LG&E Energy LLC
220 West Main Street (40202)
P.O. Box 32030
Louisville, Kentucky 40232

November 29, 2005

Elizabeth O'Donnell
Executive Director
Kentucky Public Service Commission
211 Sower Boulevard
Frankfort, Kentucky 40602-0615

RE: ***THE APPLICATION OF KENTUCKY UTILITIES COMPANY REGARDING THE TRANSFER OF ANY REAL PROPERTY ASSOCIATED WITH THE LOCK NO. 7 HYDROELECTRIC PROJECT, PROJECT NO. 539 TO LOCK 7 HYDRO PARTNERS, LLC***
CASE NO. 2005-00405

Dear Ms. O'Donnell:

Enclosed please find an original and five (5) copies of the Response of Kentucky Utilities Company ("KU") to the First Data Request of Commission Staff dated November 10, 2005, in the above-referenced proceeding.

Please note that in preparing this filing and numerous others that were also due on November 22, 2005, KU inadvertently failed to deliver this filing to the file clerk's offices. KU regrets this oversight.

Please contact me if you have any questions concerning this filing.

Sincerely,

John Wolfram
Manager, Regulatory Affairs

Enclosures

LG&E ENERGY®

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220 West Main Street (40202)
P.O. Box 32030
Louisville, Kentucky 40232

November 22, 2005

Elizabeth O'Donnell
Executive Director
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RE: ***THE APPLICATION OF KENTUCKY UTILITIES COMPANY REGARDING THE TRANSFER OF ANY REAL PROPERTY ASSOCIATED WITH THE LOCK NO. 7 HYDROELECTRIC PROJECT, PROJECT NO. 539 TO LOCK 7 HYDRO PARTNERS, LLC***
CASE NO. 2005-00405

Dear Ms. O'Donnell:

Enclosed please find an original and five (5) copies of the Response of Kentucky Utilities Company ("KU") to the First Data Request of Commission Staff dated November 10, 2005, in the above-referenced proceeding.

KU respectfully requests that the Commission issue an order by December 1, 2005, approving the transfer of any real property associated with the Lock No. 7. Hydroelectric Project, FERC Project No. 539, from KU to Lock 7 Hydro Partners, LLC. Subject to receipt of FERC approval for the transfer of the operating license for the facility, KU anticipates closing the transaction no later than December 15, 2005.

Please contact me if you have any questions concerning this filing.

Sincerely,

John Wolfram
Manager, Regulatory Affairs

Enclosures

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

THE APPLICATION OF KENTUCKY UTILITIES COMPANY REGARDING THE TRANSFER OF ANY REAL PROPERTY ASSOCIATED WITH THE LOCK NO. 7 HYDROELECTRIC PROJECT, PROJECT NO. 539 TO LOCK 7 HYDRO PARTNERS, LLC	)	CASE NO. 2005-00405

RESPONSE OF KENTUCKY UTILITIES COMPANY TO 1st DATA REQUEST OF COMMISSION STAFF DATED NOVEMBER 10, 2005

FILED: NOVEMBER 22, 2005

KENTUCKY UTILITIES COMPANY

Response to 1st Data Request of Commission Staff
Dated November 10, 2005

Case No. 2005-00405

Question No. 1

Witness: John Wolfram

Q-1. Provide the Initial Consultation Document, which is referenced in the correspondence included in Exhibit J, KU Stakeholder Correspondence.

A-1. Please see attached.

Initial Consultation Document
In Support of
Application for License Surrender

Lock and Dam No.7 postcard (circa 1920)

For the

Lock No. 7 Hydroelectric Project
(FERC No. 539)

Submitted by:

Kentucky Utilities Company

April 1, 2004

I. Introduction

Information Sources – Portions of this "Introduction" section make use of and directly copy written descriptions of the project and background information from the web sites for the U.S. Army Corps of Engineers ("ACOE") and the Kentucky River Authority ("KRA"). In addition, information on the project was taken from Kentucky Utilities Company's ("KU") original Federal Energy Regulatory Commission ("FERC") license order and FERC's environmental assessment for the project.

Background - KU, a subsidiary of LG&E Energy, operates the Lock No. 7 Project in Mercer County on the Kentucky River near the town of High Bridge in Jessamine County, Kentucky. KU holds an operating license issued by a federal agency, the FERC. Because KU has determined that continued operation of the Lock No. 7 Project is not economically feasible, KU plan to apply to the FERC to surrender their operational license (FERC License No. 539), for the Lock #7 Project and decommission the generating facility.

Regulatory History - The original license for the project was issued to the Kentucky Hydro Electric Company on August 19, 1926, project construction was completed in April 1928, and the license transferred to KU on December 31, 1928. The original license expired on August 18, 1976 and KU operated the Project under annual licenses until the current license was issued in 1992. The Project is currently operated under a license issued by the FERC on May 26, 1992 (59 FERC 62,186). The license was issued for a term of 30 years (effective on May 1, 1992) and expires on May 1, 2022. The Project uses waterpower from the ACOE Lock and Dam No. 7. The Kentucky River is considered navigable in this location. Less than one acre of Federal lands owned by the ACOE is included within the project boundary.

When the current license was issued in 1992, the lock and dam had been determined by the ACOE to be excess property and had been referred to the General Services Administration for disposal under applicable law. By 1992, the Commonwealth of Kentucky had been negotiating with the ACOE to purchase these facilities and has been leasing the lock from the ACOE pending resolution of the transfer negotiations. The lock is currently leased by the Commonwealth of Kentucky and operated by the KRA during the recreation season.

License Surrender Process – This document is the Initial Consultation Document ("ICD") and it is the first public step in the process of filing a surrender application with the FERC. Using FERC's regulations and guidance, KU intends to generally pursue the following three stages during the surrender application process and hopes to file the final surrender application with the FERC by the end of 2004:

- **First stage** - In this stage KU will issue the ICD, hold a joint agency/public meeting and site visit in an effort to gather input from the public, agencies, and tribes. That input will assist KU in determining the appropriate scope of analysis to support its license surrender and decommissioning application.

• **Second stage** – KU will gather information that may be needed to address issues associated with the project decommissioning. KU will conduct necessary studies and will prepare draft and final applications for surrendering the operating license.

• **Third stage** - KU will file its application with FERC. Then FERC, the resource agencies, and the public will evaluate the information provided in KU's application; FERC will make a decision on the requirements that will be included in FERC's surrender and decommissioning order.

This ICD was prepared, and is being made available, as part of KU's Surrender Application. FERC regulations require KU to provide each resource agency and Indian tribe with a copy of this document. This ICD explains the type of application that KU will be filing with FERC and includes a description of the Project, decommissioning proposal, and a description of the affected environment.

Decision to Surrender and Decommission - In May of 2002, KU began the process of evaluating options for the Lock No. 7 Project because KU had determined that continued operation by KU was not economically feasible. To resolve the issue, KU chose a parallel process whereby KU would either surrender the FERC license to operate the Project, or sell the Lock No. 7 Project to a third party and transfer its FERC license to that third party. In order to involve key state and federal parties of interest in KU's decommissioning/transfer plans, KU had discussions with FERC staff, the U.S. Army Corps of Engineers, Louisville District Office, the KRA and other agencies. Simultaneously, KU executed an agreement with a third party to allow them to do their own evaluation of the Lock No. 7 Project. Subsequent to their evaluation, the third party notified KU that they were not interested in purchasing the project.

After completing the thorough assessment, KU determined that the Lock No. 7 Project was no longer financially viable and decided to file an application to surrender the operating license with the FERC.

The surrender application will include a decommissioning plan that will describe how KU is planning the demolition of the generating station superstructure above the crest elevation and the filling of the voids below the current superstructure (elevation 514.6). The demolition concept would *not* include structural demolition to the existing structure below the crest elevation. KU plans to place concrete waste, from the demolition of the superstructure, with tremie concrete to create a solid concrete mass.

Proposed Property Transfer - As part of the surrender plan, KU intends to transfer the Lock No. 7 facilities and property to the ACOE once the demolition and decommissioning are complete. KU understands that the ACOE and the KRA have held discussions regarding the transfer of the dam to the KRA. The KRA was first established by the Kentucky General Assembly in 1986 to take over operation of the Kentucky River Locks and Dams 5 through 14 from the ACOE.

The KRA is charged with developing comprehensive plans for the management of the Kentucky River Basin, including long range water supply, drought response and ground

water protection plans. It is to adopt regulations to improve and coordinate water resource activities within the basin among state agencies. It is also charged with developing recreational areas within the basin.

KU understands the KRA is currently working with the ACOE to transfer Locks and Dams 5 through 14 to the Commonwealth. After such transfer, the Commonwealth will assume responsibility for their long term operation and maintenance. KU understands that the KRA is working with local governments and citizen groups to convert the appropriate adjacent lock master properties into recreational areas.

If you have any questions regarding this ICD or the overall Surrender Application process, please feel free to contact:

Mr. Marty J. Reinert
Regulatory Analyst II
Louisville Gas and Electric Company
220 West Main Street
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(502) 627-4173
Fax: (502) 627-3213
Email: marty.reinert@lgeenergy.com

II. Project Description and Background

Information Sources – Portions of this section, "Project Description and Background" make use of and directly copy written descriptions of the project and background information from the web sites for the U.S. Army Corps of Engineers ("ACOE") and Kentucky River Authority ("KRA"). Some excerpts have been taken from a recent environmental assessment sponsored by the Kentucky River Authority ("KRA") and performed by Third Rock Consultants, LLC for the prime contractor Fuller, Mossbarger, Scott, and May Engineers, Inc. In addition, information on the project was taken from Kentucky Utilities' ("KU") original Federal Energy Regulatory Commission ("FERC") license order, FERC's environmental assessment for the project and the American Canal Guide for the Kentucky River Navigation.

Background - Prior to the advent of the railroads in the late 1800s and early 1900s, the Kentucky River was the main transportation route from eastern Kentucky to central Kentucky, the Ohio River, and the seaport of New Orleans. The timber harvests of the Kentucky River headwaters were gathered throughout the year; these harvests were held until spring rains could wash the loads of trees down the tributaries to the main stem of the Kentucky. There, the logs would be bundled into rafts and young men would "float" them down to the mills in Frankfort. Later flatboats would take the place of the makeshift rafts. After gathering much of Kentucky's bounty of flour, meat products, hemp, soap, paper, powder, nails, tobacco, bourbon, and coal, the flatboats would make their way to the Ohio River, then down the Mississippi River to New Orleans. At the end of the trip, the goods sold and the boat scrapped for what the wood would bring, and the flatboat men would hike their way home to Kentucky (Grier 2001).

The shoals in the Kentucky River made travel dangerous and sometimes impossible during low flow. To facilitate the use of the river as a transportation corridor, various projects throughout the 1800s attempted to improve navigation on the river with limited success. In 1836, the Commonwealth of Kentucky constructed Locks 1 through 5; however, by 1884, Locks and Dams 1 through 5 were in complete disrepair and had to be rebuilt by the U.S. Army Corps of Engineers. By 1917, Locks 1 through 14 were in service to create year-round navigable pools from Beattyville to Carrollton. The locks provided passage for boats under most water conditions; however only small barges were able to navigate the relatively shallow, meandering river. By that time railroads had also been constructed throughout Kentucky and commercial transport was more economical by rail than by river.

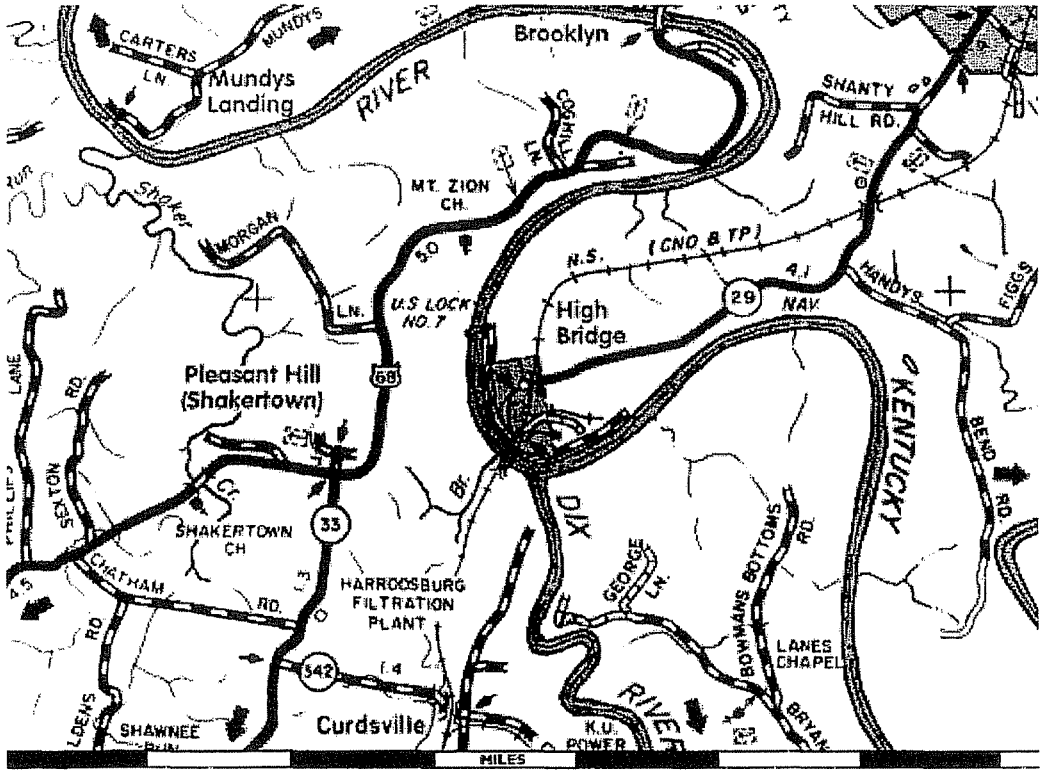
During much of the 1900s, the Kentucky River provided commercial transport, mainly for the lower locks, with sporadic shipments of timber, coal, and minerals (such as fluorspar, calcite, barite, zinc, and lead) from the upper and lower pools. The last commercial use remaining on the river was by one company, operating in Frankfort, that shipped sand and gravel to Madison, Indiana on the Ohio River.

As commercial activity on the river dwindled, the ACOE has worked to transfer ownership and maintenance to a state entity, the KRA.

Although the advent of the lock system up to Beattyville did not provide the anticipated economic stimulus, recreation was, and remains, popular on the river. The river provided entertainment before the days of television, with traveling minstrel shows, riverboat cruises, and river based resorts. One of these resorts, Estill Springs, was near Irvine and touted five separate waters for its guests' health.

Flooding and water supply have always been important issues for the river. Various projects have been built in the Kentucky River watershed to control flooding, but none of these, save floodwalls, have been on the main stem of the Kentucky River.

The Kentucky River Navigation system, locks and dams, is one of the oldest still operating in the United States. Kentucky River Locks and dams 1 through 5 go back to 1836-1842 and were constructed by the Commonwealth under its Chief Engineer, Sylvester Welch. Lock and Dam No.7 was constructed in 1897 by the U.S. Army Corps of Engineers ("ACOE") and is located at river mile 117, near High Bridge at the end of Kentucky route 29.



In 1876 High Bridge was the location of the highest railway bridge in the world, and the first railroad cantilever bridge. Lock and Dam No. 7 is one half mile below the bridge, past a pair of stone portals. Lock and Dam 7 is a timber-crib dam with a stone lock chamber built in 1896-97 by the ACOE for barge navigation. At one end of the dam is KU's Lock No. 7 Hydroelectric Project (FERC 539).

This run-of-river project utilizes the ACOE Lock and Dam 7 to generate electricity. The Project was completed in 1928. A license for the Project was originally issued to the Kentucky Hydro Electric Company on August 19, 1926, and was transferred to KU effective December 31, 1928.

The existing Lock No. 7 Hydroelectric Project consists of:

- a concrete substructure, about 116 feet long, with a 36-foot-long solid concrete section and an 80-foot-long hollow dam/spillway, containing trash racks, six intake gates, three turbines, and discharge facilities;
- a 93-foot-long, 25-foot-wide and 6.5-foot-high superstructure/powerhouse located above the spillway, supported by hollow concrete piers, with three 680 kW generating units having a total installed capacity of 2,040 kW;
- a forebay about 120 feet long and 100 feet wide;
- a substation located on the west bank;
- a foot bridge, about 85 feet long, connecting the substation with the powerhouse;
- a trash boom about 170 feet long; a 34.5 kV, .4,540-foot-long transmission line, with a right-of-way ranging from 50 feet to 200 feet wide; and,
- appurtenant facilities.

The Lock No. 7 Powerhouse is unusual in that the Powerhouse with generators and electrical equipment is situated on piers. The Powerhouse is elevated well above the river (operating floor El 554 vs. El 514.6 for spillway crest). The Powerhouse was flooded in 1978 (maximum flood of record) leading to subsequent rewinding of the generators and replacement of the switchgear.

Lock No. 7 Generator Data	
Number of Units	3
Manufacturer	General Electric
Type of Units	Vertical
Rating KVA	850
KW Output @ 0.8 PF	680
Voltage	2300
Speed (rpm)	150

Each of the three turbines at the Lock No. 7 hydroelectric project is open flume, fixed blade propeller type turbines with a long turbine shaft – more than 40 feet. Each turbine is controlled by a Woodward gate-shaft, electro-mechanical governor that actuates the operating ring on the turbine. The Woodward governors are obsolete. Woodward Governor is discontinuing spare parts and even service on older governors such as those at Lock No. 7. The turbine and guide bearings are in very poor condition.

Lock No. 7 Turbine Data	
Number of Units	3
Type of Units	Vertical fixed blade
Manufacturer	Newport News Shipbuilding and Drydock
Design Head (ft)	15
Design Flow (cfs)	743
Max. Output (kW)	757
Max. Output (hp)	1000
Speed (rpm)	150
Runner Material	Cast Iron

In addition to the powerhouse superstructure, the Project's civil components include the hollow dam section containing the turbines and supporting the powerhouse piers as well as a short solid-concrete overflow section tying the powerhouse to the west bank.

The Project is not classified as high hazard and does not fall under the FERC Part 12 Independent Consultant process. No stability or project safety issues are known to exist and no such items appear in recent FERC operational inspection reports.

KU currently monitors seepage related to the project structures in compliance with FERC public safety regulations. The 1999 operational inspection report showed that the seepage reported in the 1992 licensing process was still occurring, and FERC's letter dated May 4, 1999 noted that this monitoring should continue. The ACOE is currently responsible for safety of the dam and locks which are not FERC licensed project works.

FERC License Article 403 directs KU to file a streamflow and reservoir level monitoring plan to document run-of-river requirements specified under Article 401. This plan was filed on August 24, 1992 and approved by FERC on April 4, 1994. Monitoring is accomplished using an existing continuous-recording USGS gage at the project that the Licensee is responsible for funding under the terms of the approved stream gauging plan.

Although not required by their FERC license, KU currently manages all floating debris at the lock and dam using the station gantry crane.

For additional detail of the Project see the Project Maps and Drawings, which are part of the KU FERC license issued in 1992. These 11"x 17" drawings are located in Appendix A.

III. Decommissioning Proposal

Introduction - Kentucky Utilities Company ("KU") has determined that the Lock No. 7 Hydroelectric Project, located in Mercer County near Harrodsburg, Kentucky is no longer economical to continue operating due to the cost of operation and maintenance at the facility. As an alternative, KU entered into discussions with a third party regarding transfer of the Lock No. 7 Project to a third party that would have continued to operate the generating facility. Those discussions were unsuccessful. As a result, KU plans to surrender their federal operating license for its Lock No. 7 Hydroelectric Project. In addition, KU plans to decommission the Project by removing the generation equipment and parts of the facilities down to the waterline (elev. 514.60 ft.), filling the voids below the current superstructure and transferring all project property to the U. S. Army Corps. of Engineers ("ACOE").

Decommissioning Plan – The plan is quite straightforward and is less complicated, from an engineering and environmental impact standpoint, than many decommissioning projects. Since KU does not own the dam, the decommissioning plan includes only the removal of the generation equipment, superstructure and facilities associated with that equipment. After all generation equipment is removed from the powerhouse and sub-station, KU plans to remove the Lock No. 7 powerhouse and pier superstructure along with the spillway divider walls down to the crest elevation of 514.6 ft. This will leave the crest at its current operating level and maintain the upstream water level.

Below elevation 514.6 ft., the non-structural generation equipment will be removed from the structure. Then, voids in the remaining structure beneath elevation 514.6 ft. will be filled with tremie concrete. If practical, concrete rubble from the demolished superstructure will also be placed in the voids along with the tremie concrete. It is estimated that it will take around 2,800 cubic yards of fill to make the structure a solid mass (see Figure 1 below). A large metal bell-shaped draft tube imbedded in the foundation near the base of the structure will remain in place.

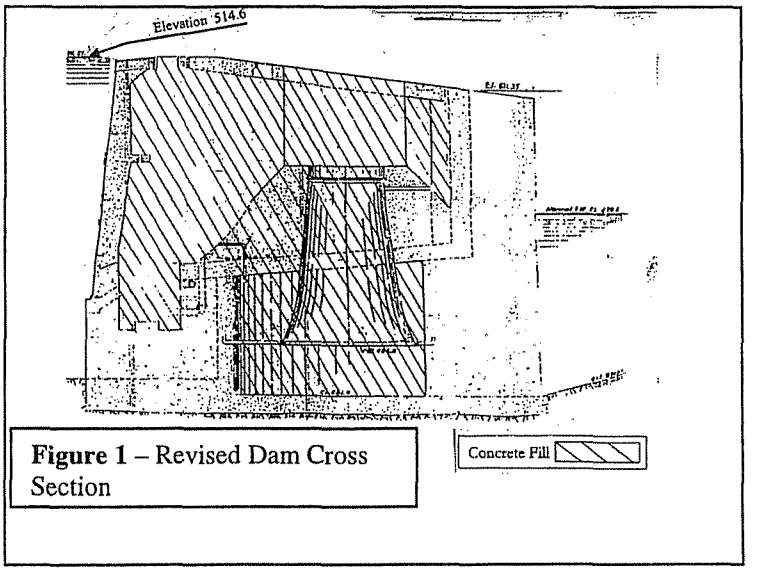


Figure 1 – Revised Dam Cross Section

Decommissioning would consist of three activities: Demolishing the powerhouse; Demolishing the piers; Placing the concrete fill. KU anticipates that the demolition would be sequenced beginning with the Unit #3 superstructure, and moving on to Unit #2 after the three major tasks at the Unit #3 area were complete, and then moving on to Unit #1 after completion of major tasks at Unit #2.

Since not all of the project structures will be removed (see description above regarding structures below the waterline), KU recognizes that great care and thought are necessary in the process in which the reinforced concrete structures will be removed and demolished. Although conventional demolition methods use a combination of jackhammers, hoe-rams, explosives and the like, create noise, dust and vibration, KU plans to employ the use of a diamond wire saw. This procedure creates less noise and dust, and does not weaken surrounding structures since it operates with little or no vibration. The diamond wire saw originated as a tool in the stone industry over 20 years ago and was successfully applied to cutting reinforced concrete in the early 1980's. In addition to demolition using a diamond wire saw technique, a nominal amount of concrete demolition using hydraulic excavator attachments and / or pneumatic jackhammer techniques is anticipated.

KU plans to file its surrender application with the FERC by the end of 2004.

Consultation – In preparing this decommissioning plan, and prior to the issuance of this Initial Consultation Document ("ICD"), KU has consulted with the ACOE, the Kentucky River Authority ("KRA"), and the Federal Energy Regulatory Commission ("FERC") to get their respective input on the approach KU plans to take in decommissioning the generating facility. Restoration of the hydroelectric portion of the existing dam, by filling it with superstructure rubble and tremie concrete, will occur below the crest elevation in the "waters of the United States" and will in all likelihood require an ACOE dredge and fill permit. As part of obtaining that permit, KU plans to dispose of all superstructure demolition materials appropriately. KU will also investigate options for disposing of some superstructure demolition materials in off-site upland locations. Before being placed into the voids of the dam, concrete rubble will be certified as free from regulated contaminants from KU activities. KU anticipates coordinating its activities with the ACOE, state agencies, and the U.S. Fish and Wildlife concerning evaluations of filling the voids in the dam, among other things, and on aquatic populations that sometimes occur in tailrace areas below dams.

The final engineering plans for the decommissioning of the Lock No. 7 Hydroelectric Project will have the benefit of being reviewed and approved by engineering staffs of both the ACOE and the FERC and may vary from the preliminary approach described above. Furthermore, as a result of consultation and comments by state and federal natural, cultural, and recreational agencies there may be changes in the methodology, timing, and sequencing of construction activities to mitigate the affect of certain construction activities. Finally, the completed engineering package will be sent out to competitive bid and the successful contractor may propose alternative methodologies. Should that occur, KU will consult with FERC and the ACOE before proceeding with a change in plans that might have an effect on either the engineering or environmental effects of the demolition.

Preliminary Project Schedule - With the anticipated resolution of any issues concerning the decommissioning plan and provided that KU's application for surrender is found to be complete, KU anticipates that FERC may issue a surrender and decommissioning order as early as the end of the first quarter of 2005.

Once an order is received KU's preliminary schedule and task sequence for the decommissioning project would be:

Task	Duration (working days)
• Engineering – Review and approval	120
• Mobilization	25
• Generation Equipment Removal	31
• Unit #3	
- Demolish Powerhouse	10
- Demolish Piers	12
- Place concrete fill	10
• Unit #2	
- Demolish Powerhouse	10
- Demolish Piers	12
- Place concrete fill	10
• Unit #1	
- Demolish Powerhouse	10
- Demolish Piers	12
- Place concrete fill	10
• Demolish divider walls and pier walls	10
• Demobilization	15

KU estimates that if the Decommissioning Project begins with engineering on or about April 1, 2005, the Project would be complete sometime in May or June 2006, or just over one calendar year.

IV. Affected Environment

Introduction - Kentucky Utilities Company ("KU") plans to surrender its license for the Lock and Dam #7 Hydroelectric Project on the Kentucky River in Mercer County, Kentucky, and remove the project's superstructure (powerhouse) and stabilize other components of the project.

KU believes that the Decommissioning Plan for the Lock No. 7 Project will have a small potential to negatively impact the environment in and around the Project area and does not anticipate conducting any environmental studies associated with the demolition or decommissioning of the Lock No. 7 Project. The majority of work associated with the demolition of the superstructure will occur above the water level or crest elevation of the dam (elevation 514.6).

However, stabilization of the existing powerhouse foundation structure by filling it with superstructure rubble and tremie concrete will occur below the crest elevation in the "waters of the United States" and will in all likelihood require a U.S. Army Corps of Engineers ("ACOE") dredge and fill permit. As part of obtaining that permit, KU plans to dispose of all superstructure demolition materials appropriately. KU will also investigate options for disposing of some superstructure demolition materials in off-site upland locations. Before being placed into the voids of the dam, concrete rubble will be certified as free from regulated contaminants from KU activities. KU anticipates coordinating its activities with the ACOE, state agencies, and the U.S. Fish and Wildlife Service ("USFWS") concerning evaluations of the effects of filling the voids in the dam on aquatic populations that sometimes occur in tailrace areas below dams.

Information Sources – Portions of this section, "Affected Environment" incorporates sections of a recent environmental assessment sponsored by the Kentucky River Authority ("KRA"). The study was performed by Third Rock Consultants, LLC for the prime contractor Fuller, Mossbarger, Scott, and May Engineers, Inc. as part of the planning studies commissioned by the KRA as part of their plans to renovate and stabilize Lock and Dam 9 at Valley View. The following is an overview of the affected environment and other statements contained within this document have been taken from the Kentucky Review study sponsored by the KRA. KU believes that since the decommissioning of the hydroelectric facilities at Lock No. 7 are minimally intrusive and should have minimal impacts, relying on the KRA study to describe the existing environment is adequate and commensurate with the anticipated impacts.

Kentucky River and Tributaries

The Kentucky River is one of 11 major drainage systems within Kentucky. Its watershed encompasses an area of 6,966 square miles (mi^2), beginning in the mountainous terrain of southeastern Kentucky and extending northwest across the middle of the state (Burr and Warren 1986). From the confluence of its North, Middle, and South Forks at Beattyville, Lee County, the Kentucky River flows northwestward 255 miles (mi.) to its confluence with

the Ohio River at Carrollton, Carroll County, Kentucky. A series of 14 locks and dams are located on the river, extending upstream from Carrollton (Lock 1, river mile 4.0) to just west of Beattyville (Lock 14, river mile 249.0). Each lock and dam creates a pool that extends upstream to the next lock and dam structure. Pool lengths vary from 11 mi. (Pool 2) to 27 mi. (Pool 1) (ACOE 1975). During the winter, spring, and early summer months, the river maintains average to high flows that create mixing within the pools and overflow at the dams. As precipitation decreases during late summer and fall, flows decrease, the river clears, and the river essentially becomes a series of long, narrow reservoirs.

Kentucky River Locks & Dams (*Mile 0 to River Mouth*)		
Lock	**River Mile**	**Lock Size**
1	4.0	145' x 38'
2	31.0	145' x 38'
3	42.0	145' x 38'
4	65.0	145' x 38'
5	82.2	145' x 38'
6	96.2	147' x 52'
7	117.0	146' x 52'
8	139.9	146' x 52'
9	157.5	148' x 52'
10	176.4	148' x 52'
11	201.0	148' x 52'
12	220.9	148' x 52'
13	239.9	148' x 52'
14	249.0	148' x 52'

Climate

The climate of the project area is temperate with moderately cold winters and warm and humid summers. Based on data presented in soil survey documents for Clark, Fayette, Jessamine, and Madison counties (McDonald *et al.* 1983; Newton *et al.* 1973; Preston *et al.* 1989; Sims *et al.* 1987), the highest and lowest average daily temperatures occur in July (86 to 88°F) and January (24 to 28 °F). Rainfall is well distributed throughout the year but lowest during late summer and early fall. Average annual precipitation is 43 to 48 inches (in.) per year. Average annual snowfall is approximately 13 to 19 in. per year, with 1 in. or more of snow falling on only 5 days per year. The average length of the growing season is approximately 190 to 200 days (McDonald *et al.* 1983; Newton *et al.* 1973; Preston *et al.* 1989; Sims *et al.* 1987).

Physiography

The project area lies in the Inner Blue Grass (IBGS) and Eden Shale Belt (ESBS) subsections, Bluegrass Section of the Interior Low Plateaus Physiographic Province (Burr and Warren 1986; Quarterman and Powell 1978). The IBGS encompasses approximately 1,600 mi^2 in central Kentucky. It consists of a gently rolling, karsted upland or plain with slight relief and elevations ranging from 800 to 1,000 ft. The Kentucky River and some of its tributaries (e.g., Boone Creek, Lower Howards Creek) cut deep (300 to 400 ft.) gorges

through the IBGS. Many of the tributaries have created rapids and waterfalls as they leave the upland and approach their confluence with the river. The Kentucky River gorge is bordered on each side by steep valley walls, some extending straight down to the water and others bordered by narrow floodplains. Within Pool 9, the river meanders back and forth across the approximate 600-ft. wide valley floor. Because of the extensive rock outcrops and steep cliffs along the Kentucky River, the 100-mile gorge that extends from Boonesborough (Lock and Dam 10) to Frankfort is often referred to as the "Kentucky River Palisades."

Within central Kentucky, the ESBS forms the northern, eastern and western border of the Inner Blue Grass Subsection. It is a roughly circular area encompassing 3,700 mi^2 that is developed on Ordovician-age shale (Eden Shale) and shaly limestone. Its topography is characterized by irregular, sharp, steep-sided hills and sinuous ridges separated by closely spaced V-shaped valleys (Martin *et al.* 1979; burr and Warren 1986).

Geology

The geology of the project area has been thoroughly reviewed by Wharton and Barbour (1991), McGrain (1983), and Martin *et al.* (1979). Rock outcrops along Pool 9 of the Kentucky River represent the oldest, exposed rock strata in Kentucky. These rocks consist of thick-bedded, cliff-forming, dolomitic limestones of Middle Ordovician age, specifically the Camp Nelson, Oregon, and Tyrone formations of the High Bridge group. These rocks outcrop only along the Kentucky River in central Kentucky, forming picturesque palisades along the river valley and some of its tributaries.

The Camp Nelson formation, the oldest in Kentucky, is a fine-grained mottled limestone that is 200 to 350 ft. thick and contains some dolomitic beds. It is light brownish-gray with dolomite that is brownish-yellow and very finely crystalline to medium crystalline. The Oregon is a calcareous limestone that is brownish-yellow and 30 to 65 ft. thick in the project area. The Tyrone formation consists of light brownish-gray to light-yellowish limestones that often have dark facets of calcite on the white surfaces of the weathered stone, producing a birds-eye effect. Rocks of the Tyrone formation are commonly used for building material because they are easily fractured and dressed by stonemasons. It is referred to as Kentucky River Marble because it weathers a soft grayish-white color that resembles marble.

In addition to the High Bridge group, two other Middle Ordovician limestones outcrop in the project area. These two members of the Lexington limestone, Grier and Curdsville, were deposited later in the Middle Ordovician Period. They are exposed next to the Kentucky River only where the Kentucky River Fault Zone displaces them downward about 400 ft. below their original position. Curdsville limestone is approximately 25 to 35 ft. thick and is medium light gray to brownish-gray with thin beds. Grier limestones are approximately 185 to 190 ft. thick in the project area. They are medium light gray to medium gray and contain a diverse fossil fauna.

Quaternary-age alluvium is located at the bottom of the Kentucky River gorge. These deposits are up to 40 ft. thick in parts of the gorge but absent in others. The alluvium is composed of silty clay, silt, sand, and gravel. The sand is yellow-brown, very fine to medium grained quartzose that forms thick deposits along the banks of the Kentucky River. The

gravel is composed of pebble to boulder size limestone fragments locally concentrated in steep-walled drainages.

Soils

Soils within the project area belong to one of seven soil associations: Fairmont-Rock Outcrop Unit (Jessamine County), Culleoka-Eden (Madison County), Lowell-Faywood-Cynthiana-Rock Outcrop (Madison County), Fairmont-McAfee-Rock Land (Fayette County), Salvisa-Culleoka (Fayette County), McAfee-Salvista-Ashwood (Clark County), and Eden-Culleoka (Clark County). A detailed description of each soil association is provided in McDonald *et al.* (1983), Newton *et al.* (1973), Preston *et al.* (1989), and Sims *et al.* (1987). The dominant soils in these associations occupy ridgetops or uplands bordering the river valley. Typically, areas along the river are dominated by minor soils that constitute only a small percentage of each association. For this discussion, soils will not be summarized according to the association in which they occur. Rather, they will be divided into one of three general categories, floodplain-valley floor, side slope-valley wall, and ridgetop-upland, based on their location within or near the river valley. County names are listed parenthetically after corresponding soil types.

Foot slopes and stream terraces are dominated by Armour, Elk, and Kickapoo soils. These soils are cultivated, used as pasture, or developed as residential or commercial property. Specific soil types of foot slopes and stream terraces include Alluvial land, 6 to 40 percent slopes (Madison); Armour silt loam, 0-12 percent slopes (Fayette); Ashton silt loam (Jessamine); Bruno loamy fine sand (Clark); Elk silt loam (Jessamine, Madison) Kickapoo fine sandy loam (Madison); Lawrence silt loam (Madison); Lindside silt loam (Madison); and Shelbyville sit loam, 0 to 12 percent slopes (Madison).

Narrow floodplains along the Kentucky River are dominated by Huntington soils (Huntington silt loam). These soils are deep, well drained, fertile, high in organic matter, and are almost always under cultivation. Other bottomland soils include Lindside, Lawrence, Mercer, and Newark. Lawrence and Newark silt loams are somewhat poorly drained soils that may have hydric soil inclusions of Robertsville silt loam or Melvin silt loam, respectively. Hydric inclusions may indicate the presence of wetlands.

Valley walls, hillsides, and side slopes include numerous soil types but are dominated by Fairmount soils. These soils are developed on residuum or colluvium from limestone rocks. Although they are generally fertile and relatively high in organic matter, these soils do not promote high productivity of woody and herbaceous plants. This is a result of their steep slopes and associated low water-holding capacity. Specific soil types of valley side slopes include Ashwood very rock clay, 12 to 30 percent slopes (Clark); Cynthiana-Rock outcrop complex, 12 to 30 percent slopes (Madison); Eden flaggy clay, 20 to 50 percent slopes – eroded (Madison); Fairmount-Rock outcrop complex, 12 to 60 percent slopes (Jessamine, Madison); McAfee silt loam, 12 to 20 percent slopes (Madison); Rock land (Clark, Fayette); and Tate fine sandy loam, 12 to 20 percent slopes – eroded (Madison).

Ridgetop and upland soils consist of Culleoka silt loam, 6 to 12 percent slopes (Madison); Culleoka flaggy silt loam, 6 to 50 percent slopes (Fayette, Madison); Eden silty clay loam, 6 to 20 percent slopes (Madison); Fairmount flaggy silty clay, 6 to 12 percent slopes

(Jessamine); Faywood silt loam, 6 to 12 percent slopes (Madison); Lawrence silt loam, 0 to 4 percent slopes (Madison); Lowell silt loam, 6 to 12 percent slopes (Fayette, Madison); McAfee silt loam, 2 to 6 percent slopes (Clark); McAfee silty clay loam, 2 to 12 percent slopes (Clark); and Salvisa silty clay loam, 12 to 30 percent slopes (Fayette). One of these soil types, Lawrence silt loam, is a somewhat poorly drained soil that may have hydric soil inclusions of Robertsville silt loam. Hydric inclusions may indicate the presence of wetlands.

Flora

The flora of central Kentucky has been well documented by F. McFarland (1942), J. McFarland (1946), Braun (1943, 1950), Beckett (1956), Guhardja (1962), Bryant (1974), Wharton and Barbour (1971, 1973, 1991), Martin *et al.* (1979), Medley (1993), and Libby (1995). According to Wharton and Barbour (1991), the flora of the Inner Bluegrass region contains over 1,200 species.

The flora contains no endemics but does include several rare species, some of which are listed as endangered, threatened, or of special concern by the United States Fish and Wildlife Service (USFWS) and the Kentucky State Nature Preserves Commission (KSNPC) (KSNPC 2000, 2002). Two species, *Arabis perstellata* (Braun's rock cress) and *Trifolium stoloniferum* (running buffalo clover), have been federally listed as endangered by the USFWS; an additional species, *Lesquerella globosa* (Lesquereux's bladderpod), has been proposed as a candidate for federal listing. The KSNPC list of Kentucky endangered, threatened, and special concern species includes 19 species that occur in the vicinity of the project area, as shown in the table below.

TABLE 1 – FLORA SPECIES OF CONCERN, KENTUCKY RIVER, POOL 9

SPECIES	COMMON NAME	STATUS*	
		US	KY
Arabis perstellata	Braun's rock cress	E	E
Trifolium stoloniferum	Running buffalo clover	E	E
Lesquerella globosa	Lesquereux's bladderpod		T
Elymus svensoni	Svenson's wild rye		S
Juglans cinerea	White walnut		S
Liparis loeselii	Loesel's twayblade		T
Malvastrum hispidum	Hispid falsemallow		T
Oenothera triloba	Stemless evening primrose		T
Onosmodium molle var. *hispidissimum*	Hairy false gromwell		E
Paxistima canbyi	Canby's mountain-love		T
Perideridia Americana	Eastern eulophus		T
Prenanthes crepidinea	Nodding rattlesnake root		T
Schizachne purpurascens	Purple oat		T
Spiranthes lucida	Shining Ladies-treses		T
Stellaria fontinalis	Water stitchwort		T
Trillium nivale	Snow trillium		T
Viburnum molle	Softleaf arrow-wood		T
V. rafinesquianum var. *rafinesquianum*	Downy arrow-wood		T
Viola walteri	Walter's violet		T

** Status: United States (US) – Endangered (E);*
Kentucky (KY) – Endangered (E), Threatened (T), and Special Concern (S)

Vegetation

Forests of the project area fall within the Western Mesophytic Forest Region as defined by Graun (1950). Within Kentucky, this forest region broadly includes all of the state west of the Cumberland Plateau. The Western Mesophytic Forest Region is transitional between the Mixed Mesophytic Forest Region of the western Appalachians and the Oak-Hickory Forest Region of the Ozarks. Differences in topography and geology within the Western Mesophytic Forest create a wide variety of forest types: mixed mesophytic, mixed hardwoods, oak-hickory, cedar glades, and swamp forest.

Braun (1950) recognized the Bluegrass Region of Kentucky as a distinct vegetative section. Because of extensive clearing for agriculture, Braun (1950) was unable to fully describe the presettlement vegetation of the area. However, from early records and existing, tree-covered estates, she was able to construct a partial picture of the forest community. Based on reports of early settlers, the river gorge and tributaries were densely forested, but upland forests were savannah-like consisting of scattered large trees, interspersed with native cane and tallgrass prairie remnants. Tree-covered lawns of historical homes and estates represent the only remaining traces of presettlement communities. Many of these trees are in excess of 200 years old, providing a glimpse of the original canopy species. Common species include bur oak (*Quercus macrocarpa*), blue ash (*Fraxinus quadrangulata*), Chinquapin oak (*Q. muhlenberii*), black walnut (*Juglans nigra*), shagbark hickory (*Carya ovata*), hackberry (*Celtis occidentalis*), black cherry (*Prunus serotina*), and Kentucky coffeetree (*Gymnoclaus dioicus*).

Wharton and Barbour (1991) divided the present-day vegetation of the Inner Bluegrass into two distinct divisions: the Kentucky River gorge and the Bluegrass plain. Due to the location of the project area, the following discussion is limited to the Kentucky River gorge. For the Kentucky River gorge and vicinity, Wharton and Barbour (1991) listed eight, distinct communities: riverbanks, floodplains, cliff bases, cliffsides, cliff summits, microclimates, tributary valleys, and old fields and succession to woodland.

Narrow strips of silver maple (*Acer sacharinum*), box elder (*Acer negundo*), sycamore (*Platanus occidentalis*), American elm (*Ulmus Americana*) and slippery elm (*Ulmus rubra*) border the banks of the Kentucky River. Due to frequent flooding, these areas are devoid of significant shrub or herbaceous layers. The majority of floodplains have been cleared for cultivation. Those that have reverted to forest are composed of sycamore, silver maple, box elder, American elm, and some beech (*Fagus grandifolia*). Shrub and herbaceous layers are more developed in these areas, consisting f such species as elderberry (*Sambucus Canadensis*), spicebush (*Lindera benzoin*), bush honeysuckle (*Lonicera mackii*), papaw (*Asimina triloba*), jewelweed (*Impatiens capensis*), mistflower (*Eupatorium coelestinum*), and wingstem (*Verbesina alternifolia*).

Cliff bases, or talus slopes, are dominated by hackberry, sugar maple (*Acer saccharum*), sycamore, black walnut, and Ohio buckeye (*Aesculus glabra*). Cliffsides are primarily forested but also contain sheer, rock cliffs. Numerous ledges or small coves are present along some clifflines, providing for a richer flora than on vertical cliffs. These slope forests are intermediate between the Mixed Mesophytic Forest of eastern Kentucky and the plant communities of the remainder of the Inner Bluegrass. The Kentucky River originates in the Mixed Mesophytic region, so the river valley may represent a possible migration route for

eastern species such as yellow buckeye (*Aesculus octandra*), wintergreen (*Gautheria procumbens*), and serviceberry (*Amelanchier arborea*).

Cliff summits are slightly to strongly xeric and are generally dominated by red cedar communities, containing eastern red cedar (*Juniperus virginiana*), oaks, hickories, and ashes. Significant microclimates, such as river cliffs, river tributaries, springs or seepage areas, contain unique communities. Tributary valleys are forested, containing similar trees as river valley slopes.

Fishes

Burr and Warren (1986) listed 90 native fish species for the Kentucky River system below the confluence of the Kentucky and Red rivers (Pool 10). The pooling of the Kentucky River mainstream has resulted in conditions favorable to the establishment of pool-inhabiting species. Consequently, the fish communities of the Kentucky River mainstem are comprised of medium to large river species that include a combination of commercial (smallmouth buffalo [Ictiobus bubalus], redhorse [Moxostoma spp.], and catfish [Ictalurus punctatus and Pylodictus olivaris]), gamefish (primarily sunfishes), and forage species (primarily gizzard shad [Dorosoma cepedianum] and shiners) (ESE 1991). The conversion of the Kentucky River from a free-flowing river to a series of impoundments has likely eliminated some riverine species and favored pool-loving species that can successfully reproduce in slow-moving waters. The free-flowing tributaries (e.g., Boone Creek or Tates Creek) of the Kentucky River have better maintained their riverine qualities and currently support far different communities.

Fish surveys on the Kentucky River mainstem have included seven studies: Carter (1954), Williams (1974), Jones (1973), ESE (1991), KDFWR (1999, 2001), and Floyd and Varner (2002). Carter (1954) investigated the movement of fishes through Kentucky River lock chambers. Rotenone surveys were conducted on 10 locks (excluding Locks 1, 2, 4, and 13). A total of 28 species were collected from all lock chambers; 17 species were reported from Locks 9 and 10. The five most abundant species included freshwater drum (Aplodinotus grunniens, 22 percent), silver chub (Macrhybopsis storeriana, 15), channel catfish (12), emerald shiner (Notropis atherinodes, 10), and white crappie (Pomoxis annularis, 10).

Williams (1975) conducted a fish population study of the Kentucky River from 1972 to 1973. Rotenone surveys of lock chambers and gill and trammel netting near dams, creek mouths, and shallow bars were used to document the fish fauna. Williams (1974) reported 46 species from all lock chamber studies; approximately 19 species were collected in surveys of Locks 9 and 10. Collected species included largemouth bass (Micropterus salmoides), spotted bass (M. punctulatus), white bass (Morone chrysops), white crappie, bluegill (Lepomis macrochirus), longear sunfish (L. megalotis), smallmouth buffalo, river carpsucker (Carpiodes carpio), carp (Cyprinus carpio), freshwater drum, gizzard shad, mooneye (Hiodon tergisus), skipjack herring (Alosa chrysochloris), channel catfish, flathead catfish, stonecat (Noturus flavus), longnose gar (Lepisosteus osseus), and American eel (Anquilla rostrata).

Jones (1973) reported 39 species and 1,532 individuals from the Kentucky River (Pools 3, 4, and 7) and selected tributaries (Boone Creek, Clear Creek, Jessamine Creek, and Silver Creek) during an inventory and classification of streams in the Kentucky River drainage.

Jones reported 25 species from river sites. Dominate species included ghost shiner (Notropis buchanani, 39 percent), bluegill (10), freshwater drum (9), and white crappie (6).

ESE (1991) reported 74 taxa and 14,812 individuals from Pools 4 to 9. Fish collections were made using a variety of methods: electrofishing (day and night) seining, gill netting, and trawling. Samples were dominated by gizzard shad (26 percent), followed by ghost shiner (10), bluegill (9), freshwater drum (8), emerald shiner (6), and largemouth bass (5). Species capture was method-specific. Electrofishing primarily captured bluegill, suckers, white bass, largemouth bass, and percids. Seining generally produced gizzard shad, while freshwater drum were collected most often during trawling.

The Kentucky Department of Fish and Wildlife Resources have conducted recent fish surveys of Pools 8 (just below Lock 9) (KDFWR 1999) and 10 (KDFWR 2001). A total of 37 fish species were collected during these investigations; 31 and 23 species were reported from Pools 8 and 10, respectively.

Floyd and Varner (2002) sampled the fish community of an approximate 0.5-mile segment of Pool 1 near Gratz, Kentucky. Their collections produced 917 individuals, representing 24 species. The most abundant species were emerald shiner (42 percent), gizzard shad (32 percent), golden redhorse (Moxostoma erythrurum, 6 percent), and longear sunfish (5).

From 1992 to 1998, the KDOW conducted numerous fish surveys within the watersheds of the two largest tributaries of Pool 9, Boone Creek and Tate Creek (KDOW 2002). These surveys used seining and backpack electrofishing methods to document the presence of 29 species in Boone Creek and 12 species in Tate Creek.

Mussels

According to Cicerello et al. (1991), 56 mussel species have been reported from the Kentucky River drainage. Mussel surveys within the Kentucky River mainstream have been limited to three studies: Williams (1974), Tolin and King (1986), and Floyd and Varner (2002).

Williams (1975) conducted mussel surveys of Pools 1 to 14 in 1972 and 1973. Mussel populations were surveyed through diving, hand-picking, and brailing methods. A total of 21 mussel species and 729 individuals were collected during his study. For Pool 9, Williams (1975) reported 12 species and 93 individuals. Three species, threeridge (Amblema plicata, 22 individuals), washboard (Megalonais nervosa, 30), and mucket (Actinonaias ligamentina, 15) comprised 72 percent of mussel abundance. The remaining 28 percent were comprised of maple leaf (Quadrula quadrula), pimpleback (Quadrula pustulosa), fatmucket (Lampsilis siliquoidea), yellow sandshell (Lampsilis teres), fluted shell (Lasmigona complanata), plain pocketbook (Lampsilis cardium), Wabash pigtoe (Fuscoaia flava), Ohio pigtoe (Pleurobema cordatum), and pick heelsplitter (Potamilus alatus). The majority of mussels were in the age group of 10 to 25 years, and few young or juvenile mussels were collected. Based on the low numbers of individuals collected and small, infrequent beds, Williams concluded that the Kentucky River mussel fauna had limited commercial potential. The majority of beds were small and confined to the outwash rubble area of creek mouths.

Tolin and King (1986) conducted a mussel survey on the Kentucky River from Lock 4 (river mile 65) downstream to the Ohio River. Collection techniques included brailing, visual searches of shoreline areas, and snorkeling. Their collections produced 20 species and 823 individuals. The three most abundant species were threehorn wartyback (Obilquaria reflexa), threeridge, and pink heelsplitter. The majority of mussels were collected just downstream of the tailwater turbulent zone. As opposed to Williams (1974), Tolan and King (1986) reported substantial mussel recruitment, with the majority of specimens falling within the 2 to 5-year class.

Floyd and Varner (2002) conducted a mussel survey at Gratz, Kentucky (Pool 1, river mile 27-28) as part of a Kentucky Transportation Cabinet aquatic and terrestrial baseline study for the proposed replacement of the KY 22 bridge over the Kentucky River. Diving methods were used to search bottom substrates at four proposed bridge locations within the project area. Sampling produced many relict shells but only one live individual of plain pocketbook.

Macroinvertebrates

From 1983 to 1988, the Kentucky Division of Water used modified Hester-Dendy multiplate samplers to survey the macroinvertebrate community of the Kentucky River at Locks 4 and 8. The macroinvertebrate community at Lock 4 was investigated for three years, 1983 to 1985; the community at Lock 8 was sampled for four years, 1985 to 1988. Collections from Lock 4 yielded 916 individuals, representing 31 taxa. Collections from Lock 8 yielded 2,760 individuals, representing 38 taxa. Dominant taxa for all collections included Ablabesmyia mallochi, Cyrnellus fraternus, Dicrotendipes, Glyptotendipes lobiferus, Polypedilum sp., Stenacron interpunctatum, and Tanypus sp.

ESE (1991) used Ponar dredge samplers, Hester-Dendy multiplate samplers, and qualitative methods to sample the macroinvertebrate community of Pools 4 to 8. The combination of all collection methods produced 185 taxa. Multiplate samplers produced 147 taxa (11,830, individuals), compared to 74 (1, 562 individuals) and 52 (861 individuals), taxa from Ponar and qualitative methods, respectively. Multiplate samples were dominated by Stenacron interpunctatum, Hydra sp.,

Dicrotendipes modestus, Isoperla sp., Cyrnellus fraternus, and Cheumatopsyche sp. Immature Tubificidae, Stictochironomus sp., Polypedilum sp., and Chironomus riparius group sp. dominated Ponar samples. Qualitative collections consisted primarily of Tribelos sp., Stictochironomus sp., and Polypedilum spp.

Floyd and Varner (2002) used multiplate samplers and qualitative dipnet sampling to survey the macroinvertebrate community of Pool 1 near Gratz, Kentucky. Their collections projected 65 taxa and were dominated by Stenacron interpunnctatum, Dicrotendipes sp., Tanytarsus sp., and zebra mussels (Dreissena polyymorpha).

Terrestrial Vertebrates

No detailed vertebrate surveys have been conducted within the Kentucky River gorge. Wharton and Davis (1991) provided an annotated list of vertebrate animals of the Inner Bluegrass that included 26 amphibian species, 27 reptile species, 257 bird species, and 44

mammal species. Detailed reviews of the distribution and biology of these species can be found in Barbour (1971), Barbour et al. (1973), and Barbour and Davis (1974).

During a vegetational study of the Kentucky River palisades, Martin et al. (1979) documented the occurrence of numerous vertebrate species from four sites in Anderson County (Pools 4 and 5). Observed bird species included turkey vulture (Cathartes aura), common crow (Corvus brachyrhynchos), red-tailed hawk (Buteo jamaicensis), yellow-billed cuckoo (Coccyzus americanus), kingfisher (Ceryle alcyon), wood duck (Aix sponsa), pileated woodpecker (Dryocopus pileatus), ruby-throated hummingbird (Archilochus colubris), and various species of warblers, vireos, and flycatchers. Conspicuous mammals included groundhog (Marmota monax), eastern chipmunk (Tamias striatus), fox squirrel (Sciurus niger), and gray squirrel (S. carolinensis). Mink (Mustela vision) and flying squirrel (Glaucomys volans) were also observed on a few occasions. Reptiles and amphibians were only occasionally sighted. Species observed included copperhead (Agkistrodon contortrix mokasen), fence swift (Sceloporus undulates hyacinthinus, on dry exposed limestone outcrops), box turtle (Terrapene c. carolina) on slopes and terraces), American toad (Bufo a. americanus), and Fowler's toad (B. woodhousii fowlrei).

In an effort to document potential rare species, Libby and Palmer-Ball (1995) conducted a biological inventory of Locks 5 to 14 for the Kentucky River Authority. They concentrated their search efforts on state and federally listed species but also documented the occurrence of several common vertebrate species: big brown bat (Eptesicus fuscus), little brown bat (Myotis lucifugus), northern long-eared bat (M. septentrionalis), barn swallow (Hirundo rustica), eastern phoebes (Sayornis phoebe), Carolina wren (Thryomanes bewickii), chimney swift (Chaetura pelagica), groundhog, raccoon (Procyon lotor), mice, and squirrels. Evidence for Allegheny woodrat (Neotoma magister, US Candidate species) was discovered and a single individual observed around several buildings at Lock 13. A single individual of Rafinesque's big-eared bat (Corynorhinus rafinesquii, KY Threatened, US Candidate) was observed hanging on the ceiling of a barn at Lock 13. It is very likely that this and other bat species forage along the Kentucky River.

Land Use

Land use along the river is primarily forested and agricultural. Agricultural uses are primary hay land and pasture, with some smaller farms growing crops such as tobacco and corn. Forested areas include deciduous forests, mixed forests, and evergreen forests. Agricultural land use includes pastureland and crops. Developed land use includes industrial and residential.

Recreation

The Kentucky River is home to a wide range of recreational opportunities and an excellent location for camping, canoeing, sightseeing, and fishing. The waterway is accessible to the public and is home to the picturesque palisades and a wide range of other activities and attractions. Although the advent of the lock system up to Beattyville did not provide the anticipated economic stimulus, recreation was, and remains, popular on the river. The river provided entertainment before the days of television, with traveling shows, riverboat cruises, and river based resorts. One of these resorts, Estill Springs, was near Irvine and touted five separate waters for its guests' health.

A unique attraction that is located near the Lock No. 7, is the Shaker Village of Pleasant Hill, the largest historic community of its kind in America. Visitors to this National Historic Landmark enjoy a wide variety of activities including self-guided tours, riverboat excursions and special events. The village also offers two craft stores, meeting facilities, as well as fine dining and overnight accommodations in restored 19th-century buildings.

The Shakers, otherwise known as The United Society of Believers in Christ's Second Appearing, were a communal society who, at their peak in numbers in the mid-1800's, originally came to central Kentucky in 1805. Settling on a high plateau above the Kentucky River near Harrodsburg, they established a village named Pleasant Hill, devoted to a peaceful way of life which was reflected in their celibacy, belief in equality of race and sex, and freedom from prejudice.

By 1910 only a few Shakers survived and the village was closed, existing as a small farm community for the next fifty years until a nonprofit group emerged to preserve its heritage. Since that time thirty three original buildings have been restored and 2,800 acres of farmland preserved. A National Historic Landmark from boundary to boundary, it is the only site of its kind where all visitor services are provided in original buildings.

Visitors to Shaker Village of Pleasant Hill enjoy a wide variety of activities including the many special events, workshops, and educational programs that occur throughout the year to entertain and enlighten.

Many sections of the Kentucky River between Boonesboro and Frankfort are popular for fishing and boating. The closest Kentucky River boat ramp to Lexington is located at Clays Ferry, Exit 99 off I-75, south of Lexington.

Lexington is just minutes from one of Kentucky's most beautiful natural areas — the Kentucky River Palisades. The Palisades are majestic limestone cliffs that run along the Kentucky River between Frankfort and Clay's Ferry, southwest of Lexington. These cliff lines harbor the largest concentration of forest in the "Inner Bluegrass," as Lexington/Fayette County and its adjoining counties are known. The area is home to numerous indigenous species of trees and wildlife, some rare, and is a wonderful place for hiking, photography and bird-watching. The beauty of the Palisades area also can be enjoyed at Jim Beam Nature Preserve, off US 27 in Jessamine County, south of Lexington. Set on 100 pristine acres, the preserve includes a 1-mile loop trail, Jacob Beam's Path. In summer, you might catch a glimpse of two endangered bat species, the gray bat and the Indiana bat, that make their homes in the caves of the Palisades area.

Another exceptional hiking area is the Red River Gorge, part of Daniel Boone National Forest, about a 1 hour drive east from Lexington. This 25,600-acre area combines forest with more than 80 natural sandstone arches. The view is great even in winter, when you have a clearer view of the rock formations. Natural Bridge State Resort Park, on Ky. 11 near Slade, has information about hiking in the park and the surrounding area.

Other tourist attractions and natural areas include:

- Buckley Wildlife Sanctuary, bordered by a Kentucky River gorge in Woodford County, includes loop trails from 0.5 to 2 miles in length. The sanctuary is located on Germany Rd., 6 miles off US 60 West between Versailles and Frankfort. (859) 873-5711.

- Berea College Forest, off Ky. 21, two miles east of Berea in Madison County, is well known as the location for the Kentucky Guild of Artists and Craftsmen's craft fairs. But it's also a scenic and quiet place for a day hike, with eight miles of trails of varying lengths.

- Excursions on the Kentucky River aboard the sternwheeler *Dixie Belle* afford a great view of the river's high limestone cliffs and untouched natural surroundings as the short trip takes passengers under High Bridge, an engineering wonder when it was built in 1807.

- Harrodsburg, once a frontier territory was founded in 1774 as the first permanent English settlement west of the Allegheny Mountains is the location of Old Fort Harrod State Park. A visit to the Park is an excellent way to absorb the history of Kentucky's oldest settlement observing blacksmithing, broom making, weaving, woodworking, tinsmithing and dollmaking demonstrations in the fort blockhouses. There is also an outstanding collection of Kentucky and Indian artifacts, Civil War relics, music boxes and a Lincoln collection.

Commerce

Prior to the advent of the railroads in the late 1800s and early 1900s, the Kentucky River was the main transportation route from eastern Kentucky to central Kentucky, the Ohio River, and the seaport of New Orleans. The timber harvests of the Kentucky River headwaters were gathered throughout the year; these harvests were held until spring rains could wash the loads of trees down the tributaries to the main stem of the Kentucky. There, the logs would be bundled into rafts and young men would "float" them down to the mills in Frankfort. Later flatboats would take the place of the makeshift rafts. After gathering much of Kentucky's bounty of flour, meat products, hemp, soap, paper, powder, nails, tobacco, bourbon, and coal, the flatboats would make their way to the Ohio, then down the Mississippi to New Orleans. At the end of the trip, the goods sold and the boat scrapped for what the wood would bring, the flatboat men would hike their way home to Kentucky (Grier 2001).

The shoals in the Kentucky River made travel dangerous and sometimes impossible during low flow. To facilitate the use of the river as a transportation corridor, various projects throughout the 1800s attempted to maintain navigation on the river with limited success. In 1836, the Commonwealth constructed Locks 1 through 5; however, by 1884, Locks and Dams 1 through 5 were in complete disrepair and had to be rebuilt by the U.S. Army Corps of Engineers.

By 1917, Locks 1 through 14 were in service to create year-round navigable pools from Beattyville to Carrolton. The locks provided passage for boats under most water conditions;

however only small barges were able to navigate the relatively shallow, meandering river. By this time railroads had been constructed through Kentucky and commercial transport was more economical by rail than by river.

During much of the 1900s, the Kentucky River provided commercial transport, mainly for the lower locks, with sporadic shipments of timber, coal, and minerals (such as fluorspar, calcite, barite, zinc, and lead) from the upper and lower pools. The last commercial use remaining on the river was by one company, operating in Frankfort, that shipped sand and gravel up the Kentucky River to Madison, Indiana, on the Ohio River. As commercial activity on the river has dwindled, the ACOE has worked to transfer ownership and maintenance of the Kentucky River locks to a state agency created for this purpose, the Kentucky River Authority.

Flooding and water supply have always been important issues for the river. Various projects have been built in the Kentucky River watershed to control flooding, but none of these, save floodwalls, have been on the main stem of the Kentucky River. Water supply alternatives have also been examined, such as the Red River Dam, but have failed due to environmental concerns.

KRA has been systematically reviewing alternatives for stabilization of the dams and renovation of the locks. The primary intent is to maintain the dams for their water supply function, and secondarily, accommodate recreation of the Kentucky River.

The Kentucky Fish and Wildlife Service issued 15 commercial fishing licenses to people fishing of the Kentucky River for the fiscal year staring March 2002. The Fish and Wildlife Service does not require the fishermen to identify specific pools where they fish.

Appendix A

Project Maps and Drawings