

W.G. HUXTABLE PUMPING PLANT



US Army Corps
of Engineers®
Memphis District

W.G. HUXTABLE PUMPING PLANT

The St. Francis River Basin

The St. Francis River Basin of eastern Arkansas is among the most highly productive agricultural areas in the world. The fertile soil that makes the high farm productivity possible was deposited in the basin by the floodwaters of the Mississippi and St. Francis rivers. The same alluvial action that produced the area's rich farmland also produced floods which destroyed homes and crops and often resulted in loss of life. Since the area is relatively flat, with little slope for runoff, the basin has a history of chronic flooding by the two rivers.

In 1904, the people of the basin organized the St. Francis Valley Drainage Association and developed the first flood control plan and remedial work for the St. Francis River. Two years later, the association made a study of the basin and presented it to the Office of Experiment Stations, U.S. Department of Agriculture. The report, published in 1911, concluded that a comprehensive plan for the entire valley was required to provide the needed flood control. By 1929, much of the 1911 plan had been completed by the basin landowners, who spent millions of dollars on an extensive system of levees and channels. Through 1935, various levee and drainage districts were formed to do the flood control work. Though helpful in reducing flood damage, it became obvious from frequent spring floods that these measures would not suffice against a major flood.

Congress passed the Flood Control Act of 1936, to designate the U.S. Army Corps of Engineers to continue and expand the work already done by the basin landowners, integrating the existing projects into an overall flood control plan.

The works that existed in 1936 included a water diversion system, leveed floodways, an extensive system of drainage channels and water control structures. The flood control work in the St. Francis Basin has been and is an evolutionary process. Elements of the St. Francis project have been altered periodically since 1936 to keep pace with changing needs within the basin. Congress has added project features through various flood control acts. The existing authorized flood control project consists of 438 miles of levees, 893 miles of channel improvement, a reservoir at Wappapello, Mo., eight diversion control structures throughout the basin and three flood-water pumping plants. W.G. Huxtable Pumping Plant, near Marianna, Ark. and 50 miles southwest of Memphis, Tenn., is one such plant and is a key element in the flood control system in the lower St. Francis River Basin.

In planning the construction of the pumping plant, engineers had to solve a "dewatering" problem since the plant was to be built in a low, swampy area. Conventional methods would require running dewatering pumps 24 hours a day. It was decided to use the "slurry" trench method of dewatering. This unique

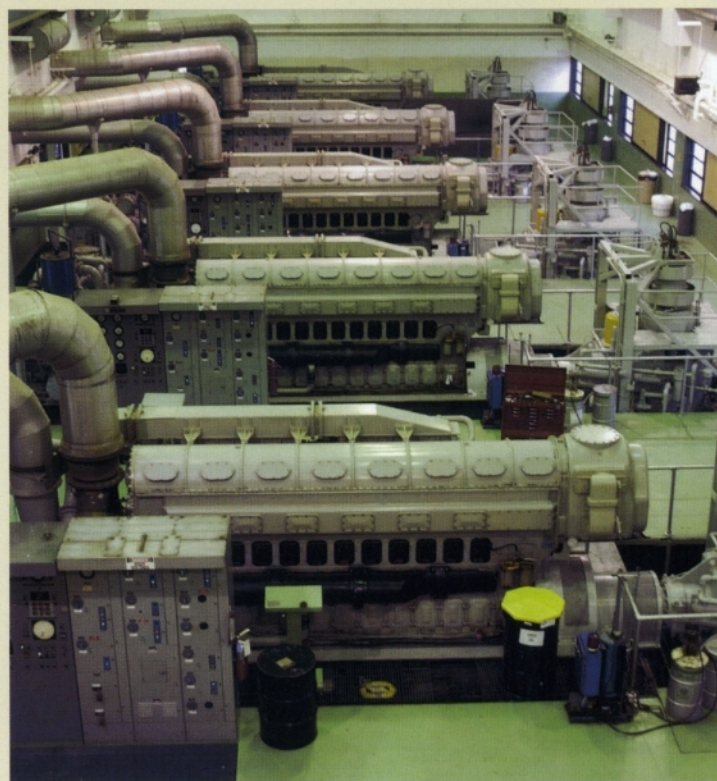
method consisted of digging a 5-foot-wide, 80-foot-deep trench around the construction site and filling it with a mixture of water and bentonite, a mineral associated with volcanic lava. This slurry kept the sides of the trench from caving in as it was being excavated around the 3,200-foot perimeter. The trench was then filled with a mixture of clay gravel and bentonite. As the gravel and bentonite were placed in the trench, the slurry was forced out. The gravel and bentonite provide a permanent seal against water seepage. The last step was to cap the trench with a clay blanket and construct an earthen cofferdam around the site.

When the structure was completed, an inlet and an outlet channel were constructed simultaneously with the closure of the St. Francis River. The pumping plant now serves portions of Poinsett, Lee, St. Francis, Crittenden and Cross counties in Arkansas.

The superior design and construction of the pumping plant earned the Memphis District the Award of Merit in



The site of the W.G. Huxtable Pumping Plant, showing an earthen cofferdam to protect it from flooding.



Ten diesel engines, each producing up to 4,000 HP, power the variable pitch propeller pumps.



Plant during the 1973 flood. The plant site is surrounded by the floodwaters while allowing construction to continue.

the Engineering Division of the Chief of Engineers 1977 Design Award Program. Huxtable pumping plant is part of a nationwide program of tributary basin improvements for major drainage and flood control programs and projects constructed and maintained in cooperation with local, state and federal agencies.

The pumping plant is recognized as the largest stormwater pumping plant in the world. It is named for Mr. W.G. Huxtable,

Chief Engineer for the St. Francis Levee District from 1935 to 1958. The plant was designed and constructed under contract by the Corps of Engineers, Memphis District. On-site construction began in the summer of 1972, and plant dedication was in the spring of 1977. Total cost of the project was in excess of \$30 million.

The pumping plant has a two-part mission:

- Prevent backwater from the Mississippi River from entering the lower St. Francis Basin when the Mississippi River is at bank full stage. This is accomplished by four 27-by-28 foot gravity flow gates, thereby becoming a dam.
- Remove excess surface water impounded by the Mississippi River and St. Francis basin levees in the most efficient manner possible.

During normal river stages, the St. Francis River flows through the gravity bays located in the center of the structure. When the elevation of the Mississippi River stage exceeds that of the St. Francis River, the bays are closed and pumping begins. This is normally when the river reaches 177 feet above sea level. Pumping continues until the level of the St. Francis River drops to 175 feet or the Mississippi River falls below 177 feet and the level of the St. Francis exceeds the level of the Mississippi River. The watershed served by the plant is more than 2,000 square miles, equal to the size of the state of Delaware.

The plant has ten Fairbanks-Morse opposed-piston diesel engines rated at 4,000 horsepower apiece. Each powers a 120-inch diameter Ingersoll-Dresser variable-pitch propeller pump with a capacity of more than 600,000 gallons per minute. Normal discharge of water from the St. Francis River is through the gravity flow gates in the center of the plant, with a maximum capacity of 9.1 million GPM. A concrete weir that is located upstream of the pumping plant creates a lake that extends 30 miles upstream.

HOW W.G. HUXTABLE PUMPING PLANT WORKS

QUICK FACTS:

ENGINES (QTY 10):

MANUFACTURER: COLT INDUSTRIES,
FAIRBANKS-MORSE PUMP AND
ELECTRIC DIVISION.

RATING: UP TO 4000 HP
765 TO 900 RPM

PUMPS (QTY 10):

TYPE: VARIABLE-PITCH, VERTICLE
MOUNTING PROPELLARS

SIZE: 120 INCH DIAMETER

PUMP CAPACITY: 1200 CFS

PLANT CAPACITY: 6 MILLION GPM

SPEEDS: 170 RPM AND 200 RPM

2

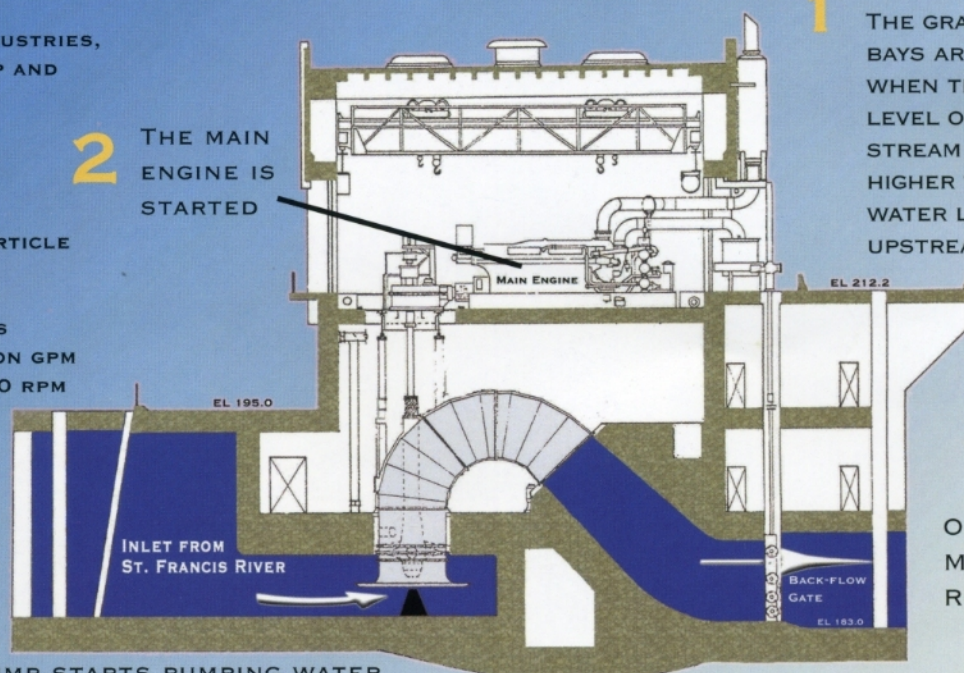
THE MAIN
ENGINE IS
STARTED

1

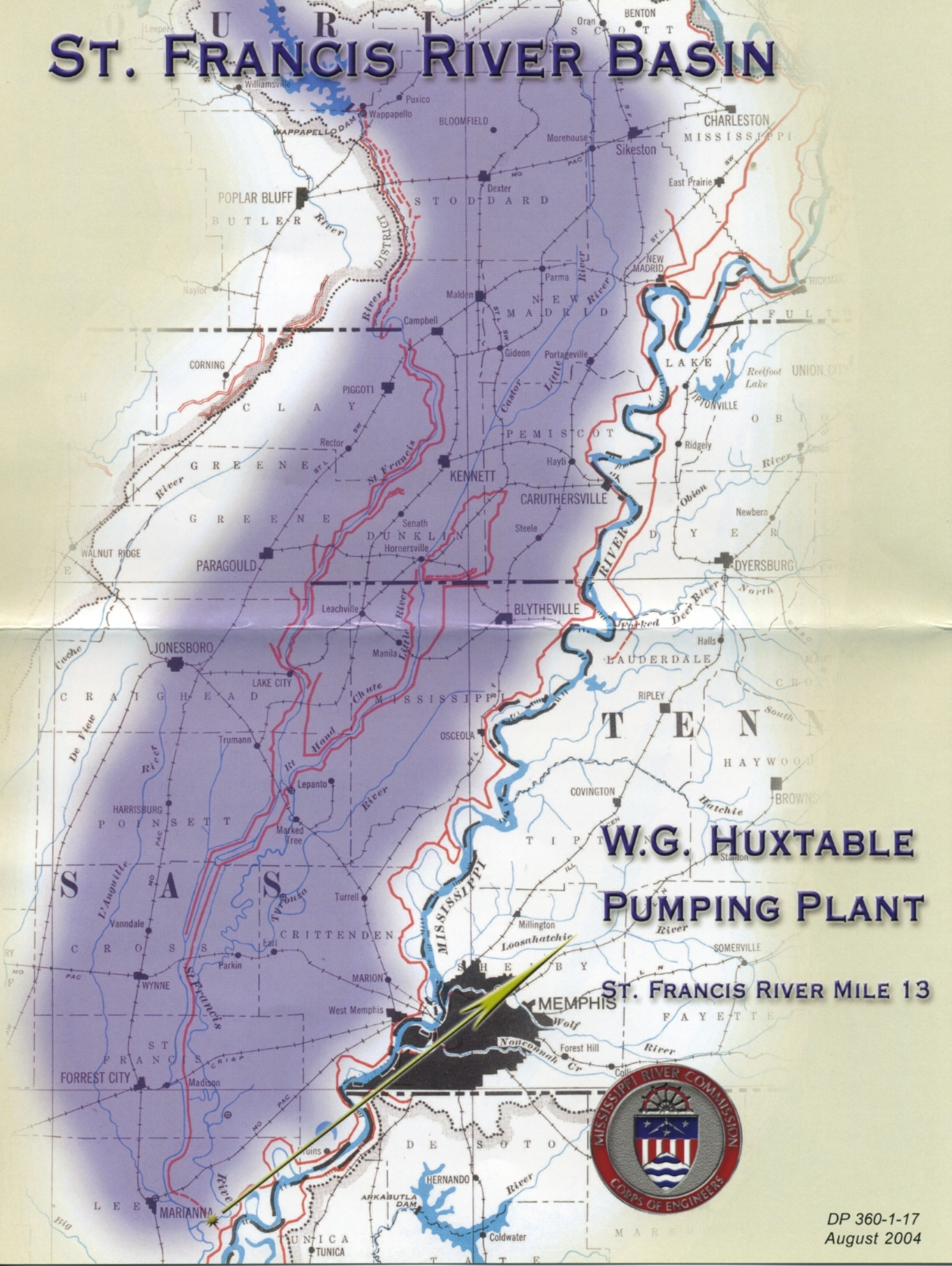
THE GRAVITY-FLOW
BAYS ARE CLOSED
WHEN THE WATER
LEVEL ON THE DOWN-
STREAM SIDE IS
HIGHER THAN THE
WATER LEVEL ON THE
UPSTREAM SIDE.

3

THE MAIN PUMP STARTS PUMPING WATER
FROM THE UPSTREAM SIDE OF THE PLANT.



ST. FRANCIS RIVER BASIN



W.G. HUXTABLE PUMPING PLANT

ST. FRANCIS RIVER MILE 13

