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STATE OF MAINE
ONE HUNDRED AND SEVENTH LEGISLATURE

COMMITTEE ON ENERGY

March 26, 1976

Senator Jerrold B. Speers, Chairman
Legislative Council
State House
Augusta, Maine 04333

Dear Senator Speers,

In accordance with House Paper 1716, directing the Committee on Energy "to determine the number of unused and abandoned hydroelectric dams in this State, to determine the potential in Maine for the production of electrical energy by hydroelectric means, and to determine methods for the restoration of Maine's unused and abandoned dams to full production of electric power," we enclose herein the final report of the Committee.

Respectfully submitted,

John B. Roberts
Co-Chairman, Energy Committee

Robert M. Farley
Co-Chairman, Energy Committee

REPORT OF THE COMMITTEE
ON ENERGY
ON ITS STUDY OF
THE HYDROELECTRIC POWER POTENTIAL OF MAINE

March 26, 1976

SENATE

John B. Roberts
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HOUSE

Robert M. Farley
Edward C. Kelleher
Laurence E. Connolly, Jr.
Lawrence P. Greenlaw, Jr.
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Glen W. Torrey

LEGISLATIVE ASSISTANT

Edward W. Potter

TABLE OF CONTENTS

APPENDICES

The Joint Standing Committee on Energy was directed by the Legislative Council per House Paper 1716 "to determine the number of unused and abandoned hydroelectric dams in this State, to determine the potential in Maine for the production of electrical energy by hydroelectric means, and to determine methods for the restoration of Maine's unused and abandoned dams to full production of electric power". The Committee on Energy was instructed to report the results of its findings together with any proposed recommendations and necessary implementing legislation to the first special session of the Legislature in 1976.

I. BACKGROUND

Maine has traditionally used hydroelectric power for electrical energy to a greater extent than the rest of New England and the nation. In 1935, hydroelectric power comprised 40 percent of the nation's electrical energy and 30 percent of New England's electrical energy. By 1950, New England's use of hydroelectrical power remained the same, but hydroelectric power comprised 65 percent of Maine's electrical energy. The Pine Tree State continued to rely heavily on hydroelectric power until 1970, while the United States and the rest of New England relied on conventional steam produced from fossil fuels. In 1970, 42 percent of the electrical energy produced by all utilities in Maine was derived from hydroelectric production compared to 7.7 percent for New England and 18 percent for the United States.

During the 1950's and 1960's, as the nation relied more and more on petroleum for energy especially inexpensive foreign oil, no alternatives or very limited ones were available in time of a crisis. By 1970, 85 percent of the electrical energy of New England, in general, was derived from petroleum. Un- like the rest of the nation, Maine obtained 57 percent of its electrical energy from oil.

In 1973, an energy crisis did occur. The Arab embargo and skyrocketing foreign oil prices which rose 300 percent between 1972 and 1974 severely affected the nation. As a result of its dependence on oil, there were nearly no alternatives available to oil. Nuclear power production was only in its infant stage and comprised 7.9 percent of the nation's electrical energy production.

Compared to New England and the United States, however, Maine was less affected by the oil crisis in 1973 in regard to energy for electric power generation. In 1973, New England depended upon petroleum for nearly 73 percent of its electrical energy while Maine depended on petroleum for 33 percent of its electrical energy. By 1973, nuclear power was providing 45 percent and hydroelectric power was providing 24 percent of the electrical energy generated in the Pine Tree State.

The conclusion is very evident. Maine possessed two alternatives to oil for electrical energy during and following the energy crisis that most other states did not possess or do not possess to the extent that they exist in Maine.

This report examines the feasibility of hydroelectric power as an alternative to petroleum for electrical energy. Hydroelectric power as an alternative energy source has been given additional impetus by proposals to reactivate retired dams and to develop new hydroelectric power sites.

Proposals to reactivate retired or abandoned dam sites are based, in part, on the assumption that the 30 percent decline in the number of kilowatt hours produced between 1960 and 1973 by hydroelectric dams can be reversed, and the energy realized could substantially reduce present energy costs. In addition, a survey of dams throughout Maine conducted by Professor William Shipman indicates that there are in excess of 800 dams in the State.

Hydroelectric power as an alternative energy source has also been given greater credence by proposals to construct new facilities on the Saco,Androscoggin,Penobscot,and St.John Rivers as well as on Passamaquoddy Bay.

A third factor prompting a study of the hydroelectric power potential in Maine is the efforts of private industry to generate hydroelectric power. Great Northern, for example, generates hydroelectric power to meet 50 percent of its electric energy needs.

In order to establish the feasibility of developing hydroelectric power facilities in Maine, it is necessary to measure the present and potential use of existing hydroelectric facilities and to analyze sites for future development with respect to the power that could be generated at these sites.

II. METHOD

The Committee on Energy prepared questionnaires that were sent to Maine's three largest electric power generating utilities (Central Maine Power, Bangor Hydro-Electric, Maine Public Service). The questions were designed to obtain information from each utility in regard to the number of retired/abandoned dam sites in the territory of each utility, the number of undeveloped/suitable dam sites in the territory of each utility,the cost of reconstruction or construction of the sites, and the amount as well as the type of power (Baseload, intermediate,peaking) that could be produced at each site.

The Committee on Energy also held public hearings to obtain more in-depth information in regard to abandoned/retired and undeveloped dam sites throughout the State.

The Energy Committee delved into detailed reports of the major river systems of Maine as well as a Federal Power Commission Report, 1972, and a report by Professor William Shipman, 1974, in regard to the present and potential use of hydroelectric power in the Pine Tree State.

III. UTILIZATION OF ELECTRICITY: DEFINITIONS

The consumption and utilization of electric power in Maine is different in some respects than the consumption and utilization of electric power in New England. According to the publication of the Electric Council of New England entitled Electric Utility Industry In New England, Statistical Bulletin 1974, residential consumption of electricity comprised 39 and 38.5 percent respectively of the total consumption of electricity in New England and

Maine. Industrial and commercial consumption of electricity in New England and Maine, however, varied significantly in 1974. In Maine, industrial consumption of electricity comprised 37 percent of the total compared to 30 percent for New England industrial electricity consumption. Commercial electricity consumption in Maine comprised 21 percent of the total compared to 29 percent for New England.

The demand for electricity in Maine and throughout the United States requires three types of generation. Baseload production, Intermediate production, and Peaking production are defined as follows:

Base Capacity

This capacity is required to meet the level of power used 24-hours a day, 7-days a week and is selected to produce the most economical power for this type of load.

Intermediate Capacity

This capacity is designed to meet the incremental power requirements of a 5-day normal work week during business hours and is the additional capacity required in excess of base capacity up to but not including the peaking capacity.

Peaking Capacity

This capacity is designed to meet the incremental short-term power requirements above the intermediate load during the business hours. This capacity is also used to provide reserves and is shut down during the night and weekend hours.

Baseload power in Maine comprises roughly 65 percent of the total amount of electricity generated in Maine. Baseload power may be broken down into three major components, nuclear, hydro, and fossil fuels. The percentage of each type of generation in baseload power varies from one utility to another.

BASELOAD POWER
1975

	Central Maine Power	Bangor-Hydro Electric	Maine Public Service
Nuclear	62.5%	56.3%	
Fossil Fuels	22.5%	18.5%	*100%
Hydro	15 %	25.2%	

* During the months April-June, Maine Public Service obtains considerable hydroelectric baseload power from a hydroelectric facility it owns in New Brunswick.

TOTAL ELECTRICITY OUTPUT
FOR CONSUMPTION IN MAINE
1975

	Central Maine Power	Bangor-Hydro Electric	Maine Public Service
Nuclear	40%	31.9%	
Fossil Fuels	35%	46.3%	77.8%
Hydro	25%	21.8%	22.2%
TOTAL ELECTRICITY OUTPUT in millions of KWH	5,275	1,067	

IV. FINDINGS

A. Hydroelectric Power Production Potential/Cost - Electric Power Utilities

A survey of the retired/abandoned dam sites and the undeveloped dam sites conducted by Maine's three largest electric power utilities indicates that there are roughly 10 retired sites and 11 potential dam sites that could be rehabilitated or constructed by these firms. The 10 retired sites could be reactivated to produce 17,610,000 kilowatt hours of electricity annually or 3/10 of 1 percent of the total amount of electricity sold in Maine in 1973. The cost of redeveloping the sites would be roughly $9,322,000 or $ .52 per KWH.

The 11 potential dam sites could be developed to produce 1,110,700,000 kilowatt hours of electricity annually of 17.5 percent of the total amount of electricity sold in Maine in 1973. The cost of constructing the dam sites has been estimated to be roughly $650,000,000 or $.55 per KWH.

Maine's three largest electric power utilities therefore, could produce approximately 18 percent more energy from hydropower at a total redevelopment/construction cost of $670,000,000 or $.55 per kilowatt hour. With some exceptions, however, the utilities do not plan to significantly increase their hydroelectric power production systems.

1. Hydroelectric Power - An Unfeasible Alternative For Maine Utilities.

TABLE A
UNDEVELOPED DAM SITES OF MAINE UTILITIES

NAME OF FIRM	# Of Undeveloped Sites	LOCATION OF SITES	Cost of Construction	# of KWH Per Year Produced	Type of Power	Percentage of Total Output
BANGOR HYDRO-ELECTRIC CO.	3	Grindstone - East Branch of Penobscot River	$ 6,800,000	22,000,000	Baseload	
		5 Islands - Penobscot River	$ 28,000,000	44,000,000	Baseload	
		Ellsworth Falls - Union River	$ 5,940,000	11,000,000	Baseload	
CENTRAL MAINE POWER	6	Poplar Falls) Dead River	TOTAL COST OF $490,000,000	156,000,000	Peaking	
		Appletree) Dead River		290,000,000		
		Caratunk) Kennebec River		135,000,000		
		Cold Stream) Kennebec River		295,000,000		
		Steep Falls - Saco River		43,000,000		
		Gilead - Androscoggin River		34,000,000		
MAINE PUBLIC SERVICE	2	Fish River Falls - Fish River	$ 28,000,000	19,700,000	Peaking	
		Castle Hill	$ 52,500,000	61,000,000	Peaking	
					Total	16.5%

TABLE B
DAMS RETIRED BY MAINE UTILITIES

NAME OF UTILITY	# of Abandoned Dams	LOCATION OF DAM SITES	Cost of Rehabilitation	# of KHW Produced Per Year	Type of Power	Percentage of Total Output
BANGOR HYDRO-ELECTRIC CO.	3	Milo - Sebec River	$ 386,000	1,368,000	Baseload	
		Machias - Machias River	$ 486,000	1,740,000	Baseload	
		East Machias - East Machias River	$3,740,000	5,160,000	Baseload	
CENTRAL MAINE POWER	7	Barker Mills - Little Androscoggin River		1,065,000		
		Dennistown - Crocker Pond		244,000		
		Orland - Toddy Pond	TOTAL COST	2,322,000	Baseload	
		Ledgemere - Little Ossipee River		1,900,000		
		Kezar Falls - Ossipee River	$4,710,000	2,207,000		
		Bridgeton - Highland Lake		745,000		
		Belfast - Goose River		858,000		
MAINE PUBLIC SERVICE	0					

According to the Maine utilities, hydroelctric power is not a feasible alternative source of energy for their operations for the following reasons:

a) Hydroelectric Power would be primarily peaking power and the need is for baseload power.

b) Hydroelectric Power production fluctuates substantially.

c) Hydroelectric Power construction costs are extremely high.

d) Hydroelectric Power production may create an undesirable environmental impact.

e) High taxes levied by local communities.

a) Hydroelectric - Peaking Power

According to statistics provided by the Maine utilities in this survey, roughly 93 percent of the hydro power generated at the undeveloped sites would be peaking power, and 100 percent of the hydroelectric power generated at the reactivated sites would be baseload power. According to Central Maine Power officials, CMP has sufficient peaking power production to last until 1990. The basic need is for baseload power which is required for a growing economy. Despite the energy crisis and recession, for example, the demand for electricity rose 7 percent between 1974 and 1975. Central Maine Power, however, no longer owns the retired sites which were retired because of high taxes and maintenance costs.

Central Maine Power and Bangor Hydro Electric Corporation are members of Nepool, the New England Power Pool, which coordinates production of electricity in New England with demand. Nepool members plan electrical power production and demand for New England ten years into the future. According to Nepool officials, the energy crisis has most seriously effected baseload and intermediate power. As a result, New England utilities are concentrating on an alternative to oil for baseload production, but hydroelectric power is not that feasible alternative for the reason given below.

b) Fluctuation of supply

Baseload power demand requires a constant and steady supply. Hydroelectric power, however, cannot fulfill this function unless it is "run-of-the-river" power. The hydroelectric power generated at the reactivated or undeveloped sites indicated in Tables A will not be, for the most part, baseload power. Some rivers such as the St. John River have a very large volume of water in the Spring months, but have a low volume thereafter. Some rivers fluctuate daily, especially rivers affected by the tides. As a result, some dams could operate for only a few hours each day.

c) Costs of construction

The three electric power utilities in the survey have not pursued the development of hydroelectric power on a large scale because the construction or rehabilitation costs are extremely high. According to the utilities, there are lower cost alternatives available to obtain equivalent power. The following table shows the investment costs, calculated by Central Maine Power Company for several types of facilities.

Capacity Type	*Capital Cost ($/KW)	Unit Size
1. Base Load Nuclear	$850-1000/KW	1000-12000 MW
2. Base Load Fossil		
a) Oil	$500-$550/KW)	
b) Coal	)	800- 1000 MW
i.with scrubbers	$700- 800/KW)	
ii.without "	$600- 700/KW)	
3. Intermediate (oil)	$350-$400/KW	600- 800 MW
4. Peaking (Gas turbine)	$150-$200/KW	50- 400 MW
5. Pumped Storage Hydro	$300-$350/KW	1200 MW
6. Conventional Hydro	$800-$1000/KW	

* These estimated costs are based on the total that would be incurred up to completion if the projects were to be undertaken in 1975.

While conventional hydroelectric facilities and nuclear generating plants have similar construction costs per kilowatt of installed capacity, conventional hydroelectric plants need a much greater installed capacity than nuclear or fossil fuel plants to produce the same output. Nuclear and fossil fuel plants can operate 24 hours per day compared to a few hours each day for a hydroelectric power plant.

d) Environmental impact

Another disadvantage to hydroelectric power is the environmental impact of some types of hydroelectric production. Run-of-the-river production and pumped storage facilities may have an environmental impact, depending upon the location of the facility. The most celebrated example in Maine of an adverse environmental impact is the Dickey-Lincoln School hydroelectric power project. According to a Congressional investigation of the feasibility of Dickey-Lincoln in 1965, 80,000 acres of timberland would be flooded to serve as a reservoir of power. During the summer months, a certain amount of the 80,000 acres would be exposed from the normal high water level.

e) High taxes

According to Professor William Shipman, author of a survey of Maine dams for the Federal Power Commission, a number of municipalities have high property tax assessments which would make hydroelectric power production in those communities unattractive to the utilities. Furthermore, reactivated dams would be fully depreciated and could not be depreciated by the utilities for tax purposes.

B. <u>Hydroelectric Power Production Potential - Federal Power Commission</u>

The Federal Power Commission (F.P.C.) surveyed the United States waterways in 1971 and issued a report on January 1,1972 which describes the developed and undeveloped hydroelectric plant sites and the potential of hydroeletric power production in each State. According to the F.P.C. report, there are 30 undeveloped sites (where no facility presently exists) that have the potential of producing 3,882,000,000 KWH per year or 51 percent more electric power than was generated in Maine in 1974. The Dickey-Lincoln School hydroelectric dam facility would produce roughly 30 percent of the 3.8 billion KWH of electricity generated at the undeveloped sites.

The F.P.C. report also indicates that there are 20 dams presently in use that could be developed further to produce an additional 422,684,000 KWH of electricity per year or approximately 7 percent of the amount sold in Maine in 1974.

If the average cost of developing new hydroelectric power facilities is assumed to be $.55 per KWH as calculated by the three largest electric power utilities in Maine, the cost of developing the undeveloped sites in the F.P.C. report would be $2,135,100,000.

While the electric power utilities in the survey indicate that most of the hydroelectric power produced at the undeveloped and rehabilitated dam sites in their territories of operation would be peaking power, the Federal Power Commissioner stated that most of the hydroelectric power produced at the sites recorded in the F.P.C. report for Maine could be utilized as baseload power. The statistics in the F.P.C. Report indicate that the total KWH of the undeveloped and expanded dam sites is 2500 times greater than the installed kilowatt capacity (1,715,975 KW produces 4,304,684,000). In order for all of the 1,715,975 KW to generate power for 24 hours per day, the number of KWH would have to be 8760 times greater than the installed capacity or roughly 15 billion KWH.

In order to be used as baseload power, the hydropower sites would have to be synchronized to produce a specific and steady quantity of electricity for 24 hours each day. For example, dams which would normally produce power for 1 or 2 hours per day would have to run at a very low steady output to become a part of baseload production.

The energy generated by the newly developed or expanded dam sites could be more easily used as intermediate and peaking power. Presently, peaking power is almost exclusively hydropower, but baseload power is used to pump water back into pump storage facilities which produce peaking power. The "new" energy could replace the baseload power for the energy used to pump the water into storage but in Maine this would not be sufficient.

used to pump the water into storage.but in Maine this woudl

In order to determine the economic feasibility of developing sites defined in the F.P.C. report, it is necessary to analyze the construction and operating costs of these facilities and compare them to the operating and construction costs of other types of facilities such as fossil fuel and nuclear plants.

Preface to Tables

The Tables on pages 16 to 23 are based exclusively on two variables, construction and fuel costs. Capital Costs and interest are excluded along with labor, maintenance, land, and other costs which have a significant impact upon the results.

One variable, capital costs and interest are very substantial. Model 17, for example assumes that three generating facilities, nuclear, fossil, and hydro, produce the same output. The interest and capital costs over a 20 year period for the following facilities are based upon a rate of 10 percent for industrial bonds.

Type of facility	Construction Cost	Interest for 20 years
Nuclear	$ 45,000,000	$ 48,300,000
Fossil	$ 22,500,000	$ 24,150,000
Conventional hydro	$ 135,000,000	$ 140,800,000

The capital and interest costs of these facilities indicates that interest costs have a substantial impact upon the results of the models, but the interest costs are not included in the models.

TABLE I

Construction and fuel costs of hydroelectric, nuclear, and oil power generating facilities of different capacities: FIXED FUEL RATES
nuclear - .0023¢ KWH base oil - .016¢ KWH

Type of Facility	Installed Capacity Usable Capacity	Construction Cost	Fuel Costs for 1 year	Fuel Costs for 5 years	Fuel Costs for 10 years	Fuel Costs for 20 years	
Baseload Nuclear	1,000 KW 8,760,000 KWH	$ 900,000	$ 20,148	$ 100,750	$ 201,500	$ 402,000	MODEL 1
Baseload Oil	1,000 KW 8,760,000 KWH	550,000	140,160	700,800	1,401,600	2,803,200	
Conventional Hydro	1,000 KW 8,760,000 KWH	900,000					
Baseload Nuclear	5,000 KW 43,800,000 KWH	4,500,000	100,740	503,700	1,007,400	2,014,800	MODEL 2
Baseload Oil	5,000 KW 43,800,000 KWH	2,750,000	700,800	3,504,000	7,008,000	14,016,000	
Conventional Hydro	5,000 KW 43,800,000 KWH	4,500,000					
Baseload Nuclear	10,000 KW 87,600,000 KWH	9,000,000	201,480	1,007,400	2,014,800	4,029,600	MODEL 3
Baseload Oil	10,000 KW 87,600,000 KWH	4,500,000	1,401,600	7,008,000	14,016,000	28,032,000	
Conventional Hydro	10,000 KW 87,600,000 KWH	9,000,000					
Baseload Nuclear	50,000 KW 438,000,000 KWH	45,000,000	1,007,400	5,037,000	10,074,000	20,148,000	MODEL 4
Baseload Oil	50,000 KW 438,000,000 KWH	22,500,000	7,008,000	35,040,000	70,080,000	140,160,000	
Conventional Hydro	50,000 KW 438,000,000 KWH	45,000,000					

TABLE I

Construction and fuel costs of hydroelectric,nuclear,and oil power generating facilities of different capacities:FIXED FUEL RATES
nuclear - .0023¢ Kwh   base oil - .016¢ Kwh

Type of Facility	Installed Capacity Usable Capacity	Construction Cost	Fuel Costs for 1 year	Fuel Costs for 5 years	Fuel Costs for 10 years	Fuel Costs for 20 years	
Baseload Nuclear	50,000 KW 438,000,000 KWH	$45,000,000	1,007,400	5,037,000	10,074,000	20,148,000	MODEL 5
Baseload Oil	50,000 KW 438,000,000 KWH	22,500,000	7,008,000	35,040,000	70,080,020	140,160,000	
Conventional Hydro	150,000 KW 438,000,000 KWH	135,000,000					
Baseload Nuclear	100,000 KW 876,000,000 KWH	90,000,000	2,014,800	10,074,000	20,148,000	40,296,000	MODEL 6
Baseload Oil	100,000 KW 876,000,000 KWH	45,000,000	14,016,000	70,080,000	140,160,000	280,320,000	
Conventional Hydro	300,000 KW 876,000,000 KWH	270,000,000					
Baseload Nuclear	250,000 KW 2,190,000,000 KWH	225,000,000	5,037,000	25,185,000	50,370,000	100,740,000	MODEL 7
Baseload Oil	250,000 KW 2,190,000,000 KWH	125,000,000	35,040,000	175,200,000	350,400,000	700,800,000	
Conventional Hydro	1,000,000 KW 2,190,000,000 KWH	900,000,000					
Baseload Nuclear	500,000 KW 4,380,000,000 KWH	450,000,000	10,074,000	50,370,000	100,740,000	201,480,000	MODEL 8
Baseload Oil	500,000 KW 4,380,000,000 KWH	225,000,000	70,080,000	350,400,000	700,800,000	1,401,600,000	
Conventional Hydro	1,500,000 KW 4,380,000,000KWH	1,350,000,000					

TABLE I

Construction and fuel costs of hydroelectric, nuclear, and oil power generating facilities of different capacities: FIXED FUEL RATES
nuclear - .0023¢ Kwh base oil - .016¢ Kwh

Type of Facility	Installed Capacity / Usable Capacity	Construction Cost	Fuel Costs for 1 year	Fuel Costs for 5 years	Fuel Costs for 10 years	Fuel Costs for 20 years	
Baseload Nuclear	500,000 KW 4,380,000,000KWH	$ 450,000,000	10,074,000	50,370,000	100,740,000	201,480,000	MODEL 9
Baseload Oil	500,000 KW 4,380,000,000KWH	225,000,000	70,080,000	350,400,000	700,800,000	1,401,600,000	
Conventional Hydro	2,500,000 KW 4,380,000,000KWH	2,250,000,000					
Baseload Nuclear	500,000 KW 4,380,000,000 KWH	450,000,000	10,074,000	50,370,000	100,740,000	201,480,000	MODEL 10
Baseload Oil	500,000 KW 4,380,000,000KWH	225,000,000	70,080,000	350,400,000	700,800,00	1,401,600,000	
Conventional Hydro	5,000,000 KW 4,380,000,000KWH	4,500,000,000					
Baseload Nuclear	1,000,000 KW 8,760,000,000KWH	900,000,000	20,148,000	100,740,000	201,480,000	402,960,000	MODEL 11
Baseload Oil	1,000,000 KW 8,760,000,000KWH	500,000,000	140,160,000	720,800,000	1,441,600,000	2,883,200,000	
Conventional Hydro	5,000,000 KW 8,760,000,000KWH	4,500,000,000					
Baseload Nuclear	1,000,000 KW 8,760,000,000KWH	900,000,000	20,148,000	100,740,000	201,480,000	402,960,000	MODEL 12
Baseload Oil	1,000,000 KW 8,760,000,000KWH	500,000,000	140,160,000	720,800,000	1,441,600,000	2,883,200,000	
Conventional Hydro	10,000,000 KW 8,760,000,000KWH	9,000,000,000					

TABLE II
Construction and fuel costs of power generating facilities:

10% Increase Per Annum in Fuel Rates   nuclear - .0023 + 10%↑ Per year   base oil - .016 + 10%↑ Per year

Type of Facility	Installed Capacity Usable Capacity	Construction Cost	Fuel Costs for 1 year	Fuel Costs for 5 years	Fuel Costs for 10 years	Fuel Costs for 20 years	
Baseload Nuclear	1,000 KW 8,760,000 KWH	$ 900,000	20,148	130,962	550,040	4,180,304	MODEL 13
Baseload Oil	1,000 KW 8,760,000 KWH	550,000	140,160	911,040	3,826,368	29,080,396	
Conventional Hydro	1,000 KW 8,760,000 KWH	900,000					
Baseload Nuclear	5,000 KW 43,800,000 KWH	4,500,000	100,740	654,810	2,750,202	20,901,535	MODEL 14
Baseload Oil	5,000 KW 43,800,000 KWH	2,750,000	700,800	4,555,200	19,131,840	145,401,984	
Conventional Hydro	5,000 KW 43,800,000 KWH	4,500,000					
Baseload Nuclear	10,000 KW 87,600,000 KWH	9,000,000	201,480	1,309,620	5,500,404	41,803,070	MODEL 15
Baseload Oil	10,000 KW 87,600,000 KWH	4,500,000	1,401,600	9,110,400	38,263,680	290,803,968	
Conventional Hydro	10,000 KW 87,600,000 KWH	9,000,000					
Baseload Nuclear	50,000 KW 438,000,000 KWH	45,000,000	1,007,400	6,548,100	27,502,020	209,015,352	MODEL 16
Baseload Oil	50,000 KW 438,000,000 KWH	22,500,000	7,008,000	45,552,000	191,318,400	1,454,019,840	
Conventional Hydro	50,000 KW 438,000,000 KWH	45,000,000					

TABLE II

Construction and fuel costs of power generating facilities:

10% Increase Per Annum in Fuel Rates — nuclear - .0023 + 10%↑ Per year — base oil - .016 + 10%↑ Per year

Type of Facility	Installed Capacity Usable Capacity	Construction Cost	Fuel Costs for 1 year	Fuel Costs for 5 years	Fuel Costs for 10 years	Fuel Costs for 20 years	
Baseload Nuclear	50,000 KW 438,000,000 KWH	$ 45,000,000	1,007,400	6,548,100	27,502,020	209,015,352	MODEL 17
Baseload Oil	50,000 KW 438,000,000 KWH	22,500,000	7,008,000	45,552,000	191,318,400	1,454,019,840	
Conventional Hydro	150,000 KW 438,000,000 KWH	135,000,000					
Baseload Nuclear	100,000 KW 876,000,000 KWH	90,000,000	2,014,800	13,096,200	55,004,040	418,030,704	MODEL 18
Baseload Oil	100,000 KW 876,000,000 KWH	45,000,000	14,016,000	91,104,000	382,636,800	2,908,039,680	
Conventional Hydro	300,000 KW 876,000,000 KWH	270,000,000					
Baseload Nuclear	250,000 KW 2,190,000,000KWH	225,000,000	5,037,000	32,740,500	137,510,100	1,045,076,760	MODEL 19
Baseload Oil	250,000 KW 2,190,000,000KWH	125,000,000	35,040,000	227,760,000	956,592,000	7,270,099,200	
Conventional Hydro	1,000,000 KW 2,190,000,000KWH	900,000,000					
Baseload Nuclear	500,000 KW 4,380,000,000KWH	450,000,000	10,074,000	65,481,000	275,020,200	2,090,153,520	MODEL 20
Baseload Oil	500,000 KW 4,380,000,000KWH	225,000,000	70,080,000	455,520,000	1,913,184,000	14,540,198,400	
Conventional Hydro	1,500,000 KW 4,380,000,000KWH	1,350,000,000					

TABLE II

Construction and fuel costs of power generating facilities:

10% Increase Per Annum in Fuel Rates   nuclear - .0023 + 10%↑ Per year   base oil - .016 + 10%↑ Per year

Type of Facility	Installed Capacity Usable Capacity	Construction Cost	Fuel Costs for 1 year	Fuel Costs for 5 years	Fuel Costs for 10 years	Fuel Costs for 20 years	
Baseload Nuclear	500,000 KW 4,380,000,000KWH	$ 450,000,000	10,074,000	65,481,000	272,020,200	2,090,153,520	MODEL 21
Baseload Oil	500,000 KW 4,380,000,000KWH	225,000,000	70,080,000	455,520,000	1,913,184,000	14,520,198,400	
Conventional Hydro	2,500,000 KW 4,380,000,000KWH	2,250,000,000					
Baseload Nuclear	500,000 KW 4,380,000,000KWH	450,000,000	10,074,000	65,481,000	272,020,200	2,090,153,520	MODEL 22
Baseload Oil	500,000 KW 4,380,000,000KWH	225,000,000	70,080,000	455,520,000	1,913,184,000	14,540,198,400	
Conventional Hydro	5,000,000 KW 4,380,000,000KWH	4,500,000,000					
Baseload Nuclear	1,000,000 KW 8,760,000,000KWH	900,000,000	20,148,000	130,962,000	550,040,400	4,180,307,040	MODEL 23
Baseload Oil	1,000,000 KW 8,760,000,000 KWH	500,000,000	140,160,000	911,040,000	3,826,368,000	29,080,396,800	
Conventional Hydro	5,000,000 KW 8,760,000,000KWH	4,500,000,000					
Baseload Nuclear	1,000,000 KW 8,760,000,000KWH	900,000,000	20,148,000	130,962,000	550,040,400	4,180,307,040	MODEL 24
Baseload Oil	1,000,000 KW 8,760,000,000 KWH	500,000,000	140,160,000	911,040,000	3,826,368,000	29,080,396,800	
Conventional Hydro	10,000,000 KW 8,760,000,000KWH	9,000,000,000					

TABLE III

Construction and fuel costs of power generating facilities

Levelized Fuel Rates .006¢ KWH - nuclear .033¢ KWH - base oil

Type of Facility	Installed Capacity Usable Capacity	Construction Cost	Fuel Costs for 1 year	Fuel Costs for 5 years	Fuel Costs for 10 years	Fuel Costs for 20 years	
Baseload Nuclear	1,000 KW 8,760,000 KWH	$ 900,000	52,560	262,800	525,600	1,051,200	MODEL A
Baseload Oil	1,000 KW 8,760,000 KWH	550,000	289,080	1,450,000	2,900,000	5,180,000	
Conventional Hydro	1,000 KW 8,760,000 KWH	900,000					
Baseload Nuclear	5,000 KW 43,800,000 KWH	4,500,000	262,800	1,314,000	2,628,000	5,250,000	MODEL B
Baseload Oil	5,000 KW 43,800 KWH	2,750,000	1,445,400	7,227,000	14,454,000	28,908,000	
Conventional Hydro	5,000 KW 43,800,000 KWH	4,500,000					
Baseload Nuclear	10,000 KW 87,600,000 KWH	9,000,000	525,600	2,628,000	5,256,000	10,512,000	MODEL C
Baseload Oil	10,000 KW 87,600,000 KWH	4,500,000	2,890,800	14,454,000	28,908,000	57,816,200	
Conventional Hydro	10,000 KW 87,600,000 KWH	9,000,000					
Baseload Nuclear	50,000 KW 438,000,000 KWH	45,000,000	2,628,000	13,140,000	26,280,000	52,560,000	MODEL D
Baseload Oil	50,000 KW 438,000,000 KWH	22,500,000	14,454,000	72,270,000	144,540,000	289,080,000	
Conventional Hydro	50,000 KW 438,000,000 KWH	45,000,000					

TABLE III
Construction and fuel costs of power generating facilities

Levelized Fuel Rates .006¢ KWH - nuclear .033¢ KWH - base oil

Type of Facility	Installed Capacity Usable Capacity	Construction Cost	Fuel Costs for 1 year	Fuel Costs for 5 years	Fuel Costs for 10 years	Fuel Costs for 20 years	
Baseload Nuclear	50,000 KW 438,000,000 KWH	$ 45,000,000	2,628,000	13,140,000	26,280,000	52,560,000	MODEL E
Baseload Oil	50,000 KW 438,000,000 KWH	22,500,000	14,454,00	72,270,000	144,540,000	289,080,000	
Conventional Hydro	150,000 KW 438,000,000 KWH	135,000,000					
Baseload Nuclear	100,000 KW 876,000,000 KWH	90,000,000	5,256,000	26,280,000	52,560,000	105,120,000	MODEL F
Baseload Oil	100,000 KW 876,000,000 KWH	45,000,000	28,908,000	144,540,000	289,080,000	578,160,000	
Conventional Hydro	300,000 KW 876,000,000 KWH	270,000,000					
Baseload Nuclear	250,000 KW 2,190,000,000 KWH	225,000,000	13,140,000	65,700,000	131,400,000	262,800,000	MODEL G
Baseload Oil	250,000 KW 2,190,000,000 KWH	125,000,000	72,270,000	361,350,000	722,700,000	1,445,400,00	
Conventional Hydro	1,000,000 KW 2,190,000,000 KWH	900,000,000					
Baseload Nuclear	500,000 KW 4,380,000,000 KWH	450,000,000	26,280,000	131,400,000	262,800,000	525,600,000	MODEL H
Baseload Oil	500,000 KW 4,380,000,000 KWH	225,000,000	144,540,000	722,700,000	1,445,400,000	2,890,800,000	
Conventional Hydro	1,500,000 KW 4,380,000,000	1,350,000,000					

TABLE III

Construction and fuel costs of power generating facilities

Levelized Fuel Rates .006¢ KWH - nuclear .033¢ KWH - base oil

Type of Facility	Installed Capacity Usable Capacity	Construction Cost	Fuel Costs for 1 year	Fuel Costs for 5 years	Fuel Costs for 10 years	Fuel Costs for 20 years	
Baseload Nuclear	500,000 KW 4,380,000,000 KWH	$ 450,000,000	26,280,000	131,400,000	262,800,000	525,600,000	MODEL I
Baseload Oil	500,000 KW 4,380,000,000 KWH	225,000,000	144,540,000	722,700,000	1,445,400,000	2,890,800,000	
Conventional Hydro	2,500,000 KW 4,380,000,000 KWH	2,250,000,000					
Baseload Nuclear	500,000 KW 4,380,000,000 KWH	450,000,000	26,280,000	131,400,000	262,800,000	525,600,000	MODEL J
Baseload Oil	500,000 KW 4,380,000,000 KWH	225,000,000	144,540,000	722,700,000	1,445,400,000	2,890,800,000	
Conventional Hydro	5,000,000 KW 4,380,000,000 KWH	4,500,000,000					
Baseload Nuclear	1,000,000 KW 8,760,000,000 KWH	900,000,000	52,560,000	262,800,000	525,600,000	1,051,200,000	MODEL K
Baseload Oil	1,000,000 KW 8,760,000,000 KWH	500,000,000	289,080,000	1,445,400,000	2,890,800,000	5,781,600,000	
Conventional Hydro	5,000,000 KW 8,760,000,000 KWH	4,500,000,000					
Baseload Nuclear	1,000,000 KW 8,760,000,000 KWH	900,000,000	52,560,000	262,800,000	525,600,000	1,051,200,000	MODEL L
Baseload Oil	1,000,000 KW 8,760,000,000 KWH	500,000,000	289,080,000	1,445,400,000	2,890,800,000	5,781,600,000	
Conventional Hydro	10,000,000 KW 8,760,000,000KWH	9,000,000,000					

1. Interpretation of the Data

a) Models 1-12

Models 1-12 assume that the only differences in cost among various types of power production facilities (nuclear, oil, and hydro) concern construction and fuel costs. The schedule in the models assumes that labor, maintenance, capital, land, and tax costs are the same for all types of facilities. In addition the models assume that present fuel costs remain unchanged for 20 years. Nuclear fuel is computed to be $.0023 per KWH and oil fuel is computed to be $.016 per KWH.

Models 1-4 assume that nuclear, oil, and hydroplants produce the same output with the same installed capacity. These models are unrealistic in one respect because a nuclear facility would not be constructed to produce such limited amounts of electricity. In each model (1-4), hydroelectric power is substantially less costly than nuclear or oil plants, particularly over a 10 or 20 year period.

Models 5-12 assume that hydroelectric power production facilities fail to produce the same amount of output as nuclear and oil power production facilities with the same installed capacity. In each model (5-12), hydroelectric power production is less costly than oil plants in terms of total construction and fuel costs over a 20 year period. Nuclear facilities are 50-75 percent less costly than hydroelectric power facilities in terms of total construction and fuel costs over a 20 year period.

Models 1-12 indicate, therefore, that hydroelectric power is more feasible economically than nuclear or oil plants in the production of limited quantities of electricity in cases in which hydroelectric power production is equivalent to that of nuclear and oil facilities with the same installed capacity.

In situations in which large volumes of energy are produced and the installed capacity of hydroelectric power facilities exceeds that of oil or nuclear facilities by 200 percent or more to produce the same output, hydroelectric power is more feasible economically than oil plants but less feasible than nuclear plants.

b) <u>Models 13-24</u>

Models 13-24 assume that the only differences in cost among the various types of power production facilities (nuclear, oil, and hydro) are differences in construction and fuel costs. The schedule in these models assumes that all other costs are equal. In addition, each model assumes that the present cost of nuclear fuel and petroleum increases at a rate of 10 percent per year based on $.0023 per KWH for nuclear fuel and $.016 per KWH for petroleum.

The Bureau of Labor Statistics in the U.S. Department of Labor shows that the Consumer Price Index increased at an unadjusted rate of 12.2 percent and at a seasonally adjusted rate of 11 percent in 1974. The rate of increase in 1975 was 12 percent unadjusted. A 10 percent per annum increase in fuel costs therefore, may be a conservative projection under present inflation rates.

In Models 13-16, hydroelectric power production is assumed to be equivalent to that of nuclear and petroleum facilities with the same installed capacity as hydro facilities. In these models hydroelectric power facilities are 75-2900 percent less costly than the other facilities in the models in terms of construction and fuel costs. The major factor in these models is the fuel variable which accounts for the entire cost difference for each type of facility.

Models 17-24 assume that the installed capacity of the hydroelectric facilities exceeds that of the nuclear and oil facilities by 300-1,000 percent and produces the same output as the nuclear and oil facilities. Despite the construction costs of the hydroelectric plant facilities that exceed the construction costs of the other types of facilities by as much as 1,000 percent, the fuel costs over a 20 year period associated with the nuclear and petroleum facilities make the total construction and fuel costs of these facilities far greater than those of the hydroelectric plant facilities.

In Models 17-24, nuclear plant facilities are less costly than the hydroelectric power plants in the first 10 years of operation. In the first five years of operation, the petroleum plant facilities are less costly than the hydroelectric plants in terms of total construction and fuel costs.

Models 13-24 indicate therefore, that long run fuel costs make the nuclear and oil plants in these models more costly than the hydroelectric plants. In cases in which hydroelectric facilities exceed the installed capacity of nuclear and petroleum facilities by 500 percent or more and produce the same output as the nuclear and oil plants, the hydroelectric facilities are economically more feasible than the oil plants after 5 years of operation and less costly than nuclear plants after 20 years of operation.

c) Models A-L

Models A-L also assume that the only cost differences between the various types of power production facilities (nuclear, oil, and hydro) are construction and fuel costs. Each model assumes that the fuel costs can be levelized over a 20 year period. The fuel costs were derived from a study constucted by Nepool (New England Power Pool) which projected nuclear fuel costs at a levelized rate of $.006¢ per KWH and petroleum costs at a levelized rate of $.033¢ per KWH between the years 1983 and 1998. The models in Table III therefore, assume that the levelized costs projected by Nepool for a 15 year period can be extended for an additional 5 years.

Models A-D assume that hydroelectric plant installed capacity and output are the same as nuclear and petroleum facilities. Since there are no fuel costs for hydroelectric production, nuclear and petroleum plants are most costly in total construction and fuel costs in these models for each of the 20 years than hydroelectric facilities.

Models E-L assume that hydroelectric installed capacity must be at least 3 times to 10 times greater than petroleum or nuclear facilities in order to produce the same output. The models indicate that hydroelectric facilities and production are less costly than petroleum power plant facilities and production after 10 years of operation in cases in which the installed capacity of the hydroplants exceeds that of the petroleum facilities by 300 percent. After 20 years of operation, hydrofacilities that exceed the installed capacity of petroleum electric power generating plants by 500 percent are less costly in construction and production costs than the oil fired plants. Hydroelectric power generating plants with an installed capacity that exceeds that of petroleum power generating plants by 1000 percent are more costly in terms of construction and fuel costs than fossil plants.

In Models E-L, in which hydroelectric generating plants exceed the installed capacity of nuclear plants, by 300 percent to 1000 percent after 20 years of operation, are 300 percent less costly in terms of construction and fuel costs than the hydroelectric generating facilities.

The major difference between Table 2 and Table 3 is that the annual average rate increase of fuel in Table 2 is 10 percent over a 20 year period compared to an annual rate of increase of less than 1 percent in Table 3. The levelized rate of increase in the cost of fuel is 60 percent in Table 3 compared to the levelized rate of 900 percent in Table 2.

Correlation of the Data

Tables I, II, and III indicate that, given the assumptions in the three tables, hydroelectric power production is economically more feasible than nuclear and fossil fuel power generation for limited electric power production, and hydroelectric generating facilities are, for the most part, economically more feasible than fossil fuel plants for the production of large quantities of electrical energy over the long run. If the rate of fuel costs increase is 10 percent or at a levelized rate of 900 percent for the next 20 years, hydroelectric power generating facilities would be more feasible over the long run than the other alternatives in the models. If the rate of fuel cost increases is 1 percent per year or at a levelized rate of 60 percent over a 20 year period, nuclear power generating facilities and production would be economically more feasible than that of hydroelectric power facilities.

The data in the models must be analyzed with a number of other variables before any precise conclusions can be drawn. The models, for example, do not include land, labor, capital cost, and interest costs and other variables that will have a significant impact upon the data in these models.

One variable that is especially significant, but is not included in the models is the topography of the State and the physical features of Maine's river valley systems. According to the Water Resources Division of the United States Geological Survey and the Bureau of Civil Emergency Preparedness, Maine does not possess the river systems capable of producing run-of-the-river baseload power in large volumes as river systems in a number of states in the West are capable of producing. As a result, hydroelectric generation of power for baseload power may be more feasible than nuclear and fossil fuel generation of power in states which have the topography for such production, but the opportunities may be more limited for such production in the East. In Maine, the upper Penobscot River, below Repogenus Dam, may afford the opportunity for baseload power production from hydroelectric dams because of the large up-stream storage system.

C. Hydroelectric Power Production Potential - Great Northern Paper Company

The Great Northern Paper Company is the second largest consumer of oil in the State and the largest industrial user of energy in Maine. The firm produces roughly 1,300,000,000 KWH of energy of which 50 percent is derived from hydroelectric power. In order to produce the electrical power that the firm requires, Great Northern consumes approximately 2,250,000 barrels of oil per year, most of which originates in the Middle East.

As a result of the Energy crisis and rising prices of oil, the Great Northern Paper Company has been studying the feasibility of hydroelectric power production as an alternative to imported oil for the generation of power. In early 1973,Great Northern was able to purchase bunker C oil for $3-$4 per barrel. Today, bunker C oil costs the firm $11.00 a barrel . The 300 percent increase in the price of oil has made hydroelectric power more attractive to the firm.

Unlike the major utilities in Maine and most other firms in the State, Great Northern occupies an enviable position in regard to hydroelectric power potential. "From the crest of Ripogenus Dam to below Weldon Dam, the river drops 746 feet. A total of 439 feet of this drop has been developed. Most of the undeveloped head lies between McKay Station and the Pemadumcook Chain of lakes." The firm's water storage system contains 57 billion cubic feet of water which may exceed that of Central Maine Power.

Presently the firm has delineated 5 undeveloped sites that could generate a total of 667,200,000 KWH of baseload electricity. It is not possible, however, to develop each site. In regard to the Holbrook, Ambejackmockamus, and Sourdnahunk dam sites, only one site can be developed. If Sourdnahunk is constructed, the other two sites will be flooded. If Ambejackmockamus is constructed,Holbrook would not be usable and Sourdnahunk would not produce much power.

The Seboomook dam site is located 40 miles from the nearest transmission line. The cost of constructing the transmission lines and the generating facilities has made the site economically unattractive at the present time.

It is estimated that the development of the Ambejackmockamus dam site would produce 181,000,000 KWH of baseload electricity or an additional 14 percent of hydroelectric power. It would reduce the consumption of bunker C oil by 428,000 barrels per year.

In the long run, Ambejackmockamus would be economically feasible compared to present prices for bunker "C" oil. If the price of bunker C oil remained fixed at $11 a barrel for 20 years, it would cost $94,160,000 for the fuel that the Ambejackmockamus dam would replace. The fuel costs would be roughly twice the cost of constructing the dam. If the price of fuel rose 10 percent per year, oil costs equivalent to Ambejackmockamus power production for a 20 year period would be $209,548,800 or 450 percent greater than the cost of constructing the dam.

Great Northern's Seboomook dam site has no generation facilities. If a power plant was built at the dam site it could increase the firm's hydroelectric power production by 5 percent. The Seboomook and Ambejackmockamus dam sites have the potential of increasing present hydroelectric power production of Great Northern by 20 percent.

In order to encourage industry to develop hydroelectric power facilities as a means of reducing demand for foreign oil, Great Northern and a number of other firms have suggested that the federal government devise some tax incentives. These firms suggest,for one example, that rapid amortization of hydroelectric power development costs over a 5 year period could significantly stimulate industrial development of hydroelectric sites. Great Northern Officials point out that amortization of costs as they are incurred as contrasted with amortization of costs after completion of the project could be an even more significant incentive.

Firms interested in developing hydroelectric power point out that construction costs are extremely great which create very high capital costs. As a means of reducing these investment costs, tax free bonds could be issued. One alternative is for the federal government to issue tax free bonds which are the moral obligation of the federal government or which are full faith and credit bonds of the federal government. A second alternative is for the State to issue tax free moral obligation bonds, the proceeds of which could be made available to a firm for the development of hydroelectric power. The bonds would not pledge the credit of the State but the interest rates would be lower than industrial bonds or industrial loans. The exemption of the bonds from federal and State taxation would increase the saleability of the bonds.

Despite the feasibility of hydroelectric power, the costs of development on the scale that Great Northern can utilize are extremely great. Financial incentives could reduce some of the obstacles to development of hydroelectric power.

D. Potential use of newly developed or restored hydroelectric power facilities

Professor William D. Shipman, professor of economics at Bowdoin College and author of a 1974 report of dams in Maine compiled for the Federal Power Commission, points out that there are roughly 800 dams in Maine without power producing facilities and 30-40 retired facilities. David Hilton of the Division of Community Services suggests that there may be as many as 1000-2000 dams in Maine. Many of these dams are in disrepair.

According to Professor Shipman and Mr. Hilton, there are a number of potential opportunities for which some of these dams could be developed. Reactivation or rehabilitation of retired dams could be undertaken by municipalities and business firms as a means of reducing electric power costs. In some cases, the initial investment cost could be substantial.

Municipalities could use hydropower to light city streets and/or public buildings. The city of Lewiston used hydroelectric power for street lighting and waterpumping. A small hydroelectric power facility of 200 KW could supply power to 1000 street lights (150-175 watts per lamp) which a town with a population of 20,000-25,000 would possess.

Hydroelectric power or direct mechanical energy is also available to firms located near retired dam sites. Some businesses may not be able to utilize the limited capacities of the old power plants, but many small businesses could use the power.

According to the Shipman report, municipalities and business firms may be impeded from purchasing or acquiring hydro-electric power facilities because the statutes are unclear in regard to P.U.C. approval of such acquisitions. Mr. Horace Libby, general counsel for the Public Utilities Commission, agrees with Professor Shipman's observation. According to Mr.Libby, a municipality or business firm which purchases or acquires a dam site from a person or a firm that is not a utility for the sole purpose of providing power to the town or firm, does not need P.U.C. approval. A municipality or firm that acquires a dam and sells any portion of the power produced, however, does need P.U.C. approval. Furthermore, any municipality or business firm that purchases a dam site from a utility which is deemed by the P.U.C. to be "useful" to the utility does need P.U.C. approval for the acquisition. The statutes could be significantly clarified.

Another problem that may confront the municipalities and business firms which acquire dam sites concerns two Acts en-acted by the State Legislature in 1973 and 1975. The 1973 Act is permissive and encourages interested persons to assume ownership of abandoned dams and to maintain and operate the dams. The 1975 Act, however, requires the owners of dams to register the dams with the Soil and Water Conservation Com-mission which can establish water levels. In addition, the 1975 Act allows littoral proprietors to petition the Soil and Water Conservation Commission (SWCC) to alter water levels. As a result, a municipality or business firm could be adverse-ly affected by a decision made by the SWCC.

CONCLUSION

Hydroelectric power in Maine is an economically feasible source of energy in the long run for industry and municipalities which have access to hydroelectric power facilities and resources capable of fulfilling their needs. Firms like The Great Northern Paper Company could utilize hydroelectric power to substantially reduce the present demand for oil. Smaller firms than Great Northern and some types of municipalities could utilize hydroelectric power for limited purposes such as lighting, etc. Financial incentives such as tax exemptions or tax deductions could further encourage the development of hydroelectric power in the State.

Hydroelectric power for baseload production of the utilities in Maine may not be feasible for one very important reason which concerns the State's topography and water power resources. The volume of water and the elevation of the dam sites, for the most part, may not be adequate for the production of a significant amount of baseload power. There are some sites, particularly on the Penobscot River in the vicinity of the Great Northern Paper Company that could be developed to produce baseload power, but the number of similar sites throughout the State is very small.

If the maximum potential of hydroelectric power production could be developed in Maine as described in the 1974 F.P.C Report, the 60 percent increase in electrical power generated by the hydroelectric power facilities would be less than half of the 125 percent increase in electric power output that occurred between 1965 and 1973 in Maine. Assuming that electric power demand increased at an annual rate of 6 percent in Maine, that the demand had to be met by hydroelectric power facilities and that the power produced at the sites in the F.P.C report is baseload power there would be sufficient power for a 10 year supply.

Under the most ideal conditions for hydroelectric power production, hydroelectric power is not a long run solution to the energy needs of the State as a whole but it is a practical alternative to some users such as business firms and municipalities. As the price of petroleum increases hydroelectric power may become more and more feasible for such firms and municipalities.

APPENDIX A

TABLE 4 - INDIVIDUAL CONVENTIONAL DEVELOPED AND UNDEVELOPED HYDROELECTRIC PLANTS AND SITES - JANUARY 1, 1972

By Geographic Divisions and States

CLASS 1/	DIVISION AND STATE PLANT OR SITE	OWNER	RIVER	DEVELOPED		UNDEVELOPED		USABLE POWER STGE CAP 1,000 AC-FT	GROSS STATIC HEAD FT
				INSTALLED CAPACITY 2/ KW	AVERAGE ANNUAL GENERATION 1,000 KWH	INSTALLED CAPACITY 2/ KW	AVERAGE ANNUAL GENERATION 1,000 KWH		
	NEW ENGLAND								
	Maine								
P	>CARIBOU	MAINE PUBLIC SERVICE CO	AROOSTOOK	800	5,000	200	1,000	U	18
	CASTLE HILL		AROOSTOOK			18,000	70,000	U	60
P	>SQUA PAN	MAINE PUBLIC SERVICE CO	SQUA PAN STREAM	1,500	700			59	30
	FISH RIVER FALLS		FISH			7,300	32,000	65	49
F	LINCOLN SCHOOL	CORPS OF ENGINEERS	ST JOHN			70,000	280,000	24	67
F	DICKEY	CORPS OF ENGINEERS	ST JOHN			760,000	750,000	2800	313
I	MILLTOWN	GEORGIA-PACIFIC CORP	ST CROIX	3,036	23,250	4,500	27,000	NA	24
I	WOODLAND	GEORGIA-PACIFIC CORP	ST CROIX	9,000	30,000			NA	48
I	GRAND FALLS	GEORGIA-PACIFIC CORP	ST CROIX	9,652	40,000			87	52
P	ELLSWORTH	BANGOR HYDRO ELECTRIC CO	UNION	8,900	31,155			U	61
M	BANGOR	BANGOR CITY UTILITIES DIV	PENOBSCOT	700	3,700			U	10
P	>VEAZIE	BANGOR HYDRO ELECTRIC CO	PENOBSCOT	8,400	64,000			U	18
	BASIN MILLS		PENOBSCOT			12,000	93,000	U	27
P	ORONO 5/	BANGOR HYDRO ELECTRIC CO	STILLWATER	2,332	18,000	2,332-	18,000-	U	25
P	STILLWATER	BANGOR HYDRO ELECTRIC CO	STILLWATER	1,950	13,900			U	18
I	>GREAT WORKS	DIAMOND INTER CORP	PENOBSCOT	5,554	29,695			U	19
P	>MILFORD	BANGOR HYDRO ELECTRIC CO	PENOBSCOT	6,400	52,000			U	20
	BANGOR DIVERSION		PENOBSCOT			60,000	223,000	U	115
	SUNKHAZE RAPIDS		PENOBSCOT			12,000	95,000	U	28
P	HOWLAND	BANGOR HYDRO ELECTRIC CO	PISCATAQUIS	1,875	11,000			U	16
	BONNIE BROOK		PISCATAQUIS			20,000	76,000	57	91
I	GREENVILLE	GREENVILLE MANUF CO	WILSON STREAM	576	1,000			U	35
P	>STANFORD	BANGOR HYDRO ELECTRIC CO	PENOBSCOT	3,800	28,900			U	23
	WINN		PENOBSCOT			12,000	89,000	U	23
	STRATTON RIPS		MATTAWAMKEAG			30,000	160,000	16	100
I	>MATTACEUNK	GREAT NORTHERN PAPER CO	PENOBSCOT	19,200	114,000			U	40
P	MEDWAY	BANGOR HYDRO ELECTRIC CO	W BR PENOBSCOT	3,440	34,000	700		U	19
I	>EAST MILLINOCKET	GREAT NORTHERN PAPER CO	W BR PENOBSCOT	7,374	46,300			U	30
I	>DOLBY	GREAT NORTHERN PAPER CO	W BR PENOBSCOT	14,100	94,500			U	49
I	>MILLINOCKET	GREAT NORTHERN PAPER CO	W BR PENOBSCOT	31,500	187,000			U	110
I	>NORTH TWIN	GREAT NORTHERN PAPER CO	W BR PENOBSCOT	8,200	43,000			344	29
	DEBSCONEAG		W BR PENOBSCOT			15,000	69,000	U	58
	SOURDNAHUNK		W BR PENOBSCOT			24,000	109,000	U	95
	THE ARCHES		W BR PENOBSCOT			22,500	94,000	U	90
I	>RIPOGENUS	GREAT NORTHERN PAPER CO	W BR PENOBSCOT	37,530	100,000			689	186
	MEADOW BROOK		E BR PENOBSCOT			12,000	48,000	U	50
	GRAND FALLS		SEBOOIS STREAM			6,000	28,000	U	50
	GRAND PITCH		WEBSTER BROOK			5,000	22,000	U	90
I	CAMDEN	SEABRIGHT CORPORATION	MEGUNTICOOK	273	400			NA	NA
I	DAMARISCOTTA	DAMARISCOTTA MANUF CO	DAMARISCOTTA LAK	400	1,500			U	66
I	COPSECOOK	WARREN S D CO	COBBOSSEE POND	300	900			U	17
I	AUGUSTA	STATLER TISSUE CORP	KENNEBEC	375	2,500			NA	22
I	>EDWARDS DIVISION	ECON DEV CORP OF AUGUSTA	KENNEBEC	3,500	19,000			U	19
P	>UNION GAS	CENTRAL MAINE POWER CO	MESSALONSKEE STR	1,500	3,900			U	38
P	>AUTOMATIC	CENTRAL MAINE POWER CO	MESSALONSKEE STR	800	2,820			U	23
P	>RICE RIPS	CENTRAL MAINE POWER CO	MESSALONSKEE STR	1,600	5,155			U	42
P	>OAKLAND	CENTRAL MAINE POWER CO	MESSALONSKEE STR	2,800	8,900			U	65
P	>FORT HALIFAX	CENTRAL MAINE POWER CO	SEBASTICOOK	1,500	6,808			U	22
I	BURNHAM	LAWRENCE KEDDY	SEBASTICOOK	1,050				U	27
I	WATERVILLE	MILSTAR MANUF CORP	KENNEBEC	800				U	21
I	>LOCKWOOD	MILSTAR MFG CORP	KENNEBEC	4,800	35,000			U	21
I	>WINSLOW	SCOTT PAPER CO	KENNEBEC	3,730	26,100			U	23
P	>SHAWMUT	CENTRAL MAINE POWER CO	KENNEBEC	4,650	43,200			5	24
P	>WESTON	CENTRAL MAINE POWER CO	KENNEBEC	12,000	81,272			U	32
M	NORRIDGEWOCK	MADISON ELECTRIC WORKS	SANDY	450	1,300			NA	15
	MADISON		KENNEBEC			8,800	55,000	U	22
I	>ABENAKI	KENNEBEC R PULP AND PAPER	KENNEBEC	3,650	46,000			U	42
I	>ANSON	KENNEBEC R PULP AND PAPER	KENNEBEC	6,000	39,160			U	20
	NORTH ANSON		KENNEBEC			10,000	54,000	U	29
P	>WILLIAMS	CENTRAL MAINE POWER CO	KENNEBEC	13,000	91,901			U	45
P	>WYMAN	CENTRAL MAINE POWER CO	KENNEBEC	72,000	321,152			67	141
	THE FORKS		KENNEBEC			48,000	166,000	U	110
	PIERCE POND DIVR		KENNEBEC			180,000	380,000	10	690
P	EUSTIS	RANGELEY POWER CO	DEAD	250				NA	12
	COLD STREAM		KENNEBEC			90,000	260,000	U	195
P	>HARRIS	CENTRAL MAINE POWER CO	KENNEBEC	75,000	184,326			16	148
I	MOOSEHEAD LAKE	KENNEBEC LOG DRIVING ETAL	KENNEBEC			24,000	67,000	545	64
	BRUNSWICK		ANDROSCOGGIN			23,000	85,000	NA	33
P	>BRUNSWICK 5/	CENTRAL MAINE POWER CO	ANDROSCOGGIN	1,473	10,520	1,473-	10,520-	U	17
P	>TOPSHAM 5/	CENTRAL MAINE POWER CO	ANDROSCOGGIN	900	7,280	900-	7,280-	U	22
	PEJEPSCOT		ANDROSCOGGIN			10,000	52,000	NA	22
I	PEJEPSCOT 5/	PEJEPSCOT PAPER CO	ANDROSCOGGIN	1,500	6,835	1,500-	6,835-	U	22
	WORUMBO		ANDROSCOGGIN			15,000	70,000	NA	48
I	WORUMBO 5/	LISBON MILLS INC	ANDROSCOGGIN	900	3,300	900-	3,300-	U	19
I	NORWAY	NORWAY MANUFACTURING CO	PENNESSEEWASSEE	280	200			U	52

SEE FOOTNOTES AT END OF TABLE

TABLE 4 (Contd.) - INDIVIDUAL DEVELOPED AND UNDEVELOPED By Geographic Divisions and States

CLASS 1/	DIVISION AND STATE PLANT OR SITE	OWNER	RIVER	DEVELOPED INSTALLED CAPACITY 2/ KW	DEVELOPED AVERAGE ANNUAL GENERATION 1,000 KWH	UNDEVELOPED INSTALLED CAPACITY 2/ KW	UNDEVELOPED AVERAGE ANNUAL GENERATION 1,000 KWH	USABLE POWER STGE CAP 1,000 AC-FT	GROSS STATIC HEAD FT
	NEW ENGLAND (Contd.)								
	Maine (Contd.)								
	LEWISTON		ANDROSCOGGIN			30,000	130,000	NA	55
I	LEWISTON 5/	LIBBEY W S CO	ANDROSCOGGIN	750	3,000	750-	3,000-	U	28
P	CONTINENTAL MILLS	CENTRAL MAINE POWER Co	ANDROSCOGGIN	1,776	6,560			U	22
I	BATES DIVISION 5/	BATES MANUFACTURING Co	ANDROSCOGGIN	4,800	18,500	4,800-	18,500-	U	28
I	HILL DIVISION 5/	BATES MANUFACTURING Co	ANDROSCOGGIN	2,160	9,500	2,160-	9,500-	U	28
I	ANDROSCOGGIN 5/	BATES MANUFACTURING Co	ANDROSCOGGIN	2,566	7,000	2,566-	7,000-	U	25
M	LEWISTON 5/	LEWISTON PUBLIC WORKS	ANDROSCOGGIN	700	3,000	700-	3,000-	U	36
P	>DEER RIPS	CENTRAL MAINE POWER Co	ANDROSCOGGIN	6,540	27,000			U	34
P	>ANDROSCOGGIN NO 3	CENTRAL MAINE POWER Co	ANDROSCOGGIN	3,600	29,000			U	34
	GULF ISLAND		ANDROSCOGGIN			30,000	160,000	NA	68
P	>GULF ISLAND 5/	CENTRAL MAINE POWER Co	ANDROSCOGGIN	19,200	123,000	19,200-	123,000-	10	56
	RAM ISLAND		ANDROSCOGGIN			30,000	90,000	240	49
I	>LIVERMORE HILL 5/	INTERNATIONAL PAPER Co	ANDROSCOGGIN	4,539	11,100	4,539-	11,100-	U	31
	OTIS		ANDROSCOGGIN			12,000	60,000	NA	NA
I	>OTIS MILL 5/	INTERNATIONAL PAPER Co	ANDROSCOGGIN	2,730	6,400	2,730-	6,400-	U	24
	JAY		ANDROSCOGGIN			20,000	80,000	NA	34
I	>JAY 5/	INTERNATIONAL PAPER Co	ANDROSCOGGIN	3,125	14,150	3,125-	14,150-	U	14
	DIXFIELD		ANDROSCOGGIN			10,000	49,000	U	25
	RUMFORD LOWER		ANDROSCOGGIN			41,000	190,000	NA	80
I	>RUMFORD FLS LWR	RUMFORD FALLS POWER Co	ANDROSCOGGIN	12,800	98,000			U	79
I	>RUMFORD FLS UPR	RUMFORD FALLS POWER Co	ANDROSCOGGIN	21,970	153,000	17,000	29,000	U	97
	RICHARDSON		RAPID			8,000	60,000	130	178
	AZISCOHOS		MAGALLOWAY			10,000	49,000	159	245
I	SACCARAPPA	WARREN S D CO	PRESUMPSCOT	1,390	11,000			U	28
I	DUNDEE	WARREN S D CO	PRESUMPSCOT	2,400	16,000			U	51
P	>NORTH GORHAM	CENTRAL MAINE POWER Co	PRESUMPSCOT	2,250	12,000			U	34
I	EEL WEIR	WARREN S D CO	PRESUMPSCOT	1,800	12,000			341	40
P	>CATARACT	CENTRAL MAINE POWER Co	SACO	6,650	38,778	10,000	40,000	U	42
I	SACO DIVISION	SACO REALTY Co	SACO	900	2,500			NA	44
P	>SKELTON	CENTRAL MAINE POWER Co	SACO	16,800	104,000			U	76
P	>BAR MILLS	CENTRAL MAINE POWER Co	SACO	4,000	19,166			U	22
P	>WEST BUXTON LOWER	CENTRAL MAINE POWER Co	SACO	4,000	18,000			U	28
P	>WEST BUXTON UPPER	CENTRAL MAINE POWER Co	SACO	2,625	11,600	5,400	16,000	U	28
P	>BONNY EAGLE	CENTRAL MAINE POWER Co	SACO	7,200	40,916	7,800	26,000	U	37
	STEEP FALLS		SACO			15,000	48,000	U	38
P	KEZAR FALLS 5/	CENTRAL MAINE POWER Co	OSSIPEE	350	2,231	350-	2,231-	U	19
	GREAT FALLS		SACO			40,000	87,000	275	111
P	>HIRAM 5/	CENTRAL MAINE POWER Co	SACO	2,400	22,500	2,400-	22,500-	U	78
M	KENNEBUNK	KENNEBUNK LT AND PWR DIST	MOUSAM	150				NA	14
I	SOUTH BERWICK	SOUTH BERWICK MANUF Co	SALMON FALLS	1,200	2,800			U	20
I	GREAT WORKS	GREAT WORKS HYDRO CO	GREAT WORKS	500	1,000			U	32
				543,131	2,750,230	1,715,975	4,304,684		
	New Hampshire								
I	>SHELBURNE	BROWN N H, INC	ANDROSCOGGIN	3,720	14,000			U	17
P	>GORHAM	PUBLIC SERVICE CO OF N H	ANDROSCOGGIN	2,150	13,747			U	18
I	>GORHAM	BROWN N H, INC	ANDROSCOGGIN	4,800	27,000			U	31
P	>J BRODIE SMITH	PUBLIC SERVICE CO OF N H	ANDROSCOGGIN	15,000	97,608			U	88
	PULSIFER RIPS		ANDROSCOGGIN			6,000	43,000	U	40
I	>CASCADE	BROWN N H, INC	ANDROSCOGGIN	7,200	54,000			U	46
I	>CROSS	BROWN N H, INC	ANDROSCOGGIN	3,220	18,000			U	21
I	>RIVERSIDE	BROWN N H, INC	ANDROSCOGGIN	11,400	63,000			U	66
I	>BERLIN	BROWN N H, INC	ANDROSCOGGIN	2,200	14,000			17	18
	PONTOOK		ANDROSCOGGIN			262,500	149,000	NA	125
	PONTOOK		ANDROSCOGGIN			300,000*	131,500*	NA	NA
	ERROL		ANDROSCOGGIN			24,000	57,000	314	55
I	ROCHESTER	WYANDOTTE WORSTED CO	COCHECO	100	400			NA	22
I	NORTH ROCHESTER	SPAULDING FIBER Co INC	SALMON FALLS	250	900			NA	23
I	MILTON N ROCHESTR	SPAULDING FIBER Co INC	SALMON FALLS	312	1,000			NA	129
I	WILTON	HILLSBOROUGH MILLS	SOUHEGAN	600	1,000			NA	38
	MOORES FALLS		MERRIMACK			30,000	110,000	U	35
P	KELLEYS FALLS	PUBLIC SERVICE CO OF N H	PISCATAQUOG	1,000	2,000			U	21
P	>AMOSKEAG	PUBLIC SERVICE CO OF N H	MERRIMACK	16,000	82,700	22,000	28,000	U	46
P	>HOOKSETT	PUBLIC SERVICE CO OF N H	MERRIMACK	1,600	11,000	7,400	20,000	U	14
I	SUNCOOK	THOMAS HODGSON INC	SUNCOOK	1,800	2,400			NA	35
P	>GARVINS FALLS	PUBLIC SERVICE CO OF N H	MERRIMACK	7,200	40,000	13,500	10,000	U	30
	RIVERHILL		CONTOOCOOK			20,000	64,000	7	114
	BLACKWATER		BLACKWATER			12,000	21,000	68	218
I	WEST HOPKINTON	HOAGUE SPRAGUE CO	CONTOOCOOK	500	1,325			U	20
	LONG FALLS		CONTOOCOOK			12,000	36,000	U	118
P	JACKMAN	PUBLIC SERVICE CO OF N H	N BR CONTOOKOOK	3,200	8,000			9	178
	STODDARD NO 1		N BR CONTOOCOOK			6,000	7,000	29	268
I	MILL WHEEL	MONADNACK MILLS INC	CONTOOCOOK	750	1,900			NA	30
I	PIERCE STATION	MONADNACK MILLS INC	CONTOOCOOK	720	1,200			NA	24

SEE FOOTNOTES AT END OF TABLE

APPENDIX B

Net Energy Generated

Millions of Kilowatthours

New England

Total Electric Utility Industry

Year	Total All Plants	Hydro	Steam Conventional	Steam Nuclear	Gas Turbine*	Internal Combustion
1940	8,556	2,729	5,800	—		27
1945	11,805	4,087	7,681	—		37
1950	16,211	3,676	12,403	—		132
1955	22,609	4,579	17,863	—		167
1960	28,808	5,152	23,442	34		180
1961	30,814	4,479	25,292	854		189
1962	32,043	4,526	26,626	690		201
1963	33,594	4,451	27,991	942		210
1964	36,334	4,046	30,912	1,189		187
1965	39,985	3,659	35,147	966		213
1966	43,388	4,443	37,659	1,082		204
1967	46,327	4,577	39,744	1,797		209
1968	51,338	4,514	42,330	4,222		272
1969	56,398	5,228	46,081	4,782		307
1970	60,934	4,703	50,224	4,814	826	367
1971	63,937	4,286	48,998	9,202	1,027	424
1972	68,086	5,087	52,098	9,500	992	409
1973	72,076	5,216	51,514	14,371	663	312
1974P	69,238	4,753	46,704	16,911	580	290

Investor-Owned Electric Utilities

Year	Total All Plants	Hydro	Steam Conventional	Steam Nuclear	Gas Turbine*	Internal Combustion
1940	8,358	2,663	5,687	—		8
1945	11,521	4,010	7,502	—		9
1950	15,837	3,585	12,184	—		68
1955	21,986	4,465	17,475	—		46
1960	28,096	5,026	23,002	34		34
1961	30,079	4,359	24,826	854		40
1962	31,267	4,408	26,122	690		47
1963	32,795	4,338	27,478	942		37
1964	35,544	3,937	30,380	1,189		38
1965	39,179	3,546	34,605	966		62
1966	42,562	4,335	37,092	1,082		53
1967	45,479	4,467	39,150	1,797		65
1968	50,474	4,415	41,719	4,222		118
1969	55,432	5,123	45,362	4,782		165
1970	59,938	4,597	49,463	4,814	817	247
1971	62,972	4,185	48,278	9,202	1,007	300
1972	67,072	4,974	51,357	9,500	961	280
1973	71,171	5,097	50,881	14,371	639	183
1974P	68,435	4,625	46,148	16,911	565	186

*Included with conventional steam prior to 1970
P - Preliminary

APPENDIX C

CENTRAL MAINE POWER COMPANY

HYDRO DAM INVENTORY

M OR NERATING STATION	RIVER IMPOUNDMENT	LOCATION TOWN/COUNTY	PRESENT USE	OWNERSHIP *PARTIAL OWNERSHIP	HEAD IN FEET	INSTALLED KW CAP.	REMARKS
		ANDROSCOGGIN RIVER BASIN					
unswick	Androscoggin R.	Brunswick/Cumb.	Power	CMP	17	1,473)	See Note 1
psham	" "	Topsham/Sag.	Power	CMP	20	900)	
ntinental Mills	" "	Lewiston/And.	Power	CMP	16	1,392	See Note 2
wiston	" "	Lewiston/And.	Divr'n.Dam	*Union Wtr.Pwr.Co.	54		
er Rips	" "	Auburn/And.	Power	CMP	30	5,740	See Note 3
droscoggin #3	" "	Lewiston/And.	Power	CMP	30	3,600	
lf Island	Gulf Island Pond	Aub.& Lewiston/And.	Power	CMP	58	19,200	
iscohos	Magalloway R.	Lincoln Plt./Oxford	Storage	*Andros.Reservoir Co.	55		See Note 4
iddle Dam	Richardson L.-Rapid R.	Township C/Oxford	Storage	*Union Wtr.Pwr.Co.	20.5	)	
pper Dam	Mooselookmeguntic L.	Richardsontown T4-R1/Oxf.	Storage	*Union Wtr.Pwr.Co.	20.5	)	See Notes 4&
angeley Lake	Rangeley L.	Rangeley/Fra.	Storage	*Union Wtr.Pwr.Co.	11	)	
		KENNEBEC RIVER BASIN					
hawmut	Kennebec R.	Fairfield/Som.	Power	CMP	23	4,650	
eston	" "	Skowhegan/Som.	Power	CMP	33	12,000	
illiams	" "	Solon/Som.	Power	CMP	45	13,000	
yman	" "	Moscow/Som.	Power	CMP	143	72,000	
arris	Indian Pond	Chase Strm.T1-R6/Som.	Power	CMP	149	76,400	
ast Outlet	Moosehead Lake	Big Squaw/Pis.	Storage	*Kenn.Log Driv.Co.	9.5	)	See Note 4
est Outlet	" "	Taunton & Raynham/Som.	Storage	*Kenn.Log Driv.Co.	6.6	)	
nion Gas - M5	Messalonskee Str.	Waterville/Kenn.	Power	CMP	37	1,500	
utomatic - M4	" "	Waterville/Kenn.	Power	CMP	23.5	800	
ice Rips - M3	" "	Oakland/Kenn.	Power	CMP	44	1,600	
essalonskee - M2	" "	Oakland/Kenn.	Power	CMP	67	2,800	
essalonskee L.	Messalonskee Lake	Oakland/Kenn.	Storage	CMP	10	)	
ong Pond	Long Pond	Mt.Vernon/Kenn.	Storage	CMP	5	)	
reat Pond Outlet	Great Pond	Belgrade/Kenn.	Storage	CMP	8	)	See Note 4
llis Pond Outlet	Ellis Pond	Belgrade/Kenn.	Storage	CMP	5	)	
t. Halifax	Sebasticook River	Winslow/Kenn.	Power	CMP	22.5	1,500	
ong Falls Dam	Flagstaff L.	T3-R4/Som.	Storage	CMP	40	)	
oxie Dam	Moxie Pond	E.Moxie T2-R4/Som.	Storage	*Mox.Assoc.	19	)	See Note 4
rassua Dam	Brassua Lake	Rockwood Strip/Som.	Storage	*Brassua Assoc.	35	)	

CENTRAL MAINE POWER COMPANY

HYDRO DAM INVENTORY

DAM OR GENERATING STATION	RIVER IMPOUNDMENT	LOCATION TOWN/COUNTY	PRESENT USE	OWNERSHIP *PARTIAL OWNERSHIP	HEAD IN FEET	INSTALLED KW CAP.	REMARKS
			SACO RIVER BASIN				
Cataract Dam	Saco River	Saco/York	Power	CMP	48	6,650	
Springs-Bradbury	" "	Saco/York	Regul'n.	CMP	4-5		
Skelton	" "	Buxton/York	Power	CMP	75.5	22,000	
Bar Mills	" "	Buxton/York	Power	CMP	21.5	4,000	
West Buxton	" "	Buxton/York	Power	CMP	27.5	6,600	See Note 5
Bonny Eagle	" "	Hollis/York	Power	CMP	35.8	7,200	
Hiram Falls	" "	Hiram/Oxford	Power	CMP	77	2,400	
Ledgemere	L.Ossipee Flowage	Waterboro/York	Storage	CMP	18		See Note 4
Kezar Falls	Ossipee River	Parsonfield/York	Power	CMP	19	350	" " 6
Moose Pond	Moose Pond	Denmark/Oxford	Storage	CMP	6.5)		" " 4
Kezar Lake	Kezar Lake	Fryburg/Oxford	Storage	CMP	10-6)		
			PRESUMPSCOT RIVER BASIN				
Great Falls Dam	No.Gorham Pond	Windham/Cumb.	Power	CMP	34	2,250	

NOTES:

1. Currently under study for redevelopment.
2. Units 5 & 6 (384 KW) are not operable. Not economically feasible to repair.
3. Unit 5 (800 KW) not operable - broken shaft. Not economical to repair.
4. Storages - Not economical to develop due to low head and no firm power at minimum drawdown conditions.
5. Units 1 & 2 (1500 KW) destroyed by fire in 1938.
6. Unit (350 KW) destroyed by fire. Not economical for redevelopment.
7. Dam of timber crib construction.

HFB
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APPENDIX D

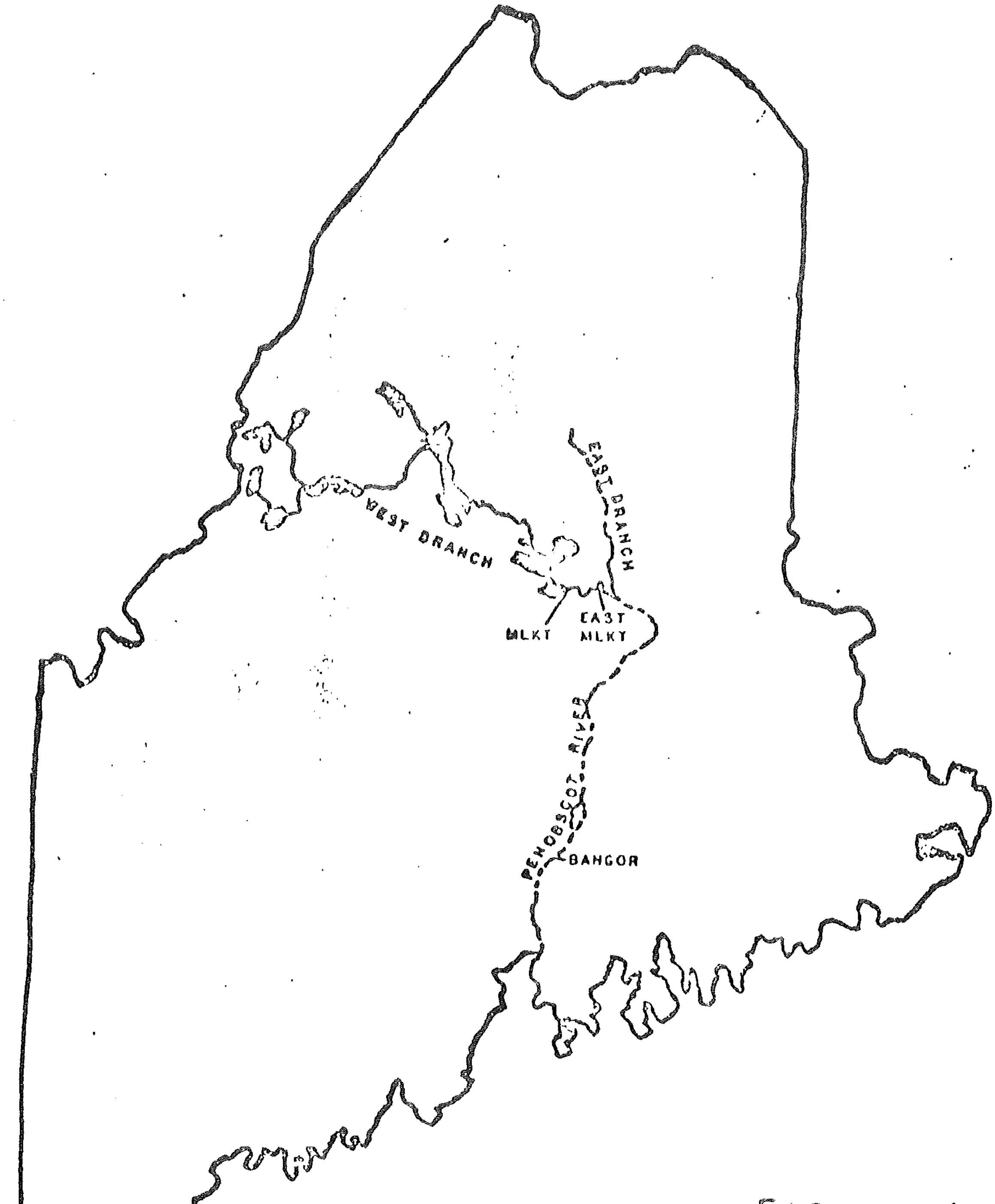

FIGURE I

West Branch – Penobscot River
State of Maine

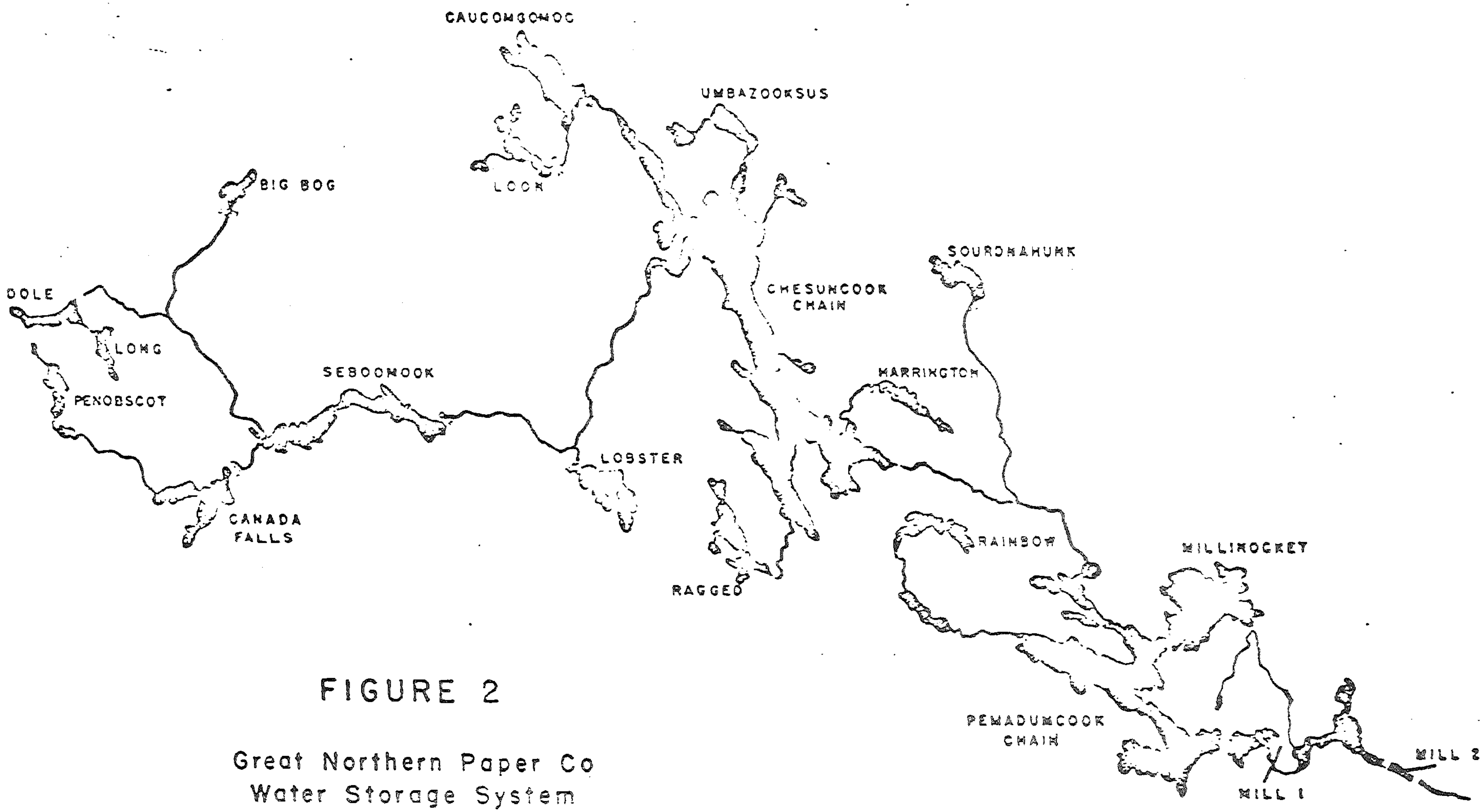

FIGURE 2

Great Northern Paper Co
Water Storage System

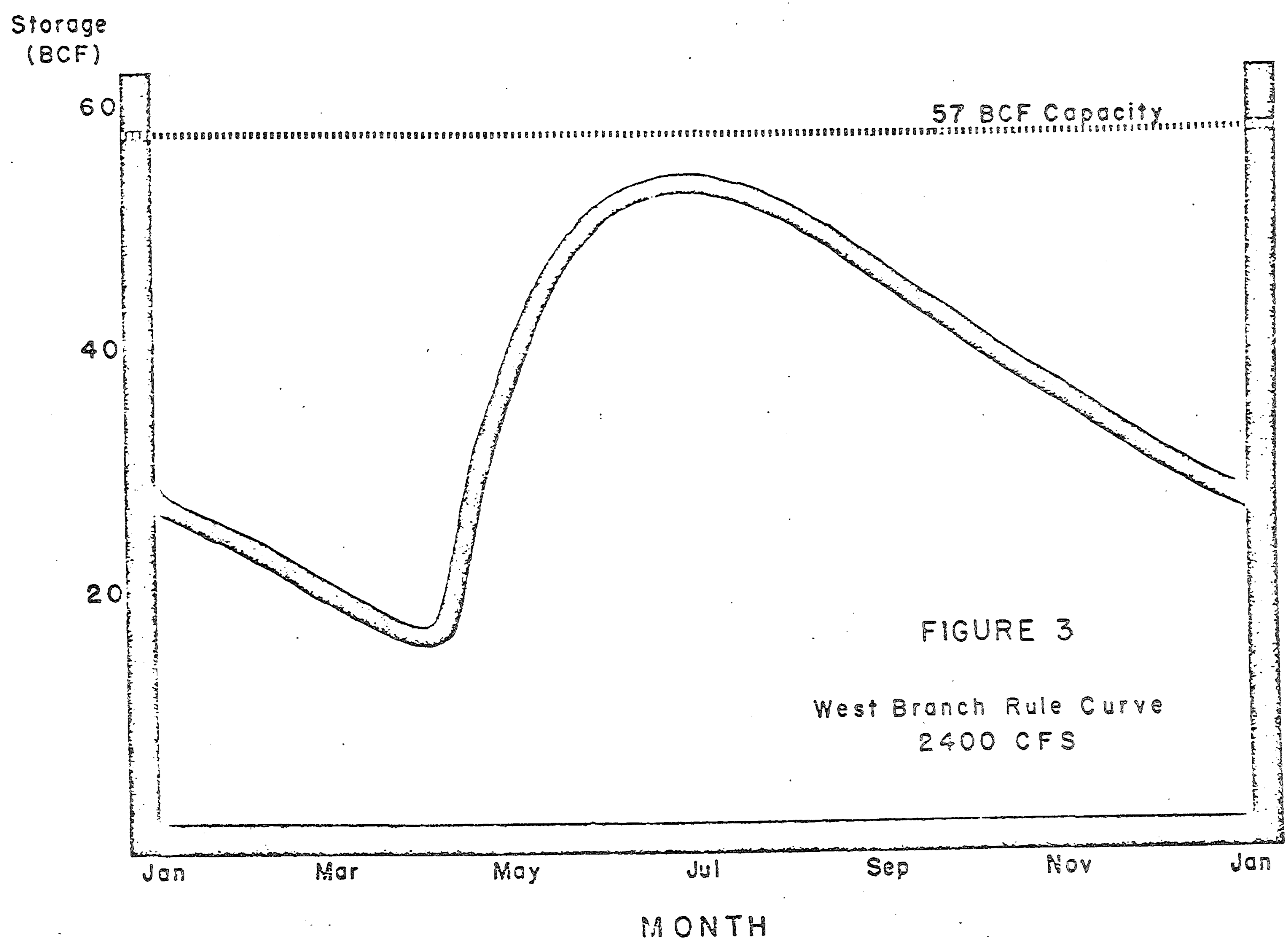

FIGURE 3

West Branch Rule Curve
2400 CFS

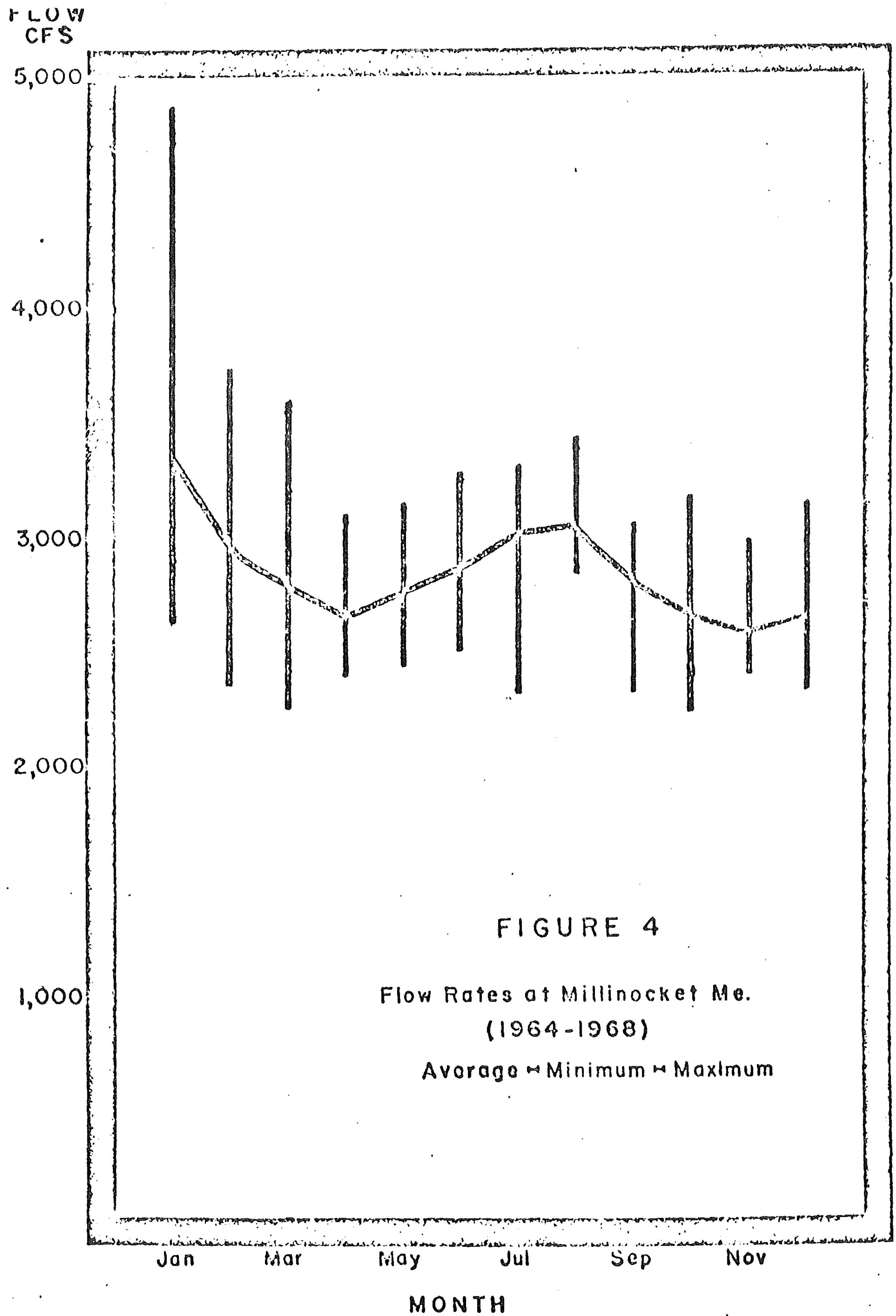

FIGURE 4

Flow Rates at Millinocket Me.
(1964-1968)
Average ⊢ Minimum ⊢ Maximum

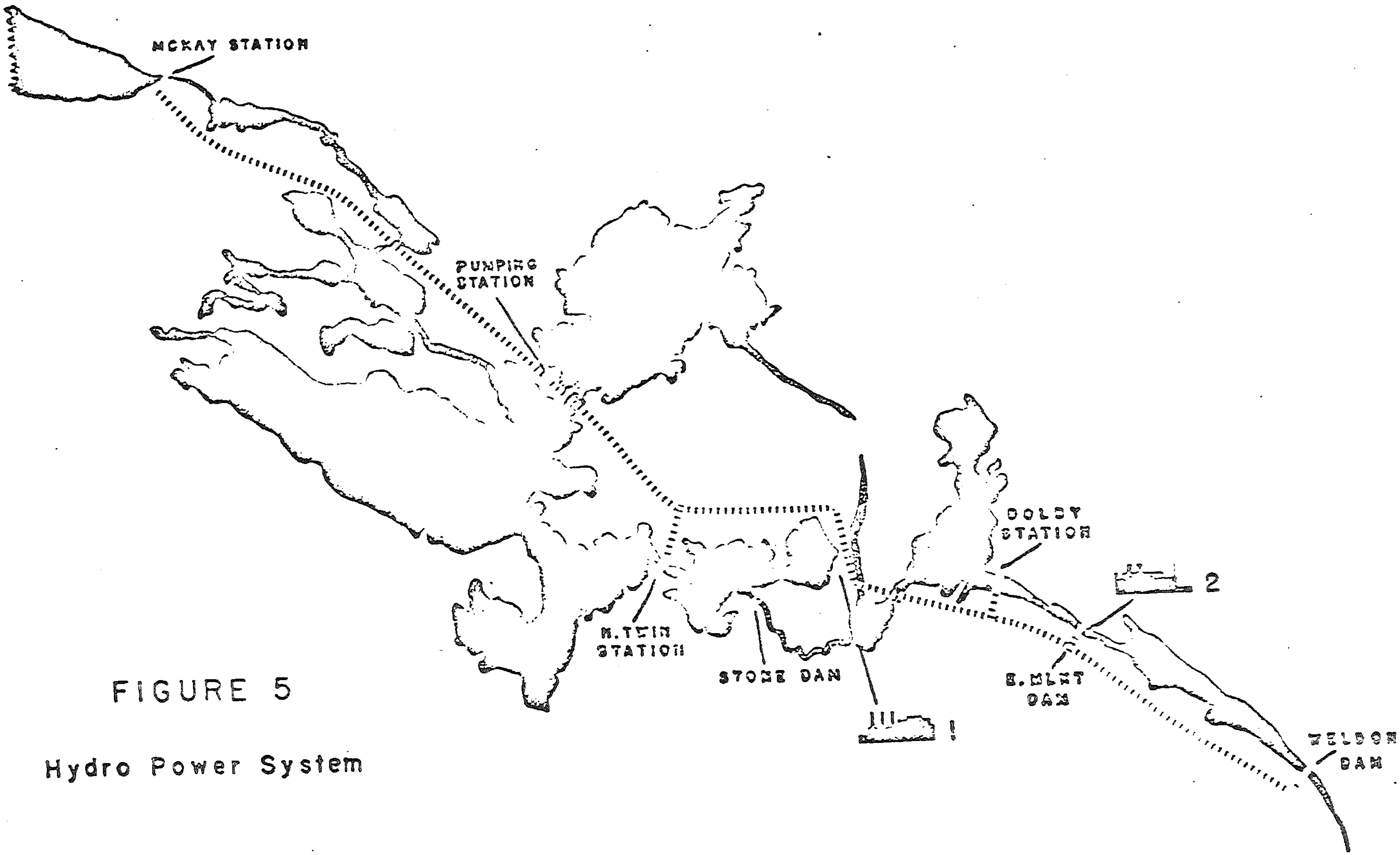

FIGURE 5

Hydro Power System

FIGURE 6

HYDRO POWER DEVELOPMENT

PERIOD	STATION	KILOWATTS	HEAD
900-1930	MILLINOCKET	26,000	110
	DOLBY	11,000	50
	E.MILLINOCKET	6,000	24
1930'S	NORTH TWIN	8,000	32
1940'S	WELDON	16,000	41
950-1968	MCKAY	37,000	192
		104,000	459