



Wrangell Ranger District  
Tongass National Forest  
P.O. Box 51  
Wrangell, AK 99929

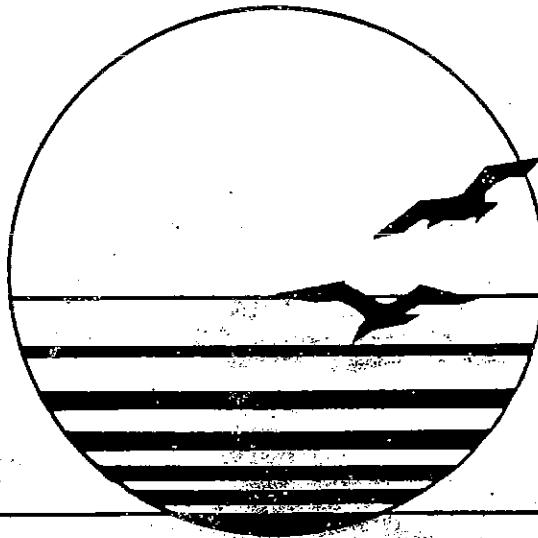
# SOUTHEAST ALASKA

## TRANSMISSION INTERTIE STUDY

### ADDENDUM 1

### TYEE / JOHNNY MOUNTAIN TRANSMISSION LINE STUDY

Wrangell Ranger District  
Tongass National Forest  
P.O. Box 51  
Wrangell, AK 99929



Prepared By HARZA ENGINEERING COMPANY

JULY 1988

## **Executive Summary**





# Alaska Power Authority

State of Alaska

August 25, 1988

Mr. Michael Barton  
Regional Forester  
P.O. Box 21628  
Juneau, AK 99802

Subject: Southeast Alaska Transmission Intertie Study  
Addendum 1, Tyee/Johnny Mountain  
Transmission Line Study

Dear Mr. Barton:

I have attached one copy of the above subject report for your information. If you have questions concerning this report, please feel free to contact me or Mr. Eric Marchegiani of my staff.

Presently, Mr. Stephen Beers, President of Bradfield Electric Inc. is pursuing the interconnection with the mining entities and the Tyee project. The Power Authority will be working with Bradfield Electric Inc. as necessary to facilitate the project. If you have specific questions concerning the project implementation you should contact Mr. Beers at the following address and phone number:

Mr. Stephen Beers, President  
Bradfield Electric Inc.  
P.O. Box 961  
Wrangell, Alaska 99929  
Telephone: (907) 874-3440

Sincerely,

Robert E. LeResche  
Executive Director

EAM:REL:t1j

Attachment as stated

- cc: Stephen Beers
- Mr. Win Green, U.S. Forest Service
- Mr. Douglas Barber, U.S. Forest Service
- Mr. Carl Burgenson, U.S. Department of Agriculture
- Ms. Les Paul, U.S. Forest Service
- Mr. Donald C. Lyon, Forest Plan Interdiscipline Team
- Mr. Keen Kohrd, U.S. Forest Service

Wrangell Ranger District	
AUG 29 1988	
Info.	Act.
<input checked="" type="checkbox"/>	Dist. Ranger
	B.M.A.
<input checked="" type="checkbox"/>	T.M. Oper.
	O.R.A.
	F & W
	Planning
	Engineering
	Log Acct.
	Resource Ck
	RAK

## EXECUTIVE SUMMARY

This report, an addendum to the Southeast Intertie Transmission Study, <sup>1/</sup> presents the results of preliminary investigations of a proposed transmission line extending from the Alaska Power Authority's Tyee Lake Hydroelectric Power Project to the site of a gold mining operation located in British Columbia, Canada. The line, proposed by Bradfield Electric, Inc. of Wrangell, would be utilized in the near and mid-terms to export surplus Tyee hydrogeneration, sold under the terms of the Four Dam Pool Agreement. In the long term, the facility, if so designed, could be utilized to import power for Southeast Alaska from B.C. Hydro's proposed Iskut/Stikine hydroelectric projects.

Based on the anticipated mine loads and the length of the line, the appropriate operating voltage for the transmission line in an exporting role was found to be 69 kV. System studies confirm that, at this voltage, the proposed facility would be compatible with the existing Tyee system. If the line were to be used in the future for importing generation from Canada, a voltage level of 138 kV would be desirable. Consequently, two alternatives were investigated; one a 69 kV facility and the other, a 138 kV class facility which would be initially energized at 69 kV. Either of these alternatives would require an expansion of the existing Tyee substation, construction of 41.5 miles of overhead transmission line, and construction of a new step-down substation at the mine site in Canada. Table 1 shows the pertinent data for the two alternatives; Figure 1 shows the proposed transmission line route. As shown in the table, the estimated cost of the 69 kV alternative is \$14.1 million at January 1988 price levels. For the 138 kV alternative, the estimated cost is \$16.7 million.

Based on planning criteria and load demand forecasts provided by the Power Authority, the Tyee Project appears to have ample surplus peak power and energy generation capacity to serve its present system and the anticipated mine loads well past the year 2000. If, as recommended in the main report, an interconnection between the Tyee Project and the Swan Lake Project were implemented in 2002, there would be a shortfall in existing system hydrogeneration capacity compared to system demand. In this event, under the terms of the Four Dam Pool Agreement, the signatory utilities would have first use of available Tyee and Swan Lake generation and, at times, no surplus generation would be available for export over the proposed line. Because the proposed project would utilize only surplus generation, its implementation would have no effect on the results or recommendations of the main report.

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<sup>1/</sup> Prepared for the Alaska Power Authority by Harza Engineering Company, October 1987.

## Background

In 1987, Bradfield Electric, Inc., an independent concern, proposed to construct, own and operate a transmission facility which would purchase surplus generation from the Power Authority's Tyee Project. The proposed line would be a 69 kV system and would be utilized to export generation to serve two Canadian gold mining operations. The mines, located near Johnny Mountain about 40 miles northeast of Tyee, are expected to have a combined peak demand of 5.0 MW and energy demand of 25,000,000 kWh per year at full development. The mine lives are estimated to be a minimum of 10 years each, beginning in 1988 and 1989.

Bradfield Electric has filed for a U.S. Forest Service Special Use Permit for the project and is exploring various avenues of funding for its implementation, including funding by the State of Alaska through the Alaska Power Authority. In cooperation with Bradfield Electric, the Power Authority initiated this study to provide input to its decision regarding the funding request and to determine the ramifications of the project on the Power Authority's goals and obligations under the Four Dam Pool Agreement.

The Power Authority has been working very closely with Bradfield Electric to insure that there would be a coordinated approach to the project and that there would be no duplication of facilities. In addition, the Power Authority has been working with the Southeast Alaska Transportation and Utility Corridor Group which was established through the efforts of Senator Lloyd Jones. This group is comprised of several state, federal, and private entities which meet about once a month. The entities include:

Alaska Power Authority	Dept. of Transportation/
Department of Natural Resources	Public Facilities
U.S. Forest Service	Tlingit-Haida Rural Electric
Federal Highways Administration	Association
Sealaska Corporation	Bureau of Indian Affairs

The purpose of the group is to insure that there is a coordinated effort between these entities on transportation and utility projects within Southeast Alaska.

## Scope of Services

The investigations described herein were performed for the Alaska Power Authority by Harza Engineering. The purpose of the studies was to provide the Power Authority with a preliminary estimate of cost for Bradfield Electric's proposed transmission facility and also for an alternative which represents the Power Authority's interests in the project. The environmental issues associated with the project were identified and system studies were performed to verify the proposed facility's compatibility with the existing and proposed Tyee system. Finally, an investigation into the

effect of this project's implementation on the results and recommendations of the Southeast Intertie Study was made. Study tasks also included a site reconnaissance, performed in February 1988, and meetings with resource agencies in Petersburg and Wrangell.

### Findings

In addition to the pertinent data given in Table 1, the major findings of the study are as follows:

1. The appropriate operating voltage for the proposed exportation of power is 69 kV.
2. If the line is to be utilized in the future for importing generation from Canada, the transmission line and required substation facilities should be constructed to 138 kV standards, similar to the existing 138 kV class Tyee system. However, these facilities would be initially energized to 69 kV. The capacity of the line in an importation role could be as high as 77 MW at 138 kV.
3. Under average hydrologic conditions, the Tyee Project has ample surplus generating capacity to supply the (median) forecast load demand of Petersburg, Wrangell and the two Canadian mining operations.
4. Under the terms of the Four Dam Pool Agreement only surplus Tyee generation can be sold to non-signatory parties, such as Bradfield Electric. This project must therefore find financial justification within that context and will not compromise the Power Authority's plans for the Tyee-Swan Lake Intertie.

### Recommendations

The proposed project will serve and derive its revenue from energy sales to mining operations having finite lives, in this case, perhaps as little as ten years in duration. Because the mines either have begun operation or will soon, any delay in implementation of the transmission line project will diminish project revenues. At the time of writing, basic information required for design of the transmission facility, such as aerial survey mapping and soils survey data, is not available and funding for gathering the required information has not yet been approved. Given the time necessary for these activities and subsequent design of the facilities it appears unlikely that project construction could begin during the 1988 field season. In this context, the following recommendations are made:

1. After the majority of the proposed transmission line corridor is clear of snow, an aerial photographic survey of the corridor should be conducted. The resulting topographic

mapping should be produced at a scale of 1" = 200' and should have contour intervals of 5 feet. The topography should also be digitized so that it can be readily used as input for computer design and optimization of the line.

2. A soils survey to assess foundation conditions at selected structure locations should be conducted.
3. Permit applications should be prepared and filed with the appropriate U.S. and Canadian agencies. Permits will be required from the U.S. Forest Service, the U.S. Department of Energy, and the Canadian Ministry of Forests and Lands.
4. Environmental studies, if any, required to support the permit applications should be undertaken during the 1988 field season, if possible.

Construction of the transmission project will take an estimated six months. Assuming data collection and engineering were performed this year, construction bids could be taken early next year and the facility could be operational in the fall of 1989. Consideration should be given to separate contracts for the purchase of equipment and materials having long delivery times such as transformers, switches and breakers, and steel poles. Contract award for equipment supply should be made in the third quarter of 1988 so that shop drawing information will be available for preparation of the construction contract bid documents.

Table 1

TYEE-JOHNNY MOUNTAIN TRANSMISSION LINE  
PERTINENT DATA

<u>Item</u>	<u>69 kV Alternative</u>	<u>138 kV Alternative</u>
Initial Operating Voltage, kV	69	69
Future Operating Voltage, kV	NA	138
Overhead Transmission Line		
Length, mi.	41.5	41.5
Conductors, Size, KCM Type Shield Wire	3-336.4 ACSR, Oriole None	3-336.4 ACSR, Oriole None
Insulator Type	Line Post Polymer Suspension Polymer	
Line Structure Type		
Tangent Structures Heavy Angle	Single Wood Pole Single Steel Pole	Single Wood Pole Single Steel Pole
Typical Span, ft.	500	500
Right-Of-Way; Width, Ft./Acres	60/302	100/503
Tyee Substation Expansion, kV	69	69
Transformer Circuit Breakers, #/kV	None 1/69	None 1/69
New Johnny Mt. Substation, kV	69/29.4	69/29.4
Transformer, #/MVA Circuit Breakers, #/kV	3/2.0 2/29.4	3/2.0 2/29.4