

**EXHIBIT B**  
**PLANT OPERATION AND RESOURCES**  
**UTILIZATION**

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## **1.0 PLANT OPERATION AND RESOURCES UTILIZATION**

### **1.1 PLANT OPERATION**

The Lake Livingston Hydroelectric Project will be operated as a run-of-river plant consistent with the routine operation of the dam. The plant will be capable of remote or local operation via a supervisory control system. Based on a rated project capacity of 24,000 kW, the average annual plant factor will be about 60 percent. Presently, Lake Livingston is maintained at elevation 131.0 feet except when drawdown of the reservoir is made to meet downstream demands. Lake levels are maintained by adjusting the continuous release either through tainter gates located at the crest of the spillway or through the outlet works. The level is observed several times each day and adjustments in gate openings are subsequently made. A detailed gate operation procedure has been established to allow TRA personnel to closely maintain this desired level. Plant start-up, operation, and all adjustments to turbine discharge rates will be coordinated with TRA prior to any changes or adjustments. TRA will have the ability to shut down the hydropower plant in the event of an emergency in the reservoir upstream or in the river downstream from the dam.

The proposed project will also be operated in accordance with a detailed gate operating procedure but will have no impact on said procedure with the exception that the continuous releases, except as noted below, will be made through the powerhouse rather than over the spillway.

#### **1.1.1 Adverse Flow**

When reservoir releases will be less than the necessary 600 cfs for minimum continuous turbine operation, the power plant will be shut down and the flow released over the spillway or through the outlet works tower. An electrical advisory system will insure sequential operation of both the powerhouse and the alternate release structures to maintain a continuous release to the river.

#### **1.1.2 Normal Flow**

The range of hydraulic capacity of the turbines at the normal lake level is 600 to 4,500 cfs. When the required releases are within this range, all releases, in addition to minimum releases through the spillway gates, will be made through the turbines.

#### **1.1.3 High Flows**

When required releases are in excess of 4,500 cfs, plus minimum spillway discharge, the turbines will operate at full gate with the remainder of the flow passed over

the spillway. The turbines will continue to operate until releases attain about 70,000 cfs. At this point, rising tailwater causes the head to fall outside of the turbine operating range and to prevent damage from vibration and cavitation, the units will be shut down. All flows in excess of 70,000 cfs will be released over the spillway.

#### 1.1.4 Minimum Releases

As previously specified, the lake level is maintained by releasing an appropriate continuous flow. Normally, this flow is sufficient to satisfy all adjacent and downstream uses. However, during periods of extreme low flow, it is occasionally necessary to augment the continuous flow with releases from the reservoir's storage. Both owners, the City of Houston and TRA, have use of this available dependable storage. During extended periods of dry weather, required minimum releases may be higher than total reservoir inflows. In such situations, the lake will be drawn down from its normal pool level of elevation 131.0 feet to augment downstream releases. Records show that reservoir drawdowns have been few in number.

### 1.2 DEPENDABLE CAPACITY AND AVERAGE ANNUAL ENERGY PRODUCTION

Because extended low flow periods can occur throughout the year, during which time the Project would produce little or no output, no dependable capacity has been assigned to the Project.

The average annual energy production is estimated to be 124,000,000 kWh, with the following approximate monthly distribution.

	kWh
January	12,020,800
February	12,859,400
March	13,764,400
April	13,504,100
May	13,808,400
June	13,472,800
July	9,819,200
August	6,686,900
September	3,965,700
October	4,152,400
November	8,007,800
December	11,938,100
<b>Total</b>	<b>124,000,000</b>



### 1.2.1 Flows

The U.S. Geological Survey (USGS) gaging station, Trinity River near Goodrich (#08066252), is located at RM 117.3 about 12 miles downstream from Livingston Dam. The station was established in December 1965, and its drainage area of 16,844 square miles is 261 square miles (1.6 percent) larger than the area of the Livingston Dam basin.

In establishing the flow duration curve at the Project site, it was assumed that the mean daily flows of the Trinity River, as recorded at the Goodrich gage, are representative of the daily releases from Lake Livingston. Although Livingston Dam was completed in 1969, normal pool level (at elevation 131.0 feet) was not reached until November 1971. Therefore, the period October 1974 to September 2004 was selected for the analysis, and the resulting duration curve is shown on *Figure B-1*.

The mean flow for the selected period is approximately 8,450 cfs. For this period of record, the maximum recorded instantaneous discharge was 110,600 cfs which occurred on October 17, 1994. A minimum flow of approximately 200 cfs has been recorded on several occasions.

### 1.2.2 Area-Capacity Curve

An area-capacity curve shown on *Figure B-2* was established for the proposed Project. The gross storage capacity of the normal reservoir level of elevation 131.0 feet is approximately 1,750,000 AF. The storage capacity of the reservoir at spillway crest elevation 99.0 feet is 161,000 AF yielding a potential usable water supply storage of 1,627,000 AF. However, since the plant will be operated on a run-of-river basis, no usable storage has been considered to be available.

### 1.2.3 Hydraulic Capacity

The total hydraulic capacity of the hydropower plant operating at normal headwater will be 4,500 cfs.

### 1.2.4 Tailwater Rating Curve

A tailwater rating curve for the project is shown in *Figure B-3*.

### 1.2.5 Power Plant Capability Versus Head Curve

A power plant capacity versus head curve is shown in *Figure B-4*.

### **1.3 UTILIZATION OF POWER GENERATED**

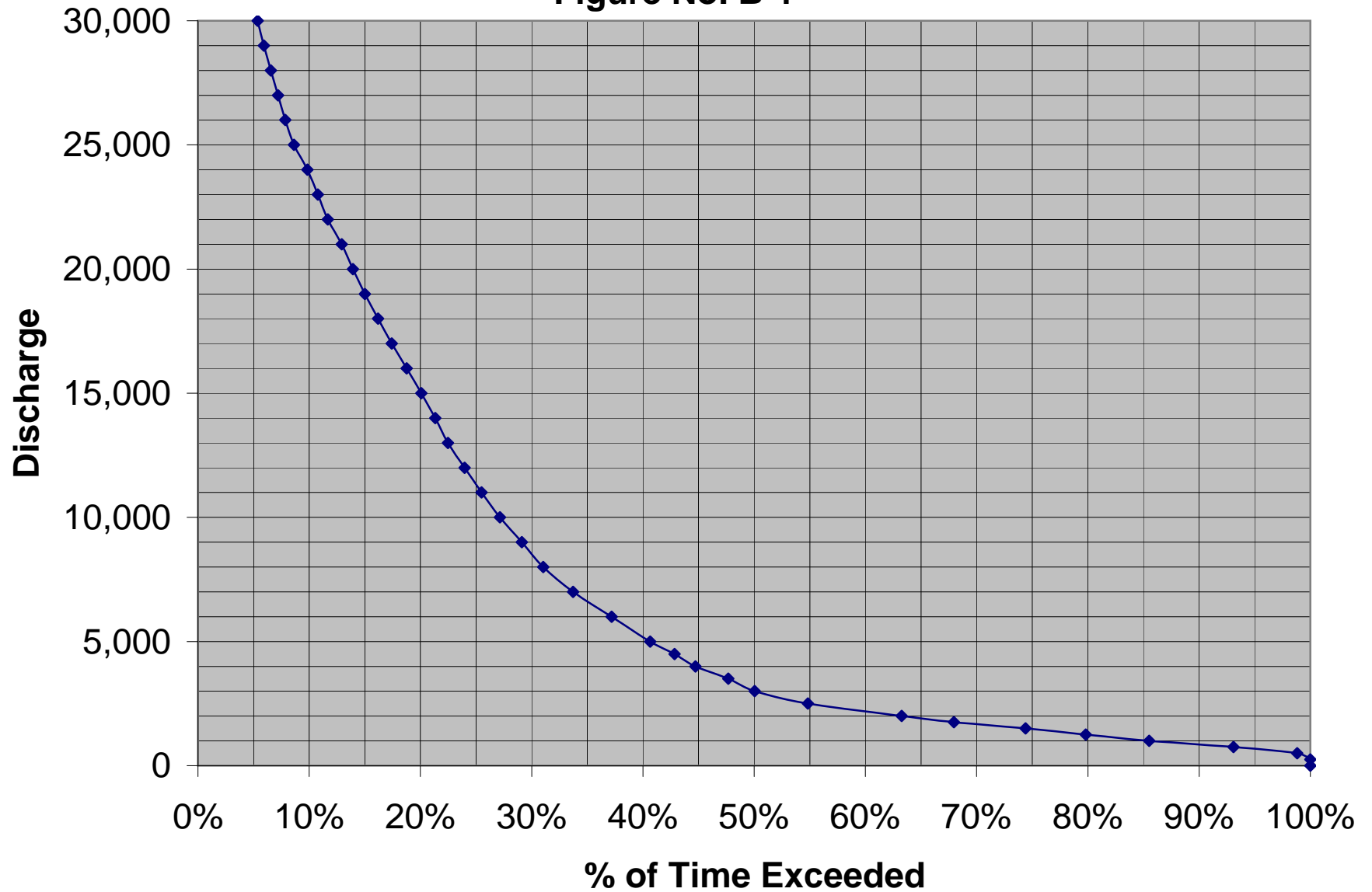
The amount of station service power required is negligible. The entire output of the plant will be utilized by the Cooperative for sale to member cooperatives and customers.

### **1.4 PLAN FOR FUTURE DEVELOPMENT**

Applicant does not have any plans for future development of the proposed project.

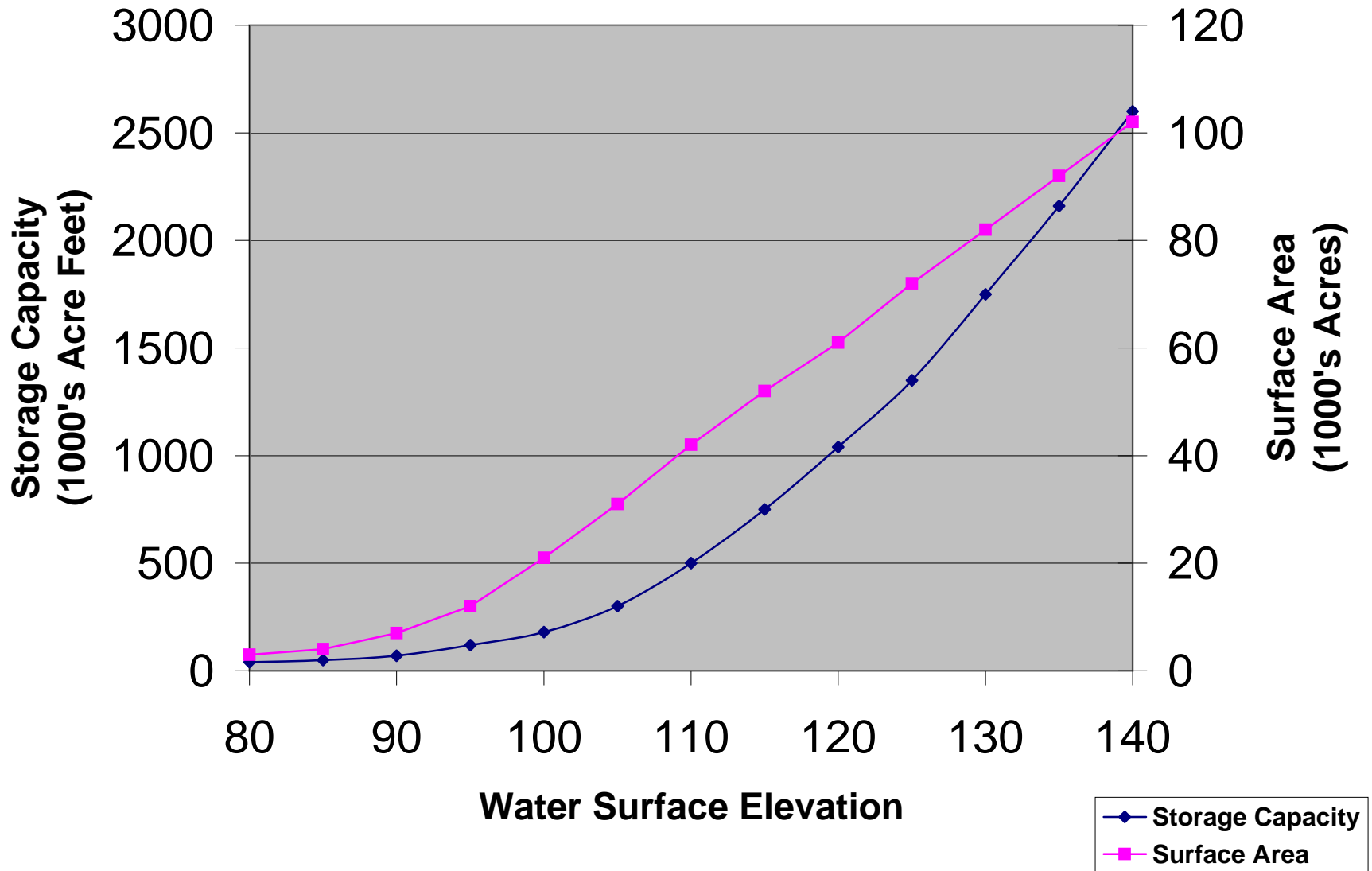
# FIGURES

**Lake Livingston Hydroelectric Project  
FERC Project No. 12632  
Flow Duration Curve  
Figure No. B-1**

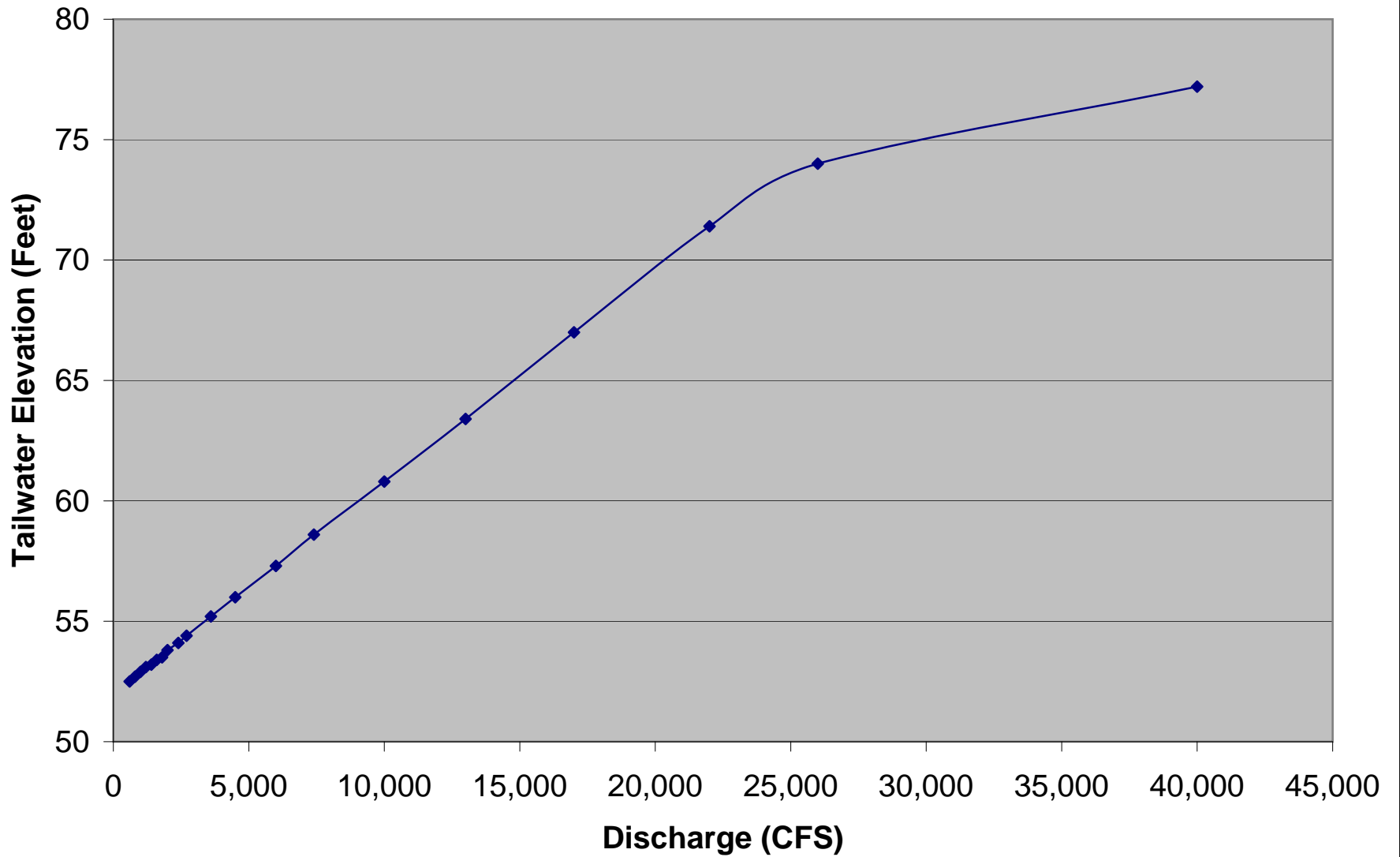




**Lake Livingston Hydroelectric Project  
FERC Project No. 12632  
Area and Capacity Curves  
Figure No. B-2**



**Lake Livingston Hydroelectric Project  
FERC Project No. 12632  
Tailwater Rating Curve  
Figure No. B-3**



**Lake Livingston Hydroelectric Project  
FERC Project No. 12632  
Powerplant Capability vs Head  
Figure No. B-4**

