

Appendix A – Permit Approvals

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Illinois Department of
Natural Resources

One Natural Resources Way • Springfield, Illinois 62702-1271
<http://dnr.state.il.us>

Rod R. Blagojevich, Governor

Joel Brunsvold, Director

August 19, 2008

Mr. Michael Beyer
Sugar Camp Energy, LLC
430 Harper Park Drive
Beckley, WV 25801

Via Certified Mail

Re: Permit Application No. 382
Surface Coal Mining and Reclamation Operations
Sugar Camp No. 1 Mine

Dear Mr. Beyer:

Pursuant to 62 Ill. Adm. Code 1773.19(a) enclosed is a copy of the Department's written findings and decision approving the above permit application.

Pursuant to Section 2.11(d), the issued permit certificate for permit application No. 382 is enclosed.

62 Ill. Adm. Code 1847.3 allows any person who has or may have an adversely affected interest to request a hearing to contest the decision. The request must be received in writing by the Department within 30 days of the date the applicant is notified of the Department's final decision by the Department's written finding date.

Please contact the Land Reclamation Division at (217) 782-4970 if you have any questions.

Sincerely,

Scott K. Fowler, Supervisor
Land Reclamation Division

SKF:EA:hcc

cc: A. Meyers
OSMRE

07310846.wpd

STATE OF ILLINOIS

DEPARTMENT OF NATURAL RESOURCES

Office of Mines and Minerals

Surface Coal Mining Land Conservation and Reclamation Act

Surface Coal Mining and Reclamation Operations Permit

This is to Certify that
Sugar Camp Energy, LLC
430 Harper Park Drive, Beckley, WV 25801
is hereby granted a permit to engage in mining and reclamation operations
from: August 19, 2008 to: August 18, 2013
on the legally described areas as stated below:

Name of Mine	Address	Acres to be Affected	Location			
			Sec.	Twp.	Range	County
Sugar Camp No. 1	11351 N Thompsonville Rd., Macedonia, IL 62862	1,264	2, 3, 4, 9, & 10	6 South	4 East	Franklin

Permit No. 382

Date: August 19, 2008

SUPERVISOR:

Land Reclamation Division

DIRECTOR, Office of Mines and Minerals

Sugar Camp Mine No. 1 Mine Plan Approval

Appendix B – Subsidence Drainage Model

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Appendix C – Wetlands

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**Wetlands on Private Property (Franklin County) and Land Overlying TVA-Owned Coal
(Hamilton County) in the Sugar Camp Mine No. 1 Mine Plan**

County	Wetland Type	No. of Wetlands	National Wetlands Inventory Classification Code¹	Acres
Hamilton	Freshwater Forested/Shrub Wetland	3	PFO1A	15.9
	Freshwater Pond	35	PUBGh	26.18
	Freshwater Pond	4	PUBFh	0.52
	Freshwater Pond	1	PUBFx	0.1
	COUNTY GRAND TOTAL, ALL WETLAND TYPES			42.7
Franklin				
	Wetland Type		Classification Code	Acres
	Freshwater Emergent Wetland	7	PEMA	17.1
	Freshwater Emergent Wetland	1	PEMC	0.1
	Freshwater Emergent Wetland	1	PEMAd	3.88
	Total Freshwater Emergent Wetland			21.08
	Freshwater Forested/Shrub Wetland	20	PFO1A	434.73
	Freshwater Forested/Shrub Wetland	1	PFO/SS1A	2.12
	Freshwater Forested/Shrub Wetland	4	PSS1A	16.91
	Total Forested/Shrub Wetland			453.76
	Freshwater Pond	37	PUBGh	19.95
	Freshwater Pond	1	PUBGx	0.51
	Freshwater Pond	13	PUBFh	1.88
	Freshwater Pond	1	PUBFx	0.1
	Freshwater Pond	1	PUBF	0.93
	Freshwater Pond	1	PFO1A	5.84
	Total Freshwater Pond			33.35
	COUNTY GRAND TOTAL, ALL WETLAND TYPES			508.19

¹ United States Fish and Wildlife Service. 2011. National Wetlands Inventory. Retrieved from <<http://www.fws.gov/wetlands/>> (April 19, 2011).

Abbreviations:

PFO1A = Palustrine, forested, broad-leaved deciduous vegetation, temporarily flooded
PUBGh = Palustrine, unconsolidated bottom, intermittently exposed, diked/impounded
PUBGx = Palustrine, unconsolidated bottom, intermittently exposed, excavated

Sugar Camp Mine No. 1 Mine Plan Approval

PUBF = Palustrine, unconsolidated bottom, semipermanently flooded

PUBFh = Palustrine, unconsolidated bottom, semipermanently flooded, diked/impounded

PUBFx = Palustrine, unconsolidated bottom, semipermanently flooded, excavated

PEMA = Palustrine, emergent, temporarily flooded

PEMC = Palustrine, emergent, seasonally flooded

PEMAd = Palustrine, emergent, temporarily flooded, partially drained/ditched, farmed

PFO/SS1A = Palustrine, forested/scrub-shrub, broad-leaved deciduous vegetation, temporarily flooded

PSS1A = Palustrine, scrub-shrub, broad-leaved deciduous vegetation, temporarily flooded

Appendix D – Wildlife

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Wildlife Common in Sugar Camp Mine No. 1 Region (Hamilton and Franklin Counties)

Species Type	Common Name	Scientific Name	Crops	Forest	Creeks and Rivers	Lakes, Ponds, and Impoundments	Residential Landscapes					General
							Human Structures	Mowed Grass	Ornamental Shrubs	Shade Trees	Pine Planting	
Birds	Cooper's hawk	<i>Accipiter cooperii</i>		X	X							
	Spotted sand-pipers	<i>Actitis macularius</i>				X						
	Red-winged blackbird	<i>Agelaius phoeniceus</i>	X			X						
	Wood duck	<i>Aix sponsa</i>					X					
	Grass-hopper sparrow	<i>Ammodramus savannarum</i>	X									
	Tufted titmouse	<i>Baeolophus bicolor</i>		X						X		
	Great horned owl	<i>Bubo virginianus</i>		X	X							
	Red-tailed hawk	<i>Buteo jamaicensis</i>	X									
	Red-shouldered hawk	<i>Buteo lineatus</i>			X							
	Green heron	<i>Butorides virescens</i>			X							
	Whip-poor-will	<i>Caprimulgus vociferus</i>		X								
	Northern cardinal	<i>Cardinalis cardinalis</i>							X			
	Pine siskin	<i>Carduelis pinus</i>									X	
	House finch	<i>Carpodacus mexicanus</i>					X					
	Chimney swift	<i>Chaetura pelagica</i>					X					

Environmental Assessment

Species Type	Common Name	Scientific Name	Crops	Forest	Creeks and Rivers	Lakes, Ponds, and Impoundments	Human Structures	Residential Landscapes				General
								Mowed Grass	Ornamental Shrubs	Shade Trees	Pine Planting	
Environmental Assessment	Killdeer	<i>Charadrius vociferus</i>	X		X	X	X					
	Northern flicker	<i>Colaptes auratus</i>						X				
	Rock dove	<i>Columba livia</i>	X					X				
	Northern bobwhite	<i>Colinus virginianus</i>	X									
	Eastern wood-pewee	<i>Contopus virens</i>		X						X		
	Common nighthawk	<i>Cordeiles minor</i>					X					
	American crow	<i>Corvus brachyrhynchos</i>	X	X				X				
	Fish crow	<i>Corvus ossifragus</i>		X	X							
	Blue jay	<i>Cyanocitta cristata</i>		X								
	Yellow warblers	<i>Dendroica aestiva</i>				X						
	Yellow-throated warblers	<i>Dendroica dominica</i>				X						
	Pileated wood-pecker	<i>Dryocopus pileatus</i>		X								
	Willow flycatcher	<i>Empidonax traillii</i>			X							
	Acadian flycatcher	<i>Empidonax virescens</i>		X	X							
	Horned Lark	<i>Eremophila alpestris</i>	X									

Species Type	Common Name	Scientific Name	Crops	Forest	Creeks and Rivers	Lakes, Ponds, and Impoundments	Human Structures	Residential Landscapes				General
								Mowed Grass	Ornamental Shrubs	Shade Trees	Pine Planting	
Environmental Assessment	American kestrel	<i>Falco sparverius</i>	X				X					
	Common yellow-throats	<i>Geothlypis trichas</i>				X						
	Barn swallow	<i>Hirundo rustica</i>			X		X					
	Baltimore orioles	<i>Icterus galbula</i>				X				X		
	Orchard orioles	<i>Icterus spurius</i>				X						
	Belted kingfisher	<i>Megaceryle alcyon</i>			X							
	Wild turkey	<i>Meleagris gallopavo</i>		X								
	Red-bellied wood-pecker	<i>Melanerpes carolinus</i>		X								
	Red-headed wood-pecker	<i>Melanerpes erythrocephalus</i>		X								
	Song sparrows	<i>Melospiza melodia</i>				X			X			
	Brown-headed cowbird*	<i>Molothrus ater</i>	X					X				
	Great crested flycatcher	<i>Myiarchus crinitus</i>		X								
	House sparrow*	<i>Passer domesticus</i>	X				X					
	Cliff swallow	<i>Petrochelidon pyrrhonota</i>			X							

Species Type	Common Name	Scientific Name	Crops	Forest	Creeks and Rivers	Lakes, Ponds, and Impoundments	Residential Landscapes					General
							Human Structures	Mowed Grass	Ornamental Shrubs	Shade Trees	Pine Planting	
	Ring-necked pheasant	<i>Phasianus colchicus</i>	X									
	Downy wood-pecker	<i>Picoides pubescens</i>		X								
	Hairy wood-pecker	<i>Picoides villosus</i>		X								
	Carolina chickadee	<i>Poecile carolinensis</i>		X						X		
	Purple martin	<i>Progne subis</i>					X					
	Common grackle	<i>Quiscalus quiscula</i>	X			X		X				
	Bank swallow	<i>Riparia riparia</i>			X							
	Eastern bluebird	<i>Sialia sialis</i>					X					
	Eastern phoebe	<i>Sayornis phoebe</i>			X		X					
	White-breasted nuthatch	<i>Sitta carolinensis</i>		X								
	Dickcissel	<i>Spiza americana</i>	X									
	Chipping sparrow	<i>Spizella passerina</i>						X				
	Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>			X							
	Barred owl	<i>Strix varia</i>		X	X							
	European Starling*	<i>Sturnus vulgaris</i>	X				X	X				

Species Type	Common Name	Scientific Name	Crops	Forest	Creeks and Rivers	Lakes, Ponds, and Impoundments	Residential Landscapes					General
							Human Structures	Mowed Grass	Ornamental Shrubs	Shade Trees	Pine Planting	
Environmental Assessment	Birds	Carolina wren		X	X		X					
		House wren			X		X					
		American robin					X	X				
		Warbling vireo								X		
		Mourning dove	X					X				
		Short-tailed shrews			X							
		Coyote		X								
		Beaver			X							
		Virginia opossum	X									
		Big brown bat		X								
	Mammals	Red bat	X									
		House mouse										X
		Mink			X							
		White-tailed deer	X									X
		Cotton mouse		X								
		Raccoon	X									X
		Eastern mole	X									

Species Type	Common Name	Scientific Name	Crops	Forest	Creeks and Rivers	Lakes, Ponds, and Impoundments	Human Structures	Residential Landscapes				
								Mowed Grass	Ornamental Shrubs	Shade Trees	Pine Planting	General
Amphibians and Reptiles	Fox squirrel	<i>Sciurus niger</i>		X								
	Gray squirrel	<i>Sciurus carolinensis</i>		X								X
	South-eastern shrew	<i>Sorex longirostris</i>	X									
	Swamp rabbits	<i>Sylvilagus aquaticus</i>			X							
	Eastern cottontail	<i>Sylvilagus floridanus</i>	X									
	Eastern chipmunk	<i>Tamias striatus</i>		X								
	Cricket frog	<i>Acris crepitans</i>			X	X						
	Copper-head	<i>Agkistrodon contortrix</i>	X									
	Tiger salamander	<i>Ambystoma tigrinum</i>			X							
	Fowler's toad	<i>Bufo fowleri</i>	X									
	Common snapping turtle	<i>Chelydra serpentina</i>				X						
	Racer snake	<i>Coluber constrictor</i>										X
	Broad head skink	<i>Eumeces laticeps</i>		X								
	Eastern gray treefrog	<i>Hyla versicolor</i>										
	Common kingsnake	<i>Lempropeltis getula</i>	X									

Species Type	Common Name	Scientific Name	Crops	Forest	Creeks and Rivers	Lakes, Ponds, and Impoundments	Residential Landscapes					General
							Human Structures	Mowed Grass	Ornamental Shrubs	Shade Trees	Pine Planting	
	Yellowbelly watersnake	<i>Nerodia erythrogaster flavigaster</i>			X							
	Slimy salamander	<i>Pethodon glutinosus</i>		X								
	Spring peeper	<i>Pseudacris crucifer</i>		X								
	Upland chorus frog	<i>Pseudacris feriarum</i>										X
	Bullfrog	<i>Rana catesbeiana</i>			X							
	Fence lizard	<i>Sceloporus occidentalis</i>		X								
	Common musk turtle	<i>Sternotherus oderatus</i>			X	X						
	Eastern box turtle	<i>Terrapene carolina</i>		X								
	Ornate box turtle	<i>Terrapene ornata ornata</i>	X									
	Common garter snake	<i>Thamnophis sirtalis</i>										X
	Slider turtle	<i>Trachemys scripta elegans</i>			X	X						

*Invasive Species

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Appendix E – Vegetation

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Plant Species Common in Sugar Camp Mine No. 1 Region (Franklin and Hamilton Counties)

Common Name	Scientific Name	Oak-Hickory Forest	Mesic Tall Grass Prairie	Flatwoods Forest	Pin Oak-Post Oak Lowland Flatwoods	Post Oak Flatwoods	Upland Forest
Red maple	<i>Acer rubrum</i>						X
Big bluestem	<i>Andropogon gerardii</i>		X				
Shagbark hickory	<i>Carya ovata</i>	X					
Mockernut hickory	<i>Carya tomentosa</i>	X					
Ash	<i>Fraxinus sp.</i>						X
Sweetgum	<i>Liquidambar styraciflua</i>				X		
Sycamore	<i>Platanus occidentalis</i>						X
White oak	<i>Quercus alba</i>					X	X
Swamp white oak	<i>Quercus bicolor</i>			X		X	
Southern red oak	<i>Quercus falcata</i>					X	
Shingle oak	<i>Quercus imbricaria</i>	X					
Blackjack oak	<i>Quercus marilandica</i>			X			
Cherrybark oak	<i>Quercus pagoda</i>				X		
Pin oak	<i>Quercus palustris</i>			X	X	X	
Red oak	<i>Quercus rubra</i>						X
Shumard's Oak	<i>Quercus shumardii</i>				X		
Post Oak	<i>Quercus stellata</i>			X	X	X	
Black Oak	<i>Quercus velutina</i>	X					
American elm	<i>Ulmus americana</i>						
Indian grass	<i>Sorghastrum nutans</i>		X				
Little bluestem	<i>Schizachyrium scoparium</i>		X				

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Appendix F – Indiana Bats

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Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902-1499

March 23, 2011

Ms. Joyce Collins, Assistant Field Supervisor
 Marion Illinois Sub-Office
 U.S. Fish and Wildlife Service
 8588 Route 148
 Marion, Illinois 62959

Dear Ms. Collins:

**REQUEST FOR CONCURRENCE - TVA'S APPROVAL OF ILLINOIS COAL LEASE MINE
 PLAN - SUGAR CAMP MINE NO. 1**

The Tennessee Valley Authority (TVA) owns underground coal reserves in Hamilton County, Illinois. In 2003, TVA leased these coal reserves to a coal mining company for underground mining with the condition that proposed mine plan must first undergo environmental review before mining begins on the TVA-owned property.

In 2008, Sugar Camp Energy LLC (Sugar Camp) obtained a permit from the Illinois Department of Natural Resources (IDNR) Land Reclamation Division for underground longwall mining operations (including surface disturbance and associated subsidence areas, called "shadow area" in the mine permit) on approximately 12,103 acres of land in Franklin and Hamilton counties. In 2010, Sugar Camp applied for a Significant Boundary Revision (SBR) permitting an additional 817 acres of shadow area on TVA-owned coal lease property; they also applied for incidental boundary revisions for road access and installation of a ventilation bleeder shaft. The surface facilities and mine entrance to the Sugar Camp Mine No. 1 are located in Franklin County on privately-owned land. The TVA-owned coal lease property, located in Hamilton County, would be accessed by the Franklin County mine entrance. The only surface disturbance on TVA-owned coal lease land would be from the ventilation shaft construction and road access modifications. This would include about 5 acres of surface disturbance within a 17-acre parcel for the ventilation shaft construction area and about 1.5 acres for road access. The TVA-leased property included in the mine plan, with its proposed SBR, totals approximately 2,600 acres.

TVA is preparing an environmental assessment under the National Environmental Policy Act to assess potential impacts that may occur as a result of approving the mine plan submitted by Sugar Camp for the proposed underground mining.

Ms. Joyce Collins
Page 2
March 23, 2011

Project Description

The TVA-owned coal lease property, where the proposed mining would occur, is located along the border of Franklin and Hamilton counties in southwestern Hamilton County (enclosure). Following coal recovery, some surface subsidence is expected. This subsidence could affect stream drainages in the area. As required by the IDNR mine permit, Sugar Camp would restore original drainage conditions and correct any damage that may have been caused by subsidence (such as cracks in building foundations or road surfaces, flooding from subsided streams). Drainage restoration would be accomplished through stream dredging activities, which would have to undergo additional environmental reviews required by the state of Illinois and the U.S. Army Corps of Engineers. The goal of the drainage restoration is to return the land to the baseline conditions that existed prior to the start of coal recovery. These land use conditions include residential areas, wildlife habitat, cropland, and livestock grazing.

Federally Listed Species Potentially Affected

Data provided by Sugar Camp and their agent Alliance Consulting, Inc. (Alliance) indicate that the federally listed endangered species Indiana bat (*Myotis sodalis*) is present on the existing mine permit area. Restoration activities have the potential to affect individuals using roosting or maternity areas within the mine footprint.

The federally listed endangered piping plover may use stopover areas in Franklin County during its migration between breeding and non-breeding grounds. 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.

No Designated Critical Habitat is present for either species in Franklin or Hamilton County.

Effects Analysis and Determination

Sugar Camp and Alliance have prepared an Indiana bat Protection and Enhancement Plan (PEP) to address the potential for these restoration plans to affect Indiana bat. Your office approved the Final Indiana Bat Protection and Enhancement Plan and the Annual Monitoring Study Plan in a letter dated January 14, 2011. TVA staff have reviewed the PEP and determined that with implementation of the PEP, these mining and restoration activities are not likely to adversely affect populations of the Indiana bat.

Because piping plover is only potentially present in Franklin and Hamilton Counties during short migratory stopovers, and this mining and associated restoration activities would not reduce the amount of habitat available to piping plover during migration, TVA has determined that this project would have no effect on piping plover.

Ms. Joyce Collins
Page 3
March 23, 2011

TVA respectfully requests your concurrence with these determinations. If you have any questions or wish to discuss the project in more detail, please contact me in Knoxville, Tennessee, at (865) 632-3360 (jt Baxter@tva.gov) or Holly LeGrand in Knoxville, Tennessee, at (865) 632-4010 (hlegrand@tva.gov).

Sincerely,

(Original signed by)

John T. (Bo) Baxter, Manager
Endangered Species Compliance
Federal Determinations

ALB:VMG:PLS
Enclosure

cc: Cynthia M. Anderson, LP 5D-C
Arianne L. Balsom, WT 11D-K
Brenda E. Brickhouse, LP 5U-C
Alan D. Casaday, LP 5E-C
Robert M. Deacy, LP 5D-C
Kenneth G. Dunay, LP 5E-C
Ruth M. Horton, WT 11D-K
Susan J. Kelly, LP 5U-C
EDMS, WT 11C-K

Bats Caught on Land Over TVA-Owned Coal

Site No.	Date	Count	Common Name	Scientific Name
6	08/04/2010	1	Eastern red bat	<i>Lasiurus borealis</i>
6	08/05/2010	3	Eastern red bat	<i>Lasiurus borealis</i>
7	08/04/2010	0		
7	08/05/2010	1	Eastern red bat	<i>Lasiurus borealis</i>
17	08/04/2010	0		
17	08/05/2010	2	Eastern red bat	<i>Lasiurus borealis</i>
25	08/04/2010	0		
25	08/05/2010	0		
34	07/19/2010	0		
34	07/20/2010	0		
35	08/06/2010	3	Eastern red bat	<i>Lasiurus borealis</i>
35	08/07/2010	0		
36	07/19/2010	2	Eastern red bat	<i>Lasiurus borealis</i>
36	07/19/2010	1	Eastern pipestrelle	<i>Pipistrellus subflavus</i>
36	07/20/2010	0		
37	07/19/2010	0		
37	07/20/2010	0		
38	07/19/2010	0		
38	07/20/2010	1	Eastern red bat	<i>Lasiurus borealis</i>
38	07/20/2010	1	Eastern pipestrelle	<i>Pipistrellus subflavus</i>

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Appendix G – Cultural Resources

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**MEMORANDUM OF AGREEMENT
BETWEEN THE TENNESSEE VALLEY AUTHORITY
AND THE
ILLINOIS STATE HISTORIC PRESERVATION OFFICE
CONCERNING
SUGAR CAMP ENERGY MINE
FRANKLIN COUNTY, ILLINOIS**

WHEREAS, the Tennessee Valley Authority (TVA) has determined that TVA's approval of the Sugar Camp Energy, LLC (SCE) mining plan may have an adverse effect upon Structure WPA No. 5711 "CULVERT" and the Cutright House "HOUSE", properties potentially eligible for inclusion in the National Register of Historic Places (NRHP), and has consulted with the Illinois State Historic Preservation Officer (IL SHPO) pursuant to Section 106 of the National Historic Preservation Act (NHPA) (17 U.S.C. § 470f) and the regulations (36 CFR Part 800) implementing the NHPA; and

WHEREAS, SCE has agreed to bear all reasonable costs incurred by TVA in implementing this Memorandum of Agreement (MOA), including the cost of evaluating the eligibility of the HOUSE and CULVERT for the NRHP, the cost of protecting the HOUSE through stabilization, and the cost of preparing documentation of the historic features of the CULVERT; and

WHEREAS, SCE has participated in this Section 106 consultation, and has been invited to be a signatory to this MOA; and

NOW, THEREFORE, TVA, SCE, and the IL SHPO agree that the undertaking shall be implemented in accordance with the following stipulations to take into account the effect of the undertaking on historic properties.

I. STIPULATIONS

TVA, in coordination with SCE and the IL SHPO, shall ensure that the following measures are carried out.

Cutright House

- A. Prior to subsidence impacts to the HOUSE, TVA and SCE shall evaluate the HOUSE and consult with the IL SHPO regarding the HOUSE's eligibility for listing on the NRHP.
- B. If the HOUSE is determined eligible for the NRHP, TVA and SCE shall implement Stipulation I.C.
- C. The HOUSE shall be protected during mining activities by stabilization. The stabilization plan shall be agreed upon in writing by the IL SHPO and implemented by SCE. After the mining activities have ended, the HOUSE shall be restored to its condition prior to the stabilization in consultation with the IL SHPO. Monitoring of the condition of the HOUSE shall be undertaken to detect any future subsidence. If such subsidence occurs, SCE, in consultation with the IL SHPO, shall develop and undertake a remediation plan.

WPA No. 5711

- D. Prior to subsidence impacts to the CULVERT, TVA and SCE shall evaluate the CULVERT and consult with the IL SHPO regarding the CULVERT's eligibility for listing on the NRHP.
- E. If the CULVERT is determined eligible for the NRHP, TVA and SCE shall proceed forward with Stipulations I.F.

F. Prior to any mining activities that could cause subsidence impacts to the CULVERT, the CULVERT shall be recorded by the SCE in accordance with Stipulation I.F.1 - 5 and consistent with the Standards and Guidelines of the Illinois Historic American Engineering Record.

1. Project area location map abstracted from appropriate 7.5 Minute USGS Quadrangle Map, submitted on 8.5x11" archival bond.
2. Site Plan showing footprint of the extant CULVERT, surrounding terrain features and other man-made features within a 200-yard radius of the CULVERT. Site plan must be presented on 8.5 x 11-inch archival bond paper.
3. Approximately ten (10) photographs of the subject CULVERT presenting approaches, elevations, and superstructure/substructure elements.
4. Written architectural/engineering description of the subject culvert.
5. Narrative contextual history of the CULVERT and other WPA culverts in Illinois.

The documentation shall be submitted to the IL SHPO on one hard copy and one gold compact disc for approval in writing prior to any subsurface disturbance in the area of the CULVERT.

G. SCE shall submit all plans for ground-disturbing activities (e.g. stream drainage corrections, dredging, construction of berms) in areas overlying TVA-owned coal to TVA Cultural Compliance staff for further review and approval prior to implementation.

II. DURATION

This MOA will be null and void if its terms are not carried out within ten (10) years from the date of its execution. Prior to such time, TVA may consult with the other signatories to reconsider the terms of the MOA and amend it in accordance with Stipulation V below.

III. MONITORING AND REPORTING

Annually (September), following the execution of this MOA until it expires or is terminated, TVA shall provide all parties to this MOA a summary report detailing work undertaken pursuant to its terms. Such report shall include any scheduling changes, any problems encountered, and any disputes or objections raised in the course of TVA's implementation of this MOA.

IV. DISPUTE RESOLUTION

Should a dispute arise on the eligibility of a property identified under the MOA, TVA shall consult with the IL SHPO to resolve the objection. If TVA and the IL SHPO do not agree, or if the Advisory Council on Historic Preservation (ACHP) or Secretary so request, TVA shall obtain a determination of eligibility from the Keeper of the NRHP, pursuant to 36 CFR Part 63. Should any signatory or invited signatory object within thirty (30) days after receipt of any plans, specifications, contracts, or other documents provided for review pursuant to this MOA, TVA shall consult with the objecting party to resolve the objection. If the objection cannot be resolved, TVA, or any other party, may seek guidance from the ACHP pursuant to 36 CFR § 800.2(b)(2). TVA will take into account ACHP comments in resolving the objection with reference to the subject

dispute. The signatories are responsible for implementing all actions under this MOA that are not subject to dispute.

V. DISCOVERIES

Immediately cease all ground-disturbing activities if any inadvertent discoveries of human remains or archaeological sites are made during construction on TVA-owned coal lease property. Sugar Camp must contact TVA's Cultural Compliance staff as soon as possible for coordination with tribal representatives and the IL SHPO for proper evaluation of the discovery. Ground-disturbing activities may not resume until appropriate notifications and actions have been taken, as determined by the IL SHPO, tribal representatives, and TVA's Cultural Compliance staff.

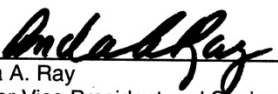
VI. AMENDMENTS

This MOA may be amended when such an amendment is agreed to in writing by all signatories. The amendment will be effective on the date a copy signed by all of the signatories is filed with the ACHP.

Execution of this MOA by TVA and the IL SHPO, its subsequent submittal to the ACHP, and the implementation of its terms, demonstrate that TVA has taken into account the effects of the undertaking on historic properties.

SIGNATORY

TENNESSEE VALLEY AUTHORITY

By:  DATE 4-28-11
Anda A. Ray
Senior Vice President and Senior Policy Official

SIGNATORY

ILLINOIS HISTORIC PRESERVATION AGENCY

By: Anne E. Haaker DATE 5/3/11
Anne Haaker
Deputy State Historic Preservation Officer
Illinois State Historic Preservation Office

INVITED SIGNATORY:
SUGAR CAMP ENERGY, LLC

BY: Barry Hale

DATE: 5-8-11

Barry Hale
Sugar Camp Energy, LLC



Sugar Camp Energy, LLC
208 Public Square, 4th Floor
Benton, Illinois 62812
Office: 618-439-4149 Fax: 618-439-4610

February 24, 2011

Hal Hassen, Ph.D.
Archaeologist, Division of Ecosystems & Environment
Illinois Department of Natural Resources
One Natural Resources Way
Springfield, IL 62702-1271

Via E-mail: hal.hassen@illinois.gov; Hard Copy to Follow.

RE: Permit No. 382 – Historical Structures
Protection of Structures During Mine Subsidence

Dear Mr. Hassen,

When protecting a structure during the subsidence event as a result of long wall mining, the following precautions and procedures are utilized:

Pre Subsidence

- Well in advance of the subsidence event, Expert Housemovers in St. Louis, Missouri, is called to visit the location and develop a plan to protect the structure.
- Usually, the plan consists of removing a small section of the block or concrete foundation to allow I-beams to pass under the structure just below the floor joists. The I-beams provide support for the structure as they are lifted by a combination of air, hydraulic and/or mechanical jacks.
- Once the I-beams and jacks are in place, the structure is uniformly lifted and suspended above the existing foundation until the subsidence event is complete.
- Survey stations are established prior to the subsidence event to allow monitoring of surface elevations during the entire process.

During Subsidence

- During the subsidence event Expert Housemovers monitors daily the level of the house and the equipment supporting the structure while making adjustments as needed.
- Survey stations are monitored daily to help determine when subsidence has ceased.

Post Subsidence

- Once subsidence has stopped, contractors are brought in to construct a new foundation.
- After the new foundation is done the structure is lowered onto it, as well as utilities reconnected and repairs made to the structure. Usually, repairs to the structure, if any, are minor. (e.g. small cracks in dry wall, plumbing adjustments to accommodate for slight elevation change of new foundation height)

Should you have any questions or require further information, please feel free to contact me.

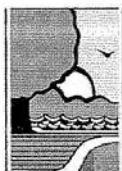
Sincerely,

SUGAR CAMP ENERGY, LLC



Ben Cox
Land Agent

Cc: Dan Barkley
Gary Miles
Sam Hatcher



Illinois Department of Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
<http://dnr.state.il.us>

Pat Quinn, Governor
Marc Miller, Director

March 8, 2011

Michael Beyer
Sugar Camp Energy
430 Harper Park Drive
Beckley, WV 25801

Re: National Register of Historic Places

Dear Mr. Beyer:

As a follow up to our letter of August 18, 2010, the following updates the status of the review of standing structures. The original lists of 14 structures within the longwall area were field inspected to determine what additional information if any would be necessary. IDNR Archeologist Hal Hassen viewed the structures identified in the August 18, 2010 correspondence as well as additional structures over the proposed longwall addition now under review as Revision No. 2 to Permit No. 382. Dr. Hassen has made a determination that most of the structures itemized in the August 18, 2010 letter do not have the potential to yield significant information and are not potentially eligible for inclusion onto then National Register of Historic Properties. In addition, it has been determined that the Revision No 2 additional shadow area does not contain structures that have the potential to yield significant information and the structures are not potentially eligible for inclusion onto then National Register of Historic Properties

Dr. Hassen has now reduced the list to two structures as requiring further documentation. In addition, a 1938 WPA bridge has also been identified as having the potential to yield significant information and/or may be potentially eligible for inclusion onto then National Register of Historic Properties. The remaining structures that require further documentation are:

<u>Number</u>	<u>Owner</u>	<u>Type</u>
0300600200	Cutright	House
16405505	Flannigan	House
WPA No. 5711	Flannigan Township Road Authority	Bridge

In correspondence dated February 24, 2011, Sugar Camp Energy detailed how structures such as homes typically receive pre-subsidence damage minimization efforts. Damage minimization efforts are required per 62 Ill. Adm. Code 1817.121(a)(3) if the structure owner does not waive damage minimization in writing. Dr. Hassen and the IHPA are evaluating if damage minimization can be used to preclude further pre-subsidence documentation for the two

Michael Beyer
National Register of Historic Places
Page 2

structures in question. The Department will notify you of their decision well in advance of subsidence impacting the two structures in question so that further pre-subsidence documentation can be performed if necessary.

Also, we will contact you in the future but well in advance of subsidence impacts occurring to the WPA Bridge. At that time, we will detail the appropriate pre-subsidence documentation and a recommendation on proper bridge evaluation and restoration after subsidence. Should you have any questions, please contact Hal Hassen at 217-524-3759.

Sincerely,

A handwritten signature in black ink, appearing to read "Scott K. Fowler".

Scott K. Fowler, Supervisor
Land Reclamation Division

SKF:cl

cc: D. Barkley
H. Hassen
A. Meyers
D. Spindler

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SEP-01-2010 12:28

P.02



Illinois Department of Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
<http://dnr.state.il.us>

Pat Quinn, Governor
Marc Miller, Director

August 18, 2010

Michael Beyer
Sugar Camp Energy, LLC
430 Harper Park Drive
Beckley, WV 25801

Re: National Register of Historic Places

Dear Mr. Beyer:

Thank you for submitting the photographs of the standing structures associated with Sugar Camp Energy Permit No. 382. The photographs were reviewed by Hal Hassen, the DNR archaeologist and Joe Phillippe, Archaeologist, Illinois Historic Preservation Agency.

Based on this review, additional information is necessary for several structures (see attached list). To complete the review, it is necessary for you to have a qualified archaeologist or architectural historian conduct an assessment of the structures. Specifically, there needs to be a determination whether or not the structures have the potential to yield significant information and if they are potentially eligible for inclusion onto the National Register of Historic Places. This assessment should be based in part of the structure's age, method of construction and historic context. The documentation needed to convey this information should include additional interior and exterior photographs as well as written descriptions, assessments and recommendations.

As a preliminary step, Hal Hassen is willing to visit these structures with your archaeological/architectural consultant to determine if the list can be reduced based on an onsite evaluation.

Sincerely,

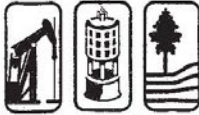
A handwritten signature in black ink, appearing to read "Scott K. Fowler".

Scott K. Fowler, Supervisor
Land Reclamation Division

DB:cl
cc: A. Meyers

08160944.docx

ILLINOIS DEPARTMENT OF MINES AND MINERALS

FRED BOWMAN
DIRECTORPROTECTING OUR
RESOURCES300 WEST JEFFERSON STREET - SUITE 300
P.O. BOX 10197
SPRINGFIELD, ILLINOIS 62781-0197
TELEPHONE: (217) 782-6791
FAX: (217) 524-4819

November 2, 1994

William L. Wheeler, Associate Director
Illinois Historic Preservation Agency
500 E. Madison, Floor 1
Springfield, Illinois 62701

RE: Interagency Agreement

Dear Mr. Wheeler:

From our past discussions, it is apparent that both the Illinois Department of Mines and Minerals (IDMM) and the Illinois Historic Preservation Agency (IHPA) are committed to implementing the 1992 amendments to the National Historic Preservation Act (NHPA) in accordance with State and Federal law. Specifically, each of our agencies want to ensure that the IDMM's regulatory program takes into account the effects of proposed surface and underground coal mines on cultural, archeological and historic resources protected by the NHPA. Our agencies are equally aware that the process by which the IDMM takes such effects into account must comport with Illinois law. Given this mutual interest and understanding, the IDMM proposes the following four (4) areas of agreement relating to your agency's review of coal mine permit applications:

1. The IHPA will not request archeological surveys of areas subject to planned subsidence operations pursuant to coal mining permits issued by the IDMM in accordance with the Surface Coal Mining Land Conservation and Reclamation Act. 225 ILCS 720/1.01 et seq. (State Act).

Rationale: Recent joint IDMM/IHPA site visits of underground coal mines have confirmed that planned subsidence operations do not adversely affect cultural, archeological or historic resources.

2. The IHPA will not request archeological surveys of surface areas included within the boundaries of renewal applications for coal mine permits issued prior to January 1, 1991, the effective date of the IDMM's current cultural, archeological and historic resources rules. The IHPA will, upon receipt of such coal mine permit applications, merely send the IDMM a letter of acknowledgement. The IDMM and the IHPA agree to follow the procedure set forth in this paragraph unless and until a determination binding on them is otherwise made.

Rationale: As outlined by agency staff during recent meetings and in correspondence with the IHPA during the last three (3) years, the IDMM maintains that applying Illinois' current cultural, archeological and historic resources rules during the renewal review process to areas within permits approved prior to the effective date of these rules is clearly illegal. In essence, applying the IDMM's current rules to the renewal of permits issued prior to 1991 violates the prohibition against retroactive rulemaking found in Section 9.01(h) of the State Act. 225 ILCS 720/9.01(h). However, the Department, where appropriate, will request surveys for revisions to permits issued prior to 1991 that propose to affect new acreage.

3. The IDMM is committed to the development of a predictive model that could be used by the IHPA to determine when to request archeological surveys of land disturbed by surface coal mining operations.

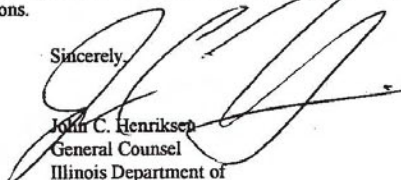
Rationale: Unlike planned subsidence operations, surface coal mining operations, as well as the surface impacts incident to underground coal mining operations, may have an adverse effect on cultural, archeological and historic resources. As outlined in 62 Ill. Adm. Code 1779.12 and 1783.12, the Department is empowered to require archeological surveys based upon information indicating a "... substantial likelihood of currently unknown resources which would be eligible for the National Register of Historic Places...." Given the Illinois State Museum's extensive database of existing archeological sites and past work in formulating a predictive model for the home construction industry, the IDMM is confident that our agencies can develop a method that will determine when archeological investigations are truly necessary during the permit review process.

4. The IDMM is committed to helping the IHPA secure the federal funding necessary to assist in reviewing coal mine permit applications.

Rationale: The Illinois State Museum (ISM) has loaded onto the Geographic Information System (GIS) the data points identifying known Illinois archeological sites. This data, when combined with other relevant information stored in the GIS, would be of immense help to your agency during its review of coal mine permit applications. The IHPA currently does not possess the hardware required to gain access to the ISM database. Therefore, the IDMM is willing to work with your agency to secure the federal funding necessary to interface with the ISM database and to secure funding for other activities directly related to the review of coal mine permit applications.

I deeply appreciate your efforts in resolving this complex problem. I look forward to working with you in the future. Please contact me if you have any further questions.

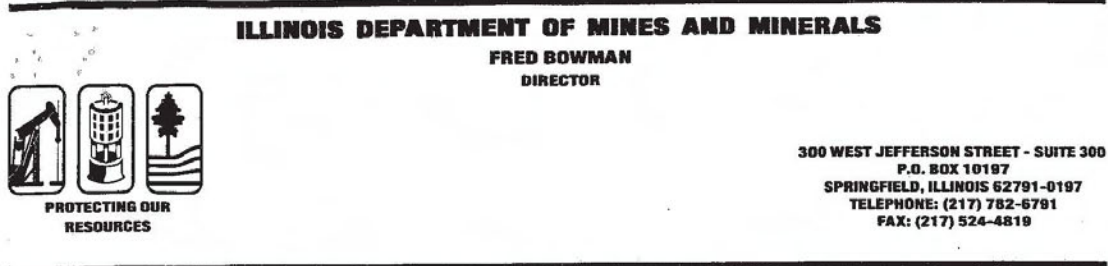
Sincerely,



John C. Henriksen
General Counsel
Illinois Department of
Mines and Minerals

JCH:lw

cc: Fred Bowman
Karen Jacobs
Scott Schmitz



August 16, 1994

William L. Wheeler, Associate Director
Illinois Historic Preservation Agency
500 E. Madison, Floor 1
Springfield, Illinois 62701

RE: Interagency Agreement

Dear Mr. Wheeler:

I am writing to follow up on the results of our August 11, 1994 meeting and to outline a suggested agenda for our next group discussion, as requested by Director Mogerman.

The Illinois Department of Mines and Minerals (IDMM) would like to discuss and resolve the following topics:

1. Whether renewal applications for permits issued prior to the effective date of the IDMM's current cultural, archaeological and historic resources rules must comply with such standards?

As outlined during our recent meeting, the IDMM maintains that applying Illinois' current cultural, archaeological and historic resources rules, as part of a permit renewal process, to areas within permits approved prior to the effective date of these rules is clearly illegal. The IDMM's January 16, 1992 letter to Theodore Hild outlines, in detail, my agency's position on this issue. (See enclosure).

2. Whether planned subsidence operations in upland areas should be subject to archaeological investigation?

The IDMM believes that planned subsidence operations that do not result in surface land being submerged should not be subjected to archaeological investigation. In essence, planned subsidence in upland areas has not been shown to have any impact on cultural, archaeological or historic resources.

3. The development of a predictive model for requesting archaeological surveys.

It is my understanding that the Illinois State Museum has developed an extensive database outlining existing archaeological sites. That information, in concert with the soil map information discussed during our meeting, could conceivably be blended into a model that would help your agency, our agency and Illinois' coal industry determine when archaeological investigations are necessary.

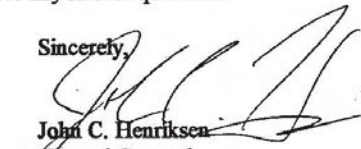
4. IHPA's relationship with OSM.

OSM has begun directing Illinois coal operators to undertake archaeological investigation of areas proposed to be mined. OSM is apparently undertaking this course of action in accordance with either the "Draft Guidance Document" developed by OSM or the proposed "Programmatic Agreement" drafted to implement recent amendments to the National Historic Preservation Act. I have enclosed copies of both the Draft Guidance Document and the Programmatic Agreement, as well as the IDMM's comments on these documents, for your review. I have also enclosed a copy of the Commonwealth of Kentucky's comments on the draft Programmatic Agreement. Kentucky's comments are significant given that this regulatory authority has had in place, for over five (5) years, a memorandum of agreement with the Kentucky Heritage Counsel and the Kentucky SHPO establishing procedures for consultation on all proposed surface coal mining and reclamation operations. It is significant to note that Kentucky, a signatory to a longstanding agreement with its SHPO believes, as does Illinois, that a nationwide Programmatic Agreement should only be implemented through rulemaking and should not extend to renewals.

I have also taken the liberty of enclosing a copy of the IDMM's March 1, 1991 letter to Theodore W. Hild. As outlined in this letter, the IDMM has suggested a procedure by which we could work with your agency to ensure the protection of cultural, archaeological and historic resources. Although we did not receive a response to this letter, we believe that the procedures suggested are still valid and would allow our agencies to work together in accordance with federal and State law.

We look forward to meeting with you and appropriate members of your agency at your earliest convenience. Please contact me if you have any further questions.

Sincerely,



John C. Henriksen
General Counsel
Illinois Department of
Mines and Minerals

Enclosures

cc: Fred Bowman
Karen Jacobs
Scott Schmitz

Appendix H – Tribal Consultation

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Pat Bernard Ezzell
Tribal Liaison and Corporate Historian
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902-1499

April 14, 2011

RE: IL/ No properties Identified/ Sugar Camp Mine No. 1
Tennessee Valley Authority (TVA), Sugar Camp Energy, Hamilton County, Illinois

Dear Rachel Benson,

This response is regarding the request from your office for comment of the referenced project.

We have reviewed the provided information and find that we concur that "no archaeological sites eligible for NRHP would be affected by TVA's proposed action". We have an interest, however, in this project area and would like to be kept informed of any archaeological findings.

Historically, the Shawnee people had a presence in the Illinois vicinity. While exact locations are not known, several historic Shawnee villages were sparsely located throughout Illinois.

It is further advised that if the area of potential effect changes or in the event of an inadvertent discovery of human remains that we receive notification within 48 hours. As well, any inadvertent discovery of human remains should remain in situ until consultation with interested tribes is undertaken.

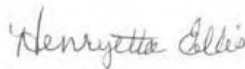
Thank you for your time and patience in communicating regarding section 106 and NAGPRA issues. We appreciate your continued efforts in such matters. Please do not hesitate to contact Henryetta Ellis if you have any questions or concerns.

Sincerely,



Liana Staci Hesler
THPO Intern
Tribal Historic Preservation Office
Absentee Shawnee Tribe of Oklahoma
405-275-4030 ext. 204
lhlesler@astribe.com

for:



Henryetta Ellis
Tribal Historic Preservation Office Interim
Cultural Preservation Director
Absentee Shawnee Tribe of Oklahoma
405-275-4030 ext. 122
hellis@astribe.com

Balsom, Arianne Lynn

From: Ezzell, Patricia Bernard
Sent: Monday, March 14, 2011 3:31 PM
To: Stringfield, I Kathleen; Cole, Stephen C; Wells, Edward William III
Cc: Balsom, Arianne Lynn; Horton, Ruth M; Eblen, James H
Subject: FW: TENNESSEE VALLEY AUTHORITY (TVA), GEOGRAPHICAL AREA OF INTEREST, HAMILTON COUNTY, IL

Fyi—The Sac and Fox Nation of OK does not want to consult on anything in Hamilton Co., IL per the email below.
Thanks--Pat

From: Sandra Massey [<mailto:smassey@sacandfoxnation-nsn.gov>]
Sent: Monday, March 14, 2011 2:11 PM
To: Ezzell, Patricia Bernard
Subject: RE: TENNESSEE VALLEY AUTHORITY (TVA), GEOGRAPHICAL AREA OF INTEREST, HAMILTON COUNTY, IL

Pat Bernard Ezzell
Program Manager
Tribal Liaison and Corporate Historian
Tennessee Valley Authority
400 W. Summit Hill Drive
460 WT 11D-K
Knoxville, Tennessee 37902

Dear Pat,

Thank you for contacting the Sac and Fox Nation of Oklahoma regarding Hamilton County in Illinois. The Sac and Fox Nation does have historic interest in Illinois; however, Hamilton County is not within our area of interest.

Sincerely,

Sandra Kaye Massey
Historic Preservation Officer
Sac and Fox Nation of Oklahoma
920883 S Hwy 99 Bldg A
Stroud, Oklahoma 74079
PH: (918) 968-3526 x 1048
Fax: (918) 968-0098



PEORIA TRIBE OF INDIANS OF OKLAHOMA

118 S. Eight Tribes Trail (918) 540-2535 FAX (918) 540-2538
P.O. Box 1527
MIAMI, OKLAHOMA 74355

CHIEF
John P. Froman
SECOND CHIEF
Jason Dollarhide

March 10, 2011

Tennessee Valley Authority
Attn: Patricia Ezzell
Tribal Liaison and Corporate Historian
400 West Summit Hill Dr
Knoxville, TN 37902-1401

RE: Sugar Camp Mine #1

Thank you for notice of the referenced project. The Peoria Tribe of Indians of Oklahoma is interested in consulting on the project. Please include us on all mailing lists pertaining to this site. Please share all information concerning this project as it pertains to Native American interests.
Contact information is:

Frank Hecksher
Special Projects/NAGPRA Manager
118 S. Eight Tribes Trail
Miami, OK 74354
918-540-2535
fhecksher@peoriatribe.com

A handwritten signature in black ink, appearing to read "JP 2" followed by a horizontal line.

John P. Froman
Chief

TREASURER
John Sharp

SECRETARY
Hank Downum

FIRST COUNCILMAN
Carolyn Ritchey

SECOND COUNCILMAN
Jenny Rampey

THIRD COUNCILMAN
Alan Goforth

Appendix I – Air Quality and Greenhouse Gas Emissions

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National Ambient Air Quality Standards Emission Calculations

Type	No.	HP Rated	Hrs/Day	Days per year	Total hp- hrs	Total VOC (g)	Total CO (g)	Total NOx (g)	Total PM10 (g)	Total PM2.5 (g)	Total SO2 (g)	Total CO2 (g)
Drill rig	1	300	8	260	78000	46800	178620	557700	39000	38220	56940	41316600
Excavator	1	300	8	260	78000	26520	101400	358800	24960	24180	57720	41831400
Loader/Backhoe	1	100	8	260	26000	48100	213200	187200	35620	34580	24700	17968600
Bulldozer	1	100	8	260	26000	9360	35880	123760	8580	8320	19240	13943800
Total (g)						130780	529100	1227460	108160	105300	158600	115060400
Total (U.S. tons)						0.14	0.58	1.35	0.12	0.12	0.17	126.83

Hamilton County (2009)

Project %

Abbreviations:

HP = horse power

VOC = volatile organic compounds

CO = carbon monoxide

g = grams

NOx = nitrogen oxides

PM₁₀ = particulate matter less than 10 microns in diameter

PM_{2.5} = particulate matter less than 2.5 microns in diameter

SO₂ = sulfur dioxide

CO₂ = carbon dioxide

Equipment emissions data from: Federal Emergency Management Agency. 2009. *Programmatic Environmental Assessment for Alternative Housing Pilot Program, Permanent Housing, Calcasieu Parish, Louisiana*

County emissions totals from United States Environmental Protection Agency. 2010. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2008*. Publication number EPA 430-R-10-006.

2008 United States Methane Emissions From States With Coal Mining Activities

State	Million Cubic Feet of Methane	%
Alabama	21120	12.63
Alaska	55	0.03
Arizona	136	0.08
Arkansas	237	0.14
Colorado	12998	7.77
Illinois	7759	4.64
Indiana	5452	3.26
Kansas	18	0.01
Kentucky	10641	6.36
Louisiana	98	0.06
Maryland	325	0.19
Mississippi	203	0.12
Missouri	20	0.01
Montana	2076	1.24
New Mexico	3479	2.08
North Dakota	386	0.23
Ohio	3959	2.37
Oklahoma	970	0.58
Pennsylvania	22325	13.35
Tennessee	105	0.06
Texas	998	0.60
Utah	5524	3.30
Virginia	9334	5.58
West Virginia	37406	22.37
Wyoming	21601	12.92
U.S. Total	167225	100

Data from: IPCC ANNEX 3 Methodological Descriptions for Additional Source or Sink Categories, Table A-117, Total Coal Mining CH₄ Emissions by State (million cubic feet), page A-140

Sugar Camp Mine No. 1 Methane Emission Calculations

Average specific gravity of solid bituminous coal = 1.32

1 cubic foot (ft³) of fresh water = 62.6 lbs

1 acre = 43,560 ft²

1 acre-foot = 43,560 ft³

1 U.S. ton = 2,000 lbs

(Data: Kentucky Geological Survey 2006)

1 U.S. ton Illinois Basin Coal = 64.3 cubic feet methane (Data: USEPA 2011e)

Amount of Coal per Acre-foot

$$\frac{1.32 \times 62.6 \text{ lbs} \times 43,560 \text{ sq. foot}}{2,000 \text{ lbs/ton}} = 1,799.72 \frac{\text{tons}}{\text{acre-foot}}$$

1799.72 rounded to 1,800 tons/acre-foot

Data from:

Kentucky Geological Survey. 2006. *Estimating Tons of Coal on a Property*. Retrieved from <<http://www.uky.edu/KGS/coal/estimatingTons.htm>> (April 19, 2011).

Wood, G. H., J. Kehn, T. M. Carter, and W. C. Culberston. 1983. *Coal Resources Classification System of the United States Geological Survey: United States Geological Survey Circular 891*.

Estimate of *in situ* methane content per ton of bituminous Illinois Basin coal is from:

United States Environmental Protection Agency. 2011. *2011 Draft U.S. Greenhouse Gas Inventory Report*.

Estimated Methane Emissions for TVA Coal Property Portion of Proposed Project

$$1,800 \frac{\text{tons of coal}}{\text{acre} - \text{foot}} \times \frac{1 \text{ acre} - \text{foot}}{43,560 \text{ sq. feet}} \times \text{sq. feet per year} \times 6 \text{ foot high panels}$$

$$= \text{tons of coal per year} \times 64.3 \text{ cubic feet methane per ton of coal}$$

$$= \text{cubic feet of methane per year}$$

Estimated CO₂ Equivalent

$$\text{Cubic feet of methane per year} * .0000193 \frac{\text{metric tons of methane}}{\text{cubic foot of methane}} * 1.102 \frac{\text{U.S. tons}}{\text{metric ton}}$$

$$= \text{tons of methane per year}$$

$$\text{Tons of methane per year} * \text{GWP} = \text{U.S. CO}_2 \text{ equivalent tons per year}$$

Methane is considered to have a global warming potential (GWP) between 21 and 23 times that of CO₂.

TVA-Owned Coal Lease Property

Year	Coal Total (Square Feet)	Total Methane per Year (cubic feet)	Metric Tons of Methane	Metric Tons CO ₂ Equivalent	U.S. Tons CO ₂ Equivalent
1	0	0	0	0	0
2	743027.7	11845457.6	229	5258	5796.2
3	546756.2	8716468.8	168	3869	4265.1
4	140193.9	2234992.0	43	992	1093.6
5	112155.1	1787993.6	35	794	874.9
6	56077.6	893996.8	17	397	437.4
7	0	0	0	0	0

Coal total square feet = calculated from scale on mine plan timing map

Total cubic feet of methane per year = Square feet of coal * 43,560 square feet per acre-foot * 1,800 tons of coal per acre-foot * 6-foot-high panels

Metric tons of methane per year = cubic feet of methane * .0000193 metric tons of methane per cubic foot of methane

Metric tons of CO₂ equivalent = methane metric tons * 23 GWP

U.S. tons of CO₂ equivalent = metric tons of CO₂ equivalent * 1.102 U.S. tons per metric ton

Estimated Methane Emissions for Private Property Proportion of Mine Plan

Year	Coal Total (square feet)	Total Methane per Year (cubic feet)	Private Property		
			Metric Tons of Methane	Metric Tons CO2 Equivalent	U.S. Tons CO2 Equivalent
1	0	0	0	0	0
2	2060850.3	32854382.5	634	14584	16076.2
3	4289933.3	68390755.5	1320	30359	33464.7
4	4584340.5	73084238.7	1411	32442	35761.3
5	4640418.1	73978235.5	1428	32839	36198.7
6	4752573.2	75766229.1	1462	33633	37073.6
7	1170619.1	18662183.3	360	8284	9132

CO2 = carbon dioxide

Coal total square feet = calculated from scale on mine plan timing map

Total cubic feet of methane per year = Square feet of coal * 43,560 square feet per acre-foot * 1,800 tons of coal per acre-foot * 6-foot-high panels

Metric tons of methane per year = cubic feet of methane * .0000193 metric tons of methane per cubic foot of methane

Metric tons of CO₂ equivalent = Methane metric tons * 23 Global Warming PotentialU.S. tons of CO₂ equivalent = Metric tons of CO₂ equivalent * 1.102 U.S. tons per metric tonConversion values from USEPA 2011. "Interactive Units Converter." *Coalbed Methane Outreach Program*.Retrieved from <<http://www.epa.gov/cmop/resources/converter.html>> (March 2, 2011).**Estimated Percentage of Methane Emissions From TVA Portion of Mine**

Year	TVA-Owned Coal Lease Property	Private Property	Entire Mine	
	U.S. Tons CO2 Equivalent	U.S. Tons CO2 Equivalent	U.S. Tons CO2 Equivalent	TVA % of Total Mine Emissions
1	0	0	0	0
2	5796.2	16076.2	21872.3	26.50
3	4265.1	33464.7	37729.8	11.30
4	1093.6	35761.3	36854.9	2.97
5	874.9	36198.7	37073.6	2.36
6	437.4	37073.6	37511.1	1.17
7	0	9132	9131.7	0

CO2 = carbon dioxide

Estimated Contribution of Sugar Camp Mine No. 1 Methane Emissions to State and United States Annual Totals

Source	Million Cubic Feet of Methane Per Year						
	1	2	3	4	5	6	7
Sugar Camp No. 1 TVA Portion	0	11.85	8.72	2.23	1.79	0.89	0
Sugar Camp No. 1 Private Property Portion	0	32.85	68.39	73.08	73.98	75.77	18.66
Sugar Camp No. 1 Mine Total	0	44.7	77.11	75.31	75.77	76.66	18.66
¹ Total Annual Methane Emissions from Illinois Mining	7559	7603.7	7636.11	7634.31	7634.77	7635.66	7577.66
¹ Total Annual Methane Emissions from U.S. Mining	167225	174828.7	174861.1	174859.3	174859.8	174860.7	174803
Percentage of Sugar Camp Mine No. 1 Emissions							
Sugar Camp No. 1 TVA Portion	0	26.51	11.31	2.96	2.36	1.16	0
Sugar Camp No. 1 Private Property Portion	0	73.49	88.69	97.04	97.64	98.84	100.00
Percentage of Illinois Mining Emissions							
Sugar Camp No. 1 TVA Portion	0	0.16	0.11	0.03	0.02	0.01	0
Sugar Camp No. 1 Private Property Portion	0	0.43	0.90	0.96	0.97	0.99	0.25
Percentage of U.S. Total Mining Emissions							
Sugar Camp No. 1 TVA Portion	0	0.01	0	0	0	0	0
Sugar Camp No. 1 Private Property Portion	0	0.02	0.04	0.04	0.04	0.04	0.01

¹ Assuming no increase in emissions except for Sugar Camp

Data from: United States Environmental Protection Agency. 2011. *2011 Draft U.S. Greenhouse Gas Inventory Report*.