

Arkansas

Best Management Practices

for Fayetteville Shale Natural Gas Activities

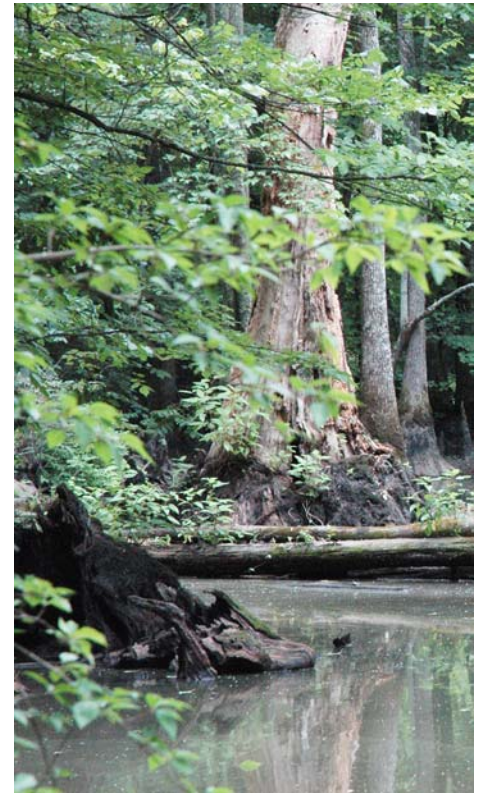
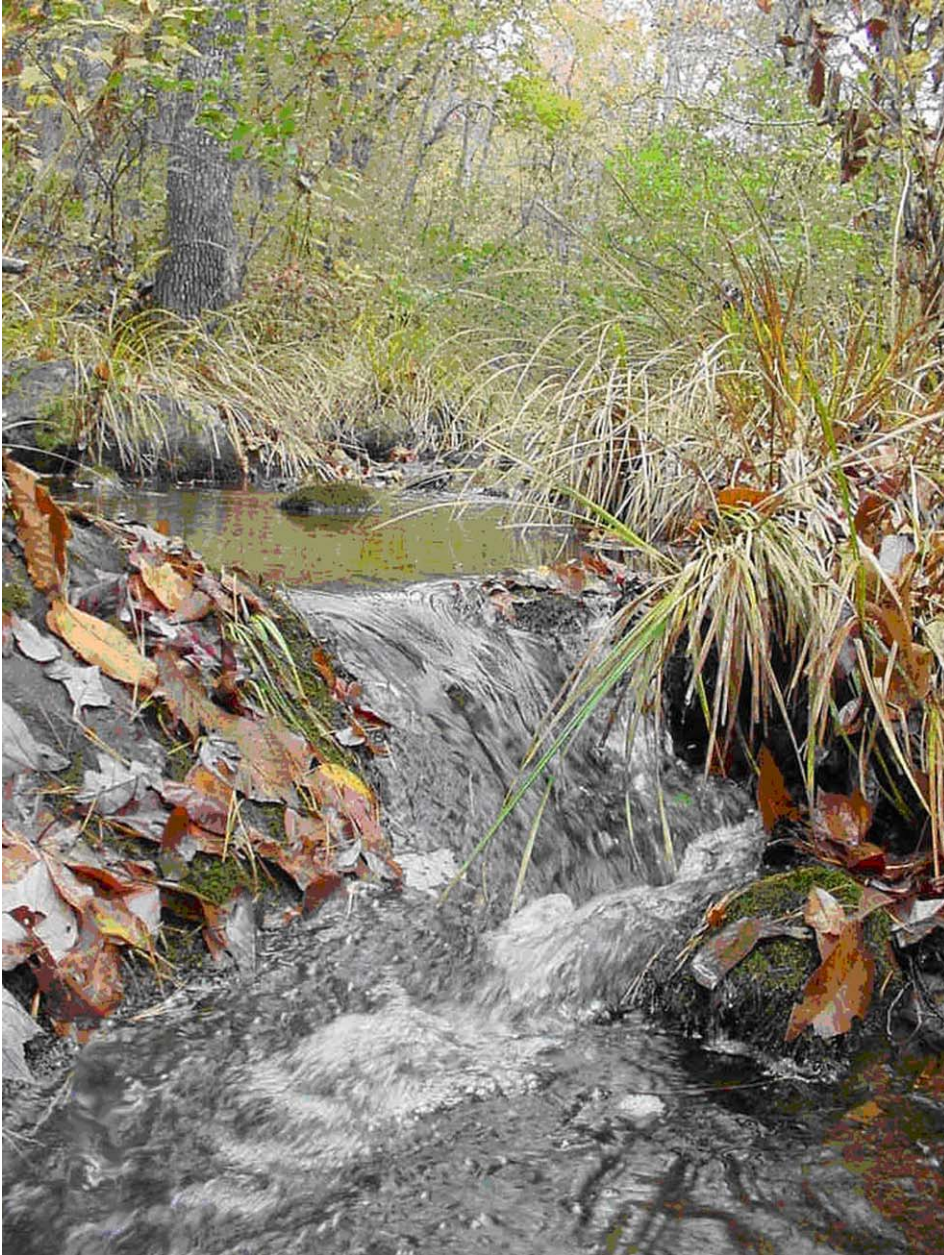
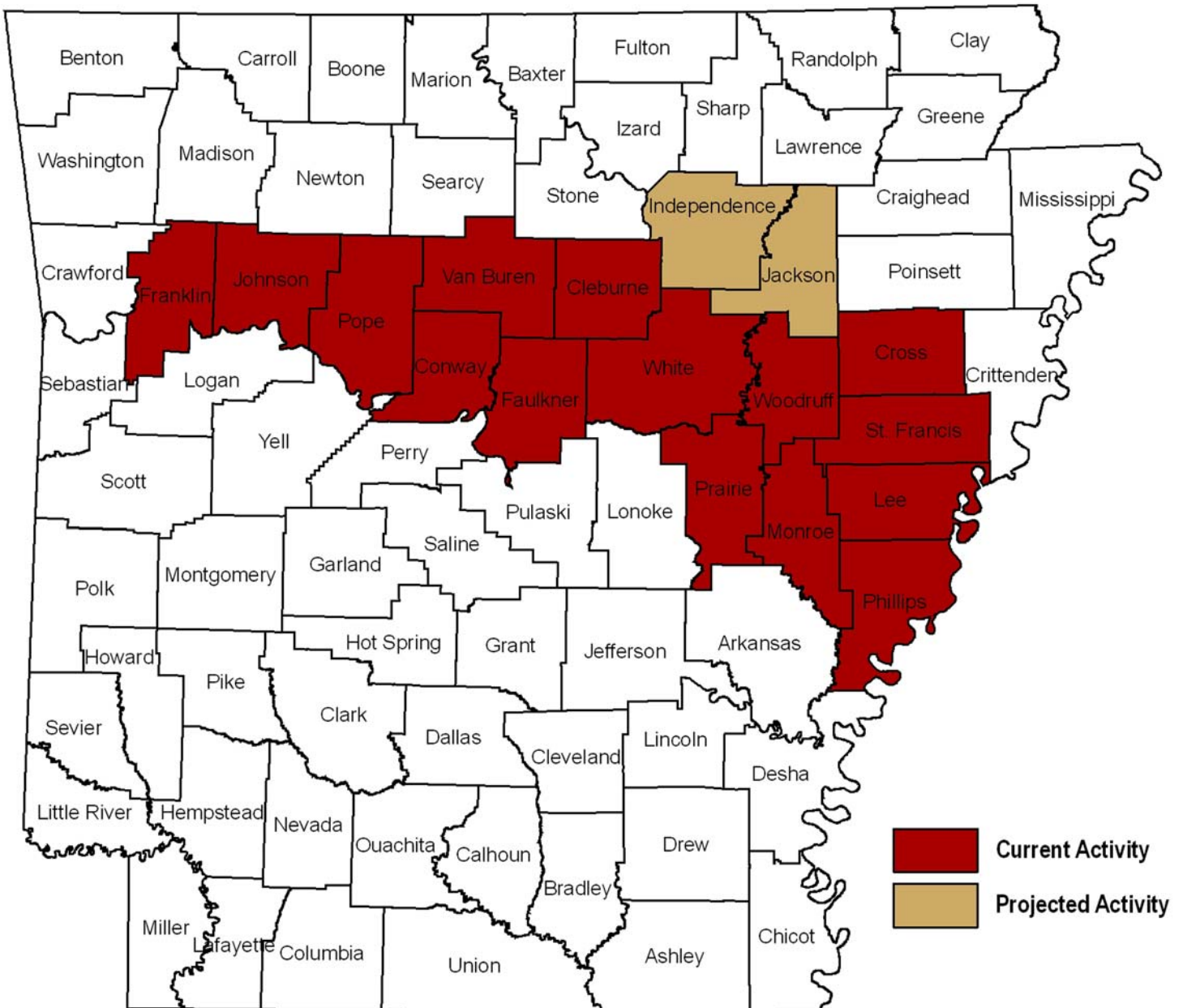


Photo above: USFWS, both at right: USFWS/Garry Tucker

Fayetteville Shale Natural Gas Development Area



Source: AR Oil and Gas Commission, April 2007

Best Management Practices

for Fayetteville Shale Natural Gas Activities *April, 2007*

These guidelines were developed in cooperation and partnership with:

Arkansas Commission of State Lands
Arkansas Department of Environmental Quality
Arkansas Game and Fish Commission
Arkansas Natural Heritage Commission
Arkansas Natural Resources Commission
Arkansas Oil and Gas Commission
Arkansas State Parks
Bureau of Land Management
Chesapeake Energy Corporation
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University of Arkansas
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Best Management Practices

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Introduction

All energy and energy-support companies are encouraged to voluntarily use best management practices (BMPs) in their exploration, drilling and reclamation activities. BMPs are innovative, dynamic, and improved environmental practices applied to activities (in this case gas exploration, drilling and production) to help ensure that activities are conducted in an environmentally responsible manner. BMPs allow energy companies to increase energy production while reducing the level of additional environmental impacts. This document was developed by a multi-agency workgroup to ensure all Arkansans benefit from the additional energy and the conservation of important public resources such as wildlife, rare plants, clean air and water, and aesthetic values while achieving the goals of state and federal laws that protect these resources.

1.0 Candidate, Threatened, and Endangered Species and Migratory Birds

The Fayetteville Shale area in Arkansas may now or hereafter contain plants, animals, or their habitat determined to be threatened, endangered, or special status species (*i.e.*, federal candidate and proposed species and state species of concern). State and federal agencies may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid activities that will contribute to loss viability of species or to trends toward the need to federally list such species.

State and federal agencies may require modifications to or disapprove a proposed activity that is likely to adversely affect or result in jeopardy to the continued existence of a candidate, proposed, threatened or endangered species or result in the destruction or adverse modification of designated or proposed critical habitat. Federal agencies (and state agencies in situations where a federal nexus, *e.g.*, federal funding, is applicable) will:

1. Provide a standard process to ensure that federally listed species and state species of concern receive full consideration in the decision-making process, including when to conduct a site specific inventory;
2. Address effects, including cumulative effects, of management activities to plant and animal species habitat and/or potential habitat of federally listed and state species of concern;
3. Incorporate any mitigation measures needed to specifically address proposed gas exploration, drilling and production activities; and
4. Will not approve any ground disturbing activity that may affect any federally listed species or critical habitat until completion of its obligations under applicable requirements of the Endangered Species Act as amended (16 U.S.C.1531 *et seq.*).

Please contact the U.S. Fish and Wildlife Service (501/513 4470) or Arkansas Natural Heritage Commission (501/324 9619) if you are unsure of the occurrence of sensitive fish, wildlife, or plants or their habitats in planned construction areas.

1.1 Bald Eagle

Disturbance sensitivity of roosting and nesting Bald Eagles may vary between individual eagles, topography, density of vegetation, and intensity of activities. The buffers and timing BMPs, as described below, are based on the

February 2006 *Draft National Bald Eagle Management Guidelines*, and should be implemented unless site-specific information indicates otherwise. The objective of Guideline 1.1 is described in more detail in the *Draft National Bald Eagle Management Guidelines*.

Modification of buffer sizes and timing may be permitted where biologically supported and in consultation with the U.S. Fish and Wildlife Service Arkansas Ecological

Services Field Office (FWS) and in coordination with Arkansas Game and Fish Commission (AGFC).

- 1.11 For activities that involve Activities “a” through “d”, follow Table A:
- a. Building construction, one or two stories, where the project footprint is 0.5 acre or less.
 - b. Construction of roads, trails, canals, power lines, and other linear utilities.
 - c. Alteration of shorelines or wetlands.
 - d. Water impoundment.



Dr. Thomas G. Barnes/bald eagle

Table A	If there is no similar activity within 1 mile from of the nest	If there is similar activity closer than 1 mile the nest
If the activity will be visible from the nest	660 feet. Clearing, external construction and landscaping should be done outside the December 15 to June 30 nesting season. Landscaping buffers are recommended.	660 feet, or as close as existing tolerated activity of similar scope. Clearing, external construction and landscaping should be done outside the December 15 to June 30 nesting season. Landscaping buffers are recommended.
If the activity will not be visible from the nest	330 feet. Clearing, external construction and landscaping should be done outside the December 15 to June 30 nesting season.	330 feet, or as close as existing tolerated activity of similar scope. Clearing, external construction and landscaping should be done outside the December 15 to June 30 nesting season.

- 1.12 For activities that involve Activities “e” through “h”, follow Table B:
- e. Building construction, 3 or more stories
 - f. Building construction where the project footprint is larger than 0.5 acre
 - g. Mining
 - h. Oil and natural gas drilling and refining

Table B	If there is no similar activity within 1 mile of the nest	If there is similar activity closer than 1 mile from the nest
If the activity will be visible from the nest	660 feet. Clearing, blasting, external construction and landscaping should be done outside the December 15 to June 30 nesting season. Landscaping buffers are recommended.	660 feet, or as close as existing tolerated activity of similar scope. Clearing, external construction and landscaping should be done outside the December 15 to June 30 nesting season. Landscaping buffers are recommended.
If the activity will not be visible from the nest	660 feet. Clearing, external construction and landscaping should be done outside December 15 to June 30 nesting season.	330 feet, or as close as existing tolerated activity of similar scope. Clearing, external construction and landscaping should be done outside the December 15 to June 30 nesting season.

1.13 Additional guidelines include:

- Avoid clear cutting within 330 feet of a nest at any time. Avoid timber harvesting operations, including road construction, chain saw, and yarding operations during the nesting season within 660 feet of a nest. Silviculture practices designed to conserve or enhance habitat should be conducted outside the December 15 to June 30 nesting season.
- Protect and retain communal roost sites, potential nest sites, and important foraging areas. Following “a” through “e” below will benefit Bald Eagles:
 - a. Retain mature trees and old growth stands within 0.5 mile of lakes and streams;
 - b. Avoid potentially disruptive activities and development in the eagles’ direct flight path between their nest or roost sites and important foraging areas;
 - c. Do not use explosives within 0.5 mile (or within one mile in open areas) of communal roosts when eagles are congregating, without prior coordination with the FWS and AGFC;
 - d. Locate aircraft corridors no closer than 1,000 feet horizontal and vertical distance from communal roost and nest sites; and

- e. Avoid excessive groundwater pumping and river diversion that can lead to destruction of nest trees, roosts, foraging areas, and negative impacts to their forage fish species.

Bald Eagles typically congregate at communal roost sites in Arkansas between November 15 and March 1. A communal roost is defined as an area where six or more Bald Eagles spend the night within 328 feet of each other.

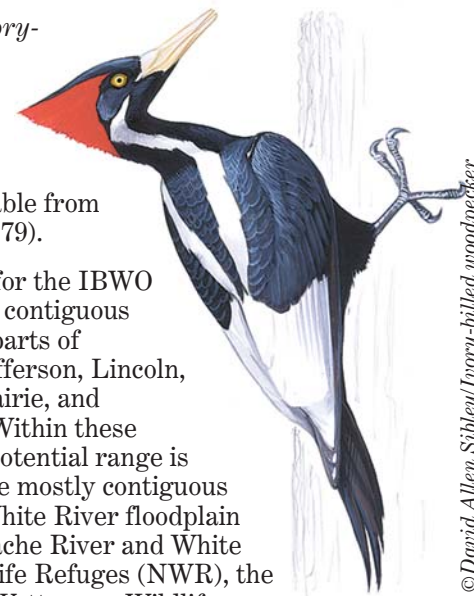
1.2 Ivory-billed Woodpecker

(Reference Ivory-billed Woodpecker Recommended Survey Criteria for Federal Actions in Arkansas and Mississippi)

The Ivory-billed Woodpecker (IBWO) has been rediscovered within the “Big Woods” of Arkansas. With the rediscovery of this species the FWS has worked with other land managers to develop a methodology for IBWO searches and to identify measures to protect this rare and endangered bird.

This information, *Ivory-billed Woodpecker Recommended Survey Criteria for Federal Actions in Arkansas and Mississippi*, is available from the FWS (501-513-4479).

The potential range for the IBWO in Arkansas includes contiguous forested habitats in parts of Arkansas, Desha, Jefferson, Lincoln, Monroe, Phillips, Prairie, and Woodruff Counties. Within these counties the IBWO potential range is further defined as the mostly contiguous forest of the lower White River floodplain encompassing the Cache River and White River National Wildlife Refuges (NWR), the AGFC Dagmar and Wattensaw Wildlife Management Areas (WMA), and adjacent contiguous forested private lands. The perimeter of the IBWO potential range generally follows the edge of large, contiguous forest but also includes forested corridors extending outward from the edge of core contiguous forest until the width decreases to less than 0.25 mile for a distance of more than 0.25 mile.



©David Allen Sibley/Ivory-billed woodpecker

The following BMPs do not exempt production companies from special use permitting requirements specific to public lands where activities may take place.

- 1.21 When natural gas exploration, and production actions are planned within IBWO potential habitat, search the footprint of proposed activities plus a one mile buffer around the perimeter of the project footprint. Apply search criteria direction identified for conversion activities.
- 1.22 No surface occupancy shall be permitted within a 0.5 mile radius buffer (primary zone) around active or inactive nest or roost cavities.

1.23 No disturbance shall be permitted during the nesting period (February 1 through May 31) in the secondary zone, which encompasses the area within 0.75 mile of the primary zone around active or inactive IBWO nest or roost cavities.

1.24 Minor construction and routine maintenance activities to existing natural gas pipelines and production facilities that are at least 1.25 miles away from known IBWO nest or roosts are permitted without search of adjacent potential IBWO habitat under the following specific conditions.

Minor activities planned on existing facilities outside of the breeding season within the IBWO potential range may be done without search of adjacent potential habitat. These activities may temporarily displace an IBWO from foraging or roosting in forested habitats adjacent to work sites. These activities should not result in significant disturbance to IBWO because the species is highly mobile outside of the breeding season, may use multiple roost sites, and the forested matrix offers well distributed foraging habitat. Additionally, there is a very low potential of encounter due to a very low population density.

Minor gas pipeline construction activities that take place on existing above ground facilities during the breeding season which can be completed in one work day with noise levels similar to those already on the existing facilities may be done with no search of adjacent potential IBWO habitat.

All other minor gas pipeline activities that would occur within the IBWO potential range are subject to search criteria guidance.

1.3 Red-cockaded Woodpecker (Pine City Population)

1.31 No surface occupancy shall be permitted within 0.5 mile of a Red-cockaded Woodpecker cluster. A cluster is defined as a convex polygon surrounding all active and inactive cavity trees plus a 200 foot buffer surrounding that polygon. Vehicle use is prohibited within a cluster unless on an existing, maintained road.



Phillip Jordon/Red-cockaded woodpecker

1.4 Interior Least Tern

1.41 No surface disturbance in Interior Least Tern habitat (sand and/or gravel islands in the Arkansas and Mississippi rivers). The critical nesting period for the Interior Least Tern is between May 15 and

August 1. Nesting may extend beyond these dates depending on river stage elevations. No activities, other than normal boat traffic, will be permitted within 1,000 feet of the shoreline of an active nesting colony.

If surveys or observations reveal Interior Least Tern breeding activity within 0.5 mile of a proposed activity during this time period, no action should proceed prior to consultation with the FWS and coordination with other appropriate state and federal agencies. Impacted or lost Interior Least Tern habitat, active or not, should be replaced in kind to ensure no net loss of habitat.



USFWS

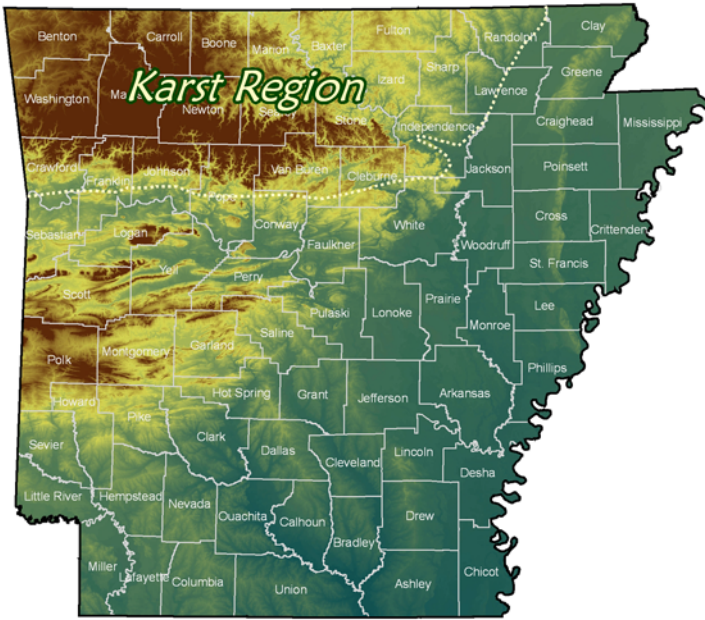
1.5 Karst (Cave) Species and Groundwater

Karst areas, such as northern Arkansas, contain numerous exposed karst features and subterranean passageways (Figure 1). Surface water enters groundwater systems rapidly as it passes through fractured bedrock under thin layers of permeable soil. Groundwater in karst areas can travel as quickly as a few thousand feet to over a mile per day. If surface water is polluted, the groundwater also may be polluted and sensitive habitats may no longer support sensitive cave species. Those characteristics of karst ecosystems make the surface/groundwater environment fragile and highly susceptible to human disturbance.

There are over 3,000 known caves in the Ozarks of Arkansas, with potential for many additional caves with no known entrances. Caves contain significant resources related to biology, geology, hydrology, archeology, paleontology, recreation, and scenery. Cave environments, by their very nature, provide unique, closed systems that are valuable for scientific study and environmental education of underground resources and the interrelationship between surface and subsurface.

Potential hazards to cave/karst resources may result from the following natural gas activities:

1. Contaminants such as lost drilling fluids (which sometimes contain chemicals) and cements (which may restrict groundwater flow and introduce pollutants), as well as hydrocarbons from spills or leaks (including floods) from well casings, storage tanks, reserve pits, pipelines, and production facilities that may enter into the cave/karst systems;



Karst region of Arkansas

2. Vented or escaped gases, collecting in sinkholes and caves. These gases can cause a die-off of plant and animal life that use the special habitat created by the microclimate of the cave entrances or sinkhole;
 3. Increase soil erosion from gas development activities (i.e., well pads, roads, etc); and
 4. Corrosion of the casing strings.
- 1.51 Bats (includes Indiana, Gray, and Ozark Big-eared bats):
- a. No drilling or blasting should occur within a one mile radius around known maternity or hibernacula.
 - b. If exploration and/or production require tree removal within a five mile radius around known Indiana bat hibernacula from March 15 to December 1, survey for the presence of Indiana bats should occur. These surveys are targeted at identifying Indiana bat roost so as to avoid any impacts to the roost trees and the pregnant females and non-volant young.

Since bats are found in these areas from spring to fall, focus should be placed on mitigating harm on the assumption that they are there and negate the need for survey.
 - c. The extended period from September 15 to December 1 is to negate affects associated with bat swarming. If it's decided not to conduct these surveys, then all ground disturbance and tree removal should occur between December 2 and March 15.
 - d. If a roost tree or maternity or hibernacula cave is located, a 0.25 mile conservation zone (No Surface Occupancy [NSO]) should be applied.
- e. Maintain riparian buffer strips of at least 250 feet either side of the stream within the five mile conservation zone.
 - f. Follow additional guidance contained in the biological opinion developed for the Ozark-St. Francis National Forest Revised Land and Resource Management Plan (Appendix A) when conducting activities on the National Forest.
 - g. Maintain the following average standing dead, existing, and potential hollow den and loose bark trees per acre forest wide: 0.25 and 5 mile Bat Conservation Zones should contain nine snags per acre, of which two snags per acre are greater than 12 inch dbh.
 - h. Optimal over story density within the 0.25 mile primary zone around bat hibernacula is a range of 60 to 80 percent canopy closure. Optimal over story within the 5 mile conservation zone around bat hibernacula is a range of 50-70 percent canopy closure.
 - i. In the 5 mile conservation zone around bat hibernacula, a minimum of 60 percent of all forested acreage should be maintained in nine inch or greater size class. Of this total, about 40 percent should be trees in a mature condition. The 0-10 age class should not exceed 10 percent of the forested acreage of the secondary buffer at any time.
 - j. Seasonal noise restrictions may be required (contact FWS at 501/513 4477).
 - k. Before old buildings, wells, cisterns, and other man-made structures are structurally modified or demolished, they should be surveyed for bats. If bat roosting is found, these structures should be maintained.
- 1.52 Ozark cavefish (*Amblyopsis rosae*), Benton County cave crayfish (*Cambarus aculabrum*), and Hell Creek cave crayfish (*Cambarus zophonastes*).
- 1.521 NSO within 1 mile of a known cavefish site, and if drilling within the recharge zone, injection of dye tracers to determine the possibility of contamination from drilling fluids should occur. Buffers (250 feet either side of stream) should be applied to all karst features (i.e. sinkholes, losing streams, caves, springs) within the recharge zone.
- 1.53 Exploration and/or production should not occur within 0.25 mile proximity to cave and karst features not containing federal candidate or listed species. For more information regarding karst or cave features, contact FWS at 501/513 4477.
- 1.54 If possible avoid entry into delineated or predicted recharge zones for public drinking water, or rare and endangered species.

Depending on the amount and depth of groundwater withdrawal, the potential for local and regional groundwater impacts may occur. Groundwater from alluvial and deep aquifers is used for municipal and agricultural purposes throughout the state. Given that the rate of withdrawal from the aquifers is greater than their recharge, additional withdrawal could influence the states groundwater basin for many years to come.

1.55 **Drilling and Cementing:** The upper portion of the well passing through the recharge zone or permeable layers within the aquifer should be drilled according to AOGC rules and regulations (AOGC General Rule B-15). Thus, the quality and quantity of water in the groundwater should not be significantly affected. If lost-circulation zones, either air-or water-filled, were encountered above the confining unit, some cement could be introduced into shallow caves adjacent to the borehole. In the saturated zone, cementing would increase the pH of water adjacent to the well bore.

The unsaturated zone in the aquifer would be affected by drilling fluid if lost-circulation zones were encountered. Fresh water, bentonite (gel), or other organic constituents such as cedar fibers or paper sweeps used to stop lost circulation or clean the hole would be introduced. Lost fluids would either be ponded locally, or move downward to the water table. Materials introduced above the water table in karst systems may remain immobile for indefinite periods only to move under conditions of increased recharge.

1.56 **Plugging and Abandonment:** After a well is depleted and then plugged and abandoned, impacts to cave values could also occur if gases leaked into a void or fracture which contacted a cave. This could occur as a result of deterioration of casing over time and/or an ineffective cementing operation during completion of additional wells. The steel casing may deteriorate over time because of interactions of the casing with hydrogen sulfide gas and other natural elements. Operations and maintenance activities should be in accordance with state and federal laws and the best industry standards.

1.57 If production is slated for an area within one mile of known human consumed groundwater or rare and endangered species, the company should conduct a review of known wells and inject dye into their drilling fluids with traces being collected at local springs and wells. In the case of an entry within a known recharge zone, dye should be injected to protect a drinking water supply.

1.58 Drilling should cease if operations open new entrances to the surface or when a cave passage is encountered. Operators should notify the AOGC, FWS, and AGFC immediately.

1.59 Initial drilling should use air or fresh water so the primary substance potentially entering a cave would be cuttings from the drilling.

1.510 Refer to BMP 4.19 (Reserve Pits) in this document for recommendations to avoid leaching chemicals from reserve pits. Closed loop systems are recommended in areas with sensitive habitats (*i.e.*, wetlands, etc.).

1.511 **Rotary Drilling with Air or Fresh Water:** Rotary drilling techniques in cave or karst areas should include air or fresh water as a circulating medium in zones where caves or karst features are expected. This should be done to a particular depth as determined by a professional geologist or hydrologist familiar with Ozark karst.

1.512 **Dye Introduction:** Where a public drinking water supply or rare and endangered species habitat exists, dye should be added to drilling fluids to track potential groundwater impacts. Wells and springs within the delineated or predicted recharge zone should be monitored for the presence of dye during the drilling process. Certain Arkansas Oil and Gas Commission (AOGC) field rules establish requirements for both surface and production casing. Surface casing is required to be cemented to surface and the depth set can be modified to a greater depth to protect the sources of freshwater (AOGC General Rule B-15).

1.513 **Directional Drilling:** Directional drilling should occur at least 100 feet below the bottom of the cave occurrence zone as identified by a professional geologist or hydrologist familiar with Ozark karst.

1.514 **Casing:** All casing should meet or exceed National Association of Corrosion Engineers specifications pertaining to the geology of the location and be run according to AOGC, American Petroleum Institute, and U. S. Forest Service standards (AOGC General Rule B-15).

1.515 **Cementing:** All casing strings should be cemented according to AOGC rules and regulations (AOGC General Rule B-15).

1.516 **Lost Circulation:** ALL lost circulation zones from the surface to the base of the cave occurrence zone should be logged and reported.

If a bit drops four feet or more with circulation losses greater than 75 percent while drilling in any cave-bearing zone, drilling operations should immediately stop and the appropriate agencies (AOGC, ADEQ, FWS, and publicly-owned property owners) should be notified by the operator. The appropriate agencies will assess the consequences of the situation and work with the operator on corrective actions to resolve the problem.

1.517 **Delayed Blasting:** Any surface or subsurface blasting in the vicinity (refer to BMP 1.51a) of karst features should be phased and time delayed. Blasting activities near karst features also should be coordinated with the FWS and AGFC.

1.518 Abandonment Cementing: Upon well abandonment the well bore should be cemented completely from 100 feet below the bottom of the cave bearing zone to the surface. Plugging requirements are regulated by the AOGC (AOGC General Rule B-8).

1.519 Pressure Tests: AOGC General Rule and field rules require testing at the time of running the casing strings. If the test results indicated a casing failure, remedial actions approved by the appropriate natural resource agencies should be undertaken to correct the problem.

1.520 Differential Shut-off Systems: A leak detection system and differential shut off systems should be installed for pipelines and tanks used in production or drilling.

1.521 The true extent of the subterranean environment is difficult to clearly delineate. Undiscovered karst features; such as cave openings, sinkholes, and underground passages; may occur on or near your project site, even in previously developed areas.

Therefore, the following precautionary measures should be taken to avoid impacts to groundwater and sensitive/endangered species which may inhabit karst features not previously surveyed:

- a. Survey existing and any new right-of-ways for karst features such as cave openings, sinkholes, losing streams, and springs.
- b. Refer to BMP 1.53 for buffer information.
- c. If a cave is used by federally listed or sensitive species, the FWS and AGFC will likely request that the cave be mapped to determine if any additional openings or passages may be affected by the project.
- d. In the event that holes or other openings are encountered during construction activities, the work should cease within 250 feet of the opening until FWS, AGFC, or their designees investigate the site thoroughly.

1.6 Aquatic Species

Mussels: Speckled Pocketbook, Fat Pocketbook, Scaleshell, Pink Mucket, Spectaclecase

Fishes: Pallid Sturgeon, Yellowcheek Darter

Amphibians: Ozark Hellbender

Arkansas Pollution Control and Ecology Commission (APCEC) Regulation No.2 is applicable to all activities related to Fayetteville Shale Natural Gas. APCEC Regulation 2 provides for the protection of the existing and designated uses of the waters of Arkansas (www.adeq.state.ar.us/regs).

The objective of these BMPs is to protect the water quality, ecologically sustainable flows, and hydrologic processes of watersheds, particularly those that support federally listed and state species of concern (a list of state species of concern is available at (<http://www.wildlifearkansas.com/strategy.html>) and their host species (for mussels). This includes ensuring that:

1. Watersheds remain healthy, dynamic, resilient, and capable of responding to natural and human caused disturbances while maintaining the integrity of its biological and physical processes and maintaining the connectivity of habitats for aquatic organisms;
2. Riparian areas remain largely undisturbed and consist of an undisturbed community with intact hydrologic functions and processes;
3. Aquatic ecosystems continue to function properly and support aquatic biota commensurate with the appropriate ecoregion;
4. Old growth seep communities develop and regenerate naturally in relatively small patches, and
5. Federally listed and state species of concern habitats are sufficient to prevent downward trends in populations or habitat capability, allow species to complete all phases of their life cycles, and to prevent federal listing.

1.61 No surface disturbing activities, including discharges, within 250 feet of a river, stream, wetland, or spring. The operator should not disturb natural vegetation, consisting of trees, shrubs, and herbaceous plant species, within the 250 foot buffer.

1.62 Avoid adverse impacts (long-term and short-term) associated with the occupancy and modification of floodplains.

1.63 Span creeks and floodplains by attaching pipelines to bridges or directionally drill (minimum 250 foot set back from stream banks) under creeks, rivers, and other waters or wetlands supporting federally listed and sensitive species.

1.64 Implement erosion control measures prior to project implementation. Erosion control measures include:



Left to right, top to bottom: Larry Willis, Ozark cavefish; Cave crayfish; Indiana bat; Ozark big-eared bat; Chattanooga Nature Center, gray bat

- a. Identifying areas with potential for erosion problems prior to construction initiation;
- b. Installation of sediment and erosion control devices (*i.e.* silt fences, hay bales, temporary sediment control basins, erosion control matting, interceptor dikes and swales, ditch checks, and mulching, seeding, and/or revegetation);

USFWS/Paltilid sturgeon



- i. **Filter fences and straw bales:** Filter fences are useful to intercept and retain small amounts of sediment under sheet flow conditions and should be placed along the borders

of water bodies wherever disturbance or construction occurs. Filter fences should be a minimum of 10 feet from the ordinary high water mark of wetlands, streams, and rivers. Filter fences should be used in areas subject to erosion where the drainage area is one acre or less, but for larger areas a sediment basin also should be used. Filter fences should be used on slopes no greater than 1:1. The maximum flow path to each fence should be about 100 feet. No concentrated flows should be directed toward any fence. Filter fences should be trenched up slope from the barrier and supported by posts spaced a maximum of six feet apart.

Straw bales should be used in areas subject to sheet flow and erosion and where the drainage area is no greater than 1/4 acre per 100 foot of barrier length and the maximum slope behind the barrier is 50 percent (2:1). In most cases, bales should be placed in single rows along contours with the ends tightly abutting one another. To ensure that there is no underflow the bale barriers should be entrenched.

Whenever possible, the back side of the bale should be an undisturbed natural area. If the area behind the barrier has been disturbed or is naturally subject to erosion, the barrier should be back filled. All bales should be tied and staked. Filter fabric fences and straw bales should be maintained throughout the construction period and inspected daily during prolonged rainfall and immediately after each rainfall event.

- ii. **Sediment Traps:** Sediment traps are small temporary ponding areas used to detain storm water runoff and allow sediment to settle, thereby minimizing the amount of sediment entering streams and rivers. Sizing criteria for the traps include inflow and

sediment load, but traps are generally used for small drainage areas less than three acres. Because sediment traps filter out all but the finest sediments, filter fences are necessary at the outfall of the trap to retain silt and clay-size sediments.

A sufficient number of traps should be constructed to intercept runoff from the disturbed area and have sufficient capacity for potential storm events and accumulated sediment. Sediment traps should be designed for the specific disturbed area, for bare soil conditions, and typically for a 75 percent removal efficiency of sediment runoff. Sediment traps should consist of check dams located within an enlarged section of the interception ditch on stable ground. Stable ground should be identified as those areas with well drained soils and/or where vegetation remains in place to provide sufficient root strength to prevent sliding.

In areas where stable ground is not available, several small check dams should be used to prevent buildup of excess water. Traps should have both a low-flow outlet and an emergency overflow. Rock should be placed at the outlet and overflow to prevent erosion where the water enters the downstream drainage. The outlet pipe, if needed, should be sized to pass runoff from a 25 year flood, 24-hour storm event. Traps should not be constructed on fill material.

- iii. **Mulching and Revegetation:** Mulching and prompt revegetation should be used to minimize erosion of exposed soils. Vegetation should be re-established as soon as possible on all disturbed ground, including access roads and trench backfill. Native vegetation should be planted in the same growing season as construction or immediately following construction, or if not possible, the disturbed areas should be covered with straw, matting, or some other erosion control material in the interim. Seed should be planted by either a hydroseed method or by covering with mulch. A native grass and forb mixture recommended by the Natural Resource Conservation Service (NRCS) and the U.S. Fish and Wildlife Service (Service) should be used to reseed.
- iv. **Permanent Stabilization:** The original contours of the land should be restored as closely as possible. After the contours have been re-established, the topsoil that had been previously segregated should be redistributed across the surface of the disturbed area. Water bars should be graded horizontally across the slopes to help prevent gullying and erosion. Areas compacted by



heavy construction equipment should be chiseled and disc-plowed to loosen compacted soil. Disturbed stream banks should be stabilized using appropriate vegetation (native if possible).

- c. Adequate and continued maintenance of sediment and erosion control devices to ensure the effectiveness;
- d. Minimization of the construction disturbance area to further avoid streams, rivers, and lakes and riparian areas;
- e. Restoring steep embankments and approaches to stream crossings by implementing erosion control measures in BMP 1.64b;
- f. On approaches to stream crossings, drainage control structures should be located at the top of the slope/bank and at the base of the slope/bank. Runoff should be routed to stable slopes on either side of the right of way, or routed via temporary conveyance structures to the base of the approach slope where it can infiltrate into the riparian zone;
- g. Staging areas should be placed at least 250 feet away from stream banks;
- h. Location of equipment staging, fueling, and maintenance areas outside of wetlands, streams, rivers, riparian areas, floodplains, and lakes; and re-seeding and re-planting of native vegetation to Arkansas in order to stabilize stream banks and reduce erosion from all ground disturbing activities;
- i. Erosion and sediment control measures should be sized to handle at least the 25 year flood, 24-hour storm event;
- j. Instream deflectors and anchored logs should be used in high velocity streams to protect vulnerable banks and allow for reestablishment of vegetation. Riprap revetment should also be used, if necessary, to help stabilize slopes in areas of high velocity stream flows. The use of riprap

should, however, be minimized. Rock typical of the local geology should be used if available. Activities in this subsection require an ADEQ Short-term Activity Authorization; and

- k. BMP's, at minimum, should be maintained to protect designated and existing uses as defined by ADEQ and to meet numeric and narrative water quality standards.
1. Monitoring of BMP performance in critical areas, particularly at sensitive stream crossings and stream approach slopes should be conducted and documented on a routine basis prior to and after major storms during construction and operation. Based on monitoring, additional BMPs or other improvements may be necessary to insure minimization of impacts.
- 1.65 Ecologically sustainable flows should be maintained in waterbodies inhabited by aquatic species of concern. An ecologically sustainable flow needs and water quality assessment should be conducted prior to any water diversions or withdrawals. State and federal laws may apply and instream designated uses should be maintained.
 - 1.66 Proper road location and design can significantly reduce or eliminate impacts to environmental resources. Existing roads should be used as access routes whenever possible. Refer to BMP 4.20 for road construction and maintenance guidelines that will help alleviate impacts to aquatic fauna resulting from increased erosion and sedimentation.
 - 1.67 All efforts should be made to minimize stream alterations which could impact water quality and fish and wildlife resources.
 - a. Construction along streams should only take place following aquatic life spawning or breeding seasons and after early life stages.
 - b. Measures (*e.g.*, installation of screens on pumps) should be taken to prevent larval fish entrainment during March 1 to June 30.
 - 1.68 Drilling sites subject to inundation due to over bank flooding should use a closed loop system to prevent drilling fluids from entering the system during floods. Riparian floodplain areas experience periodic over bank flooding, serve as spawning and nursery habitat for aquatic organisms, and perform vital wetland functions including nutrient transformation and water quality enhancement.



1.69 Compensatory mitigation may be required for impacts to perennial, intermittent, and ephemeral streams and should be designed to restore, enhance, and maintain stream uses that are adversely impacted by authorized activities. The U.S. Army Corps of Engineers, Little Rock and Memphis Districts, requires compensatory stream mitigation to compensate for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization have been achieved. Compensatory stream mitigation will be required for Standard Permits and Letters of Permission. Standard permits specific to Section 10 activities, such as dredging, will typically not require mitigation. The decision to use compensatory mitigation for General Permits, including Nationwide Permits, will be assessed on a case by case basis by the Little Rock or Memphis District.



USFWS/Yellowcheek darter

1.7 Federally Listed Plants (Virginia Sneezeweed, Missouri Bladderpod, Pondberry, Running Buffalo Clover, Harperella, *Geocarpon minimum*)

1.71 All viable special status plant species habitats will be identified during the environmental review of the proposed surface activity. If field examination indicates suitable habitat, a survey by a qualified botanist for special status plants should be conducted during time periods appropriate to each species. Based on that survey, the appropriate state and federal agencies will determine whether or not the species/would be affected by the proposed activity. If the species would be affected, additional requirements and/or recommendations may be provided to the operator by the appropriate state and federal agencies.

1.72 Avoid use of pre-emergent herbicides in areas with federally listed species and state species of concern.



USFWS/Geocarpon minimum

1.73 Avoid herbicide use at any known site inhabited by federally listed plants during the following time periods:

- a. Virginia Sneezeweed (*Helenium virginicum*): Spring “green up” until first frost.
- b. *Geocarpon minimum*: February through June.
- c. Missouri Bladderpod (*Physaria (Lesquerella) filiformis*): July through September

d. Pondberry (*Lindera melissifolia*): Bud inhibitor agents could damage plants during December through February. Plants flower in early spring before leaves are active, avoid herbicide applications from flowering through February.



USFWS/Missouri Bladderpod

e. Running Buffalo Clover (*Trifolium stoloniferum*): August through February.



Pete Pattavina/Pondberry

f. Harperella (*Ptilimnium nodosum*): May through October. Since this species occurs in stream channels and is typically underwater during this time, we assume it is dormant. It begins growing as stream waters recede in the spring and flowers and fruits in the summer when water in the stream channel is low.

- 1.73 Maintain native glade and sinkhole pond vegetation by minimizing or avoiding activities in this habitat type.
- 1.74 Pondberry is a wetland plant that is often found in sand pond habitats in eastern Arkansas, low sandy ridges in hardwood bottoms in the St. Francis Sunken Lands (Craighead and Poinsett counties), and in the Ouachita River bottoms (Ashley County). BMPs directed toward minimizing runoff and erosion or introduction of contaminants into these areas should be employed.

1.8 Migratory Birds

The objective of these BMPs is to protect perch and roosting sites, terrestrial habitats and avoid potential impacts to migratory birds. Migratory birds include ducks, geese, shorebirds, wading birds, raptors, neotropical migratory songbirds and others.

- 1.81 If any surface ponds exhibit sheen, or other contaminants are present in ponds, the ponds should be netted, covered with floating balls, or other methods used to exclude migratory birds.
- 1.82 Any reserve pit located in or near areas frequented by migratory birds, not closed within 10 days after a well is completed, and which contains water should be netted, covered with floating balls, or use other methods to exclude migratory birds.

1.83 In order to promote conservation of migratory bird populations and their habitats, federal agencies should implement those strategies outlined within the Memorandum of Understanding directed by the President of the U. S. under Executive Order 13186 (Appendix B), where possible.



Jim Rathert/MO Conservation/Common moorhen

1.84 Two primary causes of avian mortality are electrocutions and collisions with power lines. If new construction or modification of existing power lines is planned, strong precautionary measures to protect migratory birds by avian-proofing the power lines is recommended. All power lines should be built to protect migratory birds, including bald eagles, from accidental electrocution using methods detailed by the Avian Power Line Interaction Committee (2006).

CFR 7 Part 1724.52 allows for deviations from construction standards for raptor protection provided that structures are designed and constructed in accordance with the Avian Power Line Interaction Committee (1996, revised 2006).

1.85 Destruction, loss, or degradation of migratory bird habitats should be avoided to the extent practicable, minimized or appropriately mitigated. Refer to *Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances* (2002) for avoiding and minimizing impacts and mitigating unavoidable impacts to raptors.

1.86 Flare stacks should have anti-perching devices installed to prevent birds, usually raptors, from perching on them.

1.87 Open vent stack equipment, such as heater-treaters, separators, and dehydrator units, should be designed and constructed to prevent birds and bats from entering or nesting in or on such units, and to the extent practical, to discourage birds from perching on the stacks.



John and Karen Hollingsworth/Scarlet tanager

Installing cone-shaped mesh covers on all open vents is one suggested method. Flat mesh covers are not expected to discourage perching and are not acceptable.

1.88 Drilling sites subject to inundation due to over bank flooding should use a closed loop system to prevent drilling fluids from entering the system during floods. Riparian floodplain areas experience periodic over bank flooding and serve as feeding and roosting habitat for migratory birds, and perform vital wetland functions including nutrient transformation and water quality enhancement.

1.89 Maintain noise levels at or below 55 decibels during nesting seasons.

All migratory bird deaths must be reported to USFWS Law Enforcement (Little Rock, AR) at 501/324 5643.

2.0 Wetlands

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil condition. Wetlands include swamps, marshes, bogs and similar areas. Jurisdictional wetlands and waters of the U.S. are regulated under Section 404 of the Clean Water Act by the U.S. Army Corps of Engineers. A Section 404 permit issued by the Corps is required for any activity involving deposition of dredge or fill material in a jurisdictional wetland. There are four Corps Districts in the state of Arkansas; Memphis, Vicksburg, Little Rock, and Tulsa. Note that many wetlands are seasonally wet, which means that they may be seasonally dry. The Corps should be contacted if there is any question of whether a proposed project site could be in a wetland.

Compensatory mitigation may be required for impacts to perennial, intermittent, and ephemeral streams, or wetlands and should be designed to restore, enhance, and maintain streams or wetlands that are adversely impacted by authorized activities. Compensatory mitigation is required for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization have been achieved. Compensatory stream mitigation will be required for Standard Permits and Letters of Permission. Standard permits specific to Section 10 activities, such as dredging, will typically not require mitigation. The decision to use compensatory mitigation for General Permits, including Nationwide Permits, will be assessed on a case by case basis by the appropriate Corps district.

2.1 Avoid wetlands and low lying areas. If avoidance is not possible, follow BMPs 2.2 through 2.4.

2.2 Drilling sites subject to inundation due to over bank flooding should use a closed loop system to prevent drilling fluids from entering the system during floods. Riparian floodplain areas experience periodic over bank flooding and serve as spawning and nursery habitat for aquatic organisms, wintering and breeding habitat for waterfowl and neotropical migratory

songbirds, and perform vital wetland functions including nutrient transformation and water quality enhancement.

2.3 Access roads should be constructed using chemically inert materials. That is, byproducts of manufacturing or other processes that could contain toxics, nutrients, or other chemically active materials should not be used.



Ryann Hagerty/Okefenokee National Wildlife Refuge

2.4 Access roads should be constructed such that they do not alter hydrology. Hydrology is the primary controlling factor in maintaining bottomland hardwood wetlands.

Water movement through a wetland affects sediment deposition, tree health and survival, and wildlife habitat.

2.5 Temporary access roads should be constructed using materials that could easily be removed from the site with minimal ground excavation when no longer needed.

2.6 Wetlands should be stabilized by replacing the original subsoil and topsoil, replacing vegetation, and returning the topography and hydrologic characteristics of the wetland as closely as possible to their original form. Disturbed wetland buffers should be stabilized by replanting appropriate vegetation.

3.0 Geophysical Activities

Environmental impacts associated with geophysical activities largely will be controlled by the methods of access and the equipment used to drill shot holes. AOGC General Rule B-42 requires permitting of seismic activities and financial assurance. It does not establish the criteria below but does add a control value of knowing where and when seismic activity will occur. Strategies to minimize impacts from seismic operations include:

- 3.1 On public land, schedule operations to avoid conflicts with visitors and critical wildlife nesting or mating seasons. Seasonal timing and operations also may help minimize impacts on soils, water, and vegetation.
- 3.2 When determining and accessing seismic lines, use existing roads and trails to the maximum extent possible.
- 3.3 Position survey lines and access routes to minimize the number and size of stream crossings.

3.4 Use global positioning devices instead of line of sight surveying to minimize the amount of vegetative cutting. Hand cut vegetation along seismic lines where a line of sight survey is necessary.

3.5 Use vehicles that will not disturb the soils and vegetative root systems. Seasonal timing may help minimize impacts on vegetation. Foot access and hand portable drills may be feasible in areas where large vehicles would cause noticeable damage to soils and vegetation.



BLM/Geophysical activity

3.6 Use foot access for receiver lines if vehicular access will require active reclamation steps.

3.7 Consider the use of mini-shot hole patterns so that smaller, less damaging equipment may be used to drill the shot holes.

3.8 Minimize the number of passes along a line that uses vehicular access. Often single passes are achievable with careful planning.

3.9 In areas where cultural resources are expected, have a qualified archeologist accompany each survey crew to identify and avoid cultural sites.

3.10 In areas where sensitive habitats or federal candidate, proposed, or listed species occur, have a qualified biologist accompany (or review seismic lines) each survey crew to identify and avoid sensitive areas. Species specific BMPs may be applicable.

3.11 Offset shot points from structures, water bodies, and sensitive resource areas.

4.0 Construction Activities

Bureau of Land Management's *Gold Book Fourth Edition – 2006* and draft *Management of Oil and Gas Activities on National Wildlife Refuges* provides guidance for the operator about basic requirements for safe and environmentally sound construction and maintenance of gas infrastructure. At a minimum, this guidance is recommended for publicly-owned lands and is strongly recommended in or near sensitive habitats that harbor species of state or federal concern. Agency specific standards (*i.e.* USFS Revised Land and Resource Management Plan) also may apply to certain publicly-owned properties. Species specific BMPs and state or federal laws may apply. These guidelines, in part, specify the following (refer to the *Gold Book Fourth Edition* or draft *Management of Oil and Gas Activities on National Wildlife Refuges* for more detailed information):

- 4.1 All surface soil materials (topsoil) should be removed from the entire cut and fill area and temporarily stockpiled for reuse during interim and final reclamation.
- 4.2 Topsoil should be segregated and stored separately from subsurface materials to avoid mixing during construction, storage, and interim reclamation.
- 4.3 Stock piles should be located and protected to minimize erosion and maximize reclamation potential.
- 4.4 Well sites should be located to avoid sensitive resources (contact FWS, AGFC, and ANHC to identify sensitive resources). A closed mud system or steel tanks should be utilized to drill the well in sensitive habitats, wetlands, state-owned natural areas, wildlife management areas, and national wildlife refuges. In sensitive habitats, all fluids and cuttings should be hauled off site for disposal in accordance with AOGC and ADEQ requirements. Non-sensitive areas also should follow APCEC and AOGC regulations for disposal. Surface tanks must have berms sufficient to contain 1.5 times the total volume of all tanks. The berm area must be lined sufficient to prevent any leakage, and rip-stop padding must be used to prevent tears or punctures in liners. AOGC General Rule B-1 requires that a permit be issued before drilling can commence therefore a control point of knowing when and where this activity will occur before it occurs.
- 4.5 The area used for mud tanks, generators, mud storage, and fuel tanks should be sloped slightly, where possible, or a suitable alternative should be used to provide surface drainage from the work area to a secondary pit (not the reserve pit – ADEQ regulations). AOGC General Rule B-26 establishes requirements for secondary containment. Reference BMP 4.4 for additional guidelines.
- 4.6 Well pads should be capable of supporting the drill rig, tanks, heater-treater, and other production equipment. All equipment should be located on compacted fill material. Slope the well pad to the well cellar or other low point to collect spills and contaminated storm water that collects within the lined area (e.g., a separate pit should be used for collection of storm water [hydraulic fluids, honey oil, pipe dope, and other mechanical fluids that may spill onto the well pad and are prohibited by APCEC regulations from entering the reserve pit and being land applied]).
- 4.7 Well pads should be located adjacent to existing roads, when feasible. Projects may be routed in existing road corridors, and cut and fill should be minimized.
- 4.8 Seal the cellar, mouse hole, and rat hole by grouting with cement or other methods to prevent seepage of contaminants.
- 4.9 Directional drilling and multiple wells from approved well pads may be required to reduce the need for additional roads and production infrastructure.

- 4.10 The casing and cementing programs must be designed to allow for a karst protection string and all strings of casing must be cemented to the surface; upon abandonment of the well, the well bore should be cemented from the base of the cave/karst zone to the surface. AOGC General Rules prescribe casing, cementing and plugging requirements



USFWS/Well construction

- 4.11 To protect visual resources, use of low profile structures, selective paint colors, use of weathering substances to reduce the contrast of large boulders and cut areas, natural colored power poles, non-reflective (non-specular) wire, setting the drill site back from the edge of bluffs, and other techniques should be considered prior to selecting a drilling site.
- 4.12 Care should be taken when working around streams and caves to prevent unnecessary damage to or removal of vegetation.

If a cave or fracture is breached or surface water is rerouted into a karst feature, all activities should cease and the Service should be contacted to assess the situation and provide further consultation before proceeding.
- 4.13 All publicly-owned land with gas wells should have a Spill Prevention, Control, and Countermeasure Plan available for containment of any spillage within the boundaries of the publicly-owned land.
- 4.14 A berm and fence with locked gate should be constructed around storage tanks to contain spills and protect wildlife, visitors, and guard against vandalism. A sign with site name, operator name, and emergency contact information should be posted at the gate. AOGC General Rules prescribe containment and identification requirements.
- 4.15 Berms should be designed and constructed with sufficient perimeter and height to hold 1.5 times the volume of the largest tank. Containment systems with corrugated galvanized steel are available as an alternative to earthen dikes. Another option is to place a synthetic liner beneath the tanks, fold the liner into the berm, which then can be reinforced with a cement mixture. AOGC General Rule B-26 establishes requirements for secondary containment.

4.16 Interim reclamation of the drill site should be completed within six months of well completion. Interim reclamation plans including production equipment or facility site diagrams should be provided to the appropriate agency prior to drilling. Additional consultation may be required to determine final drill site dimensions. Reserve pit closure should occur within 30 days in sensitive habitats and adhere to APCEC regulations in other areas.

4.17 Initial reclamation of the site should occur within three months of well abandonment. All reclamation requirements should be completed within six months of well plugging. Reclaimed well sites should continue to be monitored until desirable vegetation (seeded and native) is established. Additional work may be required to achieve desired results.

4.18 Potential stipulations for special use permits on National Wildlife Refuges are included in Appendix E of the draft *Management of Oil and Gas Activities on National Wildlife Refuges*.

4.19 Reserve Pits

a. Closed loop systems (refer to definition below) are strongly recommended on publicly-owned properties and recommended on private lands located near sensitive areas, including flood plains. Closed loop systems require smaller pad sizes and are the safest protocol for avoiding environmental contamination.



BLM/Closed loop system

Closed Loop System: a typical closed-loop system includes a series of linear-motion shakers, mud cleaners and centrifuges followed by a dewatering system. The combination of equipment typically results in a “dry” location where a reserve pit is not required.

b. Reserve pits should be located entirely in cut material. Avoid areas with shallow groundwater and waterbodies.



USFWS/Reserve pit

c. The reserve pit should be designed to contain all anticipated drilling muds, cuttings, and precipitation while maintaining a minimum two feet of freeboard.

d. ADEQ pit liner requirements include an impermeable liner (clay, synthetic, or combination) to prevent ground water and soil contamination and conserve water.

e. Oil based mud should not be used or stored in reserve pits during waterfowl migration periods (November to March). In some situations, netting may be required in order to prevent mortality of migratory birds (refer to BMP 1.8). Reserve pits with oil-based mud must use a synthetic liner per ADEQ regulations however, closed systems are encouraged.

If site conditions warrant (i.e., floodplain, near waterbody, wellhead protection area, or other significant site issues), ADEQ or Arkansas Department of Health (ADHS) could require additional construction requirements.

f. Reserve pits should be fenced to prevent access by persons, wildlife, or livestock. The fence should remain in place until pit reclamation begins.

g. The operator must properly dispose of drilling fluids and muds from the reserve pit to a permitted facility and reclaim the pit area as soon as practicable following completion of drilling activities.

h. When closing reserve pits, follow the Arkansas Department of Environmental Quality Reserve Pit requirements (Refer to Appendix C for more information).

4.20 Roads and Access Ways

a. Roads constructed on publicly-owned lands may have to comply with applicable road and safety standards. State or federal laws may apply.

b. Use existing roads as much as practicable. Trails, primitive roads, or light duty roads often can be upgraded to handle the needs of a drilling access road.

c. Properly compact and crown road and place ditches along both sides to keep water off the road and reduce erosion and maintenance costs.

d. When designing and constructing new roads, consider soil and water protection needs, severity

and permanence of the road on the landscape, future access needs, and right-of-way needs. Locate all permanent roads to optimize resource accessibility and protection.

- e. Road gradient has a major effect on the environment, particularly in terms of erosion. The gradient should match the natural terrain as closely as possible and not exceed eight percent except for pitch grades (300 feet or less in length). Avoid road construction on side slopes greater than 40 percent.

In mountainous terrain, grades up to 16 percent may be permissible with prior approval from the appropriate resource management agencies.

- f. Avoid locating roads adjacent to water bodies unless alternative routes have been reviewed and rejected as more environmentally damaging or if such location would clearly not be in the best public interest. Where road location in the riparian area is necessary, design roads and crossings to minimize impacts on streams, aquatic fauna and their habitat. Locate fords where substrate conditions will support the designed use and maintain stream pattern and channel geometry. Stabilize roads and fills at stream crossing and culverts by utilizing rip-rap, plantings, mats, etc. Create sediment trap buffers by installing barriers, fences, etc. when required for soil stability or sediment control.
- g. After receiving a Short-term Activity Authorization from ADEQ, new stream crossings should be constructed so that aquatic organism passage is not impaired and the natural flow regime is not significantly altered such that existing and designated fisheries uses are maintained. Wherever fish passage is required for a stream crossing, bridges, bottomless arches, or partially buried pipe arch culverts or box culvert are strongly preferred to round, corrugated metal pipes. This is especially true for culverts 100 feet long or longer or if gradients are steeper than four percent (two degrees). A larger pipe with lower flow speeds is always preferable to a narrower pipe to ensure fish passage. Outlet velocities should be maintained at speeds no higher than the maximum velocity of the natural stream, and the bottom of the culvert should be at or below the natural stream bed at the inlet and outlet. Any culvert that can be installed at close to zero slope is preferable when addressing the passage concerns of different species of fish and different life cycle stages. Stream crossing should maintain the pre-installation stream conditions.
- h. Ensure good road drainage with a combination of properly constructed and well spaced wing ditches, broad based dips, rolling dips, culverts, and/or bridges.

- i. Road diversion ditches (lead off ditches and wing ditches) and gradients should be designed to minimize off-site erosion and sedimentation from runoff.
- ii. Outlets should be located on undisturbed forest soil or otherwise treated to minimize erosion and sedimentation.
- iii. Outlets should not connect directly with defined stream channels. Road diversion ditches should be constructed so water will be dispersed and not cut channels across the riparian area.
- iv. Provide out-fall protection if cross drains, relief culverts, wing ditches, and leadoff ditches discharge onto erodible soils or over erodible fill slopes.
- v. For erosion control, plan, install, and maintain drainage structures in roads using spacing guidelines from AR Forestry Commission BMPs for water quality protection.
- vi. Try to minimize road density (1.0 mile per square mile is preferred).
 - i. Stabilize and revegetate (with native vegetation) cut and fill areas, ditches, and outlets to minimize erosion.

- 4.21 Noise levels should be maintained at or below 55 decibels to minimize disturbance to migratory birds and humans.

5.0 Vehicle Maintenance, Petroleum, and Chemicals

To prevent petroleum products from contaminating soils and water bodies, the following BMPs should be implemented:

- 5.1 Construction equipment and vehicles should be properly maintained to prevent leaking of petroleum products.
- 5.2 Specific staging areas for equipment/vehicle maintenance and chemical storage should be established 250 feet or more away from wetlands, streams, or karst features.
- 5.3 Drip pans and tarps or other containment systems should be used when changing oil and other vehicle and equipment fluids.
- 5.4 Any contaminated soils or materials should be disposed of off-site in proper receptacles or at an approved disposal facility.
- 5.5 Vehicle and equipment fueling should be attended at all times by site personnel. Spill cleanup materials should be stored on site and employees should be trained in spill control procedures.
- 5.6 Wash water (including mild detergents) from the body of vehicles should be allowed to infiltrate into a permeable area such as gravel, grass, or loose soil 250 feet or more from wetlands, streams, or karst

features. Vehicle engine or under-body and equipment wash water should be disposed of off-site at appropriate facilities depending on the contents of the waste water. Waste water should not be discharged directly into water bodies or karst features.

- 5.7 Petroleum products and other chemicals, including mud additives, should be properly stored in appropriately labeled containers under sheltered areas. Storage shelters should be designed with an impermeable floor area.
- 5.8 Avoid mixing RCRA hazardous and non hazardous waste. This includes keeping fuels in a separate secondary containment area from mud, rig wash, etc.
- 5.9 Materials for cleaning up spills should be kept on site. Spills should be cleaned up immediately in accordance with state and federal regulations.

If a spill occurs contact the ADEQ (501/682 0923) and FWS (501/513 4470).

6.0 Disposal of Produced Water, Drilling Fluids, Fracturing Fluids, Biocides, or Other Specialty Chemicals

Problems arise when marginal production makes dealing with fluid disposal very expensive. Considerable documentation exists of operators releasing produced waters into adjacent streams. This type of activity not only violates state and federal laws, but could result in “take” of federally listed aquatic species.

- 6.1 Drilling fluids, fracturing fluids, biocides, or other specialty chemicals must be properly disposed of by gas companies. The best disposal method for all fluids is disposal wells, although fresh water based drilling fluids can be land applied with a permit from ADEQ. AOGC is the regulatory agency for the subsurface disposal of fluids and General Rule C-7 prescribes the requirements for permitting, construction and mechanical integrity testing related to this activity. Environmental Protection Agency (EPA), Arkansas Department of Environmental Quality (ADEQ), and AOGC regulate this activity.
- 6.2 Operators should take immediate action to prevent and control spills and leaks. Operators should report spills and leaks within 24 hours and provide written follow-up within five days to the appropriate state and federal agencies in accordance with agency requirements.
- 6.3 Secondary containment of produced water tanks is strongly encouraged.

7.0 Gas Condensate

Gas condensate (from activities such as pipeline cleaning or hydro testing) should be collected in tanks and hauled to an approved disposal facility. There should be no discharge of gas condensate to surface water, groundwater, or wetlands.

Other state and federal laws may apply.

8.0 Well Servicing and Work over Operations

- 8.1 Strategies for clean well servicing and work over operations include:
 - a. Maintain a sealed well cellar so that spills around the wellhead are easy to contain and remove. The cellar also helps in the production mode.
 - b. Use a synthetic liner and board matting under rig components and construct berms/trenches to direct liquids to cellar when location conditions require it.
 - c. Use steel tanks to hold work over fluids and all liquids and solids returned from the well until they can be removed from the site.
 - d. Contour and/or ditch around chemical, fuel, lubricant, and waste storage areas to a collection point separate from other rig equipment and not into the cellar (to prevent mixing RCRA “exempt” and “nonexempt” wastes).
- 8.2 Practices to avoid during well servicing and work over operations include:
 - a. Not considering spill control and containment (berms and liners) during this operation.
 - b. Poor housekeeping. It is a risk to the surrounding environment and health and safety of workers.
 - c. Set-up with a strong likelihood for unlawful storm water discharges.

If storm water comes into contact with any raw material, waste, or by-product, or an oil sheen is visible, the operator may not discharge the storm water without a NPDES (National Pollutant Discharge Elimination System) permit issued by the ADEQ.
 - d. No well control equipment in place.

9.0 Solid Wastes

- 9.1 Solid wastes, such as vegetation removed during clearing, sanitary waste, food and food container waste, and metal and wood scraps, should be collected and disposed of according to applicable regulations or recycled/reused.
- 9.2 Sanitary facilities should be well maintained and conveniently located.
- 9.3 Waste containers should be labeled and located in a sheltered area away from water bodies and drainage pathways.
- 9.4 Erosion and sediment control structures should be frequently inspected for accumulations of solid waste and any waste removed immediately.

10.0 Chemical Controls

- 10.1 No chemicals in toxic amounts shall be discharged into any water of the State of Arkansas and operations must be in compliance with the Federal Water Pollution Control Act, (commonly referred to as the Clean Water Act) as amended, Title I, Section 101 (a) (3), which states “it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited”.
- 10.2 There should be no aerial application of herbicides or other pesticides, sterilants, or adjuvants within 250 feet of listed species or habitat, and no ground application within 150 feet of listed species or habitat. No application of herbicides within 50 feet of the dripline of any tree within the riparian buffer area except those treatments used to control invasive or exotic species within riparian area.
- Formal consultation with the FWS may be required if determined necessary to protect species and associated habitat.
- 10.3 Refer to BMP 1.7 for guidelines to avoid/minimize impacts to federally listed plants.
- 10.4 Herbicides, fertilizers, vehicle maintenance fluids, petroleum products, and drilling fluids should be stored, and/or changed in staging areas established as far away, but no closer than 250 feet, from streams as is economically and physically possible.
- 10.5 Areas where discharge material, overburden, fuel, and equipment are stored should be designed and established at least 250 vegetated feet from the edge of streams and cave watersheds. Proper maintenance of barrier fences, surface design, and/or maintaining a vegetated buffer will alleviate or significantly minimize most impacts.
- 10.6 Spill response protocols and a spill response kit should be maintained on site to address these concerns.

11.0 Gathering and Transmission Lines

- 11.1 New pipelines should be located underground adjacent to roads or in other previously disturbed areas if feasible, thus minimizing the “foot print” and reducing habitat disturbance.
- 11.2 Flow lines should be steel, schedule 40 (pipe wall thickness), coated pipe on publicly-owned property and in areas of sensitive habitat. Good pipeline construction practices typically place a sleeve or protective coating over all weld and screw joints for external corrosion protection. This practice is recommended, at minimum, on publicly-owned land and in areas with sensitive habitat. Polyvinyl chloride pipe, fiberglass, and other materials are not recommended for pipeline construction.

Although external corrosion is prevented using other pipe materials, these materials lack durability, especially over extended periods of time with production pressures. The U.S. Department of

Transportation (DOT) and AOGC regulate interstate pipelines and states regulate intrastate pipelines, which remain in state from origin to terminus. Integrity of lines must be checked periodically in accordance with DOT and AOGC regulations.

- 11.3 Steel pipelines, due to positive and negative ionic flow, will naturally corrode. Corrosion leads to leaks and spills. Cathodic protection can be attached to pipelines to protect it. Anode beds, which are usually strategically located next to pipelines, need to be monitored and periodically replaced because they will experience the natural corrosion process. Cathodic protection is required on transmission lines, but also should be required on flow and gathering lines.
- 11.4 Large compressors are used to compress gas to move it through the pipelines to market. All compressor stations should be located off publicly-owned lands where possible, or in a very well insulated building if no other viable options exist.
- 11.5 Refer to BMPs 1.61 – 1.69, in addition to BMPs presented within this section, to minimize erosion, sedimentation, bank destabilization, and other instream alterations and/or impacts to streams that may result from transmission line construction and maintenance.
- 11.6 Stream Crossings: Several methods could be used for stream crossings, including open cut channels and directional drilling. Open cut channels are strongly discouraged and will require a Short-term Activity Authorization from ADEQ.

The standard BMPs for pipeline construction in trenches, construction near sensitive areas, and construction staging areas should be applicable to each of these water crossing methods. Construction at stream crossings should be according to the selected stream crossing method (wet trench, dry trench, or drilling) and specific mitigation concerns associated with the level of disturbance and stream sensitivity. APCEC Regulations No. 2.304, 2.305, and 2.503 are applicable for all activities related to the Fayetteville Shale Natural Gas activities.

- 11.6 Temporary in-stream settling ponds should not be constructed. Storm water runoff should be collected and stored outside the stream channel.
- 11.7 Critical slopes are characterized as steep approaches to stream crossings where the pipeline trench is parallel to the slope angle, areas where bank erosion can destabilize slopes, drainage is concentrated, and areas where sediments can directly enter receiving waters. Stringent erosion and sediment control measures, aggressive slope stabilization measures, and frequent monitoring should be implemented during and after construction in critical areas.
- 11.8 Use a directional drilling method for proposed pipeline crossings of sensitive losing streams, flowing streams, and wetlands. A 250 foot setback from perennial streams is recommended for all directional

drilling operations. Prior to directional drilling, a geotechnical investigation using the least intrusive means possible (e.g. ground penetrating radar, minimal exploratory bore hole drilling, seismic refraction and reflections, cave radio, resistivity, magnetometry, etc.) should be conducted to determine subsurface/geologic conditions. Drilling fluids should be captured and accounted for during all drilling activities.

- 11.9 If directional drilling is not feasible, it is recommended that stream crossings be conducted during periods of low flow (July-September), and that limited amounts of riparian vegetation be removed during pipeline installation.
- 11.10 Equipment should not be operated in stream channels.
- 11.11 Where excavation involves native or established wetland/riparian vegetation, the top 6-12 inches or more of vegetation and topsoil including the vegetation and root mass should be carefully removed and stockpiled separately into a dedicated deposition area. After completion of site disturbance this vegetated material and its associated soils should be placed as the surface material.
- 11.12 Soils, vegetation, water quality, fish and wildlife, and air quality can all be adversely impacted by the release of contaminants into the environment. Operators should strive to prevent releases by using good work practices and properly maintaining production equipment. Operators also should design secondary containment safeguards into their sites, and then respond quickly to clean up and remove spills that do occur. Spills must be reported to ADEQ and AOGC within 24 hours and a written follow-up within five days.

12.0 Storm water

Storm water concerns occur during construction and after the landscape are stabilized and developed. Natural gas activities are exempt from EPA construction storm water rules. However, exceedances of state and federal water quality standards are not exempt, therefore plans should be made to address storm water contaminants. In order to reduce the quantity of potential contaminants contained in storm water during and after construction activities, the following recommendations apply:

- 12.1 Establish a storm water detention basin capable of capturing sediments off the development. This detention basin can be roughly established initially then refined once construction is completed and the site stabilized.
- 12.2 Before construction begins, a detention basin should be designed and constructed to capture the first 1/2 inch of a rain/climatic event from the entire site proposed for development. Basin embankments should contain a 3:1 slope for safety reasons. The basin should not be constructed in a stream. A spillway should be established in the detention basin.

The bottom of the pond should be lined with a synthetic or bentonite type material to prevent leakage. This should then be covered by approximately 1-2 feet of gravel, so that during maintenance the impermeable lining is not breached.

- 12.3 After capture of the first 1/2 inch rainfall, waters should then be directed to a bioretention treatment area which consists of a vegetated buffer strip, sand bed, organic or mulch layer, planting soil, and hydrophilic plants. This area provides temporary storage prior to infiltration. Plants can remove contaminants while a clay layer can absorb hydrocarbons, heavy metals, nutrients and other contaminants. Organic mulch filters contaminants and provides an environment conducive to growth of microorganisms, which degrade petroleum based products and other organic materials.
- 12.4 At least once per year, the pond should be inspected for trash and debris. Any visible trash or debris should be removed. At least every five years, the pond should be drained and if necessary the pond dredged to its original depth. Removed sediments should be discarded in an appropriate location where surface erosion potential is negated as it possibly contains concentrated contaminants.
- 12.5 An alternative to detention basins could be the installation and maintenance of an oil/grit/water separation system. An example can be found on the internet at baysaver.com. Although these systems would replace detention basins, discharge would still need to run through a bioretention treatment area, as described below.



BLM/Road reclamation

13.0 Reclamation and Abandonment

If the operator considers reclamation requirements from the very beginning of project planning, it will pay off during reclamation operations. Project planning should include a step-by-step procedure that will accomplish (design and implement) reclamation goals. To ensure successful site reclamation, the operator should 1) consider site restoration requirements as part of the initial site selection, 2) take

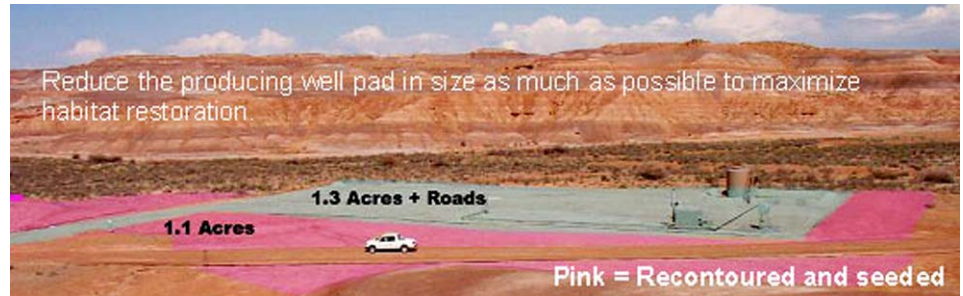
photos prior to site disturbance, 3) test soil samples for select metals, pH, oil and grease, conductivity, sodium absorption ratio, exchangeable sodium percent, and chlorides, 4) stock pile topsoil and larger rocks for site reclamation, and 5) properly design and construct berms and liners to guard against site contamination.

13.1 During the life of the development, all disturbed areas not needed for active support of production operations should undergo interim reclamation in order to minimize environmental impacts.

The long-term objective of final reclamation is to set the course for eventual ecosystem restoration, including the restoration of natural vegetation, hydrology, and wildlife habitats. The operator is not responsible for achieving full ecological restoration, but should achieve the short-term stability, visual, hydrological and productivity objectives and ensure that long-term objectives will be reached through natural processes.

13.2 In order to optimize site and road reclamation:

- a. Remove all equipment and materials.
- b. Refer to applicable reserve pit BMPs 4.19a-h.
- c. Conduct post operations soil sampling and testing for comparison with pre-operational conditions.
- d. Restore the natural contours once the site is determined to be free of significant contamination.
- e. Cement incorporated into the top layers of the pad to increase stability could retard restoration efforts after well abandonment. The soil-cemented layer is likely to reduce soil permeability and may raise local surface soil pH. Ripping the pad well below the cemented zone would help in reestablishing vegetative cover and restoring site productivity.
- f. Spread topsoil that was stockpiled over the site.
- g. Seed the site with non-persistent annuals until **native** grasses and other vegetation has an opportunity to become established. Avoid use of aggressive exotic species.
- h. Properly time reseeding.
- i. Spreading mulch over the site will help prevent erosion until vegetation takes hold.
- j. Refer to applicable road and access way BMPs 4.20a-i.
- k. Restoration of the site should occur as soon as possible following abandonment. Non-producing wells should not take up publicly-owned surface for more than one year.



When all wells in the production field are no longer producing, proper facility abandonment and reclamation should occur. Under 50 CFR Part 29.32, Mineral Rights Reserved and Excepted, companies are required to restore their sites as near as possible to conditions that existed before the project. State and federal agencies should insist that gas companies restore their sites using the same standards the agency uses itself in restoring land, regardless of cost or complexity. This establishes a “reasonable” standard for restoration.

The importation or spread of invasive weeds, particularly those that are aggressive colonizers, can cause significant ecological degradation and appropriate steps should be taken to avoid this situation.

14.0 Good House Keeping for Publicly-Owned Properties

Production facilities should be visited on a regular basis to ensure that gas companies are using “good house keeping” practices. State and federal agencies have the right to require that facilities are kept clean, maintained, and operated in safe and environmentally sound manner. AOGC conducts lease inspections to help ensure compliance with regulations

- 14.1 Signs should be posted, by the operator, in conspicuous locations to provide notice of any dangerous situations, such as flammable conditions or high voltage, and facility name, operator, and emergency contact information. (AOGC General Rule B-4 requires operator and facility name.
- 14.2 The operator should control vegetation to improve appearance and reduce the fire hazard. Operators should contact the appropriate agency to ensure that approved pesticides are used. AOGC General Rule B-26 requires vegetation to be maintained as to prevent fires around production facilities.
- 14.3 All long-term facility structures located on publicly-owned lands will be painted a color that enables the facilities to blend in with the natural background color of the landscape as seen from a viewing distance and location typically used by the public (refer to BLM Gold Book).
- 14.4 Facilities also should be kept clean to provide external corrosion protection and present good appearances.

The importation or spread of invasive weeds, particularly those that are aggressive colonizers, can cause significant ecological degradation and appropriate steps should be taken to avoid this situation.

References

APCEC Regulation 2, Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas, April 28, 2006

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Appendix A

Forest Wide (FW) Karst Standards for the Ozark-St. Francis National Forest

Rare Communities

- FW 15** As they are discovered, catalog, inventory, and classify wild caves according to the Federal Cave Resource Protection Act (FCRPA) guidelines and determine significance using established protocols. Management direction of cave resources will be made following the FCRPA guidelines and will allow for input from interested outside agencies and the public. Known or suspected threatened or endangered species occupancy and/or use are adequate to define a cave or mine as significant.
- FW 16** Districts will be responsible for maintaining inventory records for caves on their district. Districts that permit wild cave use will maintain permit records to be used to document visitor use and aid in the safety of permitted cave users. Master copies of inventory and permit records will be kept at the Supervisor's Office.
- FW 17** Manage cave significance and public use on the basis of the FCRPA guidelines as either:
- Permitted open with year-round use.
 - Permitted seasonally.
 - Closed year-round.
- (Revised LRMP page 3-3)
- FW 18** Mature forest cover is maintained within 100 feet slope distance from the top of bluffs and 200 feet slope distance from the base to provide wildlife habitat associated with this unique landform. Within this zone, activities are limited to those needed to ensure public safety or to maintain and improve habitat for federally listed species or other species whose viability is at risk.
- (Ozark-St. Francis National Forest Revised Land and Resources Management Plan pages 3-4)
- FW 46** Exceptions to established KMZ guidelines can be made through site specific analysis and consultation with the U.S. Fish and Wildlife Service (USFWS).
- (Revised LRMP page 3-7)
- FW 54** Prohibit camping and campfires within 200 feet from the entrance to caves, mines, and rock shelters used by TES species.
- FW 55** Close or restrict access to caves where disturbance or vandalism of critical resources may occur.
- FW 57** Identify caves or abandoned mines that contain significant populations of TES species as smoke-sensitive targets.
- FW 60** The use of caves for disposal sites or the alteration of cave entrances is prohibited except for the construction of cave gates or similar structures to ensure closure.
- (Ozark-St. Francis National Forest Revised Land and Resources Management Plan pages 3-9)

Threatened, Endangered and Sensitive Species

- FW 42** Karst features will be recognized and documented when they are found to occur across the landscape; these features include caves, springs, sinkholes and losing streams.
- FW 44** Management activities within KMZ's will be planned to use practices that result in minimal surface disturbance; this will be measured as less than five percent soil disturbance over the entire KMZ within the project area.
- FW 45** Within KMZ's, there will be no mechanical entry during management activities; low impact vegetation management is appropriate.

Appendix B

Executive Order 13186

Presidential Documents

Responsibilities of Federal Agencies

To Protect Migratory Birds

January 10, 2001

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in furtherance of the purposes of the migratory bird conventions, the Migratory Bird Treaty Act (16 U.S.C. 703-711), the Bald and Golden Eagle Protection Acts (16 U.S.C. 668-668d), the Fish and Wildlife Coordination Act (16 U.S.C. 661-666c), the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347), and other pertinent statutes, it is hereby ordered as follows:

Section 1. Policy. Migratory birds are of great ecological and economic value to this country and to other countries. They contribute to biological diversity and bring tremendous enjoyment to millions of Americans who study, watch, feed, or hunt these birds throughout the United States and other countries. The United States has recognized the critical importance of this shared resource by ratifying international, bilateral conventions for the conservation of migratory birds. Such conventions include the Convention for the Protection of Migratory Birds with Great Britain on behalf of Canada 1916, the Convention for the Protection of Migratory Birds and Game Mammals-Mexico 1936, the Convention for the Protection of Birds and Their Environment-Japan 1972, and the Convention for the Conservation of Migratory Birds and Their Environment-Union of Soviet Socialist Republics 1978.

These migratory bird conventions impose substantive obligations on the United States for the conservation of migratory birds and their habitats, and through the Migratory Bird Treaty Act (Act), the United States has implemented these migratory bird conventions with respect to the United States. This Executive Order directs Executive departments and agencies to take certain actions to further implement the Act.

Sec. 2. Definitions. For purposes of this Order:

- (a) “Take” means take as defined in 50 C.F.R. 10.12, and includes both “intentional” and “unintentional” take.
- (b) “Intentional take” means take that is the purpose of the activity in question.
- (c) “Unintentional take” means take that results from, but is not the purpose of, the activity in question.
- (d) “Migratory bird” means any bird listed in 50 C.F.R. 10.13.
- (e) “Migratory bird resources” means migratory birds and the habitats upon which they depend.
- (f) “Migratory bird convention” means, collectively, the bilateral conventions (with Great Britain/Canada, Mexico, Japan, and Russia) for the conservation of migratory bird resources.

- (g) “Federal agency” means an Executive department or agency, but does not include independent establishments as defined by 5 U.S.C. 104.
- (h) “Action” means a program, activity, project, official policy (such as a rule or regulation), or formal plan directly carried out by a Federal agency. Each Federal agency will further define what the term “action” means with respect to its own authorities and what programs should be included in the agency-specific Memoranda of Understanding required by this Order. Actions delegated to or assumed by nonfederal entities, or carried out by nonfederal entities with Federal assistance, are not subject to this Order. Such actions, however, continue to be subject to the Migratory Bird Treaty Act.
- (i) “Species of concern” refers to those species listed in the periodic report “Migratory Nongame Birds of Management Concern in the United States,” priority migratory bird species as documented by established plans (such as Bird Conservation Regions in the North American Bird Conservation Initiative or Partners in Flight physiographic areas), and those species listed in 50 C.F.R. 17.11.

Sec. 3. Federal Agency Responsibilities.

- (a) Each Federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations is directed to develop and implement, within 2 years, a Memorandum of Understanding (MOU) with the Fish and Wildlife Service (Service) that shall promote the conservation of migratory bird populations.
- (b) In coordination with affected Federal agencies, the Service shall develop a schedule for completion of the MOUs within 180 days of the date of this Order. The schedule shall give priority to completing the MOUs with agencies having the most substantive impacts on migratory birds.
- (c) Each MOU shall establish protocols for implementation of the MOU and for reporting accomplishments. These protocols may be incorporated into existing actions; however, the MOU shall recognize that the agency may not be able to implement some elements of the MOU until such time as the agency has successfully included them in each agency’s formal planning processes (such as revision of agency land management plans, land use compatibility guidelines, integrated resource management plans, and fishery management plans), including public participation and NEPA analysis, as appropriate. This Order and the MOUs to be developed by the agencies are intended to be implemented when new actions or renewal of contracts, permits, delegations, or other third party agreements are initiated as well as during the initiation of new, or revisions to, land management plans.

- (d) Each MOU shall include an elevation process to resolve any dispute between the signatory agencies regarding a particular practice or activity.
- (e) Pursuant to its MOU, each agency shall, to the extent permitted by law and subject to the availability of appropriations and within Administration budgetary limits, and in harmony with agency missions:
- (1) support the conservation intent of the migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions;
 - (2) restore and enhance the habitat of migratory birds, as practicable;
 - (3) prevent or abate the pollution or detrimental alteration of the Environment for the benefit of migratory birds, as practicable;
 - (4) design migratory bird habitat and population conservation principles, measures, and practices, into agency plans and planning processes (natural resource, land management, and environmental quality planning, including, but not limited to, forest and rangeland planning, coastal management planning, watershed planning, etc.) as practicable, and coordinate with other agencies and nonfederal partners in planning efforts;
 - (5) within established authorities and in conjunction with the adoption, amendment, or revision of agency management plans and guidance, ensure that agency plans and actions promote programs and recommendations of comprehensive migratory bird planning efforts such as Partners-in-Flight, U.S. National Shorebird Plan, North American Waterfowl Management Plan, North American Colonial Waterbird Plan, and other planning efforts, as well as guidance from other sources, including the Food and Agricultural Organization's International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries;
 - (6) ensure that environmental analyses of Federal actions required by the NEPA or other established environmental review processes evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern;
 - (7) provide notice to the Service in advance of conducting an action that is intended to take migratory birds, or annually report to the Service on the number of individuals of each species of migratory birds intentionally taken during the conduct of any agency action, including but not limited to banding or marking, scientific collecting, taxidermy, and depredation control;
- (8) minimize the intentional take of species of concern by: (i) delineating standards and procedures for such take; and (ii) developing procedures for the review and evaluation of take actions. With respect to intentional take, the MOU shall be consistent with the appropriate sections of 50 C.F.R. parts 10, 21, and 22;
 - (9) identify where unintentional take reasonably attributable to agency actions is having, or is likely to have, a measurable negative effect on migratory bird populations, focusing first on species of concern, priority habitats, and key risk factors. With respect to those actions so identified, the agency shall develop and use principles, standards, and practices that will lessen the amount of unintentional take, developing any such conservation efforts in cooperation with the Service. These principles, standards, and practices shall be regularly evaluated and revised to ensure that they are effective in lessening the detrimental effect of agency actions on migratory bird populations. The agency also shall inventory and monitor bird habitat and populations within the agency's capabilities and authorities to the extent feasible to facilitate decisions about the need for, and effectiveness of, conservation efforts;
 - (10) within the scope of its statutorily-designated authorities, control the import, export, and establishment in the wild of live exotic animals and plants that may be harmful to migratory bird resources;
 - (11) promote research and information exchange related to the conservation of migratory bird resources, including coordinated inventorying and monitoring and the collection and assessment of information on environmental contaminants and other physical or biological stressors having potential relevance to migratory bird conservation. Where such information is collected in the course of agency actions or supported through Federal financial assistance, reasonable efforts shall be made to share such information with the Service, the Biological Resources Division of the U.S. Geological Survey, and other appropriate repositories of such data (e.g, the Cornell Laboratory of Ornithology);
 - (12) provide training and information to appropriate employees on methods and means of avoiding or minimizing the take of migratory birds and conserving and restoring migratory bird habitat;

Appendix C

ADEQ and AOGC Requirements for Oil and Gas Activities

Go to:

http://adeq.state.ar.us/water/branch_permits/default.htm

and

<http://www.aogc.state.ar.us>

- (13) promote migratory bird conservation in international activities and with other countries and international partners, in consultation with the Department of State, as appropriate or relevant to the agency's authorities;
 - (14) recognize and promote economic and recreational values of birds, as appropriate; and
 - (15) develop partnerships with non-Federal entities to further bird conservation.
- (f) Notwithstanding the requirement to finalize an MOU within 2 years, each agency is encouraged to immediately begin implementing the conservation measures set forth above in subparagraphs (1) through (15) of this section, as appropriate and practicable.
- (g) Each agency shall advise the public of the availability of its MOU through a notice published in the Federal Register.

Sec. 4. Council for the Conservation of Migratory Birds.

- (a) The Secretary of Interior shall establish an interagency Council for the Conservation of Migratory Birds (Council) to oversee the implementation of this Order. The Council's duties shall include the following: (1) sharing the latest resource information to assist in the conservation and management of migratory birds; (2) developing an annual report of accomplishments and recommendations related to this Order; (3) fostering partnerships to further the goals of this Order; and (4) selecting an annual recipient of a Presidential Migratory Bird Federal Stewardship Award for contributions to the protection of migratory birds.
- (b) The Council shall include representation, at the bureau director/administrator level, from the Departments of the Interior, State, Commerce, Agriculture, Transportation, Energy, Defense, and the Environmental Protection Agency and from such other agencies as appropriate.

Sec. 5. Application and Judicial Review.

- (a) This Order and the MOU to be developed by the agencies do not require changes to current contracts, permits, or other third party agreements.
- (b) This Order is intended only to improve the internal management of the Executive branch and does not create any right or benefit, substantive or procedural, separately enforceable at law or equity by a party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.

William J. Clinton
The White House
January 10, 2001.

Appendix D

List of Reviewers

Draft V.1 June 2006

Comments received from:

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U.S. Fish and Wildlife Service
AR E.S. Field Office

Richard Hines
U.S. Fish and Wildlife Service
White River National Wildlife Refuge

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Bryan Winton
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Cache River National Wildlife Refuge

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Gary Looney
Arkansas Oil and Gas Commission

Ralph Odegard
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Cindy Osborne
Arkansas Natural Heritage Commission

Jeff Quinn
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Draft V.2 December 2006

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Commission

Theo Wittsell
Arkansas Natural Heritage Commission

Gary Looney
Arkansas Oil and Gas Commission

Sarah Clem
Arkansas Department of Environmental Quality

Keith Brown
Arkansas Department of Environmental Quality

Appendix E

ANHC Review/Request Policy Arkansas Natural Heritage Commission Department of Arkansas Heritage Information Sharing Environmental Review Policies/ Procedures

The Arkansas Natural Heritage Commission maintains a database of information on the known locations of species of conservation concern in Arkansas. This includes species listed as endangered or threatened under the Endangered Species Act as well as species of state concern. The database was developed to help the agency meet its mission of identifying and protecting natural areas in the state. The information is made available to outside users through the Agency's Environmental Review/Information sharing program. County level information is available on the agency's web page, but site specific location information is only available through the Environmental Review/Information Sharing program. Two options for project review are offered:

1. A project may be handled as an "information request." If handled under this option, a 2-week review period will be assigned to the project. A detailed database search will be conducted and a response prepared. The response will include the results of the data search, as well as a county element list that has been annotated to indicate those sensitive species known to occur within a 1 and 5 mile radius of the project site. The requestor will receive a response from the agency whether the agency has particular concerns or not. There is a charge for this service, please visit our web page for a full fee schedule: (<http://naturalheritage.com/program/data-requests.asp>).

Typically small projects run \$30.00-\$60.00. Users will receive an invoice with the project response. This option provides a detailed project review, a two-week "turn-around" time (very large projects may take longer), and a definitive response.

2. A project may be submitted to the agency as an "opportunity for review." If handled under this option, a 3-4 week review period will be assigned to the project. If the agency has no concerns about the proposal, project papers will be filed without comments. **The agency will make no response to the requestor unless it has specific concerns.** If desired, the requestor may contact the agency to find out the disposition of the project. As evidence that the review has been conducted, the requestor will be given the "ANHC Number" for the project. This is a unique identifying number assigned by the agency to each project it handles. A project handled as an "opportunity to review" is typically given a lower priority than an information request, time frames are likely to be much longer, and **the responsibility to verify that a review has been conducted falls solely upon the requestor.** There is no charge for this option.

Requestors should clearly identify in a cover letter which review option they prefer. To handle reviews and requests efficiently, we prefer to receive a map depicting the project area boundaries delineated on a copy of a 1:24,000 topographic map or an ArcView shapefile of the project area (this speeds up the data search). If this is not available, we will need to receive at least the township, range, and section (1/4 section if possible) of the review site or latitude and longitude coordinates. Because our data is stored on topographic maps, street addresses are much more difficult to search, which could add to overall costs for information requests or time for reviews.

Reviews for cultural resources (historice structures or archeological sites) are handled by the Arkansas Historic Preservation Program (AHPP), another agency of the Department of Arkansas Heritage. Requests for cultural reviews should be submitted separately to AHPP. For more information on AHPP you may visit their web page (<http://www.arkansaspreservation.com/>) or call them at 501/324 9880.

