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APPROVAL OF ILLINOIS COAL LEASE MINE PLAN – SUGAR CAMP MINE NO. 1

SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

Hamilton and Franklin Counties, Illinois

Prepared by:
TENNESSEE VALLEY AUTHORITY
Knoxville, Tennessee

May 2013

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Symbols, Acronyms, Abbreviations, and Glossary of Terms

APE	Area of Potential Effects
Bleeder Shaft	A ventilation shaft used to remove (or "bleed") methane gas from an underground mine to maintain safe air quality conditions
dB	Decibel, an index of sound intensity
EA	Environmental Assessment
EO	Executive Order
IDNR	Illinois Department of Natural Resources
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
$PM_{2.5}$	Particulate Matter less than 2.5 microns in diameter
PM_{10}	Particulate matter less than 10 microns in diameter
Shadow Area	The above-ground area subject to subsidence following underground mining
SHPO	State Historic Preservation Officer
TVA	Tennessee Valley Authority
U.S.	United States
USEPA	U. S. Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

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CHAPTER 1 – PURPOSE AND NEED FOR ACTION

Sugar Camp Energy LLC ("Sugar Camp") is permitted by the State of Illinois to conduct coal mining operations on approximately 12,920 acres of land in southern Illinois. Sugar Camp has submitted an *Application for Significant Permit Revision to Permit 382 for Surface Coal Mining and Reclamation Operations Permit – Underground Operations* to the Illinois Department of Natural Resources (IDNR), Office of Mines and Minerals – Land Reclamation Division. By way of this permit revision, Sugar Camp proposes to extend its current underground mining operations to include coal reserves underlying an additional 880.3-acre "shadow area[1]" located in Hamilton County, Illinois. This proposed expansion of mining operations would include the installation of a ventilation shaft known as a "bleeder" shaft on a 16.5-acre site within the 880.3-acre area.

The Tennessee Valley Authority (TVA) owns the coal reserves beneath this shadow area and executed a coal lease agreement for these reserves in July 2002. Under the terms of that agreement, the current lessee (i.e., Sugar Camp) may not commence mining of TVA-owned coal reserves activity under a mining plan or revision until TVA has completed all environmental and cultural resource reviews required for compliance with applicable laws and regulations.

TVA's proposed action is to approve the proposed mining by Sugar Camp of the coal in the 880.3-acre mine expansion area illustrated in Figure 1-1.

1.1 Background

TVA previously acquired mineral rights in the southwestern section of the Illinois Basin coalfield. TVA generally leases its mineral rights to private coal mining companies and receives royalties based on the amount of coal recovered under such lease agreements. In 2002, TVA leased Illinois Basin coalfield reserves to a mining company with the condition that mining of TVA-owned coal may not begin without an appropriate environmental review by TVA. The mine plan is subject to review and approval by the State of Illinois, which has regulatory authority delegated by the federal Office of Surface Mining Reclamation and Enforcement.

In 2008, Sugar Camp Energy LLC obtained Permit Number 382 from the State of Illinois for underground longwall[2] mining operations on approximately 12,103 acres in Franklin and Hamilton counties. In 2010, Sugar Camp applied to the State for a Significant Boundary Revision of the existing permit to mine TVA-owned coal under an additional 817-acre area. The permit was issued in May 2010. The original and revised plan included mining a total of approximately 2,600 acres of TVA-owned coal, shown as the orange polygon in Figure 1-1. In 2011 TVA prepared an environmental assessment (EA) to document the potential effects of Sugar Camp's proposed mining of TVA-owned coal underneath the 2,600-acre shadow area. The 880.3-acre mine expansion area was not included in the 2011 EA. This environmental review supplements the 2011 EA.

[1] As used here, "shadow area" refers to that area on the surface corresponding to the underground mine area, including that additional area of the surface subject to subsidence following mining operations.
[2] Longwall mining is a form of underground coal mining where a long "wall" of coal is mined in a single slice. The long panels (i.e., the blocks of coal being mined) at the Sugar Camp mine are approximately 1,400 feet wide and 20,000 feet long. Longwall mining is a form of retreat mining in which the roof and overlying rock are allowed to collapse into the void following removal of the coal.

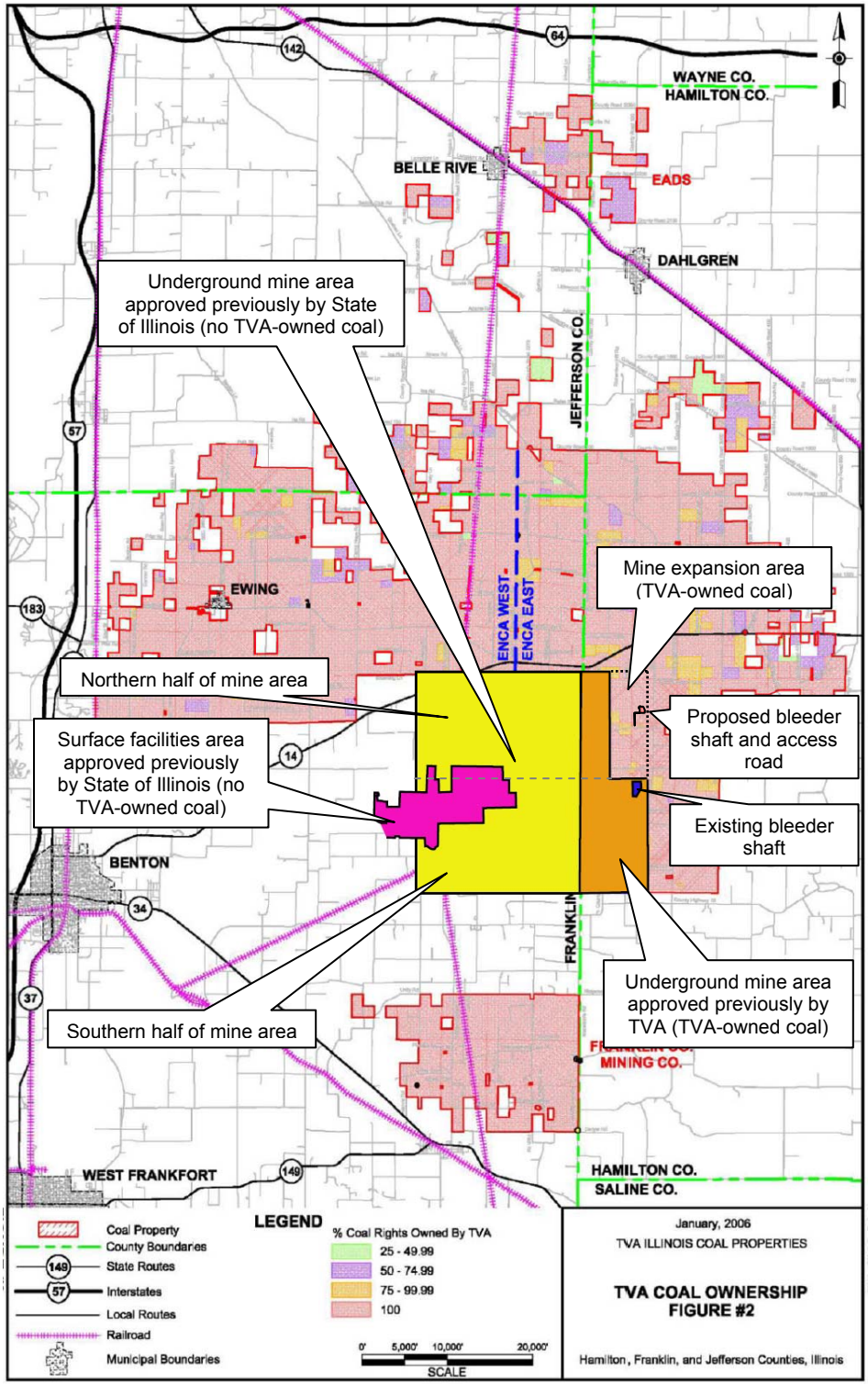

Figure 1-1. Sugar Camp Mine Areas in Southern Illinois

1.2 Decision to be Made

The decision before TVA is whether to approve or disapprove the mining and removal of TVA-owned coal by Sugar Camp LLC according to the proposed mining plan. No other state or federal agencies were a cooperator in the preparation of this supplemental EA.

1.3 Related Environmental Reviews and Consultation Requirements

TVA prepared the EA entitled *Approval of Illinois Coal Lease Mine Plan – Sugar Camp Mine No. 1, Hamilton and Franklin Counties, Illinois* (TVA 2011) to assess the potential environmental effects of the mining of TVA coal at the subject mine. Portions of that document are incorporated herein by reference.

As documented in the 2011 EA, TVA consulted informally with the U.S. Fish and Wildlife Service (USFWS) in accordance with Section 7 of the Endangered Species Act concerning potential effects to the Indiana bat (*Myotis sodalis*). In accordance with Section 106 of the National Historic Preservation Act, TVA consulted with the Illinois State Historic Preservation Office (SHPO) concerning potential effects to historic resources. That consultation resulted in the establishment of a memorandum of agreement between TVA and the Illinois SHPO concerning the documentation and protection of certain historic resources. Additionally, appropriate Native American Tribes were informed (see Section 3.8).

1.4 Scoping and Public Involvement

Public involvement undertaken by state and federal regulatory agencies concerning Sugar Camp's proposed mining operations are described in Section 1.3 of the 2011 EA. Announcements were placed in local newspapers regarding the proposed 880.3-acre mine expansion area and the associated permit revision requested by Sugar Camp. A separate public notice appeared in local newspapers announcing Sugar Camp's proposed construction of the bleeder shaft and installation of the access road.

Internal review of the project by TVA staff determined that the primary geographic scope of this supplemental EA is the 880.3-acre shadow area under which the proposed mining would occur. However, that physical area has been expanded slightly to accommodate the analysis of certain potential effects, such as visual effects to historic properties.

Consistent with the 2011 EA, potential effects to the following resources were considered in this supplemental environmental review:

- Prime farmlands
- Floodplains
- Water supply
- Groundwater
- Surface water
- Wetlands
- Air quality
- Greenhouse gases
- Wildlife
- Vegetation

- Aquatic life
- Threatened and endangered species (i.e., terrestrial animals, plants, and aquatic species)
- Natural areas
- Transportation
- Utilities
- Socioeconomic conditions and environmental justice
- Cultural resources
- Noise

1.5 Necessary Permits or Licenses

TVA would not be required to secure any permits to undertake the proposed action.

Sugar Camp currently holds Permit No. 382 from the IDNR, Office of Mines and Minerals, Land Reclamation Division. Permit No. 382 entitles Sugar Camp to conduct underground mining operations as well as certain above-ground operations associated with coal mining.

Sugar Camp Holds National Pollutant Discharge Elimination System (NPDES) Permit IL0078565, which applies to operations within the area permitted for surface disturbance. This area contains coal washing, storage, and loading facilities as well as other ancillary facilities. Sugar Camp does not intend to secure additional NPDES permits for the expanded underground mining or for the proposed bleeder shaft.

Sugar Camp has applied for the following permits from the State of Illinois, IDNR, Office of Mines and Minerals, Land Reclamation Division:

- *Surface Coal Mining and Reclamation Operations Permit – Underground Operations UCM-1*. This permit is revision number 3 to Permit 382, which authorizes Sugar Camp to conduct underground coal mining operations. Revision number 3 would allow Sugar Camp to extract coal below an 880.3-acre shadow area. The coal reserves within this 880.3-acre shadow area are owned by TVA.

- *Surface Coal Mining and Reclamation Operations Incidental Boundary Revision IBR*-1. This permit is required for the construction of a mine ventilation shaft, i.e., the bleeder shaft. This shaft would be located on a 16.5-acre parcel within the proposed expansion to the shadow area.

- If post-subsidence dredging of streams that are considered waters of the United States is necessary to comply with reclamation requirements under its mining permit, Sugar Camp would be required to secure a permit from the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act.

CHAPTER 2 - ALTERNATIVES

2.1 Description of Alternatives

TVA has determined that from the standpoint of the National Environmental Policy Act (NEPA), there are two alternatives available to TVA: the No Action Alternative and the Action Alternative. The alternatives are described below. A synopsis of the potential environmental effects of adopting each of the alternatives is also provided as Table 2-1.

2.1.1 The No Action Alternative

Under the No Action Alternative, TVA would not approve the proposed 880.3-acre revision to the shadow area submitted as Significant Permit revision to Sugar Camp Mine Permit 382. Although the mining company, Sugar Camp Energy, LLC, has previously secured permits from the State of Illinois and is seeking a permit revision from the State to mine the proposed expansion area, the proposed expansion of mining activities to include additional TVA-owned coal reserves requires approval from TVA. Thus, in the absence of TVA approval, Sugar Camp Energy would not be able to expand its underground mining operations underneath the 880.3-acre shadow area.

2.1.2 The Action Alternative

Under the Action Alternative, TVA would approve the revised Sugar Camp mine plan. This revision would expand the shadow area (i.e., that area above the underground mining operations) by 880.3 acres. Consequently, Sugar Camp would extract the coal reserves under the revised shadow area. Additionally, Sugar Camp would install a ventilation shaft (known as a bleeder shaft) within the subject 880.3-acre expansion area. Such ventilation shafts are required under permit to provide fresh air for miners and to extract methane gas released from the coal seams during mining operations.

Underground Mining within the Mine Expansion Area

A description of underground mining practices used by Sugar Camp is provided in Section 1.6 of the 2011 EA. Sugar Camp proposes to initiate a series of five additional longwall panels in the northern half of its currently permitted shadow area (see Figure 2-1). These additional panels would extend eastward into coal reserves held by TVA. The southern half of Sugar Camp's currently permitted mining area is provided as Figure 2-1 in the 2011 EA. Within the entire mine area, the seam to be removed, the Herrin #6 seam, is approximately 6 to 6.5 feet thick and is located approximately 730 to 1,000 feet beneath the surface. Within the 880.3-acre expansion area, the Herrin #6 seam lies approximately 850 feet beneath the surface.

Once mining of the five additional longwall panels begins, coal removal would continue for approximately 5 years. All coal would be removed and processed at the existing permitted surface facilities shown in Figure 1-1. Following coal recovery, as required by its mining permit, Sugar Camp would restore original drainage conditions and correct damage from subsidence. As stated in the 2011 EA, drainage restoration would likely involve stream dredging, which is subject to requirements under Illinois state law and under Section 404 of the Clean Water Act. TVA would review these stream dredging activities to assess potential effects to cultural resources. Sugar Camp is also required to monitor groundwater quality to assess any changes in groundwater quality that may be caused by subsidence or mining activities as a condition of its mining permit.

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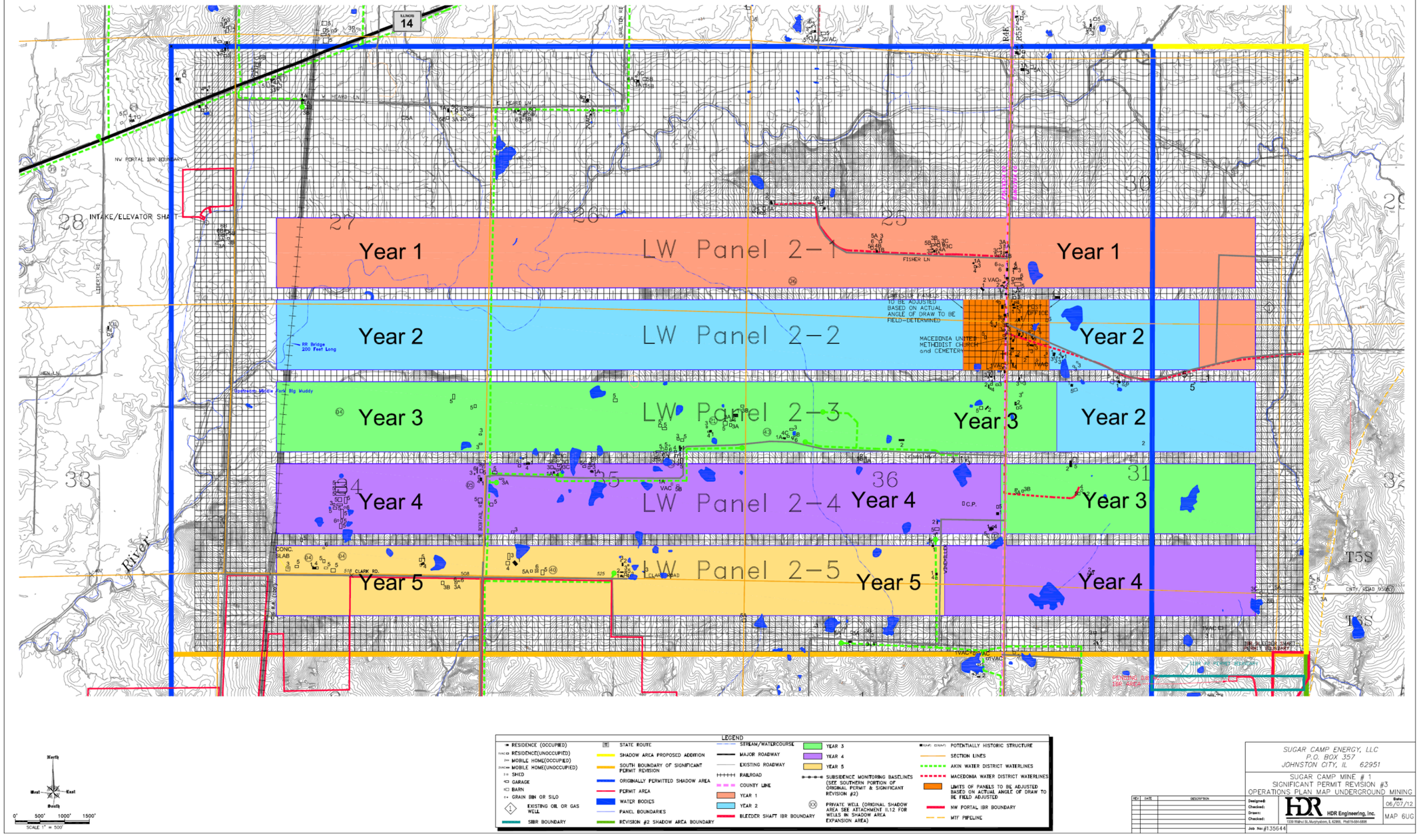

Figure 2-1. Sugar Camp Mining Plan – Northern Half of Mine Area

Bleeder Shaft

The proposed bleeder shaft would be located on a 16.5-acre parcel within the 880.3-acre expansion to the shadow area. The shaft would be 16 feet in diameter and approximately 870 feet deep. An exhaust fan would be mounted on a concrete pad having dimensions of 15 by 80 by 4 feet. Approximately 14.6 acres of the site would be used for equipment, parking, work areas, and support facilities. An existing farm road to the site would be widened to approximately 20 feet and covered with approximately 8 inches of aggregate gravel. This farm road currently connects to County Road 1000 North.

The anticipated life of the bleeder shaft site is 6 years. The reclamation plan calls for returning the site to cropland, its pre-mining land use. The property owner may elect to keep the road entrance, access road, and open work area intact. The exhaust shaft will be filled and sealed according to federal Mine Safety and Health Administration (MSHA) regulatory procedures. The sealing plan will be submitted to MSHA and the Illinois Department of Natural resources for approval prior to shaft reclamation. The temporary drill pit will be dewatered to meet Illinois Stream Standards or the settled pit water will be pumped into a container and discharged at Sugar Camp's NPDES sedimentation pond. Part of the stockpiled subsoil from the drill pit will be returned to the drill pit. The remaining subsoil will be used in shaft reclamation. If the property owner elects not to reclaim the area, aggregate rock from the yard, laydown area, and road will remain in place. Otherwise, this rock will be removed and stockpiled for re-use. Deep tillage will be used on the subsoil after rock removal. The entire disturbed area will be graded for proper drainage. Access road ditches will be filled and graded level with the adjacent surface. Topsoil removed during initial site construction will be redistributed evenly over the exposed subsoil. Topsoil will be limed, fertilized, prepared, and seeded following final grading. If the site is reclaimed in the spring season, the prepared soil will be straw mulched at the rate of 1.5 tons per acre and seeded with a cover crop of spring oats. If the site is reclaimed after October 15, the prepared soil will be seeded with a cover crop of winter wheat at a rate of approximately 1.5 bushels per acre. The site will be fertilized and mulched at a rate of approximately 2 tons per acre. Planting will occur during the first available planting season after proper seedbed preparation has been achieved.

2.2 Comparison of Alternatives

Under the No Action Alternative, TVA would not approve the mining of TVA-owned coal reserves located under the proposed 880.3-acre shadow area expansion. Lacking TVA approval for this mining, Sugar Camp would not be able to extract this coal. Thus, no potential environmental effects directly related to mining, and especially those associated with subsidence, are anticipated within the surface area of the mine expansion area. The extent of surface subsidence beyond the currently established shadow area is not expected to change under the No Action Alternative. However, Sugar Camp would likely continue to extract coal from privately-owned reserves within its currently-approved shadow area (i.e., the yellow polygon shown in Figure 1-1) as well as from TVA-owned coal reserves in Hamilton County (i.e., the orange polygon in Figure 1-1). The potential environmental consequences of those mining activities are addressed in the 2011 EA.

Under the Action Alternative, TVA would approve Sugar Camp's proposed 880.3-acre expansion to the shadow area and the subsequent removal of coal reserves within that shadow area. Consequently, Sugar Camp would expand its current longwall mining operations, as permitted under Mine Permit 382, to include the additional 880.3-acre area of TVA-owned coal reserves. Thus, Sugar Camp would be able to produce approximately

3.9 million tons of additional coal from its mining operations. The extent of surface subsidence, including those environmental effects associated with subsidence, would increase by approximately 880 acres under the Action Alternative as compared to the No Action Alternative. The potential environmental effects on the 880.3-acre shadow area resulting from the removal of TVA-owned coal are described in Chapter 4.

An additional bleeder shaft would be installed under the Action Alternative. This action would affect approximately 16.5 acres of surface. The shaft would be removed after approximately 6 years of operation, and the site would be reclaimed. The potential environmental effects of constructing and operating this structure are described in Chapter 4.

Table 2-1. Summary and Comparison of Alternatives by Resource Area

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Prime Farmlands	No additional effects to prime farmlands within the 880.3-acre expansion area are anticipated.	Within the 880.3-acre expansion area, 15.8 acres of prime farmland would be affected by construction of the bleeder shaft. The site would be restored after 6 years of operation.
Floodplains	No subsidence is anticipated on the 880.3-acre expansion area; thus, no changes to floodplains would occur on this property.	Much of surface of the expansion area would be subject to subsidence. Corrective mitigation to restore drainage is required. The bleeder shaft would be located outside the 100-year floodplain.
Water Supply	No additional effects to water supplies within the 880.3-acre expansion area are anticipated.	No adverse effects to water supplies within the 880.3-acre expansion area are anticipated.
Groundwater	No additional effects to groundwater resources within the 880.3-acre expansion area are anticipated.	Within the expansion area, subsidence would increase aquifer levels. Sugar Camp would be required to compensate for reductions in well water yields.
Surface Water	No additional effects to surface waters within the 880.3-acre expansion area are anticipated.	Subsidence on the expansion area could cause temporary changes in drainage patterns of onsite streams. Sugar Camp is required by its permit to return drainage patterns to pre-subsidence conditions. All mine drainage would be processed at existing surface facilities; no discharges to surface waters would occur in the expansion area.
Wetlands	No additional effects to wetlands within the 880.3-acre expansion area are anticipated.	Additional wetlands areas could be formed on the expansion area by subsidence, but would be eliminated when required stream repairs were completed.

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Air Quality	No additional NAAQS emissions would be generated from mining operations under the 880.3-acre expansion area or from construction and operation of the 16.5-acre bleeder shaft site.	Vehicular and equipment emissions from the construction of the bleeder shaft would cause small, temporary increases in criteria pollutant emissions. Mining of coal under the expansion area over a 5-year period would not generate major additional air pollutant emissions.
Greenhouse Gases	No methane would be released from mining operations on the 880.3-acre expansion area.	Methane emissions released from the mining of coal under the expansion area would be equivalent to approximately 28,000 tons of CO_2 per year.
Wildlife	No additional effects to wildlife within the 880.3-acre expansion area are anticipated.	Local wildlife would be displaced from the bleeder site. Subsidence on the expansion area is not expected to adversely affect wildlife.
Vegetation	No additional effects to vegetation within the 880.3-acre expansion area are anticipated.	Vegetation on the 16.5-acre bleeder site would be cleared for the life of the site (approximately 6 years). Vegetation on the balance of the expansion area would remain virtually unchanged.
Aquatic Life	No additional effects to aquatic life within the 880.3-acre expansion area are anticipated.	Subsidence could cause changes in drainage patterns and stream characteristics. With implementation of required stream remediation activities, effects to aquatic life would be temporary and minor.
Threatened and Endangered Species	No effects to threatened or endangered species would occur on the 880.3-acre expansion area.	No effects to threatened or endangered species would occur on the 880.3 expansion area.
Managed Areas	No additional effects to any local managed areas are anticipated.	No additional effects to local managed areas, including the Middle Fork Big Muddy River Resource Rich Area, are anticipated.
Transportation	No additional transportation-related effects within the 880.3-acre expansion area are anticipated.	Additional traffic associated with construction and operations of the bleeder shaft would be minor. Any subsidence-related damage to local roads would be repaired under the terms of Sugar Camp's mining permit. Coal would continue to be shipped via rail from existing facilities in Franklin County.

Resource Area	Impacts From No Action Alternative	Impacts From Proposed Action Alternative
Utilities	No additional effects to public utilities within the 880.3-acre expansion area are anticipated.	Any damages to above ground or underground utilities resulting from subsidence would be repaired in accordance with the conditions of the mining permit.
Socioeconomic Conditions and Environmental Justice	No additional socioeconomic effects or environmental justice issues within the 880.3-acre expansion area are anticipated.	Temporary jobs would be created for construction of the bleeder shaft. Hiring of additional workers to mine the expansion area, if necessary, would have minor effects on the local economy. No disproportionate effects to minority or low-income populations are expected.
Cultural Resources	No additional effects to historic resources within the 880.3-acre expansion area are anticipated.	No archaeological resources are present on the bleeder site. No historic structures are located on the 880-acre expansion area. Plans would be developed to avoid, minimize or mitigate adverse effects to archaeological resources from drainage restoration on the expansion area.
Noise	No additional noise-related effects within the 880.3-acre expansion area are anticipated.	There would be a temporary increase in noise at the bleeder shaft site during construction. Operation of the bleeder shaft would generate noise, but levels would be within acceptable limits due to distance to the nearest residence.

2.3 Identification of Mitigation Measures

As stated in Section 4.10 of the 2011 EA, the State of Illinois requires Sugar Camp to implement best management practices and certain mitigation to compensate for potential adverse environmental effects as conditions of Mine Permit 382. These conditions would remain in effect. Similarly, the *Memorandum of Agreement between TVA and the Illinois SHPO Concerning Sugar Camp Energy Mine Franklin County, Illinois* would remain in effect.

Section 4.10 of the 2011 EA also states that as additional conditions of approval of the mining plan, TVA would require Sugar Camp to:

- Adhere to the memorandum of agreement requirements
- Include TVA-owned coal lease property in Indiana Bat Protection and Enhancement Plan activities, including mist net surveys, tree removal restrictions, and tree species replacement guidelines.

These conditions would remain in effect. Thus, the Indiana Bat Protection and Enhancement Plan activities apply to the proposed 880.3-acre expansion area. No other mitigative measures or conditions would be required of Sugar Camp.

2.4 The Preferred Alternative

TVA's preferred alternative is the Action Alternative.

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CHAPTER 3 – AFFECTED ENVIRONMENT

The 2011 EA provided a description of the various physical, biological, socioeconomic, and historic resources occurring on approximately 2,600 surface acres (i.e., the shadow area) that could be affected by subsidence following the proposed underground mining activities. This 2,600-acre area overlies TVA-owned coal reserves in Hamilton County, Illinois. The 2011 EA also considered potential effects from the construction and operation of a proposed bleeder shaft on an approximately 17-acre parcel within the 2,600-acre area.

This supplemental EA focuses on the 880.3-acre mine expansion area. TVA holds coal rights under the surface of the property and has limited surface rights[3]. Sugar Camp proposes to expand its currently permitted coal mining operations into the TVA coal reserves under the 880.3-acre surface property. The site of the proposed bleeder shaft is within the 880.3-acre property. Because the subject property is adjacent to the area subject to the 2011 EA, the same potentially affected resources were considered in this supplemental EA.

3.1 Physical Characteristics

TVA previously approved mining by Sugar Camp on a 2,600-acre area of TVA-owned coal reserves, shown as the orange polygon in Figure 1-1. The physical environmental characteristics of this 2,600-acre tract overlying TVA-owned coal reserves are described in the 2011 EA. The proposed 880.3-acre mine expansion area (see Figure 1-1) is adjacent to the previously approved area, and the physical characteristics of both areas are quite similar with respect to geology, land use, and physiographic character.

3.1.1 Prime Farmlands

The term “prime farmland” is a designation assigned by the U.S. Department of Agriculture defining land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for such uses. Similarly, farmland of statewide importance is land other than prime farmland or unique farmland but that is also highly productive.

The federal Farmland Protection Policy Act (FPPA) is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. It assures that to the extent possible federal programs are administered to be compatible with state, local units of government, and private programs and policies to protect farmland. The FPPA does not authorize the Federal Government to regulate the use of private or nonfederal land or, in any way affect the property rights of owners. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land.

The primary land use on the 880.3-acre mine expansion area is agriculture. Much of this land is high quality farmland, and some qualifies as prime farmland.

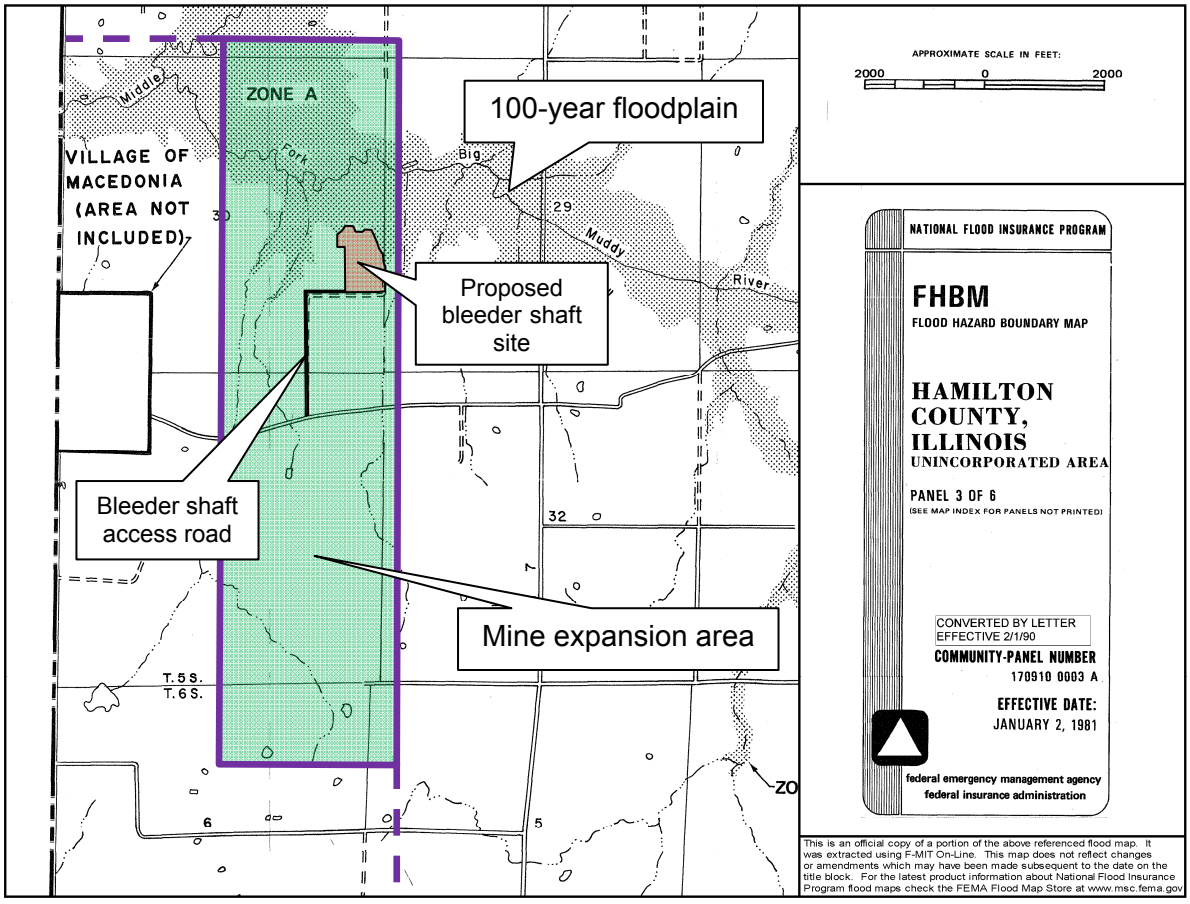
[3] Typically, the deed by which TVA acquired coal included the right to use the overlying surface for mining related uses and facilities. However, specific rights acquired by TVA vary from deed to deed based on rights held by the owner. In addition to the right to mine and remove coal, TVA’s lease grants Sugar Camp whatever right TVA may have to the surface overlying TVA-owned coal.

The site of the proposed bleeder shaft is 16.5 acres in size. According to the *Application for Subsurface Coal Mining and Reclamation Operations Incidental Boundary Revision (IBR-1)*, submitted to the IDNR by Sugar Camp, there are 15.8 acres of prime farmland soils on the 16.5-acre parcel.

3.1.2 Floodplains

Floodplains are the relatively level lands along streams and rivers that are subject to periodic flooding. Executive Order (EO) 11988 (Floodplain Management) requires federal agencies to evaluate the potential effects of proposed actions on natural and beneficial floodplain values, along with alternatives that would reduce or eliminate such effects.

Based on information published by the Federal Emergency Management Agency (FEMA 1981), portions of the northern end of the expansion area lie within the 100-year floodplain, as shown in Figure 3-1. The 100-year floodplain is that area subject to a 1 percent chance of flooding in any given year. These floodplains are associated with the Middle Fork Big Muddy River.



Source: Flood Hazard Boundary Map, Hamilton County, Illinois (Federal Emergency Management Agency 1981)

Figure 3-1. Floodplains within the Sugar Camp Mine Expansion Area

3.2 Water Resources

The mine expansion area is drained by the Middle Fork Big Muddy River. The 16.5-acre bleeder site has no water courses on the site. However, the parcel is located on a low ridge between two tributaries to the Middle Fork Big Muddy River.

3.2.1 Water Supply

According to information supplied by Sugar Camp in the permit application, there are no residential water wells within the proposed mine expansion area, which includes the site of the bleeder shaft. However, five wells are located within a half-mile radius of the shadow area. One of these wells is used as a potable water supply. The others are used for secondary purposes such as stock watering and garden irrigation.

Most residences in the area rely on local water associations or municipal water. The public water supply for the area originates from Rend Lake, located approximately 10 miles to the west.

3.2.2 Groundwater

The proposed 880.3-acre expansion area is located in the headwaters of a major regional drainage system. No major aquifers exist in the immediate area; however, some minor surficial aquifers north and south of the area may provide limited water supplies having yields of about 1 to 10 gallons per minute. Pennsylvanian sandstones and limestones underlying the area are minor aquifers. Because of their low permeability and porosity, these strata tend to contain groundwater that is highly mineralized. Sugar Camp does not propose to use groundwater in its mining operations. However, Sugar Camp is required by its permit to monitor groundwater quality to assess changes in groundwater quality that may be caused by subsidence or mining activities.

3.2.3 Surface Water

Surface water is defined as water flowing through a defined watercourse such as a creek or river or water stored within a water body such as a pond or lake. According to Sugar Camp's permit application, there are no large surface water bodies or lakes within the mine expansion area. Likewise, there are no springs within the area. Four farm ponds are located in the southern half of the expansion area. However, none are larger than 20 acre-feet in size.

This expansion area is currently drained by three small unnamed streams that run south to north. These streams are tributaries of the Middle Fork Big Muddy River, and portions of them have been channelized. The Middle Fork Big Muddy River crosses the expansion area at the northern end.

There are no streams or standing water bodies on the 16.5-acres bleeder shaft site. However, this site is adjacent to the floodplain of the Middle Fork Big Muddy River.

3.2.4 Wetlands

Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, mud flats, and natural ponds. EO 11990 (Protection of Wetlands) directs federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. In addition, activities in wetlands are regulated under the Clean Water Act and various state water quality protection regulations.

National Wetland Inventory maps (USFWS 2013) indicate there are approximately 96.31 acres of forested wetlands and 15.86 acres of scrub-shrub wetlands within the expansion area. As shown in Figure 3-2, these wetlands are associated with the floodplain of the Middle Fork of Big Muddy River. There are a few small freshwater ponds totaling less than 5 acres in the southern half of the parcel. There are no wetlands located on the 16.5-acre bleeder shaft site.

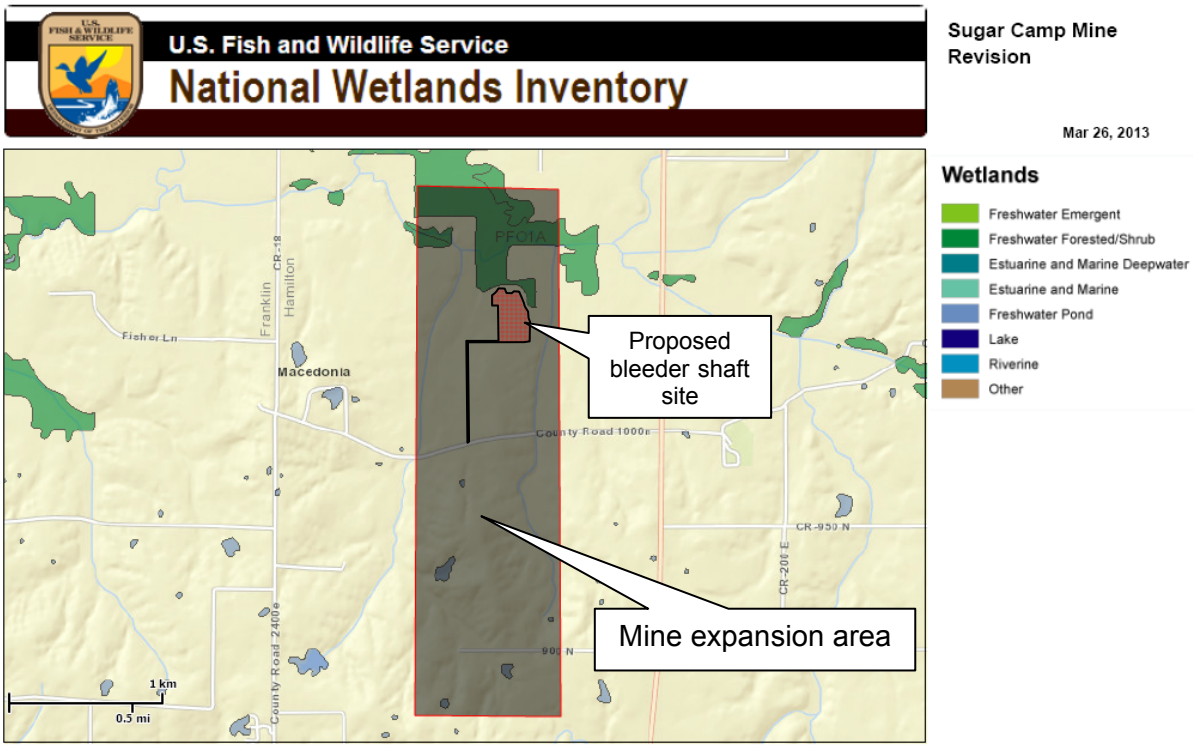


Figure 3-2. Wetlands within the Sugar Camp Mine Expansion Area

3.3 Atmospheric Conditions

3.3.1 Air Quality

The U. S. Environmental Protection Agency (USEPA) has established the National Ambient Air Quality Standards (NAAQS) based on six criteria air pollutants of particular concern. The criteria pollutants include particulate matter, sulfur dioxide, ozone, nitrogen dioxide, lead, and carbon monoxide. Particulate matter has two standards, i.e., particles less than 2.5 microns in diameter ($PM_{2.5}$) and particles less than 10 microns in size (PM_{10}). The federal Clean Air Act requires states to monitor air pollutant levels and determine areas where the NAAQS levels are exceeded. Hamilton and Franklin counties are currently in attainment status for all NAAQS pollutants.

3.3.2 Greenhouse Gases

Greenhouse gases (or "GHGs") are chemical compounds in the atmosphere that trap heat, thereby affecting the earth's energy balance. Methane (CH_4) is a relatively potent GHG, as compared to carbon dioxide (CO_2), which is used as a standard. Methane was produced naturally as coal formed in the earth. When coal is mined, the methane trapped within the coal seams is released and eventually escapes to the atmosphere. Although it was formed naturally, methane is considered a man-made source because the methane would have remained entrapped in the coal seam if it had not been exposed by mining.

Guidance from the Council on Environmental Quality (2010) recommends that federal agencies consider GHG emissions over a threshold of 25,000 metric tons per year of CO_2 equivalent to determine the effects of these emissions and consider methods to reduce GHG emissions.

3.4 Biological Environment

The general biological setting of the Sugar Camp Mine No. 1 area is described in Section 3.4 of the 2011 EA. The 880.3-acre mine expansion area is similar in nature to the larger mine shadow area. Much of the expansion area is used for agriculture, mainly row crops, with some areas of pasture. The area also contains fragmented forested areas and isolated woodlots. These tend to be located in low-lying areas along creeks or other areas that are not amenable to row crops.

3.4.1 Wildlife

The habitat characteristics of the proposed 880-acre expansion area, including the 16.5-acre bleeder shaft, are quite similar to the project area described in Section 3.4.1 of the 2011 EA. The primary land use on the expansion area is agricultural farmland. As such, the area can be described as a heavily fragmented landscape dominated by early-successional habitat interspersed with forested fragments, several riparian zones, and a few scattered residences.

Regularly occurring bird species in cropland include red-tailed hawk, American kestrel, northern bobwhite, rock dove mourning dove, red-winged blackbird, common grackle, dickcissel, and grasshopper sparrow, as well as several invasive species, including European starling, brown-headed cowbird, and house sparrow. Common mammals in the area include Virginia opossum, southeastern shrew, eastern mole, red bat, eastern cottontail, raccoon and white-tailed deer. Fowler's toad, ornate box turtle, common kingsnake, and copperhead are common amphibians and reptiles.

Typical breeding bird species of forested habitats in this area include Cooper's hawk, wild turkey, great horned owl, barred owl, whip-poor-will, red-headed woodpecker, red-bellied woodpecker, downy woodpecker, hairy woodpecker, pileated woodpecker, eastern wood-pewee, Acadian flycatcher, great-crested flycatcher, blue jay, American and fish crows, Carolina chickadee, tufted titmouse, white-breasted nuthatch, Carolina wren. Mammals known to inhabit local forest habitat include big brown bat, eastern chipmunk, fox squirrel, gray squirrel, cotton mouse, and coyote. Slimy salamander, spring peeper, eastern gray tree frog, eastern box turtle, fence lizard, and broad head skink are amphibians and reptiles typical of this habitat type.

As stated in Section 3.4.1 of the 2011 EA, the Big Muddy River watershed provides suitable habitat for a variety of migratory birds. This area also provides habitat for beavers, swamp rabbits, and a variety of common amphibians and reptiles.

3.4.2 Vegetation

A description of regional vegetation, including invasive plants, was provided in Section 3.4.2 of the 2011 EA. The 880.3-acre expansion area contains vegetation typical of the area described in the 2011 EA. Most of the expansion area is used for agriculture. However, there are several small, fragmented woodlots located in the southern half of this area. A somewhat larger, isolated wooded area is located along the Middle Fork Big Muddy River near the northern end of the expansion area.

Approximately 11.2 acres of the 16.5-acres bleeder shaft site is currently used for agricultural crops. The remaining 5.3 acres are forested.

3.4.3 Aquatic Ecology

Four ponds are located in the southern half of the expansion area. The proposed mine expansion area is drained by three small streams that empty into the Middle Fork Big Muddy River. The Middle Fork Big Muddy River crosses the expansion area at its northern end. Portions of these streams, particularly those segments within agricultural areas, have been channelized. The quality of these streams has been affected by adjacent agricultural practices (also see Section 3.4.3 of the 2011 EA). The status of aquatic populations and water quality on streams on properties to be mined by Sugar Camp are described in Section 3.4.3 of the 2011 EA. Aquatic life in streams on the 880.3-acre expansion area is typical of the general area.

There are no permanent water bodies on the 16.5-acre bleeder shaft site. Thus, no aquatic species inhabit this site.

3.4.4 Threatened and Endangered Species

A listing of plants and animals considered threatened or endangered at the state or federal level for Hamilton County and the adjacent Franklin and Jefferson counties is provided as Table 3-1 of the 2011 EA. That table remains relevant. A description of the typical habitat requirements for listed species is provided in Section 3.4.4 of the 2011 EA, which also remains relevant.

Terrestrial Animals

The marsh rice rat (*Oryzomys palustris*) is a state-listed as threatened species known to occur in Franklin and Hamilton counties. Rice rats typically utilize wetland habitats.

The barn owl (*Tyto alba*) is a state-listed endangered species and is also listed as a Species in Greatest Need of Conservation in Illinois. This species is primarily found in hay/pasture, wet meadow, and shallow marshes, as well as woodlands, where it can forage for prey. It is also found in barns, silos, grain bins, and abandoned buildings. Barn owls were formerly much more widespread in areas of cropland, especially where there were grassland areas (e.g. hayfields, pasturelands) nearby.

The piping plover (*Charadrius melodus*), which is both state and federally endangered, is a shorebird that is highly mobile, making long-distance migrations between breeding habitats. In Illinois, mudflats associated with lakes, ponds, impoundments, rivers and larger streams, as well as wetlands may provide potentially suitable stopover habitat for this species during migration. Suitable habitat for piping plover is minimal.

The Indiana bat (*Myotis sodalis*) is a federally listed as endangered species. It is also considered endangered by the State of Illinois. The Indiana bat is known to occur in southern Illinois. However, there are no recorded sightings of Indiana bats in Hamilton County (IDNR 2012; USFWS 2013a; Alliance Consulting 2010). However, some potentially suitable habitat may occur in some of the forested sections of the project area.

In recent years, white nose syndrome, a disease that compromises the bat's immune system, has become a threat (in addition to habitat loss and human disturbance) for Indiana bat and other cave-dwelling bat species. Although it was not detected at the time of development of the 2011 EA, white-nose syndrome has now been confirmed in Illinois.

A survey of the 16.5-acre bleeder shaft site was conducted on June 27, 2012, for Sugar Camp by CBC Engineers and Associates of Harrisburg, Illinois. The steps outlined in the *Range-wide Indiana Bat Protection and Enhancement Plan Guidelines* (USFWS et al. 2013) were followed to determine if Indiana bat habitat was present within the permit area and whether a Protection and Enhancement Plan would be required.

The survey indicated that the trees within the 5.3-acre forested area of the site are young, with diameters of less than 5 inches. These trees did not possess exfoliating bark capable of providing suitable habitat for Indiana bats. Some potentially suitable Indiana bat habitat may occur in the larger trees along nearby fencerows. No caves, inactive underground mine workings, rock shelters or other roosting or nesting habitats were located within the proposed bleeder shaft area.

The northern population of the copperbelly water snake (*Nerodia erythrogaster neglecta*) was listed as threatened by the USFWS in 1997. The range of the northern population includes Ohio, Michigan, and a portion of Indiana. The range of the southern population includes Illinois, Kentucky, and southern Indiana. The Illinois Department of Natural Resources entered into a conservation agreement for the species with other stakeholders in 1996. The agreement included measures to prohibit take[4] of this species. Although the conservation agreement expired after 5 years, prohibition of take is still in effect and applies to coal mining activities in Hamilton County. The most likely location of potentially suitable habitat for this species is along the Middle Fork Big Muddy River, which crosses the northern portion of the expansion area. However, this portion of the expansion area would not be mined and would not be subject to subsidence.

Plants

Storax (*Styrax americana*), a shrub also known as American snowbell, is state-listed as threatened. This plant has been recorded in Hamilton County. Storax is typically found in alluvial woodlands and along stream banks. No federally listed plant species are known to occur within Hamilton or Franklin counties.

The 16.5-acre bleeder site does not provide suitable habitat for any state listed or federally listed threatened or endangered plant species.

Aquatic Species

No federally listed aquatic animal species are known to occur within the proposed mine expansion area or within the immediate area. A large fish, the river redhorse (*Moxostoma carinatum*), which is state-listed as threatened, is known to occur within 10 miles. This species requires streams and rivers with relatively clear water. The Middle Fork Big Muddy River, which crosses the northern portion of the proposed mine expansion area, does not provide suitable river redhorse habitat, and no other suitable river redhorse habitat exists within the mine expansion area.

There are no waterbodies on the 16.5-acre bleeder shaft site. Thus, no state-listed or federally listed threatened or endangered aquatic species inhabit this site.

[4] "Take" is defined here as any activity that may result in injury, harassment or death of a species or the destruction modification of its habitat.

3.4.5 Managed Areas

Managed areas include natural areas, ecologically significant sites, streams included on the Nationwide Rivers Inventory, and streams or rivers designated as Wild and Scenic Rivers. As stated in the 2011 EA, several managed areas are located within 10 miles of the proposed mine expansion area, including the bleeder shaft site. These include the following:

- Middle Fork Big Muddy River Resource Rich Area
- Ten Mile Creek State Fish and Wildlife Area
- Rend Lake State Fish and Wildlife Area
- Wayne Fitzgerald State Recreation Area
- Pyramid State Recreation Area
- Giant City State Park
- Dolan Lake State Fish and Wildlife Area
- Bell Rive Railroad Prairie Natural Heritage Landmark
- Thompsonville Lake
- McCleansboro Lake
- Lake Moses
- West Frankfort City Lake and Reservoir

3.5 Transportation

County Road 1000 North is the main public road within the 880.3-acre expansion area. This road runs east-west across the area. The site of the proposed bleeder shaft is located approximately 2,000 feet north of County Road 1000 North. The bleeder shaft site is currently accessible via an unimproved farm road.

Another county road, identified as County Road 900 North on local road maps but named County Road 950 on maps supplied by Sugar Camp, runs east-west and provides access to the southeastern portion of the expansion area. State Route 7 (also identified as County Road 150 East) runs in a north-south direction approximately 2,000 feet east of the expansion area. County Road 1000 North and County Road 900 North both connect to State Route 7. State Route 14 runs in east-west direction north of the expansion area. Thimble Lane runs south from State Route 14 to provide access to a railroad maintenance area in the northeast corner of the expansion area. Macedonia Road (also known as County Road 2400) runs north-south along the Hamilton-Franklin County Line approximately 3,000 feet west of the expansion area.

A rail line known as the Savatran Rail Spur, which was completed in 2011 and operated by the Evansville Western Railway, crosses the northwestern corner of the proposed expansion area. This rail spur connects to the rail loop at Sugar Camp's coal loading facilities located approximately 4 miles to the southwest in Franklin County. Near the loading facilities, this rail line also connects to the Canadian National railway system, which includes the Illinois Central Gulf rail system. To the northeast, the Savatran Rail Spur connects to the Evansville Western Railway system near McLeansboro, Illinois.

3.6 Utilities

A listing of the public and private entities that own or operate utilities in the general area is provided in Section 3.6 of the 2011 EA. That list remains relevant.

The Macedonia Water District maintains a potable water line along County Road 1000 North, which crosses the proposed mine expansion area in an east-west direction. There is one oil or gas well located on the proposed expansion area. However, this well has been plugged since 1995. No major electric transmission lines cross the expansion area. However, several local distributor lines serve customers in the area. A pipeline running southwest to northeast is located near the southeast corner of the expansion area but is not located on the area.

3.7 Socioeconomic Conditions and Environmental Justice

Typical socioeconomic and demographic conditions in the mine area were described in Section 3.7 of the 2011 EA. That description remains relevant for the 880.3-acre mine expansion area, which also includes the 16.5-acre bleeder shaft site.

According to information provided in the permit application, there are few occupied residences within the 880.3-acre expansion area. A review of recent aerial photography indicated that there are only about three or four occupied homes on the area.

EO 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) requires federal agencies to analyze the effects of their actions on minority and low-income communities.

3.8 Cultural Resources

Section 106 of the National Historic Preservation Act requires federal agencies to assess the impacts of their actions on historic properties. Such historic properties typically include houses and other structures, battlefields, and Native American sites, including archaeological sites.

During the preparation of the 2011 EA, the following federally recognized tribes were contacted regarding Native American religious or cultural resources in the area of the mining project. These tribes were also contacted concerning the proposed mine expansion area.

- Peoria Tribe of Indians of Oklahoma
- Absentee Shawnee Tribe of Oklahoma
- Shawnee Tribe
- Eastern Shawnee Tribe of Oklahoma
- Miami Tribe of Oklahoma
- Sac and Fox Nation of Missouri in Kansas and Nebraska
- Sac and Fox Tribe of the Mississippi in Iowa
- Sac and Fox Nation of Oklahoma
- Osage Nation of Oklahoma

TVA considers the area of potential effects (APE) to be the entire 880.3-acre expansion area where planned subsidence and surface disturbance would occur. According to Attachment II.10 of the *Application for a Significant Permit Revision to Permit #382*, there are five structures that are at least 40 years old within the 880.3-acre mine expansion area. These structures are located on two parcels owned by the same landowners. The structures are a frame farmhouse and four sheds. The sheds, which are well maintained, are used to store farm equipment and are of frame construction, with galvanized tin roofs and siding. The IDNR evaluated potential historic structures within the shadow area and determined them to be ineligible for the National Register of Historic Places (NRHP). TVA determined that none of these structures are eligible for inclusion in the NRHP.

According to information supplied in the permit application for the proposed bleeder shaft, a Phase I Cultural Resources Survey was conducted on the 16.5-acre site by American Resources Group of Carbondale, Illinois on July 27, 2012. The archaeological reconnaissance located no archaeological material. No structures are located on the bleeder shaft site.

3.9 Noise Levels

An existing bleeder shaft, described in the 2011 EA, is located at the southern boundary of the proposed mine expansion area, and noise from its operation can be heard in the southern portions of the proposed expansion area. Farming operations and County Road 1000 North are currently the major sources of noise within the expansion area.

Three residences are located on County Road 1000 North. Two of these houses are located approximately 2,500 feet from the bleeder shaft site. The third is located approximately 3,500 feet from the bleeder shaft.

CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

This chapter contains a discussion of the anticipated potential effects of implementing the two alternatives. Under the Action Alternative, TVA would approve Sugar Camp's mining plan. That action by itself would cause few, if any, direct environmental effects. However, because the proposed underground mining operations within the boundaries of TVA-owned coal reserves and the construction of the proposed bleeder shaft are consequences of TVA's action under the Action Alternative, the potential effects of these mining-related activities were considered.

Under the No Action Alternative, Sugar Camp would not be allowed to extract coal from TVA-owned coal reserves within the shadow area. However, under its existing mining permit, Sugar Camp would likely remove coal from other, privately-owned reserves within the previously-permitted shadow area. Thus, the environmental consequences of adopting and implementing the No Action Alternative tend to be focused on the geographic area within the proposed mine expansion area as illustrated in Figure 1-1.

4.1 Physical Environment

TVA previously approved mining by Sugar Camp of a 2,600-acre area of TVA-owned coal reserves, shown as the orange polygon in Figure 1-1. The physical environmental characteristics of this 2,600-acre tract overlying TVA-owned coal reserves are described in the 2011 EA. The proposed 880.3-acre mine expansion area (see Figure 1-1) is adjacent to the previously approved area, and the physical characteristics of both areas are quite similar with respect to geology, land use, and physiographic character.

Subsidence is the settlement of the ground surface following the collapse of underground mining shafts or voids once the coal has been removed. Planned subsidence is included in Sugar Camp's proposed mining operations plan. The surface elevation over the longwall panels is expected to subside approximately 4.8 feet.

4.1.1 Prime Farmlands

As stated in the 2011 EA, subsidence can affect prime farmland resources, primarily from changes in moisture regimes, which can subsequently affect the inherent productivity of the soil. The IDNR mining permitting process requires coal companies to reestablish drainage patterns and stream profiles. Sugar camp is required by its permit to compensate landowners for temporary crop losses due to impaired drainage and for permanent crop losses due to the alteration of waterways. Likewise IDNR requires mining operators to properly reclaim lands within shadow areas and restore lands affected by mining to productive uses.

No Action Alternative

Under the No Action Alternative, Sugar Camp would be unable to expand the extent of its mining on TVA-owned coal reserves. Sugar Camp would also be unable to install a bleeder shaft at the proposed location. Thus, because there would be no additional surface disturbance, there would be no additional effects to prime farmlands on the expansion area under the No Action Alternative. The effects to prime farmlands (see Section 4.1.1 of the 2011 EA) on those 2,600 acres of surface overlying TVA-owned coal reserves would likely continue under the No Action Alternative.

Action Alternative
Sugar Camp is required by its mining permits to return farmlands within the 880.3-acre shadow area that have been affected by subsidence to productive use as part of the surface reclamation. Because adverse effects to prime farmlands and other productive land from subsidence would be rectified at the completion of mining, there would be no major, long-term effects to these resources.

Consistent with the requirements of its permit, Sugar Camp would restore the 15.8 acres of prime farmlands on the bleeder shaft site to its former capability as part of the required reclamation and restoration at the end of the mining period. The bleeder shaft is expected to operate for approximately six years.

4.1.2 Floodplains

As a federal agency, TVA is subject to the requirements of EO 11988, Floodplain Management. The objective of EO 11988 is "…to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative." The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances. The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative. As a part of the permitting approval process with the State of Illinois, drainage must be corrected as the land subsides in order to restore floodplains to pre-mining conditions.

No Action Alternative
Lacking TVA approval, Sugar Camp would not expand its mining operations into the 880.3-acre mine expansion area as proposed. Therefore, there would be no additional effects to floodplains or floodplain functions within the proposed expansion area under the No Action Alternative. However, any subsidence-related effects to floodplains and floodplain functions associated with underground mining operations on the 2,600 acres of TVA-owned coal reserves in Hamilton County would likely continue under this alternative. These cumulative effects were determined to be insignificant in the 2011 EA (see Section 4.1.2 of the 2011 EA).

Action Alternative
The only above-ground activities associated with the underground mining of this area would be the construction and operation of the ventilation shaft. This facility would be located outside of the 100-year floodplain. As shown in Figure 3-1, much of the designated floodplain within the expansion area is located in the northern portion, which would not be mined and not subject to extensive subsidence. Because drainage mitigation measures would be implemented in accordance with the requirements stated in the mining permit, the project would comply with EO 11988 (Floodplain Management).

4.2 Water Resources

Subsidence has the potential to affect water resources by altering stream elevations and gradients and by altering the rate of water infiltration into underground strata that bear groundwater. Sugar Camp's is required by its mining permit to replace drinking, domestic or residential water supplies that become contaminated or interrupted by mining activities.

4.2.1 Water Supply

Local water supplies, either from groundwater wells or from public water sources, can be affected by subsidence. Sugar Camp, in its permit application, committed to providing a suitable alternative water supply of equivalent quantity and quality as the original supply. Emergency or temporary water replacement would be provided within 24 hours and could be established by hauling water in until a permanent supply is established. Owners of adversely affected water supplies would be reimbursed for actual out-of-pocket expenses caused by the temporary disruption of water supply. Alternative permanent water supplies in the area include extension and connection to a public water supply system, drilled wells in the bedrock aquifer, and surface water impoundments. Permanent replacement includes providing an equivalent water delivery system and reimbursement for operational and maintenance costs in excess of the customary and reasonable delivery costs for the pre-mining water supplies.

No Action Alternative

Under the No Action Alternative, the proposed 880.3-acre mine expansion area would not be subject to mining, and the bleeder shaft would not be installed. Therefore there would be no changes with respect to water supply on the expansion area. The potential effects to local water supplies on adjacent TVA-owned coal properties, as described in Section 4.2.1 of the 2011 EA would likely continue under the No Action Alternative. However, there would be no additional effects to local water supplies on the 880.3-acre expansion area under this alternative.

Action Alternative

As stated in Section 3.2.1, no residential water wells are located within the expansion area, but five wells are located within a half mile of the area. Subsidence within the mine expansion area could potentially affect water supplies due to dislocation of well pipes or water supply lines. As described above, Sugar Camp is required to take certain measures to compensate for the disruption of normal water supplies. Because of these measures, potential effects to local water supplies would be minimal.

4.2.2 Groundwater

No Action Alternative

If the No Action Alternative were adopted, the 880.3-acre expansion area would not be mined, and the bleeder shaft would not be installed or operated. Therefore there would be no direct effects to groundwater on the expansion area. Mining activities on adjacent areas under the existing permit may have indirect effects to groundwater resources within the expansion area, but such effects are expected to be minor. Potential effects to groundwater on the adjacent 2,600 acres of TVA-owned coal reserves are described in Section 4.2.2 of the 2011 EA.

Action Alternative

As described in the 2011 EA, subsidence following mining activities can affect groundwater resources by either impeding groundwater movement from compression of rock strata or enhancing groundwater movement through subsidence-induced fractures in rock layers. Because of the similarity in geological conditions in the larger permitted shadow area and those within the proposed 880.3-acre expansion area, the conclusion stated in Section 4.2.2 of the 2011 EA that potential groundwater effects from mining operations would be minor remains relevant.

4.2.3 Surface Water

As stated in Section 4.2.3 of the 2011 EA, surface waters can be affected by construction of surface facilities (i.e., the bleeder shaft) and by changes in drainage patterns caused by subsidence and from the disposal of water pumped from the mine. No water from the underground mine voids would naturally flow to any surface waters. However, during mining, water pumped from the mine to the surface may increase surface quantities but only marginally due to the size of the receiving streams. All water from the mine would be pumped to the existing surface processing facilities in Franklin County (see Figure 1-1), where it would be treated as necessary and discharged in accordance with Sugar Camp's NPDES permit. Thus, no mine water would be discharged to streams within the expansion area. Sugar Camp's mining permit requires flow patterns to be returned to pre-subsidence patterns through stream mitigation activities.

No Action Alternative

Under the No Action Alternative, Sugar Camp would not be allowed mine the TVA-owned coal reserves on the 880.3-acre proposed mine expansion area. Thus, the surface waters on that property, including ponds and streams, would remain unchanged. Anticipated effects to surface waters on the surface over adjacent TVA-owned coal properties and on privately-owned coal reserves in Franklin County (see Section 4.2.3 of the 2011 EA) would likely continue to occur. Because, Sugar Camp is required by its permit to repair altered drainage patterns caused by subsidence, the duration and consequences such changes are expected to be minor.

Action Alternative

The proposed longwall mining of the expansion area is expected to cause wide-spread surface subsidence of 3 to 4.5 feet. The mining panels run east to west, while local streams on the expansion area tend to run south to north. Thus, the subsidence troughs would be oriented either perpendicular or diagonal to the direction of stream flow. Subsidence-related changes in the shadow area topography may produce surface depressions with localized surface water ponding. The subsidence mitigation plan requires Sugar Camp to re-establish pre-mining drainage patterns by grading and/or tiling to drain area of trapped or standing water. Because of the thickness of the overburden within the expansion area, cracks within the bedrock layers are not expected to reach the surface and cause loss of local stream flows.

According to Sugar Camp's mining plan, the northern part of the 880.3-acre expansion area, specifically that area along the Big Muddy River would not be mined. Therefore, that portion of the Big Muddy River would not be subjected to subsidence.

4.2.4 Wetlands

As mentioned in Section 4.2.4 of the 2011 EA, initial subsidence can result in the formation of isolated depressional wetlands due to changes in groundwater and subsurface flows. However, restoration of drainage patterns restoration required by permit tends to decrease or eliminate these wetland areas over time.

No Action Alternative

No wetland resources would be affected on the proposed mine expansion area by mining because mining would not occur on the area. Therefore, adoption of the No Action Alternative would not involve any additional effects to wetland resources within the area beyond those described previously in Section 4.2.4 of the 2011 EA.

Action Alternative
Implementation of the Action Alternative would not directly impact the approximately 112 acres of forested and scrub-shrub wetlands located in the floodplain of the Middle Fork of Big Muddy River. The current mining plan indicates these areas will be avoided. Subsidence from mining could affect the small freshwater ponds located in the southern half of the site and their associated wetland vegetation. The type and extent of these small wetlands could change, but this change would be minor within the context of the overall wetland acreage within the Big Muddy River watershed.

4.3 Atmospheric Conditions

Surface operations associated with underground mining operations, such as earth moving operations for the construction of the bleeder shaft can affect air quality due to the generation of fugitive dust and the production of particulate matter from the exhaust of internal combustion engines. Emissions from underground mining operations are lessened due to the use of electrically-powered equipment and the use of filters on diesel-powered equipment.

4.3.1 Air Quality

No Action Alternative
Under the No Action Alternative, exhaust emissions and fugitive dust emissions associated with mining and the construction and operation of the bleeder site would not occur. However, such air emissions would continue on Sugar Camp's operations in Franklin County and on TVA-owned coal reserves in Hamilton County that were the subject of the 2011 EA. However, there would be no direct additional air emissions associated with Sugar Camp's mining on the proposed expansion area if the No Action Alternative were adopted.

Action Alternative
Construction of the proposed bleeder shaft would cause temporary small increases in criteria pollutant emissions from the operation of vehicles and equipment. Maximum likely construction-related emissions were calculated and documented in Section 4.3.1 of the 2011 EA. Emissions anticipated from the construction of the proposed bleeder shaft are comparable to those provided in the 2011 EA. Use of best management practices to suppress fugitive dust emissions would reduce dust emissions to minor levels.

Underground mining equipment contributes to pollutant emissions. Safety regulations require the use of filters on diesel-powered mining equipment. Other mining equipment is electrically powered and does not generate emissions. Mining of the coal reserves under the proposed expansion area would occur over a 5-year period. Thus, underground mining on the 880.3-acre expansion area is not expected to generate major additional air pollutant emissions. However, any emissions generated by mining in the expansion area would contribute to those produced from mining under the entire permitted shadow area.

4.3.2 Greenhouse Gases

No Action Alternative
Because mining on the 880.3-acre expansion area would not occur if the No Action Alternative were adopted, the potential release of methane from the coal underlying the 880.3-acre expansion area would not occur at this time. However, current underground mining operations by Sugar Camp would likely continue within the shadow area in Franklin County and within the 2,600-acre area of TVA-owned coal in Hamilton County mentioned in

the 2011 EA. GHGs, primarily methane, would be released by mining activities in these areas for the duration of mining activities, a period of approximately 6 years.

Estimated yearly GHG emissions associated with the extraction of coal from the entire mine area, excluding the 880.3-acre expansion area were calculated using the methodology described in Appendix I of the 2011 EA. Acreages of mine panels were estimated from measurements taken from a large-scale map (i.e., Figure 2-1) provided by Sugar Camp. These acreages were used to estimate the volume of coal to be removed. GHG emissions were calculated from these volumes.

Methane emissions were converted to metric tons of equivalent carbon dioxide (CO_2) using a conservative factor of 23 metric tons of CO_2 per metric ton of methane. Estimated yearly methane emissions, expressed as metric tons per year (TPY) of equivalent CO_2, resulting from the mining of coal from the currently permitted shadow area are provided as Table 4-1. According to the USEPA (2013), in 2011, there were 292 facilities in the state of Illinois that reported a total of 140.4 million metric tons of CO_2 equivalent. As shown in Table 4-1, GHG emissions from the current level of mining by Sugar Camp would contribute less than one third of one percent to the current GHG emissions at the state level.

Table 4-1. Estimated Mining-related CO_2 Equivalent Emissions under the No Action Alternative

Year	Emissions from Mining of TVA-owned Coal (Metric TPY)	Emissions from Mining of Privately-owned Coal (Metric TPY)	Contribution to Total Illinois GHG Emissions
2013	66,490	157,191	0.159 %
2014	97,146	316,952	0.295 %
2015	110,538	307,368	0.298 %
2016	90,100	334,819	0.303 %
2017	70,297	353,386	0.302 %
2018	0	251,164	0.179 %

Action Alternative

The underground mining of the permitted shadow area in Franklin County and the 2,600-acre area of TVA-owned coal in Hamilton County as described above would continue under the Action Alternative. The resulting GHG emissions from this mining, as listed in Table 4-1 would also occur under the Action Alternative. However, under the Action Alternative, underground longwall mining would occur on the 880.3-acre expansion area, which contains TVA-owned coal. This would result in the generation of additional GHG emissions. Estimated GHG emissions resulting from mining of the expansion area were derived using the methodology described above.

As shown in Figure 2-1, coal would be mined from five panels over a five-year period. However, coal would be removed from the TVA-owned reserves within the expansion area over a span of 4 years. According to information supplied by Sugar Camp, an estimated 3.9 million tons of coal would be removed from the expansion area over the 5-year mining period. Different acreages of coal would be mined yearly over the mining period. Estimated GHG emissions, expressed in metric tons per year (TPY) of equivalent CO_2, produced under the Action Alternative are presented in Table 4-2.

Table 4-2. Estimated Mining-related CO_2 Equivalent Emissions under the Action Alternative

Year	Emissions from Mining of the Expansion Area (Metric TPY)	Emissions from Mining of Other TVA-owned Coal in Hamilton County (Metric TPY)	Emissions from Mining of Privately-owned Coal (Metric TPY)	Contribution to Total Illinois GHG Emissions	
				From Expansion Area	From Entire Shadow Area
2013	0	66,490	157,191	0.000 %	0.159 %
2014	34,531	97,146	316,952	0.025 %	0.320 %
2015	32,594	110,538	307,368	0.023 %	0.321 %
2016	22,375	90,100	334,819	0.016 %	0.319 %
2017	22,375	70,297	353,386	0.016 %	0.318 %
2018	0	0	251,164	0.000 %	0.179 %

Over the four-year period in which mining of the expansion area would occur, coal extraction within the expansion area would generate an average of approximately 28,000 tons CO_2 equivalent per year. This represents a minor increase of the overall annual emissions from the mine for the 4 years the additional acreage would be mined. As shown in Table 4-2, GHG emissions from the expansion area are a minor contribution to those from the entire mining operation, which is a very small contribution to those at the state level. The expansion of Sugar Camp's proposed mining to include the additional 880 acres of TVA-owned coal reserves is expected to cause a very small (perhaps undetectable) cumulative effect to the climate.

Under the USEPA's Greenhouse Gas Reporting Program, facilities that emit 25,000 metric tons or more per year of GHGs are required to annually report their GHG emissions (40 CFR Part 98). Specifically, underground coal mines liberating 36,500,000 cubic feet of methane or more per year are considered direct source emitters and must report emissions (Subpart FF).

4.4 Biological Environment

4.4.1 Wildlife

No Action Alternative

Under the No Action Alternative, expansion of mining activities onto 880.3 additional acres and the construction and operation of a bleeder site would not occur. Thus, the biological characteristics of the expansion area would remain in their current condition. Therefore, wildlife and wildlife habitats within the expansion area would not experience any additional effects associated with mining operations.

Action Alternative

Disturbance to wildlife resulting from construction activities at the site of the proposed bleeder shaft would be minor. The majority of the area where surface activity would take place is already disturbed (i.e., maintained as a cultivated field). Thus species most likely present would be those associated with early-successional, regularly disturbed habitat. Any wildlife present within the site at the time of construction activities would disperse to nearby areas.

Coal mining and reclamation operations may indirectly affect wildlife by increasing human access to species and/or their habitats and by causing or contributing to long-term changes in land use and the local ecology. There currently is no evidence that longwall subsidence would affect the productivity or surface usage of habitat by wildlife, migratory birds, or the copperbelly water snake within the proposed expansion area.

4.4.2 Vegetation

No Action Alternative

Under the No Action Alternative, mining on the 880.3-acre expansion area would not occur. Thus, no change on this area, including the site of the bleeder shaft, would occur. Because subsidence does not tend to affect surface vegetation, no major changes in vegetation types of areas overlying other TVA-owned coal reserves previously approved for mining are expected.

Action Alternative

The existing vegetation on the 880.3-acre expansion area (with the exception of the bleeder shaft site) would remain virtually unchanged, as no surface disturbance is anticipated. Subsidence is not expected to affect current vegetation beyond a minor extent.

Approximately 11.2 acres of cropland at the bleeder shaft site would be converted to soil storage areas and graveled areas for the life of the site (approximately 6 years after installation). Approximately 5.3 acres of forested land would be cleared for the bleeder shaft. This forested area is mainly sapling-sized trees with diameters less than 5 inches. Upon reclamation, the site would be returned to agricultural uses. The surface owner would determine if the entire site remains in agricultural use or if portions may be allowed to revert to wooded areas.

4.4.3 Aquatic Ecology

Changes of in-stream habitat conditions and riparian characteristics caused by subsidence have the potential to affect aquatic life.

No Action Alternative

Adoption and implementation of the No Acton Alternative would not involve any changes in aquatic systems or aquatic life on the 880.3-acre mine expansion because the proposed mining of this area would not occur. However, subsidence on adjacent areas being mined would continue to affect aquatic life to varying degrees. Such effects in these areas are described in Section 4.4.3 in the 2011 EA.

Action Alternative

Subsidence associated with mining under the Action Alternative could affect stream flows and characteristics. However, such impacts to stream and other watercourses are subject to Sugar Camp's mitigation plan for reestablishing pre-subsidence drainage patterns. With the implementation of these measures, direct effects to local aquatic life would be minimal.

4.4.4 Threatened and Endangered Species

No Action Alternative

Under the No Action Alternative, neither underground mining nor the installation of the proposed bleeder shaft would occur on the 880.3-acre mine expansion area. Therefore, there would be no changes in current biological conditions for threatened or endangered species, other than from naturally-occurring changes, on the expansion area. Thus, no effects to any state-listed or federally listed threatened or endangered species inhabiting

the proposed mine expansion area would occur as a result of adopting the No Action Alternative. However, the mitigative measures imposed under Sugar Camp's existing mine permit would remain in effect for the currently-permitted mine areas. These measures are stipulated in the Final Indiana Bat Protection and Enhancement Plan and Annual Monitoring Study Plan as mentioned in Section 4.4.4 of the 2011 EA.

Action Alternative
Because subsidence within the 880.3-acre expansion area is not likely to adversely affect their habitats, any effects to the marsh rice rat (state-listed as threatened) or the barn owl (state-listed as endangered) would be minor.

Coal mining may affect Indiana bats in situations where proposed surface disturbances occur near documented Indiana bat hibernacula (overwintering areas), maternity roosts, and/or collection record sites, or when forested habitat that could serve as foraging, roosting or travel corridor habitat is cleared for mining activities (USFWS et al. 2013).

A site survey of the 16.5-acre bleeder shaft site indicated that no suitable or potential Indiana bat habitat exists within this area and that no summer, swarming and/or winter habitat for Indiana bats exists within the 16.5-acre site. Therefore, TVA has determined that adoption of the Action Alternative would not affect Indiana bats or any designated critical habitat for this endangered species.

No federally listed plant species are known to occur within Hamilton or Franklin counties. Ground settling from subsidence does not tend to cause soil disturbance or result in drastic changes in habitat conditions that would affect plants directly. Storax, a state-listed threatened plant may occur in the floodplain area along the Middle Fork Big Muddy River in the northern part of the expansion area. Because mining would not occur under most of the floodplain within the expansion area, no subsidence-related effects to the plant communities along the Middle Fork Big Muddy River are likely. Thus, subsidence related to the underground mining of coal on the expansion area would not affect any state-listed or federally listed threatened or endangered plant species. For similar reasons, plus the fact that the bleeder site does not contain suitable habitat for any threatened or endangered plant species, there would be no effects to threatened or endangered plant species from the installation and operation of the proposed bleeder shaft.

No federally listed aquatic animal species occur within the proposed mine expansion area or within the vicinity. Thus, adoption and implementation of the Action Alternative would not affect any federally listed aquatic animal species. Due to the lack of suitable habitat, no effects to the river redhorse, a state-listed threatened fish are expected.

4.4.5 Managed Areas

Subsidence could affect managed areas if it alters streams or drainage patterns on the managed areas. Air emissions and noise associated with construction and mine operations also have the potential to affect managed areas.

No Action Alternative
Under the No Action Alternative, the proposed mining of the 880.3-acre mine expansion area would not occur. Thus, there would be no additional effects to local managed areas beyond those described in the 2011 EA.

Action Alternative
No effects to managed areas beyond those described in Section 4.4.5 of the 2011 EA are expected from implementing the Action Alternative. Virtually the entire mine area, including the proposed mine expansion area, lies within the Middle Fork Big Muddy River Resource Rich Area. The primary ecological asset of this managed area is the Middle Fork Big Muddy River, which affords forest and riverine habitats in an extensive agricultural area. Because Sugar Camp is required by its mining permit to restore drainage patterns to pre-subsidence conditions, the cumulative effect on this area from mining the 880.3-acre expansion area is expected to be minor.

4.5 Transportation

Local roads in the area could be affected by mine-related traffic, especially if such traffic is heavy. Subsidence can also affect roads within the shadow area. Sugar Camp is required to repair roads damaged by subsidence as a condition of its mining permit.

4.5.1 No Action Alternative
Under the No Action Alternative, the 880.3-acre expansion area would not be mined. Therefore, there would be no additional transportation-related effects on the mine expansion area from adopting this alternative.

4.5.2 Action Alternative
There would likely be a minor increase in traffic on County Road 1000 North during the construction of the bleeder shaft. Regular operation and maintenance of the bleeder shaft is also likely to generate a small amount of additional traffic for the 6-year duration of operation of the shaft. However, the contribution to the average traffic on this road is expected to be *de minimis*.

Some damage to County Road 1000 North could occur as a result of the subsidence event resulting from the removal of the coal in the panels beneath this highway. As required in its mine permit, Sugar Camp would be required to monitor the roadway section as mining occurs under this area, and temporary corrective measures such as regrading and patching would be implemented to maintain a safe roadway. After the subsidence event has passed, Sugar Camp would restore the road to pre-subsidence conditions.

Coal mined by Sugar Camp is transported underground to a central processing and loading facility in Franklin County. The location of these surface facilities is shown in Figure 1-1. Coal is processed at these facilities, and then it is loaded and shipped by rail. The local rail lines are capable of handling the volume of rail traffic. As required under its mining permit, Sugar Camp is responsible for repairing subsidence-related damage to the Canadian National rail line and the Savatran Rail Spur within the shadow area. Thus, there would be no adverse effects to local rail operations.

4.6 Utilities

The 2011 EA acknowledged that transmission lines and buried utilities such as sewer and water lines can be affected by subsidence. The State of Illinois requires mining companies to obtain agreements with utility companies, road authorities, rail lines, and buried pipeline companies to prevent or minimize subsidence-related damages as a condition of the mine permit.

In its permit application, Sugar Camp stated: "The Permittee [Sugar Camp] will pursue agreements with governmental bodies and utility companies responsible for all public roadways, utility lines, and buried pipelines expected to be affected by subsidence. Such agreements, to be negotiated well in advance of subsidence, will allow the implementation of measures designed to prevent or minimize subsidence damage and/or outline a timely procedure for the repair or replacement of damaged facilities following subsidence. These agreements will vary in scope and content, and will be site specific for each such facility."

4.6.1 No Action Alternative

Because the proposed mining activities on the 880.3-acre expansion area would not occur under the No Action Alternative, there would be no subsidence within that area. Thus, utilities such as water lines, power lines, and gas lines within the expansion area would not be affected under the No Action Alternative.

4.6.2 Action Alternative

Sugar Camp is obligated by its mining permit to minimize subsidence-related damages to public utilities. Should the Macedonia Water District potable water line along County Road 1000 North be damaged by subsidence, Sugar Camp would compensate for the loss of service. Likewise Sugar Camp would make compensation for any other damage to utilities. With these measures in place, adverse effects to public utility service under the Action Alternative would be minor.

4.7 Socioeconomic Conditions and Environmental Justice

4.7.1 No Action Alternative

Under the No Action Alternative, Sugar Camp would not mine the coal reserves under the 880.3-acre expansion area and would not construct the bleeder shaft on the area. Thus, any increase in employment or employment opportunities for accomplishing this work would be foregone.

4.7.2 Action Alternative

Mining of the 880.3-acre expansion area and construction of the bleeder shaft would occur under the Action Alternative. The 2011 EA states that approximately 15 workers would be employed to drill the bleeder shaft over a 1-year period. Six additional workers would be hired to develop the bleeder shaft, and five would be employed to install power to the ventilation shaft. Comparable employment figures are anticipated to construct the proposed bleeder shaft. Because of the technical skills required, these jobs would not necessarily provide any new employment opportunities to the local workforce.

Under the Action Alternative, Sugar Camp would conduct mining operations within the currently permitted shadow area over a 5-year period; however, according to information supplied by Sugar Camp (see Figure 2-1) mining of TVA-owned coal would occur over a 4-year period. Because the TVA-owned coal reserves within the expansion area constitute only about 10 percent of the coal to be mined, mining operations within the expansion area would not necessarily involve hiring additional workers. However, if additional mine labor is necessary, those jobs could be filled by local workers with necessary skills and experience. The hiring of additional mine workers is not expected to have a major effect on the local economy.

No disproportionate effects are expected to occur to any minority or economically disadvantaged populations. Thus, the proposed action is consistent with EO 12898.

4.8 Cultural Resources

Subsidence can affect structures by creating cracks or shifts in foundations. The State of Illinois requires mining companies to conduct pre-subsidence surveys of structures, as requested by the owners of those structures, to assess damage from subsidence. Structures can be braced before subsidence and repaired afterward. Sugar Camp is required by the State of Illinois to repair or compensate owners for structural damage caused by subsidence.

As stated in the 2011 EA, an interagency agreement between the Illinois Department of Mines and Minerals and the Illinois Historic Preservation Agency has established that subsidence, in general, does not affect archaeological sites. However, surface-disturbing actions, such as those to correct drainage patterns affected by subsidence, could affect archaeological resources.

4.8.1 No Action Alternative

Under the No Action Alternative, there would be no effect to historic structures or archaeological sites (i.e., cultural resources) on the proposed 880.3-acre expansion area because no mining would occur on this TVA-owned coal lease property. Potential effects to two historic structures located on property overlying TVA-owned coal reserves in Hamilton County outside the proposed expansion area are described in Section 4.8 of the 2011 EA. Historic structures and archaeological sites within the permitted shadow area in Franklin County (i.e., that part of the mine outside TVA-owned coal reserves) could be affected by mining activities. Such effects would be subject to mitigation required in Sugar Camp's current mining permit.

4.8.2 Action Alternative

Construction of the 16.5-acre bleeder shaft and access road expansion has the potential to affect archaeological sites. As stated in Section 3.8, an archaeological survey of the bleeder shaft and access road expansion identified no archaeological sites. TVA consulted with the Illinois SHPO and federally recognized Indian tribes regarding the ineligibility of the historic structures and the finding of no effect. The SHPO concurred with TVA's findings and determinations (Appendix A). Comments were received from the Miami Tribe of Oklahoma, a federally recognized Indian tribe. These comments are incorporated in TVA's administrative record.

Subsidence is not anticipated to affect archaeological sites because the ground would drop gradually and uniformly. An underlying clay layer provides a relatively plastic cushion, resulting in minimal damage to the surface. Subsidence could cause ponding near streams and inundate previously dry archaeological sites. These sites would be restored to previous dry conditions by post subsidence stream restoration activities.

As stated in Section 4.8 of the 2011 EA, drainage restoration activities could affect archaeological sites, as stream-side areas often have a high probability of containing archaeological sites. Such restoration would involve ground-disturbing activities such as dredging. These stream restoration activities may require an archaeological survey prior to site disturbance to establish the presence or absence of significant archaeological resources. This survey would be conducted as part of Sugar Camp's application for a permit under Section 404 of the Clean Water Act. If such resources are present, a plan would be developed by Sugar Camp for avoidance, minimization, and/or mitigation in accordance with the mining permit.

4.9 Noise Levels

4.9.1 No Action Alternative

Under the No Action Alternative, mining would not occur on the 880.3-acre expansion area. Sugar Camp would not construct or operate the proposed bleeder shaft on the area. Thus, there would be no additional noise generated on the mine expansion area if the No Action Alternative were selected.

4.9.2 Action Alternative

Under the Action Alternative, noise would be generated by heavy equipment used to construct the bleeder shaft. Onsite construction-related noise levels would be comparable to those described in the 2011 EA, i.e., about 110 decibels (dB). Because noise attenuates with distance from the source, construction noise at the two nearest receptors (houses that are approximately 2,500 feet away) is expected to be nearly the same as ambient noise levels typical of rural settings. This construction-related noise would be generated for approximately a year, and would cease upon the completion of construction.

Operational noise generated by the bleeder shaft fan would be constant and could likely be heard at the nearest residences. These operational noise levels are described in Section 4.9 of the 2011 EA and are representative of the noise levels that would be generated by the bleeder shaft under the Action Alternative. However, due to the attenuation from the distance, noise levels at the nearest residences would be comparable to normal ambient noise. The operational life of the bleeder shaft and ventilation system is expected to be approximately 6 years. After that time, the equipment would be removed, and no additional operational noise would be generated.

Underground mining operations would generally not be heard above ground within the 880.3-acre expansion area.

4.10 Cumulative Impacts

Various potential environmental effects, primarily those due to subsidence, could occur as a result of Sugar Camp's mining of coal reserves under approximately 12,103 acres of land in Franklin and Hamilton counties, Illinois. TVA does not own any of the coal reserves in Franklin County that are currently proposed to be mined by Sugar Camp and exercises no federal control and responsibility over those resources. Sugar Camp is also permitted to mine approximately 2,600 acres of TVA-owned coal reserves in Hamilton County, and TVA has approved Sugar Camp's mining plan for extracting those coal reserves. Therefore, because Sugar Camp is currently permitted to extract these coal reserves, the potential for environmental effects exists regardless of TVA's decision to allow Sugar Camp to mine coal beneath the 880.3-acre proposed mine expansion area. However, its permits require Sugar Camp to mitigate or compensate for damages resulting from subsidence.

Sugar Camp's current coal mining operations currently generate GHG emissions. As stated in Section 4.3.2, these emissions are minor at the state level. Additional GHG emissions would result from removal of coal within the proposed expansion area. These additional emissions constitute a minor cumulative effect.

Under the Action Alternative, Sugar Camp would be able to extend its underground mining operations into approximately 880.3 acres of underground coal reserves owned by TVA. Thus, any additional environmental effects from mining beneath the expansion area would constitute cumulative effects in addition to those resulting from currently planned and

permitted mining activities. Because Sugar Camp is required to mitigate subsidence-related damages, these potential cumulative environmental effects are expected to be minor.

4.11 Unavoidable Adverse Environmental Impacts

Use of approximately 16.5 acres of surface property at the bleeder shaft site would result in an unavoidable, temporary loss of approximately 15.8 acres of prime farmland. As explained in Section 4.3.2, extraction of underground coal results in the unavoidable release of methane, a GHG, to the atmosphere.

Subsidence following mining operations has the potential to cause unavoidable effects to various resources and characteristics due to changes in topography or from direct damage to structures. Subsidence could cause changes in drainage patterns, thereby indirectly affecting wetland functions. However, Sugar Camp's permit requires the company to repair such damages or compensate surface landowners for these damages.

Release of methane, a GHG, would occur as a result of Sugar Camp's coal mining, which constitutes a minor unavoidable adverse effect.

4.12 Relationship of Short-Term Uses and Long-Term Productivity

With the exception of the bleeder shaft site, there would be no surface activities on the expansion area. The 16.5-acre bleeder shaft site would be a temporary use of this property. The site would be restored to its former productivity after a period of 6 to 7 years.

Planned subsidence would affect virtually all of the 880.3-acre expansion area to various degrees. Such subsidence does not normally directly affect the inherent productivity of the surface for typical land uses such as agriculture or forestry. Thus, the removal of coal from beneath the proposed mine expansion area is not expected to negatively affect the long-term productivity of the area to any noticeable extent.

4.13 Irreversible and Irretrievable Commitments of Resources

As used here, irreversible commitments of resources include the use or consumption of non-renewable resources as a result of a decision or implementing a proposed action. The extraction of coal is an irreversible commitment of resources. Likewise, the use of fuel and electric energy to power mining equipment represents another irreversible use of resources.

Irretrievable commitments involve the use or commitment of resources for a period of time, even a long period. An example of an irretrievable resource commitment is the loss of timber production on a newly-cleared transmission line right-of-way through a previously forested area. In that case, removal of the transmission line and the right-of-way would eventually result in the restoration of forest land and timber productivity.

Loss of the productivity and agricultural use of 15.8 acres of prime farmlands at the site of the bleeder shaft is an irretrievable commitment of resources. However, after approximately six years of operation, the bleeder site would be reclaimed, and it would be returned to its former agricultural capability.

CHAPTER 5 – LIST OF PREPARERS

5.1 NEPA Project Management

Charles P. Nicholson

Position:	Principal Program Manager
Education:	Ph.D., Ecology and Evolutionary Biology; M.S., Wildlife Management; B.S., Wildlife and Fisheries Science
Experience:	34 years in Zoology, Endangered Species Studies, and NEPA Compliance
Involvement:	NEPA Compliance

James F. Williamson Jr.

Position:	Contract Senior NEPA Specialist
Education:	Ph.D., Fisheries and Wildlife Sciences; M.S., Wildlife Ecology; B.S., General Science/Zoology
Experience:	10 years in Forest Management, Inventory, and Software Development; 22 years in NEPA Compliance
Involvement:	NEPA Compliance and Document Preparation

5.2 Other Contributors

John (Bo) T. Baxter

Position:	Manager, Endangered Species Act
Education:	M.S. and B.S., Zoology
Experience:	22 years in Protected Aquatic Species Monitoring, Habitat Assessment, and Recovery; 14 years in Environmental Review
Involvement:	Aquatic Ecology/Threatened and Endangered Species

Jennifer M. Call

Position:	Meteorologist
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Experience:	10 years in Meteorological Forecasting, Air Quality Monitoring, Data Analysis, and Air Quality Research
Involvement:	Air Resources and Greenhouse Gases

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Position:	Botanist, Specialist
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Involvement:	Threatened and Endangered Plant Species, Invasive Plant Species

Holly G. LeGrand

Position:	Biologist/Zoologist
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Involvement:	Terrestrial Ecology and Threatened and Endangered Terrestrial Species

Roger A. Milstead, P.E.

Position:	Program Manager, Flood Risk
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Involvement:	Floodplains

W. Chett Peebles

Position:	Specialist, Architect
Education:	Bachelor of Landscape Architecture
Experience:	25 years in Site Planning, Design, and Scenic Resource Management; 6 years in Architectural History and Historic Preservation; Registered Landscape Architect
Involvement:	Historic Architectural Resources

Craig L. Phillips

Position:	Aquatic Biologist
Education:	M.S. and B.S., Wildlife and Fisheries Science
Experience:	6 years Sampling and Hydrologic Determinations for Streams and Wet-Weather Conveyances; 5 years in Environmental Reviews
Involvement:	Aquatic Life and Threatened and Endangered Aquatic Species

Kim Pilarski-Hall

Position:	Senior Wetlands Biologist
Education:	M.S., Geography, Minor Ecology
Experience:	17 years in Wetlands Assessment and Delineation
Involvement:	Wetlands

Edward William Wells, III

Position:	Archaeologist B
Education:	M.A., Anthropology; B.S., Anthropology
Experience:	13 years in Cultural Resource Management
Involvement:	Cultural Resources

David B. Wilson

Position:	Contract Biologist
Education:	M.S. Environmental Science; B.S. Biology
Experience:	8 years in Biological Resources and Compliance; 5 years in Natural Areas Review
Involvement:	Natural Areas

CHAPTER 6 – SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT RECIPIENTS

6.1 Federal Agencies

U.S. Army Corps of Engineers – St. Louis District
U.S. Fish and Wildlife Service – Rock Island Ecological Services Office

6.2 Federally Recognized Tribes

Absentee Shawnee Tribe of Oklahoma
Eastern Shawnee Tribe of Oklahoma
Miami Tribe of Oklahoma
Osage Nation of Oklahoma
Peoria Tribe of Indians of Oklahoma
Sac and Fox Nation of Missouri in Kansas and Nebraska
Sac and Fox Nation of Oklahoma
Sac and Fox Tribe of the Mississippi in Iowa
Shawnee Tribe

6.3 State Agencies

Illinois Department of Natural Resources – Land Reclamation Division
Illinois Environmental Protection Agency

6.4 Individuals and Organizations

Ruger Coal Company LLC
Beckley, West Virginia

Sugar Camp Energy LLC
Johnson City, Illinois

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CHAPTER 7 – LITERATURE CITED

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Appendix A – Correspondence

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Illinois Historic
Preservation Agency

FAX (217) 782-8161

1 Old State Capitol Plaza • Springfield, Illinois 62701-1512 • www.illinois-history.gov

Hamilton County
Macedonia
Revised Mining Plan and Installation of Bleeder Shaft for Sugar Camp Mine #1
(Permit 382)
South of Muddy River to South of County Road 900 North
IHPA Log #001032411

May 28, 2013

Ted Wells
Tennessee Valley Authority
1101 Market St.
Chattanooga, TN 37402

Dear Mr. Wells:

We have reviewed the documentation submitted for the above referenced project in accordance with 36 CFR Part 800.4. Based upon the information provided, no historic properties are affected. We, therefore, have no objection to the undertaking proceeding as planned.

Please retain this letter in your files as evidence of compliance with section 106 of the National Historic Preservation Act of 1966, as amended. This clearance remains in effect for two years from date of issuance. It does not pertain to any discovery during construction, nor is it a clearance for purposes of the Illinois Human Skeletal Remains Protection Act (20 ILCS 3440).

If you have any further questions, please contact me at 217/785-5027.

Sincerely,

Anne E. Haaker

Anne E. Haaker
Deputy State Historic
Preservation Officer

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