

SCOMM

#444:24

Susitna Study Hire Decision Due Soon

The Alaska Power Authority is expected to decide next month whether the Army Corps of Engineers or a private engineering firm will be hired to conduct detailed investigations on the proposed Susitna hydroelectric project.

The work, to begin late this year, will include geotechnical investigations, biological and economic studies and some design. Electric power needs of the Southcentral Alaska railbelt area and alternative power sources also will be part of the studies, according to a prepared release from the authority.

The Legislature has appropriated \$8.1 million for the first-year study, contingent on the state's choice of either the corps of engineers or a private firm.

Three firms are competing for selection in the event the corps of engineers isn't chosen to do the work. The three firms are Acres American Inc., Harza Engineering Co. and International Engineering Co. They were selected from a list of 11 qualified firms.

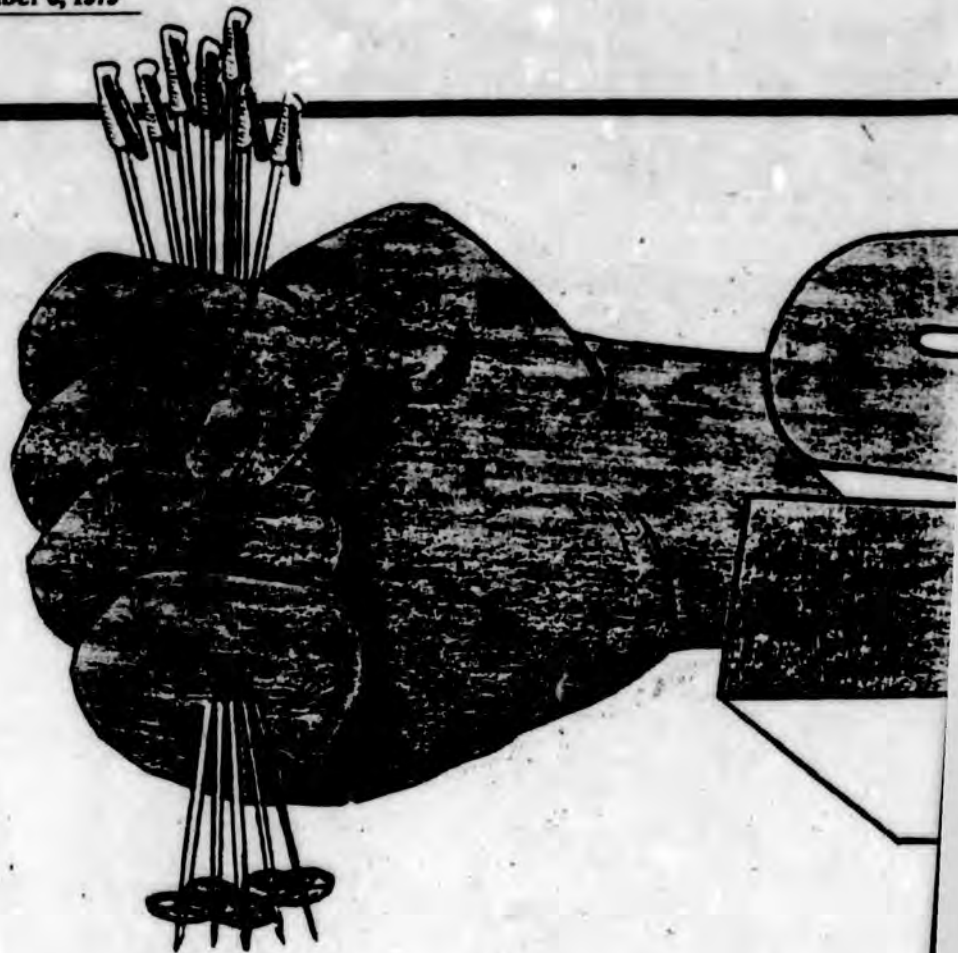
According to Eric Yould, executive director of the power authority, the selection "will be based primarily on which engineer is most qualified to formulate a technically and environmentally acceptable project."

Gov. Jay Hammond must endorse the power authority's choice before the exploratory work can begin. The initial decision will be made by the authority's board of directors.

The proposed multi-billion dollar Susitna project, located in the upper Susitna River basin northeast of Talkeetna, would provide a large part of the power needs for both Fairbanks and Anchorage.

Household Again Extends Offer

CHICAGO (AP) — For the fourth time in less than a month, the Household Finance Corp. of Chicago has extended its offer to purchase all outstanding Wien Air Alaska stock at



Door Busters Special

**Kazama
Rock Skis**

200cc Only

~~\$90⁰⁰~~ **\$19⁹⁵**

Door Busters

**Suver
X-C B**

~~\$75⁰⁰~~ **\$4**

DOWNHILL SKIS

Susitna Study Presentations to APA

9/26

You'd - Susitna project has been studied since 1950's.

Bureau of Reclamation - 1960 proposed 4 dam system

concurrent with Ramparts project } delayed
consideration

Cheap natural gas in Cook Inlet

1972 - Stevens, State Public Works - new opp. for new look at
Corps to take

Susitna Project 800 million - 1975 report

Z-dam scheme - 95% of power, lesser impact, cost

presented in 1976 - Senators agreed federal financing not possible

State concerned At Power Authority

Gravel - joint venture with Corps & state to lessen risks

- field program cost reimbursement in no project built / Sec. 203

- initial assumption of cost overruns by feds

but technical flaws with agreement - bill failed to pass through

APA then approached legislative

this

either Corps with fed guarantees, or private sector

decision in Nov. 1980

Set out proposals, picked 3 firms to prepare detailed proposals.

International Engineers -

Plan - (1) determine future demand (2) investigate available resources

(3) if Susitna best, to study project in detail.

1/ Federal - also in view of public participation. Advisory boards

- Engstrom - Plan synthesis - Future energy requirements & sources

ISER to develop projection

last menu development
various env. impacts

Comment - JELD - "citizen advisory panel" are
of the most form of public
participation.

APA should help out, not corporations

Dancer & Moore - Biology

UA museum - Archaeological

SERI (?) land use

a) env. impacts of various alternatives

b) complete impacts for Switna project

complete downstream effects,

transmission lines

public participation program

chronomorph fish studies

3 full years (FOG recommended 46 month minimum)

Water quality - stream flows, design floods
downstream floods

temperature, oxygen, turbidity, chemical,
nutrients, sedimentation

independent review of seismic

Mohr - level of effort for marketing & financing efforts

Kattentord - looking to FERC license, would only be preliminary work

only need to

extensive effort - looking at projects outside basin.

KB - we will obtain & collect info available.

Brian Rogers

Pert Wenckers - lack of consideration of ice problems

Harza

George Voland - Power studies

issues
alternate power sources - other hydro projection?
other thermal, well path

Size of projection

seismic dangers

impact on fisheries and wildlife

reliability of cost estimates

social economic impacts

Project financing

Phase I (Demand) - detail of various sizes

stage development

Portage Creek to Vee Nam oca

exc. Denol: den - serve env. impact.

Phase II - detailed planning for one set of sites

Voland - Market, Econ
- Financing studies / Power Market

Alternatives

Expansion

Econ & Financial Analysis

4 consumer categories - based on historic patterns, with
adjustments

Will consider land management & conservation

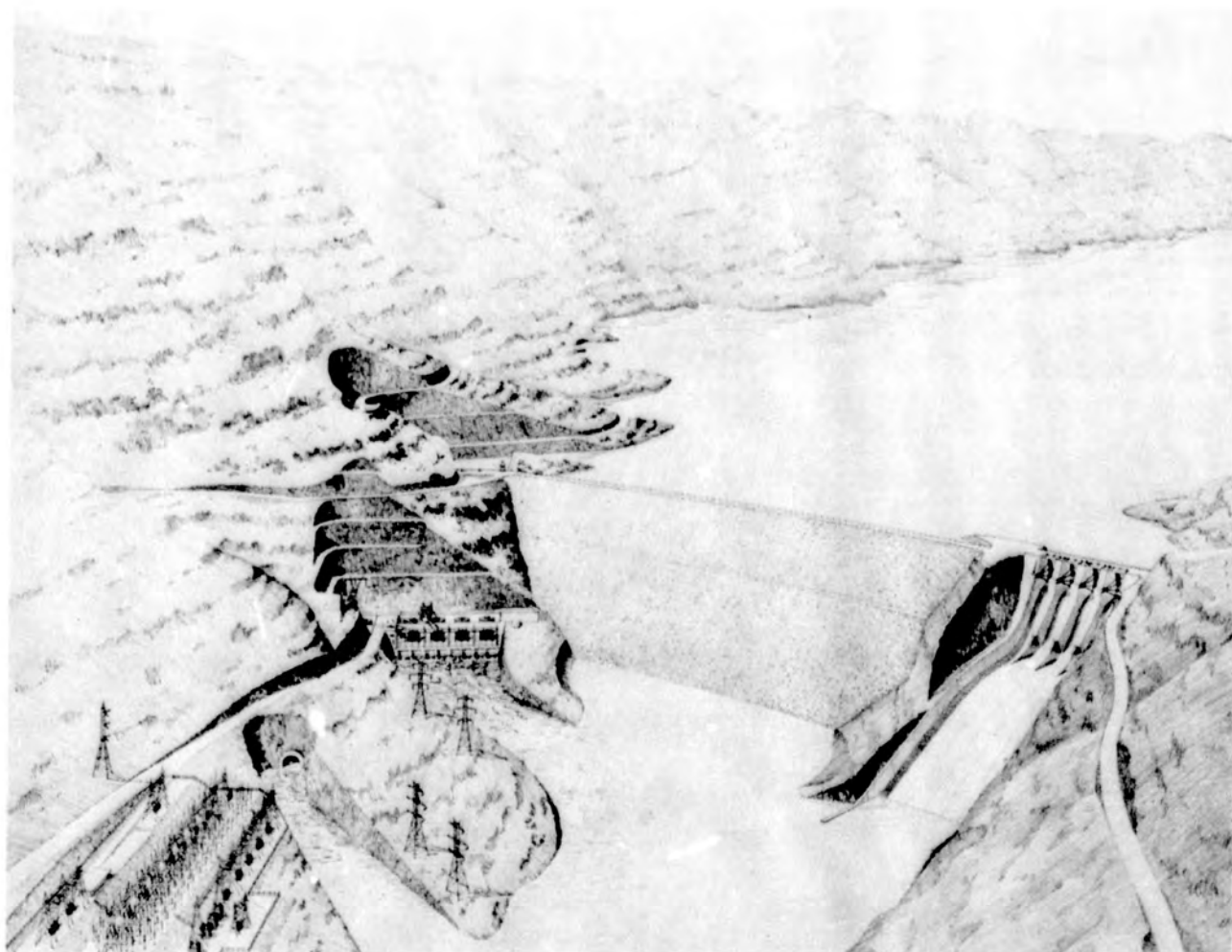
Flow serves
Analysis of
thermal
alternative
just have an evaluation
review?

THE ALASKA POWER AUTHORITY

Susitna Hydroelectric Project Plan of Study

Presentation by International Engineering Company

September 1979



INTERNATIONAL ENGINEERING COMPANY, INC.
A MORRISON-KNUDSEN COMPANY

Susitna Study Project Team

Project Executive



R. B. Christensen - Vice President

Mr. Christensen, Vice President and Regional Manager/North America, will be responsible for administrative and financial control. He will also maintain close liaison with the management of the Alaska Power Authority. Mr. Christensen has over 25 years of engineering experience and has been the Project Executive for all North American IECO projects since 1974.

Environmental Studies Principal-in-Charge



David H. Blau - Principal - EDAW Inc.

Mr. Blau is an experienced environmental planner and landscape architect with over 15 years of experience, principally in energy related projects. As Principal-in-Charge of Environmental Studies, he will provide direction and guidance to the Environmental Study Group to assure that environmental studies will be carried out in an efficient and orderly manner. Previous projects under his direction include the Environmental Report, Recreation Plan, and Fish and Wildlife Report for the 320-MW Stanislaus River Hydro Project, and the Environmental Report for the Pine Flat Hydro Project in California.

Exhibit "W" Environmental Report Coordinator



John W. Everingham - Associate - EDAW Inc.

Mr. Everingham, a system ecologist who has specialized in urban and rural environmental analyses, will be responsible for the project management and coordination of all aspects of Exhibit W-related studies including work program, work product, scheduling, production, and quality control. As Project Manager with EDAW, he is currently directing the preparation of Environmental Reports for three potential hydro projects in Idaho, as well as a Fish and Wildlife Resource Study for the Wiley Hydro Project on the Snake River.

Fish and Wildlife Resources Principal-in-Charge



James E. Hemming - Principal-in-Charge, Biological Services

Mr. Hemming, Principal-in-Charge of biological services in Alaska for Dames & Moore, will be responsible for the project management and coordination of all aspects of the biological studies for Exhibits W and S including input, scheduling, production, and quality control. He has over 17 years of experience in fish and wildlife evaluations. Having worked in Alaska since the early 1960's, he is a recognized expert on Alaskan Wildlife.

Management Project Manager



Eric B. Kollgaard - Principal Engineer

Mr. Kollgaard, Principal Engineer and Chief of the Dam Design Department, will serve as the Project Manager. He will be in full charge of all technical services provided under the terms of the contract. This will include continuous liaison with representatives of the Alaska Power Authority and coordination of the activities of the various study and design groups involved in the Susitna Project. With over 24 years of water resources experience, Mr. Kollgaard has recently served as Project Manager for the Copper Creek Hydroelectric Project, the raising of Ross Dam, and the Windy Gap Water Supply Project.

Deputy Project Manager



Robert W. Retherford - Vice President - Arctic District

Mr. Retherford, Arctic District Vice President and Manager, will serve as Deputy Project Manager. He will be in charge of the Public Participation Program, in addition to his duties as the project management representative in Alaska. Mr. Retherford, who has received numerous awards in recognition of his valuable contribution to advancing engineering in Alaska, has over 25 years of experience in the power industry including design, construction, operations, economics and rate analysis.

Plan Synthesis Chief Planning Engineer



A. Ragnar Engebretsen - Principal Engineer

Mr. Engebretsen, Principal Engineer with over 30 years of experience, will be in direct charge of the Plan Formulation Studies, and the Definitive Project Studies. He serves as Chief Planning Engineer in the Water and Power Resources Planning Department and has been involved in Master Planning Studies in Peru and Bangladesh, water resources feasibility studies in the western United States, and the planning and design of hydro projects in the U.S., Australia, Taiwan, Iceland and Norway.

Preliminary Design Design Coordinator



Ram P. Sharma - Principal Engineer

Mr. Sharma, Principal Engineer will serve as Design Coordinator. He will be in charge of design input to the Plan Formulation Studies and preliminary design of project features for inclusion in the Definitive Project Studies report. Mr. Sharma has over 27 years of experience in the field of water and land resources development with particular emphasis on the design and analysis of dams, spillways, power intake structures and other major structures associated with water resources projects.

Technical Review Board Chairman



Archie A. Stone - Executive Vice President, Engineering

Mr. Stone, Executive Vice President, will serve as Chairman of the Technical Review Board. He will be responsible for monitoring the technical development of the project and advising the Project Manager in major decisions. His 30 years of experience in water resource development includes 16 hydroelectric projects for which he served as Design Engineer and Project Manager. Mr. Stone has served in a similar capacity on various other projects including the 12,600-MW Itaipu in Brazil.

Hydrological Studies Principal-in-Charge



Cyril J. Chan - Chief Hydrologist

Mr. Chan, Chief Hydrologist, has conducted hydrological studies for such major projects as the 12,600-MW Itaipu Hydro Project, the 2,100-MW Itumbiara Hydro Project, and the Nicaragua Master Plan. As Principal-in-Charge he is responsible for evaluating and defining the scope of hydrologic studies required for the project; directing and coordinating the activities of the Task Group Leaders in the study group; and establishing criteria guidelines, and overall technical supervision of all hydrological studies.

Geotechnical Studies Principal-in-Charge



Joseph S. Long - Chief Geologist

Mr. Long, Chief Geologist with over 20 years of experience in engineering geology, will serve as Principal-in-Charge of Geotechnical Studies. He will direct and review the studies undertaken by the Geotechnical Studies Group to ensure efficient execution and high quality performance of the work. Typical recent hydroelectric projects include the 12,600-MW Itaipu Project, the 2,800-MW Sao Simao Project, and the underground powerhouse and arch dam foundations at the Paute Hydro Project in Ecuador.

Anchorage Support Operations Principal-in-Charge



Ray S. Samuelson - Deputy Manager and Administrator, Anchorage

Mr. Samuelson, Deputy Manager and Administrator of the Anchorage office, will be responsible for overall coordination of support operations to ensure that the activities are scheduled properly and executed in a timely manner. Support operations under his direction will include: office support; field camps and logistics; permit applications; real estate; surveys and mapping; and other field activities.



International Engineering Company's Project Team for the Susitna Hydroelectric Project Plan of Study is composed of

- IECO, established in 1945, a consulting engineering company specializing in water resources work throughout the world

in association with

- EDAW, Inc. and Dames and Moore, consultants in the environmental sciences, with wide experience on studies for hydroelectric projects and special expertise in the Alaskan region
- Hydrocomp, Inc. specialists in computer based hydrologic analysis

and supported in areas of their particular expertise by

- Cook Inlet Region, Inc./Holmes and Narver Inc.
- University of Alaska's Geophysical Institute, Museum and Institute of Social and Economic Research
- Shannon & Wilson

A World of Experience

Pioneering in the development of new engineering concepts and designs for dams and related projects is a tradition with INTERNATIONAL ENGINEERING COMPANY, INC. (IECO)... a tradition built on over 30 years of experience in more than 50 countries around the world. Our services for hydroelectric projects include everything from initial studies for site selection and feasibility, through preparing specifications for equipment procurement and final construction drawings, to construction management.



With an inventory of 23 multi-purpose water projects, 50 major dams, 170 km of tunnels, 43 hydroelectric powerhouses, 3000 km of transmission lines and 3 major pumping plants, we at IECO have a world of experience in the investigation and design of major dam and dam-related projects to offer.



INTERNATIONAL ENGINEERING COMPANY, INC.
A MORRISON-KNUDSEN COMPANY

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CABLE INTERENGCO TELEPHONE (415) 442-7300

SUSITNA HYDROELECTRIC PROJECT

PLAN OF STUDY

PRESENTATION BY INTERNATIONAL ENGINEERING COMPANY

A G E N D A

- ° INTRODUCTION - R. B. Christensen
 - 1. MANAGEMENT
 - GENERAL STUDY APPROACH - E. B. Kollgaard
 - PUBLIC PARTICIPATION - R. W. Retherford
 - 2. PLAN SYNTHESIS - A. R. Engebretsen
 - 3. ENVIRONMENTAL STUDIES
 - GENERAL APPROACH - D. Blau
 - BIOLOGICAL ASPECTS - J. Houghton
 - 4. HYDROLOGICAL STUDIES - C. J. Chan
 - 5. GEOTECHNICAL STUDIES - J. S. Long
 - 6. PRELIMINARY DESIGN - R. P. Sharma
 - 7. ANCHORAGE SUPPORT - R. S. Samuelson
 - ° EXECUTIVE OVERVIEW
 - TECHNICAL - A. A. Stone
 - BUSINESS - R. B. Christensen
-

ALASKA POWER AUTHORITY

AGENDA

Anchorage, Alaska

September 27, 1979

- I. Review and Approval of Minutes of the August 10, 1979 meeting in Anchorage.
- II. Opportunity for public comment.
- III. Consideration of a loan from the Power Project Revolving Loan Fund for the Mennonite Creek Hydro-electric Project.
- IV. Consideration of actions with respect to the Swan Lake Project.
- V. Selection of a consultant for the Nome/Kotzebue Study.
- VI. Consideration of the Lake Tye Letter of Understanding.
- VII. Internal Operations of the Power Authority:
 - (a) Susitna Project Management Proposals.
 - (b) Bond Counsel Contract.
 - (c) Power Authority Budgets.
 - (d) Proposed Legislation.
- VIII. Any other Business or Action which may properly come before the Board.
- IX. Actions Relative to the Susitna Project:
 - (a) The proposed agreement with Cook Inlet Native Corporations.
 - (b) Presentations by the three Engineering firms on Alternative Methods of Proceeding with the Susitna Project.

→ Adequacy of demand model:
ability to predict future?

→ Views of Power Alternatives

→ Should Power Study be under Consultants control?

~~→~~ → strong recommendatiⁿ that power study be
conducted independently

→ adequacy of contract - what is

→ Take or pay contracts as opposed to guaranteed

↳ are utilities prepared to buy power beforehand?

Building incrementally

Susitna Proposals

Int. Engineers

begin 1/80

total budget - \$22,366,000
+ 13,270,000 followup

(A) environmental studies - ~~\$3,500,000~~ \$4,105,000
~~research plan~~ includes socioeconomic

(B) Alternatives -

oil & gas	- 55,000
* Other	60,000
power ^{market} studies	87,000
	<hr/>
	202,000 ←

economics of project - impacts

79,000
<hr/>
281,000 ←

evaluation of alternative structures

163,000
<hr/>
444,000

(C) Public Participation - 216,000

- engineer doing alternative system has experience only in conventional & geothermal sources of energy

[Project proposal is well organized

by
7/80
7/80
most by
12/80

Susitna Proposals

ACRS

Start 1/1/80

feasibility - 19.7m

public participation 3.4m

26.2m - subsequent costs

anticipated difficulties

a) demand seismic etc. - good coverage

Task 1 - Power Studies \$407,000 load forecast by 7/80
alternatives by 12/80

Task 7 - Env. Studies 4.9m prelim - 7/82 through 85

Task 12 - Public Participation 657,000 7/82 final review

Power Studies - Woodward-Clyde Consultants / 276-2355

A - Load Forecasting - \$42,000 weeks 1-10 (WCC)

multiple regression models

derived demand models

B - Load Growth Scenarios - 88,000 weeks 8-26 (WCC)

analysis of demand - good range

scenarios

conservation

forecast development

design.

C - Selection of Power Alternatives - 97,000 wks. 20-35 (WCC, dc)

coal, soft path, gas conservation

consistency into alternative systems socioeconomic

D - Selection of Viable Expansion sequences - \$30,000 wks. 26-40 (ACRS)

sensitivity to scheduling concerns

Personnel - ~~over~~
Comment - no one at WCC with experience
conservation or soft path technology

Public Participation - meetings
program reports
media
report means availability
responses & questions

E - Impacts \$138,000 w/ 30-45 (WCC, TES)
F - Report - 12,000 w/ 40-48 (HRC)

Susitna Proposal

Harza

- less emphasis on alternatives

budget: 17.8 m + license app

4.3 app to award

27 months \$22.1 million

guidelines: environmental effect,

size sizing, alternative concerns

Procedure:

- 1) best Susitna project
- 2) environmental assessment
- 3) econ. of alternatives

soft path
no-load growth

assume thermal generation
best alternative

Public Info	657,000	(80-82)
Power Market	68,000	(to 9/80) ^{update in 81}
Alternatives	265,000	(early ^{mid} 1980 + mid ^{late} 1981)
System Expansion	62,000	(late 1980 + late 81)
Econ + Finance Analyses	112,000	(1982)

continued
design
of
various
sections

"thermally" oriented

Personnel - no special alternatives experience

Env. - ??

very poor organization
of project proposal

ALASKA POWER AUTHORITY

June 25, 1979

Acres American
of Buffalo, NY
won this
competition.

SUSITNA HYDROELECTRIC PROJECT

DETAILED FEASIBILITY ANALYSIS

REQUEST FOR PROPOSAL

A. INTRODUCTION:

The Alaska Power Authority is requesting written proposals from selected firms for a program of study leading to a license application to the Federal Energy Regulatory Commission for construction of the Susitna Hydroelectric Project. Inherent in the preparation of the license application is a definitive determination of project feasibility and an assessment of all alternative means of meeting the load requirements. The submitted proposal is to be in the form of a Plan of Study (POS). The three firms selected to receive this request for proposal are those that were determined by the Power Authority to be best qualified as evaluated on the basis of a previous submittal of qualifications and experience.

B. BACKGROUND:

Development of the hydroelectric potential of the Upper Susitna River Basin has been the object of extensive and long term study by federal and state agencies and some private interests. The most comprehensive analysis was a feasibility study completed by the Corps of Engineers in 1976. The recommendations contained in this report led to conditional Congressional authorization of the project pending release of the report to Congress by the Chief of Engineers. That action by the Chief of Engineers was forestalled by the Office of Management and Budget (OMB) which requested additional verification of feasibility. The additional studies were undertaken by the Corps of Engineers, and the results were presented in a 1979 Supplemental Feasibility Report. Copies of both the initial and Supplemental Feasibility Reports were provided as an attachment to the initial May 4, 1979 Request for Proposal.

The original Corps of Engineers feasibility study entailed an assessment of energy alternatives available to meet the forecasted power needs of the Railbelt area. A number of development schemes for the Upper Susitna River Basin were analyzed, and at least three were found to be economically feasible. The evaluation criteria were technical viability, economic feasibility and environmental acceptability. The recommended plan of development entailed a system for two major hydroelectric dams with transmission facilities to both Anchorage and Fairbanks. The 1979 Supplemental Studies offered additional verification of the plan's feasibility.

The Devil's Canyon Task Force, an ad hoc advisory group appointed by the Governor, concurred in the overall findings of the Corps of Engineers, but also enumerated a number of issues that needed clarification during more detailed studies. The Devil's Canyon Task Force report is attached.

ALASKA POWER AUTHORITY

It is the intent of the State of Alaska, through the Alaska Power Authority, to undertake the detailed studies required before a definite construction decision can be made. The State has two optional ways to proceed on the funding and management of these studies. The first entails a cooperative effort with the Corps of Engineers under Section 203(e) of the Water Resources Development Act of 1976. This Legislation provides that the Corps of Engineers would conduct the detailed studies with reimbursement by the State of Alaska if the project proved feasible. Amendments to the Act are currently being sought. These amendments would expand the authorization to allow initial funding by the State with Federal reimbursement if the project is determined to be either economically infeasible or not financially.

In keeping with Section 203 approach, the Corps of Engineers at the request of the State developed a POS describing a program of detailed feasibility studies. That plan of study was designed specifically to implement Section 203, and therefore the scope of the proposed studies does not relate directly to the requirements being outlined in this Request for Proposal (RFP). The Corps of Engineers' POS was provided to you under Step 1 of the selection process.

The second option for conducting detailed feasibility studies excludes the Federal government except in a permitting role. Under this alternate approach the State of Alaska would finance the detailed studies with its own resources and contract directly with private engineering firms to actually conduct the work and to seek a license for construction. The Power Authority has been directed by the Alaska Legislature to develop a plan for implementing this second approach. The proposal being sought through this RFP is that implementing plan.

During the latter part of 1979 a decision will be made to initiate the Susitna Feasibility Study utilizing one of the two optional approaches. If the decision is to proceed without the Corps of Engineers, then the competing POS will be used as one means of evaluating the three firms under consideration. Under State legislation the Power Authority must determine if the competing private sector proposals represent a reasonable alternative to initiation of the Phase I studies using the Corps of Engineers. The Engineer selected to perform the Susitna Feasibility Studies will be required to utilize Alaskan firms as sub-contractors whenever possible. In addition the agreement between the Power Authority and the Cook Inlet Native Village Corporations requires strong affirmative action in hiring of natives and sub-contracting with native firms.

C. PURPOSE OF THE PLAN OF STUDY:

The requested POS has a two-fold purpose.

1. Provide a description of the work required to definitively assess project feasibility and prepare a Federal Energy Regulatory License Application as an alternative program of study to that proposed by the Corps of Engineers under Section 203.

ALASKA POWER AUTHORITY

2. Provide an additional means of evaluating the three firms previously determined to be most qualified to undertake the detailed feasibility studies and license application preparation.

The Plan of Study becomes the property of the Power Authority upon submittal, and the Power Authority reserves the right to supplement, delete portions, or otherwise alter the POS as deemed advisable. The use of all or a portion of a POS by the Power Authority does not necessarily imply the selection of the preparing firm in the conduct of the detailed studies. The POS will be an important but not the sole basis for selection.

D. ACTIONS TO BE TAKEN UPON PLAN OF STUDY SUBMITTAL:

In keeping with the purposes of the POS, two separate actions will follow POS completion.

1. The Power Authority will recommend to the Governor, on the basis of the Plans of Study and other pertinent factors, the most appropriate method of proceeding with detailed studies and license application. Generally, the choice will be between contracting with the Corps of Engineers under Section 203 or contracting directly with a private engineering firm.
2. If the decision of the Governor is to forego the Section 203 approach and instead utilize a private engineering firm, the Power Authority will select the engineering firm on the basis of the initial submittal of qualifications, the POS, and any other appropriate means of evaluation.

E. PROGRAM OBJECTIVES:

The POS should describe the scope, schedule and cost of the activities needed for detailed feasibility studies and license application preparation. The scope of the proposed studies should be sufficiently detailed to insure that the critical issues determining project feasibility are explored to the degree that a definite decision can be made regarding project construction. In keeping with this criteria, the work program proposed by the engineer in the POS should be designed to accomplish the following:

1. Determine the optimal plan for developing the hydroelectric potential of the Upper Susitna River Basin. The optimal plan is that plan which is most beneficial to the residents of Alaska. A multiobjective approach is to be used in plan formulation. These objectives should include, but not be limited to:
 - (a) minimizing market area electrical power costs,
 - (b) minimizing adverse environmental and social impacts while enhancing environmental values to the extent possible,

ALASKA POWER AUTHORITY

- (c) safeguarding both life and property, and
 - (d) maximizing the likelihood of project financing and implementation.
2. Compare the selected plan for Susitna hydropower development with all other reasonable alternative means of satisfying market area power needs. The overall objective is to benefit the people of Alaska by developing that means of meeting electrical power requirements that offers a minimum of uncertainty, environmental impact and financial burden.
 3. Determine with reasonable certainty the cost of the project and cash flow requirements.
 4. Determine the physical, economic and financial risks associated with project development.
 5. Determine the nature and extent of environmental and social impact of the project, along with those mitigating measures that could be taken to minimize or offset adverse impact.
 6. Determine the estimated annual system power costs both with and without the project, study the integration of Susitna power into the Railbelt utility systems, and assess power marketability.
 7. Prepare a Federal Energy Regulatory Commission (FERC) License Application for construction.
 8. Keep interested parties and the general public informed of study progress and solicit public input as appropriate.

F. REQUIREMENTS:

The POS should contain as a minimum the following elements:

1. A clearly defined set of objectives that specify the level of detail to be achieved by the recommended program of study. The engineer is being given only general guidance regarding the purpose of the detailed studies and the needs of the Power Authority. It is up to the engineer to define as clearly as possible how far along the path of project planning and design the detailed studies will take the project. It is clearly recognized that the estimated level of detail required to fulfill the Power Authority's needs regarding definite project construction recommendations is a matter of judgement and may differ among the three engineering firms. As a result, of course, the time required for study completion and estimated cost will vary accordingly. The Power Authority is not necessarily looking for the shortest duration or least cost program; rather the Authority is seeking that program of study which most effectively responds to the State's need for information

ALASKA POWER AUTHORITY

sufficient to judge whether or not to proceed with construction and to fulfill the requirements of a FERC License Application. The Power Authority is seeking, through this POS, recommendations on that appropriate level of detail.

2. A general discussion of the overall study approach. This discussion should specify any study phases and intermediate decisions points, the nature and timing of reports, overall program duration, and estimated total cost. In addition a proposed budget to carry through the license to contract phase shall be provided.
3. A discussion of the personnel, equipment and other resources that will be used to accomplish the program of study. This should include supporting services as well as in-house resources. Plans for joint-ventures or sub-contracts should be specified, along with any arrangements made for study participation by Governmental agencies. Definite assignment of key personnel will be required.
4. A description of any recommended public information and/or public participation programs. In addition to addressing the involvement of the public at large, this discussion should include planned coordination with interested governmental or private interests and the use of any advisory or review bodies.
5. A summary of relative study effort among the various major disciplines. This requirement is included to allow a rapid determination of, for instance, what proportion of overall study cost is associated with environmental impact studies or geotechnical studies.
6. A detailed discussion of the separate study items or activities that comprise the proposed program. The discussion should in each case describe the activity, explain the purpose for the activity, and provide a cost estimate for the activity. The number of component activities, of course, could theoretically range anywhere from one to an infinite number. The degree to which the program is broken down into component parts is left to the judgement of the engineer. The Corps of Engineers, for instance, presented about 200 separate activities in their POS. In the Corps' view this was a reasonable breakdown for purposes of scheduling, cost estimating and program description. Estimates will also be made of the scope, nature and timing of support that will be required from the Power Authority and other agencies during the course of the feasibility studies and license application process.
7. A discussion of the logistical problems inherent in conducting the program of study and the proposed means of dealing with these problems. The engineer's plan in this regard must accommodate Bureau of Land Management and Alaska Native Corporation land use stipulations, and it must be sensitive to the needs and desires of area residents. A draft copy of the land use permit and associated stipulations is attachment 2.

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8. A schedule of program activities and an estimated quarterly budget by program and activity. The schedule should include not only work items through license application, but also estimates of time and activity up to initiation of construction. The planned initiation of the program should be no earlier than October 1, 1979. Note that \$8.178 million has been appropriated for these studies by the State of Alaska for the fiscal year beginning July 1979. Carryover of this initial year funding to subsequent fiscal years is acceptable. There are several budget items that should be included in the program and which are not subject to the discretion of the engineer. The Power Authority has agreed to pay the affected Native Corporations \$36,000 per year for use of private land and approximately \$3,000 per month for a full time inspector representing native interests in accordance with the proposed Native Corporation agreement which is attachment 3. Expenses of the Power Authority for study coordination and review in the amount of \$100,000 per year should also be included. A final required budget item is \$1 million for an independent cost estimate and seismic risk analysis to be scheduled at the discretion of the engineer.
9. In addition to the POS, each firm should provide a draft of contractual language which would permit the Power Authority and the Engineer to enter into an agreement which recognizes the various requirements and responsibilities of each party.

G. PLAN OF STUDY FORMAT:

In order to facilitate orderly review and comparison among the Plans of Study, engineers are requested to present their proposed program in the following format. The headings generally parallel the requirements previously discussed.

1. Cover Sheet
2. Table of Contents

Part A. Plan of Study:

1. Program Objectives
2. Study Approach
3. Budget Summary (by discipline and by quarter).
4. Logistical Plan
5. Detailed Activity Descriptions and Cost Estimates
6. Program Schedule

Part B. Implementation of the Plan of Study:

1. Key Personnel Assignments
2. Organizational Structure of the Study Team
3. Coordination Procedures

ALASKA POWER AUTHORITY

Part C. Supplemental Information. (This section should contain any information not specifically related to the POS that would be useful to the Power Authority in their deliberations.)

H. PLAN OF STUDY SUBMISSION:

Twenty copies of the POS should be mailed or delivered in person to the following address to arrive not later than 4:30 PM, Alaska Daylight Time, September 4, 1979. An oral presentation before the Power Authority Board of Directors will be scheduled for early September. If a private firm is selected to perform Susitna feasibility studies, that firm may be required to revise and print 300 copies of the final POS.

Alaska Power Authority
333 West 4th Avenue, Suite #31
Anchorage, Alaska 99501

Questions concerning POS preparation may be addressed to:

Robert A. Mohn, Deputy Director for Engineering
(907)-277-7641

The contractor and engineer is requested to meet with the Power Authority staff at an early stage of POS preparation and prior to contacting other state and federal agencies.

I. COMPENSATION:

The engineer will be paid \$40,000 to help defray the cost of POS preparation. Payment will be made within 15 days of the POS submittal.

J. PLAN OF STUDY EVALUATION:

This POS will provide the "reasonable alternative program for accomplishing the work required to produce a complete application to the Federal Energy Regulatory Commission for a license to construct the project" as called for in House CS for Senate Bill No. 63 (attachment 4). Should the "alternative program" be adopted, the POS will further be used as part of the available stock of information on which selection of an engineering firm to implement the alternative program will be made.

In the latter role, the POS will be evaluated on criteria such as the following:

1. Is the proposed program sufficiently comprehensive to allow the Power Authority to make the necessary determinations at the end of the study? These determinations would include the estimated project cost, the possible range of project cost, the economic feasibility of the project, the economic and financial risk associated with the project, the extent of seismic risk, the nature and degree of environmental and social impact, and the likelihood of securing the necessary financing and approvals.

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2. How well does the proposed program address the full range of generation modes available to meet the area's power needs?
3. Does the program include those elements necessary to satisfy the License Application requirements of the Federal Energy Regulatory Commission and the information requirements of the financial community?
4. Does the program represent a reasonable balance among the various disciplines of study, i.e. among hydrology, biology, seismicity, financing, etc., such that all key factors in the decision process are adequately addressed?
5. Is the logistical plan in compliance with the various land use permits and agreements, and is it sensitive to local resident desires and needs?
6. Is the program characterized by economy of time and money in achieving its objectives?
7. How effective are the proposed coordination and management mechanisms both between the Power Authority and the engineer and between the engineer and associated firms, subcontractors, advisory boards, governmental agencies, etc.?
8. How effective is the proposed public information and public participation program?
9. How flexible is the proposed program to unexpected study findings and how sensitive is the estimated study cost to such findings?
10. Does the program present an effective procedure for determining optimal basin development on the basis of the full range of planning objectives?
11. Does the program include an adequate means of assessing the need for and marketability of project power? Has sufficient effort been allotted to working with railbelt utilities to determine potential benefits and risks to them?
12. How well does the proposed program respond to the issues raised by the Governor's Devil's Canyon Task Force and by other interested parties?
13. Are the key personnel qualified and experienced in their assigned roles?

ATTACHMENTS

1. Report of the Governor's Devil Canyon Task Force
2. BLM Land Use Permit and Stipulations
3. Draft agreement between Power Authority and Cook Inlet Native Villages
4. HCSSB # 63

A.1.1 - Introduction

This Plan of Study has been prepared by Acres American Incorporated in response to the Request for Proposal issued on June 25, 1979, by Mr. Eric Yould, Executive Director of the Alaska Power Authority. It includes significant contributions from other firms who would generally be involved as subcontractors in the event that a contract to undertake the study itself is awarded to Acres American Incorporated. Major participants in the Acres team include R&M Consultants, Inc.; Woodward Clyde Consultants; Terrestrial Environmental Specialists, Incorporated; Cook Inlet Region Incorporated/Holmes and Narver, Incorporated; Salomon Brothers; and Frank Moolin Associates.

The gestation period for giant projects tends to be long. Wild bursts of enthusiastic effort followed by periods of genuine apathy (or total despair, depending upon whose vantage point is selected) are common. Development of the Susitna River has so far followed that classic pattern.

As early as 1952, the Bureau of Reclamation published a report identifying a large number of potential hydroelectric power sites in Alaska, noting pointedly the strategic advantages enjoyed by the Susitna River because of its proximity to Anchorage and Fairbanks. Even then, Devil Canyon was perceived as the place to install a large dam. It was--and is--a steep, narrow rock walled canyon through which silt laden grayish waters swirl and churn and turn to white froth as they rush for the sea. Updates by the Bureau led to proposed authorization in 1961 of Devil Canyon and Denali--a site far up-river of Devil Canyon, astride extensive wet lands and marshy areas, where the Susitna draws strength from relative placidity before it attempts the inevitable plunge through miles and miles of canyons.

Another giant project was under active contemplation in the early sixties and its mind boggling size, together with the engineering challenges it offered, were especially exciting in a brand new state and during the space technology wars then being waged. The Rampart hydro project would have created a pool larger than the State of Connecticut if it had ever been built.

While the Rampart studies put the Susitna project in limbo for a while, a number of long time Alaskans worried about the risks of such a venture. As fate and thoughtful argument would have it, Rampart is unlikely to be built at any time in this century.

Susitna was delayed long enough, though, to allow for discovery and development of then economical natural gas production. By the time the warnings of energy doomsayers were beginning to be heard and felt in 1973, the Susitna project once again began to appear attractive. The Bureau of Reclamation updated its earlier studies in 1974, recommending a four dam system, and the U. S. Army Corps of Engineers launched a major pre-feasibility study which led to a recommendation in 1976 by the Chief of Engineers that the Susitna Project be authorized. The Corps plan recommended two high dams, the first of which would be built as a massive earthfill gravity structure 810 feet in height at the Watana site more than

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from Acres American proposed Susitna Plan of Study

30 miles upstream of Devil Canyon. The second Corps dam was to be 635-foot high thin arch concrete structure which would sweep across the canyon from rock abutment to rock abutment -- essentially the same as the Bureau's Devil Canyon proposal.

By June 1978, the Corps of Engineers had prepared a Plan of Study requiring 24 million dollars and offering a program leading to completion of a detailed feasibility study. Further investigations by the Corps confirmed the adequacy of the Watana site, though they did reveal that some changes were required in particular for the spillway arrangement. As the situation now stands, provided that the necessary appropriations are made, the State of Alaska could choose to proceed along a course of action which leads to a study undertaken by the Corps and reimbursed by the State. A unique risk protection feature would permit the return of State funds in the event that feasibility is not shown.

The alternative to further federal involvement in the Susitna project is a scenario which includes selection of a private engineering firm as the State's consultant. Qualifications have been reviewed by the State for all those interested firms with strong hydroelectric development capabilities and three have been engaged to prepare a Plan of Study detailing the steps necessary to permit filing a license application to the Federal Energy Regulatory Commission (FERC). This Plan of Study describes a series of tasks and subtasks, along with reasons for these, as well as providing information regarding organizational matters and team qualifications.

A.1.2 - Primary Objectives of Study

- (i) Establish technical, economic and financial feasibility of the Susitna Project to meet future power needs of the Railbelt Region of the State of Alaska.
- (ii) Evaluate the environmental consequences of designing and constructing the Susitna Project.
- (iii) File a completed license application for the project with the Federal Energy Regulatory Commission.

A.1.3 - Specific Objectives of the Study

To meet the primary objectives of the study, the following specific objectives are proposed:

- (i) Determine the future electric power and energy needs of the Southcentral Railbelt Area.
- (ii) Assess alternative means of meeting the load requirements of the Railbelt Area.

- (iii) Prepare an optimal development plan for the Susitna Project wherein power costs and probable impacts are minimized, safety is enhanced, and financing is achievable.
- (iv) Establish a definitive estimate of the total cost of bringing power on line, together with a statement of cash flow requirements.
- (v) Evaluate the physical, economic, and financial risks of the Susitna Project and determine ways and means to avoid or minimize their consequences.
- (vi) Evaluate existing environmental and social factors as they now exist in the proposed project area, assess the impacts of the proposed project, enhance environmental values to the extent possible, and recommend mitigating measures.
- (vii) Estimate the annual system power costs in the Southcentral Railbelt Region with and without the project, study the integration of Susitna power into the Railbelt utility systems, and assess power marketability.
- (viii) Prepare a complete license application and file this with the Federal Regulatory Commission.
- (ix) Ensure that the needs and desires of the public are known, keep interested parties and the public informed, and afford an opportunity for public participation in the study process.
- (x) Determine an optimal program for achieving financing, including resolution of issues regarding tax-exempt status of bonds which may later be offered.
- (xi) Minimize the financial risks and expenditures which must be incurred by the State of Alaska in pursuit of the above objectives should development of the Susitna Project prove to be not in the best interests of the State.
- (xii) Maximize opportunities for equal employment opportunities for Alaskans and for involving in the work members of those Native Corporations in the region.

A.1.4. - Primary Aspects for Susitna Requiring Study

(i) Introduction

As with any major hydroelectric project, the number of investigations and substudies required to achieve the primary objectives noted in paragraph A.1.2 above is significant. Each of these requirements is described in terms of precise tasks and subtasks in Section A5. Even so, a number of primary aspects, particularly insofar as they address major concerns, deserve to be highlighted. Thus certain key areas of the study are highlighted in succeeding subparagraphs.

(ii) Power Studies

While this Plan of Study had necessarily to be written on the assumption that project feasibility will in fact be demonstrated, we are well aware of the importance of demonstrating that a need for significant increases in power generating capacity does truly exist in the Railbelt Area and that this need can best be satisfied by the Susitna Project. Indeed, it is clear that the absence of need or the discovery of a better means of satisfying it if it exists will represent prima facie evidence that development of the project is not in the best interests of the State. Power studies will be undertaken to examine and define a range of load forecasts and to assess possible alternatives or groups of alternatives which together could satisfy the projected demand.

We will avail ourselves of intimate knowledge of Alaska in general and the Railbelt in particular through employment of the Alaskan office of Woodward-Clyde Consultants (WCC) to undertake load forecasting studies. WCC in turn has arranged for consultation from the University of Alaska, particularly for use of their econometric models. The study of non-hydro alternatives by WCC (reviewed by Acres' Thermal Power Division) and of hydro alternatives by Acres will be enhanced through use of the General Electric Optimum Generation Program, Series V (sophisticated computer models designed to permit multiyear analysis of generation system mixes) which we have successfully used in the past for a comprehensive study of alternatives to the Dickey-Lincoln School Lakes Project in New England.

(iii) Financing Plan

Successful financing of giant projects is inevitably a complex and time-consuming task. Our own expertise in this area, as evidenced by participation in the successful financing of the Churchill Falls Project where Mr. J. G. Warnock managed the team responsible for bond support documents, will be available to our financial consultants, Salomon Brothers. This well known investment banking firm has managed or co-managed 655 issues of tax-exempt bonds in the total amount of \$48.3 billion since January 1, 1974. Dr. C. P. Chapman will manage risk analysis studies. His unique special capabilities in that area have been demonstrated time and again for large projects including some in subarctic environments.

(iv) Ice Engineering

The study of ice engineering has necessarily been an important part of Acres' efforts for past projects in recent years. Our successful involvement in hydroelectric projects throughout North America, with a total installed capacity of over 14,000,000 kW, is a matter of record. Assistance in ice engineering studies will be provided as well by R&M whose hydrologic investigations of rivers and streams throughout Alaska has been significant. Our conceptual designs for

minimizing the problems associated with frazzile ice, ice jams, ice shelving and the like will be subjected to exhaustive modeling after license application has been made and during the preparation of detailed designs. Problems associated with permafrost are also familiar to the Acres organization: our staff have extensive experience in developing unique and effective methods of dealing with such problems in connection with large power projects in subarctic regions.

(v) Earthquake Engineering

Of the many potential risks associated with the Susitna Project, those associated with seismic problems are probably the most significant. Certainly, no single area of concern is likely to have more immediate catastrophic consequences if the engineering work has not been done thoroughly and well. Not only is it important to design all structures to survive unscathed in the event of an earthquake, but it is also essential to determine the extent to which creation of reservoirs on the Susitna River will itself induce earthquakes.

Our approach to this problem is twofold: first, we have engaged the services of the California office of WCC to undertake extensive seismic studies. WCC has operated in Alaska for over ten years and has amassed a considerable data base on geological and geotechnical conditions, faulting, and seismicity of the Anchorage and Railbelt Areas. WCC have also had extensive seismic experience with major dam and power projects elsewhere. Second, we have recommended a list of eminent professional engineers whose accomplishments are recognized worldwide as the basis for selection by the Power Authority of one or more external review boards. The engineering board would be provided funds on the order of \$1 million with which to undertake confirmatory or additional seismic studies. Acres would offer coordination services and administrative support, where appropriate, to the board(s), but authority to select, remunerate, terminate and to direct their activities would remain with the Power Authority.

(vi) Project Management/Construction Management

In order to provide Alaskan-experienced project and construction management capability in the POS team, Acres will combine with its in-house resources the additional resources of the Frank Moolin and Associates, Inc. organization. This company presently operates out of Fairbanks, Alaska and provides executive project and construction management experience to the energy industry. The Moolin team provides many years of "hands-on" experience on varying sizes and types of projects, including recent responsibility for construction of the Trans-Alaska Pipeline, a \$4.2 billion effort. Members of the organization provide an unusual, multi-disciplined, combination of energy, industry and heavy construction experience. In addition, conditions unique to planning, managing and constructing projects on the Alaskan scene are familiar to all of these individuals.