U.S. Department of the Interior

Bureau of Land Management

Environmental Assessment
DOI-BLM-NM-040-2016-028
April 2017

April 2017 Competitive Oil and Gas Lease Sale

Canadian, Ellis, Roger Mills, and Major Counties, Oklahoma; and Burleson, Jackson, Live Oak, McMullen, and Washington Counties, Texas

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BLM

DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
OKLAHOMA FIELD OFFICE

Project: **April 2017 Competitive Oil and Gas Lease Sale**
EA Log Number: **DOI-BLM-NM-040-2016-028**

Location:
Canadian, Ellis, Roger Mills, and Major Counties, Oklahoma; and
Burleson, Jackson, Live Oak, McMullen, and Washington Counties, Texas
Finding of No Significant Impact

Based on the analysis of potential environmental impacts contained in the attached Environmental Assessment (EA), I have determined the Proposed Action Alternative is not expected to have significant impacts on the environment.

The impacts of leasing the fluid mineral estate in the areas described within this EA have been previously analyzed in the Oklahoma Resources Management Plan (RMP) (1994), as amended; and the Texas RMP (1996), as amended; 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 (EIS) is not warranted.

Prepared by:

Alisha Autio, Natural Resource Specialist — Date

Gary McDonald, AFM Resources (acting) — Date

Reviewed by:

Stephen G. Tryon, Oklahoma Field Office Manager — Date

Approved by:

Amy Lueders, State Director — Date

1.0 INTRODUCTION

It is the policy of the Bureau of Land Management (BLM), pursuant to the Mineral Leasing Act of 1920 (MLA), as amended [30 U.S.C. 181 *et seq*.], the Federal Land Policy and Management of 1976 (FLPMA), as amended, the Energy Policy Act of 2005, and the Mineral Leasing Act for Acquired Lands, to make mineral resources available for leasing, development, 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 land use planning process determines which public land and minerals are open for leasing and what leasing stipulations are necessary, based on information available at the time. 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.

Once parcels have been identified for potential leasing, BLM conducts a review process to validate that the proposed parcels are eligible for sale. This includes a review of 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 of which potential bidders should be made aware. The parcels nominated for this sale, along with the appropriate stipulations from the Resource Management Plan (RMP), the Bureau of Reclamation, and the Army Corp of Engineers (USACE) 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 a list of nominated lease parcels with specific, applicable stipulations is made available online to the public 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 review of the 18 parcels encompassing approximately 4,376.86 acres nominated for the April 2017, Competitive Oil and Gas Lease Sale. Nine of the 18 parcels reside in Oklahoma totaling approximately 1,205.14 acres, with another nine in Texas totaling approximately 3,171.72 acres. Six of the 18 parcels are located on public domain land, three of the 18 parcels are located on split-estate with Federal minerals and private surface, one of the 18 parcels is administered by the Lavaca-Navidad River Authority, Palmetto Bend, two of the 18 parcels are located on surface estate administered by the Bureau of Reclamation (BOR), and six of the 18 parcels are located on surface estate administered by the Army Corp of Engineers (ACE), with the Federal mineral estate under each administered by the BLM. The EA also serves to verify conformance with the approved land use plan and demonstrates the effectiveness of attaching the lease stipulations to specific parcels.

The BLM issues and administers oil and gas leases managed by other surface management agencies (SMAs) only after the surface management agency authorizes leasing for its lands. Once a Federal lease is issued on other SMAs, the BLM has the full responsibility and authority to approve and regulate all surface disturbing and downhole activities associated with oil and gas exploration and development through analysis and approval of the surface use plan of operation (SUPO) component of an Application

for Permit to Drill (APD). The BLM also has the authority and responsibility to provide final approval of all APDs including those for operations on Federal leases on other SMA lands. Each APD includes a SUPO and a drilling plan.

The parcels and applicable stipulations were posted online for a two-week public scoping period beginning on August 15, 2016. Two comments were received during the scoping period and have been considered within this EA. In addition, this EA will be made available for public review and comment for 30 days beginning on October 24, 2016.

1.1 Purpose and Need and Decision to be Made

The purpose is to provide opportunities for private individuals or companies to explore for and develop Federal oil and gas resources through a competitive leasing process.

The need for the action is established by the BLM's responsibility under the MLA and the Acquired Mineral Leasing Act, as amended, to promote the exploration and development of oil and gas on the public domain and other federal lands. 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 *et seq.*), and other applicable laws, regulations, and policies.

1.2 Land Use Plan Conformance

The applicable land use plans for this action are the Oklahoma Resources Management Plan (RMP) (1994), as amended; and the Texas RMP (1996), as amended. These RMPs are currently being revised by what has been named the Oklahoma, Kansas, and Texas RMP Revision and Environmental Impact Statement (EIS). The scoping period for the revision occurred from November 2013 through January 2014. The final Scoping Summary Report was published on June 5, 2014. The revision will contemplate, among other things, mineral development in the planning area, and disclose impacts associated with potential energy development scenarios that are within the scope of the planning document. While the planning effort is underway, the 1994 Oklahoma RMP, as amended; and the 1996 Texas RMP, as amended, are still the applicable land use plans, and decisions made under those plans are properly applied to the parcels nominated in this lease sale.

The Oklahoma RMP, as amended, describes specific tracts in Oklahoma and the stipulations that would be attached to each tract if they were offered for lease. These stipulations which include seasonal timing limitations and other controlled surface use stipulations were designed to minimize or alleviate potential impacts to special resource values. All of the Oklahoma parcels under consideration fall within the identified tracts and the applicable stipulations identified in the Oklahoma RMP would be attached to each parcel. If all Oklahoma nominated and RMP identified tracts were leased, leasing the parcel would be in conformance with the Oklahoma RMP. Leasing the parcels would also be consistent with the RMP's goals and objectives for natural and cultural resources.

The Texas RMP, as amended, does not specifically describe individual tracts of split estate; rather it broadly describes the split estate situation in Texas and includes "all Federal minerals underlying other Federal SMA lands as wells as split-estate (non-federal surface over Federal minerals)." Mandatory stipulations would be incorporated into each lease where those stipulations apply. In addition, optional

stipulations will be included where resource values exist that warrant special protections". The potential stipulations could include seasonal timing limitations and other controlled surface use stipulations which were designed to minimize or alleviate potential impacts to special resource values. The Texas parcels under consideration fall within this planning area and the applicable stipulations identified in the RMP would be attached to the parcels. If the parcels are leased, leasing the parcels would be in conformance with the RMP(s). Leasing the split-estate parcels would also be consistent with the RMP's goals and objectives for natural and cultural resources.

For SMA parcels, the Oklahoma and Texas RMP's state "the SMA is contacted for consent to lease and also for identification of specific agency surface protection stipulations." BOR and USACE were contacted regarding parcels in their jurisdiction. They submitted letters of Consent to Lease, along with specific stipulations to attach to each parcel. Leasing the SMA parcels is consistent with the Oklahoma and Texas RMP's.

Pursuant to 40 CFR 1508.28 and 1502.21, this EA is tiered to and incorporates by reference the information and analysis contained in the Oklahoma and Texas RMPs (1994 and 1996), as amended. 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 potential well densities listed in the Reasonable Foreseeable Development (RFD) Scenario included in both RMPs. 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 RFD scenarios may be used in the analysis of impacts in this EA.

FLPMA established guidelines to provide for 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 US; the BLM has no authority over use of the private 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 1601.009 and 1621-1).

1.3 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.

Oklahoma Field Office (OFO) biologists reviewed the proposed action and determined it would be in compliance with threatened and endangered species management and consultation guidelines outlined in the Oklahoma and Texas RMP biological assessments (BA). No further consultation with US Fish and Wildlife (USFWS) is required at this leasing stage.

Compliance with National Historic Preservation Act (NHPA) Section 106 responsibilities are adhered to by following the BLM Manual 8100, 36 CFR Part 800, 43 CFR Part 7, and the Cultural Resources Handbook H-8100-1 (for New Mexico, Oklahoma, Kansas, and Texas). When draft parcels locations are received by the OFO, cultural resource staff reviews the location for any known cultural resources on BLM records.

Tribal consultations would be completed when specific locations for proposed projects are received, and reviewed by the State Historic Preservation Office (SHPO), the Bureau of Indian Affairs (BIA), and specific Tribes. When particular Tribes respond during consultation, that tribe would be directly involved in negotiations with the BLM to determine if the project should be moved, or other mitigation required.

In Section 1835 of the Energy Policy Act of 2005 (43 USC 1508), 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 privately owned surface. The Split Estate Report, submitted in December 2006, documents the findings resulting from consultation on the split estate issue with affected private surface owners, the oil and gas industry, and other interested parties.

The BLM contacts the surface owners and notifies 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 that they may obtain additional information related to the oil and gas leasing process, the imposition of any stipulations on that lease parcel, federal and state regulations, and best management practices (BMPs). The surface owner 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.

1.4 Identification of Issues

The parcels included in the Proposed Action, along with the appropriate stipulations from the RMP and BOR, USACE, and USFS, were posted online at http://www.blm.gov/nm/st/en/prog/energy/oil_and_gas/oil_and_gas_lease.html for a two-week public scoping period beginning August 15 through August 29, 2016.

An internal review of the Proposed Action, along with the appropriate stipulations from the RMP, BOR, and USACE, was conducted by an interdisciplinary team of OFO resource specialists on September 12, 2016, to identify and consider potentially affected resources and associated issues. During the meeting, the interdisciplinary team also identified and subsequently addressed any unresolved issues or conflicts related to the Proposed Action.

- What effect *will* the proposed action have on seismicity?
- What effect *will* the proposed action have on wastewater and wastewater injection wells?
- What effect *will* the proposed action have on Infrastructure integrity?
- What effect *will* the proposed action have on reservoirs and aquifers?
- What effect *will* the proposed action have on atmospheric pollutants and contaminants?
- What effect *will* the proposed action have on climate change?
- What effect *will* the proposed action have on the watershed condition?
- What effect *will* the proposed action have on soil loss and contamination?
- What effect *will* the proposed action have on water quality in stream systems?
- What effect *will* the proposed action have on floodplains and the integrity of the floodplains?

- What effect *will* the proposed action have on wetland and riparian areas?
- What effect *will* the proposed action have on prime or unique farmlands?
- What effect *will* the proposed action have on known and newly discovered artifacts or areas of cultural, paleontological, and archeological significance?
- What effect *will* the proposed action have on the spread of non-native species?
- What effect *will* the proposed action have on vegetation loss, fragmentation, and regrowth?
- What effect *will* the proposed action have on federally listed and state-listed species that have the potential to be located on the proposed lease tracts?
- What effect *will* the proposed action have on Migratory Bird species?
- What effect *will* the proposed action have on wildlife and their habitat in general?
- What effect *will* the proposed action have on the management of fluid mineral drilling wastes produced and the potential for contamination in the proposed lease area?
- What effect *will* the proposed action have on locatable minerals management?
- What effect *will* the proposed action have on visual quality?
- What effect *will* the proposed action have on recreation in the recreational areas or on BLM owned lands?
- What effect *will* the proposed action have on state and local economies?
- What effect *will* the proposed action have on minority and low income populations?

Several issues were considered during internal scoping but dismissed from detailed analysis because there would be no potentially significant effects related to the issues resulting from any of the alternatives presented below. The following elements are determined by the IDT, following onsite visits, review of the RMPs, as amended and other data sources, to not be present:

- Areas of Critical Environmental Concern
- Livestock Grazing
- Wild Horse and Burros
- Public Health and Safety
- Rights-of-way
- Wild and Scenic Rivers
- Wilderness and Wilderness Study Areas
- Lands with wilderness characteristics
- Cave and Karst

<u>Social Cost of Carbon</u>

The BLM acknowledges that anthropogenic climate change is a reality. In this analysis, the BLM presents a qualitative discussion of the environmental effects of climate change and their socioeconomic consequences. Consistent with the revised CEQ draft guidance from December 2014, the BLM has used estimated GHG emissions associated with the proposed action as a reasonable proxy for the effects of climate change in this NEPA analysis. The BLM has placed those emissions in the context of relevant state emissions. This is also consistent with the approach that federal courts have upheld when considering NEPA challenges to the following BLM federal coal leasing decisions: West Antelope II, 738 F .3d at 309; WildEarth Guardians v. BLM, Civ. Case No. 1:11-cv-1481 (RJL) (D.D.C. filed Mar. 21, 2014).

The BLM finds that including monetary estimates of the Social Cost of Carbon (SCC) in its NEPA analysis for this proposed action would not be useful. There is no court case or existing guidance requiring the

inclusion of SCC in the NEPA context. Estimating SCC is challenging because it is intended to model effects at a global scale on the welfare of future generations caused by additional carbon emissions occurring in the present. A federal Interagency Working Group on the Social Cost of Carbon (IWG), convened by the Office of Management and Budget, developed estimates of the SCC, which reflect the monetary cost incurred by the emission of one additional metric ton of carbon dioxide (CO_2). However for this decision, the BLM finds there are technical constraints to including monetary estimates of the SCC and that including them would not provide additional pertinent information to the decision maker.

Given the global nature of climate change, estimating SCC of an individual decision requires assessing the impact of the project on the global market for the commodity in question. While the BLM is able to estimate the GHG emissions associated with the proposed action for this project, we have not estimated the net effect of this action on global GHG emissions or climate change. Depending on the global demand for oil and gas, the net effect of this project may be partially offset by changes in production in other locations. Accounting for this potential substitution affect is technically difficult.

Further, the NEPA analysis for this proposed action does not include monetary estimates of any benefits or costs. The quantitative economic analysis is primarily a regional economic impact analysis, which is used to estimate impacts on economic activity, expressed as projected changes in employment, personal income, or economic output. These indicators are not benefits or costs, as defined in a benefit cost analysis. Without any other monetized benefits or costs reported, monetized estimates of the SCC would be presented in isolation, without any context for evaluating their significance. This limits their usefulness to the decision maker.

2.0 PROPOSED ACTION AND ALTERNATIVES

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 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 18 parcels would not be offered for lease during the April 2017, Competitive Oil and Gas Lease Sale. Surface management and any ongoing oil and gas development on surrounding federal, private, and state leases would continue under current guidelines and practices. The selection of the no action alternative would not prevent these parcels from being nominated in a future lease sale.

2.2 Alternative B—Proposed Action

The Proposed Action would be to lease Federal minerals on 18 of 44 nominated lease parcels totaling 4,376.86 acres offered for sale in the April 2017, Competitive Oil and Gas Lease Sale with the addition of further stipulations and lease notices to certain parcels administered by the OFO.

Standard terms and conditions as well as stipulations listed in the Oklahoma RMP (1994), as amended, and Texas RMP (1996), as amended, and stipulations identified by the SMAs would apply. A complete description of these parcels, including any stipulations, is provided in Table 1. A description of each stipulation is included in Appendix 1.

Table 1. Alternative B--Proposed Action Parcels

Parcel Nomination No.	Stipulations	Acres
NM-201704-001 T.0110N, R.0080W, 17 PM Sec. 019 Upland acreage to Lot 7; Sec. 019 Accretion and riverbed accretion to Lot 7; Sec. 019 Part of NWSE upland and riverbed Sec. 019 Part of NESE upland and riverbed; Sec. 019 Upland accretion to Lot 8; Sec. 019 Riverbed and accretion to Lot 8; Sec. 030 Accretion and riverbed to Lot 1; Sec. 030 Accretion and riverbed to Lot 2; Sec. 030 Accretion and riverbed to Lot 3; Canadian County, OK	ORA-1, ORA-2: Floodplain and Wetland-Riparian Protection WO-ESA-7: Threatened and Endangered Species Protection WO-NHPA: Cultural Resources Protection	241.67
NM-201704-002 T.0220N, R.0140W, 17 PM Sec. 007 Lots 1-4; Sec. 007 SENW, SWSE; Major County, OK	WO-ESA-7: Threatened and Endangered Species Protection WO-NHPA: Cultural Resources Protection	205.78
NM-201704-003 T.0140N, R.0210W, 17 PM Sec. 010 SENE Roger Mills County, OK	ORA-3: Season of use for LPC WO-ESA-7: Threatened and Endangered Species Protection WO-NHPA: Cultural Resources Protection	40.00
NM-201704-004 T.0160N, R.0230W, 17 PM Sec. 019 Accretion and riparian acreage to Lot 5; Roger Mills County, OK	ORA-1, ORA-2: Floodplain and Wetland-Riparian Protection ORA-3: Season of use for LPC WO-ESA-7: Threatened and Endangered Species Protection WO-NHPA: Cultural Resources Protection NM-10: Drainage	6.97

Parcel Nomination No.	Stipulations	Acres
NM-201704-005 T.0160N, R.0230W, 17 PM, OK Sec. 022 Accretion and riparian acreage to Lot 4; Sec. 026 Accretion and riparian acreage to Lots 3, 5; Roger Mills/Ellis Counties, OK	ORA-1, ORA-2: Floodplain and Wetland-Riparian Protection ORA-3: Season of use for LPC WO-ESA-7: Threatened and Endangered Species Protection WO-NHPA: Cultural Resources Protection NM-10: Drainage	24.86
NM-201704-006 T.0160N, R.0230W, 17 PM Sec. 024 Accretion and riparian acreage to Lots 1, 2; Sec. 024 Lying within Section 13; Sec. 024 Accretion and riparian acreage to Lots 2, 3; Sec. 024 Lying within Section 24; Sec. 024 Accretion and riparian acreage to Lots 3, 4; Roger Mills County, OK	ORA-1, ORA-2: Floodplain and Wetland-Riparian Protection ORA-3: Season of use for LPC WO-ESA-7: Threatened and Endangered Species Protection WO-NHPA: Cultural Resources Protection NM-10: Drainage	72.94
NM-201704-007 T.0140N, R.0240W, 17 PM Sec. 015 SWSE; Roger Mills County, OK	ORA-3: Season of use for LPC WO-ESA-7: Threatened and Endangered Species Protection WO-NHPA: Cultural Resources Protection NM-10: Drainage	40.00
NM-201704-008 T.0160N, R.0240W, 17 PM Sec. 014 Accretion and riparian acreage to Lot 7; Roger Mills County, OK	ORA-1, ORA-2: Floodplain and Wetland-Riparian Protection ORA-3: Season of use for LPC WO-ESA-7: Threatened and Endangered Species Protection WO-NHPA: Cultural Resources Protection NM-10: Drainage	8.76
NM-201704-018 T.0210N, R.0160W, 17 PM Sec. 001 Lots 1-4; Sec. 001 S2N2; Sec. 002 Lots 2, 3; Sec. 002 SENE, N2SE, SWSE; Major County, OK	ORA-2: Wetland-Riparian Protection WO-ESA-7: Threatened and Endangered Species Protection WO-NHPA: Cultural Resources Protection	564.16

Parcel Nomination No.	Stipulations	Acres
NM-201704-009 TR NR-34-1 thru NR-34-8; TR NR-39-2 Live Oak County, TX	BOR Interim Stipulation-Nueces River Project ORA-2: Wetland and Riparian Protection WO-ESA-7: Threatened and Endangered Species Protection WO-NHPA: Cultural Resources Protection NM-10: Drainage	976.80
NM-201704-010 TR NR-17-1; TR NR-44; TR NR-43-1 thru NR-43-3; TR NR-47-3; TR NR-58; Live Oak/McMullen Counties, TX	BOR Interim Stipulation-Nueces River Project ORA-2: Wetland and Riparian Protection WO-ESA-7: Threatened and Endangered Species Protection WO-NHPA: Cultural Resources Protection NM-10: Drainage	634.74
NM-201704-011 TR 301, 303; TR 304, 305; Washington County, TX	COE-NSO-SOMERVILLE LAKE ORA-2: Wetland/Riparian Protection Stipulation WO-ESA-7: Threatened and Endangered Species Stipulation WO-NHPA: Cultural Resources Stipulation	161.25
NM-201704-012 TR 307; TR 308; Washington County, TX	COE-NSO-SOMERVILLE LAKE ORA-2: Wetland/Riparian Protection Stipulation WO-ESA-7: Threatened and Endangered Species Stipulation WO-NHPA: Cultural Resources Stipulation	405.60
NM-201704-013 TR 206, 232; Washington County, TX	COE-NSO-SOMERVILLE LAKE ORA-2: Wetland/Riparian Protection Stipulation WO-ESA-7: Threatened and Endangered Species Stipulation WO-NHPA: Cultural Resources Stipulation	269.10
NM-201704-014 TR 205, 208, 209, 211; TR 214, 215, 220; Burleson County, TX	COE-NSO-SOMERVILLE LAKE ORA-2: Wetland/Riparian Protection Stipulation WO-ESA-7: Threatened and Endangered Species Stipulation WO-NHPA: Cultural Resources Stipulation	229.53

Parcel Nomination No.	Stipulations	Acres
NM-201704-015 TR 404, 405, 407, 408, 411; TR 412, 413-1, 413-2; Burleson County, TX	COE-NSO-SOMERVILLE LAKE ORA-2: Wetland/Riparian Protection Stipulation WO-ESA-7: Threatened and Endangered Species Stipulation WO-NHPA: Cultural Resources Stipulation	173.93
NM-201704-016 TR 600, 602, 606, 608; Washington County, TX	COE-NSO-SOMERVILLE LAKE ORA-2: Wetland/Riparian Protection Stipulation WO-ESA-7: Threatened and Endangered Species Stipulation WO-NHPA: Cultural Resources Stipulation	167.77
NM-201704-017 TR I-C-206-1, I-C-206-2; Jackson County, TX	GR-LNRA-General Stipulations Palmetto Bend Project, TX WO-ESA-7: Threatened and Endangered Species Stipulation WO-NHPA: Cultural Resources Stipulation	153.00

Some of the proposed parcels may be within floodplains and would have lease stipulation ORA-1 Floodplain Protection attached. The Floodplain Protection stipulation informs the lessee and operator that surface occupancy of these areas and surface disturbance within up to 200 meters of the outer edge of the floodplain may not be allowed in order to protect the integrity and functionality of the floodplain and associated watercourse. Furthermore, controlled surface use requiring special mitigation measures may be required and will be developed during any applications for permit to drill.

Proposed parcels NM-201704-004, -005, -006, -010, -011, -012, -013, -014, -015, -016, -017, and -018 would also have ORA-2 Wetland/Riparian Protection stipulations added. ORA-2 is intended for the protection of wetland and/or riparian areas and states that “Surface occupancy of these areas will not be allowed without the specific approval, in writing, of the BLM. Impacts or disturbance to wetlands and riparian habitats which occur on this lease must be avoided or mitigated.”

Proposed parcels -003 thru -008 are within Lesser/Greater Prairie Chicken Habitat and would have ORA-3 stipulations added to it, which states that no surface occupancy of the lease would occur from February 15 to May 15.

Two lease stipulations, WO-ESA-7 and WO-NHPA, would also be attached to all 18 parcels. These notices would notify the lease holder that the BLM reserves direction to modify, if necessary, any action proposed on the lease to ensure protection of:

- threatened, endangered, or other special status species, and their habitats (WO-ESA-7); and
- historic properties and/or resources protected under the National Historic Preservation Act, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, Executive Order 13007, or other statutes and executive orders (WO-NHPA).

Five of the nine proposed lease parcels in Oklahoma and two of the nine proposed lease parcels in Texas are subject to drainage and the NM-10 drainage stipulation would be applied. This stipulation states, "All or parts of the land contained in this lease are subject to drainage by well(s) located adjacent to this lease. The lessee shall be required within 6 months of lease issuance to submit to the Authorized Officer plans for protecting the lease from drainage. Compensatory royalty will be assessed effective the expiration of this 6-month period if no plan is submitted."

Two parcels of the nine proposed in Texas are subject to the Bureau of Reclamation (BOR) Interim Stipulations-Nueces River Project, which states that there shall be no surface occupancy on these parcels. Similarly, the Bureau of Reclamation, Lavaca-Navidad River Authority BOR GR-LNRA and the USACE NSO- Somerville Lake prohibits surface occupancy on one parcel and six parcels, respectively, in Texas.

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 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.

Reasonably Foreseeable Development

At the leasing stage it is uncertain if an APD on leased parcels will 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, or completing work-over tasks throughout the life of the well. In Oklahoma and Texas, 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 2 for a complete description of the phases of oil and gas development.

Drilling of a well 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). An APD would not be authorized until site-specific NEPA analysis is conducted.

Standard terms and conditions, stipulations listed in the Oklahoma and Texas RMPs, 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.

2.3 Alternatives Considered But Eliminated From Detailed Analysis

USFS Lease parcels

The OFO considered one alternative that would lease all nominated 41 parcels but it was eliminated from further analysis because there were 23 tracts considered for lease that are jointly administered by the BLM and USFS.

Where the surface is administered by the Forest Service and the mineral estate is also federally owned, the Forest Service and BLM share the responsibility for enforcing mineral leasing policies and regulations. Forest Service regulations under 36 CFR 228.102(e) allow the agency to authorize the BLM to lease individual, specified areas of land administratively available for lease and include the stipulations determined to be necessary. The Forest Service is responsible for reviewing the effects of leasing the proposed parcels, although the final decision is made by the BLM authorizing official.

The Forest Service is in the process of revising a proposed forest plan, therefore could not accurately predict the concurrence of leasing these Forest Service lands with the forest use plan. These tracts may be considered at a later (Table 2).

Table 2. Proposed Action—Parcels Deferred

Parcel Nomination No.	Surface Ownership	Stipulations	Acres
NM-201704-019 TR SHF-J1I-0001; Walker County, TX	Acquired USFS Sam Houston National Forest	SHF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-NSO-14-01: Recreation Areas TXFG1996-NSO-14-03: Lake Conroe TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-CSU-16-02: Trails TXFG1996-LN-17-07: Red-Cockaded Woodpecker Habitat Management Foraging Areas	2298.16
NM-201704-020 TR DCF-K2III-0001; Trinity County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-LN-17-01: Standard Red-Cockaded Woodpecker	2336.55
NM-201704-021 TR DCF-K2III-0002; Trinity County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-LN-17-01: Standard Red-Cockaded Woodpecker	1413.97
NM-201704-022 TR DCF-K2III-0003; Trinity County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-LN-17-01: Standard Red-Cockaded Woodpecker	547.46

Parcel Nomination No.	Surface Ownership	Stipulations	Acres
NM-201704-023 TR DCF-K2III-0004; Trinity County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-LN-17-01: Standard Red-Cockaded Woodpecker	1763.39
NM-201704-024 TR DCF-K2III-0005; Trinity County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-LN-17-01: Standard Red-Cockaded Woodpecker	2369.17
NM-201704-025 TR DCF-K2III-0006; Trinity County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-LN-17-01: Standard Red-Cockaded Woodpecker	2002.31
NM-201704-026 TR DCF-K2III-0007; Trinity County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-LN-17-01: Standard Red-Cockaded Woodpecker	1910.97
NM-201704-027 TR DCF-K2III-0008; Trinity County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-LN-17-01: Standard Red-Cockaded Woodpecker TXFG1996-LN-17-09: Trinity County Airport Extension	1514.74
NM-201704-028 TR DCF-K2AI-0004; Trinity County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-CSU-16-07: River Bottom Areas TXFG1996-LN-17-07: Red-Cockaded Woodpecker Habitat Management Foraging Areas TXFG1996-LN-17-08: Bald Eagles	2344.93

Parcel Nomination No.	Surface Ownership	Stipulations	Acres
NM-201704-029 TR DCF-K2AI-0001; Trinity County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-TL-15-01: Turkey Nesting Area TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-LN-17-07: Red-Cockaded Woodpecker Habitat Management Foraging Areas	1095.78
NM-201704-030 TR DCF-K2AI-0002; Trinity County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-TL-15-01: Turkey Nesting Area TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-LN-17-07: Red-Cockaded Woodpecker Habitat Management Foraging Areas	2352.47
NM-201704-031 TR DCF-K2AI-0003; Trinity County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-TL-15-01: Turkey Nesting Area TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-LN-17-07: Red-Cockaded Woodpecker Habitat Management Foraging Areas	2256.21
NM-201704-032 TR DCF-K2ACI-0001; TR DCF-K2AC-0001; TR DCF-K1R-0001; TR DCF-K10I-0001; TR DCF-K2ABI-0001; TR DCF-K2AB-0001; Houston County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-CSU-16-02: Trails TXFG1996-LN-17-07: Red-Cockaded Woodpecker Habitat Management Foraging Areas	580.00
NM-201704-033 TR DCF-K2AJ-0001; Trinity County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-TL-15-01: Turkey Nesting Area TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-LN-17-07: Red-Cockaded Woodpecker Habitat Management Foraging Areas	30.00

Parcel Nomination No.	Surface Ownership	Stipulations	Acres
NM-201704-034 TR DCF-K32-0001; Houston County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-TL-15-01: Turkey Nesting Area TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-LN-17-07: Red-Cockaded Woodpecker Habitat Management Foraging Areas	48.00
NM-201704-035 TR DCF-K2II-0001; Trinity County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-LN-17-01: Standard Red-Cockaded Woodpecker	1620.771
NM-201704-036 TR DCF-K2II-0002; Trinity County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-LN-17-01: Standard Red-Cockaded Woodpecker	2492.59
NM-201704-037 TR DCF-K2II-0003; Trinity County, TX	Acquired Davy Crockett National Forest	DCF-WO-10/05/2006: Secretary of Agriculture Rules and Regulations Compliance TXFG1996-CSU-16-01: Streamside Management Zone TXFG1996-LN-17-01: Standard Red-Cockaded Woodpecker	1547.30
NM-201704-038 TR DCF-K50A-0001; Trinity County, TX	Acquired Davy Crockett National Forest	WO-ESA-7: Threatened and Endangered Species Stipulation WO-NHPA: Cultural Resources Stipulation	26.78
NM-201704-039 TR DCF-KIF-0001; Houston County, TX	Acquired Davy Crockett National Forest	WO-ESA-7: Threatened and Endangered Species Stipulation WO-NHPA: Cultural Resources Stipulation	54.00
NM-201704-040 TR DCF-K50-0001; TR DCF-K2III-0009; Trinity County, TX	Acquired Davy Crockett National Forest	WO-ESA-7: Threatened and Endangered Species Stipulation WO-NHPA: Cultural Resources Stipulation	82.64

3.0 DESCRIPTION OF AFFECTED ENVIRONMENT

This section describes the environment that would be affected by implementation of the alternatives described in Section 2. Aspects of the affected environment described in this section focus on the relevant resources and issues. Only those elements of the affected environment that have potential to be impacted are described in detail (see Appendix 3).

Canadian County, Oklahoma (Parcel -001)

One proposed parcel occurs in the South Canadian River bottom from approximately one mile east of the Caddo County line south east to the Union City limits. All tract areas are in the floodplain and all support wetlands with cottonwood/willow woodlands with an understory of scattered juniper trees. Openings of sandbars and water as well as grasslands with sedges and cattails occur throughout the river bottom.

Ellis County, Oklahoma (Parcel -005)

One proposed lease parcel is along the southern boundary of Ellis County at an elevation of about 2,050 feet above sea level. Other parcels both Ellis and Roger Mills Counties. Ellis County is L-shaped, bounded on the north by Harper County, on the east by Woodward and Dewey Counties, on the south by Roger Mills County (across the Canadian River), and on the west by the state of Texas. The county has a total area of 1,232 square miles (788,480 acres), of which 3 square miles (1,920 acres) is water.

Ellis County is served by four U.S. Highways (60, 270, 283 and 412) and four State Highways (3, 15, 46, and 51), and numerous county and private roads.

Major County, Oklahoma (Parcels -002 and -018)

Two proposed parcels are located in the mid- to northwestern part of the county. Major County is in the northwestern part of Oklahoma. The county in bordered by Woods County on the north, Woodward County on the west, Dewey County of the south, and Garfield County on the East. The county covers an area of about 958 square miles (613,120 acres).

Drained by the Canadian and North Canadian rivers, the county lies mostly in the Gypsum Hills physiographic region. The western quarter of the county is situated in the High Plains region.

Roger Mills County, Oklahoma (Parcels -003, -004, -005, -006, -007, and -008)

Six proposed parcels are in the north bend of Roger Mills County. Roger Mills County is a western border county, lying about midway between the northern and southern State lines. The Canadian River forms the northern boundary of the county, separating it from Ellis County. Dewey and Custer Counties adjoin it on the east, Beckham County on the south, and on the west by the State of Texas. It has an area of 1,135 square miles (726,400 acres).

The Canadian River forms the northern border of the county. The Washita River passes by the towns of Cheyenne and Strong City as it crosses the county from west to east.

Burleson County, Texas (Parcels -014 and -015)

Burleson County is in the east-central part of Texas. It is bordered by Lee County on the west, Wallace County on the south, Robertson County on the north, and Brazos County on the east. The county covers 977 square miles (625,280 acres).

The entire county lies in the drainage area of the Brazos River, which marks its eastern border. The Old River is a perennial stream that flows through Burleson County.

Live Oak County, Texas (Parcels -009 and -010)

Live Oak County is in the southeastern part of Texas. Parcel -010 shares a boarder with Live Oak and McMullen Counties. It is bounded by Karnes County on the north, on the west by Duval County, on the south by Jim Wells County, and on the east by Bee County. The county covers 1,237 square miles (791,680 acres). Water makes up 28,160 acres of water, most of which is in Lake Texoma.

Live Oak County is home to Choke Canyon reservoir and two forks of the Frio River.

McMullen County, Texas (Parcel -010)

McMullen County is in the southern part of Texas. Parcel -010 shares a boarder with Live Oak and McMullen Counties. It is bounded by Atascosca County on the north, on the west by LaSalle County, on the south by Duval County, and on the east by Live Oak County. The county covers 714 square miles (456,960 acres).

Most of the county is drained by the Nueces River which flows northeasterly from the southwestern corner of the county and bisects its eastern border. The northern half of McMullen County is drained by the Frio River, which empties into the Choke Canyon Reservoir in the northeastern corner of the county.

Washington County, Texas (Parcels -011, -012, -013, and -016)

Washington County is in the southeast part of Texas. It is bounded by Brazos County on the north, on the west by Austin County, on the south by Austin County, and on the east by Waller County. The county covers 622 square miles (398,080 acres). The county is drained by the Brazos River which flows along the eastern edge.

Jackson County, Texas (Parcel -017)

Jackson County is in the southeast part of Texas. It is bounded by Colorado/Wharton Counties on the north, on the west by Lavaca/Victoria Counties, on the south by Calhoun County, and on the east by Matagorda County. The county covers 857 square miles (548,480 acres). The county is drained by the Lavaca and Navidad Rivers.

3.1 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 (Air Resources Technical Report)(BLM 2016). 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.

3.1.1 Air Quality

The Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality nationwide, including attainment/non-attainment areas and six "criteria" air pollutants. These criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), ground level ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb). EPA has established National Ambient Air Quality Standards (NAAQS) for criteria air pollutants. Areas with concentrations of criteria pollutants that are below the levels established by the NAAQS are considered either attainment or unclassifiable areas. An area may be classified as a non-attainment area if the concentration of one or more criteria pollutants in a geographic area is found to exceed the 'threshold' level of the NAAQS.

The NAAQS are protective of human health and the environment. EPA has approved Texas' State Implementation Plan and Oklahoma's State Implementation Plan, and each state enforces state and federal air quality regulations on all public and private lands within the state, except for tribal lands.

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 U.S. are designated as Class II, which allows a moderate amount of air quality degradation. No areas of the U.S. have been designated Class III, which would allow more air quality degradation. There are also areas identified as "non-attainment" that do not meet the standards for criteria for air pollutants. 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.

<u>Oklahoma Parcels</u>

All parcels in Oklahoma are greater than 100 miles from the nearest "non-attainment" area. Proposed parcels -003 through -008 are less than 30 miles to the nearest Class I Airshed (Wichita Mountains, Oklahoma). All other Oklahoma parcels are greater than 100 miles to the nearest Class I Airshed (see Appendix 4). Oklahoma City and Tulsa seasonally exceed the levels for Ozone and can sometimes be considered non-attainment.

<u>Texas Parcels</u>

Proposed parcels -011 through -016 are approximately 25 miles from the Houston non-attainment area. Proposed parcel -017 is approximately 40 miles from the Houston non-attainment area.

There are currently four non-attainment areas in Texas, one for PM_{10} (El Paso), two for ozone (Houston area, Dallas-Fort Worth area), and a portion of Collin County is non-attainment for lead, according to the TCEQ (http://www.tceq.texas.gov).

The Houston area is in non-attainment as a result of increased levels of ozone (O_3). The nearest Class I Airshed (Wichita Mountains, Oklahoma) is over 150 miles northwest (see Appendix 4).

The proposed parcels -038 through -040 are approximately 75 miles northwest of the Houston-Livingston "non-attainment" area. All other parcels are over 100 miles away from the Houston-Livingston 'non-attainment" area.

Houston-Galveston-Brazoria "Non-Attainment" Area

The Houston-Galveston-Brazoria area was designated as severe nonattainment for eight-hour ozone based on the 1997 standard in October 2008 and includes the following counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller. De minimus values for both nitrogen oxides (NO_x) and volatile organic compounds (VOC) in this area are 25 tons/year. The Dallas-Fort Worth ozone non-attainment area was designated in June 2004, is classified as moderate, and includes the following counties: Collin, Dallas, Denton, Tarrant, Ellis, Johnson, Kaufman, Parker, and Rockwall. De minimus values in this area are 100 tons/yr for NO_x and 50 tons/yr for VOC.

The Texas Commission on Environmental Quality (TCEQ) maintains an emission inventory of current information for sources of NO_x and VOC—those that most contribute to ozone levels. The total inventory of NO_x and VOC emissions for an area is derived from estimates developed for five general categories of emissions sources: point, area, non-road mobile, on-road mobile, and biogenic. Unlike other non-attainment areas in Texas where industrial point sources account for a greater proportion of the total NO_x emissions in the area, point sources account for only about one-tenth of the total NO_x emissions in the DFW area. The majority of NO_x emissions in the DFW area come from on-road mobile sources (cars and trucks) and non-road mobile sources (i.e. construction equipment, aircraft, and locomotives). TCEQ has implemented several ozone emission reduction strategies to meet the 2018 attainment date set by EPA. Despite a continuous increase in the population of the Houston area, the area is exhibiting decreasing trends for ozone and its precursors, NO_x and VOC. The eight-hour ozone design value in 2010 is 11-17 percent lower than the eight-hour ozone design value in 2000. The number of eight-hour ozone exceedance days over the past 20 years has also decreased significantly from 26 days in 1991 to eight days in 2010. Over the same time period the number of ozone monitors in the DFW area more than doubled (TCEQ 2011).

Modeling and data analyses have consistently shown that NO_x reductions are far more effective at reducing ozone than VOC reductions. In 2008, biogenic emissions are 66 percent of the total VOCs in the DFW area. Oil and gas VOC emissions for the same area are 14 percent of the total VOCs. Thus, even if VOC emissions from oil and gas activities were controlled, there would be enough biogenic VOCs to carry ozone reactions forward.

Emissions of ozone and fine particle smog forming compounds from all Barnett Shale activities were approximately 191 tons per day (tpd) on an annual average basis in 2009. During the summer, VOC emissions increased raising the NO_x and VOC total to 307 tpd, greater than the combined emissions from the major airports and on-road motor vehicles in the DFW area. Emissions in 2009 for air toxic

compounds were approximately six tpd on an annual average, with peak summer emissions of 17 tpd (Armendariz 2009).

Current Pollution concentrations

"Design Concentrations" are the concentrations of air pollution at a specific monitoring site that can be compared to the NAAQS. Several of the pollutant concentrations are not expected to be elevated in rural areas, thus there is no available data or no monitoring conducted for several pollutants. The 2015 design concentrations of criteria pollutants are listed in Table 3.

Table 3. 2015 Design Concentrations of Criteria Pollutants

Pollutant	Design Value	Averaging period	NAAQS
O_3	0.068 ppm (Tulsa, OK)	8-hour	0.070 ppm[1]
	0.070 ppm (Oklahoma City, OK)		
	0.068 ppm (Wichita, KS)		
	0.075 ppm (Dallas, TX) 0.078 ppm (San Antonio, TX) 0.080 ppm (Houston, TX)		
$PM_{2.5}$	8.8 µg/m^3 (Tulsa, OK)	Annual	12.0 µg/m[2]
	8.6 µg/m^3 (Oklahoma City, OK)		
	9.2 µg/m^3 (Wichita, KS)		
	10.2 µg/m^3 (Dallas, TX) 8.5 µg/m^3 (San Antonio, TX) 11.6 µg/m^3 (Houston, TX)		
$PM_{2.5}$	20 µg/m^3 (Tulsa, OK)	24-hour	35 µg/m^3
	21 µg/m^3 (Oklahoma City, OK)		
	25 µg/m^3 (Wichita, KS)		
	22 µg/m^3 (Dallas, TX) 22 µg/m^3 (San Antonio, TX) 24 µg/m^3 (Houston, TX)		
PM_{10}	No data (Tulsa, OK)	24-hour	150 µg/m[5]
	0.0 exceedances/ year (Oklahoma City, OK)		
	2.2 exceedances/year (Wichita, KS)		
	0.0 exceedances/ year (Denton, TX) 0.0 exceedances/year (Houston, TX) 0.0 exceedances/year(San Antonio, TX)		
NO_2	8 ppb (Tulsa, OK)	Annual	53 ppb[7]
	7 ppb (Oklahoma City, OK)		
	7 ppb (Wichita, KS)		
	10 ppb (Dallas, TX) 10 ppb (San Antonio, TX) 13 ppb (Houston, TX)		
NO_2	No Data (Tulsa, OK)	1-hour	100 ppb[6]
	45 ppb (Oklahoma City, OK)		
	39 ppb (Wichita, KS)		
	47 ppb (Dallas, TX) 33 ppb (San Antonio, TX) 53 ppb (Houston, TX)		
	0 ppb (Central OK)		
	No Data (Western OK)		

Pollutant	Design Value	Averaging period	NAAQS
	No Data ppb (Dallas, TX)		
SO_2	40 ppb (Tulsa, OK)	1-hour	75 ppb[6]
	3 ppb (Oklahoma City, OK)		
	No Data (Wichita, KS)		
	5 ppb (Dallas, TX) No data (San Antonio, TX) 22 ppb (Houston, TX)		
CO	1.1 ppm (Tulsa, OK)	8-hour	9 ppm[4]
	0.9 ppm (Oklahoma City, OK)		
	No Data (Wichita, KS)		
	1.5 ppm (Dallas, TX) No Data (San Antonio, TX) 1.7 ppm (Houston, TX)		
CO	1.6 ppm (Tulsa, OK)	1-hour	35 ppm[4]
	2.9 ppm (Oklahoma City, OK)		
	No Data (Wichita, KS)		
	1.8 ppm (Dallas, TX) No data (San Antonio, TX) 2.3 ppm (Houston, TX)		

[1] Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
[2] Annual mean, averaged over 3 years
[3] 98th percentile, averaged over 3 years
[4] Not to be exceeded more than once per year
[5] Not to be exceeded more than once per year on average over 3 years
[6] 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
[7] Annual Mean

Air quality in a given region can be measured by its Air Quality Index (AQI) value. The 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 (51-100), unhealthy for sensitive groups (101-150), unhealthy (151-200), very unhealthy (201-300), and hazardous (301-500). 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.

Mean AQI values in or near the proposed lease parcels were generally in the good range (AQI<50) in 2015 (Table 4). The air quality index near the Texas parcel annually reaches “unhealthy for sensitive groups” on a number of days each year, while Oklahoma air quality has not reached “unhealthy for sensitive groups” in nearly a decade. Over the past decade, there appears to be a trend toward improved air quality, with fewer “very unhealthy” and “unhealthy” days and a downward trend in the total number of “unhealthy for sensitive groups” days in the past decade (Table 5). Recent years’ improvement in the air quality index may be due to reduced air pollution resulting from local, state and national regulations aimed at reducing ozone and particulate matter concentrations.

Table 4. 2015 AQI Data (2015a).

	Tulsa, Oklahoma	Oklahoma City, Oklahoma	Eastern Texas
Percent Days classified as "Good"	68.4 percent	69.0 percent	77.4 percent
Percent Days classified as "Unhealthy for Sensitive Groups"	0.005 percent	0.005 percent	1.2 percent
Median AQI	45	44	38.75
Maximum AQI	147	115	118.6

Table 5. Number of Days classified as "unhealthy for sensitive groups" or worse (EPA 2014a). Unhealthy for sensitive groups/unhealthy/very unhealthy

County	2007	2008	2009	2010	2011	2012	2013	2014	2015
Eastern Oklahoma	6/0	3/0	0/0	1/0	0/0	9/2	5/0	2/0	2/1
Western Oklahoma	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	3/0
Eastern Texas	25/6	13/5	10/3	11/4	10/1	17/4	12/2	8/1	3/0

3.1.2 Climate

Oklahoma's climate ranges from humid subtropical in the east to semi-arid in the west. Warm, moist air moving northward from the Gulf of Mexico often exerts much influence, particularly over the southern and eastern portions of the state, where humidity, cloudiness, and precipitation are resultantly greater than in the western and northern sections. Summers are long and usually quite hot. Winters are short and less severe than those of the more northern Plains states. Periods of extreme cold are infrequent, and those lasting more than a few days are rare.

Texas lies within both "cool" and "warm" parts of the Temperate Zone of the northern hemisphere. There are three major climatic types: Continental, Mountain, and Modified Marine. There are no distinct boundaries which divide these climate types. Most of the State, climatologically, has a Modified Marine climate which is classified and named "subtropical" with four subheadings. A marine climate is caused by the predominant onshore flow of tropical maritime air from the Gulf of Mexico. The onshore flow is modified by a decrease in moisture content from east to west and by intermittent seasonal intrusions of continental air. The four subheadings of Subtropical—humid, subhumid, semi-arid and arid—account for the changes in moisture content of the northward flow of Gulf air across the State (Larkin and Bomar 1983). Table 6 depicts the average climate of the counties in which the proposed parcels are located.

Table 6. Summary of climate components that could affect air quality in the region.

	Average Annual Temp. (°F)	Average Daytime High in July (°F)	Average Daytime Low in January (°F)	Total Annual Precipitation (Inches)	Total Annual Snowfall (Inches)	Mean Annual Wind Speed (mph)	Prevailing Wind Direction
Ellis Co, OK	57.0	70.0	44.0	25.39	12.3	10	Southwest
Major Co, OK	59.6	96.8	23.0	27.86	11.9	10.7	South/ Southwest
Canadian Co, OK	60.3	91.3	25.4	34.08	5.9	10.6	South

	Average Annual Temp. (°F)	Average Daytime High in July (°F)	Average Daytime Low in January (°F)	Total Annual Precipitation (Inches)	Total Annual Snowfall (Inches)	Mean Annual Wind Speed (mph)	Prevailing Wind Direction
Roger Mills Co, OK	58.0	94.7	20.6	27.17	8.7	13	South/ Southwest
Burleson Co, TX	68.7	97.0	40.4	37.8	0.3	6.0	West/ Southwest
Live Oak Co, TX	70.7	98.0	43.4	26.4	0.2	5.5	South/ Southeast
McMullen Co, TX	65.0	97.0	33.0	43.62	1.0	15.95	South
Washington Co, TX	66.60	95.0	38.2	40.9	0.3		East/South east

In addition to the air quality information in the Oklahoma and Texas RMPs, 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 0.8°C (1.4°F) from 1880 to 2012 (Goddard Institute for Space Studies, 2013). 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.

GHGs that are included in the US GHG Inventory are: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). CO_2 and CH_4 are typically emitted from combustion activities or are directly emitted into the atmosphere. On-going scientific research has identified the potential impacts of GHG emissions (including CO_2, CH_4, N_2O, and several trace gases) on global climate. Through complex interactions on regional and global scales, these GHG emissions cause a net warming effect of the atmosphere (which make surface temperatures suitable for life on Earth), primarily by decreasing the amount of heat energy radiated by the Earth back into space. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), recent industrialization and burning of fossil carbon sources have caused CO_2 concentrations to increase dramatically, and are likely to contribute to overall climatic changes. Increasing CO_2 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°C to 5.8°C (2.5°F 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 parcel and subsequent actions of oil and gas development.

A 2007 US Government Accountability Office (GAO) Report on Climate Change found that, "federal land and water resources are vulnerable to a wide range of effects from climate change, some of which are already occurring. These effects include, among others: 1) physical effects such as droughts, floods, glacial melting, and sea level rise; 2) biological effects, such as increases in insect and disease infestations, shifts in species distribution, and changes in the timing of natural events; and 3) economic and social effects, such as adverse impacts on tourism, infrastructure, fishing, and other resource uses."

A number of activities contribute to the phenomenon of climate change, including emissions of GHGs (especially CO_2 and CH_4) 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 life span of the atmosphere.

3.2 Soils

The varied climate and topography of Oklahoma and Texas have combined to produce broad differences in state soils. In the eastern part of Oklahoma, soils have been developed where leaching is intense and conditions are humid. These conditions produce soils low in phosphorous and potassium, while at the same time being moderately to strongly acidic.

The Natural Resource Conservation Service (NRCS) has surveyed the soils in the proposed lease sale parcels. There are sixty-one major soil types in Texas, and forty-one soil types in Oklahoma. Forty-one soil types were identified as occurring in at least one of the 18 proposed parcels.

The NRCS has assigned a wind erodibility index value to each soil type. The value indicates the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. The higher the value indicates higher susceptibility and more tons per acre lost per year from wind, with the highest value being 330. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

The NRCS has also assigned an erosion Factor K, which indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised USLE to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

3.2.1 Farmlands, Prime or Unique

The Farmland Protection Policy Act (FPPA), Public Law 97-98, as amended, directs Federal agencies to identify and take into account the adverse effects of Federal programs on the preservation of farmland. The FPPA is intended to minimize the extent Federal programs have on the conversion of farmland to non-agricultural uses. Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, oilseed crops, and is also available for these uses. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. Unique farmland is land other than prime

farmland that is used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality and/or high yields of a specific crop.

3.3 Water Resources

3.3.1 Surface water

Oklahoma and Texas both have abundant surface water resources including rivers, streams, and man-made and natural reservoirs. Oklahoma has two major river basins: the Red River and Arkansas River basins. Texas has 23 surface water basins, including 15 major river basins and eight coastal basins, each with varying hydrological regimes and abilities to provide water supplies.

Precipitation is the source of virtually all surface water in Oklahoma. The entire state is drained by the Arkansas and Red Rivers and their tributaries. A large number of reservoirs, lakes, and ponds have been constructed on rivers and streams for flood control and to provide a dependable supply of surface water for municipalities, irrigation, recreation, and generation of electricity. About 80 percent of all water used by municipalities and industries is taken from surface water sources. Each year, approximately 10.5 million acre-feet of water flows into Oklahoma through its two major river basins, while an average of 36 million acre-feet flows out of the state each year.

Texas has approximately 191,000 miles of streams and 196 major reservoirs. Texas' water availability models estimate that available surface water during drought was 13.3 million acre-feet in 2010. Of this amount, only 9.0 million acre-feet can be used as existing supply due to physical and legal constraints. Existing surface water supply is projected to decrease to 8.4 million acre-feet by 2060, primarily from sedimentation of existing reservoirs.

In Jackson County, Texas, portions of the proposed lease parcels (-017,) is within the Lavaca-Navidad River/Palmetto Bend ownership and authority. Parcels (-011, -012, -013, -014, -015, and -016) in Washington and Burleson Counties, Texas are underneath Lake Somerville. Proposed parcels (-009 and -010) are underneath the Nueces River.

3.3.2 Groundwater

<u>Oklahoma</u>

Groundwater can be found throughout most of the state and is considered one of the states' most valuable resources. Groundwater supplied 18 percent of the state's drinking water. About 14.7 percent of the state's fresh groundwater withdrawals were for public water supply system uses. Reported domestic groundwater withdrawals in 2000 accounted for 3.3 percent of total withdrawals from the state's aquifers. Irrigation accounted for 74.5 percent of groundwater withdrawal and is the largest single use of freshwater in the state in 2000. Industrial, mining, and power generation accounted for 1.6 percent of groundwater withdrawals in 2000 (EPA 2009).

The Oklahoma Water Resources Board (OWRB) lists twenty-one major aquifers in Oklahoma. There are two types: alluvial and terrace aquifers and bedrock aquifers. Alluvial and terrace aquifers consist of sand and gravel along major rivers, including the North Canadian and Cimarron Rivers. Bedrock aquifers, such as the Central Oklahoma, the Rush Springs, Ogallala, and the Ozark Plateau aquifers, cover large

areas of the state and consist of hardened materials ranging from sandstone to limestone and gypsum. Large areas of the state generally contain local, low yield aquifers or do not produce groundwater (EPA 2009).

Freshwater stored in Oklahoma's aquifers results from downward movement of precipitation and surface waters that enter each aquifer at its recharge area. The system is dynamic; aquifers are recharged continually by percolation down to the water table. The rate of ground-water movement in the state's aquifers is highly variable, three to 100 feet per year in most aquifers, and may reach 100 to 1,000 feet (or more) per year, where the rock is highly porous, cavernous, or fractured (EPA 2009).

Long term groundwater level declines have not been as serious in Oklahoma as in surrounding states. Severe drought conditions in recent years are affecting the State's aquifers' ability to recover from earlier and continuing declines. When there is an increase in rainfall, water levels in most alluvial aquifers can recover more quickly from declines than bedrock aquifers. The greatest protection against overuse of groundwater has come from the permit system operated by Oklahoma Water Resources Board to limit withdrawals (EPA 2009).

Texas

Groundwater is a major source of water in Texas, providing about 60 percent of the 16.1 million acre-feet of water used in the state. Groundwater deposits underlie about 76 percent of Texas. Texas has numerous aquifers capable of producing groundwater for households, municipalities, industry, farms, and ranches. The Texas Water Development Board (TWDB) recognizes nine major aquifers and 21 minor aquifers.

The source of most groundwater in Texas is precipitation. Most of the recharge occurs as rainfall on the outcrops of the water-bearing formations, although lesser amounts of recharge probably result from seepage from streams that cross the outcrop areas. The water that enters the formations moves generally down the dip of the water-bearing beds into the artesian sections of the aquifers. Several factors affect recharge including: the intensity and amount of rainfall, the slope of the land surface, the type of soil, the permeability of the aquifer, the rate of evapotranspiration, and the quantity of water in the aquifer.

Between 1994 and 2004, water levels in the state's aquifers declined in some parts of the state and rose in others. Water levels continued to decline in much of the Ogallala Aquifer in West Texas, with declines greater than 40 percent in parts of the aquifer. However, other parts of the Ogallala Aquifer showed water level rises, presumably due to increased recharge resulting from fallow fields in areas of dry land farming. Water levels have risen more than 40 feet in 10 years in the Houston area because of reduced pumping to prevent land subsidence. Water levels have fallen more than 40 feet, however in the suburbs north of Houston.

Although the vast majority of groundwater used for drinking in Texas meets states and federal requirements for safety, in some parts of the state naturally occurring levels of total dissolved solids, arsenic, and radionuclides, as well as human-cause contamination, prevent the water from meeting those standards.

DRASTIC Index

The EPA developed DRASTIC to be a standardized system for evaluating groundwater vulnerability to pollution. The primary purpose of DRASTIC is to provide assistance in resource allocation and prioritization of many types of groundwater-related activities and to provide a practical educational tool. DRASTIC was not designed to deal with pollutants introduced in the shallow or deep subsurface by methods such as leaking underground storage tanks, animal waste lagoons, or injection wells. All pollution is introduced at the ground surface.

DRASTIC considers seven hydrogeologic factors including: depth to water, net recharge, aquifer media, soil media, topography, impact of the vadose zone media, and hydraulic conductivity of the aquifer. In DRASTIC methodology, each of these factors has a "range" and associated "rating." Factor "ratings," multiplied by their assigned "weights," are then added together to yield a DRASTIC index, a numerical indicator of an aquifer's relative susceptibility to impacts from surface activities in a given location. The smallest possible DRASTIC index rating is 23, and the largest is 226. The higher the DRASTIC index the greater the vulnerability of the aquifer to contamination. A site with low DRASTIC index is not free from groundwater contamination, but is less susceptible to contamination compared with the sites with high DRASTIC indices. DRASTIC ratings for the proposed parcel aquifers range from very low to very high. DRASTIC ratings will be evaluated at the APD stage.

Wastewater Disposal

Produced water is highly variable between wells and often increases over the life of the well. Currently, monthly water production for individual wells is not readily available for Kansas and Oklahoma for analysis (Appendix 5). The State of Oklahoma does provide water volumes and pressures for existing UIC wells. Volumes can range from 1,270 to over 100,000 bbl of disposal water per month with pressures ranging from 500 to 6,000 ½ pounds per foot.

3.3.3 Seismicity

Seismicity occurrence has increased significantly since 2009 in the south-central United States. Current evidence regarding the recent increase in seismic events, primarily in central Oklahoma, indicates they have been induced, at least partly, by the increase in disposal volumes of produced water, primarily into the Arbuckle Formation. In Oklahoma, there has been approximately one magnitude 3 or greater ($M \geq 3$) event per year during the 34-year period from 1974 (the onset of modern seismic recording) to 2008, but more than 100 $M \geq 3$ events per year in 2013 and 2014. Currently, most seismic activity is less than a 4.0 scale, with few above (Walsh and Zoback, 2015).

3.4 Floodplains, Wetlands, Riparian Areas

3.4.1 Floodplains

For administrative purposes, the 100-year floodplain serves as the basis for floodplain management for Federal actions. These are in general relatively narrow areas along natural drainage ways that carry large quantities of runoff following periods of high precipitation.

After further review, proposed parcels -001, -004, -005, -006, and -008, are identified in the RMP as within mapped floodplains.

3.4.2 Wetlands, Riparian Areas

Wetland habitats provide important wintering and migrational habitat for Central Flyway Birds. Wetlands also provide a link between land and water and are some of the most productive ecosystems in the world. Executive Order 11990 on the Protection of Wetlands provides opportunity for early review of Federal agency plans regarding new construction in wetland areas. It also urges all Federal agencies to avoid supporting, assisting, or financing new construction in wetlands unless there is "no practicable alternative".

<u>Oklahoma</u>

Canadian County, Oklahoma – NM-201704-001
Township 11 N – Range 8 W Sections 19 and 30
This tract is located in the South Canadian River bottom from approximately one mile east of the Caddo County line south east to the Union City limits.

Major, Oklahoma – NM-201704-002
Township 22 N – Range 14 W Section 7
This tract is situated on the west and northwest slopes of small mesas and/or rolling hill slopes of mesas. The tract consists of badland type topography and associated sage, yucca mesquite, and grass.

Roger Mills County, Oklahoma – NM 201704-003
Township 14 N – Range 21 W Section 10
This tract consists of rolling hill grassland.

Roger Mills County, Oklahoma – NM 201704-004
Township 16 N – Range 23 W Section 19
This tract is located in the South Canadian River bottom from the Texas state line to the Dewey County line.

Roger Mills/Ellis County, Oklahoma – NM-201704-005
Township 16 N – Range 23 W Sections 22, 24, and 26
This tract is located in the South Canadian River bottom from the Texas state line to the Dewey County line.

Roger Mills County, Oklahoma – NM-201704-006
Township 16 N – Range 23 W Section 24
This tract is located in the South Canadian River bottom from the Texas state line to the Dewey County line.

Roger Mills County, Oklahoma – NM-201704-007
Township 14 N – Range 24 W Section 15
This tract consists of rolling hill grassland.

Roger Mills County, Oklahoma – NM-201704-008
Township 16 N – Range 24 W Section 14
This tract is located in the South Canadian River bottom from the Texas state line to the Dewey County line.

Major, Oklahoma – NM-201704-018
Township 21 N – Range 16 W Sections 1 and 2
These tracts consist of rolling hill grassland bisected by Griever Creek and several small intermittent drainages vegetated with junipers. Small wetlands containing cottonwoods and willows are scattered down Griever Creek.

Texas

Live Oak County, Texas – NM-201704-009
The Nueces River Project is located in Live Oak and McMullen Counties. Choke Canyon Dam is on the Frio River. Low-lying hills force the three rivers (Frio, Nueces and Atascosa Rivers) into a constricted channel. Live oak and post oak trees are found near the rivers, while mesquite, huisache, blackbrush, and grasses cover most of the area.

McMullen/Live Oak Counties, Texas – NM-201704-010
The Nueces River Project is located in Live Oak and McMullen Counties. Choke Canyon Dam is on the Frio River. Low-lying hills force the three rivers (Frio, Nueces and Atascosa Rivers) into a constricted channel. Live oak and post oak trees are found near the rivers, while mesquite, huisache, blackbrush, and grasses cover most of the area.

Washington County, Texas – NM-201704-011
Somerville Lake is located 20 river miles on the Yequa Creek and includes parts of Burleson, Lee, and Washington Counties. Somerville Lake has a normal surface area of 11,460 acres and 85 miles of shoreline with a flood pool covering approximately 24,400 acres.

Washington County, Texas – NM-201704-012
Somerville Lake is located 20 river miles on the Yequa Creek and includes parts of Burleson, Lee, and Washington Counties. Somerville Lake has a normal surface area of 11,460 acres and 85 miles of shoreline with a flood pool covering approximately 24,400 acres.

Washington County, Texas – NM-201704-013
Somerville Lake is located 20 river miles on the Yequa Creek and includes parts of Burleson, Lee and Washington Counties. Somerville Lake has a normal surface area of 11,460 acres and 85 miles of shoreline with a flood pool covering approximately 24,400 acres.

Burleson County, Texas – NM-201704-014
Somerville Lake is located 20 river miles on the Yequa Creek and includes parts of Burleson, Lee and Washington Counties. Somerville Lake has a normal surface area of 11,460 acres and 85 miles of shoreline with a flood pool covering approximately 24,400 acres.

Burleson County, Texas – NM-201704-015
Somerville Lake is located 20 river miles on the Yequa Creek and includes parts of Burleson, Lee and Washington Counties. Somerville Lake has a normal surface area of 11,460 acres and 85 miles of shoreline with a flood pool covering approximately 24,400 acres.

Washington County, Texas – NM-201704-016

Somerville Lake is located 20 river miles on the Yequa Creek and includes parts of Burleson, Lee and Washington Counties. Somerville Lake has a normal surface area of 11,460 acres and 85 miles of shoreline with a flood pool covering approximately 24,400 acres.

Jackson County, Texas – NM-201704-017
Palmetto Bend Dam is situated in the Navidad River Valley four miles upstream from the confluence of the Lavaca and Navidad Rivers. The reservoir, Lake Texana, includes an 18 mile reach of the Navidad River Valley and lower portions of the Mustang Creek and Sandy Creek Valleys.

3.5 Heritage Resources

3.5.1 Cultural Resources

Through compliance with the National Historic Preservation Act, a finding of "no historic properties affected" was determined for the lease sale. Additionally, no other significant cultural resources (such as local or state listed properties, or national or state historic trails or battlefields) would be affected by the lease sales.

To support this recommendation a cultural resource background review (Class I level) was initiated and completed to determine if important resources were in or near the lease sale parcel locations (CRR# BLM-NM-040-2017-03). If such were present, a consideration to withdraw a parcel from sale would be made. No important resources were identified.

The Texas and Oklahoma state historic preservation offices have informed the BLM that oil and gas lease sales are not considered to be "undertakings" as defined in the regulations (36 CFR 800) implementing Section 106 of the National Historic Preservation Act because they are administrative actions that do not entail earth disturbing actions. Thorough Section 106 compliance is normally done when a lease holder files an APD.

3.5.2 Paleontology

When a lease holder submits an APD, an assessment of potential effects to paleontology resources would be made; it is only at that time that detailed engineering and well locations will be identified such that a finer assessment of potential affects can be made.

3.5.3 Native American Religious Concerns

Consultation notification of the lease sale was sent to the Apache Tribe of Oklahoma, the Cherokee Nation, the Cheyenne and Arapaho Tribes, the Comanche Nation, the Creek Nation, the Kiowa Tribe, the Osage Nation, the Seminole Nation, and the Wichita and Affiliated Tribes. None of the proposed parcels have been recommended for withdrawal from the sale. Consultations with affected tribes would also be done when a lease holder submits an APD. At that time, detailed engineering and well locations would be identified such that a finer assessment of potential affects can be made.

3.6 Invasive, Non-native Species

Noxious weeds can have a disastrous impact on biodiversity and natural ecosystems. Noxious weeds affect native plant species by out-competing native vegetation for light, water, and soil nutrients.

Noxious weeds cause $2 to $3 million in estimated losses to producers annually. These losses are attributed to: (1) decreased quality of agricultural products due to high levels of competition from noxious weeds; (2) decreased quantity of agricultural products due to noxious weed infestations; and (3) costs to control and/or prevent the spread of noxious weeds.

Oklahoma

The State of Oklahoma has listed three noxious weeds and has them as a public nuisance in all counties across the state and mandates that they be treated, controlled, and eradicated. The Early Detection and Distribution Mapping System (2014) at the University of Georgia has identified 52 species in Major County, 39 species in Beaver County, 89 species in Dewey County, 51 species in Roger Mills County, and 90 species in Creek County as being exotic to the US and listed as a problem somewhere in the US. Only five counties have documented occurrences of at least one of the three state listed species (Table 7). One county (Beaver) did not have any documented state listed species.

Table 7. Invasive species listed by the State of Oklahoma.

Species	Documented in County
Musk thistle *(Carduus nutans)*	Creek, Dewey, Major, Roger Mills
Canada thistle *(Cirsium arvense)*	Creek, Dewey, Major, Roger Mills
Scotch thistle *(Onopordum acanthium)*	Creek, Dewey, Major, Roger Mills

Suitable habitat, in the form of disturbed sites, roadsides, fields, and agricultural areas, occurs within all of the proposed lease parcels, despite the species not being previously documented in the majority of the counties. There is potential that all three plants may be present on the proposed parcels, although the extent is unknown.

Texas

The State of Texas listed 27 plant species as having a serious potential to cause economic or ecological harm to the state (4 TAC §19.300, as amended). The Early Detection and Distribution Mapping System (EDDMS 2013) has identified 157 species in Grayson County as being exotic to the US and listed as a problem somewhere in the US. Seven of the 157 species were also listed by the State of Texas (Table 8). One species (hydrilla) is also identified on the Federal Noxious Weeds list. Sixteen additional species on the Federal Noxious Weeds list have distributions in Texas; however, EDDMS does not identify them as occurring in Grayson County.

Table 8. Invasive and Non-native Species documented in Proposed Lease Parcel Counties.

Species	Documented in County
Giant reed *(Arundo donax)*	Burleson, Denton, Houston, Live Oak, Trinity, Washington
Balloonvine *(Cardiospermum halicacabum)*	Burleson, Trinity
Hydrilla *(Hydrilla verticillata)*	Burleson, Houston, McMullen
Alligatorweed *(Alternanthera philoxeroides)*	Trinity
Kudzu *(Pueraria Montana var. lobate)*	Denton
Hedge bindweed *(Calystegia sepium)*	Burleson, Trinity
Chinese tallowtree *(Triadica sebifera)*	Houston
Waterhyacinth *(Eichhornia crassipes)*	Live Oak, Trinity
Salt cedar *(Tamarix L.)*	Denton, Burleson

3.7 Vegetation

Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. A Roman numeral hierarchical scheme has been adopted for different levels of ecological regions. Level I is the coarsest level, dividing North American into 15 ecological regions. Level II divided the continent into 52 regions. At level III, the continental US contains 104 regions whereas the conterminous US has 48. Level IV ecoregions are further subdivisions of level III ecoregions. In each state, there are 12 level III ecoregions. Kansas has 12 level IV ecoregions, Oklahoma has 46 level IV ecoregions and Texas has 56 level IV ecoregions with most continuing into ecologically similar parts of adjacent states.

Twelve ecoregions make up the proposed lease parcel areas (Table 9). All of the disturbed parcels have non-native species present and in some cases weedy species are more prominent.

Table 7. Ecoregions of the proposed lease parcels.

Parcel	Level III Ecoregion (EPA region)	Level IV Ecoregion (EPA region)	Description of Level IV Ecoregion
-001	Central Great Plains (27)	Prairie Tableland (27d)	The ecoregion is nearly level, dominated by cropland, and underlain by Permian red shale, soft sandstone, and siltstone. Natural vegetation is mixed grass prairie; it is distinct from the sand sagebrush–bluestem prairie.
-002	Central Great Plains (27)	Gypsum Hills (27n)	Gypsum is widely exposed and especially significant; it is prone to chemical erosion, forms karst features such as solution caves and cavities, and impacts both soil and vegetation. Solution caves are important shelter and hibernating sites for wildlife and serve as summer roosts for bats.
-003, -004, -005, -006, -007 , -008	Central Great Plains (27)	Rolling Red Hills (27q)	Underlain by red, Permian-age sandstone, shale, and siltstone. Most parts of the region, especially rough areas, are used as rangeland. The density and distribution of eastern redcedar has significantly increased since the 1930s due, in part, to the effects of overgrazing and fire suppression.
-009, -010	Southern Texas Plains (31)	Texas-Tamaullpan Thomscrub (31c)	Cut by arroyos and streams, and covered with low-growing vegetation. The thorn woodland and thorn shrubland vegetation is distinctive, and these Rio Grande Plains are commonly called the “brush country”. Three percent.
-011, -012, -013, -014, -015, -016	East Texas Southern Plains (33)	Southern Post Oak Savanna (33b)	Historically a post oak savanna, current land cover is a mix of post oak woods, improved pasture, and rangeland, with some invasive mesquite to the south.

Parcel	Level III Ecoregion (EPA region)	Level IV Ecoregion (EPA region)	Description of Level IV Ecoregion
-017	Western Gulf Coastal Prairies (34)	Northern Humid Gulf Coastal Prairies	Quaternary-age deltaic sands, silts, and clays underlie much of the Northern Humid Gulf Coastal Prairies on this gently sloping, mostly flat, coastal plain. Due to the low relief and clay subsoils, drainage is generally poor and soils remain wet for parts of the year. The historical vegetation was mostly tallgrass grasslands with a few clusters of oaks, known as oak mottes or maritime woodlands. Little bluestem, yellow Indiangrass, brownseed paspalum, gulf muhly, and switchgrass were the dominant grassland species in a mixture with hundreds of other herbaceous species across these prairies.

3.8 Wildlife

3.8.1 Threatened and Endangered Species

The purpose of the Endangered Species Act (ESA) is to ensure that federal agencies and departments use their authorities to protect and conserve endangered and threatened species. Section 7 of the ESA requires that federal agencies prevent or modify any projects authorized, funded, or carried out by the agencies that are "likely to jeopardize the continued existence of any endangered species or threatened species, or result in the destruction or adverse modification of critical habitat of such species."

<u>Oklahoma</u>

Federally-listed endangered, threatened, proposed, and candidate species located in Canadian County, Oklahoma consist of the black-capped vireo (*Vireo atricapilla*), interior least tern (*Sterna antillarum*), red knot (*Calidris canutus rufa*), piping plover (*Charadrius melodus*), Arkansas River shiner (*Notropis* girardi), and the whooping crane (*Grus Americana*). Canadian County also has critical habitat for the Arkansas River shiner.

Federally-listed endangered, threatened, proposed, and candidate species located in Major County, Oklahoma consist of the interior least tern (*Sterna antillarum*), red knot (*Calidris canutus rufa*), piping plover (*Charadrius melodus*), Arkansas River shiner (*Notropis* girardi), and the whooping crane (*Grus Americana*). Major County also has critical habitat for the Arkansas River shiner.

Federally-listed endangered, threatened, proposed, and candidate species located in Roger Mills County, Oklahoma consist of the interior least tern (*Sterna antillarum*), red knot (*Calidris canutus rufa*), piping plover (*Charadrius melodus*), Arkansas River shiner (*Notropis* girardi), and the whooping crane (*Grus Americana*).

Federally-listed endangered, threatened, proposed, and candidate species located in Ellis County, Oklahoma consist of the interior least tern (*Sterna antillarum*), red knot (*Calidris canutus rufa*), piping plover (*Charadrius melodus*), Arkansas River shiner (*Notropis* girardi), and the whooping crane (*Grus Americana*).

Texas

Federally-listed endangered, threatened, proposed, and candidate species located in Live Oak County, Texas consist of the golden orb (*Quadrula aurea*), interior least tern (*Sterna antillarum*), red knot (*Calidris canutus rufa*), piping plover (*Charadrius melodus*), Gulf Coast jagurundi (*Herpailurus yagouaroundi cacomitli*), and the whooping crane (*Grus Americana*).

Federally-listed endangered, threatened, proposed, and candidate species located in McMullen County, Texas consist of the golden orb (*Quadrula aurea*), interior least tern (*Sterna antillarum*), red knot (*Calidris canutus rufa*), piping plover (*Charadrius melodus*), ocelot (*Leopardus* pardalis), Gulf Coast jagurundi (*Herpailurus yagouaroundi cacomitli*), and the Black Lace cactus (*Echinocereus reichenbachii var. albertii*).

Federally-listed endangered, threatened, proposed, and candidate species located in Washington County, Texas consist of the smooth pimpleback (*Quadrula houstonensis*), Texas fawnsfoot (*Truncilla* macrodon), interior least tern (*Sterna antillarum*), red knot (*Calidris canutus rufa*), piping plover (*Charadrius melodus*), Navasota ladies-tresses (*Spiranthes parksii*), and the whooping crane (*Grus Americana*).

Federally-listed endangered, threatened, proposed, and candidate species located in Burleson County, Texas consist of the Houston toad (*Bufo houstonensis*), smooth pimpleback (*Quadrula houstonensis*), Texas fawnsfoot (*Truncilla* macrodon), interior least tern (*Sterna antillarum*), red knot (*Calidris canutus rufa*), piping plover (*Charadrius melodus*), Navasota ladies-tresses (*Spiranthes parksii*), and the whooping crane (*Grus Americana*).

Federally-listed endangered, threatened, proposed, and candidate species located in Jackson County, Texas consist of the interior least tern (*Sterna antillarum*), red knot (*Calidris canutus rufa*), piping plover (*Charadrius melodus*), West Indian manatee (*Trichechus manatus*), and the whooping crane (*Grus Americana*).

3.8.2 Special Status Species

Wildlife species may be classified as threatened or endangered at either the state or the federal level. Federally, a species is listed as threatened or endangered under ESA and protection of the species is overseen by the United States Fish and Wildlife Service (USFWS). At a state level, Oklahoma has an endangered species statute that gives the state the authority to list a wildlife species as threatened or endangered within the state although it might not be classified as threatened or endangered federally through ESA. The Oklahoma Department of Wildlife Conservation is responsible for overseeing protection of the species.

Oklahoma

No State listed species or their critical habitat is currently present in Canadian, Major, Roger Mills, or Ellis Counties in Oklahoma. However, the Lesser Prairie Chicken is a special status species for the Oklahoma Field Office. Therefore, the stipulation ORA-3 is enforced for specific counties in Oklahoma as a part of the 1994 Oklahoma RMP.

Texas

Texas Parks and Wildlife Department Annotated County Lists of Rare Species for Live Oak County, Texas 2011 species include the black spotted newt, sheep frog, American peregrine falcon, interior least tern, peregrine falcon, white-faced ibis, wood stork, white-tailed hawk, red wolf, golden orb, ocelot, reticulate collared lizard, Texas horned lizard, Texas indigo snake, Texas tortoise, white-tailed hawk, whooping crane, wood stork, jaguarondi, red wolf, golden orb, and the ocelot.

Texas Parks and Wildlife Department Annotated County Lists of Rare Species for McMullen County, Texas 2011 species include the black spotted newt, sheep frog, American peregrine falcon, interior least tern, peregrine falcon, white-faced ibis, wood stork, white-tailed hawk, red wolf, golden orb, ocelot, reticulate collared lizard, Texas horned lizard, Texas indigo snake, Texas tortoise, white-tailed hawk, whooping crane, wood stork, jaguarondi, red wolf, golden orb, and the ocelot.

Texas Parks and Wildlife Department Annotated County Lists of Rare Species for Washington County, Texas 2011 species include the Houston toad, American peregrine falcon, Arctic peregrine falcon, bald eagle, henslow's sparrow, interior least tern, peregrine falcon, sprague's pipit, western burrowing owl, whooping crane, wood stork, blue sucker, sharpnose shiner, smalleye shiner, cave myotis bat, Louisiana black bear, plains spotted skunk, red wolf, Texas horned lizard, timber/canebrake rattlesnake, branched gay-feather, Navasota ladies'-tresses, parks' jointweed, false spike mussel, smooth pimpleback, Texas fawnsfoot, and the alligator snapping turtle.

Texas Parks and Wildlife Department Annotated County Lists of Rare Species for Burleson County, Texas 2011 species include the Houston toad, American peregrine falcon, Arctic peregrine falcon, bald eagle, henslow's sparrow, interior least tern, peregrine falcon, sprague's pipit, western burrowing owl, whooping crane, wood stork, blue sucker, sharpnose shiner, smalleye shiner, cave myotis bat, Louisiana black bear, plains spotted skunk, red wolf, Texas horned lizard, timber/canebrake rattlesnake, branched gay-feather, Navasota ladies'-tresses, parks' jointweed, false spike mussel, smooth pimpleback, Texas fawnsfoot, and the alligator snapping turtle.

Texas Parks and Wildlife Department Annotated County Lists of Rare Species for Jackson County, Texas 2011 species include the peregrine falcon, bald eagle, brown pelican, reddish egret, sooty tern, white-faced ibis, white-tailed hawk, wood stork, Texas fatmucket, Texas horned lizard, Texas scarlet snake, Texas tortoise, and the timber/canebrake rattlesnake.

Black-capped Vireo
Black-capped Vireos are typically found in low brushy thickets comprised of deciduous trees such as oaks, redbuds, and plums.

Lesser Prairie-Chicken (LPC)
The sand shinnery and sand sagebrush native rangelands of northwest Oklahoma are crucial for survival of this species.

Red Knot
Red knots are found in intertidal, marine habitats, especially near coastal inlets, estuaries, and bays. During breeding season it can be found in dryer areas of the tundra or sparsely vegetated hillsides.

Arkansas River Shiner
The Arkansas River shiner inhabits the shallow braided channels of wide sandy prairie rivers in the Arkansas River system. Schools of shiners often gather on the lee side of sandbars and ridges of sand it

the river channel. They spawn after heavy summer rains and their eggs drift with the water current and develop as they are carried downstream.

Texas golden gladecress
These reside in edaphically influenced herbaceous communities on shallow calcareous soils in vernally moist to wet glades on glauconite or ironstone outcrops of the Weches Formation.

Bachman's sparrow
Bachman's sparrow can be found to reside in Old field, Savanna, Woodland - Conifer, Woodland – Hardwood ecotypes.

Smooth pimple back
Smooth pimple back's reside in small to moderate streams and rivers as well as moderate size reservoirs; mixed mud, sand, and fine gravel, tolerates very slow to moderate flow rates, appears not to tolerate dramatic water level fluctuations, scoured bedrock substrates, or shifting sand bottoms, lower Trinity (questionable), Brazos, and Colorado River basins.

Blue sucker
Reside in larger portions of major rivers in Texas, usually in channels and flowing pools with a moderate current; bottom type usually of exposed bedrock, perhaps in combination with hard clay, sand, and gravel; adults winter in deep pools and move upstream in spring to spawn on riffles.

Bald Eagle
Bald Eagles typically nest in forested areas adjacent to large bodies of water, staying away from heavily developed areas when possible. Bald Eagles are tolerant of human activity when feeding, and may congregate around fish processing plants, dumps, and below dams where fish concentrate. For perching, Bald Eagles prefer tall, mature coniferous or deciduous trees that afford a wide view of the surroundings. In winter, Bald Eagles can also be seen in dry, open uplands if there is access to open water for fishing.

Piping plover
Shorebirds live on sandy beaches and lakeshores.

Red-cockaded woodpecker
Open pine forests with large, widely-spaced older trees provide essential habitat for the red-cockaded woodpecker.

Swallow-tailed kite
Nesting and foraging habitats include various pine forests and savannas, cypress swamps and savannas, cypress-hardwood swamps, hardwood hammocks, mangrove swamps, narrow riparian forests, prairies, and freshwater and brackish marshes.

Rafineque's big eared bat
This is a bat of forested regions.

Louisiana pigtoe

This species occurs in freshwater streams and moderate-size rivers, usually in flowing water and not generally known from impoundments; on substrates of mud, sand, and gravel; to depths of 20 feet but usually less.

Sandbank pocketbook
This freshwater species may occur in small to large rivers with moderate flows on gravel, gravel-sand, and sand bottoms.

Southern hickorynut
This freshwater species is found in medium sized gravel in water with low to moderate current in small to large sized rivers.

Texas heelsplitter
This freshwater species is found in flowing water but not necessarily in riffles or shoals. It prefers mud or sand in small to medium rivers and may also be found in reservoirs.

Texas pigtoe
As a freshwater mussel, this species has been collected in rivers with mixed mud, sand, and fine gravel in protected areas.

Alligator snapping turtle
Habitat consists of slow-moving, deep water of rivers, sloughs, oxbows, and canals or lakes associated with rivers (e.g., large impoundments), also swamps, bayous, and ponds near rivers, and shallow creeks that are tributary to occupied rivers, sometimes including swift upland streams. This turtle sometimes enters brackish waters near river mouths. Usually it occurs in water with a mud bottom and some aquatic vegetation but may use sand-bottomed creeks.

Louisiana pine snake
In Texas, these snakes occur in longleaf pine-oak sandhills interspersed with moist bottomlands, sometimes in adjacent blackjack oak woodlands and in sandy areas of short-leaf pine/post oak forest. The snake prefers openly wooded areas over dense forest and is frequently found in fields, farmland, and tracts of second-growth timber.

Northern scarlet snake
This snake resides in hardwood, mixed, or pine forest/woodland and adjacent open areas with sandy or loamy well-drained soils. Specific habitats include pine flatwoods, dry or dry prairie, salt grass prairie, maritime hardwood hammock, bottomland forest, sandhills, margins of irrigation canals in sawgrass prairies, borders of swamps and plowed fields, abandoned fields, and roadsides.

Timber/canebrake rattlesnake
Timber rattlesnakes prefer moist lowland forests and hilly woodlands or thickets near permanent water sources such as rivers, lakes, ponds, streams and swamps where tree stumps, logs and branches provide refuge.

Golden orb
This mussel resides in freshwater rivers.

Gulf Coast jaguarundi

The Gulf Coast jaguarundi spends most of their time on the ground, but can be agile climbers when inspired, such as when they are pursued. They hunt small rodents, reptiles, and birds in dense vegetation, especially thornscrub.

Ocelot
Dense, thorny, low brush such as spiny hackberry, lotebush, and blackbrush offer the Ocelot the best habitat. The Texas ocelot prefers elevated terrain.

Whooping crane
Whooping cranes winter on the Aransas National Wildlife Refuges 22,500 acres of salt flats and marshes. The area's coastal prairie rolls gently here and is dotted with swales and ponds. They summer and nest in poorly drained wetlands in Canada's Northwest Territories at Wood Buffalo National Park.

Black-spotted newt
The terrestrial, freshwater Black-spotted newt adults, juveniles, and larvae inhabit permanent and temporary ponds, roadside ditches, quiet stream pools, and habitats that are relatively uncommon in at least the northern part of the range.

Sheep frog
In Texas, the sheep frog is fairly common in various habitats but seldom seen.

American peregrine falcon
The American peregrine falcon can be found nesting at elevations up to about 12,000 feet, as well as along rivers and coastlines or in cities, where the local Rock Pigeon populations offer a reliable food supply. In migration and winter you can find Peregrine Falcons in nearly any open habitat, but with a greater likelihood along barrier islands, mudflats, coastlines, lake edges, and mountain chains.

Interior least tern
Terns live along large rivers and may sometimes be found hunting fish in shallow wetlands and the margins of ponds and lakes. Least terns require bare sand and gravel for nesting and typically nest in small colonies consisting of two to 20 pairs along large rivers on sand bars and scoured bends.

White-faced ibis
White-faced ibis inhabit marshes, swamps, ponds, and rivers.

Reticulate collared lizard
This lizard inhabits thorn-scrub vegetation, usually on well-drained rolling terrain of shallow gravel, caliche, or sandy soils.

Texas horned lizard
This lizard can be found in arid and semiarid habitats in open areas with sparse plant cover. Because horned lizards dig for hibernation, nesting, and insulation purposes, they commonly are found in loose sand or loamy soils.

Texas indigo snake
The Texas Indigo snake is found in grassland, coastal sand dunes, lightly vegetated areas near permanent water and shelters in burrows.

Texas tortoise
This tortoise prefers open scrub woods, arid brush, lomas, grass-cactus association- often in areas with sandy well-drained soils.

White tailed hawk
This hawk relies on open country, primarily savanna, prairie, and arid habitats of mesquite, cacti, and bushes; very rarely in open forest.

Wood stork
The Wood stork forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water.

Red wolf
The Red wolf relies upon brushy and forested areas, as well as coastal prairies.

Bobcats
Bobcats live in a variety of habitats, but they favor rocky canyons or outcrops when they are available. They choose thickets for protection and den sites. These cats are highly adaptable, and in most places have been able to thrive in spite of increasing habitat loss due to human settlement.

Eastern cottontails
Typically eastern cottontails occupy habitats in and around farms including fields, pastures, open woods, and thickets associated with fencerows, wooded thickets, forest edges, and suburban areas with adequate food and cover. They are also found in swamps and marshes and usually avoid dense woods. They are seldom found in deep woods.

Striped skunks
The skunk is found in wooded or brushy areas and farmlands. They prefer taking shelter in rocky outcrops or under large boulders, but when these are unavailable, skunks choose to den in the abandoned burrows of other animals.

Eastern flying squirrel
The Eastern flying squirrel inhabits forested areas where suitable trees are present to afford den sites.

Road runner
The roadrunner inhabits desert and shrubby country in the southwestern United States and northern Mexico.

Coati
The coati inhabits wooded areas and in some of the rocky canyons that enter the mountains from the lowlands.

Henslow's Sparrow
Wintering individuals (not flocks) of Henslow's sparrow are found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles; a key component is bare ground for running/walking.

Elf owl

In Texas, elf owls are found in the arid Big Bend and Trans-Pecos areas of the lower Chihuahuan desert.

3.8.3 Migratory Birds

Executive Order (EO) 13186, 66 Fed. Reg. 3853, (January 17, 2001) identifies the responsibility of federal agencies to protect migratory birds and their habitats, and directs executive departments and agencies to undertake actions that will further implement the Migratory Bird Treaty Act (MBTA). Under the MBTA, incidental, unintentional, and accidental take, killing, or possession of a migratory bird or its parts, nests, eggs or products, manufactured or not, without a permit is unlawful. EO 13186 includes a directive for federal agencies to develop a memorandum of understanding (MOU) with the USFWS to promote the conservation of migratory bird populations, including their habitats, when their actions have, or are likely to have, a measurable negative effect on migratory bird populations. Whereas the MBTA only protects migratory birds, EO 13186 provides for the protection of both migratory birds and migratory bird habitat.

For the purpose of this EA, the term “migratory birds” applies generally to native bird species protected by the MBTA. This includes native passerines (flycatchers and songbirds) as well as birds of prey, migratory waterbirds (waterfowl, wading birds, and shorebirds), and other species such as doves, hummingbirds, swifts, and woodpeckers. The term “migratory” is a misnomer and should be interpreted broadly to include native species that remain in the same area throughout the year as well as species that exhibit patterns of latitudinal or elevational migration to avoid winter conditions of cold or a shortage of food. For most migrant and native resident species, nesting habitat is of special importance because it is critical for supporting reproduction in terms of both nesting sites and food. Also, because birds are generally territorial during the nesting season, their ability to access and utilize sufficient food is limited by the quality of the territory occupied. During non-breeding seasons, birds are generally non-territorial and able to feed across a larger area and wider range of habitats.

Among the wide variety of species protected by the MBTA, special concern is usually given to the following groups:

- Species that migrate across long distances, particularly Neotropical migrant passerines that winter in tropical or Southern Hemisphere temperate zones.
- Birds of prey, which require large areas of suitable habitat for finding sufficient prey.
- Species that have narrow habitat tolerances and hence are vulnerable to extirpation from an area as a result of a relatively minor habitat loss.
- Species that nest colonially and hence are vulnerable to extirpation from an area and hence are vulnerable to extirpation from an area as a result of minor habitat loss.

Because of the many species that fall within one or more of these groups, BLM focuses on species identified by the USFWS as Birds of Conservation Concern (BCC).

3.8.4 Wildlife

<u>Oklahoma</u>

There is a variety of wildlife that occurs or has the potential to occur in the proposed parcels including: turkey, white-tailed deer, squirrels, chipmunks, rabbits, cottontails, gophers, armadillos, coyotes, skunks, fox, bobcat, opossums, raccoon, free-tailed bats, cave myotis, several species of rats and mice,

numerous bird species, and several species of lizards, and venomous and non-venomous snakes. Regional information on wildlife and their habitats in Oklahoma is contained on page 7 of the Oklahoma RMP/FEIS October 1993.

Texas

Counties in Texas where the proposed lease tracts occur contain diverse wildlife populations as well as habitats. Generally speaking, the eastern one-third of Texas receives ample rainfall and supports much of the oak, pine, and hickory forests. The bulk of the central portion of Texas is within the cross timbers area where the transition begins from eastern deciduous forests to the more arid portions of western Texas. The faunal diversity follows this same transition from cypress swamps and alligators in the southeast tip of the state to piñon-juniper and mule deer in the furthest western portion of the Texas panhandle. Regional information on wildlife and their habitats in Texas is contained on pages 6-7 of the Texas RMP 1996, as amended.

3.9 Wastes – Hazardous or Solid

The Resource Conservation and Recovery Act (RCRA) of 1976 established a comprehensive program for managing hazardous wastes from the time they are produced until their disposal. The EPA regulations define solid wastes as any “discarded materials” subject to a number of exclusions. On January 6, 1988, EPA determined that oil and gas exploration, development, and production wastes would not be regulated as hazardous wastes under RCRA. The Comprehensive Environmental Response Compensation and Liability Act (CERCLA) of 1980, deals with the release (spillage, leaking, dumping, accumulation, etc.), or threat of a release, of hazardous substances into the environment. Despite many oil and gas constituent wastes being exempt from hazardous waste regulations, certain RCRA exempt contaminants could be subject to regulations as hazardous substances under CERCLA.

No hazardous or solid waste materials are currently known to be present on any of the proposed lease parcels. However, hazardous and/or solid wastes may be used during the development phase. See Appendix 2—Phases of Oil and Gas Development for a description of anticipated wastes.

3.10 Mineral Resources

Oklahoma

Oklahoma’s petroleum production accounts for about 95 percent of Oklahoma’s annual mineral output, nonfuel minerals, and coal represent a significant part of the current economy and an important source of future wealth. Oil and natural gas production in Oklahoma can be divided into four primary producing basins: The Anadarko Basin, Cherokee Platform, Arkoma Basin, and the Ardmore Basin.

As of September 19, 2016, IHS Energy data lists 58,012 wells as actively producing. EIA’s 2015 State ranking report shows the total oil and gas production in Oklahoma was 2,499,599 MMcf of gas and 157,770,000 bbls of oil.

The Federal mineral estate (oil and gas) in Oklahoma totals 1,998,932 acres, with 251,908 acres (15.1 percent) currently leased. Most of the state is in a high oil and gas occurrence and development potential category (BLM 1993).

Texas

Texas has produced more oil and natural gas than any other state and to date remains the largest daily producer. Oil and natural gas are found in most parts of the state. No state or any other region worldwide has been as heavily explored or drilled for oil and natural gas as Texas. Oil and natural gas production in Texas can be divided into six major producing basins; the Permian Basin dominates oil production in the state and the Gulf Coast Basin dominates natural gas production. Other major producing basins included the Anadarko Basin, Amarillo Uplift, Fortworth Basin, and East Texas Basin.

As of September 19, 2016, IHS Energy data lists 338,029 wells as actively producing. EIA's 2014 State ranking report shows the total oil and gas production in Texas was 7,872,145 MMcf of gas and 1,263,586,000 bbls of oil.

3.11 Visual Resources

BLM Manual H-8410-1 lays out the visual resource inventory process for determining visual values. The inventory consists of scenic quality evaluation, sensitivity level analysis, and a delineation of distance zones. The purpose of the analysis is to determine the area's Visual Resource Management (VRM) Class, which defines the degree of acceptable visual change within a characteristic landscape on BLM lands. Because the proposed parcels are on non-BLM surface management, a VRM class has not been established for the areas.

The existing landscape throughout all of the proposed parcel counties include oil and gas development visual impacts from facilities, lease roads, pipelines, utility lines, and above ground components such as tanks, pumpjacks, wellheads, fences, and signs. Visual impacts from agricultural/farming and timber production activities include croplands, pastures, timber plots, clear cuts, outbuildings (i.e. barns, storage sheds, and chicken coops), irrigation pipes, ditches, pivots, and improved and unimproved roads to access outbuildings, crops, pastures, plots, etc. Oil and gas development, agriculture and farming, and timber production facilities are readily visible from residences, highways, and country roads in all of the counties, including each proposed parcel.

The Rio Grande River in Texas has been designated as a wild and scenic river. None of the proposed lease parcels in Texas adjoin any part of the Rio Grande River. There are no designated wild and scenic rivers in Oklahoma.

3.12 Recreation

With all of the different ecoregions across the three-state BLM OFO administration area, there is a diverse collection of wildlife species to watch, hunt, or fish. Through intense habitat conservation and management each State wildlife department is able to provide quality hunting opportunities across each state for species such as: antelope, bear, dove, crane, deer, elk, furbearers (e.g. coyotes, bobcat, raccoon), feral hogs, mountain lion, quail, peregrine, pheasant, rabbit, squirrel, turkey, and waterfowl.

Outdoor recreation occurs in or near each of the proposed parcels to some degree in the form of hunting, wildlife watching, off-highway vehicle driving, equestrian riding, biking and hiking. Because most of the proposed parcels are on privately held land, the degree of recreation in or near each proposed parcel is limited by access. Recreation on these parcels typically is limited to individuals who have permission to access the land from the landowner. Parcels –011, -012, -013, -014, -015, -016, and -

017 are public land owned by another surface management agency and access to the public is determined by the specific agency.

3.13 Socioeconomics and Environmental Justice

3.13.1 Socioeconomics

Oklahoma

Oklahoma's population of nearly 3.8 million is mostly urban, with almost 70 percent of the State's population residing in cities or towns. While over 90 percent of the State's land is in farms and ranches, the large size of typical Oklahoma farms and modern farming methods have resulted in relatively few people residing in rural areas.

Oklahoma's economy is based upon a combination of agriculture production, manufacturing, service industries, and mineral extraction. Manufacturing contributes $18.6 billion to Oklahoma's economy and has been the fastest growing industry in the state. The oil and gas industry is a major contributor to the Oklahoma economy bringing in $15.9 billion through the extraction of more than 13 million barrels of oil and over 54 trillion cubic feet of natural gas (BEA 2012).

In and near all of the proposed parcels, the economy is very dependent on agricultural and livestock production. Crops grown include wheat, corn, grain sorghum, forage sorghum, and alfalfa. Beef cattle are the predominant livestock produced in some of the proposed parcels. Oil and gas production is widespread and very important to each proposed parcel county. Other minerals, except for coal in Coal and Le Flore County, are of minor importance.

Texas

Texas added 4,293,741 residents in the last decade (2000-2010), a 20.6 percent increase to a new population total of 25,145,561 people. Texas nationally ranked number one for the highest numeric increase in population and number two as the most populous state, behind California. Texas' rapid growth over the past decade was almost entirely concentrated in its major urban areas. The Dallas-Ft. Worth and Houston metro areas together accounted for almost half of the population of Texas and over half of the state's growth.

The economy of Texas is one of the largest and most rapidly growing economies in the United States. As of 2013 it is home to six of the top 50 companies on the Fortune 500 list. Texas is the largest exporter of goods and grosses; more than $100 billion a year in trade with other nations. The top 11 industries contributing to Texas' economy include: manufacturing; mining and logging; construction; service-providing industries; professional and business services; education and health services; financial activities; trade, transportation and utilities; information, leisure and hospitality; other services; and government.

Texas saw an increase in employment in 2012, gaining 260,800 seasonally adjusted nonfarm jobs, representing an annual growth of 2.5 percent. Over the same period, US nonfarm employment only rose 1.4 percent. All Texas industries except the information industry saw job increases. The state's trade, transportation, and utilities industries ranked first in job creation, adding 56,000 jobs for an annual employment growth rate of 2.6 percent in 2012. The leisure and hospitality services ranked second in

job creation, adding 47,500 jobs for a 4.5 percent rate increase. Construction was the state's fastest growing industry segment, with a 6.6 percent growth rate and 36,800 added jobs. The Texas unemployment rate remained below the national unemployment rate in 2012 and even decreased in 2012 (EDT 2013).

3.14 Infrastructure Integrity

The Nueces River Project was a project designed to provide municipal and industrial water to Corpus Christi and adjoining areas. The principal feature of the project is Choke Canyon Dam (near proposed parcels -009 and -010), a rolled earthfill structure about three miles long located on the Frio River near Three Rivers, Texas.

The Nueces River flows through three distinct geographic provinces. The river originates in the Texas Hill Country in Real County west of San Antonio, flows south and east through Brush Country and the Coastal Bend region before reaching its mouth in Corpus Christi Bay on the Gulf of Mexico. The geographic provinces roughly correspond to the region's three rich aquifers—Edwards Aquifer, Carrizo-Wilcox Aquifer, and Gulf Coast Aquifer, respectively. In the Hill Country, the soil is shallow and rangelands predominate; the Brush Country contains subtropical dry-land vegetation; the Coastal Bend is flat-lying marsh, salt, and grasslands. (George 1982).

The dam's concrete spillway is on the left abutment of the dam and river outlet works. Choke Canyon Dam's purpose is to release water downstream via the Frio and Nueces rivers, where the water is stored in Lake Corpus Christi and used for municipal and industrial purposes in the Texas Coastal Bend (BOR NUECES RIVER PROJECT D2).The reservoir also provides some flood control and recreational benefits. Choke Canyon reservoir has a total capacity of 880.6 x 106 m^3 at the normal water surface of 67.21 m. The active capacity is 860 x 106 m^3 (George 1982).

3.15 Environmental Justice

Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. 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. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work. Executive Order 12989, issued on February 11, 1994, addresses concerns over disproportionate environmental and human health impacts on minority and low-income populations. Under Executive Order 12898 agencies must develop strategies that identify and address these effects by: promoting enforcement of all health and environmental statutes in areas with minority and low-income populations; ensuring greater public participation; improving research and data collection relating to the health and environment of minority and low-income populations; and identifying differential patterns of consumption of natural resources among minority and low-income populations.

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 OFO. All impacts would be linked to as yet undetermined future levels of lease development. The effects of oil and gas leasing in Oklahoma and Texas are analyzed in the Oklahoma RMP (1994), as amended, and Texas RMP (1996), as amended (Chapter 4). That analysis, which assumes that the impacts from an average well, pipeline, and access road would total 5.65 acres of surface disturbance in Oklahoma and Texas, is incorporated by reference into this document.

The surface of proposed lease parcels -009, -010, -011, -012, -013, -014, -015, -016, and -017 are all managed by other surface management agencies, which have added No Surface Occupancy (NSO) stipulations to parcels under their jurisdiction. As a result of these stipulations, accessing the minerals in these leases would occur through directional drilling where surface disturbance would occur outside the boundaries of the lease parcel. Exploration/development of the lease would produce no effect on any resources, except for minerals, within the boundaries of the lease parcel as a result of the no surface occupancy stipulation. However, when the minerals are accessed from a surface location outside the lease parcel, effects to the resources at the access site are likely. The effects described in Section 4.3 apply to all proposed lease parcels, assuming that the NSO parcels are accessed through directional drilling with surface disturbance outside the proposed lease parcel boundaries.

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.

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 foreseeable non-federal actions.

4.2 Effects from the No Action Alternative

Under the No Action Alternative, all of the proposed parcels would be deferred and not offered for sale. Analysis of the No Action alternative is presented in the following sections. 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 unleased Federal minerals 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 alternative.

4.3 Effects from the Proposed Action

4.3.1 Air Resources

<u>Air Quality</u>

While the act of leasing Federal minerals would produce no impacts to air quality, subsequent exploration/development of the proposed lease could increase air borne soil particles blown from new well pads or roads, exhaust emissions from drilling equipment, compressor engines, vehicles, dehydration and separation facilities, coupled with 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, electrical lines compressor station), number of days to complete each kind of construction, number of days for each phase of the 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 geological formations from which production occurs. Currently, it is not feasible to directly quantify emissions. What can be said is that emissions associated with oil and gas exploration and production would incrementally contribute to increases in air quality emissions into the atmosphere.

During drilling and completion, the following source of emissions are anticipated during any oil and gas exploration or development: combustion engines (i.e. fossil fuel fired internal combustion engines used to supply electrical or hydraulic power for hydraulic fracturing to drive the pumps and rigs used to drill the well, drill out the hydraulic stage plugs, and run the production tubing in the well; generators to power drill rigs, pumps, and other equipment; compressors used to increase the pressure of the oil or gas for transport and use; tailpipe emissions from vehicles transporting equipment to the site), venting (i.e. fuel storage tanks vents and pressure control equipment), mobile emissions (i.e. vehicle bringing equipment, personnel, or supplies to the location) and fugitive sources (i.e. pneumatic valves, tank leaks, dust). A number of pollutants associated with combustion of fossil fuels are anticipated to be released during drilling including: CO, NO_x, SO_2, Pb, PM, CO_2, CH_4, and N_2O. Venting may release VOC/HAP, H_2S, and CH_4. Mobile source emissions are likely to include fugitive particulate matter from dust or inordinate idling. The actual emissions of each pollutant will be entirely dependent on the factors described in the previous paragraph.

During the completion phase, the most significant emissions of criteria pollutants emitted by oil and gas operations in general are VOCs, particulate matter, and NO_2. VOCs and NO_x contribute to the formation of ozone, which is a pollutant of concern in Oklahoma and Texas. Data provided to EPA's Natural Gas STAR Program show that some of the largest air emissions in the natural gas industry occur as natural gas wells that have been fractured and are being prepared for production. During well completion, "flowback", fracturing fluids, water, and reservoir gas come to the surface at high velocity and volume. This mixture includes a high volume of VOCs and methane, along with air toxins such as benzene, ethylbenzene, and n-hexane. The typical flowback process lasts from three to 10 days. Pollution also is emitted from other processes and equipment during production and transportation of the oil and gas from the well to a processing facility.

All proposed parcels except -011, -012, -013, -014, -015, -016, and -017 are a significant distance (>70 miles) from any nonattainment areas, while all proposed parcels are a significant distance (>50 miles) from any Class I airsheds. The additional NO_x and VOCs emitted from any new oil and gas development, by means of just drilling or drilling *and* hydraulic fracturing the well, on these leases are anticipated to be too small to have a significant effect on the overall ozone levels of the Houston "non-attainment" area near the above parcels. The increase in particulate matter is also expected to be too small to have a significant effect on the overall air quality of the overall PM_{10} levels of the Houston, Texas "non-attainment" area or the Wichita Mountains, Oklahoma Class I airshed.

Although the hydraulic fracturing of wells within a lease parcel is hard to predict, it is anticipated that with more wells being drilled, there would be an increase in the amount of wells being hydraulically fractured and completed. 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.

Mitigation

The BLM encourages industry to incorporate and implement best management practices (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 Notice to Lessees' (NTL) 4(a) concerning the venting and flaring of gas on Federal leases for natural gas emissions that cannot be economically recovered; flared 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; require that vapor recovery systems be maintained and functional in areas where petroleum liquids are stored; and perform interim reclamation to reclaim areas of the pad not required for production facilities and to reduce the amount of dust from the pads. In addition, the BLM encourages oil and natural gas companies to adopt proven, cost-effective technologies and practices that improve operational efficiency and reduce natural gas emissions.

In October 2012, EPA 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. Mitigation includes a process known as "Green Completion" in which natural gas brought up during flowback must be recaptured and routed into the gathering line.

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.

While the act of leasing Federal minerals would have no impact on climate as a result of GHG emissions, subsequent exploration and development of the proposed lease could have effects on global climate through GHG emissions. However, those effects on global climate change cannot be determined (refer to cumulative effects Section 4.3.16). It is unknown whether the petroleum resources specific to these leases in the Proposed Action are gas or oil or a combination thereof.

Production statistics developed from the Energy Information Administration (EIA) and DOI are shown in Table 10 for the US, Oklahoma, and Texas, as well as federal mineral estate in each state obtained from BLM's Legacy Rehost 2000 (LR2000).

Table 10. 2015 Oil and Gas Production, (U.S. Department of Interior Office of Natural Resources Revenue, 2015), (U.S. Energy Information Administration, 2015), (U.S. Energy Information Administration, 2015a)

Location	Oil (bbl)	Percent US Total	Gas (MMcf)	Percent US Total
United States	3,161,866,000	100	27,271,326	100
Oklahoma	157,770,000	4.0	2,499,599	8.5
Federal leases (Oklahoma)	253,262	0.01	12,267	0.05
Texas (onshore)	1,263,586,000	36.5	7,872,145	31.6
Federal leases (Texas)	411,954	0.02	35,086	0.14

In order to estimate the contribution of Federal oil and gas leases to greenhouse gases in Oklahoma and Texas it is assumed that the percentage of total US 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, 2015), and applying production percentages to estimate emissions for Texas. 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 BLM and allow for comparison with other sources in a broad sense.

Table 11 shows the estimated greenhouse gas emissions for oil and gas field production for the US, Oklahoma, Texas, and Federal leases in Oklahoma and Texas. 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 mentioned 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 project's GHG contribution. Note that units of Metric tons CO_2^e have been used in the table above to avoid very small numbers. CO_2^e is the concentration of CO_2 that would cause the same level of radiative forcing (the "greenhouse affect") as a given type and concentration of greenhouse gas.

Table 11 also 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_2^e from the life cycle of oil and gas. For example, acquisition (drilling and development) for petroleum is responsible for only 8 percent of the total CO_2^e emissions, whereas transportation of the petroleum to refineries represents about 10 percent of the emissions, and final consumption as a transportation fuel represents fully 80 percent of emissions (US DOE, NETL, 2008).

Table 11. 2013 Oil and Gas Field Production Potential Emissions (U.S. EPA, 2015)

Location	Oil (Metric Tons CO_2e)		Gas (Metric Tons CO_2e)		Total Oil and Gas Production (Metric Tons CO_2e)	% US Total GHG Emissions
	CO_2	CH_4	CO_2	CH_4		
United States	500,000	31,300,000	15,900,000	47,000,000	94,700,000	1.42
Oklahoma	20,000	1,252,000	1,351,500	3,995,000	6,618,500	0.099
Federal Leases	50	3,130	7,950	23,500	34,630	0.00052
Texas	182,500	11,424,500	5,024,400	14,852,000	31,483,400	0.47
Federal Leases	100	6,260	22,260	65,800	94,420	0.0014

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 (CEQ), and thus are not required to be analyzed under NEPA. GHG 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 GHG emissions resulting from consumption.

Mitigation

The EPA's GHG emissions data describes "Natural Gas Systems" and "Petroleum Systems" as two major categories of US sources of GHG emissions. The inventory identifies the contributions of natural gas and petroleum systems to total CO_2 and CH_4 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 water (via leaks, spills and unauthorized flaring and venting).

The EPA data shows that improved practices and technology and changing economics have reduced CO_2 emissions from oil and gas exploration and development (Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2010, EPA 2012). 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 OFO would 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.

4.3.2 Soils

While the act of leasing Federal minerals would produce no impacts to soils, subsequent exploration and development of the proposed lease may produce impacts by physically disturbing the topsoil and exposing the substratum soil on subsequent project areas. Direct impacts resulting from the oil and gas construction of well pads, access roads, and reserve pits include removal of vegetation, exposure of the soil, mixing of horizons, compaction, loss of topsoil productivity, and soil susceptibility to wind and

water erosion. Wind erosion would be expected to be a minor contributor to soil erosion with the possible exception of dust from vehicle traffic during all phases of development. Vehicle traffic related wind erosion would be limited to approved travel routes in which the surface has not been paved or dressed in a material to prevent soil movement. The extent of wind erosion related to vehicle traffic would be dependent on a number of factors including: length of well bore; whether hydraulic fracturing is used during completion; use of telemetry during production; or whether the well is gas, oil, condensate, or a combination thereof. These impacts could result in increased indirect impacts such as runoff, erosion, and off-site sedimentation. Activities that could cause these types of indirect impacts include construction and operation on well sites, access roads, gas pipelines, and facilities.

Additional soil impacts associated with lease development could occur when heavy precipitation causes water erosion damage. When water saturated segments of the access road become impassable, vehicles may still be driven over the road. Consequently, deep tire ruts could develop. Where impassable segments are created from deep rutting, unauthorized driving may occur outside the designated route of access roads.

Contamination of soil from drilling, hydraulic fracturing, and production wastes mixed into soil or spilled on the soil surfaces could cause a long-term reduction in site productivity. Contaminants spilled on soil would have the potential to pollute and/or change the soil chemistry. See Section 4.3.9 – Wastes - Hazardous or Solid for a more in-depth analysis of spill contamination. These potential impacts could be reduced or avoided through proper design, construction, maintenance, and implementation of BMPs.

Mitigation

The operator would stockpile the topsoil from the surface of well pads which would be used for surface reclamation of the well pads. The impact to the soil would be remedied upon reclamation of well pads when the stockpiled soil that was specifically conserved to establish a seed bed is spread over well pads and vegetation re-establishes.

During the life of the development, all disturbed areas not needed for active support of production operations would undergo “interim” reclamation in order to minimize the environmental impacts of development on other resources and uses. Upon abandonment of wells, and/or when access roads are no longer in service, final reclamation would be implemented. Earthwork for interim and final reclamation must be completed within six months of well completion or well plugging (weather permitting).

Road construction requirements and regular maintenance would alleviate potential impacts to access roads from water erosion damage.

Fluid impermeable containment systems (i.e. liners, dikes, berms) would be placed in, under, or around any tank, pit, drilling cellar, ditches associated with the drilling process, or other equipment that use or has the potential to leak or spill hazardous and non-hazardous fluids, to completely prevent soil contamination (e.g. liners) at the site or to prevent the spill from going beyond the immediate site (e.g. dikes, berms).

<u>Farmlands, Prime or Unique</u>

While the act of leasing Federal minerals would produce no impacts to prime or unique farmlands, subsequent exploration and development of the proposed lease could remove the area from production for the life of the well. Direct impacts resulting from the construction of well pads, access roads, and reserve pits can affect the soil properties, increase erosion, and reduce water infiltration potentially affecting the characteristics unique to prime or unique farmlands.

The amount of farmlands lost depends on the amount and type of development proposed during the APD process. It is anticipated that there would be no permanent loss of prime or unique farmland once all reclamation activities are complete. Initial construction and development would result in greater surface disturbance and more area temporarily lost for production. Acres not needed during the production phase would be reclaimed and returned to prime or unique farmlands suitable for production. When the well is no longer productive, the entire site would be reclaimed and returned to prime or unique farmlands.

Mitigation

During the APD process, efforts would be made to relocate the disturbance onto soils identified as “not prime farmland”; however, if relocation is not an option the following mitigation measure would be placed on the project.

When removing soil, the three major mineral soil horizons (A, B, and C) would be removed and stockpiled independent of one another. All separation would occur prior to implementation of any other construction activities. During the interim and final reclamation phases, the three independently stockpiled soil layers would be replaced in the reverse order that they were removed with the C horizon placed first followed by B, then A.

The soil and water resources mitigation measures would also minimize the impacts to prime or unique farmlands.

4.3.3 Water Resources

While the act of leasing Federal minerals would produce no impacts to water resources, subsequent exploration and development of the proposed lease may produce impacts. Surface disturbance from the construction of well pads, access roads, pipelines, and utility lines can result in degradation of surface water and groundwater quality from non-point source pollution, increased soil losses, and increased gully erosion.

<u>Water Quality</u>

Potential impacts that would occur due to construction of well pads, access roads, hydraulic fracturing ponds, pipelines, and utility lines include: increased surface runoff and off-site sedimentation brought about by soil disturbance; increased salt loading and water quality impairment of surface waters; channel morphology changes due to road and pipeline crossings; and possible contamination of surface waters by produced water. The magnitude of these impacts to water resources would depend on the proximity of the disturbance to the drainage channel, slope aspect and gradient, degree and area of soil disturbance, soil character, duration and time within which construction activity would occur, and the timely implementation and success or failure of mitigation measures.

Direct impacts would likely be greatest shortly after the start of construction activities and would decrease in time due to natural stabilization and reclamation efforts. Construction activities would occur over a relatively short period; therefore, the majority of the disturbance would be intense but short lived. Direct impacts to surface water quality would be minor; short-term impacts which may occur during storm flow events would likely be greater.

Contamination of groundwater could occur without adequate cementing and casing of the proposed well bore. For hydraulic fracturing fluid to escape the wellbore and affect the usable water quality or contaminate or cross contaminate aquifers, the fluid would have to breech several layers of steel casing and cement. Failure of the cement or casing surrounding the wellbore is unlikely but a possible risk to water supplies. If the annulus is improperly sealed, natural gas, fracturing fluids, and formation water containing high concentrations of dissolved solids may be transferred directly along the outside of the wellbore among the target formation, drinking water aquifers, and layers of rock in between. Complying with BLM and state regulations regarding casing and cementing, implementing BMPs, testing casings and cement prior to continuing to drill or introducing additional fluids, and continual monitoring during drilling and hydraulic fracturing allow producers and regulators to check the integrity of casing and cement jobs and greatly reduce the chance of aquifer contamination.

Casing specifications are designed and submitted to the BLM together with an APD. The BLM independently verifies the casing program, and the installation of the casing and cementing operations are witnessed by certified BLM Petroleum Engineering Technicians.

An expressed public concern about subsurface hydraulic fracturing operations in deep shale formations is that the process might create fractures that extend well beyond the target formation to water aquifers, allowing methane, contaminants naturally occurring in formation water, and/or fracturing fluids to migrate from the target formation into drinking water supplies (Zoback et al 2010). Typically, many thousands of feet of rock separate most major formation in the US from the base of aquifers that contain drinkable water (GWPC 2009), including in the areas proposed for leasing that are being evaluated in this EA. The direct contamination of underground sources of drinking water from fractures created by hydraulic fracturing would require hydrofractures to propagate several thousand feet beyond the upward boundary of the target formations through many layers of rock. It is extremely unlikely that the fractures would ever reach fresh water zones and contaminate freshwater aquifers (Zoback et al 2010, RRC 2013b). During the APD review, the exact difference between the base of treatable water and the top of the target formation for the specific site would be reviewed to determine the potential for direct contamination of underground sources.

Typically flowback liquids from hydraulic fracturing are hauled away to be injected into disposal wells. It is estimated that approximately 30 percent of the injected water returns without too much of a quality decrease, whereas the remaining 40 percent is more degraded. Since the flowback would be disposed of at a regulated and permitted facility, it is assumed that they would ensure all water quality regulations and laws are followed and that BMPs are in place to prevent contamination of aquifers, thus having no impact on water quality in the aquifers from flowback.

Petroleum products and other chemicals used during drilling or hydraulic fracturing, and accidentally spilled, could result in surface and groundwater contamination. Similarly, possible leaks from reserve and evaporation pits could degrade surface and groundwater quality. Authorization of the proposed projects would require full compliance with BLM directives and stipulations that relate to surface and groundwater protection.

Water Quantity

Impacts of water use for oil and gas development and production depend on local water availability and competition for water from other users. Water usage is regulated by Federal (EPA, USACE, and to some extent, BLM) and State agencies. Lease operators are required to obtain water use permits for the withdrawal of water for well drilling, completion operations, and other water related activities, unless the operator reports that water would be obtained from a commercial permitted sources. Overall, impacts range from declining water levels at the regional or local scales and related decreases in base flow to streams (Nicot and Scanlon 2012). Water supplied for hydraulic fracturing could come from surface or groundwater sources. If surface water is used, there would be a temporary decrease in the source's water levels. The time it takes to return to baseline conditions is dependent on the amount of rainfall received and other competing uses of the resource.

Typically when groundwater is used, impacts to the aquifer would be minimal due to the size of the aquifers impacted and recharge potential across the entire aquifer. However, localized aquifer effects are expected. A cone of depression may occur in the immediate vicinity of the existing water well used to supply the drilling and completion water. With each rain event, the aquifer is expected to recharge to some degree, but it is unknown if or when it would recharge to baseline conditions after pumping ceases. The time it takes depends greatly on rainfall events, drought conditions, and frequency of pumping that has already occurred or may continue to occur into the future.

The amount of water actually used for development is highly dependent on a number of factors, including: length of well bore; closed-loop or reserve pit drilling system; type of mud; whether hydraulic fracturing would be used during stimulation; whether recycled water would be used; dust abatement needs; and type and extent of construction. The impacts of water use on water quality and quantity would be analyzed in more detail during the APD review.

Wastewater Injection

Typically, disposal water primarily contains naturally produced salt water from the hydrocarbon producing formation, and to a lesser extent, fracture fluid flowback introduced into horizontal and vertical wells. Disposal water is delivered and pumped back into the ground through designated waste water disposal wells. Waste water disposal wells fall under EPA's Underground Injection Control Wells (UIC) Class II schema which encompasses waste water disposal wells, enhanced recovery wells, and hydrocarbon storage wells.

Waste water disposal is comprised of approximately 20 percent of the identified Class II types. The States of Kansas, Oklahoma, New Mexico, and Texas have primacy program oversite for enforcement of UIC wells within their respective States.

Produced water is highly variable between wells and often increases over the life of the well. Currently monthly water production for individual wells is not readably available for Kansas and Oklahoma for analysis. The State of Oklahoma does provide water volumes and pressures for existing UIC wells. Volumes can range from 1,270 to over 100,000 barrels (bbl) of disposal water per month with pressures ranging from 500 to 6,000 ½ pounds per foot (Walsh and Zoback, 2015).

The Energy Policy Act of 2005 exempts hydraulic fracturing under the Safe Drinking Water Act (SDWA). Specifically, hydraulic fracturing – except when using diesel fuel – is excluded from the definition of underground injection and is not subject to regulation under the UIC program (SDWA Section 1421(d)(1)(B)).

Seismicity

Most wastewater disposal in Oklahoma is occurring within the Arbuckle Group. Within the seismically active area of north-central Oklahoma the Arbuckle Group sits directly on top basement rock and ranges from 2,000 to 13,400 feet in depth (Appendix 7). The Arbuckle has been an ideal formation for wastewater disposal because of its under-pressured character at 0.456 psi/ft which allows it to accept wastewater with little pressure. This low pressure character has been an economic incentive for oil and gas operators to dispose of produced wastewater into the Arbuckle.

The current conceptual model for Oklahoma's wastewater induced earthquakes is that the significant increase in wastewater disposal has increased pore pressure in the Arbuckle Group. Wastewater and pore pressure spread out away from the injection wells over time with apparent hydraulic communication with the underlying crystalline basement rock, which eventually triggers slippage on critically stressed faults in the basement.

The recent earthquakes in north-central Oklahoma have been occurring at a depth ranging from 3,200 to 26,000 feet with a majority occurring in crystalline basement at an average depth of between 16,000 and 20,000 feet (USGS 2016).

Mitigation

Although the Arbuckle has been an ideal formation for waste water disposal for many decades, it was just recently discovered that a large increase of wastewater disposal associated with high water volumes of produced water from the Mississippian oil and gas play and other high water producing plays have been correlated to the increase in seismic activities.

Fluid impermeable containment systems (i.e. liners, dikes, berms) would be placed in, under, and/or around any tank, pit, drilling cellar, ditches associated with the drilling process, or other equipment that use or has the potential to leak or spill hazardous and non-hazardous fluids, to prevent chemicals from penetrating the soil and impacting the aquifer, or from moving off-site to a surface water source.

Complying with BLM and state regulations regarding casing and cementing, implementing BMPs, testing casings and cement prior to continuing to drill, introducing additional fluids, and continual monitoring during drilling and hydraulic fracturing allow producers and regulators to check the integrity of casing and cement jobs. This greatly reduces the chance of aquifer contamination.

The EPA oversees the States' disposal wells, while the Oklahoma Corporation Commission (OCC)(Section 139 of Chapter 3, Title 52 Oil and Gas) and the Texas Railroad Commission (RRC) are responsible for the enforcement of federal rules.

The OCC and RRC require operators to disclose all chemicals used, along with the amount of water used to hydraulically fracture wells, and has the authority to oversee injection wells.

Mitigation is deferred to site-specific development at the APD stage. Spacing orders and allowable production orders are designed to conserve the oil and/or gas resource and provide maximum recovery.

4.3.4 Floodplains, Wetlands, Riparian Areas

Floodplains

While the act of leasing Federal minerals would produce no direct impacts to floodplains, subsequent exploration and development of the proposed lease parcel may produce impacts. Surface disturbance from the development of well pads, access roads, pipelines, and utility lines could result in impairment of the floodplain values from removal of vegetation, removal of wildlife habitat, impairment of water quality, decreased flood water retention, and decreased groundwater recharge.

Mitigation

ORA-1 states that, "All or portions of the lands under this lease lie in and or adjacent to a major watercourse and are subject to periodic flooding. Surface occupancy of these areas will not be allowed without the specific approval, in writing, of the BLM." In addition to ORA-1, the BLM identified the need to develop a Floodplain Protection Lease Notice that would also be attached to these parcels. This notice would inform the lessee and operator that surface occupancy of these areas and surface disturbance within up to 200 meters of the outer edge of the floodplain may not be allowed in order to protect the integrity and functionality of the floodplain and associated watercourse.

Controlled surface use requiring special mitigation measures may be required and would be developed during the APD process.

Wetlands, Riparian Areas

While the act of leasing Federal minerals would produce no direct impacts to wetland and riparian areas, subsequent development of a lease could. Mandated by EO 11990 Protection of Wetlands, a lease stipulation has been developed to protect wetland and riparian areas.

Mitigation

ORA-2 would be applied, as necessary, which states "All or portions of the lands under this lease contain wetland and/or riparian areas. Surface occupancy of these areas will not be allowed without the specific approval, in writing, of the Bureau of Land Management. Impacts or disturbance to wetlands and riparian habitats which occur on this lease, must be avoided or mitigated. The mitigation shall be developed during the application for permit to drill."

4.3.5 Heritage Resources

Cultural Resources

While the act of leasing Federal minerals would produce no direct impacts to cultural resources, subsequent development of a lease could. To comply with Section 106 of the NHPA, a cultural resources survey would be conducted for all surface disturbance activities related to development of the lease. Direct and indirect effects cannot be predicted without analysis of site-specific development at the APD

stage of development. Potential impacts at that stage could include increased human activity in the area increasing the possibility of removal of, or damage to, heritage artifacts. The increase in human activity in the area increases the possibility of irretrievable loss of information pertaining to the heritage of the project region. Conversely, the benefits to heritage resources derived from the future development are the heritage and historic survey that adds to literature, information, and knowledge of cultural resources.

Many cultural resource issues exist beyond the NHPA, such as state and municipal registers of historic sites, National Heritage Areas, National Trails, or other heritage designations. Leasing the proposed parcels would have no effect on any of these types of cultural resources.

Please refer to the Cultural and Paleontological Resources Summary and BLM Cultural Determination in Appendix 6 for more information.

Paleontology

While the act of leasing Federal minerals would produce no direct impacts to paleontological resources, subsequent development of a lease could. Direct and indirect effects cannot be predicted without analysis of site-specific development at the APD stage of development. Potential impacts at that stage could include increased human activity in the area increasing the possibility of removal of, or damage to, paleontology resources. The increase in human activity in the area increases the possibility of irretrievable loss of information pertaining to the paleontology of the project region. Conversely, the benefits to paleontology resources derived from the future development are the paleontology survey that adds to literature, information, and knowledge of paleontological resources.

Protection and preservation of significant fossil materials in specific locations would be required for any BLM permitted project.

Native American Religious Concerns

The proposed action is not known to physically threaten any TCPs, prevent access to sacred sites, prevent the possession of sacred objects, or interfere or otherwise hinder the performance of traditional ceremonies and rituals pursuant to AIRFA or EO 13007. There are currently no known remains that fall within the purview of NAGPRA or ARPA that are threatened by leasing.

Please refer to the Cultural and Paleontological Resources Summary and BLM Cultural Resources Determination in Appendix 6 for more information.

Mitigation Common to all Heritage Resources

Specific mitigation measures, including but not limited to, site avoidance or excavation and data recovery would be determined when site-specific APDs and cultural surveys are received. As well, a second NHPA Section 106 evaluation would be completed. The Oklahoma State Historic Preservation Office confirmed that studies would need to be done at the APD stage.

Standard Conditions of Approval would be attached to each APD, including:

- In the event that lease development practices are found in the future to have an adverse effect on significant cultural resources, the operator and the BLM, in consultation with the affected

tribe(s), and various State Historic Preservation Offices will take action to mitigate or negate those effects. Measures include, but are not limited to physical barriers to protect resources, relocation of practices responsible for the adverse effects, or other treatments as appropriate.
- If additional ground disturbance is required outside of the currently proposed Area of Potential Effects, the Bureau of Land Management archaeologist must be notified prior to any work.
- If archaeological material such as chipped stone tools, pottery, bone, historic ceramics, glass, metal, or building structures are exposed, stop work at that spot immediately and contact the BLM Archaeologist.

4.3.6 Invasive, Non-native Species

While the act of leasing Federal minerals would not contribute to the spread or control of invasive or non-native species, subsequent exploration and development of the proposed lease may. Any surface disturbance could establish new populations of invasive non-native species, although the probability of this happening cannot be predicted using existing information. Noxious weed seeds can be carried to and from the project areas by construction equipment, the drilling rig, and transport vehicles. At the APD stage, BLM requirements for use of weed control strategies would minimize the potential for the spread of these species.

Mitigation

Mitigation is deferred to site-specific development at the APD stage. BMPs require that all Federal actions involving surface disturbance or reclamation take reasonable steps to prevent the introduction or spread of noxious weeds, including requirements to use weed-free hay, mulch, and straw.

4.3.7 Vegetation

While the act of leasing Federal minerals would produce no impacts to vegetative resources, subsequent exploration and development of the proposed lease would have impacts to vegetation. The level of impact depends on the vegetation type, the vegetative community composition, soil type, hydrology, and the topography of the parcel. Surface-disturbing activities could affect vegetation by removing, trampling, or killing the vegetation; churning soils; losing substrates for plant growth; impacting biological crusts; disrupting seedbanks; burying individual plants; reducing germination rates; covering plants with fugitive dust; and generating sites for undesirable weedy species. In addition, development could reduce available forage or alter livestock distribution leading to overgrazing or other localized excess grazing impacts to palatable plant species. If these impacts occurred after seed germination but prior to seed establishment, both current and future generations could be affected.

Vegetation would be lost within the construction areas of pads, roads, and rights of ways. Those areas covered in compacted native substrates, such as pads and roads, would have no vegetation for the life of the well. Interim and final reclamation should result in vegetation establishment in three to five growing seasons (one to two years) with appropriate techniques used and adequate precipitation. Inadequate precipitation over several growing seasons could result in loss of vegetative cover, leading to weed invasion and deterioration of native vegetation.

Mitigation

Mitigation is primarily deferred to site-specific development at the APD stage. If potential wells are productive, disturbed areas not needed for the production facility would be reclaimed. In the case of non-productive wells, all disturbed areas would be reclaimed through reseeding or vegetative cover reestablishment. BMPs identified in BLM guidance documents such as the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development: The Gold Book (USDI, 2007) recommends areas to be restored with native vegetation in regards to both species and structure.

4.3.8 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. Although reclamation and restoration efforts for surface disturbance could provide for the integrity of other resources, these efforts may not always provide the same habitat values (e.g. structure, composition, cover, etc.) in the short or in some instance, the long-term in complex vegetative community types (e.g., shrub oak communities). The short-term negative impact to wildlife could occur during the construction phase of the operation due to noise and habitat destruction. In general, most wildlife species would become habituated to the new facilities. For other wildlife species with a low tolerance to activities, the operations on the well pad would continue to displace wildlife from the area due to ongoing disturbances such as vehicle traffic, noise, and equipment maintenance. The conditions of approval would alleviate most losses of wildlife species, such as: fencing the reserve pits, netting storage tanks, installation or other modifications of cones on separator stacks, and timing stipulations. The magnitude of the effects would be dependent on the rate and location of the oil and gas development, but populations could likely not recover to pre-disturbance levels until the activity was completed and the vegetative community restored.

Measures would be taken to prevent, minimize, or mitigate impacts to fish and wildlife animal species from exploration and development activities. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project would be subject to mitigation measures. Mitigation could potentially include rapid re-vegetation, noise restrictions, project relocation, or pre-disturbance wildlife species surveying.

<u>Threatened and Endangered Species</u>

Protective stipulation WO-ESA-7 would be attached to any lease which falls within an area of potential wildlife habitat. WO-ESA-7 states that, “The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 <u>et</u> <u>seq</u>., including completion of any required procedure for conference or consultation.”

<u>Migratory Birds</u>

The USFWS estimates that many migratory birds are killed annually throughout the United States in oil field production skim pits, reserve pits, and centralized oilfield wastewater disposal facilities. Numerous grasshoppers, moths, June bugs, and the like become trapped on the surface in tanks and on pits, and become bait for many species of migratory birds. Open tanks and pits then become traps to many species of birds protected under the MBTA. Properly covered tanks and pits (and regularly inspected covered tanks and pits) is imperative to continued protection of migratory birds in the well pad area.

Mitigation Common to all Species

Per the MOU between BLM and the USFWS, entitled "To Promote the Conservation of Migratory Birds," the following temporal and spatial conservation measures would be implemented as part of the Conditions of Approval with an APD:

1. Avoid any take of migratory birds and/or minimize the loss, destruction, or degradation of migratory bird habitat while completing the proposed project or action.
2. If the proposed project or action includes a reasonable likelihood that take of migratory birds will occur, then complete actions that could take migratory birds outside of their nesting season. This includes clearing or cutting of vegetation, grubbing, etc. The primary nesting season for migratory birds varies greatly between species and geographic location, but generally extends from early April to mid-July. However, the maximum time period for the migratory bird nesting season can extend from early February through late August. Strive to complete all disruptive activities outside the peak of migratory bird nesting season to the greatest extent possible.
3. If no migratory birds are found nesting in proposed project or action areas immediately prior to the time when construction and associated activities are to occur, then the project activity may proceed as planned.

Notice to Lessees (NTL) 96-01-TDO (Modification of Oil and Gas Facilities to Minimize Bird and Bat Mortality) address measures designed to protect migratory birds from accidental deaths associated with power line collisions and electrocutions, open-vent exhaust stacks, and open pits and tanks.

The Wildlife Resource General Conditions of Approval (WRGCOAs) included in an approved APD and use of standard BMPs should provide extra measures of protection to general wildlife populations and habitats in the area. Impacts to the wildlife resource component of the environment can be avoided or minimized by adopting the WRGCOAs and BMPs. Notice to Lessees (NTL) 96-01-TDO (Modification of Oil and Gas Facilities to Minimize Bird and Bat Mortality) addresses measures designed to protect migratory birds from accidental deaths associated with power line collisions and electrocutions, open-vent exhaust stacks, and open pits and tanks.

4.3.9 Wastes – Hazardous or Solid

While the act of leasing Federal minerals would produce no impacts on the environment from hazardous or solid wastes, subsequent exploration and development of the proposed lease could result in the introduction of hazardous and non-hazardous substances to the site. Hazardous substances may be produced, used, stored, transported, or disposed of as a result of the project. Properly used, stored, and disposed of hazardous and non-hazardous substances greatly decreases the potential for any impact on any environmental resources. A method that operators and the BLM use to ensure hazardous and non-hazardous substances are properly managed is through the preparation of a Spill Prevention, Control, and Countermeasure (SPCC) plan.

In hydraulic fracturing, chemical substances other than water make up a small percentage of the fluid composition. However, the very large volumes used require correspondingly large volumes of a variety of compounds. These substances range from the relatively benign to the highly toxic at certain concentrations. In addition to these added chemicals, naturally occurring toxicants such as heavy metals, volatile organics, and radioactive compounds are mobilized during extraction and return to the surface with the produced water. Of the potential millions of gallons of water used to hydraulically fracture a well, less than 30 percent to more than 70 percent may remain underground (Bamberger and Oswald 2012). Although the risk is low, the potential exists for unplanned releases that could have serious effects on human health and environment. A number of chemical additives are used that could be hazardous, but are safe when properly handled according to requirements and long-standing industry practices. In addition, many of these additives are common chemicals which people regularly encounter in everyday life (GWPC 2009).

Surface spills of drilling mud and additives, hydraulic fracturing fluids and additives, flowback water, and other produced water can happen at a variety of points in the development and production phases. Spills that occur can span a range of different spill sizes and causes of failure at any point in the process. For example, small spills often happen as the result of poor pipe connections or leaks. Large spills sometimes occur as the result of a major well blowout, but such blowouts rarely occur. Additionally, spills from some parts of the phases may be the result of human error (i.e. vehicle collisions, improper handling, improper equipment operation or installation, etc.), while others stem from equipment failure (i.e. broken pipes, torn pit liners, leaking tanks, etc.) or acts of nature (Fletcher 2012). The most common cause of spills comes from equipment failure and corrosion (Wenzel 2012).

The cause of the spill, the spill size, the hazard rating of the spilled material, response time to clean up the spill, and the effectiveness of the cleanup all play a critical role in determining the overall impact on the environment. The volume of a spill can significantly vary with spill types. Pipe spills are not expected to release more than 1,000 gallons into the environment, retaining pit spills and truck spills are not expected to release more than 10,000 gallons of fluid, and blowouts are expected to cause the largest spills with the potential to release tens of thousands of gallons into the environment. Small spills occur with greater frequency than large spills. Secondary containment or recovery for small spills would likely minimize, if not eliminate, any potential release into the environment. However, for spills on the order of several thousands of gallons of fluid, it is expected that less than half the fluid may be captured by secondary containment or recovery. The vast majority of operations do not incur reportable spills (five gallons or more), indicating the fluid management process can be, and usually is, managed safely and effectively (Fletcher 2012).

Mitigation

Specific mitigation is deferred to the APD process. The following measures are common to most projects: all trash would be placed in a portable trash cage and hauled to an approved landfill, with no burial or burning of trash permitted; chemical toilets would be provided for human waste; fresh water zones encountered during drilling operations would be isolated by using casing and cementing procedures; a berm or dike would enclose all production facilities if a well is productive; and all waste from all waste streams on site would be removed to an approved disposal site.

4.3.10 Mineral Resources

While the act of leasing Federal minerals would produce no impacts to mineral resources, subsequent exploration and development of the proposed lease could impact the production horizons and reservoir pressures. If production wells are established, the resources allotted to the wells would eventually be depleted. The amount and location of direct and indirect effects cannot be predicted until site-specific development information is available typically during the APD stage.

Other mineral resources could be impacted as a result of exploration and development through the loss of available surface or subsurface area needed to develop or access the other mineral resource overlapping the proposed lease parcel. The extent of the impacts, if any, cannot be predicted until site-specific development information is available typically during the APD stage.

Mitigation

Mitigation is deferred to site-specific development at the APD stage. Spacing orders and allowable production orders are designed to conserve the oil and/or gas resource and provide maximum recovery.

4.3.11 Visual Resources

While the act of leasing Federal minerals would produce no impacts to visual resources, subsequent exploration and development of the proposed lease could impact visual quality through: increased visibility of constructed features such as roads, well pads, pipelines, tank batteries; road degeneration from heavy trucks and vehicles following rain and snow; dust and exhaust from construction, drilling, and production vehicles and equipment; vegetation removal and construction of steep slopes; unreclaimed sites; and discarded equipment. Well pads, power lines, access roads, and associated production facilities and storage tanks have the greatest potential to alter visual conditions for the life of the well. Vegetation removal would present an obvious contrast in color with the surrounding vegetation and affect foreground and middleground distance zones for more than a decade. These impacts would be most obvious immediately after construction. Impacts would decrease as the disturbed surface began to blend in color, form, and texture when interim or final reclamation occurs. Long-term visual impacts could persist as long as the well is producing, which could be a couple of years to more than 50 years. Long-term impacts may include vegetation removal, alteration of the landscape, and installation of equipment and facilities.

Mitigation

Additional mitigation is deferred to site-specific development at the APD stage.

4.3.12 Recreation

While the act of leasing Federal minerals would produce no impacts to recreation resources, subsequent exploration and development of the proposed lease could impact recreation quality and opportunities through: increased vehicle traffic and human presence, loss of areas to recreate, blocked access, and increased noise and visual disturbance.

Mitigation

Mitigation is deferred to site-specific development at the APD stage.

4.3.13 Socioeconomics and Environmental Justice

No minority or low income populations would be directly affected in the vicinity of the proposed lease parcels. Indirect impacts could include an increase in overall employment opportunities related to the oil and gas and service support industry in the region, as well as the economic benefits to State and County governments related to royalty payments and severance taxes. Other impacts could include a small increase in activity and noise disturbance in areas used for agriculture and recreational activities. However, these impacts would apply to all land users in the area.

Oil and gas development, especially during drilling and hydraulic fracturing, can create short-term increases in traffic volume, dust, and noise and negatively impact nearby residents or businesses. These nuisance impacts are usually limited to the construction, drilling, and completion phases of the well. These impacts would be significantly reduced during production when the site would be visited periodically for inspection and to haul produced fluids.

Mitigation

Mitigation is deferred to site-specific development at the APD stage.

4.3.14 Infrastructure Integrity

Concerns have been raised that these activities could result in damage to dams and other important structures at flood risk reduction projects. The Fort Worth District is in the process of preparing a formal engineering position explaining the risks and recommending a 3,000 foot lateral exclusion zone (Corps of Engineers, 2011).

Although hydraulic fracturing generally occurs in formations that are found more than a mile below the ground, there is concern that the disruption to the geologic structure of natural gas shale formations could result in subsidence of the underground structures supporting dams, resulting in damage to the dams and associated structures (Corps of Engineers, 2011).

The 3,000 foot lateral exclusion zone adopted by the BLM for the purpose of protecting critical facilities from damage by oil and gas operations, and documented in their Record of Decision (ROD) on the Texas RMP dated May 31, 1996, would apply to all USACE projects within the Southwestern Division. Within this exclusion zone, no surface occupancy and no drilling (including horizontal drilling) are allowed within 3,000-feet of critical facilities such as dams, embankments, and other areas critical for project operation when USACE owns the necessary estates in real property to control said development without approval from the District Commander. Note that the buffer is 3,000 feet in Texas, but that it reduces to 2,000 feet in the Tulsa District which covers Oklahoma (Corps of Engineers, 2011).

Mitigation

OFO geologists identify all potential subsurface formations that could be penetrated by the wellbore. This includes all groundwater aquifers, reservoirs, dams, 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 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 a well is considered to be a "non-routine" fracture for the area, the BLM would be onsite during those operations as well as when abnormal conditions develop during the drilling or completion of a well.

The BLM approves and regulates all drilling and completion operations, and related surface disturbance on Federal public lands to ensure that hydraulic fracturing is conducted in a safe and environmentally sound manner. Operators must submit APDs to the agency for approval prior to initiating operations.

There is currently no statute or regulation which clearly provides USACE with authority to prevent exploration and drilling activities in those locations in close proximity to major structures where the United States has no real property interest. Nevertheless, 33 USC 408 provides that it is unlawful for any person to impair the usefulness of any flood control work built by the United States. USACE currently prohibits oil and gas exploration and production activities within 2,000-feet of any major structure, including the dam, spillway or embankments (3,000 feet in Texas). This prohibition only applies to those lands underlying USACE flood control projects wherein the United States owns the minerals and has leased the minerals to third parties subject to this condition (see Appendix 3) (Corps of Engineers, 2011).

4.3.15 Cumulative Effects

The NMSO manages approximately 41 million acres of Federal mineral estate. Of the 41 million acres, 35 million acres are actually available for oil and gas leasing (Table 12). Approximately 15 percent of the 35 million acres are currently leased with73 percent of the leases and 63 percent of the leased acres in production. Leased acres are mineral estate acres and are not always directly associated with the surface estate and surface acres or acres of surface disturbance associated with the well sites. The parcels and acreages nominated and analyzed in this EA are listed in Table 13.

Table 12. Actual –Acres of Federal Minerals/Acres Available/Acres Leased

State	Federal O&G Mineral Ownership	Acres Available	Acres Leased	Percent Leased
New Mexico	34,774,457	29,751,242	4,511,646.884	15.2%
Kansas	744,000	614,586	119,993.952	19.5%
Oklahoma	1,998,932	1,668,132	251,908.210	15.1%
Texas	3,404,298	3,013,207	418,767.137	13.9%
Totals/Average	40,921,687	35,047,167	5,302,316.183	15.1%

Table 8. Parcels nominated and offered in the April 2016 Oil and Gas Lease Sale.

Field Office	No. of Nominated Parcels	Acres of Nominated Parcels
Oklahoma	9	1,205.14
Texas	9	3,171.72

The cumulative impacts fluctuate with the gradual reclamation of well abandonments and the creation of new additional surface disturbances in the construction of new access roads and well pads. The ongoing process of restoration of abandonments and creating new disturbances for drilling new wells gradually accumulates as the minerals are extracted from the land. Conserving as much land as possible and applying appropriate mitigation measures would assist in alleviating the cumulative impacts.

Analysis of cumulative impacts for reasonably foreseeable development of oil and gas wells in Oklahoma and Texas were analyzed in the Oklahoma RMP (1994), as amended, and Texas RMP (1996), as amended, respectively. Potential development of all available federal minerals in Oklahoma and Texas, including those in the proposed lease parcels, was included as part of the analysis. Total surface disturbance projected by the plan was based on an estimated 20 Federal wells being drilled annually in Oklahoma and Texas, each, with an estimated 113 acres of disturbance. Over the last 10 years there have been no changes to the basic assumptions or projections described in the either RMP's analysis.

More than 100 years of oil and gas development in Oklahoma has resulted in an extensive infrastructure of existing roads and pipelines. The OCC reports a total of 115,000 oil wells and 65,000 natural gas wells that are drilled and not plugged in Oklahoma. A total of 74,319,000 barrels of oil was produced in 2011 with an average of 62 rotary rigs in operation per month. They also report a total of 1,827,328 mcf of natural gas was produced in 2011 with an average of 120 rotary rigs in operation per month.

As of September 4, 2014, the Railroad Commission of Texas lists 287,550 current oil wells statewide including 218,582 active wells and 68,968 inactive wells (RRC 2014). The RRC lists 132,914 current gas wells in the state including 104,973 active wells and 27,941 inactive wells. In 2013, a total oil production of 757,548,412 bbl of oil and 16,298,326,842 mcf of gas (natural gas, gas well gas, and casinghead gas) was produced in the state (RRC 2014a). Impacts from this development would remain on the landscape until final abandonment and reclamation of facilities occurs as wells are plugged when they are no longer economically viable.

Effects on Air Quality

The following analysis of cumulative impacts of the proposed action on air quality will be limited to the counties in which the proposed lease parcels occur.

The primary activities that contribute to levels of air pollutants in the nine counties are predominately combustible engines of road and non-road diesel and gasoline vehicles and equipment. The Air Resources Technical Report includes a description of the varied sources of national and regional emissions that are incorporated here to represent the past, present, and reasonably foreseeable impacts to air resources (BLM 2015). It includes a summary of emissions on the national and regional scale by industry source. Sources that are considered to have notable contributions to air quality impacts and GHG emissions include electrical generating units, fossil fuel production (nationally and regionally), and transportation.

The very small increase in emissions that could result from approval of the proposed action or preferred alternative would not result in the area violating the NAAQS for any criteria pollutant or violating the Class I airshed protections. In October 2012, EPA regulations that require control of VOC emissions from oil and gas development became effective. These regulations will reduce VOC emissions from oil and gas exploration and production emissions that contribute to the formation of ozone. Emissions from any lease development are not expected to impact the eight hour average ozone concentrations, or any other criteria pollutants in the area of the proposed leases.

Cumulative Effects on Climate Change

The cumulative impacts of GHG emissions and their relationship to climate change are evaluated at the national and global levels in the Air Resources Technical Report (BLM 2016). The very small increase in GHG emissions that could result from approval of the proposed action would not produce climate change impacts that differ from the No Action Alternative. This is because climate change is a global process that is impacted by the sum total of GHGs in the Earth's atmosphere. The incremental contribution to global GHGs from the proposed action cannot be translated into effects on climate change globally or in the area of this site-specific action. It is currently not feasible to predict with certainty the net impacts from particular emissions associated with Federal actions. However, EPA's recently finalized oil and gas air quality regulations have a co-benefit of methane reduction that will reduce greenhouse gas emissions from any oil and gas development that would occur on this lease.

5.0 CONSULTATION/COORDINATION

This section includes the resource specialists located within the OFO that specifically participated and provided input in the lease parcel review process and the development of this EA document.

ID Team Member	Title	Organization
Signa Larralde	Archaeologist	BLM
Becky Peters	Wildlife Biologist	BLM
Pat Stong	Geologist	BLM
Alisha Autio	Natural Resource Specialist	BLM
Gary McDonald	Environmental Specialist	BLM
Lori Whitehorse	Planning and Environmental Coordinator	BLM

On August 17, 2016, a briefing for the BLM New Mexico State Director was held via teleconference with the Oklahoma Field Office to review Field Office recommendations for nominated parcels.

5.1 Public Involvement

The nominated parcels, along with the appropriate stipulations from the Oklahoma RMP (1994), as amended, and Texas RMP (1996), as amended were posted online for a two week review period beginning August 15, 2016. Comments were received and addressed within this EA. The EA was made available for public review and comment for 30 days beginning October 24, 2016. Any comments provided prior to the lease sale will be considered and incorporated into the EA as appropriate.

6.0 REFERENCES

Bamberger, M. and R.E. Oswald. 2013. Impacts of Gas Drilling on Human and Animal Health. New Solutions: A Journal of Environmental and Occupational Health Policy 22: 51-77. http://baywood.metapress.com/app/home/contribution.asp?referrer=parent&backto=issue,5,9;journal,6,88;linkingpublicationresults,1:300327,1.

Corps of Engineers, 2011. Mineral Exploration and Production Activities in Close Proximity to Flood Risk Management Structures. Dallas, TX: DEPARTMENT OF THE ARMY-Southwestern Division.

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.

EDDMS. 2013. Early Detection & Distribution Mapping System. The University of Georgia – Center for Invasive Species and Ecosystem Health. Available at: http://www.eddmaps.org.

Energy Information Administration, 2012. National and Statewide Production Reports. http://www.eia.gov/petroleum/data.cfm#crude and http://www.eia.gov/dnav/ng/hist/n9010us2a.htm.

Environmental Protection Agency (EPA). 2013. Air Trends: Design Values. http://www.epa.gov/airtrends/values.html.

EPA. 2015a. Air Data: Air Quality Index Report. http://www.epa.gov/airquality/airdata/ad_rep_aqi.html.

EPA. 2012. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010. EPA 430-R-12-001. http://www.epa.gov/climatechange.ghgemissions/usinventoryreport.html..

EPA. 2011. Technology Transfer Network: Clearinghouse for Inventories and Emissions Factors. http://www.epa.gov/ttn/chief/eiinformation.html.

EPA. 2009. State of the Ground Water Report. Ground Water Center, Source Water Protection Branch, EPA, Region 6. Dallas, Texas. Available at: http://www.epa.gov/region6/water/swp/groundwater/2008-report.pdf.

EPA, Natural Gas Star Program (2006 data). Environmental Protection Agency, Washington, D.C. http://www.epa.gov/gasstar/accomplishments/index.html.

Fletcher, S. M. 2012. Risk Assessment of Groundwater Contamination from Hydraulic Fracturing Fluid Spills in Pennsylvania. Thesis (S.M. in Technology and Policy)--Massachusetts Institute of Technology, Engineering Systems Division, Technology and Policy Program. http://hdl.handle.net/1721.1/72885.

Goddard Institute for Space Studies. 2013. Annual Mean Temperature Change for Three Latitude Bands.

Datasets and Images. GISS Surface Temperature Analysis, Analysis Graphs and Plots. New York, New York. http://data.giss.nasa.gov/gistemp/graphs/Fig.B.lrg.gif.

Groundwater Protection Council (GWPC). 2009. Modern Shale Gas Development in the United States: A Primer. Prepared for the U.S. Department of Energy, Office of Fossil Energy, and National Energy Technology Laboratory (NETL). DE-FG26-04NT15455. Oklahoma City, OK. Available at: http://www.netl.doe.gov/technologies/oil-gas/publications/epreports/shale_gas_primer_2009.pdf.

Kansas Ground Water: An Introduction to the State's Water Quantity, Quality, and Management Issues, compiled by Rex Buchanan and Robert W. Buddemeier. Available at: http://www.kgs.ku.edu/Publications/Bulletins/ED10/03_use.html

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2015: The Physical Basis (Summary for Policymakers). Cambridge University Press. Cambridge, England and New York, New York. http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf.

Johnson, K. 1998. Geology and Mineral Resources of Oklahoma. Oklahoma Geological Survey Information Series #2. Norman, Oklahoma. Available at: http://www.ogs.ou.edu/pubsscanned/InfSeries/infseries2.pdf.

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

Kim, E.M. and S.C. Ruppel. 2005. Oil and Gas Production in Texas. Bureau of Economic Geology, The University of Texas, Austin. Austin, TX. Available at: http://www.beg.utexas.edu/UTopia/images/pagesizemaps/oilgas.pdf.

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. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1048006.pdf.

Nicot, J.-P. and B.R. Scanlon. 2012. Water use for shale-gas production in Texas, U.S. Environmental Science and Technology 46:3580—3586.

Economic Development & Tourism (EDT). 2013. Overview of the Texas Economy. Updated: Sept. 2013. Office of the Governor Economic Development & Tourism. Available at: http://www.governor.state.tx.us/files/ecodev/texas-economic-overview.pdf

Oklahoma Corporation Commission (OCC). 2012. 2011 Report on Oil and Natural Gas Activity Within the State of Oklahoma. Technical Services Department Oil and Gas Division. Oklahoma City, Oklahoma. Available at: http://www.occeweb.com/og/2011%20Annual%20Report.pdf.

Oklahoma Water Resources Board (OWRB). 2011. 2012 Oklahoma Comprehensive Water Plan. Available at: https://www.owrb.ok.gov/supply/ocwp/ocwp.php.

Osborn, N.I. and R.H. Hardy. 1999. Statewide Groundwater Vulnerability Map of Oklahoma. Oklahoma Water Resources Board Technical Report 99-1. Available at:

http://www.owrb.ok.gov/studies/reports/gwvulnerability/entire-report.pdf.

Railroad Commission of Texas (RRC). 2014. Well Distribution by County – Well Countys, as of September 4, 2014. Available at: http://www.rrc.state.tx.us/oil-gas/research-and-statistics/well-information/well-distribution-by-county-well-counts/

Robert, Geroge L. 1982. Hydraulic Model Study of Choke Canyon Dam Spillway & Stilling Basin. Report no. GR-82-9. Department of Interior, Bureau of Reclamation.

RRC. 2014a. Texas Monthly Oil and Gas Production . Available at: http://www.rrc.state.tx.us/oil-gas/research-and-statistics/production-data/texas-monthly-oil-gas-production/

RRC. 2013. Hydraulic Fracturing Frequently Asked Questions. Railroad Commission of Texas. Available at: http://www.rrc.state.tx.us/about/faqs/hydraulicfracturing.php

Texas Administrative Code. 2012. Quarantines and noxious plants, Chapter 19 (07 September 2012). State of Texas.

Texas Commission on Environmental Quality and Texas State Soil and Water Conservation Board (TCEQ/TSSWCB). (2005). Texas Nonpoint Source Management Program, Appendix D. Joint Report SFR-068/04. https://www.tsswcb.texas.gov/files/docs/admin/Sunset2009/21G-NPS%20MGMT%20Program.pdf

Texas Water Development Board (TWDB). 2012. Water for Texas 2012 State Water Plan. Available at: http://www.twdb.state.tx.us/waterplanning/swp/index.asp

TWDB. 2011. Aquifers of Texas--Report 380. Available at: http://www.twdb.state.tx.us/publications/reports/numbered_reports/doc/R380_AquifersofTexas.pdf

Labor Market & Career Information Department (LMCI) (2013). Texas Labor Market Information, Unemployment by County. Texas Workforce Commission. Available at: http://www.tracer2.com/cgi/dataAnalysis/AreaSelection.asp?tableName=Labforce&orderBy=area

United States Geologic Survey (USGS). 2016. Myths and Misconceptions of Induced Earthquakes. http://earthquake.usgs.gov/research/induced/myths.php

US Census Bureau. (2012). State and County Quick Facts: Data derived from Population Estimates, American Community Survey, Census of Population and Housing, State and County Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic Census, Survey of Business Owners, Building Permits, Consolidated Federal Funds Report. http://quickfacts.census.gov/qfd/index.html.

US Bureau of Labor Statistics (BLS). 2013. Economy at a Glance: Oklahoma. Southwest Information Office. Dallas, Texas. Available at: http://www.bls.gov/eag/eag.ok.htm#eag_ok.f.P

US. Bureau of Economic Analysis (BEA). 2012. Regional Data: Oklahoma 2011. Gross Domestic Production by State. Washington, D.C. Available at:

http://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=1#reqid=70&step=10&isuri=1&7007=2011&7093=Levels&7090=70&7035=-1&7036=-1&7001=1200&7002=1&7003=200&7004=NAICS&7005=-1&7006=40000.

USDA (Department of Agriculture, Natural Resource Conservation Service [NRCS]). Web Soil Survey. http://websoilsurvey.nrcs.gov/.

USDI (US Department of the Interior, Bureau of Land Management [BLM]). 2007. Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development: The Gold Book (4th ed), P-417.

USDI (BLM). February 1996. Texas Resource Management Plan and Final Environmental Impact State. Tulsa, Oklahoma.

USDI (BLM). May 1996. Record of Decision and Final Texas Resource Management Plan. Tulsa, Oklahoma.

USDI (BLM). February 1994. Oklahoma Resource Management Plan and Final Environmental Impact State. Tulsa, Oklahoma.

USDI (BLM). May 1994. Record of Decision and Final Oklahoma Resource Management Plan. Tulsa, Oklahoma.

USDI (BLM). 2015. Air Resources Technical Report. New Mexico State Office. http://www.blm.gov/nm/st/en/prog/more/air_resources/air_resources_technical.html.

USDI, US Geological Survey (USGS). 2011. 2008 Minerals Yearbook: Oklahoma [Advance Release]. Available at: http://minerals.usgs.gov/minerals/pubs/state/2008/myb2-2008-ok.pdf.

US Government Accountability Office Report (2007). Climate Change: Agencies Should Develop Guidance for Addressing the Effects on Federal Land and Water Resources. GAO-07-863. 1st paragraph, 1st page, GAO Highlights. http://www.gao.gov/products/GAO-07-863.

Wenzel, C. 2012. A Case Study—Hydraulic Fracturing Geography: The Case of the Eagle Ford Shale, TX, USA. Thesis (M.S.)--Texas State University-San Marcos, Department of Geography. https://digital.library.txstate.edu/handle/10877/4247.

Walsh III, Rall F. and Mark D. Zoback. 2015. Oklahoma's Recent Earthquakes and Saltwater Disposal. Science Advances. 18 June 2015: E1500195. http://advances.sciencemag.org/content/1/5/e1500195

Zoback, M., S. Kitasei, and B. Copithorne. 2010. Addressing the Environmental Risks from Shale Gas Development. Briefing Paper 1. Worldwatch Institute Natual Gas and Sustainable Energy Initiative. Available at: http://www.worldwatch.org/files/pdf/Hydraulic%20Fracturing%20Paper.pdf.

7.0 AUTHORITIES

Code of Federal Regulations (CFR)

40 CFR All Parts and Sections inclusive Protection of Environment, Revised as of January 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. OKLAHOMA FIELD OFFICE LEASE STIPULATION SUMMARY

Stipulation	Description/Purpose
BOR – Nueces River Project	NO SURFACE OCCUPANCY – NUECES RIVER PROJECT No surface access or surface occupancy is allowed. Drilling beneath Choke Canyon Reservoir (defined by the published maximum water surface elevation of 233 feet msl) is prohibited unless approved by Regional Director contingent upon completion of a risk analysis. All areas within 2,000 feet of any major structure, including but not limited to the dam, spillway, or embankment, are restricted areas. Drilling operations in, on, or under the restricted areas, including drilling outside of the restricted areas which would cause a bore hole to be under the restricted area, will not be permitted. All storage tanks and slush pits will be protected by dikes of sufficient capacity to protect the reservoir from pollution to maximum water surface elevation 233 feet for Choke Canyon Reservoir.
COE-Somerville & Lewisville Lakes	NO SURFACE USE OCCUPANCY No surface occupancy is allowed within 3,000 horizontal feet of prime facilities critical to the operation of Somerville Lake, including but not limited to the dam, spillway, outlet structure, levees and related structures.
BOR – Lavaca-Navidad River Authority / Palmetto Bend Project	NO SURFACE OCCUPANCY – PALMETTO BEND PROJECT Generally, no well casing-head shall be placed below the surface elevation of 47.5 feet, mean sea level (M.S.L.). All well storage tanks and production equipment shall be constructed outside the flood plain above elevation 47.0 feet M.S.L. This elevation restriction does not apply to areas downstream of the dam and outlet works. Berms shall be constructed around storage batteries, tanks, and separators to contain their entire volume should an accidental spill or rupture occur. Drilling a well for oil and gas is prohibited within 5,280 feet of any dam, dike, or other major structure, unless otherwise approved by the LNRA General Manager or his designee. Generally, no drilling or production facilities are allowed within any developed recreation areas. No well shall be drilled within 1/8 mile (660 feet) of a river channel, permanent stream, tributary, or marsh site unless otherwise approved by the LNRA General Manager or his designee. To protect watersheds, slopes in excess of 40 percent (2.5:1) should be avoided where possible.
WO-ESA-7	THREATENED AND ENDANGERED SPECIES CONSULTATION The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 et seq., including completion of any required procedure for conference or consultation.
WO-NHPA	CULTURAL RESOURCES AND TRIBAL CONSULTATION This lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, Executive Order 13007, or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations (e.g., State Historic Preservation Officer (SHPO) and tribal consultation) under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized, or mitigated.

ORA-1 OK, TX	FLOODPLAIN PROTECTION: A result of EO 11988 Floodplain Management of May 24, 1977. All or portions of the lands under this lease lie in and or adjacent to a major watercourse and are subject to periodic flooding. Surface occupancy of these areas will not be allowed without the specific approval, in writing, of the Bureau of Land Management.
ORA-2 OK, TX	WETLAND/RIPARIAN: Mandated by EO 11990 Protection of Wetlands of May 24, 1077. All or portions of the lands under this lease contain wetland and/or riparian areas. Surface occupancy of these areas will not be allowed without the specific approval, in writing, of the Bureau of Land Management. Impacts or disturbance to wetlands and riparian habitats which occur on this lease, must be avoided or mitigated. The mitigation shall be developed during the application for permit to drill.
ORA-3 OK	SEASON OF USE: Surface occupancy of this lease will not be allowed from February 15 – May 15 for protection of the lesser/greater prairie-chicken breeding season.
ORA-10	DRAINAGE STIPULATION FOR FEDERAL LANDS: All or parts of the land contained in this lease are subject to drainage by well(s) located adjacent to this lease. The lessee shall be required within six months of lease issuance to submit to the Authorized Officer plans for protecting the lease from drainage. Compensatory royalty will be assessed effective the expiration of this six month period if no plan is submitted.

APPENDIX 2: PHASES OF OIL AND GAS DEVELOPMENT, POST LEASING AND PERMITTING

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, but in Oklahoma, Texas, and Kansas, the most common are commercial. 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 14 includes some of the common wastes (hazardous and non-hazardous) that are produced during oil and gas development.

Appendix 2, Table 14. Common wastes produced during oil and gas development.

Phase	Waste
Construction	• Domestic wastes (i.e. food scraps, paper, etc.) • Excess construction materials • Used lubricating oils • Solvents • Woody debris • Paints • Sewage
Drilling	• Drilling muds, including additives (i.e. chromate and barite) and cuttings • 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) • Equipment, power unit and transport maintenance wastes (i.e. batteries; used filters, lubricants, oil, tires, hoses, hydraulic fluids; paints; solvents) • Fuel and chemical storage drums and containers • Cementing wastes • Production testing wastes • Excess construction materials • Scrap metal • Sewage • Rigwash • Excess drilling chemicals • Processed water • Contaminated soil • Domestic wastes
HF	See below
Production	• Power unit and transport maintenance wastes (i.e. batteries; used filters, lubricants, filters, tires, hoses, coolants, antifreeze; paints; solvents, used parts) • Discharged produced water • Production chemicals • Workover wastes (e.g. brines) • Tank or pit bottoms • Contaminated soil • Scrap metal
Abandonment/ Reclamation	• Construction materials • Decommissioned equipment • Contaminated soil • Insulating materials • Sludge

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 (Figure 1). 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 three 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).

Figure 1. Typical Chemical Additives Used In Fracturing Fluids (GWPC 2009)

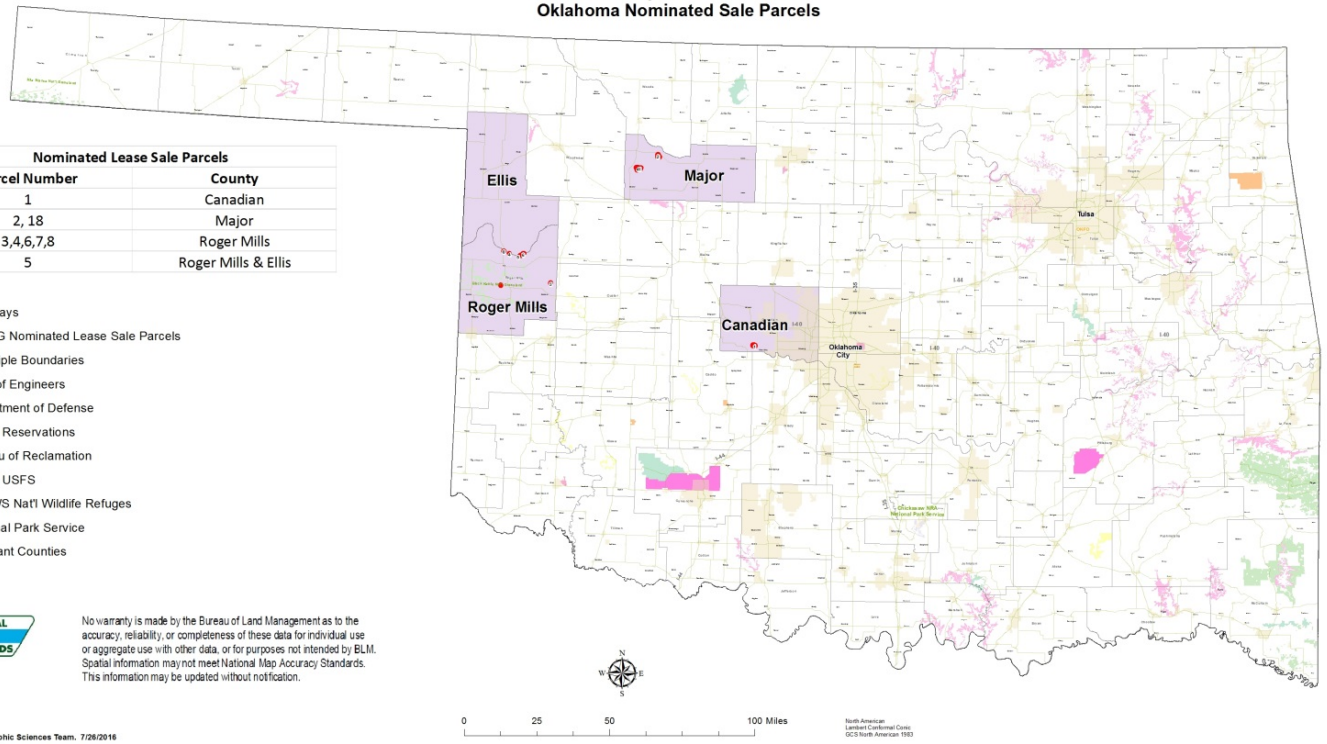
Compound	Purpose	Common application
Acids	Helps dissolve minerals and initiate fissure in rock (pre-fracture)	Swimming pool cleaner
Sodium Chloride	Allows a delayed breakdown of the gel polymer chains	Table salt
Polyacrylamide	Minimizes the friction between fluid and pipe	Water treatment, soil conditioner
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

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.

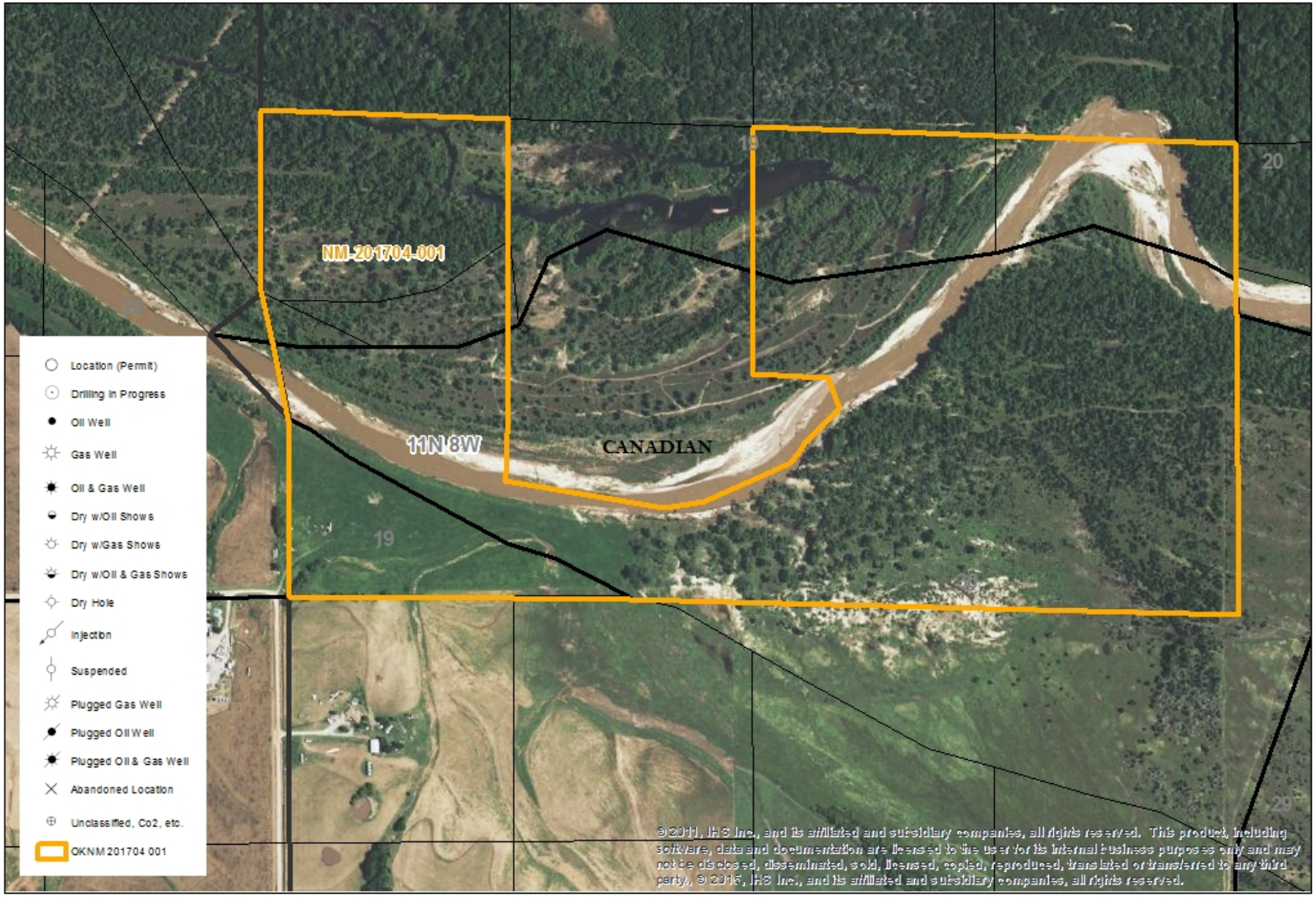
APPENDIX 3. LOCATION OF NOMINATED LEASE SALE PARCELS

BLM New Mexico Competitive Oil and Gas Lease Sale
April 2017
Oklahoma Nominated Sale Parcels



Nominated Lease Sale Parcels

Parcel Number	County
1	Canadian
2, 18	Major
3,4,6,7,8	Roger Mills
5	Roger Mills & Ellis



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data, or for purposes not intended by BLM. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

DJM 7/8/2016

N W E S

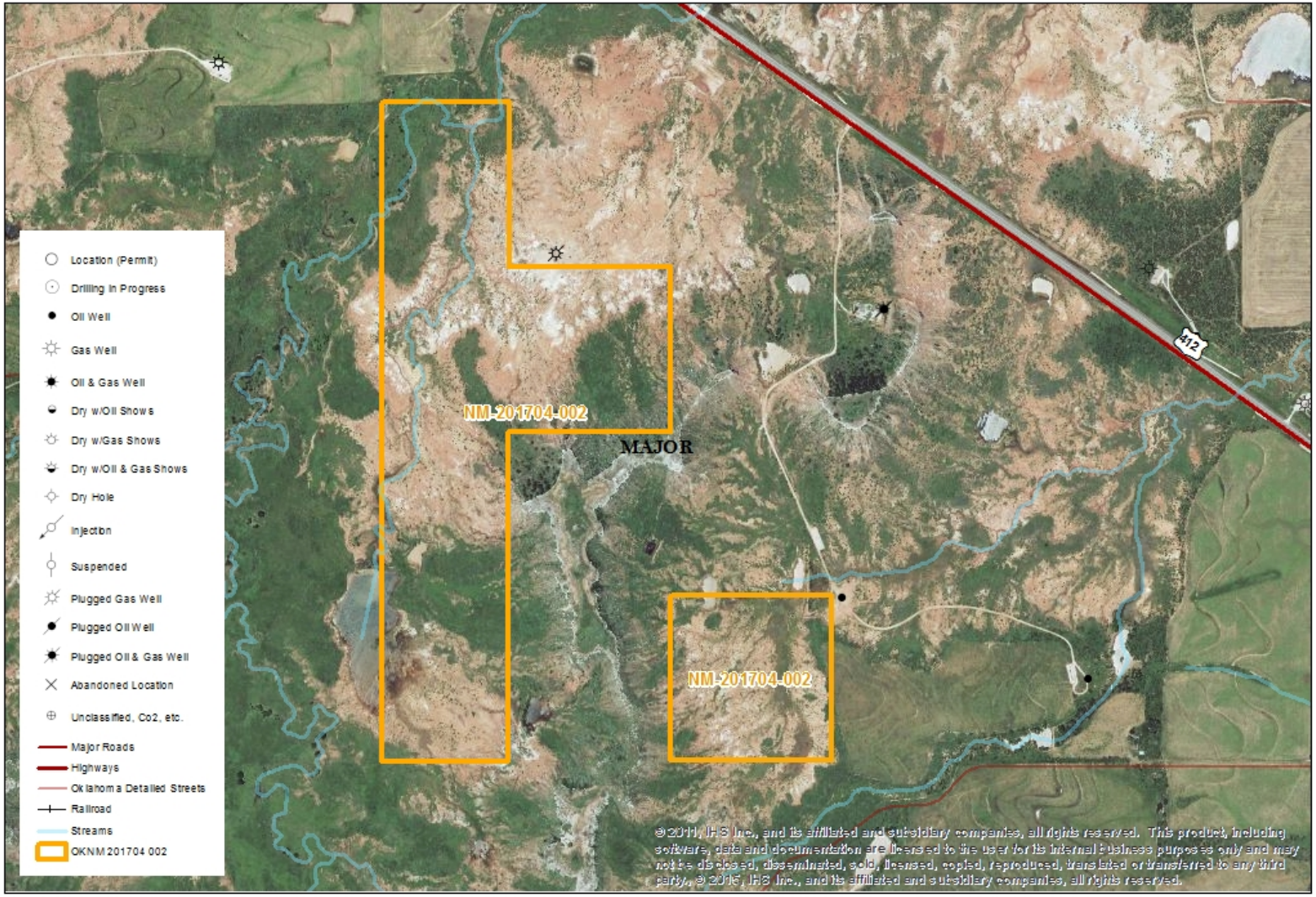
Nominated Lease Sale Parcels
OKNM 201704 001
Canadian County, OK

1:8,000

0 500 1,000 2,000 Feet

NAD 83
USA
Albers Contiguous
Equal Area Conic

Bureau of Land Management
Tulsa Field Office
7906 E 33 St, Ste 101
Tulsa, OK 74145



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DJM 7/8/2016

N W E S

Nominated Lease Sale Parcels
OKNM 201704 002
Major County, OK

1:12,000

0 750 1,500 3,000 Feet

NAD 83
USA
Albers Contiguous
Equal Area Conic

Bureau of Land Management
Tulsa Field Office
7906 E 33 St, Ste 101
Tulsa, OK 74145

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data, or for purposes not intended by BLM. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

DJM 7/8/2016

N W E S

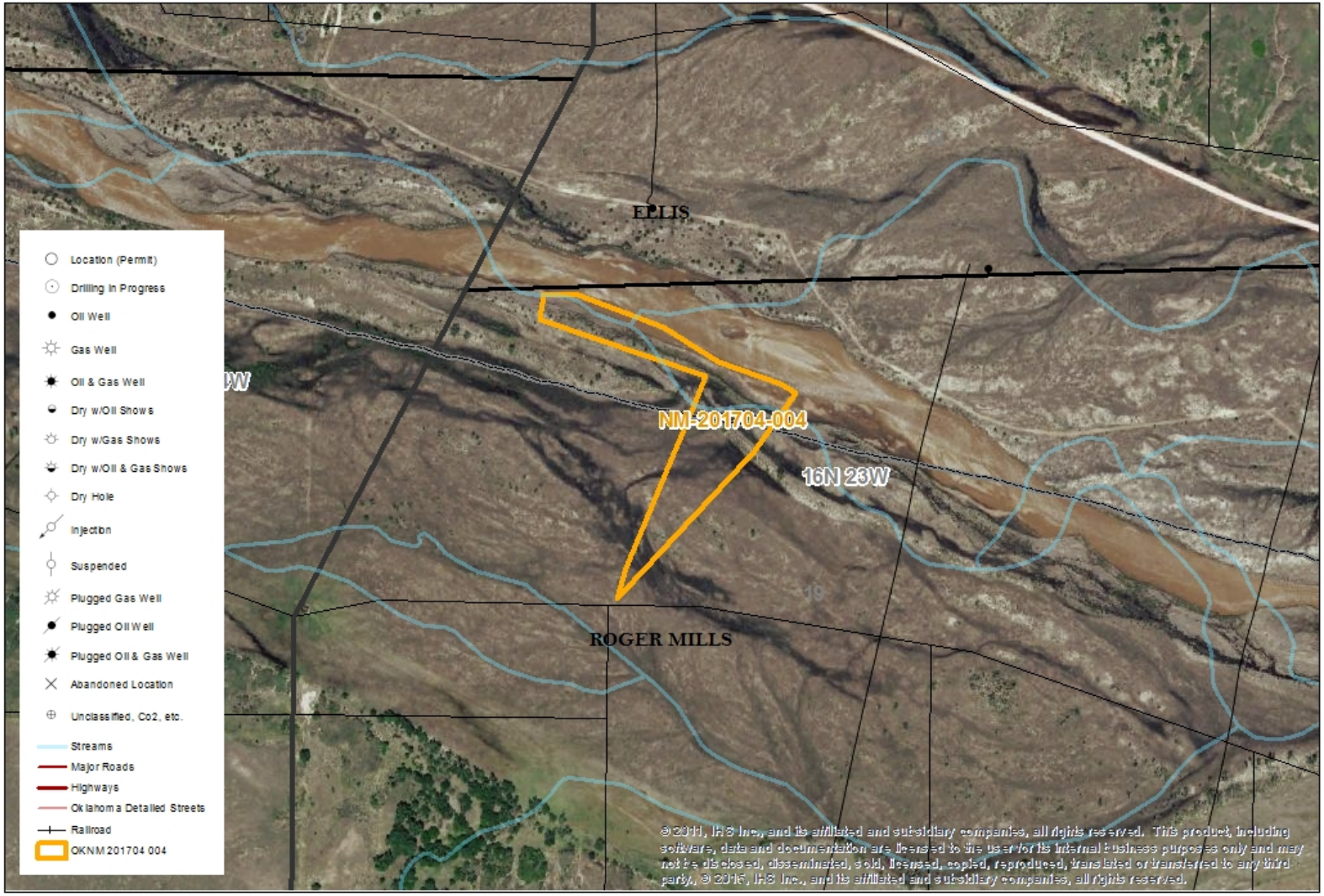
Nominated Lease Sale Parcels
OKNM 201704 003
Roger Mills County, OK

1:6,000

0 250 500 1,000 Feet

NAD 83
USA
Albers Contiguous
Equal Area Conic

Bureau of Land Management
Tulsa Field Office
7906 E 33 St, Ste 101
Tulsa, OK 74145



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DJM 7/8/2016

N W E S

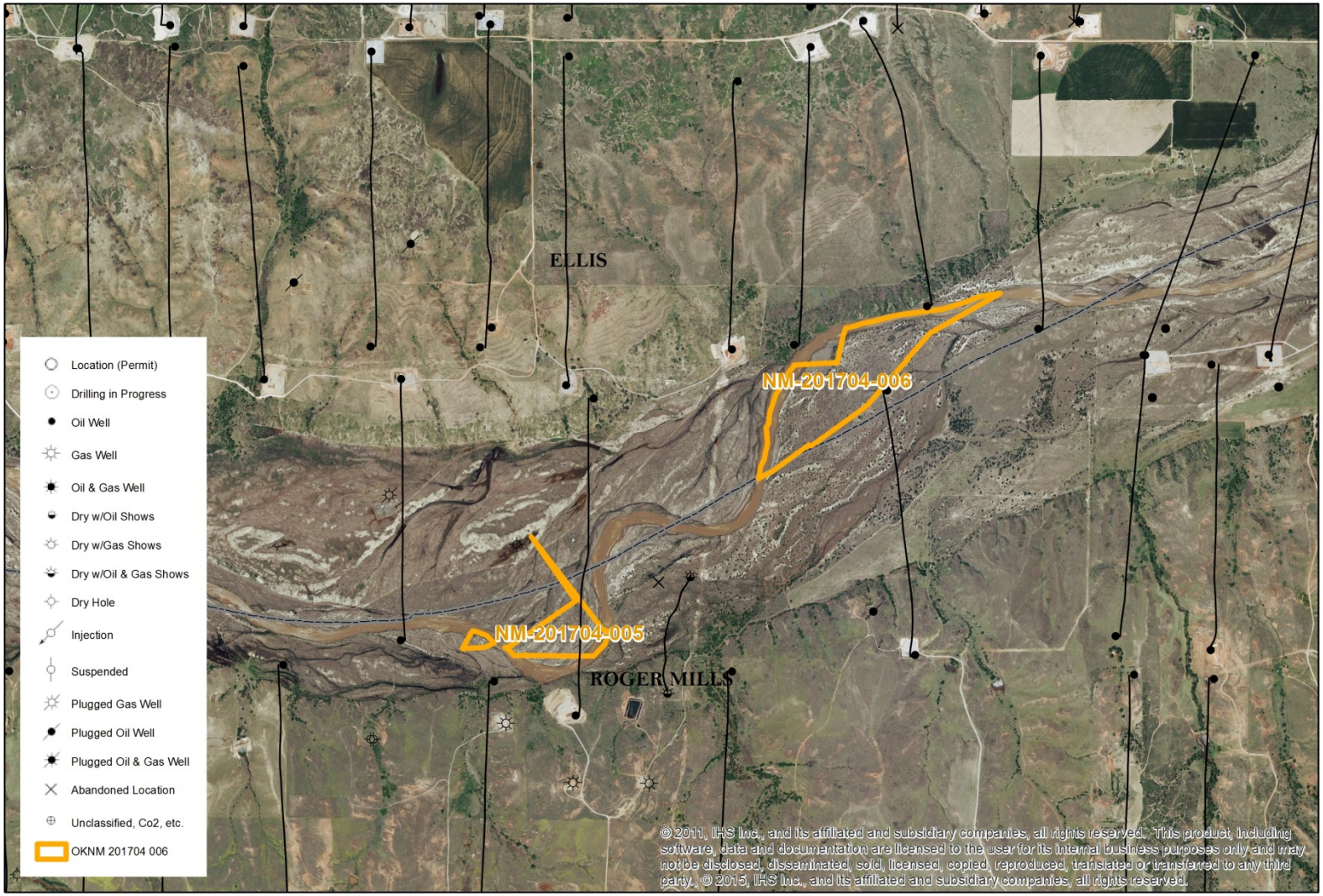
Nominated Lease Sale Parcels
OKNM 201704 004
Roger Mills & Ellis Counties, OK

1:6,000

0 250 500 1,000 Feet

NAD 83
USA
Albers Contiguous
Equal Area Conic

Bureau of Land Management
Tulsa Field Office
7906 E 33 St, Ste 101
Tulsa, OK 74145



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PCS 2/28/2016

N E S W

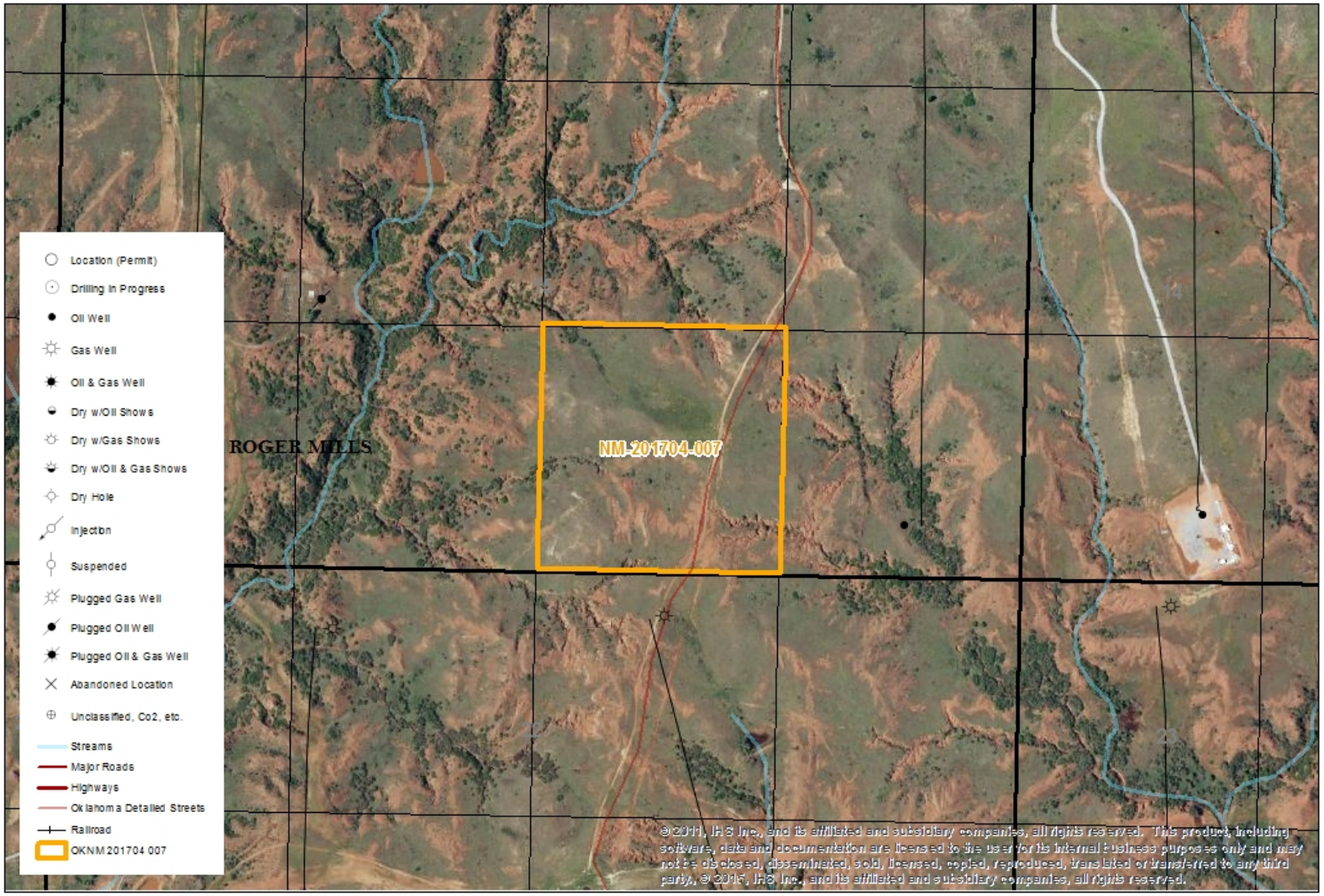
Nominated Lease Sale Parcels
OKNM 201704 005 & 006
Roger Mills & Ellis Counties, OK

1:24,000

0 750 1,500 3,000 Feet

NAD 83
USA
Albers Contiguous
Equal Area Conic

Bureau of Land Management
Tulsa Field Office
7906 E 33 St, Ste 101
Tulsa, OK 74145



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DJM 7/11/2016

N W E S

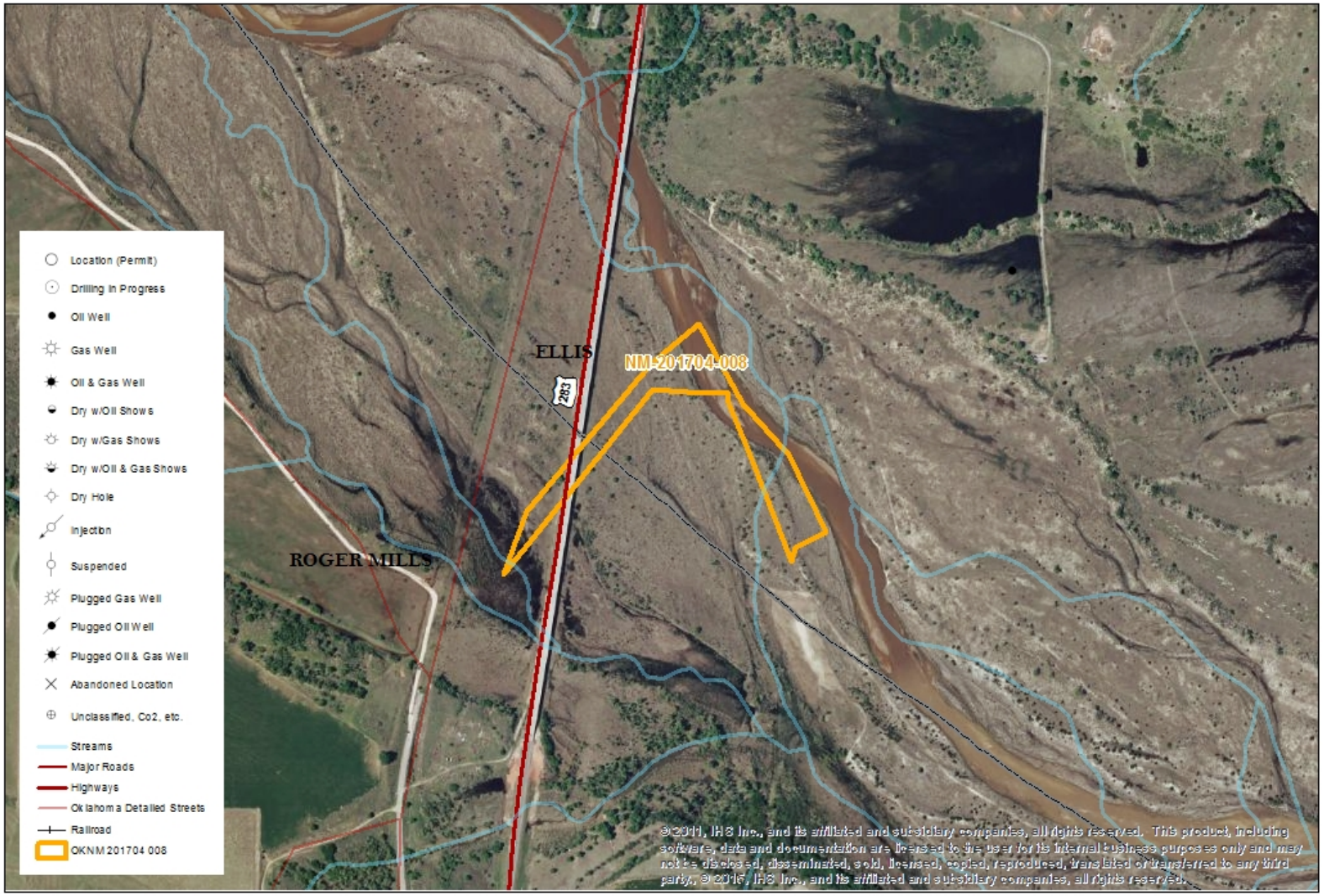
Nominated Lease Sale Parcels
OKNM 201704 007
Roger Mills County, OK

1:8,000

0 250 500 1,000 Feet

NAD 83
USA
Albers Contiguous
Equal Area Conic

Bureau of Land Management
Tulsa Field Office
7906 E 33 St, Ste 101
Tulsa, OK 74145



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DJM 7/11/2016

N W E S

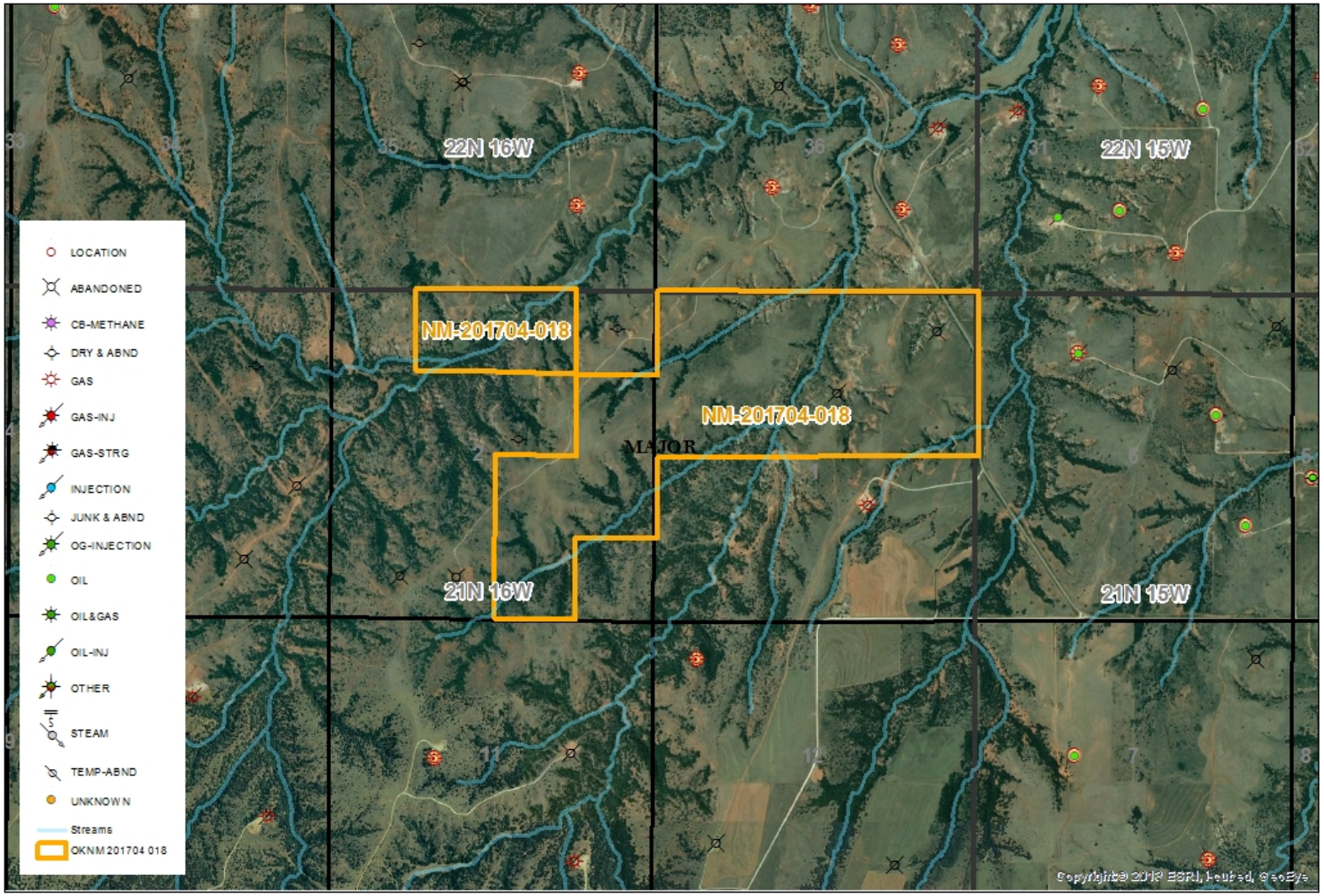
Nominated Lease Sale Parcels
OKNM 201704 008
Roger Mills & Ellis Counties, OK

1:8,000

0 250 500 1,000 Feet

NAD 83
USA
Albers Contiguous
Equal Area Conic

Bureau of Land Management
Tulsa Field Office
7906 E 33 St, Ste 101
Tulsa, OK 74145



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DJM 7/26/2016

N W E S

Nominated Lease Sale Parcels
OKNM 201704 018
Major County, OK

1:24,000

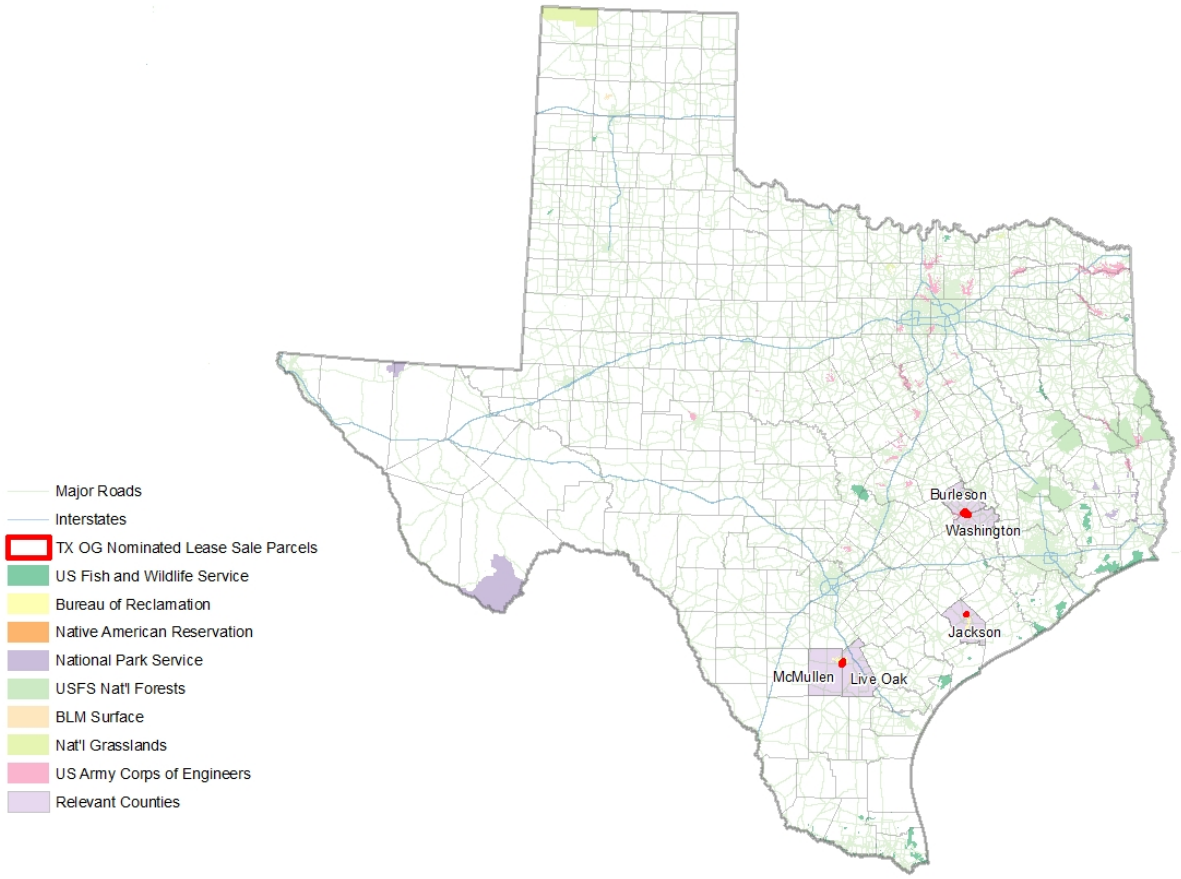
0 1,500 3,000 6,000 Feet

NAD 83
USA
Albers Contiguous
Equal Area Conic

Bureau of Land Management
Tulsa Field Office
7906 E 33 St, Ste 101
Tulsa, OK 74145

BLM New Mexico Competitive Oil and Gas Lease Sale

April 2017 Texas Nominated Lease Sale Parcels



Nominated Lease Sale Parcels	
Parcel Number	**County**
9	Live Oak
10	Live Oak, McMullen
11, 12,13,16	Washington
14, 15	Burleson
17	Jackson

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data, or for purposes not intended by BLM. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

N W E S

1:5,696,000

0 125 250 500 Miles

BLM Oklahoma Field Office GIS 7/26/2016

NATIONAL SYSTEM OF PUBLIC LANDS

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data, or for purposes not intended by BLM. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

DJM 7/28/2017

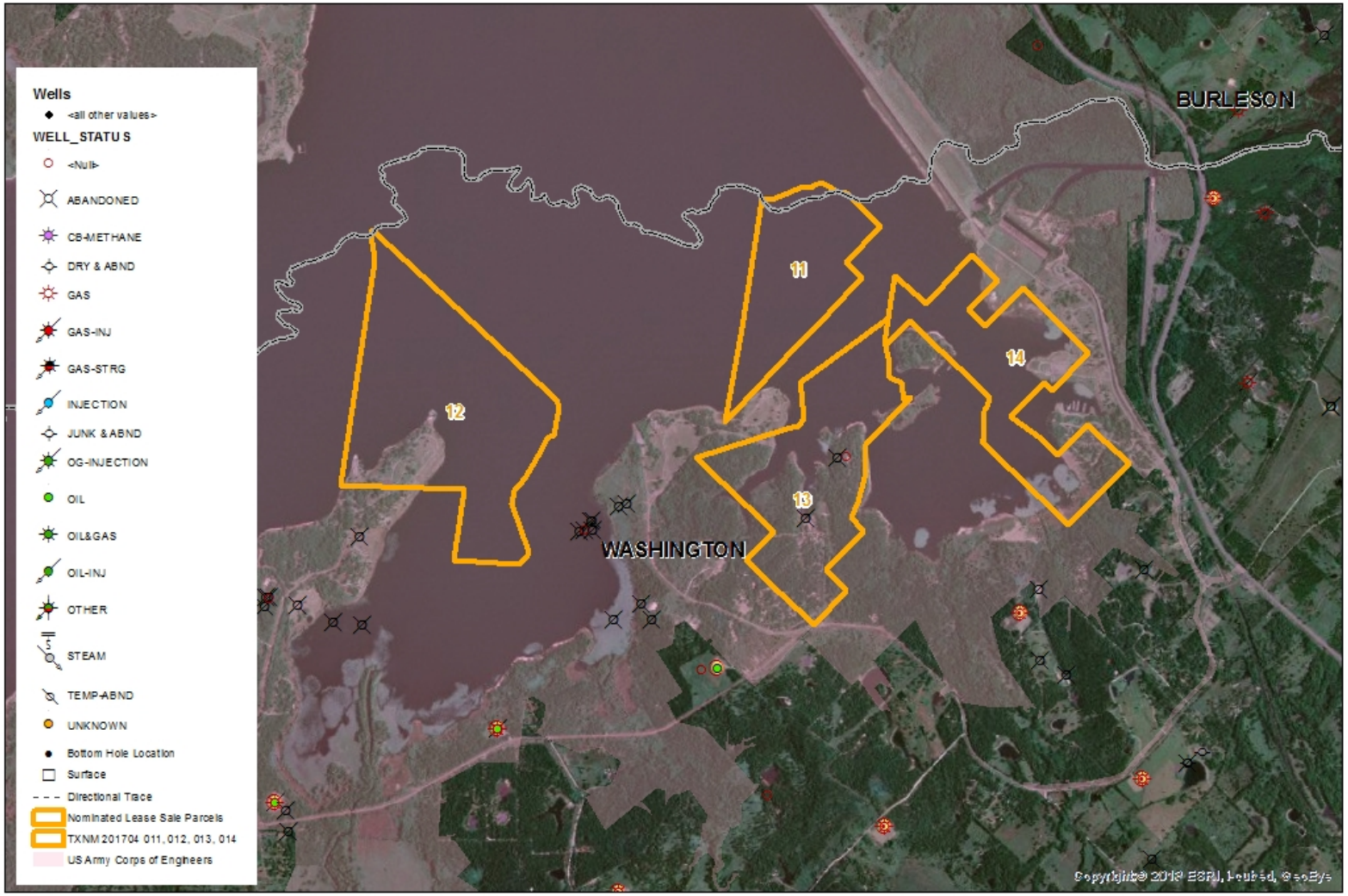
Nominated Lease Sale Parcel
TXNM 201704 009 & 010
Live Oak & McMullen Counties, TX

1:44,000

0 2,500 5,000 10,000 Feet

NAD 1983
USA Contiguous
Albers Equal Area Conic

Bureau of Land Management
Oklahoma Field Office
7906 East 33rd Street, Suite 101
Tulsa, OK 74145



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data, or for purposes not intended by BLM. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

DJM 7/29/2016

Nominated Lease Sale Parcel
TXNM 201704 011, 012, 013 & 014
Washington County, TX

1:32,000

0 2,500 5,000 10,000 Feet

NAD 1983
USA Contiguous
Albers Equal Area Conic

Bureau of Land Management
Oklahoma Field Office
7906 East 33rd Street, Suite 101
Tulsa, OK 74145

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data, or for purposes not intended by BLM. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

DJM 7/29/2016

N W E S

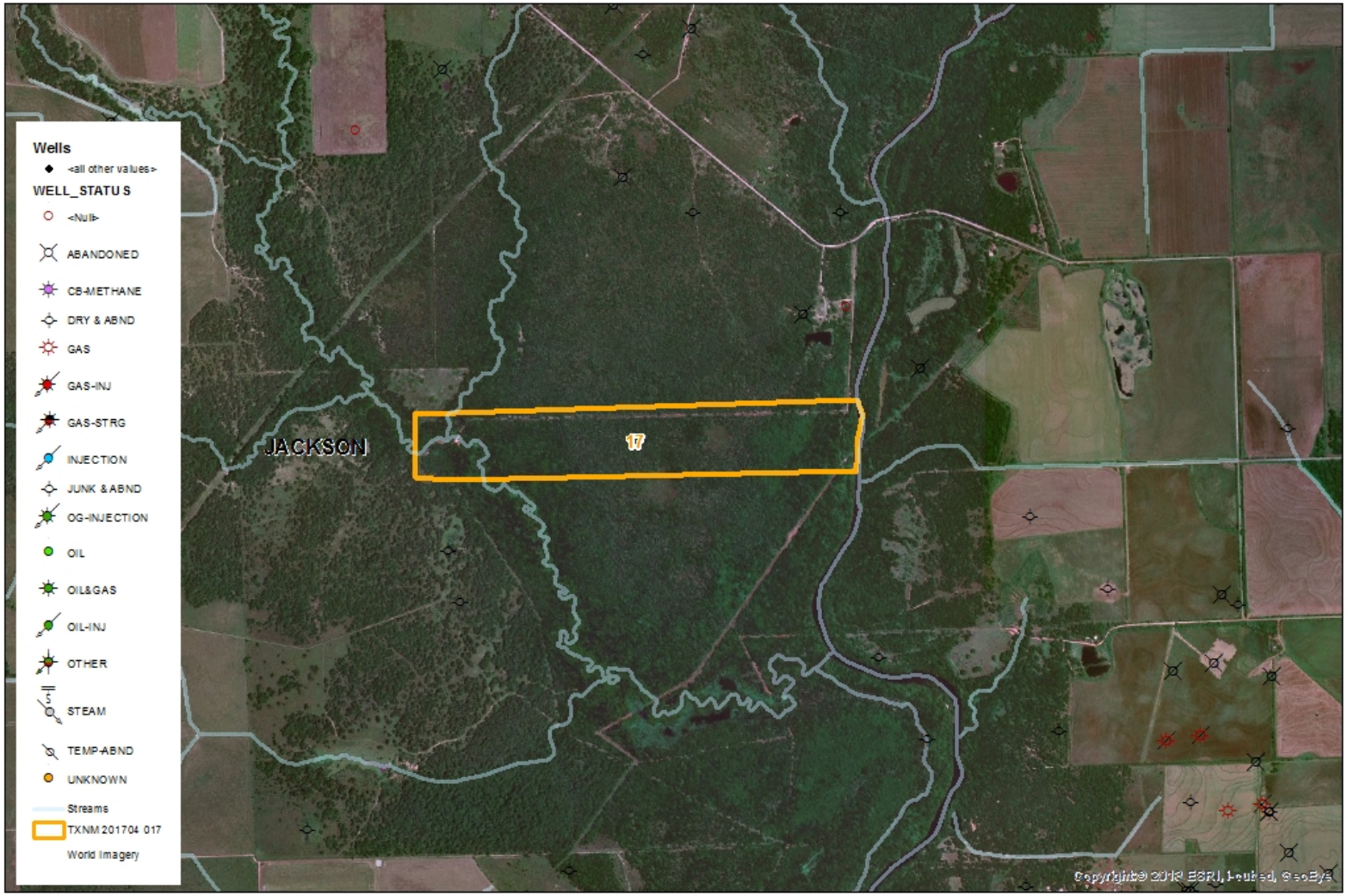
Nominated Lease Sale Parcel
TXNM 201704 015 & 016
Burleson County, TX

1:26,000

0 1,000 2,000 4,000 Feet

NAD 1983
USA Contiguous
Albers Equal Area Conic

Bureau of Land Management
Oklahoma Field Office
7906 East 33rd Street, Suite 101
Tulsa, OK 74145



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data, or for purposes not intended by BLM. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

DJM 7/28/2016

N W E S

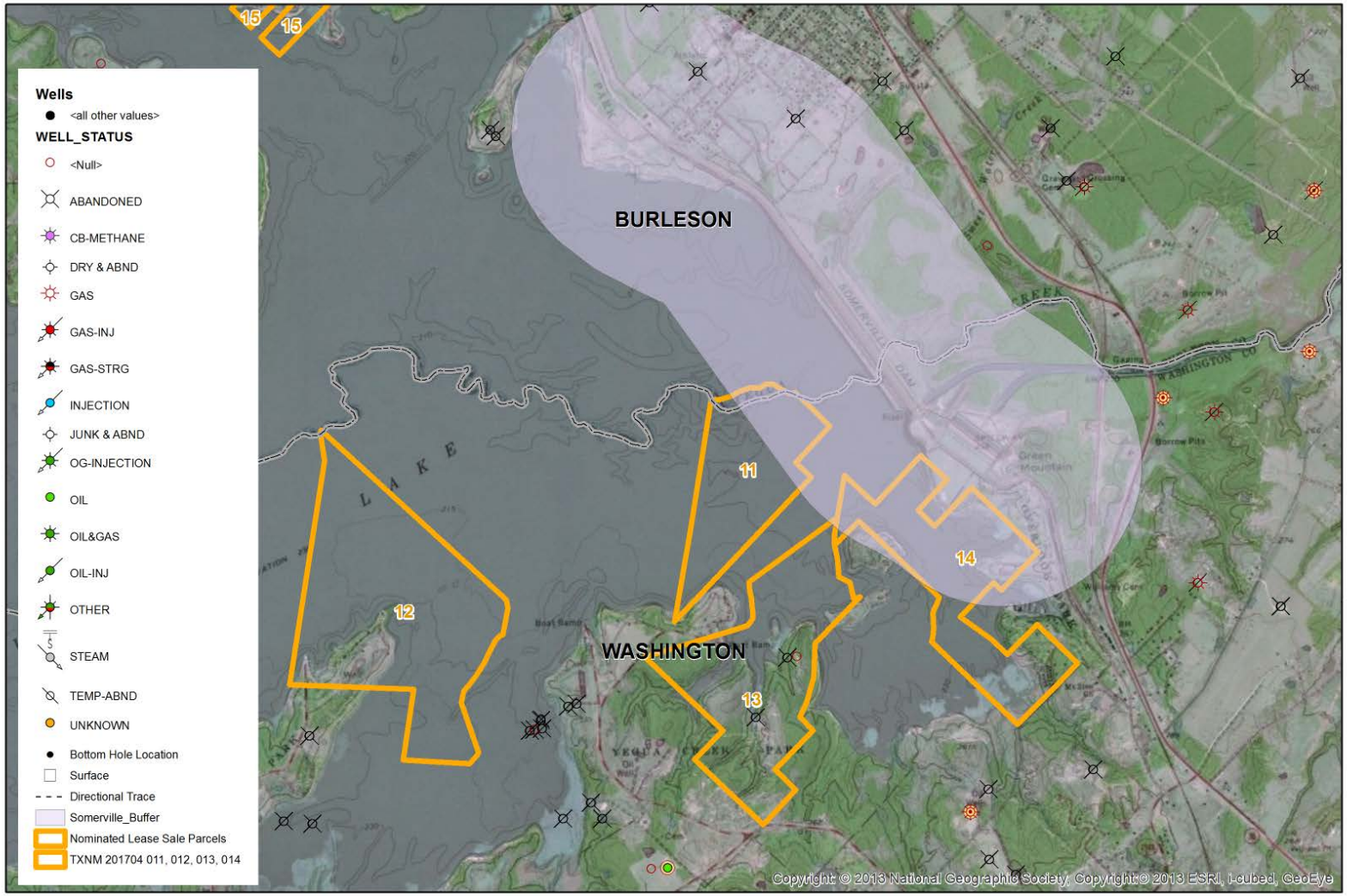
Nominated Lease Sale Parcel
TXNM 201704 017
Jackson County, TX

1:24,000

0 1,000 2,000 4,000 Feet

NAD 1983
USA Contiguous
Albers Equal Area Conic

Bureau of Land Management
Oklahoma Field Office
7906 East 33rd Street, Suite 101
Tulsa, OK 74145



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data, or for purposes not intended by BLM. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

DJM 7/29/2016

Nominated Lease Sale Parcel
TXNM 201704 011, 012, 013 & 014
Washington County, TX

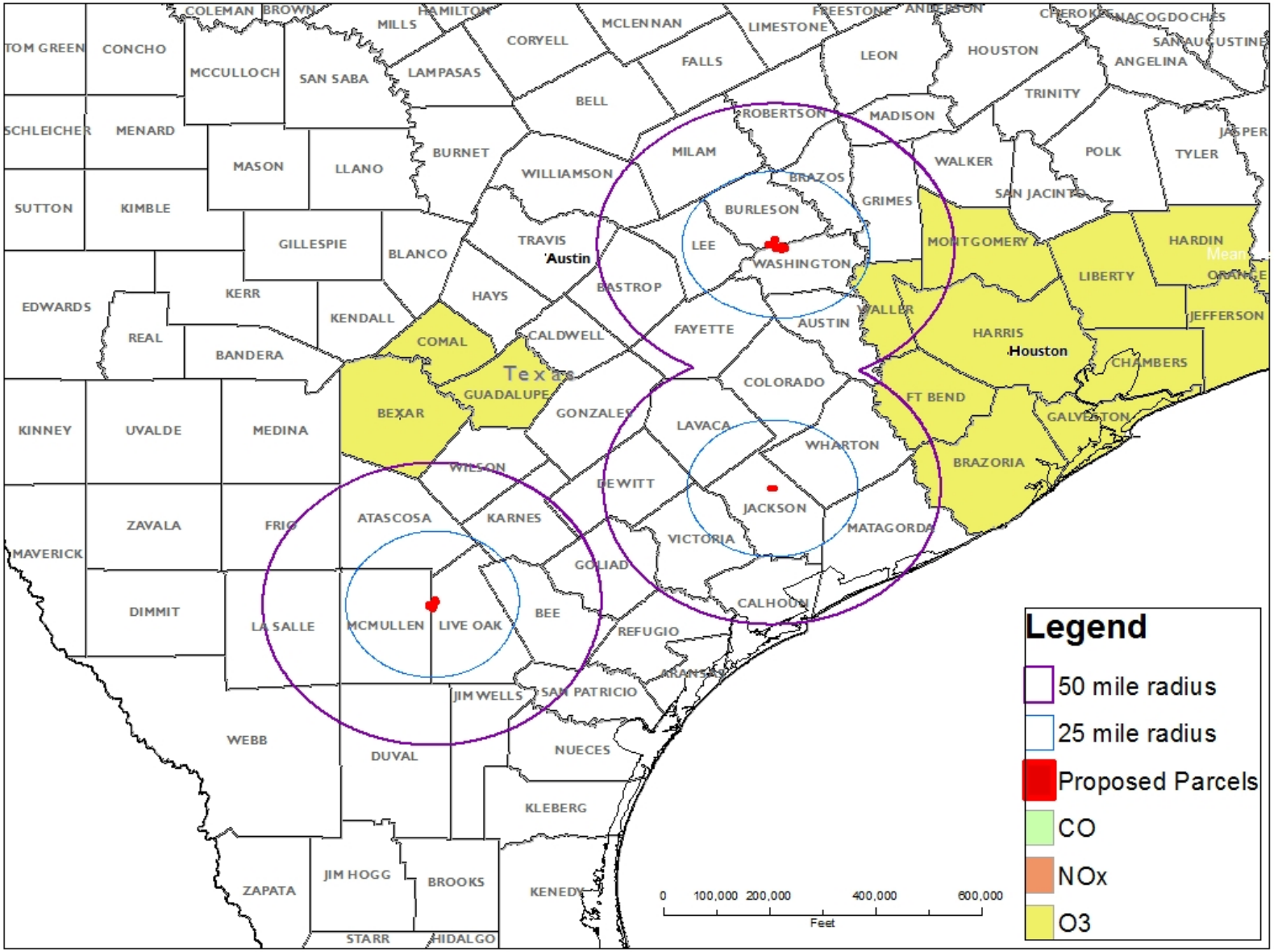
1:32,000

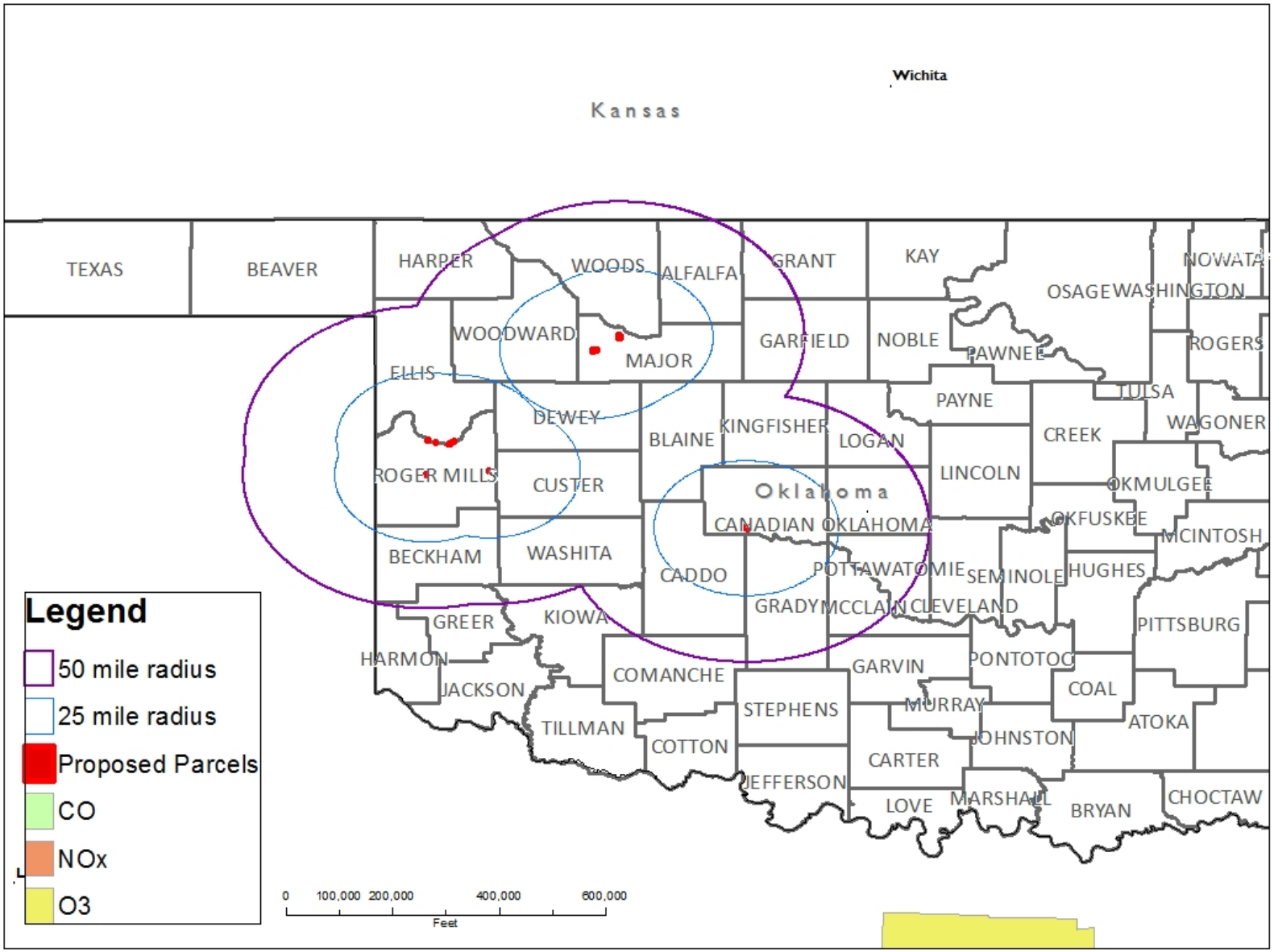
0 1,250 2,500 5,000 Feet

NAD 1983
USA Contiguous
Albers Equal Area Conic

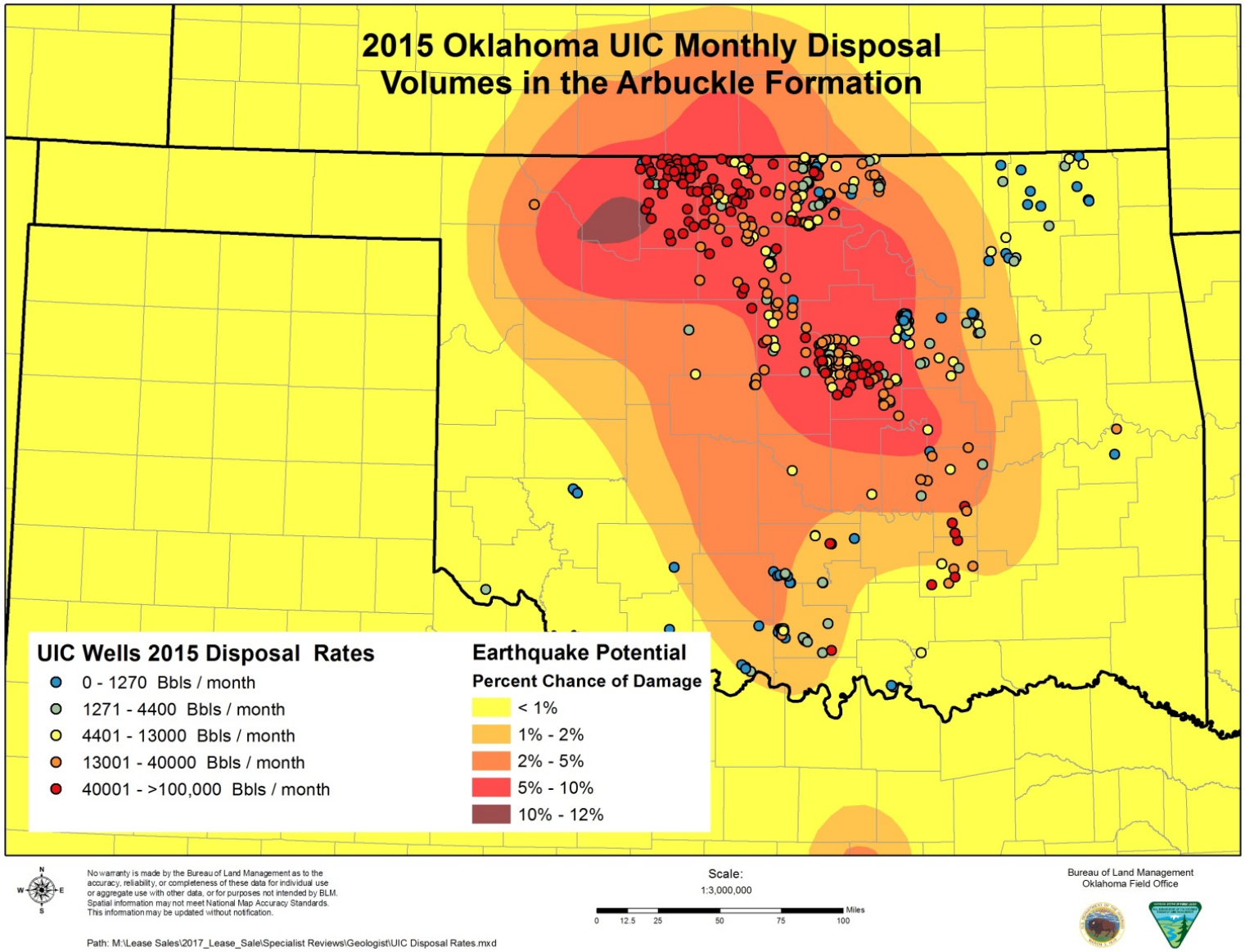
Bureau of Land Management
Oklahoma Field Office
7906 East 33rd Street, Suite 101
Tulsa, OK 74145

APPENDIX 4. AIR QUALITY ANALYSIS AND NON-ATTAINMENT AREAS.




Wichita
Kansas
TEXAS
BEAVER
HARPER
WOODS
ALFALFA
GRANT
KAY
OSAGE
WASHINGTON
NOWATA
WOODWARD
MAJOR
GARFIELD
NOBLE
PAWNEE
ROGERS
ELLIS
PAYNE
TULSA
DEWEY
BLAINE
KINGFISHER
LOGAN
CREEK
WAGONER
ROGER MILLS
CUSTER
LINCOLN
OKMULGEE
Oklahoma
CANADIAN
OKLAHOMA
OKFUSKEE
MCINTOSH
BECKHAM
WASHITA
CADDO
POTTAWATOMIE
SEMINOLE
HUGHES
GRADY
MCCLAIN
CLEVELAND
GREER
KIOWA
PITTSBURG
HARMON
COMANCHE
GARVIN
PONTOTOC
JACKSON
STEPHENS
MURRAY
COAL
TILLMAN
COTTON
JOHNSTON
ATOKA
CARTER
JEFFERSON
LOVE
MARSHALL
BRYAN
CHOCTAW
Legend
50 mile radius
25 mile radius
Proposed Parcels
CO
NOx
O3
0 100,000 200,000 400,000 600,000
Feet

APPENDIX 5. OKLAHOMA STATE-PERMITTED UNDERGROUND INJECTION CONTROL WELLS & SEISMICITY/EARTHQUAKE POTENTIAL.



APPENDIX 6. CULTURAL RESOURCES EVALUATION.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Oklahoma Field Office
7906 E. 33rd Street, Suite 101
Tulsa, Oklahoma 74145
www.blm.gov/nm

TAKE PRIDE IN AMERICA

In Reply Refer To:

April 2017 Lease Sale, Texas
Legal location: Burleson, Jackson, Live Oak, McMullen, and Washington, Counties, Texas
EA# DOI-BLM-NM-040-2016-028-EA
CRR# NM-040-2017-03
Lease# Multiple
Environmental Protection Specialist: Alisha Autio

A Class I cultural resource review was completed for each parcel and over 100 historic properties and ineligible archaeological resources were identified within 1 mile of many of the lease boundaries. Each parcel APE is large enough such that during the APD process the citing of wells can be done to avoid historic properties that may be identified at that time. During the APD process each proposed development will be re-evaluated as to its effects on historic properties under Section 106 of the NHPA.

Consultation notification of the lease sale was sent to the Apache Tribe of Oklahoma, the Comanche Nation, the Kiowa Tribe.

A determination of No Historic Properties Affected has been made by the BLM, and none of the proposed parcels have been recommended for withdrawal from the sale. The Texas State Historic Preservation Office declines to comment on lease sales since TXSHPO believes this action does not have the potential to adversely affect historic properties (In a letter dated February 26, 2013 responding to the July 17, 2013 Lease Sale Cultural Resource Report Number NM-040-2013-43). Therefore Section 106 of the National Historic Preservation Act as amended compliance has been completed.

Signa Larralde 9/23/16

Signa Larralde Date

Page 1 of 1

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Oklahoma Field Office
7906 E. 33rd Street, Suite 101
Tulsa, Oklahoma 74145
www.blm.gov/nm

TAKE PRIDE IN AMERICA

In Reply Refer To:

April 2017 Lease Sale, Oklahoma
Legal location: Canadian, Ellis, Roger Mills, and Major Counties, OK
EA# DOI-BLM-NM-040-2016-028-EA
CRR# NM-040-2017-03
Lease# multiple
Environmental Protection Specialist: Alisha Autio

A Class I level cultural resource review was done on each parcel and no historic properties were identified within one half mile of the proposed lease parcels. During the APD process a second National Historic Preservation Act (NHPA) Section 106 evaluation will be made that will typically include an on-the-ground cultural resources inventory. The Oklahoma Archaeological Survey office has confirmed that studies will need to be done at the APD stage.

Consultation notification of the lease sale was sent to the Apache Tribe, the Cherokee Nation, the Cheyenne and Arapaho Tribes, the Comanche Nation, the Creek Nation, the Kiowa Tribe, the Osage Nation, the Seminole Nation, and the Wichita and Affiliated Tribes. The Oklahoma State Historic Preservation Office responded with concurrence in letters dated September 23, 2016. The Oklahoma Archaeological Survey responded with concurrence in a letter dated September 8, 2016. None of the proposed parcels have been recommended for withdrawal from the sale.

A finding of ***no historic properties affected*** has been made for the April 2017 lease sale. It is recommended the lease sale proceed as planned.

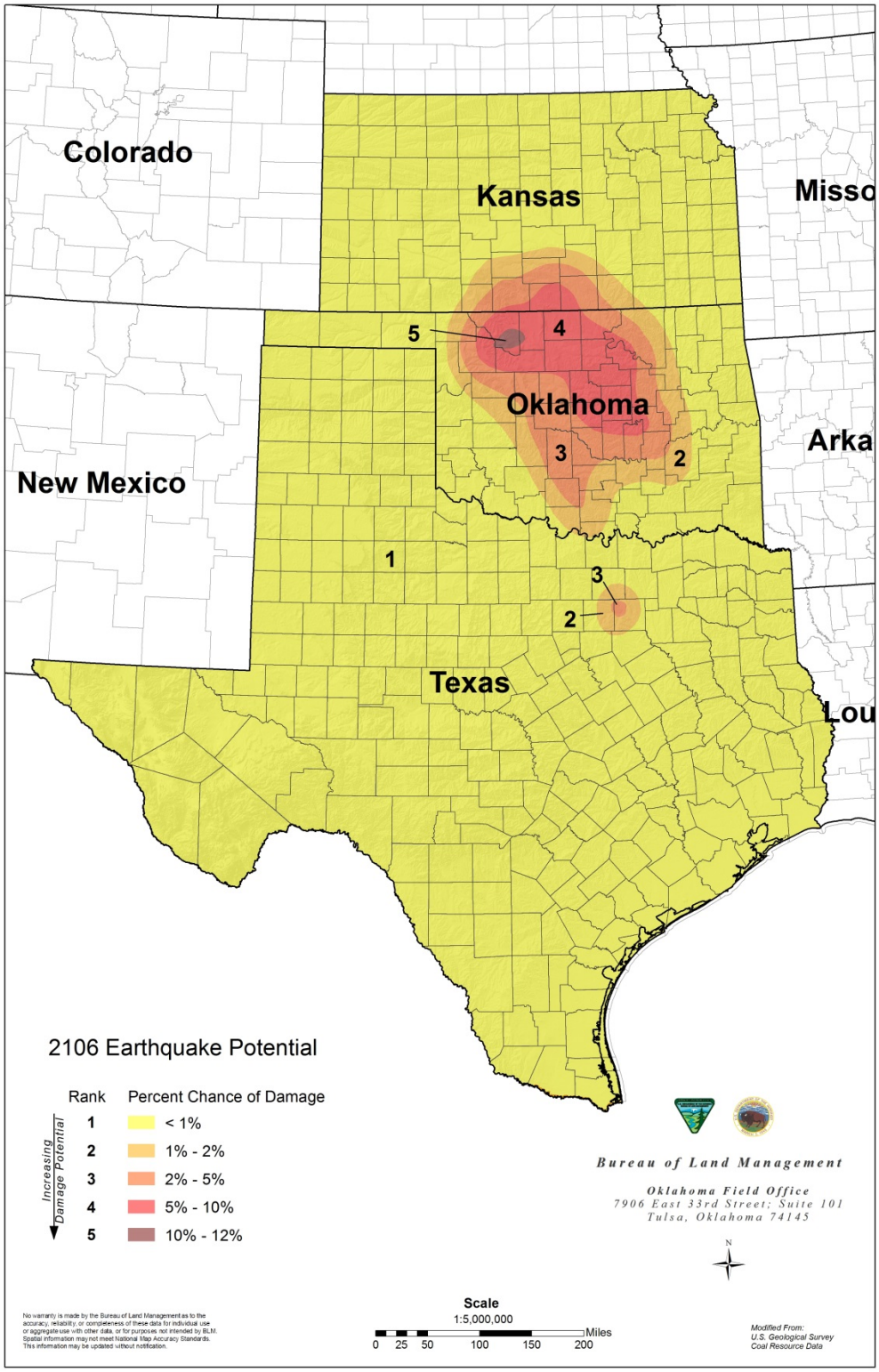
Signa Larralde

Signa Larralde

9/23/16

Date

APPENDIX 7. UIC DISPOSAL WELLS & SEISMICITY/EARTHQUAKE POTENTIAL



APPENDIX 8. BIOLOGICAL EVALUATION.

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
OKLAHOMA FIELD OFFICE
7906 E. 33rd St., Suite 101
TULSA, OK 74145-1352
http://www.blm.gov

RE: Biological Evaluation for the April, 2017 Federal Oil & Gas Lease Sale Oklahoma Counties:
NM-201704-001 - Canadian County, Oklahoma
NM-201704-002 - Major, Oklahoma
NM 201704-003 - Roger Mills County, Oklahoma
NM 201704-004 - Roger Mills County, Oklahoma
NM-201704-005 - Roger Mills/Ellis County, Oklahoma
NM-201704-006 - Roger Mills County, Oklahoma
NM-201704-007 - Roger Mills County, Oklahoma
NM-201704-008 - Roger Mills County, Oklahoma
NM-201704-018- Major, Oklahoma
(DOI-BLM-NM-040-2016-000)

The Bureau of Land Management's (BLM) environmental assessment (EA) for this project contains all pertinent information regarding the specific characteristics of the proposed leasing of federal oil & gas minerals. The purpose of this report is to document BLM's "No Effect" for threatened & endangered species based on the administrative action on making the proposed parcels available for leasing.

Wetland and Riparian Habitat
Wetland habitats provide important wintering and migrational habitat for Central Flyway Birds. Wetlands also provide a link between land and water and are some of the most productive ecosystems in the world. Executive Order 11990 on the Protection of Wetlands provides opportunity for early review of Federal agency plans regarding new construction in wetland areas. It also urges all Federal agencies to avoid supporting, assisting, or financing new construction in wetlands unless there is "no practicable alternative

Canadian County, Oklahoma – NM-201704-001
Sec. 19 & 30-T11N-R08W
This tract is located in the South Canadian River bottom from approximately one mile east of the Caddo County line south east to the Union City limits.

Major, Oklahoma – NM-201704-002
Sec. 07-T22N-R14W
This tract is situated on the west or northwest slopes of small mesas and/or rolling hill slopes of mesas. The tract consists of badland type topography and associated sage, yucca mesquite and grass.

Roger Mills County, Oklahoma – NM 201704-003
Sec. 10-T14N-R21W

This tract consists of rolling hill grassland.

Roger Mills County, Oklahoma – NM 201704-004
Sec. 19-T16N-R23W
This tract is located in the South Canadian River bottom from the Texas state line to the Dewey County line.

Roger Mills/Ellis County, Oklahoma – NM-201704-005
Sec. 22, 24, 26-T16N-R23W
These tracts are located in the South Canadian River bottom from the Texas state line to the Dewey County line.

Roger Mills County, Oklahoma – NM-201704-006
Sec. 24-T16N-R23W
This tract is located in the South Canadian River bottom from the Texas state line to the Dewey County line.

Roger Mills County, Oklahoma – NM-201704-007
Sec. 15-T14N-R24W
This tract consists of rolling hill grassland.

Roger Mills County, Oklahoma – NM-201704-008
Sec. 14-T16N-R24W
This tract is located in the South Canadian River bottom from the Texas state line to the Dewey County line.

Major, Oklahoma – NM-201704-018
Sec. 01 & 02-T21N-R16W
These tracts consist of rolling hill grassland bisected by Griever Creek and several small intermittent drainages vegetated with junipers. Small wetlands containing cottonwoods and willows are scattered down Griever Creek.

Threatened and Endangered Species
The purpose of the Endangered Species Act (ESA) is to ensure that federal agencies and departments use their authorities to protect and conserve endangered and threatened species.

Section 7 of the ESA requires that federal agencies prevent or modify any projects authorized, funded, or carried out by the agencies that are "likely to jeopardize the continued existence of any endangered species or threatened species, or result in the destruction or adverse modification of critical habitat of such species."

Federally-listed endangered, threatened, proposed, and candidate species located in Canadian County, Oklahoma consist of the black-capped vireo (Vireo atricapilla), interior least tern (Sterna antillarum), red knot (Calidris canutus rufa) piping plover (Charadrius melodus), Arkansas River shiner (Notropis girardi) and the whooping crane (Grus Americana). Canadian County also has critical habitat for the Arkansas River shiner.

Federally-listed endangered, threatened, proposed, and candidate species located in Major County, Oklahoma consist of the interior least tern (Sterna antillarum), red knot (Calidris canutus rufa) piping plover (Charadrius melodus), Arkansas River shiner (Notropis girardi) and the whooping crane (Grus Americana). Major County also has critical habitat for the Arkansas River shiner.

Federally-listed endangered, threatened, proposed, and candidate species located in Roger Mills County, Oklahoma consist of the interior least tern (Sterna antillarum), red knot (Calidris canutus rufa) piping plover (Charadrius melodus), Arkansas River shiner (Notropis girardi), Lesser Prairie Chicken (Tympanuchus pallidicinctus) and the whooping crane (Grus Americana).

Federally-listed endangered, threatened, proposed, and candidate species located in Ellis County, Oklahoma consist of the interior least tern (Sterna antillarum), red knot (Calidris canutus rufa) piping plover (Charadrius melodus), Arkansas River shiner (Notropis girardi), Lesser Prairie Chicken (Tympanuchus pallidicinctus) and the whooping crane (Grus Americana).

Black-capped Verio
Habitat: Black-capped Vireos are typically found in low brushy thickets comprised of deciduous trees such as oaks, redbuds and plums.

Piping Plovers
Habitat: Piping Plovers are found on mudflats, sandy beaches and shallow wetlands with sparse vegetation. They may be found along the margins of lakes and large rivers where there is exposed (bare) sand or mud.

Red Knot
Habitat: Red knots are found in intertidal, marine habitats, especially near coastal inlets, estuaries, and bays. During breeding season it can be found in dryer areas of the tundra or sparsely vegetated hillsides.

Lesser Prairie-Chicken (LPC)
Habitat: The sand shinnery and sand sagebrush native rangelands of northwest Oklahoma are crucial for survival of this species.

Whooping Crane
Habitat: Whooping Cranes pass through Oklahoma each spring and fall during migration. While in our state, they are typically found in shallow wetlands, marshes, the margins of ponds and lakes, sandbars and shorelines of shallow rivers, wet prairies and crop fields near wetlands.

Interior Least Tern
Habitat: Terns live along large rivers and may sometimes be found hunting fish in shallow wetlands and the margins of ponds and lakes. Least Terns require bare sand and gravel for nesting and typically nest in small colonies consisting of two to 20 pairs along large rivers on sand bars and scoured bends. Colonies also occur on salt flats such as the large one at Salt Plains National Wildlife Refuge.

Arkansas River Shiner

Habitat: The Arkansas River shiner inhabits the shallow braided channels of wide sandy prairie rivers in the Arkansas River system. Schools of shiners often gather on the lee side of sandbars and ridges of sand it the river channel. They spawn after heavy summer rains and their eggs drift with the water current and develop as they are carried downstream.

Arkansas River shiner critical habitat is designated in the Canadian River, a tributary of the Arkansas River system.

Special Status Species
Wildlife species may be classified as threatened or endangered at either the state or the federal level. Federally, a species is listed as threatened or endangered under ESA and protection of the species is overseen by the Service. At a state level, Oklahoma has an endangered species statute that gives the state the authority to list a wildlife species as threatened or endangered within the state although it might not be classified as threatened or endangered federally through ESA. The Oklahoma Department of Wildlife Conservation is responsible for overseeing protection of the species.

No State listed species or their critical habitat is present Canadian, Major, Roger Mills and Ellis Counties in Oklahoma

Wildlife
There is a variety of wildlife that occurs or has the potential to occur in the proposed parcels including: turkey, white-tailed deer, squirrels, chipmunks, rabbits, cottontails, gophers, armadillos, coyotes, skunks, fox, bobcat, opossums, raccoon, free-tailed bats, cave myotis, several species of rats and mice, numerous bird species, and several species of lizards, and venomous and non-venomous snakes. Regional information on wildlife and their habitats in Oklahoma is contained on page 7 of the OKRMP/FEIS October 1993.

According to above information all or portions of these leases could contain Federal and/or state listed threatened or endangered species or/and their habitats. Any proposed surface disturbing activity may require an inventory and consultation with the Service and/or the state wildlife agency. The consultation could take up to 180 days to complete. Surface occupancy could be restricted or not allowed as a result of the consultation. Appropriate modifications to the imposed restrictions will be made for the maintenance and operations of producing oil and gas wells.

Migratory Birds
Executive Order (EO) 13186, 66 Fed. Reg. 3853, (January 17, 2001) identifies the responsibility of federal agencies to protect migratory birds and their habitats, and directs executive departments and agencies to undertake actions that will further implement the Migratory Bird Treaty Act (MBTA). Under the MBTA, incidental, unintentional, and accidental take, killing, or possession of a migratory bird or its parts, nests, eggs or products, manufactured or not, without a permit is unlawful. EO 13186 includes a directive for federal agencies to develop a memorandum of understanding (MOU) with the Service to promote the conservation of migratory bird populations, including their habitats, when their actions have, or are likely to have, a measurable negative effect on migratory bird populations. Whereas the MBTA only protects migratory birds, EO 13186 provides for the protection of both migratory birds and migratory bird habitat.

The NM-201704-001 in Canadian County is located within the Bird Conservation Region 19, Central Mixed-Grass Prairie. Twenty-seven Birds of Conservation Concern are listed for the Central Mixed-Grass Prairie (Bird Conservation Region 19) BCC 2008 list, where this project occurs, the lesser prairie-chicken, little blue heron, Mississippi kite, Bald Eagle, Swainson's hawk, black rail, snowy plover, mountain plover, solitary sandpiper, upland sandpiper, long-billed curlew, hudsonian godwit, marbled godwit, buff-breasted sandpiper, short-billed dowitcher, red-headed woodpecker, scissor-tailed flycatcher, loggerhead shrike, Bell's vireo, Sprague's pipit, Cassin's sparrow, lark bunting, Henslow's sparrow, Harris's sparrow, McCown's longspur, Smith's longspur and the chestnut-collared longspur.

The NM-201704-002 and NM-201704-018 in Major County are located within the Bird Conservation Region 19, Central Mixed-Grass Prairie. Twenty-seven Birds of Conservation Concern are listed for the Central Mixed-Grass Prairie (Bird Conservation Region 19) BCC 2008 list, where this project occurs, the lesser prairie-chicken, little blue heron, Mississippi kite, Bald Eagle, Swainson's hawk, black rail, snowy plover, mountain plover, solitary sandpiper, upland sandpiper, long-billed curlew, hudsonian godwit, marbled godwit, buff-breasted sandpiper, short-billed dowitcher, red-headed woodpecker, scissor-tailed flycatcher, loggerhead shrike, Bell's vireo, Sprague's pipit, Cassin's sparrow, lark bunting, Henslow's sparrow, Harris's sparrow, McCown's longspur, Smith's longspur and the chestnut-collared longspur.

The NM-201704-003 and NM-201704-004 and NM-201704-005 and NM-201704-006 and 201704-007 and NM-201704-008 in Roger Mills County are located within the Bird Conservation Region 19, Central Mixed-Grass Prairie. Twenty-seven Birds of Conservation Concern are listed for the Central Mixed-Grass Prairie (Bird Conservation Region 19) BCC 2008 list, where this project occurs, the lesser prairie-chicken, little blue heron, Mississippi kite, Bald Eagle, Swainson's hawk, black rail, snowy plover, mountain plover, solitary sandpiper, upland sandpiper, long-billed curlew, hudsonian godwit, marbled godwit, buff-breasted sandpiper, short-billed dowitcher, red-headed woodpecker, scissor-tailed flycatcher, loggerhead shrike, Bell's vireo, Sprague's pipit, Cassin's sparrow, lark bunting, Henslow's sparrow, Harris's sparrow, McCown's longspur, Smith's longspur and the chestnut-collared longspur.

The NM-201704-005 Ellis County is located within the Bird Conservation Region 19, Central Mixed-Grass Prairie. Twenty-seven Birds of Conservation Concern are listed for the Central Mixed-Grass Prairie (Bird Conservation Region 19) BCC 2008 list, where this project occurs, the lesser prairie-chicken, little blue heron, Mississippi kite, Bald Eagle, Swainson's hawk, black rail, snowy plover, mountain plover, solitary sandpiper, upland sandpiper, long-billed curlew, hudsonian godwit, marbled godwit, buff-breasted sandpiper, short-billed dowitcher, red-headed woodpecker, scissor-tailed flycatcher, loggerhead shrike, Bell's vireo, Sprague's pipit, Cassin's sparrow, lark bunting, Henslow's sparrow, Harris's sparrow, McCown's longspur, Smith's longspur and the chestnut-collared longspur.

Therefore, per the MOU between BLM and the Service, entitled “To Promote the Conservation of Migratory Birds,” the following temporal and spatial conservation measures must be implemented as part of the Conditions of Approval with a permit to drill:

1) Avoid any take of migratory birds and/or minimize the loss, destruction, or degradation of migratory bird habitat while completing the proposed project or action.

2) If the proposed project or action includes a reasonable likelihood that take of migratory birds will occur, then complete actions that could take migratory birds outside of their nesting season. This includes clearing or cutting of vegetation, grubbing, etc. The primary nesting season for migratory birds varies greatly between species and geographic location, but generally extends from early April to mid-July. However, the maximum time period for the migratory bird nesting season can extend from early February through late August. Strive to complete all disruptive activities outside the peak of migratory bird nesting season to the greatest extent possible.

3) If no migratory birds are found nesting in proposed project or action areas immediately prior to the time when construction and associated activities are to occur, then the project activity may proceed as planned.

Additionally, the proposed lease sale parcels and all subsequent activities resulting from it are subject to all state and federal regulations and proposed lease stipulations designed to reduce environmental risks. Lease stipulations are legally binding restrictions and operating requirements that become part of lease contracts. Following are additional stipulations that are required of the nine individual parcels, if permitted.

The NM-201704-001 in Canadian County, OK. parcel will have stipulation WO-ESA-7: Threatened and Endangered Species protection.

The NM-201704-002 in Major County, OK. parcel will have stipulation WO-ESA-7: Threatened and Endangered Species protection.

The NM-201704-003, NM-201704-007 and in Roger Mills County, OK. parcel will have stipulation WO-ESA-7: Threatened and Endangered Species protection, and ORA-3: Season of Use for the lesser prairie chicken.

The NM-201704-004, NM-201704-005, NM-201704-006 and NM-201704-008 in Roger Mills County, OK. parcel will have stipulation WO-ESA-7: Threatened and Endangered Species protection, ORA-2: Wetland/Riparian Protection and ORA-3: Season of Use for lesser prairie chicken.

The NM-201704-005 in Ellis County, OK. parcel will have stipulation WO-ESA-7: Threatened and Endangered Species protection, ORA-2: Wetland/Riparian Protection and ORA-3: Season of use for lesser prairie chicken.

NM-201704-018 in Major County, OK. parcel will have stipulation WO-ESA-7: Threatened and Endangered Species protection and ORA-2: Wetland/Riparian Protection.

Mitigation Common for All Species

The Wildlife Resource General Conditions of Approval (WRGCOAs) included in the approved APD and use of standard Best Management Practices (BMPs) should provide extra measures of protection to general wildlife populations and habitats in the area. Impacts to the wildlife resource component of the environment can be avoided or minimized by adopting the WRGCOAs and BMPs. Notice to Lessees (NTL) 96-01-TDO (Modification of Oil and Gas Facilities to Minimize Bird and Bat Mortality) address

measures designed to protect migratory birds from accidental deaths associated with power line collisions/electrocutions, open-vent exhaust stacks and open pits and tanks.

Determination

This lease sale, in and of itself, has no impact on threatened or endangered species, wetland or migratory birds to analyze or consult on. Additionally, site-specific analysis and mitigation will occur once the parcels are leased and an Application for Permit to Drill is submitted.

Based on all the information discussed above the biological determination of effect for federally listed species regarding leasing of these parcels is "**NO EFFECT**".

_____ 06/27/2016

Becky Peters, Wildlife Biologist Date

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
OKLAHOMA FIELD OFFICE
7906 E. 33rd St., Suite 101
TULSA, OK 74145-1352
http://www.blm.gov

RE: Biological Evaluation for the April, 2017 Texas Lease Sale
NM-201704-009 - Live Oak County, Texas (BOR)
NM-201704-010 - McMullen/Live Oak Counties, Texas (BOR)
NM-201704-011 - Washington County, Texas (COR)
NM-201704-012 - Washington County, Texas (COR)
NM-201704-013 - Washington County, Texas (COR)
NM-201704-014 - Burleson County, Texas (COR)
NM-201704-015 - Burleson County, Texas (COR)
NM-201704-016 - Washington County, Texas (COR)
NM-201704-017 thru NM-201704-40 – Jackson, San Augustine, Walker Trinity and Houston Counties, Texas (US Forest Service)
(DOI-BLM-NM-040-2016-000)

The Bureau of Land Management's (BLM) environmental assessment (EA) for this project contains all pertinent information regarding the specific characteristics of the proposed leasing of federal oil & gas minerals. The purpose of this report is to document BLM's "No Effect" for threatened & endangered species based on the administrative action on making the proposed parcels available for leasing.

Wetland and Riparian Habitat
Wetland habitats provide important wintering and migration habitat for several species of Migratory Birds. Wetlands also provide a link between land and water and are some of the most productive ecosystems in the world. Executive Order (EO) 11990 on the Protection of Wetlands provides opportunity for early review of Federal agency plans regarding new construction in wetland areas. Under EO 11990, each agency shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for conduction federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating and licensing activities.

NM-201704-009 - Live Oak County, Texas
The Nueces River Project is located in Live Oak and McMullen Counties. Choke Canyon Dam is on the Frio River. Low-lying hills force the three rivers (Frio, Nueces and Atascosa Rivers) into a constricted channel. Live oak and post oak trees are found near the rivers, while mesquite, huisache, blackbrush and grasses cover most of the area.

NM-201704-010 - McMullen/Live Oak Counties, Texas

The Nueces River Project is located in Live Oak and McMullen Counties. Choke Canyon Dam is on the Frio River. Low-lying hills force the three rivers (Frio, Nueces and Atascosa Rivers) into a constricted channel. Live oak and post oak trees are found near the rivers, while mesquite, huisache, blackbrush and grasses cover most of the area.

NM-201704-011 - Washington County, Texas
Somerville Lake is located 20 river miles on the Yequa Creek, it includes parts of Burleson, Lee and Washington Counties. Somerville Lake has a normal surface area of 11,460 acres and 85 miles of shoreline with a flood pool covering approximately 24,400 acres.

NM-201704-012 - Washington County, Texas
Somerville Lake is located 20 river miles on the Yequa Creek, it includes parts of Burleson, Lee and Washington Counties. Somerville Lake has a normal surface area of 11,460 acres and 85 miles of shoreline with a flood pool covering approximately 24,400 acres.

NM-201704-013 - Washington County, Texas
Somerville Lake is located 20 river miles on the Yequa Creek, it includes parts of Burleson, Lee and Washington Counties. Somerville Lake has a normal surface area of 11,460 acres and 85 miles of shoreline with a flood pool covering approximately 24,400 acres.

NM-201704-014 - Burleson County, Texas
Somerville Lake is located 20 river miles on the Yequa Creek, it includes parts of Burleson, Lee and Washington Counties. Somerville Lake has a normal surface area of 11,460 acres and 85 miles of shoreline with a flood pool covering approximately 24,400 acres.

NM-201704-015 - Burleson County, Texas
Somerville Lake is located 20 river miles on the Yequa Creek, it includes parts of Burleson, Lee and Washington Counties. Somerville Lake has a normal surface area of 11,460 acres and 85 miles of shoreline with a flood pool covering approximately 24,400 acres.

NM-201704-016 - Washington County, Texas
Somerville Lake is located 20 river miles on the Yequa Creek, it includes parts of Burleson, Lee and Washington Counties. Somerville Lake has a normal surface area of 11,460 acres and 85 miles of shoreline with a flood pool covering approximately 24,400 acres.

NM-201704-017 - Jackson County, Texas
Palmetto Bend Dam is situated in the Navidad River Valley 4 miles upstream from the confluence of the Lavaca and Navidad Rivers. The reservoir, Lake Texana, includes an eighteen mile reach of the Navidad River Valley and lower portions of the Mustang creek and Sandy Creek Valleys.

NM-201704-018 - San Augustine County, Texas
Sabine National Forest. (Refer to Forest Service EIS)

NM-201704-019 - Walker County, Texas
Sam Houston National Forest. (Refer to Forest Service EIS)

NM-201704-020 thru NM-201704-40 - Trinity and Houston Counties, Texas
Davy Crockett National Forest. (Refer to Forest Service EIS)

Mandated by EO 11990 Protection of Wetlands of May 24, 1077. All or portions of the lands under this lease contain wetland and/or riparian areas. Surface occupancy of these areas will not be allowed without the specific approval, in writing, of the Bureau of Land Management. Impacts or disturbance to wetlands and riparian habitats which occur on this lease, must be avoided or mitigated. The mitigation shall be developed during the application for permit to drill.

Threatened and Endangered Species
The purpose of the Endangered Species Act (ESA) is to ensure that federal agencies and departments use their authorities to protect and conserve endangered and threatened species.

Section 7 of the ESA requires that federal agencies prevent or modify any projects authorized, funded, or carried out by the agencies that are "likely to jeopardize the continued existence of any endangered species or threatened species, or result in the destruction or adverse modification of critical habitat of such species."

Federally-listed endangered, threatened, proposed, and candidate species located in Live Oak County, Texas consist of the golden orb (*Quadrula aurea*), interior least tern (*Sterna antillarum*), red knot (*Calidris canutus rufa*) piping plover (*Charadrius melodus*), Gulf Coast jagurundi (*Herpailurus yagouaroundi cacomitli*) and the whooping crane (*Grus Americana*).

Federally-listed endangered, threatened, proposed, and candidate species located in McMullen County, Texas consist of the golden orb (*Quadrula aurea*), interior least tern (*Sterna antillarum*), red knot (*Calidris canutus rufa*) piping plover (*Charadrius melodus*), ocelot (*Leopardus* pardalis), Gulf Coast jagurundi (*Herpailurus yagouaroundi cacomitli*) and the Black Lace cactus (*Echinocereus reichenbachii var. albertii*).

Federally-listed endangered, threatened, proposed, and candidate species located in Washington County, Texas consist of the smooth pimpleback (*Quadrula houstonensis*), Texas fawnsfoot (*Truncilla* macrodon), interior least tern (*Sterna antillarum*), red knot (*Calidris canutus rufa*) piping plover (*Charadrius melodus*), Navasota ladies-tresses (*Spiranthes parksii*) and the whooping crane (*Grus Americana*).

Federally-listed endangered, threatened, proposed, and candidate species located in Burleson County, Texas consist of the Houston toad (*Bufo houstonensis*), smooth pimpleback (*Quadrula houstonensis*), Texas fawnsfoot (*Truncilla* macrodon), interior least tern (*Sterna antillarum*), red knot (*Calidris canutus rufa*), piping plover (*Charadrius melodus*), Navasota ladies-tresses (*Spiranthes parksii*) and the whooping crane (*Grus Americana*).

Federally-listed endangered, threatened, proposed, and candidate species located in Jackson County, Texas consist of the interior least tern (*Sterna antillarum*), red knot (*Calidris canutus*

Bachman's sparrow
Habitat: Old field, Savanna, Woodland - Conifer, Woodland - Hardwood

Smooth pimple back

Habitat: Small to moderate streams and rivers as well as moderate size reservoirs; mixed mud, sand, and fine gravel, tolerates very slow to moderate flow rates, appears not to tolerate dramatic water level fluctuations, scoured bedrock substrates, or shifting sand bottoms, lower Trinity (questionable), Brazos, and Colorado River basins.

Blue sucker
Habitat: Larger portions of major rivers in Texas; usually in channels and flowing pools with a moderate current; bottom type usually of exposed bedrock, perhaps in combination with hard clay, sand, and gravel; adults winter in deep pools and move upstream in spring to spawn on riffles.

Bald Eagle
Habitat: Bald Eagles typically nest in forested areas adjacent to large bodies of water, staying away from heavily developed areas when possible. Bald Eagles are tolerant of human activity when feeding, and may congregate around fish processing plants, dumps, and below dams where fish concentrate. For perching, Bald Eagles prefer tall, mature coniferous or deciduous trees that afford a wide view of the surroundings. In winter, Bald Eagles can also be seen in dry, open uplands if there is access to open water for fishing.

Piping plover
Habitat: Shorebirds live on sandy beaches and lakeshores.

Red-cockaded woodpecker
Habitat: Open pine forests with large, widely-spaced older trees provide essential habitat for the red-cockaded woodpecker.

Swallow-tailed kite
Habitat: Nesting and foraging habitats include various pine forests and savannas, cypress swamps and savannas, cypress-hardwood swamps, hardwood hammocks, mangrove swamps, narrow riparian forests, prairies, and freshwater and brackish marshes.

Rafineque's big eared bat
Habitat: This is a bat of forested regions.

Louisiana pigtoe
Habitat: Freshwater, This species occurs in streams and moderate-size rivers; usually in flowing water and not generally known from impoundments; on substrates of mud, sand, and gravel; to depths of 20 feet but usually less.

Sandbank pocketbook
Habitat: Freshwater, it may occur in small to large rivers with moderate flows on gravel, gravel-sand, and sand bottoms

Southern hickorynut
Habitat: Freshwater, This species is found in medium sized gravel in water with low to moderate current in small to large sized rivers.

Texas heelsplitter
Habitat: Freshwater, This species is found in flowing water but not necessarily in riffles or shoals. It prefers mud or sand in small to medium rivers and may also be found in reservoirs.

Texas pigtoe
Habitat: A freshwater mussel, this species has been collected in rivers with mixed mud, sand, and fine gravel in protected areas

Alligator snapping turtle
Habitat: Habitat consists of slow-moving, deep water of rivers, sloughs, oxbows, and canals or lakes associated with rivers (e.g., large impoundments); also swamps, bayous, and ponds near rivers, and shallow creeks that are tributary to occupied rivers, sometimes including swift upland streams. This turtle sometimes enters brackish waters near river mouths. Usually it occurs in water with a mud bottom and some aquatic vegetation but may use sand-bottomed creeks.

Louisiana pine snake
Habitat: In Texas, these snakes occur in longleaf pine-oak sandhills interspersed with moist bottomlands; sometimes in adjacent blackjack oak woodlands and in sandy areas of short-leaf pine/post oak forest; the snake prefers openly wooded areas over dense forest; it is frequently found in fields, farmland, and tracts of second-growth timber.

Northern scarlet snake
Habitat: Hardwood, mixed, or pine forest/woodland and adjacent open areas with sandy or loamy well-drained soils. Specific habitats include pine flatwoods, dry or dry prairie, salt grass prairie, maritime hardwood hammock, bottomland forest, sandhills, margins of irrigation canals in sawgrass prairies, borders of swamps and plowed fields, abandoned fields, and roadsides.

Timber/canebrake rattlesnake
Habitat: Timber rattlesnakes prefer moist lowland forests and hilly woodlands or thickets near permanent water sources such as rivers, lakes, ponds, streams and swamps where tree stumps, logs and branches provide refuge.

Golden orb
Habitat: Freshwater

Gulf Coast jaguarundi
Habitat: They spend most of their time on the ground, but can be agile climbers when inspired, such as when they are pursued. They hunt small rodents, reptiles, and birds in dense vegetation, especially thornscrub.

Ocelot
Habitat: Dense, thorny, low brush such as spiny hackberry, lotebush, and blackbrush offer the Ocelot the best habitat. The Texas ocelot prefers elevated terrain.

Whooping crane

Habitat: Whooping cranes winter on the Aransas National Wildlife Refuges 22,500 acres of salt flats and marshes. The area's coastal prairie rolls gently here and is dotted with swales and ponds. They summer and nest in poorly drained wetlands in Canada's Northwest Territories at Wood Buffalo National Park.

Black-spotted newt
Habitat: Adults, juveniles, and larvae inhabit permanent and temporary ponds, roadside ditches, and quiet stream pools, habitats that are relatively uncommon in at least the northern part of the range. Terrestrial; Freshwater

Sheep frog
Habitat: In Texas, fairly common in various habitats but seldom seen.

American peregrine falcon
Habitat: They can be found nesting at elevations up to about 12,000 feet, as well as along rivers and coastlines or in cities, where the local Rock Pigeon populations offer a reliable food supply. In migration and winter you can find Peregrine Falcons in nearly any open habitat, but with a greater likelihood along barrier islands, mudflats, coastlines, lake edges, and mountain chains.

Interior least tern
Habitat: Terns live along large rivers and may sometimes be found hunting fish in shallow wetlands and the margins of ponds and lakes. Least Terns require bare sand and gravel for nesting and typically nest in small colonies consisting of two to 20 pairs along large rivers on sand bars and scoured bends.

Peregrine falcon
Habitat: They can be found nesting at elevations up to about 12,000 feet, as well as along rivers and coastlines or in cities, where the local Rock Pigeon populations offer a reliable food supply. In migration and winter you can find Peregrine Falcons in nearly any open habitat, but with a greater likelihood along barrier islands, mudflats, coastlines, lake edges, and mountain chains.

White-faced ibis
Habitat: Marshes, swamps, ponds and rivers.

Reticulate collared lizard
Habitat: This lizard inhabits thorn-scrub vegetation, usually on well-drained rolling terrain of shallow gravel, caliche, or sandy soils.

Habitat: They can be found in arid and semiarid habitats in open areas with sparse plant cover. Because horned lizards dig for hibernation, nesting and insulation purposes, they commonly are found in loose sand or loamy soils.

Texas indigo snake
Habitat: The Texas Indigo snake is found in grassland, coastal sand dunes, lightly vegetated areas near permanent water, Shelters in burrows.

Texas tortoise

Habitat: Open scrub woods, arid brush, lomas, grass-cactus association; often in areas with sandy well-drained soils.

White tailed hawk
Habitat: Open country, primarily savanna, prairie, and arid habitats of mesquite, cacti, and bushes, very rarely in open forest.

Wood stork
Habitat: Forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water.

Red wolf
Habitat: Brushy and forested areas, as well as coastal prairies.

Bobcats
Habitat: Bobcats live in a variety of habitats, but they favor rocky canyons or outcrops when they are available. Otherwise, they choose thickets for protection and den sites. These cats are highly adaptable, and in most places have been able to thrive in spite of increasing habitat loss due to human settlement.

Eastern cottontails
Habitat: Typically eastern cottontails occupy habitats in and around farms including fields, pastures, open woods, thickets associated with fencerows, wooded thickets, forest edges, and suburban areas with adequate food and cover. They are also found in swamps and marshes and usually avoid dense woods. They are seldom found in deep woods.

Striped skunks
Habitat: The skunk is found in wooded or brushy areas and farmlands. They prefer taking shelter in rocky outcrops or under large boulders, but when these are unavailable, skunks choose to den in the abandoned burrows of other animals.

Eastern flying squirrel
Habitat: Inhabit forested areas where suitable trees are present to afford den sites.

Road runner
Habitat: Inhabit desert and shrubby country in the southwestern United States and northern Mexico.

Coati
Habitat: Inhabit wooded areas and in some of the rocky canyons that enter the mountains from the lowlands.

Henslow's Sparrow
Habitat: Wintering individuals (not flocks) found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles; a key component is bare ground for running/walking.

Elf owl

Habitat: In Texas, elf owls are found in the arid Big Bend and Trans-Pecos areas of the lower Chihuahuan desert.

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 et seq., including completion of any required procedure for conference or consultation

Wildlife

Counties in Texas where the proposed lease tracts occur contain diverse wildlife populations as well as habitats. Generally speaking the eastern one-third of Texas receives ample rainfall and supports much of the oak, pine and hickory forests. The bulk of the central portion of Texas is within the cross timbers area where the transition begins from eastern deciduous forests to the more arid portions of western Texas. The faunal diversity follows this same transition from cypress swamps and alligators in the southeast tip of the state to piñon-juniper and mule deer in the furthest western portion of the Texas panhandle. Regional information on wildlife and their habitats in Texas is contained on pages 6-7 of the TXRMP 1996, as amended.

Migratory Birds

Executive Order (EO) 13186, 66 Fed. Reg. 3853, (January 17, 2001) identifies the responsibility of federal agencies to protect migratory birds and their habitats, and directs executive departments and agencies to undertake actions that will further implement the Migratory Bird Treaty Act (MBTA). Under the MBTA, incidental, unintentional, and accidental take, killing, or possession of a migratory bird or its parts, nests, eggs or products, manufactured or not, without a permit is unlawful. EO 13186 includes a directive for federal agencies to develop a memorandum of understanding (MOU) with the Service to promote the conservation of migratory bird populations, including their habitats, when their actions have, or are likely to have, a measurable negative effect on migratory bird populations.

For the purpose of this BE, the term “migratory birds” applies generally to native bird species protected by the Migratory Bird Treaty Act (MBTA). This includes native passerines (flycatchers and songbirds) as well as birds of prey, migratory waterbirds (waterfowl, wading birds, and shorebirds), and other species such as doves, hummingbirds, swifts, and woodpeckers. The term “migratory” is a misnomer and should be interpreted broadly to include native species that remain in the same area throughout the year as well as species that exhibit patterns of latitudinal or elevational migration to avoid winter conditions of cold or a shortage of food. For most migrant and native resident species, nesting habitat is of special importance because it is critical for supporting reproduction in terms of both nesting sites and food. Also, because birds are generally territorial during the nesting season, their ability to access and utilize sufficient food is limited by the quality of the territory occupied. During non-breeding seasons, birds are generally non-territorial and able to feed across a larger area and wider range of habitats.

Among the wide variety of species protected by the MBTA, special concern is usually given to the following groups:

- Species that migrate across long distances, particularly Neotropical migrant passerines that winter in tropical or Southern Hemisphere temperate zones.
- Birds of prey, which require large areas of suitable habitat for finding sufficient prey.
- Species that have narrow habitat tolerances and hence are vulnerable to extirpation from an area as a result of a relatively minor habitat loss.
- Species that nest colonially and hence are vulnerable to extirpation from an area and hence are vulnerable to extirpation from an area as a result of minor habitat loss.

Because of the many species that fall within one or more of these groups, BLM focuses on species identified by the Service as Birds of Conservation Concern (BCC).

The proposed lease sale parcels and all subsequent activities resulting from it are subject to all state and federal regulations and proposed lease stipulations designed to reduce environmental risks. Lease stipulations are legally binding restrictions and operating requirements that become part of lease contracts.

NM-201704-009 - Live Oak County, Texas
BOR-Interim stipulation Nueces River Project, WO-ESA-7-Consultation Stipulation, ORA-2-Wetland/Riparian protection stipulation.

NM-201704-010 - McMullen/Live Oak Counties, Texas
BOR-Interim stipulation Nueces River Project, ORA-2-Wetland/Riparian protection stipulation.

NM-201704-011 - Washington County, Texas
COE-NSO-Summerville Lake, WO-ESA-7-Consultation Stipulation, ORA-2-Wetland/Riparian protection stipulation.

NM-201704-012 - Washington County, Texas
COE-NSO-Summerville Lake, WO-ESA-7-Consultation Stipulation, ORA-2-Wetland/Riparian protection stipulation.

NM-201704-013 - Washington County, Texas
COE-NSO-Summerville Lake, WO-ESA-7-Consultation Stipulation, ORA-2-Wetland/Riparian protection stipulation.

NM-201704-014 - Burleson County, Texas
COE-NSO-Summerville Lake, WO-ESA-7-Consultation Stipulation, ORA-2-Wetland/Riparian protection stipulation.

NM-201704-015 - Burleson County, Texas
COE-NSO-Summerville Lake, WO-ESA-7-Consultation Stipulation, ORA-2-Wetland/Riparian protection stipulation.

NM-201704-016 - Washington County, Texas
COE-NSO-Summerville Lake, WO-ESA-7-Consultation Stipulation, ORA-2-Wetland/Riparian protection stipulation.

NM-201704-017 - Jackson County, Texas
GR-LNRA-General stipulations Palmetto Bend Project, WO-ESA-7-Consultation Stipulation, ORA-2-Wetland/Riparian protection stipulation.

NM-201704-018 thru NM-201704-40 – Jackson, San Augustine, Walker Trinity and Houston Counties, Texas
US Forest Service stipulations will apply this lease sale, in and of itself, has no impact on threatened or endangered species, wetland or migratory birds to analyze or consult on. Additionally, site-specific analysis and mitigation and Conditions of Approval for protection of natural resources will occur once the parcels are leased and an Application for Permit to Drill is submitted.

In conclusion, we have determined that the proposed action will have, "No Effect" on listed species/designated critical habitat.

_____ 07/1/2016
Becky Peters, Wildlife Biologist Date

APPENDIX 9. DRAINAGE REVIEW FOR WELLS NEAR PROPOSED PARCELS.

Listed below are two tables for five wells that were identified as draining three nominated parcels (two in Oklahoma and one in Texas). These wells are depleting oil and gas reserves from the parcels and until they are leased there is no mechanism to recover lost royalties from drainage.

Tract	Acres	Offending Well(s)			Producing Formation	EUR		Present Economics Value / Imcome $
		API	Well Name	Well No.		Gas (Mcf)	Oil (Bbls)	
NM-201704-007	40	35129238000000	Lea Erma	3-15H	Marmaton	N/A	N/A	$33,351.30
		35129237810000	Leas Erma	2-15H	Marmaton	N/A	N/A	$140,611.20
		35129239010000	Farrell 22-14-24	1H	Marmaton	2,254,730	20,672	$34,777.40
NM-201704-008	8.76	3504520670000	Wittkopp	1	Tonkawa	N/A	N/A	$2,035.00
NM-201704-010	635	42311348690000	Lone Star Unit 1	1H	Eagleford	3,047,288	72,480	$428,347.0
Total Income								$639,121.9

Tract	Acres	Offending Well(s)			Drainage Type				
					Physical			Administrative	
		API	Well Name	Well No.	Drainage Radius (ft.)	Drainage Factor (%)	Drained Area (acres)	Spacing (acres)	CA No. / Lease No.
NM-201704-007	40	35129238000000	Lea Erma	3-15H	N/A	N/A	N/A	640	N/A
		35129237810000	Leas Erma	2-15H	N/A	N/A	N/A	640	N/A
		35129239010000	Farrell 22-14-24	1H	237	7.5	3.806	N/A	N/A
NM-201704-008	8.76	3504520670000	Wittkopp	1	N/A	N/A	N/A	640	N/A
NM-201704-010	635	42311348690000	Lone Star Unit 1	1H	282	32	22	N/A	N/A