

736

HCRA

HJR 62

HJR

62

I have the APA

- Tyee Lake

Plan of Finance

by First SW

+
Swan Lake

Mark Wittow
40 Melane

line 29 page 1

WHEREAS the costs to be incurred in financing the Lake Elva hydro-electric project will require the issuance of revenue bonds of the Alaska Power Authority in a maximum presently estimated amount not to exceed \$ 15,000,000; and

line 5 Page 2

BE IT RESOLVED by the Alaska State Legislature that the general design of the Lake Elva hydroelectric generating project near Dillingham, and the incurring of revenue bond indebtedness by the Alaska Power Authority in a maximum amount not to exceed \$15,000,000 to pay the project are approved.



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 OTHER SPONSORS: _____
RECEIVED FROM: & Eliason FURTHER REFERRALS: Finance

HEARING DATE: 2/25/80

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

Rep. Ernie Haugen
Rep. Oral Freeman

Gave general overview of proposed projects with reference to feasibility studies prepared by the Alaska Power Authority. The State has already advanced money for the necessary planning and environmental review of these projects. (see study summaries supplied as background)

Dick Ballard, Thomas Bay Company of Wrangell

It should be made clear that the request is not for a handout. Front end costs are a problem for a small community. There is currently an indication that 25% of the excess power available would be used by local industry. City Creek is not seen as an alternative for Tyee as it is a "run-of-the-river" generation project. It will only be on the line 60-70% of the time as it is a conductive system which depends on the rainfall. Steam generation has been considered. Standby in the amount of the power used by the community is necessary. The existing diesel generators in Petersburg and Wrangell will be sufficient to provide the necessary backup. Consumers were paying \$.14 1/2 per kw in Jan. 1980. The costs for hydropower are related to paying off the bonds rather than to the cost of the water...

The costs to the consumer of energy generated by the projects were discussed in relation to the varying amounts of state funding considered. Rep. Freeman sees the value of the projects in the stabilizing of the energy costs which will take place. Also, the existing diesel machinery is old and will need replacement.

Ginny Chitwood, Municipal League
Supports the concept of hydroelectric power.

COMMITTEE ACTION: Postponed action until Ak. Power Authority representative can be contacted.

TA# : # 2 SIDE 2 Footage 1318-1671



Alaska State Legislature

House of Representatives

Committee on

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Pouch V
State Capitol
Juneau, Alaska 99811

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

ORIGINAL SPONSOR: Freeman, Haugen, Gardiner OTHER SPONSORS: _____
RECEIVED FROM: & Elison 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 studying 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 Tye.

Estimates indicate it would cost Petersburg \$5,000,000 extra to convert to electricity.

Yould indicated that in fact it might be a viable alternative to run Tye 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 development.

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 psychological 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

Belt from Maynard
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? *Intentional 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 - review

Petersburg/Wrangell - dependent on electrical conversion



Alaska State Legislature

House of Representatives

Committee on

Community & Regional Affairs

Pouch V
State Capitol
Juneau, Alaska 99811

Official Business

BILL WORK SHEET

BILL NUMBER HJR 62 RE Ch. Power Authority Tye Lake, & Swan Lake

Received from _____ Fical Note Tom Breckman
Referred to Finance LAA Legal Contact _____

CONTACTS: 3876 Cliscon Thomas Bay Power Authority
3720 Gardner (at speed) Ch. Power Authority 377-7641 - Eric Yell
4939 (will necessary material down at fiscal position)

Sponsor: 4993 Freeman
3879 Haugen
Petersburg - Bruce Aronson, Mgr. 772-4511
Wangell - Joyce Foster, Clerk 772-2332 874-2381
Stedehand James Van Alvoort 325-3111
Bob Arnold

(many copies)

Commerce

Terney
M. L. Luce

be in depth study on fish stocks - NOT JUST
studies on TALUTAN cycle? Fisherman's Request.

Alaska
Telex: 099-55-242
Phone (907) 874-3371



ALASKA LUMBER & PULP CO., INC.

LUMBER DIVISION

P.O. Box 591 . Wrangell, Alaska 99929

February 21, 1980

Thomas Bay Power Commission
Box 613
Wrangell, Alaska

Attn: Harry Sundberg

Dear Sirs:

As you are probably aware I met with the City Council members and the Mayor on February 17, 1980, to discuss the electricity needs of our new sawmill which is being built at the AWP 6-Mile site. This sawmill is expected to be in operation by March 15, 1981. Our engineering is now far enough along for us to forecast the electricity needs of that site. At present we anticipate in the new mill about 5,735 connected Hp. This along with the present sorter and powerhouse, plus our needs for heating and lighting, puts us in need of a considerable amount of power. The total connected Hp will be approximately 6,100. When this is broken down to Kw and to usage percentage, it breaks down as follows:

6,100 Hp x .75% = 4,575 Kw
4,575 Kw x .60% usage = 2,745 requirement.
2,745 Kw + 200 Kw (heating & lighting) = 2,945 Kw

AWP Producing Capacity = 1,800 Kw/hour.

2,945 Kw - 1,800 Kw = 1,145 Kw need.

As you can see we will need about 1,000 Kw/hour for all hours of operation plus some usage during non-operating hours.

We requested the City to install a new line from the power plant to the mill site so they could provide us with this power. At present they do not have the line capacity to do so.

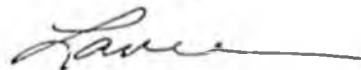
If you can be of any assistance to us in this project I would certainly appreciate it. This may fit into your future plans for hydro power from the Bradfield area. We are also considering in the future a whole log chipper which would add about 1500 Hp to our mill; however, at this time I am delaying this as the City does not have

the capability to handle both the new mill and this chipper.

If you have any questions please feel free to contact me about them.

Thank you.

Respectfully,

A handwritten signature in cursive script, appearing to read "L. Ingle", followed by a long horizontal flourish.

L. Ingle
Vice President

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.

ALASKA POWER AUTHORITY

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Alternatives Considered

Environmental Impacts

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Conclusion

ALASKA POWER AUTHORITY

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.

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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:

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

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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 small 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.

ALASKA POWER AUTHORITY

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 accompanied 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 eliminate 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 powerhouse. 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 accommodate 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

ALASKA POWER AUTHORITY

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.	<u>11,428,000</u>
Subtotal - Direct Construction Cost	\$59,269,000
Sales Tax	<u>-0-</u>
DIRECT CONSTRUCTION COST	\$59,269,000
Contingencies,	<u>8,761,000</u>
Subtotal.	\$68,030,000
Engineering.	<u>8,396,000</u>
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.

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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.

ALASKA POWER AUTHORITY

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.

7C Analysis of Governor's Decisions

ITEM	AMOUNT	FUNDING SOURCE	EXPLANATION
<p>Swan Lake Hydro Project</p> <p>Agency Request</p> <p>Gov. Rec.</p> <p><i>State growth rate 3.3% average 2.9% during '60-'90 10 1/2 mil per kilowatt 12x what it is now</i></p>	<p>18,000.0</p> <p>18,000.0</p>	<p>G.F.</p> <p>R.R.I.F.</p>	<p>The request is for a <u>subordinated loan</u>, needed to assure sale of revenue bonds. The Governor's recommendation is that the source of funding be the Renewable Resources Investment Fund (RRIF) rather than the General Fund.</p> <p><i>to you... ask for why not ask for it?</i></p> <p><i>1978 amendments rank projects - those that show those, show each appropriation show bond issues - subordinated loans etc - which I just return for the</i></p> <p><i>Compare cost - diesel, fuel Authority - How does this rank - ? Impact local gov't & construction? Plan for ranking projects -</i></p>

CATEGORY Development AGENCY Alaska Power Authority PROGRAM Economic Development

7C ANALYSIS OF GOVERNOR'S DECISIONS

000067

PROJECT TITLE Swan Lake Hydroelectric Project		LOCATION(S) Ketchikan	AREA SERVED Ketchikan	ELECTION DISTRICT(S) A - 1		
OBJ. NO(S) 4	OPERATING BUDGET BRUI(S) Alaska Power Authority	NAME(S)		BUDGET COMPONENT NUMBERS 08-71-7-060		
START DATE Sept. 1980		COMPLETION DATE August 1983				
PROJECT NARRATIVE I. Project Need Statement. The City of Ketchikan has increasing demand for electric energy which exceeds its existing hydroelectric capacity. Diesel generating capacity is used to provide power at a rapidly increasing price due to the cost of fuel. The project will be difficult to finance due to the restricted market area, the amount of project power that may be excess to initial demand, and the high cost in \$/KW for the project. It will be difficult for the utility to market debt for the full cost of the project unless a loan from the State subordinate to the revenue bond debt is made in a manner similar to the Green Lake project at Sitka. II. Project Description. The Swan Lake project consists of a dam, power tunnel, perstock, powerhouse, and 28 mile 115 KV transmission line to the City of Ketchikan. The project will have 22 MW of installed capacity producing 18 MW's of firm power and 69 million kwh of firm energy per year. A total of \$3,435,000 has been loaned by the state through the Power Project Revolving Loan Fund for design, license application, and purchase of equipment associated with the project in FY'79 and FY'80. A FERC license is expected to be approved by September of 1980, and construction will begin as soon as possible thereafter.		PROJECT TYPE				
		<input checked="" type="checkbox"/> Building Construction (C) <input type="checkbox"/> Other Improvement (I) <input checked="" type="checkbox"/> Equipment (E) <input checked="" type="checkbox"/> Land (L) <input checked="" type="checkbox"/> Professional Services (P) <input checked="" type="checkbox"/> Other (O) Hydroelectric Project Construction			APPROPRIATION REQUEST (000)	
		PROJECT CHARACTERISTICS			GOVERNOR'S RECOMMENDATION	
		<input checked="" type="checkbox"/> Totally New Facility <input type="checkbox"/> Addition to Existing Facility <input type="checkbox"/> Renovation of Existing Facility <input type="checkbox"/> Major Maintenance or Repair <input type="checkbox"/> Supplement Previously Authorized Units to Enable Completion <input checked="" type="checkbox"/> One of Several Phases <input checked="" type="checkbox"/> Major External Funding Source <input type="checkbox"/> Other			APPROVED <input checked="" type="checkbox"/> DEFERRED <input type="checkbox"/> DISAPPROVED <input type="checkbox"/> 1002 FED. RCPTS 1003 G/F MATCH 1004 GEN. FUND 1005 I/A RCPTS. G.O. BONDS 1015 RRIE 18,000.0 TOTAL	
NO YES SITE FEATURES		<input checked="" type="checkbox"/> Site Currently Owned? <input checked="" type="checkbox"/> All Utilities Available? <input checked="" type="checkbox"/> Access Already Available?				
OPERATIONAL COST & NO. PERSONNEL INCREASE (DECREASE)		FIRST OPERATING YEAR 1983	ULTIMATE ANNUAL YEAR 1984	PREVIOUS YR-PRIORITY 80-02		
FUNDING SOURCE		FED RCPTS		AGENCY PRIORITY		
		GEN. FUND		81-02		
		Project Revenues	150,000	150,000		
TOTAL ANNUAL OPERATIONAL COST		150,000	150,000	GOVERNOR'S PRIORITY		
POSITION (FTE)		2	2			

CATEGORY Power Development

AGENCY Alaska Power Authority

PROGRAM Economic Development

PROPOSED CAPITAL

000068

CAPITAL PROJECT EXPENDITURES (CASH FLOW)	TOTAL (000)	BUDGET YEAR (000)	BUDGET YEAR Plus 1	BUDGET YEAR Plus 2	BUDGET YEAR Plus 3	BUDGET YEAR Plus 4	REMAINING COST
Planning and Engineering							
Land							
Construction	18,000	18,000					
Equipment							
Administration and Other							
Total Annual Expenditure (Capital Cost)	18,000	18,000					

CONTINUATION OF NARRATIVE

III. Documentation of Estimated Capital Cost.

Construction costs estimates for the project were prepared by R. W. Beck and Associates in a Feasibility Report on the project for the Ketchikan Public Utility. The cost estimate of \$86 million included interest during construction and inflation throughout the construction period. The total amount of the bond issue to include financing costs and funding of reserves could exceed \$100 million which would be perceived by investors as too large for a community the size of Ketchikan. State assistance in the form of a subordinate loan will provide a degree of security to investors and result in a bond issue in a more acceptable range of \$80 million.

IV. Analysis of Estimate of Operational Expense.

The hydroelectric plants of the utility will all be fully automated as a result of funds made available to the community in FY'80. This will decrease significantly the operations and maintenance costs of the project for the utility. All O & M costs and debt service will be paid from revenues derived from the sale of electric power by the utility.

V. Identification of Alternatives Considered.

The alternatives available to Ketchikan are limited to other hydroelectric projects or continued dependence upon diesel generation and its associated rapidly increasing cost. Diesel generation is not considered a viable alternative in the short or long run based solely on economics. Other hydroelectric projects considered are Mahoney Lake, Lake Grace, and Lake Tyee. Mahoney Lake was considered too small by the utility and not adequate to meet long term needs even though the cost/KW for power from the project was less than Swan Lake. Lake Grace was encumbered by federal land actions. Lake Tyee was almost a year behind Swan Lake in development, and the merits of the project in relation to Swan Lake were unknown, since Lake Tyee was located 83 miles from Ketchikan. Considering the present progress of project development for Swan Lake, it appears to be the best short and long term solution to Ketchikan's power requirements since Lake Tyee can still be developed to provide future power requirements of the City.

CATEGORY Power Development AGENCY Alaska Power Authority PROGRAM Economic Development

PROJECT TITLE Swan Lake Hydroelectric Project

35b

PROPOSED PROJECT ANALYSIS

REVISED

000069

PROJECT TITLE Lake Tye Hydroelectric Project		LOCATION(S) Petersburg/Wrangell	AREA SERVED Petersburg/Wrangell	ELECTION DISTRICT(S) 2
OW NOIS' 4	OPERATING BUDGET BRU(S) Alaska Power Authority	BUDGET COMPONENT NUMBERS 08-71-7-060		START DATE
PROJECT NARRATIVE		PROJECT TYPE		COMPLETION DATE
<p>I. Project Need Statement.</p> <p>Petersburg and Wrangell are largely dependent on diesel electric generation and its associated increasing costs. A renewable resource alternative energy project would alleviate this condition. Either hydroelectric or wood/biomass power generation could be solutions. Both alternatives are being investigated, however the hydroelectric option is most favored due to its flexibility in operation, low O & M costs, and stable source of fuel. The project may also be capable of providing power to Kake and additional power to Ketchikan.</p> <p>II. Project Description.</p> <p>The Swan Lake project is in two stages. Stage 1 provides 15 MW of power and 69 million kwh/year of energy at a cost of \$45 million. It consists of a lake tap, power tunnel, penstock, powerhouse, 57 mile 115 KV transmission line to Wrangell, and a 31 mile 37 KV line to Petersburg. Stage II requires construction of a dam to increase storage capacity and the addition of generators in the powerhouse. Stage II produces an additional 15 MW's of capacity and 62 million kwh/year of additional firm energy.</p> <p>III. Documentation of Estimated Cost.</p> <p>R. W. Retherford Associates prepared a Preliminary Feasibility Report on the project and estimate in 1978 dollars a cost of \$41 million for the</p>		<input checked="" type="checkbox"/> Building Construction (C) <input type="checkbox"/> Other Improvement (I) <input checked="" type="checkbox"/> Equipment (E) <input checked="" type="checkbox"/> Land (L) <input checked="" type="checkbox"/> Professional Services (P) <input checked="" type="checkbox"/> Other (O) Hydroelectric Project Construction		APPROPRIATION REQUEST 1002 FED RCPTS. 1003 G/F MATCH 1004 GEN FUND 10,000 1005 I/A RCPTS. G.O. BONDS TOTAL 10,000
		PROJECT CHARACTERISTICS <input checked="" type="checkbox"/> Totally New Facility <input type="checkbox"/> Addition to Existing Facility <input type="checkbox"/> Renovation of Existing Facility <input type="checkbox"/> Major Maintenance or Repair <input checked="" type="checkbox"/> Supplement Previously Authorized Funds to Enable Completion <input checked="" type="checkbox"/> One of Several Phases <input checked="" type="checkbox"/> Major External Funding Source <input type="checkbox"/> Other		GOVERNOR'S RECOMMENDATION APPROVED DEFERRED DISAPPROVED <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 1002 FED. RCPTS: 1003 G/F MATCH 1004 GEN FUND 1005 I/A RCPTS. G.O. BONDS 1015 RRIF 10,000.0 TOTAL 10,000.0
NO YES SITE FEATURES		<input checked="" type="checkbox"/> Site Currently Owned? <input checked="" type="checkbox"/> All Utilities Available? <input checked="" type="checkbox"/> Access Already Available?		01-1035a (12/79)
OPERATIONAL COST & NO PERSONNEL INCREASE (OR DECREASE)		FIRST OPERATING YEAR 1984	ULTIMATE ANNUAL YEAR 1985	PREVIOUS YEAR PRIORITY 80-03
FUNDING SOURCE	FED RCPTS GEN FUND Project Revenues	200,000	200,000	AGENCY PRIORITY 81-03
TOTAL ANNUAL OPERATIONAL COST POSITION (ITE)		200,000 4	200,000 4	GOVERNOR'S PRIORITY

CATEGORY Power Development

AGENCY Alaska Power Authority

PROGRAM Economic Development

000071

CAPITAL PROJECT EXPENDITURES (CASH FLOW)	TOTAL {850}	BUDGET YEAR (000)	BUDGET YEAR Plus 1	BUDGET YEAR Plus 2	BUDGET YEAR Plus 3	BUDGET YEAR Plus 4	REMAINING COST
Planning and Engineering							
Land							
Construction	10,000	10,000					
Equipment							
Administration and Other							
Total Annual Expenditure (Capital Cost)	10,000	10,000					

CONTINUATION OF NARRATIVE

Stage I Project including 7% inflation and interest during construction. Due to increased inflation in 1979, an estimated cost of \$45 million is included in this project description. A detailed and updated cost estimate is presently being prepared by the engineer as part of the FERC license application. The two communities of Petersburg and Wrangell will have difficulty in financing the project on their own due to the dollar value of the bond issue relative to the size of the communities and the amount of excess project power remaining to be marketed in the early years of operation. A state loan for the project subordinate to the payment of revenue bond debt service will reduce the total dollar value of the bond issue, increase the security of the bonds and make them more marketable, and help to insure project financing. The state loan appropriation is required no later than FY'81 to insure availability of funds prior to the construction financing when the FERC license should be approved. Since the loan may be considered a capital project appropriation, the funds would guarantee timely project financing if they were appropriated in FY'81 for use upon receipt of the FERC license. In FY'80, HB 32 appropriated \$2 million for loans for the project. The Power Authority assumed responsibility for management and development of the project in response to a request of the Thomas Bay Power Commission and the two communities. The expenditure of the \$2 million appropriated for the project will have to be clarified by the legislature.

IV. Analysis of Estimate of Operational Expense.

All operating and maintenance expenses will be paid from project revenues and are estimated to be \$200,000/year with 4 FTE positions for Stage I, and increase by \$100,000/year with one additional FTE position with development of Stage II.

V. Identification of Alternatives Considered.

Alternatives considered to the Lake Tye project were other hydroelectric projects which were determined to be too large or small with a higher cost/kW of power produced, continued use of diesel generation with its asso-

CATEGORY Power Development AGENCY Alaska Power Authority PROGRAM Economic Development

PROJECT TITLE Lake Tye Hydroelectric Project

356 PROPOSED PROJECT ANALYSIS

REVISED

000072

ciated high operating and fuel costs, and wood waste combustion steam generation. The wood waste development appears competitive to Lake Tyee in the near term for a short period of economic analysis if a long-term low cost source of waste wood fuel can be established. The wood waste alternative has rapidly increasing fuel and operating costs which are subject to inflation. It also has a useful life of approximately 30 years, which is much shorter than a hydroelectric project.

CONTINUATION FORM

CATEGORY Power Development AGENCY Alaska Power Authority PROGRAM Economic Development 000073
PROJECT TITLE Lake Tyee Hydroelectric Project

*Better - small sites - decentralization
- it relates to viability of
communities. Monopoly is
problem.
Rec. of Public Utility Commission.
Gene Power & Energy + Resource Development
APA feasibility - give
position to Dept.*

February 5, 1980

TO: Representative Hugh Malone
Rm. 411, Capitol Bldg.

FROM: Margo W. Waring

RE: Lake Tyee Hydropower Development

Here are some initial thoughts on the Tyee situation:

1. No one is looking at a system approach to hydropower development. Each project proposed is over capacity.
2. Swan Lake (Ketchikan) expects a FERC license in September 1980. It will produce 69 million kwh/year. It needs a subordinate loan of \$20 million, of a total of \$100 million bonded, based on Ketchikan's growth rate that is inflated by about .8.
3. Lake Tyee is one alternative to Swan Lake. Tyee is one year behind Swan Lake. APA says Swan should be built "since Lake Tyee can still be developed to provide future power requirements" of Ketchikan (p.000069), despite the fact that Swan will produce great excess capacity.
4. Tyee will produce, at stage 1, 69 million kwh/year. Stage 2 will produce an additional 62 million kwh/year. Stage 1 will cost \$45-55 million and require a subordinate loan of \$10-15 million.
5. Report #HG 050800117036F identifies (p.19) nine different hydro sites for Petersburg and Wrangell. Wood waste burning is also an alternative.
6. For Petersburg and Wrangell it is apparently more cost-effective to develop several small sites, with shorter transmission lines, produce no excess capacity, and save considerable money in the provision of back-up capacity. The back-up capacity problem has been ignored in feasibility studies; but, significant costs are incurred for consumers when back-up is necessary for one large plant, instead of for ~~anemshi~~ plant.

*Cost of unusual
Water as
fuel growth
rate*

*Design
methods
originally
B & M*

*Hydroelectric
Eric Yule
Chart
B & M -
for BRC*

*All project
all which had
been*

scrutiny of project revenue financing is partially or totally eliminated [See Financing Addendum, pages 4-10]. As noted in the addendum, the cost and delays should be insignificant and the extra protection should be sufficient to offset any loss of usual market tests.

HS 570

Bill Miles
Sam Ruyco

ISSUE III:

TO INSURE THAT THE GOVERNOR AND LEGISLATURE RECEIVE A BASIC MINIMUM OF FEASIBILITY INFORMATION IN A STANDARDIZED FORM FOR ALL POWER PROJECTS PROPOSED BY THE AUTHORITY.

Option 1:

The Alaska Power Authority Statute should be amended as follows:

AS 46.56.180(c) is amended by adding the following new sentences immediately after the first sentence in the subsection [note: if the option suggested under Issue II above is also adopted, the sentences offered here should occur first] to read:

not limited to ->

Each feasibility study shall include but not be limited to, the following information: total cost, construction cost, operating and maintenance cost projections, construction timetable, revenue source, stream of revenues, rate of return (imputed), net present value, benefit cost ratio, potential environmental effect, potential effect on local communities, and the availability of alternative government financing. Each feasibility study shall also incorporate standardized non-site-specific parameters including: discount rate, interest rate by type of debt, fuel price escalation rate, state electric load growth and imputed values for non-cash costs and benefits. All values selected shall be consistent with those used in the Department of Commerce and Economic Development long term electric power development plan, when adopted. The authority may include an analysis based on different values with an explanation for any differences.

MS
discuss in
alternatives
as rejected
market, project, G. funding

Subordinated Loan subsidies - make a project revenue not financially - reduce total debt make unfeasible projects feasible.

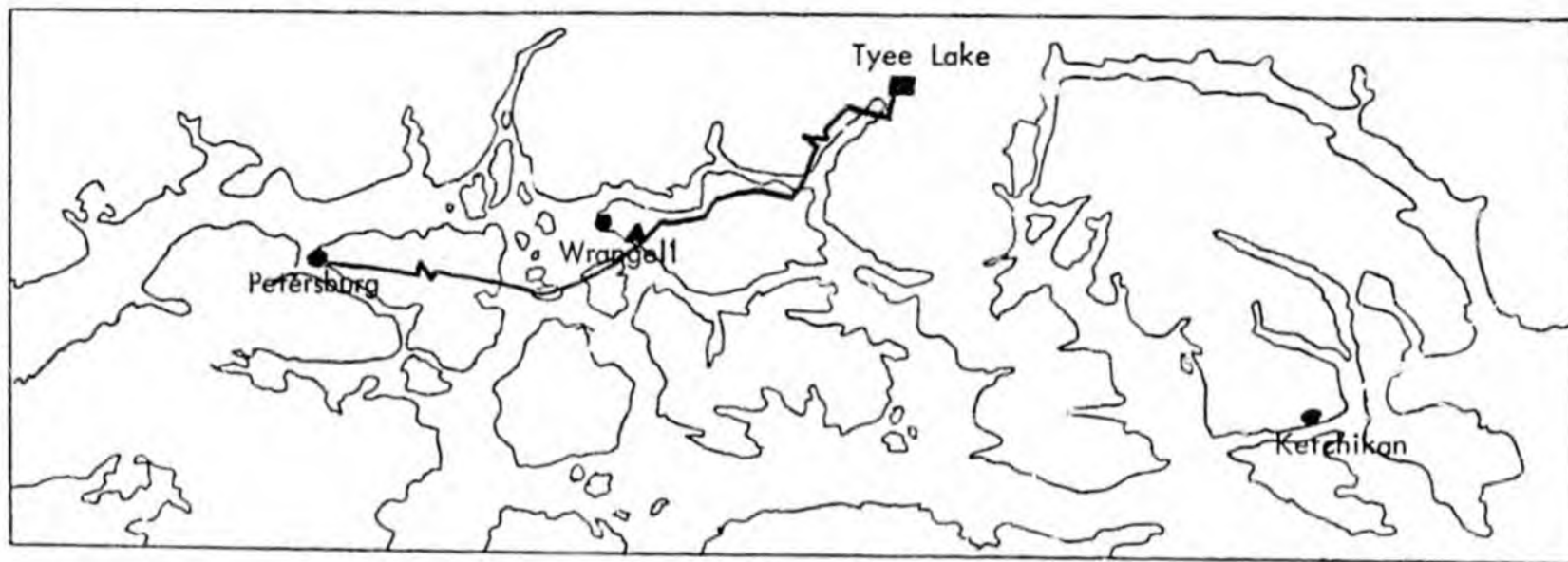
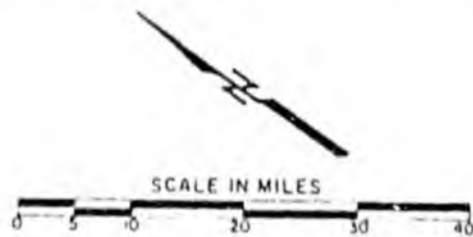


Figure 1



Petersburg-Wrangell-
Ketchikan Area
Location Map



PETERSBURG-WRANGELL-
KETCHIKAN AREA

**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

FIRST *Southwest* COMPANY

INVESTMENT BANKERS
MERCANTILE BANK BUILDING
DALLAS, TEXAS 75201

MUNICIPAL DEPARTMENT

January 28, 1980

(214) 742-6461

Mr. Eric Yould, Executive Director
Alaska Power Authority
333 W. 4th Avenue, Suite 31
Anchorage, Alaska 99501

RE: SWAN LAKE HYDROELECTRIC PROJECT

Dear Eric:

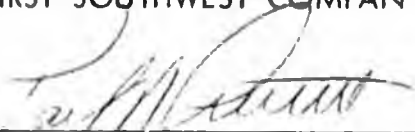
At your request, we have described the proposed plan of finance of the above-captioned Project, addressing the question of State funding assistance and its impact on financeability of the Project.

We have reviewed the various engineering reports published on the Project and we have engaged Booz, Allen & Hamilton to assist us with the technical aspects of that review. We have consulted with Wohlforth & Flint, bond counsel, and with representatives of Ketchikan Public Utilities.

We are pleased to submit herewith our report. We are available at your convenience to discuss this report with representatives of the State, the Authority, Ketchikan Public Utilities and other interested parties.

Very truly yours,

FIRST SOUTHWEST COMPANY


Paul N. Arnett, Resident Manager
Anchorage, Alaska



John I. Hinton, Vice President
Dallas, Texas

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Letter from Booz, Allen & Hamilton, Inc. APPENDIX	A
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Alternatives I thru IV	APPENDIX C

INTRODUCTION

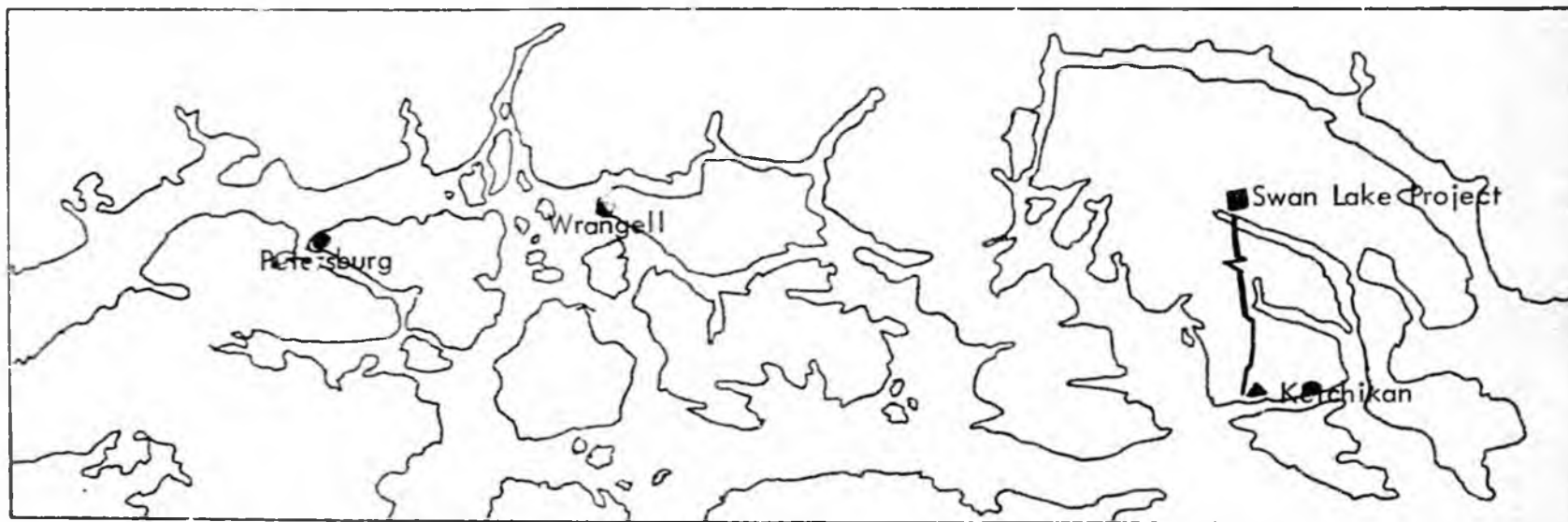
The City of Ketchikan, Alaska, having made the decision to discontinue its reliance on the use of diesel electric generation to meet existing future power demands, has requested the assistance of the Alaska Power Authority (the "APA") in the financing of its Swan Lake Hydroelectric Project (the "Project").

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.

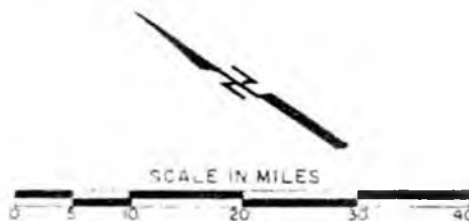
THE PROJECT

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.

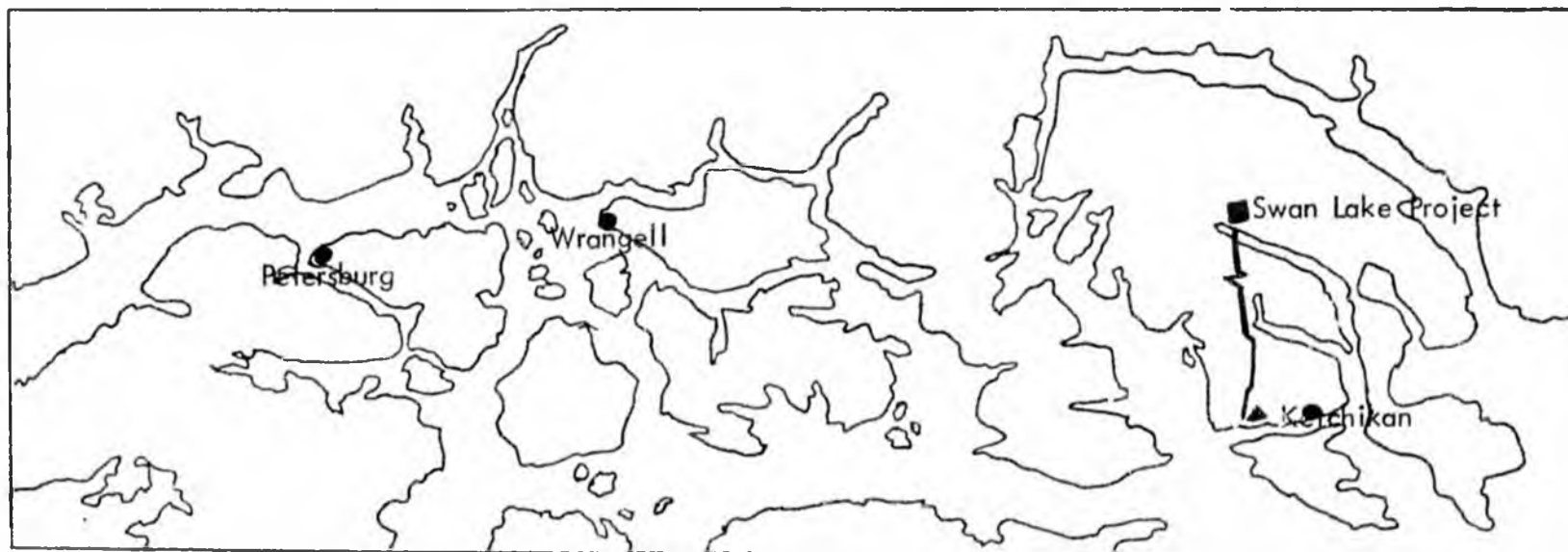


Petersburg-Wrangell-Ketchikan Area
Location Map

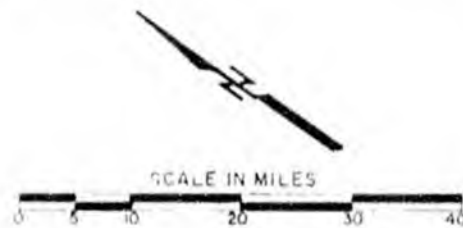


PETERSBURG-WRANGELL-KETCHIKAN AREA

Figure 1



Petersburg-Wrangell-
Ketchikan Area
Location Map



PETERSBURG-WRANGELL-
KETCHIKAN AREA

Figure 1

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.

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:

	Estimated Average Cost per KWH			
	(1985)	(1986)	(1991)	(1996)
I. No State Loan*	14.6¢	15.1¢	14.8¢	16.2¢
II. \$10,000,000 State Loan	13.5¢	13.9¢	14.1¢	14.4¢
III. \$18,000,000 State Loan	12.6¢	12.9¢	13.5¢	13.9¢
IV. \$25,000,000 State Loan	11.8¢	12.1¢	13.0¢	13.6¢

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

The above estimates do not include the positive effects of any sale of power to LPK. Although the actual cost per KWH will decrease if LPK purchases power from KPU, the relative cost impact of a State loan is validly illustrated above. Negotiations between KPU and LPK for the purchase of both firm power and surplus power should commence in late February or early March.

The assumptions used to derive the above cost estimates (set forth in more detail in Appendix B) 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 KPU System 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 City of Ketchikan in order to discontinue its present reliance on diesel electric generation and to meet its 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 possibly resulting in a more difficult and higher interest rate financing. Although some of that excess capacity may be used to produce power to sell to a single large purchaser, 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 an \$18,000,000 State loan in support of the Project be authorized. We believe that an \$18,000,000 loan is justified in light of the following:

- (1) Without State assistance, the Project could not be financed in our opinion without suffering a penalty in interest rate, thus increasing the electric rate burden of the Ketchikan consumer.
- (2) The \$18,000,000 recommended loan amount approximates the Project funding requirements during the first year of construction. 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 an \$18,000,000 subordinated loan would strengthen the overall Project financing, thus increasing the assurance of repayment of both the APA revenue bonds and the State loan.

APPENDIX A

BOOZ · ALLEN & HAMILTON Inc.
Energy and Environment Division

4330 EAST WEST HIGHWAY
BETHESDA, MARYLAND 20014
951-2200
AREA CODE 301

January 10, 1980

Mr. W. C. Jackson
Chairman of the Board
First Southwest Company
900 Mercantile Bank Building
Dallas, Texas 75201

Re: Swan Lake Hydroelectric Project (Ketchikan, Alaska)

Dear Mr. Jackson:

We have, at your request, conducted an assessment of the current status of the Swan Lake Hydroelectric Project. We are pleased to present herewith our findings.

* * * * *

BACKGROUND

The proposed Swan Lake Project is located in a remote area some 22 air miles northeast of Ketchikan near the north end of Carroll Inlet. Swan Lake is a low-elevation lake surrounded by mountains which drains westward through Falls Creek into Carroll Inlet.

The Project's arrangement will be:

- . 190 foot-high thin-arch concrete dam one mile downstream from the outlet of Swan Lake
- . 2,280 foot long concrete-lined power tunnel
- . Permanent port facility
- . One mile of access roads connecting the port facility, powerhouse, and dam
- . 30.5 miles of 115KV wood pole transmission line.

The project will have an installed capacity of 22 MW and a dependable capacity of 18 MW. Average and firm annual energy

Mr. W. C. Jackson
January 10, 1980
Page Two

capability is 85.4 and 66.7 GWH, respectively.

The scheduled date for commercial operation is November, 1983; total project capital requirements are estimated at \$85,690,000, including direct construction costs, contingencies, engineering/administrative costs, interest during construction, and escalation.

CITY OF KETCHIKAN (KETCHIKAN PUBLIC UTILITIES)

The City of Ketchikan has a population of some 8,600. Ketchikan Public Utilities, the municipally-owned public utility system, supplies the electric, water, and telephone needs of the community. As is typical of most Southeast Alaska communities, Ketchikan is almost entirely self-sufficient in terms of public services.

Major commercial and industrial activities supporting the local economy include logging and wood processing, fishing, and tourism. Transportation and communication links with surrounding areas and regions outside Southeast Alaska are up-to-date and accessible.

The City recently decided to reduce its substantial reliance on oil-fired diesel electric generation, which now accounts for about half of total system needs. The Swan Lake output could, in large measure, displace this oil-based generation in the early years of its operation.

The City will require additional capacity by 1983-1984 to meet peak demand and reserve requirements, which is the time when the Swan Lake Project is scheduled to become operational.

FINANCING PLAN

The City has requested the assistance of the Alaska Power Authority in financing the Project through the issuance of revenue bonds, and the City is also seeking a State of Alaska loan. The amount of the State loan will have

Mr. W. C. Jackson
January 10, 1980
Page Three

substantial influence upon debt service and, therefore, upon the cost of energy. Preliminary calculations indicate that the difference in annual energy cost between the case of no State loan and one of \$40 million is about 50%.

CURRENT STATUS

The Swan Lake Project has been the subject of numerous studies over the past quarter century, including efforts made by the U.S. Bureau of Reclamation, the Alaska District Corps of Engineers, and several engineering firms such as R. W. Beck and Associates. This latter organization concluded in a report of June 1978 that the project is technically and environmentally feasible.

Based upon our review of available information, and upon our field investigations to Ketchikan, Southeast Alaska (Petersburg, Wrangell, Juneau), and to the Project site, we concur with these findings as to Project feasibility...in fact recent changes have tended to make the Project more attractive since definitive studies were conducted. There are two primary influences at work here:

- The cost of diesel fuel (now about 65¢ per gallon) is higher than envisaged and will continue to escalate at a greater rate than that of general inflation

- The Louisiana-Pacific Timber Products Plant in Ketchikan has expressed definite interest in negotiating for firm power from the Project.

The influence of the first of these is obvious; the higher-cost diesel fuel increases the estimated savings associated with the Project. The effects of firm power sales to the local paper products company are substantial, because in the early years of Project operation excess capacity exists. Thus, both influences work toward Project feasibility and reduced costs to customers, which is the most important measure of consideration.

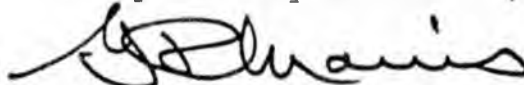
Mr. W. C. Jackson
January 10, 1980
Page Four

Alaska is fortunate in many respects, not the least of which is its potential for other, future hydroelectric power development. The Alaska Power Administration is considering the possibility of constructing a D.C. transmission line from Juneau to Ketchikan via Wrangell and Petersburg, thus forming a Southeast Gird and making possible future sale of Snettisham power. This would be a back-up to the diesel sets at Petersburg, Wrangell, and Ketchikan, and, with other future hydro developments like Lake Grace, Lake Mahoney, and Tyee Lake, for example, economy, interchange as well as reliability back-up would then be possible.

Much work remains to quantify the benefits associated with the strategic development of power supply for the whole of the Southeast, but the potential for benefit clearly exists.

We trust the foregoing is responsive to your needs for an assessment of the current status of Swan Lake. Should you have questions or require further detail, kindly so inform us.

Respectfully submitted,



BOOZ, ALLEN & HAMILTON Inc.

Griffith R. Morris
Principal

kms

APPENDIX B

ASSUMPTIONS

1. Critical Dates:

- FERC license to be received July 1, 1980
- Revenue Bonds dated October 1, 1980
- Major construction contract awarded March 1, 1981
- Project becomes operational April 1, 1984
- Interest capitalized through October 1, 1984 payment
- First principal payment October 1, 1986

2. Calculation of estimated costs of construction:

Direct construction cost, estimated as of January, 1978	\$47,682,000
Escalation @ 7%	
(38 months from January-1978 to March-1981)	10,570,000
	\$58,252,000
Contingencies @ 15%	8,738,000
	\$66,990,000
Engineering and Administration @ 12 1/2%	8,374,000
	\$75,364,000
SAY	\$75,500,000(i)

3. Terms of State Loan:

- a) Loan dated October 1, 1980, although the loan could be issued as early as July 1, 1980
- b) Term of loan - 40 years, with principal amortization beginning October 1, 1996
- c) Interest rate - 3% annually, with an adjustment to an overall annual 7% rate from date of issue to maturity
- d) Interest capitalized at 3% for four years

(1) This number differs from the \$85,690,000 total Project Capital Requirements estimate set forth on Page A-2 because interest during construction has been deleted from costs of construction and added to the financing cost.

4. Calculation of estimated operation and maintenance expenses:

		<u>Rounded Estimates</u>
Project Expenses(1) as of 1985	\$ 873,000	
Other Electric Department Expenses:		
1978 Electric Dept. Expenses	\$1,930,597 (2)	
1978 Diesel Operation Expenses	(815,001)(2)	
Net existing 1978 Expenses	<u>1,115,596</u>	
7 years escalation @ 10%	<u>780,917</u>	
1978 Existing Expenses (escalated)	<u>1,896,513</u>	
Total 1985 Operation & Maintenance Expenses	\$2,769,513	<u>\$2,800,000</u>
1 years escalation at 10%	<u>276,951</u>	
1986 escalated Expenses	\$3,046,464	<u>\$3,000,000</u>
5 years escalation at 7%	<u>1,066,262</u>	
1991 escalated Expenses	\$4,112,726	<u>\$4,100,000</u>
5 years escalation at 7%	<u>1,439,454</u>	
1996 escalated Expenses	\$5,552,180	<u>\$5,600,000</u>

5. The annual sales of KWH by KPU are assumed to be as follows:

<u>Year</u>	<u>Estimated KWH Sales</u>
1985	96,343,000(1)
1986	99,026,000(1)
1991	108,494,000(1)
1996	118,000,000

6. The City of Ketchikan is assumed to have annual debt service requirements of \$1,275,000 on the City's presently outstanding utility revenue bonds.

(1) Source: R. W. Beck and Associates

(2) Source: City of Ketchikan, Annual Financial Report, December 31, 1978

APPENDIX C

ALTERNATIVE I
(NO State Loan)

1. Use of proceeds:

Costs of Construction	\$75,500,000	
Less: Interest earnings during Construction	(22,500,000)	
Less: State loan proceeds	-0-	
Construction Funds from Bond Proceeds		\$ 53,000,000
Capitalized Interest (4 yrs. @ 8.5%)		36,380,000
Reserve Fund		9,630,000
Contingency Fund		4,780,000
Costs of Issuance		3,210,000
		\$107,000,000

2. a) Calculation of cost per KWH, first full year of operation (1985):

Debt Service Requirements, APA Contract Revenue Bonds	\$ 9,095,000	
25% Coverage	2,273,750	
Debt Service Requirements, Utility System Revenue Bonds	1,275,000	
Debt Service Requirements, State loan	-0-	
Operation and Maintenance Expenses	2,800,000	
Less: Interest earnings on Reserve and Contingency Funds	(1,368,950)	
Gross Revenues Required	\$ 14,074,800	

b) Calculation of projected average electric cost:
\$14,074,800 ÷ 96,343,000 KWH

14.6¢/KWH

3. a) Calculation of cost per KWH, second full year of operation (1986):

Debt Service Requirements, APA Contract Revenue Bonds	\$ 9,650,000	
25% Coverage	2,412,500	
Debt Service Requirements, Utility System Revenue Bonds	1,275,000	
Debt Service Requirements, State loan	-0-	
Operation and Maintenance Expenses	3,000,000	
Less: Interest Earnings on Reserve and Contingency Funds	(1,368,950)	
Gross Revenues Required	\$ 14,968,550	

b) Calculation of projected average electric cost:
\$14,968,550 ÷ 99,026,000 KWH

15.1¢/KWH

(ALTERNATIVE I - Continued)

4. a) Calculation of cost per KWH, seventh year of operation
(1991-first year of full interest payment on State loan)

Debt Service Requirements, APA Contract Revenue Bonds	\$ 9,650,350
25% Coverage	2,412,587
Debt Service Requirements, Utility System Revenue Bonds	1,275,000
Debt Service Requirements, State loan	-0-
Operation and Maintenance Expenses	4,100,000
Less: Interest Earnings on Reserve and Contingency Funds	(1,368,950)
Gross Revenues Required	<u>\$ 16,068,987</u>

- b) Calculation of projected average electric cost:
\$16,068,987 ÷ 108,494,000KWH

14.8¢/KWH

5. a) Calculation of cost per KWH, twelfth year of operation
(1996-first year of amortization of State loan)

Debt Service Requirements, APA Contract Revenue Bonds	\$ 9,650,000
25% Coverage	2,412,506
Debt Service Requirements, Utility System Revenue Bonds	1,275,000
Debt Service Requirements, State loan	-0-
Operation and Maintenance Expenses	5,600,000
Less: Interest Earnings on Reserve and Contingency Funds	(1,368,950)
Gross Revenues Required	<u>\$ 17,568,556</u>

- b) Calculation of projected average electric cost:
\$17,568,556 ÷ 108,494,000 KWH

16.2¢/KWH

\$ 107,000,000.
ALASKA POWER AUTHORITY
(SWAN LAKE PROJCT)

DATED: 10/01/80 FIRST CPN DUE: 04/01/81
PRINCIPAL DUE: 10/ 1 INTEREST DUE: 4/ 1 & 10/ 1

YEAR END 12/31	THIS \$ 107,000,000. ISSUE		
	PRINCIPAL	INTEREST(1)	TOTAL
1981	\$ 0.	\$ 9,095,000.	\$ 9,095,000.(2)
1982	0.	9,095,000.	9,095,000.(2)
1983	0.	9,095,000.	9,095,000.(2)
1984	0.	9,095,000.	9,095,000.(2)
1985	0.	9,095,000.	9,095,000.
1986	555,000.	9,095,000.	9,650,000.
1987	600,000.	9,047,825.	9,647,825.
1988	655,000.	8,996,825.	9,651,825.
1989	710,000.	8,941,150.	9,651,150.
1990	770,000.	8,880,800.	9,650,800.
1991	835,000.	8,815,350.	9,650,350.
1992	905,000.	8,744,375.	9,649,375.
1993	985,000.	8,667,450.	9,652,450.
1994	1,065,000.	8,583,725.	9,648,725.
1995	1,155,000.	8,493,200.	9,648,200.
1996	1,255,000.	8,395,025.	9,650,025.
1997	1,360,000.	8,288,350.	9,648,350.
1998	1,480,000.	8,172,750.	9,652,750.
1999	1,605,000.	8,046,950.	9,651,950.
2000	1,740,000.	7,910,525.	9,650,525.
2001	1,890,000.	7,762,625.	9,652,625.
2002	2,050,000.	7,601,975.	9,651,975.
2003	2,220,000.	7,427,725.	9,647,725.
2004	2,410,000.	7,239,025.	9,649,025.
2005	2,615,000.	7,034,175.	9,649,175.
2006	2,840,000.	6,811,900.	9,651,900.
2007	3,080,000.	6,570,500.	9,650,500.
2008	3,340,000.	6,308,700.	9,648,700.
2009	3,625,000.	6,024,800.	9,649,800.
2010	3,935,000.	5,716,675.	9,651,675.
2011	4,270,000.	5,382,200.	9,652,200.
2012	4,530,000.	5,019,250.	9,649,250.
2013	4,825,000.	4,625,700.	9,650,700.
2014	5,150,000.	4,198,575.	9,648,575.
2015	5,515,000.	3,735,325.	9,650,325.
2016	5,920,000.	3,232,550.	9,652,550.
2017	6,365,000.	2,686,850.	9,651,850.
2018	6,855,000.	2,094,825.	9,649,825.
2019	7,395,000.	1,452,650.	9,647,650.
2020	7,995,000.	756,075.	9,651,075.

\$ 107,000,000. \$ 276,236,400. \$ 383,236,400.

- (1) INTEREST CALCULATED AT 8.500%
- (2) Capitalized Interest

ALTERNATIVE II
(\$10,000,000 Loan)

1. Use of proceeds:

Costs of Construction	\$75,500,000	
Less: Interest Earnings during Construction	(21,000,000)	
Less: State loan proceeds	<u>(8,800,000)*</u>	
Construction Funds from Bond Proceeds		\$ 45,700,000
Capitalized Interest (4 yrs. @ 8.5%)		31,450,000
Reserve Fund		8,413,000
Contingency Fund		4,162,000
Costs of Issuance		<u>2,775,000</u>
		<u>\$ 92,500,000</u>

* Net of \$1,200,000 Capitalized Interest

2. a) Calculation of cost per KWH, first full year of operation (1985):

Debt Service Requirements, APA Contract Revenue Bonds	\$ 7,858,250	
25% Coverage	1,964,562	
Debt Service Requirements, Utility System Revenue Bonds	1,275,000	
Debt Service Requirements, State loan	300,000	
Operation and Maintenance Expenses	2,800,000	
Less: Interest Earnings on Reserve and Contingency Funds	(1,194,625)	
Gross Revenues Required		<u>\$ 13,003,187</u>

b) Calculation of projected average electric cost:

$$\frac{\$13,003,187}{96,343,000 \text{ KWH}} = \underline{\underline{13.5\text{c}/\text{KWH}}}$$

3. a) Calculation of cost per KWH, second full year of operation (1986):

Debt Service Requirements, APA Contract Revenue Bonds	\$ 8,338,250	
25 % Coverage	2,084,562	
Debt Service Requirements, Utility System Revenue Bonds	1,275,000	
Debt Service Requirements, State Loan	300,000	
Operation and Maintenance Expenses	3,000,000	
Less: Interest Earnings on Reserve and Contingency Funds	(1,194,625)	
Gross Revenues Required		<u>\$ 13,803,187</u>

b) Calculation of projected average electric cost:

$$\frac{\$13,803,187}{99,026,000} = \underline{\underline{13.9\text{c}/\text{KWH}}}$$

(ALTERNATIVE II - Continued)

4. a) Calculation of cost per KWH, seventh year of operation (1991-first year of full interest on State loan)

Debt Service Requirements, APA Contract Revenue Bonds	\$ 8,336,425
25% Coverage	2,084,106
Debt Service Requirements, Utility System Revenue Bonds	1,275,000
Debt Service Requirements, State loan	700,000
Operation and Maintenance Expenses	4,100,000
Less: Interest Earnings on Reserve and Contingency Funds	(1,194,625)
Gross Revenues Required	<u>\$ 15,300,906</u>

- b) Calculation of projected average electric cost:
\$15,300,906 ÷ 108,494,000 KWH

14.1¢/KWH

5. a) Calculation of cost per KWH, twelfth year of operation (1996-first year of State Loan Amortization)

Debt Service Requirements, APA Contract Revenue Bonds	\$ 8,338,050
25% Coverage	2,084,512
Debt Service Requirements, Utility System Revenue Bonds	1,275,000
Debt Service Requirements, State loan	860,000
Operation and Maintenance Expenses	5,600,000
Less: Interest Earnings on Reserve and Contingency Funds	(1,194,625)
Gross Revenues Required	<u>\$ 16,962,937</u>

- b) Calculation of projected average electric cost:
\$16,962,937 ÷ 118,000,000 KWH

14.4¢/KWH

\$ 92,500,000.
ALASKA POWER AUTHORITY
(SWAN LAKE PROJECT)
REVENUE BONDS

DATED: 10/01/80 FIRST CPN DUE: 04/01/81
PRINCIPAL DUE: 10/ 1 INTEREST DUE: 4/ 1 & 10/ 1

YEAR END 12/31	THIS \$ 92,500,000. ISSUE		
	PRINCIPAL	INTEREST(1)	TOTAL
1981	\$ 0.	\$ 7,858,250.	\$ 7,858,250.(2)
1982	0.	7,858,250.	7,858,250.(2)
1983	0.	7,858,250.	7,858,250.(2)
1984	0.	7,858,250.	7,858,250.(2)
1985	0.	7,858,250.	7,858,250.
1986	480,000.	7,858,250.	8,338,250.
1987	520,000.	7,817,450.	8,337,450.
1988	565,000.	7,773,250.	8,338,250.
1989	615,000.	7,725,225.	8,340,225.
1990	665,000.	7,672,950.	8,337,950.
1991	720,000.	7,616,425.	8,336,425.
1992	785,000.	7,555,225.	8,340,225.
1993	850,000.	7,488,500.	8,338,500.
1994	920,000.	7,416,250.	8,336,250.
1995	1,000,000.	7,338,050.	8,338,050.
1996	1,085,000.	7,253,050.	8,338,050.
1997	1,180,000.	7,160,825.	8,340,825.
1998	1,280,000.	7,060,525.	8,340,525.
1999	1,385,000.	6,951,725.	8,336,725.
2000	1,505,000.	6,834,000.	8,339,000.
2001	1,630,000.	6,706,075.	8,336,075.
2002	1,770,000.	6,567,525.	8,337,525.
2003	1,920,000.	6,417,075.	8,337,075.
2004	2,085,000.	6,253,875.	8,338,875.
2005	2,260,000.	6,076,650.	8,336,650.
2006	2,455,000.	5,884,550.	8,339,550.
2007	2,660,000.	5,675,875.	8,335,875.
2008	2,880,000.	5,449,775.	8,339,775.
2009	3,135,000.	5,204,125.	8,339,125.
2010	3,400,000.	4,937,650.	8,337,650.
2011	3,690,000.	4,648,650.	8,338,650.
2012	4,005,000.	4,335,000.	8,340,000.
2013	4,345,000.	3,994,575.	8,339,575.
2014	4,715,000.	3,625,250.	8,340,250.
2015	5,115,000.	3,224,475.	8,339,475.
2016	5,500,000.	2,789,700.	8,289,700.
2017	5,920,000.	2,322,200.	8,342,200.
2018	6,530,000.	1,810,500.	8,340,500.
2019	7,085,000.	1,255,450.	8,340,450.
2020	7,685,000.	653,225.	8,338,225.
<hr/>			
	\$ 92,450,000.	\$ 238,645,150.	\$ 331,095,150.
<hr/>			

(1) INTEREST CALCULATED AT 8.500%
(2) Paid from Capitalized Interest

\$10,000,000
STATE LOAN
INTEREST PAYMENT SCHEDULE

Year End 12/31	Beginning Principal Balance	Interest Accrued	Interest Paid	Interest Added to Principal
1981	\$10,000,000	\$ 700,000	\$ 300,000(1)	\$400,000
1982	10,400,000	728,000	300,000(1)	428,000
1983	10,828,000	757,960	300,000(1)	457,960
1984	11,285,960	790,017	300,000(1)	490,017
1985	11,775,977	824,318	300,000	524,318
1986	12,300,295	861,020	300,000	561,020
1987	12,861,315	900,292	643,000	257,292
1988	13,118,607	918,302	655,930	262,372
1989	13,380,979	936,668	669,048	267,620
1990	13,648,599	955,402	682,430	272,972
1991	13,921,571	974,509	700,000	274,509
1992	14,196,080	993,726	800,000	193,726
1993	14,389,806	1,007,286	900,000	107,286
1994	14,497,092	1,014,796	1,000,000	14,796
1995	14,511,888	1,015,832	1,027,720	(11,888)
1996	14,500,000(2)			

(1) Interest capitalized from loan proceeds.

(2) See following page for amortization of \$14,500,000 principal.

\$14,500,000
STATE LOAN
AMORTIZATION SCHEDULE

Dated: 10-1-95
Principal Due: 10-1

First Coupon Due: 4-1-96
Interest Due: 4-1 & 10-1

Year End 12/31	THIS \$14,500,000 ISSUE		
	Principal	Interest	Total
1996	\$ 230,000	\$ 1,015,000	\$ 1,245,000
1997	245,000	998,900	1,243,900
1998	260,000	981,750	1,241,750
1999	280,000	963,550	1,243,550
2000	300,000	943,950	1,243,950
2001	320,000	922,950	1,242,950
2002	345,000	900,550	1,245,550
2003	370,000	876,400	1,246,400
2004	395,000	850,500	1,245,500
2005	420,000	933,961	1,353,961
2006	450,000	904,561	1,354,561
2007	485,000	873,061	1,358,061
2008	515,000	839,111	1,354,111
2009	550,000	803,061	1,353,061
2010	590,000	764,561	1,354,561
2011	635,000	723,261	1,358,261
2012	675,000	678,811	1,353,811
2013	725,000	631,561	1,356,561
2014	775,000	580,811	1,355,811
2015	830,000	526,561	1,356,561
2016	885,000	468,461	1,353,461
2017	950,000	406,511	1,356,511
2018	1,015,000	340,011	1,355,011
2019	1,085,000	268,961	1,353,961
2020	1,170,000	193,011	1,363,011
	<u>\$14,500,000</u>	<u>\$18,389,826</u>	<u>\$32,889,826</u>

ALTERNATIVE III
(\$18,000,000 Loan)

1. Use of Proceeds:

Costs of Construction	\$75,500,000	
Less: Interest Earnings during Construction	(20,000,000)	
Less: State loan proceeds	<u>(15,840,000)*</u>	
Construction Funds from Bond Proceeds		\$ 39,660,000
Capitalized Interest (4 yrs. @ 8.5%)		27,200,000
Reserve Fund		7,140,000
Contingency Fund		3,600,000
Costs of Issuance		<u>2,400,000</u>
		<u>\$ 80,000,000</u>

* Net of \$2,160,000 Capitalized Interest

2. a) Calculation of cost per KWH, first full year of operation (1985):

Debt Service Requirements, APA Contract Revenue Bonds	\$ 6,800,000	
25% Coverage	1,700,000	
Debt Service Requirements, Utility System Revenue Bonds	1,275,000	
Debt Service Requirements, State loan	540,000	
Operation and Maintenance Expenses	2,800,000	
Less: Interest Earnings on Reserve and Contingency Funds	(1,020,300)	
Gross Revenues Required		<u>\$ 12,094,700</u>

b) Calculation of projected average electric cost:

$\$12,094,700 \div 96,343,000$ 12.6¢/KWH

3. a) Calculation of cost per KWH, second full year of operation (1986):

Debt Service Requirements, APA Contract Revenue Bonds	\$ 7,215,000	
25% Coverage	1,803,750	
Debt Service Requirements, Utility System Revenue Bonds	1,275,000	
Debt Service Requirements, State loan	540,000	
Operation and Maintenance Expenses	3,000,000	
Less: Interest Earnings on Reserve and Contingency Funds	(1,020,300)	
Gross Revenues Required		<u>\$ 12,813,450</u>

b) Calculation of projected average electric cost:

$\$12,813,450 \div 99,026,000$ 12.9¢/KWH

(ALTERNATIVE III - Continued)

4. a) Calculation of cost per KWH, seventh year of operation
(1995-first year of full interest payment on State loan)

Debt Service Requirements, APA Contract Revenue Bonds	\$ 7,215,900
25% Coverage	1,803,975
Debt Service Requirements, Utility System Revenue Bonds	1,275,000
Debt Service Requirements, State Loan	1,260,000
Operation and Maintenance Expenses	4,100,000
Less: Interest Earnings on Reserve and Contingency Funds	(1,020,300)
Gross Revenues Required	<u>\$ 14,634,575</u>

- b) Calculation of projected average electric cost:
 $\$14,634,575 \div 108,494,000$

13.5¢/KWH

5. a) Calculation of cost per KWH, twelfth year of operation
(1996-first year of amortization of State loan)

Debt Service Requirements, APA Contract Revenue Bonds	\$ 7,215,350
25% Coverage	1,803,837
Debt Service Requirements, Utility System Revenue Bonds	1,275,000
Debt Service Requirements, State Loan	1,545,000
Operation and Maintenance Expenses	5,600,000
Less: Interest Earnings on Reserve and Contingency Funds	(1,020,300)
Gross Revenues Required	<u>\$ 16,418,887</u>

- b) Calculation of projected average electric cost:
 $\$16,418,887 \div 118,000,000$ KWH

13.9¢/KWH

\$ 80,000,000.
ALASKA POWER AUTHORITY
(SWAN LAKE PROJECT)
REVENUE BONDS

DATED: 10/01/80 FIRST CPN DUE: 04/01/81
PRINCIPAL DUE: 10/ 1 INTEREST DUE: 4/ 1 & 10/ 1

YEAR END 12/31	THIS \$ 80,000,000. ISSUE		
	PRINCIPAL	INTEREST(1)	TOTAL
1981	\$ 0.	\$ 6,800,000.	\$ 6,800,000.(2)
1982	0.	6,800,000.	6,800,000.(2)
1983	0.	6,800,000.	6,800,000.(2)
1984	0.	6,800,000.	6,800,000.(2)
1985	0.	6,800,000.	6,800,000.
1986	415,000.	6,800,000.	7,215,000.
1987	450,000.	6,764,725.	7,214,725.
1988	490,000.	6,726,475.	7,216,475.
1989	530,000.	6,684,825.	7,214,825.
1990	575,000.	6,639,775.	7,214,775.
1991	625,000.	6,590,900.	7,215,900.
1992	675,000.	6,537,775.	7,212,775.
1993	735,000.	6,480,400.	7,215,400.
1994	795,000.	6,417,925.	7,212,925.
1995	865,000.	6,350,350.	7,215,350.
1996	940,000.	6,276,825.	7,216,825.
1997	1,020,000.	6,196,925.	7,216,925.
1998	1,105,000.	6,110,225.	7,215,225.
1999	1,200,000.	6,016,300.	7,216,300.
2000	1,300,000.	5,914,300.	7,214,300.
2001	1,410,000.	5,803,800.	7,213,800.
2002	1,530,000.	5,683,950.	7,213,950.
2003	1,660,000.	5,553,900.	7,213,900.
2004	1,805,000.	5,412,800.	7,217,800.
2005	1,955,000.	5,259,375.	7,214,375.
2006	2,120,000.	5,093,200.	7,213,200.
2007	2,305,000.	4,913,000.	7,218,000.
2008	2,500,000.	4,717,075.	7,217,075.
2009	2,710,000.	4,504,575.	7,214,575.
2010	2,940,000.	4,274,225.	7,214,225.
2011	3,190,000.	4,024,325.	7,214,325.
2012	3,460,000.	3,753,175.	7,213,175.
2013	3,755,000.	3,459,075.	7,214,075.
2014	4,075,000.	3,139,900.	7,214,900.
2015	4,420,000.	2,793,525.	7,213,525.
2016	4,800,000.	2,417,825.	7,217,825.
2017	5,205,000.	2,009,825.	7,214,825.
2018	5,650,000.	1,567,400.	7,217,400.
2019	6,130,000.	1,087,150.	7,217,150.
2020	6,660,000.	566,100.	7,226,100.
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	\$ 80,000,000.	\$ 206,541,925.	\$ 286,541,925.
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(1) INTEREST CALCULATED AT 8.500%
(2) Paid from Capitalized Interest

\$18,000,000
STATE LOAN
INTEREST PAYMENT SCHEDULE

Year End 12/31	Beginning Principal Balance	Interest Accrued	Interest Paid	Interest Added to Principal
1981	\$18,000,000	\$1,260,000	\$ 540,000(1)	\$ 720,000
1982	18,720,000	1,310,400	540,000(1)	770,400
1983	19,490,400	1,364,328	540,000(1)	824,328
1984	20,314,728	1,422,030	540,000(1)	882,030
1985	21,196,758	1,483,773	540,000	943,773
1986	22,140,531	1,549,837	540,000	1,009,837
1987	23,150,368	1,620,525	1,157,519	463,006
1988	23,613,374	1,652,936	1,180,669	472,267
1989	24,085,641	1,685,995	1,204,282	481,713
1990	24,567,354	1,719,714	1,228,368	491,346
1991	25,058,700	1,754,109	1,260,000	494,109
1992	25,552,809	1,788,697	1,440,000	348,697
1993	25,901,506	1,813,105	1,590,000	223,105
1994	26,124,611	1,828,722	1,800,000	28,722
1995	26,153,333	1,830,733	1,984,066	(153,333)
1996	26,000,000(2)			

(1) Interest capitalized from Loan proceeds.

(2) See following page for amortization of \$26,000,000 principal.

\$26,000,000
STATE LOAN
AMORTIZATION SCHEDULE

Dated: 10-1-95
Principal Due: 10-1

First Coupon Due: 4-1-96
Interest Due: 4-1 & 10-1

Year End 12/31	THIS \$26,000,000 ISSUE		
	Principal	Interest	Total
1996	\$ 410,000	\$ 1,820,000	\$ 2,230,000
1997	440,000	1,791,300	2,231,300
1998	470,000	1,760,500	2,230,500
1999	505,000	1,727,600	2,232,600
2000	540,000	1,692,250	2,232,250
2001	575,000	1,654,450	2,229,450
2002	615,000	1,614,200	2,229,200
2003	660,000	1,571,150	2,231,150
2004	705,000	1,524,950	2,229,950
2005	755,000	1,675,600	2,430,600
2006	810,000	1,622,750	2,432,750
2007	865,000	1,566,050	2,431,050
2008	925,000	1,505,500	2,430,500
2009	990,000	1,440,750	2,430,750
2010	1,060,000	1,371,450	2,431,450
2011	1,135,000	1,297,250	2,432,250
2012	1,215,000	1,217,800	2,432,800
2013	1,300,000	1,132,750	2,432,750
2014	1,390,000	1,041,750	2,431,750
2015	1,485,000	944,450	2,429,450
2016	1,590,000	840,500	2,430,500
2017	1,700,000	729,200	2,429,200
2018	1,820,000	610,200	2,430,200
2019	1,950,000	482,800	2,432,800
2020	2,090,000	346,300	2,436,300
	<u>\$26,000,000</u>	<u>\$32,781,500</u>	<u>\$58,981,500</u>

ALTERNATIVE IV
(\$25,000,000 State Loan)

1. Use of proceeds:

Costs of Construction	\$75,500,000	
Less: Interest earnings during Construction	(19,000,000)	
Less: State loan proceeds	<u>(22,000,000)*</u>	
Construction Funds from Bond Proceeds		\$ 34,500,000
Capitalized Interest (4 yrs. @ 8.5%)		23,800,000
Reserve Fund		6,450,000
Contingency Fund		3,150,000
Costs of Issuance		2,100,000
		<u>\$ 70,000,000</u>

*Net of \$3,000,000 Capitalized Interest

2. a) Calculation of cost per KWH, first full year of operation (1985):

Debt Service Requirements, APA Contract Revenue Bonds	\$ 5,950,000	
25% Coverage	1,487,500	
Debt Service Requirements, Utility System Revenue Bonds	1,275,000	
Debt Service Requirements, State loan	750,000	
Operation and Maintenance Expenses	2,800,000	
Less: Interest earnings on Reserve and Contingency Funds	(912,000)	
Gross Revenues Required		<u>\$ 11,350,500</u>

b) Calculation of projected average electric cost:
\$11,350,500 ÷ 96,343,000 KWH

11.8¢/KWH

3. a) Calculation of cost per KWH, second full year of operation (1986):

Debt Service Requirements, APA Contract Revenue Bonds	\$ 6,315,000	
25% Coverage	1,578,750	
Debt Service Requirements, Utility System Revenue Bonds	1,275,000	
Debt Service Requirements, State loan	750,000	
Operation and Maintenance Expenses	3,000,000	
Less: Interest earnings on Reserve and Contingency Funds	(912,000)	
Gross Revenues Required		<u>\$ 12,006,750</u>

b) Calculation of projected average electric cost:
\$12,006,750 ÷ 99,026,000 KWH

12.1¢/KWH

(ALTERNATIVE IV - Continued)

4. a) Calculation of cost per KWH, seventh year of operation
(1991-first year of full interest payment on State loan)

Debt Service Requirements, APA Contract Revenue Bonds	\$ 6,311,400
25% Coverage	1,577,850
Debt Service Requirements, Utility System Revenue Bonds	1,275,000
Debt Service Requirements, State loan	1,750,000
Operation and Maintenance Expenses	4,100,000
Less: Interest earnings on Reserve and Contingency Funds	(912,000)
Gross Revenues Required	<u>\$ 14,102,250</u>

- b) Calculation of projected average electric cost:
\$14,102,250 ÷ 108,494,000 KWH

13.0¢/KWH

5. a) Calculation of cost per KWH, twelfth year of operation
(1996-first year of amortization of State loan)

Debt Service Requirements, APA Contract Revenue Bonds	\$ 6,311,000
25% Coverage	1,577,750
Debt Service Requirements, Utility System Revenue Bonds	1,275,000
Debt Service Requirements, State loan	2,145,000
Operation and Maintenance Expenses	5,600,000
Less: Interest earnings on Reserve and Contingency Funds	(912,000)
Gross Revenues Required	<u>\$ 15,996,750</u>

- b) Calculation of projected average electric cost:
\$15,996,750 ÷ 118,000,000 KWH

13.6¢/KWH

\$ 70,000,000.
ALASKA POWER AUTHORITY
(SWAN LAKE PROJECT)
REVENUE BONDS

DATED: 10/01/80 FIRST CPN DUE: 04/01/81
PRINCIPAL DUE: 10/ 1 INTEREST DUE: 4/ 1 & 10/ 1

YEAR END 12/31	THIS \$ 70,000,000. ISSUE		
	PRINCIPAL	INTEREST(1)	TOTAL
1981	\$ 0.	\$ 5,950,000.	\$ 5,950,000.(2)
1982	0.	5,950,000.	5,950,000.(2)
1983	0.	5,950,000.	5,950,000.(2)
1984	0.	5,950,000.	5,950,000.(2)
1985	0.	5,950,000.	5,950,000.
1986	365,000.	5,950,000.	6,315,000.
1987	395,000.	5,918,975.	6,313,975.
1988	430,000.	5,885,400.	6,315,400.
1989	465,000.	5,848,850.	6,313,850.
1990	505,000.	5,809,325.	6,314,325.
1991	545,000.	5,766,400.	6,311,400.
1992	595,000.	5,720,075.	6,315,075.
1993	645,000.	5,669,500.	6,314,500.
1994	700,000.	5,614,675.	6,314,675.
1995	755,000.	5,555,175.	6,310,175.
1996	820,000.	5,491,000.	6,311,000.
1997	890,000.	5,421,300.	6,311,300.
1998	965,000.	5,345,650.	6,310,650.
1999	1,050,000.	5,263,625.	6,313,625.
2000	1,140,000.	5,174,375.	6,314,375.
2001	1,235,000.	5,077,475.	6,312,475.
2002	1,340,000.	4,972,500.	6,312,500.
2003	1,455,000.	4,858,600.	6,313,600.
2004	1,575,000.	4,734,925.	6,309,925.
2005	1,710,000.	4,601,050.	6,311,050.
2006	1,855,000.	4,455,700.	6,310,700.
2007	2,015,000.	4,298,025.	6,313,025.
2008	2,185,000.	4,126,750.	6,311,750.
2009	2,370,000.	3,941,025.	6,311,025.
2010	2,575,000.	3,739,575.	6,314,575.
2011	2,790,000.	3,520,700.	6,310,700.
2012	3,030,000.	3,283,550.	6,313,550.
2013	3,285,000.	3,026,000.	6,311,000.
2014	3,565,000.	2,746,775.	6,311,775.
2015	3,870,000.	2,443,750.	6,313,750.
2016	4,200,000.	2,114,800.	6,314,800.
2017	4,555,000.	1,757,800.	6,312,800.
2018	4,945,000.	1,370,625.	6,315,625.
2019	5,365,000.	950,300.	6,315,300.
2020	5,815,000.	494,275.	6,309,275.
<hr/>			
	\$ 70,000,000.	\$ 180,598,525.	\$ 250,698,525.
<hr/>			

- (1) INTEREST CALCULATED AT 8.500%
- (2) Paid from Capitalized Interest

\$25,000,000
STATE LOAN
INTEREST PAYMENT SCHEDULE

Year End 12/31	Beginning Principal Balance	Interest Accrued	Interest Paid	Interest Added to Principal
1981	\$25,000,000	\$1,750,000	\$ 750,000(1)	\$1,000,000
1982	26,000,000	1,820,000	750,000(1)	1,070,000
1983	27,070,000	1,894,900	750,000(1)	1,144,900
1984	28,214,900	1,975,043	750,000(1)	1,225,043
1985	29,439,943	2,060,796	750,000	1,310,796
1986	30,750,739	2,152,551	750,000	1,402,551
1987	32,153,290	2,250,730	1,607,664	643,066
1988	32,796,356	2,295,744	1,639,818	655,926
1989	33,452,282	2,341,660	1,672,614	669,046
1990	34,121,328	2,388,492	1,706,066	682,426
1991	34,803,754	2,484,301	1,750,000	734,301
1992	35,538,055	2,487,663	2,000,000	487,663
1993	36,025,718	2,521,800	2,250,000	271,800
1994	36,297,518	2,540,826	2,379,000	161,656
1995	36,459,174	2,552,142	2,511,316	40,826
1996	36,500,000(2)			

(1) Interest capitalized from loan proceeds.

(2) See following page for amortization of \$36,500,000 principal.

\$36,500,000
STATE LOAN
AMORTIZATION SCHEDULE

Dated: 10-1-95
Principal Due: 10-1

First Coupon Due: 4-1-96
Interest Due: 4-1 & 10-1

Year End 12/31	THIS \$36,500,000 ISSUE		
	Principal	Interest	Total
1996	\$ 575,000	\$ 2,555,000	\$ 3,130,000
1997	615,000	2,514,750	3,129,750
1998	660,000	2,471,700	3,131,700
1999	705,000	2,425,500	3,130,500
2000	755,000	2,376,150	3,131,150
2001	810,000	2,323,300	3,133,300
2002	865,000	2,266,600	3,131,600
2003	925,000	2,206,050	3,131,050
2004	990,000	2,141,300	3,131,300
2005	1,060,000	2,627,554	3,687,554
2006	1,135,000	2,275,577	3,410,577
2007	1,215,000	2,196,127	3,411,127
2008	1,300,000	2,111,077	3,411,077
2009	1,390,000	2,020,077	3,410,077
2010	1,490,000	1,922,777	3,412,777
2011	1,590,000	1,818,477	3,408,477
2012	1,705,000	1,707,177	3,412,177
2013	1,825,000	1,587,827	3,412,827
2014	1,950,000	1,460,077	3,410,077
2015	2,085,000	1,323,577	3,408,577
2016	2,235,000	1,177,627	3,412,627
2017	2,390,000	1,021,177	3,411,177
2018	2,555,000	853,877	3,408,877
2019	2,735,000	675,027	3,410,027
2020	2,940,000	483,577	3,423,577
	<u>\$36,500,000</u>	<u>\$46,541,959</u>	<u>\$83,041,959</u>

**Report
to the**

ALASKA POWER AUTHORITY

in regard to

**the Plan of Finance of
the Tye Lake Hydroelectric Project**

FIRST *Southwest* COMPANY

**Anchorage, Alaska
Dallas, Texas**

FIRST *Southwest* COMPANY

INVESTMENT BANKERS

MERCANTILE BANK BUILDING

DALLAS, TEXAS 75201

MUNICIPAL DEPARTMENT

January 28, 1980

214 742-6461

Mr. Eric Yould, Executive Director
Alaska Power Authority
333 W. 4th Avenue, Suite 31
Anchorage, Alaska 99501

RE: TYEE LAKE HYDROELECTRIC PROJECT

Dear Eric:


At your request, we have described the proposed plan of finance of the above-captioned Project, addressing the question of State funding assistance and its impact on financeability of the Project.

We have reviewed the various engineering reports published on the Project. We have consulted with Wohlforth & Flint, bond counsel, with representatives of the Thomas Bay Power Commission and the Cities of Petersburg and Wrangell.

We are pleased to submit herewith our report. We are available at your convenience to discuss this report with representatives of the State, the Authority, Thomas Bay Power Commission and other interested parties.

Very truly yours,

FIRST SOUTHWEST COMPANY


Paul N. Arnett, Resident Manager
Anchorage, Alaska



John I. Hinton, Vice President
Dallas, Texas

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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 Tye 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 Tye Lake, approximately 40 miles southeast of the City of Wrangell, Alaska. Tye 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 Tye 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.

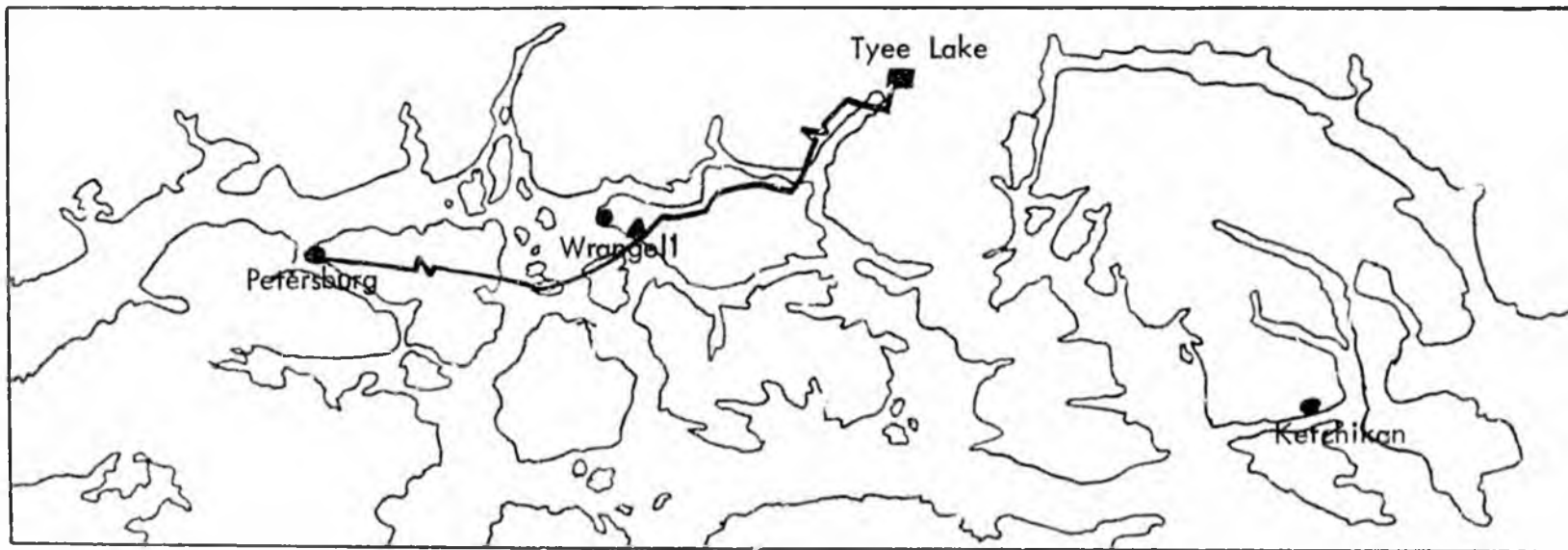
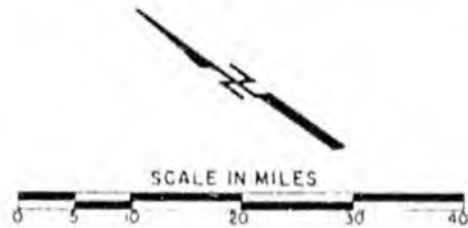


Figure 1



Petersburg-Wrangell-
Ketchikan Area
Location Map



PETERSBURG-WRANGELL-
KETCHIKAN AREA

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 a 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/Trangell 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

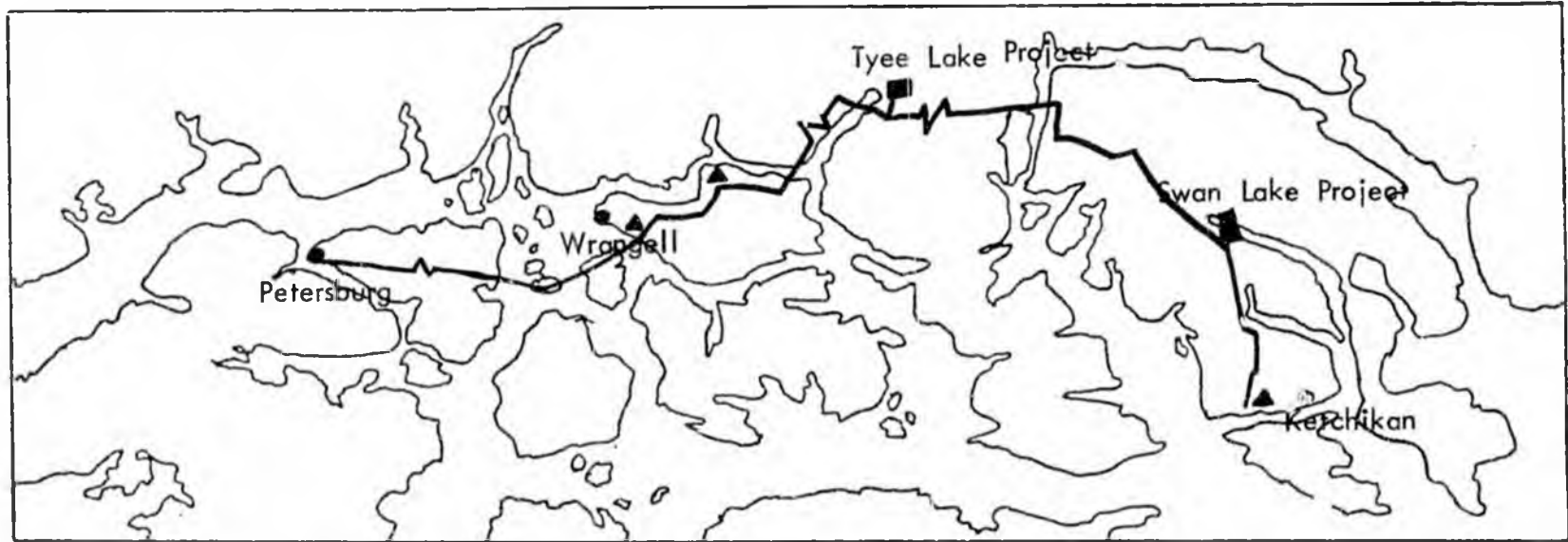
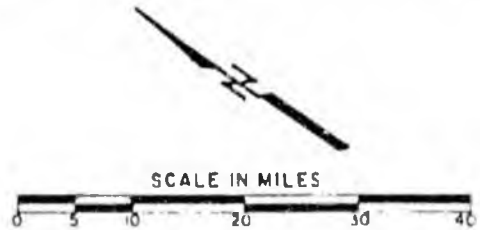


Figure 2



Petersburg-Wrangell-Ketchikan Area
Location Map



PETERSBURG-WRANGELL-KETCHIKAN AREA

*See Appendix
Appendix B
Appendix C*

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.