SPECIES PROTECTIVE MEASURES

for Benton County Cave Crayfish, Hell Creek Cave Crayfish, and Ozark Cavefish

Construction in Sensitive Areas

To avoid or minimize potential negative effects to listed species that inhabit karst features, project proponents should implement the following:

1. Survey project area for karst features such as caves, sinkholes, losing streams and springs.
    - Anytime caves or sinkholes are identified, notify the Arkansas Ecological Services Field Office of their presence and the project details. Do not place fill in an opening without consulting with the Arkansas Ecological Services field office.
2. Establish a 300-foot buffer around all caves, sinkholes, losing streams, and springs and adequately mark the area so that construction personnel are aware of the buffer boundaries. Buffer width extends outward from the edge of the feature.
    - No construction, staging, or storage should occur within the buffer area.
    - Do not apply pesticides, herbicides, or fertilizers within the buffer area.
    - If stream crossings are unavoidable, follow the guidelines outlined in the Stream Crossings section of this document.
3. Implement control measures as necessary to successfully prevent sediment or other contaminants from entering karst features.
    - Redundant perimeter controls are normally necessary to ensure sediment does not enter karst features.
4. If water is rerouted into a karst feature, cease all activities and contact the Arkansas Ecological Service Field Office.
5. Consult with the Arkansas Ecological Services Field Office prior to any blasting.
6. If closing water wells contact the Arkansas Ecological Services Field Office prior to closure.

The Arkansas Ecological Services Field Office can be reached at (501) 513-4470.

Erosion and Sediment Control

The majority of Best Management Practices (BMPs) are designed to remove larger sediment and cannot eliminate turbidity in stormwater runoff. The only methods that successfully eliminate fine silt and clay particles are filtering practices such as tall vegetation buffers. Therefore, it is key to prevent erosion by minimizing disturbance, sequencing construction and immediate revegetation of disturbed areas.

Stabilizing soil immediately after completing earth work is critical. Protect all streams, wetlands, and karst features adjacent to disturbed areas with erosion and sediment controls. Constructed wetlands, sediment ponds, reinforced silt fences, interceptor dikes and swales, sediment traps, check dams,

nets, blankets, mulching, seeding, and/or tree planting are recommended types of controls/BMPs. Specifications for these and other appropriate BMPs are provided in the BMPs for Construction in Karst Regions of Arkansas available from the Arkansas Ecological Services Field Office. Routinely monitor BMPs and clean, repair, and replace infrastructure as necessary.

Stream Crossings

Use elevated pipelines or directional drilling methods for proposed pipeline crossings of losing streams, perennial streams, and wetlands.

Directional Drilling

Prior to directional drilling, conduct 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.) This will assist in determining subsurface/geologic conditions and ensure that a directional drill pipeline at the location is feasible and to avoid unnecessary damage to a sensitive area, such as a karst void. Capture and account for all drilling fluids during drilling activities.

Directional drilling greatly reduces stream channel disturbance compared to trenching. To prevent sediment reaching the stream, construct secondary containment structures (i.e. berms and filter fences) along with runoff dispersion and sediment traps around staging areas on either side of the stream. Additionally, do not operate equipment in stream channels.

If elevated pipelines or directional drilling cannot be used, the following stream crossing guidelines apply:

- Construct stream crossings during a period of low stream flow (July to October during most years).
- Maintain natural stream features such as riffles or pools.
- Limit operation of construction equipment in streams to only what is necessary to complete construction.
- Place unused spoils 300 feet away from the stream and ensure spoils will not wash into the stream.
- Limit the removal of riparian vegetation to the minimum necessary to complete the project.
- Plant only native riparian plants.
- On approaches to stream crossings, drainage control structures should be placed at appropriate intervals along slope to disperse water velocity and volume to minimize erosion, including at the base – but do not direct runoff at the base into the stream.

Post Construction Stormwater Management

Stormwater runoff contains sediment, fuel/oil/grease, brake dust, herbicide, pesticide, and other contaminants. Utilize constructed wetlands, rain gardens or sediment ponds in compliance with state and local regulations to reduce contaminant loads contained in stormwater. Accepted alternatives for treatment of stormwater are separation systems or an established community stormwater collection system.

Reclamation of construction sites

Restore and stabilize all work areas immediately following construction activities. Use native vegetation, nets and blankets, and other BMPs to stabilize banks and return the area to pre-project conditions. Use instream deflectors and anchored logs in high velocity streams to protect vulnerable banks and allow for

reestablishment of vegetation. Riprap may also be necessary. When possible, use rock typical of the local geology. Routinely monitor BMPs and implement additional BMPs or other improvements as necessary to minimize impacts.

- Revegetate all disturbed areas immediately following or concurrent with project implementation. Plant native trees, shrubs and grasses to ensure long-term stability in areas where the soil erosion threat is not critical. Plant annual non-native cover crops (e.g., grasses such as rye or wheat) in conjunction with native species to provide short-term erosion control. Plant non-native mixtures or use erosion control materials, such as mats, nets, mulch, wattles, or adhesive mixed with seed in areas judged to be subject to immediate soil loss due to steep slopes or other factors causing critical erosion conditions. However, final revegetation of disturbed areas should use native plant species.
- Remove and dispose of temporary sediment and erosion controls within 30 days after final site stabilization is achieved or after temporary practices are no longer needed.
    - Biodegradable stabilization measures may remain in place if they will assist in long-term soil stabilization.
- Remove and properly dispose of all debris and excess materials that do not help stabilize soil or are not natural upon completion of the project.

Staging, Vehicle Maintenance, Petroleum, and Chemicals

- Establish all staging/storage areas at least 300 feet away from streams, wetlands, and karst features
    - Install and maintain erosion and sediment controls to prevent discharge from staging/storage sites.
- Do not dump excess concrete or wash water on the ground. Dispose of excess concrete and wash water according to local regulations in an area well away from karst features, streams and wetlands.
- Properly maintain construction equipment and vehicles to prevent leakage of petroleum products.
- Use drip pans and tarps or other containment systems when changing oil or other vehicle/equipment fluids.
- Dispose of contaminated soils or materials off-site in proper receptacles at an approved disposal facility.
- Attend vehicle and equipment fueling at all times. Store spill cleanup materials on site and train employees in spill control procedures.
- Wash vehicles offsite at a washing area with appropriate facilities to manage contaminated wash water. Wash water should never be discharged directly into water bodies or karst features.