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THE SUSITNA HYDRO STUDIES  
JUNE 1982

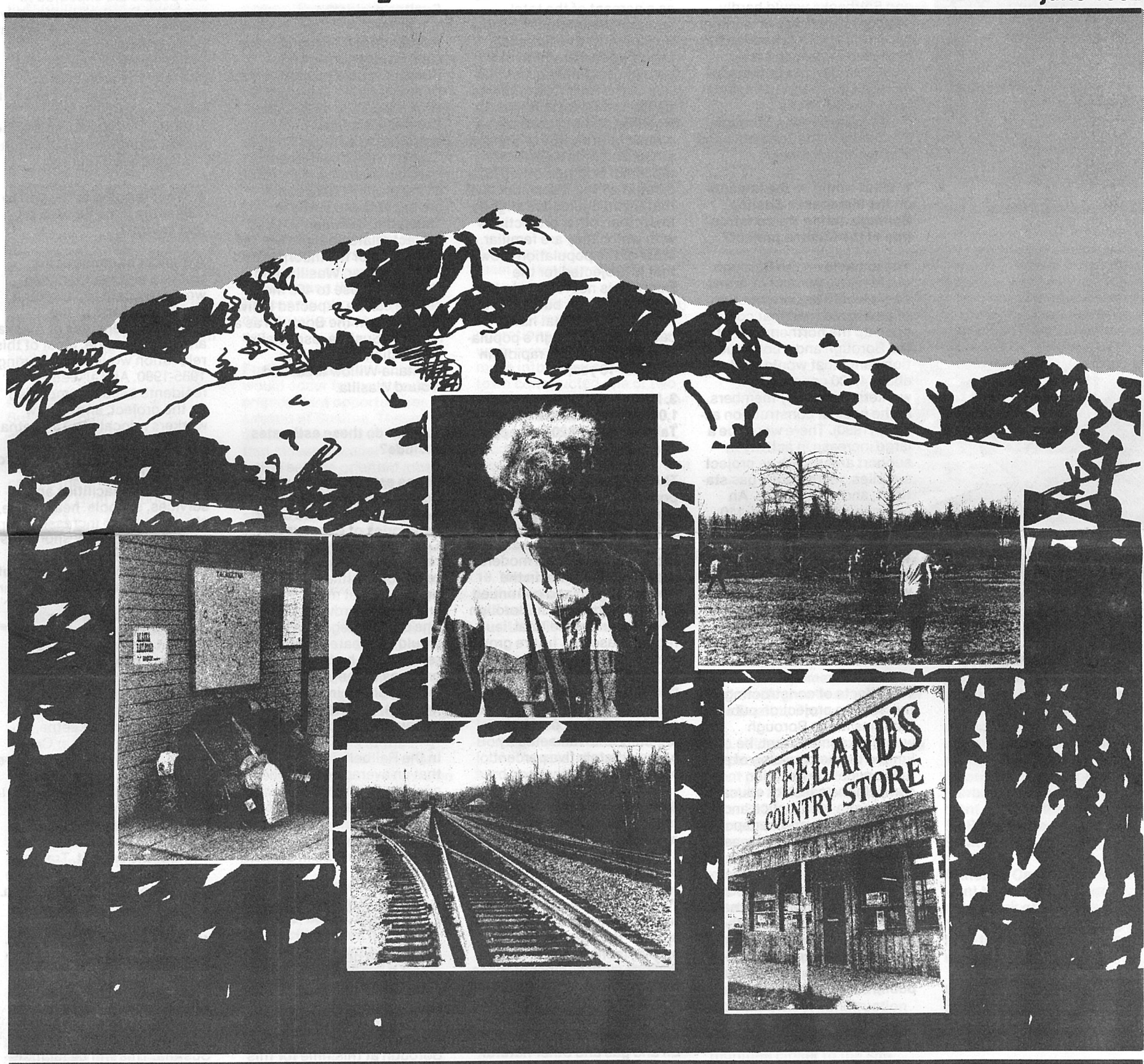


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# the susitna hydro studies

june 1982



## Impacts on *people*

A major construction project such as Susitna can cause fundamental changes in nearby communities and affect the lives of the residents of those communities. People in the Matanuska-Susitna Borough, particularly in the Talkeetna and Trapper Creek areas, have the highest potential for being directly impacted if Susitna were to be constructed.

Previous issues of this newsletter discussed the technical and environmental aspects of the proposed Susitna project. This issue focuses on the effect the proposed Susitna project may have on people, especially those living nearest the project.



# How would Susitna affect growth in the Matanuska-Susitna Borough?

## A discussion with Peter Rogers



Peter Rogers

We've been asked questions about the socioeconomic impacts of the proposed Susitna hydroelectric project. The responses are taken from an interview with Peter Rogers, Vice-President of Frank Orth & Associates.

For the most part, if Susitna were constructed, Anchorage and Fairbanks would hardly notice any increase in workers or related activity because the expected increases are so small. Most of the population increase (and related impacts) would be felt in the Matanuska-Susitna Borough, especially in the Talkeetna and Trapper Creek areas.

**1. What would be the impacts on the Matanuska-Susitna Borough during the construction of the Susitna project?**

The impacts on the Borough could take a number of forms. There would be construction of an access road that could open up the northern part of the Borough and a construction camp that would contain about 4,000 construction workers and family members at the peak of construction activity (1990). There would be a large increase in activity in support areas such as project supplies, restaurants, gas stations, and retail stores. An estimated increase of 1,110 people in the population of the Borough would occur between 1983 and 1990. The largest population-related impacts would occur in Trapper Creek and Talkeetna. This would be due to the number of people moving into the area in order to live close to the site.

The effects of constructing the Susitna project on public facilities in the Borough would, to some extent, be limited by the provision of a full service construction camp. In the cases of education, health care, police and fire protection, and transportation, the population increase associated with the project would speed up the need for new facilities by a couple of years. Even without Susitna the population growth in the Mat-Su Borough will be significant and result in substantial increases in the demand for public services.

**2. The "base case" projects that 69,000 people will live in the Borough in the year 2000. What is this based on?**

The estimate of population without the project is based on assumptions of moderate growth in the central Railbelt Region and of the continued growth of the Mat-Su Borough as a percent of the total regional population. Specifically, this forecast assumes construction of the natural gas pipeline, completion of the Knik Arm crossing by 1991, and no capital move. Houston and Big Lake are expected to grow due to the construction of the Knik Arm crossing. Borough officials indicated during December 1981 that these figures are slightly lower than other projections with which they are familiar. Most of the population growth that is projected for the Borough is not related to the Susitna project, but rather to the tendencies that have caused the Borough's population to increase so rapidly in the past 10 years.

**3. How was it determined that 1,000 people will live in Talkeetna and 320 in Trapper Creek by the year 1990?**

These figures refer to the total population increases that would occur in Talkeetna and Trapper Creek if the Susitna project is not undertaken. This growth is based on a moderate growth assumption in the Railbelt region and continued growth of the Mat-Su Borough as a percent of the total region. Based on future growth assumptions and observations of past growth trends, it is expected that Trapper Creek's population will increase by approximately four percent annually and Talkeetna by approximately five percent annually.

**4. How can that many people move into the Trapper Creek and Talkeetna areas in the year 1990 without Susitna? It seems quite high.**

We have observed that people tend to settle in the area in spite of the general lack of employment opportunities. A considerable number of these persons must obtain seasonal or other employment outside of the immediate area (for example, on the North Slope). As oil and gas and other natural

resource developments intensify during the 1980's more people will be attracted to and settle in the area. While it is difficult to forecast population so far in advance, it is felt that the estimates are reasonable.

**5. How many people might be moving into Borough communities as a result of the Susitna project?**

As mentioned previously, the total population of the Borough would increase by approximately 1,110 people. Between 1983 and 1990, about 340 project related people are expected to settle in Trapper Creek, to the extent there is housing available. As a result of the project, 260 people are expected to settle in Talkeetna. Between 40 to 50 project related people will settle in each of the incorporated cities: Palmer, Wasilla, and Houston. Close to 400 more people can be expected to live elsewhere in the Borough as a result of Susitna, especially near Indian River, in the Montana-Willow area, and around Wasilla.

**6. What do these estimates include?**

These estimates include direct construction work force, their dependents, and two other categories of employment. One category is jobs that will result in local industry as a result of Susitna in such areas as local sheet metal shops or wholesale hardware stores. The other category is jobs that would be created in the service related area by the spending patterns of the workers. These jobs would be in super-markets, gas stations, restaurants, and the like.

In the Railbelt, it is estimated that an average of 82 secondary jobs would be created for every 100 direct construction jobs on Susitna. The majority of people moving to the Borough would be in service related jobs.

**7. When would these people be coming?**

If the State decides to construct Susitna and the present schedule is followed, limited construction related activities would begin about 1985. Some people could move into the Borough at this time for this

work and in anticipation of additional employment opportunities when construction activities accelerate in the late 1980's.

Over 85 percent of the people moving into the Borough as a result of Susitna would occur between 1987 and 1990. About 200 people are expected to leave the Borough in the early 1990's as construction on the Watana dam winds down. Employment on the second phase of the project is expected to be filled by people in the Borough (including workers that stayed) so that no further significant population increases are expected.

**8. What is going to happen to Talkeetna if the Susitna project is built?**

A number of construction workers and their families would relocate to Talkeetna from other parts of the Railbelt, other areas of Alaska, and from Outside. Most of this relocation would occur during 1985-1990. As Talkeetna residents become employed on the project, and as new workers relocate to Talkeetna, additional income would be spent in Talkeetna. This would increase business activity. Demands on facilities and services, schools, health care, etc. would also increase. There could be temporary shortages if planning is inadequate or if the population influx turns out to be significantly greater than anticipated.

**9. What would happen to Trapper Creek?**

The effects on Trapper Creek would be much the same as the effects on Talkeetna, except more so. Trapper Creek would have considerably more traffic and business activity along the highway. Additionally, because the influx of people is anticipated to be about equal to the population size without the project, Trapper Creek could experience more acute impacts than Talkeetna.

**10. Would schools in the Mat-Su Borough be overcrowded?**

Most schools in the Borough will experience major growth in enrollments as a result of population growth without Susitna. This will be far more

### Chart compares population growth with and without Susitna

Geographic area	1981 population	Expected population in the year 1990 without Susitna	Additional people with Susitna (during peak construction 1990)	1990 population with Susitna
Entire Matanuska-Susitna Borough	22,300	43,000	1,100	44,100
Anchorage	174,700	225,200	1,100	226,300
Fairbanks/North Star Borough	54,600	71,200	90	71,290
Kenai Peninsula	22,900	35,600	insignificant	35,600
Community				
Trapper Creek	225	320	340	660
Talkeetna	640	1,000	260	1,260
Wasilla	2,168	4,150	50	4,200
Palmer	2,567	4,500	40	4,540
Houston	600	1,400	40	1,440





Parking lot near railroad station in Talkeetna.

significant than the increase in enrollment associated with Susitna. Project induced population influx would most affect the schools in the northern part of the Borough. With Susitna, Trapper Creek's elementary school would increase by about 60-70 students between 1983 and 1990 over the baseline projection of 80 students. Talkeetna's elementary school population would increase by about 40 students over the baseline forecast of 126 during the same time. The planned Trapper Creek elementary will have a capacity for 100 students. Although it may not need to be expanded without Susitna, additional classroom space would be necessary with Susitna. The Talkeetna elementary school will have reached its capacity without Susitna around 1990 and would need to be expanded.

The project would also increase the enrollment of Susitna Valley High by about 75 students over the baseline forecast level by 1990. The school would probably have to be expanded to accommodate the increase.

#### 11. Would taxes for education increase to cover the costs of building new schools?

In general, no. Capital improvements for education are currently funded by the State. In organized boroughs, the State reimburses the school district for 80 percent of the school debt.

#### 12. Would there be adequate housing?

The pressure on housing would be greatest in Trapper Creek and Talkeetna, due to the projected lack of vacant housing. There could be a significant amount of temporary housing utilized during the period of greatest immigration (1987-1990). This would take several forms: staying in lodges and motels, purchase of mobile homes on individual lots, as well as the use of trailers.

However, it is possible that the long lead time between the start of construction and the peak of activity in 1990 may result in speculative housing construction which would provide additional housing.

#### 13. What kinds of people would be moving to Mat-Su as a result of the Susitna project?

In the initial years of the construction project, the predominant type of people to move into the Borough would be construction workers and their families, originating from other areas of Alaska. The single greatest factor in determining how many and what type of people would relocate

is the nature of construction camps. Presently there are plans for a full-service facility at each dam site with family provisions at a separate village for engineers and professionals, and single status accommodations for construction workers. The full-service facility would include schools, stores, a bank, and a variety of recreational facilities. The majority of the work force on the project would be Alaska residents and they would, in most cases, live at the work camp. Engineers and professionals would have the option of relocating their families to the construction village, but construction workers would not.

Further population increases would occur from secondary employment opportunities as a result of Susitna. These individuals would work at jobs that closely parallel the existing service-oriented jobs. Here, too, a percentage of jobs would be filled by out-of-staters. Many of those out-of-staters would be related to the construction workers (wife, child, etc.).

Many workers coming from other areas of Alaska (primarily Anchorage) would view their employment on the project as an opportunity to move to the Mat-Su. Therefore, most of the people moving to the Borough will be Alaska residents with lifestyles similar to those of current residents of the Borough. It is likely most on-site construction workers who move into the Borough communities would have families and would remain once the Susitna construction is completed.

#### 14. If the full-service construction facilities (with families, schools, banks, stores, recreation facilities) are not provided, how much worse could it be for the Talkeetna/Trapper area?

More people would settle in Talkeetna and Trapper Creek, but it is difficult to say how many more. Currently, Acres American, Inc. has anticipated the need for a temporary construction town site that would accommodate up to 350 families as well as a single status camp for construction workers. If these accommodations are not provided, a significant number of these families might choose to settle at Talkeetna or Trapper Creek. Although no detailed estimate was made, factors that would influence settlement decisions include work schedules (e.g. four weeks on, one week off, or seven weeks on, two weeks off), commuting modes (whether personal vehicles and private/commercial planes are allowed at the construction sites), availability of mass transit (e.g. bus) to the sites, and so forth.

#### 15. Why would workers and families live in the construction camp rather than relocating in the local communities?

Several factors would discourage the relocation of workers to local communities. The major ones are: the long commuting distance; construction workers' preferences; mobile/transient lifestyle; the planned work-schedule; and the lack of available housing in these communities.

#### 16. Would the workers living in the Mat-Su commute to the site on a daily basis?

Given what the work schedules are likely to be and the distances to the site, it is unlikely that the Mat-Su workers would commute on a daily basis. Workers would probably commute weekly, bi-weekly, or less frequently depending on the final work schedule. In any event there would be much less traffic than if they were to commute daily.

#### 17. What size town would remain at the dam sites?

As the hydroelectric facilities become operational, the operations and maintenance work force is proposed to move into a new permanent town constructed one or two miles west of the Watana construction camp. This town could eventually accommodate 170 operations workers plus their families and provide all the necessary services. A preliminary design of this town site was provided in the March 1982 feasibility report.

#### 18. How many people that live in the Mat-Su Borough now will be able to get jobs on Susitna if it were built?

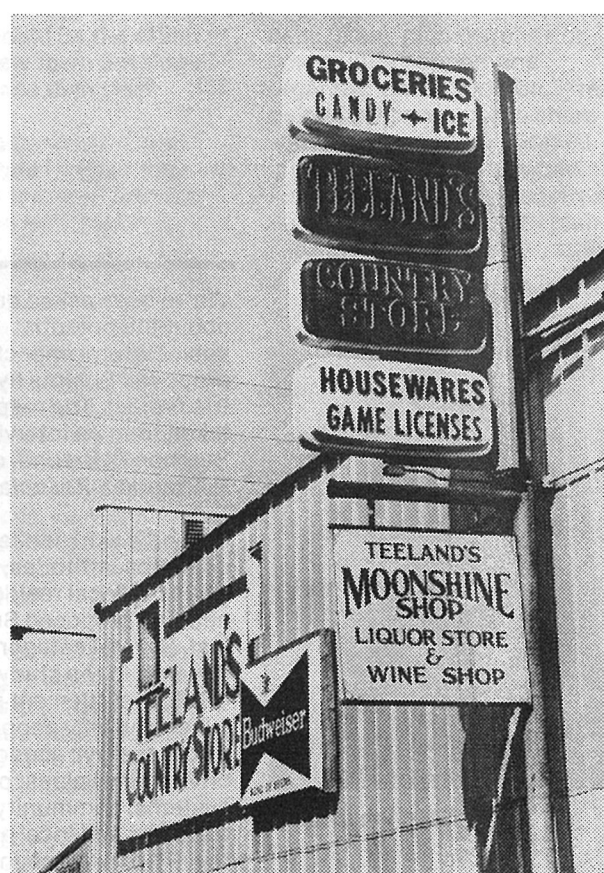
On-site employment opportunities during the construction will reach a peak of 3,500 in 1990, and it is estimated at least 200 people in the Borough would be able to get jobs. There is, of course, no hard and fast limit on this number. In addition, it is expected that business created by the project will result in another 335 jobs in other industries and service/retail businesses. About 25 percent, or 85, of these jobs would be located in the Trapper Creek/Talkeetna area.

#### 19. What kind of jobs would be available?

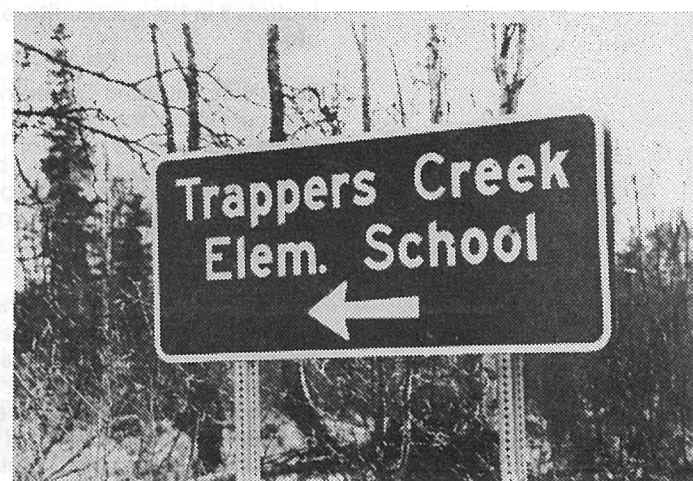
About two-thirds of the construction work force is expected to be made up of general laborers and trades such as drilling and blasting, pumping, excavation, steel, and cement workers. There will also be positions for truck drivers, mechanics, welders, sheetmetal workers, carpenters, engineers, and assorted other positions.

#### 20. Will the Mat-Su Borough administration have additional expenditures for services to the new residents?

Yes. In the short-term, the Mat-Su Borough Administration will incur additional costs in providing areawide and non-areawide services; however, in the long term revenues from local property taxes, user charges, and State funds will increase to cover these costs. The short-term lag in revenues



Teeland's Country Store in Wasilla.



Trapper Creek Elementary School, Mile 2.5 Petersville Road.

will be approximately two years. The cost would be covered by property taxes, state revenues, and user fees.

#### 21. Would Palmer or Wasilla get much growth as a result of the Susitna Project?

No. Without Susitna, Palmer is expected to grow from its present population of approximately 2,600 to 6,400 by the year 2000 and Wasilla is projected to grow from approximately 2,200 to 8,500. The population increases to these communities associated with the Susitna project are approximately 50 at the construction peak in 1990. This would decrease to approximately 25 by 2005. Although Wasilla and Palmer are currently the major population centers in the Borough, most construction workers are expected to settle in the more northern communities closer to the site.

#### 22. Would the Susitna project cause much growth in Anchorage, Fairbanks, or other parts of the Railbelt?

No. Anchorage is expected to grow from its present population of approximately 179,000 to 253,000 by 2000, without the Susitna project. Population increases associated with Susitna would total approximately 1,000 persons by 1990; and by the year 2005 approximately 300 of these persons would leave.

Population growth in Fairbanks related to the project would be slightly less than 100 at the peak (1990) and, as is the case in Anchorage, the Fairbanks region will experience

net outmigration of approximately 100 persons by the year 2005.

The Kenai Peninsula will experience an insignificant amount of project induced growth during the initial years of construction and after 1987 there will be a net outmigration of population for the same reasons as in Anchorage and Fairbanks—increased employment opportunities in the Mat-Su Borough associated with Susitna.

Although Cantwell seems to want to encourage growth, the area's lack of services and land available for housing will limit the ability of project workers to settle there.

Source: Susitna Hydroelectric Project Environmental Report, Socioeconomic Analysis Phase I Report, April 1982, prepared by Frank Orth & Associates.



# How would people's lives change with Susitna?

## A discussion with Stephen Braund



Stephen Braund

We've been asked questions about the potential sociocultural impacts from the proposed Susitna hydroelectric project. The responses are taken from an interview with Stephen R. Braund, of Stephen R. Braund & Associates.

Braund's work looked at the concerns, attitudes, and values of local residents living near the proposed Susitna project. Several categories were involved in the study including: settlement patterns (when and why people come to a community); economic conditions and values; political systems; community response capacity; and local attitudes toward growth, change, and economic development.

### 1. Which communities were included in the sociocultural study?

The study included Talkeetna, Trapper Creek, the railroad communities north of Talkeetna (Chase, Curry, Sherman, and Gold Creek), Cantwell, and the McKinley Park area.

The emphasis was less in the McKinley Park area because of its distance from the proposed dam sites. Cantwell was studied from the perspective of effects from the northern access route from the Denali Highway. Because the recommended access route would be to the south of Cantwell and the park, the impact of Susitna on Cantwell and the McKinley Park area was determined to be minimal.

### 2. Would you characterize the "lifestyle" of the area you studied?

The area's abundance of natural resources is the basic attraction for most of the residents who came to these areas: some came primarily to develop and extract those resources; others came primarily to enjoy the resources. In some ways these motives are extremes on a continuum that represents the entire spectrum of the motives, values, and attitudes of the area's residents.

On one extreme there is the more pro-development attitude; on the other extreme the more pro-recreation or enjoyment of the natural environment attitude. In spite of these two extreme attitudes or opinions, the residents of the area have one commonality that makes them unique and that is the desire to live in a non-industrial, rural, undeveloped, semi-wilderness environment.

### 3. How would you characterize the general attitudes and values of the two groups you just described?

Based on this continuum, residents on one end have a desire to protect rural, small-town, and wilderness atmospheres, minimize change, avoid industrial development in the area, and to preserve the wildlife and recreational characteristics of the environment. Many residents in this group take issue with the

charge that they are against growth and economic development per se. Rather, they point out that economic development for the upper Susitna Valley does not only mean industrial growth (such as mineral extraction or hydro development), but also its potential for visual and recreational enjoyment, both summer and winter. These residents argue that a recreational/tourist economy caters to people who enjoy the land without defacing it, which is preferred to a commercial, industrial economy which does scar the landscape. They tend to be opposed to the Susitna Hydroelectric Project as well as any other large-scale development schemes for the area.

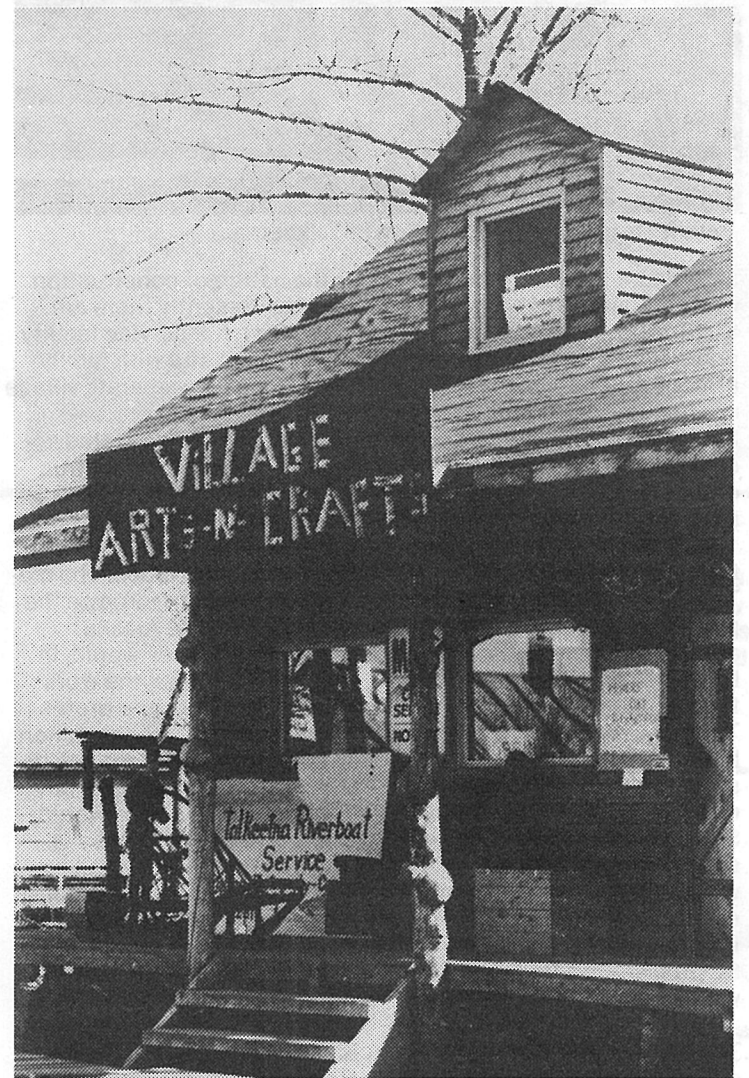
On the pro-development end of the continuum are residents who do not necessarily desire industrial development in the area, but they cannot identify with what they feel is a no-growth attitude. These residents do not generally desire to see their community radically changed, nor do they necessarily wish for industrial development to become the economic base in the area. Like their neighbors, they enjoy small-town qualities and desire to live in a non-industrial, relatively isolated, wilderness environment. Nevertheless, they feel the local economy will benefit from development, and as long as there is no danger to life, not necessarily lifestyle, the Susitna project is acceptable.

Residents with an extreme development view tend to favor roads to open up additional country and believe that progress (including hydroelectric dams, more people, and roads) will come regardless of what they, or anyone else, want. Generally long-time residents, many of whom have already witnessed considerable change in the area, they do not view future developments as necessarily undesirable.

### 4. Is one of these groups larger than the other?

Trapper Creek and Talkeetna are basically split in these attitudes. The railroad communities are very much on the end of the continuum that desires to maintain a wilderness environment. The old-time residents are the ones who have seen various changes and tend to be on the more pro-development end, whereas the newcomer who has come to escape development elsewhere tends to be more preservation oriented toward the environment.

In recent years many people have moved to Talkeetna, Trapper Creek, and the areas north of Talkeetna because they liked the quality of life or the wilderness, not specifically to go after employment or to make money. Once they got there, they figured out some way to make ends meet and to live at a lower standard of living where cash is not the motive. A population increase would make the area less



desirable for these people, because its wilderness quality would be diminished.

### 5. How would you characterize the changes that could occur in the Trapper Creek and Talkeetna areas as a result of the Susitna project?

In order to get an idea of the magnitude of the changes that might result from Susitna, it is best to compare it to what could happen without the project. One good indication is population. The following figures were developed by Frank Orth & Associates.

Trapper Creek, with a growth rate of about 4% a year, is projected to have a population of 320 by the year 1990 without Susitna. With Susitna another 340 people would be added. In Trapper Creek the Susitna project would cause a doubling of the 1990 population. This would classify Trapper Creek as a "boom town".

Talkeetna, with a growth rate of about 5% a year, is projected to have a population of 1,000 by the year 1990 without Susitna. This would be a 64% increase without Susitna. With Susitna another 263 people would be added. This would not have the same kind of impact for Talkeetna that the Susitna-related increase in Trapper Creek would have. Talkeetna's greatest impact would seem to come from its base case growth, not Susitna-related growth.

### 6. What do you mean by "boom town"?

Social scientists have defined a "boom town" as:

1. a community experiencing above average economic and population growth;

2. which results in benefits for the community, such as expanded tax base, increased employment opportunities, and social and cultural diversity;
3. but which also places or results in strain on existing community and societal institutions (such as family, education, political, economic).

Not all impacts associated with boom towns are negative. For example, positive consequences include substantial benefits to the local economy such as more jobs, more businesses, higher pay scales, increased prosperity, and an increased tax base. Generally, the positive benefits associated with rapid growth caused by a large development project are primarily economic. In the case of Trapper Creek, for the segment of the population which is not primarily motivated by economic advancement, the negative effects of rapid growth will likely overshadow any benefits.

### 7. What types of problems could happen in Trapper Creek if it does become a boom town?

Based on its lack of infrastructure, its small rural nature, and the characteristic that a significant portion of its residents are not primarily motivated by economic advancement, many of the problems associated with boom towns seem to apply to Trapper Creek.

Some of these problems are:

- Existing facilities and services (schools, fire and police protection, water and sewer, etc.) cannot meet the increased demand.



- High inflation caused by increased demands of large, incoming population and increased cost of living, especially housing
- New pay scales beyond the limits of some local businesses
- Hardships associated with inflation on those people living on fixed incomes
- Increase in crime and "people problems" (child abuse, alcoholism, divorce, etc.)
- Potential conflicts between local residents and "newcomers"
- Local government is forced to grow and expand.

These problems are compounded by a lull in 1995 when Watana would wind down and a second project peak in 1999 when Devil Canyon would be built. Based on the projections, Trapper Creek would experience a boom (1986-1990), a downswing (1991-1995), an upswing (1996-1999), and a slow decline in project-related persons beginning in 2000. The lull in the 1990's could be especially difficult for people whose jobs were not directly related to the project, such as service and support businesses. This period would likely be easier for primary construction workers because they will likely go elsewhere to work.

#### 8. Do you expect much resistance from local residents to newcomers? Will this cause much tension in the communities?

Local residents who live in the small community prior to a growth tend to blame the developer and the new residents for problems associated with population influxes. These problems can become worse if the community does not have the infrastructure to accommodate the new growth. Resentment between current residents and newcomers may develop because the former often bears the burden of the expense for new facilities and services, often in the form of higher taxes.

#### 9. What are the consequences of the small communities being unorganized?

The danger is that a community may be very ineffective in implementing or influencing any changes that may affect the community or its residents. By not being organized, the community encourages higher levels of government to deal with a lot of different voices, different attitudes, and different concerns. Government officials don't really know which voice speaks for the majority of the citizens. An organization that represents community consensus is the only effective way to give outside higher levels of government a means to listen to the community.

#### 10. Could a community organization or structure solve some of the potential problems?

A community organization could solve some problems but could create others. Successful response to the development project will likely compel people who wanted to get away from people and government to band together. In effect residents have to

form government to fight government and industry. This is time-consuming and generally conflicts with the rural values of the study area. People moved to the area to escape government and don't want to spend all their time at meetings and in political organizations.

Planning and community organization to prepare for the boom become part of the problem. The planning process makes personal relationships more formal and contractual, adds bureaucracy, and reduces the informal methods of communication that characterize small towns.

#### 11. You've described the impacts on Talkeetna and Trapper Creek. What would be some of the impacts expected in the railroad communities north of Talkeetna?

Although there is an abundance of land available, primarily due to the State land disposals, it is unlikely that the permanent population in the Chase/Curry area would increase dramatically, either with or without Susitna.

Without Susitna, the main attraction to the area would continue to be recreational for most people and residential for only a few. Recreation seekers would continue to use the area as Talkeetna continues to promote tourism. As more and more people visit this area, the chances increase that they would apply for some of the surplus available State land.

With the Susitna project, recreation in the Chase/Curry area would likely increase more than without the project. Improved access to and increased awareness of the railroad area east of the Susitna River would likely attract more recreationists. The access road initially recommended by Acres American would provide vehicle access to the Gold Creek and therefore make the general area more accessible to more people. (Ed. note: As a result of State and Federal agency and public comment, the Alaska Power Authority is reviewing other access routes in addition to that recommended by Acres. The re-evaluation includes a new option, a route north of both Gold Creek and the Indian River remote parcels. If selected, this option reduces the impacts on Gold Creek and the Indian River remote parcels.)

The Susitna project could also result in increased employment opportunities for residents in this area. At the same time, the increased employment opportunity created by the project would attract more people into the general area. This would likely have a negative effect on the existing semi-wilderness way of life for residents who value a semi-wilderness environment.

#### 12. Can the rural semi-wilderness nature of the railroad communities north of Talkeetna be preserved?

I think the railroad communities' rural, semi-wilderness nature will remain the same simply because of the limited access into them. The thing that may influence the railroad communities even more than access to Susitna is

the State land disposal programs. The State has many parcels ready for disposal to the public in this area. If this occurs it will slowly erode the wilderness environment. Rural yes. Wilderness no. People cannot totally subsist off the land as they may have been able to do ten years ago, because it takes more than five acres to subsist in that area.

#### 13. With Susitna, Gold Creek could be the area most heavily impacted by the currently recommended access. Will you expand on this?

With Susitna, the Gold Creek area would likely be the most heavily impacted if the currently recommended access route is chosen. Gold Creek would then be connected by an 18-mile road to the Parks Highway.

If vehicular access occurs in this area, local residents and absentee landowners between Hurricane and Gold Creek, as well as entrants in the Indian River Remote Parcel land disposal would be subjected to increased traffic, noise, and congestion. Potential development would mainly affect local miners, about ten full-time local residents, and absentee, recreational property owners, all of whom value their wilderness retreat.

Without the recommended access or a railhead at Gold Creek, the area would likely remain the way it is. This is true for the Indian River remote parcels as well as Gold Creek. Without Susitna there would probably be no large population influx.

#### 14. If Susitna is developed, will Talkeetna or Trapper Creek become more like Wasilla?

I don't think Talkeetna will ever become a strip development along a highway. Talkeetna is partially protected by the Spur road, a 15 mile dead end. It will always have that to protect it. That's what makes Trapper Creek so vulnerable to the Susitna project. It's along the main corridor of the Parks Highway. It would get all the traffic and it is quite possible that commercial, strip development could occur if property is available. This could occur with or without Susitna depending on local planning efforts.

#### 15. What could be the effect of having a new town developed at the Watana dam site?

On the positive side it could tend to locate more of the new families in the new town and fewer in the existing ones.

It would also tend to open up a whole new area that is now wilderness. This would be negative for those people who value the area as a wilderness area. It would be positive for the development-oriented people in those communities who value opening it up, extracting the resources, developing the region, providing access and road, and more recreational opportunities.

#### 16. Do you expect that the people coming to work on Susitna would have significantly different values than the ones who already live in Trapper Creek and Talkeetna?

People who move into the area as a result of Susitna and locate their families in Talkeetna or Trapper Creek may have quite similar values to people who are there. They'll enjoy the semi-wilderness, the small town environment, the good fishing, the cross country skiing, and other recreational opportunities. But it's the same old problem: more people tend to degrade the quality of that experience. Even though they'll all enjoy it, many people may tend to view the quality of the experience as declining as the population increases. People who come in just to work and live in the construction camps may have different values and attitudes.

#### 17. What can be done to alleviate the impacts that may result from the Susitna project?

Generally, a town facing rapid growth desires to develop the local capability to ensure that the effects of growth will be as beneficial as possible. Not all impacts can be alleviated, but many can be successfully mitigated. Controlling the impacts of rapid growth on small, rural towns within the context of local values begins with community planning, community organization, and research. It is important to understand that urban planning techniques may not apply; a rural community needs rural planning. The suc-

cess of any plan depends on community support and organization. In addition, it requires the developer to share with the community detailed information about the project. Finally, a community requires time, at least 2 years, for planning and preparation for rapid growth.

Source: Susitna Hydroelectric Project Environmental Report, Sociocultural Report Final Draft, March 1982, prepared by Stephen R Braund & Associates.

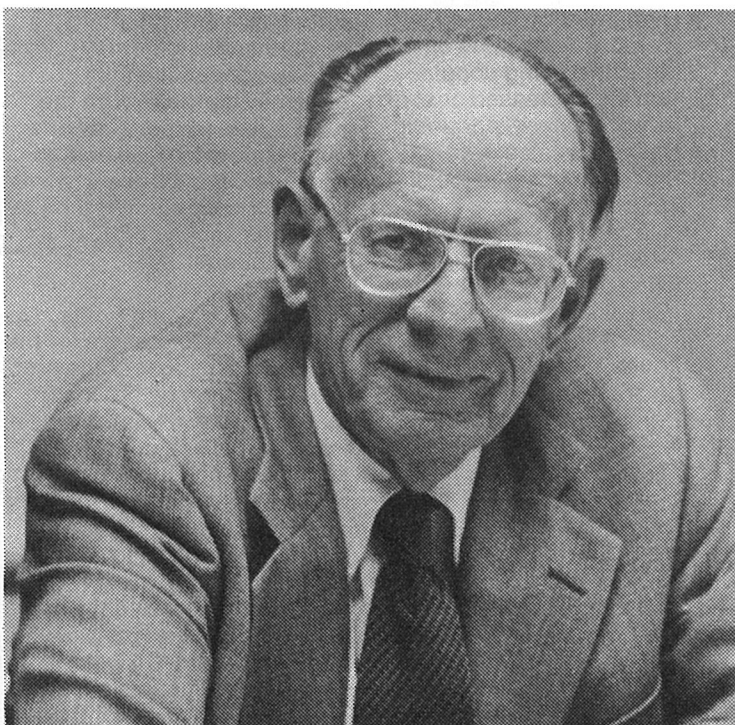




# Designing dams for "Noah's Flood" —An interview with Jacob Douma

Because people have been concerned about flooding, Jacob Douma, a member of the External Review Panel, was asked to discuss how the proposed dams are being designed to safely accommodate everything from very small to very large floods.

Jacob H. Douma, an internationally recognized hydraulics expert, served as Chief of the Hydraulic Design Branch of the U.S. Army Corps of Engineers prior to his retirement from active government service after more than 40 years. In addition to his government work on American dams, he has extensive consulting experience with Canadian hydroelectric projects.



**Question:** How are the frequency and intensity of large floods predicted?

**Douma:** In the case of the Susitna project, flood frequency analyses were made for 12 recording stations located within and adjacent to the upper Susitna River Basin. These were then used to develop regional relationships of instantaneous flood peaks to mean annual flow for various flood frequencies. Flood frequency is related to the size and probability of a flood occurring. In addition, the data from the stations were utilized to develop equations which relate the mean annual flow to the location, geography, and climate of the basin.

**"To ensure against dam failure, both dams are being designed with enough spillway capacity to pass the probable maximum flood without overtopping the dams."**

By combining the estimated mean annual flow derived from the equations along with the regional relationships associated with specific frequencies, flood frequency curves were developed for the dam sites. From these relationships, instantaneous flood peaks at various recurrence intervals, or frequencies, could be predicted for the Susitna River at the dam sites.

The frequencies used for the study are floods occurring once in 100 years, once in 500 years, once in 10,000 years, and the probable maximum flood.

**Question:** What does the term "probable maximum flood" mean?

**Douma:** The probable maximum flood is considerably larger than the one-in-10,000-year flood. Its recurrence interval is considerably less often than once in 10,000 years.

There are three primary factors that cause the probable maximum flood and there must be a reasonable probability of these three factors occurring simultaneously.

Those factors are: 1) the greatest amount of precipitation and snow melt possible; 2) the most severe concentration of runoff; and 3) the least

amount of precipitation and snow melt absorbed by the soil. The combination of these generates the greatest amount of runoff possible at a specific location.

A computer model was used to derive the probable maximum flood on the Susitna River. The model was developed by the North Pacific Division Corps of Engineers and is called the Streamflow Synthesis and Reservoir Regulation (SSARR) computer model. The model was calibrated using observed precipitation, temperatures, and discharges in the Susitna River basin for four major flood events in the period of record May through August. It was verified by comparing computer results and actual recorded data.

**Question:** What are the peak discharges for the 100-year, 500-year, 10,000-year, and probable maximum floods in the Susitna River?

**Douma:** Flood peaks were estimated for the Susitna River at the Gold Creek gauging station (about 15 miles downstream of Devil Canyon).

The peak discharge for the 100-year flood would be 104,500 cubic feet per second (cfs). This is about equal to the largest flood on record, which was 90,700 cfs at the Gold Creek Station in June 1964.

The 500-year flood is estimated to be 131,900 cfs, or 1½ times greater than the largest recorded flood.

The 10,000-year flood is estimated to be 198,000 cfs, or more than 2 times greater than the largest recorded flood.

The probable maximum flood would be 408,000 cfs, or 4½ times larger than the largest flood of record.

**Question:** What level of flood is being used in design of the dams?

**Douma:** Both Watana and Devil Canyon dams are being designed with sufficient spillway capacity to pass the one-in-10,000-year flood with no damage to structures.

**Question:** How is this done?

**Douma:** The reservoir-routed flood discharges at Watana and Devil Canyon dams for the one-in-10,000 year flood are 145,000 cfs and 165,000 cfs, respectively. At Watana dam,

7,000 cfs would pass through the power generating facilities and 24,000 cfs would be released through tunnels with six 78-inch fixed cone valves located in an abutment of the dam. The remaining 114,000 cfs would pass over a service spillway. At Devil Canyon dam, a total of 42,000 cfs would be released through a combination of the power units and five 108-inch fixed cone valves near the base of the dam, while 123,000 cfs would pass over a service spillway.

The fixed cone valves at both dams would be used for normal operation during most years when small floods occur.

The service spillways would be used infrequently for short durations when floods exceed the combined release capacity of the power units and the fixed cone valves.

**Question:** Is the probable maximum flood used in dam design?

**Douma:** Yes.

**Question:** How?

**Douma:** To ensure against dam failure, both dams are being designed with enough spillway capacity to pass the probable maximum flood without over-

topping the dams.

In addition to the cone valves and service spillways already mentioned, an emergency fuse plug spillway will be provided at each dam to pass all discharges in excess of the one-in-10,000-year flood

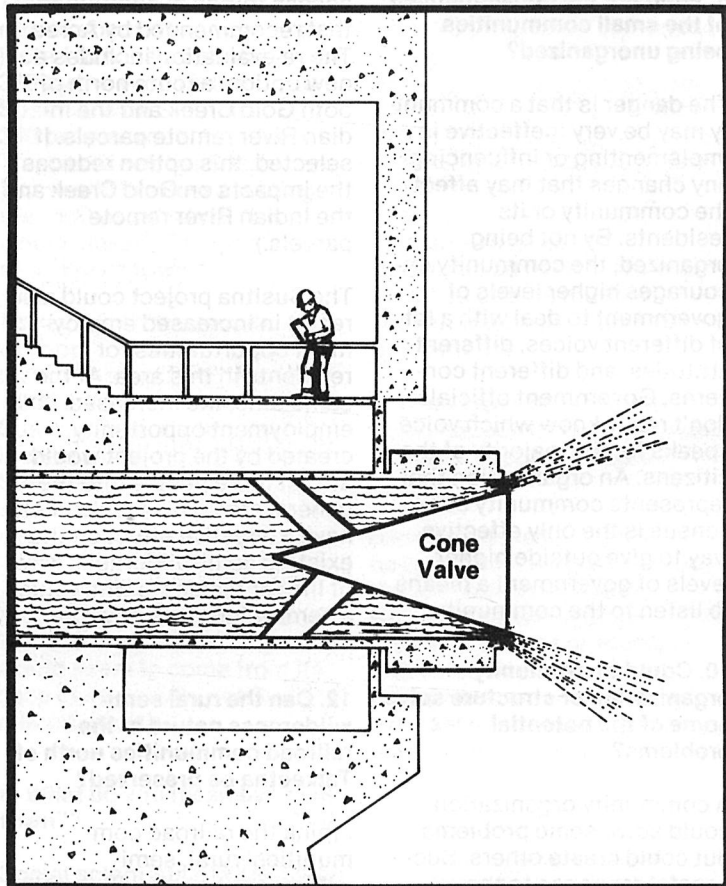
**"The probable maximum flood would be 408,000 cfs, or 4½ times larger than the largest flood of record which occurred in June 1964."**

discharges. For the probable maximum flood, the fuse plug spillway would pass 140,000 cfs at Watana dam and 160,000 cfs at Devil Canyon dam.

**Question:** What is an emergency fuse plug?

**Douma:** An emergency fuse plug is a small dam placed across the entrance to an emergency spillway. It is "designed to fail" with floods as large as the probable maximum flood. The fuse plugs at Watana and Devil Canyon dams would be small earth dams about 31.5 feet high.

For the probable maximum



**Diagram shows the size of cone valve that would be used in both dams. They would be placed near the base of the dam to spray water out like garden hose nozzles. This prevents the formation of deep plunge pools and reduces the chance of a nitrogen supersaturation problem for fish.**



flood, the fuse plugs would be overtopped. The downstream side of the fuse plugs (consisting of small-size crushed stone or gravel) would erode as the water passed over, allowing the excess water to safely pass down the emergency spillways. The fuse plug would be rebuilt after the flood subsided.

**"An emergency fuse plug is a small dam placed across the entrance to an emergency spillway. It is 'designed to fail' with floods as large as the probable maximum flood, allowing water to pass safely down the emergency spillway...the fuse plug would be rebuilt after the flood subsided."**

**Question:** Will the dams reduce the effects of flooding downstream?

**Douma:** Yes, by reducing peak discharges for various sized floods.

The reservoirs are planned to be operated to produce maximum hydroelectric power consistent with power demands and downstream flow requirements. By drawing down the reservoirs in winter, a significant amount of reservoir capacity can be provided for storage of summer floods. The peak discharge (90,700 cfs) for the flood of record in the Susitna River at Gold Creek would be reduced to about 45,000 cfs with the dams in operation.

The general effect of the reservoirs would be to moderate the flows establishing a more consistent flow pattern rather than the wide range of flows that have traditionally occurred.

**Question:** Will spillway operation cause a nitrogen supersaturation condition in flows downstream of the dams which would be harmful to salmon?

**Douma:** Whenever air-entrained, high-velocity spillway flows plunge into a deep pool or stilling basin, an excess amount of air is absorbed in the water. This produces a nitrogen supersaturation condition harmful to fish.

The possibility that a harmful nitrogen supersaturation condition will occur in the Susitna River downstream of the dams is small because:

- 1) Normal flood flows (up to one-in-50-year floods) at the two dams will be released through low-level cone valves, which will not produce deep plunge pools;
- 2) Service spillways, which would only be needed for floods with a recurring interval of less than once in 50 years, would have flip buckets designed to minimize the depth of the plunge pool;
- 3) The rock below the dams, particularly at Devil Canyon, is quite hard and will not erode enough to cause a deep plunge pool to form;
- 4) Any nitrogen supersaturation resulting from using the service spillway at Watana dam would be largely dispersed in the Devil Canyon reservoir;
- 5) Much of the nitrogen supersaturation that may occur by spillway operation at Devil Canyon dam would be dispersed in the steep, rough river channel downstream of Devil Canyon dam.

If a harmful nitrogen supersaturation condition should result from Devil Canyon spillway operation, it would not occur more often than once in 50 years, as that is as often as the spillway would operate.

**Question:** Are the reservoirs likely to fill up with silt?

**Douma:** No. Less than 5 percent of the Watana reservoir and less than 10 percent of the Devil Canyon reservoir would be filled up in 100 years. This is based on a conservative approach that assumes high estimates for the amount of sediment coming into the reservoirs and the subsequent amount of silt that will settle out.

A large percentage of deposited sediment would be in what is called the dead storage portion of the reservoir. Dead storage is that portion of the reservoir not needed for power production. Operation of the project would not be affected by a decrease in the dead storage volume due to siltation.

Since a large part of the Susitna River total sediment load would deposit in the Watana reservoir, sediment storage in Devil Canyon is estimated to be less than 25% of that in the Watana reservoir.

**Question:** How much water level change is expected on the lower Susitna River (below the Talkeetna confluence)?

**Douma:** Analyses of pre- and postproject water levels in the lower Susitna River indicate that summer water depths will be 1.5 to 3.5 feet lower, depending on which reach of the river is being considered.

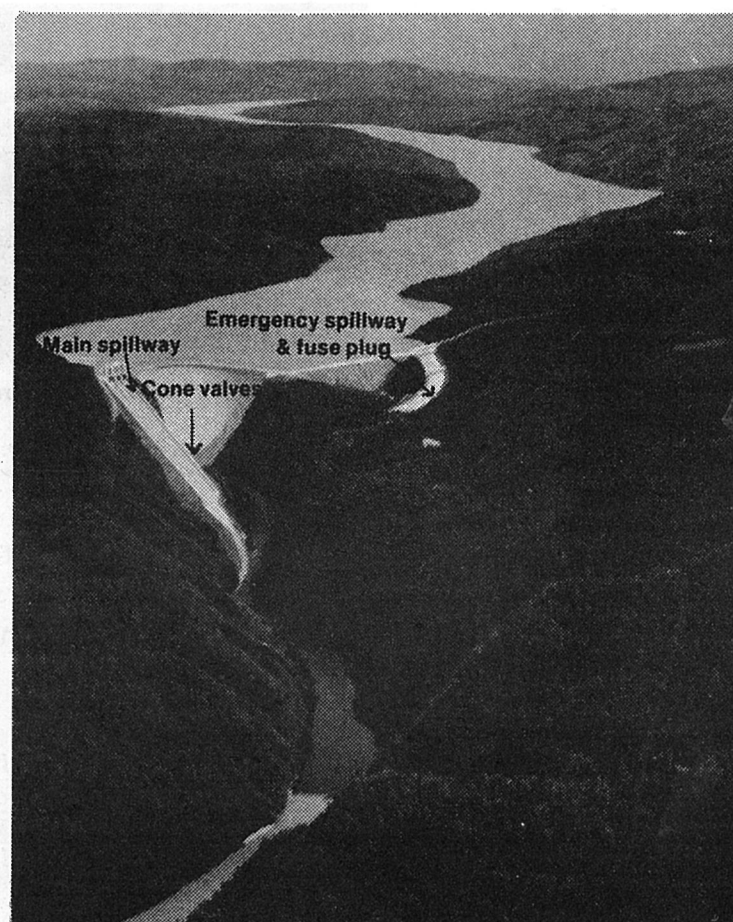
This would be about 10-25% lower than the river is now for corresponding flows.

**"Less than 5% of the Watana reservoir and less than 10% of the Devil Canyon reservoir would be filled up in 100 years."**

**Question:** What are the impacts on the lower river which could result from sedimentation?

**Douma:** Sediment analysis indicates that sediment loads in the lower Susitna River will be essentially the same for both pre- and postproject conditions. This is due to two factors: 1) the extremely large volumes of sediment in the long, wide gravel floodplain below the confluence of the Susitna River with the Talkeetna River; and 2) the large sediment load contribution from the Talkeetna River.

Between Talkeetna and the Delta Islands, a trend towards relative stabilization of the floodplain features should occur over a long period of time.



**Rendering of Devil Canyon dam shows location of cone valves, service spillway, emergency spillway, and fuse plug. These structures would allow water from various sized floods to pass safely over the dam.**

The main channel and major subchannels could develop a more uniform meandering pattern. A vegetative cover could develop on the gravel floodplain and the minor subchannels could begin to fill in.

It should be recognized that an extreme flood generated by either the Chulitna, the Talkeetna, or both could disrupt this process and delay observable changes for several years.

Below the Delta Islands, the changes would be minimal.

## Potential river navigation impact identified

One potential navigational problem area has been identified that could result from construction of the proposed Susitna hydroelectric project. This location, as shown on the map is:

- upstream of Talkeetna near Sherman (about River Mile 128 to 130).

In addition, a second location currently does not have enough data to determine if navigational problems would occur. This location provides access to Alexander Creek from upstream of Alexander Slough.

Further work will be done in summer 1982 in order to define the magnitude of problems which may develop, as well as recommended mitigation options.

Source: "A Preliminary Analysis of Potential Navigational Problems Downstream of the Proposed Hydroelectric Dams on the Susitna River", by Paul Janke, Alaska Department of Natural Resources, Division of Land and Water Management, March 5, 1982.

**Map shows areas of possible navigational difficulties**

**Sherman:**

If the Susitna project were operated for maximum power production, navigational difficulties may occur near Sherman about one year out of three in August, and one year out of two in September.

If the Susitna project were operated for minimal impact on fisheries, navigational difficulties may occur near Sherman about one year out of 10 during June.

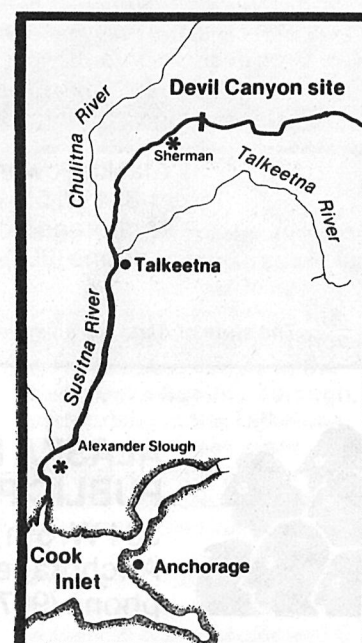
**Alexander Slough:**

At present there is not enough data to determine if navigational difficulties would occur at the upstream access to Alexander Slough (also known as the West Channel.)

### Definitions

**Navigational uses:** past and present uses of the river for transportation by boats and float planes between May 1 and October 31.

**Navigability:** the lower limit of flow depth which still permits navigation by waterborne vessels. During Phase I studies, a required depth of 2.5 feet was the primary criteria used for identifying problem areas in the Susitna River.





# Board of directors concludes Susitna "offers potential long-term benefits", but not without risk

In late April, the Alaska Power Authority Board of Directors formulated their recommendations concerning the Susitna hydroelectric project. The recommendations were sent in a letter dated April 26 to Governor Hammond, Senate President Kerttula and House Speaker Hayes.

In the letter, Board Chairman Chuck Conway concluded that "The Susitna project offers a potential of long-term benefits to the State." The letter continued to say "While this potential exists, the realization of those benefits is dependent upon certain assumptions about the future that are far from certain: upon proper project development timing; and upon very skillful project management. Because of these uncertainties and the time before any actual construction decision is necessary, the Authority believes it is premature to make any commitment, at this time, to actual project construction."

The Board's recommendations were:

- "Pre-construction developmental efforts on

the Susitna Hydroelectric Project should continue.

- The Alaska Legislature should authorize the Power Authority to submit a Federal Energy Regulatory Commission (FERC) license application at a time deemed appropriate by the Authority. The issue of license application timing will be resolved not later than June 30, 1982.
- Funds in the amount of \$25.6 million should be appropriated to the Power Authority in FY 83 for the continuation and intensification of environmental studies, for site exploration activities, and for the initiation of project design."

These recommendations were based on the potential for long-term benefits and because "no information has come to light to suggest that environmental and social impacts, after mitigation, would be unacceptable".

Conway's letter also made it clear that the Board's action to

continue the Susitna developmental activities was not an endorsement of Acres American's recommendations regarding specific project details. An example is Acres' recommended access plan. According to Conway, "The engineer's plan for access to the project site is the subject of reanalysis and will be reconsidered by the Authority at an appropriate future time."

The Board also recommended that the Legislature fund two alternative power generation option studies. First, it was recommended that \$200,000 be appropriated to assess the use of North Slope gas generation in the Railbelt. Second, \$3.3 million was recommended to continue studies of the proposed Chakachamna hydroelectric project. The Board considered both these projects as options that should be pursued in the event the Susitna development does not proceed as scheduled, for one reason or another.

Source: Letter sent to Governor Hammond, Senate President Kerttula, and House Speaker Hayes, April 26, 1982, from Charles Conway, Chairman, Alaska Power Authority Board of Directors.

## Independent cost estimate reduces chance of cost overruns

It is the policy of the Alaska Power Authority to obtain second party cost estimates on all feasibility level studies. This does not prevent cost overruns; it does, however, reduce the chance of them. By obtaining a second cost estimate, the confidence in the original cost estimate can be strengthened by identifying and resolving specific differences.

The Power Authority currently has a contract with Ebasco Services to provide independent cost estimating on its projects. Ebasco is a large international consulting firm that

specializes in power production facilities, including hydroelectric and water resource development.

Ebasco's estimate for the Susitna project was \$5.487 billion, or 7% higher than Acres' estimate of \$5.127 billion. This cost difference is considered to be well within the limits of acceptability. By way of comparison, the U.S. Army Corps of Engineers considers bids that are 15% above cost estimates on government work (such as work on military bases) and 25% above cost estimates for civil works (such as hydroelectric projects) to be acceptable.

The Ebasco estimate was made without knowledge of Acres' final cost estimate. It was based on: project drawings, feasibility study information, and quantities furnished by Acres; a visit to the dam sites; manufacturer and vendor quotations; and Ebasco experience.



From left, Board of Directors Robert Ward, Chuck Webber, Chuck Conway, Ernst Mueller, Robert Weeden, John Schaeffer.

## the susitna hydro studies

This is the fifth newsletter published by the Alaska Power Authority for citizens of the railbelt. The purpose is to present objective information on the progress of Susitna hydroelectric feasibility studies so that readers may make their own conclusions based on accurate information.

Eric P. Yould, Executive Director  
Nancy Blunck, Director of Public Participation

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