



STATE OF MAINE

Department of Environmental Protection

MAIN OFFICE: RAY BUILDING, HOSPITAL STREET, AUGUSTA
MAIL ADDRESS: State House Station 17, Augusta, 04333

207-289-7688

JOHN R. McKERNAN, JR.
GOVERNOR

DEAN C. MARRIOTT
COMMISSIONER

October 26, 1992

Ronald Manfredonia
U.S. Environmental Protection Agency
Region I
J.F.K. Federal Bldg.
Boston, Ma. 02203

Dear Ron:

Please consider the enclosed material as documentation of a use attainability analysis to support the change in classification of Ripogenus Impoundment enacted by the Maine Legislature in 38 MRSA Section 464 subsection 9. (copy enclosed)

It is our understanding that EPA can treat the Ripogenus relicensing application already submitted to it, as well as the enclosed summary and excerpts of the application and other data submitted to the state, as a basis for a use attainability analysis to allow either removal of a designated use or establishment of a subcategory of use. We believe that the operative provision in EPA's regulations is 40 CFR Section 131.10 which provides for such removal or establishment if the State demonstrates that:

"Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the waterbody to its original condition or to operate such modification in a way that will result in the attainment of the use;"

The environmental studies conducted by Great Northern (including the excerpts and summary attached) and common sense support the conclusion that it is not possible, feasible or desirable to operate the Ripogenus impoundment in such a way that would meet the 'natural' standard. This manmade impoundment cannot meet a standard designed for natural bodies of water, and if the drawdowns which are part of the operation of Ripogenus impoundment were to cease, or be modified in any material

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way, the fisheries, safety and boating benefits which are a result of Great Northern's operation of the impoundment and certain goals of the Maine Department of Inland Fisheries and Wildlife would be impaired, all to the detriment of the State. Although under 40 CFR Section 131.10 it is only necessary to show that it is not feasible to meet the 'natural' standard, the enclosures also demonstrate that the impact to aquatic habitat in the littoral zone caused by the fluctuating water levels is outweighed by the benefits of past, present and proposed operation.

Please give me a call after you have had a chance to review the submission.

Sincerely,



STEPHEN W. GROVES
Bureau of Water Quality Control

d/WSGMANFR

Ripogenus Project

FERC No. 2572

The Ripogenus Project (FERC No. 2572) is located on the West Branch of the Penobscot River approximately 37 river miles upstream of the Town of Millinocket. Ripogenus dam creates the head pond for McKay Station, which is the most upstream of six hydroelectric facilities owned and operated by Great Northern Paper, Inc. The Ripogenus impoundment system contains a total area of 29,270 acres draining 1,422 square miles or 67% of the total West Branch drainage area (Ref. Ripogenus Project Vol. II, Section E 1.0).

Ripogenus impoundment consists of Ripogenus, Chesuncook and Caribou lakes, and Black, Brandy, and Moose Ponds all classified GPA. Water qualities studies performed from 1977 to 1988 show that concentrations of nutrients, chlorophyll-a, D.O. concentrations, turbidity, and Secchi transparency are within the range of high quality lakes in the Northeast (Ref. Ripogenus Project Vol. II, Section E 2.2).

As result of consultation with agencies and interest groups a water management plan was developed incorporating the many competing demands for water. The resulting Water Use Plan was included in the FERC relicensing and 401 Certification application filing December 1991. The plan proposes no significant changes from the historic lake level management of Ripogenus impoundment (Ref. attached Water Use Plan).

During the FERC consultation process which began in 1987 agencies and interest

groups requested several environmental and recreational enhancements associated with the Ripogenus impoundment and its discharge. Requests were focused upon management of flows in the West Branch below Ripogenus dam to enhance fishing and recreational uses (Ref. Ripogenus Project Vol. II, Section E 2.3). Because Ripogenus impoundment can store up to 52% of the available water for the West Branch, management of the discharge is critical to maintaining and enhancing downstream resources and uses.

The Water Use Plan proposes to continue seasonal drawdown of Ripogenus impoundment to provide for downstream uses requested by agencies and interest groups. Requests incorporated into the Water Use Plan include (Ref. Ripogenus Project Vol. II, Section E 2.4.3):

1. Providing salmon spawning and incubation flows to the West Branch below McKay to enhance the existing "world class" salmon fishery, (Ref. Ripogenus Project, Vol. II, Section E 3.1).
2. Providing minimum flows to the upper gorge above McKay to provide for additional fishing opportunity. In addition, the Holbrook side channel is being proposed for habitat improvement for juvenile salmon, (Ref. Ripogenus Project Vol. II, Section E 3.1).
3. Increasing the biological minimum flow in the West Branch below McKay from 200 to 400 cfs (Ref. Ripogenus Project Vol. II, Section E 3.1).
4. Providing recreation flows in the West Branch below McKay for

white water boating. (Ref. Ripogenus Vol. II, Section E 3.1).

5. Providing togue spawning and incubation elevation in the North Twin impoundment downstream of Ripogenus for the establishment of a natural togue fishery (Ref. Ripogenus Vol. III, Section 3.1).
6. Maintaining relatively stable summer lake levels in North Twin impoundment downstream of Ripogenus Project to enhance recreational opportunity, wetlands and wildlife (Ref. Penobscot Mills Vol. II, Section 5.4.3).
7. Maintaining a minimum flow of 2,000 cfs in the West Branch at Millinocket downstream of Ripogenus, to ensure water quality standards are met on the lower segments of the West Branch and the Penobscot river.
8. Maintaining minimum flows to Millinocket stream to provide for fishing opportunity (Ref. Penobscot Mills Volume II, Section 3.1).

In development of the Water Use Plan, Great Northern Paper, Inc. was asked to review the affect of limiting the drawdown of Ripogenus impoundment. The review indicated that limiting the drawdown would provide for only limited enhancement of potential wildlife habitat bordering the impoundment and limited improvement in the diversity in littoral aquatic communities, (Ref. Ripogenus Vol. II, Sections 3.1, 3.2, 3.3). However, the Maine IF&W stated in comments to LURC

submitted July 10, 1992 that, "As IF&W indicated in its Second-Stage Consultation comments, the present water level management there does not appear to compromise the fisherys management goals of Chesuncook Lake."

In an October 7, 1991 presentation to the Maine DEP, Maine IF&W, USF&W and Penobscot Indian Nation, it was demonstrated that limiting the average drawdown of Ripogenus impoundment to 18' would be at the expense of downstream uses. Specifically reducing the amount of water available for release in the West Branch would impair (1) the existing world-class salmon fishery and white water rafting, (2) the ability to maintain relatively stable water levels and togue spawning elevations in North Twin and (3) the ability to pass the required 2,000 cfs minimum flow at Millinocket (Ref. attached October 7, 1991 presentation). For example, studies have determined that limiting the drawdown of the impoundment by will reduce the movement of smelts into the West Branch adversely affecting downstream salmon populations. Smelts have been shown to be vital as forage for the salmon fishery in the West Branch below McKay (Ref. Ripogenus Vol. II, Section 3.1.1). A 2 foot drawdown limition also would prohibit the maintenance of incubation elevations for salmon in the West Branch and togue in North Twin and thus would not permit the present fisheries to exist or the attainment of fishery management goals.

As a result of a request by the Maine DEP, Great Northern Paper, Inc. performed an analysis to determine the available drawdown that would maintain a littoral zone area at least equivalent to the historic area created by pre-project conditions. The results determined that the drawdown of Ripogenus impoundment would have to be limited to 8.2' in order to maintain pre-project or, in the opinion of the Maine DEP, the "natural" area as would be required by previous

standards of the State of Maine (Ref. attached Littoral Zone Analysis, December 12, 1991). Such a drawdown limitation would result in elimination of virtually all other downstream uses.

In summary, as a result of comments by agencies and interest groups, Great Northern Paper, Inc. developed a model of its hydro system. The Water Use Plan, which resulted from the modeling, identified and ranked existing and potential uses of the water that were identified during the FERC consultation process, determined if there was water available to meet these use requirements and examined the impact on Great Northern Paper, Inc.'s ability to supply power to its operations. The model determined that lake level controls at Ripogenus were incompatible with many of the resource goals located downstream of the project. Flow restrictions included in the Water Use Plan for the attainment of resource goals result in a power loss of 18,700 MWH per year at an annual cost of \$815,000 to \$1,556,000 to Great Northern Paper, Inc.

MEETING OBJECTIVES

1. Describe the Water Use Plan
 - Assumptions
 - Data Used
 - Goals
 - Accomplishments
2. Review effect of water in backchannel and/or drawdown limit at Ripogenus on Water Use Plan
3. Solicit and define other Water Bureau comments and concerns relating to water quality standards / Section 401 Certification

SUMMARY
of
WATER USE PLAN
for
RIPOGENUS & PENOBSCOT MILLS
PROJECTS

(FERC Nos. 2572 and 2458)

GEORGIA-PACIFIC

OUTLINE

- 1. STUDY REVIEW PERIOD: 1976 - 1990 (15 Years)**
- 2. IDENTIFY AND RANK POTENTIAL USE OF WATER**
- 3. DETERMINE AVAILABLE WATER FOR USE**
- 4. IDENTIFY WET YEAR, DRY YEAR, RANGE OF NORMAL AVAILABLE WATER, & INFLOW DATA**
- 5. DETERMINE WATER USE PLAN THAT SATISFIES REQUIREMENTS**
- 6. EXAMINE POWER IMPACT OF THIS PLAN**

RIPOGENUS AND PENOBSCOT MILLS PROJECTS
WATER USE

<u>Waterbody</u>	<u>Agency Request</u>	<u>Reason</u>	<u>Time Period</u>	<u>Model Outcome</u>
Ripogenus Impoundment	"relatively stable" water levels	wildlife wetlands, recreation, aesthetics	1 May - 15 July 1 May - 30 Sept.	
West Branch Flow	2,400 - 3,600 cfs	rafting	1 May - 15 Oct.	
	ABF or Study	salmon fishery	15 June - 30 Sept.	
	maintain flow/ elevation	salmon spawning salmon incubation	15 Oct. - 15 Nov. 16 Nov. - 7 June	
Upper Gorge Flow	100 cfs 50 cfs	salmon fishery salmon fishery	1 July - 30 Sept. 1 Oct. - 30 June	
North Twin & Millinocket Lake Impoundments	"relatively stable" water levels	wildlife wetlands, recreation, aesthetics	1 May - 15 July 1 May - 30 Sept.	
	drawdown limit	logue spawning logue incubation	15 Oct. - 5 Nov. 6 Nov. - 1 May	
Back Channel	350 - 500 cfs	fishery habitat	year-round	
Millinocket Stream	60 - 80 cfs	fishery habitat	year-round	
West Branch	2,000 cfs instantaneous	water quality	year-round	

WATER USE

1. SAFETY

- **Maintain Public Safety Based on Operation of Facilities**

2. ENVIRONMENTAL

- **Maintain 2000 cfs at Millinocket**
- **Provide Minimum Flow to Affected Reaches:**
 - **Upper Gorge**
 - **West Branch below McKay**
- **West Branch**
 - **Provide Salmon Spawning Flows/Elevations**
 - **Provide Salmon Incubation Elevations**
- **North Twin**
 - **Provide Togue Spawning Elevations**
 - **Provide Togue Incubation Elevations**
- **Provide Minimum Flow to Millinocket Stream**

3. RECREATION

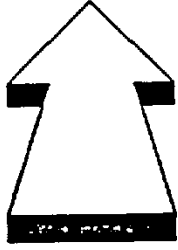
- **West Branch Recreation Flows**
- **Maintain Summer Level at North Twin**

*** POWER GENERATION**

- **Maintain Adequate Power Supply to Mills**

TOTAL AVAILABLE WATER

RULE CURVE
(MILLINOCKET)



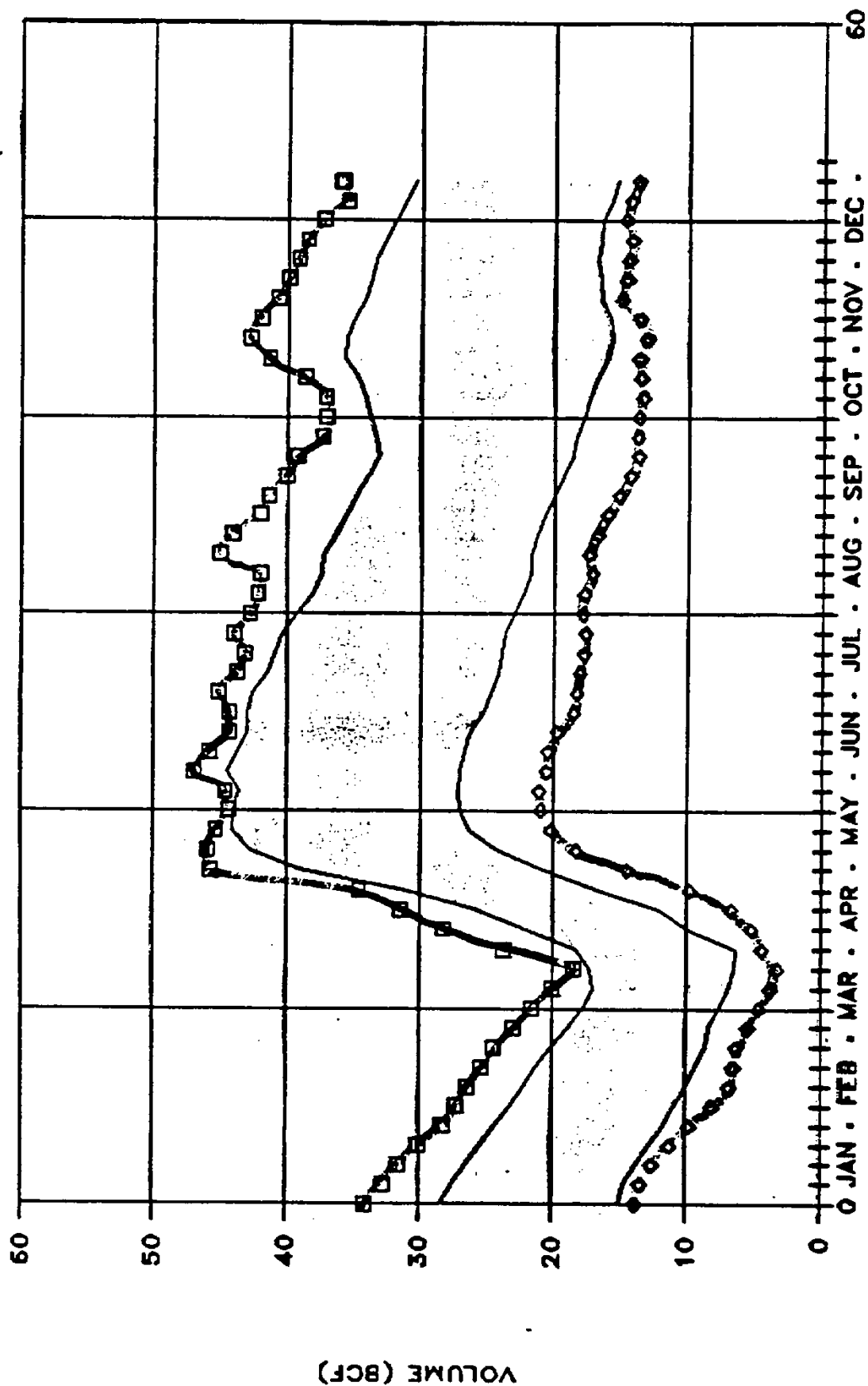
TOTAL
AVAILABLE WATER
(RIPOGENUS)

The map displays the Republic of the Congo with its administrative boundaries and major cities. The following table summarizes the information provided in the legend and map labels:

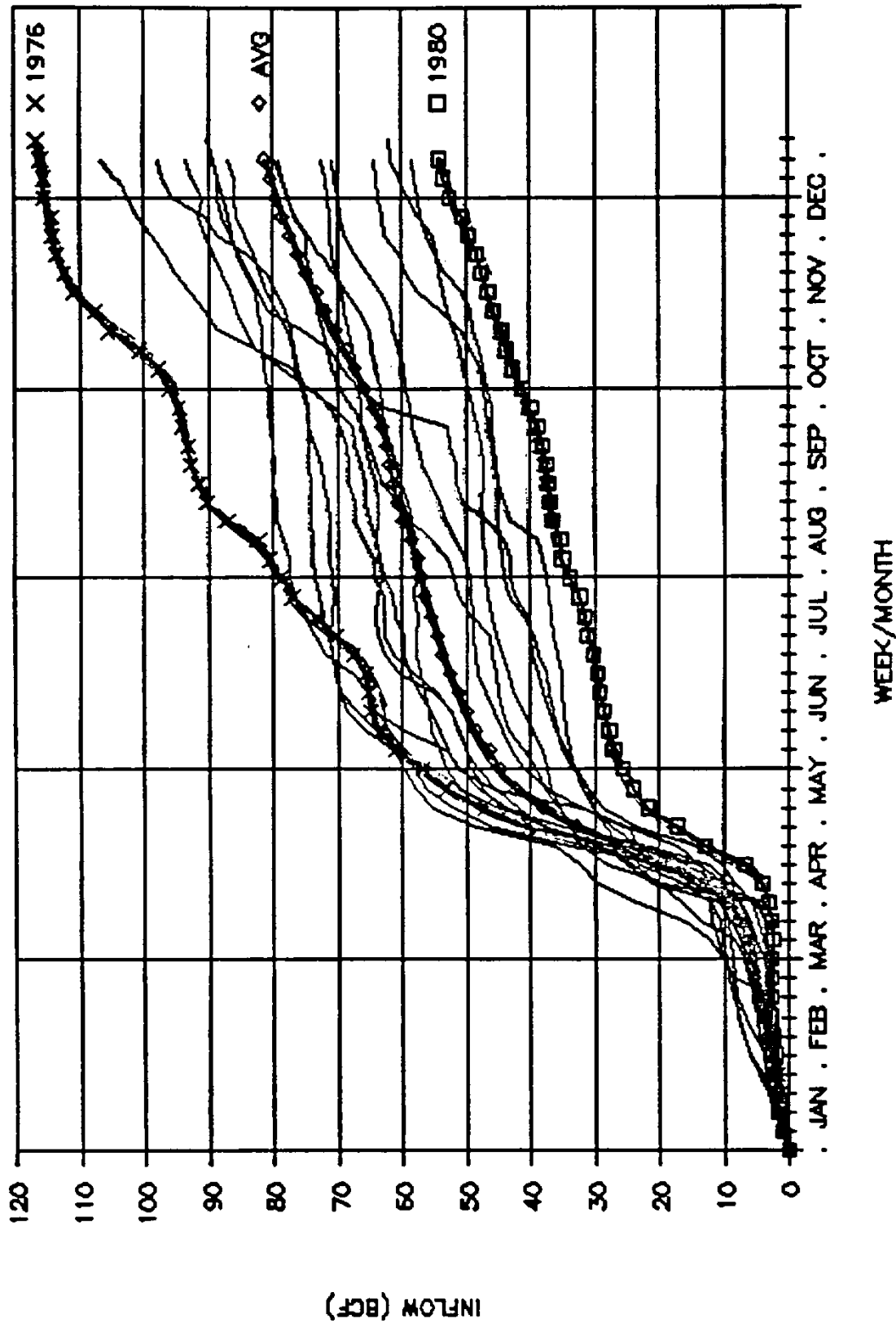
Feature	Description
—	State boundary
—	Sub-state boundary
●	Capital (Kinshasa)
○	Other cities
—	Major roads
—	Other roads
—	Railroad
—	Waterway
—	Coastal waters

Major cities labeled on the map include Kinshasa, Brazzaville, Pointe-Noire, and others. The map also shows the Atlantic Ocean to the west and the Gulf of Guinea to the south. A scale bar indicates distances up to 100 miles. An inset map of Africa shows the location of the Republic of the Congo.

RIP AVAILABLE WATER(BCF)



RIPOGENUS MASS INFLOW 76-90



WATER USE PLAN

- 1. PROVIDE SALMON SPAWNING FLOW**
In West Branch below McKay: Oct 15 - Nov 15
- 2. PROVIDE SALMON INCUBATION FLOW**
In West Branch below McKay: Nov 16 - June 7
- 3. PROVIDE TOGUE SPAWNING LEVEL**
At North Twin Impoundment: Oct 15 - Nov 5
- 4. PROVIDE TOGUE INCUBATION LEVEL**
At North Twin Impoundment: Nov 6 - May 1
- 5. PROVIDE RECREATIONAL FLOW**
In West Branch below McKay: May 1 - Sept 15
- 6. PROVIDE RELATIVELY STABLE WATER LEVELS**
At North Twin Impoundment: May 1 - Mid Aug

WATER USE PLAN

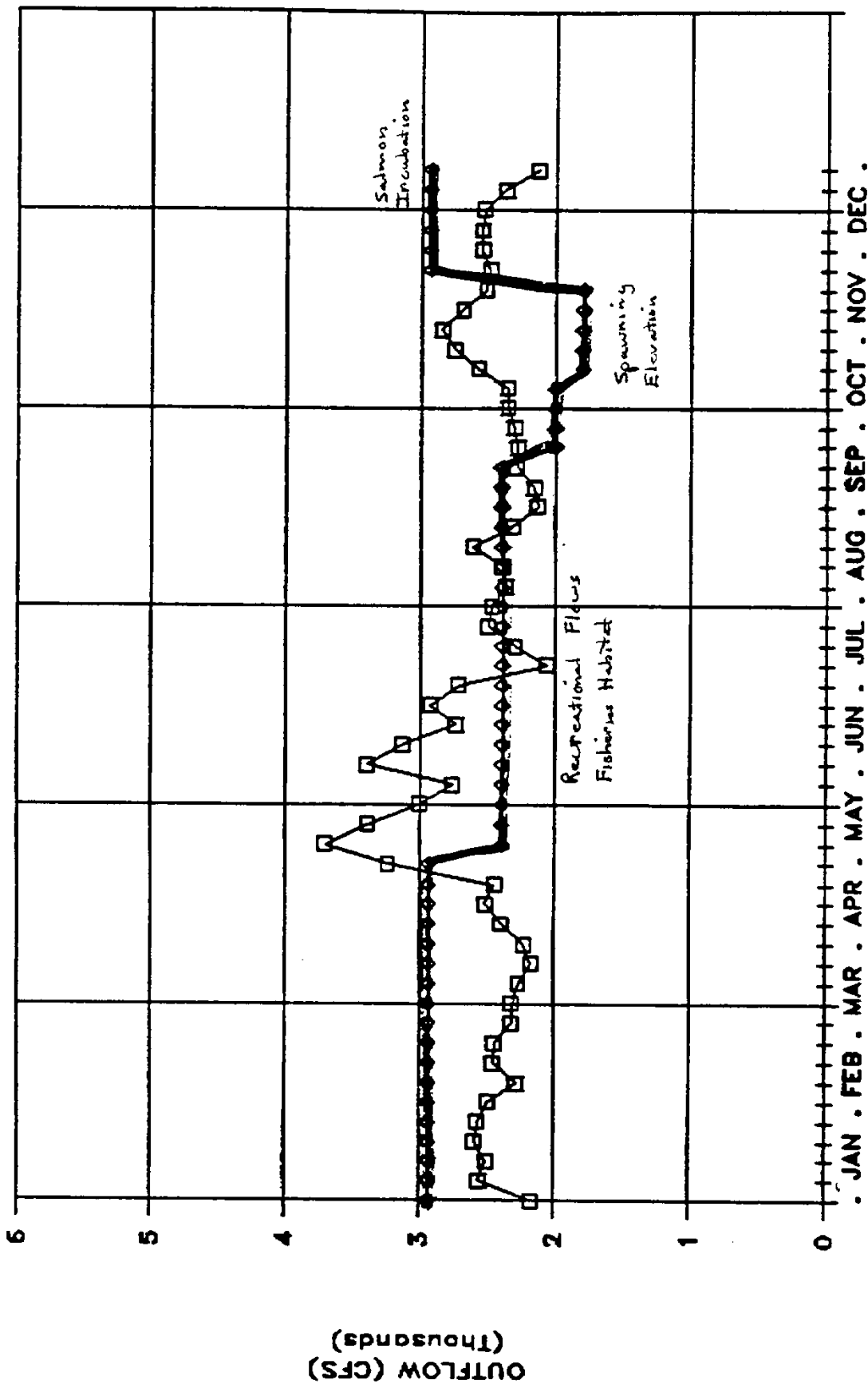
**INCLUDED IN PREVIOUS ARE MINIMUM
INSTANTANEOUS FLOWS OF:**

- 100 cfs in Upper Gorge
(July 1 - Sept 30)
- 400 cfs below McKay
- 20 cfs in Millinocket Stream

(NO IMPACT ON ANALYSIS)

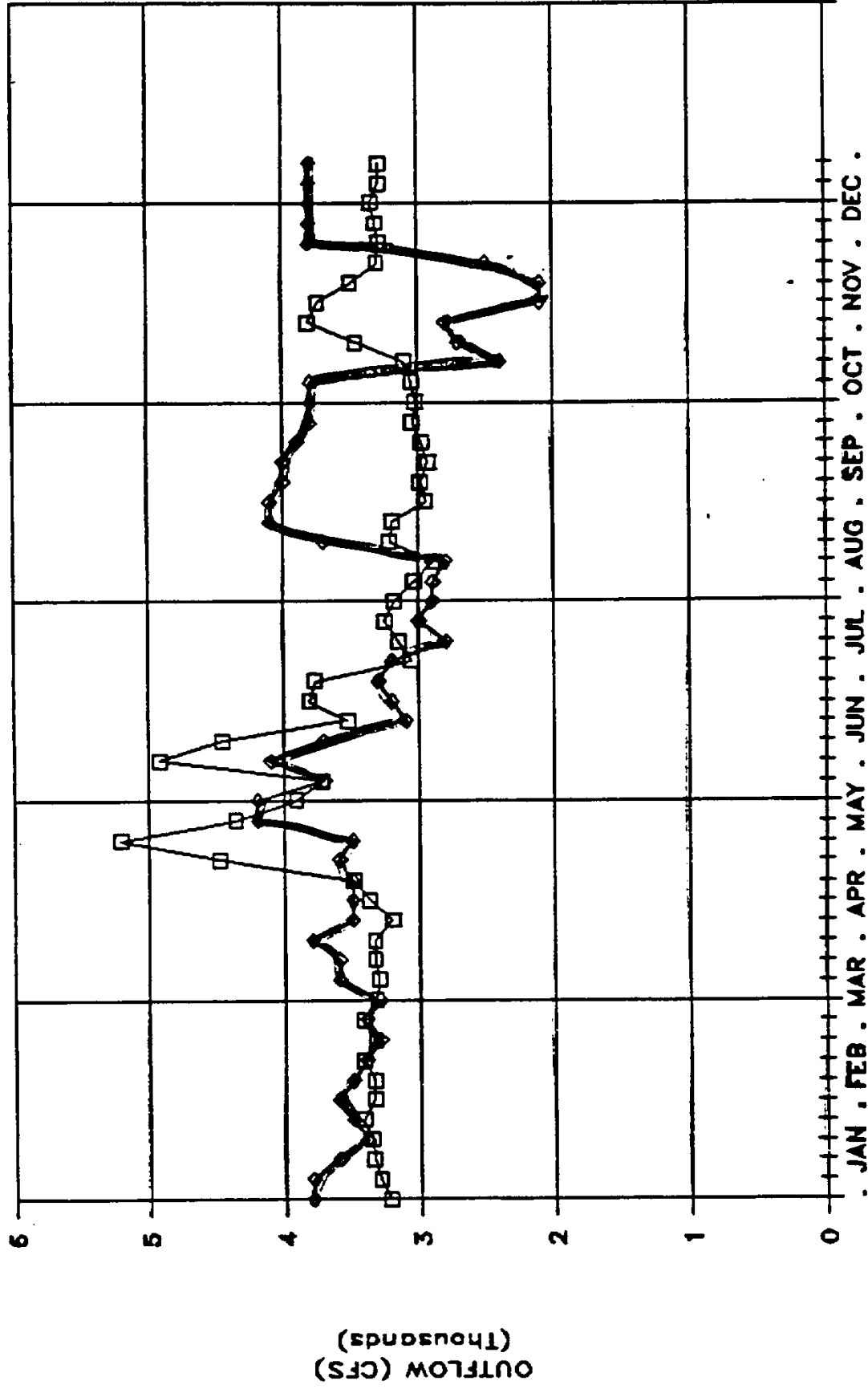
RIPOGENUS OUTFLOW

TYPICAL DATA SET



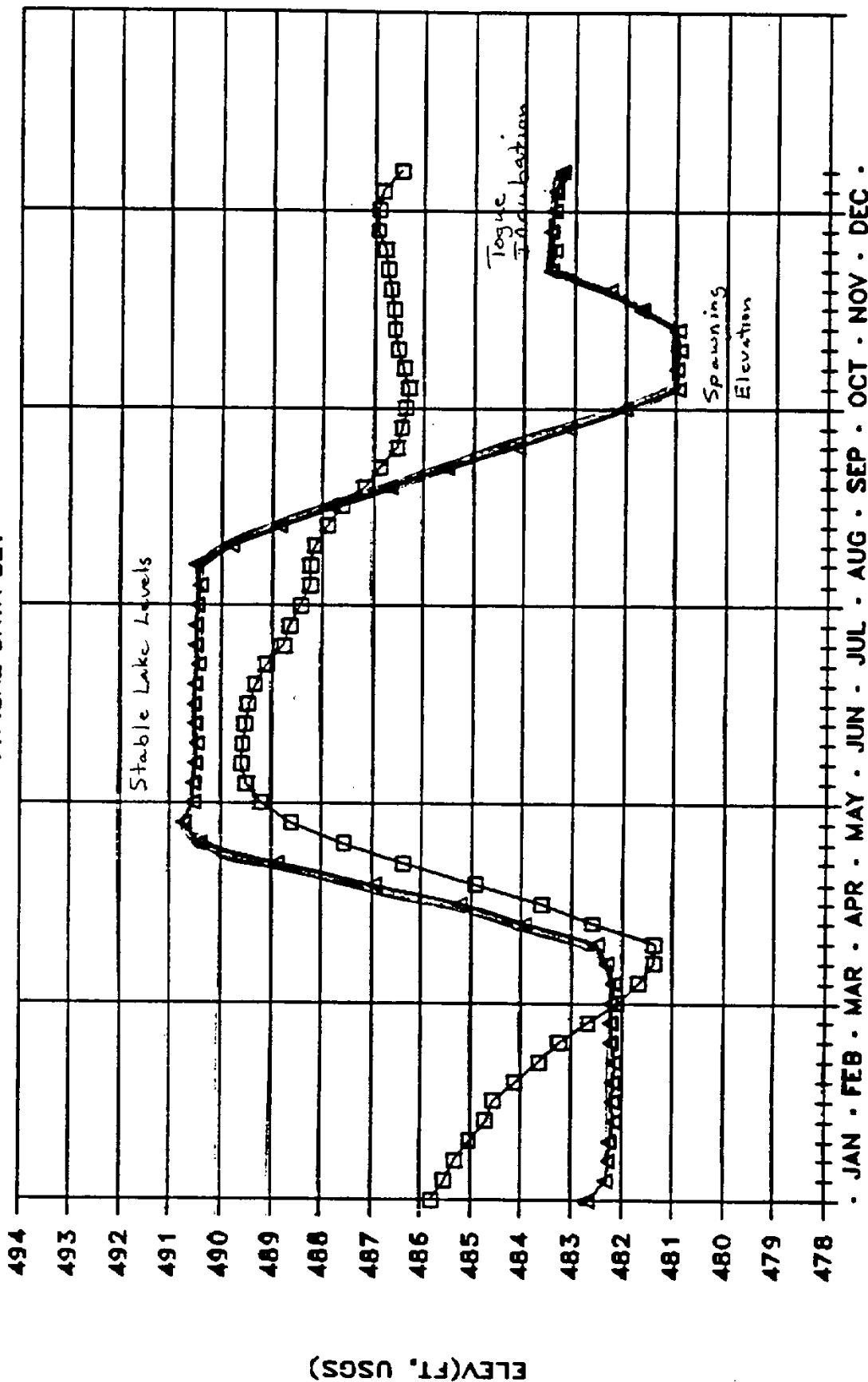
NORTH TWIN OUTFLOW

TYPICAL DATA SET



NORTH TWIN POND ELEVATION

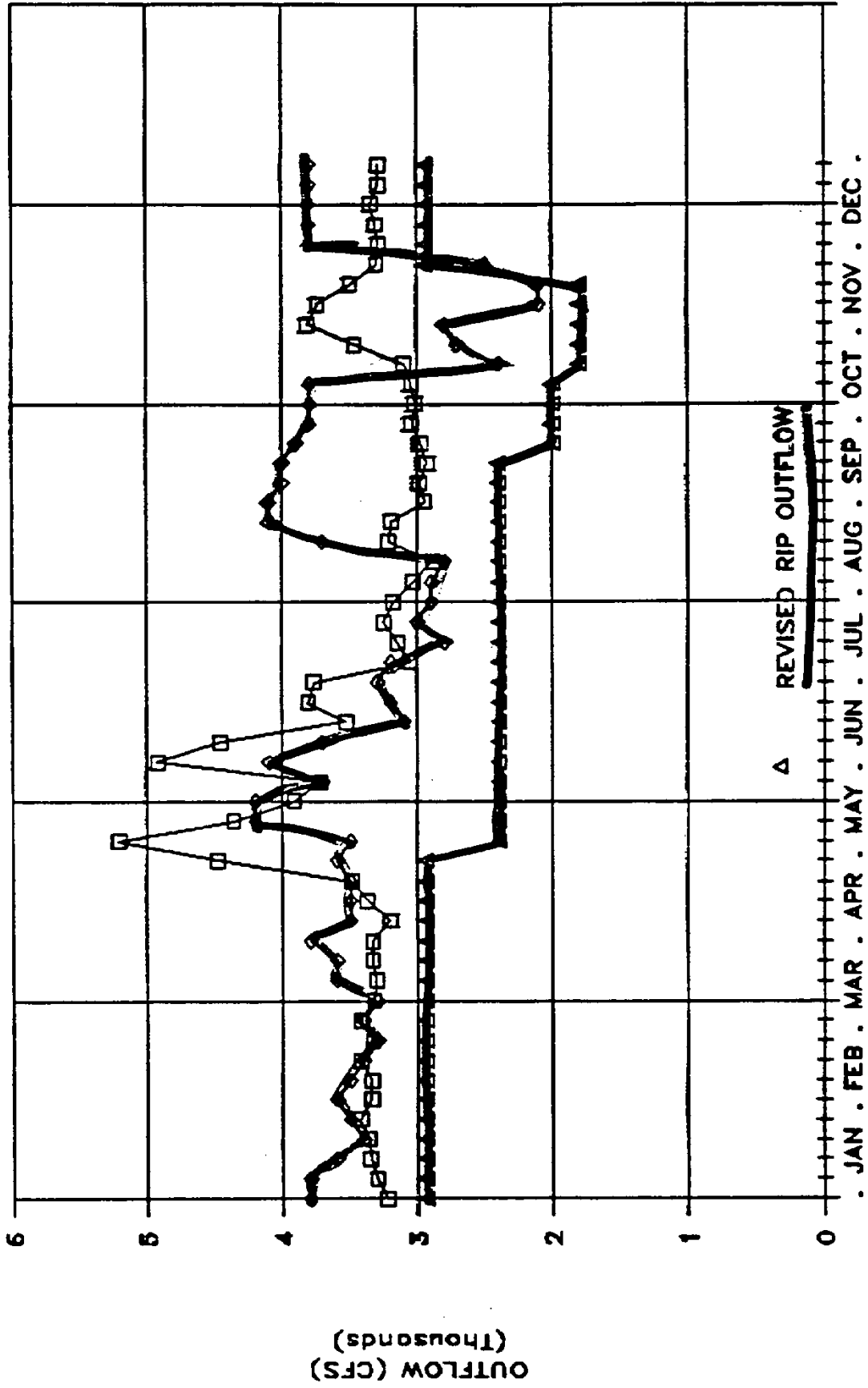
TYPICAL DATA SET



HIST ELEV
 WEEK / MONTH
 REVISED ELEV

RIPOGENUS & NORTH TWIN OUTFLOW

TYPICAL DATA SET



WEEK / MONTH

□ HIST N.TWIN OUTFLOW

Δ REV N.TWIN OUTFLOW

POWER SYSTEM - GP

EAST MILLINOCKET
DOLBY
MILLINOCKET
NORTH TWIN

90 CYCLE LOAD

HYDRO

COGENERATION

CONDENSING

PURCHASED

McKAY
MILLINOCKET
DOLBY
WELDON

40 CYCLE LOAD

SUPPLY

40/60 CYCLE

- MILLS REQUIRE 40/60 CYCLE POWER
- 40 CYCLE MUST ALL BE USED INTERNALLY

HYDRO

- 89 MW 40 CYCLE - TIED TO MILL LOAD
- 37 MW 60 CYCLE

COGENERATION

- MILLINOCKET STEAM - TIED TO MILL PRODUCTION RATES
- EAST MILLINOCKET STEAM - TIED TO MILL PRODUCTION RATES

CONDENSING

- EAST MILLINOCKET STEAM
- MILLINOCKET STEAM

PURCHASE/SALE

- BANGOR HYDRO

DEMAND

MINIMUM FLOWS
ELECTRICAL SYSTEM
STEAM SYSTEMS

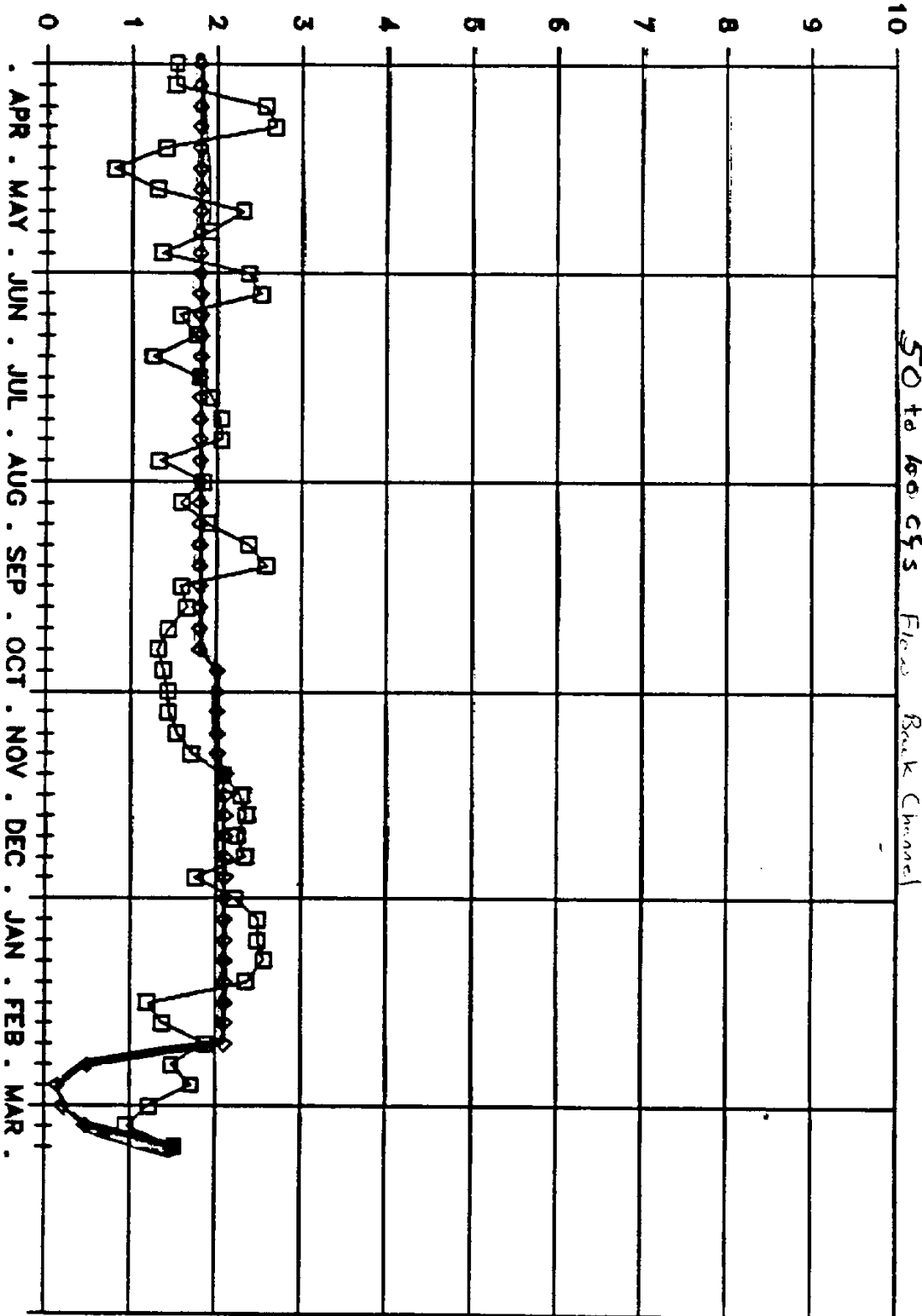
RIPOGENUS AND PENOBSCOT MILLS PROJECTS
WATER USE

<u>Waterbody</u>	<u>Agency Request</u>	<u>Reason</u>	<u>Time Period</u>	<u>Model Outcome</u>
Ripogenus Impoundment	"relatively stable" water levels	wildlife wetlands, recreation, aesthetics	1 May - 15 July 1 May - 30 Sept.	no change in operation no level controls
West Branch Flow	2,400 - 3,600 cfs	rafting	1 May - 15 Oct.	1 May - 15 Sept. normal month - at least 2000 cfs
	ABF or Study	salmon fishery	15 June - 30 Sept.	dry, wet month - at least 1800 cfs short term outage - 400 cfs provide long term outage flow
	maintain flow/ elevation	salmon spawning salmon incubation	15 Oct. - 15 Nov. 16 Nov. - 7 June	provide spawning flow incubation flow > spawning flow
Upper Gorge Flow	100 cfs 50 cfs	salmon fishery salmon fishery	1 July - 30 Sept. 1 Oct. - 30 June	100 cfs flow resolved through habitat improvement in other areas
North Twin & Millinocket Lake Impoundments	"relatively stable" water levels	wildlife wetlands, recreation, aesthetics	1 May - 15 July 1 May - 30 Sept.	N. Twin - stable water level - 1 May to mid Aug Millinocket Lake - no change in operation
	drawdown limit	logue spawning logue incubation	15 Oct. - 5 Nov. 6 Nov. - 1 May	drawdown to spawning elevation incubation elevation > spawning elevation
Back Channel	350 - 500 cfs	fishery habitat	year-round	leakage
Millinocket Stream	60 - 80 cfs	fishery habitat	year-round	maintain existing minimum flow 20 cfs
West Branch	2,000 cfs instantaneous	water quality	year-round	maintain 2000 cfs at Millinocket

RIPOGENUS OUTFLOW - MIN AVAIL WATER

50 to 100 cfs Flow Back Channel

OUTFLOW (CFS)
(Thousands)

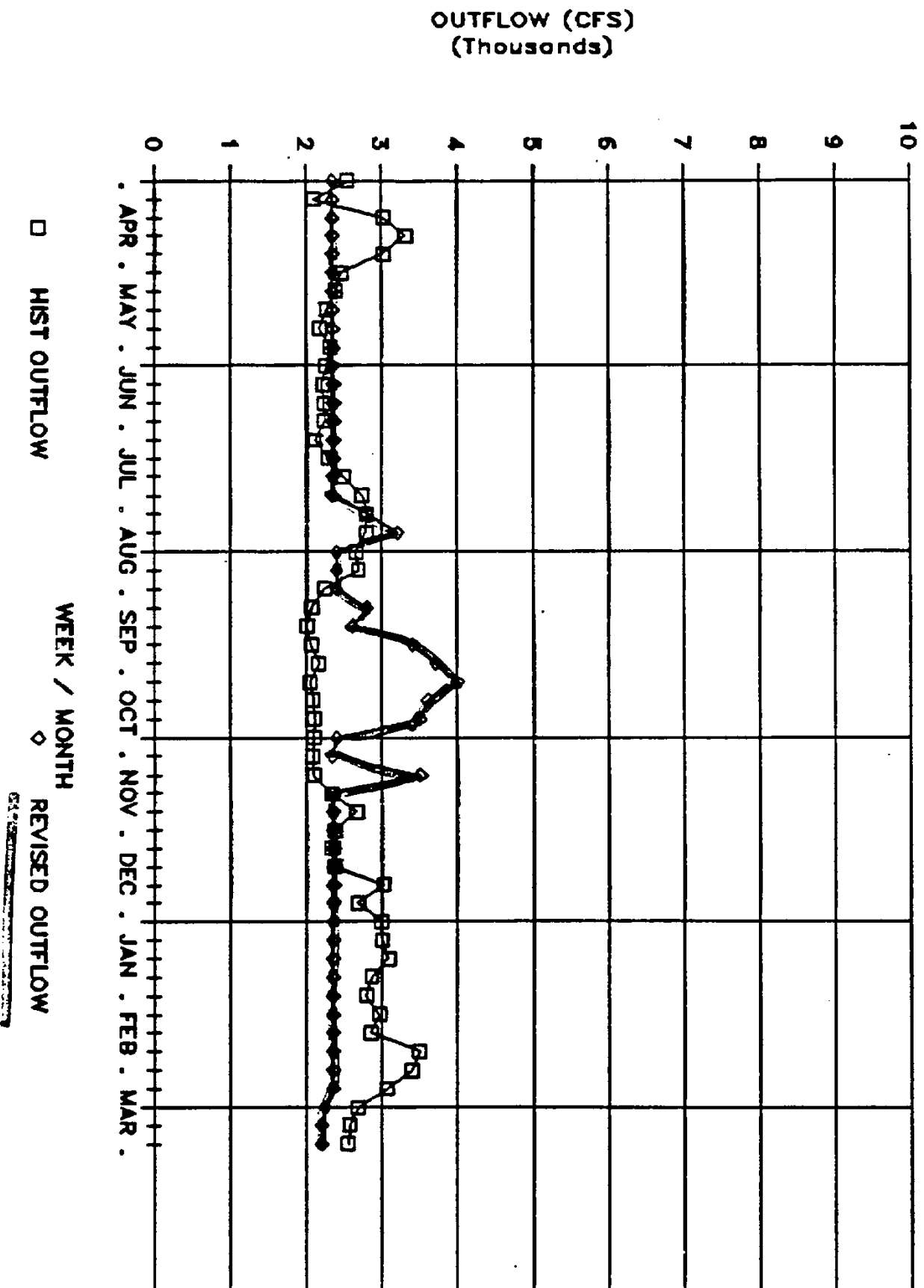


□ HIST OUTFLOW

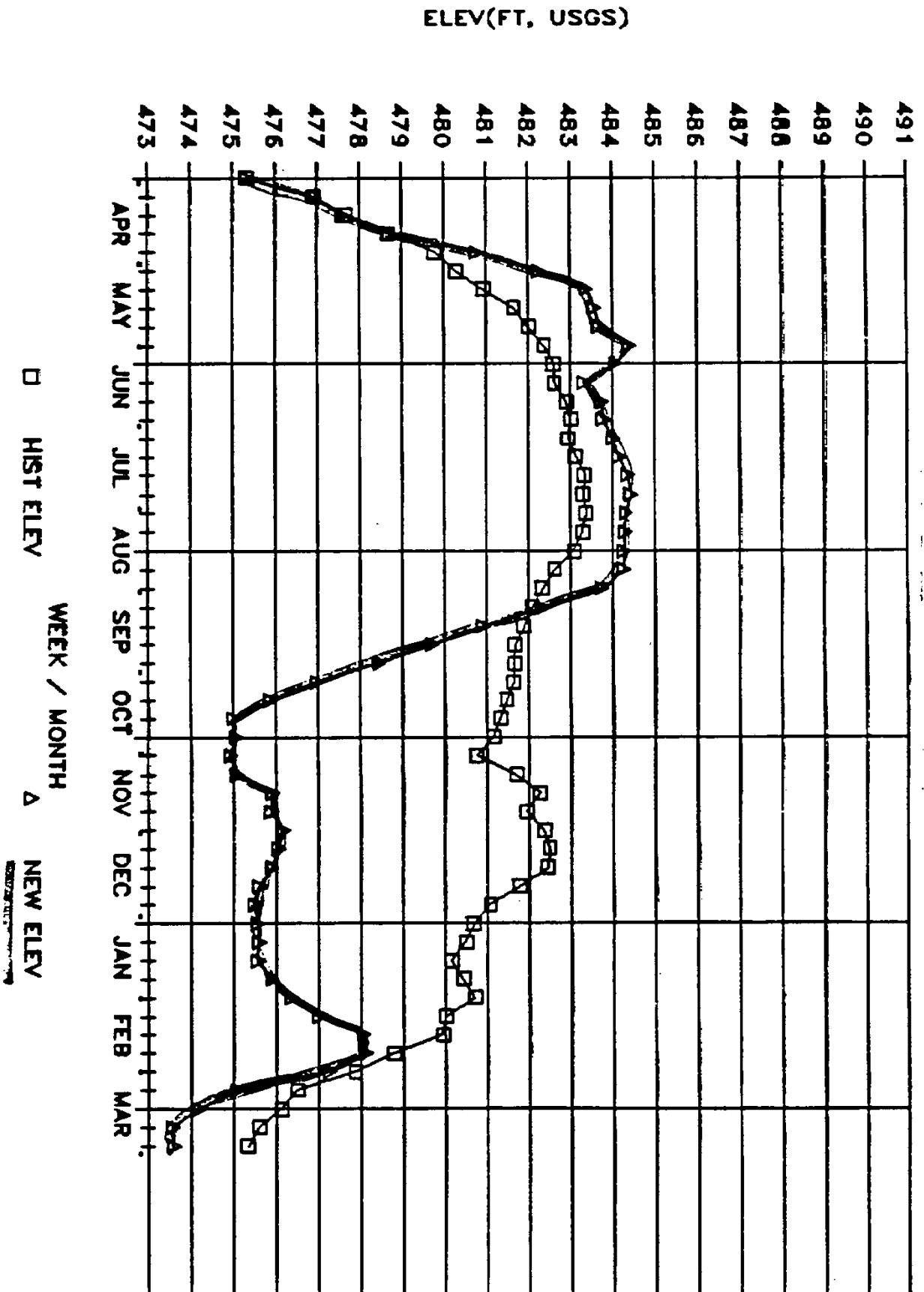
WEEK / MONTH

◇ REVISED OUTFLOW

N. TWIN POND OUTFLOW - MIN AVAIL WATER

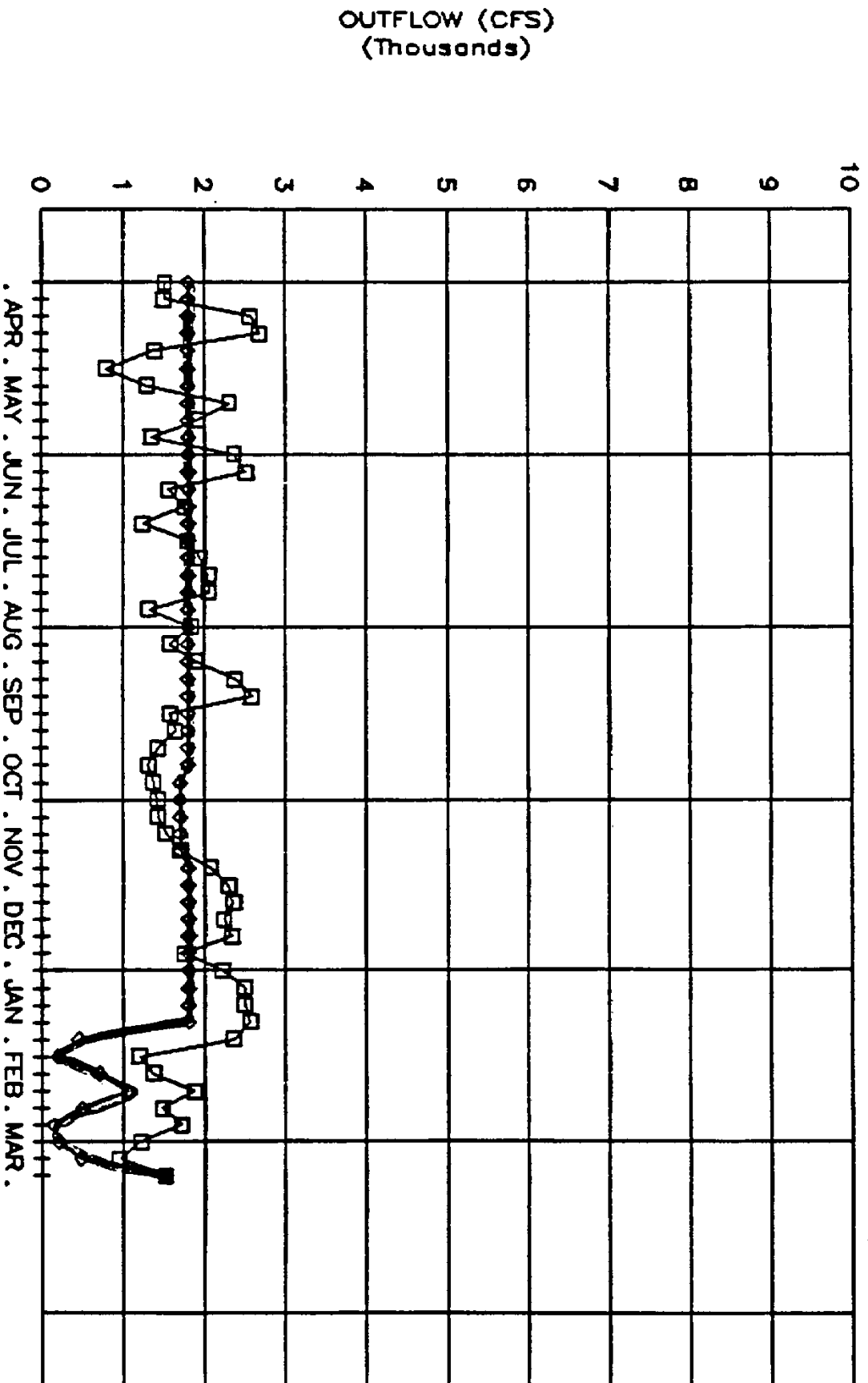


NORTH TWIN POND ELEV - MIN AVAIL WTR



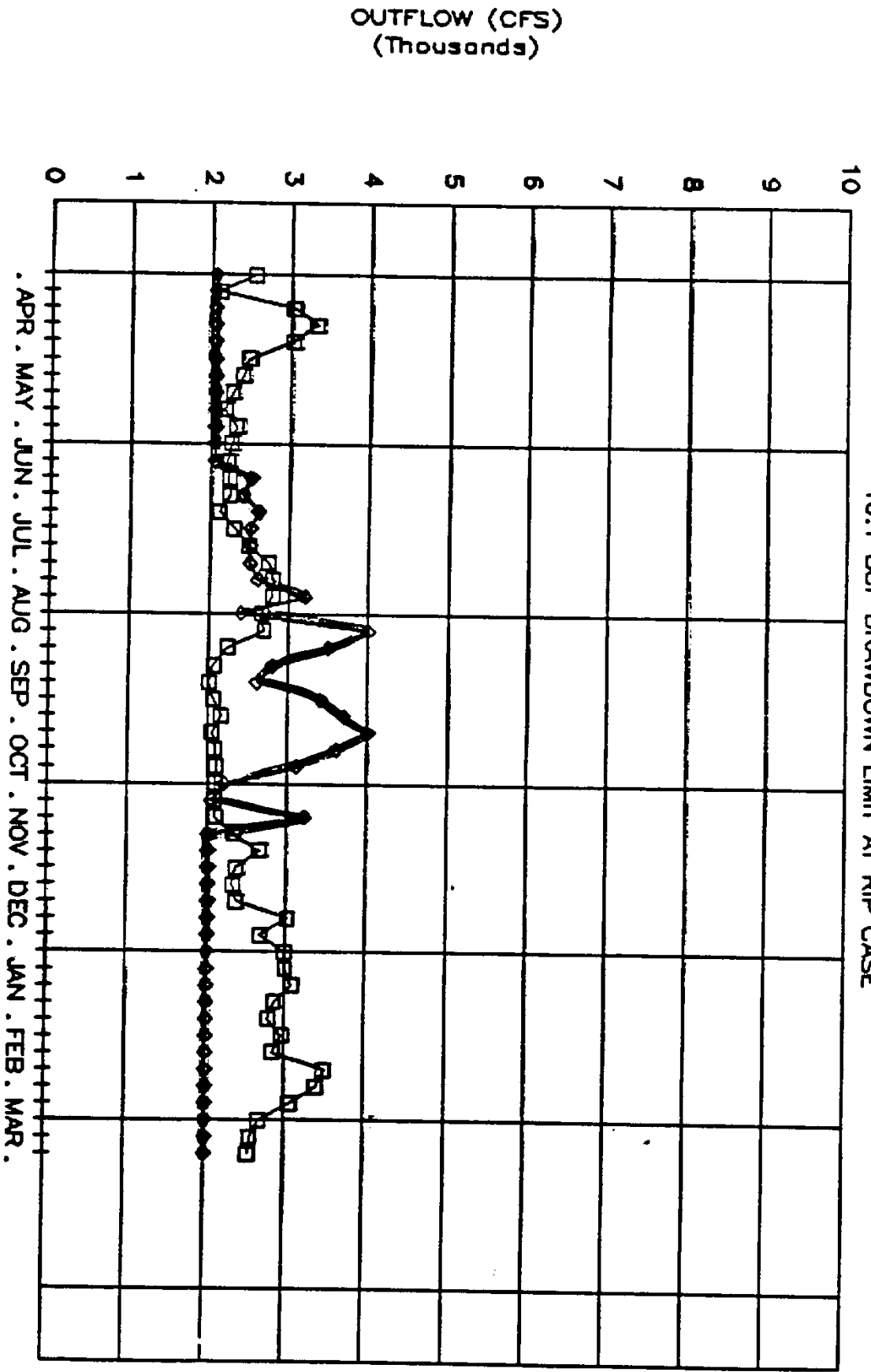
RIPOGENUS OUTFLOW - MIN AVAIL WATER

10.1 BCF DRAWDOWN LIMIT AT RIP CASE Limit Drawdown to 18 Feet



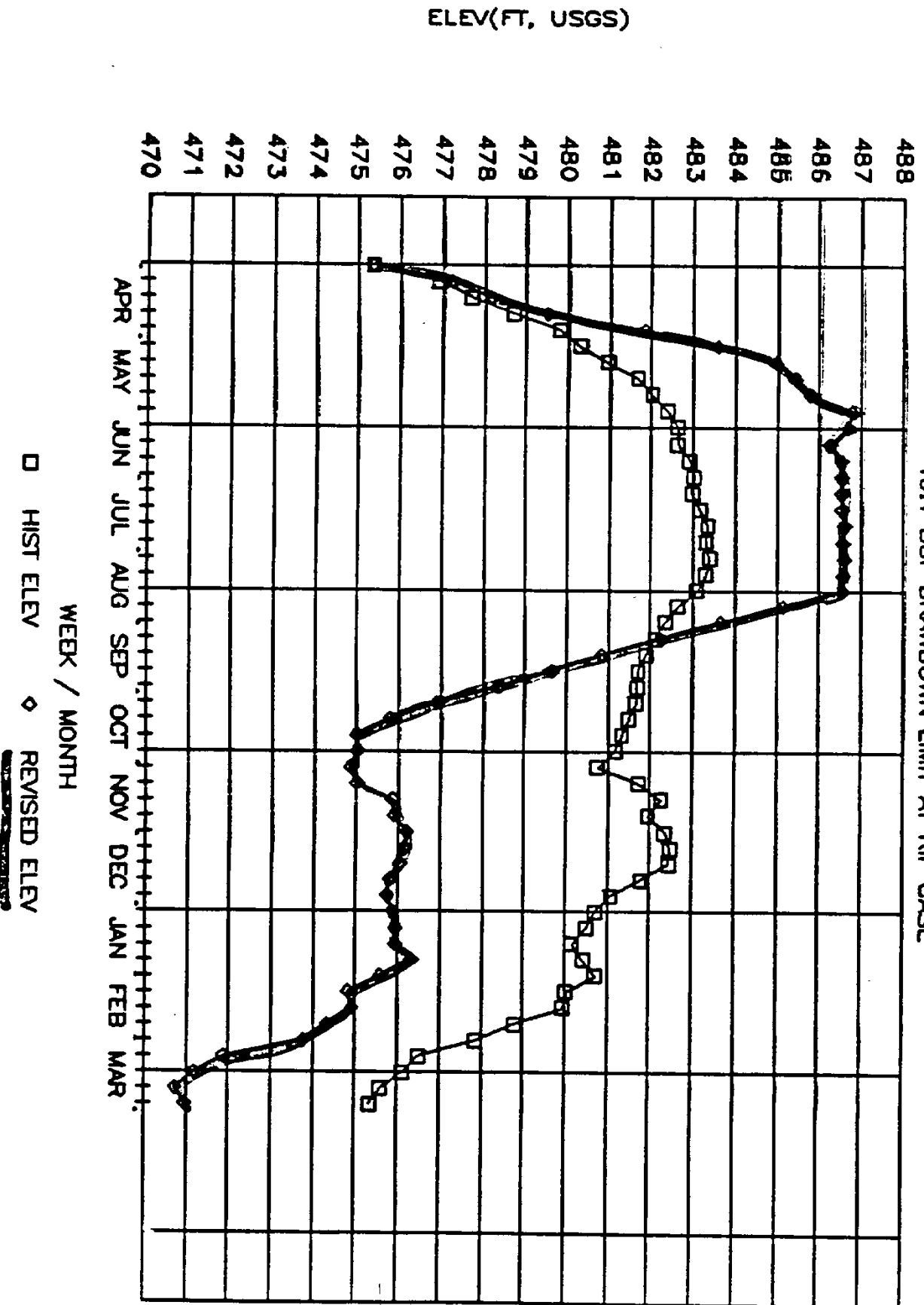
NORTH TWIN OUTFLOW - MIN AVAIL WATER

10.1 BCF DRAWDOWN LIMIT AT RIP CASE



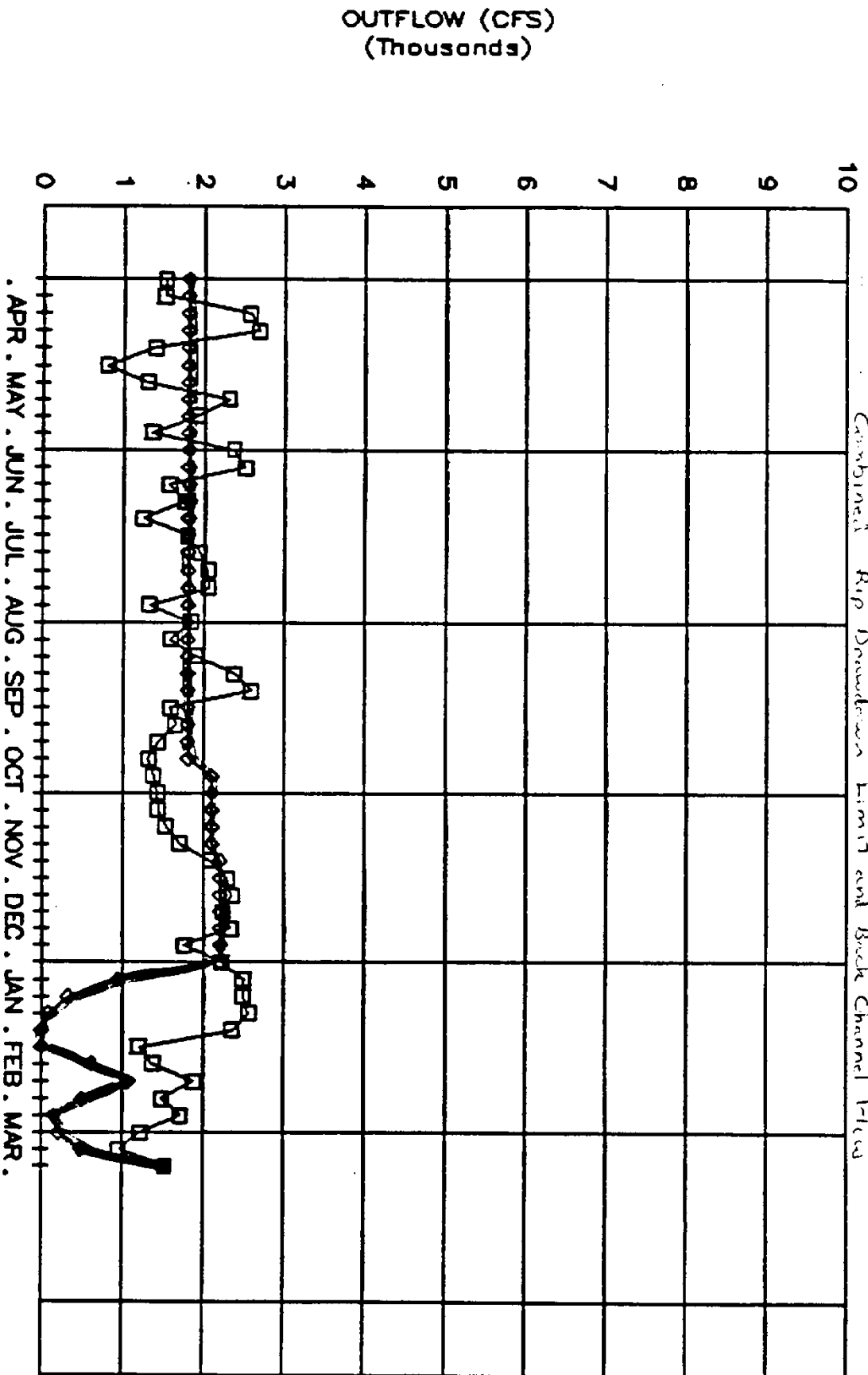
NORTH TWIN POND ELEV - MIN AVAIL WTR

10.1 BCF DRAWDOWN LIMIT AT RIP CASE

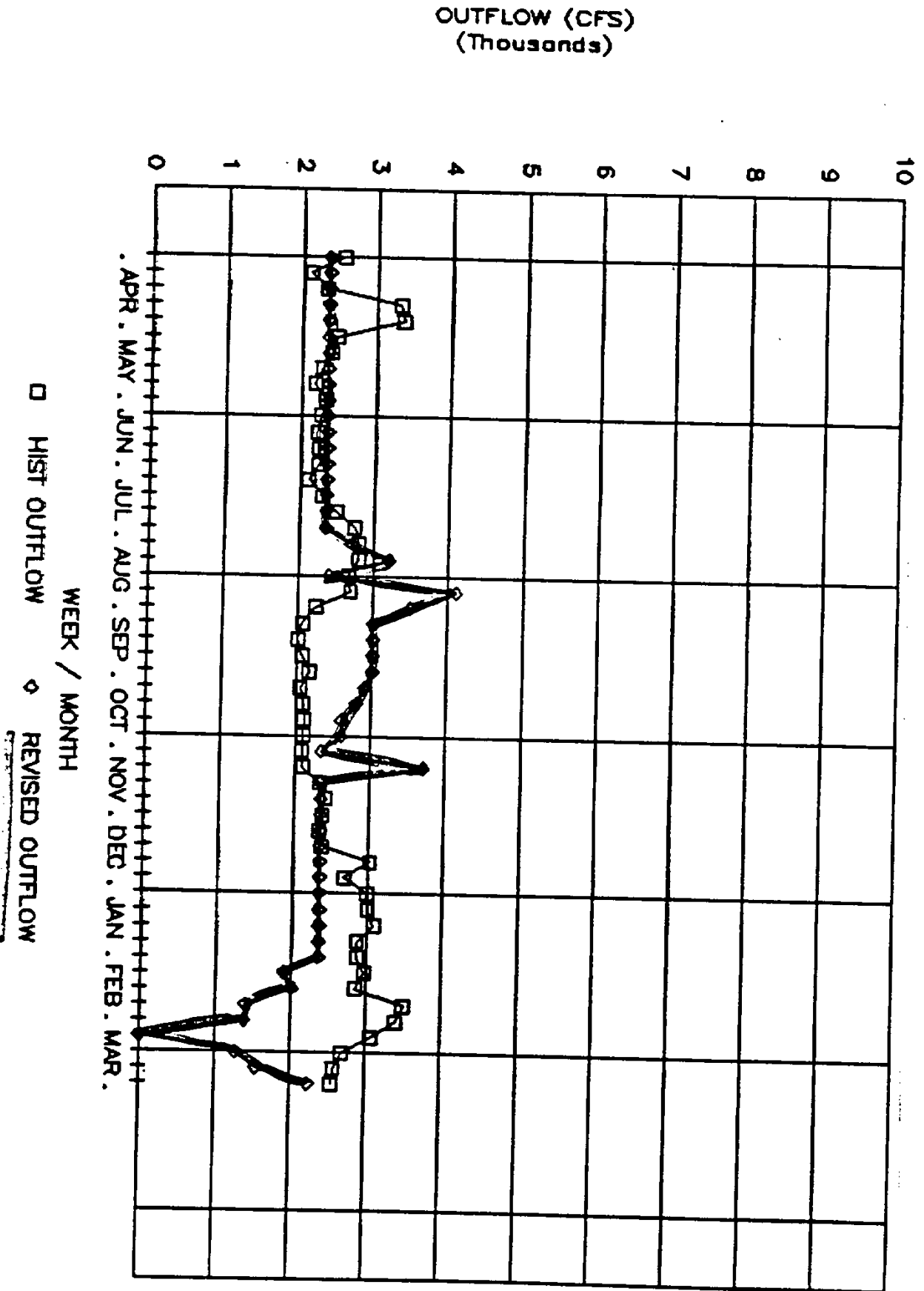


RIPOGENUS OUTFLOW - MIN AVAIL WATER

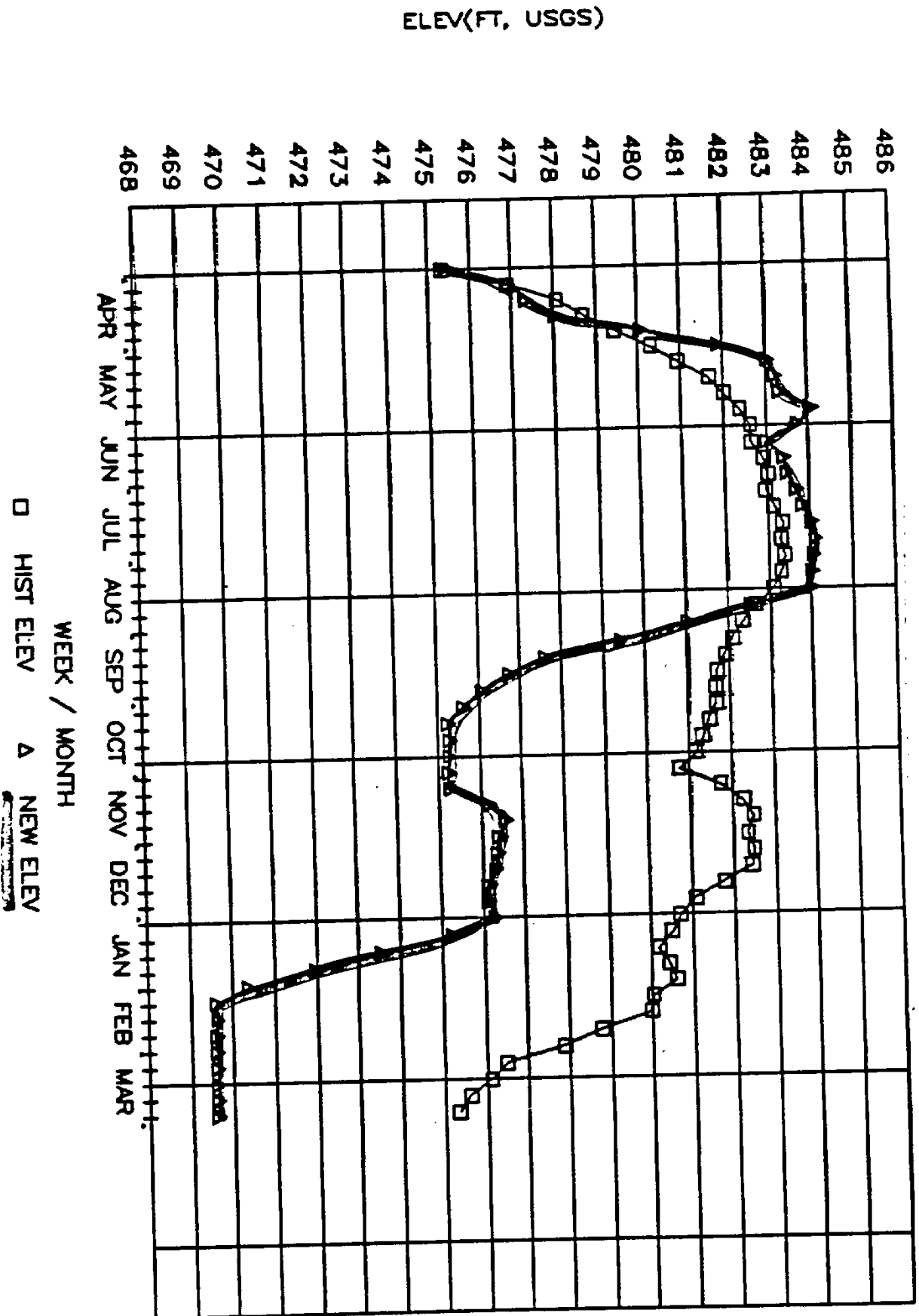
Combined Rip Drawdown Limit and Back Channel Flows



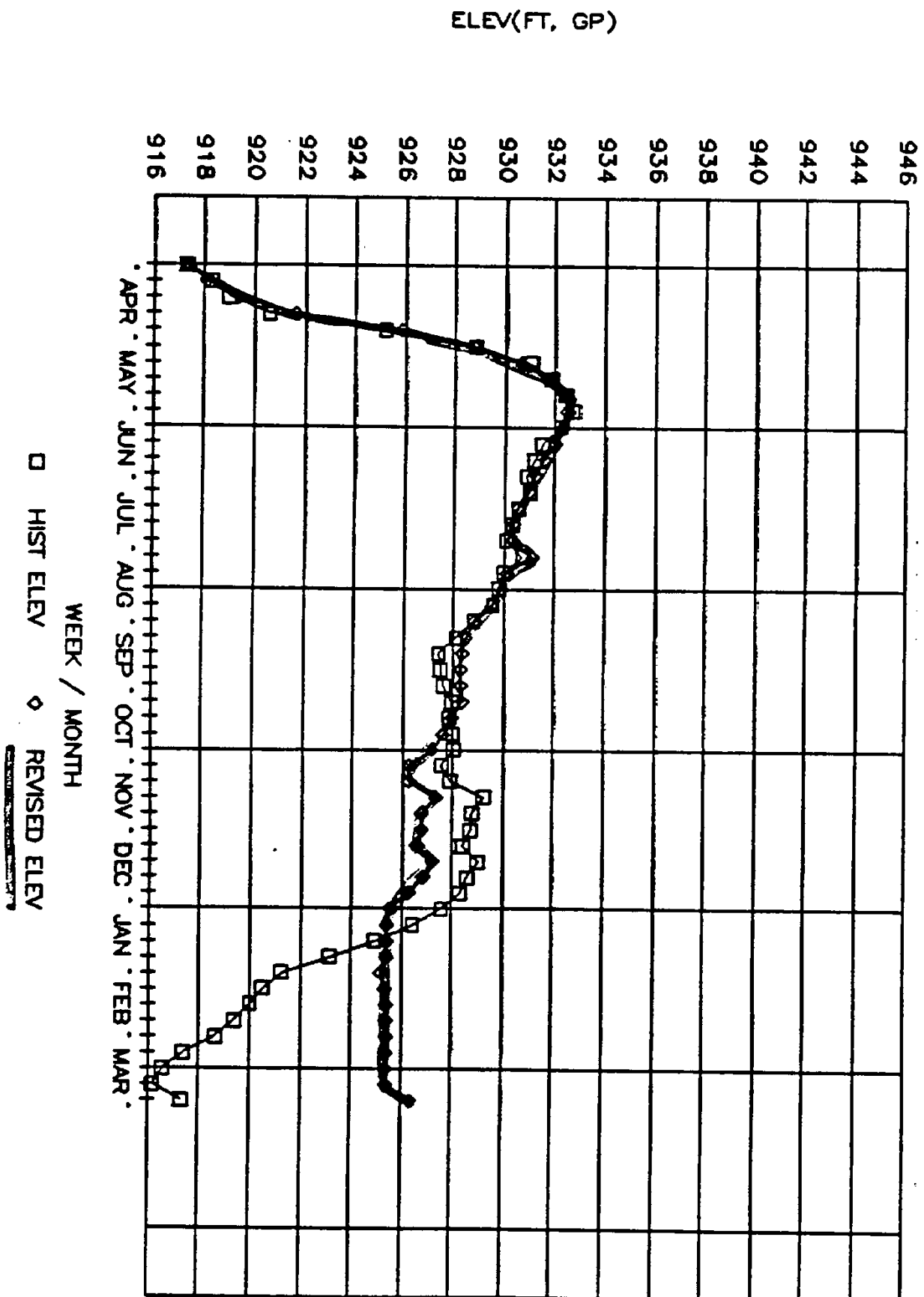
N. TWIN POND OUTFLOW - MIN AVAIL WATER



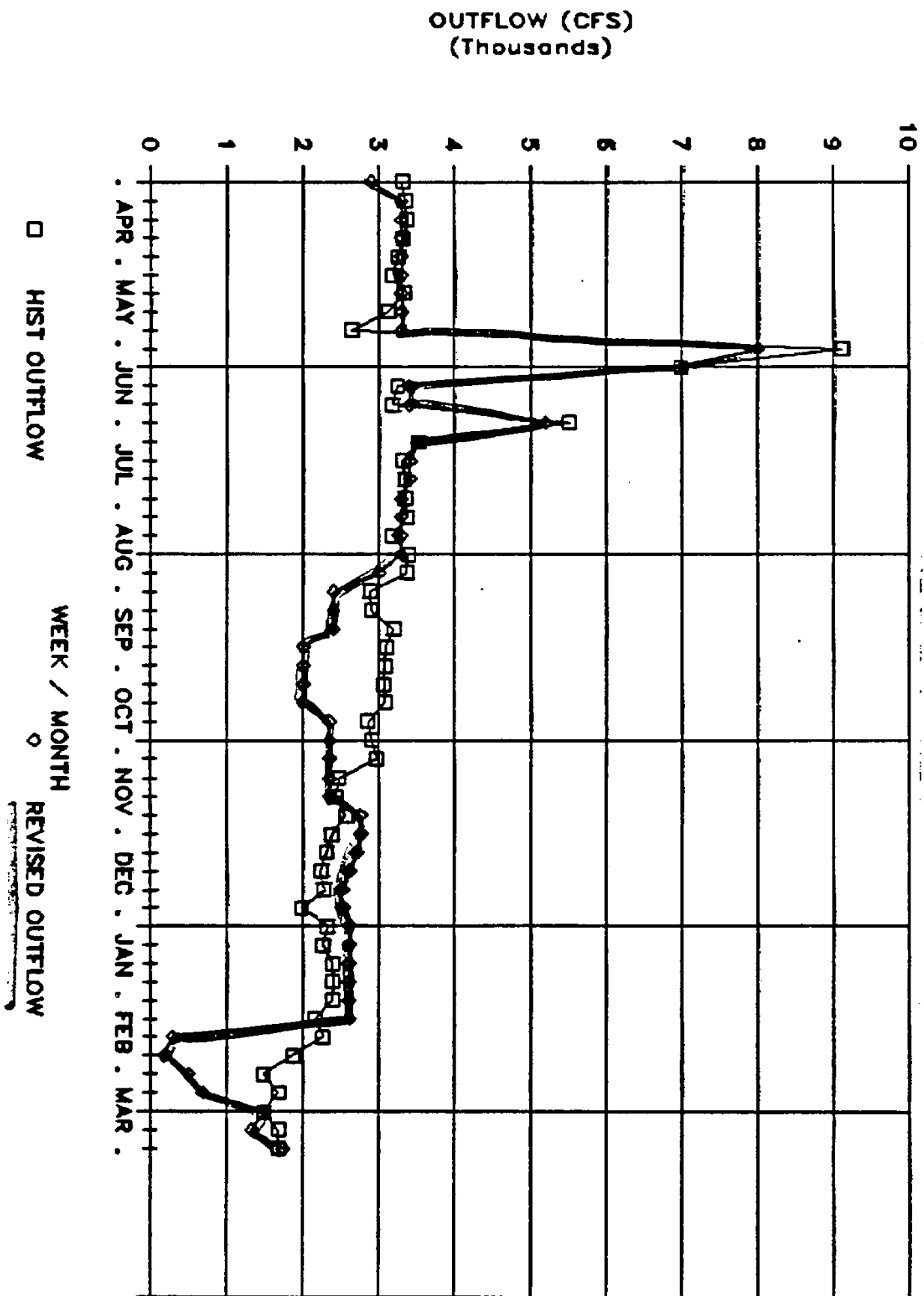
NORTH TWIN POND ELEV - MIN AVAIL WTR



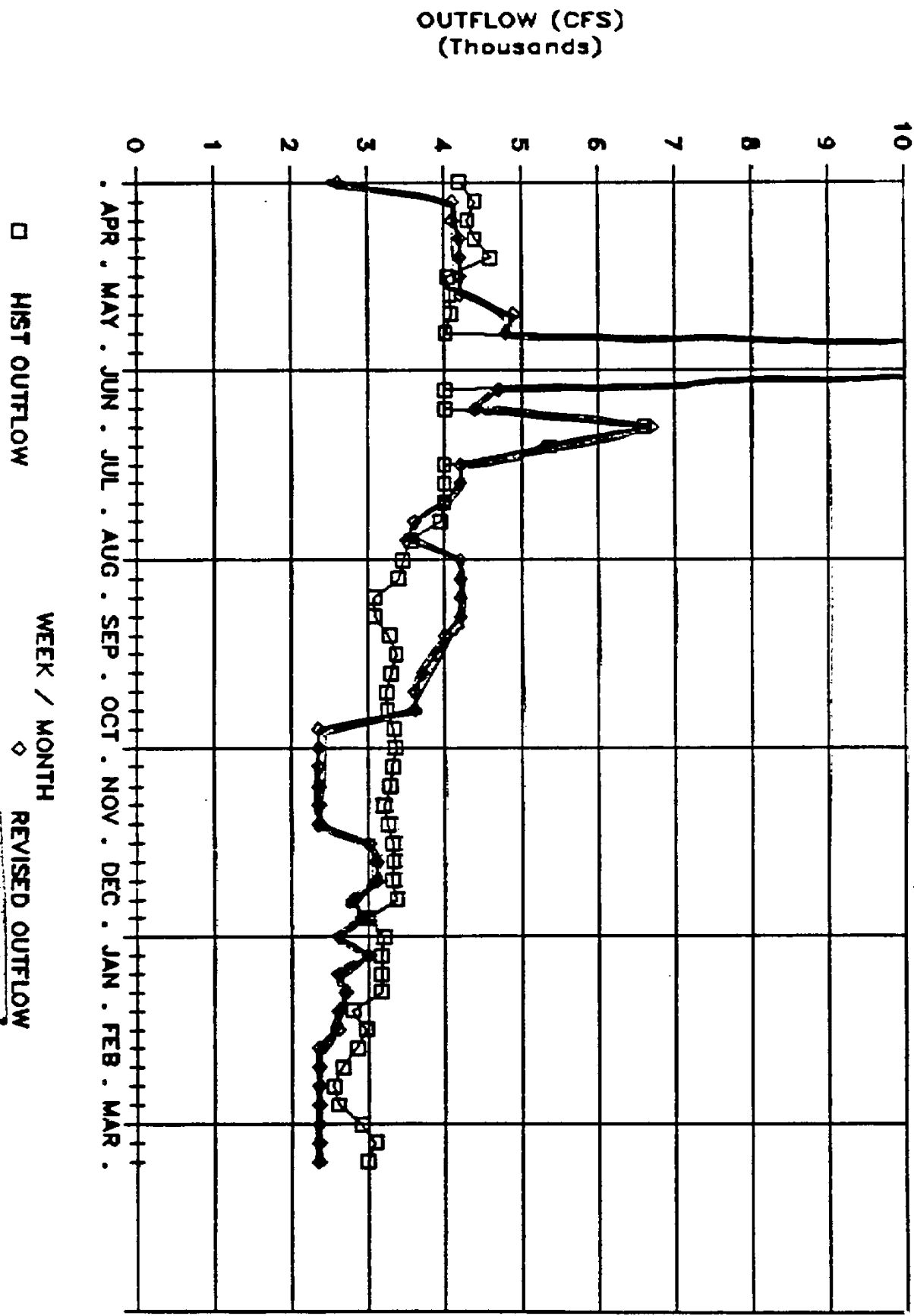
RIPOGENUS H.W. ELEV - MIN AVAIL WATER



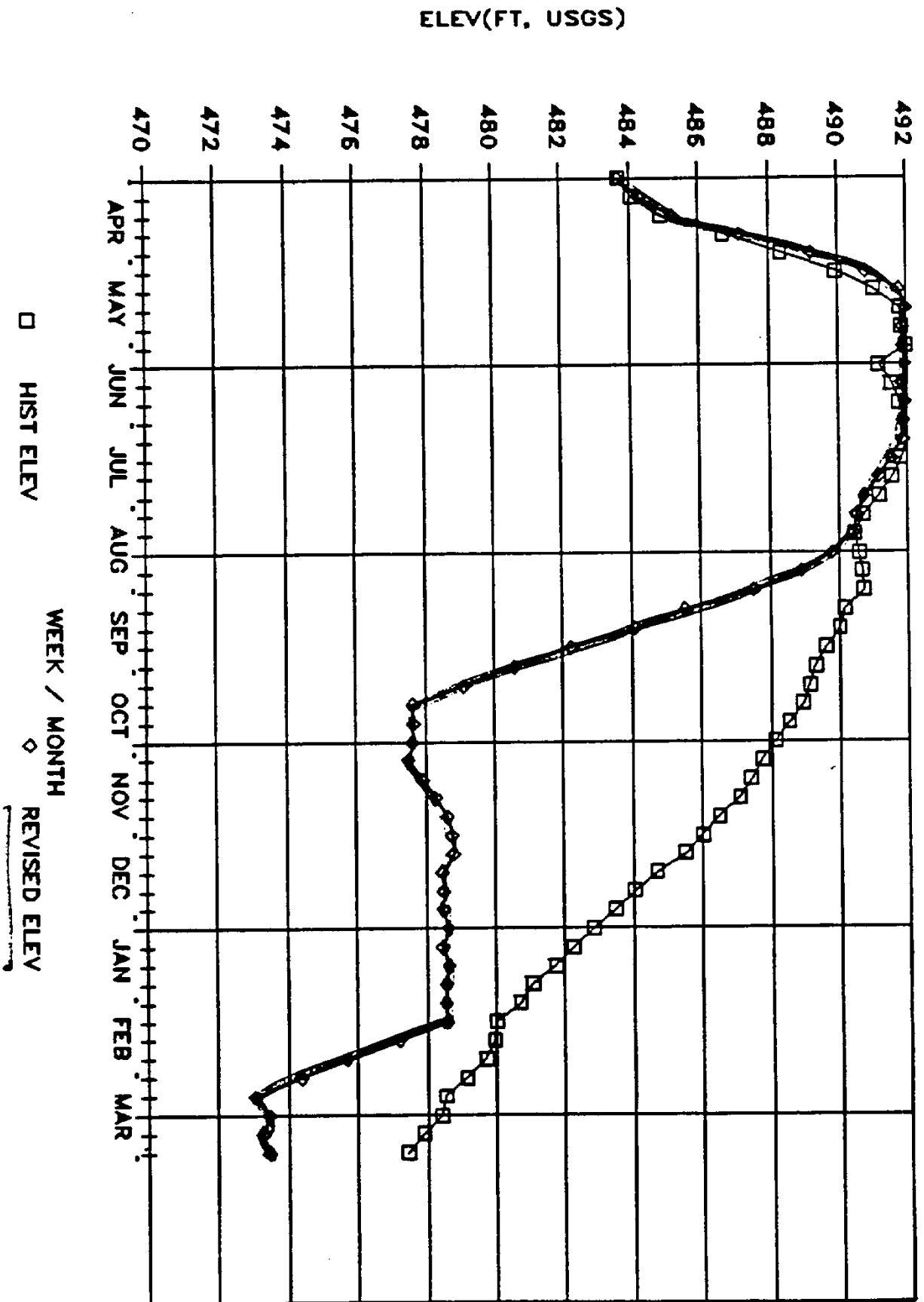
RIPOGENUS OUTFLOW - 1984 Y



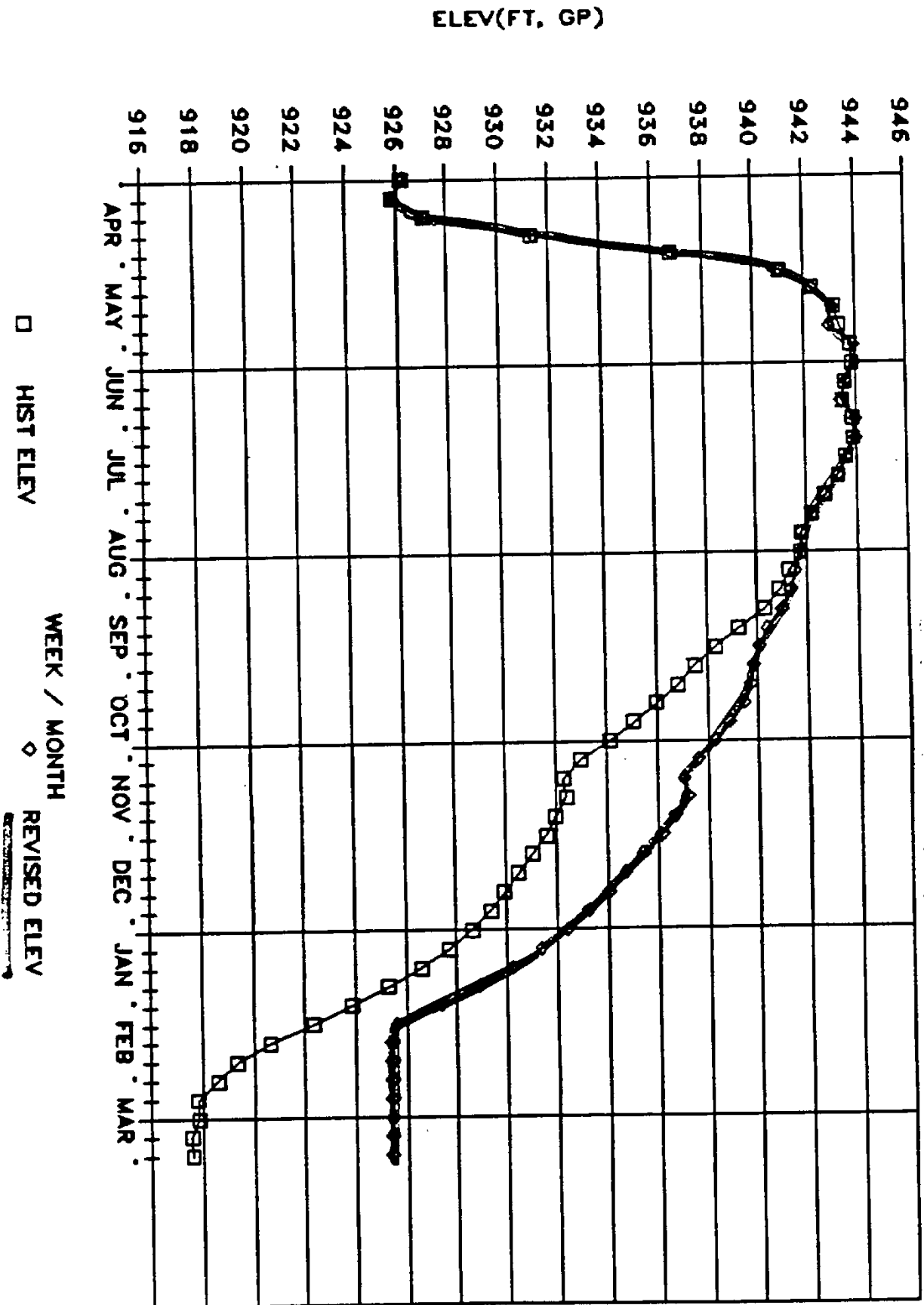
N. TWIN POND OUTFLOW - 1984 Y



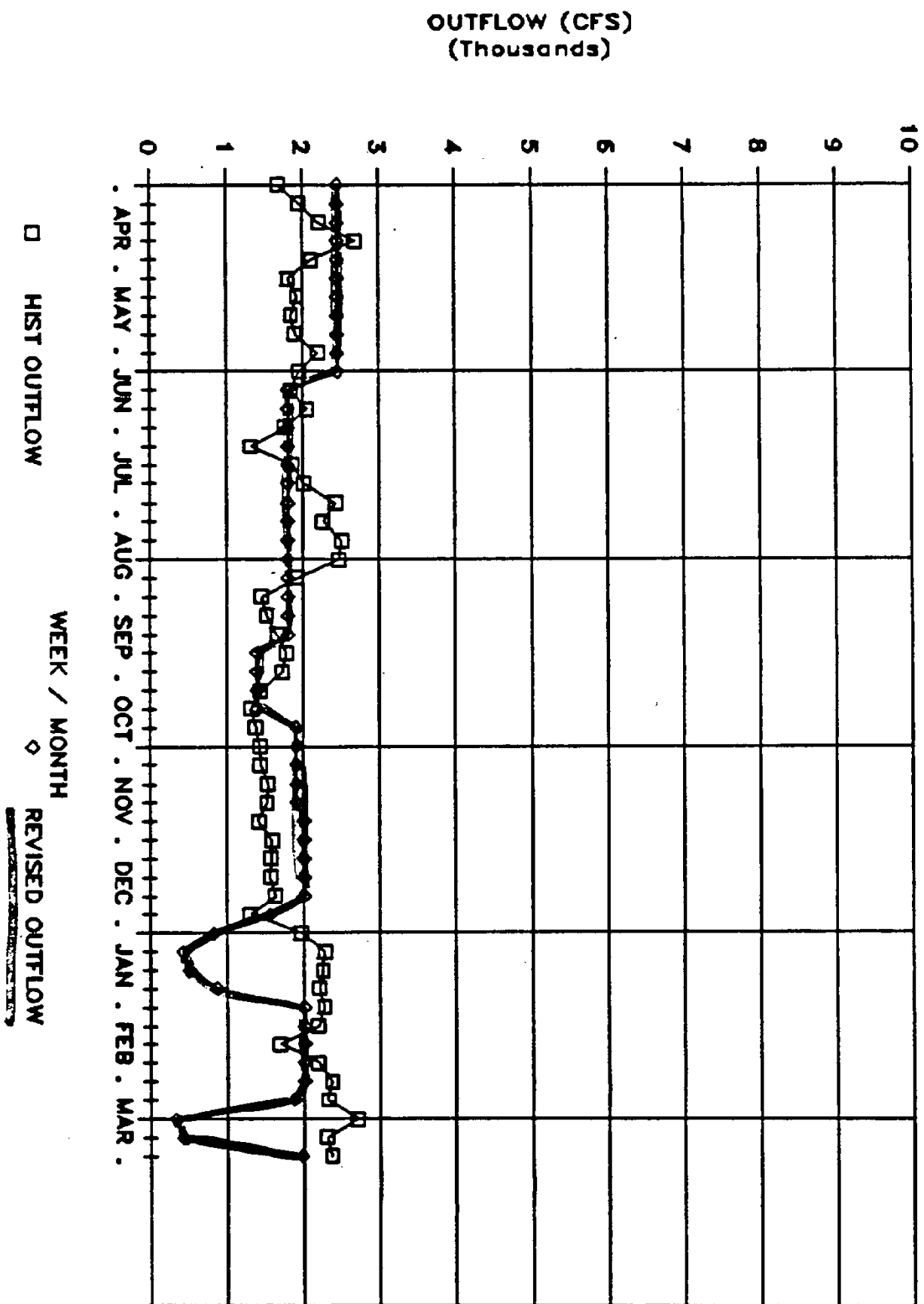
NORTH TWIN POND ELEV - 1984 Y



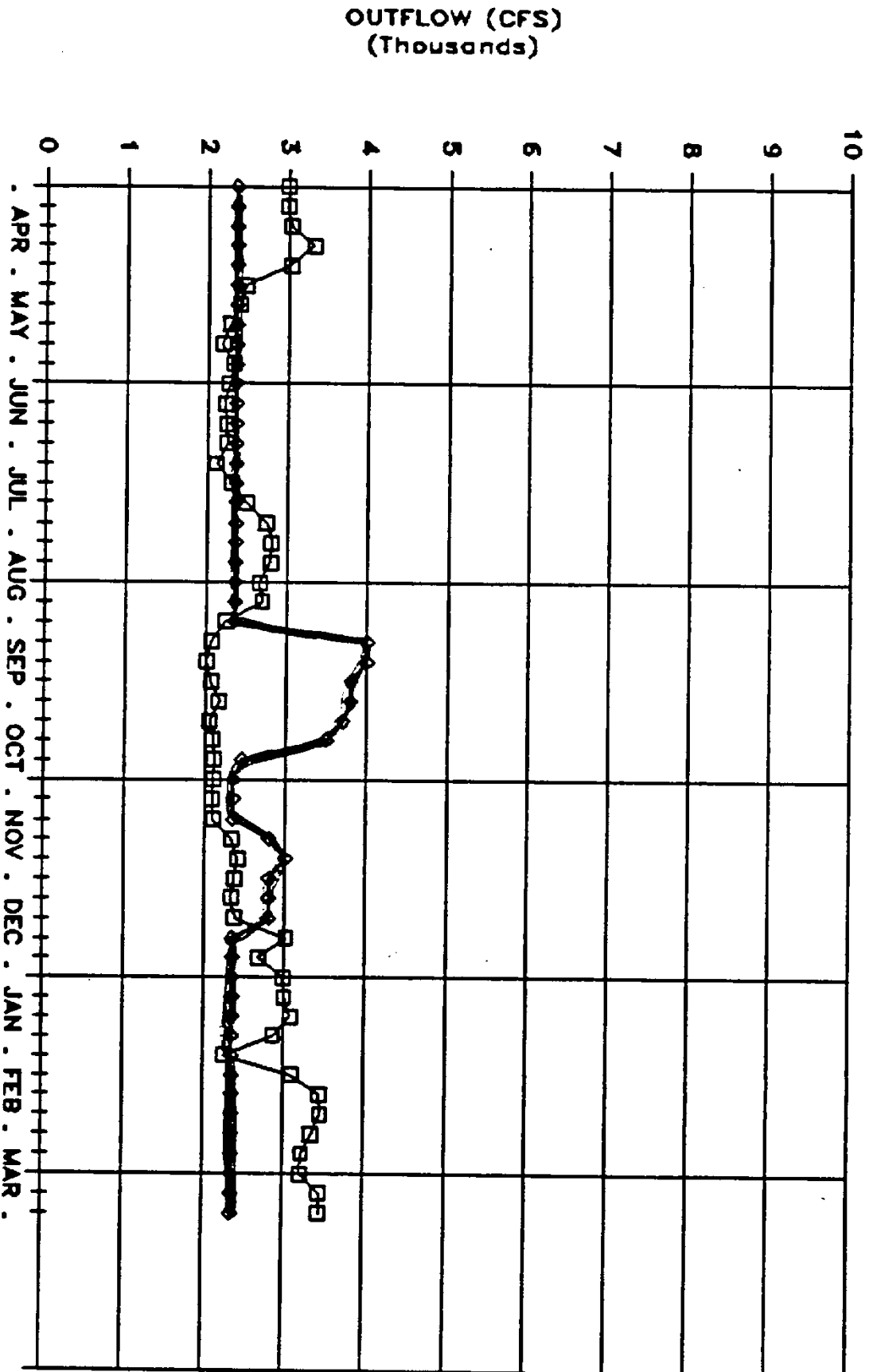
RIPOGENUS H.W. ELEV - 1984 Y



RIPOGENUS OUTFLOW -1985 Z



N. TWIN OUTFLOW - 1985 Z

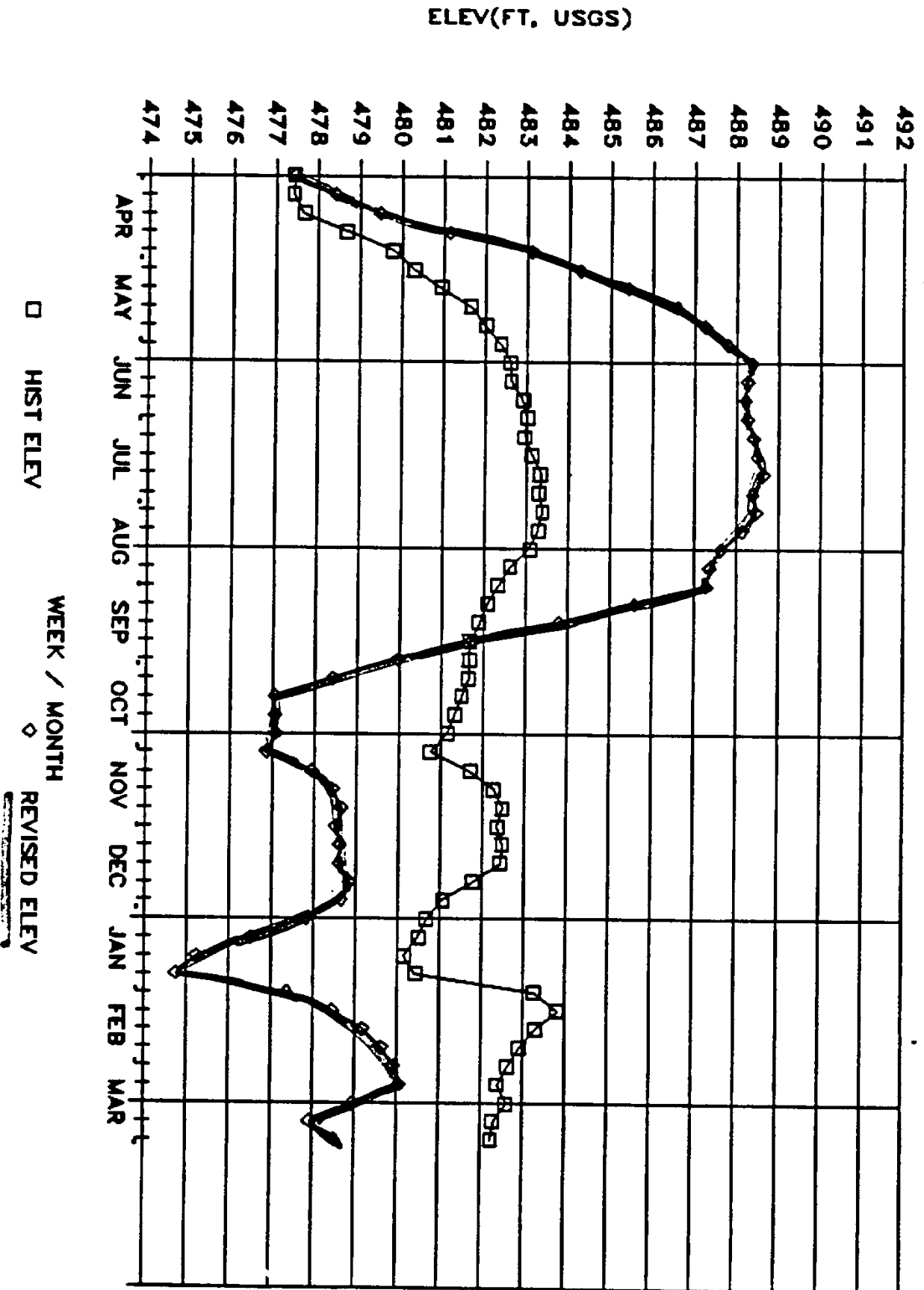


□ HIST OUTFLOW

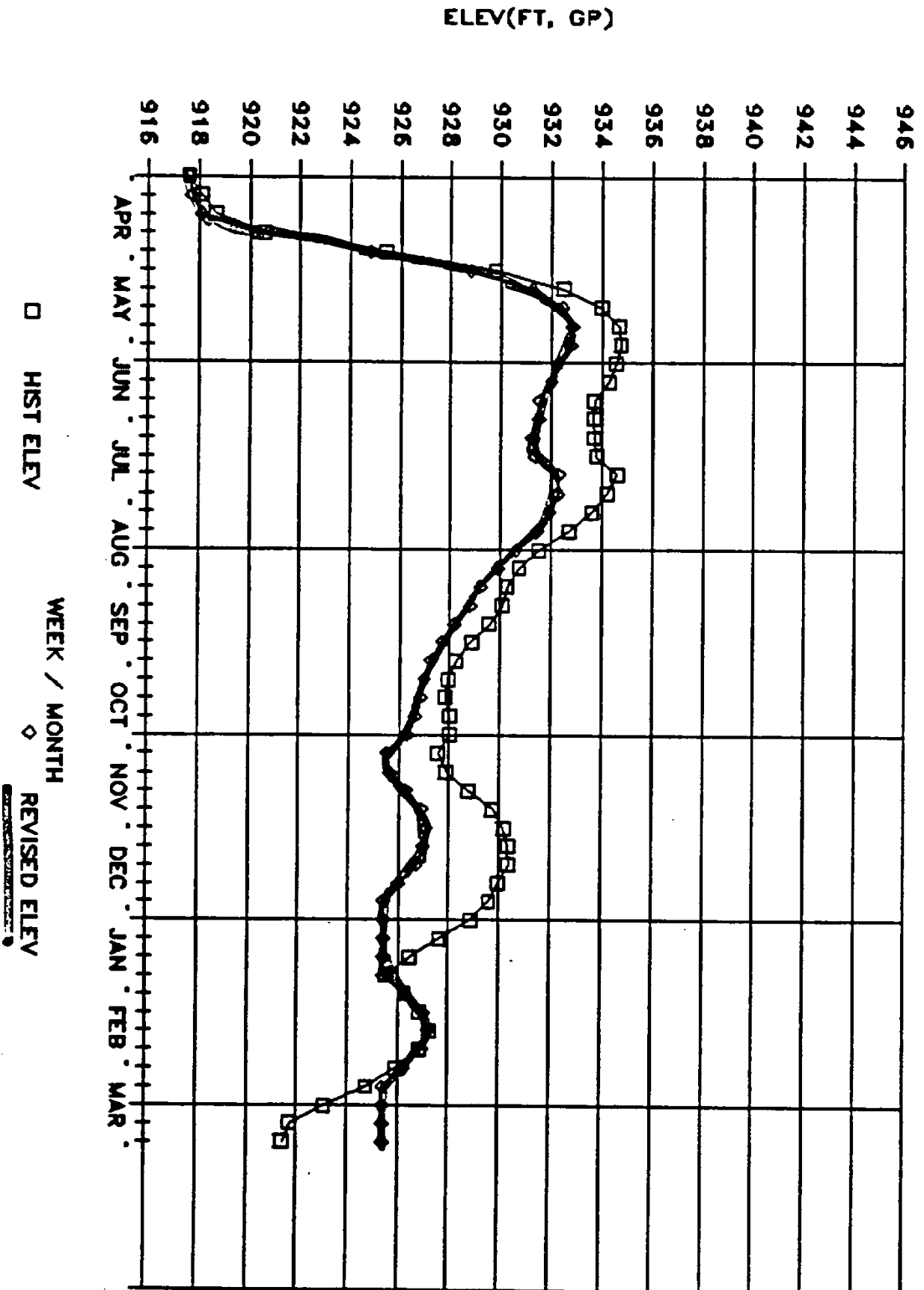
◇ WEEK / MONTH

◇ REVISED OUTFLOW

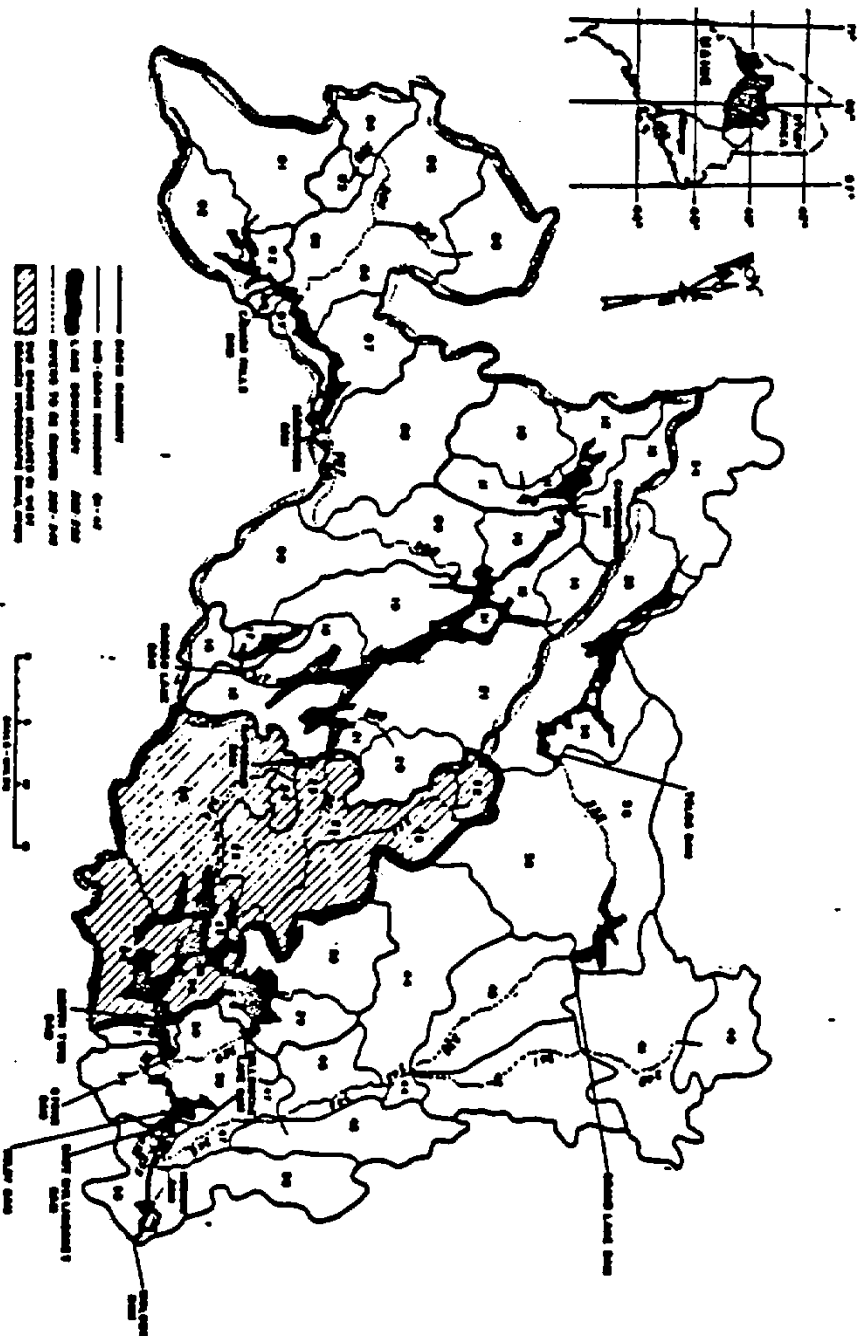
N. TWIN POND ELEV -1985 Z



RIPOGENUS ELEV - 1985 Z



MAP OF SUBBASINS OF PENOBSCOT RIVER BASINS



**RIPOGENUS PROJECT
LITTORAL ZONE ANALYSIS**

**Submitted as Part of 401
Water Quality Certification Application**

**GREAT NORTHERN NEKOOSA CORPORATION
Millinocket, Maine
December 12, 1991**

INTRODUCTION

A meeting was held between Great Northern Nekoosa Corporation (GNN) and the Maine Department of Environmental Protection (MDEP) on June 28, 1991 in the MDEP offices in Augusta, Maine to discuss 401 water quality certification issues associated with relicensing of GNN's hydroelectric and hydromechanical systems. At that meeting the MDEP expressed the position that the historic water management practices in the Ripogenus impoundment system may not be protective of littoral zone (shallow water) biota. GNN believes that biological evidence indicates that a functioning littoral zone is present within the impoundment system and cites Exhibit E3.1 of the company's FERC application (Aquatic Community report). Further, this water body has always met its designated use and water quality standards in previous MDEP reviews and periodic reports to the USEPA. That evidence notwithstanding, MDEP biologists took the position at the meeting that the Ripogenus system could be considered to possess a functioning littoral zone if the seasonal drawdown was limited. They proposed the concept of limiting the drawdown to allow for retaining a littoral area at least equivalent to the original historic littoral area created by the pre-project lakes. MDEP biologists did not further define pre-project or baseline conditions nor defend their concept on ecological grounds. GNN disagrees with the basic premise of MDEP's assumptions believing it is wholly without a scientific basis or regulatory precedent. However, GNN agreed to the MDEP's request and performed an analysis of littoral zone areas in the Ripogenus impoundment system.

APPROACH

The aquatic communities of littoral zones are composed of mobile and non-mobile fauna and flora. The littoral zone is defined as the bottom area of a water body that is within the zone of light penetration conducive to biological activity. This zone extends from the surface to a depth where penetration of sunlight is equal to 1% of that striking the surface. Below this 1% level biological activity is normally minimal. Thus, a bottom area extending from the shoreline to the depth corresponding to the 1% light penetration level can be defined and calculated. Secchi depth is a direct measure of light penetration and GNN had collected numerous Secchi depth readings throughout the Ripogenus impoundment in the course of their studies supporting their FERC application. MDEP used these data to estimate the 1% light penetration depth as 30 ft. However, GNN had collected more sophisticated light penetration measurements in support of primary productivity studies

(Exhibit E3.1) that demonstrated the littoral zone was 20 ft. deep in these waters colored by natural humic substances. GNN thus used the 20 ft. zone for littoral area calculations and not MDEP's proposed 30 ft. zone based on Secchi measurements.

The MDEP biologists did not further define either pre-project water level conditions or current baseline impoundment conditions. GNN defined current baseline conditions as full pond (Elev. 941.59 ft.), a condition normally occurring each spring at the start of the biological growing season. Pre-project conditions were assumed to be pre-dams (i.e., pre-1840's) when three distinct unregulated water bodies existed: Ripogenus Lake, Chesuncook Lake and Caribou Lake. Existing bathymetry of the Ripogenus impoundment system is available from Maine Inland Fish and Game mapping and from data collected by GNN. The original lake levels were discerned from historic maps and elevation survey data. In this manner the historic lake and current impoundment perimeters and littoral areas corresponding to the 20 ft. zone were calculated.

RESULTS

The results of the littoral zone calculations are:

<u>Ripogenus Impoundment</u> -(full pond)	9,900 acres
<u>Pre-project lakes</u>	
	Ripogenus 170 acres
	Chesuncook 3,200 acres
	Caribou 2,470 acres
	Total 5,840 acres

Using MDEP's reasoning, an area equivalent to the original littoral acreage of 5,840 acres would need to be maintained in the Ripogenus impoundment during the annual drawdown. Subtracting 5,840 acres from the total current full pond littoral acres of 9,900 yields 4,060 acres "available" to GNN and still satisfy the MDEP criterion. This acreage can then be converted to vertical feet of drawdown by assuming a uniform average slope to the impoundment bottom (available bathymetric data are not accurate enough to permit calculation of site and depth specific slopes) and performing a simple apportionment.

$$\frac{4,060}{9,900} = 0.41$$

0.41 x 20 ft littoral depth = 8.2 ft. of drawdown "available".

CONCLUSION

GNN proposes to continue drawdowns of the Ripogenus impoundment seasonally as they have historically between the normal high water elevation of 941.59 ft. and an average drawdown of 20 ft. This drawdown is more than twice the estimated "available" drawdown of 8.2 ft. calculated from the approach suggested by MDEP biologists in the June 28, 1991 meeting. The results of this littoral zone analysis were orally presented to the MDEP during an October 7, 1991 meeting with GNN at the MDEP offices in Augusta, Maine.