

ALASKA LEGISLATURE SPECIAL COMMITTEE / SUBJECT FILES 86 / 2
984 SCOMM44: HOUSE POWER ALTERNATIVES STUDY COMM. 1979-80

I. Take advantage of existing \$5.45 million (existing Sec. 203)

This plan would require the Power Authority to enter into an agreement with the Secretary of the Army to repay the Secretary for all costs of the Phase I studies if the project proves "economically feasible." Since the Power Authority has no funds with which to commit itself to repayment, the legislature would either have to appropriate funds annually, or it could appropriate all funds during the upcoming special session or during the next legislature. The \$8.178 million appropriated to the Governor could suffice to get us through the first year if the funds were released. In addition, Congress would have to appropriate the balance of federal funds needed to complete the Phase I studies. Upon completion of the Phase I studies, a construction agreement between the Power Authority and the Secretary would be authorized by Congress. It would appear that at this point a new law would be needed to insure that the Corps documents fulfill the FERC requirements in the event it became desirable to construct the project with the private sector. On the other hand if we decided to construct with the Corps, we would either have to wait for the authorization to construct, or we would need a change in Sec. 203 to circumvent this requirement. Finally, during this four year period of time, a change in the IRS laws would be needed in order to sell tax-exempt bonds.

II. Study and Construct as a Federal Project (Sec. 160)

Use of Section 160 would be tantamount to developing the project as a traditional Corps of Engineers civil works project. One variation might be, however, to accomplish Phase I under Section 160 and then switch to the private sector or Section 203 for construction. However, use of Section 160 could seriously delay project development. The normal Phase I study envisioned by the Corps under Section 160 would still require four years but only \$12.5 million worth of field explorations would be accomplished. Thus if it were desirable to switch to Section 203 at the end of Phase I, a minimum additional \$12 million would need to be expended before starting construction.

III. Amend Existing Section 203

Under the terms of the state appropriation bill that makes \$8.178 million available to initiate the Susitna project under a Federal/State joint venture, funds can be obligated at such time as federal guarantees are passed by Congress which provide state payback if the project is not economically feasible or financeable. This alternative provides much the same advantage as the preceding method except that it requires changes to Section 203 before we can initiate the studies. Federal authorization to construct would not be needed however if we desired to use the private sector to construct, legislation would be needed to insure that Corps studies fulfill FERC requirements. State appropriations would still be needed.

IV. Total Development through the Private Sector

The Power Authority has entered into contracts with three engineering firms to develop competing proposals to the Corps of Engineers Plan of Study. Preliminary discussions would indicate that the field investigations and FERC license process will cost roughly \$15 million and be accomplished within three and a half years. Thus, construction may start in 1983. The \$8.178 million appropriated by the Legislature could be supplemented during the next legislative session. Assuming the project does prove feasible, the State could be repaid through the first bond sale. The success in actually starting construction in 1983 will be dependent on how much pressure can be applied to FERC. Finally, financing will be dependent upon Federal legislation which will allow us to use tax exempt bonds.

SUMMARY OF THE QUESTION -

CORPS of ENGINEERS vs PRIVATE SECTOR?

Factors Advantageous to Selecting the Corps of Engineers.

1. Section 203 amendments may provide for payback of study costs and federal financing of cost overruns with delayed principal and interest payments.
2. The Corps of Engineers Plan of Study will result in a Comprehensive Study addressing engineering, economic, and environmental issues for the proposed development.
3. A Federal Energy Regulatory License to Construct will not be required.
4. The Corps of Engineers is familiar with the project having completed reports in 1975 and 1978.
5. The Corps of Engineers has an excellent record of quality engineering and construction management.
6. Federal involvement may make revenue bond financing easier to accomplish.

Factors Advantageous to Selecting the Private Sector.

1. The Corps Plan of Study is too long and costly.
2. Federal involvement will create delays in completion of the study, authorization for construction, and actual construction.
3. The Corps of Engineers will utilize conservative design, cost estimates, and construction schedule.
4. The private sector will utilize cost escalation in formulation of a less conservative economic feasibility determination which can result in a higher benefit/cost ratio.
5. The private sector is profit and time oriented in the interest of both itself and the State.
6. Use of the private sector will result in a lower project cost due to lower engineering, construction, and inflation costs.
7. The Corps of Engineers has no experience in underground powerhouses, concrete arch dams, or rock fill dams of the height proposed.

8. The private sector is experienced at working with revenue bond financing and developing power marketing arrangements.

9. The private sector is not burdened with lengthy review procedures, congressional approvals, and approvals of the federal Office of Management and Budget.

10. Use of the private sector provides more flexible engineering, it would permit more state control of the project, federal politics would not influence the development, and the project developed would be responsive to the interests of Alaska.

11. Section 203 construction financing makes federal funds subject to appropriation which might not be acceptable to the revenue bond financing community.

12. The private sector does not have extensive civil and military construction programs that compete for limited personnel resources that are authorized for Corps of Engineers activities.

**4 - FACTORS TO BE CONSIDERED IN DECIDING WHETHER
THE STATE SHOULD TAKE OVER THE SUSITNA PROJECT**

Given increasing international pressures on the costs and availability of fossil fuels, there can be little doubt that alternative means of energy production involving the use of renewable resources should be vigorously sought. It follows that the national interest will be well served if feasibility is shown and the Susitna Hydroelectric Project is ultimately constructed. In addition to the conservation of fossil fuels, however, is the important fact that the Alaskan employment picture would be greatly improved by the construction of a major project and the long-term economic outlook would be enhanced by the availability of large blocks of power at a reasonably stable price. Regardless of which route the State of Alaska chooses to follow, the proposed project should not be allowed to sink into bureaucratic oblivion. The questions of economic viability, environmental acceptability, and technical feasibility should be resolved and a decision regarding the future of the project should then be made. Factors worthy of consideration in deciding whether the State should take over the Susitna Project include:

- (a) Historical experience on major water resources projects undertaken by the Corps of Engineers demonstrates that intermittent funding, frequent imposition of manpower ceilings, and other constraints imposed by the executive or legislative branches of the Federal Government tend to be extremely time consuming. Indeed, Senator Gravel (Dem., Alaska) noted in a speech just prior to his introduction of Public Law 94-578, that the average time the Corps of Engineers takes from authorization of a project to receipt of first construction funds is 18 years. This extreme length of time is not necessarily indicative of deficiencies on the part of the COE, but rather indicates that the combination of events which must take place sequentially in the bureaucratic process can lead to significant delays.
- (b) Federal management will necessarily create a situation wherein national interests are always given precedence over the interests of the State of Alaska.
- (c) The Corps has a solid reputation for quality engineering and construction management. A Corps-designed dam has never failed.
- (d) The Corps tends to be overly conservative on large engineering projects. In this regard, for example, it is extremely unlikely that the Corps will allow the concept of a thin-arch dam to survive during the Phase I design studies.
- (e) The Corps has never built a large hydroelectric dam in a subarctic environment with the attendant dangers of substantial ice buildup.
- (f) On a nominal \$2 billion project, a one-year delay is equivalent to \$200 million when the interest rate is 10 percent.

- (g) The national perception of Alaska may create difficult barriers to the passage of necessary authorizing legislation to provide monies for the revolving fund. In this regard, for example, Alaska is seen in the Lower 48 as a wealthy oil state whose needs for further Federal assistance are far less than those areas wherein heavy concentrations of high unemployment or low income are concentrated. In addition, the Lower 48 generally views Alaska as the last virgin land, which the remainder of the nation should put in trust to protect the environment for future generations. The recent House vote on the Alaska Lands Bill is indicative of this latter attitude. As a result, it may be difficult to get sustained Federal support for a Federal project which removes some pristine land from the domain of the untouched.
- (h) Federal spending per capita in Alaska typically amounts to twice the per capita income of Alaskans. This statistic may well be cited as a defense against authorizing large sums for a revolving fund which will be tapped primarily by the State of Alaska; even though repayment would ultimately be made, the probability that large sums will be placed annually in the revolving fund is not very high.
- (i) The cost of advanced engineering and development for this project will probably run about \$15 million per year for a period of 4 years. This amount is more than 50 percent of the money requested for advanced engineering and design for all projects in the 1977 Federal budget. It may be difficult to sustain, in periods of tight money, such a level of funding, even if it is to be later repaid.
- (j) The project will be regarded as benefiting 1/10 of 1 percent of the total population in the U.S. On the other hand, it can be argued that the nation would receive the benefit of nonrenewable resources conserved for other purposes.
- (k) The State can follow a low risk path on the Phase I work if the Federal Government provides the necessary concept of relieving the State of liability for the monies expended in the event that feasibility is not shown. Accepting this low risk, nonetheless, has to be balanced against the possibility that bureaucratic delays could cost much more than the \$25 million or so involved.
- (l) In the event that the Federal Government does provide sufficient money to maintain the revolving fund at the required level, the State could defer a decision to proceed on its own until that point at which Federal monies dry up.
- (m) The Federal hydroelectric development process is extremely cumbersome. It is time consuming, sometimes confusing, and often laced with conflicting regulatory requirements. On the other hand, it has been effective in ensuring that there is ample opportunity for consideration of all issues and for hearing the voice and arguments of the opposition.

(n) If the Corps is to take responsibility, the chances are great that most of the design will be done outside the State of Alaska. The Corps has a hydroelectric branch currently in Portland, Oregon; and, in addition, the work load is relatively slack at the Walla Walla District office, which has been involved over the years in a number of large hydroelectric projects. The use of a private consultant would allow the State to set specific minimum percentages of work which would have to be performed in-state.

- (o) As a Federal project progresses, need for a significant change to the originally authorized purpose can result in extended delays while changes are sought to the authorization. It is reasonable to assume that the State could streamline this process if it were footing the entire bill.
- (p) There is an element of State pride to be associated with undertaking this important giant project without having to rely upon the Federal government for subsidies and support. In that regard, the State of Alaska could be viewed as taking a leadership role, providing an incentive and an example for other states who may wish to have a greater hand in their own destinies.
- (q) One danger associated with Federal development is that there may be strong Federal influence as customer priority preferences are set.
- (r) In light of recent accelerated increases in the costs of fossil fuels, the chances that the project will be shown feasible are currently reasonably good. It follows that Alaska's expectation of having to reimburse the revolving fund for the cost of the Corps work must be correspondingly high. There is at least the chance that a private consulting team, unconstrained by certain bureaucratic layering and able to avoid the inefficiencies associated with year-to-year funding variations and uncertainties, can deliver a feasibility study and all the necessary exhibits required for FERC licensing at a markedly lower price than the \$25 million (in 1977 dollars) proposed by the Corps.

- A. A brief discussion of the factors the state of Alaska should consider in deciding whether to study and develop this project in cooperation with the federal government or undertake it as a state project using the private sector

The Alaska Power Authority (APA) is considering the ramifications of studying and developing the project in conjunction with the federal government, as a total state project supported by the private sector or some combination thereof. This question involves key policy and economic issues concerning the future business, organization and operation of the APA.

Section 203 of the Water Resources Development Act offers federal funds to states considering the study, construction and operation of qualified hydro projects. However, the use of federal funds also results in the imposition of constraints which could impact a state's control and flexibility over a given project.

The principal advantage of using federal funds lies in the financial assistance that might be available. Under Section 203, the federal government will underwrite the cost of studies which upon completion prove a project non-feasible. If the project moves to the development stage, the federal government will guarantee construction cost overruns and allow the building party to defer repayment of said capital overruns until the end of the license period. Upon completion of a project financed using funds appropriated by Congress, the marketing of project power will be the responsibility of APA. Principal drawbacks to the use of federal funds lie in the degree of increased government intervention generally fostered, the whimsical nature of the Congress in actually appropriate funds and the pure availability of funds.

APA would, no doubt, retain a greater degree of flexibility in marketing, allocating and pricing power from a state project.

Local or state control would streamline the planning, engineering, construction, operating and financing processes required for such a project. Also, orderly development of Alaska's natural, economic and human resources can be more easily sponsored, encouraged and coordinated if the state controls this most important power resource.

Local control would no doubt require a larger APA staff. If properly managed and controlled, the state's technical, financial, management and business resources should gradually expand.

A detailed Plan of Study developed with the supervision of the staff of the Alaska Power Authority and Stone & Webster's project team utilizing mutual incentives and motivation could jointly develop a necessary level of confidence on the engineering, economical and environmental feasibility of the Susitna River Basin Project at an early phase, or stage, of the POS. With a built-in series of check points and agreed upon milestones,



the State of Alaska could reach, at lower total expenditure, an early decision of the viability of the project and proceed with construction of the project. The state of Alaska could decide with a level of confidence to proceed with federal funding, state supported under Section 203 of the Water Resources Development Act or totally financed by the State of Alaska.

To display our confidence in our ability to perform the services on time and within budget, we would be willing to earn a portion of our engineering and construction fee against agreed upon schedule and performance targets. From our experience in both feasibility studies, engineering design and construction management, APA will recognize many advantages to the Susitna hydroelectric project by a closely coordinated effort where APA would control members of the project team, their schedule and quality of work. All services are provided by the same firm with single responsibilities.

In summary, development of the project by the state of Alaska using the private sector has the following advantages:

1. Studies and investigations would be completed more expeditiously.
2. State of Alaska would retain full control over the studies.
3. Private consultants would be more responsive toward the best interests of Alaska.
4. Plan formulations, power market and power benefit analysis, and economic evaluations would be performed to meet the requirements of Alaska and APA.
5. Major decisions as to the extent of development of hydroelectric resources and environmental and social considerations would be made by Alaskan authorities.

ALASKA POWER AUTHORITY

333 WEST 4th AVENUE - SUITE 31 - ANCHORAGE, ALASKA 99501

Phone: (907) 277-7641
(907) 276-2715

June 4, 1979

Mr. Gregg Erickson, Director
Legislative Affairs Agency
Pouch Y
Juneau, Alaska 99811

Dear Mr. Erickson:

As promised at our meetings in Anchorage on May 24 and 25, 1979, I am providing some initial comments on the study of alternatives to Susitna hydropower development.

1. The plan for Susitna development selected by the Corps of Engineers after preliminary feasibility studies consists of two large dam projects. This plan was arrived at through consideration of three factors: technical feasibility, maximization of long-term economic benefit and minimization of environmental impact. A factor not considered in plan formulation was economic/financial risk in the face of uncertainty. The recent supplemental studies completed by the Corps of Engineers include tests to assess the economic sensitivity of the proposed plan to variation in load growth, discount rates, and costs of the alternative modes. No attempt, however, has been made by the Corps to reformulate the plan to reduce economic/financial risk.

The need to develop a reduced risk plan to facilitate project financing was recognized and noted by several engineering firms that have reviewed the Corps of Engineers plan. Such a plan might include a staged development at the Watana site or perhaps a completely new development plan for the basin. The detailed feasibility studies to be conducted over the next several years will address this issue. I have attached information provided in 1977 by Harza Engineering Company in which more moderately sized initial development is recommended. (See attached, page 4-6.)

As you proceed in the study, then, please keep in mind that the currently accepted 2-dam plan is by no means the only way to develop the Susitna potential. A more gradually staged plan of development may emerge from the detailed studies. This, in fact, is my hope and expectation.

2. In the determination of the various generation mode power cost estimates (or probability distributions), there is a need for consistent uniform treatment among alternatives. This applies to locational cost factors, unit prices, contingency factor assumptions, etc. The lack of such consistency could severely bias the study conclusions. I recommend that this issue of uniform treatment be addressed in the study plan. For this reason, it would seem to me that the use of a single consultant for estimating the cost of all alternatives would be preferable to using several different consultants.
3. As I understand it, the impetus for this study was largely from the environmental community. One of the major concerns of the environmentalists is that the "soft path" of energy provision, using "appropriate technology" in small dispersed increments, is not receiving adequate consideration in the decision making process. It seems only reasonable, then, to address the full range of energy alternatives in this study. I recommend that the environmental groups be contacted early on and given an opportunity to offer their suggested generation scenarios. It would then fall upon you to select from among the full range of alternatives those that deserve detailed attention in the study.
4. In a related matter, geothermal energy has been suggested by some as an alternative to Susitna. Our research indicates that "hot dry rock" applications offer the best hope of economic development on a significant scale. This technology is presently under development by Los Alamos Scientific Laboratories in New Mexico. Drilling for wet steam in the vicinity of volcanic activity may also be a possibility. A cost of study for geothermal development in Alaska is under way at Energy Systems, Inc. of Anchorage. I suggest that the geothermal alternative be one that is explored, at least initially.
5. Another alternative requiring consideration is smaller hydroelectric potential in the Railbelt area. The Alaska Power Administration in Juneau is the authority on this issue. The Power Administration just recently completed an analysis of alternate sites for the Corps of Engineers' supplemental feasibility studies of Susitna. Another source of information on the subject is the CH2M Hill study done for the Corps. As I mentioned during our discussion, this latter work is primarily an environmental and land use review with the participation of environmental interests. I have asked the Corps (Ron Turner, 752-3432) to send you a copy.

6. Information on electrical energy alternatives for Southcentral Alaska is currently being gathered as part of the inter-governmental Southcentral Level B Water Resources Study. The Alaska Power Administration is the lead agency for the electric power task force and can probably provide a useful assessment of energy options.
7. The provision of Railbelt electrical power is now and will continue to be the responsibility of the several utilities. With this in mind, I hope you maintain frequent contact with the utility managers through the course of the study. It is really their problems that we are trying to shed light on.

It was very beneficial for Robert and I to talk with you about the study. Robert, by the way, will be coordinating most of our Susitna Activities and I would appreciate his being kept informed on your studies as they progress. It appears that you intend to drive to the heart of the controversy. We look forward to clear and useful results, hopefully followed by definitive action on the part of the State. Please keep us informed as the study plan takes shape.

Sincerely,


Eric P. Yould
Executive Director

Attachments:
as noted

cc: Chuck Behlke

STATE
of ALASKA**MEMORANDUM**TO: ☐ All Interested Persons

DATE: 10/24/79

FILE NO:

TELEPHONE NO:

FROM:

Eric P. Yould *EPY*
Executive Director

SUBJECT:

ALASKA POWER AUTHORITY

PLEASE TAKE NOTICE that the Board of Directors of the ALASKA POWER AUTHORITY will hold a public meeting in the Windsor Room of the Sheffield House Anchorage, 720 West Fifth Avenue, Anchorage, Alaska, on Friday, November 2, 1979 at 1:00 P.M. for the purposes of: (1) Review and approval of Minutes of the September 27, 1979 Board Meeting held in Anchorage, Alaska; (2) Opportunity for public comment; (3) Consideration of actions relative to the Lake Tye Hydroelectric Project FERC license application; (4) Any other business or action which may properly come before the Board; and (5) Actions with respect to the Susitna Hydropower Project: (a) Agreements and (b) Selection of method and engineer for proceeding with Feasibility Study.

May 24, 1977

Mr. W. C. McConkey, Director
Division of Energy and Power
Development
Department of Commerce and
Economic Development
State of Alaska
7th Floor Mackay Building
Anchorage, Alaska 99501

Re: Susitna River Development

Dear Mr. McConkey:

In accordance with your request, we are pleased to present our Proposal for professional services to carry out an appraisal of the Susitna River including a Master Plan for ultimate river development and selection of an initial project.

Our Proposal, attached to this letter, contains:

1. Scope of Services
2. Work Program
3. Project Organization
4. Personnel Experience Records
5. Harza Engineering Company Experience

In this letter we review the more significant conceptual aspects of the Susitna River Program and of our Proposal.

Need for Study

To date the Susitna River has had three major appraisal studies; two by U. S. Federal agencies and one by a consultant formerly associated with a large aluminum producer and construction firm. The ultimate development and initial projects proposed in each of these prior studies differ substantially from each other. The solutions of the Federal agencies appear to be

based upon traditional Federal financing with very large initial investments. This would require repayment deferrals or annual subsidies during the early years of Project operation.

The development proposed by the private firm, while physically different from the others, also would require a very large initial investment as well as a fill dam of unprecedented height. The justification for this large initial investment appears to be based on the superposition of a major aluminum reduction load upon the normal growth of Railbelt power demands.

Our analysis of the existing studies leads us to believe that the developments proposed are inappropriate for the power market, the environment and the current private money market. We urge that a more moderate approach to river development be followed in the first stages. This course of action will prepare the way for maximum realization of the river's energy potential in the future.

The existing studies, while well done, have created initial projects which are appropriate to mature power markets. In those markets the energy from new projects is easily absorbed in an already functioning multi-billion dollar industry. This is not the case in Alaska, where we are trying to establish an integrated power system. The economics of such a system should offer some rate of relief for retail customers and some protection from the price spiral soon to boost even more the Railbelt power rates.

State financing of the projects would now appear more feasible than Federal financing, and probably represents the only way to achieve early development of this valuable hydroelectric resource. Federal funds for large water projects are now difficult to obtain whereas there is an extensive market for tax-exempt revenue bonds.

Limitations on repayment capacity will most likely rule out very large initial projects. Therefore, a State-financed project should be of a size compatible

with the anticipated growth and the repayment capacity of the Railbelt utility companies. No dependence should be placed now on speculative special loads such as aluminum reduction facilities or gas pipeline compressors. If they do occur, second and third stage projects can be advanced.

State-financed projects are subject to authorization by the Federal Power Commission and not by the U. S. Congress as is the case for Federally-financed projects. The FPC procedures, being quasi-judicial and non-political, should be more favorable to a less populous State such as Alaska. However, the projects should be of modest size, of proven designs and with minimum environmental impact. Smaller projects will have shorter lead time as well as shorter construction and reservoir filling times, which will permit earlier replacement of energy generated by fossil fuels.

The thrust of our Proposal is for projects that can be financed by the State of Alaska which we understand is a present consideration of the State. Nevertheless, a development suitable for State financing should not preclude Federal financing should changes in State and Federal policies occur. On the contrary, such a development would be more acceptable for either type of financing, rather than very large dams with greater environmental impact and costs.

Development Program

The proposed study is a first essential phase of a State-financed program of development. On Exhibit A, attached to this letter, we show our concept of the various engineering, legal, and construction phases required to place the initial and subsequent project in operation.

At the end of each phase or sub-phase there is a decision point at which the State can consider the merits of proceeding to the subsequent phase, or of continuing the overlapping phases then in progress.

For most of the phases the time requirements can be fairly well determined from experience with similar projects. The least certain phase is the FPC licensing procedure. The timing of this phase will depend upon the need for and extent of FPC hearings. If environmental impact is minimized, and the projects are of moderate size, the time should be reasonably short. In the absence of objections to the projects, the resulting reduction in use of fossil fuels should make an early FPC license desirable from both the State and national viewpoints. On Exhibit A, we show our best estimate of this phase.

No commitment to construct (Phase IV) is required until:

1. An FPC license is granted
2. Construction and major equipment bids are received
3. Power sales contracts are in escrow
4. Financing is assured.

If the program shown on Exhibit A is followed, and no exceptional delays occur before the FPC, a modest size initial project could be in operation by the end of 1985.

By that time the Railbelt peak power demand (without special loads) should be over 1000 megawatts, almost entirely served from fossil-fueled plants. An initial hydroelectric project on the order of 400 megawatts would have its energy immediately useable and its capacity absorbed in less than four years.

Type of Development

The prior studies have considered hydroelectric development on the Upper Susitna River from Denali to Devil Canyon. The FPC inventory of resources in Alaska shows potential run-of-river projects downstream of Devil Canyon. These latter need upstream storage for their justification and are unlikely to be part of an initial project.

Our study is directed to the Denali-Devil Canyon section of the river. A number of specific sites have been identified previously:

Denali

Vee

Watana

Devil Canyon

Devil Canyon (high dam)

Different types and heights of dam and installed capacities have been studied and proposed for each of these sites.

Rockfill dams to an unprecedented 810-foot height have been considered at Devil Canyon and Watana. A well precededented 635-foot high concrete arch dam at Devil Canyon appears in some plans.

The high rockfill dams proposed were intended to provide large reservoir storage permitting almost complete regulation of the river. These developments anticipated large power plants with installed capacities that could substantially replace all thermal-electric generation. We do not believe that this approach is viable under State financing. The initial investments in the hydroelectric project would be too great and the investment in existing thermal-electric plants would not be fully depreciated by the Railbelt utilities.

Alaska, with 33,000 megawatts of potential hydroelectric power, should, within the next twenty years, convert to a fully hydroelectric supply, similar to the Columbia River Basin development in previous decades. The plan for ultimate development of the Upper Susitna River should include greater amounts of storage in future stages, but not necessarily in the initial stage.

In our view, the type of development of the Upper Susitna River best suited for State financing requires;

1. Economic development of the maximum potential of the river within a future Railbelt power system.
2. Individual projects of reasonable size within the limits of an acceptable environmental impact.

3. An initial project of a size commensurate with the power needs and repayment capacity of the power purchasers in the mid-1980's, and which can be placed in operation in minimum time.

Scope of Study and Work Program

The scope of study and corresponding work program as presented in this proposal are intended to provide the State of Alaska with sufficient information by the end of 1977 for a decision to begin early in 1978 with a definite project report on the initial stage of development (Phase IIA).

The timing of these phases is important for use of the summer seasons. Field reconnaissance required for Phase I can still be done during the 1977 summer. If Phase IIA starts early in 1978, the required drilling and other field exploration can be mobilized for the 1978 summer. A significant delay in the start of either phase will cost at least one summer season.

Phases I and IIA can be combined, if the State should so desire, with a less formal interim report to be submitted at the end of 1977 when the initial project has been identified. However, the attached Proposal for Phase I only is intended to minimize the initial commitment of funds and to provide a more substantial basis by January 1978 for the budgeting of the subsequent phases.

The scope of work shown includes a Master Plan for ultimate development of the Susitna River and selection of the most favorable initial project. It also provides for a preliminary comparison of the initial Susitna Project with other potential sources of power available to the Railbelt area. This latter comparison could be omitted from Phase I, if the State so wishes. In any case, a thorough comparison with other sources of energy will be essential in Phases IIA and IIB.

Organization for Study

To carry out the studies, we propose to use our senior and most experienced people for the key aspects that require creative professional services.

We will also assign experienced men as overall Project Director, Chicago Project Manager, and Alaska Resident Manager to coordinate the work both in Chicago and in Alaska. We will maintain constant liaison with the Alaska authorities.

A list of personnel to be assigned to the studies is contained in our Proposal, together with their responsibilities and personal experience.

Harza Engineering Company

By now you are familiar with our firm, its capabilities, and its experience. Some of this information is repeated with this Proposal.

We wish to emphasize Harza's independent character. The firm is wholly owned by full-time employees and has no affiliation with any constructors, manufacturers, financial institutions, or governmental agencies. This professional independence enables us to serve in our Client's sole interest without distracting influences.

Alaskan Associate

We have found it generally advantageous for the client if we are able to utilize the abilities of a local consulting firm in carrying out assignments. In this project we anticipate requiring the assistance of one or more Alaskan firms. Presently we have arranged with KPFF Consulting Engineers, Anchorage to make available to the project the services of Frankland Smith. KPFF and Harza have been acquainted for about 10 years and Frankland Smith is known personally by the officers of Harza. Mr. Smith was Project Manager for the City of Tacoma for hydroelectric projects on the Cowlitz River which were designed by Harza. We believe that his knowledge and ability will be of particular value in the project.

Conclusion

We believe that the study described in the attached Proposal is needed now and is appropriate to the orderly and successful development of the Susitna

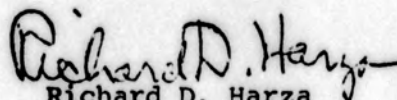
Mr. W. C. McConkey, Director
May 24, 1977
Page Eight

River. To make use of the 1977 summer season, the study should be started soon.

For this type of appraisal of a non-Federally financed hydroelectric development, Harza Engineering Company is well qualified. To our knowledge, our experience in such projects is not matched by private firms or government agencies in the United States.

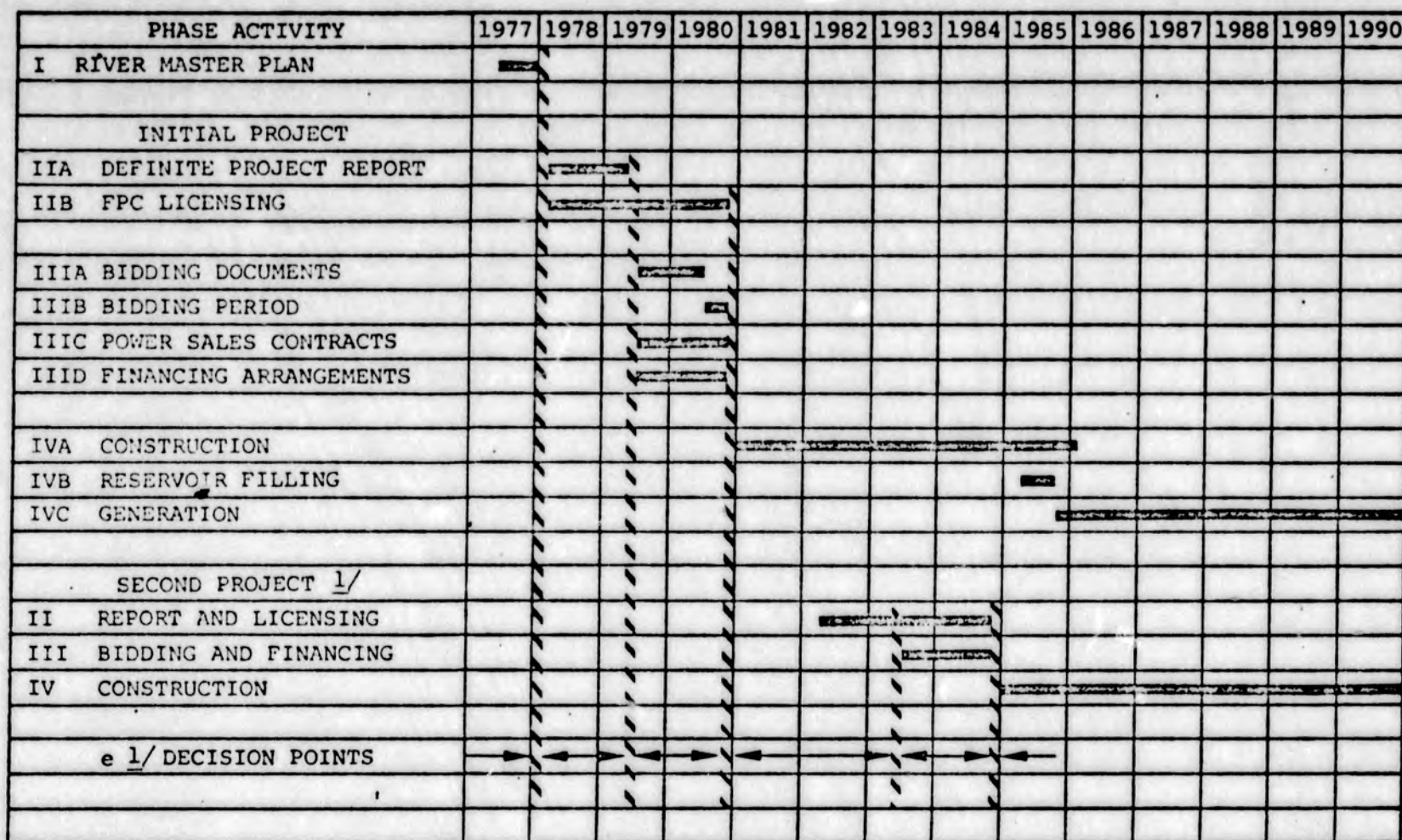
We will be pleased to discuss any element of our Proposal at your convenience.

Very truly yours,


Richard D. Harza
Vice President

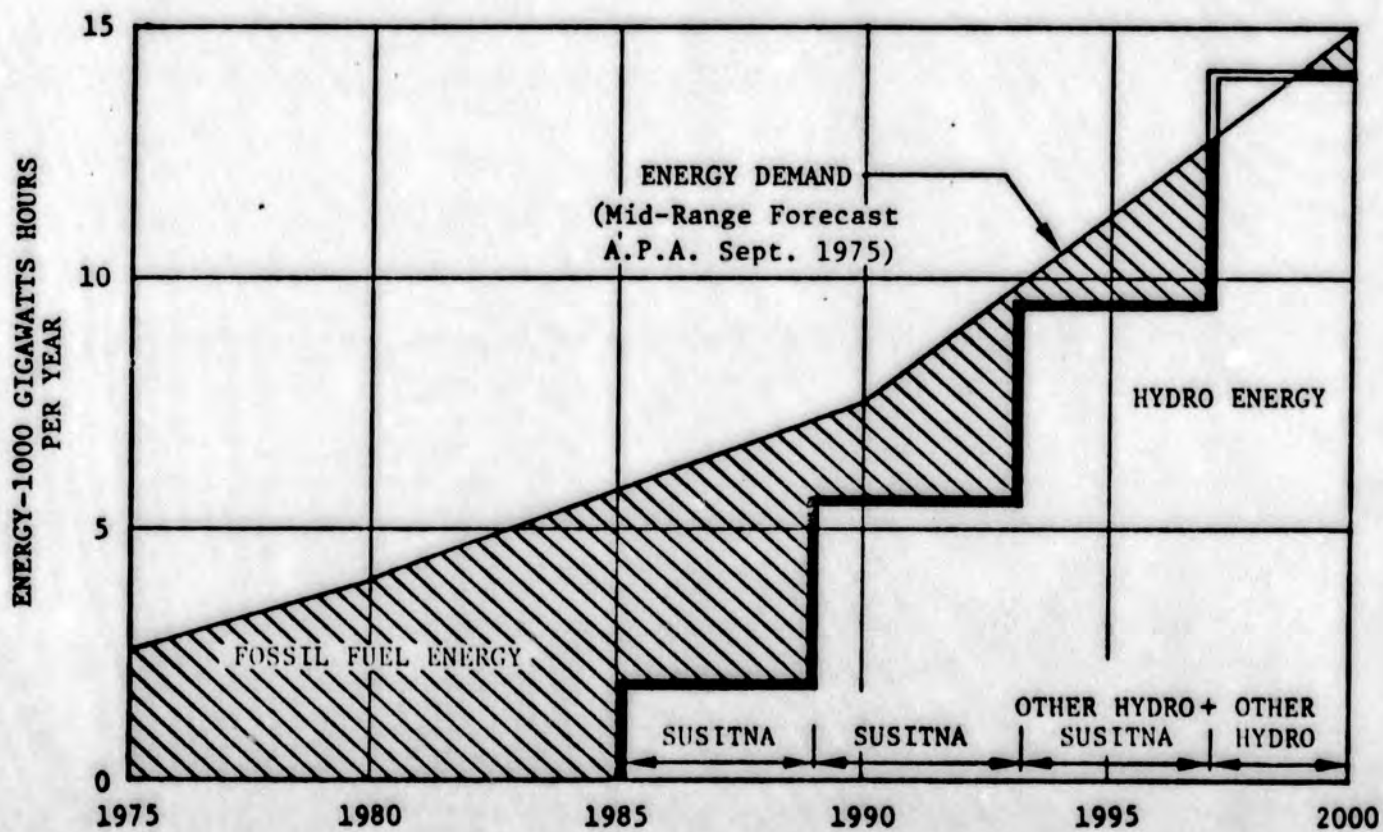
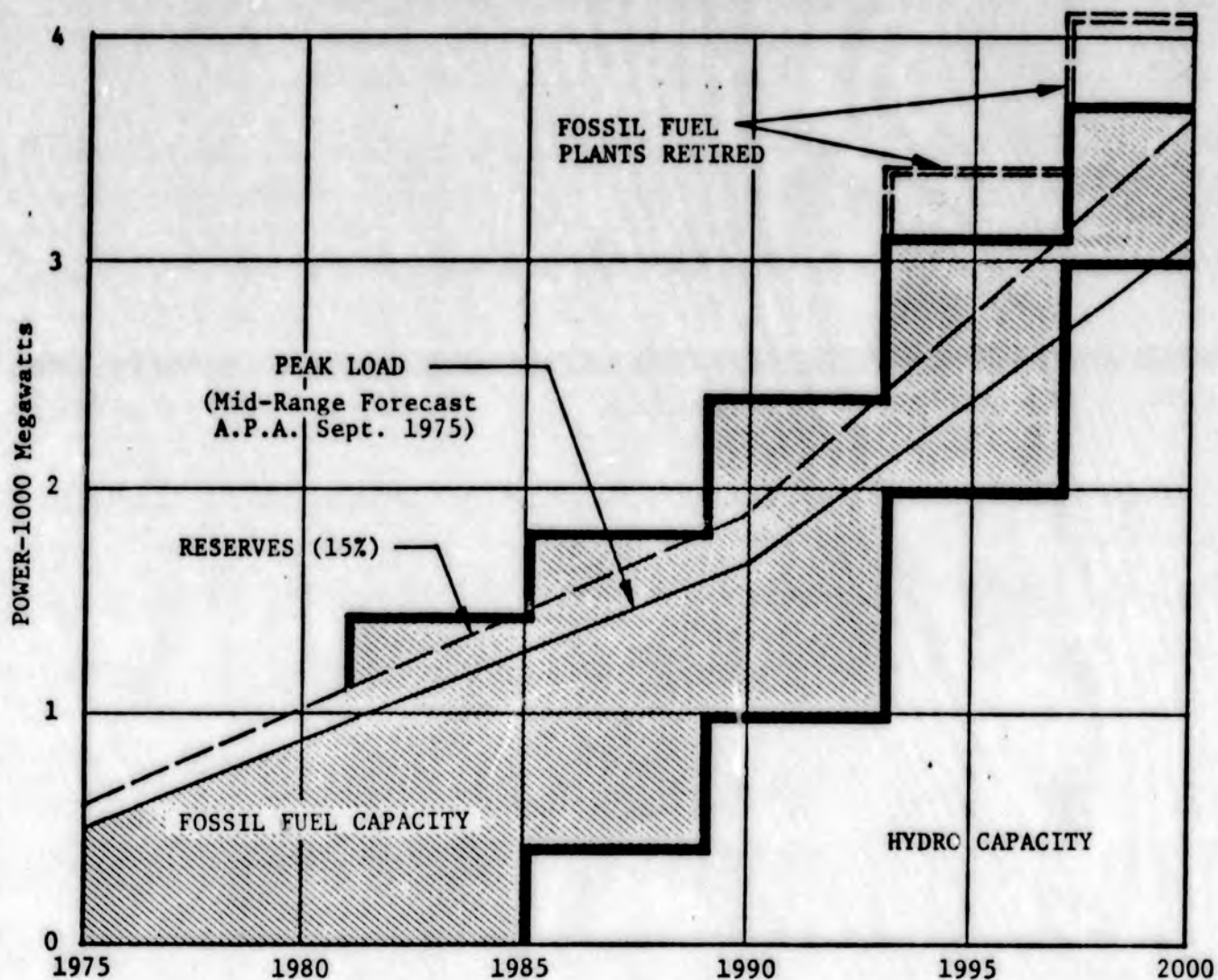
Enclosures: Exhibit A
Proposal

EXHIBIT A

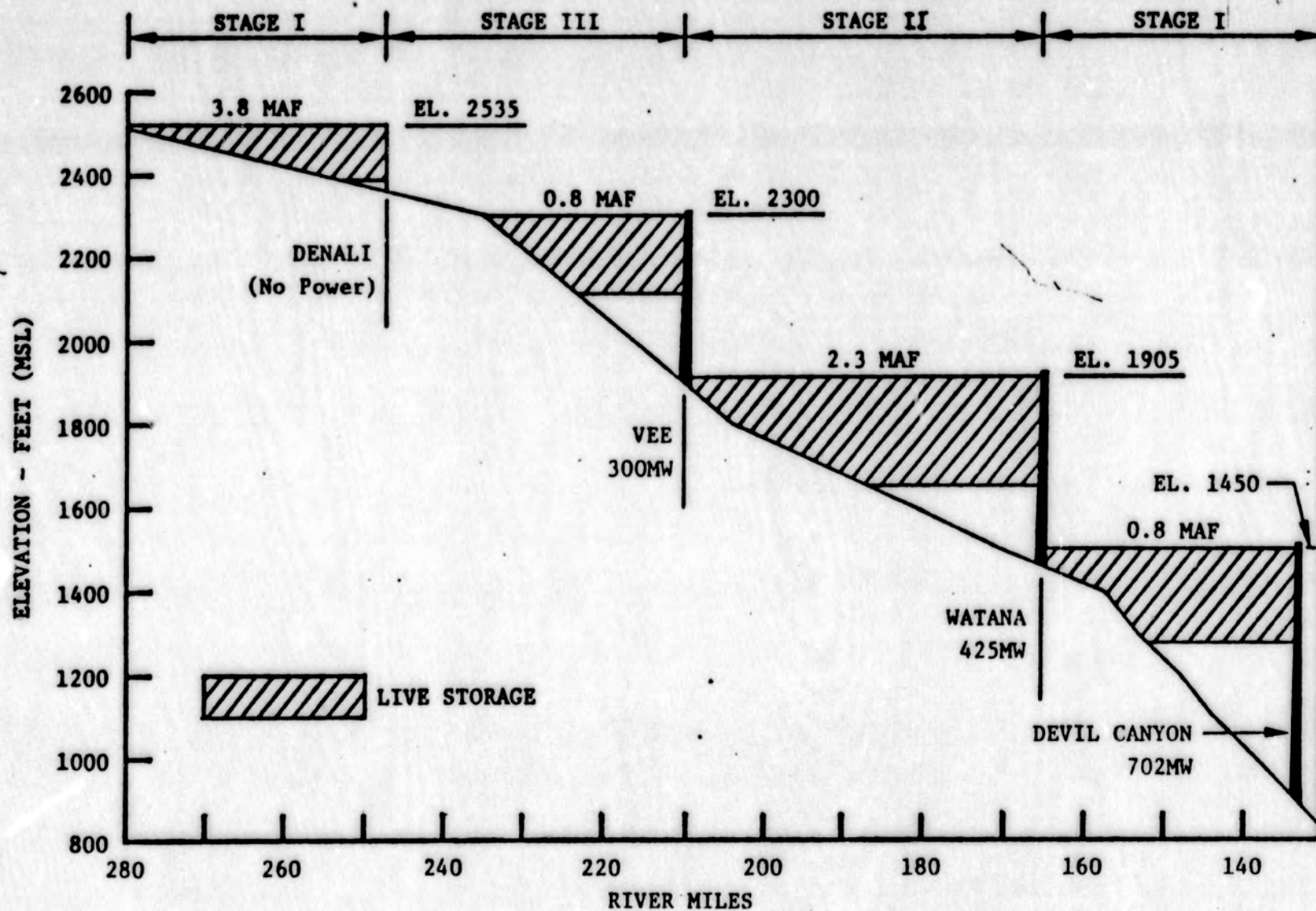


^{1/} Second project can be advanced if needed sooner.

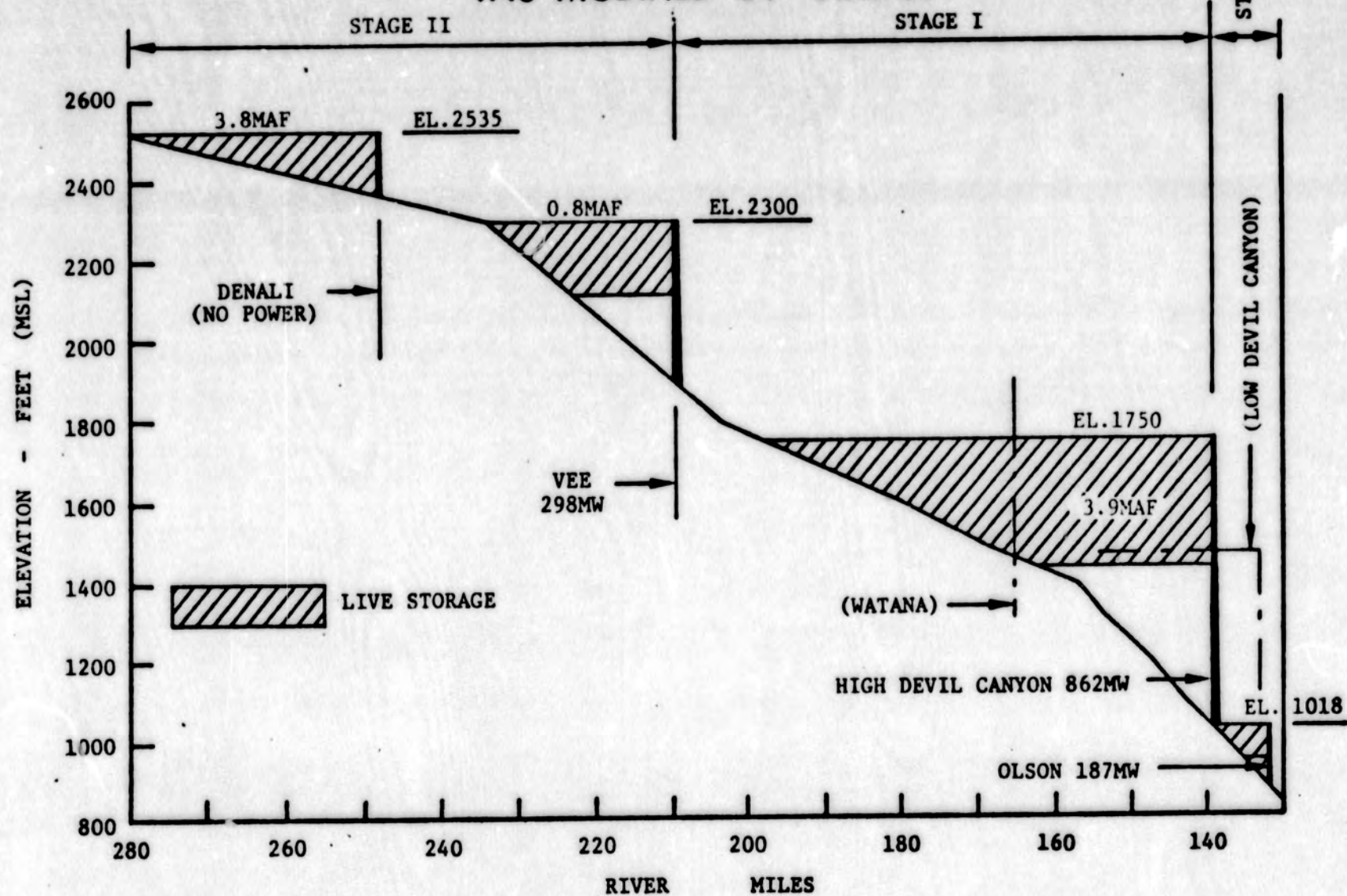
SOUTH CENTRAL RAILBELT LOADS AND RESOURCES



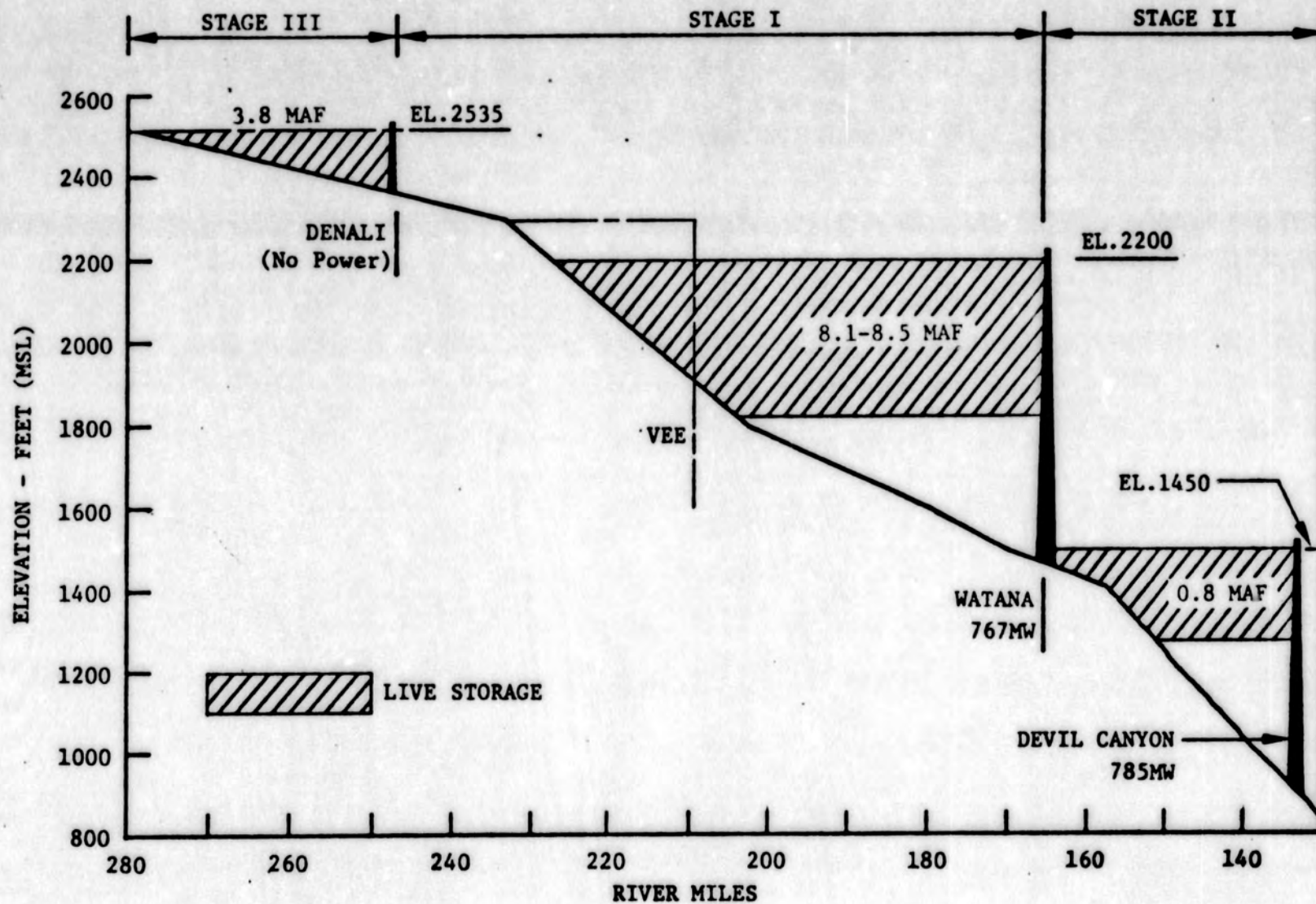
UPPER SUSITNA RIVER USBR DEVELOPMENT



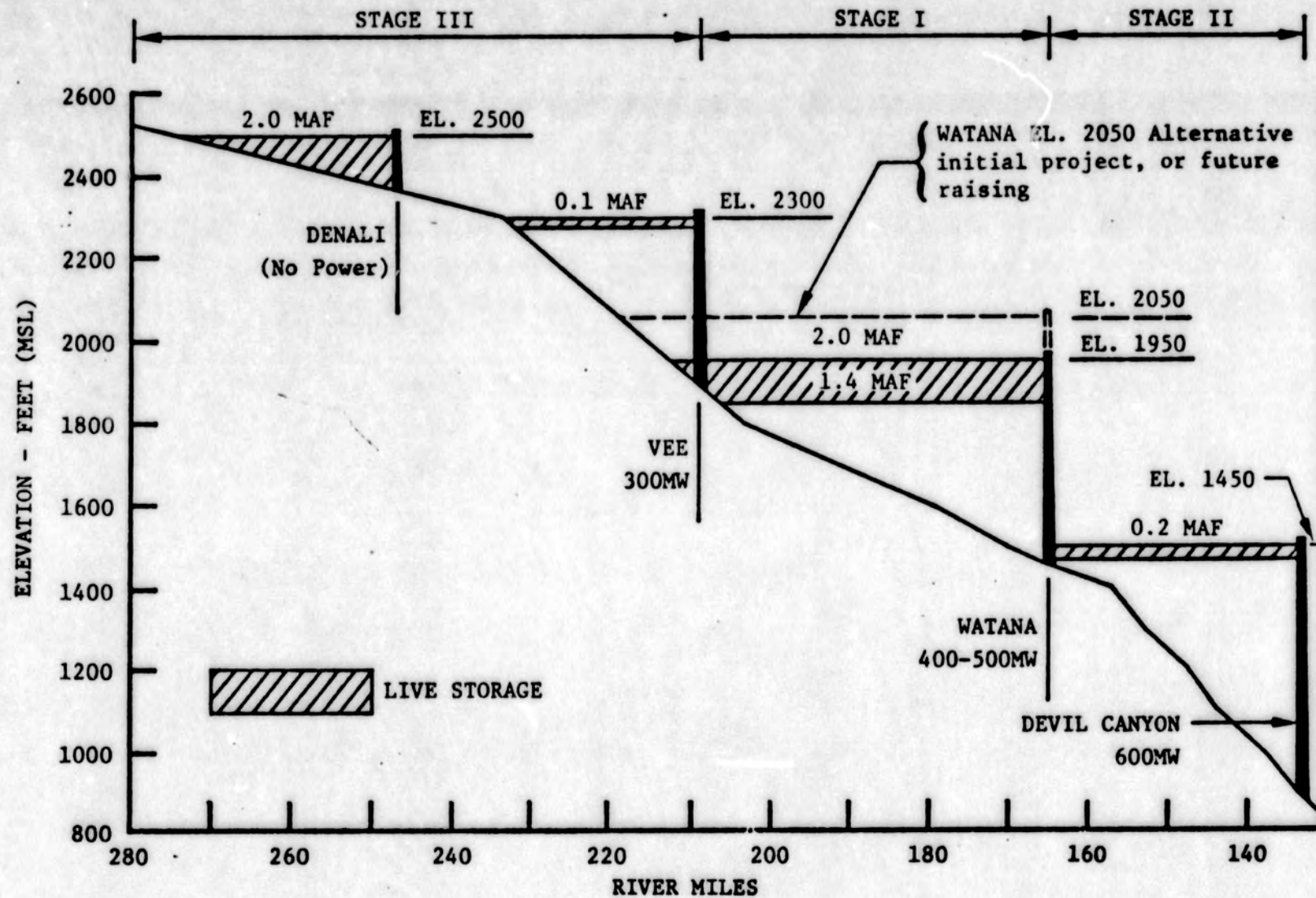
UPPER SUSITNA RIVER KAISER DEVELOPMENT (AS MODIFIED BY CORPS)



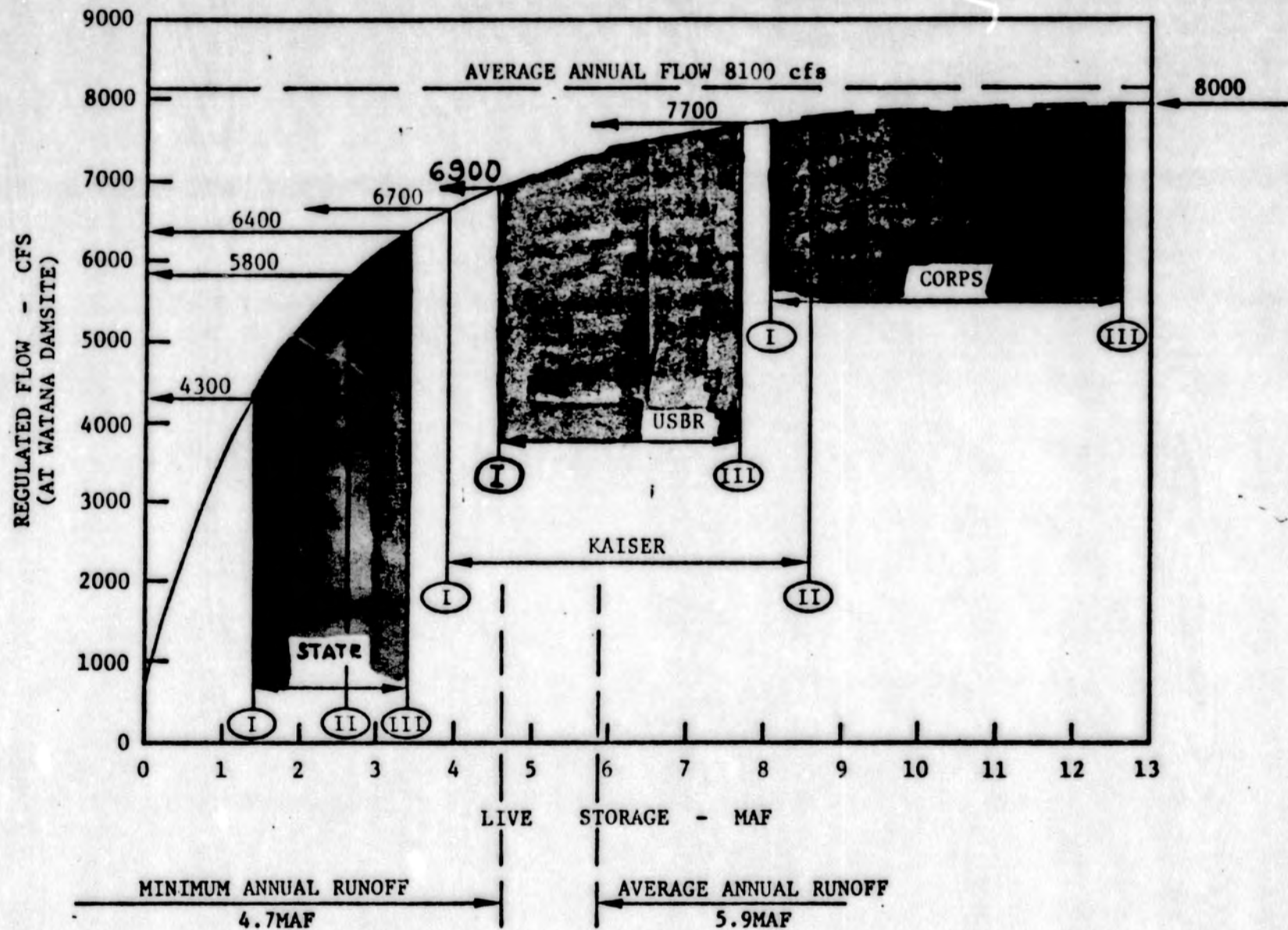
UPPER SUSITNA RIVER CORPS DEVELOPMENT



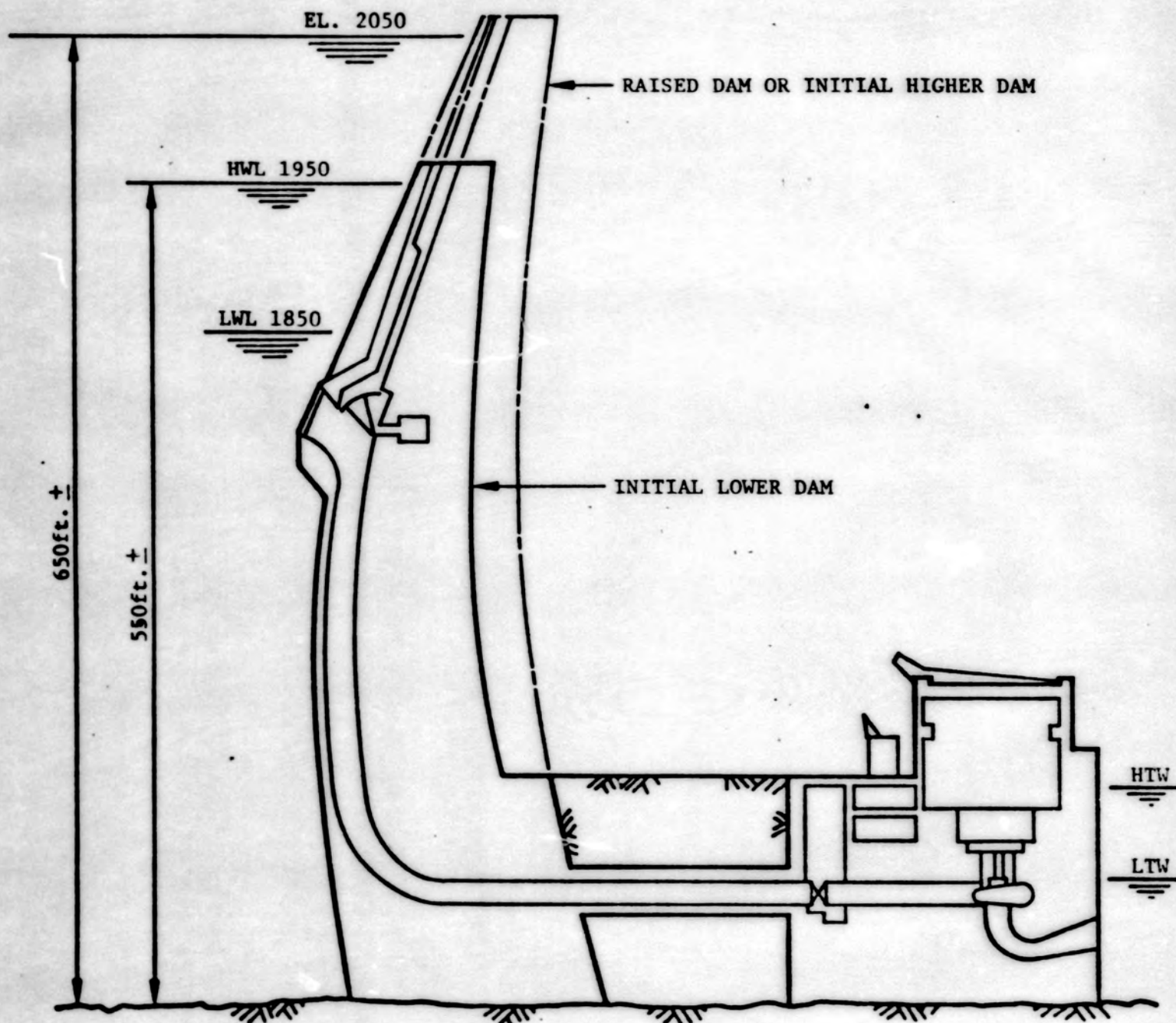
UPPER SUSITNA RIVER STATE DEVELOPMENT (SUGGESTED)



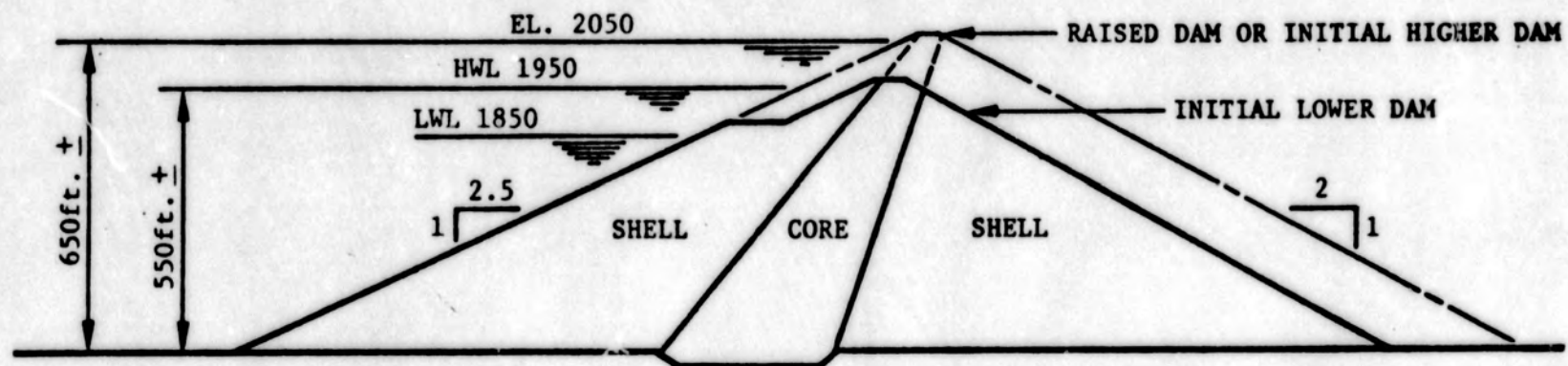
UPPER SUSITNA RIVER COMPARISON OF DEVELOPMENTS LIVE STORAGE



WATANA PROJECT STATE DEVELOPMENT CONCRETE ARCH DAM



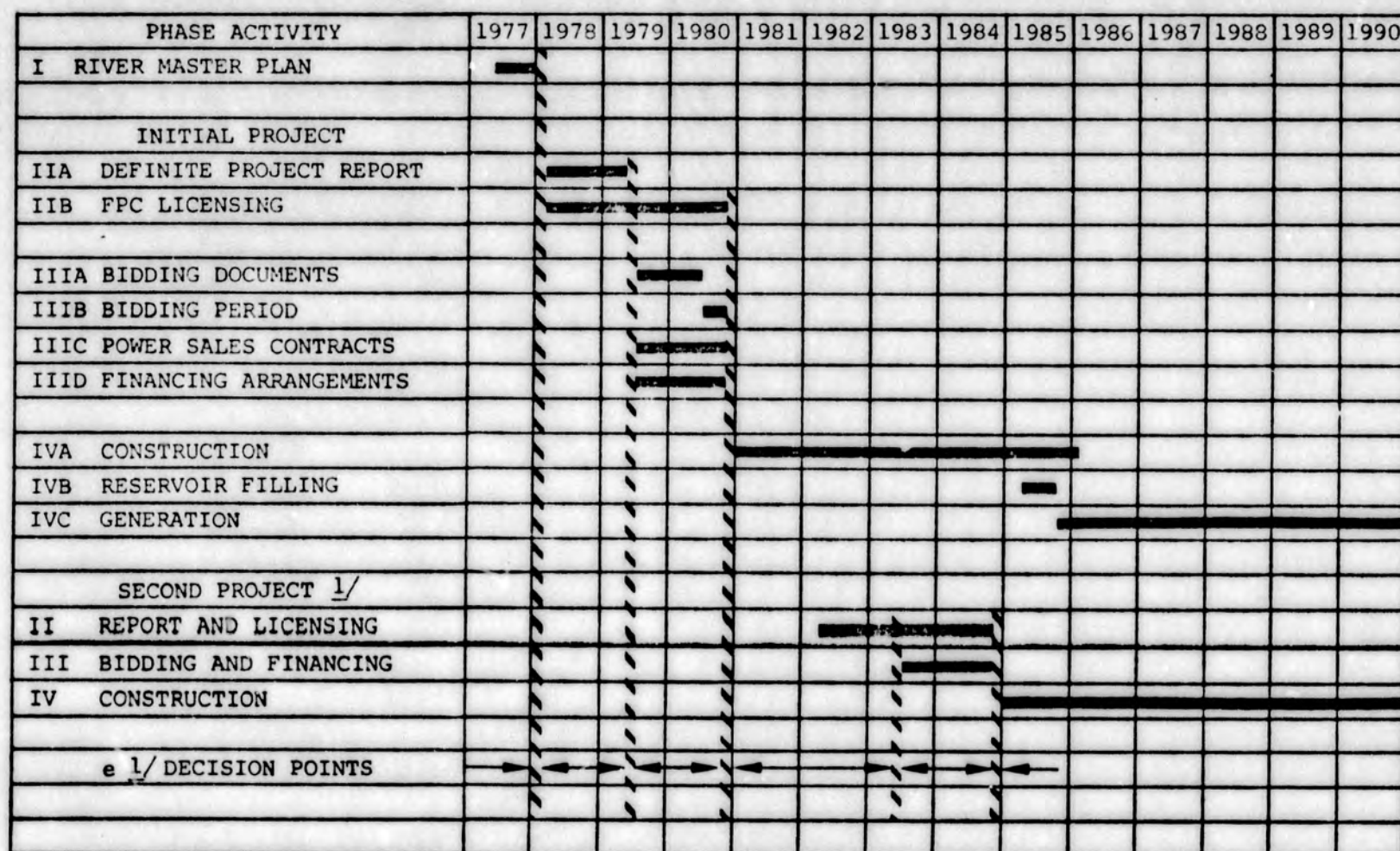
WATANA PROJECT
STATE DEVELOPMENT
ROCKFILL DAM



COMPARISON OF DEVELOPMENTS

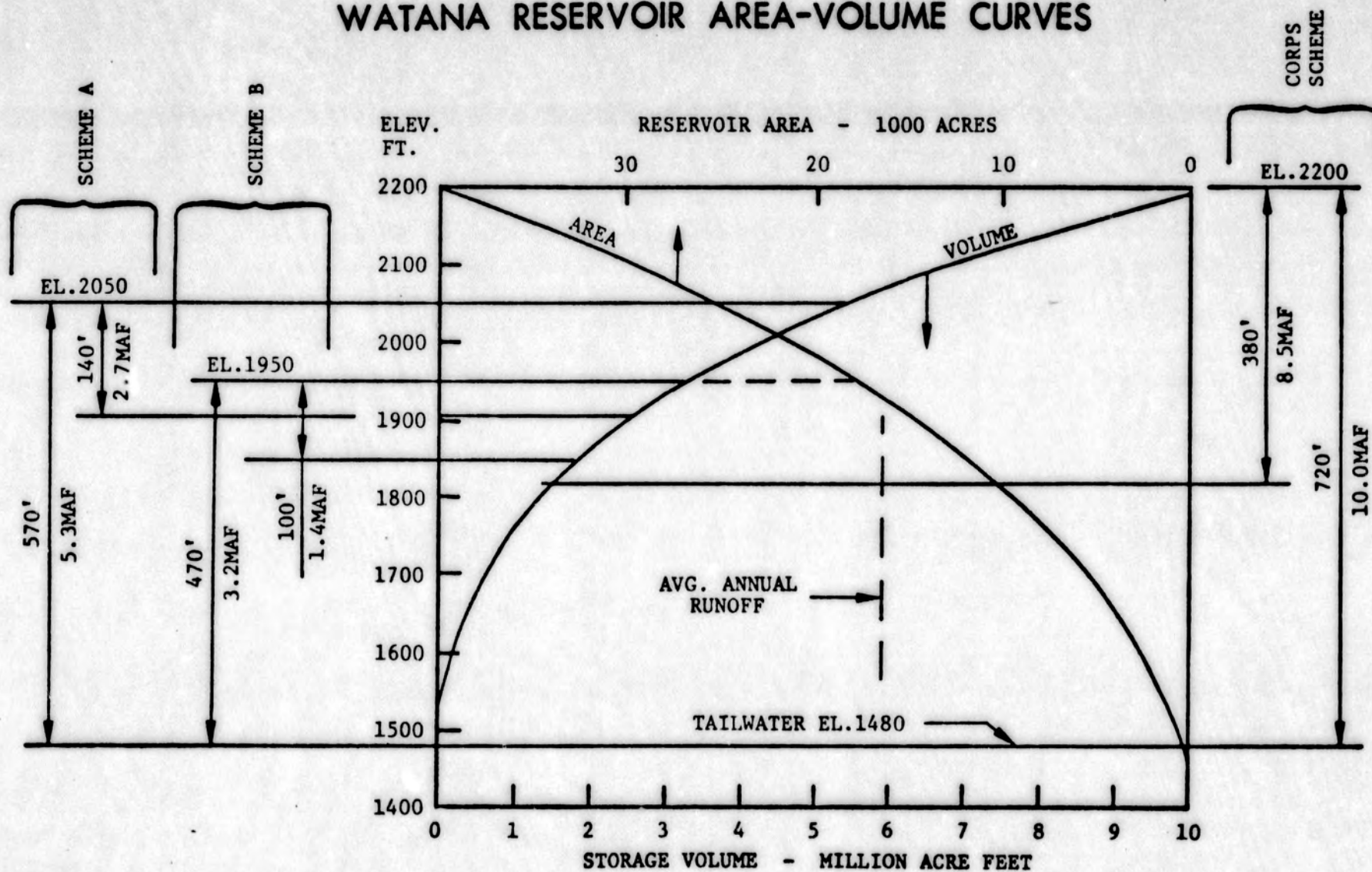
	STAGE I				ULTIMATE			
	USBR	KAISER	CORPS	STATE	USBR	KAISER	CORPS	STATE
POWER - MW	425	862	767	400	1,427	1,347	1,552	1,300
ENERGY - Gwh yr.	2,031	4,456	3,405	2,000	6,881	6,511	6,911	7,000
LIVE STORAGE - MAF	4.6	3.9	8.1	1.4	7.7	8.6	12.7	3.4
TOTAL STORAGE - MAF	5.3	4.7	10.0	3.2	8.9	9.6	15.3	7.6
RESERVOIR AREA (1000 Acres)	61	23	40	18	84	86	101	74
DAMS (Height in Feet)								
Denali	268	-	-	-	268	268	268	233
Vee	-	-	-	-	455	455	-	455
Watana	-	-	810	560	515	-	810	560
Devil Canyon	635	810	-	-	635	810	635	635
Olson	-	-	-	-	-	145	-	-
TOTAL	903	810	810	560	1,873	1,678	1,713	1,883

EXHIBIT A



^{1/} Second project can be advanced if needed sooner.

WATANA RESERVOIR AREA-VOLUME CURVES



ALASKA POWER AUTHORITY

333 WEST 4th AVENUE - SUITE 31 - ANCHORAGE, ALASKA 99501

Phone: (907) 277-7641
(907) 276-2715

April 7, 1980

Mr. Mark Wittow
Pouch V
Juneau, Alaska 99811

Dear Mark:

I want to be sure that you knew that the first round of community meetings for the Susitna hydroelectric plan of study will be held next week. I have enclosed a copy of a flyer for the meetings. Please pass it around or post it to help advertise the meeting.

You are especially invited to join us at the meetings because of the work you are doing for the Power Alternatives Study Committee.

An agenda is attached. Of particular interest is the part describing the process by which alternatives to Susitna will be examined and analyzed, and the points at which the public is involved.

We are making every effort possible to give the public ample opportunity to make comments, especially in the early stages of the study when additions or changes to the plan of study are easier to accommodate.

I also want you to know that I am receiving copies of your work and will be using some of it as I prepare information for the general public throughout this year. I will be checking with Mark Wittow to make sure that I am referencing your work accurately.

Reserve copies of the plan of study are available at libraries in these areas: Anchorage--Z. J. Loussac, Alaska Resources Library, the University of Alaska Library, and Eagle River; Fairbanks--Noel Wien and Elmer E. Samson at U of A; Kenai Peninsula--Seward, Homer, and Kenai; Mat-Su Borough--Palmer, Wasilla, Willow and Talkeetna. The Alaska Resources Library and Rasmuson Library also have one copy each that may be taken from the library.

I hope to see you at one of the meetings next week.

Sincerely,



Nancy Blum

Director

Public Participation Program

Enclosures

ALASKA POWER AUTHORITY

333 WEST 4th AVENUE - SUITE 31 - ANCHORAGE, ALASKA 99501

Phone: (907) 277-7641
(907) 276-2715

April 25, 1980

The Honorable Hugh Malone
Alaska State Legislature
Pouch V
Juneau, Alaska 99811

Dear Representative Malone:

The Power Authority's Susitna Hydroelectric Project Plan of Study (POS), prepared by Acres American Incorporated, has now had the benefit of substantial review. Comments have been received during a series of four public meetings held throughout the Railbelt during the week of April 14, 1980; they have been received from Arlon R. Tussing & Associates in the form of a draft report for House Power Alternatives Committee; and others have been received directly from agencies and individuals who have studied the POS.

The Tussing Report, along with many of the other comments, address the selection of the preferred power generation alternatives in the face of uncertainty and risk. The original plan of study acknowledged this high level of uncertainty and the resultant difficulties in recommending a single plan. At the same time, the POS was also sensitive to the somewhat conflicting goal of economizing on study cost. The weighing of these and other factors resulted in an approach whereby all alternatives would be studied for one year after which a single plan would be recommended for additional study. This plan, if it included the Susitna Project, would then be the subject of intensified detailed feasibility investigations. At the completion of the feasibility studies, the earlier decision would be reassessed in light of the more detailed information gathered during the second year. If the earlier decision was confirmed, then the Federal Energy Regulatory Commission license application would be prepared and submitted.

A more cautious and more costly approach has been suggested by Mr. Tussing. He suggests detailed assessments of several of the more promising alternatives before the recommended plan is selected. Thus, detailed marketing, financing, cost, scheduling and risk assessments would be conducted on a number of alternatives rather than on the one alternative plan that emerged from the first year alternatives study.

A plan of study revision in keeping with Tussing's suggestions has been prepared by Acres American at the request of the Power Authority. The Go/No Go decision points in the POS relate to continuation of study efforts and not construction of any project. The revised plan now has two such decision points relating specifically to assessment of alternatives, one in early 1981 much as originally proposed and a second in the Spring of 1982. The first decision was and still is intended to provide some assurance that continuation

The Honorable Hugh Malone
April 25, 1980
Page Two

of Susitna Project studies are, or are not, likely to be worthwhile. In addition, it would now serve to identify several promising power generation plans. The second decision would provide the more detailed comparison of the several more promising alternative plans such that a decision could be made on whether to proceed with licensing the project. In the event that a decision in favor of Susitna licensing was forthcoming, the revised approach would not impact license application submittal timing. In fact, it would likely strengthen the defensibility of the license application and thereby possibly accelerate eventual licensing. The additional cost associated with this revised approach is \$1,365,000. A summary of changes to the POS reflecting the revised approach is attached.

While the Tussing Report contains a number of valuable suggestions, there are also a number of inaccuracies that should be noted. First of all, there is an apparent misconception about the purpose of the first decision. It is not to decide "whether or not the state should develop the hydropower potential of the Susitna River" (Tussing, page 12). Instead, it is to decide whether or not the feasibility studies of the project should be continued. Thus, the statement that "the decision regarding Susitna's viability will not be based on either its economic or financial feasibility" (Tussing, page 12) is grossly in error.

With regard to load forecasting, Tussing claims that the POS ignores load management techniques (page 17). In fact, the POS specifically calls for the consideration of such techniques in Subtask 1.03.

Despite such inaccuracies, the suggestions provided by Mr. Tussing and others to more completely and systematically deal with uncertainty and risk in choosing among different power generation strategies is worthy of your consideration for additional funding.

Sincerely,



Eric P. Yould
Executive Director

Attachment:
as noted

ATTACHMENT 1

SUMMARY OF CHANGES RECOMMENDED TO INCREASE LEVEL OF EFFORT
FOR ALTERNATIVE POWER STUDIES (\$ x 1000)

Subtask	Original POS Value	Changes Associated With Recommendation Number (4)								Other Recommended Changes	New Value	Remarks
		1	2	3	4	5	6	7	8			
ISER Work	\$ 60 ⁽¹⁾								+100		\$160	Provides funds for major updates, especially after census data is in
1.01 - Review ISER	35.2								+ 50		85.2	Permits continuing interaction with ISER work including the formulation of a place for improving the data base for future energy and load forecasting
1.02 - Forecasting Peak Load Demand	47.7	+100									147.7	Provides separate peak load and load duration for each load management strategy at each demand level
1.03 - Identify Alternatives	96.3	+100										Provides detailed analysis of load management strategy and considers interrelationship with conservation strategy. Develops energy conservation in more detail as an alternative.
				+100							296.3	Provides for refined site-specific data to assess energy resource availability, technical and commercial use availability, expected fuel dependency, preliminary safety, health and environmental concerns, costs per unit of electricity supplied, schedules and input to risk analyses.
1.04 - OGP Analyses and Expansion Sequence	30.0								+ 70		100.0	Significant increases due to: (1) More alternatives to be evaluated in-depth and screened through OGP Program (2) Decentralized scenario added (3) Imposition of three load management strategies on each demand level (4) Reiterate when necessary using additional OGP analyses and Delphi method when appropriate.
05 - Impact Assessments	138.0									+150.0	288.0	Balances more detail on study of other factors (cost, risk, site specificity, finance, etc.) Has to be expanded to additional scenarios (Decentralized scenario, three load management strategies).

NOTE:

Tussing's Recommendation #7 is incorporated as an integral part of the Revised Study Approach.

ATTACHMENT 1 (Cont'd)

SUMMARY OF CHANGES RECOMMENDED TO INCREASE LEVEL OF EFFORT
FOR ALTERNATIVE POWER STUDIES (\$ x 1000)

Subtask	Original POS Value	Changes Associated With ⁽⁴⁾ Recommendation Number							Other Recommended Changes	New Value	Remarks
		1	2	3	4	5	6	8			
1.06 - Report	12		+ 25				+ 50			87.0	\$50k for interim report and updates. \$25k to account for reporting on broader scope, more alternatives, etc.
6.01 - 6.08 (Susitna alts)	354.6		+200							554.6	Develop more details on cost and schedule for all Susitna alternatives (not just "selected" scheme)
11.01, .02 - Project Overview and Internal Reports	\$ 191.1 ⁽²⁾							+ 50 ⁽³⁾		\$241.1	Although Task 11 is still under discussion with APA, changes noted here are based on effect of Tussing recs on plan as currently in POS
11.03 - Alternative Risk Analysis	17.5			+ 50 (3)						67.5	Major increase in number of expansion sequences to be considered requires corresponding increase in risk analysis
11.04 - Susitna Risk Analysis	24.5		+ 50 (3)							74.5	Risk analysis would now be done on all Susitna alternatives (not just one)
11.12 - Preliminary Marketing and Financial Studies	(New)				+ 75					75	Marketing and Financing studies were to be made only for Susitna and only if selected. More detail is now sought earlier per Mr. Tussing's comment
1.07 - Power Study Panel	(New)					+ 75				75	Adds subjective probability factors permitting increase in information available at review points. Adds objectivity factor to eliminate potential bias
* (0)											
TOTALS	1006.9	200	275	150	75	75	120	200	150	2251.9	

* (0) Does not include \$120,000 for changes to the Public Participation Program needed to accommodate the revised approach.

(1) The ISER work is funded in part by APA (\$30) and in part by the Legislature (\$30)

(2) Although this is the POS value for subtasks 11.01 and 11.02, the work involved is only partially in support of power studies.

(3) These values may not require full additional funding by the Legislature if pending proposed Task 11 changes are accepted by APA.

(4) Numbers above each column are keyed to numbered recommendations on pp 22-23 of the Tussing report.



SELBERG & WYCOFF
ARCHITECTS, URBAN DESIGNERS, & PLANNERS

post office box 1191
wasilla, alaska 99687
(907) 376-5046

April 15, 1980

Mr. Mark Wittow
State of Alaska
House Power Alternatives Committee
Capitol Building
Juneau, Alaska 99811

Dear Sir:

Please send me Rich Seifert's Solar
Component Study. Also we would be interested
in receiving any additional studies on solar
energy in Alaska.

Yours truly

Peggy Behnke

Peggy Behnke
Selberg & Wycoff, Architects

Sent
4/28



Alaska State Legislature

House of Representatives

POWER ALTERNATIVES STUDY COMMITTEE

Official Business

Pouch V
State Capitol
Juneau, Alaska 99811

April 21, 1980

James Landman
Acres American
2207 Spenard Dr.
Anchorage, Alaska 99503

Dear James:

Enclosed is a copy of a report written for our committee by Arlon Tussing and Assoc. The report analyzes the Acres Susitna Plan of Study, and makes a number of recommendations for changes in Task I (see Chapter II). I would appreciate receiving your comments on the report as soon as possible, especially as they pertain to your work.

Please let me know if you have any questions.

Sincerely,

A handwritten signature in cursive script that reads "Mark Wittow".

Mark Wittow
Study Coordinator

Enclosures

Pouch V
Juneau, Alaska 99811

Rep. Terry Gardiner
Speaker of the House
Pouch V
Juneau, Alaska 99811

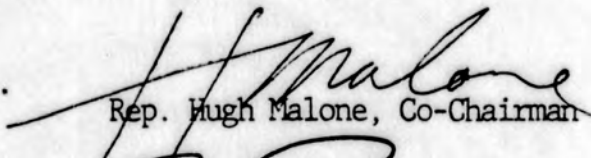
April 15, 1980

Dear Terry:

Chapter 76 of SLA 1979 mandated the completion of a study which discussed the assumptions of the Susitna Hydroelectric Project and the feasibility of various alternatives for power generation in the Railbelt such as coal, natural gas and small hydro. The appropriation was directed to the Legislative Research Division; a report was to be submitted by April 15, 1980.

As you know, the Legislative Research Division was dissolved shortly after Chapter 76 was enacted. The House Power Alternatives Study Committee was established by the Legislative Council in August 1979 to oversee the study. We offer the following report to satisfy the April 15 deadline set out in Chapter 76. A final report will be available by May 20, 1980.

Sincerely,



Rep. Hugh Malone, Co-Chairman



Rep. Brian Rogers, Co-Chairman

Attachments:

1. Power Market Demand Study (by ISER, draft)
2. Review of Demand Forecasting (Tuck, draft)
3. Comentary on ISER work (Energy Probe, draft)
4. End Uses of Energy in the Railbelt (Ak. Center for Policy Studies)
5. Potential for Energy Conservation in the Railbelt (Center)
6. Alternative Energy Potential (Fryer and Assoc.)
7. Susitna Geotechnical Evalution (Dynamic Research)
8. January 30, 1980 Status Report

9. Background and History - Susitna and Railbelt Power (Tussing and Assoc.)
10. Solar Energy Potential (Center)

To be completed:

1. Analysis of Management, Policy and Financial Issues for Railbelt Power Generation (Tussing and Assoc.)
2. Potential of Natural Gas for Power Generation (G. Erickson)
3. Potential of Coal for Power Generation (G. Erickson)
4. Policy and Management Issues for Energy Conservation and Alternative Energy (Center)



SUSITNA HYDROELECTRIC PROJECT

March 5, 1980
P5700.17.04
T000.17A

House Power Alternatives Committee
Pouch V
Juneau, Alaska 99811

Attention: Mr. Mark Wittow

Dear Mark,

Alaska Federation For Community
Self Reliance Draft Report
on Energy Conservation

Thank you for the opportunity to comment upon the Alaska Federation For Community Self Reliance's (AFCSR) Draft Report on Energy Conservation. My remarks are enclosed as a separate document.

My basic concern about this report is its technical content. In many cases, numbers and statistics are used improperly; there are a few errors of fact and several inconsistencies throughout the text. References are named which could be accessed by those sufficiently interested, but it would assist most readers if more background material were included. The conservation options should be carefully and completely explained.

We here at Acres are pleased to see this type of work being conducted. It is our general conclusion that many of the results attributed to conservation may be a bit optimistic. However, the paper is headed in the right direction. More work on the subject of conservation and its potential benefits is greatly needed in the face of rapidly rising fuel costs and the rapid depletion of many of our most conveniently accessible fuel resources. We hope that your committee will see fit to continue funding more studies and more detailed studies on this vital topic.

I am enclosing three copies each of this cover letter and my comments for your use. Please pass on at least one set to AFCSR. If either you or they have any questions or comments, please do not hesitate to contact me.

Very truly yours,

James K. Landman, P.E.
Coordinator, Power Systems Studies

JKL/ja

ACRES AMERICAN INCORPORATED

Consulting Engineers
2207 Spenard Road
Anchorage, Alaska 99503

Telephone 907 276-4888 Telex 91-6423 ACRES BUF

Other Offices: Columbia, MD: Pittsburgh, PA: Raleigh, NC: Washington, DC: Buffalo, NY

House Power Alternatives Committee - 2

cc: Alaska Power Authority
333 West 4th Street, Suite 31
Anchorage, Alaska 99501

Attn: Mr. R. Mohn

Woodward-Clyde Consultants, Inc.
Three Embarcadero Center
Suite 700
San Francisco, CA 94111

Attn: Mr. C. W. Kirkwood



SUSITNA HYDROELECTRIC PROJECT

March 5, 1980
P5700.17.04
T000.17A

House Power Alternatives Committee
Pouch V
Juneau, Alaska 99811

Attention: Mr. Mark Wittow

Dear Mark,

Alaska Federation For Community
Self Reliance Draft Report
on Energy Conservation

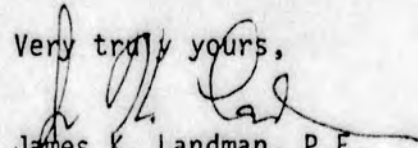
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Very truly yours,


James K. Landman, P.E.
Coordinator, Power Systems Studies

JKL/ja

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Telephone 907 276-4888 Telex 91-6423 ACRES BUF

Other Offices: Columbia, MD; Pittsburgh, PA; Raleigh, NC; Washington, DC; Buffalo, NY

House Power Alternatives Committee - 2

cc: Alaska Power Authority
333 West 4th Street, Suite 31
Anchorage, Alaska 99501

Attn: Mr. R. Mohn

Woodward-Clyde Consultants, Inc.
Three Embarcadero Center
Suite 700
San Fransisco, CA 94111

Attn: Mr. C. W. Kirkwood

COMMENTS ON ALASKA FEDERATION FOR
COMMUNITY SELF RELIANCE DOCUMENT
CONCERNING ENERGY CONSERVATION

1. Outline - Sections VI and VII seem to be missing from my copy of this draft.
2. Page 1 - Sweden, England, and New England have been used as examples where "energy conservation programs have been instituted due to rising costs." Why is the only documentation (page 2) of the effectiveness of these programs given that of the British experience? More detailed information on each of these programs should be provided: their methods and their results.
3. Page 1 - With regards to the implications of the second paragraph, it should be noted that our past energy conservation practices (or lack thereof) were based almost solely on economics. Nothing has taken place to change this. The economics of energy sources have themselves changed, and changed quite rapidly lately, but the major force which will drive people to change their energy use patterns will continue to be cost.
4. Page 1 - The first four sentences of the third paragraph are quite liberal interpretations of the second law of thermodynamics. The second law is normally expressed in terms of devices such as turbines or piston engines which rely upon temperature differences for their operation.
5. Page 1 - The fifth sentence of the third paragraph implies that we are, or were, in a figurative way, killing mosquitoes with our energy cannons. This is an overstatement of the facts and nothing in the remainder of the report shows that such a practice has ever occurred. The energy-saving steps mentioned throughout this document show how many small steps can add up to significant savings of energy.
6. Page 2 - It should be made clear what Mr. Leach used as his basis for computing the U.K.'s GNP growth rate. If absolute pound sterling were used, the figures are deceptive due to the effect of inflation. If the figures are tied to the value of the pound of a given year, this should be so noted.
7. Page 2 - It would be statistically improper to use the single example of a three year sample of British data to discredit the long-held precept that energy use is tied to economic activity. Such an undertaking is well beyond the scope of this paper.
8. Page 2 - The second paragraph of this page needs some further explanation. Mr. Oliver's paper has not been made available, but it is doubtful that the claim of cost savings of a factor of six could stand close scrutiny. If these claims are accurate, the authors should attempt to explain why Mr. Oliver's proposals have not been implemented earlier. Are the English people not interested in saving money? Is there a governmental/industrial conspiracy to suppress the implementation of "soft" technologies?
9. Page 2 - The third paragraph should be revised to point out that it is economics that now makes it "more cost effective to adopt conservation technologies."

10. Page 2 - The "point" of the third paragraph may be a bit off the mark with regard to the timing of resource development. It may be successfully argued by some that we should have spent more time and effort in the past to develop our renewable resources such as solar, wind, hydro, tidal, geothermal, and biomass. It may be wiser to suggest a parallel development of both renewable resources and conservation technologies.
11. Page 3 - The "evidence" offered to demonstrate that "Alaskans have the skills and ingenuity to develop (conservation) technologies" is weak. Your evidence demonstrates more that a thousand people showed interest, or at least curiosity, in the energy conference.
12. Page 3 - You should break down your figures to show what the DOE grants were to be used for. Many times, these grants are for development of small hydro sites or other electric generation sources. How does this apply to the point being made about conservation?
13. Page 3 - No reason is given for lumping the residential and commercial sectors together. This may not be an appropriate method of analysis, but that cannot be determined, since no mention of commercial building data is given in the paragraphs following. For instance, is it true, as the table purports, that fifteen percent of energy losses of homes and businesses are through windows and doors? Many businesses have both large areas of glass and outside doors which are open frequently. The consumption patterns for each type of building should be better defined before lumping them together.
14. Page 3 - With reference to implications of the second sentence of the final paragraph, are homes presently being built with some consideration of long-term operating costs?
15. Page 4 - The description of insulation installed in "most houses in the U.S." needs some clarification. Is this to be taken to mean that most houses in Minnesota have no more insulation than most houses in Miami?
16. Page 4 - In what way is the trend of home insulation changing? Are just new houses affected, or are existing homes being retrofit on a large scale?
17. Page 4 - Are "most" people really considering how to improve the energy efficiency of the housing stock? What data is there to back this up?
18. Page 5 - The definition of a typical house may need some clarification. Most houses in Anchorage do not have basements and are built on slabs. Houses in Anchorage are built with 2x4 walls. Those homes built with 2x6 outside walls are usually custom jobs.
19. Page 6 - This table is virtually impossible to interpret. What does "BTU/H-F" mean? Could this be the Btu's required each hour to heat the house in Fairbanks? The fourth column's figures add up to 547, not 810. The fifth column tabulates oil savings in terms of negative numbers. If these numbers are indeed savings, they should be positive. The figures in the sixth column add up to 436, not 648. What does the

future oil cost shown in the seventh column represent? Why does fuel escalate at 10% annually for six years? Does its price stop increasing then? The figures in this column add up to 791, not 1174. The figures in the three columns concerned with building costs are confusing. The first column seems to be a figure describing the cost of each item listed in column 1, on a \$/ft² basis. From this, it is understood that the ceiling above the first floor, at \$9.30/ft² should cost (\$9.30/ft² x (1152 ft²) = \$10714, close to the figure given. It is presumed, but not explicitly stated, that there are a certain justifiable number of square feet of doors, windows, walls, etc., used to multiply the \$/ft² figures to achieve the surface total costs. Data to back up these square footage figures should be provided. These figures are incomplete without providing data on costs of houses following conventional building practices. It is not abundantly clear how the figures in the "mortgage" column are derived. Our calculations show that an annual interest rate of 9.91% was used over 30 periods for all of the mortgage costs except for the wall foundation below grade and the insulated door, where 9.93% and 10.01% were used. (1) It is not possible to evaluate payback times or potential savings without knowledge of baseline costs.

20. Page 7 - It may be helpful to owners of existing homes if an analysis were included showing savings and payback periods which could be reasonably expected for retrofit insulation projects.
21. Page 7 - Carrying the ideas of the third paragraph to the extreme, could a homeowner expect zero fuel costs if the thermostats were reduced 33 1/3 degrees? This seems doubtful. It may be a good idea to mention that the 3 percent per degree savings applies to only the "comfort zone", about 60°F to 70°F.
22. Page 7 - In foundation insulation, why is "Blue Styrafoam" specified? Does it have different thermal properties than the white variety?
23. Page 8 - The analysis of savings realized by improving furnace burner efficiency from 65% to 75% is not correct. At a constant heat value of the fuel oil ("K") the 65% efficient burner will produce:

$$(1652 \text{ gal}) \times (\text{K Btu/gal}) \times (0.65) = 1074 \text{ K Btu}$$

To achieve this same amount of heat from a burner operating at 75% efficiency, we find that:

$$(1074 \text{ K Btu}) / ((\text{K Btu/gal}) \times (0.75)) = 1432 \text{ gal}$$

This represents a savings of 200 gallons of oil, or \$176.00 at a cost of \$0.80/gal. Figures should be included showing what this type of furnace tuneup would cost, and how often it must be repeated. Where do the efficiency figures used come from?

¹ Interest rates computed using a cash flow program found in "HP-41C Standard Applications Handbook", Hewlett-Packard Co., 1979. Thirty (30) periods were used, with periodic payments and initial present values as noted in the table.

24. Page 8 - The explanation of the heat recuperator's operating principle needs clarification. Without using mechanical energy, it is doubtful that "50% to 70% of the heat in the vented air" leaving the house could be recovered.
25. Page 8 - If the recuperator can indeed recover 50% to 70% of the house's vented air, how can a house using such a device lose "80% less heat through ventilation than a normal house?" It stands to reason that it would save 50% to 70% of a normal house's ventilation loss.
26. Page 8 - One Page 7, the figure of 0.3 CPH is used as typical for an Alaskan house. Here the range of 0.3 to 0.4 is given. The leakage rates used should be consistent.
27. Page 8 - A leakage rate of 0.3 to 0.4 CPH does not represent a change of warm air every two hours. A leakage rate of 0.4 CPH represents a change every 2 1/2 hours; 0.3 CPH represents a change every 3 1/3 hours.
28. Page 9 - It should be pointed out that in many newer commercial buildings, the general lighting systems have been designed to be a significant part of the heating system. This type of design permits the use of smaller, less costly heating equipment. In instances such as this, it may not be prudent to reduce general lighting levels in cold weather.
29. Page 10 - Some discussion should be made on the subject of why there is such a variation of water heater efficiencies.
30. Page 11 - A statement was made on Page 7 reading "weather stripping doors and caulking windows in a leaky house saves more energy per dollar invested than any other technology." The graph "Add Up The Savings" shows a different situation. It is plainly evident that the most economical heat savings is realized from the furnace tune-up and thermostat set-back. This graph does not give enough data describing conditions found at the house before the work began. For example, was there no insulation at all in the ceiling and walls? If there was insulation, what was it's R rating? These are considerations which will affect the economics of the modifications suggested.
31. Page 12 - More realistic figures will result if present worth calculations are performed, allowing fuel costs to rise, as they most likely will.
32. Page 16 - The "Los Angeles Example" cited could, without additional information, overstate the potential of energy conservation. In conversation with a Rand Corporation economist, it was learned that the conservation program was enacted not by the utility, but by the city council. Having the force of law, the incentive to conserve electric energy may have been stronger than if a simple voluntary program had been in place. It is a common phenomenon for electrical system loads to fluctuate widely from season to season. If, for example, the conservation ordinance in Los Angeles began after a particularly hot month such as August, it may very well be that no extraordinary action would be needed by the citizens to realize the 17% decrease in demand cited. No mention is made if this load reduction continued after the program was dropped. How did the

utility deal with those customers who were already conscientious and had been efficient consumers even before the ordinance. Rand has promised to send a copy of their report to Acres' Anchorage office, but at the time of this writing it has not arrived.

33. Page 18 - There seems to be a loss of continuity between this paragraph and the closing section of Page 18.
34. Page 19 - Examples of cogeneration existing in Alaska should be provided.
35. Page 19 - Is the required population density of 4 to 5 residences per acre for economic district heating applications valid in Alaska?
36. Page 21 - Some discussion should be made describing the location of the potential heat sources relative to their potential users.
37. Page 23 - In addition to the obstacles to the total energy systems, the environmental problems associated with these systems should be discussed. In many urban areas, air quality standards may rule out the use of the small fuel burning installations common to total energy systems.
38. Page 23 - The efficiency of the fluidized bed burners is impressive at 80%, but no data is presented describing the efficiency of a conventional coal burner. The figure of 80% efficiency may be misleading, if losses for boiler and turbine equipment are ignored. If these are shown, some relevant comparison between the fluidized bed and conventional technologies could be made. If the fluidized bed fired boilers operate at lower temperatures than conventional boilers, how can the principle cited on page 20 concerning operating temperatures and efficiency, be reconciled?
39. Page 24 - Waste heat cannot be applied economically to any use if the source is not located near that use. (Refer to statements on page 22 regarding "Factors Effecting Waste Heat Utilization." (sic) Agricultural producers are typically located in remote areas away from heat sources. Specific examples of agricultural waste heat utilization applications should be provided.
40. Page 24 - Is a greenhouse large enough to grow commercial food crops economically feasible? Has one been built in Alaska? Give examples of such greenhouses.
41. Page 26 - Examples of those corporations in the U.S. which have "made significant strides in raising energy efficiency" should be given.
42. Page 27 - There is obviously a trade-off between increasing window size to admit more light, and reducing window size to conserve heat. A discussion of this problem should be included.
43. Page 27 - See comment number 28
44. Page 27 - Does the scheme to provide 90°F water at faucets and hotter water in kitchens require multiple water heaters? How does this affect building economics?
45. Page 29 - Lifeline rates generally apply only to residential customers, not "each" customer. In some cases, only elderly or economically disadvantaged customers are eligible for lifeline rates.

46. Page 29 - Changing energy use patterns to even out loads per se saves absolutely no energy. The savings realized by load leveling results from the reduction of the amount of energy which must be supplied by a utility's peaking units, which are traditionally fueled by the most expensive fuel used by the utility.
47. Page 29 - The fuel savings realized by a utility purchasing from a small producer can be a false savings if the big picture is not considered. In most cases, the smaller producer is also a fuel user, perhaps operating equipment not as efficient as that owned by the utility. In such cases, fuel consumption is increased rather than decreased.
48. Page 30 - What is the significance of this table?
49. Page 31 - Reconcile the figures given in the table on this page with information given on page 12 of the first part of the report. In that example, the home's heating load (which, according to data presented on page 4, represents 75% of a residential or commercial building's energy use) was cut in half, representing a 37.5% reduction in overall energy use. Figures on page 31 show that optimistically, only a 12% savings could be realized (the "total energy" concept not being considered for houses.)
50. Page 32 - Nothing in the report has shown how "industrial energy users can raise productivity of their use." Productivity is a function of manpower input and goods produced.
51. Page 32 - In many cases it is not acceptable to locate powerplants near population centers. Citizen concern with aesthetics, noise, air pollution, fog produced by cooling towers, and fuel storage and transport are making it increasingly difficult for utilities to site plants in areas which represent potential waste heat consumer areas.
52. Page 32 - Some discussion of what percentage of the 3.5 M Btu/min (about 60 MW) is actually near potential users should be included.
53. Page 33 - The statement that "without it (cars) urban dwellers can be left high and dry" is not correct. Many urban residents do not need, or even own, autos. Obvious examples include New York City, Washington, D.C., Chicago, and other parts of the country served by developed public transit systems. It is the suburban and rural residents who are so highly dependent upon personal transportation.
54. Page 33 - The contention that Alaskans "have no control over the fuel economy of autos available" is not correct. Alaskans have the ultimate control over the fuel economy of their cars: the choice offered by the free market. The problem here is that many people have not exercised the option available to them to purchase fuel efficient vehicles.
55. Page 33 - The first sentence of the sixth paragraph needs to be revised to be understandable.
56. Page 34 - The greater reliance on walking, skiing, and bicycling is applicable in any real way only to urban dwellers in good physical

condition. The very young, the elderly, and those living any appreciable distance from work or shopping cannot make good use of this alternative.

57. Page 34 - It is not possible to increase load factors of trucks leaving Alaska without developing industries and agricultural products to furnish the Outside with not otherwise available at less cost.
58. Page 36 - There seems to be little in this section which is actually related to conservation. It is presumed that future revisions of this document will attempt to draw some conclusions on actions which may be taken to more efficiently move food and goods to Fairbanks.

STATE
of ALASKA

MEMORANDUM

TO: ☐Mark Wittow
Administrative Aid
House Power Alternative
Study Committee

DATE:

March 10, 1980

FILE NO:

TELEPHONE NO:

Thru:

C. Deming Cowles *cd*
Deputy Commissioner
Department of Environmental
Conservation

SUBJECT:

Conservation Section
of the Susitna Alternatives
Study

From:

Dave Sturdevant *DCA*
Management and Technical
Assistance Section

I am writing a hasty response to the draft of the Conservation section prepared by the Alaska Federation for Community Self Reliance, dated February 16. Although the cover letter makes clear that the draft is very rough, I have a particular concern with the way the introduction is written. Two segments of the "Conservation Overview" are included (page 2 and page 15); my comments apply to largely to the former.

"Conservation," using the term broadly, has become the dark horse of energy resources, as evidenced by a wheelbarrow full of studies, including such notables as the CONNAES study and the Harvard report. President Carter has expressly recognized conservation as the cheapest, quickest and easiest energy source. However, many skeptics remain, and I believe that we have to be very careful how the subject is presented. Basically, I feel the introductory discussion of conservation must be a much more eloquent statement and somewhat redirected if it is to have the impact I would like to see.

The major need is to separate energy efficiency from behavioral conservation. The draft report makes a stab at doing this by stating that conservation need not mean sacrifice, and by terming the energy gained through efficiency improvements as "conservation energy." These ideas need to be more explicitly developed.

I feel the report needs to make very clear that behavioral conservation is up to the individual -- one can turn down the thermostat or ride a bicycle as much as one desires -- but that this aspect, which implies sacrifice, is not the subject of the report. The report deals instead with an entirely different aspect -- improving the efficiency of use in accomplishing a given task, without degrading the quality of result or product. We can achieve more efficient lighting, appliances, houses, transportation, and industrial processes without, in most cases,

March 10, 1980

altering the outcome. The objective is to focus on that set of measures which can be achieved with little or no sacrifice, thus eliminating the stigma which has too often been attached to "conservation."

My view is that an energy efficiency alternative must be developed and promoted as a whole if it is to be a significant contributor. And especially, it has to be recognized as simply a better way of doing business. I don't feel that the introduction as drafted shapes the subject effectively. It does contain a large number of valid, valuable thoughts which perhaps can be given more vitality.

I might also suggest including significant conclusions on conservation energy from some of the notable recent studies and reports.

I have not examined the sector analyses in detail. I hope you will find these comments useful.



Alaska State Legislature

House of Representatives

Hugh - 6, your information
MW

c/o Malone
Pouch V
State Capitol
Juneau, Alaska 99811

Official Business

Robert Cross
Alaska Power Administration
PO Box 50
Juneau, Alaska 99802

Dear Mr. Cross:

Thank you for the report on "Hydroelectric Alternatives for the Alaska Railbelt." I have a few comments on the report, and its relationship to the evaluation of power alternatives for the Railbelt. I find that the study misses the goals set out in its introduction:

For the last several years, hydroelectric investigations for the Alaska Railbelt have focused on the Upper Susitna and Bradley Lake Hydroelectric projects. Many other potential projects, larger and smaller, have been identified which are accessible to the Railbelt, thus there are important questions to ask as to how these projects were selected and whether some other project or group of projects might offer a more sensible hydroelectric development plan for the Alaska Railbelt.

This report provides a review of the data and studies that brought about the selection of the two projects, and a current appraisal as to whether that selection remains appropriate.
(page 1, emphasis added)

Your report does not review what a suitable mix of power projects for the Railbelt might be, nor does it consider the contribution of possible hydroelectric sites toward meeting electrical demand in the Railbelt. Instead, the report addresses a somewhat different question: what possible hydroelectric projects, or mix of projects, could completely replace the Susitna project, and, assuming simultaneous construction, at what price?

As you know, the benefits of building a variety of small projects instead of a large dam result from their ability to more closely match growth in demand, and from the decreased need for backup capacity.. Yet the report does not consider the comparative costs of mixing power from various hydroelectric sites beginning operation at various times, or of mixing hydroelectric generation with thermal-fired plants.

The summary of the report states that "The purpose of the review (of alternatives) was to examine whether selection of the Upper Susitna Project remains appropriate (for the Railbelt)." (p.2) Without a discussion of the costs to consumers of excess capacity in a series

Page Two
Robert Cross
Hydroelectric Alternatives

of smaller projects versus one large project, how can any conclusions be reached?

The report could serve a useful purpose, if it provided a listing of the alternative sites with cost estimates. But the validity of the cost estimates are compromised by three assumptions used in the report: 1966 prices, a 3 1/8% interest rate and complete utilization of average annual energy. (p.10) Although the report states that all construction costs would inflate at comparable rates, the difference,, for example, of cost overruns on large versus midrange projects demands further analysis of this assumption. The assumed interest rate is obviously too low, and interest rates have a great effect on the feasibility of large projects when compared with less-capital intensive alternatives. The assumption of complete utilization of energy is also unrealistic -- the larger the power output of a given dam, the greater the amount of excess capacity at the time it comes on line.

The alternatives to the Susitna project, including small and midrange hydroelectric sites, deserve a thorough review. Smaller projects, coming on line in a graduated manner, could possibly provide as much power at a much lower cost to the consumer than a single, large project for a relatively small, isolated market area (ie, the Railbelt). The comparative of costs of the various possible options for scaling and staging the Sustina project also deserve scrutiny. I hope that this analysis is not the final review of the ability of alternative hydroelectric sites to contribute to meeting Raibelt power needs.

I also received your report on the costs of thermal upgrading and conversion to electric heat for Southeast Alaska. I found this report worthwhile, as it squarely faced the question of the costs of conservation as a "source" of energy. I hope you will continue to pursue the ideas in this report.

Please let me know if you have any questions about my comments. I would be happy to provide further detail or clarification if necessary.

Sincerely,



Mark Wittow
Coordinator
Power Alternatives Study Committee

cc: Alaska Power Authority
Acres American (Anchorage)
Division of Budget and Management

mark

ALASKA POWER AUTHORITY

333 WEST 4th AVENUE - SUITE 31 - ANCHORAGE, ALASKA 99501

Phone: (907) 277-7641
(907) 276-2715

March 12, 1980

The Honorable Brian Rogers and Hugh Malone
House Power Alternative Committee
Alaska State Legislature
Pouch V
Juneau, Alaska 99811

Dear Representatives Rogers and Malone:

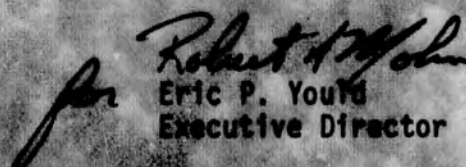
I am writing to alert you to potential problems in regard to the timing of the Susitna energy requirement forecasts being developed under contract to your committee, with partial Power Authority funding.

We have seen slippage in the ISER work despite the deadlines faced by both your committee and the Power Authority. Let me describe the relationship of the ISER work to other activities in our Susitna program and clarify the need for timeliness. It may be helpful to refer to page 5-24 of the Acres Plan of Study, Plate T1.1, as well as page 7-3/7-4, Plate A7.1. You will note the logical interrelationship between the ISER work and subtasks 1.01 through 1.06. Specifically, the Power Alternatives Study Report cannot be accomplished before the Selection of Viable Expansion Sequences which, in turn, cannot start before the Development of Peak Load Forecasts (Subtask 1.02). Of course, Subtask 1.02 relies almost completely upon the ISER energy forecast. Subtask 1.02 was scheduled to begin in week eight of the study period which was the week of March 3, 1980. Clearly there is a scheduling problem.

We have also been advised through Acres and Woodward-Clyde that the data collection effort (described in the ISER Detailed Work Plan under Task D.6) may be falling short of the level of effort that is going to be required for a satisfactory analysis. The meeting scheduled in Anchorage on March 20, 1980 will hopefully shed light on the extent of the problem.

Thank you for considering these matters.

Sincerely,


Eric P. Youd
Executive Director

cc: ISER, Scott Goldsmith
Acres, Jim Landman

ALASKA POWER AUTHORITY

333 WEST 4th AVENUE - SUITE 31 - ANCHORAGE, ALASKA 99501

Phone: (907) 277-7641
(907) 276-2715

March 5, 1980

Mr. Mark Wittow
House Power Alternatives
Committee
Pouch V
Juneau, Alaska 99811

Dear Mark:

Thank you for sending us a copy of the AFCSR draft report on energy conservation and for giving us an opportunity to review it.

Rather than conducting concurrent reviews with our engineer, we are relying upon Acres to review the document and offer comments. I have seen a draft of Acres' letter to you and think that many of their suggestions will be very helpful in improving the AFCSR work. You can expect Acres' comments in the very near future.

Acres has reviewed the document in light of insuring an accurate, well documented and thorough product. Because of the nature and extent of the comments, one might perceive a certain negativism toward conservation in general or the AFCSR work in particular. I want to assure you that such is not the case; we want to encourage conservation at the same time that we keep our feet firmly planted on a foundation of fact.

Sincerely,

FOR THE EXECUTIVE DIRECTOR


Robert A. Mohn
Director of Engineering

cc: Jim Landman, Acres

ALASKA POWER AUTHORITY

333 WEST 4th AVENUE - SUITE 31 - ANCHORAGE, ALASKA 99501

Phone: (907) 277-7641
(907) 276-2715

March 12, 1980

The Honorable Brian Rogers
Alaska State Legislature
P. O. Box K
College Branch
Fairbanks, Alaska 99708

Dear Representative Rogers:

In February, Eric Yould, Executive Director of the Alaska Power Authority, sent you a copy of the plan of study for the Susitna Hydroelectric Project and invited you to attend community meetings at which you will receive more information and have the opportunity to influence the manner in which the work within the plan of study is to be accomplished.

The first round of community meetings will be held April 14, 15, 16, and 17, a few weeks later than originally scheduled. Hopefully, the change in schedule will give you more time to review the plan of study and prepare your questions and comments. The meetings will be held:

April 14:	Fairbanks	7:00 p.m.	Traveler's Inn Gold Room
April 15:	Talkeetna	7:00 p.m.	Talkeetna Elementary School
April 16:	Wasilla	7:00 p.m.	Wasilla Junior High School
April 17:	Anchorage	7:00 p.m.	Bartlett High School

Yellow Cafeteria (near visitor parking lot) North Muldoon Road (enter Muldoon and Glenn Highway interchange)

We expect this first series of meetings to be informative and dynamic. ACRES, the consultant conducting the plan of study, will present a slide show outlining various aspects of the feasibility study. Information summarizing current knowledge of alternatives to the Susitna Hydroelectric Project will also be presented. We will explain the Public Participation Program and the "Action Lists", the primary method for receiving public comment throughout the 30 month period of the plan of study.

After you have been given information, you will have time to ask questions and make comments. Some discussion will take place in small groups where there will be opportunity to share ideas. A written record of the comments of each group will be compiled as part of the official record of the meeting. Since the format of the meeting does not allow time for testimony, those wishing to present testimony or comments is writing or tape record their remarks to be presented at the end of the meeting. Action List forms will be distributed to all attendees.

filled out on Action List forms will be reviewed by ACRES and responded to in writing.

If you can't make it to the April meetings, please note that this first series of meetings will not be your only opportunity to make comments and receive information. I urge you to contact my office to see how you can participate. I can be reached at 276-0001.

I look forward to working with you over the next two and a half years.

Sincerely,

Nancy Blunck

Nancy Blunck
Director
Public Participation Program

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

AGENDA Community Meetings April 14, 15, 16 and 17, 1980

WELCOME	- 5 Minutes	Power Authority
DESCRIBE PLAN OF STUDY	- 25 Minutes	Acres
DESCRIBE ENERGY SOURCES FOR THE RAILBELT	- 15 Minutes	Power Authority
QUESTIONS AND ANSWERS	- 20 Minutes	Power Authority and Acres
TABLE TOP DISCUSSION BY CITIZENS	- 20 Minutes	Power Authority
DESCRIBE PUBLIC PARTICIPATION PROGRAM	- 15 Minutes	Power Authority
DESCRIBE ACTION LISTS	- 10 Minutes	Power Authority
SHORT REPORT ON TABLE TOP DISCUSSION RESULTS	- 20 Minutes	Power Authority and Acres
PERMITS	- 5 Minutes	Acres and CIRI/H&N
CLOSING	- 5 Minutes	Power Authority

After the meeting officially ends, persons are invited to:

1. Submit written testimony.
 2. Record verbal testimony.
 3. Fill out action forms and turn in that night.
 4. Ask questions of Power Authority staff, Acres, or their sub-contractors.
-

COMMUNITY MEETING -- DATES, TIMES, AND PLACES

April 14:	Fairbanks	7:00 p.m.	Traveler's Inn Gold Room
April 15:	Talkeetna	7:00 p.m.	Talkeetna Elementary School
April 16:	Wasilla	7:00 p.m.	Wasilla Junior High School
April 17:	Anchorage	7:00 p.m.	Bartlett High School
			Yellow Cafeteria (near visitor parking lot); North Muldoon Road (enter from the Muldoon and Glenn Highway interchange)

Institute of Water Resources

UNIVERSITY OF ALASKA
FAIRBANKS, ALASKA 99701

March 3, 1980

BRIAN - MARK
FOR YOUR PERusal -
THANKS FOR THE OPPORTUNITY
SEE ESPECIALLY P 70-71
AND CONCLUSIONS.

Rich

Mark Fryer, P.E.
1709 South Bragaw, Suite F
Anchorage, Alaska 99504

Dear Mark:

Enclosed you will find the report on the Solar Component Analysis of the Alternative Energy Analysis which was contracted by you to our Institute. The report was developed by Richard Seifert, and is submitted in fulfillment of our obligations to you and the Center for Policy Studies.

The report is a quantitative analysis of the (maximum) possible and probable contributions of solar energy to the total energy use in Alaska's railbelt. Active solar, passive solar, and photovoltaic applications are considered, and an estimate of the useful energy from active and passive solar applications is made. Photovoltaics are not analyzed because there is so little information available on their performance in Alaska. However, some of the most significant impacts on electrical needs and costs could come from predicted cost declines in photovoltaic cells. The U.S. Department of Energy predicts the cost of photovoltaic cells to be 50-70¢ per peak watt by 1986. The lowest estimates of capital costs of the Susitna dam systems translate into 93¢ per peak watt. This is an oversimplified comparison, but it identifies an important area of the solar alternatives to monitor and research. Other areas of economic concern and research recommendations are made in the report's conclusions.

It was a pleasure to do this work, and much remains to be done. Your comments, suggestions and review are welcomed.

Sincerely,



Robert F. Carlson
Director

dd
Encl.

BRADFORD H. TUCK, PH.D.

ECONOMIC CONSULTANT

1822 CINDYLEE LANE
ANCHORAGE, ALASKA 99507

(907) 344-9293

March 14, 1980

Mr. Mark Wittow
Power Alternatives Study Committee
House of Representatives
Pouch V
Juneau, Alaska 99811

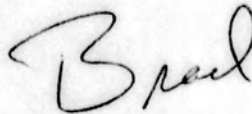
Dear Mark:

Enclosed is Part III. This completes the work I can do until I get the ISER draft.

Also, after you have Xeroxed from the original would you please return it to me (also Parts I and II). To the extent that this draft turns out to be satisfactory, I'd rather not have to retype it.

Thanks.

Sincerely yours,

A handwritten signature in cursive script, appearing to read 'Brad', is written over the typed name.

Bradford H. Tuck

Enclosure.

BRADFORD H. TUCK, PH.D.

ECONOMIC CONSULTANT

1822 CINDYLEE LANE
ANCHORAGE, ALASKA 99507

(907) 344-9293

March 4, 1980

Mr. Mark Wittow
Study Coordinator
House Power Alternatives Study Committee
Alaska State Legislature
Pouch V
Juneau, Alaska 99811

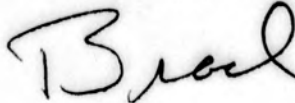
Dear Mark:

Enclosed are portions of the draft of my study. The review of existing power demand forecasts is nearly complete and I should be sending it to you within a few days.

Am I supposed to circulate the draft, or does your office take care of that?

Part II has obviously been written to appeal to a broader group of readers than those involved in the study (i.e., it's non-technical). Should the remainder be aimed at and written for the same general audience?

Sincerely yours,



Bradford H. Tuck

Enclosure.

Mark

By: C.L. "Lee" Wareham
Mike Ribar
Phil Younker
John Kohler
Bruce Wammack
Wally Droz
Bill Stringer
Introduced: 2/14/80
Adopted: 2/14/80

RESOLUTION NO. 80-11

A RESOLUTION REGARDING IMMEDIATE CONSTRUCTION BY
THE STATE OF ALASKA OF THE DEVILS CANYON-
UPPER SUSITNA HYDROPOWER PROJECT

WHEREAS, the high cost of electrical energy in interior Alaska is a heavy burden on our citizens; and

WHEREAS, all evidence points to continued escalation of energy costs unless bold and decisive remedial steps are taken immediately; and

WHEREAS, a viable solution to our electrical energy needs through the end of this century and beyond exists in the form of the Upper Susitna-Devils Canyon Hydro Project and transmission system; and

WHEREAS, the Devils Canyon Hydro Project is subject to excessive uncertainty and delay if left in the hands of the Federal Government; and

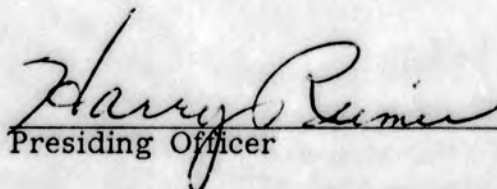
WHEREAS, the State of Alaska possesses the knowledge, resources and right to complete this vital project on its own; and

WHEREAS, over 75% of the residents of the State of Alaska will benefit directly from the Susitna Project and all other residents indirectly; and

WHEREAS, immediate and supportive action by the Legislature of the State of Alaska and the office of Governor Jay Hammond is vital to the success of this project:

NOW, THEREFORE, BE IT RESOLVED jointly by the Fairbanks North Star Borough Assembly and the City Council of Fairbanks, Alaska, that Governor Jay Hammond and the Alaska State Legislature are urged to take all necessary steps to assure early commencement and expeditious completion, under State auspices, of the Devils Canyon Hydro Project.

PASSED AND APPROVED THIS 14th DAY OF FEBRUARY, 1980.


Presiding Officer

ATTEST:


Clerk of the Assembly

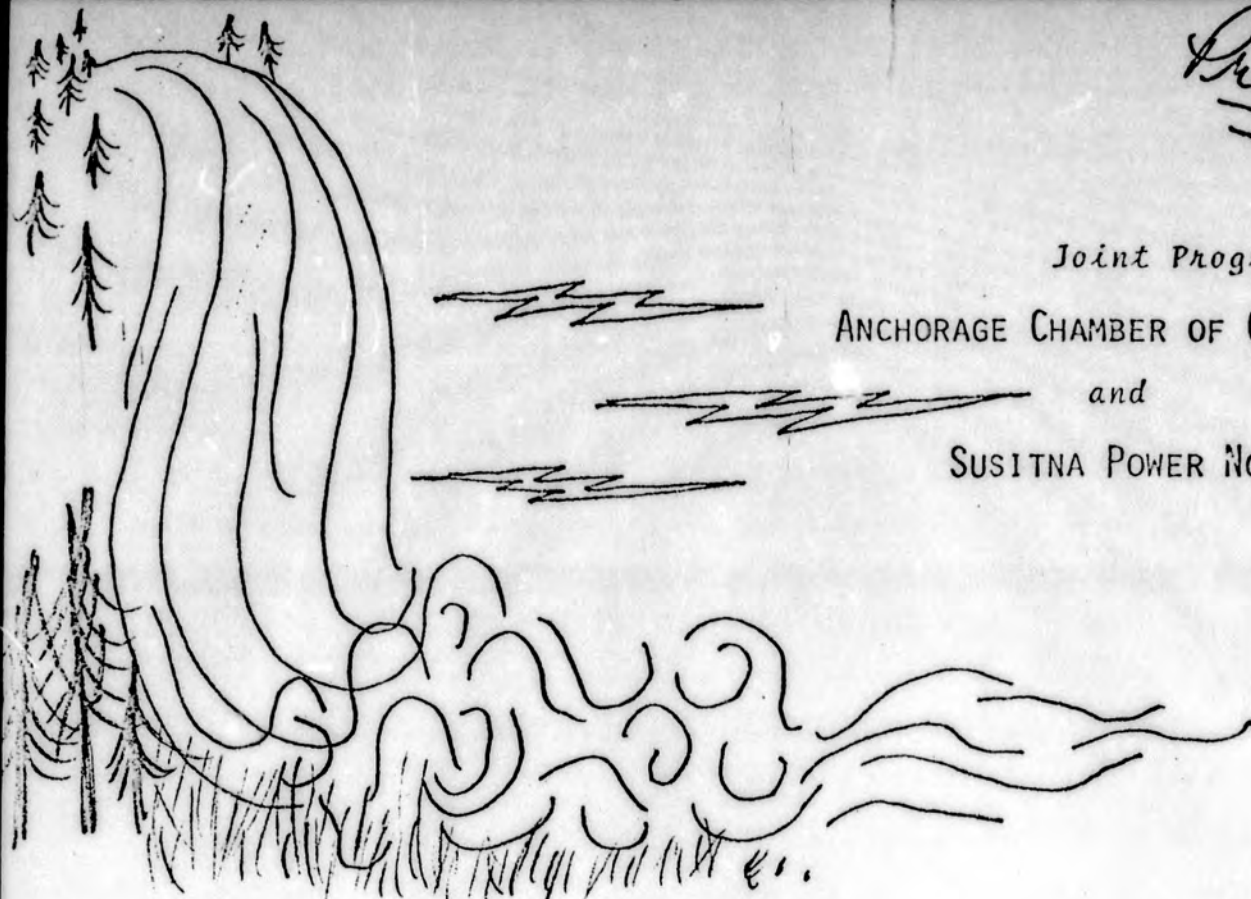
Press Release

Joint Program

ANCHORAGE CHAMBER OF COMMERCE

and

SUSITNA POWER NOW



SUSITNA POWER

"WHO NEEDS IT?"

Hear for yourself at:

ANCHORAGE CHAMBER OF COMMERCE MEETING

12:00 NOON

MONDAY, MARCH 17TH (ST. PATRICK'S DAY)

CAPTAIN COOK HOTEL - LUNCH \$8.00 - COFFEE \$2.00

SPEAKERS:

- ... LEE WAREHAM - CO-CHAIRMAN, SUSITNA POWER NOW, INC.
- ... ERIC YOULD - EXEC. DIRECTOR, ALASKA POWER AUTHORITY
- ... JOHN SPENCER - MUNICIPAL UTILITIES
- ... ERIC WOHLFORTH - BOND COUNCIL
- ... SENATOR JAY KERTULLA
- ... BOB PENNEY - CO-CHAIRMAN, SUSITNA POWER NOW, INC.

THIS PROJECT WILL BE ONE OF THE MOST ...

WIDELY-DISCUSSED AND NEWSWORTHY
PROJECTS IN ALASKA FOR YEARS TO COME!!!

BE THERE!!!





Alaska State Legislature

House of Representatives

Official Business

c/o Malone
Pouch V
State Capitol
Juneau, Alaska 99811

Robert Cross
Alaska Power Administration
PO Box 50
Juneau, Alaska 99802

Dear Mr. Cross:

Thank you for the report on "Hydroelectric Alternatives for the Alaska Railbelt." I have a few comments on the report, and its relationship to the evaluation of power alternatives for the Railbelt. I find that the study misses the goals set out in its introduction:

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This report provides a review of the data and studies that brought about the selection of the two projects, and a current appraisal as to whether that selection remains appropriate.
(page 1, emphasis added)

Your report does not review what a suitable mix of power projects for the Railbelt might be, nor does it consider the contribution of possible hydroelectric sites toward meeting electrical demand in the Railbelt. Instead, the report addresses a somewhat different question: what possible hydroelectric projects, or mix of projects, could completely replace the Susitna project, and, assuming simultaneous construction, at what price?

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The summary of the report states that "The purpose of the review (of alternatives) was to examine whether selection of the Upper Susitna Project remains appropriate (for the Railbelt)." (p.2) Without a discussion of the costs to consumers of excess capacity in a series

Page Two
Robert Cross
Hydroelectric Alternatives

of smaller projects versus one large project, how can any conclusions be reached?

The report could serve a useful purpose, if it provided a listing of the alternative sites with cost estimates. But the validity of the cost estimates are compromised by three assumptions used in the report: 1966 prices, a 3 1/8% interest rate and complete utilization of average annual energy. (p.10) Although the report states that all construction costs would inflate at comparable rates, the difference,, for example, of cost overruns on large versus midrange projects demands further analysis of this assumption. The assumed interest rate is obviously too low, and interest rates have a great effect on the feasibility of large projects when compared with less-capital intensive alternatives. The assumption of complete utilization of energy is also unrealistic -- the larger the power output of a given dam, the greater the amount of excess capacity at the time it comes on line.

The alternatives to the Susitna project, including small and midrange hydroelectric sites, deserve a thorough review. Smaller projects, coming on line in a graduated manner, could possibly provide as much power at a much lower cost to the consumer than a single, large project for a relatively small, isolated market area (ie, the Railbelt). The comparative of costs of the various possible options for scaling and staging the Sustina project also deserve scrutiny. I hope that this analysis is not the final review of the ability of alternative hydroelectric sites to contribute to meeting Raibelt power needs.

I also received your report on the costs of thermal upgrading and conversion to electric heat for Southeast Alaska. I found this report worthwhile, as it squarely faced the question of the costs of conservation as a "source" of energy. I hope you will continue to pursue the ideas in this report.

Please let me know if you have any questions about my comments. I would be happy to provide further detail or clarification if necessary.

Sincerely,



Mark Wittow
Coordinator
Power Alternatives Study Committee

cc: Alaska Power Authority
Acres American (Anchorage)
Division of Budget and Management



ROBERT A. MOHN

Director of Engineering

Alaska Power Authority

333 W. 4th Ave., Suite 31
Anchorage, Alaska 99501
Phone (907) 277-7641

ALASKA POWER AUTHORITY

333 WEST 4th AVENUE - SUITE 31 - ANCHORAGE, ALASKA 99501

Phone: (907) 277-7641
(907) 276-2715

March 3, 1980

Representative Hugh Malone
Representative Brian Rogers
House Power Alternative Study Committee
House of Representatives
Pouch V
Juneau, Alaska 99811

Dear Representatives Malone and Rogers:

Thank you for your letter dated February 27, 1980 that addressed the relationship between the Committee's energy conservation study efforts and those of Acres American as part of the Susitna studies.

Responses 2.1 T.1.2 and 2.2 T1.7 appear accurate to us; that is, your studies "will be closely monitored, and findings will be considered or incorporated in the Susitna alternatives studies." While we are not necessarily depending on your Committee's work, we are hoping to take advantage of it to later reduce the scope of our work if review of your studies show our efforts to be redundant. If you do not wish your reports to be used in this way, please so advise us.

I would agree that the extensive POS coverage given to the Committee's work might create the impression that it is being offered as a substitute for the Power Authority's own program. Acres' conservation study efforts should have been given more attention, and the special-purpose nature of your work clarified. Also, we note that pages 5-4 and 5-5 of the Acres plan no longer accurately reflect your program.

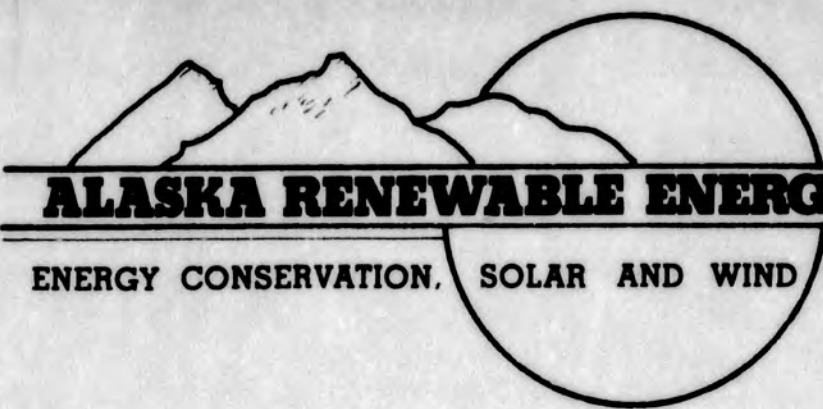
We will make a special effort to clarify the entire matter at the first series of public meetings and in any future reprintings of the Plan of Study document.

Again, thank you for your comments.

Sincerely,



Eric P. Yeld
Executive Director



Nancy -
ref - to
me

ALASKA RENEWABLE ENERGY ASSOCIATES

ENERGY CONSERVATION, SOLAR AND WIND CONSULTING SERVICES

WHO WE ARE

We are professional energy consultants who can help you decide how to reduce the energy costs of your building, be it an older home, a new office, or a blue-print design. By utilizing state-of-the-art computer technologies (developed by us for the U.S. Departments of Energy and Housing and Urban Development), we can estimate the energy use of any building in any climate, as we have done for over 700 buildings across the country. Careful analysis of these computer studies allows us to develop alternative building design strategies that will significantly reduce energy use and/or increase a building's use of renewable energy resources. The same techniques are also used to produce sensible energy plans for communities and entire regions.

WHAT WE DO CAN HELP YOU SAVE ENERGY AND MONEY

We can help you design a home or commercial building that can cut your yearly heating bill at least 50%. We can help you utilize state-of-the-art alternative energy systems - sun, wind, small hydro-electric, wood and waste materials.

WE SPECIALIZE IN

Building Design - computer analysis of plans for energy conservation and solar applications • design consulting • siting and energy land planning • natural lighting and cooling • designer/Architect services (in house).

Retrofit/Remodel - on-site building audits and thermal performance monitoring • analysis of solar/wind • computer analysis of solar building performance including:
- heat loss calculations
- residential, commercial, multiple family housing
- analysis of all types of solar construction such as greenhouses, underground homes, and double envelope.

Research and Policy Development - renewable energy feasibility studies • energy economics, individual, local and regional • energy conservation/solar building codes • legislation development and preparation • grant proposal preparation • energy components of Environment Impact Statements • community energy plans.

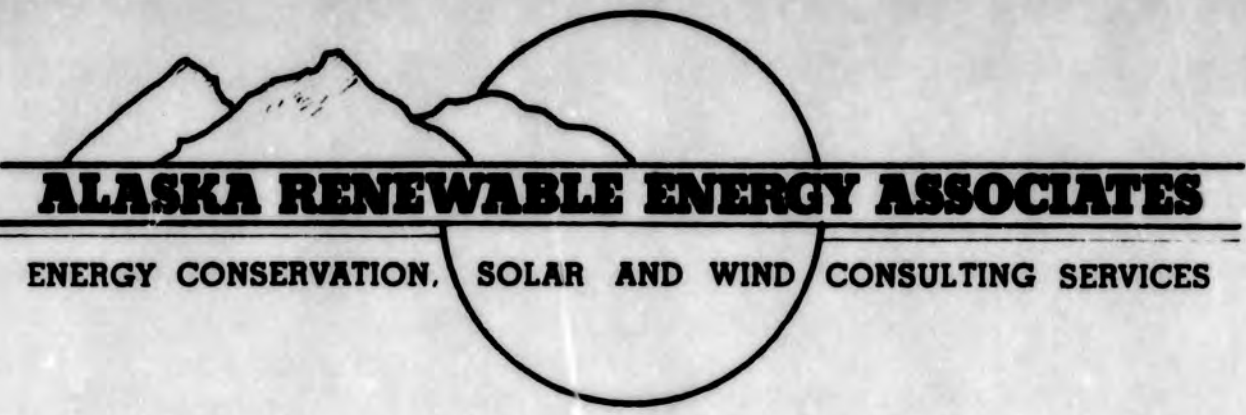
Education - seminar and courses on solar design and energy conservation for colleges and government administrators. • media presentations • curriculum development • "Hands on" workshops - solar greenhouses, solar collectors, solar hot water heaters.

40 Mcken
327 Engle

For more information, call or write:

ALASKA RENEWABLE ENERGY ASSOCIATES

308 G STREET • ANCHORAGE, ALASKA • 99501 • (907) 279-5904



ALASKA RENEWABLE ENERGY ASSOCIATES

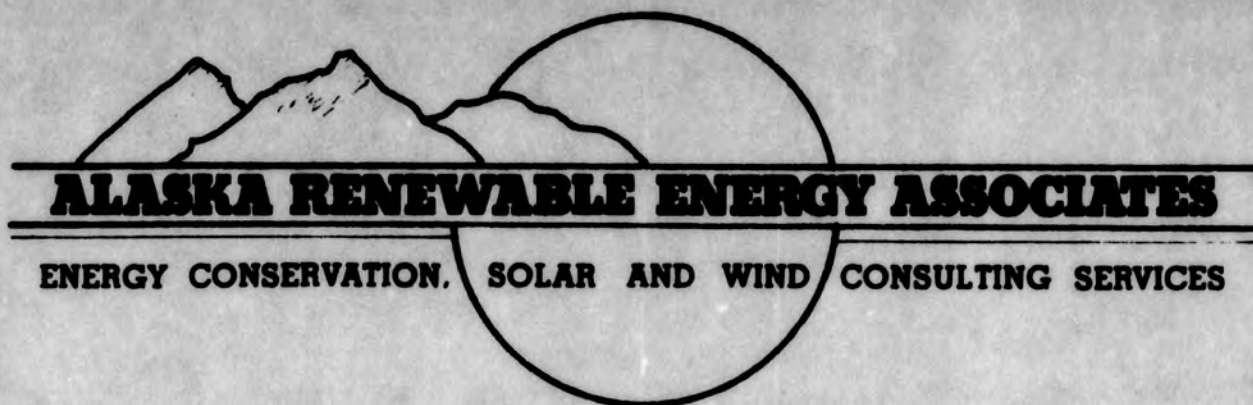
ENERGY CONSERVATION. SOLAR AND WIND CONSULTING SERVICES

Energy conservation is now a major concern in the United States. In Alaska, the need for efficient and conserving use of energy is more acute than in any other state: current energy prices are so high, especially in the Bush, that building designs that can save forty to sixty percent of the energy consumed by standard buildings will now pay for themselves in three to seven years, with some techniques paying off in as little as two years. The use of renewable energy sources (solar, wind, hydro, etc.), where applicable, can reduce the dollars spent on energy by an additional twenty to twenty-five percent. Equally short payback periods are possible, depending on the local climate and energy costs.

Alaska Renewable Energy Associates was established in May, 1979, in response to the need of Alaskans to reduce the amount of money they spend on energy. (Our parent firm, Earth Integral of Davis, California, has consulted on the design of more than 800 solar buildings in the lower 48 and has authored numerous major policy studies for the state and federal governments.) In the Far North, the cost of energy, the severity of the climate, and the length of the heating season combine to make the economics of renewable energy (solar, wind, etc.) and energy conservation far more attractive than anywhere in the continental USA. Our state-of-the-art computer programs are used to give an understandable economic assessment of renewable energy and conservation strategies anywhere in Alaska.

Our firm does three main kinds of work. First, and most common, is consulting directly with architects and engineers on specific building projects. We help analyze the site, develop basic design strategies, and then, by using our computer, we offer choices between several building packages. Each package includes predicted yearly dollar savings and payback period. We use the same techniques on existing buildings in retrofit/rehabilitation projects.

A second thrust of our work is to offer work shops and seminars for both professionals and do-it-yourself individuals. Our standard series includes six-



January 21, 1980

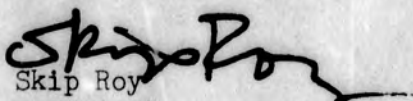
To the Legislators and Government Officials of Alaska:

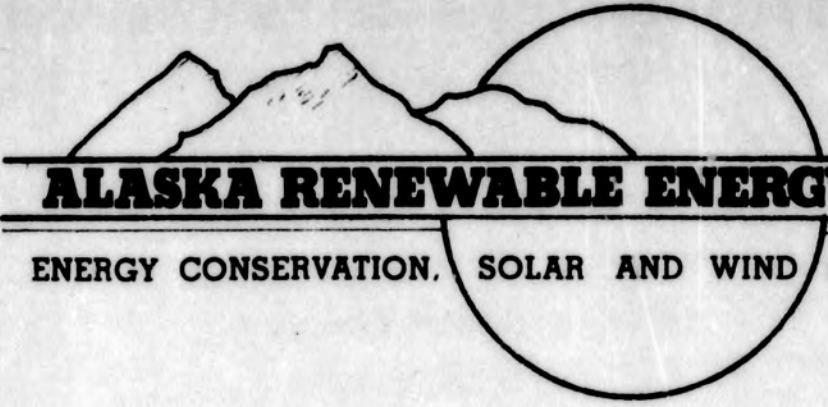
Alaska --and the rest of the United States-- must move toward a renewable energy future. Elected public representatives are in a position to create the policies needed to accomplish this task. Unfortunately, a lack of knowledge often prevents decision-makers from considering renewable resources as solutions to energy problems.

We would like to help legislators and government officials increase their knowledge about energy conservation and renewable energy resources. The seminar/workshop series mentioned in the preceding pages could be of real help to the concerned official. In addition, we can design state-supported research and development policies aimed at providing an understanding of Alaska's various climates and how to best use those climates in energy production and consumption.

Please contact us if we can be of help to you in your work.

Sincerely,


Skip Roy
Principal



ALASKA RENEWABLE ENERGY ASSOCIATES

ENERGY CONSERVATION. SOLAR AND WIND CONSULTING SERVICES

ALASKA RENEWABLE ENERGY ASSOCIATES

SEMINARS AND HANDS-ON WORKSHOPS

SEMINAR: Solar in Alaska for Builders, Architects and Engineers

- I. 1.Sun Path
- 2.The Alaskan Climate: The Data Base
- 3.Passive vs. Active
- 4.Economics: When is it Worth it?
- II.5.Basic Strategies
 - A.Underground
 - B.Superinsulation
 - C.Trombe Walls and Other Mass
 - D.South Glass, Reflective Designs
 - E.Making up the Difference:Active or Other
- III.6.Envelope Heat Loss Calculations
- 7.Solar Gain Calculations
- 8.Thermal Mass
- 9.Calculator Programs, Office Computers
- 10.Consultation on Specific Projects

SEMINAR: Renewable Energy for Alaska - 1980

- I. 1.Energy Economics
- 2.Utilizing and Mitigating the Local Climate
- 3.Buildings and Energy Use
- 4.A Brief Look at Conservation
- II. 5.Solar Feasibility in Your Area
- 6.Solar Basics
- 7.The Building Site
- 8.Passive Solar
- 9.Active Solar
- 10.Heating Water, Drying Crops
- 11.Economics
- III.12.Electricity Basics
- 13.Wind Power Feasibility
- 14.Wind Power Hardware
- 15.Ties to the Grid
- 16.Economics
- 17.Photovoltaics
- IV. 18.Small Hydro-electric Systems
- 19.Wood Heat
- 20.Individual Discussion with Students; Analyzing Situations

SEMINAR: Energy Conservation Calculations & Techniques for the Home-Owner

- I. 1. Energy Economics and Climate
2. Heat Flow in a Building
3. Detailed Heat Loss Calculations
- II. 4. Heat Loss Calculations for Student's Own Home
- III. 5. Electricity in the Home
6. Electricity Conservation Techniques
7. Techniques for Reducing Building Heat Loss
- IV. 8. Selecting Techniques for Students' Homes
9. Calculating Cost and Payback
10. A Quick Look at Renewable Energy

SEMINAR: Energy Considerations for Communities and Housing Authorities

- I. 1. Energy in the Community
2. Energy in Buildings
3. Electric Generation
- II. 4. Reducing Community Energy Use - Now
5. Energy Planning for the Future - Renewable
- III. 6. Workshop on Individual Communities

WORKSHOP: How to Construct Simple Solar Devices

- I. 1. Solar Basics
2. Solar Gain Calculations
3. Climate
4. Heating Space, Heating Water, Cooking, Distillation
- II. 5. Heating Space
 - A. Passive Wall Collector (build)
 - B. Greenhouse (discussion/plans)
 - C. South Glass plus Shutters (discussion)
 - D. Hot Air Collector (plans/aluminum can)6. Cooking, etc.
 - A. Simple Reflector Oven (plans)
 - B. Concentrating Collector with Transfer (plans)
- III. 7. Heating Water
 - A. Sun Coil (plans)
 - B. Sun Tray (plans)
 - C. Oil Drum (build)
 - D. Breadbox (plans)8. Stills (plans)
- IV. 9. Building the Breadbox (hands-on)

WORKSHOP: How to Size and Build Flat Plate Collectors

- I. 1. Sun Path/Solar Basics
2. The System
 - A. Collector
 - B. Transfer
 - C. Storage
- 3. Heating Domestic Water
- 4. Space Heating

(continued)

- II. 5.Sizing
 - A.Rules of Thumb
 - B.Calculations
 - C.F-Chart Computer Program
- 6.Off-the-Shelf: What's Available
- 7.Economics
- III.8.Constructing a Flat Plate Collector (hands-on)

WORKSHOP: Solar Greenhouse Design, Construction, and Operation

- I. 1.Understanding Climate and Buildings
- 2.Solar Basics
- 3.Plants, Heat and Light
- 4.Kinds of Solar Greenhouses
- II. 5.Design for Free-standing Greenhouses
- 6.Design for Attached Greenhouses
- 7.Calculating Heat Loss, Heat Gain
- 8.Greenhouse Operation
- III.9.Constructing a Simple Greenhouse

WORKSHOP: How to Design Your Own Passive Solar House

- Pre-assignment: Develop a Floor Plan
- I. 1.What is Passive Solar
- 2.Solar Basics
- 3.Climate and Micro-climate:The Site
- 4.Basic Passive Strategies
- II. 5.Construct a Basic Site Map (at home)
- 6.Elevations from the Floor Plan
- 7.Introduction to Heat Loss Calculations
- 8. Introduction to Solar Gain & Thermal Storage Calculations
- III.9.Redesign and Comparison
- 10.Three Design-Day Calculations, detailed
- 11.Sizing the Back-up Heater
- IV. 12.Individual Design Critique

ALASKA'S FIRST PASSIVE SOLAR HOUSE

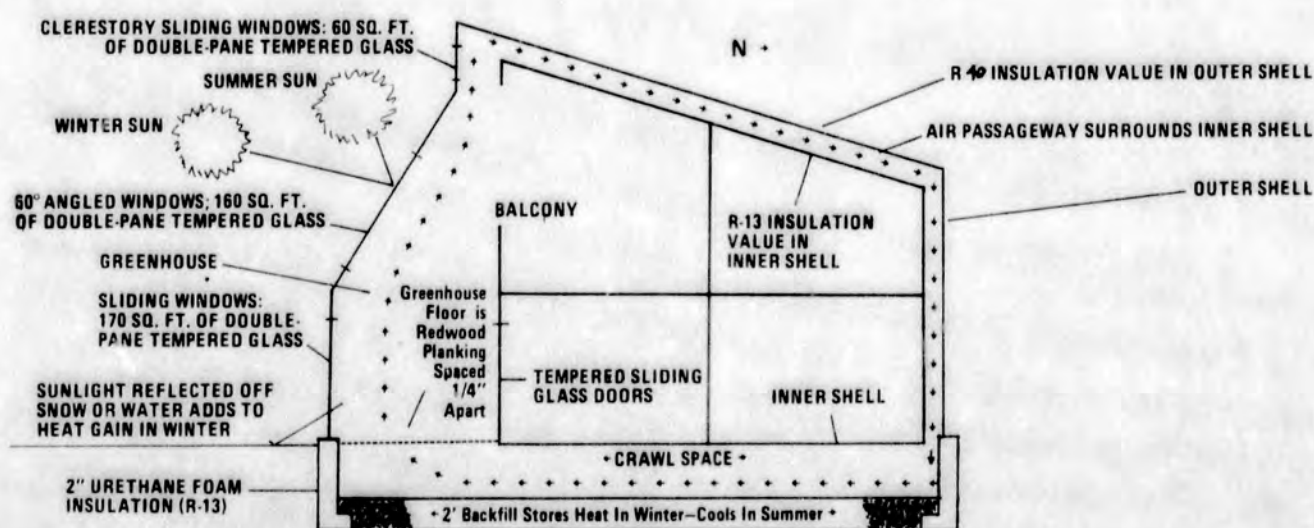
by James Barkshire and Skip Roy

The first passive solar house to be built in the State of Alaska was completed in January, 1980, in Homer. The house is "passive" in that there are no moving parts: heat collected in the attached solar greenhouse is transferred to the rest of the house by natural air convection currents. The only mechanical features are the insulated shutters which are used to minimize heat loss through the glass at night and during cloudy periods.

The design of the Homer House was closely modeled after a passive solar house built at Lake Tahoe, California, by Tom Smith in 1978. (The Tahoe House has been featured in several national publications, including Mother Earth News, Better Homes and Gardens (March, 1979), Omni (Nov. 1979), and Popular Science (Dec. 1979)). Smith had contracted with Bruce Maeda and Charles (Skip) Roy of Davis Alternative Technology Associates (now Earth Integral) to perform detailed computer studies to design the solar heating system and insulation strategy. By reprogramming the computer with climate data from Homer, the solar consultants were able to adapt the design of the Smith house to the climate of Homer.

A Model of Simplicity

The Homer House is a model of simplicity: it is super-insulated and has a full eighty percent of its glass on the south side. The key design feature is the "double envelope" construction: in addition to its structural outer shell, there is a second inner shell at the roof and the north wall. This dual-wall construction creates a twelve inch hollow space (plenum) around one entire axis, allowing the air heated in the greenhouse to circulate around the living space. (see diagram below)



It Works Like This

As the sun hits the south glass wall, it warms the large greenhouse. By the natural principles of convection, this hot air rises to the top of the structure, where it begins to fall downward through the roof plenum as it cools slightly, pushed along by warm air behind it. The air continues to drop down the north wall and into the basement. From here, it circulates up through the wood slat deck of the greenhouse floor, still pushed along by warmer air behind it, and is ready to be heated up again in the greenhouse and continue its circuit through the plenum.

The result of this circulation is a constantly moving "envelope" of warm

ventional construction, heat is lost directly to the outdoors through the walls and roof. In the double envelope design, escaping heat must first pass through the inner shell (insulated to R-13), then through the heated space in the plenum, and finally through the outer shell (insulated to R-40). Due to the physics of heat transfer, the existence of the heated plenum greatly reduces heat loss: because warm air transfers its heat more quickly to cooler rather than warmer areas, the heated plenum dramatically decreases the speed of heat transfer from the living space to the outside. In addition to this slowing of heat loss, the double envelope circulation of warm air keeps temperatures remarkably constant throughout the house because entire walls are actually radiating heat.

The House is Cost Efficient

The Homer House construction costs were about \$6,000 higher than an equivalent-sized, conventionally heated house. Most of the extra cost went into added insulation and the second shell at the roof and north walls. (The east and west walls are conventional single-wall construction, insulated to approximately R-32.) Calculations have shown that the Homer House will save over \$1000 per year at 1977 energy prices. This is a payback period of only six years, with money in the bank thereafter. If the cost of electricity in Homer rises as it is likely to, the payback period will be shortened. (The house uses an electric heat back-up system.)

Construction and Design Features

Building materials and methods are standard in the Homer House. Light wood frame construction is used. There is virtually nothing in the design that could cause problems for the experienced builder. The outer walls are of 2X6, inner walls of 2X4. The floors are built with Trus-Joist 9 1/2 inches deep to insure rigidity and an even floor. The roof system was built out of job-constructed box beams, although a 14 inch wood I-beam was originally specified and could be used. The deeper beams are used to provide room for the air plenum at the roof.

The Homer House is a very simple and striking design. The attached greenhouse, with its expanse of glass and wood finishes, overlooks a spectacular view of Kachemak Bay. The home features a sunken livingroom, fully modern kitchen, and four bedrooms. Floor area is 3000 square feet, including the basement.

Lee Porter Butler, a California architect, developed the original double envelope concept for the Tahoe House. CNL Designs of Anchorage provided the technical design and drawing for the Homer House. Earth Integral of Davis, California, performed the solar consulting, and Blueberry Hill Designs of Homer did the actual construction of the Homer House.

For more information on either the Homer House or alternative energy use and energy conservation in Alaska, contact Skip Roy at his newly created sister firm to Earth Integral, Alaska Renewable Energy Associates, 308 G Street, Room 311, Anchorage, Alaska, 99501, 907-279-5904, or James Barkshire of CNL Designs at the same address.

About the Authors

James Barkshire is the owner of CNL Designs, specializing in custom solar and energy efficient home design for Alaska. He has been building and designing in the state for the past four years. He also teaches classes in design, building, and energy efficiency through Anchorage Community College.

Skip Roy is an Energy Consultant, specializing in conservation, solar, and wind applications. He opened Alaska Renewable Energy Associates in May, 1979, as the Alaskan arm of the Davis firm, Earth Integral. Using state-of-the-art computer programs, they have consulted on more than 800 solar designs nationwide,



Alaska State Legislature

House of Representatives

POWER ALTERNATIVES STUDY COMMITTEE

c/o Rep. Malone
Pouch V
State Capitol
Juneau, Alaska 99811

Official Business

February 7, 1980

Deborah Pick -- GASP
Hold That Line
Lowry Town Hall
Lowry, Minnesota 56349

Dear Deborah:

Thank you for your note and publications list. I am enclosing a State of Alaska check for \$30.00, and a personal check for \$5.25, for the publications marked on the attached list. Included in the \$30. is \$5. for a year's subscriptions to the newsletter. You can use the extra \$1.75 for postage.

In your note you said that you had enclosed back issues of the newsletter. Unfortunately, you forgot to put them in the envelope. I would still like to receive those back issues, and would be happy to have our year's subscription extend backwards to the issues you think would be most valuable to us.

I am enclosing a report which describes our committee's activities. Although we did not specifically refer to the high voltage line that will be constructed as part of the project, the effects of the proposed EHV line (230-345kV) are of concern to many legislators. If you would like more information from us, let me know.

Thank you for responding promptly to my original inquiry.

Sincerely,

A handwritten signature in cursive script that reads "Mark Wittow".

Mark Wittow
Study Coordinator

enclosures