ALASKA LEGISLATURE COMMITTEE FILES 1983-1984

3015 SSA SB 68-71 (FILE 3) - (FILE 4) 8672

Devil Canyon Dam

The proposed design of Devil Canyon Dam is a concrete arch and an evaluation of the design is presented in the following section. With regard to earthquake-resistant design, dynamic analyses have been made to determine the stresses developed by conservatively-selected design earthquakes: a magnitude 8 1/2 event occurring at a distance of 90 kms and a local earthquake of magnitude 6 1/4 occurring very near the dam-site. The computed stresses are with the acceptable limits for concrete arch dams.

Furthermore, the ability of such dams to safely withstand extremely strong earthquake shaking has been demonstrated by the excellent performance of the Pacoima Dam in California in the San Fernando earthquake of 1971. This 350 ft. high dam safely withstood the effects of a Magnitude 6 1/2 earthquake occurring directly below the dam and producing some of the strongest earthquake motions ever recorded. This full scale test of a prototype structure provides convincing evidence that such dams can be designed to safely withstand the effects of strong earthquake shaking.

Other structures

In final design careful attention will have to be given to the earthquake-resistant design of other features of the project including spillways, powerhouses, intake structures, etc. The safe design of these structures is well within the state-of-the-art of engineering design for the anticipated levels of earthquake shaking and should present no major problems with regard to unacceptable levels of damage or public safety.

Uncertainties in Design

Probably the greatest uncertainty with regard to seismic design is in the required treatment of the buried channel on the right bank of the Watana reservoir. This uncertainty stems mainly from the fact that it has not been possible at this stage of project development to ascertain by borings the types of soils filling the buried channel and their engineering characteristics.

However, this is not a major problem since even if very unfavorable characteristics are assumed for these soils (and this will not necessarily be the case), remedial design measures have been explored and developed to eliminate any problems which could arise. Provisions for the costs of these measures are included in the cost-estimate even though the mitigation measures themselves, which may not be required, are not presented in the feasibility design reports.

Conclusion

In summary, it may be stated that the feasibility studies for the Susitna Project included an extremely comprehensive investigation of the seismicity of the project area and the development of design concepts for the major critical structures which, with appropriate attention to details in the final design and construction, should certainly eliminate any concerns regarding the provision of an adequate level of public safety and the prevention of any significant damage to the project as a result of earthquake effects.

DEVIL CANYON DAM

The Devil Canyon Damsite is ideally suited for an arch dam. The canyon is narrow and V-shaped. The abutment rock is sound and competent.

Devil Canyon arch dam has been designed and analyzed by use of the Arch Dam Stress Analysis System (ADSAS) computer program, which is the computerized version of the Trial Load Method of Analysis. This method was developed by the U. S. Bureau of Reclamation and has been thoroughly examined by rigorous mathematical analyses. In addition, results from this method have been successfully compared with structural models and prototypes in service.

The design selected for Devil Canyon is a thin double curvature arch. It is curved in both horizontal and vertical planes to produce the most efficient distribution of stresses possible under the site and loading conditions to which it may be exposed at this site.

The static loading conditions examined are the most severe combinations of gravity, reservoir and temperature loads anticipated at the site. The resulting stresses indicate a factor of safety greater than four, based on the anticipated compressive strength of concrete in the structure. The maximum tensile stresses occur on the downstream face of the arch, where, if cracking were to occur, no damage would result. The magnitudes of tensile stresses indicated will not occur since a redistribution of load in the dam will result as such stresses develop.

The dynamic loads applied to the dam are considered to be very conservative. Even so the resulting stresses will not cause serious damage to the structure. The analytical method used for stress studies is based on elastic theory. If the stresses indicated should occur, contraction joints in the upper part of the dam may open momentarily but would not result in major release of water or permanent damage to the structure.

The preliminary design for Devil Canyon Dam does, in every respect, respond to the seismic environment of the site.

With proper construction control, the dam will provide adequate safety under all loading conditions. It is extremely important that the very best construction techniques be employed in this dam. Proper concrete mix designs, consistent consolidation of the concrete and careful treatment of the rock contact and construction joints are of the utmost importance. The resulting concrete must be a homogeneous and isotropic product.

There are always risks of inadequate or inconsistent construction practices which would present problems in the behavior of a dam. Fortunately an arch dam has the capability of distributing load from weak areas to stronger, more capable concrete. This is not meant to excuse any but the best concrete control possible, because any weaknesses are not acceptable in this important structure.

Additional foundation investigations and insitu measurements will be required before a final design for Devil Canyon Dam is completed. Deformation moduli, joint orientation and continuity, and shearing resistance along joints will be required. Because of the preliminary nature of the present studies, such investigations are not considered necessary at this time. Instead, conservative assumptions have been made to assure a safe and satisfactory structure.

The proposed foundation treatment, consisting of consolidation and curtain grouting and adequate drainage, is satisfactory.

The engineering consultant has used adequate conservatism throughout the design for Devil Canyon Dam. Very little change from the preliminary design is anticipated for a safe and efficient final design for Devil Canyon Dam.

HYDROLOGY AND HYDRAULIC DESIGN CONSIDERATIONS

Flood Potential

The engineering consultant's assessment of the flood potential in the project area has properly identified the potential magnitudes and frequencies of flood flows.

The assessment utilized all available precipitation, snow survey and stream gaging data for stations within and adjacent to the Susitna River Basin. The probable maximum flood is based on the most critical combination of precipitation, snow melt, infiltration losses and flow

concentrations that is reasonably possible. The hydrologic analyses are in accordance with accepted engineering practice which has been developed in the United States and is being used in many parts of the world.

Spillway Capacity and Dependability

The proposed design adequately responds to the hydrologic environment in terms of spillway capacity and dependability.

Both Watana and Devil Canyon dams will have low-level valve-controlled outlets to pass the once in 50-year flood, a gate controlled chute spillway in combination with the valve outlets would pass the once in 10,000-year flood and a fuse plug emergency spillway in combination with the valve outlets and chute spillway would pass the probable maximum flood without overtopping the dams. Similar valve outlets and emergency spillways have been constructed and operated elsewhere with successful service. There is no reason to believe that they would not be successful at the Susitna project.

Public Flood Safety

The proposed project adequately protects public safety in terms of the flood danger and there are no increased flood risks inherent in building the project.

The reservoirs will be drawn down in winters providing significant amounts of reservoir capacity for storage of summer floods. Virtually all normal river flows would pass through the powerhouses with very little spillway operation. Peak discharges for major floods would be reduced substantially. Consequently, project operation would enhance the public safety by reducing the magnitude and danger of floods in the lower Susitna River.

Spillway capacities and heights of dams are designed with conservative safety factors. The dams and water conveyance structures are designed and would be constructed with high safety factors in accordance with best engineering practice. For these reasons, there would be no increased flood risk inherent in building the project.

Project Damage or Shutdown

There is no reason to expect that the project would experience damage and/or require shutdown as a result of floods.

Major floods may cause some cavitation erosion in spillway chutes, river bank and bed erosion downstream of flip buckets and valve outlets, and erosion in the unlined emergency spillway channel.

Because of the infrequent occurrence and relatively short duration of major floods, none of these types of damage would become so extensive during any single flood to require project shutdown.

One or more of the valve controlled low-level outlets may sustain damage during a major flood requiring temporary shutdown for repairs. This shutdown would not significantly affect flood regulation since each outlet discharges a small percentage of the total flood flow.

As the powerhouses will be underground, floods would not cause them to be damaged or shutdown.

Design and Operation Assumptions

The engineering consultant has not made any major assumptions regarding design, operational mode, etc. of water conveyance structures that lack a satisfactory level of conservatism.

The low-level outlets, main spillways, and fuse plug emergency spillways have all been designed in accordance with current engineering practice which is based on conservative assumptions. Fixed cone valves are superior to any other type of valve for high-head operation. Air slots will be provided in spillway chutes to prevent cavitation erosion by high velocity flow. Pre-excavated plunge pools and/or bank protection will be provided downstream of flip buckets and fixed cone valves to prevent excessive streambed and bank erosion. The fuse plugs are designed conservatively to withstand reservoir pressures until they are overtopped and then wash out rapidly to activate emergency spillway operation. The assumption that excessive erosion would not occur in the unlined emergency spillway channel is conservative in view of the mild channel slope and favorable rock quality.

The proposed operation of the water conveyance structures is believed to be the most reasonable and practical operational mode which provides a satisfactory level of conservatism with respect to downstream effects and project safety.

Reservoir Sedimentation

The effects of reservoir sedimentation have been properly assessed in design of the project.

Based on conservative values of the sediment inflow and reservoir trap efficiency, less than 5 percent of Watana reservoir would be filled in 100 years, and deposits in Devil Canyon would be less than 25 percent of that deposited in Watana reservoir. A large percentage of the sediment would be deposited in the dead storage portion of the

reservoirs. Reservoir sedimentation is not a controlling factor in project design as larger reservoirs or higher dams are not required and power production due to reservoir sedimentation would not be affected for well over 500 years.

Potential Downstream Effects

The proposed design and operation of the water conveyance structures adequately addresses potential downstream effects on river morphology, fisheries and wildlife.

Multi-level intakes will be provided for the power intakes and/or low-level outlets, as necessary, to permit release of reservoir water in the temperature range suitable for the downstream fishery. The valved outlets will discharge into relatively shallow basins, thereby preventing nitrogen supersaturation conditions harmful to fish. Spillway flip buckets and plunge pools will be designed to minimize nitrogen supersaturation. Their infrequent operation of once in 50 years would also greatly reduce any potential for serious effects on fish by nitrogen supersaturation. Planned increased reservoir releases during critical spawning periods together with remedial river channel work in spawning areas would minimize detrimental effects caused by lower river water levels due to project operation. While turbidity levels of reservoir releases would be sharply reduced in the summer, winter turbidity levels may be above natural levels due to suspension of fine sediments in the reservoirs; but this is not believed to be significant. Project operation will cause the following addtional effects in the Susitna River downstream of Devil Canyon Dam:

1) Eliminate and/or reduce thickness of ice cover for 20 to 30 miles downstream of Devil Canyon Dam in the winter due to release of reservoir flows above freezing temperatures which would prevent river crossings over ice by some wildlife and humans.

2) Sediment loads would be reduced in the Susitna River upstream of the confluence with Talkeetna causing some degradation of river channels.

3) Sediment loads would be essentially unchanged below the confluence because of the extremely large volume of sediment in the flood plain and contributed by tributary streams below the Talkeetna confluence.

4) Summer water stages in the lower Susitna River will be reduced by 1.5 to 3.5 feet which would reduce flooding in some areas and should not cause major impacts on navigation and other river operations.

5) The lower river will become more stabilized, resulting in a decrease in the number of small subchannels and an increase in vegetative cover.

6) The absence of annual floods may result in some loss of new lands for moose browse.

In summary, the potential downstream effects do not appear to be of such significance as to seriously jeopardize project construction.

Mitigation Measures in Water Conveyance Structures

Based on successful experience at other projects, mitigation measures that will be incorporated in the design of the water conveyance structures should be reliable and effective.

Multi-level intakes would have ports at several reservoir levels and a gate control system which would permit reservoir water to be released at the best possible temperatures suitable to the downstream fishery. The fixed cone valve sizes and operating heads for the Susitna project are well within their acceptable limits. Additional reliability of operation is provided by the use of 5 and 6 valved outlets at Devil Canyon and Watana, respectively. This enables continued operation at a high level of reservoir release in the event that one or two outlets would need to be closed. Operation of the valved outlets, as proposed, will reduce operation of the main spillway to once in 50 years, thereby reliably and effectively minimizing nitrogen supersaturation effects on the downstream river fishery.

Conclusions

In summary, it may be stated that the feasibility studies for the Susitna Project includes a thorough development of hydrologic aspects of the Susitna River and the development of design concepts for the major water conveyance structures which, with appropriate attention to details in the final hydraulic design, would assure an adequate level of public safety against flooding and the prevention of excessive detrimental downstream effects on river morphology, fisheries and wildlife.

MARKETS, ECONOMICS AND FINANCE FOR THE PROJECT

This section responds to the basic issues of the macroeconomic forces impacting the economic viability of the project, the future demand for power, economic measures and risks for the project, financial

opportunities and problems, marketability of power and suggestions for an overall strategy.

Macroeconomics

Two factors, future world oil prices and market rate of interest strongly impact (if not dominate) the economic and financial viability of the project. Both of these factors are in a large measure outside the control of the Alaska Power Authority.

Oil prices strongly affect the State's revenues, which in turn influence the State's economy, the rate of economic development in Alaska and correspondingly the future demand for power. These prices, through competitive market forces, establish the long run competitive price of natural gas and influence the price of coal and thus strongly influence the costs of thermal alternatives to the Susitna Project. These same prices affect State revenues and available funding from the State for the project, and the marketability of power.

More than 90% of the direct costs of operating a hydro facility are interest charges. The market rates of interest, thus strongly determines the cost of the Susitna Project and its relative economics.

The Susitna project is economically attractive in an environment of rising oil prices and low interest rates. Interest rates for State Government bonds are the highest they have been in fifty years. With a growing surplus of crude on world oil markets, the spot prices of crude have declined and future price trends are uncertain.

Demand For Power

We have reviewed the range of demand forecasts developed by ISER and Battelle and employed by Acres in their report and it is our opinion that these forecasts appear reasonable. Actual growth rates will probably lie between the expected and low cases. This is true because essentially all of the power will serve the residential and commercial market, which tracks population and employment trends.

Economics of the Susitna Project

The present value of the cost of the Susitna Project versus another source of power is related to the time horizon of the evaluation and the discount rate. The time horizon is important because the economics may be different depending on the period of evaluation.

Work done by Acres and Battelle, and supported by our independent evaluation show that over a 30 year period through the year 2010, the Susitna project would probably yield no net benefits. With current interest rates and oil prices, over a thirty year period, power from the Susitna could very likely be more costly than a thermal alternative.

However, hydro projects usually have long useful lives of many decades, and over a 60 year period, the Susitna project appears to be economically attractive.

With this framework, there is a value trade-off for Alaskans to choose between

* Receiving the current benefits from funds that would be invested in the Susitna Project

or

* Investing and receiving the potential long term benefits of hydro power in the next century.

Sensitivity and Risk Analysis

The net economic benefits for the Susitna project versus alternatives are highly sensitive to load forecasts, real discount rates, fuel escalation costs, capital costs of the project, and financing strategies.

For the Acres' base case analysis, which has escalating energy prices of 9-10% per year based on inflation of 7% per year and an implied interest rate of 10%, the net gain over a 60 year period is about $1.3 billion (1982). The investment in the Susitna Project corresponding to this gain is $5.1 billion (1982). If the load forecast follows a low growth scenario, the net gain is reduced to nearly zero, or if the discount rate is reduced to 12% (5% real) the project would yield a loss of $500 million or more.

If the fuel costs escalated at an inflation rate of 7% per annum, the impact would also be a loss of $1.1 billion dollars. Conversely, if the escalation rate for fuel is 10%, the impact would be a net sum of about $1.5 billion. If the capital costs of the project were 20% more than estimated, the cost of the Susitna Project and a thermal alternative would be essentially the same.

There is a wide range of possibilities for forecasts of these variables and corresponding values for the net benefits or losses. Through a probabilistic assessment of each of these variables, Acres estimated that there is about 25 - 30% chance for a net loss and a 70 - 75% chance for a net gain. These assessments were made in an

environment of increasing oil prices and medium increases in load, and did not directly account for the financing and marketing risks in these economic analysis. If we include these factors in todays environment, the risks increase although the weight of the economics still slightly favors the Susitna Project.

The major economic risks for the project are:

(1) Inability to obtain favorable bond rates and corresponding high financing charges for the project.

(2) Lower than expected energy price increases could make the project economically nonviable.

(3) Capital cost estimates may be too low, placing severe financial strain on the project.

(4) Possible opportunity losses, that is, foregoing the benefits of other investments in Alaska, for example, industrial development in enterprises which might generate net revenues or a stable long term employment base. The Susitna project would generate jobs during construction. However, in the long term during operation, the number of jobs added to Alaska's economy is minimal.

(5) Difficulty in entering into long term contracts for the power.

(6) A possible combination of the above.

Management of Economic Risks

Many of these risks can be managed, thereby substantially increasing the possibility of favorable economics for the project. The essence of this management is (1) timing and (2) additional low-cost studies.

A strategy of waiting patiently for favorable bond interest rates and an increase of oil prices would substantially reduce the risks. Taking a long term view, over say ten years, there is a strong possibility that interest rates will decline giving the Power Authority a window to obtain inexpensive financing. Correspondingly in the same time frame, it is likely that oil prices may start to rise again. In order to finance and start construction when these favorable events occur requires positioning now. This includes obtaining in advance all permits and licenses, and completing the engineering design and environmental studies.

To further reduce the risks, it is recommended that the Power Authority develop a business plan which would, among other things, identify viable power alternatives if the Susitna project is delayed or the demand forecast changes.

In the current inflationary environment, the Susitna Project would probably need state goverment participation of about 50% of the project's value -- $2,500,000,000 in 1982 dollars and more than $3,500,000,000 in actual costs. Because of the high level of risks, the debt portion of the project would probably require implicit or explicit state guarantees, or possible general obligation bonding. The State of Alaska effectively takes all the risk on the entire cost of the project including potential bonding of $2,800,000,000 in 1982 dollars and a correspondingly greater numbers of actual dollars.

A combination of escalating construction costs, high interest rates, and declining state revenues could put a revenue cash flow squeeze on the project. Positioning, patience and timing are critical to minimizing this risk.

These are some major opportunities in the financing area including the arbitraging of funds during the construction period or obtaining low cost debt financing. For example, if the project could be financed today at the lower rates that prevailed in 1977 and 1978 (7 to 8%), the present value of the costs could be reduced by about $1,500,000,000 (1982 dollars). A recurrence of low rates would markedly affect the financing of the project.

The tactics and strategy for financing needs further study and should be developed in the business plan.

Marketability

The power from the Susitna Project probably could not be sold unless it were less costly than alternatives. Anchorage, Fairbanks, and other regions within the Railbelt Area have different power sources and, correspondingly, different cost bases for power. This means that if uniform electric rates were used for Susitna power, the cost of power may be pegged to the least costly alternative. This would further exacerbate the financing and contracting problems.

A solution lies in organizational changes and a possible state referendum to gain support from the interested parties. This problem of marketing needs further study in the suggested business plan.

ALASKA POWER AUTHORITY

334 WEST 5th AVENUE · ANCHORAGE, ALASKA 99501

Phone: (907) 277-7641
(907) 276-0001

April 26, 1982

The Honorable Jay S. Hammond
Governor
State of Alaska
Pouch A
Juneau, Alaska 99811

Dear Governor Hammond:

Alaska Statute 44.83.300 mandates that the Alaska Power Authority prepare and submit a preliminary report recommending whether work should continue on the Susitna River Hydroelectric Project and on other viable alternatives. The law further directs the Authority to explain certain project aspects in detail, in the event of an affirmative recommendation. This letter and the accompanying materials constitute that preliminary report.

In formulating its recommendations, the Power Authority has reviewed the Acres American Draft Feasibility Report, has been briefed by Battelle Pacific Northwest on the results of the Railbelt Alternatives Study, has received an independent Susitna Project cost estimate, has received a final report from our Susitna External Review Panel, and has listened to public, agency and utility testimony about the proposed project.

The Board of Directors has concluded that the Susitna Project offers a potential of long term benefits to the residents of the State. While this potential exists, the realization of those benefits is dependent upon certain assumptions about the future that are far from certain, upon proper project development timing, and upon very skillful project management. Because of these uncertainties and the time available before any construction decision is necessary, the Authority believes it is premature to make any commitment, at this time, to actual project construction. On the other hand, since the potential exists for realizing substantial long-term benefits and since no information has come to light to suggest that environmental and social impacts, after mitigation, would be unacceptable, we recommend the following actions which were unanimously approved at the meeting of the Power Authority on April 22, 1982.

1. Pre-construction developmental efforts on the Susitna Hydroelectric Project should be continued;

2. The Alaska Legislature should authorize the Power Authority to submit a Federal Energy Regulatory Commission license application at a time deemed appropriate by the Authority. The issue of license application timing will be resolved by the Authority not later than June 30, 1982;

3. Funds in the amount of $25.6 million should be appropriated to the Authority in FY-83 for the continuation and intensification of environmental studies, for site exploration activities, and for the initiation of project design.

Ensuing Board discussions raised several additional issues. Assessment of selected alternative power generation options should be pursued in the event that Susitna development does not proceed as scheduled for one reason or another. Specifically, we suggest that an initial assessment be made of the technical viability, environmental impact and life cycle cost of a North Slope gas generation and transmission system to serve railbelt power needs, and that feasibility studies of the proposed Chakachamna Hydroelectric Project by continued. The estimated FY-83 costs of these activities are $200,000 and $3,300,000, respectively.

In as much as a substantial State monetary contribution (in the form of either a loan or a grant) will be necessary to offset the relatively high power cost in the initial years of project operation, State officials should carefully consider the alternative near term uses of these State funds that would be foregone.

The Authority wishes it be understood that the recommendation to continue development activities on the Susitna Project is not an endorsement of the consulting engineer's recommendations regarding specific project details. For instance, the engineer's plan for access to the project site is the subject of reanalysis and will be reconsidered by the Authority at an appropriate future time.

With respect to the detailed information required by AS 44.83.300, please reference the accompanying draft feasibility report and associated documents. The proposed conceptual design can be found in Chapters 11-14 of Volume 1. The phases of construction and the expected completion dates for each phase are presented in Chapter 17 of Volume 1 and on Plates 75 and 76 of Volume 3. This schedule represents an optimal program under the assumption of a mid-range load growth forecast. The actual commitment to begin construction will require continued assessment of the opportunities and constraints associated with financial markets, Railbelt load growth and State revenues. The expected cost of constructing each phase is shown in Chapter 16 of Volume 1. A second estimate, prepared at Power Authority direction independently of the consulting engineer is also provided. Finally, the anticipated costs to the State and to power consumers under a number of alternative methods of project financing are presented in Chapter 18 of Volume 1. Analysis must continue on these as well as other financing alternatives.

You will find additional very important information in the other sections of the draft feasibility report, in the independent cost estimate report, in the Susitna External Review Panel report, and in the transcript of public, agency and utility testimony.

The Power Authority appreciates the opportunity to provide this preliminary report and make these recommendations on the Susitna Hydroelectric Project.

Respectfully Submitted,

Charles Conway
Chairman

Attachments: As noted.

N.C.

UNIVERSITY OF ALASKA
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Anchorage, Alaska 99501
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February 24, 1983

Senator Vic Fischer
Senate State Affairs Committee
Pouch V
Juneau, Alaska 99811

Dear Senator Fischer:

At the request of the Senate State Affairs Committee, I am sending you a brief paper which describes our work to date in developing new economic projections for determining future electricity demand in the Railbelt.

Our work is still in a preliminary stage as all components of our projection methodology and data inputs are currently under intensive review and scrutiny both from within and without the Institute. Consequently, the projections presented in the paper are subject to change before they are actually used in a revised evaluation of Susitna feasibility.

With the caveat in mind, the paper presents our best estimate at this time of a base case (most likely) projection of economic activity. High and low projections are not yet available, but it should be kept in mind that due to the inherent uncertainties surrounding oil prices and production, as well as other variables affecting the levels of future economic activity, the range of possible futures covers a broad band.

Tables 1-4 in the paper show the 1983 preliminary projections for state population, employment, petroleum revenues, and general fund expenditures (defined to include Permanent Fund Dividends and restricted general fund expenditures). It also compares these projections to those done by the Institute in 1981 for the Battelle Railbelt study.

The significantly lower population and employment projections are the result of the downward adjustment in forecasted petroleum revenues. For the mid-1990s the most recent projections are less

than one-third those of 1981. This fall in forecasted petroleum revenues dramatically reduces state spending in the current projection below the projection made in 1981. Further, as lower petroleum revenues are a reflection of lower real energy prices, lower petroleum revenue projections go hand in hand with a reduction of the economic viability of large scale energy projections such as the ANGTS line.

Table 5 of the paper describes the revised base case economic scenario and compares it with the one used in the Battelle study. One can see the postponement or elimination of several projects, but also the addition of some new projects.

The difference between the 1981 projection and the preliminary 1983 projection is symptomatic of the uncertainty inherent in energy planning in Alaska. We cannot expect that this uncertainty has now been eliminated because a revised set of projections, albeit preliminary, has been developed. Events will continue to surprise us, forcing us to continuously change our best estimates of what the future economic picture of the state will be. Energy planning must confront this uncertainty directly and direct us toward those options which minimize the risks inherent in planning in an uncertain world.

I will be unavailable to appear before the committee on March 1, but if you desire an oral briefing on our work to date, please contact Dr. Gunnar Knapp of the Institute, who is prepared to explain in more detail the current status of our research.

Sincerely,

Oliver Scott Goldsmith/D.K.

Oliver Scott Goldsmith
Associate Professor of Economics

Enclosures

cc: Ned Lesnick, Harza-Ebasco
Robert Mohn, APA

COMPARISON OF ISER MAP MODEL PROJECTIONS PREPARED IN 1981 FOR BATTELLE RAILBELT STUDY AND PRELIMINARY PROJECTIONS PREPARED IN 1983

Prepared for

The Alaska Senate State Affairs Committee

Prepared by

Scott Goldsmith and Gunnar Knapp
University of Alaska
Institute of Social and Economic Research

February 1983

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I. COMPARISON OF 1981 PROJECTIONS AND 1983 PRELIMINARY PROJECTIONS

In 1981, the Institute of Social and Economic Research (ISER) prepared projections of population and economic activity in Alaska and the Railbelt for Battelle.* Tables 1-4 compare these 1981 projections for state population, employment, petroleum revenues, and general fund expenditures with the preliminary results of projections which ISER is presently preparing for the Alaska Power Authority and the Minerals Management Service Alaska OCS Office.

The significantly lower population and employment projections are the result of the downward adjustment in forecasted petroleum revenues. For the mid-1990s the most recent petroleum revenue projections are less than one-third those made in 1981. This fall in forecasted petroleum revenues dramatically reduces state spending in the current projection below the projection made in 1981. Further, as lower petroleum revenues are a reflection of lower real energy prices, lower petroleum revenue projections go hand in hand with a reduction of the economic viability of large scale energy projects such as the ANGTS line.

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*See Scott Goldsmith and Ed Porter, "Alaska Economic Projections for Estimating Electricity Requirements for the Railbelt" (ISER report prepared for Battelle, October 1981).

Our current work is still in a preliminary stage, and all of the components of the projection methodology and data inputs are currently under intensive review and scrutiny from both within and without ISER. Consequently, the projections presented in the attached tables are subject to change.

With this caveat in mind, the preliminary 1983 projections represent our best estimate at this time of a base case (most likely) projection of economic activity. We have not yet completed high and low projections, but it should be kept in mind that due to the inherent uncertainties surrounding oil prices and production, as well as other variables affecting the levels of future economic activity, the range of possible futures covers a broad band.

TABLE 1.

COMPARISON OF MAP MODEL PROJECTIONS:

POPULATION

(THOUSANDS)

	1981 PROJECTIONS	1983 PRELIMINARY PROJECTIONS	DIFFERENCE
1980	400.457	-	-
1981	412.395	415.695	3.300
1982	428.251	431.412	3.160
1983	444.492	445.441	0.948
1984	463.274	457.310	-5.964
1985	498.151	468.152	-30.000
1986	531.933	481.069	-50.864
1987	545.304	491.021	-54.283
1988	547.669	502.515	-45.154
1989	558.208	512.465	-45.743
1990	562.438	521.061	-41.377
1991	572.732	533.891	-38.841
1992	579.364	538.950	-40.413
1993	588.021	541.646	-46.375
1994	598.543	544.941	-53.603
1995	608.963	547.669	-61.293
1996	621.173	549.747	-71.426
1997	634.519	552.455	-82.064
1998	646.899	556.224	-90.675
1999	660.873	561.274	-99.600
2000	674.983	566.779	-108.204
2001	-	572.190	-
2002	-	577.875	-
2003	-	584.169	-
2004	-	590.959	-
2005	-	598.222	-
2006	-	605.880	-
2007	-	614.087	-
2008	-	622.780	-
2009	-	631.767	-
2010	-	641.297	-

NOTE: DIFFERENCE IS 1983 PRELIMINARY PROJECTIONS MINUS 1981 PRO
BLANKS INDICATE PROJECTIONS NOT AVAILABLE
SEE NOTES AT END OF TABLES FOR SOURCES

NOTE: Population projections are for long-term trends and will not capture short-term cyclical swings.

TABLE 2.

COMPARISON OF MAP MODEL PROJECTIONS:

EMPLOYMENT

(THOUSANDS)

	1981 PROJECTIONS	1983 PRELIMINARY PROJECTIONS	DIFFERENCE
1980	206.214	-	-
1981	214.193	214.217	0.024
1982	223.028	228.620	5.592
1983	233.475	234.000	0.525
1984	244.809	237.027	-7.782
1985	268.663	242.787	-25.876
1986	291.040	251.519	-39.521
1987	299.174	256.739	-42.435
1988	298.113	263.751	-34.362
1989	301.154	268.122	-33.033
1990	299.004	271.005	-27.999
1991	303.003	278.883	-24.120
1992	303.739	277.461	-26.278
1993	306.920	275.488	-31.432
1994	311.561	275.260	-36.301
1995	316.167	274.677	-41.489
1996	322.484	273.882	-48.602
1997	329.803	274.101	-55.702
1998	336.114	275.637	-60.477
1999	343.883	278.370	-65.513
2000	351.656	281.385	-70.271
2001	-	284.108	-
2002	-	286.979	-
2003	-	290.281	-
2004	-	293.862	-
2005	-	297.658	-
2006	-	301.571	-
2007	-	305.768	-
2008	-	310.155	-
2009	-	314.532	-
2010	-	319.225	-

NOTE: DIFFERENCE IS 1983 PRELIMINARY PROJECTIONS MINUS 1981 PROJECTIONS
BLANKS INDICATE PROJECTIONS NOT AVAILABLE
SEE NOTES AT END OF TABLES FOR SOURCES

TABLE 3.

COMPARISON OF MAP MODEL PROJECTIONS:

PETROLEUM REVENUES

(MILLIONS OF CURRENT DOLLARS)

	1981 PROJECTIONS	1983 PRELIMINARY PROJECTIONS	DIFFERENCE
1980	1721.020	-	-
1981	3036.738	3314.232	277.495
1982	4132.719	3964.701	-168.018
1983	5030.418	3450.448	-1579.970
1984	5598.605	3163.283	-2435.323
1985	6623.777	3388.757	-3235.021
1986	7427.629	3772.009	-3655.620
1987	8612.336	3952.286	-4660.047
1988	9549.510	4470.195	-5079.316
1989	10907.430	4713.133	-6194.301
1990	11456.360	4502.570	-6953.793
1991	12468.160	4213.605	-8254.551
1992	13032.680	4134.953	-8897.730
1993	13766.180	4049.570	-9716.610
1994	13911.120	4108.281	-9802.840
1995	13456.950	3938.794	-9518.150
1996	12864.070	3771.708	-9092.360
1997	12155.070	3927.083	-8227.984
1998	11311.730	4055.789	-7255.941
1999	10396.860	4369.531	-6027.324
2000	9559.230	4590.996	-4968.238
2001	-	4824.875	-
2002	-	5072.004	-
2003	-	5333.211	-
2004	-	5609.359	-
2005	-	5901.387	-
2006	-	6210.293	-
2007	-	6537.129	-
2008	-	6883.031	-
2009	-	7249.211	-
2010	-	7636.957	-

NOTE: DIFFERENCE IS 1983 PRELIMINARY PROJECTIONS MINUS 1981 PROJECTIONS
BLANKS INDICATE PROJECTIONS NOT AVAILABLE
SEE NOTES AT END OF TABLES FOR SOURCES

TABLE 4.

COMPARISON OF MAP MODEL PROJECTIONS:

STATE GENERAL FUND EXPENDITURES

(MILLIONS OF CURRENT DOLLARS)

	1981 PROJECTIONS	1983 PRELIMINARY PROJECTIONS	DIFFERENCE
1980	1402.121	-	-
1981	2381.692	2783.068	401.375
1982	3238.556	4000.100	761.543
1983	3582.562	3076.350	-506.212
1984	4033.220	3510.656	-522.564
1985	4556.820	3841.445	-715.375
1986	5410.379	4191.855	-1218.523
1987	6319.211	4305.965	-2013.246
1988	6915.836	4834.742	-2081.094
1989	7354.871	5063.359	-2291.512
1990	7908.508	5711.844	-2196.664
1991	8566.227	6206.945	-2359.281
1992	9202.680	5754.664	-3448.012
1993	10045.590	5810.402	-4235.191
1994	11018.460	5987.268	-5031.195
1995	12145.130	5984.492	-6160.633
1996	13389.920	5981.754	-7408.168
1997	14818.750	6268.918	-8549.828
1998	16433.000	6537.012	-9895.990
1999	18144.310	6991.930	-11152.380
2000	20107.040	7382.637	-12724.410
2001	-	7798.238	-
2002	-	8237.258	-
2003	-	8705.035	-
2004	-	9205.180	-
2005	-	9738.430	-
2006	-	10306.680	-
2007	-	10911.940	-
2008	-	11557.960	-
2009	-	12245.140	-
2010	-	12976.270	-

NOTE: DIFFERENCE IS 1983 PRELIMINARY PROJECTIONS MINUS 1981 PROJECTIONS
BLANKS INDICATE PROJECTIONS NOT AVAILABLE
SEE NOTES AT END OF TABLES FOR SOURCES

NOTE: General Fund Expenditures are defined to include permanent fund dividends and restricted general fund expenditures.

II. COMPARISON OF ASSUMPTIONS USED IN 1981 PROJECTIONS AND PRELIMINARY 1983 ASSUMPTIONS

Differences between the 1981 and 1983 projections result primarily from differences in the assumptions used. Some changes have also been made to the structure of the model; however, these are of less importance in explaining differences between projections.

Table 5 presents a brief comparison of these assumptions for the 1981 and the 1983 preliminary projections. Exogenous employment assumptions are developed by constructing a scenario of employment in different special projects and basic industries. The scenario used in the 1983 preliminary projections postponed or eliminated some projects assumed for the 1981 projections, but added others.

Table 6 compares the total exogenous employment that resulted from the exogenous employment scenarios outlined in Table 5. The significant decline in the assumptions for total exogenous employment results primarily from lower exogenous employment assumptions for the mining, construction, and transportation industries.

TABLE 5. COMPARISON OF ASSUMPTIONS, 1981 PROJECTIONS AND PRELIMINARY 1983 PROJECTIONS

	1981 Projections	Preliminary 1983 Projections
State Revenues and Expenditure Assumptions		
Revenues	Petroleum revenues based upon Alaska Department of Revenue projections published in June of 1981 (see Table 3 for projections).	Petroleum revenues based upon Alaska Department of Revenue projections published in December of 1982 (see Table 3 for projections). The income tax is reinstated in 1989.
Expenditures	Real per capita expenditures increase at the same rate as per capita income.	State expenditures are at the levels allowed by the recently-passed spending limit. In 1992 when revenues are no longer sufficient to allow expenditures at the level permitted by the spending limit, expenditures are cut to equal total revenues.
Exogenous Employment Assumptions*		
Trans-Alaska Pipeline	Operating employment continues; four new pumping stations constructed.	Operating employment continues; four new pumping stations constructed.
North Slope Oil	Long-run North Slope oil operating employment is 1,667.	Long-run North Slope oil operating employment is 2,400.
Upper Cook Inlet Oil and Gas	Upper Cook Inlet employment remains constant with gas development offsetting declines in oil production.	Upper Cook Inlet employment declines to 50 percent of current levels by 2010.
Tertiary Oil Recovery	No tertiary oil recovery assumed.	Tertiary employment in oil recovery project on North Slope utilizing natural gas peaks at 2,000 in early 1990s.
Gas Pipeline	Northwest gas pipeline constructed, 1983-87.	No gas pipeline assumed.

*Employment in different special projects and basic industries is totaled to arrive at the total exogenous employment assumptions shown in Table 6.

TABLE 5. COMPARISON OF ASSUMPTIONS, 1981 PROJECTIONS AND PRELIMINARY 1983 PROJECTIONS (Continued)

	1981 Projections	Preliminary 1983 Projections
National Petroleum Reserve in Alaska	Slow development of 5 oil fields.	No development assumed.
Outer Continental Shelf (OCS) Petroleum and Gas	Oil and gas resources are developed in Lower Cook Inlet, the Beaufort Sea, the Chukchi Sea, & the Navarin Basin, with total employment exceeding 4,000 by 1998.	Oil and gas resources are developed only in the Beaufort Sea, with maximum employment of 1,771 in 1995.
Hydroelectric Development	No hydroelectric development assumed.	Employment in construction of hydroelectric projects peaks at 700 in 1990.
Coal Development	Beluga Coal Field developed for export.	Beluga Coal Field developed for export.
Mining	1 percent annual growth in employment	U.S. Borax, Greens Creek, and Red Dog Mines constructed; other mining employment increases at 1 percent per year.
Petroleum Refining	100,000 barrel-per-day refinery constructed at Valdez.	No new refineries assumed.
Pacific LNG Project	LNG project assumed for Anchorage area.	No LNG project assumed.
Forestry, Lumber and Pulp	Employment expands to 6,778 in 2000.	Employment expands to 4,028 in 2000.
Agriculture	Employment expands to 1,037 in 2000.	Employment expands to 508 in 2000.
Fishing	Total fish-harvesting employment expands to 7,423 in 2000. Fish processing employment expands roughly proportionately.	Total fish-harvesting employment expands to 7,096 in 2000. Fish processing employment expands roughly proportionately.
Federal Gov't Employment	Military employment constant. Civilian employment grows at .5 percent per year.	Military employment constant. Civilian employment grows at .5 percent per year.

TABLE 6. COMPARISON OF MAP MODEL TOTAL EXOGENOUS EMPLOYMENT ASSUMPTIONS

(thousands)

	1981 Projections	1983 Preliminary Projections	Difference
1980	67.010	66.152	-.858
1981	69.105	66.696	-2.409
1982	70.184	69.150	-1.034
1983	72.627	70.688	-1.939
1984	74.391	70.733	-3.658
1985	80.888	71.160	-9.728
1986	83.928	72.238	-11.690
1987	80.182	72.525	-7.657
1988	75.257	73.319	-2.208
1989	76.170	74.565	-1.595
1990	77.657	74.964	-2.693
1991	79.648	74.944	-4.704
1992	79.451	74.683	-4.798
1993	79.250	75.026	-4.224
1994	80.295	75.486	-4.809
1995	80.749	74.964	-5.755
1996	81.388	74.944	-6.444
1997	82.344	74.683	-7.661
1998	82.190	75.026	-7.164
1999	82.672	75.486	-7.186
2000	83.308	75.947	-7.361
2001	-	75.912	-
2002	-	75.816	-
2003	-	75.902	-
2004	-	75.995	-
2005	-	76.097	-
2006	-	76.152	-
2007	-	76.284	-
2008	-	76.418	-
2009	-	76.438	-
2010	-	76.598	-

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TASK 11: FINANCING OPTIONS
SUMMARY

Task 11 was prepared by Acres American to set out what they considered the most viable financing options for the Watana phase of the Susitna project. Task 11 also includes comments by the Alaska Power Authority's investment advisors.

The pre-conditions laid out are (1) an acceptable cost of electricity in the early years, (2) meeting the debt coverage, (3) acceptable levels of borrowing, both G.O. and revenue, (4) acceptable level of demands on available revenues of the State.

The four options are:

* Option A -- state appropriations of $1.4 billion in 1982 dollars from 1984-89, with revenue bonds after 1989
* Option B -- the same as A but with $1.8 billion
* Option C -- the same as A and B but with the state appropriations guaranteed through a constitutional amendment

All options assume that no revenue bonds could be obtained in the early years (1985-87), and that revenue bonds sold after 1989 would require the backing of the moral obligation of the state and would be based on "sufficiently rigorous" power contracts so that they would not "to any significant extent" rely upon the state's credit. A key condition would be that "power contracts providing for such Revenue Bond financing are obtained and are in place before any major capital expenditure is undertaken."

The APA's investment advisors have reviewed the options and commented upon them. Their recommendations are:

* state appropriations should be funded during 1983-89
* prior to major expenditures definitive contractual commitments by participating utilities should be in place
* significant borrowing should not commence before the late 1980's
* prerequisites for issuance of bonds should be (1) definitive contractual commitments by utilities, (2) updated economic and financial analysis of the project, and (3) resolution of the question of tax exemption of bonds
* rather than using G.O. bonds, borrowing should be, to the fullest extent possible, by revenue bonds secured by long-term power sales contracts with participating utilities
* over the next two years, the preconditions of financing viability should be resolved

SUSITNA HYDROELECTRIC PROJECT

TASK 11: FINANCING OPTIONS

Prepared by:
Acres American Incorporated

January 1983

ACRES

ALASKA POWER AUTHORITY

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Option A - $1.4 Billion Drawn from Uncommitted State Funds Available for Capital Construction

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Option D - $1.8 Billion Dedicated from Permanent Fund Income

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC DEVELOPMENT
FINANCING OPTIONS

1 - OBJECTIVES

The objective of this report is to set out the currently most viable financing options for the Watana phase (1985-1993) of the Susitna Hydroelectric Development together with the comment of the Power Authority's investment advisors (The First Boston Corporation, John Nuveen & Company, and First Southwest Company) on the impact of these options on the credit rating of the State of Alaska and on other related issues.

2 - ECONOMIC CONTEXT OF THE FINANCING PROPOSALS

The economics, marketing and financing of Susitna will be the subject of a final review by Acres American in March of 1983. The data utilized in this analysis however is, with minor modification, based on the Susitna Task 11 Reference Report. Some amendment of the data used here will then arise in the light of the March 1983 review. Our preliminary indications are however that the probable revisions will not materially impact the conclusions which may be based on the results presented in this memorandum.

3 - BASIC POLICY ISSUES: RISK AND TIMING

The Watana phase alone of Susitna will take 10 years (from the present stage of FERC licence application) to complete. It is also clearly apparent that it will not be possible to produce wholly certain forecasts of the underlying energy economics of the project nor of the availability of State revenues or of the competing demands for State resources

which may arise over this extended period. The requirement that such forecasts be produced as an initial pre-condition for authorization of development would therefore effectively preclude Susitna or indeed, any long term development of Alaska's natural resources.

It must also be frankly recognized that risks from erroneous forecasts will arise from proceeding with Watana at its estimated capital cost of $3.6 billion (1982 dollars). These are primarily risks associated with load forecasts, interest rates, inflation, etc. But it must be recognized also that risks will arise through not proceeding with Susitna since this will force Alaska electric power consumers to face the alternative risks arising from the estimated $1.7 billion (1982 dollars) of capital cost for fossil fuel plants and the risk that these plants will also require meeting the ever increasing operating costs reflected in Exhibit A. Moreover, these other options also involve risks from forecasting errors in the load forecasts, interest rates, inflation, etc.

In the Watana investment decision, therefore, the issue is not between risk and no risk, or investment and no investment, but only between one set of risks and another and one set of capital expenditures and another. The financing options as developed below therefore endeavor to reflect these risks in a realistic manner and provide for development/financing options which effectively minimize these risks.

It is an inherent characteristic in the very magnitude of their financial requirements and the complex political and economic issues which they pose, that "mega-projects" such as Susitna, have a "window of opportunity" during which they can proceed. If this "window" is missed the opportunity to proceed may not recur for many years.

Ultimate development of the hydroelectric potential of Susitna must be considered as highly probable given the authoritive estimates (see Exhibit C) and forecasts of Alaska's own Department of Revenue of continued significant long term real increase in alternative energy prices. Hence the essential issue is whether we proceed in the immediate future with this window of opportunity or whether the project is postponed-- possibly for a long period. Here, the following considerations must be taken into account:

(a) On present forecasts, postponement of Susitna wholly delaying its net benefits, would cost $43 million p.a. in 1982 present value terms.

(b) The possibility, referred to above, that the "window of opportunity" for Susitna may not recur for a very long period. This could result in the cost of postponement being a multiple of that given in (a).

Finally, we would stress that the Susitna Project would also be re-assessed by the Power Authority in 1984 before any major outlays were undertaken in 1985. By this date we will have two more years of economic and financial data with which to re-evaluate the situation and the uncertainties regarding the scale of the world economic recovery. The existing uncertainty of near-term future petroleum prices and revenues should be substantially reduced.

4 - THE FINANCING OPTIONS

The Essential Pre-conditions

The essential pre-conditions for any financing scheme is taken as the requirement that they meet:

(a) An acceptable cost of energy in the early years of operation. This is taken as effectively meaning that the cost of power must be close to or below the cost of energy that would result from pursuing the best Thermal Option as shown in Exhibit A.

(b) Meeting its debt coverage. All the residual financing requirements are assumed to be met (long-term) by borrowing in the form of tax-exempt bond financing at 10% with a coverage requirement of 1.1. This requirement must be met or the borrowing could not be regarded as meeting the basic requirements of acceptability to investors.

(c) Acceptable and viable levels of borrowing. The level of borrowing which the project requires to be met by G.O. bonds will depend upon the capacity of the State of Alaska to raise G.O. Bonds either without effect on its bond rating or with an effect that is regarded as an acceptable price for proceeding with the project. The other source of borrowing will be Revenue Bonds which, as discussed below, depend upon the power contracts which are in place.

(d) An acceptable level of demands on the funds available to the State of Alaska. The funds here are taken as the estimate of the uncommitted funds for capital appropriation as estimated by John Nuveen & Company and shown in Tables 1 and 2. (These take into account the estimated maximum G.O. Bonds as a source of funds.)

The Financing Options

A very large number of financing options have been considered. The four options: A, B, C, and D summarized in Tables 3 and 4 appear those most likely to fulfill the essential criteria stated above. These options are:

Option A

This option calls for $1.4 billion 1982 dollars in State appropriations phased over the period 1984 to 1989. This option may also indirectly involve drawing upon G.O. Bonds since these (see Tables 1 and 2) are built into the final total "available for Susitna". (The phasing of the appropriations year-to-year is, of course, arbitrary in that it can be adapted to the flow of funds represented by the "available for Susitna", providing the total remains the same.)

Option B

This option is precisely identical to that of Option A except that it involves a State appropriation of $1.8 billion in 1982 dollars phased over the period 1984-1989.

Options C and D

These options involve the concept of dedicated funds of the same magnitude as Option A and B being made available through a constitutional amendment. Since these options are of a markedly different character, they are discussed separately below.

Phases and Forms of Borrowing

Before reviewing the characteristics of the schemes proposed, it is necessary first to deal briefly with the phases and forms which the borrowing may involve.

In the Preliminary Phase between 1985 and 1987, the dam itself will not be under actual construction and only preliminary work will be in progress. Under these circumstances, it must be accepted that no Revenue Bond financing could be obtained and that the project at this stage would have to rely wholly upon State appropriations from the resources shown in Tables 1 and 2.

In the final and major phase of construction between 1989 and 1993 the objective of any financing or scheme must be to ensure that the financing at this stage is based upon Revenue Bonds which, although they will require moral obligation of the State of Alaska, are based on sufficiently rigorous power contracts that they wholly meet their debt coverage requirements when Watana comes into operation and do not to any significant extent rely upon the credit of the State of Alaska.

Whether this objective can be attained will depend first on the levels of State appropriations. This might be seen as the "equity" investment in the project which provides security to the investors and reduces the total amount of borrowing which the project requires.

The second factor is the precise magnitude and terms of the power contracts with the utilities. Since this depends upon detailed negotiations and organizational considerations it is not possible to comment definitively on whether or not the objective of 100% Revenue Bond financing would be possible for the final stage of the Watana development. In what follows, therefore, the Revenue Bond requirement is simply stated as a total sum which follows from the level of State appropriations A, B, C and D.

Hence any financing scheme must be seen at this stage as simply conditional with a key condition being that power contracts providing for such Revenue Bond financing are obtained and are in place before any major capital expenditure is undertaken. Since any significant capital expenditure could not, in any case, take place before the end of 1984 when the FERC license is expected to be granted, there are at least two years during which to secure such power contracts and meet this condition.

Assessment of the Financing Options

Details of the financing options are given in the computer printouts (attached) and the basic details are summarized in Tables 3 and 4 and Attachment E. In order to make the data conform as far as possible with the data on State revenues and the sums described in Tables 1 and 2 as "uncommited capital funds", the inflation assumptions in the Acres Task 11 March 1982 report, were revised to conform to those of the State revenue projections. Other minor revisions were also made.

Subject to maintaining the State's present double A rating, the assessment of the options given in Table 3 must be seen as a trade-off between the criteria of cost of power and State appropriations, (the higher the State appropriations, the lower the cost of power). Where these objectives are in conflict, it is left to the political decision-makers to resolve this conflict by modification of the criteria.

Considering Option A first, it is seen from Table 3 to involve State appropriations of $1.4 billion over the six year to 1989 and to require Revenue Bond financing of $2.7 billion (all in 1982 dollars).

Turning first then to the criterion of acceptability in terms of the percentage of uncommitted capital funds in Tables 1 and 2, this is shown in Table 4 as an average over the appropriation period 1984 to 1989. It varies from 57% for the 30th percentile projections to 38% in the 50th percentile case. It is left, of course, for the political assessment whether the percentages shown are acceptable in the light of other priorities.

No year-by-year figures of this percentage is given since in Acres' assessment the year-by-year engineering estimates of costs are, in the early years, subject to very considerable choice and could be changed significantly with rescheduling if this was thought desirable to reduce the claims on the funds available.

Turning then to the criterion of the cost of power, it is found that this option, because of the high level of borrowing (assuming a 10% rate of

interest), would involve significant deficits during operation in early years unless the cost of power were increased above the level set by the Best Thermal Option.

In these early years the essential problem facing Watana in marketing its power is that, in the first year or two of its life, it is in competiton with power sources with the advantage of being based on the cost of facilities purchased years earlier at much lower cost than will be involved either in their replacement or in the additional coal-fired units which would be required in 1995 and 1996 if Watana power were not available.

As shown in Tables 3 and 4 and in Exhibit E, the only means of meeting the deficits without further State appropriations would be to allow the cost of power to rise above the best Thermal Option in these three transitional years. Whether this would be regarded as an acceptable option is again an issue of political judgment. It might reasonably be supposed given that the only alternative option would be to face the dramatically escalating cost of the best Thermal Option only a few years later, the increase in the cost of power above the Best Thermal Option might be acceptable in turn for the very considerable long-term advantages afforded by a source of power which would be virtually fixed in cost even in nominal dollars.

It is also possible that appropriate levelizing provisions could be devised in the rate base to bring about a phased increase in price closer to the price set by the Best Thermal Option ceiling.

Option B might be seen as defining an alternative to any increase in the cost of power by increasing the level of State appropriation to $1.8 billion over the period 1984 to 1989. This is seen from Table 2 and the attached Exhibit E, to produce a cost of power below the Thermal Option even in the earliest years. It also has the advantage of reducing the Revenue Bond requirement in the Final Phase of Watana by $0.52 billion (in 1982 dollars). It would, however, mean committing between 50% and 75% of the uncommitted capital funds to the project over the period 1984-1989 and thus heavily competing with other priorities in the 30th percentile revenue forecast case.

The Dedicated Fund Options C & D

A significant difficulty in the development of any long-term financing scheme such as would be required for any long term development of Alaskan resources is the uncertainty of the year-by-year political appropriation process. This applies generally throughout North America, but is of particular relevance in the context of Alaska given the constitutional considerations and the relative importance of appropriations for capital spending in the State.

It is of understandable concern to investors in State of Alaska securities related to long-term developments, that through the political process these projects could be subject to deferral, limitations of State contribution, or even cancellation in the course of their development phase. This may be considered a serious handicap to the long-term development of Alaska's natural resources.

In the light of this, we have been asked to consider the dedication of 50% of the Permanent Fund income to a Power Development Fund which would be designed to provide a relatively more secure and certain source of appropriations for the major long-term development potential for Alaska represented by hydroelectric power and which could offer most Alaskans permanent low-cost power as a basic domestic and industrial resource. This proposal is regarded as representing an important contribution to securing long-term appropriations for such major developments in a manner which would be regarded by investors as offering much greater assurance of on-going systematic development and hence greater security for borrowing in the course of construction.

The scheme, as provisionally formulated, involves the principle of $4,500 to $6,000 per capita being the normal contribution from the fund for a

hydro development serving a particular area. In the context of Susitna this would involve a total State appropriation from the fund of approximately $1.4 to $1.8 billion. Its results are shown as Options C and D in Tables 3 and 4 and in Exhibit E. Its impact on cost of power and the level of Revenue Bond financing required is seen to be very close to that of Options A and B.

A further important characteristic of this particular proposal, however, is that such funding would provide the Power Authority with a substantial financial base that would make it capable of raising finance or providing guarantees where these were important to secure financing under changing market conditions or secure funding for developments lacking an adequate independent credit base.

It is recognized that this proposal would involve a constitutional amendment, but it is precisely the constitutional nature of such a dedicated fund that would be most effective in terms of development of Alaska's resources.

5 -STATEMENT BY THE FIRST BOSTON CORPORATION,
JOHN NUVEEN & COMPANY, AND FIRST SOUTHWEST COMPANY

The First Boston Corporation and John Nuveen & Company (the Alaska Power Authority's co-senior managing underwriters) and First Southwest Company (the Power Authority's financial advisor) have reviewed the financing options described in this memorandum and have made the following observations regarding the financing of the Susitna Project. Together these investment firms are referred to as the Power Authority's Investment Advisors. Their opinions stated herein are based primarily upon the State's projected revenues using the "30th Percentile". First Boston Corporation, John Nuveen & Company and First Southwest Company have concurred in the following statement:

"It is our opinion that prior to major State expenditures, of State appropriations definitive contractual commitments by participating Railbelt Utilities be in place and that such appropriations should be funded by the State during the period 1983-1989, a period within the estimated life of Alaska's oil and gas reserves, so that appropriations provided during this period will provide the crucial "equity" to assure the most economical bond financing of the remainder of the project.

In view of the magnitude of Susitna and the relatively long construction period, the Power Authority should not commence significant borrowing for Susitna before the late 1980's at which time major risks have been defined and completion and start-up dates are known with a high degree of reliability.

In our opinion, in order to maintain the financial integrity for the State of Alaska, prerequisites for issuance of bonds of any type for the project are:

(a) Definitive contractual commitments by participating Railbelt utilities;

(b) Up-dated economic and financial analysis of the project; and

(c) Resolution of the question of tax exemption of such bonds.

With regard to the utilization of State G.O. Bonds, it is our opinion that the issuance of such bonds will be of limited importance to financing Susitna because of the substantial borrowing required for this project. If a major portion of such borrowing were met from State G.O. Bonds, Alaska's present double A ratings would be endangered. The following are some major limitations of State G.O. Bonds:

(1) A crucial feature of Alaska's double A rating is the Rating Agencies' concurrence with the State's present debt policy of amortizing G.O. Bonds rapidly (i.e., within 10 to 15 years (a period within current estimates of oil/gas revenues (the principal source of State revenues) and we believe this policy should be continued.

(2) Using the State's December, 1982 Department of Revenue forecasts, we estimate that the State can issue a relatively small volume of G.O. Bonds while maintaining it's double A rating (see Tables 1 and 2). Based on the "30th percentile" of the Department of Revenue projections, the State could "safely" issue $565 million (nominal dollars, assuming 8% inflation) G.O. Bonds during the period fiscal 1983-1990. This amount would rise to $945 million if the "50th percentile" revenue projections were achieved during this period.

A reduction in the State's rating from double A to single A could correspondingly lower the rating of Alaska Power Authority's own revenue bonds backed by a Capital Reserve Fund with a moral obligation to a rating as low as Baa by Moody's and BBB by Standard & Poors. Such a rating would substantially raise the

Authority's borrowing cost and could impair the viability of the project. The volume of debt contemplated under all scenarios would be extremely difficult to market if rated less than "A".

The Power Authority, rather than utilizing State G.O. Bonds, should utilize, to the fullest extent possible, revenue bonds secured by the income derived from participating Railbelt Utilities pursuant to long-term power sales contracts. Additional security for the bonds would be provided by the Capital Reserve Fund provided in the Alaska Power Authority Act whereby to the extent that revenues from Susitna were insufficient to service the bonds, the Legislature may, but is not legally obligated to, appropriate monies to make up such deficiency in the Capital Reserve Fund. Alaska Power Authority's credit perception will be enhanced by a simple and straightforward debt structure comprised solely of revenue bonds backed by the State's "moral obligation" pledge.

Any dedicated stream of State appropriations covering the entire construction and start-up period will enhance confidence of investors, participating utilities, and the rating agencies in the completion of the project. Such an appropriation would, however, require a constitutional amendment.
In conclusion, as Investment Advisors to the Authority, we strongly prefer the financing plan developed as Option B and D which requires greater appropriations prior to issuance of Revenue Bonds because the credit status of the State is least affected and the credit quality of the Authority's bonds is enhanced, maintaining project feasibility. Should oil revenue and projections, however, dramatically improve we would be in a position to more favorably consider alternate financial options."

6 - CONCLUSIONS

Our conclusions relate primarily to Options A and B since the dedicated fund proposals C and D can be seen in the present context as primarily a legislative route to these options.

It may be appropriate in conclusion first to state our own assessment of the decision issues involved at this stage. First, the decision issue is not an irrevocable commitment to proceed with Watana. As already noted, the FERC license will not be available for another two years and no major expenditures could be undertaken until 1985.

It would therefore appear that the essential issue is that of maintaining and planning for the Watana option. The only grounds for not maintaining this option with its very substantial long-term economic advantages, would be that we had concluded that no viable and politically acceptable financing scenario was possible.

Given the very wide range of uncertainties for future State revenues, and hence the levels of State appropriations which might be available at the first point of major commitment in late 1985, such an adverse conclusion certainly cannot be substantiated at this time on the basis of the preceding analysis. If, for example, State revenues were as high or higher than the 50th percentile, the State capital fund available for Watana would be substantially increased and the $1.4 billion appropriation (Option A) would represent 38% of the uncommitted capital funds over the period 1984-1989. Moreover, the circumstances which would bring about such an increase in State funds--mainly a recovery in world oil prices--would confirm the economic desirability of advancing with Watana and obviating dependence on fuels with prices related to that of oil.

We must also note again that the levels of spending in individual years used in the analysis was constructed on normal engineering criteria without reference to phasing the engineering expenditures to conform (without significant additional cost) to year-to-year budget constraints.

Subject to political decisions and priorities, therefore, our assessment is that all the financing options proposed in this memorandum are viable. In consequence, we recommend that over the two-year decision period to 1984, the remaining preconditions of financing viability, both political and contractual (in terms of power contracts and tax exempt bond financing) are resolved. A reconsideration of the financing options might then be undertaken in 1984 when, as aleady noted, some of the major economic uncertainties affecting the economics of generation options and the revenues of the State of Alaska are also likely to be resolved. It should also be possible within this time frame to review the time profile of potential cash demands for construction and bring them more closely into conformity with available appropriations.

If this conclusion were adopted, it might also be considered appropriate, in order to avoid undue "bunching" of demands for Susitna financing, to establish a level of funding for the project of the order of perhaps $100 million in FY 1984. This, in our view, would be seen as a positive step which should appreciably assist in the negotiations of power contracts since it would indicate the State's conditional intent to proceed with the project. This would give such negotiations the credibility essential to a successful outcome.

ALASKA POWER AUTHORITY
CAPITAL FUNDS AVAILABLE FOR SUSITNA
30th PERCENTILE PROJECTION

Fiscal Year	General Fund Unrestricted Revenues (1)	Total Capital Spending Limits	Estimated Maximum G.O. Bond Issues (2)	Total Available Capital	Committed Capital Grants and Loans (8%)	Remaining Capital	APA Capital Budget Excluding Susitna	Uncommitted Capital Funds	Planned Susitna Expenditures (nom. $) (3)
1984	2908.2	969	0	969	475	494	174.2	320	0
1985	2939.9	980	0	980	513	467	244.5	222	183
1986	3472.9	1158	300	1458	554	904	282.3	622	405
1987	3870.4	1290	90	1380	598	782	125.8	656	437
1988	3917.0	1306	125	1431	646	785	0	785	442
1989	4293.8	1431	0	1431	698	733	0	733	639
1990	3679.9	1227	50	1277	754	523	0	523	1121
1991	3295.9	1099	140	1239	814	425	0	425	1270
1992	3186.4	1062	0	1062	879	183	0	183	862
1993	2919.4	973	110	1083	950	133	0	133	584
1994	2779.0	926	0	926	1025	0	0	0	0

(1) 30th percentile projection of Department of Revenue net of Debt Service on the State G.O. Debt.

(2) Maximum General Obligation Debt that can be issued (10 year, equal annual principal amortization at 7.5%) and keep total G.O. Bond Debt Service below 5% of General Fund Unrestricted Revenues.

(3) Source: Acres American Incorporated (Converted to June 30 Fiscal Year).

TABLE 1

ACRES

ALASKA POWER AUTHORITY
CAPITAL FUNDS AVAILABLE FOR SUSITNA
50th PERCENTILE PROJECTION

Fiscal Year	General Fund Unrestricted Revenues (1)	Total Capital Spending Limits	Estimated Maximum G.O. Bond Issues (2)	Total Available Capital	Committed Capital Grants and Loans (8%)	Remaining Capital	APA Capital Budget Excluding Susitna	Uncommitted Capital Funds	Planned Susitna Expenditures (nom. $) (3)
1984	3369	1123	0	1123	475	648	174.2	474	0
1985	3492	1164	350	1514	513	1001	244.5	757	183
1986	4116	1372	190	1562	554	1008	282.3	726	405
1987	4553	1518	95	1613	598	1015	125.8	889	437
1988	4645	1548	235	1783	646	1137	0	1137	442
1989	5103	1701	50	1751	698	1053	0	1053	639
1990	4848	1616	25	1641	754	887	0	887	1121
1991	4345	1448	160	1608	814	794	0	794	1270
1992	4221	1407	35	1442	879	563	0	563	862
1993	4017	1339	170	1509	950	559	0	559	584
1994	3957	1319	0	1319	1025	294	0	294	0

(1) 50th percentile projection of Department of Revenue net of Debt Service on the State G.O. Debt.

(2) Maximum General Obligation Debt that can be issued (10 year, equal annual principal amortization at 7.5%) and keep total G.O. Bond Debt Service below 5% of General Fund Unrestricted Revenues.

(3) Source: Acres American Incorporated (Converted to June 30 Fiscal Year).

TABLE 2

ACRES

SUSITNA-SUMMARY OF FINANCING REQUIREMENTS

----------REAL 1982 DOLLARS----------

	STATE APPROPIATION TAKEN AS NEEDED				DEDICATED STATE APPROPIATION			
	----$1.4 BN----- (REAL)		----$1.8 BN----- (REAL)		----$1.4 BN----- (REAL)		----$1.8 BN----- (REAL)	
	DEBT	STATE APPROP.	DEBT	STATE APPROP.	DEBT	STATE APPROP.	DEBT	STATE APPROP.
	$M	$M	$M	$M	$M	$M	$M	$M
1983	-	-	-	-	-	160	-	160
1984	-	81	-	81	-	222	-	222
1985	-	225	-	225	-	276	-	276
1986	-	336	-	336	-	318	-	318
1987	-	317	-	317	-	345	-	345
1988	-	306	-	306	-	79	-	378
1989	409	94	9	535	337	-		101
1990	884	-	847	-	878	-	770	-
1991	757	-	718	-	750	-	710	-
1992	505	-	466	-	498	-	457	-
1993	146	-	146	-	146	-	146	-
TOTAL	2701	1400	2186	1800	2609	1400	2083	1800

COST OF ENERGY TO MEET 1.1 DEBT SERVICE COVER AND PERCENT IN EXCESS OF BEST THERMAL OPTION

	MILLS		MILLS		MILLS		MILLS	
1993	74	46 %	61	17 %	72	41 %	58	14 %
1994	77	25 %	64	5 %	75	22 %	62	-
1995	73	21 %	61	1 %	70	17 %	58	-
1996	72	-	57	-	69	-	55	-
1998	68	-	54	-	65	-	51	-
1999	63	-	51	-	61	-	48	-
2000	60	-	48	-	57	-	46	-

TABLE 3 -- SUSITNA: SUMMARY OF FINANCING REQUIREMENTS IN REAL TERMS

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SUSITNA-SUMMARY OF FINANCING REQUIREMENTS

----------NOMINAL DOLLARS----------

	STATE APPROPIATION TAKEN AS NEEDED				DEDICATED STATE APPROPIATION			
	----$1.4 BN----- (REAL)		----$1.8 BN----- (REAL)		----$1.4 BN----- (REAL)		----$1.8 BN----- (REAL)	
	DEBT	STATE APPROP.	DEBT	STATE APPROP.	DEBT	STATE APPROP.	DEBT	STATE APPROP.
	$M	$M	$M	$M	$M	$M	$M	$M
1983	-	-	-	-	-	175	-	175
1984	-	100	-	100	-	257	-	257
1985	-	276	-	276	-	338	-	338
1986	-	436	-	436	-	413	-	413
1987	-	437	-	437	-	475	-	475
1988	-	447	-	447	-	115	-	552
1989	633	208	13	828	522	-		157
1990	1465	-	1403	-	1454	-	1275	-
1991	1341	-	1274	-	1329	-	1259	-
1992	958	-	883	-	945	-	868	-
1993	296	-	296	-	296	-	296	-
TOTAL	4693	1904	3869	2524	4546	1773	3698	2367
PERCENTAGE OF UNCOMMITTED STATE CAPITAL FUNDS		38 to 57 %		50 to 75 %				

COST OF ENERGY TO MEET 1.1 DEBT SERVICE COVER AND PERCENT IN EXCESS OF BEST THERMAL OPTION

	MILLS		MILLS		MILLS		MILLS	
1993	150	46 %	123	17 %	145	41 %	110	14 %
1994	168	25 %	140	5 %	163	22 %	134	-
1995	169	21 %	141	1 %	164	17 %	135	-
1996	179	-	143	-	172	-	137	-
1998	180	-	144	-	173	-	137	-
1999	181	-	145	-	175	-	139	-
2000	182	-	147	-	176	-	140	-

NOTE: PERCENTAGE OF UNCOMMITTED FUNDS CALCULATED FROM 30 AND 50 PERCENTILE PROJECTIONS

TABLE 4 -- SUSITNA: SUMMARY OF FINANCING REQUIREMENTS IN-NOMINAL TERMS

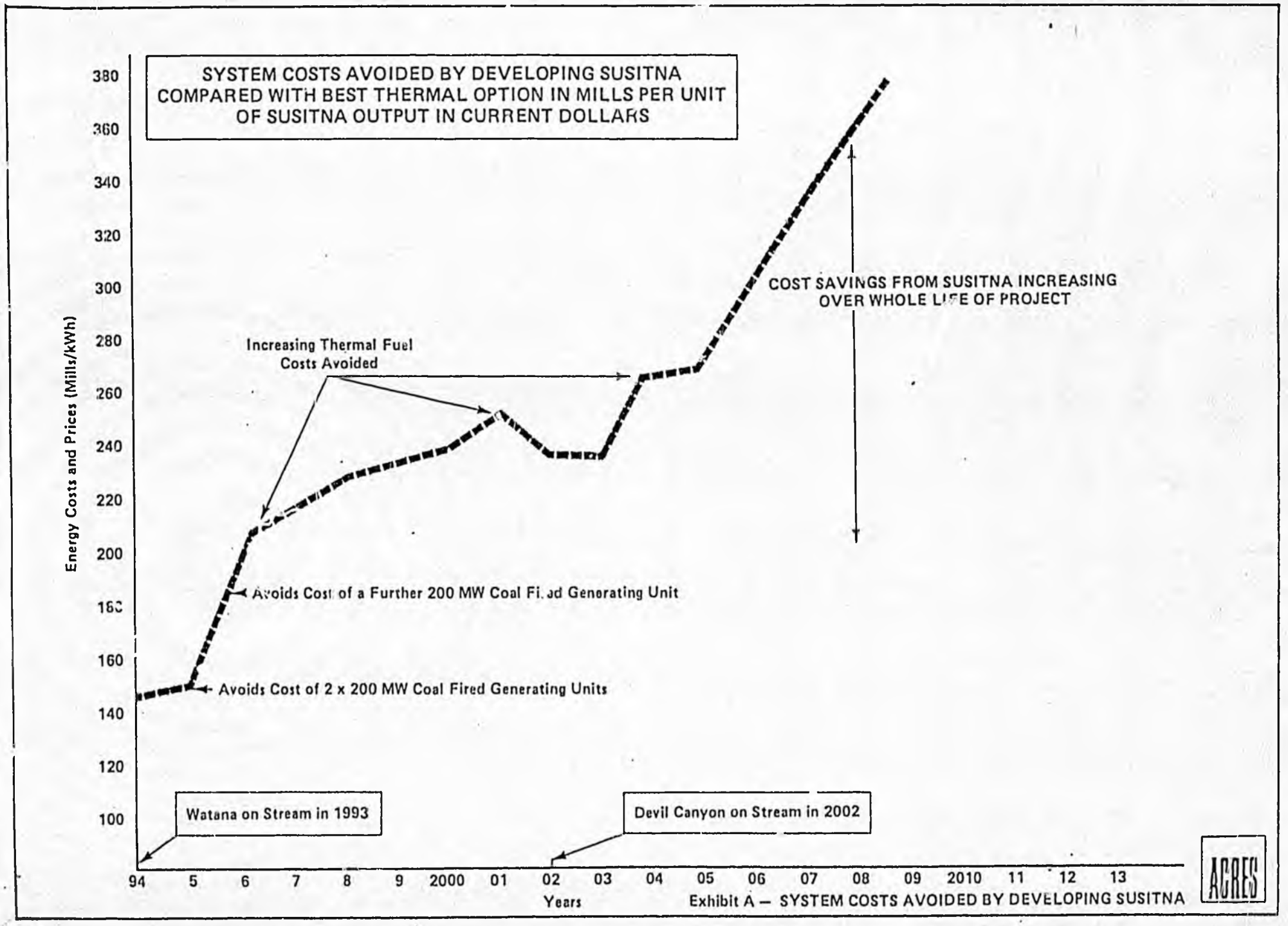


Exhibit A – SYSTEM COSTS AVOIDED BY DEVELOPING SUSITNA

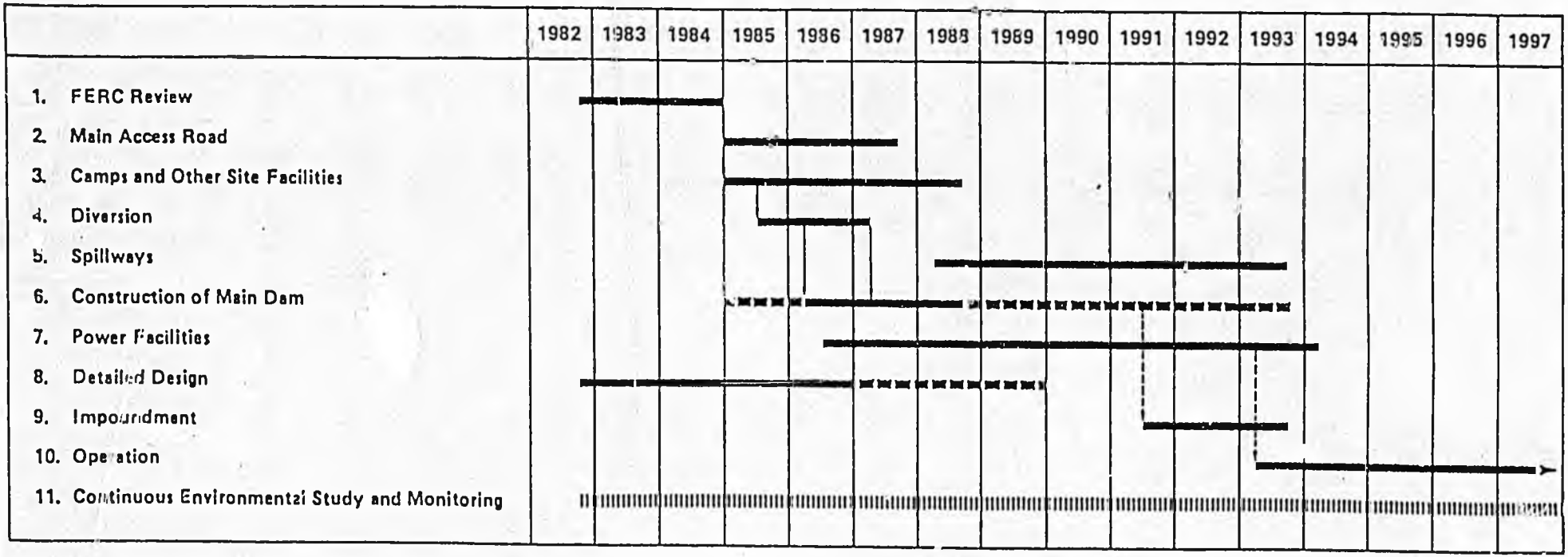


EXHIBIT B -- WATANA CONSTRUCTION SCHEDULE

ACRES

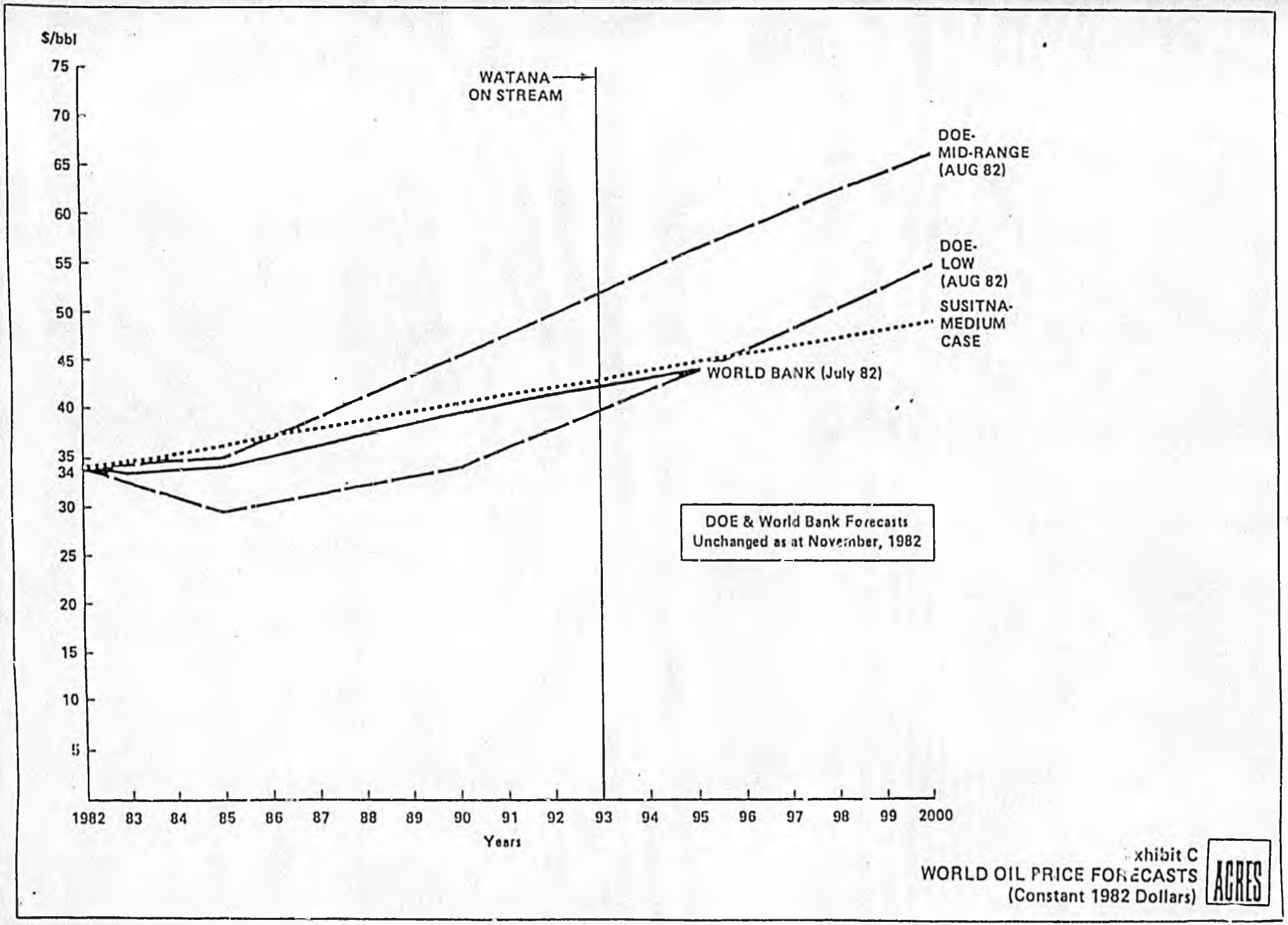
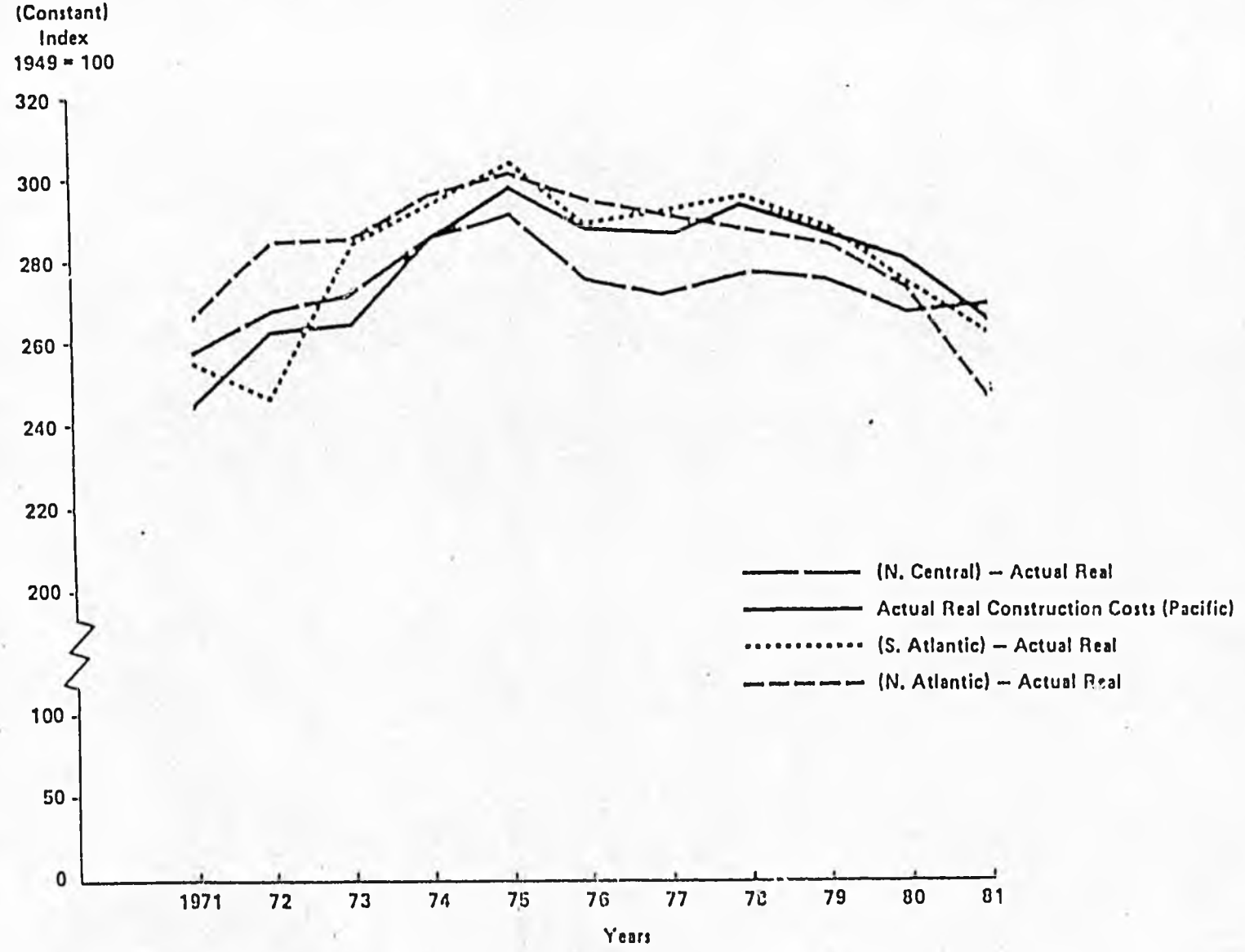


Exhibit C
WORLD OIL PRICE FORECASTS
(Constant 1982 Dollars)

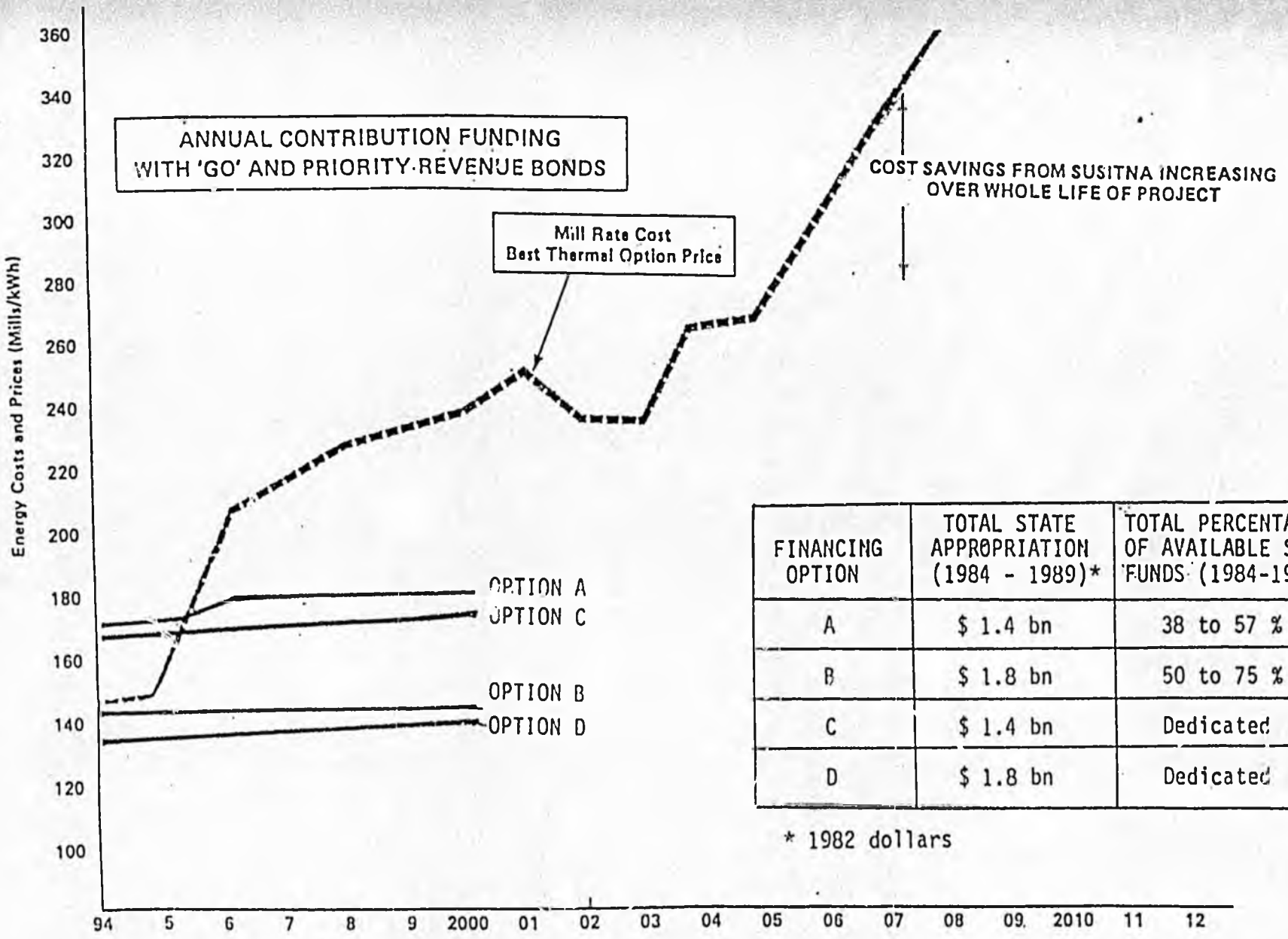
ACRES



Source: ENR Utilities, December 17, 1981 for nominal costs;
Monthly Labor Review, US Dept. of Labor November, 1982 for Consumer Price Index

EXHIBIT D -- US HYDROELECTRIC PLANT CONSTRUCTION COST INDEXES

ACRES



FINANCING OPTION	TOTAL STATE APPROPRIATION (1984 - 1989)*	TOTAL PERCENTAGE OF AVAILABLE STATE FUNDS (1984-1989)*
A	$ 1.4 bn	38 to 57 %
B	$ 1.8 bn	50 to 75 %
C	$ 1.4 bn	Dedicated
D	$ 1.8 bn	Dedicated

* 1982 dollars

EXHIBIT E
ENERGY COST COMPARISON
WITH VARIOUS FINANCING OPTIONS

ACRES

FINANCIAL ANALYSES

ACRES

DATA1OK5.DII WATANA (ON LINE 1993)- STATE FUNDS TO 1989 ($1.4 BN)- INFLATION 6%,7%-INTEREST 10%-CAPCOST $3.647 BN 8-JAN-83

		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
					CASH FLOW SUMMARY						
					===($MILLION)===						
73	ENERGY GWH	0	0	0	0	0	0	0	0	3387	3387
521	REAL PRICE-MILLS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.93	61.60
466	INFLATION INDEX	122.62	129.98	137.78	146.05	154.81	165.65	177.24	189.65	202.92	217.13
520	PRICE-MILLS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	103.34	133.76
	-----INCOME----------										
516	REVENUE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	350.0	453.0
170	LESS OPERATING COSTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.1	27.3
517	OPERATING INCOME	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	324.9	425.7
214	ADD INTEREST EARNED ON FUNDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3
550	LESS INTEREST ON SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.6
391	LESS INTEREST ON LONG TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	439.7	469.3
548	NET EARNINGS FROM OPERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-114.7	-59.0
	-----CASH SOURCE AND USE----										
548	CASH INCOME FROM OPERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-114.7	-59.0
448	STATE CONTRIBUTION	375.7	436.1	437.2	447.4	208.2	0.0	0.0	0.0	0.0	0.0
143	LONG TERM DEBT DRAWDOWNS	0.0	0.0	0.0	0.0	632.6	1464.8	1341.6	957.8	411.1	102.0
248	WORCAP DEBT DRAWDOWNS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.4	15.5
549	TOTAL SOURCES OF FUNDS	375.7	436.1	437.2	447.4	840.8	1464.8	1341.6	957.8	387.8	58.5
320	LESS CAPITAL EXPENDITURE	375.7	436.1	437.2	447.4	840.8	1464.8	1341.6	957.8	296.4	25.7
448	LESS WORCAP AND FUNDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.4	15.5
260	LESS DEBT REPAYMENTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.3
395	LESS PAYMENT TO STATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
141	CASH SURPLUS(DEFICIT)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
249	SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
444	CASH RECOVERED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-----BALANCE SHEET----------										
225	RESERVE AND CONT. FUND	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	52.6	57.4
371	OTHER WORKING CAPITAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.8	49.4
454	CASH SURPLUS RETAINED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
370	CUM. CAPITAL EXPENDITURE	375.7	811.8	1248.9	1696.3	2537.1	4002.0	5343.5	6301.3	6597.7	6623.4
465	CAPITAL EMPLOYED	375.7	811.8	1248.9	1696.3	2537.1	4002.0	5343.5	6301.3	6689.1	6730.3
461	STATE CONTRIBUTION	375.7	811.8	1248.9	1696.3	1904.5	1904.5	1904.5	1904.5	1904.5	1904.5
462	RETAINED EARNINGS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-114.7	-173.8
555	DEBT OUTSTANDING-SHORT TERM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.4	106.8
554	DEBT OUTSTANDING-LONG TERM	0.0	0.0	0.0	0.0	632.6	2097.4	3439.0	4396.8	4807.9	4892.7
542	ANNUAL DEBT DRAWDOWN $1982	0.0	0.0	0.0	0.0	408.6	884.3	756.9	505.0	202.6	87.0
543	CUM. DEBT DRAWDOWN $1982	0.0	0.0	0.0	0.0	408.6	1292.9	2049.8	2554.9	2757.5	2804.5
519	DEBT SERVICE COVER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.84

Option A -- $1.4 Billion Drawn From Uncommitted State Funds Available For Capital Construction

ACRES

DATA1OM5.D11 WATANA (ON LINE 1993)- STATE FUNDS TO 1989 ($1.4 BN)- INFLATION 6%,7%-INTEREST 10%-CAPCOST $3.647 BN 8-JAN-83

		1995	1996	1997	1998	1999	2000	2001	2002	2003	TOTAL
					CASH FLOW SUMMARY						
					===($MILLION)====						
73	ENERGY GWH	3387	3387	3387	3387	3387	3387	3387	3387	3387	37257
521	REAL PRICE-MILLS	60.24	71.94	67.56	63.34	59.44	55.81	52.45	49.36	46.51	0.00
466	INFLATION INDEX	232.33	248.59	265.99	284.61	304.53	325.85	348.66	373.07	399.18	0.00
520	RICE-MILLS	139.96	178.84	179.71	180.28	181.02	181.87	182.87	184.15	185.64	0.00
	-----INCOME----------										
518	REVENUE	474.0	605.7	608.6	610.6	613.1	615.9	619.3	623.7	628.7	6202.6
170	LESS OPERATING COSTS	29.8	32.6	35.6	38.8	42.3	46.2	50.4	55.1	60.1	443.3
517	OPERATING INCOME	444.2	573.1	573.1	571.8	570.7	569.7	568.9	568.6	568.7	5759.3
214	ADD INTEREST EARNED ON FUNDS	5.7	6.3	6.8	7.5	8.1	8.9	9.7	10.6	11.6	80.5
550	LESS INTEREST ON SHORT TERM DEBT	32.4	42.8	43.2	42.4	41.9	41.5	41.3	41.7	42.4	390.1
391	LESS INTEREST ON LONG TERM DEBT	467.6	465.7	463.6	461.3	458.7	456.0	452.9	449.5	445.8	5034.1
548	NET EARNINGS FROM OPERS	-50.1	70.9	73.1	75.6	78.2	81.2	84.5	88.0	92.0	419.7
	-----CASH SOURCE AND USE----										
548	CASH INCOME FROM OPERS	-50.1	70.9	73.1	75.6	78.2	81.2	84.5	88.0	92.0	419.7
446	STATE CONTRIBUTION	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1904.5
143	LONG TERM DEBT DRAWDOWNS	98.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5006.6
248	WORCAP DEBT DRAWDOWNS	7.7	24.6	10.5	11.2	10.2	9.9	13.5	14.4	15.3	224.2
549	TOTAL SOURCES OF FUNDS	54.3	95.5	83.6	86.8	88.4	91.1	98.0	102.4	107.3	7555.0
320	LESS CAPITAL EXPENDITURE	27.5	29.4	31.5	33.7	36.1	38.6	41.3	44.2	47.3	6953.0
448	LESS WORCAP AND FUNDS	7.7	24.6	10.5	11.2	10.2	9.9	13.5	14.4	15.3	224.2
260	LESS DEBT REPAYMENTS	19.0	22.1	24.3	26.8	29.4	32.4	35.6	39.2	43.1	289.2
393	LESS PAYMENT TO STATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
141	CASH SURPLUS(DEFICIT)	0.0	19.3	17.3	15.1	12.8	10.2	7.6	4.7	1.6	88.6
249	SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
444	CASH RECOVERED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-----BALANCE SHEET----------										
225	RESERVE AND CONT. FUND	62.7	68.4	74.7	81.5	88.9	97.1	105.1	115.6	126.2	126.2
371	OTHER WORKING CAPITAL	81.9	70.8	75.0	79.4	82.2	83.9	88.6	93.3	98.0	98.0
454	CASH SURPLUS RETAINED	0.0	19.3	36.6	51.7	64.5	74.7	82.3	87.0	88.6	88.6
370	CUM. CAPITAL EXPENDITURE	6651.0	6680.4	6711.9	6745.6	6781.7	6820.3	6861.6	6905.7	6953.0	6953.0
465	CAPITAL EMPLOYED	6765.5	6838.9	6898.2	6958.2	7017.2	7076.0	7138.3	7201.6	7265.8	7265.8
461	STATE CONTRIBUTION	1904.5	1904.5	1904.5	1904.5	1904.5	1904.5	1904.5	1904.5	1904.5	1904.5
462	RETAINED EARNINGS	-223.8	-152.9	-79.8	-4.2	74.0	155.2	239.7	327.7	419.7	419.7
555	DEBT OUTSTANDING-SHORT TERM	114.6	139.2	149.7	160.9	171.1	181.0	194.5	208.9	224.2	224.2
554	DEBT OUTSTANDING-LONG TERM	4970.2	4948.1	4923.8	4897.0	4867.6	4835.2	4799.6	4760.5	4717.4	4717.4
542	ANNUAL DEBT DRAWDOWN $1982	41.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2846.0
543	CUM. DEBT DRAWDOWN $1982	2846.0	2846.0	2846.0	2846.0	2846.0	2846.0	2846.0	2846.0	2846.0	2846.0
519	DEBT SERVICE COVER	0.06	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	0.00

ACRES

DATA1OH5.D11 WATANA (ON LINE 1993)- STATE FUNDS TO 1989 ($1.8 BN)- INFLATION 6X,7X-INTEREST 10X-CAPCOST $3.647 BN 8-JAN-83

CASH FLOW SUMMARY
($MILLION)*

		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
73	ENERGY GWH	0	0	0	0	0	0	0	0	3387	3387
521	REAL PRICE-MILLS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.93	61.60
466	INFLATION INDEX	122.62	129.98	137.78	146.05	154.81	165.65	177.24	189.65	202.92	217.13
520	PRICE-MILLS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	103.34	133.76
	-----INCOME----------										
516	REVENUE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	350.0	453.0
170	LESS OPERATING COSTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.1	27.3
517	OPERATING INCOME	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	324.9	425.7
214	ADD. INTEREST EARNED ON FUNDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3
550	LESS INTEREST ON SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.4
391	LESS INTEREST ON LONG TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	357.3	386.9
548	NET EARNINGS FROM OPERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-32.3	31.6
	-----CASH SOURCE AND USE----										
548	CASH INCOME FROM OPERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-32.3	31.6
446	STATE CONTRIBUTION	375.7	436.1	437.2	447.4	827.4	0.0	0.0	0.0	0.0	0.0
143	LONG TERM DEBT DRAWDOWNS	0.0	0.0	0.0	0.0	13.3	1402.9	1273.5	802.9	328.7	8.3
248	WORCAP DEBT DRAWDOWNS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.4	15.5
549	TOTAL SOURCES OF FUNDS	375.7	436.1	437.2	447.4	840.8	1402.9	1273.5	802.9	387.8	55.4
320	LESS CAPITAL EXPENDITURE	375.7	436.1	437.2	447.4	840.8	1402.9	1273.5	802.9	296.4	25.7
448	LESS WORCAP AND FUNDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.4	15.5
260	LESS DEBT REPAYMENTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3
395	LESS PAYMENT TO STATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
141	CASH SURPLUS(DEFICIT)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
249	SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
444	CASH RECOVERED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-----BALANCE SHEET----------										
225	RESERVE AND CONT. FUND	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	52.6	57.4
371	OTHER WORKING CAPITAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.8	49.4
454	CASH SURPLUS RETAINED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
370	CUM. CAPITAL EXPENDITURE	375.7	811.8	1248.9	1696.3	2537.1	3940.0	5213.5	6096.4	6392.8	6418.5
465	CAPITAL EMPLOYED	375.7	811.8	1248.9	1696.3	2537.1	3940.0	5213.5	6096.4	6484.1	6525.3
461	STATE CONTRIBUTION	375.7	811.8	1248.9	1696.3	2523.8	2523.8	2523.8	2523.8	2523.8	2523.8
462	RETAINED EARNINGS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-32.3	-0.7
555	DEBT OUTSTANDING-SHORT TERM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.4	106.8
554	DEBT OUTSTANDING-LONG TERM	0.0	0.0	0.0	0.0	13.3	1416.3	2689.7	3572.6	3901.3	3895.4
542	ANNUAL DEBT DRAWDOWN $1982	0.0	0.0	0.0	0.0	8.6	846.9	718.5	465.5	162.0	3.8
543	CUM. DEBT DRAWDOWN $1982	0.0	0.0	0.0	0.0	8.6	855.5	1574.0	2039.5	2201.5	2205.4
519	DEBT SERVICE COVER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91	1.04

Option B -- $1.8 Billion Drawn From Uncommitted State Funds Available For Capital Construction

ACRES

DATA1OMS.DI1 WATANA (ON LINE 1993)- STATE FUNDS TO 1989 ($1.8 BN)- INFLATION 6%,7%-INTEREST 10%-CAPCOST $3.647 BN 8-JAN-83

		1995	1996	1997	1998	1999	2000	2001	2002	2003	TOTAL
					CASH FLOW SUMMARY						
					===($MILLION)====						
73	ENERGY GWH	3387	3387	3387	3387	3387	3387	3387	3387	3387	37257
521	REAL PRICE-MILLS	40.24	37.33	34.00	40.76	47.76	44.98	42.39	40.03	37.85	0.00
466	INFLATION INDEX	232.33	248.59	265.99	284.61	304.53	325.85	348.66	373.07	399.18	0.00
520	PRICE-MILLS	139.94	142.51	143.63	144.46	145.45	146.58	147.81	149.34	151.08	0.00
	-----INCOME----------										
516	REVENUE	474.0	482.6	486.4	489.3	492.6	496.3	500.6	505.8	511.7	5242.3
170	LESS OPERATING COSTS	29.8	32.6	35.6	38.8	42.3	46.2	50.4	55.1	60.1	443.3
517	OPERATING INCOME	444.2	450.1	450.9	450.5	450.2	450.1	450.1	450.7	451.6	4799.0
214	ADD INTEREST EARNED ON FUNDS	3.7	6.3	6.8	7.5	8.1	8.9	9.7	10.6	11.6	80.5
550	LESS INTEREST ON SHORT TERM DEBT	14.7	14.9	16.3	16.4	16.9	17.5	18.3	19.7	21.5	168.6
391	LESS INTEREST ON LONG TERM DEBT	385.5	383.9	382.2	380.3	378.2	375.9	373.4	370.6	367.5	4141.5
548	NET EARNINGS FROM OPERS	49.7	57.6	59.3	61.2	63.3	65.6	68.2	71.0	74.1	569.4
	-----CASH SOURCE AND USE----										
548	CASH INCOME FROM OPERS	49.7	57.6	59.3	61.2	63.3	65.6	68.2	71.0	74.1	569.4
446	STATE CONTRIBUTION	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2523.8
143	LONG TERM DEBT DRAWDOWNS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3909.7
248	WORCAP DEBT DRAWDOWNS	7.7	24.6	10.5	11.2	10.2	9.9	13.5	14.4	15.3	224.2
549	TOTAL SOURCES OF FUNDS	57.4	82.2	69.8	72.4	73.5	75.6	81.7	85.4	89.4	7227.0
320	LESS CAPITAL EXPENDITURE	27.5	29.4	31.5	33.7	36.1	38.6	41.3	44.2	47.3	6748.0
448	LESS WORCAP AND FUNDS	7.7	24.6	10.5	11.2	10.2	9.9	13.5	14.4	15.3	224.2
260	LESS DEBT REPAYMENTS	15.7	17.4	19.2	21.1	23.2	25.5	28.1	30.9	34.0	229.2
395	LESS PAYMENT TO STATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
141	CASH SURPLUS(DEFICIT)	6.5	10.7	8.6	6.4	4.1	1.5	-11.1	-4.0	-7.1	25.5
249	SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
444	CASH RECOVERED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-----BALANCE SHEET----------										
225	RESERVE AND CONT. FUND	62.7	68.4	74.7	81.5	88.9	97.1	105.9	115.6	126.2	126.2
371	OTHER WORKING CAPITAL	51.9	70.8	75.0	79.4	82.2	83.9	88.6	93.3	98.0	98.0
454	CASH SURPLUS RETAINED	6.5	17.2	25.8	32.2	36.3	37.8	36.7	32.6	25.5	25.5
370	CUM. CAPITAL EXPENDITURE	6446.0	6475.4	6506.9	6540.6	6576.7	6615.3	6656.6	6700.8	6748.0	6748.0
465	CAPITAL EMPLOYED	6567.0	6631.8	6682.4	6733.8	6784.1	6834.1	6887.8	6942.3	6997.8	6997.8
461	STATE CONTRIBUTION	2523.8	2523.8	2523.8	2523.8	2523.8	2523.8	2523.8	2523.8	2523.8	2523.8
462	RETAINED EARNINGS	49.0	106.6	163.9	227.1	290.4	356.1	424.3	495.3	569.4	569.4
555	DEBT OUTSTANDING-SHORT TERM	114.6	139.2	149.7	160.9	171.1	181.0	194.5	208.9	224.2	224.2
554	DEBT OUTSTANDING-LONG TERM	3879.7	3862.2	3843.1	3822.0	3798.8	3773.3	3745.2	3714.4	3680.4	3680.4
542	ANNUAL DEBT DRAWDOWN $1982	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2205.4
543	CUM. DEBT DRAWDOWN $1982	2205.4	2205.4	2205.4	2205.4	2205.4	2205.4	2205.4	2205.4	2205.4	2205.4
519	DEBT SERVICE COVER	1.00	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	0.00

ACRES

DATA1OM5.D11 UATANA (ON LINE 1993)-$1.4 BN STATE FUNDS (PER 30% SCHED)- INFLATION 6%/7%-INTEREST 10%-CAPCOST $3.647 8-JAN-83

		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
					CASH FLOW SUMMARY						
					($MILLION)*						
73	ENERGY GWH	0	0	0	0	0	0	0	0	3387	3387
521	REAL PRICE-MILLS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.93	61.60
466	INFLATION INDEX	122.62	129.98	137.78	146.05	154.81	164.65	177.24	189.65	202.92	217.13
520	PRICE-MILLS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	103.34	133.76
	-----INCOME----------										
516	REVENUE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	350.0	453.0
170	LESS OPERATING COSTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.1	27.3
517	OPERATING INCOME	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	324.9	425.7
214	ADD INTEREST EARNED ON FUNDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3
550	LESS INTEREST ON SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.1
391	LESS INTEREST ON LONG TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	424.9	454.6
548	NET EARNINGS FROM OPERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-100.0	-42.8
	-----CASH SOURCE AND USE----										
548	CASH INCOME FROM OPERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-100.0	-42.8
446	STATE CONTRIBUTION	806.8	413.3	475.3	115.4	0.0	0.0	0.0	0.0	0.0	0.0
143	LONG TERM DEBT DRAWDOWNS	0.0	0.0	0.0	0.0	521.8	1453.8	1329.4	944.4	396.4	85.3
248	WORCAP DEBT DRAWDOWNS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.4	15.5
549	TOTAL SOURCES OF FUNDS	806.8	413.3	475.3	115.4	521.8	1453.8	1329.4	944.4	387.8	57.9
320	LESS CAPITAL EXPENDITURE	373.3	390.5	389.2	390.9	811.8	1453.8	1329.4	944.4	296.4	25.7
448	LESS WORCAP AND FUNDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.4	15.5
260	LESS DEBT REPAYMENTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.8
395	LESS PAYMENT TO STATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
141	CASH SURPLUS(DEFICIT)	433.5	22.8	86.1	-275.5	-290.0	0.0	0.0	0.0	0.0	0.0
249	SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
444	CASH RECOVERED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-----BALANCE SHEET----------										
225	RESERVE AND CONT. FUND	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.6	57.4
371	OTHER WORKING CAPITAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.8	49.4
454	CASH SURPLUS RETAINED	456.6	479.4	565.5	290.0	0.0	0.0	0.0	0.0	0.0	0.0
370	CUM. CAPITAL EXPENDITURE	373.3	763.8	1153.0	1543.9	2355.7	3809.4	5138.8	6083.2	6379.6	6405.3
465	CAPITAL EMPLOYED	829.9	1243.2	1718.5	1833.9	2355.7	3809.4	5138.8	6083.2	6471.0	6512.1
461	STATE CONTRIBUTION	806.8	1220.1	1695.4	1810.8	1810.8	1810.8	1810.8	1810.8	1810.8	1810.8
462	RETAINED EARNINGS	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	-76.9	-119.7
555	DEBT OUTSTANDING-SHORT TERM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.4	106.8
554	DEBT OUTSTANDING-LONG TERM	0.0	0.0	0.0	0.0	521.8	1975.5	3304.9	4249.3	4645.7	4714.2
542	ANNUAL DEBT DRAWDOWN $1982	0.0	0.0	0.0	0.0	337.0	877.6	750.0	498.0	195.3	39.3
543	CUM. DEBT DRAWDOWN $1982	0.0	0.0	0.0	0.0	337.0	1214.6	1964.7	2462.6	2658.0	2697.2
319	DEBT SERVICE COVER	0.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.76	0.87

Option C -- $1.4 Billion Dedicated From
Permanent Fund Income
Page 1 of 2

ACRES

DATA1OM5.D11 WATANA (ON LINE 1993)-$1.4 BN STATE FUNDS (PER 30% SCHED)- INFLATION 6%,7%-INTEREST 10%-CAPCOST $3.6@7 8-JAN-83

		1995	1996	1997	1998	1999	2000	2001	2002	2003	TOTAL
					CASH FLOW SUMMARY						
					($MILLION)*						
73	ENERGY GWH	3387	3387	3387	3387	3387	3387	3387	3387	3387	37257
521	REAL PRICE-MILLS	60.24	69.32	65.13	61.09	57.35	53.87	50.65	47.69	44.96	0.00
466	INFLATION INDEX	232.33	248.59	265.99	284.61	304.53	325.85	348.66	373.07	399.18	0.00
520	PRICE-MILLS	139.96	172.33	173.25	173.87	174.65	175.55	176.60	177.92	179.46	0.00
	-----INCOME----------										
516	REVENUE	474.0	583.7	586.7	588.9	591.5	594.5	598.1	602.6	607.8	6030.7
170	LESS OPERATING COSTS	29.8	32.6	35.6	38.8	42.3	46.2	50.4	55.1	60.1	443.3
517	OPERATING INCOME	444.2	551.1	551.2	550.1	549.2	548.3	547.6	547.5	547.7	5587.4
214	ADD INTEREST EARNED ON FUNDS	5.7	6.3	6.8	7.5	8.1	8.9	9.7	10.6	11.6	80.5
550	LESS INTEREST ON SHORT TERM DEBT	29.2	37.8	38.4	37.8	37.4	37.2	37.2	37.7	38.7	350.5
391	LESS INTEREST ON LONG TERM DEBT	452.9	451.0	449.0	446.8	444.3	441.6	438.7	435.4	431.8	4871.0
548	NET EARNINGS FROM OPERS	-32.2	68.5	70.6	73.0	75.6	78.4	81.5	85.0	88.8	446.4
	-----CASH SOURCE AND USE----										
548	CASH INCOME FROM OPERS	-32.2	68.5	70.6	73.0	75.6	78.4	81.5	85.0	88.8	446.4
446	STATE CONTRIBUTION	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1810.8
143	LONG TERM DEBT DRAWDOWNS	78.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4809.1
248	WORCAP DEBT DRAWDOWNS	7.7	24.6	10.5	11.2	10.2	9.9	13.5	14.4	15.3	224.2
549	TOTAL SOURCES OF FUNDS	53.7	93.1	81.1	84.2	85.7	88.3	95.0	99.4	104.1	7290.5
320	LESS CAPITAL EXPENDITURE	27.5	29.4	31.5	33.7	36.1	38.6	41.3	44.2	47.3	6734.9
448	LESS WORCAP AND FUNDS	7.7	24.6	10.5	11.2	10.2	9.9	13.5	14.4	15.3	224.2
260	LESS DEBT REPAYMENTS	18.4	21.3	23.4	25.7	28.3	31.1	34.3	37.7	41.4	278.4
395	LESS PAYMENT TO STATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
141	CASH SURPLUS(DEFICIT)	0.0	17.8	15.7	13.5	11.2	8.7	6.0	3.1	0.0	53.0
249	SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
444	CASH RECOVERED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-----BALANCE SHEET----------										
235	RESERVE AND CONT. FUND	62.7	68.4	74.7	81.5	88.9	97.1	105.9	115.6	126.2	126.2
371	OTHER WORKING CAPITAL	61.9	70.8	75.0	79.4	82.2	83.9	88.6	93.3	98.0	98.0
454	CASH SURPLUS RETAINED	0.0	17.8	33.5	47.1	58.3	67.0	73.0	76.1	76.1	76.1
370	CUM. CAPITAL EXPENDITURE	6432.8	6462.3	6493.8	6527.5	6563.5	6602.1	6643.4	6687.6	6734.9	6734.9
465	CAPITAL EMPLOYED	6547.4	6619.2	6677.0	6735.5	6792.9	6850.1	6910.9	6972.6	7035.2	7035.2
461	STATE CONTRIBUTION	1810.8	1810.8	1810.8	1810.8	1810.8	1810.8	1810.8	1810.8	1810.8	1810.8
462	RETAINED EARNINGS	-151.9	-83.4	-12.7	60.2	135.8	214.2	295.8	380.7	469.5	469.5
555	DEBT OUTSTANDING-SHORT TERM	114.6	139.2	149.7	160.9	171.1	181.0	194.5	208.9	224.2	224.2
554	DEBT OUTSTANDING-LONG TERM	4773.9	4752.6	4729.3	4703.5	4675.2	4644.1	4609.8	4572.1	4530.7	4530.7
542	ANNUAL DEBT DRAWDOWN $1982	33.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2730.9
543	CUM. DEBT DRAWDOWN $1982	2730.9	2730.9	2730.9	2730.9	2730.9	2730.9	2730.9	2730.9	2730.9	2730.9
519	DEBT SERVICE COVER	0.89	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	0.00

ACRES

DATA10M5.D11 WATANA (ON LINE 1993)-$1.8 BN STATE FUNDS (PER 30% SCHED)- INFLATION 6%,7%-INTEREST 10%-CAPCOST $3,647 8-JAN-83

CASH FLOW SUMMARY
(***$MILLION***)

		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
73	ENERGY GWH	0	0	0	0	0	0	0	0	3387	3387
521	REAL PRICE-MILLS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.93	61.60
466	INFLATION INDEX	122.62	129.98	137.78	146.05	154.81	164.10	174.04	184.48	202.92	217.13
520	PRICE-MILLS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	103.34	133.76
	-----INCOME----------										
516	REVENUE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	350.0	453.0
170	LESS OPERATING COSTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.1	27.3
517	OPERATING INCOME	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	324.9	425.7
214	ADD INTEREST EARNED ON FUNDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3
550	LESS INTEREST ON SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.7
391	LESS INTEREST ON LONG TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	340.2	369.8
548	NET EARNINGS FROM OPERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-15.2	50.4
	-----CASH SOURCE AND USE----										
548	CASH INCOME FROM OPERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-15.2	50.4
446	STATE CONTRIBUTION	806.8	413.3	475.3	552.1	156.4	0.0	0.0	0.0	0.0	0.0
143	LONG TERM DEBT DRAWDOWNS	0.0	0.0	0.0	0.0	0.0	275.1	1259.3	867.3	311.6	0.0
248	WORCAP DEBT DRAWDOWNS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.4	15.5
549	TOTAL SOURCES OF FUNDS	806.8	413.3	475.3	552.1	156.4	1275.1	1259.3	867.3	387.8	65.9
320	LESS CAPITAL EXPENDITURE	373.3	390.5	389.2	390.9	768.1	1390.1	1259.3	867.3	296.4	25.7
448	LESS WORCAP AND FUNDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.4	15.5
260	LESS DEBT REPAYMENTS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.6
395	LESS PAYMENT TO STATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
141	CASH SURPLUS(DEFICIT)	433.5	22.8	86.1	161.2	-611.7	-115.0	0.0	0.0	0.0	11.1
249	SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
444	CASH RECOVERED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-----BALANCE SHEET----------										
225	RESERVE AND CONT. FUND	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	52.6	57.4
371	OTHER WORKING CAPITAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.8	49.4
454	CASH SURPLUS RETAINED	456.6	479.4	565.5	726.7	115.0	0.0	0.0	0.0	0.0	11.1
370	CUM. CAPITAL EXPENDITURE	373.3	763.8	1153.0	1543.9	2312.0	3702.1	4961.4	5828.8	6125.2	6150.9
465	CAPITAL EMPLOYED	829.9	1243.2	1718.5	2270.6	2427.0	3702.1	4961.4	5828.8	6216.5	6268.8
461	STATE CONTRIBUTION	806.8	1220.1	1695.4	2247.5	2403.9	2403.9	2403.9	2403.9	2403.9	2403.9
462	RETAINED EARNINGS	23.1	23.1	23.1	23.1	23.1	23.1	23.1	23.1	7.9	58.3
555	DEBT OUTSTANDING-SHORT TERM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.4	106.8
554	DEBT OUTSTANDING-LONG TERM	0.0	0.0	0.0	0.0	0.0	1275.1	2534.4	3401.8	3713.4	3699.7
542	ANNUAL DEBT DRAWDOWN $1982	0.0	0.0	0.0	0.0	0.0	769.7	710.5	457.3	153.6	0.0
543	CUM. DEBT DRAWDOWN $1982	0.0	0.0	0.0	0.0	0.0	769.7	1480.3	1937.6	2091.2	2091.2
519	DEBT SERVICE COVER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.96	1.10

Option D -- $1.8 Billion Dedicated From
Permanent Fund Income

ACRES

DATA1OM5.D11 WATANA (ON LINE 1993)-$1.8 BN STATE FUNDS (PER 30% SCHED)- INFLATION 6%,7%-INTEREST 10%-CAPCOST $3.647 8-JAN-93

CASH FLOW SUMMARY
---($MILLION)---

		1995	1996	1997	1998	1999	2000	2001	2002	2003	TOTAL
73	ENERGY GWH	3387	3387	3387	3387	3387	3387	3387	3387	3387	37257
521	REAL PRICE-MILLS	38.08	34.51	31.39	48.34	45.52	42.89	40.46	38.24	36.19	0.00
466	INFLATION INDEX	232.33	248.59	265.99	284.61	304.53	325.89	348.66	373.07	399.18	0.00
520	PRICE-MILLS	134.94	135.32	136.69	137.57	138.61	139.77	141.08	142.66	144.46	0.00
	-----INCOME----------										
516	REVENUE	457.0	459.0	462.9	465.9	469.5	473.4	477.8	483.2	489.2	5040.9
170	LESS OPERATING COSTS	29.8	32.6	35.6	38.8	42.3	46.2	50.4	55.1	60.1	443.3
517	OPERATING [illegible]ME	427.2	426.4	427.4	427.1	427.1	427.1	427.4	428.1	429.2	4597.5
214	ADD, INTER[illegible]EARNED ON FUNDS	5.7	6.3	6.8	7.5	8.1	8.9	9.7	10.6	11.6	80.5
550	LESS INTEREST ON SHORT TERM DEBT	11.1	10.8	12.4	12.7	13.4	14.1	15.2	16.8	18.8	135.9
391	LESS INTEREST ON LONG TERM DEBT	368.5	367.0	365.3	363.5	361.5	359.3	356.9	354.2	351.3	3957.3
548	NET EARNINGS FROM OPERS	53.4	54.9	56.6	58.4	60.4	62.6	65.0	67.7	70.6	584.9
	-----CASH SOURCE AND USE----										
548	CASH INCOME FROM OPERS	53.4	54.9	56.6	58.4	60.4	62.6	65.0	67.7	70.6	584.9
446	STATE CONTRIBUTION	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2403.9
143	LONG TERM DEBT DRAWDOWNS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3713.4
248	WORCAP DEBT DRAWDOWNS	7.7	24.6	10.5	11.2	10.2	9.9	13.5	14.4	15.3	224.2
549	TOTAL SOURCES OF FUNDS	61.1	79.6	67.1	69.6	70.6	72.5	78.5	82.1	86.0	6926.3
320	LESS CAPITAL EXPENDITURE	27.5	29.4	31.5	33.7	36.1	38.6	41.3	44.2	47.3	6480.4
448	LESS WORCAP AND FUNDS	7.7	24.6	10.5	11.2	10.2	9.9	13.5	14.4	15.3	224.2
260	LESS DEBT REPAYMENTS	15.0	16.6	18.2	20.0	22.1	24.3	26.7	29.3	32.3	218.1
395	LESS PAYMENT TO STATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
141	CASH SURPLUS(DEFICIT)	10.8	8.9	6.9	4.6	2.3	-0.2	-2.9	-5.8	-8.9	3.6
249	SHORT TERM DEBT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
444	CASH RECOVERED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-----BALANCE SHEET----------										
225	RESERVE AND CONT. FUND	62.7	68.4	74.7	81.5	88.9	97.1	105.9	115.6	126.2	126.2
371	OTHER WORKING CAPITAL	51.9	70.8	75.0	79.4	82.2	83.9	80.6	93.3	98.0	98.0
454	CASH SURPLUS RETAINED	21.9	30.8	37.7	42.3	44.6	44.4	41.4	35.6	26.7	26.7
370	CUM. CAPITAL EXPENDITURE	6178.4	6207.8	6239.3	6273.0	6309.1	6347.7	6389.0	6433.2	6480.4	6480.4
465	CAPITAL EMPLOYED	6314.9	6377.8	6426.7	6476.3	6524.8	6573.1	6624.9	6677.6	6731.3	6731.3
461	STATE CONTRIBUTION	2403.9	2403.9	2403.9	2403.9	2403.9	2403.9	2403.9	2403.9	2403.9	2403.9
462	RETAINED EARNINGS	111.7	166.6	223.2	281.6	342.0	404.6	469.6	537.3	608.0	608.0
555	DEBT OUTSTANDING-SHORT TERM	114.6	139.2	149.7	160.9	171.1	181.0	194.5	208.9	224.2	224.2
554	DEBT OUTSTANDING-LONG TERM	3684.7	3668.2	3649.9	3629.9	3607.8	3583.6	3556.9	3527.6	3495.3	3495.3
542	ANNUAL DEBT DRAWDOWN $1982	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2091.2
543	CUM. DEBT DRAWDOWN $1982	2091.2	2091.2	2091.2	2091.2	2091.2	2091.2	2091.2	2091.2	2091.2	2091.2
519	DEBT SERVICE COVER	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	0.00

ACRES

THE INFLATION OUTLOOK

DRI has lowered its forecast of inflation by another few tenths of a percent, with the CPI forecast to rise at a 5.3% average rate for the next three years, the finished goods producer price index by 5.1%, and the GNP deflator by 5.4%. Wages will retain most of the reductions achieved in the recession, but are not forecast to slow significantly further. Total compensation will accelerate because of the jump in Social Security taxes.

Table 6 shows the pattern of disinflation, from an 11.5% rate in 1979 to 1981 to 3.9% in the most recent 12 months. Of the 7.7% slowdown, home ownership, mainly mortgage rates and taxes, accounted for 3.6 percentage points. Lower energy prices, principally gasoline, contributed another 2.2 percentage points to the slowdown, and food accounted for 0.9 percentage points. Thus, interest rates, energy prices and farm prices account for 6.7 out of the 7.7 points of improvement. While the recession contributed to all of these improvements to a degree, there was considerable luck in these items, and not all of these gains are permanent. Farm prices will inevitably rise sooner or later, interest rates will cease to decline, and the energy price outlook will not always remain as favorable as it is today.

Table 6
Disinflation: How the CPI Slowed from 11.5% to 3.9%

	Annual Percent Change		Contribution to Slowdown (Percentage points)
	Dec 1978-Dec 1981	Dec 1981-Dec 1982	
CPI - All Items	11.5	3.9	7.7
Home Ownership	15.4	1.4	3.6
Home Prices	9.3	7.5	0.2
Finance, Taxes, Insurance	22.8	-4.0	3.2
Maintenance and Repairs	10.1	4.2	0.2
Energy	22.0	1.3	2.2
Gasoline	26.0	-6.6	1.9
Heating Fuels	29.8	0.9	0.4
Electricity	14.1	6.4	0.2
Natural Gas	16.5	25.4	-0.1
Food and Beverages	8.1	3.1	0.9
Clothing	6.1	3.3	0.1
Home Furnishings	4.4	0.9	0.1
New Cars	7.3	1.4	0.2
Medical Care	10.8	11.0	0.0
All Other			0.6

The question arises, therefore, whether the inflation improvement is to be short lived, and whether the danger of much larger inflation figures is very real. As we have pointed out before, the core inflation rate is in the 5% to 6% area, but the danger of much higher figures is quite remote. The farm price outlook is very moderate for the next year or two, interest rates are likely to show only small changes and in any event are removed from the index, and world energy prices are still headed lower. The rate of wage increase is currently near 5%, and it will not accelerate substantially for the next several years, given unemployment rates near 10%. Industrial prices, which will surely show some revival with recovery, cannot rise much as long as utilization rates are very, very low. Even in 1985, utilization rates do not quite reach 80%.

Data Resources Summary Table for the U.S. Economy - CONTROL012483

	1982		1983				1984		Years				
	III	IV	I	II	III	IV	I	II	1981	1982	1983	1984	1985
GNP and Its Components Billions of Dollars - SAAR													
Total Consumption	1986.3	2034.6	2064.2	2104.3	2150.0	2199.6	2244.2	2294.0	1843.2	1972.0	2129.5	2318.4	2528.2
Nonres. Fixed Investment	344.2	336.6	323.9	322.6	328.4	336.7	348.8	360.5	346.1	347.5	327.9	366.7	417.8
Res. Fixed Investment	94.3	99.8	112.1	120.0	128.1	134.6	139.5	145.8	105.0	95.8	123.7	149.8	180.3
Inventory Investment	4.7	-38.5	-12.2	0.6	5.3	8.3	18.7	17.3	20.4	-21.4	0.5	20.5	30.6
Net Exports	6.9	-6.9	-10.8	-13.8	-18.2	-19.3	-16.8	-14.2	26.1	16.6	-15.8	-13.2	-6.8
Federal Purchases	259.0	276.1	279.6	280.8	285.9	298.4	304.4	312.8	228.9	257.3	286.2	317.0	347.8
State and Local Govt. Purchases	392.7	399.6	404.2	409.8	415.2	421.0	427.3	435.0	368.0	389.8	412.5	439.3	474.2
Gross National Product	3088.2	3101.3	3160.8	3224.3	3294.8	3379.3	3466.0	3551.2	2937.7	3057.5	3264.8	3598.5	3972.1
Real GNP (1972 Dollars)	1481.1	1471.7	1481.8	1491.8	1505.9	1523.8	1540.7	1558.8	1502.6	1475.5	1500.8	1568.1	1635.6
Prices and Wages - Annual Rates of Change													
Implicit Price Deflator	5.0	4.3	5.0	5.4	5.0	5.6	5.9	5.2	9.4	6.0	5.0	5.5	5.8
CPI - All Urban Consumers	7.6	2.6	4.5	5.7	5.4	5.4	5.8	4.9	10.3	6.1	4.9	5.4	5.6
Producer Price Index - Finished Goods	6.4	4.2	2.7	4.0	5.2	5.4	5.2	5.0	9.3	4.0	4.0	5.1	6.0
Compensation per Hour	6.4	4.7	6.2	5.4	6.2	6.2	8.4	6.1	9.6	7.1	5.8	6.7	6.7
Core Inflation	7.6	7.3	6.8	6.4	6.0	5.7	5.5	5.5	9.0	7.8	6.2	5.4	5.4
Production and Other Key Measures													
Industrial Production (1967=1.000)	1.382	1.351	1.364	1.386	1.414	1.448	1.476	1.509	1.509	1.386	1.403	1.522	1.619
Annual Rate of Change	-3.4	-8.6	4.0	6.4	8.3	10.2	7.7	9.3	2.6	-8.1	1.2	8.5	6.3
Housing Starts (Mil. Units)	1.118	1.251	1.350	1.435	1.490	1.514	1.558	1.610	1.100	1.060	1.447	1.646	1.842
Retail Unit Car Sales (Mil. Units)	7.7	8.7	8.4	8.4	8.8	9.3	9.4	9.7	8.5	8.0	8.8	9.8	10.5
Unemployment Rate (%)	10.0	10.7	11.0	10.7	10.5	10.3	10.1	9.7	7.6	9.7	10.7	9.6	8.5
Federal Budget Surplus (NIA)	-156.0	-199.5	-191.6	-185.1	-201.5	-206.8	-204.1	-204.0	-60.0	-148.4	-196.3	-200.3	-188.4
Money and Interest Rates													
Money Supply (M-2)	1941.9	1985.7	2023.0	2062.4	2108.3	2161.0	2202.2	2252.7	1807.4	1985.7	2161.0	2367.1	2617.1
% Change, 4th-Qtr. to 4th-Qtr.	10.1	9.3	7.7	8.0	9.2	10.4	7.8	9.5	9.5	9.9	8.8	9.5	10.6
New AA Utility Rate (%)	15.02	12.54	12.11	11.36	10.80	10.57	10.56	10.55	16.25	15.13	11.21	10.61	10.98
New High-Grade Corp. Bond Rate (%)	14.09	11.07	10.95	10.57	10.19	10.05	10.09	10.10	15.01	13.89	10.44	10.16	10.53
Federal Funds Rate (%)	11.01	9.29	7.96	8.27	8.64	8.94	9.59	9.32	16.38	12.26	8.45	9.09	9.61
Prime Rate (%)	14.72	11.96	10.34	10.51	10.81	11.27	11.90	11.63	18.87	14.86	10.73	11.42	11.50
Incomes - Billions of Dollars													
Personal Income	2592.4	2623.0	2659.8	2709.5	2772.2	2840.1	2905.5	2979.0	2415.8	2569.6	2745.4	3014.1	3299.2
Real Disposable Income (%Ch)	1.3	-0.2	0.3	2.2	7.1	4.6	3.9	5.0	2.5	1.1	2.0	4.5	3.7
Saving Rate (%)	6.9	5.8	5.6	5.6	6.4	6.5	6.8	7.0	6.4	6.5	6.0	7.0	7.2
Profits Before Tax	180.3	180.6	185.6	189.1	194.3	203.5	209.6	222.8	232.1	176.1	193.1	229.8	277.4
Profits After Tax	119.4	120.4	123.0	125.2	128.7	134.7	138.9	147.3	150.9	117.8	127.9	151.6	182.2
Company Profits	94.0	88.2	91.5	99.1	108.5	111.7	114.7	116.9	107.2	90.7	102.7	119.7	136.8
Four-Qtr. Percent Change	-11.1	-16.3	3.4	7.7	15.4	26.6	25.3	17.9	2.6	-15.4	13.2	16.5	14.3
Composition of Real GNP - Annual Rates of Change													
Gross National Product	0.7	-2.5	2.8	2.7	3.8	4.8	4.5	4.8	1.9	-1.6	1.7	4.5	4.3
Final Sales	-1.3	3.1	-0.5	1.2	3.3	4.6	3.3	5.0	1.0	-0.6	1.1	4.0	4.1
Total Consumption	0.6	5.0	1.1	2.3	3.5	4.2	2.5	4.2	1.8	1.0	2.5	3.5	3.4
Nonres. Fixed Investment	-7.7	-9.0	-15.9	-4.3	4.0	6.5	9.4	9.3	3.5	-3.8	-7.6	7.1	8.1
Equipment	-8.8	-12.1	-11.4	-0.2	9.0	11.0	12.4	12.4	2.4	-6.8	-5.9	10.6	9.0
Nonres. Construction	-5.2	-2.3	-24.6	-12.5	-7.9	-3.3	2.7	2.0	6.3	3.1	-11.1	-0.6	5.7
Res. Fixed Investment	-5.9	24.2	50.7	24.1	21.9	15.2	7.6	12.5	-4.9	-10.9	24.4	13.9	12.6
Exports	-16.7	-26.9	-2.8	3.0	6.0	6.0	7.7	5.9	-0.5	-6.9	-6.6	6.1	5.6
Imports	4.5	-14.8	0.2	3.7	7.3	5.8	5.3	3.7	7.2	0.6	0.3	4.9	4.1
Federal Government	23.2	28.4	-3.0	-6.9	0.2	6.9	2.0	5.9	3.7	5.2	4.0	3.1	2.2
State and Local Governments	-0.2	1.1	-1.1	0.1	-0.4	0.0	0.0	1.6	-0.8	-0.9	-0.1	0.6	1.8

ALASKA POWER AUTHORITY

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September 24, 1982

James N. Souby
Director
Division of Policy Development &
Planning
Pouch AD
Juneau, Alaska 99811

Dear Jim:

Thank you for the opportunity to review the draft report entitled "Alaska Energy Planning Studies: Substantive Issues and the Effects of Recent Events" by Arlon Tussing and Gregg Erickson. I find the "Critique" thought provoking and useful for highlighting risks associated with the Susitna Project. I believe, however, that it lacks balance, is based upon very selective use of the available evidence, and generally presents an extreme position.

Transmitted with these comments are the following:

1. Commentary by Acres American.
2. Letter to Eric Yould from Mr. Bob Cross.
3. Department of Revenue forecast of wellhead prices for North Slope crude oil.
4. Engineering News Record article on the James Bay Hydroelectric Project.

World Oil Prices and Railbelt Electrical Energy Demand

The authors assert that the state's forecasts "project declining real oil prices through 1998" (p.16). A footnote attributes this information to the Department of Revenue's Chief Petroleum Economist. A request was made to Commissioner Williams seeking confirmation of this forecast. While a formal response has not been received as of this writing, Dr. Logsdon provided the Department's projection of the constant dollar wellhead value for North Slope crude oil. The forecast shows a decline through 1985, with a rise thereafter through 1998. The average annual real rate of increase is projected at a positive 1.7 percent from 1982 through 1998. See attachment #1. It is my understanding that it is the wellhead value which chiefly determines petroleum revenue.

The Department of Revenue forecast is the only one specifically cited by the authors to confirm their view of future world oil prices. In their review of the Tussing/Erickson Critique, Acres finds that major forecasts generated during the spring and summer of 1982 continue to

project significant positive rates of change in real prices. In fact, the forecasts presented tend to support the Battelle/Acres 2.0 percent base case assumption. On this issue, the authors seem to have adopted a somewhat extreme position outside the mainstream of informed opinion. Refer to Acres Commentary, pages 3-6.

To be fair to Acres, the Critique should clarify the ground rules under which Acres labored. The original scope of the Susitna Feasibility Study included a work element addressing load forecasts and alternative generation costs. Certain interested parties were concerned that these issues, being as crucial to a showing of economic feasibility as they are, should be segregated from the work of Acres and the Power Authority. The Railbelt Alternatives Study was thus born, and Battelle was eventually selected by the Governor's Policy Review Committee as the consultant to perform the work. From that point in time, it was understood that neither the Power Authority nor Acres was to be responsible for developing load forecasts or fuel prices, and Acres was so directed. The authors, on page 21, state that Acres adopted the Battelle work with some modifications. In fact, the reason there is some difference in the final forecasts is that Acres, in order to meet schedule requirements, had to take what Battelle could offer in December, 1981. Battelle subsequently refined its forecast, thus creating the difference after the data transfer. The author's statement on page 20 that Acres' base case assumes no relationship between oil prices and electricity demand cannot be accurate unless Battelle made the same assumption.

The Critique draws the conclusion on page 24 that an up-to-date view implies a "most-likely" future in which electricity demand "will be considerably lower than the lowest case postulated by Acres or Battelle." This is consistent with conclusions drawn by Dick Emerman of DPDP, but Dick made it clear that his conclusion is predicated on the assumption that the ISER and Battelle economic and load models are, in fact, an accurate reflection of reality. Emerman, for example, points out that alteration of the electricity pricing assumption could lead to as much as a doubling of demand over the base case forecast. In other words, if the state could, and actually did, subsidize the price of electrical energy (as is now being done throughout the state to some degree) all bets are off, and the oil price issue, at least as far as demand is concerned, becomes much less important.

Mr. Bob Cross, Administrator of the Alaska Power Administration, raises the very basic question of whether the existing models are capturing actual casual relationships. His concern is heightened by the finding that the recorded annual growth rate for the Anchorage-Cook Inlet power systems was 8.15 percent for the 12-month period ending in April, 1982. As of now, the Battelle mid-range forecast is apparently under-forecasting actual demand.

Alaska Fossil-Fuel Availability and Costs

The authors contend that the Battelle/Acres assumption of no change in relative world prices among oil, gas and coal is not supported by the data. The data that appears on page 34 of the Critique indicates a coal/gas price ratio of between 0.29 and 0.53 with no clear trend over the period. For instance, the price ratio was 0.37 in both 1974 and in 1980. Please refer to Acres Commentary, page 7 and 8, for further discussion.

The authors' assertion that Battelle/Acres is projecting Cook Inlet gas prices to increase at an average annual rate of 9 percent in the medium case (and 11.2 in the high case) is misleading. After a period of adjustment when existing contracts expire and average prices reach present day " marginal prices" for additional gas, the average annual constant dollar growth rate assumed is 2 percent rather than 9 percent.

Acres in its Commentary questions the authors' criticism of the net-back approach to estimating the value of Cook Inlet gas. It is suggested by Acres that the Critique has adopted too short a horizon for evaluating the merits of the Susitna Project, which is not even due to have its first phase on line until 1993.

It should be made very clear that, while Acres expresses concerns about the long term availability of Cook Inlet gas, the economic analysis is predicated on unlimited gas supplies. Cost determines economic feasibility; gas availability does not.

Susitna Construction Costs

The authors imply that TAPS and the WPPSS nuclear plants are the most useful projects for cost history comparison with Susitna. I take strong exception to this suggestion, and offer the Churchill Falls Hydroelectric Project and the James Bay Hydroelectric Project as more appropriate for comparison. Both are characterized by remote northern locations and capacities greater than Susitna. The Churchill Falls Project was completed for 96 percent of the feasibility level estimate, after correction for inflation. Refer to Acres' Commentary for a detailed discussion.

With respect to the James Bay Project, the attached Engineering News Record article highlights the extremely favorable cost and schedule history of that undertaking. Again, a remote project more extensive than the Susitna development is being constructed ahead of schedule and within budget estimates made six years ago. Refer to the attached article for further discussion. The authors' technique of "guilt by association" is not the most professional approach.

Real Discount and Interest Rates

The Critique's discussion of today's bond yields and inflation rates obviously needs updating. Accepting the authors' contention that

the relevant discount rate is the effective rate at which the project is to be actually financed, the appropriate discount rate today is less than the 3 percent used by Acres in the base case analysis. However, irrespective of what the present day situation indicates, the authority recognizes that the rate existing at the time the financial commitment is made is the relevant rate for determining the applicability of the economic feasibility analysis. Refer to Acres' Commentary, pages 19-21.

Again, thank you for the opportunity to comment. The work by Tussing and Erickson will be very useful in scoping future updates of the Susitna Project's economic and financial viability.

Sincerely,

Eric P. Yould
Executive Director

4 attachments: as stated

cc: Each Board Member, w/attachments
Arlon Tussing, w/attachments
Gavin Warnock, Acres American, w/attachments
Robert Cross, Alaska Power Administration, w/attachments

Department Of Energy
Alaska Power Administration
P.O. Box 50
Juneau, Alaska 99802

FILED

September 8, 1982

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SEP 13 1982
ALASKA POWER AUTHORITY

Mr. Eric Yould
Executive Director
Alaska Power Authority
334 West Fifth Avenue
Anchorage, AK 99501

Dear Eric:

I had some thoughts on the new Tussing/Erickson paper, "Alaska Energy Planning Studies: Substantive Issues and the Effects of Recent Events."

I surely don't suggest that Alaska Power Administration can match credentials of these two influential economists, particularly in Tussing's natural gas speciality. But, I think their new work may be a little misleading.

I share to a degree the author's disappointment in the outcome of the Railbelt alternatives study which came about largely as a result of previous work by the authors. I think the alternatives study was a good one, but it didn't provide all that much new insight.

There is a lot of data which support the Tussing/Erickson outlook on world energy supplies and costs, which, in simplified form, is that the producers have some big problems and the consumers will enjoy a buyer's market for a long time to come. With that kind of outlook it is sensible for Alaskans to base their energy plans on natural gas and oil, thus avoiding some huge investments in alternative energy sources.

There are other data and indicators which are not so comforting. There have been huge adjustments in energy prices in the past 10 years for which there wasn't much precedent and the results haven't fit the economists predictions all that well. Our present energy supply situation reflects some horrendous economic problems in our country and elsewhere in the world. Even with the deepest recession in the U.S. since the great one, we're still making annual payments of $80 billion for imported oil.

Certainly demands will be depressed by 30 percent iddleness in industrial capacity, record low levels in construction and other industries, 10 percent unemployment, etc.

I personally feel the Tussing/Erickson outlook on world energy supply and prices is consistent only with a long-term worsening of the economies of the major industrial nations.

I partly agree with Tussing/Erickson in the criteria of the fuel escalation assumptions--a gradual increase of 2 or 3 percent per year above inflation. Commodity prices just don't behave that way unless they are controlled. The recent (10-year) energy price history shows two or three major upward adjustments plus a lot of smaller ups and downs. That's probably what will happen in the future, too.

The Susitna Review Committee made a very thoughtful recommendation to the Power Authority several weeks ago--economic conditions at the time including outlook for oil revenues and prevailing interest rates were not right for start of construction of a project like Susitna. It appears that Tussing/Erickson agree with that point.

Stated another way, it's tough to undertake new capital-intensive plant construction during a period of unusually expensive financing costs. The same problem is largely responsible for deferral of many projects throughout the country.

If the financing costs come down, a lot of the deferred projects will get started. The most recent changes in interest rates are very promising from that standpoint.

I also share the Tussing/Erickson disappointment in the estimates of future power demands. Except for very short-range forecasts, no one has been able to do this job very well. In spite of a lot of work and a lot of modelling, the relationship between economic factors and energy and power use in Alaska are still pretty hazy.

The most recent studies are dominated by data from 1979 and 1980--the post pipeline doldrums for the Alaska Railbelt. For whatever the reason, the studies failed to pick up a rather distinct upturn in power demands starting in the 1980-1981 winter. Some notes on this are attached.

I made a recent check and found a recorded growth of 8.5 percent for the Cook Inlet systems for the 12-month period ending in April 1982.

I think all are agreed that the huge and generally sustained growth in Railbelt power demands which occurred from 1960 to 1978 won't be duplicated in the future--at least as measured by percentages of demand.

Sincerely,

Robert J. Cross
Administrator

Enclosure

cc: Dr. Tussing
Mr. Dzinbach

1. RAILBELT POWER DEMANDS

There's a rather large problem in validating forecasts of future power demands for the Railbelt. There is strong criticism of the most recent forecasts on grounds they incorporate unrealistically high estimates of future state expenditures.

I think there is a larger problem in that the available forecasting techniques do not work well through times of major economic change.

All of the recent load forecasts are dominated by the power use data up through 1980 or 1981. The forecasts are based on either net generation or power sales data on a calendar year basis and attempt to establish relationships between the power use and various economic factors.

The CY power use data indicate that declining rates of growth prevailed between 1977 and 1981. This is illustrated by net generation data for the south half of the Railbelt:

Anchorage-Cook Inlet Net Generation

	Annual GWH	Annual Increases GWH	%
CY 1977	1803.6		
		127.8	7.1
1978	1931.4		
		100.2	5.2
1979	2031.6		
		73.3	3.6
1980	2104.9		
		71.0	3.4
1981	2175.9		

Examination of the same data on a monthly basis gives a somewhat different picture (tabulation attached). The monthly data show a period of very slow growth starting in the spring of 1978 and extending through most of 1980. There was a significant upswing during the 1980-1981 winter which has been sustained since that time.

This upswing was disguised in the 1981 CY data -both January and December of 1981 showed abnormally low power use, probably because of weather.

We also looked at the data on the basis of 12-month totals for May to April.

Anchorage-Cook Inlet Net Generation

Year ending in:	Annual GWH	Annual Increases GWH	%
April 1979	1989.8		
		21.8	1.1
April 1980	2011.6		
		94.7	4.7
April 1981	2106.3		
		224.1	10.6
April 1982	2330.4		

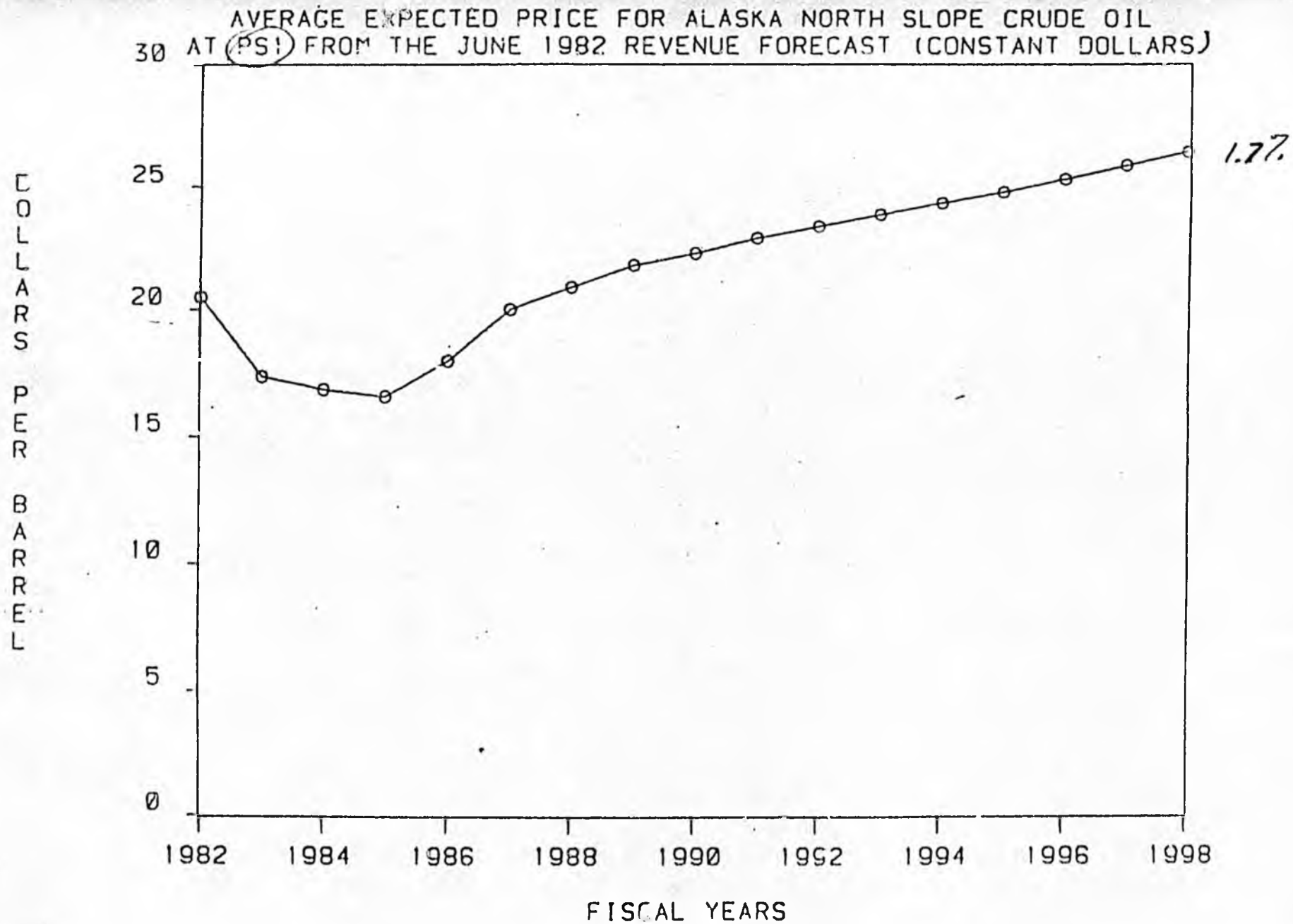
The data indicate that current growth levels for power demand are substantially above those in the most recent forecast. The recent period of higher growth seems to follow very closely the improvement in the area economy for that same period.

Anchorage-Cook Inlet Net Generation
GWH

Month	1982	±	1981	±	1980	±	1979	±	1978
Jan	272.7[a]	+70.4	202.3[a]	-19.0	221.3	+12.1	209.2	+12.0	197.2
Feb	220.3	+32.5	187.8	+6.0	181.8	-28.6	210.4[a]	+42.8	167.6
Mar	216.5	+29.7	186.8	+0.8	186.0	+0.8	185.2	+12.1	173.1
Apr	192.3	+22.1	170.2	+13.2	157.0	-4.5	161.5	+12.0	149.5
May			154.2	+8.0	146.2	+4.4	144.1	+2.8	141.3
Jun			148.2	+11.4	136.8	+4.9	131.9	+2.2	129.7
Jul			155.8	+14.6	141.2	+5.4	135.8	+3.6	132.2
Aug			157.4	+12.5	143.7	+5.7	138.2	+6.1	132.1
Sept			163.7	+11.4	152.3	+14.5	137.8	-0.9	138.7
Oct			196.8	+19.4	177.4	+9.5	168.1	+18.7	149.4
Nov			218.1	+15.6	202.5	+22.3	178.3[a]	-12.8	191.1
Dec			234.4	-24.7	259.1[a]	+27.8	231.3	+22.3	209.0
CY Total			2175.9		2104.9		2031.6		1931.4
Yearly change				+71.0 3.4%		+73.3 3.6%		+100.2 5.2%	
Total, Year Ending April	2330.4		2106.3		2011.6		1989.8		
Yearly change		+224.1 +10.6%		+99.7 +4.7%		+21.8 +1.1%			

NOTES: These are net generation totals for CEA, AML&P, and Federal APA.

[a] Months with power use abnormally high or low, probably because of weather.



SOURCE: DR. LOGSDON, DEPARTMENT OF REVENUE

SUSITNA HYDROELECTRIC PROJECT

COMMENTARY ON

"ALASKA ENERGY PLANNING STUDIES –
SUBSTANTIATIVE ISSUES AND
THE EFFECTS OF RECENT EVENTS"

(A. R. Tussing and G. K. Ericson)

Commentary Prepared by:
Acres American Incorporated

ACRES

ALASKA POWER AUTHORITY

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

September 7, 1982

Commentary on:
"ALASKA ENERGY PLANNING STUDIES - Substantiative Issues and the Effects of Recent Events" - a review by A. R. Tussing and G. K. Ericson for the Division of Policy Development and Planning - Office of the Governor of the State of Alaska

Commentary Prepared for the Alaska Power Authority by Acres American Incorporated in accordance with instructions received on August 27, 1982.

Introduction

The draft document "Alaska Energy Planning Studies - Substantiative Issues and the Effects of Recent Events" (the Review), covers four reports submitted to Alaska state agencies:

- Draft Susitna Hydroelectric Project Feasibility Report (the Report)
  by Acres American Incorporated (Acres)

- Railbelt Electric Power Alternatives Study: Evaluation of Railbelt Electric Energy Plans
  by Battelle Pacific Northwest Laboratories (Battelle)

- State of Alaska Long-Term Energy Plan
  by Booz Allen & Hamilton Inc. (Booz Allen)
  (and Homan-McDowell, Pacific Polar Rims and NORTEC)

- Electric Power and Industrial Development: Baseline Data for State Planning (Draft)
  by SRI International (SRI)