

*Application for LIHI Certification  
Arkansas River Dam No. 2 Hydropower Project (FERC No. 3033)  
Arkansas Electric Cooperative Corporation*

## ATTACHMENT B: SUPPLEMENTAL INFORMATION

### Introduction

Arkansas River Dam No. 2 Project is one of a number of hydroelectric projects constructed by retrofitting existing dams on the Arkansas River. Arkansas Electric Cooperative Corporation (AECC), a rural electric cooperative corporation, developed the projects to reduce long-term costs of producing energy for its 17 distribution cooperatives around the state and, equally important, to displace a portion of AECC's fossil-fuel derived energy with energy generated from renewable hydropower. No other forms of renewable energy such as wind, solar, and geothermal energy were or are economically or technically competitive with low-head hydroelectric generation in Arkansas.

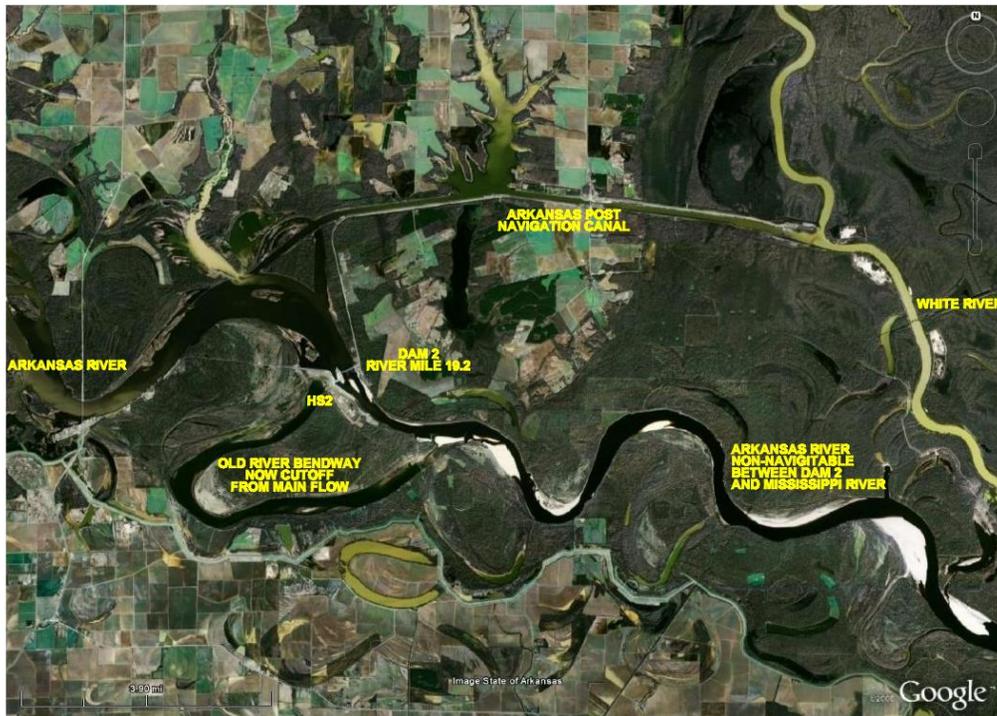


*Aerial view looking west at Arkansas River Dam No. 2. The hydroelectric project, built into an existing non-overflow embankment, is to the west of the Corps spillway visible in foreground. The water body visible in the upper left of the photo is the old Arkansas River channel, cut off at the time Corps constructed the dam in the late 1960s, and fed by a water supply pipeline from the dam. See text for additional information.*

### Hydrological Context

Arkansas River Dam No. 2 is part of the McClellan-Kerr Arkansas River Navigation System (McClellan-Kerr). The McClellan-Kerr is a 445-mile-long-waterway with 18 locks and dams; for a majority of that distance, it and the Arkansas River are one and the same. The U.S. Army Corps of Engineers (Corps) constructed the waterway to achieve the primary goal of allowing barge traffic to overcome a 420-foot elevation difference between the Mississippi River and the head of navigation at Catoosa, Oklahoma. The Corps constructed the McClellan-Kerr between 1964 and 1970; Arkansas River Dam No. 2, also known as the Wilbur D. Mills Dam, was

constructed between 1963-1968.<sup>1</sup> The shallowness of the lowermost reach of the Arkansas River precluded direct navigation from the Mississippi up the Arkansas River. For that reason, the first 10 miles of the White River, which meets the Mississippi River upriver from the confluence of the Arkansas and Mississippi Rivers, provides the entrance channel to the McClellan-Kerr; a nine-mile artificial canal connects the White River to the Arkansas River immediately upstream of Dam No. 2. Because there is no commercial navigation below Dam No. 2, the dam has no lock facilities.



*Satellite view of the McClellan-Kerr Arkansas Navigation System in the vicinity of the project. The Arkansas River and White River flow southeasterly to the Mississippi River (not shown in photo).*

The 2/25/1999 Memorandum of Agreement Establishing Procedures for Hydropower Operation at Wilbur D. Mills Dam between the Corps and AECC stipulates:

*...[the project is] operated as a run-of-river project (no dedicated storage for hydropower operations at Wilbur D. Mills Dam) and in coordination with [the] Dam. Releases from the Hydropower Project will be in conformance with instructions and criteria established on a real-time basis by [the Corps] ...*

and that

<sup>1</sup> See <http://www.encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?entryID=2309> and <http://www.swl.usace.army.mil/navigation/mckarns.html>

*...the Licensee recognizes that navigation is the primary purpose of Wilbur D. Mills Dam.*

See “Project Operations” section below for additional information on the historical and present-day flow regimes.

### **Regulatory Context**

On August 10, 1983, the Federal Energy Regulatory Commission (FERC) issued to AECC a 50-year license for the Arkansas River Dam No. 2 Project. Due to construction challenges and other factors AECC did not seek to begin building the project until the 1990s. At that time, it sought and obtained, in 1994, a Corps Clean Water Act Section 404 (wetland fill) permit. The project underwent regulatory review by state and federal natural resource, environmental, and cultural resource agencies in the early 1980s and again in the early 1990s. These agencies included the Arkansas Game and Fish Commission, the U.S. Fish and Wildlife Service, the Arkansas Department of Pollution Control and Ecology (today the Arkansas Department of Environmental Quality), the Environmental Protection Agency, and the Arkansas state historic preservation officer. At those times agencies stated that they had no objections to the project and made recommendations relating only to avoiding construction-related water quality impacts, performing wetland mitigation (in the context of the CWA 404 permit), and providing recreation resources, but did not make any recommendations regarding flows or fish and wildlife protections. In preparing this application for LIHI certification, AECC requested and obtained letters from key resource agencies indicating that the project is not adversely affecting fish and wildlife resources. (See *Attachment C – USFWS Letter* and *Attachment D – AGCF Letter* for letters issued in 2009 by the U.S. Fish and Wildlife Service and Arkansas Game and Fish Commission, respectively.)

### **Project Description**

The project is located at the Corps navigation Dam No. 2 on the Arkansas River, two miles southeast of river mile 19 on the McClellan-Kerr Arkansas River Navigation System. The Corps constructed the dam to impound and maintain a minimum nine-foot deep navigation pool along this section of the Arkansas River. Built in the mid 1960s, the dam is located in Arkansas and Desha Counties approximately 12 miles northeast of Dumas, Arkansas.

The dam consists of a gated spillway and an earthfill overflow and non-overflow embankments. The spillway section is a straight concrete gravity type structure with a crest length of 1130 feet and 54 feet at the maximum height. Sixteen conventional tainter gates in the spillway control the upstream pool. The Corps constructed a non-overflow earth embankment on the west end of the dam to block the old Arkansas River channel. The access road to the dam is located on this non-overflow embankment which measures 3150 feet in length. The embankment has a crest elevation of 180 feet M.S.L. In the mid 1990’s, AECC constructed the hydropower project as an integral part of this embankment. The hydropower project was completed and began operation in 1999.

The hydropower facility, as described in the FERC License Application (*Attachment J*), included development of a reinforced concrete powerhouse with upstream and downstream channels to

divert water from the Arkansas River. The channels pass water from Pool 2 (upstream of the existing Corps dam) through the powerhouse and immediately return it to the river downstream of the dam.

A headrace channel was constructed to divert the river flow and convey it into the powerhouse. Rip-rapped slope banks and reinforced concreted training walls forming the sides of the channel were built upstream from the powerhouse. Beyond the training walls, the stabilized sides of the channel were sloped to meet existing ground level. A log boom across the headrace is intended to trap large debris; however, a trash rack crane on the powerhouse is required to clear the trashrack of the extensive debris the Arkansas River can deliver. Water flow is directed back into the river by the tailrace channel. A portion of the existing navigation revetments were removed to construct the headrace and tailrace channels. These channels provide a transition to the undisturbed revetment areas.

The powerhouse is approximately 180 feet wide by 225 feet long. The upstream face of the powerhouse is located about 500 feet downstream from the dam axis. The powerhouse structure is located on the west side of the Arkansas River adjacent to the dam on the existing non-overflow embankment. The powerhouse elevation is at least as high as the non-overflow embankment. For this reason the high roof of the powerhouse will always be above flood level.



The powerhouse contains three horizontal-shaft, bulb-type, axial-flow hydraulic turbine-generator units. Each of the turbines is of the Kaplan propeller type with four adjustable blades, and adjustable wicket gates, complete with an electronically controlled hydraulically operated governor. The maximum net power head available to the turbines is approximately 44.5 feet. The turbines operate under a net head which normally ranges from 5 feet to 37 feet. The turbines

are designed to rotate at 72 rpm. Each turbine is directly coupled to a generator by a horizontal shaft. Thus each of the generators also rotate about a horizontal axis at 72 rpm.

The electrical power and energy from the project is conveyed to the electrical network by a single span of 115 Kv transmission line to a new 115 Kv switching station. The 115 Kv switching station is connected to a new 115 Kv line which was constructed by the Arkansas Power and Light Company (now referred to as Entergy). This new section of line is outside of the FERC project boundary but was reviewed by FERC, the Corps of Engineers, and other resources agencies throughout the licensing and permitting process since it was specifically required for the hydropower project. All applications and studies, including the 404 Permit Application, included this new section of 115 Kv line.

### **Project Operations**

As noted earlier, the project is run-of-river, with no ability to impound water and no discretion over flow releases, which are dictated by the Corps. The February 25, 1999 *Memorandum of Agreement Establishing Procedures for Hydropower Operation at Wilbur D. Mills Dam* between the Corps and AECC stipulates:

*During normal operation the Hydropower Project will generate with one, two, or three units up to 24 hours per day when available river flows exist. All of the following flows are approximate. The flow range during which generation is possible is from 4,000 cfs (minimum turbine discharge) to 200,000 (flow at which units are shut down due to insufficient operating head). River flows from 4,000 cfs to 53,400 cfs (Hydropower Project maximum discharge capacity) normally will be passed through the powerhouse but may be passed through either, neither, or both the powerhouse and Wilbur D. Mills Dam in a coordinated effort, as the Corps deems appropriate. It shall be the responsibility of the Licensee to assure release rates are made as set by the Corps. The Licensee shall schedule all hydropower releases in compliance with the Lockmaster's needs and instructions. For river flows between 53,400 and 200,000 cfs, discharges will be made through both the powerhouse and Wilbur D. Mills Dam. At flows greater than 200,000 cfs, discharges will be made through Wilbur D. Mills Dam only. The Licensee agrees to fully cooperate with the Corps in the establishment of release schedules and in case of disagreement the Corps' decision will be final.*

In practice, each project turbine typically operates over a flow range of 4,100 to 16,400 cubic feet per second (cfs). The maximum flow rate through the powerhouse is in the range of 51,000 cfs. At this flow range or below, all flows are normally only through the powerhouse and no flow is through the Corps spillway gates.

At total river flow above 51,000 cfs up to about 210,000 cfs, the Corps' spillway gates are opened to handle the flows beyond the 51,000 capacity of the powerhouse. Any river flow above 210,000 cfs usually has insufficient head for turbine operation, in which case all flows are released through the spillway gates.

## **Supplemental Information for LIHI Questionnaire Section C – Fish Passage and Protection**

There are two diadromous fish species that may exist in the Mississippi River Basin. One is the catadromous American eel (*anguilla rostrata*) that appears on a list of fish found in the vicinity of the project contained in the Environmental Assessment included with the project's final FERC license application (*Attachment J*). There is evidence that the American eel is still present in the Arkansas River upstream of the project.<sup>2</sup> In 2007 the FWS determined that listing the species as threatened or endangered under the Endangered Species Act was unwarranted.<sup>3</sup> The state, national, and global status of the species is classified as "apparently secured"<sup>4</sup> and, correspondingly, the species is not included among the "Species of Greatest Conservation Need" identified in the State of Arkansas' Wildlife Conservation Strategy. Therefore, the answer to Question C.2 for the American eel is "no." This interpretation is confirmed in the FWS 2009 letter regarding the project (see *Attachment C – USFWS Letter*). Note that the FWS plans to conduct preliminary studies this summer immediately below the project powerhouse to determine if the American eel is present in this area of the Arkansas River (see *Attachments L and M*).

The other species is the anadromous Alabama shad, which in 1999 was designated by the National Marine Fisheries Service (NMFS) as a "species of concern" while it undergoes status review.<sup>5</sup> (NMFS uses the term "species of concern" to identify species about which NMFS has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA.) The area of concern was identified as Alabama, Florida, and the Gulf of Mexico. While the State of Arkansas identified the species among its "Species of Greatest Conservation Need" in the Arkansas Wildlife Conservation Strategy, it identified the location of the species in ecoregions that do not encompass the Arkansas River.<sup>6</sup> The environmental assessment prepared in connection with the project's 1983 FERC license did not include Alabama shad among the fish found in the vicinity of the project. Given the absence of records of the movement of the fish in the vicinity of the project, the answer to Question C.2 for the Alabama shad is "no."

Natural resource agencies reviewed the project in conjunction with the 1983 FERC licensing (See *Attachment J – FERC Application*) and 1994 Clean Water Act Section 404 permit (See *Attachment L – 1994 Corps Permit and Agency Comments*). In neither proceeding did the agencies recommend passage, or indicate that they considered issuing such recommendations, or identify technological infeasibility of fish passage as a reason for foregoing the opportunity to make such recommendations. Because the project was constructed at an existing Corps of

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<sup>2</sup> Arkansas Fish and Game Commission. 2006. Arkansas Fish. Available at: [http://www.agfc.com/userfiles/pdfs/ar\\_fish\\_pocketguide.pdf](http://www.agfc.com/userfiles/pdfs/ar_fish_pocketguide.pdf)

<sup>3</sup> 72 Federal Register 4967.

<sup>4</sup> See the Natureserve comprehensive species report at <http://www.natureserve.org/explorer/servlet/NatureServe?searchName=ANGUILLA+ROSTRATA>

<sup>5</sup> 69 Federal Register 19977.

<sup>6</sup> Arkansas Game and Fish Commission. 2005 (rev 2006). The Arkansas Comprehensive Wildlife Conservation Strategy. P 414. Available at: <http://www.wildlifearkansas.com/strategy.html>

Engineers dam, and because it has always operated as a run-of-river, non-storage project, the project does not have an impact on upstream habitat independent of the Corps dam. Finally, resource agencies have not identified the project, separate from the preexisting dam, as having adverse impacts to diadromous species. This interpretation is confirmed in the FWS 2009 letter regarding the project (see *Attachment C – USFWS Letter*).