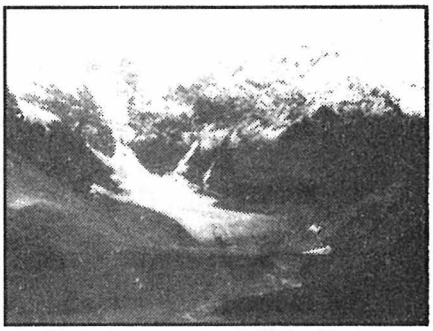
SUSITNA HYDROELECTRIC PROJECT NEWSLETTER
September 1983

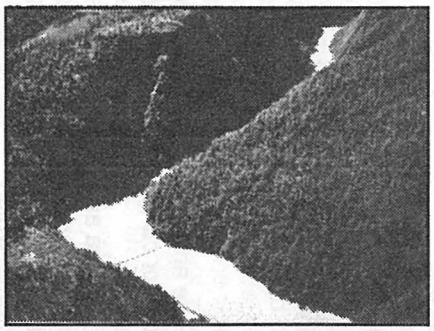
susitna hydroelectric project Newsletter

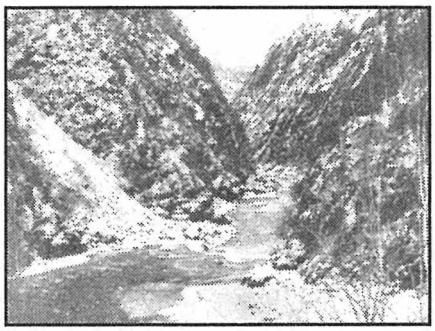
september 1983

The Susitna River System

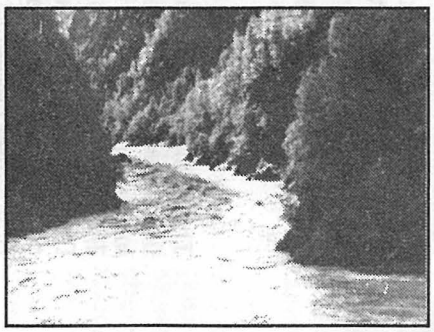
During its 318-mile journey to Cook Inlet from the Alaskan Range, the Susitna River changes "faces" several times. The Susitna originates about 90 miles south of Fairbanks, where summer runoff from three glaciers feeds forks of the river. These forks run about 18 miles south before joining to form the mainstream. Flowing out of its glacial headwaters, the Susitna

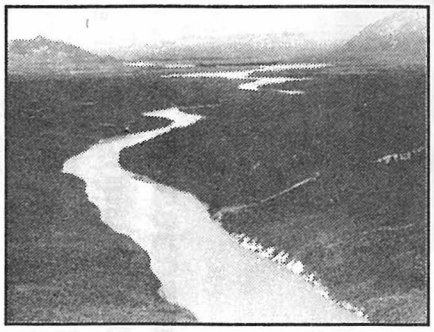


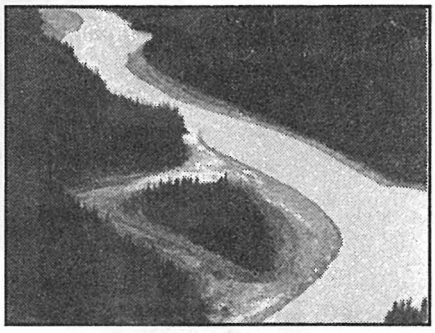




crosses a generally flat, broad valley for about 55 miles. It is in this meandering upper stretch that most of the coarse sediments from the glaciers settle out. Just below the confluence with the Tyone River, the Susitna turns westward, flowing for 96 miles through narrow valleys and deep canyons. The walls of these canyons are up to 1000 feet in height.







In the area of Devil Creek, the river cuts a deep gorge, known as Devil Canyon, and creates some of the most violent white-water rapids in the world. Below Devil Canyon, the river turns south again, becoming much less steep and confined. About 40 miles south of Gold Creek, the Susitna is joined by two of its major tributaries: the Talkeetna and Chulitna Rivers. From this confluence, the Susitna flows south through increasingly braided channels for 97 miles before it empties into Cook Inlet near Anchorage.

The Susitna is a typical northern glacial river with high, turbid summer flow and low, clearer winter flow. Runoff from snowmelt and from rain in the spring causes rapid increases in flow. At breakup, flows increase to over 13,000 cfs as the river freezes in November and December, and to a low of 1000 cfs in March and April.

In terms of physical configuration, the east-west stretch of the river is ideal for a hydroelectric project. Various projects have been suggested since the early 1960s. The present concept, developed by the Alaska Power Authority, is the subject of this newsletter.

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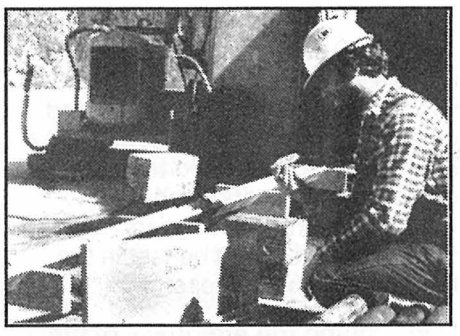
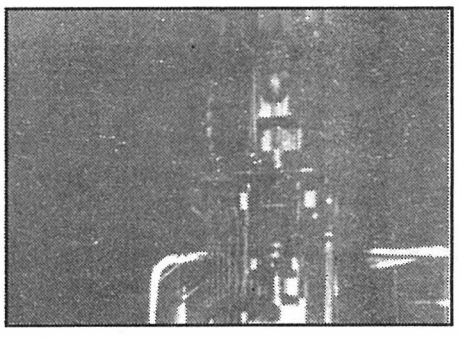
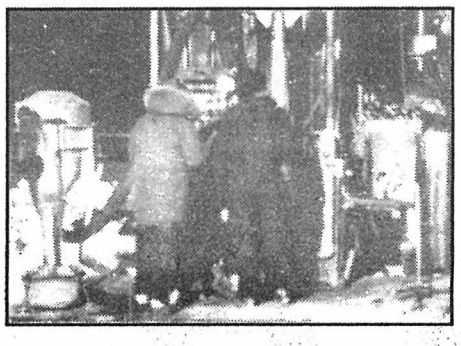
Susitna Project History

1975 •Corps of Engineers complete project study and Draft EIS on proposed federal Susitna Project

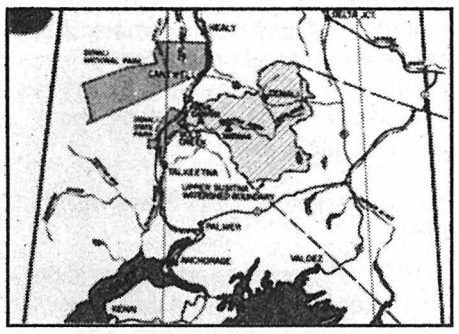


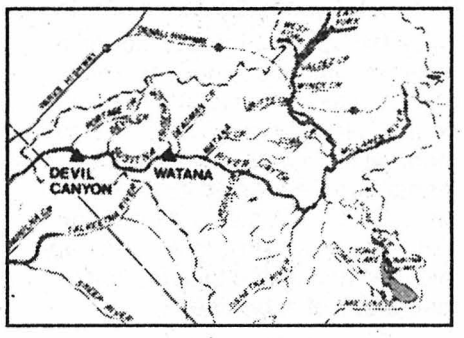


1976 •Alaska Power Authority established to provide project financing

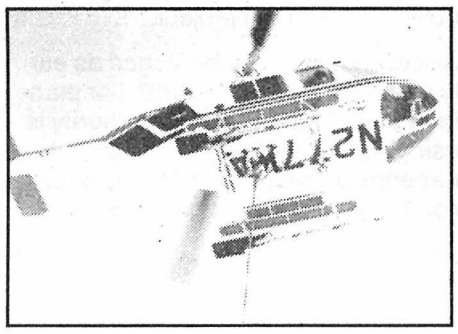


1979 •Corps studied alternatives, proposed study program
•Federal funds unavailable; State assumes project
•Power Authority selects Acres to conduct feasibility study rather than the Corps

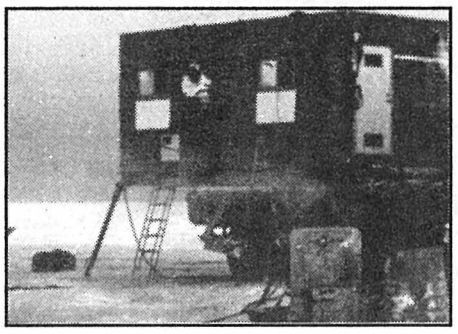


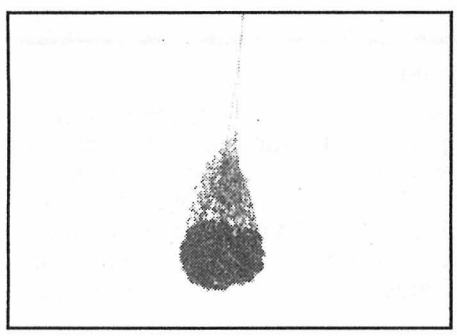


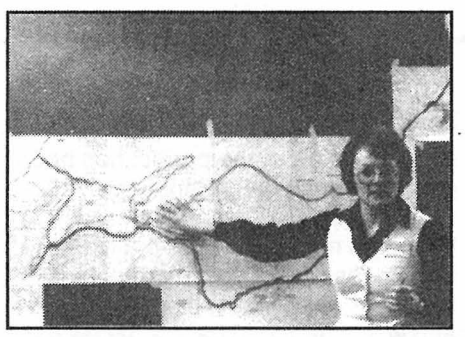
1977 •Corps continues engineering and environmental studies
• State financing of Corps project considered



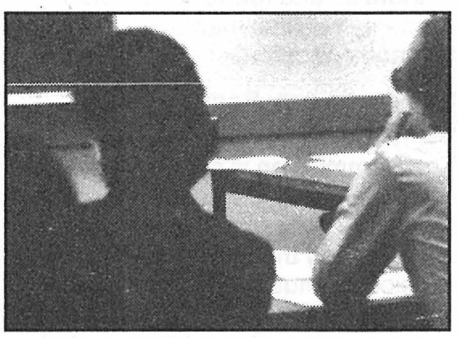
1980 •Plan of study for feasibility approved
•Battelle begins separate alternatives analysis
•Public participation program begins







1982 •Feasibility study complete; project judged feasible
•Power Authority Board recommends submitting license application, continuing design/environmental work



1983 •License application submitted to Federal Energy Regulatory Commission (FERC)
•FERC formally accepts application
•Environmental and engineering studies continue

The Susitna Project Today—Where Does It Stand?

This newsletter's purpose is to provide a general update on the Susitna Project. The Susitna Hydroelectric Project has passed several important milestones since 1980. A two-year feasibility study, conducted by Acres American, concluded that the project was technically, environmentally and economically practical. The Alaska Power Authority Board of Directors acted on those results to recommend in early 1982 that preconstruction efforts continue and a license application be submitted to the Federal Energy Regulatory Commission (FERC). That application contained a great deal of information on the engineering, environmental, and economic features of the project. It was submitted to FERC on February 28, 1983. Copies of the application were placed at that time in public libraries throughout the Railbelt for public review.

Preliminary review of the application by FERC staff revealed several areas where more information was required. After receiving those supplemental materials, FERC accepted the application as adequate on July 29, 1983. The acceptance of the license application triggered FERC's formal review process, which includes detailed evaluations of energy load forecasts and engineering and design, and the preparation of a draft Environmental Impact Statement (EIS).

While FERC is scrutinizing the project for the next 2 or 3 years, the Power Authority will continue studying the project and its impacts. The Harza-Ebasco Susitna Joint Venture has been selected as the planning and design contractor. Their continuing studies are aimed at designing the safest, best project for the least cost, and at more accurately predicting what the environmental effects will be. Plans to reduce or eliminate impacts can then be refined as the project moves through the licensing process.

In this issue, William Wakefield, Susitna Project Manager for the Federal Energy Regulatory Commission, gives his views on the project in an interview. The licensing process and current status are described. Engineering and economic studies to optimize the project and update the estimates of needed power are also discussed.

Environmental programs continue to provide information on fish, wildlife, river flows, cultural resources, and other factors important in licensing and design. Pages 6 and 7 briefly describe each study area, what has happened to date, and the study as it is now underway.

The External Review Panel advises the Power Authority on the overall project, bringing to bear many years of technical experience and capability. The Panel's members are presented on page 6.

What's Ahead—the FERC Licensing Process

The FERC process for reviewing the license application, preparing an Environmental Impact Statement, and determining whether or not to grant a license is the most important and complex authorization required for the project. There are several major milestones that must be met in the FERC licensing process:

Determining the Adequacy of the Application

The Power Authority license application was first reviewed by FERC staff to determine if it contained sufficient information for FERC to start the formal review of the project. Additional information was requested from the Power Authority in April and submitted in July. The Susitna application was determined to be adequate and was accepted on July 29, 1983.

Public & Agency Comment Period

Once the application was judged to be adequate, public notices were placed in local newspapers and the Federal Register to invite public comment on the license application. Comments were requested by October 11, 1983. Federal, State, and local agencies were provided copies of the application and asked to comment on their areas of expertise.

FERC Staff Evaluation

The FERC staff will consider three areas in their evaluation:

- need for power
- project structures
- environmental impacts

Need for Power Evaluation

Two questions are considered in the evaluation: "How much electric energy is needed in the Railbelt?," and "Is the Susitna Project the best way to provide it?" In the need for power hearings, the Power Authority will be required to demonstrate that the energy demand forecasts are reasonable, both in terms of methods used and results obtained. Practical alternatives to the project will also be assessed to satisfy the FERC that Susitna is the most attractive project. Those hearings will start in spring of 1984 and the hearing record will be considered by the FERC in making a need for power decision.

Project Structures Evaluation

Evaluating the safety of the dams and the engineering soundness of the project is a key FERC responsibility. The license application contains information on the hydrologic and geotechnical conditions of the site, availability of construction materials, and designs for all permanent project facilities, including stability and stress analysis under extreme floods and seismic conditions.

Environmental Impact Statement (EIS)

An EIS for the proposed project is being prepared by Argonne and Oak Ridge National Laboratories. The labs, retained by the FERC for this project, are both Federal research organizations. After a Draft EIS is issued, resource agencies and the public will have an opportunity to review and comment on it.

Environmental Issue Resolution

Environmental issues concerning the Susitna Project can be resolved in several ways, including negotiated settlements or formal administrative hearings. The Power Authority is committed to accommodating valid environmental concerns at the local level, within Alaska, through cooperative agreements with various agencies and organizations. Negotiated settlements will allow many issues to be resolved early in the process and on the local level, without resorting to costly and lengthy hearings in Washington D.C. If formal hearings were to be held, a FERC adminstrative law judge would prepare an opinion on the environmental issues based on the testimony presented.

FERC License Order

The five FERC Commissioners will make their decision on whether or not to issue a license based on FERC staff findings and the opinion of the administrative law judge. The majority of the Commissioners will have to be convinced that the project is needed, the structures will be safe, and that the environmental impacts of construction and operation will be adequately mitigated. They may impose a number of stipulations. For example, issuance of the license may require use of a specified river flow regime downstream of the project.

A license order may be issued as early as 1985 or as late as 1987. For planning purposes, the Power Authority is using 1986. The timing in large part depends on whether licensing issues can be resolved by negotiations.

Who Is Involved?

Alaska Power Authority

The Alaska Power Authority is a public corporation of the State, mandated to develop new power sources for Alaska. The Power Authority, as the applicant for the Susitna Project, has taken the project through the feasibility stage and submittal of the license application. If the project is authorized and funded, the Power Authority will also manage construction and operation.

Federal Energy Regulatory Commission

The Commission is a Federal regulatory body, part of the Department of Energy, with Commissioners appointed by the President. The Commissioners must issue a license for the Susitna Project before construction can begin. (See adjoining article and interview with William Wakefield)

Local, State and Federal Agencies

Agency review of the project has been going on since the beginning of the feasibility study. Their review role becomes more formal as the licensing process proceeds. Examples of the types of agencies that have had and will continue to have a review role include:

- Office of Budget and Management
- Bureau of Land Management
- U.S. Fish & Wildlife Service
- Department of Environmental Conservation
- Department of Natural Resources
- Department of Fish & Game
- Borough Planning Agencies
- School Districts
- Native Corporations

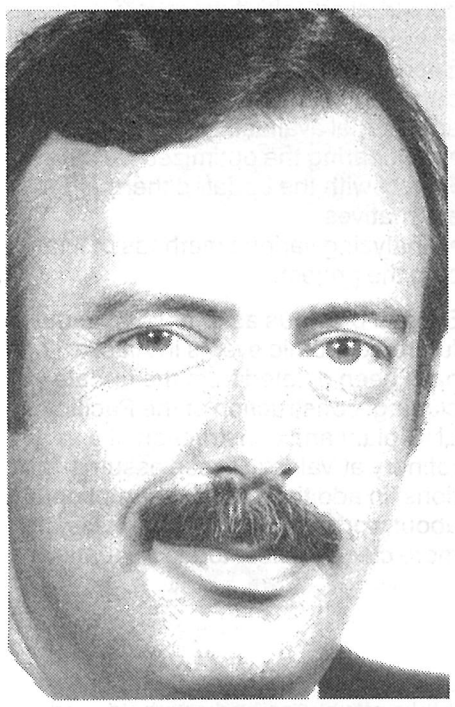
Public

Members of the public, community groups and landowners have actively participated in the project for three years. The Power Authority will continue to provide all types of information and encourage public comment through the Susitna Public Participation Program.

External Review Panel

A ten-member External Review Panel of distinguished experts is advising the Power Authority on engineering and environmental aspects of the project. Their recognized experience provides an objective overview and an alternate opinion on all project elements. See article on page 6, which describes eight panel members. Two more will be added this fall.

Interview with William Wakefield, Susitna Project Manager for the Federal Energy Regulatory Commission



"...the Commission has established a project manager and a project management schedule to track Susitna specifically."

Question: What is the Federal Energy Regulatory Commission (FERC)?

Wakefield: The Commission, under the purview of the Department of Energy, is the Federal regulatory agency that is charged with the regulation of natural gas and electrical energy in the United States. This regulatory responsibility includes both cost of energy, such as electrical rates and natural gas drilling, and construction of major pipeline and electrical generating projects, such as hydroelectric projects. The Commission is directed by five Commissioners and is organized into offices that take care of specific regulatory functions.

Question: Why does FERC need to review a project being developed and financed entirely by the State of Alaska?

Wakefield: It is mandated by the Federal Power Act. The basis of the FERC jurisdiction is the navigability of waterways and the use of Federal land. On each of these two points the Susitna Project would come under the Commission's regulatory control, in that the Susitna River may be determined to be navigable and there is a portion that the project touches that does utilize Federal lands.

Question: Has the Commission reviewed a project as large as the proposed Susitna Project recently?

Wakefield: No. The largest conventional hydropower project the Commission has reviewed recently was a project in Mississippi, around 192 megawatts. The largest project by capacity has been a pumped storage project in Bath County, Virginia, about 2,100 megawatts, in 1975-1976.

Question: How familiar is FERC with the Susitna Project?

Wakefield: We are very familiar with it. For the past two years we have been advising the Power Authority as to our regulations and what is required to file an application, particularly for a project the size of Susitna.

In October 1982, there was a special project team formed within the Commission to review the pre-filing application which was filed on the eleventh of November. For two months, we reviewed the pre-filing application and sent to the Alaska Power Authority a list of additional required information.

The official license application was filed on February 28, 1983. We then requested additional information from the Power Authority on April 12, allowing 90 days for response. The additional information was submitted on July 11 and we accepted the license for filing on July 29. Now that the application has been officially filed and accepted, we are reviewing the project in detail.

Question: You stated that a special team was formed within FERC to handle Susitna. Is this the way things are usually done or is this a new procedure?

Wakefield: We only do this on very large projects such as, in Alaska, with the ANGTS project (the Alaska Natural Gas Transportation System). Susitna is by far the largest conventional hydroelectric project that we've undertaken and the most costly and complex project of this nature. As a result, the Commission has established a project manager and a project management schedule to track Susitna specifically.

Question: What aspects of the project will FERC review?

Wakefield: We review the environmental, engineering, and economic aspects. We try to answer a number of questions: does it meet the National Environmental Policy Act (NEPA) requirements; is it safe, sound, and adequate as far as the engineering structures are concerned; and is the project economically feasible?

Question: Will an environmental impact statement be prepared? If so, who will be responsible for preparing it?

Wakefield: Yes, a project of this nature certainly warrants an environmental impact statement (EIS). When the application was found to be acceptable, the analysis and work on the EIS started. It is the responsibility of the Federal Energy Regulatory Commission to prepare that statement. It is initially prepared in draft form, called a Draft EIS. It is noted in the Federal Register, and people have a period of time in which to comment. After all those comments are considered, a final impact statement will be issued.

Question: Will the Commission staff prepare the EIS?

Wakefield: Two national labs have been hired to assist in preparation of the EIS. They are the Argonne National Laboratory near Chicago, Illinois, and the Oak Ridge National Laboratory in Oak Ridge, Tennessee. Their experts are preparing the majority of environmental portions of the impact statement. The engineering, need for power, and economic portions are being analyzed by Commission staff.

Question: Have FERC personnel visited Alaska?

Wakefield: Yes. There were meetings in May in Anchorage, Talkeetna, Cantwell, and Fairbanks for agency scoping sessions in the morning and public hearings in the evenings. There was also a site visit in August by FERC engineering, economic, and environmental personnel.

Question: Did the hearings give FERC a chance to see how the people in the Railbelt feel about the project?

Wakefield: One of the main purposes of holding those public hearings was to test the public reaction to the project.

Question: Did you learn anything new on the site visits?

Wakefield: I think that all the FERC personnel and the people from the labs gained a greater appreciation of the unique environmental and engineering aspects of the Susitna Project. We were all able to visit the project sites, the lower Susitna River, and the upper basin. Being in the field with members of the Power Authority staff and their consultants allowed us to see firsthand many of the project features that we had read about.

Question: Who pays for the FERC staff time in Alaska?

Wakefield: It comes out of our budget as provided by the United States Congress.

Question: How do the FERC Commissioners make the final decision on whether or not to grant a license to construct?

Wakefield: They base it on whether the project is environmentally sound, sound from an engineering standpoint, and economically feasible. The Commissioners decide and the majority rules; three of the five is enough for issuance of a license.

Question: Can FERC require the State to do certain things in constructing the project?

Wakefield: Yes, particularly in the course of sound engineering practices. If there are engineering practices that our experts have determined have been addressed, but perhaps not to the full scope, we will condition the license to assure that sound engineering practices are followed. Generally each license that is issued has some license article that requires additional study or requires mitigation for something that had not been fully considered.

Question: So FERC can also require specific mitigation measures for direct project impacts.

Wakefield: Yes, that's correct.

Question: Can FERC prevent the project from being built?

Wakefield: Again, if the project is not environmentally sound, or if it is not safe, or if it is not economically feasible, the Commission will not issue a license. Without the license, the project cannot be constructed.

Question: How can people express their opinions on the project to FERC?

Wakefield: During the public notice period, notice of the project appeared in the Alaskan papers and the Federal Register, and people had an opportunity to make their comments or questions known to the Commission.

Harza-Ebasco Susitna Joint Venture

The joint-venture firm of Harza Engineering Company and Ebasco Services, Incorporated (Harza-Ebasco) was selected as the planning and design contractor for the Watana portion of the Susitna Project. The Harza-Ebasco team will design the Watana dam and power facilities, as well as continue environmental investigations and licensing support for the entire project. Working from an Anchorage office, the project team includes several Alaskan organizations:

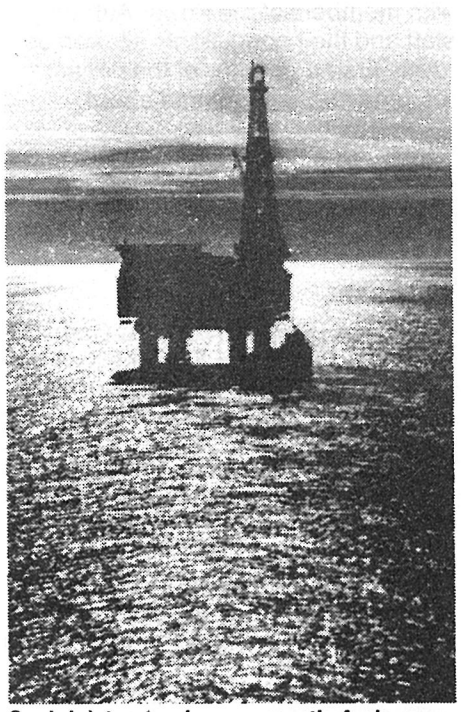
- R&M Consultants
- AEIDC
- University of Alaska Museum
- Frank Moolin & Associates
- Air Logistics
- Denali Drilling
- Alaska Department of Fish & Game
- University of Alaska, Palmer
- University of Alaska, ISER
- CIRI/Holmes & Narver
- Woody Trihey, Consultant

Additional Alaskan firms will be included in the team when design of the supporting facilities begins.

Both Harza and Ebasco have world-wide experience in designing and constructing large hydropower projects. Harza has been involved in the 10,00 megawatt Guri Project in Venezuela, the world's second largest hydroelectric project. Ebasco was cited by the American Society of Civil Engineers for the "Outstanding Civil Engineering Achievement of the Year, 1973" for their work on the 1900 megawatt Ludington Pumped Storage Project in Michigan. Both firms also have recent hydroelectric experience in Alaska. Harza has conducted feasibility studies for the Black Bear Lake and Chester Lake projects in Southeast Alaska. Ebasco is serving as construction manager for the Terror Lake Project on Kodiak Island, and has conducted feasibility and reconnaissance studies and independent cost estimates on several other Power Authority projects.

Project Update Results in Revise

Energy Forecasts Revised



Cook Inlet natural gas currently fuels electric energy generation in a large part of the Railbelt.

The key to the economic feasibility of the Susitna Project is the long-term world oil price. World oil prices directly affect Alaska's economy and, consequently, forecasts of population growth, energy demand, cost, and state revenue are sensitive to changes in oil prices.

When the Alaska Power Authority began the Susitna feasibility study in 1980, world oil prices were on an upward trend. Oil price forecasts made by Battelle Pacific Northwest Laboratories using information from the Alaska Department of Revenue were used in forecasting future levels of Alaska population and energy demand. These forecasts were done as part of the study of alternatives to the Susitna Project. Battelle's forecasts were then used in the Susitna feasibility study.

The feasibility study was completed in March 1982 and approved by the Alaska Power Authority Board of Directors in late April. A license application based on the feasibility study was submitted to the Federal Energy Regulatory Commission (FERC) in February 1983. In making their decision to submit the FERC application, the Board was sensitive to changes in economic indicators and wanted to be in a position to take advantage of changes in the Alaskan economy. Their action was taken with the understanding that an update of the project based on changes in oil revenues would be completed later.

In November 1982, the Power Authority selected the Harza-Ebasco Susitna Joint Venture as the design consultant for the Watana phase of the Susitna Project. In January 1983, the Power Authority directed that an updated study of Railbelt electrical energy needs be made based on the decline in world oil prices and changes in some of the assumptions made about the future of Alaska's economy. As work began on an update, FERC made its initial review of the Susitna license application. They requested information on the effect of the downturn in oil prices on the future energy needs of the Railbelt and on the computer models used to forecast future energy needs.

The first step in the process of revising the Susitna need for power forecasts was responding to the request from FERC for additional information. This information was submitted on July 11 and FERC officially acccepted the license application on July 29, 1983. The next step in the need for power revision is a complete update of the electrical energy forecasts for the Railbelt and the comparison of the Susitna Project concept with those forecasts. The update will include:

- Reevaluating the demand and load growth forecasts.
- Reviewing the Susitna Project to optimize the size, costs, design, and construction schedule.
- Updating the thermal alternatives to Susitna (coal and natural gas fired generation) based on current information on fuel availability and cost.
- Comparing the optimized Susitna Project with the updated thermal alternatives.
- Analyzing various methods of financing the project.

Several previous assumptions about future economic events in Alaska have been deleted from the update including: construction of the Pacific LNG plant and construction of a refinery at Valdez. These assumptions, in addition to the assumptions about world oil prices, were revised to more clearly reflect today's situation.

Cost Savings from Design Refinements

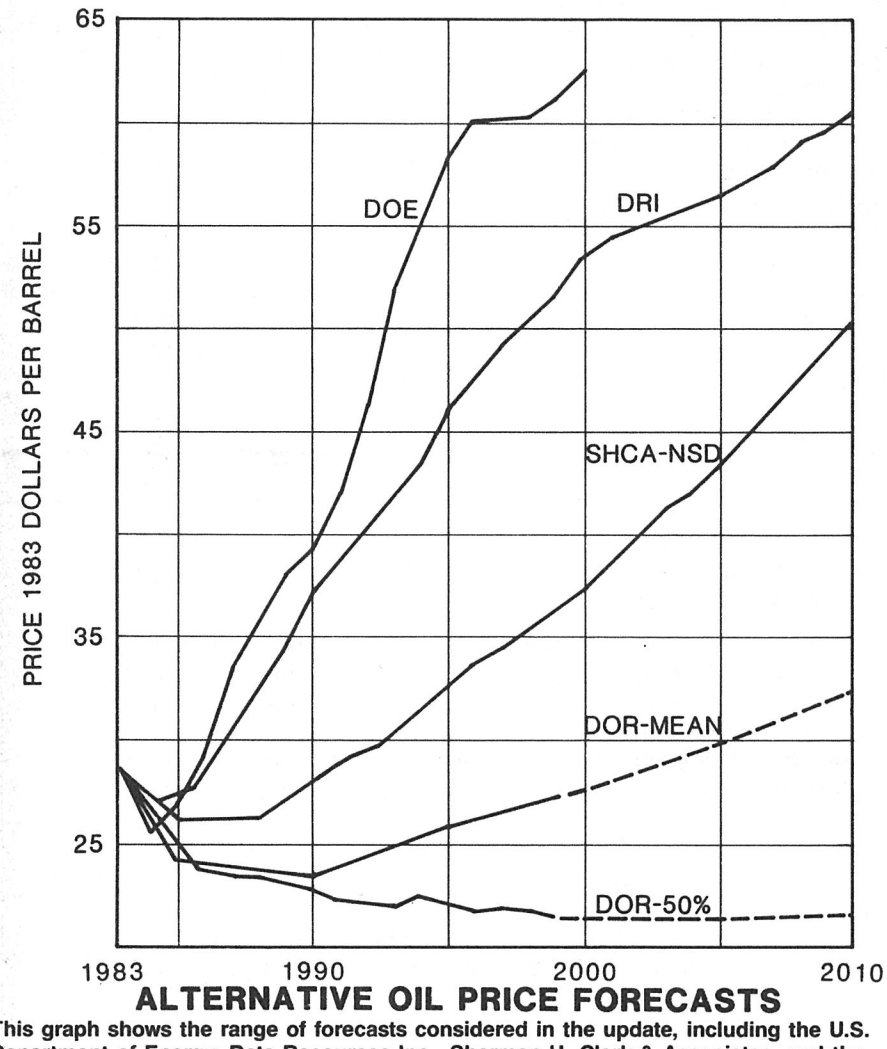
The overall goal of the update is to determine if the Susitna Project concept as submitted to the FERC is still the optimum project. As part of the update, Harza-Ebasco has made a conceptual design review and engineering analysis of the Watana dam design and has identified several project refinements which reflect a net cost savings. These refinements are based on recent geotechnical investigations (see article at right) and more detailed engineering studies. Because much of the information used in the feasibility study was quite preliminary, extremely conservative engineering and construction estimates were used. With more complete information, the following refinements have been identified:

- Reduction in the amount of foundation rock to be excavated for the Watana dam by 3.5 million cubic yards; and change in composition of the dam to more efficiently use available materials.
- Change in orientation of underground caverns and reduction in the number of power conduits for the generating units on the Watana project.
- Modification of main spillways for both Watana and Devil Canyon to handle Probable Maximum Flood, thus eliminating the fuse plug emergency spillways.
- Reduced transmission voltage from Gold Creek to Ester substation to meet Fairbanks' load requirements.

Harza-Ebasco has shown that the total project cost can be reduced by about $421 million (or 10% of the 1983 project cost estimate) if these, and several other, refinements are implemented. They would not alter either the generating capacity or operation of the project.

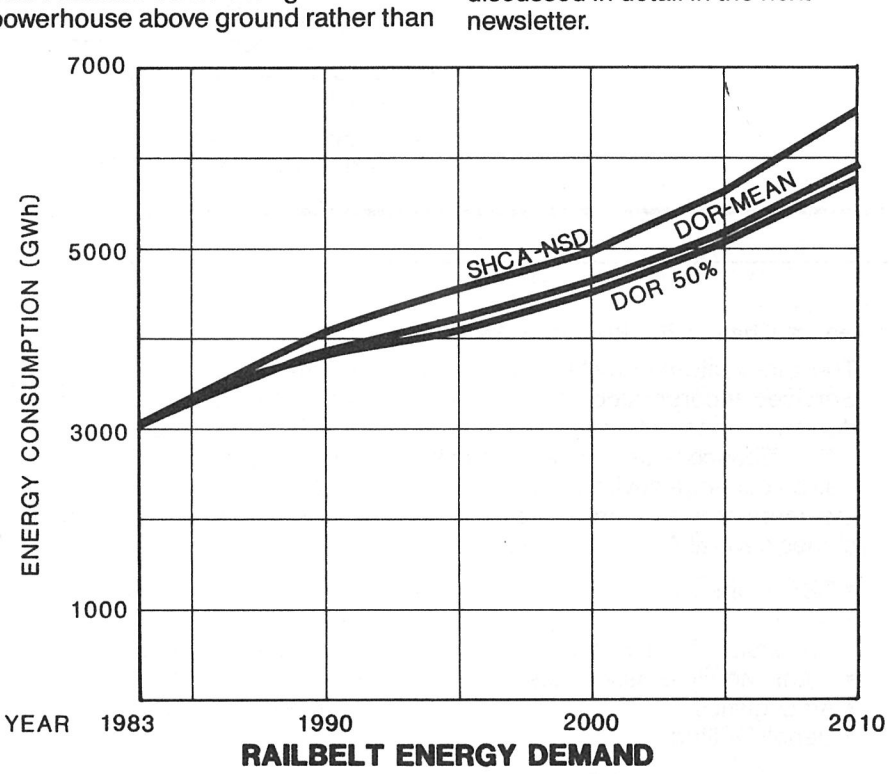
Several other design modifications are also being evaluated. Potential modifications to the Watana project could include constructing the powerhouse above ground rather than underground, modifying the power intake structures and conduits, and reducing costs by sealing the reservoir upstream of the dam. Modification of the Devil Canyon project could include changes in the tailrace tunnel downstream from the dam. These changes could result in additional cost savings of up to $250 million.

In addition to these potential design refinements, reduced economic projections have resulted in other modifications to the project that are being further evaluated. The primary one would be lowering the height of the Watana dam, with accompanying reductions in generation and transmission system requirements. This would bring project energy production more closely in line with current estimates of need for power. These refinements could also reduce the cost of the project by an estimated $700 million and contribute to a further reduction in environmental impacts because of reduced reservoir size. Only the refinements listed on the left are recommended at this time. Any furthur refinements will be discussed in detail in the next newsletter.



ALTERNATIVE OIL PRICE FORECASTS

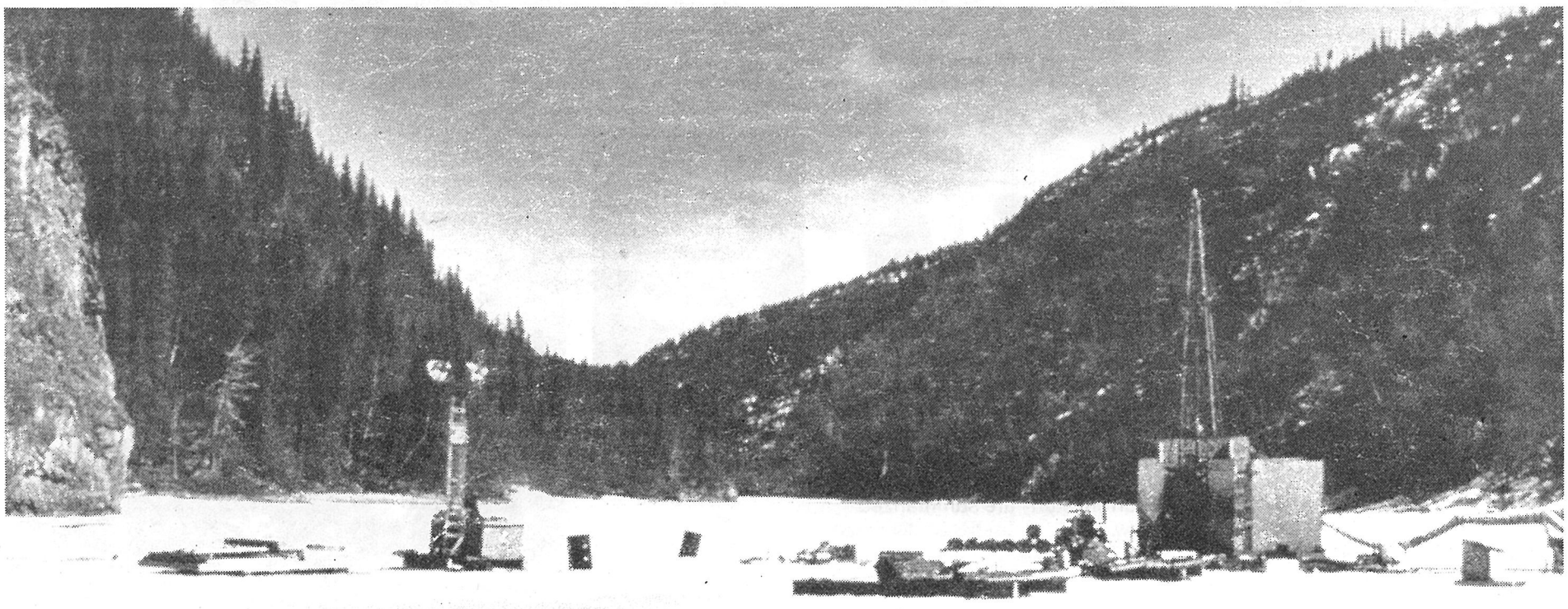
This graph shows the range of forecasts considered in the update, including the U.S. Department of Energy, Data Resources Inc., Sherman H. Clark & Associates, and the Department of Revenue.



RAILBELT ENERGY DEMAND

Based on revised oil price projections, energy demand forecasts for the Railbelt have also been updated. Shown here are estimates by Sherman Clark and Associates and two versions from the Alaska Department of Revenue.

Forecasts and Cost Savings



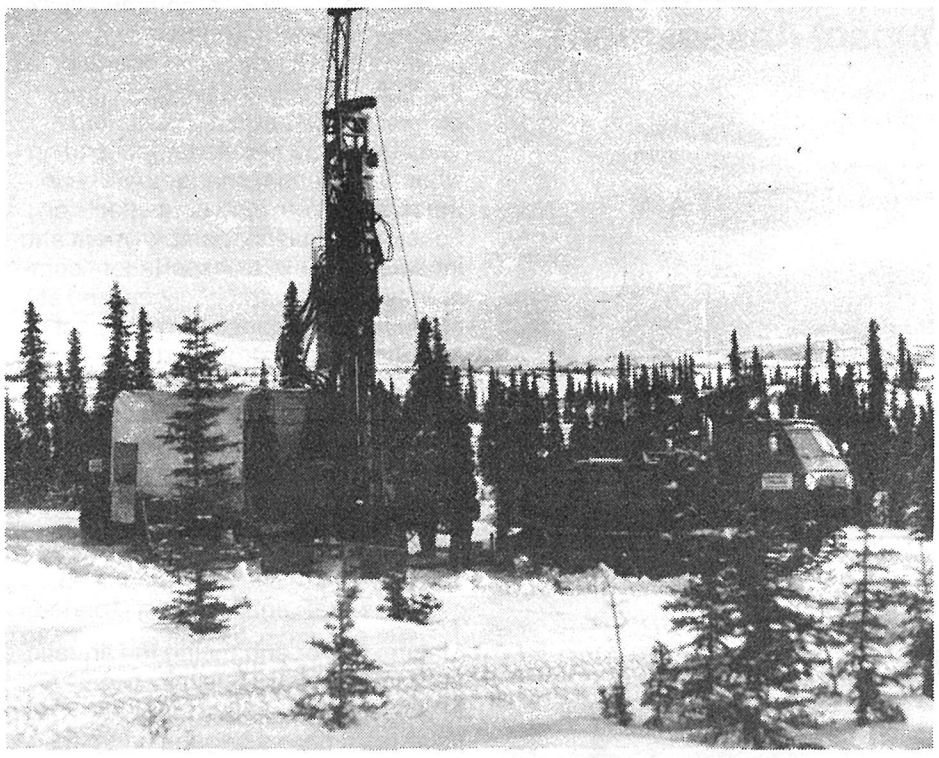
The winter geotechnical program used drilling and testing equipment on the river ice to confirm early work and improve design information.

Winter Geotechnical Work Provides Basis for Cost Savings

Good foundation conditions and appropriate construction materials are critical factors for the construction of any hydroelectric project. Exploration of the Susitna River Basin began in the early 1950s, when the Bureau of Reclamation investigated potential hydroelectric sites. Over the years, the Bureau and the Army Corps of Engineers continued to map the surface geology, perform seismic surveys to characterize underground features, and drill test holes in the potential damsite areas. When the Alaska Power Authority began the Susitna feasibility study in 1980, an expanded geotechnical program showed that there were no significant geologic or geotechnical problems which could affect the project feasibility. It also showed that suitable construction materials were available nearby.

In the winter of 1983, the Power Authority went back into the field to further evaluate the Susitna River channel. The winter geotechnical program had several main purposes: (1) to look at the river bottom to decide if the soils are suitable for dam foundations, (2) to provide information on the soils to be used in design, (3) to estimate how much material would have to be removed for construction, and (4) to assess the type and quality of bedrock in the proposed locations of the dam foundations.

Working in the winter allowed the geotechnical team to set up drilling and seismic equipment on the river ice and on stable ground nearby. This testing equipment helped develop a base of information on the critical geotechnical conditions that underlie the project area. For example, a very large hammer drill was used to drill 53 holes, and ground-penetrating radar provided an underground profile of where soil and rock came in contact.



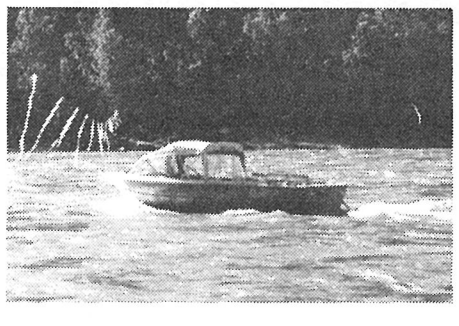
Drilling results help engineers design a more cost effective project. This Becker hammer drill tested over 50 locations at the Watana site.

The winter program confirmed earlier work and provided much improved information which is allowing designers to incorporate some cost-saving refinements. For example, information is now available to better assess the suitability of the river bottom deposits as a foundation for the dam embankment. This new information indicates that more river channel deposits may be left in place than was originally planned. Building on these deposits in some locations can save both time and money for the project. Rock excavation under the dam core may be reduced from earlier plans since the quality of the bedrock is better than earlier assumed.

Hydrology Studies Provide Details on River

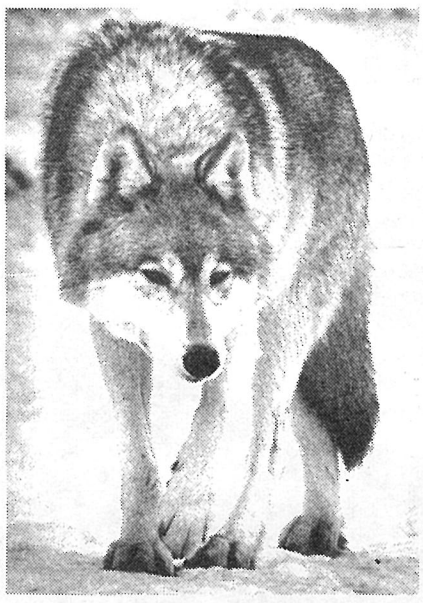
It is important to know how the proposed dams will affect river flows, how the reservoirs will function, and what the effects will be on the river, side channels, and sloughs downstream. Dams, accompanying structures, and their operation will be designed in parallel with ongoing analysis of potential effects on fisheries, wildlife, and vegetation. To add to earlier hydrologic information, this year's program continues the focus on these analytical activities:

- Simulating reservoir water level changes and energy benefits due to water releases under various operating plans.
- Predicting reservoir water temperature patterns and ice conditions.
- Simulating, through computer models, the downstream river hydraulics, temperatures, and ice conditions.
- Analyzing sediment concentrations and volumes which will flow into and out of the reservoir and how they will be distributed.
- Predicting potential problems of sediments either building up or eroding downstream from the reservoir.
- Estimating effects of different water releases on the hydraulic and groundwater characteristics of sloughs and side channels downstream from the dams.
- Refining estimates of the largest probable flood (Probable Maximum Flood) and other significant floods for use in designing the dams and other project features.

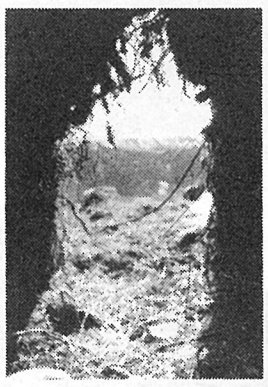


All of this information will be used in both engineering and environmental studies and will be especially useful in environmental mitigation planning.

Environmental Programs to Continue Through Licensing



Wildlife studies include wolves, shown at left, and involve evaluation of bear denning habits. An "inside-out" shot of a bear den is shown below, and the bear on the right is being measured for monitoring.



Archeologists are studying both historic and prehistoric sites. Shown is a cabin in the study area.

Efforts to characterize the Susitna River Basin and to predict project effects are continuing this year. Areas of current study are summarized below.

Socioeconomic Impact Assessment

How will the Susitna Project change the Railbelt? The local communities? The rest of the State? Impacts on people from construction and operation of the Susitna Project have been and continue to be carefully evaluated. The June 1982 newsletter focused on what the potential changes will be in the project area, including effects on housing, population, employment and income, schools, transportation, community facilities and services, and attitudes. The socioeconomic impact assessment has projected the population growth for potentially affected communities in the Mat-Su Borough, without Susitna, and then calculated what the changes might be in each community with the project. For example, predictions were that approximately 810 people would move into the combined Trapper Creek and Talkeetna areas by 1990 as a result of the Susitna Project.

Predicting future conditions is a difficult task, and projections require periodic updating as conditions change. The Susitna socioeconomic program will attempt to accomplish two things this year. The first is to collect firsthand information on the communities that will be most directly affected by the Susitna Project. Household surveys will be conducted in Talkeetna, Trapper Creek and Cantwell in October. Surveyors will visit households chosen at random to collect information on household size, employment, housing type, services and facilities, hunting and fishing, and community attitudes. The results will add to the understanding of conditions in the communities today so that impacts of the project can be more accurately identified.

Second, estimates of population and economic conditions in the Mat-Su Borough and potentially affected communities are being revised to reflect changes in state-wide and Railbelt forecasts. These revised estimates will represent conditions without the Susitna Project. With the updated information, a computerized socioeconomic impact assessment model will be used to update projected impacts. This impact assessment will be updated throughout the project.

Fisheries Program

Maintaining or enhancing the aquatic productivity of the Susitna River is a key objective in project planning. The fisheries program began during the feasibility study and has evolved into one of the most comprehensive aquatic studies programs ever conducted in Alaska. The Alaska Department of Fish and Game's Su-Hydro Studies Team started their characterization studies in 1981. That work led to detailed instream flow studies which examine the effects of various river flows on fish habitats. Results will be coupled with the results of hydraulic, temperature, water quality and stream bottom studies, to determine the potential effects of the project on the downstream fisheries.

The Susitna River drainage contains habitats for various life stages of all five species of Pacific salmon as well as for resident species including rainbow trout, arctic grayling and burbot. The main river, tributaries, side channels, and sloughs all provide specific conditions for each of these species. Changes in the river due to the project could alter the availability and suitability of the existing habitats. Habitats could be either lost or improved. Once the range of potentially adverse or beneficial effects are identified, appropriate tradeoffs and mitigation measures can be considered.

The study has focused to date on the stretch of the river between Devil Canyon and Talkeetna. This year's study of the river between Talkeetna and Cook Inlet is being expanded to determine the potential range of post-project effects throughout the Susitna drainage.

External Review Panel Advises Power Authority

The External Review Panel plays a key role in advising the Alaska Power Authority. As is often the case in major projects such as this one, an external panel of experts can provide an objective, overall review of all elements of the project from outside the organization to ensure the quality of the project's results. As planning and feasibility studies began, the External Review Panel was formed to review that phase. Now that the project has moved into the design phase, several new members have been added with appropriate expertise. The current membership is described below. Members bring to the project a wide range of relevant experience.

Mr. Robert A. Boyd, a Canadian electrical and mechanical engineer, was selected by *Engineering News Record* as Construction's Man of the Year for 1981, due to his engineering and managerial excellence in the over 10,000 megawatt development of the Le Grande River in the remote subarctic James Bay region of Quebec. Mr. Boyd has served as past President of the James Bay Energy Corporation and Hydro Quebec, as well as Commissioner of Hydro Quebec. Currently he is Vice President for Gendron Lefebvre, Inc., and Laboratorie de Beton Ltee, as well as Director, Bank of Montreal.

Mr. James W. Libby, an independent engineer, has served on hydroelectric consulting boards throughout the world. As Chief Design Engineer for International Engineering Company, his projects included the Furnas Hydroelectric Project in Brazil, a 12 million cubic yard rockfill dam; as well as the 210 megawatt Oxbow Hydroelectric Project on the Snake River. Subsequently he has served as a member of numerous boards of consultants, including the Nelson River development in Manitoba.

Dr. Andrew H. Merritt, a geologist, has been involved in research investigations, design, construction, and review of major hydroelectric projects internationally. As a consultant in engineering geology and applied rock mechanics, Dr. Merritt serves as a specialist in tunnels and rock mechanics, with extensive hydroelectric experience. He has written several technical publications and is a member of the Underground Construction Research Council of the American Society of Civil Engineers.

Dr. Ralph B. Peck has served as Professor Emeritus of Foundation Engineering at the University of Illinois since 1974. Dr. Peck was a member of the Corps of Engineer's Board of Consultants on landslides induced by the 1964 Alaska earthquake. He has been selected as one of the top 10 U.S. Construction Men of the past 50 years by the American Society of Civil Engineers and has been the recipient of the National Medal of Science.

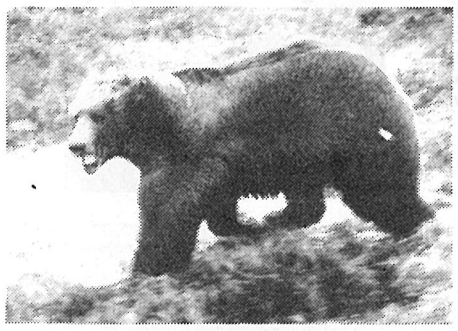
Cultural Resources Program

In 1980, a cultural resources program began in the Susitna River Basin as part of the Susitna feasibility study. Archeologists from the University of Alaska Museum began identifying sites where human activity had occurred in historic and prehistoric times. That first summer field season focused on testing the area to identify potential sites.

Now finishing its fourth summer, the University of Alaska team has continued to identify cultural sites (such as homesites, campsites, and hunting base camps) and systematically excavate each site. Most sites are found where expected: attractive camping areas, high well-drained ground, hunting trails, and good viewpoints. Typical evidence of human activity includes "debitage," or flakes from forming tools, burned fragments of animal bones, and some flaked stone tools. Most artifacts are very small, but their importance is that different sites can be related to one another by using four tephras (distinct volcanic ash layers) that cover the study area. All artifacts have been cataloged and are being held in the University of Alaska Museum's Susitna collection in Fairbanks, although ownership remains with the landholders.

Results of this program will allow mitigation planning within Federal and State guidelines for cultural sites that will be directly affected by the project; for example, covered with water or disturbed by construction. Planning for mitigation activities will occur in 1984 and 1985. The studies will help archeologists in reconstructing the prehistory and history of the Susitna River Basin.

Wildlife Studies



The effects of the Susitna Project on wildlife and their habitats are a major focus of continued studies. The Power Authority has supported intensive wildlife studies since 1980. Together with earlier work in the project area, these studies have substantially expanded the range of knowledge of wildlife and vegetation which allows the development of impact assessments and mitigation plans. Continuing investigations are designed to refine impact assessment and mitigation plans, especially for big game mammals.

Field studies continue on moose (both in the project area and downstream), caribou, Dall sheep, brown and black bears, wolves, beaver, hawks and eagles, and vegetation. Most of the wildlife information is obtained by aerial survey to determine numbers, sex and age class, distribution, habitat use, and seasonal movements. Radio collars have been placed on some animals to provide better information on age, sex, and health. By tracking the animals from aircraft, details of their movements, habitat use, reproductive success, and eventually, cause of death, can be obtained.

Computer models have been developed to predict potential project effects on several species including moose, brown and black bears, and beaver. Biologists use information from the models to identify both adverse and beneficial impacts and to determine what further studies are most important to refine mitigation plans. Examples of mitigation techniques that are being studied include evaluating enhancement of moose habitat and techniques for providing artificial nesting sites.

Transmission Line Routing

The Susitna Project license application shows routes selected for carrying Susitna energy to users. Transmission lines from Watana and Devil Canyon will be run westward to connect with and parallel the Anchorage-Fairbanks Intertie, which will have capacity added to handle the additional Susitna power load.

Routes extending from the Intertie endpoints (Willow and Healy) to the Anchorage and Fairbanks areas were selected as well. The recommended transmission line system and routes resulted from an evaluation of numerous alternative corridors. Requirements included technical and economic feasibility, environmental suitability, land availability, and compatible existing land uses.

The Power Authority is now further evaluating and refining the route selection. Community meetings were held in May 1983 to seek public ideas on the routing. The refinement studies will be completed late in 1983.

Surveys — Coming Soon

Survey teams will be contacting a sample of households in Cantwell, Trapper Creek and Talkeetna in October. Information on population, housing, employment and other factors will be collected for use in planning for the Susitna Project. The purpose of the surveys is to gain a more complete understanding of today's conditions in communities likely to be affected by construction and operation of the Susitna Project.

Representatives may come to your home to interview an adult who lives there. We appreciate your cooperation with the interviewers and will hold all reports completely confidential.

Meeting Notification

A weekly listing of Susitna technical working meetings between the Power Authority and resource agencies will be posted at the Power Authority offices. That information will also be available by calling 276-0001.

We are interested in hearing from you. Please give us your questions or comments on this newsletter, the Susitna Project, or other topics you would like to read about in the future by writing:

Alaska Power Authority
Susitna Project Office
334 W. 5th Avenue
Anchorage, Alaska 99501

Dr. H. Bolton Seed is a specialist in earthquake-resistant design. A Professor of Civil Engineering at the University of California, Berkeley, he has served as chairman of the Department of Civil Engineering. Dr. Seed has been a consultant on soil mechanics and seismic design since 1953, and has worked on over 80 dams worldwide, most of which were in seismically active areas. He was involved in analyzing the 1964 Alaska earthquake. After a dam failure in California in the early 70s, Dr. Seed wrote design procedures for California to avoid future dam failures. These procedures are now used throughout the world to produce safe seismic designs.

Stanley D. Wilson, P.E., is a Consulting Civil Engineer and former Executive Vice-President of Shannon & Wilson, Inc. Mr. Wilson is an internationally recognized authority on earth and rockfill dams and serves as a consultant on major hydroelectric projects all over the world. He is also an expert in laboratory and field instrumentation used in geotechnical engineering and has developed techniques and special equipment for measurements of earth and rock movements. Mr. Wilson developed a tiltmeter, now known as a Slope Indicator instrument, after extensive research of earth and rock movements under dynamic loads and landslide conditions. He also worked in researching effects of the Alaska earthquake in 1964.

Dr. Vera Alexander is currently Dean of the College of Environmental Sciences for the University of Alaska at Fairbanks. Additionally, she directs the Division of Marine Science and the Institute of Marine Science. Her areas of expertise include nutrient cycles of aquatic systems, primary productivity, arctic and subarctic limnology, biological oceanography, and nutrient cycling, with special emphasis on low trophic level biology, nitrogen fixation in aquatic and terrestrial ecosystems, and dynamics of marine marginal ice zone ecosystems.

Dr. Roy E. Nakatani is the Associate Director of the Fisheries Research Institute at the University of Washington. Currently he serves as a fisheries consultant to Centralia City Light, assessing instream flow issues on the Nisqually River. He has written numerous publications related to water quality, bioassay and heavy metal metabolization in fishes. Dr. Nakatani has served as a scientific consultant and lecturer for environmental management to a number of agencies and companies working in the energy field in the Pacific Northwest. Additionally he has testified as an expert witness in Federal Energy Regulatory Commission hearings on fishery-hydro problems, as well as conducting independent technical review of Environmental Impact Statements.

Dr. A. Starker Leopold, recently deceased, was nationally recognized as a zoologist and had worked in Alaska since the 1950s.

He co-authored the book *"Wildlife in Alaska,"* which discusses ecologic problems in the State (the decrease in caribou, the increase in moose, and the basic causes for both). Later Dr. Leopold acted as an advisor on several major project proposals: the Rampart Dam proposal and the U.S. Forest Service timber sale to Champion International in Southeast Alaska. His involvement in the External Review Panel has been invaluable and will be missed.

september 1983

susitna hydroelectric project *Newsletter*

This is the sixth of several newsletters published by the Alaska Power Authority for citizens of the Railbelt. The purpose is to present objective information on the progress of the Susitna Project so that readers may make their own conclusions based on accurate information.

Eric P. Yould, Executive Director
George E. Gleason, Public Information Officer
Patricia J. Serie, Public Participation Coordinator

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