United States Department of the Interior
Bureau of Indian Affairs - Osage Agency

FINAL ENVIRONMENTAL ASSESSMENT

Proposed Oil and Gas Development on the Osage Minerals Reservation
By Performance Operating Company, LLC, including
Ten (10) New Well Locations in Osage County, Oklahoma:

Well Name	Township	Range	Section
Alee #22-1	T26N	R11E	SE/4 Sec. 22
Alee #22-2	T26N	R11E	SE/4 Sec. 22
JM Hughes (Dove) #28-5	T26N	R12E	SW/4 Sec. 28
Royal #4-3	T25N	R12E	SW/4 Sec. 4
Royal/E. Hughes #5-6	T25N	R12E	SE/4 Sec. 5
David #31-2	T25N	R11E	NW/4 Sec. 31
Cottonmouth #3-5	T24N	R9E	NW/4 Sec. 3
Cottonmouth #3-6	T24N	R9E	NW/4 Sec. 3
Jackson/Williams #10-3	T24N	R11E	NE/4 Sec. 10
Jackson Stoabs #10-2	T24N	R11E	NW/4 Sec.10

March 2015

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Abbreviations and Acronyms

ABB	American Burying Beetle
Applicant	Performance Operating Company
APD	Application for Permit to Drill
BGEPA	Bald and Golden Eagle Protection Act
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	Best Management Practice
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CIAA	Cumulative Impacts Analysis Area
CWA	Clean Water Act
EA	Environmental Assessment
EJ	Environmental Justice
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FPPA	Farmland Protection Policy Act
GHG	Greenhouse Gases
HAP	Hazardous Air Pollutants
IPaC	Information, Planning, and Conservation System
MBTA	Migratory Bird Treaty Act
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act of 1966
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OAS	Oklahoma Archeological Survey
ODWC	Oklahoma Department of Wildlife Conservation
ODEQ	Oklahoma Department of Environmental Quality
ONPD	Osage Nation Police Department
OSHA	Occupational Safety and Health Administration
Performance	Performance Operating Company
PHMSA	Pipeline and Hazardous Materials Safety Administration
RCRA	Resource Conservation and Recovery Act
Reserve	Osage Nation Mineral Reserve
ROW	Right of Way
SARA	Superfund Amendments and Reauthorization Act
THPO	Tribal Historic Preservation Officer
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compound

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1.0 INTRODUCTION

1.1 Background

In the 1880s, the Osage Tribe purchased 1,469,077 acres of land from the Cherokee Indians, and this area – now known as Osage County, Oklahoma- became the new homeland of the Osage Nation. The oil, gas, coal, and other minerals covered by this land were reserved to the Osage Tribe for twenty five years pursuant to the Act of June 28, 1906. The term of the reservation of the mineral estate was extended by subsequent Acts of Congress in 1921, 1929 and 1938. Finally, on October 21, 1978, Congress extended Federal trust supervision over the Osage mineral estate in perpetuity. (BIA, 1979) The 1906 Act directed that royalties received from mineral production were to be distributed to the membership of the Osage Tribe in accordance with the legal roll. The heirs of the original members of the Osage Tribe and others entitled to receive annuity payments derived from the Osage Mineral Reserve are often referred to as "Osage headright holders" or "Osage shareholders".

The Osage Minerals Reserve underlies all of Osage County, Oklahoma. (Figure 1-1) The Osage Nation's tribal headquarters, the county seat, and the Osage Agency of the Bureau of Indian Affairs (BIA) are all located in Pawhuska. Much of Osage County is rural and sparsely populated. The population includes a relatively high percentage (14.12%) of Native Americans (mostly Osage) compared to the state average (8.2%). The typical landscape of Osage County is characterized by gently rolling hills of native grassland and woods, used primarily for cattle grazing and dotted with oil and gas wells and associated structures.

The availability of energy resources underlying Osage County, the national demand for energy, and the improvement of petroleum extraction technologies, have all combined to make the Osage Mineral Reserve a valuable asset for the Osage Tribe, Osage headright holders and the local economy. Oil and gas development began in the County in 1896 when the first oil and gas lease was obtained by Edwin B. Foster of Rhode Island. The first producing oil well was brought in on October 28, 1897, and the first oil from the well was sold in May 1900. The entire County has been repetitively leased for mineral development, parts of it more than four or five times, and there are large numbers of active and inactive wells. Osage County is one of the leading oil and gas producing counties in Oklahoma.

1.2 Purpose, Need, and Decision to be Made

Purpose

Performance Operating Company, LLC (hereinafter referred to as "Performance" or "Applicant") is proposing new oil and gas development within the Osage Mineral Reserve. The proposed development includes selecting exact locations for ten new oil and gas wells, developing ingress/egress access roads, drilling the new wells and building related infrastructure. Table 1-1 lists the locations for the proposed new wells.

Osage County

2015 EA

Figure 1.1

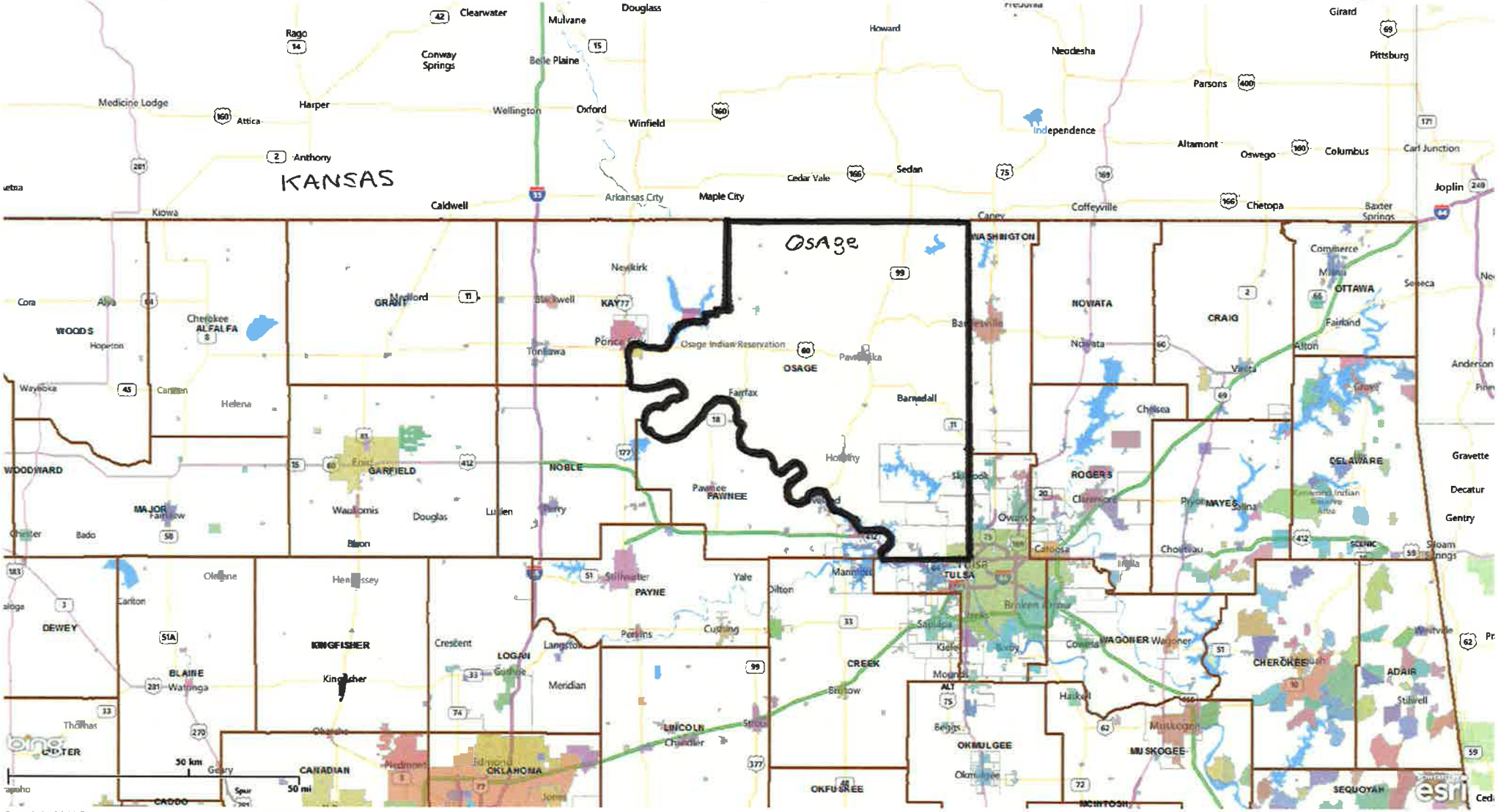

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Table 1-1. Proposed Well Locations

Well Name	Township	Range	Section
Alee #22-1	T26N	R11E	SE/4 Sec. 22
Alee #22-2	T26N	R11E	SE/4 Sec. 22
JM Hughes (Dove) #28-5	T26N	R12E	SW/4 Sec. 28
Royal #4-3	T25N	R12E	SW/4 Sec. 4
Royal/E. Hughes #5-6	T25N	R12E	SE/4 Sec. 5
David #31-2	T25N	R11E	NW/4 Sec. 31
Cottonmouth #3-5	T24N	R9E	NW/4 Sec. 3
Cottonmouth #3-6	T24N	R9E	NW/4 Sec. 3
Jackson/Williams #10-3	T24N	R11E	NE/4 Sec. 10
Jackson Stoabs #10-2	T24N	R11E	NW/4 Sec.10

The BIA Osage Agency is the federal agency with responsibility for managing oil and gas development in the Osage Mineral Reserve. The purpose of this site specific Environmental Assessment (EA) is to determine whether BIA should take federal actions to approve construction and development by Performance of the new wells listed in Table 1-1. All of the proposed wells are located on existing oil and gas leases held by Performance. Figure 1-2 depicts the locations of all 10 wells in relation to one another.

This site-specific Environmental Assessment will address any potential impacts associated with the following potential actions by BIA:

- Approval of Applications for Permits to Drill
- Approval of Requests for Exemptions from location requirements
- If needed, BIA will set the route for ingress/egress roads

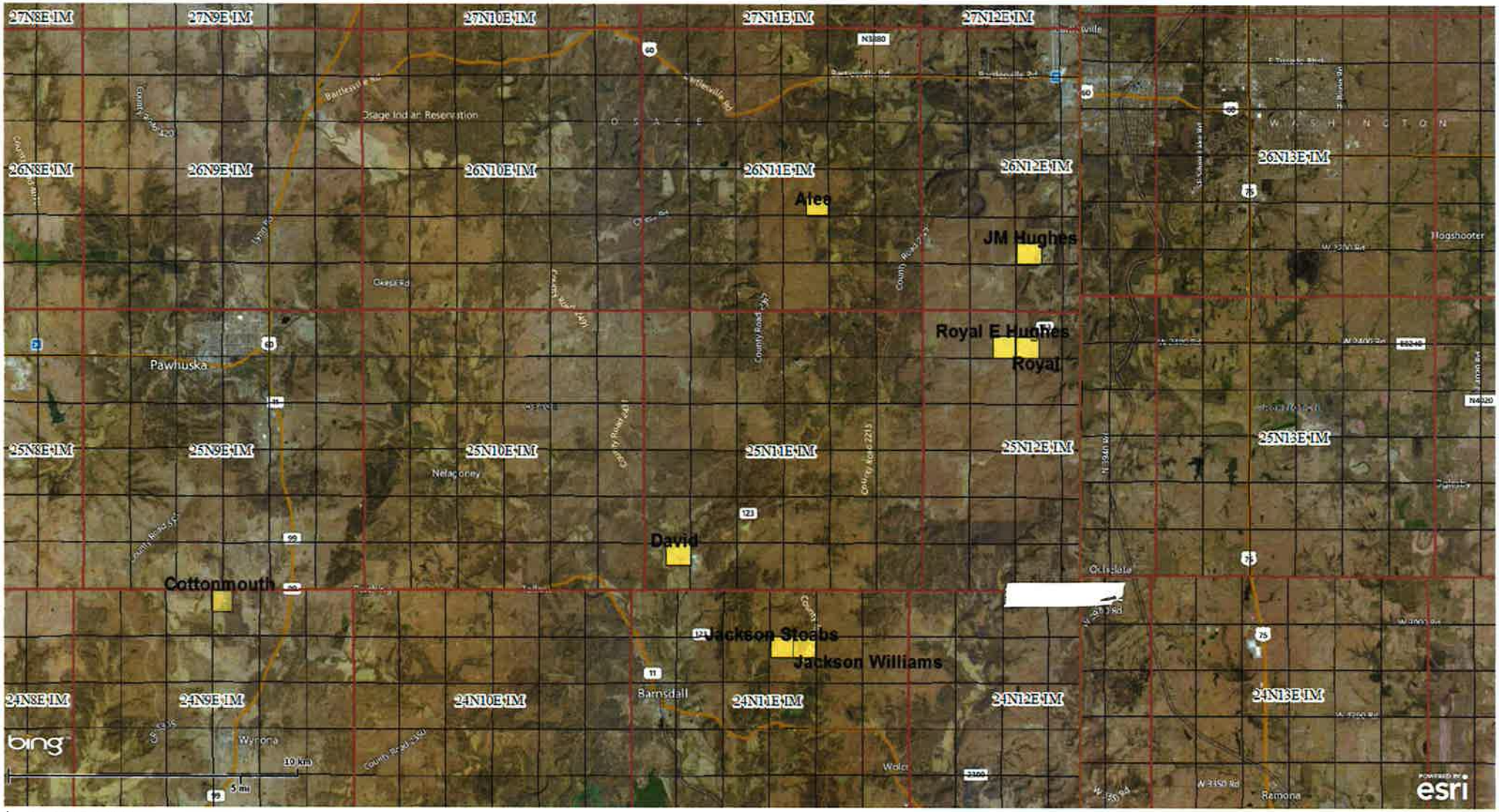
In order to assess indirect and cumulative impacts, this EA will also consider activities associated with the Proposed Action that do not require separate permits or approvals from BIA Osage Agency, although these activities may be subject to federal and/or other requirements: e.g., use of temporary drilling pits; the installation of utility corridors; oil, gas, and water gathering pipelines; electric and other utility lines; and temporary use of freshwater sources.

This EA does not include an analysis of all potential future activities associated with the new wells, such as workovers and plugging actions which require a separate permit. A separate NEPA review will be performed for such future activities as the need arises. The NEPA analysis

Performance Locations

2015 EA

Figure 1.2.



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for these activities, may include preparation of supplements to this EA, utilization of a Programmatic Environmental Assessment for Workovers and Plugging Activities (expected completion date in 2015), and/or preparation of a document that tiers to an Environmental Impact Statement that is being prepared for oil and gas development throughout Osage County (expected completion date in 2016).

The BIA Osage Agency manages surface lands held in trust by the United States for the Osage Nation and restricted allotments owned by individual Tribal members within Osage County, Oklahoma. The proposed action does not affect surface lands held in trust or restricted status, and no tribal rights of way are involved.

Need

The need for the proposed oil and gas development by Performance in the Osage Minerals Reserve, and associated federal actions by BIA, stems broadly from the economic reliance of the Osage Nation and Osage headright holders on income generated from the Osage Mineral Reserve that is held in trust pursuant to the "1906 Act". Responsible and reasonable development of these mineral resources, done in a manner that complies with applicable laws and regulations, is consistent with the BIA's mission to develop, conserve and preserve Tribal trust assets.

The proposed oil and gas development is also consistent with the mineral Leases previously entered into between Performance and the Osage Minerals Council, and approved by the Superintendent. Performance has, over the past years, committed resources and made financial investments in the purchase of those lease agreements and in the development of associated mineral resources. The drilling of new oil and gas wells and increased production was contemplated by these lease agreements.

Decision to be Made

This EA analyzes potential impacts to the human environment for:

1) The No Action Alternative (described fully in Section 3.1), and
2) The Proposed Action (described in Section 3.2)

If this EA finds that the Proposed Action will not result in significant negative consequences, it would result in a Finding of No Significant Impact and the Proposed Action may proceed. Drilling permits would be issued by BIA, with appropriate conditions, for the new wells at the locations described in Table 1-1 of this EA. BIA would also determine whether any exemptions are necessary, and whether they should be granted, with respect to location requirements for the new wells. Access routes for ingress/egress to the wells would be established. Construction of access roads, well pads and any necessary drilling mud pits would begin, the new wells would be drilled and associated infrastructure would be built. If the wells produce, long term operations would likely continue for many years to come. The Applicant would be required to undertake all activities in accordance with the terms and conditions of approved permits, leases, regulations and laws.

If this EA identifies significant adverse impacts as a result of the direct, indirect, or cumulative effects of the Proposed Action, then an environmental impact statement (EIS) must be prepared in order to comply with NEPA. Until such an EIS is prepared, the Applicant would not be allowed to drill new wells at the specified locations on their existing leases.

1.3 Identification of Issues

The BIA did not hold a scoping meeting to identify issues specific to the subject of this EA, but issues have been identified previously in a variety of recent venues. Representatives of the Osage Nation, the Osage Minerals Council, Osage headright holders, Osage Producers, landowners, federal/state agencies and other interested stakeholders identified issues in 2012-2013 during a negotiated rulemaking process concerning revisions of 25 CFR Part 226, which governs oil and gas development of the Osage Minerals Reserve. Other issues were identified by stakeholders during EPA/BIA joint meetings in 2014 concerning an update of a document known as "the Osage Producers Manual". The BIA Osage Agency is also aware of various concerns through its Complaint process and tracking system, discussions at regular meetings of the Osage Minerals Council, the Osage Oil and Gas Summit, and through review of comments on NEPA documents such as the 2014 Programmatic Leasing Environmental Assessment.

Some common questions and issues include the following:

1. What effect will the proposed action have with regard to impacts to livestock and wildlife due to spills, electric lines, flow lines and disturbance of habitat?
2. What effect will the proposed action have regarding potential contamination of watering places for livestock and other surface waters?
3. What effect will the proposed action have on water used as drinking water?
4. What effect will the proposed action have on known and newly discovered artifacts or areas of cultural, paleontological, and archeological significance?
5. What effect will the proposed action have on federally listed endangered or threatened species that have the potential to be located in the proposed project area?
6. What impact will the proposed action have with regard to dust, visual impacts, noise and disturbance associated with traffic on access roads?
7. What effect will the proposed action have on tribal, state and local economies?

2.0 FEDERAL STATUTES, REGULATIONS AND OTHER AUTHORITIES

Since 1906, the responsibility for management of the oil and gas program affecting the Osage Minerals Reserve has been defined by multiple Federal legislative acts, delegations, and regulations. The Secretary of the Interior, or his authorized representative, is ultimately responsible for approval of leases, permits and related federal actions affecting the Osage Mineral Reserve, but the authority for these actions has been delegated to the Superintendent of the Osage Agency headquartered in Pawhuska, Oklahoma.

Federal actions authorizing mineral extraction must comply with the National Environmental Policy Act of 1969 (NEPA). The Federal involvement with the Osage Nation oil and gas leasing program has been deemed a Federal action requiring compliance with the National

Environmental Policy Act (NEPA). Regulations that implement NEPA and are applicable to this EA include 43 CFR Part 46- Implementation of the National Environmental Policy Act (NEPA) of 1969 for the Department of the Interior, and 59 Indian Affairs Manual (IAM 3-H), the BIA NEPA Guidebook. (BIA, 2012)

To demonstrate compliance with NEPA and implementing regulations cited above, either the Applicant (Performance) or the BIA must perform appropriate analyses of environmental impacts and develop proper documentation that the appropriate analyses were performed, prior to approval of permits to drill or other federal actions. This NEPA analysis will assist in the development of any appropriate conditions of approval for avoiding, minimizing and mitigating adverse environmental impacts associated with proposed actions. The NEPA documentation and documents associated with related federal actions should outline appropriate conditions of approval that will be binding upon the Applicant. The Applicant must agree to take appropriate and reasonable actions to avoid, minimize and mitigate unacceptable environmental consequences.

This EA analyzes potential impacts to the environment and socio-economic resources, known collectively as the human environment. The EA describes management goals and objectives, provides an in-depth analysis of the potential impacts of the BIA federal actions on the affected human environment, describes conditions of approval and lists required best management practices (BMPs).

In addition to NEPA, other federal laws may be applicable, such as:

- Section 7 of the Endangered Species Act (ESA)
- Section 106 of the National Historic Preservation Act (NHPA) (16 U.S.C. 470 et seq.)
- Native American Graves Protection and Repatriation Act (25 U.S.C. 3001, et. seq.)
- The federal Clean Air Act (42 U.S.C. §7401 et seq.)
- The Safe Drinking Water Act (42 U.S.C. §300f et seq.)
- The federal Clean Water Act (33 U.S.C. §1251 et seq.)

Regulations include:

- Title 25 of the Code of Federal Regulations (CFR) Part 226- Leasing of Osage Reservations Lands for Oil and Gas Mining.
- Federally approved water quality standards in Chapter 45, Title 785 of the Oklahoma Administrative Code (OAC 785:45). Note: EPA has not approved Oklahoma WQS for waters located in Indian Country, as defined in 18 U.S.C. § 1151.

Executive Orders and policies that may impact BIA activities related to the proposed action, and the analysis in NEPA documents include, but are not limited to:

- Executive Order 12898 (1994) : Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (February 11, 1994); 59 FR 7629
- Executive Order 13175 (2000) - Consultation and Coordination With Indian Tribal Governments
- Bureau of Indian Affairs Government-to-Government Consultation Policy (2000)

Tribal laws affecting the Osage Mineral Reserve include the Constitution of the Osage Nation, adopted in 2006. Article XV of the Osage Constitution establishes an eight member Osage Minerals Council to oversee the Osage Mineral Reserve. The Osage Minerals Council is elected by Osage headright holders, and plays a critical role in oil and gas development, as described in the Constitution. For example, the Council negotiates the value and establishes the term of each minerals lease, which the Constitution specifies must be consistent with federal law and the laws of the Osage Nation. Each lease is also subject to the approval of the Superintendent of the BIA Osage Agency.

3.0 PROPOSED ACTION AND THE NO ACTION ALTERNATIVE

NEPA requires federal agencies such as BIA to "study, develop, and describe appropriate alternatives to the recommended course of action in any proposal that involves unresolved conflicts concerning alternative uses of available resources..." (NEPA Sec 102[2][e]). Developing a range of alternatives allows for exploration of options designed to meet the purpose and need for the action. For this EA, the BIA will study and develop a "No Action Alternative" as well as a "Proposed Action Alternative".

3.1 Alternative A – The No Action Alternative

Under the No Action Alternative, the access roads, well pads, wells, gathering pipelines, and electric and fiber optic lines described in the Proposed Action Alternative would not be constructed, drilled, installed, or operated. The BIA would not approve new Permits to Drill for the proposed new well locations. There would be no project-related ground disturbance, use of hazardous materials, or trucking of product to collection areas. Osage headright holders and others would not have the opportunity to realize potential financial gains from development of mineral resources at these well locations.

No new impacts would occur due to the No Action Alternative to the following critical elements: air quality, public health and safety, water resources, wetland/riparian habitat, threatened and endangered species, soils, vegetation and invasive species, cultural resources, socioeconomic conditions, and environmental justice (EJ). `

Under the No Action Alternative, any impacts due to present levels of surface disturbance, oil and gas operations, access roads and traffic can be expected to continue. Performance's existing oil and gas leases would remain in effect so long as production from existing wells continues in paying quantities. Table 3-1 shows the locations of currently existing wells, as well as proposed new oil and gas wells in the same quarter section.

Table 3-1. Existing wells and new wells.

LEGAL DESCRIPTION	EXISTING WELLS	PROPOSED NEW WELLS
(SE/4 22-T26N-R11E)	4 Active Wells/2 Dry	Alee #22-1 and #22-2
(NW/4 03-T24N-R9E)	4 Active Wells/7 Abandoned	Cottonmouth #3-5 and #3-6

(NW/4 31-T25N-R11E)	11 Active Wells/9 Abandoned	David #31-2
(NE/4 01-T24N-R11E)	4 Active Wells/3 Dry/1 Abandoned	Jackson/Williams #10-3
(SW/4 04-T25N-R12E)	4 Active Wells/1 Abandoned	Royal #4-3
(NW/4 10-T24N-R11E)	5 Active Wells/1 Dry/3 Abandoned	Jackson Stoabs #10-2
(SW/4 28-T26N-R12E):	1 Active Well/2 Dry/14 Abandoned	JM Hughes (Dove) #28-5
(SE/4 05-T25N-R12E):	7 Active Wells/5 Abandoned	Royal/E. Hughes #5-6

Under the No Action Alternative, oil and gas activities associated with production and maintenance of the existing active wells listed in Table 3-1 would continue, and the lessee, operators and contractors associated with well services industries will continue to utilize existing access roads, utility easements and pipelines.

3.2 Alternative B - The Proposed Action

The Proposed Action involves drilling up to ten (10) oil and gas wells on ten (10) new developmental oil and gas well pads, and construction of the associated infrastructure, which may include access roads; oil, gas, and produced water gathering pipelines; buried electric and fiber optic utility lines; and temporary above-ground freshwater pipelines. Proposed New Wells are identified in Table 1-1 and in column 3 of Table 3-1. Detailed drilling plans and maps for each of the proposed new wells are found in Appendix A and Appendix B of this Environmental Assessment.

The Applicant must obtain a Permit to Drill from the BIA, prior to drilling each of the wells. Well surface hole locations, discussed below in Section 3.2.5, were chosen by the Applicant in consultation with tribal and BIA resource managers, and are intended to maximize the production potential of the Osage Reserve.

The Applicant has requested that the Superintendent approve exemptions for two well locations with regard to the requirement in 25 CFR Part 226.33 that a two hundred (200) foot distance should be maintained between the well location and the nearest watering place. (See Request letters in Appendix D) The Superintendent would approve the exemptions for these two locations, based on recommendation of Osage Agency environmental staff who reviewed documentation, visited each site and determined that adequate protection of the watering places will be provided by compliance with standard best management practices discussed in this EA.

The Applicant has submitted documentation to show that all surface landowners have been consulted and are in agreement with the proposed location of roads. Therefore, no federal action by BIA should be necessary to set ingress/egress routes for any new access roads associated with the Proposed Action.

3.2.1 Specific Location Descriptions

The Applicant proposes construction and operation of the well pads in order to maximize the oil potential previously found in the Osage Minerals Reserve. The location area described below for each well may include topsoil piles, soil berms, pump jacks, tanks and separators/treaters. Any needed BMPs (Section 5.0) would be applied and/or installed.

3.2.1.1 Alee #22-1 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the SE ¼ Section 22, Township 26 North, Range 11 East, Osage County, Oklahoma. The proposed disturbance acreage is summarized as follows:

- Well Pad Acreage= 0.5 acres
- Pipeline Acreage=0.15 acres
- Utility Corridor Acreage= 0.15 acres
- Access Road Acreage= 0.03 acres
- Total Footprint Acreage= 0.82

3.2.1.2 Alee #22-2 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the SE ¼ Section 22, Township 26 North, Range 11 East, Osage County, Oklahoma. The proposed disturbance acreage is summarized as follows:

- Well Pad Acreage= 0.5 acres
- Pipeline Acreage=0.10 acres
- Utility Corridor Acreage= 0.10 acres
- Access Road Acreage= 0.05 acres
- Total Footprint Acreage= 0.75

3.2.1.3 Cottonmouth #3-5 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the NW ¼ Section 3, Township 24 North, Range 9 East, Osage County, Oklahoma. The proposed disturbance acreage is summarized as follows:

- Well Pad Acreage= 0.5 acres
- Pipeline Acreage=0.14 acres
- Utility Corridor Acreage= 0.12 acres
- Access Road Acreage= 0.23 acres
- Total Footprint Acreage= 0.99

3.2.1.4 Cottonmouth #3-6 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the NW ¼ Section 3, Township 24 North, Range 9 East, Osage County, Oklahoma. The proposed disturbance acreage is summarized as follows:

- Well Pad Acreage= 0.5 acres
- Pipeline Acreage=0.07 acres

- Utility Corridor Acreage= 0.02 acres
- Access Road Acreage= 0.01 acres
- Total Footprint Acreage= 0.60

3.2.1.5 David #31-2 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the NW ¼ Section 31, Township 25 North, Range 11 East, Osage County, Oklahoma. The proposed disturbance acreage is summarized as follows:

- Well Pad Acreage= 0.5 acres
- Pipeline Acreage=0.36 acres
- Utility Corridor Acreage= 0.31 acres
- Access Road Acreage= 0.31 acres
- Total Footprint Acreage= 1.47

3.2.1.6 Jackson Stoabs #10-2 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the NW ¼ Section 10, Township 24 North, Range 11 East, Osage County, Oklahoma. The proposed disturbance acreage is summarized as follows:

- Well Pad Acreage= 0.5 acres
- Pipeline Acreage=0.17 acres
- Utility Corridor Acreage= 0.17 acres
- Access Road Acreage= 0.17 acres
- Total Footprint Acreage= 1.02

3.2.1.7 Jackson/Williams #10-3 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the NE ¼ Section 10, Township 24 North, Range 11 East, Osage County, Oklahoma. The proposed disturbance acreage is summarized as follows:

- Well Pad Acreage= <0.5 acres
- Pipeline Acreage=0.29 acres
- Utility Corridor Acreage= 0.35 acres
- Access Road Acreage= 0.35 acres
- Total Footprint Acreage= 1.48

3.2.1.8 JM Hughes (Dove) # 28-5 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the SW ¼ Section 28, Township 26 North, Range 12 East, Osage County, Oklahoma. The proposed disturbance acreage is summarized as follows:

- Well Pad Acreage= 0.5 acres
- Pipeline Acreage=0.0 acres
- Utility Corridor Acreage= 0..04 acres
- Access Road Acreage= 0.03 acres
- Total Footprint Acreage= 0.57

3.2.1.9 Royal #4-3 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the SW ¼ Section 4, Township 25 North, Range 12 East, Osage County, Oklahoma. The proposed disturbance acreage is summarized as follows:

- Well Pad Acreage= 0.5 acres
- Pipeline Acreage=0.17 acres
- Utility Corridor Acreage= 0.04 acres
- Access Road Acreage= 0.04 acres
- Total Footprint Acreage= 0.75

3.2.1.10 Royal/E. Hughes #5-6 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the SE ¼ Section 5, Township 25 North, Range 12 East, Osage County, Oklahoma. The proposed disturbance acreage is summarized as follows:

- Well Pad Acreage= <0.5 acres
- Pipeline Acreage=0.19 acres
- Utility Corridor Acreage= 0.07 acres
- Access Road Acreage= 0.23 acres
- Total Footprint Acreage= 0.99

3.2.2 Well Pads and Infrastructure

Well pad and utility corridor locations, shown in Appendix A, were developed in consultation with tribal and BIA resource managers during a pre-clearance process that included surveys for cultural, archaeological, and natural (i.e., biological and physical) resources.

Surveys were conducted by the applicant and/or their contractors prior to that time to determine potential impacts to natural and cultural resources. If necessary, additional interdisciplinary on-site meetings will be conducted to review the proposed locations with regard to topography, potential drainage issues, and erosion control measures, such as straw wattles and check dams. The on-site meetings will be attended by the surveyors, environmental contractors, the Applicant's representatives, and a BIA representative.

The proposed well pads would include a leveled area (pad) that would be used for the drilling rig and equipment. If necessary, the pad would be stripped of topsoil and vegetation and then graded. The topsoil would be stockpiled and stabilized with native grasses until it could be used to reclaim and revegetate the disturbed area. The subsoil would be used in the construction of the pad and the finished pad would be graded to ensure that water drains away from the pad.

The pump jack will be surrounded by a suitable fence because the project area is located within an active cattle grazing pasture. The fence would keep cattle offsite as well as any unauthorized individuals from possible injuries sustained by wandering onsite.

At all well pad locations, access roads will be constructed and maintained with gravel to reduce erosion. The road will be kept to a minimum, and will utilize an easement approximately 12 feet wide.

Utility lines to supply power to the well pad equipment will be needed. Existing infrastructure will be used where possible, and new utility lines will occupy an easement of approximately 30 feet in width. Where feasible, the utility and pipeline corridors will be one to reduce the footprint of the project.

Pipelines to connect the well to existing infrastructure to move the product to market will be constructed. The installation will occur using a trencher, and where necessary, heavier equipment to penetrate through rock. Actual soil disturbance is expected to be 6 inches, except where rock is encountered, and then maximum width of soil disturbance will be approximately 10 inches.

Interim reclamation activities for this undertaking would reclaim approximately 0.3 acres from the initial well pad surface disturbance for the well(s). All components (e.g., well pad, access road, storage areas, and supporting facilities), with the exception of buried pipelines, electrical lines, and fiber optic utility lines would be reclaimed upon final abandonment unless formally transferred, with federal approval, to either the BIA or the landowner. Applicant will incorporate the appropriate BMPs as described in Section 5.0 "Mitigation and Monitoring".

3.2.3 Well Drilling

Drilling of the new wells is expected to occur between March of 2015 and May of 2015. Each well pad will occupy a maximum of ½ acre; however, actual field conditions may result in a much lower area of impact. Performance will only disturb the minimum area required to drill each well.

Following preparation of the well pad, a drilling rig will be rigged up. The total time for each well for rigging up, drilling the well, and rigging down the well is approximately 10 days.

Cuttings would be placed into a single onsite cuttings pit. The wells will be drilled using air rotary drilling rigs. The total depth of each well will vary from 1,800 feet to 2,100 feet, depending on the location and elevation.

A more detailed drilling plan is included in Appendix B.

3.2.4 Access Roads and Utility Corridors

Approximately 5,477 feet of new access roads would be constructed to connect the proposed well pads to existing access roads. Signed agreements would be in place allowing road and utility construction across affected land surfaces, and any applicable approach permits and/or easements would be obtained prior to any construction activity.

Pipeline construction would adhere to the requirements of 49 CFR 192.707 with regard to the marking of buried pipelines. Specifically, pipeline markers would be placed within 1,000 feet of one another at all public road crossings, railroad crossings, creek crossings, and fence crossings, and at all points of major direction change.

On average the temporary above-ground freshwater pipelines would remain in place for approximately 10 days to facilitate the drilling and hydraulic fracturing (HF) of a single well.

Access road construction would follow a road design based on the agreement with applicable surface owner, and appropriate for the planned use as well as environment. Stockpiled topsoil would be placed on the outside slopes of the ditches following road construction. Care would be taken during road construction to avoid disturbing or disrupting any buried utilities that exist along existing major roads. The access roads would be surfaced with aggregate if the site were to be established as a commercial production site, and the applicable surface owner is in agreement with the use of aggregate. Also, the roadways would remain in use for the life of the wells. Details of road construction are addressed in the APD.

3.2.5 Casing and Cementing

Surface casing will be set at approximately 50 feet with production casing being set to the total depth of the well, and cemented up to the ground surface in order to protect any applicable underground source of drinking water (USDW) at approximately 250' to 500' below ground level. See the Drilling Plan in Appendix B.

3.2.6 Completion and Evaluation

Completion of the wells involves the fracturing of the well, which utilizes 10,000 to 30,000 pounds of sand propping agent in conjunction with 300 to 500 barrels of saltwater. This is pumped in at a rate of 20 to 28 barrels per minute.

After the well has been pumped with sand and saltwater, the well is shut in for several days, after which the well is turned over to the production team to install the proper pumping equipment. See the Drilling Plan in Appendix B.

3.2.7 Commercial Production

If drilling, testing, and production results determine that there will be commercial production from the proposed well pads, two (2) black poly pipelines will be installed to transport crude oil, natural gas and produced water to existing mainline pipelines, where it will travel to an existing storage facility serving multiple existing wells.

The duration of production operations cannot be reliably predicted, but some oil wells have been pumping for more than 100 years. The operator estimates that each of the wells would initially yield approximately 5 barrels of oil per day and 150 barrels of water per day during the first year of production. After the first year, the operator estimates production would decrease to approximately 2 barrels of oil per day and 50 barrels per day of water. Approval will be obtained from the Osage Agency Superintendent prior to the initiation of any flaring operations in accordance with applicable regulations. See the Drilling Plan in Appendix B.

3.2.8 Reclamation

3.2.8.1 Interim Reclamation

Reclamation would continue over the life of each well pad and would include the return of topsoil when appropriate, and contouring and seeding of native vegetation. Interim reclamation would be required 6 months after construction, if environmentally feasible, and then following any maintenance work or additions of infrastructure. Reclamation would be required before final

abandonment of the decommissioned well pad. A successful reclamation would at all times be the responsibility of the operator.

Applicant will take reasonable precautions in order to minimize and control erosion in disturbed areas.

The disturbed areas would be reclaimed and contoured as soon as possible after construction is complete (fall/spring). The utility roads and disturbed areas outside of the working well pad areas would be covered with stockpiled topsoil when appropriate, and seeded with native grass.

The Applicant would control any noxious weeds within the project area and other applicable facilities by approved chemical or mechanical methods.

The entire project area would be monitored for erosion, subsidence, and noxious weeds. In areas where problems are found to occur, reclamation efforts would continue until the ROW is successfully reclaimed. Reclamation is considered successful when:

- seeded areas are established;
- adjacent vegetative communities spread back into the disturbed areas; and
- noxious weeds are under control.

See the Drilling Plan in Appendix B for additional information.

3.2.8.2 Final Reclamation

Final reclamation would occur when each well pad is decommissioned. All disturbed areas would be reclaimed, reflecting the BIA's view of oil and gas exploration and production as temporary intrusions on the landscape. All facilities, with the exception of buried electrical, fiber optic, and pipelines would be removed. Access roads and work areas would be leveled or backfilled as necessary, scarified, recontoured, and seeded when appropriate. Exceptions to these reclamation measures might occur if the BIA approves assignment of an access road either to the BIA roads inventory or to concurring surface allottees. All decommissioned pipelines would be purged of remaining product, capped, and abandoned in place. Buried electrical lines would be disconnected from the active power source and abandoned in place. See the Drilling Plan in Appendix B.

3.3 BIA Preferred Alternative

BIA's preferred alternative is Alternative B- the Proposed Action- to complete all administrative actions and approvals necessary to authorize or facilitate oil and gas development at all of the proposed well pad locations listed in Table 1-1. The preferred alternative would include issuance of Permits to Drill for all proposed new well locations with appropriate conditions consistent with the mitigation, monitoring and best management practices outlined in Section 5.0 of this EA. It would also include approval of two requests for location exemptions for two wells.

4.0 THE AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

The broad definition of NEPA leads to the consideration of the following elements of the human and natural environments: air quality, public health and safety, water resources, wetland/riparian habitat, threatened and endangered species, soils, vegetation and invasive species, cultural resources, socioeconomic conditions, and Environmental Justice (EJ).

4.1 Land Resources

Osage County is the largest of 77 counties in Oklahoma, encompassing a total of 1,476,480 acres. It is located in the northeastern portion of the State and is border by Kansas on the north, the Arkansas River on the southwest, Tulsa County on the southeast, and Washington County on the east. Except for large flood plains along the Arkansas River and several other major streams, the topography of the county is characterized by gently rolling hills. These hills are generally covered by rock outcrops, native grassland and woodlands, and they are used primarily for cattle grazing.

Osage County is within the Central Lowlands physiographic province on the Oklahoma Platform that dips gently to the west. The Oklahoma Platform is a region of mid-continental Paleozoic rocks on the Ozark Uplift. Bedrock formations are typically intermixed with layers of sandstone, shale and thin limestone and outcrops. .

The Proposed Action is in the general area of the Upper Pennsylvanian and Lower Permian age structures. The proposed well drilling corridor is characterized by gently rolling to rocky hills dissected by lowland areas coursed by tributaries to the Arkansas River.

4.1.1 Physiography and Topography

Osage County is situated in the Interior Plains division of the Central Lowlands physiographic province. The northwestern part of the County is in the Northern Limestone Cuesta Plains subdivision while the southeastern portion is in the Eastern Cuesta Plains subdivision. The average elevation in the county is about 860 feet, and ranges from a maximum of 1,407 feet at one point a few miles northeast of Foraker to around 590 feet. Most slopes are in the range of 0 to 15 percent.

Table 4-1 details the elevation at each proposed well pad site.

Table 4-1. Well Pad Elevations.

Well Name	Estimated Mean Elevation (feet above sea level)
Alee #22-1	900
Alee #22-2	900
Cottonmouth #3-5	900
Cottonmouth #3-6	880
David #31-2	775

Jackson Stoabs #10-2	850
Jackson/Williams #10-3	850
JM Hughes (Dove) #28-5	940
Royal #4-3	1000
Royal/E. Hughes #5-6	940

4.1.2 Geologic Setting and Mineral Resources

Osage County is situated in a region of mid-continental Paleozoic rocks on the western flank of the Ozark Uplift. Structurally, the entire area is part of a regional homocline which dips gently to the west. Bedrock formations are typically intermixed sequences of sandstone, shale and thin limestones in the eastern two-thirds of the county. For the most part, the entire county is considered to be an outcrop of Upper Pennsylvanian aged structures. However, rocks of Lower Permian age produce outcrops in a few extreme western areas of the county.

The first well of significance was drilled in 1897 near the Eastern boundary of the County to a depth of 1,349 feet into Sand strata now known as the "Bartlesville Sand." Within 6 years, 30 more wells were drilled, and by 1920 the Burbank Field had been discovered. More than 25,000 oil and gas wells, owned by more than 1,000 oil companies, have been drilled in Osage County

Oil and gas production in the county comes mainly from formations at depths between 200 and 3,000 feet. The Burbank Sand, Bartlesville Sand, Oswego Lime, Arbuckle Sand and Mississippi Chat are among the formations from which oil and gas have been produced. In general, production comes from shallow formations in the eastern portion of the county and from deeper formations to the west.

4.2 Air Quality

4.2.1 Air Quality Standards and Criteria Pollutants

The Clean Air Act (CAA) of 1970 requires that states adopt ambient air quality standards. The CAA (42 USC 7401 et seq.) establishes ambient air quality standards, permit requirements for both stationary and mobile sources, and standards for acid deposition and stratospheric ozone (O_3) protection. The standards have been established in order to protect the public from potentially harmful amounts of pollutants. Under the CAA, the U.S. Environmental Protection Agency (EPA) establishes primary and secondary air quality standards. Primary air quality standards protect public health, including the health of "sensitive populations, such as people with asthma, children, and other adults." Secondary air quality standards protect public welfare by promoting ecosystem health, and preventing decreased visibility and damage to crops and buildings.

USEPA has set National Ambient Air Quality Standards (NAAQS) for the following six criteria pollutants: O_3, particulate matter ($PM_{2.5}$, PM_{10}), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and lead (Pb). Greenhouse gasses (GHG), water vapor, carbon dioxide, methane, nitrous oxide, and O_3 are also regulated and have been linked to global climate change.

Criteria pollutants and their health effects include the following.

- SO_2: SO_2 is a colorless gas with a strong, suffocating odor. SO_2 is produced by burning coal, fuel oil, and diesel fuel, and can trigger constriction of the airways, causing particular difficulties for asthmatics. Long-term exposure is associated with increased risk of mortality from respiratory or cardiovascular disease. SO_2 emissions are also a primary cause of acid rain and plant damage (EPA 2012a).

- Inhalable PM (PM_{10} and $PM_{2.5}$): PM_{10} and $PM_{2.5}$ are classes of compounds that can lodge deep in the lungs, causing adverse health problems, depending on their size, concentration, and content. Based on extensive health studies, particulate matter is regulated under two classes. PM_{10} is the fraction of total particulate matter 10 microns or smaller, and $PM_{2.5}$ is two and a half microns or smaller. Inhalable particulate matter can range from inorganic wind-blown soil to organic and toxic compounds found in diesel exhaust. Toxic compounds such as benzene often find a route into the body via inhalation of fine particulate matter (EPA 2012a).

- NO_2: NO_2 is a reddish-brown gas with an irritating odor. Primary sources include motor vehicles, industrial facilities, and power plants. In the summer months, NO_2 is a major component of photochemical smog. NO_2 is an irritating gas that may constrict airways, especially of asthmatics, and increase the susceptibility to infection in the general population. NO_2 is also involved in ozone smog production (EPA 2012a).

- O_3: O_3 is a colorless gas with a pungent, irritating odor and creates a widespread air quality problem in most of the world's industrialized areas. Ozone smog is not emitted directly into the atmosphere but is primarily formed through the reaction of hydrocarbons and nitrogen oxides in the presence of sunlight. Health effects related to O_3 can include reduced lung function, aggravated respiratory illness, and irritated eyes, nose, and throat. Chronic exposure can cause permanent damage to the alveoli of the lungs. O_3 can persist for many days after formation and travel several hundred miles (EPA 2012a).

- CO: CO is a colorless, odorless gas that is a byproduct of incomplete combustion. CO concentrations typically peak nearest a source, such as roadways or areas with high fireplace use, and decrease rapidly as distance from the source increases. Ambient levels are typically found during periods of stagnant weather, such as on still winter evenings with a strong temperature inversion. CO is readily absorbed into the body from the air. It decreases the capacity of the blood to transport oxygen, leading to health risks for unborn children and people suffering from heart and lung disease. The symptoms of excessive exposure are headaches, fatigue, slow reflexes, and dizziness (EPA 2012a).

According to the USEPA, no counties in Oklahoma are classified as nonattainment areas for criteria pollutants (USEPA 2011). No air quality monitoring stations in Osage County were identified (ODEQ 2012). Southerly winds prevail for most of the year in the area with the exception of winter when northerly winds are associated with weather events (OCS 2012). Osage County, given its rural nature, maintains good air quality and visibility throughout the year.

4.2.2 Typical Air Emissions from Oil Field Development

According to EPA Emission Inventory Improvement documents (EPA 1999), oil field emissions encompass three primary areas: combustion, fugitive, and vented. Typical processes that occur during exploration and production include the following.

- Combustion emissions include SO_2, ozone precursors called volatile organic compounds (VOCs), GHGs, and hazardous air pollutants (HAPs). Sources include engine exhaust, dehydrators, and flaring (EPA 1999).
- Fugitive emissions include criteria pollutants, H_2S, VOCs, HAPs, and GHGs. Sources of fugitive emissions include mechanical leaks from well field equipment such as valves, flanges, and connectors that may occur in heaters/treaters, separators, pipelines, well heads, and pump stations. Pneumatic devices such as gas actuated pumps and pressure/level controllers also result in fugitive emissions. Other sources of fugitive emissions include evaporation ponds and pits, condensate tanks, storage tanks, and wind-blown dust (from truck and construction activity) (EPA 1999).
- Vented emissions include GHGs, VOCs, and HAPs. Primary sources are emergency pressure relief valves and dehydrator vents (EPA 1999).

Pad and road construction, drilling activities, and tanker traffic would generate emissions of criteria pollutants and HAPs. Primary emissions sources during drilling are diesel exhaust; wind-blown dust from disturbed areas and travel on dirt roads; evaporation from pits and sumps; and gas venting. Diesel emissions are being progressively controlled by the EPA in a nationwide program (EPA 2012c). This program takes a two-pronged approach. First, fuels are improving to the ultra-low sulfur standard, and secondly manufacturers must produce progressively lower engine emissions.

4.2.3 Greenhouse Gas Emissions and Climate Change

Gases that trap heat in the atmosphere are often called greenhouse gases (GHGs). Some GHGs such as carbon dioxide (CO_2) occur naturally and are emitted to the atmosphere through natural processes and human activities. Other GHGs (e.g., fluorinated gases) are created and emitted solely through human activities. The EPA (2012c) identifies the principal GHGs that potentially enter the atmosphere because of human activities as the following.

- CO_2: CO_2 enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). CO_2 is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.
- Methane (CH_4): CH_4 is emitted during the production and transport of coal, natural gas, and oil. CH_4 emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.
- Nitrous Oxide (N_2O): N_2O is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.
- Fluorinated Gases: Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes.

Fluorinated gases are typically emitted in small quantities, but are potent GHGs thought to contribute significantly to global warming processes (EPA 2012b).

CO_2 is the primary GHG, responsible for approximately 90% of radiative forcing (the rate of energy change as measured at the top of the atmosphere; can be positive [warmer] or negative [cooler]) (EPA 2012b). To simplify discussion of the various GHGs, the term "Equivalent CO_2 or CO_2e" has been developed. CO_2e is the amount of CO_2 that would cause the same level of radiative forcing as a unit of one of the other GHGs. For example, one ton of CH_4 has a CO_2e of 22 tons; therefore, 22 tons of CO_2 would cause the same level of radiative forcing as one ton of CH_4. N_2O has a CO_2e value of 310. Thus, control strategies often focus on the gases with the highest CO_2e value.

Energy production and supply was estimated to emit up to 25.9% of GHGs worldwide in 2004 (Pew Center 2009). CH_4, with a high radiative forcing CO_2 ratio, is a common fugitive gas emission in oil and gas fields (EPA 2012b). Oil and gas production, however, is highly variable in potential GHG emissions. Oil and gas producers in the United States are not considered large GHG emitters by the EPA, and are not the subject of any current federal proposals that would regulate GHG emissions.

4.2.4 Hazardous Air Pollutants

Hazardous air pollutants (HAPs) are a class of compounds known to cause cancer, mutation, or other serious health problems. HAPs are usually a localized problem near the emission source. HAPs are regulated separately from criteria air pollutants. There are several hundred HAPs recognized by the EPA and State of Oklahoma. Health effects of HAPs may occur at exceptionally low levels; for many HAPs, it is not possible to identify exposure levels that do *not* produce adverse health effects. Major sources of toxic air contaminants include industrial processes, commercial operations (e.g., gasoline stations and dry cleaners), wood smoke, and motor vehicle exhaust. Unlike regulations for criteria pollutants, there are no ambient air quality standards for HAPs. Examples of HAPs found in gases released by oil field development and operation include benzene, toluene, xylene, and formaldehyde (BLM 2009). HAP emissions receive evaluation based on the degree of exposure that can cause risk of premature mortality, usually from cancer.

4.2.5 Air Quality Best Management Practices

Under the CAA, federal land management agencies have an affirmative responsibility to protect air quality. Tribes, federal land managers, and private entities can make emission controls part of a lease agreement. When appropriate based on risk of exposure, BMPs can be adopted for various portions of an oil/gas well's lifecycle. BMPs fall into the following six general categories.

- Transportation BMPs to reduce the amount of fugitive dust and vehicle emissions
- Drilling BMPs to reduce rig emissions
- Unplanned or emergency releases

- Vapor recovery
- Inspection and maintenance
- Monitoring and repair

While not all of these BMPs may be applicable to the specific project, the implementations of applicable BMPs are aimed at eliminating or reducing potential impacts that may result from the proposed action. Air Quality BMPs are included in Section 5.0.

4.2.6 Potential Air Quality Impacts

Based on the existing air quality of Osage County, typical air levels and types of emissions from similar oil field projects, and the applicant's commitment to implement BMPs identified in Section 5.0, the Proposed Action would not produce significant increases in criteria pollutants, GHGs or HAPs. The Proposed Action would incrementally contribute to emissions occurring within the region. In general, however, the increase in emissions associated with the Proposed Action would occur predominantly during construction and drilling operations and therefore would be localized, largely temporary, and limited in comparison with regional emissions. The Proposed Action is not expected to impact attainment status based on any of the Primary and Secondary National Ambient Air Quality Standards for criteria pollutants or other regulated air emissions. Contribution of the proposal to incremental increases of unregulated GHG emissions is expected to be minor.

4.3 Water Resources

This section identifies the existing water resources within the project area and potential effects of the Proposed Action. Specific subjects discussed in this section include surface water and surface water quality, groundwater resources, and the potential short-term and long-term impacts of the Proposed Action on these water resources.

4.3.1 Ground Water

The major groundwater basin in Osage County is the Vamoosa Aquifer which measures approximately four to nine miles across Osage County. It is composed of inter-bedded sandstone, shale and conglomerate. The formation ranges from about 300 to more than 630 feet thick. The large amount of shale in northern portions of the Vamoosa limits well yields to about 60 gallons per minute. Alluvium quaternary deposits (stream-laid deposits of inter-fingering sand, silt and clay) are the most productive deposits and occur within a one to six mile stretch along the Arkansas River.

4.3.2 Surface Water

The Proposed Action locations are in the eastern one-half of Osage County, which is included in Oklahoma Water Quality Basin Number 1 (see Appendix E). The average annual precipitation for Osage County ranges from 32 to 38 inches. Moderate rainfall and hilly topography allow for perennial, intermittent and ephemeral stream flows. Streams generally drain to the Arkansas River and Caney River, a main tributary of the Arkansas River.

Area lakes include Bluestem, Shidler, Skiatook, Hulah, Kaw, Keystone, Candy, and Birch. These lakes provide water storage for public drinking water supplies to nearby towns and rural water systems. In addition to area lakes, water supplies for wildlife and livestock include numerous farm ponds, watershed projects, streams and creeks.

Surface water resources in the Proposed Action area must be managed and protected according to existing federal laws and regulations during both construction and continued operations of the project. Surface water protection is primarily regulated the federal Clean Water Act of 1972, as amended (33 USC 1251 et seq.) and the Safe Drinking Water Act of 1974, as amended (42 USC 300 et seq.). Under the Clean Water Act, states and tribes may establish and seek federal approval of water quality standards for surface waters. Federally approved water quality standards (WQS) for surface waters in the areas affected by the Proposed Action are found in Chapter 45, Title 785 of the Oklahoma Administrative Code (OAC). Waters affected by the Proposed Action are included in Water Quality Basin Number 1, with stream segments numbered in the 121300 and 121400 sequences.

Most major streams and lakes in the affected area of Osage County have designated beneficial uses that include Primary Body Contact Recreation, Public and Private Water Supply, Warm Water Aquatic Habitat, and some are listed as Sensitive Water Supplies. Each of these beneficial uses has numeric and/or narrative criteria listed in the WQS for the purpose of protecting the beneficial, such prohibition of oily sheen, limits on discharges, limits on bacteria concentrations, minimum dissolved oxygen criteria and numeric criteria for toxic pollutants).

Many waterbodies in Osage County have been assessed to determine whether they are meeting applicable water quality standards. Waters in Osage County that do not currently meet applicable water quality standards are listed in the 2012 List of Impaired Waters compiled by the state of Oklahoma under Section 303(d) of the Clean Water Act. A total of nineteen (19) Osage lakes and streams are on the list of impaired waters (See Appendix E). One source of impairment for six (6) of 19 impaired streams and lakes in Osage County is listed as Source ID number 102- "petroleum/natural gas activities (Legacy)". Other sources of impairment vary, and include agriculture, grazing, point sources and unknown sources. Special care must be taken to prevent new or increased contributions of pollutants from sources of impairment to streams on the 303(d) list.

The Clean Water Act regulates point source discharges of pollutants into waters of the United States. Such discharges are prohibited, unless a permit has first been obtained through the National Pollutant Discharge Elimination System (NPDES) program. In Osage County, the U.S. Environmental Protection Agency Region 6 (Dallas) office is responsible for issuance of NPDES permits related to oil and gas development activities. Nonpoint source pollution from contaminated stormwater runoff should also be avoided.

Under the Proposed Action, drilling activities should be engineered and constructed to: (1) avoid contact with pollutants and contaminants, including but not limited to brine, oil residues and sediments, (2) minimize the amount of suspended sediment (i.e., turbidity) and the concentration of contaminants in any runoff or discharges, and (3) avoid alteration of natural drainages. Compliance with applicable federal water quality standards is required at all times. No surface

water would be converted for use as a lagoon or pit or otherwise used for well drilling operations. Any chemicals or potentially hazardous materials would be handled in accordance with the operator's spill prevention, control, and countermeasure plan (SPCC Plan). The relative site specific SPCC plan must be designed to minimize potential impacts to any surface waters associated with an accidental spill. *The appropriate SPCC plans are on file at the BIA, and are included in the appendix section.*

The Proposed Action would be engineered and constructed to minimize the suspended sediment (i.e., turbidity) concentration of surface runoff, avoid disruption of drainages, and avoid direct impacts to surface water. No surface water would be used for well drilling operations. Any chemicals or potentially hazardous materials would be handled in accordance with the operator's spill prevention, control, and countermeasure plan. Provisions established under this plan would minimize potential impacts to any surface waters associated with an accidental spill.

4.3.3 Hydraulic Fracturing Process

Hydraulic fracturing (HF) is a well stimulation process used to maximize the extraction of oil and gas. The process enhances subsurface fracture systems, allowing oil to move more freely through porous rock to production wells that bring the oil or gas to the surface (EPA 2013b). During HF, fluids, commonly comprised of water and chemical additives, are pumped down the well bore into these target formations at high pressure. The HF process uses large volumes of water under high pressure to fracture rock within the target formation to increase formation porosity and allow the flow of petroleum from the rock. Depending upon the characteristics of the well and the rock being fractured, a few million gallons of water can be required to complete a job (Arthur et al. 2008).

Only specific sections of the well within the target formation receive the full force of pumping. As pressure builds up in this portion of the well, water opens fractures, and the driving pressure extends the fractures deep into the rock unit. When pumping stops, these fractures quickly snap closed and the water used to open them is pushed back into the borehole, back up the well and is collected at the surface. The water returned to the surface is comprised of injected water mixed with the pore water that has been trapped in the rock unit for millions of years. The pore water is usually a brine with significant amounts of dissolved solids (Arthur et al. 2008).

When the pressure exceeds the rock strength, the fluids open or enlarge fractures that can extend several hundred feet from the well shaft, which is oriented laterally within the target formation. After the fractures are created, a propping agent is pumped into the fractures to keep them from closing when the pumping pressure is released. After HF is completed, the internal pressure of the geologic formation causes the injected HF fluids to enter the well bore where it is pumped to the surface and then stored in disposal tanks (EPA 2013b).

Proppants are small compression-resistant particles added to the HF fluids to assist in holding the fractures open and creating pore space through which petroleum can flow. Sand was the original proppant but now aluminum beads, ceramic beads, sintered aluminum (i.e., bauxite), and other materials are being used in the wells. Over one million pounds of proppants can be used during HF of a single well (Arthur et al. 2008).

In addition to proppants, a variety of chemical additives are included with the water used in HF. Some chemicals are used to thicken the water into a gel that is more effective at opening fractures and carrying proppants deep into the rock unit. Other chemicals are added to reduce friction, keep rock debris suspended in the liquid, prevent corrosion of equipment, kill bacteria, control pH, and other functions (Arthur et al. 2008). Typical chemical additives used in the HF fluids are listed in Table 4-2.

Table 4-2. Common Additives of Hydraulic Fracturing Fluid.

Additive Type	Main Compound	Common Use of Main Compound
Acid	Hydrochloric acid or muriatic acid	Swimming pool chemical and cleaner
Biocide	Glutaraldehyde	Cold sterilant in health care industry
Breaker	Sodium chloride	Food preservative
Corrosion inhibitor	N,n-dimethyl formamide	Used as a crystallization medium in pharmaceutical industry
Friction reducer	Petroleum distillate	Cosmetics including hair, make-up, nail, and skin products
Gel	Guar gum or hydroxyethyl cellulose	Thickener used in cosmetics, sauces, and salad dressings
Iron control	2-hydroxy-1,2,3-propanetricaboxylic acid	Citric acid is used to remove lime deposits; lemon juice ~7% citric acid
Oxygen scavenger	Ammonium bisulfite	Used in cosmetics
Proppant	Silica, quartz sand or clay beads	Play sand (seldom used)
Scale inhibitor	Ethylene glycol	Automotive antifreeze and de-icing agent

Source: Arthur et al. 2008.

4.3.4 Potential Impacts to Surface Water and Groundwater Resources Surface Waters

All but two of the proposed ten new well locations are all located at least 200 feet from an existing water place or waterway. None are located immediately adjacent to any perennial streams or lakes. Specific waterbodies that may be affected are described in Section 4.5 Wetlands. No proposed wells are in the drainage area of any state designated scenic river or high quality water.

All of the proposed development activities would be done in a manner to prevent any point source or nonpoint sources of contaminated discharges. Compliance with applicable SPCC requirements, mitigation measures and best management practices identified in Section 5.0 or specifically listed in any BIA-issued permits, would ensure protection of water quality and water resources. No withdrawal or consumptive use of surface water resources is proposed, so stream flow or water levels in ponds/lakes will not be affected.

Several Osage county streams are listed as impaired, and the source of impairment for some of these includes legacy oil and gas development. However, none of the proposed well locations

are immediately adjacent to, nor would they directly drain into, any streams or lakes listed on the state's list of impaired waterbodies.

Alee #22-1 and Alee #22-2

The Alee wells are in the far northeast portion of Osage County. Surface runoff from the Alee wells would ultimately drain to Whiskey Hollow Creek, which flows north to Sand Creek. Sand Creek is designated as Category 4a (impaired, TMDL completed), according to the 2012 Oklahoma Integrated Report. Sand Creek flows east to the Caney River. No impacts to nearby streams are expected, as they are well outside the planned construction limits.

Cottonmouth #3-5 and Cottonmouth #3-6

The surface drainage from these two wells will drain to the east and ultimately into Double Creek, North Fork, a Category 3 water (insufficient or no data to determine if designated uses attained). A freshwater pond was identified as being located approximately 210 feet west of the proposed well bore for the Cottonmouth #3-6. No impacts to this pond or nearby streams are expected, as they are well outside the planned construction limits.

David #31-2

This well will drain a short distance via a tributary to Choteau Creek, a category 3 stream that flows south to a segment of Bird Creek designated as Category 2 (attaining some beneficial uses, no use threatened, and insufficient data to determine if remaining uses are threatened or attained). If best management practices are followed as outlined in Chapter 5.0, erosion should be avoided and no discharges of contaminated water will occur to nearby streams.

Jackson Stoabs #10-2 and Jackson Williams #10-3

A review of aerial photographs as well as topographical maps indicates a waterway along the western boundary of the construction limits for well #10-3 (See Appendix A). This waterway appears to be an unnamed tributary to Dog Thresher Creek. Dog Thresher Creek flows into Bird Creek, which is listed on the 2012 Oklahoma 303d List of Impaired Waters. One potential source of the impairment of Bird Creek by oil and grease and turbidity in segment OK1213000010010_00 is Legacy Oil and Gas Activities.

While the unnamed tributary appears to be located within the construction limits of the proposed well pad for well #10-3, during actual construction activities Performance will adjust the limits of construction such that no impacts, direct or indirect, will result during the construction of the well pads. Performance will avoid construction, drilling and completion activities during times when surface water is present in the indicated temporary waterway. Performance will only begin construction activity after receiving written permission from the BIA Superintendent according to 25 CFR 226.33.

JM Hughes (Dove) #28-5

A freshwater pond was identified as being located approximately 400 feet east of the proposed well pad boundary. No impacts to this waterbody are expected, as it is outside the planned construction limits. There are no major streams in the area.

Royal East Hughes #4-3

A freshwater pond was identified as being located approximately 200 feet west of the proposed well pad boundary. No impacts to this waterbody are expected, as the well bore exceeds the distance requirement listed in the regulation. There are no major streams or lakes in the vicinity. Surface drainage from the north half the SW/4 appears to flow east toward Jessie Creek (a category 3 waterbody), then to Sand Creek (a Category 4a water). Surface drainage from the south half of the SW/4 appears to flow south and ultimately to a segment of the Caney River designated as Category 4a.

Royal #5-6

A review of aerial photographs as well as topographical maps indicates a waterway along the western boundary of the construction limits. This waterway appears to be an unnamed tributary to Caney River. While the waterway appears to be located within the construction limits of the proposed well pad, during actual construction activities Performance will adjust the limits of construction such that no impacts, direct or indirect, will result during the construction of the well pad. Performance will avoid construction, drilling and completion activities during times when surface water is present in the indicated temporary waterway. Performance will only begin construction activity after receiving written permission from the BIA Superintendent according to 25 CFR 226.33. A freshwater pond was also identified as being located approximately 230 feet east of the proposed well bore. No impacts to this waterbody are expected, as it is well outside the planned construction limits.

Conclusion: No significant impacts to surface waters are anticipated for any of the ten new wells and associated activities connected with the Proposed Action.

Groundwater

Holders of mineral rights are entitled to use groundwater necessary to produce minerals. Brine infiltration from water flood injection used in oil recovery has contaminated the water-bearing strata and is a water quality problem in Osage County. There are areas in Osage County which are designated as wellhead protection zones (groundwater is being used for drinking water). However, the proposed well locations do not appear to be close to any of these designated areas.

Oil-bearing formations typically occur much deeper than potable water aquifers. However, since the introduction of technological advances in HF, some environmental concerns have been published related to the use of chemical additives and their potential effect on groundwater resources. These concerns, reviewed in Arthur et al. (2008), include the following.

1. Fractures produced in the well might extend directly into shallow rock units that are used for drinking water supplies, or fractures produced in the well might communicate with

natural fractures that extend into shallow rock units that are used for drinking water supplies.

2. The casing of a well might fail and allow fluids to escape into shallow rock units used for drinking water supplies.

3. Accidental spills of HF fluids or fluids expelled during HF might seep into the ground or contaminate surface water.

The EPA has studied the effects of coalbed methane well fracturing, publishing the results in a report entitled *Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs* (EPA 816-R-04-003) in 2004 (EPA 2004). The report has received both internal and external peer review, and public comment on its research design and incident information. Based on its research, the EPA concluded that there was negligible risk of HF fluid contaminating underground sources of drinking water during HF of coalbed methane production wells. However, the EPA continues to monitor the effects of HF in coalbed methane well completion (EPA 2004). The EPA is currently undertaking a study to evaluate the effect of oilfield HF technology, processes, and fluids on potable water aquifers. The EPA study is expected to be completed in 2014 (EPA 2013b).

No direct or indirect impacts to groundwater resources are anticipated from drilling of the proposed wells, HF completions, or operation of the proposed wells due to the following.

- The employment of spill prevention planning during the construction phase of the project.
- The use of protective casings on the well shafts to protect shallow water-bearing rock formations during drilling and operation of the oil wells.

Several groundwater protective measures have been included in the drilling and production procedures, such as drilling with freshwater to a point below the base of certain formations, implementing proper hazardous materials management, and using appropriate casing and cementing.

The intent of the Proposed Action is to minimize the risks associated with saltwater and hydrocarbon pollution. Based on the location, design, and the drilling methods that would be used on the proposed well pads, no significant adverse impacts to or groundwater resources are anticipated from the Proposed Action.

4.4 Soils

A complete and detailed soil survey of Osage County has been completed by the U.S. Department of Agriculture, Natural Resources Conservation Service in 2012. Four major soil groupings exist in Osage County, which incorporate 70 individual soils as determined from this survey. The twelve soil associations can be categorized into three major groups. One group, the Verdigris-Mason-Wynona and Kiomatia-Mason-Roebuck Associations are comprised of soils which are deep, loamy sands found primarily on wooded floodplains. These two associations cover 14 percent of Osage County, and are used mainly for field crops and tame pastures.

Uncleared areas of these soils support bottomland hardwoods with an understory of native tall grasses.

The second group is comprised of seven soil associations which cover about 50 percent of the county supporting the prairie-covered uplands. These seven associations are the Dennis-Parsons-Bates, Steedman-Coweta-Bates, Apperson-Wolco-Dwight, Shidler-Summit-Foraker, Grainola-Shidler-Stoneburg, Corbin-Pawhuska, and Norge-Vanoss. The soils in these associations are used mainly for native range, native hay meadows and tame pasture. Native vegetation consists mostly of tall grasses. Soils that are free of stones and on level to gently sloping topography are suitable for cultivation. In some areas containing these soils, limestone is quarried.

The remaining group of three associations is comprised of the following: Niotaze-Darnell, Dougherty-Eufaula, and Darnell-Stephenville Associations. This group covers about 34 percent of the county. The soils are shallow to deep, loamy or sandy, and are found on wooded uplands. Some of the deeper soils are cultivated to small grains, cotton, or grain sorghum. Native vegetation is mostly postoak, blackjack oak, and hickory, with an understory of native tall grasses.

Generally, the soils in Osage County are a constraint to both mechanized agricultural production and urban and industrial development. Soil erosion is a major problem for cropland or other exposed surfaces on slopes greater than 2 percent. Most soils present moderate to severe limitations to recreational use, shallow excavations, basement construction, road bases, septic tank fields, sewage lagoons and sanitary landfills. Consequently, over 70 percent of the County remains in native grassland or partially wooded rangeland.

In the southeastern part of the county most of the soils are loamy and are moderately deep or shallow over sandstone. In the northeastern and western part of the county the soils are loamy and are dominantly moderately deep, with some shallow and deep soils over shale, and shale interbedded with sandstone. In the north-central, central, and south-central part of the county the soils are loamy and are moderately deep, with some shallow and deep soils over sandstone and sandstone interbedded with shale (USDA NRCS 2012a).

A list of all mapped soil types that occur within the proposed project area is located in Table 4-3.

Table 4-3. Soil Descriptions.

Well Name	Soil Description	Percent Slope	Hydric Rating
Alee #22-1	Niotaze-Bigheart-Rock outcrop complex	15-25%	0 (Non Hydric)
Alee #22-2	Niotaze-Bigheart-Rock outcrop complex	15-25%	0 (Non Hydric)
Cottonmouth #3-5	Agra silt loam	1-3%	0 (Non Hydric)
	Steedman-Lucien complex	1-8%	0 (Non Hydric)
	Bigheart-Niotaze-Rock outcrop complex	3-15%	0 (Non Hydric)
Cottonmouth #3-6	Bigheart-Niotaze-Rock outcrop complex	1-%	0 (Non Hydric)
David #31-2	Lucien-Coyle complex	3-8%	0 (Non Hydric)

	Verdigris silt loam	0-1%	0 (Non Hydric)
Jackson Stoabs #10-2	Steedman –Lucien complex	3-15%	0 (Non Hydric)
	Steedman –Lucien complex	15-25%	0 (Non Hydric)
Jackson/Williams #10-3	Bartlesville-Bigheart complex	1-5%	0 (Non Hydric)
	Niotaze-Bigheart-Rock outcrop complex	15-25%	0 (Non Hydric)
JM Hughes (Dove) #28-5	Niotaze-Bigheart-Rock outcrop complex	3-15%	0 (Non Hydric)
Royal #4-3	Steedman-Lucien complex	3-15%	0 (Non Hydric)
Royal/E. Hughes #5-6	Niotaze-Bigheart-Rock outcrop complex	3-15%	0 (Non Hydric)
	Steedman-Lucien complex	3-15%	0 (Non Hydric)

4.4.1 Potential Impacts from Soil Erosion

4.4.1.1 General

The soil types are not expected to create unmanageable erosion issues or interfere with reclamation of the area. Topsoil stripped from areas of new construction would be retained for use during reclamation. Any areas stripped of vegetation during construction would be recontoured to original topographic variations and seeded with a native grass mixture within 6 months of construction cessation, environmental conditions permitting. No significant adverse impacts to soil resources are anticipated.

The proposed well pad areas are primarily where soils have 0 to 25 percent slopes. Care would be taken during construction to minimize soil erosion impacts.

1. The soil types found at the well pad locations have variable run-off depending on the slope, which ranges between 0 and 25 percent (NRCS 2012).
2. Reclamation of vegetative communities should be attainable due to the affinity of native grassland species to the soil types present (NRCS 2012).
3. The sites would be monitored during and after construction to prevent erosion, minimize runoff and loss of sediment, and ensure soil stabilization.

4.4.1.2 Action Designed to Reduce Impacts

Unlike well pads, active roadways are not typically reclaimed, thus sediment yield from roads can continue indefinitely at rates two to three times the background rate. The Proposed Action would create approximately 1.03 miles of new and improved roads in the cumulative impacts analysis area (CIAA), adding incrementally to existing and future impacts to soil resources, dust deposition, and erosion processes. New well field developments would be speculative until APDs are submitted to the BIA for approval. Additional wells have been or are likely to be drilled in the same general area as the Proposed Action, using many of the same main access roads and minimizing the disturbance as much as possible.

The Applicant is committed to using BMPs to mitigate the potential effects of erosion. BMPs would include the implementation of erosion and sedimentation control measures, such as installing culverts; constructing water bars alongside slopes; and planting cover vegetation if

necessary to stabilize soil following construction and before permanent seeding takes place. Additional information regarding BMPs is provided in Section 5.0, Mitigation and Monitoring.

Specific erosion control measures would be implemented when necessary at the proposed well pads. If needed, berms would be installed along the outer edges of the well pads, and well pad corners would be rounded.

4.5 Wetlands

The USACE regulates the discharge of dredge and fill material into waters of the U.S., including wetlands, pursuant to Section 404 of the Clean Water Act. Additionally, Executive Order 11990 (protection of Wetlands) requires federal agencies to avoid, to the extent possible, adverse impacts to wetlands.

The National Wetland Inventory (NWI) maps maintained by the U.S. Fish and Wildlife Service (USFWS) were reviewed for each of the proposed well sites. Copies of the NWI data for each well site are included in Appendix D. According to the NWI maps, there were no jurisdictional wetlands affected by the proposed well sites.

Alee #22-1

No jurisdictional wetlands were indicated by the USFWS NWI online database in the project area or in the vicinity of the project. In addition, the soils at the well pad site were classified as non-hydric. Based on these factors, no jurisdictional wetlands would be impacted by the proposed Alee #22-1 well pad.

Alee #22-2

No jurisdictional wetlands were indicated by the USFWS NWI online database in the project area or in the vicinity of the project. In addition, the soils at the well pad site were classified as non-hydric. Based on these factors, no jurisdictional wetlands would be impacted by the proposed Alee #22-2 well pad.

Cottonmouth #3-5

No jurisdictional wetlands were indicated by the USFWS NWI online database in the project area or in the vicinity of the project. In addition, the soils at the well pad site were classified as non-hydric. Based on these factors, no jurisdictional wetlands would be impacted by the proposed Cottonmouth #3-5 well pad.

Cottonmouth #3-6

No jurisdictional wetlands were indicated by the USFWS NWI online database in the project area or in the vicinity of the project. In addition, the soils at the well pad site were classified as non-hydric. Based on these factors, no jurisdictional wetlands would be impacted by the proposed Cottonmouth #3-6 well pad.

David #31-2

No jurisdictional wetlands were indicated by the USFWS NWI online database in the project area or in the vicinity of the project. In addition, the soils at the well pad site were classified as non-hydric. Based on these factors, no jurisdictional wetlands would be impacted by the proposed David #31-2 well pad.

Jackson Stoabs #10-2

No jurisdictional wetlands were indicated by the USFWS NWI online database in the project area or in the vicinity of the project. In addition, the soils at the well pad site were classified as non-hydric. Based on these factors, no jurisdictional wetlands would be impacted by the proposed Jackson Stoabs #10-2 well pad.

Jackson Williams #10-3

No jurisdictional wetlands were indicated by the USFWS NWI online database in the project area or in the vicinity of the project. The soils at the well pad site were classified as non-hydric.

Based on these factors, and as a result of applicant implementing the appropriate BMPs in Section 5.0, no jurisdictional wetlands would be impacted by the proposed Jackson Williams #10-3 well pad.

JM Hughes (Dove) #28-5

No jurisdictional wetlands were indicated by the USFWS NWI online database in the project area or in the vicinity of the project. In addition, the soils at the well pad site were classified as non-hydric.

Based on these factors, no jurisdictional wetlands would be impacted by the proposed JM Hughes (Dove) #28-5 well pad.

Royal East Hughes #4-3

No jurisdictional wetlands were indicated by the USFWS NWI online database in the project area or in the vicinity of the project. In addition, the soils at the well pad site were classified as non-hydric.

Based on these factors, no jurisdictional wetlands would be impacted by the proposed Royal East Hughes #4-3 well pad.

Royal #5-6

No jurisdictional wetlands were indicated by the USFWS NWI online database in the project area or in the vicinity of the project. The soils at the well pad site were classified as non-hydric.

Based on these factors, and as a result of applicant implementing the appropriate BMPs in Section 5.0, no jurisdictional wetlands would be impacted by the proposed Royal #5-6 well pad.

4.5.1 Potential Impacts to Wetlands

While initial siting of the well pad disturbance shows that there will be no potential impacts to wetlands, Performance will implement BMPs as described in Section 5.0 to avoid disturbances to any waterbodies near or in the proposed well pad development site. No impacts to jurisdictional wetlands are anticipated as a result of the proposed action.

4.6 Prime Farmland

The Farmland Protection Policy Act (FPPA) estates that federal agencies must "minimize the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses…" The NRCS is responsible for protecting significant agricultural lands from irreversible conversions that result in the loss of an essential food or environmental resource. Prime farmland is characterized as land with the best physical and chemical characteristics for the production of food, feed, forage, fiber, and oilseed crops. This land either is used for food or fiber crops or is available for those crops, and not urban, built-up land, or a water area. The soil qualities, growing season, and moisture supply are those needed for a well-managed soil to economically produce a sustained, high yield of crops (USDA NRCS 2012).

Consultation was performed with the Natural Resources Conservation Service to identify prime farmland within the Proposed Action area. Table 4-4 is a summary of the information obtained from NRCS. Detailed prime farmland reports are included in Appendix D.

Table 4-4. Prime Farmland.

Well Name	Soil Description	Prime Farmland
Alee #22-1	Niotaze-Bigheart-Rock outcrop complex	No
Alee #22-2	Niotaze-Bigheart-Rock outcrop complex	No
Cottonmouth #3-5	Agra silt loam	Yes
	Steedman-Lucien complex	No
	Bigheart-Niotaze-Rock outcrop complex	No
Cottonmouth #3-6	Bigheart-Niotaze-Rock outcrop complex	No
David #31-2	Lucien-Coyle complex	No
	Verdigris silt loam	Yes
Jackson Stoabs #10-2	Steedman –Lucien complex	No
	Steedman –Lucien complex	No
Jackson/Williams #10-3	Bartlesville-Bigheart complex	Yes
	Niotaze-Bigheart-Rock outcrop complex	No
JM Hughes (Dove) #28-5	Niotaze-Bigheart-Rock outcrop complex	No
Royal #4-3	Steedman-Lucien complex	No
Royal/E. Hughes #5-6	Niotaze-Bigheart-Rock outcrop complex	No
	Steedman-Lucien complex	No

4.6.1 Potential Impacts to Prime Farmland

Impacts as a result of the Proposed Action would be considered minimal, as Performance will limit the area of impact and disturbance during the well pad installations. Losses of prime farmland will be temporary in nature, as the land will be reclaimed and placed back to natural conditions when the well production has ceased and the well is closed in. No significant impacts to NRCS-designated Prime Farmland soils are anticipated as a result of the proposed action.

4.7 Vegetation and Noxious Weeds

4.7.1 Vegetation

According to the Oklahoma Biological Survey, Osage County includes three major vegetation types: post oak-blackjack forest, tallgrass prairie, and bottomland forest along the Arkansas River. Vegetation types are influenced by precipitation, geology and soils, and fire and grazing disturbances. Post oak-blackjack forest, also known as cross timbers, is characterized by a mix of forest, woodland, and grassland vegetation. Post oak, blackjack, blackhaw, black oak, black hickory, buckbrush, gum bumelia, Mexican plum, redbud, roughleaf dogwood, and smooth and winged sumac are common woody species. The herbaceous layer contains beebalm; big bluestem, poverty grass, among others. The tallgrass prairies contain primarily grasses such as little bluestem, big bluestem, Indiangrass and switchgrass. Other herbaceous plants found in the tallgrass prairie are lead plant, Indian plantain, prairie clover, and many others. Tallgrass prairie is commonly replaced by forests and woodlands in the absence of fire or grazing pressure and has declined in acreage during recent years. There is tremendous variation in species composition of bottomland forests, but most are dominated by hackberry, red elm, sugarberry, and green ash. (Hoagland 2008)

4.7.2 Noxious Weeds

"Noxious weeds" is a general term used to describe plant species that are not native to a given area, spread rapidly, and have adverse ecological and economic impacts. These species may have high reproduction rates and are usually adapted to occupy a diverse range of habitats otherwise occupied by native species. These species may subsequently out-compete native plant species for resources, causing a reduction in native plant populations.

Efforts to reduce the spread of noxious weeds would be made during the project construction and maintenance processes.

4.7.3 Potential Impacts on Vegetation and Noxious Weeds

The Proposed Action would result in the loss of approximately 9.44 acres of mixed-grass vegetation and some improved livestock pasture vegetation. In addition to the removal of typical native grasslands, removal of existing vegetation may facilitate the spread of noxious weeds. The operator will control noxious weeds throughout project area. If a noxious weed community is found, it would be eradicated unless the community is too large, in which case it would be controlled or contained to prevent further growth. The services of a qualified weed control contractor would be utilized if necessary.

Surface disturbance and vehicular traffic would not take place outside approved ROWs for the well pads, access roads, and utilities. Areas that are stripped of topsoil would be seeded and

reclaimed at the earliest opportunity. Prompt and appropriate construction, operation, and reclamation are expected to maintain minimal levels of adverse impacts to vegetation and would reduce the potential establishment of invasive vegetation species.

Any acreage disruption associated with the Proposed Action would result in negligible levels of vegetation disturbance and would not result in significant adverse impacts to vegetation resources.

The Proposed Action would result in some loss of vegetation and ecological diversity. In addition, vegetation resources across the project area could be affected by foreseeable future energy development and surface disturbance in the CIAA. Continued oil and gas development within the CIAA could result in the loss, and further fragmentation, of native habitat. Incremental impacts to quality native prairie may occur in the future from vegetation clearing and soil disturbance, soil loss, compaction, and increased encroachment of unmanaged invasive weed species. Past, present, and reasonably foreseeable future activities within the general area have reduced, and would likely continue to reduce, the amount of available habitat for certain listed species known to use native habitats. Cumulative impacts to vegetation and other biological resources are expected to be minor and temporary in nature.

4.8 Wildlife

4.8.1 General Wildlife Species Occurrence and Habitat

In Osage County, migratory waterfowl such as ducks, herons, shorebirds, and geese are known to frequent areas around rivers, streams, ponds, wetlands and lakes. Additionally, wildlife attracted to these areas includes muskrat, mink and beaver. Upland game birds such as wild turkey, bobwhite quail, and doves are plentiful and can be found in agricultural and prairie lands. Birds such as bald eagle, golden eagle, marsh hawk, red-tailed hawk, red-bellied woodpecker, chickadee, tufted titmice, and numerous warblers and sparrows also are common. The area of Osage County that includes the Tallgrass Prairie Preserve is said to have over three hundred species of birds.

Mammals found in Osage County include white-tailed deer, bobcats, coyotes, fox, rabbit, raccoon, squirrels, skunks and opossums.

Many ponds and lakes have been stocked with game fish, such as crappie, perch and catfish. Catfish, bass, darters, sunfish, carp, gar and other species can also be found in larger streams. Species found in Salt Creek and other streams have been studied and described in the literature. See, e.g., Fishes Known from Salt Creek, Osage County, Oklahoma, in Proceedings of the Oklahoma Academy of Science for 1961 by Wayne F. Hadley and William Carter.

4.8.2 Potential Impacts to Wildlife

Approximately 9.44 acres and 6.4 acres of existing vegetation would be removed short and long term, respectively, by well-pad, pipeline, and access road construction. The proposed action would result in short-term change in plant and animal species composition and altered utilization of the site and surrounding area by wildlife until reclamation occurs. Wildlife will be temporarily displaced, but the effects will be short term. The proposed action would remove food, cover, and space for wildlife in the area. The more mobile species will move away from

the area during the construction, drilling and well completion phases of this petroleum exploration project to avoid direct mortality, the increase in human presence, and levels of noise. The less mobile species could suffer some mortality during the active construction phase of the project. However, no significant adverse impacts to wildlife are anticipated, and any adverse impacts that result from the proposed action will be incidental.

4.8.3 Threatened and Endangered Species

Section 7 of the Endangered Species Act (16 USC 1531 et seq.) requires that federal agencies, in consultation with the USFWS, ensure that their actions are not likely to jeopardize the continued existence of any listed species, or result in adverse effects on designated critical habitat of such species. The Endangered Species Act also prohibits any action that results in a "taking" of any listed federally protected plant, fish or wildlife species. The Applicant and the BIA must ensure that the proposed action does not jeopardize the continued existence of a federally listed threatened or endangered species, or result in the adverse modification of a federally designated critical habitat of a listed species.

As part of the proposed actions' preliminary planning and development, information was obtained to determine the federally protected species that could potentially occur within the vicinity of the project. An official list of species potentially impacted by each well is located in Appendix D.

4.8.4 Migratory Birds

The Migratory Bird Treaty Act (MBTA) (16 USC 703-712; 40 Stat. 755 as amended) protects migratory birds and most resident birds that are native to the United States. According to the MBTA, it is illegal to pursue; hunt; take; capture; kill; attempt to take capture, or kill; and active nests (and the eggs or young within). The MBTA does not prohibit harassment, disturbance, or habitat removal and alterations. Thus, MBTA prohibitions most relevant to the proposed action involve killing of a chick or egg through destruction of an active nest.

Use of the general wildlife resource mitigation measures should provide adequate protection to general wildlife populations and their habitats in the project area. 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.

Unlike the MBTA, the Bald and Golden Eagle Protection Act (BGEPA) prohibits disturbance of eagles and the destruction of both active and inactive nests. Under BGEPA, permit programs are available that may allow the Applicant to take an inactive nest of to disturb eagles at an active nest or eagle concentration area, if avoidance and minimization measures are implemented in coordination with the USFWS and the threshold of take for the regional eagle population has not be exceeded. In order to comply with the BGEPA, Applicants must avoid clearing trees with eagle nests, unless the USFWS is contacted. In addition, during clearing and construction the Applicant must plan to avoid disturbing adult bald eagles, chicks and fledglings within the

appropriate disturbance distance identified by the USFWS from the project site during the breeding season.

4.8.5 Potential Impacts to Threatened and Endangered Species and Migratory Birds

A list of federally-listed species that may be affected by the proposed action was obtained from the USFWS' Information, Planning, and Conservation System (IPaC) online database. Table 4.5 lists the species reported as well as their federal status and preferred habitat descriptions.

Table 4-5. Federally-Listed Species, Status, and Preferred Habitat Descriptions

Species	Status	Preferred Habitat
Least Tern (*Sterna antillarum*)	Endangered	Formerly the major river systems of the Midwestern United States. These rivers included the Red, Rio Grande, Arkansas, Missouri, Ohio, and Mississippi river systems. Currently, they occur as small remnant colonies throughout their former range. In Oklahoma, least terns nest along most of the larger rivers, as well as at the Salt Plains National Wildlife Refuge near Jet, Oklahoma. Least terns winter in South America.
Piping Plover (*Charadriusmelodus*)	Threatened	Migration through Oklahoma is likely to occur from March-May and July-September. Piping plovers usually migrate as individuals or small groups and may be seen along sandbars of major rivers, salt flats, and mudflats of reservoirs. Piping plovers forage on these shoreline habitats and eat small invertebrates.
Red Knot (Calidris*canut usrufus*)	Proposed Threatened	The Red Knot is a migratory shore bird that breeds on the dry tundra in northern Canada, and winters along the coast of southern North America and South America. The Red Knot migration path brings it through Oklahoma.
Whooping Crane (*Grus americana*)	Endangered	The Whooping Crane inhabits a variety of wetland and other habitats, such as coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural fields.
Neosho Mucket (*Lampsilisrafi nesqueana*)	Endangered	The Neosho Mucket is a small mussel that is found in stable gravel and finer sediment in near shore and backwater portions of small rivers.
American Burying Beetle *(Nicrophorusa mericanus)*	Endangered	Considered to be a feeding habitat generalist, their reproductive habitat is believed to be more specialized. Habitat requirements are not fully understood, as the ABB has been found in various habitat types.

Rattlesnake-Master Borer Moth (*Papaipemaery ngii)*	Candidate	The Rattlesnake-Master Borer Moth is associated with prairie habitats and the rattlesnake master, a prairie plant that is its only food source. These moths depend on undisturbed prairie habitat to support their food source.

No suitable habitat was identified within any of the well pad sites for supporting the least tern, piping plover, red knot, whooping crane, Neosho mucket, or the rattlesnake master borer moth. Therefore, the proposed action would have "no effect" on these listed species.

Suitable habitat for supporting the American burying beetle (ABB) was identified within the proposed well pad areas. A presence/absence survey was performed by BEACON (USFWS Survey ID #2672) at each site to more accurately determine the potential effects of the proposed action on the ABB. For all ten (10) well pads, the presence/absence surveys were negative; indicating that the well pad installation would likely not affect any ABBs. Based on suitable habitat being present, and recent surveys indicating that ABB are not present, the species impact determination for potential impact to the ABB would be "May affect, not likely to adversely affect." Since this determination was made based on valid presence/absence surveys, USFWS does not require any further Section 7 consultation in regard to the ABB. A copy of the relevant ABB survey report is included in Appendix C. However, the negative presence absence surveys will expire if the proposed actions have not been implemented before the survey results expire at the beginning of the next active season. If the proposed ground disturbing activities have not commenced by this time then the lessee will be required to perform a subsequent round of ABB surveys and submit those valid survey results to the BIA and the USFWS in accordance with the BMPs contained in Section 5.0, which will be incorporated into the drilling permit as a mandatory condition.

No habitat suitable for nesting of eagles was observed at any of the well pad sites. Any impacts to migratory birds would be in the form of minor harassment, as the well pad installation will be minimally invasive and short term in duration.

No significant impacts to federally listed species, migratory birds, or eagles are anticipated as a result of the Preferred Action. No further Section 7 consultation with USFWS is required for the proposed action.

4.9 Agriculture

Ranching is the main enterprise in Osage County. According to the 2007 Agricultural Census, livestock sales accounted for $127 million, or 96 percent, of the total agricultural market. Osage County ranks 9th out of the 77 counties in Oklahoma in total value of agricultural products sold (USDA NASS 2007a). The average operating ranch unit is approximately 83.5 acres. About 75 percent of the land in farms or ranches is open range, 12 percent is wooded range, 7 percent is cropland, and 6 percent is tame pasture. Small grains, mainly wheat, alfalfa, grain sorghums, and soybeans are the principal crops. Corn and sorghums cut for silage and used by local dairies, and orchard crops are grown on a minor acreage. A large acreage of native grasses and tame pastures are cut for hay which is mostly used by local farms and ranchers. The other crops are shipped to local and distant markets and sold for cash. Approximately 75 percent of the annual

production on rangeland grows in April, May, and June coinciding with spring rains and moderate temperatures. A secondary growth period generally occurs in September and October coinciding with fall rains and cooling temperatures (USDA NRCS 2012a).

4.9.1 Potential Impacts to Agriculture

No cropland exists in or near any of the ten proposed well pad sites, therefore, none would be affected. The well pad sites are located within cattle pasture, and any impacts would be minor and temporary in nature. The creation of access roads would be beneficial to the ranch operator, as it would increase their vehicle access to the property.

4.10 Cultural Resources

Historic properties, or cultural resources, on federal or tribal lands are protected by many laws, regulations, and agreements. Section 106 of the National Historic Preservation Act of 1966 (16 USC 470 et seq.) requires, for any federal, federally assisted, or federally licensed undertaking, that the federal agency take into account the effect of that undertaking on any district, site, building, structure, or object that is included in the National Register of Historic Places (National Register) before the expenditure of any federal funds or the issuance of any federal license. Cultural resources is a broad term encompassing sites, objects, or practices of archaeological, historical, cultural, and religious significance. Eligibility criteria (36 CFR 60.4) include association with important events or people in our history, distinctive construction or artistic characteristics, and either a record of yielding or a potential to yield information important in prehistory or history. In practice, properties are generally not eligible for inclusion in the National Register if they lack diagnostic artifacts, subsurface remains, or structural features, but those considered eligible are treated as though they were listed in the National Register, even when no formal nomination has been filed. This process of taking into account the effect on historic properties is known as "Section 106 review," or more commonly as a cultural resource inventory.

The area of potential effect of any federal undertaking must also be evaluated for significance to Native Americans from a cultural and religious standpoint. Sites and practices may be eligible for protection under the American Indian Religious Freedom Act of 1978 (42 USC 1996). Sacred sites may be identified by a tribe or an authoritative individual (Executive Order 13007). Special protections are afforded to human remains, funerary objects, and objects of cultural patrimony under the Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.).

Whatever the nature of the cultural resource addressed by a particular statute or tradition, implementing procedures invariably include consultation requirements at various stages of a federal undertaking (Executive Order 13175). The Osage Nation has designated a Tribal Historic Preservation Officer (THPO), whose office and functions are certified by the National Park Service. The BIA consults and corresponds with the THPO regarding cultural resources on all projects proposed within Osage County.

If cultural resources are discovered during construction or operation, the operator shall immediately stop work, secure the affected site, and notify the BIA and THPO. Unexpected or inadvertent discoveries of cultural resources or human remains trigger mandatory federal procedures that include work stoppage and BIA consultation with all appropriate parties.

Following any such discovery, operations shall not resume without written authorization from the BIA. Project personnel are prohibited from collecting any artifacts or disturbing cultural resources in the area under any circumstance. Individuals outside the ROW are trespassing. No laws, regulations, or other requirements have been waived; no compensatory mitigation measures are required. The presence of qualified cultural resource monitors during construction activities is encouraged.

4.10.1 Brief Cultural Overview

Based on previous archaeological work within Oklahoma, portions of the state have been inhabited by humans for at least 12,000 years. Throughout most of the state, the recorded prehistoric occupations range from Paleoindian Period encampments to Late Prehistoric Period sites. Some areas within the region hold a long history of Native American habitation. Multiple sites have been explored that suggest the area was inhabited by societies adapted for various geographical regions of the area dating back to 6000 B.C.

Historic Period sites vary widely across Oklahoma. Structures and buildings associated with pre-removal and post-removal historic Native American tribes, non-Indian settlements of the Oklahoma Territory beginning in 1889, farming, and the late nineteenth/early twentieth century petroleum industry are commonly encountered.

4.10.2 Potential Impacts to Cultural Resources

Open Range Archeology conducted an investigation of the ten well pads in order to more accurately predict any potential impacts to cultural resources as a result of the preferred action. This investigation included a review of records maintained by Oklahoma Archeological Survey (OAS) as well as a pedestrian field survey of the well pad area and a ten (10) acre buffer area around the proposed well pad sites. During the records review portion of the investigation, no records of cultural resources or historical register eligible places were identified.

During the subsequent field survey, one (1) previously unrecorded site (Site number 34OS1316) was located within the proposed Cottonmouth #3-6 well pad and ten acre buffer area. This site was described as being comprised of historic oil well and tank debris. Open Range's analysis of the site concluded that it was not eligible for the National Register of Historic Places, and that the proposed action could proceed as planned.

No other previously unrecorded sites at the remaining nine (9) proposed well pads were identified during the field survey conducted by Open Range, and no impacts to cultural resources or historic places are anticipated as a result of the proposed action.

The survey report was submitted to the BIA Osage Agency Archeologist for review and approval. In accordance with 36 CFR Part 800.3 and 800.4 the survey report was provided to the Osage Nation Tribal Historic Preservation Office, the State of Oklahoma Historic Preservation Office and the Oklahoma Archeological Survey for further review. All National Historic Preservation Act (NHPA) correspondence and concurrence letters are provided in the Appendix of the EA to demonstrate completion of the section 106 NHPA compliance process.

Significant archaeological resources are irreplaceable and often unique; any destruction or damage of such resources can be expected to diminish the archaeological record as a whole. However, no such damage or destruction of significant archaeological resources is anticipated as a result of the Proposed Action, as these resources would be avoided. Therefore, no cumulative impacts to the archaeological record would occur as a result of implementation of the Proposed Action.

4.11 Public Health and Safety

Osage County is dominated by farm land and grazed pastures with residents living in rural communities. The Osage County Sheriff's department as well as several local agencies provides law enforcement services. In addition, the Osage Nation Police Department (ONPD) is charged with enforcing all tribal, state, and federal laws on the Osage Nation Reservation. The ONPD is directed by a Chief of Police who is responsible for the day to day operations of the police department (Osage Nation 2012). Fire and emergency response is the responsibility of municipal fire departments in nearby communities such as Cleveland, Hominy, and Wynona. The Osage Nation Emergency Management Agency provides fire protection for the restricted and trust land on the Osage Reservation.

Health and safety concerns include H_2S gas that could be released as a result of drilling activities, hazards introduced by heavy truck traffic, and hazardous materials used or generated during construction, drilling, and/or production activities.

H_2S is extremely toxic in concentrations above 500 parts per million and is known to occur in varying concentrations within the Osage Minerals Reserve. Contingency plans incorporated into the BMPs (Section 5.0) comply with relevant portions of Onshore Oil and Gas Order No. 6. Emergency response plans protect both the drilling crew and the general public, and precautions include sampling and monitoring by drilling personnel stationed at each well site.

Standard mitigation measures would be applied, and because release of H_2S at dangerous concentration levels is very unlikely, no direct impacts from H_2S are anticipated with implementation of the Proposed Action.

All traffic would be confined to approved routes and conform to established load restrictions and speed limits for state and county roadways and haul permits would be acquired as appropriate.

The EPA specifies chemical reporting requirements under Title III of the Superfund Amendments and Reauthorization Act (SARA), as amended. No chemicals subject to reporting under SARA Title III (hazardous materials) in an amount greater than 10,000 pounds would be used, produced, stored, transported, or disposed of annually in association with the Proposed Action. Furthermore, no extremely hazardous substances, as defined in 40 CFR 355, in threshold planning quantities would be used, produced, stored, transported, or disposed of in association with the Proposed Action. All operations, including flaring, would conform to instructions from BIA fire management staff.

Spills of oil, produced water, or other produced fluids would be cleaned up and disposed of in accordance with appropriate regulations. Sewage would be contained in a portable chemical

toilet during drilling if one is necessary. All trash would be stored in a trash cage and hauled to an appropriate landfill during and after drilling and completion operations.

4.11.1 Hazardous Materials

The Pipeline and Hazardous Materials Safety Administration (PHMSA), a federal agency within the USDOT, is the primary federal regulatory agency responsible for ensuring the safety of America's energy pipelines, including crude oil pipeline systems. As a part of the responsibility, PHMSA established regulatory requirements for the construction, operation, maintenance, monitoring, inspection and repair of hazardous liquid pipeline systems.

Hazardous substances are defined as any solid, liquid, contained gaseous or semisolid waste, or any combination of wastes that pose a substantial present or potential hazard to human health and the environment. Hazardous substances are primarily generated by industry, hospitals, research facilities, and the government. Improper management and disposal of hazardous substances can lead to pollution of groundwater or other drinking water supplies and the contamination of surface water and soil. The primary federal regulations for the management and disposal of hazardous substances are the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA).

Safety and security issues considered in this EA include the health and safety of the area residents and the public-at-large, and the protection of personnel involved in activities related to the proposed management activities. Executive Order 13045 (Protection of Children) requires federal agencies to make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children

4.11.2 Emergency Response

Osage County is dominated by farm land and grazed pastures with residents living in rural communities. The county has a Sheriff's department and in addition several towns within the county have local law enforcement. On November 8, 1994 pursuant to the National Council Bill Number 10; the Osage Nation elected to establish a law enforcement agency to be called the Osage Nation Police Department (ONPD). The ONPD is charged with enforcing all laws including Tribal, state, and federal in Osage County.

Fire and emergency response with the area affected by the Proposed Action is the responsibility of municipal fire departments in nearby communities such as Cleveland, Hominy, Wynona, Pawhuska, among others, and including rural volunteer fire department. The Osage Nation Emergency Management Agency provides fire protection for the restricted and trust lands in Osage County.

4.11.3 Potential Impacts to Public Health and Safety

With the implementation of the described reporting and management of hazardous materials, no adverse impacts to public health and safety are anticipated as a result of the proposed well pads. Other potential adverse impacts to any nearby residents from construction would be largely temporary. Noise, fugitive dust, and traffic hazards would be present for about 30 days during construction, drilling, and well completion as equipment and vehicles move on and off the site,

and then diminish sharply during production operations. If a well proved productive, one small pumper truck would visit the well once a day to check the pump. Wells typically produce both oil and water initially. Gas would be flared initially and intermittently only if necessary, and only after applicant receives written authorization from the Osage Agency Superintendent according to 25 CFR 226.37. Oil and produced water would be connected to existing gathering systems and then processed and stored in tanks at a centralized tank battery. Produced water would be disposed of in an EPA approved disposal well, and oil would be hauled out by tankers. No new storage tank batteries will be installed as part the installation of these ten (10) wells.

4.12 Socioeconomics

This section discusses socioeconomic characteristics such as population, housing, demographics, employment, and economic trends within the analysis area. Also included are data relating to the State of Oklahoma and the United States, which provide a comparative discussion when compared to the analysis area. Information in this section was obtained from various sources including, but not limited to, the U.S. Census Bureau, the U.S. Bureau of Economics, and the State of Oklahoma.

4.12.1 Population and Demographic Trends

According to the U.S. Census Bureau, the 2010 population estimate for Oklahoma was approximately 3.75 million, as shown in Table 4-6. Between the years 2000 and 2010, the state population grew by 8.7 percent. The population of Osage County grew at a similar rate to the state.

Table 4-6. Population Change in Osage County, Oklahoma.

Region	Population		Percent Change 2000-2010
	2000	2010	
Oklahoma	3,450,654	3,751.351	8.71
Osage County	44,437	47,472	6.83

Source: USCB, 2000 and 2010 Population Estimates

Table 4-7 presents the racial composition of Oklahoma and Osage County. The dominant race in Oklahoma and Osage County is white, comprising 65 percent of the population in Osage County. The next most represented race in Osage County is American Indian/Alaska Native, comprising 14 percent of the population in Osage County.

Table 4-7. 2010 Census Population by Race in Osage County, Oklahoma.

Category	Osage County		Oklahoma	
	Population	%	Population	%
Hispanic/Latino	1,366	2.88	332,007	8.85
White	30,709	64.69	2,575,381	68.65
Black or African American	5,355	11.28	272,071	7.25
American Indian/Alaska	6,704	14.12	308,733	8.23

Native				
Asian	118	0.25	64,154	1.71
Native Hawaiian and Other Pacific Islander	11	0.02	3,977	0.11
Some Other Race	14	0.03	2,954	0.08
Two or More Races	3,195	6.73	192,074	5.12
Total Population	47,472		3,751,351	

Source: USCB, 2010 Census

Table 4-8 presents the population in the workforce in Osage County. Approximately 78% of the Oklahoma population is 16 years old, or older, and part of the workforce. Osage County follows the same trend with 78 percent in the workforce.

Table 4-8. 2010 Census Population in the Workforce in Osage County, Oklahoma.

Region	16 and Over	
	Population	Percent
Oklahoma	2,924,289	77.95
Osage County	37,292	78.56

Source: USCB, 2010 Census

Total "non-farm employment" in Oklahoma increased by approximately 22,800 jobs in 2011. The largest non-farm related employer industry in Oklahoma is the government, which includes jobs in public schools, law enforcement, and tribal government, followed in number of non-farm jobs by trade, transportation, and utilities jobs. In 2011 the mining and logging industry experienced a growth of 15 percent, the greatest of all industries within Oklahoma. Other industries that grew in 2011 includes manufacturing; trade, transportation and utilities; education/health services, leisure/hospitality; and government. Industries that saw a decline in employment in 2011 include construction, information, financial activities, profession/business services, and other services (OESC 2012).

The 2010 median household income for Oklahoma was $42,979. Median household income was slightly lower than the state average in Osage County (USCB 2010).

4.12.2 Potential Impacts to Socioeconomics

Impacts to socioeconomic resources of the analysis area would be incremental and therefore would not adversely impact the local area. Short-term impacts to socioeconomic resources would generally occur during the construction/drilling and completion phases of the proposed wells. Long-term effects would occur during the production phase, should the wells prove successful. Any increase in workers would result in a short-term increase in population in the project area required for short-term operations and would create an incremental increase in and for services or infrastructure within Osage County.

Implementation of the Proposed Action would likely result in direct and indirect economic benefits associated with industrial and commercial activities in Osage County. Direct impacts would include increased spending by contractors and workers for materials, supplies, food, and lodging in the surrounding area, which would be subject to sales and lodging taxes. Other state and local tax payments and fees would be incurred with a small percentage of these revenues distributed back to the local economies. Wages due to employment would also impact per capita income for those who were previously unemployed or underemployed. Indirect benefits would include increased spending from increased oil and gas production, as well as a slight increase in generated taxes from the short-term operations. Mineral severance and royalty taxes, as well as other relevant taxes on production would also grow directly and indirectly as a result of increased industrial activity in the oil and gas industry.

4.13 Environmental Justice

Executive Order 12898 directs federal agencies to consider environmental justice in connection with their programs and activities. It requires federal agencies to *"...analyze the environmental effect, including human health, economic and social effects of federal actions, including effects on minority communities and low-income communities, when such analysis is required by the National Environmental Policy Act of 1969 (NEPA)..."* Furthermore, it states that *"...each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies or activities on minority populations and low-income populations..."* Memorandum accompanying E.O. 12898, February 4, 1994

The affected area analyzed in this Environmental Assessment is part of Osage County, which is the homeland of the Osage Tribe of Indians. There is a higher percentage of Native Americans in Osage County as compared to the State of Oklahoma, as shown in Table 4-7.

Osage County has a slightly lower percentage (14.5 percent) than the state of Oklahoma (16.9 percent) with regard to the population below the poverty level. At the same time, Osage County has slightly lower per capita income ($22,353) than the state ($24,208), and a slightly lower median household income ($44,195) compared to the state ($45,339). See Census Quickfacts at www.quickfacts.census.gov/.

The percent of the Oklahoma population 5 years and over with a disability is 21.6 percent. Osage County has a slightly higher disability rate than the state. Overall, within the three age groups, the population 65 years and over has the highest rate of disability (USCB 2000b).

In order to advance environmental justice, BIA and other federal agencies should pursue fair treatment and meaningful involvement of minority and low-income populations. Fair treatment means such groups should not bear a disproportionately high share of negative environmental consequences from federal programs, policies, decisions or operations. Meaningful involvement means federal officials actively promote opportunities for public participation and federal decisions can be materially affected by participating groups and individuals.

The EPA headed the interagency workgroup established by the 1994 Executive Order and is responsible for related legal action. EPA has developed the *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses (1998)* and various tools

such as EJ View to assist with statistics and methodology for identifying communities of concern.

4.13.1 Potential Impacts to Environmental Justice

At least one factor commonly used to review the potential for environmental justice concerns is present within Osage County. The population of Osage County includes a higher percentage of persons identifying as a minority (Native American and Black) than the State of Oklahoma. The majority of persons identifying as Native American are likely Osage citizens.

There is no reason to suspect that the Proposed Action well locations would have direct disproportionate impacts on any minority since there are several affected landowners at dispersed locations. However, since all locations associated with the Proposed Action are located in the homeland of the Osage people, there is the potential for adverse impacts to traditional lifeways and cultural resources from the potential disturbance of any traditional gathering places, cultural properties and cultural resources.

The BIA is unaware of any places in Osage County that are used for traditional gathering and hunting purposes. However, BIA frequently coordinates with the Osage Minerals Council and the Executive Branch of Osage Nation, and maintains a Complaint Hotline for persons who have concerns about oil and gas development.

Potential impacts to cultural resources are avoided or minimized through compliance with the NHPA. Prior to any ground disturbance, cultural resource surveys are performed for all proposed well locations, access roads and gathering pipeline routes. BMPs and mitigation measures required by the BIA provide additional protection against adverse impacts. Current BMPs require that work be immediately stopped following an unexpected discovery of cultural resources of any type. Mandatory consultation would take place during any such work stoppage, affording an opportunity for all affected parties to assert their interests and contribute to an appropriate resolution, regardless of their home location or tribal affiliation.

The Proposed Action is likely to directly benefit Osage citizens who are headright holders. Osage headright holders derive direct economic benefit from increased production of oil and gas, since they receive annuity payments based on royalties received from that production. Osage citizens and other minorities will also likely benefit from employment opportunities associated with a healthy oil and gas industry, as will residents of Osage County as a whole.

4.14 Lifestyles and Cultural Values

Oklahomans are proud of their diverse cultures, scenic landscapes, and hospitality. Oklahoma has a history of rich American Indian culture and currently, Oklahoma is home to more than 37 tribes. Additionally, Oklahoma has a long standing tradition of rodeos and is home to horse and cattle ranches with working cowboys. Over 100 traditional and Indian rodeos occur through the year in Oklahoma (Shop Oklahoma 2012).

The Osage Nation is headquartered in Pawhuska, Oklahoma and has approximately 14,500 members nationwide. The Cultural Center, located in Pawhuska, was established in 2004 to maintain the ancestral traditions, values, and way of life of the Osage Nation. To maintain the

values of their ancestors and their unique identity, the Osage Nation preserves the lessons of their ancestors. The Cultural Center hosts classes on traditional Osage language; traditional craft-wear, hosts artwork exhibits, and is home to a library (Osage Nation 2012 and Shop Oklahoma 2012).

4.15 Infrastructure

Osage County is generally rural with small farming communities and rural residences are scattered throughout; there is limited infrastructure development. There is very little urban development in the County with the exception of the southeast corner which borders the city limits of Tulsa. Communities within are served by multiple municipal services including police, fire, water, power and other utilities.

4.16 Resource Use Patterns

4.16.1 Hunting and Fishing

The Oklahoma Department of Wildlife Conservation (ODWC) provides habitat conservation and management efforts across the state at designated Wildlife Management Areas (WMAs). Game species in the state include: antelope, bear, dove, deer, elk, furbearers, feral hogs, mountain lion, quail, peregrine, pheasant, turkey, waterfowl, and various other small game and migratory birds. Hunting seasons vary for the various species, but in general hunting occurs in the fall and winter, October through December.

Additionally, the ODWC manages and stocks lakes and ponds through the state. Fish species produced and stocked annually include largemouth bass, smallmouth bass hybrid, walleye, brown trout and rainbow trout.

Within Osage County there are 6 designated WMAs that provide opportunities for hunting, fishing and camping. Some of the WMAs include U.S. Army Corps of Engineers (USACE) operated and controlled reservoirs while the park and/or WMA is operated by the ODWC. The USACE creates reservoirs for flood control, water supply, irrigation, hydropower, navigation, recreation, and fish and wildlife (ODWC 2012c). The WMAs in Osage County include: Hula, Osage, John Dahl, Candy Creek, Keystone, and Skiatook.

4.16.2 Timber Harvesting

Osage County is located within the Cross Timbers ecological region (USEPA 2012a). The hardwood community consists primarily of short oak trees that are not prime timber for harvest. However, forested areas have been cleared to create open sections for rangeland, pastures, and farmland

4.16.3 Recreation

Osage Hills State Park offers 1,100 acres with picnic tables and shelters, RV campsites, cabins, a swimming pool, hiking trails, a ball field, and a tennis court. Fishing for bass, crappie, catfish and perch is common in Lookout Lake or in Sand Creek at the south end of the park. The park is also used for fall foliage viewing (OHSP 2012).

Walnut Creek State Park is located on Lake Keystone and offers fishing, boating, camping, swimming, and water skiing. The 15-mile Sand Plum Trail that features flat to rolling terrain with many vistas of the lake is open to hikers, mountain bikers and horses (OTRD 2012).

Keystone State Park is located on Keystone Lake and offers boating, ATV trails, water skiing, and fishing (OTRD 2012)

4.16.4 Land Use Plans

The Osage County Assessor's Office provided information on the number of acres in each of the major land assessment categories. The data shows that almost 95 percent of Osage County is categorized as rural agricultural with rural residential comprising 2.6 percent of the county

4.16.5 Noise and Light

The Noise Control Act (42 USC 4901-4918) initially was implemented through regulations issues by the USEPA in the early 1980s; however, the primary responsibility for regulating noise has been delegated to state and local governments.

Noise in generally defined as unwanted sound. Sound is most commonly measured in decibels (dB) on the A-weighted scale, which is the scale most similar to the range of sounds audible to the human ear. The Day-Night Average Sound Level (DNL) is an average measure of sound.

The DNL descriptor is accepted by federal agencies as a standard for estimating sound impacts and establishing guidelines for compatible land uses. USEPA guidelines, and those of many other federal agencies, state that outdoor sound levels in excess of 55 dB DNL are "normally unacceptable" for noise-sensitive land uses such as residences, schools or hospitals.

Osage County is comprised of mostly rural land with occasional residences located throughout. Because of the rural character of Osage County, noise control ordinances are most likely not in place. Excessive artificial lighting is not a current concern for Osage County because of the rural character of the land. No lighting ordinances are in place for the county

4.16.6 Visual

The visual character of Osage County is a function of the terrain, land cover, and land use. Osage County is generally rural with small farming communities and rural residences scattered throughout. Osage County is dominated by agricultural fields, woodlands, and pastures/grasslands. Highways, local roads, and railroads, multiple transmission lines, distribution lines, and other types of development occur, contributing to the overall visual character of the area. No designated scenic rivers or areas occur within the Proposed Action area (National Wildlife and Scenic Rivers System 2012)

4.16.7 Potential Impacts to Resource Use Patterns

Based on the limited and short term nature of the project, no significant impacts to any resource use patterns are anticipated as a result of the preferred action

5.0 MITIGATION AND MONITORING

Many protective measures and procedures are described in this document and will be incorporated, as appropriate, by the applicant.

Mitigation opportunities can be found in general and operator-committed BMPs and mitigation measures. BMPs are loosely defined as techniques used to lessen the visual and physical impacts of development. Performance Operating will implement, to the extent possible, BMPs in an effort to mitigate environmental concerns in the planning phase, thereby allowing for smoother analysis, and possibly faster project approval.

5.1 General Requirements

Applicant will comply with the requirements of 25 CFR 226, including but not limited to:

- §226.22 – Prohibition of Pollution
- §226.33 – Line Drilling – Prohibiting location of any well or tank battery within 200 feet of a public highway, established watering place, or building used as a dwelling, granary, or barn unless prior written permission is granted by the Superintendent.
- §226.19 – Use of Surface Lands – Lessee must conduct operations in a workman like manner, commit no waste and allow none to be committed upon the land, nor permit any unavoidable nuisance to be maintained on the premises under his/her control.

5.2 Standard BMPs

The following BMPs shall be followed by applicant, their agents, operators and contractors:

1. Avoid impacts to National Register-eligible or unevaluated cultural resources on well sites and access roads. If cultural resources are discovered during construction or operation, stop work immediately, secure the affected site, and notify the BIA and Tribal Historic Preservation Officer. In the event of a discovery, work in that area shall halt and not resume until written authorization to proceed has been received from the BIA. All surface disturbances must be kept within the proposed ground disturbance area described in the EA. Expansion or relocation of the well pads, access roads, or other implementation of additional activities not included in the approved EA is prohibited unless an appropriate cultural resources survey has been submitted and determined adequate, approve by the BIA Osage Agency and all appropriate permits have been obtained.

2. Avoid or minimize soil and vegetation disturbance. Avoid removal of or damage to trees, shrubs, and groundcover the extent possible. Avoid or minimize alteration of the natural topography, and limit activities on steep slopes.

3. Erosion control measures are required for the duration of the construction, drilling and completion phases of the project. Erosion control measures must effectively minimize the movement of soil, debris or contaminants from the well site to adjacent lands and waterways.

4. All vehicles and equipment must utilize and stay confined to existing and new roads described in the approved EA. These roads must be maintained and upgraded as needed according to BIA direction and agreements between the operator and surface owners.

5. Tank batteries must have a Spill Prevention and Control and Countermeasure Plan (SPCC) in compliance with EPA Regulations under 40 CFR Part 112. A fluid impermeable secondary containment dike/berm must be constructed around any tank battery and facilities according to 40 CFR 112.7. The dike/berm and entire containment area must be graveled. No water collected within the secondary containment shall be discharged. In accordance with the SPCC plan and the BIA regulations, the Lessee will immediately notify the BIA of all spill incidents.

6. No venting or flaring of gas is allowed unless prior written approval of the BIA Osage Agency Superintendent has been obtained.

7. Store and label chemicals properly (including secondary containment). Do not store equipment or chemicals onsite if they are not being used on site. Do not leave open containers of chemicals or wastes on site.

8. Keep sites clean and free of any litter, trash, old equipment, contaminated soil or unused containers. Promptly dispose of any wastes at appropriate recycling facility, approved landfill or other approved location based on type of waste. Remove any unused equipment not necessary to the operation of the lease after drilling activities have been completed.

9. If the well is successful, all production equipment, facilities and tanks including well-head and above-ground piping/equipment shall be properly enclosed to exclude livestock if present.

10. All pits (including tank batteries contained within a dike/berm) must be enclosed with a fence of at least four strands of barbed wire, or approved substitute. Unlined earthen pits shall not be used for the continued storage of saltwater or other deleterious substances. Temporary pits must be filled and leveled upon completion of the activity.

11. To the extent possible, minimize disturbance to land owners, wildlife, and natural resources due to noise, excessive traffic, dust or other impacts associated with operations.

12. Do not conduct activities within stream channels or wetlands without proper authorization, and avoid any discharge of soil or contaminants or removal of stream water that could result in a violation of applicable federally-approved water quality standards.

13. Return area to original contour or as directed by the surface owner. If needed, add clean soil to disturbed areas. Restore disturbed areas by re-establishing vegetation using seed, sod or other approved method. Restore with native species unless otherwise directed by the surface owner in writing and approved by the BIA. No noxious or invasive species may be used in revegetation and reclamation activities.

14. If well drilling, completion and development are successful; all areas of the surface disturbance (i.e. well pad, access road, pipeline, etc.) that are not needed or used in the production or operation of the well shall be promptly reclaimed as described in the approved EA. If well drilling, completion and development are not successful, reclamation of the entire area will begin promptly. After a completed well is no longer in production, reclamation of the site will begin promptly. Reclamation shall be completed not later than ninety (90) days from rig removal, well abandonment or final plugging of a well, unless otherwise approved by the BIA.

15. The applicant shall conduct activities in a manner that avoids any potential incidental take or harm to federally-listed threatened and endangered species, or in a manner that complies with any permit or authorization issued by the USFWS. Applicant will follow guidance in the U.S. Fish and Wildlife Service (USFWS) "Oklahoma Ecological Services Field Office Migratory Bird and Eagle Impact Avoidance Measures for Actions Associated with Oil and Gas Projects" (April 2014).

16. Applicant will follow USFWS established protocol regarding areas where the American burying beetle (ABB) is known or suspected to exist. See http://www.fws.gov/southwest/es/oklahoma/ABBICP.htm. If proposed operations require the construction of a drilling pit or other excavation activity by heavy equipment, then the lessee must ensure that suitable habitat for the ABB does not exist. If proposed operations will impact suitable habitat for the ABB, it will be the responsibility of the lessee to obtain authorization from the USFWS to proceed with that portion of the project.

5.3 Air Quality BMPs

For proposed drilling operations in areas where formations will be penetrated which have zones suspected of containing H2S of 100 ppm in the gas stream, Performance Operating will implement the following Air Quality BMPs in an effort to mitigate exposure to personnel and contractors, and to protect the public:

1. Conduct the appropriate H2S training and install H2S related safety equipment which is operational when drilling commences.
2. If H2S was not suspected, but is encountered in excess of 100 ppm in the gas stream, the following measures shall be taken:
    a. Operator shall immediately ensure control of the well, suspend drilling operations, and obtain materials and safety equipment in order to protect all personnel or individuals in risk of exposure.
    b. Operator shall notify the appropriate company personnel of the event and mitigating steps that have or are being taken as soon as possible.

3. The operator will ensure that all personnel who will be working at the well site once drilling operations resume, will be properly trained in H2S drilling procedures and use of applicable safety equipment including:
    a. Respiratory protection.
    b. H2S detection and monitoring equipment.
    c. Visible warning system:
        i. Wind direction indicators
        ii. Post appropriate warning signs.

In the event that the company anticipates the continued risk of exposure to H2S emissions during ongoing production operations, BMPs will be implemented that follow the guidelines listed in BLM Onshore Order 6.

6.0 CUMULATIVE IMPACTS

6.1 Environmental

Environmental impacts may accumulate either over time or in combination with similar events in the area. Unrelated and dissimilar activities may also have negative impacts on critical elements, thereby contributing to the cumulative degradation of the environment. For purposes of this analysis, the cumulative impacts analysis area (CIAA) is considered to be all lands within a 2-mile radius of the project area.

Past and current disturbances in the CIAA include farming, grazing, roads, and other oil and gas wells. Farming and grazing activities occur in Osage County regardless of the density of oil and gas development, since undivided interests in the land surface, range permits, and agricultural leases are often held by different surface owners than those holding mineral rights, such that economic benefits of both agricultural and oil and gas activities currently co-exist.

Reasonably foreseeable impacts of future developments in the CIAA must also be considered. Should development of the proposed well pads prove productive, it is likely that Performance Operating and other operators would pursue additional development in the CIAA. For purposes of cumulative impact analyses, the density of active and permitted oil wells and associated facilities (including access and utility corridors) is expected to increase steadily within the CIAA over the next decade. Oil and gas development is expected to have a minor cumulative effect on land use patterns and the human and natural environment, due to the dispersed and passive nature of the development.

6.2 Air Quality

If the pace and level of oil and gas development within this region of the state continues at the current rate over the next few years, it is expected to contribute incrementally to cumulative air quality impacts. The Proposed Action would incrementally contribute to emissions occurring within the region. In general, however, the increase in emissions associated with the Proposed Action would occur predominantly during construction and drilling operations and would therefore be localized, largely temporary, and limited in comparison with regional emissions. Since the AQI is exceptionally low in the CIAA and the expected future development would be

widely dispersed in time and space, the Proposed Action is not expected to impact attainment status based on any of the Primary and Secondary NAAQS for criteria pollutants or other regulated air emissions. Contribution of the proposal to incremental increases of unregulated GHG emissions is expected to be minor.

6.3 Hydrology

If listed best management practices are followed and other requirements as outlined in Chapter 5.0 are followed, there will be no dredge and fill operations in wetlands, no unauthorized point source discharges of contaminated water to streams or lakes, and nonpoint sources of stormwater would be controlled to avoid, minimize or mitigate erosion.

No unpermitted consumptive use of surface water or groundwater would occur, and stream flows and recharge of aquifers should not be adversely affected.

The Proposed Action, when combined with other future actions, such as cattle grazing, other oil and gas development, and agriculture in the CIAA could tend to increase sedimentation and runoff rates.

Sediment yield from active roadways could occur at higher rates than background rates and continue indefinitely. Thus, the Proposed Action could incrementally add to existing and future sources of water quality degradation in nearby watersheds. However, any potential increase in degradation would be reduced by the commitment of Performance Operating to minimizing disturbance, using erosion control measures, and implementing standard industry practices designed to reduce impacts and comply with 25 CFR Part 226, Leasing of Osage Reservation Lands for Oil and Gas Mining.

6.4 Access Roads

Unlike well pads, active roadways are not typically reclaimed, thus sediment yield from roads can continue indefinitely at rates two to three times the background rate. The Proposed Action would create approximately 1.04 miles of roads in the CIAA, adding incrementally to existing and future impacts to soil resources, dust deposition, and erosion processes. Additional wells are likely to be drilled in the same general area as the Proposed Action, but lessees will be required to use as many of the same main access roads and minimize the disturbance as much as possible.

6.5 Erosion Control

Performance is committed to using procedures that are required under 25 CFR Part 226, and to comply with the BMPs listed under section 5.2 of this EA, in order to mitigate the potential effects of erosion.

6.6 Vegetation

The Proposed Action would result in the loss of approximately 6.4 acres of vegetation and ecological diversity of mixed-grass prairie habitat. In addition, vegetation resources across the project area could be affected by foreseeable future energy development and surface disturbance in the CIAA. Continued oil and gas development within the CIAA could result in the loss, and

further fragmentation, of mixed-grass prairie habitat. Incremental impacts to quality native prairie may occur in the future from vegetation clearing and soil disturbance, soil loss, compaction, and increased encroachment of unmanaged invasive weed species. Past, present, and reasonably foreseeable future activities within the general area have reduced, and would likely continue to reduce, the amount of available habitat for certain listed species known to use mixed-grass prairie habitats. Such impacts could be partially offset by avoidance of previously undisturbed prairie habitats, as well as implementation of soil and vegetation mitigation measures. Standard BMPs in Section 5.2 suggest the use of native species for reclamation and revegetation purposes. Cumulative impacts to vegetation and other biological resources are therefore expected to be minor.

6.7 Wildlife

Cumulatively, the potential impacts on various species and their habitats would be minimal. Currently, no adverse impacts have been identified for either Osage County, or the adjacent areas.

6.8 Cultural Resources

Significant archaeological resources are irreplaceable and often unique; any destruction or damage of such resources can be expected to diminish the archaeological record as a whole. However, no such damage or destruction of significant archaeological resources is anticipated as a result of the Proposed Action, as these resources would be avoided. Therefore, no cumulative impacts to the archaeological record would occur as a result of implementation of the proposal.

6.9 Socioeconomic

The Proposed Action would incrementally add to existing and future socioeconomic impacts in the general area. The Proposed Action would result in an additional source of revenue for shareholders of the Osage Minerals Estate. Increases in employment would be temporary during the construction, drilling, and completion phases of the Proposed Action. Therefore, little change in employment would be expected over the long term.

No significant negative impacts are expected to affect any element of the human and natural environments; impacts would generally be low and mostly temporary from both a context and intensity standpoint. The cumulative impacts from activities on the Reservation are still limited enough to not appear to be significant.

6.10 Reclamation

Performance has committed to implementing interim reclamation of the utility corridors and well pads immediately following construction and completion. Implementation of both interim and permanent reclamation measures would decrease the magnitude of cumulative impacts.

7.0 CONSULTATION AND COORDINATION

The BIA is committed to ongoing efforts to solicit the opinions and concerns of all stakeholders. For the purpose of this EA, a stakeholder is considered any Tribe, agency, municipality, or

individual person which the Proposed Action may affect either directly or indirectly in the form of public health, environmental, or socioeconomic issues. The BIA has informally engaged the Osage Minerals Council in discussions about the NEPA process as it relates to this EA. The BIA has received comments concerning NEPA and environmental concerns from lessees, operators, Osage headright holders, nonprofit environmental organizations, the Osage Producers Association, the Osage Cattlemen's Association, state agencies, landowners and other interested stakeholders at various meetings of the Osage Minerals Council and at joint EPA/BIA stakeholder meetings on updates to the Osage Producers Manual. Discussion of issues with the Osage Nation, Osage Minerals Council, and Oklahoma Department of Wildlife Conservation, U.S. Fish and Wildlife Service and others is ongoing, including meetings of cooperating agencies on the county-wide Environmental Impact Statement for Oil and Gas Operations in Osage County.

Pursuant to 25 CFR §226.18, Performance Operating Company, LLC has conducted meetings to discuss the proposed action with applicable surface owners, or their authorized representatives, to coordinate the activity related to drilling and completing of the proposed wells. This included confirming project location and ingress/egress route. A confirmation letter has been submitted to the BIA – Osage Agency, a copy of which is included in Appendix D-4.

A copy of this EA will be available to the public, and it will be submitted to the Osage Nation, Osage Minerals Council, all federal cooperating agencies and to those with interests in or near the proposed actions.

8.0 LIST OF PREPARERS

An interdisciplinary team contributed to this document according to guidance provided in Part 1502.6 of Council on Environmental Quality regulations. This document was drafted by BEACON Environmental Assistance Corporation under the direction of the BIA. Information was compiled from various sources within Performance Operating Company.

BEACON Environmental Assistance Corporation, Edmond, Oklahoma

- Mr. Andy Middick, Project Manager, conducted ABB presence/absence surveys and created the Environmental Assessment.

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APPENDIX A

LOCATION MAPS

= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES AND PIPELINE

= EXISTING PIPELINE

-N-

TOPOGRAPHICAL MAP

ALLEE #22-1 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 22 TOWNSHIP 26 NORTH RANGE 11 EAST, OSAGE COUNTY, OKLAHOMA
WOOLAROC, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 1
DRAWN BY:	AM	PROJECT #:	P938	

= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES AND PIPELINE

= EXISTING PIPELINE

-N-

AERIAL PHOTOGRAPH

ALLEE #22-2 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 22 TOWNSHIP 26 NORTH RANGE 11 EAST, OSAGE COUNTY, OKLAHOMA
WOOLAROC, OKLAHOMA QUADRANGLE

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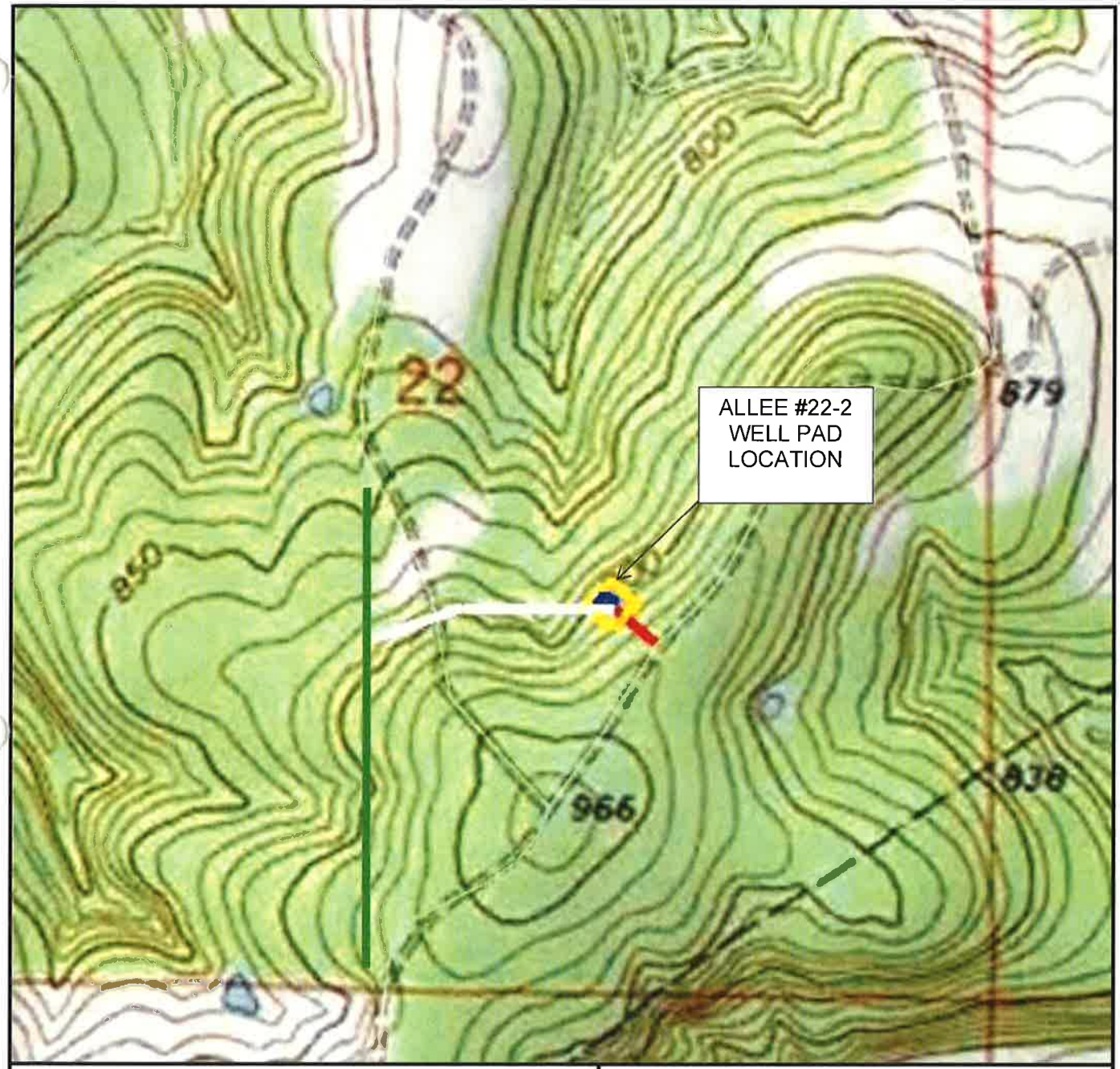
DRAWN BY:	AM	PROJECT #:	P938	



= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES AND PIPELINE

= EXISTING PIPELINE

-N-

TOPOGRAPHICAL MAP

ALLEE #22-2 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 22 TOWNSHIP 26 NORTH RANGE 11 EAST, OSAGE COUNTY, OKLAHOMA
WOOLAROC, OKLAHOMA QUADRANGLE

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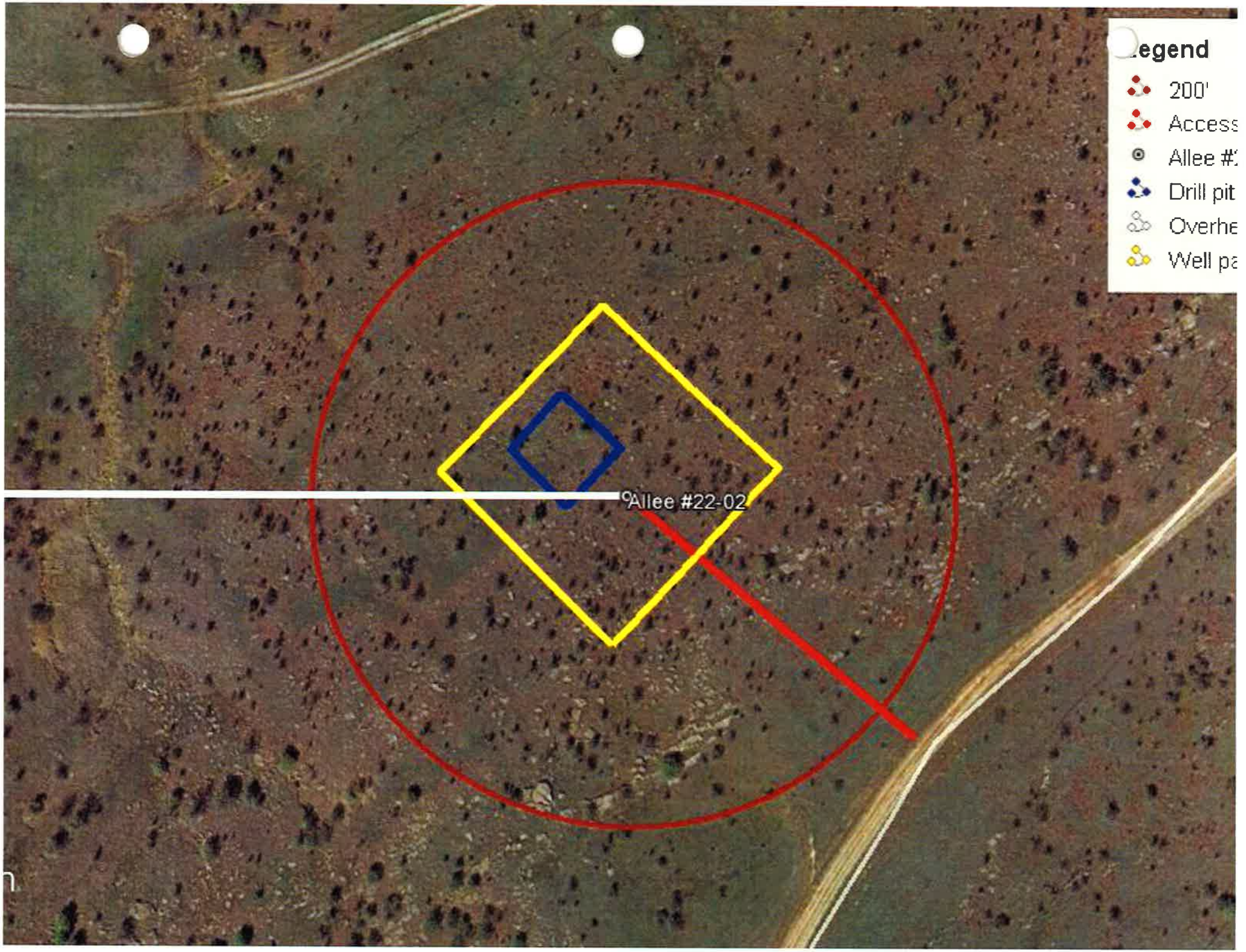
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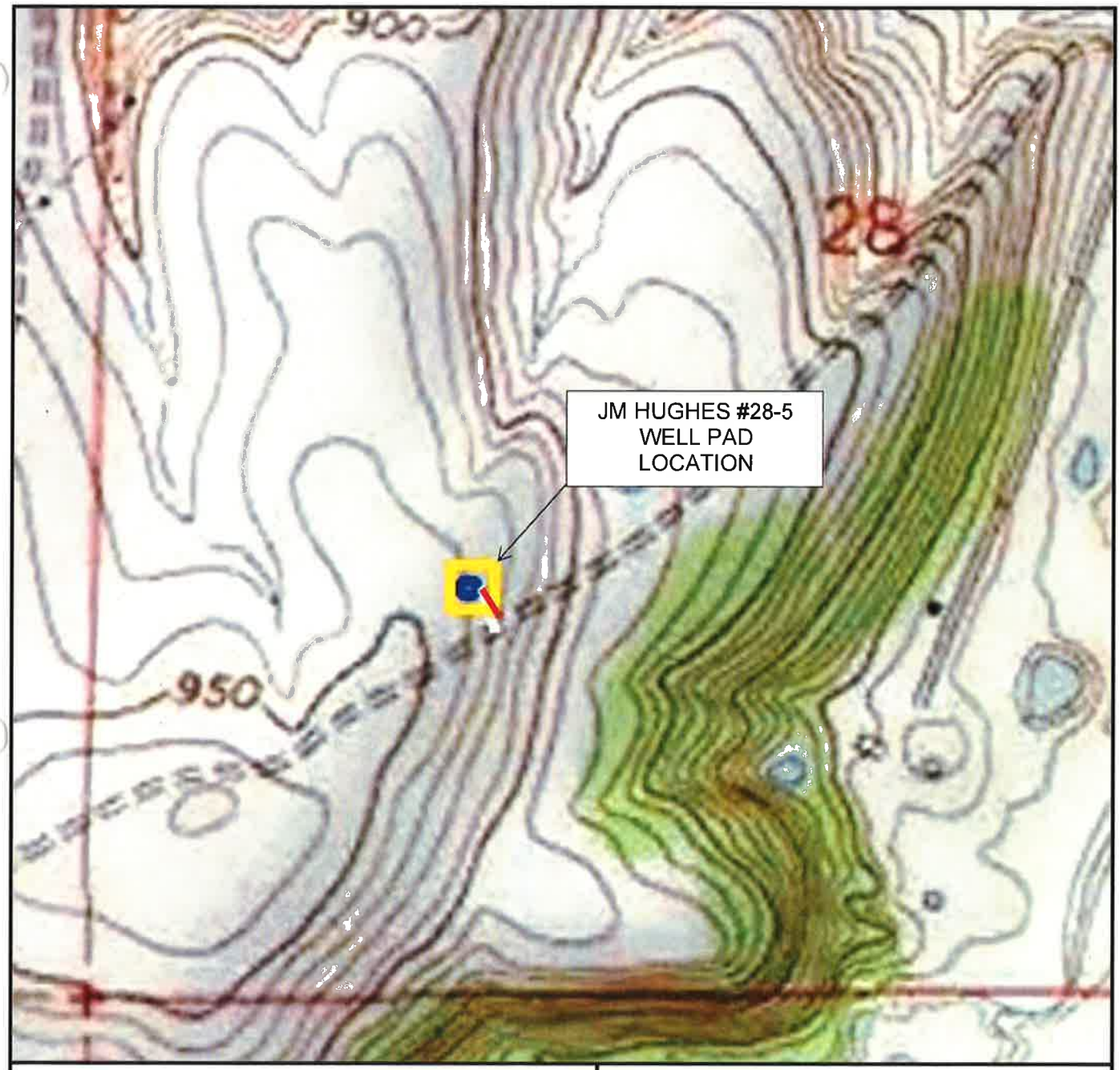
Well pa
Allee #22-02



= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES

= PIPELINE

-N-

TOPOGRAPHICAL MAP

JM HUGHES #28-5 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 28 TOWNSHIP 26 NORTH RANGE 12 EAST, OSAGE COUNTY, OKLAHOMA
WOOLAROC, OKLAHOMA QUADRANGLE

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= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES

= PIPELINE

-N-

AERIAL PHOTOGRAPH

JM HUGHES #28-5 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 28 TOWNSHIP 26 NORTH RANGE 12 EAST, OSAGE COUNTY, OKLAHOMA
WOOLAROC, OKLAHOMA QUADRANGLE

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= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES

= PIPELINE

-N-

TOPOGRAPHICAL MAP

ROYAL #4-3 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location

SECTION 4 TOWNSHIP 25 NORTH RANGE 12 EAST, OSAGE COUNTY, OKLAHOMA
WOOLAROC, OKLAHOMA QUADRANGLE

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PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
DRAWN BY:	AM	PROJECT #:	P938	

= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES

= PIPELINE

-N-

AERIAL PHOTOGRAPH

ROYAL #4-3 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location

SECTION 4 TOWNSHIP 25 NORTH RANGE 12 EAST, OSAGE COUNTY, OKLAHOMA
WOOLAROC, OKLAHOMA QUADRANGLE

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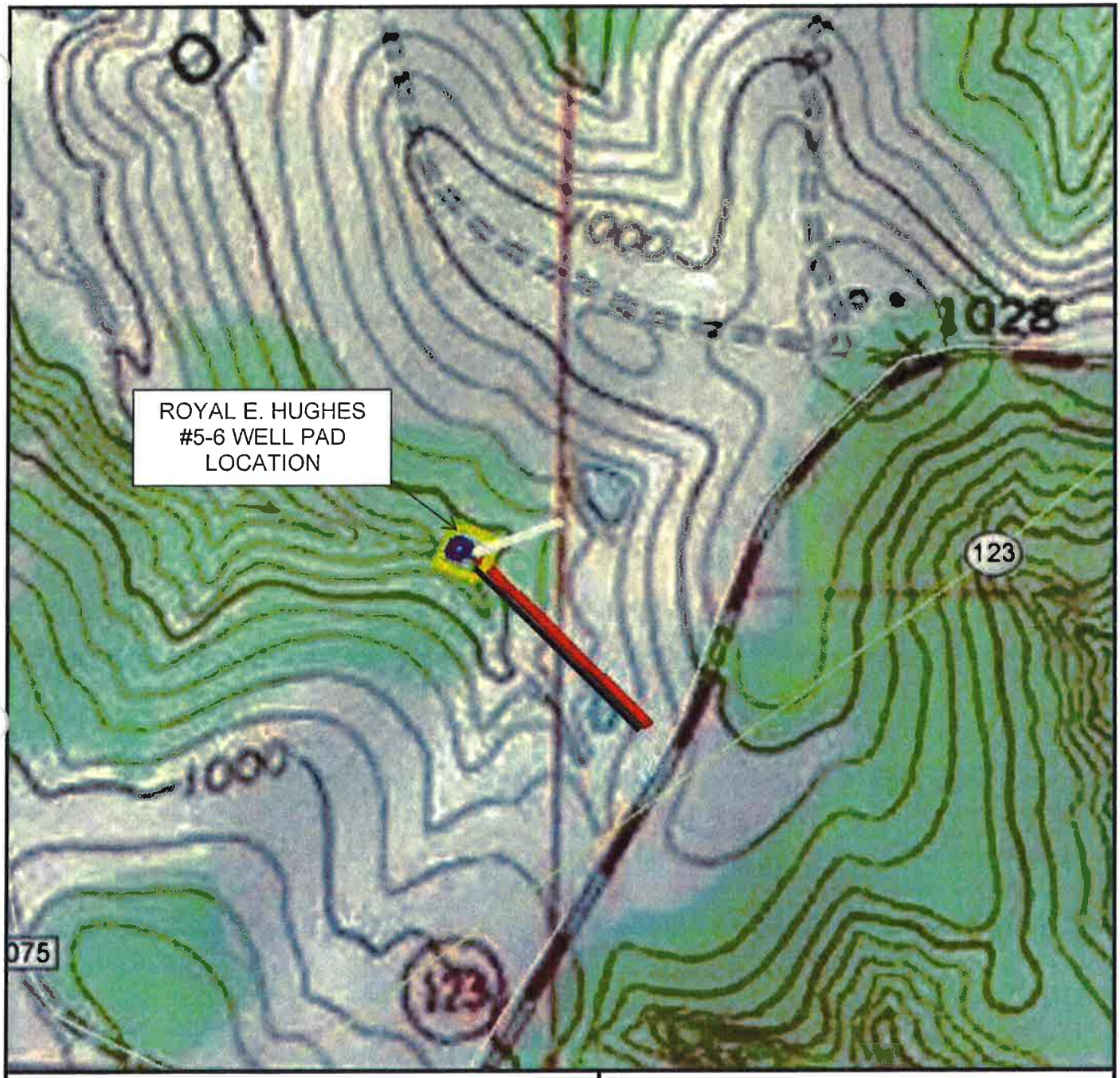
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
DRAWN BY:	AM	PROJECT #:	P938	



= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES

= PIPELINE

-N-

TOPOGRAPHICAL MAP

ROYAL E. HUGHES #5-6 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 5 TOWNSHIP 25 NORTH RANGE 12 EAST, OSAGE COUNTY, OKLAHOMA
WOOLAROC, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

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Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
DRAWN BY:	AM	PROJECT #:	P938	

= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES

= PIPELINE

-N-

AERIAL PHOTOGRAPH

ROYAL E. HUGHES #5-6 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location

SECTION 5 TOWNSHIP 25 NORTH RANGE 12 EAST, OSAGE COUNTY, OKLAHOMA
WOOLAROC, OKLAHOMA QUADRANGLE

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PERFORMANCE OPERATING

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Environmental Assistance Corporation

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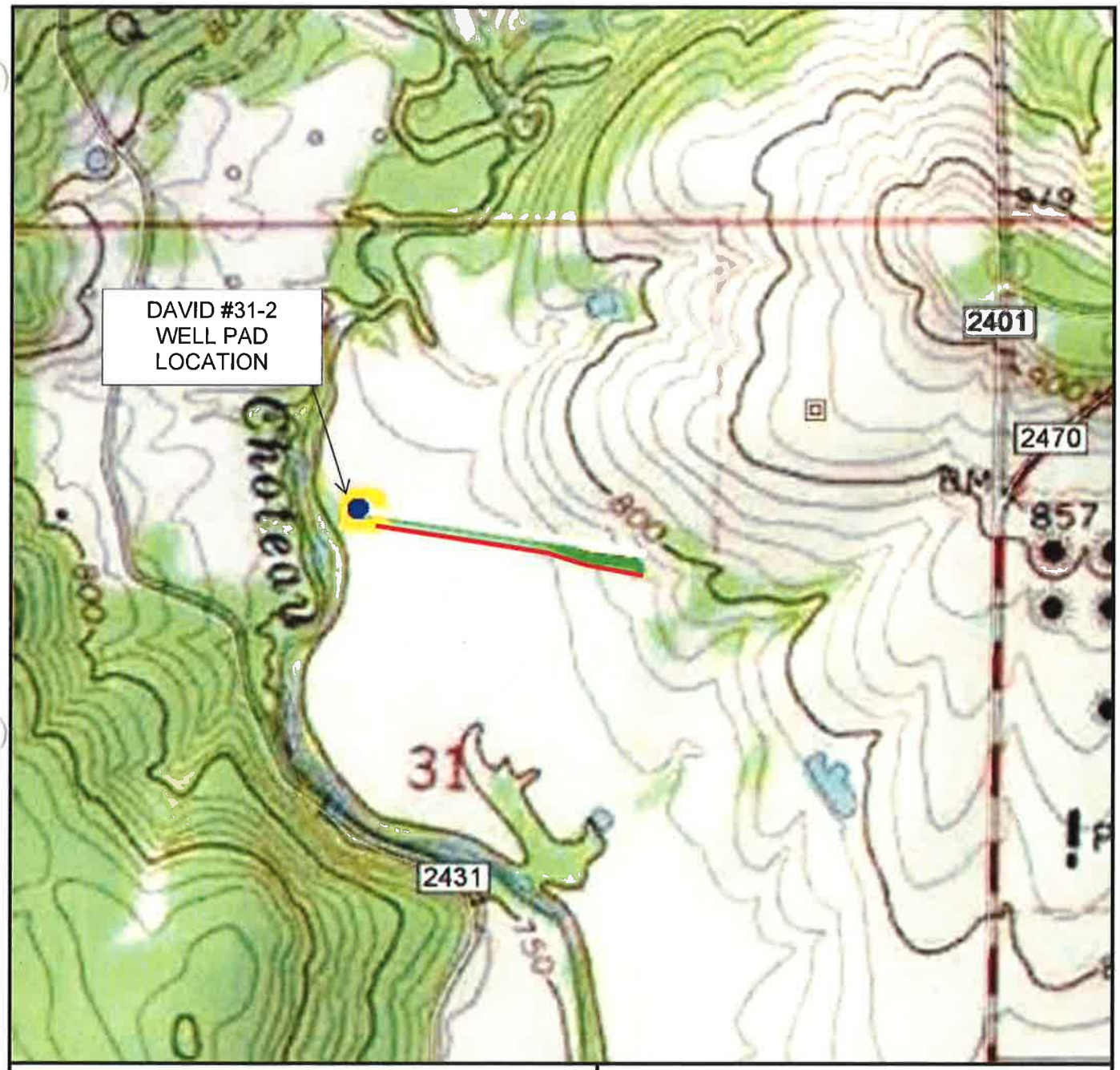

= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES

= PIPELINE

-N-

TOPOGRAPHICAL MAP

DAVID #31-2 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 31 TOWNSHIP 25 NORTH RANGE 11 EAST, OSAGE COUNTY, OKLAHOMA
BARNSDALL, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
DRAWN BY:	AM	PROJECT #:	P938	

= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES

= PIPELINE

-N-

AERIAL PHOTOGRAPH

DAVID #31-2 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 31 TOWNSHIP 25 NORTH RANGE 11 EAST, OSAGE COUNTY, OKLAHOMA
BARNSDALL, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
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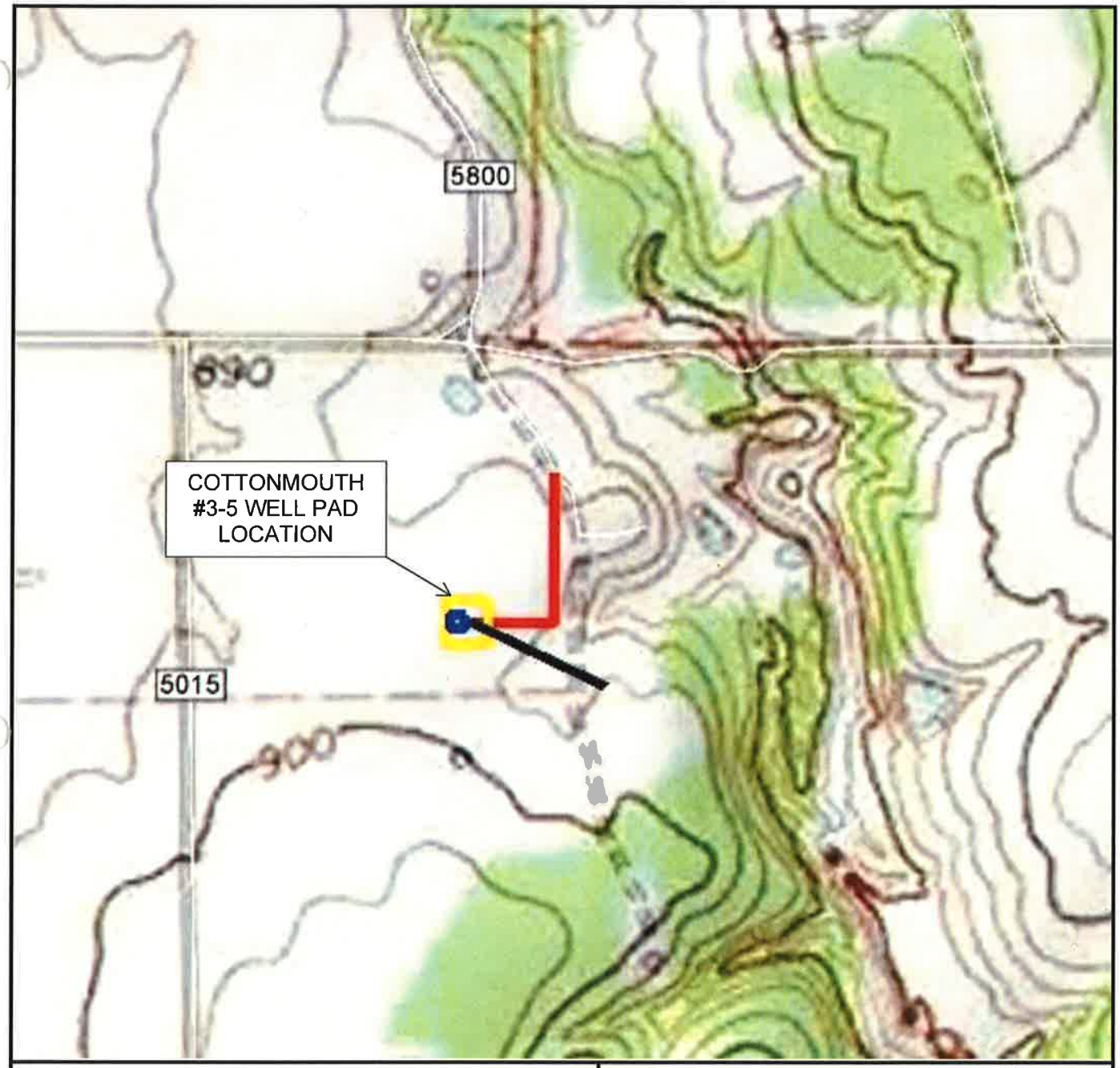

= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES AND PIPELINE

-N-

TOPOGRAPHICAL MAP

COTTONMOUTH #3-5 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 3 TOWNSHIP 24 NORTH RANGE 9 EAST, OSAGE COUNTY, OKLAHOMA
WYNONA, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
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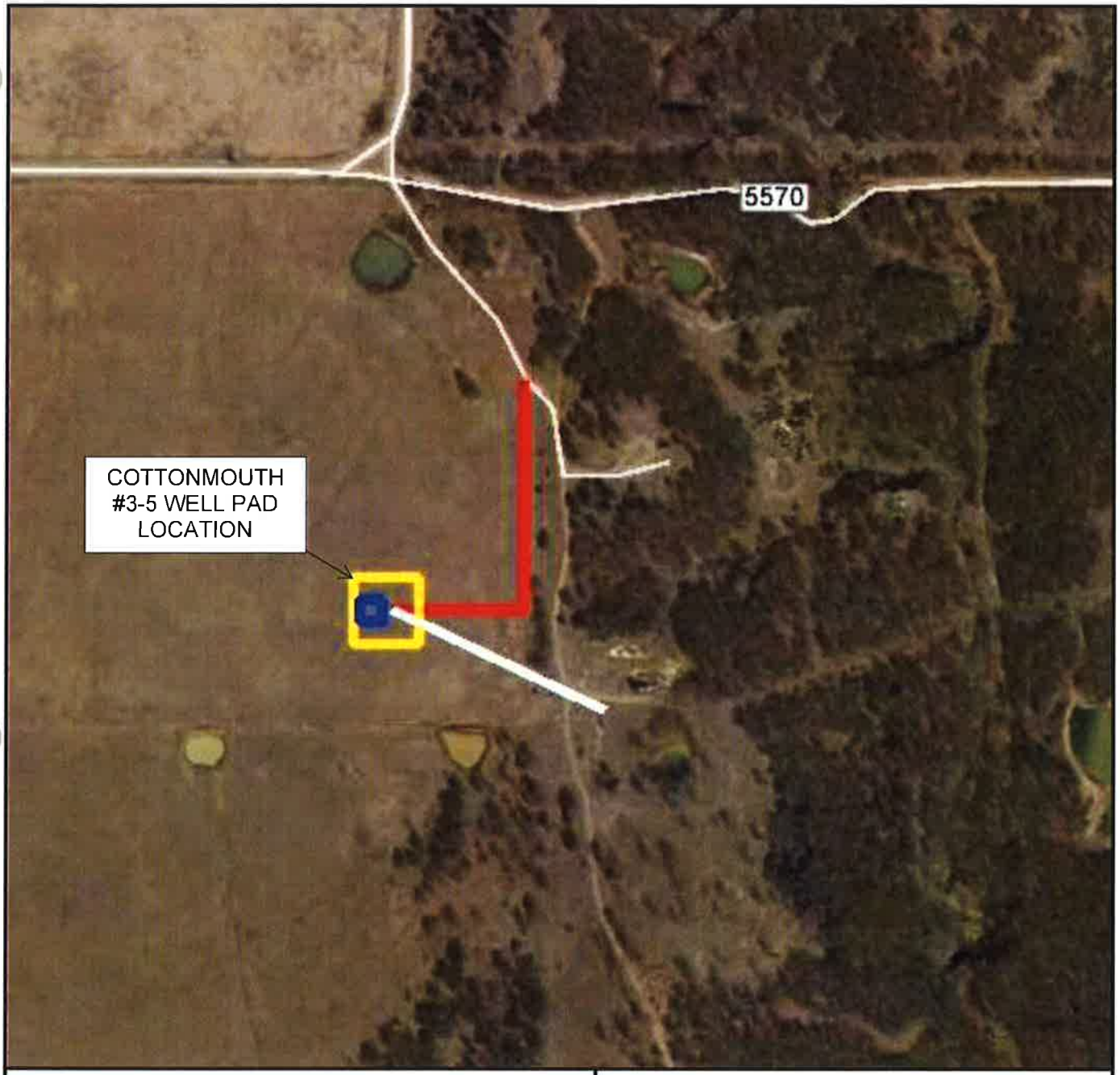


= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES AND PIPELINE

-N-

AERIAL PHOTOGRAPH

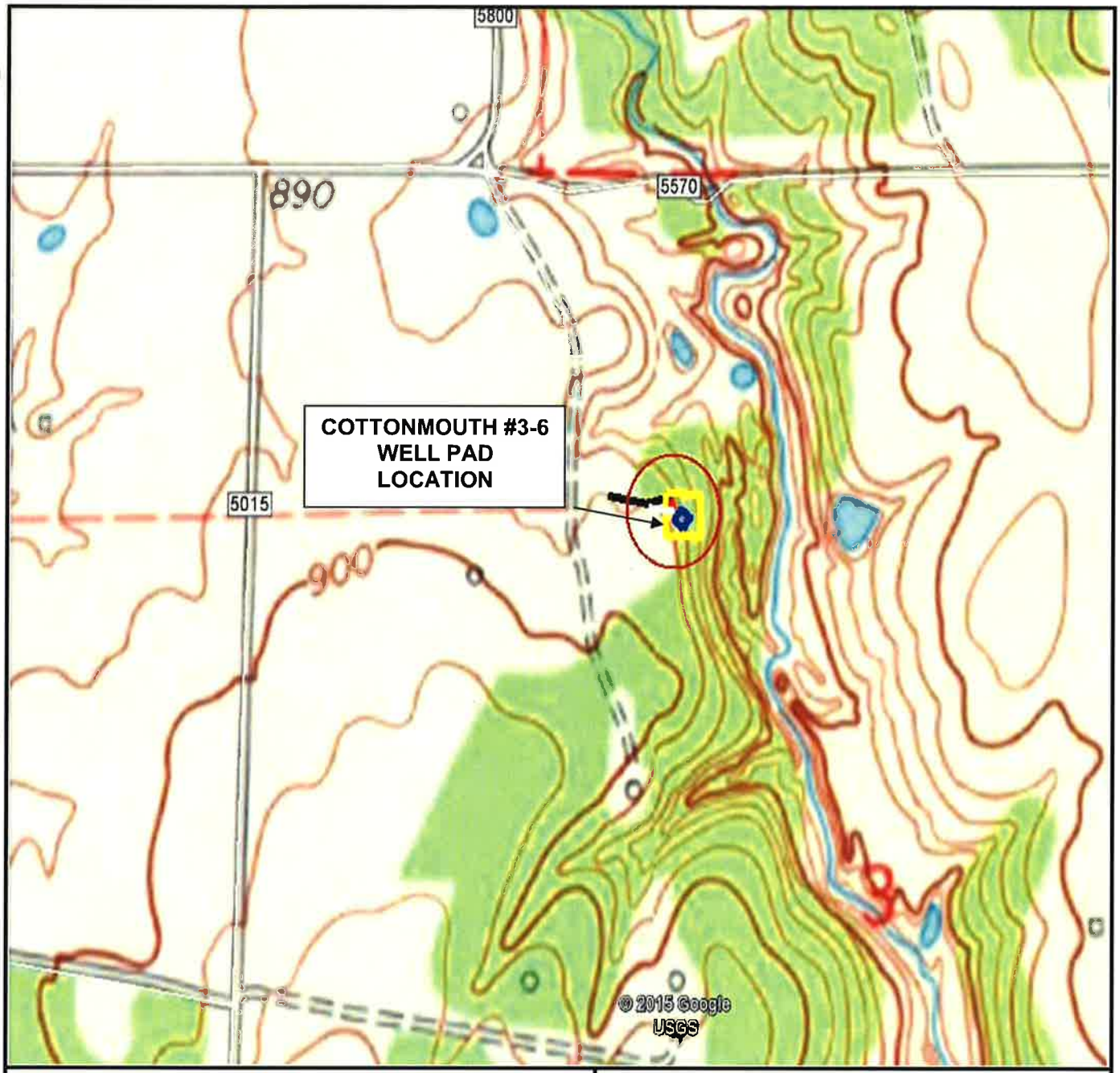
COTTONMOUTH #3-5 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 3 TOWNSHIP 24 NORTH RANGE 9 EAST, OSAGE COUNTY, OKLAHOMA
WYNONA, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
DRAWN BY:	AM	PROJECT #:	P938	



= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES

= PIPELINE

-N-

TOPOGRAPHICAL MAP

COTTONMOUTH #3-6 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 3 TOWNSHIP 24 NORTH RANGE 9 EAST, OSAGE COUNTY, OKLAHOMA
BARNSDALL, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

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Environmental Assistance Corporation

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DRAWN BY:	AM	PROJECT #:	P938	

= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES AND PIPELINE

= OVERHEAD UTILITY LINES AND PIPELINE

-N-

AERIAL PHOTOGRAPH

COTTONMOUTH #3-6 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 3 TOWNSHIP 24 NORTH RANGE 9 EAST, OSAGE COUNTY, OKLAHOMA
WYNONA, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

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Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
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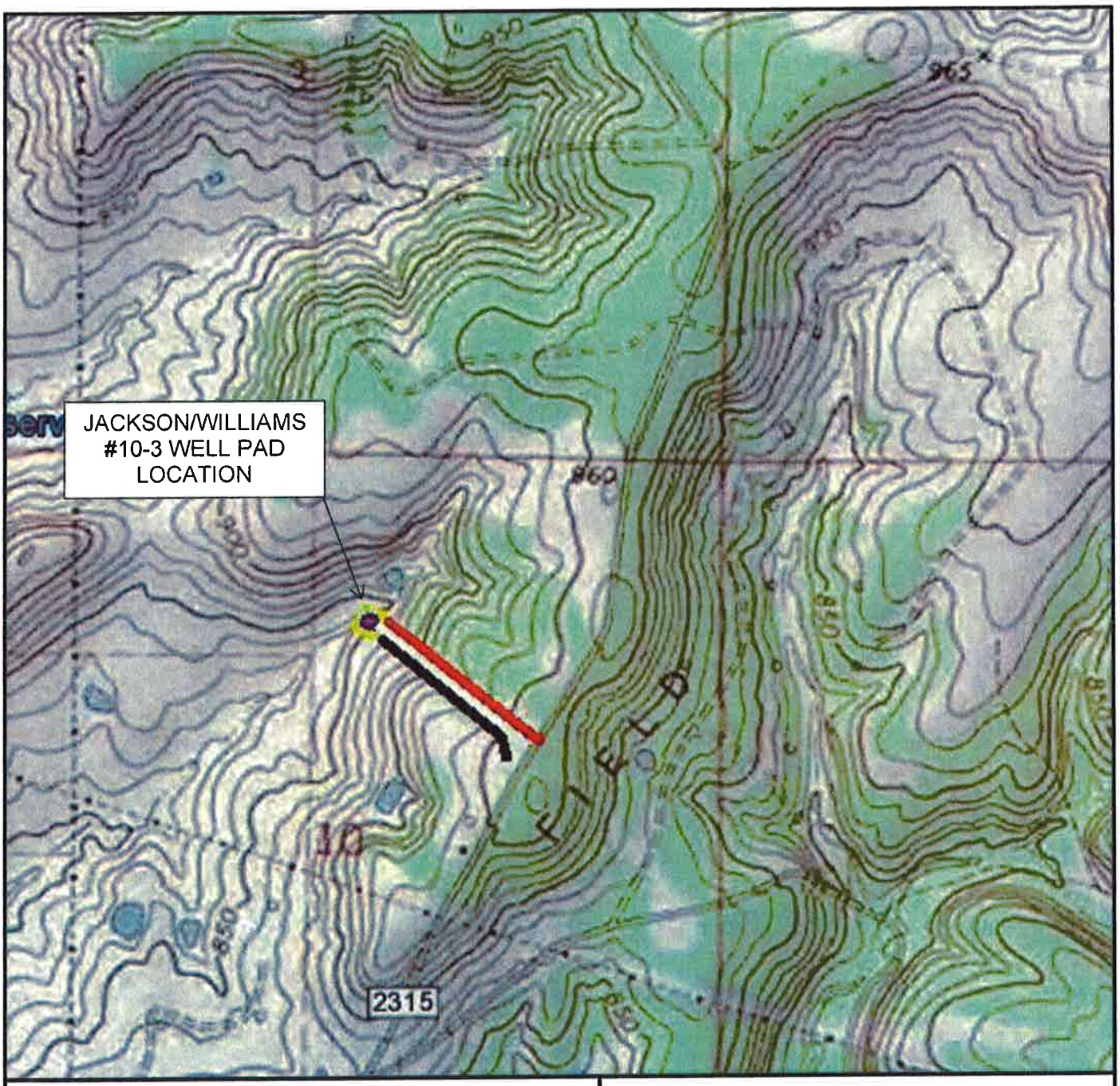

= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES

= PIPELINE

-N-

TOPOGRAPHICAL MAP

JACKSON/WILLIAMS #10-3 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 10 TOWNSHIP 24 NORTH RANGE 11 EAST, OSAGE COUNTY, OKLAHOMA
WOLCO, OKLAHOMA QUADRANGLE

Prepared for:
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PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
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= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES

= PIPELINE

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AERIAL PHOTOGRAPH

JACKSON/WILLIAMS #10-3 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location

SECTION 10 TOWNSHIP 24 NORTH RANGE 11 EAST, OSAGE COUNTY, OKLAHOMA
WOLCO, OKLAHOMA QUADRANGLE

Prepared for:
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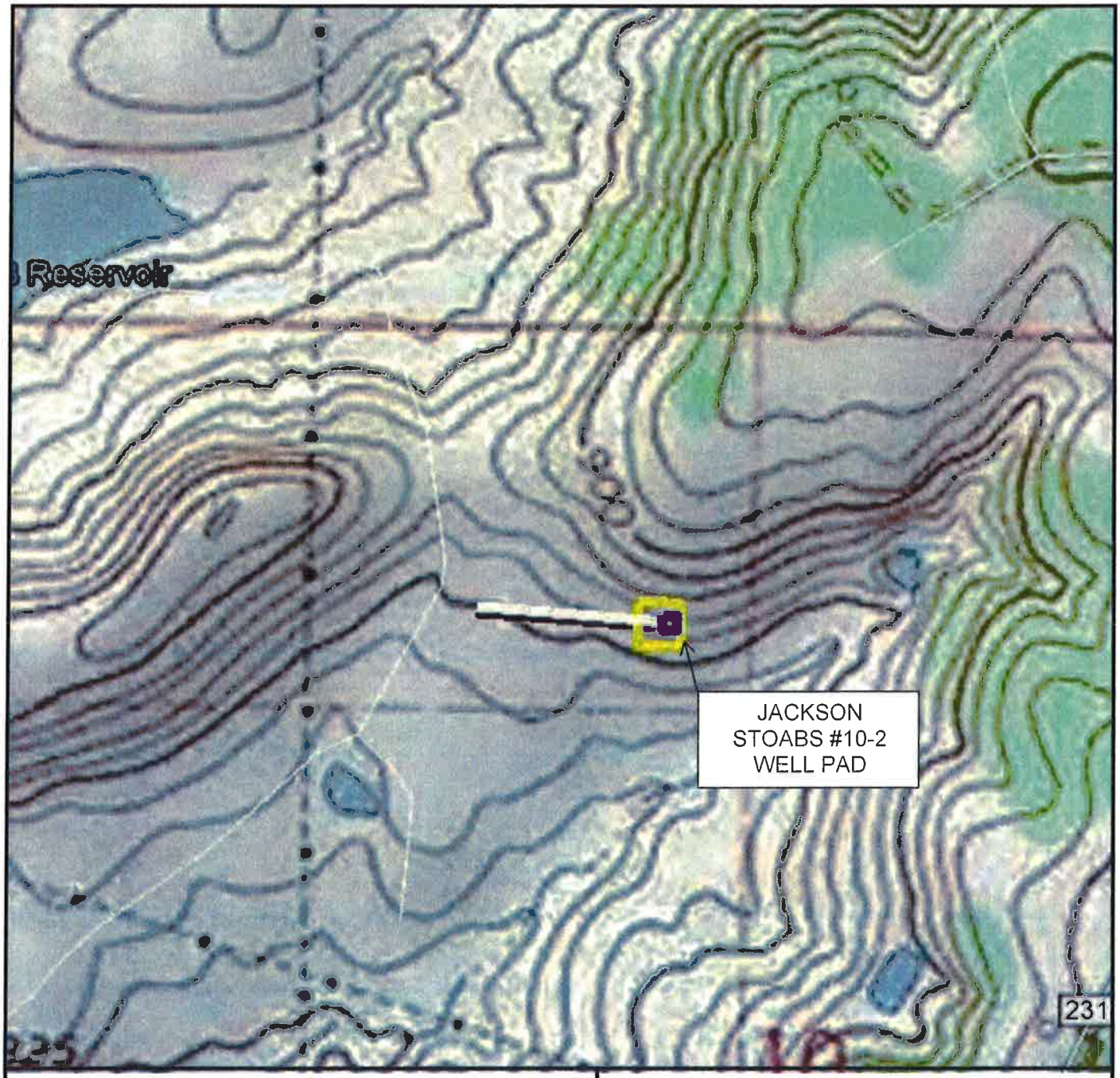
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
DRAWN BY:	AM	PROJECT #:	P938	



= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES

= PIPELINE

-N-

TOPOGRAPHICAL MAP

JACKSON STOAABS #10-2 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 10 TOWNSHIP 24 NORTH RANGE 11 EAST, OSAGE COUNTY, OKLAHOMA
WOLCO, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

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Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 1
DRAWN BY:	AM	PROJECT #:	P938	

= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES

= PIPELINE

-N-

AERIAL PHOTOGRAPH

JACKSON STOABS #10-2 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location

SECTION 10 TOWNSHIP 24 NORTH RANGE 11 EAST, OSAGE COUNTY, OKLAHOMA
WOLCO, OKLAHOMA QUADRANGLE

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PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
DRAWN BY:	AM	PROJECT #:	P938	

APPENDIX B

DRILLING PLAN

Drilling Plan

Performance Operating Company

Proposed Ten (10) Wells in Osage County, Oklahoma

Alee #22-1, Alee #22-2, Cottonmouth #3-5, Cottonmouth #3-6, David #31-2, Jackson Stoabs #10-2, Jackson/Williams #10-3, JM Hughes (Dove) #28-5, Royal #4-3, Royal/E. Hughes #5-6.

January 2015

1.0 Description of the Proposed Project

Performance Operating has proposed to drill ten (10) oil wells in Osage County, Oklahoma. These well pads will also include access roads, utility corridors, and pipelines carrying crude oil and produced water to storage tanks to be transported to market. This document describes the well pad locations and drilling operations for each proposed well in detail.

2.0 Well Hole Locations

This section describes the location of the well hole, with the location being reference by legal description as well as by the footage from the section lines. These wells are vertical wells, so there is no bottom hole locations to be reported.

Allee #22-1 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the SW ¼ NW ¼ SE ¼ Section 22 Township 26 North, Range 11 East, Osage County, Oklahoma. The well hole will be located 990 feet from the north line and 330 feet from the west line.

Allee #22-2 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the SE ¼ NW ¼ SE ¼ Section 22 Township 26 North, Range 11 East, Osage County, Oklahoma. The well hole will be located 990 feet from the north line and 990 feet from the west line.

Cottonmouth #3-5 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the SE ¼ NW ¼ NW ¼ Section 3 Township 24 North, Range 9 East, Osage County, Oklahoma. The well hole will be located 990 feet from the north line and 990 feet from the west line.

Cottonmouth #3-6 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the SW ¼ NE ¼ NW ¼ Section 3 Township 24 North, Range 9 East, Osage County, Oklahoma. The well hole will be located 1,240 feet from the north line and 875 feet from the east line.

David #31-2 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the E ½ NW ¼ Section 31 Township 25 North, Range 11 East, Osage County, Oklahoma. The well hole will be located 1,320 feet from the north line and 330 feet from the west line.

Jackson Stoabs #10-2 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the SE ¼ NE ¼ NW ¼ Section 10 Township 24 North, Range 11 East, Osage County, Oklahoma. The well hole will be located 920 feet from the north line and 330 feet from the east line.

Jackson/Williams #10-3 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the SE ¼ NW ¼ NE ¼ Section 10 Township 24 North, Range 11 East, Osage County, Oklahoma. The well hole will be located 990 feet from the north line and 330 feet from the west line.

JM Hughes (Dove) #28-5 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the NE ¼ SW ¼ SW ¼ Section 28 Township 26 North, Range 12 East, Osage County, Oklahoma. The well hole will be located 1,320 feet from the south line and 1,320 feet from the west line.

Royal #4-3 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the SW ¼ NW ¼ SW ¼ Section 4 Township 25 North, Range 12 East, Osage County, Oklahoma. The well hole will be located 840 feet from the north line and 430 feet from the west line.

Royal/E. Hughes #5-6 Well Pad

The proposed well pad, utility corridor, and pipeline system would be located in the SE ¼ NE ¼ SE ¼ Section 5 Township 25 North, Range 12 East, Osage County, Oklahoma. The well hole will be located 990 feet from the north line and 330 feet from the east line.

3.0 Drilling Operations

Performance Operating plans to complete drilling of these between March 2015 and May 2015. These dates include the first phases of construction (access roads, utility corridors, etc.) to completion and start of production. Air rigs will be utilized in the drilling phase using air and approximately 120 barrels of fresh water. The fresh water will come from a pond, creek, or city source to complete operations.

The oil wells will be vertical wells, with the bottom hole directly under the surface hole. These wells will be drilled to a total depth of 1,800 to 2,100 feet, depending on location and surface elevation at the site of drilling.

4.0 Casing and Cementing

Surface casing will be set at approximately 50 feet with production casing being set to total depth of the well. The production casing will be cemented to the surface in order to protect the underground source of drinking water (USDW) located approximately 250' to 500' below ground level. Once the cement has been allowed time to cure, a cased-hole cement bond log will be run up to the surface casing. At this point, the well is to be perforated per recommendations from a geologist.

5.0 Completion and Evaluation

After casing and cementing operations are complete, an acid job will be performed on the well to break the cement and clean up any cement that may have permeated into the formation. These acid jobs usually consist of 300 to 500 gallons of 15% Hydrochloric Acid and approximately 80 barrels of either potassium chloride water or produced salt water from the well. These operations are generally pumped at a rate of 5 to 8 barrels per minute.

Once the acid job is completed, hydraulic fracturing operations are employed. Hydraulic fracturing operations utilize 10,000 to 30,000 pounds of sand along with 300 to 500 barrels of potassium chloride treated water. This solution is pumped in at a rate of 20 to 28 barrels per minute, and then the well is shut in. After a few days of being shut it, the well is transferred to the production team to install the proper pumping equipment and utility lines.

6.0 Access Roads and Utility Corridors

Access roads will be constructed from existing roadways to the new well pad. These access roads will be approximately 12 feet wide, and will be the shortest route possible to minimize impacts. The access roads will have an approximately 2% grade away from the center to allow for drainage to protect the road's integrity. The access road will be cleared of vegetation and large rocks, graded, and covered with a minimum of 4 inches of aggregate to minimize erosion and runoff.

Pipeline corridors will be combined with the utility (electric) corridors where possible to minimize impacts. These corridors will initially be approximately 12 feet wide to allow for construction equipment to access the area. However, the actual trenches will be 6 inches to 10

inches in width, depending on the trenching machine used. Once installation is complete, the disturbed areas will be re-seeded with native grasses.

The pipelines servicing the wells will be black poly piping, with one (1) carrying natural gas and one (1) carrying crude oil and produced water. The two pipelines will be laid side-by-side in the trench. These pipelines will extend from the new well to an existing well or a trunk line, depending on what is available. Depending on surface conditions, these pipelines will be buried 18 to 36 inches deep. Pipeline markers will be placed at all road and fence crossings, as well as at any major change in direction. No boring locations are anticipated, as none of the pipelines as part of this activity will traverse any roads or streams. Valves controlling the flow for these pipelines will be located at the well sites and tank batteries; no in-line valves are expected to be installed.

Since these pipelines will be made of polyethylene, they are considered non-corrosive. Additionally, none of these well pads will include tank batteries for storage as part of this proposed action, as these wells will be connected to existing tank batteries.

APPENDIX C

ABB SURVEY REPORT

American Burying Beetle (ABB) Presence/Absence Survey

Performance Operating ABB Survey
Ten (10) Well Pad Sites
Osage County, Oklahoma

Prepared for: Performance Operating Company
3993 Oklahoma 123
Barnsdall, OK 74005

October 2014

BEACON
Environmental Assistance Corporation
2000 E. 15th Street, Bldg. 400, Suite J
Edmond, Oklahoma 73013
(405) 330-8688

DISCLAIMER

This evaluation was performed by BEACON Environmental Assistance Corporation (BEACON) staff for use by Performance Operating Company (Client) utilizing skill and practices ordinarily exercised by professional consultants. BEACON is not responsible for any incorrect or incomplete information provided by agencies or organizations that were used in the formulation of this evaluation. BEACON does not take responsibility for impacts to T&E species other than the American Burying Beetle as a result of the proposed action. Use of the information supplied within this evaluation by parties other than the client this document was developed for is done so solely at the risk of the user.

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Section 1.0 Description of the Proposed Action 1

Section 2.0 Species and Habitat Description 2

Section 3.0 Survey Method 4

Section 4.0 Description of Project Area 5

Section 5.0 Results 7

Section 6.0 Conclusions 8

Section 7.0 References 9

Appendices

Appendix A – Maps

Appendix B – USFWS American Burying Beetle Oklahoma Presence/Absence Live-Trapping Survey Guidance

Appendix C – American Burying Beetle Impact Assessment for Project Reviews

Appendix D – ABB Survey Field Data

Section 1.0 Area of Investigation

A presence/absence survey for the federally endangered American Burying Beetle (ABB) (*Nicrophorus americanus)* was conducted by BEACON Environmental Assistance Corporation (BEACON) personnel for various proposed well pad installations for Performance Operating Company (Performance). Located in Appendix A are USGS 7.5 minute series topographic map reproductions and aerial maps exhibiting the location of the ABB traps and the proposed well pad installations.

The survey intended to provide data for areas that have been identified by Performance as potential well drilling sites was comprised of a total of twenty-five (25) trap sites. However, this report summarizes the results of six (6) of these traps for support of permitting of ten well pad sites. These trap results have been parsed out in support of Performance's application for a Permit to Drill as issued by the Bureau of Indian Affairs (BIA) for these ten wells. Below lists the trap number and the well pad sites each was intended to survey:

- Trap #3- Royal #4-3 and Royal/East Hughes #5-6
- Trap #4- JM Hughes (Dove) #28-5
- Trap #9- Jackson Stoabs #10-2 and Jackson Williams #10-3
- Trap #12- David #31-2
- Trap #14 Cottonmouth 33-5 and Cottonmouth #3-6
- Trap #23 Allee #22-1 and Allee #22-2

These trap locations are generally described as being in the eastern portion of Osage County. More specifically, these traps were in the Barnsdall and Bartlesville areas. The areas surveyed are within a USFWS designated Conservation Priority Area (CPA).

Suitable habitat for supporting the ABB was identified within the proposed project location, and therefore, in order to definitively determine the presence/absence of the ABB within the project area, a presence/absence survey was conducted by BEACON's on staff Section 10 permitted biologists, Mr. Andy Middick and Mr. Doug Latham (TE-206016-2).

2.0 Species and Habitat Description

Seven (7) species of the genus *Nicrophorus* are found in Oklahoma. Of these, only *Nicrophorus americanus* is listed as endangered by USFWS. However, it should be noted that the capture of other *Nicrophorus* species were also recorded to further document the effectiveness of the survey methods. The ABB (*Nicrophorus americanus*) is the largest beetle of the *Nicrophorus* genus in North America. The ABB is 1 – 1.5 inches in length, with a black body with orange markings. The ABB has an orange pronotum (shield over the midsection between the head and wings), making it quite distinguishable from other species of the *Nicrophorus* genus.

ABBs are feeding habitat generalists, and have been found in a variety of habitat types, including oak-pine woodlands, open fields, oak-hickory forest, open grasslands, and edge habitat. The ABB is a scavenger, feeding on decomposing carcasses, and reproduction involves burying of a small vertebrate carcass, on which eggs are laid and young are reared.

USFWS recognizes that due to certain land conditions and/or uses, specific locations within the ABB range identified by IPaC may not be suitable for supporting the ABB. Specific areas that exhibit (verified upon field observation) any of the following characteristics can be considered "not likely to adversely affect the ABB" (please refer to Appendix C):

- Land that is tilled on a regular basis, planted in monoculture, and does not contain native vegetation.
- Pasture or grassland that have been maintained through frequent mowing, grazing, or herbicide application at a height of 20 cm (8 inches) or less.
- Land that has already been developed and no longer exhibits surficial topsoil, leaf litter, or vegetation.
- Urban areas with maintained lawns, paved surfaces, or roadways.
- Stockpiled soil without vegetation.
- Wetlands with standing water or saturated soils (defined as sites exhibiting hydric soils, and vegetation typical of saturated soils, and/or wetland hydrology).

As habitat deemed suitable for supporting the ABB was identified within the proposed project area, a presence/absence survey was necessary to determine the effects of the action on the ABB.

3.0 Survey Method

Survey methods employed for the proposed project strictly followed the most current USFWS ABB Survey Guidance (updated May 2014). Please refer to Appendix B for a copy of the most current guidelines. Within the area that exhibited suitable habitat for supporting the ABB, one (1) above ground baited pit fall trap was placed in the proposed project area. The pit fall trap was constructed of a 5-gallon bucket with a wooden trap cover, and was baited with well-aged chicken gizzards and hearts. The trap was checked by 10 a.m., and weather records were checked to be within guideline parameters.

Weather parameters that require an additional night of surveying are as follows:

- The night time (9:00 p.m. to 4:00 a.m.) temperature falls below 60° F,
- Wind speed is greater than 10 mph for an average duration for 20% between 9:00p.m. and 4:00 a.m.
- Rainfall in excess of ½ inch during the time period between 9:00p.m. and 4:00 a.m.

Weather information was obtained and recorded on the survey data forms from each day to evaluate if an additional night of trapping was required in order to achieve the 5-nights of survey required by the guidance. Weather information was obtained from the Wynona, Oklahoma Mesonet station.

The timing of this ABB presence/absence survey was intended to be related to further disturbances at the site which will take place during the ABB inactive period of 2014-2015. These results will be considered valid until the beginning of the 2015 ABB active season.

4.0 Description of Project Area

BEACON's research and review of information obtained from the EPA website revealed that the proposed pipeline corridor is situated within the Cross Timbers ecoregion. According to the Ecoregions of Oklahoma (color poster with map, descriptive text, and photographs) the identified ecoregion is described as follows:

"A mix of savanna, woodland, and prairie is native to the low hills, cuestas, ridges, and plains of Ecoregion 29, and separates the forests of eastern ecoregions from the prairies of drier, western ecoregions. The boundary between the Cross Timbers and the nearly treeless Central Great Plains coincides with the western limit of many mammals and insects. Post oak-blackjack woodland and savanna are native on porous, course-textured soils derived from sandstone; the percentage of blackjack oak increases westward. Tall grasses are native on fine-textured, moisture deficient soils derived from limestone, shale, or marl. Recent fire suppression has increased forest density and allowed eastern redcedar to invade many areas. Today, woodland, rangeland, pastureland, and several extensive, but declining, oil fields occur. Abandoned, depleted farmland is common. The remaining cropland is largely restricted to valleys near channelized streams whose degraded habitat supports very poor assemblages of aquatic fauna. Two types of streams are common. The first is characterized by a mixture of shaded riffles, runs, and pools that have gravel or cobble substrates. The second stream type has lower gradients and is found downstream of the first; it is characterized by wide, shallow, sand-choked channels. In the summer, surficial flow is often absent from wide, sandy, lower reaches. Erratic stream flow has led to the construction of many reservoirs. Generally, stream conditions in Ecoregion 29 are more stressful for fish than in eastern Oklahoma, but less rigorous than in the west. As a result, Ecoregion 29 lacks many sensitive fish species as well as some river species. Other species are shared with adjacent regions. Common minnows include the red, sand, and redfin shiners and the suckermouth minnow. The redfin and orangethroat darters, smallmouth buffalo, river carpsucker, black and golden redhorses, and channel and flathead catfishes occur in many streams" (Griffith et al., 2004).

More specifically, the proposed project is located in the Northern Cross Timbers ecoregion of Oklahoma.

"The hills, cuestas, and ridges of the Northern Cross Timbers are naturally covered by a mosaic of oak savanna, scrubby oak forest, eastern redcedar, and tall grass prairie, Native on porous, course-textured soils derived from sandstone are post oak, blackjack oak, and understory grasses. Tall grass prairie naturally occurs on fine-textured soils derived from limestone or shale. Overall, far more oak savanna occurs that in the Central Great Plains, Flint Hills, or Central Irregular Plains. Floristic variety is less, vegetation is sparser, and the growing season is shorter than in the Eastern Cross Timbers. Today, livestock farming is the main land use; cropland is less extensive than in the Central Great Plains and the Central Irregular Plains, but rangeland is less widespread than in the Flint Hills. Soils are highly erodible when disturbed. Large oilfields were developed in the early 20th century; associated brine, drilling mud, and petroleum waste products have increased salinity in many streams. Streams are typically shallow and have sandy substrates; they are habitat-poor and have lower fish and macroinvertebrate species richness than the Lower Canadian Hills. However, some stream reaches have deep pools, riffles, and bedrock, boulder, cobble, or gravel substrates; these reaches have greater species richness and more pollution-and habitat-intolerant species than shallower streams in the Northern Cross Timbers " (Griffith et al., 2004).

The areas surveyed are currently used in livestock production, and are comprised of native grasses and trees. Occasional rock outcrops are common within these survey areas, as are gently rolling hills. Soils in the area are generally described as loams or sandy loams, with slopes from 1 to 25%.

5.0 Results

Nighttime (9:00 p.m. to 4:00 a.m.) temperatures did not fall below 60° for the duration of the survey, and recorded wind speeds did not exceed parameters for establishing a valid survey. Therefore, five (5) nights of survey were considered sufficient for determining presence or absence of ABB.

No ABBs were captured in any of the traps, therefore, all traps and the area within their ½ mile radius are considered ABB negative.

Captures of other species of *Nicrophorus* beetles as well as other carrion beetles are recorded to show that the trap method was effective. Below are the totals for recorded captures other than ABB:

- *Nicrophorus orbicollis*-3
- *Nicrophorus tomentosus*-0
- *Nicrophorus pustulatus*-3
- *Nicrophorus marginatus*-0
- *Nicrophorus carolinus*-0
- *Nicrophorus sayi*-0
- *Other carrion-attracted beetles-73*

Captured *Nicrophorus* were released on site, and none were removed from the in situ population.

5.0 Conclusions

Based on the presence of suitable habitat within the area, a preliminary species impact determination of **"may affect"**. The presence/absence surveys were intended to further define the potential effects of the actions. Based on the negative presence/absence surveys, a determination of **"may affect, not likely to adversely affect"** is the appropriate species impact determination. This determination does not require concurrence from USFWS, as a valid survey has been conducted and the results and data submitted to the Tulsa, Oklahoma USFWS office for their records. No further Section 7 consultation with USFWS is required regarding these ten well pad sites.

Included in Appendix D are copies of the data forms submitted to the Tulsa USFWS office for their records.

It needs to be noted that this survey is considered by USFWS to be valid until the beginning of the 2015 ABB active season. The timing of this survey was intended to determine potential impacts to the ABB during the 2014 ABB inactive season.

6.0 References

1) United States Fish and Wildlife Service. Tulsa, Oklahoma Ecological Services Field Office. American Burying Beetle Impact Assessment for Project Reviews http://www.fws.gov/southwest/es/Oklahoma/Documents/ABB/Step-wise%20guidance%20for%20ABB%202013.pdf

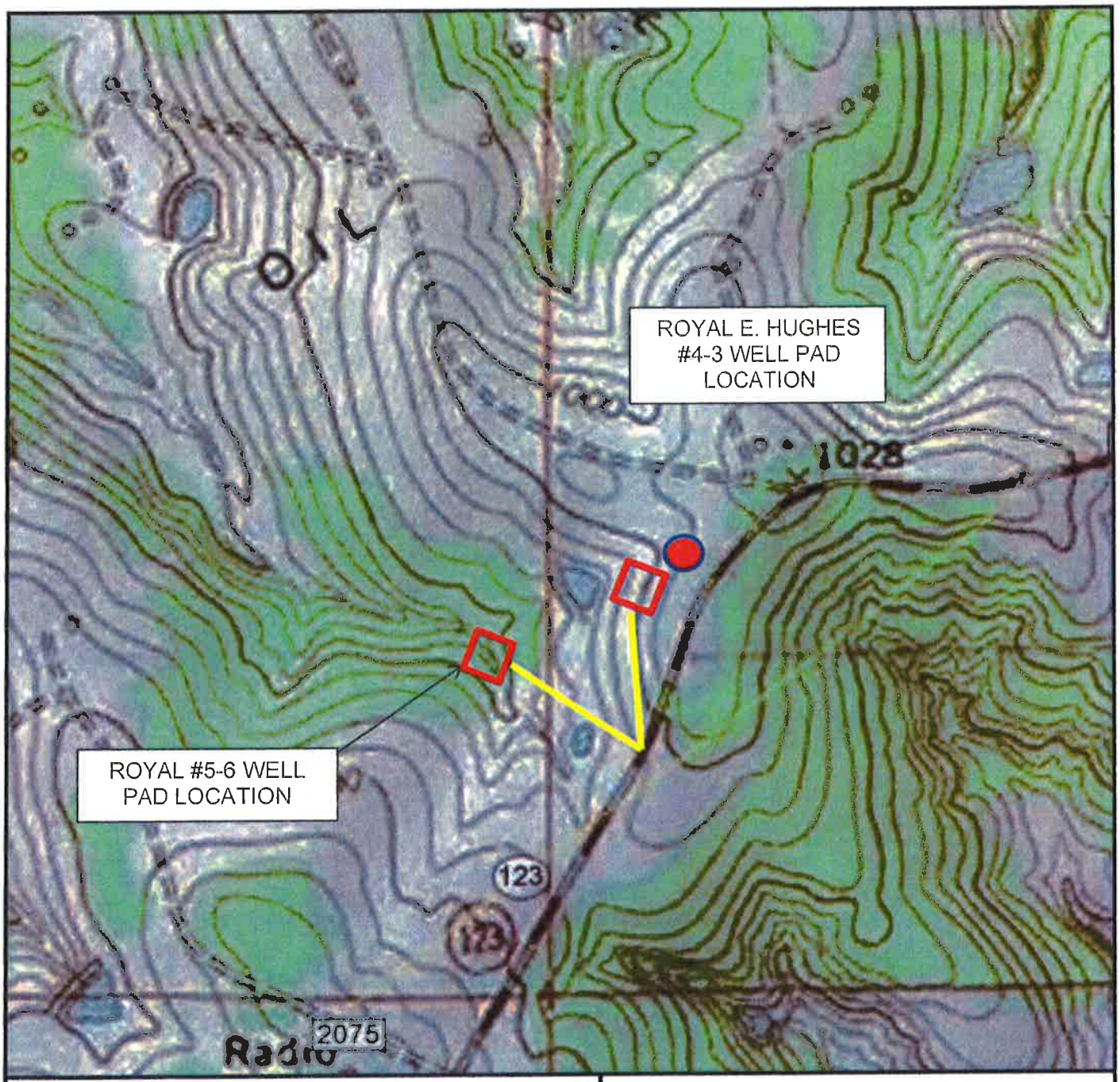
2) United States Fish and Wildlife Service. Tulsa, Oklahoma Ecological Services Field Office. 2014 American Burying Beetle Oklahoma Presence/Absence Live Trapping Survey Guidance http://www.fws.gov/southwest/es/Oklahoma/Documents/ABB/Surveying%20final/DRAFT%20ABB%20Range%20wide%20Survey%20Guidance%204_20_2013.pdf

3) Griffith, G.E., Bryce, S.A., Omernik, J.M., Comstock, J.A., Rogers, A.C., Harrison, B., Hatch, S.L., and Bezanson, D., 2004, Ecoregions of Oklahoma (color poster with map, descriptive text, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:2,500,000).

4) Weather Underground. http://wunderground.com/history

Appendix A

Maps



= PROPOSED WELL PAD

= ACCESS ROAD AND UTILITY CORRIDORS

=ABB TRAP LOCATION

ABB TRAP NUMBER 3

36.6705 -96.2322

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TOPOGRAPHICAL MAP

ROYAL #4-3 WELL PAD AND ROYAL E. HUGHES #5-6
OSAGE COUNTY, OKLAHOMA

Project Location
SECTIONS 4 AND 5, TOWNSHIP 25 NORTH RANGE 12 EAST, OSAGE COUNTY, OKLAHOMA
WOOLAROC, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 1
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= PROPOSED WELL PAD

= ACCESS ROAD AND UTILITY CORRIDORS

=ABB TRAP LOCATION

ABB TRAP NUMBER 3

36.6705 -96.2322

-N-

AERIAL PHOTOGRAPH

ROYAL #4-3 WELL PAD AND ROYAL E. HUGHES #5-6
OSAGE COUNTY, OKLAHOMA

Project Location
SECTIONS 4 AND 5, TOWNSHIP 25 NORTH RANGE 12 EAST, OSAGE COUNTY, OKLAHOMA
WOOLAROC, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 1
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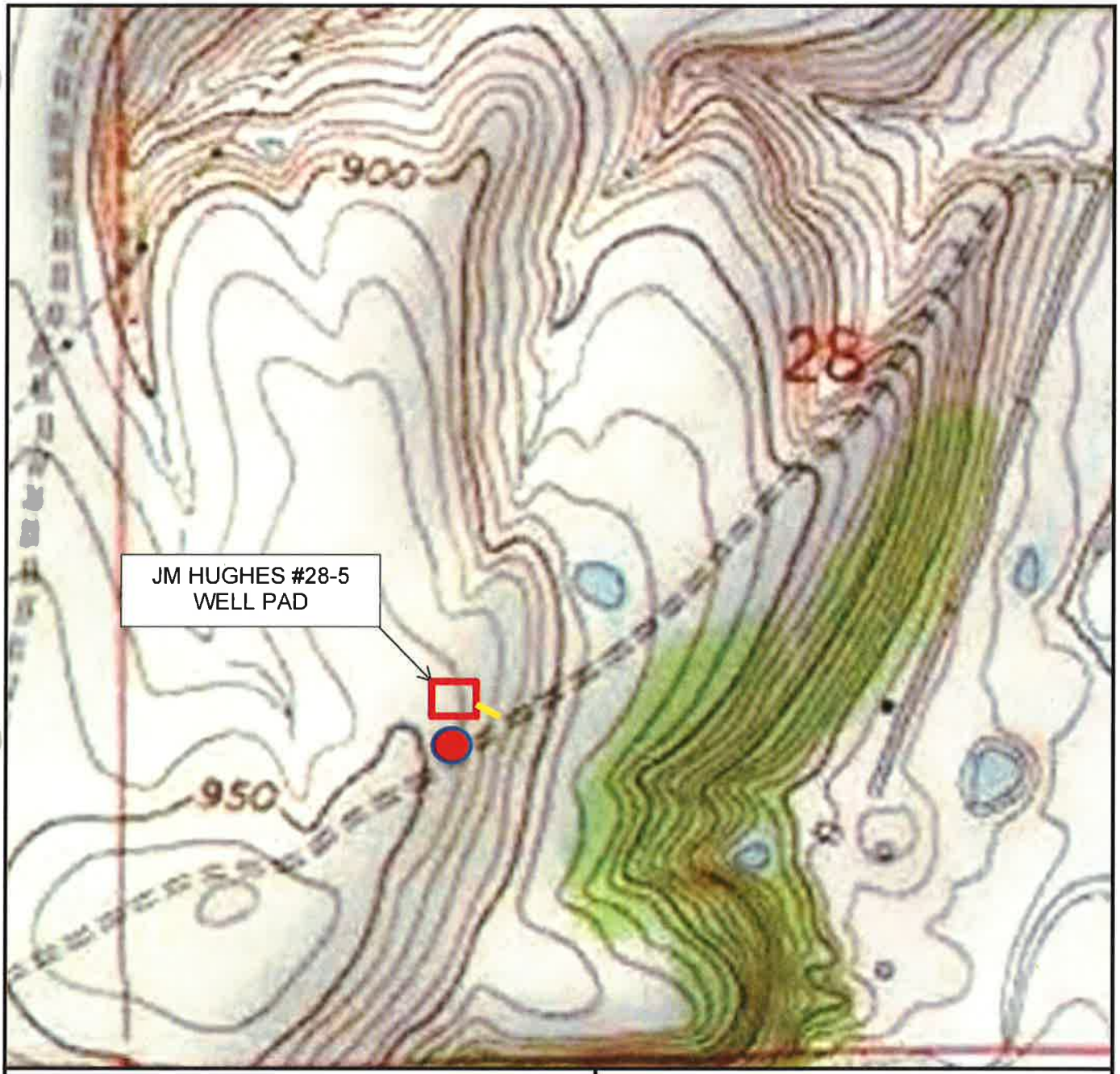


= PROPOSED WELL PAD

= ACCESS ROAD AND UTILITY CORRIDORS

=ABB TRAP LOCATION

ABB TRAP NUMBER 3

36.6977 -96.0211

-N-

TOPOGRAPHICAL MAP

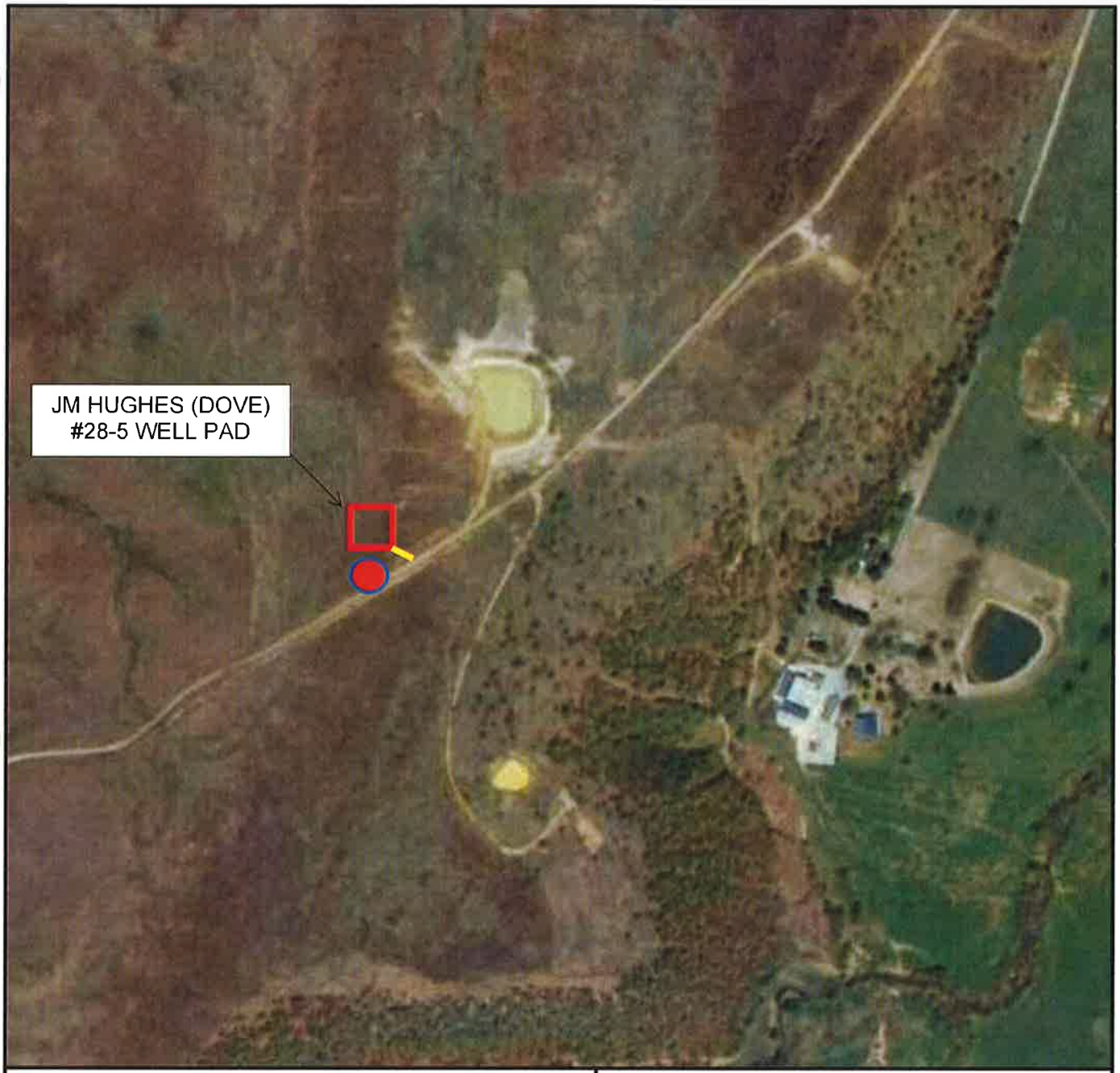
JM HUGHES #28-5 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 28 TOWNSHIP 26 NORTH RANGE 12 EAST, OSAGE COUNTY, OKLAHOMA
WOOLAROC, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 1
DRAWN BY:	AM	PROJECT #:	P938	



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= ACCESS ROAD AND UTILITY CORRIDORS

=ABB TRAP LOCATION

ABB TRAP NUMBER 4

36.66977 -96.0211

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AERIAL PHOTOGRAPH

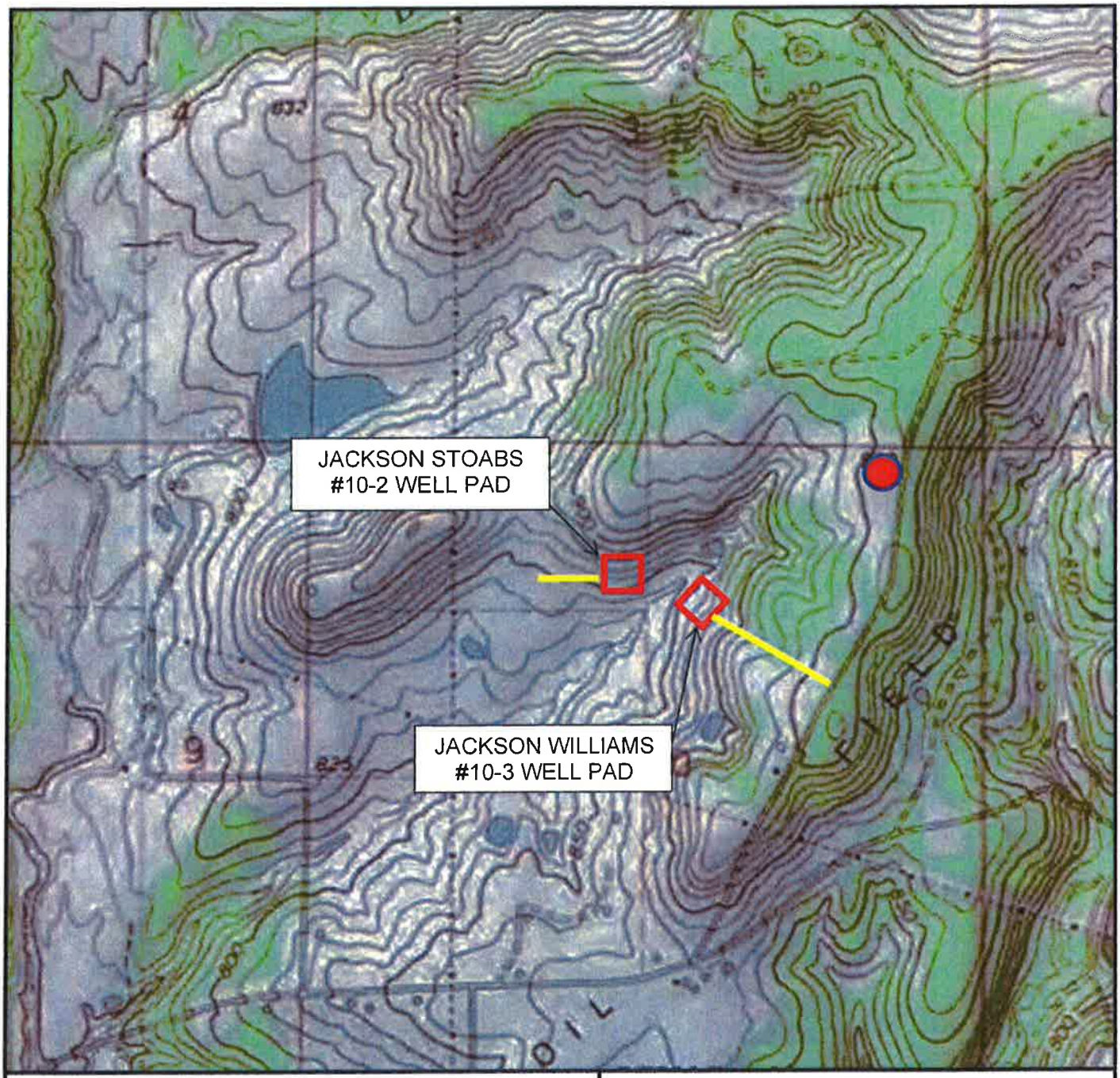
JM HUGHES #28-5 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 28 TOWNSHIP 26 NORTH RANGE 12 EAST, OSAGE COUNTY, OKLAHOMA
WOOLAROC, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 1
DRAWN BY:	AM	PROJECT #:	P938	



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= ACCESS ROAD AND UTILITY CORRIDORS

=ABB TRAP LOCATION

ABB TRAP NUMBER 9

36.5761 -96.1055

-N-

TOPOGRAPHICAL MAP

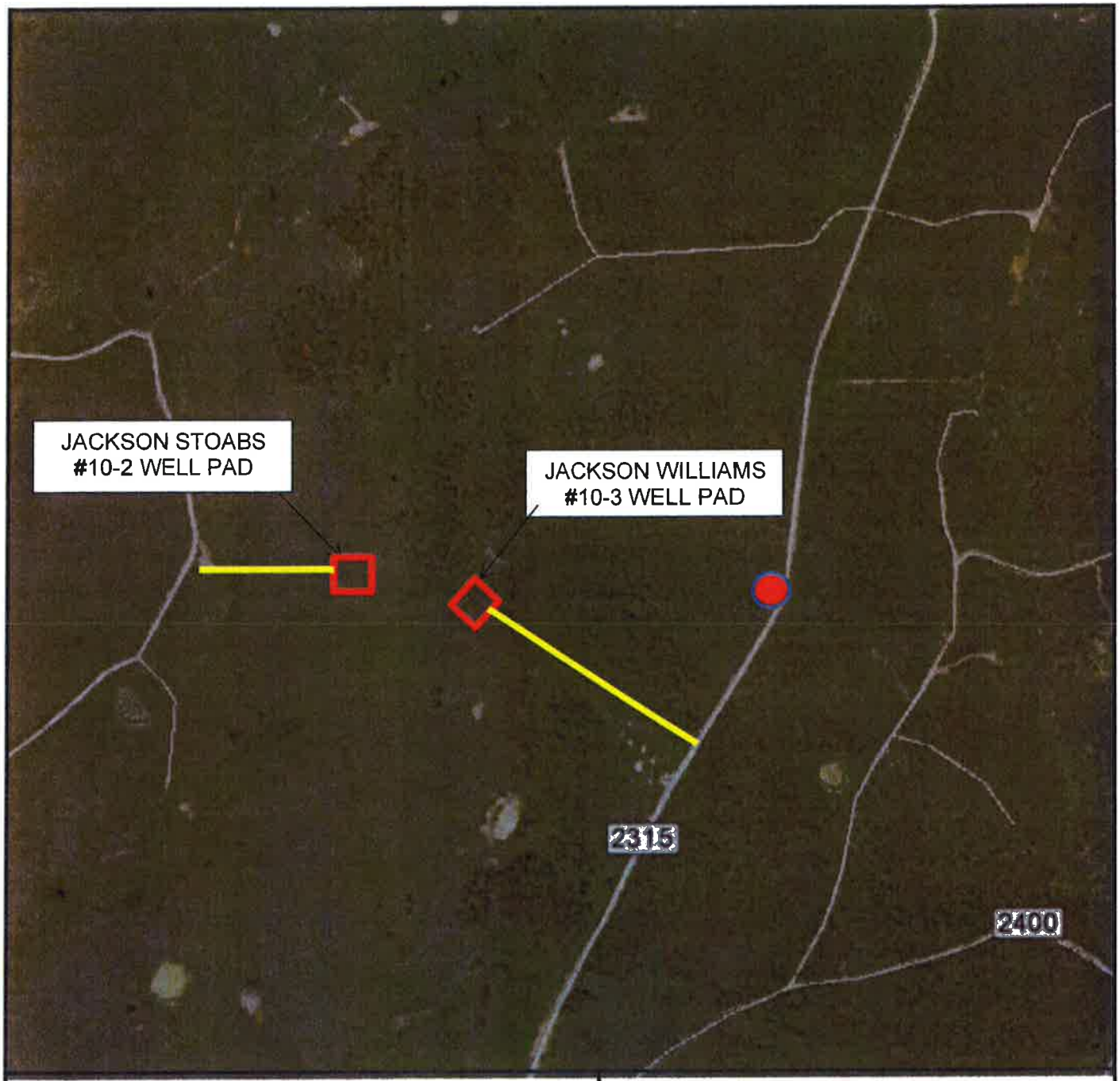
JACKSON STOABS #10-2 AND JACKSON WILLIAMS #10-3 WELL PADS
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 10 TOWNSHIP 24 NORTH RANGE 11 EAST,
OSAGE COUNTY, OKLAHOMA
WOLCO, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE
OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 1
DRAWN BY:	AM	PROJECT #:	P938	



= PROPOSED WELL PAD

= ACCESS ROAD AND UTILITY CORRIDORS

=ABB TRAP LOCATION

ABB TRAP NUMBER 9

36.5761 -96.1055

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AERIAL PHOTOGRAPH

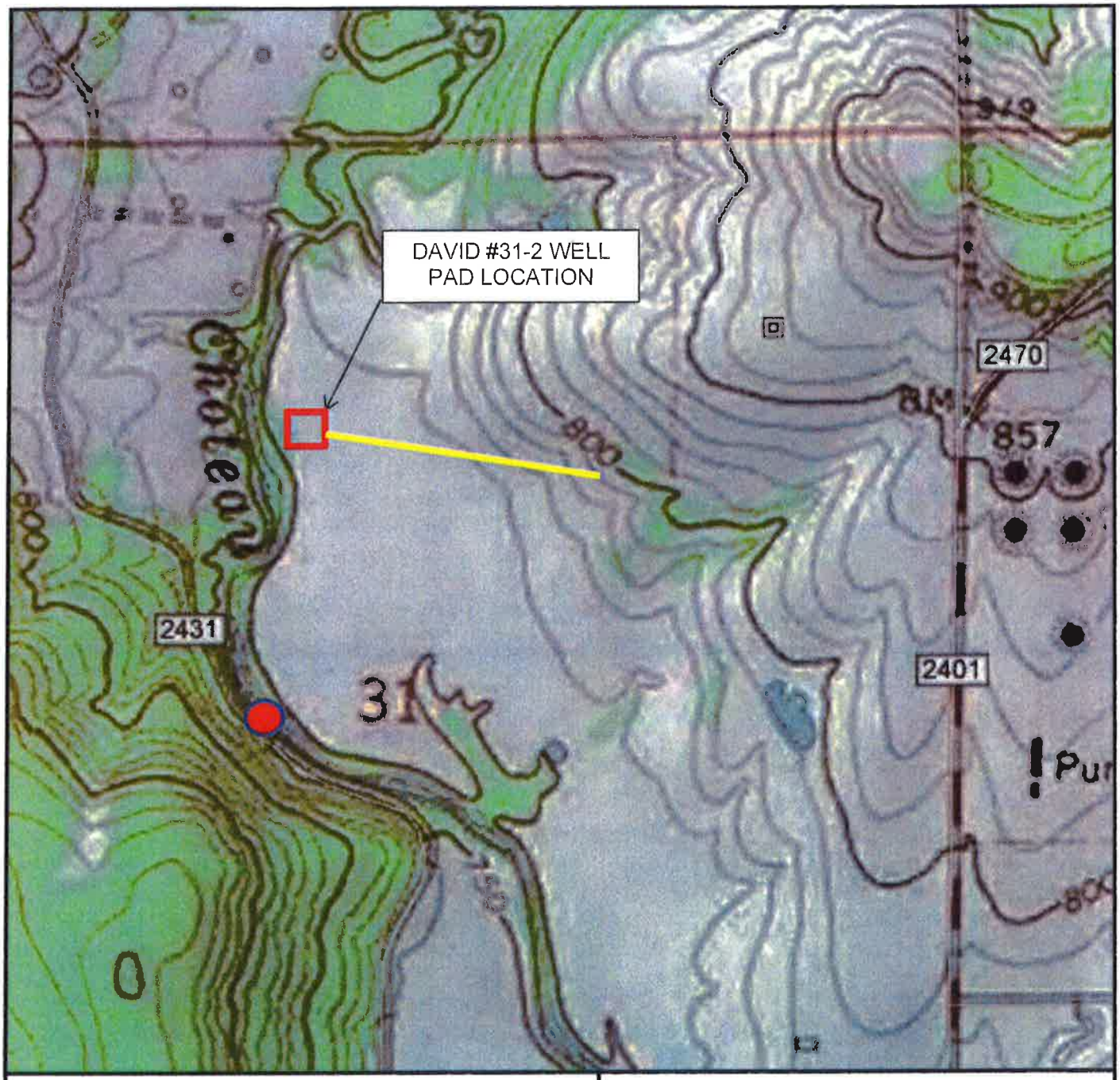
JACKSON STOABS #10-2 AND JACKSON WILLIAMS #10-3 WELL PADS
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 10 TOWNSHIP 24 NORTH RANGE 11 EAST,
OSAGE COUNTY, OKLAHOMA
WOLCO, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE
OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
DRAWN BY:	AM	PROJECT #:	P938	



= PROPOSED WELL PAD

= ACCESS ROAD AND UTILITY CORRIDORS

=ABB TRAP LOCATION

ABB TRAP NUMBER 12

36.6006 -96.1627

-N-

TOPOGRAPHICAL MAP

DAVID #31-2 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 31 TOWNSHIP 25 NORTH RANGE 11 EAST, OSAGE COUNTY, OKLAHOMA
BARNSDALL, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 1
DRAWN BY:	AM	PROJECT #:	P938	

= PROPOSED WELL PAD

= ACCESS ROAD AND UTILITY CORRIDORS

=ABB TRAP LOCATION

ABB TRAP NUMBER 12

36.6006 -96.1627

-N-

AERIAL PHOTOGRAPH

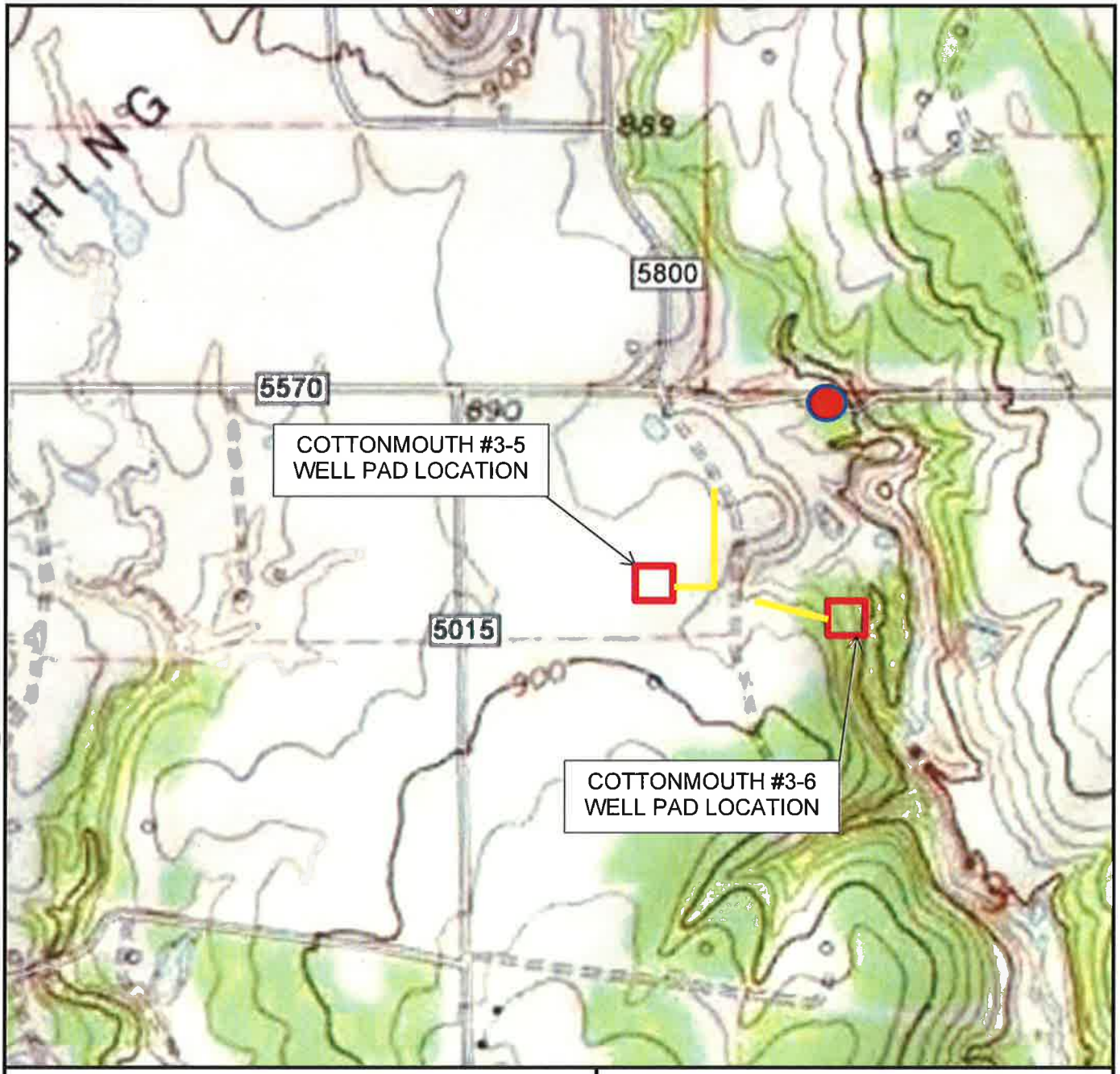
DAVID #31-2 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 31 TOWNSHIP 25 NORTH RANGE 11 EAST, OSAGE COUNTY, OKLAHOMA
BARNSDALL, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
DRAWN BY:	AM	PROJECT #:	P938	



= PROPOSED WELL PAD

= ACCESS ROAD AND UTILITY CORRIDORS

=ABB TRAP LOCATION

ABB TRAP NUMBER 14

36.5931 -96.3297

-N-

TOPOGRAPHICAL MAP

COTTONMOUTH #3-5 AND COTTONMOUTH #3-6 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 3 TOWNSHIP 24 NORTH RANGE 9 EAST, OSAGE COUNTY, OKLAHOMA
WYNONA, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 1
DRAWN BY:	AM	PROJECT #:	P938	

= PROPOSED WELL PAD

= ACCESS ROAD AND UTILITY CORRIDORS

=ABB TRAP LOCATION

ABB TRAP NUMBER 14

36.5931 -96.3297

-N-

AERIAL PHOTOGRAPH

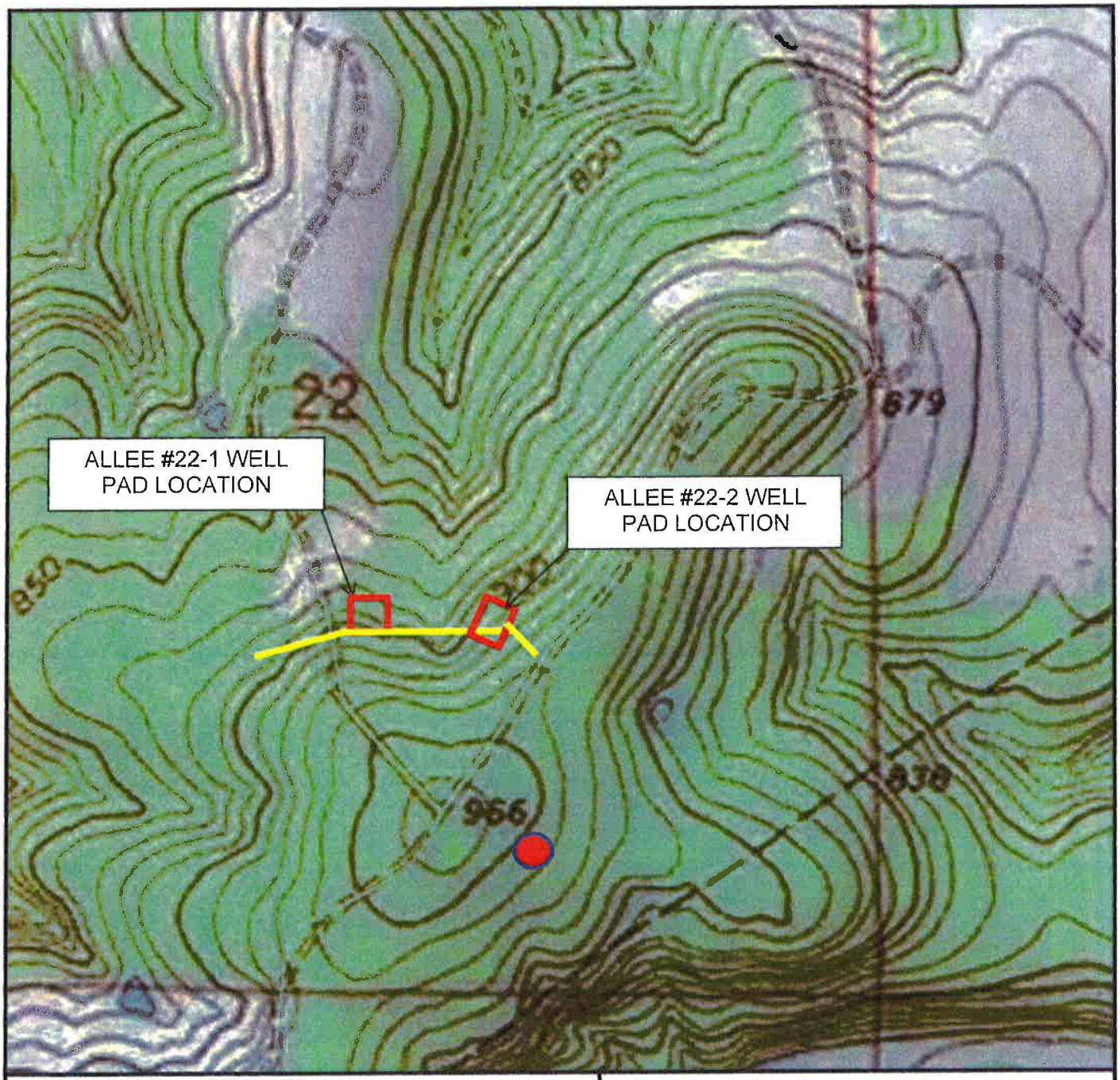
COTTONMOUTH #3-5 AND COTTONMOUTH #3-6 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 3 TOWNSHIP 24 NORTH RANGE 9 EAST, OSAGE COUNTY, OKLAHOMA
WYNONA, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
DRAWN BY:	AM	PROJECT #:	P938	



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= ACCESS ROAD AND UTILITY CORRIDORS

=ABB TRAP LOCATION

ABB TRAP NUMBER 23

36.7122 -96.1036

-N-

TOPOGRAPHICAL MAP

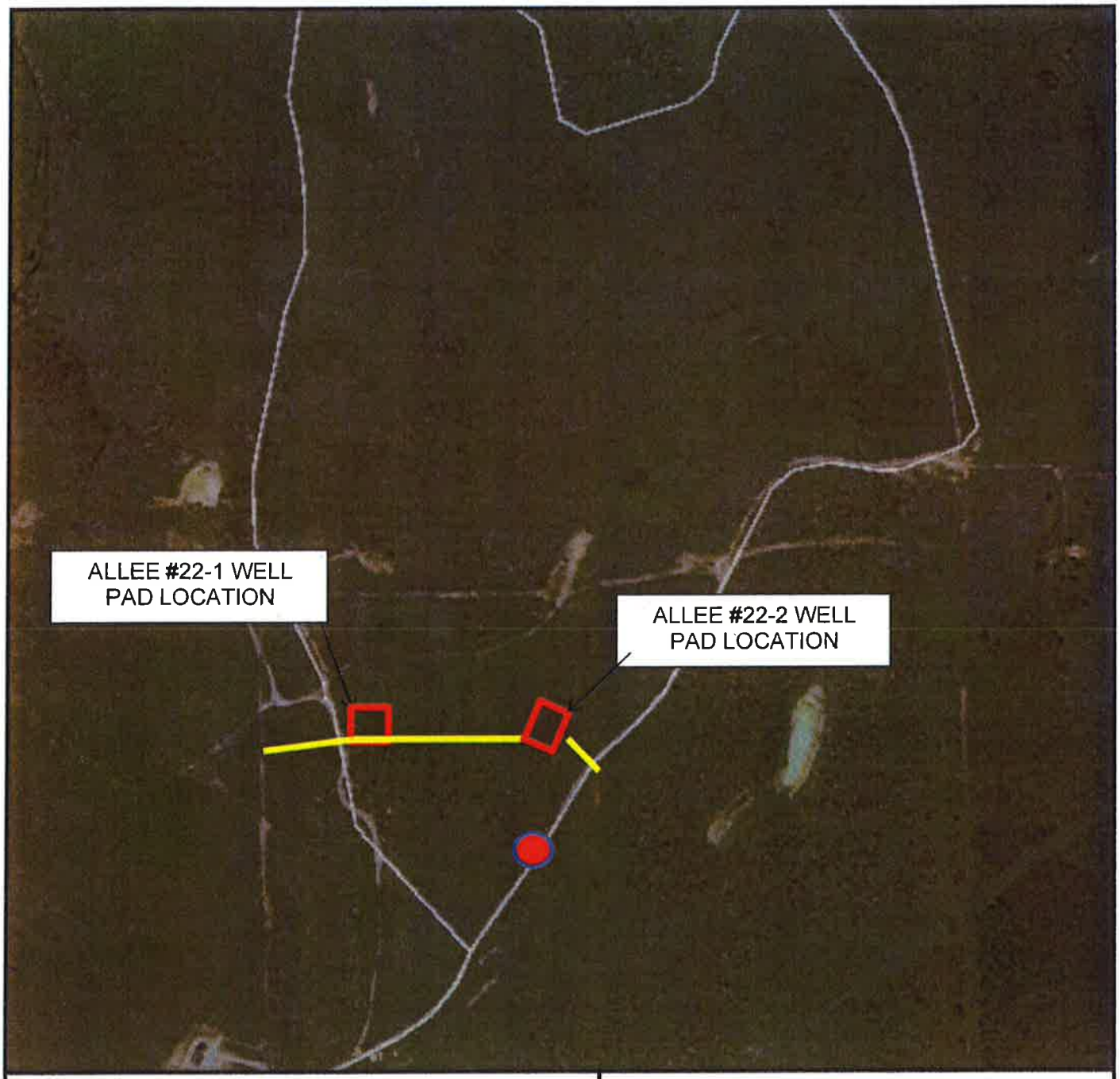
ALLEE #22-1 AND ALLEE #22-2 WELL PADS
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 22 TOWNSHIP 26 NORTH RANGE 11 EAST, OSAGE COUNTY, OKLAHOMA
WOOLAROC, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 1
DRAWN BY:	AM	PROJECT #:	P938	



= PROPOSED WELL PAD

= ACCESS ROAD AND UTILITY CORRIDORS

=ABB TRAP LOCATION

ABB TRAP NUMBER 23

36.7122 -96.1036

-N-

AERIAL PHOTOGRAPH

ALLEE #22-1 AND ALLEE #22-2 WELL PADS
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 22 TOWNSHIP 26 NORTH RANGE 11 EAST, OSAGE COUNTY, OKLAHOMA
WOOLAROC, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
DRAWN BY:	AM	PROJECT #:	P938	

Appendix B

USFWS American Burying Beetle Oklahoma Presence/Absence Live-Trapping Survey Guidance

2014
American Burying Beetle *Nicrophorus americanus*
Oklahoma Presence/Absence Live-trapping Survey Guidance

Introduction

This document provides guidance for designing and conducting live-trapping presence/absence surveys for the endangered American burying beetle *(Nicrophorus americanus,* ABB) throughout its current and historical range in Oklahoma. This guidance replaces any previous U.S. Fish and Wildlife Service (Service) recommended ABB survey guidance for the state of Oklahoma. These surveys may only be conducted by individuals possessing a valid Federal Fish & Wildlife Permit for scientific recovery of the ABB (Surveyors), as defined under section 10(a)(1)(A) of the Endangered Species Act (ESA), issued by the Service. Surveyors should read the Service's *ABB Impact Assessment and Mitigation Guidelines* prior to conducting any ABB surveys to determine where and in what cases surveys are recommended. Surveys for ABB conducted beyond the scope of a presence/absence survey must be coordinated with the Service. Additionally, surveyors should contact the Oklahoma Department of Wildlife Conservation to determine whether any state guidelines and/or permits apply. This guidance is based on the most current scientific data available at this time. The Service's Oklahoma Ecological Services Field Office (OKESFO) will update this survey guidance as new information becomes available.

NOTICE: The Service will no longer provide separate validation letters for individual surveys. Instead, responsibility to ensure that the surveys are conducted in accordance with this protocol and cover all potential ABB habitats within a project area will lie with the Permitted Biologist. The Service expects Permitted individuals to adhere to the protocols outlined within this document. If upon review, the Service discovers a survey to be invalid for any reason, the Service will return the project to the proponent as incomplete with directions to resubmit the project once they have conducted a valid survey. Additional reporting details are found below in the *Reporting Procedures* section of this document.

Areas Unfavorable for the ABB

This information can be used to help determine whether surveys are appropriate and provides guidance for areas to avoid when selecting the placement of traps. While the ABB uses a wide variety of habitats, the Service currently believes that areas exhibiting the following characteristics are *unfavorable* for use by ABBs based on disturbance regime, vegetation structure, unsuitable soil conditions and carrion availability:

1. Land that is tilled on a regular basis, planted in monoculture, and does not contain native vegetation.
2. Pasture or grassland that have been maintained through frequent mowing, grazing, or herbicide application at a height of 20 cm (8 inches) or less.
3. Land that has already been developed and no longer exhibits surficial topsoil, leaf litter, or vegetation.

4. Urban areas with maintained lawns, paved surfaces, or roadways.
5. Stockpiled soil without vegetation.
6. Wetlands with standing water or saturated soils (defined as sites exhibiting hydric-soils, and vegetation typical of saturated soils, and/or wetland hydrology).

NOTE: Areas adjacent to wetlands and/or riparian areas are **not** considered unfavorable for the ABB, as they may be important for ABBs seeking moist soils during dry conditions.

Seasonal Parameters

Time of Year for Surveys

In order for the Service to consider a survey valid within the state of Oklahoma, surveys for the ABB must occur during the ABB active season. The Service considers the ABB active season in Oklahoma to begin after five consecutive nights when the minimum nightly temperature reaches 15.5 degrees Celcius/60 degrees Fahrenheit (°F) or greater (Bedick 1997, Kozol 1991, USFWS 1991). Over the past 10 years in Oklahoma (2003-2012), on average, the fifth consecutive night of minimum temperatures meeting or exceeding 60°F occurred on May 26 (Mesonet 2013). Surveys may continue until the first night when the minimum temperature falls below 60°F after August 31, which signifies the end of the ABB active season. Over the past 10 years in Oklahoma, on average, the first night after August 31 when minimum temperatures fell below 60°F occurred on September 14 (Mesonet 2013). These dates are provided for planning purposes only and are subject to the current year's weather/temperatures. Permitted biologists will need to ensure nightly temperature criteria have been met before trapping begins. Surveyors should collect the necessary temperature information from the closest weather station to the survey site (see more information in the Reporting Procedures section below).

Timeframe Surveys are Valid

Previously surveys performed anytime during the active season were valid until the next active season. This is not consistent with the mobile nature of the ABB and new information documenting the presence of ABBs in areas that had negative surveys earlier in the season. This revised guidance allows surveys completed prior to July 28 to be valid for only that active season. Surveys completed after July 28, however, will be valid until the start of the new active season, typically May 26.

Following metamorphosis from larva to adult, tenerals (adult ABBs newly emerged from the pupal case) typically emerge from underground in late summer; though timing can vary based on latitude and weather conditions. For example presence/absence surveys in Oklahoma have documented tenerals in early summer of 2013 (USFWS species files). Typically, tenerals over-winter as adults and comprise the breeding population the following spring and summer (Kozol 1990). ABBs usually live for only one year and all ABBs that overwinter were produced the previous summer. In Oklahoma, by July 28, most new or teneral ABBs should have emerged and be actively seeking carcasses. Surveys completed after July 28th should more accurately represent the presence or absence of teneral ABBs prior to overwintering.

Trap Design

General

The Service requires surveyors to use an 18.92-liter (5-gallon) bucket-style trap when conducting ABB presence/absence surveys. Traps must be light in color, have smooth sides, and be free of any texture or ridges to prevent ABBs from climbing out. Each trap consists of a bucket with cover and bait. Utilization of trap designs and equipment that deviate from the traps described herein must be coordinated with and approved by the Service prior to deployment. Surveyors may place buckets above ground or bury them as a pitfall trap, as described below.

5-gallon Above-ground Bucket Trap

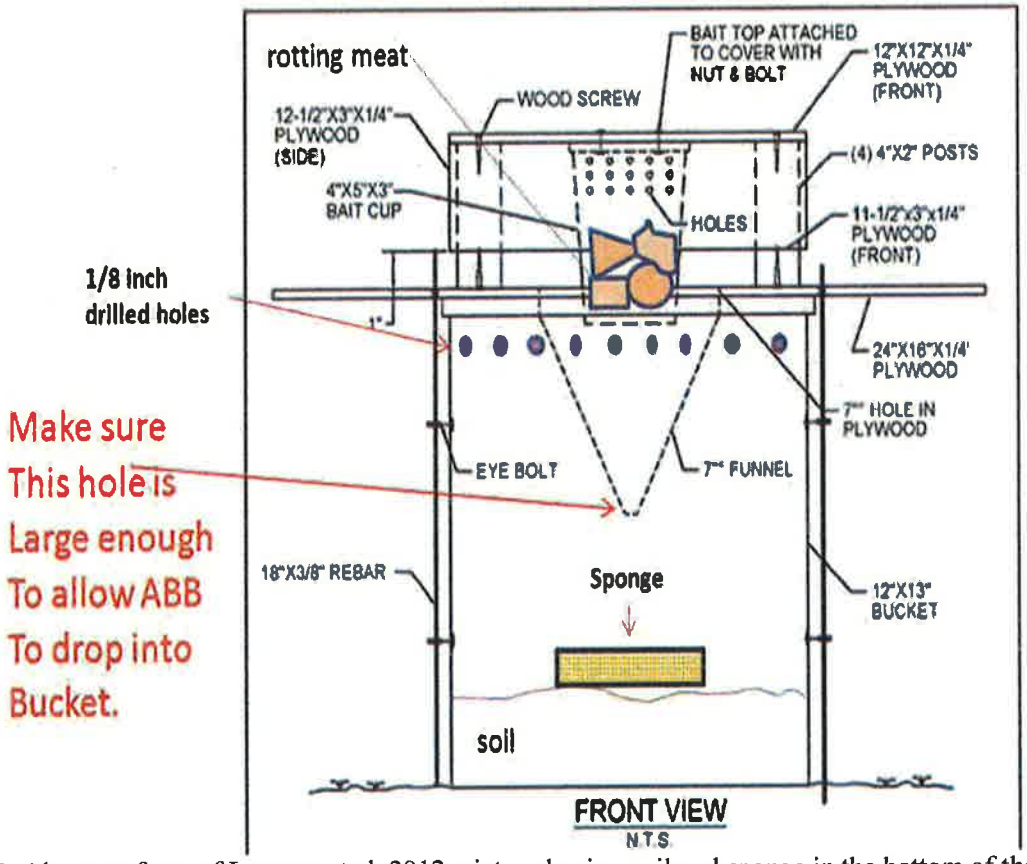


Figure 1. Alternate form of Leasure et al. 2012, pictured using soil and sponge in the bottom of the bucket. This allows beetles to find refuge from other congeners, decreases competition, and decreases stress to ABB's.

See Appendix C (Leasure et al. 2012) for instructions, materials, figures and schematics. Funnels used to make these traps can come in different sizes. When selecting a funnel for your trap, the small end of the funnel MUST be large enough to allow a large ABB to fall through into the bucket (approximately 55 mm – 2.16 inches). If the funnel's small end opening is not large enough, you may need to cut it off to make the hole larger (**Figure 1**). Surveyors should drill

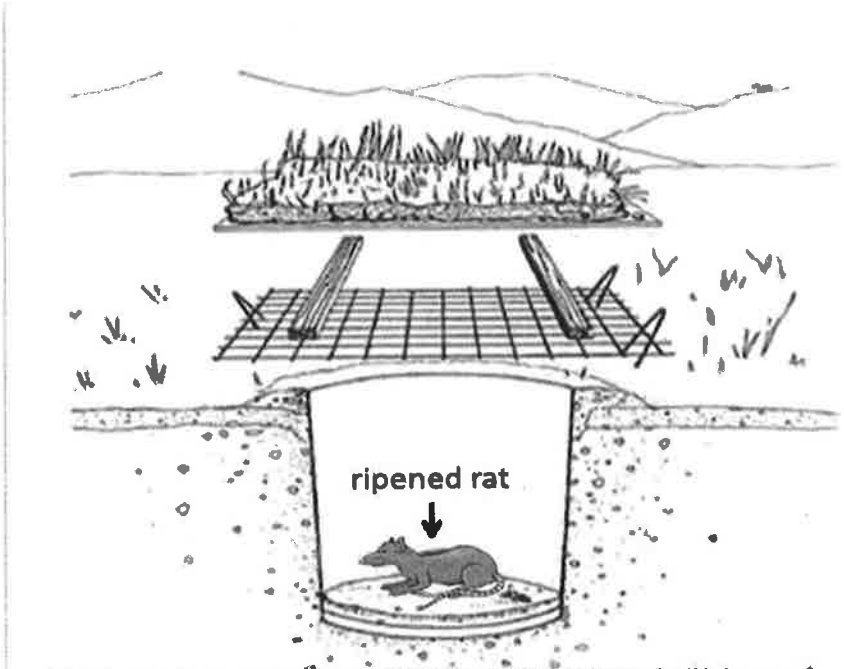
additional 3.2 mm (1/8 inch) holes around the top edge of the bucket (see figure 1) to allow air circulation through the bucket while preventing beetles from escaping.

5-gallon Pitfall Bucket-Trap

This pitfall trap design follows Bedick et al. 2004, although biologists have recommended a few modifications to this trap over the years to provide for better performance, such as allowing ABB access to bait within the trap to decrease competition and provide moisture for captured beetles. A schematic of the improved design is pictured in **Figure 2**. The following is a list of items needed to build these pitfall traps.

Materials

1. Two 18.92 liter (5-gallon) buckets with a diameter of 28.5 centimeters (11.2 inches) or greater
2. Piece of plywood at least 10.2 centimeters (4 inches) wider than diameter of bucket
3. Piece of wire mesh (≥ 2.5 centimeters [1-inch] mesh size) to allow ABB to enter but still exclude scavengers.
4. Four garden staples
5. Two 2.5 centimeters by 2.5 centimeters (1-inch by 1-inch) sticks large enough to hold the cover off the bucket
6. Shovel or ground auger



Pitfall trap design (Bedick et al. 2004). Place ripened carrion on top of soil in bottom of bucket.

Figure 2. Pitfall trap design (based on Bedick et al. 2004)

Place one bucket inside the other bucket, and place both in a pre-dug hole. Stacking the buckets one inside the other facilitates removal of trapped insects by easily pulling the top bucket out, while the second bucket remains in the ground to maintain the integrity of the hole. The rim of the buckets should be 1.2 to 2.5 centimeters (0.5 to 1.0 inch) above ground level and a berm of soil built up to the rim of the bucket to create a gradient from ground level upwards to the rim for ABBs to access the bucket. This also prevents water runoff from filling the bucket.

If using a pit-fall trap design in areas where scavengers are a significant problem, surveyors should install wire mesh between the pitfall trap and the cover as pictured in **Figure 2**. Place the wire mesh over the buckets and secure in place with the garden staples to help exclude vertebrate scavengers. The piece of wire mesh should allow ABBs access to the trap, but prevent larger animals from stealing the bait. Surveyors should secure the wire mesh to the ground with stakes.

Lay the 1 x 1 sticks over the wire mesh and place a hard cover on top of the sticks.

Place additional weight (soil, rocks, etc.) on top of the trap cover to reduce bait loss to vertebrate scavengers and to prevent wind or small animals from moving the cover, as depicted in **Figure 2**.

Do not place traps in areas where inundation during rainfall events could occur as ABBs can drown easily in even a small amount of water. Close traps if high winds or severe thunderstorms are predicted for the survey area.

A cover is required to deter scavenger's access to the trap, to prevent rainfall from entering the trap, and to provide shade to captured insects to inhibit desiccation. The cover over traps should be rigid, light in color, weighted or secured to the trap or ground. Covers over pitfall traps should be raised off the trap about 1 to 2 inches to allow ABBs to crawl into the trap and to allow the scent of the bait to better permeate the air.

Trap Deployment

Minimum Survey Effort (Temporal Scale)

To determine presence/absence of ABBs, surveyors should set traps for a minimum of **five (5) consecutive nights** (Bedick et al 2004). *This is a change from previous guidance that recommended a minimum of three nights.* Surveys with 5 consecutive nights reduce the potential for false negatives and are consistent with recommendations in Bedick et al. 2004 and guidance used in other portions of the ABB range. A minimum survey effort of 5 nights was required to eliminate false negatives in 123 surveys conducted in 2011(Hoback 2011 Unpublished). See "Weather Requirements" section below for additional information about timing of surveys with invalid nights.

Weather Requirements

The following environmental conditions are not conducive to ABB presence/absence surveys and therefore invalidate survey results unless additional nights of surveying are added. Additional night(s) of surveying are required in Oklahoma when:

- Nighttime temperature falls below 60°F (during the survey period),
- Wind speed is greater than 10 mph in excess of 20% of the time between 9:00 p.m. and 4:00 a.m. (1 hour 24 minutes),
- Precipitation exceeds 0.5 inches between 9:00 p.m. and 4:00 a.m., or
- Surveys are interrupted by 3 nights of unsuitable weather conditions.

Minimum survey effort should include five consecutive nights of suitable weather conditions. Surveyors should collect the necessary precipitation, temperature, and wind information from the closest weather station to the survey site (see more information in the Reporting Procedures section below). If unsuitable weather conditions invalidates one or more survey nights during the overall survey effort, surveyors should continue surveying until they reach five valid nights. It is not necessary to restart surveys to obtain five (5) consecutive nights of sampling, unless surveys are interrupted by three (3) consecutive nights of unsuitable weather. Record which survey nights did not meet weather requirements on the "*ABB Survey Data Collection Form*" (Appendix A) and the total number of nights with unsuitable weather conditions on the "*ABB Survey Summary Report*" (Appendix B).

Disturbed bait or traps

An additional night of trapping is required for every night the trap or bait is disturbed. Record which survey night(s) the disturbance occurred on the "*ABB Survey Data Collection Form*" (Appendix A) and the total number of nights of trap disturbance on the "*ABB Survey Summary Report*" (Appendix B).

Trap Spacing and Placement

The effective survey radius for each trap is 0.8 km (0.5 miles). Therefore, surveyors should space traps 1.6 km (1.0 mile) apart to achieve adequate survey results. The Service determined this effective survey radius based on the ABB's mobility, size, recorded movement distances, and the distance from which ABBs can detect carrion.

Surveyors should place traps at the highest elevation in the survey area and along the upwind edge of the survey area, if possible. High elevation areas take precedent over upwind placement. (Do not place traps in depressions that may hold water if rain occurs.)

Baiting and Checking Traps

Any type of carrion is suitable for use as bait, as long as it is the appropriate size in correlation with trap size and produces a pungent odor that ABBs are able to detect (Bedick et al 2004, Leasure *et al.* 2012). All bait must be aged or ripened and emit a pungent odor to be effective. Surveyors should store the bait outside in airtight containers for 3 to 7 days, depending on the temperature and other weather conditions. Do not fill the container or bag completely full, because as the bait rots, gas pressure inside the container increases, and expands the container.

The Service recommends that surveyors bait the bottom of the pitfall bucket traps with whole

carcasses, hair/feathers intact. Surveyors may use previously frozen, 275-374 gram (9.7-13.2 ounce) laboratory rats (*Rattus norvegicus*), available from pet stores and online dealers, as bait. If rats are not available, bait items of comparable size and structure may be used. Additionally, if using the aboveground 5-gallon bucket, surveyors will utilize the bait cup attached to the lid to ensure that the pungent odor of carrion is effectively dispersed. This bait need not be a whole carcass and may consist of aged pieces that have neither skin nor hair. Baiting traps consists of:

1. Emplace or secure the bucket to the ground
2. Place approximately 2.5 to 5.1 centimeters (1 to 2 inches) of loose, friable, moist (but not wet) soil with little or no clay content in the bottom of the pitfall bucket or above-ground bucket if bait is placed in the bottom. When checking traps, care must be taken when sifting the dirt for ABB presence.
3. Place a wetted sponge and/or soil in the bottom of the 5-gallon bucket. (All traps require the use of a wetted sponge.)
4. If you are using a pitfall trap, place the carcass on top of the soil in the bottom of the trap. If you are using the 5-gallon above-ground bucket trap, surveyors must place the bait in the perforated bait cup that is attached to the lid and may place additional bait in the bottom (if soil is added).
5. During trapping efforts, surveyors must replace any bait that has dried out or no longer emits a pungent odor with new, prepared bait. Do not leave discarded or old bait at or near the current trapping area. This could lure ABBs away from the baited traps. Surveyors must wash all buckets with bleach and thoroughly rinse with water prior to each trapping survey effort.
6. Secure the tops of the traps to ensure predators do not have access to the contents of the bucket.
7. All traps must be in place and baited by dusk each night.

Surveyors must check and clear all ABB traps by 10:00 a.m. every day the traps are set. Surveyors may bait traps at the same time they check traps each morning, provided the bait does not dry out. Because ABBs are nocturnal, the risk of ABB captures during the day is extremely low. However, exposure to full sunlight and temperatures over 25°C (77°F) even for a few hours, can result in mortality (Kozol 1990, USFWS 1991, Kozol 1992) and traps must be checked by 10:00 a.m to minimize any temperature-related mortality.

Checking traps consists of:

1. Record and release all *Nicrophorus* species
2. Replace any missing or dry bait and moisten the sponge
3. Replace/resituate any disturbed parts of the trap

Surveyors should immediately release any injured or lethargic ABBs that are clearly alive. Surveyors should monitor all ABBs that appear to be dead, holding for at least 20 minutes for accurate determination of their condition. Process any dead ABBs as described below under "*Accidental Death of ABBs*".

Ants

Surveyors should not place traps within 7 meters (23 feet) of any ant colonies. If ants are in a trap, the surveyor should relocate the trap at least 23 feet away.

Processing Captures

Identification and processing of Nicrophorus Species

Surveyors must identify and record all *Nicrophorus* species. Appendix D provides descriptions of the *Nicrophorus* species, and Appendix E provides a dichotomous key.

Processing ABBs includes gender determination, age determination, taking measurements (if required,) marking (if authorized) and data recording of all ABBs captured. Surveyors must record all information on the "*ABB Survey Data Collection Form*" (Appendix A) if gathered.

ABBs are sensitive to prolonged heat exposure. Surveyors cannot hold captured ABBs for longer than 30 minutes, preferably much less. If more than 10 minutes is required for processing, surveyors should place ABBs in a hard plastic container with a damp sponge, which should be stored in an ice cooler until processing commences.

Surveyors cannot mark (clipping of elytra, adhesion of bee tags, painting) ABBs in any way unless approved by the Service. Calipers should be utilized if the surveyor desires to measure the pronotum or other features of individuals.

Release ABBs near (within 609 meters/2,000 feet) the transect where they were captured, but at least 3 meters (10 feet) away from foot traffic along the transect and a minimum of 152 meters (500 feet) from any vehicle pathway, to avoid trampling.

Gender Determination

The gender of ABBs is distinguishable by the orange-red marking located between the frons and mandibles on the head. These markings are rectangular on males and triangular on females (Figure 3). Surveyors must record ABB gender on the "*ABB Survey Data Collection Form*".

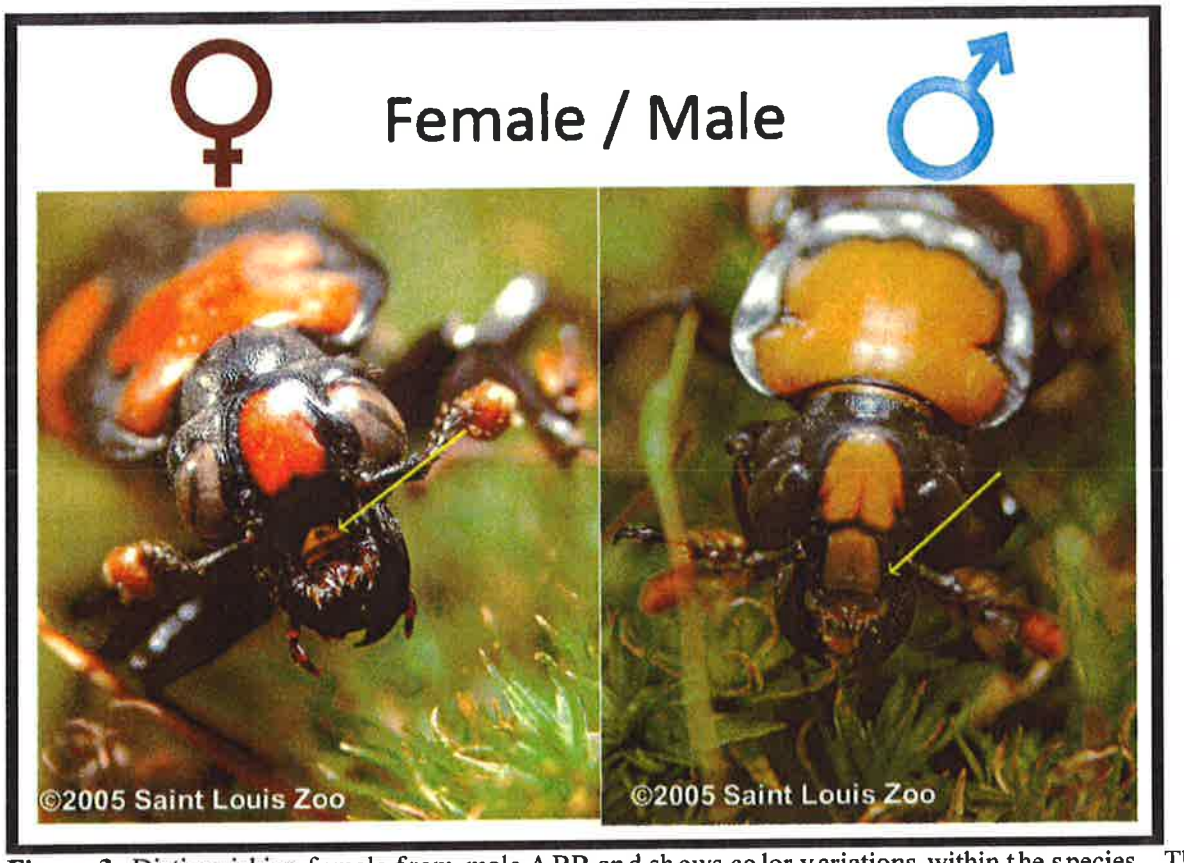


Figure 3. Distinguishing female from male ABB and shows color variations within the species. This female is darker in hue and appears more red, consistent with an older adult coloring; while this male is lighter in hue and appears more orange, consistent with characteristics of a teneral adult.

Age Determination

ABBs that have pupated during the current active season are referenced as new (i.e., newly emerged or teneral) and ABBs pupated the previous year are referenced as old (emerged the previous active season and overwintered as adults). Surveyors can distinguish newly emerged ABBs from older ABBs by their softer bodies, a more shiny appearance, and the pronotum appears more orange (less red) and lighter in hue (**Figure 3**). Older ABB's pronotum appears red rather than orange, are deeper in hue, are often missing body parts (especially legs or antennae), and their mandibles appear more worn at the tip. Surveyors must record the ages of ABBs as old, young, or unknown, on all data forms. It is also important to consider the time of year when assessing age. More mature ABBs will emerge earlier in the season while there may be higher numbers of younger ABBs captured later in the season.

Reporting Procedures

Surveyors should collect the necessary precipitation, temperature, and wind information from the weather station closest to the survey site, which can be found at ***http://www.wunderground.com/history/*** (or other appropriate weather-reporting website, such as a Mesonet site that would provide the required data). Surveyors must record this information on the "*ABB Survey Data Collection Form*" and include the total number of valid nights surveyed on the "*ABB Survey Summary Report*" (Appendix B).
To automatically find the closest weather station:

- From the homepage, hover over the Weather tab and click on the bold Weather History heading.
- Enter the closest town to the survey site and the date of the survey into the drop down menus. Remember that the valid hours of a survey are from 9:00 p.m. to 4:00 a.m. This requires the surveyor to review the weather data for two consecutive days for each night of survey effort (i.e., the night of the 3rd and morning of the 4th to determine if the survey effort for the 4th is valid).
- The weather data for the day selected will display at the top of the page. Scroll down this page to view the hourly weather data.
- If the weather station that Weather Underground takes you to does not contain all the necessary information, you will need to search for a personal weather station using the Personal Weather Station (PWS) option in Weather Underground.

To locate the closest Personal Weather Station in Weather Underground:

- Type ***http://www.wunderground.com/weatherstation/setup.asp*** in your web browser.
- Under the PWS network box on the right side of the page, select Oklahoma from the "select a state" drop down box.
- Review the list of weather stations and select the closest **reputable** weather station to your survey site (i.e., city hall, hospital, emergency management center).
- Enter the date into the drop down box and click view.
- Ensure that the weather station contains all the required data to validate the survey effort.

2-inch Fractional Water Index

Surveyors should document and record on the "*ABB Survey Data Collection Form*" and "*ABB Survey Summary Report*" the 2-inch fractional water index using the closest Mesonet station (http://www.mesonet.org/index.php/weather/daily_data_retrieval) to your trap locations. Per the Mesonet: "The Daily Averaged Fractional Water Index at 2 inches [provides] the 24-hour-averaged soil moisture at 2 inches (5 cm) under native sod for the previous day. Fractional water index ranges from 0 (completely dry) to 1.0 (completely saturated) … updated once each day between 7 and 8 a.m." The Service is using this information to help identify abiotic components associated with ABB abundance.

Location Data

At each trap, a GPS location (in decimal degrees, NAD 83) and digital photograph must be taken to document the location of the trap and the general habitat characteristics of the trap site.

Submission

For each survey effort, surveyors should complete an "*ABB Survey Data Collection Form*" (Appendix A), an "*ABB Survey Summary Report*" (Appendix B), and a digital photo of each emplaced trap. Surveyors should electronically submit Appendix B ("*ABB Survey Summary Report*") and the digital photographs to ***ABBContact@fws.gov*** for **every** survey conducted. Surveyors should submit Appendix B in Excel format only. Surveyors may decide whether to submit the *"ABB Survey Data Collection Forms"* either electronically or by mail. If surveyors choose to submit the data forms electronically, they should do so as one pdf file. Surveyors must ensure all reports are **accurate** and **complete**. The Service will consider incomplete and/or inaccurate submissions as invalid. When sending corrected forms, surveyors should indicate on the form that it is a corrected form, the project name, and identify each specific correction.

Permittees must submit their results within 30 days of the survey effort, but the Service will no longer issue letters of validation (hard copy or e-mail) for surveys. It is the project proponent and surveyor's responsibility to ensure that the surveys are conducted in accordance with this protocol and cover all potential ABB habitats within a project area. The Service will, however, periodically spot check submitted surveys for accuracy and review all surveys that are part of a submitted Project Review Package (as part of the Endangered Species Act Consultation or Technical Assistance process). When submitting a Project Review Package, project proponents should include the digital photos, as well as appendices A and B as part of their consultation package.

Specific data entry criteria are required to maintain functionality of the Service's ABB database. All names of companies, months, locations, soil types, plant species, persons, etc. are to be spelled out, no abbreviations (i.e., May instead of 5, Joe Smith instead of J. Smith, with no punctuation (i.e., Joe L Smith instead of Joe L. Smith). Report all latitude and longitude data in decimal degrees with NAD 83 coordinate system/projection. Longitude should have a negative sign preceding the number. Do not include the N or W with the latitude or longitude number. Each survey should have a specific and individual name to distinguish it from other surveys (e.g., Acme oil well 14). Specific and individual survey report identifiers are necessary to ensure the proper survey is referenced when the Service responds to a survey effort, if questions arise, or if the survey is for a specific project. Specify the project proponent and their project name in the ABB survey report and any other correspondence submitted to the Service (Acme Company, XYZ pipeline). The project proponent is the company that is ultimately responsible for the project, not just the consulting firm that may have hired you to perform these surveys.

Accidental Death of ABBs

Surveyors must record all mortalities of ABBs on the "*ABB Accidental Death Form*" (Appendix F). Surveyors must submit this form electronically within two (2) calendar days of collection via email to ***abbcontact@fws.gov***. Surveyors must also submit the hardcopy "*ABB Accidental Death Form*" with their annual permitee report.

Surveyors should put any dead specimens on ice until they can be prepared for submission. When storing and submitting dead specimens, surveyors will place dead ABBs in cotton within a sealable, rigid container (one ABB specimen per container) to prevent jostling, which can cause limb or antennae damage. Each specimen must have a unique alphanumeric name assigned by the surveyor and included inside each container to ensure future identification. This alphanumeric name should be the first letter of the first two (2) words of the permittee company or individual (e.g., Acme Company, first dead ABB = AC001). Additionally, a label must accompany the specimen and include: the date the ABB was found dead, permittee, legal description of where the beetle was found (down to quarter section at least), and a latitude and longitude coordinate in decimal degrees; NAD 83.

Surveyors should deliver dead specimens, along with a hardcopy of the "*ABB Accidental Death Form*" (Appendix F) to the Service or a Service-approved facility. The Oklahoma Ecological Services Field Office will provide recommendations as to which facility or facilities would be acceptable for deposits.

Protocols and Forms

All forms (including the ABB survey guidance appendices listed below) are located on the Oklahoma Ecological Services Field Office's website ***http://www.fws.gov/southwest/es/Oklahoma/ABB_Add_Info.htm***.

ABB Survey Guidance Attachments

Survey Guidance Appendix A- ABB Survey Data Collection Form
Survey Guidance Appendix B- ABB Survey Summary Report
Survey Guidance Appendix C- Leasure et al. 2012
Survey Guidance Appendix D- Description of Nicrophorus Species
Survey Guidance Appendix E- Dichotomous Key
Survey Guidance Appendix F- ABB Accidental Death Form

Other Federal and/or State Requirements

Surveyors need a state permit to conduct surveys for the ABB in Oklahoma. Contact the Oklahoma Department of Wildlife Conservation for more information.

Conclusion

The Service appreciates compliance with this protocol and associated reporting. The reports enable the Service to monitor the status of the ABB. However, these surveys also provide the necessary information for companies to avoid impacts to ABBs from project implementation. Additionally, maintaining a survey database provides data that can be utilized by the public during project planning.

Note

This document is based on the best scientific and commercial data available at the time of its development. The OKESFO updates this survey protocol as necessary due to new findings.

To ensure you have the most recent version, go to
http://www.fws.gov/southwest/es/oklahoma/ABB_Add_Info.htm

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Appendix C

American Burying Beetle Impact Assessment for Project Reviews

American Burying Beetle Impact Assessment for Project Reviews

U.S. Fish and Wildlife Service
Southwest Region

Oklahoma Ecological Services Field Office

March 6, 2014

ABB Impacts Assessment for Project Review – March 6, 2014

INTRODUCTION

The American burying beetle (*Nicrophorus americanus* Olivier, ABB) was federally listed as endangered in 1989 (54 FR 29652) by the U.S. Fish and Wildlife Service (Service) in accordance with the Endangered Species Act of 1973, as amended; 16 U.S.C. 1531 *et seq.*, (ESA). The ABB Recovery Plan was finalized in 1991 and a 5-year Review was completed in 2008 that recommended the ABB's status remain as endangered. Due to its Federal listing as endangered, activities that may affect ABB, whether adverse or completely beneficial, are regulated to ensure conservation and persistence of the species.

The Service recommends that project proponents use this document to determine whether their project may affect the ABB for section 7 consultation for Federal projects or may result in take of the ABB for non-Federal projects. This document describes how to assess the potential impacts of your project. Additional information regarding the recommended level of offsets or mitigation based on project location and type of impacts can be found in the ABB Conservation Strategy and Mitigation Guidance document, found on our webpage: ***http://www.fws.gov/southwest/es/oklahoma/ABB_Add_Info.htm***. The Service anticipates that with the accumulation of more detailed information, management strategies and priorities may change.

One of the goals of the ESA is to conserve ecosystems upon which listed threatened and endangered species of fish, wildlife, and plants depend. Section 9 of the ESA makes it illegal for any person subject to the jurisdiction of the United States to "take" any federally listed endangered or threatened species of fish or wildlife without a special exemption. "Person" is defined under the ESA to include individuals, corporations, partnerships, trusts, associations, or any other private entity; local, state, and Federal agencies; or any other entity subject to the jurisdiction of the United States. Under the ESA, "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering (50 CFR § 17.3). Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering(50 CFR § 17.3). Consequently, it is a violation of Federal law to take endangered species without appropriate permits. Take of federally-listed species incidental to an otherwise lawful activity may be authorized through section 7 or 10 of the ESA.

Section 7(a)(1) of the ESA directs Federal agencies, in consultation with the Service, to use their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of endangered and threatened species. Additionally, Section 7(a)(2) of the ESA requires Federal agencies to ensure that any action they authorize, fund, or carry out (Federal nexus) is not likely to jeopardize the continued existence of any federally listed threatened or endangered species or result in the destruction or adverse modification of designated critical habitat. Jeopardy is defined as an appreciable reduction in the likelihood of survival and recovery in the wild. This includes actions that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02). In the event that a Federal agency determines that their authorized, funded, or carried out action "may affect" a listed threatened or endangered species or designated critical habitat, the agency is required to consult with the Service regarding the degree of impact and measures available to avoid or minimize the adverse effects.

Section 10 provides a mechanism for take authorization for private entities where no Federal nexus exists. This provision authorizes the Service, under some circumstances, to permit the taking of federally listed fish and wildlife if such taking is "incidental to, and not the purpose of carrying out otherwise lawful activities." This process is also intended to be used to reduce conflicts between listed species and private development and to provide a framework that would encourage "creative partnerships" between the private sector and local, state, and Federal agencies in the interest of endangered and threatened species and habitat conservation. Applications for such permits include habitat conservation plans (HCP). When an HCP meets issuance criteria (50 CFR §§ 17.22(b) and 17.32(b)) and is approved by the Service, an incidental take permit is issued for the anticipated incidental take. The HCP must include appropriate conservation measures that, to the maximum extent practicable, minimize and mitigate the effects of the authorized take of the species.

SPECIES DESCRIPTION

Physical Characteristics

The ABB is the largest species of its genus (*Nicrophorus*) in North America, measuring 25-46 mm (1 – 1.8 inches) long (Wilson 1971, Anderson 1982). Species in the genus *Nicrophorus* are generally referred to as burying or undertaker beetles due to their unique behavior of burying carrion to provide a source of nutrition for developing young.

ABBs are black with orange-red markings (Figure 1). The most diagnostic feature of the ABB is the large orange-red marking on the raised portion of the pronotum (the upper surface of the first

segment of the body that lies between the head and the abdomen), a feature shared with no other members of the genus in North America (USFWS 1991). Gender can be determined from markings on the clypeus (a shield-like plate on the front of the head of an insect); males have a large, rectangular, red marking and females have a smaller, triangular, red marking.

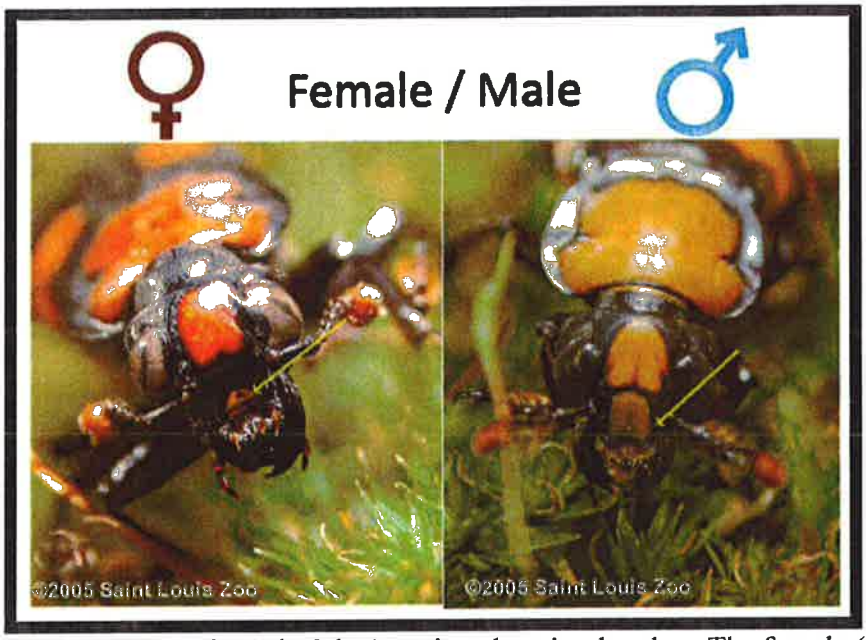

Figure 1. Female and Male American burying beetles. The female (left) has a smaller, triangular, red marking, while the male (right) has a larger, rectangular marking. Photo credit: Saint Louis Zoo, St. Louis, Missouri.

Geographic Distribution

The ABB once occurred throughout much of temperate eastern North America, including 35 U.S. states (USFWS 1991). Its absence throughout much of its former range became apparent in the 1980s, and by 1989 the ABB was thought to occur only on Block Island, Rhode Island, and at one location in Oklahoma (Davis 1980; Kozol et al. 1988; USFWS 1991). Currently, the ABB can be found in less than 10% of its historic range, with localized, extant populations discovered in six states (Backlund and Marrone 1997, Bedick et al. 1993, Godwin 2003, Lomolino et al. 1995, Miller and McDonald 1997, Ratcliffe 1996, Sikes and Raithel 2002, USFWS 2008). These locations include Block Island off the coast of Rhode Island, eastern Oklahoma, western Arkansas, the Sand Hills and Loess Hills regions in Nebraska, the Chautauqua Hills region of southeastern Kansas, south-central South Dakota, and northeastern Texas. Additionally, a reintroduced population on Nantucket Island off the coast of Massachusetts is thought to be stable and a recent reintroduction attempt in Missouri in 2012 has reported successful brood

rearing and overwintering (personal communication with Bob Mertz, St. Louis Zoo, May 30, 2013).

Life History

The ABB is a nocturnal species. Individuals usually live for only one year. Adults and larvae are dependent on carrion (flesh of dead animals) for food and reproduction. The ABB competes with other invertebrate species, as well as vertebrate species, for carrion. They are active in the summer months (active season) and bury themselves in the soil during the winter months (inactive season). The length of the inactive season can fluctuate depending on temperature. (Once nighttime temperatures are below 60 degrees Fahrenheit (°F), the ABB retreat underground and become inactive until the temperatures are above 60 °F.) In Oklahoma the inactive season is typically from October to April or May. The ABB begins reproduction soon after emergence from the inactive season, finding and securing a mate and carcass for reproduction. Adults bury a small vertebrate carcass (35-250 grams; 1-9 ounces) and lay eggs beside it. Resulting ABB larvae use the carcass as a food source until they emerge. The entire reproductive process takes approximately 48-65 days (Kozol et al. 1988). Following metamorphosis from larva to adult, tenerals (adult ABBs newly emerged from the pupal case) typically emerge from underground in late summer; although timing can vary based on latitude and weather conditions and some presence/absence surveys in Oklahoma have documented tenerals in early summer (USFWS species files). Typically, tenerals over-winter as adults and comprise the breeding population the following spring and summer (Kozol 1990).

Movement

ABBs fly and have been reported moving nightly distances ranging from 0.16 to 30 kilometers (km) (0.10 to 18.6 miles) in various parts of their range (Bedick et al. 1999, Creighton and Schnell 1998, Jurzenski et al. 2011, Schnell et al 1997-2006). In Oklahoma, ABBs have been recorded to move approximately 10 km (6.2 miles) in 6 nights (Creighton and Schnell 1998). In Nebraska, one ABB was reported to move, wind-aided, approximately 30 km (18.6 miles) in one night (Jurzenski et al. 2011).

Habitat

ABBs have been successfully live-trapped in several vegetation types including native grassland, grazed pasture, riparian zone, coniferous forest, mature forest, and oak-hickory forest, as well as on a variety of soil types (Creighton et al. 1993; Lomolino and Creighton 1996; Lomolino et al. 1995; USFWS 1991). Ecosystems supporting ABB populations are diverse and include primary

forest, scrub forest, forest edge, grassland prairie, riparian areas, mountain slopes, and maritime scrub communities (Ratcliffe 1996; USFWS 1991).

The ABB readily moves between different habitats (Creighton and Schnell 1998, Lomolino et al. 1995) and are considered to be habitat generalists. However, they are believed to have more selective breeding habitat (suitable soils and vegetation layer) compared to their feeding habitat (Anderson 1982).

Areas Unfavorable for the ABB

While the ABB uses a wide variety of habitats, the Service currently believes that areas exhibiting the following characteristics are *unfavorable* for use by ABBs based on disturbance regime, vegetation structure, unsuitable soil conditions and carrion availability:

1. Land that is tilled on a regular basis, planted in monoculture, and does not contain native vegetation.
2. Pasture or grassland that have been maintained through frequent mowing, grazing, or herbicide application at a height of 20 cm (8 inches) or less.
3. Land that has already been developed and no longer exhibits surficial topsoil, leaf litter, or vegetation.
4. Urban areas with maintained lawns, paved surfaces, or roadways.
5. Stockpiled soil without vegetation.
6. Wetlands with standing water or saturated soils (defined as sites exhibiting hydric-soils, and vegetation typical of saturated soils, and/or wetland hydrology).

NOTE: Areas adjacent to wetlands and/or riparian areas may be used by the ABB (and are therefore not considered unfavorable for the ABB). These areas may be important for ABBs seeking moist soils during dry conditions.

Additional information regarding ABB biology and habitat can be found on the Oklahoma Ecological Field Service's website at:
http://www.fws.gov/southwest/es/Oklahoma/Documents/TE_Species/Species%20Profiles/American%20Burying%20Beetle.pdf and
http://www.fws.gov/southwest/es/Oklahoma/ABB_Add_Info.htm.

ABB RANGE IN OKLAHOMA

The Service has delineated the range of the ABB in Oklahoma based on locations of known ABB occurrences. The primary source for documented ABB occurrences is ABB presence/absence

surveys conducted by Service-permitted biologists. The ABB range in Oklahoma includes all areas within 30 km (18.6 miles) (maximum ABB movement recorded by Jurzenski et al. 2011) of all documented ABB occurrences. The Service also considers portions of counties on the eastern edge of Oklahoma that are not within 30 km of a documented ABB occurrence as potential ABB range, due to the potential for ABB habitat in these areas and previously documented ABB locations in adjacent states. These areas are identified at the Information, Planning, and Conservation System (IPaC) website at ***http://ecos.fws.gov/ipac/.***

The ABB range will be updated as new occurrence data are gathered using the above delineation methods unless the best available science identifies a better technique for identifying ABB range. Updated ABB range information will be available through our website ***http://www.fws.gov/southwest/es/Oklahoma/ABB_Add_Info.htm*** and the IPaC website (*http://ecos.fws.gov/ipac/*).

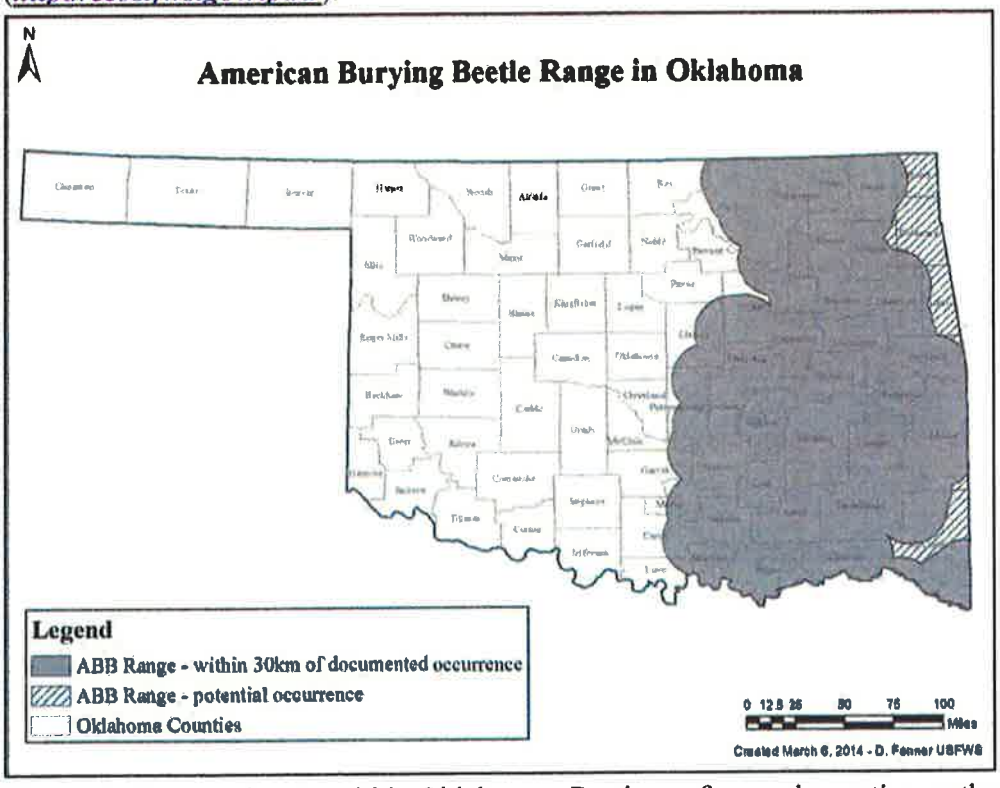

Figure 2. Range of ABB within Oklahoma. Portions of several counties on the Eastern edge of the ABB range in Oklahoma are not within 30 km of a recent survey (identified within IPaC, *http://ecos.fws.gov/ipac/*). However, these areas may contain ABB habitat.

Part or all of the following counties are currently included in the ABB range in Oklahoma (**Figure 2**): Adair, Atoka, Bryan, Carter, Cherokee, Choctaw, Coal, Craig, Creek, Delaware, Garvin, Haskell, Hughes, Johnston, Kay, Latimer, Le Flore, Lincoln, Love, Marshall, Mayes,

McClain, McCurtain, McIntosh, Murray, Muskogee, Nowata, Okfuskee, Okmulgee, Osage, Ottawa, Pawnee, Payne, Pittsburg, Pontotoc, Pottawatomie, Pushmataha, Rogers, Seminole, Sequoyah, Tulsa, Wagoner, and Washington. If a project is located within the ABB range, the Service recommends that the project proponent consider impacts to ABB. In several counties on the western edge, only the eastern portion of that county is included in the ABB range (see Figure 2). Within the ABB range, the Service recommends ABB presence/absence surveys for any proposed projects with potential impacts to suitable habitat.

ABB Conservation Priority Areas in Oklahoma

The Service has identified areas where conservation of the ABB should be targeted in Oklahoma (Figure 3.) The ABB Conservation Priority Areas (CPA) will serve as areas where conservation efforts should be focused and where higher ratios of mitigation for impacts to ABBs should occur. CPAs include areas with recent (within 10 years) documented ABB presence that the Service believes are likely to contain important elements for ABB conservation, such as documented presence over multiple years, relatively high density populations, suitable breeding, feeding, and sheltering habitat, and carrion resources.

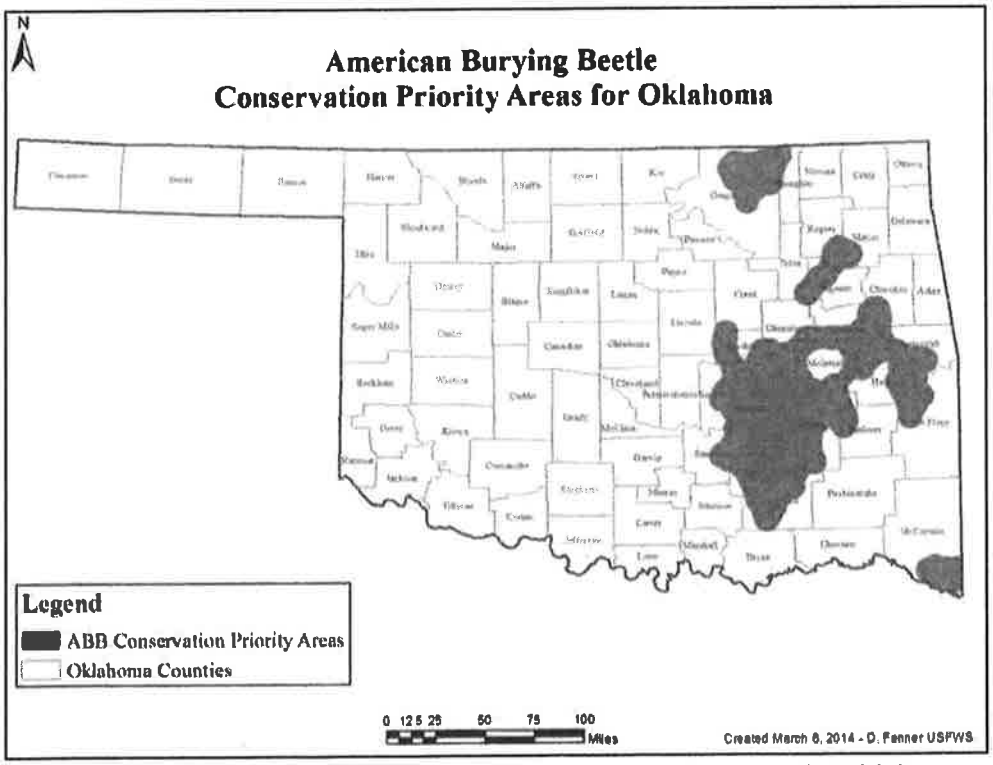

Figure 3. American burying beetle Conservation Priority Areas in Oklahoma.

The Service anticipates re-analyzing and updating the CPAs in Oklahoma every three years using the most recent 10 years of ABB occurrence data. The Service will also use the best available scientific information to determine whether a new method for identifying CPAs should be used in the future.

IMPACTS ANALYSIS

The Service's recommended *step-wise process* for determining the potential for take of the ABB resulting from a proposed activity is described below. The Service provides a step-wise process to assist project proponents in evaluating their action's risk of taking ABBs. However, the responsibility for this determination is ultimately that of each Federal agency or project proponent, as applicable. These recommendations are based on the best available information and are subject to change at any time.

1. a. Project has a Federal nexus (Federal agency is undertaking, funding, permitting, or authorizing actions).....Cont. to Step 2
1. b. Project does not have a Federal nexus (no Federal agency is undertaking, funding, permitting, or authorizing actions).....Cont. to Step 6

    2. a. Entire Action Area (all areas to be affected directly or indirectly by the action and not merely the immediate area involved in the action [50 CFR §402.02]) occurs outside of ABB range (as defined by the Service).....*Activity will have "No Effect" on the ABB. No concurrence from the Service required. Document your decision in your project files.*
    2. b. All or portions of the Action Area occur within ABB range.....Cont. to Step 3

        3. a. Entire Action Area considered unfavorable for use by ABBs (see list in "Areas unfavorable for the ABB" section above).....*Activity "May Affect, Not Likely to Adversely Affect" the ABB. Federal agency requests concurrence from the Service through informal Section 7 consultation.*
        3. b. All or portions of the action area may be favorable for use by the ABB (ABB habitat; areas not excluded by list of "Areas unfavorable for the ABB").....Cont. to Step 4

4. a. Valid and current ABB presence/absence survey conducted for portion(s) of action area with ABB habitat did not find any ABBs (according to the latest ABB Oklahoma Presence/Absence Survey Guidance – ***http://www.fws.gov/southwest/es/Oklahoma/***,) **AND**
the entire action area is farther than 0.8 km (0.5 miles) from any valid positive survey (the effective radius of an ABB survey, as described in ABB Oklahoma Presence/Absence Survey Guidance)..... *Activity "May Affect, Not Likely to Adversely Affect" the ABB. Federal agency requests concurrence from the Service through informal Section 7 consultation.*

4. b. Presence/absence surveys conducted for the action area find ABBs (according to the latest ABB Oklahoma Presence/Absence Survey Guidance), **OR** no presence/absence surveys are conducted, **OR**
any portion of the Action Area is within 0.8 km (0.5 miles) of a valid positive ABB survey (the effective radius of an ABB survey, as described in ABB Oklahoma Presence/Absence Survey Guidance).....Cont. to Step 5

5. a. Project actions do not include soil disturbance, use of vehicles or heavy equipment, artificial lighting, vegetation removal, use of herbicides, pesticides, other hazardous chemicals, **OR** any activity that may impact soil or vegetation or otherwise harm ABBs..... *Activity will have "No Effect" on the ABB. No concurrence from the Service required. Document your decision in your project files.*

5. b. Project actions include soil disturbance, use of vehicles or heavy equipment, artificial lighting, vegetation removal, use of herbicides, pesticides, other hazardous chemicals, **OR** any activity that may impact soil or vegetation or otherwise harm ABBs..... *Activity "May Affect, Likely to Adversely Affect" ABBs. Submit a Biological Assessment (BA) to the Service and initiate formal consultation through Section 7(a)(2) of the ESA. Incorporate the Service's best management practices (BMPs) for the ABB (Appendix A) into the proposed project description as conservation measures in the BA. Additionally, the Service encourages Federal agencies to improve the status of the species and reduce the relative impacts of their actions by including conservation measures as part of their project, through acquisition of mitigation lands (described below in Appendix B).*

6. a. Entire Action Area (all areas to be affected directly or indirectly by the action and not merely the immediate area involved in the action [50 CFR §402.02]) occurs outside of ABB range (as defined by the Service)..... *Activity causes "No Take" of ABB, Incidental Take Permit not needed.*

6. b. All or portions of the Action Area occur within ABB range.....Cont. to Step 7

7. a. Entire Action Area considered unfavorable for use by ABBs (see list in "Areas unfavorable for the ABB" section above).....*Activity causes "No Take" of ABB, Incidental Take Permit not needed.*

7. b. All or portions of the action area may be favorable for use by the ABB (ABB habitat; areas not excluded by list of "Areas unfavorable for the ABB").....Cont. to Step 8

8. a. Valid and current ABB presence/absence survey conducted for the portion(s) of the action area with ABB habitat did not find any ABBs (according to the latest ABB Oklahoma Presence/Absence Survey Guidance – ***http://www.fws.gov/southwest/es/Oklahoma/***) **AND** the entire action area is farther than 0.8 km (0.5 miles) from any valid positive survey (the effective radius of an ABB survey, as described in ABB Oklahoma Presence/Absence Survey Guidance) ..... *Activity causes "No Take" of ABBs, Incidental Take Permit not needed.*

8. b. Presence/absence surveys conducted for the action area find ABBs (according to the latest ABB Oklahoma Presence/Absence Survey Guidance), **OR** no presence/absence surveys are conducted, **OR** any portion of the Action Area is within 0.8 km (0.5 miles) of a valid positive ABB survey (the effective radius of an ABB survey, as described in ABB Oklahoma Presence/Absence Survey Guidance).....Cont. to Step 9

9. a. Project actions do not include soil disturbance, use of vehicles or heavy equipment, artificial lighting, vegetation removal, use of herbicides, pesticides, other hazardous chemicals, **OR** any activity that may cause take of ABBs.....*Activity causes "No take" of ABB, Incidental Take Permit for the ABB is not needed.*

9. b. Project actions include soil disturbance, use of vehicles or heavy equipment, artificial lighting, vegetation removal, use of herbicides, pesticides, other hazardous chemicals, **OR** any action that could cause take of ABBs.....*The Service recommends obtaining an ESA Section 10(a)(1)(B) permit through the development of a Habitat Conservation Plan (either individually or as part of an applicable General Conservation Plan). Incorporate the Service's BMPs for the ABB (Appendix A) as minimization measures in the HCP. Contact the Service for more information on how to prepare a Habitat Conservation Plan or permit application.*

Surveys results should only be used in the decision-making process if they are current and valid (as defined in the latest *ABB Oklahoma Presence/Absence Live-trapping Survey Guidance – **http://www.fws.gov/southwest/es/Oklahoma/***). Project proponents should re-evaluate impacts if survey results have expired prior to project implementation. For example, a project proponent expects to start construction in September. Therefore, ABB presence/absence surveys are conducted in August. Due to unexpected delays, the project does not end up starting construction until the following June. In this situation, the surveys conducted in August are no longer valid or current. Therefore, additional surveys should be conducted, or if ABB presence is likely, occupancy could be assumed in order to avoid further project delays. See the latest *ABB Oklahoma Presence/Absence Live-trapping Survey Guidance* for more information; this document can be found on the OKESFO webpage ***http://www.fws.gov/southwest/es/oklahoma/ABB_Add_Info.htm***.

Additionally, see Appendix A for the Service's BMPs for American burying beetle in Oklahoma. These BMPs should be incorporated as conservation measures in Federal project Biological Assessments and as minimization measures in non-Federal project HCPs. The list of BMPs is not exhaustive and is subject to change at any time. To ensure you have the most recent version, visit our webpage at ***http://www.fws.gov/southwest/es/oklahoma/ABB_Add_Info.htm***.

For projects that cannot avoid take of the ABB, the Service recommends mitigating the effects of the take through conservation (protection, preservation, and management) of occupied ABB habitat in perpetuity (referred to as "mitigation lands") to assist in recovery efforts for the ABB (Appendix B). The Service strongly encourages habitat offsets to Federal agencies conducting formal Section 7 consultations, and the Service requires them of private entities developing HCPs (pursuant to section 10(a)(1)(B) of the ESA). Additionally see the *American Burying Beetle Conservation Strategy for the Establishment, Management, and Operations of Mitigation Lands* document on our webpage at ***http://www.fws.gov/southwest/es/oklahoma/ConsBank.htm***.

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APPENDIX A:

Best Management Practices for American burying beetle (ABB) in Oklahoma

Oklahoma Ecological Services Office
October 29, 2013

1. To decrease habitat loss, minimize clearing of temporary work areas and use small equipment or hand cutting techniques that leave the root zone intact. In general, using hand cutting techniques is likely to result in a smaller area of impact and reduce soil compaction relative to heavy equipment.

2. Minimize construction requiring artificial lighting. In situations where night construction work is necessary, shield direct light to the work area and prevent light from projecting upwards, thus minimizing the potential to attract insects, including ABBs.

3. In areas where ABBs are present (determined by valid surveys) or where ABB presence is assumed (when no ABB surveys were completed), return surface soils to approximate pre-construction conditions.

4. Restore areas in native range using approved native seed mixes developed for the applicable ecozone.

5. Prior to the topsoil replacement, rip (i.e., mechanically turn soil with a plow or ripping device) the impacted area. Rip and disk at a time when the soil is dry enough for normal tillage operations to occur on undisturbed farmlands adjacent to the areas to be ripped. This soil de-compaction treatment should be beneficial to the ABB by reducing the extent of soil compaction.

6. Educate all workers operating in the project areas about ABB habitat, biology, reasons for ABB decline, and the responsibility of all workers to protect the ABB. Require all workers to report any ABB sightings to the project manager or environmental inspector, remove all food wastes from the ROW each day, and prohibit dogs or cats on the ROW. Provide each worker a full color Endangered Species Card with a picture of the ABB and all information summarized on the card before they are allowed to conduct soil disturbing activities. Post signs at all access points to the project area highlighting the areas as ABB habitat and reminding workers to follow special restrictions in the area.

7. Install appropriate erosion controls, including such items as straw bales, biologs, silt fence, and similar materials.

8. Implement Pollution Prevention Requirements as required in section 3.3.3 of the Oklahoma Department of Environmental Quality General Permit OKR10 for Storm Water Discharges. Additionally, fuel all equipment outside of ABB habitat (that is, outside of undisturbed native vegetation) and store all fuel and motor vehicle oil outside of ABB habitat.

APPENDIX B:

Mitigation Recommendations for the American burying beetle (ABB) in Oklahoma

Oklahoma Ecological Services Office

The Service recommends that each project proponent conserve an amount of land proportional to the impacts to ABB habitat resulting from the project. The Service's proportions, or ratios, are based on proximity of the impacts to areas of importance to ABB conservation (location) and duration of habitat impacts (**Table 1**).

Table 1. Mitigation Ratios for ABB impacts. Ratio = acres of impact : acres of offset

	Location of impact		
Impact Duration	ABB Range (but not within CPA)	Conservation Priority Area (CPA)	Mitigation Land
Temporary	1:0.25	1:0.5	1:1.5*
Permanent Cover Change	1:0.5	1:1	1:2*
Permanent	1:1	1:2	1:3*
*Mitigation Land ratio= CPA ratio plus replacement of lost mitigation value.			

Areas where impacts may result in a greater magnitude of take, and thus a larger effect on ABB, have higher mitigation ratios. For example, for permanent impacts occurring within the ABB range but outside of a CPA, for each acre of impact, 1 acre of mitigation is required (1:1 ratio). For permanent impacts occurring within an ABB CPA, for each acre of impact, 2 acres of mitigation is required (1:2 ratio). For impacts occurring within an established mitigation area, 3 acres of mitigation is expected for each acre of impact (1:3 ratio); this is the same as the ratio for impacts in a CPA, plus replacement for the acre of mitigation from prior projects that would be impacted by the action. Mitigation ratios start at 1:0.25 for temporary impacts and increase as duration of impacts increase. Greater duration of impacts likely results in greater adverse impacts to the ABB.

The ABB CPAs have a higher proportion of positive ABB surveys; consequently these areas will contribute more towards ABB conservation and recovery than areas within the ABB's range but outside the CPAs. Factors such as availability of habitat, food resources, and environmental variables likely contribute to higher density of ABB present within the CPAs. Therefore, impacts that could cause take and that occur within the CPAs have a greater effect on ABB and thus have a higher mitigation ratio than impacts in areas outside of CPAs.

Conservation easements are required for mitigation lands to protect the land from various potential impacts. However, it may not be possible to avoid all impacts, such as sub-surface mineral exploration. In cases where impacts to mitigation lands cannot be avoided, the Service expects a higher mitigation ratio. For temporary impacts the ratio is 1:1.5 and for permanent impacts 1:3. Mitigation lands are usually within ABB CPAs, have additional conservation value for the ABB through permanent protection by a conservation easement, and have a management plan specifically for the ABB.

Temporary impacts are those that impact ABB habitat for 5 years or less (areas impacted by the project are restored to a condition suitable for ABB use within 5 years of the original impact). Based on the climate and vegetation types of eastern Oklahoma, the Service expects that most grass and shrub-dominated cover types can be re-established to their pre-impact condition within 5 years. When considering precipitation, vegetation regrowth time, etc. in ABB range in Oklahoma, 5 years after the impacts occur is a reasonable timeframe for habitat to be restored to a condition suitable for ABB use.

Permanent cover change impacts are defined as impacts that change the successional stage of an area to a different stage (e.g., forest or shrubland to grassland; grassland to forest), resulting in habitat that is possibly less preferable for ABB use. Similar to temporary impacts, these areas will be restored to a condition suitable for ABB use within 5 years. However, if these areas will be permanently maintained at a different successional stage (through vegetation control, tree planting, or suppression of natural vegetation), the Service considers the vegetation cover of the area to have been permanently changed. Anthropogenic changes in cover type create intense, sudden contrast between patches (e.g., a grassland ROW fragmenting a contiguous stand of forest habitat or a forest stand fragmenting a contiguous grassland), compared to the natural patchy landscapes in Oklahoma, which have less contrast between adjacent patches. Evidence suggests that permanent change in cover, even if the types are native to the area, can increase threats to ABBs (Trumbo and Bloch 2000) by increasing invasive plant and animal species (Marvier et al. 2004), reducing the carrion prey base of the appropriate size for ABB reproduction (Oxley et al. 1974), or increasing the vertebrate scavenger competition for carrion (Kozol 1995, Ratcliffe 1996, Amaral et al. 1997, Bedick et al. 1999) necessary for ABB reproduction.

Permanent impacts are those that eliminate ABB habitat (e.g., buildings, roads, quarries, strip mines), as well as any impact to habitat that that takes more than 5 years to re-establish as suitable for ABB use.

Please see the *American Burying Beetle Conservation Strategy for the Establishment, Management, and Operations of Mitigation Lands* document for additional information about implementing appropriate mitigation ratios. This is available on our webpage at ***http://www.fws.gov/southwest/es/oklahoma/ConsBank.htm***.

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Appe 2. American Burying Beetle Survey Summary Report (Electronic)

An electronic copy (in excel format, *NOT* PDF) of this is to be submitted to the Oklahoma Ecological Services Field Office within 30 days of each su ABB Survey Data Forms are to be submitted to the Oklahoma Office within 30 days.

The data for each transect should be summarized and entered in the report below.

Project Information			Date			Locat					
Transect	Proj_name	Proj_desc	month	day	year	county	state	T	R	S	lat (dec. degrees)
3	Performance Operating	Royal #4-3 and Royal/East Hughes #5-6	August	18	2014	Osage	Ok	25N	12E	4	36.6705
4	Performance Operating	JM Hughes (Dove) #28-5	August	18	2014	Osage	Ok	26N	12E	28	36.6977
9	Performance Operating	Jackson Stoabs #10-2 and Jackson Williams #10-3	August	18	2014	Osage	Ok	24N	11E	10	36.5761
12	Performance Operating	David #31-2	August	18	2014	Osage	Ok	25N	11E	31	36.6006
14	Performance Operating	Cottonmouth #3-5 and Cottonmouth #3-6	August	18	2014	Osage	Ok	25N	9E	34	36.5931
23	Performance Operating	Allee #22-1 and Allee #22-2 Well Pad installation	August	18	2014	Osage	Ok	26N	11E	22	36.7122

Appen 2. American Burying Beetle Survey Summary Report (Electronic)

vey effort. In addition, a hard copy (previous worksheet) along with the corresponding

ion			Involved Parties			Survey Information							
long (dec. degrees)	coordsyst (NAD 83)	location	company	surveyor	proj_proponent	survey_method	survey_type	bait_type	area	Tabb	pos_neg	recap	male_total
-96.0232	NAD 83	Bartlesville	BEACON Environmental	Andy Middick	BIA	Above Gr	Preser	Aged Chicken	1	0	Negative	N/A	0
-96.0211	NAD 83	Bartlesville	BEACON Environmental	Andy Middick	BIA	Above Gr	Preser	Aged Chicken	1	0	Negative	N/A	0
-96.1055	NAD 83	Barnsdall	BEACON Environmental	Andy Middick	BIA	Above Gr	Preser	Aged Chicken	1	0	Negative	N/A	0
-96.1627	NAD 83	Barnsdall	BEACON Environmental	Andy Middick	BIA	Above Gr	Preser	Aged Chicken	1	0	Negative	N/A	0
-96.3297	NAD 83	Barnsdall	BEACON Environmental	Doug Latham	BIA	Above Gr	Preser	Aged Chicken	1	0	Negative	N/A	0
-96.1036	NAD 83	Bartlesville	BEACON Environmental	Doug Latham	BIA	Above Gr	Preser	Aged Chicken	1	0	Negative	N/A	0

ABB Capture Data												Trap Effort				
male_young	male_adult	Munkage	female_total	female_young	female_adult	Funkage	unknsex	dead	Adult	YOY	unknage	tot_trap_night	tot_bait_distub	TTN_tbd	abbptn	abbptn_tbd
0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	0	0
0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	0	0
0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	0	0
0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	0	0
0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	0	0
0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	0	0
																14

Appe . 2. American Burying Beetle Survey Summary Report (Electronic)

Habitat Data			**Other Nicrophorus captured**								**Relc**
soil	**GenSoil**	**veg**	**orb**	**tom**	**pust**	**marg**	**caro**	**sayi**	**abb_released**	**gen_rel_ site**	**rlsmonth**
Lucien-Coyle complex, 3-8% slopes	loam	Grassland	0	0	2	0	0	0	N/A	N/A	N/A
Niotaze-Bigheart-Rock outcrop complex, 3-15 % slopes, very stony	sandy loam	Grassland	0	0	0	0	0	0	N/A	N/A	N/A
Bartlesville-Bigheart complex, 1-5% slopes, very rocky	sandy loam	Woodland	0	0	1	0	0	0	N/A	N/A	N/A
Niotaze-Bigheart-Rock outcrop complex, 15-25 % slopes, extremely stc	sandy loam	Woodland	1	0	0	0	0	0	N/A	N/A	N/A
Verdigris silt loam, 0-1 % slopes, frequently flooded	silt loam	Woodland	2	0	0	0	0	0	N/A	N/A	N/A
Niotaze-Bigheart-Rock outcrop complex, 3-15 % slopes, very stony	sandy loam	Grassland	0	0	0	0	0	0	N/A	N/A	N/A

Apper 2. American Burying Beetle Survey Summary Report (Electronic)

cation Effort*						
risday	risyear	abb_died	lat	long	coorsys	Notes
N/A	N/A	N/A	N/	N/A	N/A	
N/A	N/A	N/A	N/	N/A	N/A	
N/A	N/A	N/A	N/	N/A	N/A	
N/A	N/A	N/A	N/	N/A	N/A	
N/A	N/A	N/A	N/	N/A	N/A	
N/A	N/A	N/A	N/	N/A	N/A	

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 7:24 Date Checked[1]: 8-14-14 Transect #: 3 Survey Night: 1

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 25N 12E 4 (Sec Township Range) General Location: Bartlesville (nearest town, city, landmark)

Decimal Degrees[2]: 36.6705 / -96.0232 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Grassland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Lucien-Coyle complex, 3-8% slopes (Refer to County Soil Survey) Soil Moisture[4]: 3.29

Temp[3]: Min 68 Max 83 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	1
Totals	N	0	0	0	0	0	0	0	1

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

avy Rain is defined by the World Meteorological Organization (http://severe.worldweather.org/raindoc.html) as "Rainfall greater than or equal to 50 mm [1.9685 inches] in the past 24 hours."

Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 9:26 Date Checked[1]: 8-15-14 Transect #: 3 Survey Night: 2

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 25N 12E 4 (Sec Township Range) General Location: Bartlesville (nearest town, city, landmark)

Decimal Degrees[2]: 36.6705 / -96.0232 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Grassland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Lucien-Coyle complex, 3-8% slopes (Refer to County Soil Survey) Soil Moisture[4]: 3.56

Temp[3]: Min 74 Max 89 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	4
Totals	N	0	0	0	0	0	0	0	4

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

Heavy Rain is defined by the World Meteorological Organization (http://severe.worldweather.org/raindoc.html) as "Rainfall greater than or equal to 50 mm [1.9685 inches] in the past 24 hours."

Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 9:17 Date Checked[1]: 8-16-14 Transect #: 3 Survey Night: 3

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 25N 12E 4 (Sec Township Range) General Location: Bartlesville (nearest town, city, landmark)

Decimal Degrees[2]: 36.6705 / -96.0232 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Grassland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Lucien-Coyle complex, 3-8% slopes (Refer to County Soil Survey) Soil Moisture[4]: 3.78

Temp[3]: Min 80 Max 90 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	3
Totals	N	0	0	0	0	0	0	0	3

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

avy Rain is defined by the World Meteorological Organization (http://severe.worldweather.org/raindoc.html) as "Rainfall greater than or equal to 50 mm [1.9685 inches] in the past 24 hours."

Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 9:21 Date Checked[1]: 8-17-14 Transect #: 3 Survey Night: 4

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 25N 12E 4 (Sec Township Range) General Location: Bartlesville (nearest town, city, landmark)

Decimal Degrees[2]: 36.6705 / -96.0232 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Grassland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Lucien-Coyle complex, 3-8% slopes (Refer to County Soil Survey) Soil Moisture[4]: 3.92

Temp[3]: Min 75 Max 93 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	1	0	0	0	6
Totals	N	0	0	0	1	0	0	0	6

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 8:12 Date Checked[1]: 8-18-14 Transect #: 3 Survey Night: 5

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 25N 12E 4 (Sec Township Range) General Location: Bartlesville (nearest town, city, landmark)

Decimal Degrees[2]: 36.6705 / -96.0232 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Grassland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Lucien-Coyle complex, 3-8% slopes (Refer to County Soil Survey) Soil Moisture[4]: 4.00

Temp[3]: Min 76 Max 91 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	1	0	0	0	5
Totals	N	0	0	0	1	0	0	0	5

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 7:32 Date Checked[1]: 8-14-14 Transect #: 4 Survey Night: 1

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 26N 12E 28 (Sec Township Range) General Location: Bartlesville (nearest town, city, landmark)

Decimal Degrees[2]: 36.6977 / -96.0211 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Grassland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Sandy loam, Niotaze-Bigheart-Rock outcrop complex, 3-15% slopes, very stony (Refer to County Soil Survey) Soil Moisture[4]: 3.29

Temp[3]: Min 68 Max 83 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	0
Totals	N	0	0	0	0	0	0	0	0

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 9:34 Date Checked[1]: 8-15-14 Transect #: 4 Survey Night: 2

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 26N 12E 28 (Sec Township Range) General Location: Bartlesville (nearest town, city, landmark)

Decimal Degrees[2]: 36.6977 / -96.0211 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Grassland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Sandy loam, Niotaze-Bigheart-Rock outcrop complex, 3-15% slopes, very stony (Refer to County Soil Survey) Soil Moisture[4]: 3.56

Temp[3]: Min 74 Max 89 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	5
Totals	N	0	0	0	0	0	0	0	5

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 9:25 Date Checked[1]: 8-16-14 Transect #: 4 Survey Night: 3

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 26N 12E 28 (Sec Township Range) General Location: Bartlesville (nearest town, city, landmark)

Decimal Degrees[2]: 36.6977 / -96.0211 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Grassland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Sandy loam, Nloteze-Bigheart-Rock outcrop complex, 3-15% slopes, very stony (Refer to County Soil Survey) Soil Moisture[4]: 3.78

Temp[3]: Min 80 Max 90 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	14
Totals	N	0	0	0	0	0	0	0	14

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 9:29 Date Checked[1]: 8-17-14 Transect #: 4 Survey Night: 4

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 26N 12E 28 (Sec Township Range) General Location: Bartlesville (nearest town, city, landmark)

Decimal Degrees[2]: 36.6977 / -96.0211 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Grassland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Sandy loam, Niotaze-Bigheart-Rock outcrop complex, 3-15% slopes, very stony (Refer to County Soil Survey) Soil Moisture[4]: 3.92

Temp[3]: Min 75 Max 93 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	7
Totals	N	0	0	0	0	0	0	0	7

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 8:17 Date Checked[1]: 8-18-14 Transect #: 4 Survey Night: 5

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 26N 12E 28 (Sec Township Range) General Location: Bartlesville (nearest town, city, landmark)

Decimal Degrees[2]: 36.6977 / -96.0211 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Grassland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Sandy loam, Nlotaze-Bigheart-Rock outcrop complex, 3-15% slopes, very stony (Refer to County Soil Survey) Soil Moisture[4]: 4.0

Temp[3]: Min 76 Max 91 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	4
Totals	N	0	0	0	0	0	0	0	4

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 8:58 Date Checked[1]: 8-14-14 Transect #: 9 Survey Night: 1

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 24N 11E 10 (Sec Township Range) General Location: Barnsdall (nearest town, city, landmark)

Decimal Degrees[2]: 36.5761 / -96.1055 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Woodland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Bartlesville-Bigheart complex, 1-5% slopes, very rocky (Refer to County Soil Survey) Soil Moisture[4]: 3.29

Temp[3]: Min 68 Max 83 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	0
Totals	N	0	0	0	0	0	0	0	0

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 8:38 Date Checked[1]: 8-15-14 Transect #: 9 Survey Night: 2

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 24N 11E 10 (Sec Township Range) General Location: Barnsdall (nearest town, city, landmark)

Decimal Degrees[2]: 36.5761 / -96.1055 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Woodland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Bartlesville-Bigheart complex, 1-5% slopes, very rocky (Refer to County Soil Survey) Soil Moisture[4]: 3.56

Temp[3]: Min 74 Max 89 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	1	0	0	0	2
Totals	N	0	0	0	1	0	0	0	2

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

Heavy Rain is defined by the World Meteorological Organization (http://severe.worldweather.org/raindoc.html) as "Rainfall greater than or equal to 50 mm [1.9685 inches] in the past 24 hours."

Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 8:28 Date Checked[1]: 8-16-14 Transect #: 9 Survey Night: 3

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 24N 11E 10 (Sec Township Range) General Location: Barnsdall (nearest town, city, landmark)

Decimal Degrees[2]: 36.5761 / -96.1055 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Woodland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Bartlesville-Bigheart complex, 1-5% slopes, very rocky (Refer to County Soil Survey) Soil Moisture[4]: 3.78

Temp[3]: Min 80 Max 90 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	0
Totals	N	0	0	0	0	0	0	0	0

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 8:34 Date Checked[1]: 8-17-14 Transect #: 9 Survey Night: 4

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 24N 11E 10 (Sec Township Range) General Location: Barnsdall (nearest town, city, landmark)

Decimal Degrees[2]: 36.5761 / -96.1055 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Woodland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Bartlesville-Bigheart complex, 1-5% slopes, very rocky (Refer to County Soil Survey) Soil Moisture[4]: 3.92

Temp[3]: Min 75 Max 93 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	1
Totals	N	0	0	0	0	0	0	0	1

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 9:08 Date Checked[1]: 8-18-14 Transect #: 9 Survey Night: 5

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 24N 11E 10 (Sec Township Range) General Location: Barnsdall (nearest town, city, landmark)

Decimal Degrees[2]: 36.5761 / -96.1055 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Woodland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Bartlesville-Bigheart complex, 1-5% slopes, very rocky (Refer to County Soil Survey) Soil Moisture[4]: 4.0

Temp[3]: Min 76 Max 91 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	6
Totals	N	0	0	0	0	0	0	0	6

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 8:48 Date Checked[1]: 8-14-14 Transect #: 12 Survey Night: 1

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 25N 11E 31 (Sec Township Range) General Location: Barnsdall (nearest town, city, landmark)

Decimal Degrees[2]: 36.6006 / -96.1627 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Woodland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Sandy Loam, Nlotaze-Bigheart rock outcrop complex, 15-25% slopes, extremely stony (Refer to County Soil Survey) Soil Moisture[4]: 3. 29

Temp[3]: Min 68 Max 83 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	1	0	0	0	0	0	0
Totals	N	0	1	0	0	0	0	0	0

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

avy Rain is defined by the World Meteorological Organization (http://severe.worldweather.org/raindoc.html) as "Rainfall greater than or equal to 50 mm [1.9685 inches] in the past 24 hours."

Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 8:57 Date Checked[1]: 8-15-14 Transect #: 12 Survey Night: 2

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 25N 11E 31 (Sec Township Range) General Location: Barnsdall (nearest town, city, landmark)

Decimal Degrees[2]: 36.6006 / -96.1627 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Woodland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Sandy Loam, Niotaze-Bigheart rock outcrop complex, 15-25% slopes, extremely stony (Refer to County Soil Survey) Soil Moisture[4]: 3. 56

Temp[3]: Min 74 Max 89 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	3	0	0	0	0	0	1
Totals	N	0	3	0	0	0	0	0	1

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 8:43 Date Checked[1]: 8-16-14 Transect #: 12 Survey Night: 3

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 25N 11E 31 (Sec Township Range) General Location: Barnsdall (nearest town, city, landmark)

Decimal Degrees[2]: 36.6006 / -96.1627 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Woodland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Sandy Loam, Nitolezo-Bigheart rock outcrop complex, 15-25% slopes, extremely stony (Refer to County Soil Survey) Soil Moisture[4]: 3. 78

Temp[3]: Min 80 Max 90 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	2	0	0	0	0	0	0
Totals	N	0	2	0	0	0	0	0	0

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 8:47 Date Checked[1]: 8-17-14 Transect #: 12 Survey Night: 4

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 25N 11E 31 (Sec Township Range) General Location: Barnsdall (nearest town, city, landmark)

Decimal Degrees[2]: 36.6006 / -96.1627 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Woodland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Sandy Loam, Nioteze-Bigheart rock outcrop complex, 15-25% slopes, extremely stony (Refer to County Soil Survey) Soil Moisture[4]: 3. 92

Temp[3]: Min 75 Max 93 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	2	0	0	0	0	0	1
Totals	N	0	2	0	0	0	0	0	1

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

…ivy Rain is defined by the World Meteorological Organization (http://severe.worldweather.org/raindoc.html) as "Rainfall greater than or equal to 50 mm [1.9685 inches] in the past 24 hours."

Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 8:55 Date Checked[1]: 8-18-14 Transect #: 12 Survey Night: 5

Survey Company: BEACON Environmental Permittee: Andy Middick (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 25N 11E 31 (Sec Township Range) General Location: Barnsdall (nearest town, city, landmark)

Decimal Degrees[2]: 36.6006 / -96.1627 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Woodland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Sandy Loam, Niotaze-Bigheart rock outcrop complex, 15-25% slopes, extremely stony (Refer to County Soil Survey) Soil Moisture[4]: 4.00

Temp[3]: Min 76 Max 91 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	1	0	0	0	0	0	4
Totals	N	0	1	0	0	0	0	0	4

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
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10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 10:05 am Date Checked[1]: 8-14-14 Transect #: 14 Survey Night: 1

Survey Company: BEACON Environmental Permittee: Doug Latham (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 25N 9E 34 (Sec Township Range) General Location: Barnsdall (nearest town, city, landmark)

Decimal Degrees[2]: 36.5931 / -96.3297 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Woodland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Silt Loam, Verdigris silt loam 0-1% slopes, frequently flooded (Refer to County Soil Survey) Soil Moisture[4]: 3.29

Temp[3]: Min 68 Max 83 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	0
Totals	N	0	0	0	0	0	0	0	0

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

Heavy Rain is defined by the World Meteorological Organization (http://severe.worldweather.org/raindoc.html) as "Rainfall greater than or equal to 50 mm [1.9685 inches] in the past 24 hours."

Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 6:31 am Date Checked[1]: 8-15-14 Transect #: 14 Survey Night: 2

Survey Company: BEACON Environmental Permittee: Doug Latham (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 25N 9E 34 (Sec Township Range) General Location: Barnsdall (nearest town, city, landmark)

Decimal Degrees[2]: 36.5931 / -96.3297 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Woodland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Silt Loam, Verdigris silt loam 0-1% slopes, frequently flooded (Refer to County Soil Survey) Soil Moisture[4]: 3.56

Temp[3]: Min 74 Max 89 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	1	0	0	0	0	0	0
Totals	N	0	1	0	0	0	0	0	0

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 6:29 am Date Checked[1]: 8-16-14 Transect #: 14 Survey Night: 3

Survey Company: BEACON Environmental Permittee: Doug Latham (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 25N 9E 34 (Sec Township Range) General Location: Barnsdall (nearest town, city, landmark)

Decimal Degrees[2]: 36.5931 / -96.3297 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Woodland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Silt Loam, Verdigris silt loam 0-1% slopes, frequently flooded (Refer to County Soil Survey) Soil Moisture[4]: 3.78

Temp[3]: Min 80 Max 90 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	0
Totals	N	0	0	0	0	0	0	0	0

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 6:34 am Date Checked[1]: 8-17-14 Transect #: 14 Survey Night: 4

Survey Company: BEACON Environmental Permittee: Doug Latham (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 25N 9E 34 (Sec Township Range) General Location: Barnsdall (nearest town, city, landmark)

Decimal Degrees[2]: 36.5931 / -96.3297 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Woodland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Silt Loam, Verdigris silt loam 0-1% slopes, frequently flooded (Refer to County Soil Survey) Soil Moisture[4]: 3.92

Temp[3]: Min 75 Max 93 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	1	0	0	0	0	0	0
Totals	N	0	1	0	0	0	0	0	0

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 6:50 am Date Checked[1]: 8-18-14 Transect #: 14 Survey Night: 5

Survey Company: BEACON Environmental Permittee: Doug Latham (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 25N 9E 34 (Sec Township Range) General Location: Barnsdall (nearest town, city, landmark)

Decimal Degrees[2]: 36.5931 / -96.3297 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Woodland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Silt Loam, Verdigris silt loam 0-1% slopes, frequently flooded (Refer to County Soil Survey) Soil Moisture[4]: 4.00

Temp[3]: Min 76 Max 91 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	0
Totals	N	0	0	0	0	0	0	0	0

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 6:55 am Date Checked[1]: 8-14-14 Transect #: 23 Survey Night: 1

Survey Company: BEACON Environmental Permittee: Doug Latham (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 26N 11E 22 (Sec Township Range) General Location: Bartlesville (nearest town, city, landmark)

Decimal Degrees[2]: 36.7122 / -96.1036 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Grassland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Sandy Loam, Nioteze-Bigheart rock outcrop complex, 3-15% slopes, very stony (Refer to County Soil Survey) Soil Moisture[4]: 3.29

Temp[3]: Min 68 Max 83 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	0
Totals	N	0	0	0	0	0	0	0	0

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 9:10 am Date Checked[1]: 8-15-14 Transect #: 23 Survey Night: 2

Survey Company: BEACON Environmental Permittee: Doug Latham (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 26N 11E 22 (Sec Township Range) General Location: Bartlesville (nearest town, city, landmark)

Decimal Degrees[2]: 36.7122 / -96.1036 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Grassland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Sandy Loam, Nlotaze-Bigheart rock outcrop complex, 3-15% slopes, very stony (Refer to County Soil Survey) Soil Moisture[4]: 3.56

Temp[3]: Min 74 Max 89 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	1
Totals	N	0	0	0	0	0	0	0	1

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 9:08 am Date Checked[1]: 8-16-14 Transect #: 23 Survey Night: 3

Survey Company: BEACON Environmental Permittee: Doug Latham (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 26N 11E 22 (Sec Township Range) General Location: Bartlesville (nearest town, city, landmark)

Decimal Degrees[2]: 36.7122 / -96.1036 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Grassland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Sandy Loam, Nlotaze-Bigheart rock outcrop complex, 3-15% slopes, very stony (Refer to County Soil Survey) Soil Moisture[4]: 3.78

Temp[3]: Min 80 Max 90 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	0
Totals	N	0	0	0	0	0	0	0	0

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 9:20 am Date Checked[1]: 8-17-14 Transect #: 23 Survey Night: 4

Survey Company: BEACON Environmental Permittee: Doug Latham (Spell out) Permittee Number: TE 206016-1

State: OK County: Osage Legal Description[2]: 26N 11E 22 (Sec Township Range) General Location: Bartlesville (nearest town, city, landmark)

Decimal Degrees[2]: 36.7122 / -96.1036 (NAD 83) Type of transect: Above Ground (above-ground or pitfall traps)

Vegetation Type: Grassland (Prairie, woodland, forest, pasture) Action Agency/Proponent: Performance Oil/BIA

Primary Soil Type: Sandy Loam, Nlotaze-Bigheart rock outcrop complex, 3-15% slopes, very stony (Refer to County Soil Survey) Soil Moisture[4]: 3.92

Temp[3]: Min 75 Max 93 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	1
Totals	N	0	0	0	0	0	0	0	1

Number of disturbed traps and/or bait (D): 0

Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

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Last updated May 8, 2014

AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM

Project Name: P926 Performance Oil Project Description: Well Pad Installation

Time Checked[1]: 9:15 am Date Checked[1]: 8-18-14 Transect #: 23 Survey Night: 5

Survey Company: BEACON Environmental Permittee: Doug Latham Permittee Number: TE 206016-1
(Spell out)

State: OK County: Osage Legal Description[2]: 26N 11E 22 General Location: Bartlesville
(Sec Township Range) (nearest town, city, landmark)

Decimal Degrees[2]: 36.7122 / -96.1036 Type of transect: Above Ground
(NAD 83) (above-ground or pitfall traps)

Vegetation Type: Grassland Action Agency/Proponent: Performance Oil/BIA
(Prairie, woodland, forest, pasture)

Primary Soil Type: Sandy Loam, Niotaze-Bigheart rock outcrop complex, 3-15% slopes, very stony Soil Moisture[4]: 4.0
(Refer to County Soil Survey)

Temp[3]: Min 76 Max 91 ° Heavy Rainfall?[5] No (Yes/No) Wind >10 mph?[6] No (Yes/No)

Additional number of survey night(s) required because of wind, temperature, or rain?[7] No

Trap No.	Disturbed (Y/N)	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1.	N	0	0	0	0	0	0	0	7
Totals	N	0	0	0	0	0	0	0	7

Number of disturbed traps and/or bait (D): 0
Additional survey night(s) required because of disturbance?[8]: No (Yes/No)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[9]	New[9]	Age Unknown[9]	Recapture[10]	Newly Marked[11]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										

Comments:

1. Date and time refer to when trap is checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 9 pm to 4 am prior to checking traps, must use data from www.wunderground.com
4. Soil moisture must be obtained by obtaining the TR-05 report from http://www.mesonet.org/index.php/weather/daily_data_retrieval.
5. Rain from 9 pm to 4 am, must use data from www.wunderground.com
6. Wind exceeds 10 mph > than 20% of time between 9 pm to 4 am
7. Additional trapping required if any metrics exceed the allowable thresholds.
8. Determine total number of disturbed traps over all 5 survey nights. Any disturbance to 5-gallon traps requires an additional night of survey effort.
9. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
10. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
11. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

Heavy Rain is defined by the World Meteorological Organization (http://severe.worldweather.org/raindoc.html) as "Rainfall greater than or equal to 50 mm [1.9685 inches] in the past 24 hours."

Last updated May 8, 2014

Andy Middick

From: anita_barstow@fws.gov on behalf of ABBContact, FW2 <abbcontact@fws.gov>
Sent: Monday, January 12, 2015 8:51 AM
To: Andy Middick
Subject: Re: Performance Oil Company ABB survey

Thank you for submitting your surveys on 9/30/2014

On Tue, Sep 30, 2014 at 4:27 PM, Andy Middick <amiddick@beaconcorp.com> wrote:

Attached are the data sheets for the Performance oil Company ABB survey in Osage County, Oklahoma.

Andy Middick

Project Manager

BEACON Environmental Assistance Corporation

2000 E. 15th Street, Building 400 Suite C

Edmond, Ok 73013

Office: (405) 330-8688 x-130

Fax: (405) 330-8668

Cell: (405) 593-5053

Email: amiddick@beaconcorp.com

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Anita Barstow (ABB Contact)
918-382-4518

ABB webpage http://www.fws.gov/southwest/es/Oklahoma/ABB_Add_Info.htm

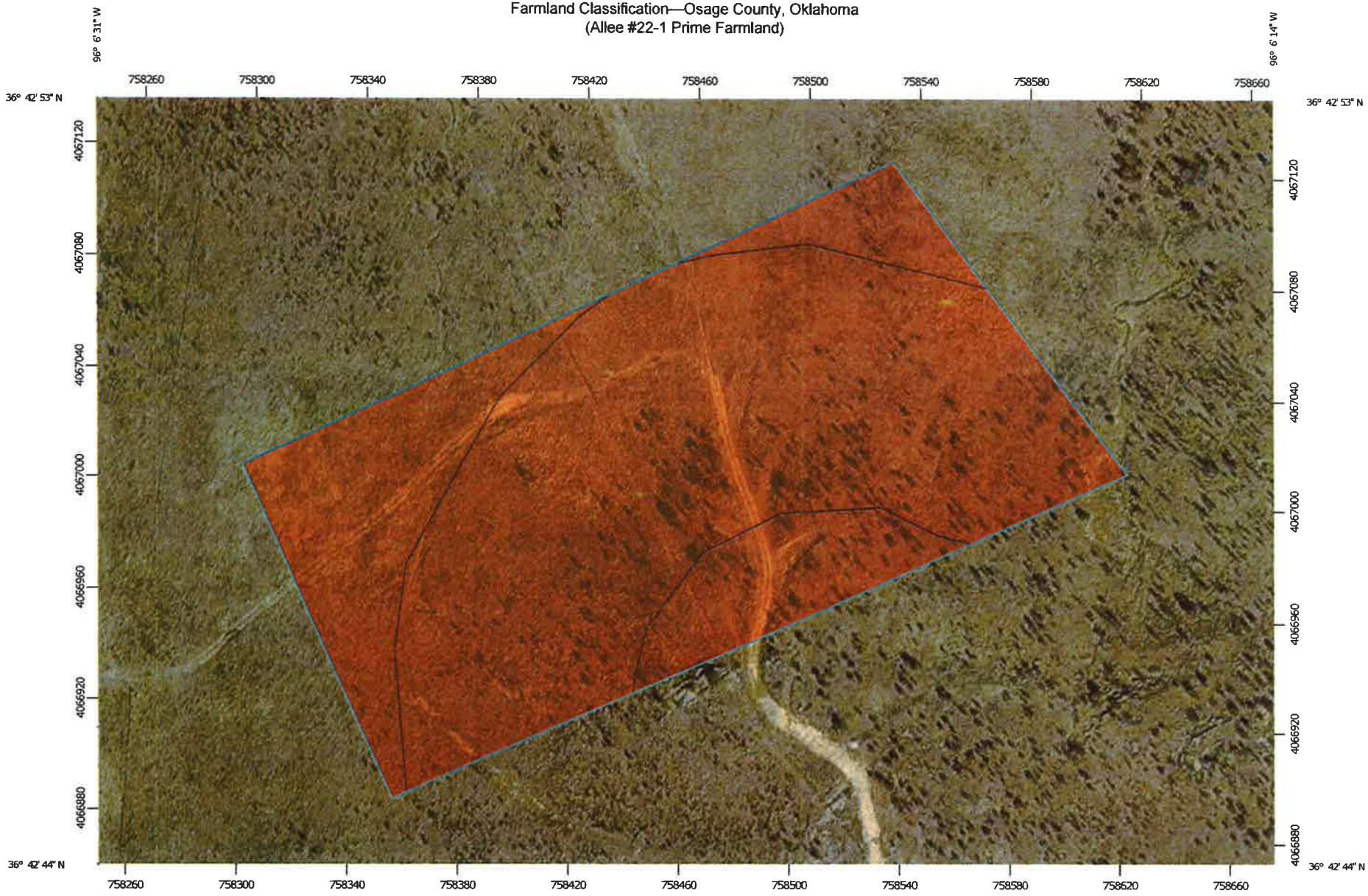
APPENDIX D

REFERENCE DOCUMENTS

APPENDIX D-1

PRIME FARMLAND CLASSIFICATION FROM NRCS

Farmland Classification—Osage County, Oklahoma
(Allee #22-1 Prime Farmland)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines
- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points
- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 23, 2010—May 16, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
NBRE	Niotaze-Bigheart-Rock outcrop complex, 3 to 15 percent slopes, very stony	Not prime farmland	2.8	30.8%
NBRF	Niotaze-Bigheart-Rock outcrop complex, 15 to 25 percent slopes, extremely stony	Not prime farmland	6.4	69.2%
Totals for Area of Interest			**9.2**	**100.0%**

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Farmland Classification—Osage County, Oklahoma
(Allee #22-2)

Map Scale: 1:1,230 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 10, Dec 26, 2013

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Date(s) aerial images were photographed: Jul 23, 2010—May 16, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
NBRE	Niotaze-Bigheart-Rock outcrop complex, 3 to 15 percent slopes, very stony	Not prime farmland	1.1	36.5%
NBRF	Niotaze-Bigheart-Rock outcrop complex, 15 to 25 percent slopes, extremely stony	Not prime farmland	2.0	63.5%
Totals for Area of Interest			**3.1**	**100.0%**

Description

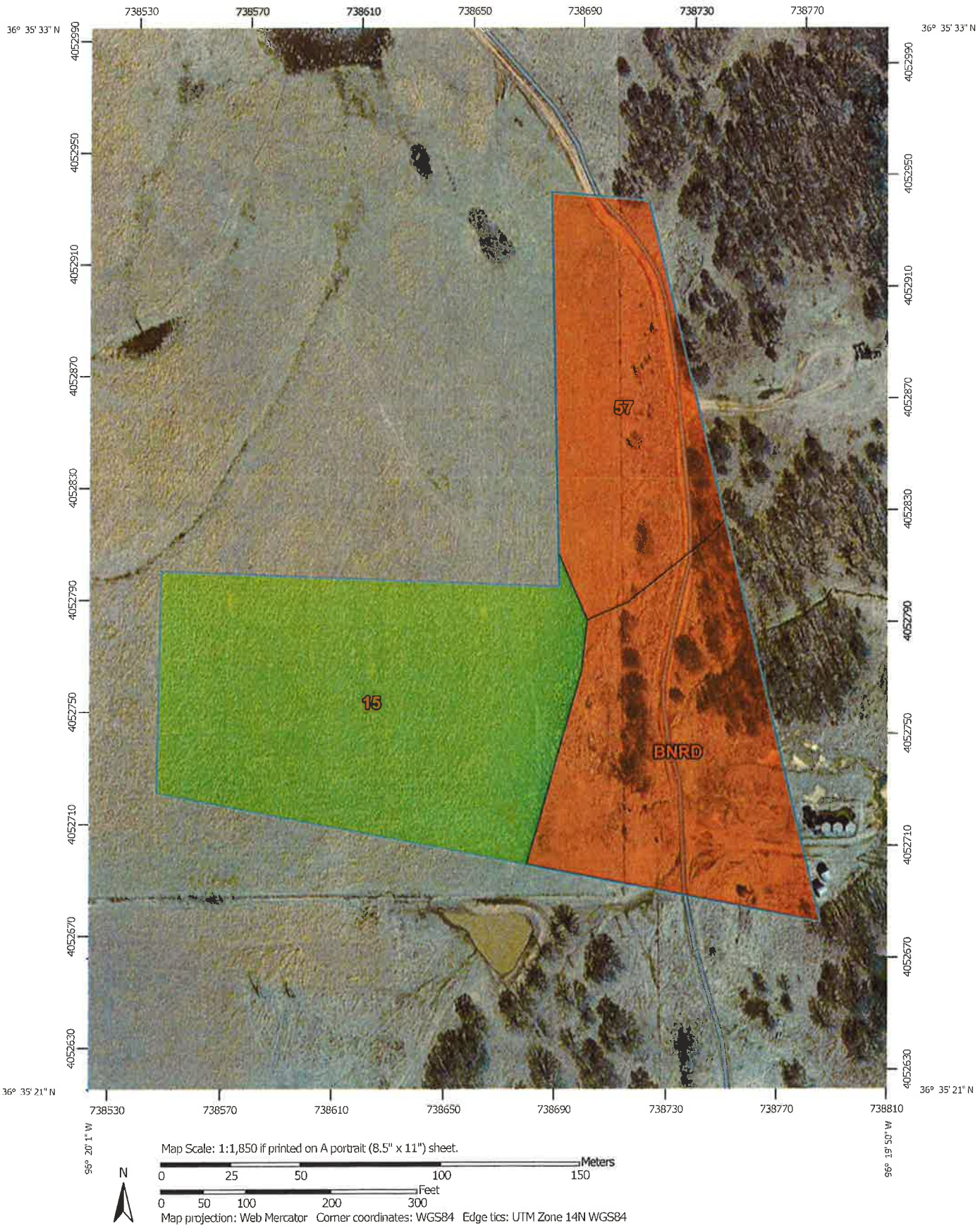
Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Farmland Classification—Osage County, Oklahoma
(Cottonmouth #3-5)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines
- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
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- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points
- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
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- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

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Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 5, 2011—Mar 23, 2011

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Farmland Classification

Farmland Classification— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
15	Agra silt loam, 1 to 3 percent slopes	All areas are prime farmland	3.3	46.0%
57	Steedman-Lucien complex, 3 to 15 percent slopes	Not prime farmland	1.7	23.4%
BNRD	Bigheart-Niotaze-Rock outcrop complex, 1 to 8 percent slopes	Not prime farmland	2.2	30.6%
Totals for Area of Interest			**7.1**	**100.0%**

Description

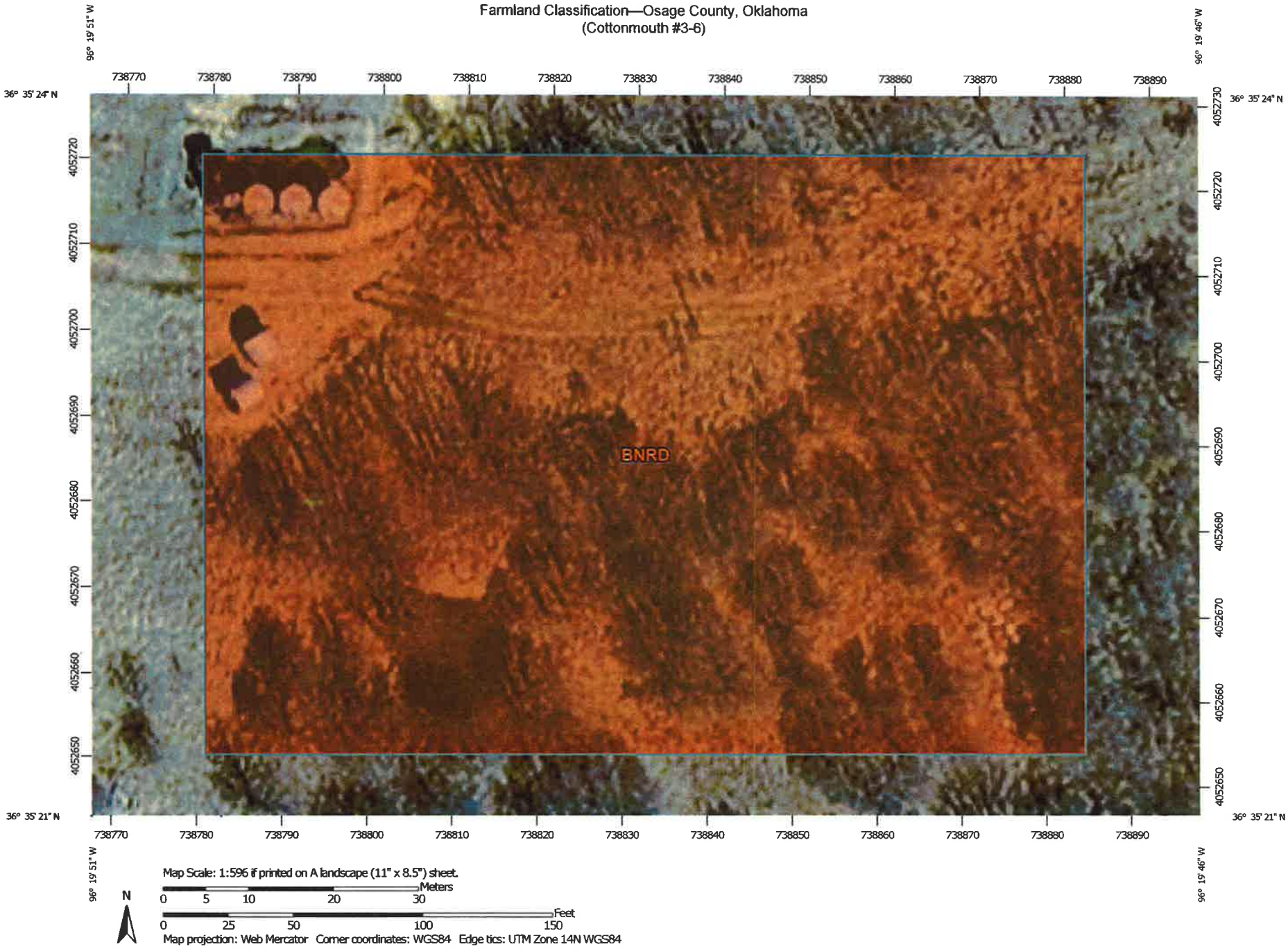
Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Farmland Classification—Osage County, Oklahoma
(Cottonmouth #3-6)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
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- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
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- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

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Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 5, 2011—Mar 23, 2011

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Farmland Classification

Farmland Classification— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BNRD	Bigheart-Niotaze-Rock outcrop complex, 1 to 8 percent slopes	Not prime farmland	1.8	100.0%
Totals for Area of Interest			**1.8**	**100.0%**

Description

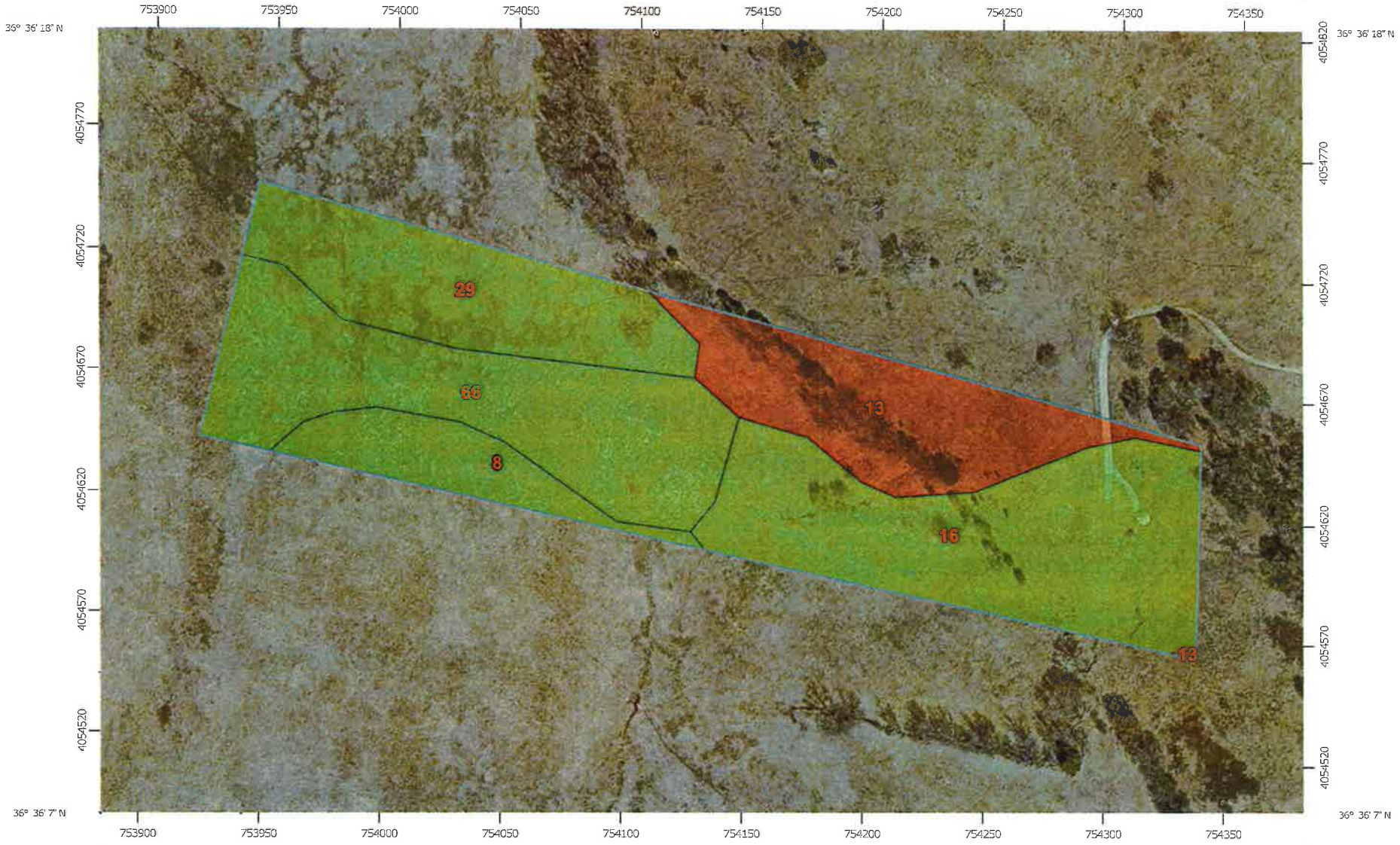
Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Farmland Classification—Osage County, Oklahoma
(David #31-2)



Map Scale: 1:2,280 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 30 60 120 180

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
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Soil Rating Points

- Not prime farmland
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- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
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- Prime farmland if irrigated and reclaimed of excess salts and sodium
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- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 5, 2011—Mar 23, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Pocasset fine sandy loam, 0 to 1 percent slopes, occasionally flooded	All areas are prime farmland	0.8	7.6%
13	Lucien-Coyle complex, 3 to 8 percent slopes	Not prime farmland	1.8	18.0%
16	Agra silt loam, 3 to 5 percent slopes	All areas are prime farmland	3.0	30.1%
29	Lightning silt loam, 0 to 1 percent slopes, occasionally flooded	All areas are prime farmland	1.8	18.2%
66	Verdigris silt loam, 0 to 1 percent slopes, occasionally flooded	All areas are prime farmland	2.6	26.1%
Totals for Area of Interest			**9.9**	**100.0%**

Description

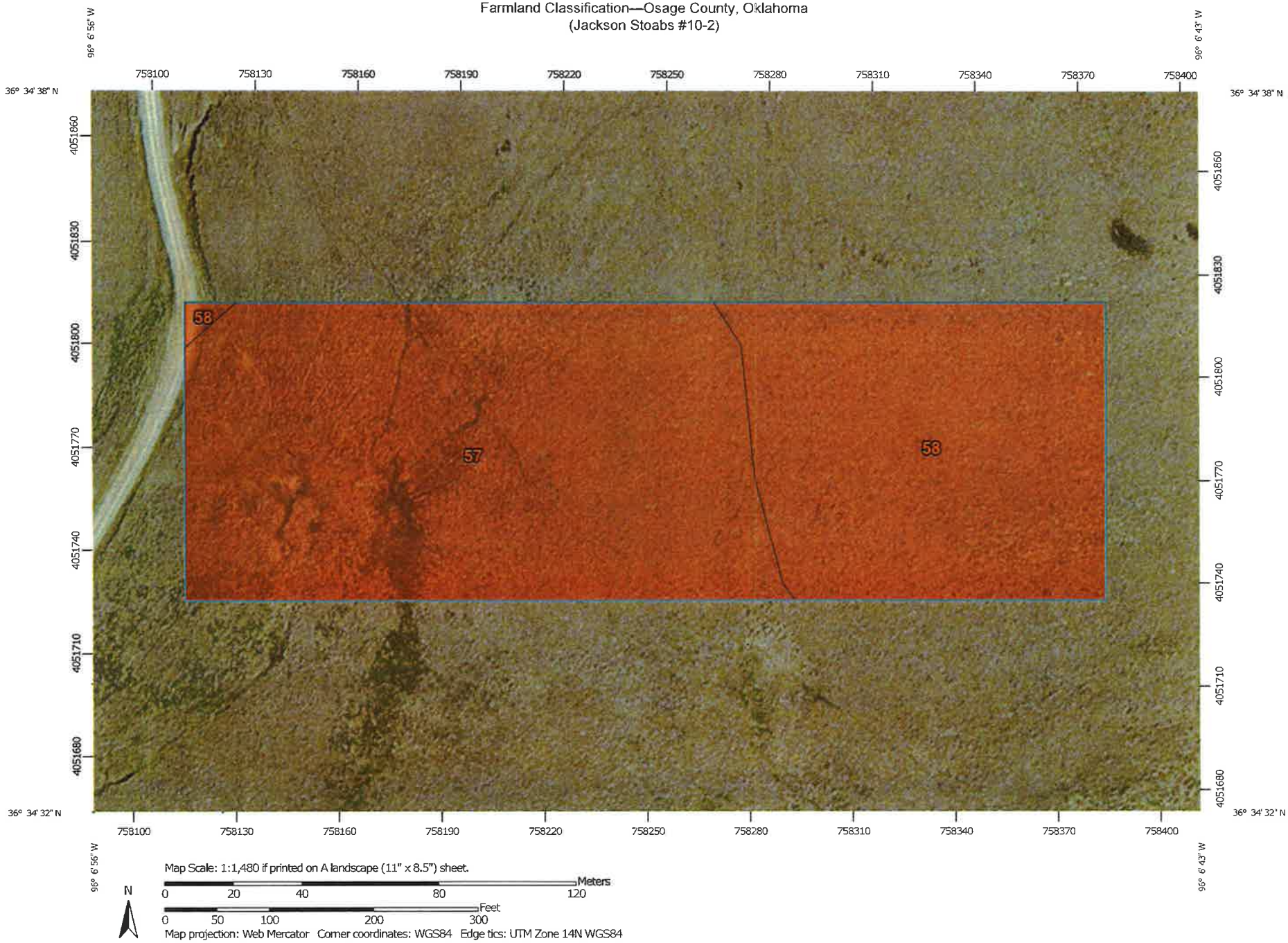
Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Farmland Classification—Osage County, Oklahoma
(Jackson Stoabs #10-2)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 23, 2010—May 16, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
57	Steedman-Lucien complex, 3 to 15 percent slopes	Not prime farmland	3.5	61.4%
58	Steedman-Lucien complex, 15 to 25 percent slopes	Not prime farmland	2.2	38.6%
Totals for Area of Interest			**5.8**	**100.0%**

Description

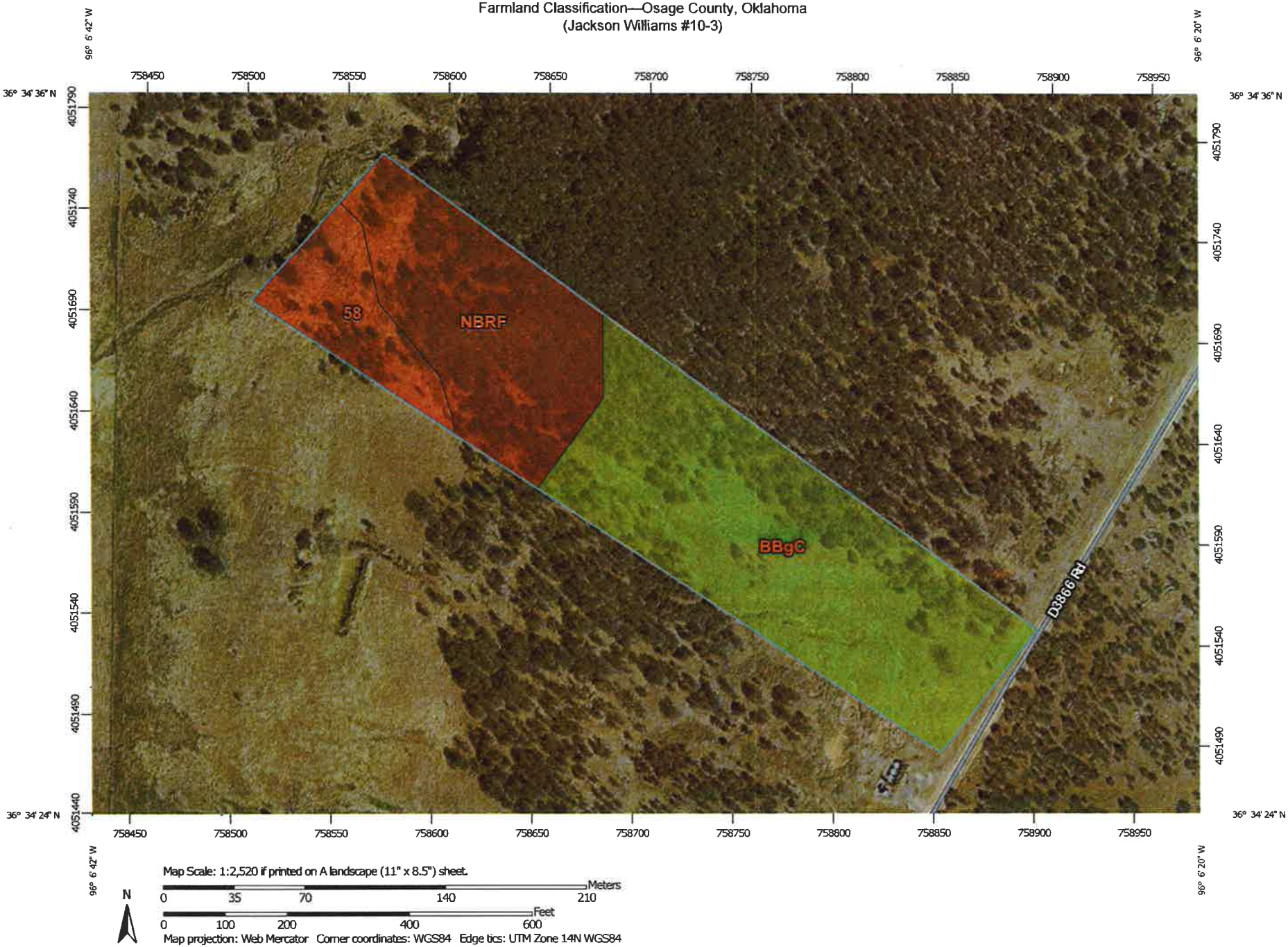
Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Farmland Classification—Osage County, Oklahoma
(Jackson Williams #10-3)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 23, 2010—May 16, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
58	Steedman-Lucien complex, 15 to 25 percent slopes	Not prime farmland	1.0	11.4%
BBgC	Bartlesville-Bigheart complex, 1 to 5 percent slopes, very rocky	All areas are prime farmland	5.1	57.9%
NBRF	Niotaze-Bigheart-Rock outcrop complex, 15 to 25 percent slopes, extremely stony	Not prime farmland	2.7	30.7%
Totals for Area of Interest			**8.8**	**100.0%**

Description

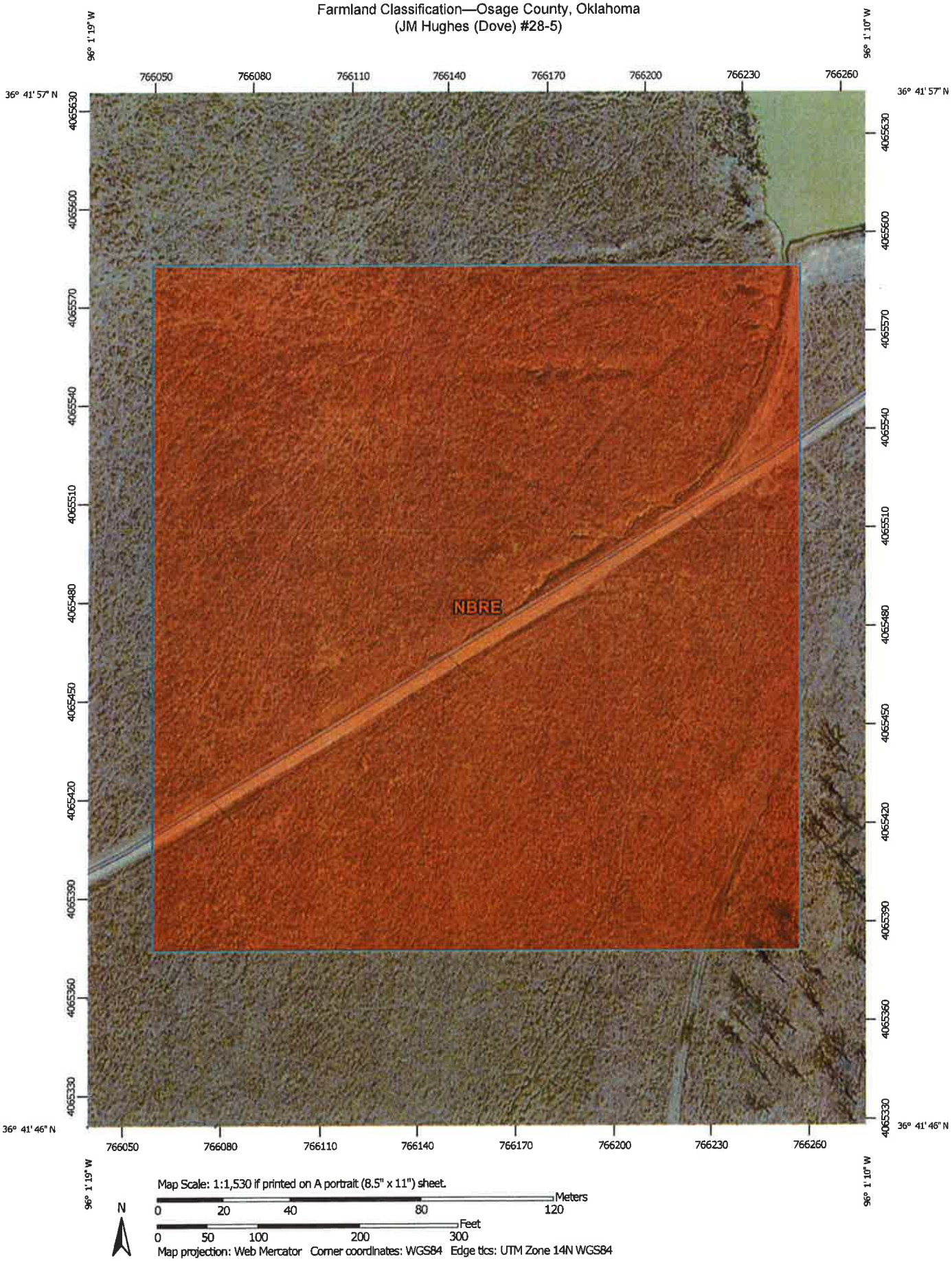
Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Farmland Classification—Osage County, Oklahoma
(JM Hughes (Dove) #28-5)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 23, 2010—May 16, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
NBRE	Niotaze-Bigheart-Rock outcrop complex, 3 to 15 percent slopes, very stony	Not prime farmland	10.2	100.0%
Totals for Area of Interest			**10.2**	**100.0%**

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Farmland Classification—Osage County, Oklahoma
(Royal #5-6)

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 23, 2010—May 16, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
13	Lucien-Coyle complex, 3 to 8 percent slopes	Not prime farmland	1.6	8.9%
57	Steedman-Lucien complex, 3 to 15 percent slopes	Not prime farmland	9.3	52.2%
NBRE	Niotaze-Bigheart-Rock outcrop complex, 3 to 15 percent slopes, very stony	Not prime farmland	6.9	39.0%
Totals for Area of Interest			**17.8**	**100.0%**

Description

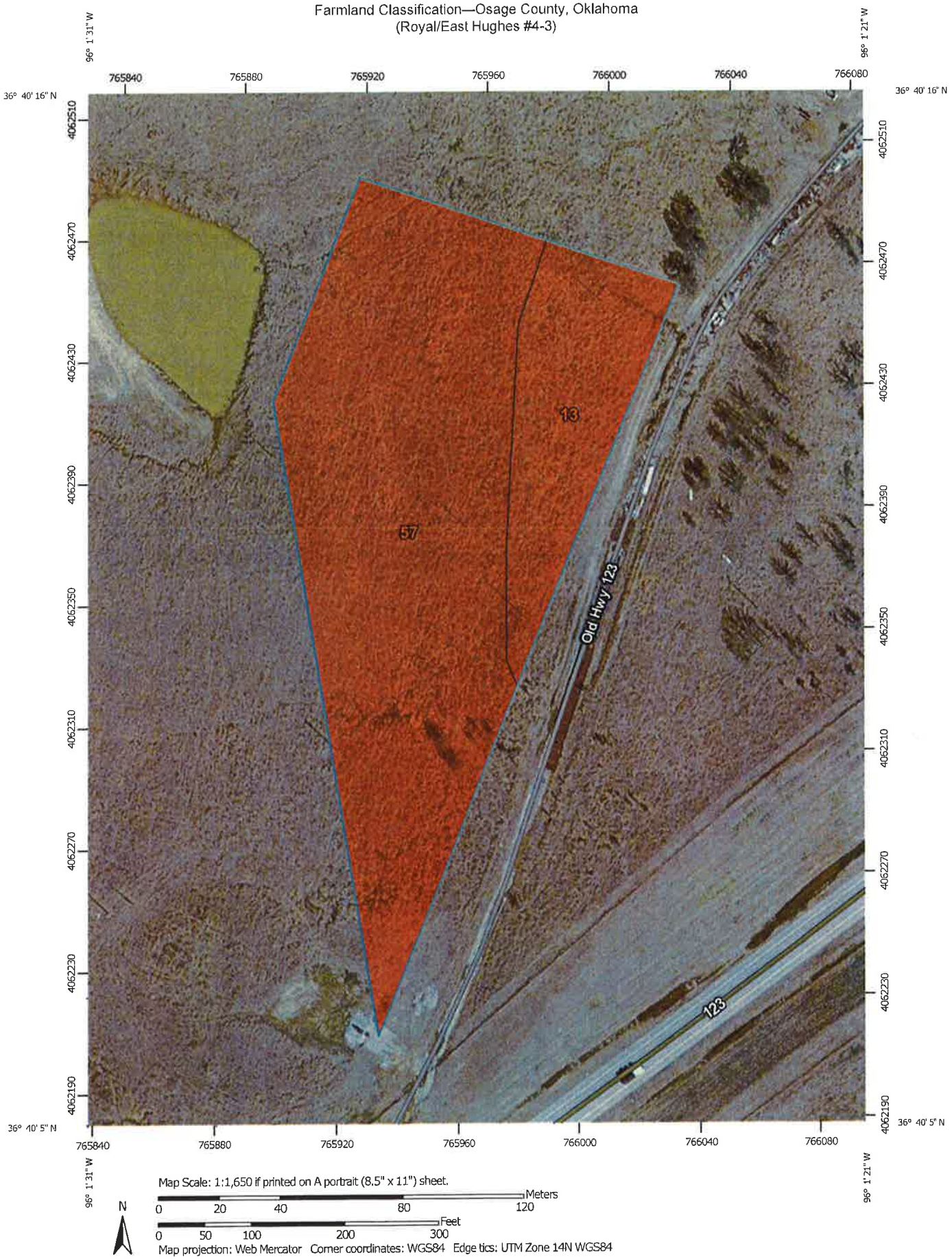
Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Farmland Classification—Osage County, Oklahoma
(Royal/East Hughes #4-3)



Map Scale: 1:1,650 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

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Please rely on the bar scale on each map sheet for map measurements.

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Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

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Date(s) aerial images were photographed: Jul 23, 2010—May 16, 2011

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Farmland Classification

Farmland Classification— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
13	Lucien-Coyle complex, 3 to 8 percent slopes	Not prime farmland	1.0	21.5%
57	Steedman-Lucien complex, 3 to 15 percent slopes	Not prime farmland	3.7	78.5%
Totals for Area of Interest			**4.7**	**100.0%**

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

APPENDIX D-2

THREATENED AND ENDANGERED SPECIES LIST FROM USFWS IPAC SYSTEM

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
PHONE: (918)581-7458 FAX: (918)581-7467
URL: www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0035 October 08, 2014
Project Name: Performance Operating Allee #22-1

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having

similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Non-federal entities conducting activities that may result in take of listed species should consider seeking coverage under section 10 of the ESA, either through development of a Habitat Conservation Plan (HCP) or, by becoming a signatory to the General Conservation Plan (GCP) currently under development for the American burying beetle. Each of these mechanisms provides the means for obtaining a permit and coverage for incidental take of listed species during otherwise lawful activities.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit through our Project Review step-wise process http://www.fws.gov/southwest/es/oklahoma/OKESFO%20Permit%20Home.htm.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Allee #22-1

Official Species List

Provided by:

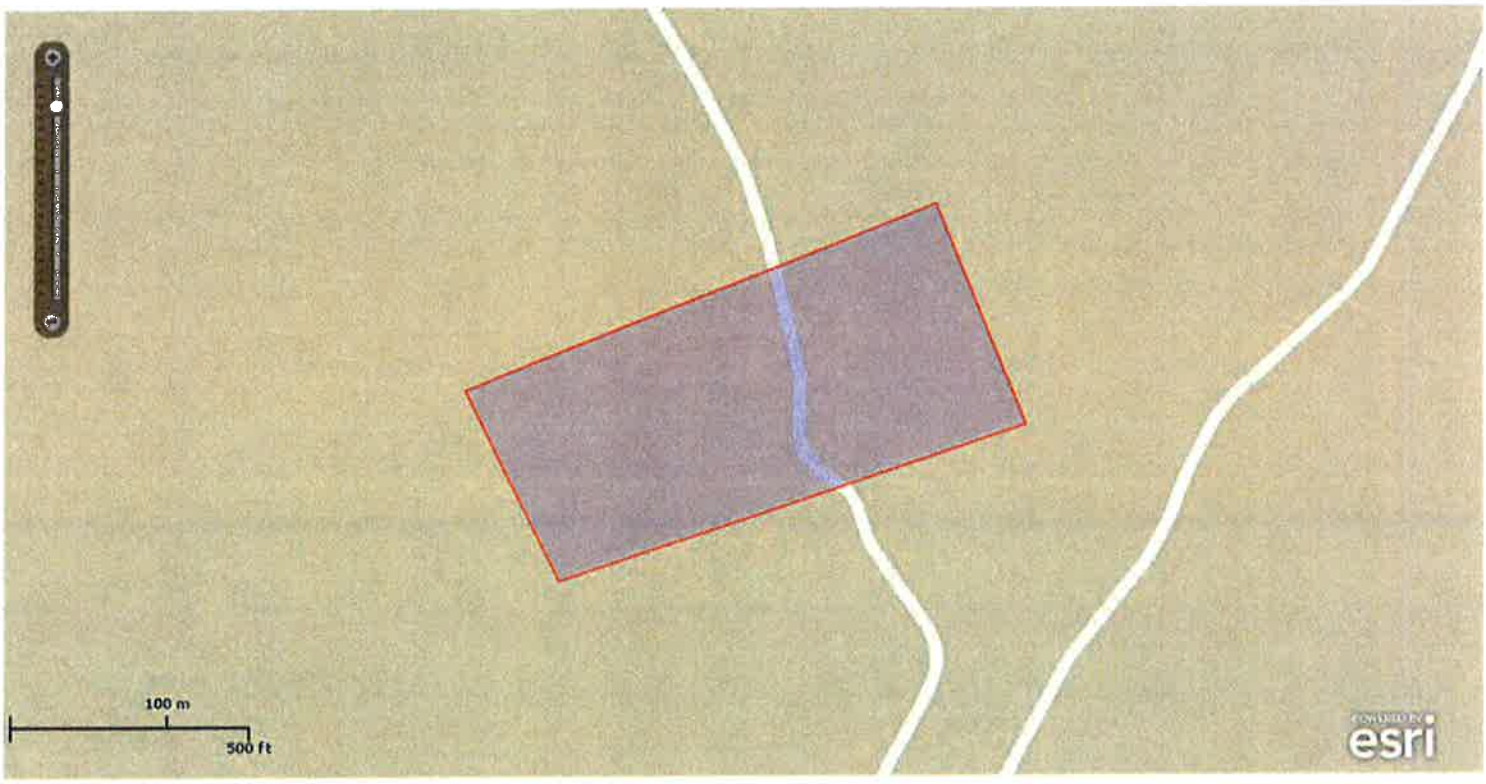
Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
(918) 581-7458
http://www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0035
Project Type: Oil Or Gas
Project Description: Well Pad Installation

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Allee #22-1

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-96.1084485 36.7132404, -96.1050604 36.7143086, -96.1044166 36.7130375, -96.107764 36.712143, -96.1084485 36.7132404)))

Project Counties: Osage, OK

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Allee #22-1

Endangered Species Act Species List

There are a total of 7 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	Status	Has Critical Habitat	Condition(s)
Least tern *(Sterna antillarum)* Population: interior pop.	Endangered		
Piping Plover *(Charadrius melodus)* Population: except Great Lakes watershed	Threatened	Final designated	
Red Knot *(Calidris canutus rufa)*	Proposed Threatened		
Whooping crane *(Grus americana)* Population: except where EXPN	Endangered	Final designated	
Clams			
Neosho Mucket *(Lampsilis rafinesqueana)*	Endangered	Proposed	
Insects			
American Burying beetle *(Nicrophorus americanus)* Population: Entire	Endangered		
Rattlesnake-Master Borer moth *(Papaipema eryngii)*	Candidate		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
PHONE: (918)581-7458 FAX: (918)581-7467
URL: www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0036 October 08, 2014
Project Name: Performance Operating Allee #22-2

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having

similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Non-federal entities conducting activities that may result in take of listed species should consider seeking coverage under section 10 of the ESA, either through development of a Habitat Conservation Plan (HCP) or, by becoming a signatory to the General Conservation Plan (GCP) currently under development for the American burying beetle. Each of these mechanisms provides the means for obtaining a permit and coverage for incidental take of listed species during otherwise lawful activities.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

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We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit through our Project Review step-wise process http://www.fws.gov/southwest/es/oklahoma/OKESFO%20Permit%20Home.htm.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Allee #22-2

Official Species List

Provided by:

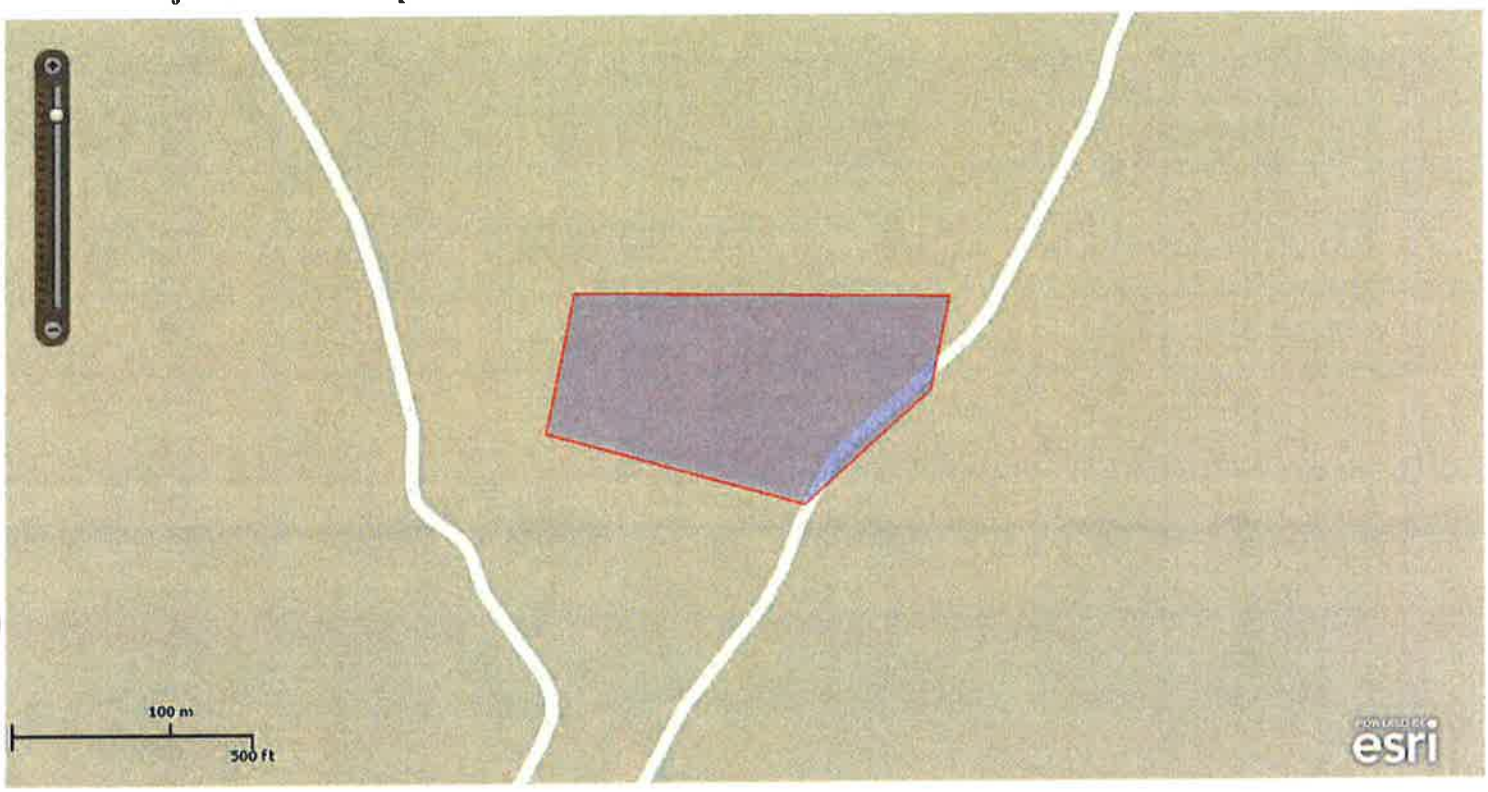
Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
(918) 581-7458
http://www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0036
Project Type: Oil Or Gas
Project Description: Well Pad Installation

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Allee #22-2

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-96.1051017 36.7132552, -96.1048984 36.7140636, -96.1022055 36.7140378, -96.102345 36.713496, -96.1032355 36.7128424, -96.1051017 36.7132552)))

Project Counties: Osage, OK

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Allee #22-2

Endangered Species Act Species List

There are a total of 7 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	Status	Has Critical Habitat	Condition(s)
Least tern *(Sterna antillarum)* Population: interior pop.	Endangered		
Piping Plover *(Charadrius melodus)* Population: except Great Lakes watershed	Threatened	Final designated	
Red Knot *(Calidris canutus rufa)*	Proposed Threatened		
Whooping crane *(Grus americana)* Population: except where EXPN	Endangered	Final designated	
Clams			
Neosho Mucket *(Lampsilis rafinesqueana)*	Endangered	Proposed	
Insects			
American Burying beetle *(Nicrophorus americanus)* Population: Entire	Endangered		
Rattlesnake-Master Borer moth *(Papaipema eryngii)*	Candidate		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
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TULSA, OK 74129
PHONE: (918)581-7458 FAX: (918)581-7467
URL: www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0037 October 08, 2014
Project Name: Performance Operating Cottonmouth #3-5

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

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Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Cottonmouth #3-5

Official Species List

Provided by:

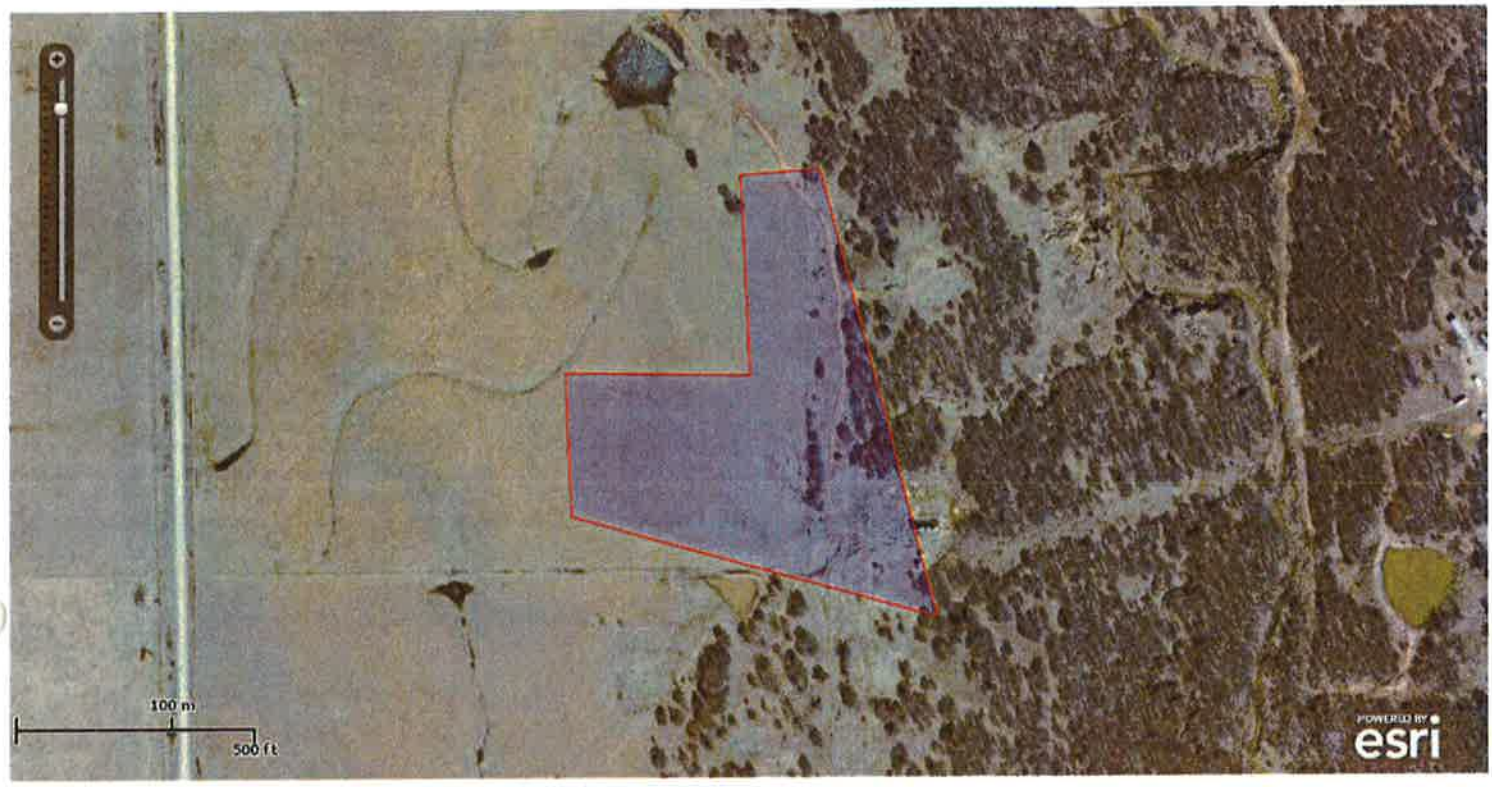
Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
(918) 581-7458
http://www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0037
Project Type: Oil Or Gas
Project Description: WEll Pad installation

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Cottonmouth #3-5

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-96.3315658 36.5921572, -96.3307279 36.5895738, -96.3333457 36.5901595, -96.3333887 36.5909865, -96.3320583 36.5909693, -96.3321237 36.5921227, -96.3315658 36.5921572)))

Project Counties: Osage, OK

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Cottonmouth #3-5

Endangered Species Act Species List

There are a total of 7 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

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Red Knot *(Calidris canutus rufa)*	Proposed Threatened		
Whooping crane *(Grus americana)* Population: except where EXPN	Endangered	Final designated	
Clams			
Neosho Mucket *(Lampsilis rafinesqueana)*	Endangered	Proposed	
Insects			
American Burying beetle *(Nicrophorus americanus)* Population: Entire	Endangered		
Rattlesnake-Master Borer moth *(Papaipema eryngii)*	Candidate		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

United States Department of the Interior

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Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
PHONE: (918)581-7458 FAX: (918)581-7467
URL: www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0038 October 08, 2014
Project Name: Performance Operating Cottonmouth #3-6

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

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Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Cottonmouth #3-6

Official Species List

Provided by:

Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
(918) 581-7458
http://www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0038
Project Type: Oil Or Gas
Project Description: Well pad installation

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Cottonmouth #3-6

Project Location Map:

Project Coordinates: MULTIPOLYGON (((-96.330918 36.5901454, -96.3300704 36.590111, -96.3300709 36.5896117, -96.3308858 36.5896458, -96.330918 36.5901454)))

Project Counties: Osage, OK

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Cottonmouth #3-6

Endangered Species Act Species List

There are a total of 7 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

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Neosho Mucket *(Lampsilis rafinesqueana)*	Endangered	Proposed	
Insects			
American Burying beetle *(Nicrophorus americanus)* Population: Entire	Endangered		
Rattlesnake-Master Borer moth *(Papaipema eryngii)*	Candidate		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

United States Department of the Interior

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Oklahoma Ecological Services Field Office
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TULSA, OK 74129
PHONE: (918)581-7458 FAX: (918)581-7467
URL: www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0040 October 08, 2014
Project Name: Performance Operating David #31-2

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having

similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Non-federal entities conducting activities that may result in take of listed species should consider seeking coverage under section 10 of the ESA, either through development of a Habitat Conservation Plan (HCP) or, by becoming a signatory to the General Conservation Plan (GCP) currently under development for the American burying beetle. Each of these mechanisms provides the means for obtaining a permit and coverage for incidental take of listed species during otherwise lawful activities.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit through our Project Review step-wise process http://www.fws.gov/southwest/es/oklahoma/OKESFO%20Permit%20Home.htm.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating David #31-2

Official Species List

Provided by:

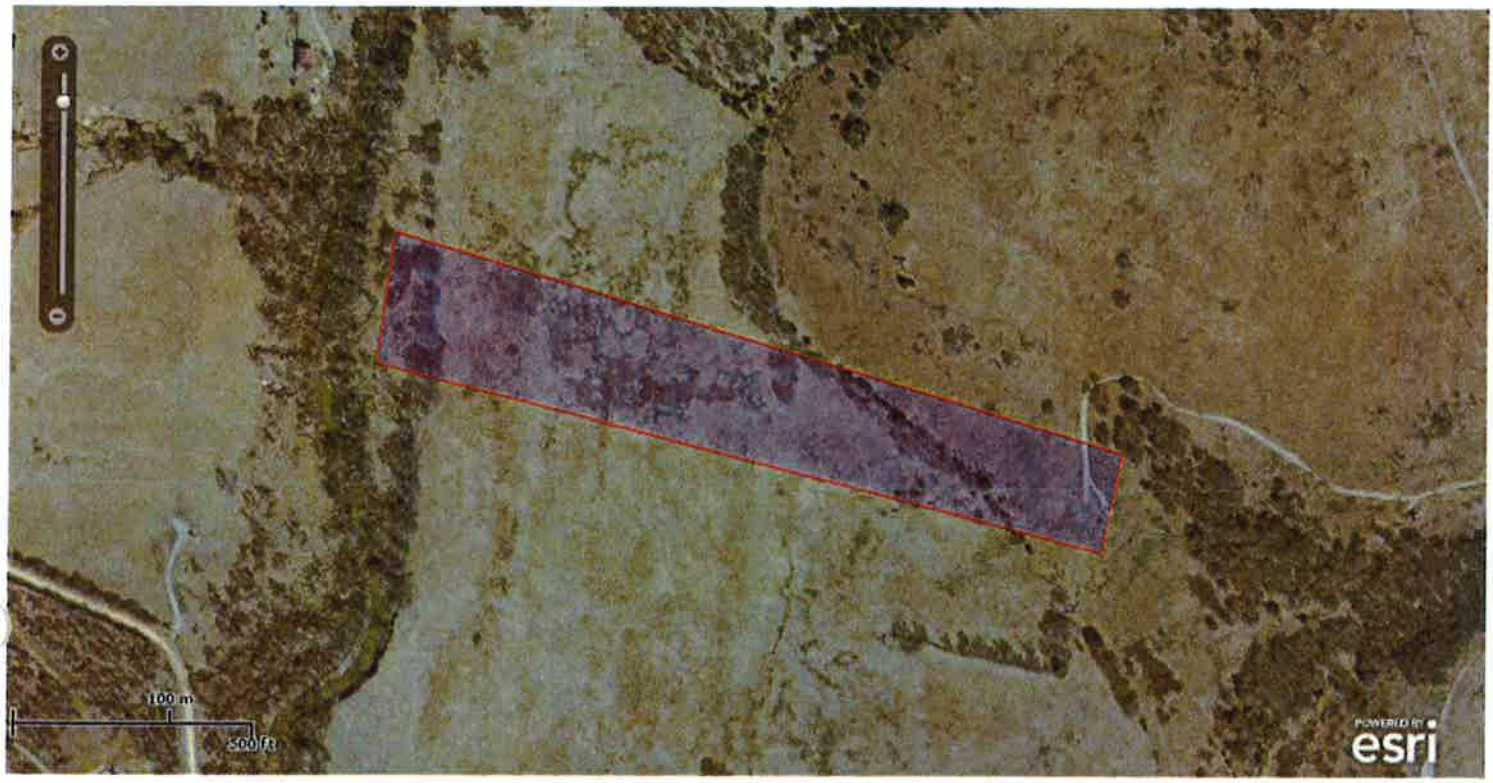
Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
(918) 581-7458
http://www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0040
Project Type: Oil Or Gas
Project Description: Well pad installation

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating David #31-2

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-96.156878 36.6029848, -96.1620922 36.6040709, -96.1619645 36.6048288, -96.1567278 36.6035541, -96.156878 36.6029848)))

Project Counties: Osage, OK

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating David #31-2

Endangered Species Act Species List

There are a total of 7 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	Status	Has Critical Habitat	Condition(s)
Least tern *(Sterna antillarum)* Population: interior pop.	Endangered		
Piping Plover *(Charadrius melodus)* Population: except Great Lakes watershed	Threatened	Final designated	
Red Knot *(Calidris canutus rufa)*	Proposed Threatened		
Whooping crane *(Grus americana)* Population: except where EXPN	Endangered	Final designated	
Clams			
Neosho Mucket *(Lampsilis rafinesqueana)*	Endangered	Proposed	
Insects			
American Burying beetle *(Nicrophorus americanus)* Population: Entire	Endangered		
Rattlesnake-Master Borer moth *(Papaipema eryngii)*	Candidate		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
PHONE: (918)581-7458 FAX: (918)581-7467
URL: www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0041 October 08, 2014
Project Name: Performance Operating Jackson Stoabs #10-2

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

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A Biological Assessment is required for construction projects (or other undertakings having

similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

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http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Non-federal entities conducting activities that may result in take of listed species should consider seeking coverage under section 10 of the ESA, either through development of a Habitat Conservation Plan (HCP) or, by becoming a signatory to the General Conservation Plan (GCP) currently under development for the American burying beetle. Each of these mechanisms provides the means for obtaining a permit and coverage for incidental take of listed species during otherwise lawful activities.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

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We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit through our Project Review step-wise process http://www.fws.gov/southwest/es/oklahoma/OKESFO%20Permit%20Home.htm.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Jackson Stoabs #10-2

Official Species List

Provided by:

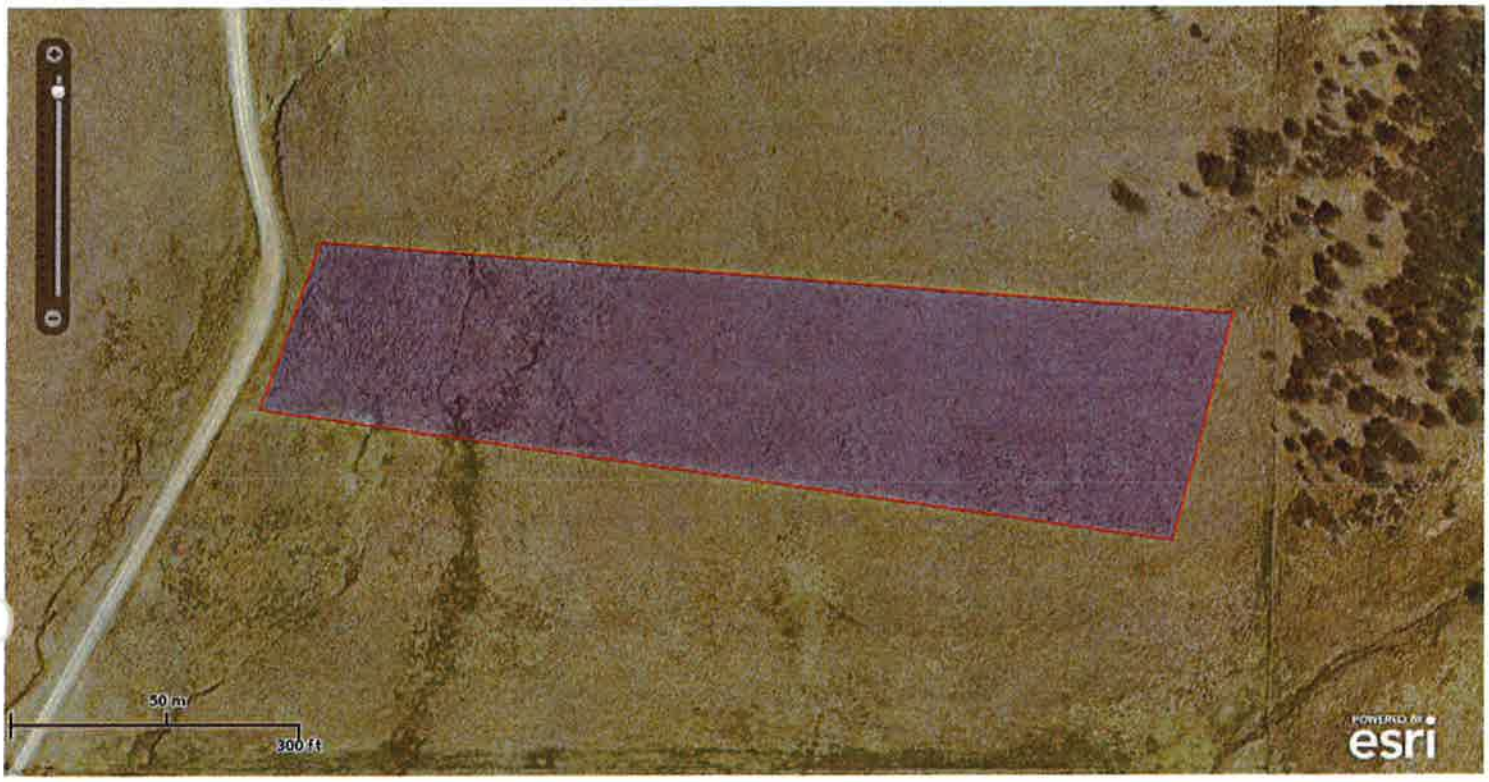
Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
(918) 581-7458
http://www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0041
Project Type: Oil Or Gas
Project Description: Well pad installation

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Jackson Stoabs #10-2

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-96.1153895 36.576472, -96.1151749 36.5769544, -96.1118919 36.5767477, -96.1121065 36.5760929, -96.1153895 36.576472)))

Project Counties: Osage, OK

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Jackson Stoabs #10-2

Endangered Species Act Species List

There are a total of 7 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	Status	Has Critical Habitat	Condition(s)
Least tern *(Sterna antillarum)* Population: interior pop.	Endangered		
Piping Plover *(Charadrius melodus)* Population: except Great Lakes watershed	Threatened	Final designated	
Red Knot *(Calidris canutus rufa)*	Proposed Threatened		
Whooping crane *(Grus americana)* Population: except where EXPN	Endangered	Final designated	
Clams			
Neosho Mucket *(Lampsilis rafinesqueana)*	Endangered	Proposed	
Insects			
American Burying beetle *(Nicrophorus americanus)* Population: Entire	Endangered		
Rattlesnake-Master Borer moth *(Papaipema eryngii)*	Candidate		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
PHONE: (918)581-7458 FAX: (918)581-7467
URL: www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0042 October 08, 2014
Project Name: Performance Operating Jackson/Williams #10-3

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

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A Biological Assessment is required for construction projects (or other undertakings having

similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

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Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

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We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit through our Project Review step-wise process http://www.fws.gov/southwest/es/oklahoma/OKESFO%20Permit%20Home.htm.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Jackson/Williams #10-3

Official Species List

Provided by:

Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
(918) 581-7458
http://www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0042
Project Type: Oil Or Gas
Project Description: WEll Pad installation

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Jackson/Williams #10-3

Project Location Map:

Project Coordinates: MULTIPOLYGON (((-96.110891 36.5761944, -96.1102156 36.5766601, -96.106836 36.5739805, -96.1071686 36.5737565, -96.110891 36.5761944)))

Project Counties: Osage, OK

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Jackson/Williams #10-3

Endangered Species Act Species List

There are a total of 7 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	Status	Has Critical Habitat	Condition(s)
Least tern *(Sterna antillarum)* Population: interior pop.	Endangered		
Piping Plover *(Charadrius melodus)* Population: except Great Lakes watershed	Threatened	Final designated	
Red Knot *(Calidris canutus rufa)*	Proposed Threatened		
Whooping crane *(Grus americana)* Population: except where EXPN	Endangered	Final designated	
Clams			
Neosho Mucket *(Lampsilis rafinesqueana)*	Endangered	Proposed	
Insects			
American Burying beetle *(Nicrophorus americanus)* Population: Entire	Endangered		
Rattlesnake-Master Borer moth *(Papaipema eryngii)*	Candidate		

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Jackson/Williams #10-3

Critical habitats that lie within your project area

There are no critical habitats within your project area.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
PHONE: (918)581-7458 FAX: (918)581-7467
URL: www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0043 October 08, 2014
Project Name: Performance Operating JM Hughes (Dove) #28-5

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

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A Biological Assessment is required for construction projects (or other undertakings having

similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

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Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating JM Hughes (Dove) #28-5

Official Species List

Provided by:

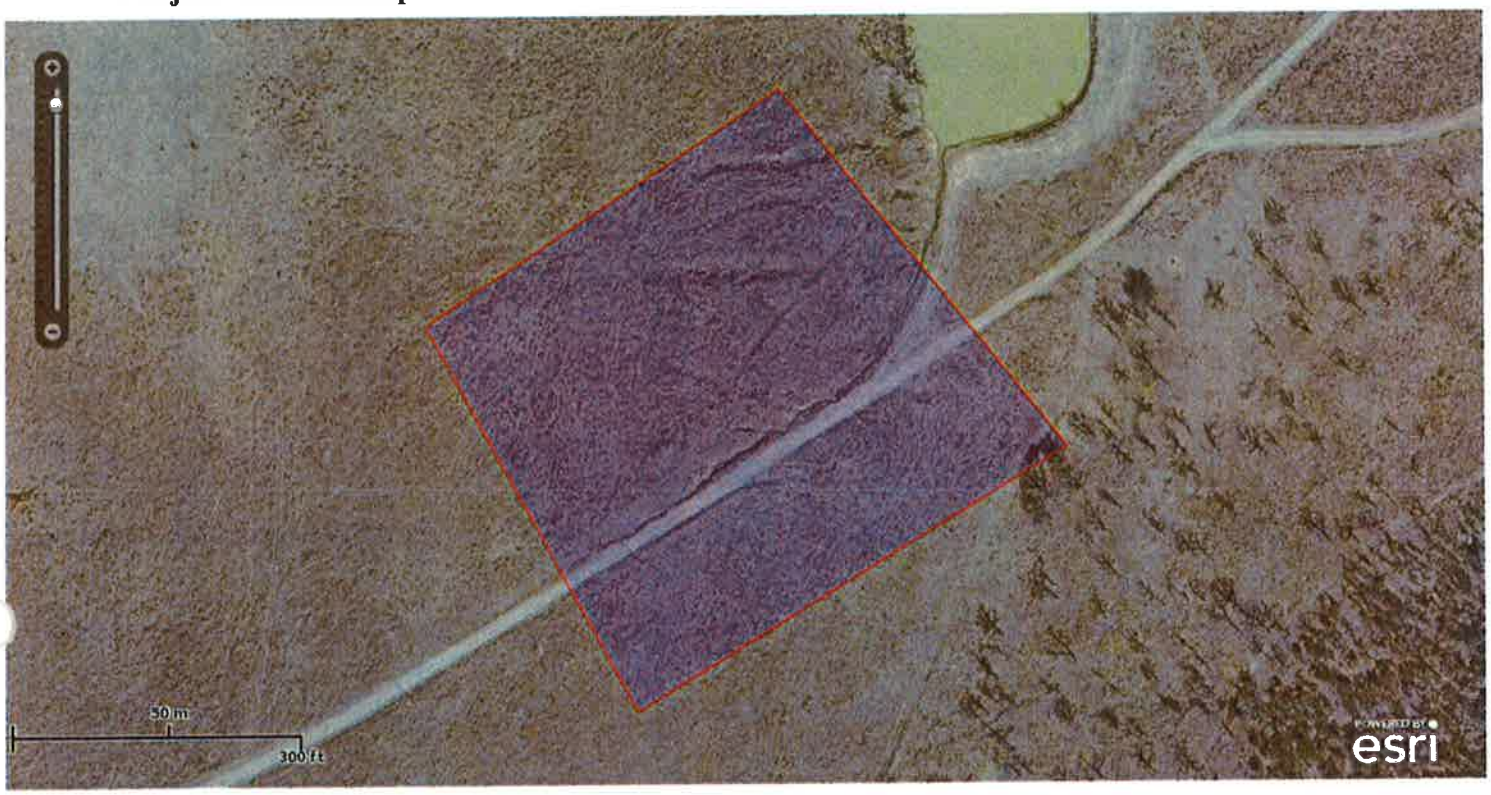
Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
(918) 581-7458
http://www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0043
Project Type: Oil Or Gas
Project Description: Well Pad installation

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating JM Hughes (Dove) #28-5

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-96.0216361 36.6982626, -96.0203701 36.6989405, -96.0193401 36.6979082, -96.0208851 36.6971512, -96.0216361 36.6982626)))

Project Counties: Osage, OK

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating JM Hughes (Dove) #28-5

Endangered Species Act Species List

There are a total of 7 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	Status	Has Critical Habitat	Condition(s)
Least tern *(Sterna antillarum)* Population: interior pop.	Endangered		
Piping Plover *(Charadrius melodus)* Population: except Great Lakes watershed	Threatened	Final designated	
Red Knot *(Calidris canutus rufa)*	Proposed Threatened		
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Clams			
Neosho Mucket *(Lampsilis rafinesqueana)*	Endangered	Proposed	
Insects			
American Burying beetle *(Nicrophorus americanus)* Population: Entire	Endangered		
Rattlesnake-Master Borer moth *(Papaipema eryngii)*	Candidate		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
PHONE: (918)581-7458 FAX: (918)581-7467
URL: www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0045 October 08, 2014
Project Name: Performance Operating Royal #5-6

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

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The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having

similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Non-federal entities conducting activities that may result in take of listed species should consider seeking coverage under section 10 of the ESA, either through development of a Habitat Conservation Plan (HCP) or, by becoming a signatory to the General Conservation Plan (GCP) currently under development for the American burying beetle. Each of these mechanisms provides the means for obtaining a permit and coverage for incidental take of listed species during otherwise lawful activities.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit through our Project Review step-wise process http://www.fws.gov/southwest/es/oklahoma/OKESFO%20Permit%20Home.htm.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Royal #5-6

Official Species List

Provided by:

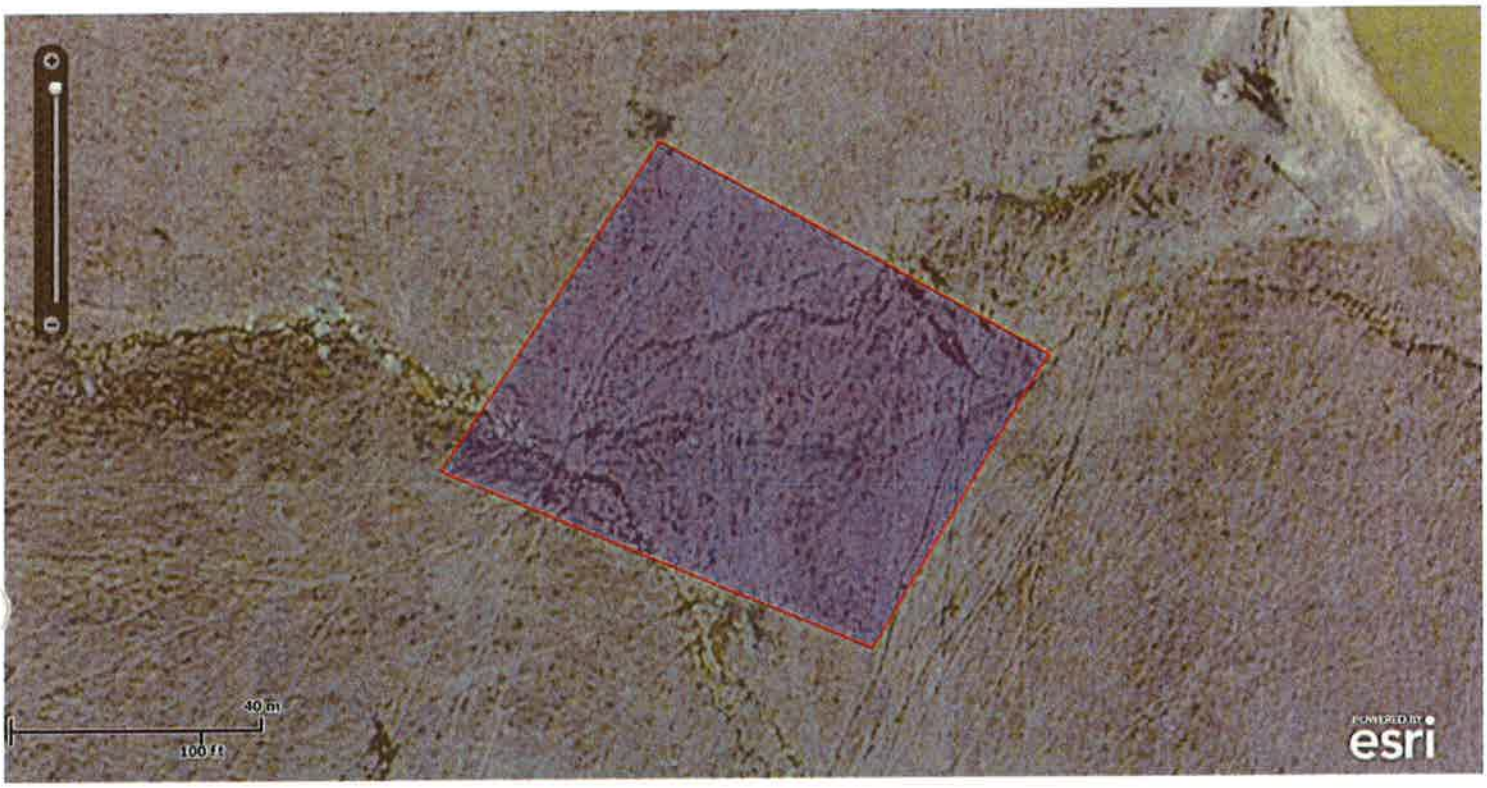
Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
(918) 581-7458
http://www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0045
Project Type: Oil Or Gas
Project Description: Well pad installation

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Royal #5-6

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-96.0270995 36.669931, -96.0267031 36.6704048, -96.0260057 36.670095, -96.0263276 36.6696733, -96.0270995 36.669931)))

Project Counties: Osage, OK

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Royal #5-6

Endangered Species Act Species List

There are a total of 7 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	Status	Has Critical Habitat	Condition(s)
Least tern *(Sterna antillarum)* Population: interior pop.	Endangered		
Piping Plover *(Charadrius melodus)* Population: except Great Lakes watershed	Threatened	Final designated	
Red Knot *(Calidris canutus rufa)*	Proposed Threatened		
Whooping crane *(Grus americana)* Population: except where EXPN	Endangered	Final designated	
Clams			
Neosho Mucket *(Lampsilis rafinesqueana)*	Endangered	Proposed	
Insects			
American Burying beetle *(Nicrophorus americanus)* Population: Entire	Endangered		
Rattlesnake-Master Borer moth *(Papaipema eryngii)*	Candidate		

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Royal #5-6

Critical habitats that lie within your project area

There are no critical habitats within your project area.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
PHONE: (918)581-7458 FAX: (918)581-7467
URL: www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0044 October 08, 2014
Project Name: Performance Operating Royal East Hughes #4-3

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having

similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Non-federal entities conducting activities that may result in take of listed species should consider seeking coverage under section 10 of the ESA, either through development of a Habitat Conservation Plan (HCP) or, by becoming a signatory to the General Conservation Plan (GCP) currently under development for the American burying beetle. Each of these mechanisms provides the means for obtaining a permit and coverage for incidental take of listed species during otherwise lawful activities.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit through our Project Review step-wise process http://www.fws.gov/southwest/es/oklahoma/OKESFO%20Permit%20Home.htm.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Royal East Hughes #4-3

Official Species List

Provided by:

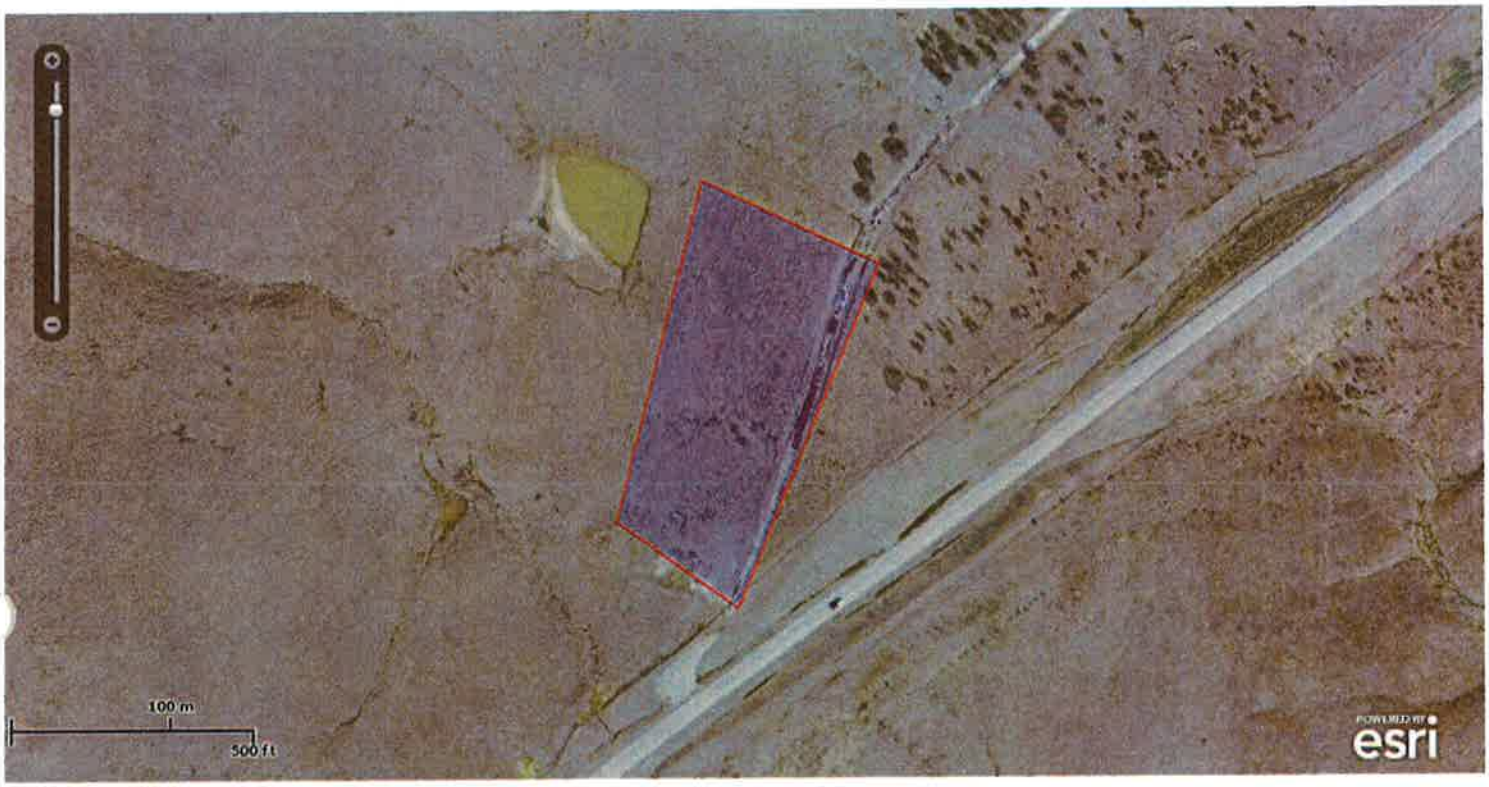
Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
(918) 581-7458
http://www.fws.gov/southwest/es/Oklahoma/

Consultation Tracking Number: 02EKOK00-2015-SLI-0044
Project Type: Oil Or Gas
Project Description: Well Pad Installation

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Royal East Hughes #4-3

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-96.0244754 36.6707127, -96.0232094 36.6702317, -96.0242179 36.6682524, -96.0250966 36.6687515, -96.0244754 36.6707127)))

Project Counties: Osage, OK

United States Department of Interior
Fish and Wildlife Service

Project name: Performance Operating Royal East Hughes #4-3

Endangered Species Act Species List

There are a total of 7 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	Status	Has Critical Habitat	Condition(s)
Least tern *(Sterna antillarum)* Population: interior pop.	Endangered		
Piping Plover *(Charadrius melodus)* Population: except Great Lakes watershed	Threatened	Final designated	
Red Knot *(Calidris canutus rufa)*	Proposed Threatened		
Whooping crane *(Grus americana)* Population: except where EXPN	Endangered	Final designated	
Clams			
Neosho Mucket *(Lampsilis rafinesqueana)*	Endangered	Proposed	
Insects			
American Burying beetle *(Nicrophorus americanus)* Population: Entire	Endangered		
Rattlesnake-Master Borer moth *(Papaipema eryngii)*	Candidate		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

APPENDIX D-3

DISCLAIMER LETTER FROM BREWER, WORTEN, ROBINETT ATTORNEYS AT LAW

BREWER, WORTEN, ROBINETT
ATTORNEYS AT LAW

BRUCE W. ROBINETT*
JESSE J. WORTEN, III*
DAVID B. KING*
JAMES M. ELIAS*
P. SCOTT BUHLINGER*
THOMAS J. BROWN
RICK D. TUCKER
JESS M. KANE
*PROFESSIONAL CORPORATIONS

CHESTER A. BREWER (1901-2002)
JESSE J. WORTEN, JR. (1920-1983)

117 W. 5TH STREET
PROFESSIONAL BUILDING, SUITE 500
P.O. BOX 1066
BARTLESVILLE, OKLAHOMA 74005-1066
(918) 336-4132
FAX (918) 336-9009

537 LEAHY
P.O. BOX 25
PAWHUSKA, OKLAHOMA 74056
(918) 287-2200

Writer's direct e-mail address:
bwrobinett@bwrlawoffice.com

November 24, 2014

RECEIVED
OSAGE AGENCY
PAWHUSKA, OK
2014 NOV 25 AM 9 29

Performance Energy, LLC
Attention: Scott DuCharme and Bob Knappe
P.O. Box 628
Barnsdall, Oklahoma 74002

Re: Proposed Environmental Assessment for Allee #22-1, Allee #22-2, Cottonmouth #3-5, Cottonmouth #3-6, David #31-6, Jackson Stoabs #10-2, Jackson/Williams #10-3, JM Hughes (Dove) #28-5, Royal #4-3, Royal/E. Hughes #5-6

Dear Mr. DuCharme and Mr. Knappe:

Based on our recent conversations, we understand that you intend to continue your efforts to achieve permits for the drilling of the above referenced wells by submitting an Environmental Assessment to the Osage Agency, Bureau of Indian Affairs (BIA). Due to the existence of the 1979 Environmental Assessment, it is not necessary for you to submit Environmental Assessments to permit oil and gas wells in Osage County. However, it appears that, at this time, the BIA will not permit any wells without an Environmental Assessment. As you are aware, both Performance Operating Company, LLC and the Bureau of Indian Affairs are named defendants in the ongoing litigation styled *Donelson et. al. v. Devon Energy, et. al.*: United States District Court for the Northern District of Oklahoma Case No. 14-*CV-316* wherein the Plaintiffs' have alleged that the BIA leasing procedures in Osage County is in violation of the National Environmental Policy Act (NEPA). We fear that the submission of such EA's might be viewed as a tacit admission by you and by the BIA that the BIA has been violating NEPA. I further understand that, due to financial commitments, you have little choice but do whatever is needed to continue your drilling program.

Accordingly, we advise you to make this letter a part of the administrative record related to the permitting of the above referenced wells to make it clear that such Environmental Assessments are submitted under protest and submitted as a result of economic duress, and that their submission does not constitute any sort of admission by you or your company.

Regards,

Bruce W. Robinett

BWR:dae

APPENIX D-4

EXEMPTION REQUESTS AND APPROVAL LETTERS – 25 CFR PART 226.33

Performance Operating Company, LLC
97 State Highway 123
Barnsdall, Oklahoma 74002

January 20, 2015

Benjamin Daniels
Environmental Protection Specialist
Bureau of Indian Affairs – Osage Agency
813 Grandview
Pawhuska, Oklahoma 74820

Re: Application for Drilling Permits – January 2015 Environmental Assessment for the following wells:

Alee #22-1 - SE/4 22-T26N-R11E	Alee #22-2: SE/4 22-T26N-R11E
Cottonmouth #3-5 - NW/4 03-T24N-R12E	Cottonmouth #3-6 – NW/4 03-T24N-R12E
David #31-6 – NW/4 31-T25N-R11E	Jackson Stoabs #10-2 – NW/4 10-T24N-R11E
Jackson/Williams #10-3 – NE/4 01-T24N-R11E	JM Hughes (Dove) #28-5 – SW/4 28-T25N-R12E
Royal #4-3 – SW/4 04-T25N-R12E	Royal/E. Hughes #5-6 – SE/4 05-T25N-R12E

Dear Mr. Daniels,

This letter is submitted in conjunction with the above referenced Environmental Assessment as written confirmation of consultation and coordination with the various surface owners which are affected by the above wells.

As required under 25 CFR §226.18, Performance Operating Company, LLC personnel have met with each appropriate surface owner or their authorized representative to discuss and coordinate the following:

1. Location of the well to be drilled.
2. Discuss and coordinate arrangements related to ingress and egress, placement of access road, utilities, infrastructure, etc.
3. Provide contact information for company representatives in case surface owner has any claims or issues related to proposed activity.

In each case, Performance Operating Company, LLC has received approval and consent from the appropriate surface owner or representative to proceed with the proposed drilling activity as outlined in the Environmental Assessment submitted herewith.

If there is anything else you need in this regard, please let us know.

With Best Regards,

Robert T. Knappe, Jr
Performance Operating Company, LLC
918-331-6570

Cc: Robin Phillips – Superintendent

Performance Operating Company, LLC
97 State Highway 123
Barnsdall, Oklahoma 74002

January 19, 2015

Robin Phillips - Superintendent
Bureau of Indian Affairs – Osage Agency
813 Grandview
Pawhuska, Oklahoma 74820

Re: Application for Drilling Permit – Jackson/Williams #10-3; NE/4 Sec 01-T24N-R11E.

Dear Ms. Phillips,

Performance Operating Company, LLC is in the process of submitting an application to drill the above mentioned well in Osage County. This well is one of a group of 10 wells which are included in the Environmental Assessment recently submitted.

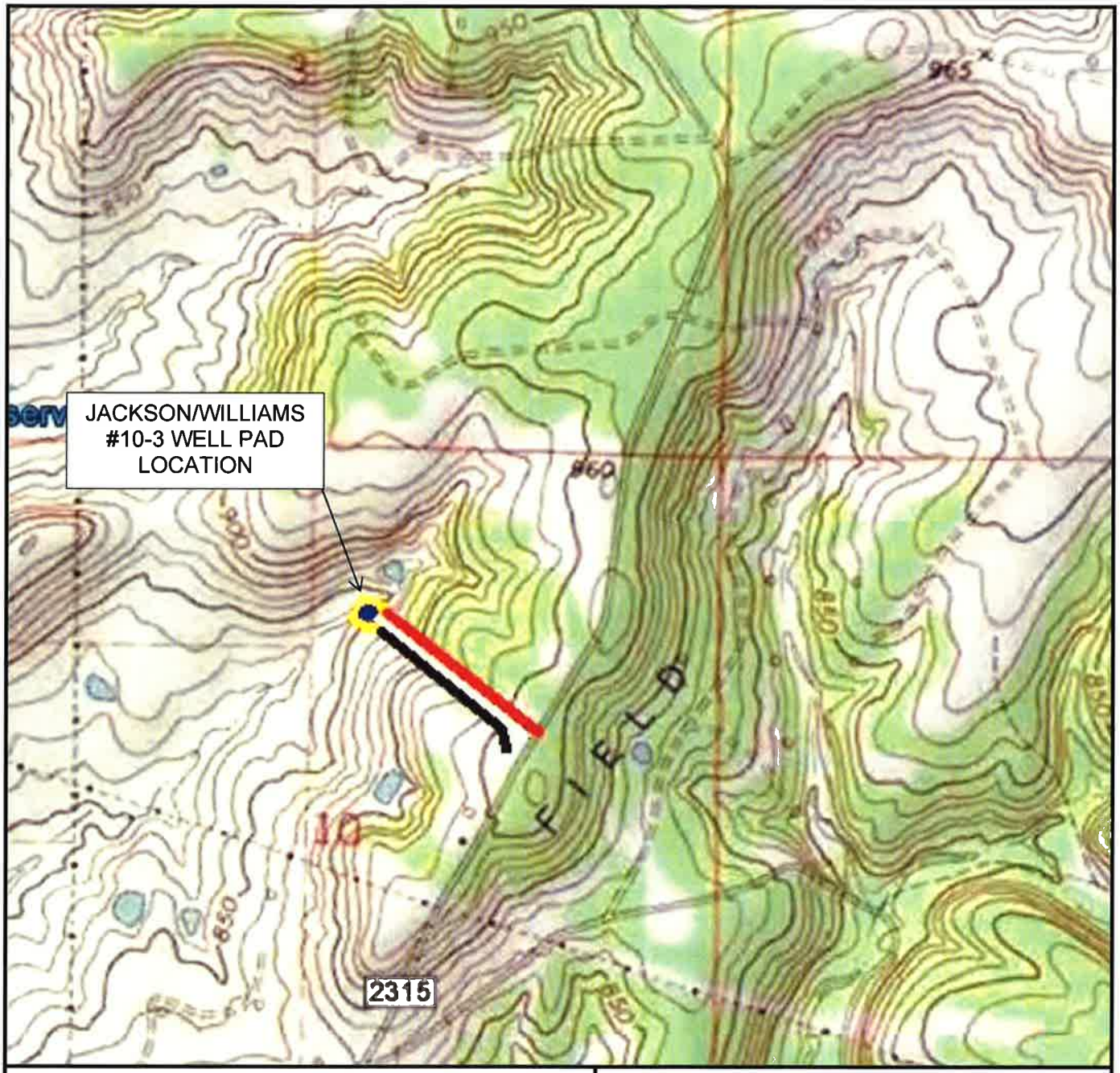
As required by 25 CRF 226.33, we are asking for your written permission to drill the above mentioned well. Although no jurisdictional waterways or wetlands were indicated in the project area, or in the vicinity of the project by the USFWS NWI online database, an onsite inspection and aerial photographs indicate a potential jurisdictional waterway along the western boundary of the construction limits (See attached Illustrations).

While the waterway (drainage ditch) appears to be located within the construction limits of the proposed well pad, during actual construction activities Performance will adjust the limits of construction such that no impacts, direct or indirect, will result during the construction of the well pad. As this relates specifically to this location, Performance will avoid construction, drilling and completion activities during times when surface water is present in the indicated temporary waterway.

Performance Operating personnel have met with the appropriate surface owner to discuss location, proximity to possible waterway, and have obtained the necessary agreement and permission from said landowner to proceed with drilling activity. If there is anything else you need in order to proceed with your consideration of this request, please let me know.

With Sincere Thanks,

Robert T. Knappe, Jr
Performance Operating Company, LLC
918-331-6570



= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES

= PIPELINE

-N-

TOPOGRAPHICAL MAP

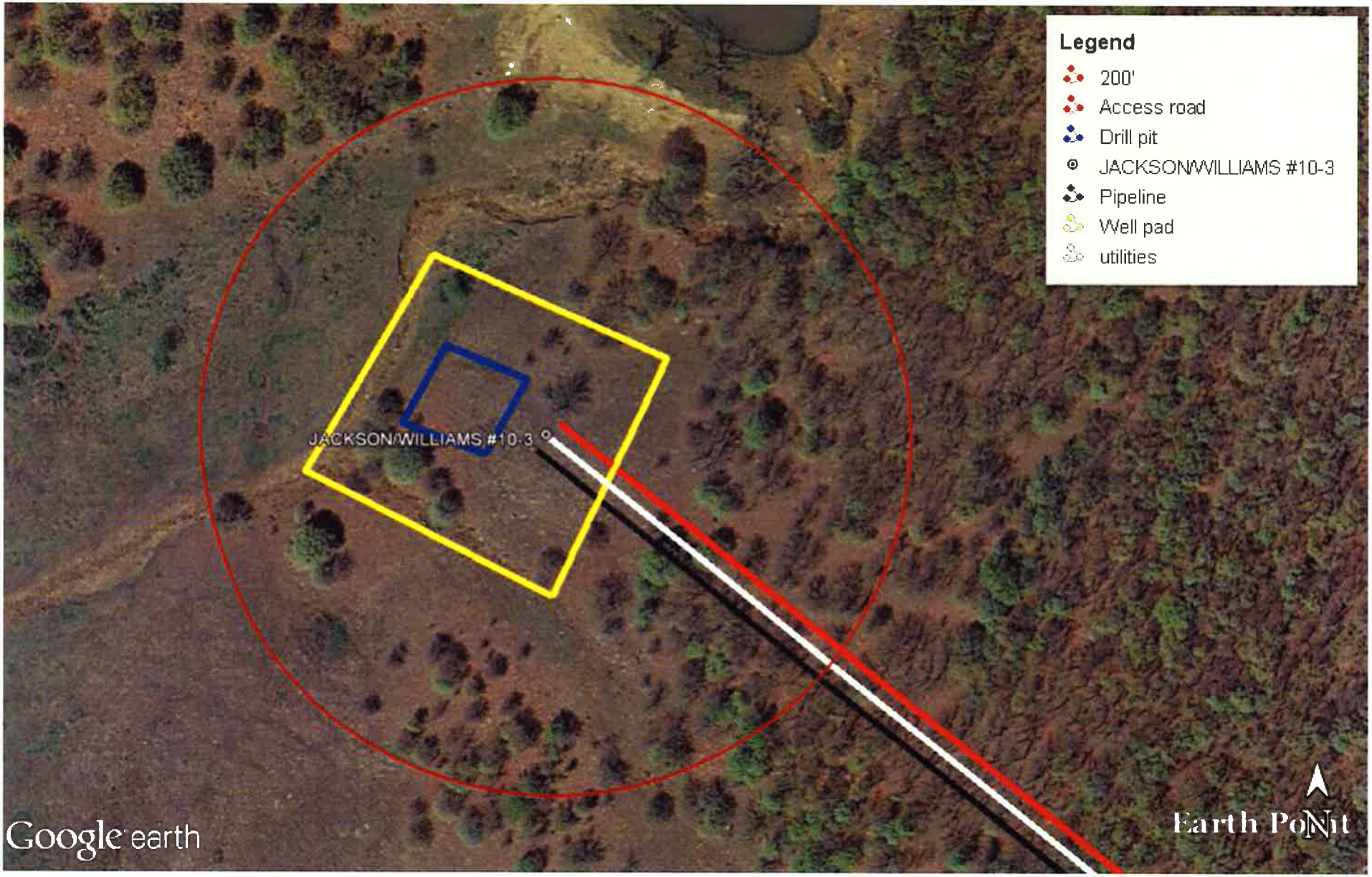
JACKSON/WILLIAMS #10-3 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 10 TOWNSHIP 24 NORTH RANGE 11 EAST, OSAGE COUNTY, OKLAHOMA
WOLCO, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
DRAWN BY:	AM	PROJECT #:	P938	


Legend
200'
Access road
Drill pit
JACKSON/WILLIAMS #10-3
Pipeline
Well pad
utilities
JACKSON/WILLIAMS #10-3
Google earth
Earth PoNt

Performance Operating Company, LLC
97 State Highway 123
Barnsdall, Oklahoma 74002

January 19, 2015

Robin Phillips - Superintendent
Bureau of Indian Affairs – Osage Agency
813 Grandview
Pawhuska, Oklahoma 74820

Re: Application for Drilling Permit – Royal/E. Hughes #5-6; SE/4 Sec. 05-T25N-R12E.

Dear Ms. Phillips,

Performance Operating Company, LLC is in the process of submitting an application to drill the above mentioned well in Osage County. This well is one of a group of 10 wells which are included in the Environmental Assessment recently submitted.

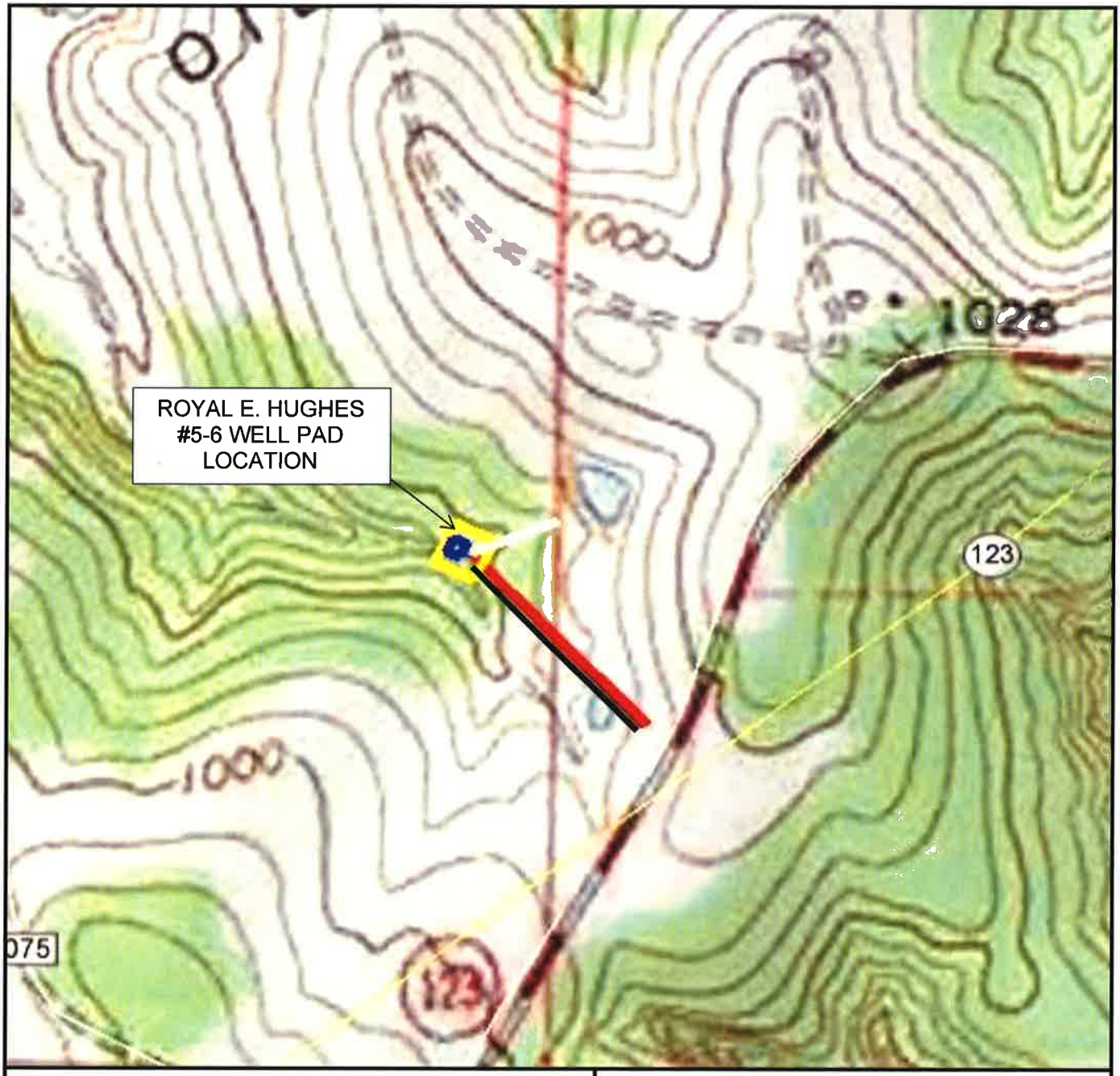
As required by 25 CRF 226.33, we are asking for your written permission to drill the above mentioned well. Although no jurisdictional waterways or wetlands were indicated in the project area, or in the vicinity of the project by the USFWS NWI online database, an onsite inspection and aerial photographs indicate a potential jurisdictional waterway along the western boundary of the construction limits (See attached Illustrations).

While the waterway (drainage ditch) appears to be located within the construction limits of the proposed well pad, during actual construction activities Performance will adjust the limits of construction such that no impacts, direct or indirect, will result during the construction of the well pad. As this relates specifically to this location, Performance will avoid construction, drilling and completion activities during times when surface water is present in the indicated temporary waterway.

Performance Operating personnel have met with the appropriate surface owner to discuss location, proximity to possible waterway, and have obtained the necessary agreement and permission from said landowner to proceed with drilling activity. If there is anything else you need in order to proceed with your consideration of this request, please let me know.

With Sincere Thanks,

Robert T. Knappe, Jr
Performance Operating Company, LLC
918-331-6570



= PROPOSED WELL PAD

= ACCESS ROAD

= BORE PIT

= OVERHEAD UTILITY LINES

= PIPELINE

-N-

TOPOGRAPHICAL MAP

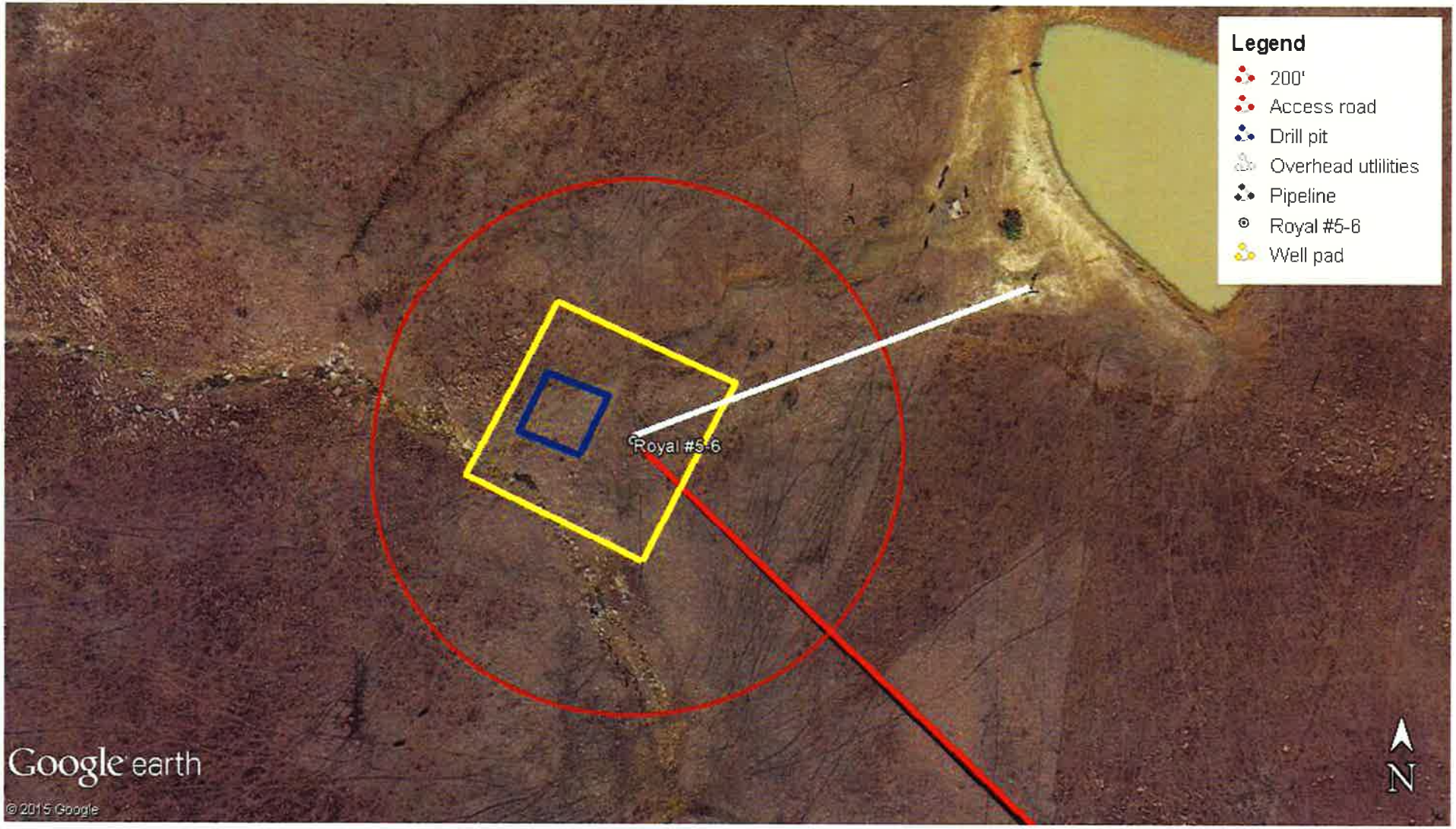
ROYAL E. HUGHES #5-6 WELL PAD
OSAGE COUNTY, OKLAHOMA

Project Location
SECTION 5 TOWNSHIP 25 NORTH RANGE 12 EAST, OSAGE COUNTY, OKLAHOMA
WOOLAROC, OKLAHOMA QUADRANGLE

Prepared for:
PERFORMANCE OPERATING

BEACON
Environmental Assistance Corporation

PROJECT MGR.:	AM	DATE:	10/14	Fig. 2
DRAWN BY:	AM	PROJECT #:	P938	


Legend
200'
Access road
Drill pit
Overhead utlilities
Pipeline
Royal #5-6
Well pad
Royal #5-6
Google earth
© 2015 Google
N

United States Department of the Interior
BUREAU OF INDIAN AFFAIRS
EASTERN OKLAHOMA REGION
OSAGE AGENCY
POST OFFICE BOX 1539
PAWHUSKA, OKLAHOMA 74056-1539

IN REPLY REFER TO

TAKE PRIDE® IN AMERICA

Branch of Enforcement and Lease Compliance

January 23, 2015

Performance Operating Company.
Attn: Robert Knappe
97 State Highway 123
Barnsdall, OK 74002

Dear Mr. Knappe:

The Bureau of Indian Affairs, Osage Agency, is in receipt of a letter dated January 19, 2015 from Performance Operating Company concerning the proposed application for permit to drill (APD) the Royal/E. Hughes #5-6 well to be located in the SE/4 of Section 5, Township 25N, Range 12E, Osage County, Oklahoma. In accordance with the requirements of 25 CFR § 226.33, your letter requested written permission from the Osage Agency Superintendent to drill the proposed well within 200 feet of a potential jurisdictional waterway along the western boundary of the construction limits.

This response letter serves as notification that the Superintendent approves your exemption request. All correspondence and supporting documentation related to this exemption must be included as a component of your APD package and referenced in the corresponding environmental assessment for this proposed action before the drilling permit can be submitted to the Superintendent for final review and approval consideration.

If you should have any questions regarding this matter, please do not hesitate to contact this office at (918) 287-5700.

Respectfully,

Superintendent

Enclosure(s)

cc: Subsurface; Field Operations; Osage Minerals Council Chairman

United States Department of the Interior
BUREAU OF INDIAN AFFAIRS
EASTERN OKLAHOMA REGION
OSAGE AGENCY
POST OFFICE BOX 1539
PAWHUSKA, OKLAHOMA 74056-1539

IN REPLY REFER TO

TAKE PRIDE® IN AMERICA

Branch of Enforcement and Lease Compliance

January 23, 2015

Performance Operating Company.
Attn: Robert Knappe
97 State Highway 123
Barnsdall, OK 74002

Dear Mr. Knappe:

The Bureau of Indian Affairs, Osage Agency, is in receipt of a letter dated January 19, 2015 from Performance Operating Company concerning the proposed application for permit to drill (APD) the Jackson/Williams #10-3 well to be located in the NE/4 of Section 1, Township 24N, Range 11E, Osage County, Oklahoma. In accordance with the requirements of 25 CFR § 226.33, your letter requested written permission from the Osage Agency Superintendent to drill the proposed well within 200 feet of a potential jurisdictional waterway along the western boundary of the construction limits.

This response letter serves as notification that the Superintendent approves your exemption request. All correspondence and supporting documentation related to this exemption must be included as a component of your APD package and referenced in the corresponding environmental assessment for this proposed action before the drilling permit can be submitted to the Superintendent for final review and approval consideration.

If you should have any questions regarding this matter, please do not hesitate to contact this office at (918) 287-5700.

Respectfully,

Superintendent

Enclosure(s)

cc: Subsurface; Field Operations; Osage Minerals Council Chairman

APPENDIX D-5

NHPA DOCUMENTATION

EOR-04-15-049

Oklahoma Historical Society *Founded May 27, 1893*
State Historic Preservation Office
Oklahoma History Center • 800 Nazih Zuhdi Drive • Oklahoma City, OK 73105-7917
(405) 521-6249 • Fax (405) 522-0816 • www.okhistory.org/shpo/shpom.htm

December 17, 2014

Ms. Robin Phillips
BIA Osage Agency
P.O. Box 1539
Pawhuska, Ok 74056-1539

RE: File #0425-15; Osage Proposed David #31-2 Well Site Project

Dear Ms. Phillips:

We have received and reviewed the documentation concerning the referenced project in Osage County. Additionally, we have examined the information contained in the Oklahoma Landmarks Inventory (OLI) files and other materials on historic resources available in our office. We find that there are no historic properties affected by the referenced project.

Thank you for the opportunity to comment on this project. We look forward to working with you in the future.

If you have any questions, please contact Catharine M. Wood, Historical Archaeologist, at 405/521-6381.

Should further correspondence pertaining to this project be necessary, please reference the above underlined file number. Thank you.

Sincerely,

Melvena Heisch
Deputy State Historic
Preservation Officer

MH:jr

EOR-09-15-049

Oklahoma Archeological Survey

THE UNIVERSITY OF OKLAHOMA

December 9, 2014

Richard Beaty
Bureau of Indian Affairs
Osage Agency
PO Box 1539
Pawhuska, Oklahoma 74056

RE: Proposed well David #31-2, Beacon Environmental. Legal Description: E ½ NW ¼ Section 31 T25N R11E, Osage County, Oklahoma.

Dear Mr. Beaty:

A cultural resources report of investigations has been received by this agency on the above referenced project. This agency confirms the recommendations contained in the report. The review was conducted in cooperation with the State Historic Preservation Office, Oklahoma Historical Society.

Please contact this office at (405) 325-7211 if buried archaeological materials such as chipped stone tools, pottery, bone, historic crockery, glass, metal items, or building materials are exposed during construction activities.

In addition to our comment on the cultural resource inventory conducted for this project, under 36CFR Part 800.3 you are reminded of your responsibility to consult with the appropriate Native American tribe/groups for any concerns they may have pertaining to this report.

Sincerely,

Robert L. Brooks
State Archaeologist

:ls

Cc: SHPO
Sierra Mandelo, BIA

111 E. Chesapeake, Room 102, Norman, Oklahoma 73019-5111 PHONE: (405) 325-7211 FAX: (405) 325-7604
A UNIT OF ARTS AND SCIENCES SERVING THE PEOPLE OF OKLAHOMA

FILE COPY
SURNAME
Baty

EOR-OA-15-049

November 28, 2017

Dr. Bob Blackburn
State Historic Preservation Officer
Oklahoma Historical Society /History Center
800 Nazih Zuhdi Drive
Oklahoma City, Oklahoma 73105-7917

Dear Dr. Blackburn:

Enclosed is a copy of a report titled *Phase 1 Archaeological Survey Report: Proposed David #31-2 Well Site Project Osage County, Oklahoma,* concerning the proposed development of drilling locations in Osage County, Oklahoma. The survey was conducted and reported by Open Range Archaeology, LLC (ORA), consulting archeologist for Beacon Environmental Assistance Corporation of Edmond, Oklahoma. The Bureau of Indian Affairs, Osage Agency (Agency), has reviewed this report pursuant to 36 CFR 800.4 for effects of the undertaking upon National Register of Historic Places (NRHP) eligible properties.

ORA conducted archival and field searches resulting in the surveying of ten accumulative acres for the proposed drilling location. No cultural sites or properties were discovered. Thus the findings are **no property** is present that is eligible or that may become eligible for inclusion on the NRHP.

The Agency accepts ORA's findings and recommends this project be allowed to move forward without additional cultural concerns. Standard stipulations will be in place for inadvertent discovery. Please review this report and provide the Agency with any comments.

Respectfully,

s/ Robin M Phillips

Superintendent

Enclosure

FILE COPY
SURNAME
Beaty

EOR-OA-15-049

November 28, 2017

Honorable Geoffrey Standing Bear
Principal Chief, Osage Nation
P.O. Box 779
Pawhuska, OK 74056

Dear Chief Standing Bear:

Enclosed is a copy of a report titled *Phase 1 Archaeological Survey Report: Proposed David #31-2 Well Site Project Osage County, Oklahoma,* concerning the proposed development of drilling locations in Osage County, Oklahoma. The survey was conducted and reported by Open Range Archaeology, LLC (ORA), consulting archeologist for Beacon Environmental Assistance Corporation of Edmond, Oklahoma. The Bureau of Indian Affairs, Osage Agency (Agency), has reviewed this report pursuant to 36 CFR 800.4 for effects of the undertaking upon National Register of Historic Places (NRHP) eligible properties.

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Respectfully,

s/ Robin M Phillips

Superintendent

Enclosure

EOR-OA-15-049

November 28, 2017

Robert L. Brooks, Ph.D.
State Archeologist
Oklahoma Archeological Survey
111 East Chesapeake
Norman, Oklahoma 73019-0575

Dear Dr. Brooks:

Enclosed is a copy of a report titled *Phase 1 Archaeological Survey Report: Proposed David #31-2 Well Site Project Osage County, Oklahoma,* concerning the proposed development of drilling locations in Osage County, Oklahoma. The survey was conducted and reported by Open Range Archaeology, LLC (ORA), consulting archeologist for Beacon Environmental Assistance Corporation of Edmond, Oklahoma. The Bureau of Indian Affairs, Osage Agency (Agency), has reviewed this report pursuant to 36 CFR 800.4 for effects of the undertaking upon National Register of Historic Places (NRHP) eligible properties.

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The Agency accepts ORA's findings and recommends this project be allowed to move forward without additional cultural concerns. Standard stipulations will be in place for inadvertent discovery. Please review this report and provide the Agency with any comments.

Respectfully,

s/ Robin W. Phillips

Superintendent

Enclosure

EOR-04-15-047 & 048

Oklahoma Historical Society *Founded May 27, 1893*
State Historic Preservation Office
Oklahoma History Center • 800 Nazih Zuhdi Drive • Oklahoma City, OK 73105-7917
(405) 521-6249 • Fax (405) 522-0816 • www.okhistory.org/shpo/shpom.htm

December 17, 2014

Ms. Robin Phillips
BIA Osage Agency
P.O. Box 1539
Pawhuska, Ok 74056-1539

RE: File #0427-15; Osage Proposed Cottonmouth #3-5 & #3-6 Well Sites, Including 34OS1316

Dear Ms. Phillips:

We have received and reviewed the documentation concerning the referenced project in Osage County. Additionally, we have examined the information contained in the Oklahoma Landmarks Inventory (OLI) files and other materials on historic resources available in our office. We find that there are no historic properties affected by the referenced project.

Thank you for the opportunity to comment on this project. We look forward to working with you in the future.

If you have any questions, please contact Catharine M. Wood, Historical Archaeologist, at 405/521-6381.

Should further correspondence pertaining to this project be necessary, please reference the above underlined file number. Thank you.

Sincerely,

Melvena Heisch
Deputy State Historic
Preservation Officer

MH:jr

EOR-04-FS-47448

Oklahoma Archeological Survey

THE UNIVERSITY OF OKLAHOMA

RECEIVED
OSAGE AGENCY
PAWHUSKA, OK
2014 DEC 12 AM 9 31

December 8, 2014

Superintendent
Osage Agency
Bureau of Indian Affairs
P. O. Box 1539
Pawhuska, OK 74056-1539

Re: Proposed wells Cottonmouth 3-5 & 3-6, Beacon Environmental. Legal Description:
SE ¼ NW ¼ NW ¼ (3-5) & SW ¼ NE ¼ NW ¼ (3-6) Section 3 T24N R9E,
Osage County, Oklahoma.

Dear Ms. Superintendent:

I have received a report documenting the results of a cultural resource inventory for the above referenced action. Tom and Jana Gruber of Open Range Archaeology accomplished this work on October 16-17, 2014. The field inspection of some 20 acres representing the area of potential effect resulted in the documentation of debris from oil field activities (34OS1316). **I defer comment on the potential eligibility of 34OS1316 and project effect to the Historic Archaeologist with the State Historic Preservation Office. Please ensure that a copy of this report and accompanying documentation has been provided to the State Historic Preservation Office.**

This review has been conducted in cooperation with the State Historic Preservation Office, Oklahoma Historical Society. You must also have a letter from that office to document your consultation pursuant to Section 106 of the National Historic Preservation Act.

Sincerely,

Robert L. Brooks
State Archaeologist

Cc: SHPO
S. Mandelko, BIA

111 E. Chesapeake, Room 102, Norman, Oklahoma 73019-5111 PHONE: (405) 325-7211 FAX: (405) 325-7604
A UNIT OF ARTS AND SCIENCES SERVING THE PEOPLE OF OKLAHOMA

FILE COPY
SURNAME
Batty

EOR-OA-15-047 &048

November 28, 2017

Robert L. Brooks, Ph.D.
State Archeologist
Oklahoma Archeological Survey
111 East Chesapeake
Norman, Oklahoma 73019-0575

Dear Dr. Brooks:

Enclosed is a copy of a report titled *Phase 1 Archaeological Survey Report: Proposed Cottonmouth 3-5 and Cottonmouth 3-6 Well Site Projects Osage County, Oklahoma,* concerning the proposed development of drilling locations in Osage County, Oklahoma. The survey was conducted and reported by Open Range Archaeology, LLC (ORA), consulting archeologist for Beacon Environmental Assistance Corporation of Edmond, Oklahoma. The Bureau of Indian Affairs, Osage Agency (Agency), has reviewed this report pursuant to 36 CFR 800.4 for effects of the undertaking upon National Register of Historic Places eligible properties.

ORA conducted archival and field searches resulting in the surveying of twenty accumulative acres for the two proposed drilling locations. One new site (34OS1316) an oil field debris dump site has been recorded. This site is determined an inventory not eligible for the National Register of Historic Places (NRHP). Thus the findings are **no property** that is eligible or that may become eligible for inclusion on the NRHP.

The Agency accepts ORA's findings and recommends these projects be allowed to move forward without additional cultural concerns. Standard stipulations will be in place for inadvertent discovery. Please review this report and provide the Agency with any comments.

Respectfully,

s/ Robin M Phillips

Superintendent

Enclosure

FILE COPY
SURNAME
Baty

EOR-OA-15-047 &048

November 28, 2017

Honorable Geoffrey Standing Bear
Principal Chief, Osage Nation
P.O. Box 779
Pawhuska, OK 74056

Dear Chief Standing Bear:

Enclosed is a copy of a report titled *Phase 1 Archaeological Survey Report: Proposed Cottonmouth 3-5 and Cottonmouth 3-6 Well Site Projects Osage County, Oklahoma,* concerning the proposed development of drilling locations in Osage County, Oklahoma. The survey was conducted and reported by Open Range Archaeology, LLC (ORA), consulting archeologist for Beacon Environmental Assistance Corporation of Edmond, Oklahoma. The Bureau of Indian Affairs, Osage Agency (Agency), has reviewed this report pursuant to 36 CFR 800.4 for effects of the undertaking upon National Register of Historic Places eligible properties.

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Respectfully,

s/ Robin M Phillips

Superintendent

Enclosure

FILE COPY
SURNAME

EOR-OA-15-047 &048

November 28, 2017

Dr. Bob Blackburn
State Historic Preservation Officer
Oklahoma Historical Society /History Center
800 Nazih Zuhdi Drive
Oklahoma City, Oklahoma 73105-7917

Dear Dr. Blackburn:

Enclosed is a copy of a report titled *Phase 1 Archaeological Survey Report: Proposed Cottonmouth 3-5 and Cottonmouth 3-6 Well Site Projects Osage County, Oklahoma,* concerning the proposed development of drilling locations in Osage County, Oklahoma. The survey was conducted and reported by Open Range Archaeology, LLC (ORA), consulting archeologist for Beacon Environmental Assistance Corporation of Edmond, Oklahoma. The Bureau of Indian Affairs, Osage Agency (Agency), has reviewed this report pursuant to 36 CFR 800.4 for effects of the undertaking upon National Register of Historic Places eligible properties.

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Respectfully,

s/ Robin M Phillips

Superintendent

Enclosure

EOR-04-15-050 & 051

Oklahoma Historical Society *Founded May 27, 1893*
State Historic Preservation Office
Oklahoma History Center • 800 Nazih Zuhdi Drive • Oklahoma City, OK 73105-7917
(405) 521-6249 • Fax (405) 522-0816 • www.okhistory.org/shpo/shpom.htm

December 17, 2014

Ms. Robin Phillips
BIA Osage Agency
P.O. Box 1539
Pawhuska, Ok 74056-1539

RE: File #0426-15; Osage Proposed Jackson-Stoabs #10-2 & Jackson-Williams #10-3 Wells

Dear Ms. Phillips:

We have received and reviewed the documentation concerning the referenced project in Osage County. Additionally, we have examined the information contained in the Oklahoma Landmarks Inventory (OLI) files and other materials on historic resources available in our office. We find that there are no historic properties affected by the referenced project.

Thank you for the opportunity to comment on this project. We look forward to working with you in the future.

If you have any questions, please contact Catharine M. Wood, Historical Archaeologist, at 405/521-6381.

Should further correspondence pertaining to this project be necessary, please reference the above underlined file number. Thank you.

Sincerely,

Melvena Heisch
Deputy State Historic
Preservation Officer

MH:jr

EoR-04-15-050
15-051

Oklahoma Archeological Survey

THE UNIVERSITY OF OKLAHOMA

December 9, 2014

Richard Beaty
Bureau of Indian Affairs
Osage Agency
PO Box 1539
Pawhuska, Oklahoma 74056

RE: Proposed wells Jackson Stoabs #10-2 and Jackson/Williams #10-3, Beacon Environmental. Legal Description: SW ¼ NW ¼ SE ¼ (Stoabs) and SE ¼ NW ¼ SE ¼ (Williams) Section 10 T24N R11E, Osage County, Oklahoma.

Dear Mr. Beaty:

A cultural resources report of investigations has been received by this agency on the above referenced project. This agency confirms the recommendations contained in the report. The review was conducted in cooperation with the State Historic Preservation Office, Oklahoma Historical Society.

Please contact this office at (405) 325-7211 if buried archaeological materials such as chipped stone tools, pottery, bone, historic crockery, glass, metal items, or building materials are exposed during construction activities.

In addition to our comment on the cultural resource inventory conducted for this project, under 36CFR Part 800.3 you are reminded of your responsibility to consult with the appropriate Native American tribe/groups for any concerns they may have pertaining to this report.

Sincerely,

Robert L. Brooks
State Archaeologist

:ls

Cc: SHPO
Sierra Mandelo, BIA

111 E. Chesapeake, Room 102, Norman, Oklahoma 73019-5111 PHONE: (405) 325-7211 FAX: (405) 325-7604
A UNIT OF ARTS AND SCIENCES SERVING THE PEOPLE OF OKLAHOMA

FILE
SURNAME
Beaty

EOR-OA-15-050 & 051

November 28, 2017

Robert L. Brooks, Ph.D.
State Archeologist
Oklahoma Archeological Survey
111 East Chesapeake
Norman, Oklahoma 73019-0575

Dear Dr. Brooks:

Enclosed is a copy of a report titled *Phase 1 Archaeological Survey Report: Jackson Stoabs #10-2, Jackson/Williams #10-3Well Site Projects Osage County, Oklahoma,* concerning the proposed development of drilling locations in Osage County, Oklahoma. The survey was conducted and reported by Open Range Archaeology, LLC (ORA), consulting archeologist for Beacon Environmental Assistance Corporation of Edmond, Oklahoma. The Bureau of Indian Affairs, Osage Agency (Agency), has reviewed this report pursuant to 36 CFR 800.4 for effects of the undertaking upon National Register of Historic Places (NRHP) eligible properties.

ORA conducted archival and field searches resulting in the surveying of twenty accumulative acres for the proposed drilling locations. No cultural sites or properties were discovered. Thus the findings are **no property** is present that is eligible or that may become eligible for inclusion on the NRHP.

The Agency accepts ORA's findings and recommends these projects be allowed to move forward without additional cultural concerns. Standard stipulations will be in place for inadvertent discovery. Please review this report and provide the Agency with any comments.

Respectfully,

s/ Robin W Phillips

Superintendent

Enclosure

FILE COPY
SURFACE

EOR-OA-15-050 & 051

November 28, 2017

Dr. Bob Blackburn
State Historic Preservation Officer
Oklahoma Historical Society /History Center
800 Nazih Zuhdi Drive
Oklahoma City, Oklahoma 73105-7917

Dear Dr. Blackburn:

Enclosed is a copy of a report titled *Phase 1 Archaeological Survey Report: Jackson Stoabs #10-2, Jackson/Williams #10-3Well Site Projects Osage County, Oklahoma,* concerning the proposed development of drilling locations in Osage County, Oklahoma. The survey was conducted and reported by Open Range Archaeology, LLC (ORA), consulting archeologist for Beacon Environmental Assistance Corporation of Edmond, Oklahoma. The Bureau of Indian Affairs, Osage Agency (Agency), has reviewed this report pursuant to 36 CFR 800.4 for effects of the undertaking upon National Register of Historic Places (NRHP) eligible properties.

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The Agency accepts ORA's findings and recommends these projects be allowed to move forward without additional cultural concerns. Standard stipulations will be in place for inadvertent discovery. Please review this report and provide the Agency with any comments.

Respectfully,

s/ Robin M Phillips

Superintendent

Enclosure

FILE COPY
SURNAME
Beaty

EOR-OA-15-050 & 051

November 28, 2017

Honorable Geoffrey Standing Bear
Principal Chief, Osage Nation
P.O. Box 779
Pawhuska, OK 74056

Dear Chief Standing Bear:

Enclosed is a copy of a report titled *Phase 1 Archaeological Survey Report: Jackson Stoabs #10-2, Jackson/Williams #10-3Well Site Projects Osage County, Oklahoma,* concerning the proposed development of drilling locations in Osage County, Oklahoma. The survey was conducted and reported by Open Range Archaeology, LLC (ORA), consulting archeologist for Beacon Environmental Assistance Corporation of Edmond, Oklahoma. The Bureau of Indian Affairs, Osage Agency (Agency), has reviewed this report pursuant to 36 CFR 800.4 for effects of the undertaking upon National Register of Historic Places (NRHP) eligible properties.

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Respectfully,

s/ Robin W Phillips

Superintendent

Enclosure

EOR OA-15-042 thru 046

Oklahoma Historical Society *Founded May 27, 1893*
State Historic Preservation Office
Oklahoma History Center • 800 Nazih Zuhdi Drive • Oklahoma City, OK 73105-7917
(405) 521-6249 • Fax (405) 522-0816 • www.okhistory.org/shpo/shpom.htm

RECEIVED
BIA OSAGE AGENCY
PAWHUSKA, OK
2014 DEC 19 AM 9 57

December 17, 2014

Ms. Jeannine Hale
BIA Osage Agency
P.O. Box 1539
Pawhuska, Ok 74056-1539

RE: File #0400-15; Osage Proposal for Five Beacon Environmental Wells (Listed on Attachment)

Dear Ms. Hale:

We have received and reviewed the documentation concerning the referenced project in Osage County. Additionally, we have examined the information contained in the Oklahoma Landmarks Inventory (OLI) files and other materials on historic resources available in our office. We find that there are no historic properties affected by the referenced project.

Thank you for the opportunity to comment on this project. We look forward to working with you in the future.

If you have any questions, please contact Catharine M. Wood, Historical Archaeologist, at 405/521-6381.

Should further correspondence pertaining to this project be necessary, please reference the above underlined file number. Thank you.

Sincerely,

Melvena Heisch
Deputy State Historic
Preservation Officer

MH:jr

Attachment

EOR-04-15-042 thru 046

FILE #	LIST OF PROPERTIES
0400-15	OSAGE PROPOSAL FOR FIVE BEACON ENVIRONMENTAL WELLS, OSAGE AGENCY

1. ALLEE #22-01,
   N2/NW/SE SEC22 T26N R11E
2. ALLEE #22-02,
   N2/NW/SE SEC22 T26N R11E
3. JM HUGHES (DOVE) #28-5,
   SE/NW/SW SEC28 T26N R12E
4. ROYAL HUGHES #4-3,
   NE/NW/SW SEC4 T25N R12E
5. ROYAL HUGHES #5-6,
   SE/NE/SE SEC5 T25N R12E

EQR-OA-15-042thru046

Oklahoma Archeological Survey

THE UNIVERSITY OF OKLAHOMA

December 3, 2014

Jeanine Hale
Bureau of Indian Affairs
Osage Agency
PO Box 1539
Pawhuska, Oklahoma 74056

RE: Proposed wells Allee #22-01 and 22-02; Royal Hughes #4-3, Royal #5-6, and Jim Hughes (Dove) #28-5, Beacon Environmental Assistance Corporation. Legal Description: SW ¼ NW ¼ SE ¼ Section 22 T26N R11E (22-01), SE ¼ NW ¼ SE ¼ Section 22 T26N R11E(22-02); SW ¼ NW ¼ SW ¼ Section 4 T25N R12E (4-3), SE ¼ NE ¼ SE ¼ Section 5 T25N R12E (5-6); and SW ¼ SW ¼ NE ¼ Section 28 T26N R12E (28-5), Osage County, Oklahoma.

Dear Ms. Hale:

A cultural resources report of investigations has been received by this agency on the above referenced project. This agency confirms the recommendations contained in the report. The review was conducted in cooperation with the State Historic Preservation Office, Oklahoma Historical Society.

Please contact this office at (405) 325-7211 if buried archaeological materials such as chipped stone tools, pottery, bone, historic crockery, glass, metal items, or building materials are exposed during construction activities.

In addition to our comment on the cultural resource inventory conducted for this project, under 36CFR Part 800.3 you are reminded of your responsibility to consult with the appropriate Native American tribe/groups for any concerns they may have pertaining to this report.

Sincerely,

Robert L. Brooks
State Archaeologist

:ls

Cc: SHPO
Sierra Mandelko, BIA

111 E. Chesapeake, Room 102, Norman, Oklahoma 73019-5111 PHONE: (405) 325-7211 FAX: (405) 325-7604
A UNIT OF ARTS AND SCIENCES SERVING THE PEOPLE OF OKLAHOMA

Beaty

EOR-OA-15-042-046

November 26, 2017

Dr. Bob Blackburn
State Historic Preservation Officer
Oklahoma Historical Society /History Center
800 Nazih Zuhdi Drive
Oklahoma City, Oklahoma 73105-7917

Dr. Blackburn:

Enclosed is a copy of a report titled *Phase 1 Archaeological Survey Report: Proposed Allee #22-01, Allee #22-02, Royal Hughes #4-3, Royal #5-6 & Jim Hughes (Dove) #28-5 Well Site Projects Osage County, Oklahoma,* concerning the proposed development of drilling locations in Osage County, Oklahoma. The survey was conducted and reported by Open Range Archaeology, LLC (ORA), consulting archeologist for Beacon Environmental Assistance Corporation of Edmond, Oklahoma. The Bureau of Indian Affairs, Osage Agency (Agency), has reviewed this report pursuant to 36 CFR 800.4 for effects of the undertaking upon National Register of Historic Places eligible properties.

ORA conducted archival and field searches resulting in the surveying of fifty accumulative acres for the five proposed drilling locations. One previously recorded site (34OS1208) and two documented structures on GLO Maps were noted , but found to be one half mile distance outside the APE thus in no danger of disturbance. ORA have determined there are no sites that are eligible or that may become eligible for inclusion on the National Register of Historic Places.

The Agency accepts ORA's findings and recommends these projects be allowed to move forward without additional cultural concerns. Standard stipulations will be in place for inadvertent discovery. Please review this report and provide the Agency with any comments.

Respectfully,

/s/ Jeannine Hale

Superintendent

Enclosure

EOR-OA-15-042-046

November 26, 2017

Robert L. Brooks, Ph.D.
State Archeologist
Oklahoma Archeological Survey
111 East Chesapeake
Norman, Oklahoma 73019-0575

Dear Dr. Brooks:

Enclosed is a copy of a report titled *Phase 1 Archaeological Survey Report: Proposed Allee #22-01, Allee #22-02, Royal Hughes #4-3, Royal #5-6 & Jim Hughes (Dove) #28-5 Well Site Projects Osage County, Oklahoma,* concerning the proposed development of drilling locations in Osage County, Oklahoma. The survey was conducted and reported by Open Range Archaeology, LLC (ORA), consulting archeologist for Beacon Environmental Assistance Corporation of Edmond, Oklahoma. The Bureau of Indian Affairs, Osage Agency (Agency), has reviewed this report pursuant to 36 CFR 800.4 for effects of the undertaking upon National Register of Historic Places eligible properties.

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Respectfully,

/s/ Jeannine Hale

Superintendent

Enclosure

FILE COPY
SURNAME
Baty

EOR-OA-15-042-046

November 26, 2017

Honorable Geoffrey Standing Bear
Principal Chief, Osage Nation
P.O. Box 779
Pawhuska, OK 74056

Dear Chief Standing Bear:

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Respectfully,

Jeannine Hale

ACTING Superintendent

Enclosure

APPENDIX D-6

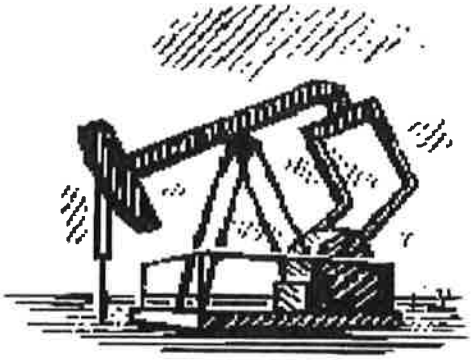
SPILL PREVENTION, CONTROL AND COUNTERMEASURE PLANS

SPILL PREVENTION, CONTROL, AND COUNTERMEASURE, PLAN

Prepared for

PERFORMANCE OPERATING LLC

Barnsdall, Oklahoma



October 2013

RFS Consulting, Inc.
P.O. Box 470947
Tulsa, Oklahoma 74147-0947
(918) 663-9850 / 663-9856 (Fax)

Cross Reference with SPCC Rule

Provision	Plan Section	Page(s)
112.1	General Applicability	3
112.3(d)	Professional Engineer Certification	4
112.3(e)	Location/Availability of SPCC Plan	8
112.4	Plan Amendments by Administrator	5
112.5 (a)(b)	Plan Review	5
112.7	Management Approval	4
112.7	Cross-Reference with SPCC Rule	2
112.7(a)(1)	Conformance	10
112.7(a)(2)	Compliance or reason for non-compliance	10
112.7(a)(3)	Part I – General Information and Facility Diagrams	8
	Type of Oil Stored	Appendix E 9
112.7(a)(3)	Discharge Discovery	12
112.7(a)(4)	Discharge Notification	12 Appendix A
112.7(a)(5)	Spill Mitigation Procedures	13
112.7(b)	Potential Discharge Volume and Direction of Flow	15
112.7(c)	Containment and Diversionary Structures	15
112.7(d)	Practicability of Secondary Containment	16
	Written Commitment of manpower, Equipment and materials	4
	Oil Spill Contingency Plan	Appendix D
112.7(e)	Inspections, Tests, and Records	17
112.7(f)	Personnel, Training, and Discharge Prevention Procedures	19
	Spill Prevention Briefing	Appendix C 19
112.7(g)	Security – NA (does not apply to production facilities)	NA
112.7(h)	Loading/Unloading Rack – NA (no rack present)	NA
112.7(i)	Brittle Fracture – NA (no field erected tanks)	18
112.7(j)	Conformance with Applicable State and Local Requirements	10

112.9(b)	Oil Production Facility Drainage Record of Dike Drainage	15 Appendix E
112.9(c)(1)	Container Compatibility	9
112.9(c)(2)	Secondary Containment for Bulk Storage Containers	15 Appendix E
112.9(c)(3)	Inspection, Tests, and Records Monthly Inspection Checklist	17 Appendix B
112.9(c)(4)	Bulk Storage Container Overflow Prevention	16
112.9(d)(1) 112.9(d)(2)	Transfer Equipment Inspection Inspection of Saltwater Disposal Facilities	17 NA
112.9(d)(3)	Flowline Maintenance Program	18

Spill Prevention, Control, and Countermeasure Plan
Performance Operating LLC

Introduction

The purpose of this Spill Prevention Control and Countermeasure (SPCC) Plan is to describe measures implemented by Performance Operating LLC to prevent oil discharges from occurring and to prepare to respond in a safe, effective, and timely manner to mitigate the impacts of an oil discharge from Performance Operating LLC facilities. This SPCC Plan has been prepared and implemented in accordance with the SPCC requirements contained in 40 CFR Part 112.

General Applicability (40 CFR 112.1)

Performance Operating LLC has non-transportation related onshore facilities engaged in producing, storing, and transferring oil and oil products, which due to the locations, could reasonably be expected to discharge oil in quantities that may be harmful to navigable waters of the United States. Each facility represented has more than 1,320 gallons of oil or produced water on site in above ground tanks.

Management Approval and Commitment of Resources
40 CFR 112.7

Performance Operating LLC is committed to maintaining the highest standards for preventing discharges of oil to navigable waters and the environment through the implementation of this SPCC Plan. This SPCC Plan has the full approval of Performance Operating LLC management, and management has committed the necessary resources, including manpower, equipment, and materials, to implement the measures described in this Plan.

The Designated Person Accountable for Oil Spill Prevention at the Performance Operating LLC facilities is the Response Coordinator named in Appendix A and has the authority to commit the necessary resources to implement the Plan as described.

Authorized Facility Representative: Dustin Kerbs

Signature:

Title: Petroleum Engineer

Date: 11/29/13

Professional Engineer Certification
40 CFR 112.3(d)

The undersigned Registered Professional Engineer is familiar with the requirements of Part 112 and has visited and examined the facility, or has supervised examination of the facility by appropriately qualified personnel. The undersigned Registered Professional Engineer attests that this Spill Prevention, Control, and Countermeasure Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and the requirement of 40 CFR Part 112; that procedures for required inspections and testing have been established; and that this Plan is adequate for the facility (112.3(d)).

Ronald F. Sober, P.E.
Printed Name of Registered Professional Engineer
Registration No.: 17765 State: OK

DATE: 11/22/13

Plan Amendments by Administrator
40 CFR 112.4

The Regional Administrator may require you to amend your Plan if he finds that it does not meet the requirements of this part or that amendment is necessary to prevent and contain discharges from your facility. The Regional Administrator must specify the terms of such proposed amendment. Within 30 days from receipt of such notice, you may submit written information, views, and arguments on the proposed amendment. After considering all relevant material presented, the Regional Administrator must either notify you of any amendment required or rescind the notice. You must amend your Plan as required within 30 days after such notice, unless the Regional Administrator, for good cause, specifies another effective date. You must implement the amended Plan as soon as possible, but not later than six months after you amend your Plan, unless the Regional Administrator specifies another date.

Performance Operating LLC will amend their plans when necessary or required by the Regional Administrator within 30 days of receipt of a notice or submit written information on the proposed amendment.

Plan Review
40 CFR 112.5 (a)(b)

In accordance with 40 CFR 112.5, Performance Operating LLC periodically reviews and evaluates this SPCC Plan for any changes in the facility design, construction, operation, or maintenance that materially affects the facility's potential for an oil discharge. Performance Operating reviews this SPCC Plan at least once ever five years. Revisions to the Plan, if any are needed, are made within six months of this five-year review. Performance Operating will implement any amendments as soon as possible, but not later than six months following preparation of any amendments. A registered PE certifies any technical amendments to the Plan, as described above, in accordance with 40 CFR 112.3(d). Scheduled five-year reviews and Plan amendments are recorded in Table 1. This log must be completed even if no amendments are made to the Plan. Unless a technical or administrative change prompts and earlier review, the next scheduled review of this Plan must occur in 5 years.

A plan review and change form on the following page provides the facility with a means of recording the dates when the plan is reviewed, changed, or recertified. Date, type of change, a space to describe the changes made to the plan and a signature line for the Operations Manager to attest that the review or administrative change or recertification has been completed. A recertification will result in an additional certification page (page 4) being added to the plan.

Performance Operating LLC

TABLE 1

RECORD OF PLAN REVIEW AND CHANGE

Date	Reviewer	Admin. Change	PE Certification	Summary of Changes

By placing their signature on the form above, the person signing attests to the following certification statement that the SPCC Plan review, administrative change or material change has been made and plan modifications, as needed, have been completed.

"I have completed review and evaluation of the SPCC Plan for Performance Operating on the date listed above, and will (will not) (see check marks in boxes above) amend the Plan as a result."

Certification of Substantial Harm Determination
40 CFR 112.20(e), 40 CFR 112.20(f)(1)

Facility name: All Performance Operating Facilities
Facility Company name: Performance Operating, LLC
Facility mailing address: PO BOX 628
Barnsdall, OK 74002
Does this facility currently have an EPA SPCC plan: Yes

1. Does the facility transfer oil over water to or from vessels and does the facility have a total oil storage capacity greater than or equal to 42,000 gallons?

YES: _____ NO: X

2. Does the facility have a total oil storage capacity greater than or equal to one million (1,000,000) gallons and does the facility lack secondary containment that is sufficiently large to contain the capacity of the largest aboveground storage tank plus sufficient freeboard to allow for precipitation within any aboveground storage area?

YES: _____ NO: X

3. Does the facility have a total oil storage capacity greater than or equal to one million (1,000,000) gallons and is the facility located at a distance (as calculated using the appropriate formula) such that a discharge from the facility could cause injury to fish and wildlife and sensitive environments?

YES: _____ NO: X

4. Does the facility have a maximum storage capacity greater than or equal to one million (1,000,000) gallons and is the facility located at a distance (as calculated using the appropriate formula) such that a discharge from the facility would shut down a public drinking water intake?

YES: _____ NO: X

5. Does the facility have a maximum storage capacity greater than or equal to one million (1,000,000) gallons and has the facility experienced a reportable oil spill in an amount greater than or equal to 10,000 gallons within the last 5 years?

YES: _____ NO: X

Certification

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document base, and that based on my inquiry of those individuals responsible for obtaining the information, I believe that the information is true, accurate, and complete.

Signature

Petroleum Engineer
Title, Company, Department

Dustin Kerbs
Name

11/29/13
Date

PART I – GENERAL FACILITY INFORMATION
40 CFR 112.7(a)(3) and 40 CFR 112.3(e)

1.1 Company Information

Company information, facility address, and driving directions are provided for each facility in Appendix E.

1.2 Contact Information

The designated person accountable for the overall oil spill prevention and response at the facility is the facility's Response Coordinator. Contact information is located in Appendix A.

1.3 Facility Layout Diagram

A facility diagram showing oil containing equipment and bulk storage containers as well as piping and direction of flow is presented In Appendix A, Facility Layout and Surface Drainage Diagram.

1.4 Facility Location and Operations 40 CFR 112.7(a)(3)

Performance Operating LLC, operates facilities for the production of crude oil and natural gas in Osage County, Oklahoma. These facilities are classified as onshore oil and gas exploration and production facilities that store produced water and oil from various production facilities in the area. All fluids produced from the Performance Operating wells are transferred via flow lines to their respective tank batteries. The flow lines are both buried and aboveground and are strategically located the intent to be protected from damage under normal operations. Produced water from the facilities wells is stored in fiberglass storage tanks before either being transported offsite or being disposed of in an injection well. Oil from the facilities is stored in welded steel or fiberglass storage tanks before being transported off site for sale.

1.5 Oil Storage and Handling/Oil Storage 40 CFR 112.7(a)(3)(i) and 40 CFR 112.9(c)(1)

1.5.1 Oil Storage

Oil storage and handling information for each facility is included in Appendix E.

1.6 Proximity to Navigable Waters

A description of the proximity to navigable waters for each facility is included in Appendix E.

1.7 Conformance with Applicable State and Local Requirements (40 CFR 112.7 (a)(1), (a)(2), and (j))

This SPCC plan for the Performance Operating LLC facilities was written to conform to 40 CFR Part 112 requirements. The facilities thereby conform to general requirements for oil pollution facilities in Oklahoma. All discharge notifications are made in compliance with local, state, and federal requirements. Because the facility is engaged in oil and gas production and processing, security requirement are not applicable. However, in some cases the facilities may be surrounded by fence with locking gate. This would be noted on the drawings. Additionally, the facility does not have a loading rack as described by the rule. All transport vehicles are made aware of any overhead piping and the care to take to minimize spills during material transfers. On disconnection, trucks are inspected to ensure there are no leaks of material. Performance Operating facilities do not have secondary containment for flow lines, but does have a flow line maintenance program (Sec 3.4.5) and Oil Spill Contingency Plan. (Appendix D)

PART II. SPILL RESPONSE AND REPORTING
40 CFR 112.7

2.1 Discharge Discovery and Reporting (40 CFR 112.7(a)(3) and 112.7(a)(4))

Several individuals and organizations may require notification in the event of an oil discharge. The Operations Manager is responsible for ensuring that all required notifications have been made. All discharges should be reported to the Operations Manager, who then determines if and to whom notifications are made. Appendix A contains company contact information and a listing of local, state, and federal agencies to be contacted under different circumstances. Details to be included in notifications are presented in Appendix A.

2.1.1 Verbal Notification Requirements (Local, State and Federal (40 CFR Part 110))

Any unauthorized discharge into air, land, or water must be reported immediately to the appropriate State authorities. In most instances this will be the Oklahoma Corporation Commission and the Osage Tribe. Agencies contact information and spill criteria are in Appendix A.

Detailed instructions on when to report to the different agencies are located in Appendix A with the contact information.

Whenever notifying any agency regarding a spill, have the following information readily available:

- Exact location and/or address and telephone number
- Date and time of discharge
- Type of material discharged
- Estimate of total quantity discharged
- Source of the discharge
- Description of affected media
- Cause of discharge
- Damages or injuries from discharge
- Actions taken to stop, remove, or mitigate effects of the discharge
- Need for evacuation
- List of those contacted regarding the discharge

2.1.2 Written Notification Requirements (State and Federal (40 CFR Part 112))

A written notification will be made to EPA Region 6 for any single discharge of oil to a navigable water or adjoining shoreline waterway of more that 1,000 gallons, or for two discharges of 1 bbl (42 gallons) of oil to a waterway in any

12-month period. This written notification must be made within 60 days of the qualifying discharge, and a copy sent to the Oklahoma Department of Environmental Quality and the Osage Indian Tribe. In the event a spill leaves the containment notify the BIA.

2.1.3 Submission of SPCC Information

Whenever the facility experiences a discharge into navigable waters of more than 1,000 gallons, or two discharges of 1 bbl (42 gallons) of oil to a waterway in any 12-month period, Performance Operating will provide information in writing to EPA Region VI office within 60 days of a qualifying discharge as described above with copies sent to the Osage Indian Tribe.

2.1.4 Post-Discharge Review Procedure

Once a discharge has been addressed, as required under the provisions of this Plan, a post discharge review will be convened. This review will be convened by the Performance Operating Management: to address the following points:

- The Cause of the Release: Identify the root cause of the release. This should not only include the apparent direct cause (e.g., faulty valve), but also the root cause (e.g., failure of inspections to identify the faulty valve, and/or failure to perform suitable preventive maintenance).
- Critique the Initial Response: Evaluate to what degree the identified initial response actions were followed and whether they were effective at mitigating the impact from the release. Determine whether changes to the initial response procedures are appropriate.
- Was the Response Effective? Ensure all necessary actions to remediate the impacts from the release have been performed, to include excavation and proper disposal of wastes generated.
- Notifications Performed? Ensure all internal and external notifications were performed and properly documented.
- Spill reports are documented.
- Future Prevention: Can anything be done to prevent this release from happening again?
- Documentation of the results of the Post-Discharge Review will be maintained in the records with this Plan.

2.2 Spill Response Material

Spill control equipment is maintained at the field and includes the following as a minimum:

1. Shovels
2. Absorbent pads and/or booms
3. Empty drums; and
4. Outside contractors - Additional equipment and materials,

including personnel are available through local contractors. A list of local contractors and their contact information is located in Appendix A.

2.3 Spill Mitigation Procedures (40 CFR 112.7(a)(5))

The following is a summary of actions that must be taken in the event of a discharge. It summarizes the distribution of responsibilities among individuals and describes procedures to follow in the event of a discharge.

A complete outline of actions to be performed in the event of a discharge from flowlines reaching or threatening to reach navigable waters is included in the Oil Spill Contingency Plan in Appendix D.

First person on site:

1. Shut off ignition sources;

2. Stop the spill at its source to prevent further discharge or release if possible. This may involve shutting off a pump or closing a valve. If the spill cannot be stopped *i.e.:* a leaking tank, Call for help immediately and then go to step 3.

3. Contain the spill to minimize the area impacted. This could involve the use of temporary dikes, emergency pits, or containment booms on water.

4. Recover fluids from the impacted area by using pumps, vacuum trucks or absorbent materials.

Management Personnel

5. Report the spill (if required to be reported to agencies)

6. Evaluate the impacts to determine the area and depth of soil affected. Also, look for any impacts to water, vegetation and/or animals.

7. Restore the site to its condition prior to the spill. This may involve treating or removing affected soils. All spills must be cleaned up, even those too small to report.

8. Document the spill and contacts with the regulatory agency.

2.4 Disposal Plan

The cleanup contractor will handle the disposal of any recovered product, contaminated soil, contaminated materials and equipment, decontamination

solutions, sorbents and spent chemicals collected during a response to a discharge incident. Material recovered from spills or containment areas is disposed of at a permitted site.

If Performance Operating personnel participate directly in the response to a discharge, additional training is required. All facility personnel handling hazardous wastes must have received both the initial 40-hour and annual 8-hour refresher training (if applicable) in the Hazardous Waste Operations, and Emergency Response Standard (HAZWOPER) of the Occupational Health and Safety Administration (OSHA). This training may be included as part of the initial training received by field personnel. Training records and certificates are kept in the field office.

PART III. SPILL PREVENTION, CONTROL AND COUNTERMEASURE PROVISIONS 40 CFR 112.7 and 112.9

3.1 Potential Discharge Volume, Direction of Flow (40 CFR 112.7(b)) and Containment (40 CFR 112.7(a)(3)(iii))

The potential discharge volume and direction of flow is provided in Appendix E for each facility.

3.2 Containment and Diversionary Structures

3.2.1 Oil Production Facility Drainage (40 CFR 112.9(b))

Facility drainage from secondary containment will not occur. There are no valves in containment areas. A description of the drainage and inspection areas is provided in Appendix E for each facility

3.2.2 Secondary Containment for Bulk Storage Containers (40 CFR 112.7(a)(3)(iii), 40 CFR 112.7(c)(1) and 112.9(c)(2))

The components of the Performance Operating LLC facilities tank batteries are described and detailed in the facility diagrams. The tank batteries at the facilities are equipped with secondary containment systems adequate to contain the contents of the entire capacity of the largest single container with sufficient freeboard to contain heavy and extended precipitation. Containment volume calculations are found in Appendix E for each facility.

3.2.3 Practicability of Secondary Containment (40 CFR112.7(d))

Performance Operating LLC believes it is impracticable to provide secondary containment for flowlines. Therefore the Performance Operating has a flowline maintenance program and Oil Spill Contingency Plan (Appendix D). This "Oil Spill Contingency Plan" has been prepared with the intent to conform with and satisfy the requirements of the United States Environmental Protection Agency as stated in 40 CFR Part 112.

3.3 Other Spill Prevention Measures

3.3.1 Bulk Storage Container Overflow Prevention (40 CFR 112.9(c)(4))

Bulk storage container description and overflow prevention is described in Appendix E for each facility.

3.3.2 Transfer Operations and Saltwater Disposal System (40 CFR 112.9(d)(1) and (d)(2))

All aboveground valves and piping associated with transfer operations are observed at least weekly by the pumper or truck driver. This includes observing flange joints, valve glands and bodies, drip pans, and pipe supports for corrosion, indication of leakage (discoloration, residue, fluids), or general state of repair.

3.4 Inspection, Tests and Records (40 CFR 112.7(e) 40 CFR 112.9(c)(3) and 40 CFR 112.9(d)(1))

This plan outlines procedures for inspecting the facility equipment in accordance with SPCC requirements. Records of inspections performed as described in this Plan and signed by the appropriate person are a part of this plan, and are maintained with this Plan at the field office for a period of 3 or more years. The reports include a description of the inspection procedure, the date of inspection, and the inspector's signature.

The procedures established in this SPCC Plan for regular inspection of all oil storage tanks and related production and transfer equipment follows the American Petroleum Institute's Recommended Practice for Settling Maintenance, Inspection, Operation, and Repair of Tanks in Production Service. Each container is observed weekly by the pumpers as described in this Plan section and following the checklist provided in Appendix B of this SPCC Plan. The weekly observation is aimed at identifying signs of deterioration and maintenance needs, including the foundation and supports of each container. Any leak from tanks seams, gaskets, rivets, and bolts is promptly corrected.

The procedures are comprised of informal daily examinations, weekly scheduled observations, and periodic conditions inspections. Additional checks and/or examinations are performed whenever an operation alert, malfunction, shell or deck leak, or potential bottom leak is reported following a scheduled examination. Written annual examinations/inspection reports are signed by the field inspector and are maintained at the field office for at least 3 years.

3.4.1 Regular Examinations

The weekly observations cover above ground flowlines and all processing equipment. It also includes verifying the proper function of all detection devices, including any level control sensors. Storage tanks are inspected for signs of deterioration, leaks, or accumulation of oil inside the containment area, or other signs that maintenance or repairs are needed. The secondary containment area is checked for proper drainage, general conditions, evidence of oil, or signs of leakage. The weekly check also involves visually inspecting all above ground valves and pipelines and noting the general condition of items such as transfer hoses, flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports, and metal surfaces.

The checklist provided in Appendix B is used as a guide during all site visits and documented on the form annually.

3.4.2 Periodic condition Inspection of Bulk Storage Containers

A condition inspection of bulk storage containers is performed by a qualified inspector according to the schedule and scope specified in API 653. Inspection schedule will be based on the date of the most recent inspection, date originally placed in service, or at least every 10 to 12 years, in accordance with API 653.

3.4.3 Brittle Fracture Evaluation (40 CFR 112.7(i))

At present, none of the bulk storage containers at this site was field-erected, and therefore no brittle fracture evaluation is required.

3.4.4 Flowline Maintenance Program (40 CFR 112.9(d)(3))

Flowline maintenance includes visually inspecting lines above the surface routinely. Whenever lines are exposed they are visually inspected for signs of deterioration, corrosion, and evidence of leakage. New lines maybe subjected to MTR testing (thickness, grade of materials, and compatibility), pressure or hydrostatic testing prior to being placed into service. In some instance, lines may also be coated with and/or cathodically protected. Should a line leak be detected, the Oil Spill Contingency Plan is activated. Records of integrity inspections, leak tests, and part replacements are kept at the facility for at least three years (integrity test results are kept for ten years.

Performance Operating comprehensive piping program includes the following elements:

3.4.4.1 Prevention Measures

All flow line piping is compatible with production fluids and conditions expected in the operational environment.

A physical review of line right-of-ways by the lease operators is generally performed each day during regular rounds, if possible. Daily well/line pressure data is turned in each day by the lease operator. Lines are walked and operators look for dead vegetation, surface staining, or other indications of leaks.

When possible or practical, lines will be equipped with cathodic protection, or at least buried anodes. If for any reason a line is uncovered, careful inspection of line integrity is performed and anode is installed.

3.4.4.2 Protection Measures

Shutting off the source of the leak is critical to minimizing the impact of discharges.

Time is of the essence if a leak is confirmed. Shovels and or earthmoving equipment are used to channel and pond liquids, which are removed via vacuum truck.

3.4.4.3 Remediation Measures

Contaminated soils, or soil saturated with spilled material are removed promptly and actions are initiated to stabilize and remediate any accumulations of oil discharges. Contaminated soils are then transported to a proper disposal location.

3.5 Personnel, Training, and Discharge Prevention Procedures (40 CFR 112.7(f))

The Operations Manager has been designated as the point of contact for all oil discharge prevention and response at this facility.

All Performance Operating LLC personnel receive training on proper handling of oil products and procedures to respond to oil discharge prior to entering Performance Operating production facilities. The training ensures that all facility personnel understand the procedures described in this SPCC Plan and are informed of the requirements under the applicable pollution control laws, rules and regulations.

3.5.1 Spill Prevention Briefing

Spill prevention training is performed annually to ensure adequate understanding and effective implementation of this SPCC Plan. These trainings, called briefings highlight and describe known spill events or failures, malfunctioning components, and recently developed precautionary measures. The Briefings are conducted in conjunction with the company safety meetings. Sign-in sheets, which included the topics of discussion at each meeting, are maintained with the plan in the field office. The scheduled annual briefing includes a review of Performance Operating policies and procedures relating to spill prevention, control, cleanup, and reporting; procedures for routine handling of products (i.e., loading, unloading, transfers). SPCC inspections and spill prevention procedures spill reporting procedures spill response and recovery disposal and treatment of spilled material.

Personnel are instructed in operation and maintenance of equipment to prevent the discharge of oil, and in applicable federal, state, and local pollution laws, rules, and regulations. Facility operators and other personnel have an opportunity during the briefings to share recommendations concerning health, safety and environmental issues encountered during facility operations.

The general outline of the briefings is as follows:

Incidents reports including spills are submitted by all supervisors routinely. Once a month all reports are reviewed among supervisors and disseminated to workers during

monthly briefings.

- Responsibilities of personnel and designated person accountable for spill prevention
- Spill prevention regulations and requirements.
- Spill prevention procedures
- Spill reporting and cleanup procedures
- History/cause of known spill events
- Equipment failures and operational issues
- Recently developed measures/procedures
- Proper equipment operation and maintenance, and
- Procedures for draining rainwater from berms.

3.5.2 Contractor Instructions

Performance Operating ensures all contractor personnel are familiar with the facility operations, safety procedures, and spill prevention and control procedures described in this Plan prior to working at the facility, as necessary in order that there will be no misunderstanding on joint and respective duties and responsibilities to perform work in a safe manner. The instructions cover the contractor activities.

Personnel visiting the facility receive training as may be deemed appropriate to perform their respective task.

APPENDIX A

FACILITY CONTACTS

STATE AND GOVERNMENT AGENCY CONTACTS

LOCAL EMERGENCY GROUPS CONTACTS

CONTRACTOR CONTACTS

Facility Contact(s)

NAME	TITLE	TELEPHONE
David Brim	(Response Coordinator) Operations Manager	918.440.3074 Cell
Rusty Fink	Production Manager	918.440.6220 Cell
Will Whistler	Pumper	918.914.9652 Cell
Jim Virden	Senior Production Manager	918.857.7004 Cell
Glenn Security	(24-hour emergency contact)	918.337.0600 Cell

Contractor Contacts

CONTRACTOR	TELEPHONE
Sooner Emergency Services	918.583.2021
Roustabouts Services (Skips Oil Field Services)	918.287.1676
Dozer Service (Pawhuska Dozer)	918.287.2300
Tank Trucks (HS Field Services)	918.531.9121

Emergency Response Contacts

AGENCY CONTACT	TELEPHONE
Hospital: Jane Phillips Medical Center, 3500 E Frank Phillips Blvd Bartlesville, OK	918.333.7200
LEPC: Osage County	918.978.3524
Sheriff:	918.287.3535

Which spills are required to be reported?
Contact the LEPC in the event of a spill that threatens to result in an emergency condition.

Governmental Agency Contacts

AGENCY	TELEPHONE
National Response Center	**800.424.8802**
EPA Spill Hotline	**1-866-EPASPILL (866.372.7745)**
EPA Spill Prevention Team	**800.887.6063**
OKLAHOMA DEQ OFFICE	**800.832.8224**

Which spills are required to be reported?
For any discharge that reaches navigable waters or threatens to reach navigable waters, immediate notification must be made to the National Response Center Hotline above

For EPA, any spill or release of a "reportable quantity" of oil during a 24-hour period is required to be reported within 24 hours of the release. A reportable quantity of oil is about 1000 pounds or 125 gallons or 3 barrels

CONTACTS FOR OSAGE COUNTY
(Osage County spills only)

Bureau of Indian Affairs (BIA) **918.287.5721**
Mailing Address:
P.O. Box 1539
Pawhuska, OK 74056

Osage Tribe **918.287.5333**
Beverly LaCrone **918.287.5405**

Mailing address
100 W. Main St.
Pawhuska, OK 74056

Which spills are required to be reported?

In the event a spill leaves the containment contact the BIA
For any spill that warrants notifying the EPA contact the Osage Tribe

1.0 Oil Spill Contingency Plan

1.1 Introduction

This Oil Spill Contingency Plan (Contingency Plan) is prepared in accordance with 40 CFR 112.7(d) to address areas of the facility where secondary containment is impracticable, as documented in the facility Spill Prevention, Control, and Countermeasure (SPCC) Plan. This plan will develop various scenarios including worst-case scenarios and the responses to be taken under these scenarios.

1.2 Purpose and Scope

The purpose of this Contingency Plan is to define procedures and tactics for responding to discharges of oil into navigable waters or adjoining shorelines of the United States, originating more specifically from flowlines at Performance Operating LLC. The Contingency Plan is implemented whenever a discharge of oil has reached, or threatens, navigable waters or adjoining shorelines.

The objective of procedures described in this Contingency Plan is to protect the public, Performance Operating personnel, and other responders during oil discharges. In addition, the Plan is intended to minimize damage to the environment, natural resources, and facility installations from a discharge of oil. This Oil Spill Contingency Plan complements the prevention and control measures presented in the facility's SPCC Plan by addressing areas of the facility that have inadequate secondary containment and impacts that may result from a discharge from these areas. The company implements a detailed and stringent flowline maintenance program to prevent leaks from the primary system (in this case, piping). Areas lacking adequate containment at Performance Operating include the flowlines that run between the gas intake and the compressors and between the tank battery areas.

The facility diagrams indicating the location of the oil extraction, production, and storage areas are included in Appendix F for each facility.

Flowlines (which contain oil) at the facility lack adequate secondary containment and are therefore the subject of this contingency plan.

The focus of the Contingency Plan is on four key areas of oil spill response:

Prevention: Prevention is the most effective oil spill response strategy. The goal of the company is to prepare for an oil spill by planning for its prevention. While this plan does not specifically address prevention, Performance Operating intends to continue to investigate measures aimed at the prevention of a release of petroleum products such as safe product handling, improved vessel construction and preparedness.

Preparedness: Performance Operating will provide on-going specialized training to train its emergency response personnel to respond to emergency incidents in an effective and efficient manner. This Contingency Plan should ensure that personnel involved in emergency operations are aware of their roles and responsibilities, as well as the responsibilities of other governmental agencies and the responsible party in emergency operations.

Timely Response: This plan encourages efficient and coordinated response to oil spills among the various sites involved and coordination with contractors for spill response to minimize damage from a spill.

Restoration and Disposal: Performance Operating will use available technology to mitigate damages or restore damaged areas. In addition, Performance Operating will ensure that all recovered petroleum products and contaminated materials are disposed of according to applicable environmental regulations.

1.3 Resources at Risk

The water resources that are at risk are listed in section 1.6 in the individual plans for each facility in the SPCC plan. Sources at greatest risk due to proximity and volume will be spelled out on that page.

1.4 Response Strategy

Performance Operating personnel and contractors are equipped and trained to respond to certain "minor discharges" confined within the facility. Minor discharges can generally be described as those where the quantity of product discharged is small, the discharged material can be easily stopped and controlled, the discharge is localized, and the product is not likely to seep into groundwater or reach surface water or adjoining shorelines. Procedures for responding to these minor discharges are covered in the SPCC Plan.

This Contingency Plan addresses all discharge incidents, including those that affect navigable waters or during which the oil cannot be safely controlled by facility personnel and confined within the boundaries of the facility. Response to such incidents may necessitate the assistance of outside contractors or other responders to prevent imminent impact to navigable waters.

2.0 Spill Discovery and Response

2.1 Distribution of Responsibilities

The Response Coordinator (RC) has the primary responsibility for providing the initial response to oil discharge incidents originating from each facility. To accomplish this, the Field Operations Manager is designated as the qualified oil discharge RC in the event of an oil discharge.

40 CFR 109.5(b)(2) The RC has the authority to commit the necessary services and equipment to respond to the discharge and to request assistance from fire and/or police departments, contractors, or other responders, as appropriate.

The RC will direct notifications and initial response actions in accordance with training and capabilities. In the event of a fire or emergency situation that threatens the health and safety of those present at the site, the RC will direct evacuations and contact the fire and police departments.

In the event of an emergency involving outside response agencies, the RC's primary responsibility is to provide information regarding the characteristics of the materials and equipment involved and to provide access to resources as requested. The RC shall also take necessary measures to control the flow of people, emergency equipment, and supplies and obtain the support of the Police Department or Sheriffs Department as needed to maintain control of the site. These controls may be necessary to minimize injuries and confusion.

Finally, the RC serves as the coordinator for radio communications by acquiring all essential information and ensuring clear communication of information to emergency response personnel. The RC has access to reference material at the field office either as printed material or on computer files that can further assist the response activities.

Whenever circumstances permit, the RC transmits assessments and recommendations to Senior Management for direction. Phone numbers are located in Appendix A of the SPCC plan.

In the event that the Field Operations Manager is not available, the responsibility and authority for initiating a response to a discharge rests with the most senior employee on site at the time the discharge is discovered or with the contractor Field Supervisor (or next person in command) if contractor personnel are the only personnel on site.

2.2 Response Activities

In the event of a discharge, the first priority is to stop the product flow and to shut off all ignition sources, followed by the containment, control, and mitigation of the

discharge. This Contingency Plan breaks out actions to be performed to respond to an oil discharge into different phases, described in greater detail in the checklists below.

2.2.1 Discharge Discovery and Source Control

Minor Discharge. A minor discharge (i.e., small volume leak from flowlines or other equipment) should be discovered by facility personnel or by contractor personnel during scheduled daily or monthly visits to the facility. Aboveground flowlines to be visually inspected formally once a month during the normal inspection rounds.

Major Discharge. A more severe and sudden discharge will trigger the automatic shut down of the pumping units and will affect production if at a compressor station. If the site is a storage tank site, a major discharge would be controlled in the containment. The impact should be detected during the daily visit to the area by employees or contractor field personnel. The maximum amount of time until a major discharge is detected can be up to 24 hours.

Notifications to the National Response Center, Oklahoma authorities and LEPC must occur immediately upon discovery of reportable discharges. Immediately report the discharge to the RC, providing the following information:

- Exact location;
- Material involved;
- Quantity involved;
- Circumstances that may hinder response
- Topographic and environmental conditions;
- Injuries, if any.

Discharge Discovery and Source Control Actions

Turn off all sources of ignition.
Turn off lift pumps that charge or provide flow to the flowline.
Locate the flowline break.
If safe to do so, isolate the affected section of piping by closing off the closest valves upstream and downstream from the break.

2.2.2 Assessment and Notification

- Investigate the discharge to assess the actual or potential threat to human health or the environment:
- Location of the discharge relative to receiving water bodies;
- Request outside assistance from local emergency responders, as needed.
- Evaluate the need to evacuate facility and evacuate employees, as needed.

- Notify the local fire/police departments and Local Emergency Planning Committee (LEPC) to assess whether community evacuation is needed.
- Communicate with neighboring property owners regarding the discharge and actions taken to mitigate the damage.
- If the oil reaches (or threatens to reach) the navigable waters, notify the local fire/police departments and LEPC to limit access to the water by local residents until the oil has been contained and recovered.
- Additionally, notify downstream water users of the spill and of actions that will be taken to protect these downstream receptors.

2.2.3 Control and Recovery

Clean-up actions must begin as soon as possible to minimize the effect on natural and economic resources. These actions may include locating the source of the discharge and preventing any further spillage, placement of containment boom to control the spread of oil and to protect sensitive areas, measuring and sampling, physical removal of the oil from water and land, the use of chemicals to disperse the oil. The official coordinating response to the spill must address many questions, including:

- Has the oil reached water?
- How large an area will the spill cover?
- How thick will the slick be?
- How fast and in what direction will the slick drift?
- What will happen to the oil if it is not removed?
- What is the value and sensitivity of the resources at risk?

The answers to the questions will determine what response actions are taken.

All effort will be made to prevent oil from reaching water.

2.2.4 Disposal of Recovered Product and Contaminated Response Material

The RC ensures that all contaminated materials classified as hazardous waste are disposed of in accordance with all applicable solid and hazardous waste regulations.

2.2.5 Termination

The RC ensures that cleanup has been completed and that the contaminated area has been treated or mitigated according to the applicable regulations and state/federal cleanup action levels. The RC collaborates with the local, state and federal authorities regarding the assessment of damages.

2.3 Discharge Notification

Instructions and phone numbers for required reporting of a discharge to the National Response Center and other federal, state, and local authorities are provided in Appendix A to the SPCC Plan. *Any discharge (i.e., oil sheen or sludge) to navigable water must be reported promptly on discovery to the National Response Center.* The Response Coordinator must ensure that details of the discharge are recorded on the Discharge Record provided in Appendix B.

If the discharge qualifies under 40 CFR part 112 (see Appendix A for conditions), the RC is responsible for ensuring that all pertinent information is provided to the EPA Regional Administrator.

3.0 Response Resources and Preparedness Activities

3.1 Equipment, Supplies, Services, and Manpower

Spill kits are provided in field offices that are accessible by both Performance Operating LLC employees and contract personnel and contract personnel may furnish additional spill materials, as necessary.

This material should be sufficient to respond to most minor discharges occurring at any facility and to initially contain a major discharge while waiting for additional material or support from outside contractors. The inventory is to be verified on a monthly basis during the scheduled facility inspection by designated personnel and should be replenished as needed.

Performance Operating has employees trained and available to respond to an oil discharge. Performance Operating personnel may be assisted by employees from the available contractors, as necessary. These "responders" are familiar with the facility layout, location of spill response equipment and staging areas, response strategies, and with the SPCC and Oil Spill Contingency Plans for Performance Operating facilities. Those engaged in physical contact with spilled material will have received training in the deployment of response material and handling of hazardous waste (HAZWOPER).

To respond to larger discharges and ensure the removal and disposal of cleanup debris, Performance Operating has established agreements with specialized cleanup contractors. These contractors are listed in the SPCC plan. Contact information is provided in Appendix B. These contractors have immediate access to an assortment of equipment and materials, including mechanical recovery equipment for use on water and on land, small boats, floating booms, and large waste containers. Each contractor has sufficient response equipment to contain and recover the maximum possible discharge of oil. These contractors are able to respond *within 4 hours* of receiving a verbal request from the RC. Performance Operating discusses response capacity needs on an annual basis with each contractor to ensure that sufficient equipment and material are available to respond to a potential discharge. The inventories of the contractor's equipment are maintained with the response agreements and updated annually.

3.2 Access to Receiving Water Bodies

Water bodies affected by a spill are listed in each facility plan. The response strategy consists of: (1) deploying booms and other response equipment at various points downstream from the oil plume to prevent its migration; and (2) deploying booms as a protective measure for an irrigation water intake and other downstream sensitive receptors.

Vehicular access to the receiving stream is essential to ensure that the response equipment can be effectively deployed to contain oil at various points along the waterway and prevent further migration of the oil towards the receiving stream.

Response personnel are familiar with appropriate access points and prepare to make any entrance necessary to contain a spill.

3.3 Communication and Controls

A central coordination center will be set up at the field office in the event of a discharge. The field office is equipped with a variety of fixed and mobile communication equipment (telephone, fax, cell phones, two-way radios, and computers) to ensure continuous communication with management, responders, authorities, and other interested parties.

Communications equipment includes:

- **Cell phones.** Each field vehicle and the RC are provided with a cell phone. The RC and/or his alternate (Site Supervisor when the Field Operations Manager is not "on call") can be reached by cell phone 7 days a week, 24 hours a day. Cell phones will be the primary mode of communication.

- **Additional equipment.** Additional equipment will be obtained from contractors in the event that more communications equipment is necessary.

The RC is responsible for communicating the status of the response operations and for sharing relevant information with involved parties, including local, state, and federal authorities.

In the event that local response agencies, Oklahoma authorities, or a federal On Site Coordinator (OSC) assumes Incident Command, the RC will function as the facility representative in the Unified Command structure.

3.4 Training Exercises and Updating Procedures

Performance Operating has established and maintains an ongoing training program to ensure that personnel responding to oil discharges are properly trained and that all necessary equipment is available to them. The program includes on-the-job training on the proper deployment of response equipment and periodic practice drills during which Performance Operating personnel are asked to deploy equipment, table top discussions, and material in response to a simulated discharge. It also includes Occupational Safety and Health Act Safety and training requirements. The RC is responsible for implementing and evaluating employee preparedness training.

Following a response to an oil discharge, the RC will evaluate the actions taken and identify procedural areas where improvements are needed. The RC will

conduct a briefing with field personnel, contractors, and local emergency responders to discuss lessons learned and will integrate the outcome of the discussion in subsequent SPCC briefings and employee training seminars. As necessary, the RC will amend this Contingency Plan or the SPCC Plan to reflect changes made to the facility equipment and procedures. A Professional Engineer will certify any technical amendment to the SPCC Plan.

ALEE TANK BATTERY

Professional Engineer Certification
40 CFR 112.3(d)

The undersigned Registered Professional Engineer is familiar with the requirements of Part 112 and has visited and examined the facility, or has supervised examination of the facility by appropriately qualified personnel. The undersigned Registered Professional Engineer attests that this Spill Prevention, Control, and Countermeasure Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and the requirement of 40 CFR Part 112; that procedures for required inspections and testing have been established; and that this Plan is adequate for the facility (112.3(d)).

Ronald F. Sober, P.E.
Printed Name of Registered Professional Engineer
Registration No.: 17765 State: OK

DATE 5/1/14

PART I – GENERAL FACILITY INFORMATION
40 CFR 112.7(a)(3)

1.1 Company Information

Name of facility:	Alee Tank Battery
Location:	The coordinates for this facility are Latitude 36° 42' 36.2633" N and Longitude 96° 06' 28.1062" W.
Location of SPCC:	At the corporate and field offices.
Type of facility:	Onshore Gas Production, Storage and transfer facility consisting of one (1) 200 bbl. fiberglass storage tank for wastewater and two (2) 200 barrel fiberglass storage tanks for oil and one (1) 100 barrel steel horizontal separator.
Original Date of Plan:	New facility October, 2013
Owner or operator:	Performance Operating LLC PO BOX 628 Barnsdall, OK 74002

Alee Tank Battery

Transfer Activities

This facility is an onshore oil and gas exploration and production facility that stores oil and produced water from various production facilities in the area. Produced water is stored in the on site storage tanks and periodically hauled offsite for disposal. At the same time, any accumulated rainwater in the secondary containment area or sumps is removed.

Proximity to Navigable Waters

The facility is located in sparsely wooded area. The nearest water ways are 2000 ft NW to an intermittent stream Sand Creek then 3000 ft. SE to Little Rock Creek.

Bulk Storage Container Overflow Prevention (40 CFR 112.9(c)(4))

The tank battery is designed with a fail-safe system to prevent discharge as follows:

The capacity of the produced water and oil storage tanks are sufficient to ensure that storage is adequate even in the event where facility personnel are unable to perform the daily visit to unload the tanks or the pumper is delayed in stopping production.

Containment was calculated to be able to hold the largest tank plus sufficient size to hold a 25 year rainfall event.

Alee Tank Battery

PART III. SPILL PREVENTION, CONTROL AND COUNTERMEASURE PROVISIONS 40 CFR 112.7 and 112.9

3.1 Potential Discharge Volume, Direction of Flow (40 CFR 112.7(b)) and Containment (40 CFR 112.7(a)(3)(iii))

All sources with a reasonable potential for equipment failure that would result in a release of oil are listed below along with an estimate of the amount of spill, the direction of a spill, and the location of drains, and secondary containment. The rate of flow will depend upon the size and location of the source. At this facility surface flow would be towards the west end of the property. See the facility description for the nearest waterway.

SOURCE AND MATERIAL	MAJOR TYPE OF FAILURE	TOTAL QUANTITY (GALS)	RATE (GALS /HR)	DIRECTION OF FLOW	SECONDARY CONTAINMENT TYPE	SECONDARY CONTAINMENT VOLUME (GALS)
Oil TANK (Tank 1)	RUPTURE, LEAKAGE	8,459	8,459	Northwest	Earthen DIKE	27,239
Oil TANK (Tank 2)	RUPTURE, LEAKAGE	8,459	8,459	Northwest	Earthen DIKE	27,239
Wastewater TANK (Tank 3)	RUPTURE, LEAKAGE	8,459	8,459	Northwest	Earthen DIKE	27,239
Horizontal Separator (Tank 4)	RUPTURE, LEAKAGE	4,229	4,229	Northwest	Earthen DIKE	27,239

SPCC Secondary Containment Calcuations
Alee Tanks Battery
Performance Operating, LLC

		Length	Width	Height	Dike area	
Secondary Containment area	A1, toe	93	39	0.7	3,627.00	ft^2
	A2, ridge	109	51		5,559.00	ft^2

Tanks within Secondary Containment for displacement calculation		BBL	Dia	Ht	ft^2	ft^3	Gallons
	1	200	12	10	113.10	1,130.97	8,459.04
	2	200	12	10	113.10	1,130.97	8,459.04
	3	200	12	10	113.10	1,130.97	8,459.04
	4	100	6	20	28.27	565.49	4,229.52
	5				0.00	0.00	0.00
	6				0.00	0.00	0.00
	7				0.00	0.00	0.00
		Sum of tank area footprint =			367.57	ft^2	

Largest Tanks, bbl = 200 bbl; 8,400.00 gallons; 1123.08 ft^3 max; 113.10 ft^2 max

Volume calc =(A1+A2+(sqrt A1*A2))*H/3 A1 = Base area A2 = Top area (formula for pyrmidal frustum)

Potential Containment Volume =	23,867.83 gallons	3,191.13 ft^3	568.28 barrels
Potential Containment Volume with Sump =	29,084.73 gallons	3,888.63 ft^3	692.49 barrels

Evaluation of Secondary Containment	gallons	barrels	ft^3	
Potential containment volume	29,084.73	692.49	3,888.6	
Tank displacement volume	1,845.26	43.93	246.7	(sum of displacement minus largest tank)
Actual containment volume	27,239.47	648.56	3,641.9	(including sump)
Rainfall (precip)	3,011.13	71.69	402.6	
Required volume (largest tank + precip)	11,411.13	271.69	1,525.7	

Conclusion - Secondary containment is: Adequate for SPCC -2116.25 ft^3 needed

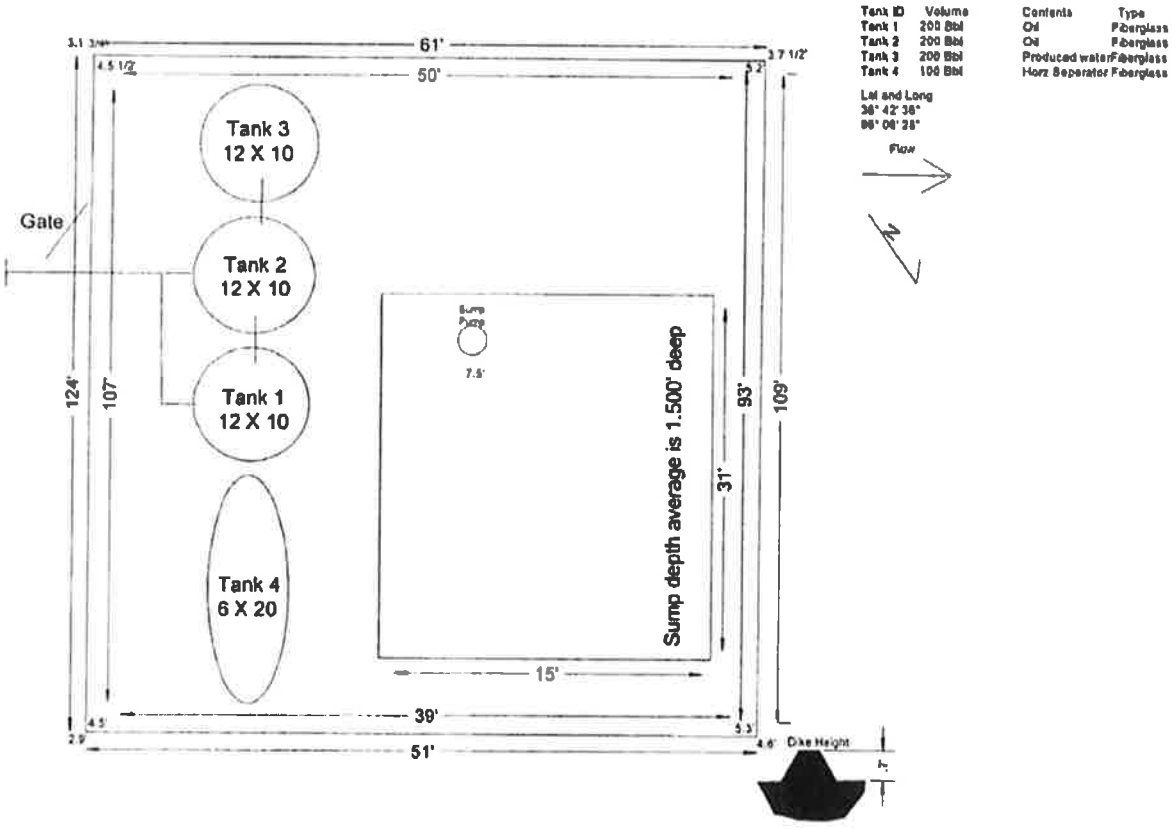
Reference:
24hr, 25yr Rainfall Event = 6.5 in; 0.542 ft

Sump Capacity			Volume	
Length	Width	Depth	ft^3	gallons
31	15	1.5	697.5	5,216.9

Contants

pi =	3.1416
Gallons/Ft^3 =	7.48
Data Entry Field =	

PERFORMANCE OPERATING LLC
Alee Tank Battery
NOT TO SCALE



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EAST HUGHES TANK BATTERY

Professional Engineer Certification
40 CFR 112.3(d)

The undersigned Registered Professional Engineer is familiar with the requirements of Part 112 and has visited and examined the facility, or has supervised examination of the facility by appropriately qualified personnel. The undersigned Registered Professional Engineer attests that this Spill Prevention, Control, and Countermeasure Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and the requirement of 40 CFR Part 112; that procedures for required inspections and testing have been established; and that this Plan is adequate for the facility (112.3(d)).

Ronald F. Sober, P.E.
Printed Name of Registered Professional Engineer
Registration No.: 17765 State: OK

DATE 5/1/14

PART I – GENERAL FACILITY INFORMATION
40 CFR 112.7(a)(3)

1.1 Company Information

Name of facility:	Hughes East Tank Battery
Location:	At corner of Hwy 123 and county road 2075 Fitzpatrick site on left. The coordinates for this facility are Latitude 36° 39' 50.9173" N and Longitude 96° 01' 37.3467" W.
Location of SPCC:	At the corporate and field offices.
Type of facility:	Onshore Gas Production, Storage and transfer facility consisting of one (1) 200 bbl. fiberglass storage tank for wastewater and two (2) 200 barrel steel storage tanks for oil and one (1) 52 barrel steel vertical separator.
Original Date of Plan:	New facility October, 2013
Owner or operator:	Performance Operating LLC PO BOX 628 Barnsdall, OK 74002

Hughes East Tank Battery

Transfer Activities

This facility is an onshore oil and gas exploration and production facility that stores oil and produced water from various production facilities in the area. Produced water is stored in the on site storage tanks and periodically hauled offsite for disposal. At the same time, any accumulated rainwater in the secondary containment area or sumps is removed.

Proximity to Navigable Waters

The facility is located in prairie area. The nearest water way is 2,750 ft. SW to intermittent stream, Candy Creek.

Bulk Storage Container Overflow Prevention (40 CFR 112.9(c)(4))

The tank battery is designed with a fail-safe system to prevent discharge as follows:

The capacity of the produced water and oil storage tanks are sufficient to ensure that storage is adequate even in the event where facility personnel are unable to perform the daily visit to unload the tanks or the pumper is delayed in stopping production.

Containment was calculated to be able to hold the largest tank plus sufficient size to hold a 25 year rainfall event.

Hughes East Tank Battery

PART III. SPILL PREVENTION, CONTROL AND COUNTERMEASURE PROVISIONS 40 CFR 112.7 and 112.9

3.1 Potential Discharge Volume, Direction of Flow (40 CFR 112.7(b)) and Containment (40 CFR 112.7(a)(3)(iii))

All sources with a reasonable potential for equipment failure that would result in a release of oil are listed below along with an estimate of the amount of spill, the direction of a spill, and the location of drains, and secondary containment. The rate of flow will depend upon the size and location of the source. At this facility surface flow would be towards the west end of the property. See the facility description for the nearest waterway.

SOURCE AND MATERIAL	MAJOR TYPE OF FAILURE	TOTAL QUANTITY (GALS)	RATE (GALS /HR)	DIRECTION OF FLOW	SECONDARY CONTAINMENT TYPE	SECONDARY CONTAINMENT VOLUME (GALS)
Oil TANK (Tank 1)	RUPTURE, LEAKAGE	8,459	8,459	Northeast	Earthen DIKE	55,654
Oil TANK (Tank 2)	RUPTURE, LEAKAGE	8,459	8,459	Northeast	Earthen DIKE	55,654
Wastewater TANK (Tank 3)	RUPTURE, LEAKAGE	8,459	8,459	Northeast	Earthen DIKE	55,654
Vertical Separator (Tank 4)	RUPTURE, LEAKAGE	2,202	2,202	Northeast	Earthen DIKE	55,654

SPCC Secondary Containment Calcuations
Hughes East Tanks Battery
Performance Operating, LLC

Secondary Containment area		Length	Width	Height	Dike area	
	A1, toe	79	70.9	1	5,601.10	ft^2
	A2, ridge	90	81		7,290.00	ft^2

Tanks within Secondary Containment for displacement calculation		BBL	Dia	Ht	ft^2	ft^3	Gallons
	1	200	12	10	113.10	1,130.97	8,459.04
	2	200	12	10	113.10	1,130.97	8,459.04
	3	200	12	10	113.10	1,130.97	8,459.04
	4	52	5	15	19.63	294.52	2,202.87
	5				0.00	0.00	0.00
	6				0.00	0.00	0.00
	7				0.00	0.00	0.00
		Sum of tank area footprint =			358.93	ft^2	

Largest Tanks, bbl = 200 bbl | 8,400.00 gallons | 1123.08 ft^3 max | 113.10 ft^2 max

Volume calc =(A1+A2+(sqrt A1*A2))*H/3 A1 = Base area A2 = Top area (formula for pyrmidal frustum)

Potential Containment Volume =	48,070.54 gallons	6,427.03 ft^3	1144.54 barrels
Potential Containment Volume with Sump =	58,226.11 gallons	7,784.83 ft^3	1386.34 barrels

Evaluation of Secondary Containment	gallons	barrels	ft^3	
Potential containment volume	58,226.11	1386.34	7,784.8	
Tank displacement volume	2,571.47	61.23	343.8	(sum of displacement minus largest tank)
Actual containment volume	55,654.64	1325.11	7,441.0	(including sump)
Rainfall (precip)	3,948.75	94.02	527.9	
Required volume (largest tank + precip)	12,348.75	294.02	1,651.0	

Conclusion - Secondary containment is Adequate for SPCC -5790.00 ft^3 needed

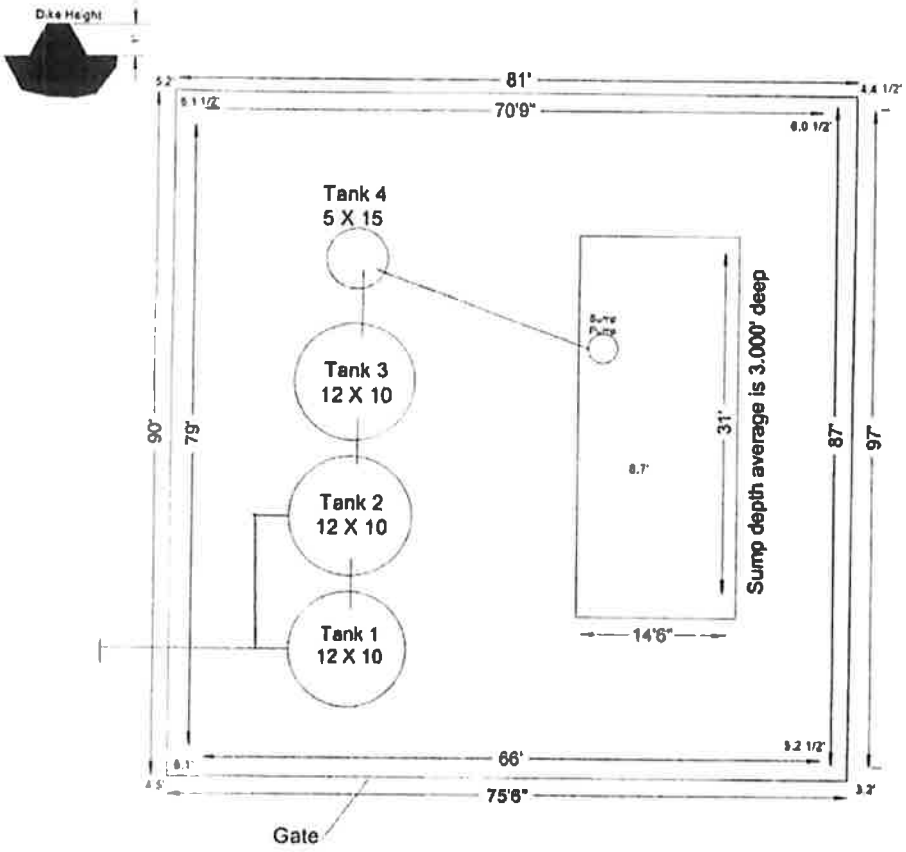
Reference:
24hr, 25yr Rainfall Event = 6.5 in | 0.542 ft

Sump Capacity			Volume	
Length	Width	Depth	ft^3	gallons
31	14.6	3	1,357.8	10,155.6

Contants

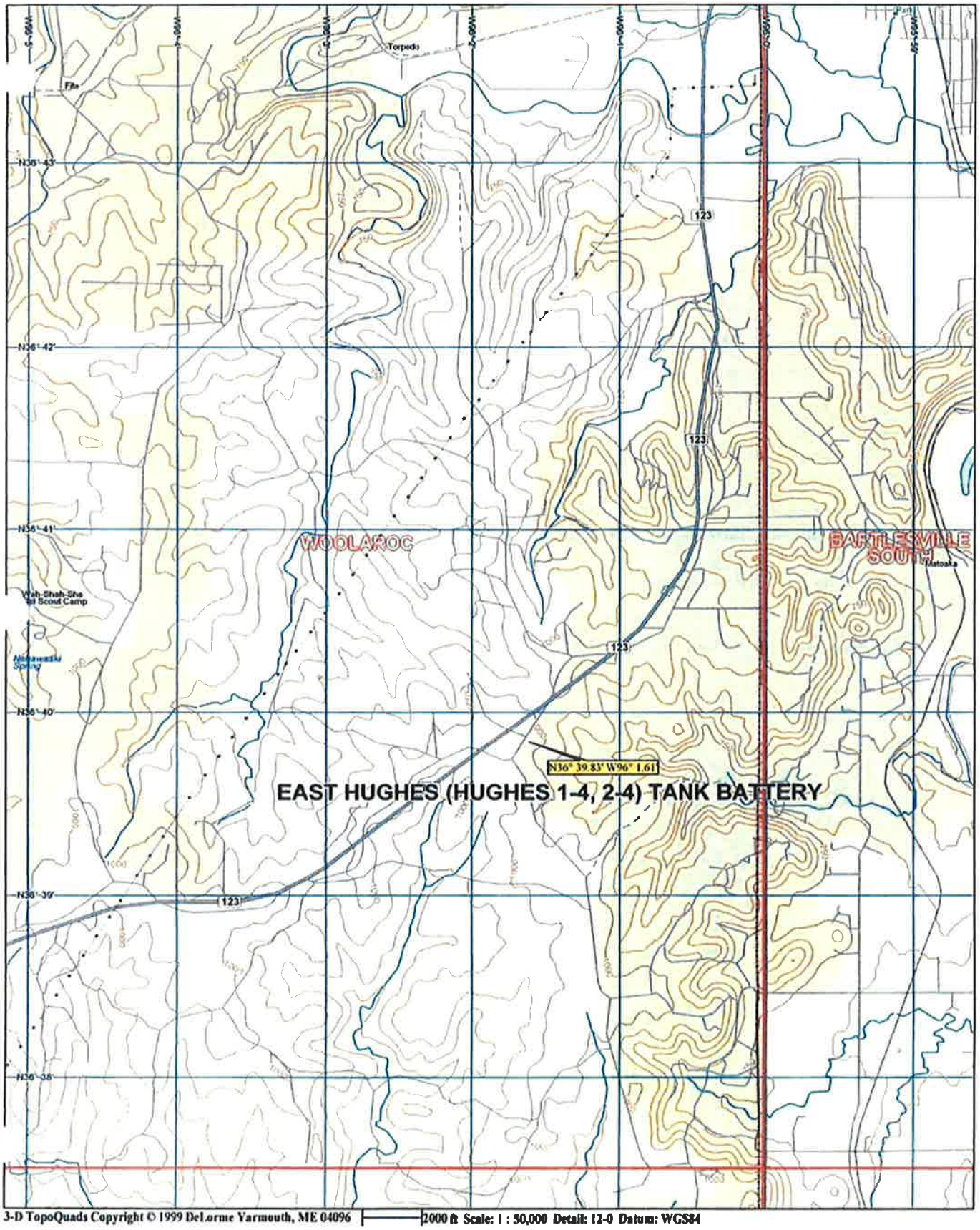
pi =	3.1416
Gallons/Ft^3 =	7.48
Data Entry Field =	

PERFORMANCE OPERATING LLC
Hughes East Tank Battery
NOT TO SCALE



Tank ID	Volume	Contents	Type
Tank 1	200 Bbl	Oil	Steel
Tank 2	200 Bbl	Oil	Steel
Tank 3	200 Bbl	Produced water	Fiberglass
Tank 4	52 Bbl	Vert Seperator	Steel

Lat and Long
36° 39' 50"
96° 01' 37"



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ROYAL TANK BATTERY

Professional Engineer Certification
40 CFR 112.3(d)

The undersigned Registered Professional Engineer is familiar with the requirements of Part 112 and has visited and examined the facility, or has supervised examination of the facility by appropriately qualified personnel. The undersigned Registered Professional Engineer attests that this Spill Prevention, Control, and Countermeasure Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and the requirement of 40 CFR Part 112; that procedures for required inspections and testing have been established; and that this Plan is adequate for the facility (112.3(d)).

Ronald F. Sober, P.E.
Printed Name of Registered Professional Engineer
Registration No.: 17765 State: OK

DATE: 5/1/14

PART I – GENERAL FACILITY INFORMATION
40 CFR 112.7(a)(3)

1.1 Company Information

Name of facility:	Fitz-Royal Tank Battery
Location:	at corner of Hwy 123 and county road 2075 Fitzpatrick site on left. The coordinates for this facility are Latitude 36° 39' 54.7423" N and Longitude 96° 01' 46.5893" W.
Location of SPCC:	At the corporate and field offices.
Type of facility:	Onshore Gas Production, Storage and transfer facility consisting of one (1) 111 bbl. fiberglass storage tank for wastewater and three (3) 111 barrel fiberglass storage tanks for oil and one (1) 33 barrel steel vertical separator.
Original Date of Plan:	New facility October, 2013
Owner or operator:	Performance Operating LLC PO BOX 628 Barnsdall, OK 74002

Fitz-Royal Tank Battery

Transfer Activities

This facility is an onshore oil and gas exploration and production facility that stores oil and produced water from various production facilities in the area. Produced water is stored in the on site storage tanks and periodically hauled offsite for disposal. At the same time, any accumulated rainwater in the secondary containment area or sumps is removed.

Proximity to Navigable Waters

The facility is located in prairie area. The nearest water way is 2,250 ft. SW to intermittent stream.

Bulk Storage Container Overflow Prevention (40 CFR 112.9(c)(4))

The tank battery is designed with a fail-safe system to prevent discharge as follows:

The capacity of the produced water and oil storage tanks are sufficient to ensure that storage is adequate even in the event where facility personnel are unable to perform the daily visit to unload the tanks or the pumper is delayed in stopping production.

Containment was calculated to be able to hold the largest tank plus sufficient size to hold a 25 year rainfall event.

Fitz-Royal Tank Battery

PART III. SPILL PREVENTION, CONTROL AND COUNTERMEASURE PROVISIONS 40 CFR 112.7 and 112.9

3.1 Potential Discharge Volume, Direction of Flow (40 CFR 112.7(b)) and Containment (40 CFR 112.7(a)(3)(iii))

All sources with a reasonable potential for equipment failure that would result in a release of oil are listed below along with an estimate of the amount of spill, the direction of a spill, and the location of drains, and secondary containment. The rate of flow will depend upon the size and location of the source. At this facility surface flow would be towards the west end of the property. See the facility description for the nearest waterway.

SOURCE AND MATERIAL	MAJOR TYPE OF FAILURE	TOTAL QUANTITY (GALS)	RATE (GALS /HR)	DIRECTION OF FLOW	SECONDARY CONTAINMENT TYPE	SECONDARY CONTAINMENT VOLUME (GALS)
Oil TANK (Tank 1)	RUPTURE, LEAKAGE	4,699	4,699	North	Earthen DIKE	35,017
Oil TANK (Tank 2)	RUPTURE, LEAKAGE	4,699	4,699	North	Earthen DIKE	35,017
Oil TANK (Tank 3)	RUPTURE, LEAKAGE	4,699	4,699	North	Earthen DIKE	35,017
Vertical Seperator (Tank 4)	RUPTURE, LEAKAGE	1,409	1,409	North	Earthen DIKE	35,017
Wastewater TANK (Tank 5)	RUPTURE, LEAKAGE	4,699	4,699	North	Earthen DIKE	35,017

SPCC Secondary Containment Calculations
Fitz - Royal Tanks Battery
Performance Operating, LLC

Secondary Containment area		Length	Width	Height	Dike area	
	A1, toe	67	65	1	3,685.00	ft^2
	A2, ridge	79	85		5,135.00	ft^2

Tanks within Secondary Containment for displacement calculation		BBL	Dia	Ht	ft^2	ft^3	Gallons
	1	111	10	8	78.54	628.32	4,699.47
	2	111	10	8	78.54	628.32	4,699.47
	3	111	10	8	78.54	628.32	4,699.47
	4	33	4	15	12.57	188.50	1,409.84
	5	111	10	8	78.54	628.32	4,699.47
	6				0.00	0.00	0.00
	7				0.00	0.00	0.00
			Sum of tank area footprint =		326.75	ft^2	

Largest Tanks, bbl = 111 bbl; 4,662.00 gallons; 628.3084 ft^3 max; 78.54 ft^2 max

Volume calc =(A1+A2+(sqrt A1*A2))*Ht/3 A1 = Base area A2 = Top area (formula for pyrmidal frustum)

Potential Containment Volume =	32,834.70	gallons	4,390.00	ft^3	781.78 barrels
Potential Containment Volume with Sump =	37,382.19	gallons	4,998.00	ft^3	890.05 barrels

Evaluation of Secondary Containment	gallons	barrels	ft^3	
Potential containment volume	37,382.19	890.05	4,998.0	
Tank displacement volume	2,365.18	56.31	316.2	(sum of displacement minus largest tank)
Actual containment volume	35,017.01	833.74	4,681.8	(including sump)
Rainfall (precip)	2,781.46	66.23	371.9	
Required volume (largest tank + precip)	7,443.46	177.23	995.2	

Conclusion - Secondary containment is Adequate for SPCC -3686.58 ft^3 needed

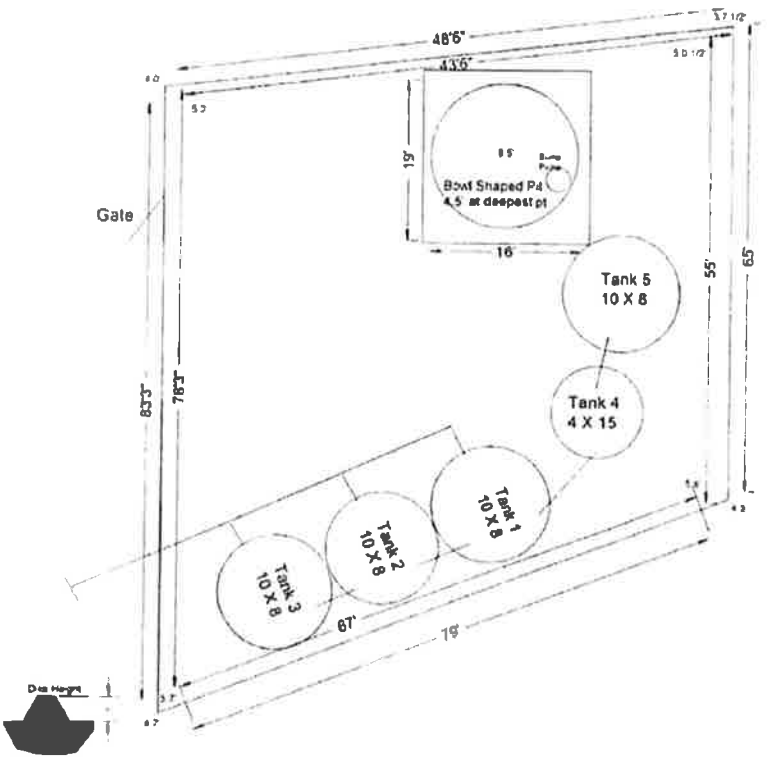
Reference:
24hr, 25yr Rainfall Event = 6.5 in; 0.542 ft

Sump Capacity			Volume	
Length	Width	Depth	ft^3	gallons
19	16	2	608.0	4,547.5

Contants

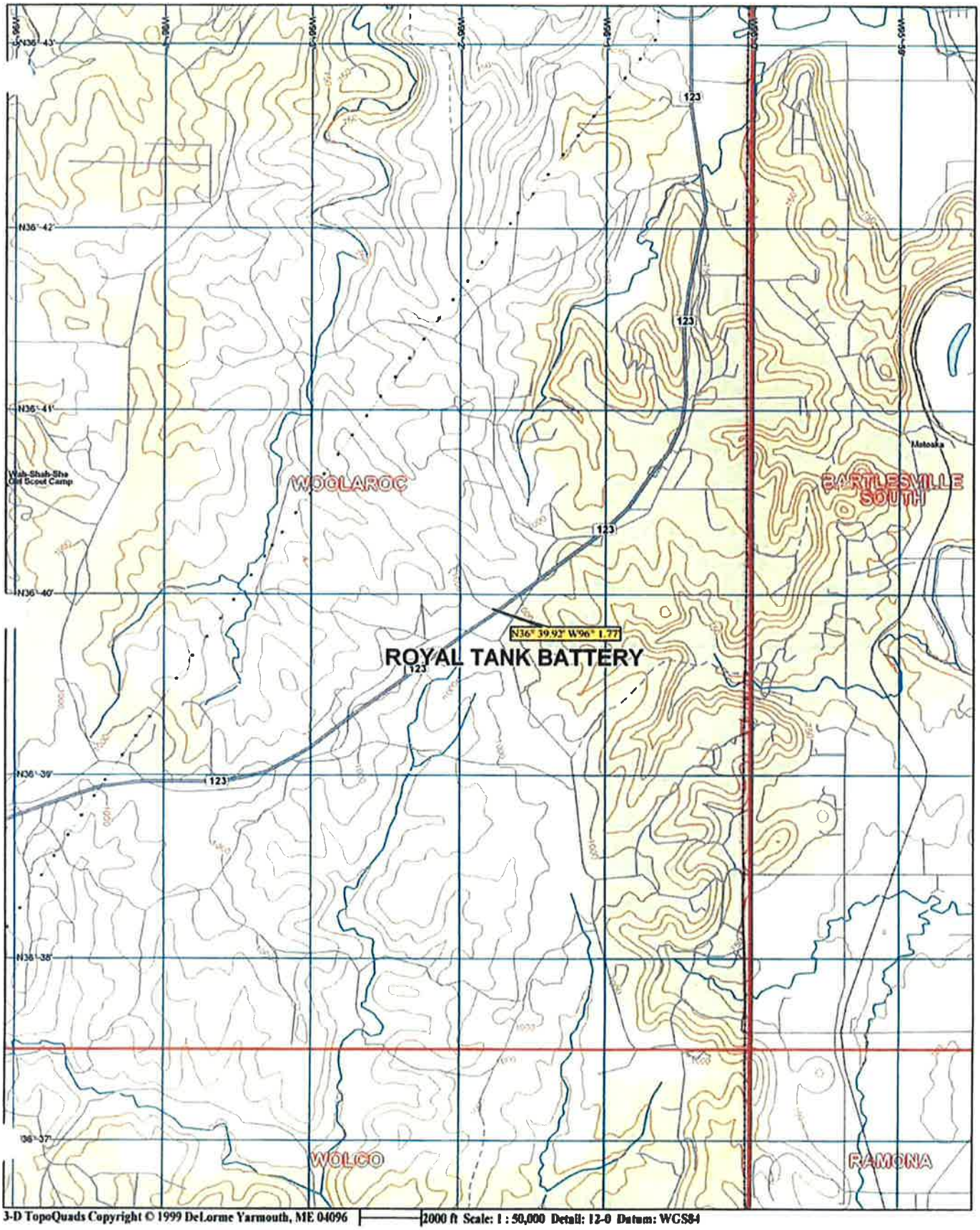
pi =	3.1416
Gallons/ft^3 =	7.48
Data Entry Field =	

PERFORMANCE OPERATING LLC
Fitzpatrick Royal Tank Battery
NOT TO SCALE



Tank ID	Volume	Contents	Type
Tank 1	111 Bbl	Oil	Fiberglass
Tank 2	111 Bbl	Oil	Fiberglass
Tank 3	111 Bbl	Oil	Fiberglass
Tank 4	33 Bbl	Vent Gas	Steel
Tank 5	111 Bbl	Produced water	Fiberglass

Lat and Long
36° 38' 54" N
96° 01' 46" W



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2000 ft Scale: 1 : 50,000 Detail: 12-0 Datum: WGS84

COTTONMOUTH TANK BATTERY

Professional Engineer Certification
40 CFR 112.3(d)

The undersigned Registered Professional Engineer is familiar with the requirements of Part 112 and has visited and examined the facility, or has supervised examination of the facility by appropriately qualified personnel. The undersigned Registered Professional Engineer attests that this Spill Prevention, Control, and Countermeasure Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and the requirement of 40 CFR Part 112; that procedures for required inspections and testing have been established; and that this Plan is adequate for the facility (112.3(d)).

Ronald F. Sober, P.E.
Printed Name of Registered Professional Engineer
Registration No.: 17765 State: OK

DATE 5/1/14

PART I – GENERAL FACILITY INFORMATION
40 CFR 112.7(a)(3)

1.1 Company Information

Name of facility:	Cottonmouth Tank Battery
Location:	From the junction of OK Highways 99 and 11, drive north 1.05 miles. Turn left (W) drive 1.5 miles, turn left (S) onto CR 5800 drive south 1 mile to CR5015. Continue south 0.17 miles on lease road to site. The coordinates for this facility are Latitude 36.589876° N and Longitude 96.330651° W.
Location of SPCC:	At the office of Performance Operating Offices, Barnsdall, OK
Type of facility:	Onshore Gas Production, Storage and transfer facility consisting of two (2) 200 bbl. Fiberglass storage tanks for oil and one (1) 110 bbl fiberglass storage tank for wastewater and a 75 bbl Fiberglass separator.
Original Date of Plan:	NA
Owner or operator:	Performance Operating Company, LLC 3993 Oklahoma 123 Barnsdall, OK 74002

Cottonmouth Tank Battery

Transfer Activities

This facility is an onshore oil and gas exploration and production facility that stores oil and produced water from various production facilities in the area. Produced water is stored in the on site storage tanks and sent offsite to a disposal well for disposal. As the sites are observed, any accumulated rainwater in the secondary containment area or sumps is pumped to the disposal well.

Proximity to Navigable Waters

The facility is located in a wooded area. The nearest water way is 716 ft east to a tributary to Birch Creek.

Bulk Storage Container Overflow Prevention (40 CFR 112.9(c)(4))

The tank battery is designed with a fail-safe system to prevent discharge as follows:

The capacity of the produced water and oil storage tanks are sufficient to ensure that storage is adequate even in the event where facility personnel are unable to perform the daily visit to unload the tanks or the pumper is delayed in stopping production.

Containment was calculated to be able to hold the largest tank plus sufficient size to hold a 25 year rainfall event.

Cottonmouth Tank Battery

PART III. SPILL PREVENTION, CONTROL AND COUNTERMEASURE PROVISIONS 40 CFR 112.7 and 112.9

3.1 Potential Discharge Volume, Direction of Flow (40 CFR 112.7(b)) and Containment (40 CFR 112.7(a)(3)(iii))

All sources with a reasonable potential for equipment failure that would result in a release of oil are listed below along with an estimate of the amount of spill, the direction of a spill, and the location of drains, and secondary containment. The rate of flow will depend upon the size and location of the source. At this facility surface flow would be towards the north or northeast end of the property. See the facility description for the nearest waterway.

SOURCE AND MATERIAL	MAJOR TYPE OF FAILURE	TOTAL QUANTITY (GALS)	RATE (GALS /HR)	DIRECTION OF FLOW	SECONDARY CONTAINMENT TYPE	SECONDARY CONTAINMENT VOLUME (GALS)
Separator TANK (Tank 1)	RUPTURE, LEAKAGE	3,172	3,172	North/northeast	Earthen DIKE	24,425
Water TANK (Tank 2)	RUPTURE, LEAKAGE	4620	4620	North/northeast	Earthen DIKE	24,425
Oil TANK (Tank 3)	RUPTURE, LEAKAGE	8,400	8,400	North/northeast	Earthen DIKE	24,425
Oil TANK (Tank 4)	RUPTURE, LEAKAGE	8,400	8,400	North/northeast	Earthen DIKE	24,425

SPCC Secondary Containment Calcuations
Cottonmouth Tank Battery
Performance Operating, LLC

		Length	Width	Height	Dike area	
Secondary Containment area	A1, toe	63	29	1	1,827.00	ft^2
	A2, ridge	73	39		2,847.00	ft^2

Tanks within Secondary Containment for displacement calculation		BBL	Dia	Ht	ft^2	ft^3	Gallons
	1	200	12	10	113.10	1,130.97	8,459.04
	2	200	12	10	113.10	1,130.97	8,459.04
	3	111.892	10	8	78.54	628.32	4,699.47
	4	75.5271	6	15	28.27	424.12	3,172.14
	5				0.00	0.00	0.00
	6				0.00	0.00	0.00
	7				0.00	0.00	0.00
				Sum of tank area footprint =	333.01	ft^2	

Largest Tanks, bbl = 200 bbl / 8,400.00 gallons — 1123.08 ft^3 max — 113.10 ft^2 max

Volume calc =(A1+A2+(sqrt A1*A2))*H/3 — A1 = Base area — A2 = Top area — (formula for pyrmidal frustum)

Potential Containment Volume =	17,339.00 gallons	2,318.22 ft^3	412.83 barrels
Potential Containment Volume with Sump =	26,803.47 gallons	3,583.62 ft^3	638.18 barrels

Evaluation of Secondary Containment	gallons	barrels	ft^3	
Potential containment volume	26,803.47	638.18	3,583.6	
Tank displacement volume	2,377.62	56.61	317.9	(sum of displacement minus largest tank)
Actual containment volume	24,425.85	581.57	3,265.7	(including sump)
Rainfall (precip)	1,542.13	36.72	206.2	
Required volume (largest tank + precip)	9,942.13	236.72	1,329.3	

Conclusion - Secondary containment is: Adequate — for SPCC -1936.47 ft^3 needed

Reference:
24hr, 25yr Rainfall Event = 6.5 in / 0.542 ft

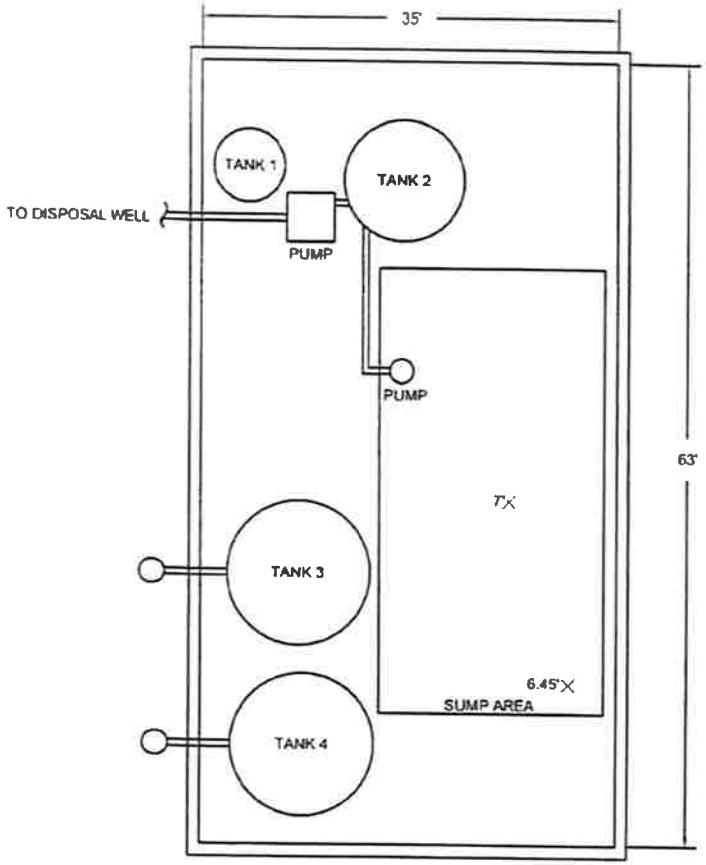
Sump Capacity			Volume	
Length	Width	Depth	ft^3	gallons
37	19	1.8	1,265.4	9,464.5

Contants

pi =	3.1416
Gallons/Ft^3 =	7.48
Data Entry Field =	

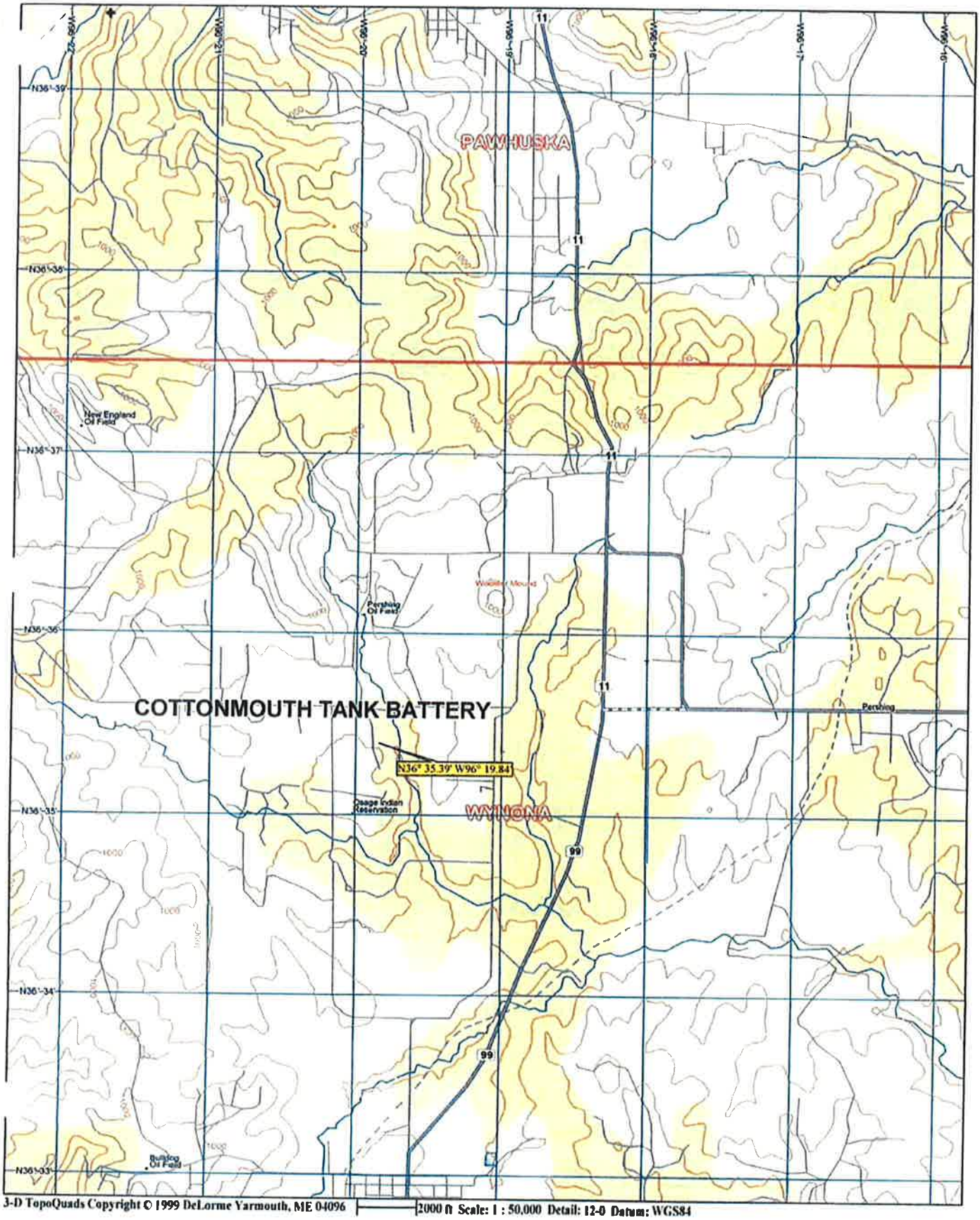
COTTONMOUTH TANK BATTERY

DIKE HEIGHT	TANK	SIZE	TYPE	CONTAINS
1.0'	TANK 1	6' X 15'	FIBERGLASS	SEPERATOR
	TANK 2	10' X 8'	FIBERGLASS	WATER
	TANK 3	12' X 10'	FIBERGLASS	OIL
	TANK 4	12' X 10'	FIBERGLASS	OIL



SLOPE → N

PERFORMANCE OPERATING COMPANY, LLC.	
FIGURE 1, FACILITY DIAGRAM	
COORDINATES	N36.589876, W96.330651
PREPARED BY	RFS CONSULTING, INC.
DATE	02/17/2014
SCALE	NTS


PAWHUSKA
COTTONMOUTH TANK BATTERY
N36° 35.39' W96° 19.84'
WYNONA
Pershing
New England Oil Field
Pershing Oil Field
Osage Indian Reservation
Bulldog Oil Field
11
99
N36°39'
N36°38'
N36°37'
N36°36'
N36°35'
N36°34'
N36°33'
W96°22'
W96°21'
W96°20'
W96°19'
W96°18'
W96°17'
W96°16'
3-D TopoQuads Copyright © 1999 DeLorme Yarmouth, ME 04096
2000 ft Scale: 1 : 50,000 Detail: 12-0 Datum: WGS84

J&M HUGHES (DOVE) TANK BATTERY

Professional Engineer Certification
40 CFR 112.3(d)

The undersigned Registered Professional Engineer is familiar with the requirements of Part 112 and has visited and examined the facility, or has supervised examination of the facility by appropriately qualified personnel. The undersigned Registered Professional Engineer attests that this Spill Prevention, Control, and Countermeasure Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and the requirement of 40 CFR Part 112; that procedures for required inspections and testing have been established; and that this Plan is adequate for the facility (112.3(d)).

Ronald F. Sober, P.E.
Printed Name of Registered Professional Engineer
Registration No.: 17765 State: OK

DATE 5/1/14

PART I – GENERAL FACILITY INFORMATION
40 CFR 112.7(a)(3)

1.1 Company Information

Name of facility:	J&M Hughes/Dove Tank Battery
Location:	1.5 miles into Hughes Ranch then turn right go 1 mile Hughes site on left. The coordinates for this facility are Latitude 36° 42' 36.4339" N and Longitude 96° 01' 11.9896" W.
Location of SPCC:	At the corporate and field offices.
Type of facility:	Onshore Gas Production, Storage and transfer facility consisting of one (1) 111 bbl. fiberglass storage tank for wastewater and two (2) 200 barrel steel storage tanks for oil and one (1) 76 barrel steel vertical separator.
Original Date of Plan:	New facility October, 2013
Owner or operator:	Performance Operating LLC PO BOX 628 Barnsdall, OK 74002

J&M Hughes/Dove Tank Battery

Transfer Activities

This facility is an onshore oil and gas exploration and production facility that stores oil and produced water from various production facilities in the area. Produced water is stored in the on site storage tanks and periodically hauled offsite for disposal. At the same time, any accumulated rainwater in the secondary containment area or sumps is removed.

Proximity to Navigable Waters

The facility is located in prairie area. The nearest water way is 4,500 ft. SE to intermittent stream, Jessie Creek.

Bulk Storage Container Overflow Prevention (40 CFR 112.9(c)(4))

The tank battery is designed with a fail-safe system to prevent discharge as follows:

The capacity of the produced water and oil storage tanks are sufficient to ensure that storage is adequate even in the event where facility personnel are unable to perform the daily visit to unload the tanks or the pumper is delayed in stopping production.

Containment was calculated to be able to hold the largest tank plus sufficient size to hold a 25 year rainfall event.

J&M Hughes/Dove Tank Battery

PART III. SPILL PREVENTION, CONTROL AND COUNTERMEASURE PROVISIONS 40 CFR 112.7 and 112.9

3.1 Potential Discharge Volume, Direction of Flow (40 CFR 112.7(b)) and Containment (40 CFR 112.7(a)(3)(iii))

All sources with a reasonable potential for equipment failure that would result in a release of oil are listed below along with an estimate of the amount of spill, the direction of a spill, and the location of drains, and secondary containment. The rate of flow will depend upon the size and location of the source. At this facility surface flow would be towards the west end of the property. See the facility description for the nearest waterway.

SOURCE AND MATERIAL	MAJOR TYPE OF FAILURE	TOTAL QUANTITY (GALS)	RATE (GALS /HR)	DIRECTION OF FLOW	SECONDARY CONTAINMENT TYPE	SECONDARY CONTAINMENT VOLUME (GALS)
Oil TANK (Tank 1)	RUPTURE, LEAKAGE	8,459	8,459	Northwest	Earthen DIKE	34,248
Oil TANK (Tank 2)	RUPTURE, LEAKAGE	8,459	8,459	Northwest	Earthen DIKE	34,248
Wastewater TANK (Tank 3)	RUPTURE, LEAKAGE	4,699	4,699	Northwest	Earthen DIKE	34,248
Vertical Separator (Tank 4)	RUPTURE, LEAKAGE	3,172	3,172	Northwest	Earthen DIKE	34,248

SPCC Secondary Containment Calcuations
Hughes, Dove Tanks Battery
Performance Operating, LLC

		Length	Width	Height	Dike area	
Secondary Containment area	A1, toe	76	50	0.85	3,800.00	ft^2
	A2, ridge	86	56		4,816.00	ft^2

Tanks within Secondary Containment for displacement calculation		BBL	Dia	Ht	ft^2	ft^3	Gallons
	1	200	12	10	113.10	1,130.97	8,459.04
	2	200	12	10	113.10	1,130.97	8,459.04
	3	111	10	8	78.54	628.32	4,699.47
	4	76	6	15	28.27	424.12	3,172.14
	5				0.00	0.00	0.00
	6				0.00	0.00	0.00
	7				0.00	0.00	0.00
			Sum of tank area footprint =		333.01	ft^2	

Largest Tanks, bbl = 200 bbl; 8,400.00 gallons; 1123.08 ft^3 max; 113.10 ft^2 max

Volume calc =(A1+A2+(sqrt A1*A2))*H/3 A1 = Base area A2 = Top area (formula for pyrmidal frustum)

Potential Containment Volume =	27,324.49	gallons	3,653.28	ft^3	650.58 barrels
Potential Containment Volume with Sump =	36,269.89	gallons	4,849.28	ft^3	863.57 barrels

Evaluation of Secondary Containment	gallons	barrels	ft^3	
Potential containment volume	36,269.89	863.57	4,849.3	
Tank displacement volume	2,020.98	48.12	270.2	(sum of displacement minus largest tank)
Actual containment volume	34,248.91	815.45	4,579.1	(including sump)
Rainfall (precip)	2,608.67	62.11	348.8	
Required volume (largest tank + precip)	11,008.67	262.11	1,471.9	

Conclusion - Secondary containment is: Adequate for SPCC -3107.22 ft^3 needed

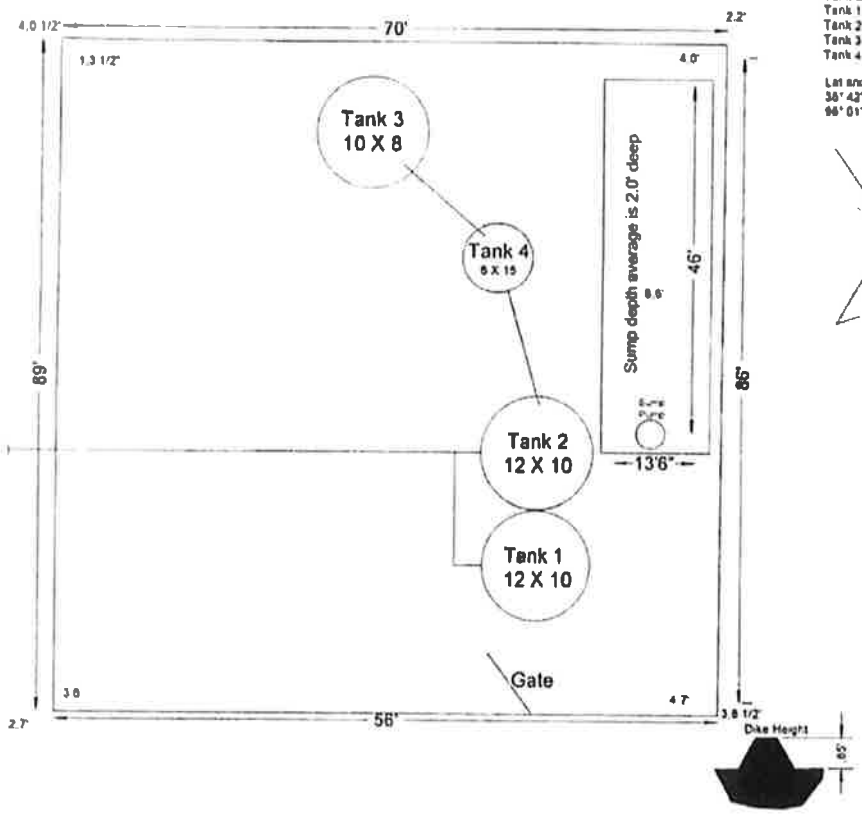
Reference:
24hr, 25yr Rainfall Event = 6.5 in; 0.542 ft

Sump Capacity			Volume	
Length	Width	Depth	ft^3	gallons
48	13	2	1,196.0	8,945.4

Contants

pi =	3.1416
Gallons/Ft^3 =	7.48
Data Entry Field =	

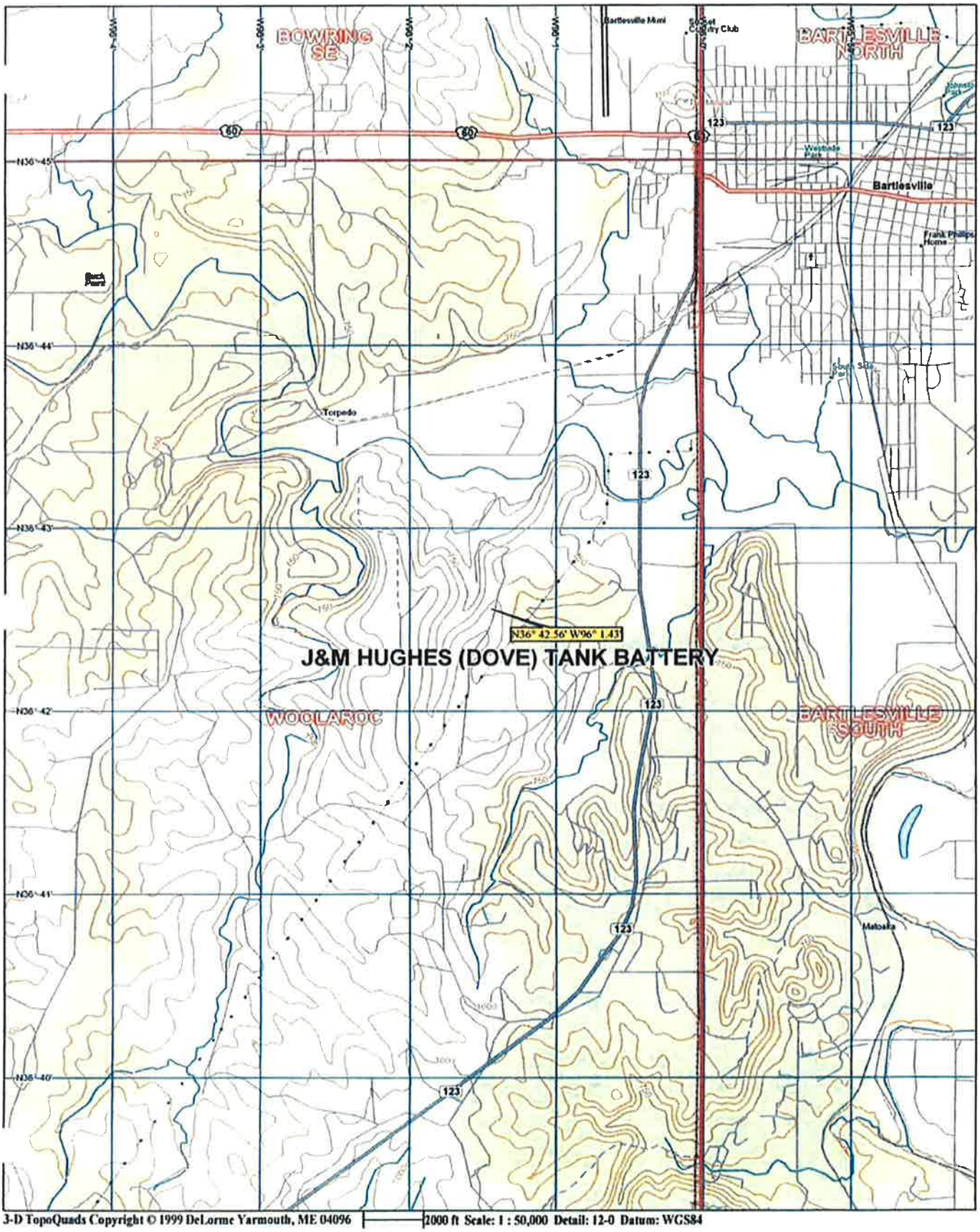
PERFORMANCE OPERATING LLC
CJM Hughes, Dove Tank Battery
NOT TO SCALE



Tank ID	Volume	Contents	Type
Tank 1	200 Bbl	Oil	Steel
Tank 2	200 Bbl	Oil	Steel
Tank 3	111 Bbl	Produced Water	Fiberglas
Tank 4	78 Bbl	Vert Seperator	Steel

Lat and Long
36° 42' 36" N
96° 01' 10" W

N



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DAVID TANK BATTERY

Professional Engineer Certification
40 CFR 112.3(d)

The undersigned Registered Professional Engineer is familiar with the requirements of Part 112 and has visited and examined the facility, or has supervised examination of the facility by appropriately qualified personnel. The undersigned Registered Professional Engineer attests that this Spill Prevention, Control, and Countermeasure Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and the requirement of 40 CFR Part 112; that procedures for required inspections and testing have been established; and that this Plan is adequate for the facility (112.3(d)).

Ronald F. Sober, P.E.
Printed Name of Registered Professional Engineer
Registration No.: 17765 State: OK

DATE: 5/1/14

PART I – GENERAL FACILITY INFORMATION
40 CFR 112.7(a)(3)

1.1 Company Information

Name of facility:	David Tank Battery
Location:	From Barnsdall drive north on SH 11 to CR2460. Turn right (NE) drive 1.08 miles to CR2431. Turn left (N) drive 1.13 miles to site on right. The coordinates for this facility are Latitude 36.608950° N and Longitude 96.165336° W.
Location of SPCC:	At the office of Performance Operating Offices, Barnsdall, OK
Type of facility:	Onshore Gas Production, Storage and transfer facility consisting of three (3) 95 bbl. steel storage tanks for oil and one (1) 70 bbl fiberglass storage tank for wastewater and one (1) vertical separator 130 bbl.
Original Date of Plan:	NA
Owner or operator:	Performance Operating Company, LLC 3993 Oklahoma 123 Barnsdall, OK 74002

David Tank Battery

Transfer Activities

This facility is an onshore oil and gas exploration and production facility that stores oil and produced water from various production facilities in the area. Produced water is stored in the storage tanks and sent to a disposal well for disposal. At the same time, any accumulated rainwater in the secondary containment area or sumps is removed.

Proximity to Navigable Waters

The facility is located in a wooded area. The facility is 1278 ft either northeast or southeast of a Choteau Creek.

Bulk Storage Container Overflow Prevention (40 CFR 112.9(c)(4))

The tank battery is designed with a fail-safe system to prevent discharge as follows:

The capacity of the produced water and oil storage tanks are sufficient to ensure that storage is adequate even in the event where facility personnel are unable to perform the daily visit to unload the tanks or the pumper is delayed in stopping production.

Containment was calculated to be able to hold the largest tank plus sufficient size to hold a 25 year rainfall event.

David Tank Battery

PART III. SPILL PREVENTION, CONTROL AND COUNTERMEASURE PROVISIONS 40 CFR 112.7 and 112.9

3.1 Potential Discharge Volume, Direction of Flow (40 CFR 112.7(b)) and Containment (40 CFR 112.7(a)(3)(iii))

All sources with a reasonable potential for equipment failure that would result in a release of oil are listed below along with an estimate of the amount of spill, the direction of a spill, and the location of drains, and secondary containment. The rate of flow will depend upon the size and location of the source. At this facility surface flow would be towards the south/southeast end of the property. See the facility description for the nearest waterway.

SOURCE AND MATERIAL	MAJOR TYPE OF FAILURE	TOTAL QUANTITY (GALS)	RATE (GALS /HR)	DIRECTION OF FLOW	SECONDARY CONTAINMENT TYPE	SECONDARY CONTAINMENT VOLUME (GALS)
Water Tank (Tank 4)	RUPTURE, LEAKAGE	3,053	3,053	South/southeast	Earthen DIKE	24,291
Separator (Tank 5)	RUPTURE, LEAKAGE	5,488	5,488	South/southeast	Earthen DIKE	24,291
Oil TANK (Tank 3)	RUPTURE, LEAKAGE	4,031	4,031	South/southeast	Earthen DIKE	24,291
Oil TANK (Tank 3)	RUPTURE, LEAKAGE	4,031	4,031	South/southeast	Earthen DIKE	24,291
Oil TANK (Tank 3)	RUPTURE, LEAKAGE	4,031	4,031	South/southeast	Earthen DIKE	24,291

SPCC Secondary Containment Calcuations
David Tank Battery
Performance Operating, LLC

		Length	Width	Height	Dike area	
Secondary Containment area	A1, toe	72	32	0.9	2,304.00	ft^2
	A2, ridge	80	41		3,280.00	ft^2

Tanks within Secondary Containment for displacement calculation		BBL	Dia	Ht	ft^2	ft^3	Gallons
	1	95.9999	8.5	9.5	56.75	539.08	4,031.99
	2	95.9999	8.5	9.5	56.75	539.08	4,031.99
	3	95.9999	8.5	9.5	56.75	539.08	4,031.99
	4	130.69	8	14.6	50.27	733.88	5,488.98
	5	72.7074	5.7	16	25.52	408.28	3,053.71
	6				0.00	0.00	0.00
	7				0.00	0.00	0.00
	8				0.00	0.00	0.00
	9				0.00	0.00	0.00
	10				0.00	0.00	0.00
	11				0.00	0.00	0.00
	12				0.00	0.00	0.00
	13				0.00	0.00	50.00
				Sum of tank area footprint =	246.02	ft^2	

Largest Tanks, bbl = 130.689896 bbl / 5,488.98 gallons — 733.87604 ft^3 max — 56.75 ft^2 max

Volume calc =(A1+A2+(sqrt A1*A2))*H/3 — A1 = Base area — A2 = Top area — (formula for pyrmidal frustum)

Potential Containment Volume =	18,697.88	gallons	2,499.91	ft^3	445.19	barrels
Potential Containment Volume with Sump =	25,896.83	gallons	3,462.41	ft^3	616.59	barrels

Evaluation of Secondary Containment	gallons	barrels	ft^3	
Potential containment volume	25,896.83	616.59	3,462.4	
Tank displacement volume	1,605.00	38.21	214.6	(sum of displacement minus largest tank)
Actual containment volume	24,291.83	578.38	3,247.8	(including sump)
Rainfall (precip)	1,776.67	42.30	237.5	
Required volume (largest tank + precip)	7,265.64	172.99	971.4	

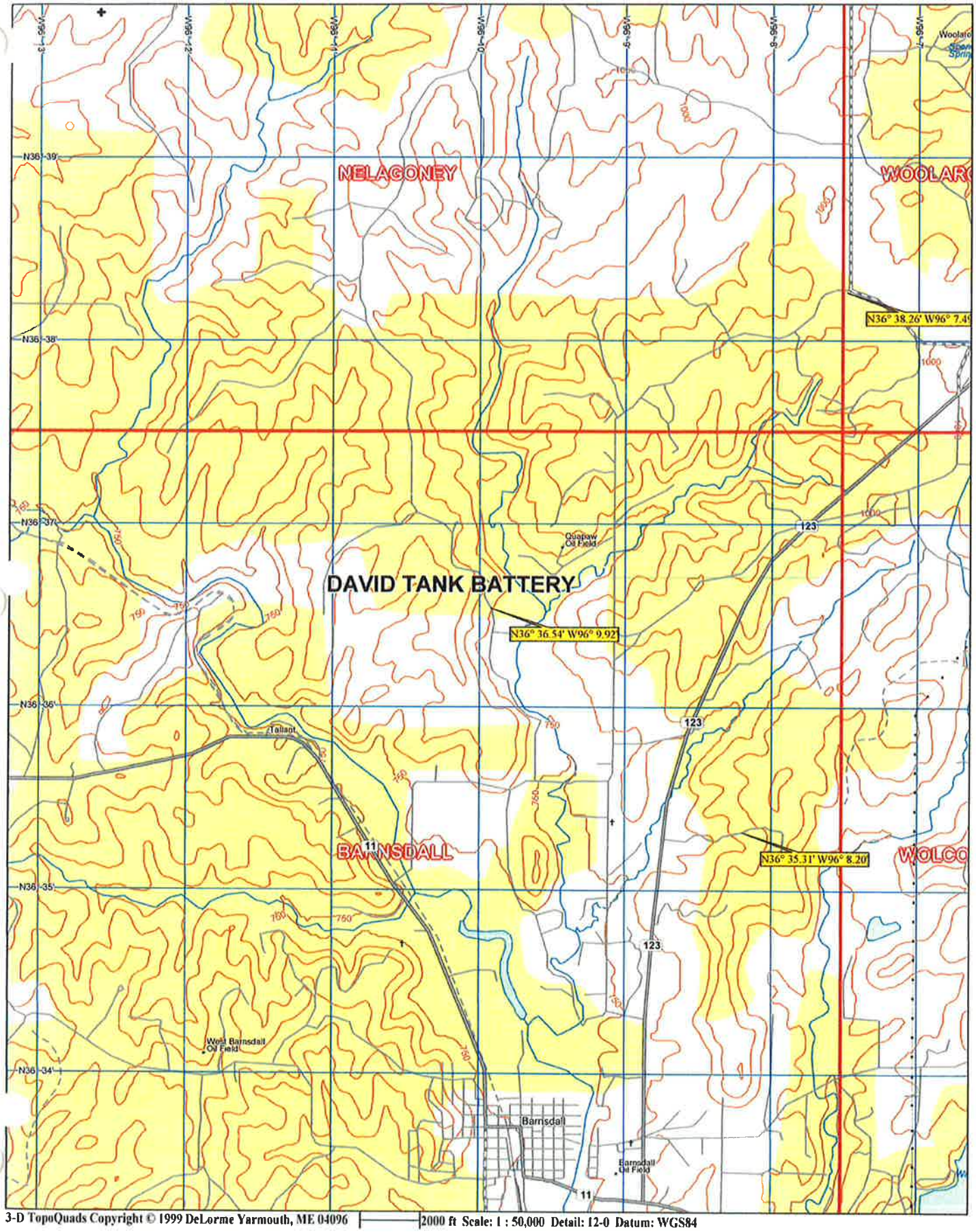
Conclusion - Secondary containment is: Adequate — for SPCC: -2276.40 ft^3 needed

Reference:
24hr, 25yr Rainfall Event = 6.5 in / 0.542 ft

Sump Capacity			Volume	
Length	Width	Depth	ft^3	gallons
35	11	2.5	962.5	7,199.0

Contants

pi =	3.1416
Gallons/Ft^3 =	7.48
Data Entry Field =	



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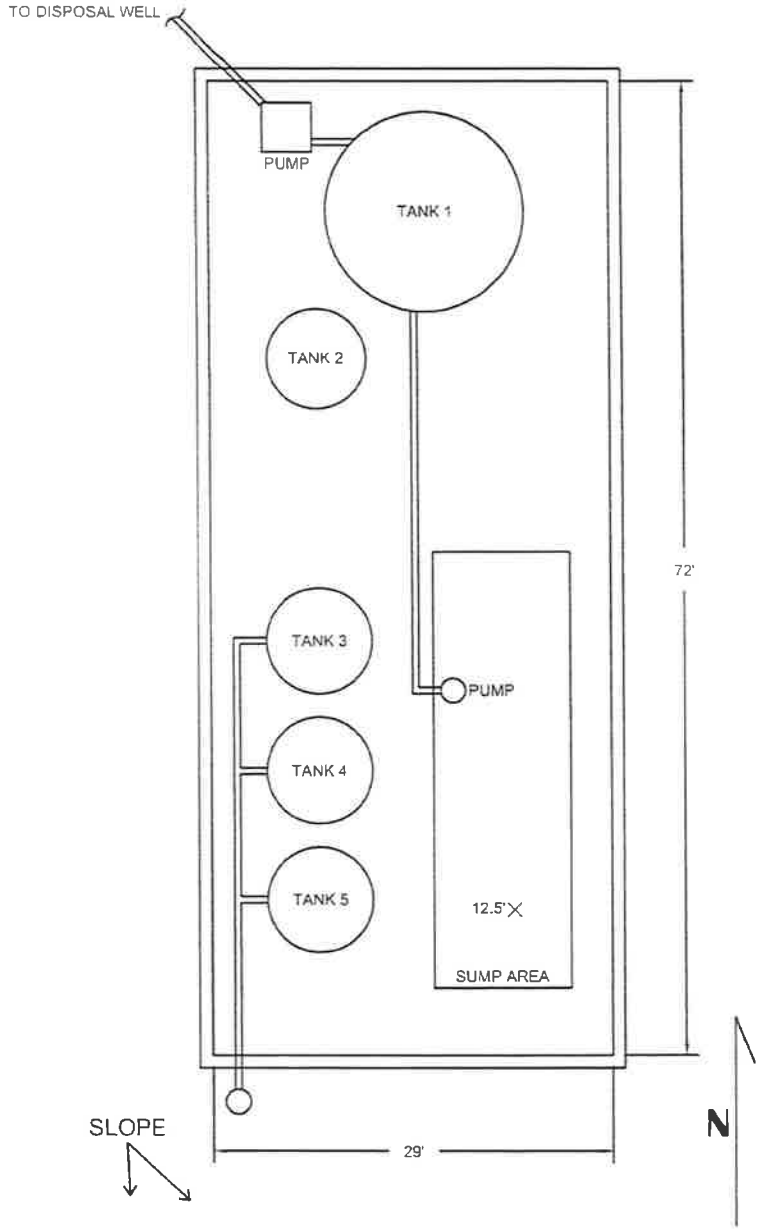
DAVID TANK BATTERY

DIKE HEIGHT	TANK	SIZE	TYPE	CONTAINS
0.9'	TANK 1	16' X 5.7'	FIBERGLASS	WATER
	TANK 2	8' X 14.6'	FIBERGLASS	SEPERATOR
	TANK 3	8.5' X 9.5'	STEEL	OIL
	TANK 4	8.5' X 9.5'	STEEL	OIL
	TANK 5	8.5' X 9.5'	STEEL	OIL



PERFORMANCE OPERATING COMPANY, LLC.	
FIGURE 1, FACILITY DIAGRAM	
COORDINATES	N36.608950, W96.165336
PREPARED BY	RFS CONSULTING, INC.
DATE	02/17/2014
SCALE	NTS

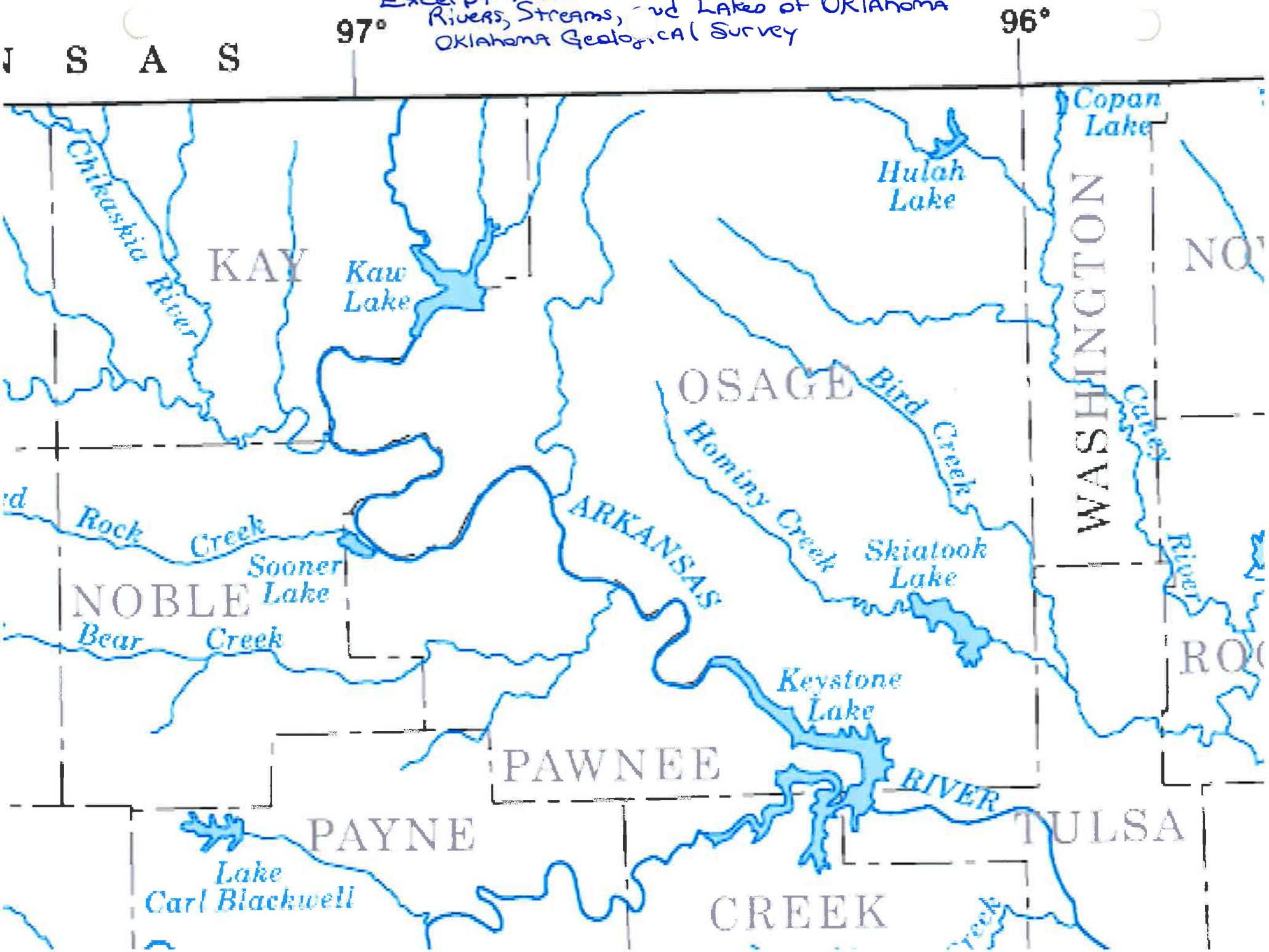
APPENDIX E

WATER RESOURCES

APPENDIX E-1

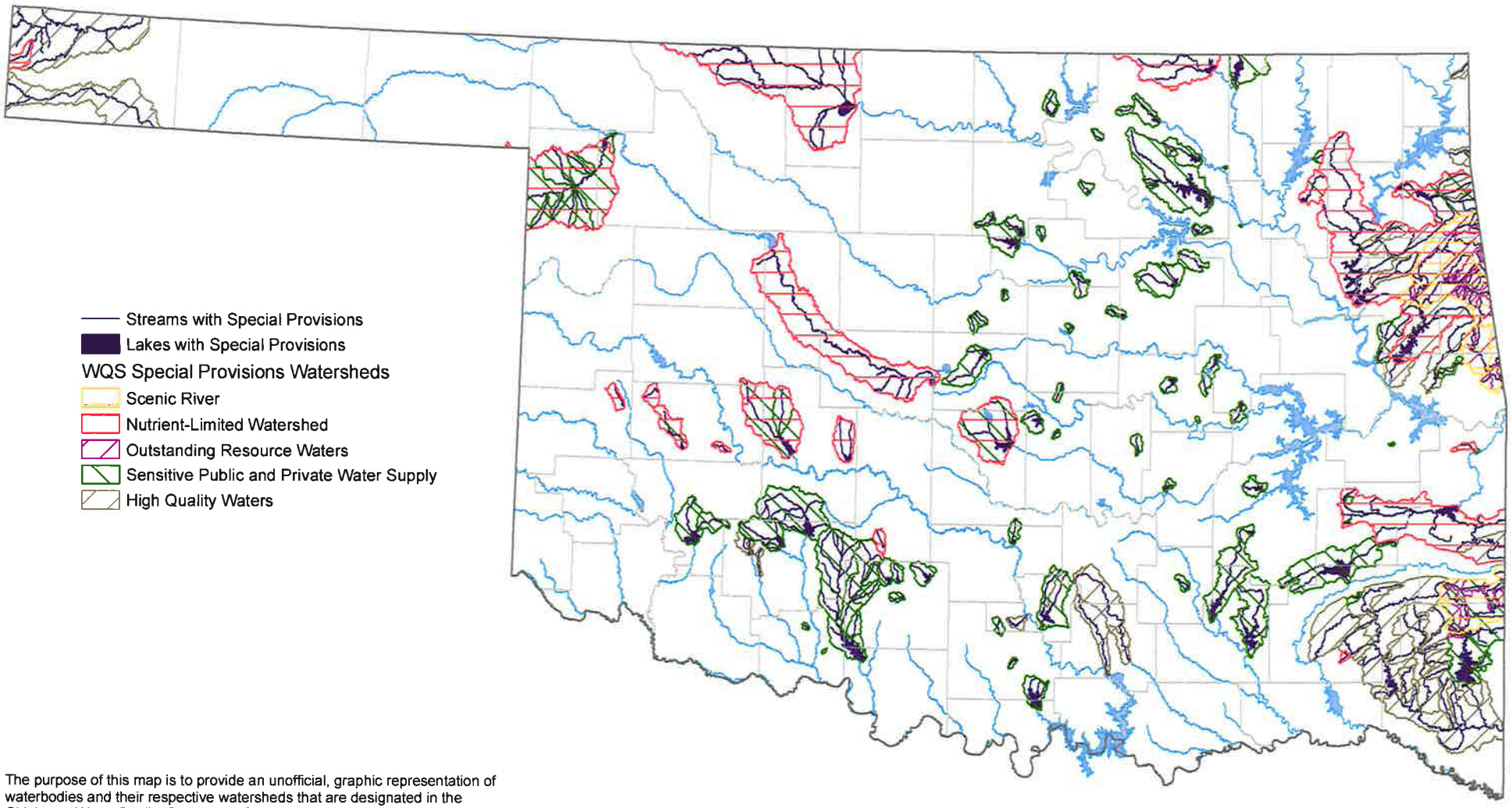
WATER QUALITY AND GROUNDWATER

Excerpt from
Rivers, Streams, and Lakes of Oklahoma
Oklahoma Geological Survey



Oklahoma Water Quality Standards

Waterbodies and Watersheds with Special Provisions

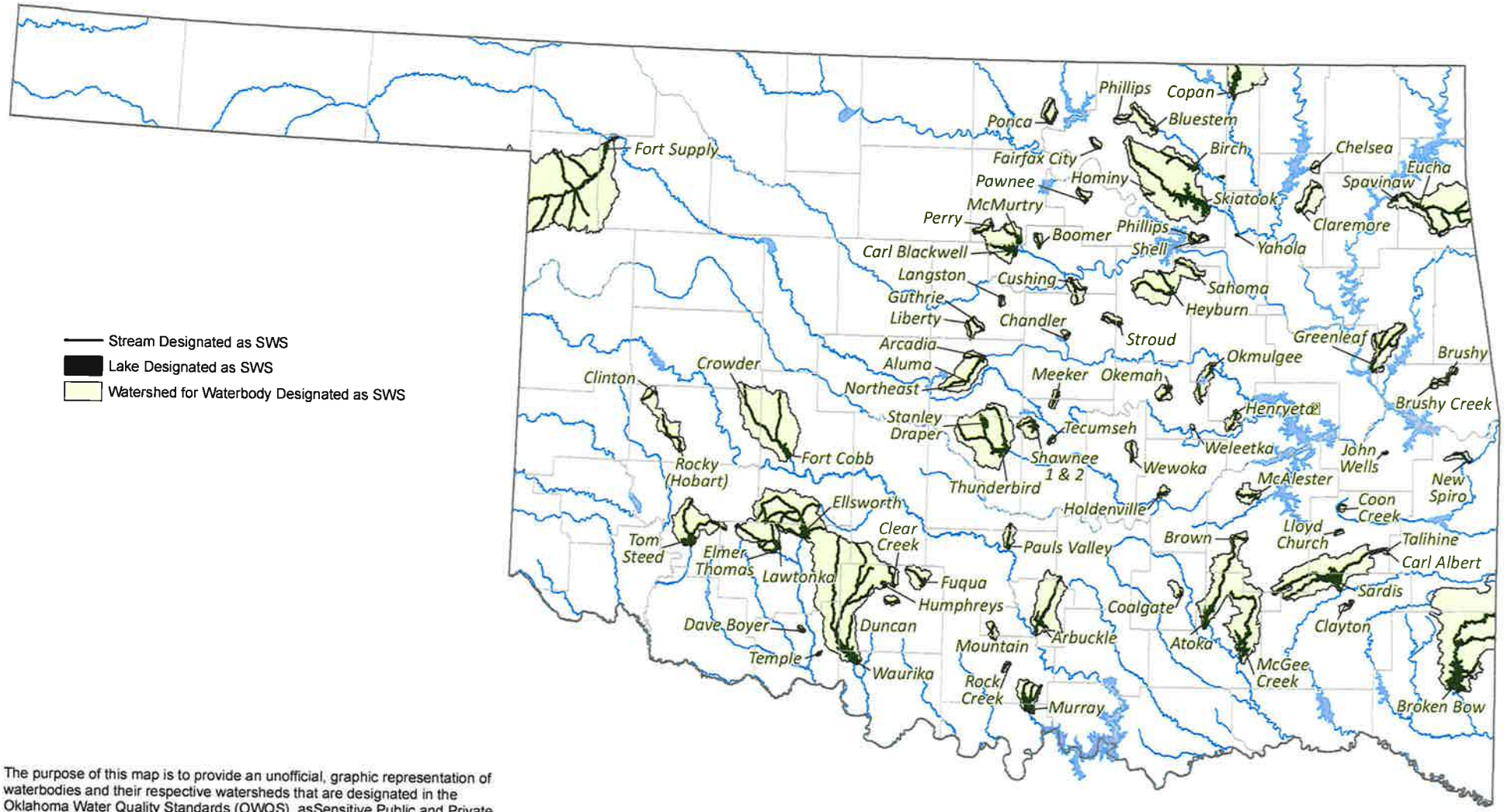


The purpose of this map is to provide an unofficial, graphic representation of waterbodies and their respective watersheds that are designated in the Oklahoma Water Quality Standards (OWQS), with Special Provisions. The official version of the OWQS is published by the Oklahoma Secretary of State in the Oklahoma Administrative Code at Title 785, Chapter 45 (http://www.sos.ok.gov). A complete but unofficial version of the OWQS is available through the OWRB homepage (http://www.owrb.ok.gov).
7/1/2011

State of Oklahoma
OWRB
Water Resources Board
the water agency

Oklahoma Water Quality Standards

Sensitive Public and Private Water Supplies (SWS)

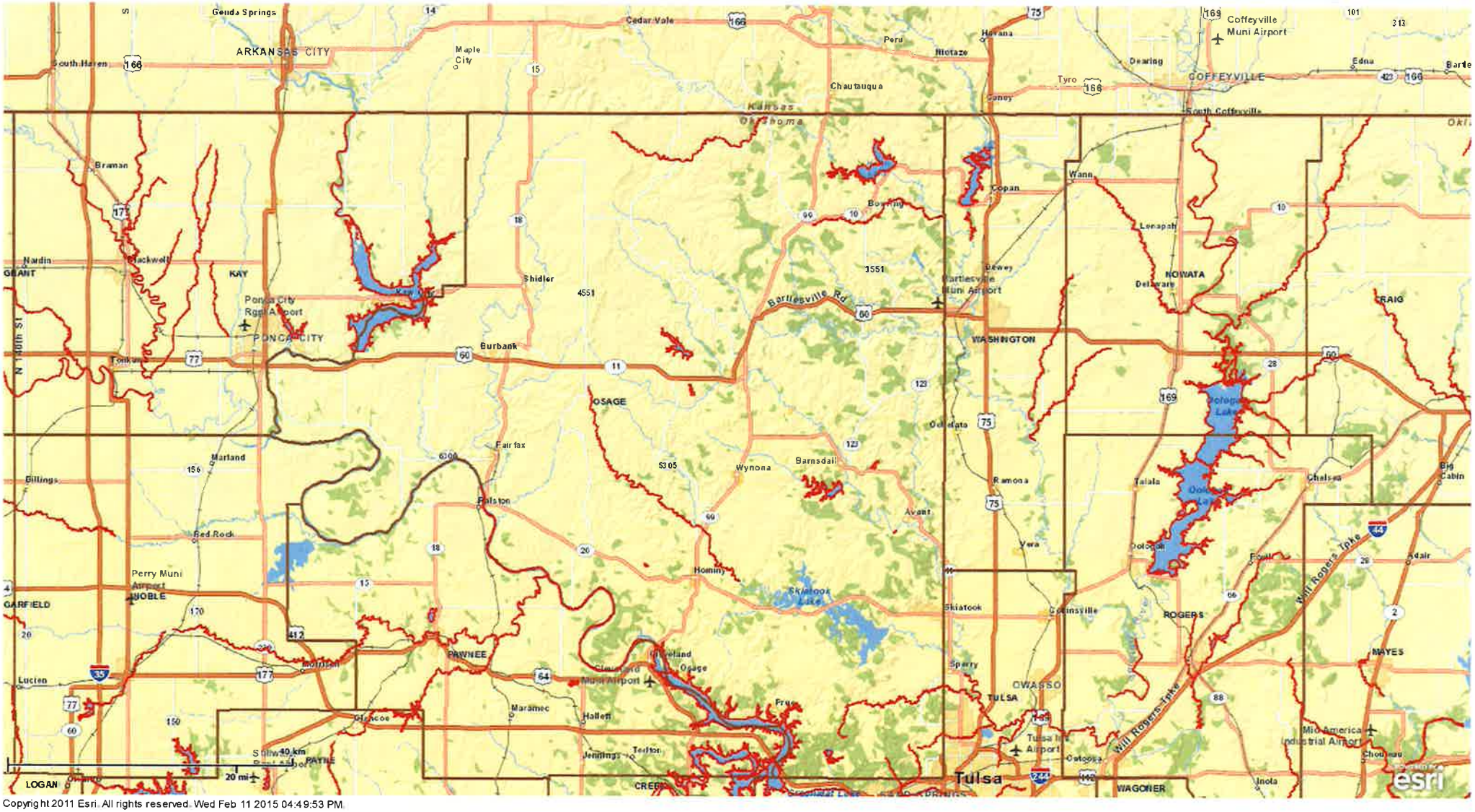


The purpose of this map is to provide an unofficial, graphic representation of waterbodies and their respective watersheds that are designated in the Oklahoma Water Quality Standards (OWQS), asSensitive Public and Private Water Supplies (SWS). The official version of the OWQS is published by the Oklahoma Secretary of State in the Oklahoma Administrative Code at Title 785, Chapter 45 (http://www.sos.ok.gov). A complete but unofficial version of the OWQS is available through the OWRB homepage (http://www.owrb.ok.gov).
7/1/2011

State of Oklahoma
OWRB
WATER RESOURCES BOARD
the water agency

2012 303d list

Osage Impaire Waters



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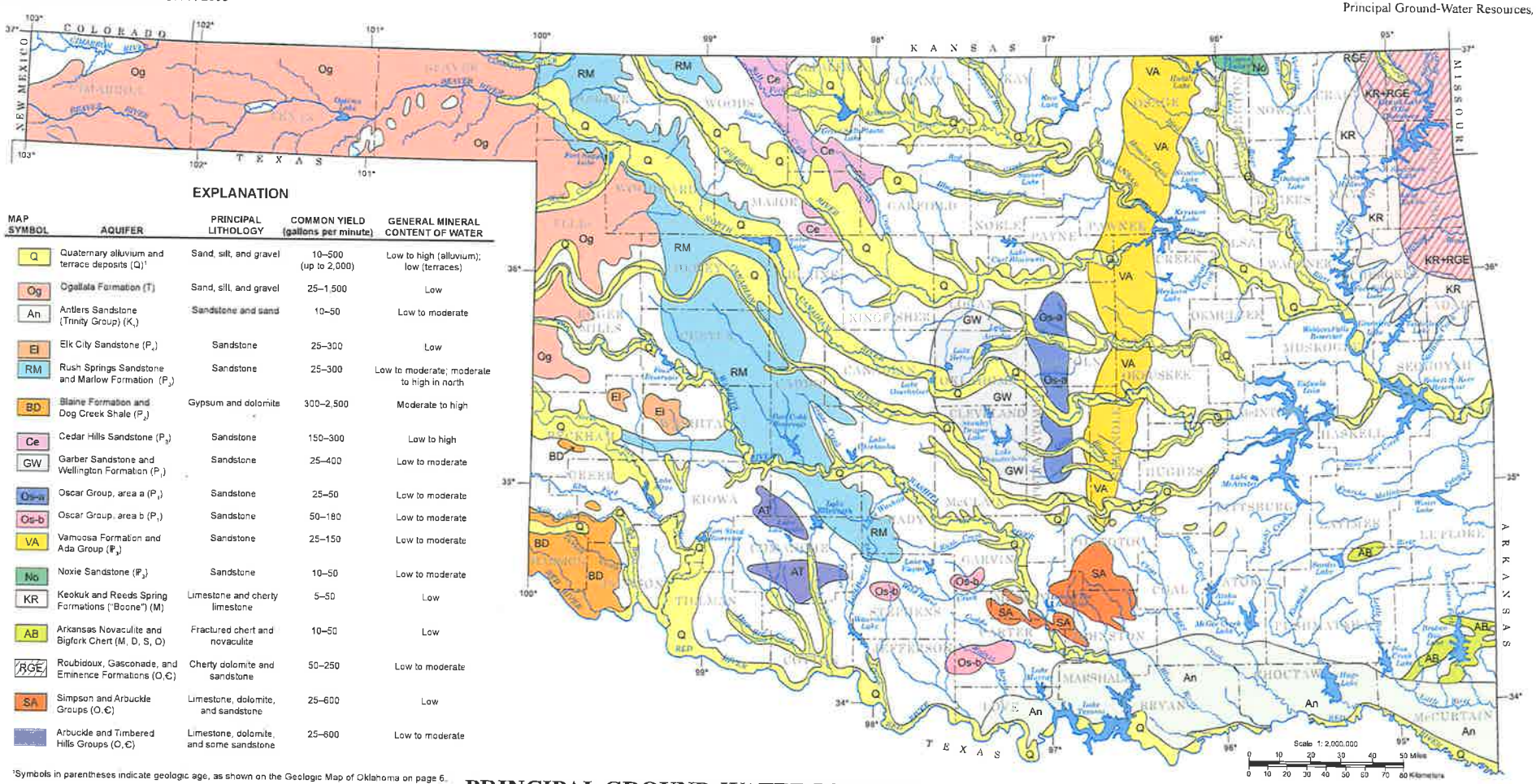
The methods used to develop the Integrated Report are described in the Continuing Planning Process (CPP). One goal of the CPP is to provide an objective and scientifically sound waterbody assessment listing methodology including:

- A description of the data that the State will use to assess attainment of surface water quality standards;
- The quality assurance aspects of the data;
- A detailed description of the methods used to evaluate water quality standards attainment;
- The placement of waterbodies in one of 5 Categories:
    - Category 1 - Attaining the water quality standard and no use is threatened.
    - Category 2 - Attaining some of the designated uses; no use is threatened; and insufficient or no data and information is available to determine if the remaining uses are attained or threatened.
    - Category 3 - Insufficient or no data and information to determine if any designated use is attained.
    - Category 4 - Impaired or threatened for one or more designated uses but does not require the development of a TMDL.
        - 4a - TMDL has been completed.
        - 4b - Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future.
        - 4c - Impairment is not caused by a pollutant.
    - Category 5 - The water quality standard is not attained. The waterbody is impaired or threatened for one or more designated uses by a pollutant(s), and requires a TMDL. This category constitutes the Section 303(d) list of waters impaired or threatened by a pollutant(s) for which one or more TMDL(s) are needed.
        - 5a - TMDL is underway or will be scheduled.
        - 5b - A review of the water quality standards will be conducted before a TMDL is scheduled.
        - 5c - Additional data and information will be collected before a TMDL or review of the water quality standards is scheduled.

The CPP is a companion to the Integrated Report. It is anticipated that this will be a living document and will be modified, as appropriate, to accompany subsequent Integrated Reports.



EXPLANATION

MAP SYMBOL	AQUIFER	PRINCIPAL LITHOLOGY	COMMON YIELD (gallons per minute)	GENERAL MINERAL CONTENT OF WATER
Q	Quaternary alluvium and terrace deposits (Q)[1]	Sand, silt, and gravel	10–500 (up to 2,000)	Low to high (alluvium); low (terraces)
Og	Ogallala Formation (T)	Sand, silt, and gravel	25–1,500	Low
An	Antlers Sandstone (Trinity Group) (K_1)	Sandstone and sand	10–50	Low to moderate
El	Elk City Sandstone (P_2)	Sandstone	25–300	Low
RM	Rush Springs Sandstone and Marlow Formation (P_2)	Sandstone	25–300	Low to moderate; moderate to high in north
BD	Blaine Formation and Dog Creek Shale (P_2)	Gypsum and dolomite	300–2,500	Moderate to high
Ce	Cedar Hills Sandstone (P_3)	Sandstone	150–300	Low to high
GW	Garber Sandstone and Wellington Formation (P_1)	Sandstone	25–400	Low to moderate
Os-a	Oscar Group, area a (P_1)	Sandstone	25–50	Low to moderate
Os-b	Oscar Group, area b (P_1)	Sandstone	50–180	Low to moderate
VA	Vamoosa Formation and Ada Group (P_3)	Sandstone	25–150	Low to moderate
No	Noxie Sandstone (P_3)	Sandstone	10–50	Low to moderate
KR	Keokuk and Reeds Spring Formations ("Boone") (M)	Limestone and cherty limestone	5–50	Low
AB	Arkansas Novaculite and Bigfork Chert (M, D, S, O)	Fractured chert and novaculite	10–50	Low
RGE	Roubidoux, Gasconade, and Eminence Formations (O,€)	Cherty dolomite and sandstone	50–250	Low to moderate
SA	Simpson and Arbuckle Groups (O,€)	Limestone, dolomite, and sandstone	25–600	Low
	Arbuckle and Timbered Hills Groups (O,€)	Limestone, dolomite, and some sandstone	25–600	Low to moderate

[1]Symbols in parentheses indicate geologic age, as shown on the Geologic Map of Oklahoma on page 6.

PRINCIPAL GROUND-WATER RESOURCES OF OKLAHOMA

Kenneth S. Johnson, Oklahoma Geological Survey

An "aquifer" consists of rocks and sediments saturated with good- to fair-quality water, and that is sufficiently permeable to yield water from wells at rates greater than 25 gal/min (gallons per minute). This map shows the distribution of the principal aquifers in Oklahoma and was modified from Marcher (1969), Marcher and Bingham (1971), Hart (1974), Bingham and Moore (1975), Carr and Bergman (1976), Havens (1977), Bingham and Bergman (1980), Morton (1981), Marcher and Bergman (1983), and Johnson (1983).

Bedrock aquifers in Oklahoma consist of sandstone, sand, limestone, dolomite, gypsum, or fractured novaculite and chert. Aquifer thicknesses range from 100 ft to several thousand feet. Depth to fresh water ranges from a few feet to more than 1,000 ft; most wells are 100–400 ft deep. Wells in these aquifers yield 25–300 gal/min, although some wells yield as much as 600–2,500 gal/min. Water in most bedrock aquifers has low to moderate mineral content, about 300–1,500 milligrams per liter dissolved solids.

Ground water is also present in Quaternary alluvium and terrace deposits that consist mainly of unconsolidated sand, silt, clay, and gravel. "Alluvium" refers to sediments in present-day stream channels or flood plains, whereas "terrace deposits" refer to older alluvium that remains (usually at an elevation above the present-day flood plain) after a stream shifts its position or cuts a deeper channel. Alluvium and terrace deposits are among the most recent geologic deposits; therefore, they overlie bedrock aquifers where the two are mapped together. The thickness of Quaternary deposits ranges from 10 to 50 ft (locally up to 100 ft). Wells in alluvium and terrace deposits yield 10–500 gal/min of water (locally several thousand gal/min); most of this ground water has less than 1,000 milligrams per liter dissolved solids.

Fresh water stored in Oklahoma aquifers results from the downward movement of meteoric (precipitation) and surface waters that enter each aquifer at its recharge area. Fresh water may displace saline water that originally may have occupied parts of the aquifer. The system is dynamic; water percolating downward to the water table recharges the aquifer continuously. The vertical or horizontal rate of ground-water flow in the aquifers probably ranges from 5 to 100 ft per year; under certain geologic and hydrologic conditions, such as in cavernous or highly fractured rocks, flow can range up to more than 1,000 ft per year.

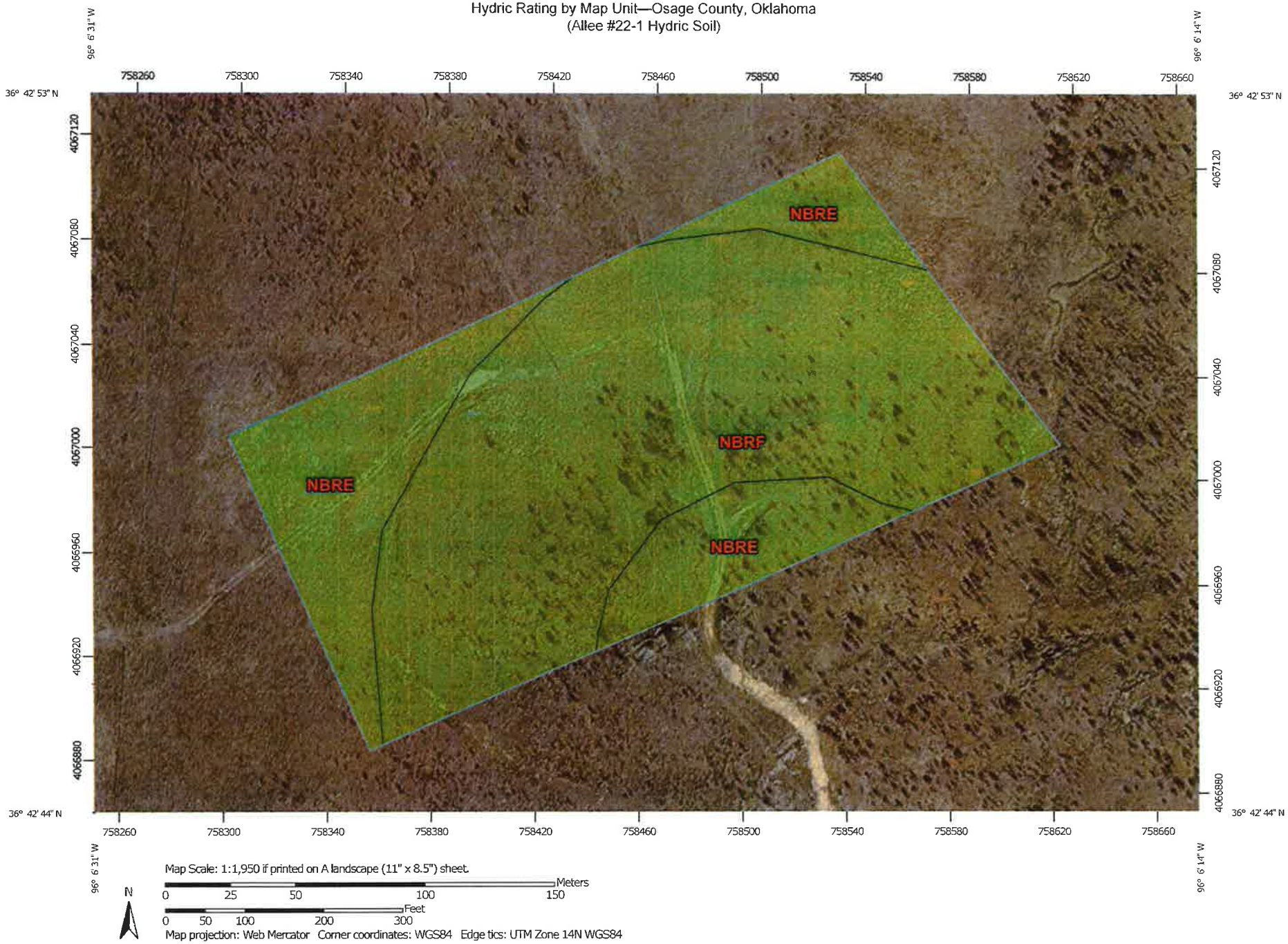
Large areas of Oklahoma, shown uncolored on the map, are underlain mostly by shale or other low-permeability rocks that typically yield only enough water for household use (about 1–5 gal/min). Highly mineralized (saline) water, unfit for most uses, is present beneath fresh-water zones in these rocks, and beneath fresh-water aquifers. The depth to the top of this saline water ranges from less than 100 ft in some places, up to 3,000 ft in the Arbuckle Mountains.

The Oklahoma Water Resources Board (1990) estimated that Oklahoma's principal aquifers contain 320 million acre-feet of fresh water, perhaps half of which is recoverable for beneficial use. Wells and springs tapping these aquifers currently supply more than 60% of the water used in Oklahoma, chiefly in the west where surface-water is less abundant.

APPENDIX E-2

NRCS HYDRIC MAPS

Hydric Rating by Map Unit—Osage County, Oklahoma
(Allee #22-1 Hydric Soil)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Lines

- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Points

- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 23, 2010—May 16, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
NBRE	Niotaze-Bigheart-Rock outcrop complex, 3 to 15 percent slopes, very stony	0	2.8	30.8%
NBRF	Niotaze-Bigheart-Rock outcrop complex, 15 to 25 percent slopes, extremely stony	0	6.4	69.2%
Totals for Area of Interest			**9.2**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Hydric Rating by Map Unit—Osage County, Oklahoma
(Allee #22-2)

Map Scale: 1:1,230 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 23, 2010—May 16, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
NBRE	Niotaze-Bigheart-Rock outcrop complex, 3 to 15 percent slopes, very stony	0	1.1	36.5%
NBRF	Niotaze-Bigheart-Rock outcrop complex, 15 to 25 percent slopes, extremely stony	0	2.0	63.5%
Totals for Area of Interest			**3.1**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

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Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

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Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

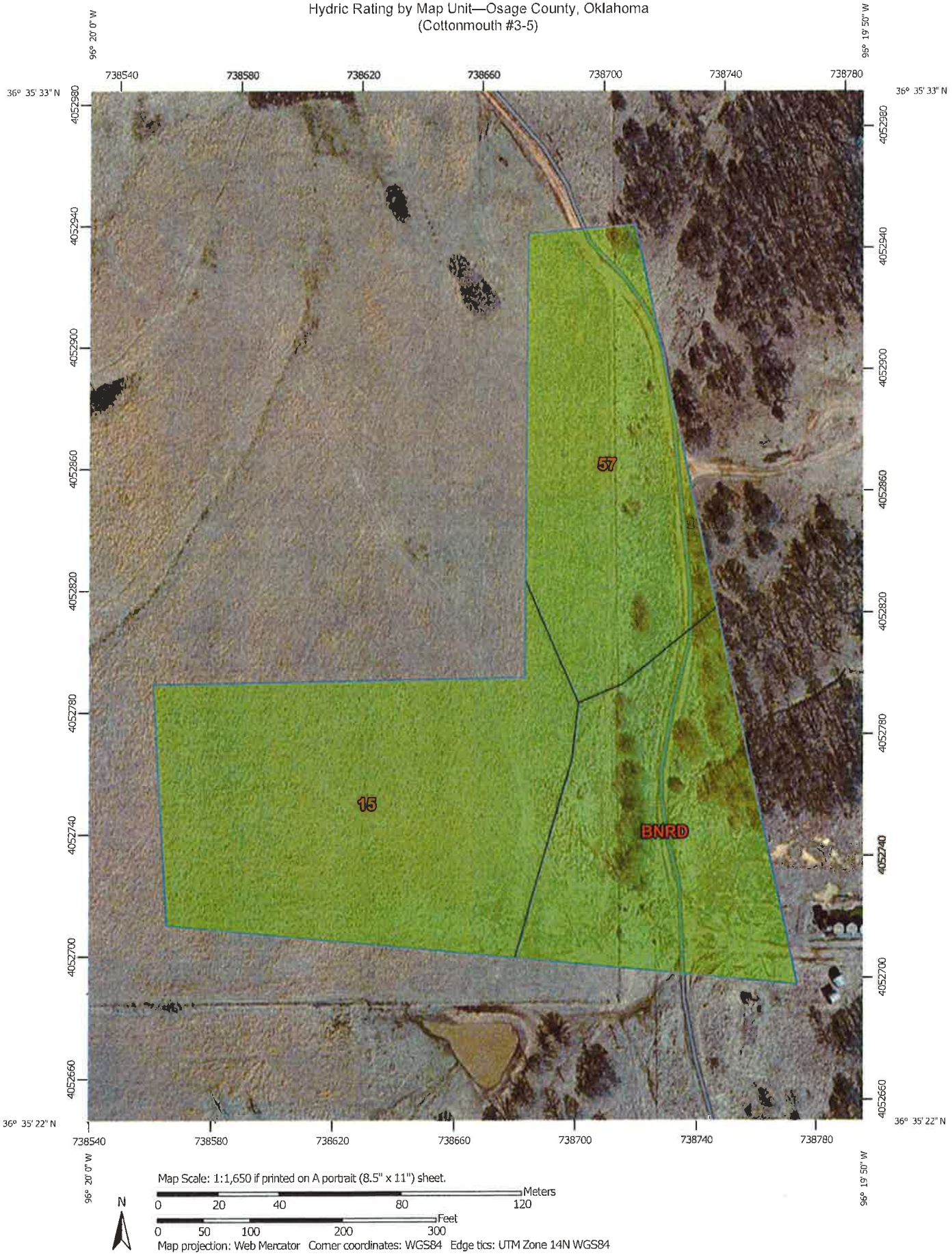
Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Hydric Rating by Map Unit—Osage County, Oklahoma
(Cottonmouth #3-5)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 5, 2011—Mar 23, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
15	Agra silt loam, 1 to 3 percent slopes	0	2.8	44.5%
57	Steedman-Lucien complex, 3 to 15 percent slopes	0	1.8	27.8%
BNRD	Bigheart-Niotaze-Rock outcrop complex, 1 to 8 percent slopes	0	1.8	27.7%
Totals for Area of Interest			**6.3**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

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Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Hydric Rating by Map Unit—Osage County, Oklahoma
(Cottonmouth #3-6)

Map Scale: 1:596 if printed on A landscape (11" x 8.5") sheet.

Meters: 0 5 10 20 30

Feet: 0 25 50 100 150

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 5, 2011—Mar 23, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BNRD	Bigheart-Niotaze-Rock outcrop complex, 1 to 8 percent slopes	0	1.8	100.0%
Totals for Area of Interest			**1.8**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

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References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

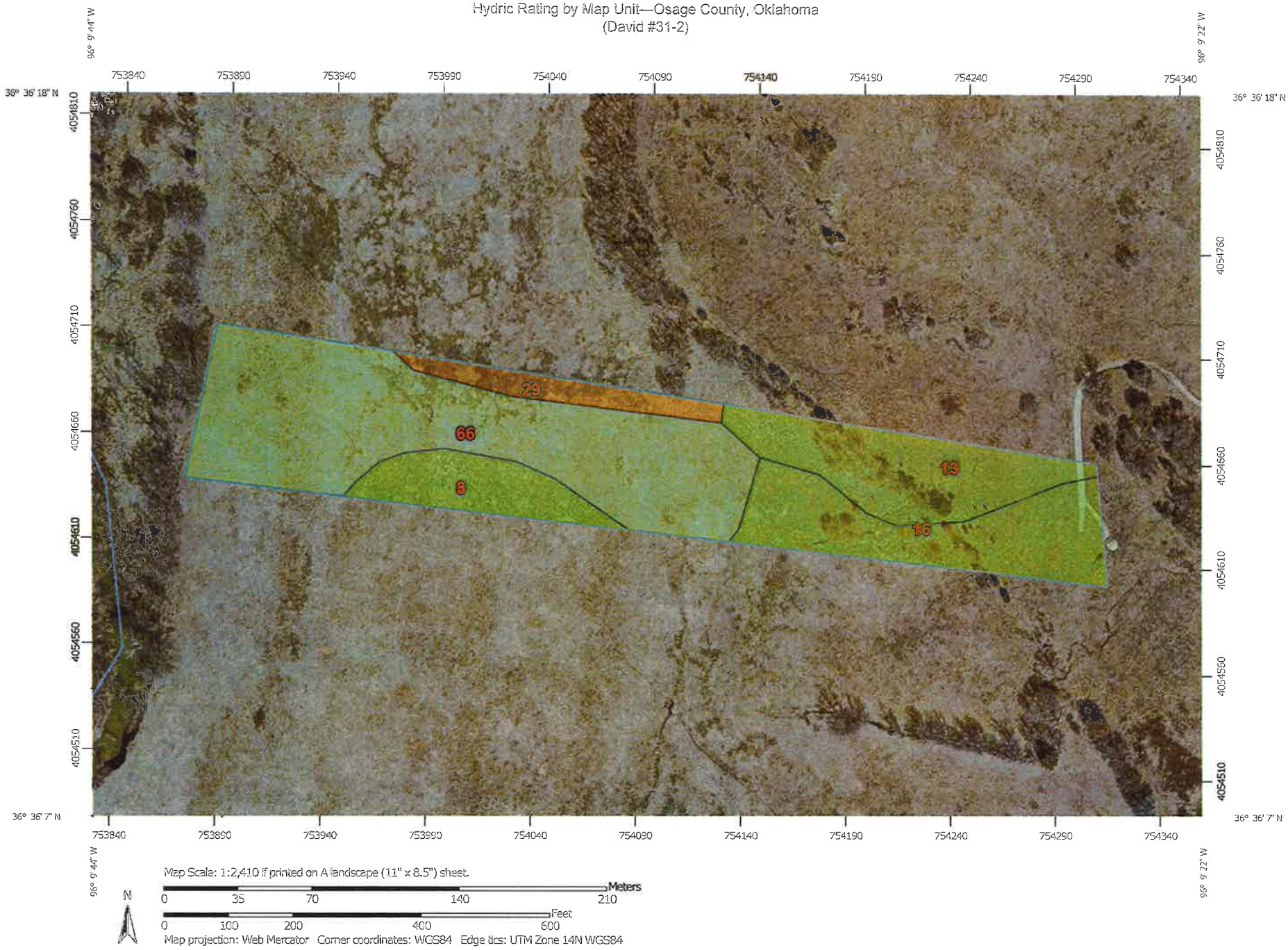
Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Hydric Rating by Map Unit—Osage County, Oklahoma
(David #31-2)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 5, 2011—Mar 23, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Pocasset fine sandy loam, 0 to 1 percent slopes, occasionally flooded	0	0.6	9.2%
13	Luclen-Coyle complex, 3 to 8 percent slopes	0	1.2	17.5%
16	Agra silt loam, 3 to 5 percent slopes	0	1.4	19.5%
29	Lightning silt loam, 0 to 1 percent slopes, occasionally flooded	85	0.4	5.6%
66	Verdigris silt loam, 0 to 1 percent slopes, occasionally flooded	5	3.4	48.2%
Totals for Area of Interest			**7.0**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

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References:

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Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

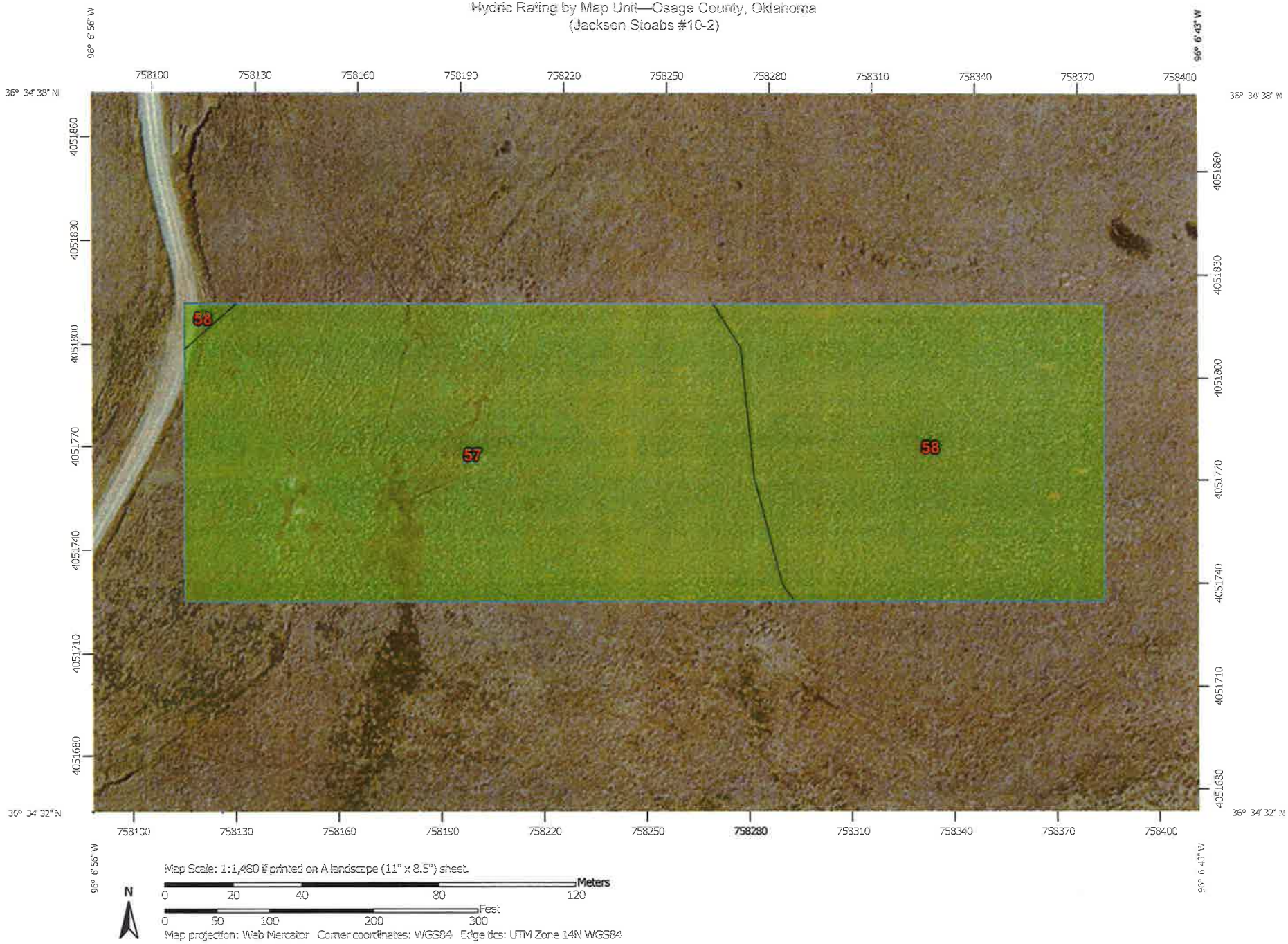
Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Hydric Rating by Map Unit—Osage County, Oklahoma
(Jackson Stoabs #10-2)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Lines

- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Points

- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 23, 2010—May 16, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
57	Steedman-Lucien complex, 3 to 15 percent slopes	0	3.5	61.4%
58	Steedman-Lucien complex, 15 to 25 percent slopes	0	2.2	38.6%
Totals for Area of Interest			**5.8**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

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Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

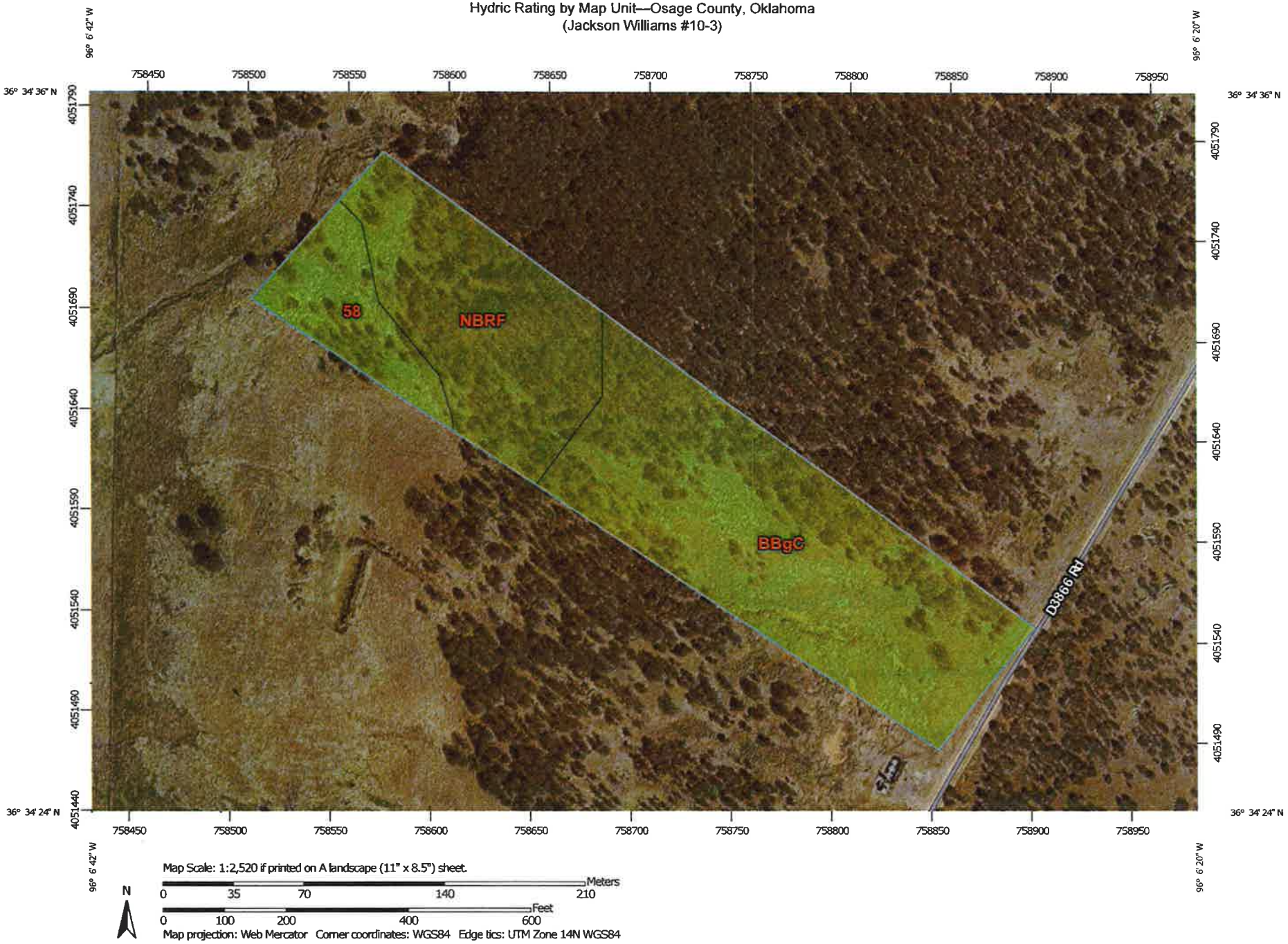
Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Hydric Rating by Map Unit—Osage County, Oklahoma
(Jackson Williams #10-3)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 23, 2010—May 16, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
58	Steedman-Lucien complex, 15 to 25 percent slopes	0	1.0	11.4%
BBgC	Bartlesville-Bigheart complex, 1 to 5 percent slopes, very rocky	0	5.1	57.9%
NBRF	Niotaze-Bigheart-Rock outcrop complex, 15 to 25 percent slopes, extremely stony	0	2.7	30.7%
Totals for Area of Interest			**8.8**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

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If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

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Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

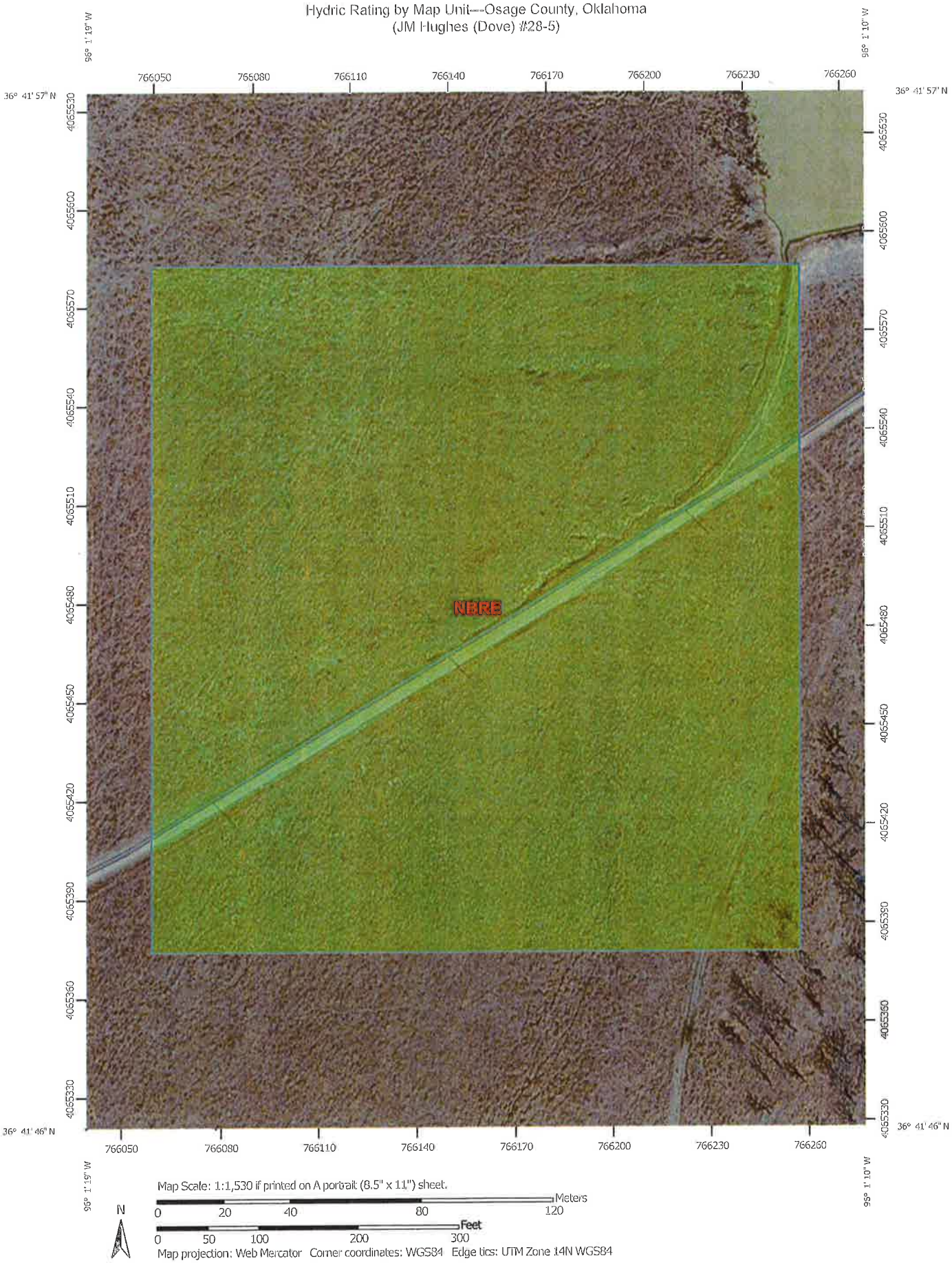
Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Hydric Rating by Map Unit—Osage County, Oklahoma
(JM Hughes (Dove) #28-5)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

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Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 23, 2010—May 16, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
NBRE	Niotaze-Bigheart-Rock outcrop complex, 3 to 15 percent slopes, very stony	0	10.2	100.0%
Totals for Area of Interest			**10.2**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

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Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

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Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Hydric Rating by Map Unit—Osage County, Oklahoma
(Royal #5-6)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 23, 2010—May 16, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
13	Lucien-Coyle complex, 3 to 8 percent slopes	0	1.6	8.9%
57	Steedman-Lucien complex, 3 to 15 percent slopes	0	9.3	52.2%
NBRE	Niotaze-Bigheart-Rock outcrop complex, 3 to 15 percent slopes, very stony	0	6.9	39.0%
Totals for Area of Interest			**17.8**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Hydric Rating by Map Unit—Osage County, Oklahoma
(Royal/East Hughes #4-3)

Map Scale: 1:1,650 if printed on A portrait (8.5" x 11") sheet.

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Osage County, Oklahoma
Survey Area Data: Version 10, Dec 26, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 23, 2010—May 16, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Osage County, Oklahoma (OK113)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
13	Lucien-Coyle complex, 3 to 8 percent slopes	0	1.0	21.5%
57	Steedman-Lucien complex, 3 to 15 percent slopes	0	3.7	78.5%
Totals for Area of Interest			**4.7**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

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Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: *None Specified*

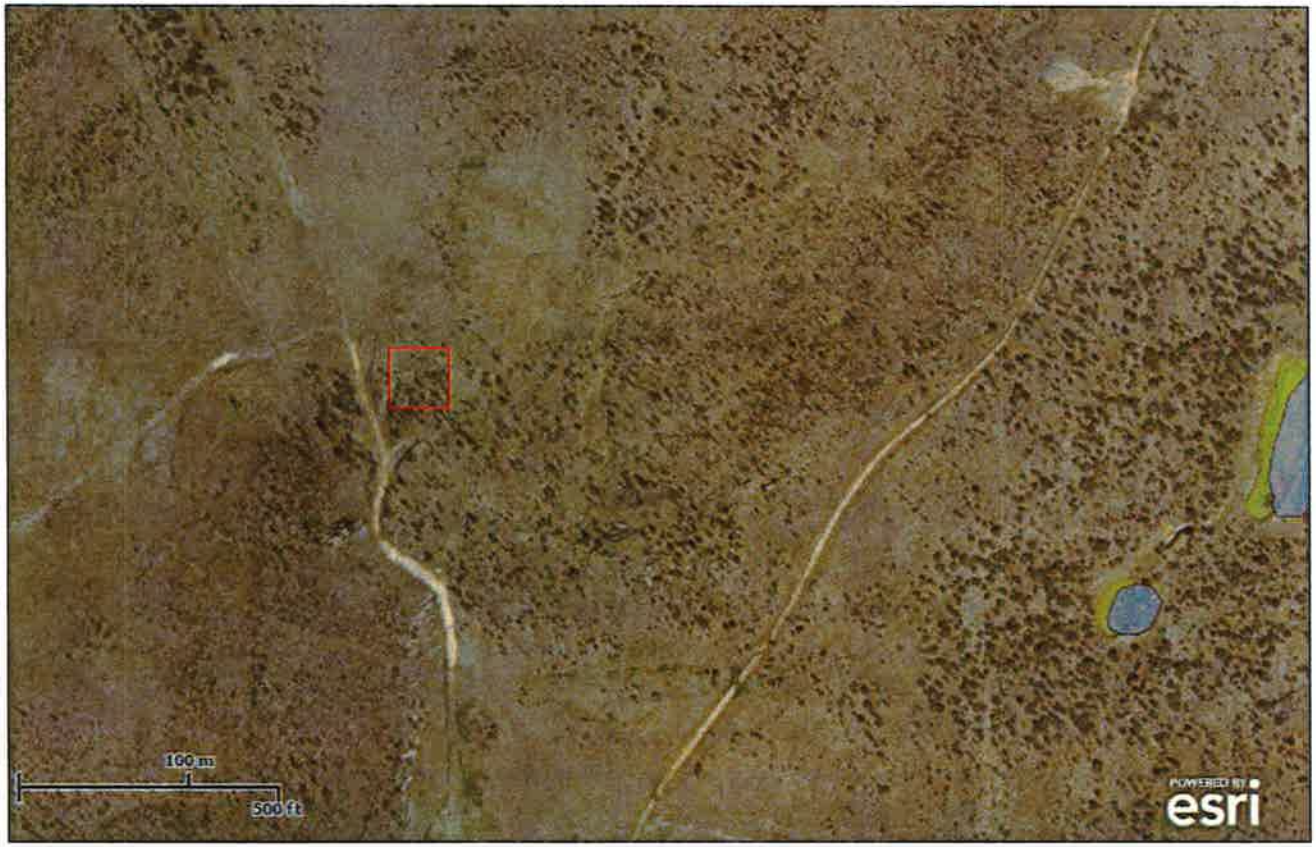
Tie-break Rule: Lower

U.S. Fish and Wildlife Service

National Wetlands Inventory

Allee #22-1

Oct 8, 2014



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

User Remarks:

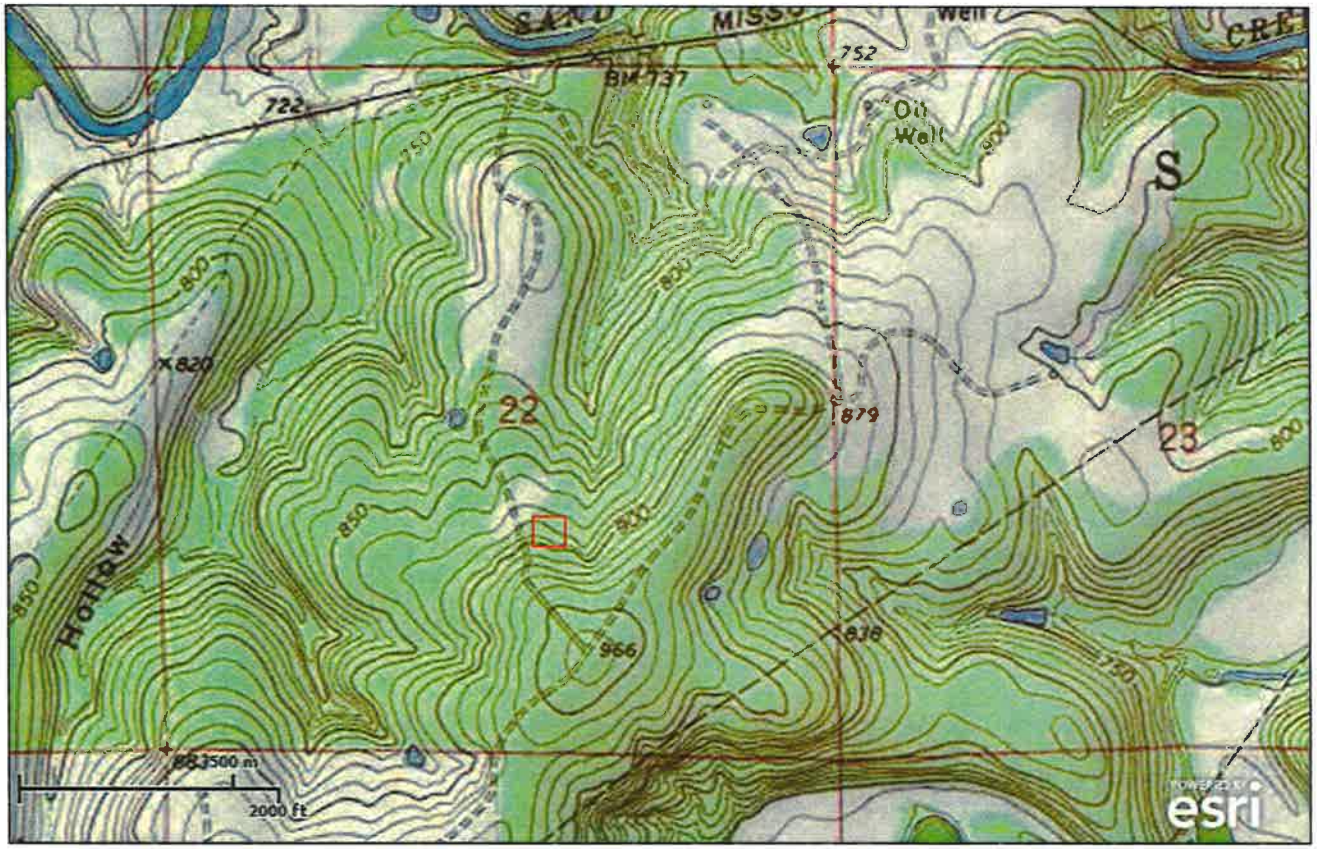
Osage County, Oklahoma

U.S. Fish and Wildlife Service

National Wetlands Inventory

Allee #22-1

Oct 8, 2014



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

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User Remarks:

Osage County, Oklahoma

U.S. Fish and Wildlife Service

National Wetlands Inventory

Allee #22-2

Oct 8, 2014

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

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User Remarks:

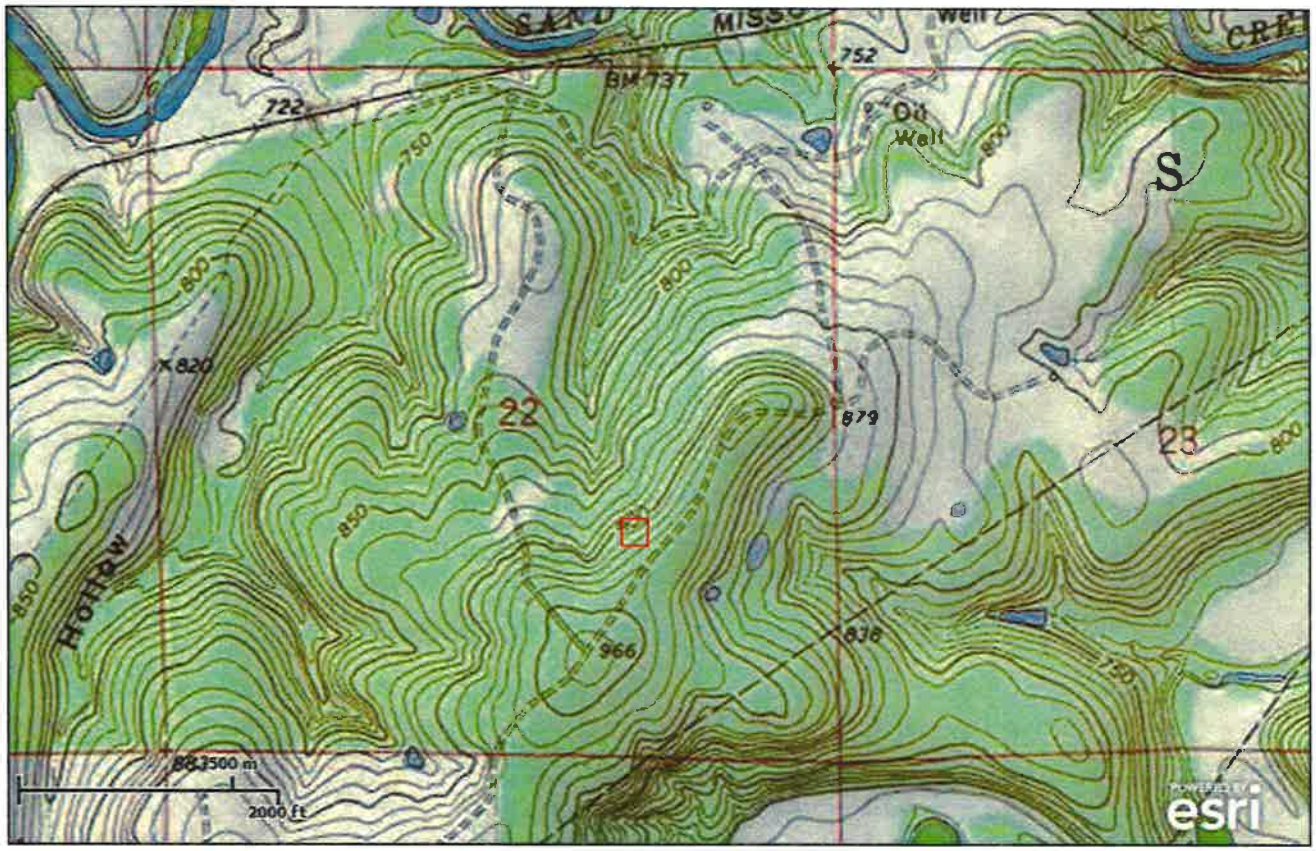
Osage County, Oklahoma

U.S. Fish and Wildlife Service

National Wetlands Inventory

Allee #22-2

Oct 8, 2014



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

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User Remarks:

Osage County, Oklahoma

U.S. Fish and Wildlife Service

National Wetlands Inventory

Cottonmouth #3-5

Oct 8, 2014

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

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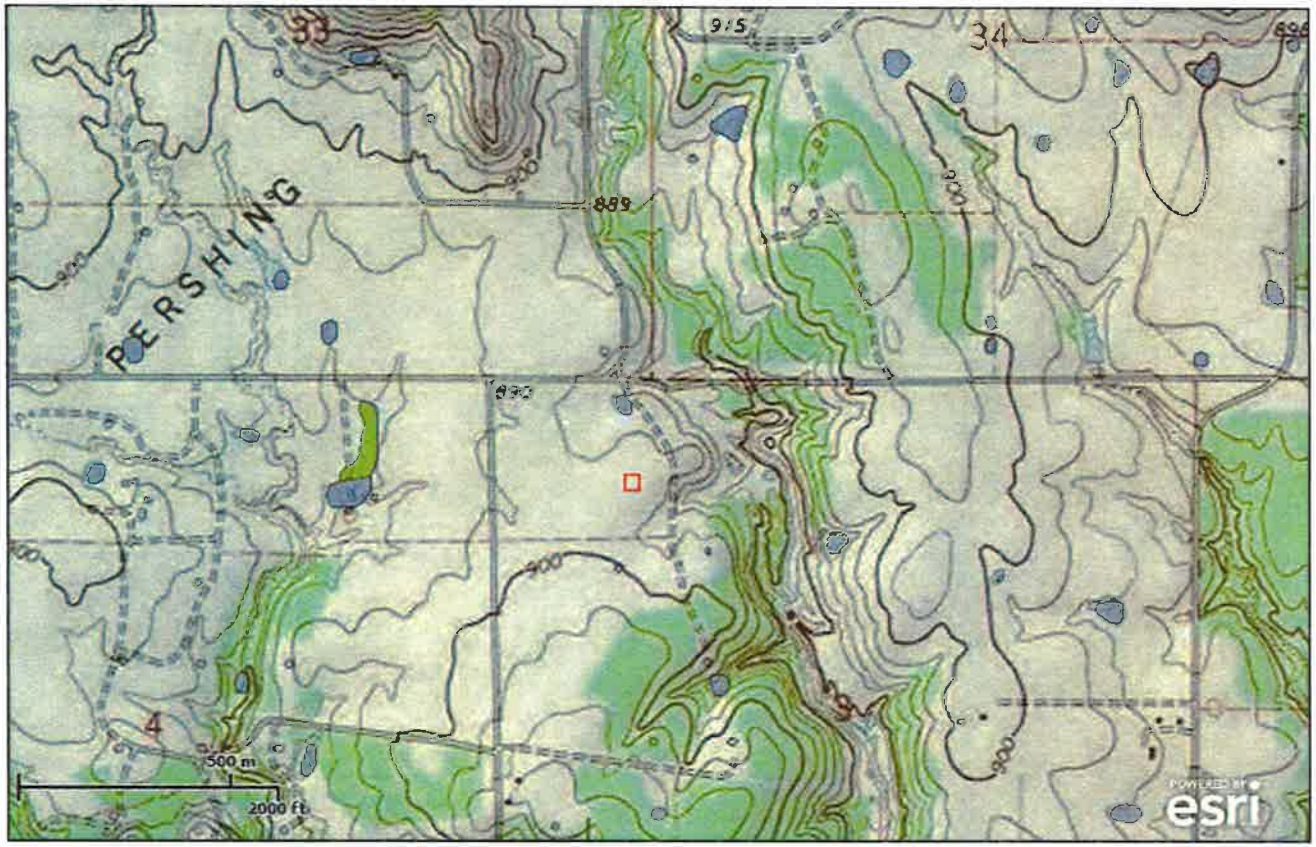
User Remarks:

Osage County Oklahoma

U.S. Fish and Wildlife Service
National Wetlands Inventory

Cottonmouth #3-5

Oct 8, 2014



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

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User Remarks:

Osage County, Oklahoma

U.S. Fish and Wildlife Service

National Wetlands Inventory

Cottonmouth #3-6

Oct 8, 2014

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

User Remarks:

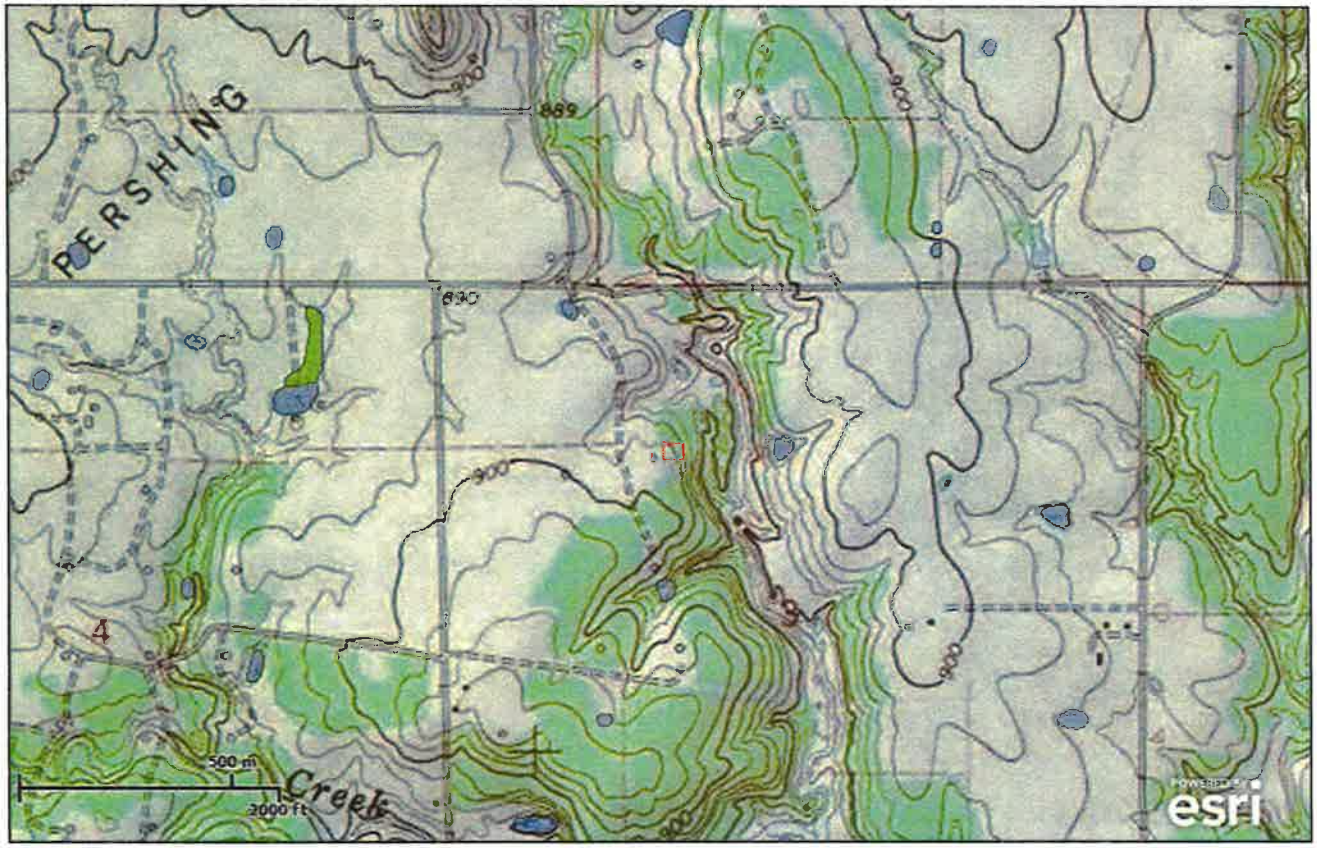
Osage County, Oklahoma

U.S. Fish and Wildlife Service

National Wetlands Inventory

Cottonmouth 33-6

Oct 8, 2014



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

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User Remarks:

Osage County, Oklahoma

U.S. Fish and Wildlife Service

National Wetlands Inventory

David #31-2

Oct 8, 2014

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

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User Remarks:

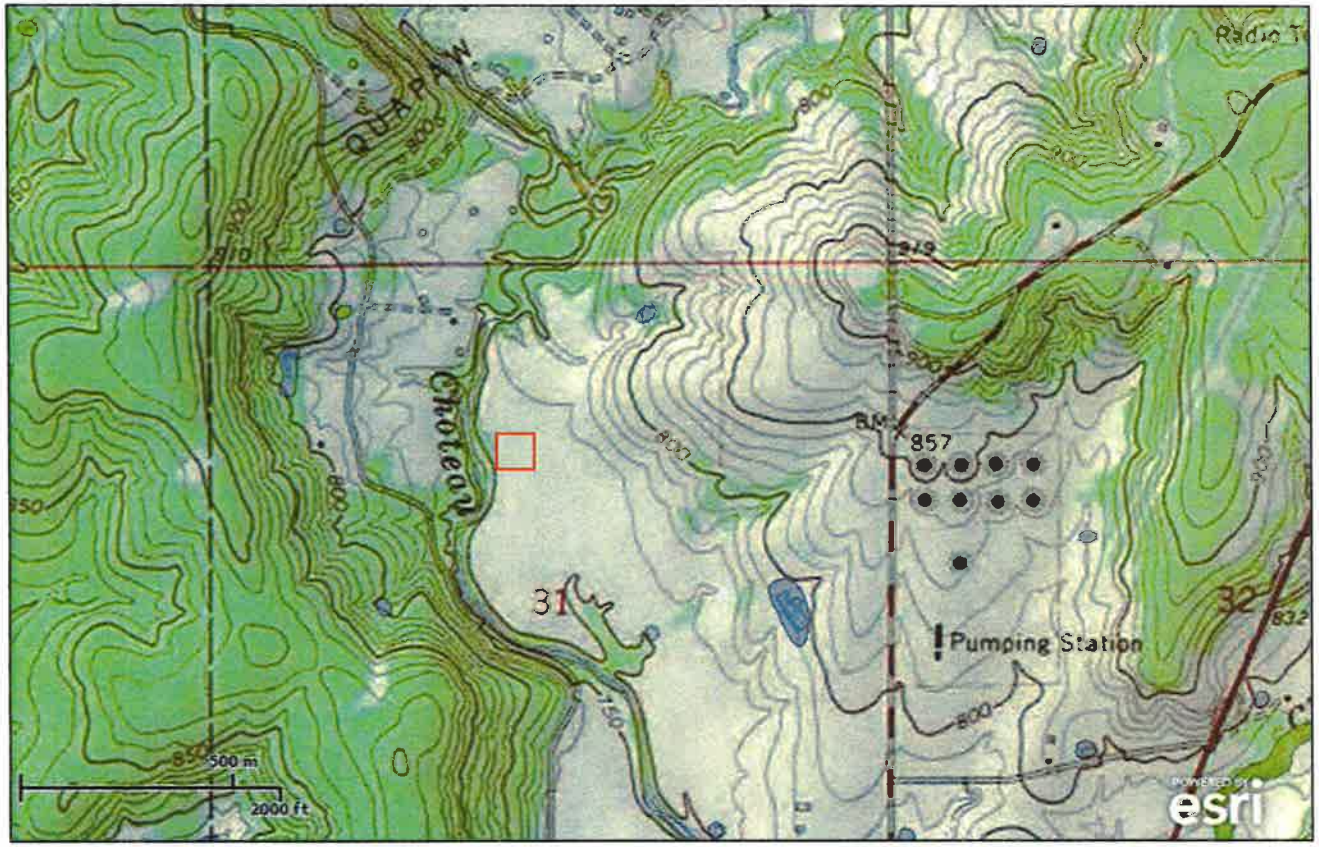
Osage County, Oklahoma

U.S. Fish and Wildlife Service

National Wetlands Inventory

Davis #31-2

Oct 8, 2014



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
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- Riverine
- Other

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User Remarks:

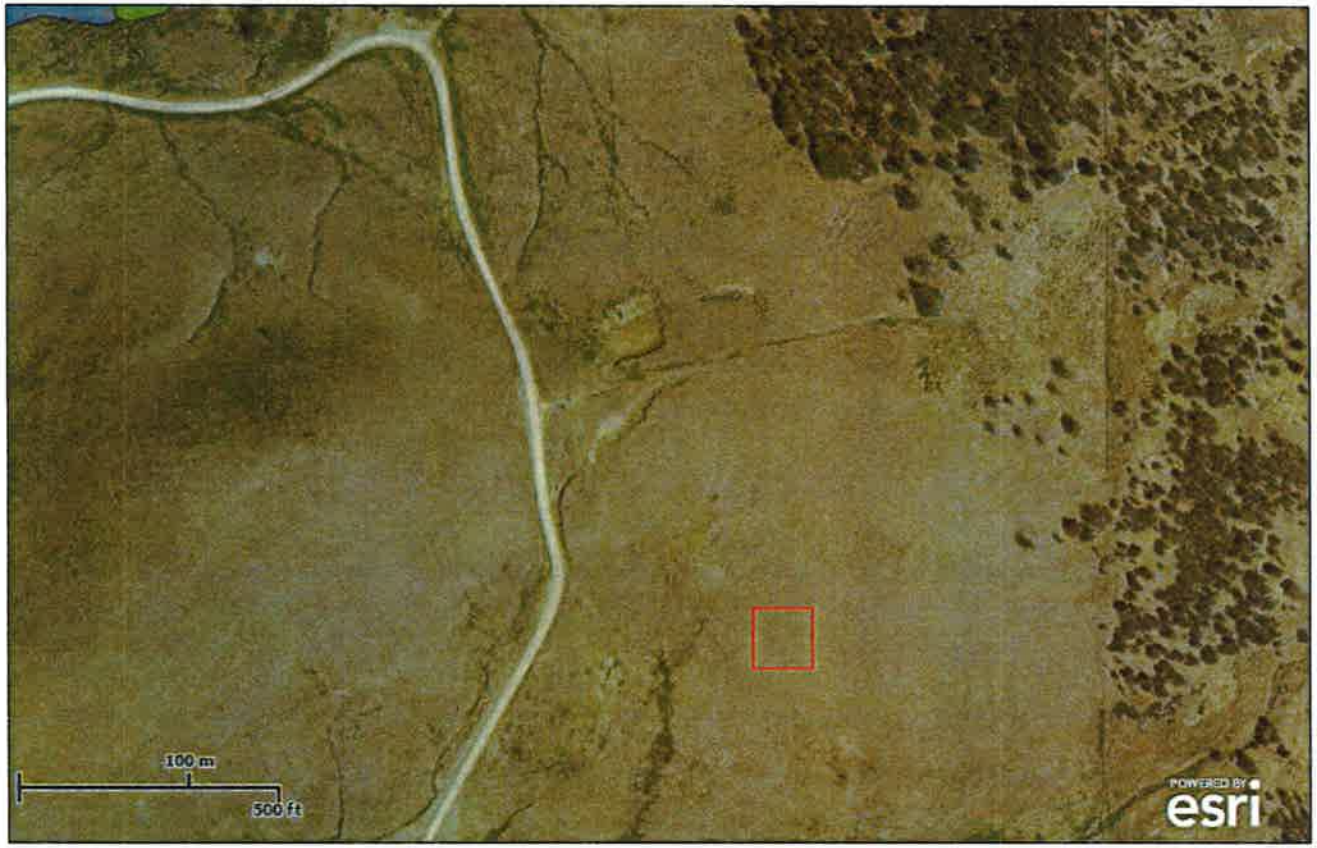
Osage County, Oklahoma

U.S. Fish and Wildlife Service

National Wetlands Inventory

Jackson Stoabs
#10-2

Oct 8, 2014



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

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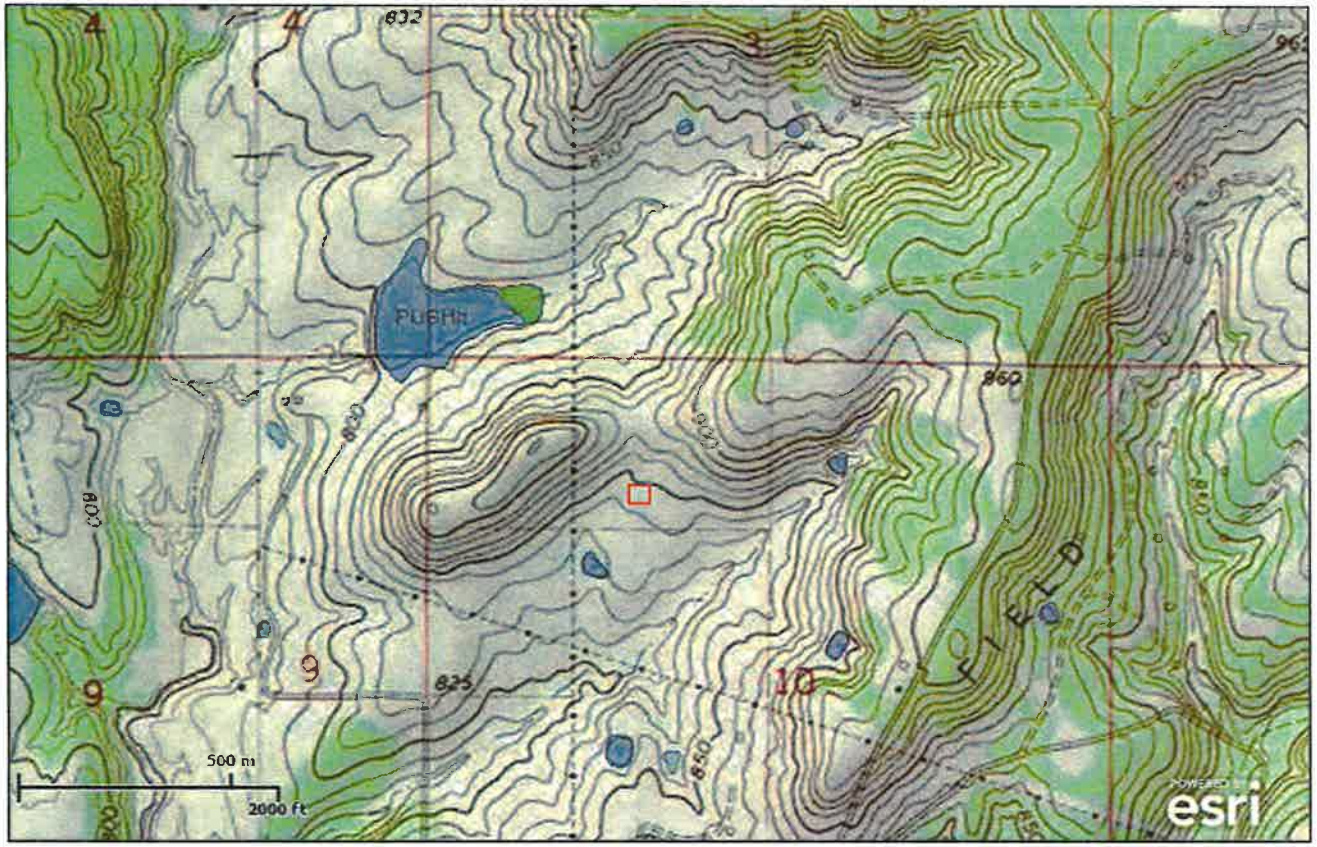
User Remarks:

Osage County, Oklahoma

U.S. Fish and Wildlife Service
National Wetlands Inventory

Jackson Stoabs
#10-2

Oct 8, 2014



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

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User Remarks:

Osage County, Oklahoma

U.S. Fish and Wildlife Service

National Wetlands Inventory

Jackson Williams
#10-3

Oct 8, 2014

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

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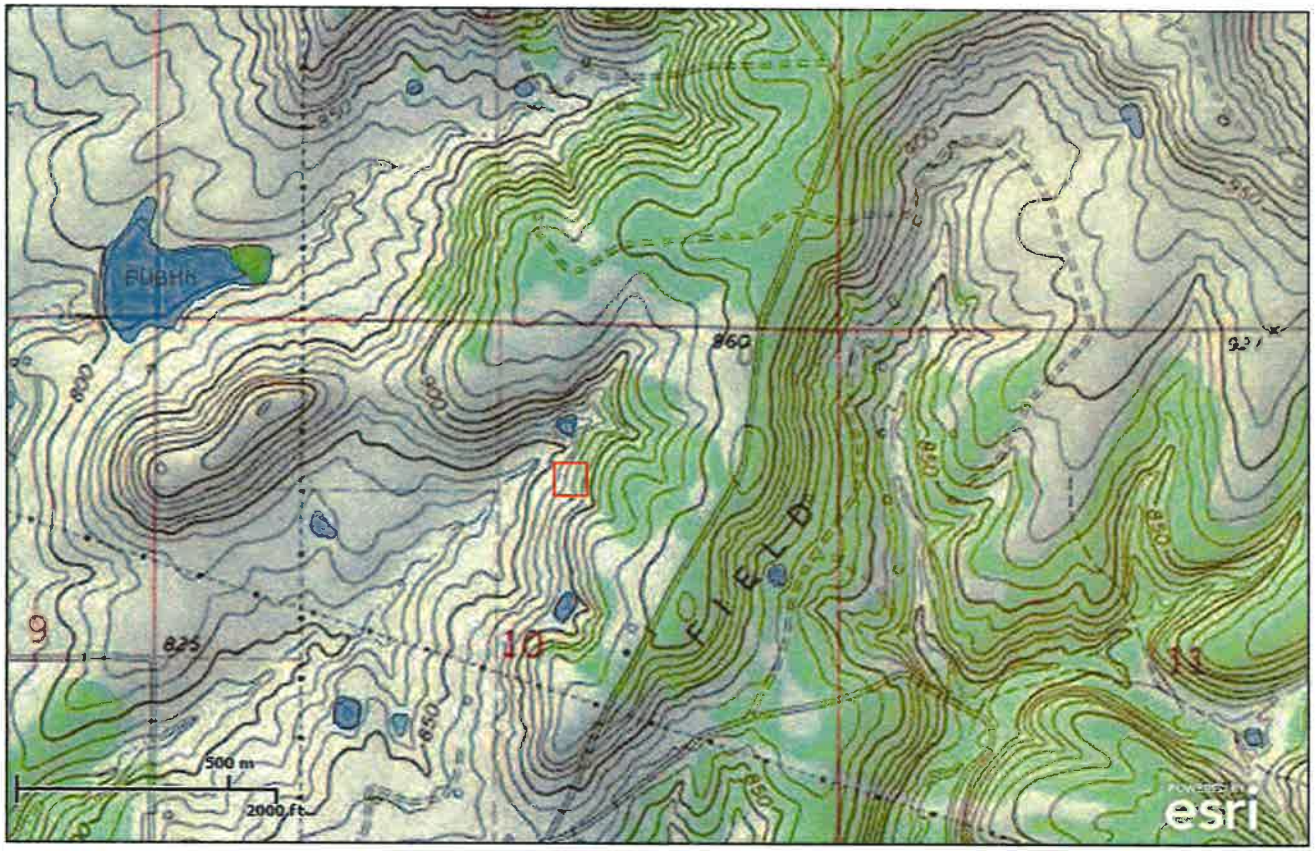
User Remarks:

Osage County, Oklahoma

U.S. Fish and Wildlife Service
National Wetlands Inventory

Jackson Williams
#10-3

Oct 8, 2014



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

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User Remarks:

Osage County, Oklahoma

U.S. Fish and Wildlife Service
National Wetlands Inventory

JM Hughes (Dove)
#28-5

Oct 8, 2014

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

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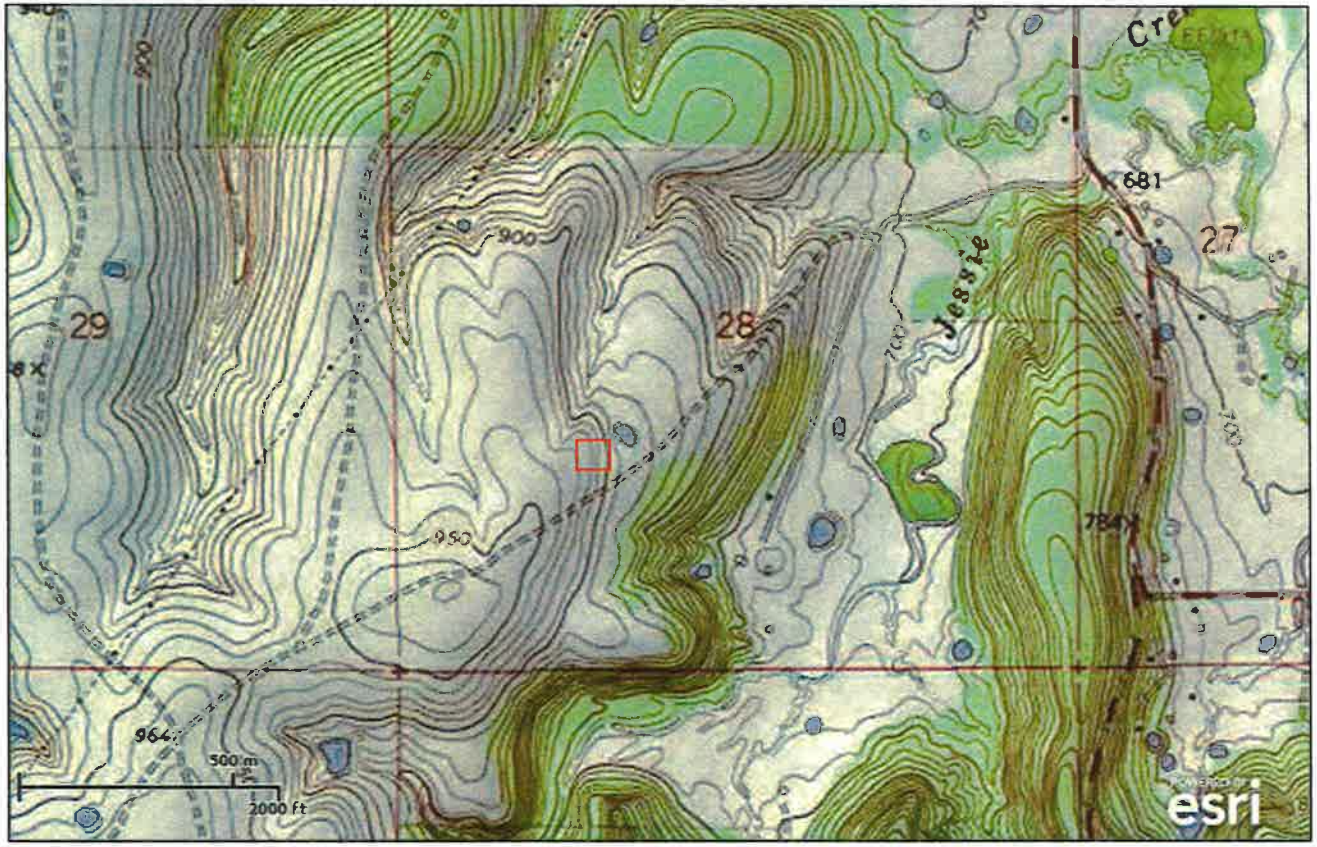
User Remarks:

Osage County, Oklahoma

U.S. Fish and Wildlife Service
National Wetlands Inventory

JM Hughes (Dove)
#28-5

Oct 8, 2014



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
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- Lake
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- Other

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User Remarks:

Osage County, Oklahoma

U.S. Fish and Wildlife Service
National Wetlands Inventory

Royal #5-6

Oct 8, 2014

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

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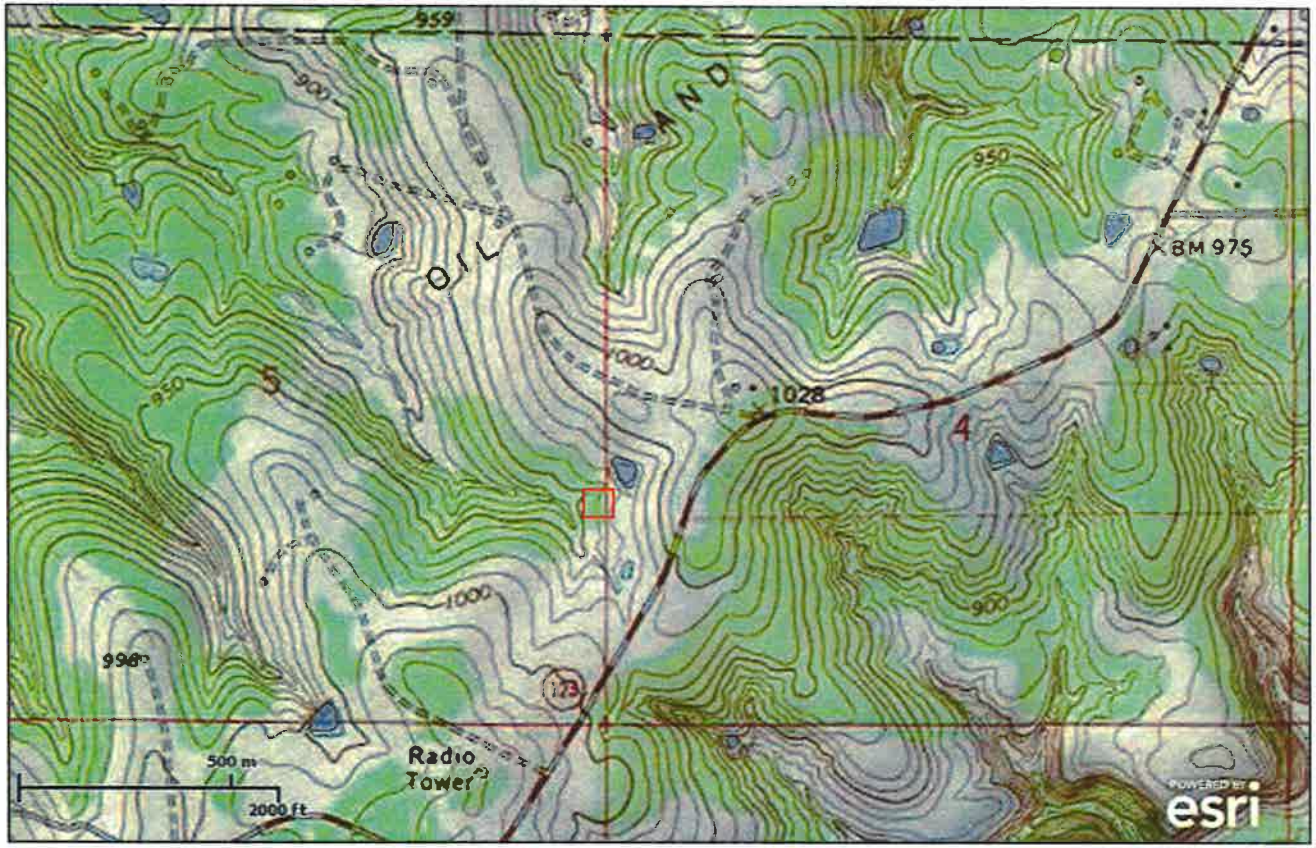
User Remarks:

Osage County, Oklahoma

U.S. Fish and Wildlife Service
National Wetlands Inventory

Royal #5-6

Oct 8, 2014



Wetlands

- Freshwater Emergent
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- Estuarine and Marine Deepwater
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User Remarks:

Osage County, Oklahoma

U.S. Fish and Wildlife Service

National Wetlands Inventory

Royal East Hughes
#4-3

Oct 8, 2014

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

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User Remarks:

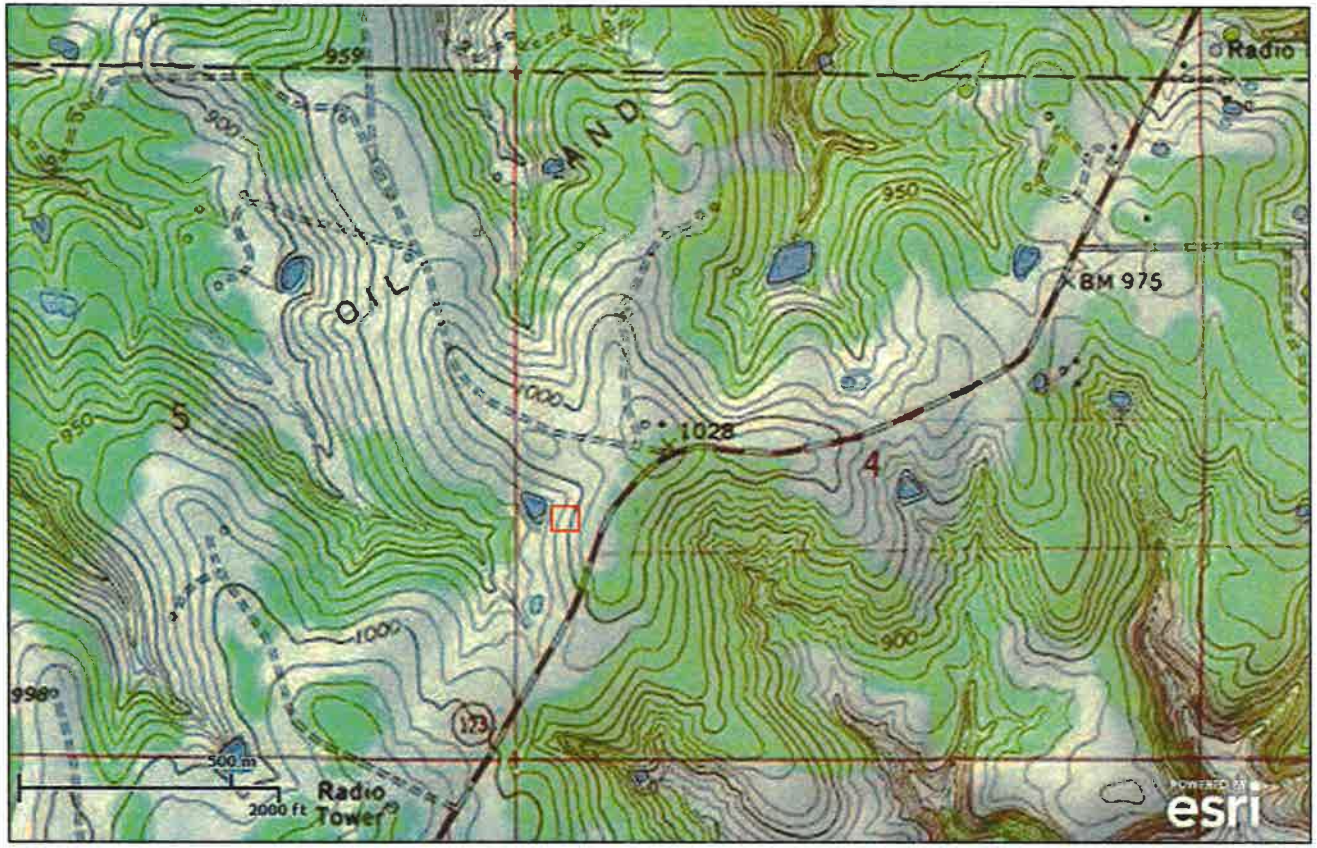
Osage County, Oklahoma

U.S. Fish and Wildlife Service

National Wetlands Inventory

Royal East Hughes #4-3

Oct 8, 2014



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- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
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User Remarks:

Osage County, Oklahoma