, Floodplains

SENM-S-21 Caves and Karst

SENM-S-25 Visual Resource Management

SENM-S-39 Plan of Development

NM-201407-007                    640.000 Acres

T.0220S, R.0240E, NM PM, NM

Sec. 026    ALL;

Eddy County

Carlsbad FO

NMNM 90591, NMNM 97856

Formerly Lease No.

Stipulations: The McKittrick SMA in the 1997 RMPA is closed to leasing.

Defer Proposed ACEC - Cave Resources

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

NM-201407-008                    956.800 Acres

T.0210S, R.0250E, NM PM, NM

Sec. 004    LOTS 1-16;

004    SW,N2SE,SWSE;

009    N2NW;

Eddy County

Carlsbad FO

NMNM 93464, NMNM 104641

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-LN-1    Lease Notice - Cave-Karst Occurrence Area

SENM-S-15    Wildlife Water

SENM-S-17    Slopes or Fragile Soils

SENM-S-18    Streams, Rivers, Floodplains

SENM-S-21    Caves and Karst

SENM-S-25    Visual Resource Management

SENM-S-39    Plan of Development

NM-201407-009                    600.000 Acres

T.0210S, R.0250E, NM PM, NM

Sec. 008    NE,W2,N2SE,SWSE;

Eddy County

Carlsbad FO

NMNM 96199, NMNM 98148, NMNM 110338

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-LN-1    Lease Notice - Cave-Karst Occurrence Area

SENM-S-18    Streams, Rivers, Floodplains

SENM-S-21    Caves and Karst

SENM-S-25    Visual Resource Management

SENM-S-39    Plan of Development

NM-201407-010                    120.000 Acres

T.0210S, R.0250E, NM PM, NM

Sec. 009      SESW,S2SE;

Eddy County

Carlsbad FO

NMNM 96200

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-LN-1 Lease Notice - Cave-Karst Occurrence Area

SENM-S-18 Streams, Rivers, Floodplains

SENM-S-21 Caves and Karst

SENM-S-25 Visual Resource Management

SENM-S-39 Plan of Development

NM-201407-011                    168.100 Acres

T.0210S, R.0250E, NM PM, NM

Sec. 030      LOTS 5-8;

Eddy County

Carlsbad FO

NMNM 86524

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-LN-1 Lease Notice - Cave-Karst Occurrence Area

SENM-S-16 Raptor Nest

SENM-S-17 Slopes or Fragile Soils

SENM-S-18 Streams, Rivers, Floodplains

SENM-S-21 Caves and Karst

SENM-S-25 Visual Resource Management

SENM-S-39 Plan of Development

Delete from Sale has already been leased under the July 2013 lease sale.

NM-201407-012                    639.600 Acres

T.0220S, R.0250E, NM PM, NM

Sec. 005      LOTS 1-4;

005      S2N2,S2;

Eddy County

Carlsbad FO

NMNM 97861

Formerly Lease No.

Stipulations: Would like to put a note on lease that access could only come in from the South side of the parcel or the northwest side of the parcel.

Avoiding coming through the proposed ACEC to the West of this parcel.

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-LN-1 Lease Notice - Cave-Karst Occurrence Area

SENM-S-17 Slopes or Fragile Soils

SENM-S-18 Streams, Rivers, Floodplains

SENM-S-21 Caves and Karst

SENM-S-39 Plan of Development

NM-201407-013            158.050 Acres

T.0220S, R.0250E, NM PM, NM

Sec. 006    LOTS 3-5;

006    SENW;

Eddy County

Carlsbad FO

NMNM 104647

Formerly Lease No.

Stipulations:

Defer entire parcel; South Half of Parcel is within a Proposed ACEC - Cave Resources, also a TCP for cultural concerns

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-S-17    Slopes or Fragile Soils

SENM-S-21    Caves and Karst

SENM-S-25    Visual Resource Management

NM-201407-014            40.000 Acres

T.0220S, R.0250E, NM PM, NM

Sec. 008    SENE;

Eddy County

Carlsbad FO

NMNM 104647

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-LN-1    Lease Notice - Cave-Karst Occurrence Area

SENM-S-17    Slopes or Fragile Soils

SENM-S-18    Streams, Rivers, Floodplains

SENM-S-21    Caves and Karst

SENM-S-39 Plan of Development

NM-201407-015            320.000 Acres

T.0220S, R.0250E, NM PM, NM

Sec. 018    E2;

Eddy County

Carlsbad FO

NMNM 104652

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-LN-1    Lease Notice - Cave-Karst Occurrence Area

SENM-S-17    Slopes or Fragile Soils

SENM-S-18    Streams, Rivers, Floodplains

SENM-S-21    Caves and Karst

SENM-S-39 Plan of Development



NM-201407-023            314.730 Acres

T.0170S, R.0290E, NM PM, NM

Sec. 012    N2SW,SESW,N2SE,SWSE;

012    ALL FORMATIONS EXCEPT;

012    THE GRAYBURG FORMATION;

T.0170S, R.0300E, NM PM, NM

Sec. 007    LOTS 3,4;

007    ALL FORMATIONS EXCEPT;

007    THE GRAYBURG FORMATION;

Eddy County

Carlsbad FO

NMLC 028785, NMLC 065591

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-S-22    Prairie Chicken

NM-201407-024            120.000 Acres

T.0260S, R.0290E, NM PM, NM

Sec. 003    N2NW;

004    NENE;

Eddy County

Carlsbad FO

NMNM 102032

Formerly Lease No.

Stipulations:

Defer Proposed ACEC - Chihuahuan Desert Rivers ACEC

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

NM-201407-025            160.000 Acres

T.0160S, R.0300E, NM PM, NM

Sec. 013    NE;

Eddy County

Carlsbad FO

NMNM 107388

Formerly Lease No.

Stipulations:

Defer HEA - Mescalero Sands; Also alternative to create SRMA/ERMA under new RMP

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-LN-2 Lease Notice - Protection of Dune Sagebrush Lizard

SENM-S-23 Sand Dune Lizard

SENM-S-46 POD - Dune Sagebrush Lizard

NM-201407-026            120.000 Acres

T.0160S, R.0300E, NM PM, NM

Sec. 013    N2SW,SWSW;

Eddy County

Carlsbad FO

NMNM 107388

Formerly Lease No.

Stipulations:

Defer HEA - Mescalero Sands

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-LN-2 Lease Notice - Protection of Dune Sagebrush Lizard

SENM-S-23 Sand Dune Lizard

SENM-S-46 POD - Dune Sagebrush Lizard

NM-201407-027                      320.850 Acres

T.0230S, R.0300E, NM PM, NM

Sec. 005      LOTS 3,4;

005      S2NW,SW;

Eddy County

Carlsbad FO

Formerly Lease No.

Stipulations:

Defer Proposed ACEC - Salt Playas ACEC

Note: Sheers pincushion cactus

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-LN-6 Lease Notice - Potash

SENM-LN-1 Lease Notice - Cave-Karst Occurrence Area

SENM-S-1 Potash

SENM-S-17 Slopes or Fragile Soils

SENM-S-19 Playas and Alkali Lakes

SENM-S-21 Caves and Karst

NM-201407-028                      160.000 Acres

T.0230S, R.0300E, NM PM, NM

Sec. 020      SE;

Eddy County

Carlsbad FO

NMNM 0556864

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-LN-1 Lease Notice - Cave-Karst Occurrence Area

SENM-LN-6 Lease Notice - Potash

SENM-S-1 Potash

SENM-S-17 Slopes or Fragile Soils

SENM-S-21 Caves and Karst

NM-201407-029                      162.090 Acres

T.0190S, R.0320E, NM PM, NM

Sec. 006      LOTS 3,4;

006      E2SW;

Lea County

Carlsbad FO

NMNM 23007

Formerly Lease No.

Stipulations:

Defer HEA - Southpaw

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-S-15 Wildlife Water

SENM-S-17 Slopes or Fragile Soils

SENM-S-22 Prairie Chicken

SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat

NM-201407-030                    960.000 Acres

T.0200S, R.0320E, NM PM, NM

Sec. 008      NWNE,E2W2,NWSE,S2SE;

009      ALL;

Lea County

Carlsbad FO

Formerly Lease No.

Stipulations:

Defer Proposed ACEC - Salt Playas ACEC, Archaeological District, and Laguna - HEA

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-LN-6 Lease Notice - Potash

SENM-S-1 Potash

NM-201407-031                    320.000 Acres

T.0210S, R.0320E, NM PM, NM

Sec. 025      S2;

Lea County

Carlsbad FO

NMNM 102042

Formerly Lease No.

Stipulations:

Defer entire parcel; Northwest Corner of the parcel is within HEA - Bilbrey, EA working on for HEA is looking at possible expansion of HEA boundaries

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-LN-6 Lease Notice - Potash

SENM-S-1 Potash

SENM-S-22 Prairie Chicken

SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat

NM-201407-035                    680.000 Acres

T.0220S, R.0330E, NM PM, NM

Sec. 020      SWSE;

029      ALL;

Lea County

Carlsbad FO

NMNM 94100, NMNM 104692

Formerly Lease No.

Stipulations:

Defer HEA - Paduca

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-S-22 Prairie Chicken

SENM-S-34 Plan of Development- Shinnery Oak Sand Dune Habitat

NM-201407-036                    320.000 Acres

T.0220S, R.0330E, NM PM, NM

Sec. 020      N2;

Lea County

Carlsbad FO

NMNM 98194

Formerly Lease No.

Stipulations:

Defer HEA - Paduca (deferred parcel in April 2011) EA working on for HEA is looking at possible expansion of HEA boundaries

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-S-22 Prairie Chicken

SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat

NM-201407-037                    640.000 Acres

T.0250S, R.0340E, NM PM, NM

Sec. 023    ALL;

Lea County

Carlsbad FO

NMNM 94111, NMNM 110353

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-S-22    Prairie Chicken

SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat

NM-201407-038                    322.320 Acres

T.0200S, R.0350E, NM PM, NM

Sec. 005    LOTS 3,4;

005    S2NW,SW;

Lea County

Carlsbad FO

NMNM 105563

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-LN-2 Lease Notice - Protection of Dune Sagebrush Lizard

SENM-S-17    Slopes or Fragile Soils

SENM-S-22    Prairie Chicken

SENM-S-23 Sand Dune Lizard

SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat

SENM-S-46 POD - Dune Sagebrush Lizard

NM-201407-039                    320.000 Acres

T.0240S, R.0350E, NM PM, NM

Sec. 029    W2;

Lea County

Carlsbad FO

NMNM 101606

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-S-18    Streams, Rivers, Floodplains

SENM-S-20 Spring, Seeps, and Tanks

SENM-S-22    Prairie Chicken

SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat

SENM-S-47 Lease Reclamation

NM-201407-040                    400.730 Acres

T.0240S, R.0350E, 23 PM, NM

Sec. 031    LOTS 2,4;

031    E2;

Lea County

Carlsbad FO

NMNM 101606

Formerly Lease No.

Stipulations: Combined Parcels 40, 41 and 42

NM-11-LN Special Cultural Resource

SENM-S-16 Raptor Nest

SENM-S-22 Prairie Chickens

SENM-S-34 Zone 3 - POD

NM-201407-043            361.400 Acres  
T.0250S, R.0350E, 23 PM, NM  
Sec. 005    LOTS 1,3;  
005    SENE, SENW, S2S2, NESE;

Lea County

Carlsbad FO

NMNM 104701

Formerly Lease No.

Stipulations: Combine Parcels 43 and 44

NM-11-LN Special Cultural Resource

SENM-S-22 Prairie Chickens

SENM-S-34 Zone 3 - POD

SENM-S-47 Reclamation

NM-201407-045            80.480 Acres  
T.0250S, R.0350E, NM PM, NM  
Sec. 006    LOTS 4,5;

Lea County

Carlsbad FO

NMNM 104701

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-S-22    Prairie Chicken

SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat

SENM-S-47 Lease Reclamation

NM-201407-046            80.000 Acres  
T.0250S, R.0350E, NM PM, NM  
Sec. 007    E2SW;

Lea County

Carlsbad FO

NMNM 94860

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-S-22    Prairie Chicken

SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat

NM-201407-047            560.000 Acres  
T.0250S, R.0350E, NM PM, NM  
Sec. 020    N2NE, W2, SE;

Lea County

Carlsbad FO

NMNM 0450818, NMNM 104702

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-S-16    Raptor Nest

SENM-S-22    Prairie Chicken

SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat

SENM-S-47 Lease Reclamation

NM-201407-048                    360.000 Acres

T.0250S, R.0350E, NM PM, NM

Sec. 021    E2,NESW;

Lea County

Carlsbad FO

NMNM 104703

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-S-22    Prairie Chicken

SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat

NM-201407-049                    640.000 Acres

T.0250S, R.0350E, NM PM, NM

Sec. 029    ALL;

Lea County

Carlsbad FO

NMNM 103884, NMNM 113906

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-S-16    Raptor Nest

SENM-S-22    Prairie Chicken

SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat

NM-201407-050                    320.320 Acres

T.0250S, R.0350E, NM PM, NM

Sec. 031    LOTS 1,2;

031    NE,E2NW;

Lea County

Carlsbad FO

NMNM 103884

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-S-16    Raptor Nest

SENM-S-22    Prairie Chicken

SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat

NM-201407-051                    280.000 Acres

T.0250S, R.0350E, NM PM, NM

Sec. 033    SWNE,NW,N2SW;

Lea County

Carlsbad FO

NMNM 104703, NMNM 104704

Formerly Lease No.

Stipulations:

NM-LN-11 Lease Notice - Special Cultural Resource Lease Notice

SENM-S-22    Prairie Chicken

SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat

NM-201407-057 40.00 Acres

T. 0250 S., R. 0340 E., NMPM

Sec. 09: SWSW;

Lea County

Carlsbad FO

NMNM 110353

Formerly Lease No.

Stipulations:

NM-11-LN Special Cultural Resources

NM-10 Drainage

SENM-S-22 Prairie Chickens

SENM-S-34 Plan of Development - Shinnery Oak Sand Dune Habitat

Added to the parcel list on 2-18-14

**FORM 1****Documentation of BLM Wilderness Characteristics Inventory Findings from Previous Inventory on Record****1. Is there existing BLM wilderness characteristics inventory information on all or part of this area?**

No ☐ (Go to Form 2) Yes ☒ (If yes, and if more than one area is within the area, list the unique identifiers for those areas.):

a) Inventory Source: Summary Wilderness Review New Mexico, BLM 1979

b) Inventory Area Unique Identifier(s): NM-060-806, NM-060-608,609

c) Map Name(s)/Number(s): 1979 Units\_NoLWC\_Updated

d) BLM District(s)/Field Office(s): Roswell DO/Carlsbad FO

**2. BLM Inventory Findings on Record:**

Existing inventory information regarding wilderness characteristics (if more than one BLM inventory area is associated with the area, list each area and answer each question individually for each inventory area):

Inventory Source: \_\_\_\_\_

Area Unique Identifier	Sufficient Size? Yes/No (acres)	Naturalness? Yes/No	Outstanding Solitude? Yes/No	Outstanding Primitive & Unconfined Recreation? Yes/No	Supplemental Values? Yes/No
NM-060-806	Yes (20,080.7) acres	NO	NO	NA	NA
NM-060-608,609	Yes (53,608.8) acres	NO	NO	NA	NA



**3. Documentation of changes to the area since previous inventory:**

Have any of the following conditions changed in the public lands of the project area since the last wilderness inventory or update?

- ☐ Acquisitions (surface)
- ☐ Road decommissioning or abandonment
- ☐ Reclamation to natural state (agency initiated or natural)
- ☐ Removal of substantially noticeable human made features
- ☐ Other change relevant to wilderness characteristics

*Check all boxes that apply. As appropriate, provide a short description below.*

Does new information exist for the public lands of the project area since the last wilderness inventory or update regarding:

- ☐ Errors discovered in the original inventory
- ☐ Missing inventory documentation
- ☐ Area separated from WSA or Wilderness by survey line
- ☐ Other new information relevant to wilderness characteristics

*Check all boxes that apply. As appropriate, provide a short description below.*

Description of changes identified above:

July 2014 Lease Parcel that were within the 1979 Wilderness Study inventory are as follow:

Parcels -006, -008, and -009 were within NM-060-806 and comprise of 1,716.8 combined acres.

Parcels -037, -047, -048, -049, -050, and -051 were within NM-060-608, 609 and comprise of 2,800.32 combined acres.

Are any of the above boxes checked?

No ☒ The previous wilderness inventory finding that the area lacks wilderness characteristics remains valid and up-to-date. Sign the form below.

Yes ☐ The wilderness inventory may be out-of-date, proceed with Form 2 and Appendix C and D (as necessary).

Prepared by:

Cody R. Lyster

Title: Natural Resource Specialist

01/29/14

Date

## **APPENDIX 3: PHASES OF OIL AND GAS DEVELOPMENT**

### **Construction Activities**

Clearing of the proposed well pad and access road would be limited to the smallest area possible to provide safe and efficient work areas for all phases of construction. First all new construction areas need to be cleared of all vegetation. All clearing activities are typically accomplished by cutting, mowing and/or grading vegetation as necessary. Cut vegetation may be mulched and spread on site or hauled to a commercial waste disposal facility.

Next, heavy equipment including but not limited to bulldozers, graders, front-end loaders, and/or track hoes are used to construct at a minimum the pad, but other features, as needed for development, may include, but is not limited to an access road, reserve pit, pipeline, and/or fracturing pond. Cut and fills may be required to level the pad or road surfaces. If a reserve pit is authorized, it would be lined using an impermeable liner or other lining mechanism (i.e. bentonite or clay) to prevent fluids from leeching into the soil. Access roads may have cattle guards, gates, drainage control, or pull-outs installed, among a host of other features that may be necessary based on the site specific situation. Long-term surfaces are typically dressed with a layer of crushed rock or soil cemented. Construction materials come from a variety of sources. Areas not needed for long-term development (i.e. portions of the pipeline or road right-of-way) are reclaimed by recontouring the surface and establishing vegetation.

If a pipeline is needed, the right-of-way would be cleared of all vegetation. The pipeline would be laid out within the cleared section. A backhoe, or similar piece of equipment, would dig a trench at least 36 inches below the surface. After the trench is dug, the pipes would be assembled by welding pieces of pipe together and bending them slightly, if necessary, to fit the contour of the pipeline's path. Once inspected, the pipe can be lowered into the trench and covered with stockpiled subsoil that was originally removed from the hole. Each pipeline undergoes hydrostatic testing prior to natural gas being pumped through the pipeline. This ensures the pipeline is strong enough and absent of any leaks.

### **Drilling Operations**

When the pad is complete, the drilling rig and associated equipment would be moved onsite and erected. A conventional rotary drill rig with capability matched to the depth requirements of the proposed well(s) would be used. The well could be drilled as a vertical or horizontal well to target the desired formation. The depth of the well is entirely dependent on the target formation depth and could be several hundred feet vertical depth to over 20,000 feet vertical depth.

When a conventional reserve pit system is proposed, drilling fluid or mud is circulated through the drill pipe to the bottom of the hole, through the bit, up the bore of the well, and finally to the surface. When mud emerges from the hole, it enters into the reserve pit where it would remain until all fluids are evaporated and the solids can be buried.

A closed-loop system, operates in a similar fashion except that when the mud emerges from the hole, it passes through a series of equipment used to screen and remove drill cuttings (rock chips) and sand-sized solids rather than going into the pit. When the solids have been removed, the mud would be placed into holding tanks, and from the tank, used again.

In either situation the mud is maintained at a specific weight and viscosity to cool the bit, seal off any porous zones (thereby protecting aquifers or preventing damage to producing zone productivity), control subsurface pressure, lubricate the drill string, clean the bottom of the hole, and bring the drill cuttings to the surface. Water-based or oil-based muds can be used and is entirely dependent on the site-specific conditions.

### Completion Operations

Once a well has been drilled, completion operations would begin once crews and equipment are available. Well completion involves setting casing to depth and perforating the casing in target zones.

Wells are often treated during completion to improve the recovery of hydrocarbons by increasing the rate and volume of hydrocarbons moving from the natural oil and gas reservoir into the wellbore. These processes are known as well-stimulation treatments, which create new fluid passageways in the producing formation or remove blockages within existing passageways. They include fracturing, acidizing, and other mechanical and chemical treatments often used in combination. The results from different treatments are additive and complement each other.

### ***Hydraulic Fracturing***

Hydraulic fracturing (HF) is one technological key to economic recovery of oil and gas that might have been left by conventional oil and gas drilling and pumping technology. It is a formation stimulation practice used to create additional permeability in a producing formation, thus allowing gas to flow more readily toward the wellbore. Hydraulic fracturing can be used to overcome natural barriers, such as naturally low permeability or reduced permeability resulting from near wellbore damage, to the flow of fluids (gas or water) to the wellbore (GWPC 2009). The process is not new and has been a method for additional oil and gas recovery since the early 1900s; however, with the advancement of technology it is more commonly used.

Hydraulic fracturing is a process that uses high pressure pumps to pump fracturing fluid into a formation at a calculated, predetermined rate and pressure to generate fractures or cracks in the target formation. For shale development, fracture fluids are primarily water-based fluids mixed with additives which help the water to carry proppants into the fractures, which may be made up of sand, walnut hulls, or other small particles of materials. The proppant is needed to “prop” open the fractures once the pumping of fluids has stopped. Once the fracture has initiated, additional fluids are pumped into the wellbore to continue the development of the fracture and to carry the proppant deeper into the formation. The additional fluids are needed to maintain the downhole pressure necessary to accommodate the increasing length of opened fracture in the formation.

Hydraulic fracturing of horizontal shale gas wells is performed in stages. Lateral lengths in horizontal wells for development may range from 1,000 feet to more than 5,000 feet. Depending on the lengths of the laterals, treatment of wells may be performed by isolating smaller portions of the lateral. The fracturing of each portion of the lateral wellbore is called a stage. Stages are fractured sequentially beginning with the section at the farthest end of the wellbore, moving uphole as each stage of the treatment is completed until the entire lateral well has been stimulated.

This process increases the flow rate and volume of reservoir fluids that move from the producing formation into the wellbore. The fracturing fluid is typically more than 99 percent water and sand, with small amounts of readily available chemical additives used to control the chemical and mechanical properties of the water and sand mixture (see discussion about Hazardous and Solid Wastes below). Because the fluid is composed mostly of water, large volumes of water are usually needed to perform hydraulic fracturing. However, in some cases, water is recycled or produced water is used.

Before operators or service companies perform a hydraulic fracturing treatment, a series of tests is performed. These tests are designed to ensure that the well, casing, well equipment, and fracturing equipment are in proper working order and will safely withstand the application of the fracture treatment pressures and pump flow rates.

To ensure that hydraulic fracturing is conducted in a safe and environmentally sound manner, the BLM approves and regulates all drilling and completion operations, and related surface disturbance on Federal public lands. Operators must submit Applications for Permit to Drill (APDs) to the agency. Prior to approving an APD, a BLM OFO geologist identifies all potential subsurface formations that would be penetrated by the wellbore. This includes all groundwater aquifers and any zones that would present potential safety or health risks that may need special protection measures during drilling, or that may require specific protective well construction measures.

Once the geologic analysis is completed, the BLM reviews the company's proposed casing and cementing programs to ensure the well construction design is adequate to protect the surface and subsurface environment, including the potential risks identified by the geologist and all known or anticipated zones with potential risks.

During drilling, the BLM is on location during the casing and cementing of the ground water protective surface casing and other critical casing and cementing intervals. Before hydraulic fracturing takes place, all surface casing and some deeper, intermediate zones are required to be cemented from the bottom of the cased hole to the surface. The cemented well is pressure tested to ensure there are no leaks and a cement bond log is run to ensure the cement has bonded to the casing and the formation. If the fracturing of the well is considered to be a "non-routine" fracture for the area, the BLM would always be onsite during those operations as well as when abnormal conditions develop during the drilling or completion of a well.

### Production Operations

Production equipment used during the life of the well may include a 3-phase separator-dehydrator; flow-lines; a meter run; tanks for condensate, produced oil, and water; and heater treater. A pump jack may be required if the back pressure of the well is too high. Production facilities are arranged to facilitate safety and maximize reclamation opportunities. All permanent above-ground structures not subject to safety considerations are painted a standard BLM or company color or as landowner specified.

Workovers may be performed multiple times over the life of the well. Because gas production usually declines over the years, operators perform workover operations which involve cleaning, repairing and maintaining the well for the purposes of increasing or restoring production.

### Hazardous or Solid Wastes Associated with Oil and Gas Development

Anticipated use or produced hazardous materials during the development may come from drilling materials; cementing and plugging materials; HF materials; production products (natural gas, condensates, produced water); fuels and lubricants; pipeline materials; combustion emissions; and miscellaneous materials. Appendix 3, Table 1 includes some of the common wastes (hazardous and non-hazardous) that are produced during oil and gas development.

**Appendix 3, Table 1. Common wastes produced during oil and gas development.**

Phase	Waste
Construction	<ul style="list-style-type: none"> <li>Domestic wastes (i.e. food scraps, paper, etc.)</li> <li>Excess construction materials</li> <li>Used lubricating oils</li> <li>Solvents</li> <li>Woody debris</li> <li>Paints</li> <li>Sewage</li> </ul>
Drilling	<ul style="list-style-type: none"> <li>Drilling muds, including additives (i.e. chromate and barite) and cuttings</li> <li>Well drilling, completion, workover, and stimulation fluids (i.e. oil derivatives such as polycyclic aromatic hydrocarbons (PAHs), spilled chemicals, suspended and dissolved solids, phenols, cadmium, chromium, copper, lead, mercury, nickel)</li> <li>Equipment, power unit and transport maintenance wastes (i.e. batteries; used filters, lubricants, oil, tires, hoses, hydraulic fluids; paints; solvents)</li> <li>Fuel and chemical storage drums and containers</li> <li>Cementing wastes</li> <li>Production testing wastes</li> <li>Excess construction materials</li> <li>Scrap metal</li> <li>Sewage</li> <li>Rigwash</li> <li>Excess drilling chemicals</li> <li>Processed water</li> <li>Contaminated soil</li> <li>Domestic wastes</li> </ul>
HF	See below

  

Production	<ul style="list-style-type: none"> <li>Power unit and transport maintenance wastes (i.e. batteries; used filters, lubricants, filters, tires, hoses, coolants, antifreeze; paints; solvents, used parts)</li> <li>Discharged produced water</li> <li>Production chemicals</li> <li>Workover wastes (e.g. brines)</li> <li>Tank or pit bottoms</li> <li>Contaminated soil</li> <li>Scrap metal</li> </ul>
Abandonment/Reclamation	<ul style="list-style-type: none"> <li>Construction materials</li> <li>Decommissioned equipment</li> <li>Contaminated soil</li> <li>Insulating materials</li> <li>Sludge</li> </ul>

### ***Hydraulic Fracturing***

Chemicals serve many functions in hydraulic fracturing, from limiting the growth of bacteria to preventing corrosion of the well casing. Chemicals are needed to insure the hydraulic fracturing job is effective and efficient. The fracturing fluids used for shale stimulations consist primarily of water but also include a variety of additives. The number of chemical additives used in a typical fracture treatment varies depending on the conditions of the specific well being fractured. A typical fracture treatment will use very low concentrations of between 3 and 12 additive chemicals depending on the characteristics of the water and the shale formation being fractured. Each component serves a specific, engineered purpose. The predominant fluids currently being use for fracture treatments in the shale gas plays are water-based fracturing fluids mixed with friction-reducing additives, also known as slickwater (GWPC 2009).

The make-up of fracturing fluid varies from one geologic basin or formation to another.

Because the make-up of each fracturing fluid varies to meet the specific needs of each area, there is no one-size-fits-all formula for the volumes for each additive. In classifying fracture fluids and their additives it is important to realize that service companies that provide these additives have developed a number of compounds with similar functional properties to be used for the same purpose in different well environments. The difference between additive formulations may be as small as a change in concentration of a specific compound (GWPC 2009).

Typically, the fracturing fluids consist of about 99 percent water and sand and about 1 percent chemical additives. The chemical additives are essential to the process of releasing gas trapped in shale rock and other deep underground formation.

## ***NORM***

Some soils and geologic formations contain low levels of radioactive material. This naturally occurring radioactive material (NORM) emits low levels of radiation, to which everyone is exposed on a daily basis. When NORM is associated with oil and natural gas production, it begins as small amounts of uranium and thorium within the rock. These elements, along with some of their decay elements, notably radium<sub>226</sub> and radium<sub>228</sub>, can be brought to the surface in drill cuttings and produced water. Radon<sub>222</sub>, a gaseous decay element of radium, can come to the surface along with the shale gas. When NORM is brought to the surface, it remains in the rock pieces of the drill cuttings, remains in solution with produced water, or, under certain conditions, precipitates out in scales or sludges. The radiation is weak and cannot penetrate dense materials such as the steel used in pipes and tanks.

**Figure 4. Typical Chemical Additives Used In Fracturing Fluids (GWPC 2009)**

Compound	Purpose	Common application	
Acids	Helps dissolve minerals and initiate fissure in rock (pre-fracture)	Swimming pool cleaner	
Sodium Chloride	Allows a delayed breakdown of the gel polymer chains	Table salt	
Polyacrylamide	Minimizes the friction between fluid and pipe	Water treatment, soil conditioner	
Ethylene Glycol	Prevents scale deposits in the pipe	Automotive anti-freeze, deicing agent, household cleaners	
Borate Salts	Maintains fluid viscosity as temperature increases	Laundry detergent, hand soap, cosmetics	
Sodium/Potassium Carbonate	Maintains effectiveness of other components, such as crosslinkers	Washing soda, detergent, soap, water softener, glass, ceramics	
Glutaraldehyde	Eliminates bacteria in the water	Disinfectant, sterilization of medical and dental equipment	
Guar Gum	Thickens the water to suspend the sand	Thickener in cosmetics, baked goods, ice cream, toothpaste, sauces	
Citric Acid	Prevents precipitation of metal oxides	Food additive; food and beverages; lemon juice	
Isopropanol	Used to increase the viscosity of the fracture fluid	Glass cleaner, antiperspirant, hair coloring	

## **Appendix 4 - Summary of Public Comments Received**

A comment letter was received from the WildEarth Guardians on March 11, 2014 that provided comments on proposed parcels nominated for the July 2014 competitive oil and gas lease auction. Responses to the comments made in regard to the nominated lease parcels are provided below.

### Comment #1:

Leasing of parcels that contain lesser prairie chicken occupied and/or potential habitat (the “shinnery oak parcels”), parcels NM-201407-029, -031, -035, -036, -037, -038, -039, -040, -043, -045, -046, -047, -048, -049, -050, and -051, as well as -032, -033, -034, -052, -053, and -054 is likely to result in significant impacts to lesser prairie chickens. These parcels are considered occupied habitat and also are within the Isolated Population Area for this species. Carlsbad EA at unnumbered 35. The lesser prairie chicken is a candidate species under the Endangered Species Act, with a final rule determining its status due March 31, 2014. BLM should wait for the final USFWS determination for this species prior to undertaking the leases of any of the shinnery oak parcels.

### BLM Response:

Parcels -023, -030, -031, -036, -037, -038, -039, -040, -043, -045, -046, -047, -048, -049, -050, -051, and -057 include suitable habitat for lesser prairie-chicken. All 17 of these parcels are located within the Isolated Population Area (IPA). The 2008 Special Status Species Resource Management Plan Amendment (RMPA) defines occupied habitat as “all areas within 1.5 miles of an active lesser prairie chicken site, regardless of vegetation that has been active for one out of the last 5 years.” Two rounds of screening of the 17 lease parcels show that all parcels are greater than 1.5 miles from an LPC siting or an LPC lek. Therefore leasing of these parcels is in conformance with the management decisions, criterion, and appropriate lease stipulations (see table above under 2.0 of Preferred Alternative in the CFO Environmental Assessment (EA)) for leasing within the IPA as set forth in the 2008 RMPA.

See section 2.3, 2.5, 3.9 and 4.3.9 of Carlsbad Field Office EA for more information.

Parcels NM-2014-032, -033, -034, -052, -053, and -054 fall within the jurisdiction of the BLM Roswell Field Office (RFO). Parcels -034, -052, -053, and -054 are currently out of conformance with the 2008 RMPA and will not be offered for lease. These parcels are located within the Primary Population Areas as identified in the RMPA and are not available for lease.

Parcels -032 and -033 are outside of the planning boundary for the 2008 RMPA, but are located within occupied habitat. These parcels are subject to the 1997 RFO RMP which identified the land as open to oil and gas leasing with restrictions. While the lands are open for leasing and are being considered for lease under the proposed action, the BLM RFO’s preferred alternative is to defer leasing of these parcels until the United States Fish & Wildlife Service issues a decision regarding the status of the species as threatened under the Endangered Species Act. It is anticipated that these two parcels will not be included in the July 2014 Competitive Oil and Gas Lease Sale Notice (published on April 16, 2014) and will not be offered for lease.

See section 2.3, 2.4, 3.6.2 and 4.3.6 of RFO EA for more information.

Comment #2:

We are also concerned that the development of parcels -025, -026, and -028 will result in significant negative impacts on the dunes sagebrush lizard, a BLM Sensitive Species. All of the aforementioned parcels should be removed from the July 2014 lease sale prior to the auction.

BLM Response:

Parcels -025 and -026 are not being considered for sale in the July 2014 Competitive Oil and Gas Lease Sale as they are within a Habitat Evaluation Area, and leasing these two parcels would be out of conformance with the 2008 RMPA. Parcel -028 is not within dunes sagebrush lizard habitat.

See section 2.5, 3.9 and 4.9 of the CFO EA for more information.

Comment #3:

A new study indicates that the entire rangewide population of the species is estimated at 17,616 individuals in 2013, down from 34,440 in 2012 (McDonald et al. 2013, Attachment 1). This study, and the major population decline, represents significant new information that was not considered under the 2008 sensitive species RMP amendment (when the most current estimated rangewide population was 40,000 using less rigorous techniques, Attachment 1 and 16). In light of the significant new information presented by this precipitous decline, a programmatic EIS does not presently exist to provide the legally sufficient NEPA analysis to support oil and gas leasing in lesser prairie chicken occupied habitat and the significant impacts on lesser prairie chicken populations that are likely to result from the legal exercise of these leases.

BLM Response:

The 2008 RMPA does not allow leasing in occupied lesser-prairie chicken habitat. All parcels nominated for the July 2014 Competitive Oil and Gas Lease Sale that are within occupied lesser-prairie chicken habitat will not be offered for sale as leasing the parcels would not be in conformance with the RMPA. The two parcels (-032 and -033) outside of the RMPA planning boundary that are within occupied habitat, are subject to the 1997 RMP and could be offered for sale. However, the RFO's preferred alternative is to defer leasing of these parcels. See the response for Comment #1 for more information.

Comment #4:

BLM itself catalogs potentially significant impacts on the bird from the exercise of these lease rights. EA at unnumbered 56. Measures designed to address these potentially significant impacts are not applied to the lease parcels at present, and the EA includes no analysis of the effectiveness of mitigation measures described for these species.

BLM Response:

The BLM did not catalog potentially significant impacts on the bird from the exercise of the lease rights in the CFO EA. The CFO EA does state in Section 3.9 that "Development of leases with suitable habitat could potentially impact local populations of lesser prairie-chicken (LPC)." The 17 parcels include suitable habitat and are within the IPA, but the parcels are greater than 1.5 miles of an LPC siting or a lek. These parcels have mitigation or lease stipulations as identified for leasing within the IPA in the 2008 Pecos District Special Status Species RMPA.



The analysis for of these mitigation measures was completed in the 2008 Pecos District Special Status Species Final Environmental Impact Statement/RMPA.

See Section 3.9 of the CFO EA for more information.