CUMBERLAND RIVER BASIN

VOLUME VII

J. PERCY PRIEST
WATER CONTROL MANUAL

U.S. ARMY CORPS OF ENGINEERS

Nashville District

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Prepared by

SVERDRUP CORPORATION

For

U.S. ARMY CORPS OF ENGINEERS

Nashville District

December 1998

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J. PERCY PRIEST DAM & RESERVOIR PERTINENT DATA

DAM LOCATION

- Dam Location

State:	Tennessee
County:	Davidson
Nearest Community:	Metropolitan Nashville Davidson County project within community limits
River:	Stones
Mile:	6.8
Latitude:	North 36°09'23"
Longitude:	West 86°37'07"

- Adjacent Water Control Facilities
  - Upstream
    - No Federal Projects
  - Downstream
    - Cheatham Dam - Cumberland River, Mile 148.7

ORIGINAL AUTHORIZATION AND HISTORY

• Primary Project Purposes	• Authorizing Legislation
Flood Control	PL 75-761, Flood Control Act of 1938
Hydropower	PL 79-525, River and Harbor Act of 1946
Recreation	PL 78-534, Flood Control Act of 1944

- Additional Operating Purposes

Fish and Wildlife	PL 85-624, Fish and Wildlife Coordination Act of 1958
Water Quality	PL 92-500, Federal Water Pollution Control Act Amendments of 1972
Water Supply	Although storage space is not allocated for water supply on either a permanent (PL 85-500) or temporary (PL 78-534) basis, water is being withdrawn for municipal and industrial purposes. Consequently, during drought, consideration is given to keeping the lake level above the supply pipe intakes.

- Construction Dates

Began	- 29	Jun	63
Closure	- 14	Nov	67
Impoundment	- 15	May	68
Inservice			
Power Unit	- 3	Feb	70

PHYSICAL COMPONENTS OF DAM

- Type of Structure
  Combination concrete gravity and rolled earthfill embankment

Dam Section Lengths				
Earth embankment, left (west) bank	- 1,372.5	feet	418.3	m
Power intake and left nonoverflow section	- 280.5	feet	85.5	m
Spillway section	- 213	feet	64.9	m
Right nonoverflow section	- 170	feet	51.8	m
Earth embankment, right (east) bank	- 680	feet	207.3	m
Total Dam Length	- 2,716	feet	827.8	m
Structure Elevations				
Embankment	- 518	NGVD	157.88	m
Top of Gates	- 504.5	NGVD	153.76	m
Spillway Crest	- 463.5	NGVD	141.27	m
Outlet Works				
Spillway				
Total Effective Width	- 180	feet	54.9	m
Tainter Gates				
Number	- 4			
Width	- 45	feet	13.7	m
Height	- 41	feet	12.5	m
Power Plant				
Operating Heads				
Minimum net with pool at elev. 483	- 72.5	feet	22.1	m
Nominal	- 78	feet	23.8	m
Net with pool at elev. 490	- 90	feet	27.4	m
Net with full flood control pool (elev. 504.5)	- 100	feet	30.5	m
Maximum static	- 119.5	feet	36.4	m
Tailwater Elevation (approximate)				
Normal with powerplant in operation	- 396	NGVD	120.7	m
Normal with powerplant not in operation	- 387	NGVD	118.0	m
Penstock				
Diameter	- 22	feet	6.7	m
Invert Elevation	- 415	NGVD	126.5	m
Nominal Discharge	- 4700	cfs	133	cu. m/sec.
Nameplate Power Rating	- 28	MW		
Dependable capacity added to system (powerplant capacity has been designated as 30 MW under all circumstances due to mechanical limitations)	- 30	MW		
Estimated average annual generation	70,000	MWH		

HYDRAULICS AND HYDROLOGY

- Drainage Areas

Project				
Total	-	892 sq. mi.		2,310 sq. km.
Control Point - Nashville, Tennessee				
Total	-	12,860 sq. mi.		33,307 sq. km.
Local Uncontrolled	-	275 sq. mi.		712 sq. km.
(between Nashville and Old Hickory & J. Percy Priest)				
Downstream Project - Cheatham				
Total	-	14,160 sq. mi.		45,579 sq. km.
Local Uncontrolled	-	1,594 sq. mi.		8,904 sq. km.
(between Cheatham and Old Hickory & J. Percy Priest)				

- Top of Pool Elevations (NGVD)

			Meters	
	Summer	Winter	Summer	Winter
Flood Control	504.50	504.50	153.76	153.76
Hydropower	490.50	483.00	149.50	147.21
Inactive	489.50	480.00	149.19	146.30

- Storage Volumes

			Cubic Hectometers	
	Summer	Winter	Summer	Winter
Acre Feet				
Flood Control	253,000	350,000	312	432
Hydropower	14,000	34,000	17	42
Inactive	385,000	268,000	475	331
Total	652,000	652,000	804	804
Day Second Feet (day cfs)				
Flood Control	128,000	176,000		
Hydropower	7,000	17,000		
Inactive	194,000	135,000		
Total	329,000	329,000		
Runoff (inches)			Centimeters	
Flood Control		7.36		18.7
Hydropower		0.72		1.8
Inactive		5.64		14.3
Total		13.72		34.8

HYDRAULICS AND HYDROLOGY
(continued)

- Average Outflows (cfs) (1971 -1996)

Month	Generation	Spill	Total	Total Cubic Meters/Sec
Jan	2,704	308	3,012	85
Feb	2,283	204	2,487	70
Mar	1,997	347	2,345	66
Apr	1,214	140	1,354	38
May	1,232	197	1,429	40
Jun	666	15	681	19
Jul	454	0	454	13
Aug	310	0	310	9
Sep	365	172	537	15
Oct	1,067	51	1,117	32
Nov	1,898	89	1,987	56
Dec	2,492	498	2,990	85
Annual	1,387	169	1,556	44

- Maximum Pool Frequencies

Period of Record	-	1968 through 1996
2 Year	-	494.57
5 Year	-	498.33
10 Year	-	500.62
25 Year	-	503.30
50 Year	-	505.18
100 Year	-	506.97
200 Year	-	508.69
Maximum Observed	-	505.18 @ 0400 on 5/9/84

Note - Theoretical pool elevations based on statistical evaluations of annual peak stage.

- Maximum Daily Average Discharge 20,100 cfs on 3/18/75

REAL ESTATE

- Acquisition

Fee Holdings	-	33,054 acres	13,381 hectares
Easement Holdings	-	538 acres	218 hectares

- Elevation of Taking Line - Elevation 504.5 plus 300 feet or Elevation 508, whichever is greater

ACCESS LOCATIONS

	Reservoir Sailing Line (Mile)*	Bank	
• Bridge Crossings			
Hobson Pike	6.4		
• Recreation Areas			
Corps of Engineers			
Dam Site	0		
Hermitage Landing	0.3	R	
Elm Hill	1.5	L	
Cook	2.4	R	
Anderson Road	3.4	L	
Seven Points	3.5	R	
Vivrett Creek	3.6	R	(Suggs Creek)
Smith Springs	5.5	L	
Four Corners	7.0	L	(Hurricane Creek)
Hurricane Creek	7.2	L	(Hurricane Creek)
Jones Mill	11.5	R	
Poole Knobs	13.0	L	
Stewart Creek	14.4	L	(Stewart Creek)
Gregory Mill	14.4	L	(Stewart Creek)
Fate Sanders	14.6	R	
Lamar Hill	15.3	R	
Fall Creek	17.4	R	(Fall Creek)
Jefferson Springs	19.7	L	
West Fork	1.6	L	(West Fork)
Nice's Mill	4.8	L	(West Fork)
East Fork	1.4	L	(East Fork)
Mona	4.6	R	(East Fork)
By Others			
Hamilton Creek Park	2.3	L	(Hamilton Creek)
Long Hunter State Park	6.1	R	
Commercial Docks			
Hermitage Landing	0.3	R	
Elm Hill Marina	1.5	L	
Four Corners Dock	7.0	L	(Hurricane Creek)
Fate Sanders Dock	14.4	R	

*The reservoir mile represents a much more direct path than the river mile of the old channel. Since recreation areas generally exceed one mile in length, the reservoir mile given is about at the midpoint of the area.

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CHAPTER I
INTRODUCTION

1.1. Authorization. This manual was prepared for the U.S. Army Corps of Engineers, Nashville District, by the Sverdrup Corporation under contract DACW62-87-C-0068, modification P00011 in accordance with ER 1110-2-240, ETL 1110-2-251, and EC 1110-2-256.

1.2. Purpose. The purpose of this manual is to serve as a guide for the day to day and emergency regulation of the J. Percy Priest project, and to provide background information on the project.

1.3. Scope. This manual presents the plan of regulation for the J. Percy Priest project and furnishes information pertinent to its operation.

1.4. Emergency Regulation Assistance Procedures. In the event that unusual conditions arise, contact can be made by telephone to the CELRN-EP-H Water Management Section at the phone number listed in Appendix E. During nonduty hours, assistance can be obtained by contacting one of the officials also listed in Appendix E.

1.5. Update Procedure. Regulations specify that this Water Control Manual be published in loose leaf form, and only those sections, or parts thereof, requiring changes will be revised and printed. Therefore, this copy should be preserved in good condition so that inserts can be made to keep the manual current.

1.6. Responsible Agencies.

▪ Project Owner:	U.S. Army Corps of Engineers
▪ Operating Agency:	U.S. Army Corps of Engineers
▪ Regulating Agency:	U.S. Army Corps of Engineers
▪ Hydropower Marketing Agency:	Southeastern Power Administration (SEPA)
▪ Hydropower Scheduling:	Tennessee Valley Authority (TVA)

1.7. Related Manuals and Reports.

1.7.1. Original Water Control Manuals.

Master Regulation Manual for Reservoirs in the Cumberland River Basin Revised March, 1954		
	Appendices	Date
A:	Regulation Manual for Wolf Creek	Revised March, 1954
B:	Regulation Manual for Dale Hollow	Revised March, 1954
C:	Regulation Manual for Center Hill	Revised March, 1954
D:	Regulation Manual for Old Hickory	November, 1959
E:	Regulation Manual for Cheatham	November, 1959
F:	Regulation Manual for Barkley Reservoir	April, 1969
G:	Regulation Manual for J. Percy Priest Reservoir	April, 1977

1.7.2. Revised Water Control Manuals.

Cumberland River Basin Water Control Manuals		Published
Volume I	Master Water Control Reference Manual	April, 1990
Volume II	Master Water Control Plan	December, 1998
Volume III	Barkley Water Control Manual	December, 1998
Volume IV	Cheatham Water Control Manual	December, 1998
Volume V	Old Hickory Water Control Manual	December, 1998
Volume VI	Cordell Hull Water Control Manual	December, 1998
Volume VII	J. Percy Priest Water Control Manual	December, 1998
Volume VIII	Center Hill Water Control Manual	December, 1998
Volume IX	Dale Hollow Water Control Manual	December, 1998
Volume X	Wolf Creek Water Control Manual	December, 1998
Volume XI	Laurel Water Control Manual	December, 1998
Volume XII	Martins Fork Water Control Manual	December, 1998

1.7.3. Related Manuals.

1. J. Percy Priest Dam Instructions for Reservoir Regulation - Revised December, 1998.
2. Old Hickory Dam Instructions for Reservoir Regulation- Revised December, 1998.
3. Cumberland River Basin Drought Contingency Plan - November, 1994.

CHAPTER II
WATER CONTROL PLAN

2.1. Primary Objectives. The Water Control Plan for the J. Percy Priest project has three primary objectives. These are:

1. To store water during flood events and thereby reduce flood damages downstream of the project, particularly along the Cumberland River through Metropolitan Nashville.

2. To provide a relatively stable pool during the summer for the recreational enjoyment of the general public.

3. To generate hydropower.

2.2. Regulation Curve.

2.2.1. The regulation curve, or guide curve, represents the primary guidance for regulating the J. Percy Priest Project. It defines the limits of reservoir elevations as a function of time of year and is presented graphically as Plate A-1. The guide curve separates the storage volume in the lake into four distinct horizontal zones as described below.

2.2.2. Inactive Pool. Inactive storage at J. Percy Priest extends from the bottom of the reservoir up to elevation 480. Water is not released if it would bring the surface of the pool below the top of this zone. Inactive storage is provided primarily to offset lake sedimentation and provide head for hydropower. Other benefits of this permanent pool include depth for recreation, water intake installation, habitat for fish and other aquatic life, and insurance water for drought periods.

2.2.3. Power Pool. During the winter months, a three foot power pool is provided at J. Percy Priest extending between elevations 480 and 483. This seasonal power pool is effective from mid-December through late March each year. Utilization of this operating zone by storing local inflows or drafting from storage allows hydropower releases to be scheduled to best meet peak hour energy demands.

2.2.4. Recreation Pool. Recreational activities occur on J. Percy Priest Lake throughout the year. During the prime recreation season, the lake is filled about seven vertical feet to provide additional surface area and shoreline to accommodate increased usage. The recreation pool is at elevation 490 from late April through early

October each year. A one-half foot tolerance has been added to each side of this level to allow for minor fluctuations caused by isolated heavy rainfall events on the high side (490.5) and evaporation on the low side (489.5). Public access facilities such as beaches, boat ramps, and marinas are designed to function best when the water surface is at elevation 490, although most will successfully function at pool levels above and below this elevation. The range of this functionality depends on the characteristics of each individual facility. Beaches have the most limited usable range. Most beaches will be adversely affected if the pool gets more than a couple feet away from this optimum recreational level (elevation 490). Boat ramps and marinas have a much larger range of pool elevation tolerance.

2.2.5. Transition Levels. As the threat of floods subside in the spring, the headwater level of J. Percy Priest is allowed to rise to accommodate increased recreational use. A transition zone was designed to permit gradual filling of the reservoir in late March to attain the full summer recreation level by late April. As recreational use decreases in the fall, a drawdown zone is followed beginning in early October to return the lake level to winter power pool by early December. Basically, this schedule permits maximum flood control and power benefits during the winter and early spring and best recreational use during the summer and early fall seasons.

2.2.6. Flood Control Pool. Storage is reserved for flood control at J. Percy Priest throughout the year. The flood pool extends from elevations 483 to 504.5 during the winter and early spring (early December to late March) when the threat of flooding is greatest. The volume of flood control storage available during the flood season is 350,000 acre feet which equates to 7.4 inches of runoff over the 892 square mile watershed. From late April through early October the flood pool is from elevation 490.5 to elevation 504.5 with the time frame consistent with a lower flood potential and a higher recreation use. Even at the summer recreation pool level, 253,000 acre feet (5.3 inches) of flood storage remains available. Flood storage extends from the top of the transition zones to elevation 504.5 during the spring fill and fall drawdown periods. Water is not allowed to remain in the flood pool any longer than necessary, and flood control storage is evacuated as rapidly as downstream conditions permit.

2.3. Normal Regulation.

2.3.1. During periods of normal regulation, the water surface elevation behind J. Percy Priest Dam is kept within the elevation bounds of the guide curve, Plate A-1, and all releases will be made through the turbine as governed by the demand for power. This regulation procedure is in effect as long as inflows to the project remain less than the discharge capacity of the turbine. When reservoir inflows exceed turbine capacity and the lake tends to rise above seasonal guide curve levels, spillway releases may be initiated to augment power discharges and control lake levels. Water Management Section is responsible for issuing directives concerning all spillway releases at J. Percy Priest.

2.3.2. Stratification. In the summer and early fall J. Percy Priest becomes stratified from the water quality point of view. During this period Water Management Section will assure that at least one hydropower unit at Old Hickory is discharging concurrently with generation from the unit at J. Percy Priest. Concurrent generation from Old Hickory is needed to dilute the high concentrations of iron and manganese present in the J. Percy Priest discharge when the lake is stratified.

2.3.3. Daily Water Management. As a result of a daily analysis of current hydrologic conditions, the Water Management Section directs TVA to schedule a specific amount of energy production for the following day at J. Percy Priest and, if needed, to modify the generating schedule for the current day. TVA accepts this daily total generation and then schedules the energy on an hourly basis to best meet power demands. The District discourages TVA from deviating from the prescribed daily generation at the project.

2.3.4. Operators. The power generating unit at J. Percy Priest is operated remotely from the Old Hickory powerhouse. However, spillway gate operations must be accomplished on-site at J. Percy Priest. TVA load coordinators in Chattanooga communicate the hourly generation schedule directly to the Old Hickory operators who, in turn, control all turbine releases from the dam. Plant personnel at Old Hickory are responsible for insuring that the headwater levels at J. Percy Priest are above the minimum allowable and that the machinery is operated within the allowable limits. If instructions are issued from TVA which conflict with these criteria, plant personnel are to inform TVA that such a conflict exists and the execution of such instructions is not permitted. The attending personnel are supervised by the Construction and Operations Division but it is the responsibility of the Water Management Section of the Engineering-Planning Division to issue specific project release instructions and to insure adherence to the water control plan. Deviation from normally allowable ranges of operations are permitted only upon direction from the Water Management Section.

2.4. Flood Regulation.

2.4.1. There are two distinct modes of operation relative to flood regulation:

1) Normal flood operation where outflows are reduced to provide flood protection for the principal damage center of Nashville, Tennessee.

2) Emergency flood operation where downstream flood reduction is an objective, but protection of the dam is the prime concern.

2.4.2. Control Station. The key station controlling the operation of J. Percy Priest during flood events is the Cumberland River at Nashville, Tennessee. The reference gage for Nashville is located downtown at Cumberland River Mile 191.1. This is 14.7 miles downstream of the confluence of the Stones River with the Cumberland River, or a total of 21.5 miles downstream of J. Percy Priest Dam. Nashville is the primary damage center within the Cumberland River Basin.

2.4.3. Control Flows. The control flow for Nashville has been established at 90,000 cfs (stage of 35 feet) during the flood season and 54,000 cfs (stage of 26 feet) during the crop season. Crop season is generally understood to be from April 15 through December 15, however these dates may be adjusted depending on actual field conditions. Flood season is designated as anytime other than crop season, generally from December 15 through April 15. The official flood stage at Nashville is 40 feet. It is recognized that the control flows (maximum desired flows) for Nashville result in river stages below damage levels. These control flows have been set to leave room in the channel to accommodate additional runoff from subsequent rainfall events during periods when flood control storage is being evacuated from upstream projects. The channel capacity of the Stones River below J. Percy Priest is about 17,000 cfs, disregarding the flooding of low areas at the mouths of smaller tributary streams.

2.4.4. Rate of Release Change Limits. Increases in combined total spillway releases from Old Hickory and J. Percy Priest are limited to 5,000 cfs per hour. Hourly decreases are limited to 10,000 cfs. The 5,000 cfs per hour increase limit, which corresponds to about a one foot per hour rise in the Nashville harbor, can be waived during severe events. In addition, to reduce surges and prevent excessive bank erosion in the Stones River due to flooding, increases in spillway releases are limited to 2,000 cfs per hour; decreases are limited to 4,000 cfs per hour. These limits also represent J. Percy Priest's maximum contribution to the flow increase limit (5,000 cfs per hour) and decrease limit (10,000 cfs per hour) at the Nashville harbor. However, during extreme conditions, spillway increases greater than 2,000 cfs per hour from J. Percy Priest are allowed if they are needed to get the outflow to the level designated on the Emergency Operation Schedule which is discussed below.

2.4.5. Normal Flood Operations. The Nashville flow is allowed to reach the maximum desired amount without flood control procedures being initiated. If the Nashville flow is forecasted to exceed the maximum desired level, releases from J. Percy Priest are curtailed, and flood control storage utilized in a manner that will reduce the flood crest at Nashville as much as practical. After the flood crest has passed, utilized flood control storage is evacuated as fast as practical to prepare for future potential floods. When evacuating flood control storage consideration is given to preventing a second flood crest at Nashville, allowing Nashville flows to recede to the maximum desired amount, and limiting J. Percy Priest discharges to the Stones River channel capacity.

2.4.6. Emergency Flood Operation. If forecasts indicate that limiting the project discharges to 17,000 cfs or the Nashville flow to the maximum desired amount would result in the water surface in the reservoir surpassing the top of the flood pool (elevation 504.5 ft), then emergency operations should be initiated. This operation is controlled by the Emergency Operations Schedule (EOS) presented as Plate A-7. The intent of this plan is to prevent the overtopping of the dam while minimizing project discharges as much as practical. This is accomplished by utilizing induced surcharge storage by raising all spillway gates simultaneously so that any inflow in excess of the discharge will be stored above the nominal top of the flood control pool. When operating according to the EOS project discharges are increased until the lake elevation peaks. Spillway gates should then remain in their existing opening until the pool falls to elevation 504.5 ft. At that time gates should be adjusted uniformly such that outflow approximates inflow until the flow at Nashville recedes to the maximum desired amount and project releases recede to 17,000 cfs. When these conditions are met, normal flood control procedures are to be resumed.

2.5. Drought Regulation.

2.5.1. As specified in the Cumberland River Basin Drought Contingency Plan, the system wide priorities for drought operation in the basin are:

1. Water Supply*
2. Water Quality*
3. Navigation
4. Hydropower
5. Recreation

* For Public Health and Safety

2.5.2. Authorization. Of these operating purposes, hydropower and recreation were specifically authorized by Congress. Flood control was also specifically authorized but is generally not a factor during drought. J. Percy Priest is also operated for water quality and fish and wildlife under the general authorities of the Federal Water Pollution Control Act Amendments and the Fish and Wildlife Coordination Act respectively. While there is no general authority at J. Percy Priest for storage allocated for water supply on either a permanent (PL 85-500) or temporary (PL 78-534) basis, water is being withdrawn for municipal and industrial purposes. Consequently, in the interest of public health and safety, high priority is given to maintaining the lake level above the minimum operating elevations of all water supply intakes.

2.5.3. Municipal Water Supply. As discussed later in Chapter III, J. Percy Priest Reservoir serves as the water supply source for two municipal water supply systems. The minimum pool level at which both these systems can function is elevation 476, or 4 feet below the top of the inactive pool.

2.5.4. Water Quality for Public Health and Safety. During both normal and drought conditions, the releases from J. Percy Priest during the summer and early fall are high in manganese and iron. In order to minimize the impact of this on Metropolitan Nashville's water supply intakes, the turbine at this project should not come online during periods when the J. Percy Priest Reservoir is stratified unless there is also at least one unit operating at Old Hickory.

2.5.5. Navigation. Navigation is not a project purpose at J. Percy Priest and no special operations for navigation are anticipated, even during drought conditions.

2.5.6. Hydropower. Hydropower operations at J. Percy Priest will be reduced due to the nature of a drought, and power production will decrease in proportion to the decrease in flows. However, no special operations or modifications to normal operating procedure are anticipated.

2.5.7. Recreation. Even during drought periods, recreation interests are very adequately served by the normal regulation plan. No special operations are anticipated for recreation at J. Percy Priest.

2.5.8. Summary. The water control plan at J. Percy Priest is more modern due to its relatively recent construction. The normal regulation plan incorporates a more steady pool with tighter limitations than at the older storage projects. This is primarily due to the inclusion of recreation as a specifically authorized project purpose. The reservoir's operating zone during the recreation season is only one foot deep and inflows during this period are usually quite low. Because of these factors, J. Percy Priest can not significantly contribute to low flow augmentation during drought for such things as water quality and navigation downstream. This was not the intent of this project and thus it is not relied upon for these types of operational modifications during drought conditions.

2.6. Special Regulation.

2.6.1. Stabilization for Spawning. Usually in late April or early May the largemouth bass and crappie spawn occurs. For a two to three week period during this event, it is important to keep a relatively stable pool for good spawning conditions. If however, water should rise into the flood control pool, it should be evacuated as rapidly as practical to attempt to delay the spawn. Stabilization efforts are initiated when the Nashville District determines that the spawn is occurring, based on criteria established by the Tennessee Wildlife Resources Agency. TWRA criteria to identify the beginning of the spawning period for all lakes in Tennessee is water temperature at a five foot depth at or above 60 degrees Fahrenheit. Proper lake level stabilization to enhance the fish spawn must be a cooperative effort between the Corps, TWRA, SEPA, and TVA.

2.6.2. Miscellaneous. In addition to the functional goals discussed in this chapter, there are often other miscellaneous requirements of reservoir regulation for special purposes or circumstances. These include such things as providing specific water levels or discharges for construction activities, project maintenance, inspections, or response to emergency situations such as drownings or oil and chemical spills. Intermittent hydropower releases have also been requested during the summer to flush the fish which have been trapped in small ponds in the tailwater. Normally, special operations can be accomplished within the framework of the approved reservoir operating plan and therefore do not require approval of higher authority. In rare circumstances when deviation from the approved plan is necessary, prior approval of the Great Lakes and Ohio River Division (LRD) office is required.

2.7. Safety. Maintaining the integrity of the dam structures, and providing for the safety of employees and the general public both at the project and in the river system downstream take precedence over all functional requirements. The project design and this water control plan are intended to result in safe conditions for all circumstances. If however, conditions arise where adherence to this plan would jeopardize anyone's personal safety or the integrity of the dam structures, the safety conditions shall prevail.

2.8. Specific Operating Rules.

2.8.1. Normal and Drought Conditions.

(1) Maintain headwater elevation within the limits of the hydropower pool and release all water through the turbines as governed by hydropower generation schedules.

(2) If water surface is below hydropower pool, do not discharge any water.

(3) During the summer and early fall, when J. Percy Priest Reservoir is stratified, do not discharge water from the project unless Old Hickory Dam is discharging.

(4) There is no designated minimum release rate or volume for J. Percy Priest Dam.

2.8.2. Flood Periods.

(1) Limit the rate of increase of spillway releases to 2,000 cfs per hour, unless operating under the Emergency Operation Shedule. Limit decrease in these releases to 4,000 cfs per hour and, if practical, limit this decrease to 2,000 cfs per hour.

(2) Limit increases in combined spillway releases from J. Percy Priest and Old Hickory to 5,000 cfs per hour.

(3) In coordination with Old Hickory, limit flow in downtown Nashville to 90,000 cfs (35 foot stage) during flood season and 54,000 cfs (26 foot stage) during crop season.

(4) Limit total project releases to the bankfull capacity of the Stones River, 17,000 cfs.

(5) If forecasts indicate the need to completely utilize the flood control pool and total project releases above 17,000 cfs are necessary, increase releases up to 2,000 cfs per hour until the required release rate is achieved or until the Emergency Operation Schedule (EOS) indicates higher release rates. Once the EOS is triggered, calculate the rate of rise in the pool and determine the required releases from the EOS, Plate A-7, every two hours.

(6) If operating under the Emergency Operation Schedule, adjust the total outflow as required until pool elevation reaches the Induced Surcharge Curve (the upper most curve depicted on Plate A-7) or until free flow conditions are reached.

(7) Once the Induced Surcharge Curve is reached, it must be followed without deviation.

(8) After the pool peaks (either during normal flood control operations or when the Induced Surcharge Curve is reached while operating under the Emergency Operation Schedule), maintain spillway gates at existing opening until the pool falls to elevation 504.5. Then adjust gates uniformly such that outflow approximates inflow until the flow at Nashville recedes to the maximum desired amount and project releases recede to below bankfull discharge. After this is achieved, resume normal flood control procedures.

2.9. Instruction to Operators. Additional instructions regarding normal and emergency operations and specific instructions on data collection and reporting duties can be found in the separate J. Percy Priest Dam Instructions for Reservoir Regulation document.

2.10. Deviation from Water Control Plan. Permission to deviate from this plan must be obtained from the Great Lakes and Ohio River Division (LRD), Water Management Branch.

2.11. Standing Instructions. See next page.

STANDING INSTRUCTIONS

J. Percy Priest

In the unlikely event that contact cannot be established between operators of the J. Percy Priest Project and the Water Management Section, the following guidelines should be used by the operators.

1. Maintain headwater elevation within the limits of the seasonal guide curve (Plate A-1) and release all water through the turbine as governed by hydropower generation schedules.

2. Should the headwater elevation tend to fall below the bottom of the seasonal guide, curtail hydropower discharges to maintain the seasonal minimum level and notify the power scheduling agency.

3. When high inflows tend to cause the headwater to rise above the top of the seasonal guide, increase the hydropower discharges to turbine capacity rates as required to return the pool to normal levels and notify the power scheduling agency.

4. If the headwater continues to rise, maintain turbine capacity discharges until the combined releases from Old Hickory and J. Percy Priest reach 90,000 cfs (flood season) or 54,000 cfs (crop season). If further increases are required at Old Hickory, curtail hydropower releases from J. Percy Priest.

5. To the extent possible, limit flows at Nashville to a maximum of 90,000 cfs during the flood season (15 Dec - 15 Apr) and 54,000 cfs during the crop season (15 Apr - 15 Dec).

6. As J. Percy Priest headwater continues to rise, closely monitor the rate of rise and review the Emergency Operation Schedule (EOS) (Plate A-7) to see if EOS utilization criteria has been met. Should use of the EOS be required, follow instructions provided on the plate (Plate A-7) without deviation.

7. Should the EOS dictate spillway releases, all gates must be opened uniformly to permit surcharge conditions.

8. When the pool elevation crests, the gate settings existing at the time of the crest should be maintained until the reservoir recedes to the top of the normal seasonal range. Then reduce discharges to maintain the pool within this range; however, combined decreases in releases from J. Percy Priest and Old Hickory are limited to 10,000 cfs per hour.

9. When the pool level has been stabilized within the normal seasonal range, resume normal operations.

CHAPTER III
EFFECT OF THE WATER CONTROL PLAN

3.1. Pool Elevation. Plate III-1 shows the annual peak headwater elevation of the J. Percy Priest pool in each of the last 27 years of operation arranged in descending order. the first three years of operation, 1967 through 1969, were not included in pool elevation analyses because: a) the hydropower unit was not yet operational and b) some of the outlying data points that resulted from early operations skewed the charts such tnat they were not representative of historical project operations. As shown on the chart, there was only the one occasion in which the peak was above the top of the flood control pool which occurred in May, 1984. Plate III-2 , the pool elevation frequency curve, shows the percent of time that the pool has been at or below various elevations. During the summer period of April 27 through October 5, the pool has been within its normal one foot range about 75% of the time. It has been above the normal range approximately 15% of the time and below that range about 10% of the time. When the pool was below this range, it was due to lack of sufficient runoff to raise levels from winter to summer pool. Generation has never occurred when the lake was below the bottom of the band. During the winter pool period of December 15 through March 19, the water surface has been within the three foot winter pool almost 60% of the time. Plate III-3 shows the range of pool elevations used each year since 1970. All three headwater analyses are based on midnight pool readings.

3.2. Project Discharge. The monthly average discharge for the project is shown in Plate III-4. This information is also shown in tabular form in the Pertinent Data section. The lowest releases are in August and the highest releases are in December and January. Plate III-5 shows the average annual turbine and spill release for the project's history. Spill averages 169 cfs or about 11% of the total flow past the project. There have been several years during which no water has been spilled from the project. The lowest total discharge from the project occurred during 1981 and 1985, while the highest occurred during 1979 and 1989. Related information is also shown on the summary hydrographs in Appendix D.

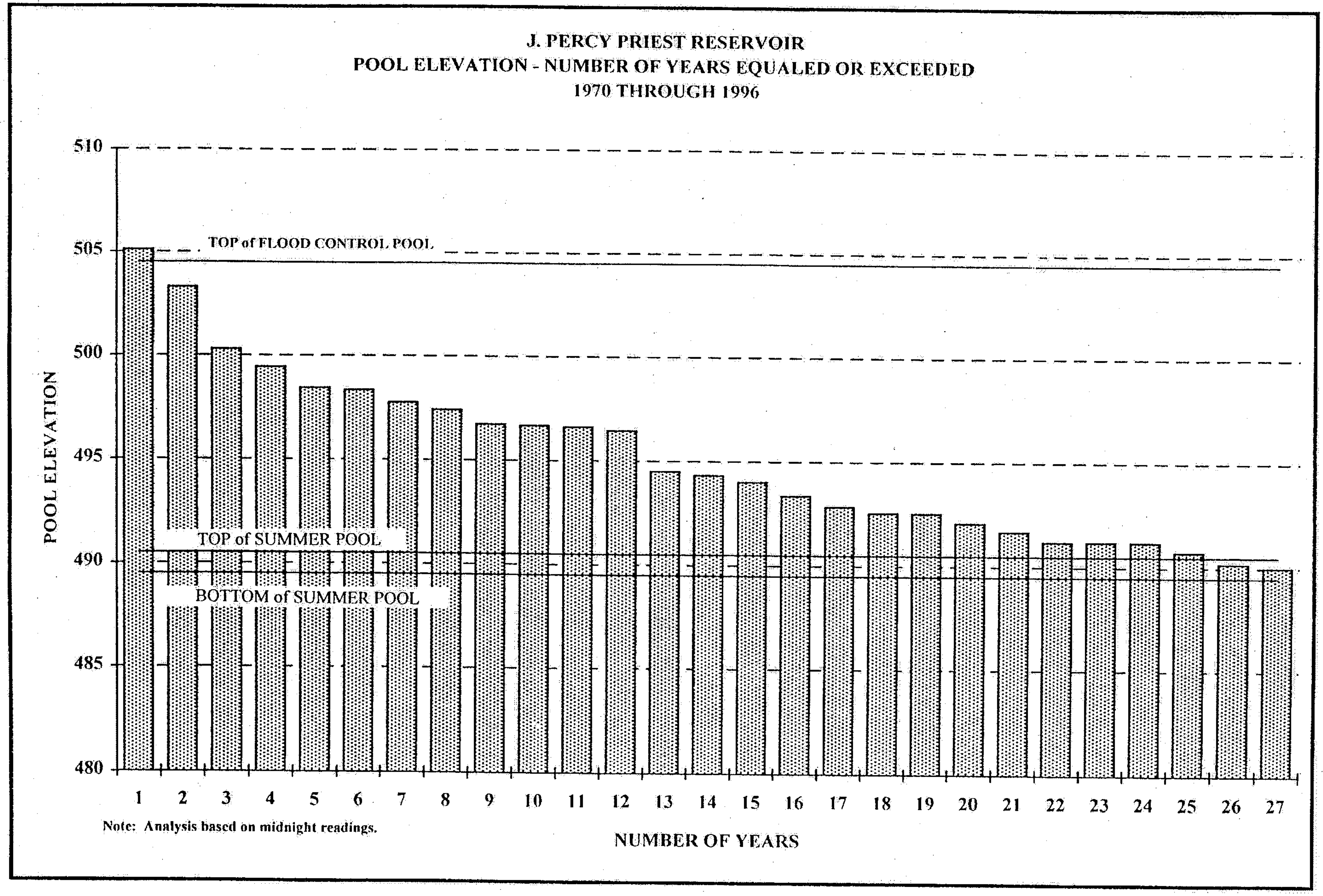

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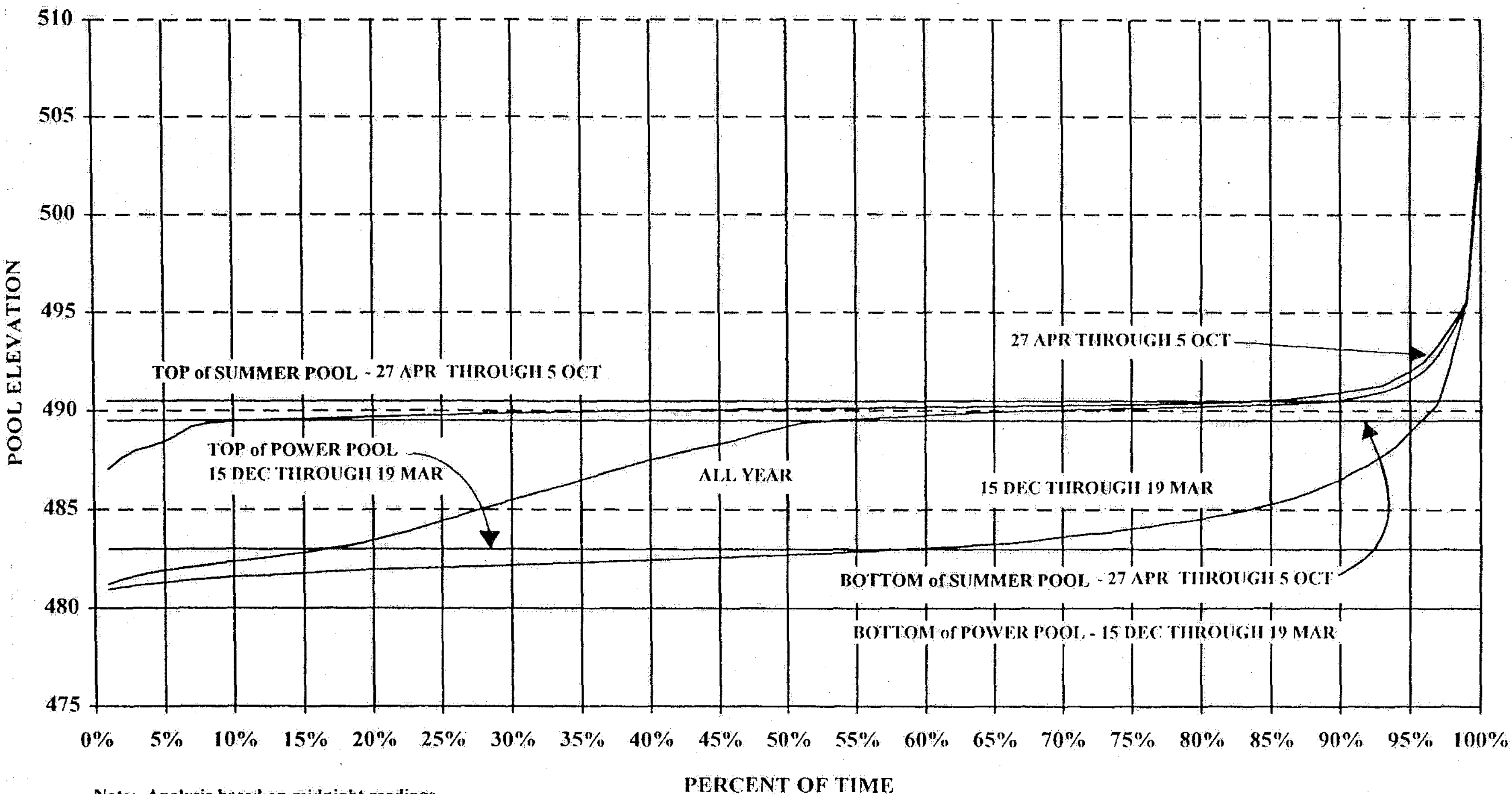
PLATE III-1

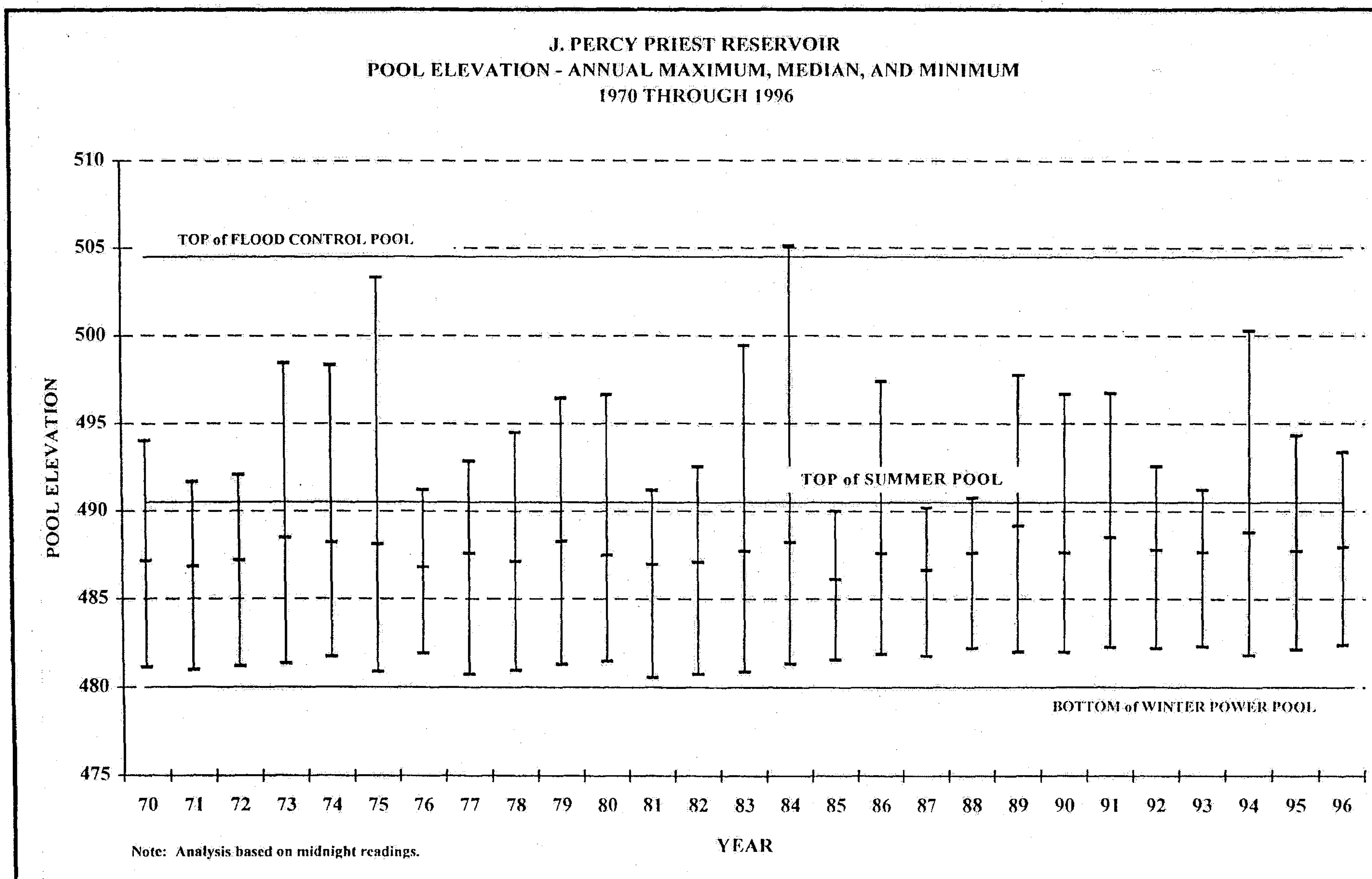
J. PERCY PRIEST RESERVOIR
POOL ELEVATION - PERCENT OF TIME AT OR BELOW
1970 THROUGH 1996



Note: Analysis based on midnight readings.

9/22/97
Pp%time.xlc

PLATE III-2


J. PERCY PRIEST RESERVOIR
POOL ELEVATION - ANNUAL MAXIMUM, MEDIAN, AND MINIMUM
1970 THROUGH 1996
POOL ELEVATION
510
505
500
495
490
485
480
475
TOP of FLOOD CONTROL POOL
TOP of SUMMER POOL
BOTTOM of WINTER POWER POOL
70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96
YEAR
Note: Analysis based on midnight readings.

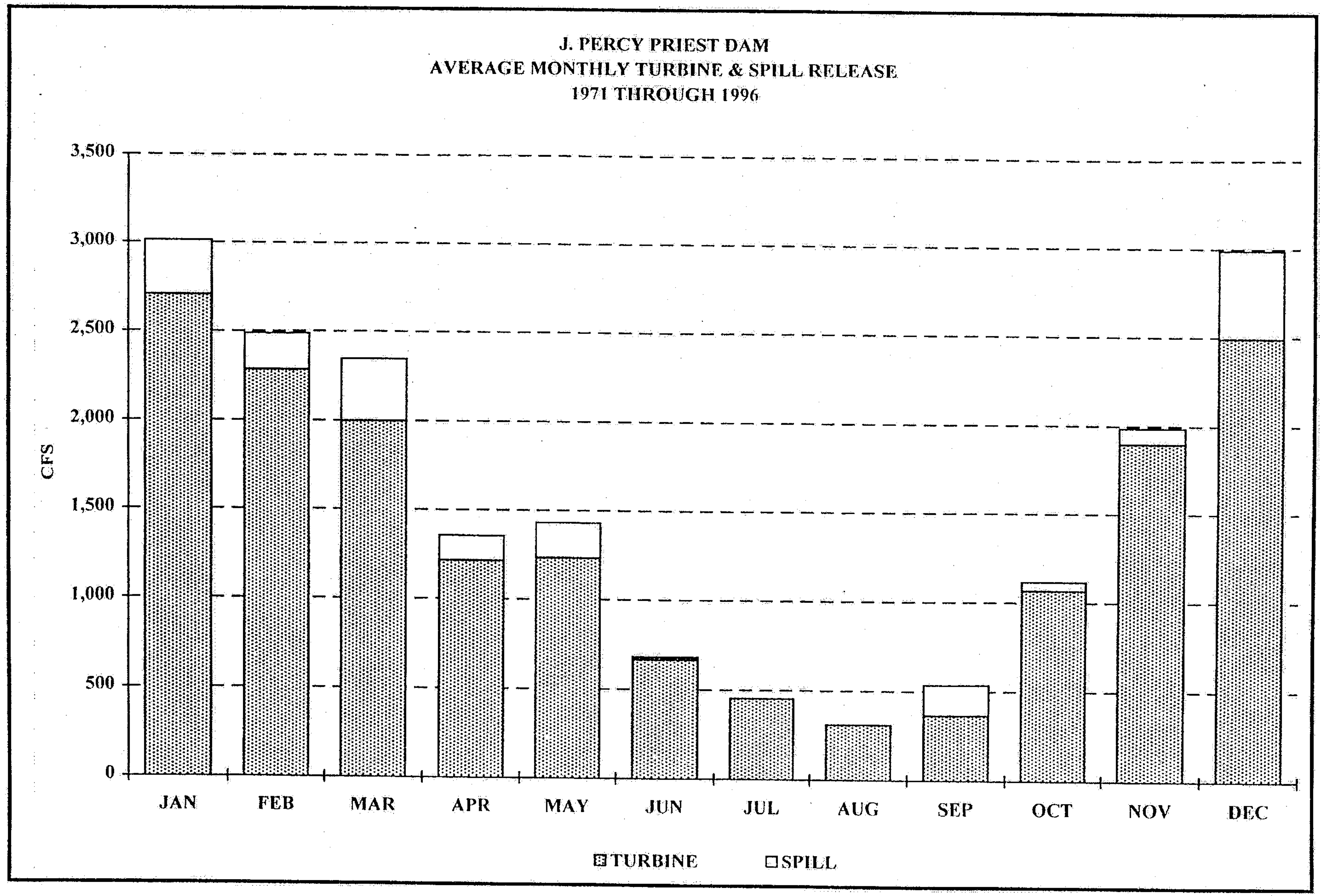


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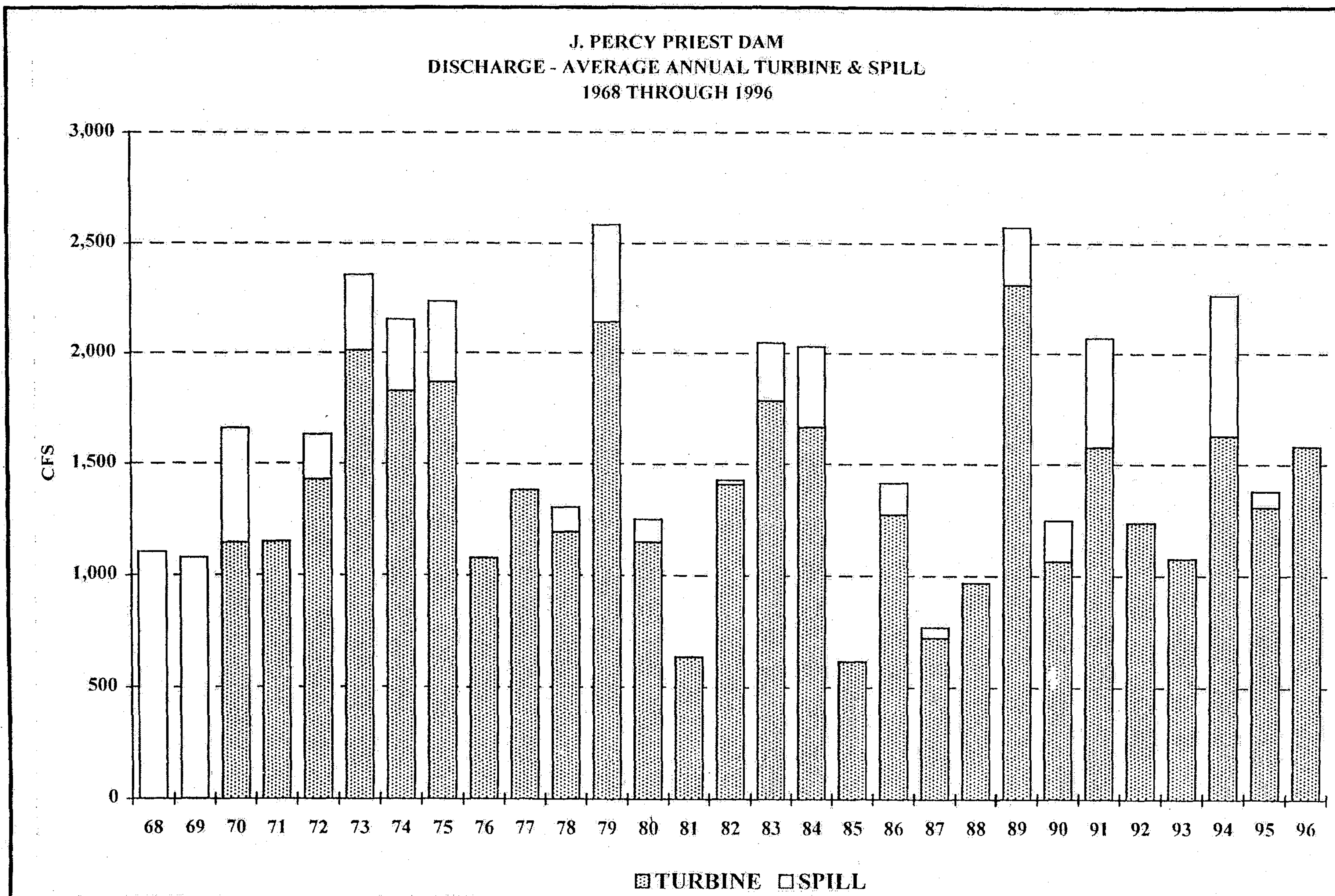
PLATE III-4



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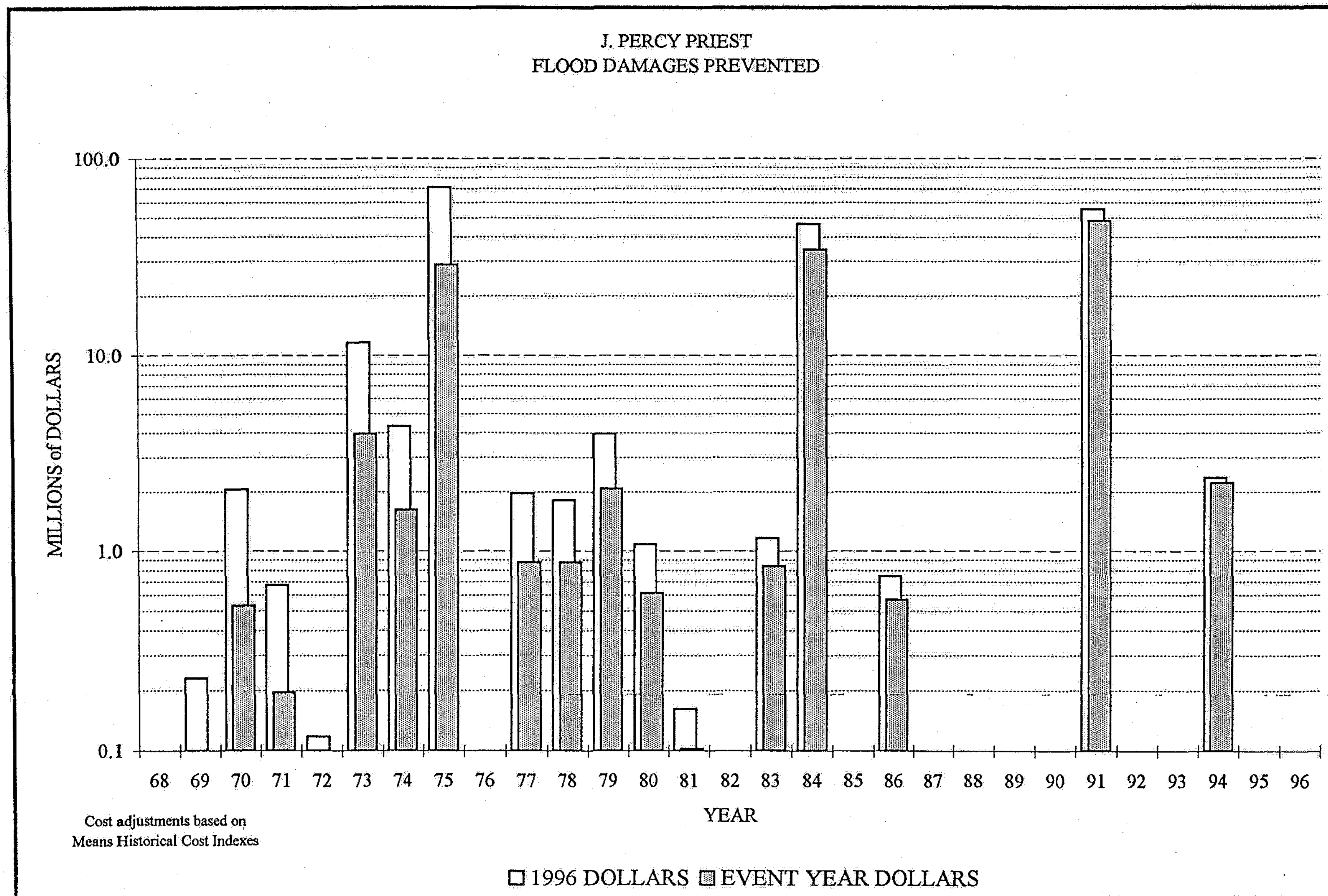
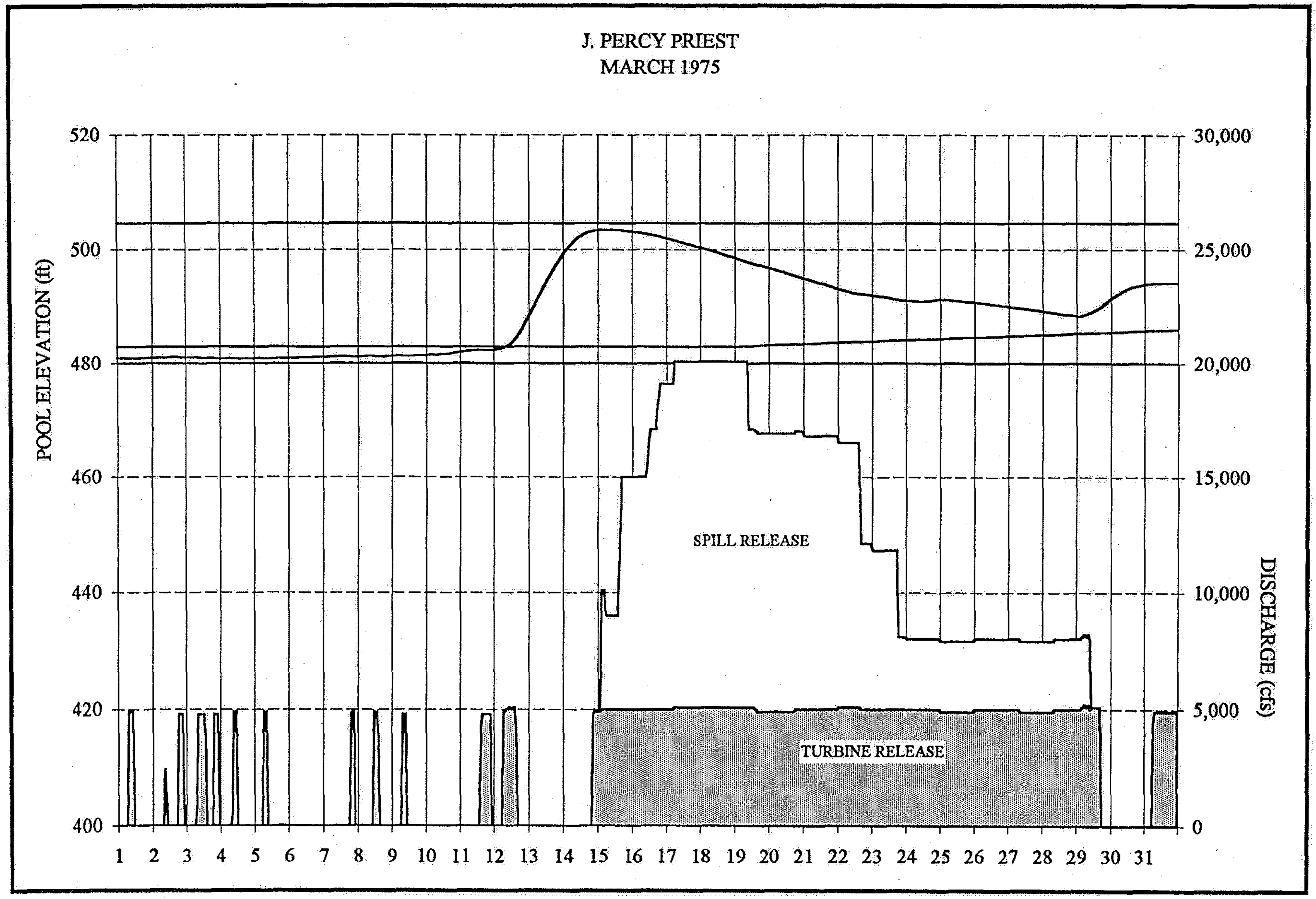
3.3. Flood Control. Flood control operations at J. Percy Priest have been very effective in reducing the peak stage in Nashville since lag time to Nashville for releases from this project is only about five to six hours. As shown in Plate III-1 the flood control pool at J. Percy Priest has been used regularly during the project's history. Water has been above the bottom third of the flood control pool during 12 of the 27 years displayed. Water has been into the top third of the pool three times, and one year actually exceeded the top of the flood control pool. Plate III-6 shows the history of flood damages prevented by operations at J. Percy Priest. In terms of 1996 dollars, the project has prevented over 200 million dollars of damage, primarily in Metropolitan Nashville. The damages prevented in 1975, 1984, and 1991 account for the vast majority of the total. These three years represent 80% of the total dollar amount of flood protection provided by this project to date. Pool elevations and discharges for the March, 1975 and May, 1984 flood events are shown on Plates III-7 and III-8.


J. PERCY PRIEST
FLOOD DAMAGES PREVENTED
100.0
10.0
1.0
0.1
MILLIONS of DOLLARS
68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96
YEAR
Cost adjustments based on
Means Historical Cost Indexes
1996 DOLLARS
EVENT YEAR DOLLARS


J. PERCY PRIEST
MARCH 1975
POOL ELEVATION (ft)
DISCHARGE (cfs)
520
500
480
460
440
420
400
30,000
25,000
20,000
15,000
10,000
5,000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
SPILL RELEASE
TURBINE RELEASE

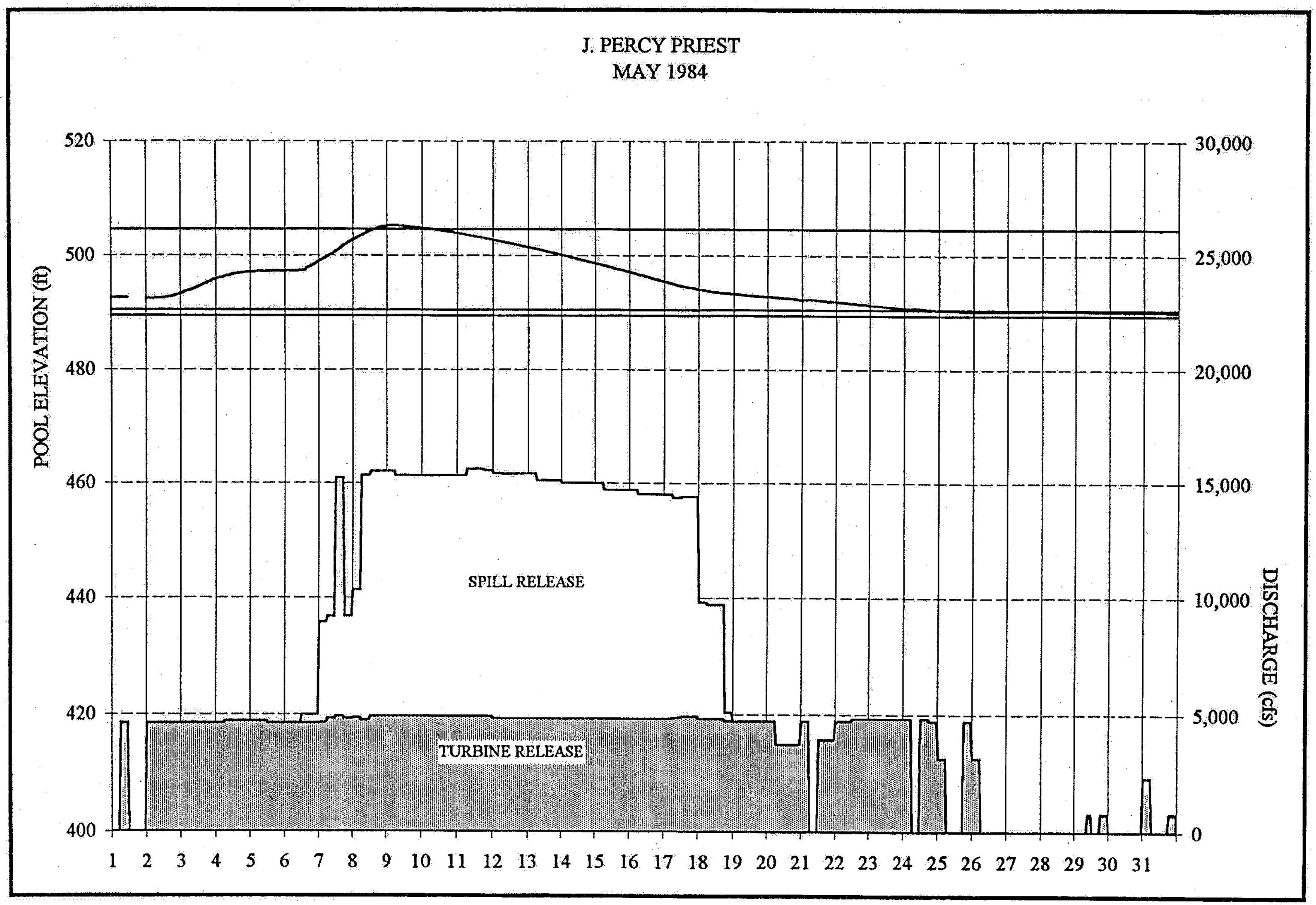

J. PERCY PRIEST
MAY 1984
POOL ELEVATION (ft)
DISCHARGE (cfs)
520
500
480
460
440
420
400
30,000
25,000
20,000
15,000
10,000
5,000
0
SPILL RELEASE
TURBINE RELEASE
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

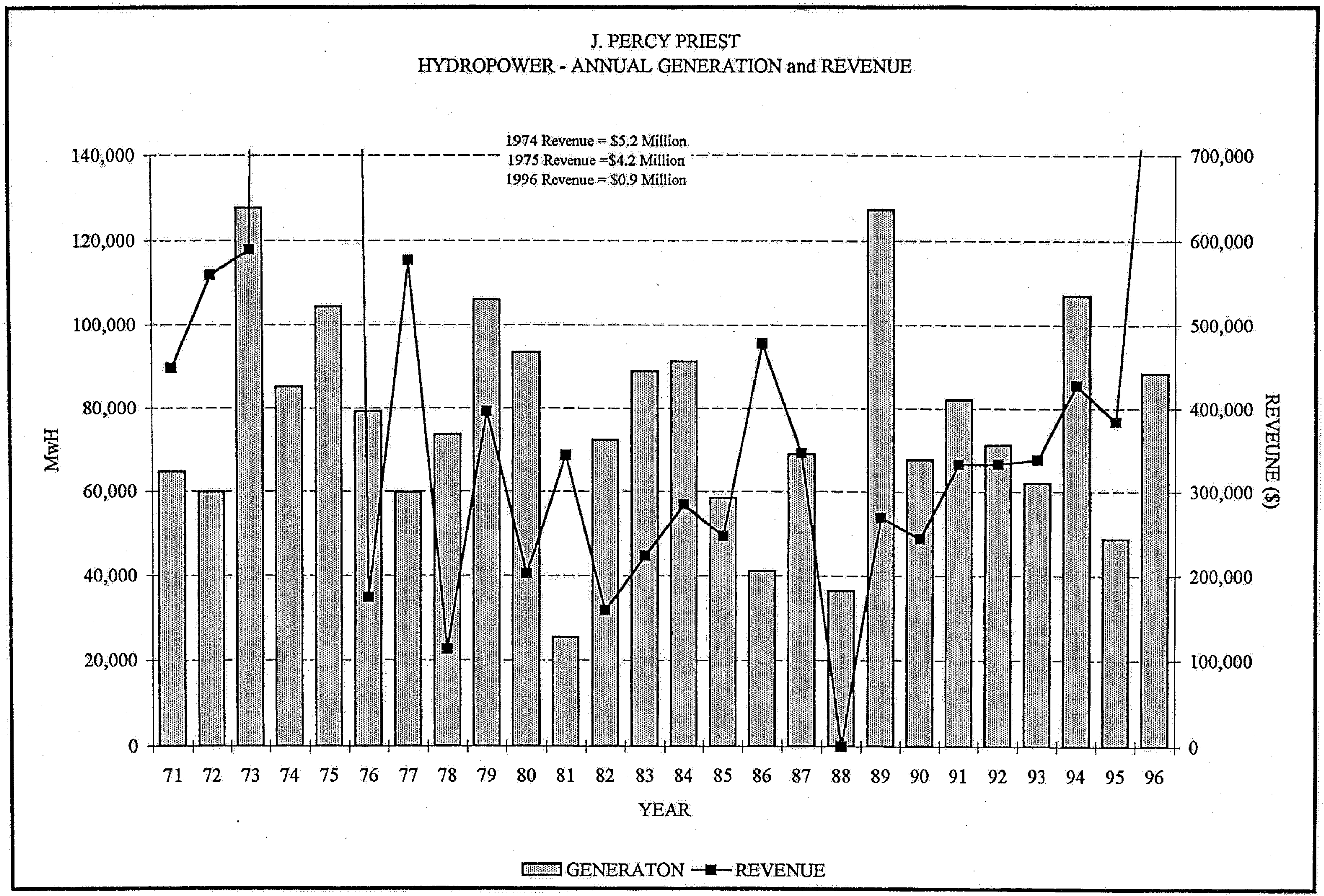
PLATE III - 8

3.4. Hydropower.

3.4.1. Power generated at J. Percy Priest is marketed by the Southeastern Power Administration. SEPA negotiates separate contracts with each utility that purchases hydropower from the Cumberland system, however, all power generated from J. Percy Priest is dispatched through the Tennessee Valley Authority (TVA). A contract between SEPA and TVA specifies minimum weekly declarations of energy to be made available from the collective operation of eight projects in the Cumberland Basin including J. Percy Priest. The Corps of Engineers is not a party to this contract but operates under a separate Memorandum of Understanding (MOU) between SEPA, TVA, and the Corps. A copy of the MOU along with a discussion of its contents is provided in the Cumberland River Basin Master Water Control Plan.

3.4.2. The J. Percy Priest hydropower plant has one unit which supplies 30 megawatts of power, or about 3% of the District's 914 megawatt capacity. Like the other upstream storage projects, the power unit is operated to satisfy peak energy demands. However, unlike these other projects, which have deep zones of normal operation, the J. Percy Priest pool is operated within a relatively narrow band especially during the summer recreation season. In fact, the economic justification of the project clearly demonstrated that recreational dollar benefits overshadowed hydropower benefits during the summer months and that no firm power or energy should be expected from J. Percy Priest during the recreation season. Storage in the power pool ranges from about 10 days worth of the average seasonal flow in the winter to about 6 days worth in the summer.

3.4.3. A summary of the hydropower output of J. Percy Priest is presented on Plates III-9 and III-10. Both basin-wide and project specific annual generation fluctuate as a function of annual stream flows. Basin-wide, the annual fluctuations in hydropower revenues generally coincide with fluctuations in power generation. However, due to accounting procedures, this is not necessarily the case at individual projects. Annual system wide revenues fluctuate with flow but not as dramatically as generation due to baseline revenues received for providing a guaranteed power capacity which is available at all times. In addition, revenues have increased over the years reflecting the increases in the monetary value of power.


J. PERCY PRIEST
HYDROPOWER - ANNUAL GENERATION and REVENUE
1974 Revenue = $5.2 Million
1975 Revenue =$4.2 Million
1996 Revenue = $0.9 Million
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
MwH
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
REVEUNE ($)
71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96
YEAR
GENERATON
REVENUE

PPPOWER.XLC

SUMMARY OF J. PERCY PRIEST DAM HYDROPOWER OUTPUT

FISCAL YEAR	ESTIMATED ANNUAL GENERATION (million kwh)	GROSS GENERATION (million kwh)	% ABOVE/BELOW ESTIMATED ANNUAL GENERATION	STATION USE (million kwh)	NET GENERATION ① (million kwh)	REVENUE (s million)	REVENUE (¢ / kwh sold)
1971	70	65.4	- 7	.62	64.7	.45	.71
1972	70	60.5	- 14	.50	60.0	.56	1.00
1973	70	128.2	83	.54	127.7	.59	.47
1974	70	85.6	22	.39	85.2	5.21	6.16
1975	70	104.8	50	.42	104.4	4.24	4.08
1976	70	79.6	14	.42	79.2	.17	.22
1977	70	60.3	- 14	.50	59.8	.58	.98
1978	70	74.1	6	.47	73.6	.11	.16
1979	70	106.4	52	.43	106.0	.40	.38
1980	70	93.9	34	.44	93.4	.20	.22
1981	70	26.0	- 63	.53	25.4	.34	1.39
1982	70	72.7	4	.43	72.3	.16	.22
1983	70	89.3	28	.45	88.9	.22	.25
1984	70	91.7	31	.46	91.3	.29	.31
1985	70	59.0	- 16	.46	58.5	.25	.49
1986	70	41.6	- 41	.55	41.1	.48	1.19
1987	70	69.6	- 1	.55	69.0	.35	.51
1988	70	37.0	- 47	.64	36.4	0	0
1989	70	127.8	83	.55	127.2	.27	.21
1990	70	68.2	- 3	.50	67.7	.24	.36
1991	70	82.4	18	.45	82.0	.33	.41
1992	70	71.6	2	1.17	71.2	.33	.47
1993	70	62.4	-11	1.31	61.9	.34	.55
1994	70	107.5	54	1.25	107.0	.43	.40
1995	70	50.0	-29	1.12	48.7	.38	.80
1996	70	88.9	27	1.19	88.4	.90	1.03

① Net generation plus station use may not equal gross generation due to rounding

Source LRNCO-H

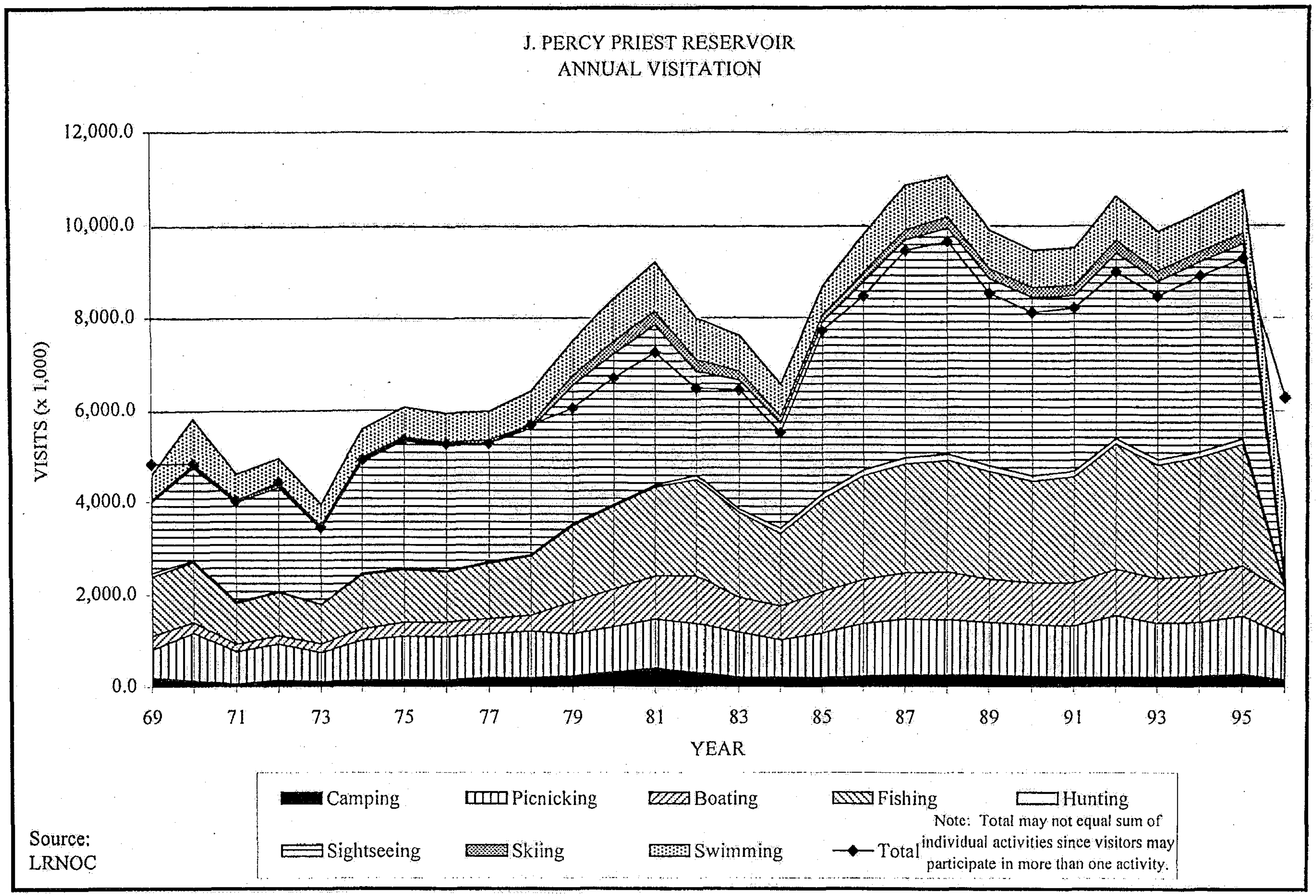
Plate III - 10

3.5. Recreation.

3.5.1. Recreation is an original congressionally authorized purpose at J. Percy Priest and the project is the second most active for recreation in the Nashville District. Only Old Hickory is more extensively used. This high usage is due to the location of both these dams within Metropolitan Nashville. As shown in Plate III-11, recreational visitation at J. Percy Priest has risen fairly steadily over the years, with a few brief periods of decline. To date, the record year for visitation is 1988 with 9.6 million. The sharp increase between 1984 and 1988 coincides with the severe four year drought experienced in the Cumberland Basin. The most popular recreational activity at the project has always been sightseeing, with fishing being second. Swimming, boating and picnicking are also popular activities.

3.5.2. The visitation dollar benefit attributed to J. Percy Priest Lake is shown on Plate III-12. Prior to 1996, this was a very conservative rough estimate based on an average expenditure rate of $1.96 per visitor hour for all the various user groups, such as boaters, campers, hunters, etc. In addition, it was intended to reflect only those expenditures made in the vicinity of the lake and did not attempt to account for major expenditures prior to the visit, such as the purchase of camping gear or a boat. Plate III-13 shows the impacts of low lake levels on water based recreational facilities and water supply intakes.

3.5.3. For 1996, a distinct decrease in the visitation chart and increase in the dollar benefit chart can easily be detected. This is due to a change in methodology of how the District determines these recreational values. The Nashville District now uses the Visitor Information and Reporting System (VIRS) which was developed by the Waterways Experiment Station (WES). This system counts each "visitor" on Corps' property for recreation as "one", even if that visitor stayed a full week on the property. The previous method used by the District would have counted a full week stay as seven recreation use-days. This different methodology would account for the decrease in the visitation chart. The sharp increase in the dollar benefit is also attributed to the new VIRS system. It reflects a much greater average expenditure rate which varies depending on the recreational activity. However, similar to the previous technique, this new accounting method still does not attempt to account for major expenditures of durable goods.


J. PERCY PRIEST RESERVOIR
ANNUAL VISITATION
12,000.0
10,000.0
8,000.0
6,000.0
4,000.0
2,000.0
0.0
VISITS (x 1,000)
69
71
73
75
77
79
81
83
85
87
89
91
93
95
YEAR
Camping
Picnicking
Boating
Fishing
Hunting
Sightseeing
Skiing
Swimming
Total
Note: Total may not equal sum of individual activities since visitors may participate in more than one activity.
Source:
LRNOC

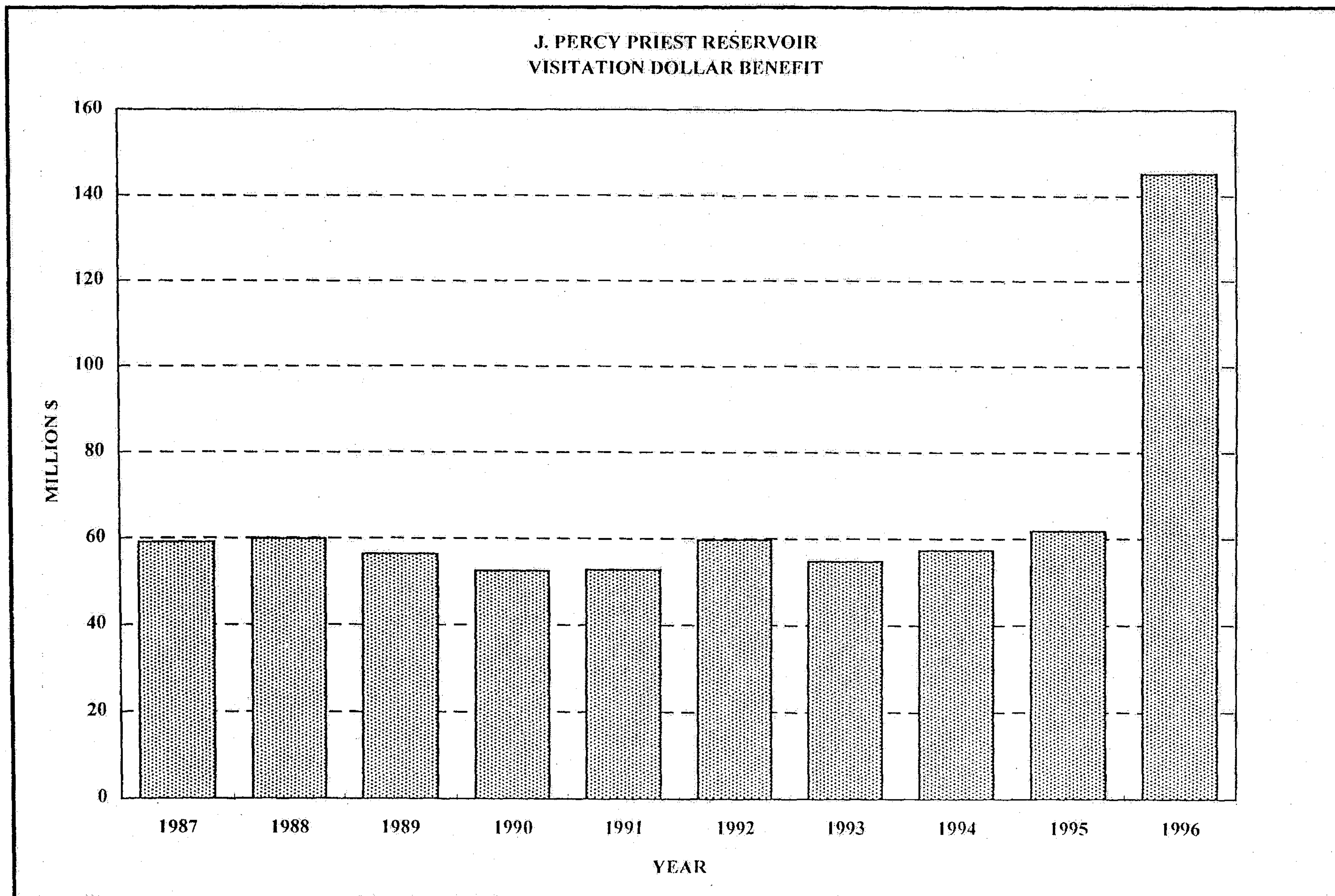


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PLATE III - 12

J. PERCY PRIEST RESERVOIR
IMPACTS OF LAKE LEVELS ON RECREATION AND NATURAL RESOURCES

TOP OF SUMMER POOL - ELEVATION 490.5
BOTTOM OF SUMMER POOL - ELEVATION 489.5

WATER BASED FACILITIES		INITIAL IMPACT (A) ELEVATION 483.0 (6.5 feet below bottom of summer pool)			MAJOR IMPACT (B) ELEVATION 475.0 (14.5 feet below bottom of summer pool)			SEVERE IMPACT (C) ELEVATION 475.0 (14.5 feet below bottom of summer pool)		
Type	Number	Usable	Marginal or Unusable	Percent Reduction	Usable	Marginal or Unusable	Percent Reduction	Usable	Marginal or Unusable	Percent Reduction
Beaches	10	0	10	100%	0	10	100%	Same as Major Impact		
Boat Ramps	30	30	0	0%	0	30	100%			
Marinas	5	5	0	0%	0	5 (D)	100%			
Wet Moorage at Marinas	1,324	1,324	0	0%	0	1,324	100%			
Private Docks	0	-	-	N/A	-	-	N/A			
Public Water Intakes	2	2	0	0%	1	1 (E)	50%			
Industrial Water Intakes	0	-	-	N/A	-	-	N/A			
Water Surface Acreage	14,200	11,630	2,570	18%	8,755	5,445	38%			

J. PERCY PRIEST RESERVOIR
IMPACTS OF LAKE LEVELS ON RECREATION AND NATURAL RESOURCES

FOOTNOTES:

A. Initial Impacts - The level where recreation and natural resources management impacts are first observed: some ramps are unusable, most beaches are unusable or minimally usable, and/or navigation hazards begin to surface.

B. Major Impacts - The level where significant impact would occur: water or boating access would be significantly limited, a significant number of boat ramps would be unusable, major navigation hazards occur, channels to marinas would become impassable and/or slips would have to be relocated, exposed mud or rock bottom surfaces would make water access from recreation areas inaccessible, a majority of privately permitted boat docks would be unusable or relocated, and all swimming beaches are unusable.

C. Severe Impacts - The level where a majority of recreation facilities are virtually out of business: all or almost all boat ramps are closed, all swimming beaches are closed, major navigation hazards severely limit lake use, channels to marinas are impassable, and slips are unusable, and a majority of the privately permitted boat docks are unusable.

D. All marinas.
E. Consolidated Utilities

3.6. Water Quality.

3.6.1. The overall quality of water in J. Percy Priest Reservoir is not very good, especially through the summer and early fall. Evaporation frequently exceeds inflow during this period. Theoretical retention times which are based on historic median monthly pool elevations and historic mean monthly discharges are presented on Plate III-21. Retention times vary from an average of just under 50 days for water released in January to about 220 days for water released in October. These estimates adequately reflect conditions in the entire reservoir since water exchange between the embayments and the main stream is considered to be relatively good.

3.6.2. The operating plan provides for a relatively stable recreation pool from April 27 until October 5th. During this period, releases are generally made only after rainfall events. This relatively stagnant condition causes the reservoir to experience severe dissolved oxygen depletion throughout the summer and early fall. It is not unusual for DO levels to drop below 1.0 mg/l at water depths of 15 to 30 feet. Representative water quality charts are included as Plates III-14 through III-20 at the end of this chapter.

3.6.3. The main water quality problem in the lake is eutrophication. Algal blooms have occurred in all areas of the reservoir at various times and can sometimes interfere with recreational activities. In addition to suburban runoff, a significant amount of nutrient loading occurs naturally due to the geology of the basin and is most extreme during heavy runoff periods. This causes the most severe algal blooms in the downstream areas of the reservoir to occur in the spring during high flow years. In the upstream areas, however, the most severe blooms occur during the fall when stream flows are relatively low and when a more significant portion of the nutrients come from sewage treatment effluents located in the upstream reaches. Eutrophic problems are expected to continue in the reservoir since it is not economically feasible at this time to remove a significant portion of the nutrients originating from the non-point sources.

3.6.4. The reservoir is thermally stratified for seven to eight months of the year and anaerobic conditions in the hypolimnion exist for about five of these months. During the period when the hypolimnion is anaerobic, the concentrations of ammonia, phosphorus, hydrogen sulfide, iron and manganese increase significantly in the deeper layers. Since the power plant discharges water from this lower area, generation during the summer and fall results in the release of water with undesirably high concentrations of these parameters along with low dissolved oxygen concentrations. This can be a very undesirable condition if these releases are allowed to merge with a relatively slow moving Cumberland River. In order to dilute the J. Percy Priest release and move the water through this reach of the Cumberland as quickly as possible, every effort is made to generate with at least one unit at Old Hickory anytime J. Percy Priest releases are being made during the summer and early fall. To improve the in-pool situation, localized mixing devices have been installed on the upstream face of the dam in an effort to push better quality surface water down to the penstock intake. Safety concerns and problems encountered with structural components have precluded the utilization of the localized mixing system.

3.7. Fish & Wildlife.

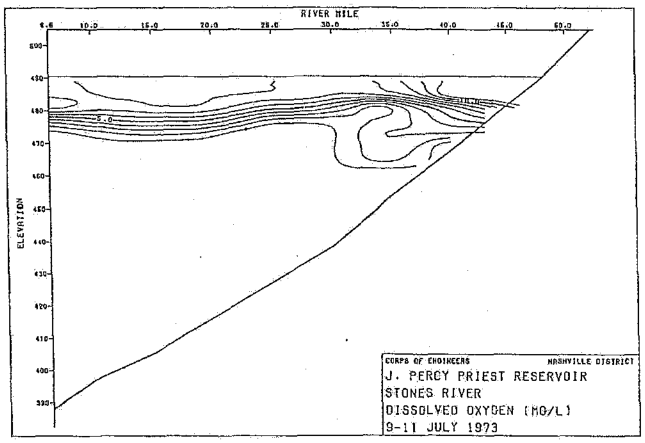
3.7.1. Due to its location within Nashville, the reservoir receives tremendous fishing pressure. Thus far, the fishery has held up under this pressure and continues to produce heavy annual harvests. The reservoir receives a high nutrient loading which is generally not flushed through the system. This produces a condition similar to that of a large farm pond with a high carrying capacity for fish and contributes to excellent annual production rates.

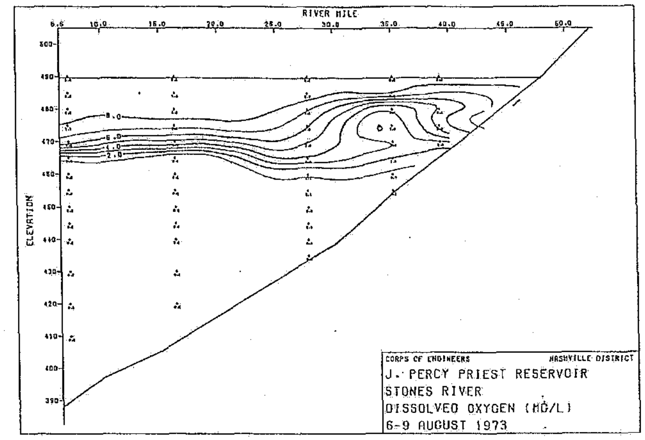
3.7.2. Bass are the species most sought by the fishermen, however, crappie have recently produced the greatest harvest. During the late eighties growth studies indicated that the black bass were experiencing significant declines in relative lengths and weights. This situation has improved since the Tennessee Wildlife Resources Agency (TWRA) implemented a 15 inch size limit for black bass beginning on March 1, 1990. Over the past ten years, the TWRA has stocked rock bass and hydrids at an average rate of about 80,000 per year.

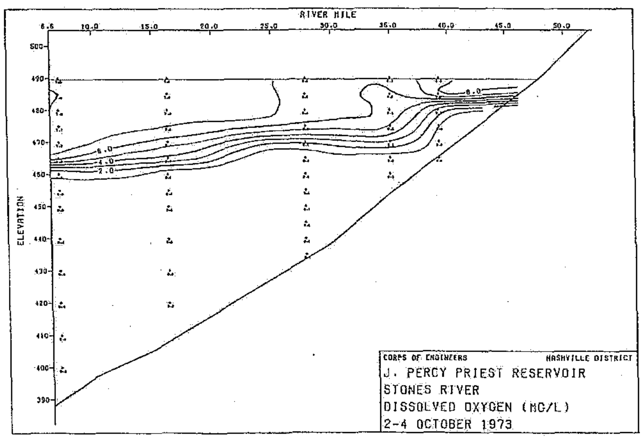
3.7.3. Commercial species found in the reservoir include catfish, flathead, buffalo, carp, carpsucker and gar. However, commercial fishing is not permitted at the present time.

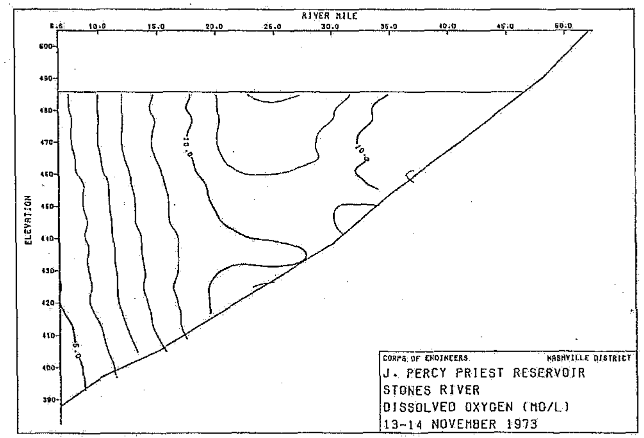
3.7.4. Low inflows and project releases during the summer contribute to higher surface temperatures and lower dissolved oxygen levels in the reservoir. This produces great stress on the fish since in order to obtain an adequate dissolved oxygen supply, they are forced to remain in undesirable water temperatures, usually within about fifteen feet of the surface. These factors have contributed to several fish kills, especially during the 1970's and early 1980's.

3.7.5. Overall, fish and wildlife conditions are enhanced due to the lack of shoreline development which is limited to recreation areas under the control of Corps leases. Aerial wheat and rye grass seeding of the shoreline has been performed with limited success primarily due to the late drawdown of the summer pool.



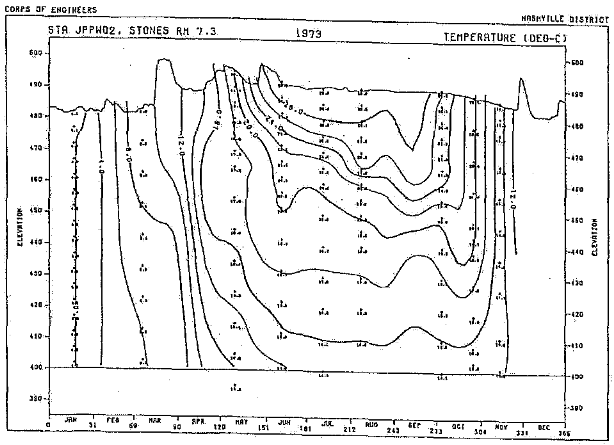


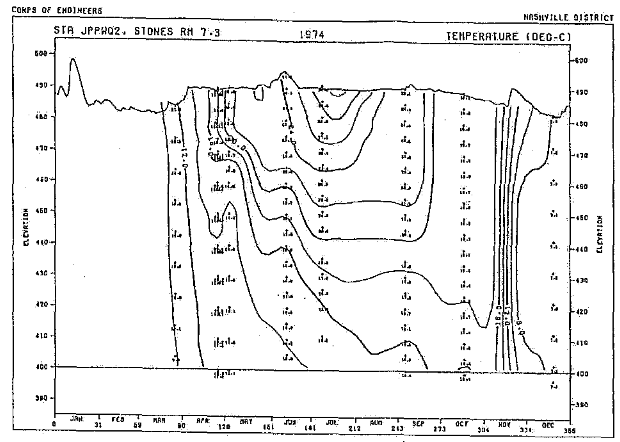


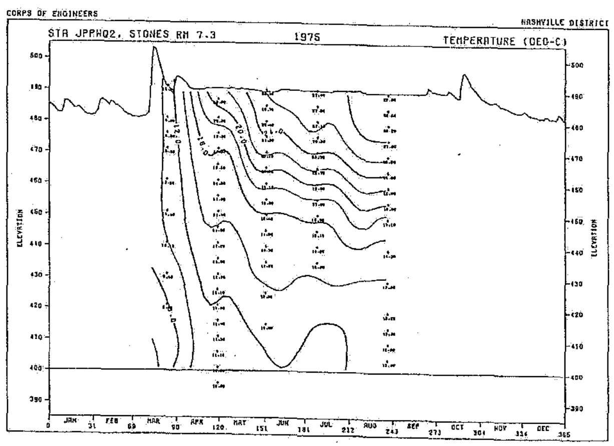


DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
NASHVILLE, TENNESSEE

LONGITUDINAL DISSOLVED OXYGEN PLOTS (JUL-NOV,1973)

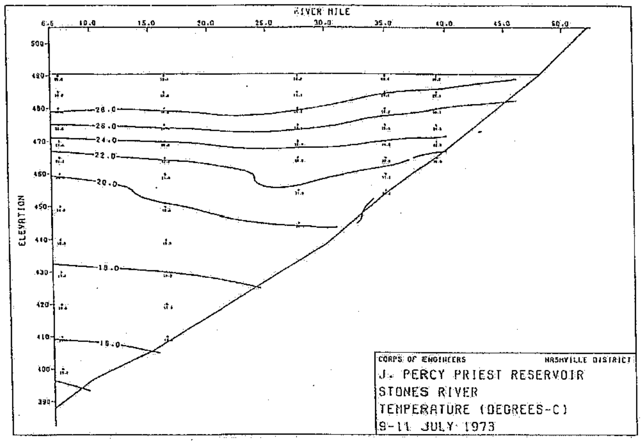


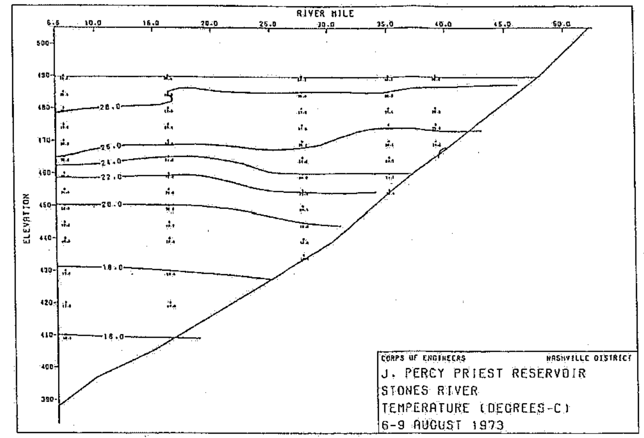


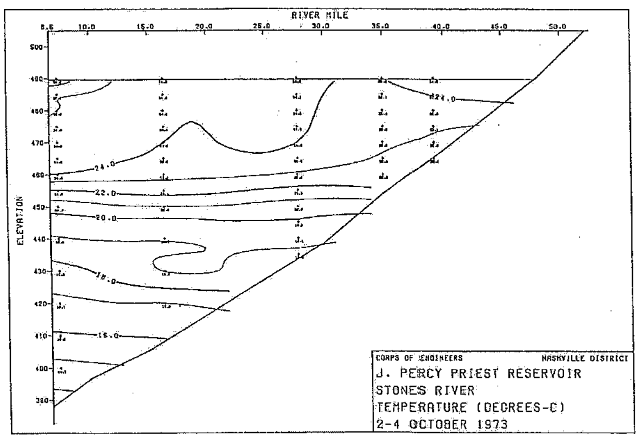


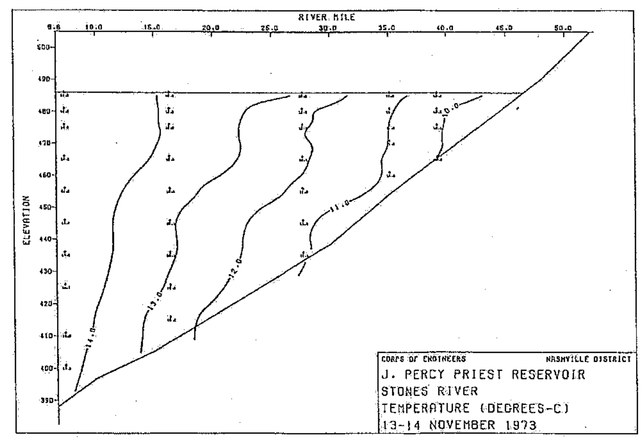
DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
NASHVILLE, TENNESSEE

ANNUAL TEMPERATURE
PLOTS (1973-1975)



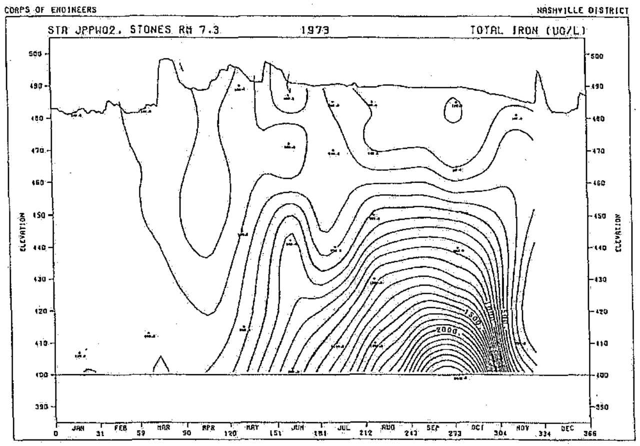


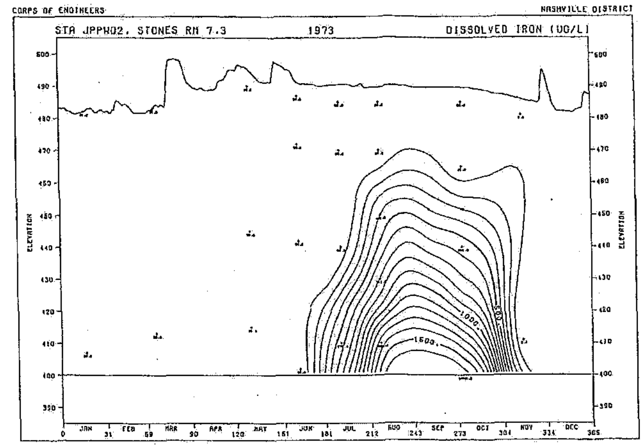


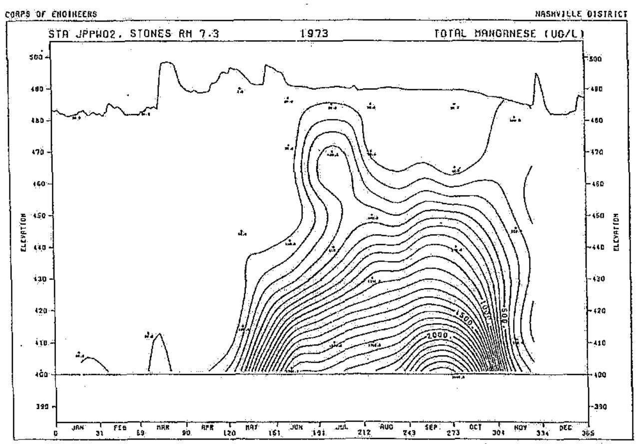


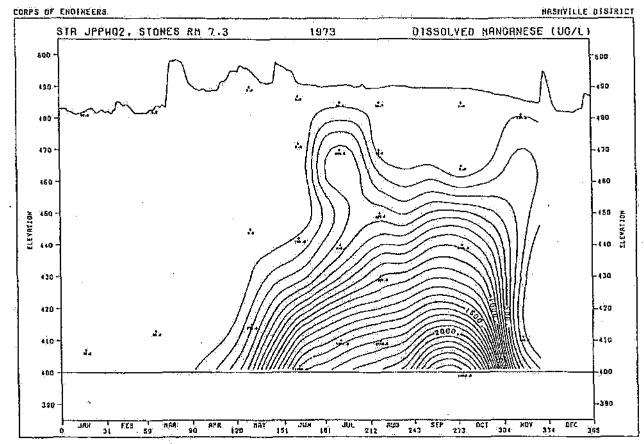
DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
NASHVILLE, TENNESSEE

LONGITUDINAL TEMPERATURE PLOTS (JUL-NOV,1973)



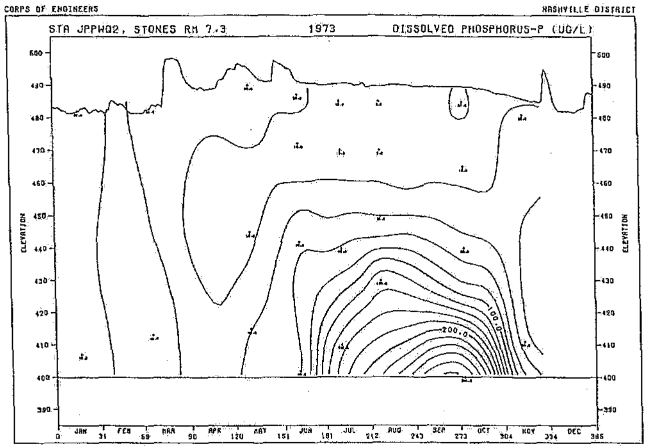


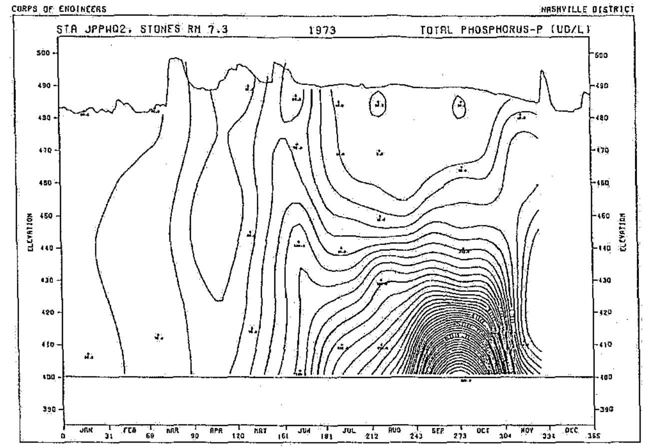


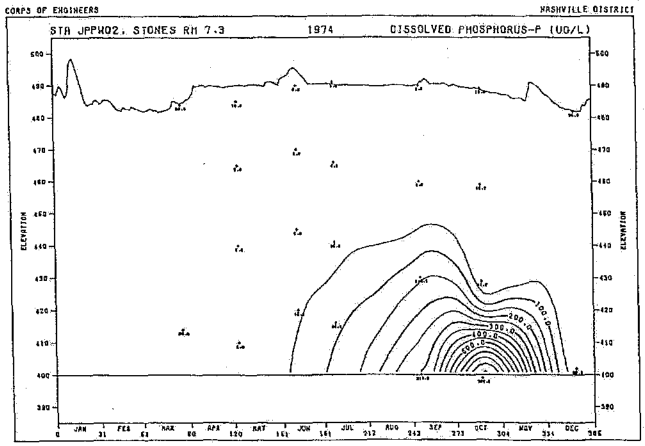


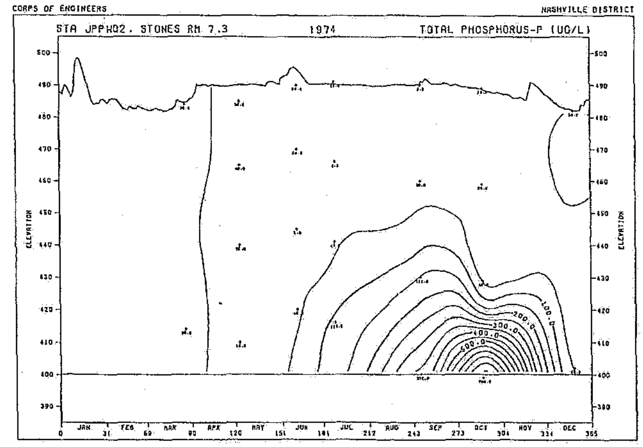
DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
NASHVILLE, TENNESSEE

ANNUAL TOTAL AND DISSOLVED IRON AND MANGANESE PLOTS (1973)



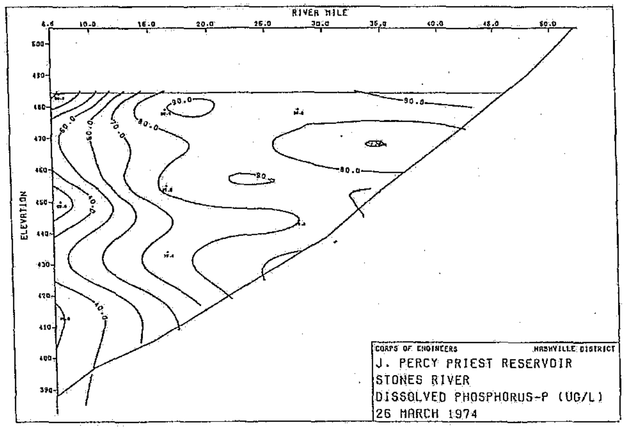


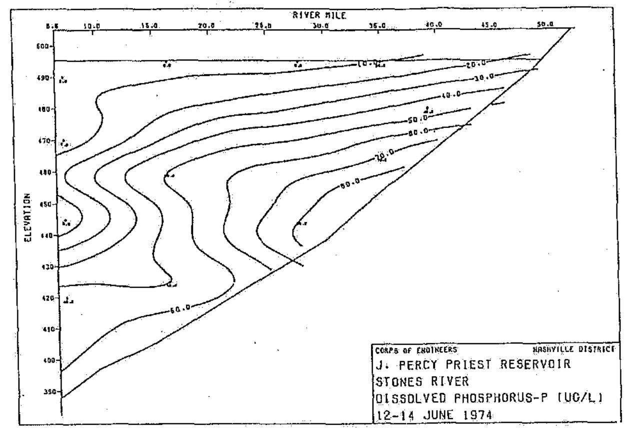


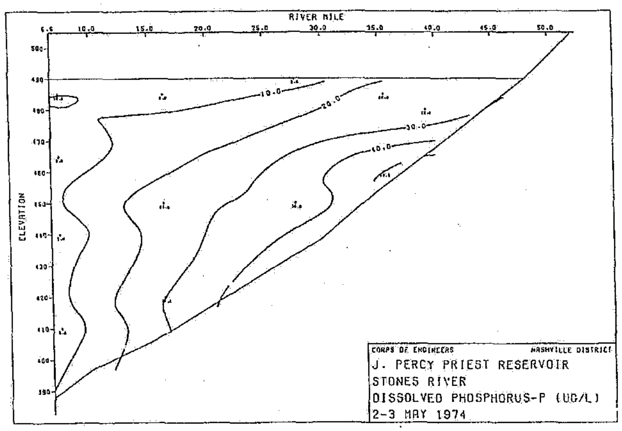


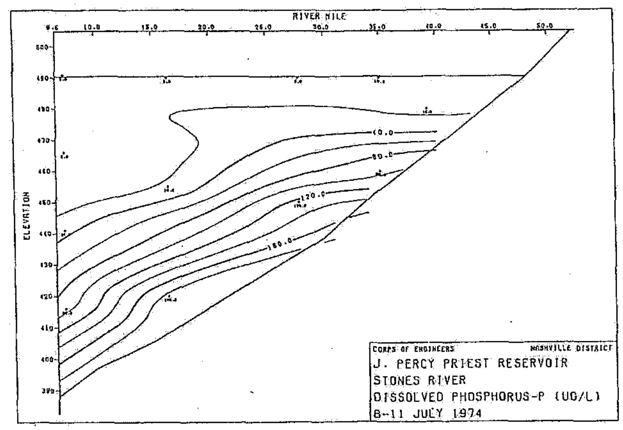
DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
NASHVILLE, TENNESSEE

ANNUAL TOTAL AND DISSOLVED PHOSPHORUS PLOTS (1973-1974)









DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS

LONGITUDINAL DISSOLVED PHOSPHORUS PLOTS (MAR-JUL,1974)

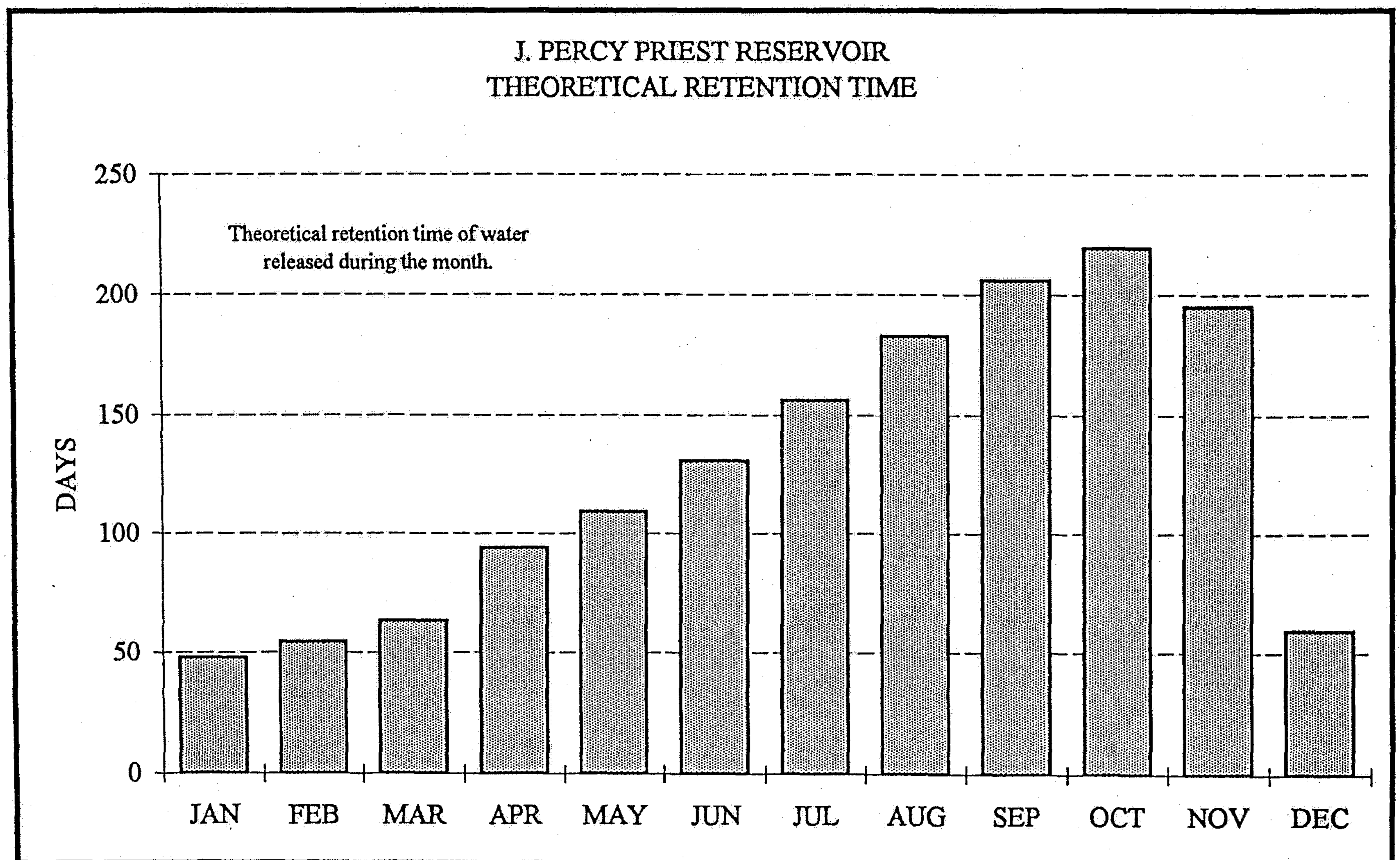

J. PERCY PRIEST RESERVOIR
THEORETICAL RETENTION TIME
Theoretical retention time of water released during the month.
DAYS
250
200
150
100
50
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

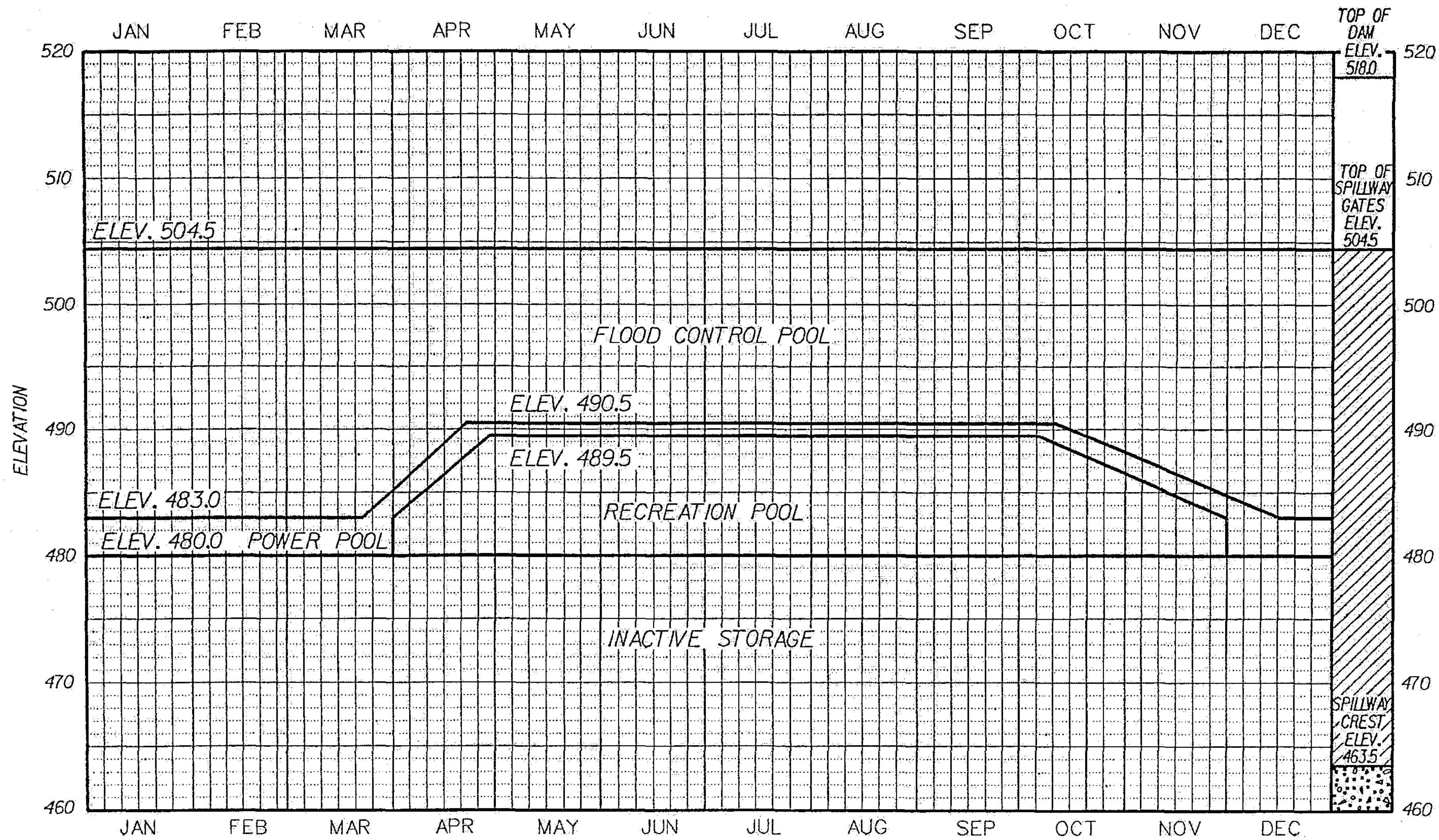
PLATE III - 21

J. PERCY PRIEST LAKE
WATER SUPPLY INTAKES

SYSTEM	STATE	COUNTY	RIVER NAME	RIVER MILE	RIVER BANK	EMBAYMENT NAME	EMBAYMENT MILE	EMBAYMENT BANK	INLET (ins.) DIA.	INLET TOP ELEV.	INLET OPER. ELEV.	SERVICES NUM.	SERVICES POP.
Smyrna	TN	Rutherford	Stones	[redacted]	[redacted]				16 x 16	[redacted]	[redacted]	3,500	10,430
Consolidated	TN	Rutherford	Stones	[redacted]		East Fork Stones	[redacted]	[redacted]	2@24	[redacted]	[redacted]	9,525	28,345

SYSTEM	PRODUCTION (gpd) AVERAGE DAILY	PRODUCTION (gpd) DESIGN CAPACITY	SURVEY DATE	PLANT PHONE NUMBER	OFFICE PHONE NUMBER	OFFICE CONTACT NAME	OFFICE CONTACT TITLE
Smyrna	2,800,000	8,000,000	6/19/86	[redacted]		[redacted]	
Consolidated	4,000,000	8,000,000	6/09/86	[redacted]	[redacted]	[redacted]	Engineer

J. PERCY PRIEST PROJECT
GUIDE CURVE



U.S. ARMY CORPS OF ENGINEERS
NASHVILLE DISTRICT

J. PERCY PRIEST RESERVOIR
STONES RIVER, TENNESSEE

AREA & VOLUME TABLE

Elevation msl	Area acres	Volume acre-feet	Volume KDSF	Elevation msl	Area acres	Volume acre-feet	Volume KDSF	Elevation msl	Area acres	Volume acre-feet	Volume KDSF
				431	1,360	15,800	7.97	476	9,290	229,000	115.5
387	0	0	0.	2	1,480	17,200	8.67	7	9,600	238,000	120.0
8	2	1	0.0005	3	1,610	18,800	9.48	8	9,900	248,000	125.0
9	5	5	0.0025	4	1,740	20,500	10.3	9	10,240	258,000	130.1
390	10	10	0.005	435	1,860	22,300	11.2	480	10,570	268,000	135.1
1	15	20	0.010	6	1,990	24,200	12.2	1	10,920	279,000	140.7
2	20	35	0.018	7	2,120	26,200	13.2	2	11,280	290,000	146.2
3	25	60	0.030	8	2,240	28,400	14.3	3	11,630	302,000	152.3
4	30	85	0.043	9	2,370	30,700	15.5	4	12,000	313,000	157.8
395	40	120	0.061	440	2,500	33,200	16.7	485	12,370	326,000	164.4
6	50	170	0.086	1	2,620	35,700	18.0	6	12,730	338,000	170.4
7	60	220	0.11	2	2,750	38,400	19.4	7	13,110	351,000	177.0
8	70	290	0.15	3	2,870	41,200	20.8	8	13,470	364,000	183.5
9	85	360	0.18	4	3,000	44,200	22.3	9	13,840	378,000	190.6
400	100	460	0.23	445	3,120	47,200	23.8	490	14,200	392,000	197.6
1	115	560	0.28	6	3,240	50,400	25.4	1	14,590	406,000	204.7
2	130	680	0.34	7	3,360	53,700	27.1	2	14,980	421,000	212.3
3	145	820	0.41	8	3,500	57,100	28.8	3	15,380	436,000	219.8
4	165	98	0.49	9	3,640	60,700	30.6	4	15,820	452,000	227.9
405	185	1,150	0.58	450	3,800	64,400	32.5	495	16,300	468,000	236.0
6	205	1,340	0.68	1	3,980	68,300	34.4	6	16,800	485,000	244.5
7	225	1,560	0.79	2	4,150	72,400	36.5	7	17,380	502,000	253.1
8	245	1,790	0.90	3	4,320	76,600	38.6	8	17,840	519,000	261.7
9	265	2,050	1.03	4	4,480	81,000	40.8	9	18,740	538,000	271.2
410	290	2,330	1.17	455	4,660	85,600	43.2	500	19,600	557,000	280.8
1	310	2,630	1.33	6	4,840	90,300	45.5	1	20,210	577,000	290.9
2	335	2,950	1.49	7	5,020	95,200	48.0	2	20,900	597,000	301.0
3	360	3,300	1.66	8	5,200	100,000	50.4	3	21,610	618,000	311.6
4	385	3,670	1.85	9	5,390	106,000	53.4	4	22,350	640,000	322.7
415	410	4,060	2.05	460	5,590	111,000	56.0	505	23,100	663,000	334.3
6	435	4,490	2.26	1	5,800	117,000	59.0	6	23,920	687,000	346.4
7	465	4,940	2.49	2	6,020	123,000	62.0	7	24,800	711,000	358.5
8	490	5,420	2.73	3	6,230	129,000	65.0	8	25,650	736,000	371.1
9	525	5,920	2.98	4	6,440	135,000	68.1	9	26,550	762,000	384.2
420	555	6,460	3.26	465	6,660	142,000	71.6	510	27,460	789,000	397.8
1	590	7,040	3.55	6	6,870	148,000	74.6	1	28,370	817,000	411.9
2	630	7,650	3.86	7	7,080	155,000	78.1	2	29,270	846,000	426.5
3	670	8,290	4.18	8	7,300	163,000	82.2	3	30,180	876,000	441.7
4	715	8,990	4.53	9	7,510	170,000	85.7	4	31,080	906,000	456.8
425	765	9,730	4.91	470	7,730	178,000	89.7	515	31,980	938,000	472.9
6	825	10,500	5.29	1	7,960	186,000	93.8	6	32,890	970,000	489.0
7	895	11,400	5.75	2	8,200	194,000	97.8	7	33,790	1,004,000	506.2
8	980	12,300	6.20	3	8,46	202,000	101.8	8	34,700	1,038,000	523.3
9	1,100	13,400	6.76	4	8,720	211,000	106.4	9	35,600	1,073,000	541.0
430	1,230	14,500	7.31	475	9,000	219,000	110.4	520	36,500	1,109,000	559.1

Note: Areas and volumes determined from maps prepared by stereo-projection from aerial photographs flown in 1944. Map scale, 1:10,000; contour interval, 10 feet; datum, M.S.L. (1929 Gen. Adj.)

DISCHARGE RATING TABLE

East Fork Stones River at Woodbury, TN
Datum 676.23 Rating No. 21 (10/1/83)

Gage Height (feet)	Discharge (cfs)	Gage Height (feet)	Discharge (cfs)
1.4	.50 *	5.1	708 *
1.5	1.10 *	5.2	738 *
1.6	2.20 *	5.3	769 *
1.7	3.80 *	5.4	801 *
1.8	6.00 *	5.5	834 *
1.9	9.00 *	6.0	1010 *
2.0	13.0 *	6.5	1190 *
2.1	18.0 *	7.0	1354
2.2	26.0 *	7.5	1525
2.3	32.0 *	8.0	1703
2.4	41.2	8.5	1887
2.5	52.0 *	8.8	2000 *
2.6	63.0 *	9.0	2081
2.7	77.0 *	9.5	2287
2.8	94.0 *	9.65	2350 *
2.9	115 *	10.0	2496
3.0	138 *	10.2	2580 *
3.1	159	10.5	2756
3.2	182	10.9	3000 *
3.3	207	11.0	3065
3.4	234 *	11.5	3400 *
3.5	260 *	12.0	3820
3.6	287 *	12.5	4270 *
3.7	313	13.0	4850
3.8	340	13.5	5480 *
3.9	369	14.0	6276
4.0	399 *	14.5	7150 *
4.1	425	15.0	8296
4.2	453	15.5	9576
4.3	481	16.0	11000 *
4.4	509	16.5	12470
4.5	539 *	16.7	13100 *
4.6	566	16.8	13400 *
4.7	593		
4.8	621		
4.9	650		
5.0	679 *		

* Values which were included in USGS rating table.
All other values were interpolated.

Source: USGS

DISCHARGE RATING TABLE

East Fork Stones River near Lascassas, TN
Datum 507.88 Sandy Hook — Rating No. 32 (12/25/87)

Gage Height (feet)	Discharge (cfs)
2.1	3.000 *
2.2	4.000 *
2.3	5.000 *
2.4	6.092
2.5	7.100 *
2.6	8.951
2.7	10.89
2.8	12.90 *
2.9	16.89
3.0	21.50 *
3.5	71.00 *
4.0	147.0 *
4.4	215.0 *
4.5	234.5
4.6	255.0 *
5.0	350.0 *
5.5	475.0 *
6.0	630.0 *
7.0	1000 *
8.0	1411
10.0	2428
12.0	3700 *
14.0	4924
16.0	6271
18.0	7732
20.0	9300 *
22.0	11100 *
24.0	12850
26.0	14690 *
28.0	16570 *
30.0	19030 *
32.0	21920 *
34.0	25160 *
36.0	29000 *
38.0	35000 *
40.0	43000 *

West Fork Stones River at Murfreesboro, TN
Datum 514.95 — Rating No. 08 (10/1/91)

Gage Height (feet)	Discharge (cfs)
1.2	1.500 *
1.3	2.600 *
1.4	4.200 *
1.5	5.800 *
1.6	7.800 *
1.7	10.00 *
1.8	13.00 *
1.9	17.00 *
2.0	21.50 *
2.1	27.00 *
2.2	33.00 *
2.3	41.00 *
2.4	53.00 *
2.5	66.00 *
2.6	85.00 *
2.7	112.0 *
2.8	150.0 *
2.9	195.0 *
3.0	240.0 *
3.2	342.0 *
3.4	445.0 *
3.6	557.0 *
3.8	670.0 *
4.0	772.0 *
4.5	1015 *
5.0	1230 *
6.0	1706
6.2	1810 *
7.0	2210 *
8.0	2710 *
9.0	3200 *
10.0	3750 *
12.0	4900 *
13.5	6015 *
15.0	7200 *
17.0	9600 *
18.5	12300 *
20.0	15800 *
22.0	22800 *
24.0	32000 *

* Values which were included in USGS rating table. All other values were interpolated.

Source: USGS

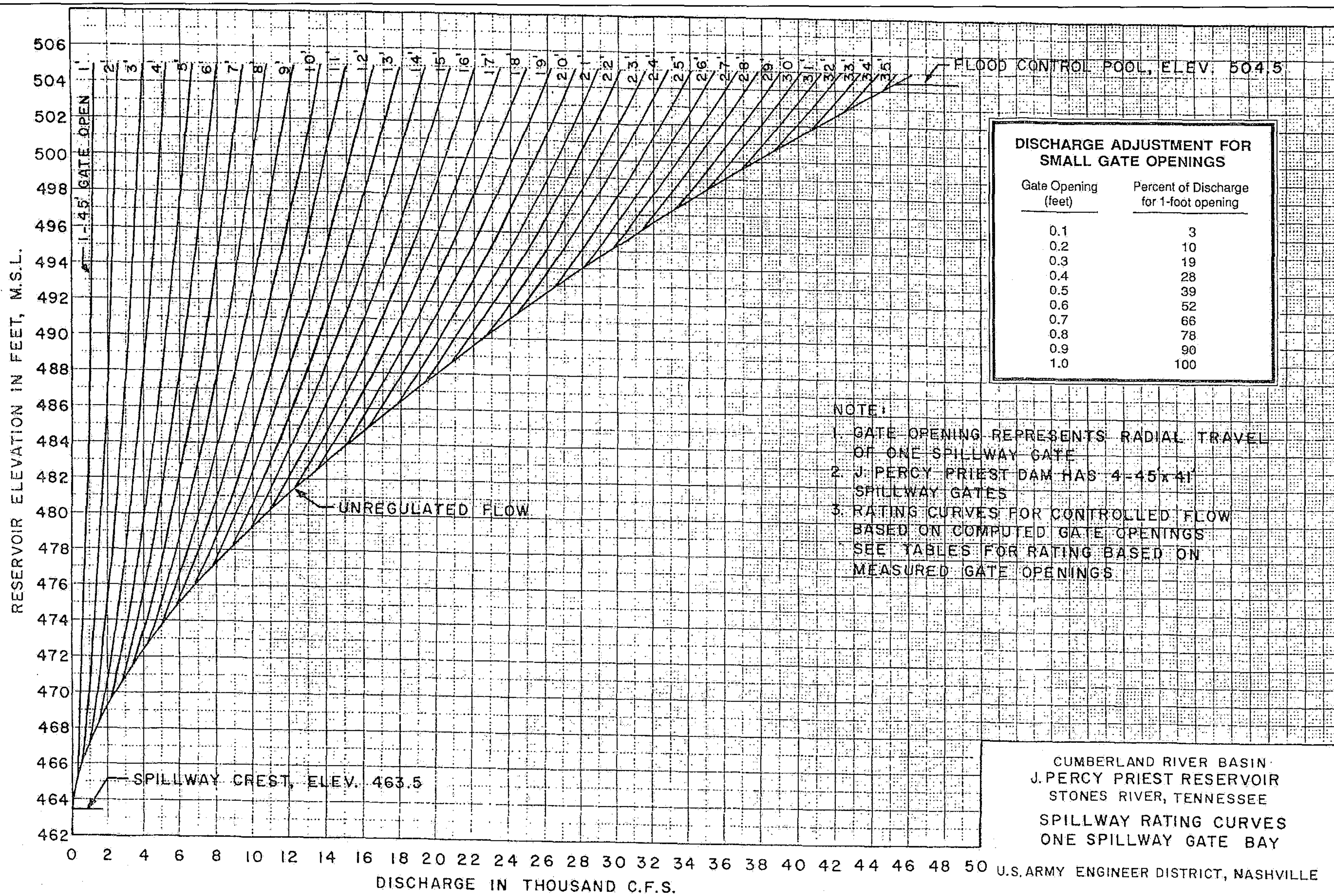
DISCHARGE RATING TABLE

West Fork Stones River near Smyrna, TN
Datum 500.00 Rating No. 14 (10/2/89)

Gage height (feet)	Discharge (cfs)	Gage height (feet)	Discharge (cfs)
1.6	10.00 *	13.5	14000 *
1.8	15.00 *	14.0	15000 *
2.0	22.00 *	14.5	16000 *
2.2	30.00 *	15.0	17500 *
2.4	41.00 *	15.5	19200 *
2.6	53.00 *	16.0	21000 *
2.8	65.00 *	16.5	26000 *
3.0	83.00 *	17.0	31310
3.3	125.0 *	17.5	37500 *
3.6	195.0 *	18.0	44130
4.0	330.0 *	18.5	51690
4.5	630.0 *	19.0	60280
5.0	1150 *	19.5	70000 *
5.5	1750 *		
6.0	2400 *		
6.5	3150 *		
7.0	4000 *		
7.5	4950 *		
8.0	5850 *		
8.5	6900 *		
9.0	7700 *		
9.5	8500 *		
10.0	9200 *		
10.5	9900 *		
11.0	10600 *		
11.5	11300 *		
12.0	11800 *		
12.5	12400 *		
13.0	13200 *		

* Values which were included in USGS rating table.
All other values were interpolated.

Source: USGS



DISCHARGE ADJUSTMENT FOR SMALL GATE OPENINGS

Gate Opening (feet)	Percent of Discharge for 1-foot opening
0.1	3
0.2	10
0.3	19
0.4	28
0.5	39
0.6	52
0.7	66
0.8	78
0.9	90
1.0	100

NOTE:

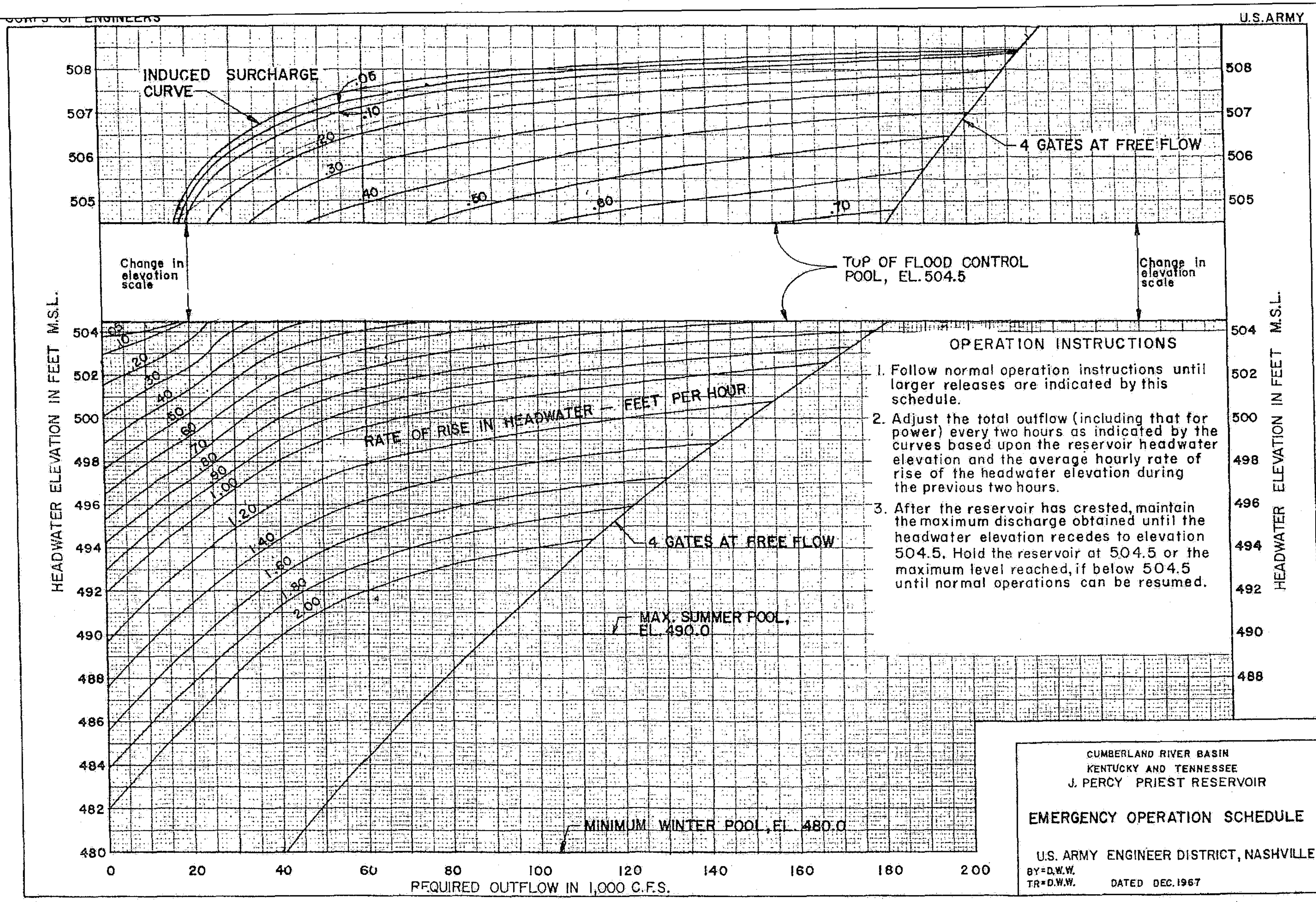
1. GATE OPENING REPRESENTS RADIAL TRAVEL OF ONE SPILLWAY GATE.
2. J. PERCY PRIEST DAM HAS 4-45'x 41' SPILLWAY GATES.
3. RATING CURVES FOR CONTROLLED FLOW BASED ON COMPUTED GATE OPENINGS. SEE TABLES FOR RATING BASED ON MEASURED GATE OPENINGS.

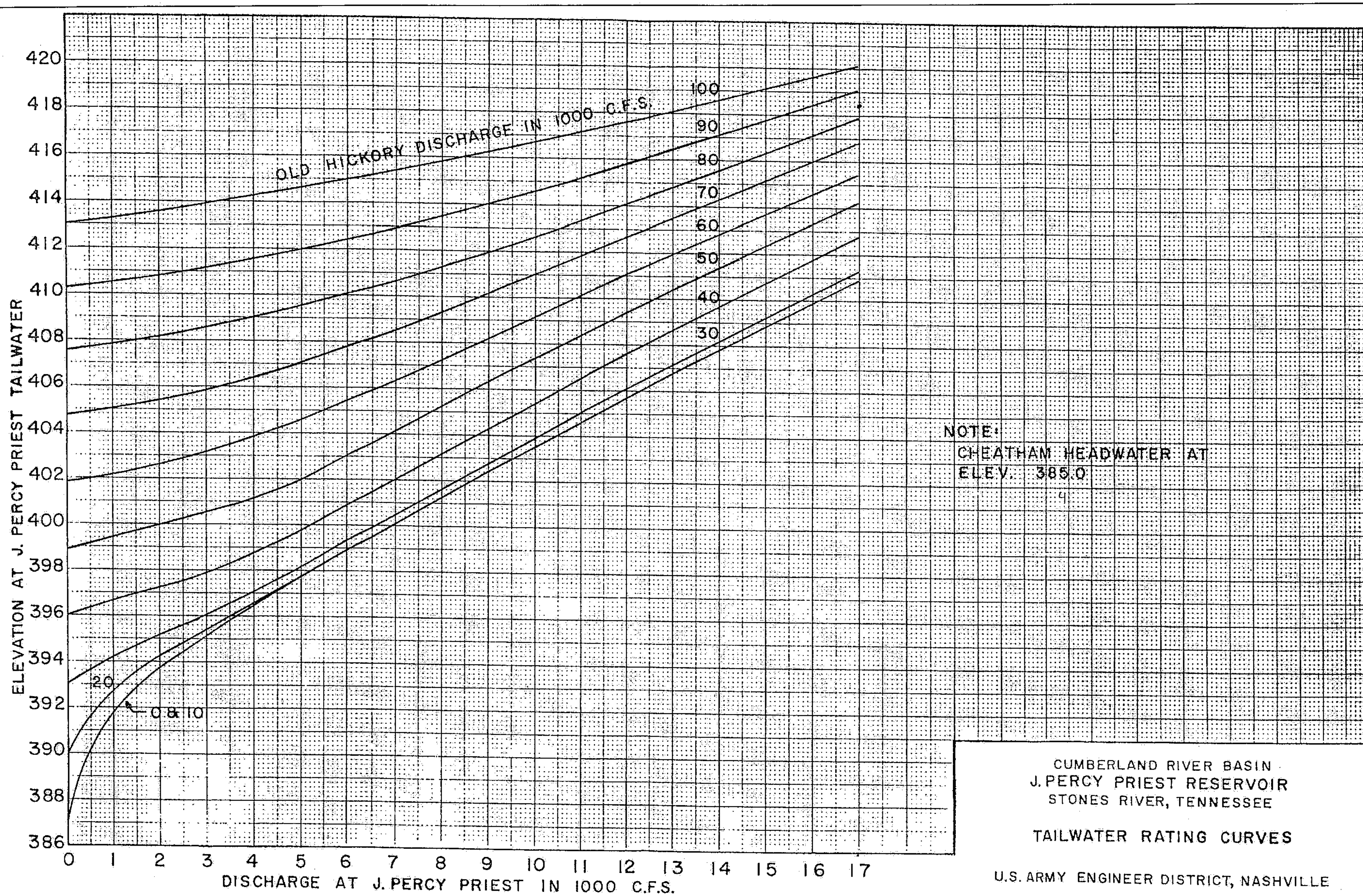
CUMBERLAND RIVER BASIN
J. PERCY PRIEST RESERVOIR
STONES RIVER, TENNESSEE

SPILLWAY RATING CURVES
ONE SPILLWAY GATE BAY

U.S. ARMY ENGINEER DISTRICT, NASHVILLE

DATED: APRIL 1961


INDUCED SURCHARGE CURVE
4 GATES AT FREE FLOW
Change in elevation scale
TOP OF FLOOD CONTROL POOL, EL. 504.5
RATE OF RISE IN HEADWATER — FEET PER HOUR
MAX. SUMMER POOL, EL. 490.0
MINIMUM WINTER POOL, EL. 480.0
HEADWATER ELEVATION IN FEET M.S.L.
REQUIRED OUTFLOW IN 1,000 C.F.S.
OPERATION INSTRUCTIONS
1. Follow normal operation instructions until larger releases are indicated by this schedule.
2. Adjust the total outflow (including that for power) every two hours as indicated by the curves based upon the reservoir headwater elevation and the average hourly rate of rise of the headwater elevation during the previous two hours.
3. After the reservoir has crested, maintain the maximum discharge obtained until the headwater elevation recedes to elevation 504.5. Hold the reservoir at 504.5 or the maximum level reached, if below 504.5 until normal operations can be resumed.
CUMBERLAND RIVER BASIN
KENTUCKY AND TENNESSEE
J. PERCY PRIEST RESERVOIR
EMERGENCY OPERATION SCHEDULE
U.S. ARMY ENGINEER DISTRICT, NASHVILLE
BY=D.W.W.
TR=D.W.W.
DATED DEC. 1967

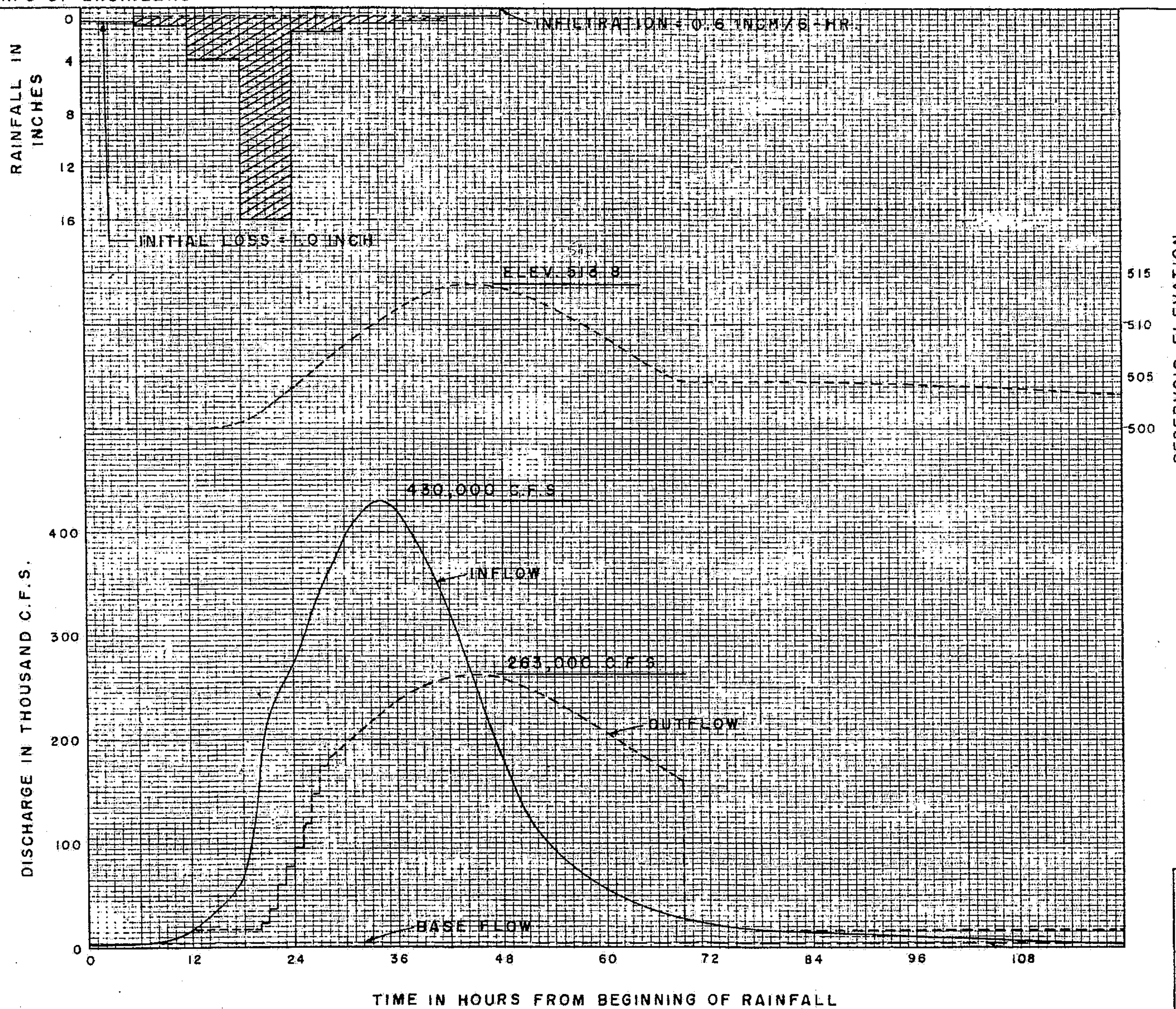


CUMBERLAND RIVER BASIN
J. PERCY PRIEST RESERVOIR
STONES RIVER, TENNESSEE

TAILWATER RATING CURVES

U.S. ARMY ENGINEER DISTRICT, NASHVILLE

DATED: 31 MARCH 1970



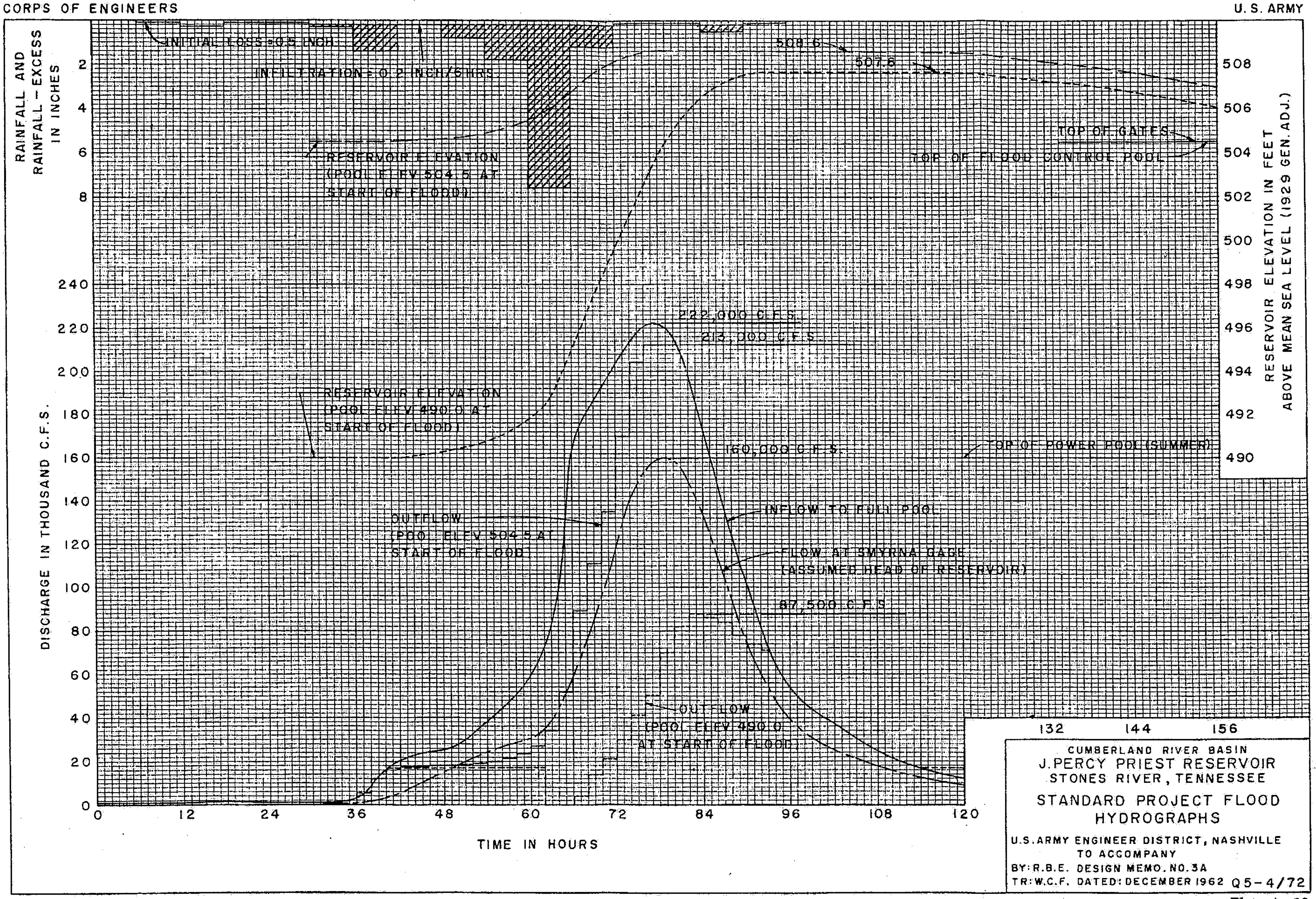
NOTES:

1. Unit hydrograph for 6-hour rainfall is used.
2. Drainage area is 892 square miles.
3. Spillway crest at elev. 463.5; controlled by 4-41' x 45' tainter gates; net length 180 ft.
4. Reservoir at elev. 500.0 at start of flood.
5. Releases controlled in accordance with the Emergency Operations Curve until full gate opening is reached. When pool recedes to elev. 504.5 (top of gates), discharge controlled to maintain this elevation until flow recedes to 17000 c.f.s..

CUMBERLAND RIVER BASIN
J. PERCY PRIEST RESERVOIR
STONES RIVER, TENNESSEE

SPILLWAY DESIGN FLOOD
INFLOW, OUTFLOW, AND
RESERVOIR STAGE HYDROGRAPHS

U.S. ARMY ENGINEER DISTRICT, NASHVILLE
BY: R.B.E.
TR: W.C.F. DATED ~~APRIL 1961~~ Q5-4/67

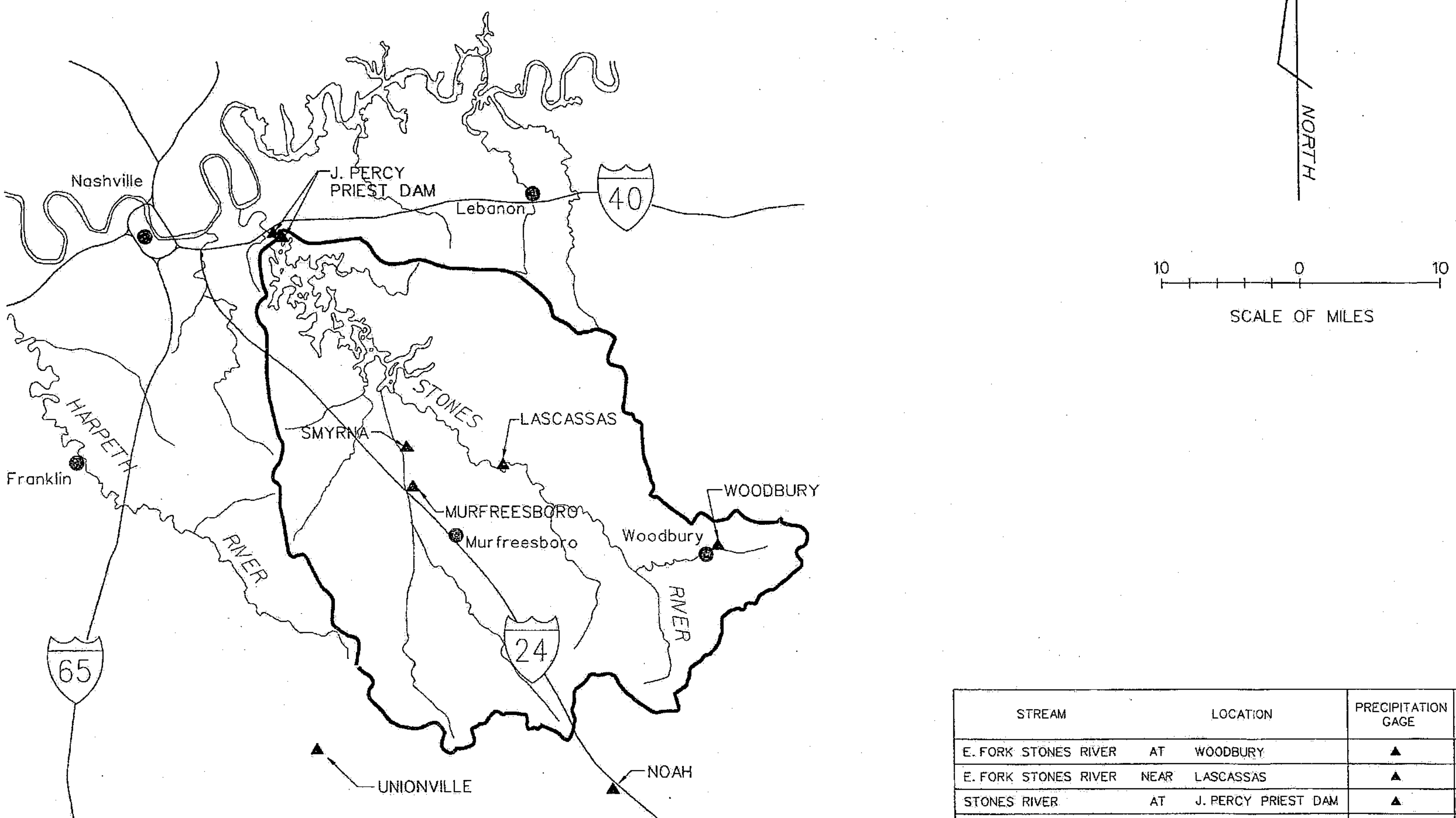


CUMBERLAND RIVER BASIN
J. PERCY PRIEST RESERVOIR
STONES RIVER, TENNESSEE

STANDARD PROJECT FLOOD HYDROGRAPHS

U.S. ARMY ENGINEER DISTRICT, NASHVILLE
TO ACCOMPANY
BY: R.B.E. DESIGN MEMO. NO. 3A
TR: W.C.F. DATED: DECEMBER 1962 Q5-4/72

J. PERCY PRIEST SUBBASIN MAP



STREAM		LOCATION	PRECIPITATION GAGE	RIVER STAGE GAGE	WATER QUALITY GAGE	GOES GAGE
E. FORK STONES RIVER	AT	WOODBURY	▲	▲		▲
E. FORK STONES RIVER	NEAR	LASCASSAS	▲	▲		▲
STONES RIVER	AT	J. PERCY PRIEST DAM	▲	▲		
STONES RIVER	BELOW	J. PERCY PRIEST TW		▲		
W. FORK STONES RIVER	AT	MURFREESBORO	▲	▲		▲
W. FORK STONES RIVER	NEAR	SMYRNA	▲	▲		▲
		NOAH	▲			
		UNIONVILLE	▲			

Plate B-1

J. PERCY PRIEST LAKE
DATA COLLECTION NETWORK

STREAM		LOCATION	DATUM	DRAINAGE AREA sq.mi.	RIVER MILE	COUNTY	HYDROLOGIC UNIT CODE	NORTH LATITUDE	WEST LONGITUDE
E Fork Stones River	at	Woodbury	676.23	39.1	[redacted]	Cannon	05130203	[redacted]	[redacted]
E Fork Stones River	near	Lascassas	507.88 S	262	[redacted]	Rutherford	05130203	[redacted]	[redacted]
Stones River	at	J Percy Priest Dam	0.00	892	[redacted]	Davidson	05130203	[redacted]	[redacted]
Stones River	below	J Percy Priest TW	0.00	892	[redacted]	Davidson	05130203	[redacted]	[redacted]
W Fork Stones River	at	Murfreesboro	514.95	177	[redacted]	Rutherford	05130203	[redacted]	[redacted]
W Fork Stones River	near	Smyrna	500.00	237	[redacted]	Rutherford	05130203	[redacted]	[redacted]
		Noah				Coffee	06040002	[redacted]	[redacted]
		Unionville				Bedford	06040002	[redacted]	[redacted]

STREAM		LOCATION		USGS ID	TELEPHONE ACCESS GOES ID		DSS PATHNAME PART	STAGE	PRECIP	WQ
E Fork Stones River	at	Woodbury	TN	03426800	[redacted]		WOODBURY	S	P	
E Fork Stones River	near	Lascassas	TN	03427500	[redacted]		LASCASSAS	S	P	
Stones River	at	J Percy Priest Dam	TN	03430050			J PERCY PRIEST DAM	S	P	
Stones River	below	J Percy Priest TW	TN	03430100			J PERCY PRIEST DAM	S		
W Fork Stones River	at	Murfreesboro	TN	03428200	[redacted]		MURFREESBORO	S	P	
W Fork Stones River	near	Smyrna	TN	03428500	[redacted]	T	SMYRNA	S	P	
		Noah	TN				NOAH		P	
		Unionville	TN				UNIONVILLE		P	

CLIMATOGRAPHY OF THE UNITED STATES NO. 20

MURFREESBORO, TN

PERIOD: 1951-80
ELEVATION: 550 FT

CLIMATOLOGICAL SUMMARY

TEMPERATURE (F)

	MEANS			EXTREMES						MEAN NUMBER OF DAYS				DEGREE DAYS	
	* DAILY MAXIMUM	* DAILY MINIMUM	* MONTHLY	RECORD HIGHEST	YEAR	DAY	RECORD LOWEST	YEAR	DAY	MAX 90 AND ABOVE	MAX 32 AND BELOW	MIN 32 AND BELOW	MIN 0 AND BELOW	* HEATING BASE 65	* COOLING BASE 65
JAN	47.7	27.7	37.7	77	52	1	-19	55	31	0	4	20	1	846	0
FEB	52.0	29.7	40.9	83+	62	13	-7+	51	3	0	2	17	0	682	7
MAR	60.8	37.8	49.3	85+	77	31	2+	80	3	0	0	11	0	501	15
APR	72.3	47.2	59.7	89+	77	18	22+	73	11	0	0	2	0	190	31
MAY	79.7	55.1	67.4	96+	62	28	32+	76	4	2	0	0	0	68	142
JUN	87.0	62.9	75.0	103+	54	27	41+	72	1	10	0	0	0	0	305
JUL	90.2	66.9	78.6	108+	52	28	51+	61	10	18	0	0	0	0	422
AUG	89.8	65.6	77.7	109+	54	16	49+	76	31	17	0	0	0	0	394
SEP	84.1	59.1	71.6	107+	54	5	37+	67	30	7	0	0	0	17	215
OCT	73.3	45.9	59.6	95+	54	5	23+	61	27	0	0	3	0	209	42
NOV	60.7	37.0	48.9	85+	61	2	9	76	30	0	0	11	0	483	0
DEC	51.6	30.8	41.2	76+	64	24	-7	62	13	0	1	18	0	738	0
YEAR	70.8	47.1	59.0	109	AUG 54	16	-19	JAN 55	31	54	7	82	1	3734	1573

PRECIPITATION TOTALS (INCHES)

	* MEAN	* GREATEST MONTHLY	YEAR	GREATEST DAILY	YEAR	DAY	SNOW MEAN	SNOW MAXIMUM MONTHLY	SNOW YEAR	MEAN NUMBER OF DAYS .10 OR MORE	.50 OR MORE	1.00 OR MORE
JAN	4.81	11.87	54	3.95	74	11	3.2	11.5	66	8	3	1
FEB	4.48	10.78	56	3.76	51	01	2.4	14.0	60	7	3	1
MAR	5.85	14.84	75	6.41	75	13	1.3	10.0	60	9	4	1
APR	4.87	9.09	64	3.06	74	04	.0	1.0	71	7	3	1
MAY	5.04	10.03	73	3.49	79	04	.0	.0		7	4	2
JUN	3.70	8.79	70	5.43	70	21	.0	.0		6	3	1
JUL	4.28	8.20	67	5.44	75	20	.0	.0		7	3	1
AUG	3.59	7.35	52	3.24	63	29	.0	.0		6	2	1
SEP	3.99	11.09	79	4.23	79	14	.0	.0		6	3	1
OCT	2.85	6.79	75	4.50	75	17	.0	.0		4	2	1
NOV	3.83	8.24	73	4.67	73	27	.3	9.1	66	7	3	1
DEC	4.66	10.23	51	4.30	66	09	1.0	8.0	63	7	3	1
YEAR	51.95	14.84	MAR 75	6.41	MAR 75	13	8.2	14.0	FEB 60	81	36	13

*FROM 1951-80 NORMALS

ESTIMATED VALUE BASED ON DATA FROM SURROUNDING STATIONS

+ ALSO ON EARLIER DATES.

DEGREE DAYS TO SELECTED BASE TEMPERATURES (F)

BASE BELOW	HEATING DEGREE DAYS JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
65	846	682	501	190	68	0	0	0	17	209	483	738	3734
60	702	550	366	99	21	0	0	0	0	117	338	583	2776
57	615	474	294	57	10	0	0	0	0	74	255	499	2278
55	558	425	252	36	6	0	0	0	0	50	204	441	1972
50	425	315	164	10	0	0	0	0	0	16	105	308	1343

BASE ABOVE	COOLING DEGREE DAYS JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
55	22	30	75	177	390	600	732	704	498	192	21	14	3455
57	16	23	55	138	332	540	670	642	438	154	12	9	3029
60	10	15	34	90	251	450	577	549	352	105	0	0	2433
65	0	7	15	31	142	305	422	394	215	42	0	0	1573
70	0	0	0	8	65	173	271	244	111	14	0	0	886

DERIVED FROM THE 1951-80 MONTHLY NORMALS

PROBABILITY THAT THE MONTHLY PRECIPITATION WILL BE EQUAL TO OR LESS THAN THE INDICATED PRECIPITATION AMOUNT

MONTHLY PRECIPITATION (INCHES)

PROBABILITY LEVELS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
.05	1.54	1.33	2.01	1.86	1.75	.96	1.02	1.50	.93	.44	.99	1.17
.10	2.00	1.76	2.56	2.31	2.23	1.30	1.42	1.83	1.31	.82	1.35	1.61
.20	2.67	2.40	3.36	2.96	2.92	1.84	2.04	2.29	1.89	1.30	1.91	2.29
.30	3.25	2.95	4.05	3.50	3.50	2.31	2.60	2.67	2.41	1.70	2.40	2.89
.40	3.81	3.48	4.70	4.01	4.06	2.78	3.16	3.02	2.93	2.09	2.88	3.48
.50	4.38	4.04	5.37	4.53	4.64	3.27	3.75	3.38	3.48	2.50	3.39	4.11
.60	5.01	4.65	6.10	5.10	5.26	3.82	4.41	3.77	4.10	2.96	3.96	4.81
.70	5.76	5.37	6.96	5.76	5.99	4.46	5.19	4.21	4.84	3.50	4.63	5.63
.80	6.71	6.31	8.06	6.59	6.93	5.31	6.22	4.77	5.81	4.22	5.50	6.72
.90	8.19	7.77	9.76	7.87	8.37	6.64	7.85	5.63	7.34	5.34	6.88	8.43
.95	9.57	9.12	11.32	9.05	9.70	7.89	9.39	6.41	8.79	6.40	8.17	10.03

THESE VALUES WERE DETERMINED FROM THE INCOMPLETE GAMMA DISTRIBUTION.

SOURCE: NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

406371 MURFREESBORO, TN

LAT: 35 55N (DEG MIN) LONG: 86 22W (DEG MIN)

PERIOD: 1951-80

FREEZE DATA

PROBABILITY OF LATER DATE IN SPRING (THRU JULY 31) THAN INDICATED(*)

SPRING FREEZE DATES (MO/DAY)

TEMP (F)	.90	.80	.70	.60	.50	.40	.30	.20	.10
36	4/07	4/13	4/17	4/20	4/24	4/27	5/01	5/05	5/11
32	3/27	4/01	4/04	4/07	4/10	4/12	4/15	4/18	4/23
28	3/09	3/14	3/18	3/21	3/24	3/28	3/31	4/04	4/09
24	2/24	3/02	3/07	3/11	3/15	3/19	3/23	3/28	4/03
20	1/28	2/06	2/13	2/19	2/24	3/01	3/07	3/13	3/22
16	1/23	2/01	2/07	2/12	2/17	2/21	2/26	3/04	3/11

PROBABILITY OF EARLIER DATE IN FALL (BEGINNING AUG 1) THAN INDICATED(*)

FALL FREEZE DATES (MO/DAY)

TEMP (F)	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	10/03	10/07	10/10	10/12	10/14	10/16	10/19	10/22	10/25
32	10/09	10/13	10/17	10/19	10/22	10/25	10/28	10/31	11/04
28	10/22	10/27	10/31	11/03	11/06	11/08	11/11	11/15	11/20
24	10/29	11/03	11/06	11/09	11/12	11/14	11/17	11/21	11/25
20	11/09	11/15	11/20	11/23	11/27	12/01	12/04	12/09	12/15
16	11/18	11/26	12/02	12/07	12/12	12/17	12/22	12/29	1/08

PROBABILITY OF LONGER THAN INDICATED FREEZE FREE PERIOD (DAYS)

FREEZE FREE PERIOD

TEMP (F)	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	193	186	181	177	173	169	164	159	153
32	215	208	203	199	195	191	187	182	175
28	243	237	233	229	225	222	218	214	208
24	260	254	249	245	241	237	233	228	221
20	303	293	287	281	275	270	264	257	248
16	>365	323	312	303	296	289	281	273	261

(*)PROBABILITY OF OBSERVING A TEMPERATURE AS COLD, OR COLDER, LATER IN THE SPRING OR EARLIER IN THE FALL THAN THE INDICATED DATE.
0/00 INDICATES THAT THE PROBABILITY OF OCCURRENCE OF THRESHOLD TEMPERATURE IS LESS THAN INDICATED PROBABILITY.

GROWING DEGREE UNITS TO SELECTED BASE TEMPERATURES (F)

BASE		GROWING DEGREE UNITS												
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
40	M	117	146	327	600	857	1057	1204	1177	955	616	303	151	7510
	S	117	263	590	1190	2047	3104	4308	5485	6440	7056	7359	7510	
45	M	63	82	212	454	702	907	1049	1022	805	465	194	81	6036
	S	63	145	357	811	1513	2420	3469	4491	5296	5761	5955	6036	
50	M	30	39	122	318	548	757	894	867	655	322	109	37	4698
	S	30	69	191	509	1057	1814	2708	3575	4230	4552	4661	4698	
55	M	11	14	61	200	398	607	739	712	506	200	51	14	3513
	S	11	25	86	286	684	1291	2030	2742	3248	3448	3499	3513	
60	M	2	3	24	109	259	457	584	557	361	106	19	3	2484
	S	2	5	29	138	397	854	1438	1995	2356	2462	2481	2484	

M = MONTHLY DATA S = SUM OF MONTHLY DATA

GROWING DEGREE UNITS FOR CORN

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
CORN	M	69	93	206	386	561	715	819	798	632	405	195	90	4969
	S	69	162	368	754	1315	2030	2849	3647	4279	4684	4879	4969	

NOTE: FOR CORN THE BASE IS 50, AND THE DEGREE UNITS ARE ADJUSTED FOR TEMPERATURES BELOW 50 AND ABOVE 86

OTHER CLIMATOLOGICAL DATA ARE AVAILABLE IN A VARIETY OF SUMMARIES AND FORMATS, SUCH AS THE CLIMATOGRAPHY OF THE UNITED STATES: NO. 60 - CLIMATE OF STATES; NO. 81 - MONTHLY NORMALS (AND SUPPLEMENTS: ANNUAL DEGREE DAYS TO SELECTED BASES DERIVED FROM THE 1951-80 NORMALS; AND MONTHLY PRECIPITATION PROBABILITIES, SELECTED PROBABILITY LEVELS DERIVED FROM THE 1951-80 NORMALS); NO. 84 - DAILY NORMALS; NO. 85 - DIVISIONAL NORMALS. A VARIETY OF DATA IS AVAILABLE EITHER ON MAGNETIC TAPE, MICROFICHE, OR PAPER COPY.

TO OBTAIN INFORMATION ABOUT CLIMATOLOGICAL DATA AND RELATED PUBLICATIONS, CONTACT:

DIRECTOR
NATIONAL CLIMATIC DATA CENTER
FEDERAL BUILDING
ASHEVILLE, NC 28801-2696
(OR TELEPHONE: (704) 259-0682)

DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE
NATIONAL CLIMATIC DATA CENTER
ASHEVILLE, NC

USCOMM-NOAA-ASHEVILLE, NC 7/84/200

NORMALS, MEANS, AND EXTREMES FOR 1996

NASHVILLE, TN (BNA)

LATITUDE: 36° 07' 08" N | LONGITUDE: 86° 41' 21" W | ELEVATION (FT): GRND: 590 BARO: 630 | TIME ZONE: CENTRAL (UTC+ 6) | WBAN: 13897

	ELEMENT	POR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	NORMAL DAILY MAXIMUM	30	45.9	50.8	61.2	70.8	78.8	86.5	89.5	88.4	82.5	72.5	60.4	50.2	69.8
	MEAN DAILY MAXIMUM	49	46.7	51.4	60.3	71.0	79.2	86.8	89.9	88.9	82.6	72.3	59.5	50.4	69.9
	HIGHEST DAILY MAXIMUM	57	78	84	86	91	97	106	107	104	105	94	84	79	107
	YEAR OF OCCURRENCE		1972	1962	1982	1989	1941	1952	1952	1954	1954	1953	1971	1982	JUL 1952
	MEAN OF EXTREME MAXS.	49	67.9	72.0	79.0	85.5	89.6	95.1	97.1	96.3	93.4	85.9	77.1	69.1	84.0
	NORMAL DAILY MINIMUM	30	26.5	29.9	39.1	47.5	56.6	64.7	68.9	67.7	61.1	48.3	39.6	30.9	48.4
	MEAN DAILY MINIMUM	49	28.1	30.9	38.6	47.7	57.0	65.1	69.3	67.8	60.9	48.5	38.6	31.5	48.7
	LOWEST DAILY MINIMUM	57	-17	-13	2	23	34	42	51	47	36	26	-1	-10	-17
	YEAR OF OCCURRENCE		1985	1951	1980	1982	1976	1966	1947	1946	1983	1987	1950	1989	JAN 1985
	MEAN OF EXTREME MINS.	49	7.2	10.4	21.7	31.0	41.9	52.8	59.9	58.0	45.9	32.5	20.6	12.2	32.8
	NORMAL DRY BULB	30	36.2	40.4	50.2	59.2	67.7	75.6	79.3	78.1	71.8	60.4	50.0	40.5	59.1
	MEAN DRY BULB	49	37.4	41.2	49.5	59.4	68.1	76.0	79.7	78.4	71.8	60.4	49.0	41.0	59.3
	MEAN WET BULB	13	34.0	37.8	44.3	52.1	61.5	68.7	71.8	70.7	64.5	54.3	41.9	37.9	53.3
	MEAN DEW POINT	13	28.2	31.0	36.6	44.7	56.7	64.6	68.0	66.9	60.3	49.0	36.6	32.3	47.9
	NORMAL NO. DAYS WITH:														
	MAXIMUM ≥ 90°	30	0.0	0.0	0.0	0.1	1.5	9.2	16.6	13.1	5.8	0.1	0.0	0.0	46.4
	MAXIMUM ≤ 32°	30	5.1	2.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.4	10.1
	MINIMUM ≤ 32°	30	22.2	17.1	9.2	1.8	0.0	0.0	0.0	0.0	0.0	1.2	7.7	17.8	77.0
	MINIMUM ≤ 0°	30	0.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.4
H/C	NORMAL HEATING DEG. DAYS	30	893	689	469	193	59	0	0	0	21	195	450	760	3729
	NORMAL COOLING DEG. DAYS	30	0	0	10	19	143	318	443	406	225	52	0	0	1616
RH	NORMAL (PERCENT)	30	70	68	65	63	70	70	73	73	74	69	70	71	70
	HOUR 00 LST	30	75	74	71	72	81	83	85	85	85	81	77	76	79
	HOUR 06 LST	30	80	80	79	80	86	87	89	90	90	86	82	80	84
	HOUR 12 LST	30	63	60	54	51	55	55	57	57	58	53	59	63	57
	HOUR 18 LST	30	65	61	55	52	58	59	62	62	64	60	64	67	61
S	PERCENT POSSIBLE SUNSHINE	54	41	47	52	59	60	65	63	63	62	62	50	42	56
W/O	MEAN NO. DAYS WITH:														
	HEAVY FOG(VISBY ≤ 1/4 MI)	56	2.4	1.3	1.0	0.5	0.9	0.9	1.1	1.5	1.8	2.1	1.6	1.8	16.9
	THUNDERSTORMS	56	1.2	1.6	4.0	5.0	7.3	8.3	9.4	7.6	3.5	1.6	1.6	1.0	52.1
CLOUDINESS	MEAN:														
	SUNRISE-SUNSET (OKTAS)	56	5.7	5.4	5.3	4.9	4.8	4.5	4.4	4.2	4.2	3.9	4.8	5.3	4.8
	MIDNIGHT-MIDNIGHT (OKTAS)	32	5.3	5.1	5.0	4.6	4.6	4.1	4.0	3.8	4.0	3.6	4.7	5.0	4.5
	MEAN NO. DAYS WITH:														
	CLEAR	55	6.3	6.9	7.5	8.3	8.0	8.0	8.1	9.9	10.5	12.8	8.8	7.1	102.2
	PARTLY CLOUDY	55	6.1	5.9	7.2	8.5	10.1	12.5	13.2	12.2	9.1	8.0	6.8	7.0	106.6
	CLOUDY	55	18.5	15.5	16.3	13.2	13.0	9.5	9.7	8.9	10.4	10.2	14.4	17.0	156.6
PR	MEAN STATION PRESSURE(IN.)	24	29.50	29.47	29.39	29.37	29.35	29.36	29.91	29.41	29.43	29.47	29.48	29.51	29.47
	MEAN SEA-LEVEL PRES. (IN.)	13	30.17	30.12	30.06	29.99	30.01	29.99	30.02	30.03	30.07	30.11	30.13	30.18	30.07
WINDS	MEAN SPEED (MPH)	44	9.0	9.1	9.7	9.0	7.4	6.9	6.5	6.0	6.3	6.7	8.3	8.8	7.8
	PREVAIL.DIR(TENS OF DEGS.)	28	18	18	18	18	18	18	18	18	18	18	18	18	18
	MAXIMUM 2-MINUTE:														
	SPEED (MPH)	21	32	35	41	35	41	35	33	40	33	32	39	41	41
	DIR. (TENS OF DEGS.)		34	32	13	18	36	36	34	02	34	36	15	23	23
	YEAR OF OCCURRENCE		1985	1980	1987	1993	1984	1990	1978	1983	1977	1986	1984	1987	DEC 1987
	PEAK GUST :														
	SPEED (MPH)	13	48	47	56	67	55	52	58	70	47	48	60	54	70
	DIR. (TENS OF DEGS.)		SE	SW	SE	W	NW	S	S	NW	N	N	W	SW	NW
	YEAR OF OCCURRENCE		1994	1988	1987	1991	1984	1994	1995	1990	1989	1986	1985	1987	AUG 1990
PRECIPITATION	NORMAL TOTAL (IN.)	30	3.58	3.81	4.85	4.37	4.88	3.57	3.97	3.46	3.46	2.62	4.12	4.61	47.30
	MAXIMUM TOTAL (IN.)	57	13.92	10.31	12.35	8.41	11.04	9.37	7.75	8.31	11.44	6.13	9.04	13.63	13.92
	YEAR OF OCCURRENCE		1950	1956	1975	1984	1983	1960	1950	1942	1979	1959	1945	1978	JAN 1950
	MINIMUM TOTAL (IN.)	57	0.19	0.64	1.18	0.52	0.69	0.45	0.71	0.69	0.28	T	0.54	0.98	T
	YEAR OF OCCURRENCE		1986	1968	1987	1986	1941	1988	1954	1968	1956	1963	1949	1985	OCT 1963
	MAXIMUM IN 24 HOURS (IN.)	57	4.40	4.73	4.66	3.29	4.27	4.91	4.32	5.34	6.68	3.75	3.74	5.12	6.68
	YEAR OF OCCURRENCE		1946	1989	1975	1979	1984	1960	1992	1963	1979	1975	1973	1978	SEP 1979
	NORMAL NO. DAYS WITH:														
	PRECIPITATION ≥ 0.01	30	10.3	10.3	11.6	10.8	10.9	9.3	10.4	8.3	8.2	7.2	10.1	11.0	118.4
	PRECIPITATION ≥ 1.00	30	0.7	0.7	1.1	1.2	1.5	0.9	1.2	1.0	0.7	0.7	1.0	1.5	12.2
SNOWFALL	NORMAL TOTAL (IN.)	30	4.4	3.5	1.1	0.*	0.0	0.0	0.0	0.0	0.0	T	0.3	1.7	11.0
	MAXIMUM TOTAL (IN.)	57	18.8	18.9	16.1	1.1	0.0	T	0.0	T	0.0	0.4	9.2	13.2	18.9
	YEAR OF OCCURRENCE		1948	1979	1960	1971		1994		1989		1993	1950	1963	FEB 1979
	MAXIMUM IN 24 HOURS (IN.)	57	8.1	8.3	8.8	1.1	0.0	T	0.0	T	0.0	0.4	9.2	10.2	10.2
	YEAR OF OCCURRENCE		1988	1979	1951	1971		1994		1989		1993	1950	1963	DEC 1963
	MAXIMUM SNOW DEPTH (IN.)	48	70	8	7	0	0	0	0	0	0	0	5	7	70
	YEAR OF OCCURRENCE		1948	1979	1968								1966	1963	JAN 1948
	NORMAL NO. DAYS WITH:														
	SNOWFALL ≥ 1.0	30	1.2	1.4	0.3	0.*	0.0	0.0	0.0	0.0	0.0	0.0	0.*	0.5	3.4

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Note: 1996 Local Climatological Data Summary

PRECIPITATION (inches) 1996 NASHVILLE, TENNESSEE (BNA)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1967	1.62	1.78	4.44	3.40	6.98	4.23	7.46	2.06	1.93	1.57	3.87	5.88	45.22
1968	3.50	0.64	4.47	3.57	6.28	2.26	6.87	0.69	2.76	3.92	5.39	3.58	43.93
1969	4.96	4.48	2.12	6.03	4.81	3.34	5.33	2.27	2.06	2.01	1.83	8.03	47.27
1970	1.16	4.36	3.87	6.81	5.90	6.73	3.61	2.99	2.76	2.94	2.20	3.60	46.93
1971	2.66	4.70	2.95	3.34	2.93	3.47	5.00	5.87	2.11	1.27	1.18	5.17	40.65
1972	5.15	3.45	4.34	3.58	3.52	2.54	6.40	4.30	3.71	4.06	5.22	8.14	54.41
1973	3.40	3.63	9.88	7.00	5.72	4.80	7.67	1.79	1.56	3.32	7.78	3.23	59.78
1974	9.45	3.01	5.25	3.97	5.04	6.80	2.10	4.13	10.44	1.47	6.23	2.81	60.70
1975	4.67	5.22	12.35	3.55	6.52	2.22	2.96	4.69	5.42	5.86	3.00	4.12	60.58
1976	4.11	2.28	5.32	1.53	6.19	4.72	4.01	8.05	5.08	5.17	1.30	1.81	49.57
1977	2.53	3.27	5.83	7.87	1.65	4.29	1.15	4.65	5.04	4.22	5.96	4.25	50.71
1978	5.95	1.57	4.88	2.42	8.03	1.46	4.03	3.81	1.37	2.28	4.01	13.63	53.44
1979	7.13	4.01	4.92	7.80	8.18	2.79	4.27	4.59	11.44	3.97	5.98	5.04	70.12
1980	2.59	1.38	7.27	3.67	6.14	2.89	3.53	1.24	1.09	1.17	2.55	1.40	34.92
1981	1.60	3.83	3.38	4.78	3.05	8.05	3.49	3.10	1.37	2.82	3.83	2.38	41.68
1982	6.50	4.80	3.00	4.36	4.19	2.28	5.47	3.46	3.23	1.91	3.87	6.36	49.43
1983	2.56	2.93	3.44	6.80	11.04	3.93	1.71	1.36	0.45	2.77	6.98	7.75	51.72
1984	1.79	2.38	5.14	8.41	9.68	4.49	6.63	2.42	0.97	6.00	6.20	2.38	56.49
1985	3.02	3.30	2.70	2.91	2.65	1.53	2.00	3.91	2.52	1.59	3.81	0.98	30.92
1986	0.19	3.59	2.29	0.52	3.36	2.38	0.77	3.38	2.19	2.19	7.43	3.31	31.60
1987	1.61	4.87	1.18	1.03	4.41	2.82	2.56	0.73	1.95	0.21	3.40	5.46	30.23
1988	3.73	2.02	2.18	2.09	1.86	0.45	3.26	2.39	2.45	1.54	5.49	3.95	31.41
1989	4.52	9.36	5.31	2.68	4.61	7.87	3.18	3.67	6.30	3.62	3.94	1.97	57.03
1990	2.76	4.73	3.26	1.60	2.80	2.37	4.86	3.12	2.13	4.41	4.29	10.76	47.09
1991	2.92	5.44	4.25	3.35	5.63	1.25	2.82	1.79	5.47	3.88	2.87	7.27	46.94
1992	2.97	2.60	4.50	0.77	3.12	4.31	5.89	3.25	3.45	1.62	4.48	2.88	39.84
1993	2.76	3.33	5.50	3.33	4.50	5.31	3.64	1.76	2.90	2.20	2.53	6.62	44.38
1994	4.36	6.18	7.56	5.72	3.76	8.08	4.82	5.05	4.20	3.31	4.04	2.69	59.77
1995	5.61	1.81	3.87	3.95	7.66	3.69	1.95	3.40	5.00	5.60	3.98	2.32	48.84
1996	3.82	2.46	5.15	3.68	4.48	3.68	5.45	1.09	4.89	3.16	6.00	4.77	48.63
POR= 126 YRS	4.55	4.11	5.07	4.14	4.10	3.81	3.87	3.28	3.31	2.51	3.62	4.01	46.38

WBAN : 13897

AVERAGE TEMPERATURE (˚F) 1996 NASHVILLE, TENNESSEE (BNA)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1967	42.3	37.5	57.0	63.9	66.3	76.3	75.7	72.6	66.8	59.3	44.3	42.6	58.7
1968	34.0	32.4	47.8	58.7	66.3	74.9	77.8	79.5	69.9	59.5	48.7	38.1	57.3
1969	37.2	39.8	42.6	60.9	68.9	77.2	82.7	78.1	70.8	60.6	46.5	37.3	58.5
1970	32.4	38.4	46.8	61.3	68.4	73.6	77.2	79.2	76.9	61.0	47.5	43.2	58.8
1971	35.6	38.7	44.6	57.9	63.3	77.5	76.8	76.4	74.4	66.7	49.9	49.2	59.3
1972	41.8	41.8	50.2	60.5	67.4	73.0	77.3	77.2	75.7	60.2	47.3	42.8	59.6
1973	38.0	39.7	56.8	56.4	64.2	76.1	78.7	78.1	76.2	66.2	54.7	40.5	60.5
1974	45.4	41.8	54.9	58.6	70.0	71.4	78.0	77.6	67.5	59.4	50.0	42.6	59.8
1975	43.4	44.6	47.3	58.5	70.4	76.0	78.5	79.1	67.9	62.4	52.1	42.8	60.2
1976	36.7	50.5	55.9	59.9	64.0	73.3	76.4	74.4	66.8	53.9	40.9	36.6	57.4
1977	24.5	40.6	53.9	63.0	71.9	77.2	82.2	79.5	74.0	57.0	50.8	38.6	59.4
1978	27.6	29.2	46.9	61.0	66.7	76.2	80.5	78.7	75.5	57.4	53.6	42.4	58.0
1979	29.7	33.4	50.7	57.8	66.3	73.7	77.6	77.0	70.5	60.3	48.6	41.5	57.3
1980	39.7	35.7	46.3	57.3	67.8	75.5	82.8	81.7	76.0	57.8	48.5	41.0	59.2
1981	35.5	42.6	47.5	64.0	64.2	77.5	79.8	76.6	68.1	60.4	49.9	38.3	58.7
1982	34.0	39.5	52.5	54.6	71.0	73.3	79.8	76.1	69.6	61.1	51.4	48.2	59.3
1983	38.8	42.7	50.3	54.5	64.8	75.5	80.5	83.2	73.7	62.4	49.9	34.0	59.2
1984	32.2	43.4	46.1	58.2	64.2	77.4	76.1	76.5	68.6	66.7	46.0	49.6	58.8
1985	27.8	36.5	53.2	61.9	68.4	75.7	80.2	77.2	70.8	64.4	56.9	34.2	58.9
1986	37.2	44.7	50.8	60.8	68.6	76.5	82.4	76.7	74.9	61.0	49.9	39.9	60.3
1987	36.1	43.1	51.8	57.7	73.4	77.5	80.2	81.1	72.2	54.6	52.4	44.1	60.3
1988	34.4	38.7	49.3	57.1	67.3	77.3	81.4	81.9	72.8	54.2	51.1	42.4	59.0
1989	44.9	39.0	52.6	59.3	65.7	74.7	79.1	78.0	70.5	61.0	51.4	29.5	58.8
1990	45.8	49.9	53.6	58.4	66.4	78.2	80.4	79.6	74.7	60.1	54.3	43.7	62.1
1991	39.2	43.9	52.5	63.8	74.2	78.2	81.1	78.3	72.3	61.2	47.2	44.5	61.4
1992	40.0	45.9	50.1	59.6	65.8	72.4	79.9	74.9	70.9	59.4	49.5	41.2	59.1
1993	41.6	39.3	47.1	56.7	67.6	75.9	83.3	81.0	71.0	58.6	47.4	40.3	59.1
1994	33.4	44.0	50.7	62.5	64.1	78.1	78.5	77.1	69.1	61.0	54.5	45.3	59.9
1995	38.6	40.4		60.9	68.5	74.7	80.8	83.3	70.7	60.0	44.0	39.5	
1996	36.3	40.6	44.6	55.8	71.5	75.6	77.6	77.5	69.5	60.8	45.7	44.4	58.3
POR= 126 YRS	38.5	41.0	49.6	59.4	68.1	76.2	78.9	78.3	72.1	60.8	49.1	41.0	59.4

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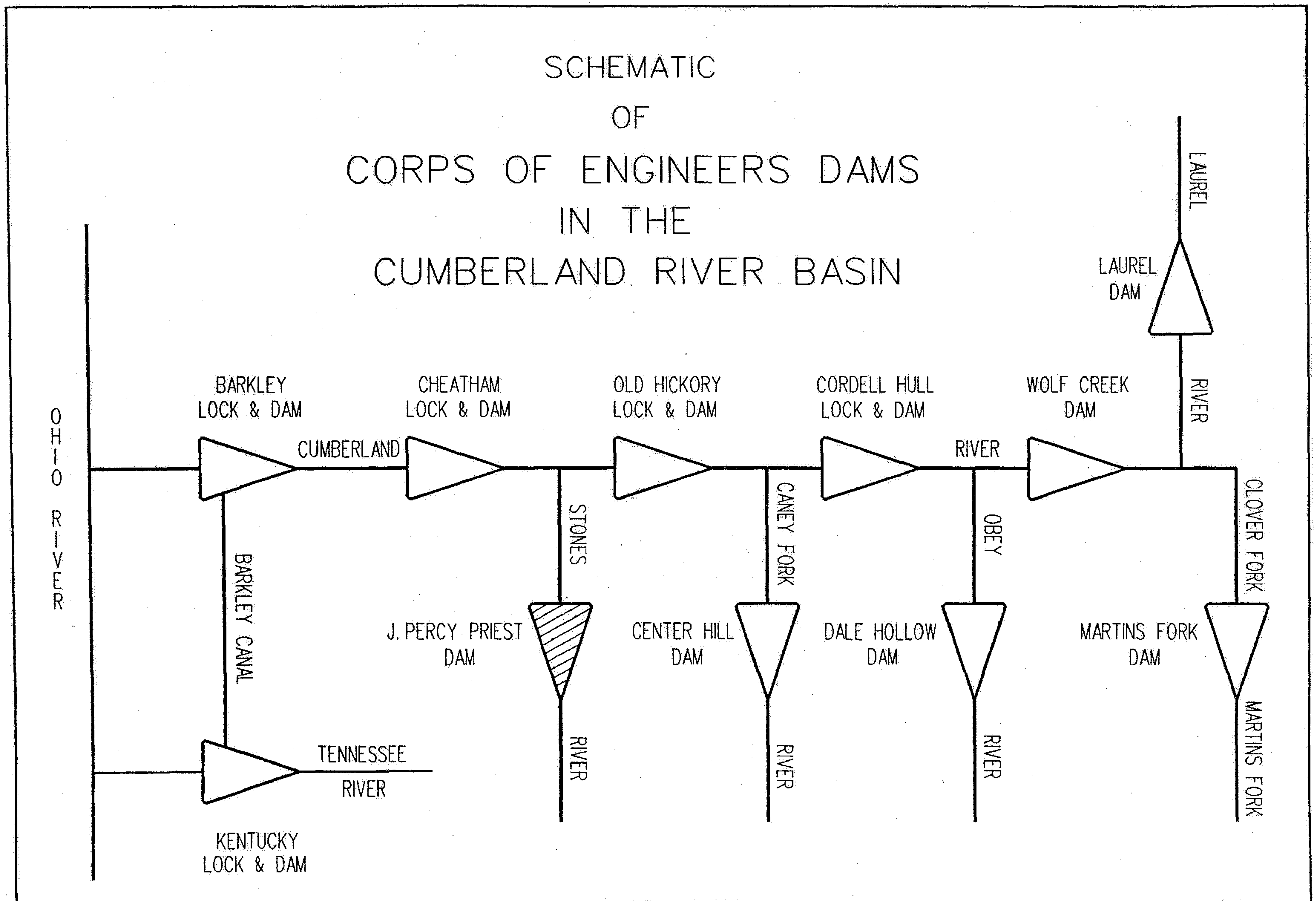
WBAN : 13897


SCHEMATIC
OF
CORPS OF ENGINEERS DAMS
IN THE
CUMBERLAND RIVER BASIN
OHIO RIVER
BARKLEY LOCK & DAM
CUMBERLAND
CHEATHAM LOCK & DAM
OLD HICKORY LOCK & DAM
CORDELL HULL LOCK & DAM
RIVER
WOLF CREEK DAM
LAUREL
LAUREL DAM
RIVER
BARKLEY CANAL
STONES
RIVER
J. PERCY PRIEST DAM
CANEY FORK
RIVER
CENTER HILL DAM
OBEY
RIVER
DALE HOLLOW DAM
CLOVER FORK
MARTINS FORK DAM
MARTINS FORK
TENNESSEE
RIVER
KENTUCKY LOCK & DAM

CUMBERLAND RIVER BASIN MAP

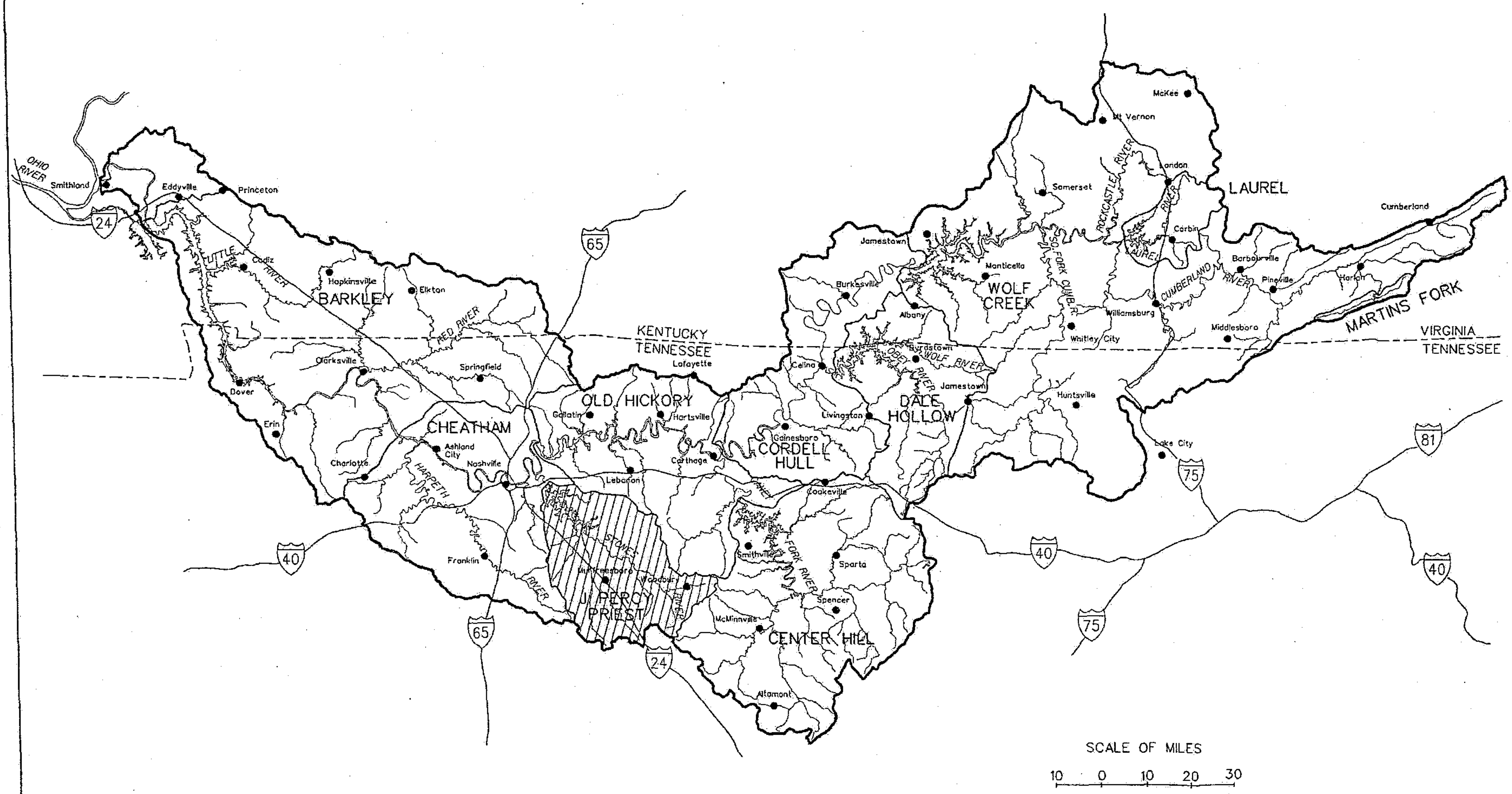


Plate C-2

PROFILE OF
CUMBERLAND RIVER AND TRIBUTARIES
KENTUCKY AND TENNESSEE

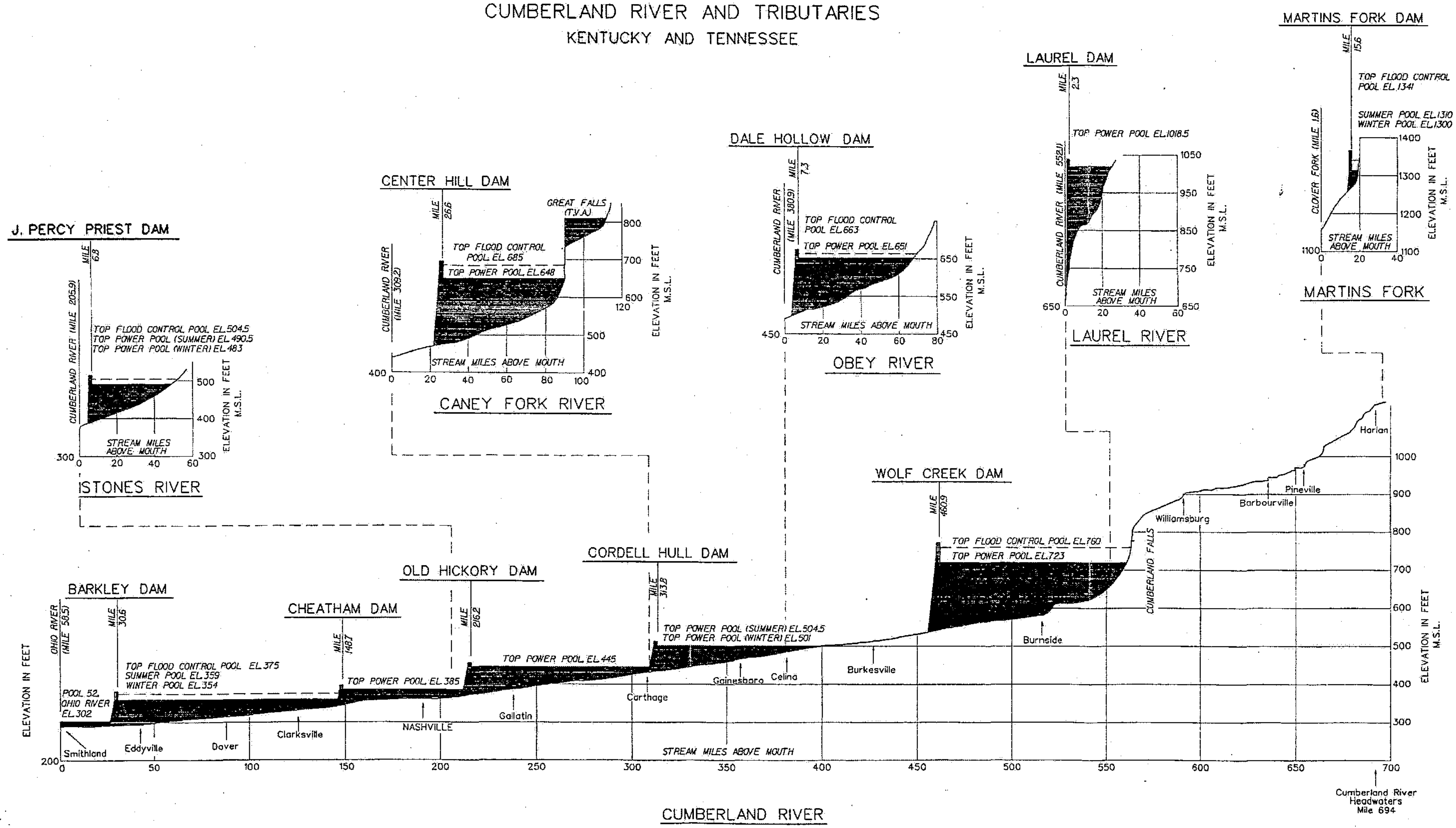


Plate C - 3

Redacted
Ex. 7

REVISION	DATE	DESCRIPTION	BY	CHKD.

100' 50' 0 100' 200'
GRAPHIC SCALE

U. S. ARMY ENGINEER DISTRICT, NASHVILLE
CORPS OF ENGINEERS
OFFICE OF THE DISTRICT ENGINEER
NASHVILLE, TENNESSEE

DRAWN: J.E.M.
CHECKED:
TRACED:
COMPARED:
ENGINEER

CUMBERLAND RIVER BASIN
J. PERCY PRIEST RESERVOIR
STONES RIVER, TENNESSEE
DAM
GENERAL PLAN
ELEVATION AND SECTIONS

SUBMITTED: CHIEF, DESIGN BRANCH
APPROVAL RECOMMENDED: CHIEF, ENGINEERING DIVISION
APPROVED: James B. Newman COLONEL, C. E., DISTRICT ENGINEER
DATE: OCTOBER 1962
SCALE: AS SHOWN | SPEC. NO.

Redacted
Ex. 7

OHIO RIVER BASIN
J. PERCY PRIEST DAM & RESERVOIR
STONES RIVER, TENN.
DAM

SCALE IN FEET
200 0 200 400

U.S. ARMY ENGINEER DISTRICT, NASHVILLE
30 JUNE 1972

PLATE C-5

CORPS OF ENGINEERS U.S.ARMY

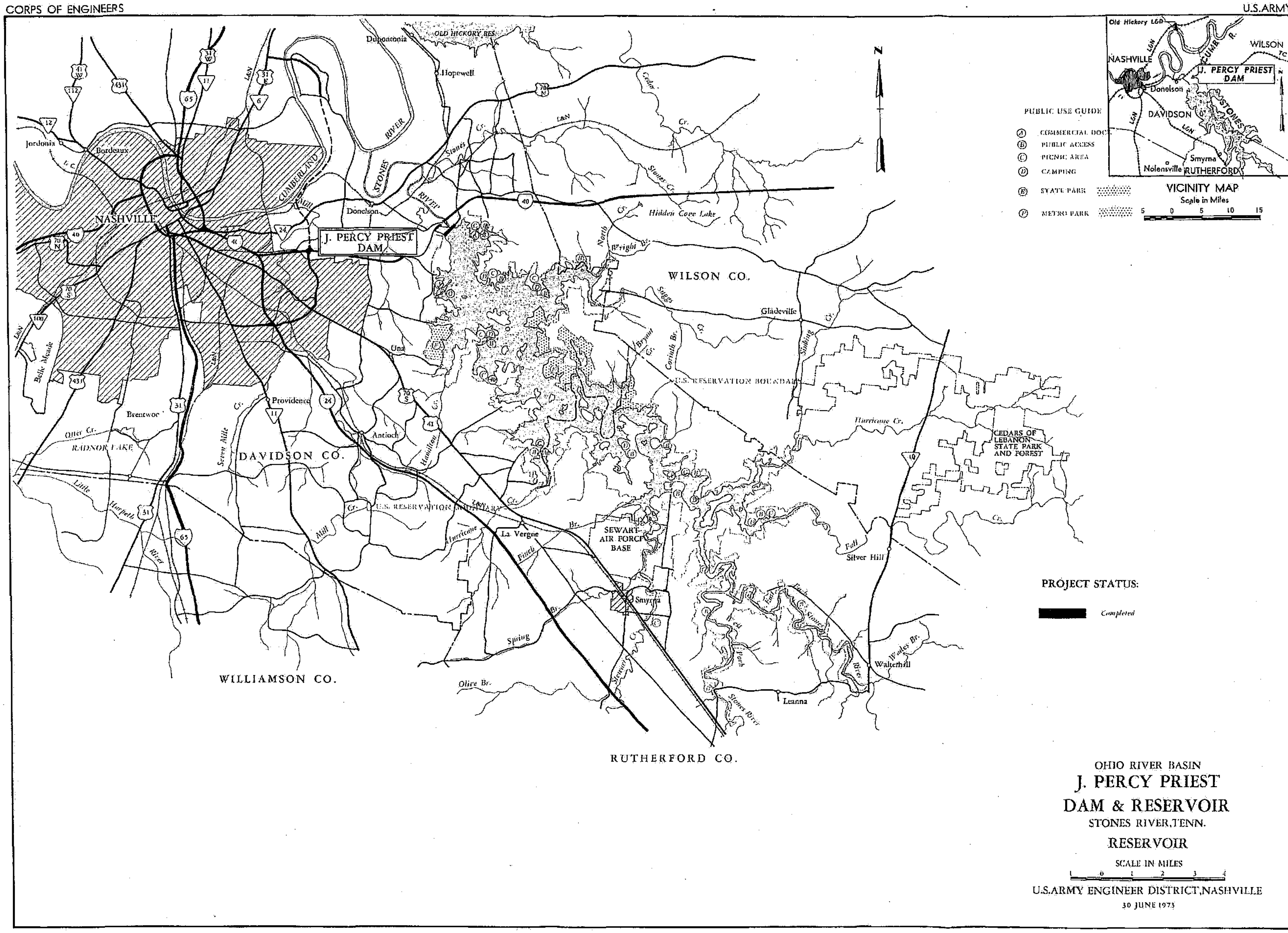
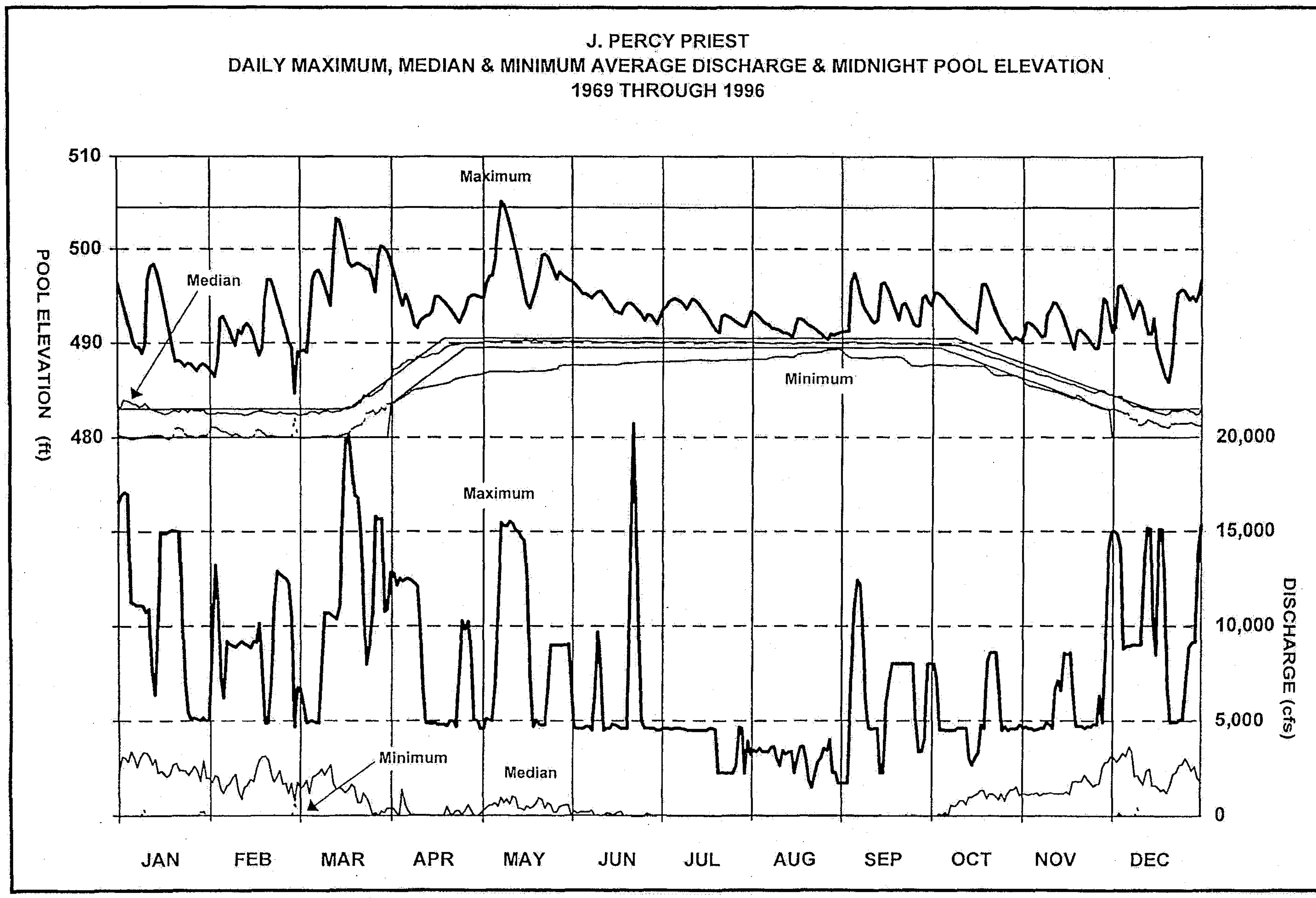


PLATE C-6



9/24/97
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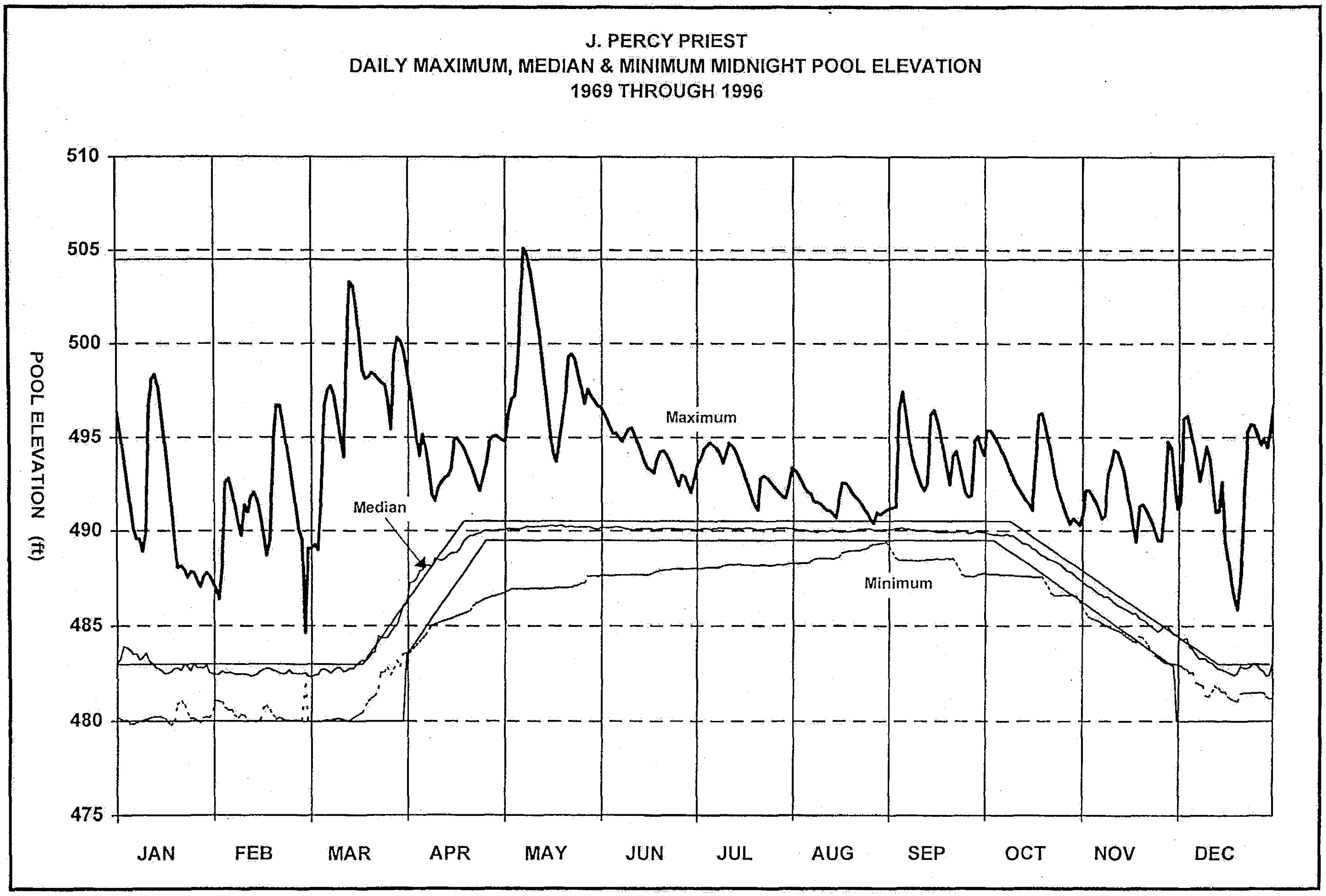

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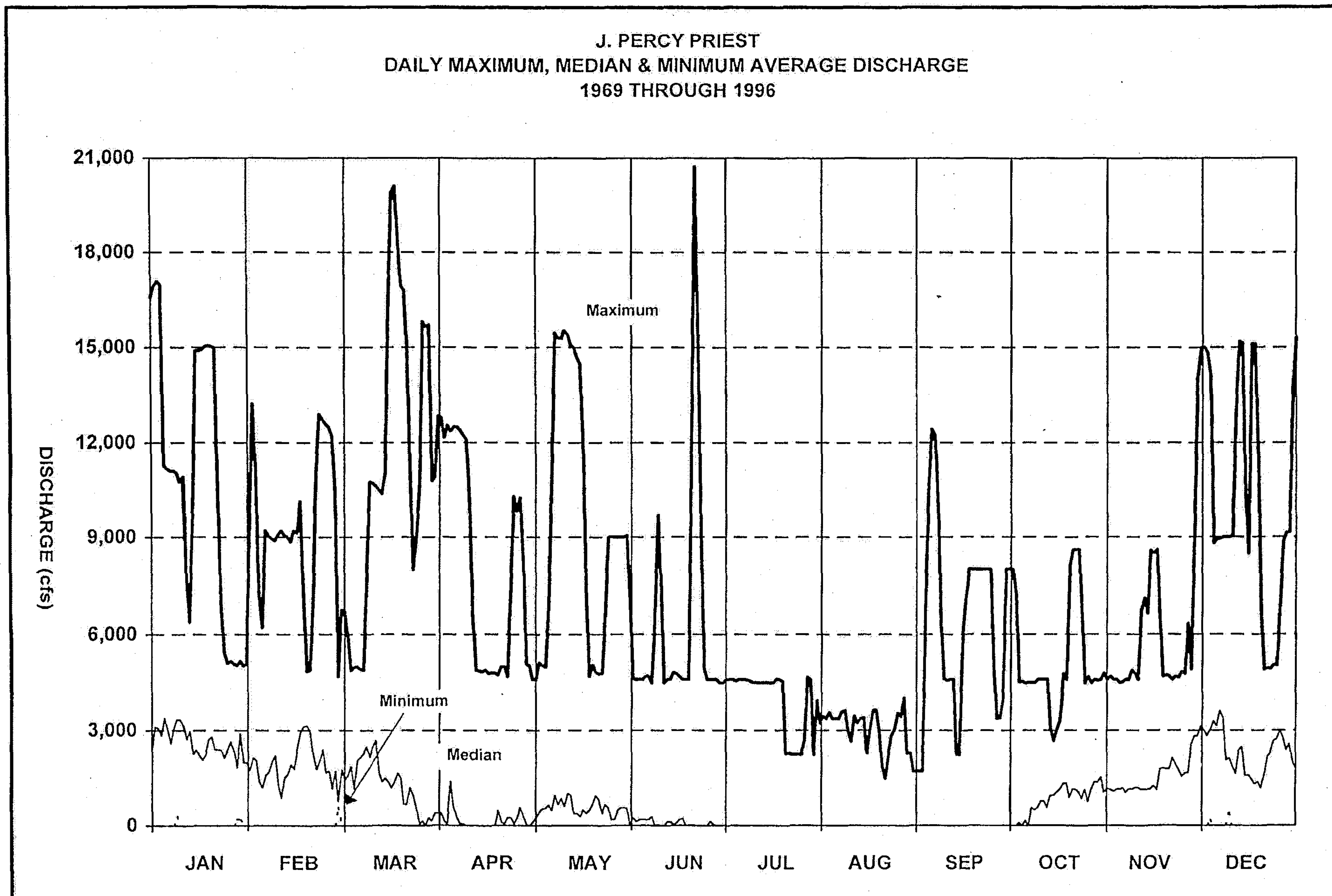

9/24/97
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PLATE D-1c

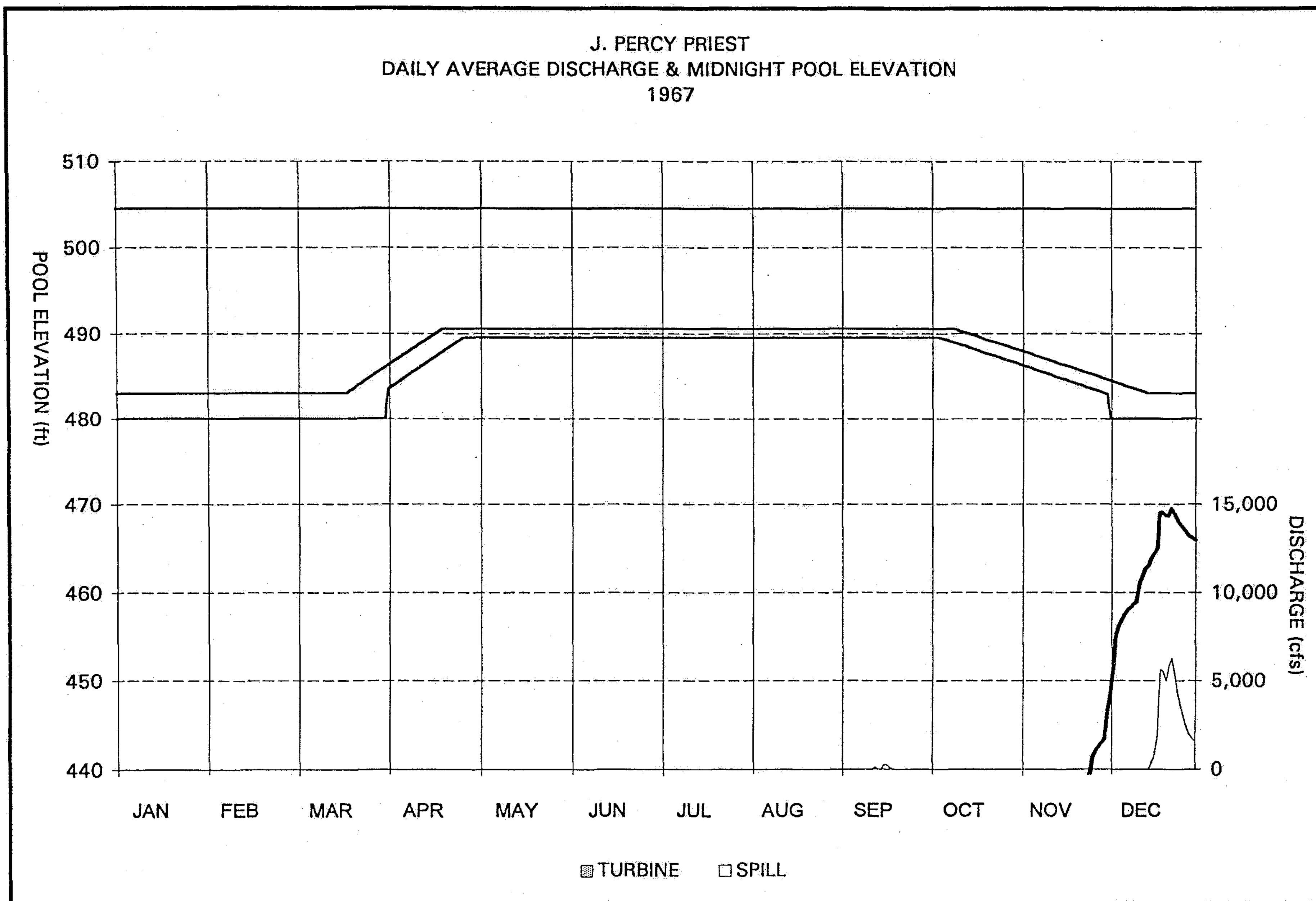
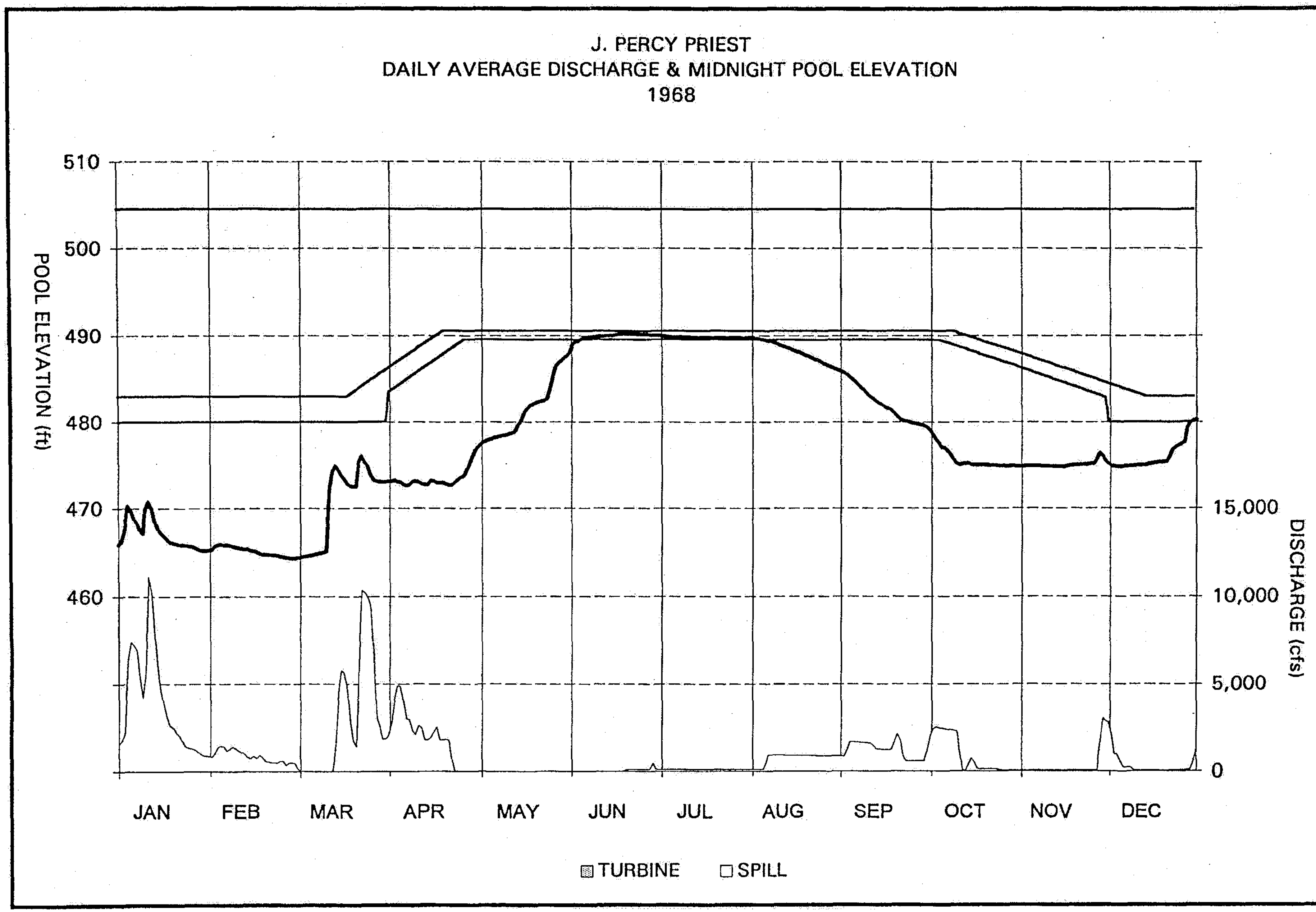
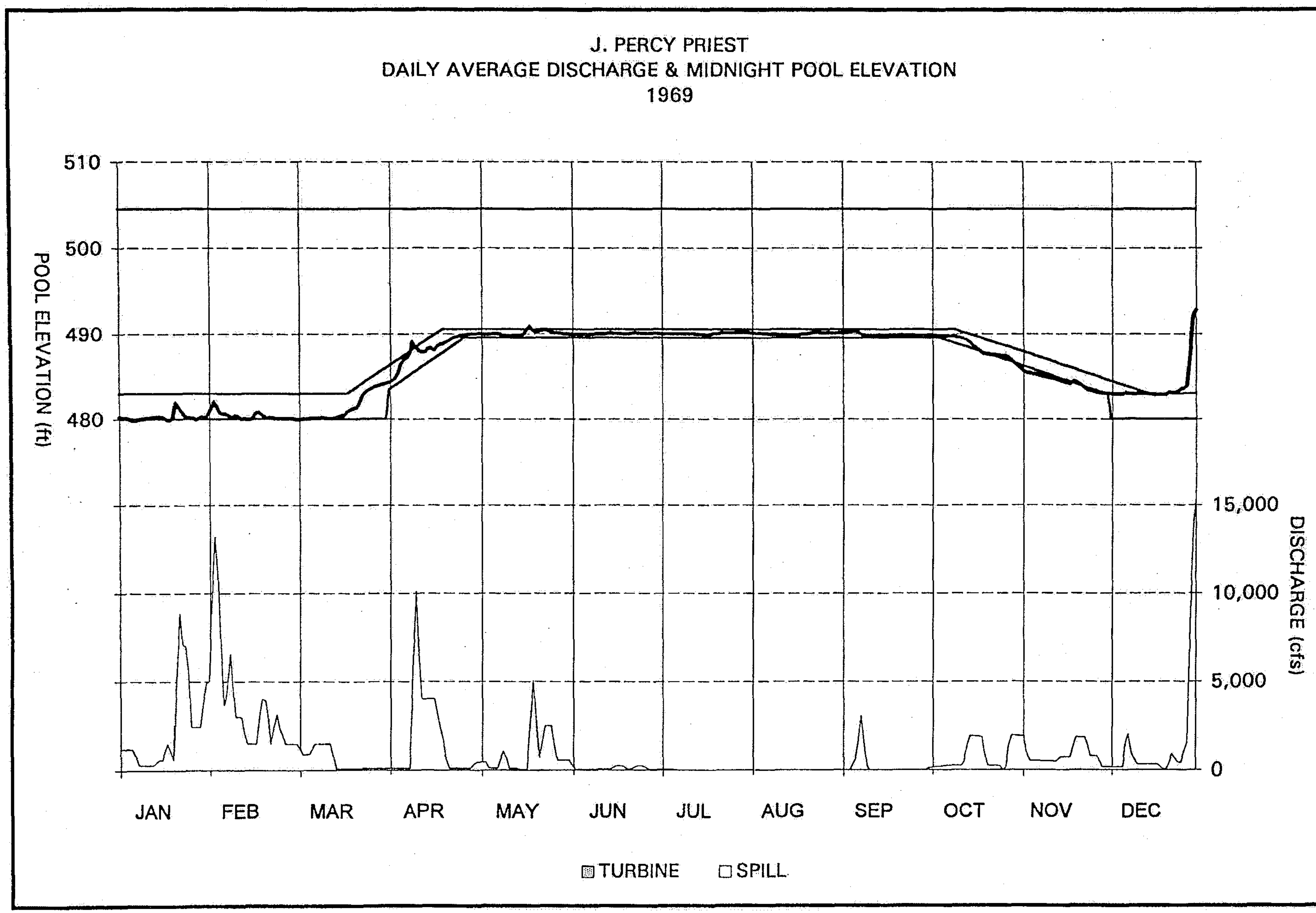
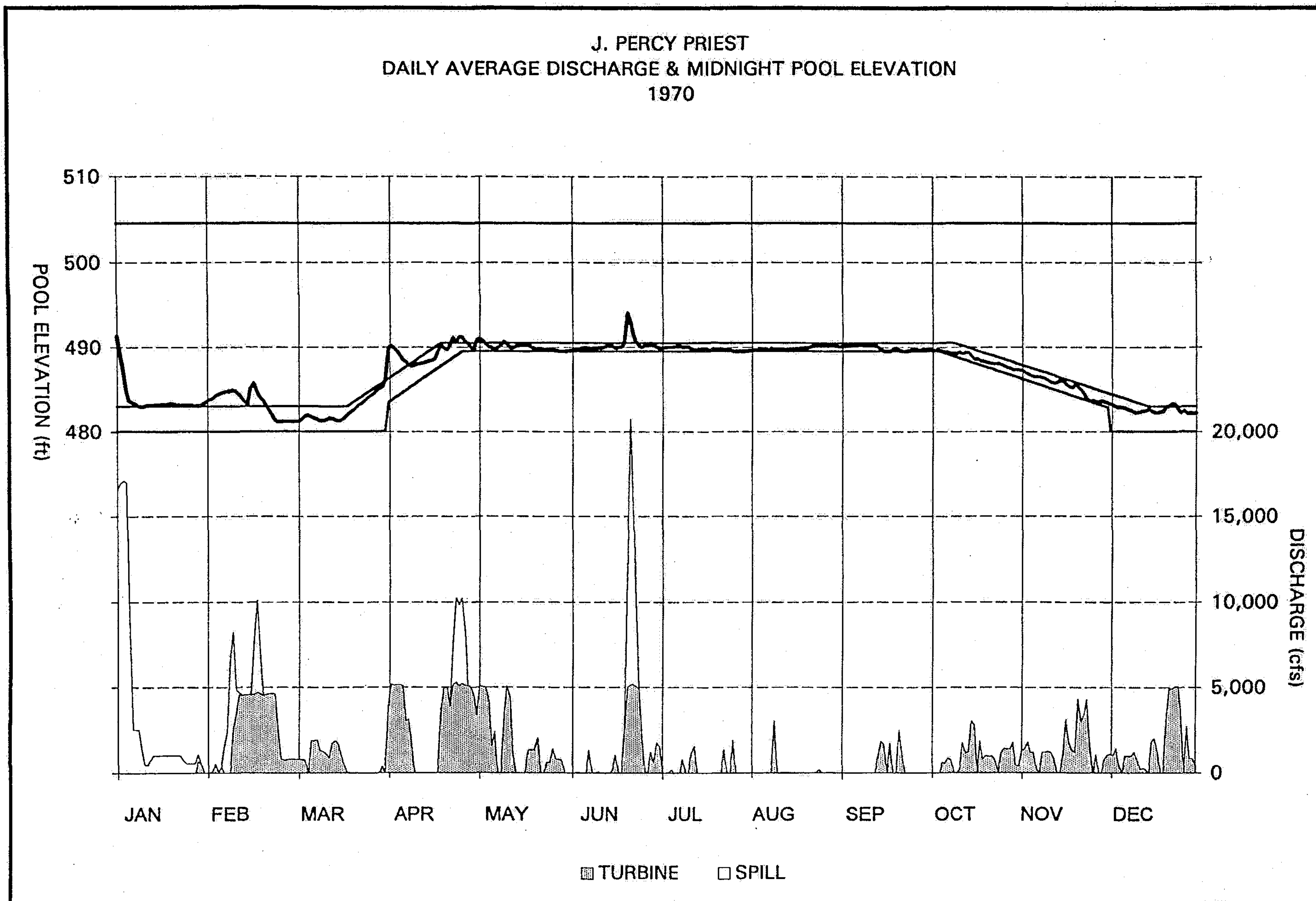
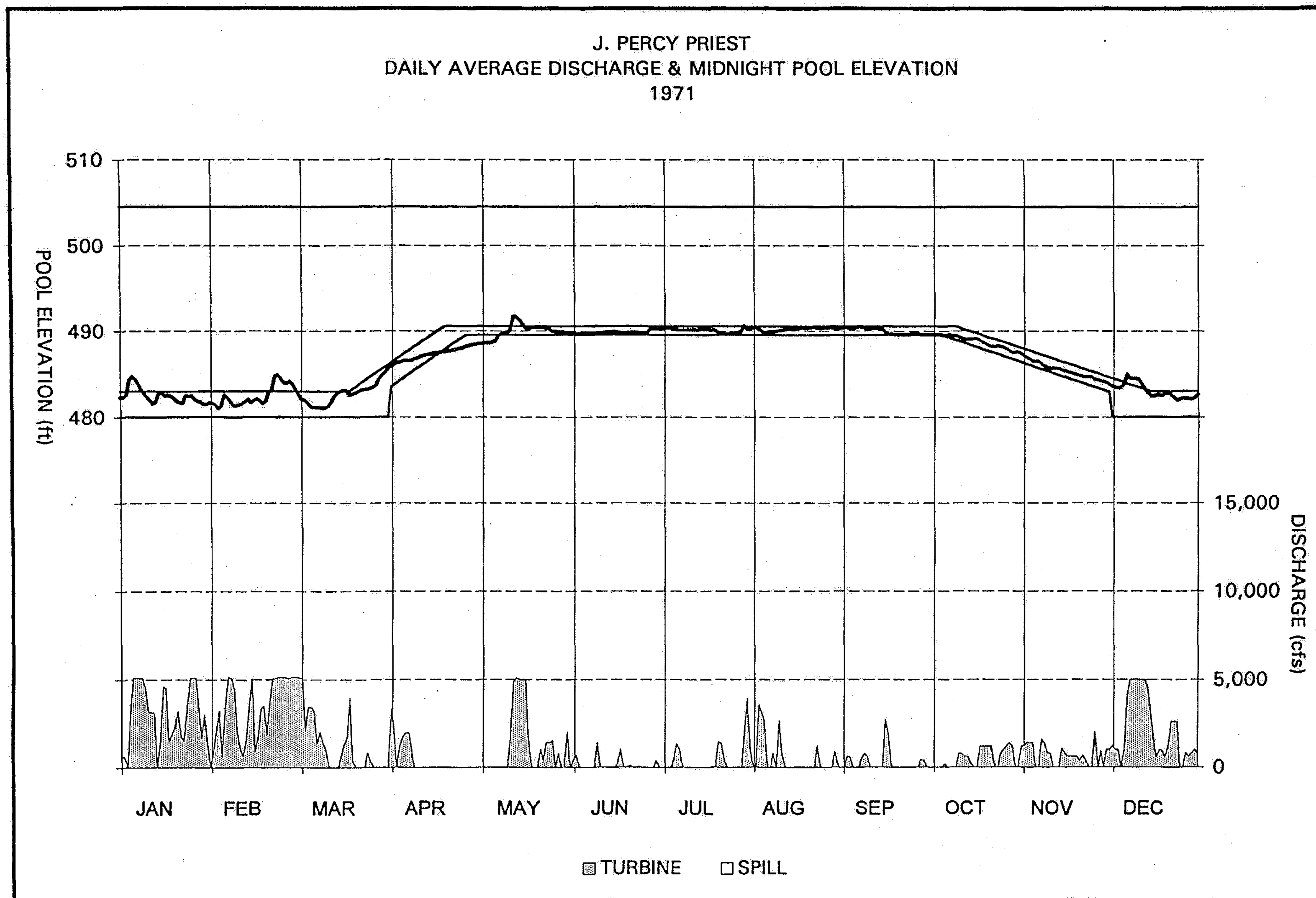

J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1967
POOL ELEVATION (ft)
510
500
490
480
470
460
450
440
DISCHARGE (cfs)
15,000
10,000
5,000
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL

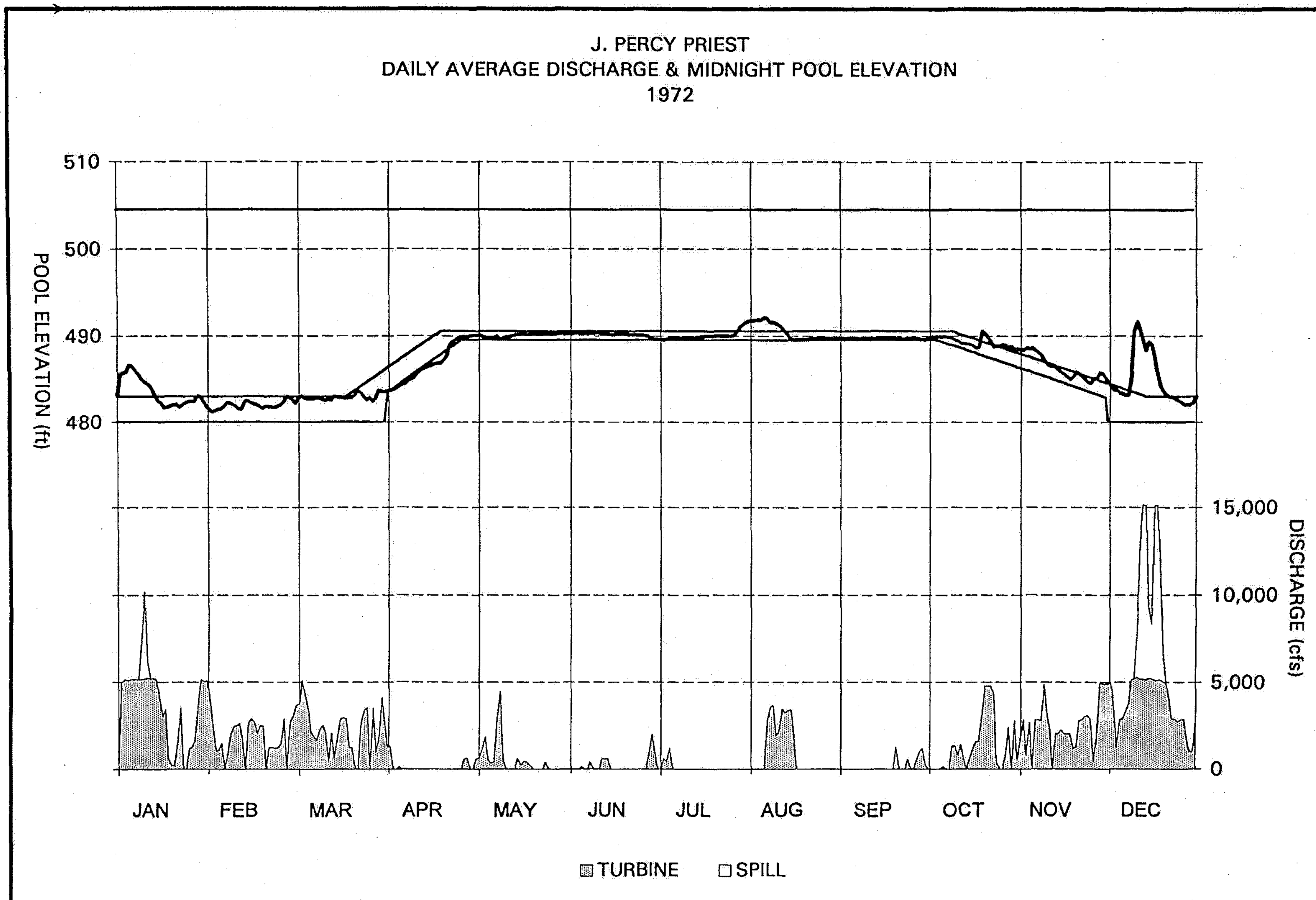
PLATE D-2

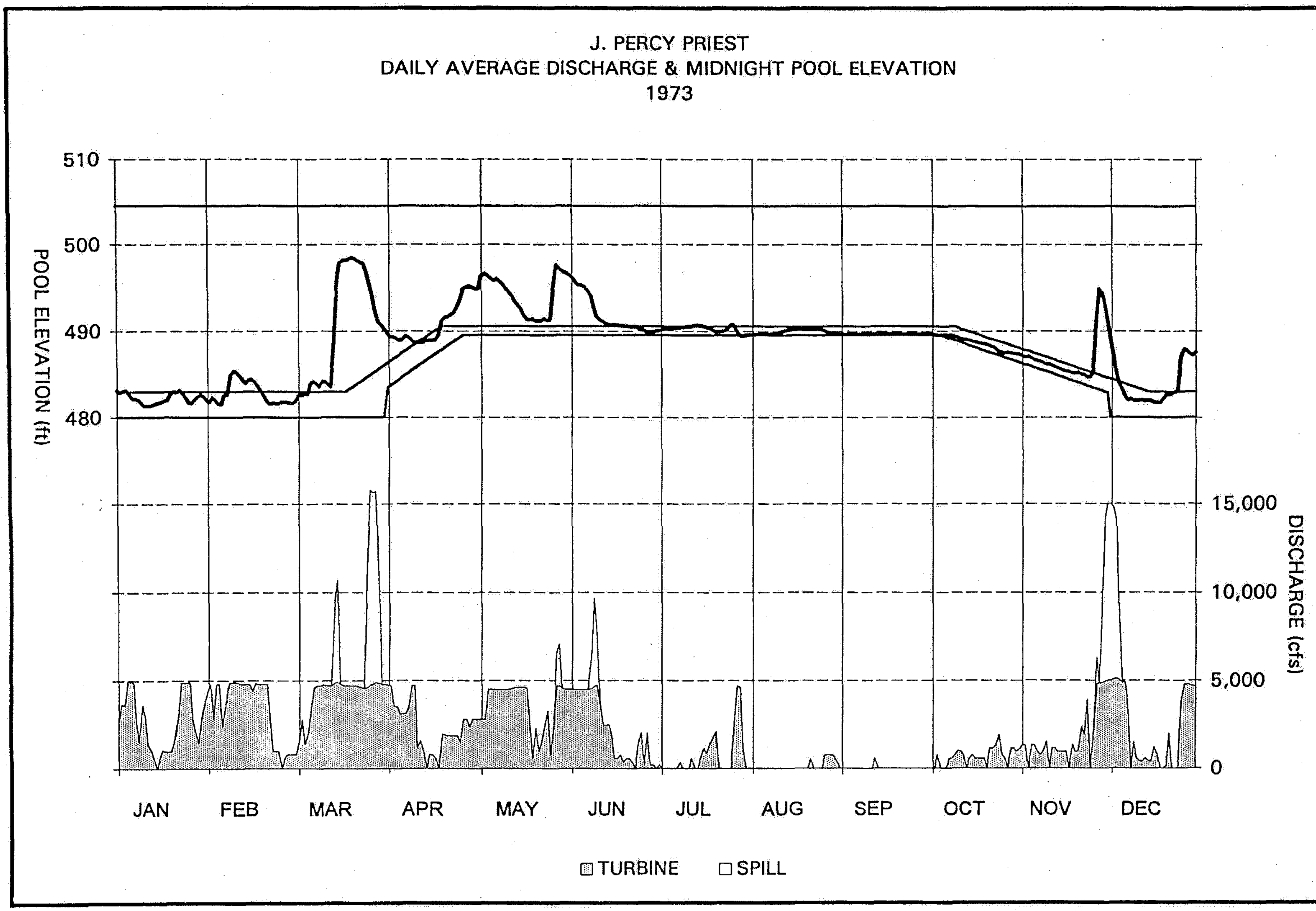

J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1968
POOL ELEVATION (ft)
510
500
490
480
470
460
DISCHARGE (cfs)
15,000
10,000
5,000
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL


J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1969
510
500
490
480
POOL ELEVATION (ft)
15,000
10,000
5,000
0
DISCHARGE (cfs)
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL

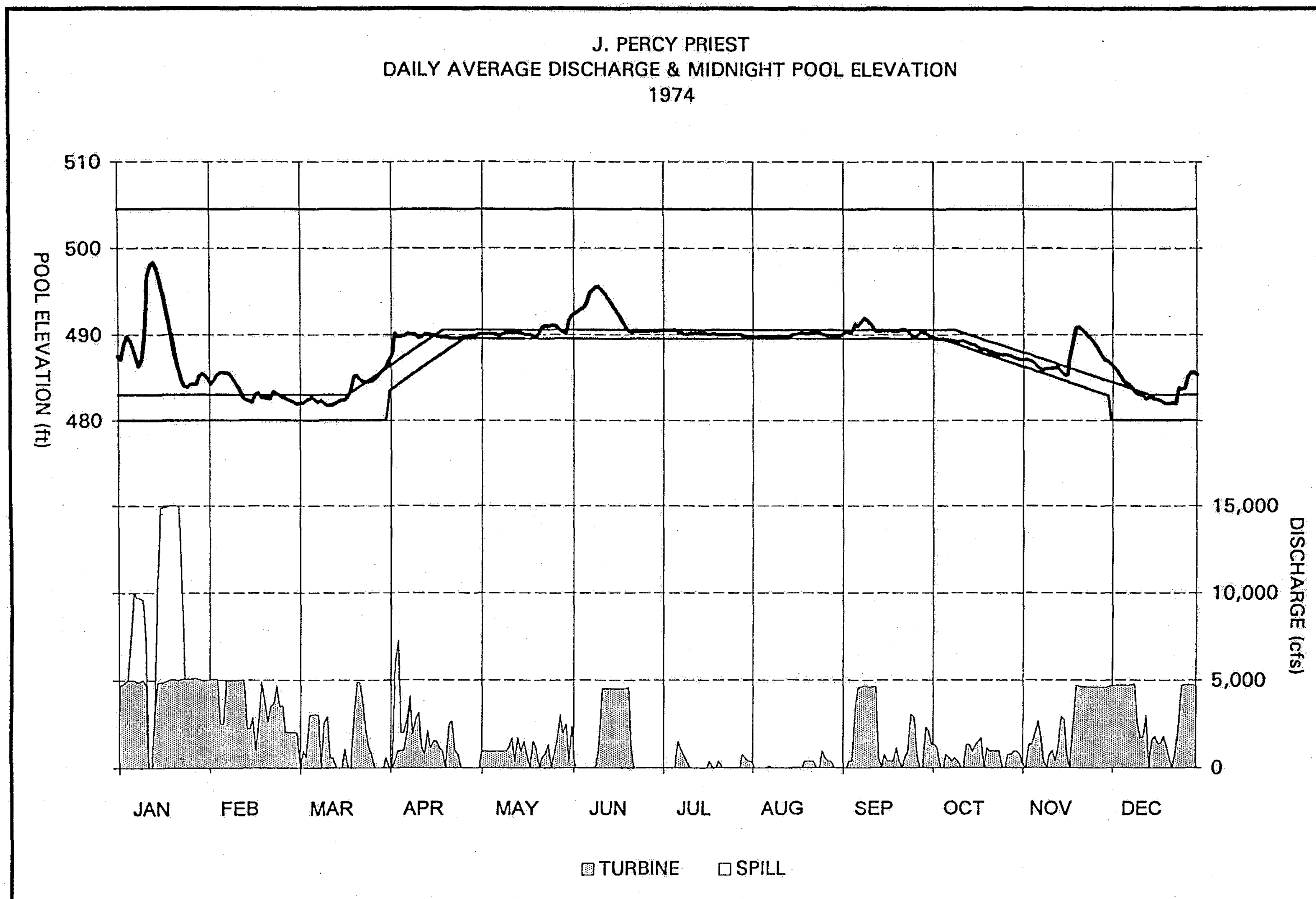

J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1970
POOL ELEVATION (ft)
510
500
490
480
DISCHARGE (cfs)
20,000
15,000
10,000
5,000
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL

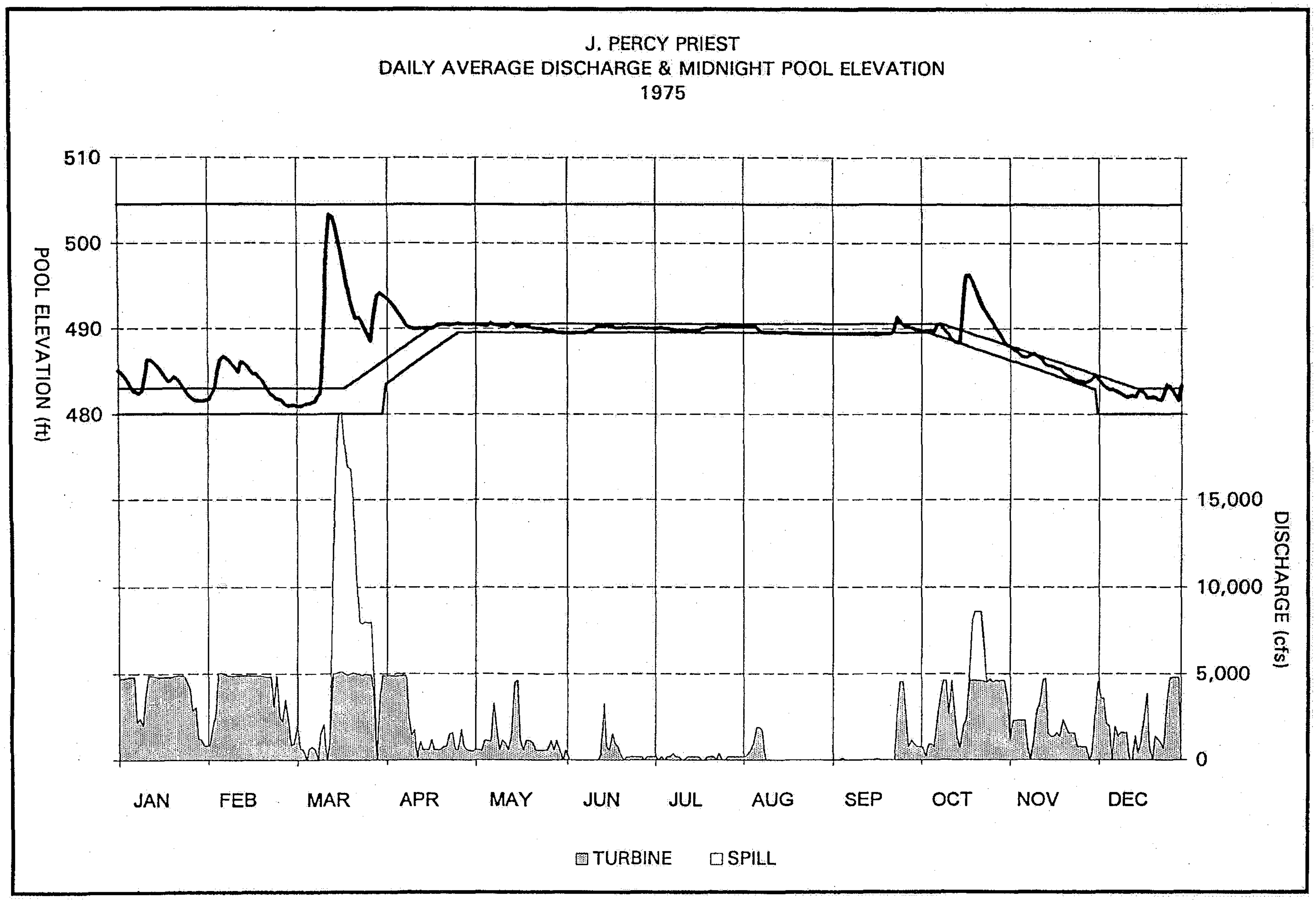

J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1971
510
500
490
480
POOL ELEVATION (ft)
15,000
10,000
5,000
0
DISCHARGE (cfs)
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL

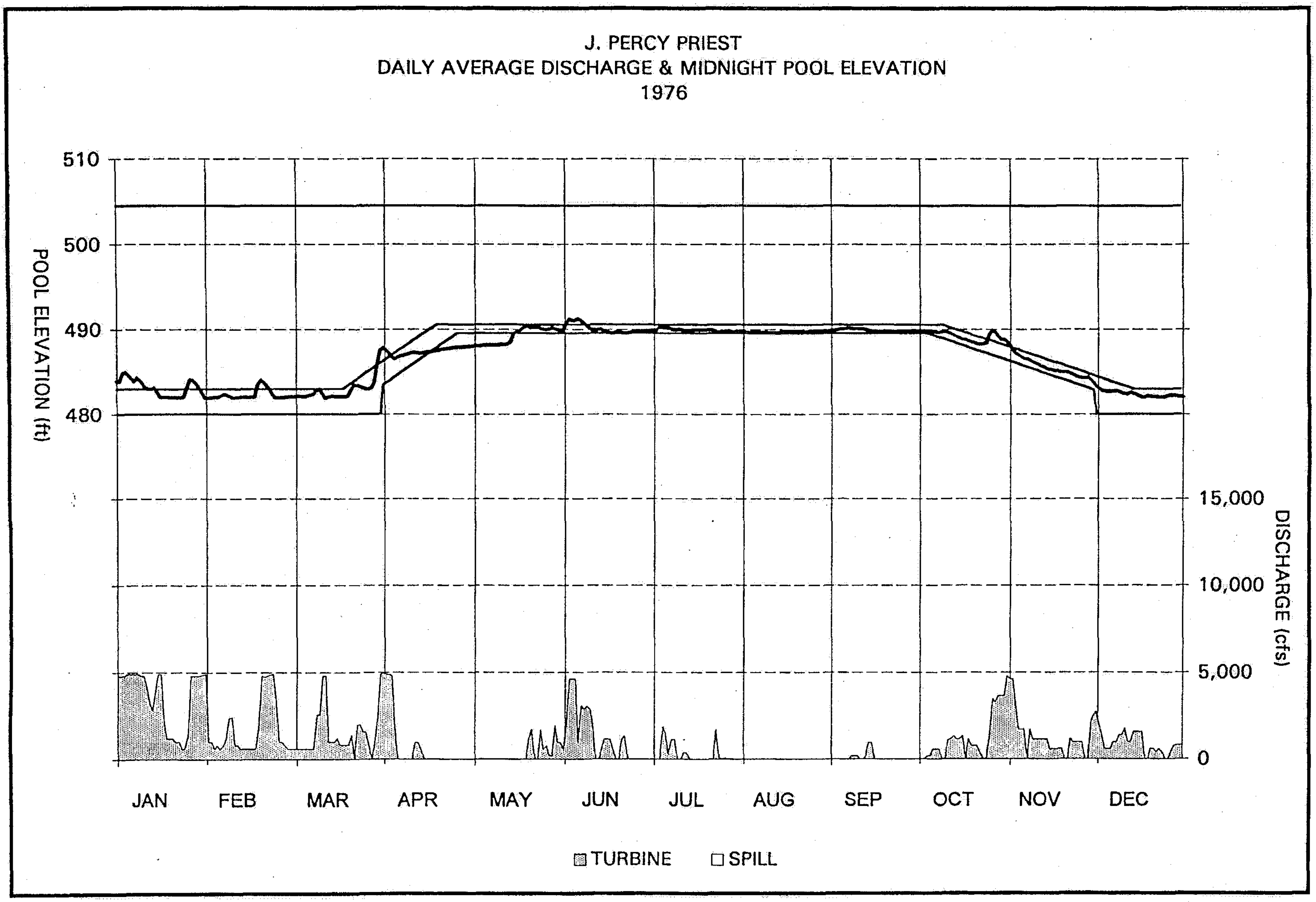

J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1972
POOL ELEVATION (ft)
510
500
490
480
DISCHARGE (cfs)
15,000
10,000
5,000
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL

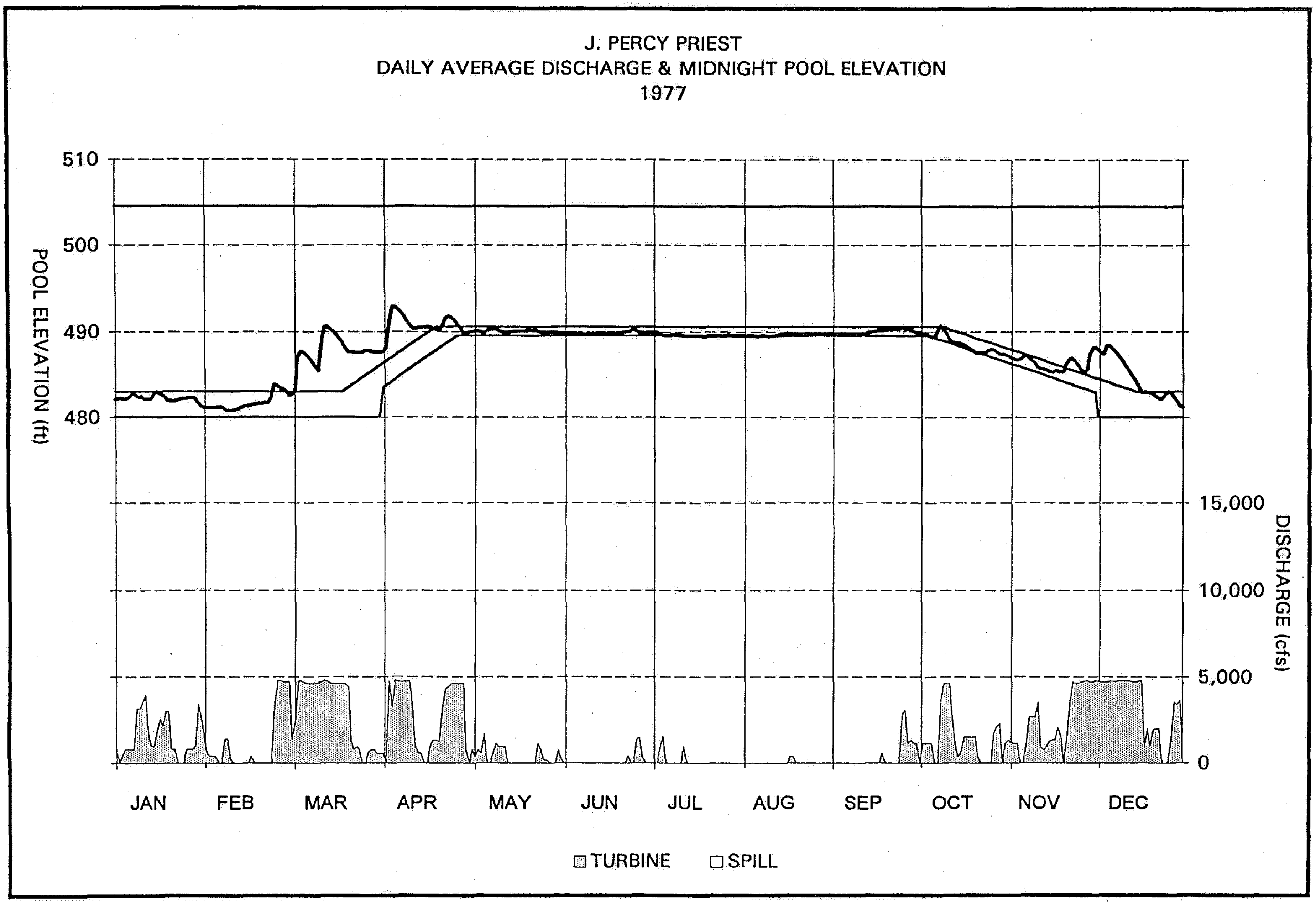


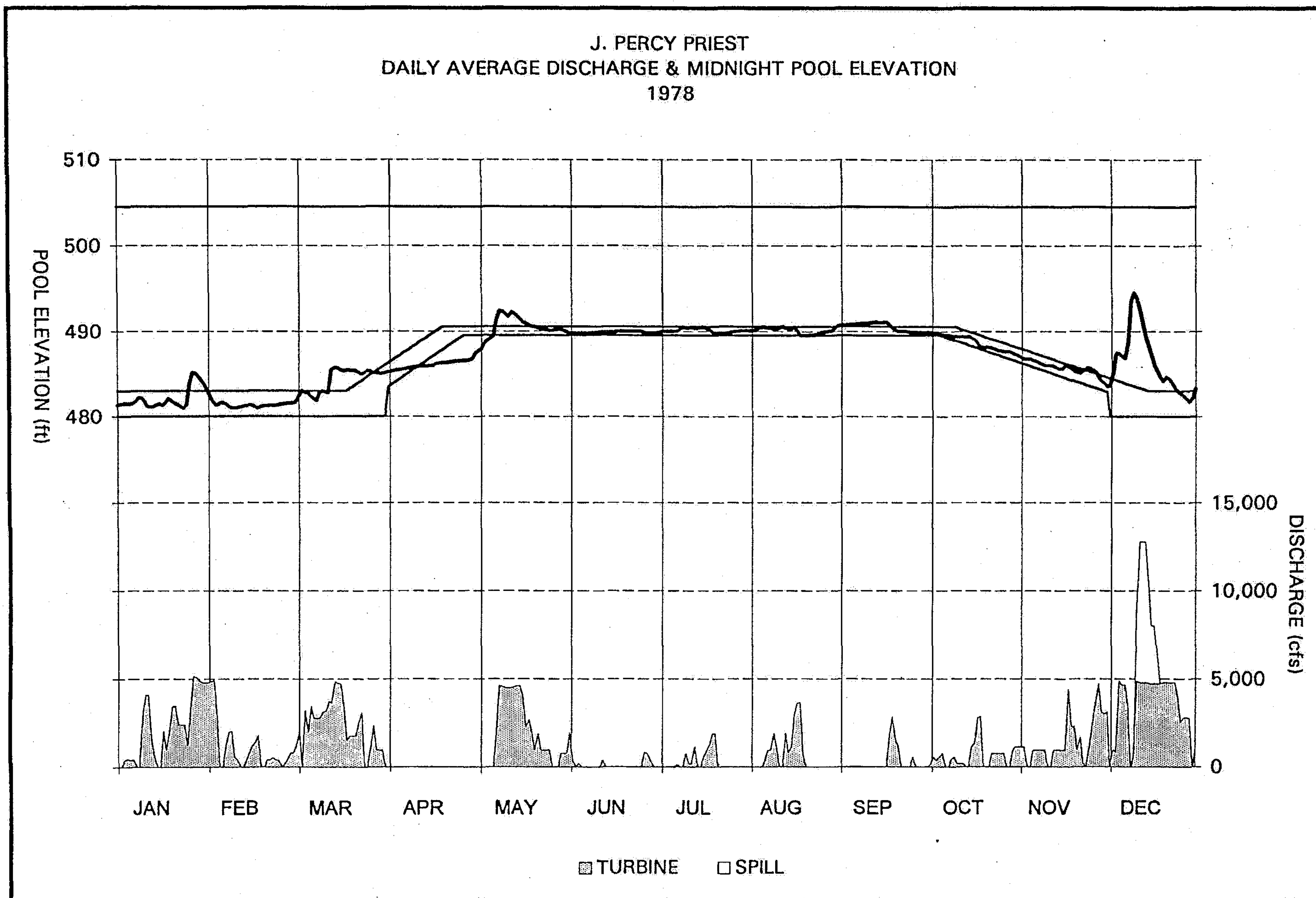
J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1973
510
500
490
480
POOL ELEVATION (ft)
15,000
10,000
5,000
0
DISCHARGE (cfs)
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL


J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1974
510
500
490
480
POOL ELEVATION (ft)
15,000
10,000
5,000
0
DISCHARGE (cfs)
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL

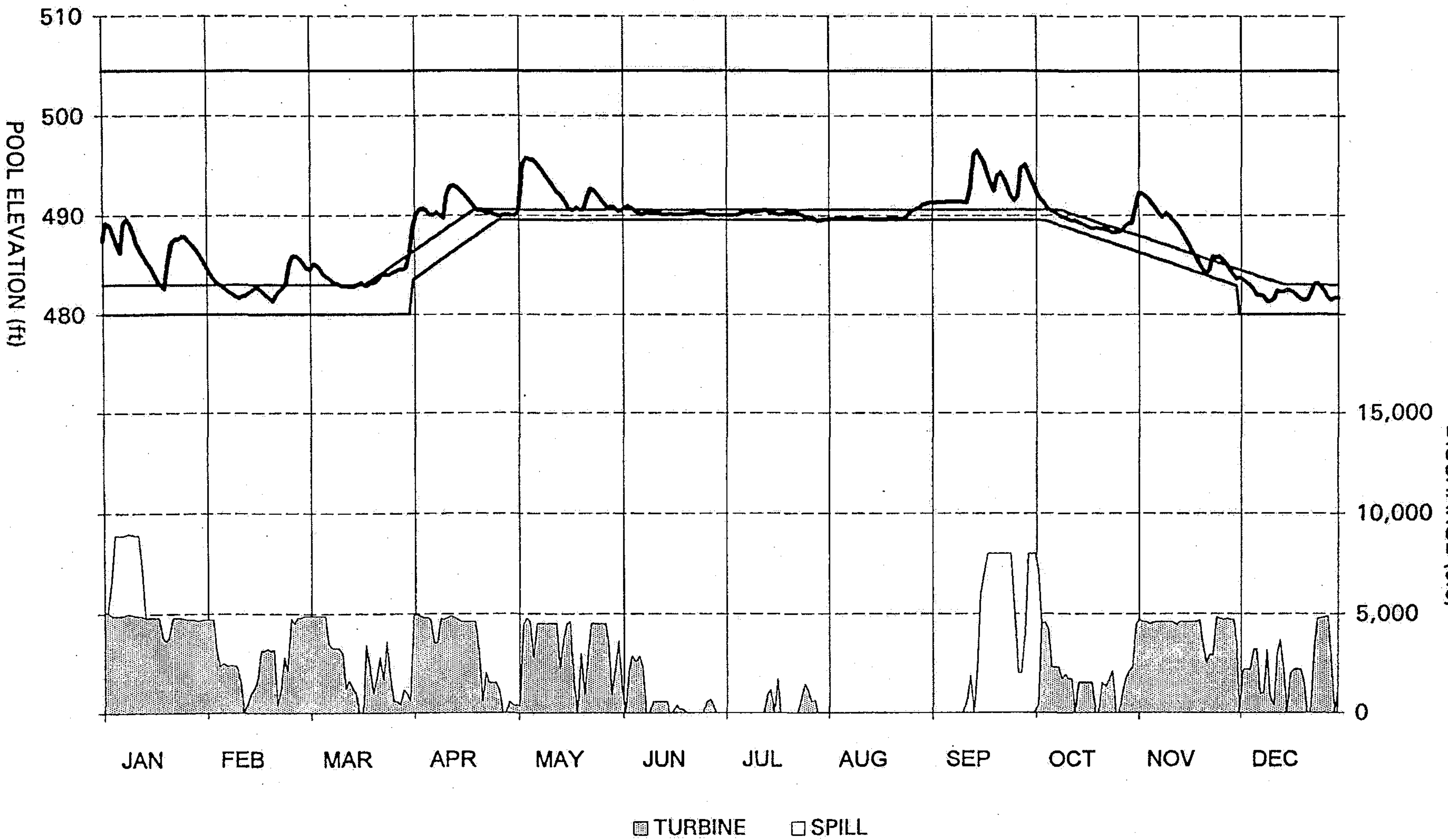

J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1975
POOL ELEVATION (ft)
510
500
490
480
DISCHARGE (cfs)
15,000
10,000
5,000
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL

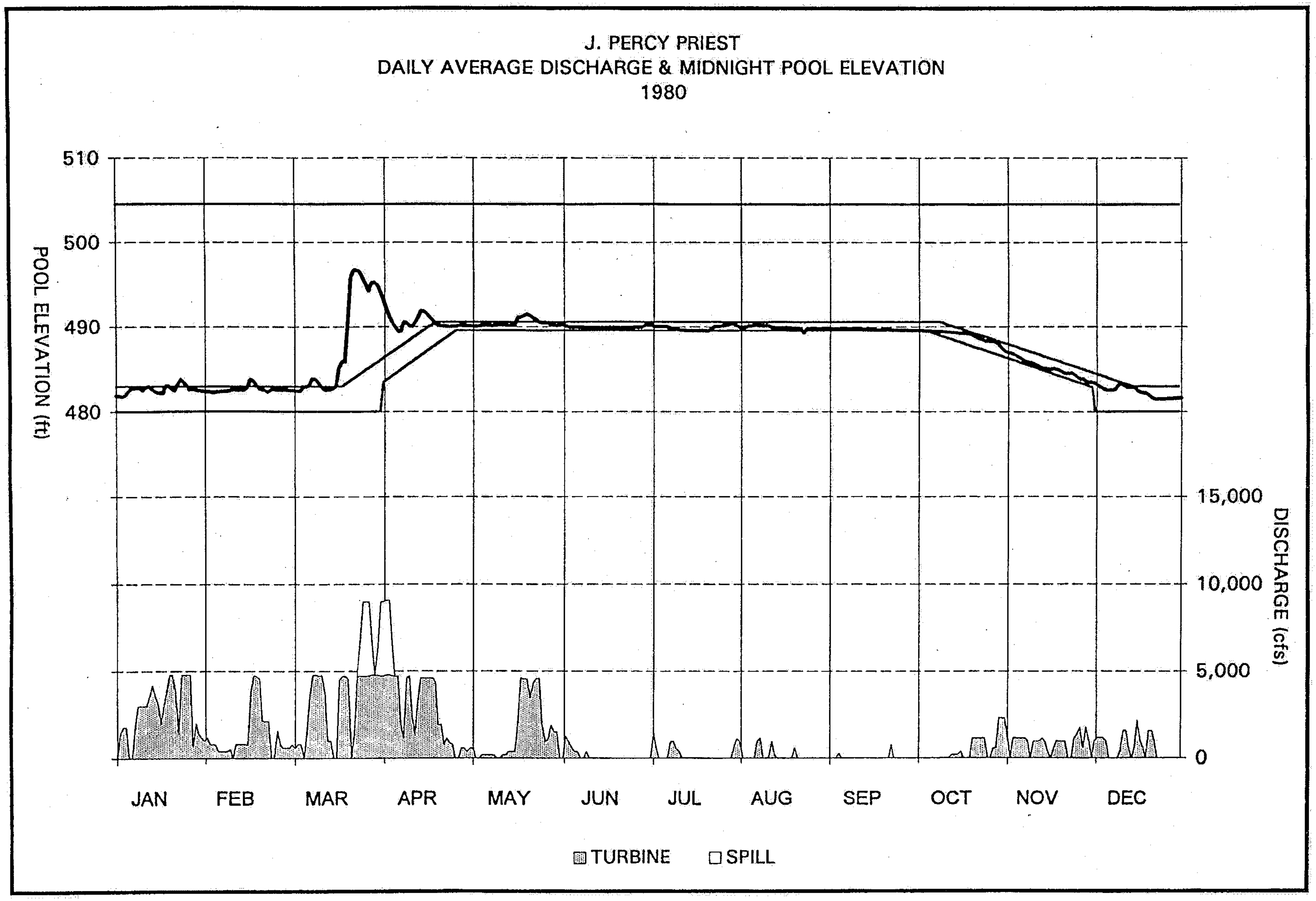

J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1976
510
500
490
480
POOL ELEVATION (ft)
15,000
10,000
5,000
0
DISCHARGE (cfs)
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL

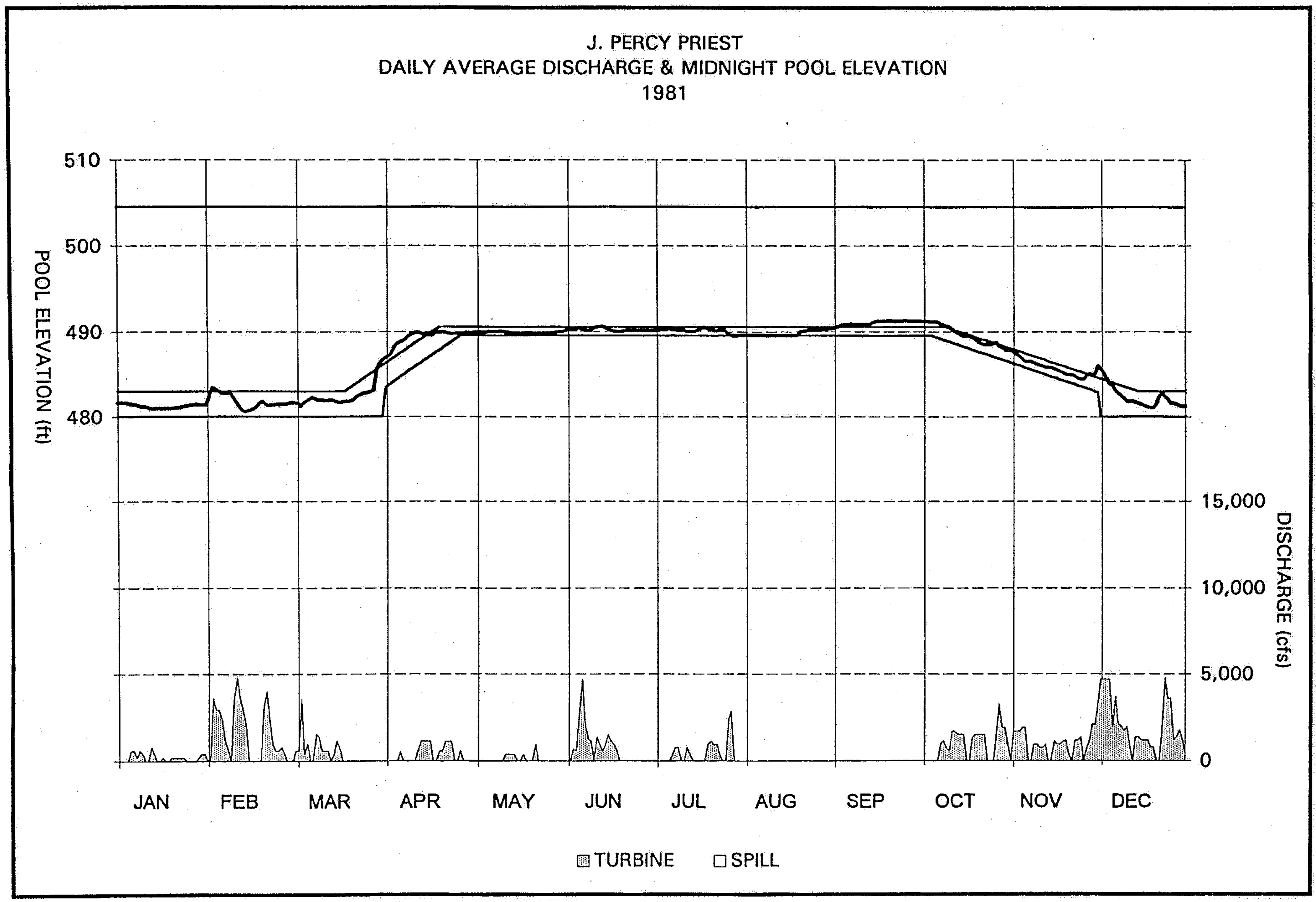

J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1977
POOL ELEVATION (ft)
510
500
490
480
DISCHARGE (cfs)
15,000
10,000
5,000
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL

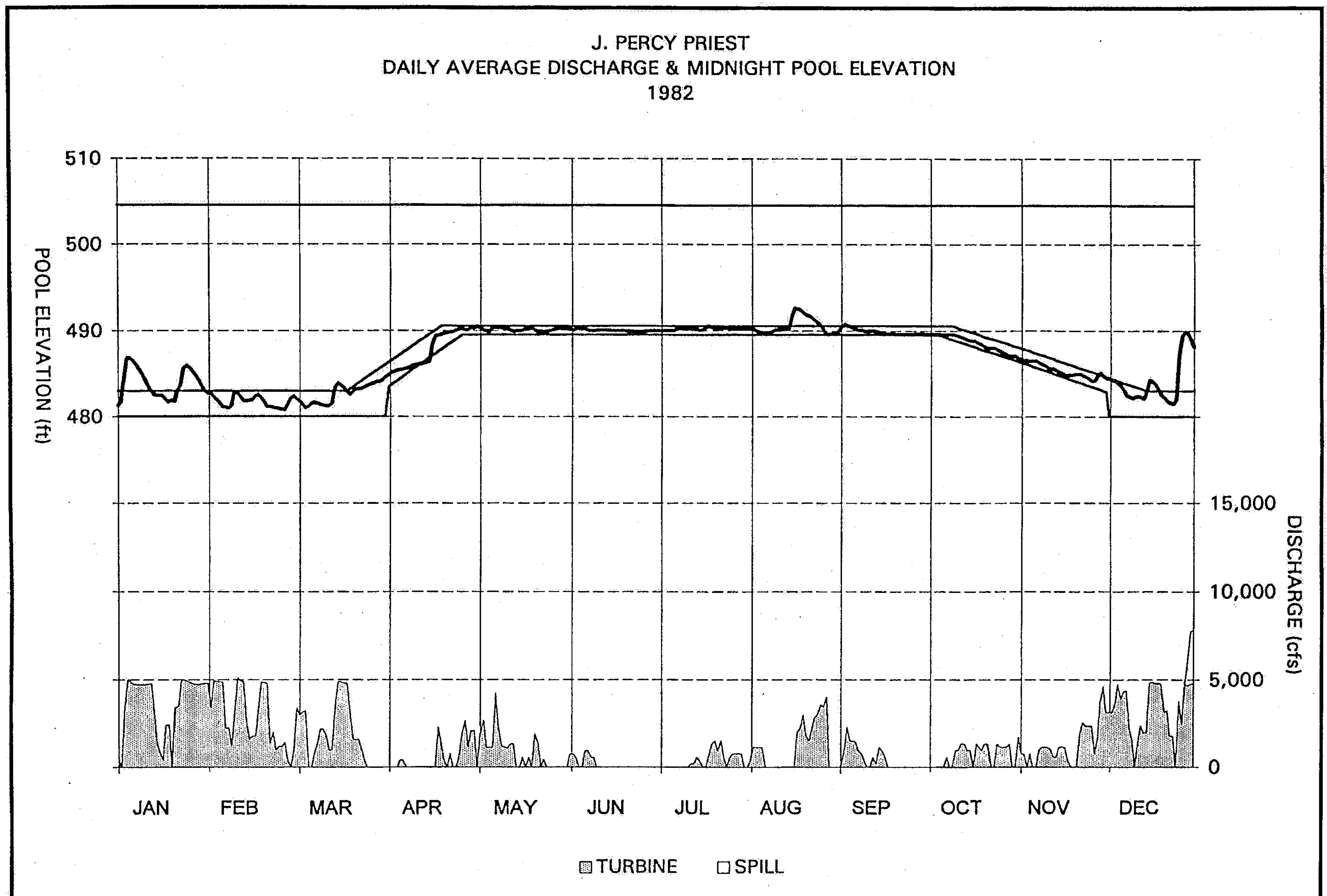

J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1978
510
500
490
480
POOL ELEVATION (ft)
15,000
10,000
5,000
0
DISCHARGE (cfs)
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL

J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1979

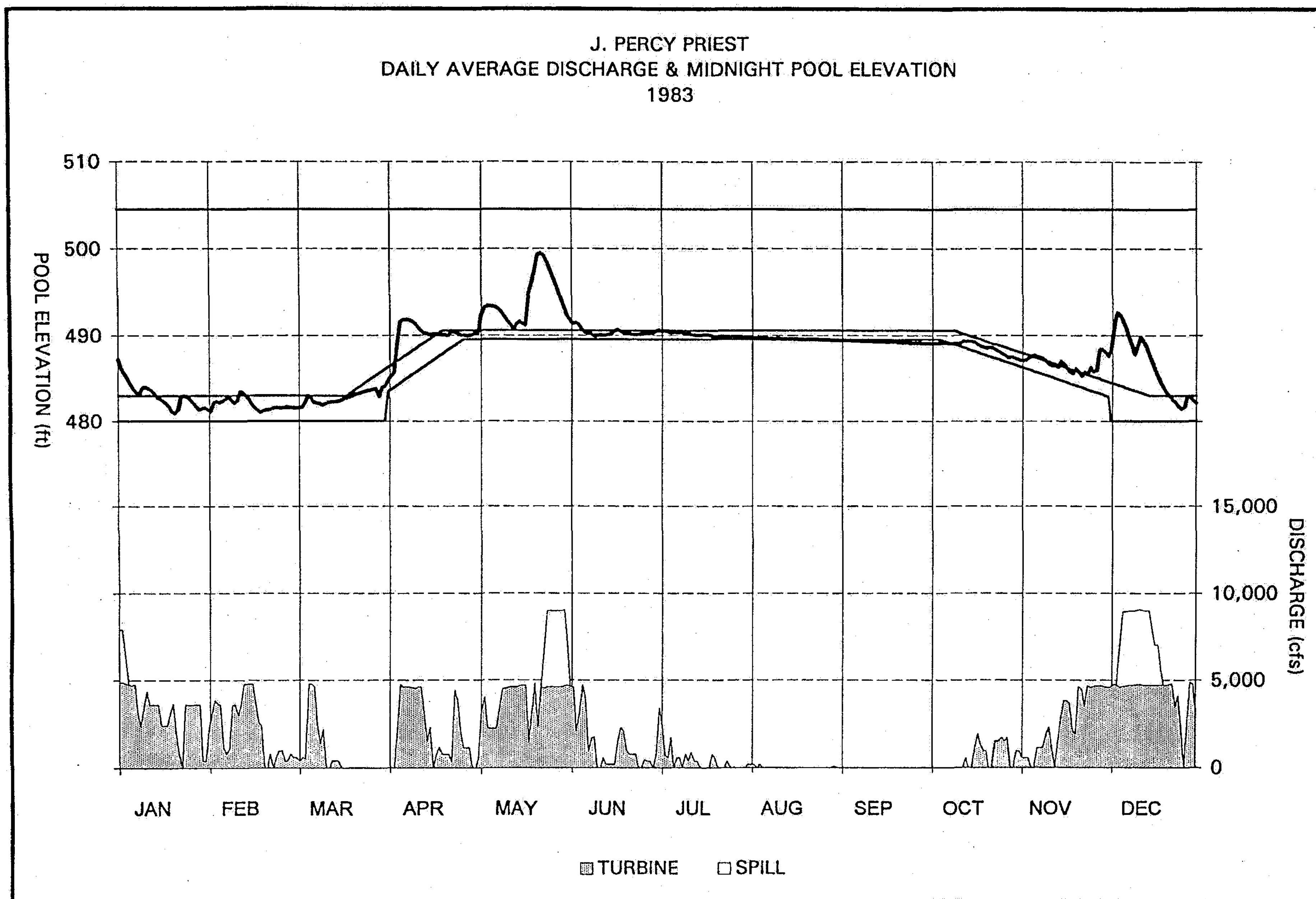



J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1980
510
500
490
480
POOL ELEVATION (ft)
15,000
10,000
5,000
0
DISCHARGE (cfs)
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL


J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1981
510
500
490
480
POOL ELEVATION (ft)
15,000
10,000
5,000
0
DISCHARGE (cfs)
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL



J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1982
510
500
490
480
POOL ELEVATION (ft)
15,000
10,000
5,000
0
DISCHARGE (cfs)
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL


J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1983
POOL ELEVATION (ft)
510
500
490
480
DISCHARGE (cfs)
15,000
10,000
5,000
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL

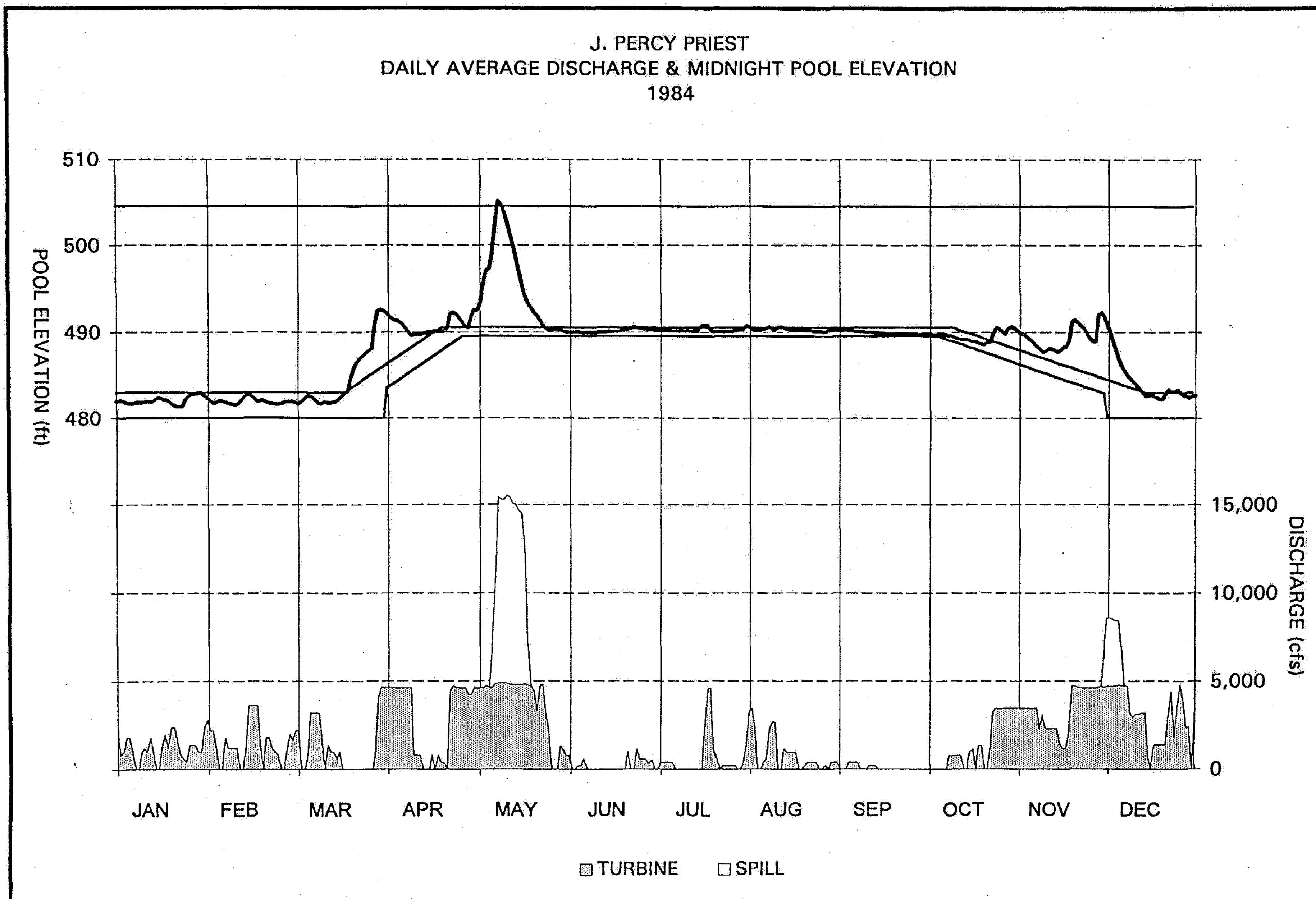
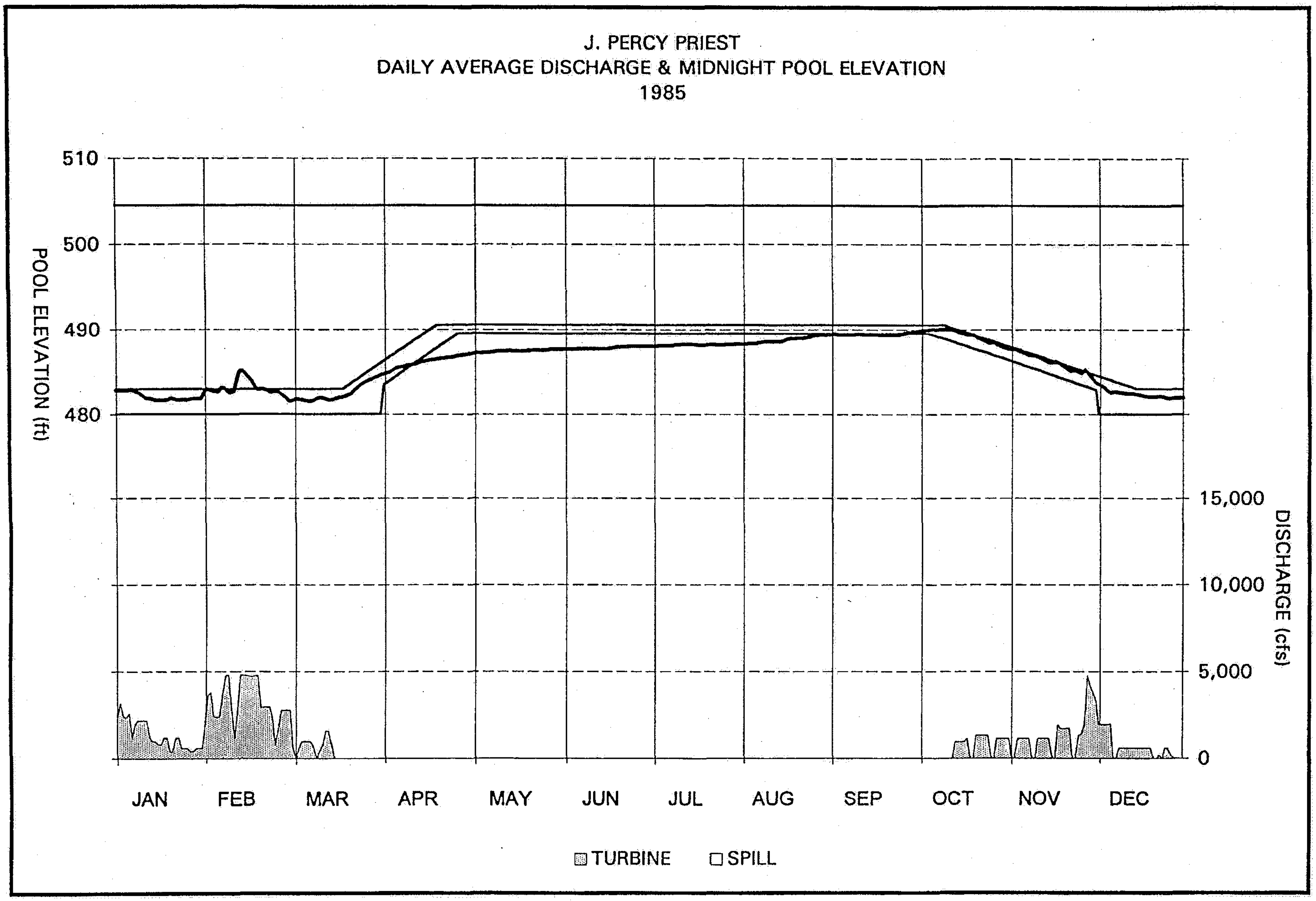
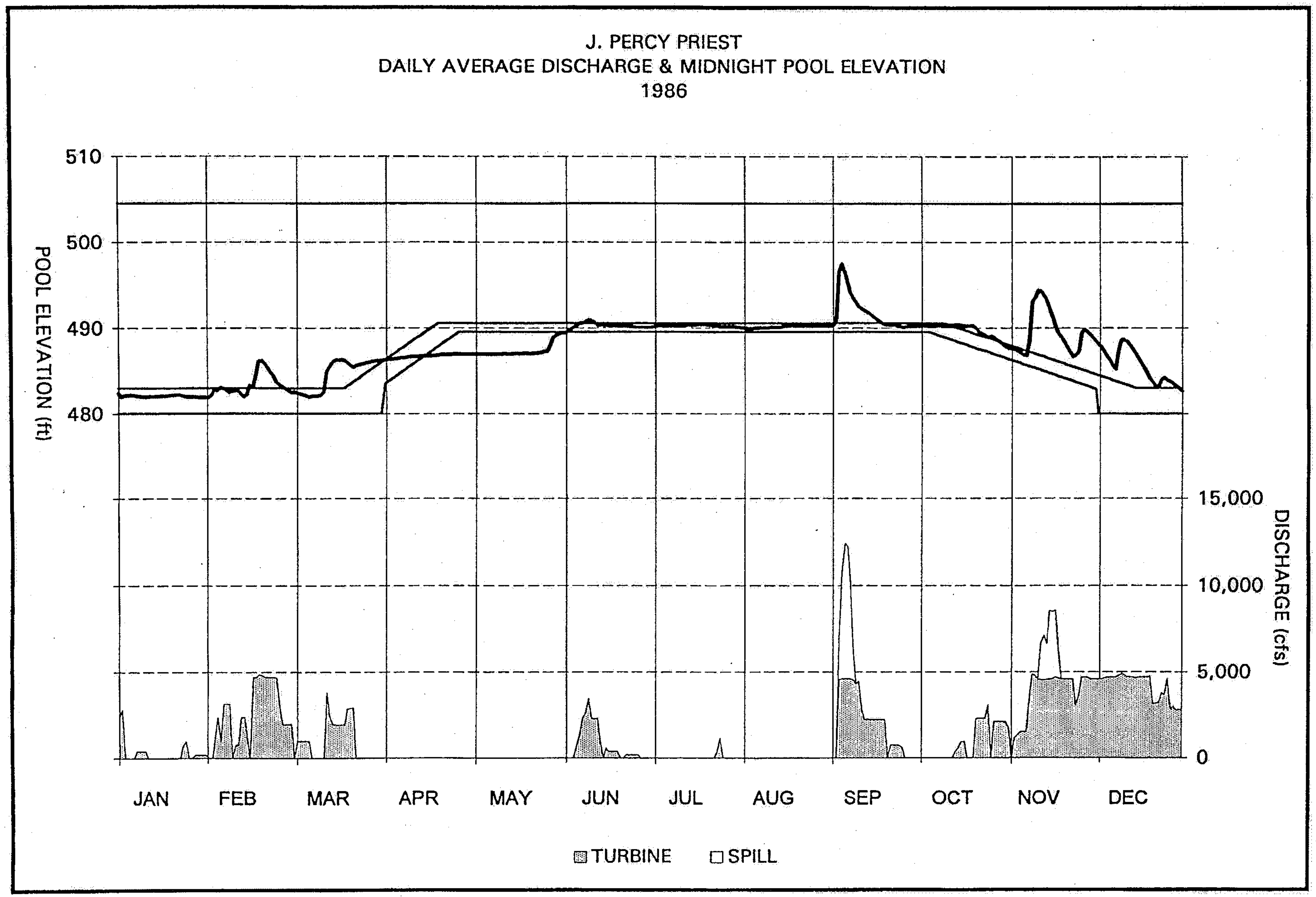
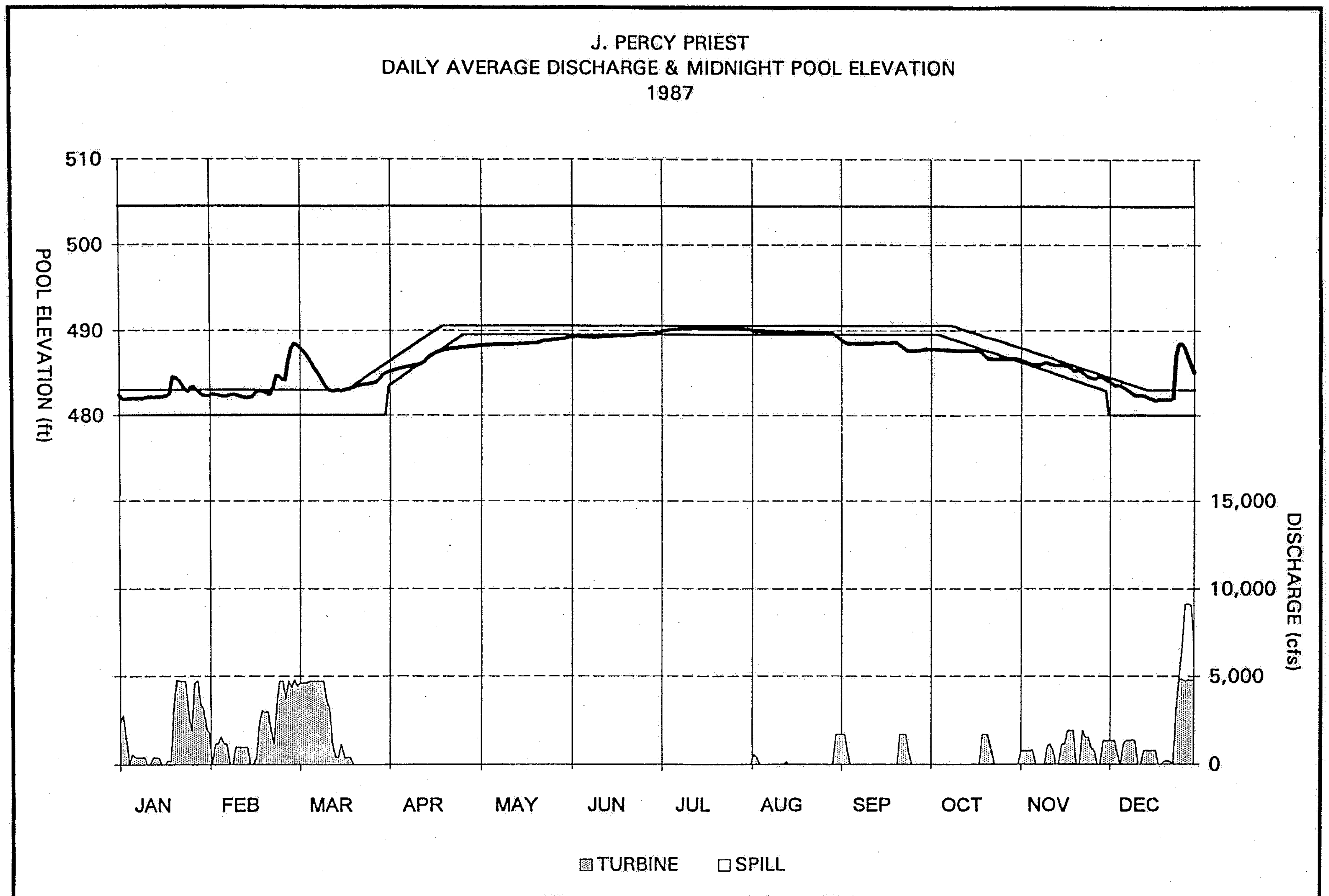

J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1984
POOL ELEVATION (ft)
510
500
490
480
DISCHARGE (cfs)
15,000
10,000
5,000
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL

PLATE D-19


J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1985
510
500
490
480
POOL ELEVATION (ft)
15,000
10,000
5,000
0
DISCHARGE (cfs)
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL


J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1986
POOL ELEVATION (ft)
510
500
490
480
DISCHARGE (cfs)
15,000
10,000
5,000
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL


J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1987
POOL ELEVATION (ft)
510
500
490
480
DISCHARGE (cfs)
15,000
10,000
5,000
0
JAN
FEB
MAR
APR
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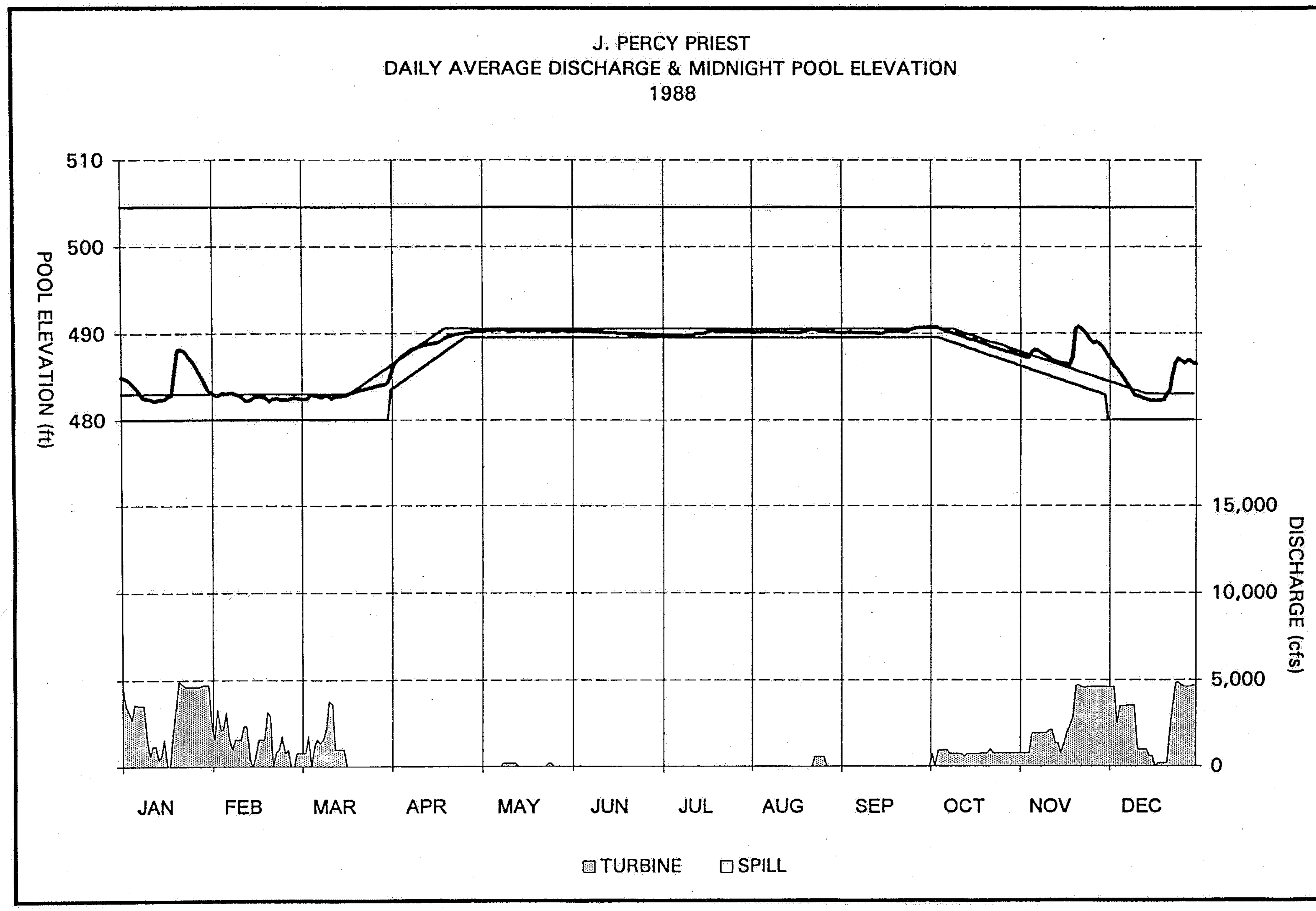
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL


J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1988
POOL ELEVATION (ft)
510
500
490
480
DISCHARGE (cfs)
15,000
10,000
5,000
0
JAN
FEB
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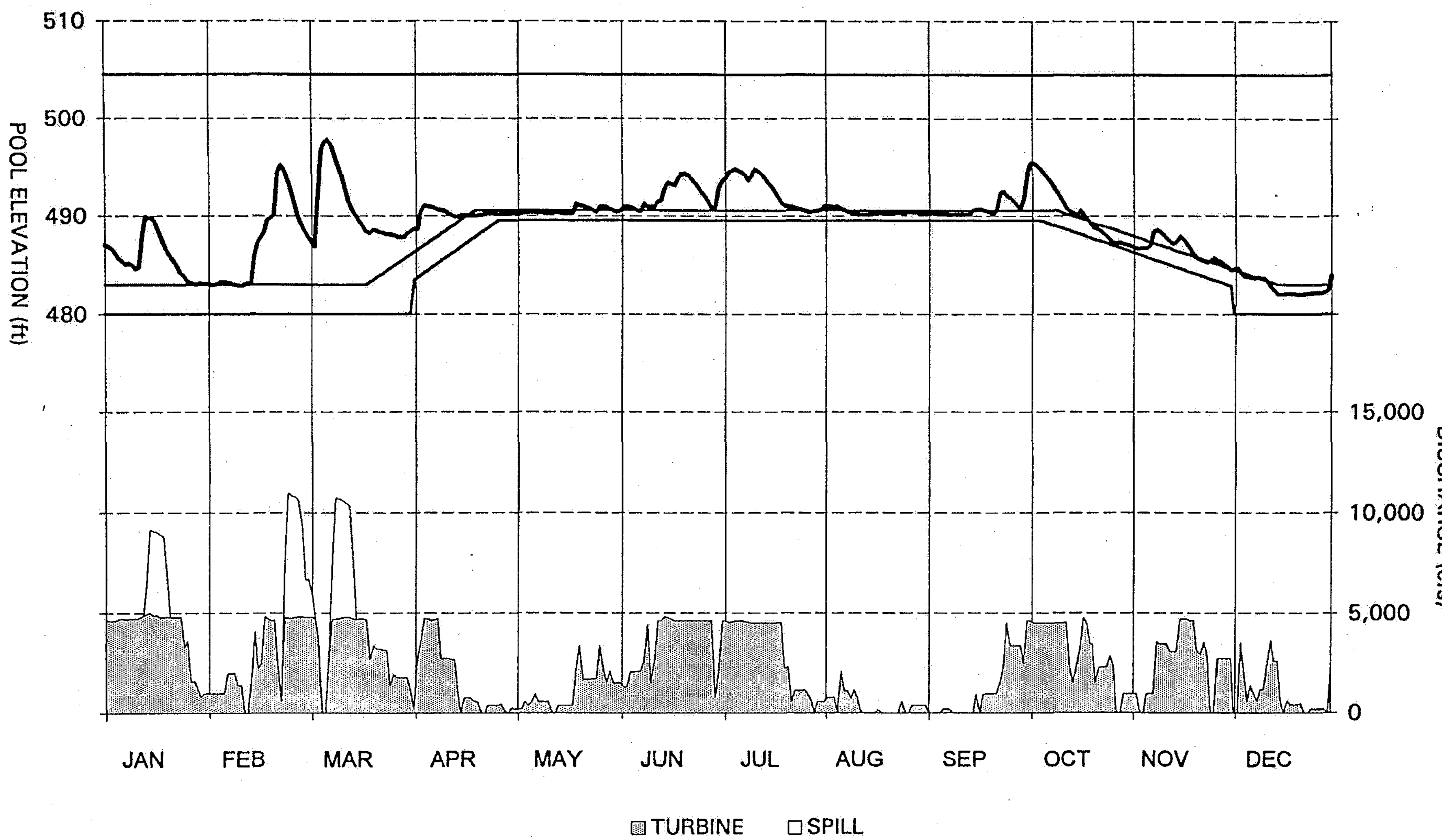
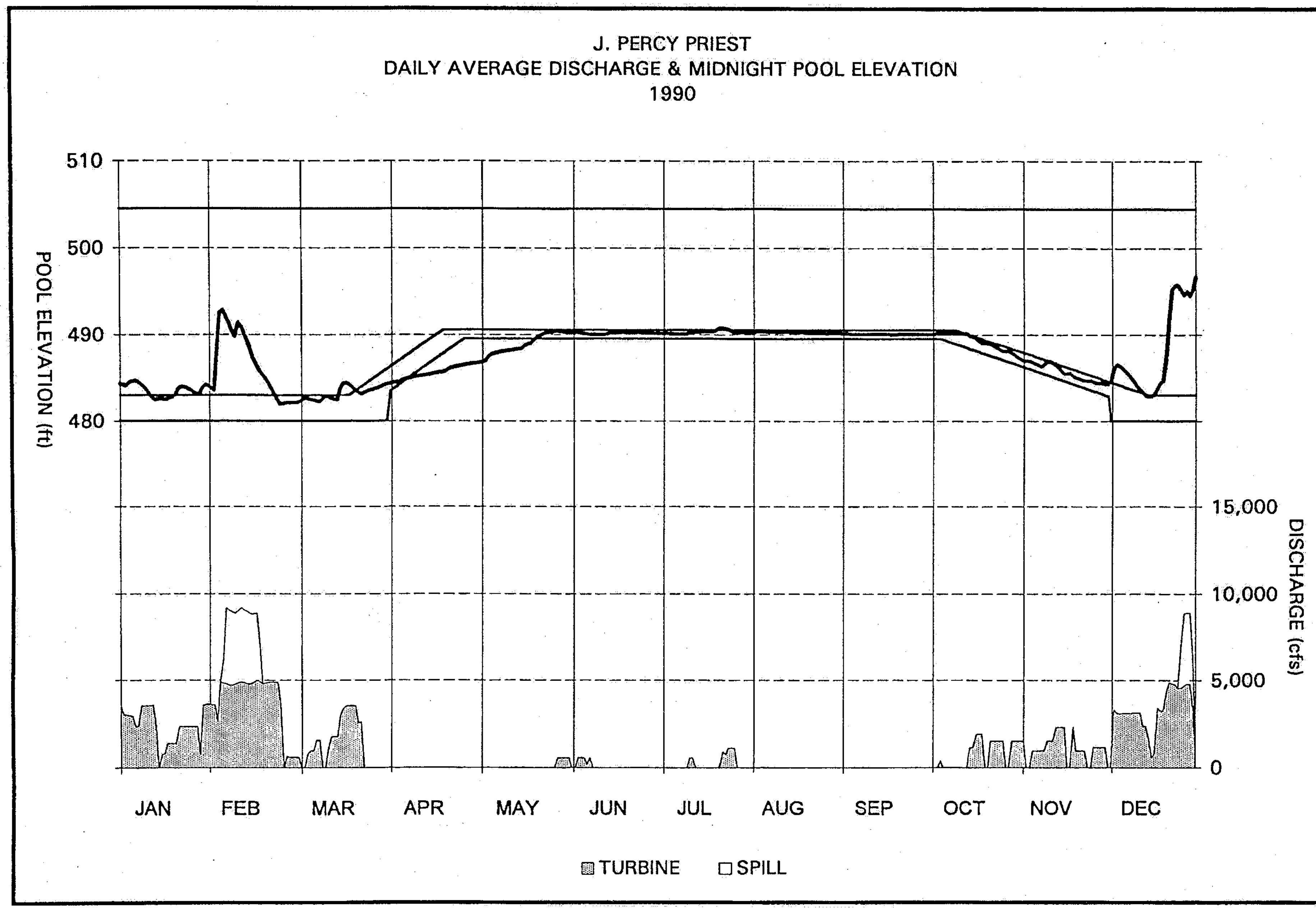
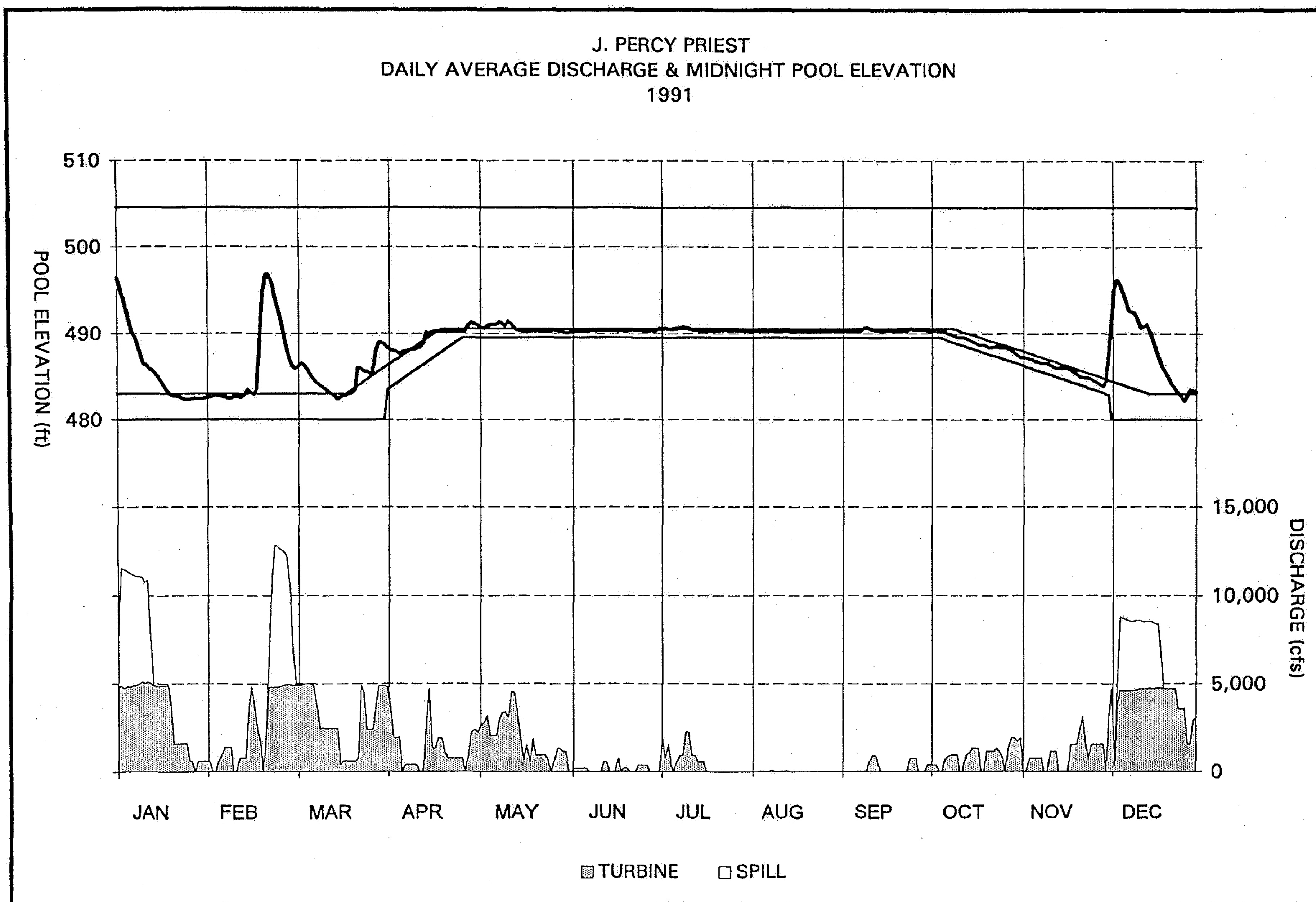
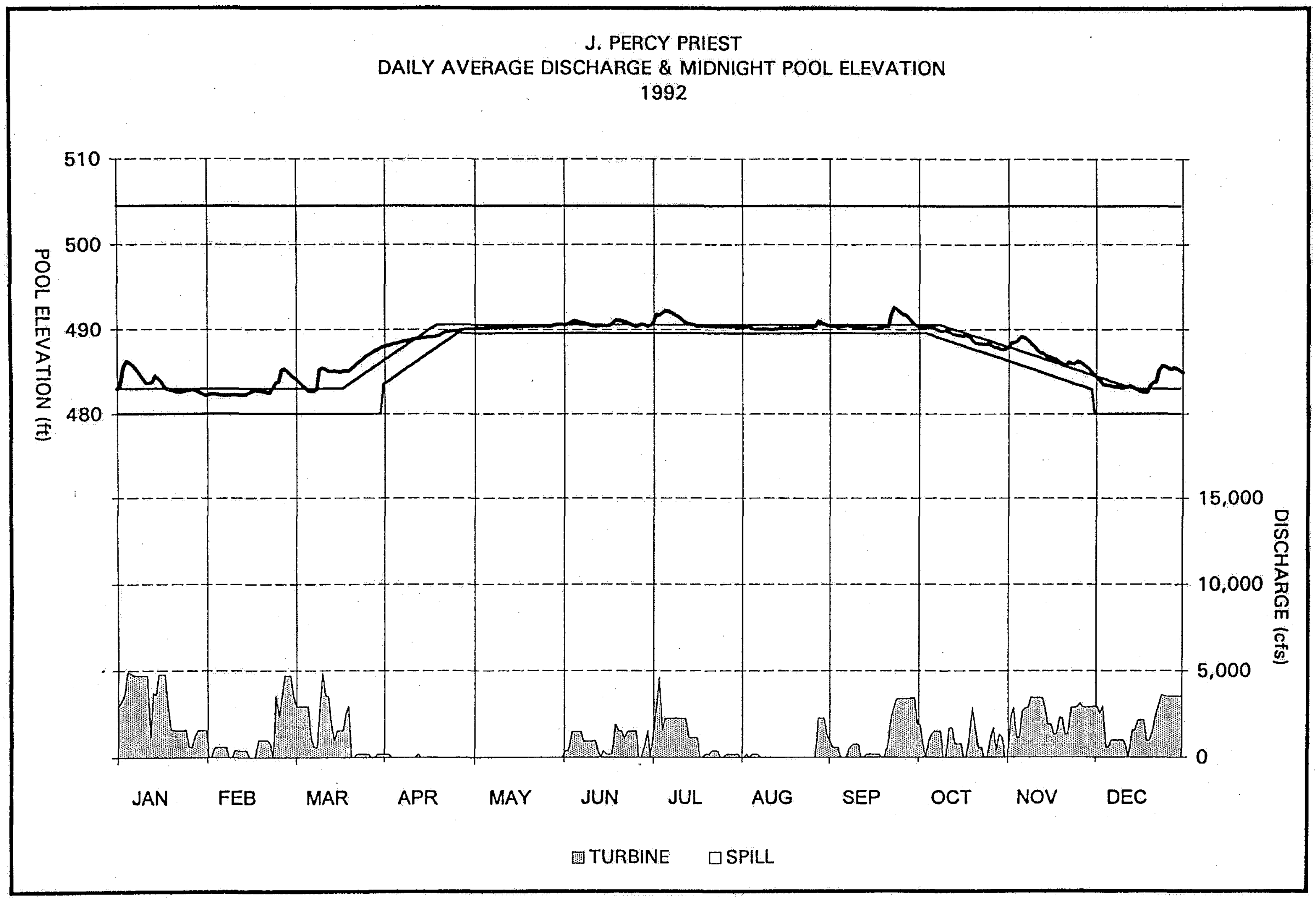
NOV
DEC
TURBINE
SPILL

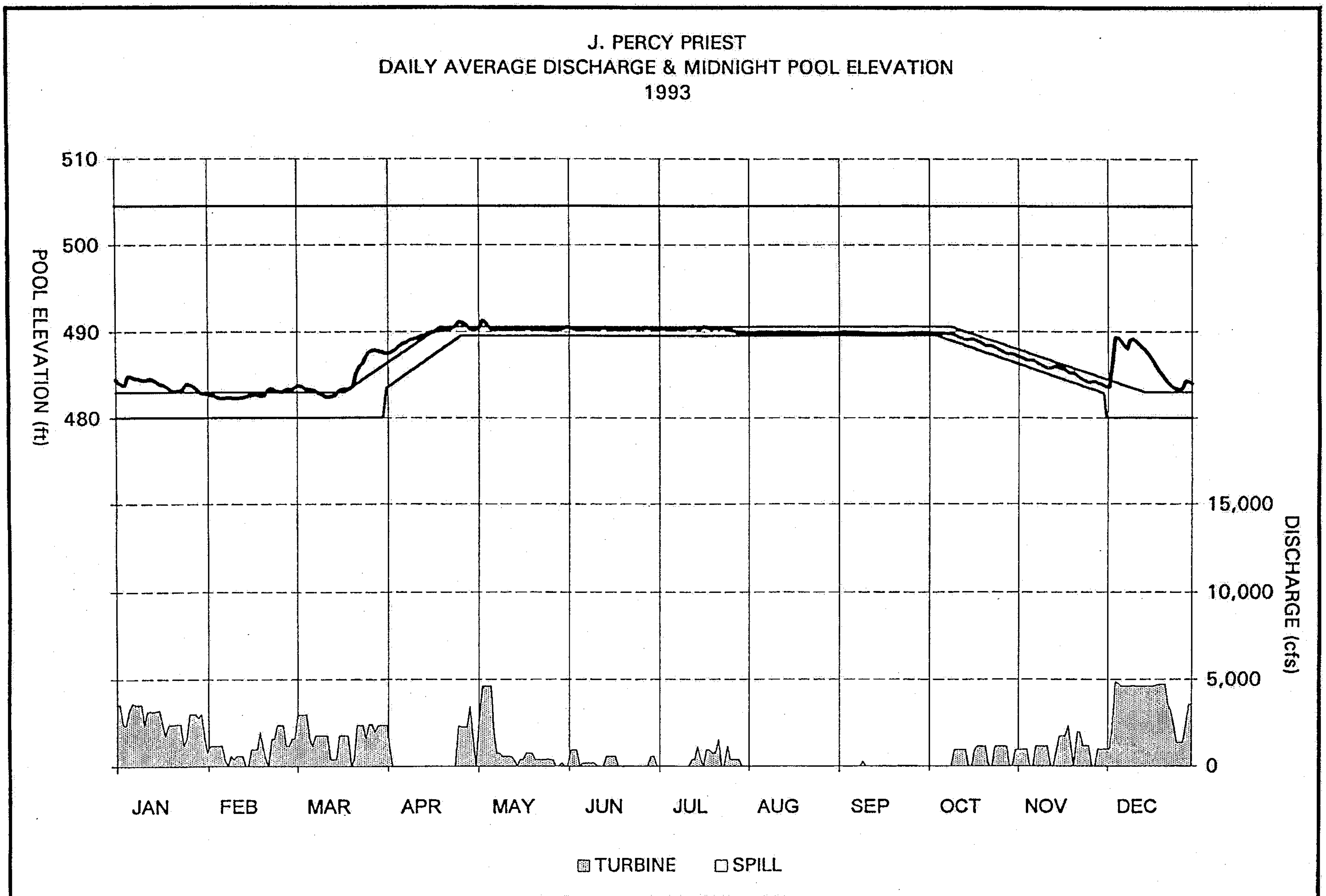
J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1989



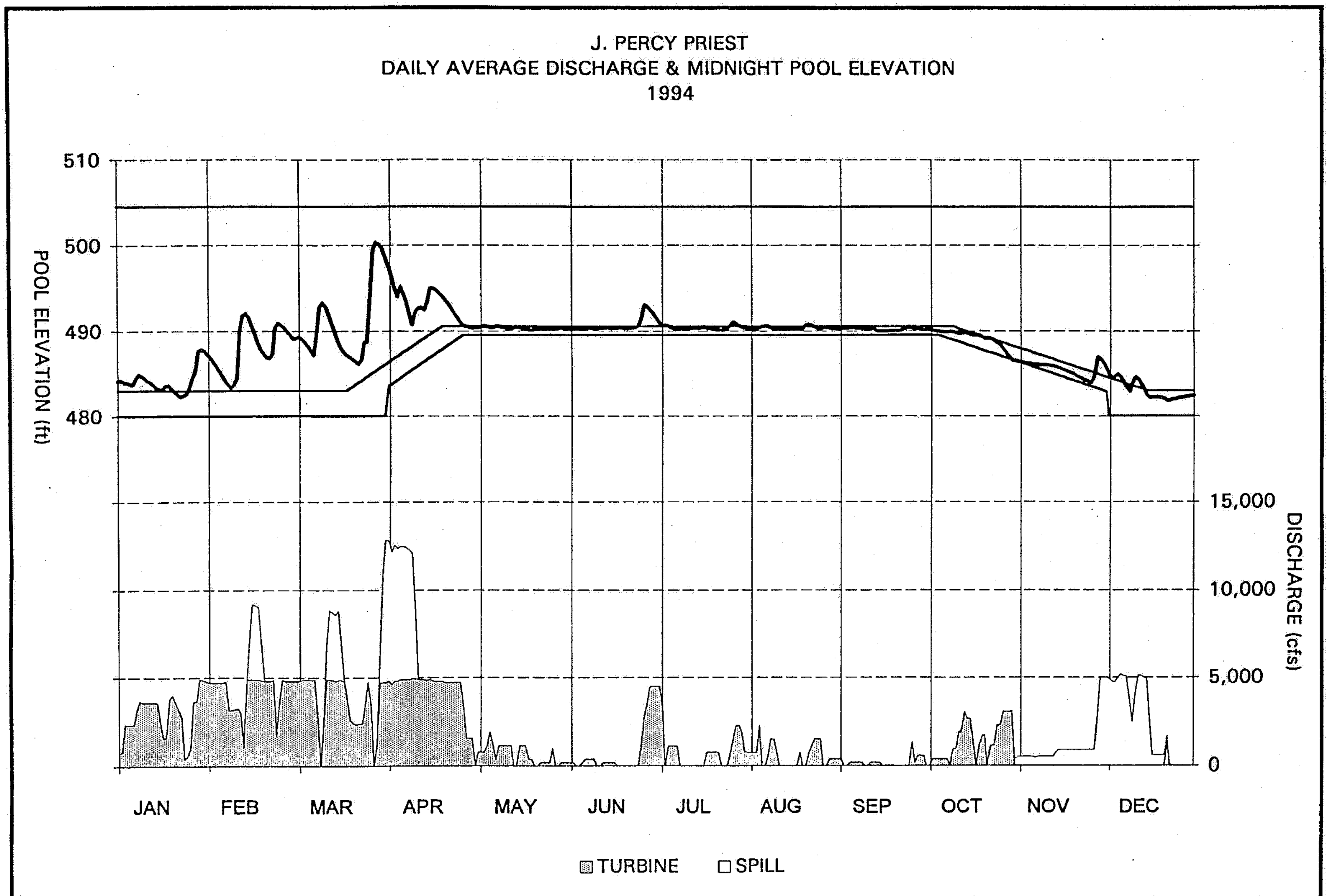

J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1990
POOL ELEVATION (ft)
510
500
490
480
DISCHARGE (cfs)
15,000
10,000
5,000
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL


J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1991
POOL ELEVATION (ft)
510
500
490
480
DISCHARGE (cfs)
15,000
10,000
5,000
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL


J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1992
POOL ELEVATION (ft)
510
500
490
480
DISCHARGE (cfs)
15,000
10,000
5,000
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL



J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1993
510
500
490
480
POOL ELEVATION (ft)
15,000
10,000
5,000
0
DISCHARGE (cfs)
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL



J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1994
510
500
490
480
POOL ELEVATION (ft)
15,000
10,000
5,000
0
DISCHARGE (cfs)
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
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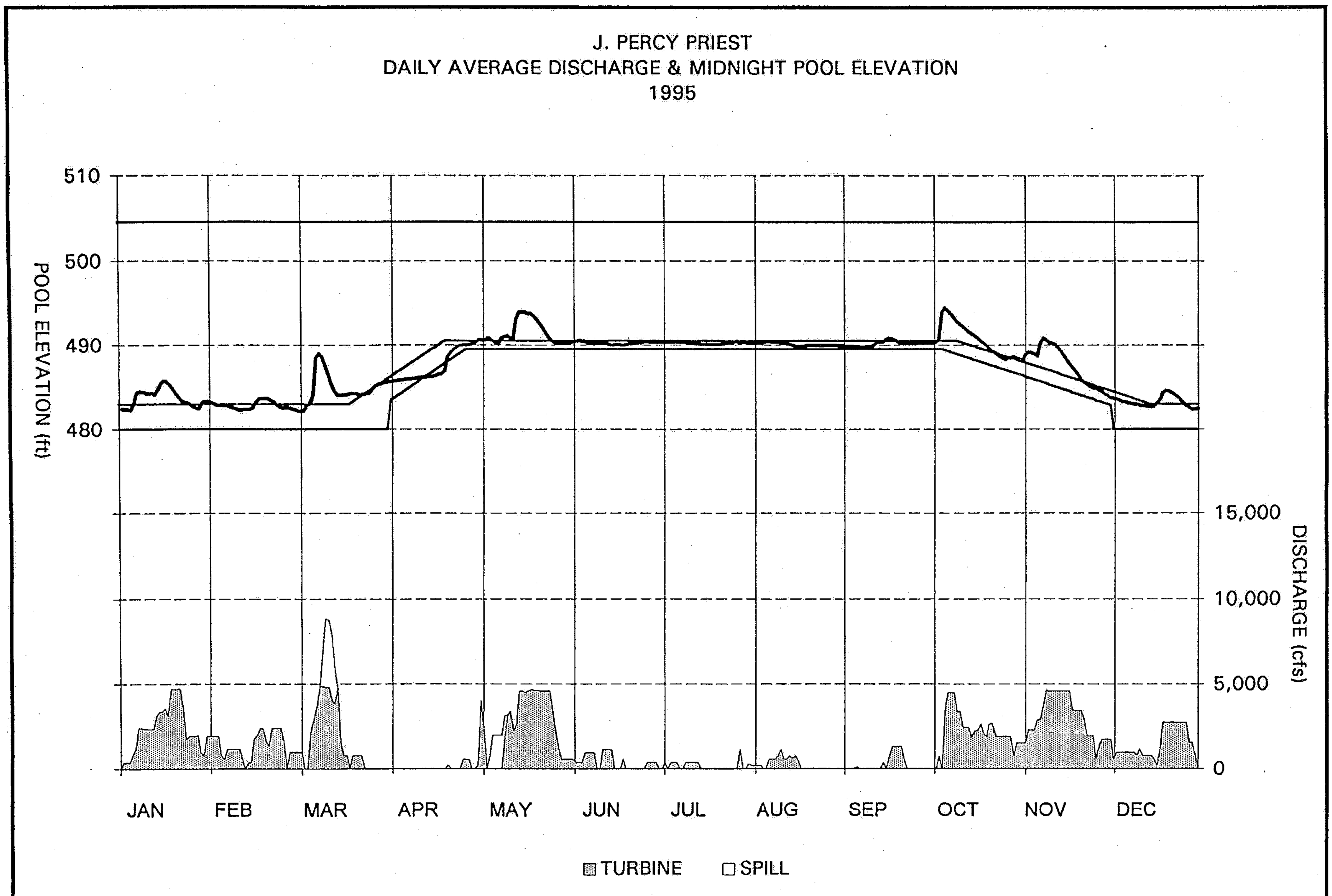
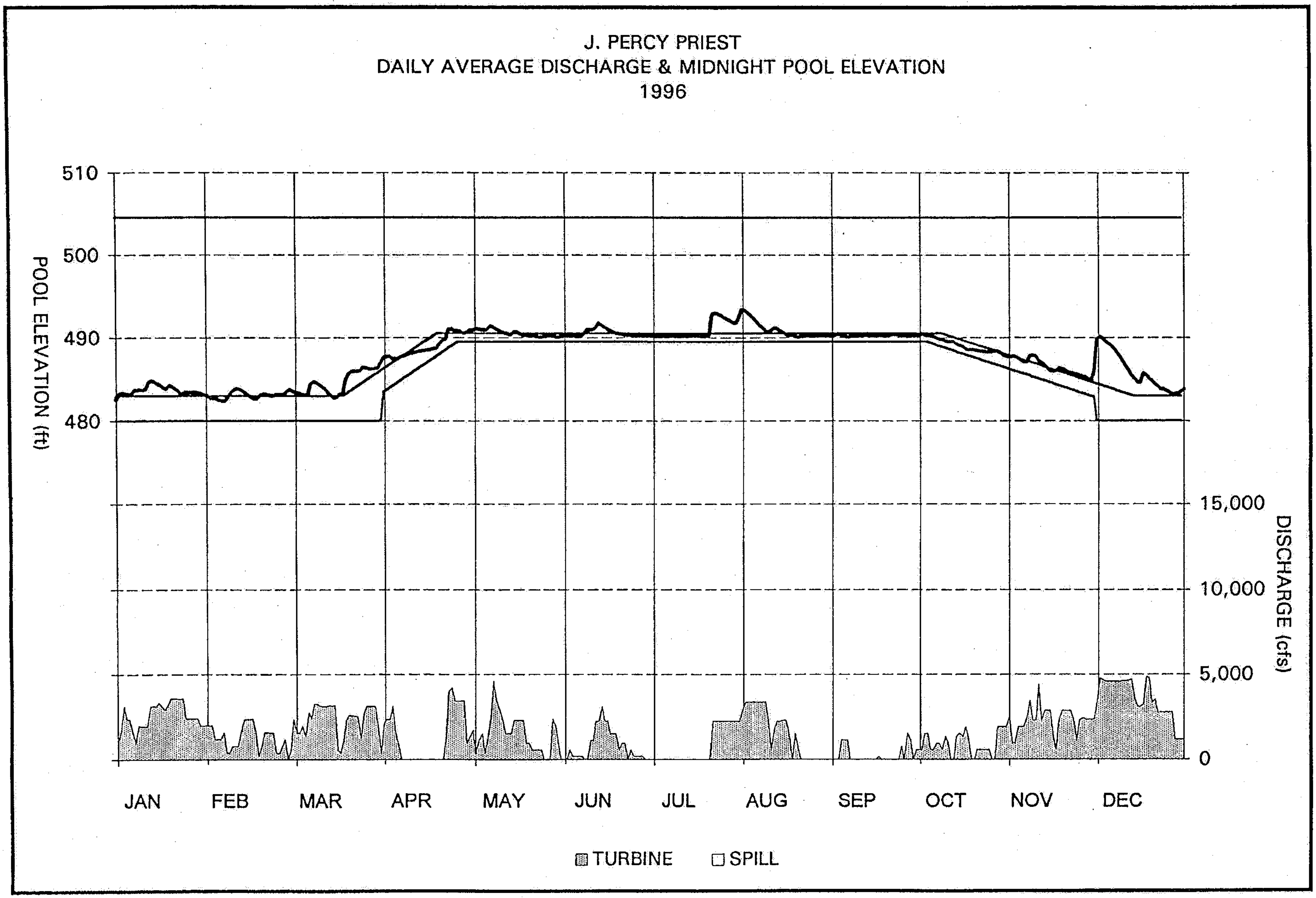
DEC
TURBINE
SPILL


J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1995
POOL ELEVATION (ft)
510
500
490
480
DISCHARGE (cfs)
15,000
10,000
5,000
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL


J. PERCY PRIEST
DAILY AVERAGE DISCHARGE & MIDNIGHT POOL ELEVATION
1996
510
500
490
480
POOL ELEVATION (ft)
15,000
10,000
5,000
0
DISCHARGE (cfs)
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
TURBINE
SPILL

KEY CONTACT TELEPHONE LIST

CONTACT	TELEPHONE Office	Home	Restricted
■ **CORPS OF ENGINEERS**			
ENGINEERING - PLANNING DIVISION			
Chief, Tom Waters	615/[redacted]		
Hydrology and Hydraulics Branch			
Chief, Dennis Williams (acting)	615/[redacted]		
Water Management Section			
Chief, Jim Upchurch	615/[redacted]	615/[redacted]	
[redacted]	615/[redacted]	615/[redacted]	
[redacted]	615/[redacted]	615/[redacted]	
[redacted]	615/[redacted]	615/[redacted]	
CONSTRUCTION - OPERATIONS DIVISION			
Chief, Dan Hall	[redacted]		
Readiness Branch			
Chief, [redacted]	[redacted]		
[redacted]	[redacted]	[redacted]	
Technical Support Branch			
Chief, [redacted]	[redacted]		
Hydropower Section			
Chief, [redacted]	[redacted]		
Locks Section			
Chief, [redacted]	[redacted]		
Natural Resource Section			
Chief, [redacted]	[redacted]		
Hydropower Plants			
Barkley	[redacted]		
Center Hill	[redacted]		
Cheatham	[redacted]		
Cordell Hull	[redacted]		
Dale Hollow	[redacted]		
J. Percy Priest	[redacted]		
Laurel	[redacted]		
Old Hickory	[redacted]		
Wolf Creek	[redacted]		

Note: A space has been provided for Restricted telephone numbers for use by employees with access to such.

CONTACT	TELEPHONE		
	Office	Home	Restricted
Locks			
Barkley	[redacted]		
Cheatham			
Old Hickory			
Cordell Hull			
Resource Managers			
Center Hill	[redacted]		
Cheatham			
Cordell Hull			
Dale Hollow			
J. Percy Priest			
Lake Barkley			
Lake Cumberland (Wolf Creek)			
Laurel			
Martins Fork			
Old Hickory			
Public Affairs Office (PAO)			
Chief, E.M. Evans	[redacted]	[redacted]	
FM Radio Call Letters		Radio ID	
Emergency Operations Center (Base)		[redacted]	
Center Hill			
Cheatham			
Cordell Hull			
Dale Hollow			
J. Percy Priest			
Barkley			
Wolf Creek (Lake Cumberland)			
Laurel			
Martins Fork			
Old Hickory			

■ GREAT LAKES AND OHIO RIVER DIVISION (LRD)

Water Management Branch			
Chief, [redacted]	[redacted]	[redacted]	
River and Reservoir Control Section			
Chief [redacted]	[redacted]		

Note: A space has been provided for Restricted telephone numbers for use by employees with access to such.

CONTACT	TELEPHONE Office	Home	Restricted
■ **TENNESSEE VALLEY AUTHORITY (TVA)**			
Reservoir Operations (Knoxville)			
Manager, [redacted]	[redacted]		
[redacted]	[redacted]		
Power Supply Operations (Chattanooga)			
Load Coordinator	[redacted]		
Manager, [redacted]	[redacted]	[redacted]	
Data Collection			
Supervisor, [redacted]	[redacted]		
Daily Operations (Chattanooga)			
Manager, [redacted]	[redacted]		
[redacted]	[redacted]		
■ **SOUTHEASTERN POWER ADMINISTRATION (SEPA)**			
Systems Engineering			
Manager, [redacted]	[redacted]		
Power Operations			
Specialist [redacted]	[redacted]		
■ **NATIONAL WEATHER SERVICE (NWS)**			
Nashville Office			
Chief, [redacted]	[redacted]		
Nashvile Radar Site	[redacted]		
Weather Forecast Office			
Memphis	[redacted]		
Service Hydrologist,			
[redacted]	[redacted]		
Louisville			
River Forecast Center			
Cincinnati (Wilmington, OH)			[redacted]
Kansas City			
Slidell			

Note: A space has been provided for Restricted telephone numbers for use by employees with access to such.

CONTACT	TELEPHONE Office	Home	Restricted
■ **UNITED STATES GEOLOGIC SERVICE (USGS)**			
Tennessee Office	[redacted]		
District Chie[redacted]	[redacted]		
Assist. Dist. Chie[redacted]	[redacted]		
Supervisor of Field Operations			
[redacted]	[redacted]		
Kentucky Office			
District Chief [redacted]	[redacted]		
Assist. Dist. Chief [redacted]	[redacted]		
Supervisor of Field Operations			
Upper Cumberland			
[redacted]	[redacted]		
West Kentucky			
[redacted]	[redacted]		
■ **NATIONAL RESPONSE CENTER**	[redacted] N.R.C. will call Coast Guard if it is determined to be the Coast Guard's responsibility or jurisdiction.		
■ **TENNESSEE EMERGENCY MANAGEMENT AGENCY** Cecil Whaley	615/741-0001 Note: T.E.M.A. will notify the Tennessee Department of Water Pollution Control in case of a spill.		
■ **KENTUCKY DISASTER EMERGENCY RESPONSE**	502/564-7815 800/255-2587		
■ **TENNESSEE DEPARTMENT OF WATER POLLUTION CONTROL** **Spill Notification**			
John McLendon	615/226-6918	615/650-7261	
Jack Hughes	615/532-0654		
■ **KENTUCKY ENVIRONMENTAL RESPONSE EMERGENCY** **Spill Notification**	502/564-2380 800/928-2380		

Note: A space has been provided for Restricted telephone numbers for use by employees with access to such.

■ PERTINENT GAGES IN THE CUMBERLAND BASIN WITH TELEPHONE ACCESS

Stream	Subbasin	Location	Restricted No.	Goes Station ID
Cumberland River	Barkley	Clarksville		[redacted]
Cumberland River	Barkley	Dover		[redacted]
Red River	Barkley	Port Royal		[redacted]
Cumberland River	Cheatham	Nashville		[redacted]
Harpeth River	Cheatham	Kingston Springs		[redacted]
Harpeth River	Cheatham	Franklin		[redacted]
Mill Creek	Cheatham	Antioch		[redacted]
Cumberland River	Old Hickory	Carthage		[redacted]
W Fork Stones River	J. Percy Priest	Smyrna		[redacted]
Cumberland River	Cordell Hull	Penitentary Branch		[redacted]
Cumberland River	Cordell Hull	Celina		[redacted]
Roaring River	Cordell Hull	Gainsboro		[redacted]
Cumberland River	Wolf Creek	Pineville Pine St		[redacted]

Note: A space has been provided for Restricted telephone numbers for use by employees with access to such.