HJR

62

COMMITTEE REPORT

SENATE

FURTHER: Finance

3/13/80

Date: 3-7-80

Mr. President:

The Committee on COMMUNITY & REGIONAL AFFAIRS has had HJR 62

Alaska Power Authority, and incurring of revenue bond indebtedness of the Alaska Power Authority for Tyee Lake hydroelectric generating project near Petersburg & Wrangell

under consideration and (a majority of the committee) (the committee) reports it back with the following recommendations:

[ ] do pass [ ] do not pass

[ ] do pass with attached amendments(s)

[ ] replace with CS for _____ [ ] same title [ ] new title

and recommends _____

[ ] AND attaches a "Letter of Intent" [ ] New Fiscal Note

[ ] reports it back without recommendation

[ ] referred to the _____ Committee

MEMBERS SIGNING DO PASS

Patrick Rooney

Bob Mulcahy

Tim Kelly

MEMBERS HAVING OTHER RECOMMENDATIONS:

Peter Sturgulewski

CHAIRMAN

S 60 (Rev. 12/78)

Committee Log Book - 1980

Tape Number XX

SENATE C/RA

Committee

Side Number 1

Dates 3/27/80 to

PRESENT: Senators Kelly, Mulcahy, Stimson, Rodey and Chairman Sturgulewski

Bill Numbers Discussed

SB 389	SB 408	HJR 62							

Date & Time	Tape Meter Number	Bill	Significant Information (Witness, Action)
3/27/80 389	005	SB 389	Chairman Sturgulewski overview (received testimony
			but did not put bill up for action as CS not
			yet received.
	084		Mary Ross
	221		Vivian Lovelace
	269		Carl Hagerup
	435	HJR 62	Sen. Kelly
	450		Bob Speed, AA to Rep. Gardiner
	483		Sen. Sturgulewski
			Bill was passed out with no objections
	540	CSSB 408	Sen. Sturgulewski
	618		Sen. Mulcahy Moved "CS" do pass w/rec.
			Sen. Sturgulewski "Do Pass" // no objections
	668		MEETING ADJOURNED

Alaska State Legislature

Senate

Committee on Community & Regional Affairs

Official Business

Pouch V
State Capitol
Juneau, Alaska 99811

March 24, 1980

TO:

Senator Bob Mulcahy Vice-Chairman	Senator Jalmar Kerttula
Senator Tim Kelly	Senator Ed Dankworth
Senator Pat Rodey	Senator Bettye Fahrenkamp
Senator Terry Stimson	Senator Don Bennett
Senator Mike Colletta	Representative Terry Gardiner
Senator Brad Bradley	Representative Oral Freeman
Senator Glenn Hackney	Representative Ernie Haugen
Senator Robert Ziegler	Representative Richard Eliason

FROM: Arliss Sturgulewski
Chairman

SUBJECT: Committee Meetings, Capitol Building

Tuesday, March 25, 1980 - 1:30 p.m. (Butrovich Room)

SB 370 - An Act relating to fire prevention.

SB 309 - An Act requiring the preparation of a local government impact statement.

SB 348, 349, 492 - (Part of the Local Government Study Package)

Wednesday, March 26, 1980 - 1:30 p.m. (Beltz Room)

SB 348, 349, 492 - Local Government Study Package Work Session

Thursday, March 27, 1980 - 1:30 p.m. (Butrovich Room)

SB 408 - An Act making a special appropriation to the Department of Community and Regional Affairs for village gardening projects; and providing for an effective date

HJR 62 - An Act relating to the Alaska Power Authority and the incurring of revenue bond indebtedness of the APA for the Tyee Lake hydroelectric generating project near Petersburg and Wrangell, and for the Swan Lake hydroelectric generating project in the Ketchikan Gateway Borough.

SB 389 - An Act relating to the senior citizens tax exemption.

Friday, March 28, 1980 - 1:30 p.m. (Governor's Conference Room)

HB 932 - Creating Office of Rural Development and Rural Devlopment Council Joint C/RA meeting (teleconference)

Alaska State Legislature

House of Representatives

Committee on

Community & Regional Affairs

Pouch V
State Capitol
Juneau, Alaska 99811

Official Business

BILL NUMBER AND TITLE: HJR 62 Tyee & Swan Lakes Hydroelectric Projects

ORIGINAL SPONSOR: Freeman, Haugen, Gardiner & Ellison OTHER SPONSORS: _____

RECEIVED FROM: _____ FURTHER REFERRALS: Finance

HEARING DATE: 2/26/80

MEMBERS PRESENT:					
	Bill Parker	X		Pat Carney	X
	Margaret Branson	X		Charlie Parr	X
	Pat O'Connell			Fred Zharoff	X
				Ray Metcalfe	X

Eric Yould, Executive Director, Ak. Power Authority

Yould gave the history of the projects and discussed the finances and feasibility of the hydro facilities. Indicated that $500,000 had already been expended in studing the feasibility of the projects (during 1977-78) and that $3.1 Million has been expended on the Swan Lake project and $2 Million on the Tyee.

Estimates indicate it would cost Petersburg $5,000000 extra to convert to electricity.

Yould indicated that in fact it might be a viable alternative to run Tyee to Ketchikan.

It appeared that on the life cycle analysis, Swan Lake is preferable to Mahoney.

The relationship between hydro and development is not always clear but the presence of cheap power can stimulate develpment.

Yould responded to the questions (see attached) asked by the Chairman.

Carney questions the feasibility of having later users share in the major costs of building the hydro projects. Response indicated that there would be potential psycholicial problems in voting on a bond which someone else was going to be paying for. This restriction on a bond might effect its marketability.

COMMITTEE ACTION: Passed bill out.

TAPE # 3 SIDE 1 Footage 0-024

Bill from Mayone

TYEE AND SWAN LAKES HYDRO PROJECTS

AREAS FOR DISCUSSION

Among the projects submitted by the Alaska Power Authority, how do Tyee and Swan Lake rank in terms of priority for funding?

Explanation of the funding approach involved in the projects--you might want to have "subordinated loans" explained.

What community growth rate was calculated in the development of the user and cost figures?

Was the public involved in the discussion of the relative costs of the alternatives explored?

What is the "backup" system requirement? Does it have to be a certain % of the capacity of the main system? And if so, does building a larger hydro facility necessitate a larger diesel backup and therefore increase the costs to the consumer? ✓

More Specific questions

What is the status of the City Creek hydroelectric project in Petersburg and how does it relate to the Tyee project?

Has there been full exploration of the possibility of Tyee serving the Ketchikan community? Or of Swan serving the Petersburg/Wrangell areas? Interties possibilities?

It appears that a factor which may lessen the adverse effect of excess capacity of the Swan Lake facility is the possible sale of power to Louisiana Pacific Corp. HOw likely is this possibility? Have the relative costs to the consumer of carrying the excess capacity anticipated in both these projects been evaluated ? Have the merits of a facility with smaller capacity been fully explored?

Questions generated by 2/25/80 hearing on bill:

Testimony was given that the existing diesel generators are old and will eventually need replacement. Was the cost of this replacement calculated in the cost figures for the hydro projects?

different financial options - service Petersburg/Wrangell - dependent on electrical conversion

Report
to the

ALASKA POWER AUTHORITY

in regard to

the Plan of Finance of
the Tyee Lake Hydroelectric Project

FIRST *Southwest* COMPANY
Anchorage, Alaska
Dallas, Texas

INTRODUCTION

The Thomas Bay Power Commission, having made the decision to discontinue its reliance on the use of diesel electric generation to meet existing and future power demands, has requested the assistance of the Alaska Power Authority (the "APA") in the financing and construction of the Tyee Lake Hydroelectric Project (the "Project") as a capital project of the State. The Thomas Bay Power Commission is composed of the Cities of Petersburg and Wrangell (the "Cities").

This report is a preliminary analysis of four alternatives containing various combinations of State funding and revenue bond funds. The impact of each alternative on electric costs has been estimated, based upon certain assumptions set forth in the report.

THE PROJECT

The Project is a major hydroelectric generating facility located at Tyee Lake, approximately 40 miles southeast of the City of Wrangell, Alaska. Tyee Lake is a natural lake perched 1,370 feet above the Bradfield Canal.

The Project,Stage 1 of two stages, consists of a ten foot diameter unlined tunnel, 6,785 feet in length, between Tyee Lake and Bradfield Canal, a gate shaft and gate, a surge tank, a steel penstock, a powerhouse containing two 10,000 KW impulse turbine-generator sets and a 115 KV transmission line approximately 83 miles in length connecting the Project with the Cities of Wrangell and Petersburg. (See Figure 1.) Stage 2 (a potential future addition) consists in large part of the addition of a dam.

The Project is designed to have an installed capacity of 20,000 KW and a firm capacity of 8,900 KW. It is designed to be capable of delivering 114,100,000 KWH average annual energy and 75,200,000 KWH of firm annual energy.

Robert W. Retherford Associates, a division of International Engineering Company, Inc., concluded in their Definite Project Report dated December, 1979, that the Project "is the most economical means by which the Cities can meet the immediate and future energy requirements of their service areas".

Although the Project output is not expected to be fully utilized for 11 years, the Cities will derive long term benefits from the Project by replacing their diesel generating facilities with power from relatively fixed cost hydroelectric facilities.

THE CITIES

The City of Petersburg, a community located in Southeast Alaska, has a current population of approximately 3,200. Petersburg has total of 7,630 KW installed capacity, 79% of which is diesel generation and 21% of which is hydroelectric generation. During the year ended December 31, 1979, Petersburg sold approximately 19,600,000 KWH and has experienced a load growth of approximately 4.7% per year over the last five years.

The City of Wrangell, located approximately 32 miles from Petersburg, has a current population of approximately 3,200. Wrangell has a total of 7,750 KW primary installed capacity, all of which is diesel generation. During the year ended December 31, 1979, Wrangell sold approximately 11,600,000 KWH and has experienced a load growth of

approximately 5% per year over the last five years.

PROPOSED PLAN OF FINANCE

It is proposed that APA revenue bonds be issued pursuant to an Indenture of Trust between APA and a trustee bank. From the proceeds of this bond issue and a proposed subordinated State loan, the Project would be constructed. APA would own and operate the Project and sell power to the Cities pursuant to a Wholesale Power Sales Agreement. APA would covenant to set its wholesale rates at the level projected to be necessary to generate gross revenues at least equal to (a) 1.25 times debt service on the Bonds, (b) projected operation and maintenance expenses of the Project, and (c) debt service requirements of the State loan. The funds the APA generates from the 25% coverage requirement would be used for improvements and extensions of the Project and to provide funds that could be used to redeem the APA revenue bonds (thus lowering future debt service requirements).

A Reserve Fund equal to average annual debt service requirements and a Contingency Fund equal to 6 months average annual debt service requirements would be capitalized from bond proceeds. The Contingency Fund could be used to pay extraordinary repairs and maintenance on the Project and, if needed, to pay debt service on the Bonds. Both funds would have to be replenished if drawn upon.

The Bonds would be amortized over 40 years with the Revenue and Contingency Funds being used to pay the last 18 months' debt service.

THE NEED FOR STATE ASSISTANCE

The need for State assistance arises when the Project is reviewed from the standpoint of financeability. The long term economic feasi-

bility of the Project appears to be established in that diesel fuel prices are expected to continue rising over time while the costs of capital intensive hydroelectric generating facilities are relatively fixed. The most critical concern in terms of ability to finance the Project in the tax-exempt bond market is the substantial excess capacity that may exist in the early years of Project operation and its adverse effects on electric costs in the short run. In the first full year of Project operation (1985), its firm energy of 75,200,000 KWH will result in significant excess capacity relative to the projected 33,726,000 KWH of energy from diesel generation which the Project would displace in that year. Thus, rates must be increased to the extent necessary to satisfy the debt service requirements attributable to this 41,474,000 annual KWH excess. Although high electric rates are certainly undesirable from the personal financial standpoint of the Petersburg/Wrangell consumer, they also increase the bond market's perceived risk of an obligation in that economic growth in the area may be retarded.

There are three significant factors which together may lessen the adverse effect of excess capacity on the Cities' electric costs. The first factor is the possible sale of a block of power in the distant future to Ketchikan Public Utilities ("KPU"). This sale could only occur after terms of the sale are negotiated following elimination of excess capacity in the Swan Lake Project and after a transmission line is constructed between the three electric systems (see fig. 2). The sale, in any case, could only assist the Project in the long run.

The second factor is the potential increased demand from conversion of oil-fired residential heating in the Cities to the use of electric

heatpumps. The extent and timing of such conversion cannot now be projected.

The third factor which ameliorates the adverse cost effects of excess capacity is a loan from the State, repayment of which would not be required until after full capacity is reached. State assistance in the form of a subordinate loan is justified in that the ability to obtain conventional financing for the Project under reasonable terms is enhanced. The State loan would lower electric rates in the following ways:

(1) Interest payments on the loan would be partially deferred and principal repayment fully deferred until full capacity is attained, thereby minimizing the adverse rate effects of excess capacity in the early years of Project operation.

(2) The loan is subordinated to the APA revenue bonds, thus enabling the APA to obtain a more favorable interest rate than would otherwise be possible.

(3) The 25% debt service coverage requirement would not be applied to the loan debt service requirements, thus resulting in significant rate relief.

The terms of the loan as proposed approximate the terms of the Sitka-Green Lake loan and are described in more detail in Appendix B. The assumed 7% interest rate approximates the State's own cost of borrowing. Although the actual interest rate could range from 5% to 7%, the more conservative rate was used in the analysis.

ANALYSIS OF STATE FUNDING ALTERNATIVES

Four alternative financings, assuming four different levels of State subordinated funding, are illustrated in Appendix B, based upon

the assumptions set forth in Appendix A. The estimated average wholesale cost per KWH for each alternative are set forth below:

		Estimated Average Cost per KWH (1985)	(1986)	(1991)	(1996)
I.	No State Loan*	20.7¢	20.2¢	14.4¢	12.0¢
II.	$ 5,000,000 State Loan	19.0¢	18.7¢	13.7¢	11.8¢
III.	$10,000,000 State Loan	17.4¢	17.1¢	13.0¢	11.6¢
IV.	$15,000,000 State Loan	15.8¢	15.5¢	11.0¢	9.7¢

The estimated average retail cost per KWH for each alternative and for each city are calculated in Appendix C and set forth below:

Petersburg

		Estimated Average Cost per KWH (1985)	(1986)	(1991)	(1996)
I.	No State Loan*	16.1¢	16.4¢	14.2¢	13.2¢
II.	$ 5,000,000 State Loan	15.1¢	15.5¢	13.7¢	13.0¢
III.	$10,000,000 State Loan	14.1¢	14.5¢	13.1¢	12.9¢
IV.	$15,000,000 State Loan	13.2¢	13.5¢	11.7¢	11.4¢

Wrangell

		Estimated Average Cost per KWH (1985)	(1986)	(1991)	(1996)
I.	No State Loan*	24.7¢	24.2¢	18.8¢	16.8¢
II.	$ 5,000,000 State Loan	23.1¢	22.6¢	18.0¢	16.6¢
III.	$10,000,000 State Loan	21.5¢	21.0¢	17.3¢	16.4¢
IV.	$15,000,000 State Loan	19.9¢	19.4¢	15.3¢	14.5¢

*Without a State loan, the actual interest rate would be higher than the assumed rate, thus resulting in electric costs higher than the estimates set forth here.

The retail costs for Petersburg are materially lower than the Wrangell costs because of the low cost of hydroelectric facilities presently existing in Petersburg. Although all of the above cost estimates appear high, they are reasonable in comparison to future diesel generated energy if the price of diesel fuel continues to increase faster than the rate of inflation.

The assumptions used to derive the above cost estimates (set forth in more detail in Appendix A) are, in our opinion, conservative but realistic. Conservatism is required in any analysis involving the question of financeability. Any changes in the assumptions will have a material effect on the projections. In particular, the assumptions as to future Petersburg/Wrangell demand, the levels of inflation of construction costs and operating expenses and the terms of the State loan yet to be determined are all assumptions that have a material bearing on the results.

SUMMARY AND CONCLUSION

The Project appears to be needed by the Cities of Petersburg and Wrangell in order to discontinue their present reliance on diesel electric generation and to meet their future power needs. The Project appears to be technically and economically feasible. The excess capacity of the Project in its early years will increase electric costs during that period, thus raising the question of financeability. Although some of that excess capacity may be used to produce power to sell to Ketchikan Public Utilities at some time in the distant future and some conversion of oil-fired residential heating to electric heatpumps may occur, a State loan will mitigate the adverse cost effects of excess capacity if repayment of the loan is delayed until full capacity is reached.

We therefore recommend that at the very minimum a $10,000,000 State loan in support of the Project be authorized and that serious consideration be given to a $15,000,000 or greater loan amount to insure a more favorable financing in light of the high electric costs during the early years of Project operation. We believe that a large State loan is justified in light of the following:

(1) Without substantial State assistance, the Project, in our opinion, cannot presently be financed in the tax-exempt bond market at a reasonable rate of interest.

(2) A large loan would provide funding for the Project during the early stages of the construction period. The loan would provide timing flexibility for the revenue bond financing, thus enhancing APA's ability to obtain the lowest possible interest rate.

(3) State assistance in the form of a large subordinated loan would strengthen the overall Project financing, thus increasing assurance of repayment of both the APA revenue bonds and the State loan.

Report
to the

ALASKA POWER AUTHORITY

in regard to

the Plan of Finance of
the Swan Lake Hydroelectric Project
of the
Ketchikan Public Utilities System

FIRST *Southwest* COMPANY
Anchorage, Alaska
Dallas, Texas

INTRODUCTION

The City of Ketchikan, Alaska, having made the decision to discontinue its reliance on the use of diesel electric generation to meet existing future power demands, has requested the assistance of the Alaska Power Authority (the "APA") in the financing of its Swan Lake Hydroelectric Project (the "Project").

A plan of finance is proposed for the Project and a preliminary analysis of four alternatives containing various combinations of State funding and revenue bond funds is set forth. The impact of each alternative on electric cost has been estimated, based upon certain assumptions set forth in the report. The report concludes with our recommendation and justification thereof.

THE PROJECT

The Project is a major hydroelectric generating facility located at Swan Lake, approximately 22 air miles northeast of Ketchikan near the north end of Carroll Inlet. Swan Lake, a low-elevation lake surrounded by mountains, drains westward through a narrow gorge into Carroll Inlet via Falls Creek. (See Figure 1.)

The Project consists of a 190 foot high thin arch concrete dam located downstream from the outlet of Swan Lake, a concrete lined power tunnel leading to a powerhouse, a permanent port facility, access roads connecting the dam, powerhouse and port facility, a switchyard and approximately 30.5 miles of 115 KW wood pole transmission lines.

Petersburg-Wrangell-Ketchikan Area Location Map

SCALE IN MILES

0 5 10 20 30 40

Figure 1

PETERSBURG-WRANGELL-KETCHIKAN AREA

The Project is designed to have an installed capacity of 22,000 KW and a dependable capacity of 18,900 KW delivered to the load center. It is designed to be capable of delivering 85,400,000 KWH average annual energy and 66,700,000 KWH of firm annual energy to the load center.

R. W. Beck and Associates, Engineers and Consultants, concluded in their Evaluation Report dated June 1978 that the "Project is technically and environmentally feasible." Nevertheless, R. W. Beck's Demand and Energy Forecast dated January 11, 1980 indicates that "it appears that even if electrical loads grow at the highest projected rate in future years, there would still be significant amounts of both firm and secondary energy available for sale during the initial years of Project operation."

Booz, Allen & Hamilton, Inc., Consultants, have reviewed the Project reports and generally concur with the findings as to technical and economic feasibility. Their assessment is contained in Appendix A.

The central factor emphasized in all of the economic feasibility reports is the long term benefits KPU will derive by replacing its diesel generating facilities with relatively fixed cost hydroelectric facilities.

THE CITY

The City of Ketchikan, a community located in Southeast Alaska has a current population of approximately 8,600. Ketchikan Public Utilities ("KPU"), the municipally-owned public utility system, operates the electric, water and telephone system and provides electricity for a service area with a population of approximately 12,600.

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The central factor emphasized in all of the economic feasibility reports is the long term benefits KPU will derive by replacing its diesel generating facilities with relatively fixed cost hydroelectric facilities.

THE CITY

The City of Ketchikan, a community located in Southeast Alaska has a current population of approximately 8,600. Ketchikan Public Utilities ("KPU"), the municipally-owned public utility system, operates the electric, water and telephone system and provides electricity for a service area with a population of approximately 12,600.

The existing hydroelectric facilities have produced average annual energy of approximately 63,000,000 KWH and the existing diesel facilities could produce 77,900,000 KWH.

During the fiscal year ended December 31, 1979, KPU sold 72,213,615 KWH and has experienced a load growth of approximately 4.6% per year over the last 10 years.

PROPOSED PLAN OF FINANCE

It is proposed that contract revenue bonds be issued by APA pursuant to an Indenture of Trust between APA and a trustee bank. From the proceeds of this bond issue and a proposed subordinated State loan, the Project would be constructed. Although APA would nominally own the Project when construction is completed, KPU would operate the Project, control its output and would obtain title to the Project through a bargain option to purchase after all obligations have been repaid. APA would enter into a contract with KPU under which KPU would agree, in consideration for its use of the facilities, to timely pay (a) amounts to the trustee equal to the principal and interest on the Bonds; and (b) principal and interest requirements on the State obligation. All payments to be made by KPU pursuant to the Contract would constitute reasonable and necessary operating expenses of KPU. The Indenture of Trust and the Contract must insure that KPU's obligation to pay its reasonable operation and maintenance expenses, including payments due under this contract, has priority over its obligations to make principal and interest payments on any of its other debts. KPU would covenant to set rates projected to be necessary to generate gross revenues at least

equal to (a) 1.25 times the payments under this Contract, (b) projected operation and maintenance expenses and (c) all other debt service payments in the upcoming year. The funds KPU generates from the 25% coverage requirement would be used to finance capital expenditures of the electric, water and telephone system and to provide funds that could be used to redeem the APA contract revenue bonds (thus lowering future debt service requirements).

A Reserve Fund equal to average annual debt service requirements and a Contingency Fund equal to 6 months average annual debt service requirements would be capitalized from bond proceeds. The Contingency Fund could be used to pay extraordinary repairs and maintenance on the Project and, if needed, to pay debt service on the Bonds. Both funds would have to be replenished by KPU if drawn upon.

The Bonds would be amortized over 40 years, with the Reserve and Contingency Funds being used to pay the last 18 months' debt service.

To implement the proposed plan of finance, defeasance of KPU's outstanding revenue bonds may be required.

THE NEED FOR STATE ASSISTANCE

The need for State assistance arises when the Project is reviewed from the standpoint of financeability. The long term economic feasibility of the Project appears to be established in that diesel fuel prices are expected to continue rising over time while the costs of capital intensive hydroelectric generating facilities are relatively fixed. The most critical concern in terms of ability to finance the Project in the tax-exempt bond market is the substantial excess capacity that may exist in the early years of Project operation and its adverse effects on electric cost in

the short run. In 1985, the Project's average annual energy of 85,400,000 KWH, when added to the 63,000,000 KWH from KPU's existing hydroelectric facilities, will result in significant excess capacity relative to the projected 96,000,000 KWH sales. This estimate of sales was prepared by R.W. Beck and Associates in January, 1980 and represents the low load and energy forecast based upon conservative growth assumptions. Thus, rates must be increased to the extent necessary to satisfy the debt service requirement attributable to this potential annual excess of 52,400,000 KWH. Although high electric rates are certainly undesirable from the personal financial standpoint of the Ketchikan consumer, they also increase the bond market's perceived risk of an obligation in that economic growth in the area may be retarded.

There are two significant factors which together may lessen the adverse effect of excess capacity on KPU electric costs. The first factor is the possible sale of a block of power to Louisiana Pacific Corporation ("LPK"). The size of this block of power could range from 5,000,000 KWH to 25,000,000 KWH per year. The exact dimensions of the purchase and the price and terms have yet to be negotiated and will depend on LPK's power alternatives. The actual cost effect will be a function of the amount of power purchased and the differential between the LPK price and KPU's average cost per KWH. Nevertheless, even under the most favorable circumstances, some excess capacity is projected to exist until 1993.

The second factor which ameliorates the adverse cost effects of excess capacity is a loan from the State, repayment of which would not be required until after full capacity is reached. State assistance in the form of a subordinated loan is justified in that the ability to obtain conventional financing for the Project under reasonable terms is enhanced. The State loan would lower electric

rates in the following ways:

(1) Interest payments on the loan would be partially deferred and principal repayment fully deferred until full capacity is attained, thereby minimizing the adverse rate effects of excess capacity in the early years of Project operation;

(2) The loan is subordinated to the APA revenue bonds, thus enabling the APA to obtain a more favorable interest rate than would otherwise be possible;

(3) The 25% debt service coverage requirement would not be applied to the loan debt service requirements, thus resulting in significant rate relief.

The terms of the loan as proposed approximate the terms of the Sitka-Green Lake loan and are described in more detail in Appendix B. The assumed 7% interest rate approximates the State's own cost of borrowing. Although the actual interest rate could range from 5% to 7%, the more conservative rate was used in the analysis.

ANALYSIS OF STATE FUNDING ALTERNATIVES

Four alternative financings, assuming four different levels of State subordinated funding, are illustrated in Appendix C, based upon the assumptions set forth in Appendix B. The estimated average cost per KWH for each alternative are set forth below:

Dam projects win House okay

3/13/80

The Associated Press

JUNEAU — Two multi-million dollar hydroelectric projects in Southeast Alaska received the formal go-ahead from House lawmakers Wednesday.

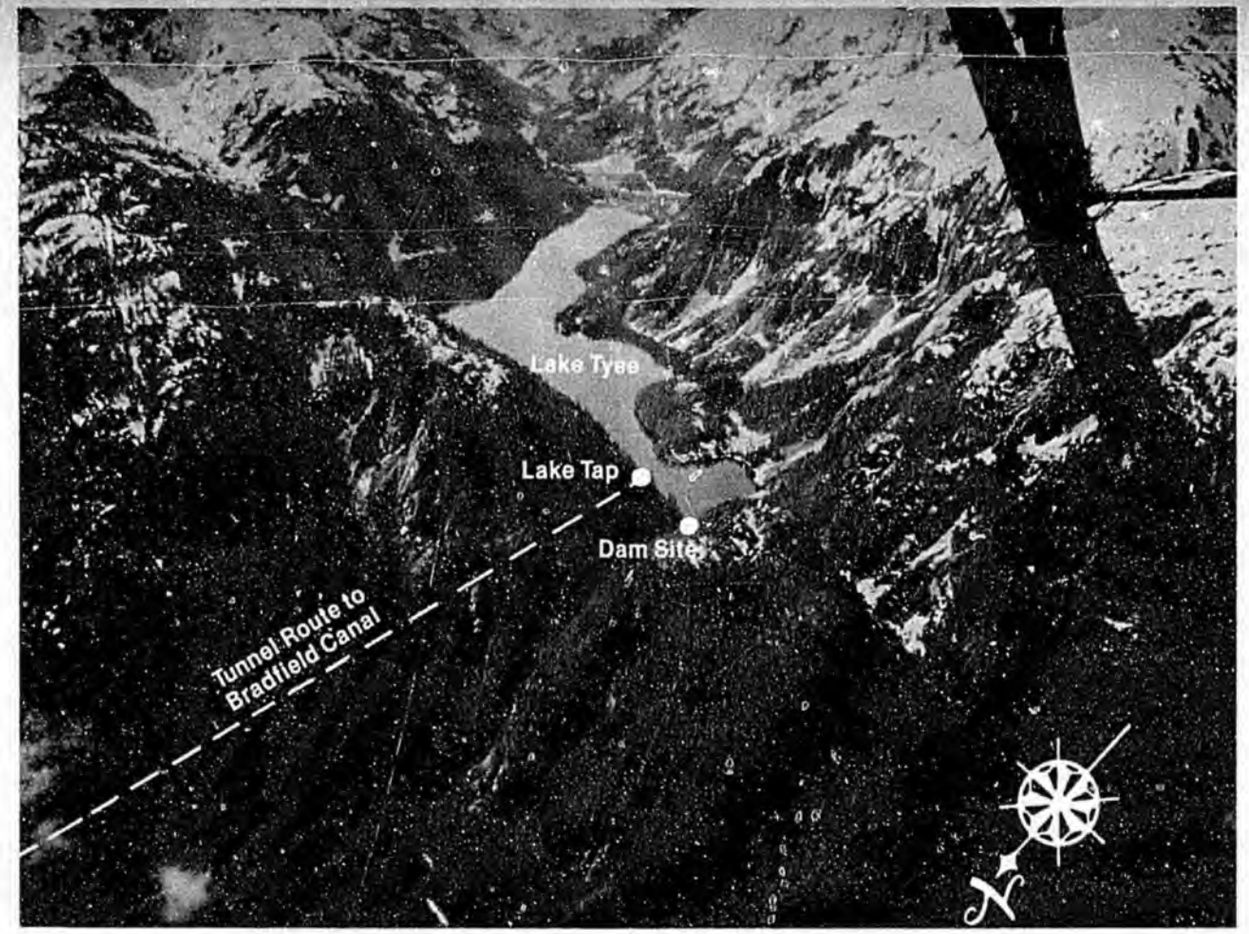
The House unanimously passed a resolution approving the design plans for both the Tyee Lake hydroelectric project near Petersburg and the Swan Lake project near Ketchikan. The resolution now goes to the Senate.

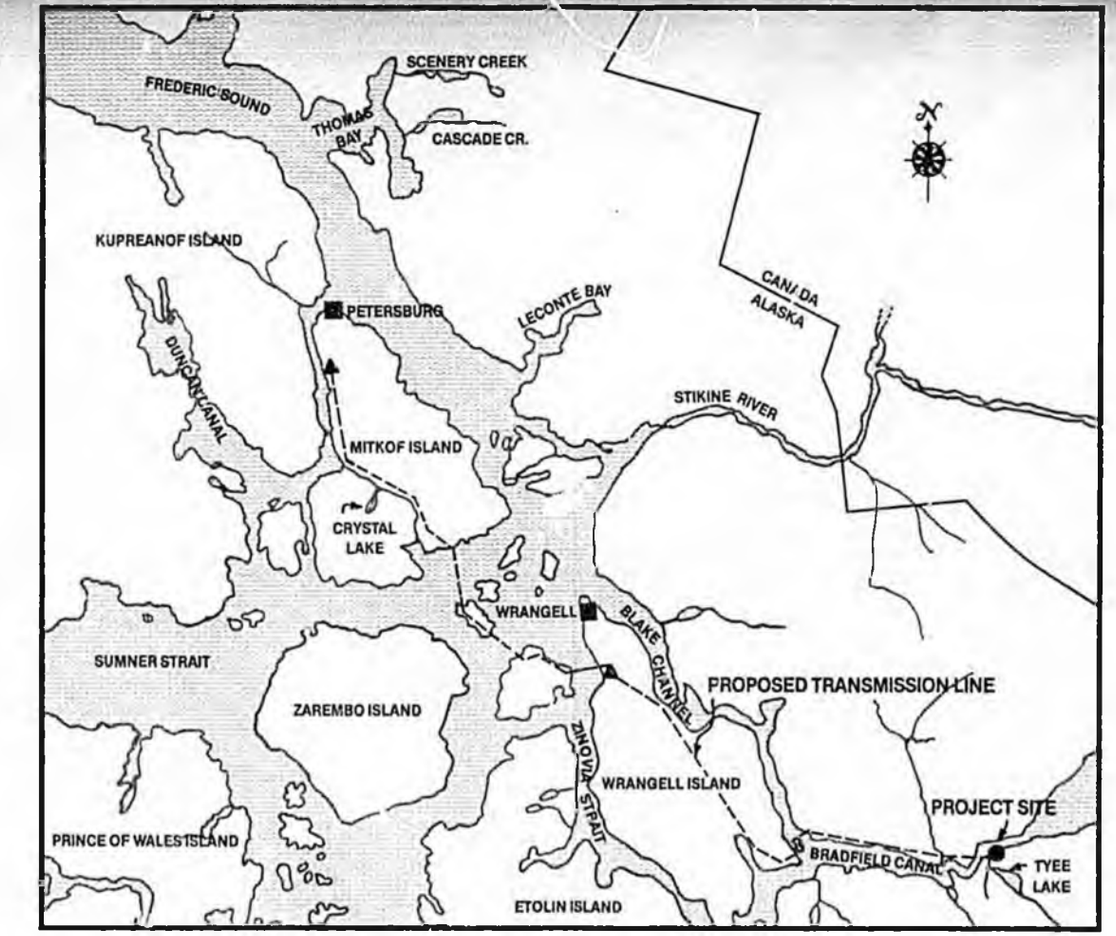
The resolution (HJR 62) authorizes the Alaska Power Authority to proceed with revenue bond sales of up to $70 million for the Tyee project and up to $120 million for the Swan Lake project.

Rep. Oral Freeman, D-Ketchikan, explained to his colleagues that the the Alaska Power Authority already has completed feasibility studies and general design work on the two projects. However, he said state law requires the authority to receive legislative authorization to proceed with bond sales.

Several other state bonding authorities are not required to get legislative approval, although Finance Chairman Russ Meekins, D-Anchorage, said lawmakers are considering a requirement that all bonding authorities get legislative approval prior to issuing bonds.

The Tyee Lake project is to be designed, built, financed and owned by the power authority. The Swan Lake project is to financed by the authority, while it is to be designed and built by the City of Ketchikan under an agreement worked out with the power authority.





TYEE LAKE HYDROELECTRIC PROJECT - PETERSBURG & WRANGELL, ALASKA

TYEE: Looking Toward The Year 2000 And Beyond

Efforts by the Thomas Bay Power Commission, in conjunction with work being done by the Alaska Power Authority, may result in ample and cheaper electric power for Petersburg and Wrangell residents. The Thomas Bay Power Commission was formed in 1973 to promote and develop dependable hydroelectric power for the area and to discontinue reliance on expensive diesel power generation. Its efforts have focused on the Tyee Lake Hydroelectric Project, located about 40 miles southeast of Wrangell in some of the most rugged wilds of Alaska.

"The Thomas Bay Power Commission originally investigated building a hydroelectric facility at Thomas Bay, but the proposal proved too costly," explains Richard Ballard, chairman of the commission.

Harry Sundberg, secretary of the commission, said they then focused studies on Tyee Lake and turned to the Alaska Power Authority for feasibility studies and engineering assistance.

The Power Authority's investigation indicates that Tyee Lake could free Petersburg and Wrangell from the economic stranglehold of diesel generation, at an investment cost of $53,333,000. This figure approximates the value of taxable property in both Petersburg and Wrangell, which is about $56 million each.

Diesel fuel prices are going nowhere but up. In 1973, the Petersburg utility could produce electricity at a cost of about one cent per kilowatt hour. Today, the same amount costs seven cents per kilowatt hour. The reason is that in 1973, diesel fuel cost the utility 13 cents a gallon; today (January 1980) it costs 87 cents and is skyrocketing almost monthly.

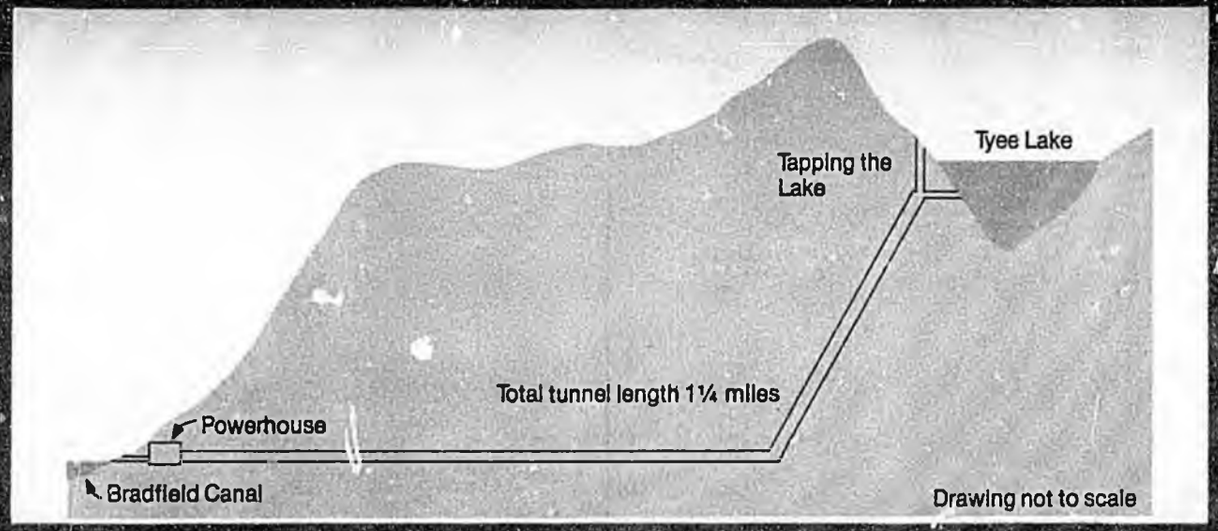
Tyee power will not be cheap during the early years of operation. In fact, for the initial years of operation, Tyee may result in higher utility bills than would otherwise be realized from diesel generation.

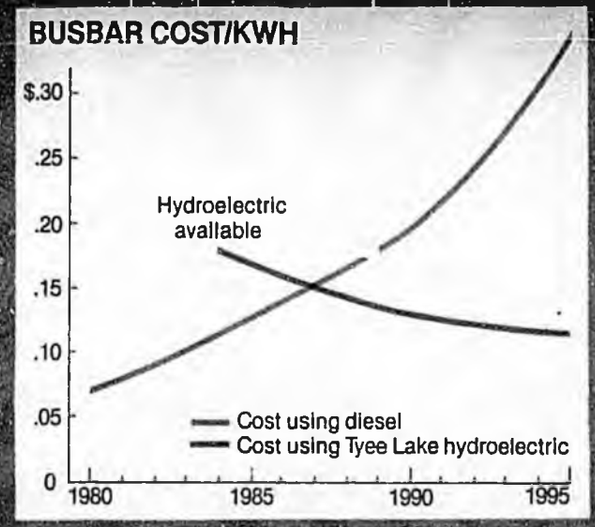
After the excess energy has been fully absorbed by the two communities, however, and during the remainder of the Tyee project life, power costs in Petersburg and Wrangell will be significantly lower than diesel generation.

The beauty of hydroelectric power generation is that once a plant is producing power, energy is derived from falling water and the costs remain relatively constant. For example, electric bills for Petersburg residents already are materially lower than for Wrangell residents because of the existence of hydroelectric facilities in Petersburg.

The hydroelectric potential of Tyee Lake has been recognized for many years. Efforts were made as early as 1921 to build a dam at the Tyee Lake outlet, but the project never materialized.

The Tyee Lake Hydroelectric Project, designed to deliver 20 megawatts of power,





Tyee Lake Hydro-electric Project

would come on line early in 1984 and serve the residents of Petersburg and Wrangell and their service areas through an 83-mile long transmission line, nine miles of which would be under water.

During the first phase of the Tyee project, water drawn from the lake would pass through a 10-foot diameter tunnel into an underground powerhouse containing two turbine generators (there are provisions to add a third turbine about 1995) and then would be released into Bradfield Canal.

Engineering studies conducted by the Alaska Power Authority indicate that the total 20 megawatt output would be fully used within 11 years from the time Tyee goes on line. It is then that Tyee Phase II—a dam at the lake's outlet to raise the water level—would be constructed. Plans are to have the dam and the third turbine generator on line by the year 2000.

Where would the money come from to construct the Tyee Lake Project?

The Alaska Power Authority would issue revenue bonds in cooperation with a trustee bank, as well as receive a loan from the State of Alaska.

The Authority would own and operate the project and supply electricity to Petersburg and Wrangell through wholesale power sales agreements, or by lease agreements with the Thomas Bay Power Commission.

The mile-and-a-quarter long tunnel, above, measuring 10 feet in diameter, will draw water from Tyee Lake into an underground powerhouse containing two turbine generators. The water is released into Bradfield Canal. If tunnel construction begins in mid-August 1981, as planned, it will be completed by May 1982. Below are some of the more than a dozen permits and clearances required for the Tyee Lake project. These must be obtained before even the first shovel of earth can be dug. The Federal Energy Regulatory Commission (FERC) is the agency which issues license for construction.

This graph shows the cost of generating electricity in the Petersburg/Wrangell area. The orange line shows the continued use of diesel power generation based on 1980 fuel prices and escalated at 10 percent per year. The solid blue line represents the intermediate (expected) load growth forecast for the Tyee Lake Hydroelectric Project. The initial costs of Tyee are higher than diesel for the first years of operation. As potential power output is more fully used, the costs go down. This decreasing cost trend would be accelerated if homeowners, faced with rising fuel oil prices, convert to electric heating after Tyee Lake power is available.

SCHEDULE FOR CONSTRUCTION OF TYEE PHASE I

Mid-1980: Site planning at Tyee Lake.
1981-1982: Tunnel excavation at Tyee Lake.
1981: Build transmission line intertie between Petersburg and Wrangell. Construct substations.
1982: Build transmission line between Tyee and Wrangell.
1983: Lay nine miles of submarine transmission cable.
Late 1983-Early 1984: Testing and start-up of facility with power on line early 1984.

Thomas Bay Power Commission
Richard Ballard, Chairman

Alaska Power Authority
Eric Yould, Executive Director

March 1980

ALASKA POWER AUTHORITY

SWAN LAKE HYDROELECTRIC PROJECT

SUMMARY AND

FINANCING STATEMENT

This report summarizes key characteristics of the Swan Lake Hydroelectric Project for the purpose of satisfying requirements of Section 180 of Alaska Statute 44.56.

CONTENTS

INTRODUCTION

The Ketchikan Public Utilities (KPU) submitted a Federal Energy Regulatory Commission (FERC) license application in February of 1979. Approval of the license for construction is expected by July of 1980. Ketchikan Public Utilities has applied for and received Project loans from the Water Resources Revolving Loan Fund and $3,450,000 in loans from the Power Project Revolving Loan Fund administered by the Power Authority. Loans to date have been principally for the preconstruction costs of Project development and for purchase of equipment to automate the KPU generation control system. The City of Ketchikan has requested that the Alaska Power Authority issue revenue bonds to finance construction of the Project.

The Alaska Power Authority desires to assist KPU by issuing revenue bonds to finance construction, interest during construction and a reserve fund for the Swan Lake Project. The financing will be accomplished through the tax exempt municipal market with security provided only by the merits of the Project and the strength of sales contracts for Project power. A request for $18,000,000 in state assistance in financing construction of the Project has been requested. This amount will permit flexibility in entering the bond market for the remainder of the construction financing needs, diminish the amount of bond indebtedness by $25,000,000, and indicate state support and interest in the Project to the benefit of the overall Project financing. State assistance in the form of a subordinate loan to the Project debt with graduated interest payments and/or deferred principal payments will permit lower cost power in the early years of operation and contribute to the overall security of the Project.

PROJECT DESCRIPTION

The Project site is located at Swan Lake in a remote area approximately 22 air miles northeast of Ketchikan near the northern end of Carroll Inlet. Swan Lake, a low-elevation lake surrounded by mountains, drains westward through a narrow gorge and into Carroll Inlet via Falls Creek. Historical stream gaging records and correlations with nearby basins indicate that the basin yields an average of 335,000 acre-feet of runoff per year. The site is extremely well suited for the development of a hydroelectric generating facility and, based on the optimization studies conducted, a project arrangement has been selected which will permit the maximum economical utilization of the site potential.

The selected Project arrangement will consist of: a 190 foot high thin arch concrete dam located approximately one mile downstream from the outlet of Swan Lake; a 2,280 foot long concrete lined power tunnel leading to a powerhouse located just north of the mouth of Falls Creek near tidewater; a permanent port facility located at tidewater approximately 1,000 feet north of the powerhouse site; about one mile of access roads connecting the port facility, powerhouse and dam; a switchyard located just north of the powerhouse; approximately 30.5 miles of 115 KV wood pole transmission line crossing Carroll Inlet from the powerhouse site with a single overhead span, extending south along the west side of the Inlet, and then west across the northern tip of George Inlet up the White River Valley and past Ward Cove and then south to the proposed substation site near the existing S. W. Bailey Diesel Plant. The Project will have an installed capacity of 22,000 KW, will operate under an average gross head of 311 feet and have a dependable capacity of 18,000 KW delivered to the load center. It will be capable of delivering 85,400,000 kwh average annual energy and 66,700,000 kwh of firm annual energy to the load center. For the scheduled on-line date of November 1983, the Project is estimated to have Total Capital Requirements of $107,000,000 including inflation, interest and issue costs.

Existing Capabilities and Projected Demand

The KPU system includes 8,550 KW of existing hydroelectric capacity which produces 62.7 Gwh of energy, and 17,320 KW of diesel generation capacity to supplement all additional demand. Peak power and average annual energy forecasts for Ketchikan are:

Year	Peak Power MW	Annual Energy kwh X 106
1975	14.5	76.6
1980	17.3	97.7
1985	22.5	124.7
1990	28.0	158.0

The capacity and energy of Swan Lake will be fully utilized by 1989 if the 10 year historic load growth of 5%/year is maintained. All excess energy may be marketed to the Louisiana Pacific Ketchikan Pulp Mill through a power sales contract, in which case the Project power may be fully utilized upon first operation.

Alternatives Considered

Lake Grace, Mahoney Lakes, and continued use of diesel generation were alternatives considered to the Swan Lake Project. Lake Grace is larger than Swan Lake and has potential environmental constraints that would preclude development since it is located in a restricted land status area. Mahoney Lakes, which has roughly 1/2 the power and energy potential of Swan Lake, was determined to be too samll to meet long term needs of the Ketchikan system. Continued dependence on diesel generation is determined to be the least feasible of all alternatives.

Environmental Impacts

The environmental impacts of the Swan Lake Project and associated transmission line are principally associated with the construction activity itself, and the visual distractions the completed system will have on the presently undisturbed surroundings. Over the long run, imbalances or alterations in the existing wildlife and fishery ecosystems of the area are not anticipated. There are no endangered species known to inhabit the Project area.

Air and Water Quality

Operation of the Project would not degrade air quality. However, some temporary impacts on air quality may be experienced during construction, due to exhaust and crankcase emissions from vehicles and construction equipment and the dust generated by drilling and movement of equipment. Noise levels will increase due to blasting, machinery operation, and other construction activities. Project operation will result in some increased noise, particularly in the vicinity of the powerhouse. However, this impact is expected to be minor.

Construction of the dam and dikes would introduce sediment into Falls Creek. Other surface waters may experience increased sediment loads due to clearing and earth moving operations along the transmission line route and quarrying and land clearing operations in other Project areas. During Project operation fluctuations in the water level of Swan Lake may cause soil erosion which would introduce sediments into Falls Creek.

Land Use

Direct impacts on land use would stem from the inundation of 450 acres of land presently covered with shrub and the removal from alternative uses of 240 acres along the transmission line routes. The impact of the Project on regional land use patterns is not expected to be severe. The inundated acres represent an addition to an existing reservoir. The main transmission line would be constructed in a route containing limited timber and recreational uses. The existence of the line would interfere with the area's scenic and aesthetic qualities.

Social and Economic Impacts

Project construction activity would focus on the Ketchikan area. The level and duration of social and economic impacts would depend on a number of factors, including the need to import a Project workforce, the number of workers who would be accompained by dependents, their length of stay, and the ability of Ketchikan to absorb a small increase in demand for housing, public services and consumer goods. Most workers will be physically located at a temporary field camp near the powerhouse location. These impacts would be primarily secondary, short-term economic impacts associated with personal consumption expenditures of the Project workforce.

Engineering Considerations

The dam site 2,800 feet upstream from the mouth of Falls Creek is a suitable location for a concrete arch dam. The crystalline schist bedrock at the site would provide an adequate foundation for this type of structure. To elimate the hazard of locating a surface penstock through an area which might be subject to landslides and snowslides, a concrete lined power tunnel constructed in bedrock is proposed. The powerhouse site adjacent to the mouth of Falls Creek on Carroll Inlet has adequate bedrock for the foundation of the p werhouse. The spillway preliminary design accommodates only 50% of the probable maximum flood inflow into the reservoir, therefore the non-overflow portions of the arch dam must be designed to accommodate this infrequent occurrence. The 115 KW transmission line is adequately sized to accomodate Swan Lake power transmission. The necessity to upgrade the transmission line to accommodate additional sources of power should be considered prior to construction.

Economic Feasibility

The Swan Lake Project was compared to the Lake Grace, Mahoney Lake, and all diesel alternatives in an economic analysis. Results of the analysis are that any hydroelectric alternative is superior to continued dependence on diesel. The Mahoney Lakes Project has a lower cost/KW than the Swan Lake Project, however, reliance upon supplemental diesel generation

occurs from first power-on-line of this Project which is too small to satisfy long term needs. The Lake Grace Project has environmental problems, it is larger than Swan Lake, and the cost/KW of power is equal to Swan Lake. The Swan Lake Project satisfies the long term needs of the KPU system, and depending upon the rate of escalation of diesel fuel over the normal rate of inflation, the Project can achieve cost savings to the system of between $2 and $22 million over the first 10 years of Project operation.

Project Costs and Financing

Without state assistance, an estimate of Project costs are:

Land and Land Rights	$ 572,000
Powerplant Structures and Improvements	4,010,000
Reservoirs, Dams and Waterways	23,232,000
Water Wheels, Turbines and Generators	5,866,000
Accessory Electric Equipment	1,649,000
Miscellaneous Power Plant Equipment	3,430,000
Construction and Access Facilities	9,082,000
Transmission Facilities	11,428,000
Subtotal - Direct Construction Cost	$59,269,000
Sales Tax	-0-
DIRECT CONSTRUCTION COST	$59,269,000
Contingencies,	8,761,000
Subtotal	$68,030,000
Engineering	8,396,000
TOTAL CONSTRUCTION COST	$76,426,000

The total amount of the revenue bond issue will be approximately $107,000,000 to include interest during construction, funding of reserve funds, and costs of issuance. This amount could be decreased by $25 million if the recommended amount and form of state assistance is approved. The $18,000,000 loan to the Ketchikan Public Utilities would be subordinate debt to the bond indebtedness, with graduated interest payments and deferred principal and interest payments to shape overall Project debt service in a manner to improve the revenue bond Project financing.

The ability of the Project to be financed without state assistance is questionable due to the Project size, amount of the bond issue, and the potential for power excess to system needs in the early years of operation. Without state assistance, an interest penalty on the overall bond issue will result in even higher power costs for Ketchikan consumers.

The Power Authority may issue contract revenue bonds (under an Indenture of Trust between the Power Authority and a trustee bank) for the difference between Project capital requirements and a subordinated State loan. Under the plan, the Power Authority would own the Project, KPU would have the option to purchase after obligations are repaid, KPU would operate/maintain the facilities, KPU would be responsible for debt service, KPU would set rates to collect revenues with a stipulated coverage. The bonds would be amortized over 40 years, with the Reserve and Contingency Funds paying the last years and one-half debt service.

CONCLUSION

This summary was prepared by the staff of the Alaska Power Authority to comply with Section 44.56.180 of the enabling statutes of the Power Authority. The maximum amount of bonds estimated to be necessary to finance the Swan Lake Project is $120 million. The Power Authority intends to assist the Ketchikan Public Utilities to finance the Project with state assistance in the form of an $18 million subordinate loan. The Power Authority does not intend to design, construct, or operate the Project itself. The Project will be designed, constructed, and operated by Ketchikan Public Utilities, with rights to the capacity remaining with the Utility, and ownership of the Project determined by the optimal acceptable form of revenue bonds issued for the Project. Ultimate ownership rights upon retirement of debt service will remain with the Utility. The general design and financial feasibility of the Swan Lake Project is acceptable, and the Project should proceed to construction. The Power Authority recommends that the Legislature adopt a joint resolution approving the general design and financial feasibility of the Swan Lake Project, approve action of the Power Authority to issue bonds in a maximum amount of $120,000,000 for the Project, and approve state assistance in the form of an $18 million subordinate loan for the Project.

Introduced: 3/21/80
Referred: Resources and Finance

IN THE HOUSE BY THE RULES COMMITTEE

HOUSE BILL NO. 967

IN THE LEGISLATURE OF THE STATE OF ALASKA

ELEVENTH LEGISLATURE - SECOND SESSION

A BILL

For an Act entitled: "An Act relating to the Alaska Power Authority and approving the general design and maximum amount of bonds for power projects; and providing for an effective date."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

* Section 1. Actions taken by the legislature before the effective date of this Act to approve the general design and maximum amount of bonds for power projects are confirmed and the Alaska Power Authority is authorized to issue its bonds for the following power projects in the maximum principal amount set out after each:

(1) Solomon Gulch, $20,000,000;

(2) Terror Lake, $120,000,000;

(3) Golden Valley Electric Association waste heat, $110,000,000;

(4) Tyee Lake, $70,000,000;

(5) Swan Lake, $120,000,000;

(6) Glacier Highway Electric Association, $800,000;

(7) Cordova Electric Cooperative, $6,500,000;

(8) Matanuska Electric Association, $2,500,000;

(9) Homer Electric Association, $3,360,000; and

(10) Naknek Electric Association, $730,000.

* Sec. 2. This Act takes effect immediately in accordance with AS 01.10.-070(c).

LAW OFFICES
WOHLFORTH & FLINT
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900 WEST 5TH AVENUE, SUITE 505
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PETER ARGETSINGER
W. J. PAT SORSBY

TELEPHONE
AREA CODE 907
276-6401

Rule 19 by John Sund

March 17, 1980

Hon. Bill Miles
Co-Chairman/Resources Committee
House of Representatives
Pouch V
Juneau, Alaska 99811

Re: Ability of Alaska Power Authority to Issue Revenue Bonds in Light of State v. A.L.I.V.E. Voluntary (No. 2022, February 19, 1980) - Our File No. 3610.

Dear Representative Miles:

On March 14, 1980 during a drafting session in regard to HB 953 we indicated to you that we had advised the Alaska Power Authority that in view of the recent Alaska Supreme Court decision in the A.L.I.V.E. Voluntary case referenced above the Authority could not now issue any of its revenue bonds even though previously approved by resolution. At the conclusion of that discussion we agreed to reiterate that opinion in the form of a letter to you, enclosing a bill which we believe will remedy the problem. Eric Yould has also requested that we communicate this information to Representative Gardiner with whom he has also discussed the matter.

The Alaska Power Authority Act in AS 44.56.180(c) provides that the Authority may not design, acquire and construct a new project, nor may it issue its bonds in that regard unless the Legislature has adopted "a joint resolution approving the general design and maximum amount of bonds". In addition, AS 44.56.180(b) requires prior approval of the Legislature by joint resolution before the Authority may proceed with the engineering or design phase of power projects the financing of which will include a guarantee of indebtedness by the permanent fund or an appropriation from the general fund. An occasion to utilize the latter of these approval processes where a project will be "subsidized" has not yet been presented. However, the Legislature has previously passed AS 44.56.180(c) joint resolutions approving the issuance of bonds in regard to three projects and joint resolutions approving an additional eight projects are now pending. In addition, HB 953 as introduced on March 11, 1980 would provide that the Legislature by concurrent resolution may prevent the Authority from proceeding beyond the completion of a reconnaissance study in regard to a new power project.

The Supreme Court of the State of Alaska in the A.L.I.V.E. Voluntary decision recently held that the Legislature may not annul a

regulation of an agency or department of the State by adopting a concurrent resolution which so provides. Holding that this method of proceeding violates Article II of the Alaska Constitution, the Court indicated that while the Legislature may express its views and desires (i.e., recommend or act in an advisory capacity) by resolution, when it expected to speak with the force and effect of law (i.e., exercise its legislative power) it must follow the constitutional safeguards which surround enactment of a bill. As Justice Matthews stated in writing the A.L.I.V.E. Voluntary decision,

> "Of course, when the legislature wishes to act in an advisory capacity it may act by resolution. However, when it means to take action having a binding effect on those outside the legislature it may do so only by following the enactment procedures. Other state courts have so held with virtual unanimity." [Slip Opinion at pp. 10, 11]

In view of the Court's decision and after an analysis of the language of the decision, including that quoted just above, we have advised the Alaska Power Authority that, under the present language of the Alaska Power Authority Act which provides for legislative approval of Authority bond issues by joint resolution, it may not issue bonds which have been approved by resolution.

Further, we have advised the Authority that, in our opinion, the approval by resolution provisions of the Act are not severable so that the Authority may not go forward in the absence of legislative approval which meets the mandate of the Alaska Constitution as interpreted by the Supreme Court in A.L.I.V.E. Voluntary. Faced with such a situation we believe that a court would hold that the Legislature clearly had in mind a process involving approval by the Legislature prior to the issuance of bonds and that, therefore, the court would hold that the bonds could not be issued until the process was lawfully completed, or the approval requirement modified by the Legislature.

In view of the doubtful constitutionality of the use of a joint resolution to approve the bonds of the Authority, we have drafted legislation in the form of a bill which would allow the Authority to issue its bonds to finance the projects heretofore approved or expected to be

approved this Session by joint resolution. A copy of that bill is attached.

Very truly yours,

WOHLFORTH & FLINT

By _____
Pete Argetsinger

PA:jr

cc: Hon. Terry Gardiner
Mr. Eric P. Yould

March 24, 1980

6967 Laser Drive
Anchorage, Alaska
99504

Senator Arliss Sturgulewski
Pouch V
Juneau, Alaska 99811

Dear Arliss:

After talking to you the other day regarding the proposed hydro project at Ketchikan I got out some old information R.W. Beck had given me as well as the more up to date data from Eric Yould. Other than a general interest in hydro development I enjoyed studying this project since I am familiar with the area. I grew up there and still have family and friends in Ketchikan.

As I stated before it is not possible to correctly evaluate a power project without information on all energy requirements of the area. This is becoming even more the case as it becomes clear that dependence upon petroleum must be reduced and eventually eliminated. The handwriting is also on the wall that all combustion of carbon based fuels must be reduced to an absolute minimum. Current technology can now provide the required alternatives for all except transportation related requirements. In time hydrogen and improved batteries will be available for transportation needs. The use of biomass such as burning wood, wood waste or organically produced alcohol is also being advocated by some but it cannot be a long term solution. The immediate effect of burning carbon is the same whether it comes from wood, alcohol, coal or oil. Even though biomass carbon comes from the carbon dioxide in the air a long residence time in a fixed state is necessary for a stable carbon cycle. In fact it is now believed that at least half of the CO_2 build up is due to shorting the carbon residence time in the biosphere by human activities. I am certainly not advocating that we stop using wood as a domestic fuel supplement, or as a total supply where appropriate, but I do want to see that we avoid future problems and restrictions which are sure to come as global pollution problems become more pressing.

Returning to the immediate question, I have made an estimate of the Ketchikan area stationary energy requirements. These are current needs and do not include any allowance for growth. They are as follows:

K.P.U. Current generation	82.2 million KWH
Space heating (now primarily oil)	105.5 million KWH
L.P.K. pulp mill (now primarily oil)	15.0 million KWH
Total area stationary energy use	202.6 million KWH

The figure for heating requirements is based upon data on estimated needs if conversion from oil to electric heat occurred. The total number is mine based on that data and the number of residential and commercial customers they now have. I checked this against the electric and oil equivalent of our own home gas use and even allowing for differences in the climate I believe the number I used is quite low.

Their currently existing hydro capacity can produce 62.7 million KWH and the proposed Swan Lake project could produce an average of 85.4 million KWH, so in terms of absolute need for energy the project is not too large. Ultimately they will need this project and more. The problem is financial and one of the proper sequence of development. While to stop using oil for space heating and power generation is the ony rational action in the long run, people are not going to willingly replace $1.00 per gallon oil with electricity at over twice the price just for the sake of conservation. On the other hand the longer the hydro is delayed the more it will cost and delay will just make the inevitable transition more painful. I don't think anyone could live in Southeast long without realizing that sunshine there comes in the form of rain.

Now as to the other smaller project, Mahoney Lake. The data on the Mahoney Lake project in the Electric Power in Alaska report done by I.S.E.R. I found highly suspect. However, among the Beck material I did find what appears to be a reasonable estimate for the project. If fact, if the Beck data and projections had been properly interpreted, Mahoney Lake is the project that should have been pushed for first.

The current construction cost estimate for Swan Lake is $75 million, the remainder of the required funds are for interest during construction, reserves, financing costs, etc. Escalating the old Beck estimate for Mahoney Lake by the same factor (1.23) as required to bring the old Beck estimate for Swan Lake up to current costs yields a construction cost of $36.5 million. Assuming both plants are built for 50% load factor (more or less standard practice), one gets a cost of $3847/Kw for Swan Lake and $3313/Kw for Mahoney Lake. Thus Mahoney Lake should produce cheaper energy if escalation and inflation factors are removed. Beck analyzed the first ten years energy costs for four alternatives. Swan Lake, Lake Grace (a larger project yet), Mahoney Lake and continued expansion of the diesel plant. They showed that the first ten years energy cost was lower for Swan Lake. Under their assumptions this was true but from an engineering and financial standpoint, one should look at the present worth of future costs not just future costs. Present worth analysis takes into account the time value of money and of course shows the benefits of deferring investments which can be deferred while for a simple sum a future cost counts the same as a present one. Using

the present worth approach the Beck numbers indicate a lower levelized life cycle cost for Mahoney Lake. Looking at the year to year cost of these alternatives shows Swan Lake power costing initially about 50% more than Mahoney Lake power. It is only in the sixth year that the annual cost of Swan Lake power becomes cheaper. These are old estimates and projections and I have not taken the time to update them except as noted. Current oil costs and escalations have been higher than anticipated and load growth somewhat less, but all in all I think a good job was done in everything except interpreting the results.

Clearly they should have worked on Mahoney Lake first, but it does not automatically follow that is what should be done now. If because of licensing and/or design problems it would take two years longer to start actual construction on Mahoney Lake it would no longer be the more economical producer of power. At 15% annual inflation, which may be on the low side just now, Mahoney Lake goes to $3810/Kw with one year delay and to $4381/Kw in two years. Since escalation will effect the cost of energy over 40 years, it will utltimately make up for differences in the available load during the early years. Therefore the correct project to build is the one which can be built first.

The other factor is what the people are willing to pay at the front end for power rates. I would assume that the elected representatives from Ketchikan should be able to evaluate community feeling on that issue.

Since transmission line problems have been such a problem in Juneau it may become a issue here. I have walked over a good portion of the proposed Swan Lake route and have seen from the water most of the remainder so I feel confident the proposed route will not have severe problems such as the Snettisham line or even the Turnagain line has had.

Sincerely,

Thomas R. Stahr

TRS:slg

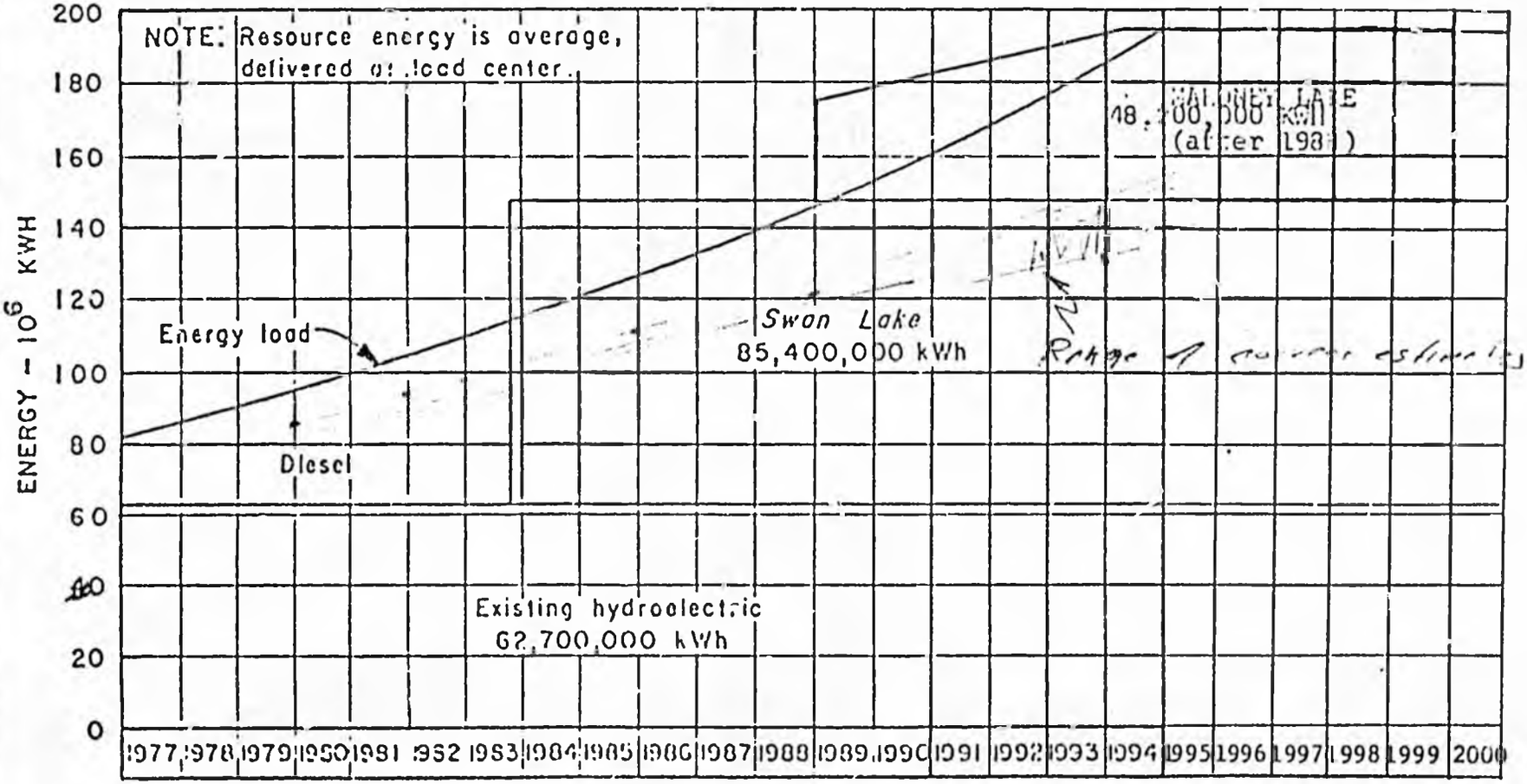
SWAN LAKE, LAKE GRACE AND MAHONEY LAKE PROJECTS

Table 1

COST ESTIMATE SUMMARY

ITEM	PROJECT SWAN LAKE	LAKE GRACE	MAHONEY LAKE
1. Preparatory Work	$ 3,378,000	$ 5,611,000	$ 3,460,000
2. Dam and Reservoir	9,719,000	8,498,000	629,000
3. Power Tunnel	4,785,000	9,720,000	7,229,000
4. Power Plant Civil Work	2,614,000	2,905,000	2,125,000
5. Power Plant Mechanical Equipment ...	2,772,000	2,890,000	1,200,000
6. Power Plant Electrical Equipment ...	2,534,000	2,700,000	1,400,000
7. Transmission and Switchyards	9,540,000	13,600,000	420,000
TOTAL DIRECT CONSTRUCTION COST ...	$35,342,000	$45,924,000	$16,463,000
Contingencies	5,301,000	6,889,000	3,293,000
Subtotal	$40,643,000	$52,813,000	$19,756,000
Engineering & Owner Administration	5,081,000	6,602,000	2,469,000
TOTAL CONSTRUCTION COST (Bid Date January 1977)	$45,724,000	$59,415,000	$22,225,000
Interest During Construction (5%/yr.)	3,429,000	4,456,000	1,667,000
TOTAL INVESTMENT COST (Bid January 1977, On-Line September 1980)	$49,153,000	$63,871,000	$23,892,000
Escalation (7%/yr.)	15,277,000	19,851,000	7,426,000
TOTAL INVESTMENT COST (Bid January 1981, On-Line September 1983)	$64,430,000	$83,722,000	$31,318,000
subtract IDC	− 3,429.000		− 1,667,000
	61,001.000		29,651,000
Current estimate	75,000,000		36,455,550
Factor	1.23		

Chart No. 2



ENERGY

SWAN LAKE, LAKE GRACE AND MAHONEY LAKE PROJECTS

COST OF POWER - COMPARISON OF ALTERNATIVES

	ANNUAL COST - $1,000(1)									
	1983-84(2)	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93
P.W. factor	.93	.87	.82	.76	.71	.67	.62	.58	.54	.51
SWAN LAKE ALTERNATIVE										
Hydro Debt Service (3)	3,592	3,592	3,592	3,592	3,592	3,592	3,592	3,592	3,592	3,592
Hydro O&M (4)	916	980	1,048	1,122	1,200	1,284	1,374	1,470	1,543	1,683
Existing Diesel O&M (Fuel)	-	-	-	-	-	-	513	1,180	1,983	2,919
TOTAL										
1. No Sale of Excess Energy	4,508	4,572	4,640	4,714	4,792	4,876	5,479	6,242	7,148	8,194
Credit for Sale of Excess(5)	-164	-175	-188	-208	-215	-	-	-	-	-
2. With Sale of Excess Energy	4,344	4,397	4,452	4,506	4,577	4,876	5,479	6,242	7,148	8,194
3. present worth of cost*	4,040	3,825	3,651	3,425	3,250	3,267	3,397	3,620	3,860	4,179
4 early cost/kwh mills	82.3	75.0	68.8	63.3	58.8	57.5				
LAKE GRACE ALTERNATIVE										
Hydro Debt Service	4,668	4,668	4,668	4,668	4,668	4,668	4,668	4,668	4,668	4,668
Hydro O&M	1,190	1,273	1,362	1,457	1,560	1,669	1,785	1,910	2,044	2,187
Existing Diesel O&M (Fuel)	-	-	-	-	-	-	-	-	527	1,361
TOTAL	5,858	5,941	6,030	6,125	6,228	6,337	6,453	6,578	7,239	8,216
MAHONEY LAKE ALTERNATIVE										
Hydro Debt Service	1,746	1,746	1,746	1,746	1,746	1,746	1,746	1,746	1,746	1,746
Hydro O&M	445	476	509	545	583	674	668	715	765	818
Existing Diesel O&M (Fuel)	740	985	1,316	1,721	2,170	2,653	3,335	4,182	5,135	6,242
New Diesel Debt Service (6)	-	-	-	-	-	-	254	504	504	504
New Diesel O&M (Fixed)	-	-	-	-	-	-	192	410	439	470
TOTAL	2,931	3,207	3,571	4,012	4,499	5,023	6,195	7,557	8,589	9,780
present worth of costs*	2,726	2,789	2,928	3,049	3,194	3,365	3,841	4,383	4,638	4,987
cents/kwh mills	55.5	54.7	55.2	56.3	57.8	59.2	67.5			
DIESEL ALTERNATIVE										
Existing Diesel O&M (Fuel)	2,704	3,210	3,791	4,457	5,217	5,690	6,088	6,514	6,971	7,458
New Diesel Debt Service	381	381	381	381	639	898	898	898	898	898
New Diesel O&M (Fixed)	290	310	355	355	577	827	885	947	1,014	1,084
New Diesel O&M (Fuel)	-	-	-	-	160	546	1,095	1,718	2,466	3,397
TOTAL	3,375	3,901	4,504	5,193	6,593	7,961	8,966	10,077	11,349	12,837
present worth of costs*	3,137	3,394	3,693	3,946	4,681	5,334	5,559	5,845	6,128	6,547
Generation Required to Meet Load -	59.5	66.6	69.6	72.9						
(10^6 kWh)	52.8	58.6	64.7	71.2	77.8	84.8	92.1	99.8	108.0	113.8

(1) - Costs of meeting Ketchikan loads during first ten years of project operation (1983-1993) exclusive of costs of existing hydro resources and diesel debt service.

(2) - Power Year, July 1983 through June 1984, typical.

(3) - Basis for hydro debt service is the same as shown in Table VI-1.

(4) - All O&M costs and diesel fuel costs are escalated at 7% per year.

(5) - Assumed 4,000,000 kWh/year of energy from the Swan Lake Project would be sold to LPK during first five years at 90% of diesel fuel cost.

(6) - Capital costs of all new diesels are based on current estimated costs escalated at 7% per year to on-line date.

* present worth @ 7%

KE GRACE AND MAHONEY LAKE PROJECTS

ER - COMPARISON OF ALTERNATIVES

Table 2

ANNUAL COST - $1,000(1)							Cumulative Total Cost ($1,000)	Average Cost (Mills/kWh)
86-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93		
76	.71	.67	.62	.58	.54	.51		
,592	3,592	3,592	3,592	3,592	3,592	3,592		
·122	1,200	1,264	1,374	1,470	1,543	1,68[illegible]		
-	-	-	513	1,180	1,983	2,919		
,714	4,792	4,876	5,479	6,242	7,148	8,194	55,165	67.0
-208	-215	-	-	-	-	-		
,506	4,577	4,876	5,479	6,242	7,148	8,194	54,215	65.8
425	3,250	3,267	3,397	3,620	3,860	4,179	36,514	44.3
63.3	58.8	57.5						
,668	4,668	4,668	4,668	4,668	4,668	4,668		
,457	1,560	1,669	1,785	1,910	2,044	2,187		
-	-	-	-	-	527	1,361		
,125	6,228	6,337	6,453	6,578	7,239	8,216	65,005	78.9
,746	1,746	1,746	1,746	1,746	1,746	1,746		
545	583	674	668	715	765	818		
,721	2,170	2,653	3,335	4,182	5,135	6,242		
-	-	-	254	504	504	504		
-	-	-	192	410	439	470		
,012	4,499	5,023	6,195	7,557	8,589	9,780	55,364	67.2
049	3,194	3,365	3,841	4,353	4,638	4,927	35,901	43.6
56.3	57.8	59.2	67.3					
,457	5,217	5,690	6,088	6,514	6,971	7,458		
381	639	898	898	898	898	898		
355	577	827	885	947	1,014	1,084		
-	160	546	1,095	1,718	2,466	3,397		
193	6,593	7,961	8,966	10,077	11,349	12,837	74,756	90.8
196	4,681	5,314	3559	5,845	6,128	6,547	48,266	58.6
72.9	[illegible]							
1.2	77.8	84.8	92.1	99.8	108.0	113.8	823.6(10^6) kWh Total	

* [illegible]

[illegible]

[illegible]