

**HARZA-EBASCO**

Susitna Joint Venture  
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**SUSITNA  
HYDROELECTRIC PROJECT**

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**INSTREAM ICE SIMULATIONS:  
SUPPLEMENTARY STUDIES FOR  
MIDDLE SUSITNA RIVER**

**FINAL REPORT**

**HARZA-EBASCO**  
SUSITNA JOINT VENTURE

**NOVEMBER 1985**  
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SUPPLEMENTARY STUDIES FOR MIDDLE SUSITNA RIVER**

Report by  
Harza-Ebasco Susitna Joint Venture

Prepared for  
Alaska Power Authority

Final Report  
November 1985

**NOTICE**

**ANY QUESTIONS OR COMMENTS CONCERNING  
THIS REPORT SHOULD BE DIRECTED TO  
THE ALASKA POWER AUTHORITY  
SUSITNA PROJECT OFFICE**



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# LIST OF EXHIBITS

## ICECAL SIMULATION RESULTS

### EXHIBITS A-F: THREE-STAGE PROJECT

<u>Exhibit</u>	<u>Project Status<sup>1</sup></u>	<u>Weather Period</u>	<u>Flow Requirement</u>	<u>Intake Operating Policy</u>
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### EXHIBITS G-X: TWO-STAGE PROJECT

<u>Exhibit</u>	<u>Project Status</u>	<u>Energy<sup>1</sup> Demand</u>	<u>Weather Period</u>	<u>Flow Requirement</u>	<u>Intake Operating Policy</u>	<u>Watana Intake Design</u>	<u>Devil Canyon Cone Valve Intake</u>
G	Watana Only	2001	1981-82	Case C	Inflow-Matching	Original	Present
H	Watana Only	2001	1981-82	Case C	Warmest Water	Original	Present
I	Watana Only	2001	1981-82	Case C	Lowest Port	Original	Present

1) See note on page ix

# LIST OF EXHIBITS (continued)

## ICECAL SIMULATION RESULTS

<u>Exhibit</u>	<u>Project Status</u>	<u>Energy<sup>1</sup> Demand</u>	<u>Weather Period</u>	<u>Flow Requirement</u>	<u>Intake Operating Policy</u>	<u>Watana Intake Design</u>	<u>Devil Canyon Cone Valve Intake</u>
J	Watana Only	2001	1981-82	Case E-VI	Inflow-Matching	Original	Present
K	Watana Only	2001	1981-82	Case E-VI	Warmest Water	Original	Present
L	Watana Only	2001	1971-72	Case C	Warmest Water	Original	Present
M	Watana & Devil Canyon	2002	1981-82	Case C	Warmest Water	Original	Present
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1) See note on page ix

# LIST OF EXHIBITS (continued)

## ICECAL SIMULATION RESULTS

<u>Exhibit</u>	<u>Project Status</u>	<u>Energy<sup>1</sup> Demand</u>	<u>Weather Period</u>	<u>Flow Requirement</u>	<u>Intake Operating Policy</u>	<u>Watana Intake Design</u>	<u>Devil Canyon Cone Valve Intake</u>
V	Watana & Devil Canyon	2002	1981-82	Case C	Warmest Water	1800/1770	Present
W	Watana & Devil Canyon	2002	1981-82	Case C	Warmest Water	Original	High
X	Watana & Devil Canyon	2002	1981-82	Case C	Warmest Water	1800/1770	High

- 1) The projected energy demands in the Amendment to the License Application (Alaska Power Authority 1985) have been revised from the original License Application (Alaska Power Authority 1983). The exhibits in this report show the energy demand years based on the original License Application. The following table is provided to facilitate conversion of energy demand years shown on the exhibits in this report to energy demand years for the amended License Application.

	<u>ENERGY DEMAND YEAR</u>	
	<u>Shown on Exhibit</u>	<u>Amended License Application</u>
<u>Three Stage Project</u>		
Watana (Elev. 2000)	2001	mid-Stage I
Watana (Elev. 2000) and Devil Canyon	2002	mid-Stage II
Watana (Elev. 2185) and Devil Canyon	2020	late-Stage III
<u>Two Stage Project</u>		
Watana (Elev. 2185)	2001	mid-Stage I
Watana (Elev. 2185) and Devil Canyon	2002	early-Stage III



## SUMMARY

River ice simulation results are presented herein as a supplement to those included in the "Instream Ice Simulation Study" (Harza-Ebasco 1984b). The supplementary simulations are intended to include recent refinements in the proposed Susitna Hydroelectric Project and to evaluate the sensitivity of Susitna River ice processes to various parameters. The following were considered:

- a) Revised "three-stage" construction of the project
- b) Alternative instream flow requirements
- c) Alternative operating policies for multi-level power intakes
- d) Alternative low levels for Watana power intake
- e) Alternative levels for Devil Canyon outlet works.

Results of the river ice simulations support the following conclusions:

1. Expected river ice conditions with the proposed Case E-VI flow requirements are not significantly different from those with Case C or Case E-I requirements.
2. It is expected that the "warmest water" and the "lowest port" alternative operating policies may tend to reduce somewhat the ice cover development relative to the proposed "inflow-matching" policy. However, this trend did not hold for all of the sensitivity simulations and should not be counted on as a general rule. In particular, with Devil Canyon Dam in operation the alternative operating policies have no significant effect on river ice.

3. It is expected that provision of lower ports at the Watana power intake would generally tend to reduce somewhat the extent of the ice front progression and the maximum river stages near the upstream extent of the cover. However, substantial reductions in the ice conditions are not expected to occur consistently unless a very low intake port at Elevation 1636 is provided.
4. An alternative high intake (elevation 1425) for the Devil Canyon outlet works has no significant effect on expected river ice conditions relative to the present design, although it increases release temperatures during brief periods of summer operation.

## 1.0 INTRODUCTION

This report presents the results of river ice simulations for the middle reach of the Susitna River (i.e., downstream of the proposed Susitna Hydroelectric Project and upstream of the Chulitna River confluence - see Figure 1). These river ice simulations are provided as a supplement to the previously published "Instream Ice Simulation Study" (Harza-Ebasco 1984b). One purpose of the present study is to provide updated river ice results based on recent refinements to the proposed Susitna Hydroelectric Project. In particular, these updated results are based on the revised "Case E-VI" instream flow requirements and the "Three-Stage" construction sequence (Alaska Power Authority 1985), which has replaced the "Two-Stage" project proposed in the original License Application (Alaska Power Authority 1983). This report is also intended to evaluate the sensitivity of Susitna River ice processes to several parameters beyond the scope of the earlier report. These include alternative power intake operating policies, alternative designs for the Watana multi-level power intakes, alternative instream flow requirements and alternative intake elevations for the Devil Canyon outlet works. The scope of these alternatives is discussed in Chapter 2.

Many of the sensitivity simulations described in this report were carried out with the Case C flow requirements and the "two-stage" project prior to the adoption of the "Case E-VI" flow requirements and the "three-stage" project by the Alaska Power Authority. The general trends of the sensitivity results are not expected to be affected by these changes in flow requirements and construction staging. Conclusions regarding sensitivity of river ice processes are therefore considered valid.

The methodology for the supplementary river ice simulations herein is identical to that employed for the Instream Ice Simulation Study (Harza-Ebasco 1984b). The calibrated river ice model ICECAL (Harza-Ebasco 1984a) is used to generate the simulations. Each ICECAL simulation is based on the results of a corresponding reservoir temperature simulation (via the DYRESM model, Alaska Power Authority 1984, Harza-Ebasco 1984d) and a stream temperature

simulation (via the SNTMP model, Arctic Environmental Information and Data Center 1984, Alaska Power Authority 1984). Results of the ICECAL model are presented in terms of representative ice thicknesses and water surface elevations as a function of time and location along the river. Results continue to be focused at the river mile locations of those slough and side channels believed to be most important in terms of salmon production.

A more complete description of the background, methodology, capabilities and limitations of the river ice modeling process is included in the previously published reports (Harza-Ebasco 1984a, Harza-Ebasco 1984b).



## 2.0 SCOPE OF RIVER ICE SIMULATIONS

### 2.1 General

Initial ICECAL simulations included in the "Instream Ice Simulation Study" (Harza-Ebasco 1984b) were based on conditions presented in the original License Application (Alaska Power Authority 1983). These conditions included a "two-stage" construction sequence (i.e., Watana completed in 1996, Devil Canyon completed in 2002), the Case C flow requirements (Figure 2), multi-level Watana power intake geometry shown in Figure 3, and the "inflow-matching" operating policy for the power intakes (i.e., an attempt to match the reservoir release water temperatures with the natural flow temperatures). These initial simulations were performed for a variety of weather conditions and project energy demands.

Several refinements to the proposed Susitna Hydroelectric Project have recently been adopted by the Alaska Power Authority, and are fully discussed in the License Application Amendment currently under preparation (Alaska Power Authority 1985). In particular, these refinements include the "Case E-VI" flow-requirements (Figure 2) and the "three-stage" construction sequence for the project as outlined below:

1. Stage I - A lower Watana Dam (normal maximum pool elevation 2000 ft. MSL) would be constructed.
2. Stage II - The full Devil Canyon Dam (normal maximum pool elevation 1455 ft. MSL) would be added.
3. Stage III - Watana Dam would be raised to its ultimate height (normal maximum pool elevation 2185 ft. MSL).

This report includes ICECAL simulations which are based upon these project refinements as currently adopted. These ICECAL simulations were performed for operation of Stage I, Stage II and Stage III based on the 1981-82 weather

conditions (an average winter in terms of mean air temperatures). The "inflow-matching" power intake operating policy and the Case E-VI flow requirements, adopted by the Alaska Power Authority, were assumed for these simulations. The effects of the alternative Case E-I flow requirements (Figure 4), relative to the adopted Case E-VI requirement, were also simulated. Case E-I was selected for these sensitivity studies since it has the highest minimum summer flow requirements of the suggested alternative flow constraints (Harza-Ebasco 1984c). The summer minimum flow requirement for Case E-I is 14,000 cfs as compared to 9,000 cfs for Case E-VI. Ice conditions for summer minimum flow requirements between these two extremes are expected to be within the simulated range of conditions for E-VI and E-I.

As detailed in the following sections, this report also includes a number of sensitivity simulations. These simulations were performed to investigate the effects on river ice due to alternative flow requirements, additional low power intakes at Watana Dam, alternative intake operating policies which attempt the release of warmer water, and alternative intake elevations for the Devil Canyon outlet works. The scope of these sensitivity simulations is shown in Table I. Although these sensitivity simulations, as well as those presented in the "Instream Ice Simulation Study" (Harza-Ebasco 1984b), were based upon the original "two-stage" project, the general trends of the results are believed applicable to the "three-stage" project also. Conclusions regarding the sensitivity of river ice to weather conditions, flow requirements, power intake designs, operating policies and outlet works designs, based on the simulations of the "two-stage" project, are therefore also believed valid for the "three-stage" project.

## 2.2 Alternative Operating Policies for Watana and Devil Canyon Multi-Level Power Intakes

Water temperatures within the proposed Watana and Devil Canyon reservoirs will vary with time and depth. The multi-level power intake structures proposed for the Watana and Devil Canyon reservoirs are therefore intended to provide some degree of control over the reservoir release temperatures discharged to the river through the powerhouse. Alternative policies considered

herein for operating the multi-level power intakes include "inflow-matching", "warmest water" and "lowest port". The "inflow-matching" policy, which was assumed for the "Instream Ice Simulation Study" (Harza-Ebasco 1984b) and has been adopted by the Alaska Power Authority for the License Application studies (Alaska Power Authority 1983, 1985), represents a year-round attempt to match the reservoir release temperatures with the natural temperature of the flow entering the reservoir. In effect, "inflow-matching" results in winter release of the coldest water available to the power intakes. The "inflow-matching" policy also is expected to result in the lowest possible suspended sediment concentration in the reservoir outflow during the winter, thereby minimizing the project effects in this regard (Alaska Power Authority 1985). The "warmest water" policy represents a year-round policy of releasing the warmest water available to the power intakes. For both "inflow-matching" and "warmest water" policies, the particular intake port selected for operation will vary with the changing reservoir levels and temperature profiles. The "lowest port" operating policy means that the lowest port of the multi-level power intake will be operated year-round regardless of water temperatures.

Comparisons of river ice simulations for these three alternative operating policies are based on the "two-stage" project, Case C and Case E-VI alternative flow requirements (see Section 2.3) and the weather conditions of 1981-82 and 1971-72 (average and cold winters, respectively, in terms of mean air temperature).

### 2.3 Alternative Instream Flow Requirements

River ice simulations based on the "Case C" and "Case E-VI" alternative instream flow requirements are compared in this report. The "Case C" instream flow requirement (Figure 2) was proposed in the original Susitna Hydroelectric Project License Application (Alaska Power Authority 1983) and was assumed for the "Instream Ice Simulation Study" (Harza-Ebasco 1984b). The "Case E-VI" flow requirement (Figure 2) represents a recommended refinement of "Case C" as described in the report "Evaluation of Alternative Flow Requirements" (Harza-Ebasco 1984c) and the License Application Amendment

(Alaska Power Authority 1985). Comparisons of river ice simulations for "Case C" and "Case E-VI" are based on both "inflow-matching" and "warmest water" operating policies (Section 2.2), Watana and Watana + Devil Canyon operating ("two-stage" project), and the 1981-82 weather conditions (an average winter in terms of mean air temperatures). Figure 5 shows a comparison of the simulated Case C and Case E-VI flow rates released from Watana reservoir for Watana operating alone with 2001 energy demand and the 1981-82 weather conditions. Figure 6 shows corresponding flows released from Devil Canyon reservoir with the 2002 energy demand.

#### 2.4 Alternative Designs for Watana Multi-Level Power Intake

River ice simulations are provided for several alternative designs of the Watana multi-level power intake structure as detailed in Table 2. The "original design" shown in Figure 3 corresponds to that proposed in the original License Application (Alaska Power Authority 1983) and is also applicable to Stage III of the "three-stage" project. This design includes intake ports at elevations 2151, 2114, 2077 and 2040 ft. MSL with an approach channel at elevation 2025 ft. MSL. This "original design" was assumed for the "Instream Ice Simulation Study" (Harza-Ebasco 1984b). The alternative Watana power intake designs considered herein are similar to the "original design" but with one additional low level port at elevation 1880, 1800 or 1636 ft. MSL (Table 2). These alternative power intake designs are considered in order to determine if an additional low level port can effectively provide warmer winter reservoir releases and subsequently reduced river ice cover development downstream relative to that with the "original design". Comparisons of river ice simulations for the alternative power intake designs are based on the "warmest water" operating policy (Section 2.2), "Case C" flow requirements (Section 2.3), Watana and Watana + Devil Canyon operating ("two-stage" project) and the 1971-72 and 1981-82 weather conditions.



## 2.5 Alternative Designs for Devil Canyon Outlet Works

River ice simulations are included for two alternative designs for the intake to the Devil Canyon outlet works. The "present design" provides the outlet works intakes at elevation 930 and 1050 ft. MSL and was used for the "Instream Ice Simulation Study" (Harza-Ebasco 1984b). As discussed in the License Application Amendment (Alaska Power Authority 1985), an alternative "high level" intake at elevation 1425 ft. MSL was considered for the purpose of warming the reservoir release temperatures by 1°C to 2°C during summer operation of the outlet works. River ice simulations were performed to determine if such a change in summer release temperatures would have any effect on winter conditions. River ice results for the "present design" and "high level" outlet works are compared on the basis of the "warmest water" power intake operating policy (Section 2.2), "Case C" flow requirements (Section 2.3), the "original" and Elev. 1800 Watana power intake designs (Section 2.4) and the average 1981-82 winter weather conditions.

### 3.0 RESULTS

#### 3.1 General

The supplementary river ice simulation results are presented in Exhibits A through X. These exhibits are presented in the same format as those of the "Instream Ice Simulation Study" (Harza-Ebasco 1984b) and include the following information:

1. Profile of maximum river stages which occurred during the simulation period and the corresponding ice cover thickness which existed on the date of maximum stage.
2. Location of the ice front and 0°C water isotherm throughout the simulation.
3. Time history of water surface elevation, ice thickness and water temperature at selected slough and side channel locations.

Tables 3, 6 and 9 present a summary of the maximum simulated river stages and simulated ice front progression for the various alternatives considered in this study (see Chapter 2). With a similar format, Tables 4, 7 and 10 summarize the maximum simulated total ice cover thicknesses (i.e., solid + slush ice components - Harza-Ebasco 1984b) and Tables 5, 8 and 11 show the maximum solid ice component thicknesses for the various alternatives.

For comparative purposes, Tables 3 through 11 include summary results of certain river ice simulations already presented in the Instream Ice Simulation Study (Harza-Ebasco 1984b) with simulations prepared for this supplementary study.

### 3.2 Three-Stage Project

River ice simulations for the current "three-stage" Susitna Hydroelectric Project are presented in Exhibits A, B and C. These results are summarized in Tables 3, 4 and 5 and Figures 7 through 10. These results are based on the "inflow-matching" operating policy and Case E-VI flow requirements. (Additional simulations based on the Case E-I flow requirements are shown in Exhibits D, E and F and are also summarized in Tables 3, 4 and 5.) The results are shown for operation of Stage I, Stage II and Stage III and are based on the average winter weather conditions of 1981-82. Results of the corresponding reservoir temperature simulations are shown in Figures 14, 15 and 16. Simulated flow rates released from the reservoirs are shown in Figures 11, 12 and 13. Simulations of Stage I and Stage II are believed to be representative of typical ice conditions throughout the duration of those particular stages. The Stage III simulation represents conditions when the project's annual energy output is nearing its ultimate capacity.

The river ice simulation results for Stage I, Stage II and Stage III indicate the following:

#### 3.2.1. Stage I Operation

- a) Ice cover progression upstream of Talkeetna in an average winter is expected to begin in mid-December, approximately 3 weeks later than for natural conditions. The ice cover would reach a maximum extent near RM 139 in late January and would melt-out by late April, about 2 weeks earlier than the spring breakup of natural conditions.
- b) Maximum total ice cover thicknesses in an average winter would range from 3 feet to 9 feet along the river, and are generally similar to those of natural conditions. Maximum solid ice thicknesses of 3 feet are expected.

- c) Maximum river stages within the ice-covered reach (downstream of RM 139) in an average winter would generally be 2 to 6 feet higher than those of natural conditions and additional sloughs, including Slough 11, would be overtopped. Those sloughs overtopped under natural conditions would be overtopped by greater amounts with Stage I operating.
- d) Upstream of the ice cover, the river would remain open with some border ice and anchor ice expected within approximately 10 to 25 miles upstream of the cover.
- e) River ice results with Case E-I flow-requirements are similar to those with Case E-VI.

### 3.2.2. Stage II Operation

- a) Ice cover progression upstream of Talkeetna in an average winter is expected to be further delayed from Stage I operation, beginning in late December (approximately 6 weeks later than under natural conditions). Ice front progression is expected to reach a maximum extent near RM 133 in late January and would melt-out by late March, about 6 weeks earlier than the natural spring breakup.
- b) Maximum total ice cover thicknesses in an average winter would range from 2 to 6 feet and would be less than or equal to those of natural conditions. Solid ice thicknesses of up to 3 feet are expected.
- c) Maximum river stages within the ice-covered reach (downstream of RM 133) in an average winter would typically be 1 to 4 feet higher than those of natural conditions and would cause an additional overtopping event at Slough 8.
- d) Upstream of the ice cover, maximum river stages would be less than or equal to those of natural conditions, and Slough 9A would no longer be overtopped. Water temperatures in this reach (i.e., upstream of RM 133)



would remain above 0°C for Stage II operation in an average winter and no border or anchor ice is expected.

- e) River ice results with Case E-I flow requirements are similar to those with Case E-VI.

### 3.2.3. Stage III Operation

- a) Ice cover progression upstream of Talkeetna in an average winter is expected to start at the beginning of January, similar to that of Stage II operation and about 6 weeks later than under natural conditions. The ice cover is expected to reach a maximum extent near RM 114 in late January and would melt out by early March, about 9 weeks earlier than the natural spring breakup.
- b) Maximum total ice cover thicknesses in an average winter would range from 1 to 3 feet and would be several feet less than under natural conditions. Solid ice thicknesses are not expected to exceed 1.5 feet.
- c) Maximum river stages within the ice-covered reach (downstream of RM 114) in an average winter would be about 2 feet higher than those of natural conditions.
- d) Upstream of the ice cover, maximum river stages would be typically less than those of natural conditions. Slough overtoppings in this reach would be less frequent and less severe than under natural conditions.
- e) River ice results with Case E-I show somewhat greater ice development than with Case E-VI. Slough overtoppings and the timing of the ice front progression, however, remain similar for Case E-I and Case E-VI.
- f) The Stage III simulation described above is based on the projected energy demand when the project is operating near its ultimate capacity. Earlier in the Stage III operation, it is expected that river ice conditions would be generally similar to those described above, except that the ice

cover may progress to a point between RM 120 and RM 126. This conclusion is based on simulation of the final stage of the two-stage project (equivalent to Stage III) for an energy demand which is slightly less than the demand during the early years of Stage III operation (Exhibit N).

### 3.3 Alternative Operating Policies for Watana and Devil Canyon Multi-Level Power Intakes - "Two-Stage" Project

#### 3.3.1 Watana Operating Alone with 2001 Energy Demand

River ice simulation results for the alternative power intake operating policies for Watana operating alone ("two-stage" Project) are presented in Exhibits G through L. A summary of these results is shown in Tables 6, 7 and 8. (Note that these exhibits and tables also consider the effects of the alternative instream flow requirements - see Section 3.4.)

Review of Tables 6, 7 and 8 suggests that the relative effects on river ice of the alternative Watana power intake operating policies (i.e. "inflow-matching", "warmest water" and "lowest port" - see Section 2.2) do not follow a simple general trend. These river ice results, however, are consistent with the corresponding results of the reservoir temperature simulations (DYRESM model) and can best be discussed in conjunction with the DYRESM results. Figures 17, 18 and 19 show these corresponding reservoir temperature simulation results for the alternative power intake operating policies based on Watana operating alone with 2001 energy demand.

Figure 17 shows that, based on Case C flows and 1981-82 weather conditions, the "lowest port" operating policy provides significantly warmer releases (often by 1°C or more) during the winter months than either the "inflow-matching" or "warmest water" policies. This is reflected in the river ice results (Tables 6, 7 and 8) which show a significantly reduced ice front extent, reduced ice thickness and river stages and fewer slough overtoppings for the "lowest port" policy relative to "inflow-matching" or "warmest water." Figure 17 also shows that the "lowest port" policy provides summer

releases in the range of 6 to 8°C. These temperatures are often 4°C colder than those obtained using the "inflow-matching" or "warmest water" policies. Further downstream, however, this temperature difference is only about 2°C (Alaska Power Authority 1985). To some extent, these cold summer releases of the "lowest port" policy may allow the reservoir to store a relatively large amount of thermal energy (compared to the alternative policies) which can subsequently be released in the form of warmer water the following winter. Based on Case C flows and the 1981-82 weather conditions, it therefore appears that the "lowest port" policy is more effective than the other policies in reducing the extent of river ice development.

Based on the Case C flows and 1981-82 weather conditions, Tables 6, 7 and 8 show that the "warmest water" operating policy is not effective in reducing river ice development relative to "inflow-matching". In fact, simulated results of the "warmest water" policy at some locations show greater ice thicknesses and river stages than the "inflow-matching" policy. These river ice results are consistent with the corresponding reservoir temperature simulation results (see Figure 17) which show that, for Case C flows and 1981-82 weather, the "warmest water" policy provides winter releases which are often cooler than those of the "inflow-matching" policy. Although this result may appear unusual, it should be emphasized that these alternative power intake operating policies are year-round policies. As shown in Figure 17, the summer releases of the "warmest water" policy are often warmer than those with "inflow-matching". The "warmest water" policy may therefore cause faster depletion of thermal energy storage in the reservoir and subsequently colder water available for release the following winter.

A comparison of the "warmest water" and "inflow-matching" policies is also made for the Case E-VI flows with 2001 energy demand and 1981-82 weather conditions. The simulated river ice results for Case E-VI are again consistent with the corresponding reservoir temperature simulation results shown in Figure 18. With Case E-VI (see Figure 18), the "warmest water" policy again shows summer releases which are often warmer than those of "inflow-matching", but also shows warmer winter releases. In this case, the reservoir ice cover

formed earlier with the "warmest water" policy than with the "inflow-matching" policy and subsequently tended to insulate the reservoir from the further cooling effects of wind and air temperature. The earlier ice cover formation with "warmest water" policy appears to be caused by removal of greater amounts of warm water from near the reservoir surface, resulting in cooler surface temperatures. As shown in Tables 6, 7 and 8, simulated river ice results for Case E-VI with the "warmest water" policy show reduced ice thicknesses, river stages and ice front extent and fewer slough overtoppings relative to "inflow-matching".

Alternative operating policies for Watana operating alone with 2001 energy demand and Case C flows are also simulated for 1971-72 weather conditions (cold winter). For these conditions, Figure 19 shows that reservoir releases with the "warmest water" policy are warmer during the winter months than those with the "inflow-matching" policy. These release temperatures are again reflected in the simulated river ice results. As shown in Tables 6, 7 and 8, the "warmest water" policy (with Case C flows, 2001 energy demand, 1971-72 weather) results in reduced ice thicknesses and river stages and fewer slough overtoppings in the reach upstream of River Mile 126 relative to the "inflow-matching" policy.

### 3.3.2 Watana and Devil Canyon Operating with 2002 Energy Demand

River ice simulation results for the "inflow-matching" and "warmest water" power intake operating policies for Watana and Devil Canyon operating ("Two-Stage" Project) with 2002 energy demand are presented in Exhibits M, N and O. These results are based on Case C and Case E-VI flows and the 1981-82 (average) weather conditions. As shown in Tables 6, 7 and 8, the river ice results for the "warmest water" policy are nearly identical to those with "inflow-matching" policy. The corresponding reservoir temperature simulation results (Figures 20 and 21) show that the "warmest water" policy provides slightly warmer winter releases than "inflow-matching", but this difference is not great enough to significantly affect the river ice development.



### 3.4 Alternative Instream Flow Requirements - "Two-Stage" Project

#### 3.4.1 Watana Operating Alone with 2001 Energy Demand

River ice simulation results for Watana operating alone with the Case C and Case E-VI alternative flow requirements are presented in Exhibits G, H, J and K. These comparisons are based on the "Two-Stage" Project, the 1981-82 weather conditions and 2001 energy demand and consider both "inflow-matching" and "warmest water" intake operating policies. Results are summarized in Tables 6, 7 and 8. As discussed in Section 3.3.1, trends in river ice simulation results reflect the corresponding trends in the reservoir temperature simulation results. Simulated Watana reservoir release temperatures for the alternative instream flow requirements are compared in Figures 22 and 23.

Based on the "inflow-matching" policy, simulated reservoir release temperatures during the winter for Case C and Case E-VI show significant time-variation (Figure 22) but the average winter release temperatures for the two flow cases appear quite similar. The corresponding river ice simulations for "inflow-matching" show that Case E-VI causes slightly greater ice thicknesses and river stages upstream of River Mile 126 and slightly reduced ice thicknesses and river stages downstream of River Mile 126 relative to Case C. The extent of the ice cover progression and the occurrences of slough overtoppings, however, remains nearly the same for Case C and Case E-VI.

Based on the "warmest water" policy, Figure 23 shows that Case E-VI results in warmer winter reservoir releases (often by 1°C) than those of Case C. This is reflected in reduced river ice extent, reduced river stages and fewer slough overtoppings for the Case E-VI river ice simulations relative to Case C (Tables 6, 7 and 8) based on the "warmest water" policy.

### 3.4.2 Watana and Devil Canyon Operating with 2002 Energy Demand

River ice simulation results for the alternative flow requirements with both dams operating are presented in Exhibits M, N and O. Comparisons of Case C and Case E-VI are based on the "Two-Stage" Project, the 1981-82 weather conditions and 2002 energy demand and include "inflow-matching" and "warmest water" operating policies. Corresponding results of the Devil Canyon reservoir release temperature simulations are shown in Figures 24 and 25.

Figures 24 and 25 show that the simulated winter releases from Devil Canyon reservoir for Case E-VI are generally quite similar or only slightly colder than those of Case C. This trend is reflected in the river ice simulations which show generally similar river stages, ice thicknesses and slough overtoppings for Case C and Case E-VI flow requirements.

### 3.5 Alternative Designs for Watana Multi-Level Power Intake - "Two-Stage" Project

#### 3.5.1 Watana Operating Alone with 2001 Energy Demand

River ice simulation results for alternative Watana power intake designs (see Section 2.4) are presented in Exhibits H, L and P through U based on Watana operating alone ("Two-Stage" Project), 2001 energy demand, Case C flows and the "warmest water" operating policy. These results are summarized for comparison in Tables 9, 10 and 11. Figures 26 and 27 show simulated reservoir release temperatures for several of these alternatives and are consistent with the trends in river ice simulation results.

Tables 9, 10 and 11 show that the addition of a lower level intake port may tend to reduce somewhat the extent of the simulated river ice cover and corresponding river stages near the upstream extent of the cover. Based on the 1971-72 weather conditions, the largest reduction in ice extent, relative to the original intake design, is simulated for the addition of an intake port at elevation 1636 ft. For this alternative, the ice cover extent is

reduced by 9 miles and simulated overtopping at sloughs 9A, 11, 20 and 21 is prevented, relative to the original intake design.

Provision of a lower level intake port at elevation 1880 or 1800 ft., however, does not necessarily result in significantly reduced river ice development. Based on the 1971-72 weather conditions, for example, an additional intake at elevation 1880 ft. provides no reduction in river ice extent or slough overtoppings relative to the original intake design. A lower level intake at elevation 1800 ft. shows only a very slight reduction in river ice extent and prevents at most only one additional slough (Slough 21-A6) from overtopping relative to the original design.

It therefore appears that the addition of lower level Watana power intake ports at elevation 1636 would substantially reduce the extent of river ice development relative to the "original design". Intake ports at elevations 1880 or 1800 ft, however, may not be very effective.

### 3.5.2 Watana and Devil Canyon Operating with 2002 Energy Demand

River ice simulation results for alternative Watana intake designs are presented in Exhibits M, V, W and X based on Watana and Devil Canyon operating ("Two-Stage" Project), 2002 energy demand, 1981-82 weather conditions, Case C flows and the "warmest water" intake operating policy. These results are summarized for comparison in Tables 9, 10 and 11. Note that comparisons are based on both "present" and "high" alternative designs for the Devil Canyon outlet works (see Section 2.5). Figures 28 and 29 show the corresponding reservoir release temperature simulation results.

Tables 9, 10 and 11 show that an additional Watana intake port at elevation 1800 results in a very slight reduction in river ice development relative to the original Watana intake designs. For the most part, river stages and slough overtoppings with the lower (Elevation 1800) intake are the same as those with the original design. This trend occurs based on both the "present design" and the "high level" Devil Canyon outlet works. It therefore again

appears that lower level Watana power intakes at elevations 1880 or 1800 ft may not be very effective in reducing river ice development.

### 3.6 Alternative Designs for Devil Canyon Outlet Works - "Two-Stage" Project

River ice simulation results for the "present" and "high level" designs for the Devil Canyon outlet works (see Section 2.5) are presented in Exhibits M, V, W and X. These alternatives are based on 1981-82 weather conditions, the "Two-Stage" Project, 2002 energy demand, Case C flows and "warmest water" operating policy. The results are summarized for comparison in Tables 9, 10 and 11. Corresponding results of the reservoir release temperature simulations are shown in Figures 30 and 31.

As shown in Tables 9, 10 and 11, there is no significant difference in river ice results between the alternative Devil Canyon outlet works designs. This is true based on both the "original design" and the alternative "El. 1800" design for the Watana power intakes. The similarity of winter reservoir release temperatures for the alternative Devil Canyon outlet works is apparent from Figures 30 and 31.

#### 4.0 CONCLUSIONS

The following conclusions are based on the river ice simulations presented in this study and the "Instream Ice Simulation Study" (Harza-Ebasco 1984b).

##### 4.1 "Three-Stage" Project as Currently Adopted - Average Winter Weather

Expected river ice conditions during an average winter with operation of Stage I, Stage II and Stage III are as shown in Figure 10 and described in Section 3.2 of this report. Ice front progression at Talkeetna, with Stage I operating, would be delayed about 3 weeks (relative to natural conditions) until mid-December, and would be further delayed until late December or early January with the operation of Stages II and III respectively. Spring meltout in the Middle Susitna River with Stage I operating would be completed by late April about 2 weeks earlier than the natural breakup. With addition of Stages II and III, the meltout would be further advanced, occurring in late to early March, respectively.

The maximum upstream extent of the ice cover during an average winter would be in the vicinity of RM 139 with Stage I operating. This ice cover extent would be reduced to near RM 133 with Stage II operating and further reduced to the vicinity of RM 114 with Stage III operating. The total thickness of the river ice cover with Stage I operating would be generally similar to that of natural conditions. Ice cover thickness would be progressively reduced with the addition of Stages II and III.

Maximum river stages within the ice-covered reaches during operation of Stages I, II and III would generally be several feet higher than those of natural conditions. The frequency and magnitude of slough overtoppings within the ice-covered reaches during project operation would therefore be greater than under natural conditions (Table 3). Mitigation measures such as construction of berms will therefore be undertaken with the project to prevent these sloughs from overtopping. Upstream of the ice-cover, however, maximum river stages with the project operating would be generally less than or equal to those of natural conditions. Frequency and magnitude of slough



overtoppings upstream of the ice cover with the project in operation would therefore be less than or equal to natural conditions.

#### 4.2 Weather Conditions

The conclusions of Section 4.1 above are based on the average winter weather conditions of 1981-82. In a cold winter, such as that of 1971-72, the ice front progression upstream of Talkeetna would be expected to begin several weeks earlier and would extend a few miles further upstream than with the average winter conditions. The maximum with-project ice front progression would occur with Stage I operating during a cold winter and would be expected to reach the vicinity of RM 142 (versus RM 139 in an average winter). Maximum ice cover thicknesses and river stages in a cold winter are likely to be about 2 feet greater than those in an average winter. Further slough overtopping would therefore be expected in a cold winter.

In a very warm winter, such as that of 1976-77, the extent of the ice cover is expected to be a few miles downstream of that in an average winter. Maximum ice cover thicknesses and river stages in a very warm winter are expected to be about 2 feet less than those in an average winter. Fewer and less severe slough overtoppings are therefore expected in a very warm winter.

#### 4.3 Alternative Power Intake Operating Policies

The conclusions of Section 4.1 above were based on the recommended "inflow-matching" operating policy for the multi-level power intakes. It is expected that the "warmest water" and the "lowest port" alternative operating policies may tend to reduce somewhat the ice cover extent and maximum ice thicknesses and may result in fewer slough overtoppings, relative to the "inflow-matching" policy. However, this trend did not hold for all of the sensitivity simulations and should not be counted on as a general rule. In particular, with Devil Canyon Dam in operation (Stages II or III) the alternative operating policies are expected to have no significant effect on river ice.

#### 4.4 Alternative Instream Flow Requirements

The expected river ice conditions with the Case E-I or Case C flow requirement are not significantly different from those with the recommended Case E-VI requirements.

#### 4.5 Alternative Designs for Watana Power Intake

The conclusions of Section 4.1 above are based on the Stage I and Stage III multi-level power intake elevations shown in Table II. It is expected that provision and use of alternative lower intake ports would generally tend to reduce somewhat the extent of the ice front progression and the maximum river stages near the upstream extent of the cover. However, substantial reductions in the ice conditions are not expected to occur consistently unless a very low intake port at Elevation 1636 is provided.

#### 4.6 Alternative Elevations for Devil Canyon Outlet Works

It is expected that an alternative high level intake at elevation 1425 ft. MSL would have no significant effect on river ice relative to the present design for the Devil Canyon outlet works.

## 5.0 REFERENCES

Alaska Power Authority 1983, Before the Federal Energy Regulatory Commission, Project No. 7114, Application for Major License, The Susitna Hydroelectric Project prepared by Acres American, Inc.

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# **TABLES**



# SUSITNA HYDROELECTRIC PROJECT

## SCOPE OF SUPPLEMENTARY RIVER ICE SIMULATIONS

### TWO-STAGE PROJECT

**TABLE 1**

		WATANA ONLY 2001 DEMAND								WATANA + DEVIL CANYON 2002 DEMAND				PROJECT STATUS
		1981-82						1971-72		1981-82				WEATHER CONDITIONS
		CASE C			CASE E-VI			CASE C		CASE C		CASE E-VI		FLOW REQUIREMENTS
		I	W	L	I	W	I	W	I	W	I	W	OPERATING POLICIES	
DEVIL CANYON OUTLET WORKS	WATANA POWER INTAKE DESIGN													
PRESENT DESIGN EI. 930, 1050	ORIGINAL	G	H	I	J	K	△	L	△	M	N	O		
	1880/1850		P					R						
	1800/1770		Q					S		V				
	1800/1500							T						
	1636/1470							U						
HIGH LEVEL EI. 1425	ORIGINAL									W				
	1800/1770									X				

LEGEND: **G,H,I** ..etc ICECAL EXHIBIT PRESENTED HEREIN



ICECAL SIMULATION PRESENTED  
PREVIOUSLY (HARZA-EBASCO 1984b)

POWER INTAKE  
OPERATING POLICIES:

**I** INFLOW-MATCHING  
**W** WARMEST WATER  
**L** LOWEST PORT

TABLE 2

SUSITNA HYDROELECTRIC PROJECT  
 ALTERNATIVE WATANA POWER INTAKE DESIGNS  
 PORT ELEVATIONS IN FEET M.S.L.

	<u>Original Design*</u>	<u>Alt. 1880/1850</u>	<u>Alt. 1800/1770</u>	<u>Alt. 1800/1500</u>	<u>Alt. 1636/1470</u>	<u>Stage I</u>
Level 1	2151	2151	2151	2151	2151	1964.5
Level 2	2114	2114	2114	2114	2114	1926.5
Level 3	2077	2077	2077	2077	2077	1888.5
Level 4	2040	2040	2040	2040	2040	1850.5
Level 5	—	1880	1800	1800	1636	1812.5
Approach Channel	2025	1850	1770	1500	1470	1800

\* Stage III design is same as "original design", except approach channel is at El. 1800.

**SUSITNA HYDROELECTRIC PROJECT  
MAXIMUM SIMULATED WINTER RIVER STAGES  
1981-82 WEATHER CONDITIONS (AVERAGE WINTER)  
THREE-STAGE PROJECT vs NATURAL CONDITIONS**

**TABLE 3**

SLOUGH OR SIDE CHANNEL	RIVER MILE	THRESHOLD ELEVATION	NATURAL CONDITIONS	WATANA ONLY		WATANA AND DEVIL CANYON			
				STAGE I		STAGE II		STAGE III	
				CASE E-VI	CASE E-I	CASE E-VI	CASE E-I	CASE E-VI	CASE E-I
Whiskers	101.5	367	368	370	370	370	370	370	370
Gash Creek	112.0	Unknown	455	457	458	459	458	457	457
6A	112.3	(Upland)	457	459	461	461	461	459	460
8	114.1	476	472	475	478	476	476	474	475
MS II	115.5	482	484	487	490	487	487	485	486
MS II	115.9	487	486	489	493	490	490	487	488
Curry	120.0	Unknown	523	526	526	521	520	518	522
Moose	123.5	Unknown	549	555	555	551	551	545	545
8A West	126.1	573	571	575	574	573	573	569	569
8A East	127.1	582	583	585	585	584	584	581	582
9	129.3	604	606	607	607	605	605	603	603
9 u/s	130.6	Unknown	620	620	621	619	619	617	617
4th July	131.8	Unknown	629	633	632	630	630	628	628
9A	133.7	651	651	656	656	649	649	650	650
10 u/s	134.3	657	657	664	663	655	655	656	656
11 d/s	135.3	Unknown	670	675	674	667	667	668	668
11	136.5	687	683	688	637	682	682	684	684
17	139.3	Unknown	UPSTREAM BOUNDARY OF NATURAL SIMULATIONS	715	715	714	714	715	715
20	140.5	730		729	729	728	728	729	729
21 (A6)	141.8	747		747	747	746	746	747	747
21	142.2	755		753	753	752	752	753	753
22	144.8	780		787	786	785	785	787	787
LRX-3 Ice Front Starting Date			11-18	12-10	12-10	12-29	12-29	1-2	1-1
Max. Ice Front Extent (River Mile)			137 <sup>4/</sup>	139	139	133	133	114	120
Melt Out/Breakup Date			5-10	4-28	4-20	3-26	3-28	3-5	3-6

UPSTREAM EXTENT OF  
ICE COVER PROGRESSION

**NOTES:**

1. ☐ LOCATIONS WHERE MAXIMUM RIVER STAGE OVERTOPS A KNOWN SLOUGH THRESHOLD ELEVATION.
2. ALL RIVER STAGES IN FEET MSL.
3. "INFLOW-MATCHING" POWER INTAKE OPERATING POLICY IS ASSUMED FOR PROJECT SIMULATIONS.
4. ICE COVER FOR NATURAL CONDITIONS EXTENDS UPSTREAM OF GOLD CREEK (RIVER MILE 137) BY MEANS OF BORDER ICE BRIDGING.

**TABLE 3**

**SUSITNA HYDROELECTRIC PROJECT  
MAXIMUM SIMULATED TOTAL ICE THICKNESS  
1981-82 WEATHER CONDITIONS (AVERAGE WINTER)  
THREE-STAGE PROJECT vs NATURAL CONDITIONS**

**TABLE 4**

SLOUGH OR SIDE CHANNEL	RIVER MILE	THRESHOLD ELEVATION	NATURAL CONDITIONS	WATANA ONLY		WATANA AND DEVIL CANYON			
				STAGE I		STAGE II		STAGE III	
				CASE E-VI	CASE E-I	CASE E-VI	CASE E-I	CASE E-VI	CASE E-I
Whiskers	101.5	367	4	3	3	3	3	2	2
Gash Creek	112.0	Unknown	4	3	4	5	5	1	3
6A	112.3	(Upland)	4	3	4	5	5	1	3
8	114.1	476	4	3	5	4	3	1	2
MS II	115.5	482	5	3	7	4	4		1
MS II	115.9	487	7	3	8	6	7		1
Curry	120.0	Unknown	7	7	7	2	2		1
Moose	123.5	Unknown	7	9	9	5	4		
8A West	126.1	573	3	4	3	3	3		
8A East	127.1	582	3	3	3	2	2		
9	129.3	604	7	3	4	2	2		
9 u/s	130.6	Unknown	6	3	4	2	2		
4th July	131.8	Unknown	3	3	4	1	1		
9A	133.7	651	3	6	6				
10 u/s	134.3	657	3	9	7				
11 d/s	135.3	Unknown	3	7	6				
11	136.5	607	3	4	3				
17	139.3	Unknown							
20	140.5	730							
21 (A6)	141.8	747							
21	142.2	755							
22	144.8	780							

UPSTREAM BOUNDARY OF  
NATURAL SIMULATIONS

**NOTES:**

1. ALL ICE THICKNESS IN FEET.
2. "INFLOW MATCHING" POWER INTAKE OPERATING POLICY IS ASSUMED FOR PROJECT SIMULATIONS.

**TABLE 4**

**SUSITNA HYDROELECTRIC PROJECT  
MAXIMUM SIMULATED SOLID ICE THICKNESS  
1981-82 WEATHER CONDITIONS (AVERAGE WINTER)  
THREE-STAGE PROJECT vs NATURAL CONDITIONS**

**TABLE 5**

SLOUGH OR SIDE CHANNEL	RIVER MILE	THRESHOLD ELEVATION	NATURAL CONDITIONS	WATANA ONLY		WATANA AND DEVIL CANYON			
				STAGE I		STAGE II		STAGE III	
				CASE E-VI	CASE E-I	CASE E-VI	CASE E-I	CASE E-VI	CASE E-I
Whiskers	101.5	367	4	3	3	3	3	2	2
Gash Creek	112.0	Unknown	4	3	3	3	3	0	1
6A	112.3	(Upland)	4	3	3	3	3	0	1
8	114.1	476	4	3	3	3	3	0	1
MS II	115.5	482	4	3	3	2	2		0
MS II	115.9	487	4	3	3	2	2		0
Curry	120.0	Unknown	4	3	3	2	1		0
Moose	123.5	Unknown	4	3	3	1	1		
8A West	126.1	573	3	3	3	1	1		
8A East	127.1	582	3	2	2	1	1		
9	129.3	604	3	2	2	1	1		
9 u/s	130.6	Unknown	3	2	1	0	0		
4th July	131.8	Unknown	3	2	1	0	0		
9A	133.7	651	3	1	1				
10 u/s	134.3	657	3	1	1				
11 d/s	135.3	Unknown	3	1	1				
11	136.5	607	3	1	1				
17	139.3	Unknown							
20	140.5	730							
21 (A6)	141.8	747							
21	142.2	755							
22	144.8	780							

UPSTREAM BOUNDARY OF  
NATURAL SIMULATIONS

**NOTES:**

1. ALL ICE THICKNESS IN FEET.
2. "INFLOW MATCHING" POWER INTAKE OPERATING POLICY IS ASSUMED FOR PROJECT SIMULATIONS.
3. "0" REPRESENTS SOLID ICE FORMATION < 0.5' THICK

**TABLE 5**



**SUSITNA HYDROELECTRIC PROJECT**  
**MAXIMUM SIMULATED WINTER RIVER STAGES, TWO-STAGE PROJECT: SENSITIVITY STUDIES**  
**ALTERNATIVE POWER INTAKE OPERATING POLICIES AND INSTREAM FLOW REQUIREMENTS**

**TABLE 6**

SLOUGH OR SIDE CHANNEL	RIVER MILE	THRESHOLD ELEVATION	WATANA ONLY: 2001 ENERGY DEMAND								WATANA + DEVIL CANYON: 2002 DEMAND			
			WINTER 1981-82						WINTER 1971-72		WINTER 1981-82			
			CASE C FLOWS			CASE E-VI		CASE C			CASE C		CASE E-VI	
			I	W	L	I	W	I	W		I	W	I	W
Whiskers	101.5	387	371	371	370	371	370	372	372		369	369	369	369
Gash Creek	112.0	Unknown	461	458	458	458	457	459	459		456	455	456	455
6A	112.3	(Upland)	464	461	460	460	460	461	461		458	458	459	458
8	114.1	476	477	476	475	475	475	476	477		475	475	476	476
MSII	115.5	482	489	487	487	488	487	489	489		485	485	485	485
MS II	115.9	487	491	490	490	490	489	491	492		488	488	488	487
Curry	120.0	Unknown	525	525	522	524	522	525	527		520	520	520	520
Moose	123.5	Unknown	553	556	552	552	546	555	556		548	548	548	548
8A West	126.1	573	574	574	573	575	569	575	575		568	568	571	571
8A East	127.1	582	584	585	582	585	582	586	585		580	581	581	581
9	129.3	604	606	606	602	607	603	610	607		601	601	601	601
9 u/s	130.6	Unknown	620	620	617	621	617	625	622		616	616	616	616
4th July	131.8	Unknown	632	633	628	633	628	636	633		627	627	627	627
9A	133.7	651	652	654	650	654	650	659	655		650	649	649	649
10 u/s	134.3	657	658	660	656	660	656	665	663		655	655	655	655
11 d/s	135.3	Unknown	667	670	668	668	668	676	674		667	667	667	667
11	136.5	687	683	684	684	684	684	690	687		682	682	682	682
17	139.3	Unknown	715	715	715	715	715	727	718		714	714	714	714
20	140.5	730	729	729	729	729	729	741	735		728	728	728	728
21 (A6)	141.8	747	747	747	747	747	747	751	749		745	746	746	746
21	142.2	755	753	753	753	754	754	755	754		752	752	752	752
22	144.8	788	787	787	787	787	787	787	787		785	785	785	785
			UPSTREAM EXTENT OF ICE COVER PROGRESSION											
SIMULATED ICE FRONT PROGRESSION:														
Ice Front Start at River Mile 98.6			12 30	12 28	1 2	12 28	1 3	11 28	12 1		12 30	1 1	12 30	12 31
Maximum Ice Front Extent (River Mile)			134	136	126	134	123	142	142		124	124	126	126
Melt Out Date			4 3	3 29	3 19	3 23	3 9	5 15	5 3		3 12	3 13	3 19	3 16

**NOTES:**

1. ☐ LOCATIONS WHERE MAXIMUM RIVER STAGE OVERTOPS A KNOWN SLOUGH THRESHOLD ELEVATION.
2. OPERATING POLICIES FOR WATANA AND DEVIL CANYON POWER INTAKES:  
I INFLOW-MATCHING  
W WARMEST WATER  
L LOWEST PORT
3. ALL RIVER STAGES IN FEET MSL.
4. "ORIGINAL DESIGN" FOR WATANA POWER INTAKE IS ASSUMED THROUGHOUT.
5. WINTER AIR TEMPERATURES:  
1981-82 AVERAGE  
1971-72 COLD
6. TWO-STAGE PROJECT.

**SUSITNA HYDROELECTRIC PROJECT**  
**MAXIMUM SIMULATED TOTAL ICE THICKNESSES, TWO-STAGE PROJECT: SENSITIVITY STUDIES**  
**ALTERNATIVE POWER INTAKE OPERATING POLICIES AND INSTREAM FLOW REQUIREMENTS**

**TABLE 7**

SLOUGH OR SIDE CHANNEL	RIVER MILE	THRESHOLD ELEVATION	WATANA ONLY: 2001 ENERGY DEMAND								WATANA+DEVIL CANYON: 2002 DEMAND			
			WINTER 1981-82						WINTER 1971-72		WINTER 1981-82			
			CASE C FLOWS			CASE E-VI		CASE C			CASE C		CASE - E-VI	
			I	W	L	I	W	I	W		I	W	I	W
Whiskers	101.5	367	3	3	2	3	2	5	5		2	2	3	2
Gash Creek	112.0	Unknown	7	3	3	2	2	5	5		2	2	3	2
6A	112.3	(Upland	7	4	3	2	2	5	5		3	2	4	3
8	114.1	476	4	3	3	2	1	5	5		3	3	4	3
MS II	115.5	482	5	4	4	3	1	5	5		3	2	3	1
MS II	115.9	487	6	6	6	3	1	5	6		4	3	4	3
Curry	120.0	Unknown	6	7	3	4	2	5	7		1	1	1	1
Moose	123.5	Unknown	5	9	5	4		6	8		1	1	3	3
8A West	126.1	573	2	3	2	2		5	4				1	1
8A East	127.1	582	2	2		2		4	3					
9	129.3	604	1	2		2		6	2					
9 u/s	130.6	Unknown	1	2		2		6	3					
4th July	131.8	Unknown	2	3		3		7	3					
9A	133.7	651	1	3		2		8	5					
10 u/s	134.3	657	1	3		2		9	7					
11 d/s	135.3	Unknown		2				8	5					
11	136.5	687						5	3					
17	139.3	Unknown						13	3					
20	140.5	730						12	5					
21 (A6)	141.8	747						3	1					
21	142.2	755						1						
22	144.8	788												

**NOTES:**

1. OPERATING POLICIES FOR WATANA AND DEVIL CANYON POWER INTAKES:  
I INFLOW-MATCHING  
W WARMEST WATER  
L LOWEST PORT
2. ALL ICE THICKNESSES IN FEET
3. "ORIGINAL DESIGN" FOR WATANA POWER INTAKE IS ASSUMED THROUGHOUT
4. WINTER AIR TEMPERATURE:  
1981-82 AVERAGE  
1971-72 COLD
5. TWO STAGE PROJECT.

**TABLE 7**

**SUSITNA HYDROELECTRIC PROJECT**  
**MAXIMUM SIMULATED SOLID ICE THICKNESSES, TWO-STAGE PROJECT: SENSITIVITY STUDIES**  
**ALTERNATIVE POWER INTAKE OPERATING POLICIES AND INSTREAM FLOW REQUIREMENTS**

**TABLE 8**

SLOUGH OR SIDE CHANNEL	RIVER MILE	THRESHOLD ELEVATION	WATANA ONLY: 2001 ENERGY DEMAND								WATANA+DEVIL CANYON: 2002 DEMAND			
			WINTER 1981 82						WINTER 1971 72		WINTER 1981 82			
			CASE C FLOWS			CASE E-VI		CASE C			CASE C		CASE E-VI	
			I	W	L	I	W	I	W		I	W	I	W
Whiskers	101.5	367	3	3	2	3	2	5	5		2	2	3	2
Gash Creek	112.0	Unknown	3	3	2	2	1	5	5		2	2	2	2
6A	112.3	(Upland)	3	3	2	2	1	5	5		2	2	2	2
8	114.1	476	2	3	2	2	1	5	5		2	2	2	2
MS II	115.5	482	2	2	1	2	1	5	4		1	1	1	1
MS II	115.9	487	2	2	1	2	1	5	5		1	1	1	1
Curry	120.0	Unknown	1	2	1	2	0	5	4		1	1	1	1
Moose	123.5	Unknown	1	1	1	1		4	3		0	0	1	1
8A West	126.1	573	1	1	0	1		4	3				1	0
8A East	127.1	582	1	1		1		4	3					
9	129.3	604	1	1		1		4	2					
9 u/s	130.6	Unknown	1	1		0		4	2					
4th July	131.8	Unknown	0	1		0		4	2					
9A	133.7	651	0	0		0		4	2					
10 u/s	134.3	657	0	0		0		3	2					
11 d/s	135.3	Unknown		0				3	2					
11	136.5	687						3	1					
17	139.3	Unknown						2	1					
20	140.5	730						2	1					
21 (A6)	141.8	747						1	0					
21	142.2	755						0						
22	144.8	788												

**NOTES:**

1. OPERATING POLICIES FOR WATANA AND DEVIL CANYON POWER INTAKES.  
I INFLOW-MATCHING  
W WARMEST WATER  
L LOWEST PORT
2. ALL ICE THICKNESSES IN FEET.
3. "ORIGINAL DESIGN" FOR WATANA POWER INTAKE IS ASSUMED THROUGHOUT.
4. WINTER AIR TEMPERATURE.  
1981 82 AVERAGE  
1971 72 COLD
5. TWO STAGE PROJECT.
6. "0" REPRESENTS SOLID ICE FORMATION < 0.5' THICK

**TABLE 8**

**SUSITNA HYDROELECTRIC PROJECT**  
**MAXIMUM SIMULATED WINTER RIVER STAGES, TWO-STAGE PROJECT: SENSITIVITY STUDIES**  
**ALTERNATIVE DESIGNS FOR WATANA POWER INTAKE AND DEVIL CANYON OUTLET WORKS INTAKE**

**TABLE 9**

SLOUGH OR SIDE CHANNEL	RIVER MILE	THRESHOLD ELEVATION	WATANA ONLY : 2001 ENERGY DEMAND								WATANA+DEVIL CANYON:2002 DEMAND				WATANA POWER INTAKE DESIGN	DEVIL CANYON OUTLET WORKS	UPSTREAM EXTENT OF ICE COVER PROGRESSION
			WINTER 1981-82			WINTER 1971-72					WINTER 1981-82						
			ORIGINAL	1880/1850	1800/1770	ORIGINAL	1880/1850	1800/1770	1800/1500	1636/1470	ORIGINAL	1800/1770	ORIGINAL	1800/1770			
											PRESENT (EL. 1050)	HIGH (EL. 1425)					
Whiskers	101.5	367	371	370	370	372	372	372	372	372	369	369	369	369			
Gash Creek	112.0	Unknown	458	458	458	459	461	459	461	460	455	455	455	455			
6A	112.3	(Upland)	461	461	460	461	464	461	464	462	458	458	458	458			
8	114.1	476	476	476	476	477	480	477	478	478	475	474	475	474			
MS II	115.5	482	487	487	488	489	490	491	490	489	485	485	485	485			
MS II	115.9	487	490	489	491	492	493	494	493	492	488	487	488	486			
Curry	120.0	Unknown	525	522	524	527	526	528	527	525	520	520	520	520			
Moose	123.5	Unknown	556	551	552	556	555	557	556	555	548	545	548	544			
8A West	126.1	573	574	572	574	575	574	574	575	574	568	568	568	568			
8A East	127.1	582	585	582	584	585	585	585	585	584	581	581	581	581			
9	129.3	604	606	602	604	607	608	607	608	605	601	601	601	601			
9 u/s	130.6	Unknown	620	617	617	622	624	621	621	620	616	616	616	616			
4th July	131.8	Unknown	633	628	628	633	635	633	633	631	627	627	627	627			
9A	133.7	651	654	650	650	655	654	656	656	650	649	649	649	649			
10 u/s	134.3	657	660	656	656	663	660	663	662	657	655	655	655	655			
11 d/s	135.3	Unknown	670	668	667	674	672	673	673	668	667	667	667	667			
11	136.5	687	684	683	683	687	687	688	687	683	682	682	682	682			
17	139.3	Unknown	715	715	715	718	719	717	716	715	714	714	714	714			
20	140.5	730	729	729	729	735	735	730	730	729	728	728	728	728			
21 (A6)	141.8	747	747	747	747	749	749	747	747	747	746	746	746	746			
21	142.2	755	753	753	753	754	754	753	753	753	752	752	752	752			
22	144.8	788	787	787	787	787	787	787	787	787	785	785	785	785			
SIMULATED ICE FRONT PROGRESSION:																	
Ice Front Start at River Mile 98.6			12 28	1 2	1 1	12 1	12 2	12 2	12 3	12 6	1 1	1 1	1 1	1 1			
Maximum Ice Front Extent (River Mile)			136	126	129	142	142	140	139	133	124	122	124	122			
Melt out Date			3 29	3 15	3 20	3 3	4 30	4 26	4 25	4 5	3 13	3 9	3 14	3 10			

**NOTES:**

1. ☐ LOCATIONS WHERE MAXIMUM RIVER STAGE OVERTOPS A KNOWN SLOUGH THRESHOLD ELEVATION.
2. ALL RIVER STAGES IN FEET MSL.
3. CASE C INSTREAM FLOW REQUIREMENTS AND "WARMEST WATER" POWER INTAKE OPERATING POLICY IS ASSUMED THROUGHOUT.
4. WINTER AIR TEMPERATURE 1981-82 AVERAGE, 1971-72 COLD
5. TWO STAGE PROJECT.

**TABLE 9**



**SUSITNA HYDROELECTRIC PROJECT**  
**MAXIMUM SIMULATED TOTAL ICE THICKNESSES, TWO-STAGE PROJECT: SENSITIVITY STUDIES**  
**ALTERNATIVE DESIGNS FOR WATANA POWER INTAKE AND DEVIL CANYON OUTLET WORKS INTAKE**

**TABLE 10**

SLOUGH OR SIDE CHANNEL	RIVER MILE	THRESHOLD ELEVATION	WATANA ONLY: 2001 ENERGY DEMAND								WATANA+DEVIL CANYON: 2002 DEMAND			
			WINTER 1981-82			WINTER 1971-72					WINTER 1981-82			
			ORIGINAL	1880/1850	1800/1770	ORIGINAL	1880/1850	1800/1770	1800/1500	1636/1470	ORIGINAL	1800/1770	ORIGINAL	1800/1770
											PRESENT (EL. 1050)		HIGH (EL. 1425)	
Whiskers	101.5	387	3	2	2	5	5	5	4	3	2	2	2	2
Gash Creek	112.0	Unknown	3	4	4	5	7	4	7	5	2	1	2	1
6A	112.3	(Upland)	4	5	3	5	7	4	7	5	2	2	3	1
8	114.1	476	3	3	3	5	6	4	5	4	3	2	3	2
MS II	115.5	482	4	3	5	5	6	7	7	5	2	1	2	1
MS II	115.9	487	6	5	6	6	7	11	8	6	3	2	3	1
Curry	120.0	Unknown	7	2	5	7	7	9	7	5	1	1	1	1
Moose	123.5	Unknown	9	4	5	8	8	9	8	8	1		1	
8A West	126.1	573	3	1	3	4	2	3	3	3				
8A East	127.1	582	2		2	3	2	2	2	2				
9	129.3	604	2			2	3	3	3	1				
9 u/s	130.6	Unknown	2			3	5	2	3	1				
4th July	131.8	Unknown	3			3	4	3	3	1				
9A	133.7	651	3			5	3	5	5					
10 u/s	134.3	657	3			7	4	6	6					
11 d/s	135.3	Unknown	2			5	3	4	4					
11	136.5	687				3	3	3	3					
17	139.3	Unknown				3	4	2						
20	140.5	730				5	5							
21 (A6)	141.8	747				1	1							
21	142.2	755												
22	144.8	788												

WATANA POWER  
INTAKE DESIGN  
DEVIL CANYON  
OUTLET WORKS

**NOTES:**

1. ALL RIVER STAGES IN FEET MSL.
2. CASE C INSTREAM FLOW REQUIREMENTS AND "WARMEST WATER" POWER INTAKE OPERATING POLICY IS ASSUMED THROUGH.
3. WINTER AIR TEMPERATURE  
1981-82 AVERAGE  
1971-72 COLD
4. TWO STAGE PROJECT.



TABLE 11

**SUSITNA HYDROELECTRIC PROJECT**  
**MAXIMUM SIMULATED SOLID ICE THICKNESSES, TWO-STAGE PROJECT: SENSITIVITY STUDIES**  
**ALTERNATIVE DESIGNS FOR WATANA POWER INTAKE AND DEVIL CANYON OUTLET WORKS INTAKE**

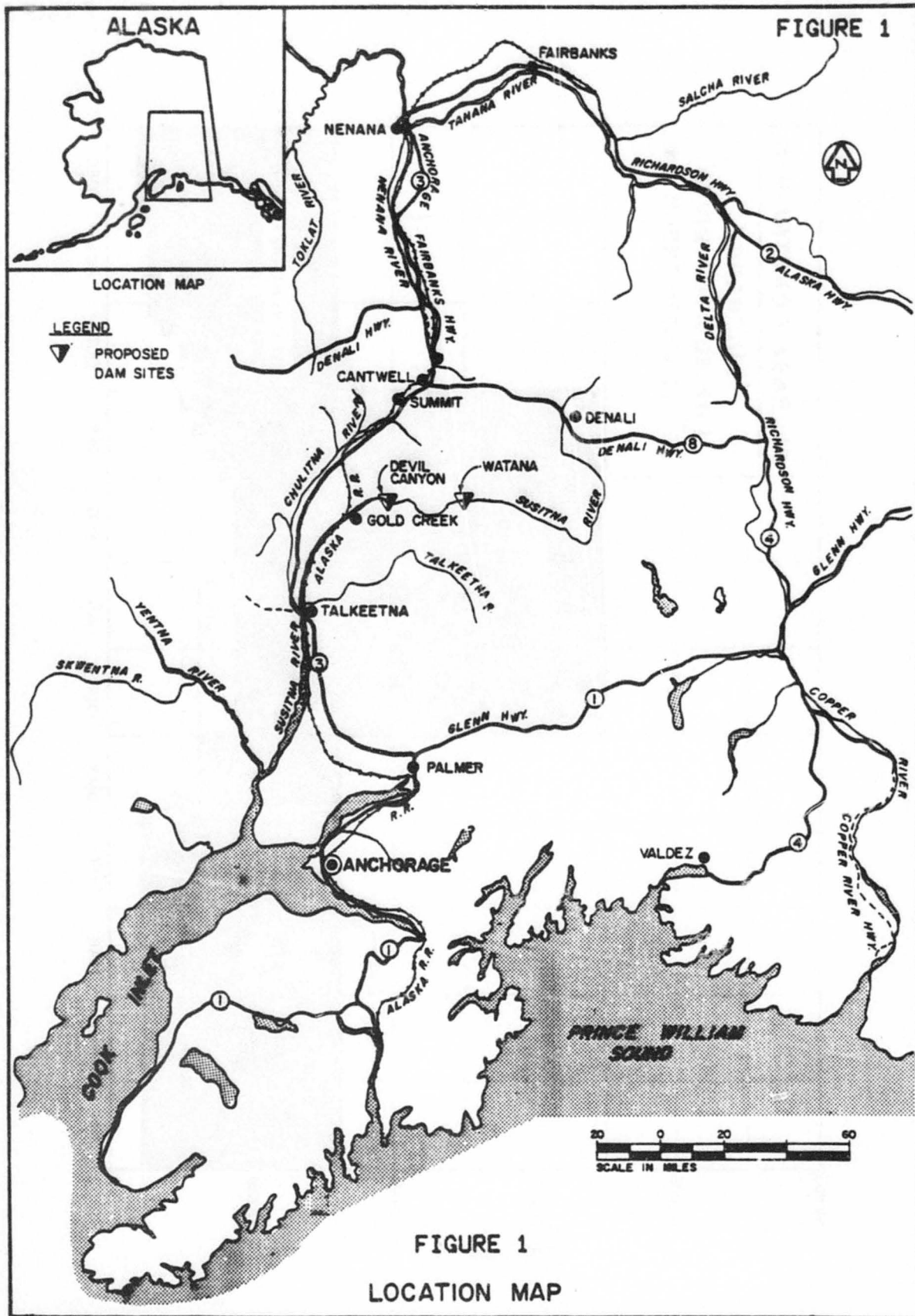
SLOUGH OR SIDE CHANNEL	RIVER MILE	THRESHOLD ELEVATION	WATANA ONLY: 2001 ENERGY DEMAND								WATANA+DEVIL CANYON: 2002 DEMAND			
			WINTER 1981-82			WINTER 1971-72					WINTER 1981-82			
			ORIGINAL	1880/1850	1800/1770	ORIGINAL	1380/1850	1800/1770	1800/1500	1636/1470	ORIGINAL	1800/1770	ORIGINAL	1800/1770
											PRESENT (EL. 1050)		HIGH (EL. 1425)	
Whiskers	101.5	367	3	2	2	5	5	5	4	3	2	2	2	2
Gash	112.0	Unknown	3	2	2	5	4	4	4	3	2	1	2	1
8A	112.3	(Upland)	3	2	1	5	4	4	4	3	2	1	2	1
8	114.1	476	3	2	1	5	4	4	3	3	2	1	2	1
MS II	115.5	482	2	1	1	4	4	4	3	3	1	1	1	1
MS II	115.9	487	2	1	1	5	3	4	3	3	1	1	1	1
Curry	120.0	Unknown	2	1	1	4	3	3	3	3	1	0	1	0
Moc-ne	123.5	Unknown	1	1	1	3	3	3	2	2	0		0	
8A West	126.1	573	1	0	1	3	2	2	2	1				
8A East	127.1	582	1		0	3	2	2	2	1				
9	129.3	604	1			2	2	2	2	0				
9 u/s	130.6	Unknown	1			2	2	2	2	0				
4th July	131.8	Unknown	1			2	2	2	2	0				
9A	133.7	651	0			2	2	1	1					
10 u/s	134.3	657	0			2	2	1	1					
11 d/s	135.3	Unknown	0			2	1	1	1					
11	136.5	687				1	1	1	1					
17	139.3	Unknown				1	1	0						
20	140.5	730				1	1							
21 (A6)	141.8	747				0	0							
21	142.2	755												
22	144.8	788												

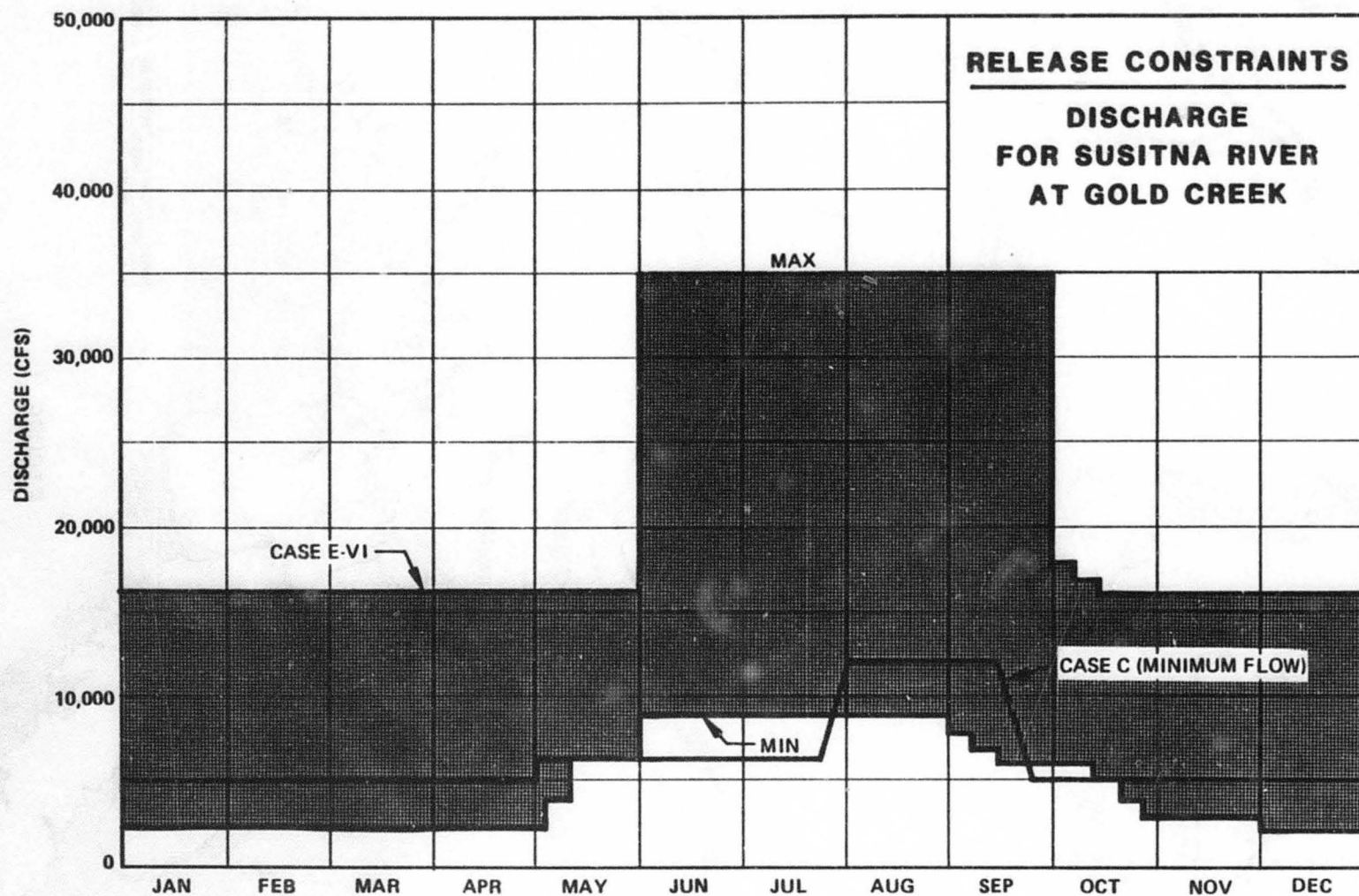
WATANA POWER  
INTAKE DESIGN  
DEVIL CANYON  
OUTLET WORKS

## NOTES:

1. ALL RIVER STAGES IN FEET MSL.
2. CASE C INSTREAM FLOW REQUIREMENTS AND "WARMEST WATER" POWER INTAKE OPERATING POLICY IS ASSUMED THROUGH
3. WINTER AIR TEMPERATURE  
1981-82 AVERAGE  
1971-72 COLD
4. TWO STAGE PROJECT.
5. "0" REPRESENTS SOLID ICE FORMATION < 0.5' THICK

# FIGURES





**FIGURE 2**



FIGURE 3

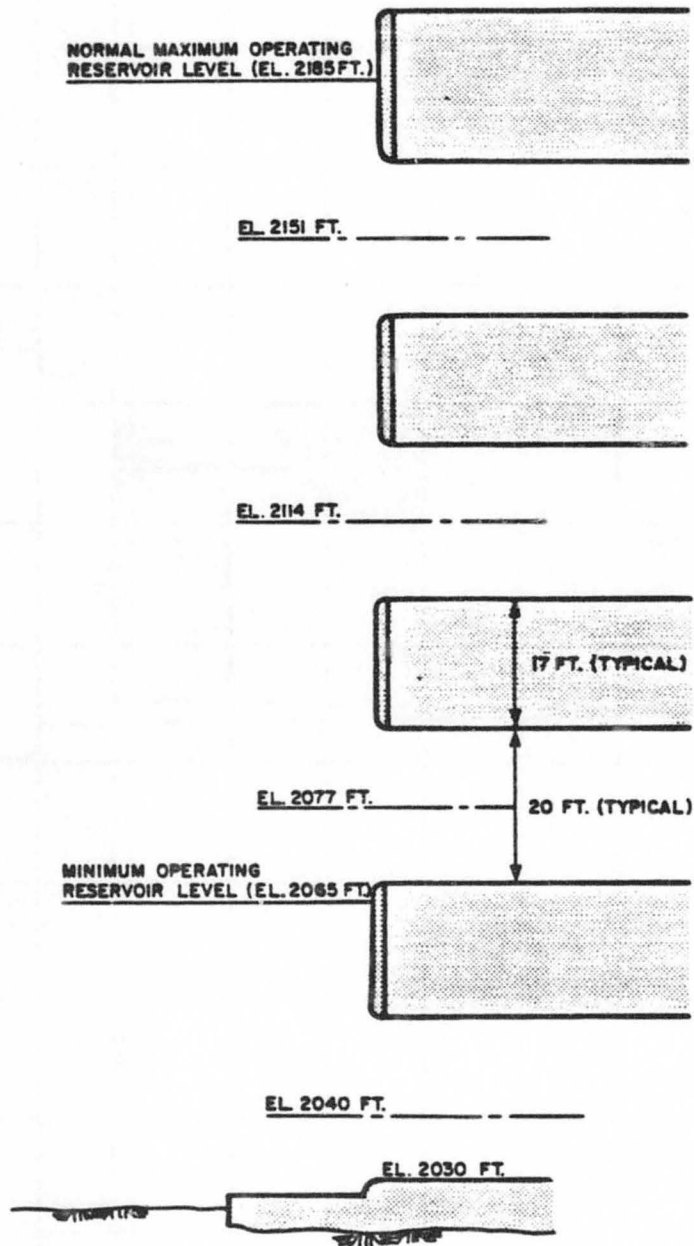


FIGURE 3

WATANA MULTILEVEL INTAKE  
ORIGINAL DESIGN



# ENVIRONMENTAL FLOW REQUIREMENTS CASE E I

NO NET IMPACT

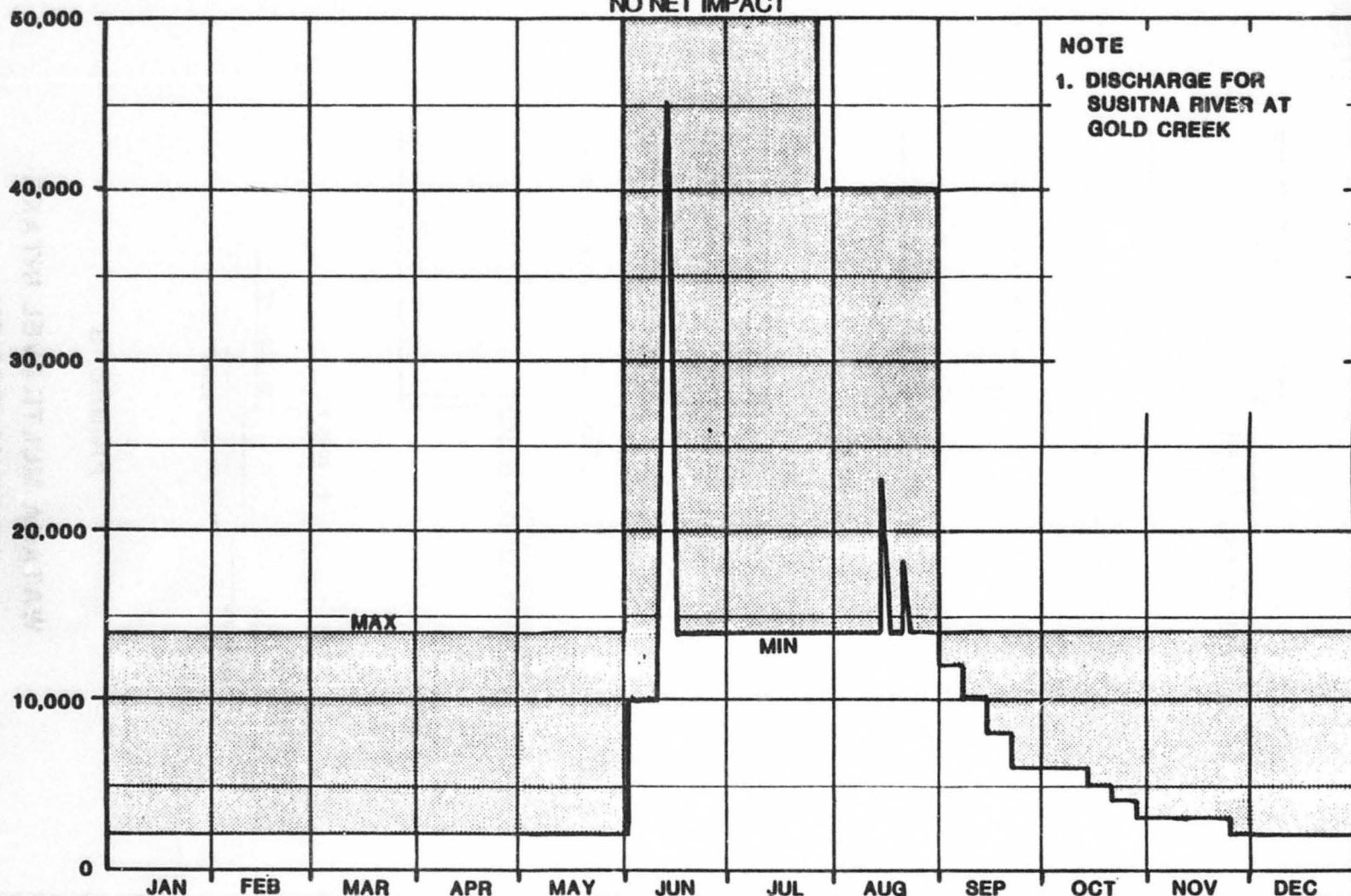


FIGURE 4

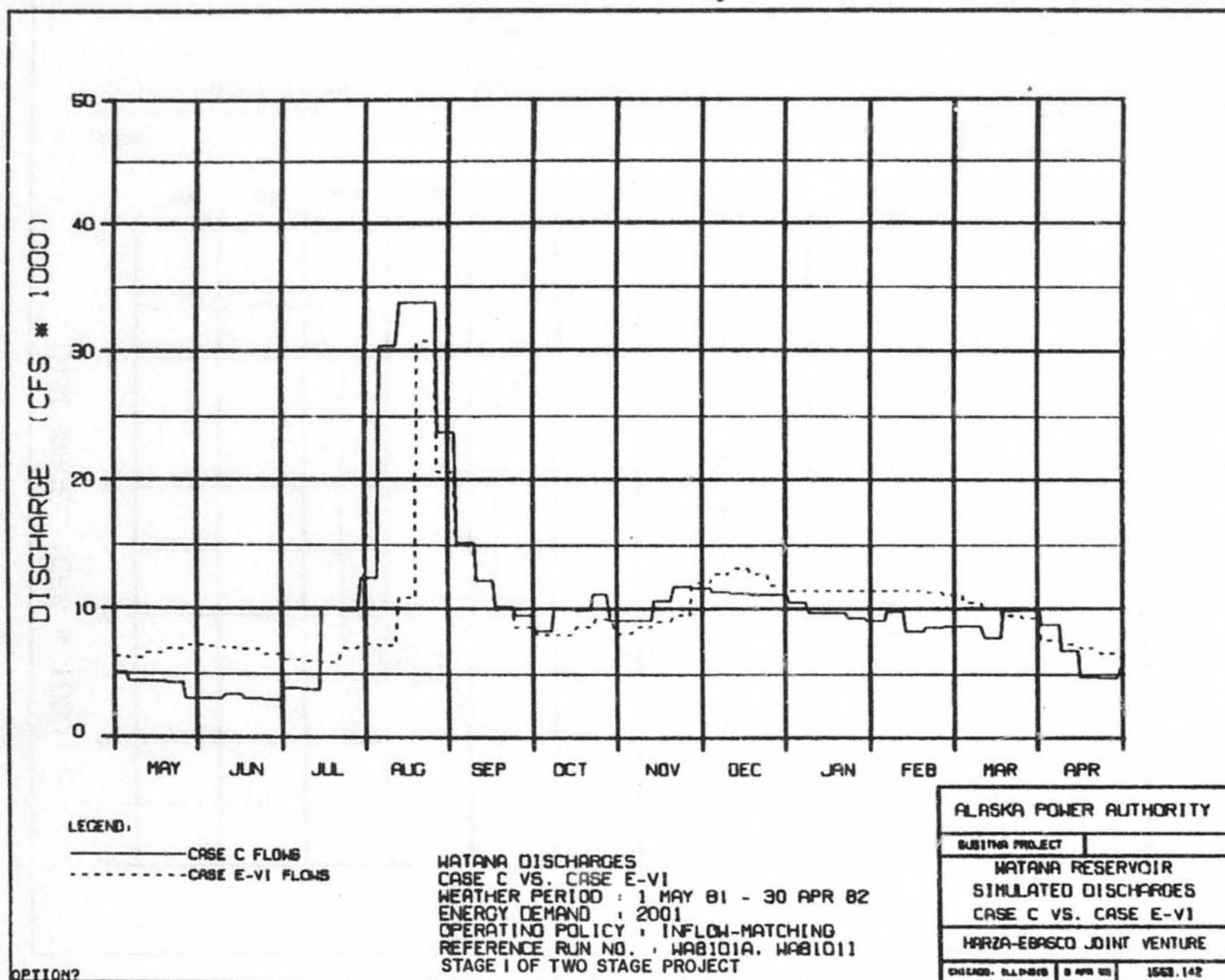


FIGURE 5

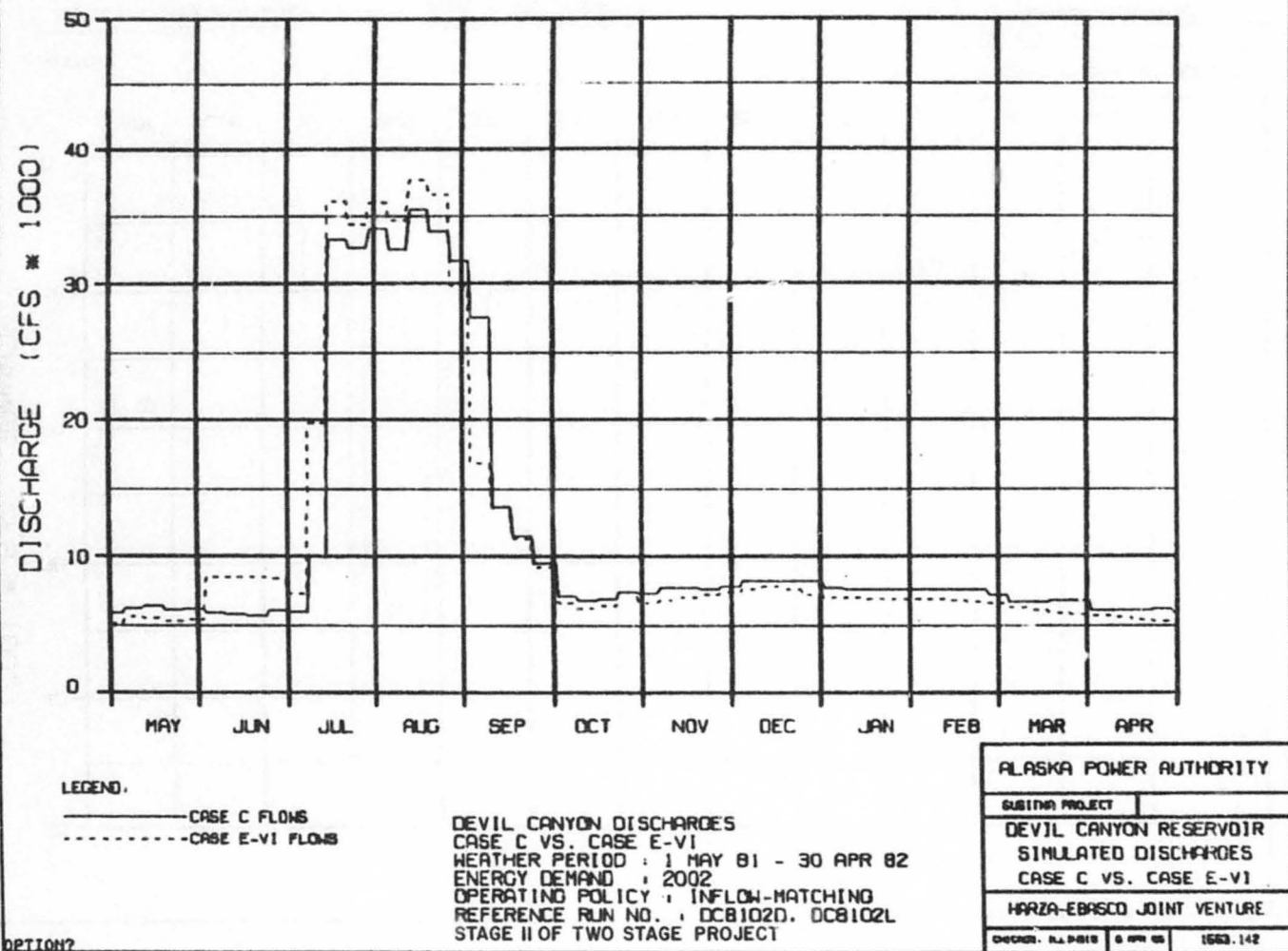
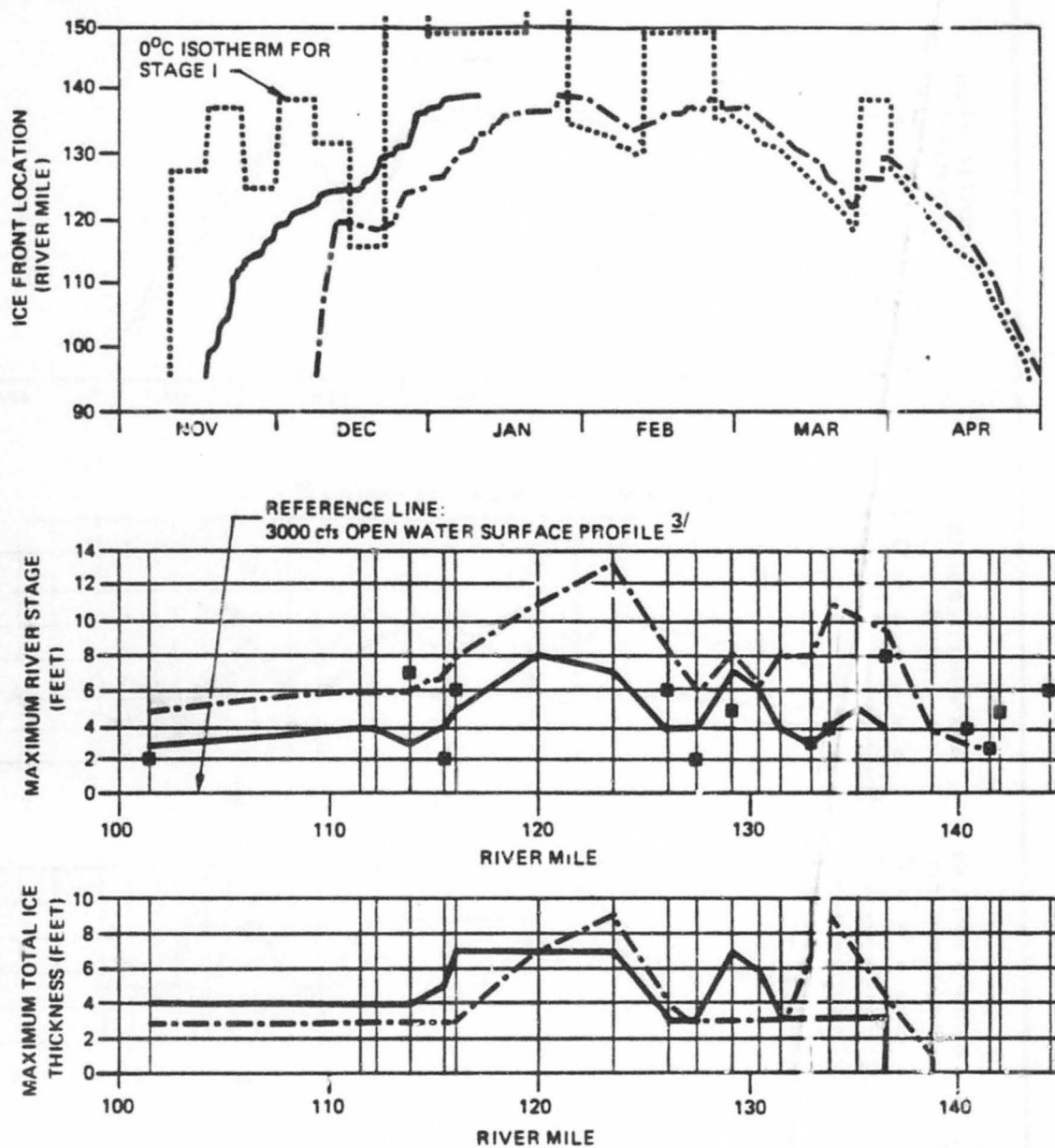


FIGURE 6

FIGURE 7



## NOTES:

1. STAGE I SIMULATION BASED ON CASE E-VI FLOWS. STAGE I ENERGY DEMAND, INFLOW MATCHING TEMPERATURE POLICY.
2. NATURAL CONDITIONS NOT SIMULATED UPSTREAM OF RM 140.
3. 3000 cfs REPRESENTS TYPICAL WINTER FLOW UNDER NATURAL CONDITIONS AT FREEZE UP.

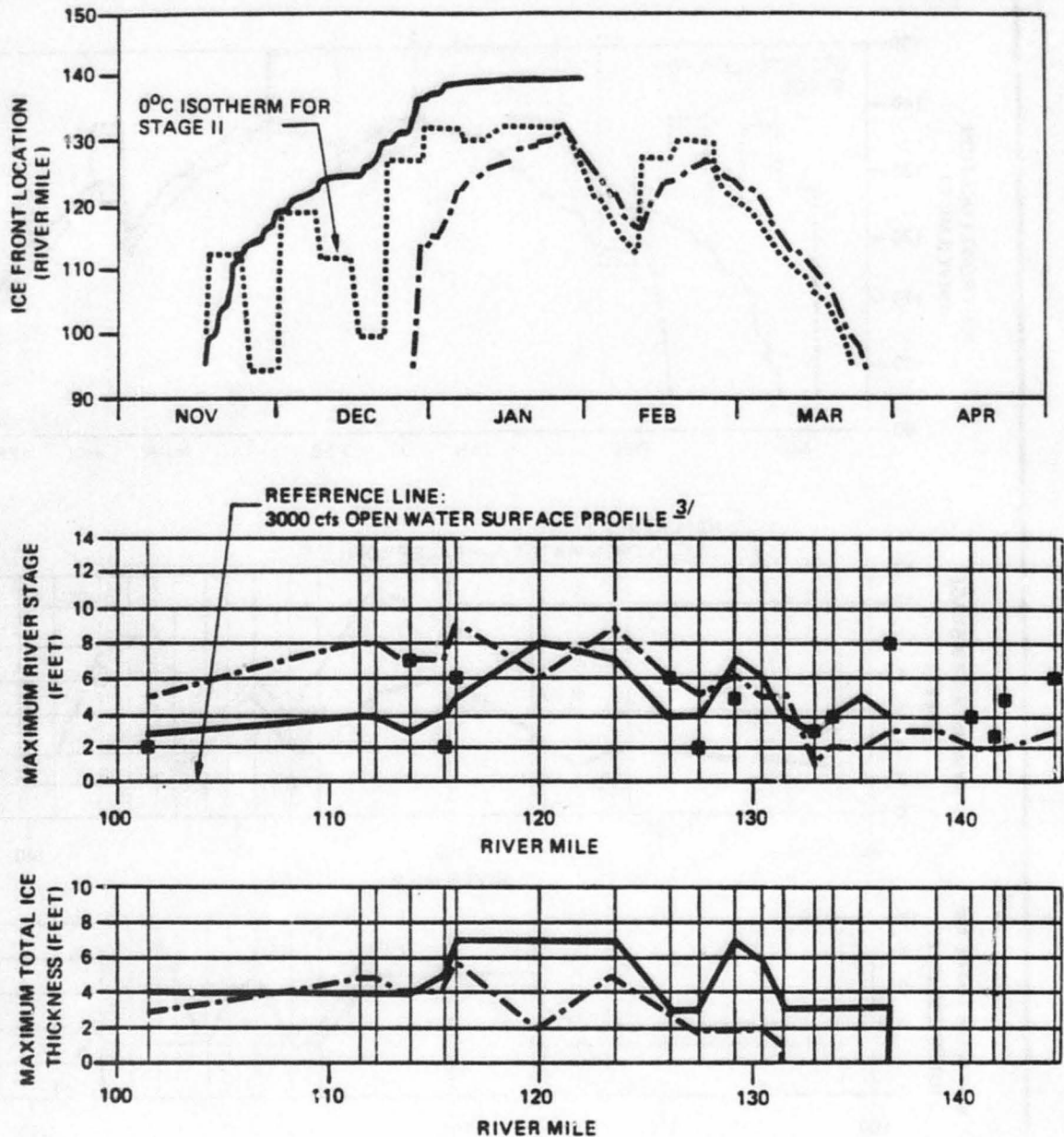
## LEGEND:

- NATURAL CONDITIONS
- - - STAGE I OPERATING
- NATURAL SLOUGH BERM ELEVATION

FIGURE 7

**SIMULATED RIVER ICE CONDITIONS  
STAGE I vs. NATURAL  
1981-82 WEATHER CONDITIONS  
CASE E-VI FLOWS**

FIGURE 8



NOTES:

1. STAGE II SIMULATION BASED ON CASE E-VI FLOWS, MID STAGE II ENERGY DEMAND, INFLOW MATCHING TEMPERATURE POLICY
2. NATURAL CONDITIONS NOT SIMULATED UPSTREAM OF RM 140.
3. 3000 cfs REPRESENTS TYPICAL WINTER FLOW UNDER NATURAL CONDITIONS AT FREEZE UP

LEGEND:

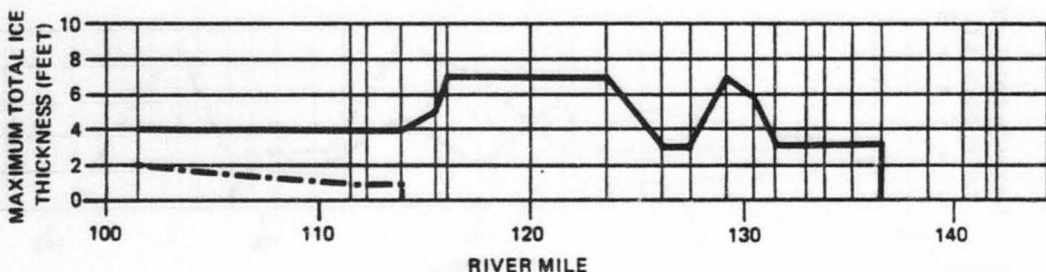
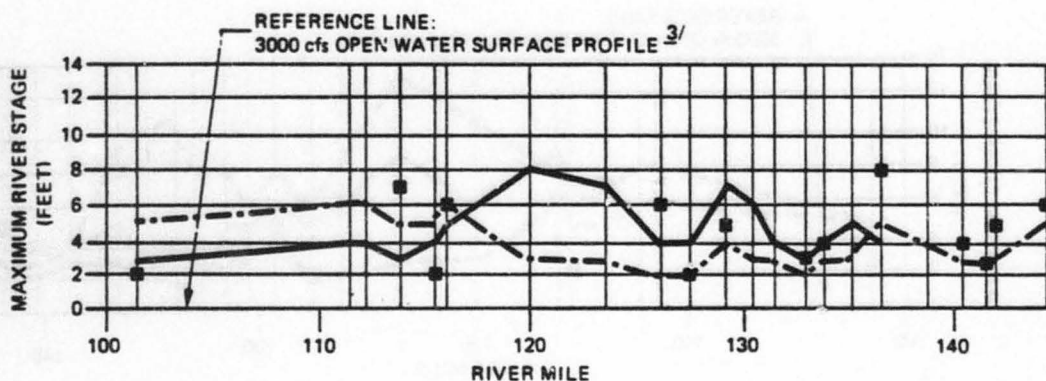
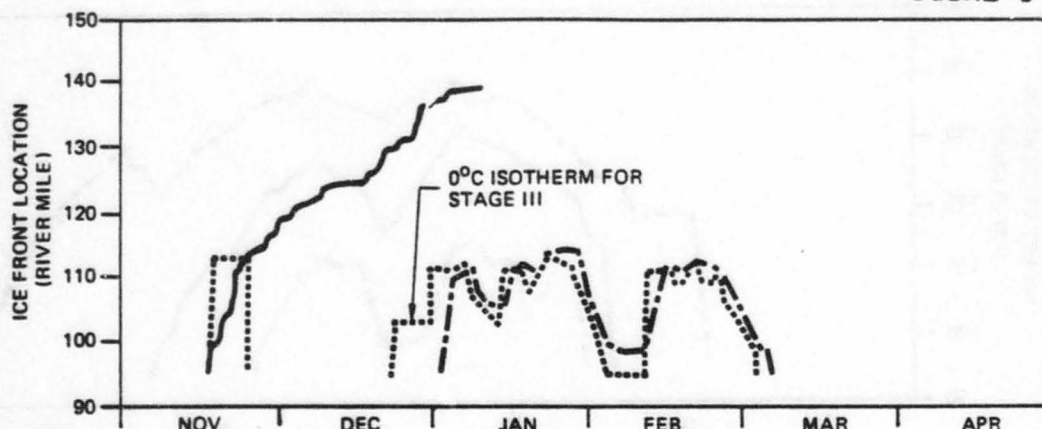
- NATURAL CONDITIONS
- - - STAGE II OPERATING
- NATURAL SLOUGH BERM ELEVATION

FIGURE 8

**SIMULATED RIVER ICE CONDITIONS  
STAGE II vs. NATURAL  
1981-82 WEATHER CONDITIONS  
CASE E-VI FLOWS**



FIGURE 9



NOTES:

1. STAGE III SIMULATION BASED ON CASE E-VI FLOWS, LATE STAGE III ENERGY DEMAND, INFLOW MATCHING TEMPERATURE POLICY
2. NATURAL CONDITIONS NOT SIMULATED UPSTREAM OF RM 140.
3. 3000 cfs REPRESENTS TYPICAL WINTER FLOW UNDER NATURAL CONDITIONS AT FREEZE UP.

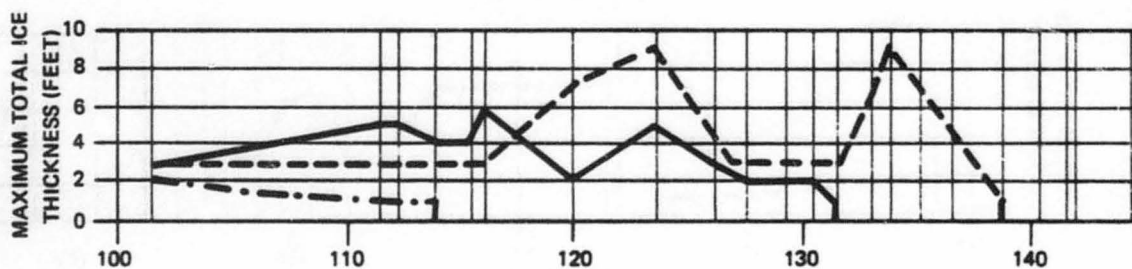
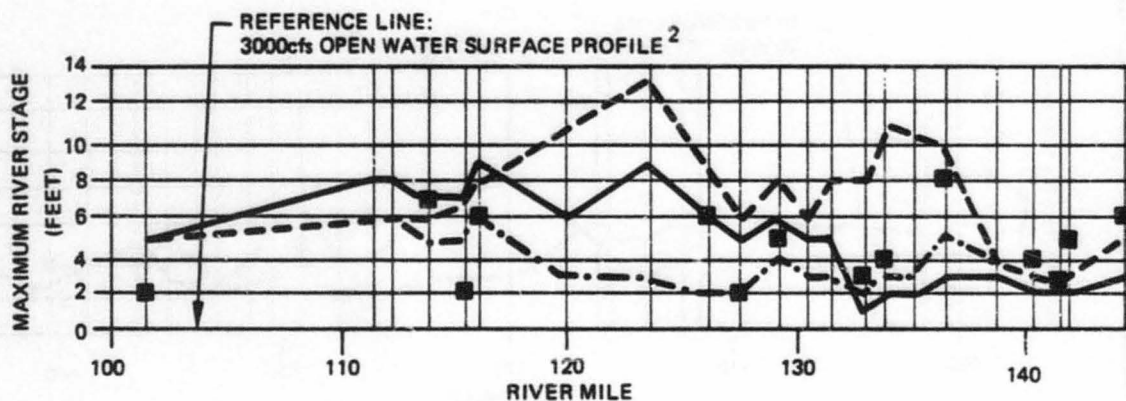
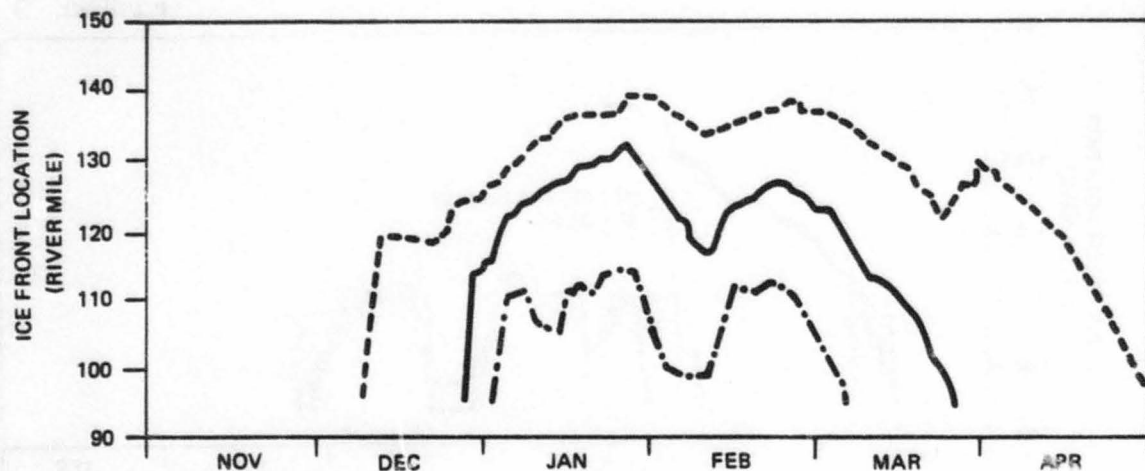
LEGEND:

- NATURAL CONDITIONS
- - - STAGE III OPERATING
- NATURAL SLOUGH BERM ELEVATION

FIGURE 9

**SIMULATED RIVER ICE CONDITIONS  
STAGE III vs. NATURAL  
1981-82 WEATHER CONDITIONS  
CASE E-VI FLOWS**

FIGURE 10



NOTES:

1. SIMULATION BASED ON CASE E-VI FLOWS "INFLOW-MATCHING" POWER INTAKE OPERATION, THREE-STAGE PROJECT.
2. 3000cfs REPRESENTS TYPICAL WINTER FLOW UNDER NATURAL CONDITIONS AT FREEZE UP.

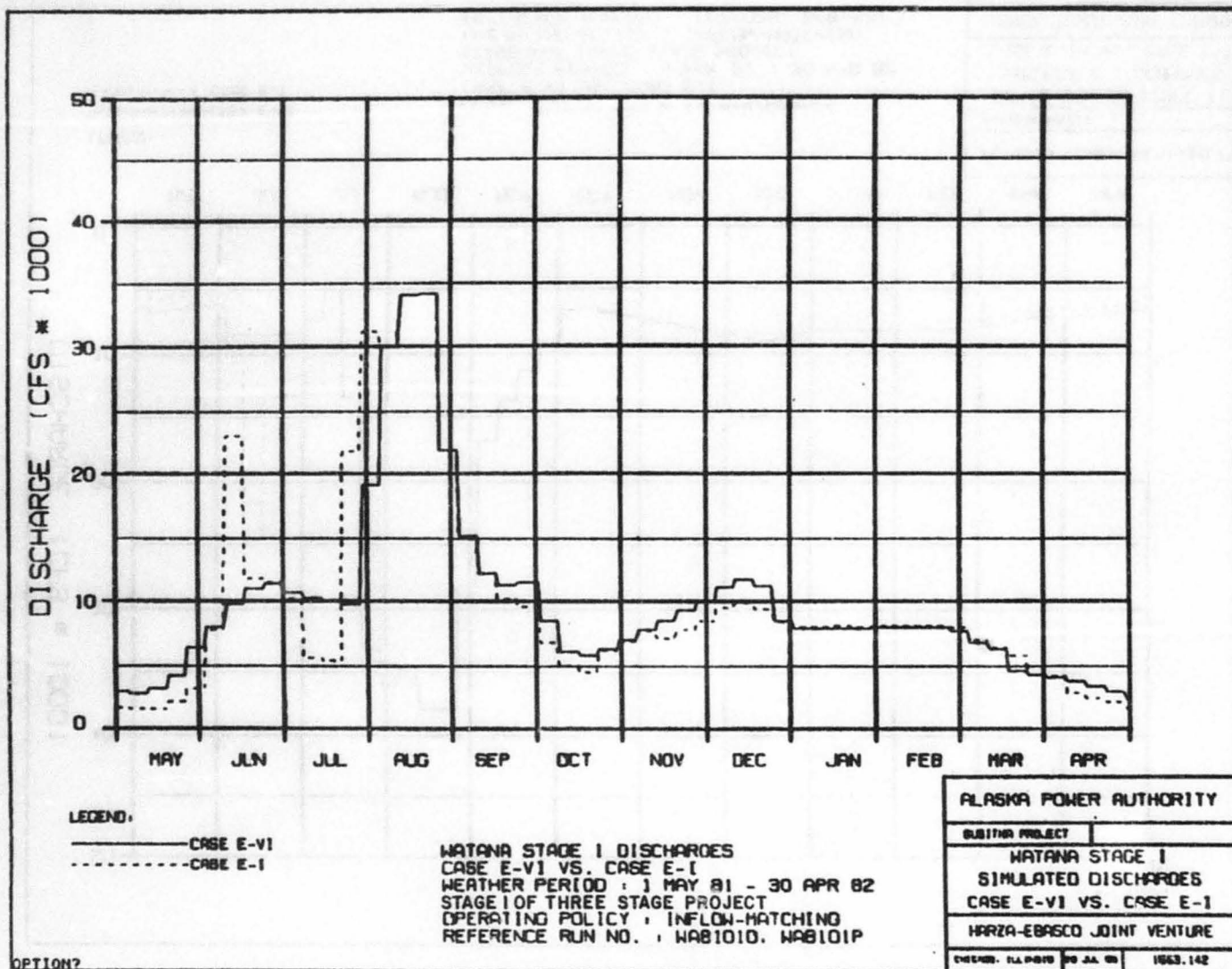
RIVER MILE  
LEGEND:

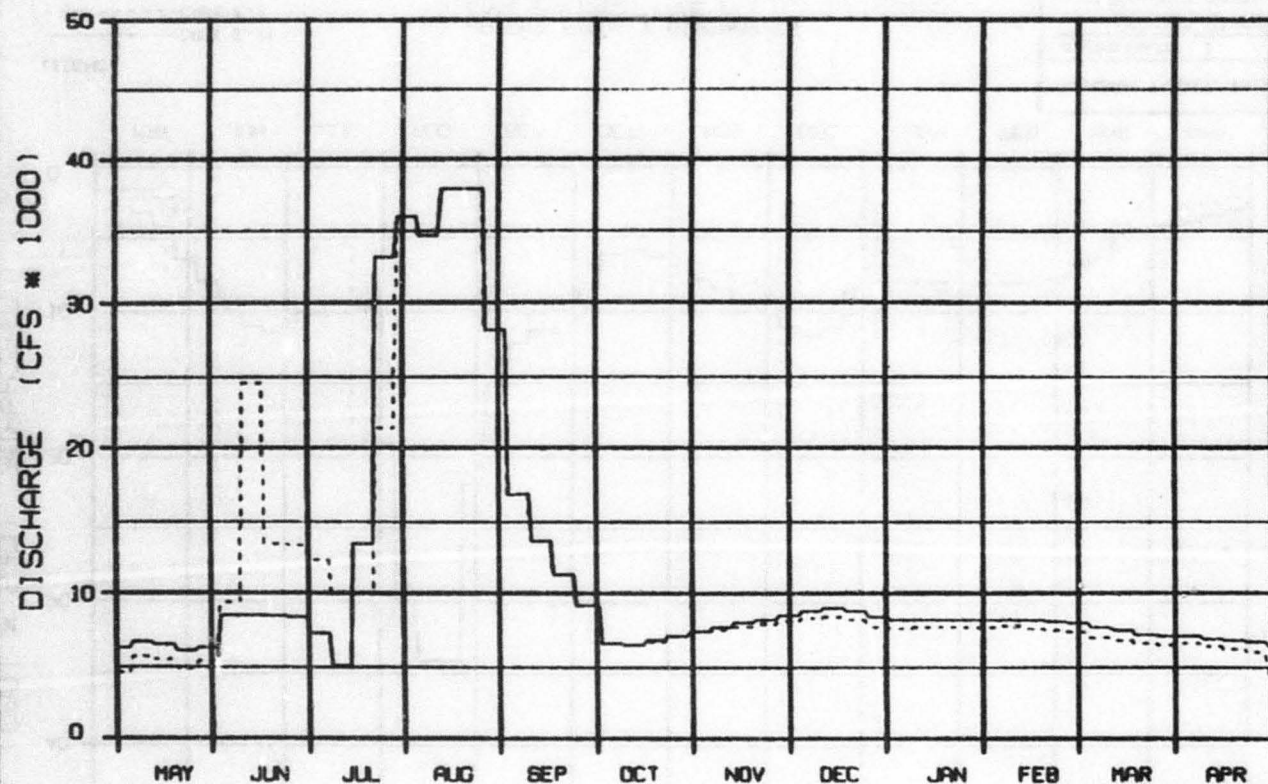
- STAGE I OPERATING
- STAGE II OPERATING
- · - STAGE III OPERATING
- NATURAL SLOUGH BERM ELEVATION

FIGURE 10

**SIMULATED RIVER ICE CONDITIONS  
STAGES I, II AND III  
1981-82 WEATHER CONDITIONS  
(AVERAGE WINTER)**

FIGURE 11





LEGEND:

— CASE E-VI  
 - - - CASE E-I

DEVIL CANYON STAGE II DISCHARGES  
 CASE E-VI VS. CASE E-I  
 WEATHER PERIOD : 1 MAY 81 - 30 APR 82  
 STAGE II OF THREE STAGE PROJECT  
 OPERATING POLICY : INFLOW-MATCHING  
 REFERENCE RUN NO. : DC81025, DC8102U

OPTION?

ALASKA POWER AUTHORITY

SUBMITTA PROJECT

DEVIL CANYON STAGE II  
 SIMULATED DISCHARGES  
 CASE E-VI VS. CASE E-I

HARZA-EBASCO JOINT VENTURE

CHICAGO, ILLINOIS 90 JUL 82 1983-142

FIGURE 12



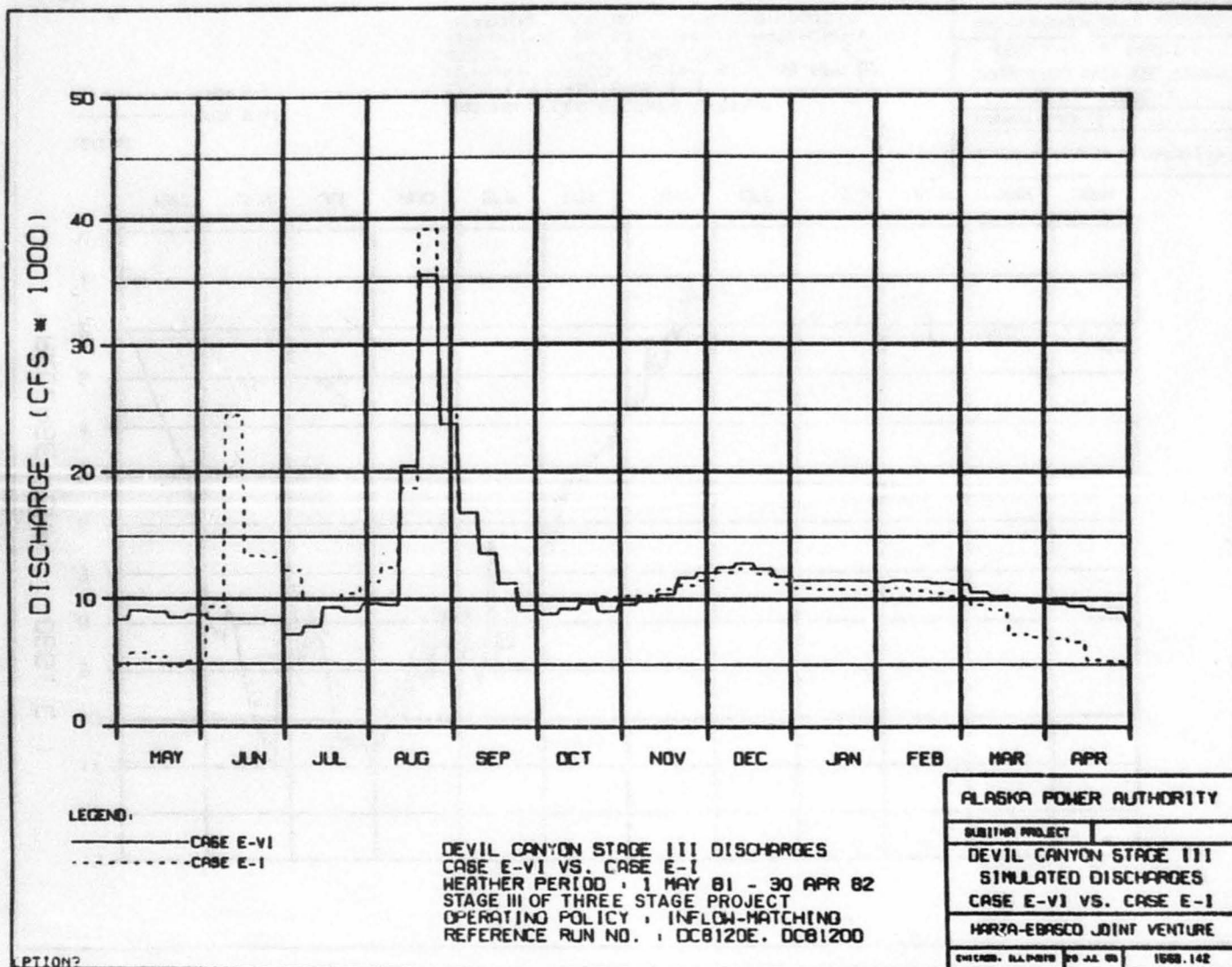
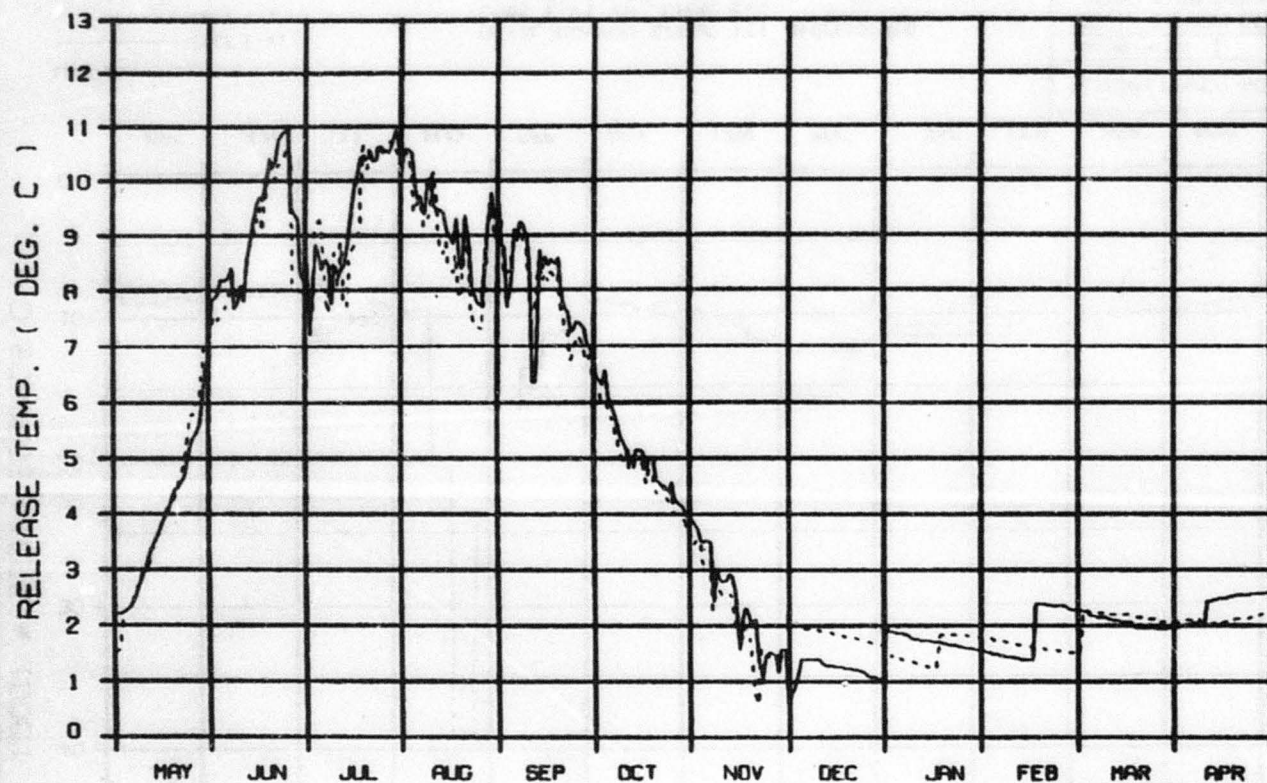


FIGURE 13





LEGEND:

— CASE E-VI  
 - - - CASE E-I

WATANA RELEASE TEMPS - STAGE I  
 CASE E-VI VS. CASE E-I  
 WEATHER PERIOD : 1 MAY 81 - 30 APR 82  
 STAGE I OF THREE STAGE PROJECT  
 OPERATING POLICY : INFLOW-MATCHING  
 REFERENCE RUN NO. : WAB1010.WAB101P

ALASKA POWER AUTHORITY

SUBMITTA PROJECT

WATANA STAGE I  
 SIMULATED RELEASE TEMPS  
 CASE E-VI VS. CASE E-I

HARZA-EBASCO JOINT VENTURE

DISCARD: ALP010 20 JUL 82 1603.142

OPTION?

FIGURE 14

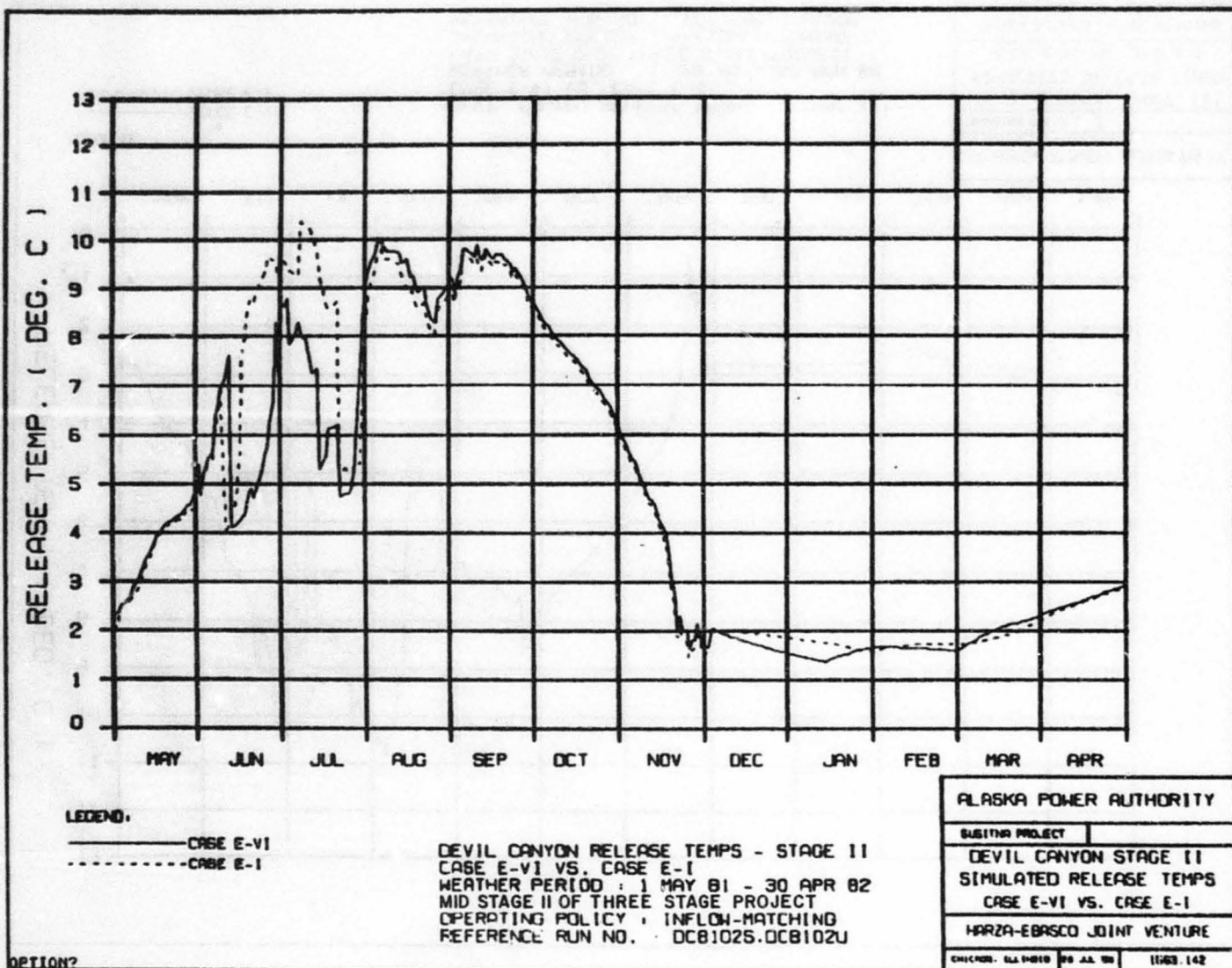
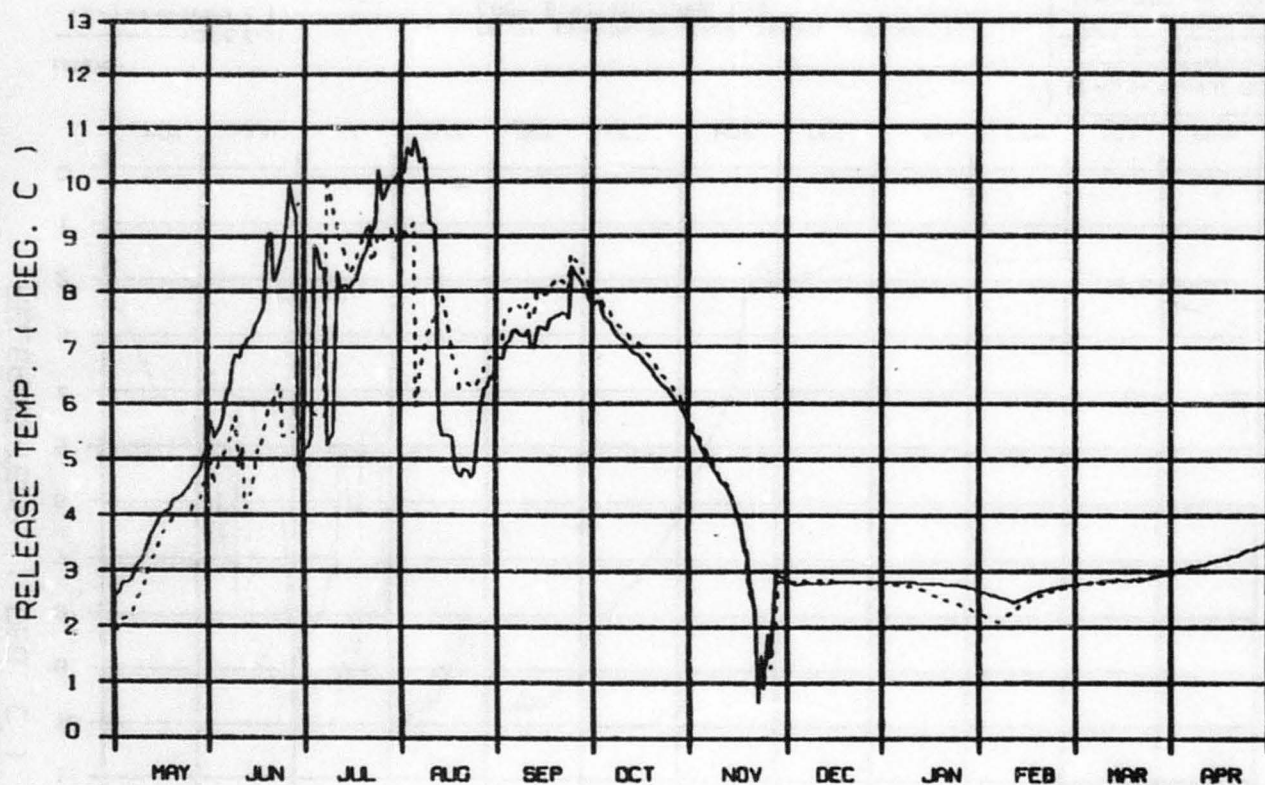


FIGURE 15



LEGEND.

— CASE E-VI  
- - - CASE E-I

DEVIL CANYON RELEASE TEMPS - STAGE III  
CASE E-VI VS. CASE E-I  
WEATHER PERIOD : 1 MAY 81 - 30 APR 82  
LATE STAGE III OF THREE STAGE PROJECT  
OPERATING POLICY : INFLOW-MATCHING  
REFERENCE RUN NO. : DCB120E.DCB120D

ALASKA POWER AUTHORITY

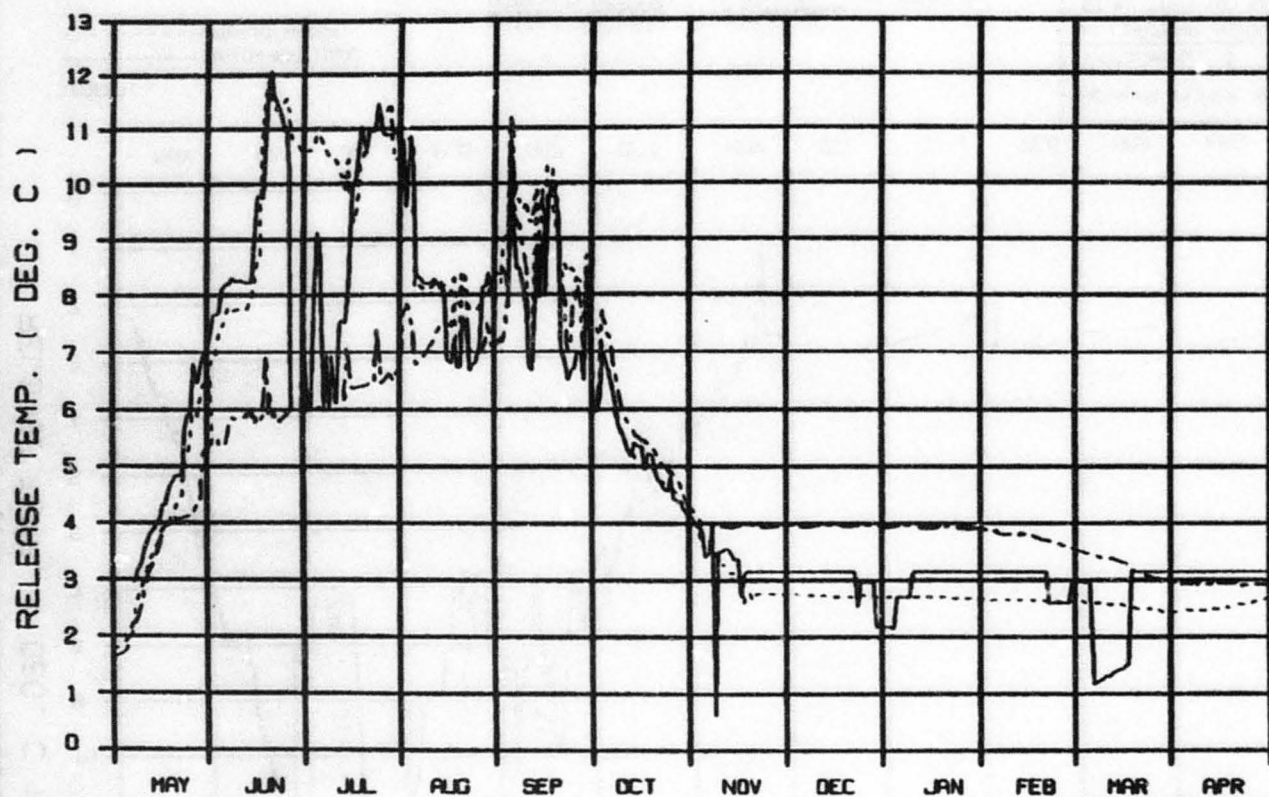
SUBMITTAL PROJECT

DEVIL CANYON STAGE III  
SIMULATED RELEASE TEMPS  
CASE E-VI VS. CASE E-I

WARZA-EDASCO JOINT VENTURE

DATE: 08/01/82 BY: J.A. 08 1553.142

FIGURE 16



LEGEND:

—— INFLOW-MATCHING  
 - - - - - WARMEST WATER  
 . . . . . LOWEST PORT

WATANA RELEASE TEMPERATURES  
 WEATHER PERIOD : 1 MAY 81 - 30 APR 82  
 ENERGY DEMAND : 2001 FLOWS : CASE C  
 INFLOW-MATCHING VS. WARMEST VS. LOWEST PORT  
 REFERENCE RUNS : WAB101A, WAB101D, WAB101E  
 STAGE I OF TWO STAGE PROJECT

ALASKA POWER AUTHORITY

SUSTINA PROJECT

WATANA RESERVOIR  
 SIMULATED RELEASE TEMPS  
 CASE C FLOWS

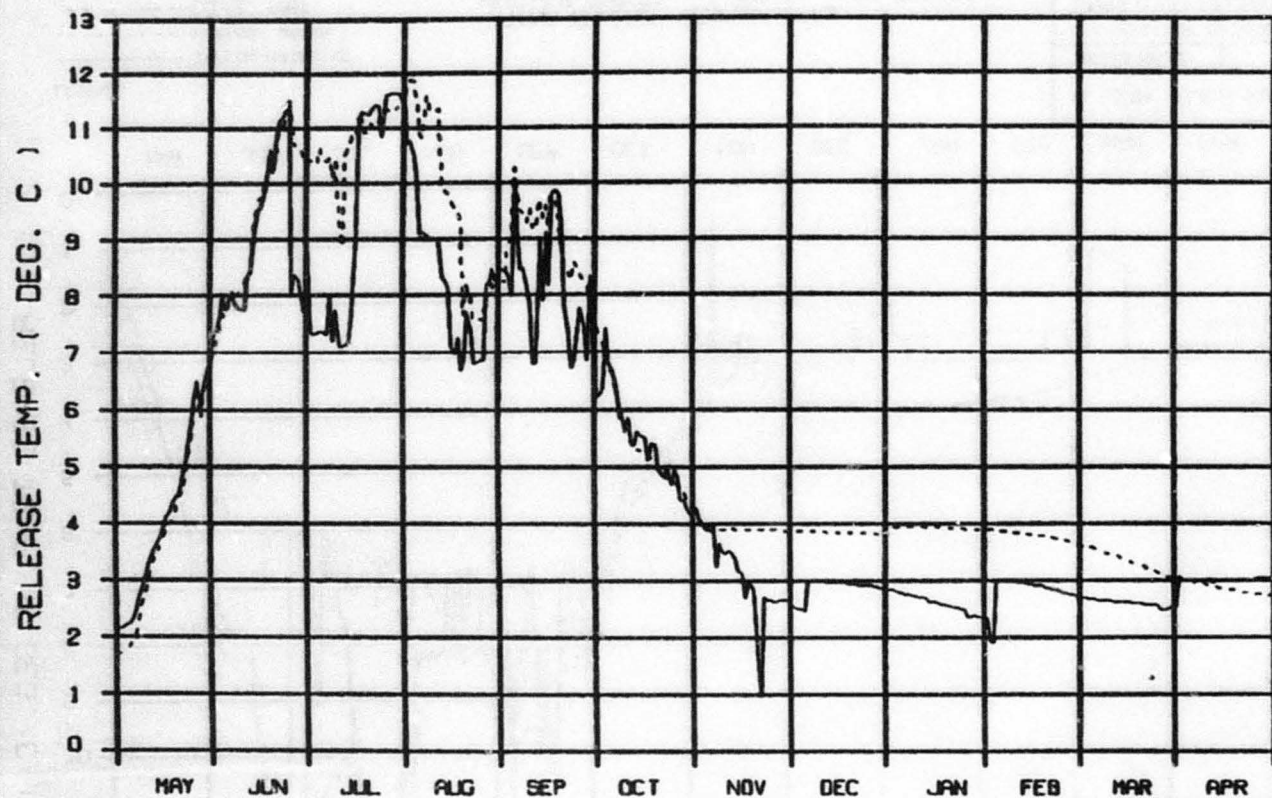
HAZRA-EBASCO JOINT VENTURE

DRAWN - ALL DATA 28 APR 82 1558.142

OPTION?

FIGURE 17





LEGEND.

—— INFLOW-MATCHING  
 - - - - - WARMEST WATER

WATANA RELEASE TEMPERATURES  
 WEATHER PERIOD : 1 MAY 81 - 30 APR 82  
 ENERGY DEMAND : 2001 FLOWS : CASE E-VI  
 INFLOW-MATCHING VS. WARMEST WATER  
 REFERENCE RUN NO. : WAB1011, WAB101J  
 STAGE 1 OF TWO STAGE PROJECT

OPTION2

ALASKA POWER AUTHORITY

WATANA PROJECT

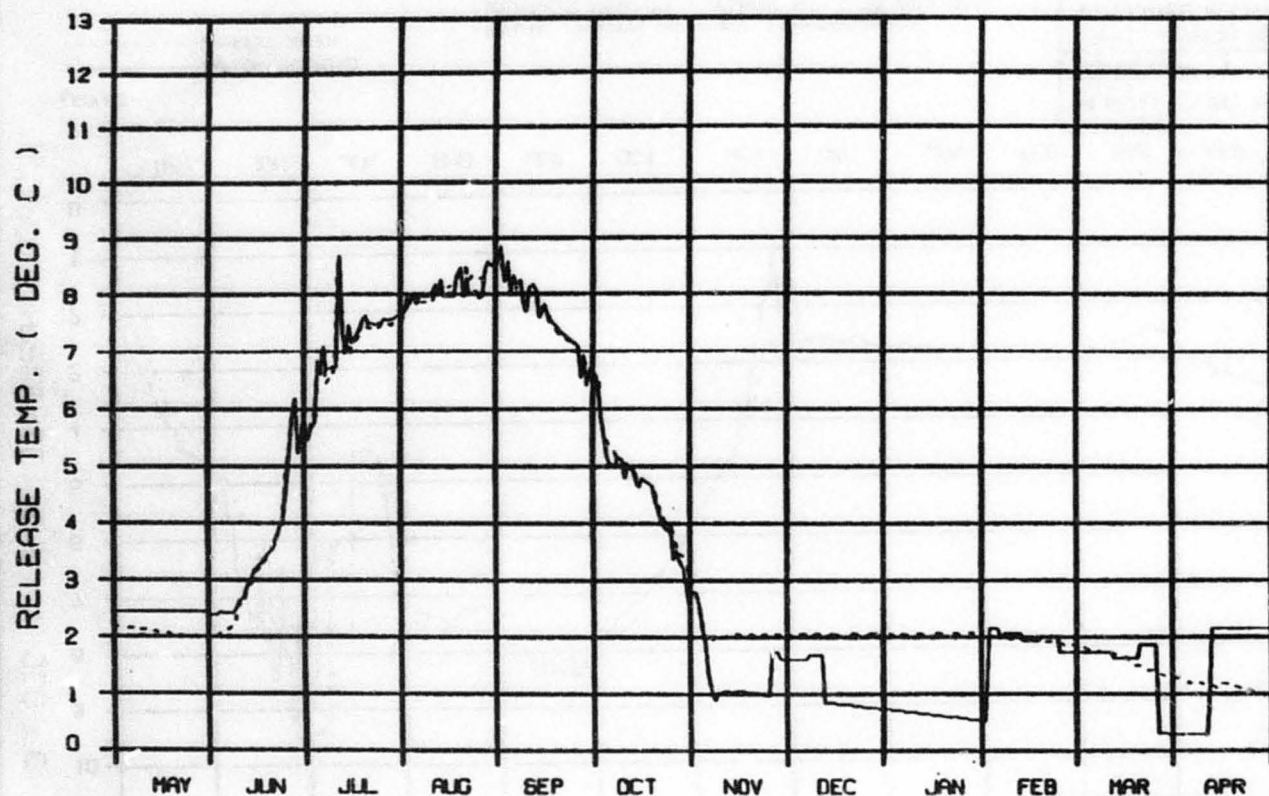
WATANA RESERVOIR  
 SIMULATED RELEASE TEMPS  
 CASE E-VI FLOWS

HARZA-EBASCO JOINT VENTURE

CHECKED: B.L.P. 10/81 BY: 1003.142

FIGURE 18





LEGEND:

—— INFLOW-MATCHING  
 - - - - - WARMEST WATER

WATANA RELEASE TEMPERATURES  
 WEATHER PERIOD : 1 MAY 71 - 30 APR 72  
 ENERGY DEMAND : 2001 FLOWS : CASE C  
 INFLOW-MATCHING VS. WARMEST WATER  
 REFERENCE RUN NO. : WA7101A, WA7101B  
 STAGE I OF TWO STAGE PROJECT

OPTION?

ALASKA POWER AUTHORITY

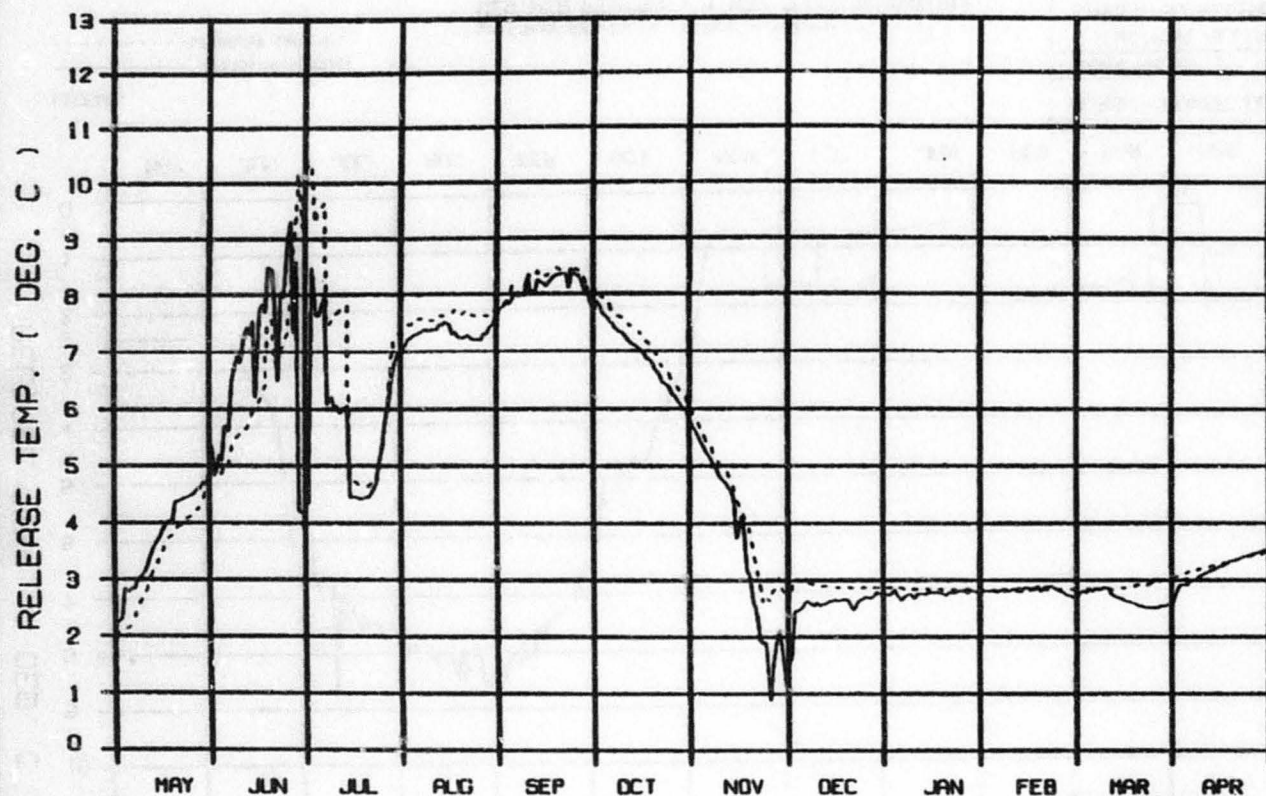
WATANA PROJECT

WATANA RESERVOIR  
 SIMULATED RELEASE TEMPS  
 CASE C FLOWS

HAZARDOUS JOINT VENTURE

DESIGN: BLDG 100 21 APR 72 1000.142

FIGURE 19



LEGEND:

—— INFLOW-MATCHING  
 - - - - WARMEST WATER

DEVIL CANYON RELEASE TEMPERATURES  
 WEATHER PERIOD : 1 MAY 81 - 30 APR 82  
 ENERGY DEMAND : 2002 FLOWS, CASE C  
 INFLOW-MATCHING VS. WARMEST WATER  
 REFERENCE RUN NO. : DCB102D, DCB102F  
 STAGE II OF TWO STAGE PROJECT

ALASKA POWER AUTHORITY

SUBMITTA PROJECT

DEVIL CANYON RESERVOIR  
 SIMULATED RELEASE TEMPS  
 CASE C FLOWS

WARZA-EBASCO JOINT VENTURE

DESIGNED: A.L.H. 1010 100 HPA 100 1003.142

OPTION?

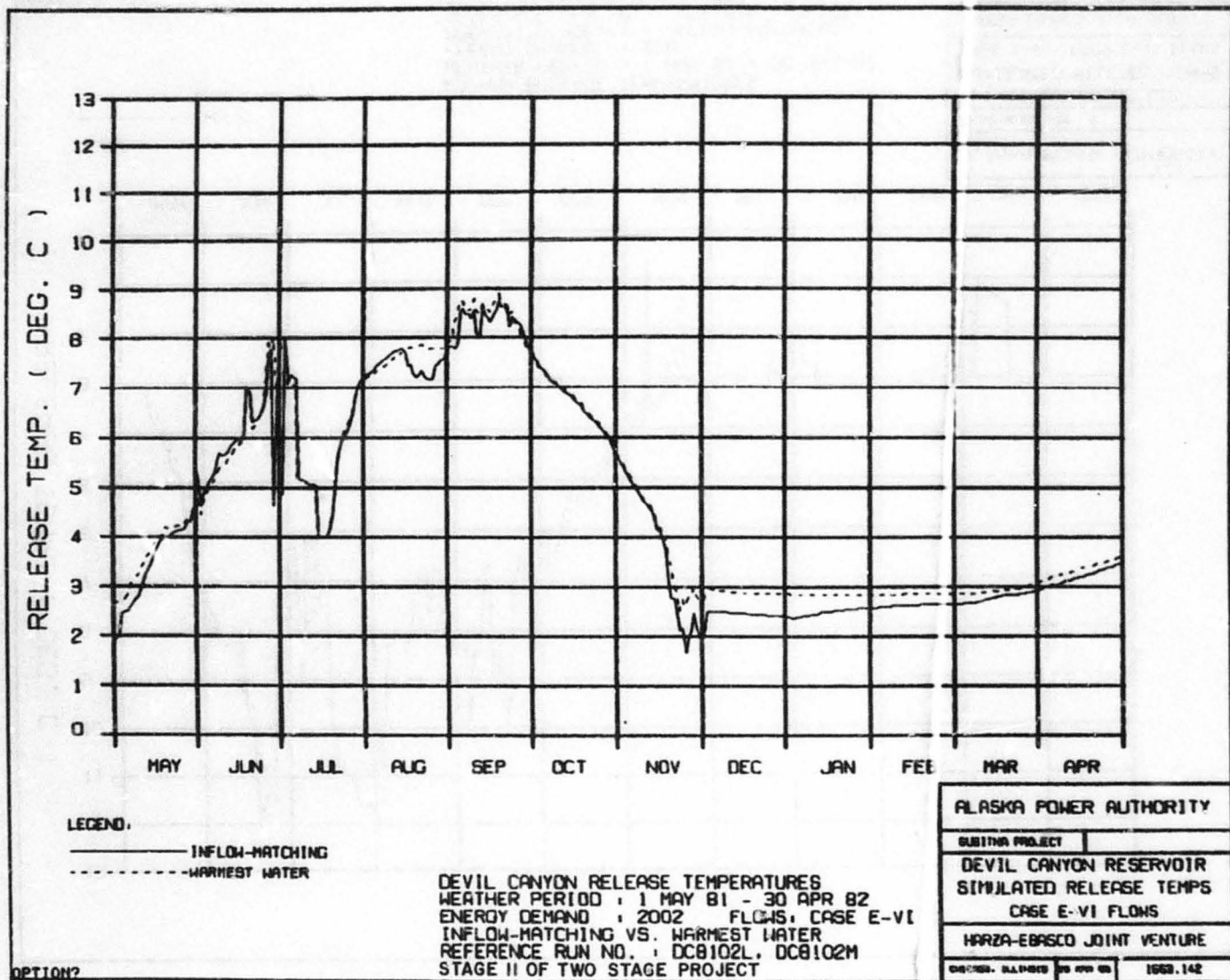
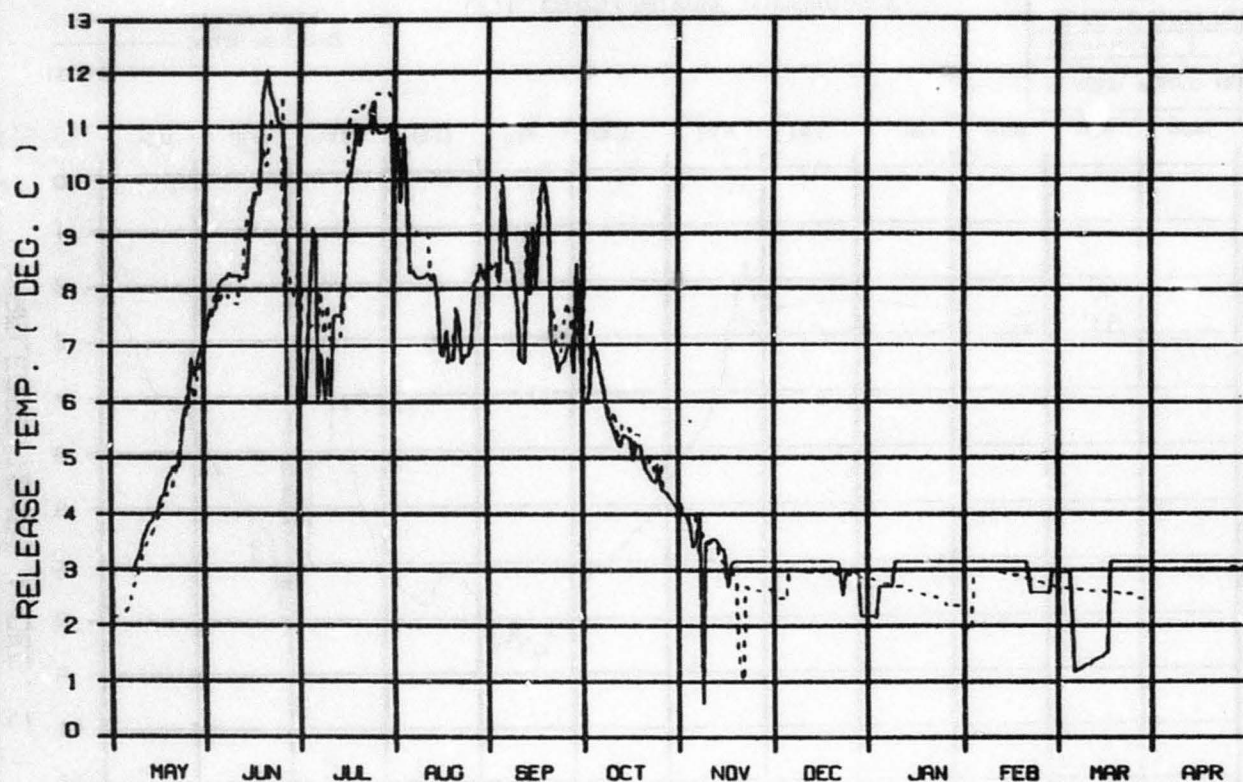


FIGURE 21



LEGEND:

— CASE C  
 - - - CASE E-VI

WATANA RELEASE TEMPERATURES  
 WEATHER PERIOD : 1 MAY 81 - 30 APR 82  
 ENERGY DEMAND : 2001  
 OPERATING POLICY : INFLOW-MATCHING  
 REFERENCE RUN NO. : WAB101A, WAB101I  
 STAGE 1 OF TWO STAGE PROJECT

OPTION?

ALASKA POWER AUTHORITY

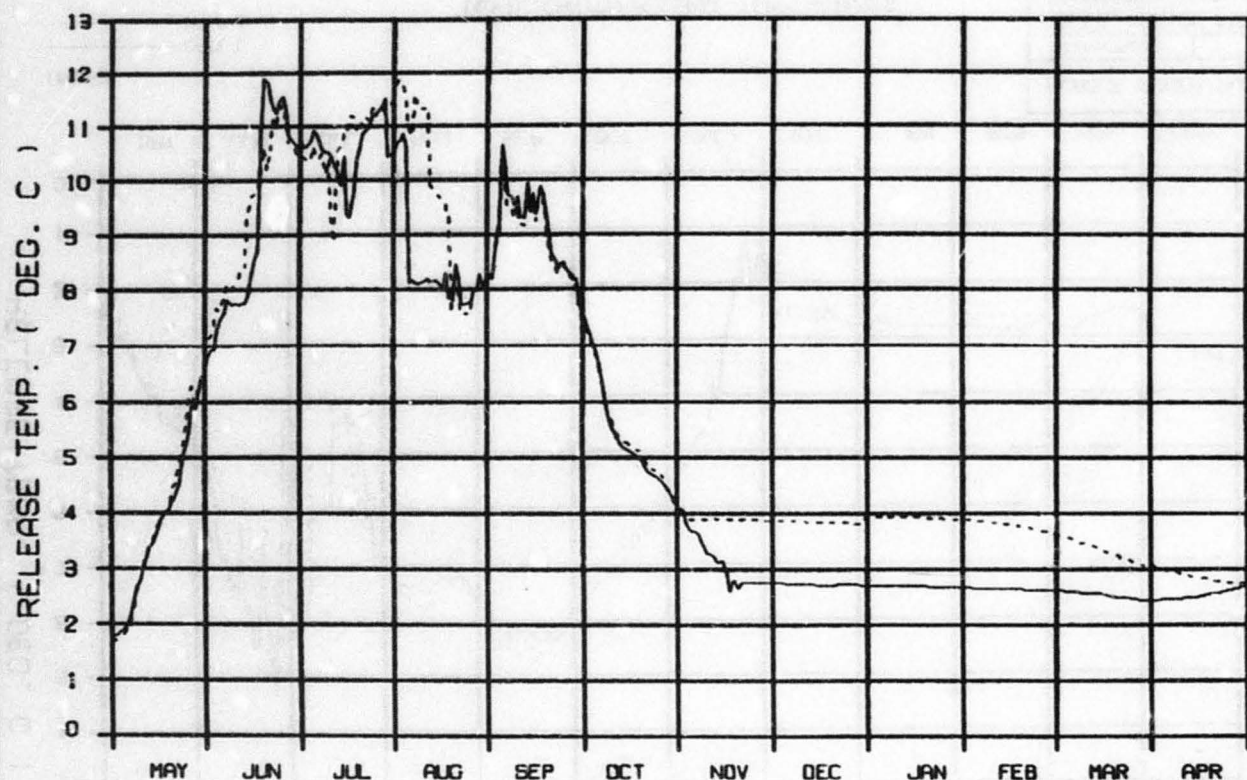
BUSHTA PROJECT

WATANA RESERVOIR  
 SIMULATED RELEASE TEMPS  
 CASE C VS. CASE E-VI FLOWS

WARZA-EBASCO JOINT VENTURE

CHECKED: ALL DATED 75 APR 82 1562.13





LEGEND:

— CASE C  
 - - - CASE E-VI

WATANA RELEASE TEMPERATURES  
 WEATHER PERIOD : 1 MAY 81 - 30 APR 82  
 ENERGY DEMAND : 2001  
 OPERATING POLICY : WARMEST WATER  
 REFERENCE RUN NO. : WAB101D, WAB101J  
 STAGE 1 OF TWO STAGE PROJECT

OPTION?

ALASKA POWER AUTHORITY

SUSTAIN PROJECT

WATANA RESERVOIR  
 SIMULATED RELEASE TEMPS  
 CASE C VS. CASE E-VI FLOWS

HARZA-EBASCO JOINT VENTURE

CHGNO. ALD-010 20 APR 82 1552.142



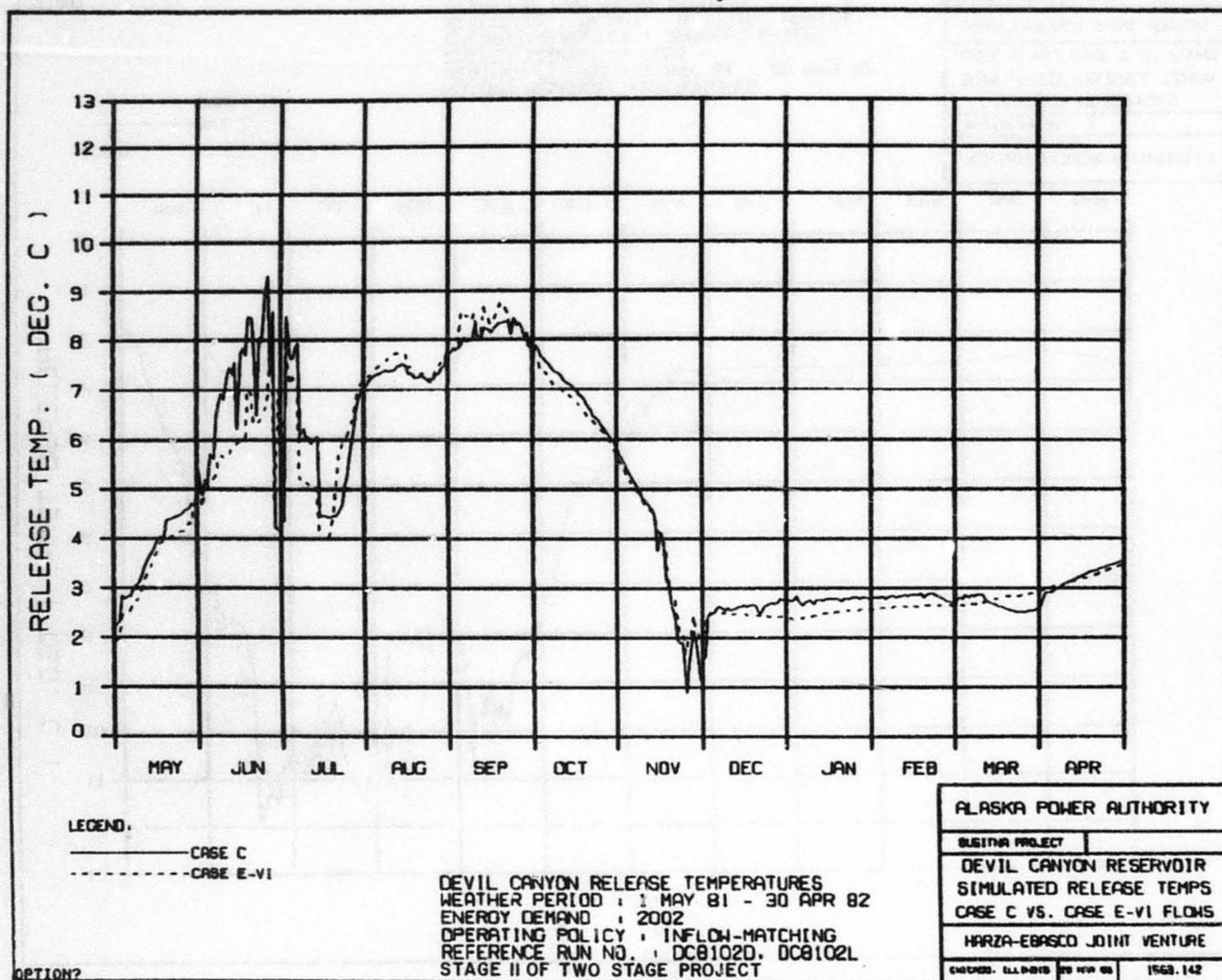
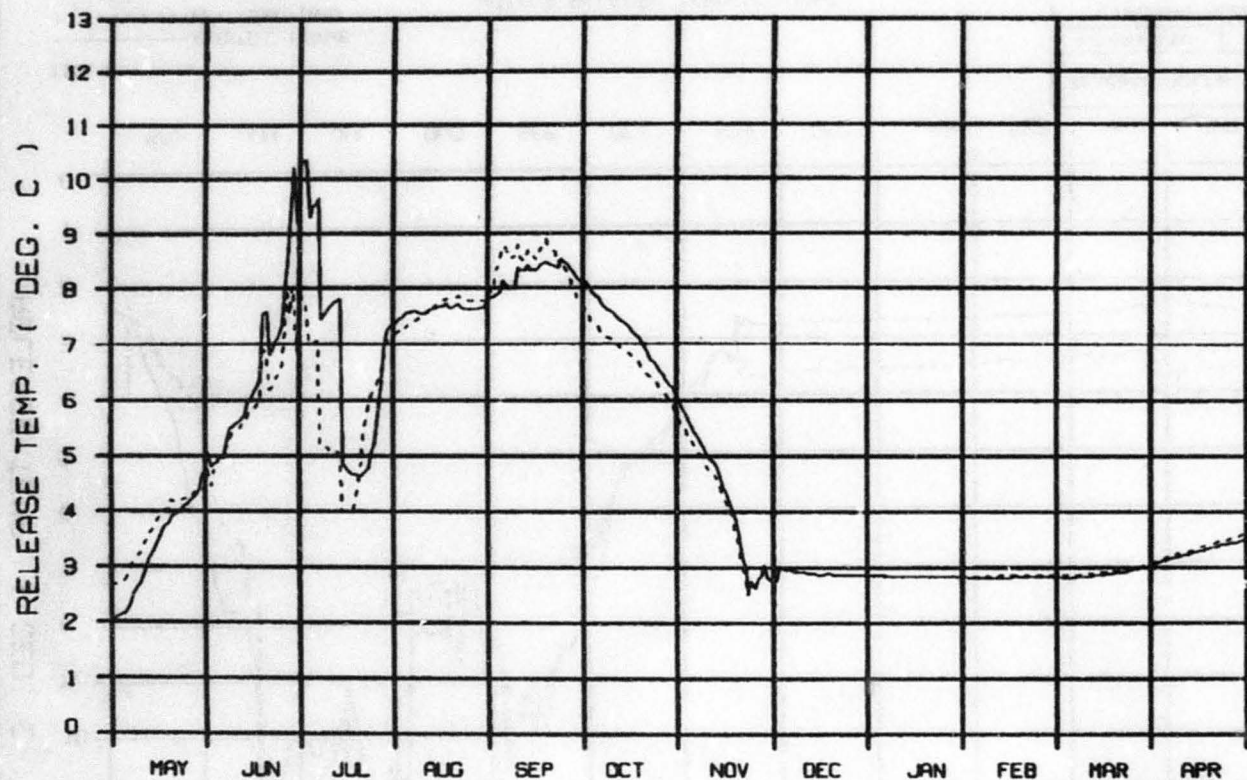


FIGURE 24



LEGEND:

— CASE C  
 - - - CASE E-VI

DEVIL CANYON RELEASE TEMPERATURES  
 WEATHER PERIOD : 1 MAY 81 - 30 APR 82  
 ENERGY DEMAND : 2002  
 OPERATING POLICY : WARMEST WATER  
 REFERENCE RUN NO. : DC8102F, DC8102M  
 STAGE II OF TWO STAGE PROJECT

ALASKA POWER AUTHORITY

GUSTINA PROJECT

DEVIL CANYON RESERVOIR  
 SIMULATED RELEASE TEMPS  
 CASE C VS. CASE E-VI FLOWS

HAZRA-EBASCO JOINT VENTURE

CHECKED: BLD/8102 25 MAR 82 1563.142

OPTION?

FIGURE 25

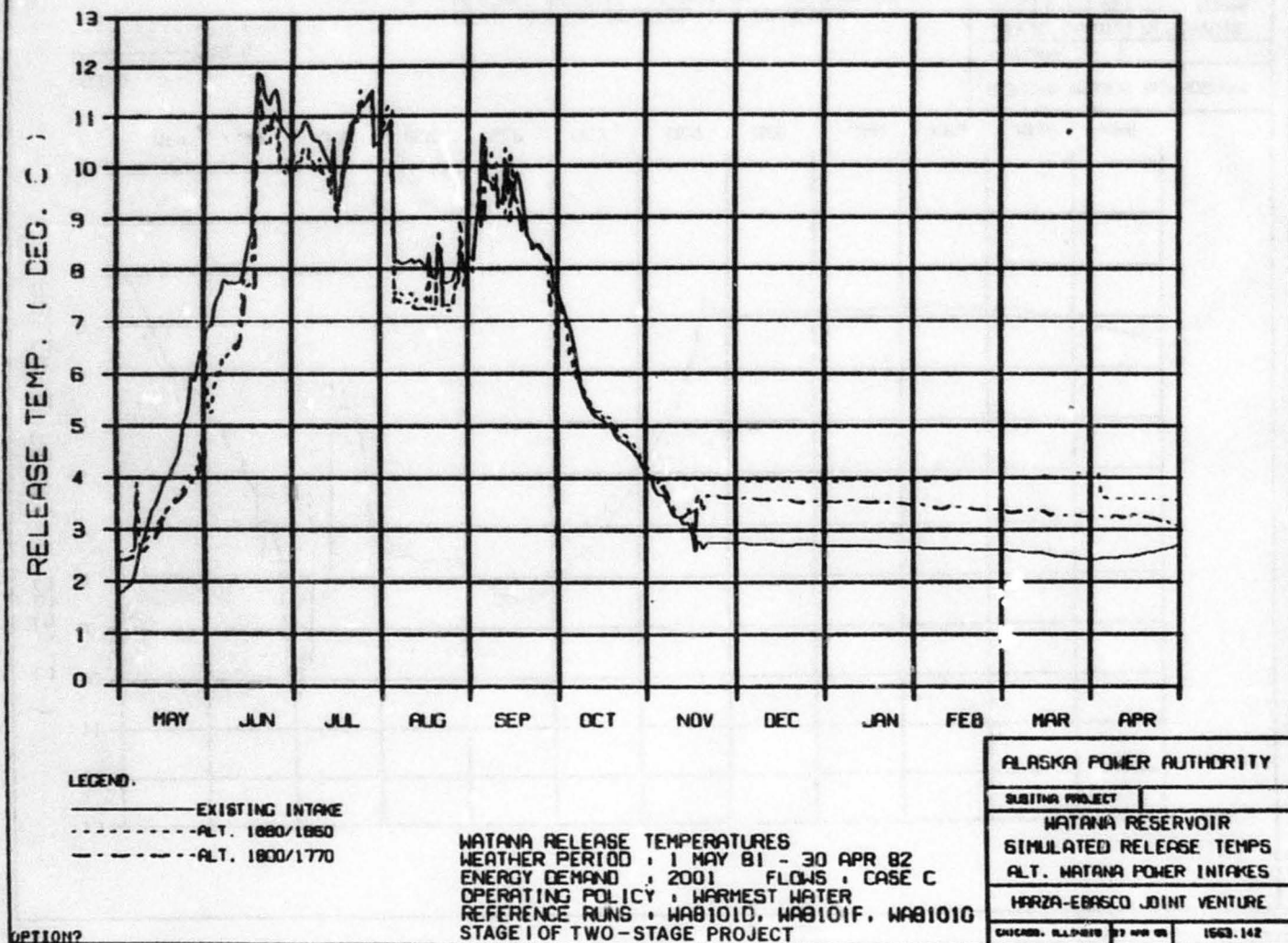
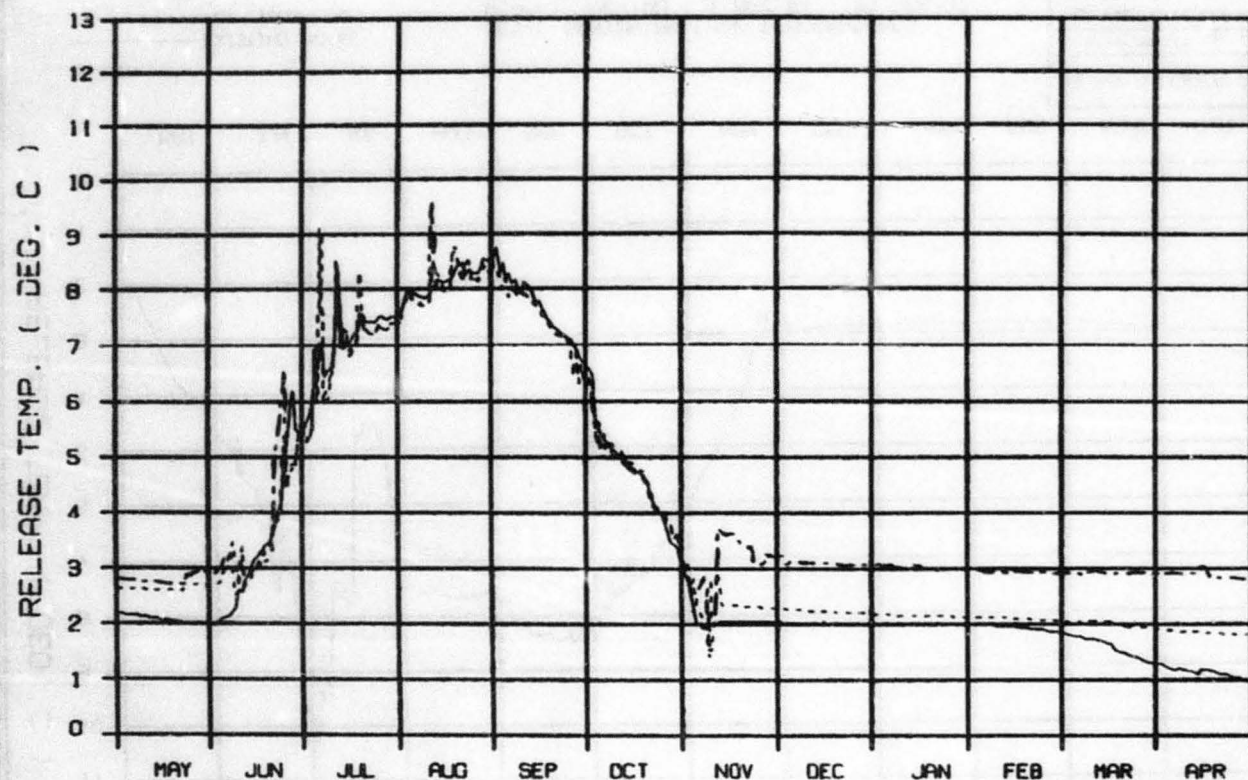


FIGURE 26



LEGEND.

— EXISTING INTAKE  
 - - - - - ALT. 1800/1770  
 - - - - - ALT. 1636/1470

WATANA RELEASE TEMPERATURES  
 WEATHER PERIOD : 1 MAY 71 - 30 APR 72  
 ENERGY DEMAND : 2001 FLOWS : CASE C  
 OPERATING POLICY : WARMEST WATER  
 REFERENCE RUNS : WA7101B, WA7101D, WA7101F  
 STAGE I OF TWO STAGE PROJECT

ALASKA POWER AUTHORITY

SUBSTANA PROJECT

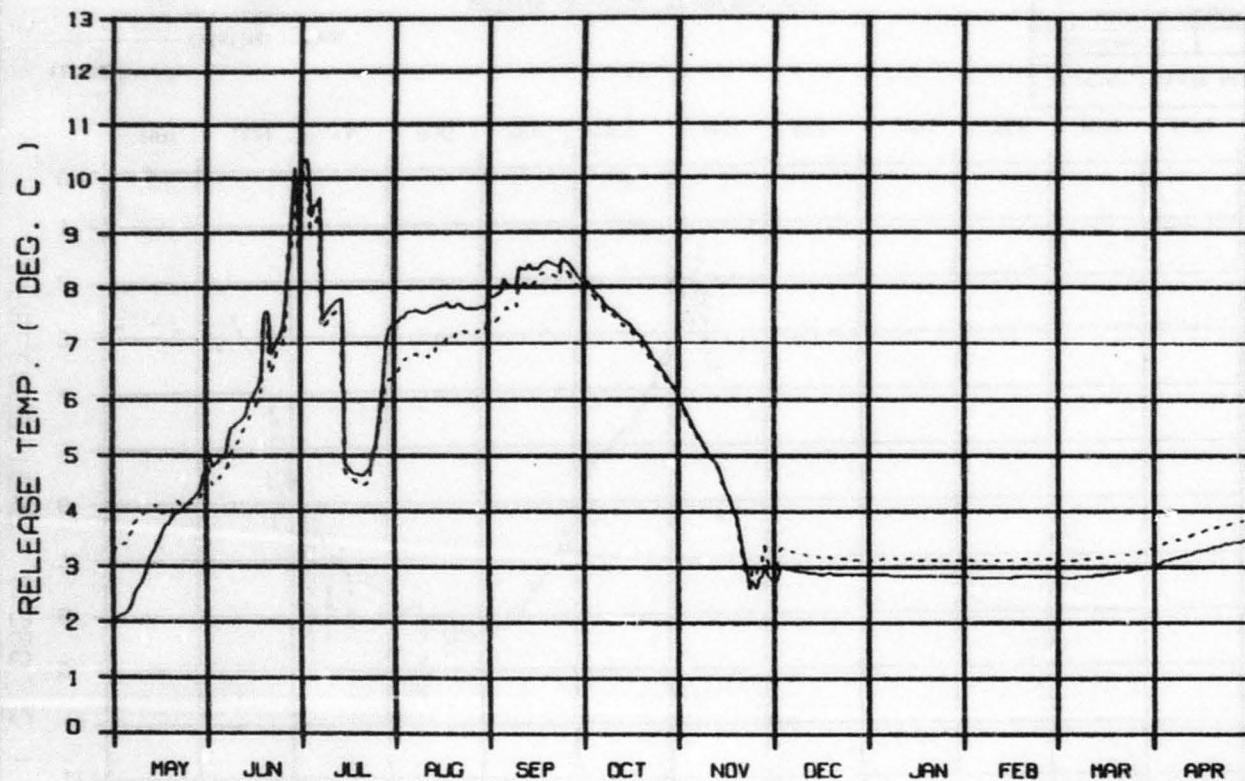
WATANA RESERVOIR  
 SIMULATED RELEASE TEMPS  
 ALT. WATANA POWER INTAKES

WARZA-EBASCO JOINT VENTURE

CHECKED: ILLUSTRATED BY: 1553.142

OPTION 2





LEGEND:

————— EXISTING INTAKE  
 - - - - - ALT. 1800/1770

DEVIL CANYON RELEASE TEMPERATURES  
 WEATHER PERIOD : 1 MAY 81 - 30 APR 82  
 ENERGY DEMAND : 2002 FLOWS: CASE C  
 OPERATING POLICY : WARMEST WATER  
 EXISTING D.C. CONE VALVE INTAKES  
 REFERENCE RUN NO. : DC8102F, DC8102G  
 STAGE II OF TWO STAGE PROJECT

ALASKA POWER AUTHORITY

SUBTNA PROJECT

DEVIL CANYON RESERVOIR  
 SIMULATED RELEASE TEMPS  
 ALT. WATANA POWER INTAKES

HARZA-EBASCO JOINT VENTURE

CHECKED: R.L. DAVIS BY: W.P. 08 1563.142

OPTION?



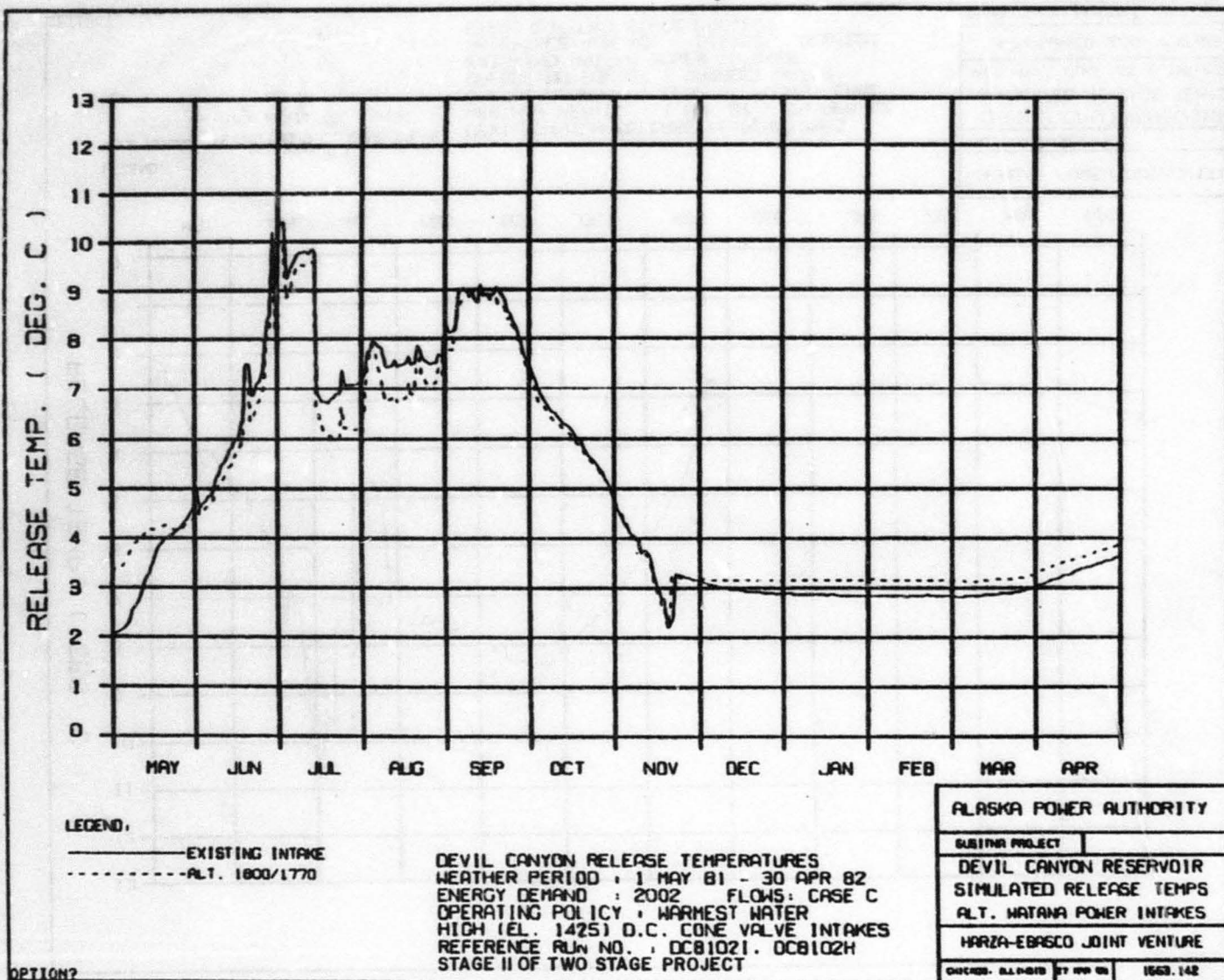
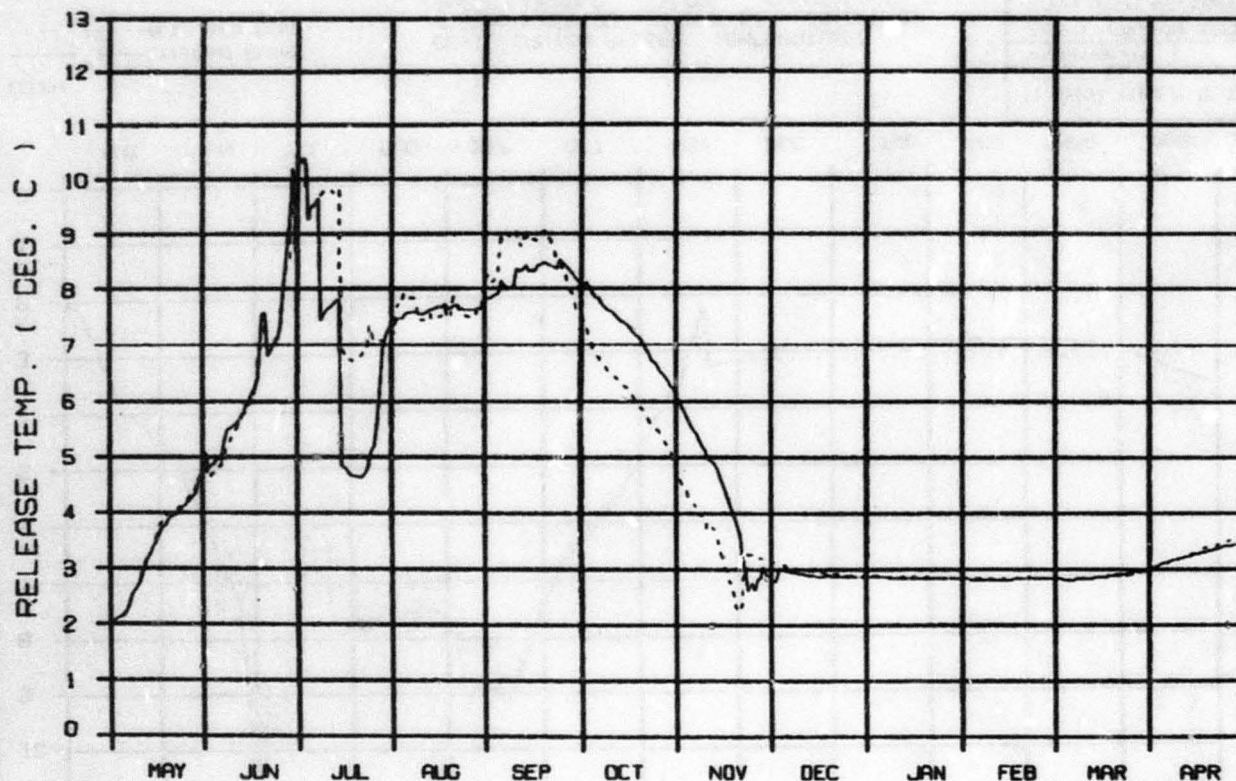


FIGURE 29



LEGEND:

————— EXISTING D.C. CONE VALVE  
 - - - - - HIGH LEVEL (EL. 1425)

DEVIL CANYON RELEASE TEMPERATURES  
 WEATHER PERIOD : 1 MAY 81 - 30 APR 82  
 ENERGY DEMAND : 2002 FLOWS: CASE C  
 OPERATING POLICY : WARMEST WATER  
 EXISTING WATANA POWER INTAKES  
 REFERENCE RUN NO. : DC8102F, DC8102I  
 STAGE II OF TWO STAGE PROJECT

OPTION?

ALASKA POWER AUTHORITY

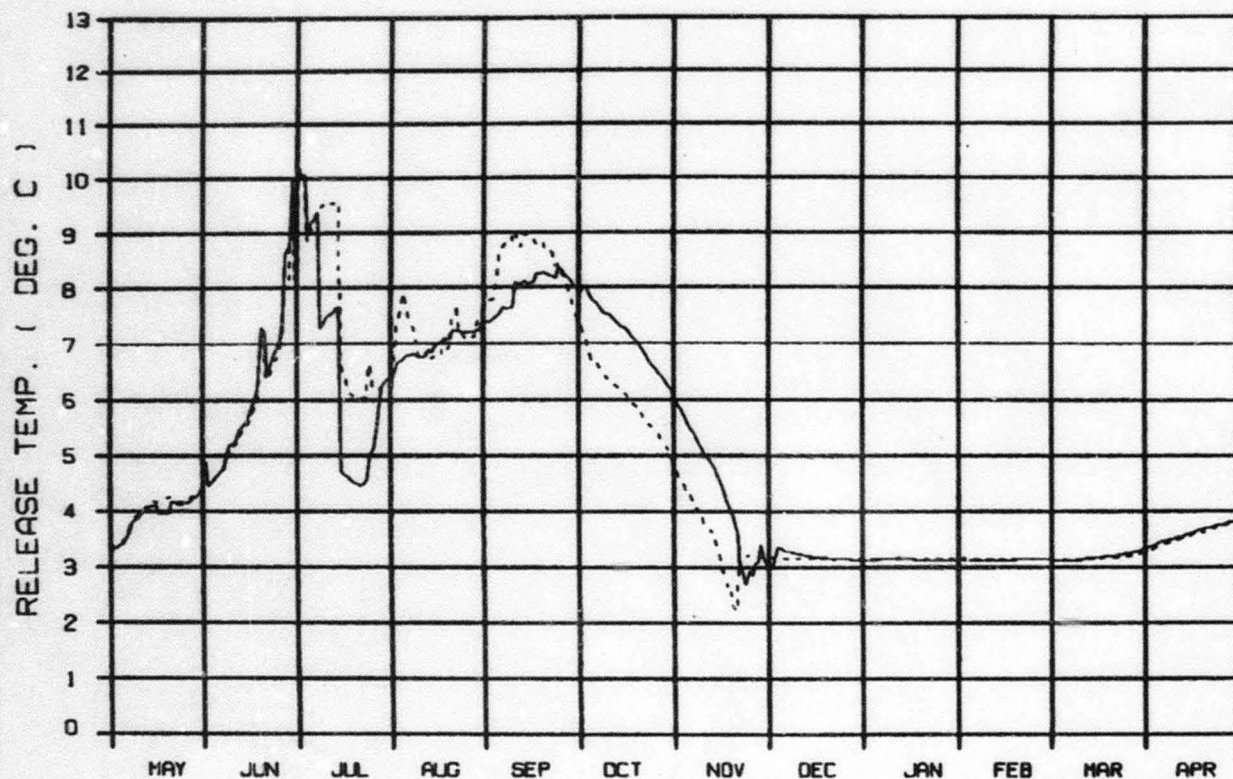
SUSTAINA PROJECT

DEVIL CANYON RESERVOIR  
 SIMULATED RELEASE TEMPS  
 ALT. D.C. CONE VALVE INTAKES

HARZA-EBASCO JOINT VENTURE

DESIGN - ALL PARTS 1 APR 82 1563.142

FIGURE 30



LEGEND:

————— EXISTING D.C. CONE VALVE  
 - - - - - HIGH LEVEL (EL. 1426)

DEVIL CANYON RELEASE TEMPERATURES  
 WEATHER PERIOD : 1 MAY 81 - 30 APR 82  
 ENERGY DEMAND : 2002 FLOWS: CASE C  
 OPERATING POLICY : WARMEST WATER  
 ALT. 1800/1770 WATANA POWER INTAKES  
 REFERENCE RUN NO. : DCB102G, DCB102H  
 STAGE II OF TWO STAGE PROJECT

OPTION?

ALASKA POWER AUTHORITY

DEVIL CANYON PROJECT

DEVIL CANYON RESERVOIR  
 SIMULATED RELEASE TEMPS  
 ALT. D.C. CONE VALVE INTAKES

WARZA-EBASCO JOINT VENTURE

CHIEF: D.L. PATE 1 APR 82 1553.142

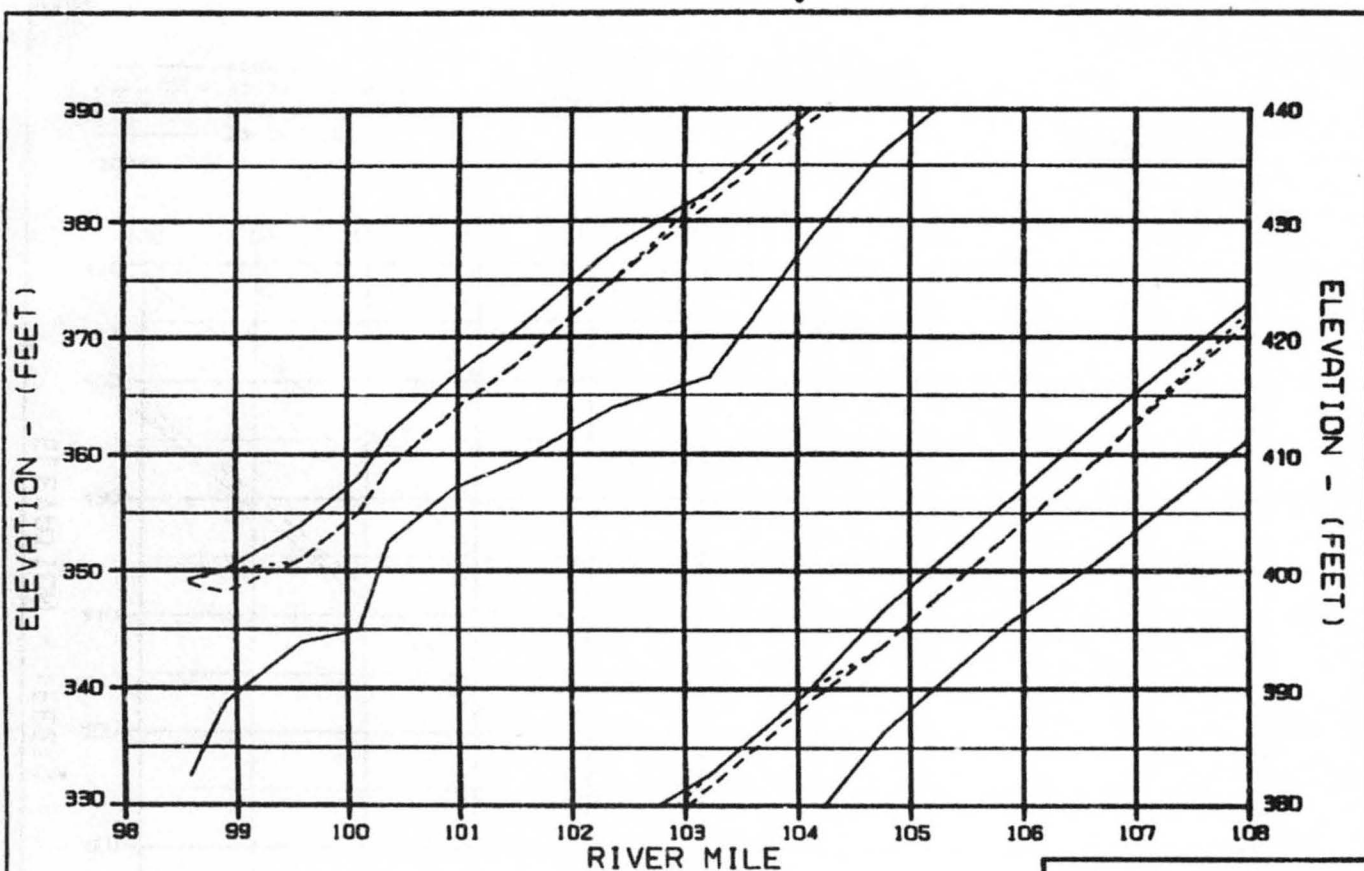
FIGURE 31



# EXHIBITS

**EXHIBIT A**





LEGEND.

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- ..... BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 FLOW CASE E-V1, INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101ENX

ALASKA POWER AUTHORITY

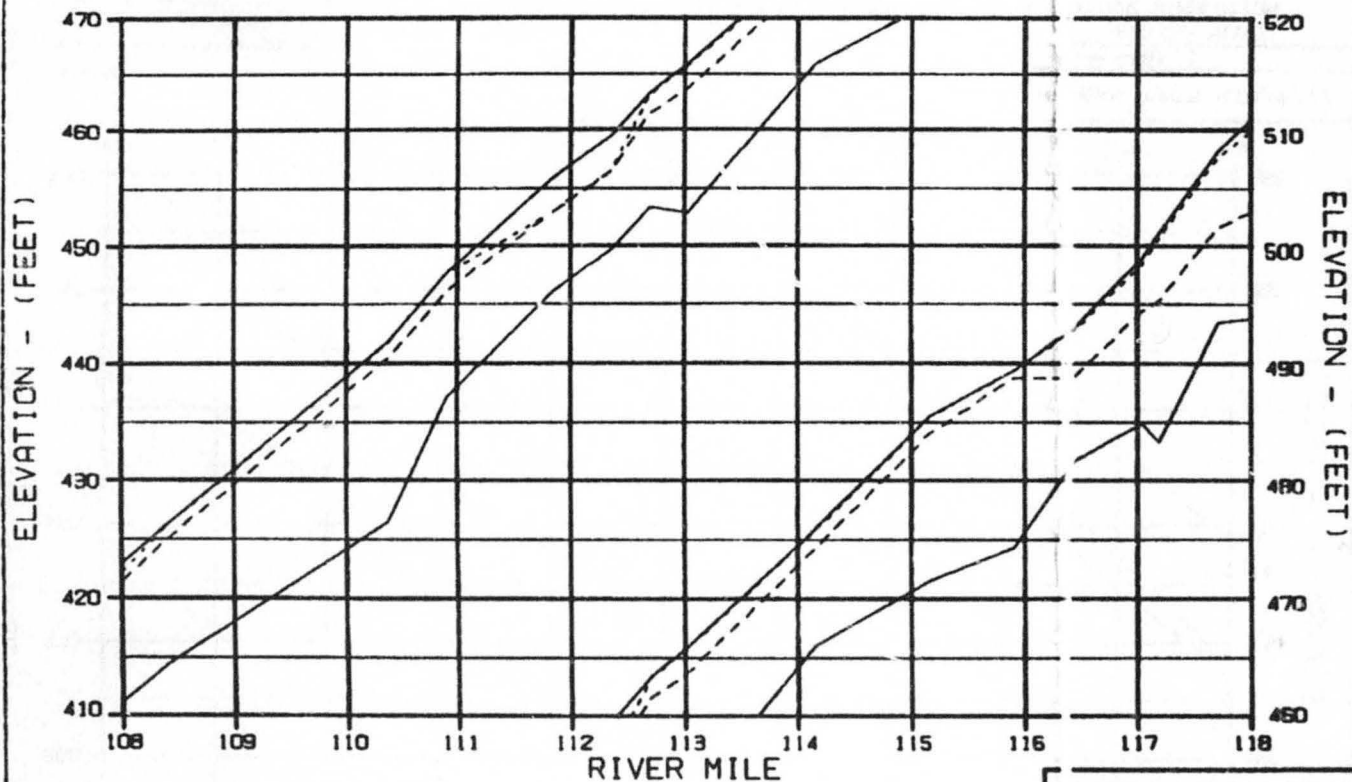
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

DESIGNED BY ALP/HRB 28 JUL 83 1988.142

EXPLAN?



LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- ..... BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 FLOW CASE E-V1. INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101ENX

OPTION?

ALASKA POWER AUTHORITY

SUSITNA PROJECT

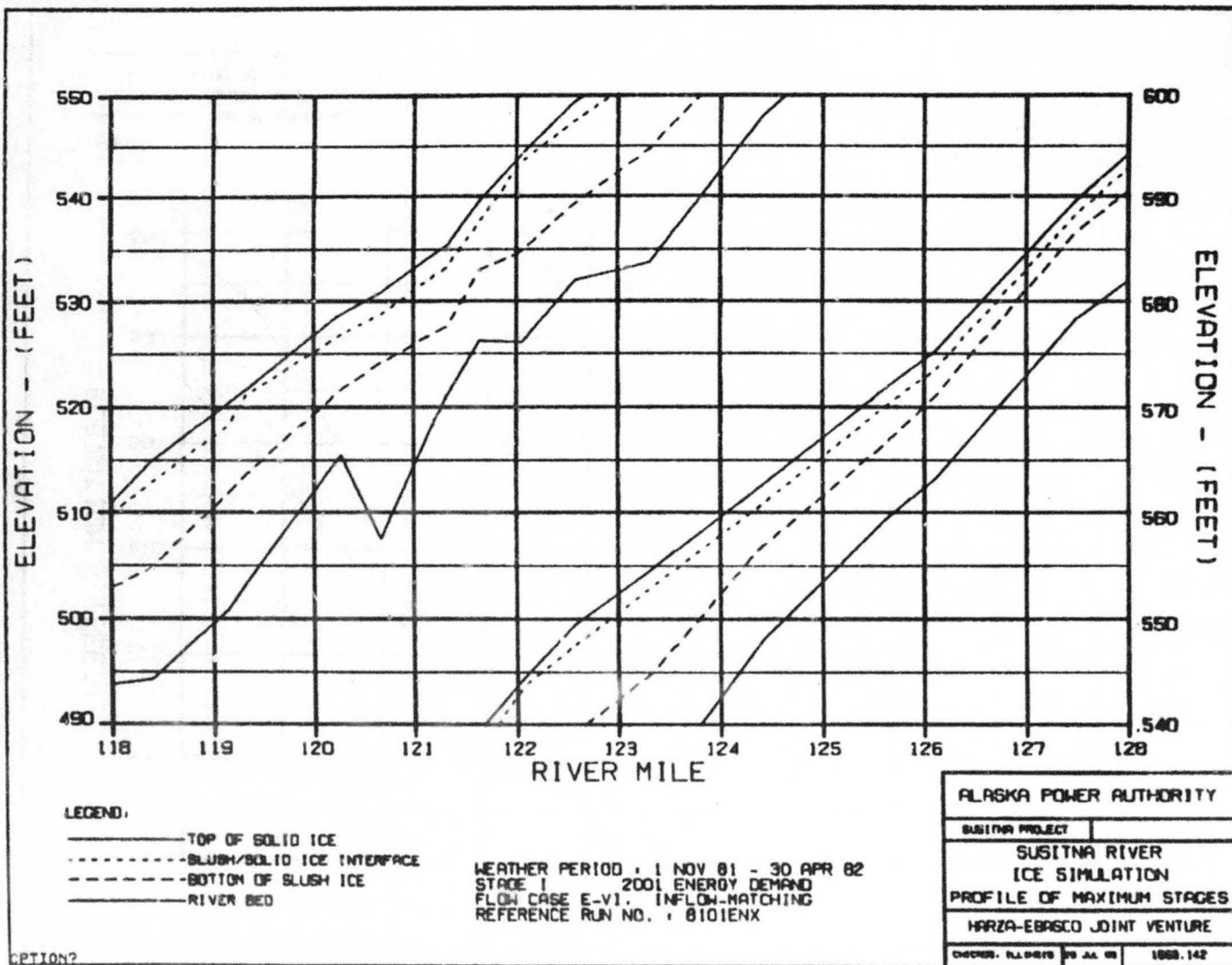
SUSITNA RIVER

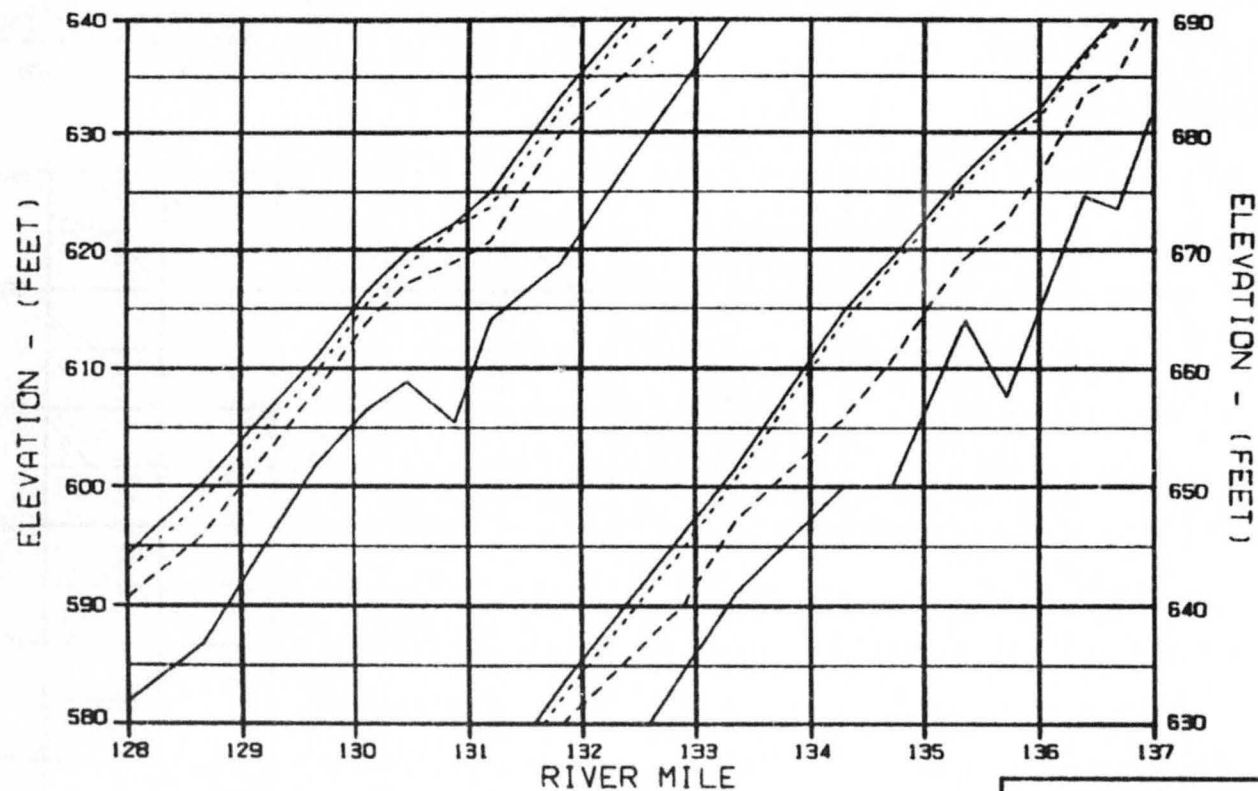
ICE SIMULATION

PROFILE OF MAXIMUM STAGES

HEARZ-EBASCO JOINT VENTURE

E 10480, 8-1-81 00 J.A. 00 1000.142





LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- ..... BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 FLOW CASE E-VI. INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101ENX

ALASKA POWER AUTHORITY

SUSITNA PROJECT

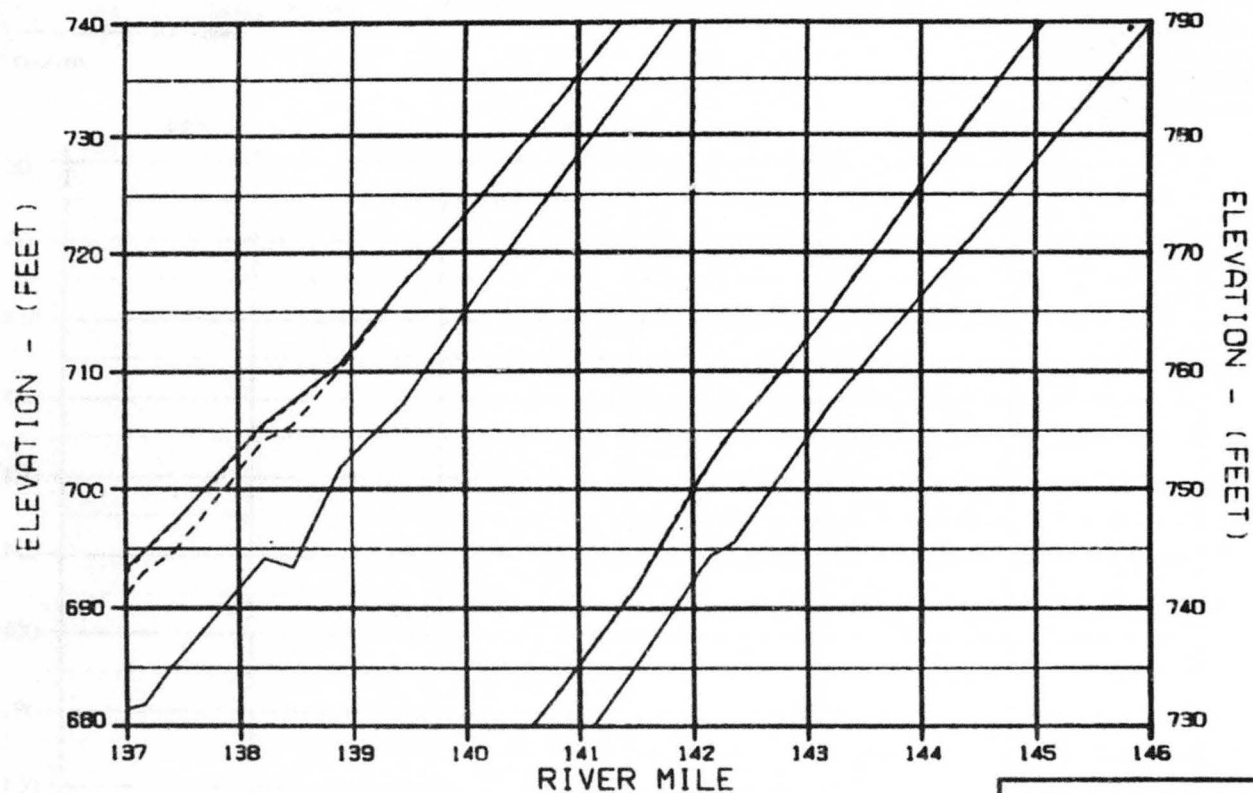
SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

CHECKED: J.A. 04/82 BY: J.A. 04/82 1000.142

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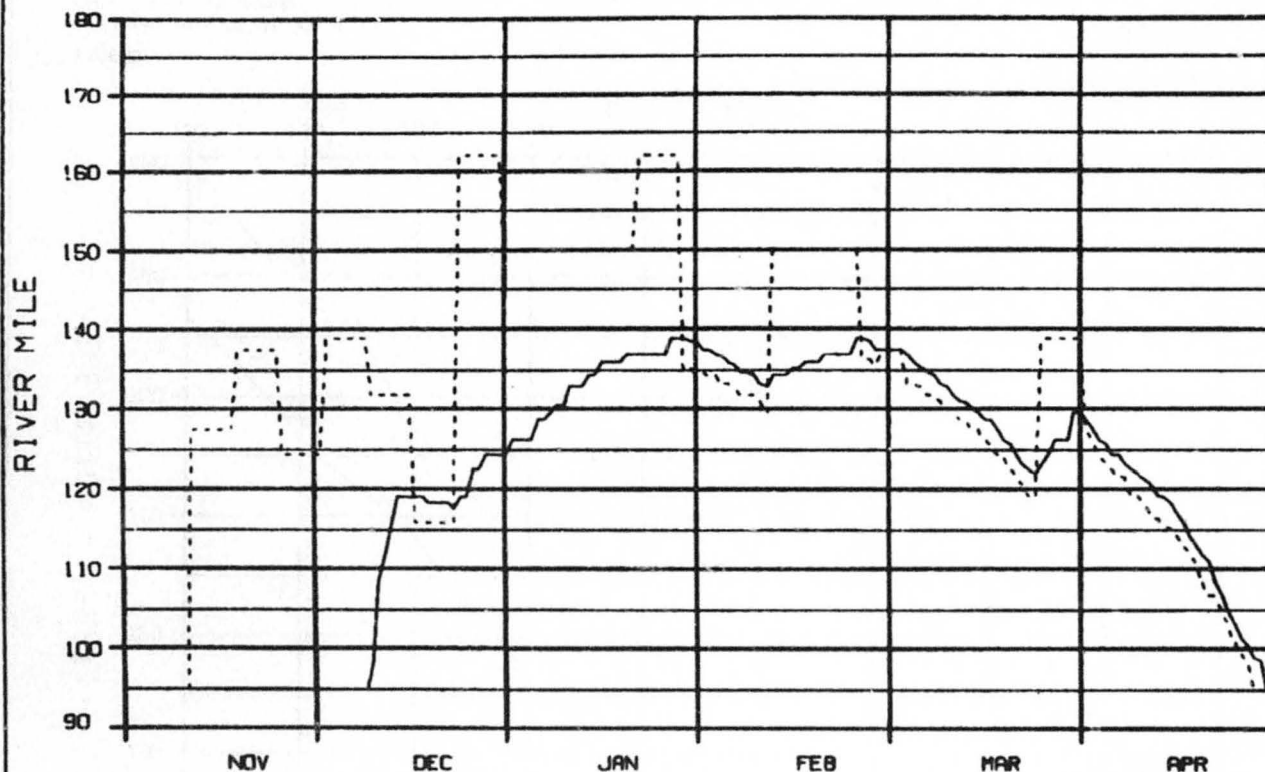


## LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- .-.-.- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 FLOW CASE E-V1, INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101ENX

ALASKA POWER AUTHORITY		
SUSITNA PROJECT		
SUSITNA RIVER		
ICE SIMULATION		
PROFILE OF MAXIMUM STAGES		
HARZA-EBASCO JOINT VENTURE		
DESIGNED BY	DATE	1988.142



LEGEND:

———— ICE FRONT  
 - - - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE I 2001 ENERGY DEMAND  
 FLOW CASE E-VI : INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101ENX

ALASKA POWER AUTHORITY

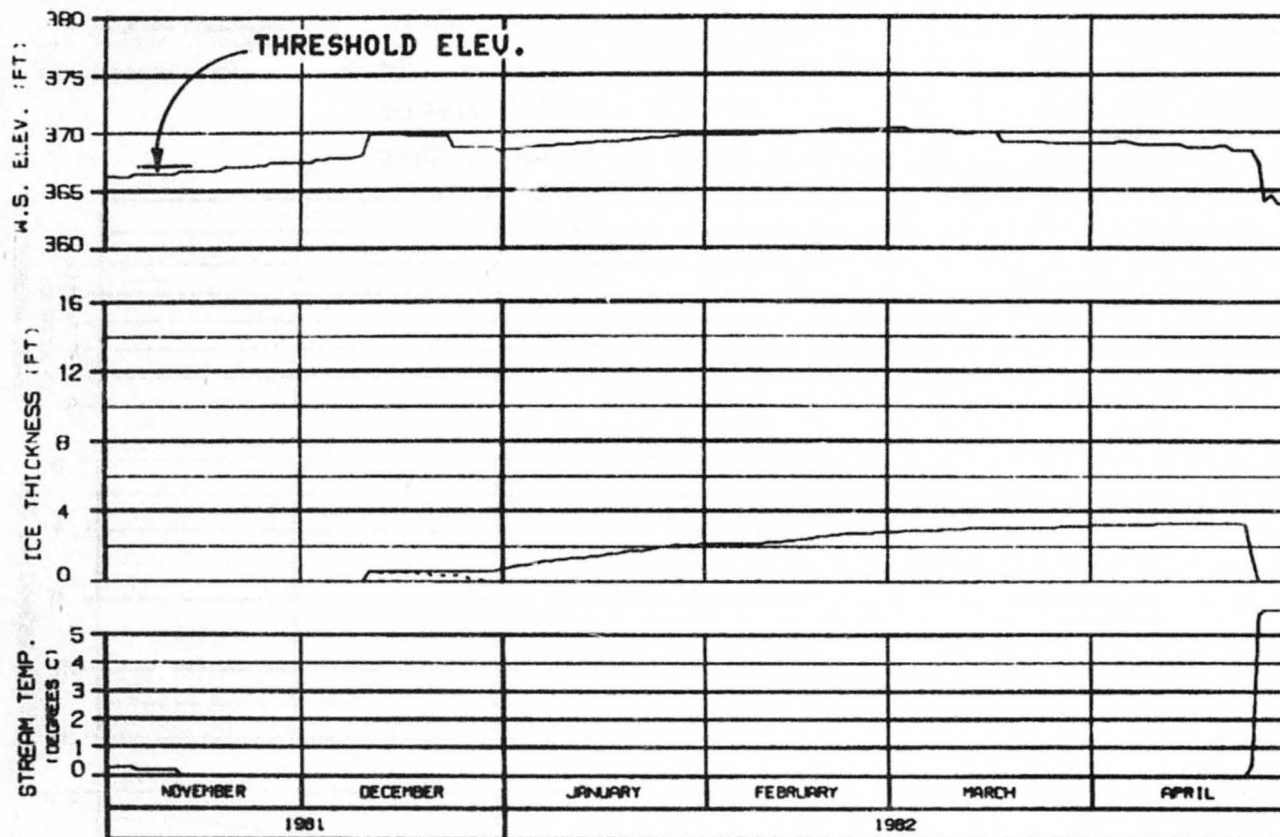
SUSITNA PROJECT

SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

HARZA-EBASCO JOINT VENTURE

CHECKED: ALL P-010 00 JUL 82 1888.142

OPTION?



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

### HEAD OF WHISKERS SLOUGH

RIVER MILE : 101.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE I 2001 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 REFERENCE RUN NO. : 8101ENX

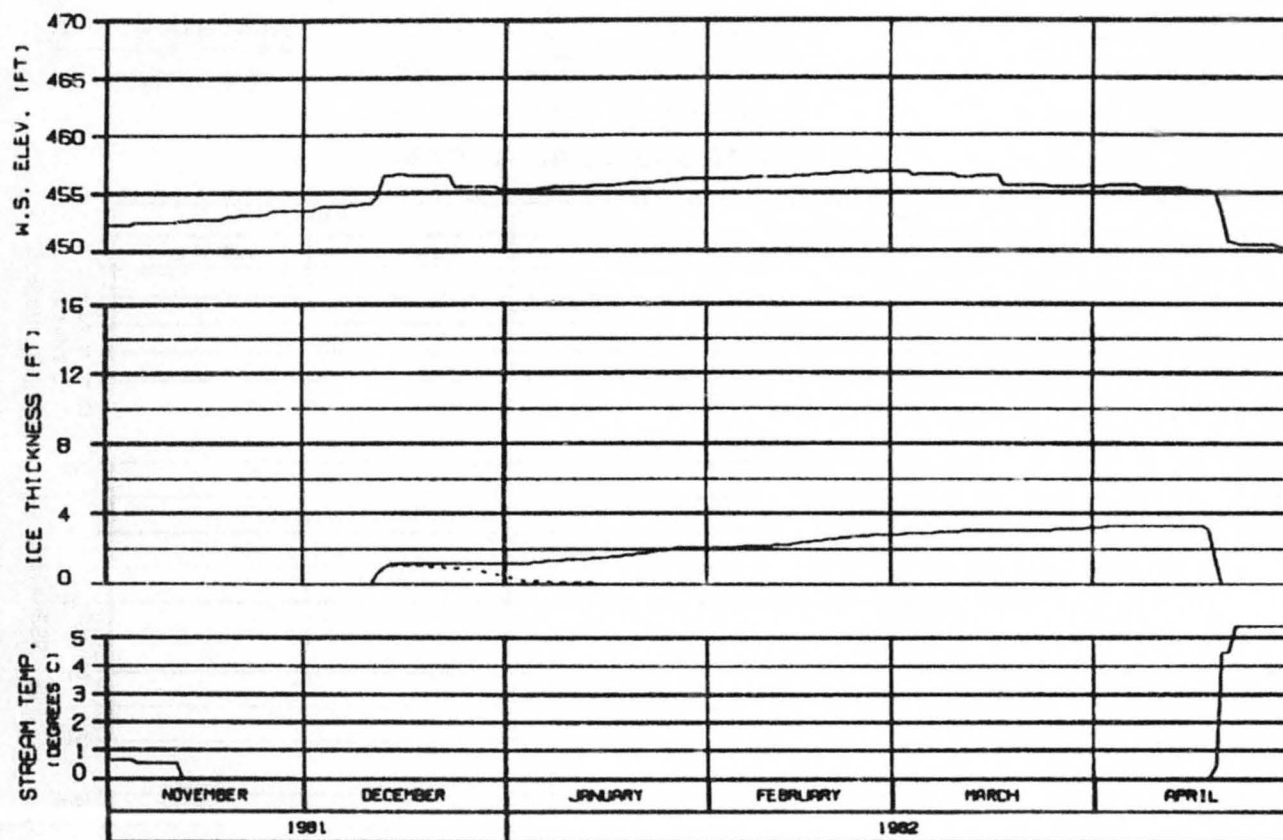
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHICAGO, ILL. 60606 25 JUL 82 1553.142



**SIDE CHANNEL AT HEAD OF GASH CREEK**  
**RIVER MILE : 112.00**

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 : 2001 ENERGY DEMAND  
 INFLOW-MATCHING : FLOW CASE E-VI  
 REFERENCE RUN NO. : B101ENX

ALASKA POWER AUTHORITY

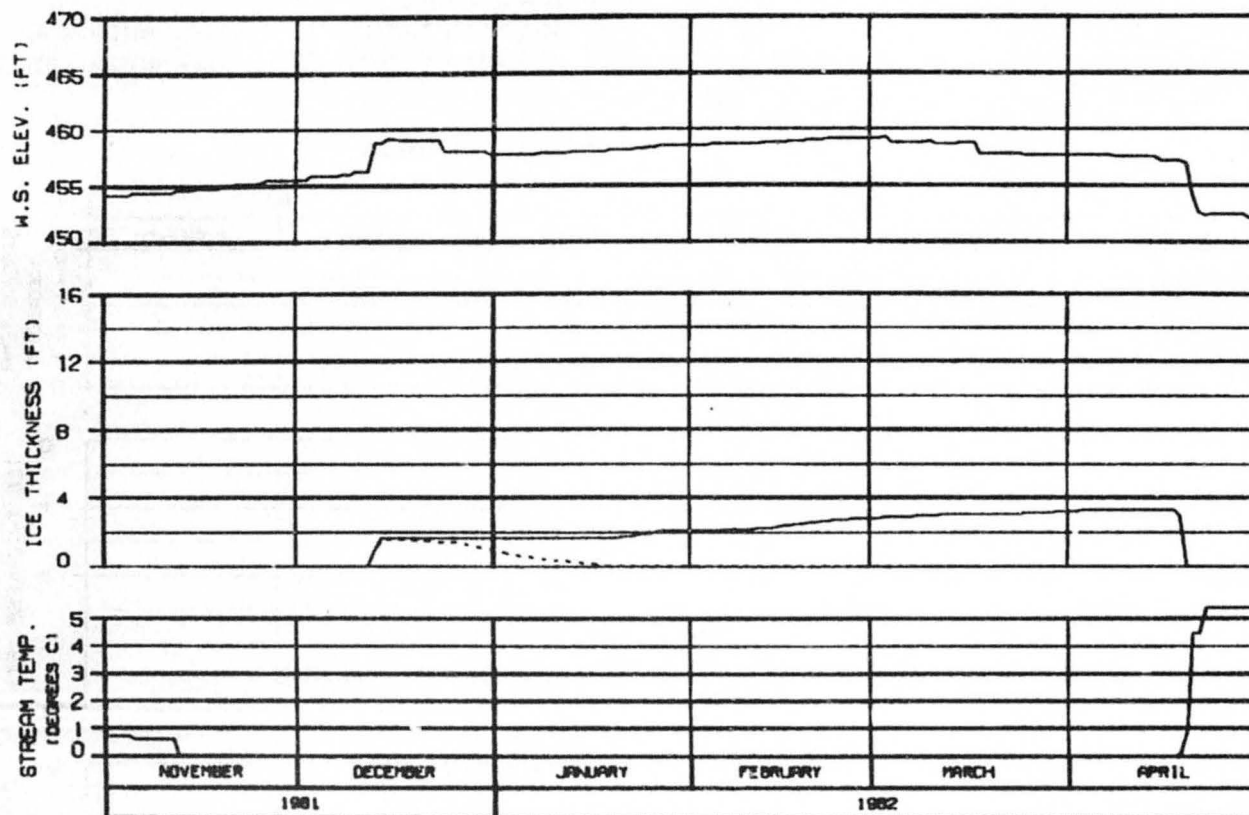
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

CHIEF: S.A. P. 878 78 JUL 81 1583.142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

MOUTH OF SLOUGH 6A  
 RIVER MILE : 112.34

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 REFERENCE RUN NO. : 8101ENX

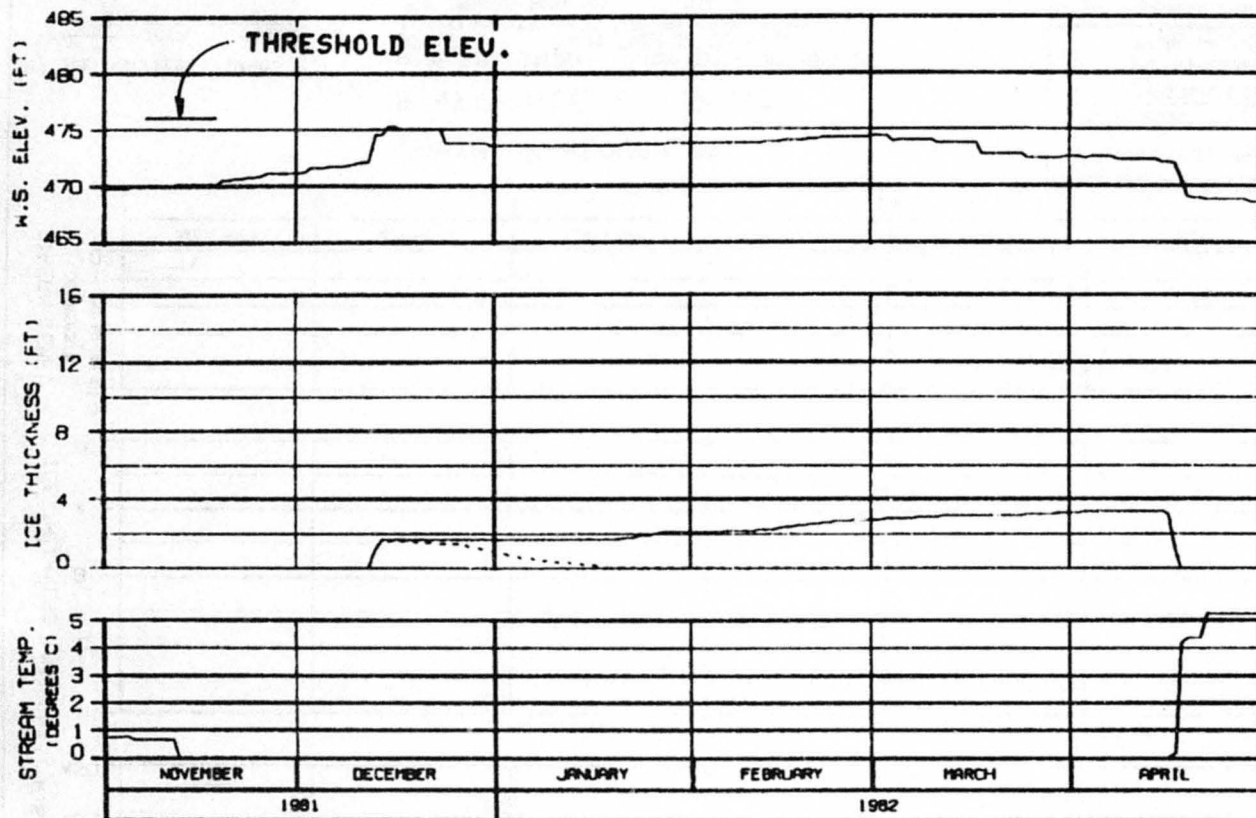
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

ENCLOS. 511-0101 20 JUL 82 1982.142



### HEAD OF SLOUGH 8

RIVER MILE : 114.10

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-MATCHING . FLOW CASE E-VI  
 REFERENCE RUN NO. : 8101ENX

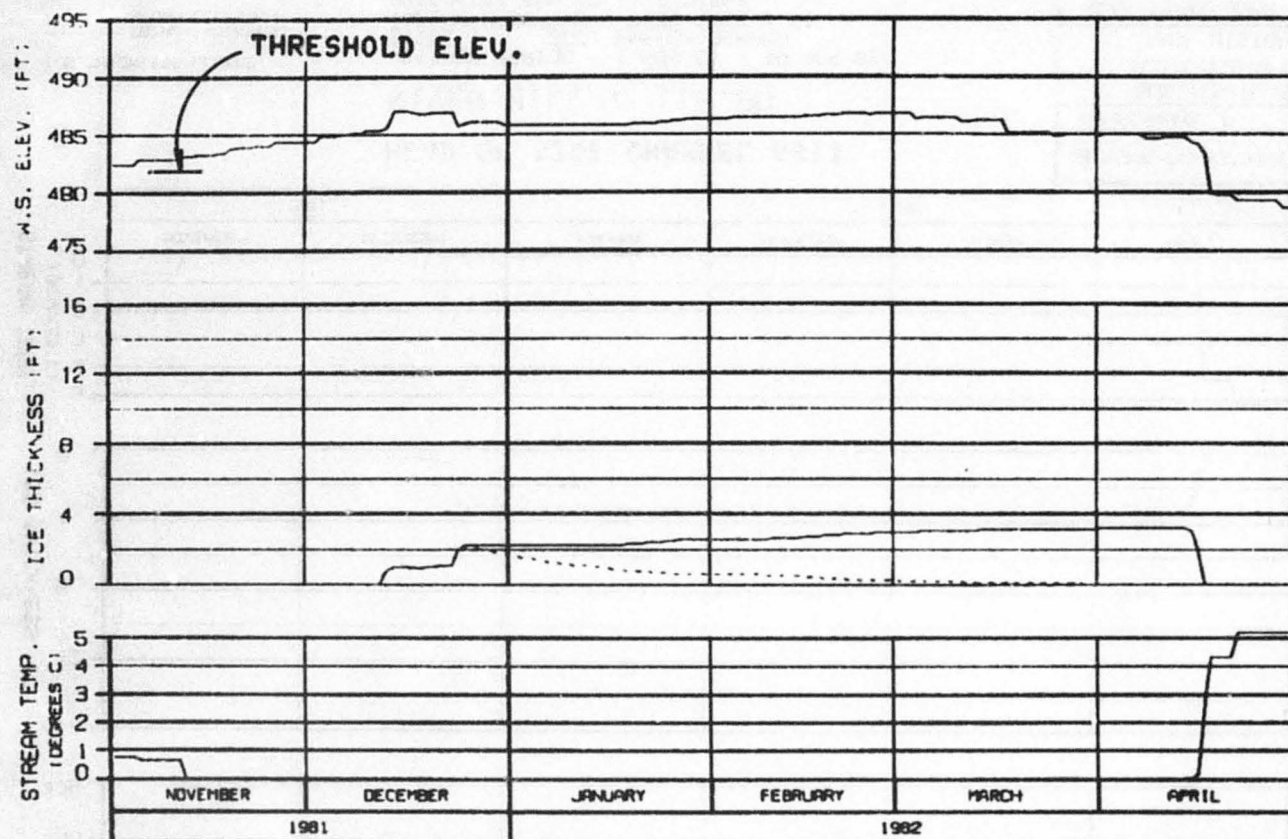
ALASKA POWER AUTHORITY

SUSTITNA PROJECT

SUSTITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHICAGO, ILLINOIS 60606-0001 1563.142



### SIDE CHANNEL MSII

RIVER MILE : 115.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 REFERENCE RUN NO. : 8101ENX

#### ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

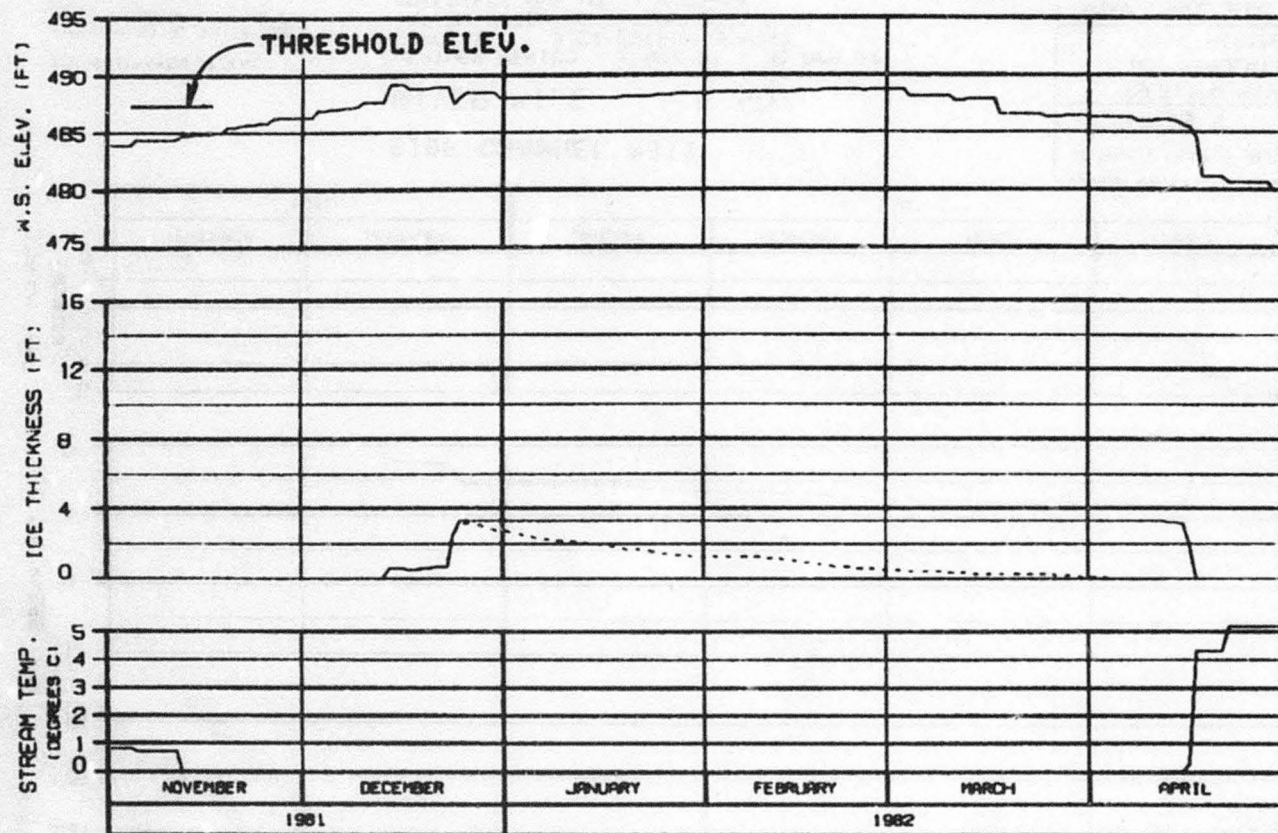
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHICAGO, ILLINOIS 90 JAA 82 1983.142



# HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

## ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE I 2001 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 REFERENCE RUN NO. : 8101ENX

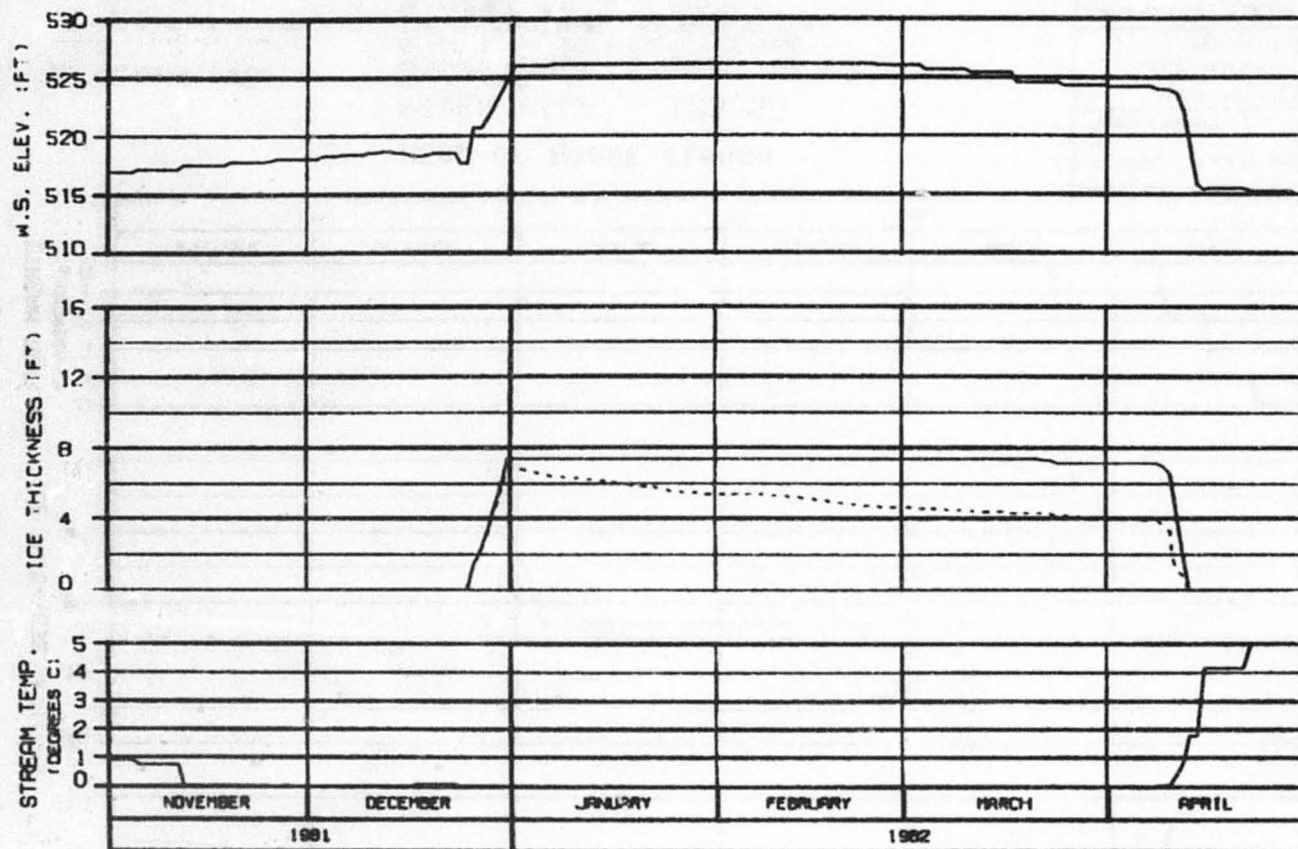
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHICHO, ILLINOIS 06 JUL 82 1503.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 REFERENCE RUN NO. : 8101ENX

ALASKA POWER AUTHORITY

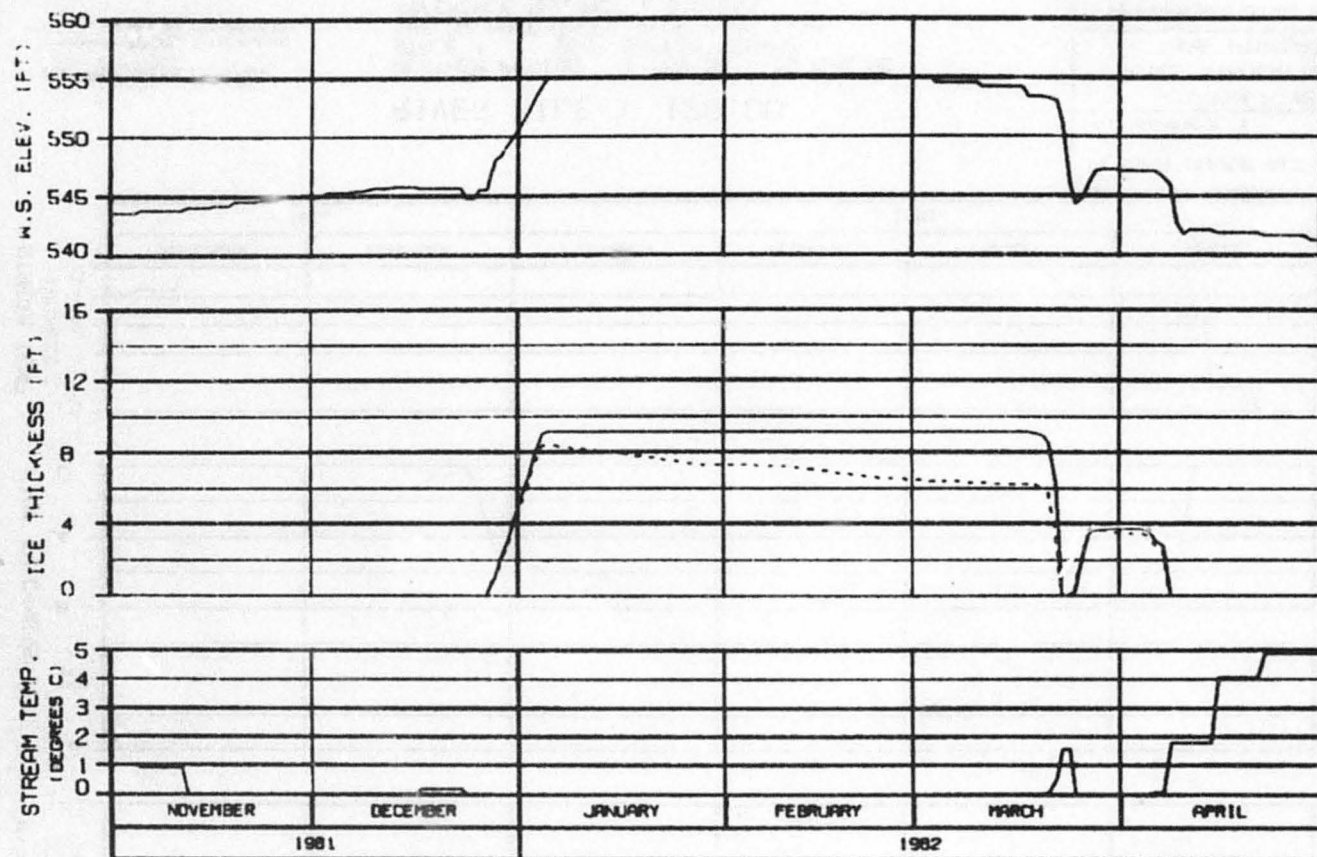
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: B.L. D-815 30 JAN 82 1000.142





# HEAD OF MOOSE SLOUGH RIVER MILE : 123.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE 1 2001 ENERGY DEMAND  
INFLOW-MATCHING . FLOW CASE E-VI  
REFERENCE RUN NO. : 8101ENX

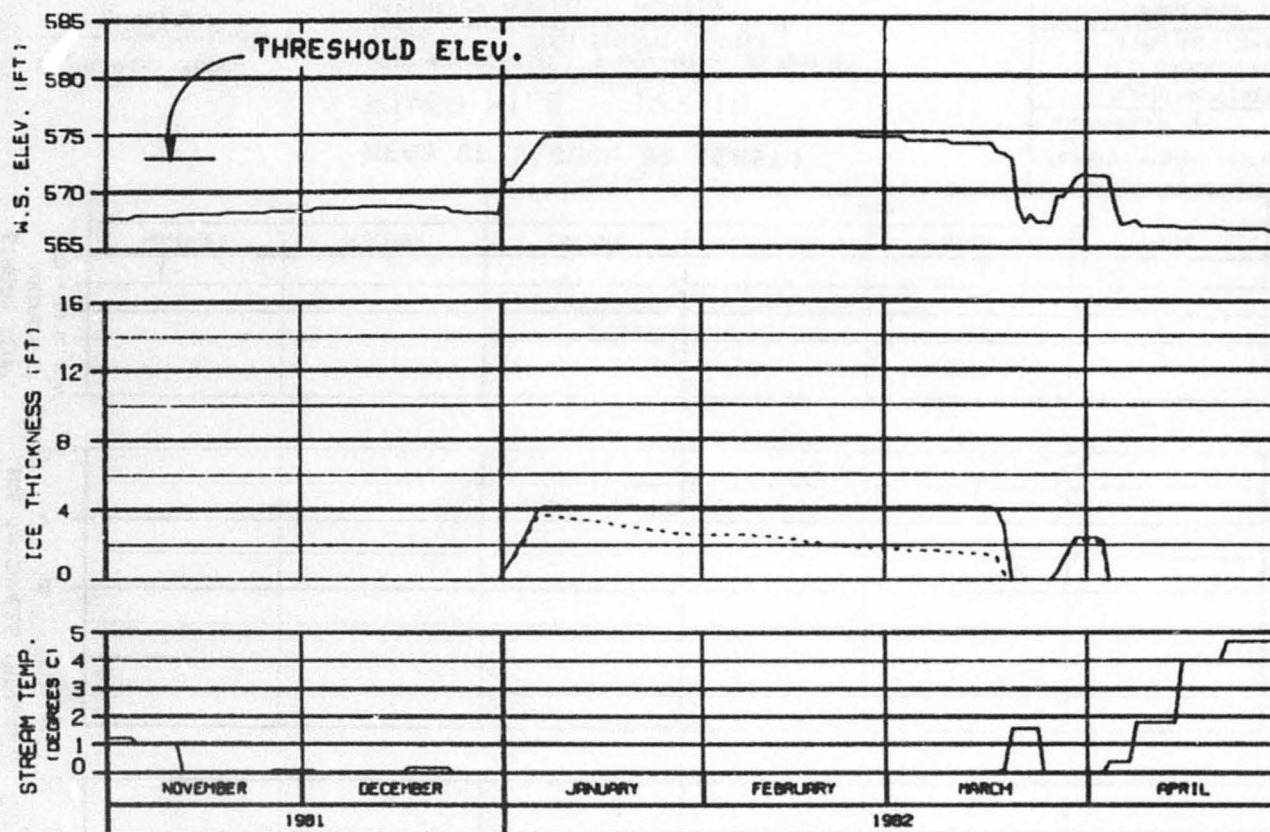
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHICAGO, ILL. 60610 89 JUL 88 1988.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE I 2001 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 REFERENCE RUN NO. : 8101ENX

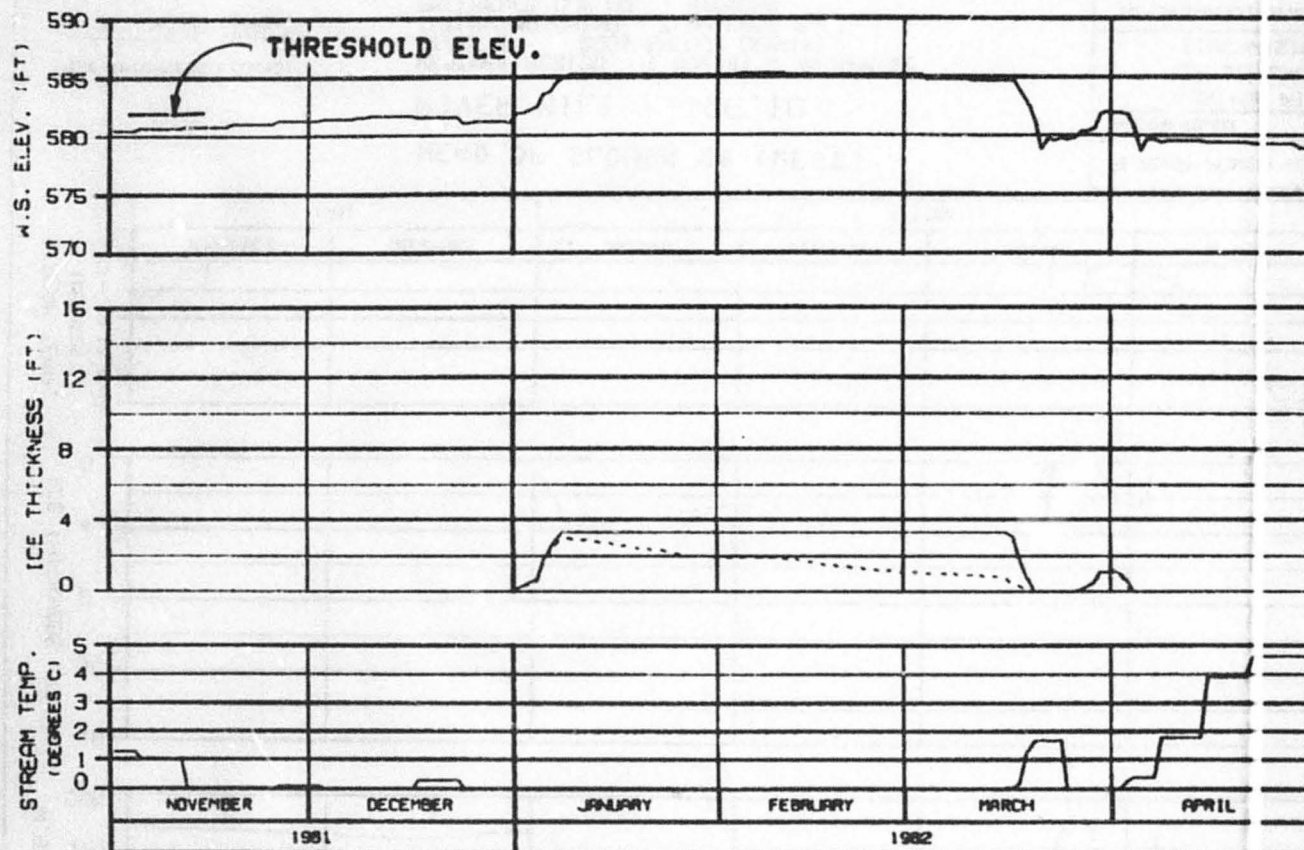
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

CHICAGO, ILLINOIS 90 JUL 82 1000.142



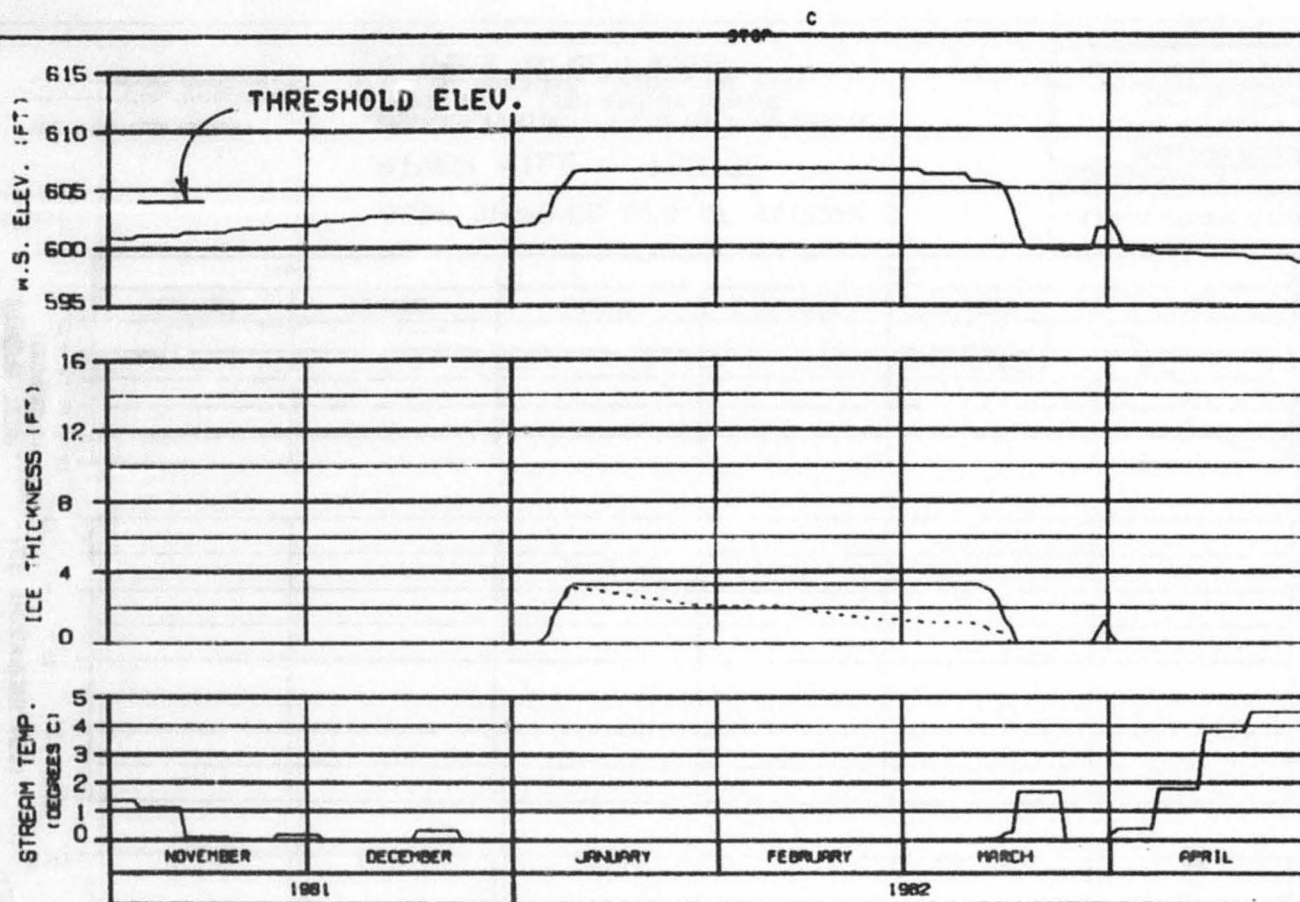
HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE : 2001 ENERGY DEMAND  
 INFLOW-MATCHING : FLOW CASE E-VI  
 REFERENCE RUN NO. : 8101ENX

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER	
ICE SIMULATION	
TIME HISTORY	
WARZA-EBASCO JOINT VENTURE	
CHIEF: ALP/8101	REV: 45
1000.142	



# HEAD OF SLOUGH 9 RIVER MILE : 129.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD 1 NOV 81 - 30 APR 82  
STAGE I 2001 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-VI  
REFERENCE RUN NO. : 8101ENX

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

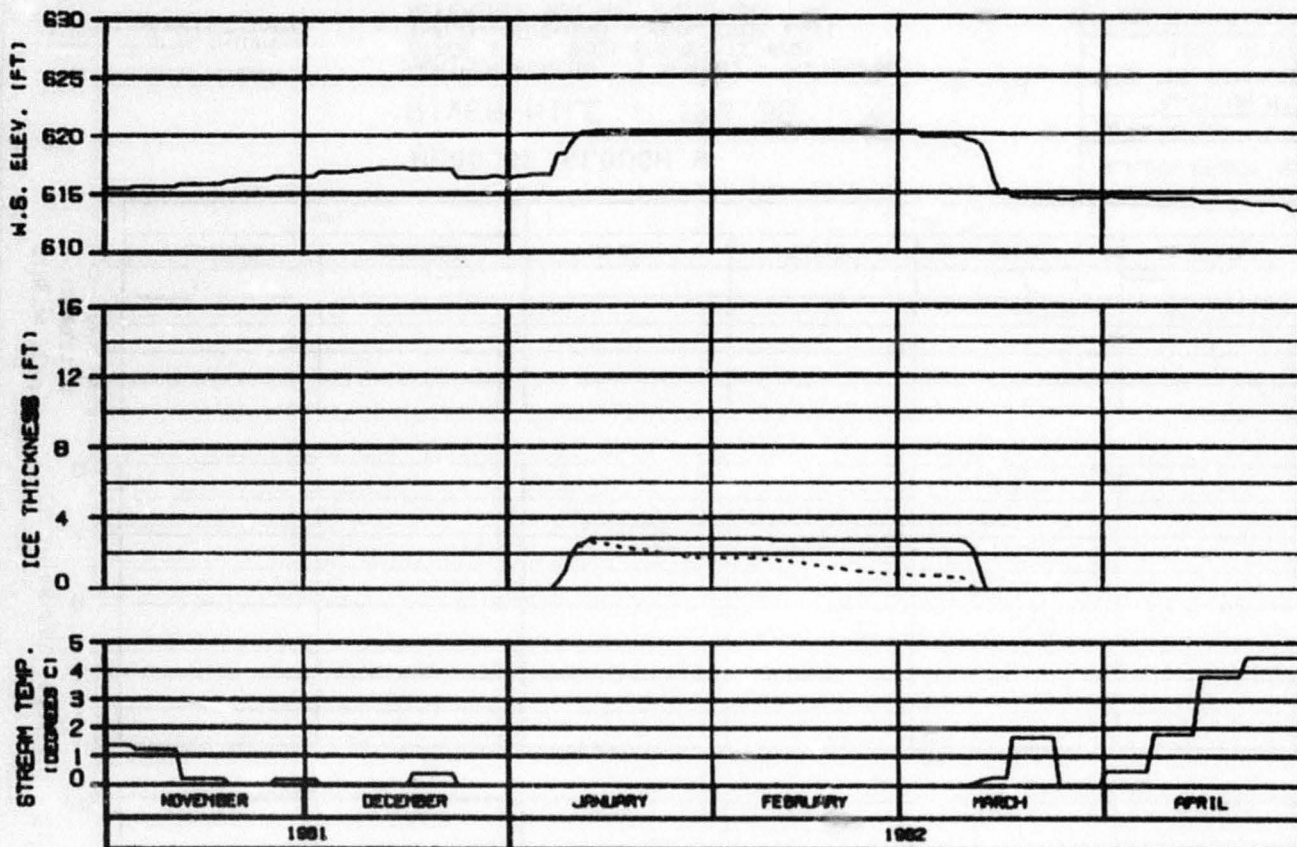
HARZA-EBASCO JOINT VENTURE

CHECKED: RALPHS BY J.A. ON 1089.142

0210117



OPTION 7



SIDE CHANNEL U/S OF SLOUGH 9  
RIVER MILE : 130.60

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE : 2001 ENERGY DEMAND  
INFLOW-MATCHING : FLOW CASE E-VI  
REFERENCE RUN NO. : 8101ENX

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

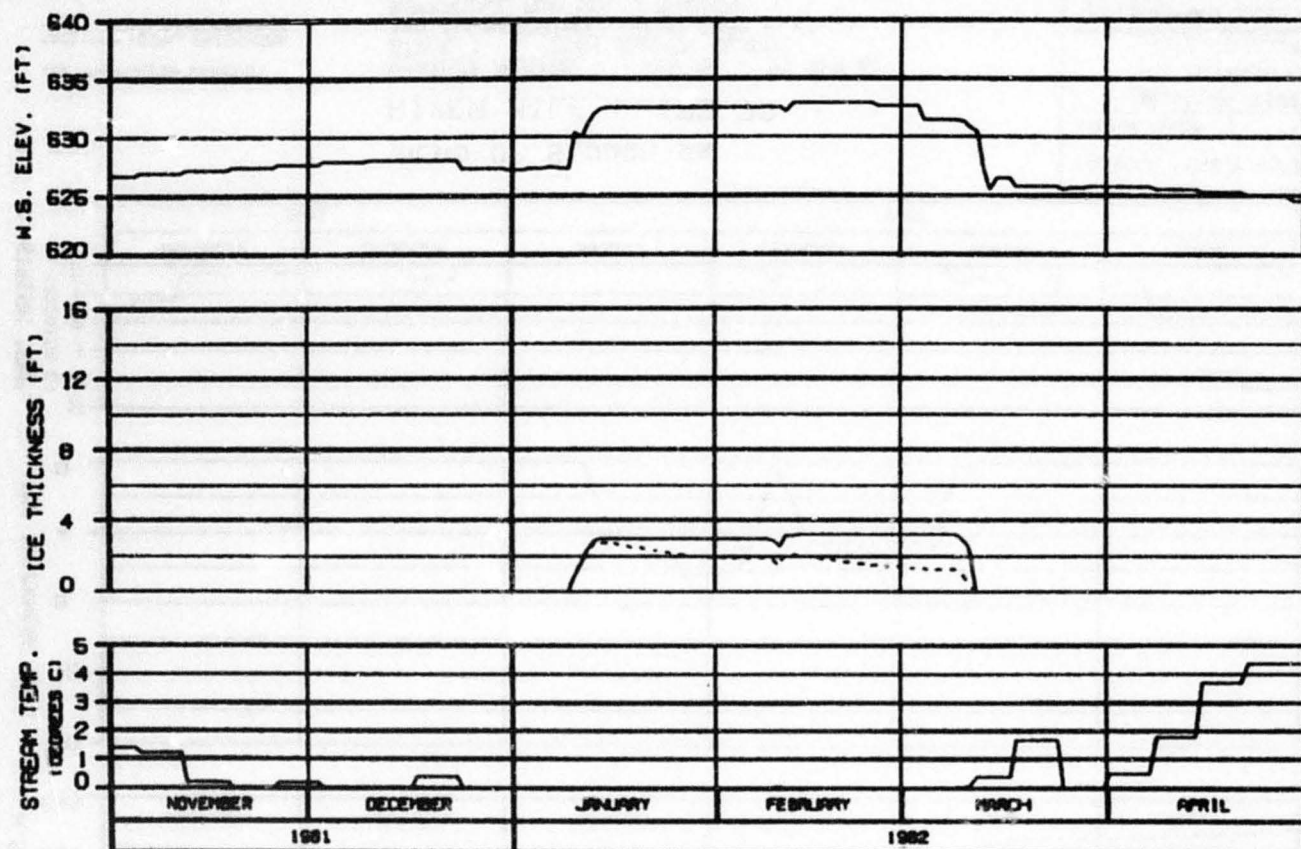
WARZA-EBASCO JOINT VENTURE

DESIGN - ALP/81

28 JAN 82

1985.142





SIDE CHANNEL U/S OF 4TH JULY CREEK

RIVER MILE : 131.80

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 REFERENCE RUN NO. : 8101ENX

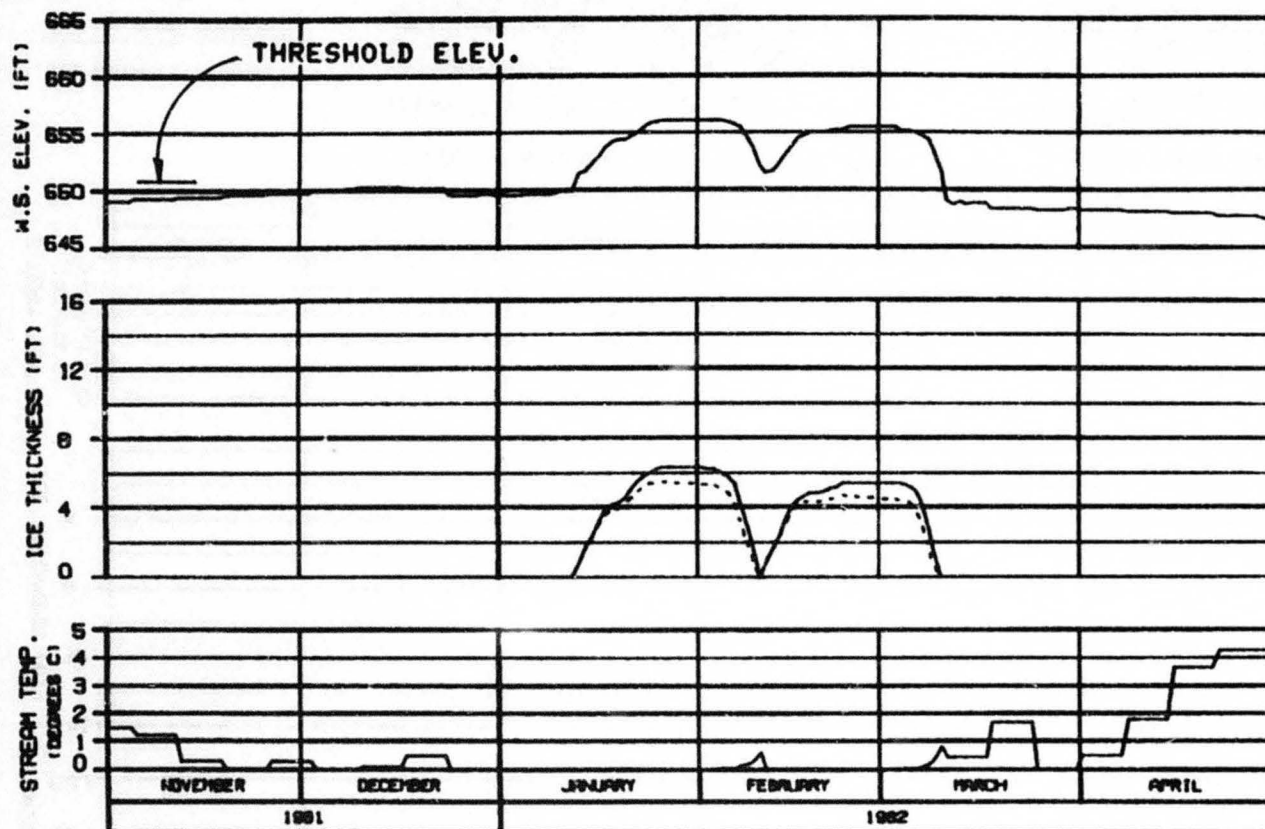
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZDA-EBASCO JOINT VENTURE

DESIGNED: ALP-8000 00 00 00 1982.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 9A  
 RIVER MILE : 133.70

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-MATCHING . FLOW CASE E-VI  
 REFERENCE RUN NO. : 8101ENX

ALASKA POWER AUTHORITY

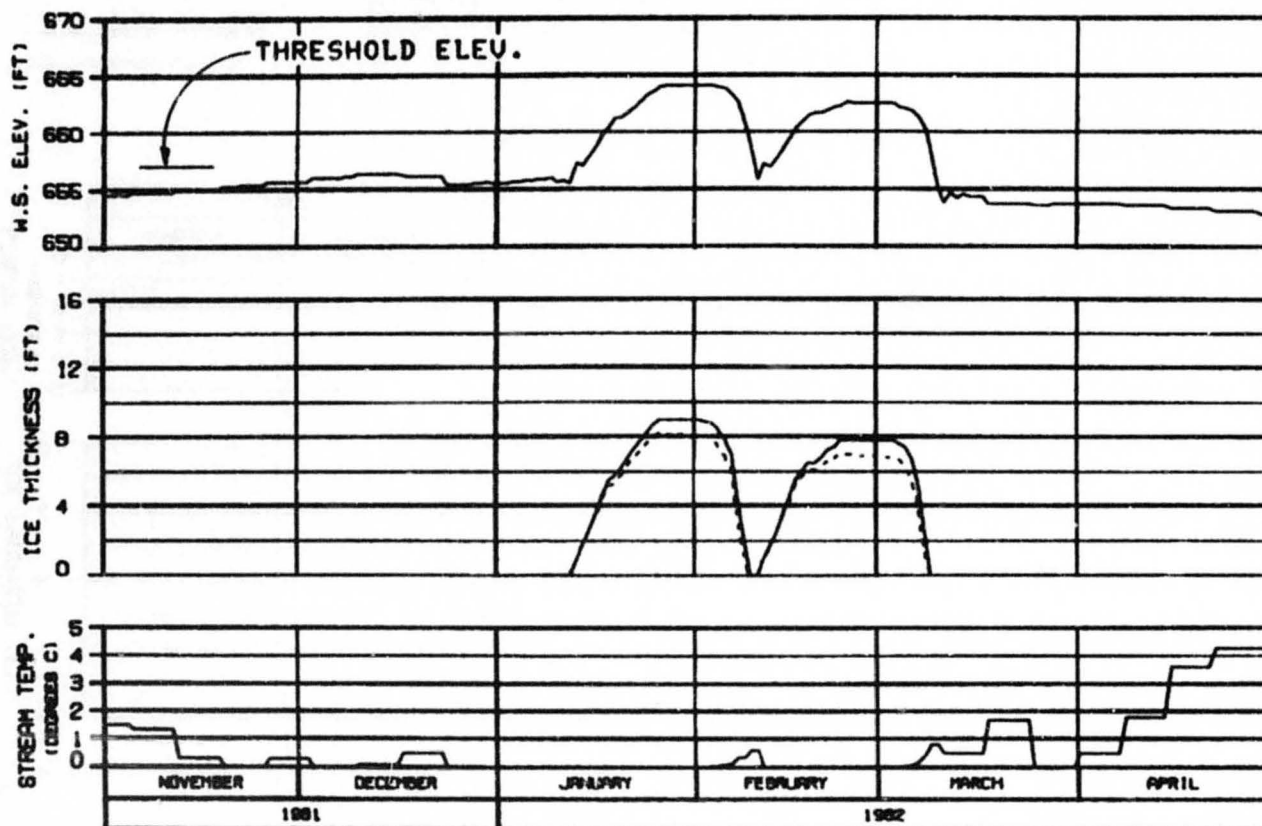
SUSTINA PROJECT

SUSTITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBRARD JOINT VENTURE

DESIGNED BY: HAZRA-EBRARD

DATE: 04.14.82



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF SLOUGH 10  
 RIVER MILE : 134.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 REFERENCE RUN NO. : 8101ENX

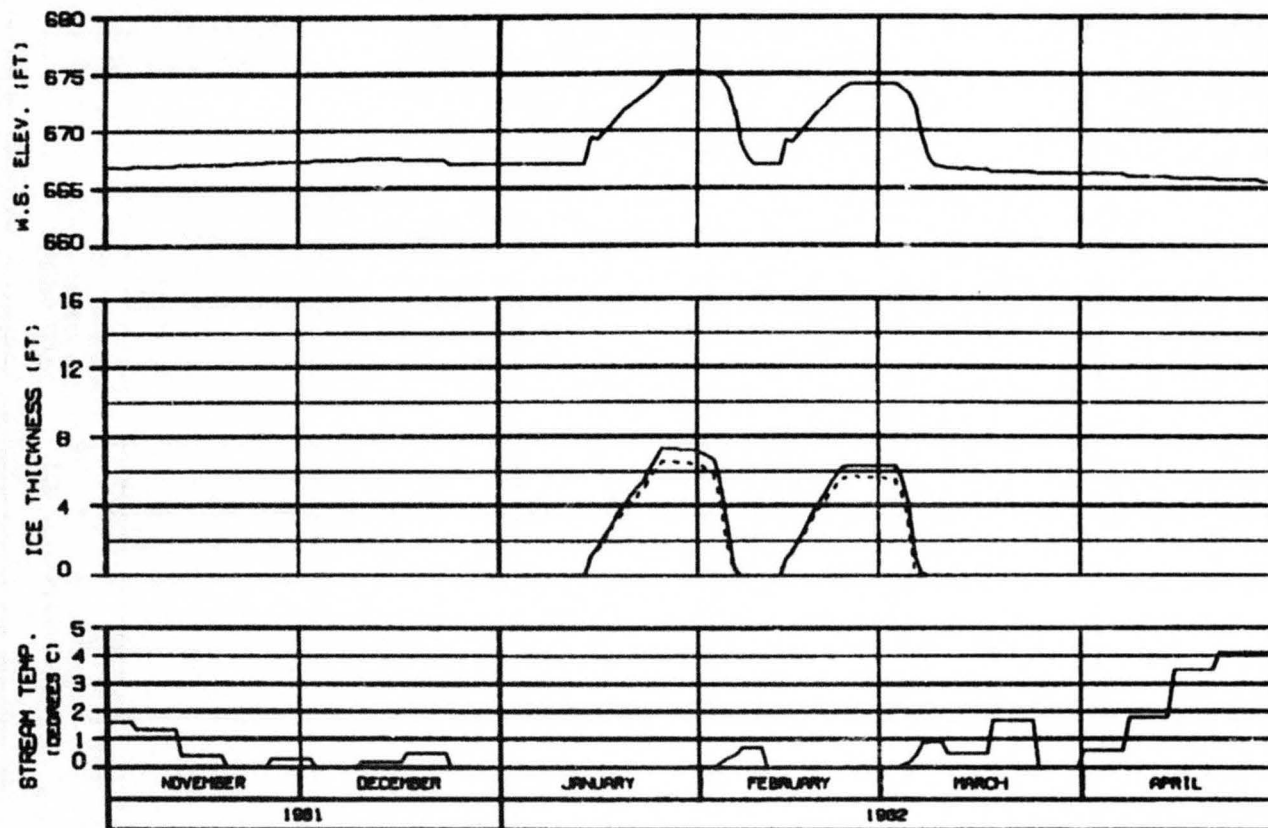
ALASKA POWER AUTHORITY

SUBMITTER PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHIEF: ALASKA POWER AUTHORITY 1988.142



SIDE CHANNEL D/S OF SLOUGH 11  
RIVER MILE : 135.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE 1 2001 ENERGY DEMAND  
INFLOW-MATCHING . FLOW CASE E-VI  
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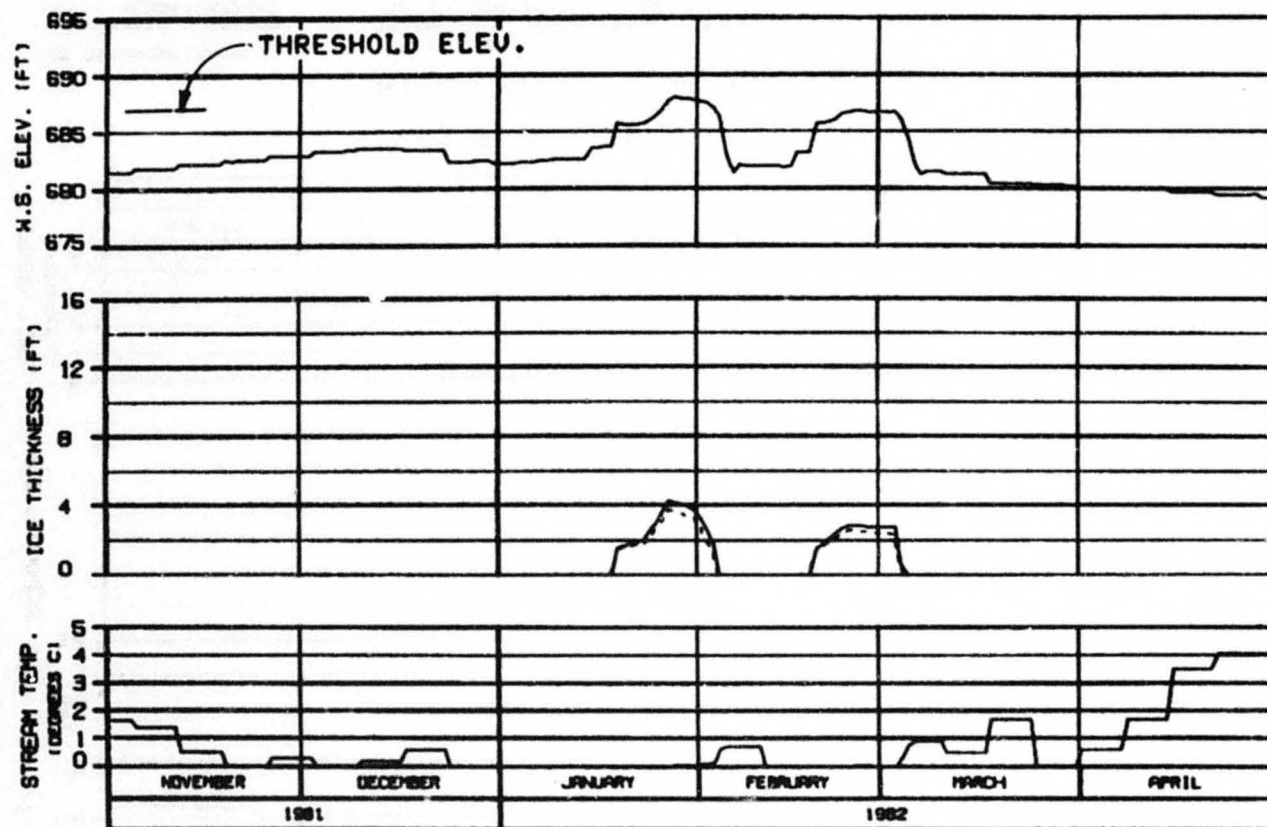
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DIVISION: SLEWING 20 JAN 82 1000.142



HEAD OF SLOUGH 11  
RIVER MILE : 136.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE 1 2001 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-VI  
REFERENCE RUN NO. : 8101ENX

ALASKA POWER AUTHORITY

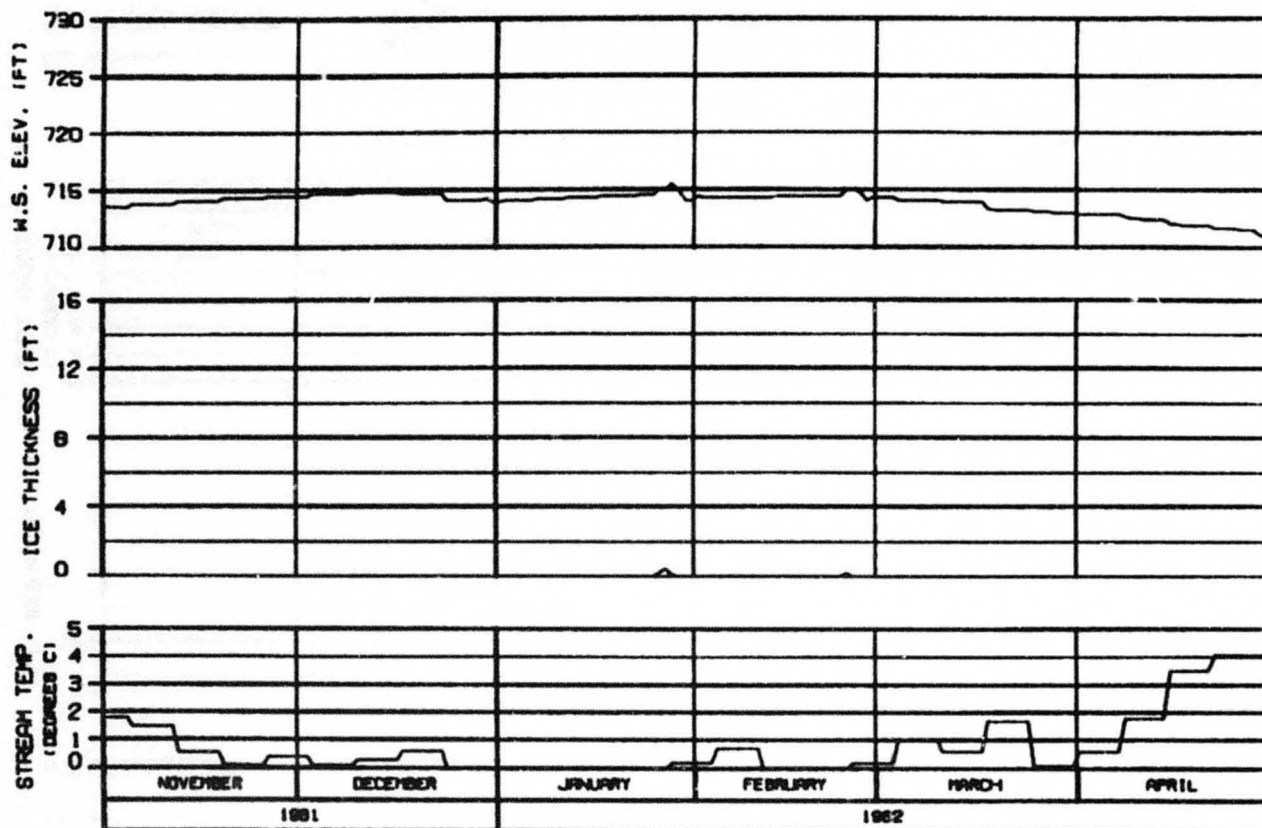
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRISCO JOINT VENTURE

CHARTS - 8110000 20 JUL 82 1982.142





HEAD OF SLOUGH 17

RIVER MILE : 139.30

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 REFERENCE RUN NO. : 8101ENX

ALASKA POWER AUTHORITY

SUSITNA PROJECT

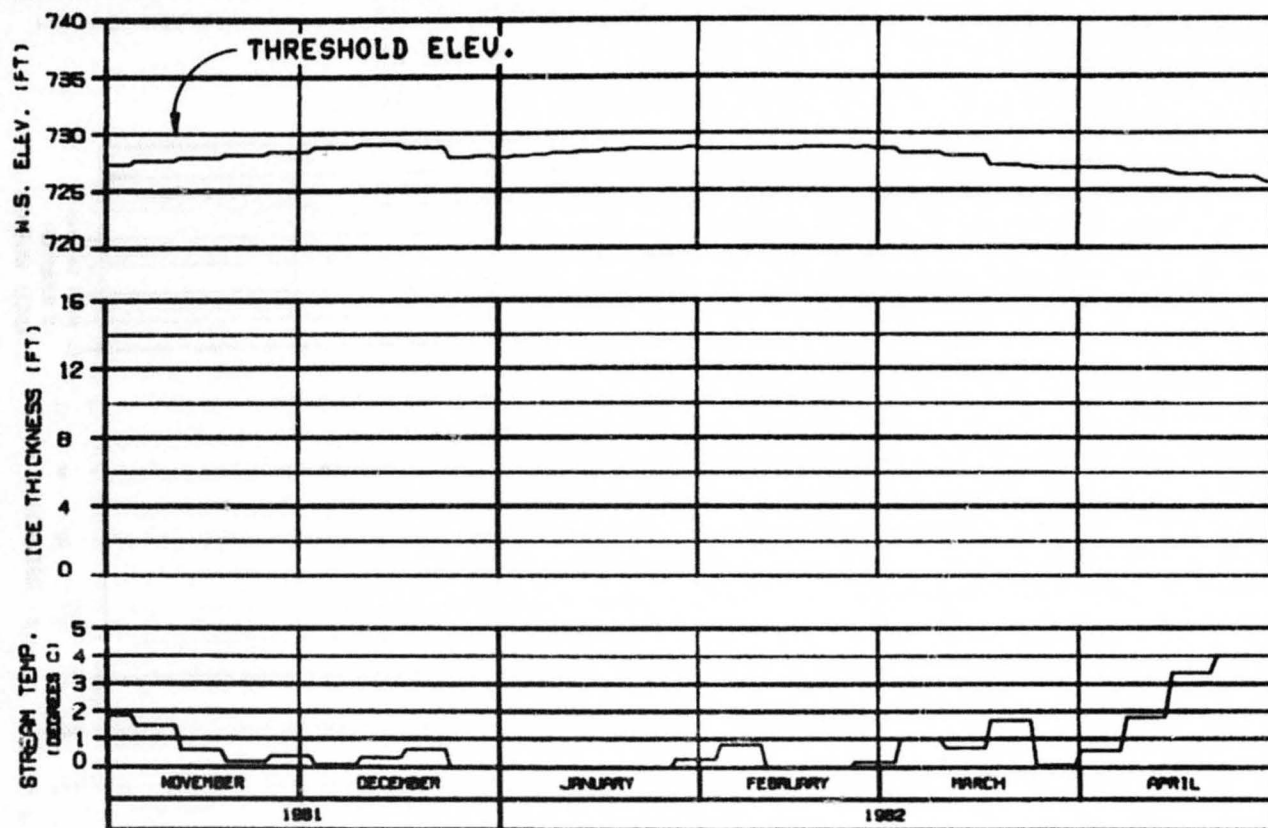
SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHUCKER, S.A. 1981 10 22 1982.142

OPTION 7

APPENDIX 4



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 20

RIVER MILE : 140.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-HATCHING . FLOW CASE E-VI  
 REFERENCE RUN NO. : B101ENX

ALASKA POWER AUTHORITY

SUSTITNA PROJECT

SUSTITNA RIVER

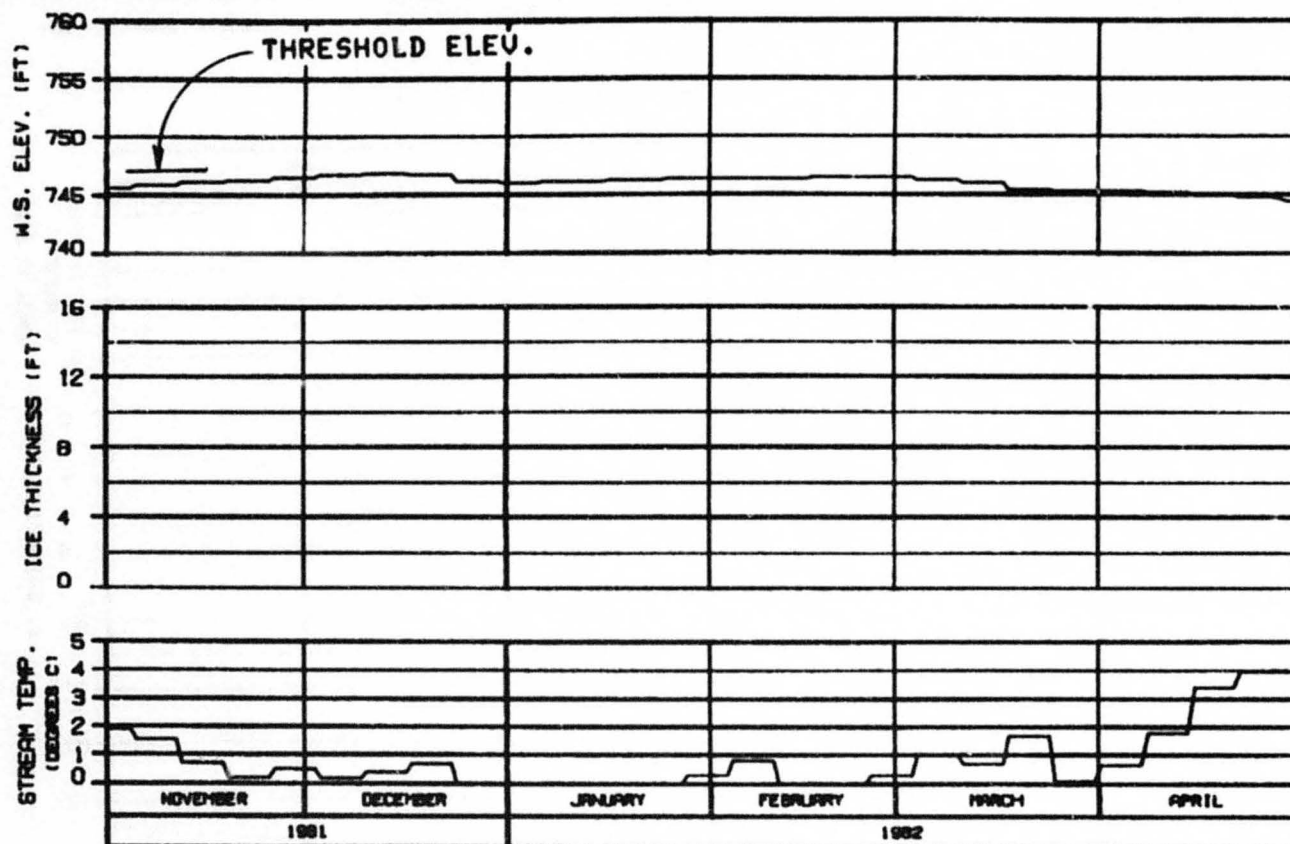
ICE SIMULATION

TIME HISTORY

WARZA-EBR600 JOINT VENTURE

DESIGN: B. L. BROWN JR. &amp; ASSOCIATES

1982.142



SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE I 2001 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 REFERENCE RUN NO. : 8101ENX

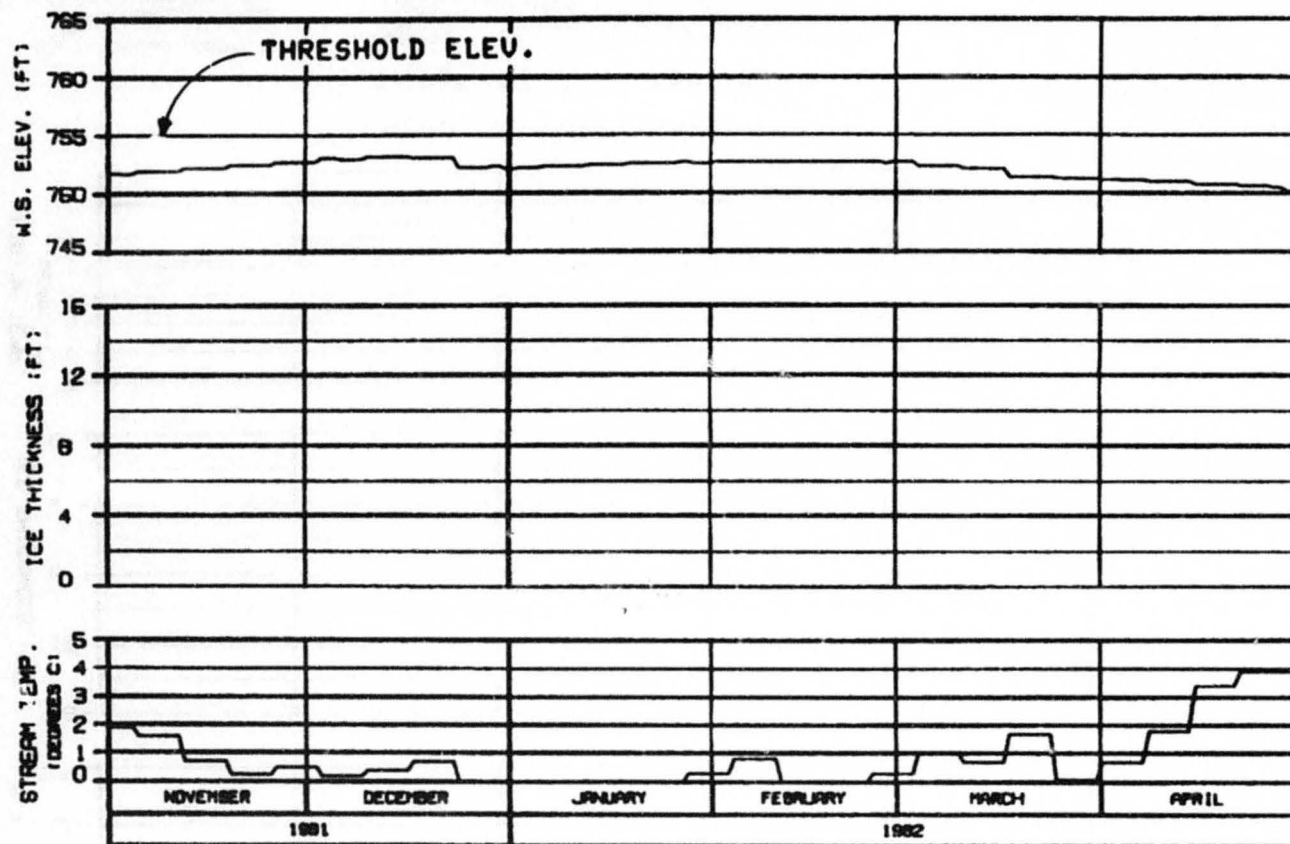
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED: RALPH W. 25 JAN 82 1003.142



HEAD OF SLOUGH 21  
RIVER MILE : 142.20

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE I 2001 ENERGY DEMAND  
INFLOW-MATCHING : FLOW CASE E-VI  
REFERENCE RUN NO. : 8101ENX

ALASKA POWER AUTHORITY

SUSITNA PROJECT

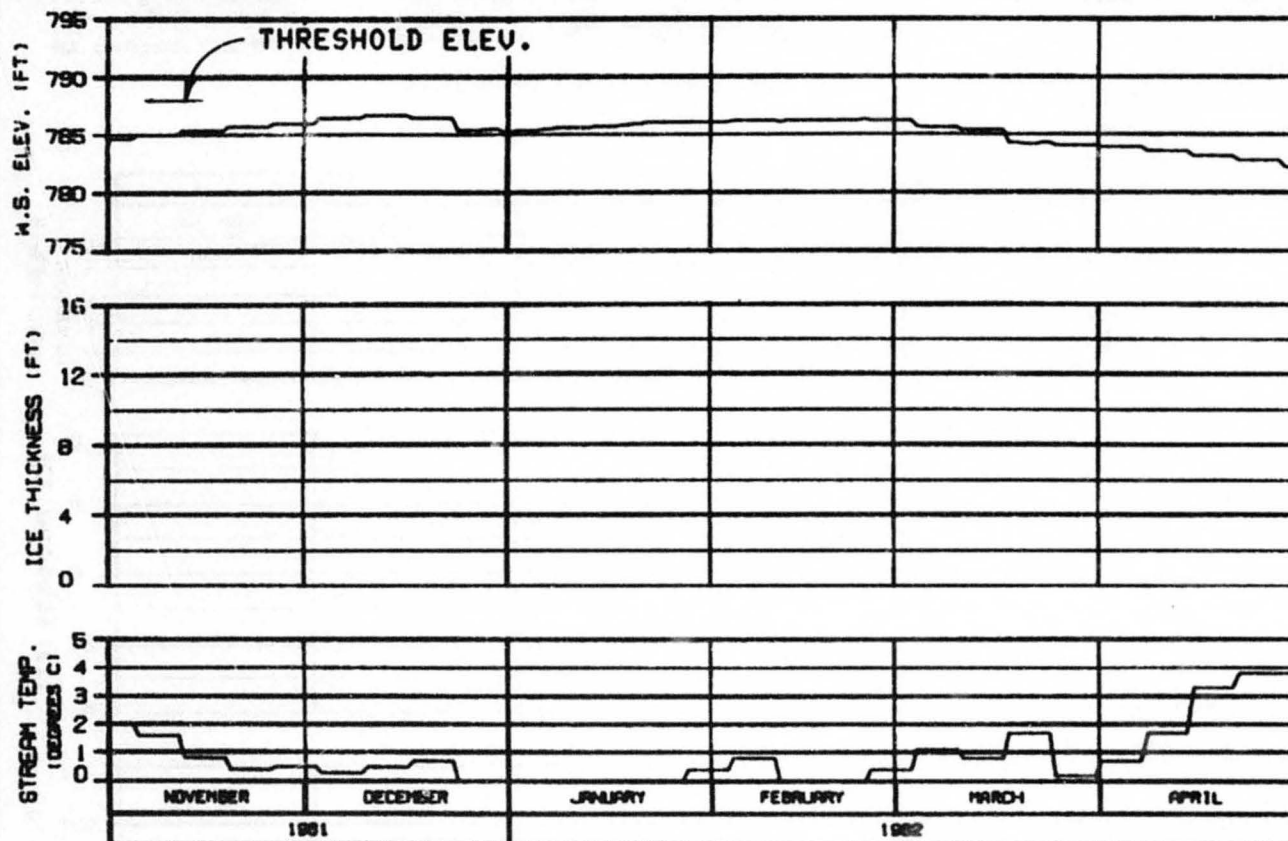
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED BY: J. J. J. 20 JUL 82 1982.142

OPTION?

C



HEAD OF SLOUGH 22  
RIVER MILE : 144.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE I 2001 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-VI  
REFERENCE RUN NO. : 8101ENX

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

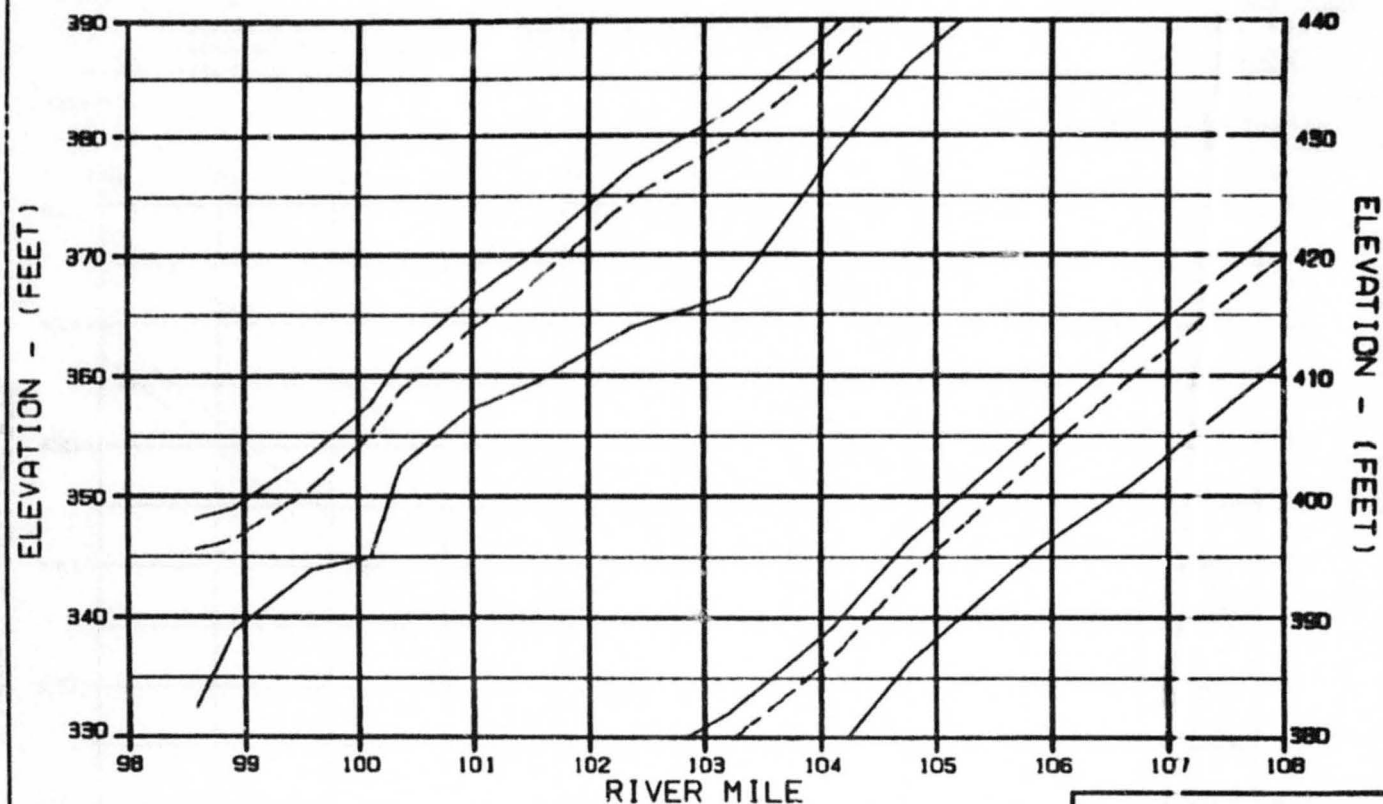
HARZA-EBASCO JOINT VENTURE

DESIGN - 81-01ENX 25 JUL 82 1982.142

OPTION?



**EXHIBIT B**



LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- .-.-.-.- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 11 2002 ENERGY DEMAND  
 FLOW CASE E-V1, INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENX

OPTION?

ALASKA POWER AUTHORITY

SUBJECT

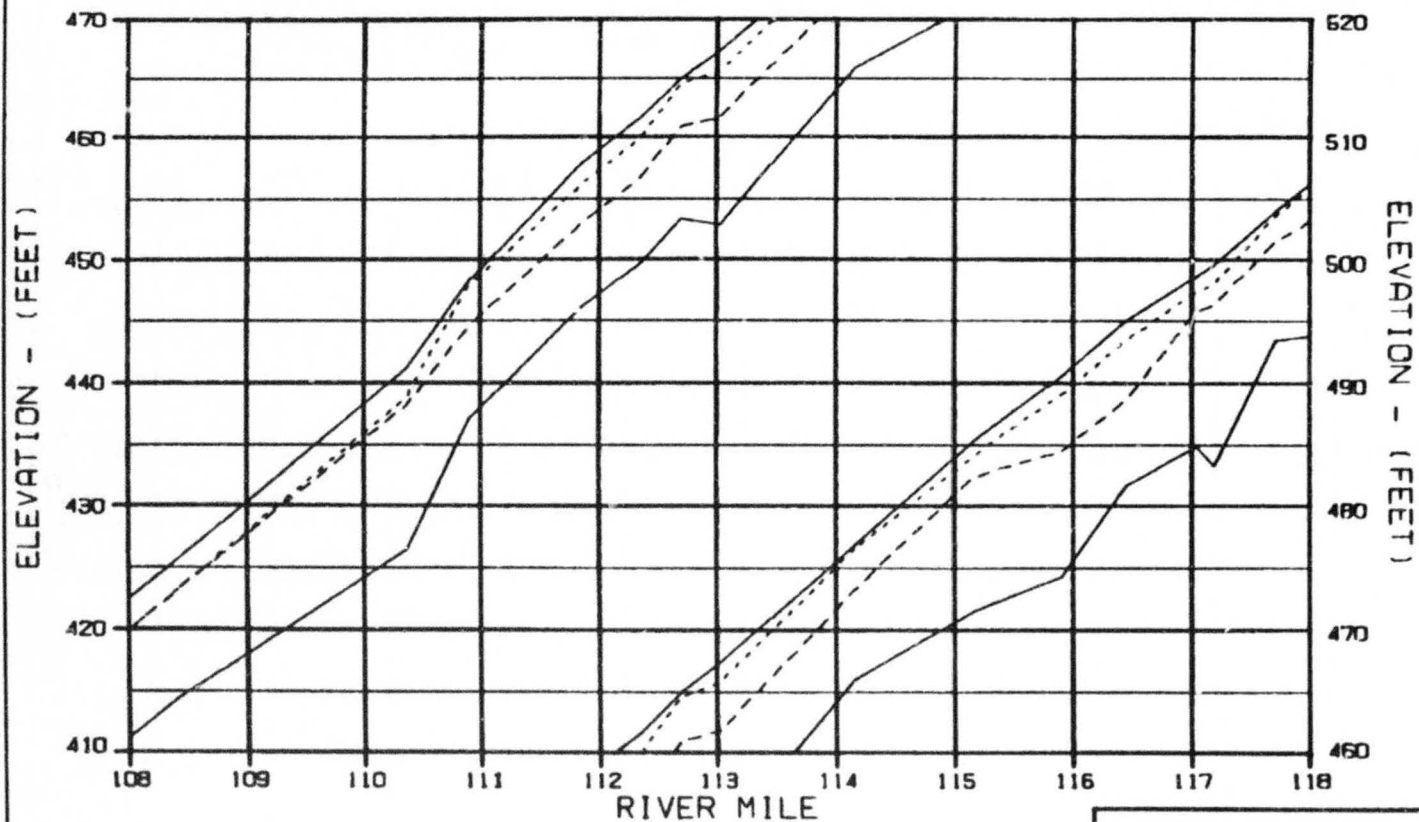
SJSITNA RIVER

ICE SIMULATION

PROFILE OF MAXIMUM STAGES

HAZRA-EBASCO JOINT VENTURE

CHECKED BY: [ ] DATE: [ ] 1988.142



## LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 11 2002 ENERGY DEMAND  
 FLOW CASE E-V1, INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENX

ALASKA POWER AUTHORITY

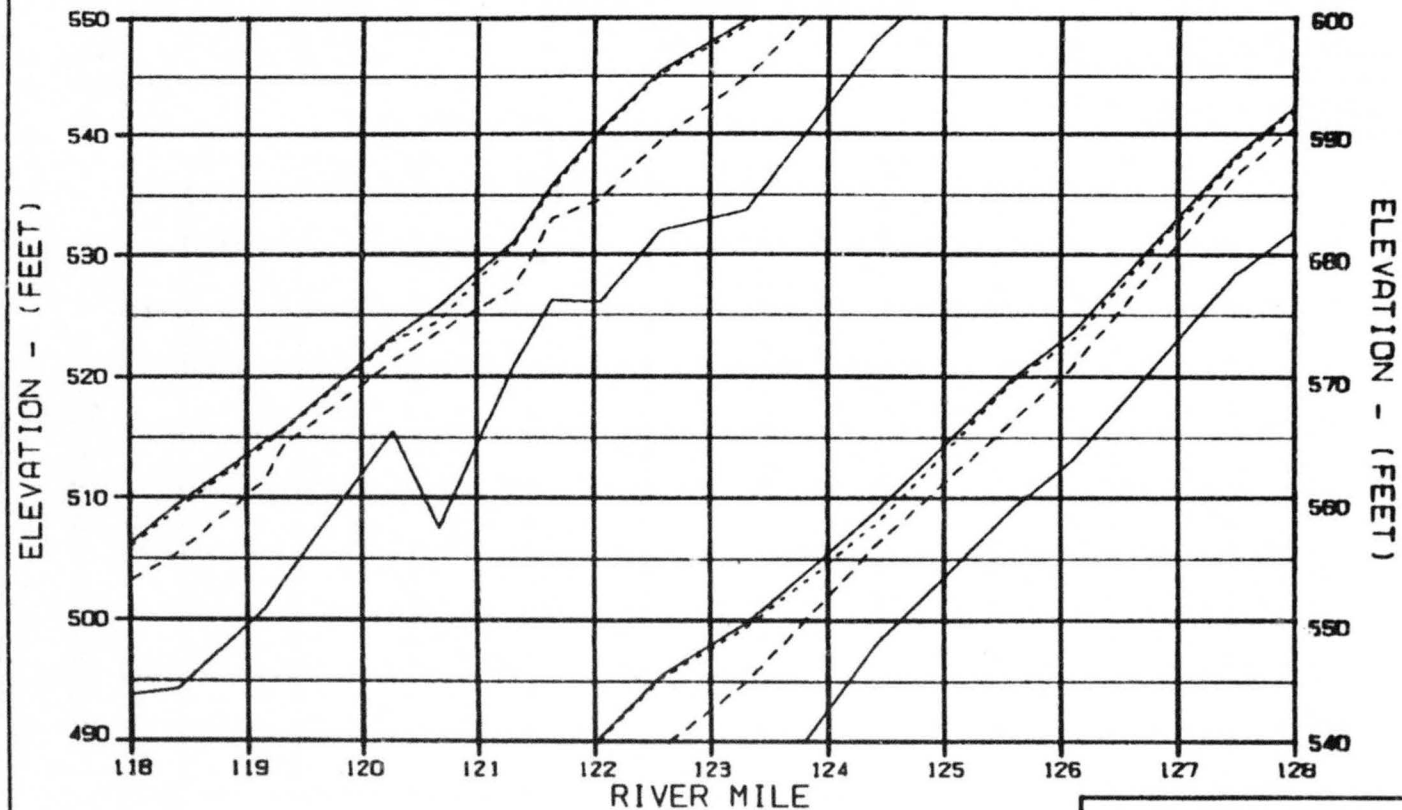
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

KARZA-EPSCO JOINT VENTURE

DESIGN: ... DE. 8 NO. 11. 15  
 1583.142

OPTION?



## LEGEND.

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- .-.-.- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 FLOW CASE E-VI, INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENX

ALASKA POWER AUTHORITY

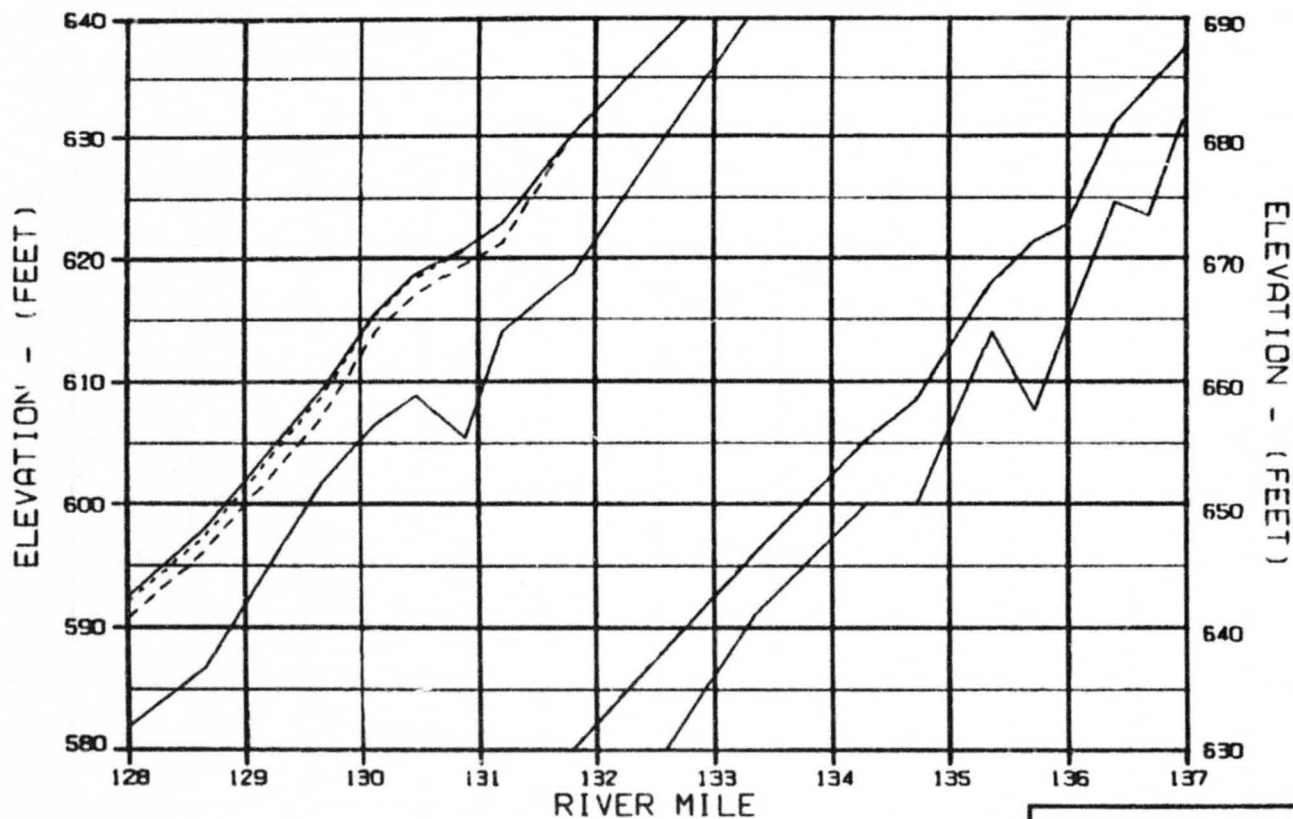
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

THIS CASE - D.A. 00105 20 JUL 82 1989.142

OPTION?



LEGEND:

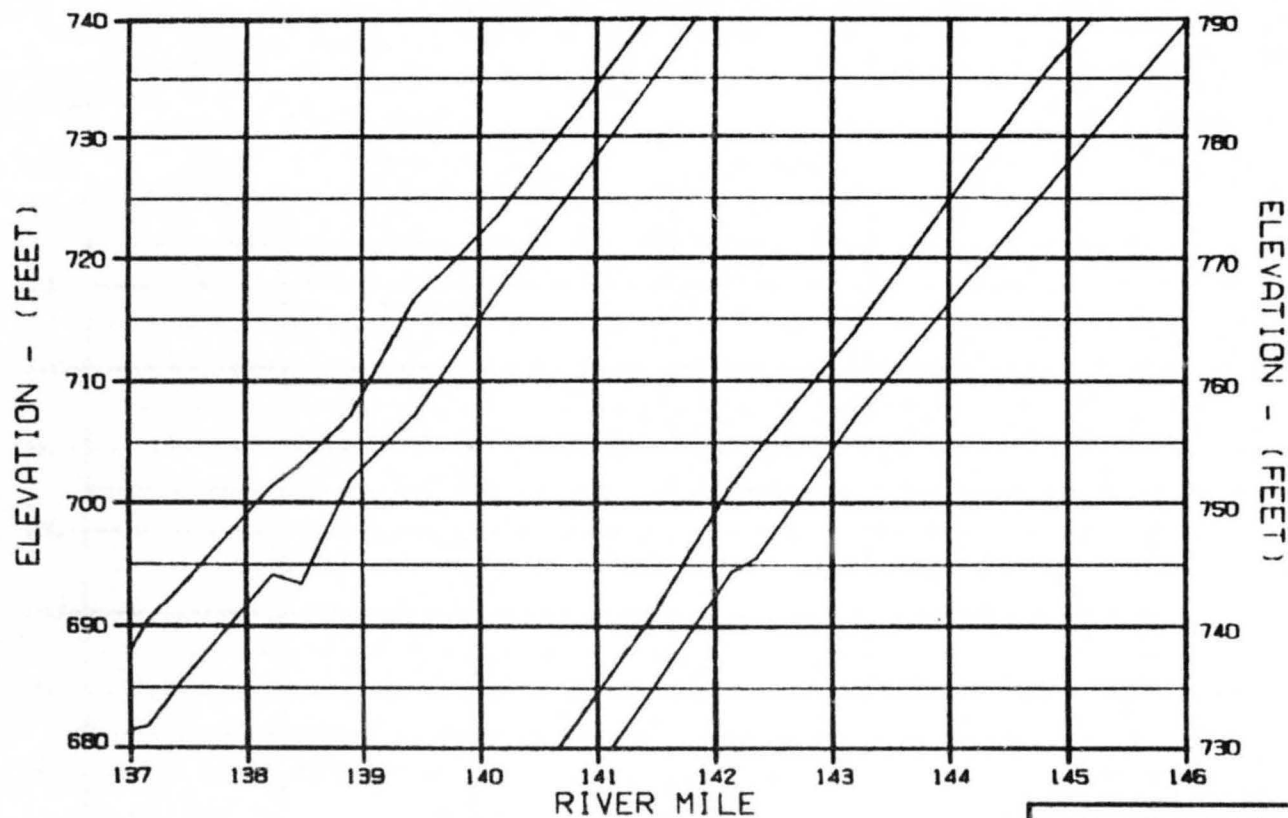
- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- ..... BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 FLOW CASE E-VI, INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENX

OPTION?

ALASKA POWER AUTHORITY		
SUSITNA PROJECT		
SUSITNA RIVER ICE SIMULATION PROFILE OF MAXIMUM STAGES		
HARZA-EBASCO JOINT VENTURE		
DRAWN: S.J.BATES	NO. J.A. 05	1988.142





## LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- ..... BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 11 2002 ENERGY DEMAND  
 FLOW CASE E-VI. INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 810ZENX

## ALASKA POWER AUTHORITY

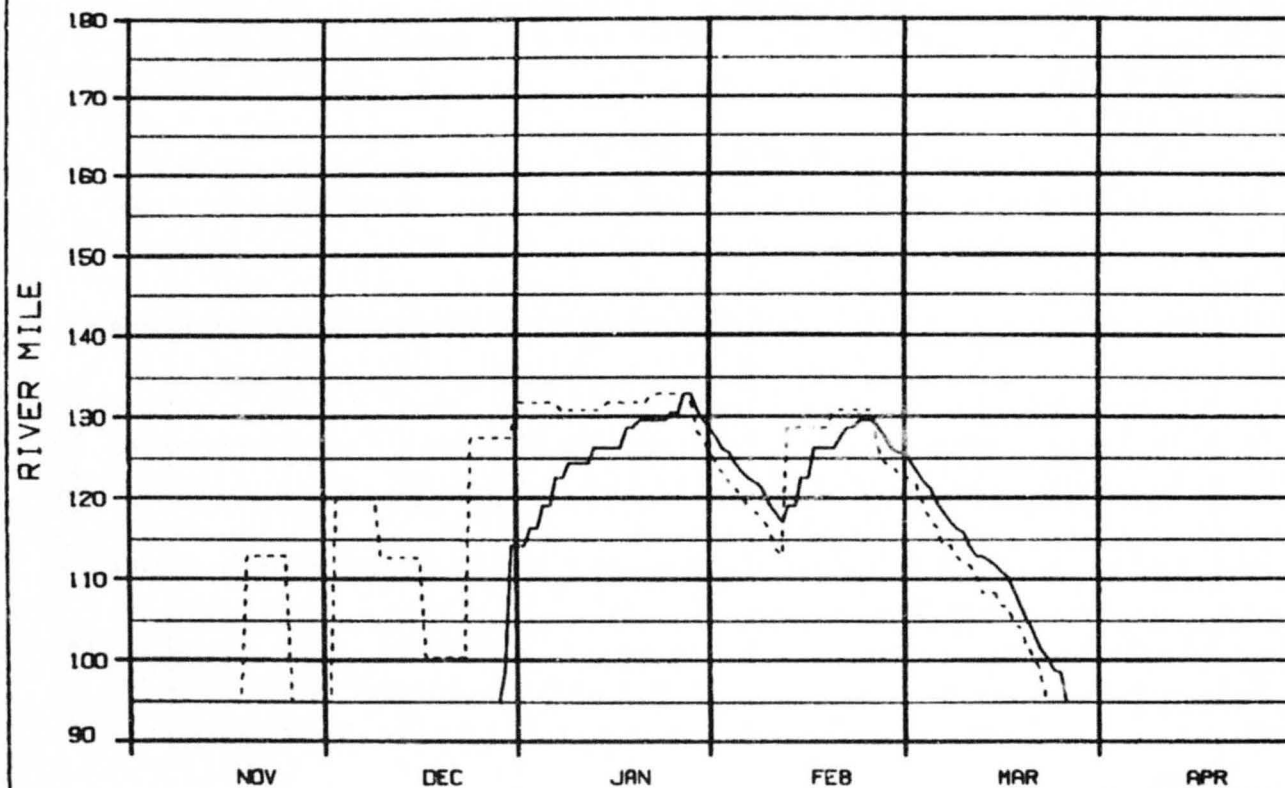
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EDGCO JOINT VENTURE

ENRCHS - 11.1.1981 10.11.81 1981.142

OPTION?



## LEGEND:

—— ICE FRONT  
 - - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 11 2002 ENERGY DEMAND  
 FLOW CASE E-VI . INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENX

OPTION?

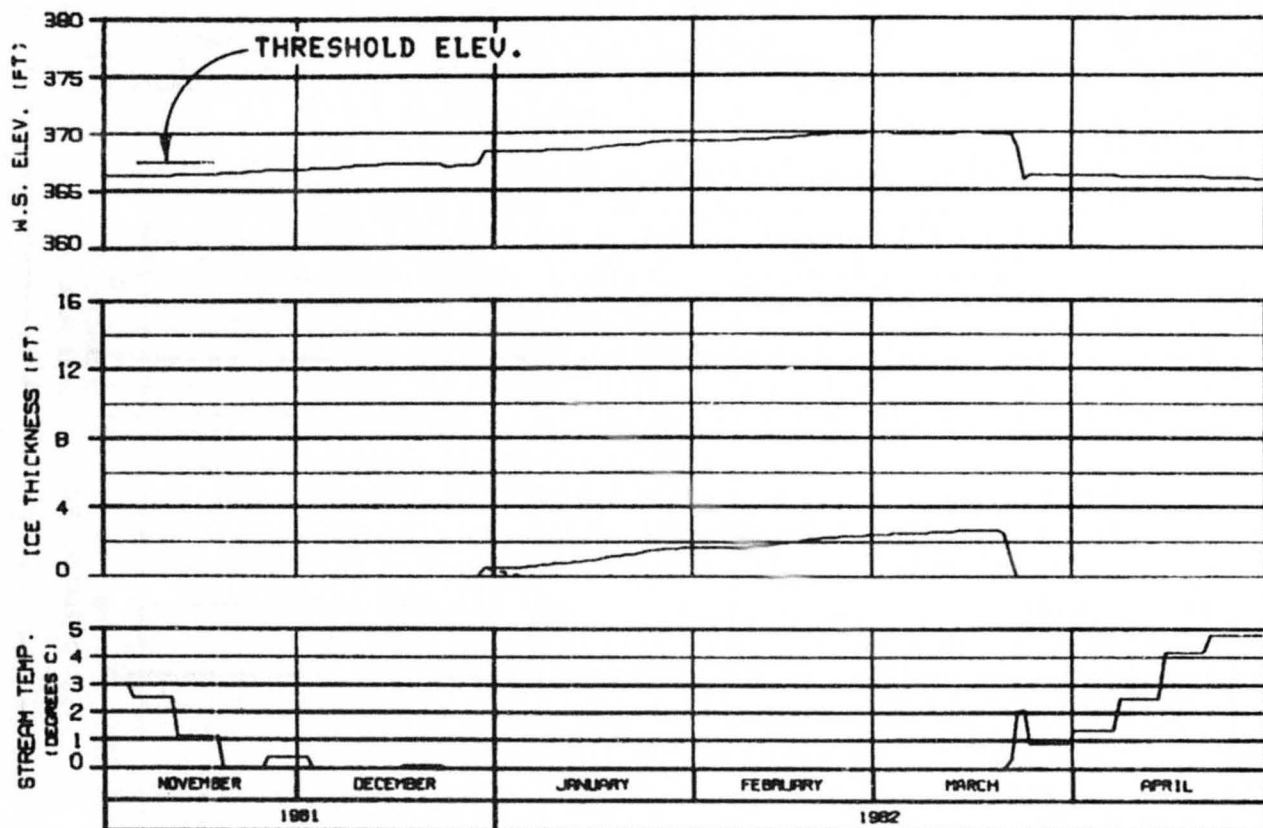
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

HARZA-EBASCO JOINT VENTURE

CHECKED: J.L. DAVIS 20 JUL 82 1000.142



HEAD OF WHISKERS SLOUGH

RIVER MILE : 101.50

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENX

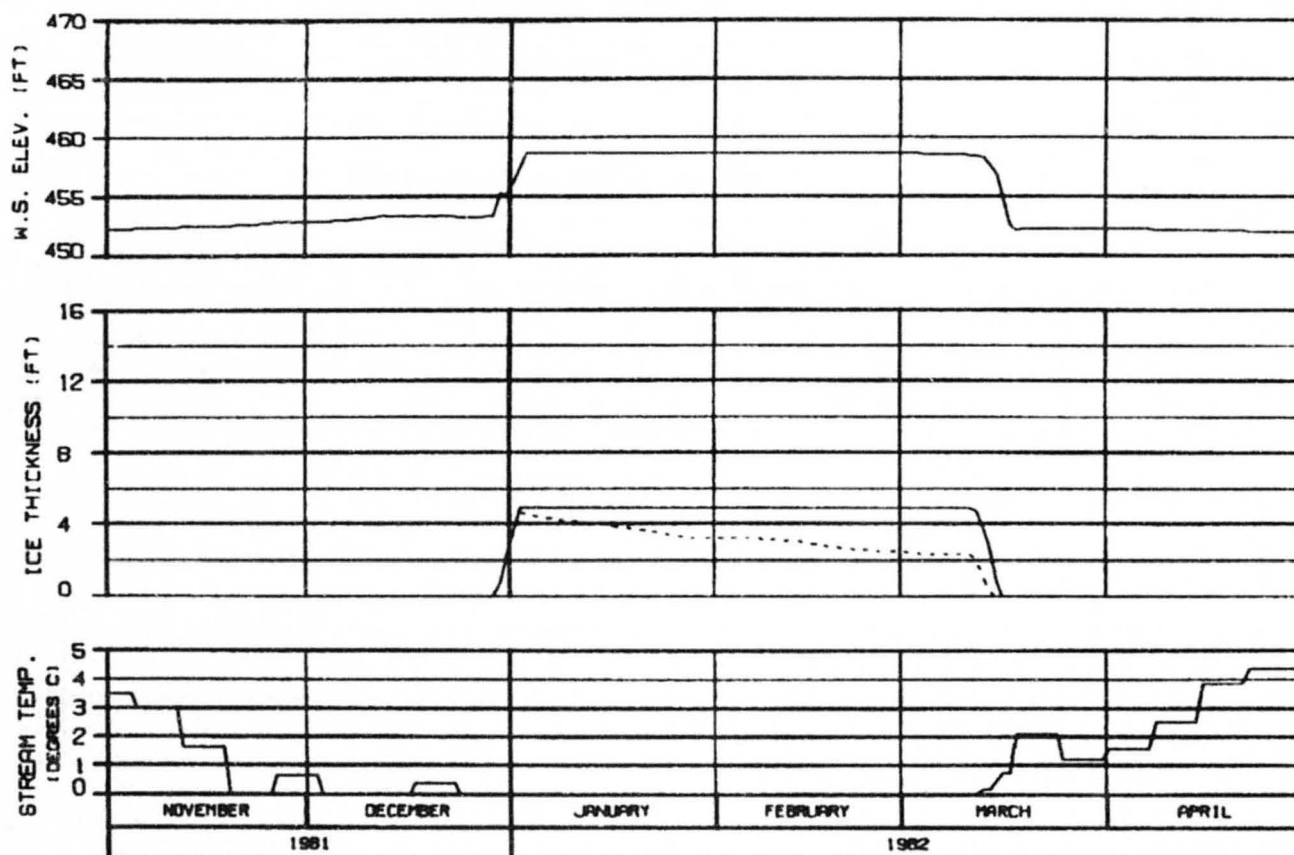
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACO JOINT VENTURE

CHIEF: R. L. PETERSON JR. J. A. OR 1503.142



SIDE CHANNEL AT HEAD OF GASH CREEK  
RIVER MILE : 112.00

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD 1 NOV 81 - 30 APR 82  
STAGE II 2002 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-VI  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8102ENX

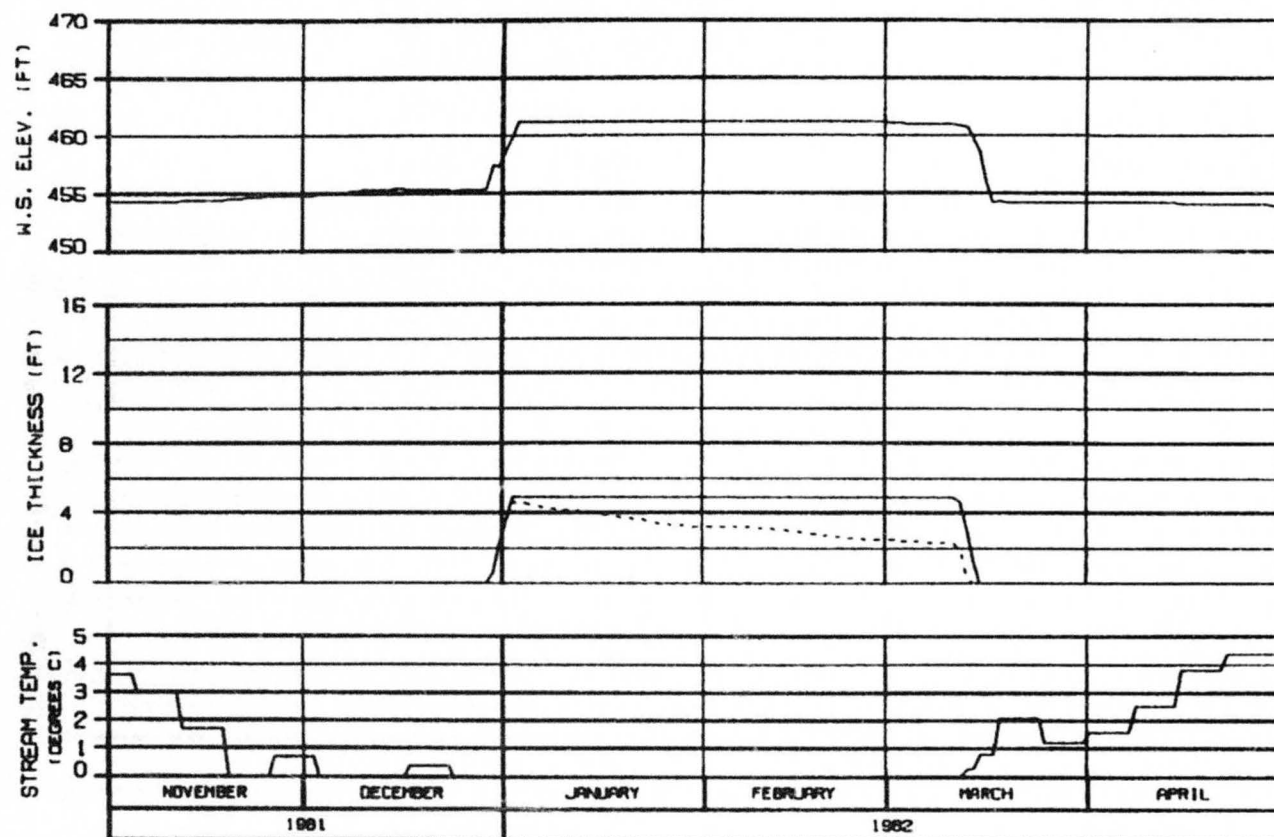
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHEMUR, ALA 0010 00 JUL 88 1000.142



MOUTH OF SLOUGH 6A

RIVER MILE : 112.34

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II - 2002 ENERGY DEMAND  
 INFLOW-MATCHING - FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 810ZENX

ALASKA POWER AUTHORITY

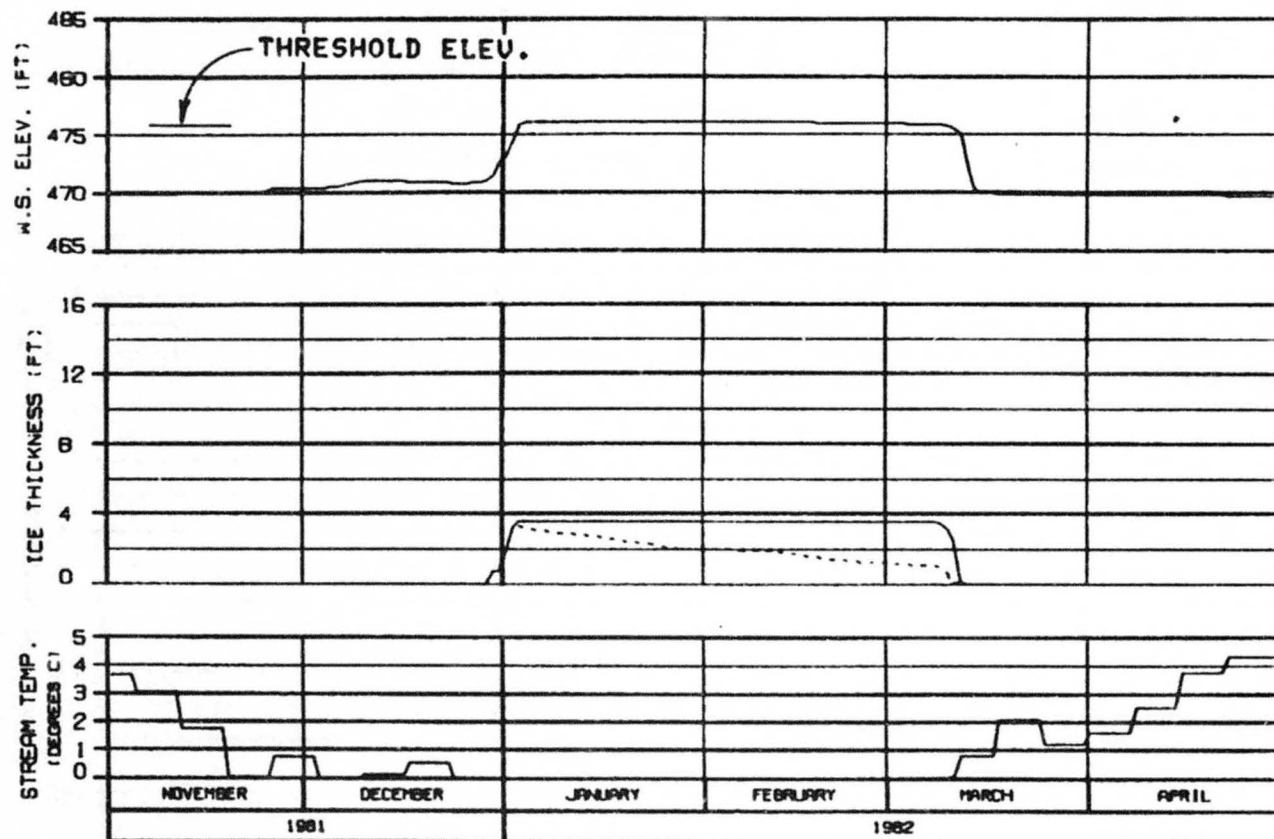
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

APRZA-EBASCO JOINT VENTURE

DRAWN: S.J.P.D.T. 20 AA 00 1982.142





HEAD OF SLOUGH 8

RIVER MILE : 114.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 810ZENX

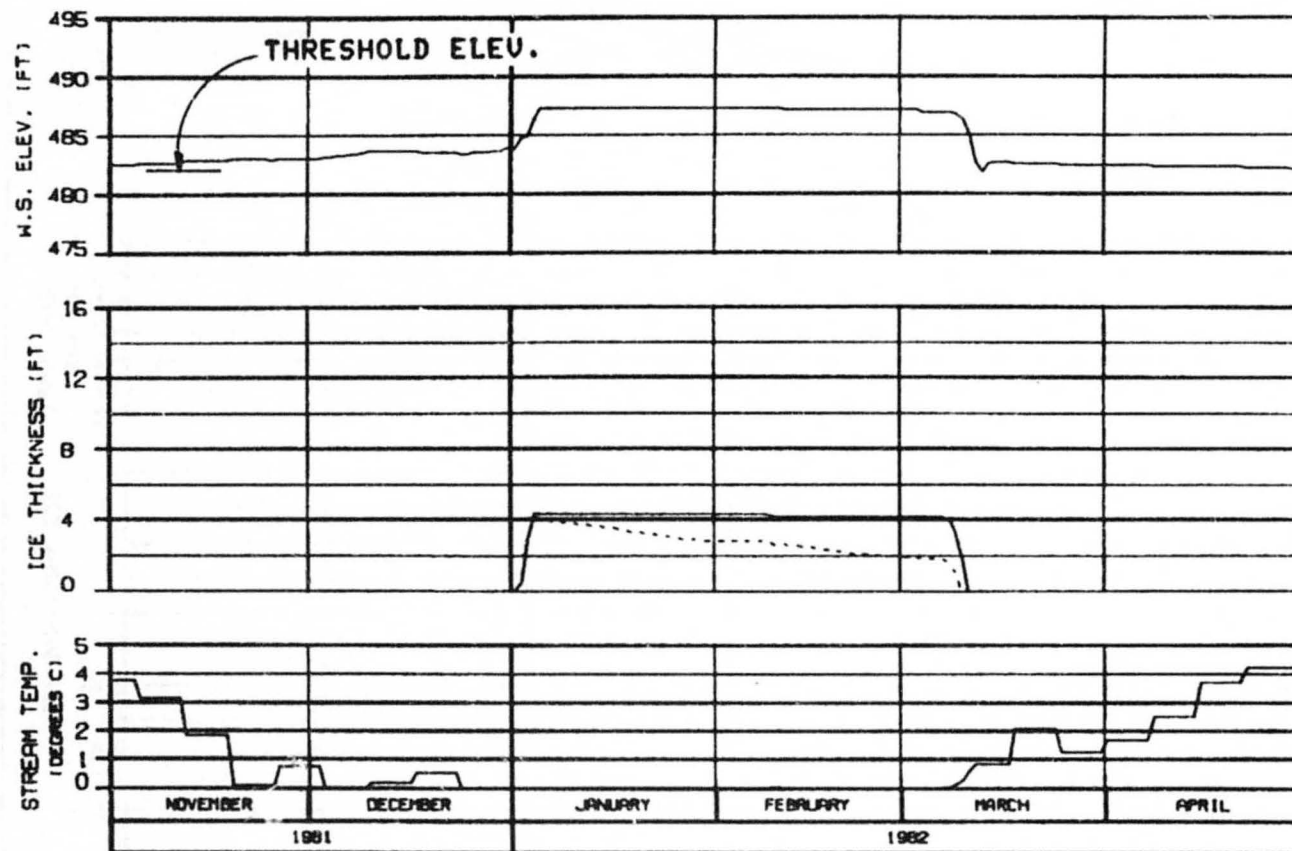
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHS CASE - 81.0-015 80 J.A. 100 1000, 142



SIDE CHANNEL MSII

RIVER MILE : 115.50

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 810ZENX

ALASKA POWER AUTHORITY

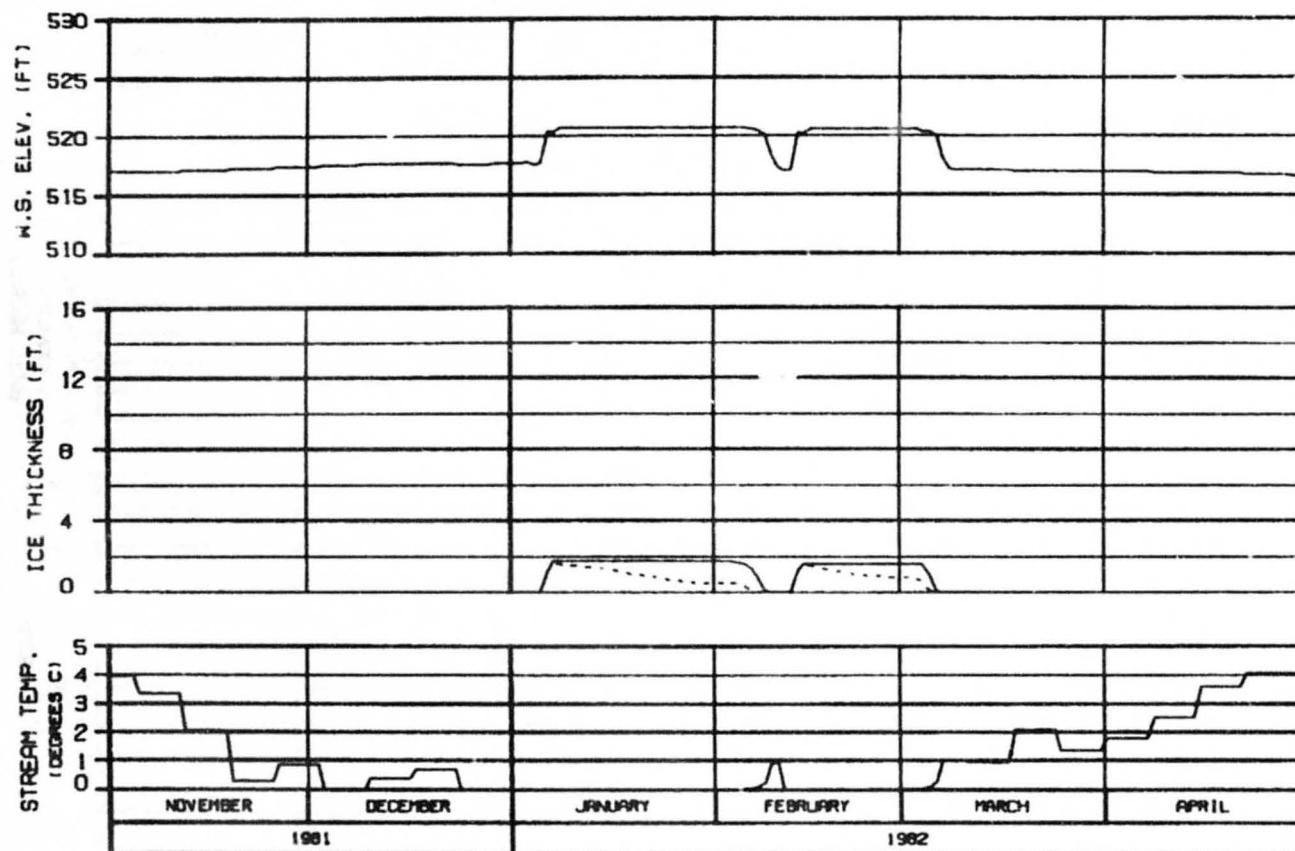
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN REPORT NO. AL 88 1583.142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 810ZENX

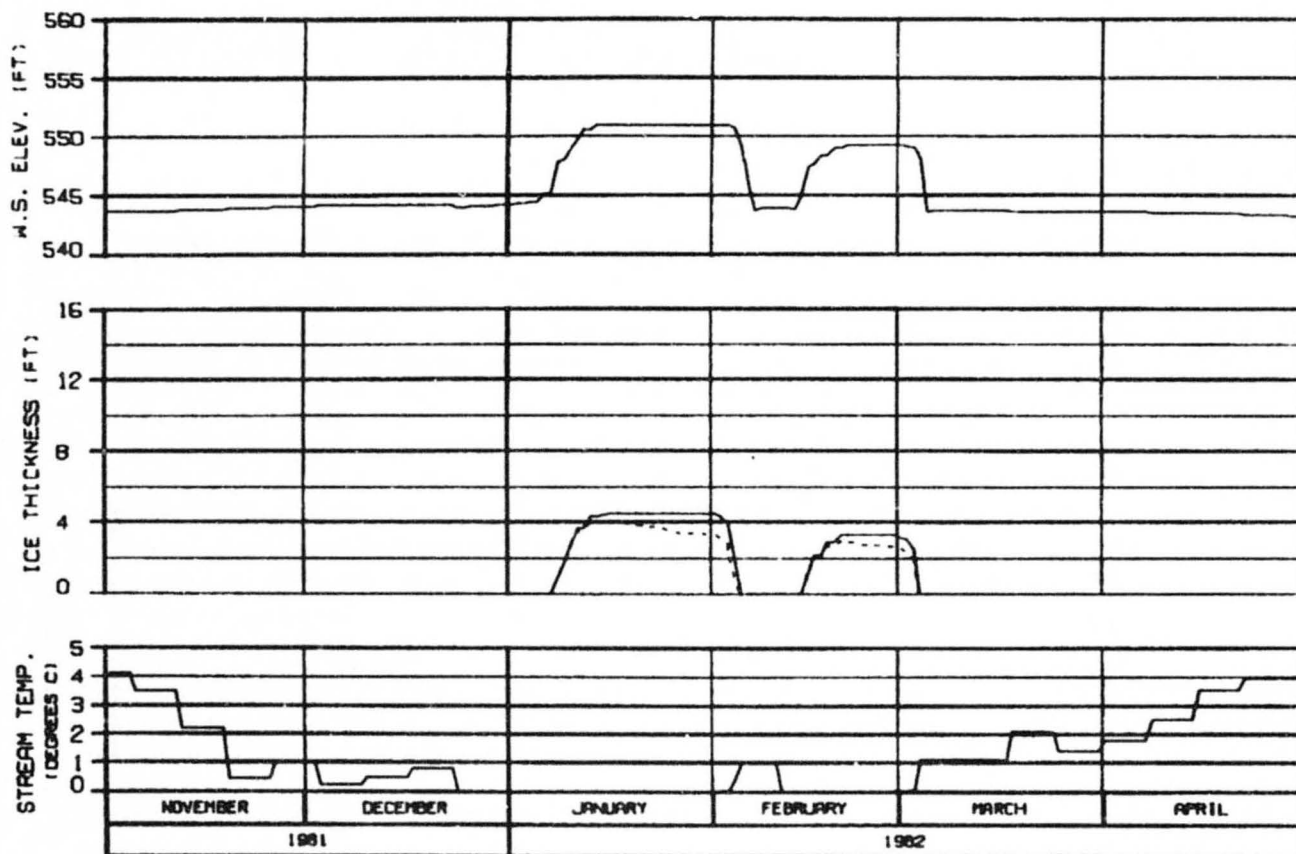
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHICHO - ILLINOIS 05 JAN 82 1982.142



# HEAD OF MOOSE SLOUGH RIVER MILE : 123.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE II : 2002 ENERGY DEMAND  
INFLOW-MATCHING : FLOW CASE E-VI  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 810ZENX

ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

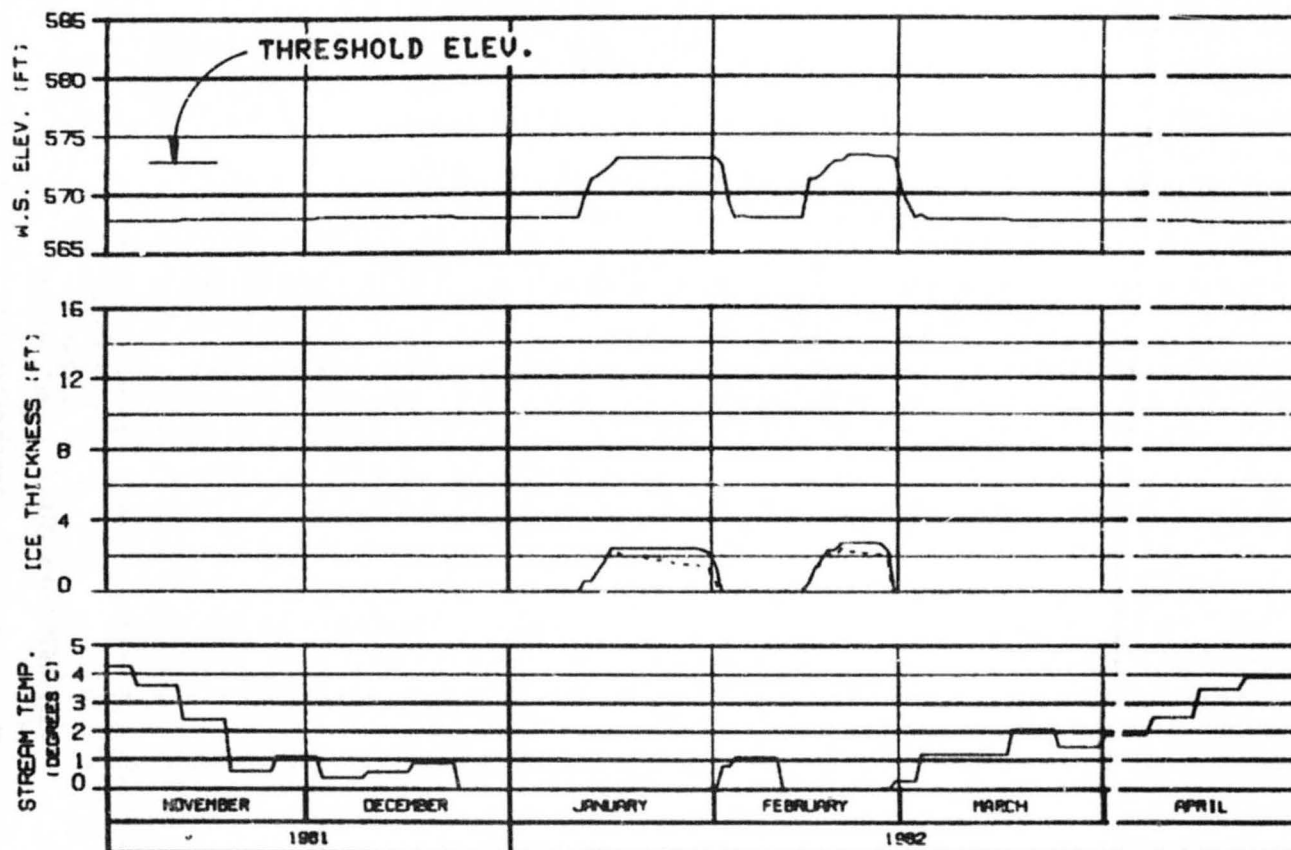
HARZA-EBASCO JOINT VENTURE

DATE: 01.08.82

BY: J. L. B.

1000.142





HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE II 2002 ENERGY DEMAND  
INFLOW-MATCHING : FLOW CASE E-VI  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 810ZENX

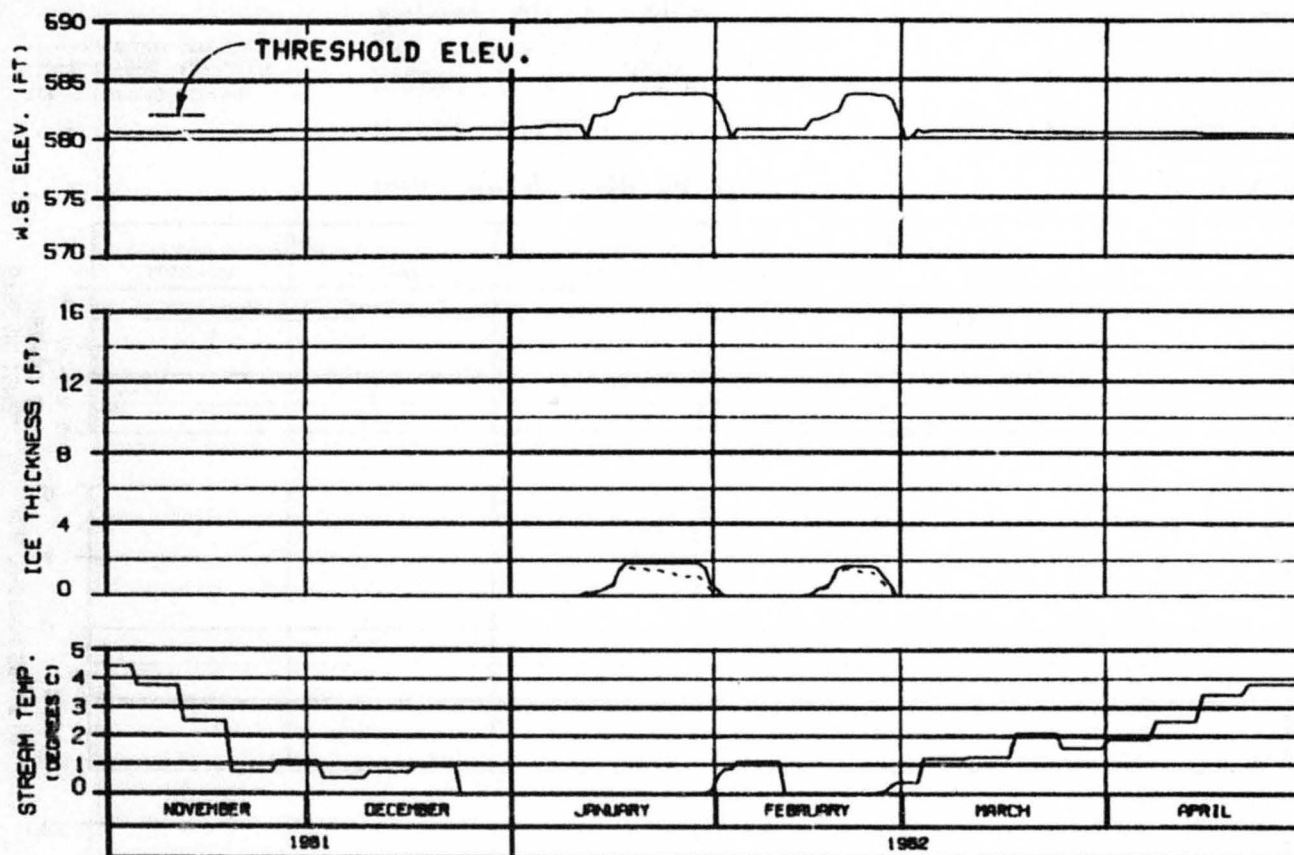
ALASKA POWER AUTHORITY

BY OTHER PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

PARZA-EBR600 JOINT VENTURE

CH01 000, 01, 00000 00 00 00 1000, 142



HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 810ZENX

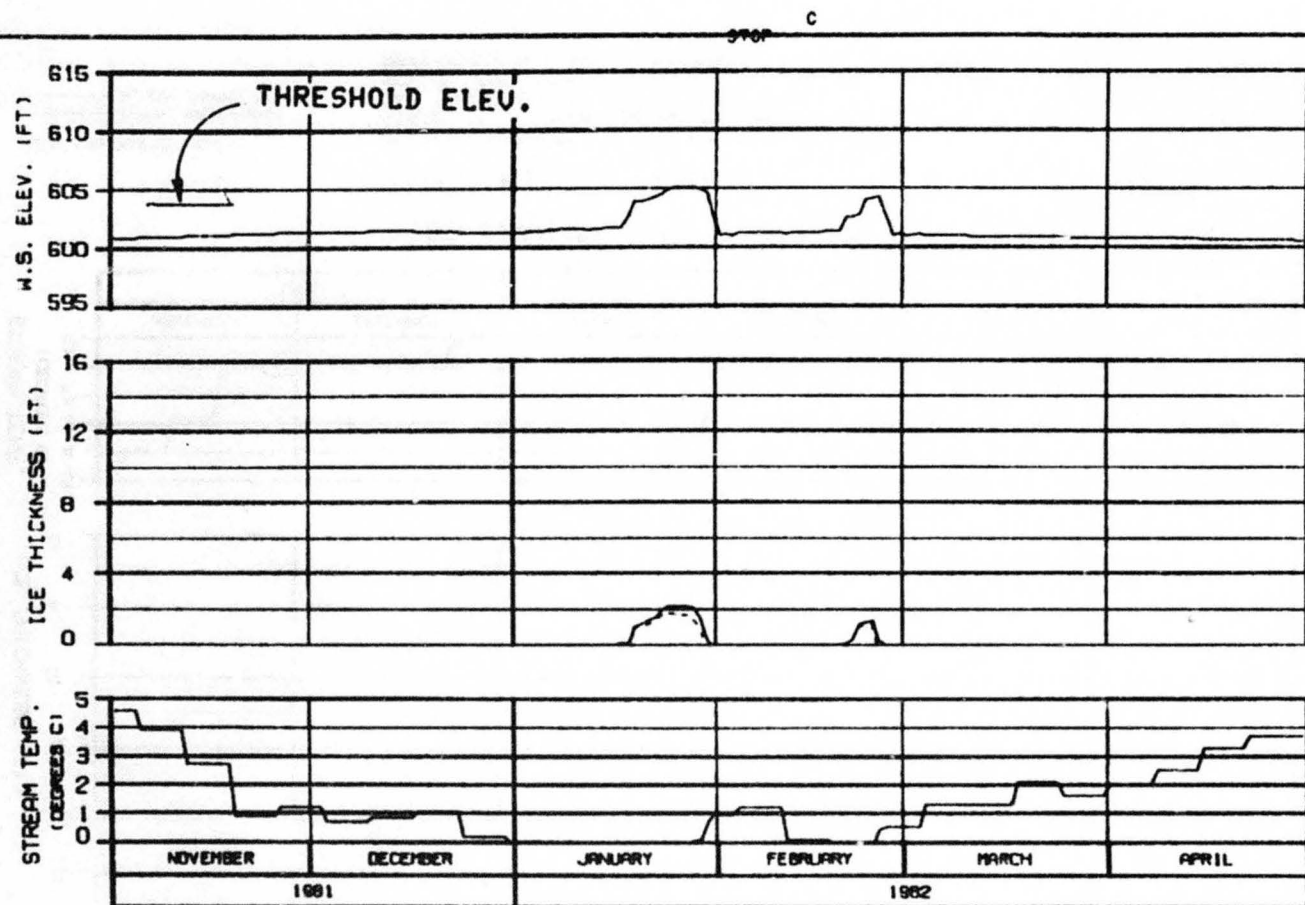
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHECKED: BLD/STB 28 JUL 82 1000.142



HEAD OF SLOUGH 9  
RIVER MILE : 129.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE II 2002 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-VI  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 810ZENX

ALASKA POWER AUTHORITY

SUSITNA PROJECT

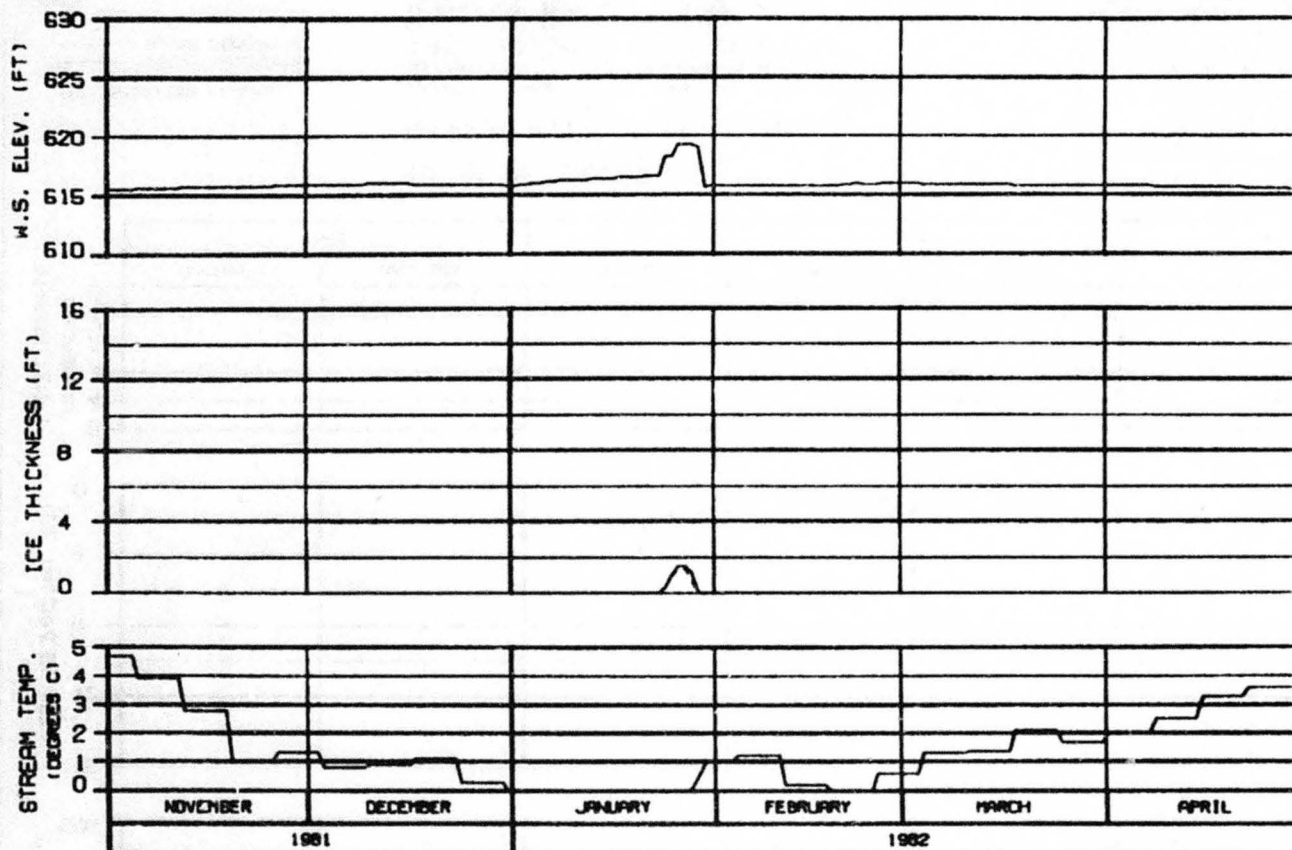
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: R.L. BATES 10 JUL 82 1002.142

OPTION?

OPTION?



SIDE CHANNEL U/S OF SLOUGH 9

RIVER MILE : 130.60

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 810ZENX

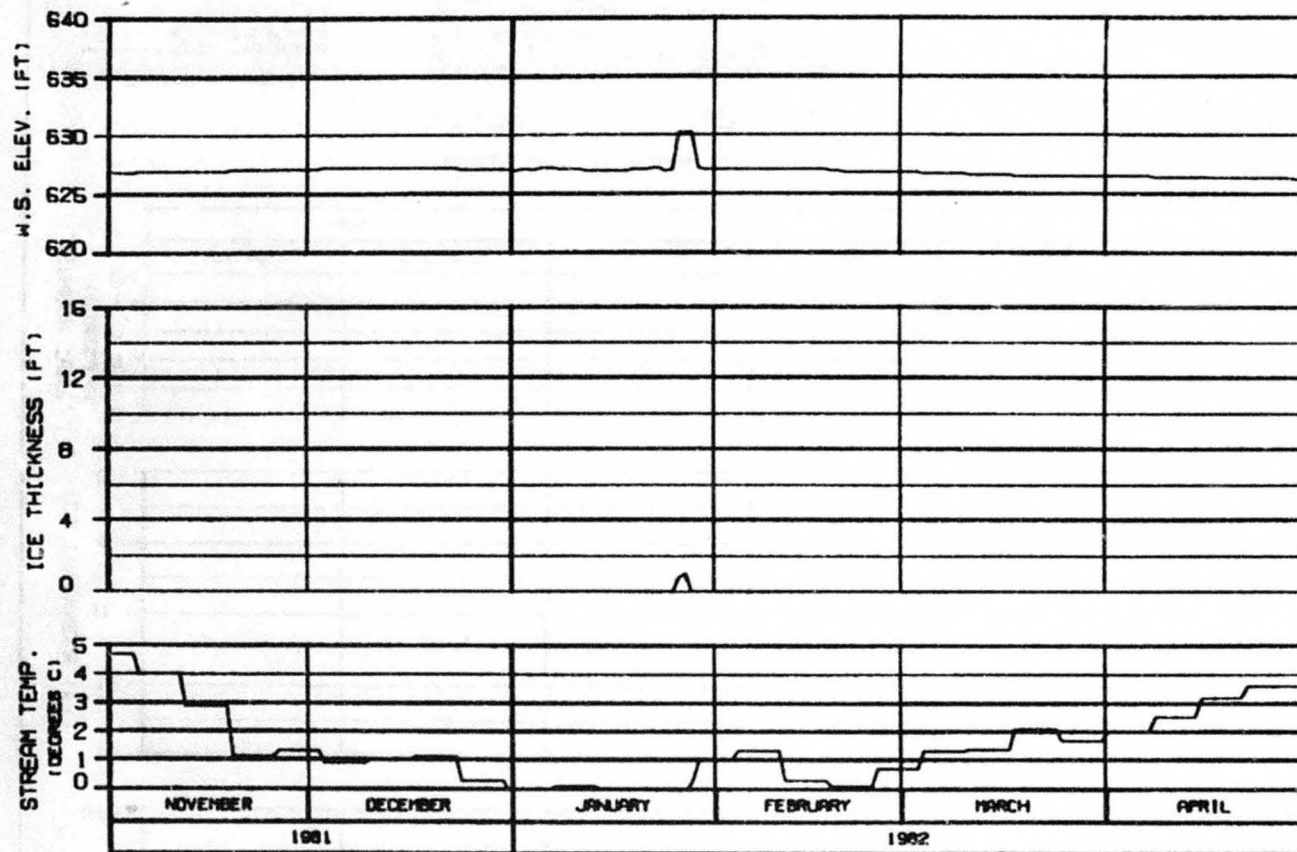
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHIEF: H. L. BENT 30 JAN 82 1982.142



**SIDE CHANNEL U/S OF 4TH JULY CREEK**  
**RIVER MILE : 131.80**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENX

**ALASKA POWER AUTHORITY**

**SUSITNA PROJECT**

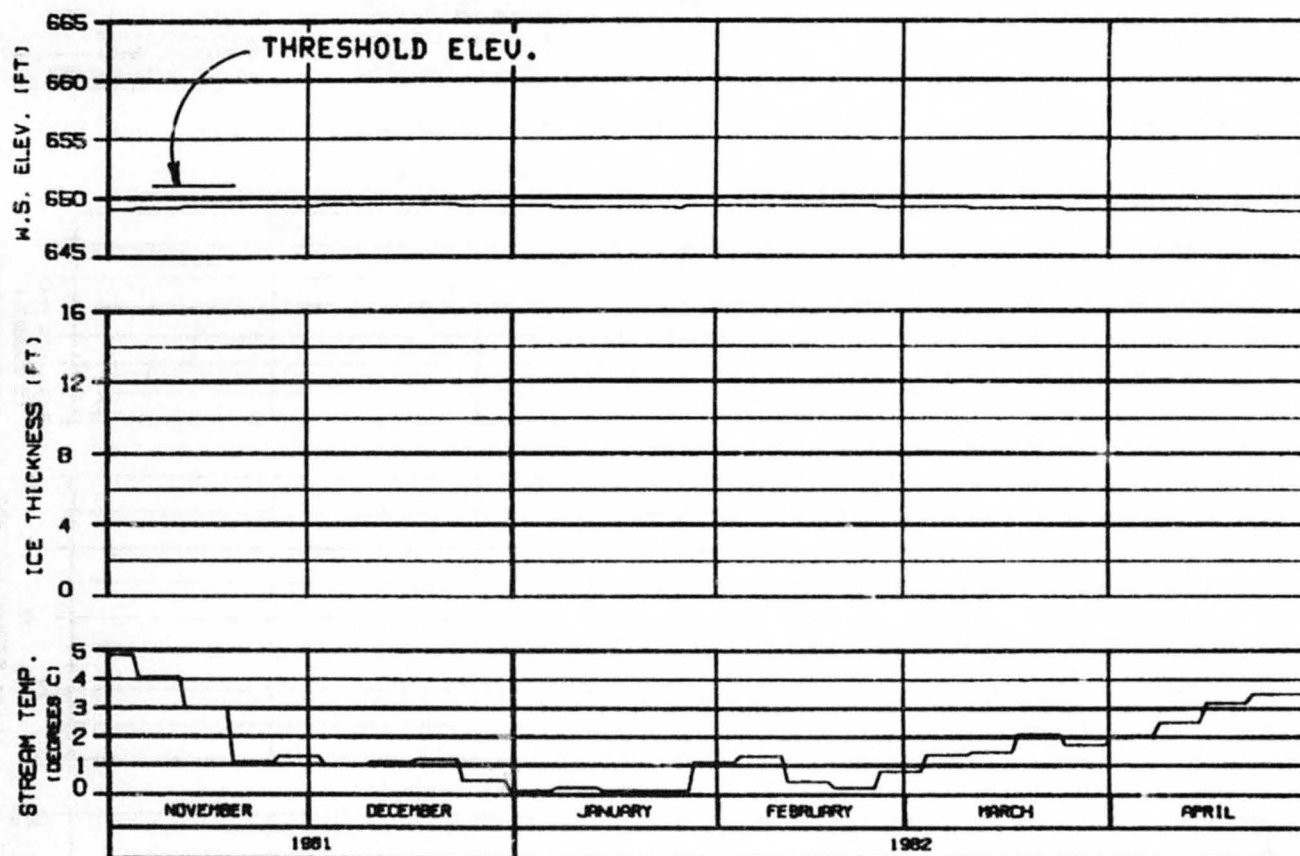
**SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY**

**HAZRA-EBRACO JOINT VENTURE**

CHUCKER, D.A. 8-810 89 J.A. 81

1088.142





HEAD OF SLOUGH 9A  
RIVER MILE : 133.70

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE II 2002 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-VI  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8102ENX

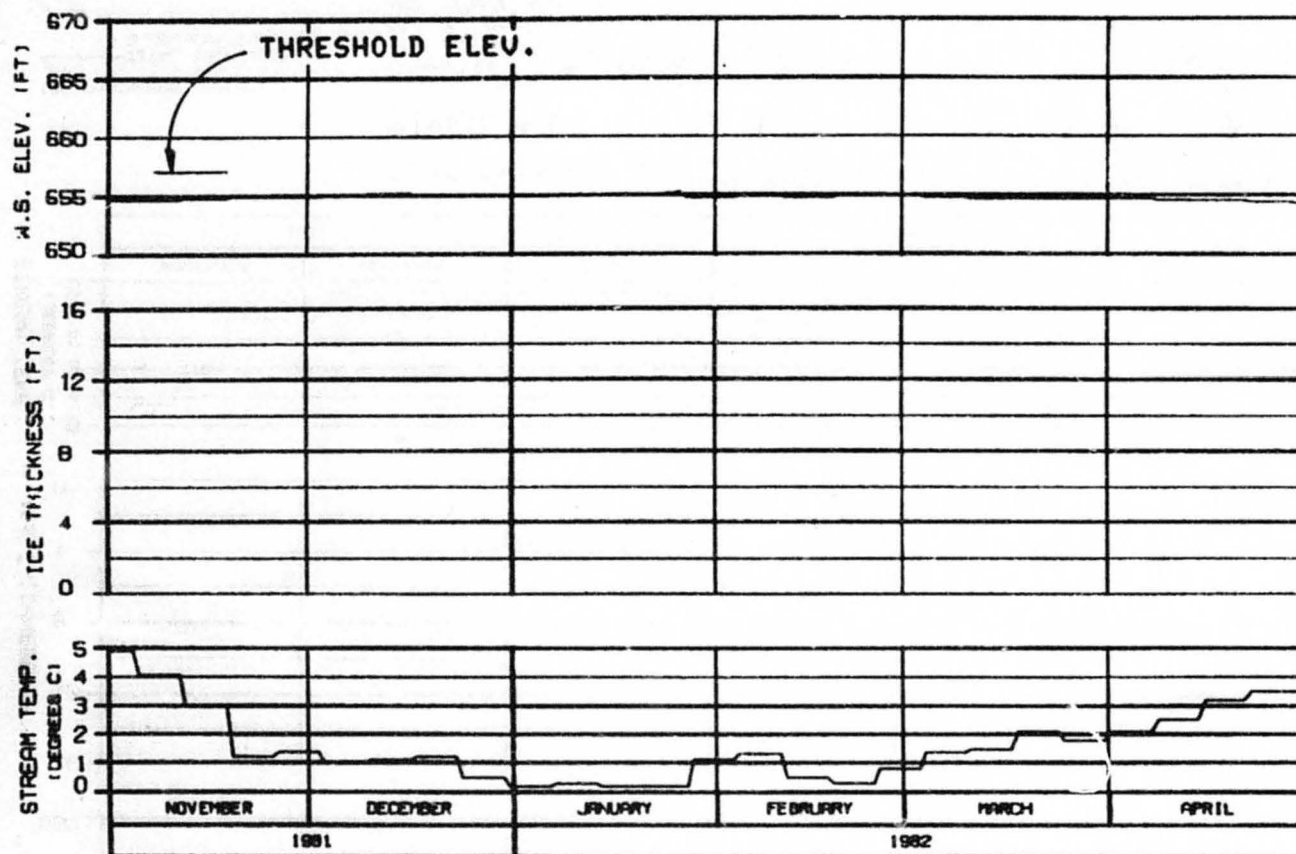
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

PROJECT: S.A. 9416 20 JUL 82 1982.142



SIDE CHANNEL U/S OF SLOUGH 10  
RIVER MILE : 134.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE II 2002 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-VI  
50 FT. DRAWDOWN, 2 PORTS  
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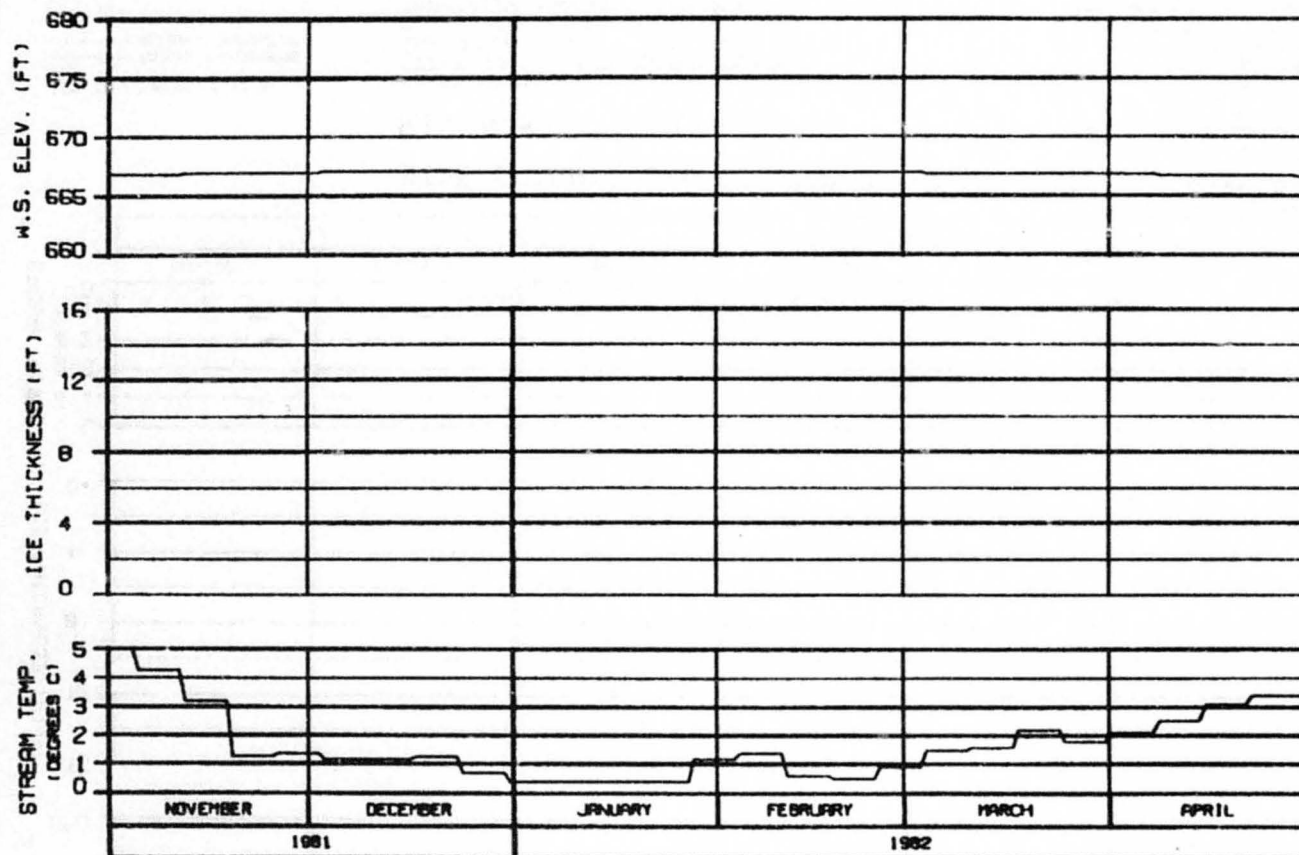
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHICAGO, ILLINOIS 90 JUL 90 1992.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL D/S OF SLOUGH 11  
 RIVER MILE : 135.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 810ZENX

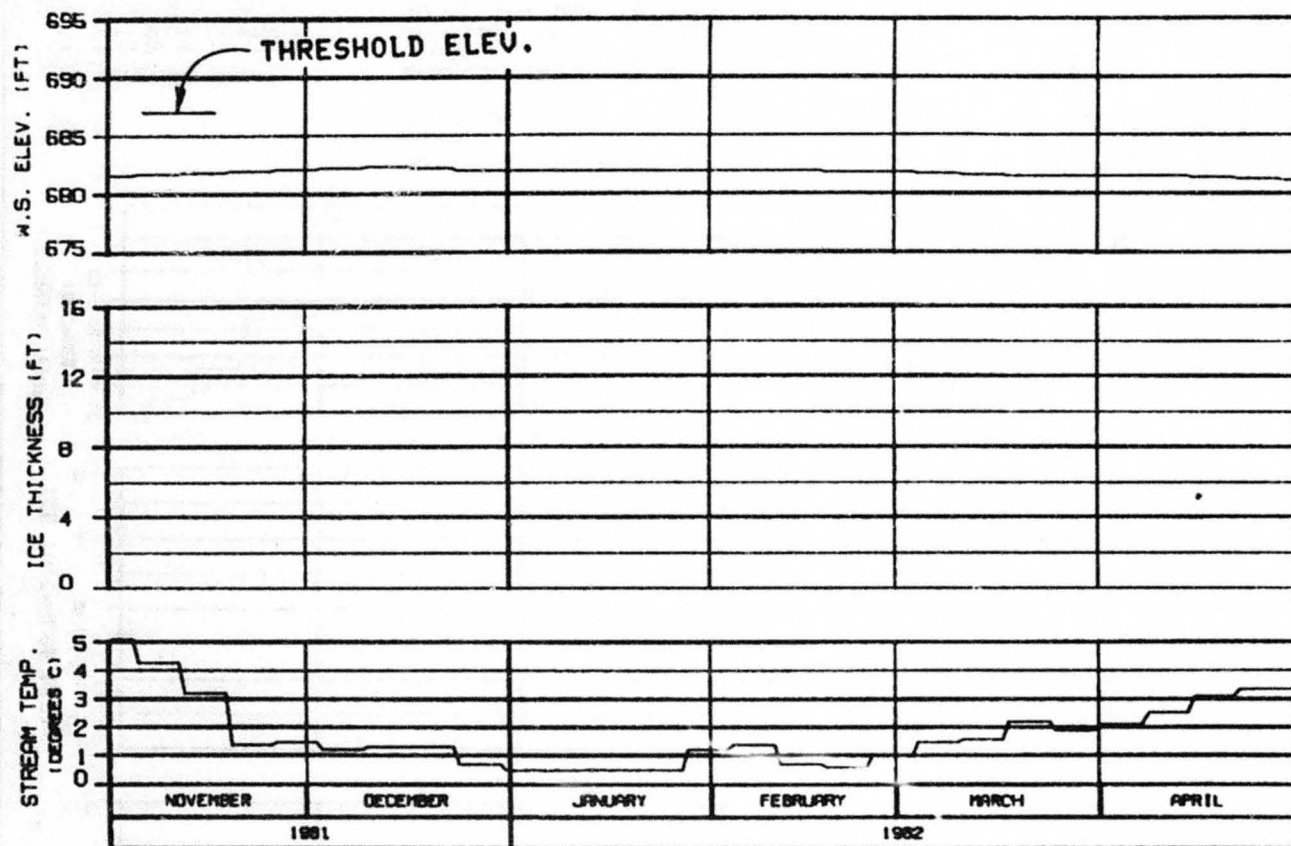
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHIEF: ELLIOTT 88 AA 88 1988.142



HEAD OF SLOUGH 11  
RIVER MILE : 136.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE II 2002 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-VI  
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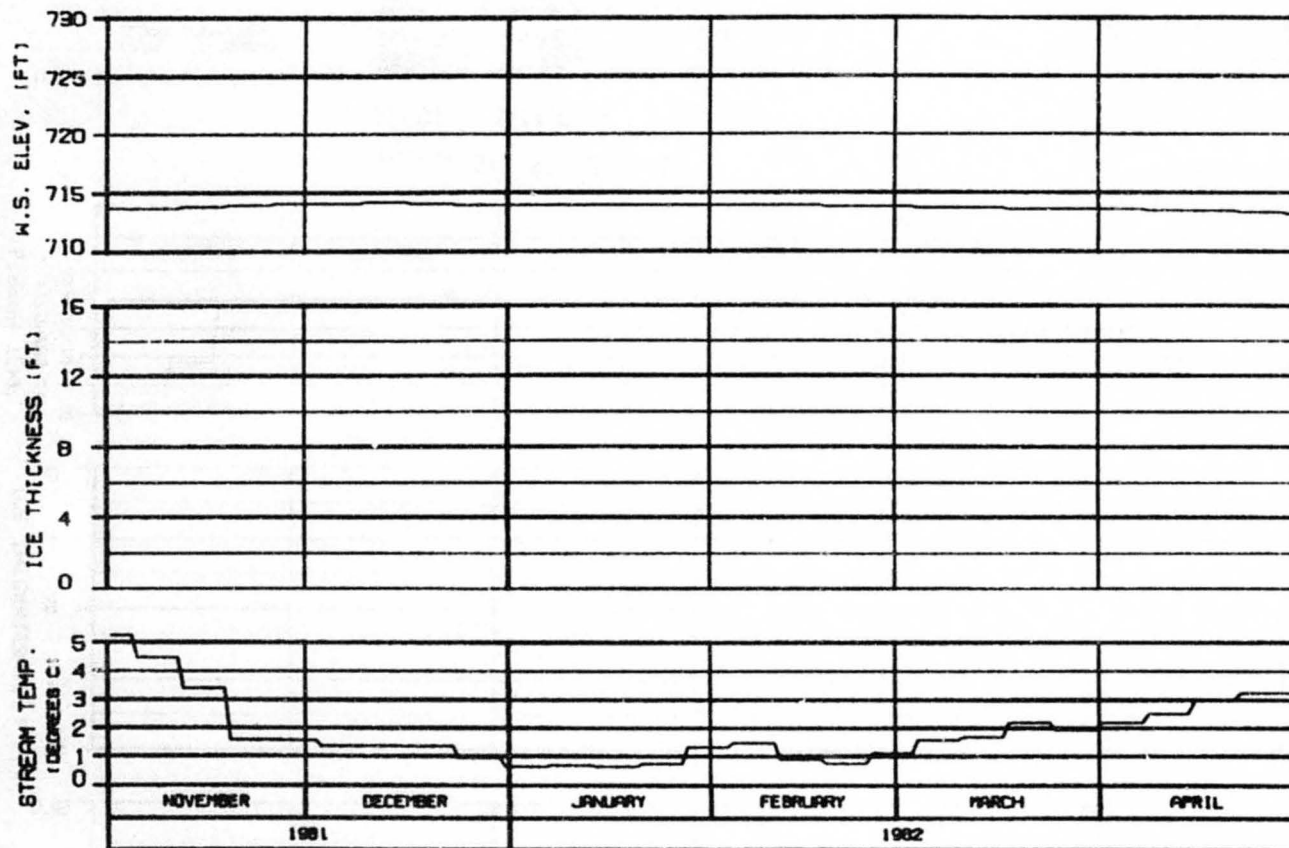
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: KALWIS 20 JUL 82 1003.142



HEAD OF SLOUGH 17  
RIVER MILE : 139.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE II 2002 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-VI  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 810ZENX

ALASKA POWER AUTHORITY

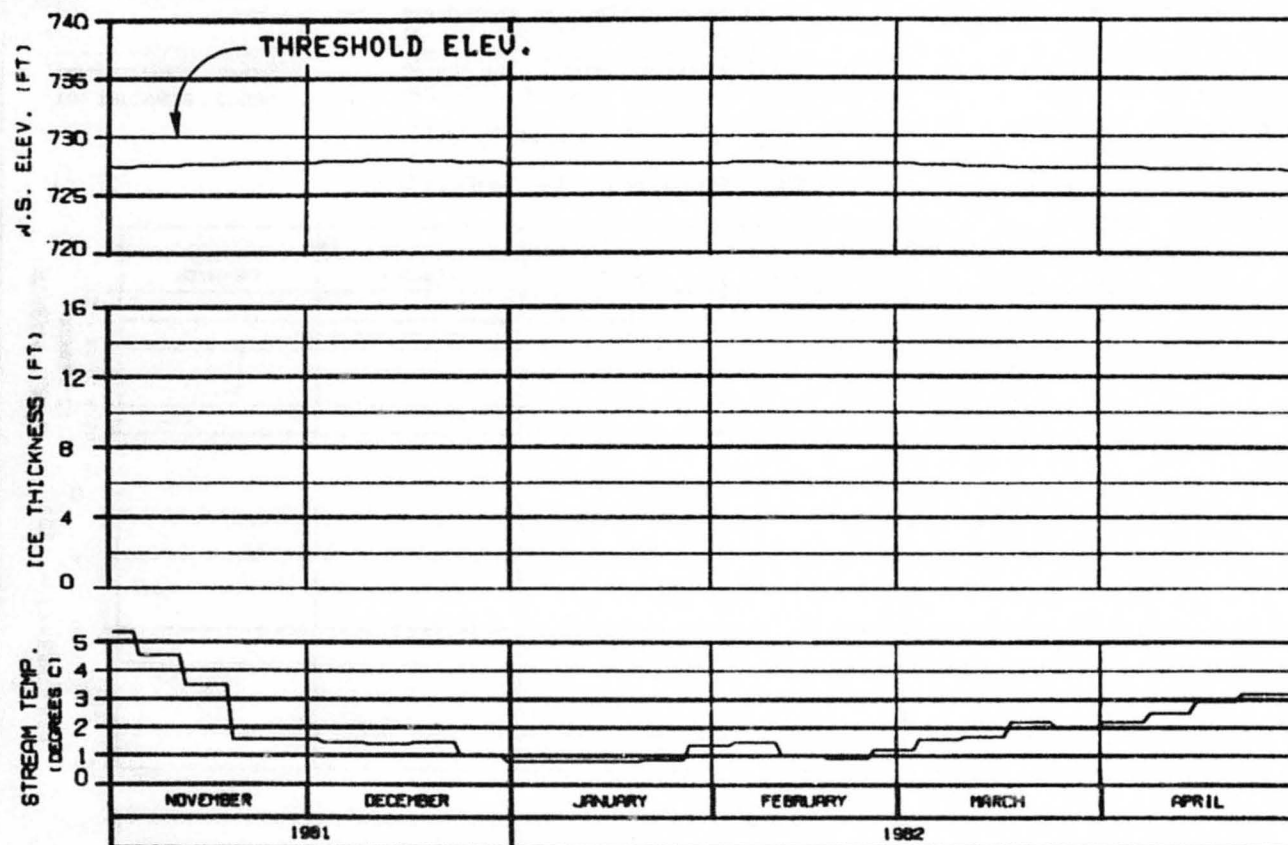
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRACCO JOINT VENTURE

DESIGN - ELLIOTT & ASSOCIATES, INC. 1983, 142





HEAD OF SLOUGH 20

RIVER MILE : 140.50

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 810ZENX

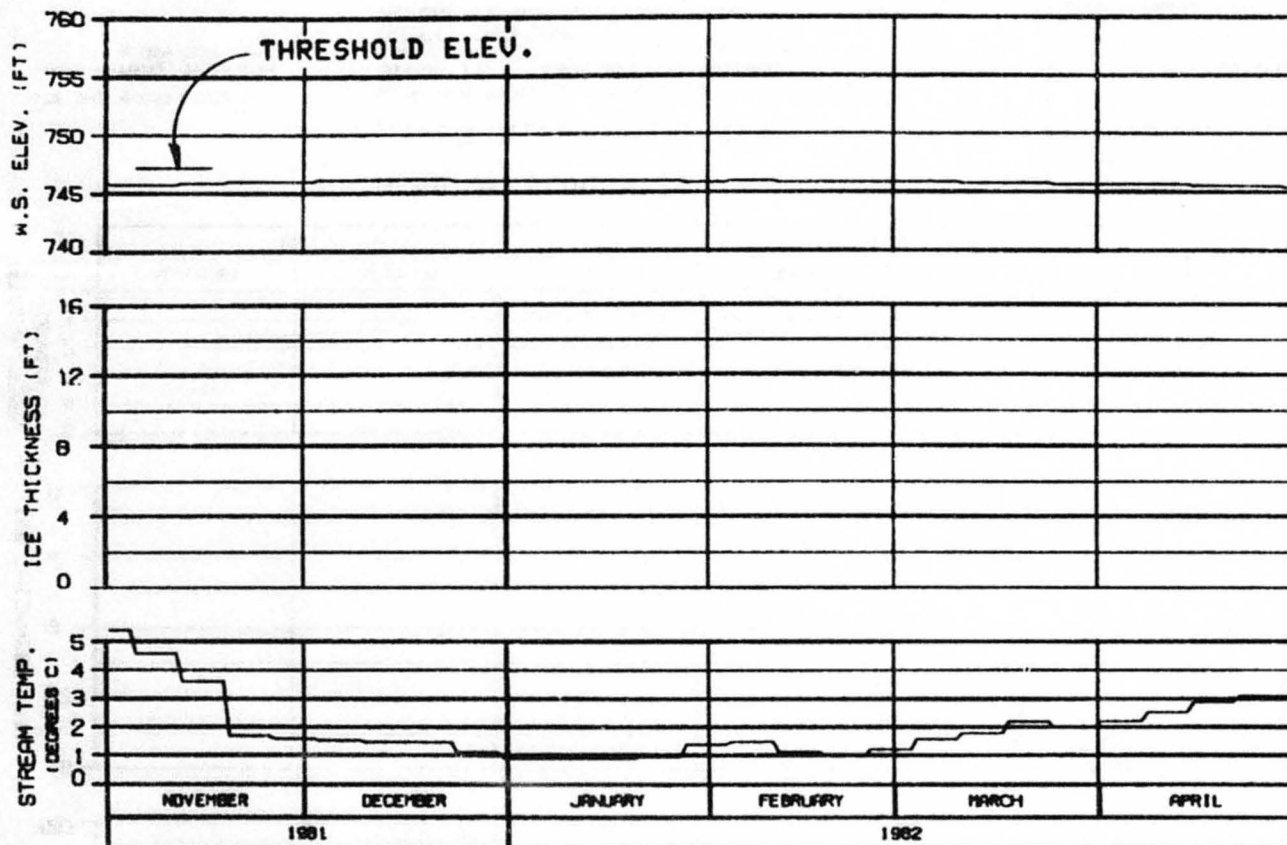
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBASCO JOINT VENTURE

CHECKED: ALL DATA 28 JUL 82 1982.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 810ZENX

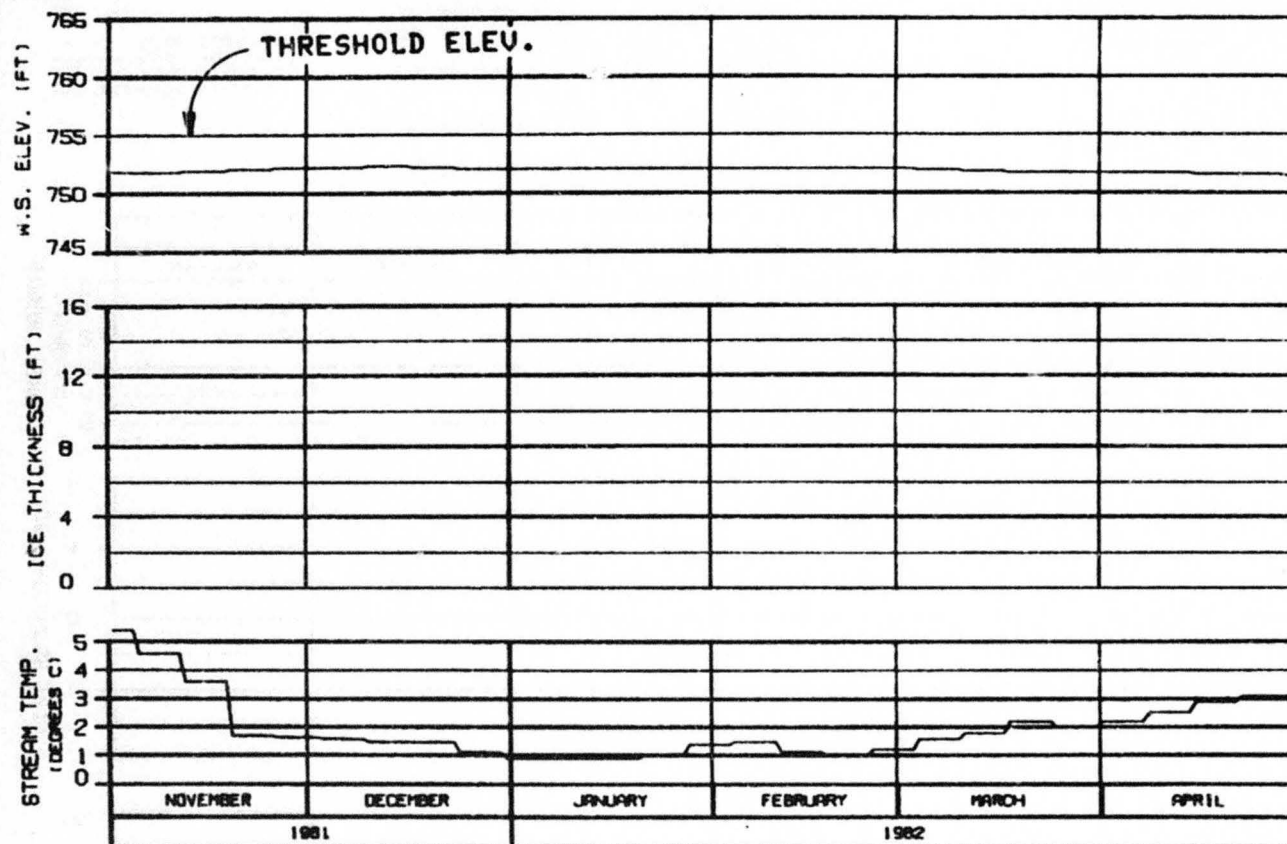
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHUCKER, RALPH 00 AA 00 1982.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 21  
 RIVER MILE : 142.20

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENX

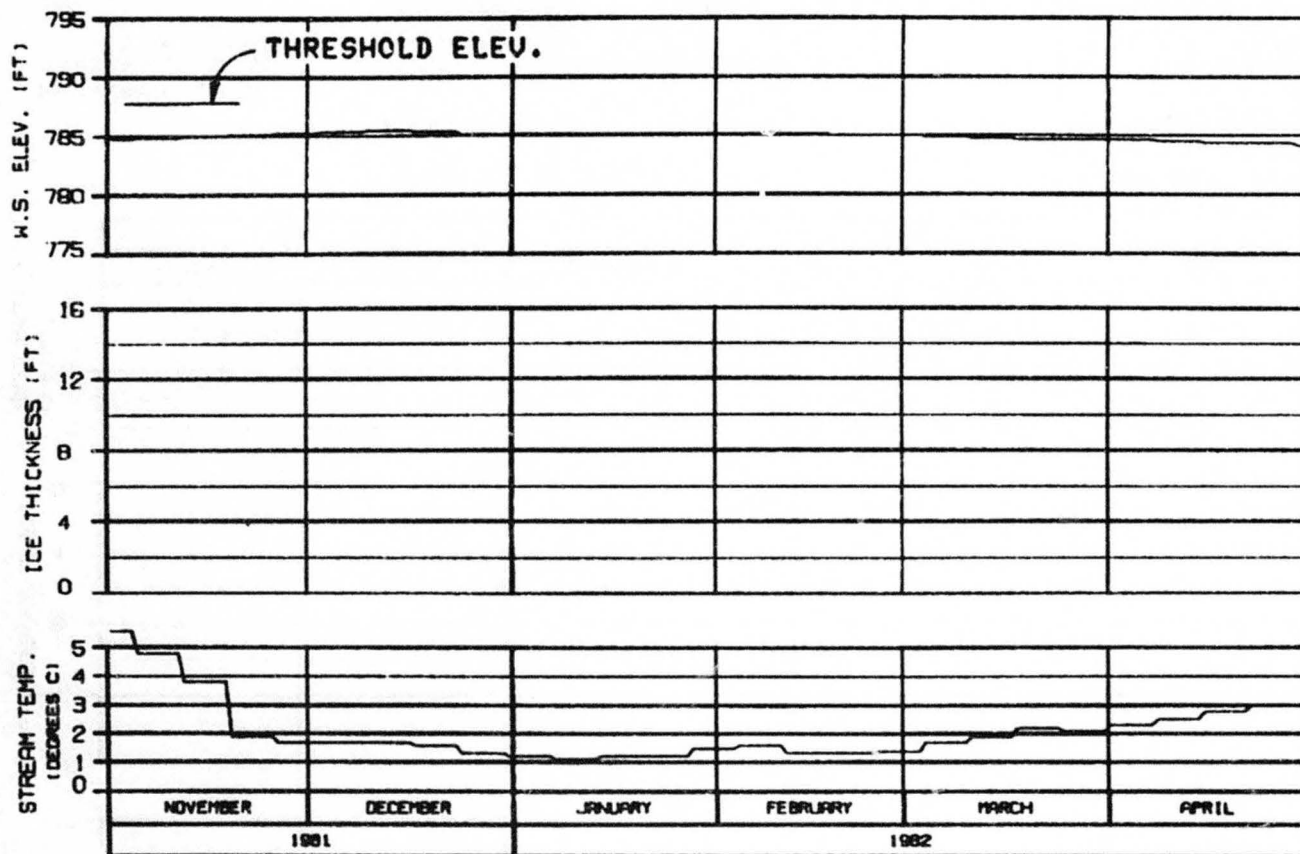
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: AL-8119 BY J.A. 1000.142



HEAD OF SLOUGH 22  
RIVER MILE : 144.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE II 2002 ENERGY DEMAND  
INFLOW-MATCHING : FLOW CASE E-VI  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8102ENX

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

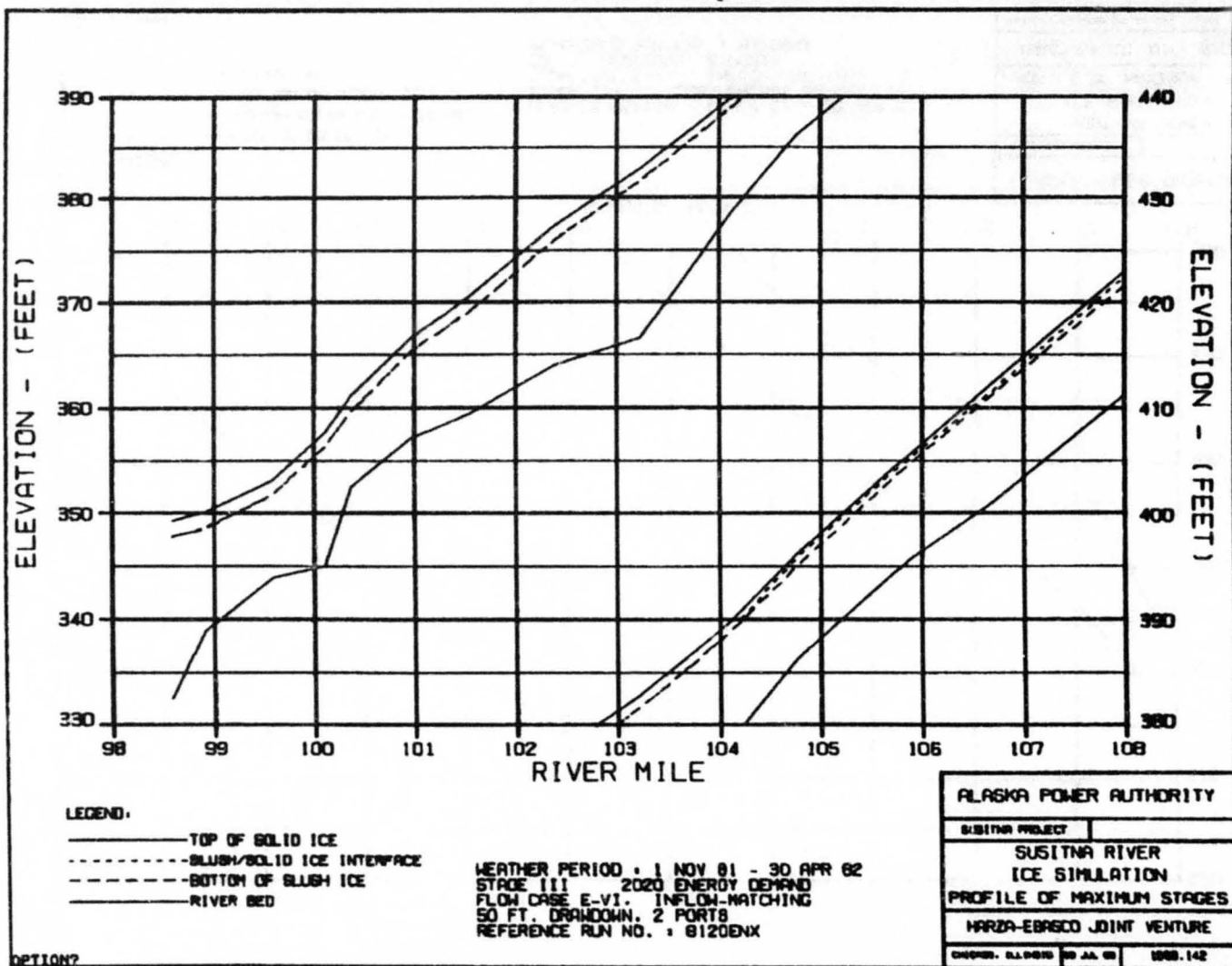
HARZA-EBASCO JOINT VENTURE

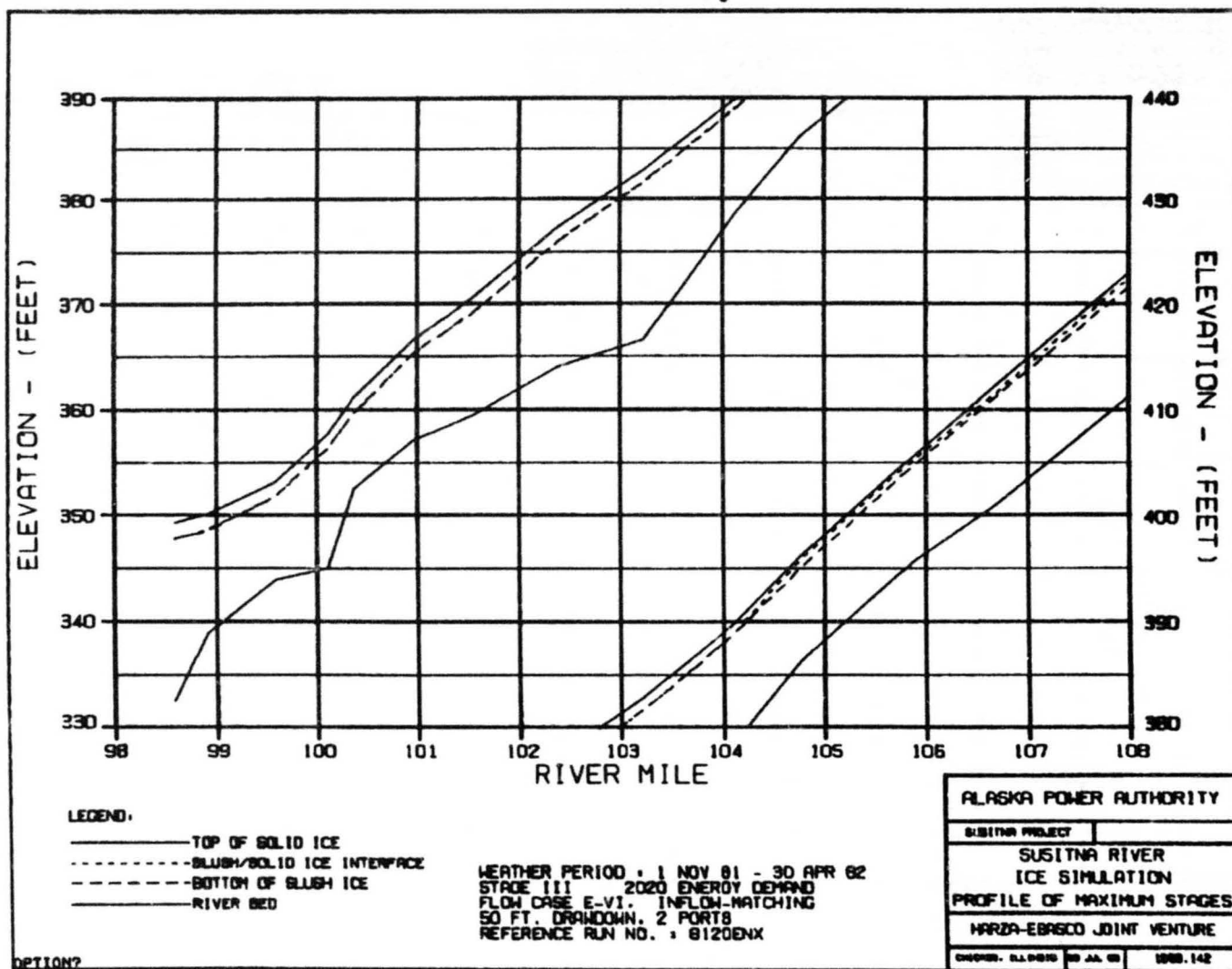
DISCLOS. 04-04-82 00 00 00 1982.142

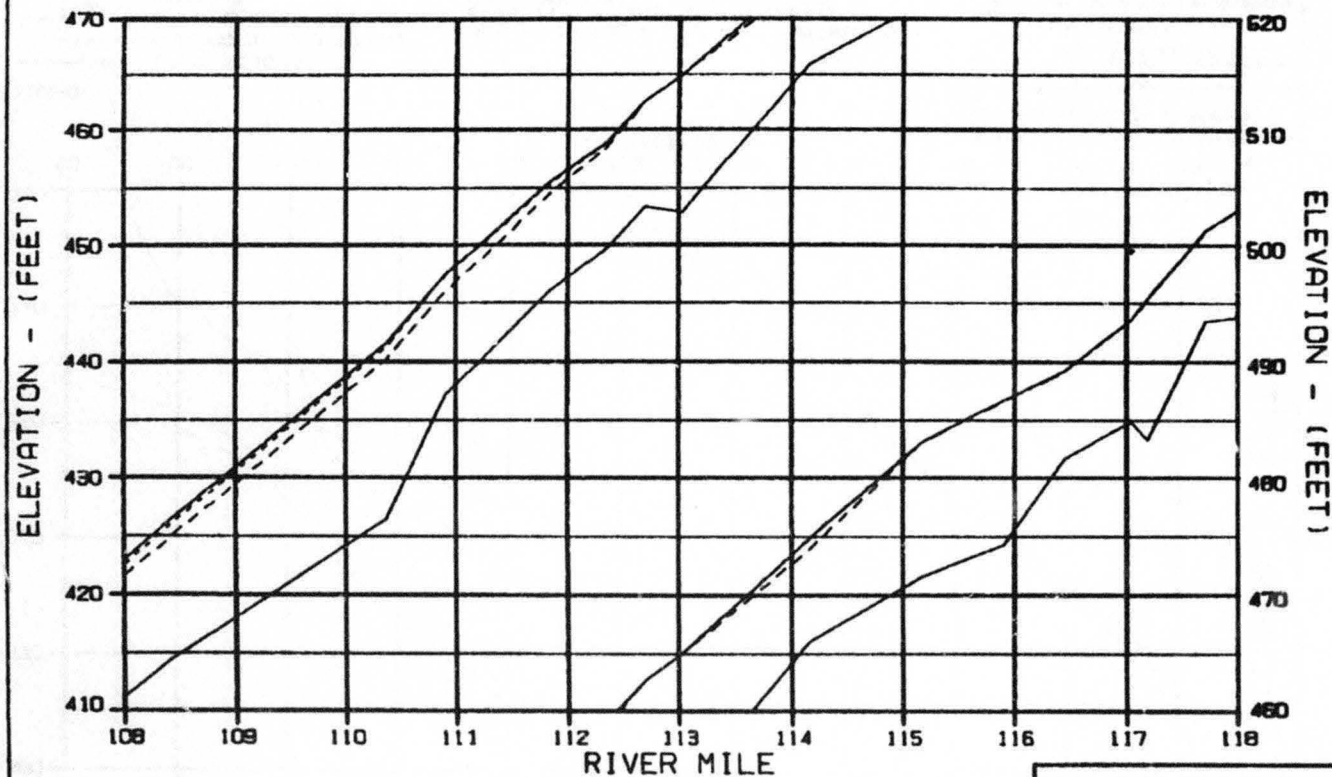
OPTION?

**EXHIBIT C**









LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III - 2020 ENERGY DEMAND  
 FLOW CASE E-V1. INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENX

OPTION2OPTION7

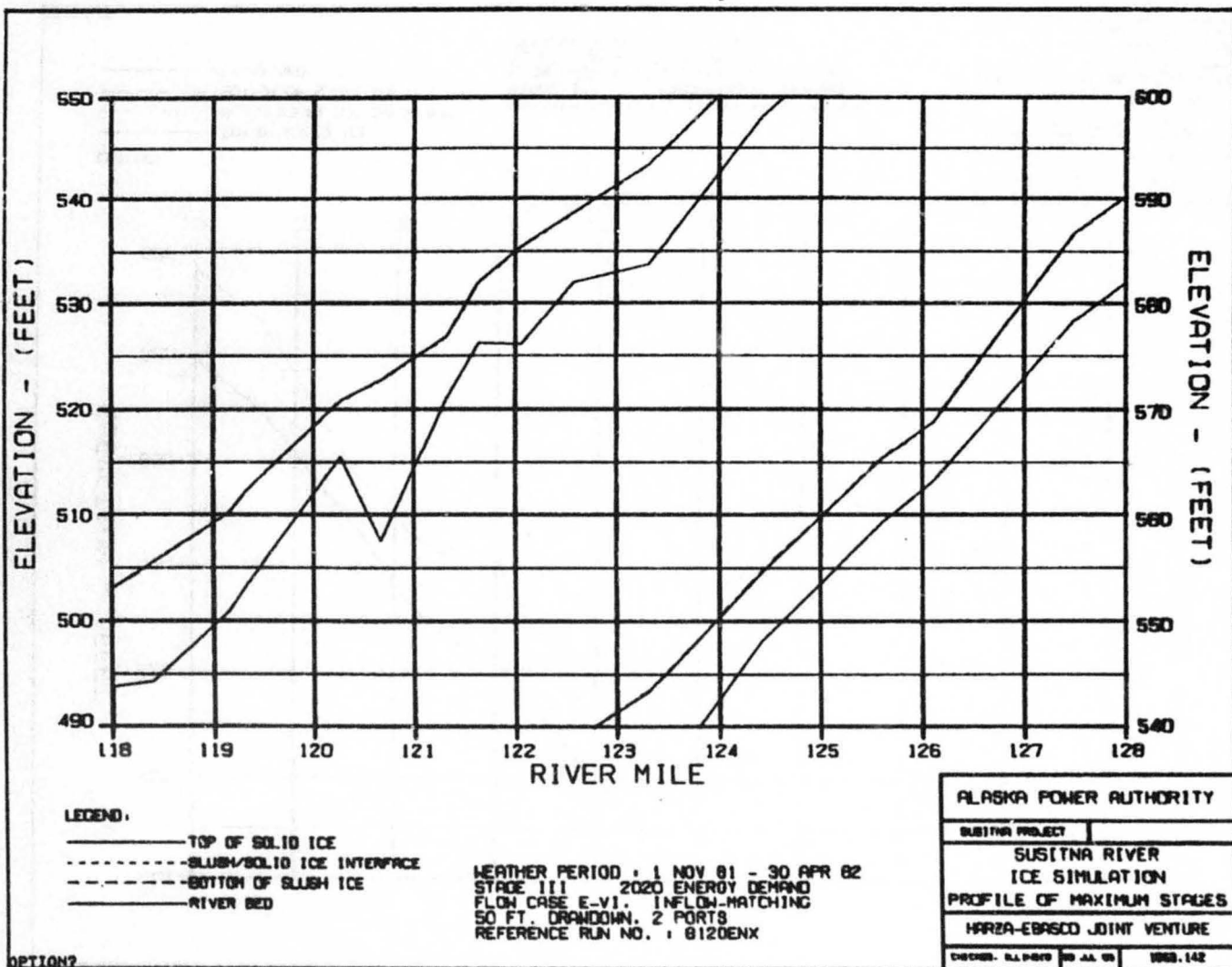
ALASKA POWER AUTHORITY

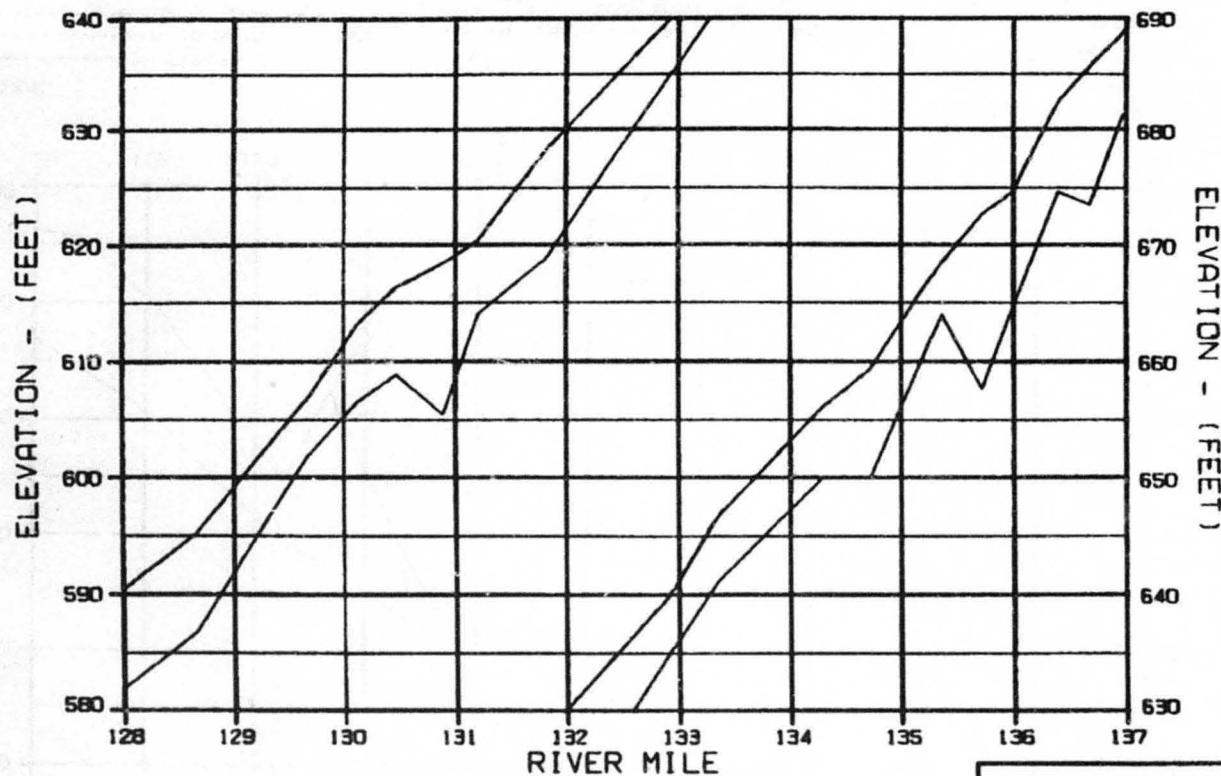
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

CHOPED - 01.0000 00.00.00 1000.142





LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- ..... BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 FLOW CASE E-VI. INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENX

ALASKA POWER AUTHORITY

SUSITNA PROJECT

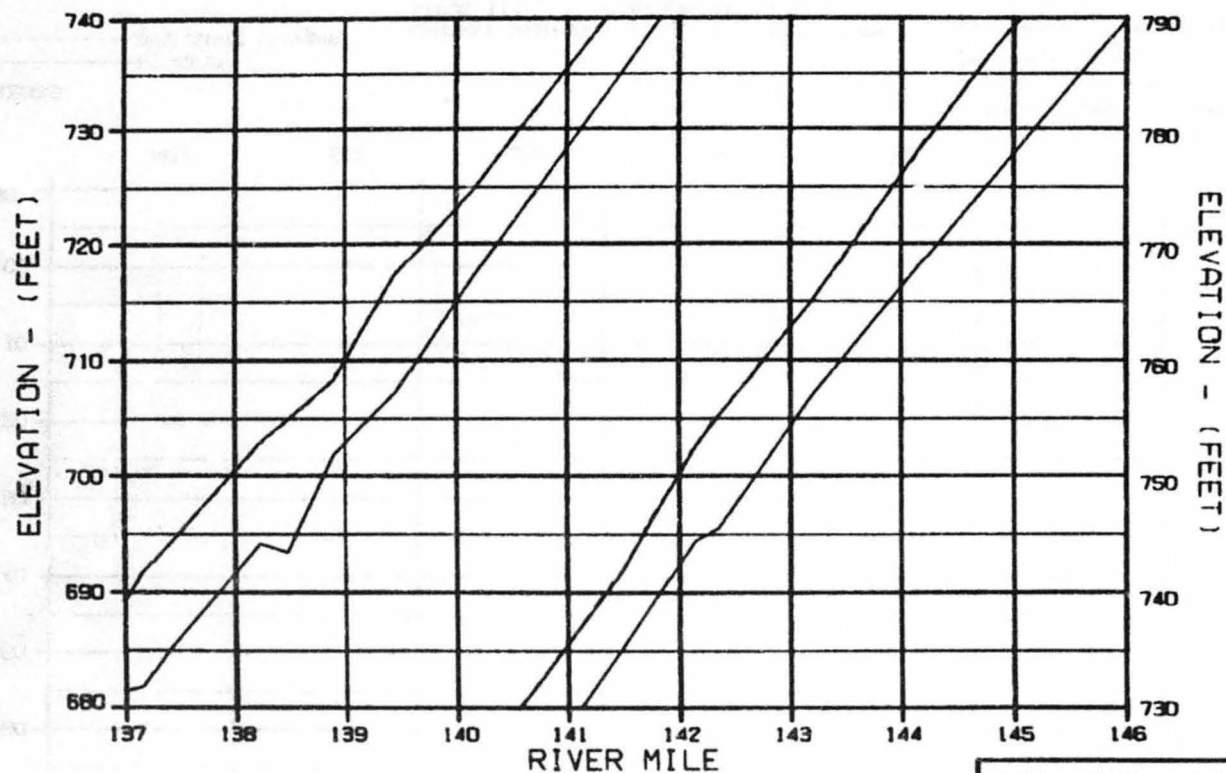
SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

DIVISION, ALASKA POWER AUTHORITY 00 JAN 82 1000.142

OPTION?





## LEGEND:

- TOP OF SOLID ICE
- - - - - SLUSH/SOLID ICE INTERFACE
- - - - - BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 FLOW CASE E-VI. INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENX

OPTION2

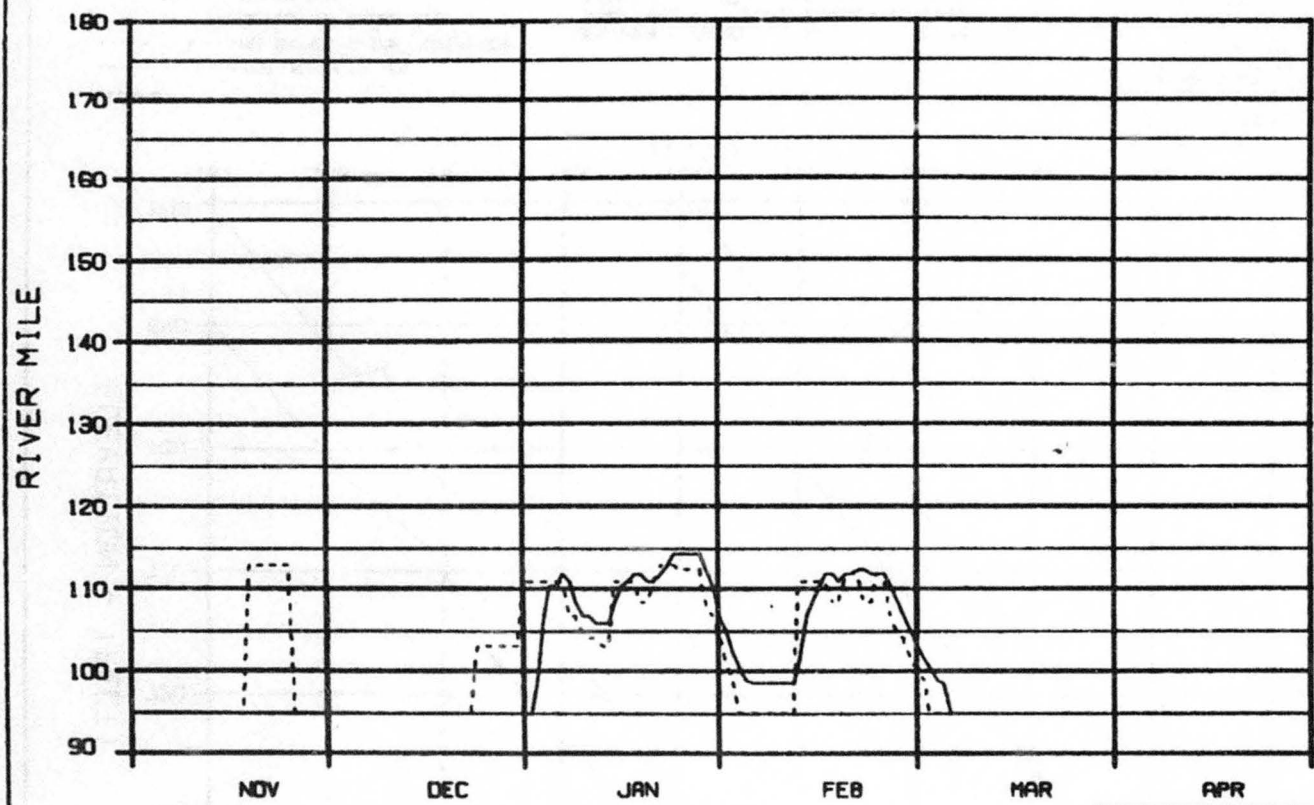
## ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

DESIGNED - J.A. HARTIS 200 J.A. 02 1000.142

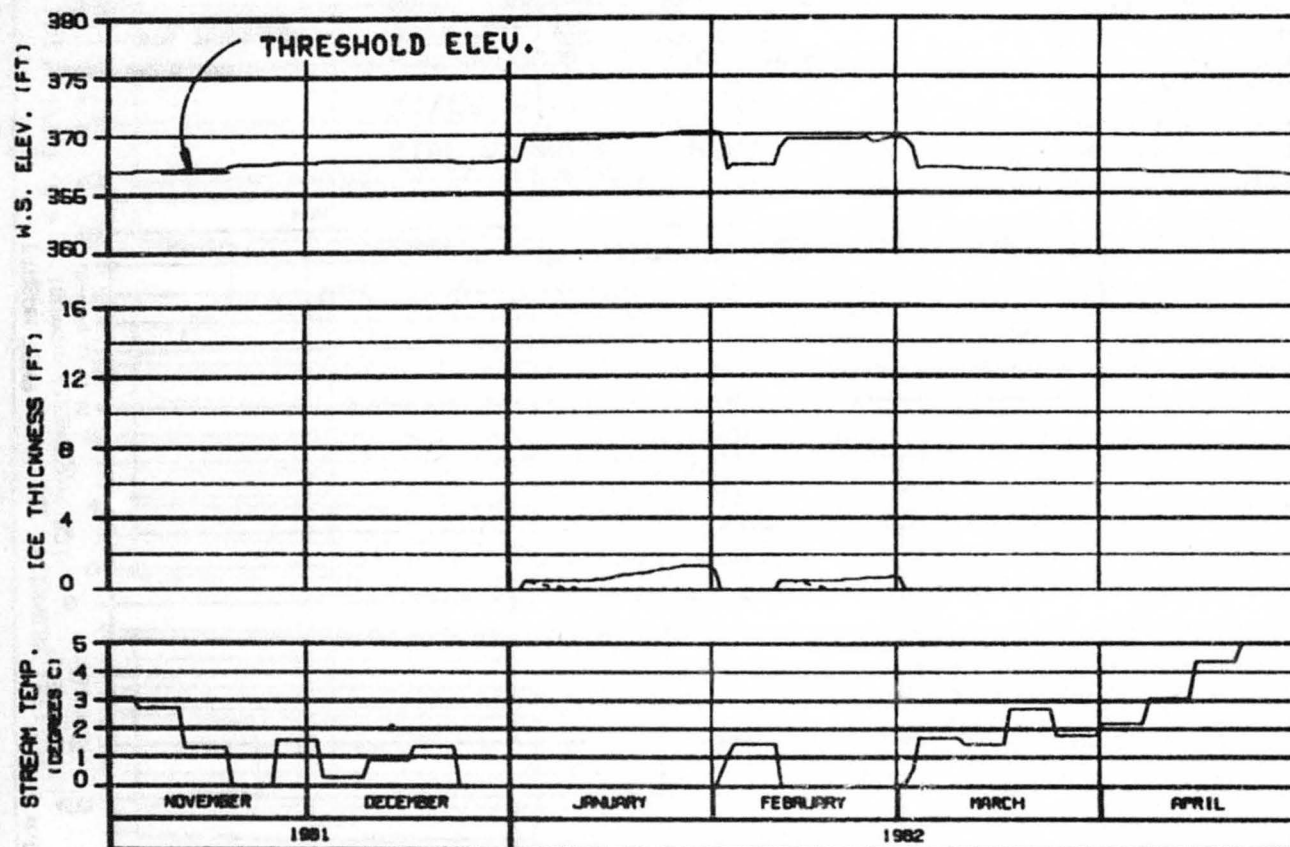


LEGEND.  
 — ICE FRONT  
 - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 FLOW CASE E-VI INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENX

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER	
PROGRESSION OF ICE FRONT & ZERO DEGREE ISOTHERM	
HARZA-EBASCO JOINT VENTURE	
DESIGNER: ELLIOTT	NO. 142

OPTION 2



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF WHISKERS SLOUGH  
 RIVER MILE : 101.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENX

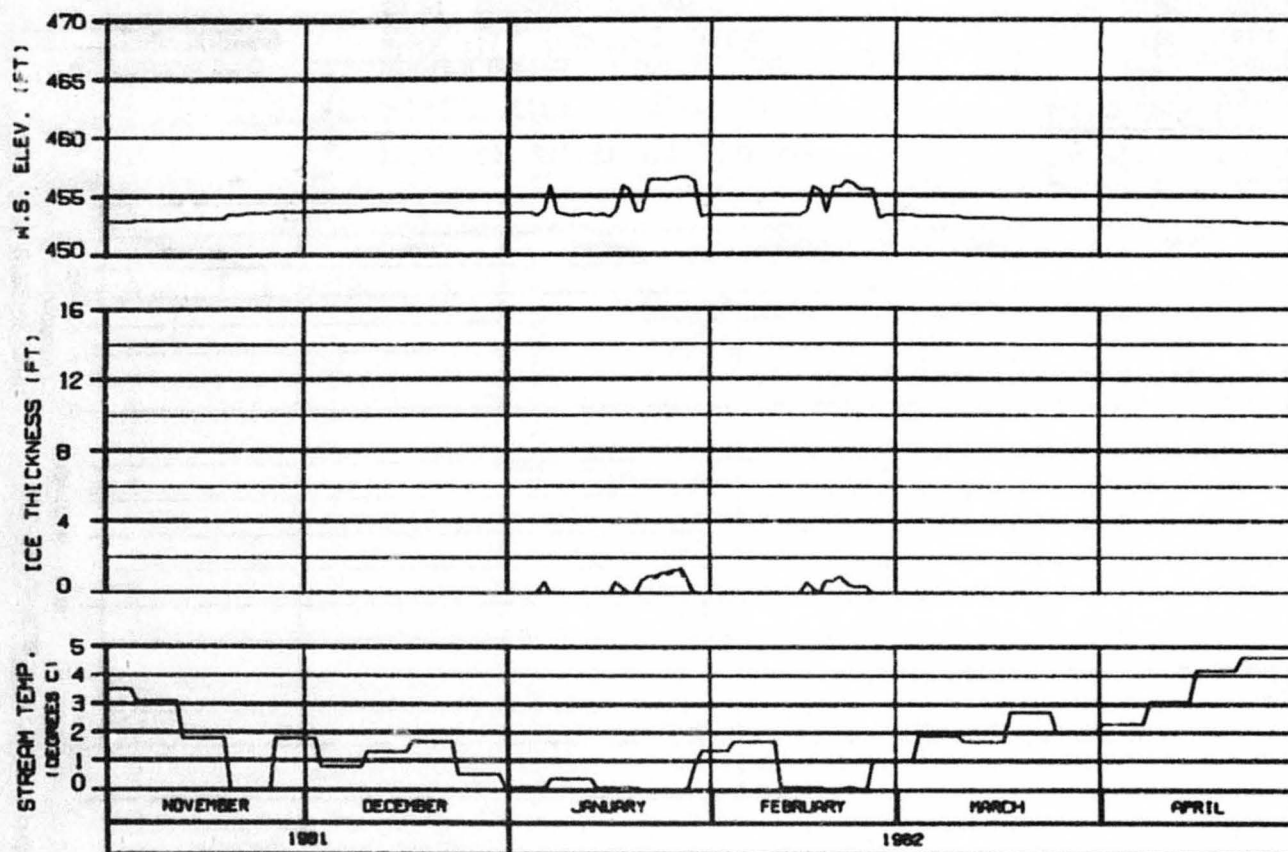
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HRZA-EBASCO JOINT VENTURE

CHECKED: S.J. P-215 20 JUL 82 1008.142



**ICE THICKNESS LEGEND:**

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

**SIDE CHANNEL AT HEAD OF GASH CREEK**  
**RIVER MILE : 112.00**

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : B12DENX

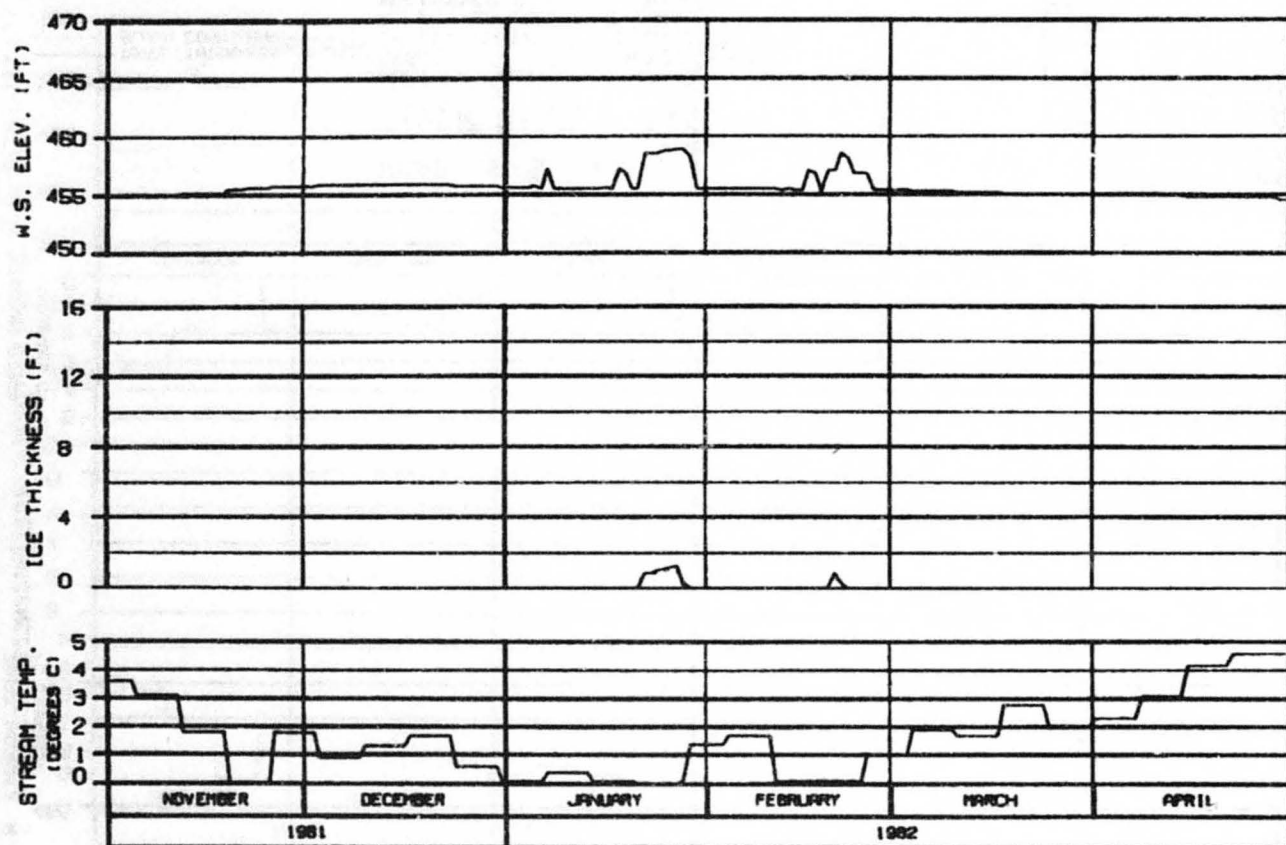
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HEARZ-EBASCO JOINT VENTURE

DRAWN BY: J. L. BROWN 03 JUL 82 1000.142



**MOUTH OF SLOUGH 6A**  
**RIVER MILE : 112.34**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING . FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 81Z0ENX

ALASKA POWER AUTHORITY

SUSITNA PROJECT

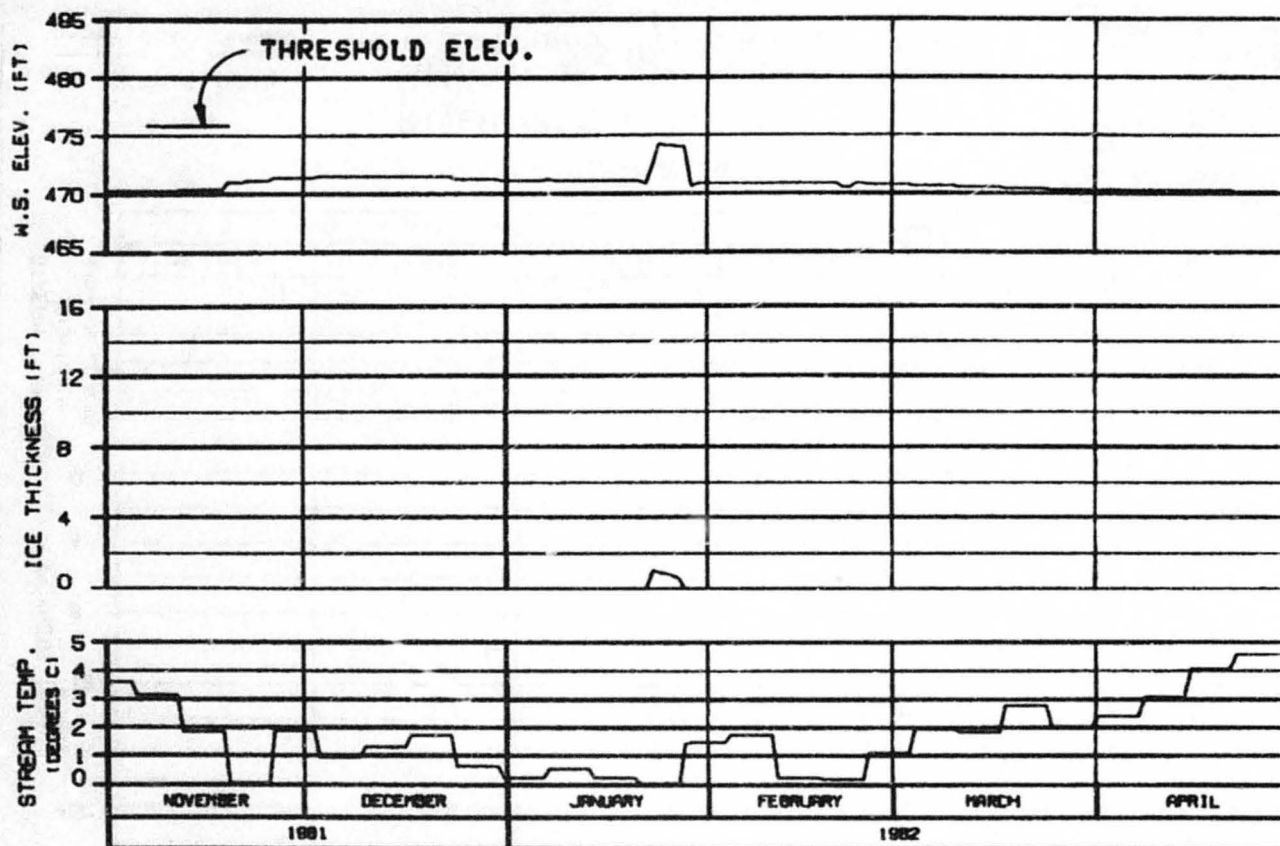
SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: B.L. 0416 30 JAN 82 1000.142



OPTION?



# HEAD OF SLOUGH 8 RIVER MILE : 114.10

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE III 2020 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-VI  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8120ENX

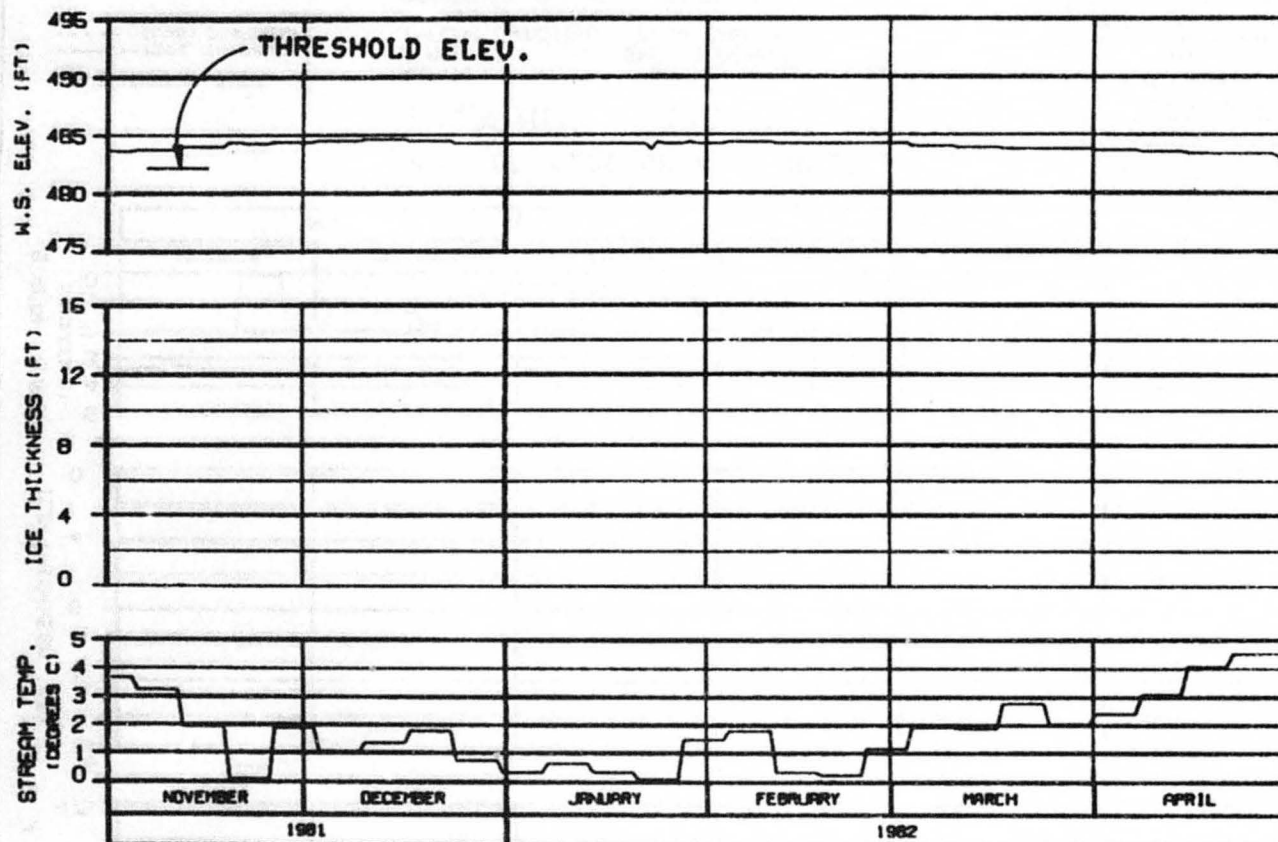
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBRACO JOINT VENTURE

CHECKED: J.A. 1000 BY J.A. 1000 1000.142



SIDE CHANNEL MSII  
RIVER MILE : 115.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE III : 2020 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-VI  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8120ENX

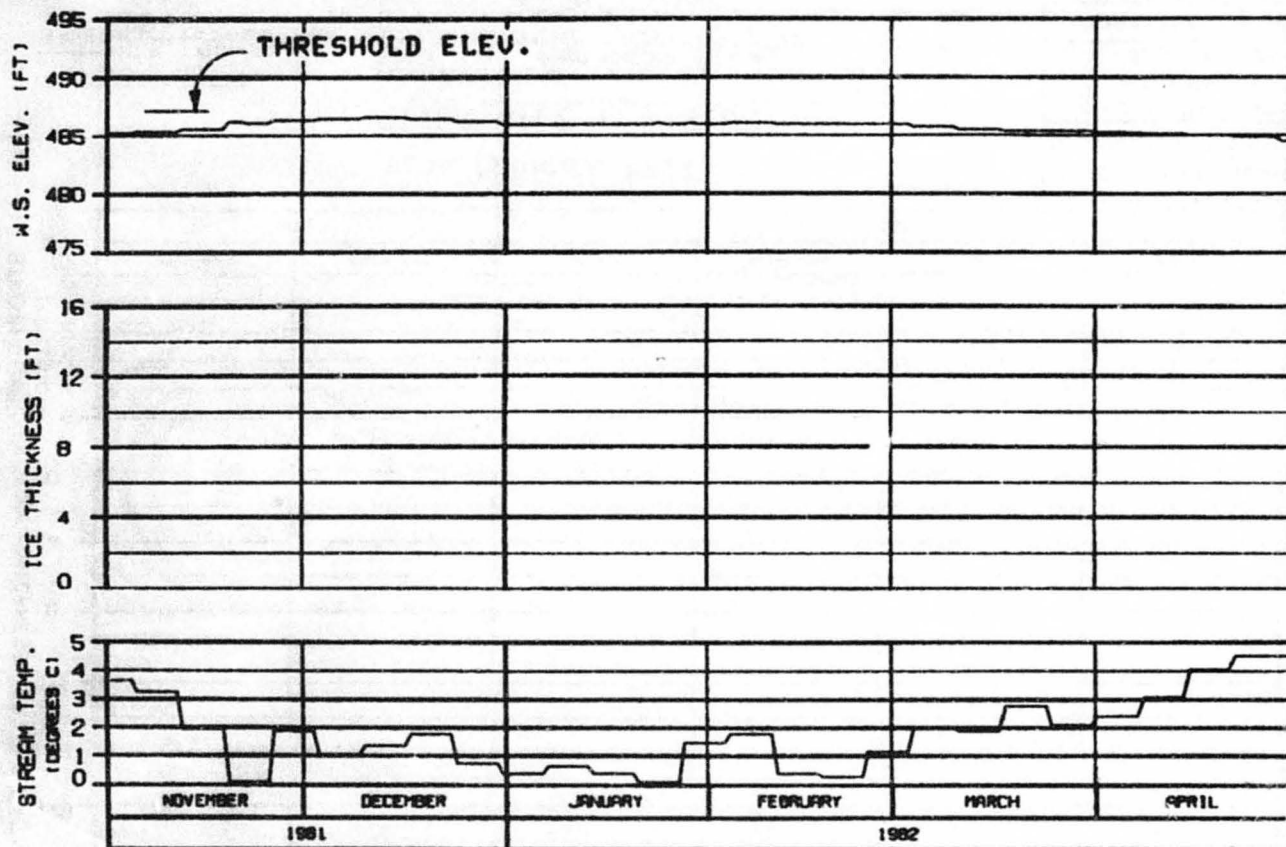
ALASKA POWER AUTHORITY

SUBMITTAL PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHECKED: RLA PHOTO 20 JUL 82 1982.142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

HEAD OF SIDE CHANNEL MSII  
 RIVER MILE : 115.90

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENX

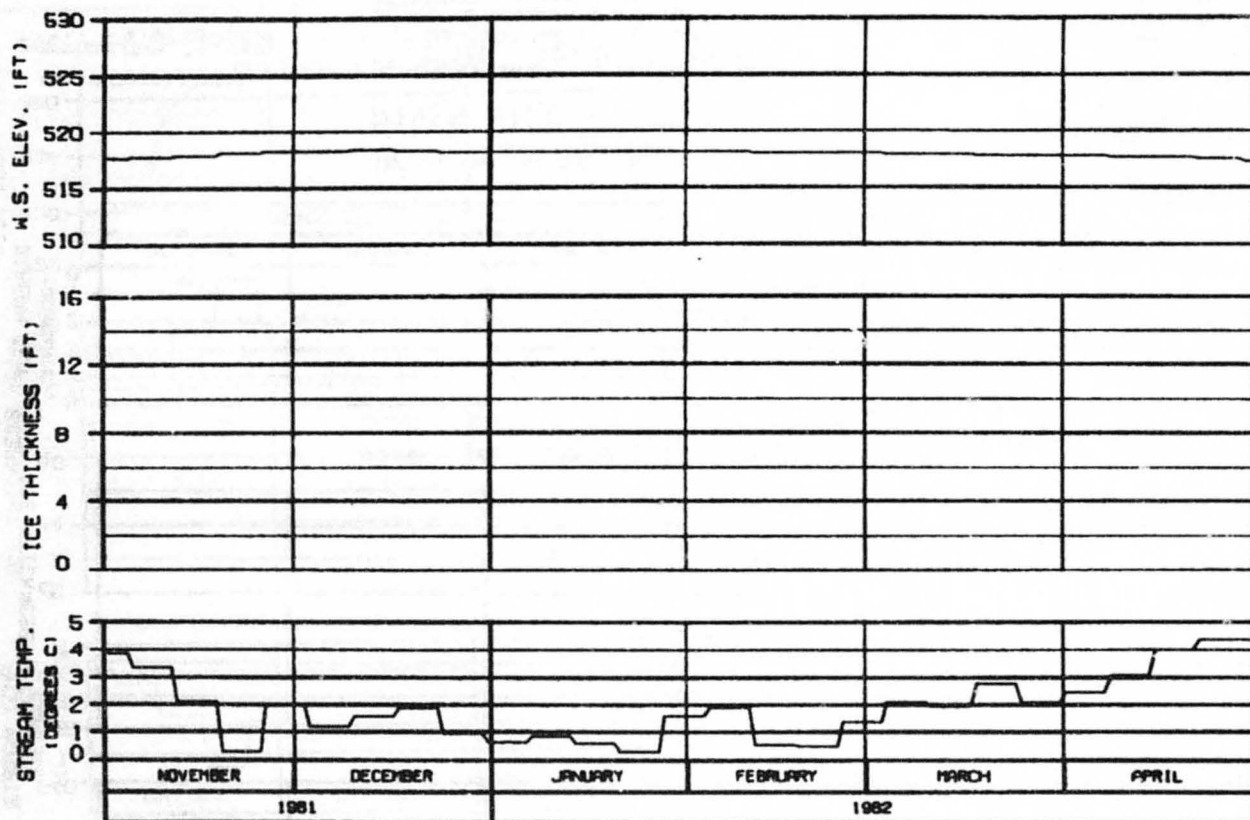
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBRACD JOINT VENTURE

CHICHO, S.L.P. 810 810 810 810 1982.142



ICE THICKNESS LEGEND:

——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING . FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENX

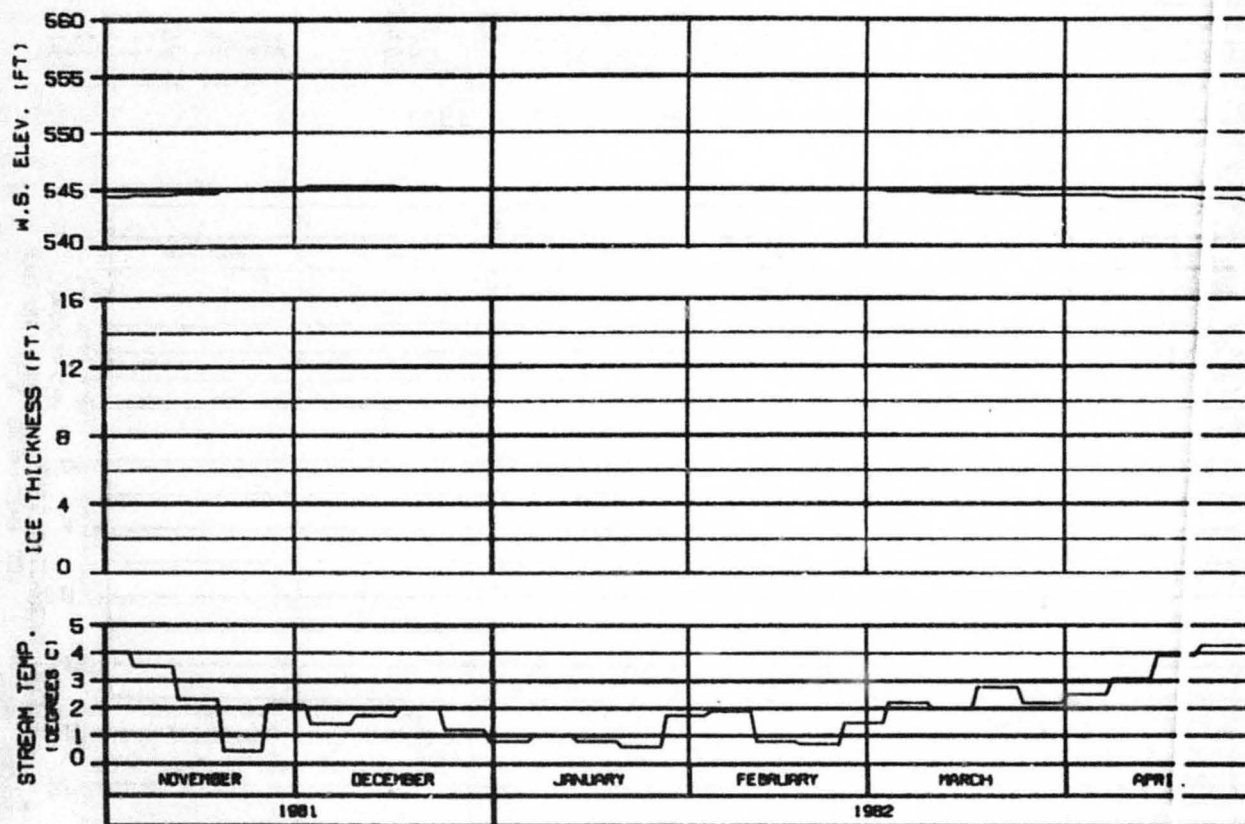
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBRACO JOINT VENTURE

DESIGNED BY: J. L. PETERSON DATE: JAN. 82 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF MOOSE SLOUGH  
 RIVER MILE : 123.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENX

ALASKA POWER AUTHORITY

SUBMITTAL PROJECT

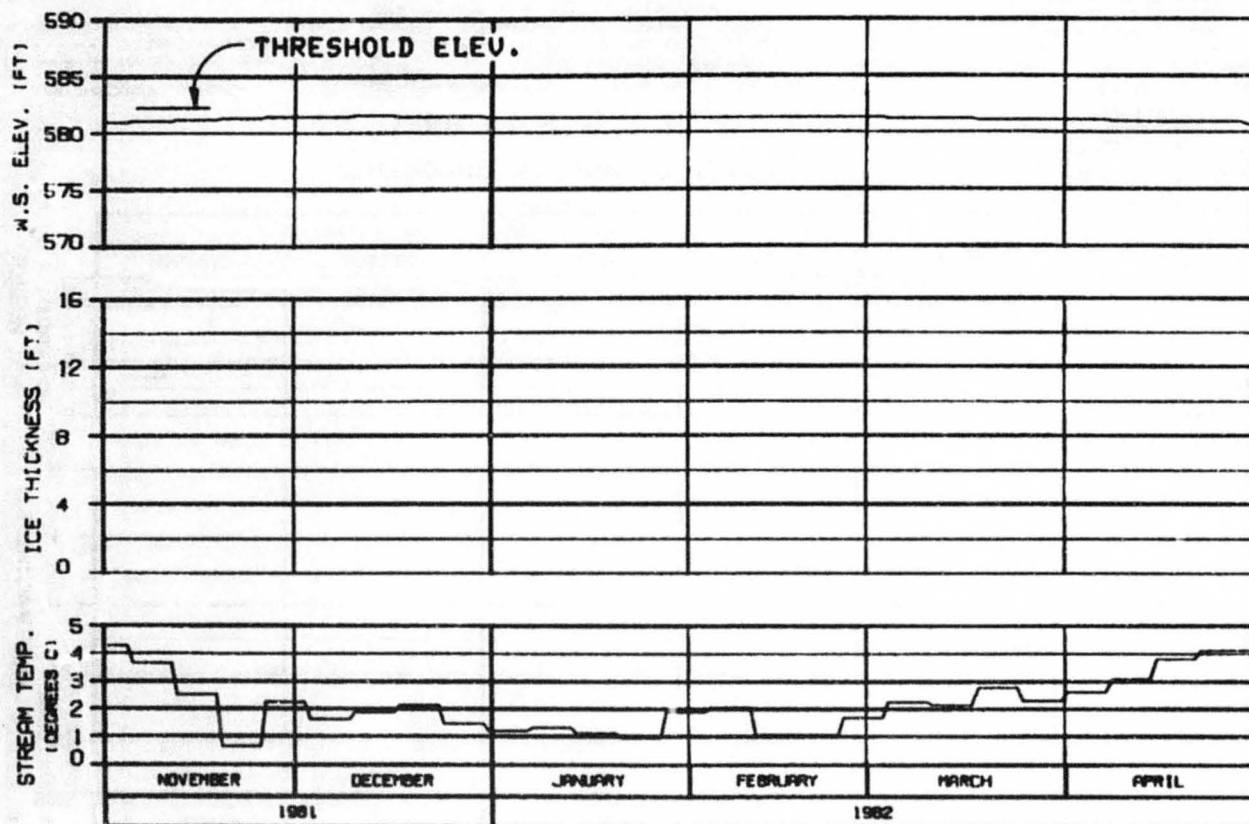
SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNER: BLD/DES 1 11.11.81 1981.142







HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENX

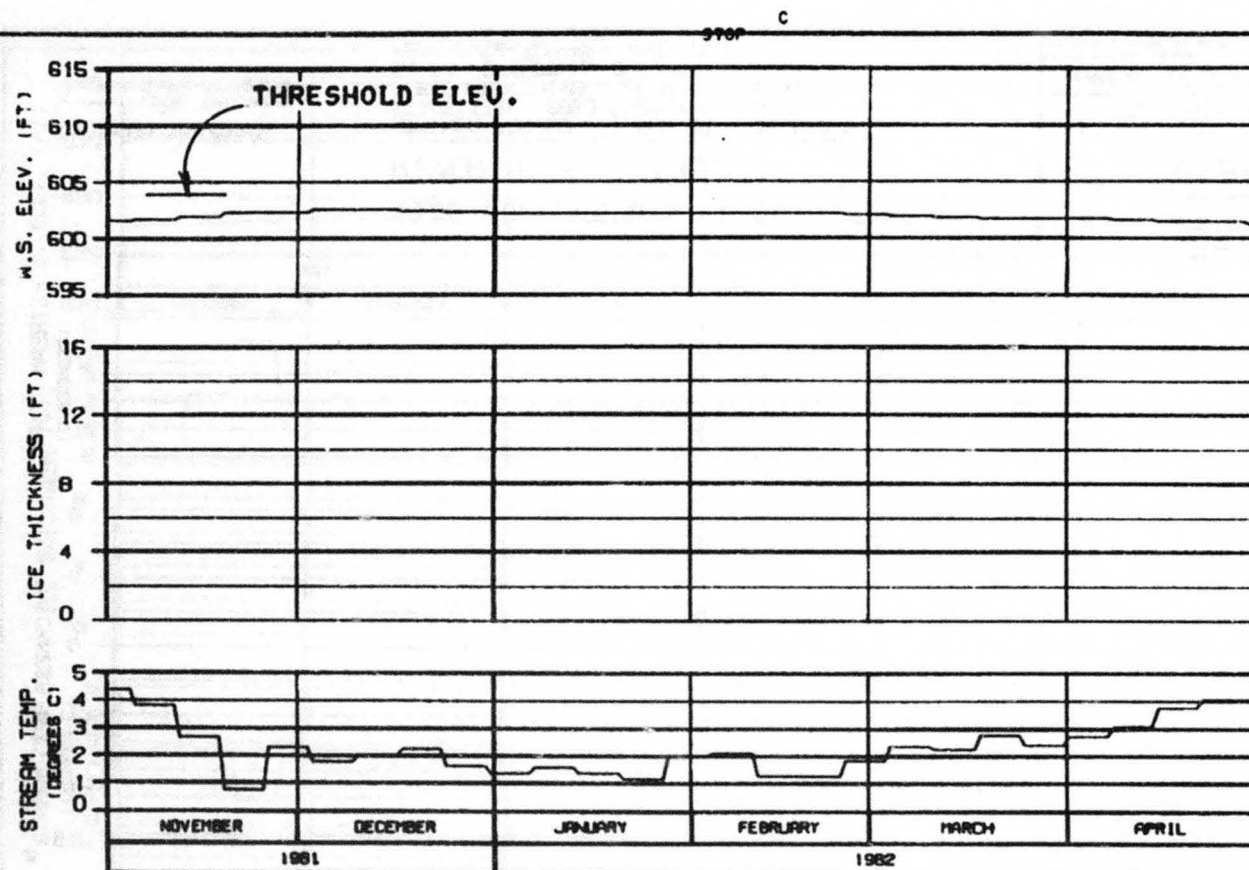
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: BLD/DB 00 JAN 82 1000.142



**HEAD OF SLOUGH 9**  
**RIVER MILE : 129.30**

**ICE THICKNESS LEGEND:**  
—— TOTAL THICKNESS  
----- SLOUGH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE III 2020 ENERGY DEMAND  
INFLOW-MATCHING FLOW CASE E-VI  
50 FT. DRAWDOWN 2 PORTS  
REFERENCE RUN NO. : 8120ENX

**ALASKA POWER AUTHORITY**

**SUSITNA PROJECT**

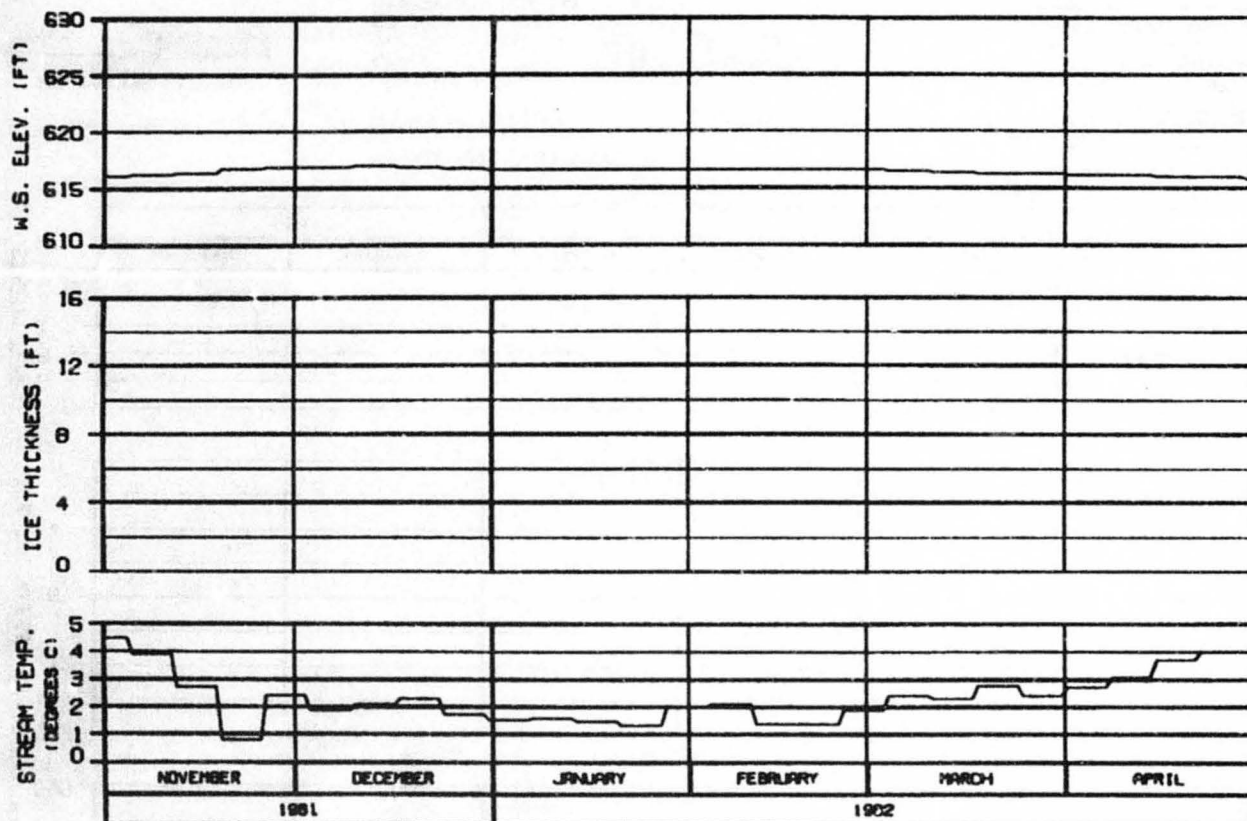
**SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY**

**HARZA-EBASCO JOINT VENTURE**

DISCHG. CALCULATED BY J.A. CO. 1988.142

OPTION2

OPTION?



## ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF SLOUGH 9  
 RIVER MILE : 130.60

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENX

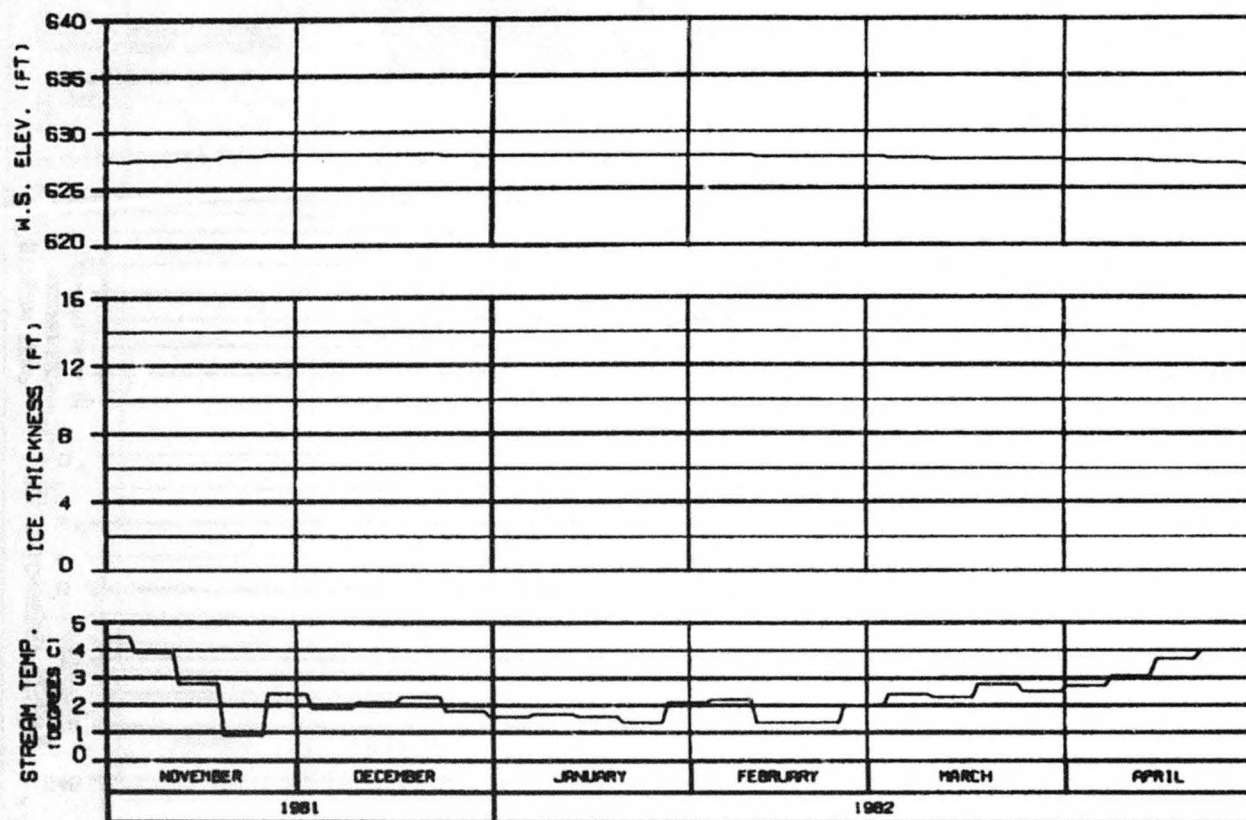
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DUCHESS, 6.1.9-8.10 88 J.A. 88 1988.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF 4TH JULY CREEK  
 RIVER MILE : 131.80

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ST. 7E III 2020 ENERGY DEMAND  
 INFL W-MATCHING . FLOW CASE E-VI  
 50 FT. DRAWDOWN. 2 PORTS  
 REFERENCE RUN NO. : 8120ENX

ALASKA POWER AUTHORITY

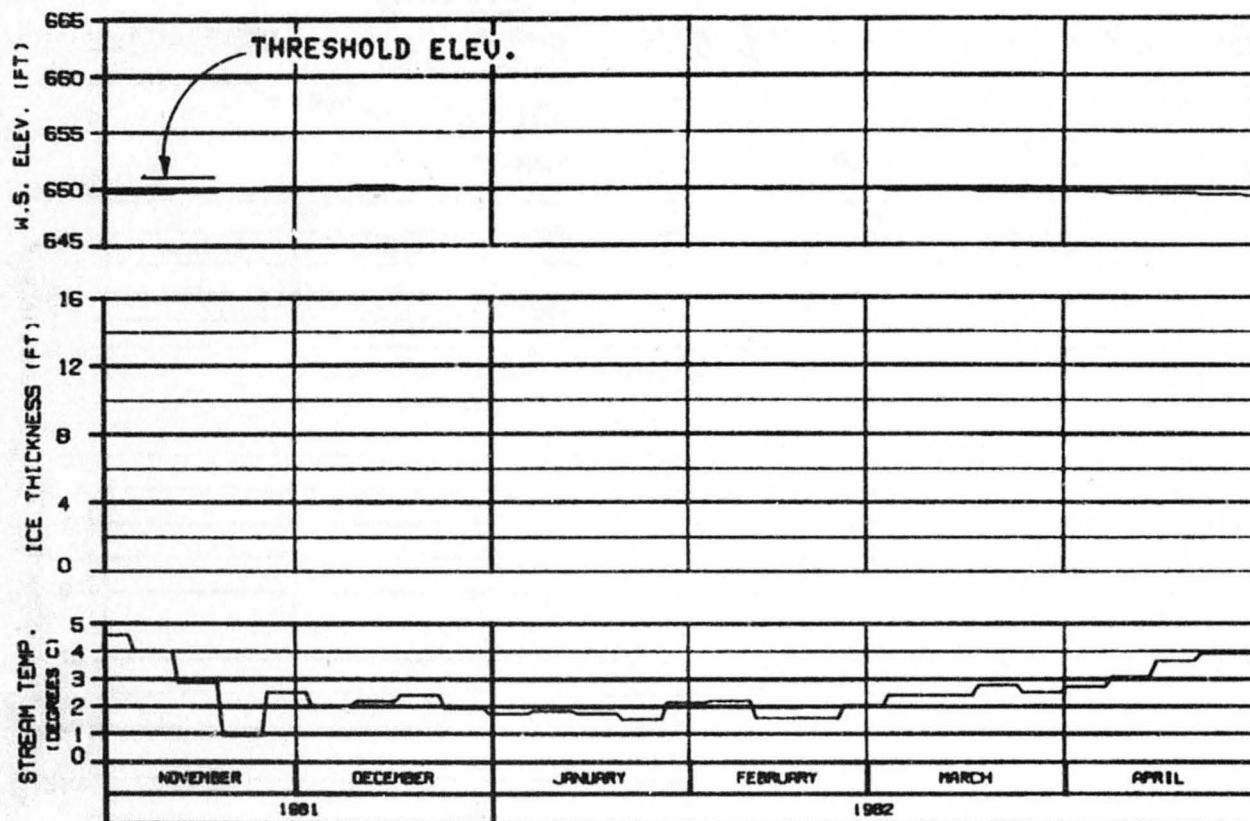
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HEARZ-EBASCO JOINT VENTURE

DISTRICT: S.A. DISTRICT 89 JAN 82 1003.142





HEAD OF SLOUGH 9A  
RIVER MILE : 133.70

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : B12DENX

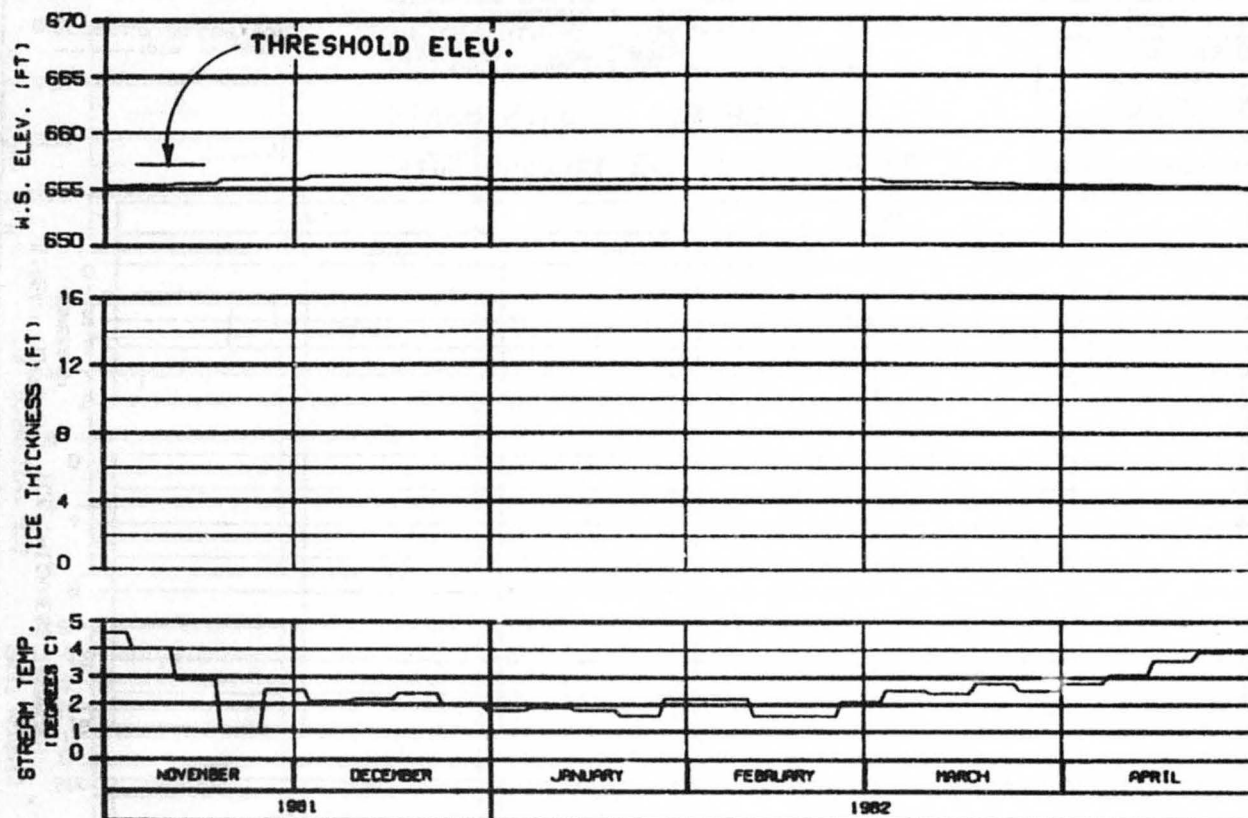
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBRSCO JOINT VENTURE

000000, 01/00/82 00 00 00 1000,142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF SLOUGH 10  
 RIVER MILE : 134.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING FLOW CASE E-VI  
 50 FT. DRANDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENX

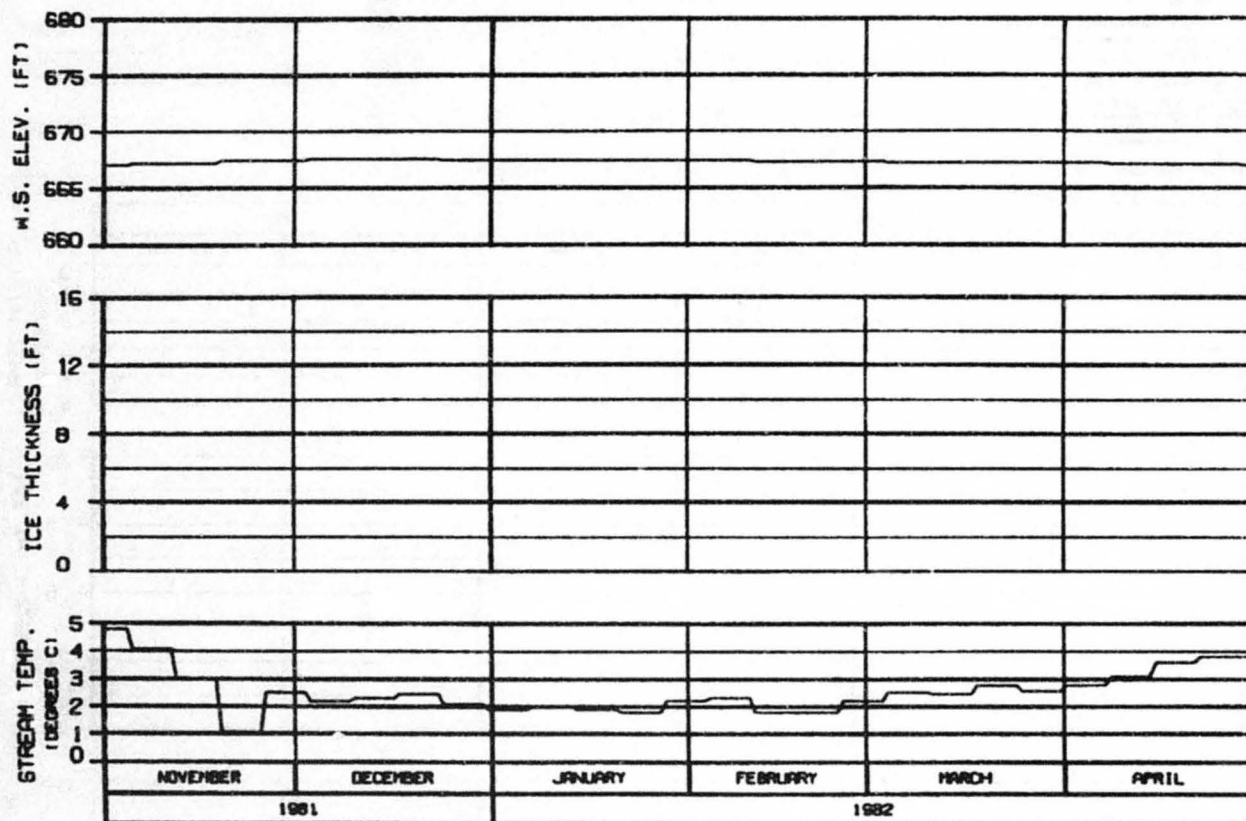
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HPA-EBRSCO JOINT VENTURE

CHIEF, EL PASO 30 JUL 82 1982.142



SIDE CHANNEL D/S OF SLOUGH 11

RIVER MILE : 135.30

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENX

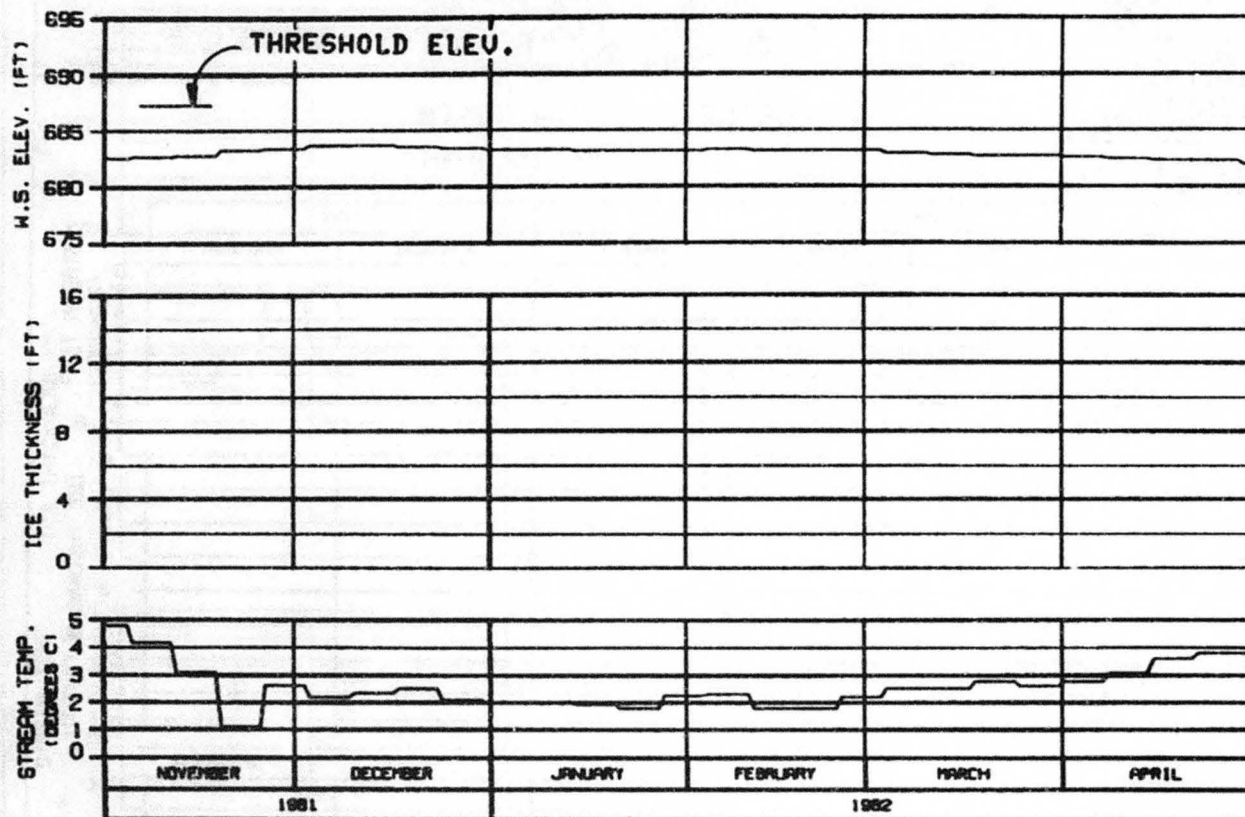
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

ORDER: 84-0000 00 00 00 000.142



HEAD OF SLOUGH 11  
RIVER MILE : 136.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE III - 2020 ENERGY DEMAND  
INFLOW-MATCHING - FLOW CASE E-VI  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8120ENX

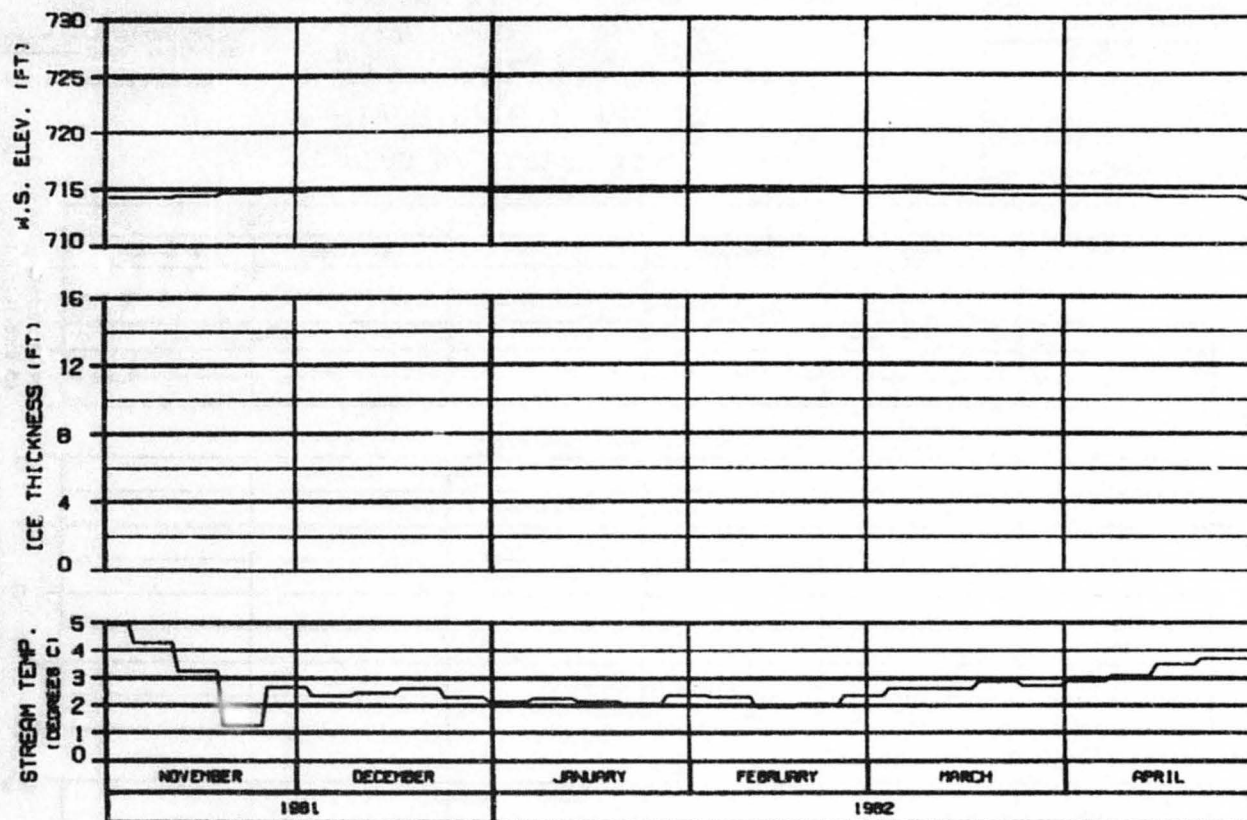
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBASCO JOINT VENTURE

DRAWN: ELLPOT 28 JUL 82 1508.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 17  
 RIVER MILE : 139.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : B120ENX

ALASKA POWER AUTHORITY

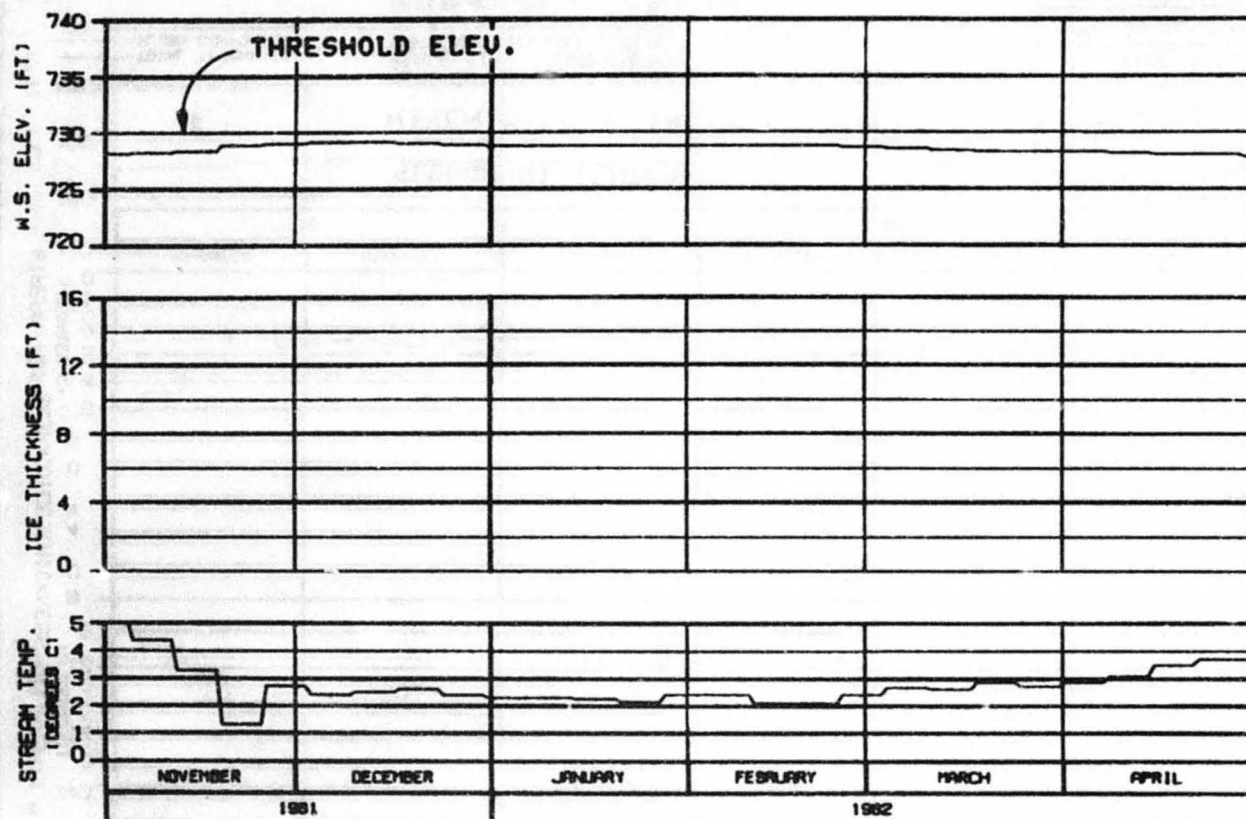
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHECKED: ELLIOTT BY J.A. OR 1088.142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 20  
 RIVER MILE : 140.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III - 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
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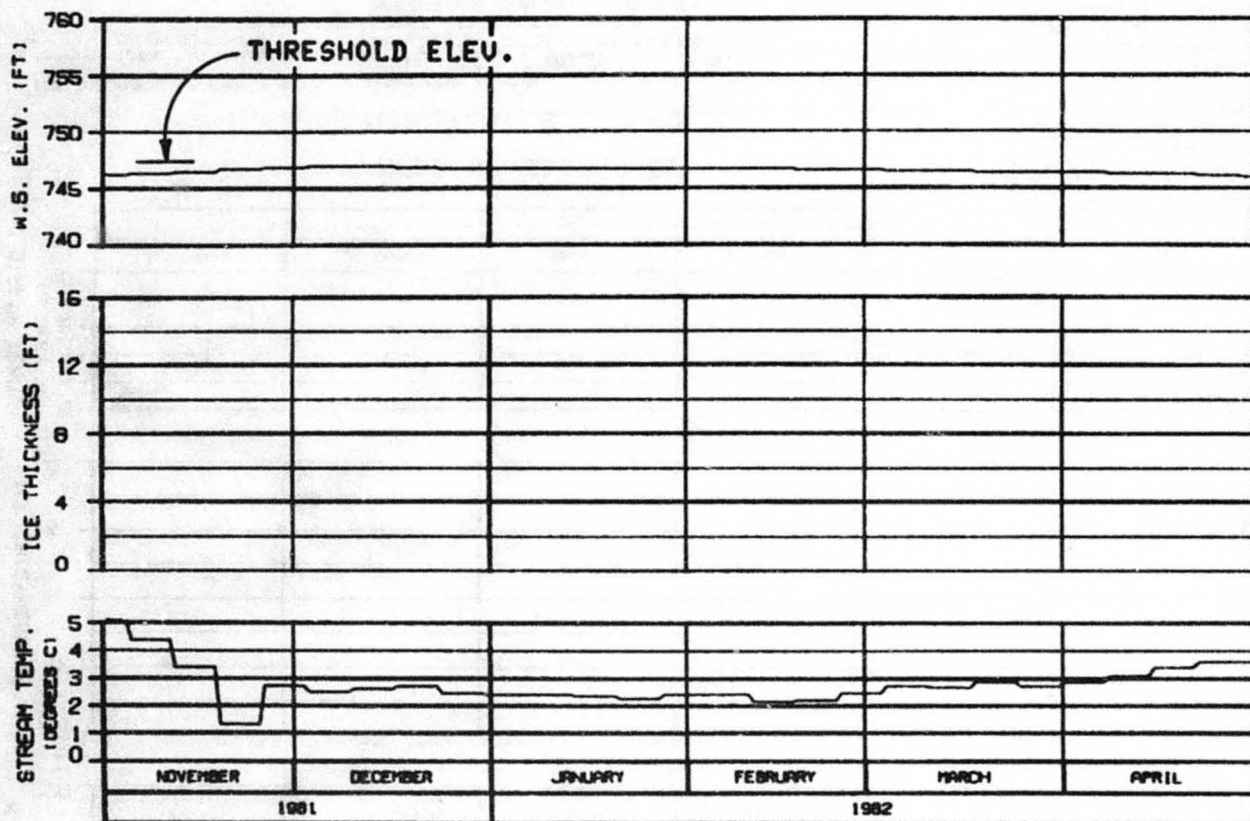
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

DRAWN: BL/BNR 00 JA 82 1988.142



SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
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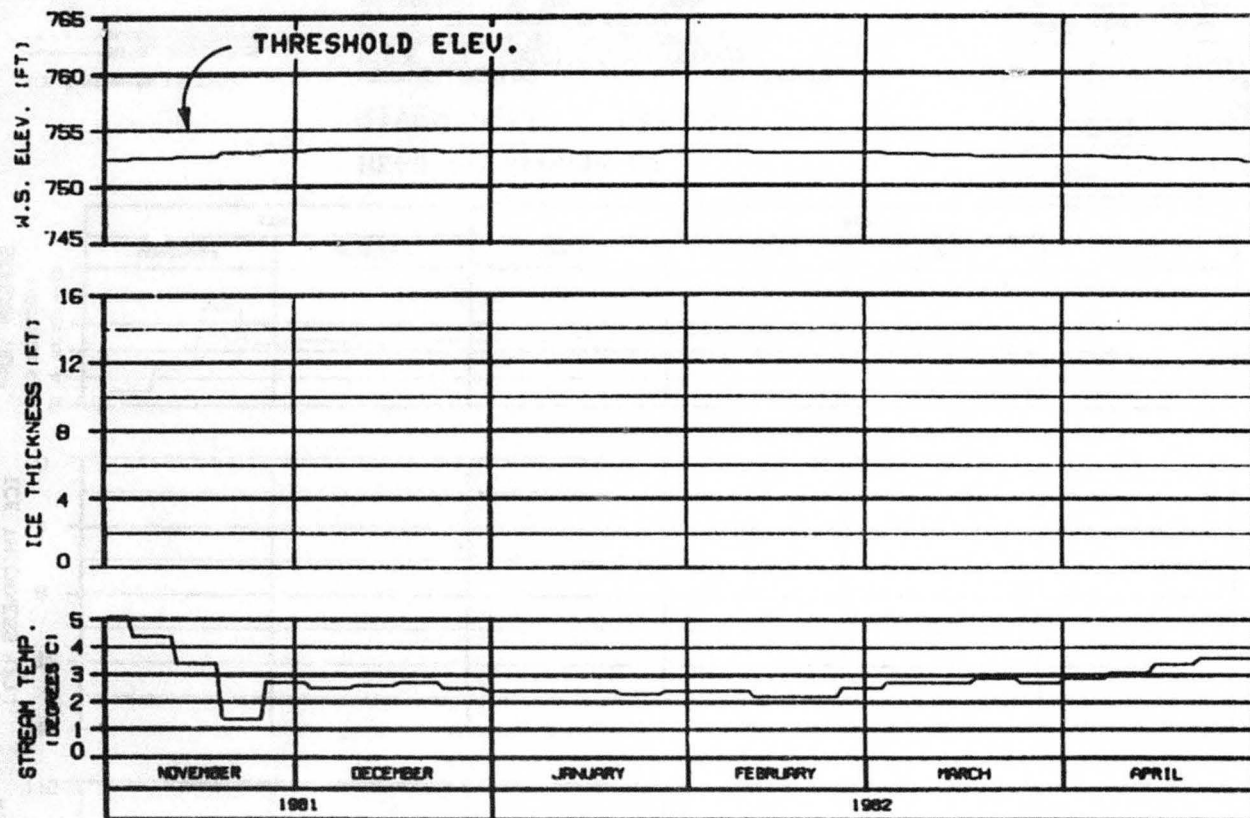
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBASCO JOINT VENTURE

DRAWING: E-14-0000 00 JUL 82 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 21  
 RIVER MILE : 142.20

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING . FLOW CASE E-VI  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENX

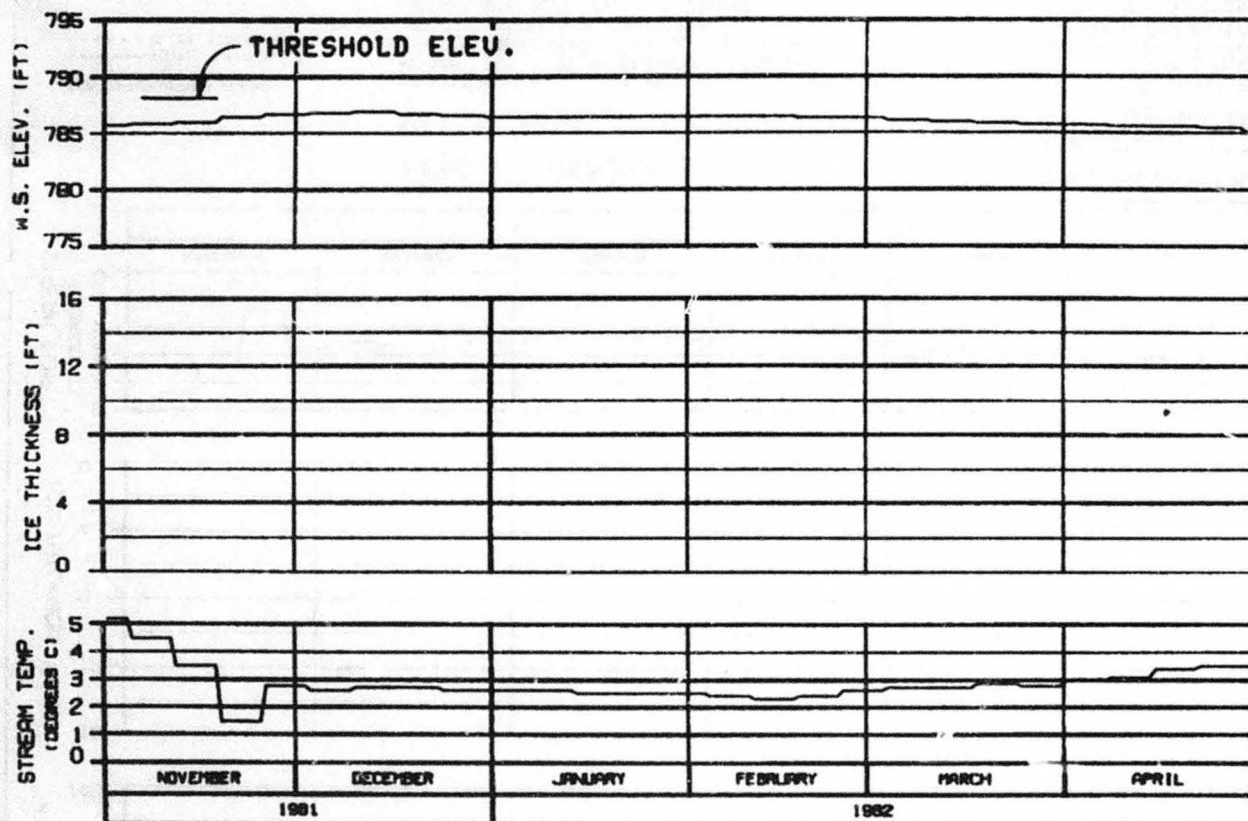
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHUCKER. PLANNED 20 JUL 82 1588.142



HEAD OF SLOUGH 22  
RIVER MILE : 144.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE III 2020 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-VI  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8120ENX

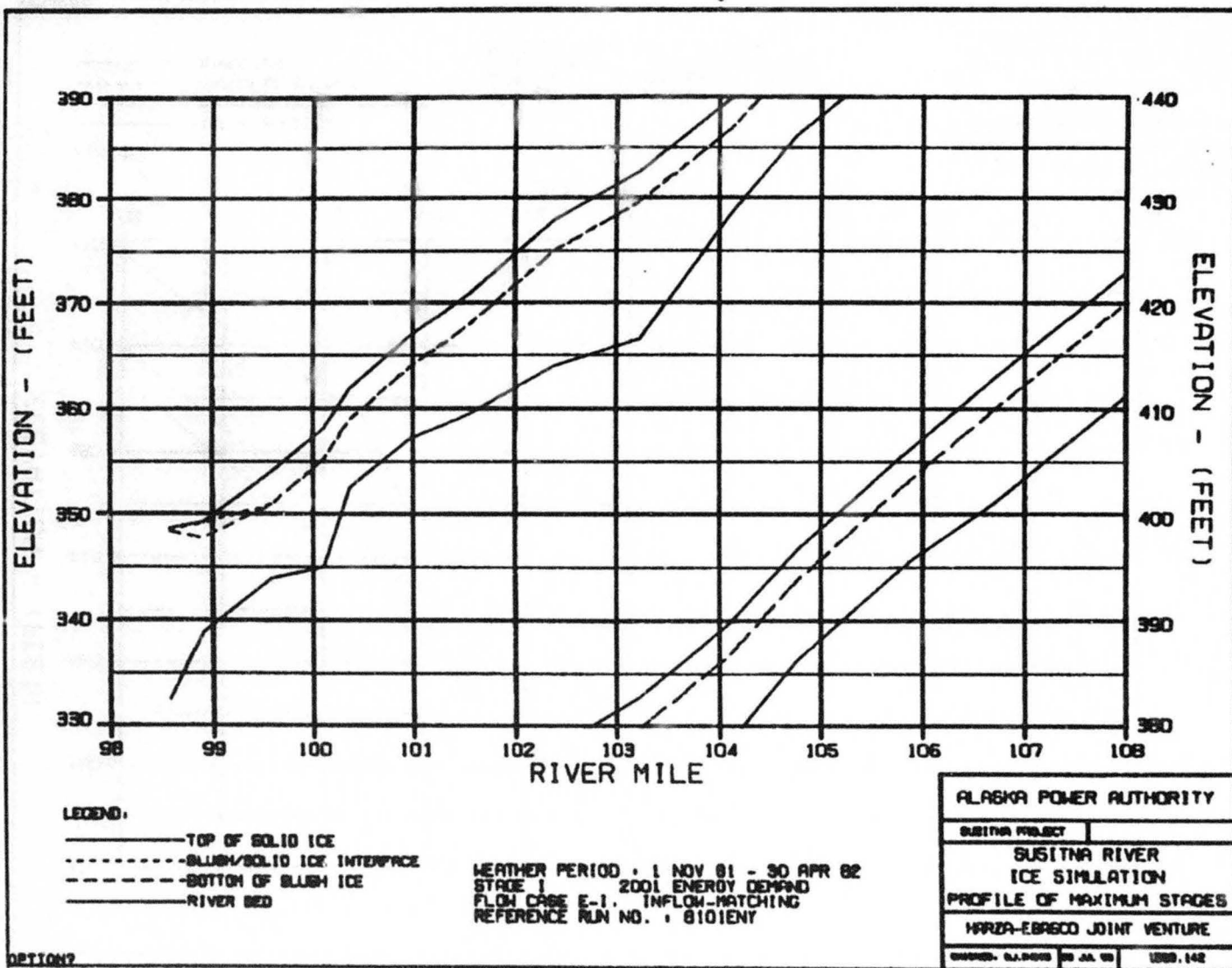
OPTION?

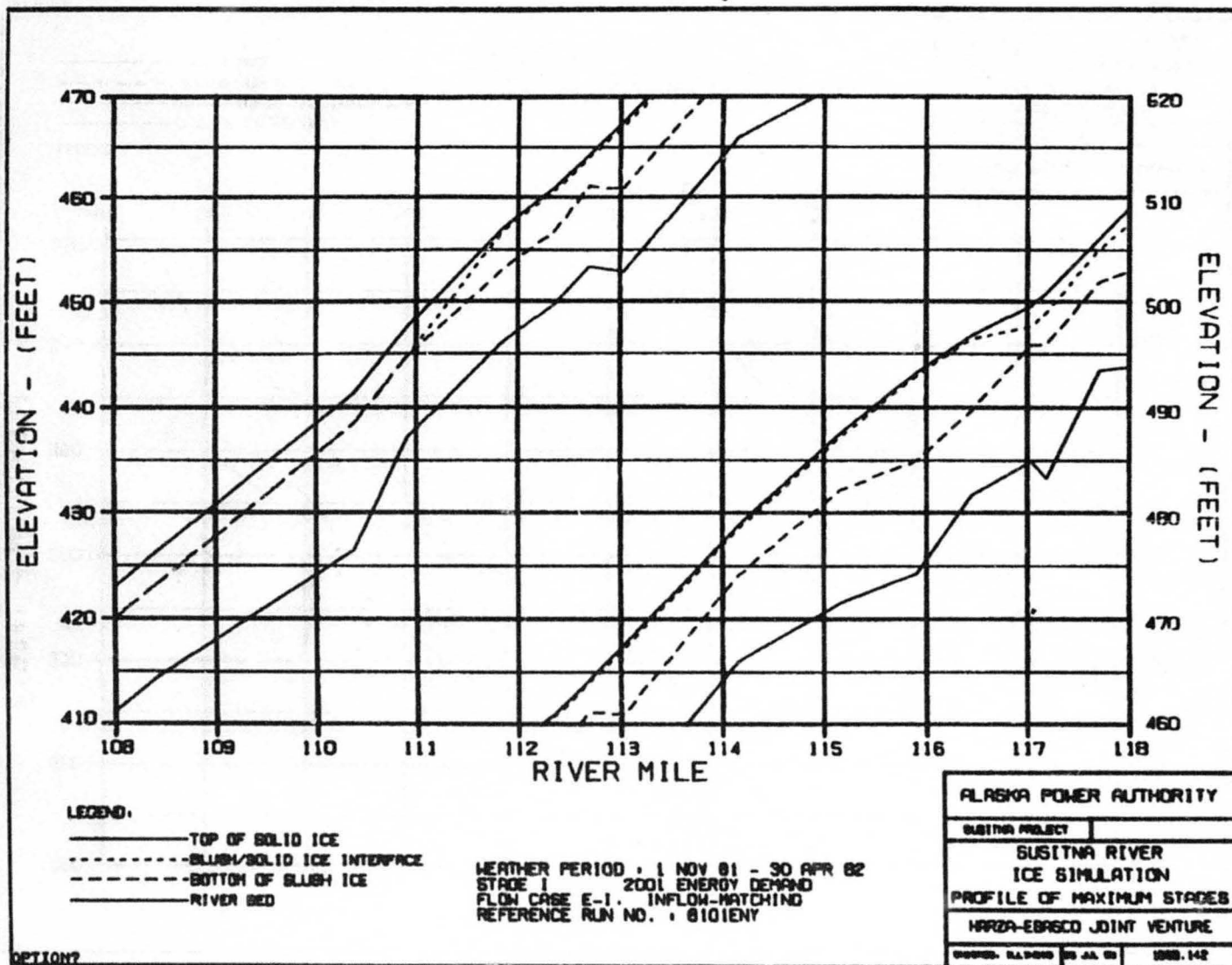
ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER ICE SIMULATION TIME HISTORY	
HARZA-EBASCO JOINT VENTURE	
CHECKED: S.A. DAVIS	20 JAN 82
ISSN: 142	

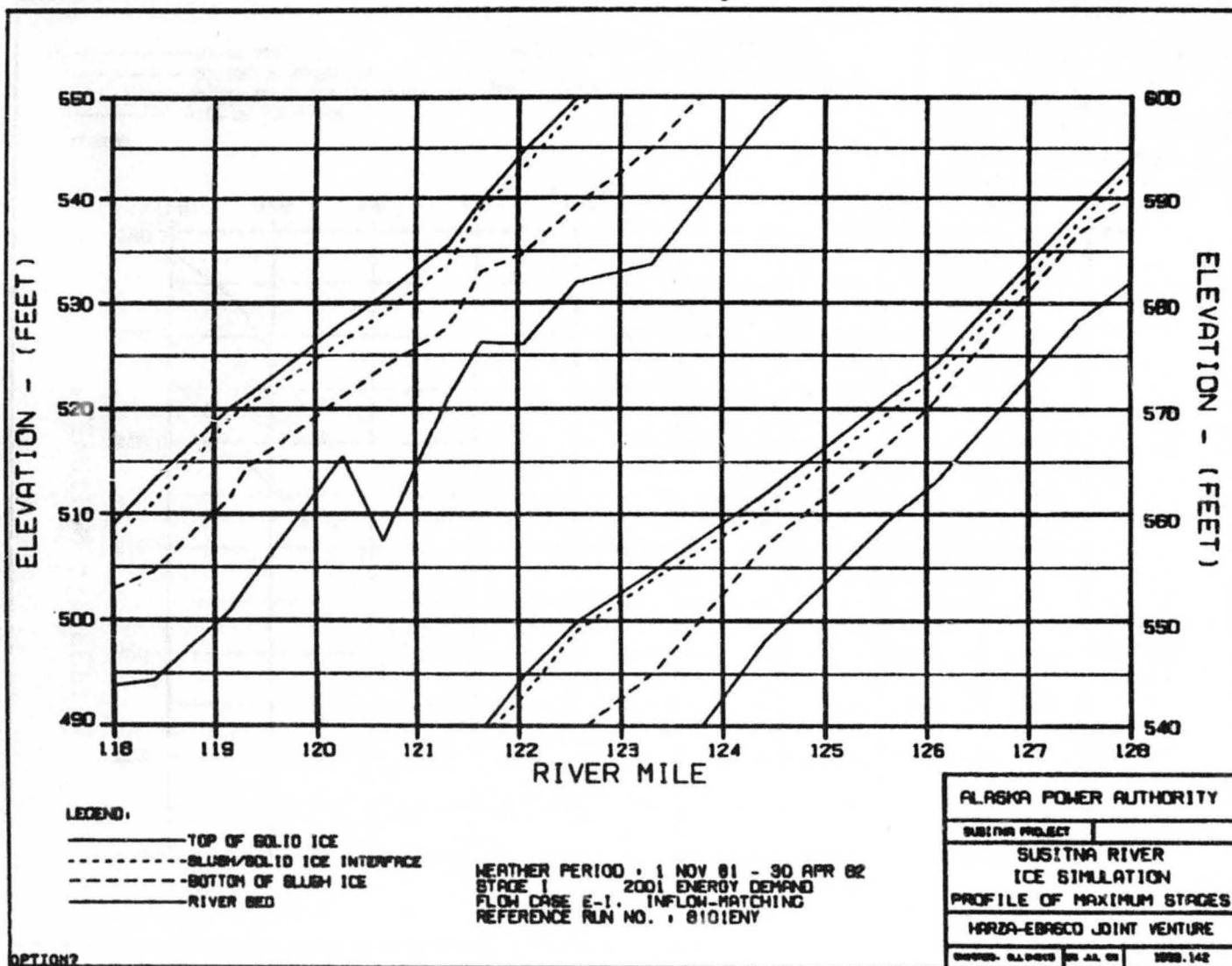


**EXHIBIT D**



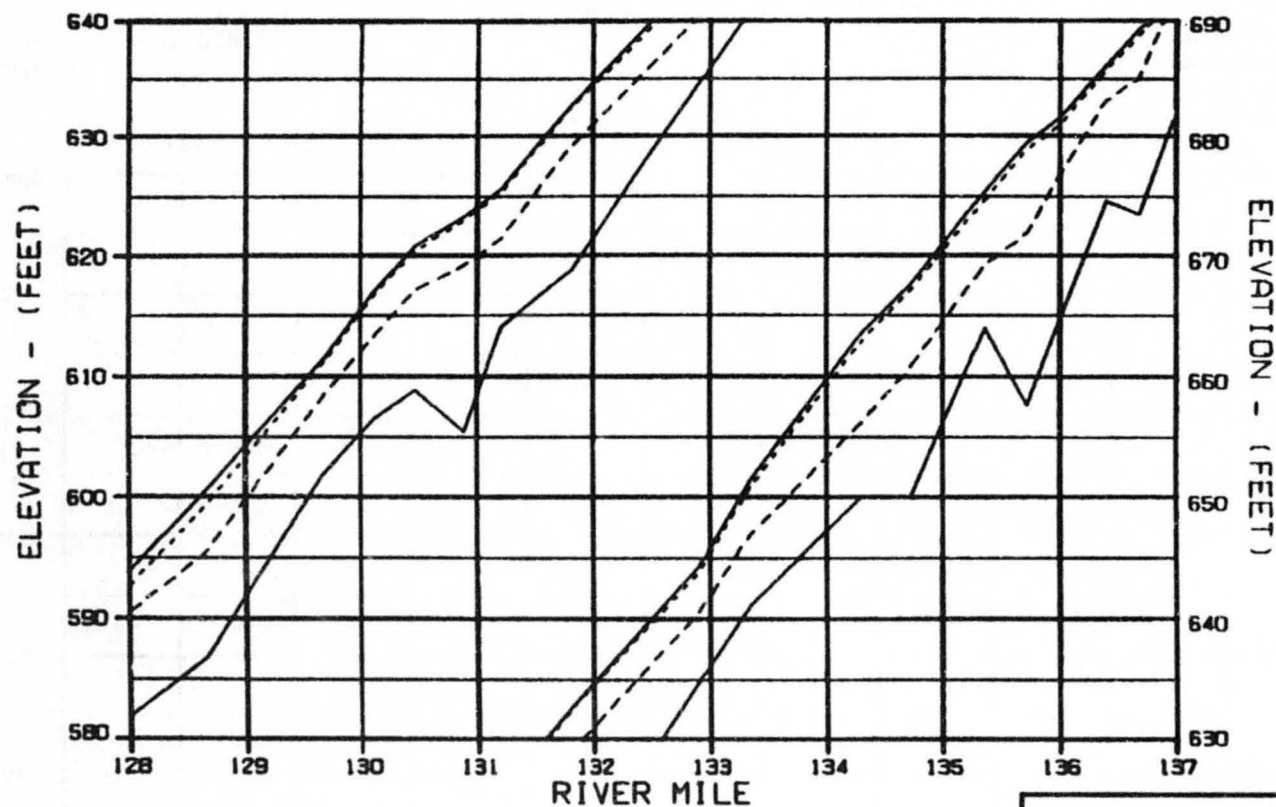






OPTION?

C



## LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- ..... BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 FLOW CASE E-1, INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101ENY

ALASKA POWER AUTHORITY

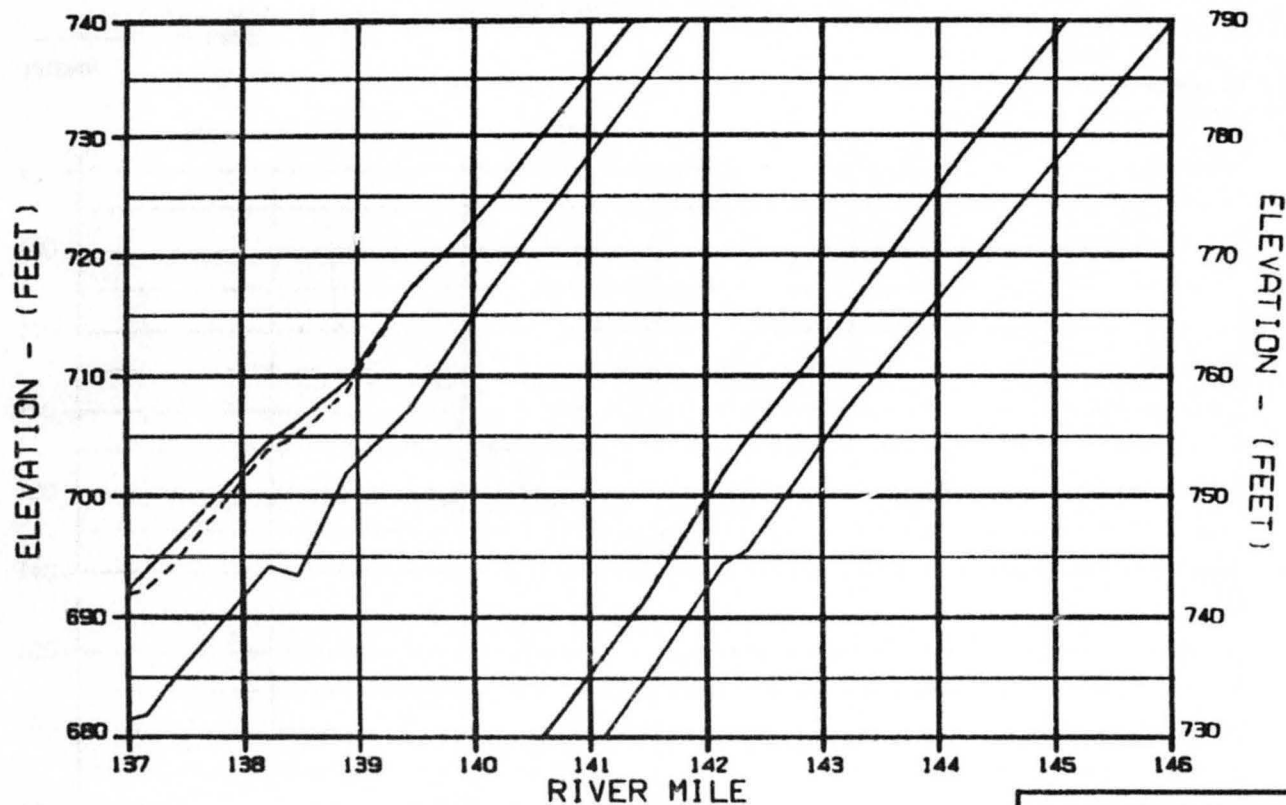
SUBMITTER PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

CHECKED: B. L. BROWN 05 JUL 82 1000.142

OPTION?



## LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 FLOW CASE E-1. INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101ENY

## ALASKA POWER AUTHORITY

SUSITNA PROJECT

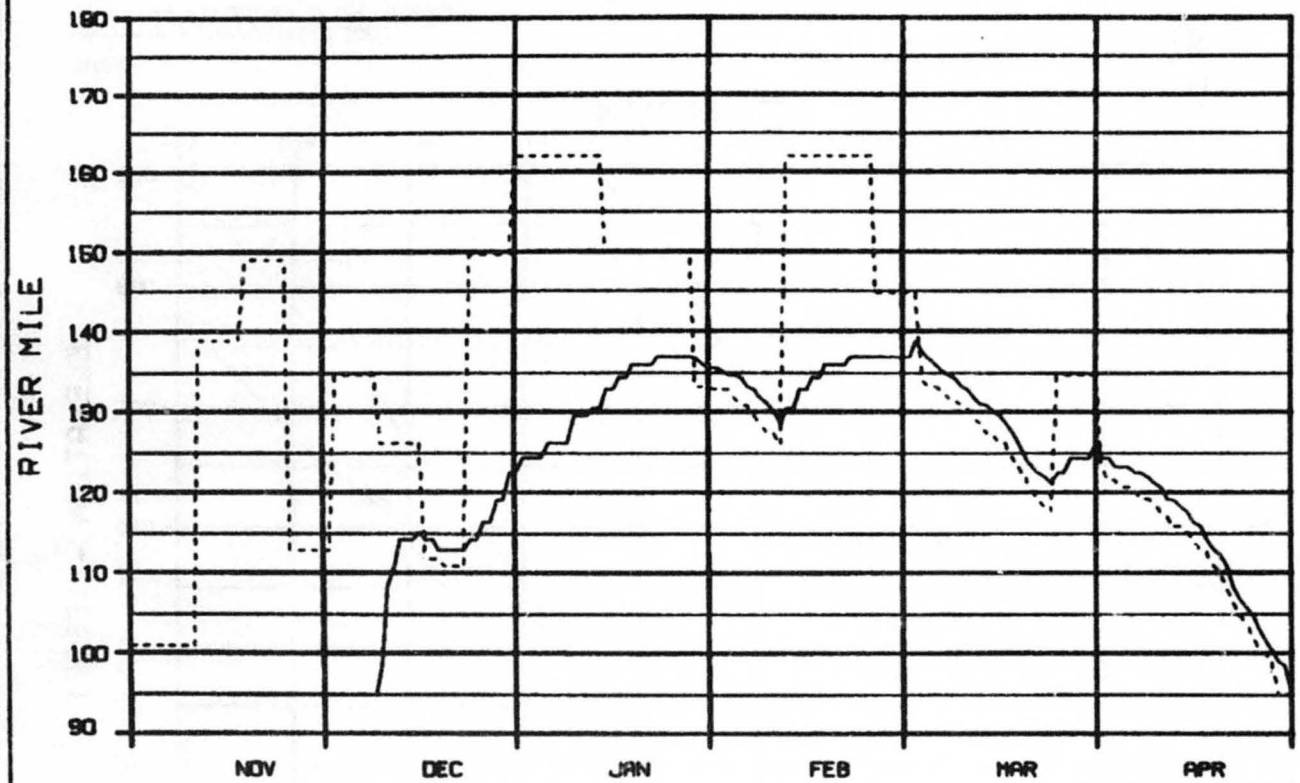
SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

DESIGNED BY P-100 20 JUL 82 1000.142

OPTION?





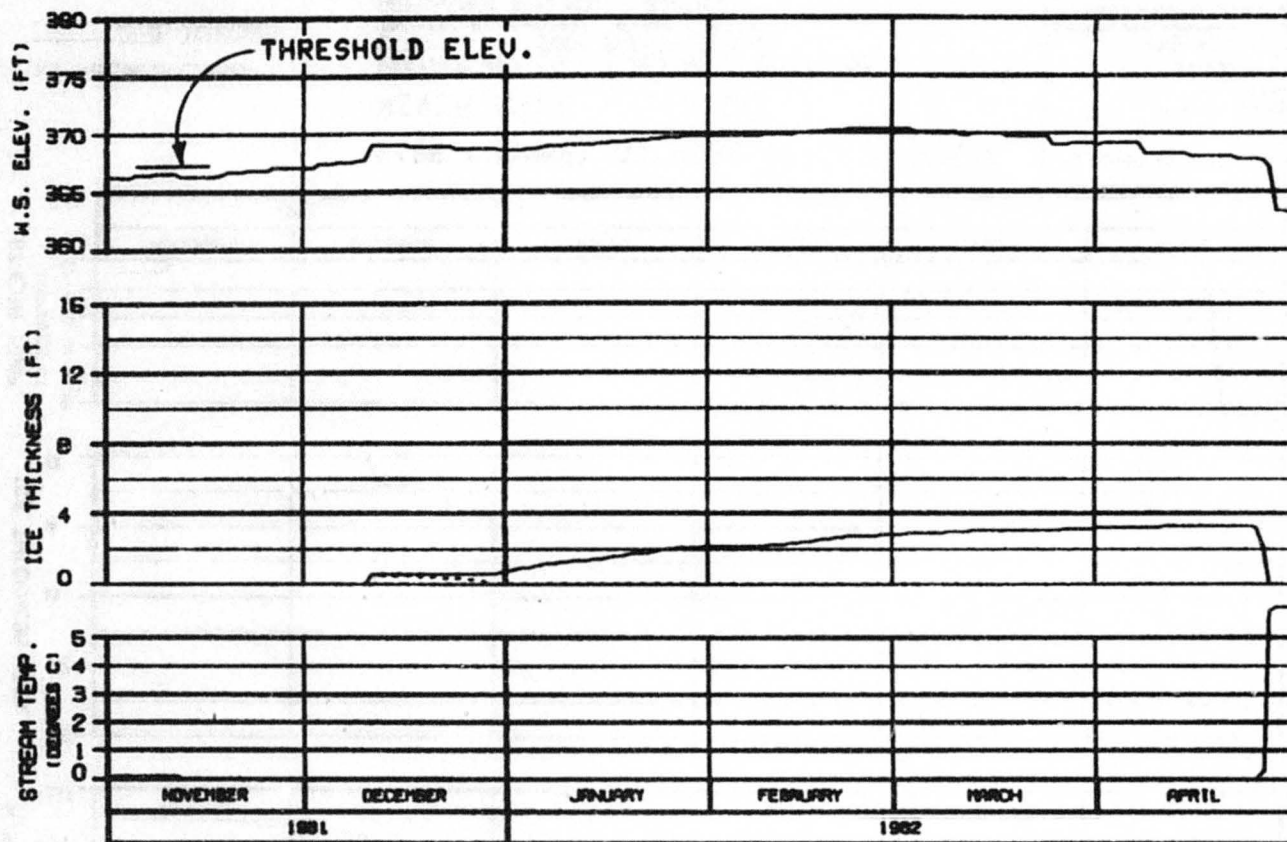
LEGEND:

- ICE FRONT
- - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE 1 2001 ENERGY DEMAND  
FLOW CASE E-1 INFLOW-MATCHING  
REFERENCE RUN NO. : 8101ENY

ALASKA POWER AUTHORITY	
SUSTINA PROJECT	
SUSTINA RIVER	
PROGRESSION OF ICE FRONT	
& ZERO DEGREE ISOTHERM	
HARZA-EBASCO JOINT VENTURE	
DESIGNED BY: BLDG 20	DATE: 1982.142

OPTION?



**ICE THICKNESS LEGEND:**

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

**HEAD OF WHISKERS SLOUGH  
 RIVER MILE : 101.50**

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-MATCHING : FLOW CASE E-1  
 REFERENCE RUN NO. : 8101ENY

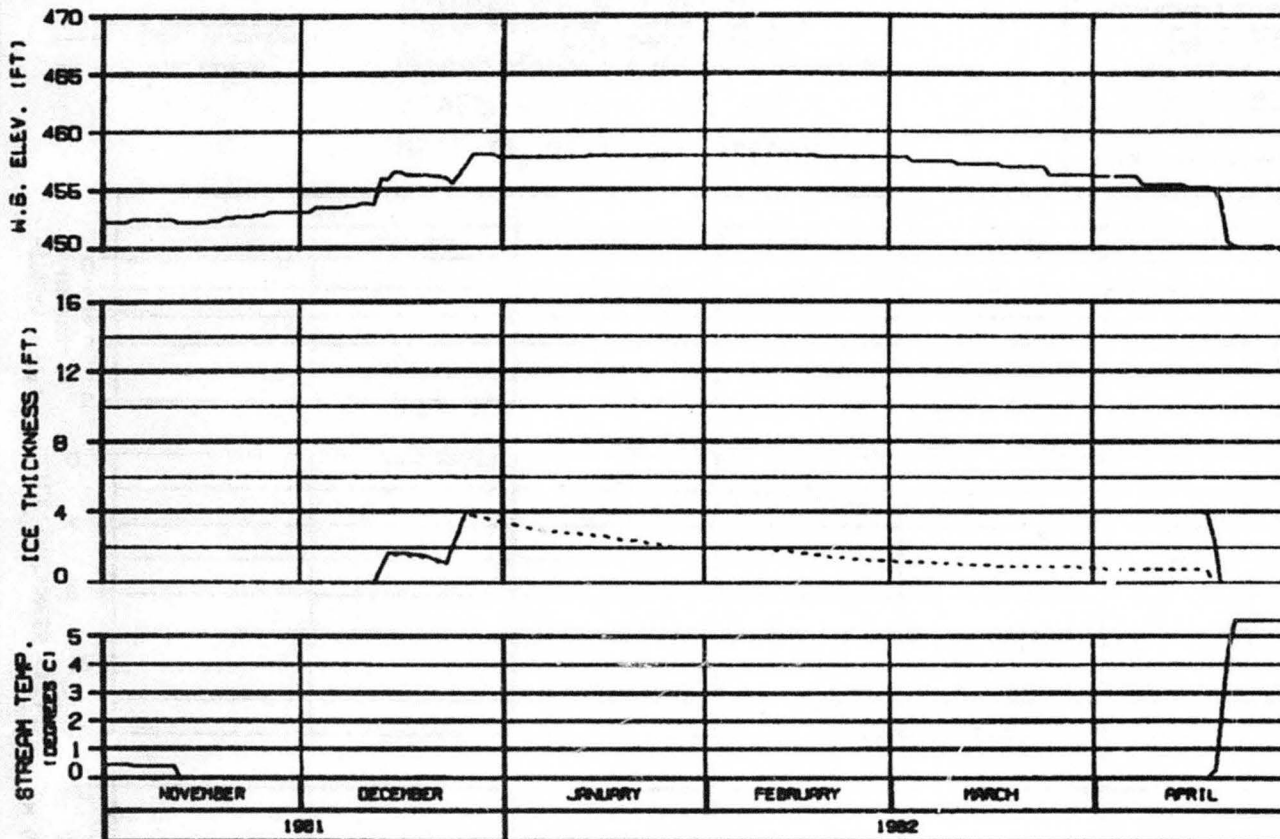
**ALASKA POWER AUTHORITY**

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZDA-EBASCO JOINT VENTURE

CHARTED: 04-19-82 BY J.E. 02 1982.142



**SIDE CHANNEL AT HEAD OF GASH CREEK**  
**RIVER MILE : 112.00**

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-MATCHING FLOW CASE E-1  
 REFERENCE RUN NO. : 8101ENY

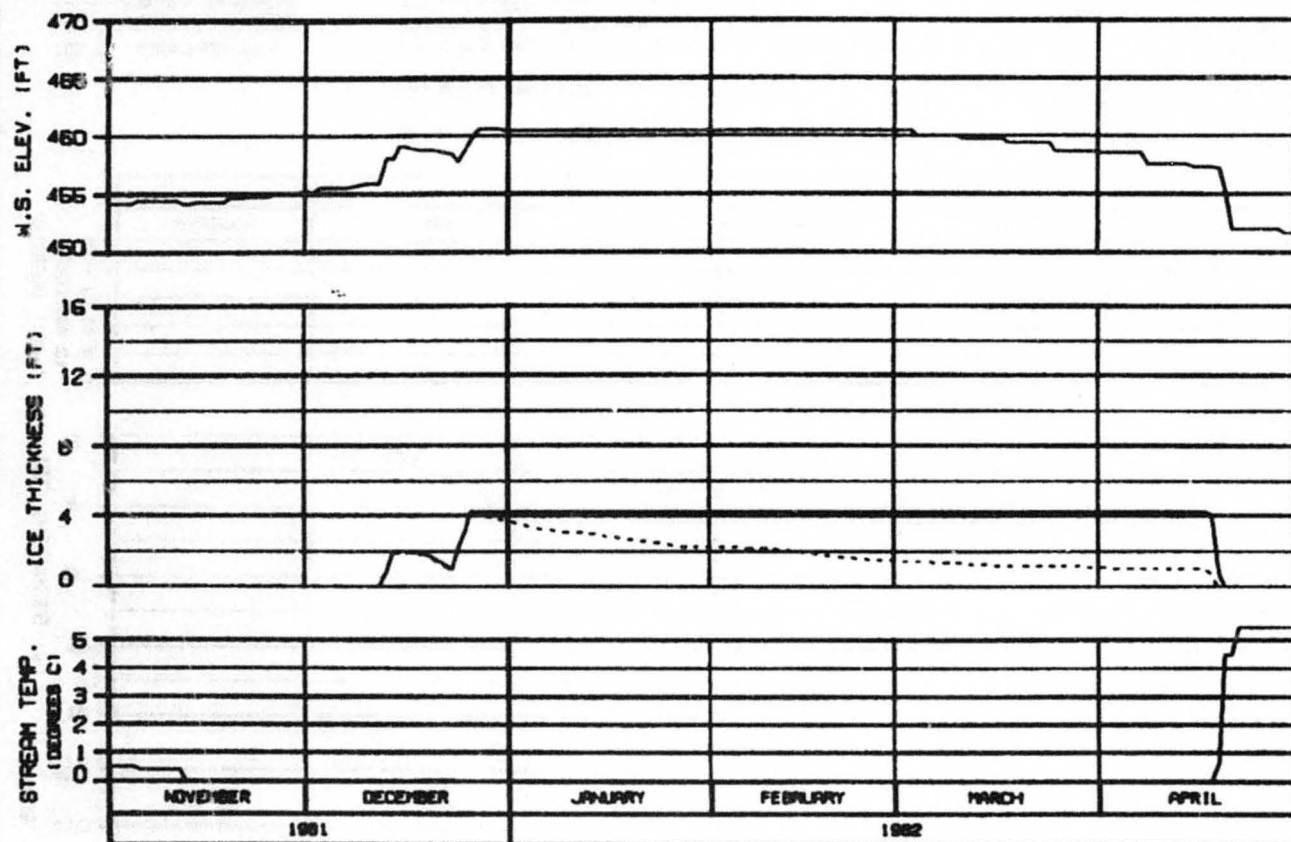
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARDA-EBRACO JOINT VENTURE

UNIVERS. 5.11.800 00 AA 01 1000.142



MOUTH OF SLOUGH 6A  
RIVER MILE : 112.34

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE I 2001 ENERGY DEMAND  
INFLOW-MATCHING : FLOW CASE E-1  
REFERENCE RUN NO. : 8101ENY

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

ALASKA POWER AUTHORITY

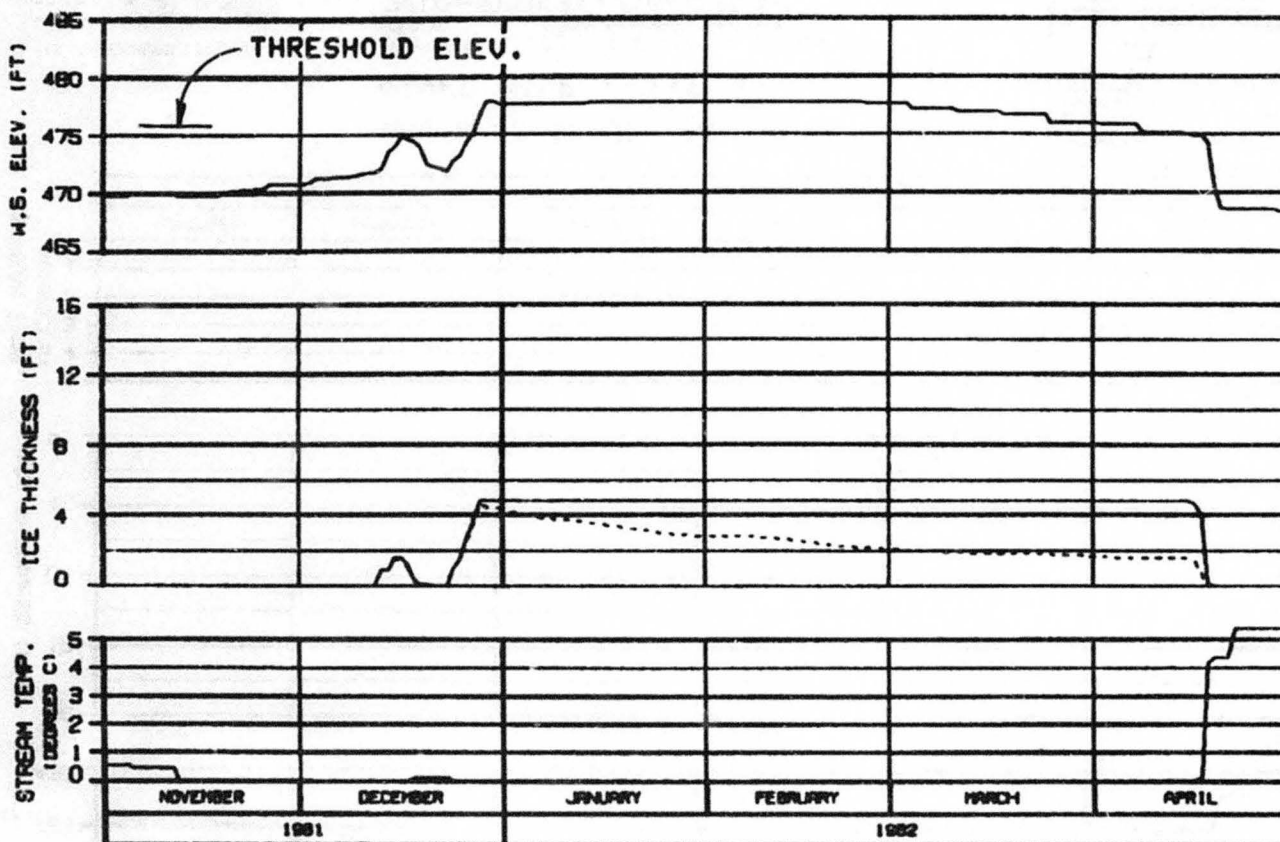
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZDA-EBR600 JOINT VENTURE

CHARTS: 81-0000 20 44 00 1982.142

OPTION 9



HEAD OF SLOUGH 8  
RIVER MILE : 114.10

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE I 2001 ENERGY DEMAND  
INFLOW-MATCHING : FLOW CASE E-1  
REFERENCE RUN NO. : 8101ENY

ALASKA POWER AUTHORITY

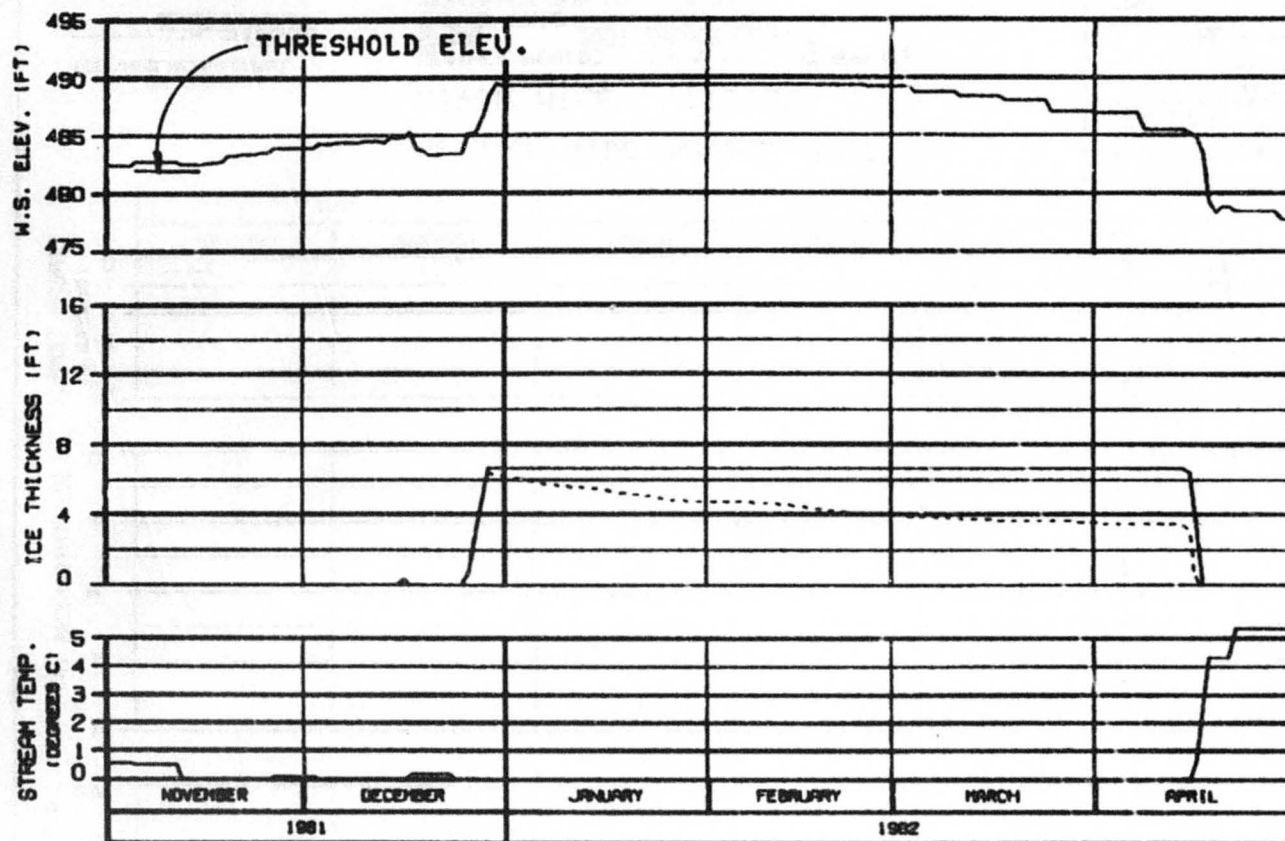
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: ELLP008 20 JUL 82 1000.142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - BLUISH COMPONENT

SIDE CHANNEL MSII  
 RIVER MILE : 115.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 REFERENCE RUN NO. : 8101ENY

ALASKA POWER AUTHORITY

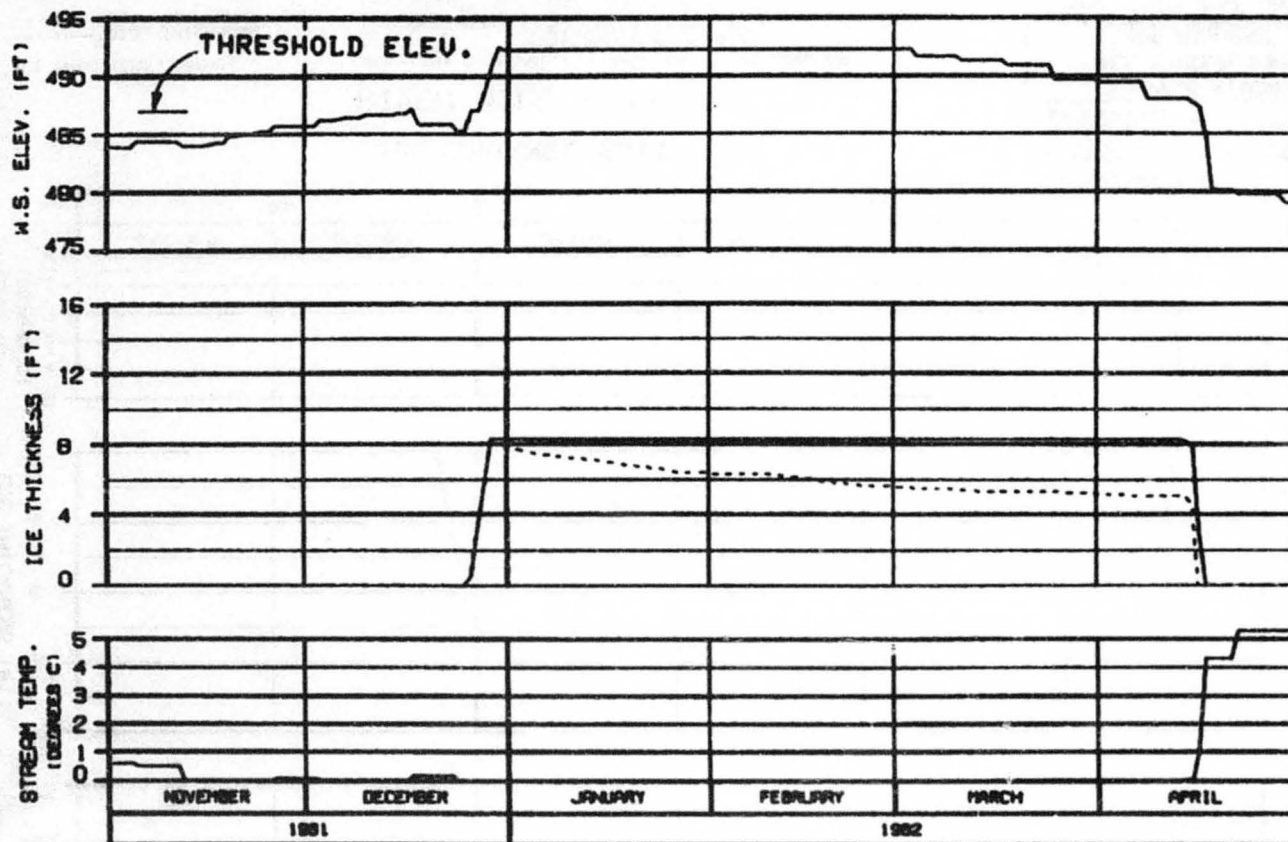
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: D.L. & S. 10 11 12 1982.142

OPTION 9



HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-MATCHING FLOW CASE E-1  
 REFERENCE RUN NO. : 8101ENY

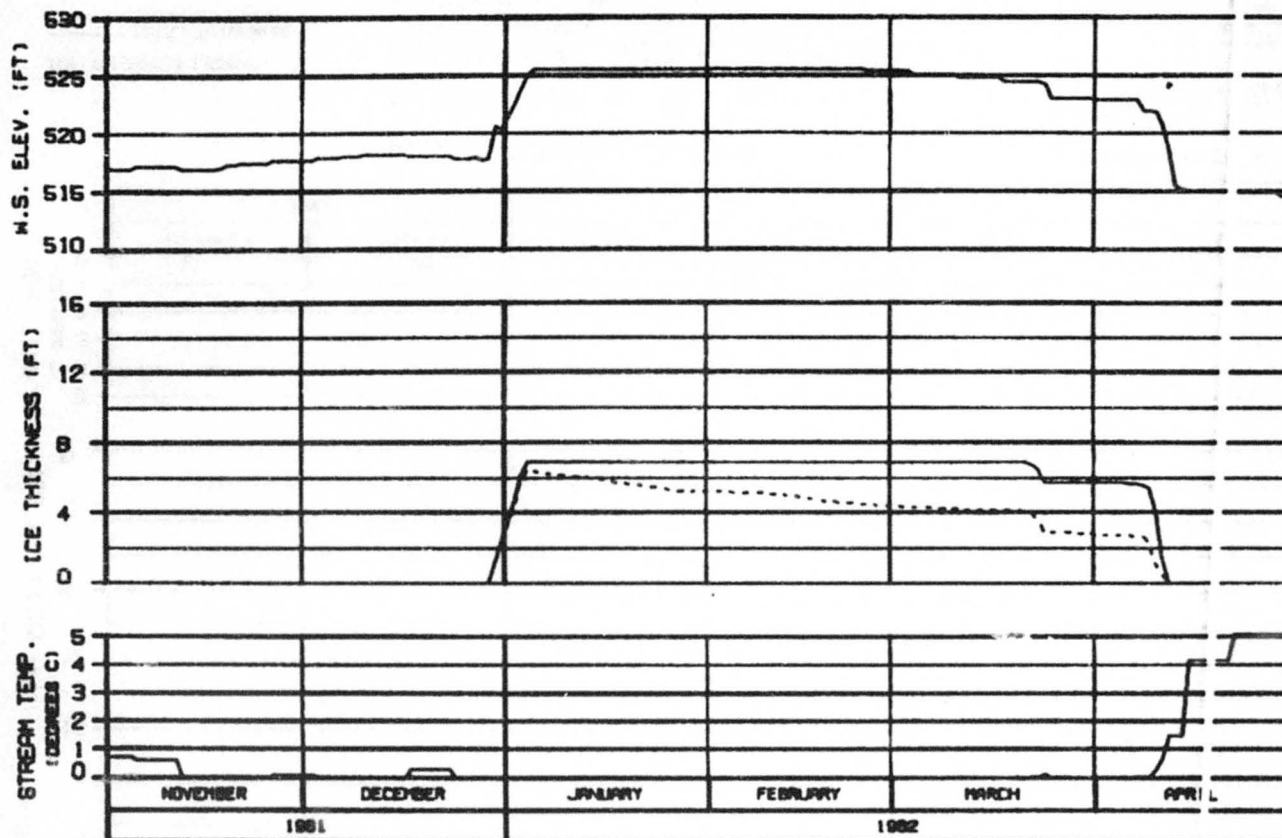
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-ERASCO JOINT VENTURE

DATED: 11/08/82 BY: JAL/MS 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - BLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE : 2001 ENERGY DEMAND  
 INFLOW-MATCHING : FLOW CASE E-1  
 REFERENCE RUN NO. : 8101ENY

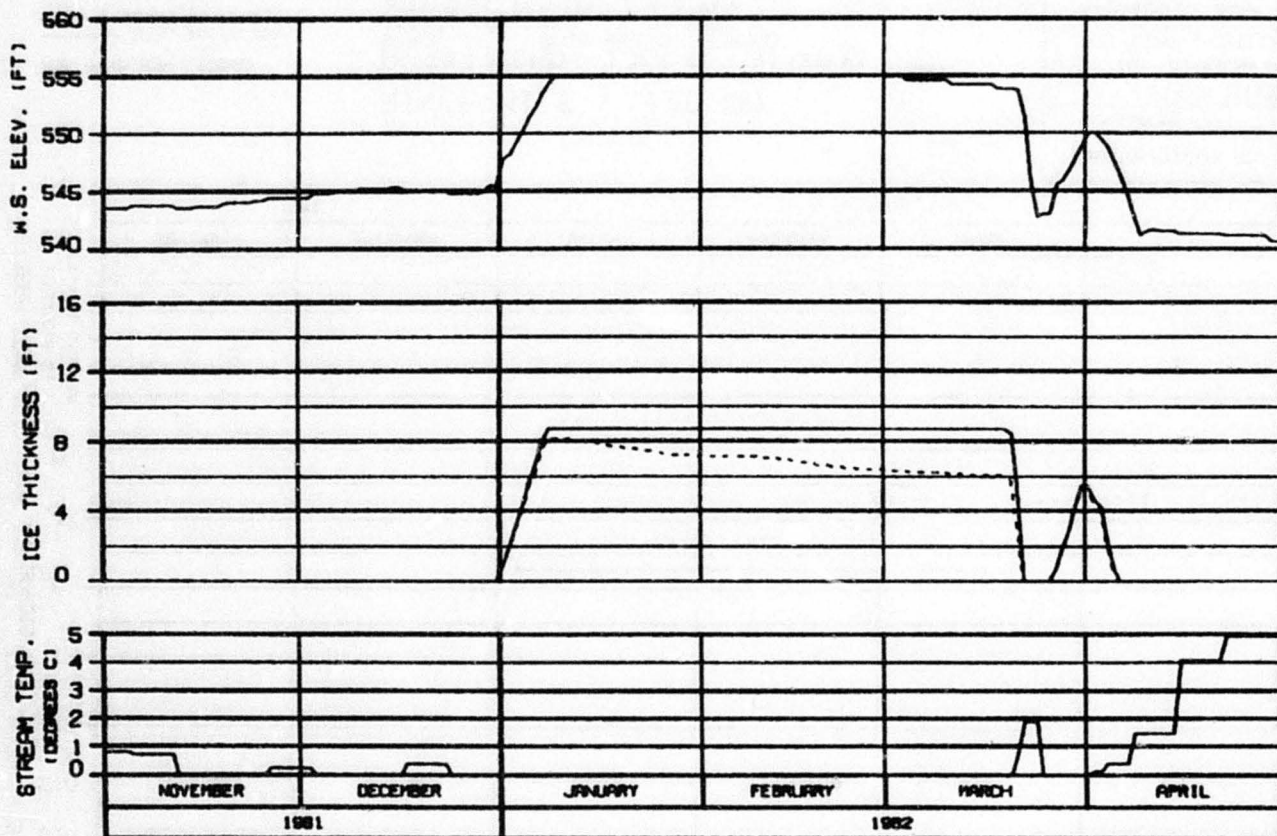
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBASC JOINT VENTURE

CHIEF: HAZRA EBASC JA 82 1982.142



HEAD OF MOOSE SLOUGH  
RIVER MILE : 123.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE 1 2001 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-1  
REFERENCE RUN NO. : 8101ENY

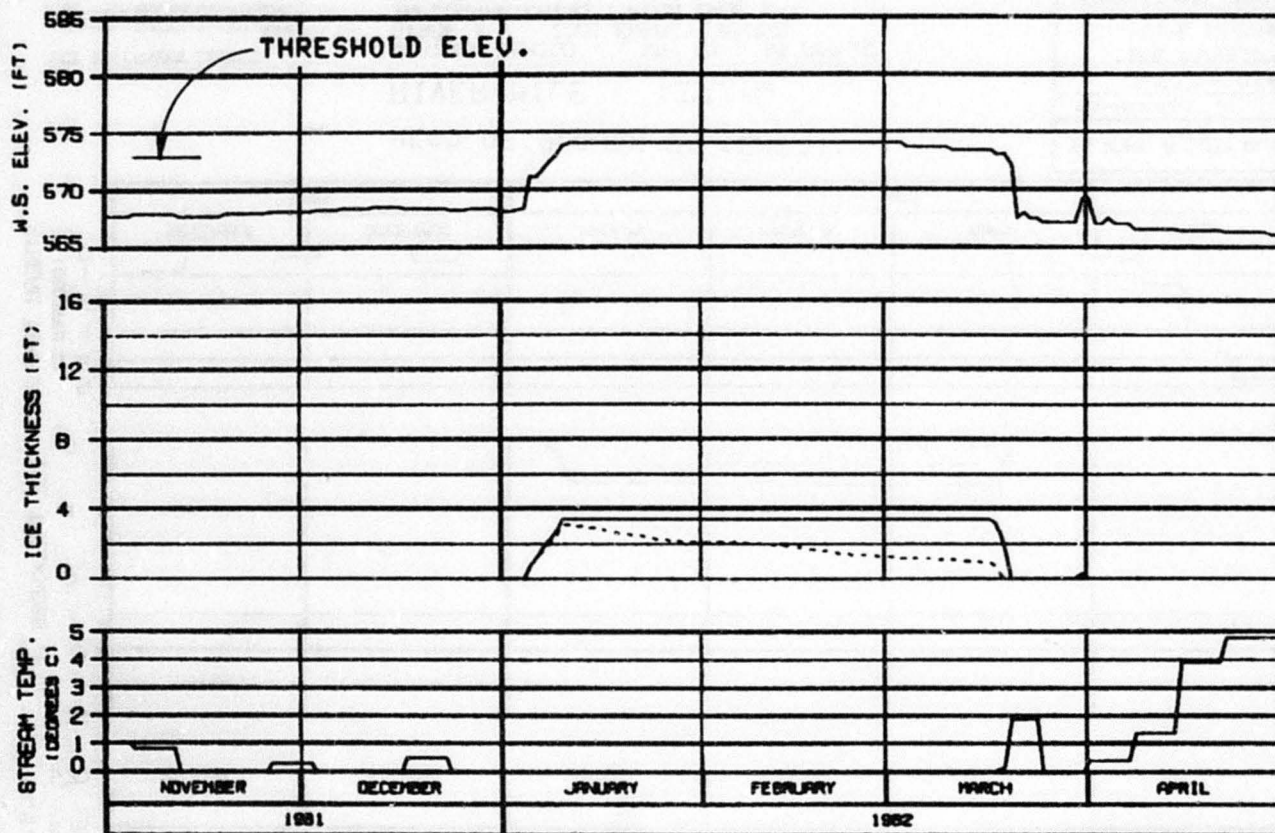
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED BY: J. L. PETERSON 1000.142



HEAD OF SLOUGH 8A (WEST)  
RIVER MILE : 126.10

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE I 2001 ENERGY DEMAND  
INFLOW-MATCHING FLOW CASE E-1  
REFERENCE RUN NO. : 8101ENY

ALASKA POWER AUTHORITY

SUSITNA PROJECT

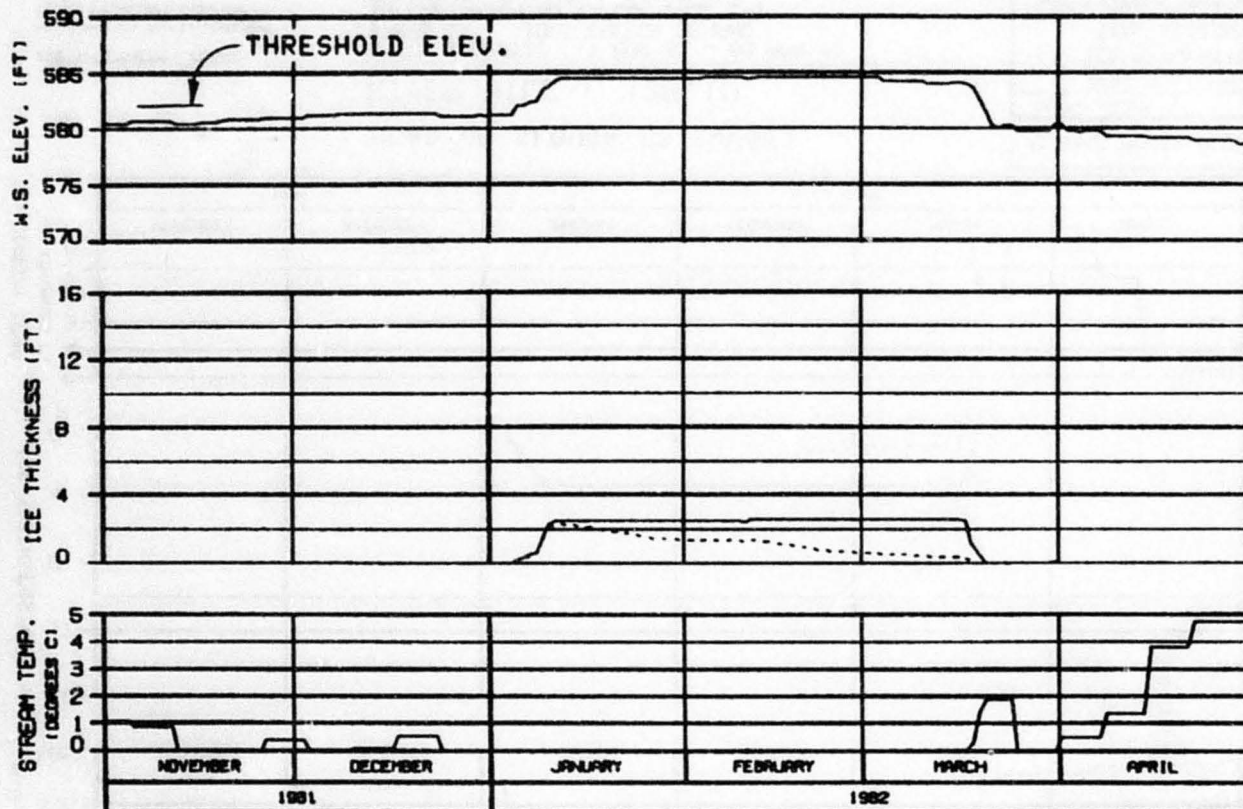
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZDA-EBASCO JOINT VENTURE

DESIGNED BY: J. A. JOHNSON DATE: 04-82

2000.142





HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-MATCHING : FLOW CASE E-1  
 REFERENCE RUN NO. : 8101ENY

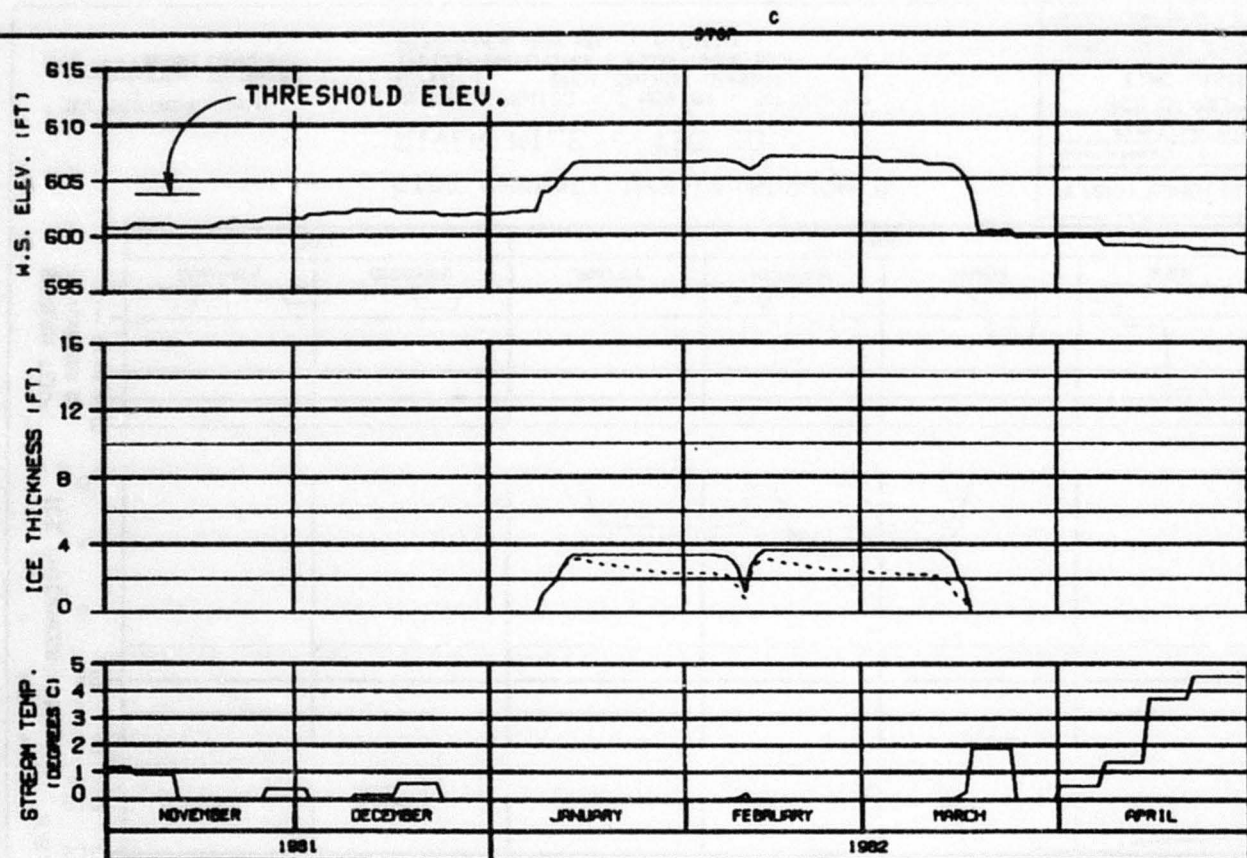
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN : 11-10010 05 JAN 82 1000, 142



HEAD OF SLOUGH 9  
RIVER MILE : 129.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- BLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE I 2001 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-1  
REFERENCE RUN NO. : 8101ENY

ALASKA POWER AUTHORITY

SUSITNA PROJECT

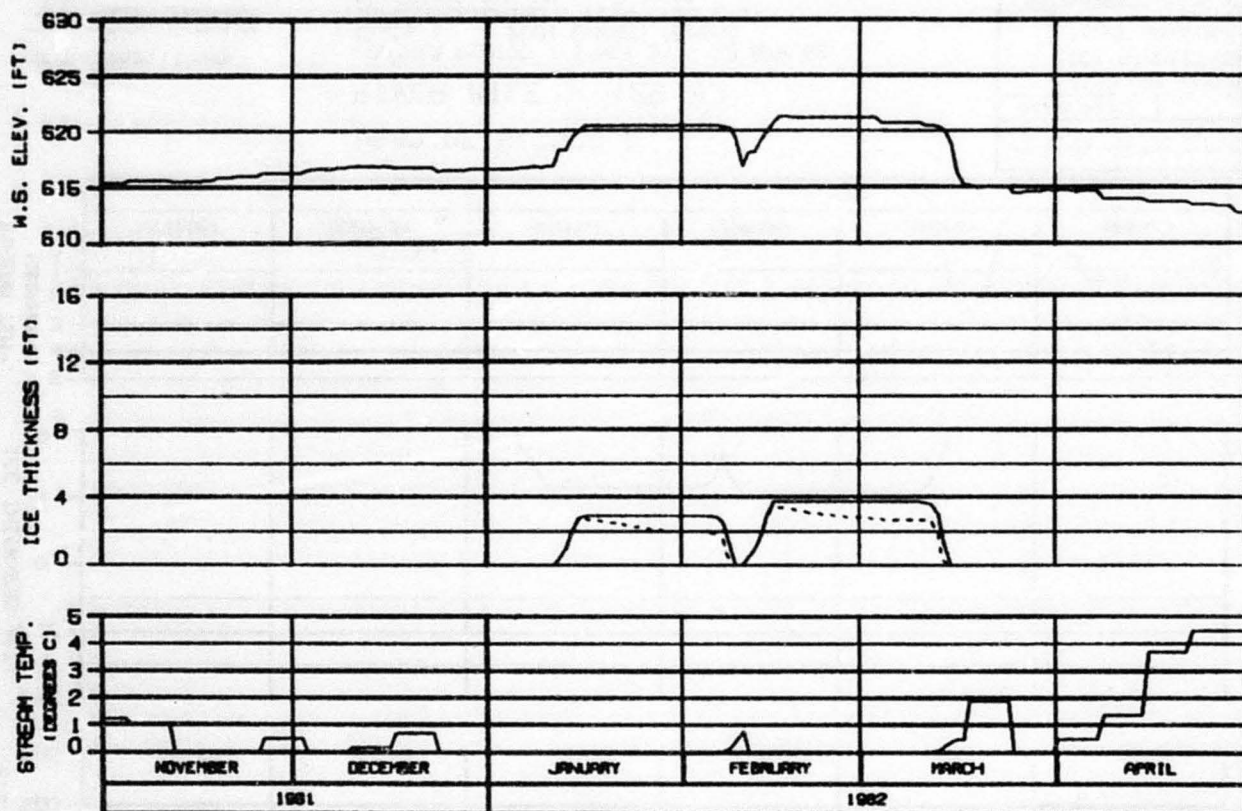
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBRARD JOINT VENTURE

DRAWN: B.L.P. 82 JA 01 1000.142

OPTION?

OPTION?



SIDE CHANNEL U/S OF SLOUGH 9

RIVER MILE : 130.60

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-MATCHING : FLOW CASE E-1  
 REFERENCE RUN NO. : 8101ENY

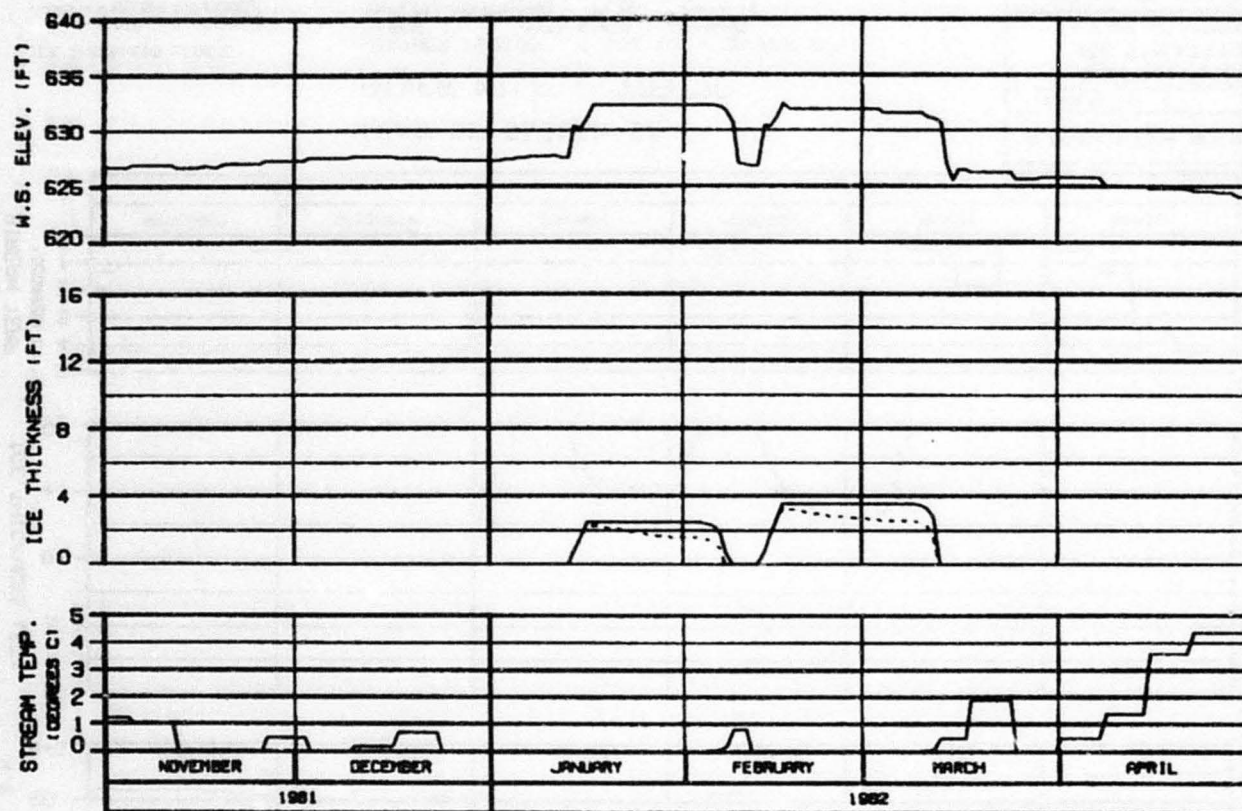
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

FORM 3.1-80 (REV. 11-80) 1000-142



SIDE CHANNEL U/S OF 4TH JULY CREEK  
RIVER MILE : 131.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE 1 2001 ENERGY DEMAND  
INFLOW-MATCHING FLOW CASE E-1  
REFERENCE RUN NO. : 8101ENY

ALASKA POWER AUTHORITY

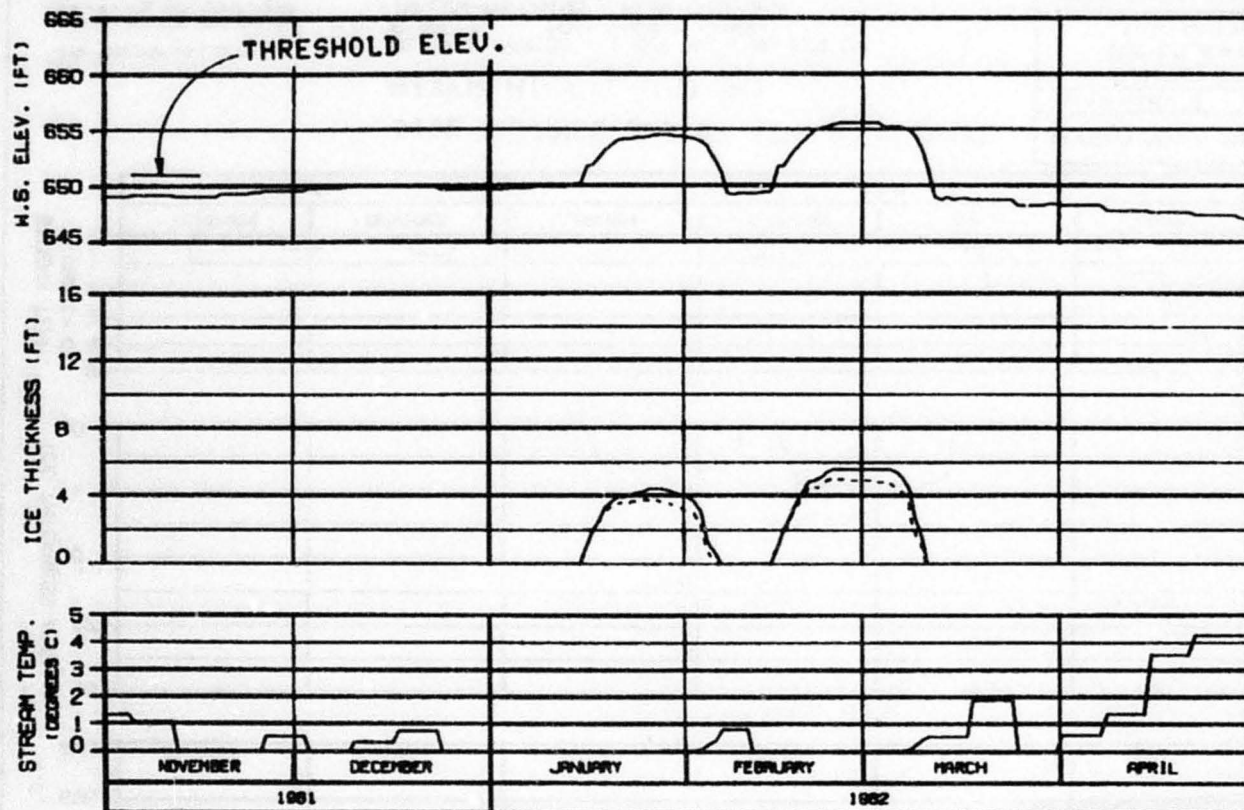
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

00000- 01.0000 25 JAN 82 1000.142





HEAD OF SLOUGH 9A  
RIVER MILE : 133.70

ICE THICKNESS LEGEND:  
——— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE : 2001 ENERGY DEMAND  
INFLOW-MATCHING : FLOW CASE E-1  
REFERENCE RUN NO. : B101ENY

ALASKA POWER AUTHORITY

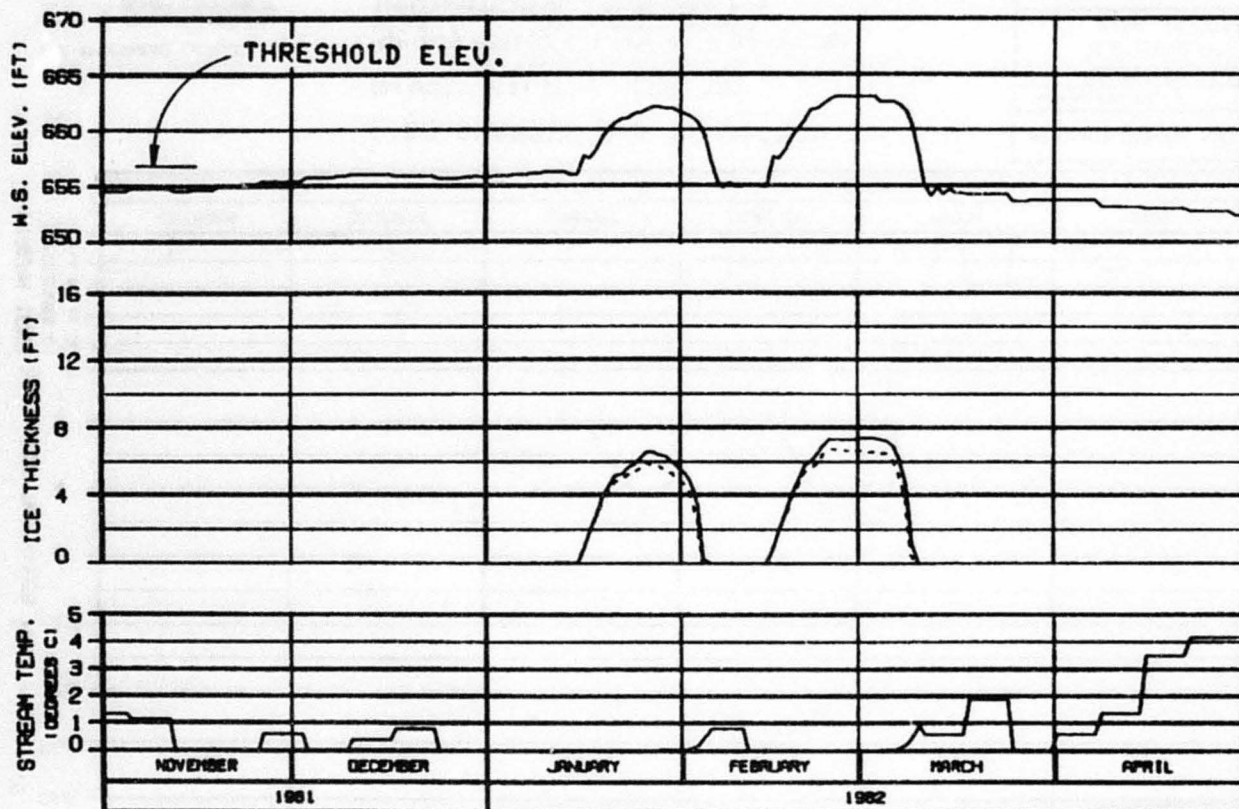
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EGASCO JOINT VENTURE

DESIGN: SLIPPER 29 JUL 82 1988.142





SIDE CHANNEL U/S OF SLOUGH 10  
RIVER MILE : 134.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
- - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE 1 2001 ENERGY DEMAND  
INFLOW-MATCHING : FLOW CASE E-1  
REFERENCE RUN NO. : 8101ENY

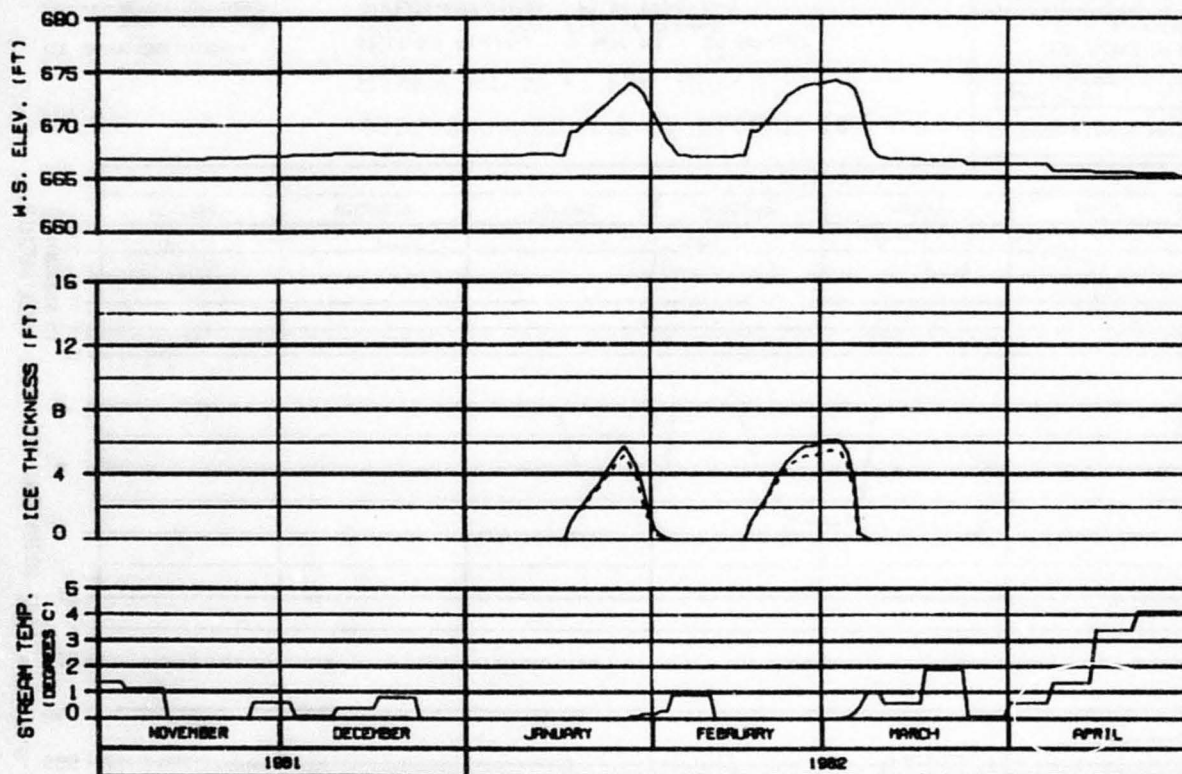
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBERCO JOINT VENTURE

DESIGN: SLD/SHS 30 JUL 82 1000.142



SIDE CHANNEL D/S OF SLOUGH 11

RIVER MILE : 135.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-MATCHING : FLOW CASE E-1  
 REFERENCE RUN NO. : 8101ENY

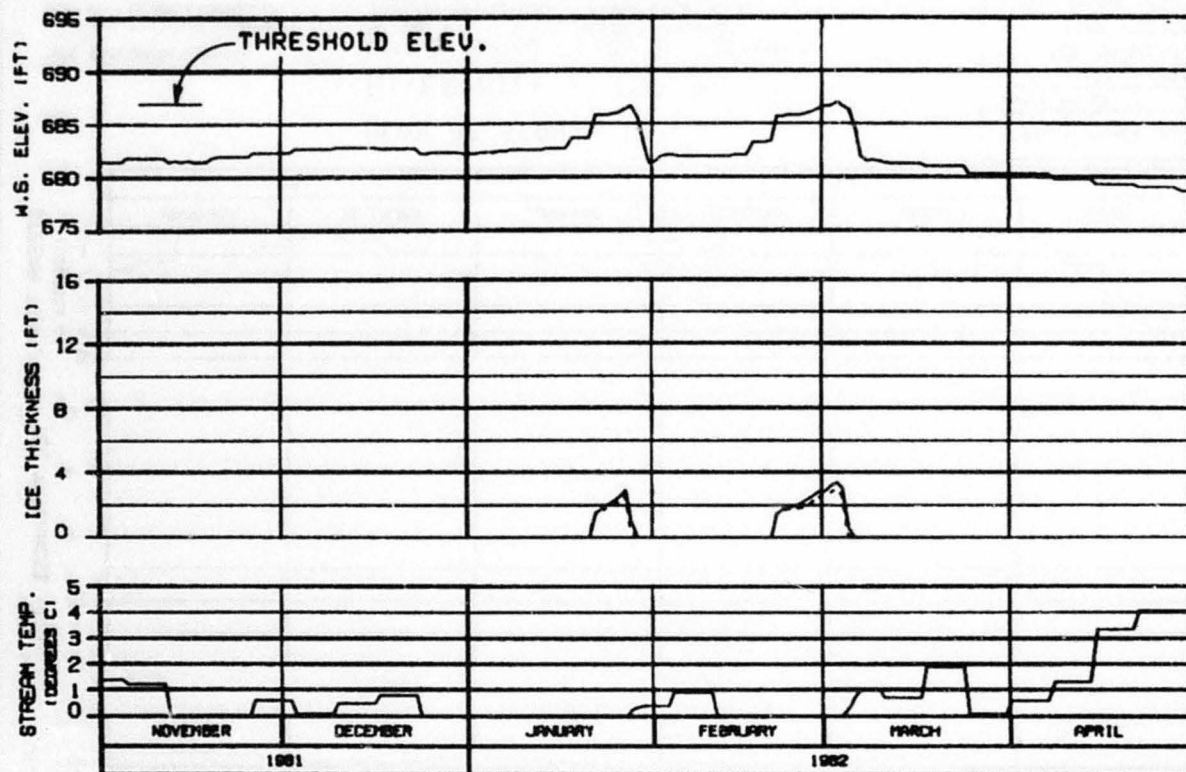
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

DESIGN- R.L.D. 8000 80 J.A. 82 1000.142



HEAD OF SLOUGH 11  
RIVER MILE : 136.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE 1 - 2001 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-1  
REFERENCE RUN NO. : 8101ENY

ALASKA POWER AUTHORITY

SUSITNA PROJECT

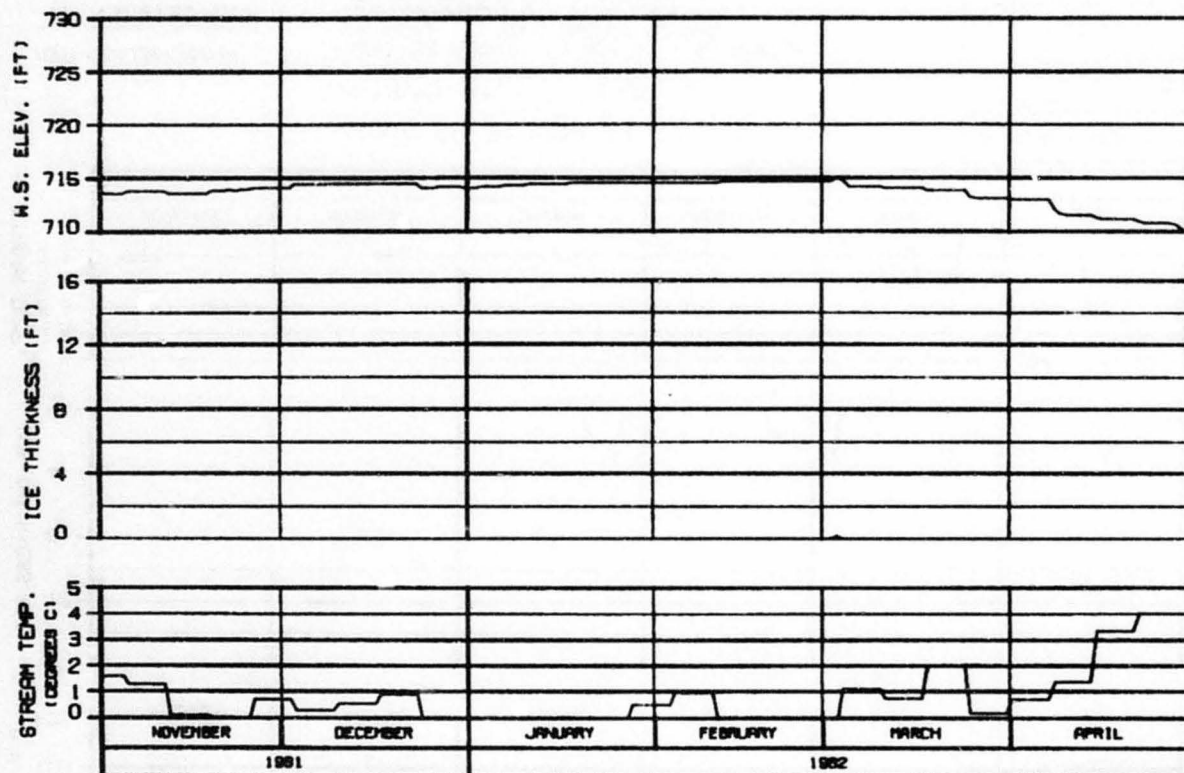
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZDA-EBASCO JOINT VENTURE

DESIGN: ELP/MS

30 JUL 82

0000.142



HEAD OF SLOUGH 17  
RIVER MILE : 139.30

ICE THICKNESS LEGEND:  
——— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE I 2001 ENERGY DEMAND  
INFLOW-MATCHING FLOW CASE E-1  
REFERENCE RUN NO. : 8101ENY

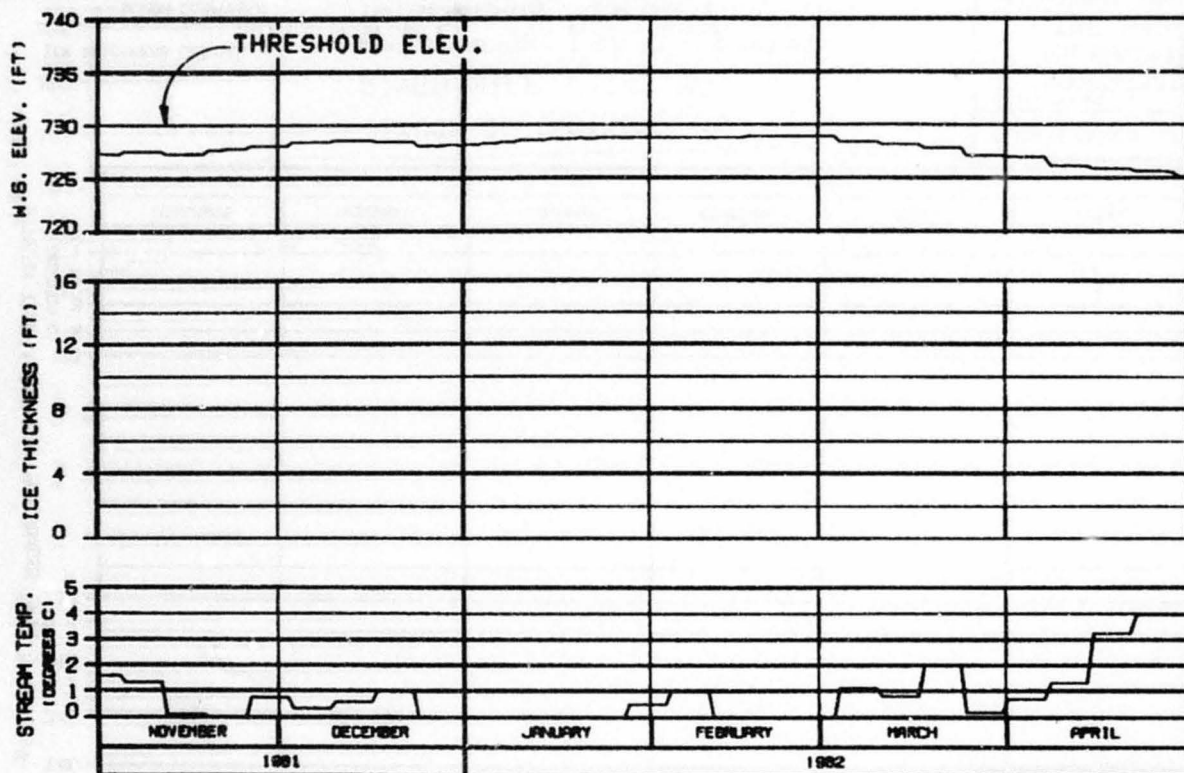
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBASCO JOINT VENTURE

DESIGNED BY: R. J. BROWN 10-11-81 1000-142



HEAD OF SLOUGH 20  
RIVER MILE : 140.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE 1 2001 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-1  
REFERENCE RUN NO. : 8101ENY

ALASKA POWER AUTHORITY

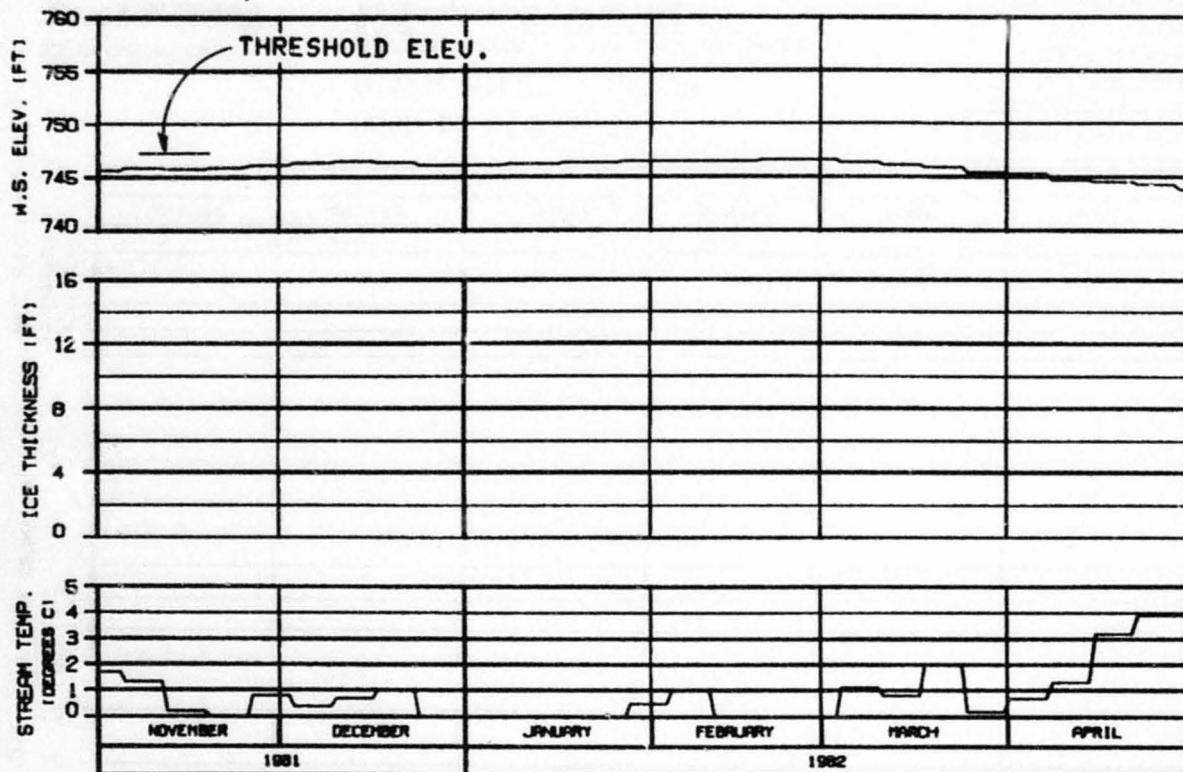
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: ELD-000 20 JUL 82 1000.142





SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE I - 2001 ENERGY DEMAND  
 INFLOW-MATCHING : FLOW CASE E-1  
 REFERENCE RUN NO. : 8101ENY

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

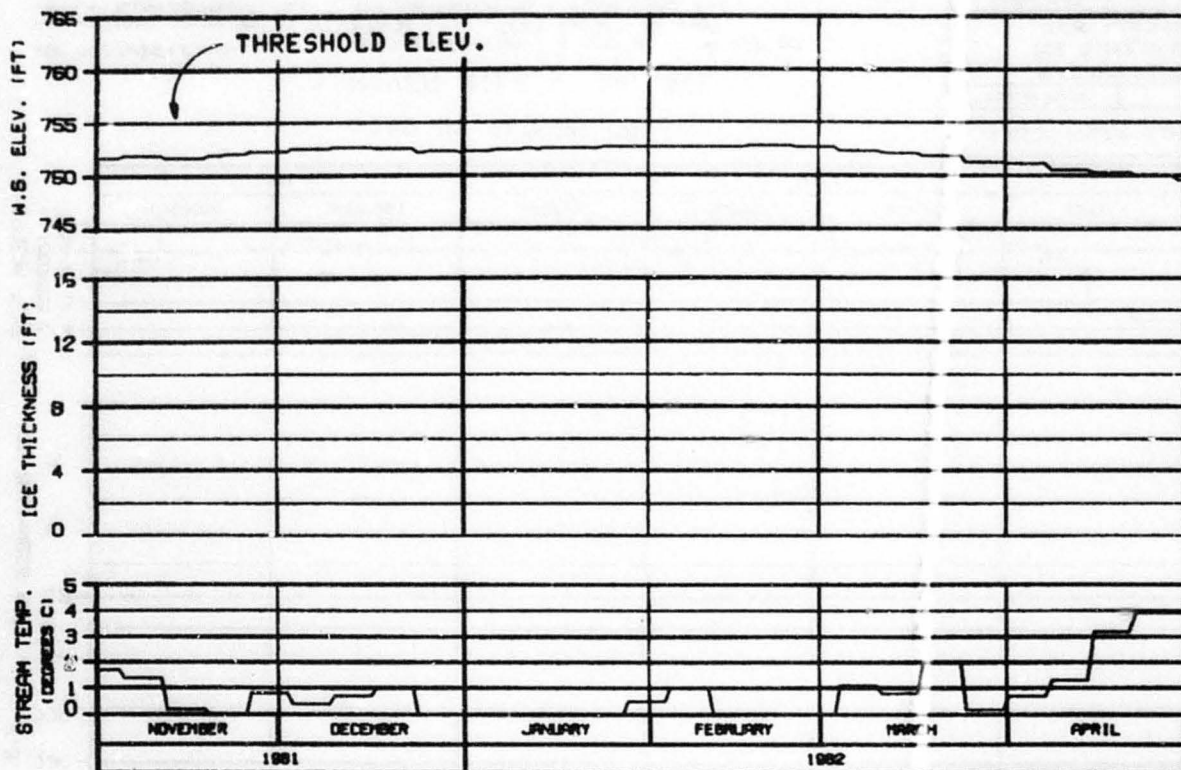
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: ELLIOTT 80 44 00 1000.142



HEAD OF SLOUGH 21  
RIVER MILE : 142.20

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE 1 2001 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-1  
REFERENCE RUN NO. : 8101ENY

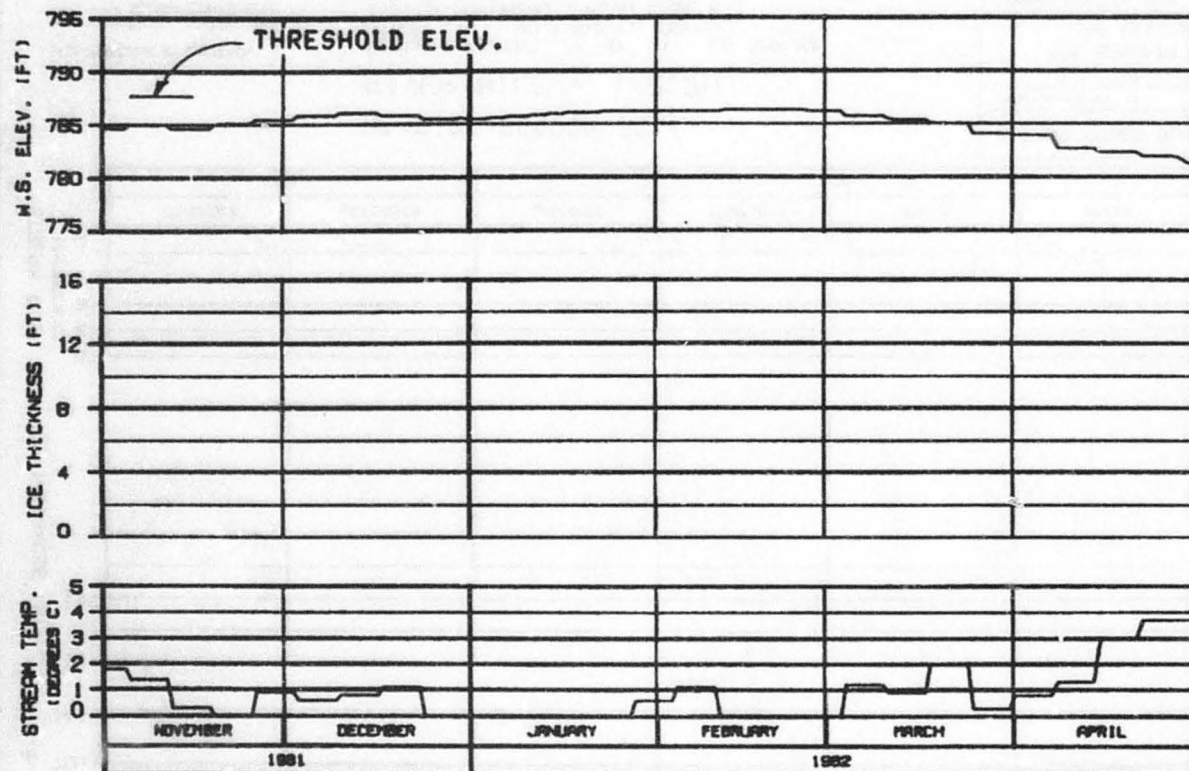
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBRARD JOINT VENTURE

DESIGN: ALBANY 20 JUL 82 1000.142



HEAD OF SLOUGH 22

RIVER MILE : 144.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 1 2001 ENERGY DEMAND  
 INFLOW-MATCHING FLOW CASE E-1  
 REFERENCE RUN NO. : 8101ENY

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

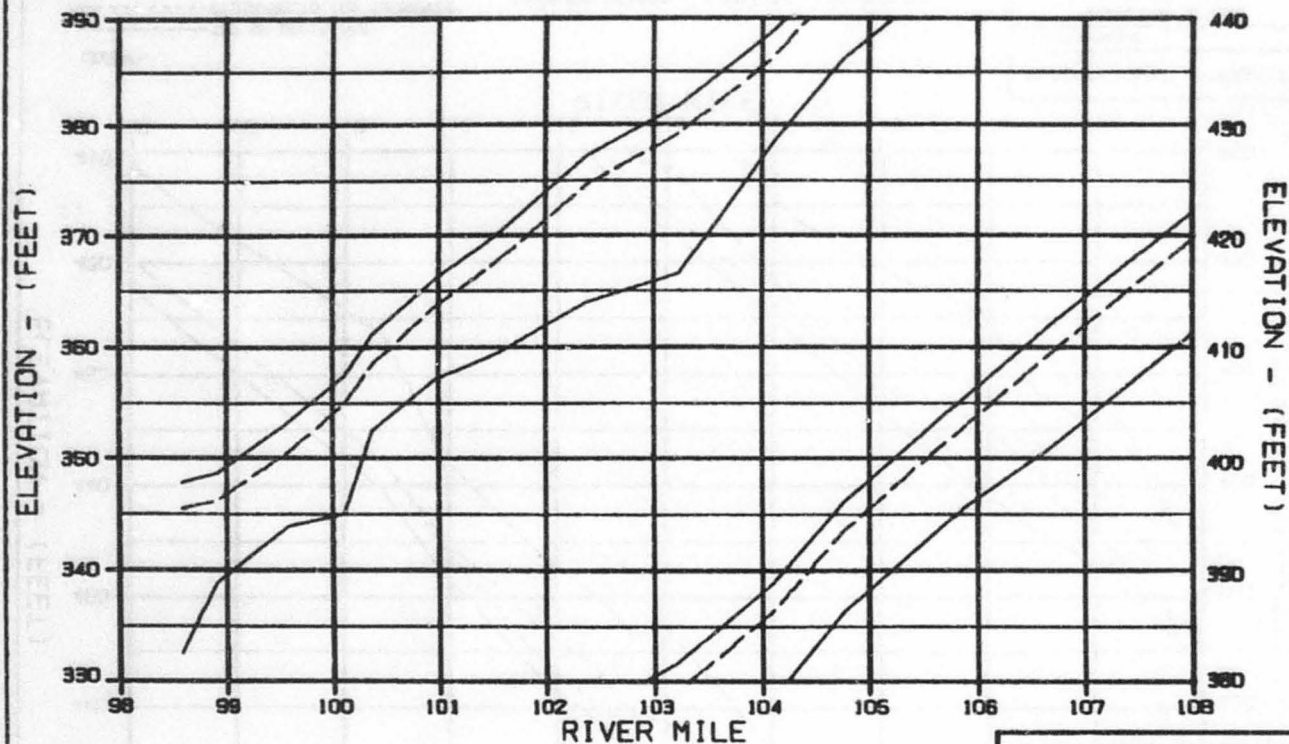
HARZA-EGASCO JOINT VENTURE

DESIGN: SLP/000 20 JUL 82 1000.142

OPTION?

**EXHIBIT E**





## LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 11 2002 ENERGY DEMAND  
 FLOW CASE E-1. INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENY

## ALASKA POWER AUTHORITY

SUSITNA PROJECT

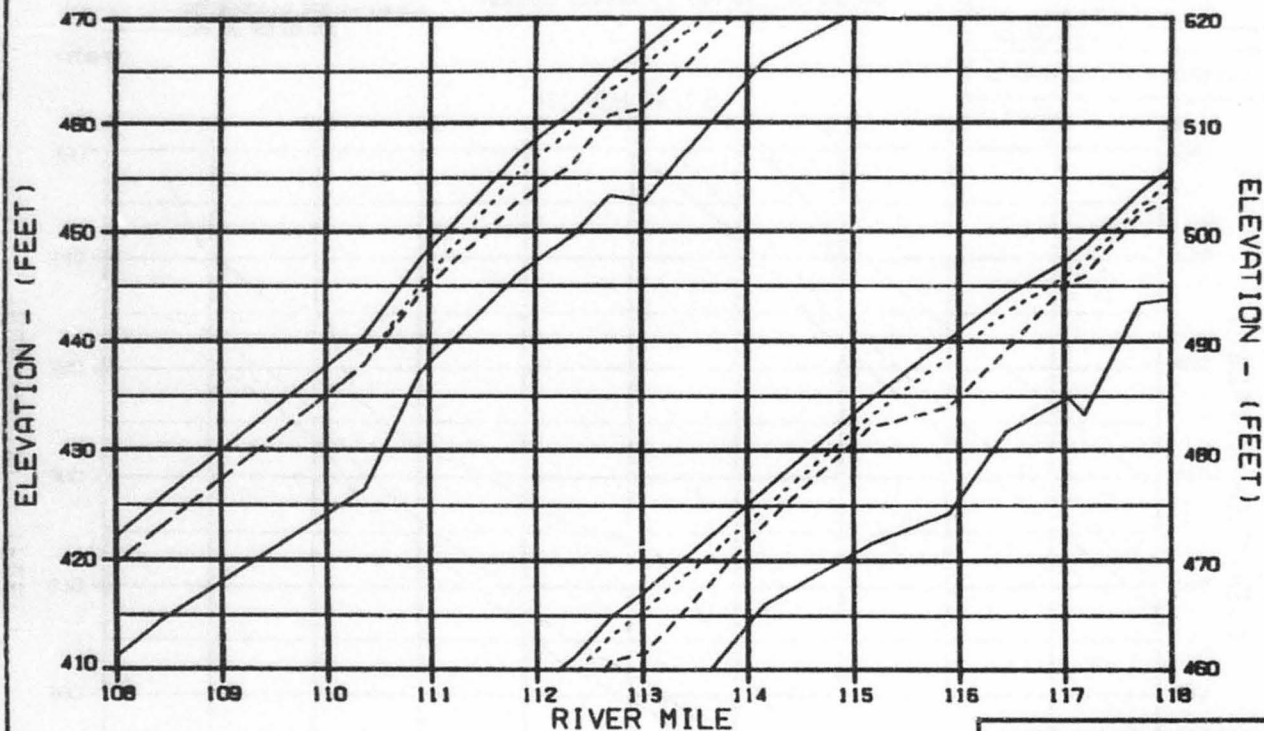
SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

DESIGNED: ELLIOTT 88 JUL 88 1005.142

OPTION?





LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- ..... BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 11 2002 ENERGY DEMAND  
 FLOW CASE E-1. INFLOW-WATCHING  
 50 FT. DRANDOWN, 2 PORTS  
 REFERENCE RUN NO. : 810ZENY

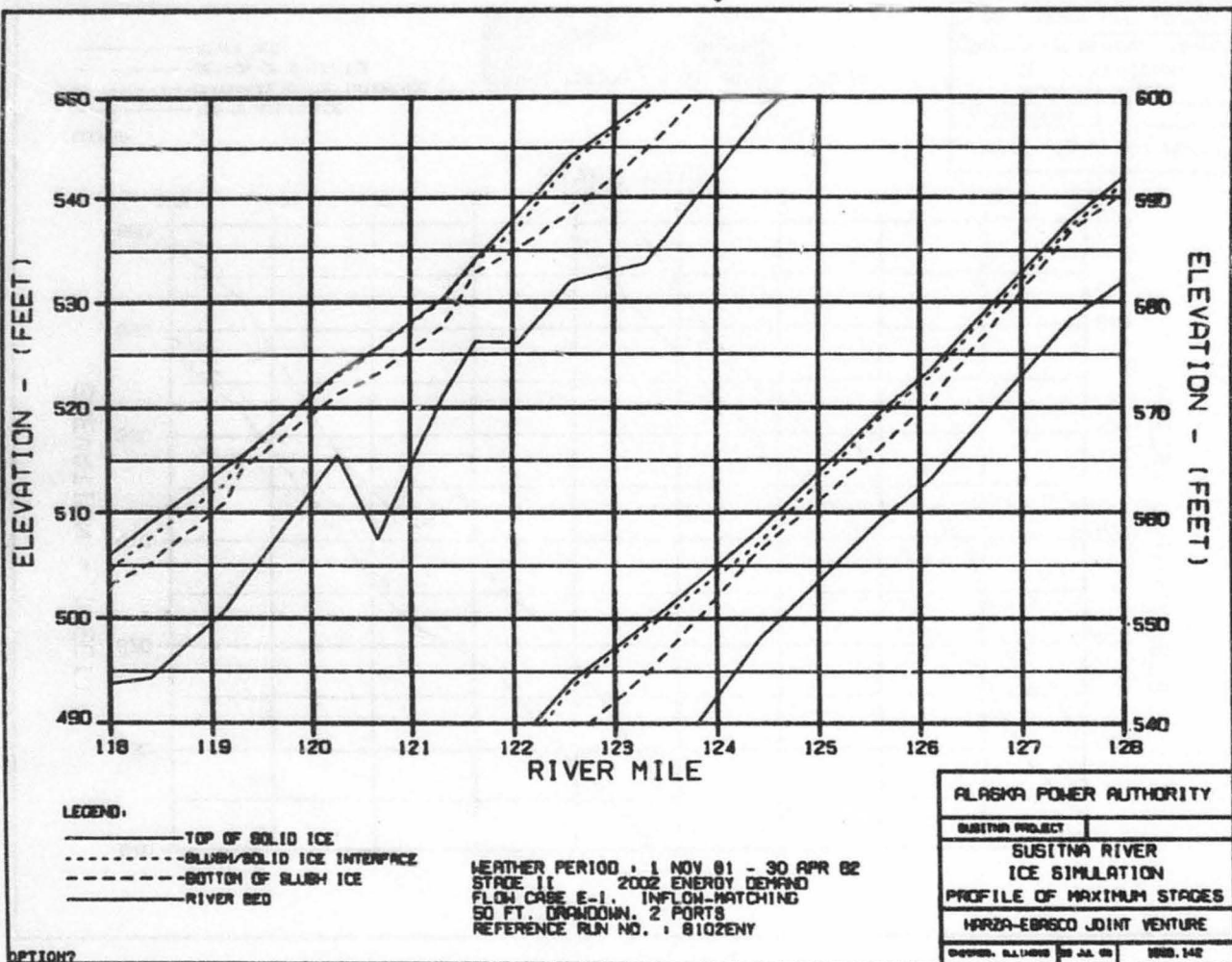
OPTION?

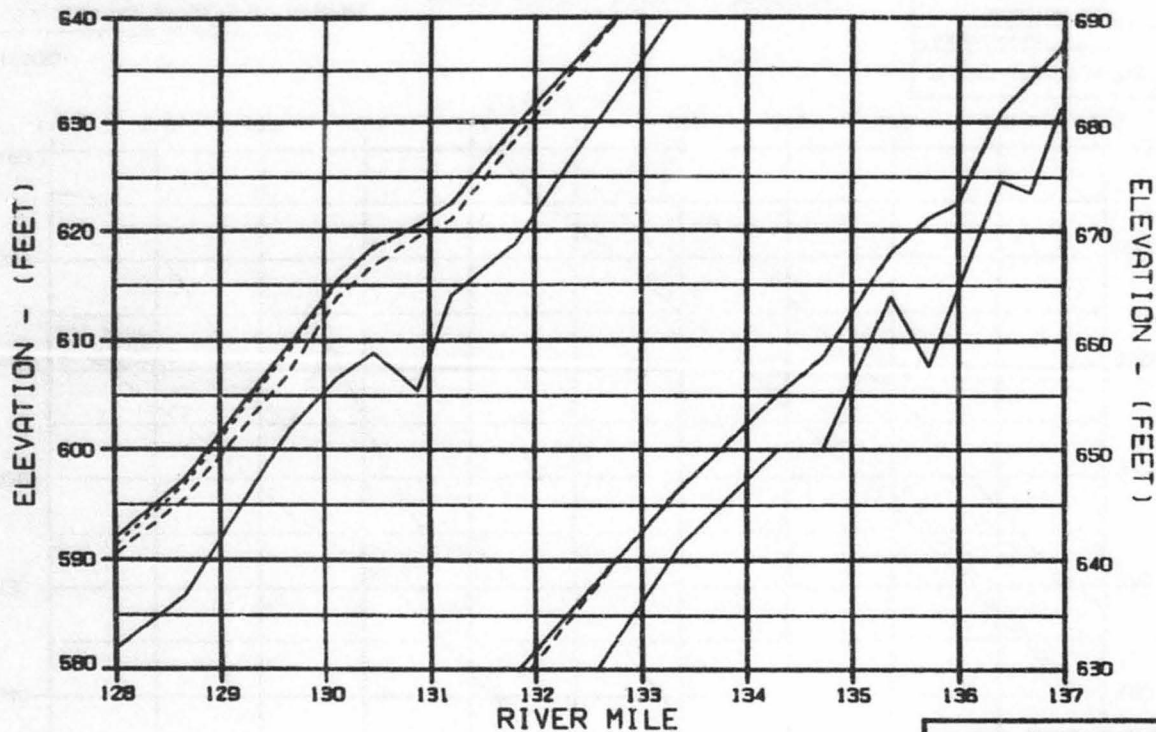
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES  
 HARZA-EGASCU JOINT VENTURE

DESIGNED: S.L. MOORE 20 JUL 82 1000.142





LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- ..... BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 11 2002 ENERGY DEMAND  
 FLOW CASE E-1. INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENY

ALASKA POWER AUTHORITY

GUSITNA PROJECT

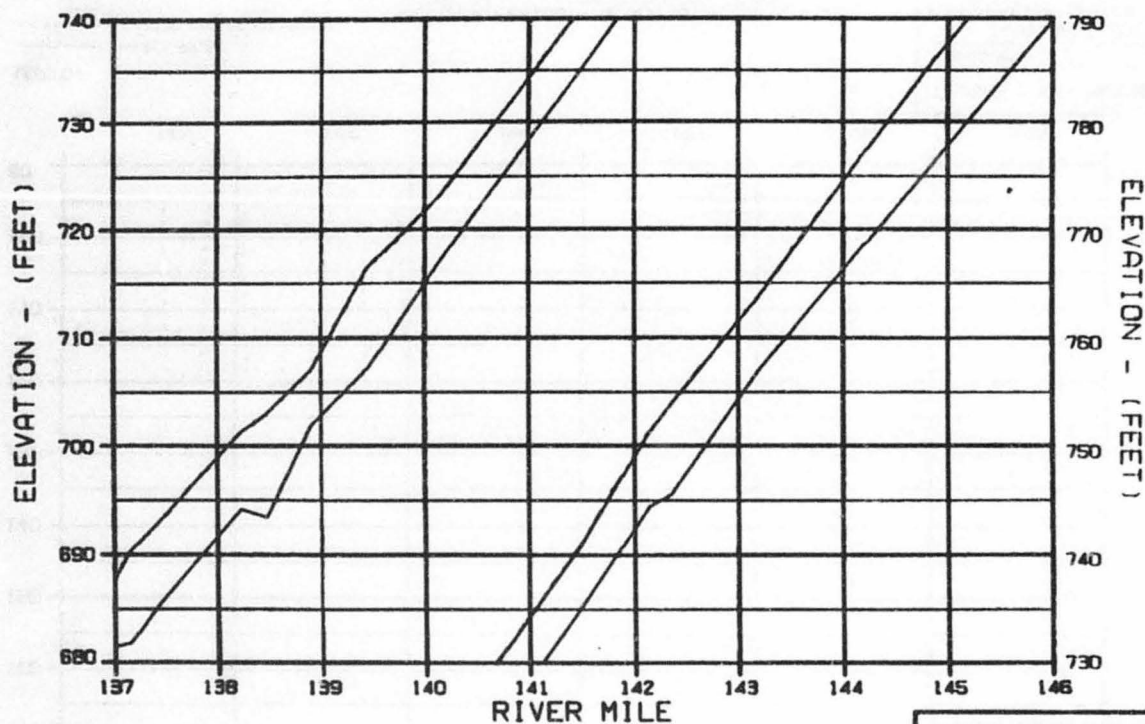
GUSITNA RIVER  
 ICE SIMULATION

PROFILE OF MAXIMUM STAGES

HAZZA-EBASCO JOINT VENTURE

CHUCKER, S.A. 1987 20 J.A. 01 1988, 142

OPTION 7



**LEGEND:**

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 FLOW CASE E-1, INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 6102ENY

**ALASKA POWER AUTHORITY**

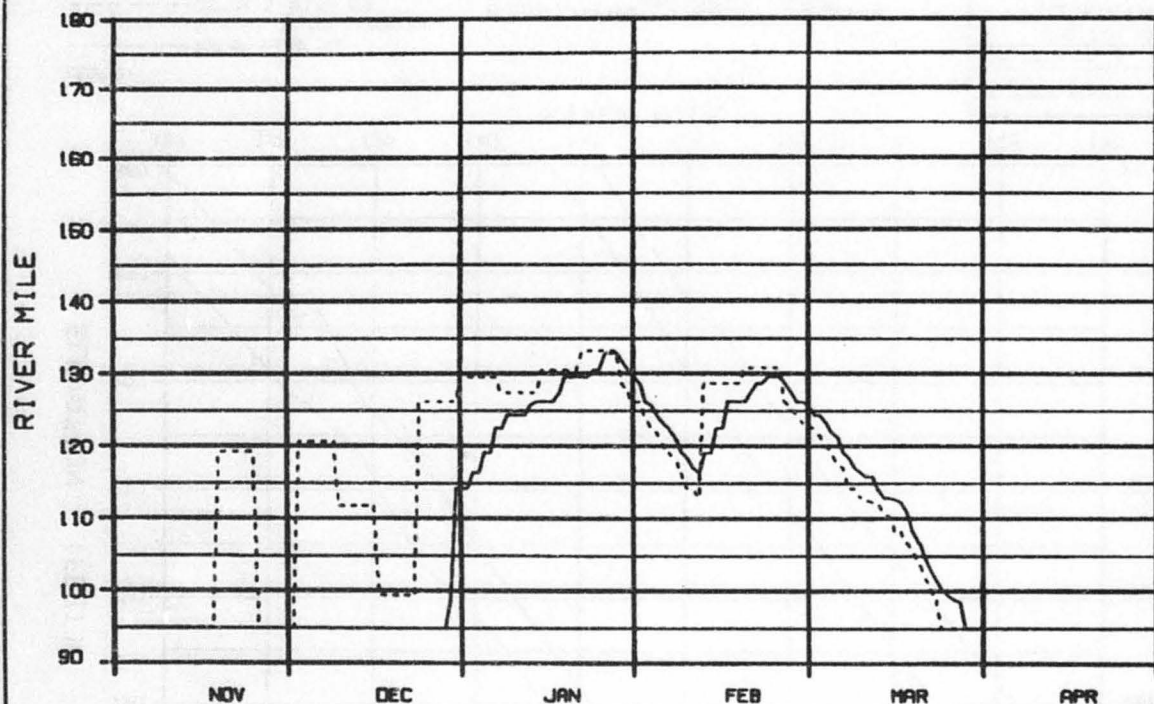
**SUSITNA PROJECT**

**SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES**

**WARZA-EBRSCO JOINT VENTURE**

**DESIGNED: S. L. DODGE 75 JUL 81 1000.142**

**OPTION?**



## LEGEND:

—— ICE FRONT  
 - - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 11 2002 ENERGY DEMAND  
 FLOW CASE E-1 INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENY

## ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

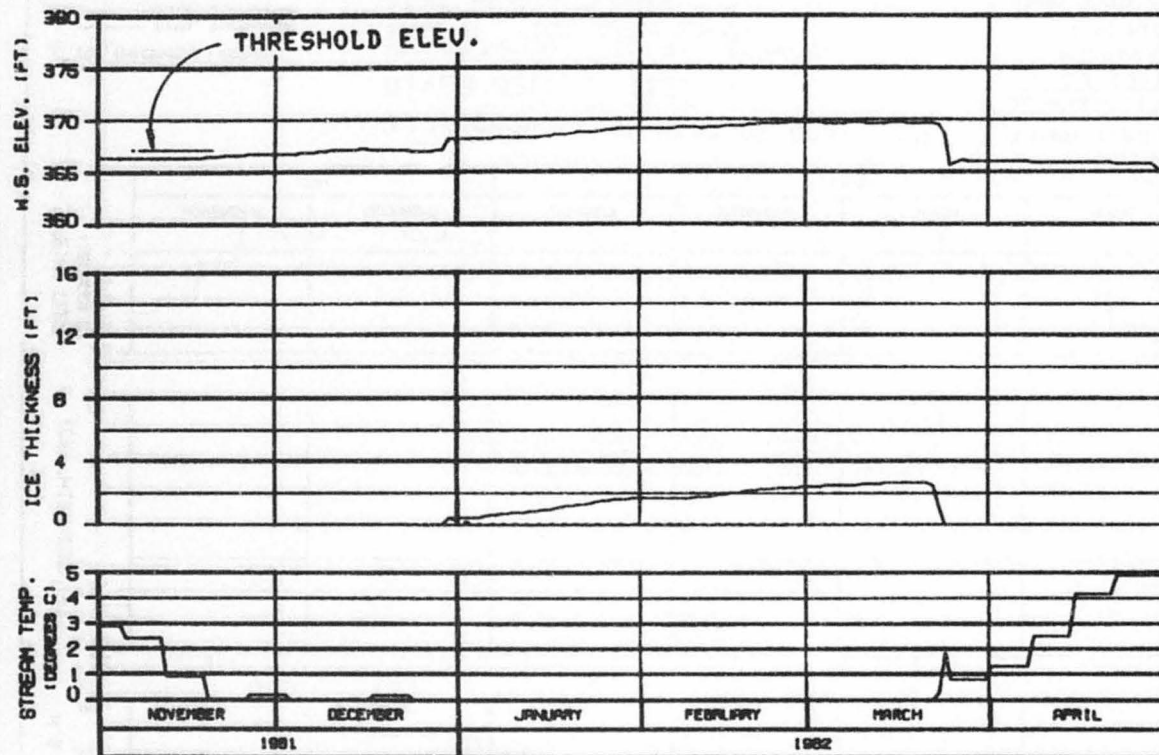
HARZA-EBASCO JOINT VENTURE

SUSITNA, 01-0000 00 AA, 00

1000, 142

OPTION2





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF WHISKERS SLOUGH  
 RIVER MILE : 101.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENY

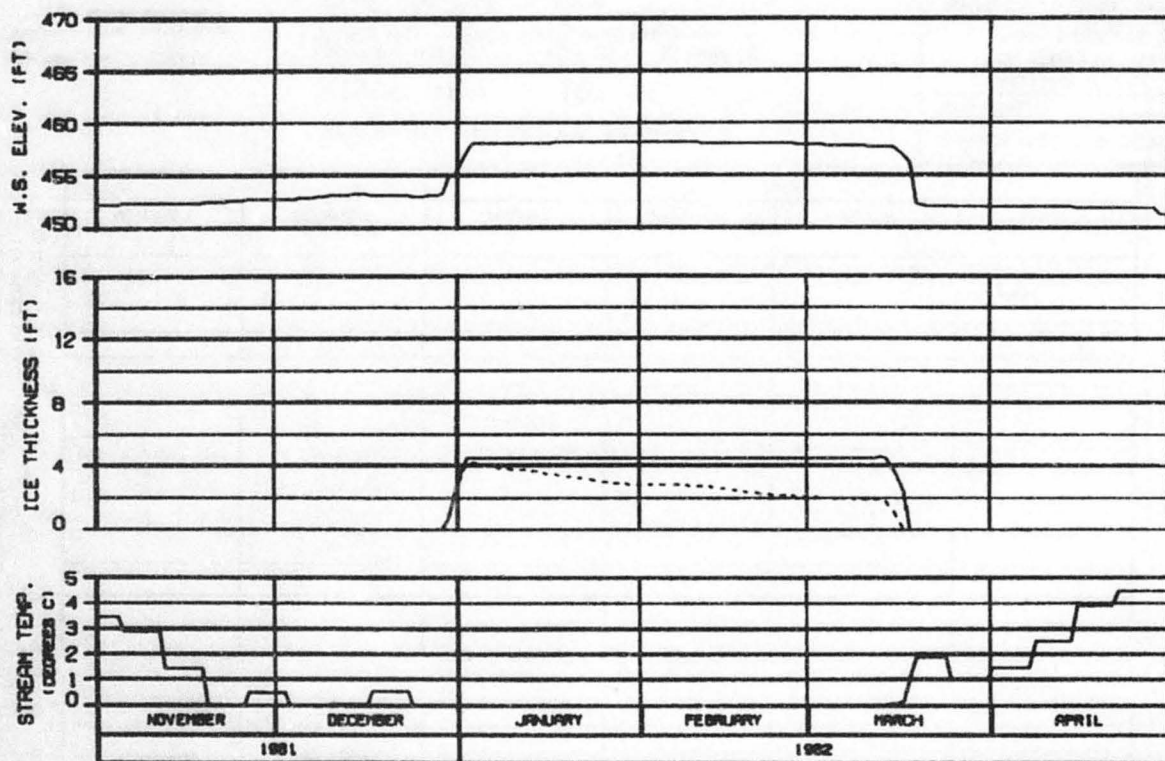
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

UNIVERSITY OF ALASKA 20 JUL 82 1000.142



SIDE CHANNEL AT HEAD OF GASH CREEK  
RIVER MILE : 112.00

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE 11 2002 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-1  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8102ENY

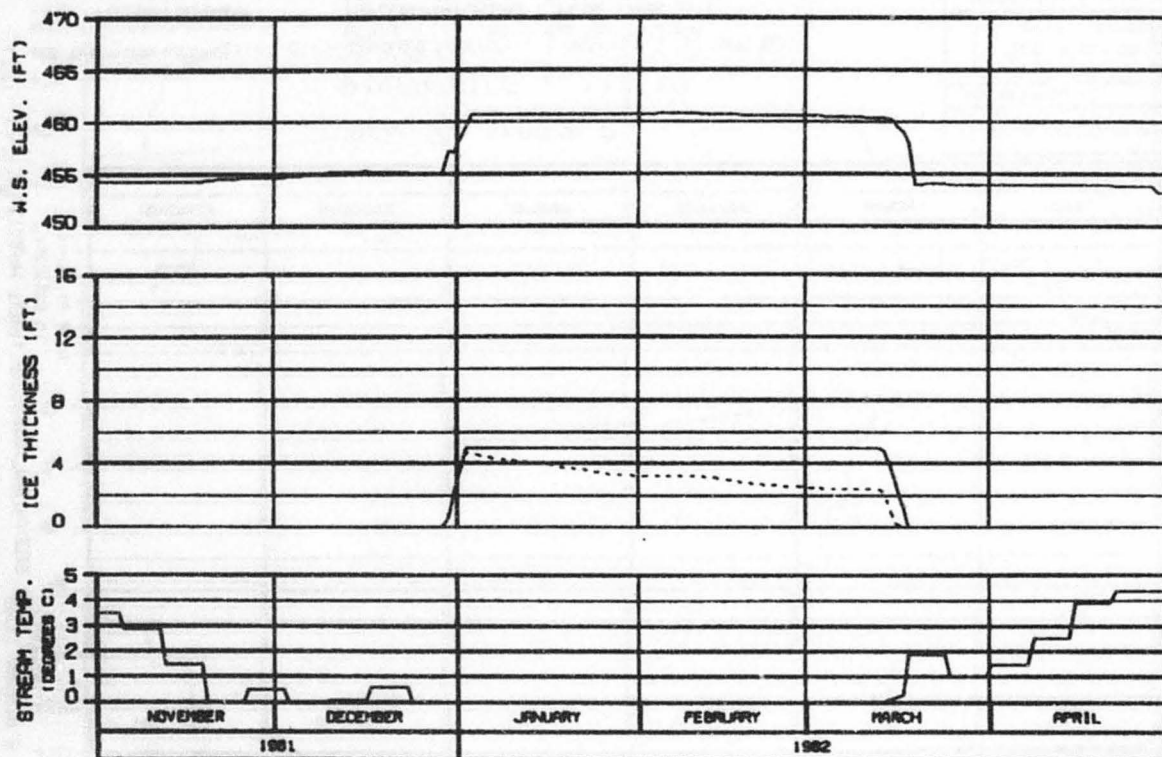
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBASCO JOINT VENTURE

SHOWN: 11/1/81 10:00 AM 1981.142



MOUTH OF SLOUGH 6A  
RIVER MILE : 112.34

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE 11 2002 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-1  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8102ENY

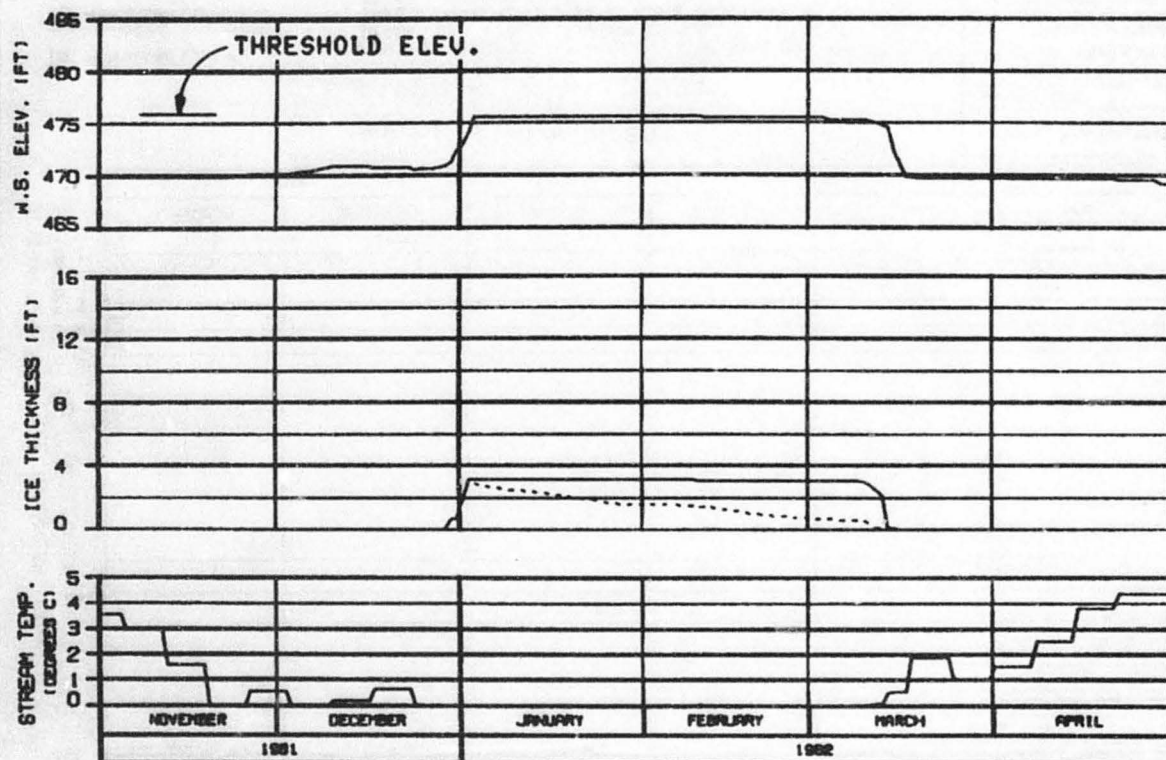
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBRSCO JOINT VENTURE

CHGDS. 8/1/82 20 44 00 1988.142



HEAD OF SLOUGH 8  
RIVER MILE : 114.10

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE II 2002 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-1  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 810ZENY

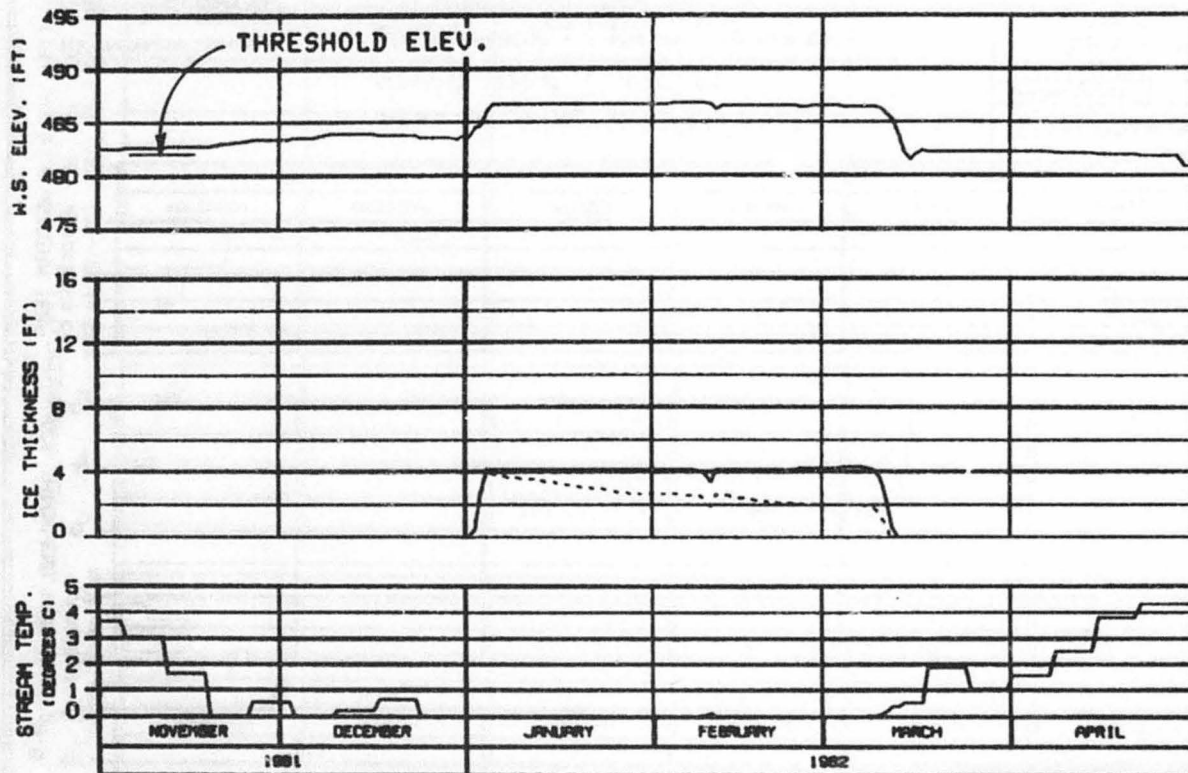
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED BY: JLD/DB 29 JUL 82 1000.142



SIDE CHANNEL MSII  
RIVER MILE : 115.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE II 2002 ENERGY DEMAND  
INFLOW-MATCHING FLOW CASE E-1  
50 FT. DRAINAGE, 2 PORTS  
REFERENCE RUN NO. : 8102ENY

ALASKA POWER AUTHORITY

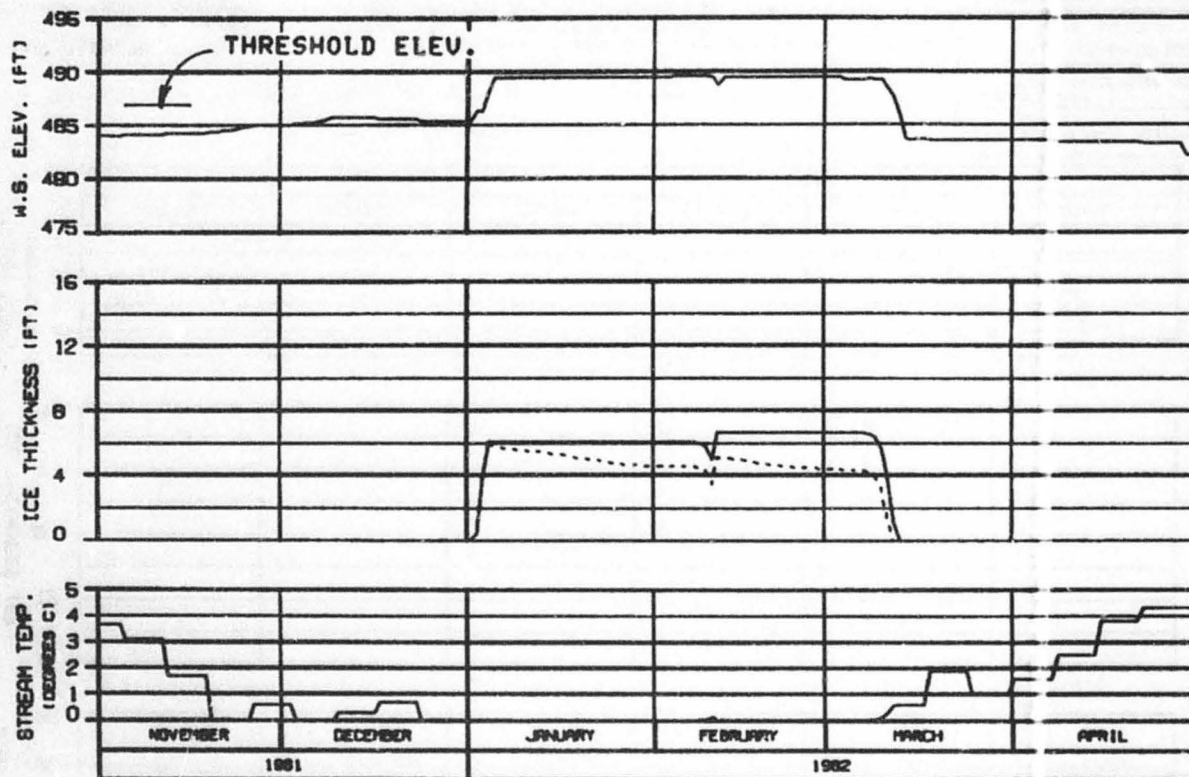
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EDBACCO JOINT VENTURE

DESIGNED BY: J. J. J. 100, 142





HEAD OF SIDE CHANNEL MSII  
RIVER MILE : 115.90

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE II - 2002 ENERGY DEMAND  
INFLOW-MATCHING - FLOW CASE E-1  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8102ENY

ICE THICKNESS LEGEND:

———— TOTAL THICKNESS  
----- SLUSH COMPONENT

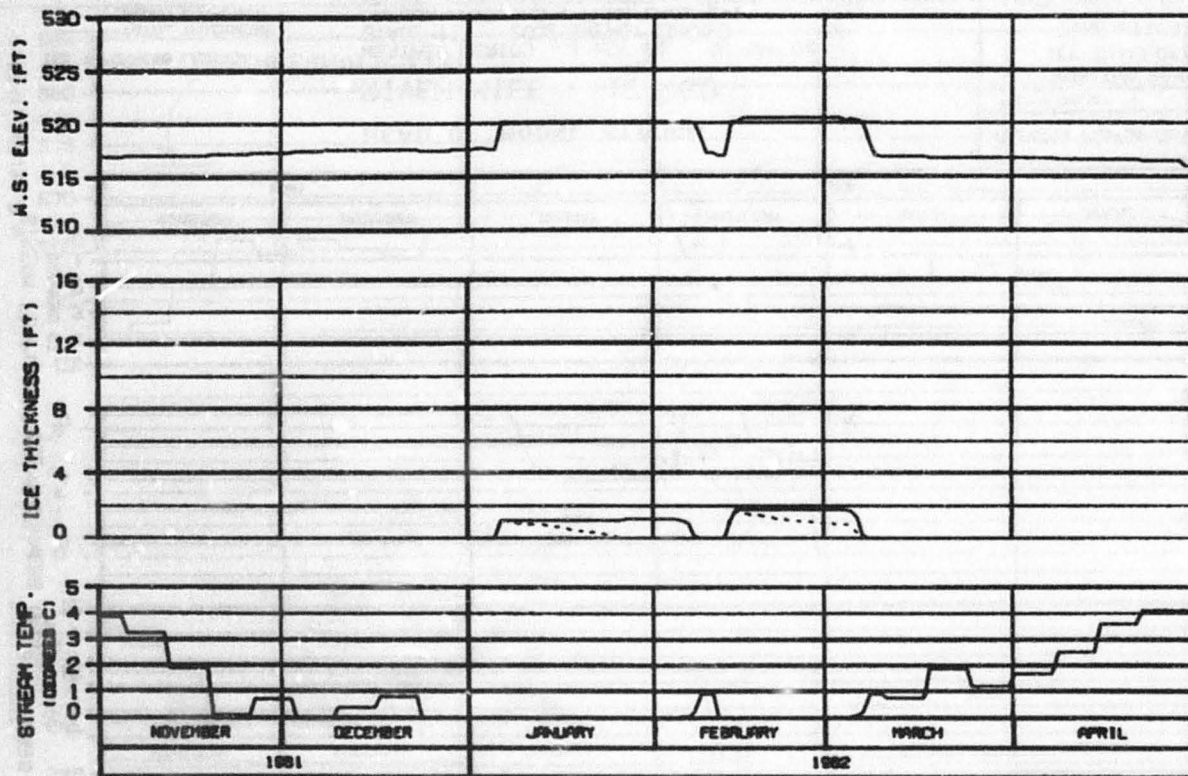
ALASKA POWER AUTHORITY

SUBJECT: PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WAP: A-EBASCO JOINT VENTURE

DESIGNED BY: J. D. G. 30 JUL 82 1000.142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 ..... SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 11 2002 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 810ZENY

ALASKA POWER AUTHORITY

SUSITNA PROJECT

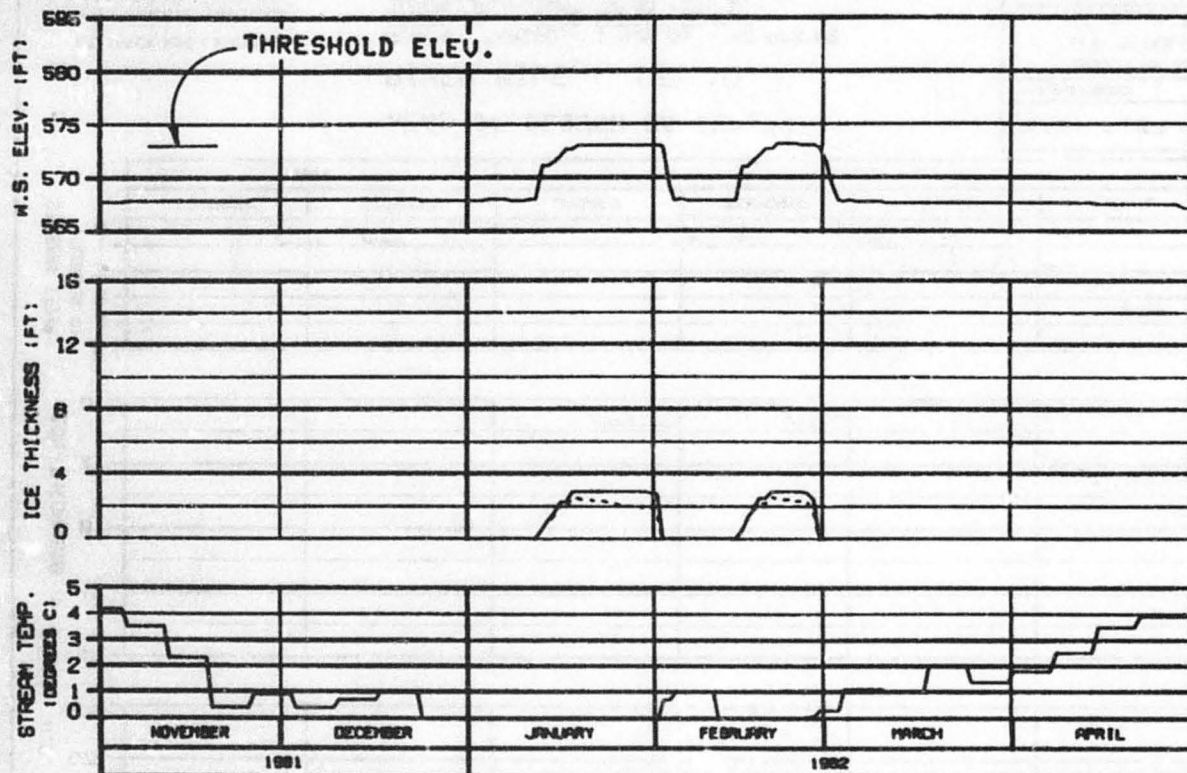
SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: R.L. 0000 20 JAN 82 1000.142



OPTION?



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II - 2002 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENY

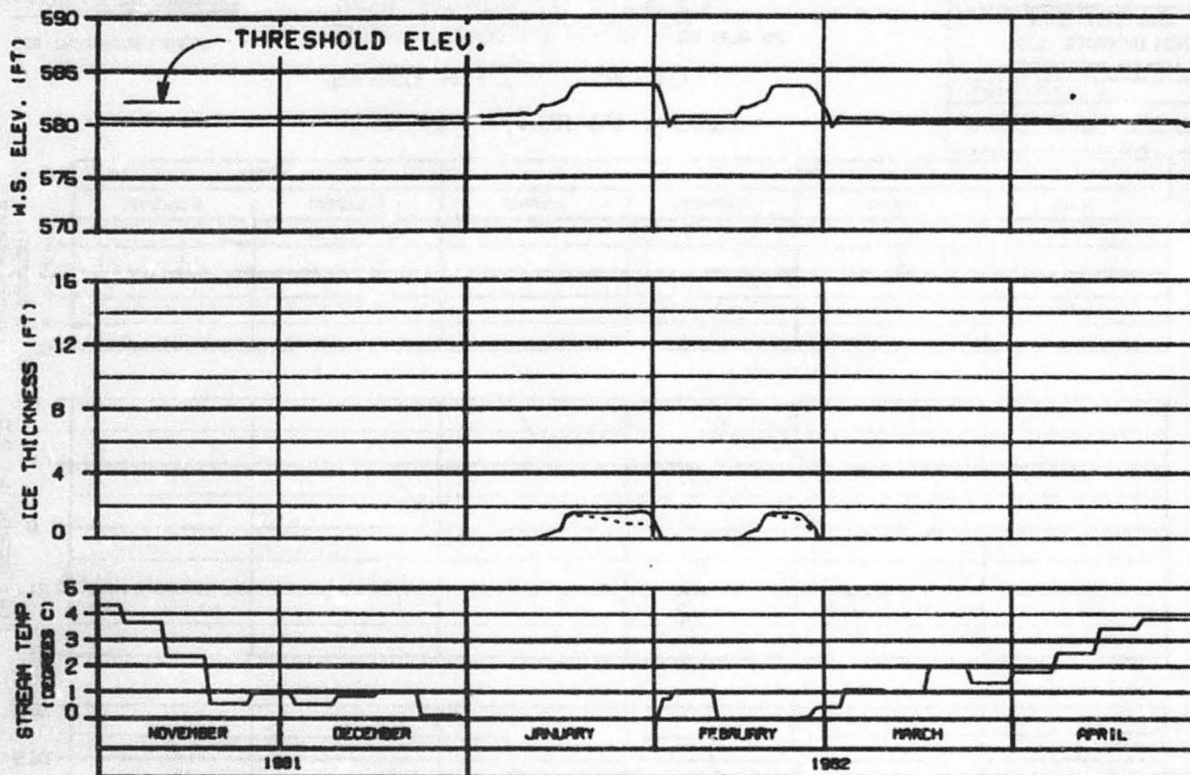
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EPSCO JOINT VENTURE

DESIGN: 81-0010 20 AA 01 1000.142



HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING FLOW CASE E-1  
 50 FT. DRAINDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENY

ALASKA POWER AUTHORITY

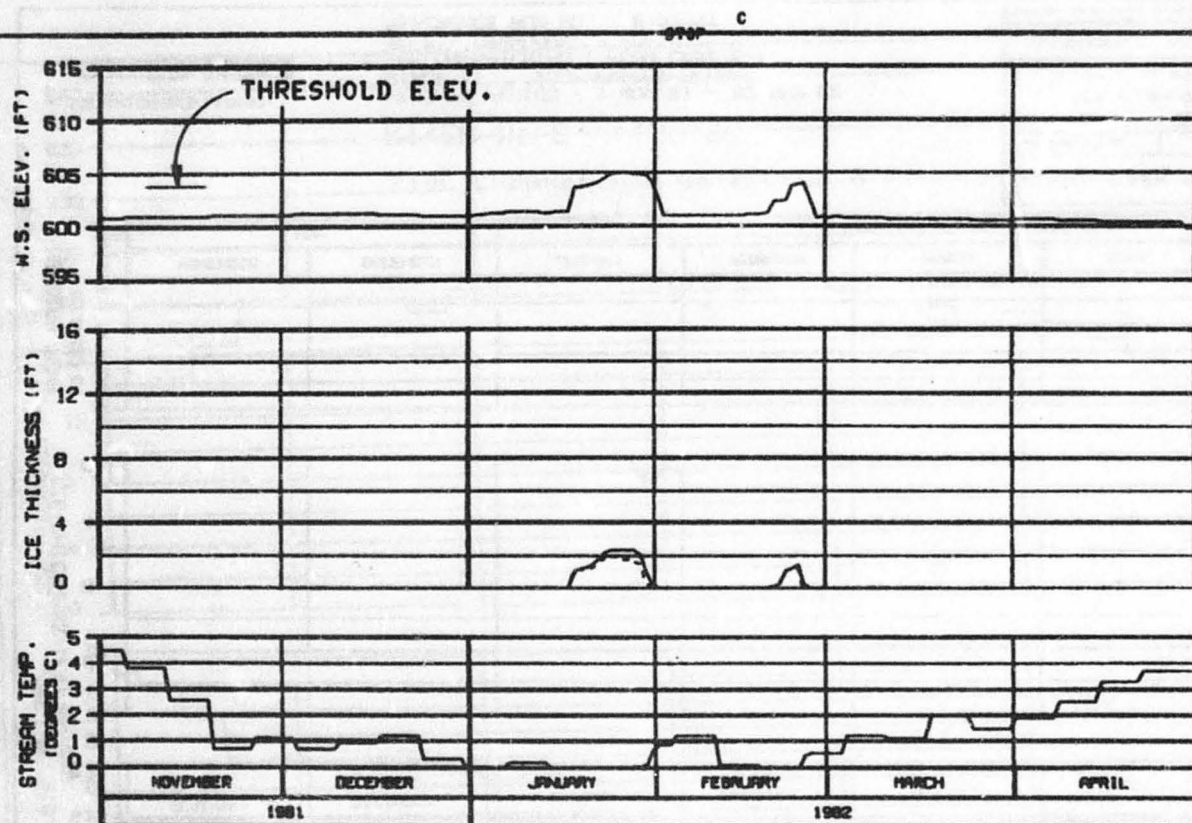
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARREN-EBASCO JOINT VENTURE

DESIGNED BY: B. S. S. 10 JUL 82 8008.142





HEAD OF SLOUGH 9  
RIVER MILE : 129.30

ICE THICKNESS LEGEND:  
----- TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE 11 2002 ENERGY DEMAND  
INFLOW-HATCHING . FLOW CASE E-1  
50 FT. DRAWDOWN. 2 PORTS  
REFERENCE RUN NO. : 8102ENY

ALASKA POWER AUTHORITY

SUSITNA PROJECT

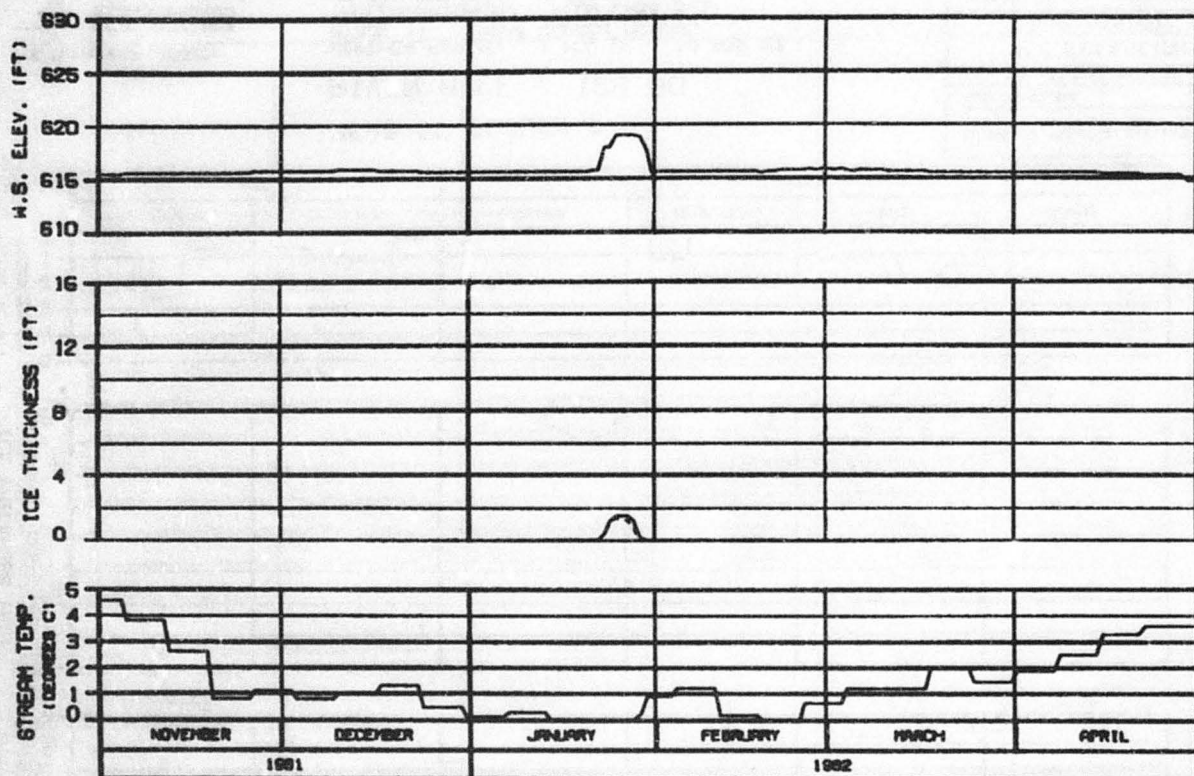
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBASCO JOINT VENTURE

DESIGNED BY: HAZRA-EBASCO 30 JUL 82 8208.142

OPTION?

OPTION 9



SIDE CHANNEL U/S OF SLOUGH 9  
RIVER MILE : 130.60

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE II 2002 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-1  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8102ENY

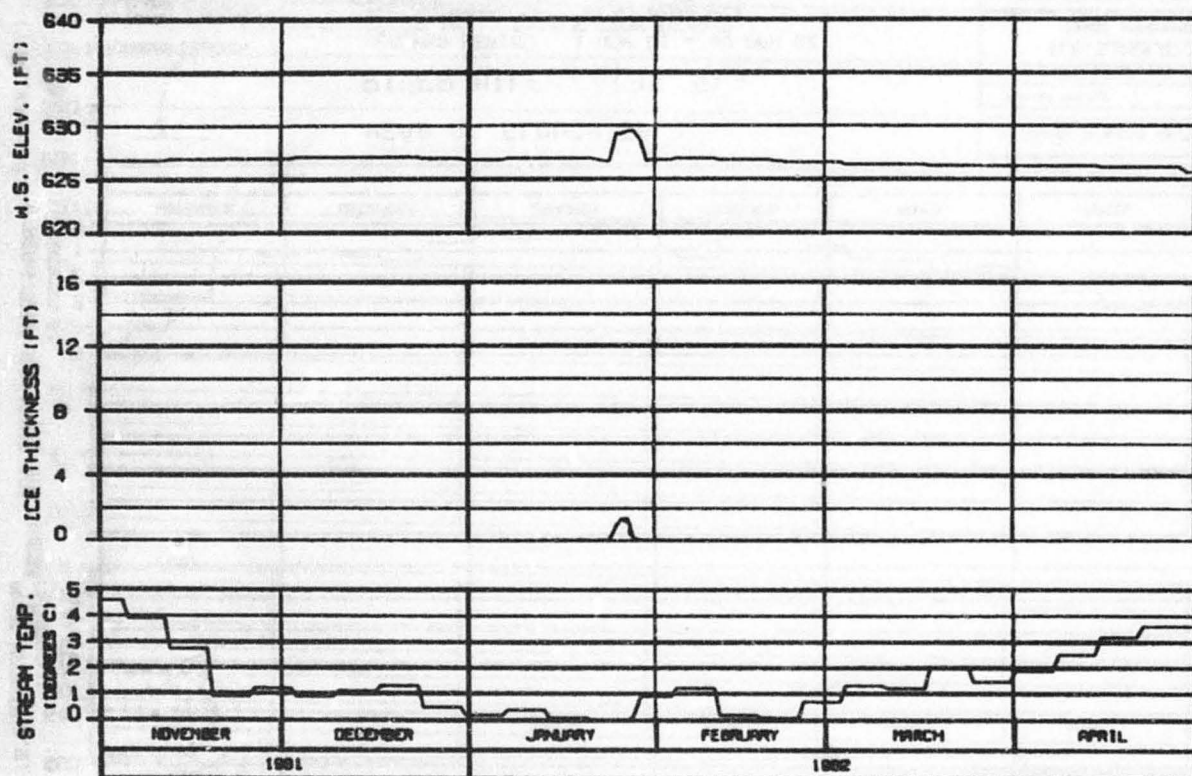
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED: D.L. GIBBS 70 00 00 1000.142



**SIDE CHANNEL U/S OF 4TH JULY CREEK**  
**RIVER MILE : 131.80**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING - FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 810ZENY

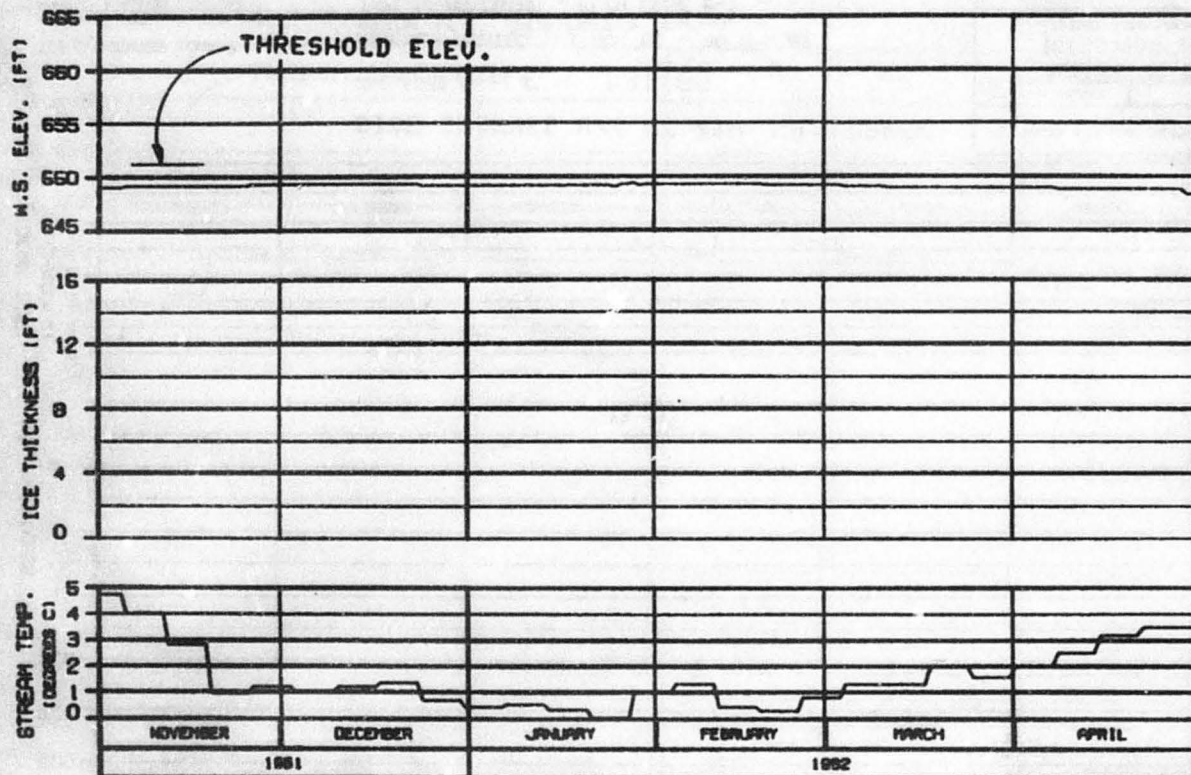
**ALASKA POWER AUTHORITY**

**SUSITNA PROJECT**

**SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY**

**WARDA-EBASCO JOINT VENTURE**

DESIGN: AL-0010 30 JUL 82 1000.142



HEAD OF SLOUGH 9A

RIVER MILE : 133.70

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 30 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENY

ALASKA POWER AUTHORITY

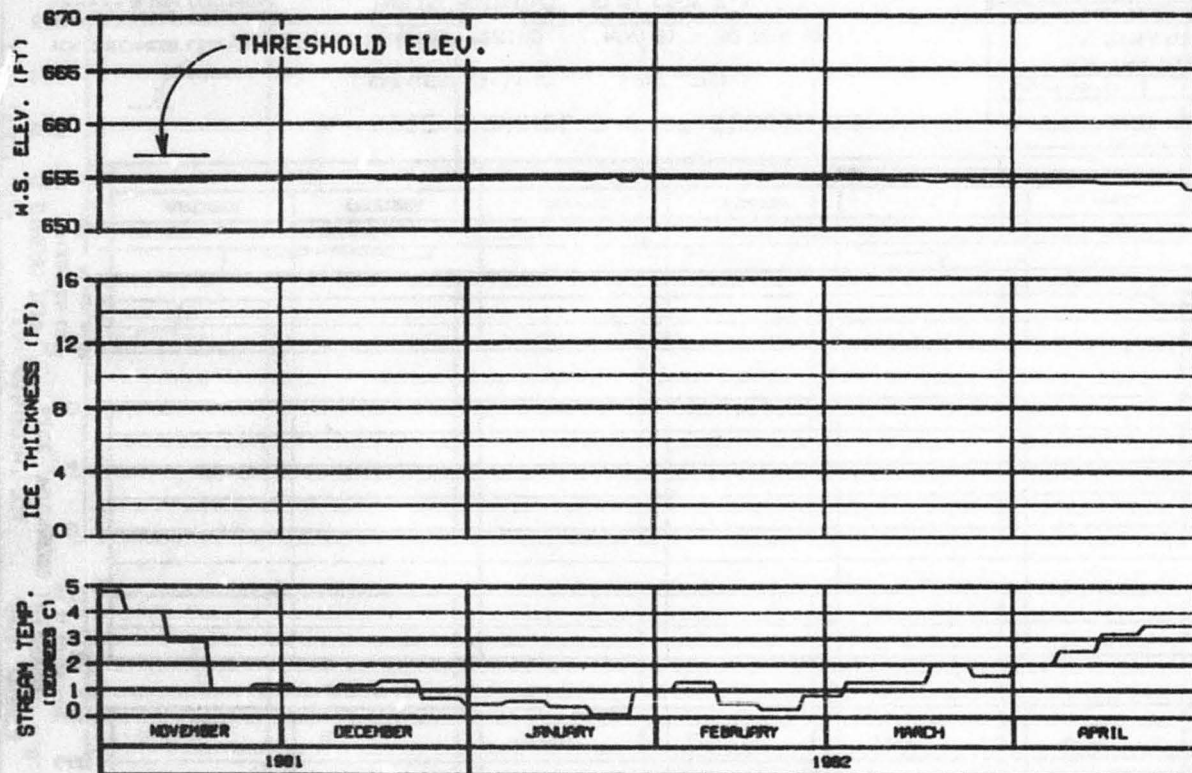
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARDA-EBASCO JOINT VENTURE

DESIGN: SLD/DBB 80 JUL 80 1000.142





SIDE CHANNEL U/S OF SLOUGH 10  
RIVER MILE : 134.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE 11 2002 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-1  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8102ENY

ALASKA POWER AUTHORITY

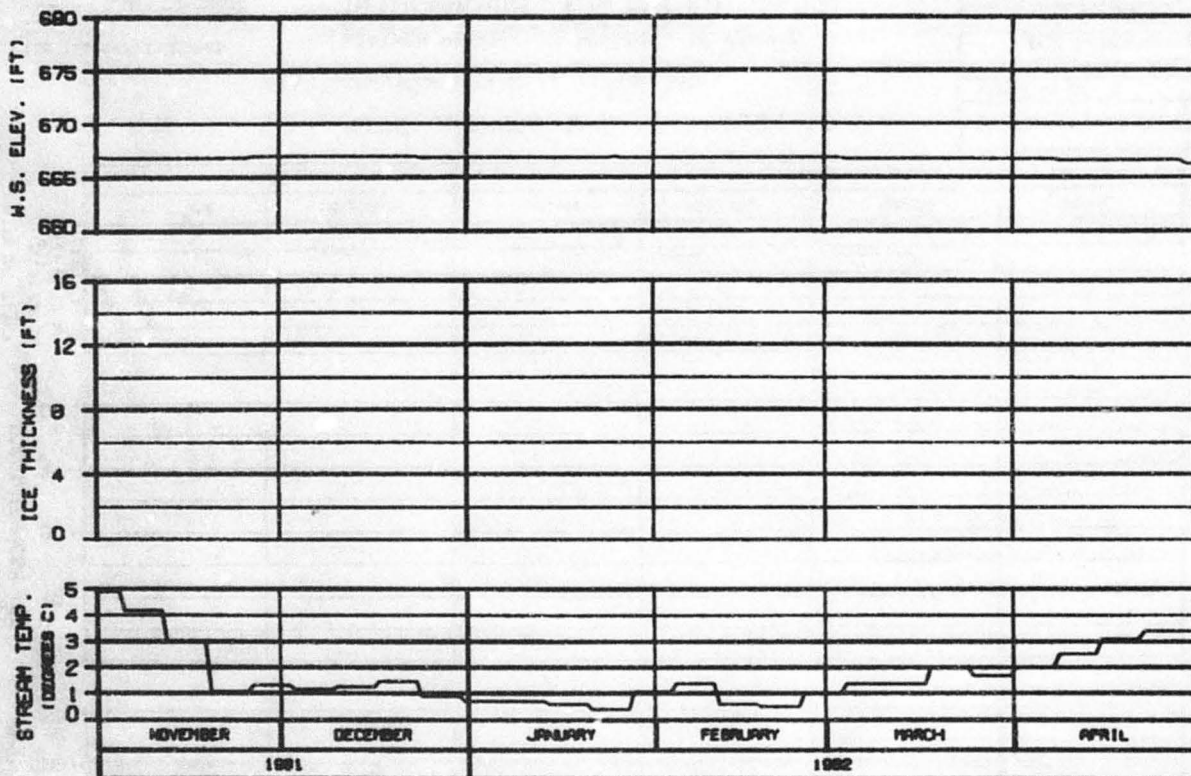
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED BY: J. J. J. 30 JUL 82 1000.142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL D/S OF SLOUGH 11

RIVER MILE : 135.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENY

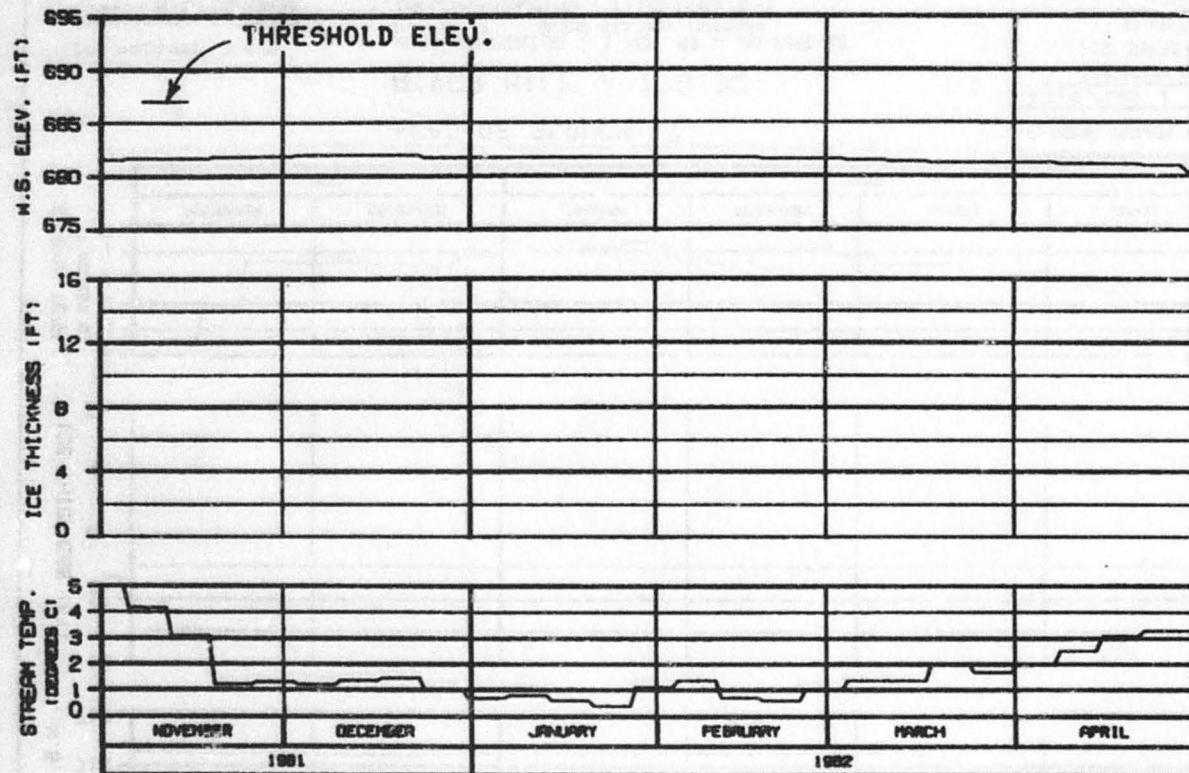
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-ENRSCO JOINT VENTURE

DESIGN: 8/8/88 BY: JAL/CS 1000, 142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 11  
 RIVER MILE : 136.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 11 2002 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENY

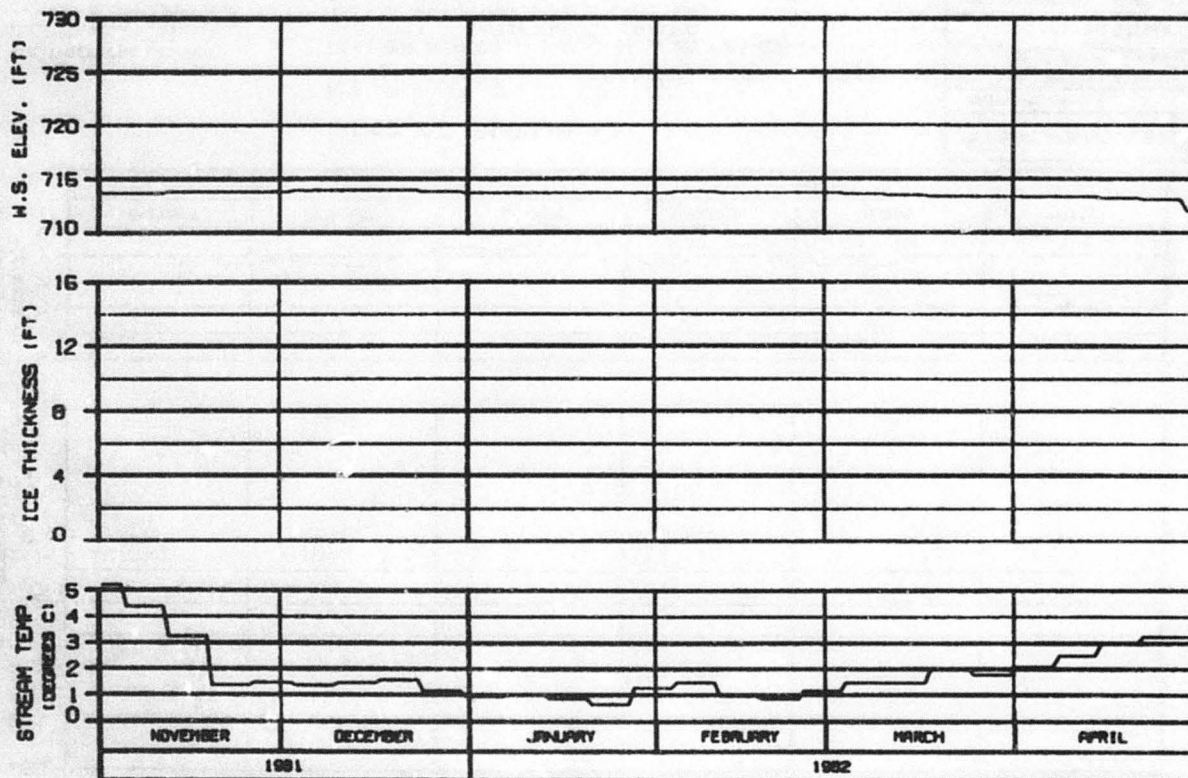
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZDA-EBRSCO JOINT VENTURE

DESIGN: SLAPERS 30 JUL 82 1982.142



HEAD OF SLOUGH 17

RIVER MILE : 139.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II - 2002 ENERGY DEMAND  
 INFLOW-MATCHING - FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 810ZENY

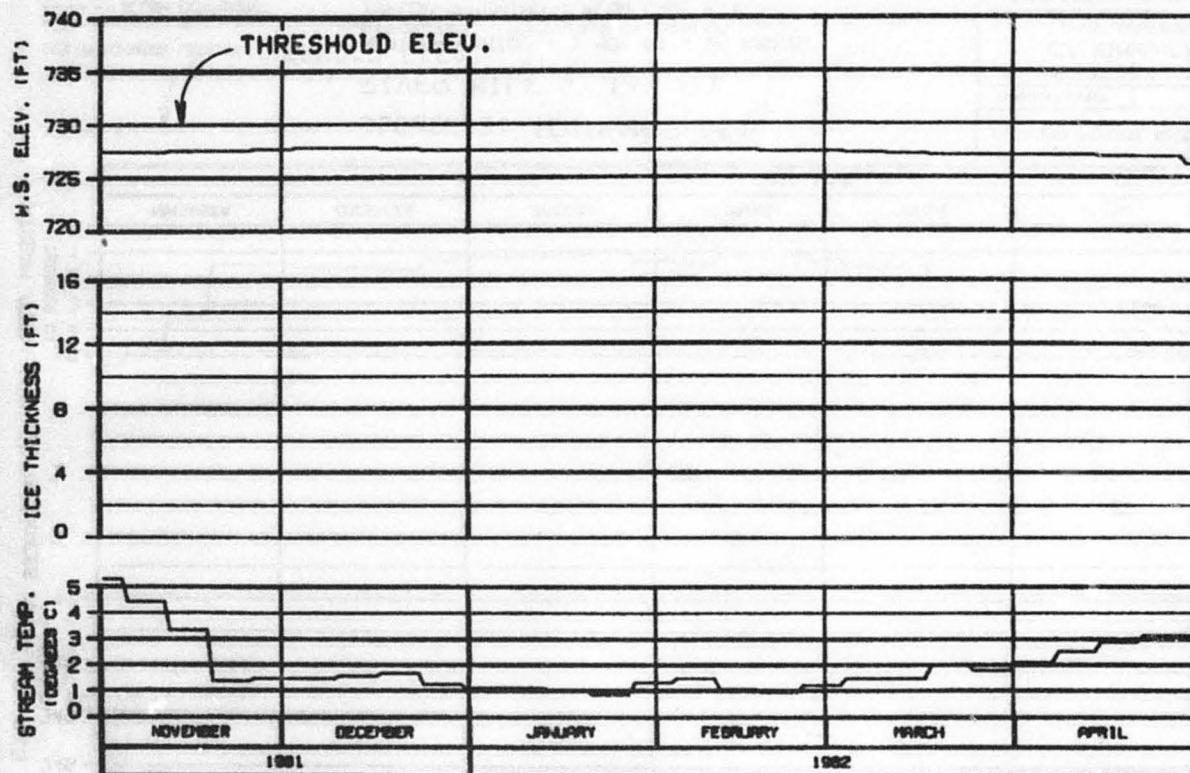
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DIGEST: 04 APR 82 09 44 AM 1982, 142



HEAD OF SLOUGH 20  
RIVER MILE : 140.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE II 2002 ENERGY DEMAND  
INFLOW-MATCHING FLOW CASE E-1  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8102ENY

ALASKA POWER AUTHORITY

SUSITNA PROJECT

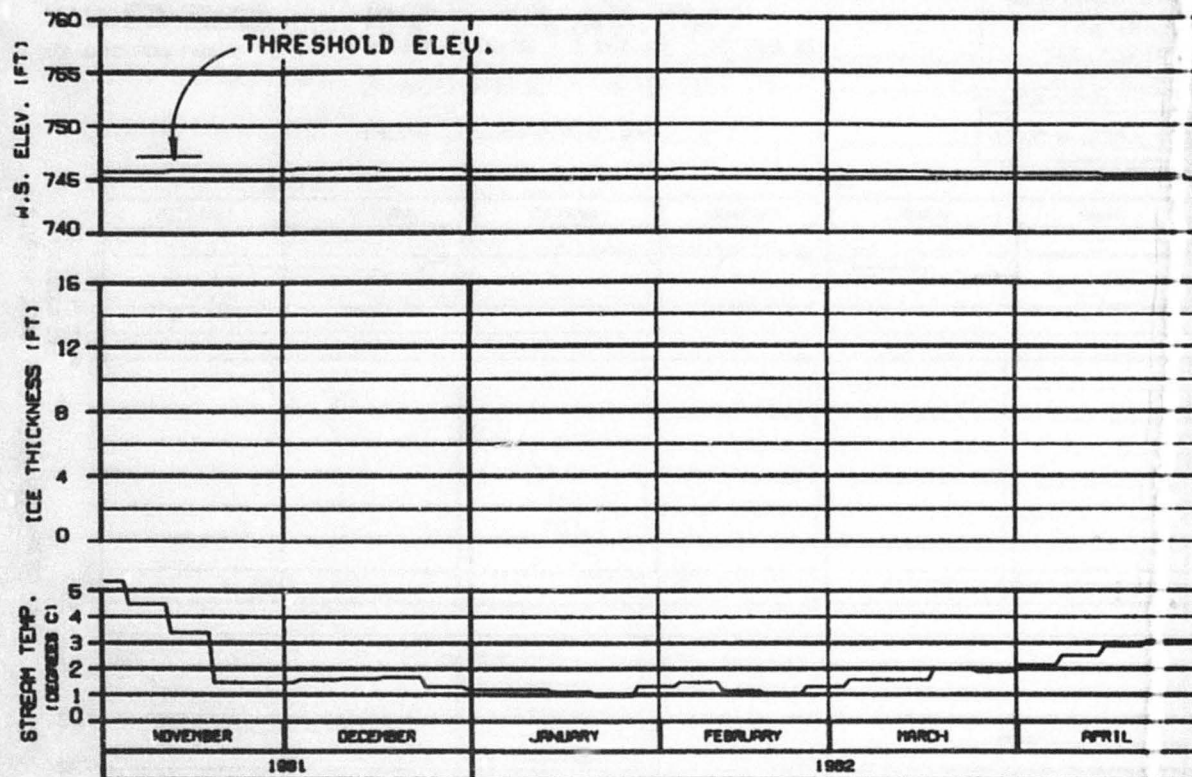
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARDA-EDBECO JOINT VENTURE

DESIGNED BY: J. L. HARRIS

NOV. 1982





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SLOUGH 21 (ENTRANCE A6)  
 RIVER MILE : 141.80

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II : 2002 ENERGY DEMAND  
 INFLOW-MATCHING : FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENY

ALASKA POWER AUTHORITY

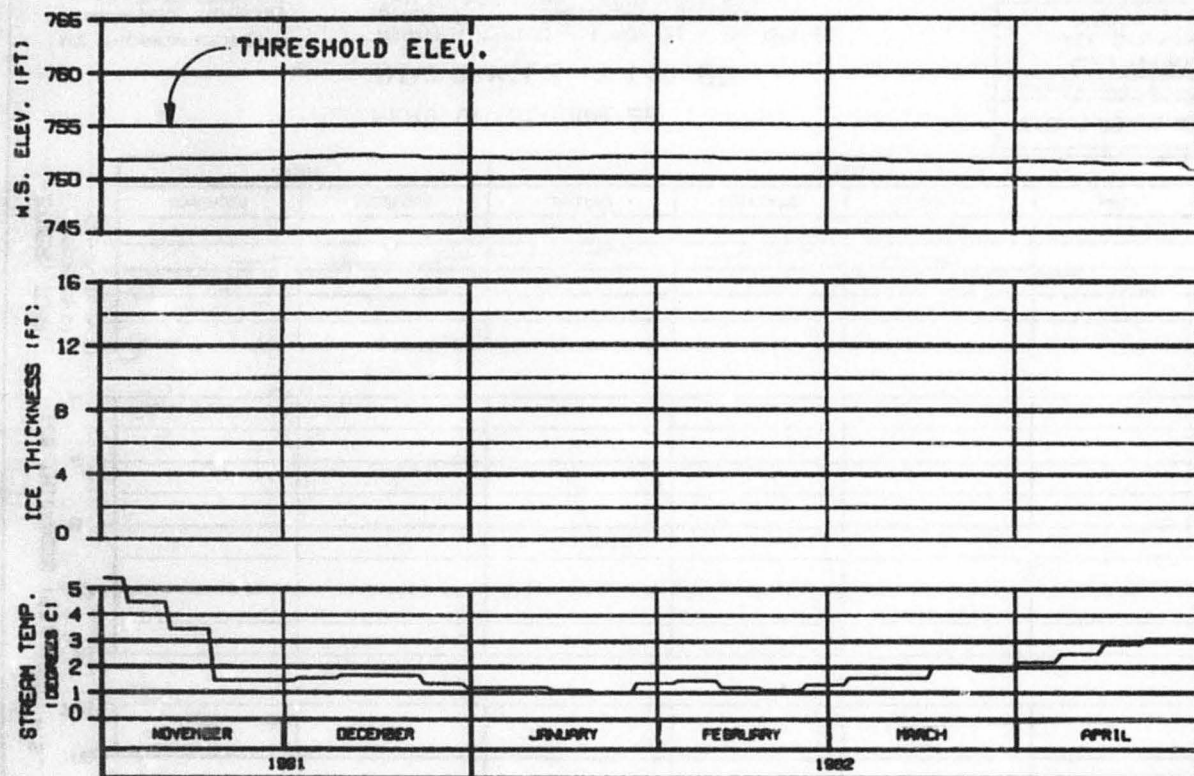
SUSTINA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBERSCO JOINT VENTURE

DESIGN: 8110-010 00 01 00 PAGE 142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 21  
 RIVER MILE : 142.20

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE 11 2002 ENERGY DEMAND  
 INFLOW-MATCHING FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8102ENY

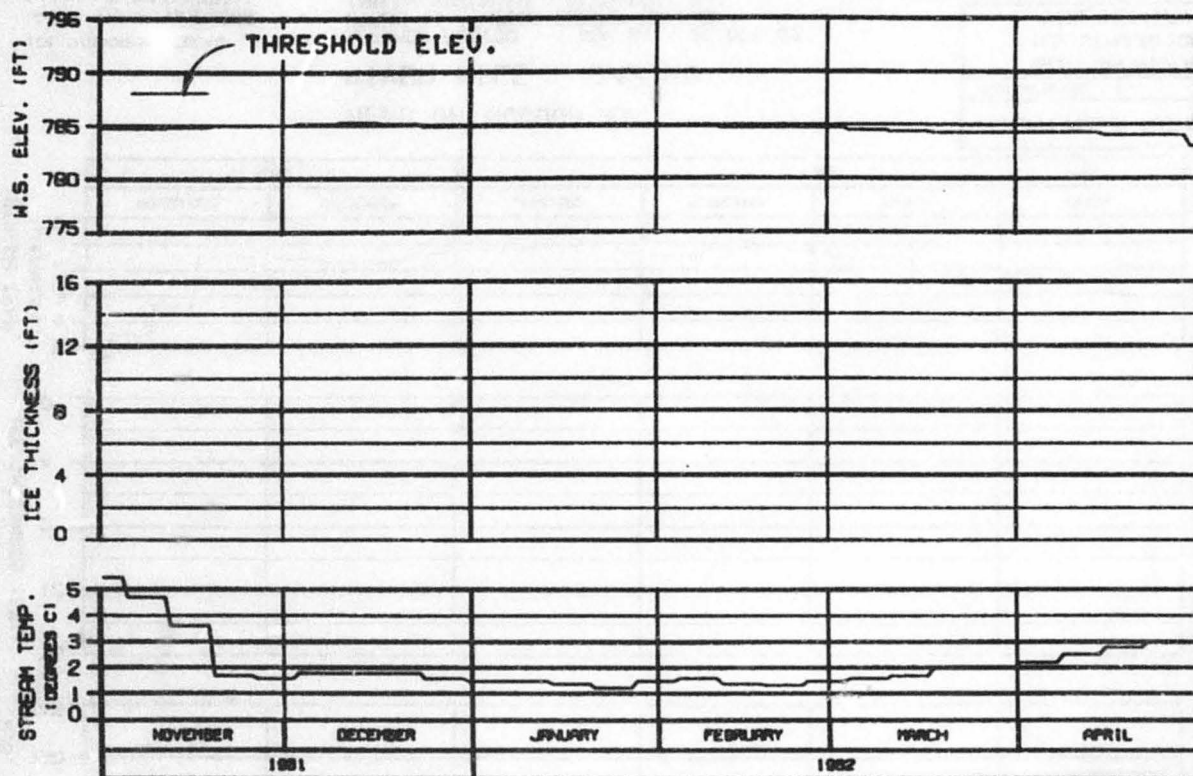
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED BY: J. L. DAVIS 20 JAN 82 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

OPTION?

HEAD OF SLOUGH 22  
 RIVER MILE : 144.80

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE II 2002 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 810ZENY

ALASKA POWER AUTHORITY

SUSITNA PROJECT

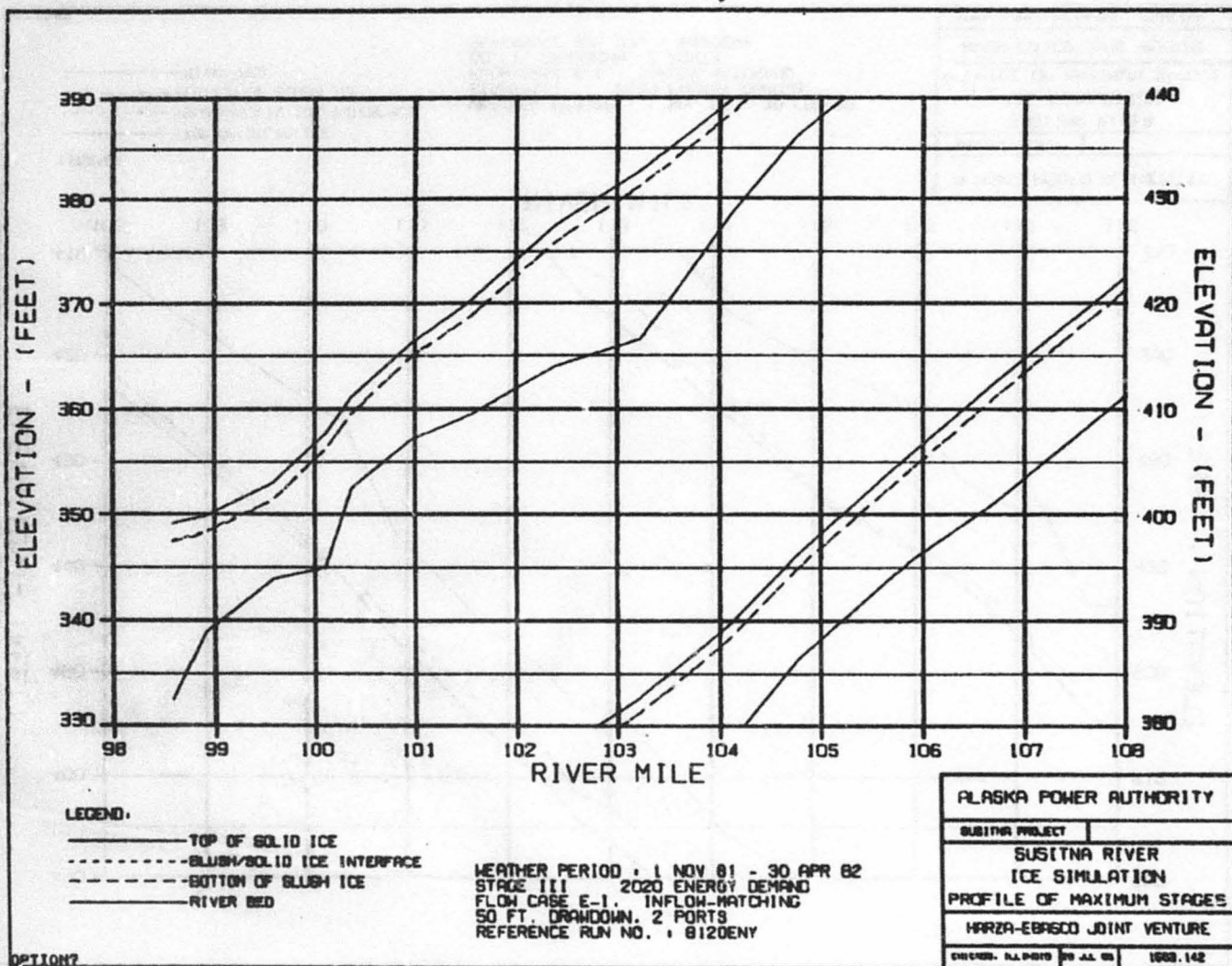
SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

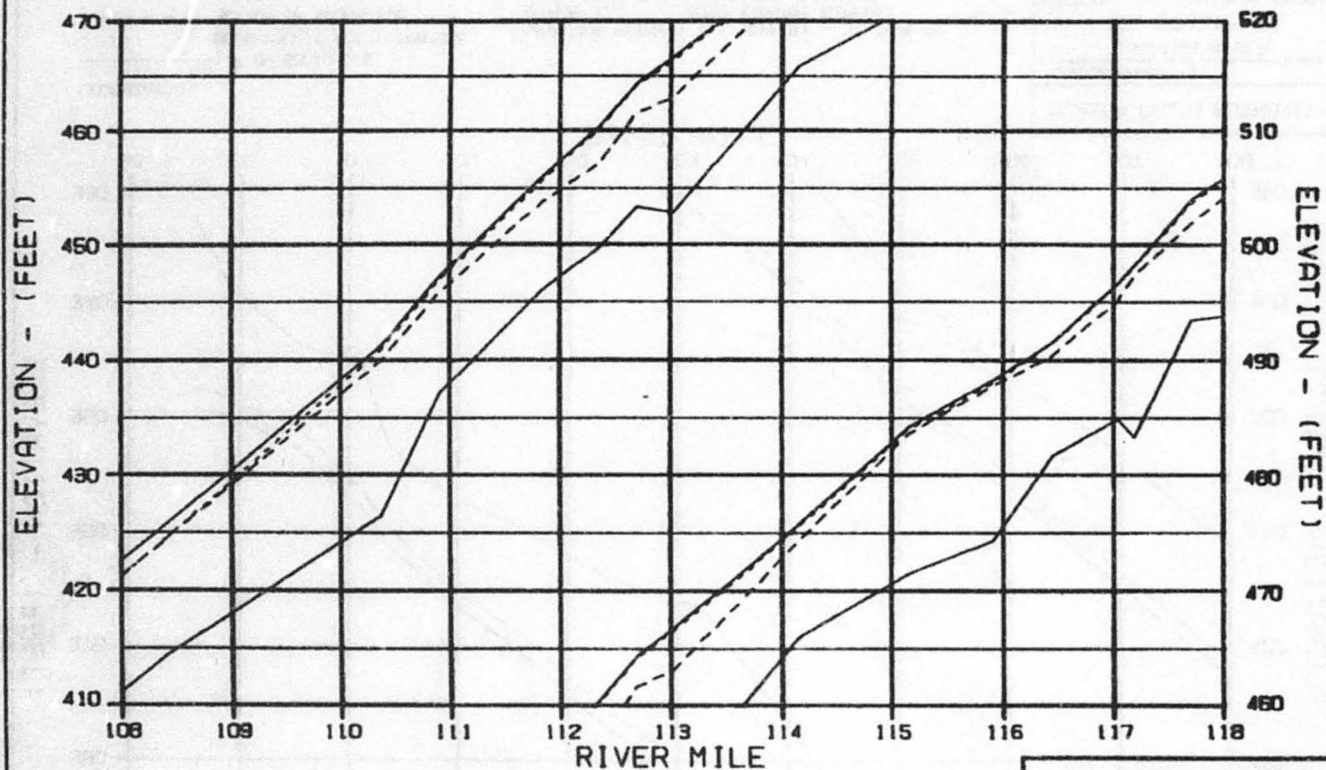
HARZA-EBASCO JOINT VENTURE

DIVISION: ELECTRIC NO. 44-01 000-142

**EXHIBIT F**







## LEGEND:

- TOP OF SOLID ICE
- - - SLUSH/SOLID ICE INTERFACE
- . - - BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 FLOW CASE E-1, INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENV

## ALASKA POWER AUTHORITY

SUSITNA PROJECT

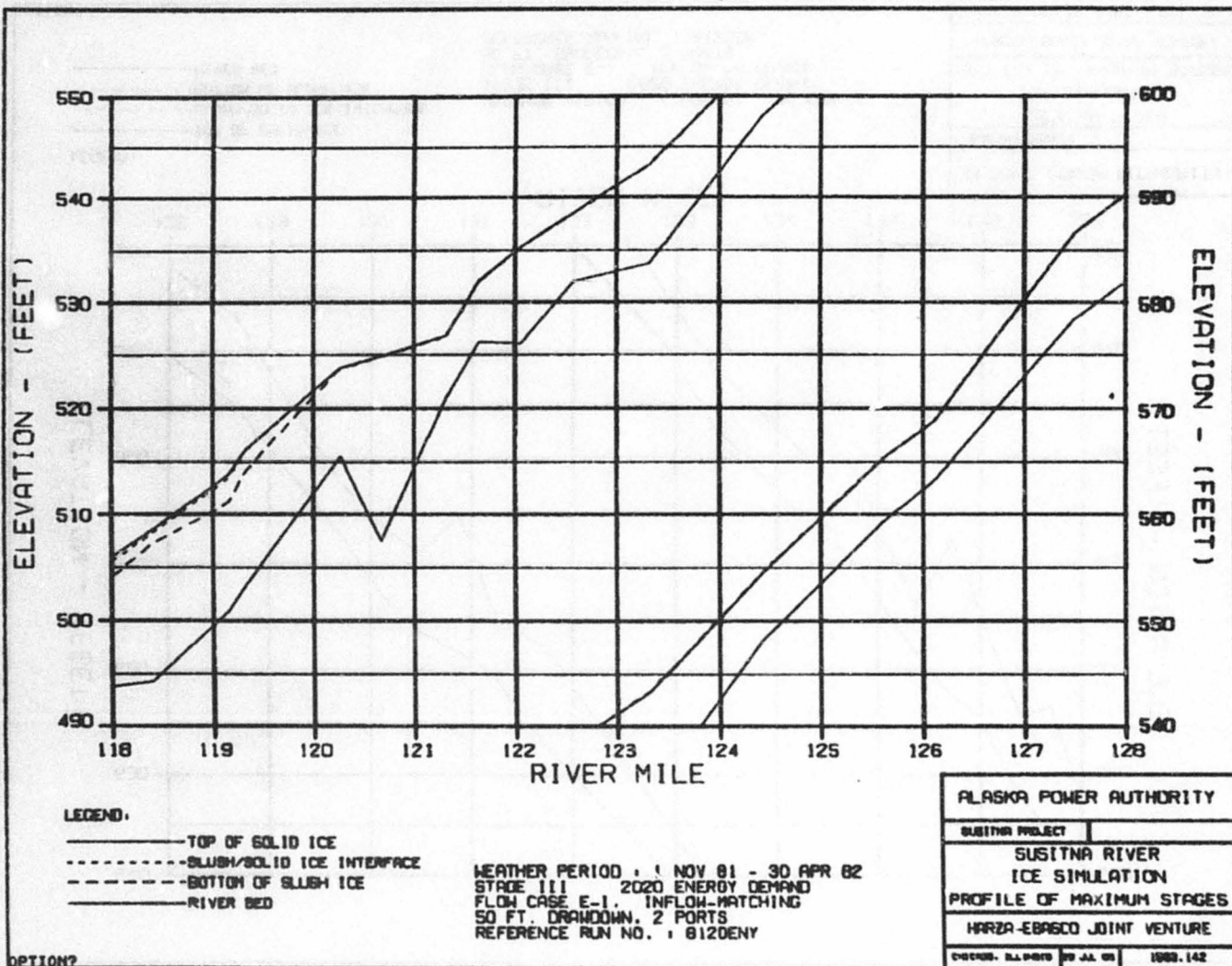
SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

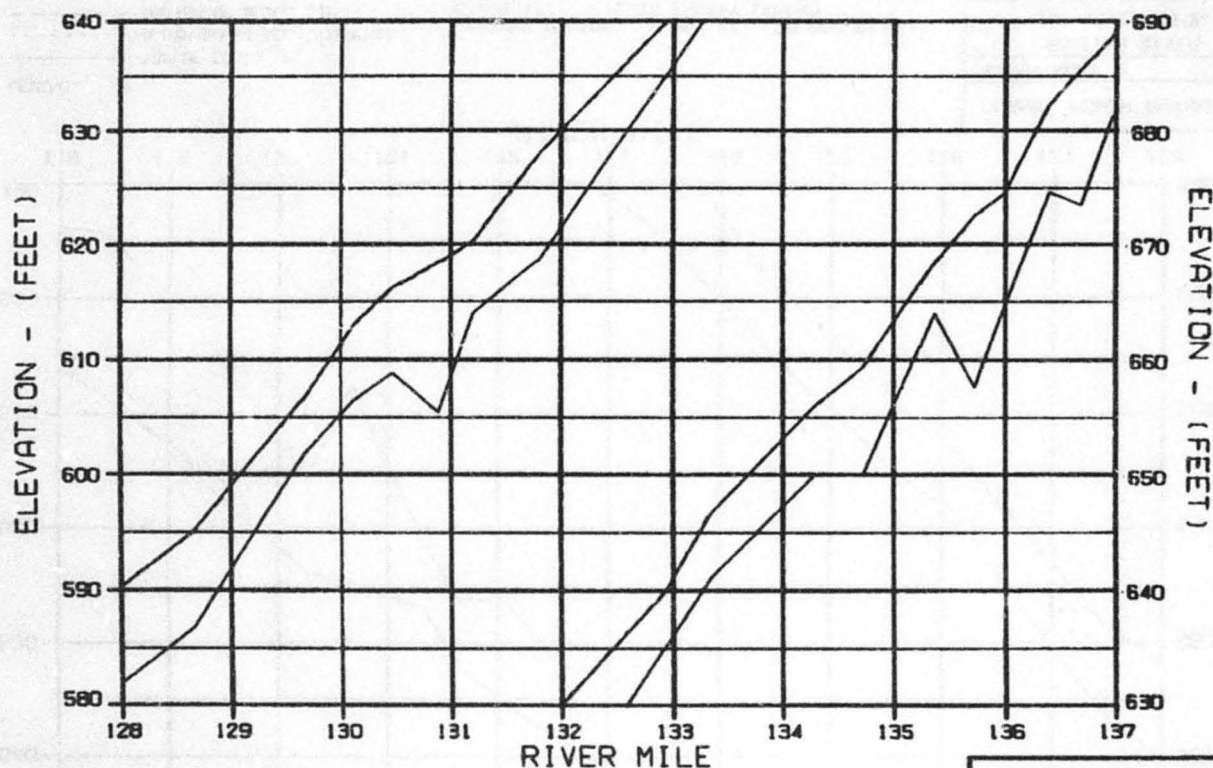
HARZA-EBRARD JOINT VENTURE

CHICAGO, ILLINOIS 60606-1402

OPTION 2







LEGEND.

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- ..... BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 FLOW CASE E-1, INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENV

OPTION?

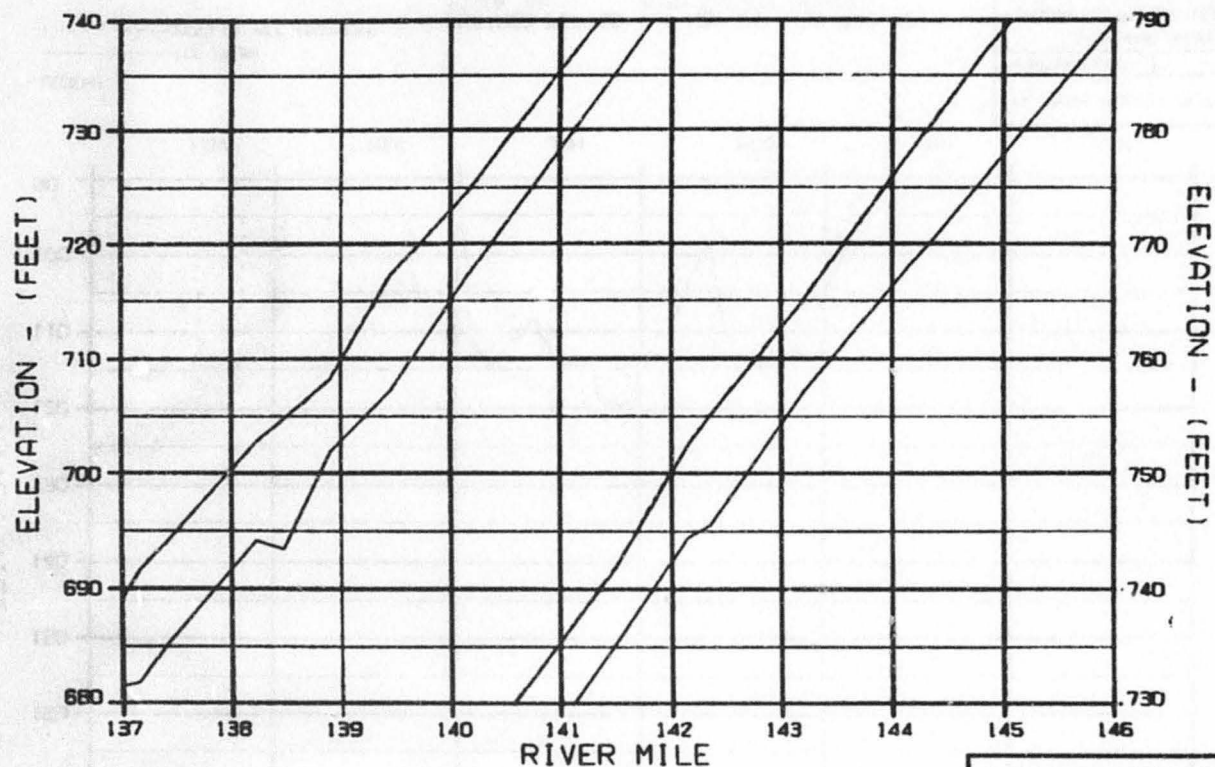
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

CHARTER: R.L. 0400 20 JAN 82 1000.142



LEGEND.

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- .-.-.- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III - 2020 ENERGY DEMAND  
 FLOW CASE E-1. INFLOW-MATCHING  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

ALASKA POWER AUTHORITY

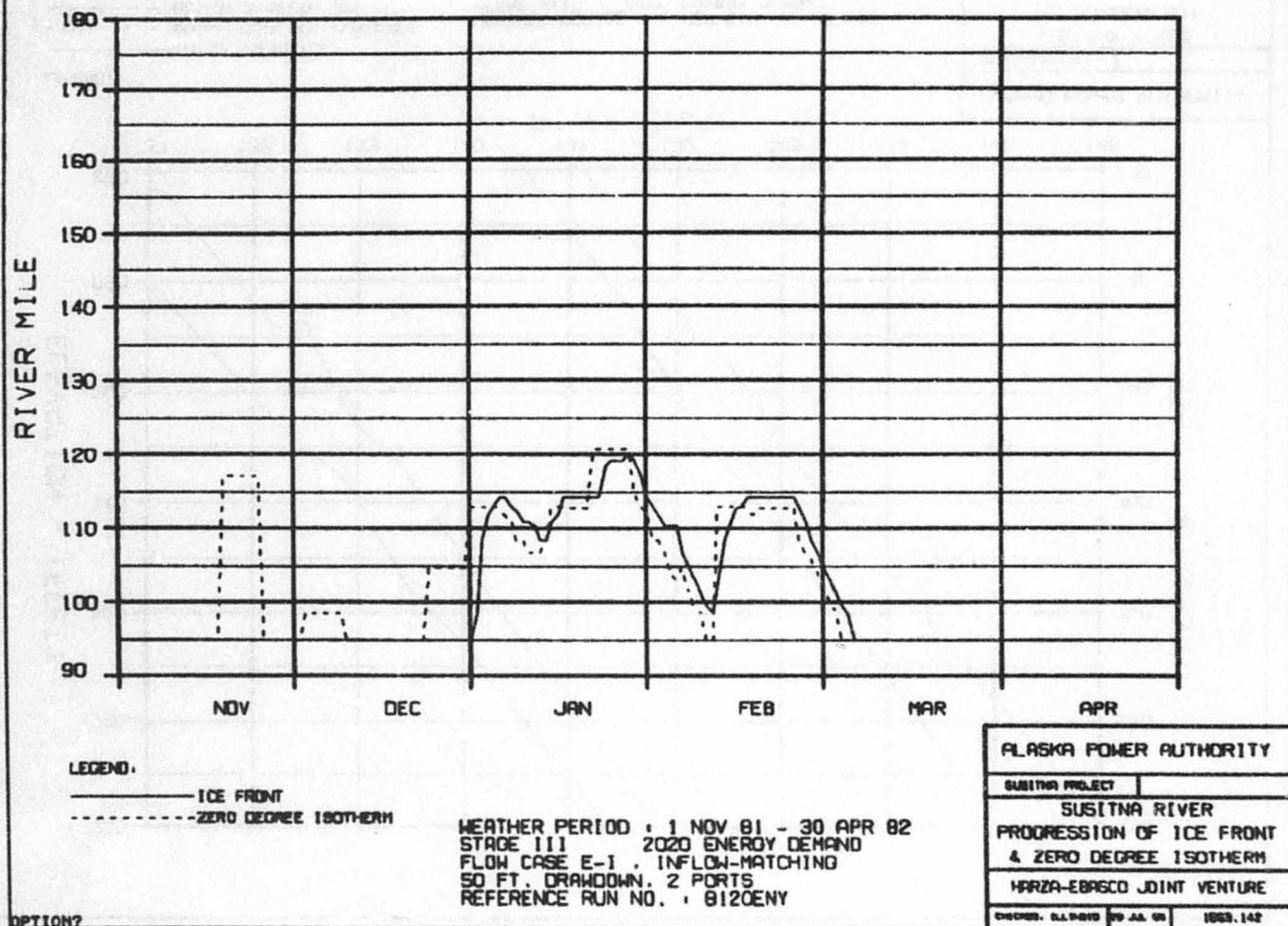
SUSITNA PROJECT

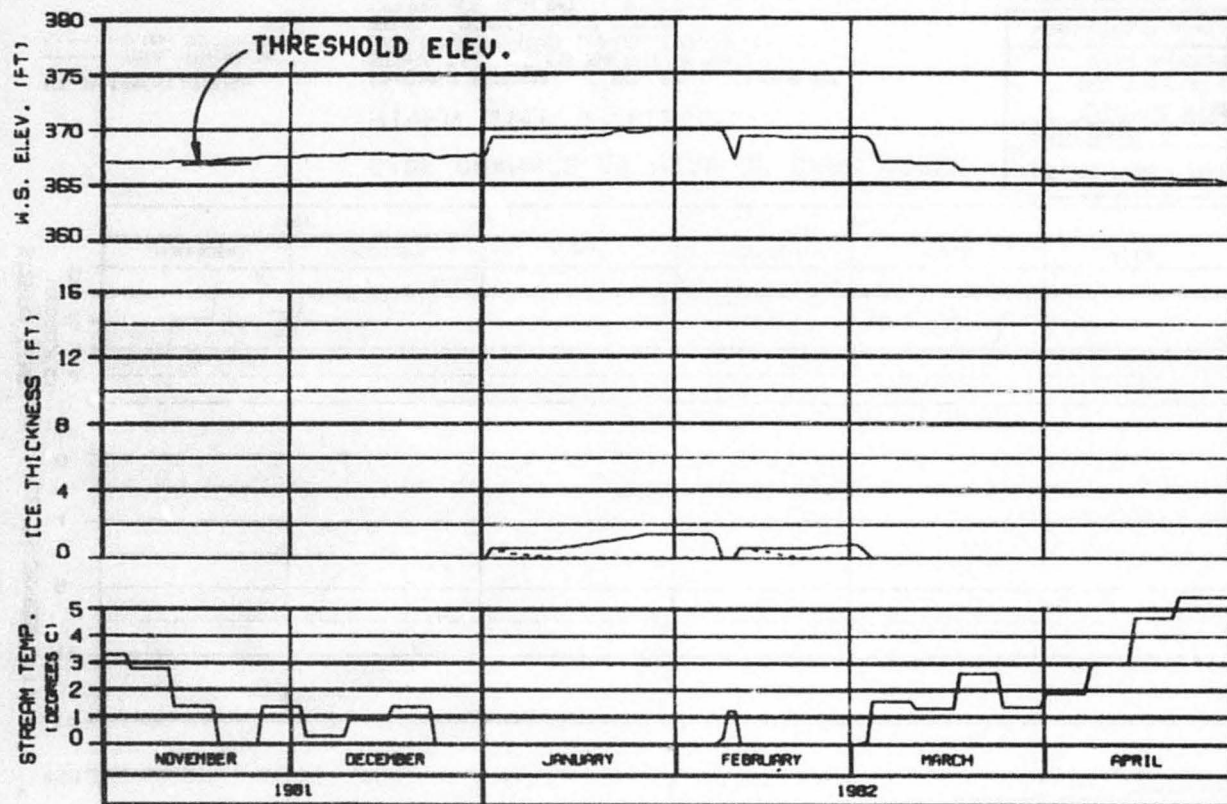
SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

ENCLOSURE, 8/1/82 89 JA 08 1883.142

OPTION2





# HEAD OF WHISKERS SLOUGH

RIVER MILE : 101.50

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

ALASKA POWER AUTHORITY

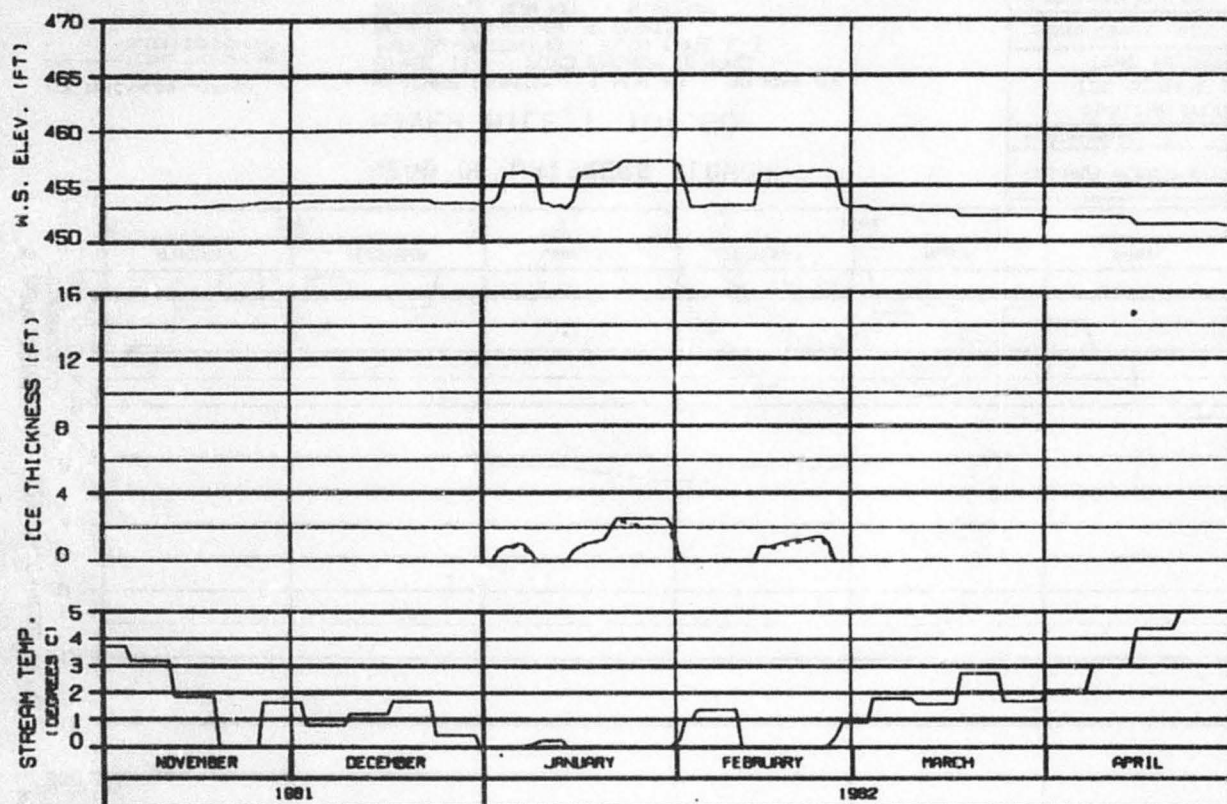
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBASCO JOINT VENTURE

DESIGNED - ELLIPSON 20 JAN 82 1588.142





# SIDE CHANNEL AT HEAD OF GASH CREEK

RIVER MILE : 112.00

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III - 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

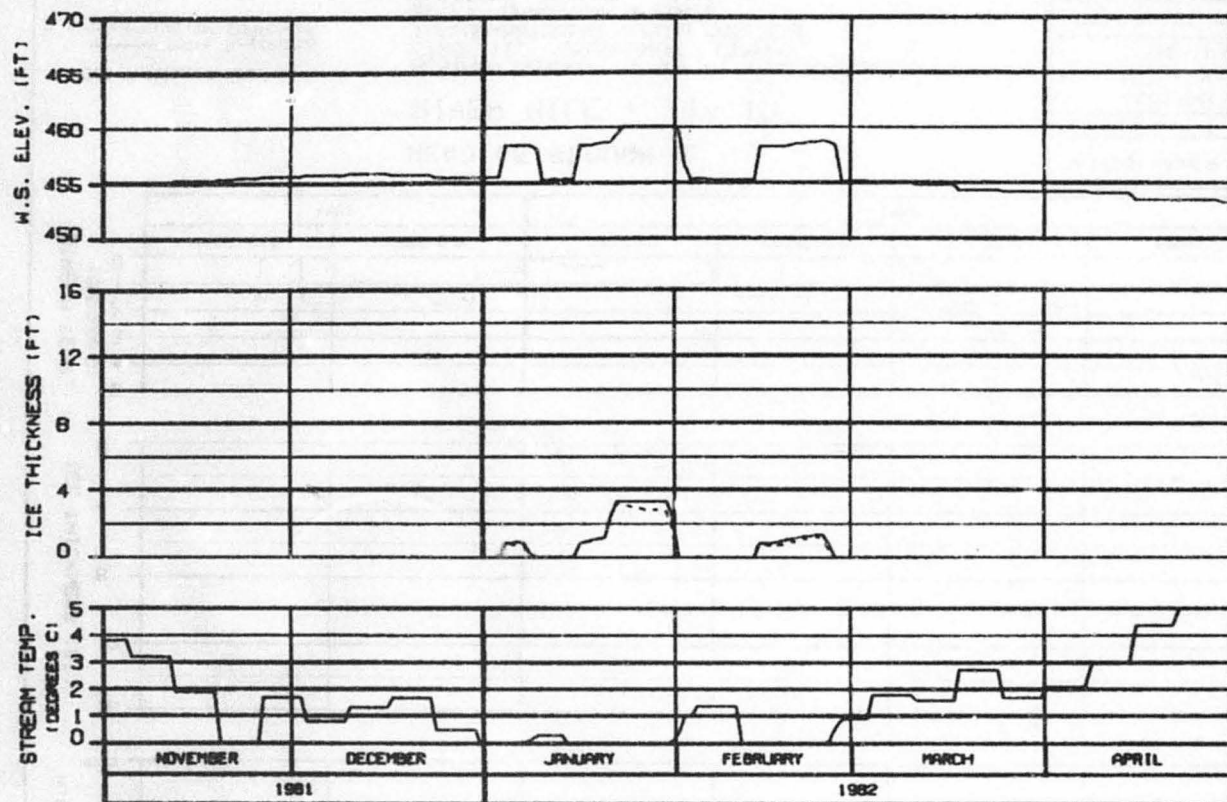
ALASKA POWER AUTHORITY

SUBMITTER PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHECKED: SLA/PSTB 29 JUL 82 1000.142

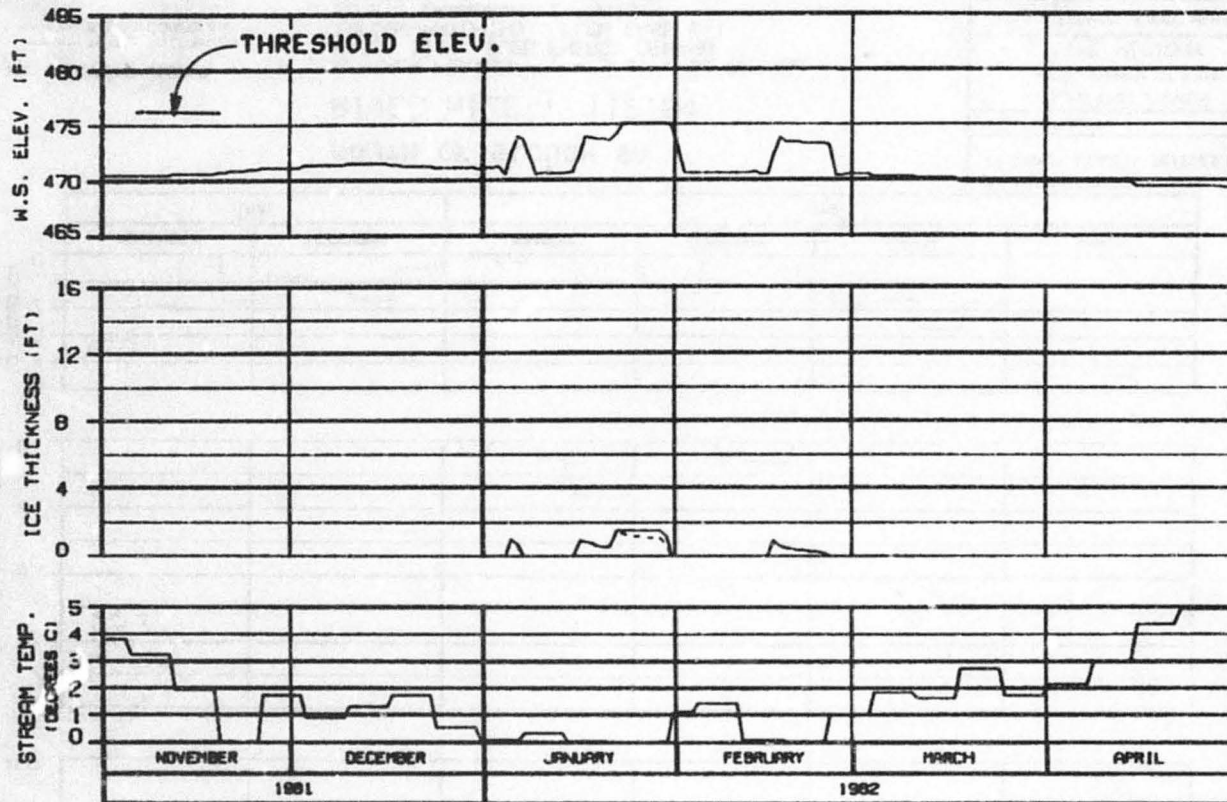


**MOUTH OF SLOUGH 6A**  
**RIVER MILE : 112.34**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III - 2020 ENERGY DEMAND  
 INFLOW-MATCHING - FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER ICE SIMULATION TIME HISTORY	
HARZA-EBRSCO JOINT VENTURE	
CHARGE - ILLINOIS	28 JUL 82
1000, 142	



**HEAD OF SLOUGH 8**  
**RIVER MILE : 114.10**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III - 2020 ENERGY DEMAND  
 INFLW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

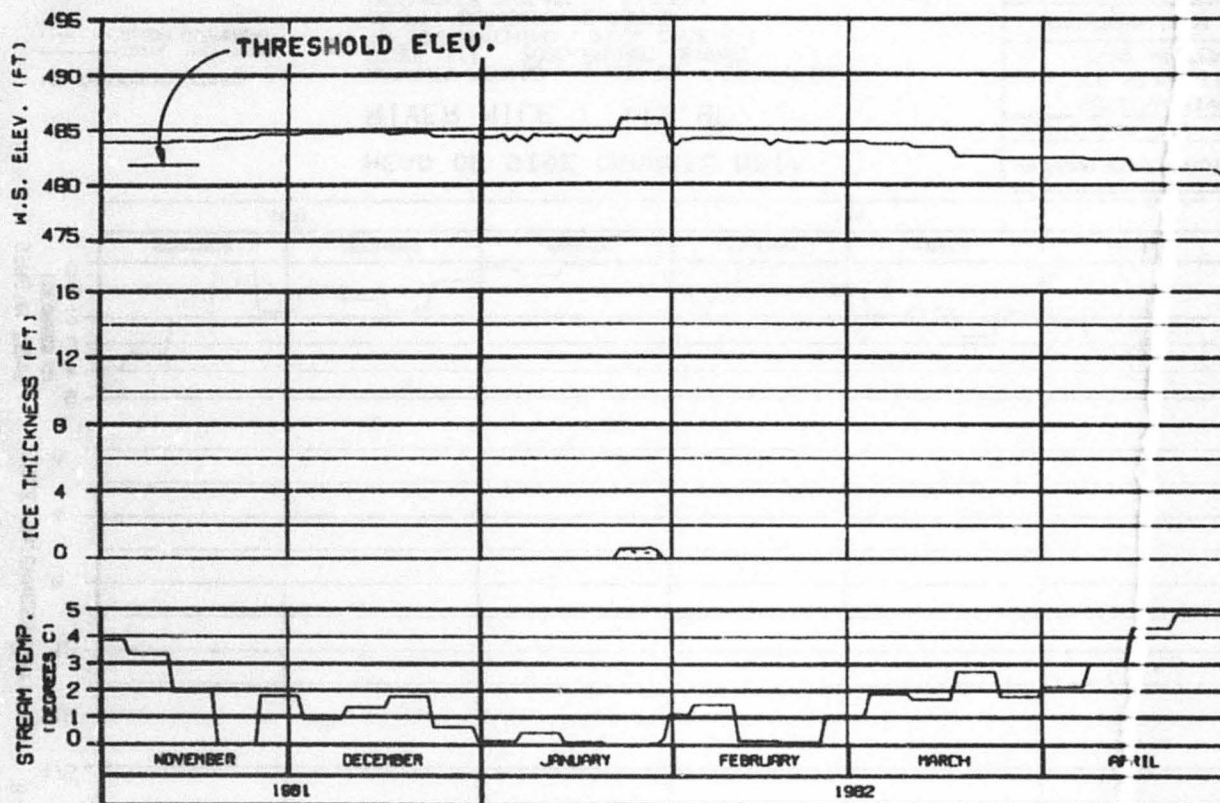
**ALASKA POWER AUTHORITY**

**SUSITNA PROJECT**

**SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY**

**HARZA-EBASCO JOINT VENTURE**

CHIEF, ALASKA DIVISION OF WATER RESOURCES 1982.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL MSII  
 RIVER MILE : 115.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

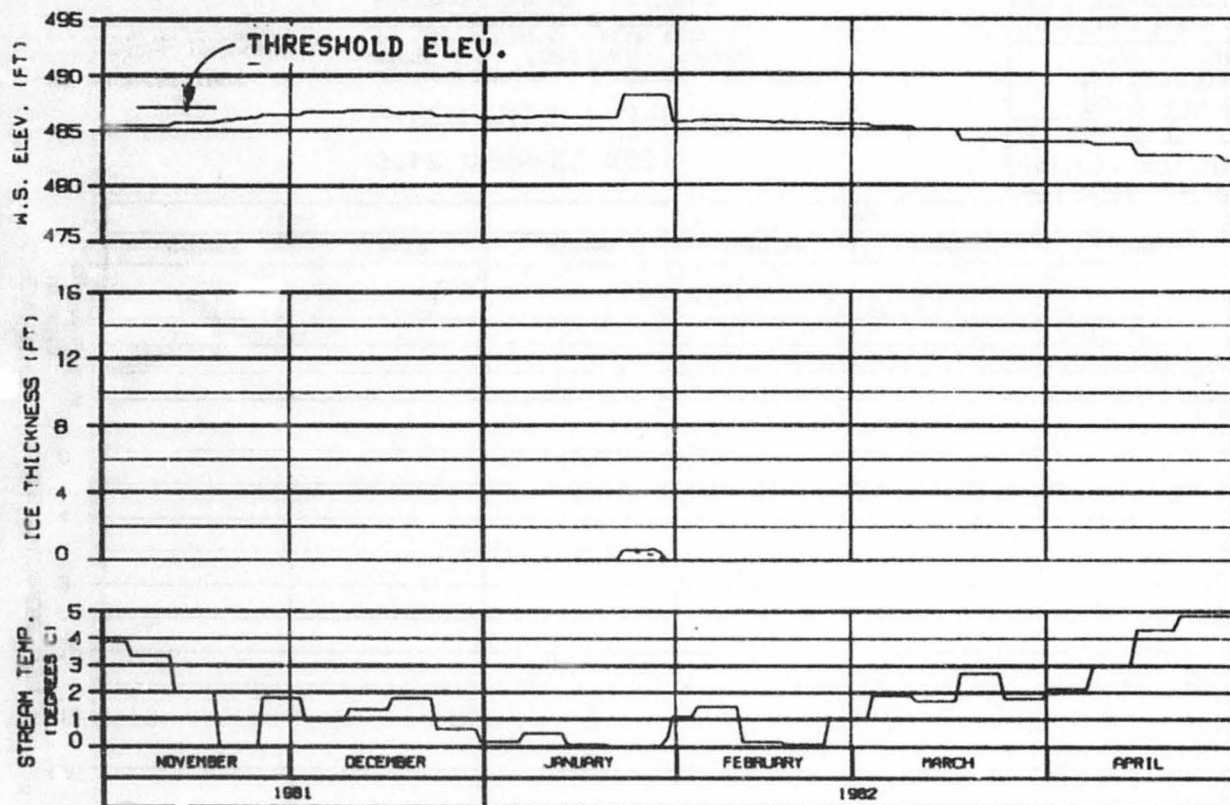
ALASKA POWER AUTHORITY

GLITCHIA FABLE CT

SUS TNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EB 1500 JOINT VENTURE

DESIGN: SLAP: 8 28 JAN 82 1000.142



# HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

ALASKA POWER AUTHORITY

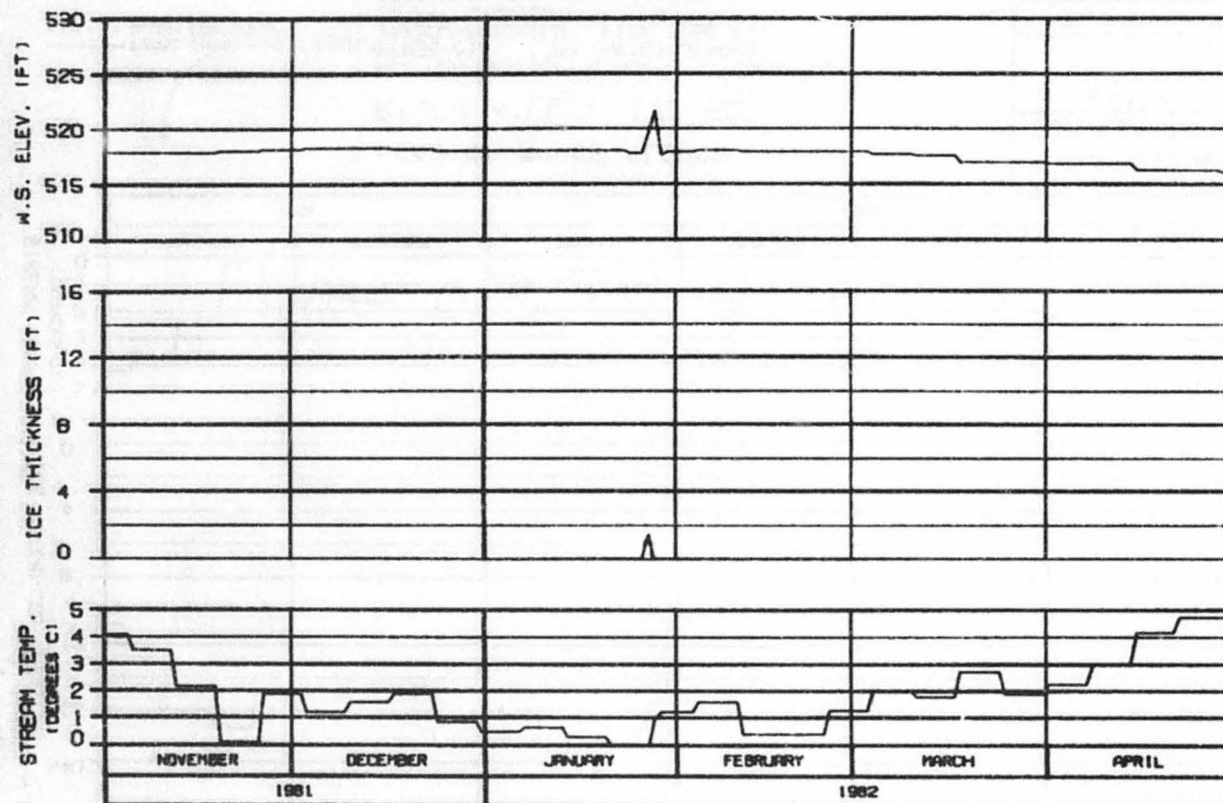
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHGNO. ILLDSTD 79 JAN 82 1003.142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - BUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

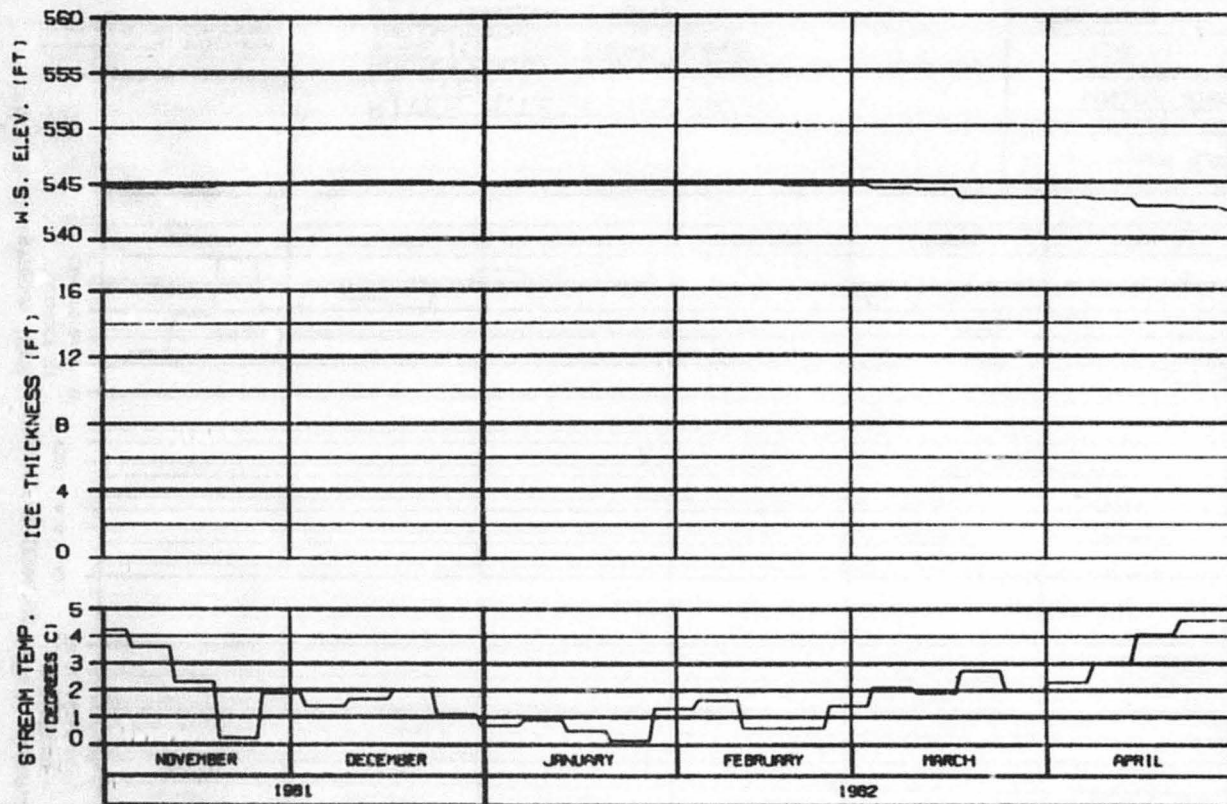
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHICAGO, ILL. 60610 89 AA 00 1000.142



**HEAD OF MOOSE SLOUGH**  
**RIVER MILE : 123.50**

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

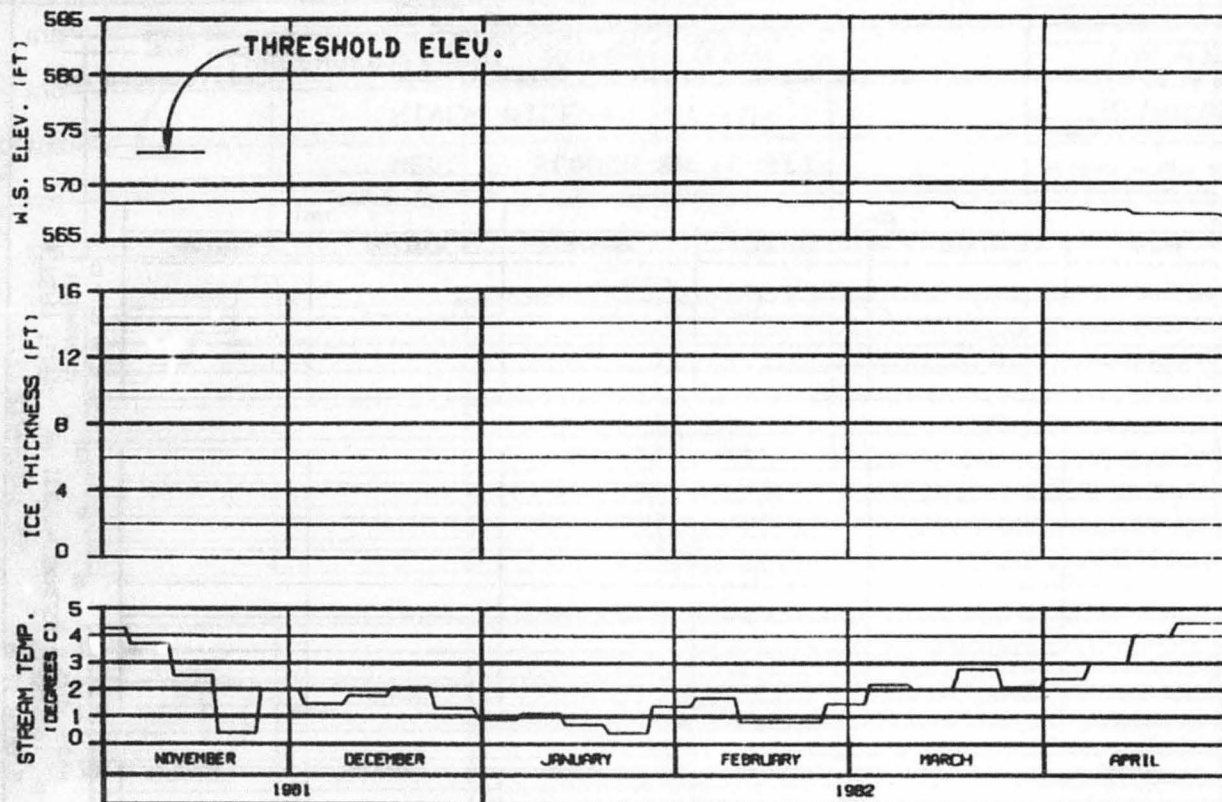
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHICAGO, ILLINOIS 99 JUL 82 1000.142



HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

ALASKA POWER AUTHORITY

SUSITNA PROJECT

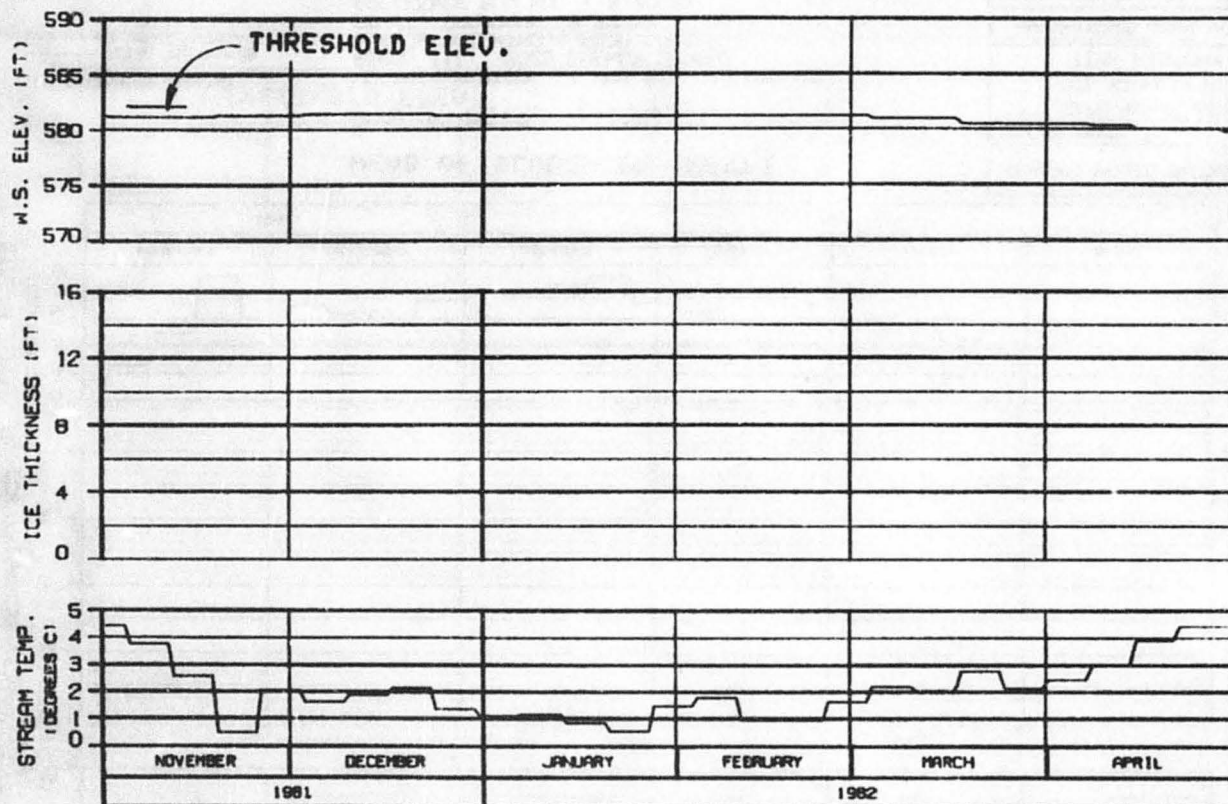
SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

CHICAGO - ILLINOIS 20 AA 10

1583.142

OPTION 7



HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

## ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

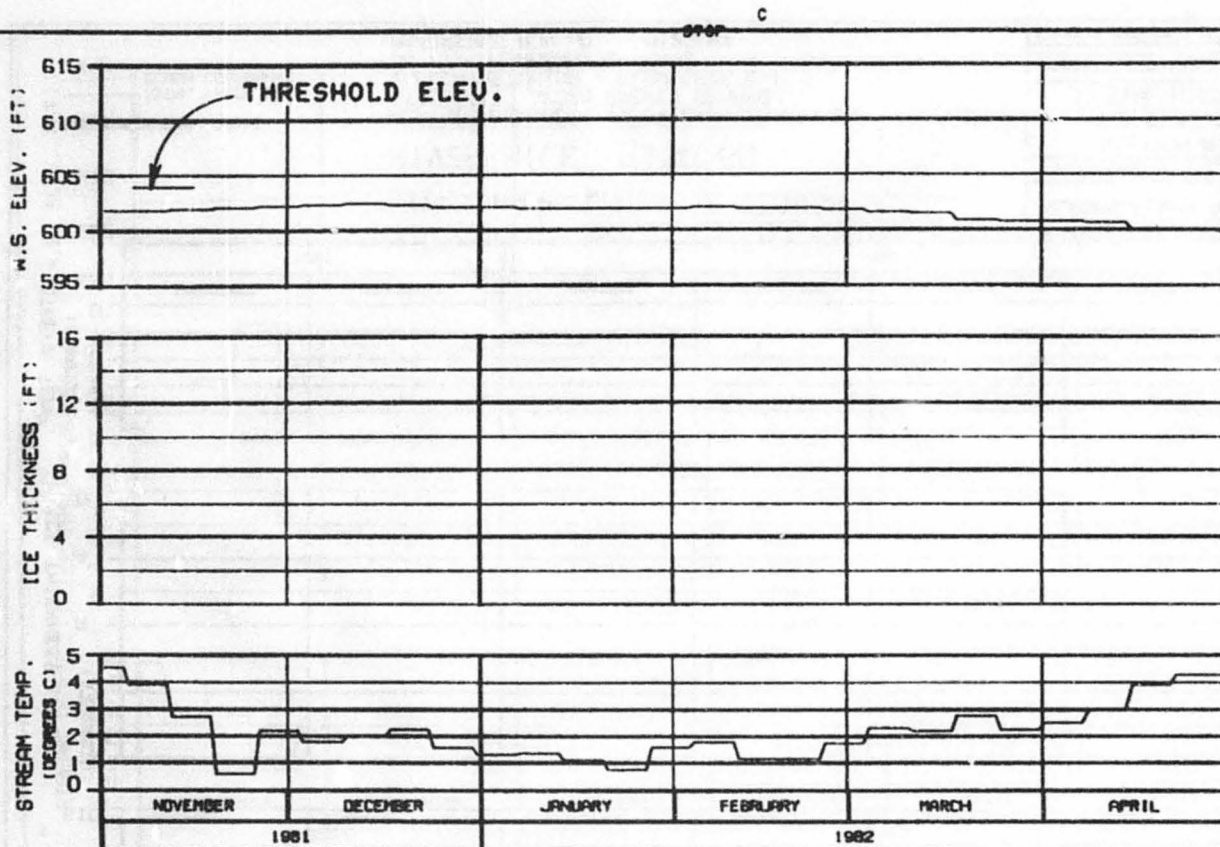
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: SL-8013 29 JUL 82 1553.142



HEAD OF SLOUGH 9

RIVER MILE : 129.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

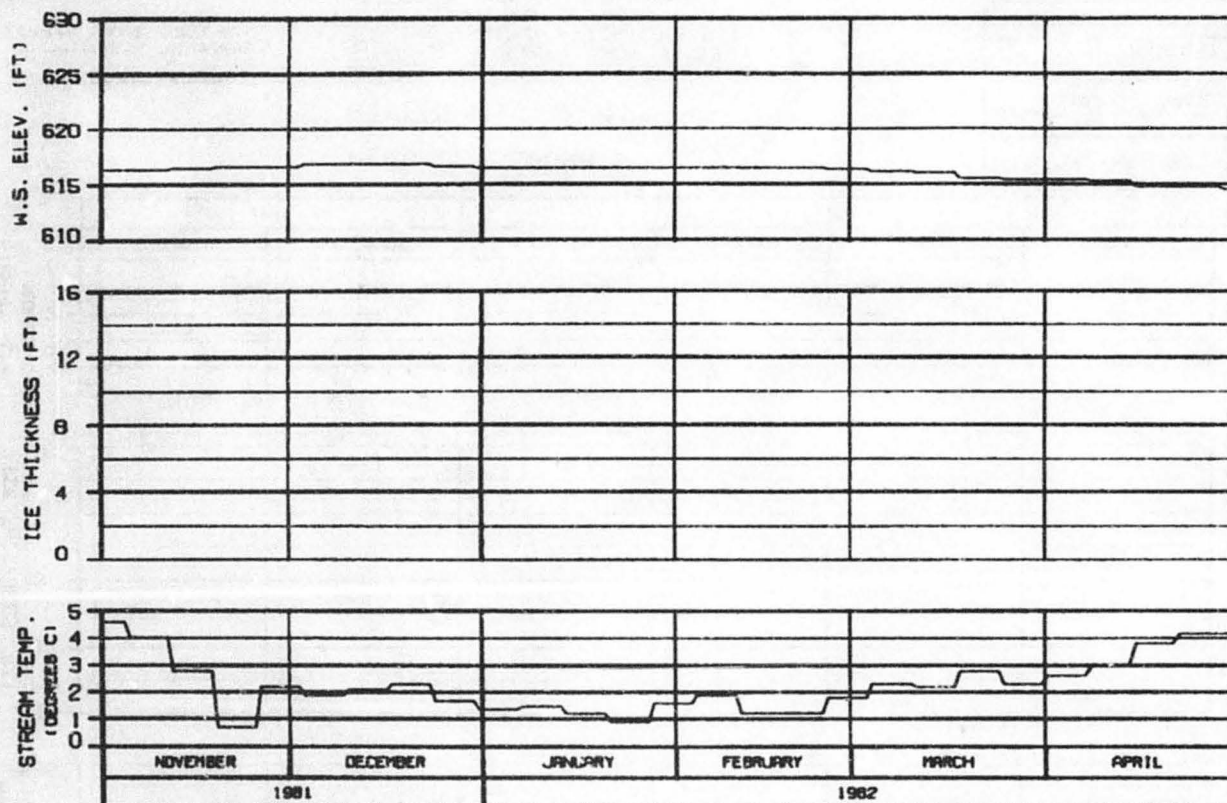
HARZA-EBASCO JOINT VENTURE

CHICAGO, ILLINOIS 99 JUL 81 1000.142

OPTION?



OPTION 7



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF SLOUGH 9  
 RIVER MILE : 130.60

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

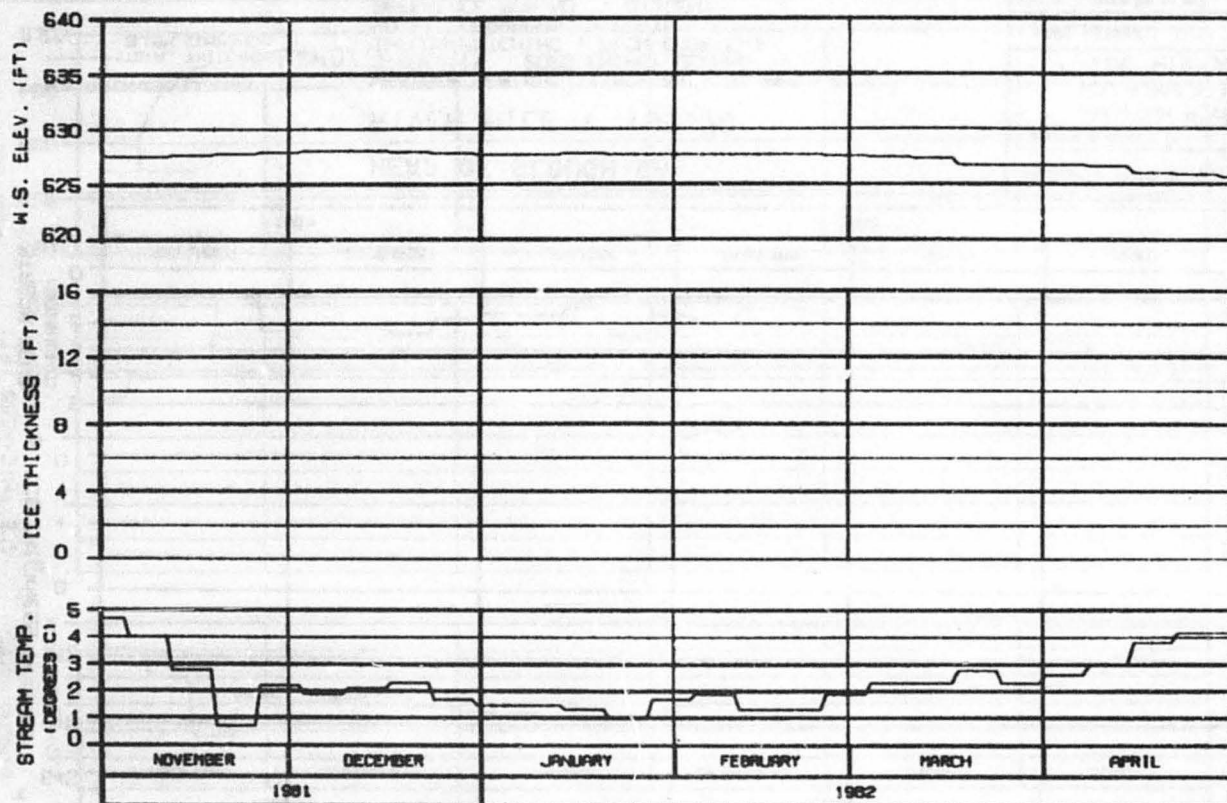
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

ENCLOSURE, ALD-818 29 JUL 82 1003.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

# SIDE CHANNEL U/S OF 4TH JULY CREEK RIVER MILE : 131.80

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

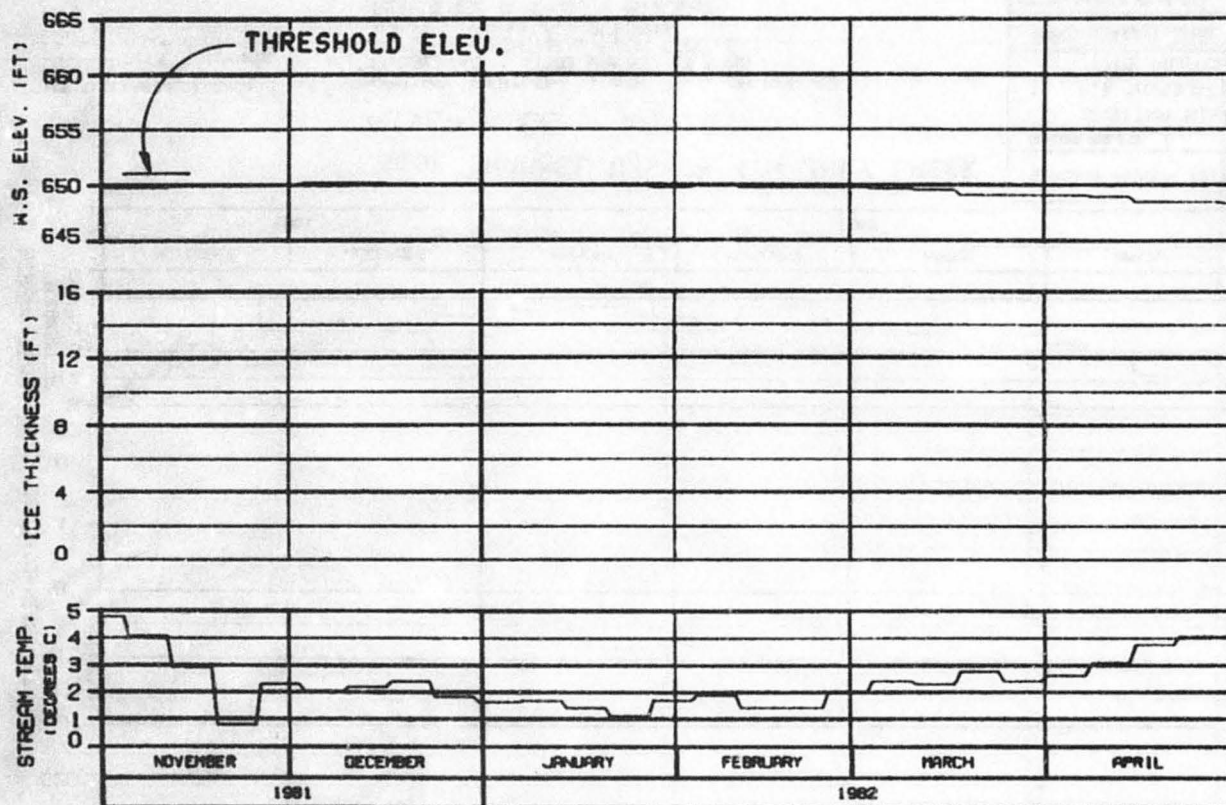
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHG 0000, 11-14-81 00 JUL 82 1989, 142



HEAD OF SLOUGH 9A  
RIVER MILE : 133.70

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE III 2020 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-1  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8120ENY

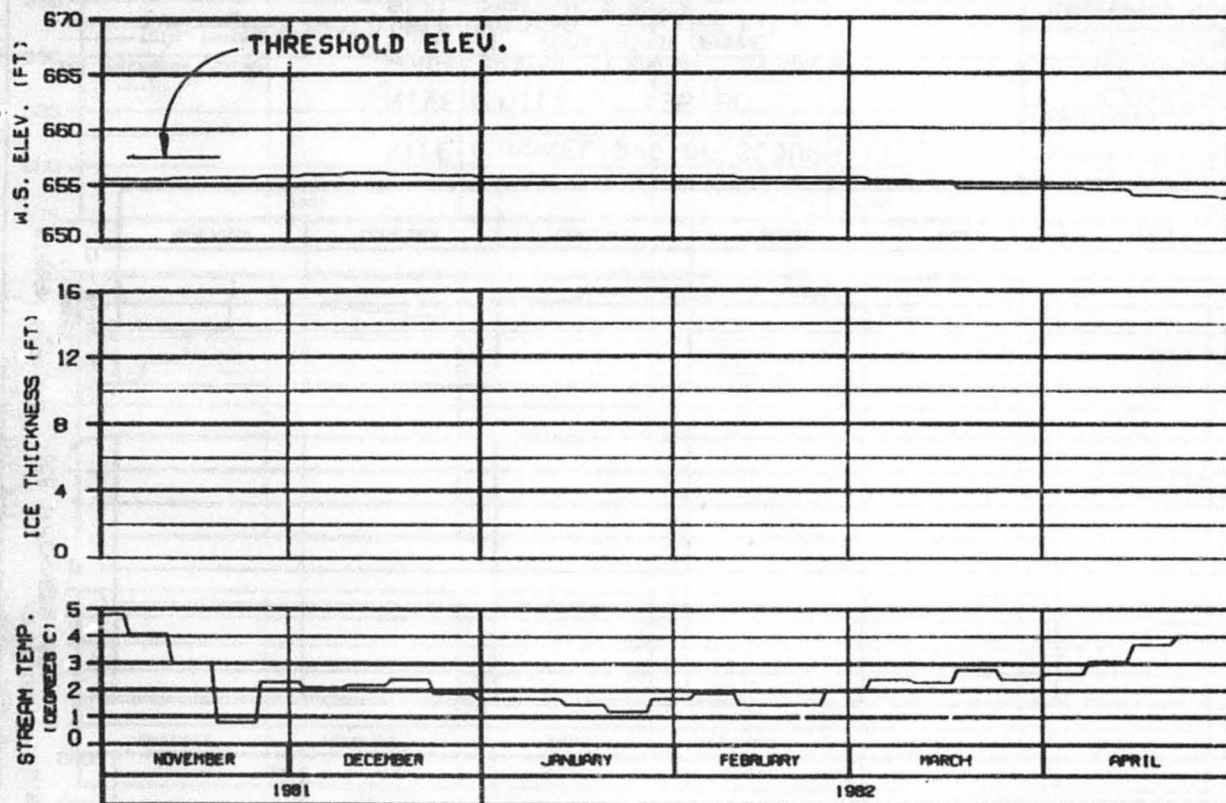
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHICAGO, ILLINOIS 98 JUL 82 1588.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF SLOUGH 10  
 RIVER MILE : 134.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

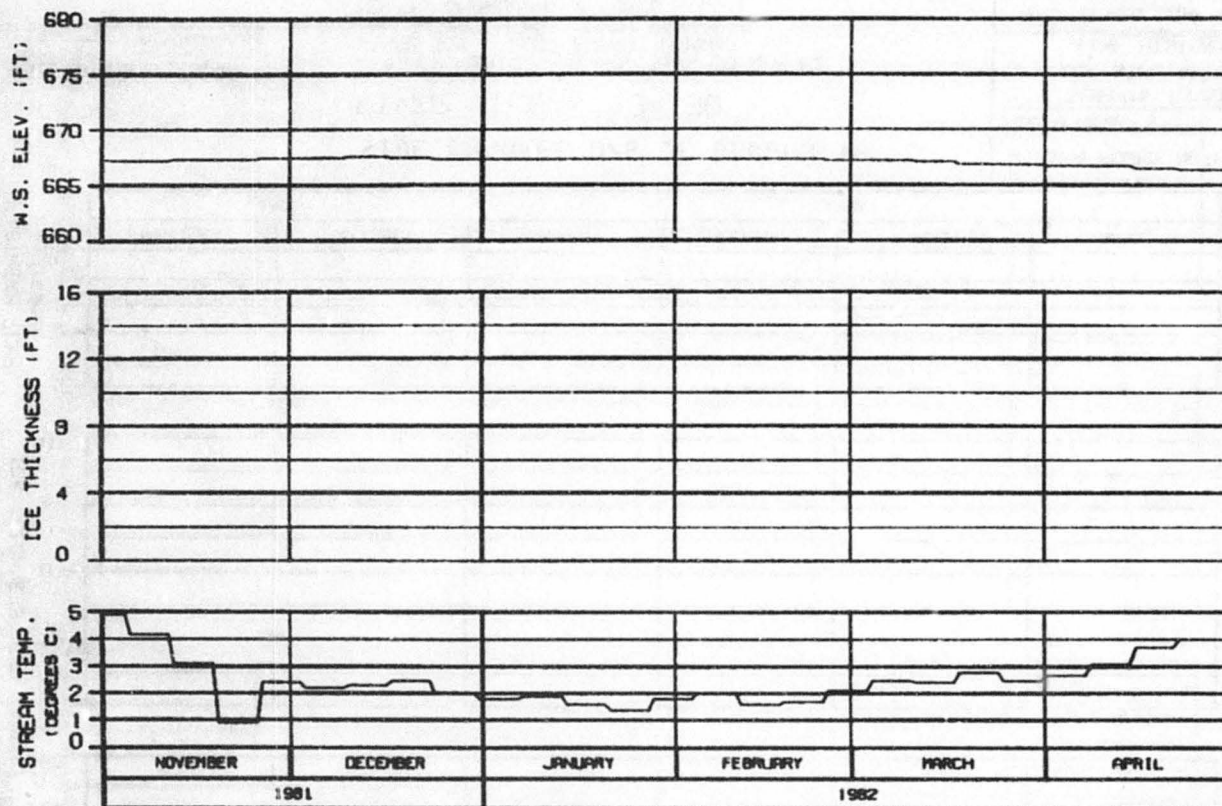
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHS-100 - 11/1/82 10 11 12 1982.142



SIDE CHANNEL D/S OF SLOUGH 11

RIVER MILE : 135.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III - 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

ALASKA POWER AUTHORITY

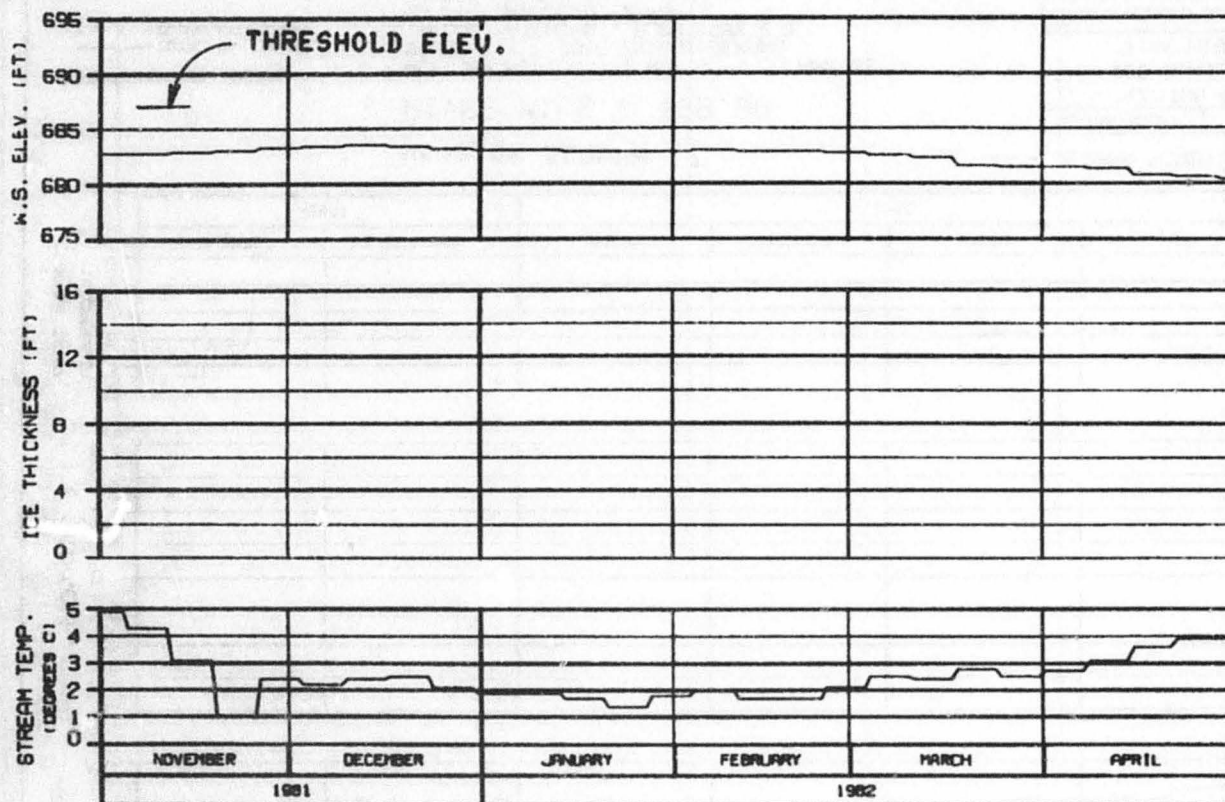
SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBASCO JOINT VENTURE

CHECKED: 04/08/82 BY J.A. CH 1063.142





HEAD OF SLOUGH 11

RIVER MILE : 136.50

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING . FLOW CASE E-1  
 50 FT. DRAWDOWN . 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

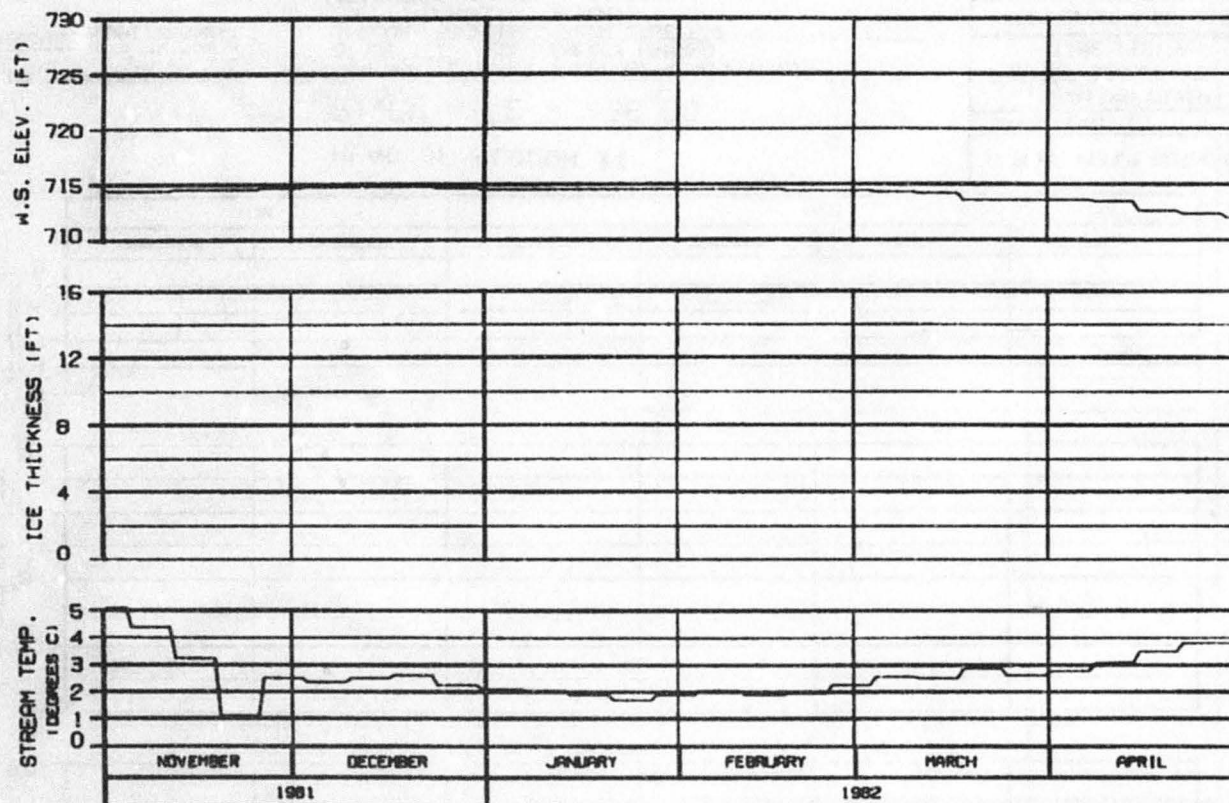
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZA-EBASCO JOINT VENTURE

CHECKED: ELLIOTT 28 JUL 82 1982.142



HEAD OF SLOUGH 17  
RIVER MILE : 139.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE III 2020 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-1  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8120ENY

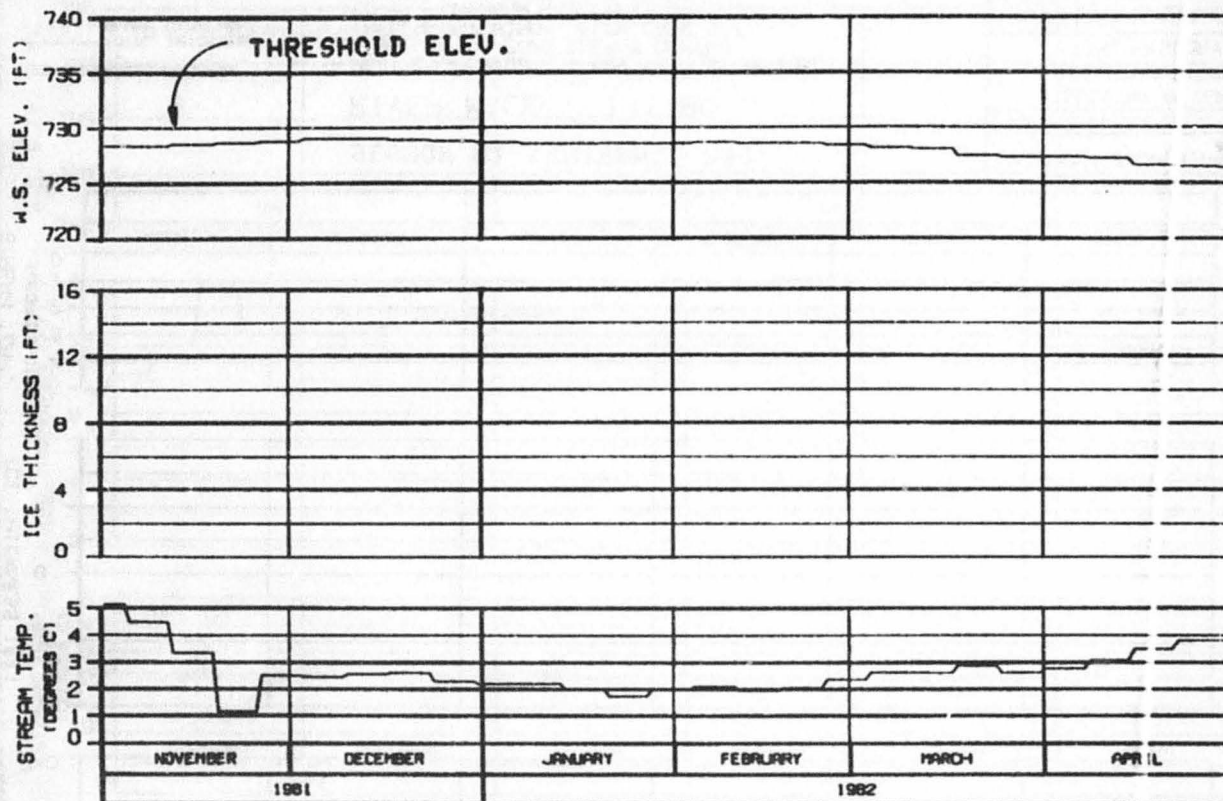
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWING - ALL PAGES TO A4 05 1089.142



HEAD OF SLOUGH 20  
RIVER MILE : 140.50

ICE THICKNESS LEGEND:  
——— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE III 2020 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-1  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8120ENY

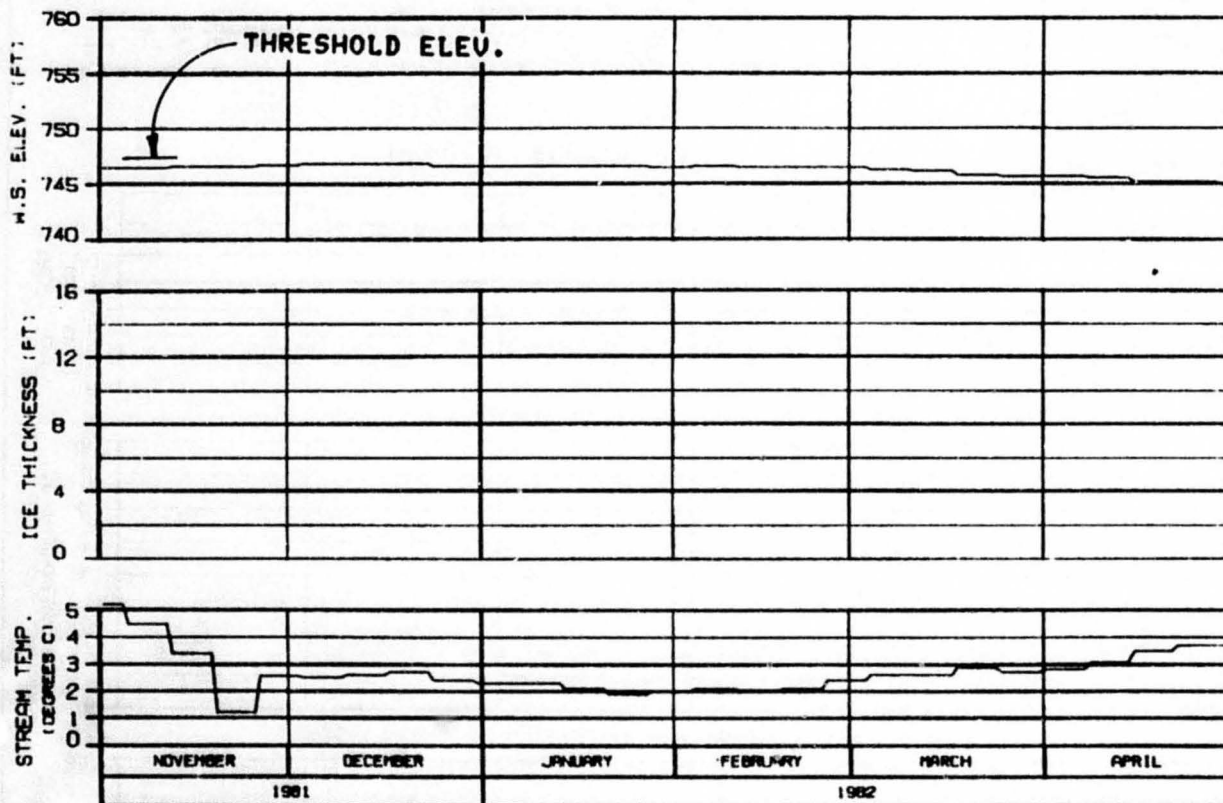
ALASKA POWER AUTHORITY

SUBMITTER PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EB&F CO JOINT VENTURE

CHECKED: D.L. 04/82 BY: J.A. 02 1000.142



SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUGH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 STAGE III 2020 ENERGY DEMAND  
 INFLOW-MATCHING, FLOW CASE E-1  
 50 FT. DRAWDOWN, 2 PORTS  
 REFERENCE RUN NO. : 8120ENY

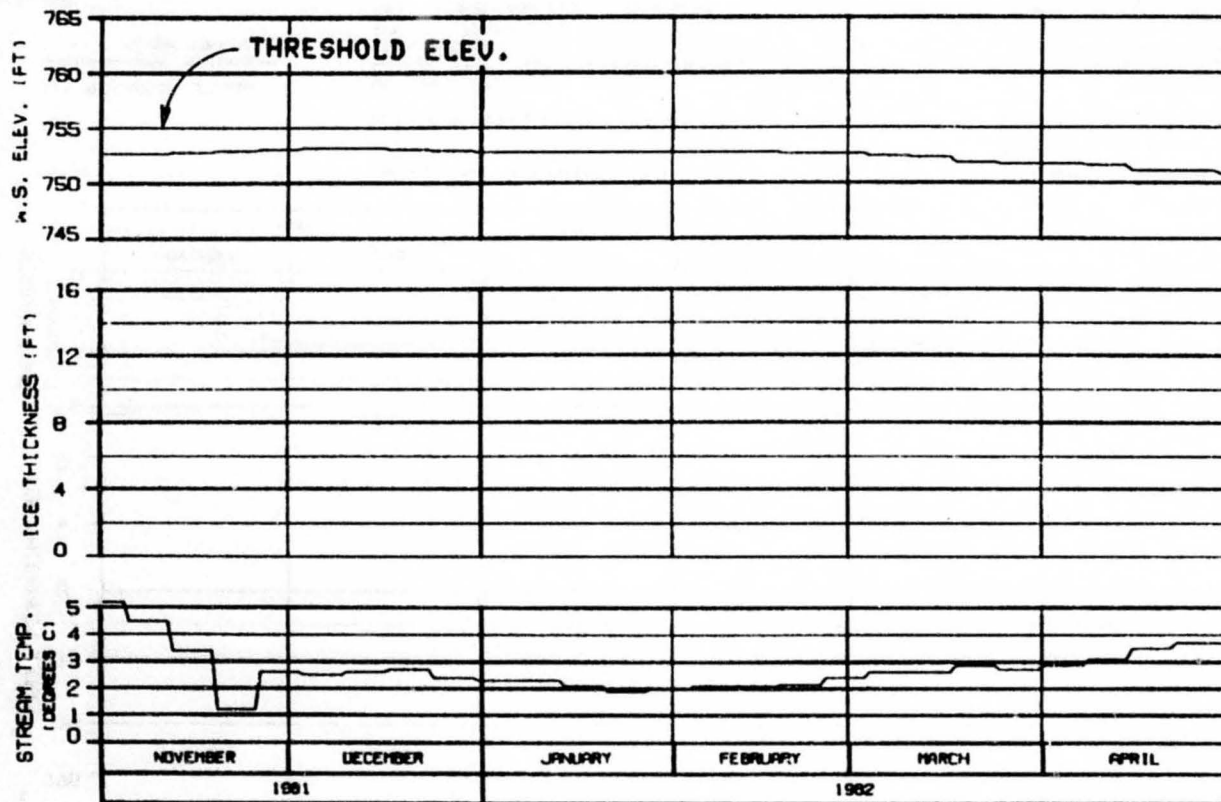
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHICAGO, ILLINOIS 60606-0000 1983.142



HEAD OF SLOUGH 21  
RIVER MILE : 142.20

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE III 2020 ENERGY DEMAND  
INFLOW-MATCHING . FLOW CASE E-1  
50 FT. DRAWDOWN. 2 PORTS  
REFERENCE RUN NO. : 8120ENY

ALASKA POWER AUTHORITY

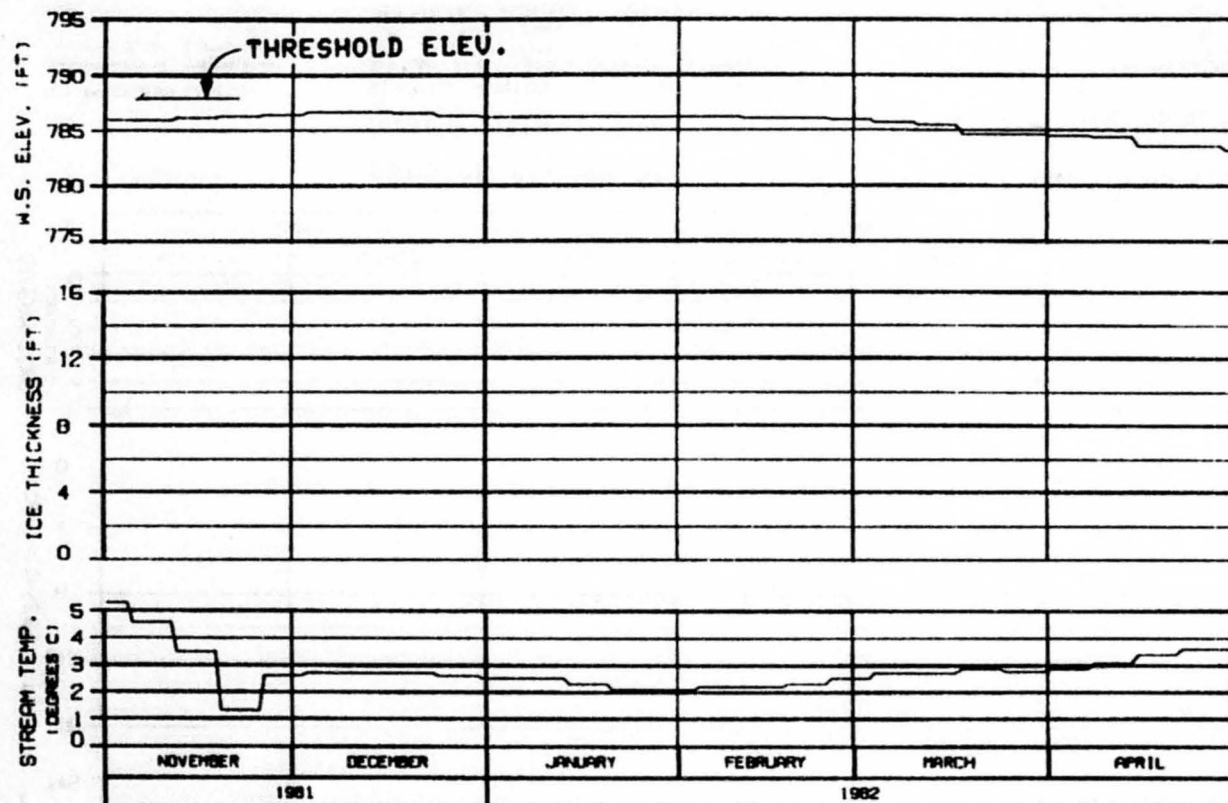
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHIEF: ALA 1015 28 JUL 82 1563.142





HEAD OF SLOUGH 22  
RIVER MILE : 144.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUGH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
STAGE III 2020 ENERGY DEMAND  
INFLOW-MATCHING, FLOW CASE E-1  
50 FT. DRAWDOWN, 2 PORTS  
REFERENCE RUN NO. : 8120ENY

OPTION?

ALASKA POWER AUTHORITY

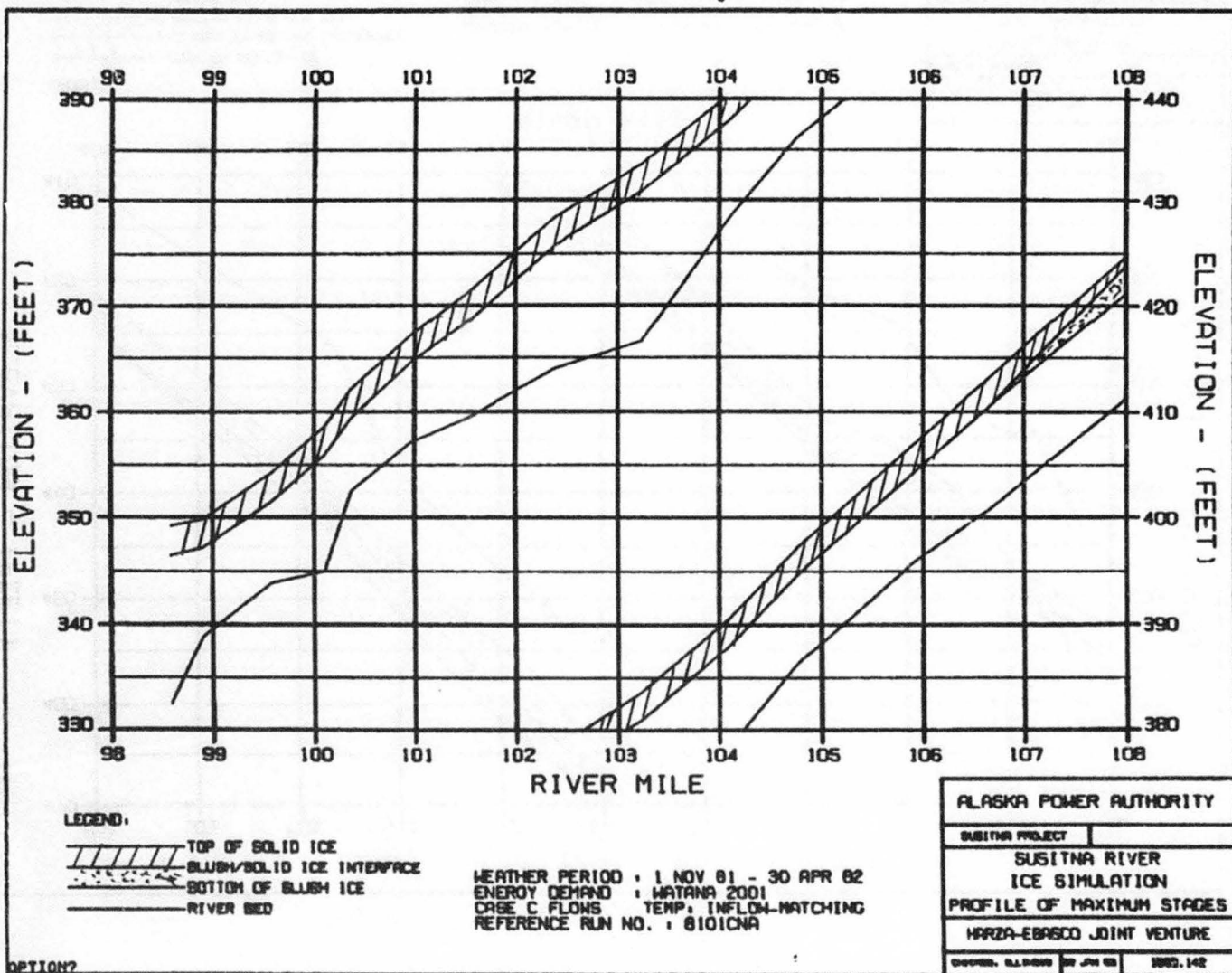
SUSITNA PROJECT

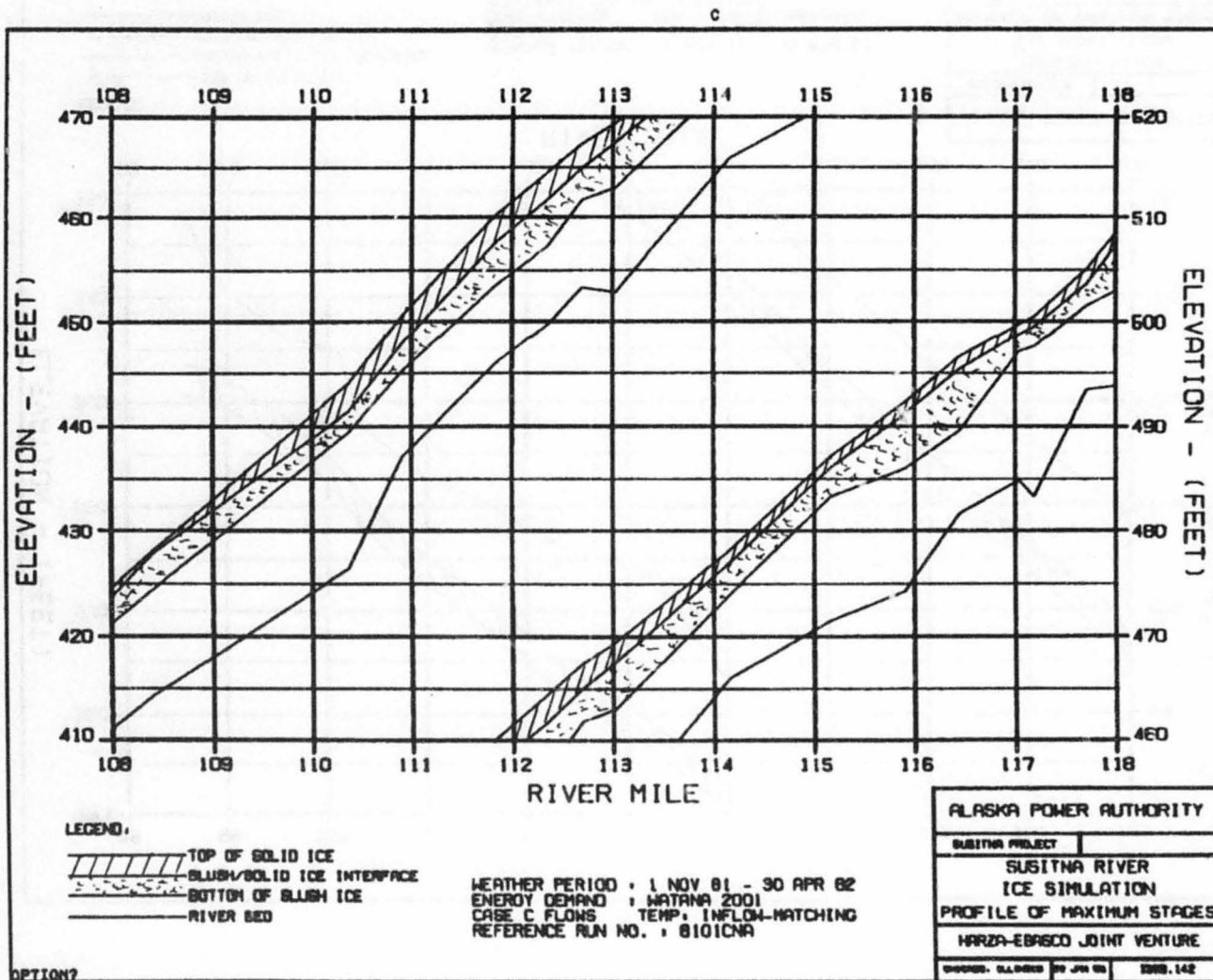
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

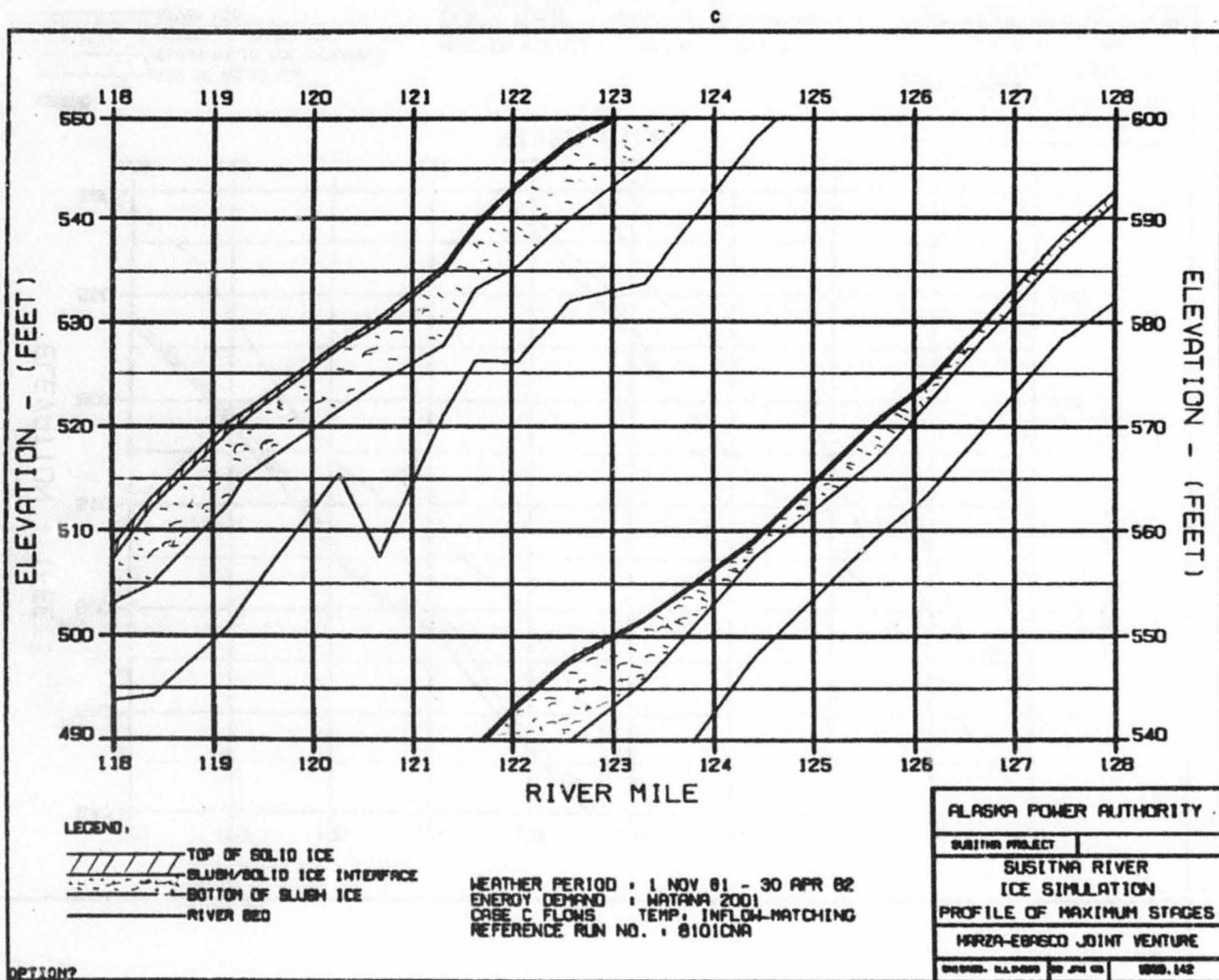
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**EXHIBIT G**

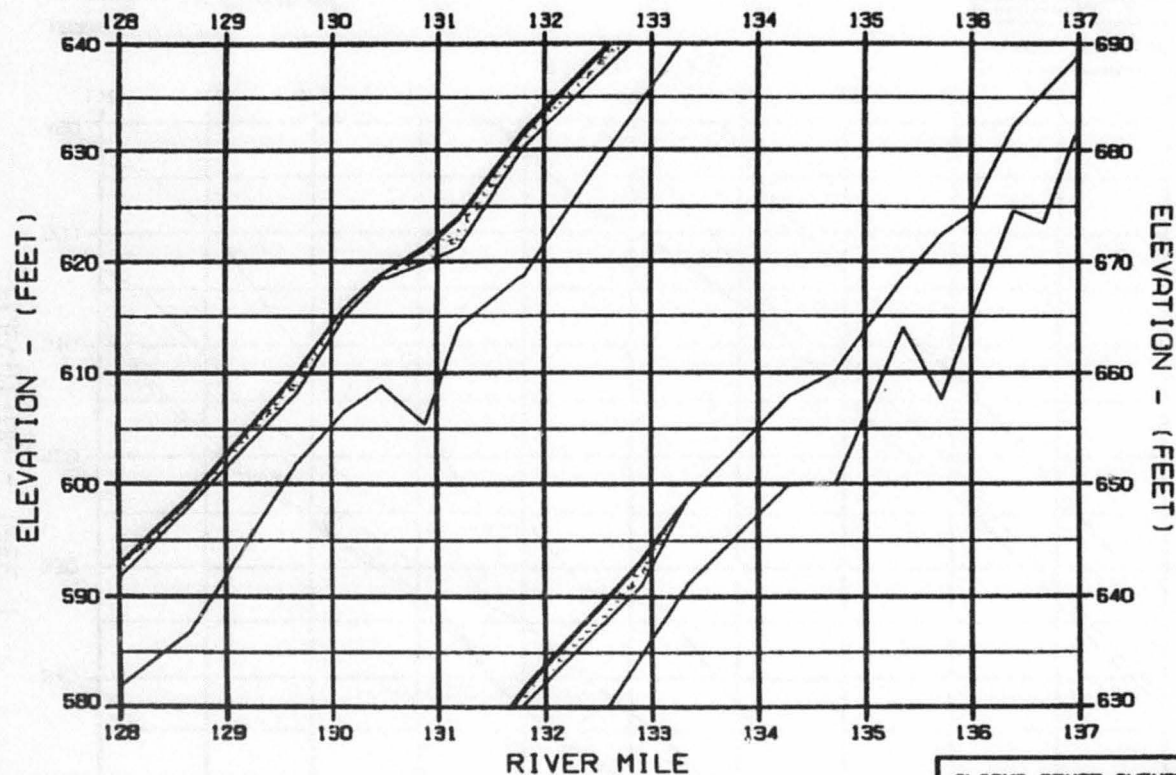




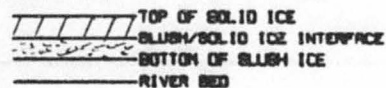








LEGEND.



WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP. INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101CNA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

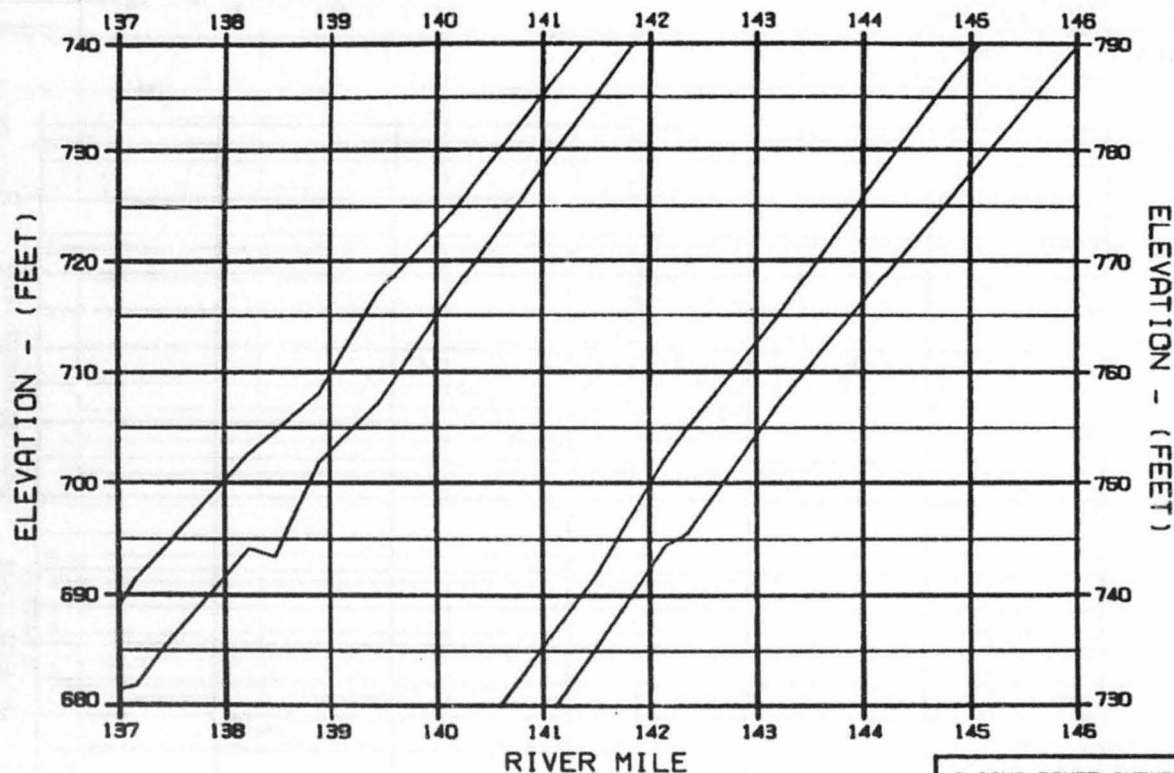
SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HAZRA-EBASCO JOINT VENTURE

DESIGNED: SLD/MSB 29 JAN 82 1000.142

OPTION?

C



## LEGEND.

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP: INFLOW-WATCHING  
 REFERENCE RUN NO. : 8101CNA

## ALASKA POWER AUTHORITY

SUSITNA PROJECT

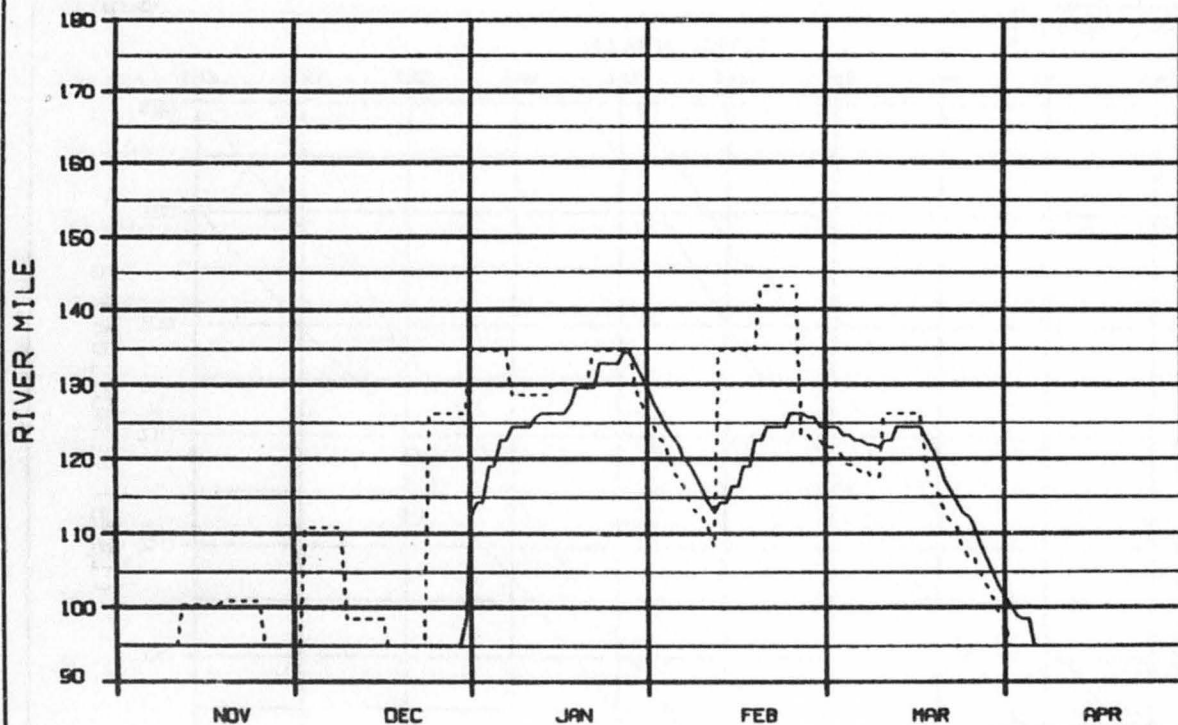
SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

DESIGNED BY JPM 01 2000.142

OPTION?

C



## LEGEND.

———— ICE FRONT  
 - - - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE C TEMP. INFLOW MATCHING  
 REFERENCE RUN NO. : 8101CNA

## ALASKA POWER AUTHORITY

SUSITNA PROJECT

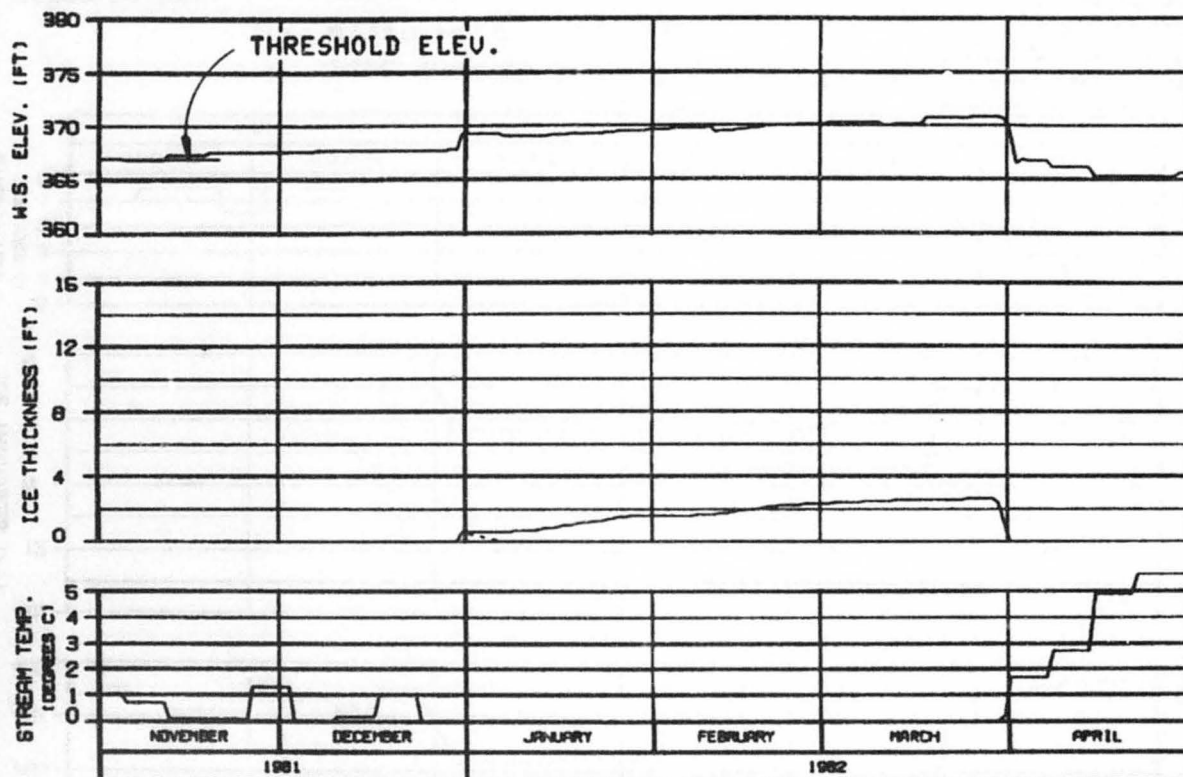
SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

HARZA-EBASCO JOINT VENTURE

DRAWN: H. J. HARRIS 22 APR 82

10000, 142

OPTION?



HEAD OF WHISKERS SLOUGH

RIVER MILE : 101.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2001  
 CASE C FLOWS TEMP: INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101CNA

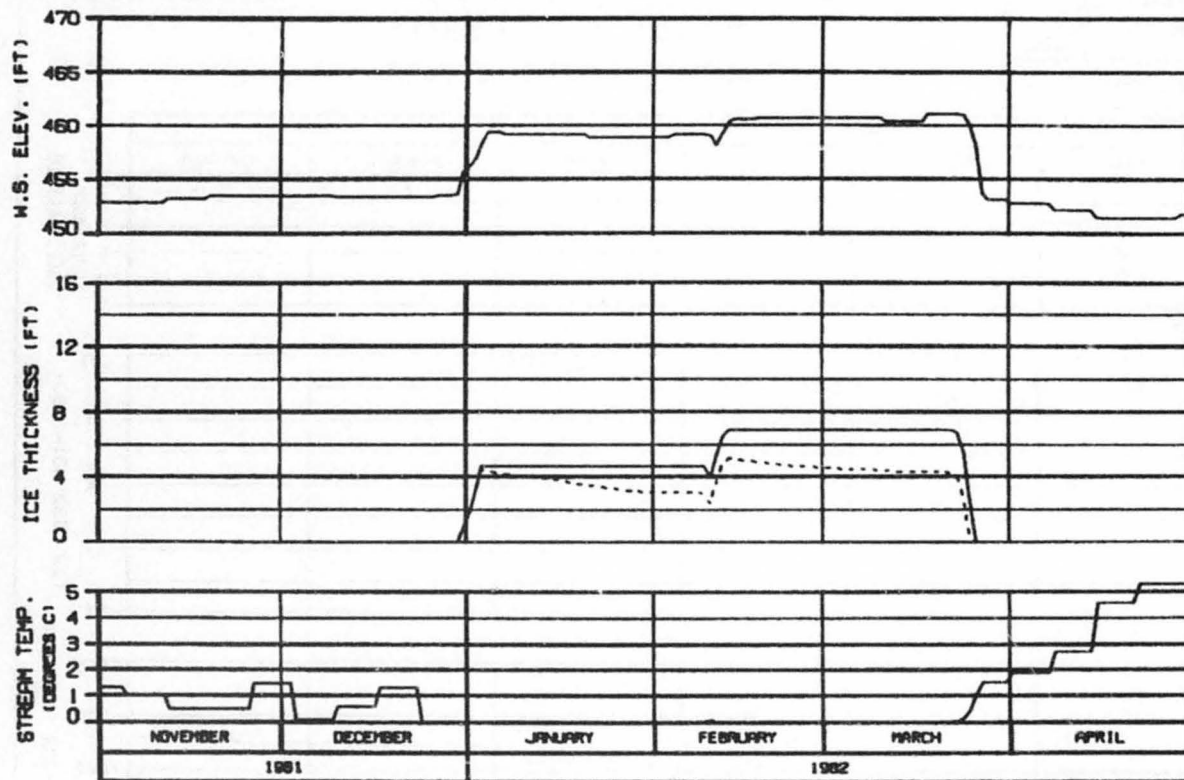
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED - 11/1/81 BY JFM/81 888.142



**SIDE CHANNEL AT HEAD OF GASH CREEK**  
**RIVER MILE : 112.00**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP. INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101CNA

**ALASKA POWER AUTHORITY**

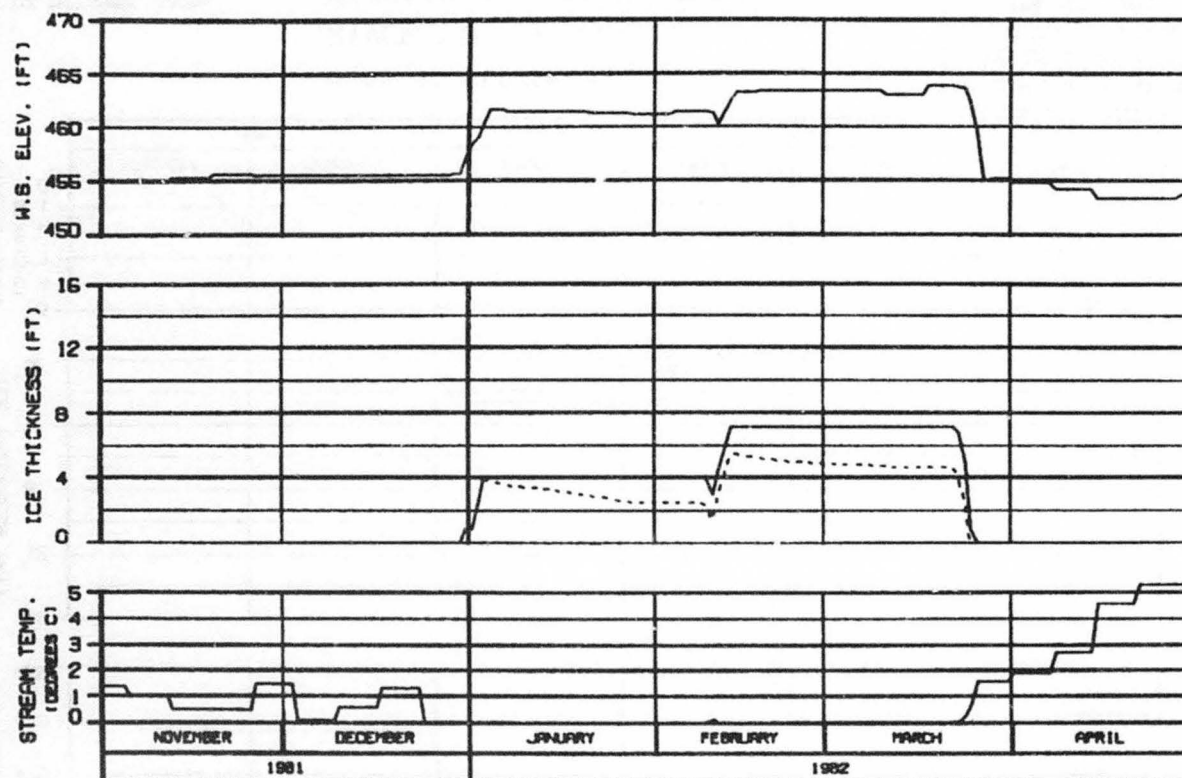
**SUSITNA PROJECT**

**SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY**

**WARZA-EBERCO JOINT VENTURE**

REVISED: 04-1982 BY JPM/MS 1000.142





MOUTH OF SLOUGH 6A  
RIVER MILE : 112.34

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP, INFLOW-MATCHING  
REFERENCE RUN NO. : 8101CNA

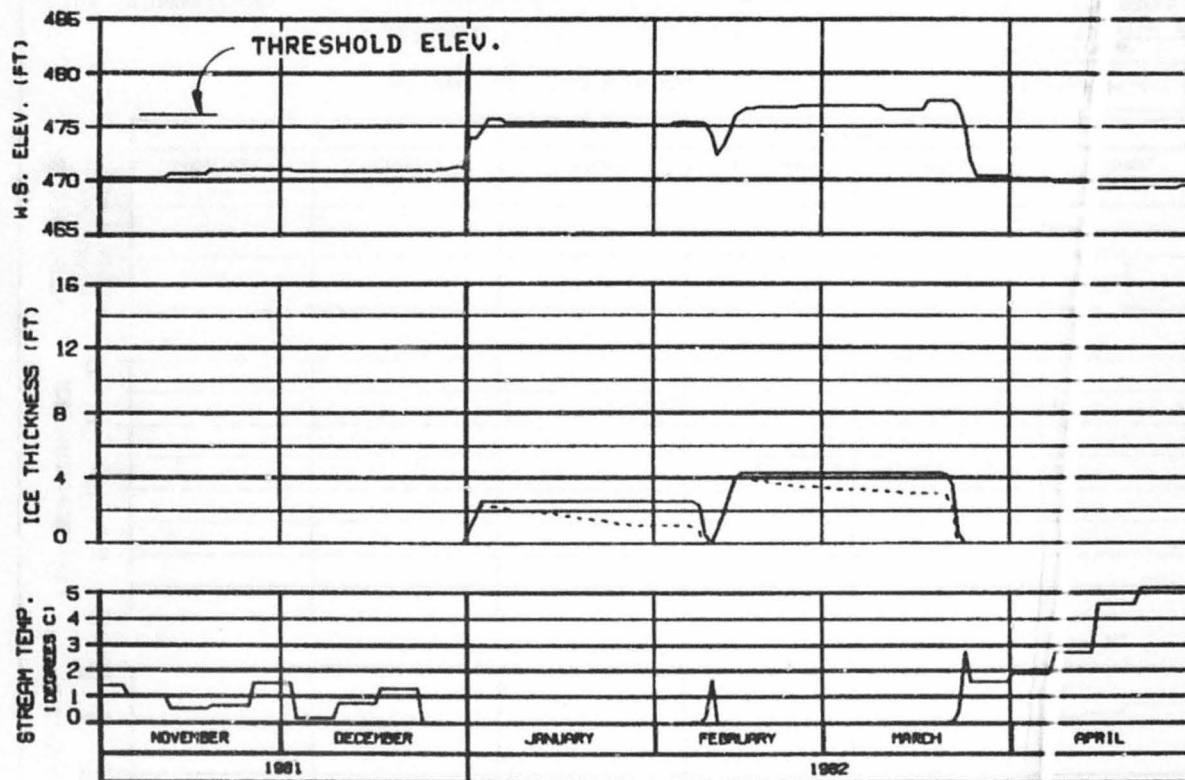
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HRZDA-EBASCO JOINT VENTURE

DESIGNED: ELMORED 29 JAN 82 1000.142



HEAD OF SLOUGH 8  
RIVER MILE : 114.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

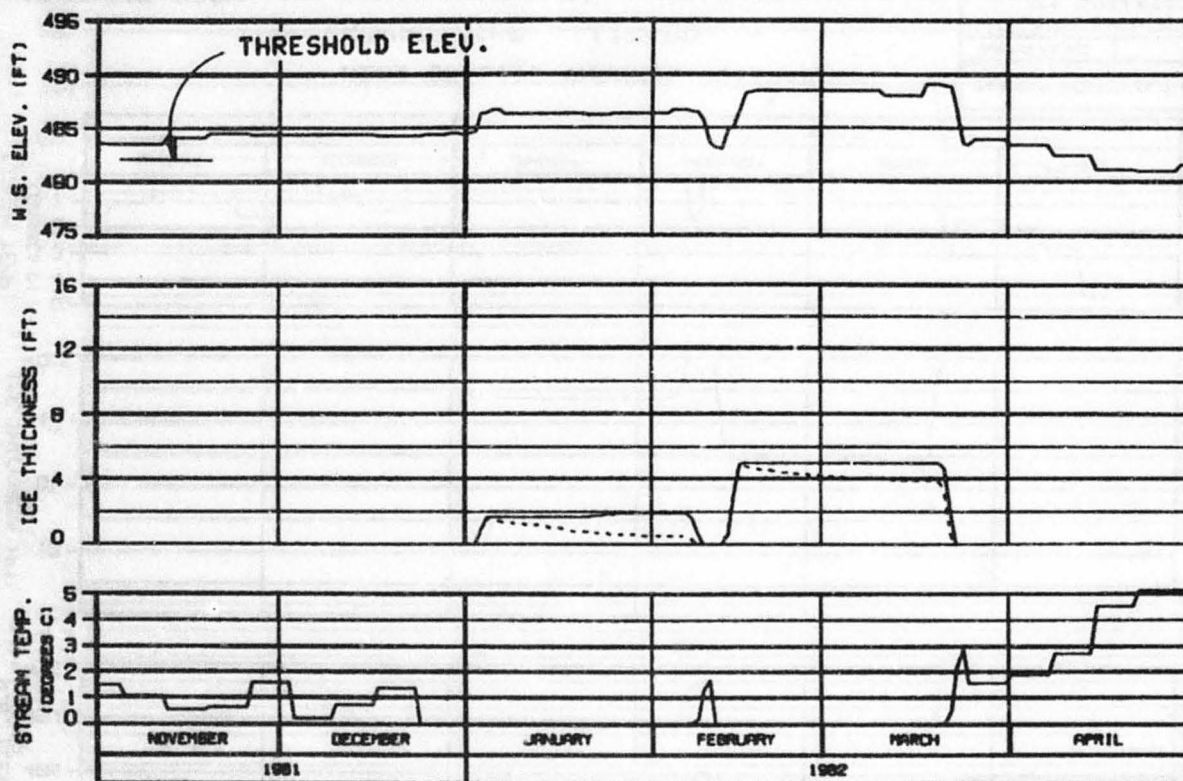
WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP, INFLOW-MATCHING  
REFERENCE RUN NO. : 8101CNA

ALAS A POWER AUTHORITY

SUBJECT PROJECT  
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAR A-EBRACO JOINT VENTURE

DESIGN DRAWING NO. JAN 82 1000.142



SIDE CHANNEL MSII  
RIVER MILE : 115.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP: INFLOW-MATCHING  
REFERENCE RUN NO. : 8101CNA

ICE THICKNESS LEGEND:

———— TOTAL THICKNESS  
----- SLUSH COMPONENT

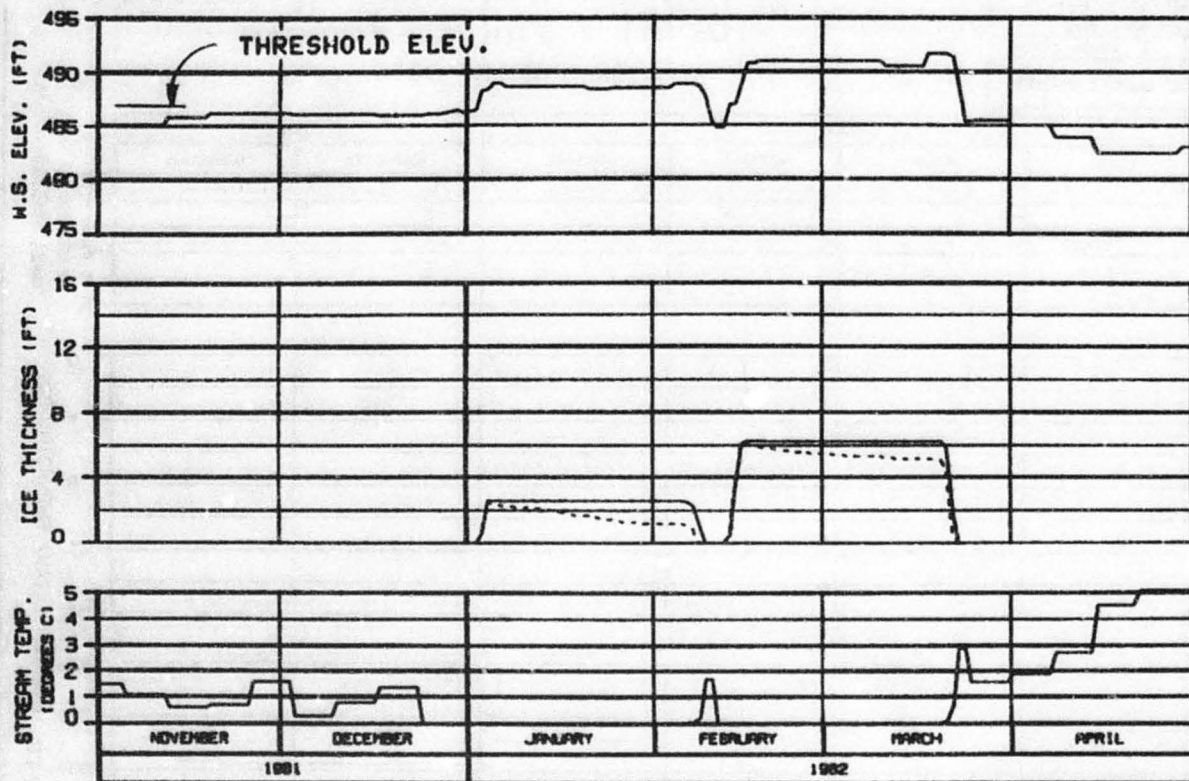
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

GRAPHIC RELEASED BY JPL 05 1993.142



HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP: INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101CNA

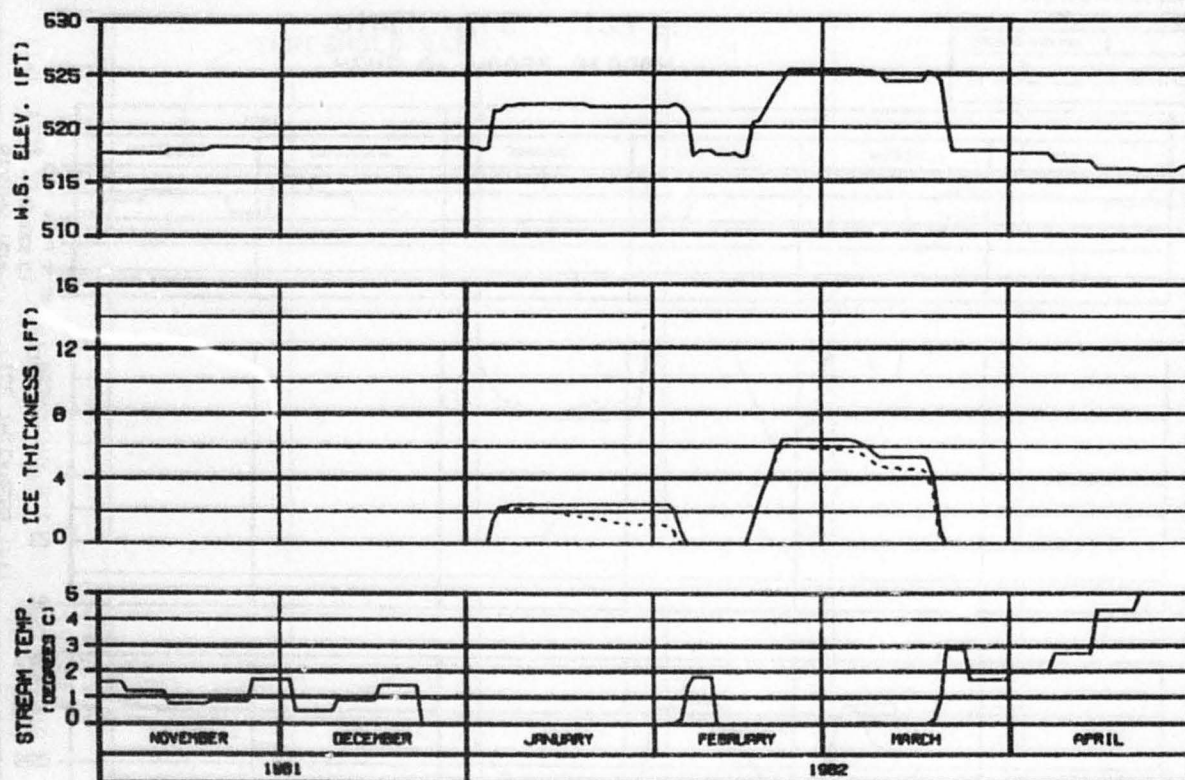
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBERCO JOINT VENTURE

DESIGNED BY: J. L. BROWN JR. DATE: 1982.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2001  
 CASE C FLOWS TEMP. INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101CNA

ALASKA POWER AUTHORITY

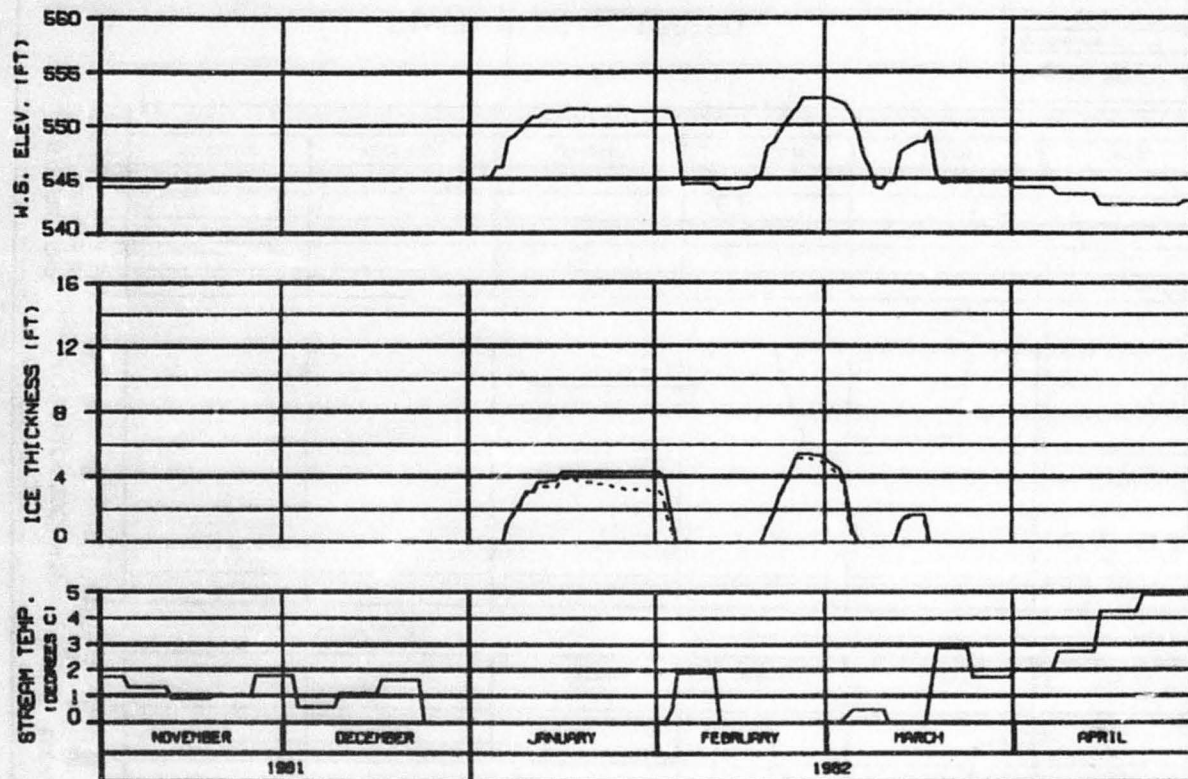
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZARDOUS JOINT VENTURE

DESIGNED BY: J. A. HARRIS 20 APR 82 8008.142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF MOOSE SLOUGH  
 RIVER MILE : 123.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP: INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101CNA

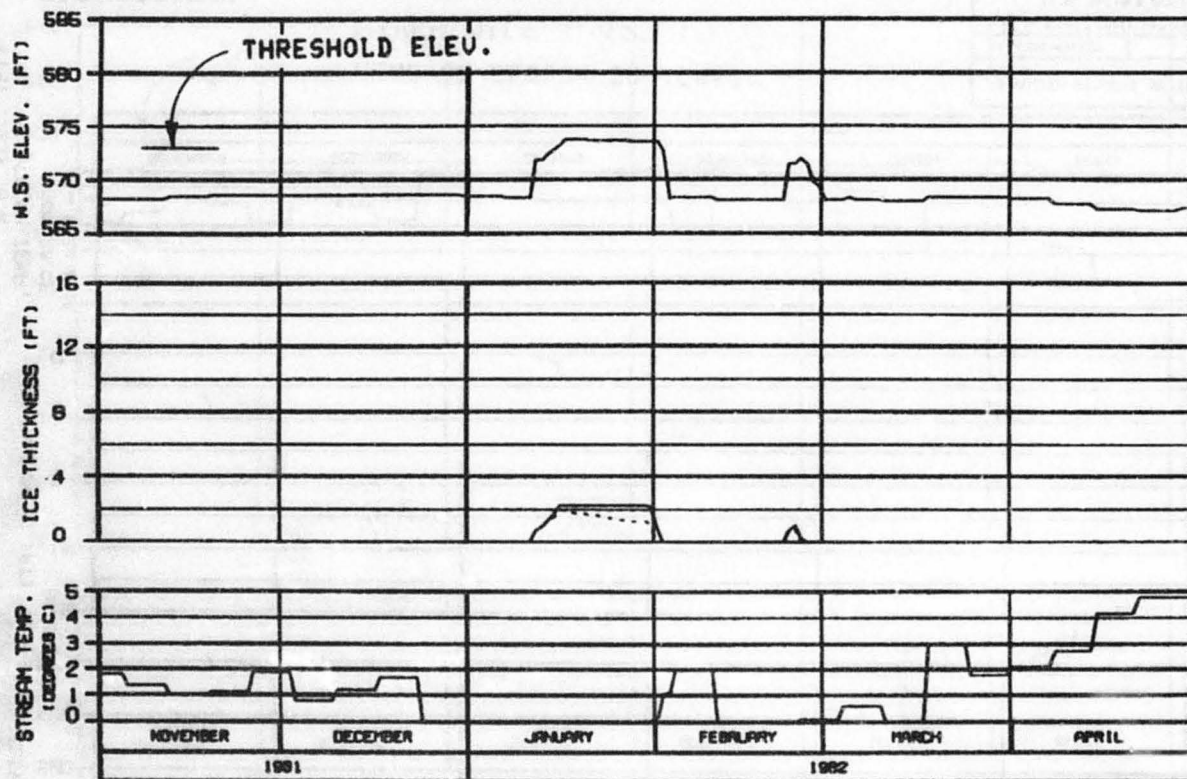
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED: ALL-9-81 BY: JAY 82 1000.142



HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2001  
 CASE C FLOWS TEMP: INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101CNA

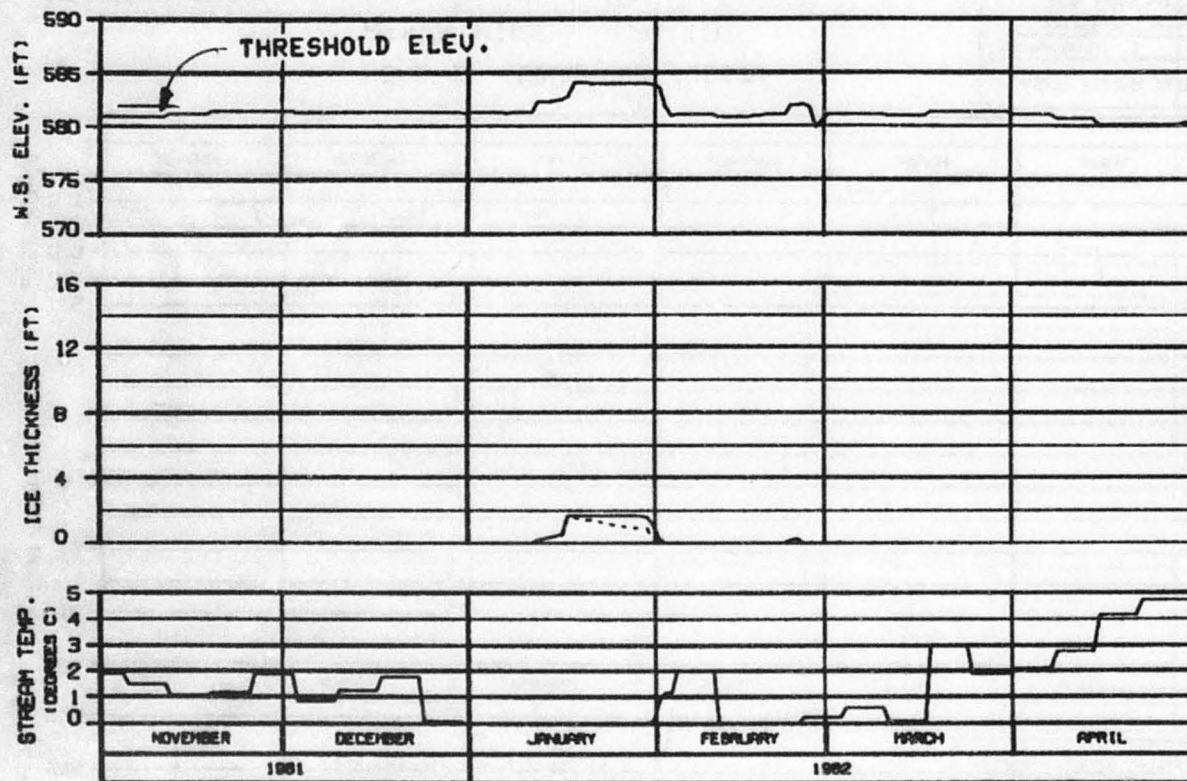
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

MODEL: SLIM2D 20 JAN 82 1992.142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2001  
 CASE C FLOWS TEMP, INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101CNA

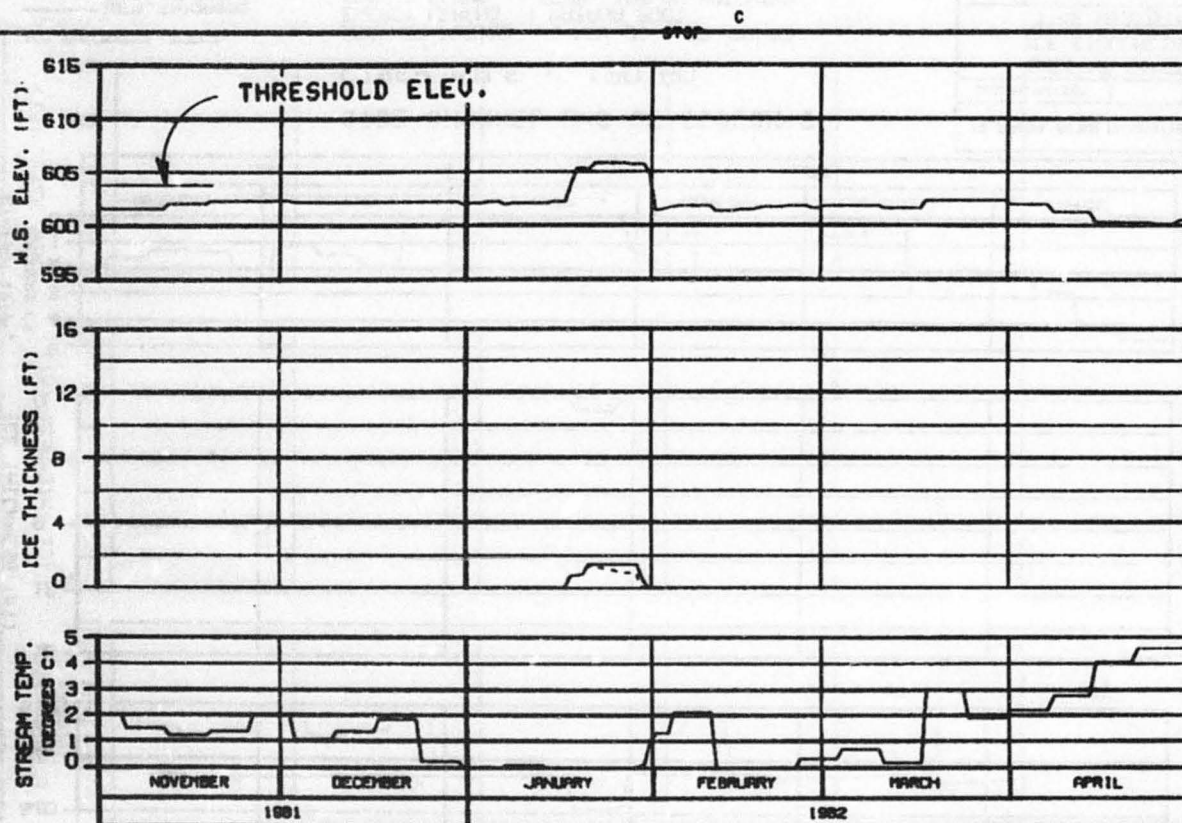
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBRSCO JOINT VENTURE

CHGASD, AL 0000 DT JPN 00 1000.142



HEAD OF SLOUGH 9

RIVER MILE : 129.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP. INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101CNA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

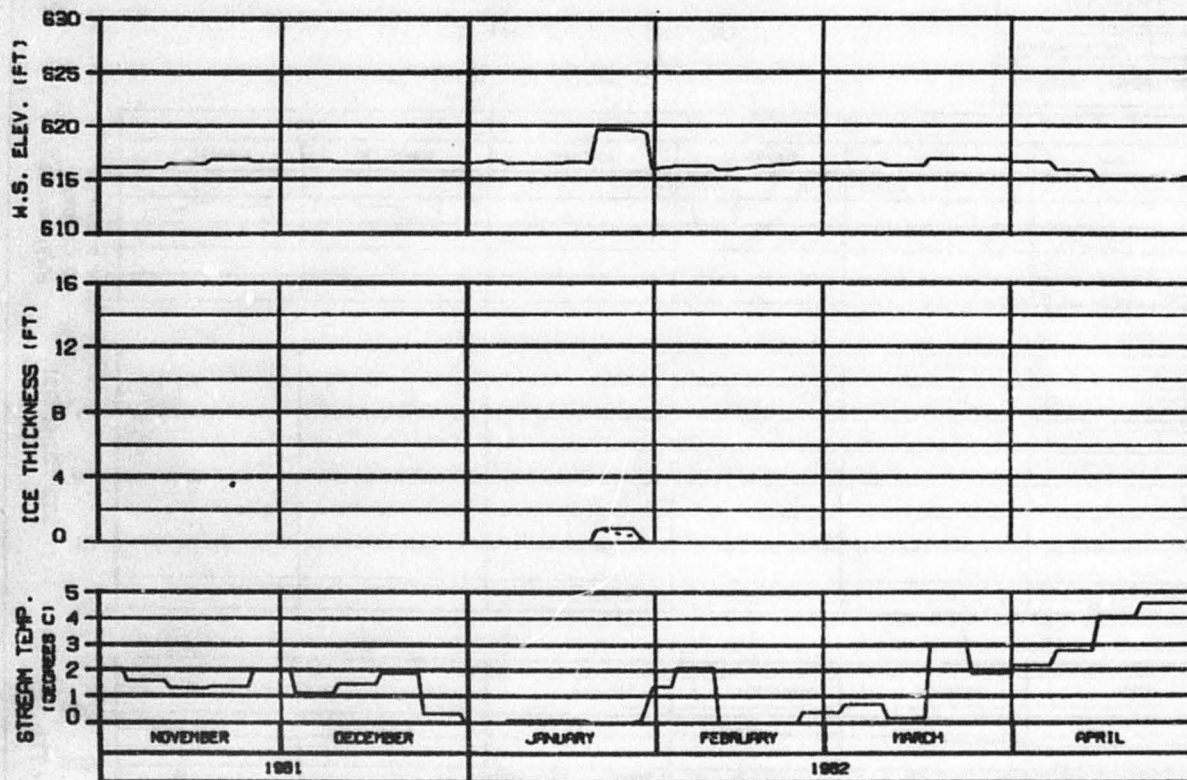
HARZA-EBASCO JOINT VENTURE

DESIGN, ANALYSIS AND CONSTRUCTION 1982, 1983

OPTION 7



OPTION?



SIDE CHANNEL U/S OF SLOUGH 9  
RIVER MILE : 130.60

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : MATANA 2001  
CASE C FLOWS TEMP: INFLOW-MATCHING  
REFERENCE RUN NO. : 81010NA

ALASKA POWER AUTHORITY

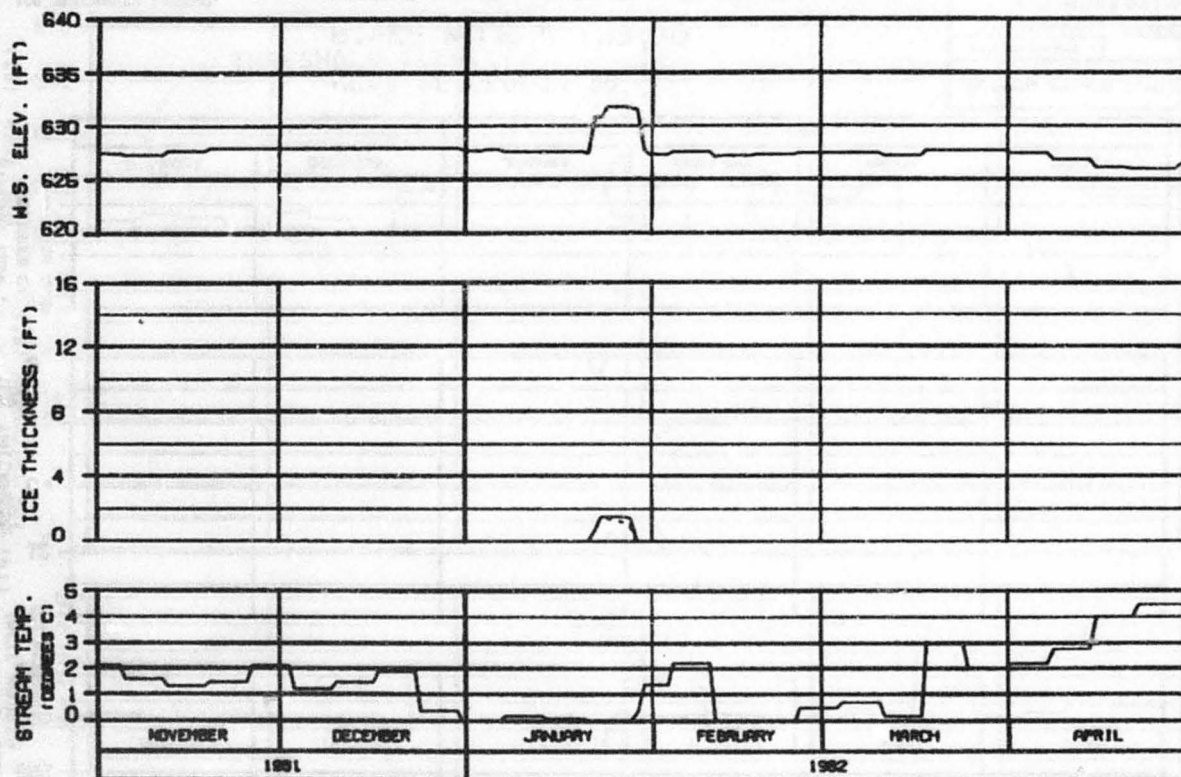
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBASCO JOINT VENTURE

DESIGN: 811000 02 JAN 82 1000.142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF 4TH JULY CREEK  
 RIVER MILE : 131.80

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP. INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101CNA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER

ICE SIMULATION

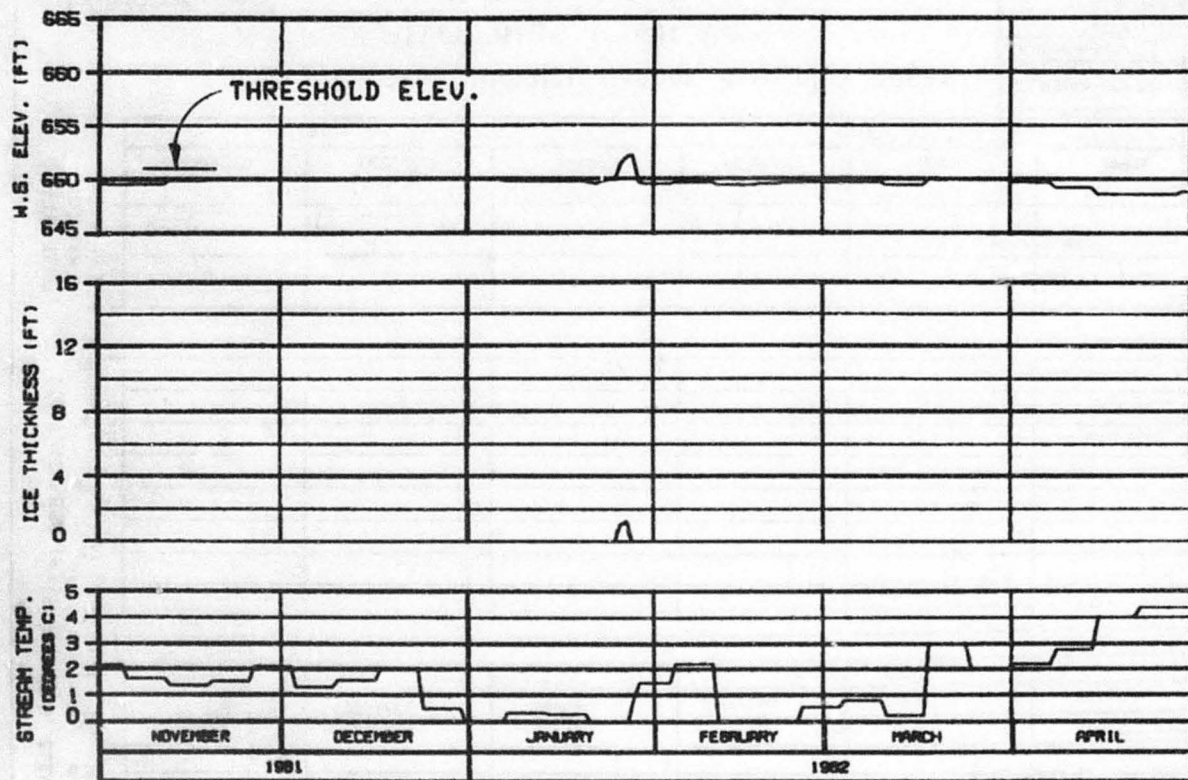
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHRON. PLANNED

30 JAN 82

1008.142



HEAD OF SLOUGH 9A  
RIVER MILE : 133.70

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : NATANA 2001  
CASE C FLOWS TEMP. INFLOW-MATCHING  
REFERENCE RUN NO. : B101CNA

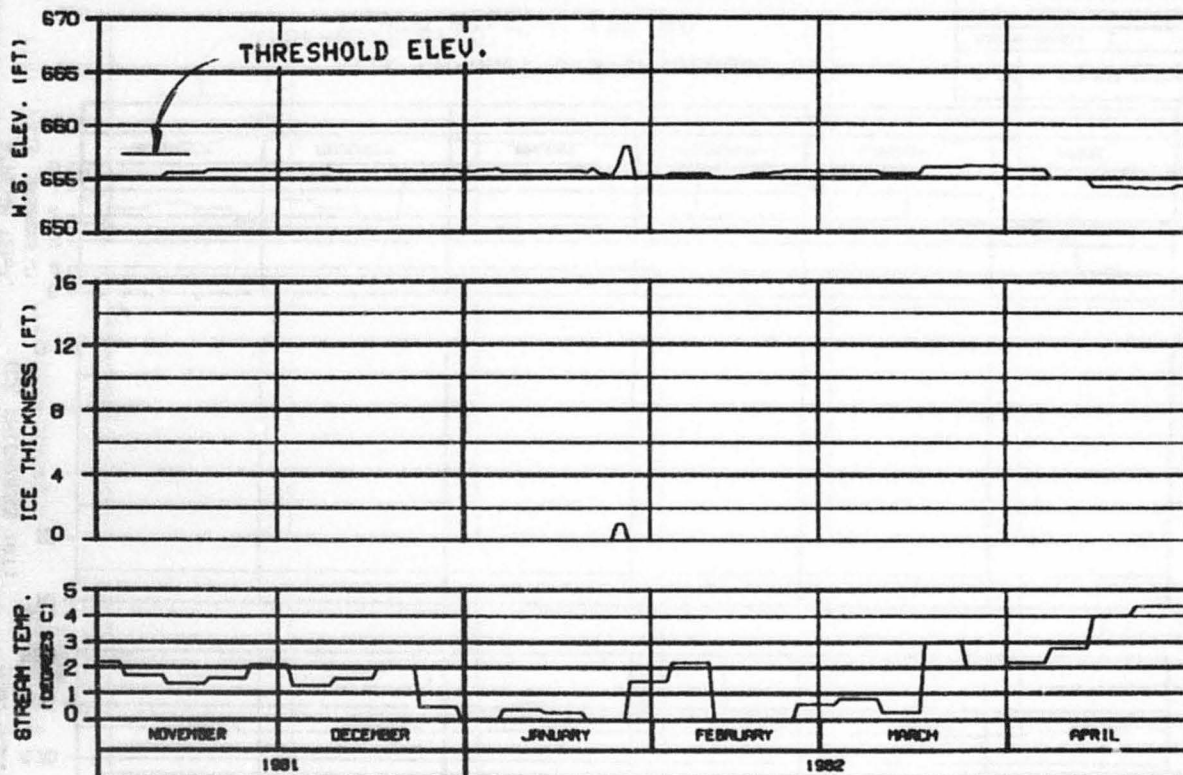
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HRZA-EBR60 JOINT VENTURE

DIGESTED, BALANCED BY JPH GB 1000.142



SIDE CHANNEL U/S OF SLOUGH 10  
RIVER MILE : 134.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : NATANA 2001  
CASE C FLOWS TEMP: INFLOW-MATCHING  
REFERENCE RUN NO. : 81010NA

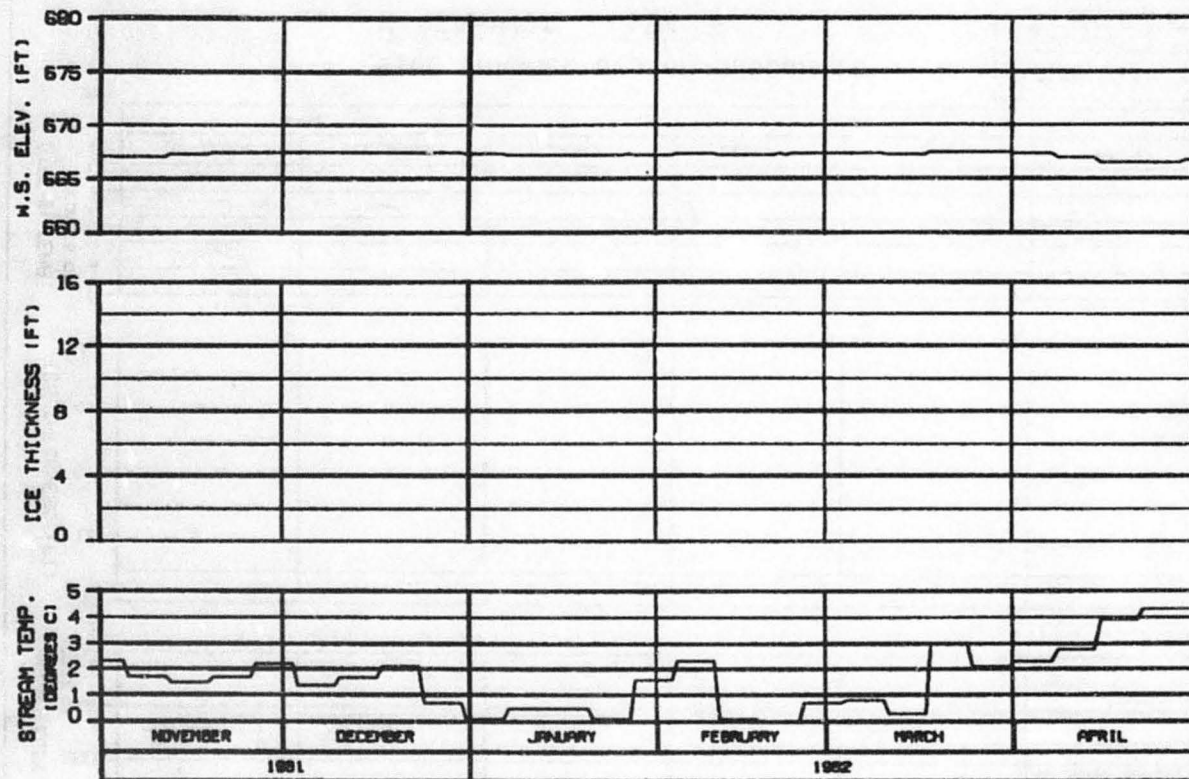
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EDISON JOINT VENTURE

DESIGN, ANALYSIS BY JH 03 1982.142



SIDE CHANNEL D/S OF SLOUGH 11

RIVER MILE : 135.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 91 - 30 APR 92  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP: INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101CNA

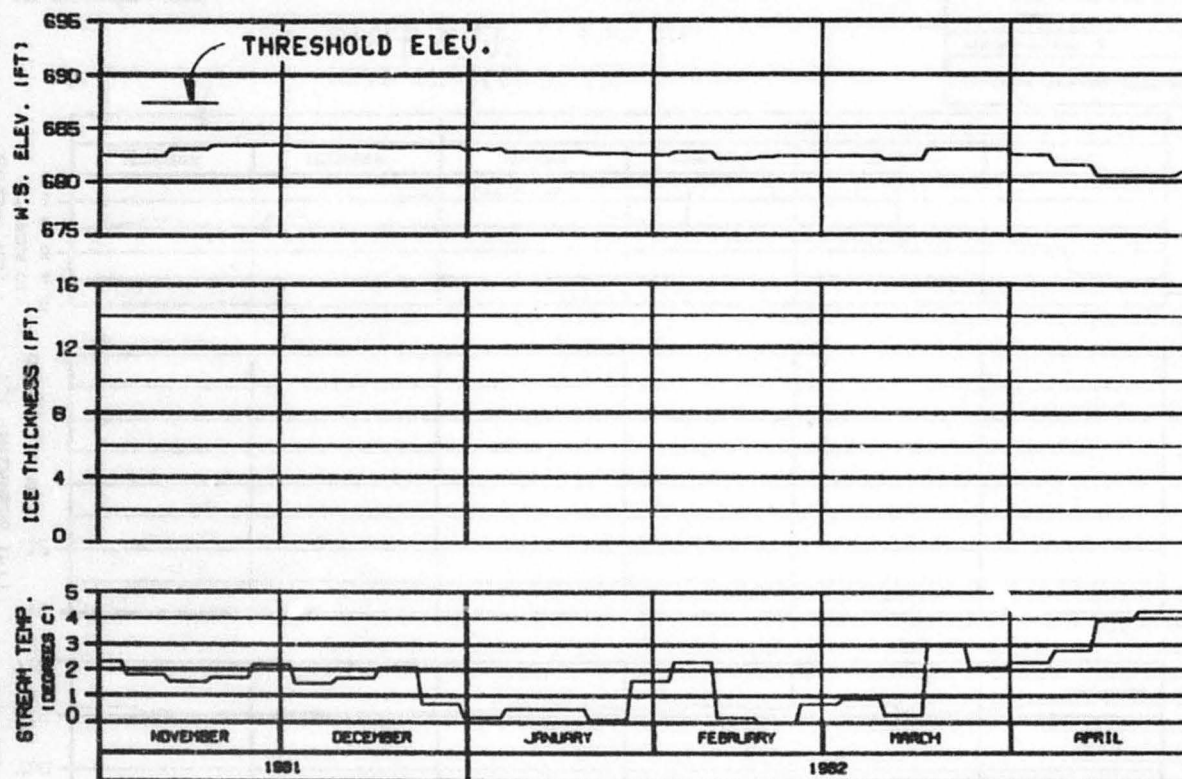
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBAGCO JOINT VENTURE

DESIGNED - ALASKA POWER AUTHORITY 2001-142



HEAD OF SLOUGH 11  
RIVER MILE : 136.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP: INFLOW-MATCHING  
REFERENCE RUN NO. : 81010NA

ALASKA POWER AUTHORITY

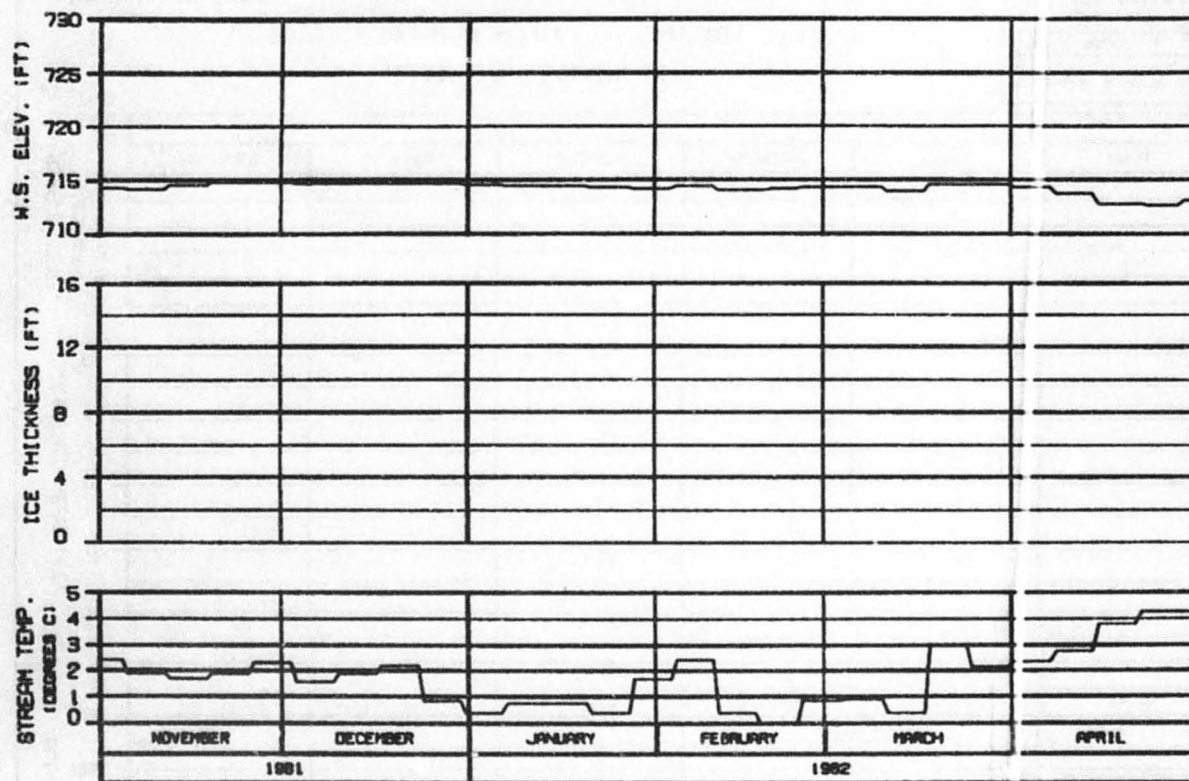
SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: B.J. DAVIS 22 JAN 82 1982. 142





HEAD OF SLOUGH 17

RIVER MILE : 139.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2001  
 CASE C FLOWS TEMP, INFLOW-MATCHING  
 REFERENCE RUN NO. : 81010NA

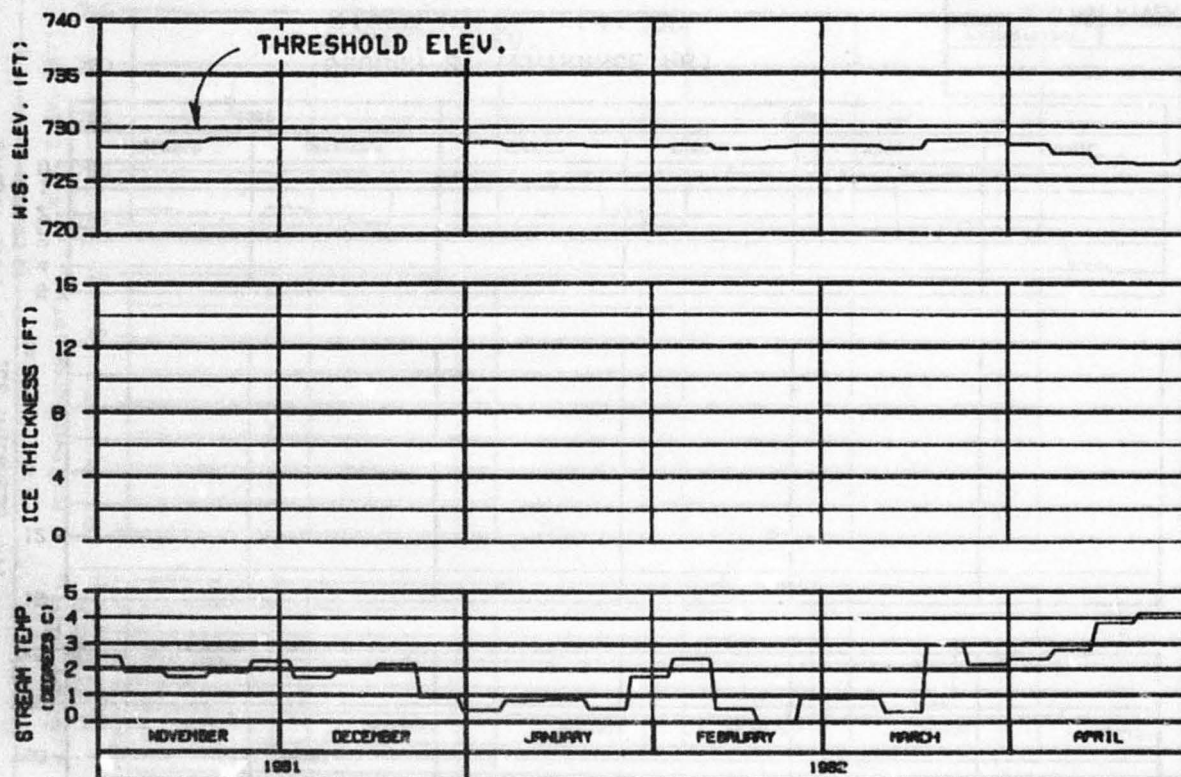
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HEIDA-EBASCO JOINT VENTURE

051-05, 01-000 00 JAN 79 0000, 142



HEAD OF SLOUGH 20

RIVER MILE : 140.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : NATANA 2001  
 CASE C FLOWS TEMP. INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101CNA

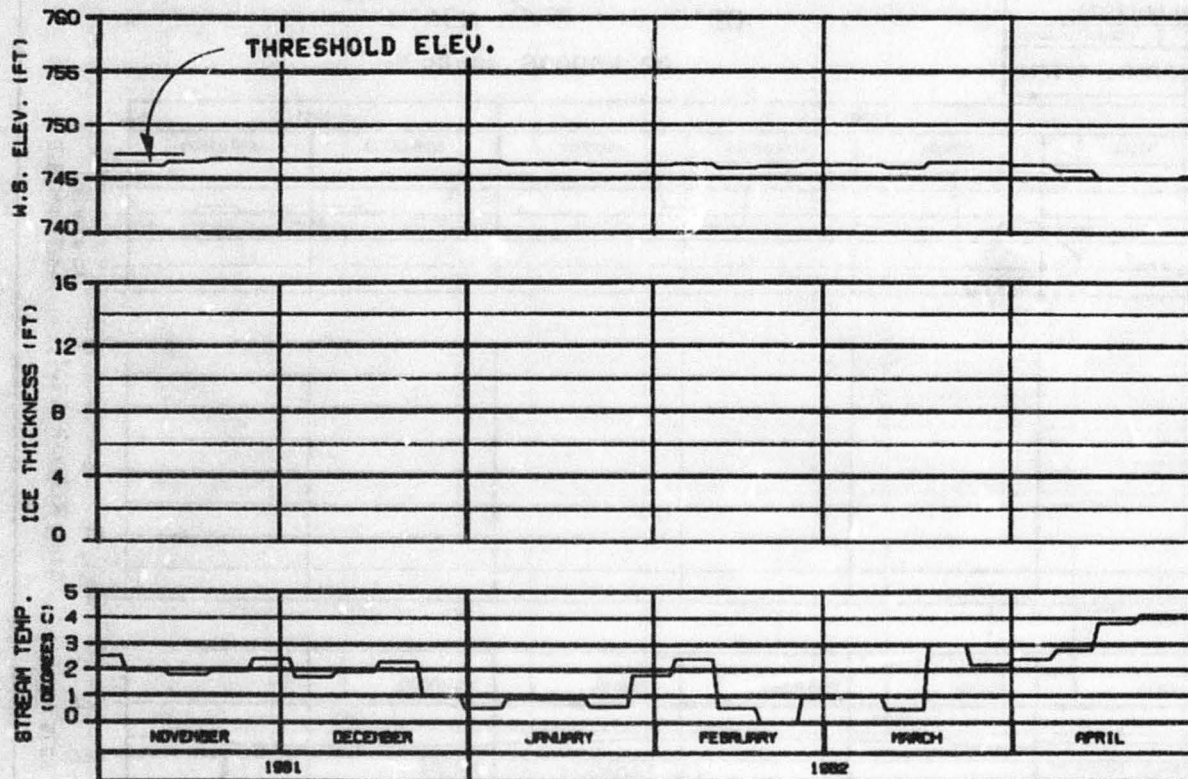
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: RALPH 20 20 JUN 82 1000, 142



SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP. INFLOW-MATCHING  
 REFERENCE RUN NO. : 81010NA

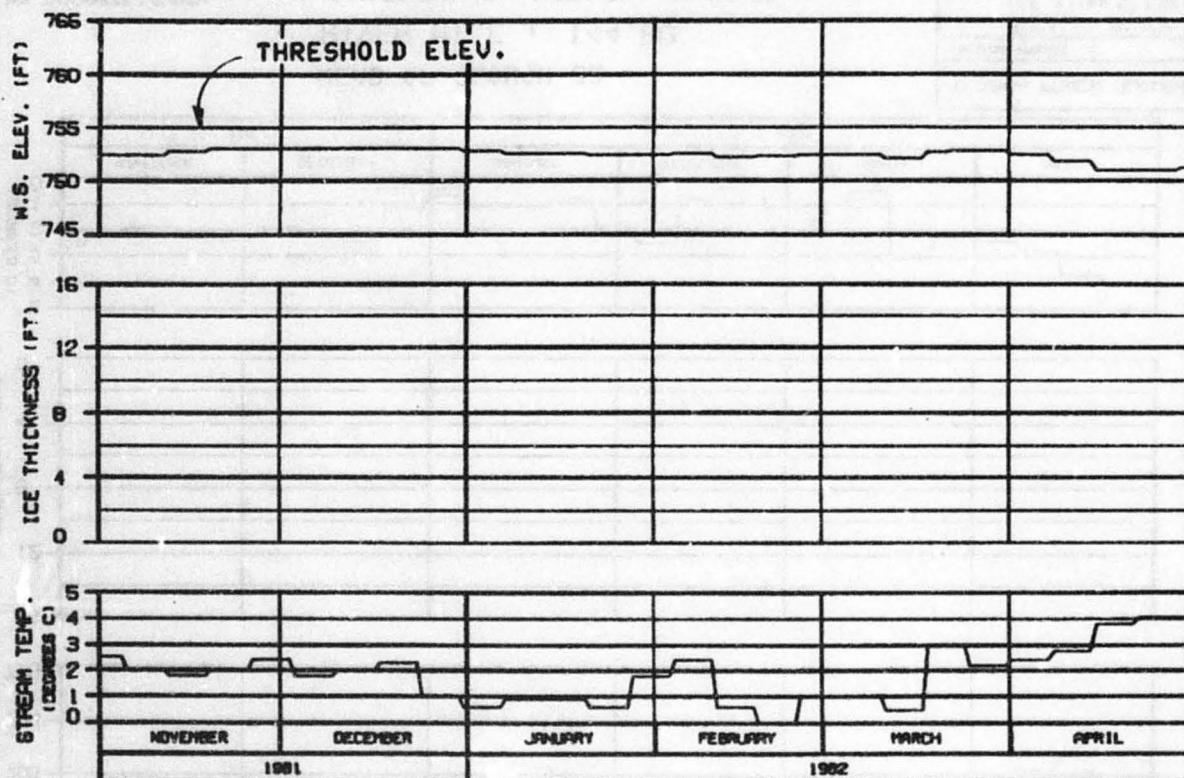
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HRZA-EBASCO JOINT VENTURE

CHARTED - 8/1/88 BY JHI 88 1988.142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

HEAD OF SLOUGH 21

RIVER MILE : 142.20

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP, INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101CNA

ALASKA POWER AUTHORITY

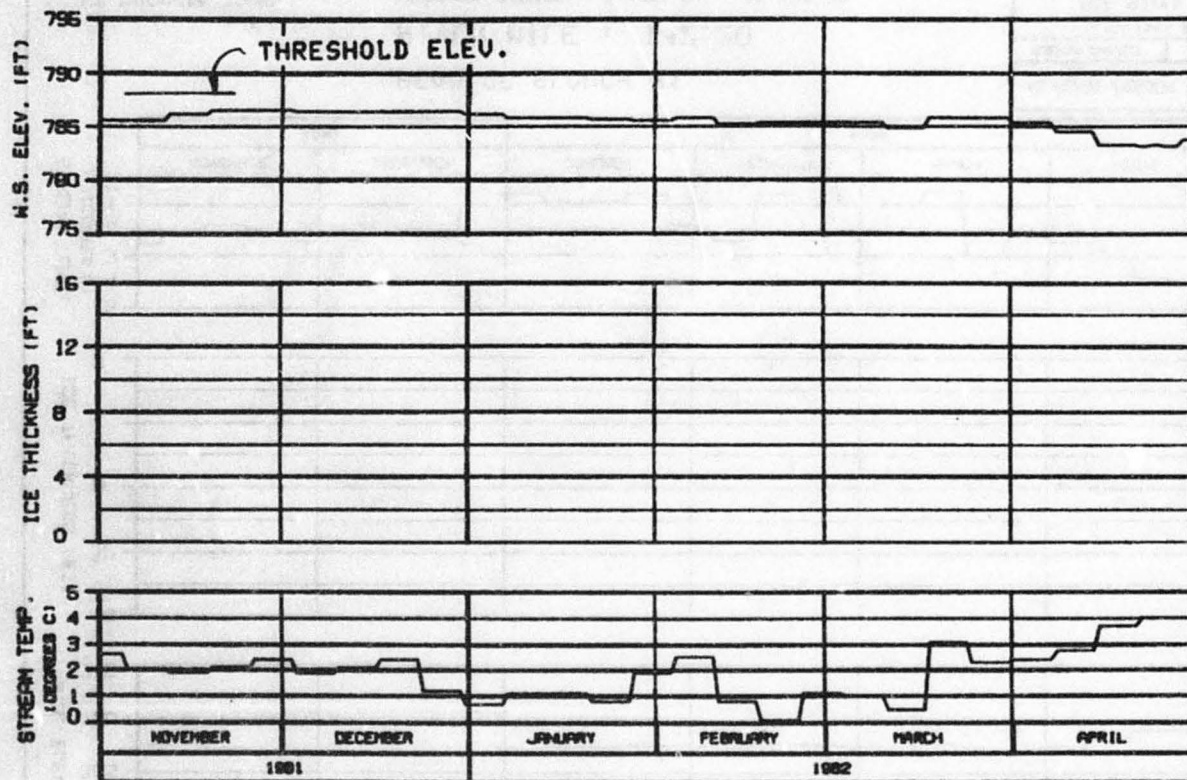
SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZDA-EBERCO JOINT VENTURE

ORDER: 84-0000 IN JAN 85 000.142





HEAD OF SLOUGH 22  
RIVER MILE : 144.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : NATANA 2001  
CASE C FLOWS TEMP: INFLOW-MATCHING  
REFERENCE RUN NO. : 8101CNA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

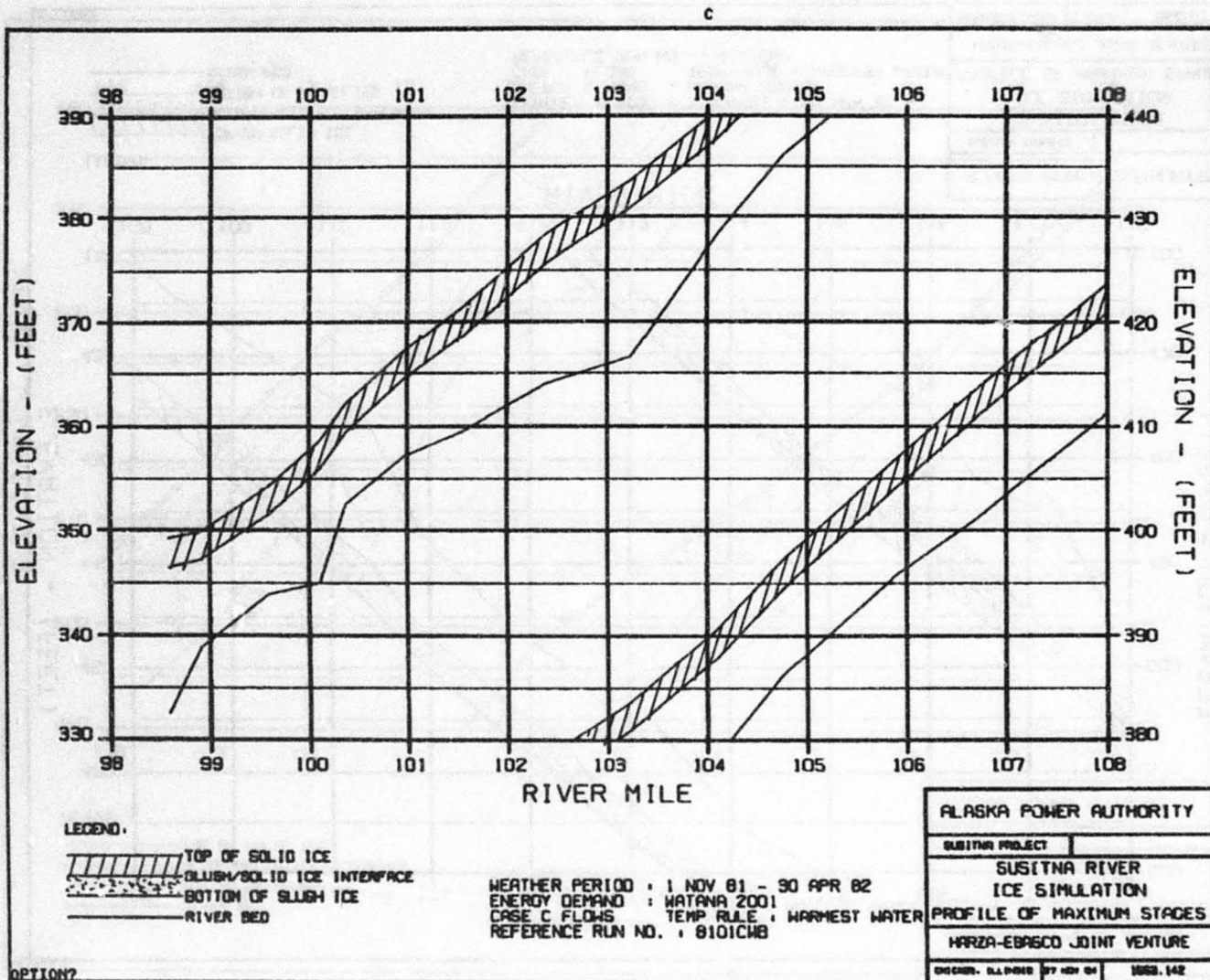
WARZA-EBASCO JOINT VENTURE

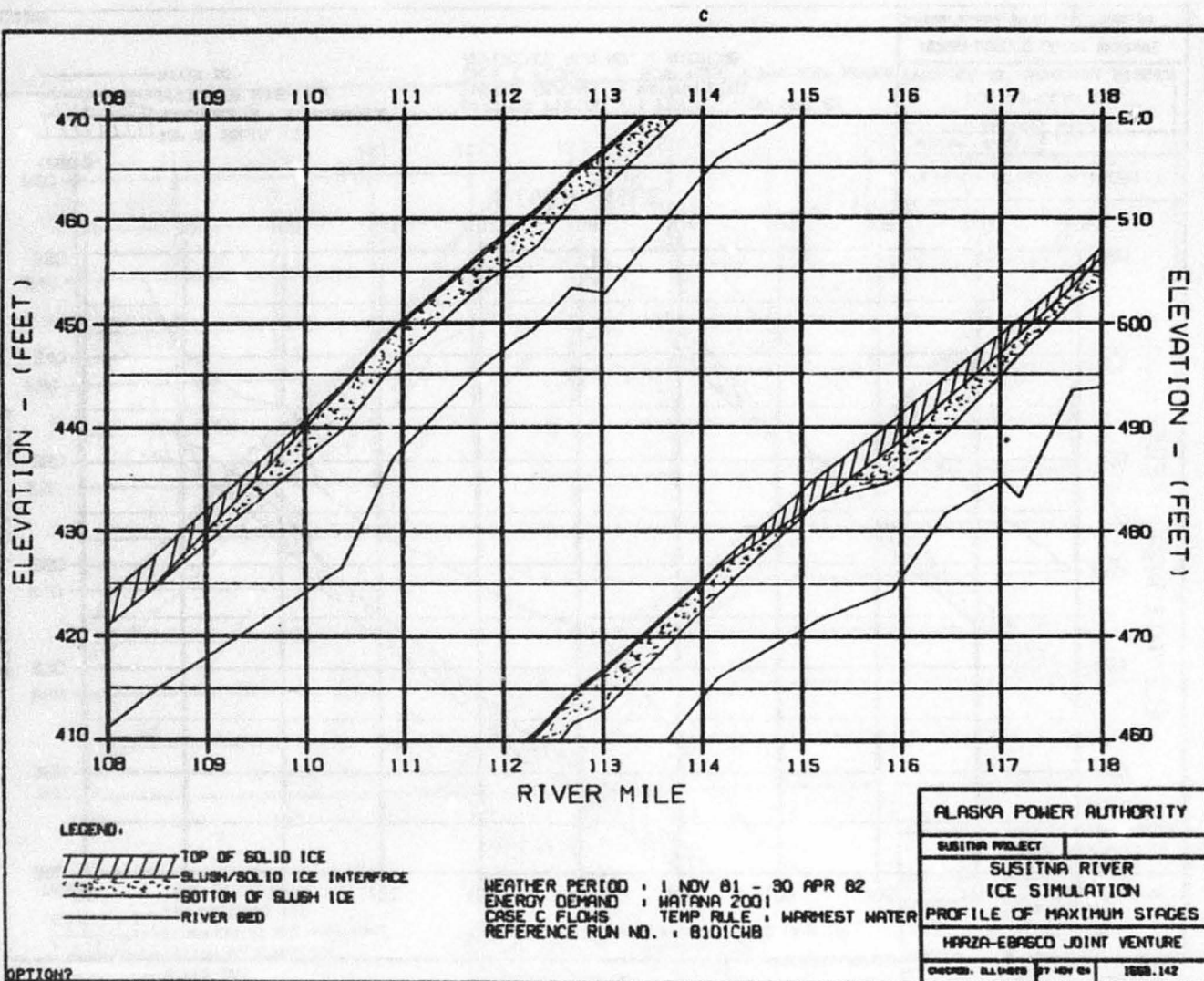
DRAWN: SLD/MSB 22 JUN 82 1000.142

OPTION?

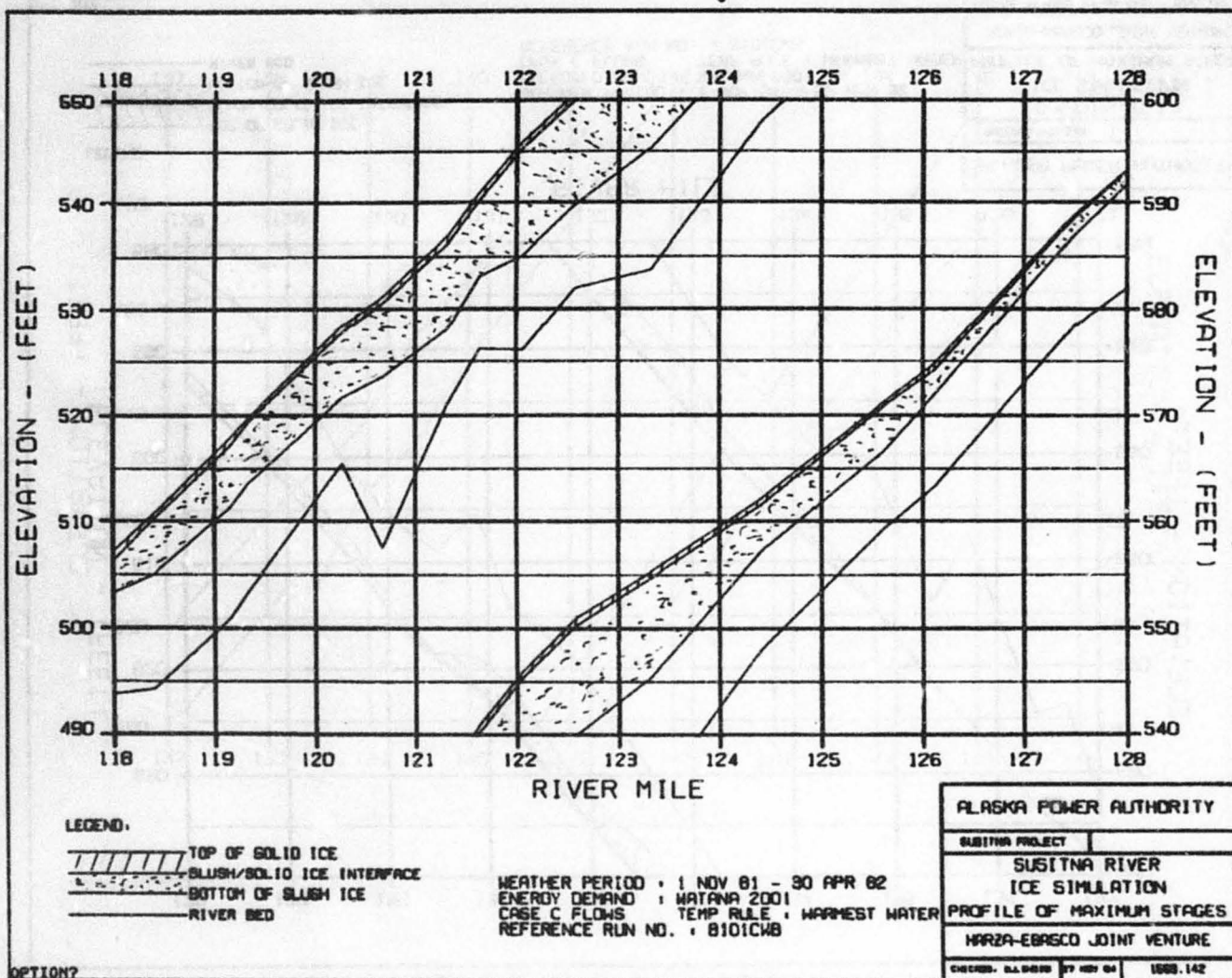


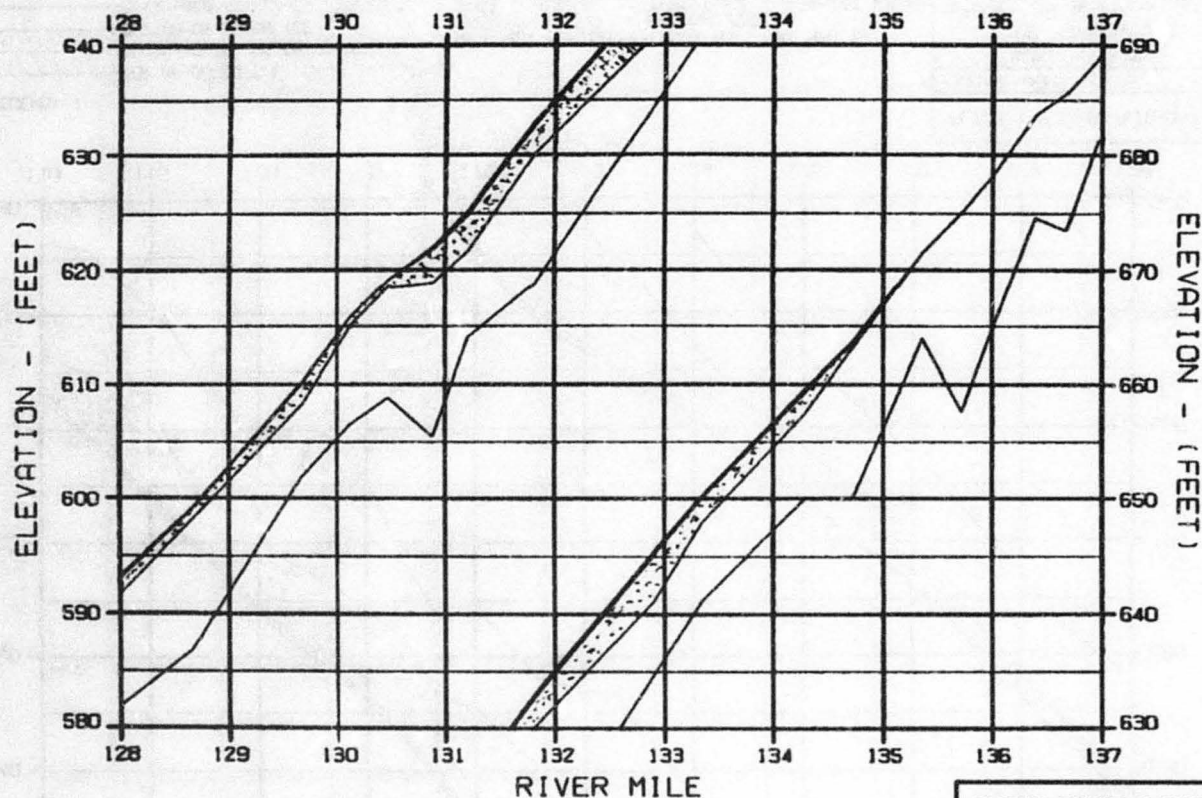
**EXHIBIT H**



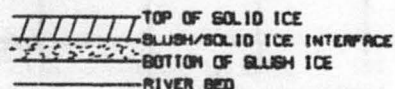








LEGEND:



WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8101CHB

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER

ICE SIMULATION

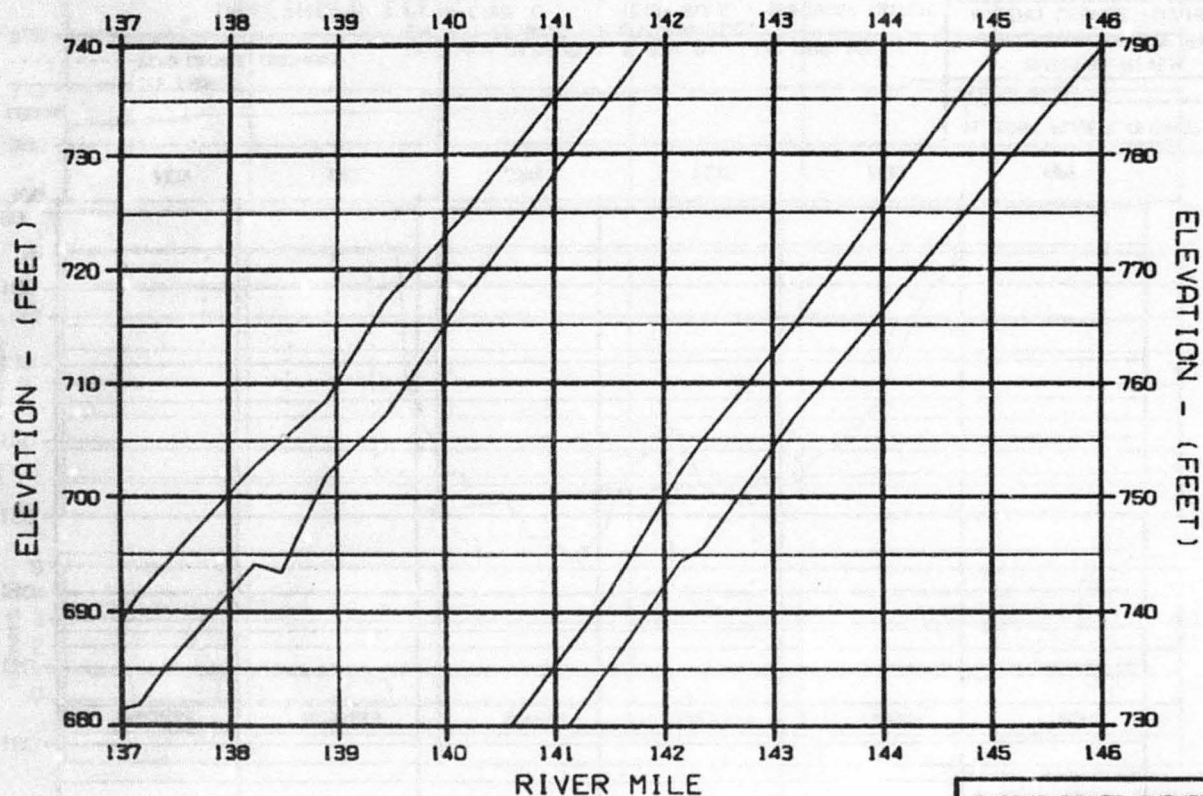
PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

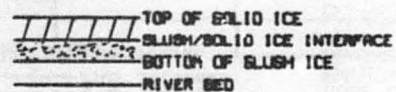
DESIGN: 11/81/82 BY: 11/81/82

OPTION?





LEGEND.



WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8101CMB

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER

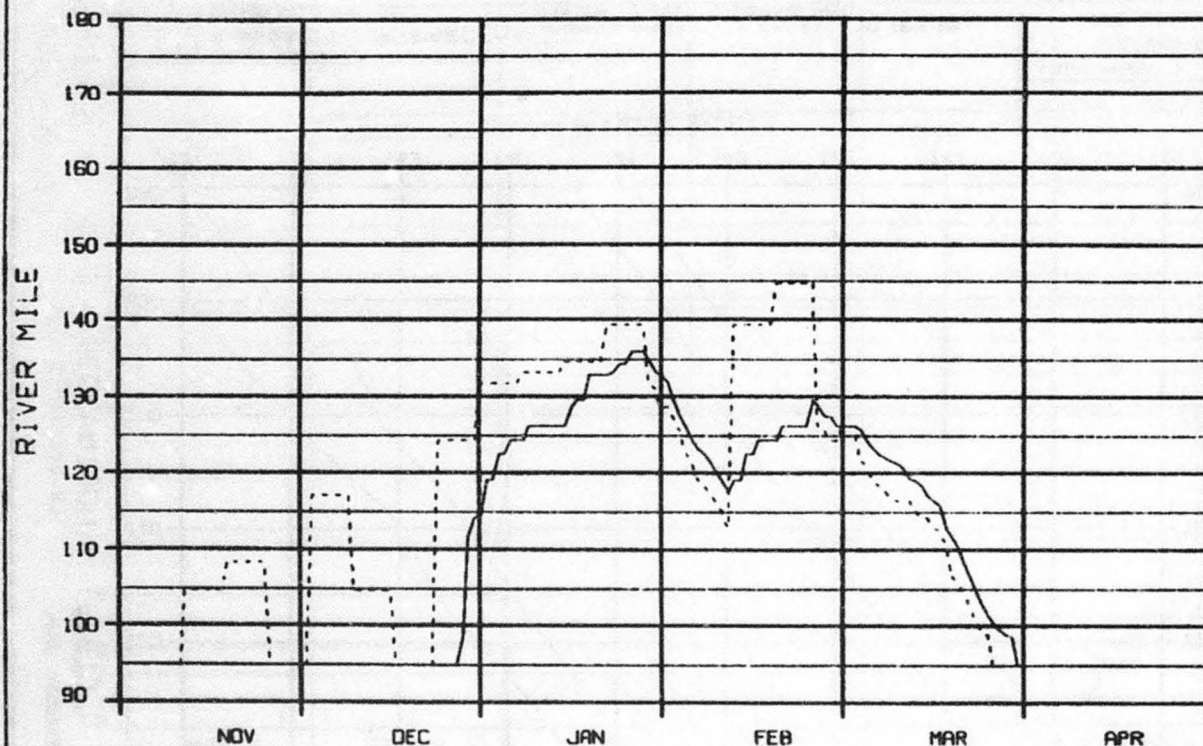
ICE SIMULATION

PROFILE OF MAXIMUM STAGES

HAZA-EBASCO JOINT VENTURE

CHICAGO, ILLINOIS 60601-142

OPTION?



LEGEND.

———— ICE FRONT  
 - - - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE C TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8101CHB

ALASKA POWER AUTHORITY

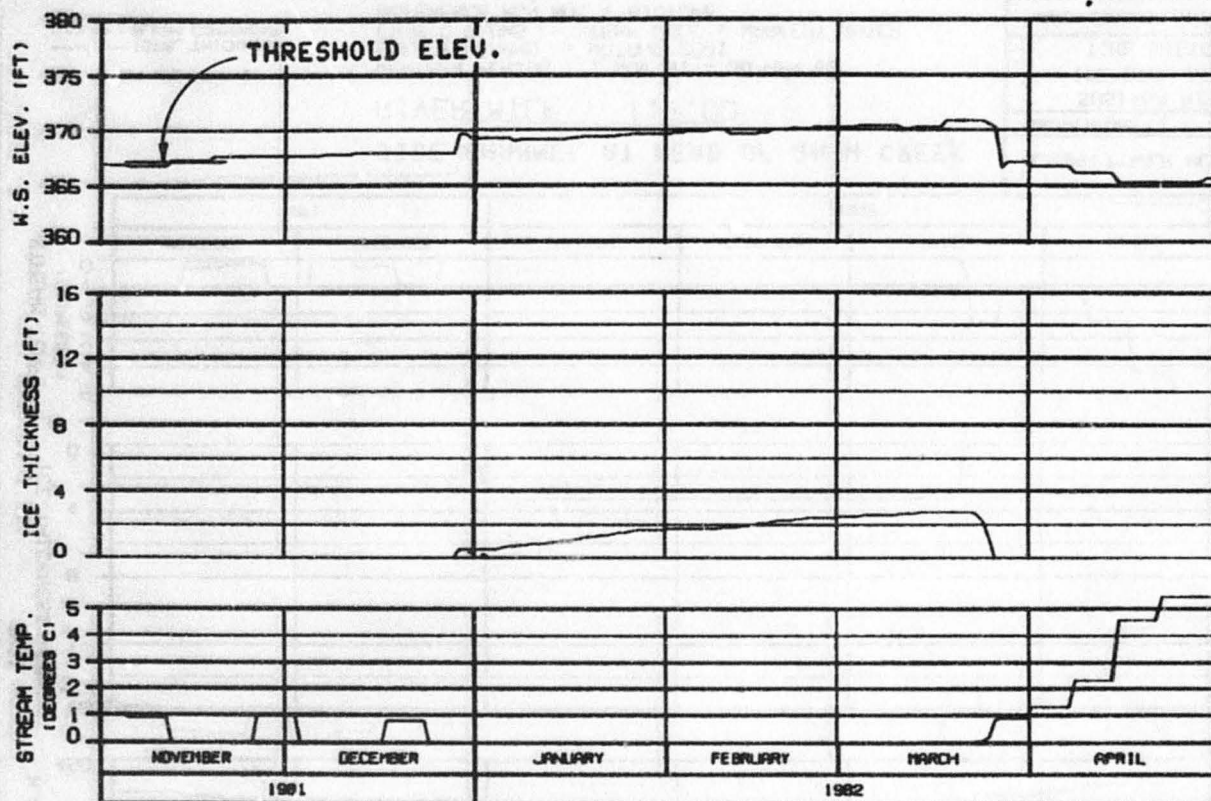
SUSITNA PROJECT

SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

HARZA-EBASCO JOINT VENTURE

CHECKED: ALLIANCE BY NOV 84 1583.142

OPTION?



ICE THICKNESS LEGEND.

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF WHISKERS SLOUGH  
 RIVER MILE : 101.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : B101C48

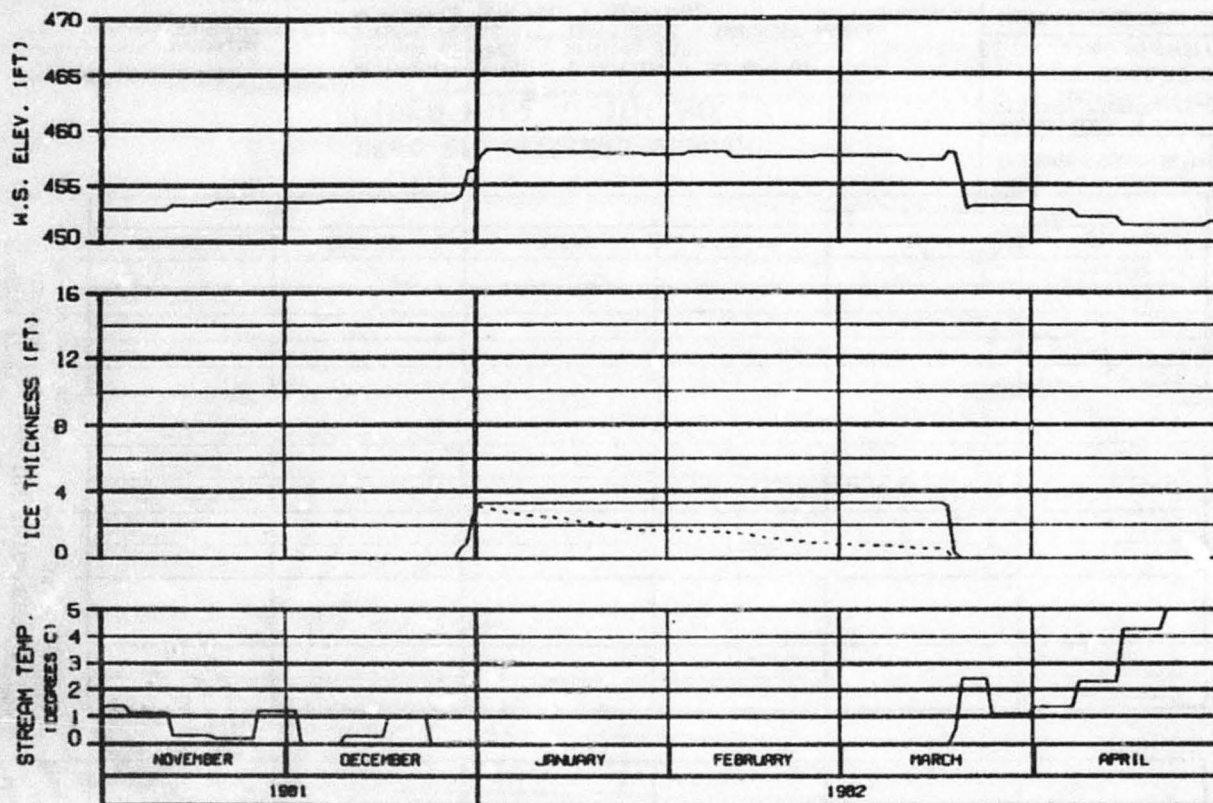
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHICAGO, ILLINOIS 60601-142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL AT HEAD OF GASH CREEK  
 RIVER MILE : 112.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8101CWB

ALASKA POWER AUTHORITY

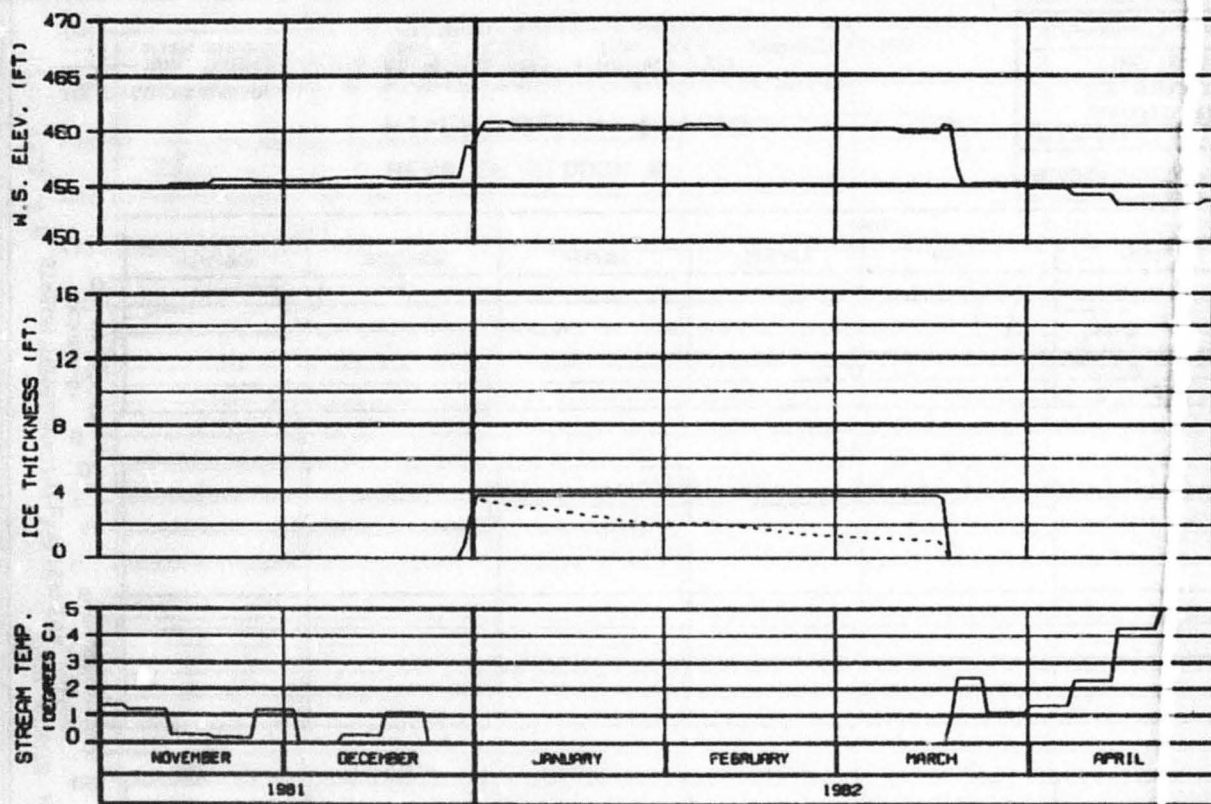
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

CHECKED: B.L. 04/82 BY: H.W. 04/82 1000.142





MOUTH OF SLOUGH 6A

RIVER MILE : 112.34

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8101CWB

ALASKA POWER AUTHORITY

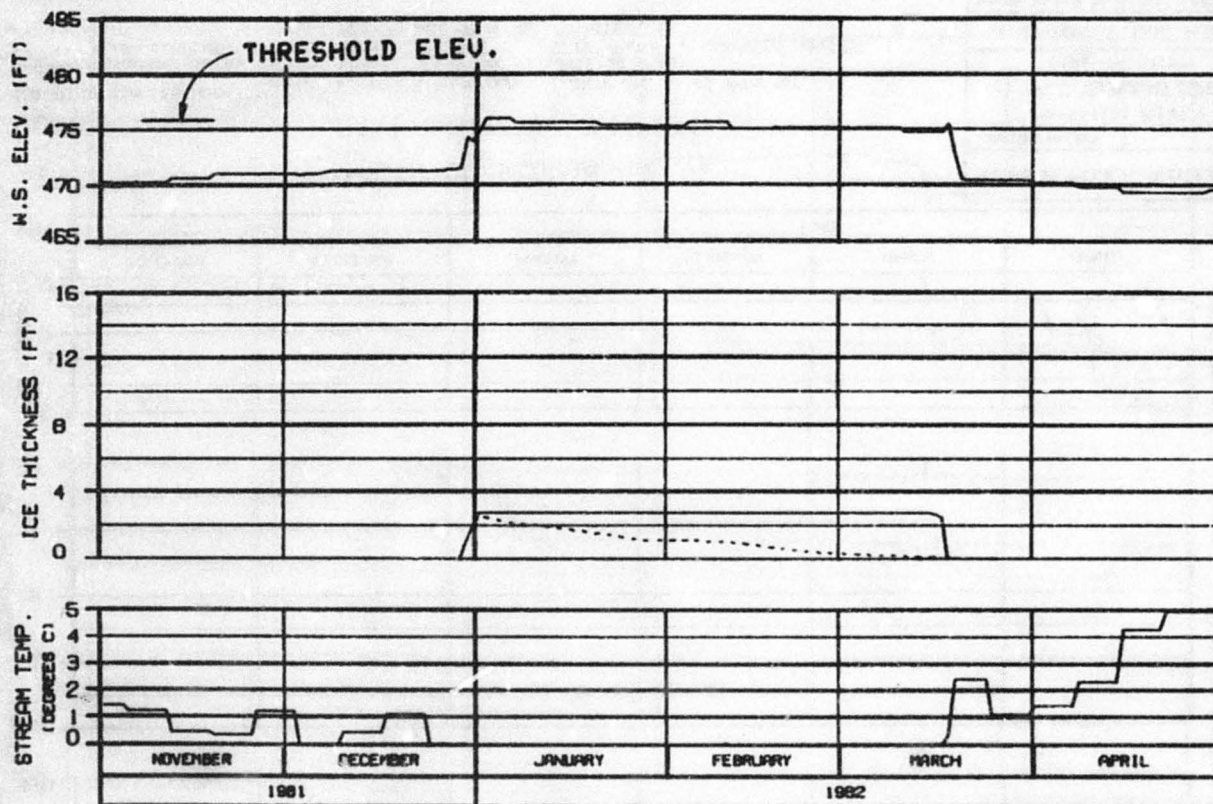
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN, ANALYSIS BY 84 1000.142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 8  
 RIVER MILE : 114.10

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8101CWB

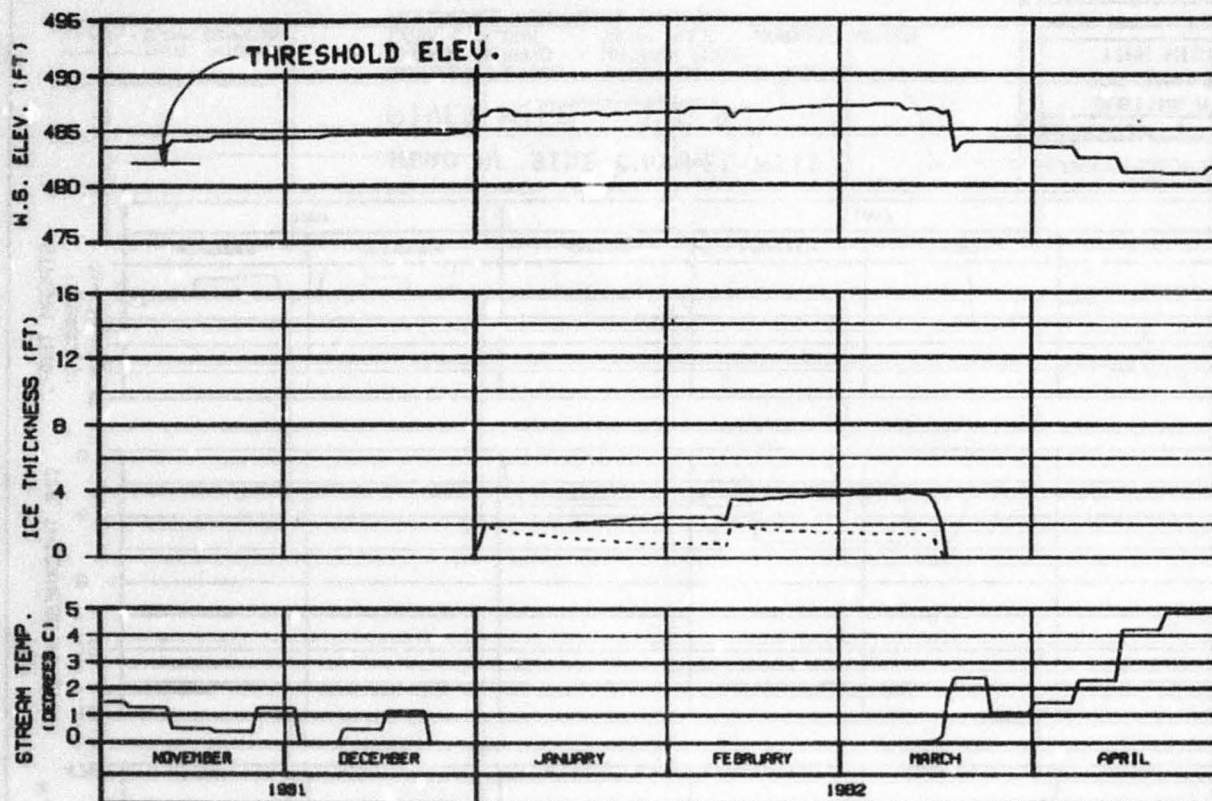
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRISCO JOINT VENTURE

ENCLOS. 81-0405 87 NOV 84 1008.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL MSII  
 RIVER MILE : 115.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8101CH8

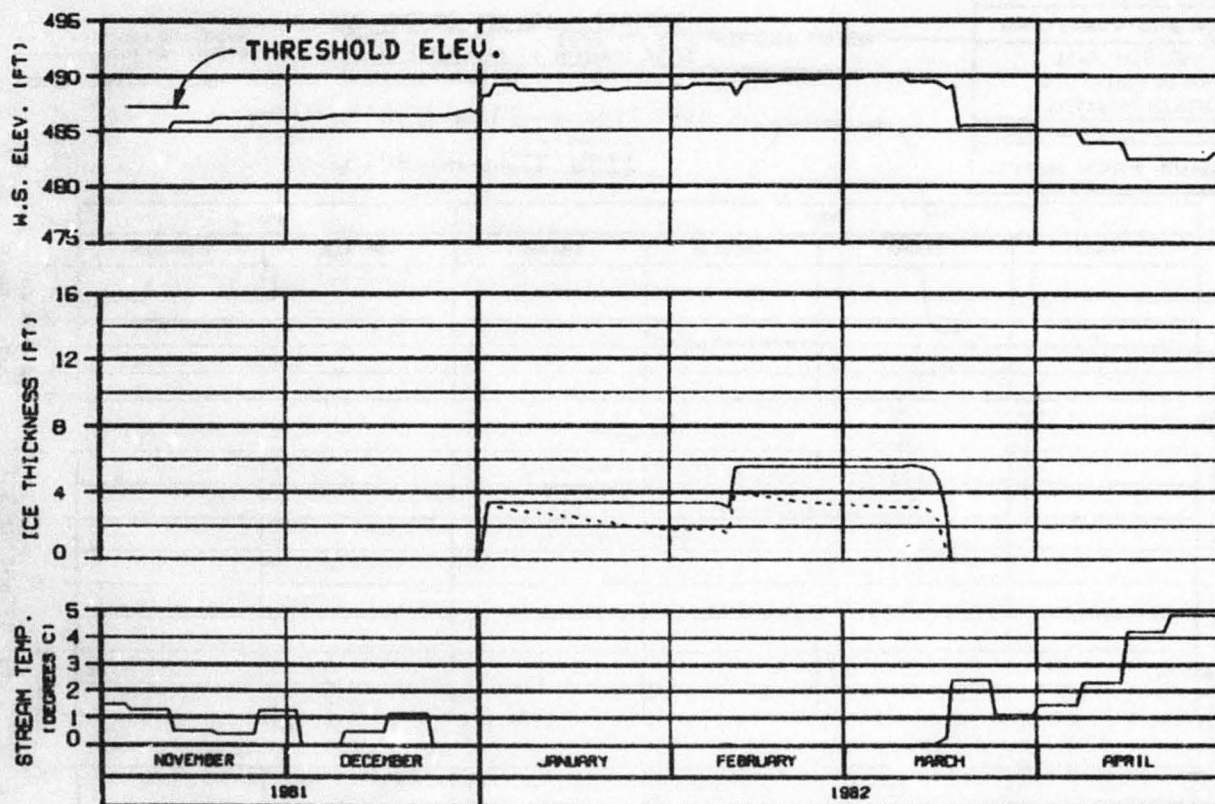
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHGCD: ALP/MSI BY NEW 04 1988.147



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8101CHB

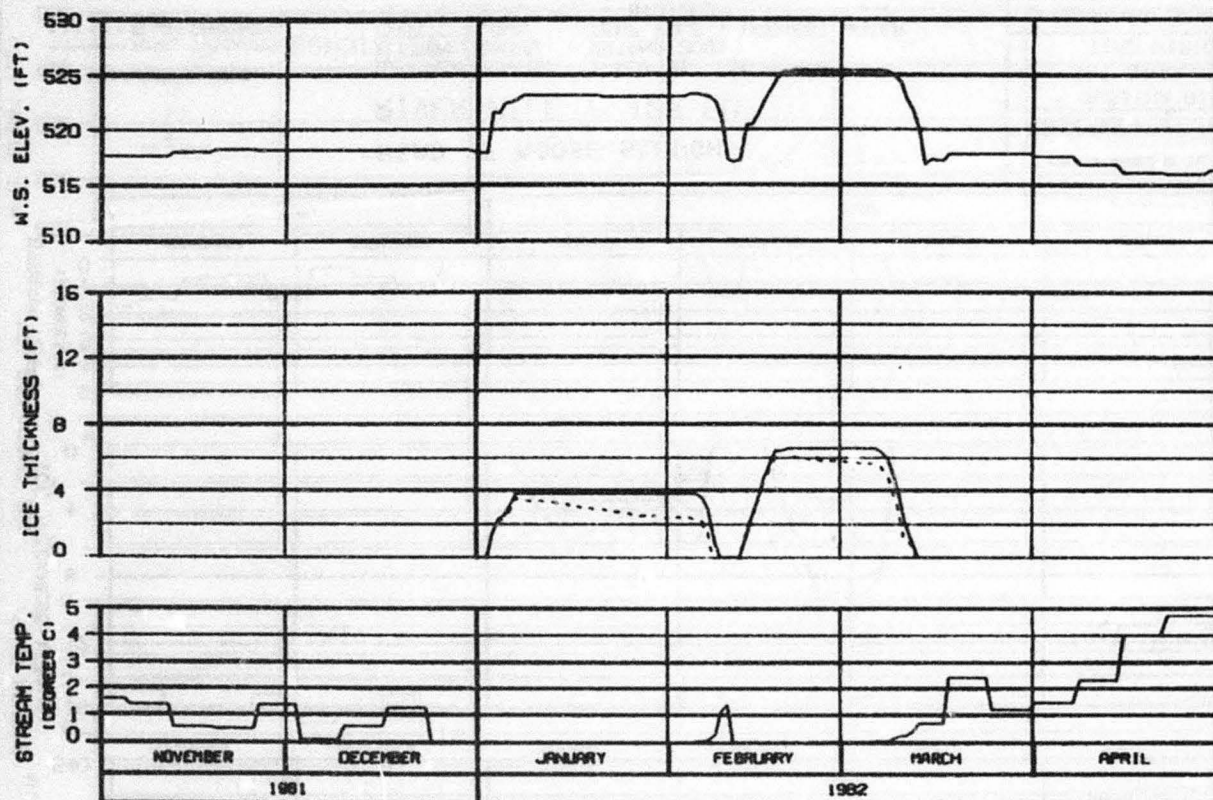
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHECKED: ALLISON BY NCH 84 1000.142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 ---- BLUISH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8101CWB

ALASKA POWER AUTHORITY

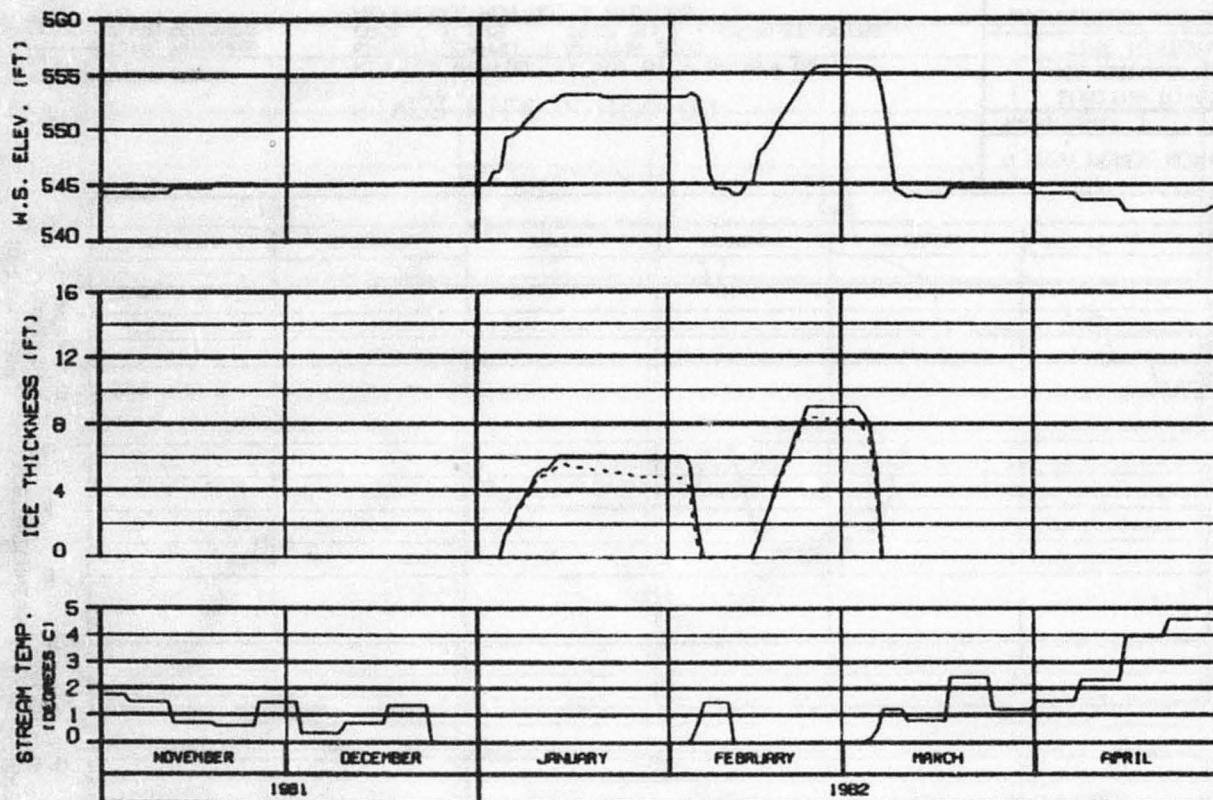
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: SLD/RS 27 MAY 84 1000.142





ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - BLUISH COMPONENT

HEAD OF MOOSE SLOUGH  
 RIVER MILE : 123.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8101CHB

ALASKA POWER AUTHORITY

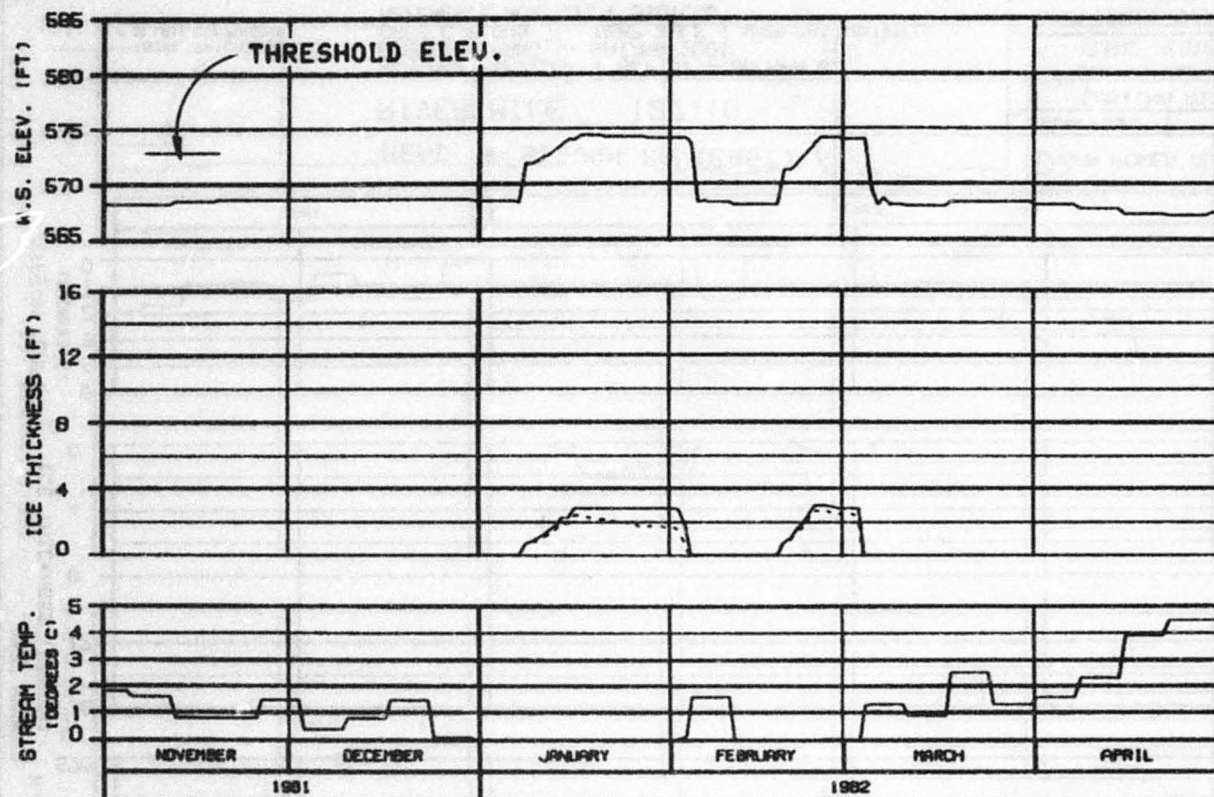
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

DESIGN: 11.04.82 BY: 11.04.82 102.142





HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8101CWB

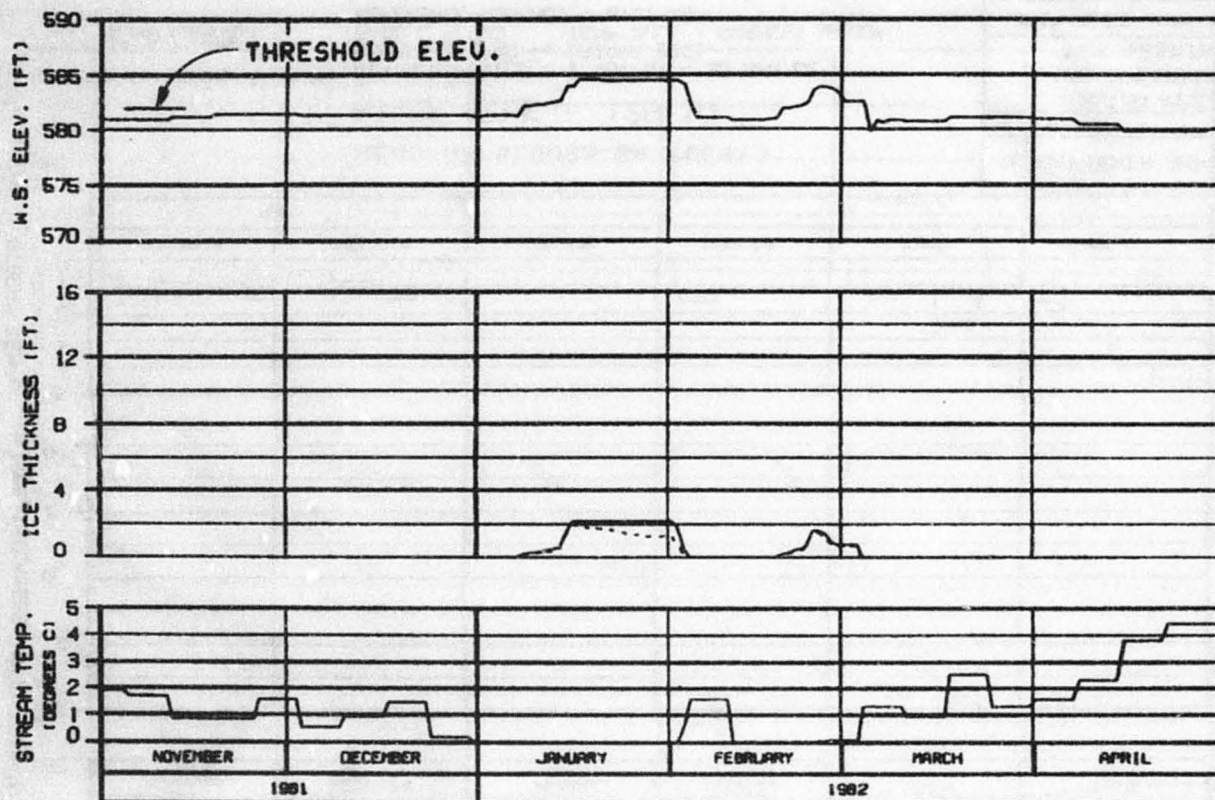
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZA-EDASCO JOINT VENTURE

CHARTED: 8/10/82 BY: HAZA 84 1988.142



HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - BLUISH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : NATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8101CW8

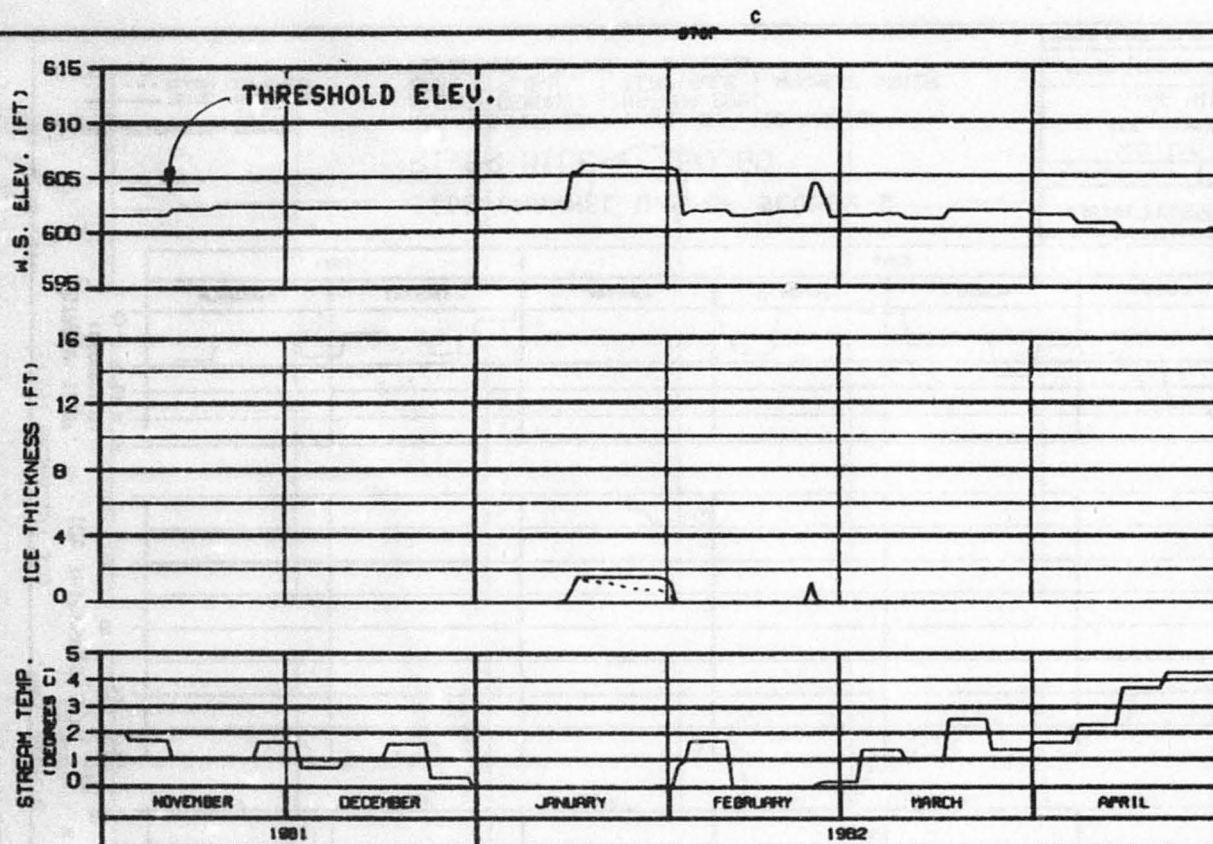
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EGASCO JOINT VENTURE

DISTRICT: ALASKA 87 NOV 81 1988.142



HEAD OF SLOUGH 9  
RIVER MILE : 129.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : 8101CWB

ALASKA POWER AUTHORITY

SUSTINA PROJECT

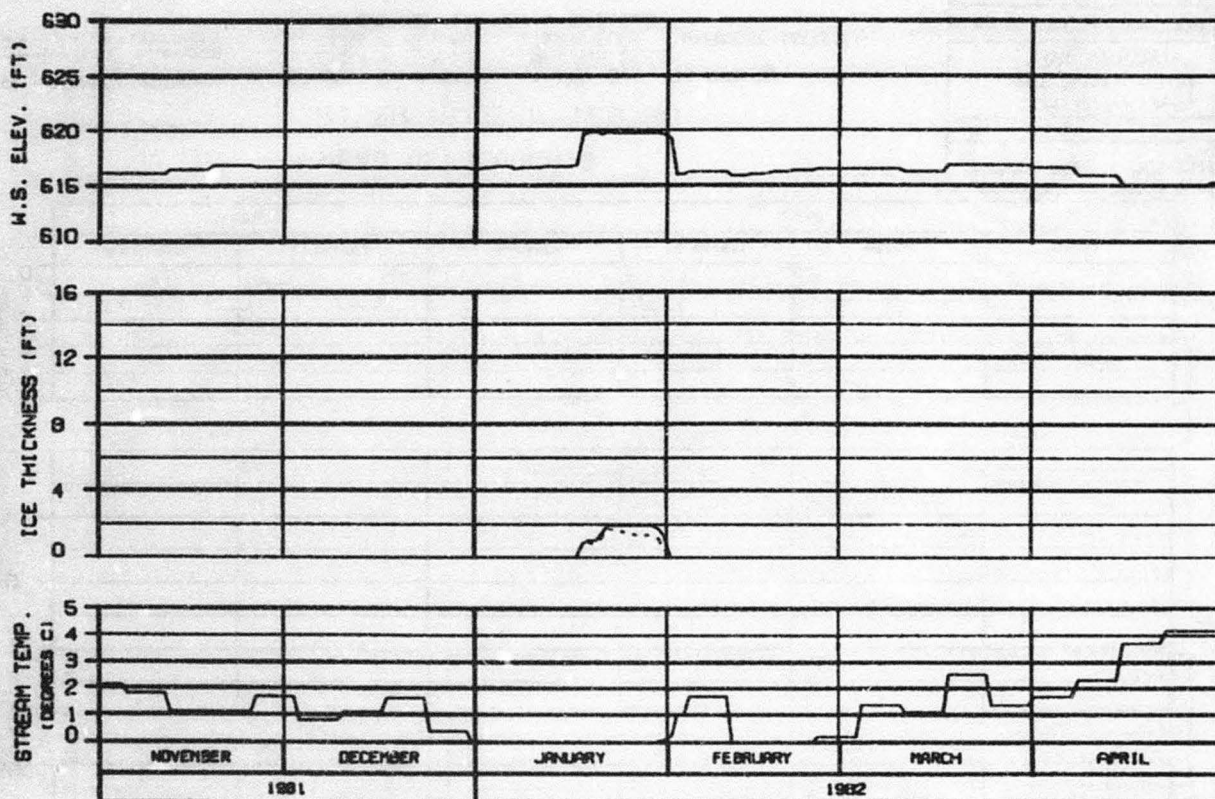
SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: R.L. 04/82 BY: KIM SM 1085.142

OPTION?

OPTION?



## ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF SLOUGH 9  
 RIVER MILE : 130.60

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8101CHB

ALASKA POWER AUTHORITY

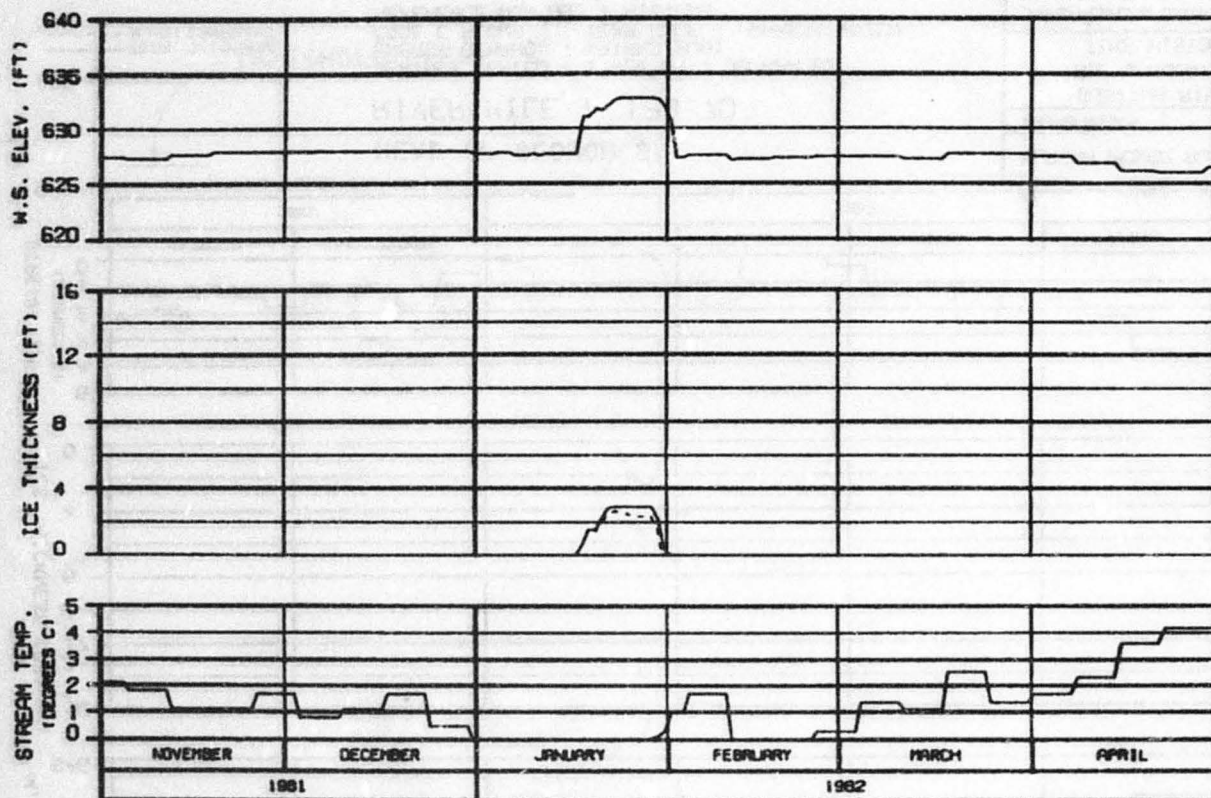
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN, ANALYSIS BY HEN CH 1000.142





**SIDE CHANNEL U/S OF 4TH JULY CREEK**  
**RIVER MILE : 131.80**

**ICE THICKNESS LEGEND:**

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8101CHB

**ALASKA POWER AUTHORITY**

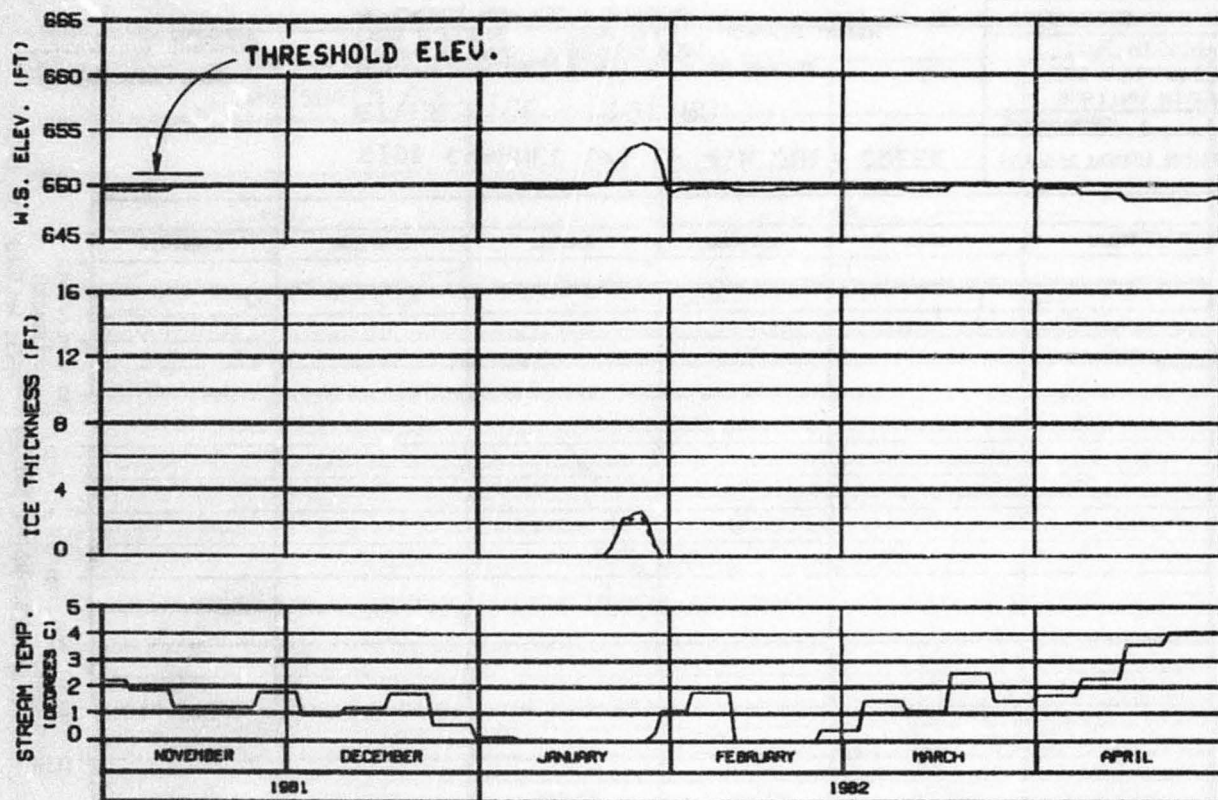
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHECKED: B.L.B. 07 MAY 84 1000.142





HEAD OF SLOUGH 9A  
RIVER MILE : 133.70

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : 8101CH8

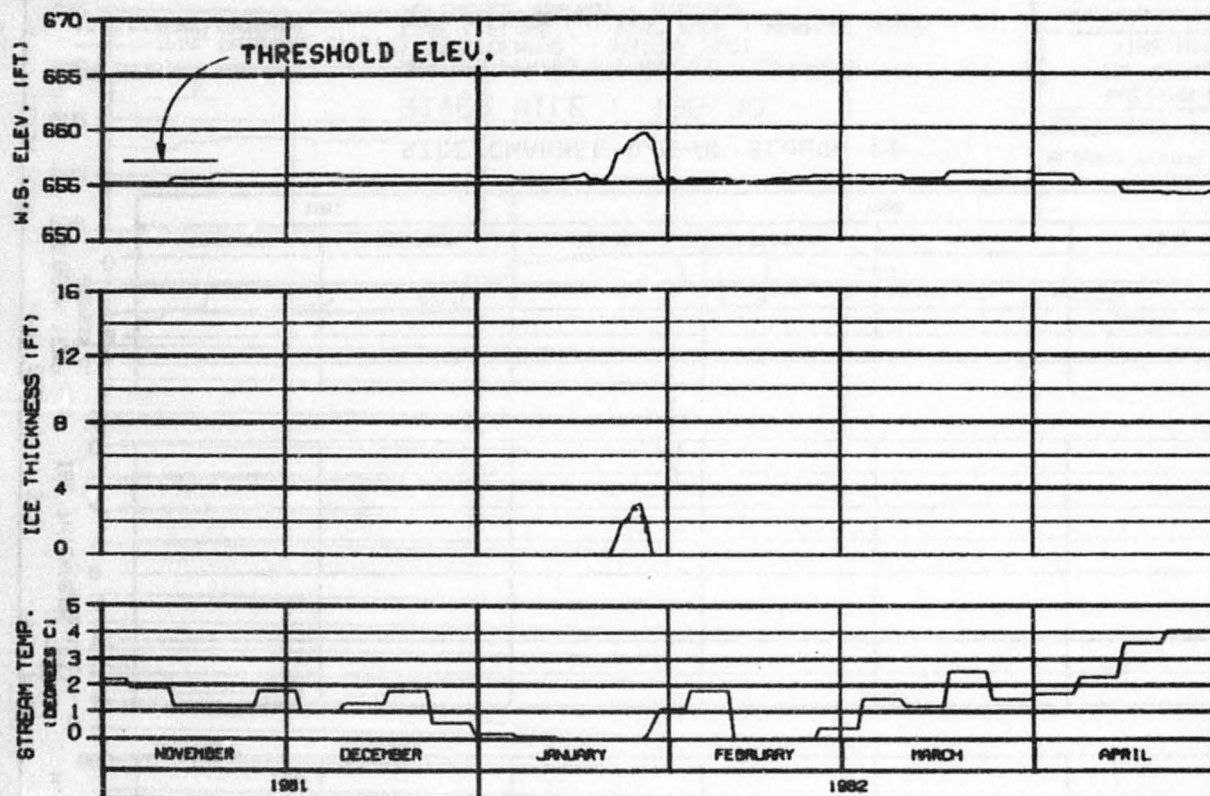
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBERD JOINT VENTURE

CHARGE - 0.00000 BY 001 04 1000.142



SIDE CHANNEL U/S OF SLOUGH 10  
RIVER MILE : 134.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : B101CH8

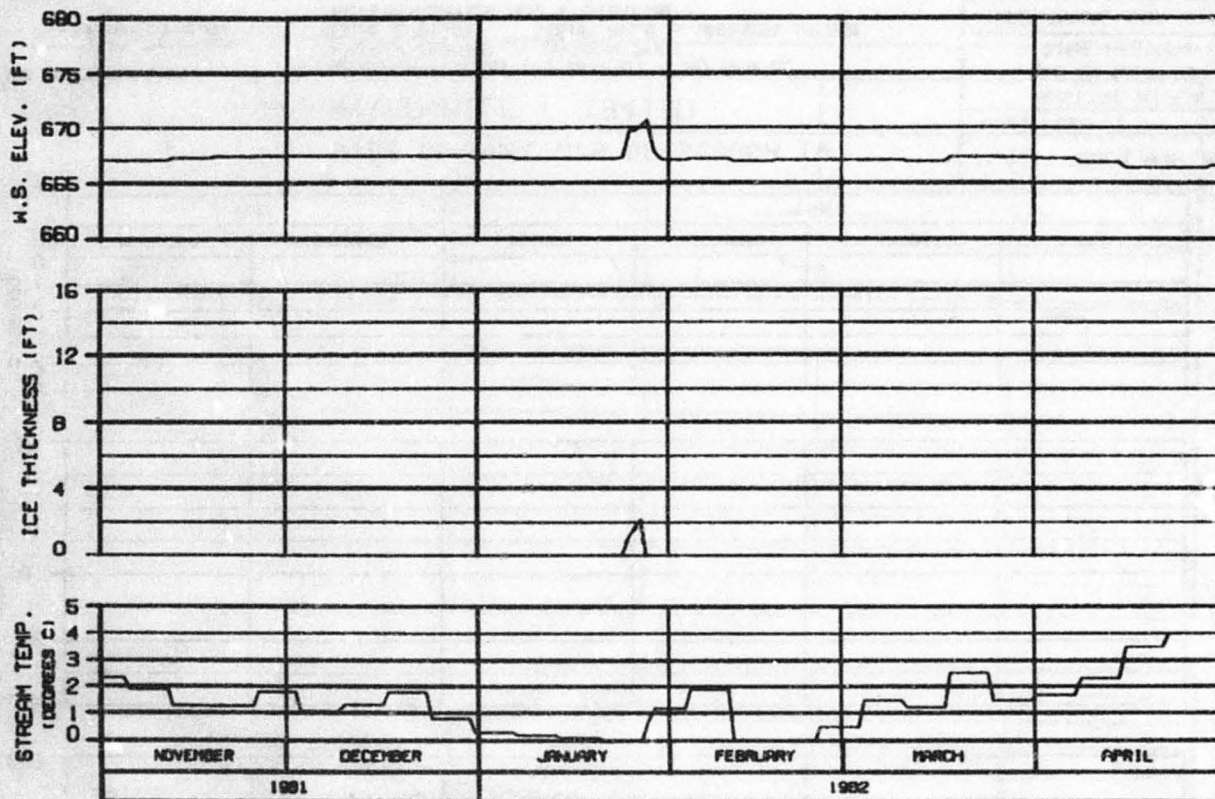
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHICHO - ALL 9-808 87 APR 82 1589.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUICH COMPONENT

SIDE CHANNEL D/S OF SLOUGH 11  
 RIVER MILE : 135.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 81D1CWB

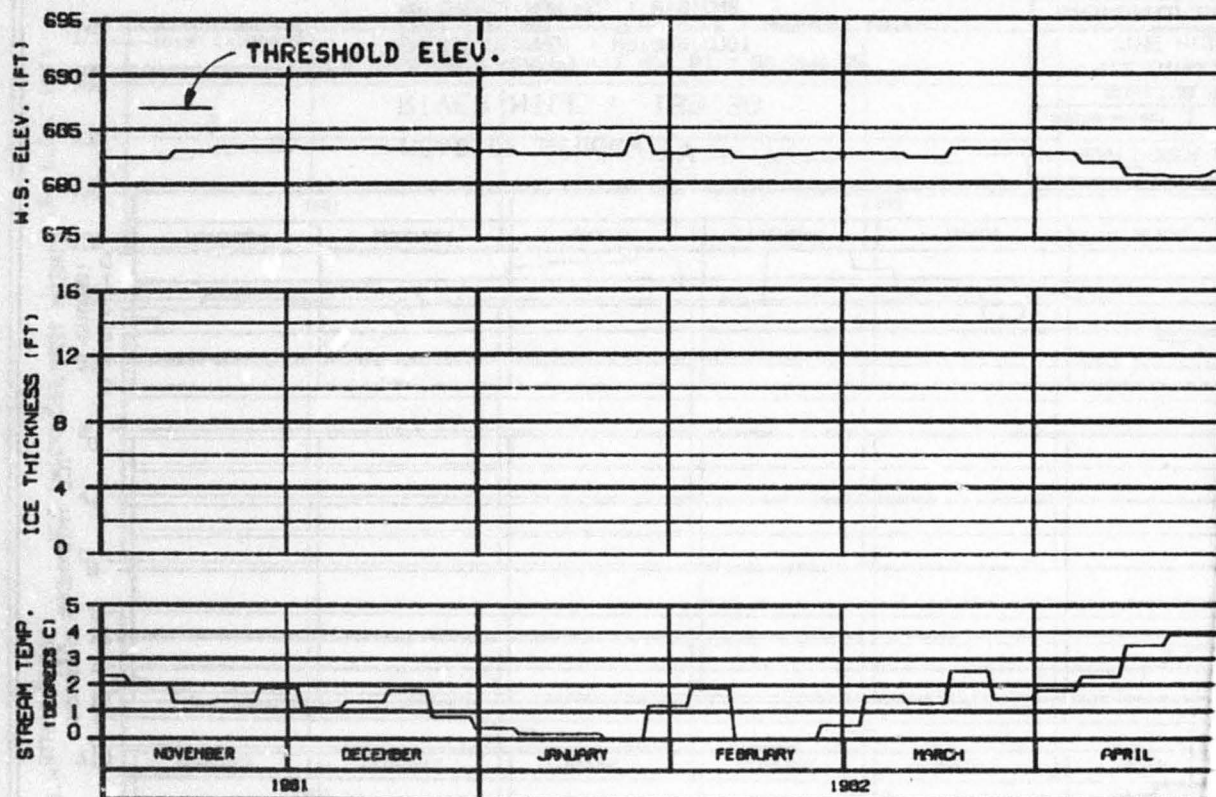
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

ENCLOS. 14/10/82 17 NOV 82 1000.142



HEAD OF SLOUGH 11

RIVER MILE : 136.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8101C4B

ALASKA POWER AUTHORITY

SUSTINA PROJECT

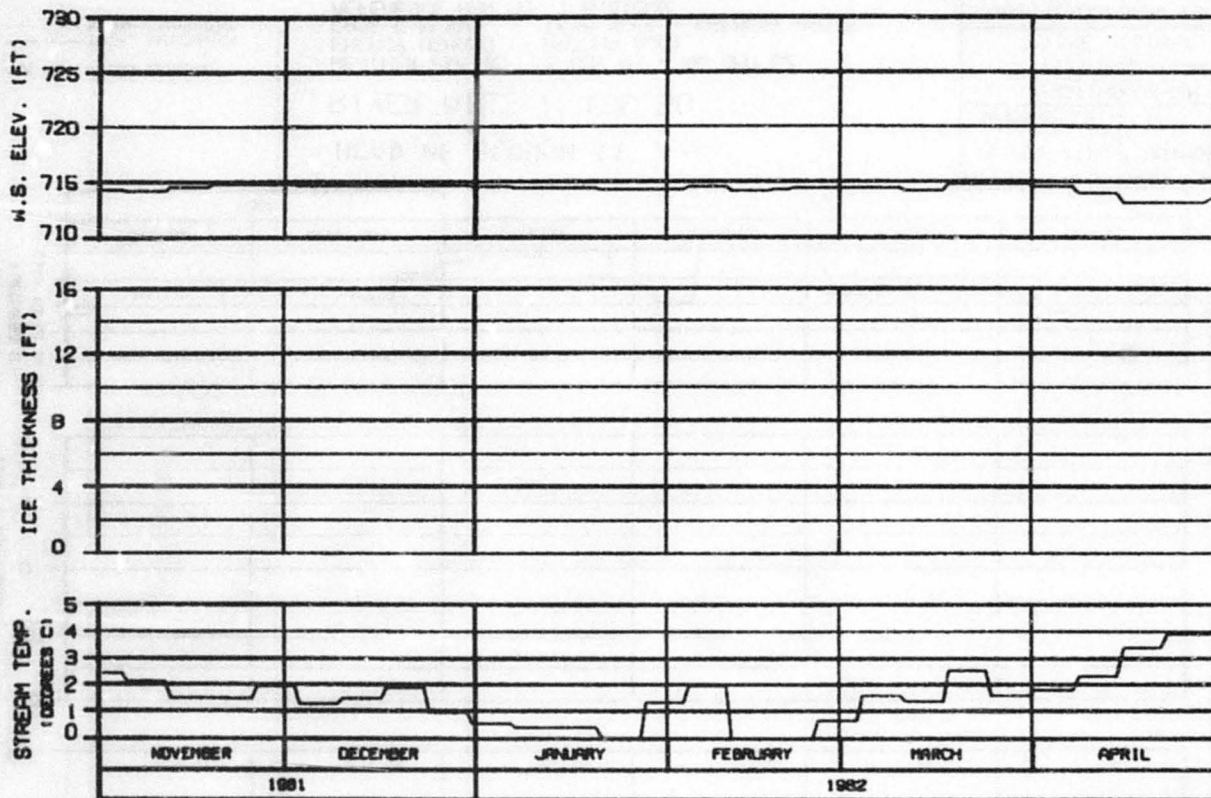
SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: BLDG/87 BY HW/81

ISS. 142





HEAD OF SLOUGH 17  
RIVER MILE : 139.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : 8101CWB

ALASKA POWER AUTHORITY

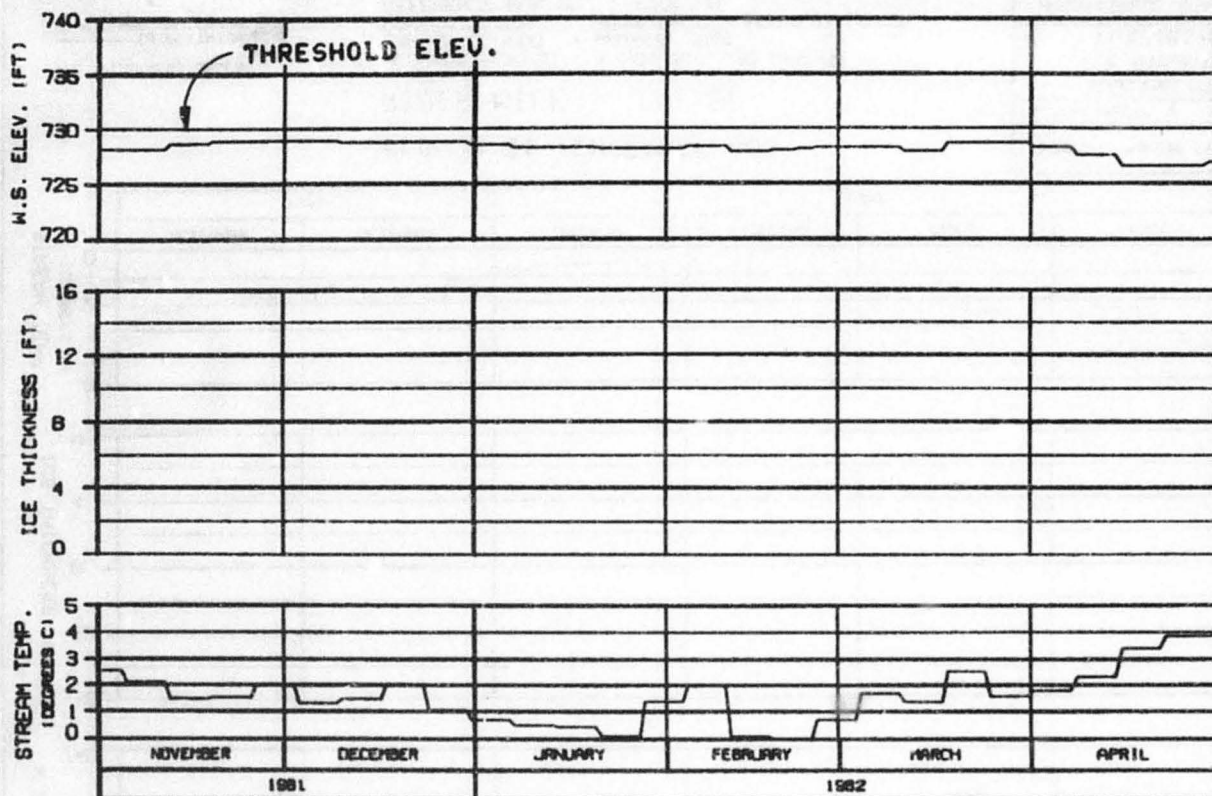
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED BY ELLIOTT 87 104 04 1000, 142





HEAD OF SLOUGH 20  
RIVER MILE : 140.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : 8101CH8

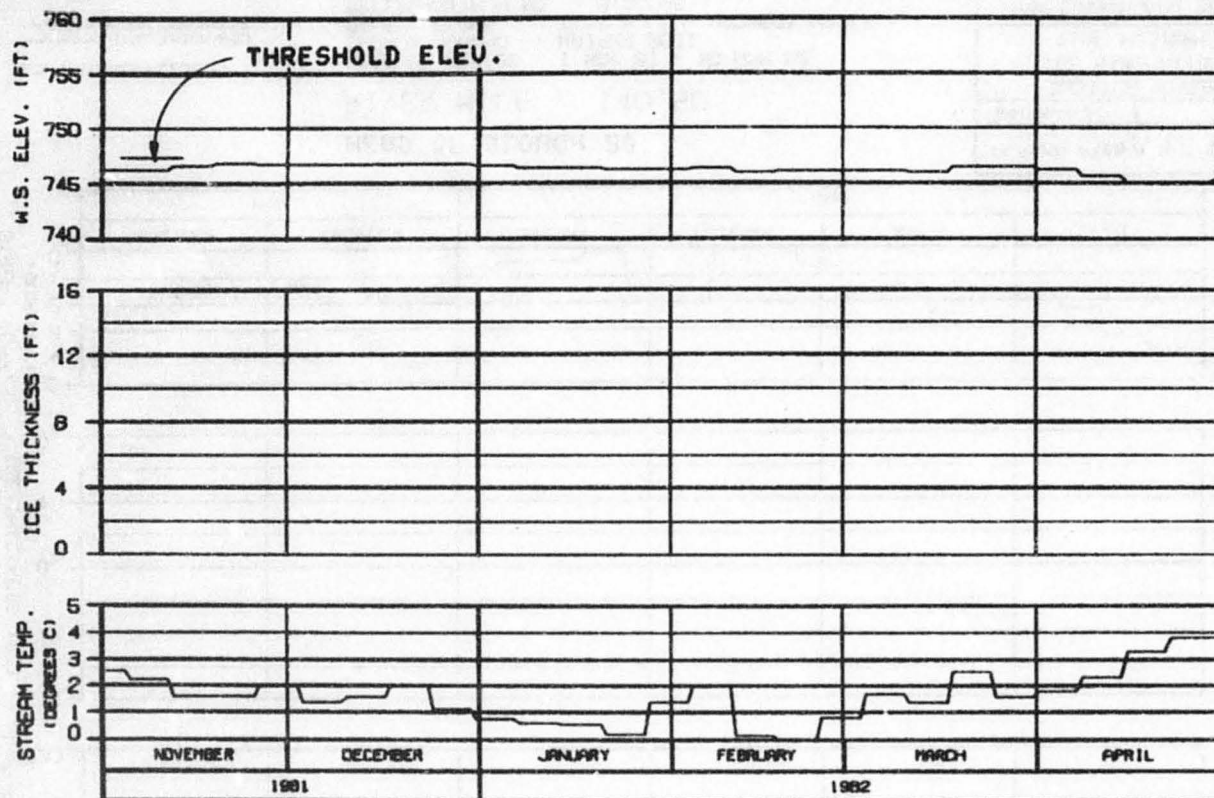
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME : HISTORY

HARZA-EBAGCO JOINT VENTURE

DESIGNED BY: J. L. HARRIS 27 NOV 81 1000.142



SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8101CWB

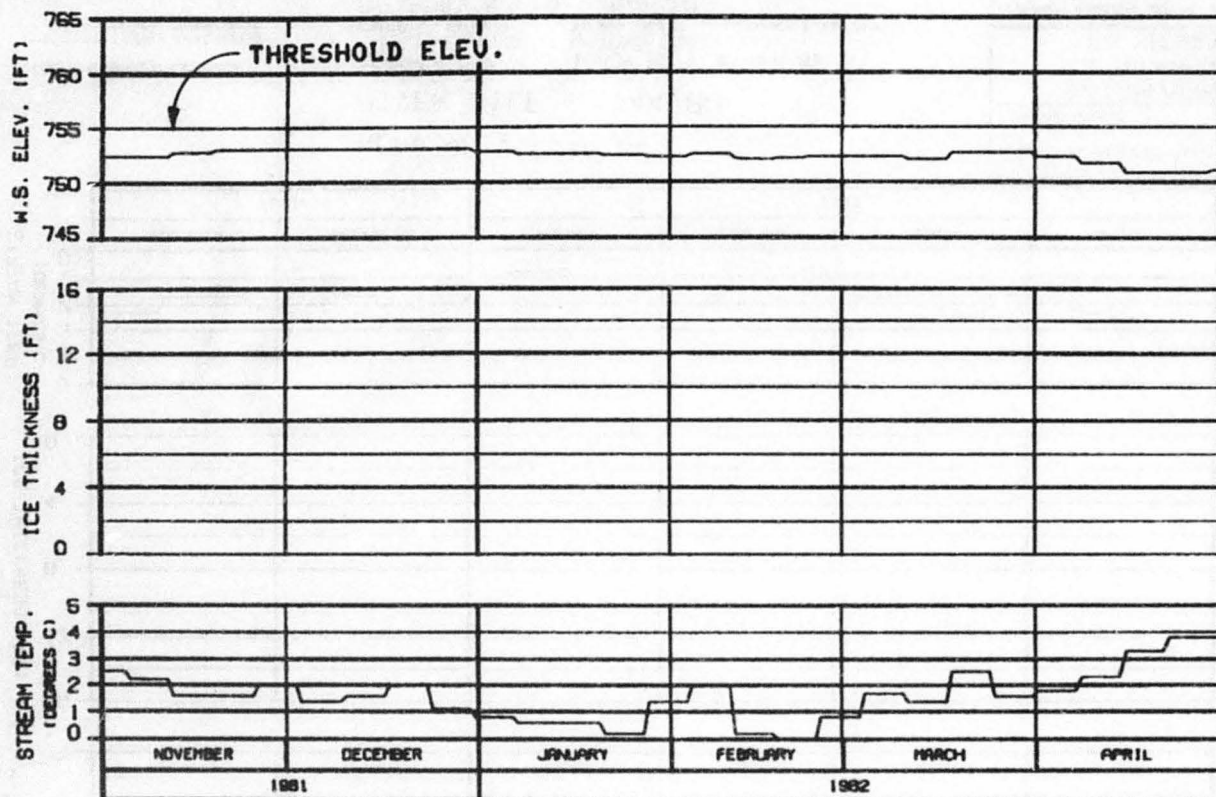
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHG002 - ILL (HND) BY NEN 04 1588.142



HEAD OF SLOUGH 21  
RIVER MILE : 142.20

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : 8101CH8

ALASKA POWER AUTHORITY

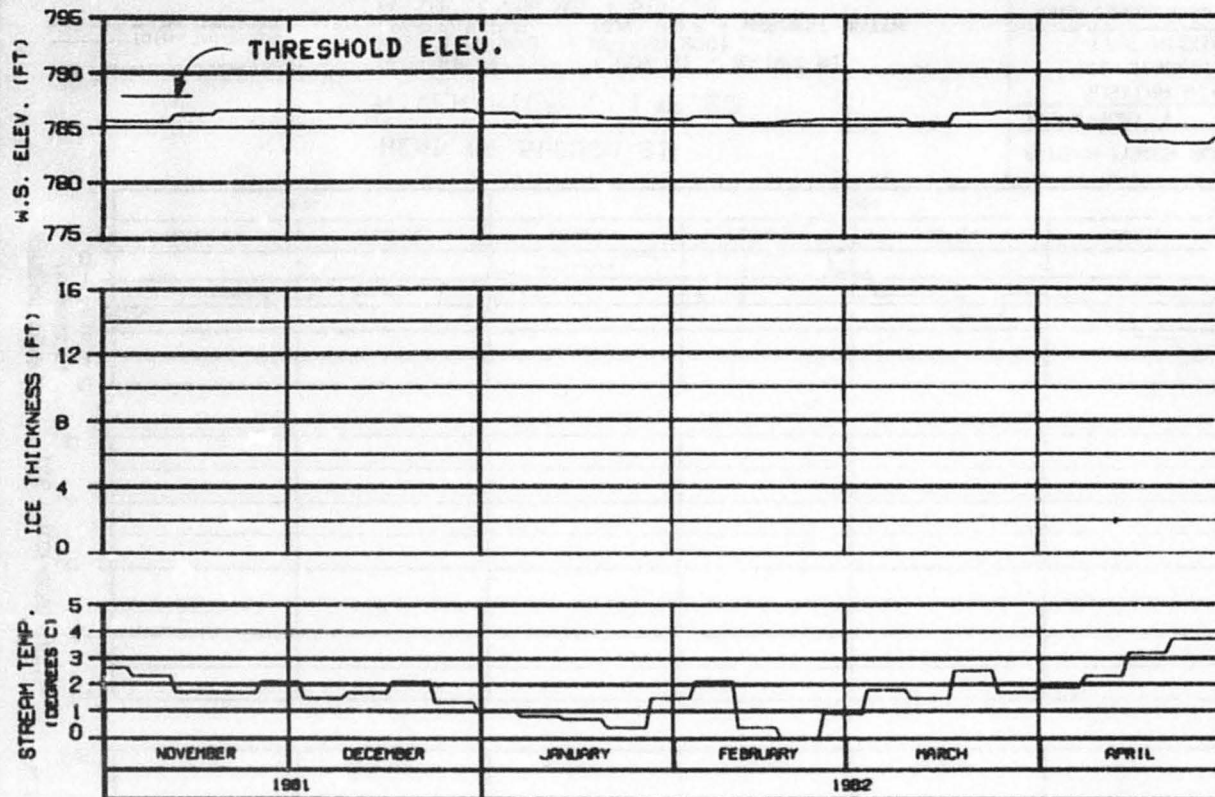
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DIVISION - ILLINOIS BY NOV 84 1988.142

C



HEAD OF SLOUGH 22  
RIVER MILE : 144.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : 8101CWB

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

MARZA-EBASCO JOINT VENTURE

DESIGN: 11.04.82 BY: JWH/SH 1000.142

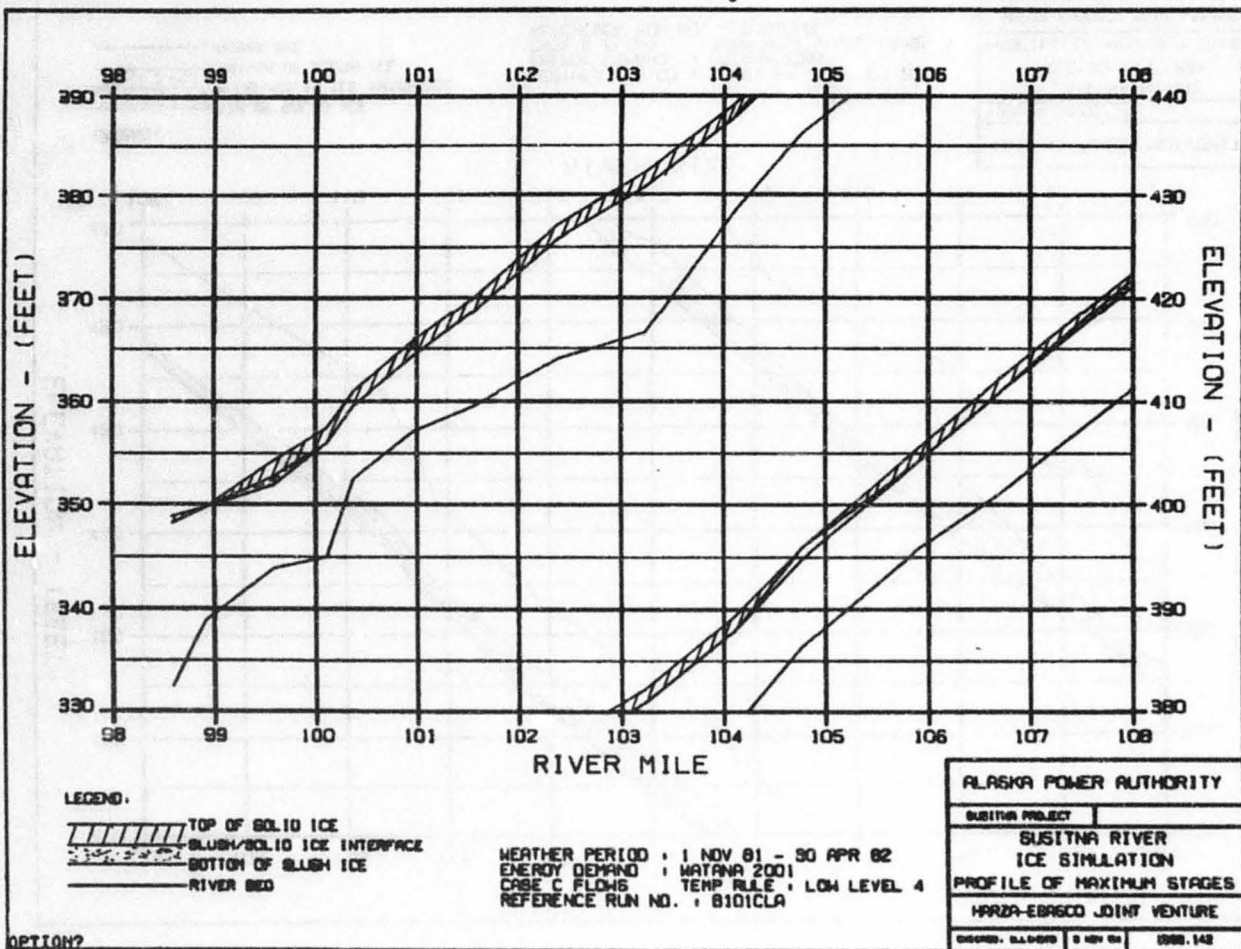
OPTION?

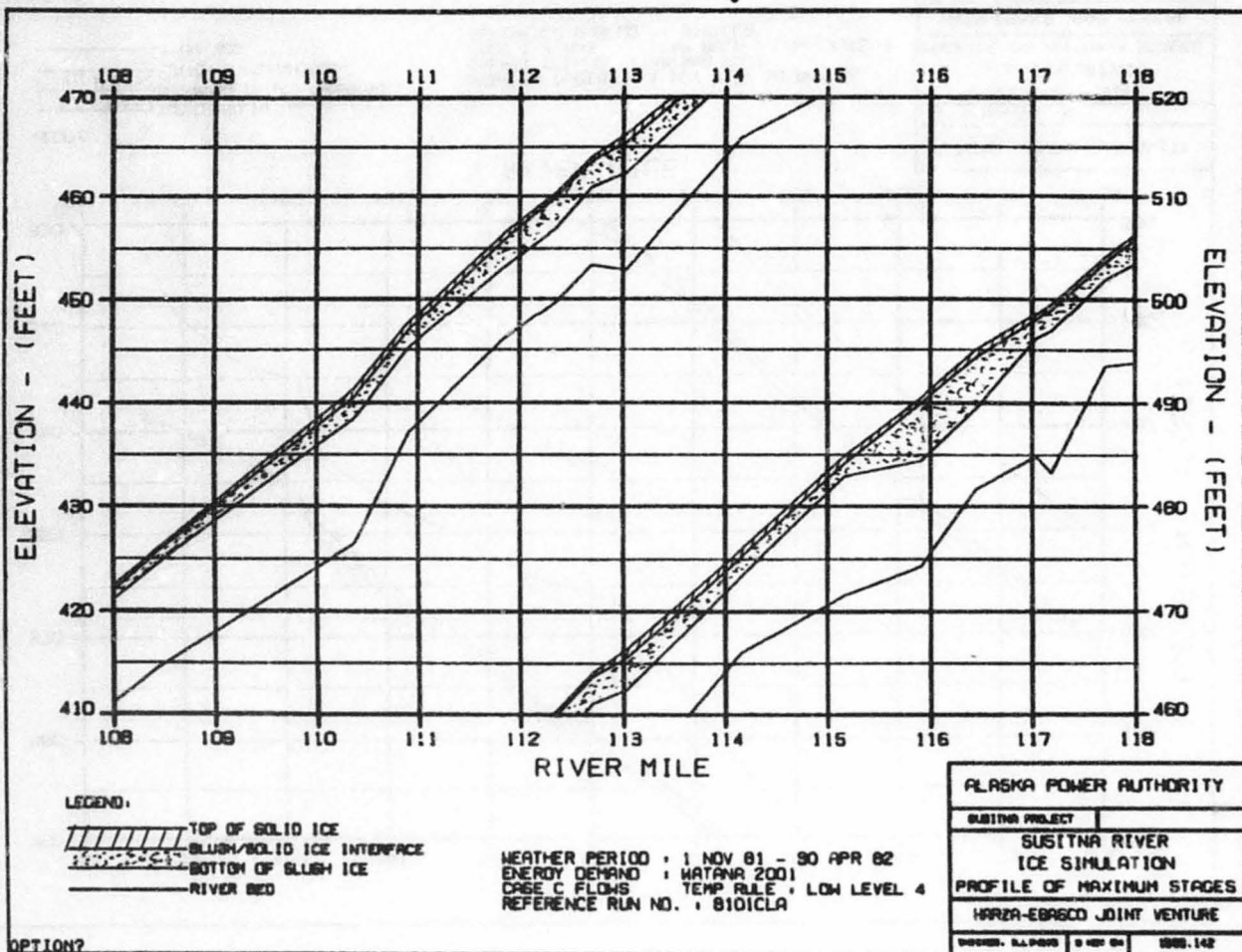


**EXHIBIT I**

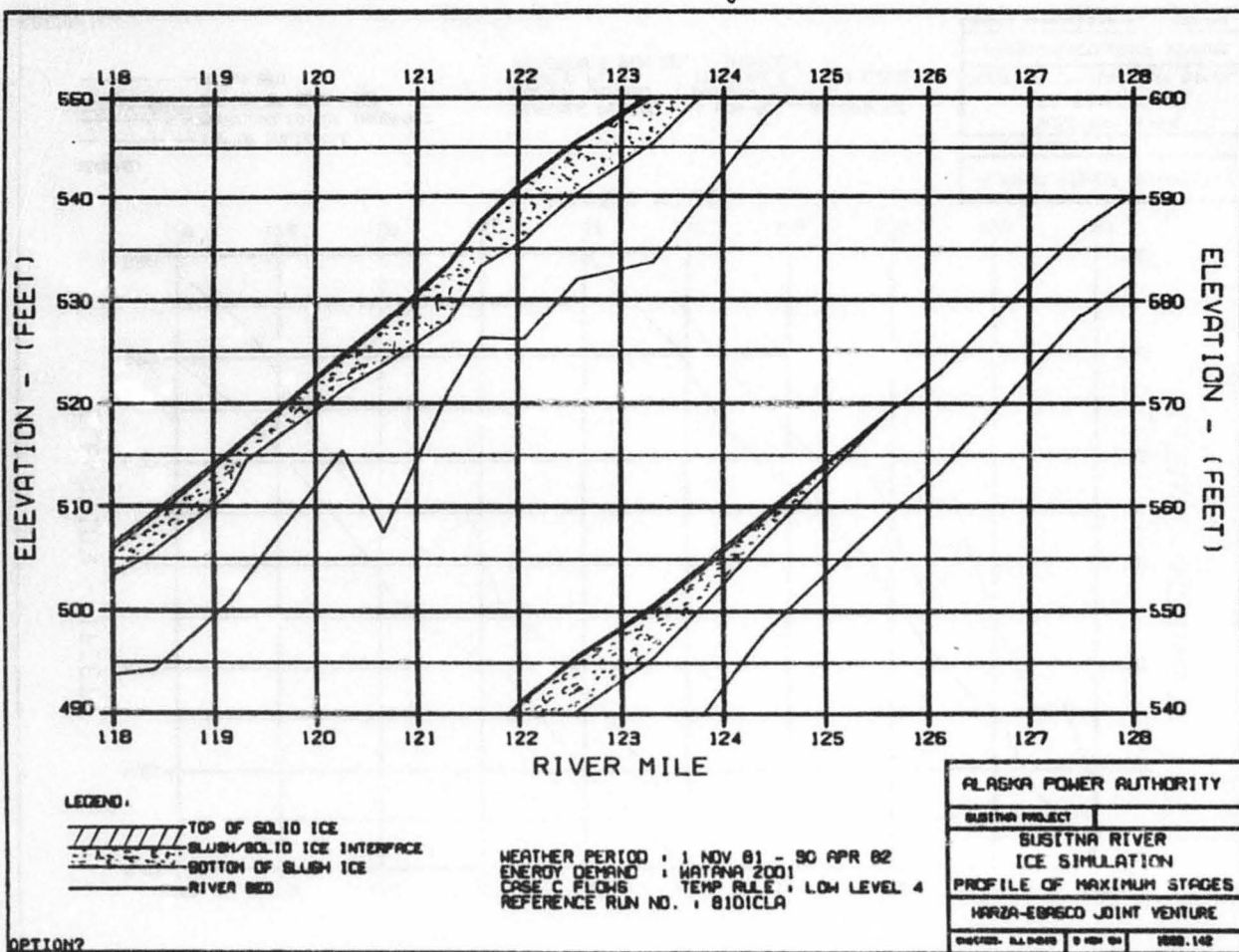


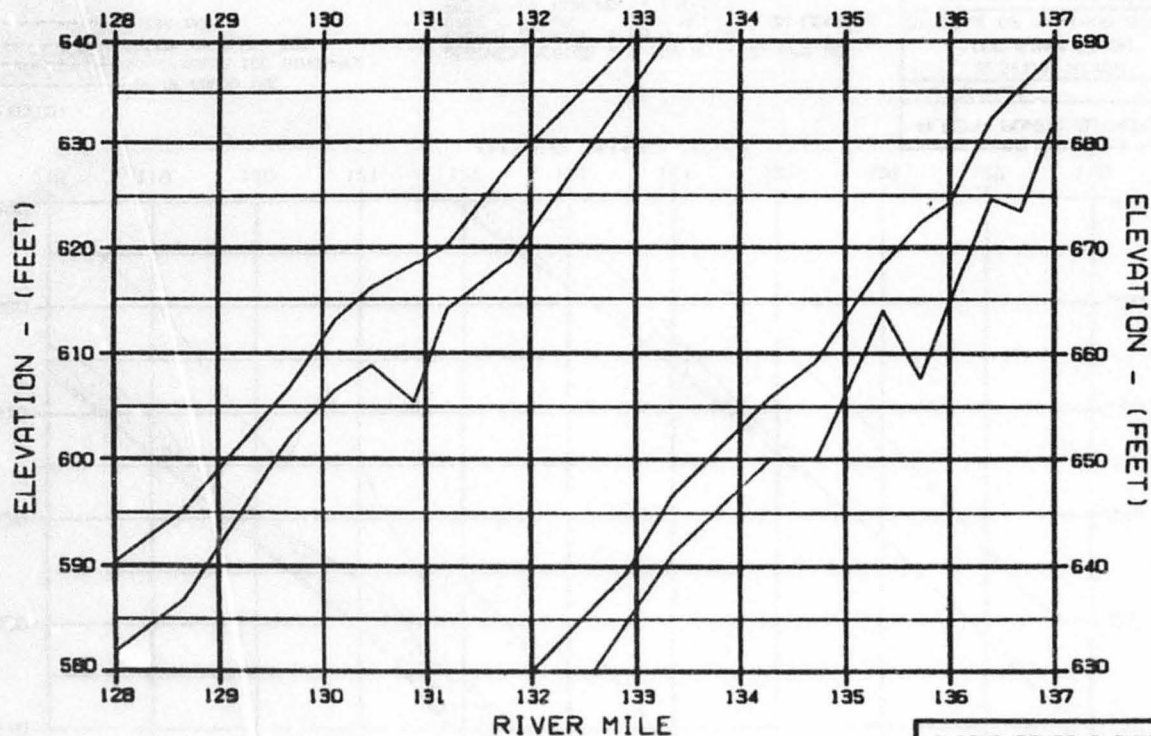
C





C





## LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : LOW LEVEL 4  
 REFERENCE RUN NO. : 8101CLA

## ALASKA POWER AUTHORITY

SUSITNA PROJECT

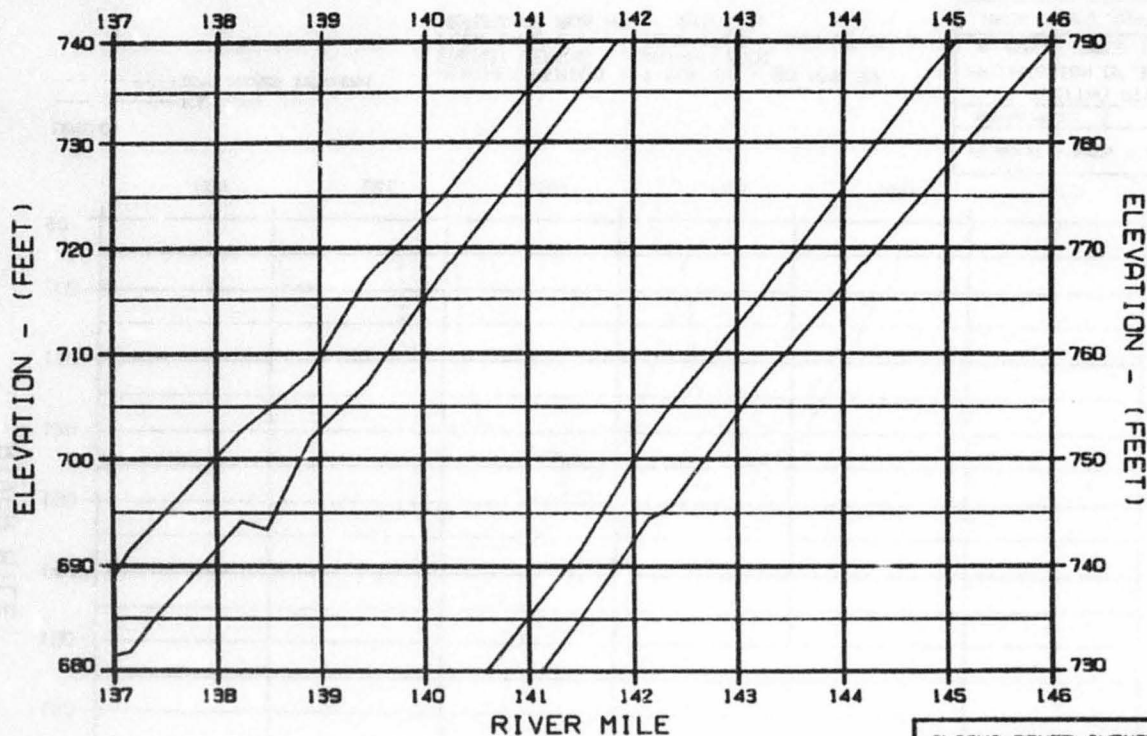
SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

DRAWN: BLM/MSD 8 NOV 84 1000.142

OPTION?

C



## LEGEND:

- TOP OF SOLID ICE
- BLUISH/SOLID ICE INTERFACE
- BOTTOM OF BLUISH ICE
- RIVER BED

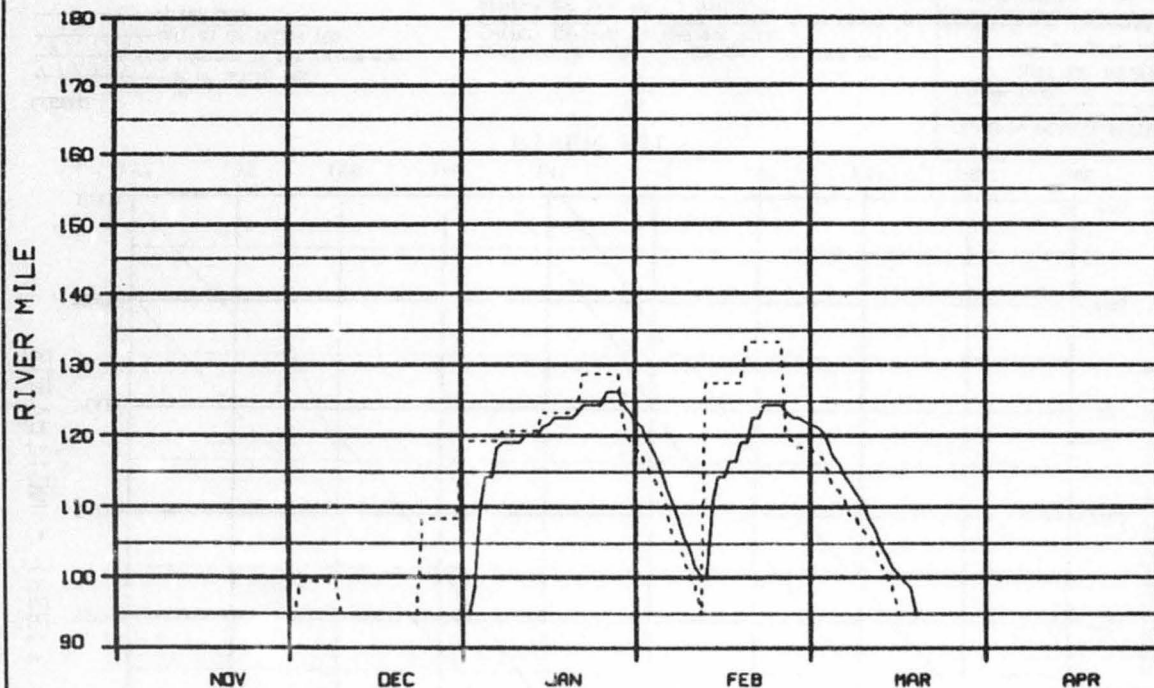
WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : LOW LEVEL 4  
 REFERENCE RUN NO. : 8101CLA

## ALASKA POWER AUTHORITY

SUSITNA PROJECT	
SUSITNA RIVER ICE SIMULATION PROFILE OF MAXIMUM STAGES	
HARZA-EBASCO JOINT VENTURE	
DESIGN: SLP/PSD 3 APR 84	ISSN: 142

OPTION?





LEGEND:

—— ICE FRONT  
 - - - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE C TEMP RULE : LOW LEVEL 4  
 REFERENCE RUN NO. : 8101CLA

OPTION?

ALASKA POWER AUTHORITY

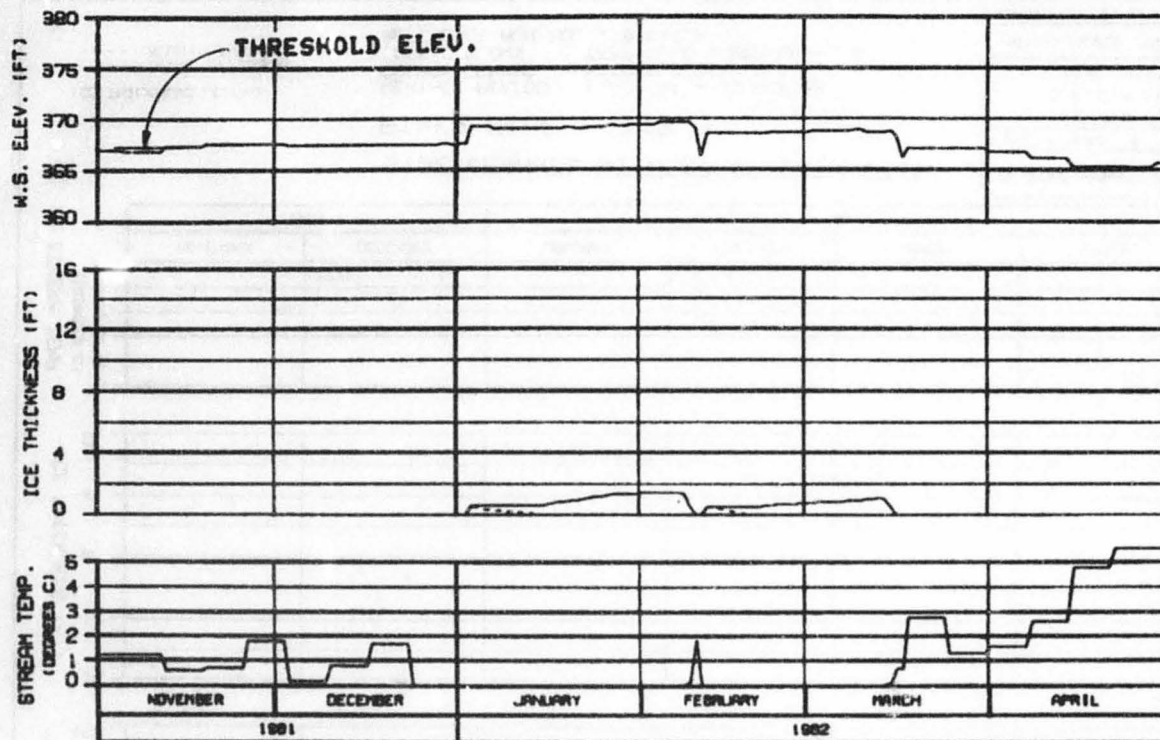
SUSITNA PROJECT

SUSITNA RIVER

PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

WARZA-EBASCO JOINT VENTURE

CHG000- 01.0000 0 000 00 1988.142



# HEAD OF WHISKERS SLOUGH RIVER MILE : 101.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : LOW LEVEL 4  
REFERENCE RUN NO. : B101CLA

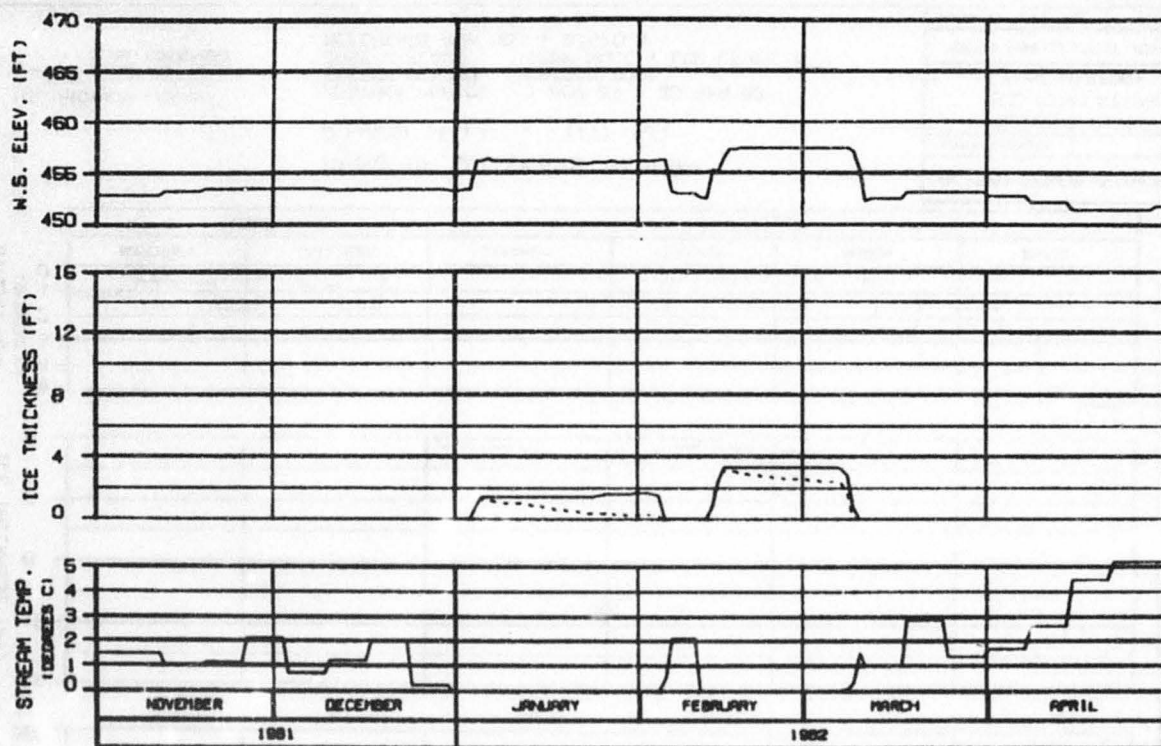
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EDISON JOINT VENTURE

DESIGN: SL-1015 8 NOV 81 1000.142



**SIDE CHANNEL AT HEAD OF GASH CREEK**  
**RIVER MILE : 112.00**

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : LOW LEVEL 4  
 REFERENCE RUN NO. : 8101CLA

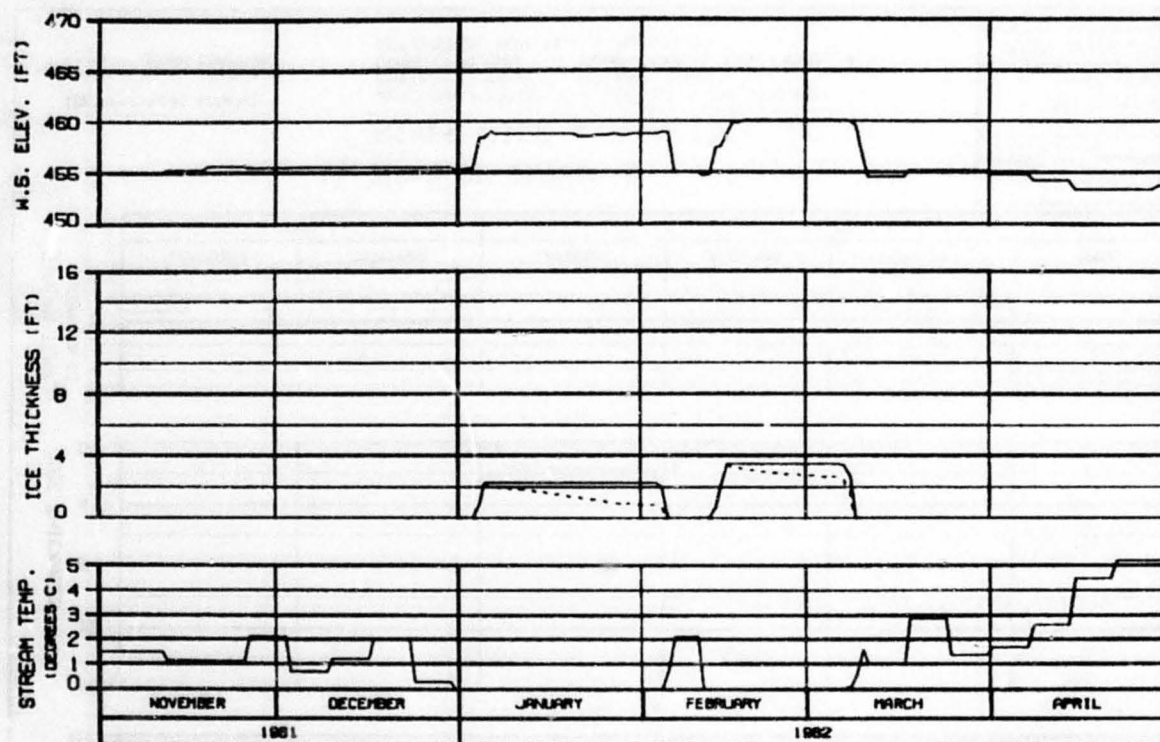
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EDISON JOINT VENTURE

CHARTS: 8101CLA 8101CLA 8101CLA 8101CLA



MOUTH OF SLOUGH 6A

RIVER MILE : 112.34

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : LOW LEVEL 4  
 REFERENCE RUN NO. : B101CLA

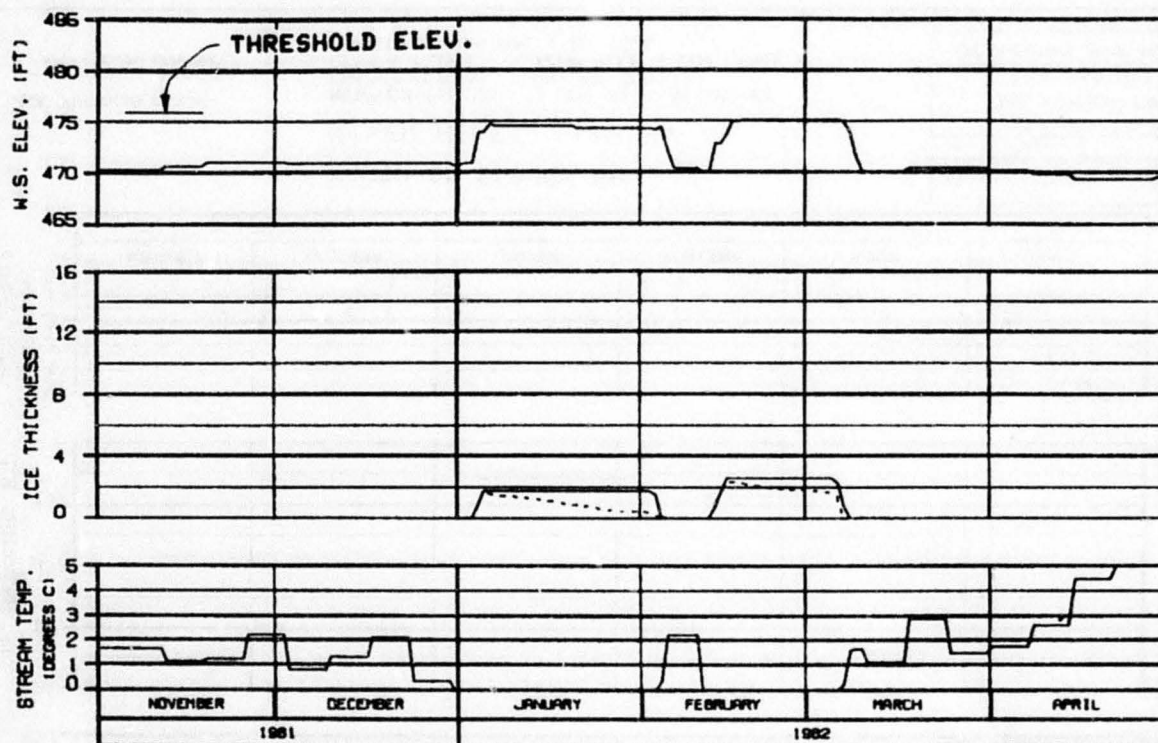
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: EASONS DRAWN BY: 1000.142



# HEAD OF SLOUGH 8 RIVER MILE : 114.10

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : LOW LEVEL 4  
 REFERENCE RUN NO. : 8101CLA

ALASKA POWER AUTHORITY

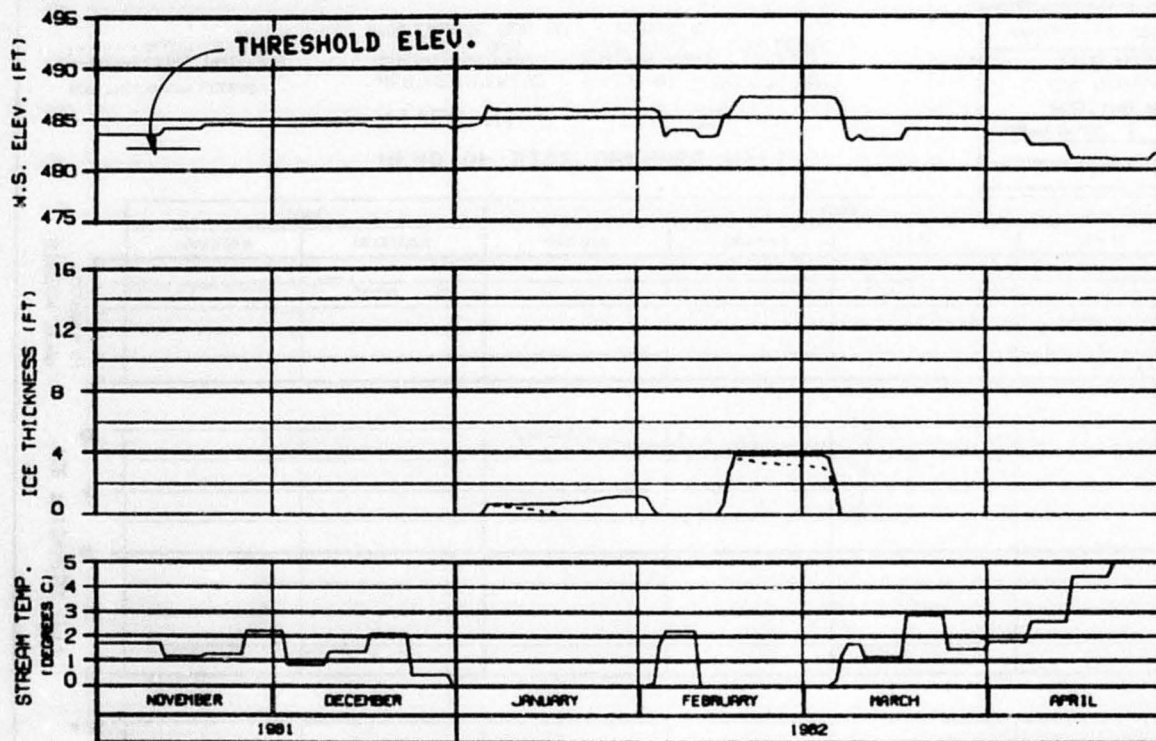
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: AL 0000 0 REV 01 1000.142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

**SIDE CHANNEL MSII**  
**RIVER MILE : 115.50**

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : LOW LEVEL 4  
 REFERENCE RUN NO. : 8101CLA

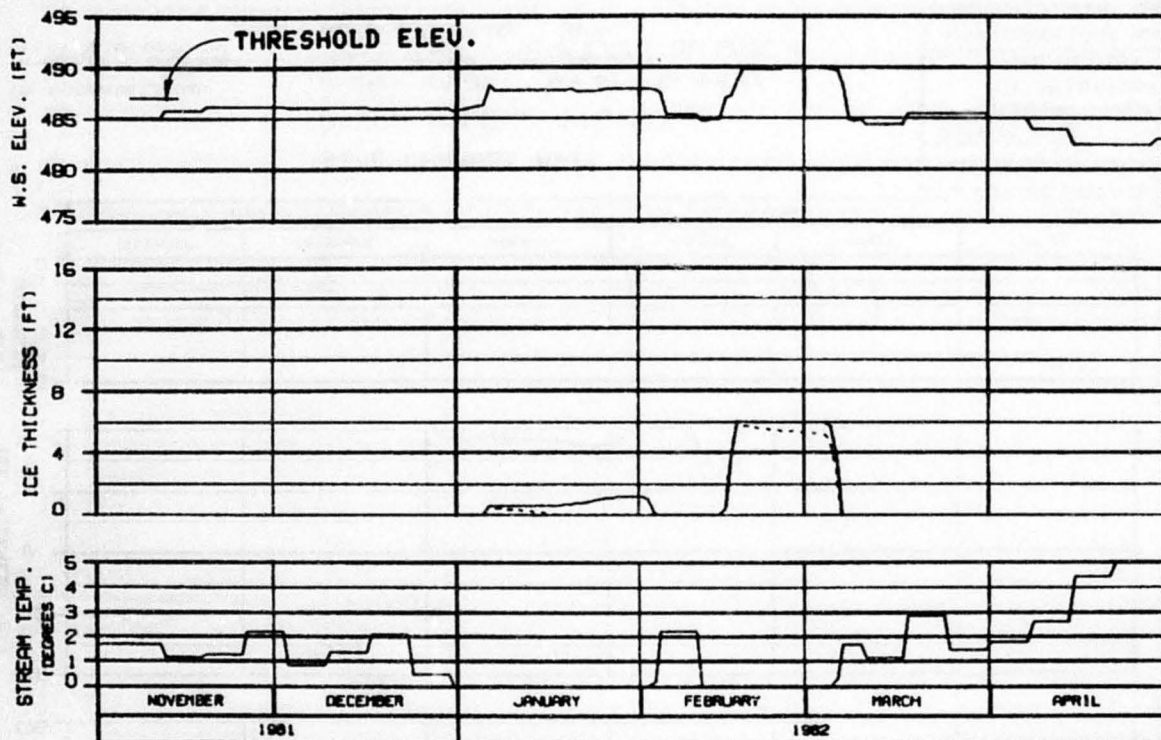
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACO JOINT VENTURE

DRAWN: ALP/RSB 8 NOV 81 1000.142



# HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

## ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : LOW LEVEL 4  
 REFERENCE RUN NO. : 8101CLA

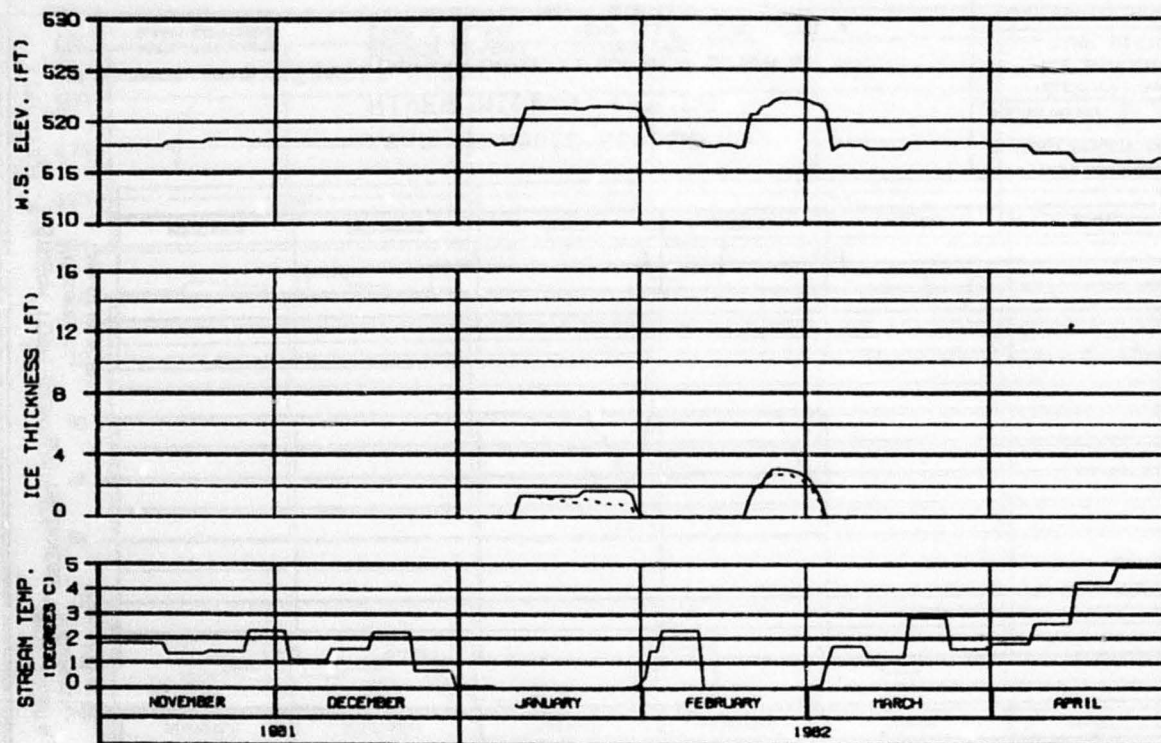
## ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHECKED: A.L. 9-88 9 MAY 84 1000.142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - BLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : LOW LEVEL 4  
 REFERENCE RUN NO. : 8101CLA

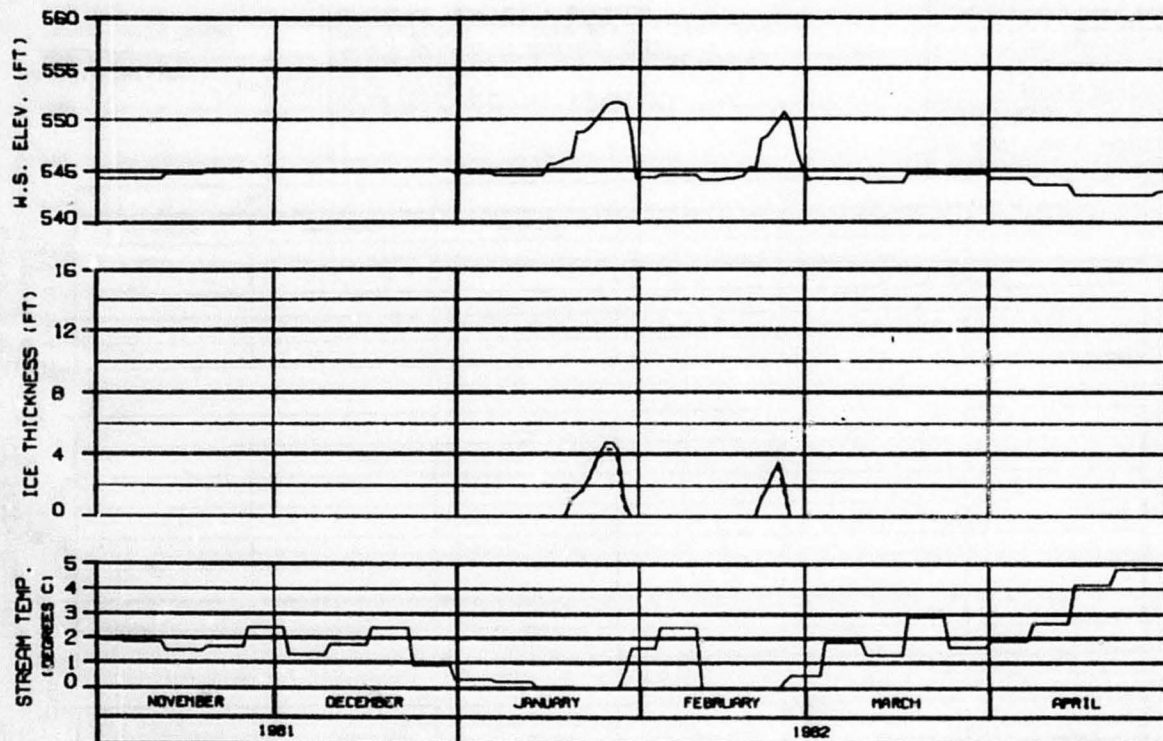
ALASKA POWER AUTHORITY

SUSTNA PROJECT

SUSTNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

ISSUED: 8/1/82 BY: 8101CLA 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF MOOSE SLOUGH  
 RIVER MILE : 123.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : LOW LEVEL 4  
 REFERENCE RUN NO. : 8101CLA

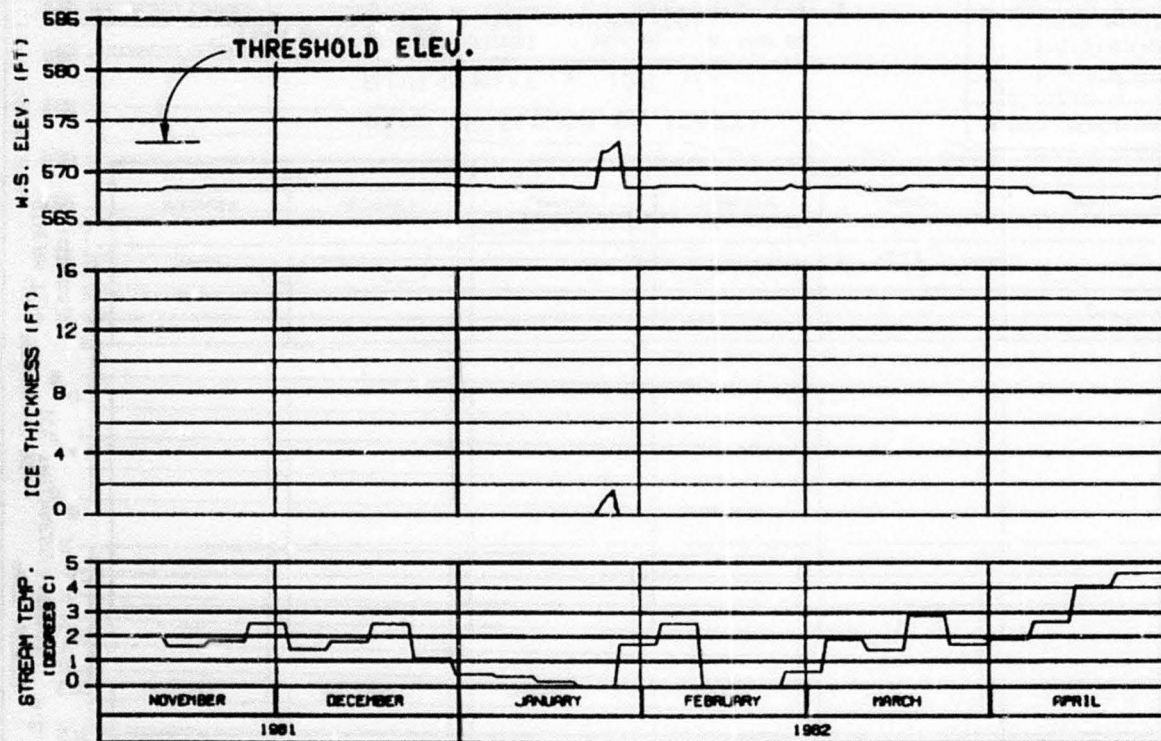
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHECKED: J.L. DAVIS 8 MAR 84 1000.142



HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANAI 2001  
 CASE C FLOWS TEMP RULE : LOW LEVEL 4  
 REFERENCE RUN NO. : 8101CLA

ALASKA POWER AUTHORITY

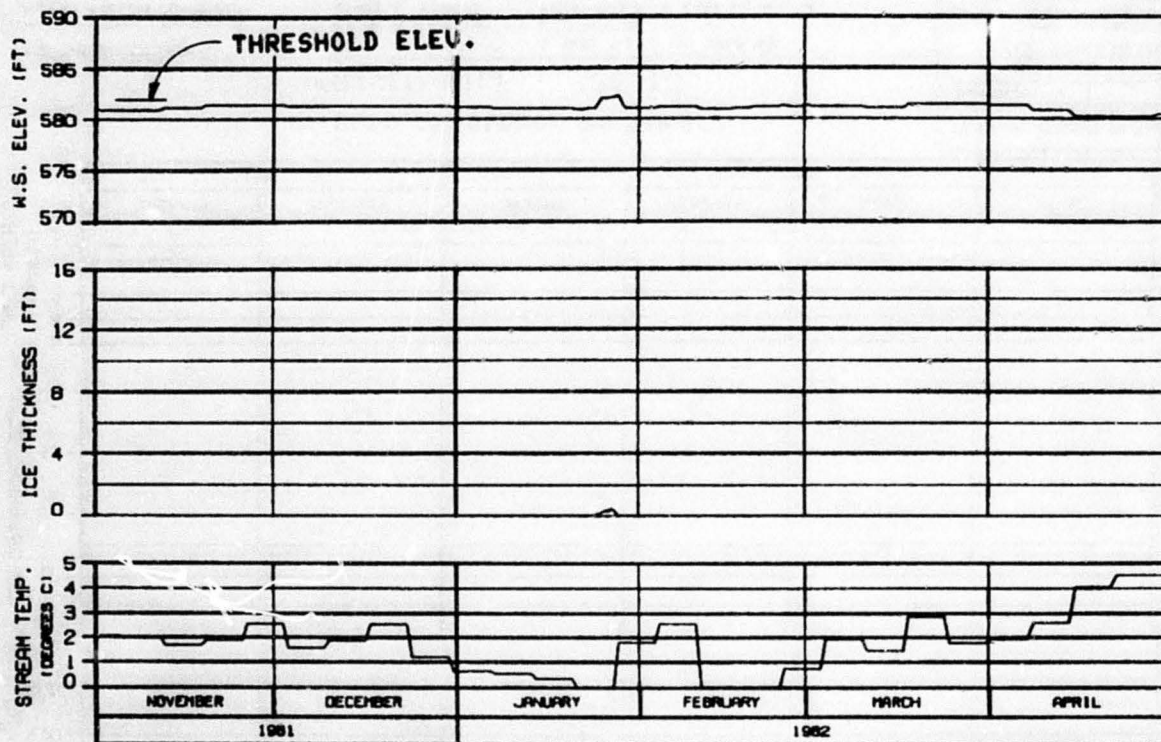
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZARDOUS JOINT VENTURE

CHIEF: SLD-810 8 APR 84 1000.142





HEAD OF SLOUGH 8A (EAST)  
RIVER MILE : 127.10

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : LOW LEVEL 4  
REFERENCE RUN NO. : B101CL3

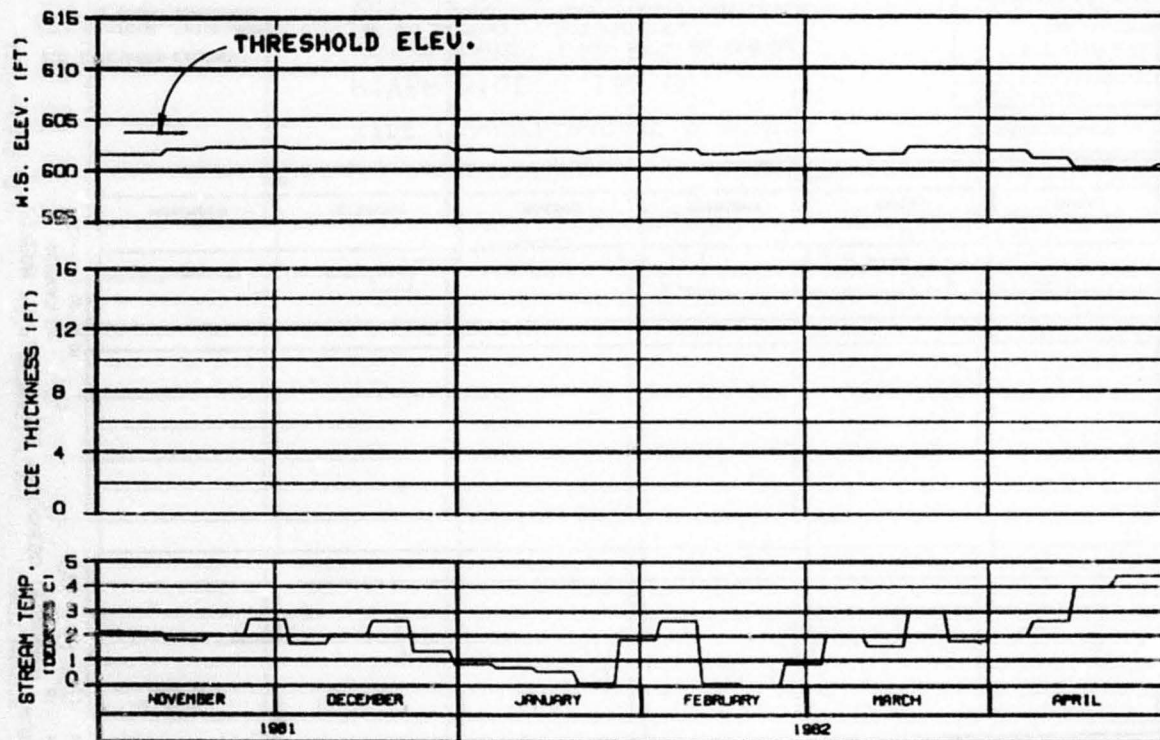
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: S.J. DAVIS 8 NOV 84 1000.142



HEAD OF SLOUGH 9

RIVER MILE : 129.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : LOW LEVEL 4  
 REFERENCE RUN NO. : 8101CLA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

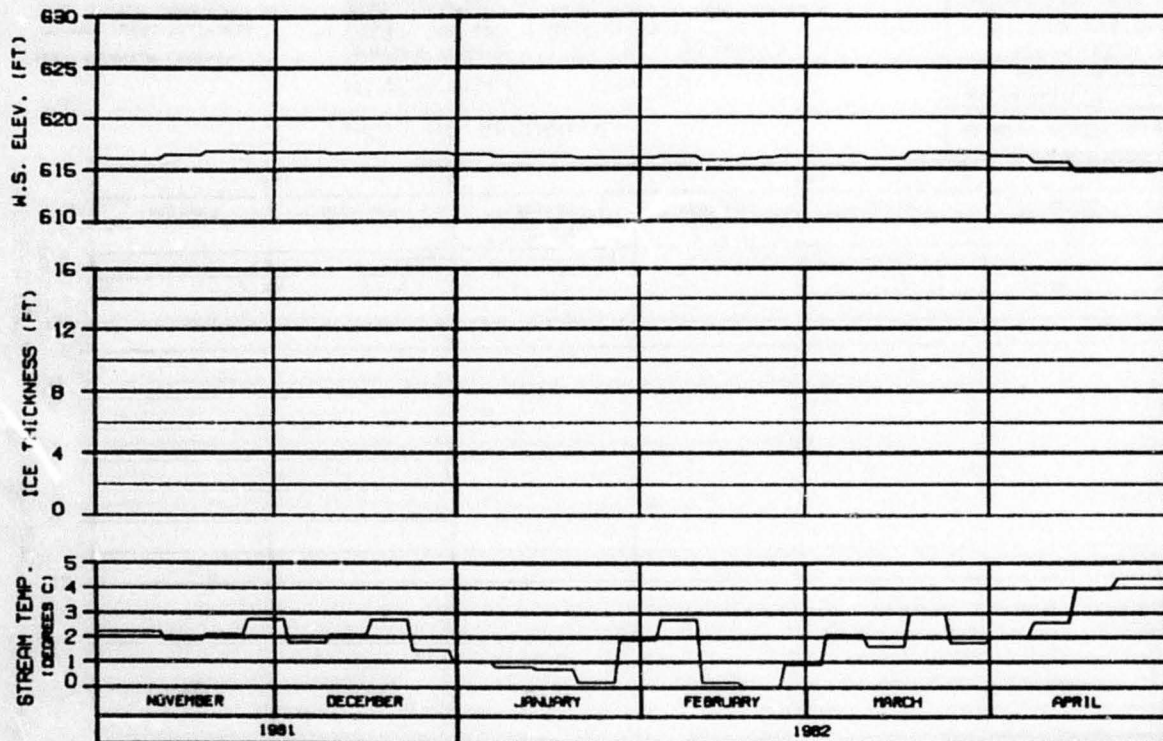
SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHUCKER, S.L. 8-81 9 APR 82 1000.142

OPTION?

OPTION?



SIDE CHANNEL U/S OF SLOUGH 9  
RIVER MILE : 130.60

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : LOW LEVEL 4  
REFERENCE RUN NO. : 8101CLA

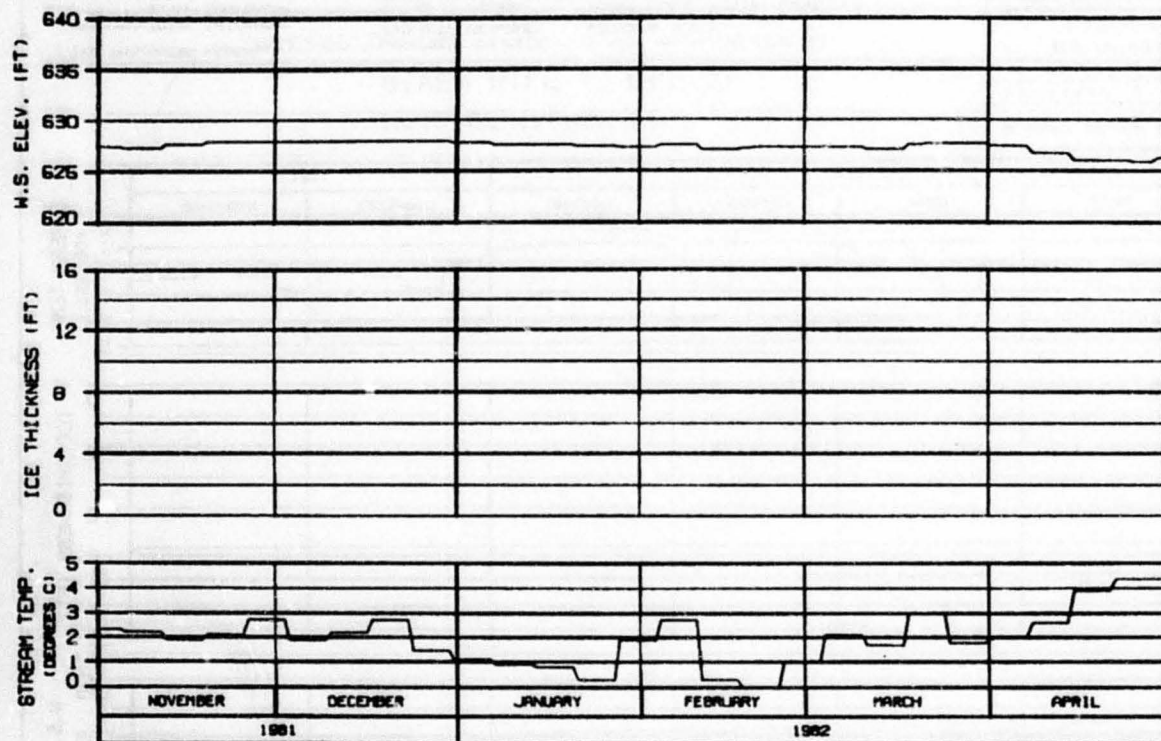
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBRSCO JOINT VENTURE

CHARTNO. 111-00115 8 1/2" X 11" 1000.142



SIDE CHANNEL, U/S OF 4TH JULY CREEK  
RIVER MILE : 131.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : LOW LEVEL 4  
REFERENCE RUN NO. : 8101CLA

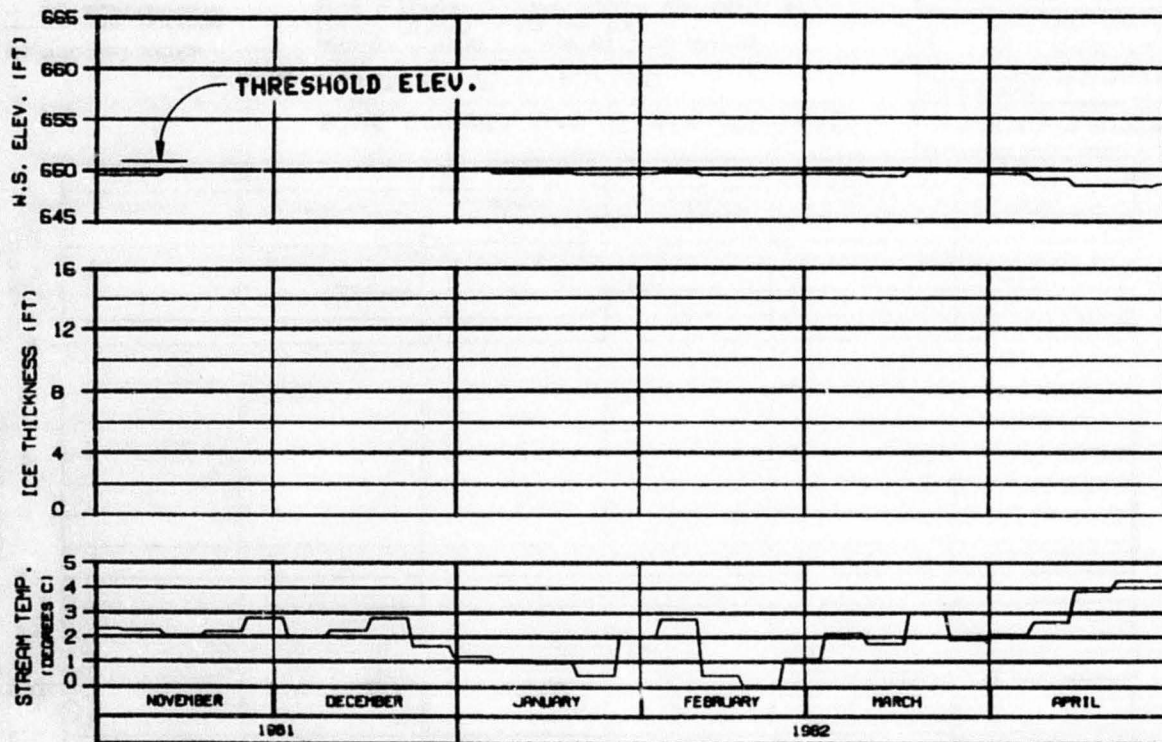
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN - ELLIOTT & SMITH 10 MAY 82 1000.142



**HEAD OF SLOUGH 9A**  
**RIVER MILE : 133.70**

**ICE THICKNESS LEGEND:**

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS : TEMP RULE : LOW LEVEL 4  
 REFERENCE RUN NO. : 8101CLA

**ALASKA POWER AUTHORITY**

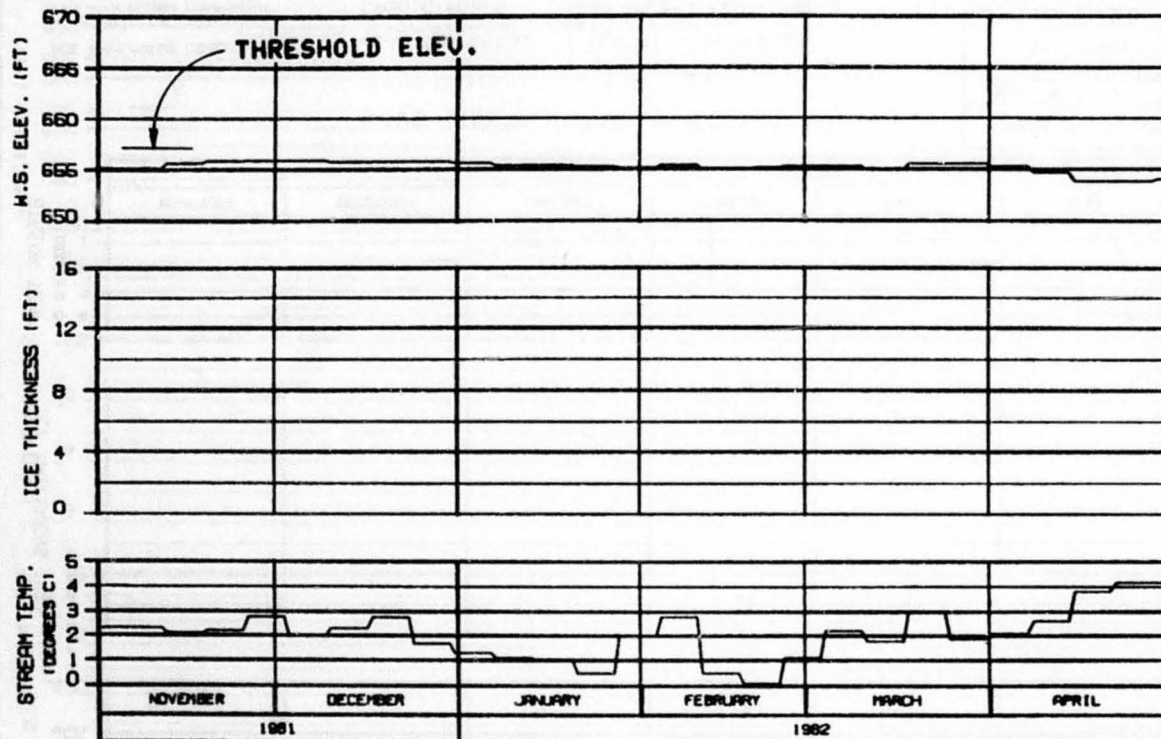
**SUSITNA PROJECT**

**SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY**

**HARZA-EBASCO JOINT VENTURE**

CHART NO. AL-8488 9 NOV 81 1000.142





SIDE CHANNEL U/S OF SLOUGH 10  
RIVER MILE : 134.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : MATANA 2001  
CASE C FLOWS TEMP RULE : LOW LEVEL 4  
REFERENCE RUN NO. : 8101CLA

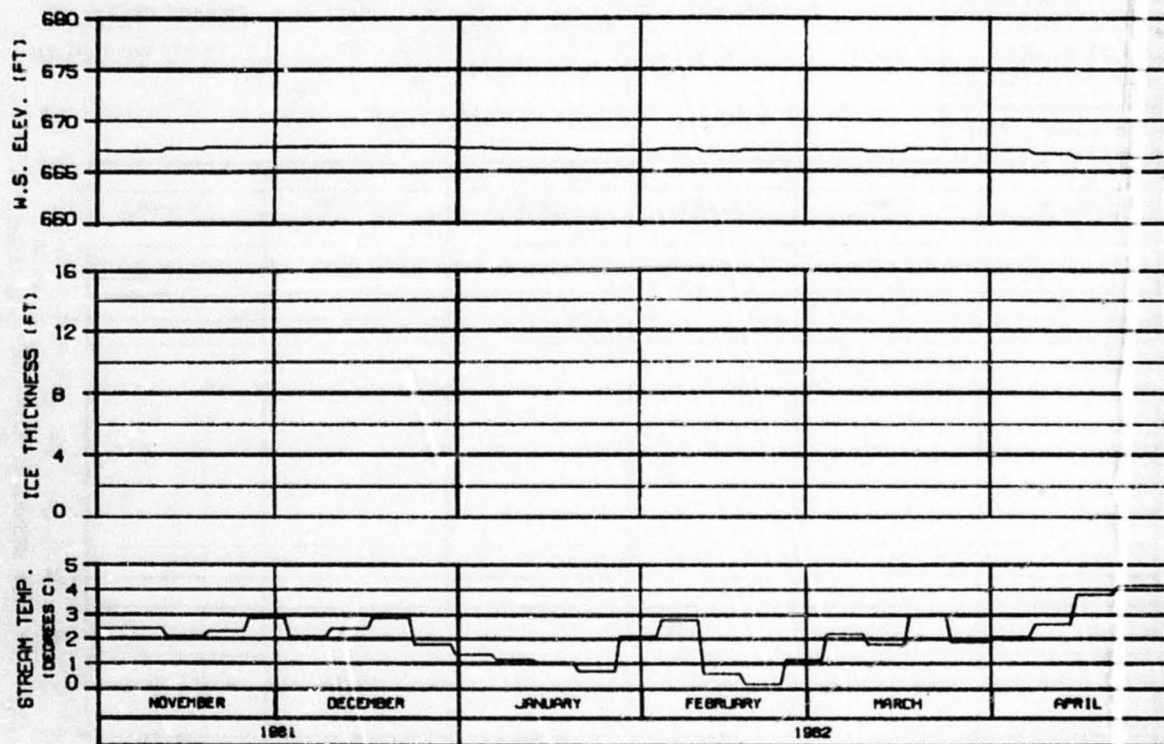
ALASKA POWER AUTHORITY

GUSITNA PROJECT

GUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHART NO. : 81-01-000 8 NOV 81 1000, 142



SIDE CHANNEL D/S OF SLOUGH 11  
RIVER MILE : 135.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- BLUE-I COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : LOW LEVEL 4  
REFERENCE RUN NO. : 8101CLA

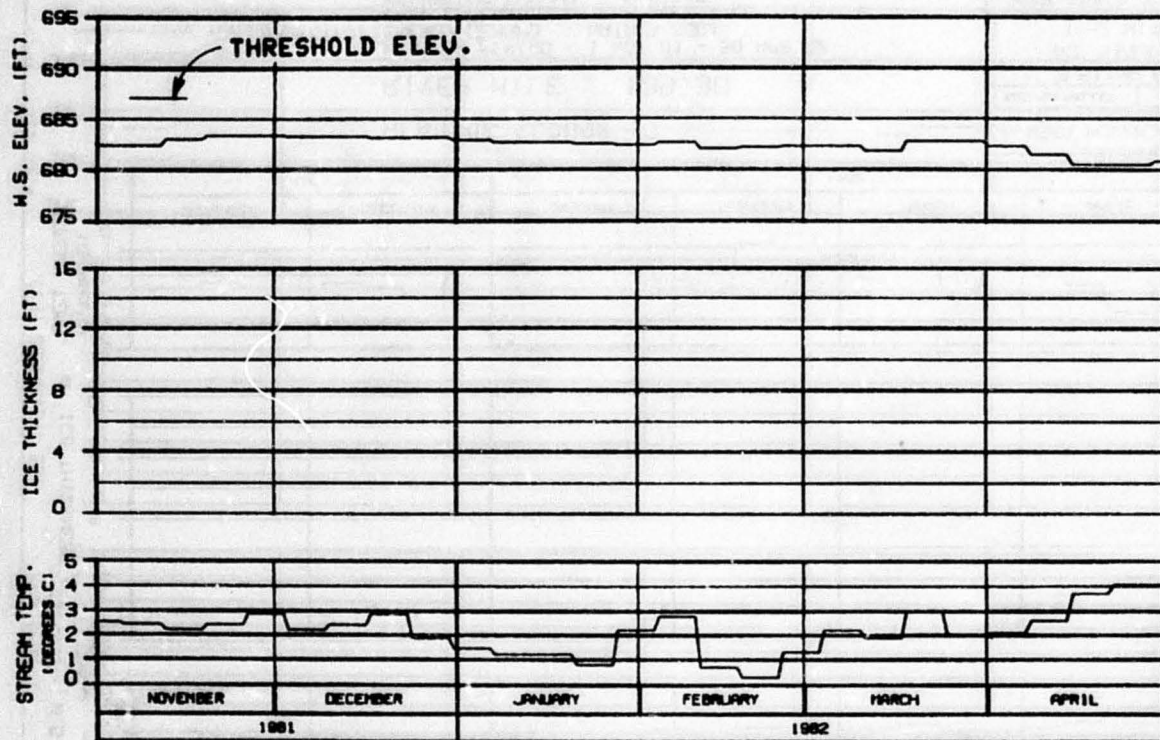
ALASKA POWER AUTHORITY

SUBMITTA PROJECT

GUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHICAGO - ALLIANCE 8 10 84 1088.142



HEAD OF SLOUGH 11  
RIVER MILE : 136.50

ICE THICKNESS LEGEND:  
——— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : MATANA 2001  
CASE C FLOWS TEMP RULE : LOW LEVEL 4  
REFERENCE RUN NO. : B101CLA

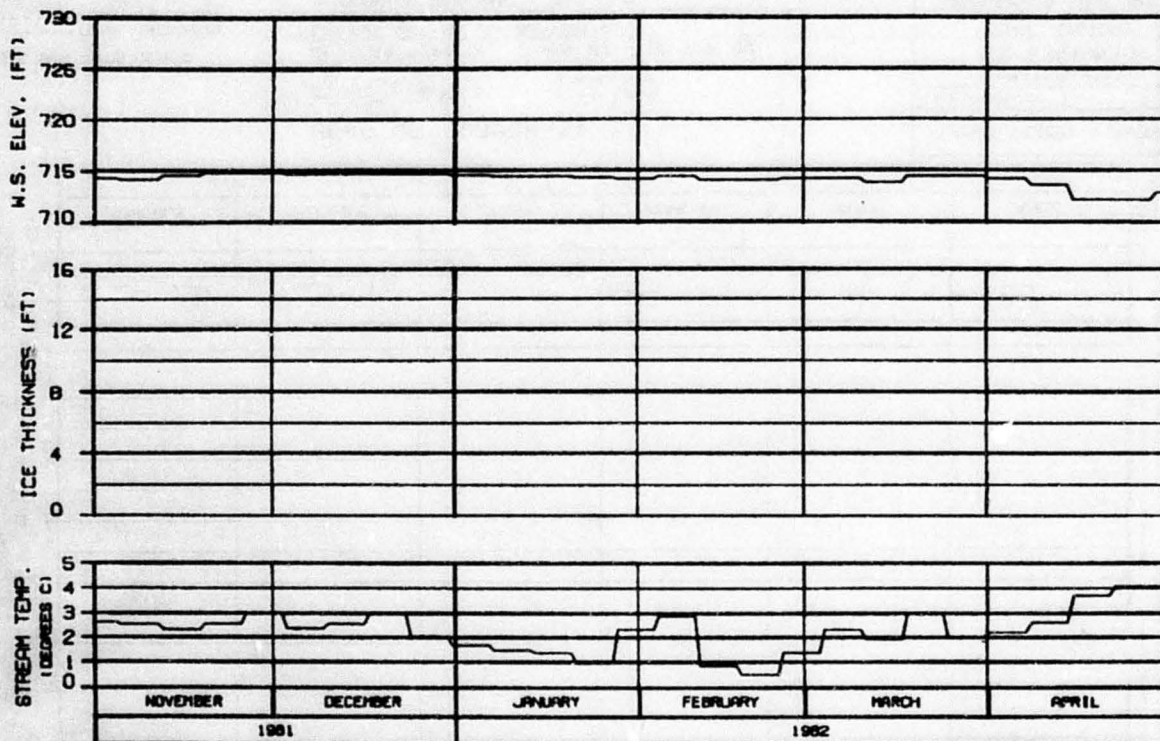
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHARGE: 8.14000 0.000 000 142



HEAD OF SLOUGH 17  
RIVER MILE : 139.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : LOW LEVEL 4  
REFERENCE RUN NO. : 8101CLA

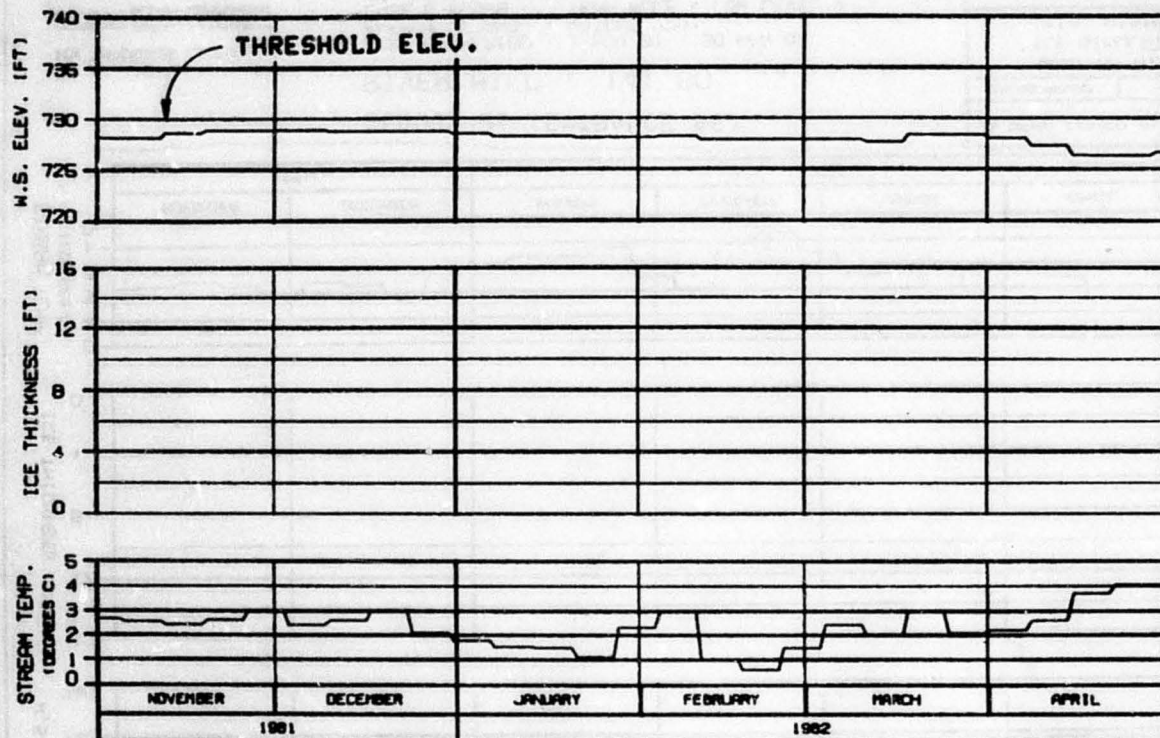
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EGASCO JOINT VENTURE

DESIGNED BY: J. J. P. 1000 0 1000 1000 1000



HEAD OF SLOUGH 20

RIVER MILE : 140.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : LOW LEVEL 4  
 REFERENCE RUN NO. : 81D1CLA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

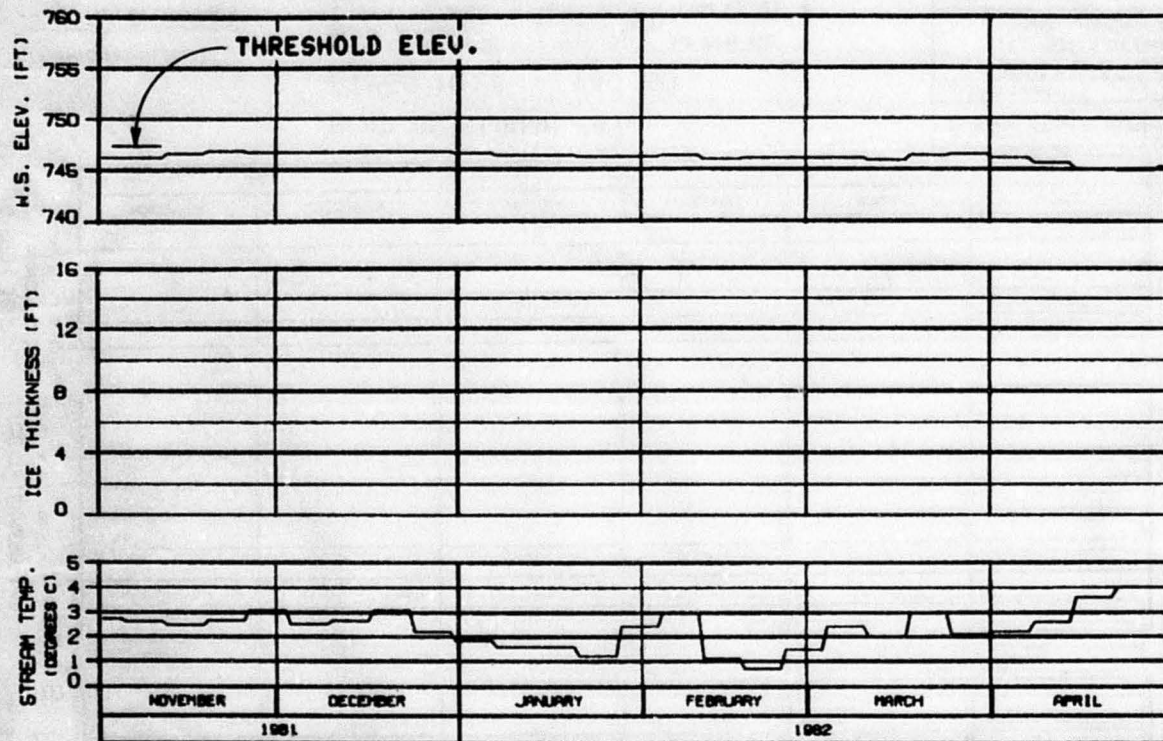
HARZA-EBRISCO JOINT VENTURE

DESIGNED BY: S. J. HARRIS

BY: S. J. HARRIS

1000-142





SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2001  
 CASE C FLOWS TEMP RULE : LOW LEVEL 4  
 REFERENCE RUN NO. : 8101CLA

ALASKA POWER AUTHORITY

SUSTINA PROJECT

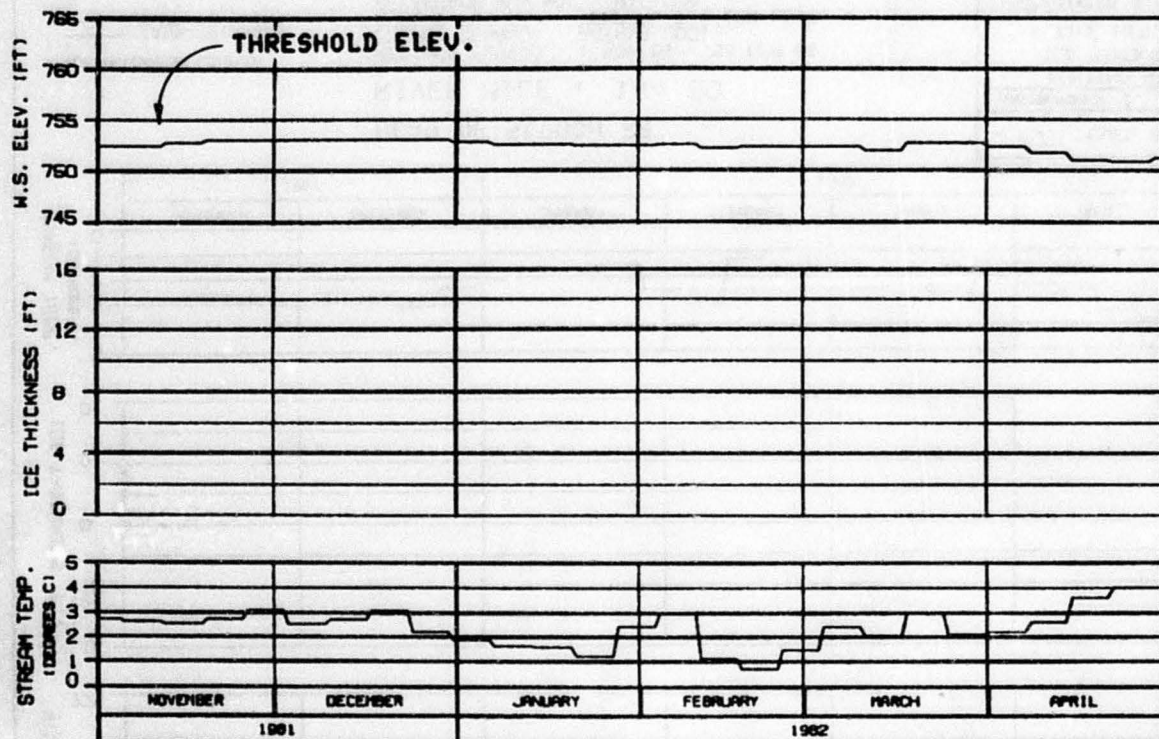
SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: ELLIOTT

8 APR 82

1000.142



HEAD OF SLOUGH 21  
RIVER MILE : 142.20

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : LOW LEVEL 4  
REFERENCE RUN NO. : 8101CLA

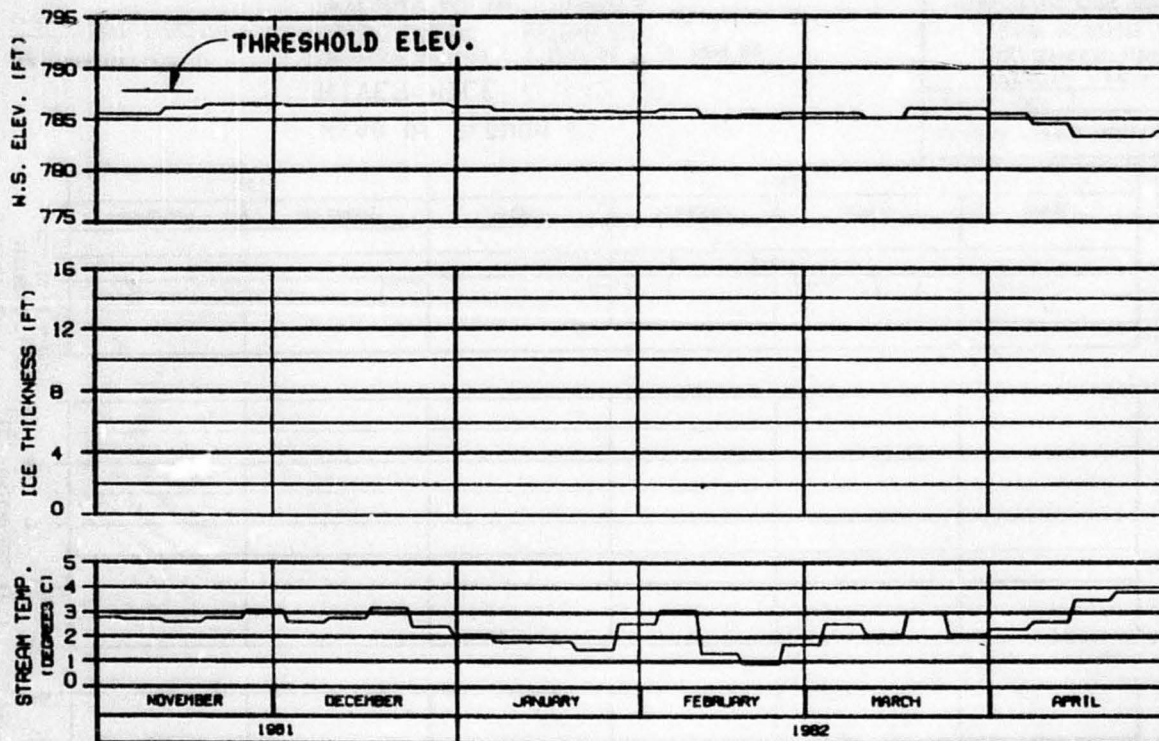
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRACO JOINT VENTURE

DRAWN: B.L.0006 8 NOV 81 1000.142



HEAD OF SLOUGH 22  
RIVER MILE : 144.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : LOW LEVEL 4  
REFERENCE RUN NO. : B101CLA

ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

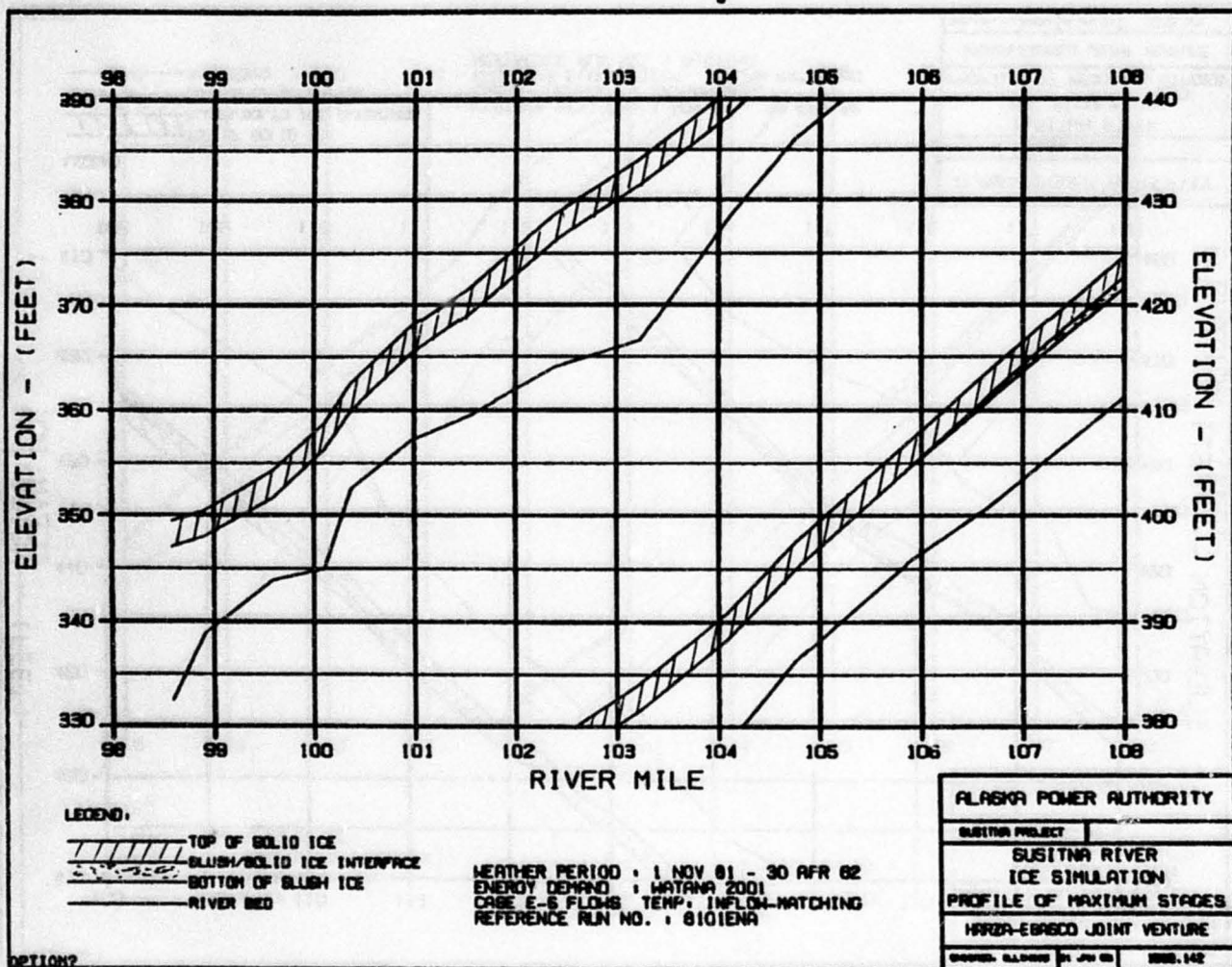
HARZA-EBASCO JOINT VENTURE

CHGNO. 5.1.9005 5 APR 81 1000.142

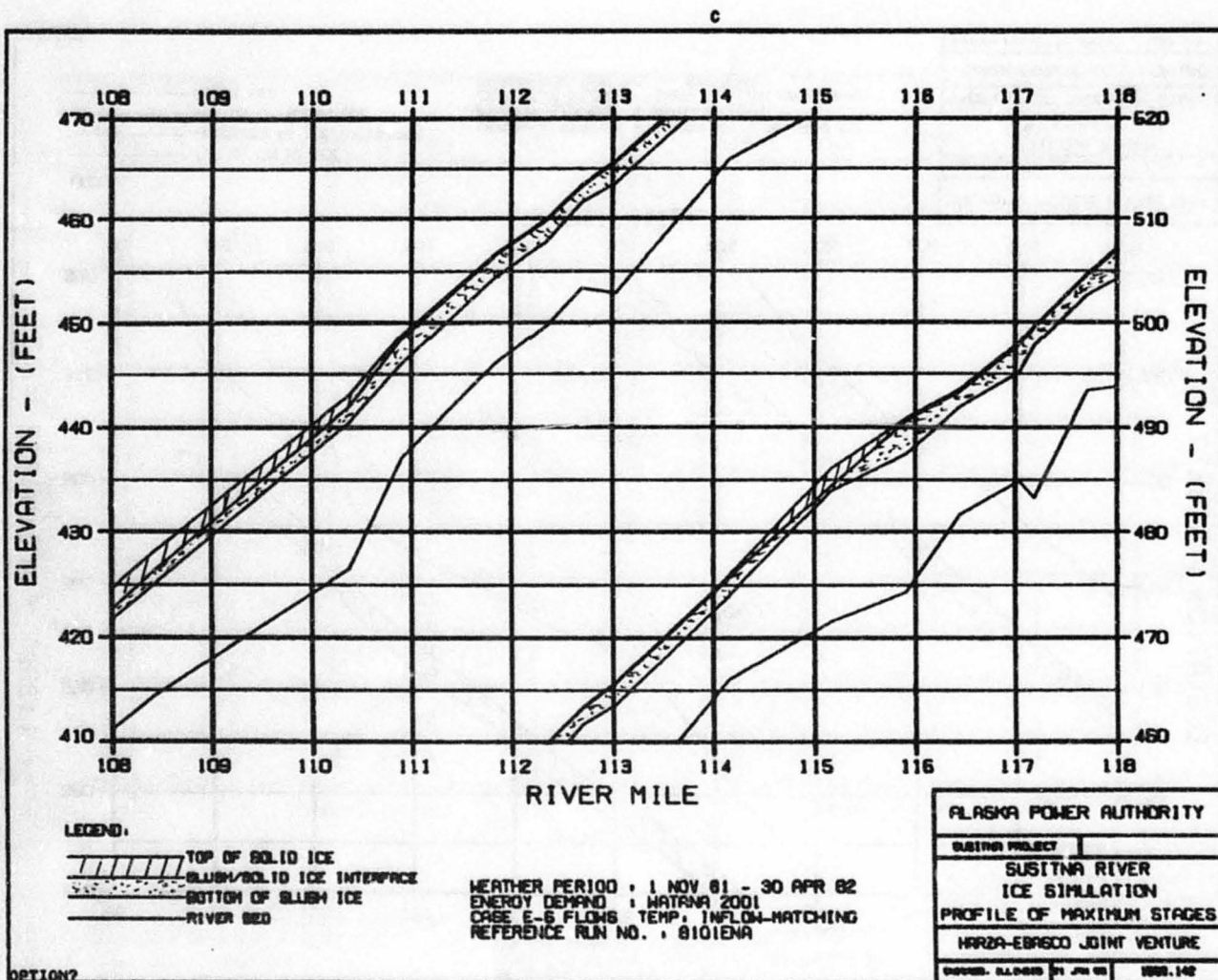
OPTION?

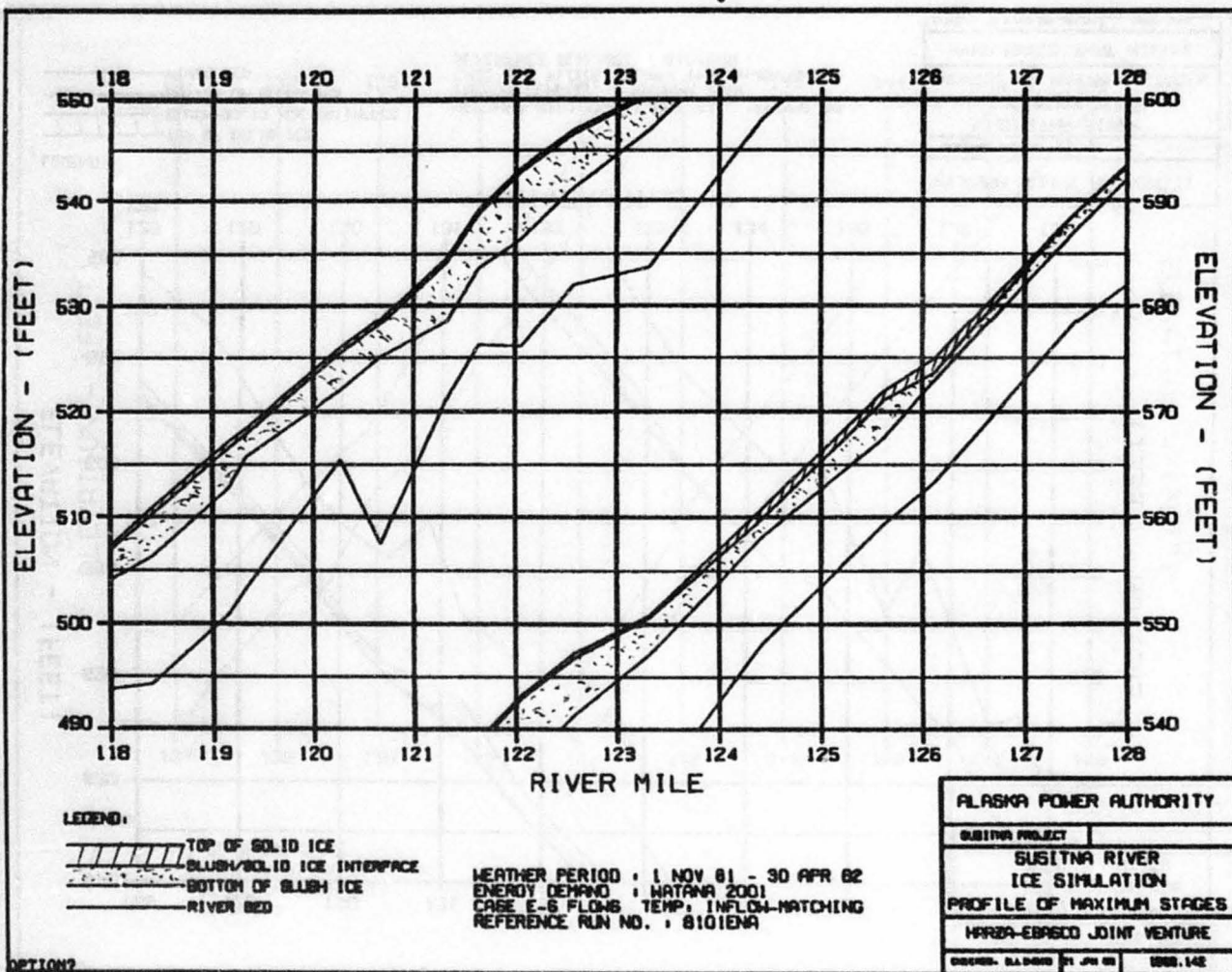


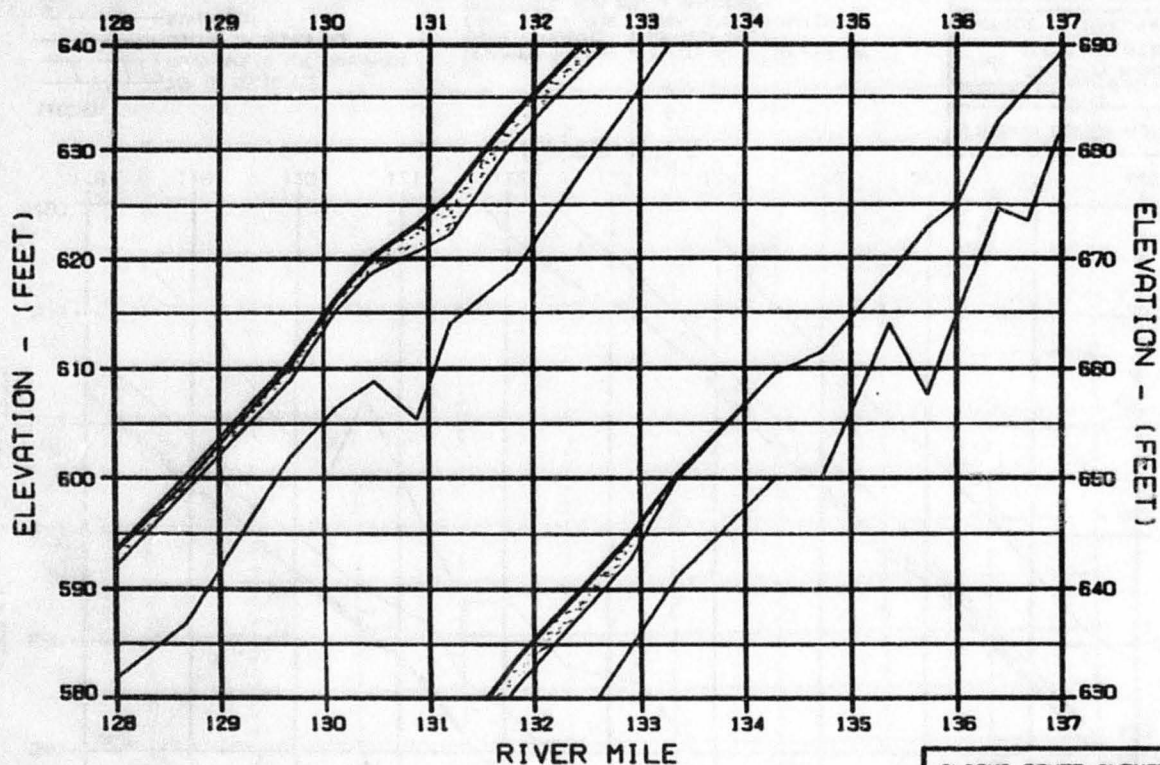
**EXHIBIT J**











## LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS TEMP. INFLOW MATCHING  
 REFERENCE RUN NO. : 8101ENR

## ALASKA POWER AUTHORITY

SUSITNA PROJECT

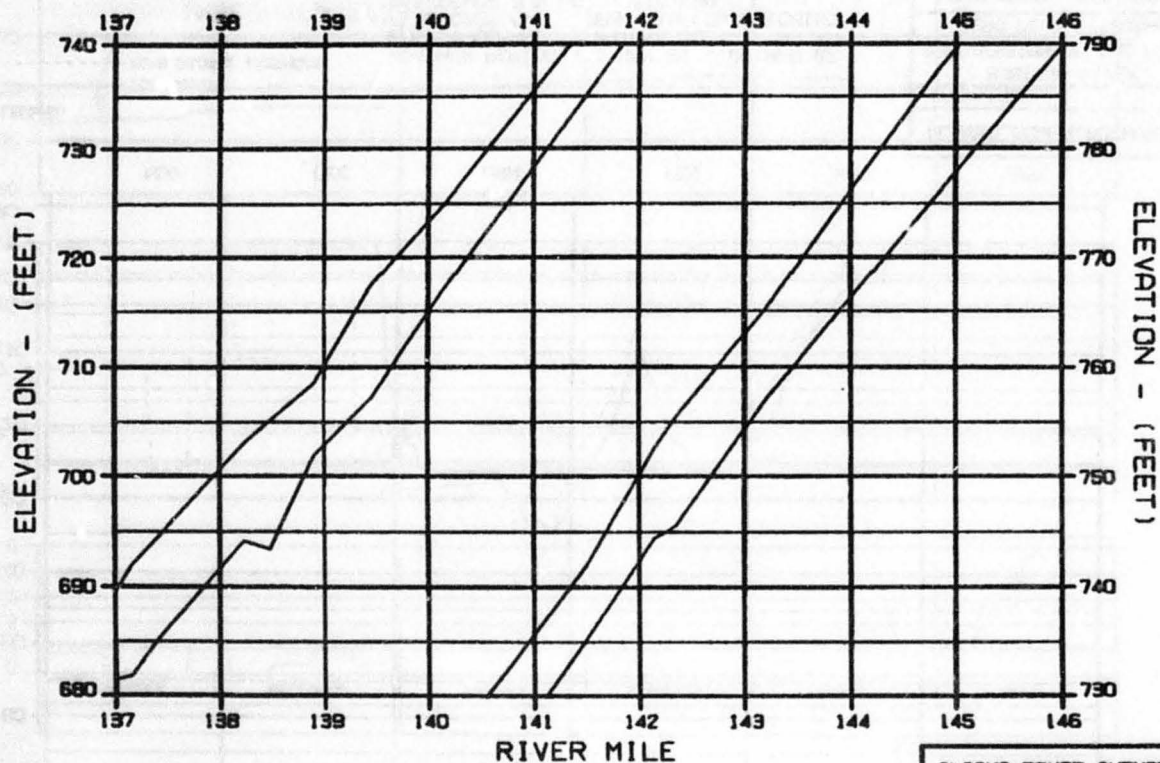
SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

DESIGN: SLUSHING IN JAN 82

NOV. 1982

OPTION?



WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOOD TEMP. INFLOW MATCHING  
 REFERENCE RUN NO. : 8101ENA

**ALASKA POWER AUTHORITY**

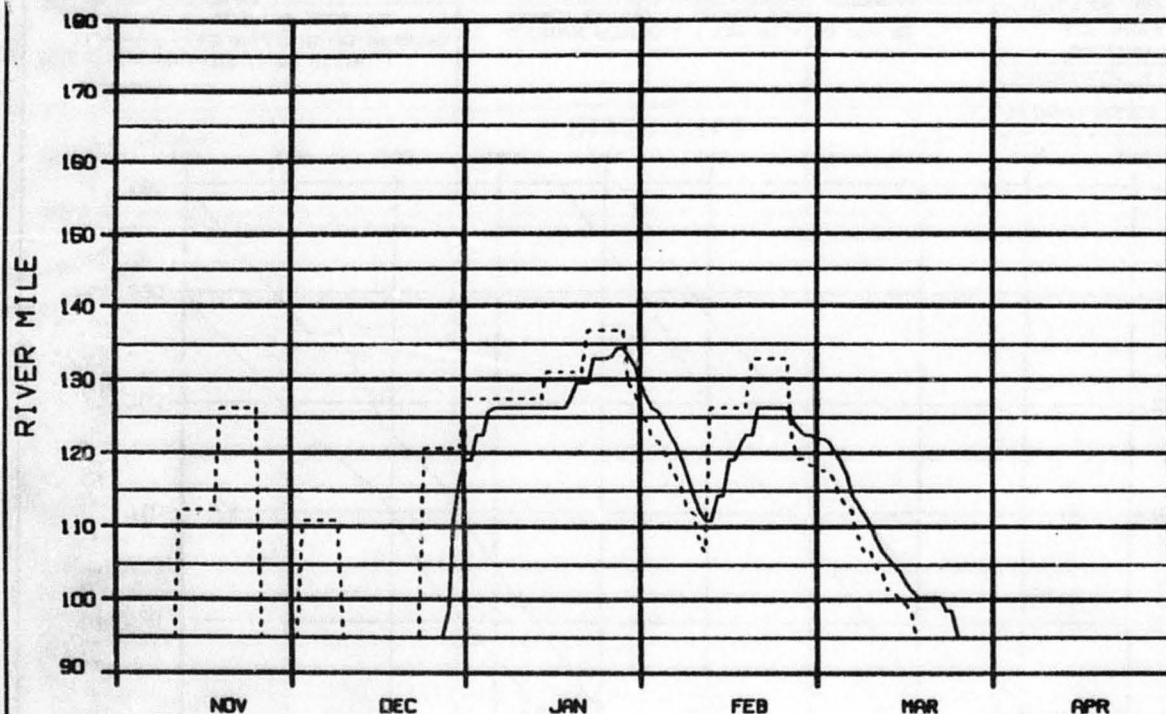
SUSITNA PROJECT

**SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES**

HARZA-EBASCO JOINT VENTURE

DESIGNED: S.L. PETERSON 21 JUN 82 10000.142

OPTION?



## LEGEND.

— ICE FRONT  
 - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE E-6 TEMP: INFLOW MATCHING  
 REFERENCE RUN NO. : 8101ENA

OPTION?

## ALASKA POWER AUTHORITY

SUSITNA PROJECT

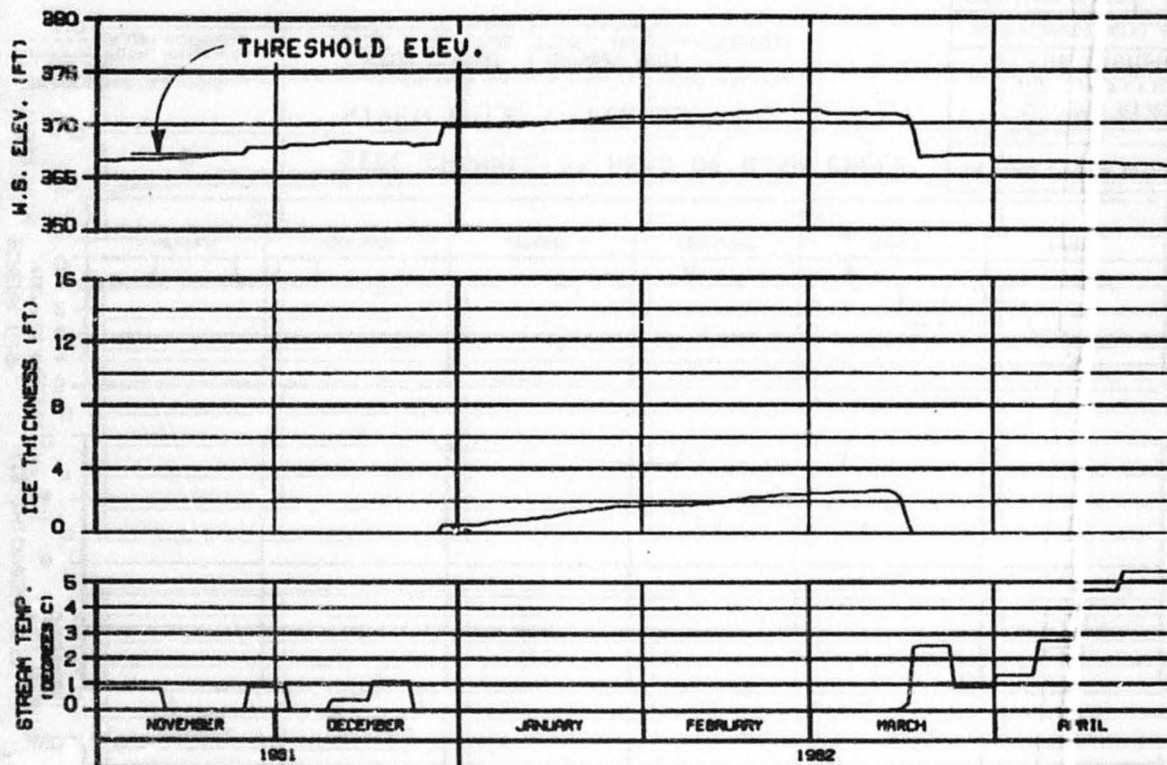
SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

HARZA-EBASCO JOINT VENTURE

DESIGNED: R.L. HARRIS 24 JAN 82

SHEET 142





ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF WHISKERS SLOUGH

RIVER MILE : 101.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2001  
 CASE E-6 FLOWS TEMP, INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101ENA

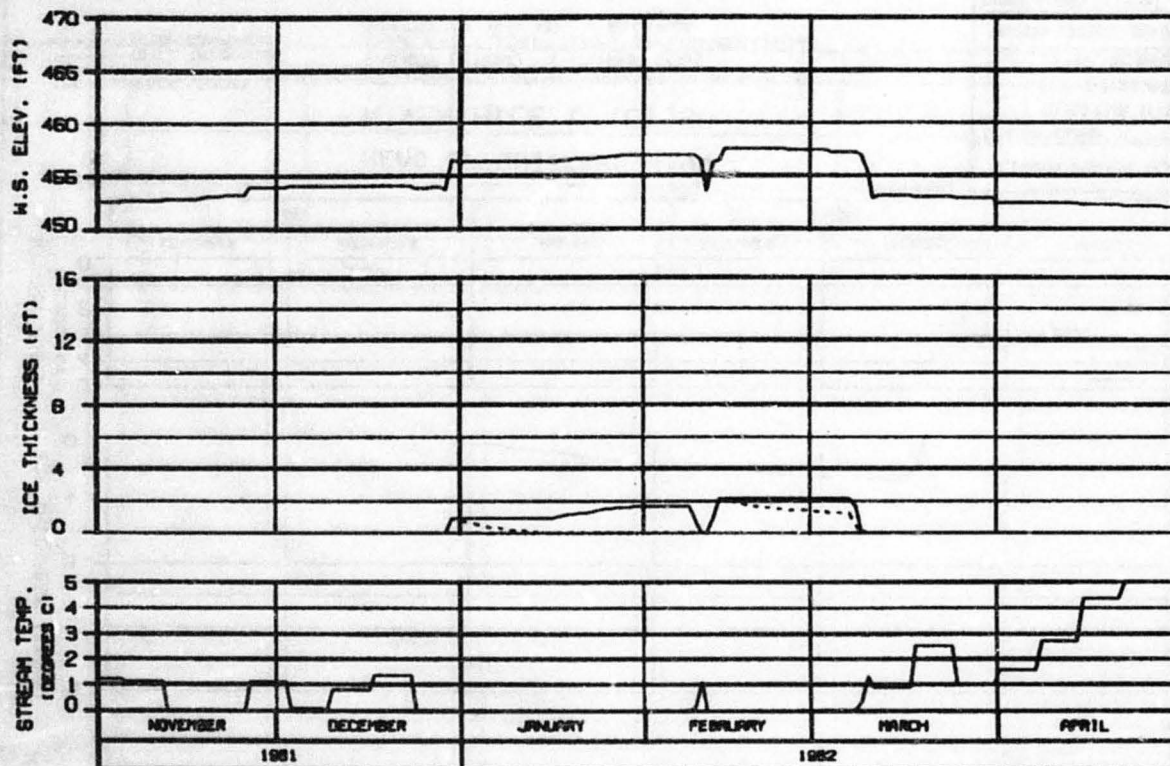
ALASKA POWER AUTHORITY

SUBMITTA PROJ. CT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZARDOUS WASTE JOINT VENTURE

DESIGN, BLDG 1 101 JN 81 1000, 142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL AT HEAD OF GASH CREEK  
 RIVER MILE : 112.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS TEMP. INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101ENA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

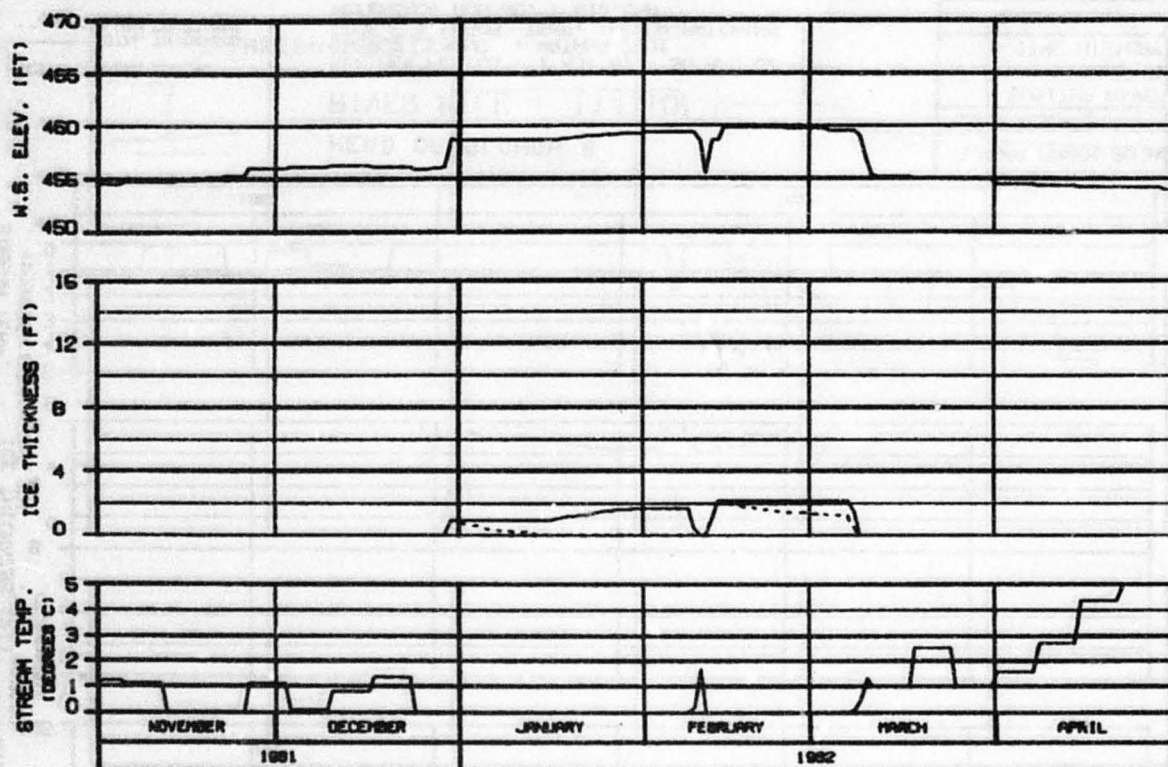
SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARDA-EBASCO JOINT VENTURE

DESIGNED BY: BLD/BS

31 JAN 82

0000.142



MOUTH OF SLOUGH 6A  
RIVER MILE : 112.34

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-6 FLOWS TEMP, INFLON-HATCHING  
REFERENCE RUN NO. : 8101ENR

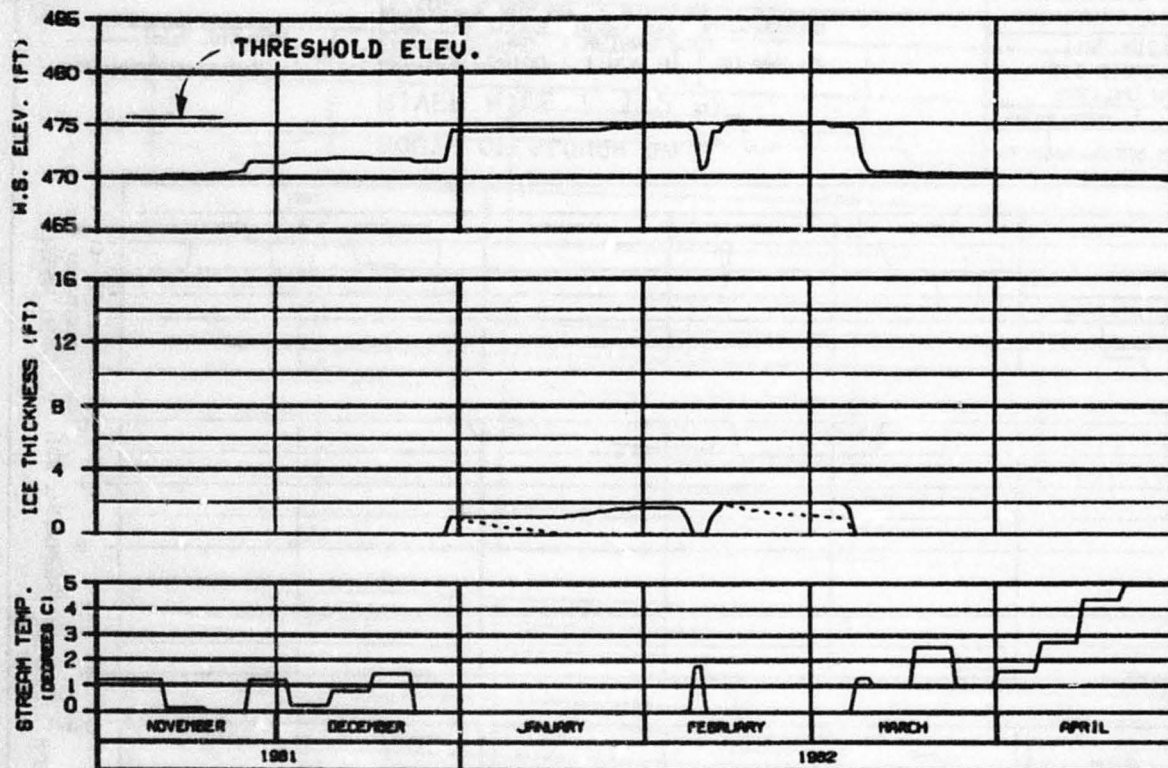
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARDA-EBERCO JOINT VENTURE

ISSUED: 04/08/82 BY JWH/ENR 000,142



HEAD OF SLOUGH 8  
RIVER MILE : 114.10

ICE THICKNESS LEGEND:  
——— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-6 FLOWS TEMP: INFLOW-MATCHING  
REFERENCE RUN NO. : 8101ENA

ALASKA POWER AUTHORITY

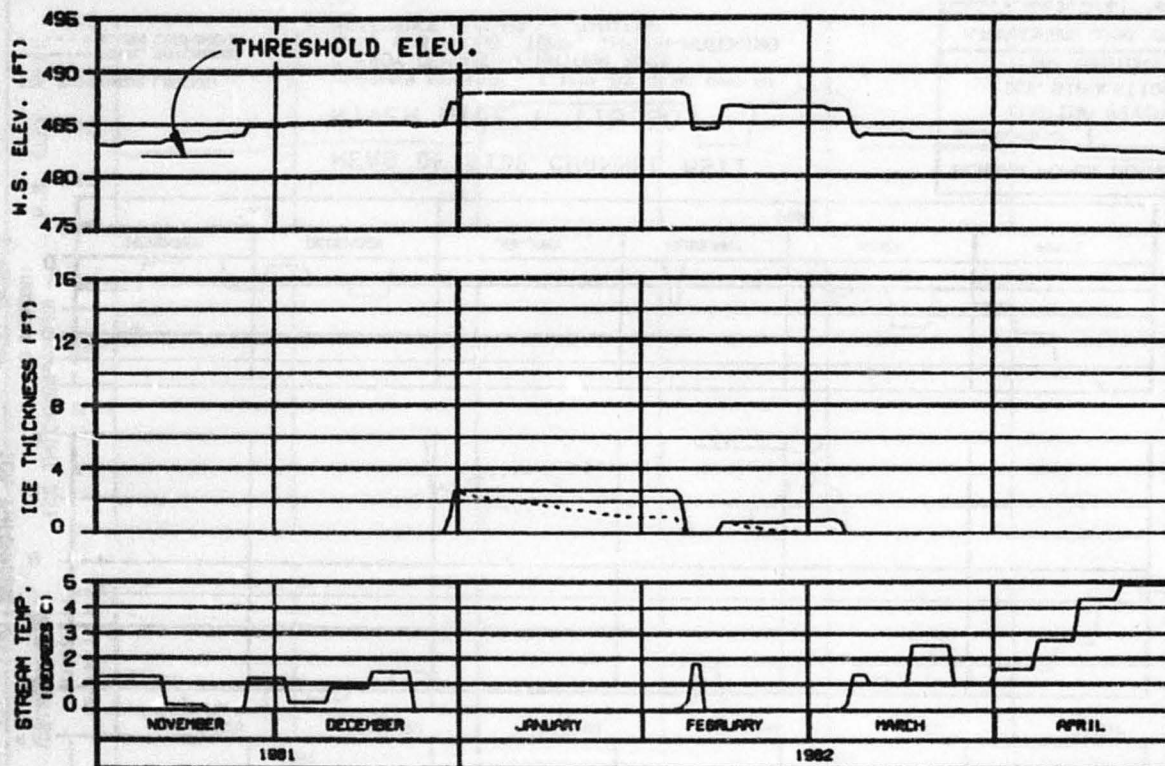
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WPAZ-EBASCO JOINT VENTURE

DESIGNED: ALASKA POWER AUTHORITY 24 JAN 82 1000.1/2





SIDE CHANNEL MSII  
RIVER MILE : 115.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : MATANA 2001  
CASE E-S FLOWS TEMP, INFLOW-MATCHING  
REFERENCE RUN NO. : 8101ENA

ALASKA POWER AUTHORITY

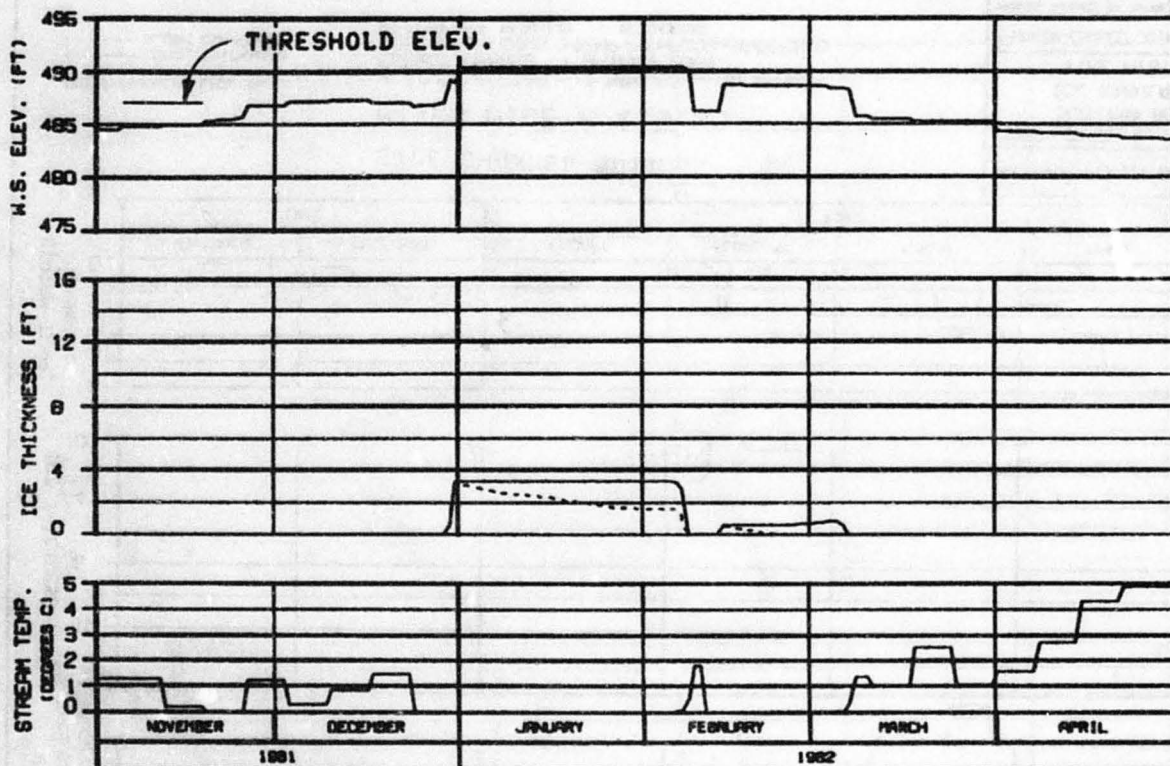
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DWGNO. 81-1000 01 JAN 82 1000.142





HEAD OF SIDE CHANNEL MSII  
RIVER MILE : 115.90

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-6 FLOWS TEMP. INFLOW-MATCHING  
REFERENCE RUN NO. : 8101ENA

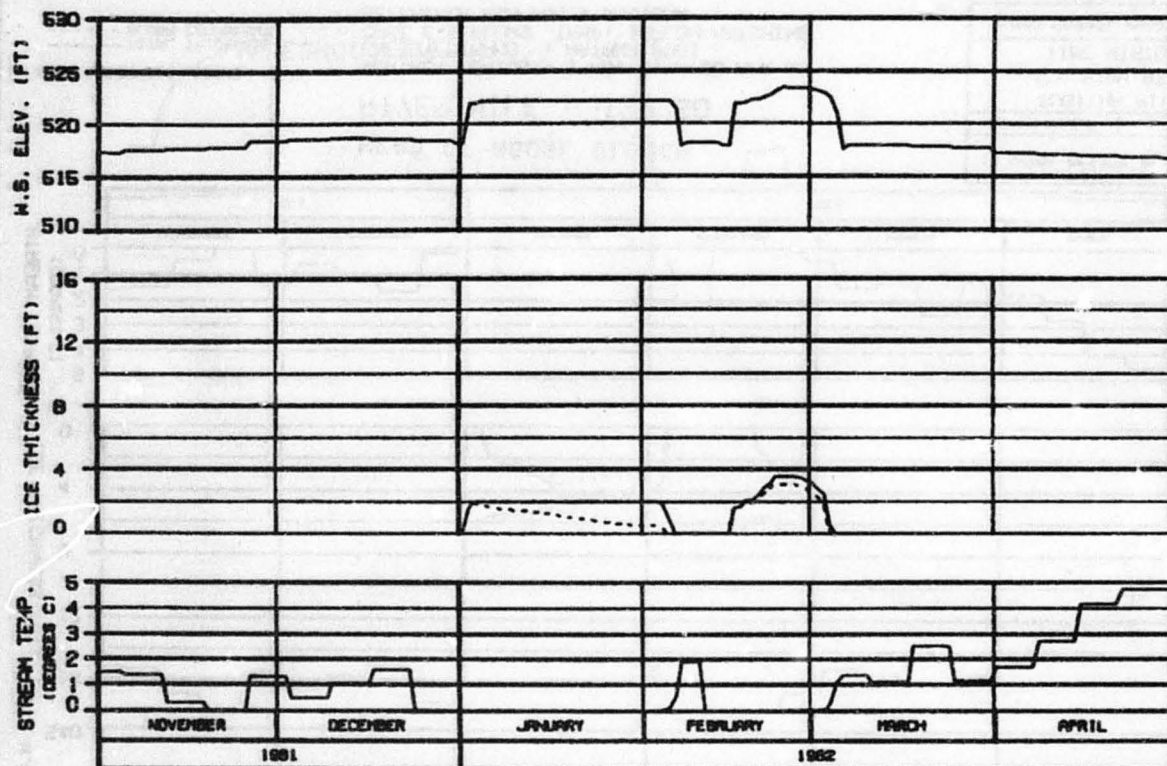
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: BLM/MSD PL JIN 82 000.142



ICE THICKNESS LEGEND.

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2001  
 CASE E-6 FLOWS TEMP: INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101ENR

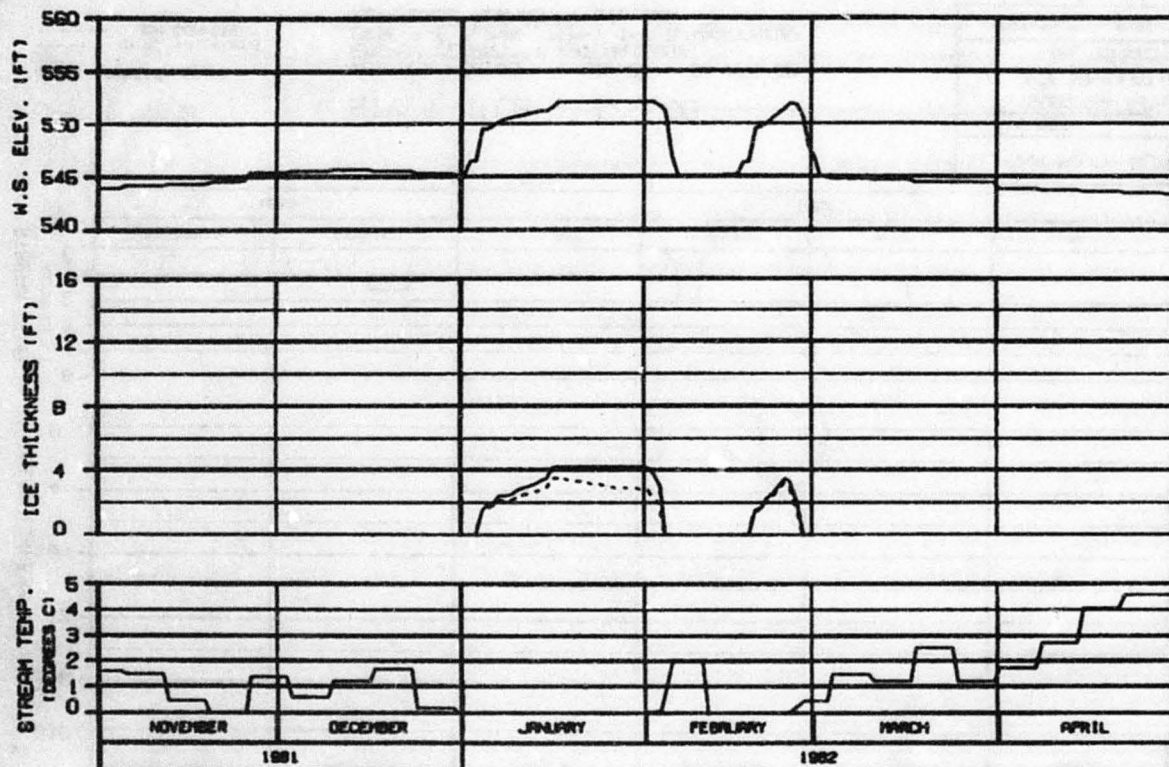
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DIGEST: 81-0001 IN JAN 82 0000.142



HEAD OF MOOSE SLOUGH  
RIVER MILE : 123.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : MATANA 2001  
CASE E-S FLOWS TEMP: INFLOW-MATCHING  
REFERENCE RUN NO. : 8101ENA

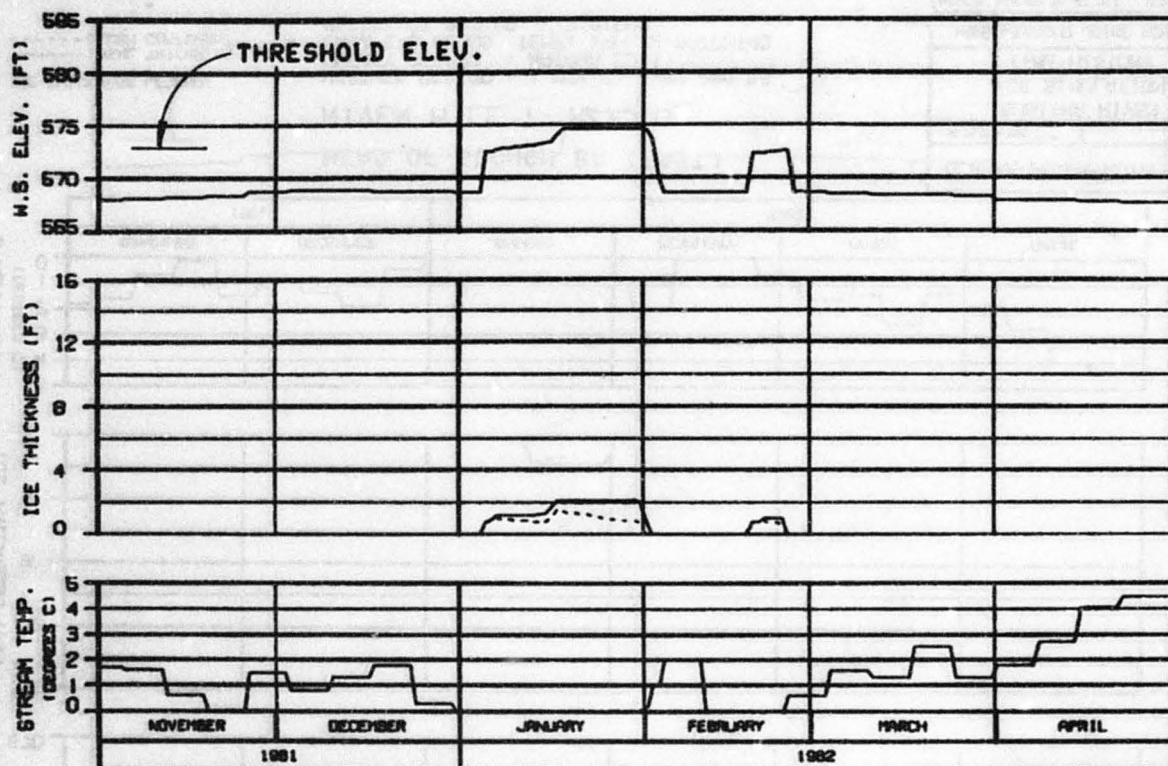
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARSA-EBASCO JOINT VENTURE

WORKING DRAWING NO. JN 01 1000.142



HEAD OF SLOUGH 8A (WEST)  
RIVER MILE : 126.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-S FLOWS TEMP. INFLOW-MATCHING  
REFERENCE RUN NO. : 81018NA

ALASKA POWER AUTHORITY

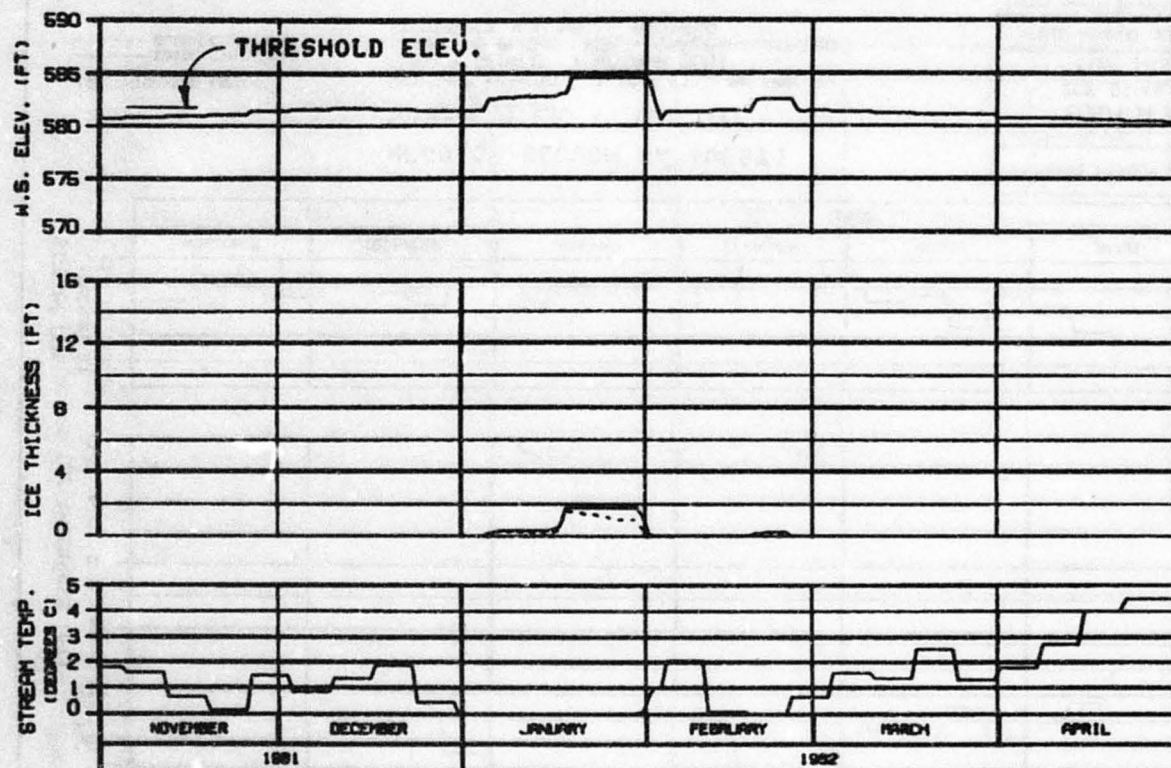
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBRACCO JOINT VENTURE

DESIGN: 81-000 31 JAN 82 1000.142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - BLUISH COMPONENT

HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS TEMP. INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101ENR

ALASKA POWER AUTHORITY

SUBSTATION PROJECT

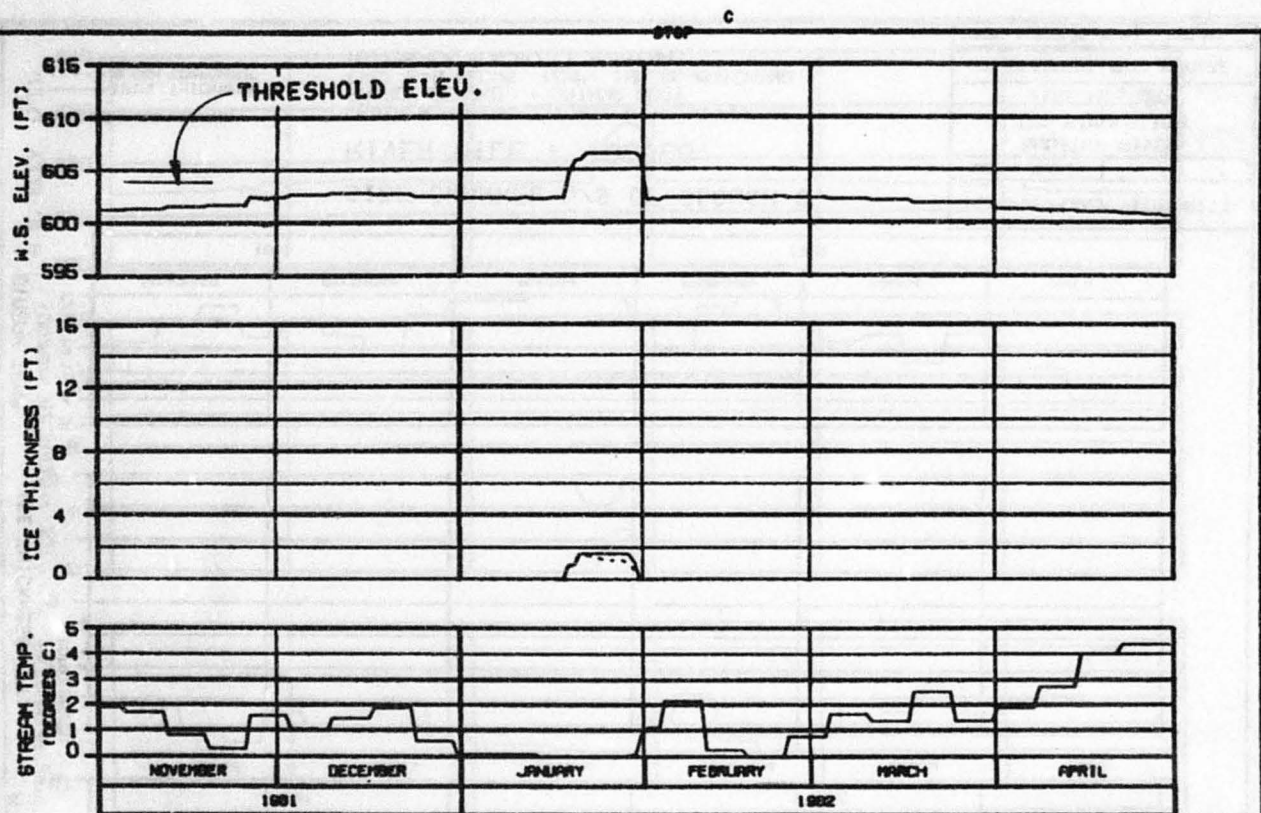
SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

CHIEF, ELABORATION

1982.142





HEAD OF SLOUGH 9  
RIVER MILE : 129.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-S FLOWS TEMP. INFLOW-MATCHING  
REFERENCE RUN NO. : 8101ENR

OPTION?

ALASKA POWER AUTHORITY

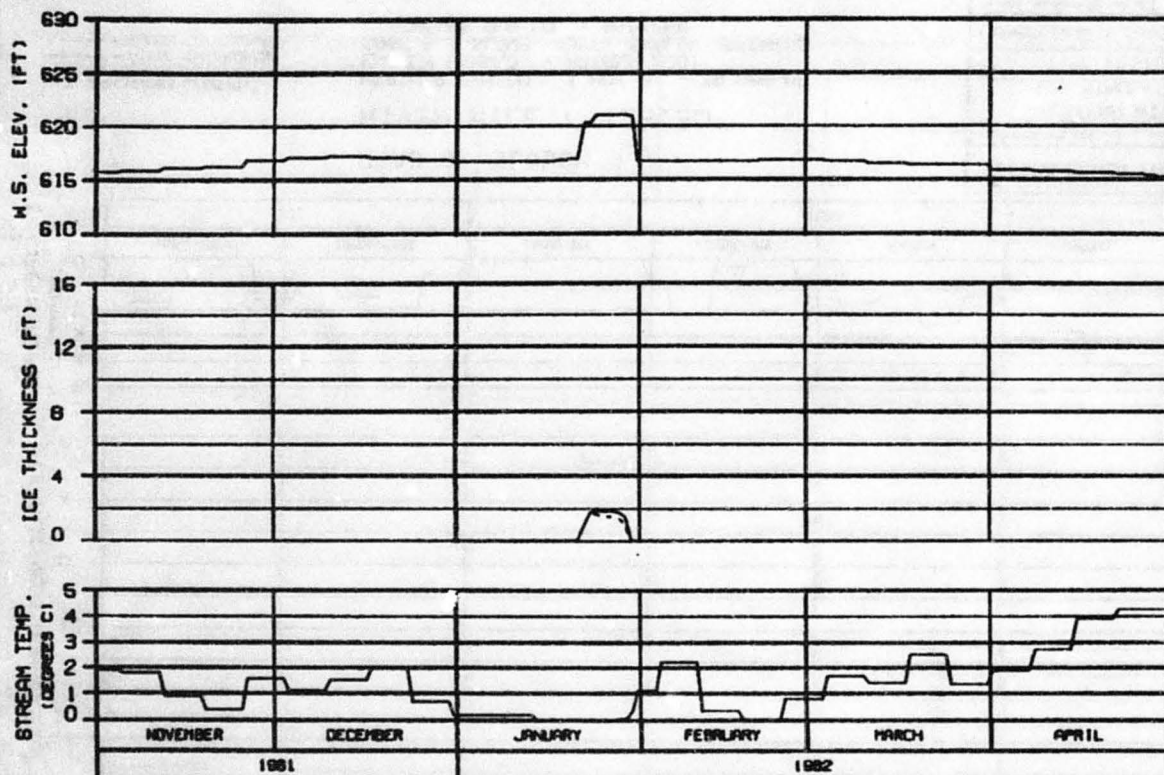
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRACD JOINT VENTURE

DESIGNED: AL-0002 BY JH 00 1000.142

OPTION 7



SIDE CHANNEL U/S OF SLOUGH 9  
RIVER MILE : 130.60

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : MATANA 2001  
CASE E-6 FLOWS TEMP, INFLOW-MATCHING  
REFERENCE RUN NO. : 8101ENA

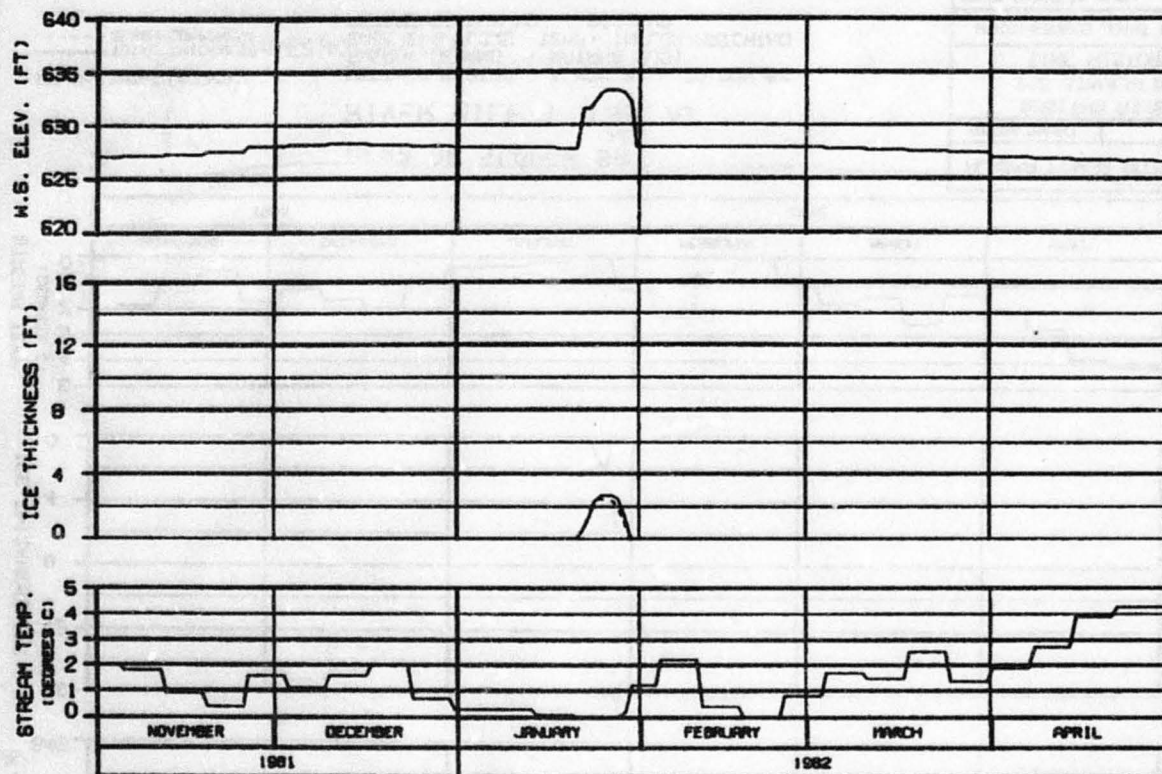
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZDA-EBASCO JOINT VENTURE

CHENAI, ALASKA 20 JAN 82 1000.142



**SIDE CHANNEL U/S OF 4TH JULY CREEK**  
**RIVER MILE : 131.80**

**ICE THICKNESS LEGEND:**

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS TEMP. INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101ENA

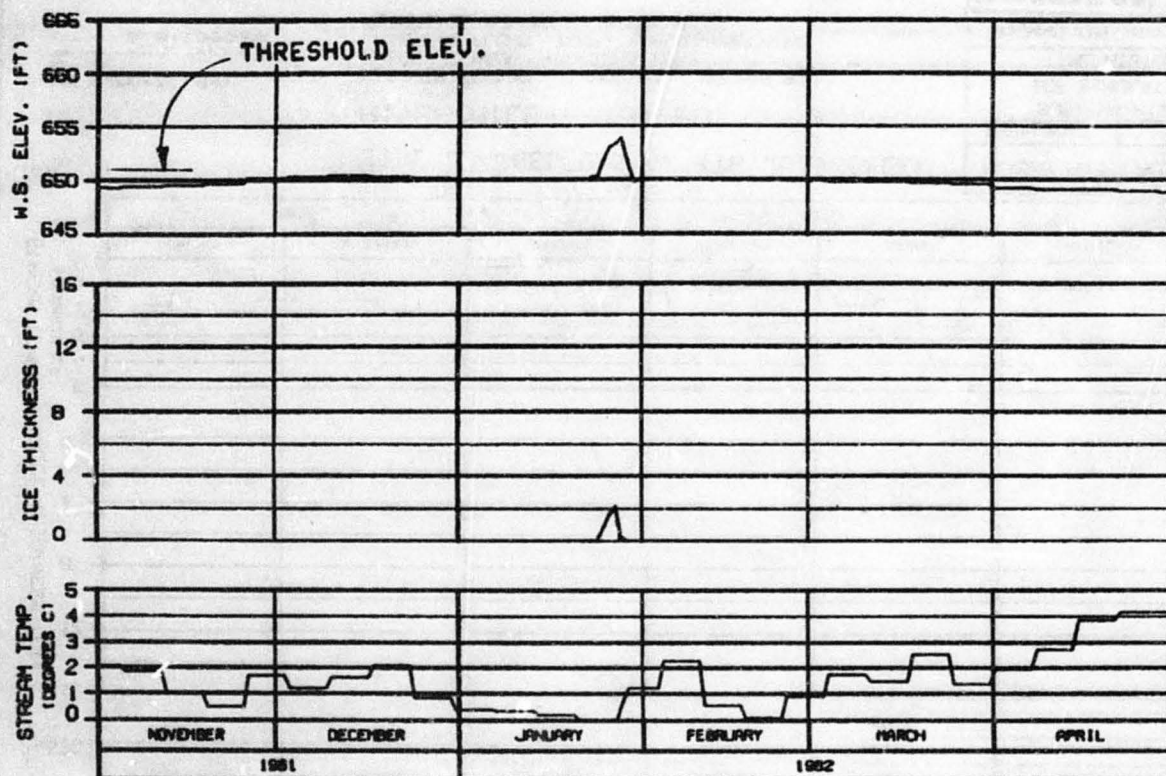
**ALASKA POWER AUTHORITY**

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHECKED: B.L. DAVIS 20 APR 82 1008.142



HEAD OF SLOUGH 9A  
RIVER MILE : 133.70

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-6 FLOWS TEMP, INFLOW-MATCHING  
REFERENCE RUN NO. : 8101ENA

ALASKA POWER AUTHORITY

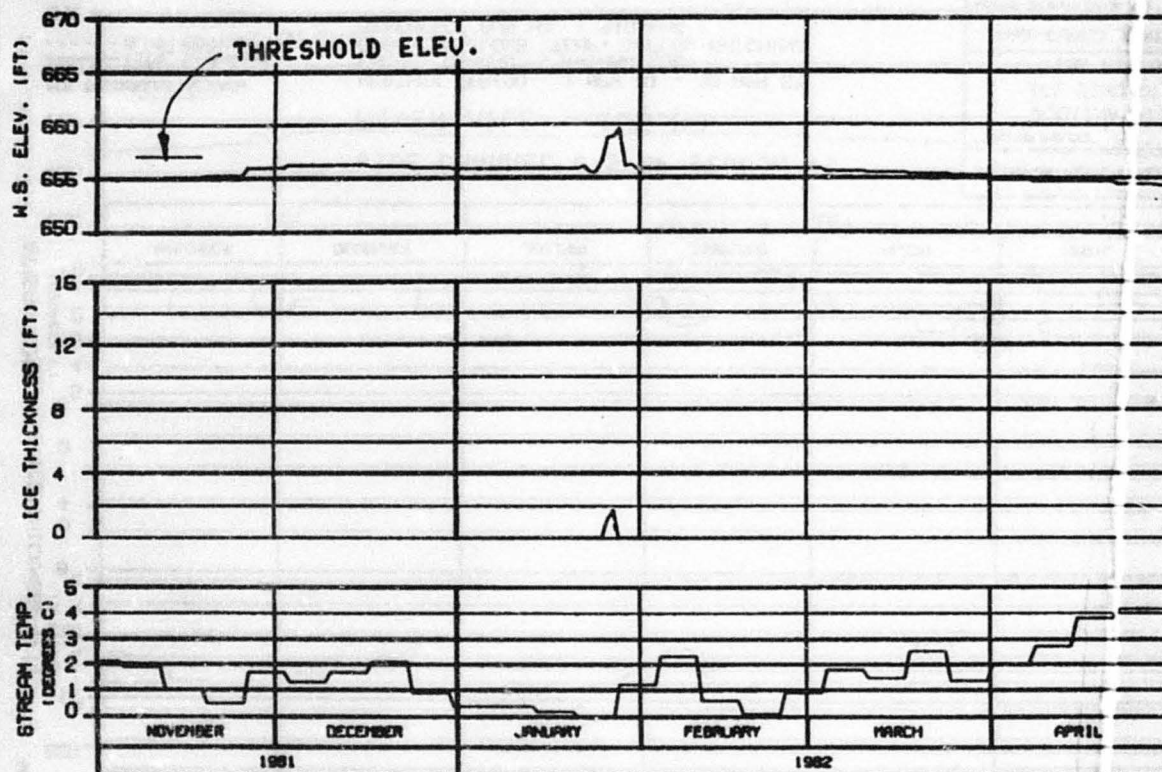
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN, ANALYSIS BY JVA 82 1982.142





SIDE CHANNEL U/S OF SLOUGH 10

RIVER MILE : 134.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS TEMP. INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101ENA

ALASKA POWER AUTHORITY

SUBMITTAL PROJECT

SUSITNA RIVER

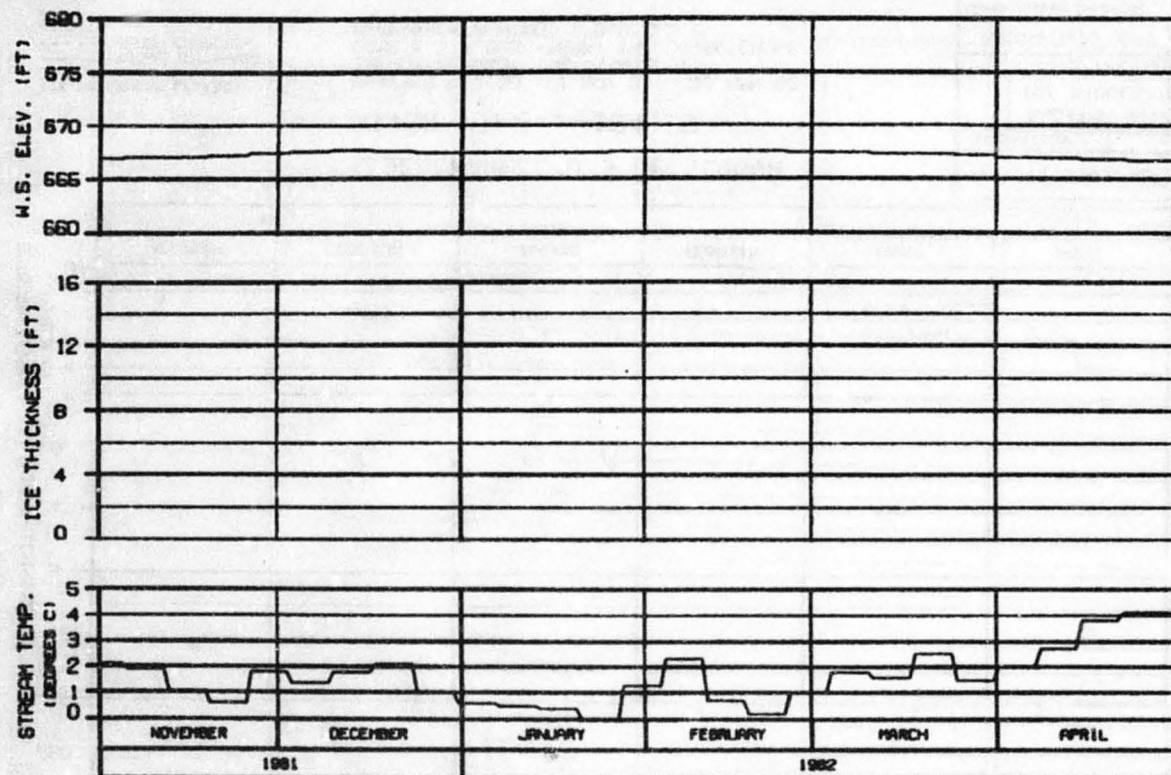
ICE SIMULATION

TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: ELL-800 22 - 11 82 1000.142





ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUGH COMPONENT

SIDE CHANNEL D/S OF SLOUGH 11  
 RIVER MILE : 135.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS TEMP, INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101EN

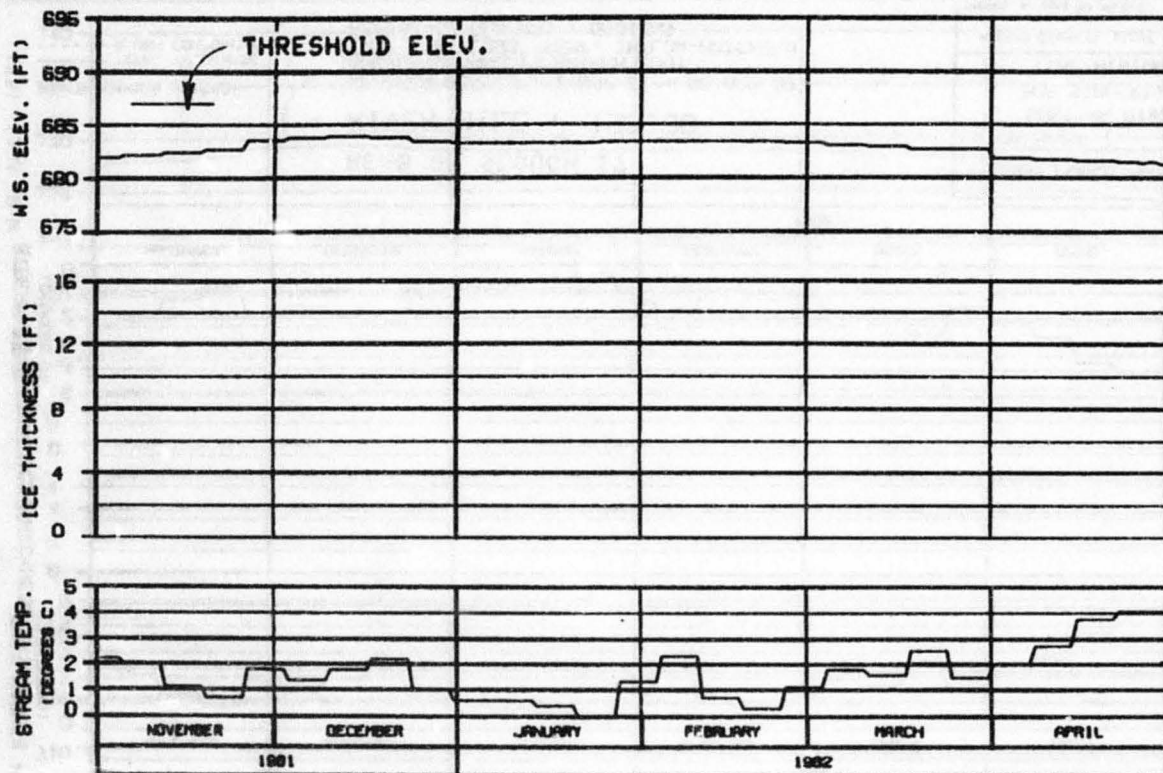
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBSCO JOINT VENTURE

CHUCKLE - ALASKA 80 JUL 85 1982, 142



HEAD OF SLOUGH 11  
RIVER MILE : 136.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-6 FLOWS TEMP. INFLOW-MATCHING  
REFERENCE RUN NO. : 8101EN4

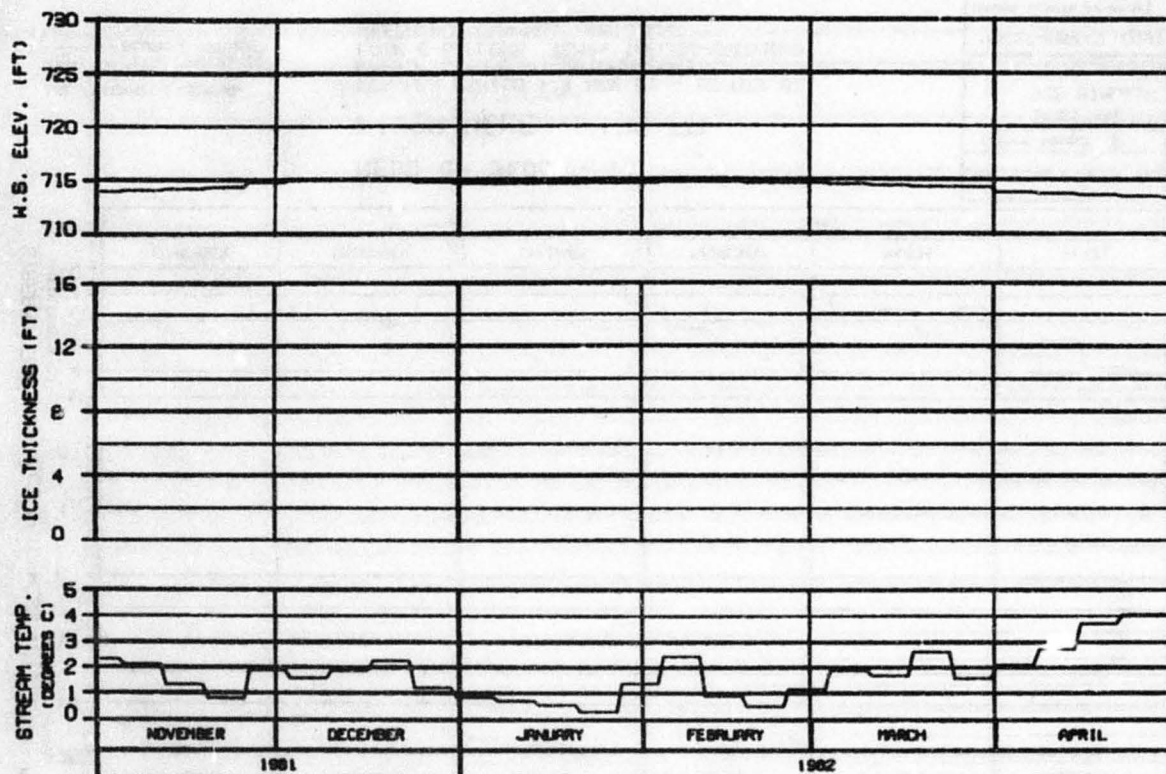
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARDA-EBASCO JOINT VENTURE

REVISED: 04-04-82 BY JPH/CR 1008.142



HEAD OF SLOUGH 17  
RIVER MILE : 139.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-6 FLOWS TEMP. INFLOW-MATCHING  
REFERENCE RUN NO. : 8101ENR

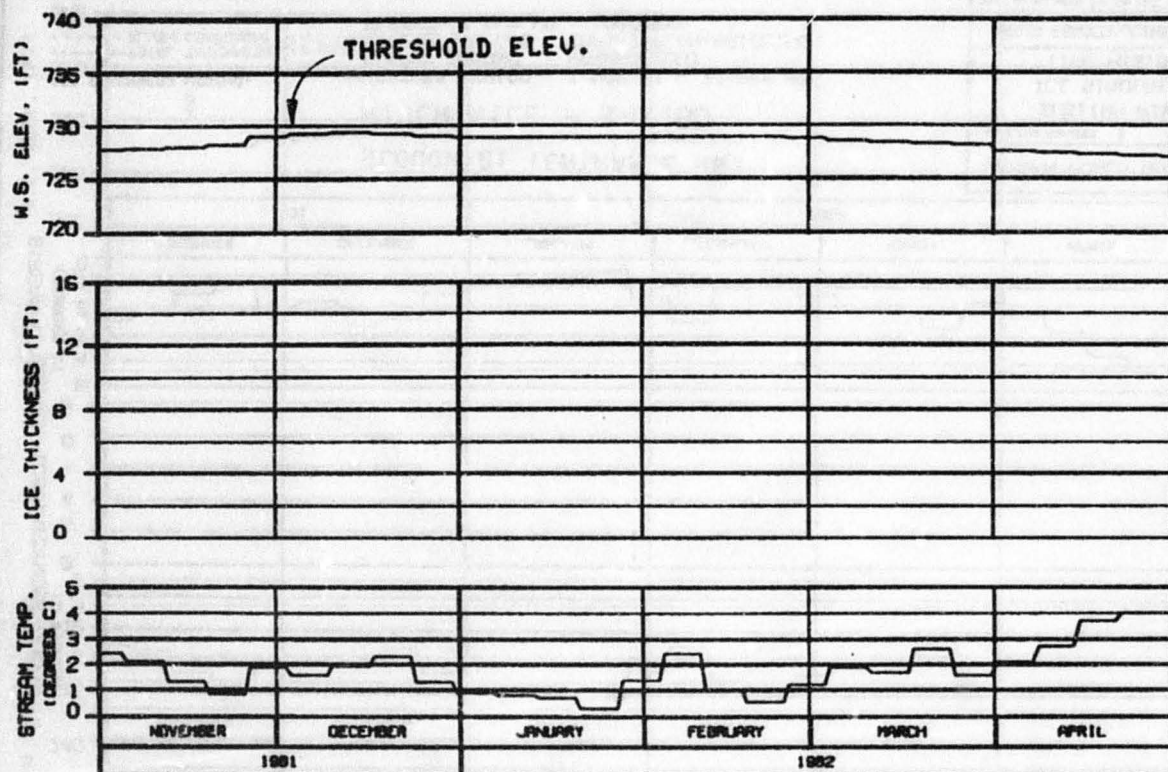
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: SLD/STG 20 JAN 82 1000.142



HEAD OF SLOUGH 20

RIVER MILE : 140.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2001  
 CASE E-6 FLOWS TEMP, INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101ENA

ALASKA POWER AUTHORITY

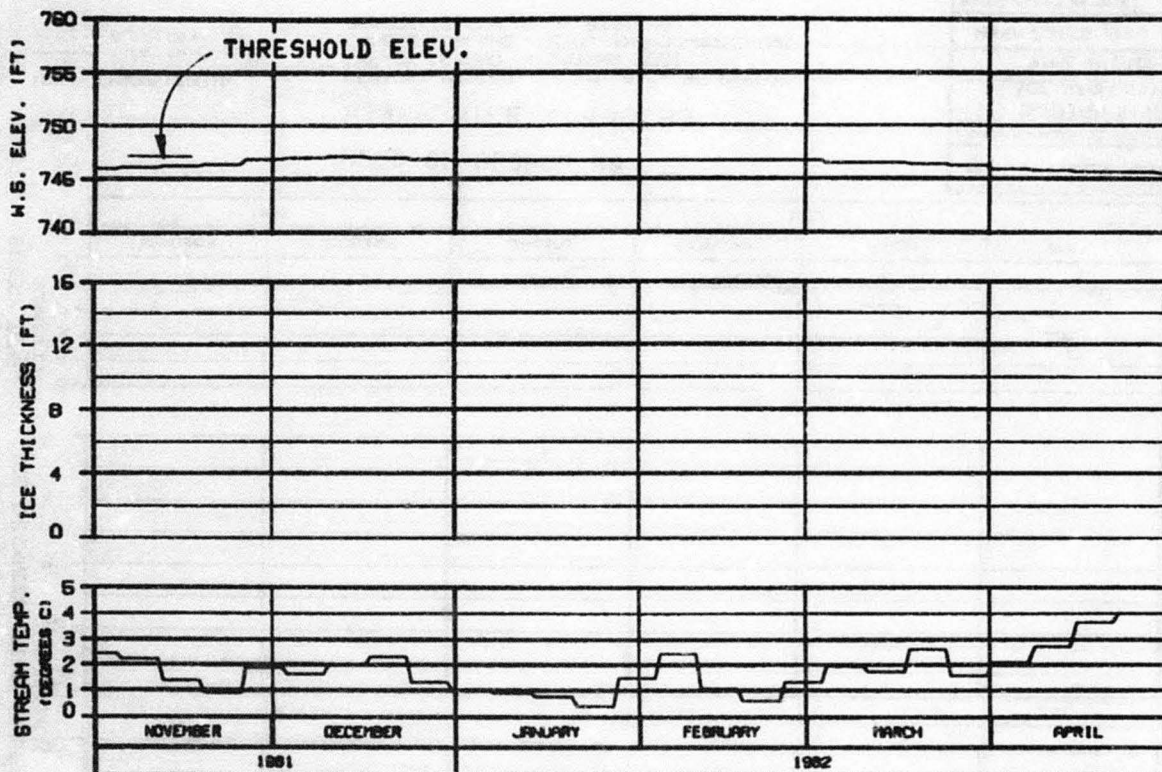
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACD JOINT VENTURE

DESIGN: 81-000 20 APR 82 1982.142





SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2001  
 CASE E-6 FLOWS TEMP. INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101ENA

ALASKA POWER AUTHORITY

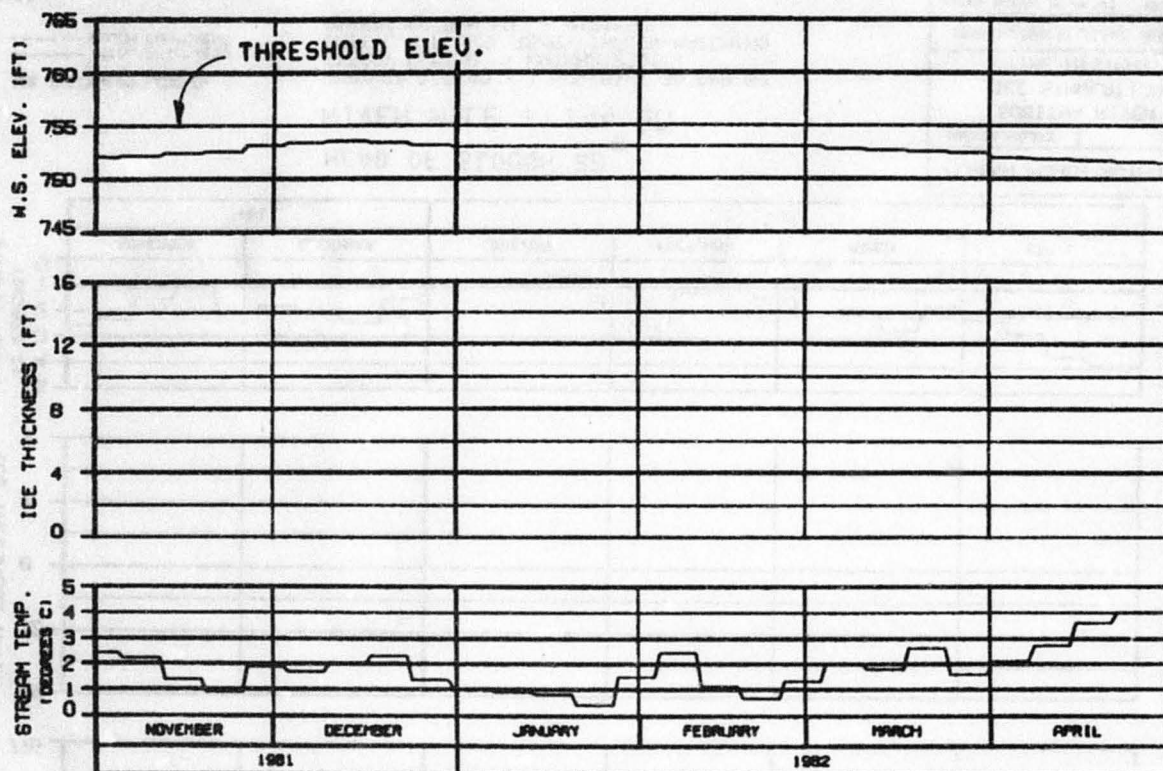
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

CHARTS - SLOUGH 21 APR 82 1982.142





HEAD OF SLOUGH 21  
RIVER MILE : 142.20

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-6 FLOWS TEMP. INFLOW-MATCHING  
REFERENCE RUN NO. : 8101ENA

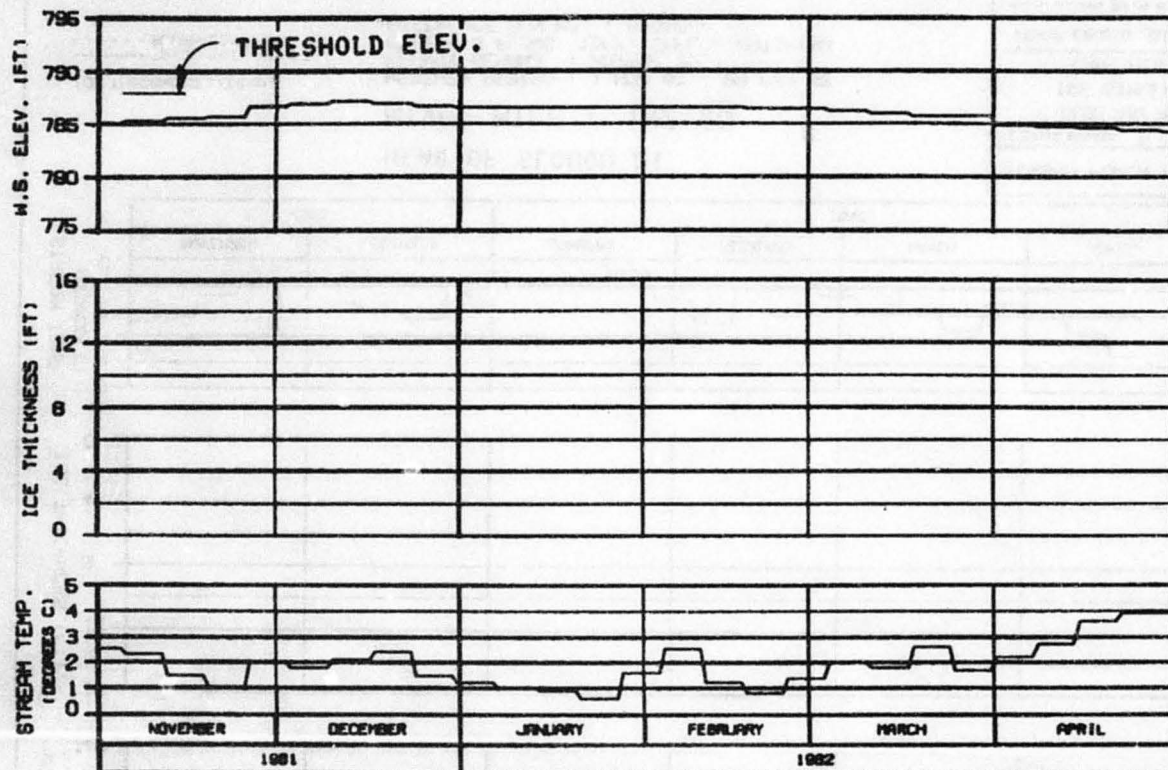
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EDISON JOINT VENTURE

DOCS. 111488 07 JAN 83 1000.142



HEAD OF SLOUGH 22

RIVER MILE : 144.80

## ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS TEMP: INFLOW-MATCHING  
 REFERENCE RUN NO. : 8101ENR

OPTION?

ALASKA POWER AUTHORITY

SUSTINA PROJECT

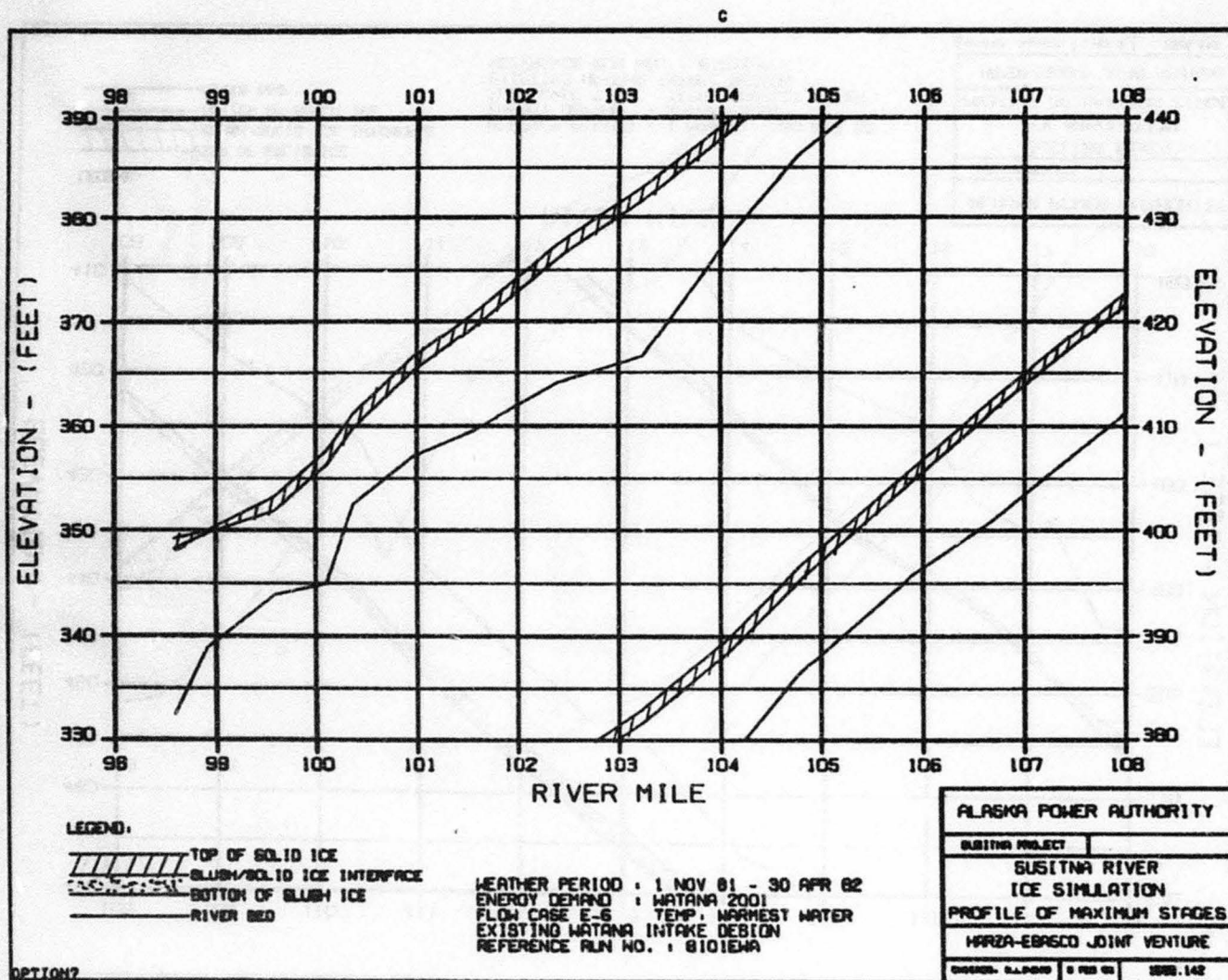
SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

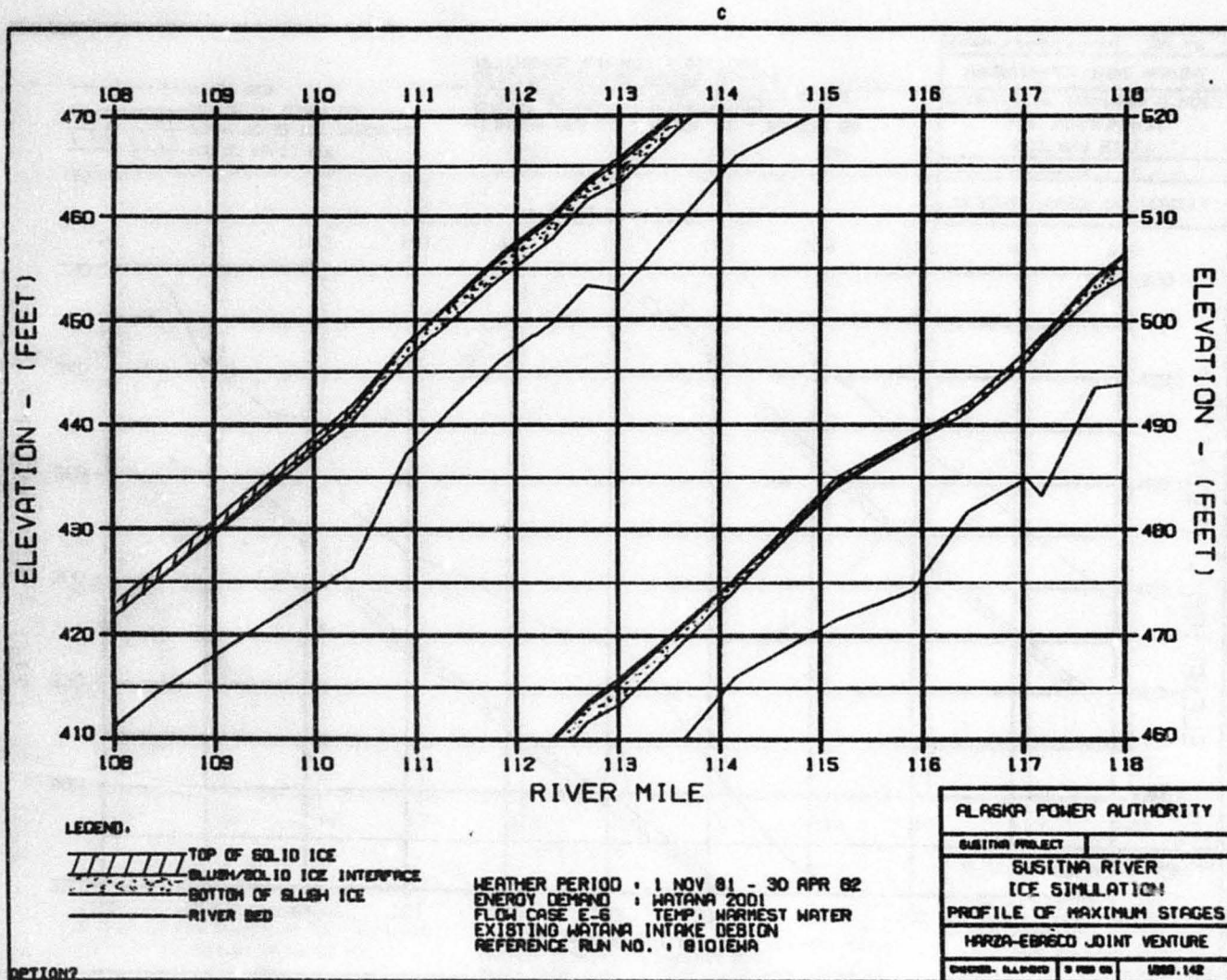
HARZA-EBASCO JOINT VENTURE

DESIGN: ALBINS 30 JAN 82 1000.142

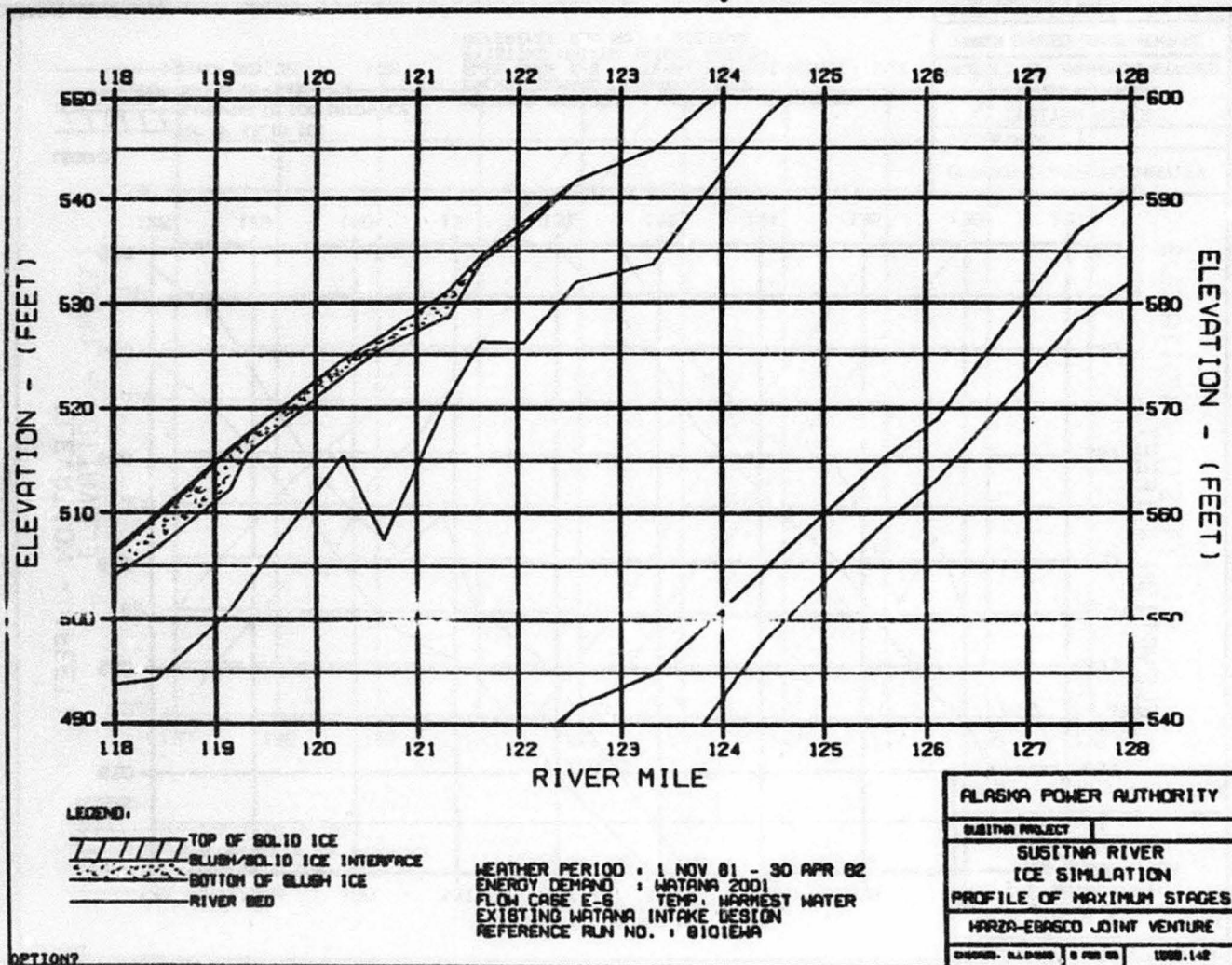
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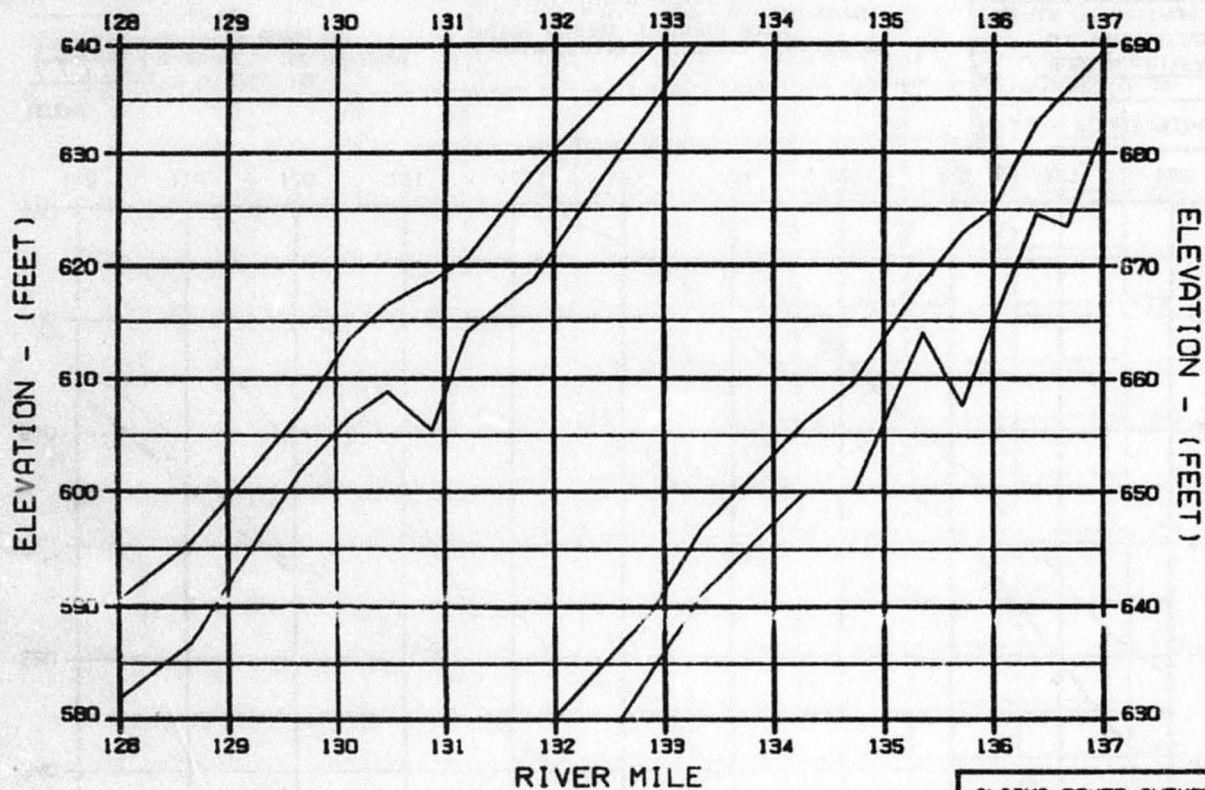




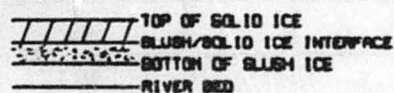








LEGEND.



WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE E-6 TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101ENR

ALASKA POWER AUTHORITY

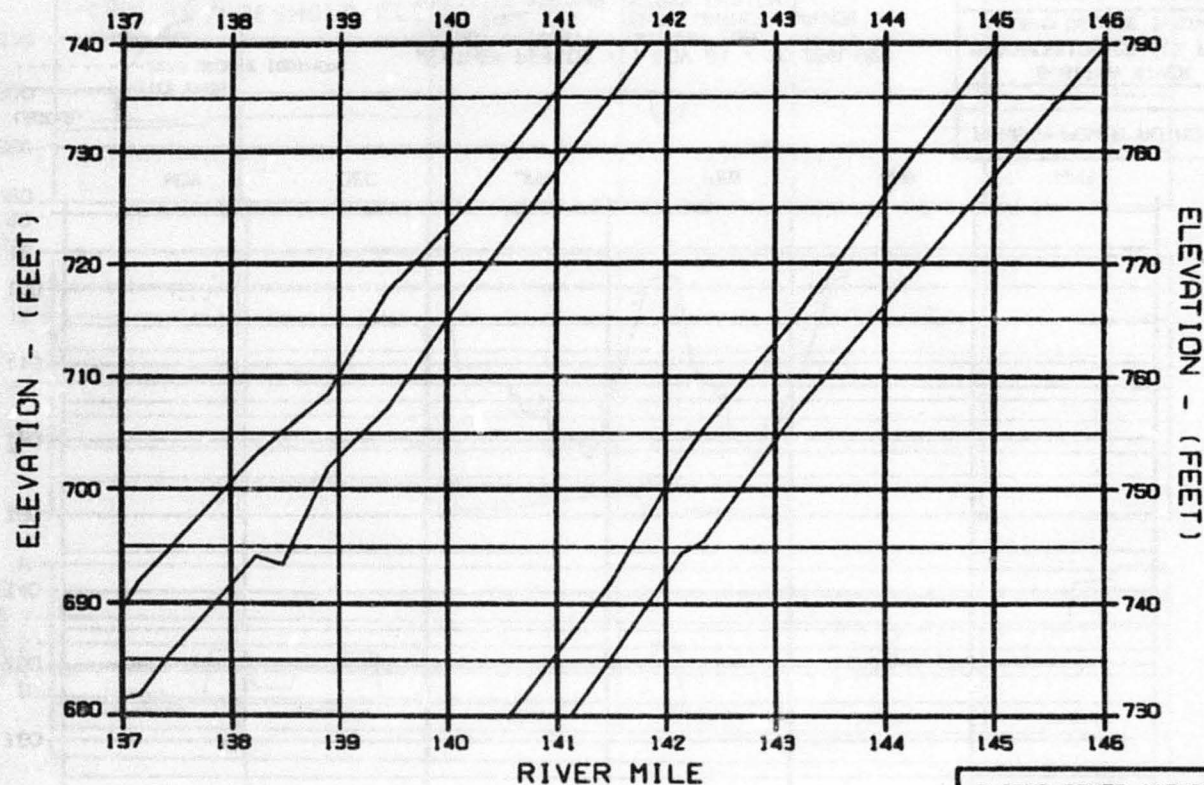
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

DRAWN: ELLIOTT 5 FEB 82 1982.142

OPTION?



## LEGEND:

- TOP OF SOLID ICE  
 SLUSH/SOLID ICE INTERFACE  
 BOTTOM OF SLUSH ICE  
 RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE E-6 TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101EHA

## ALASKA POWER AUTHORITY

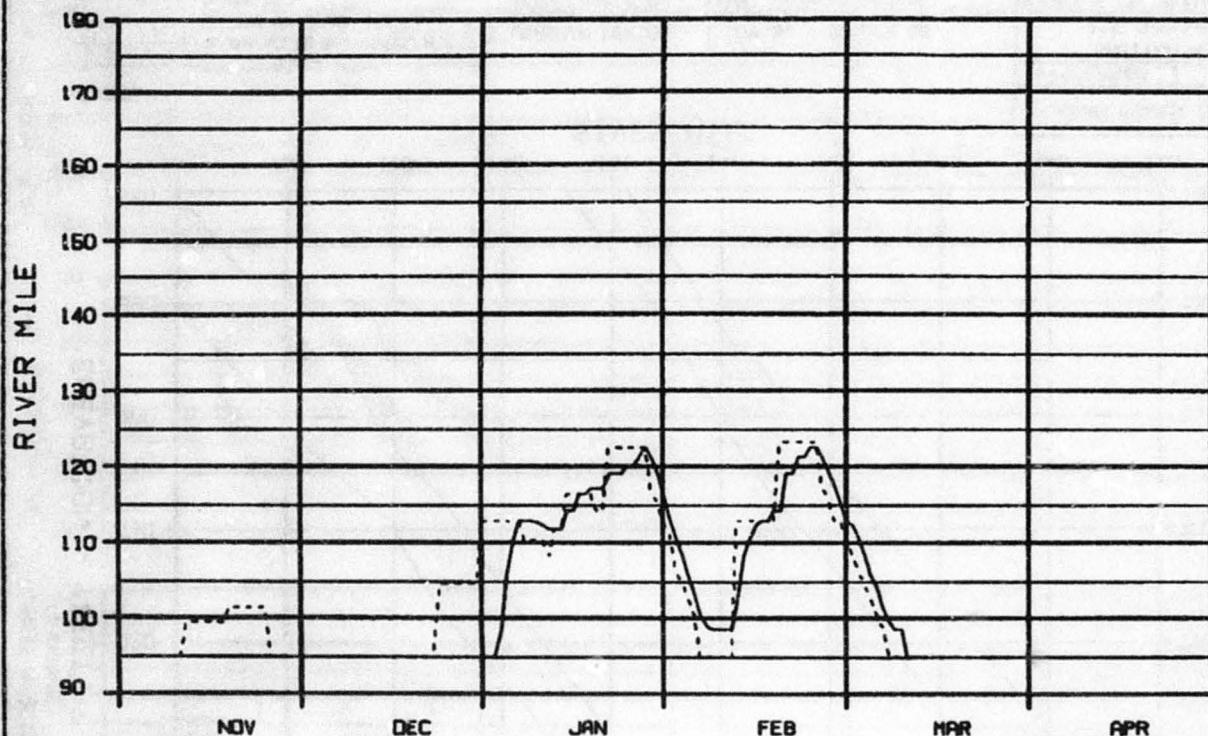
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

WARZA-EBRSCO JOINT VENTURE

DESIGNED BY: J. D. G. 8 FEB 82 1988. 142

OPTION 7



## LEGEND:

—— ICE FRONT  
 - - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE E-6 TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101EWA

OPTION?

## ALASKA POWER AUTHORITY

GUSITNA PROJECT

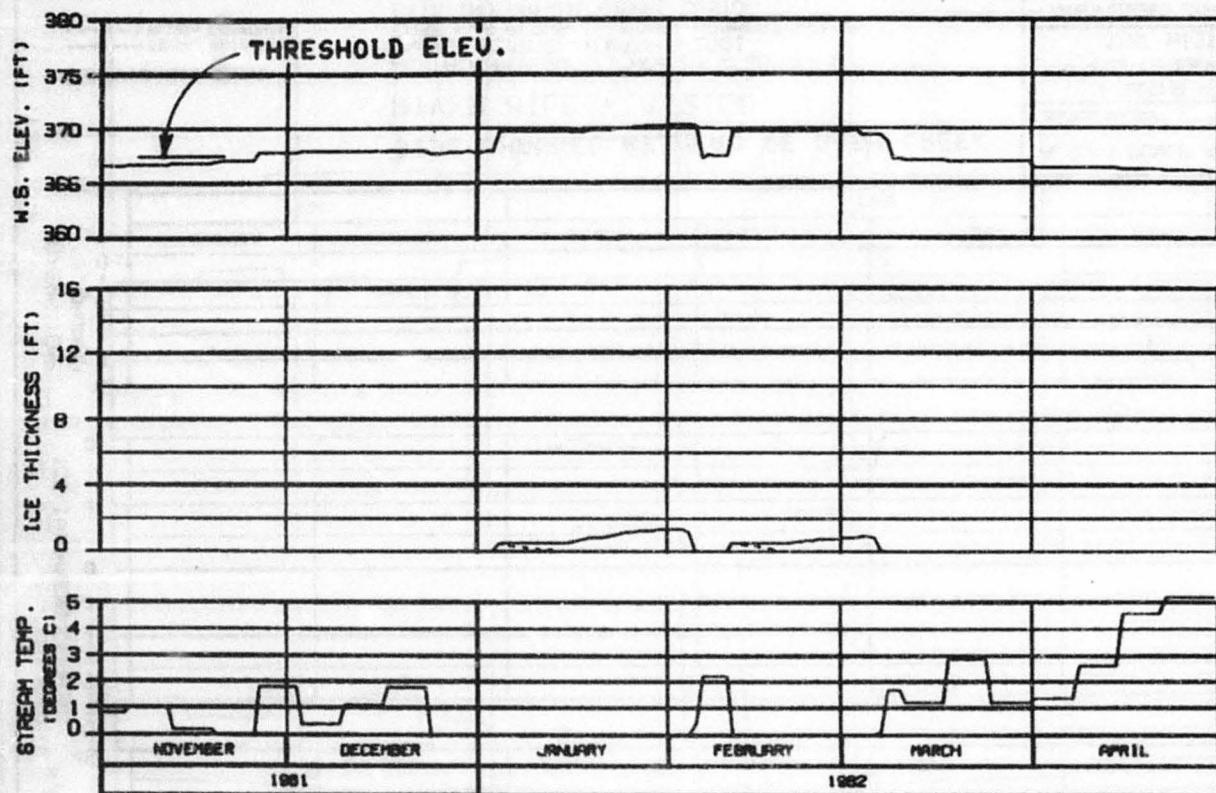
SUSITNA RIVER

PROGRESSION OF ICE FRONT  
& ZERO DEGREE ISOTHERM

HARZA-EBASCO JOINT VENTURE

DESIGN. 11-19-81 5 FEB 82 1000.142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

# HEAD OF WHISKERS SLOUGH RIVER MILE : 101.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS TEMP: WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101E4A

ALASKA POWER AUTHORITY

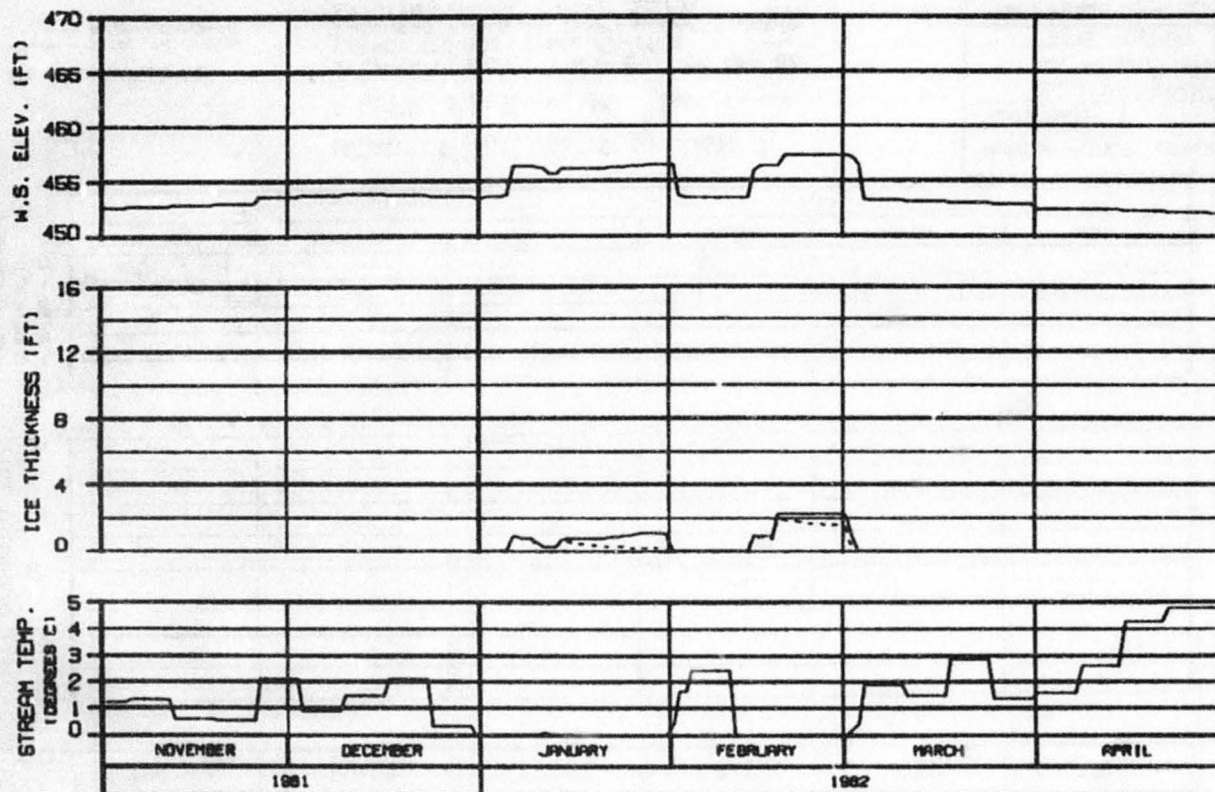
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBASCO JOINT VENTURE

CHORDS - 0114-000 0 FEB 82 1000.142





**SIDE CHANNEL AT HEAD OF GASH CREEK  
RIVER MILE : 112.00**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS TEMP, WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101ENH

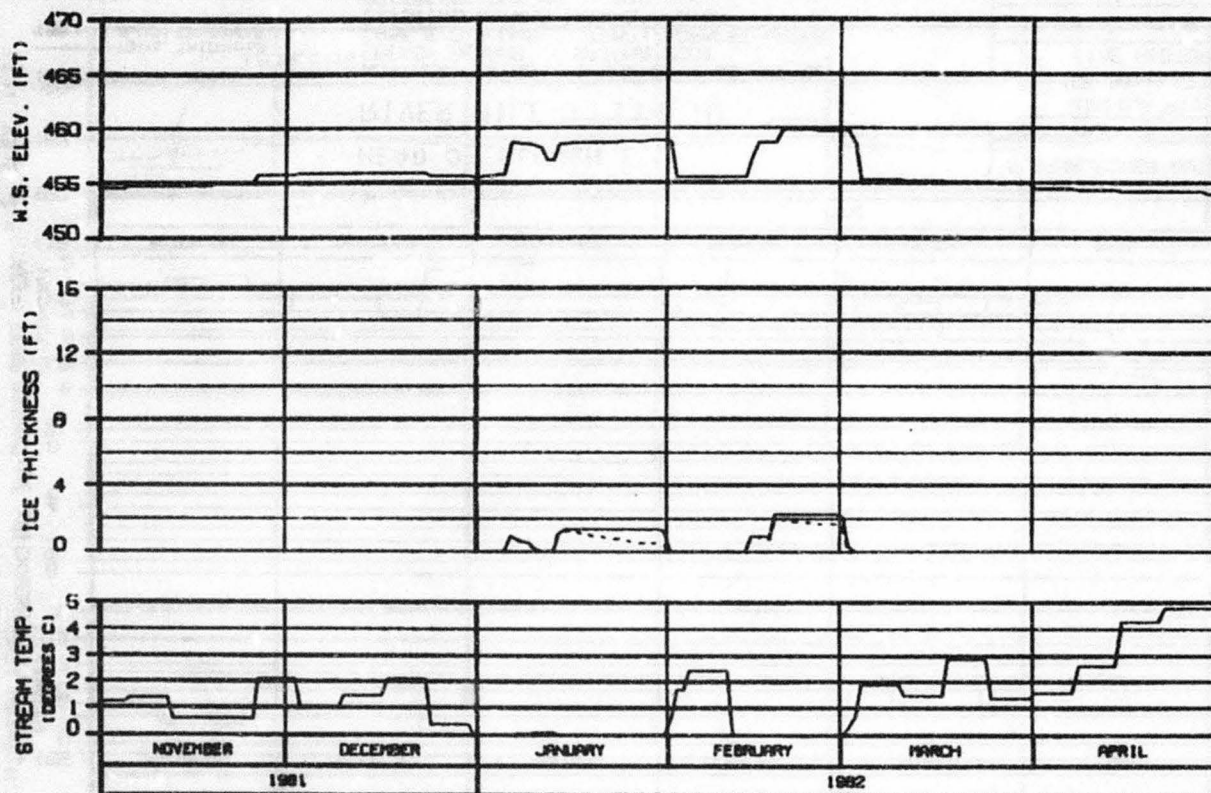
**ALASKA POWER AUTHORITY**

**SUSITNA PROJECT**

**SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY**

**HARZA-EBERCO JOINT VENTURE**

CHRONO. 8-1-82 8 FEB 82 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

MOUTH OF SLOUGH 6A  
 RIVER MILE : 112.34

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-S FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101EWA

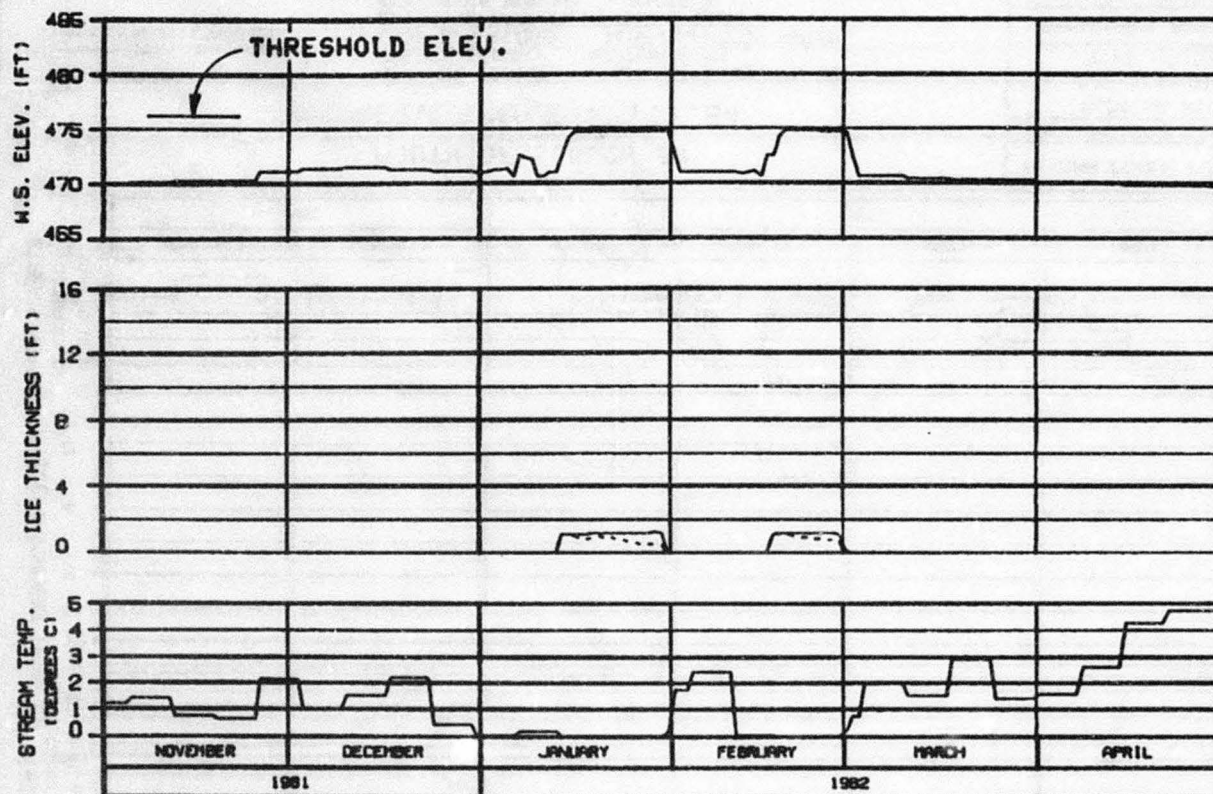
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACO JOINT VENTURE

DRAWN: SLD/MSD 9 FEB 82 1000.142



HEAD OF SLOUGH 8  
RIVER MILE : 114.10

ICE THICKNESS LEGEND:  
——— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-6 FLOWS TEMP. WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 9101EMA

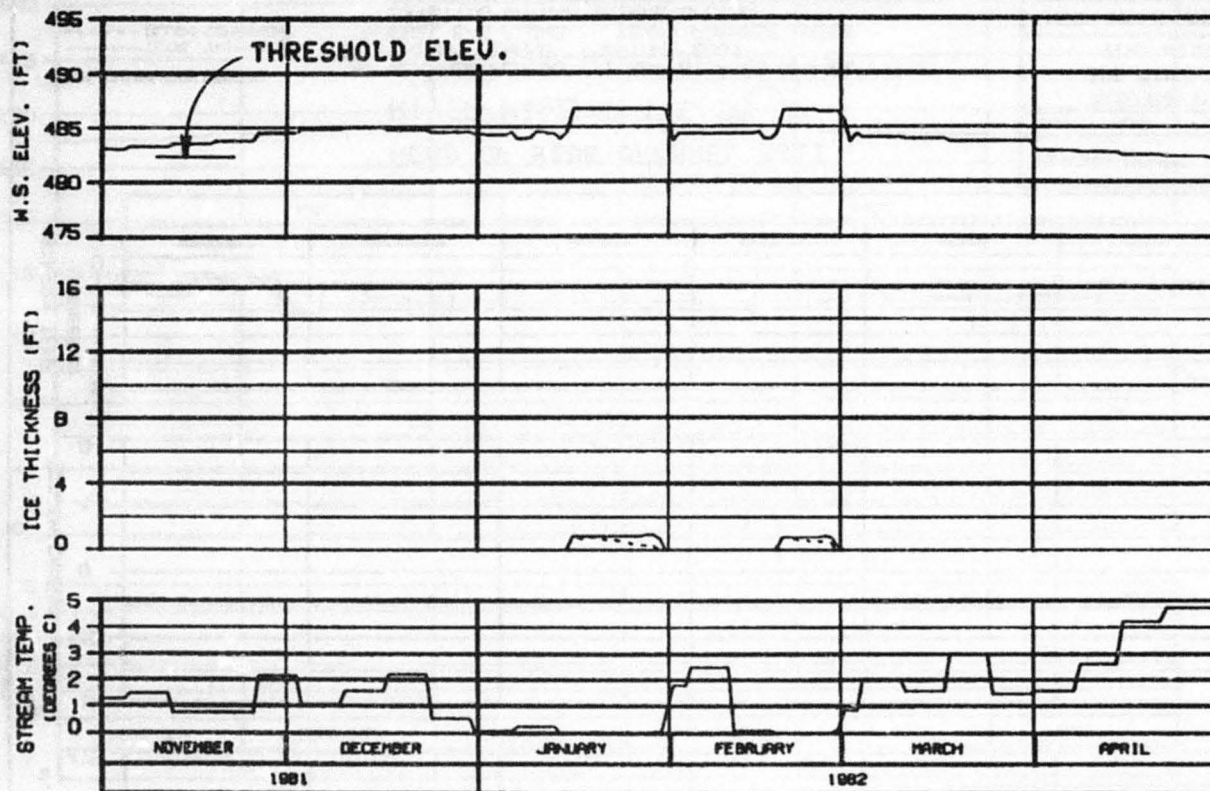
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZARD-EBASCO JOINT VENTURE

DESIGN: E.A. 9000 8 FEB 82 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL MSII  
 RIVER MILE : 115.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS TEMP, WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101EWA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

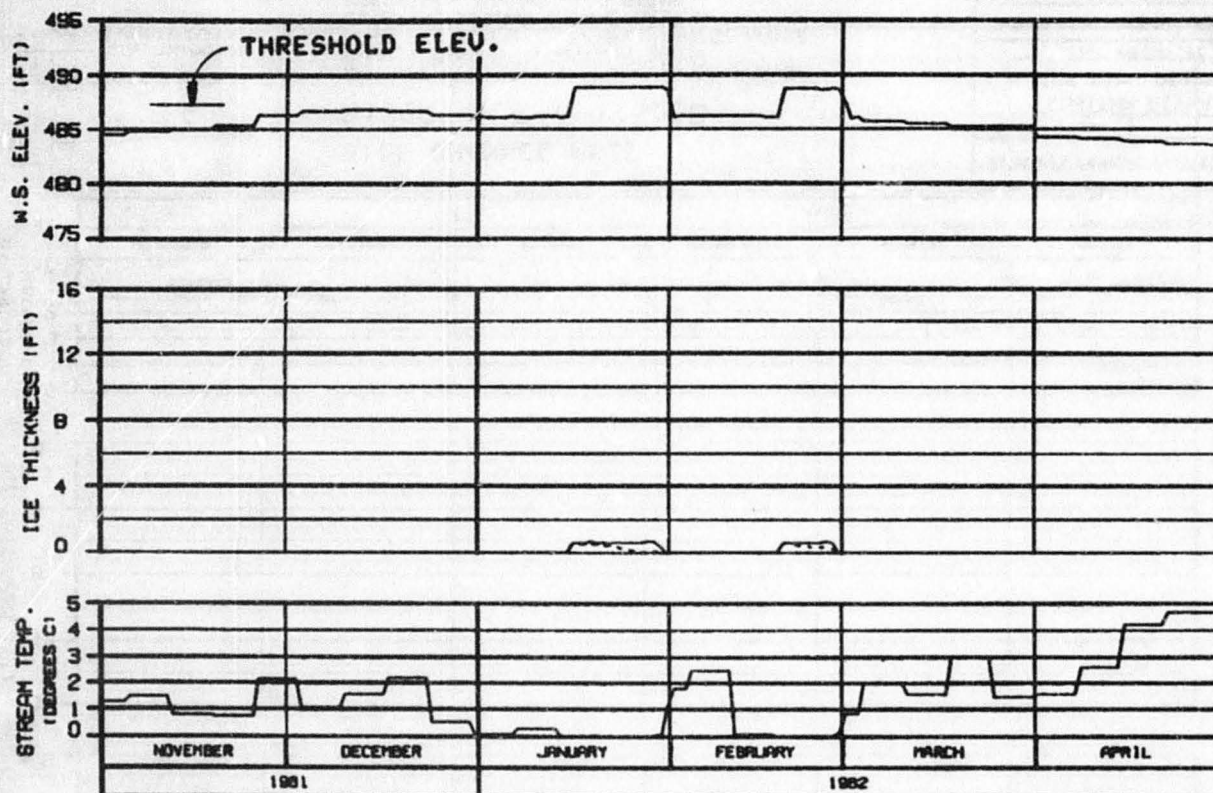
WARDA-EBASCO JOINT VENTURE

DESIGNED BY: JLD/MSI

6 FEB 82

1000.142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

# HEAD OF SIDE CHANNEL MSII RIVER MILE : 115.90

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS : TEMP: WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101EWA

ALASKA POWER AUTHORITY

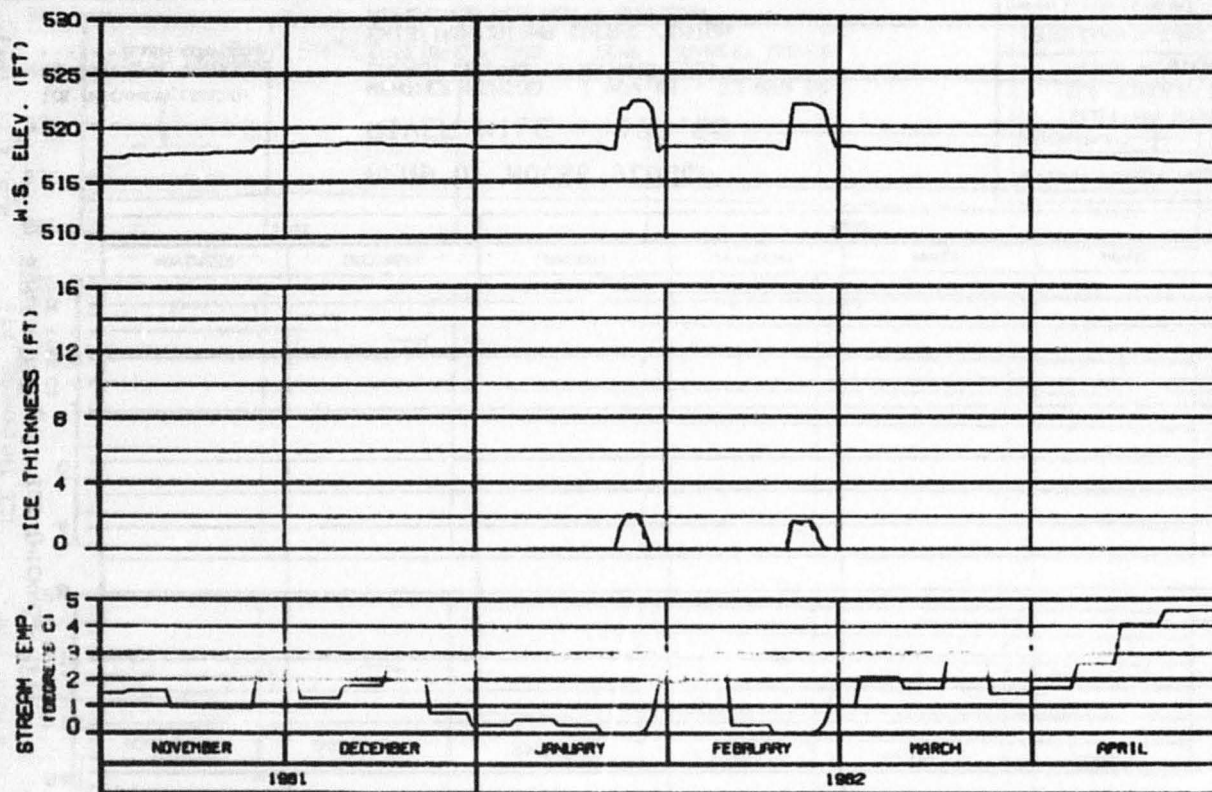
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARDA-EBASCO JOINT VENTURE

DRAWN: DALPOND 8 FEB 82 1508.142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS TEMP, WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101EHA

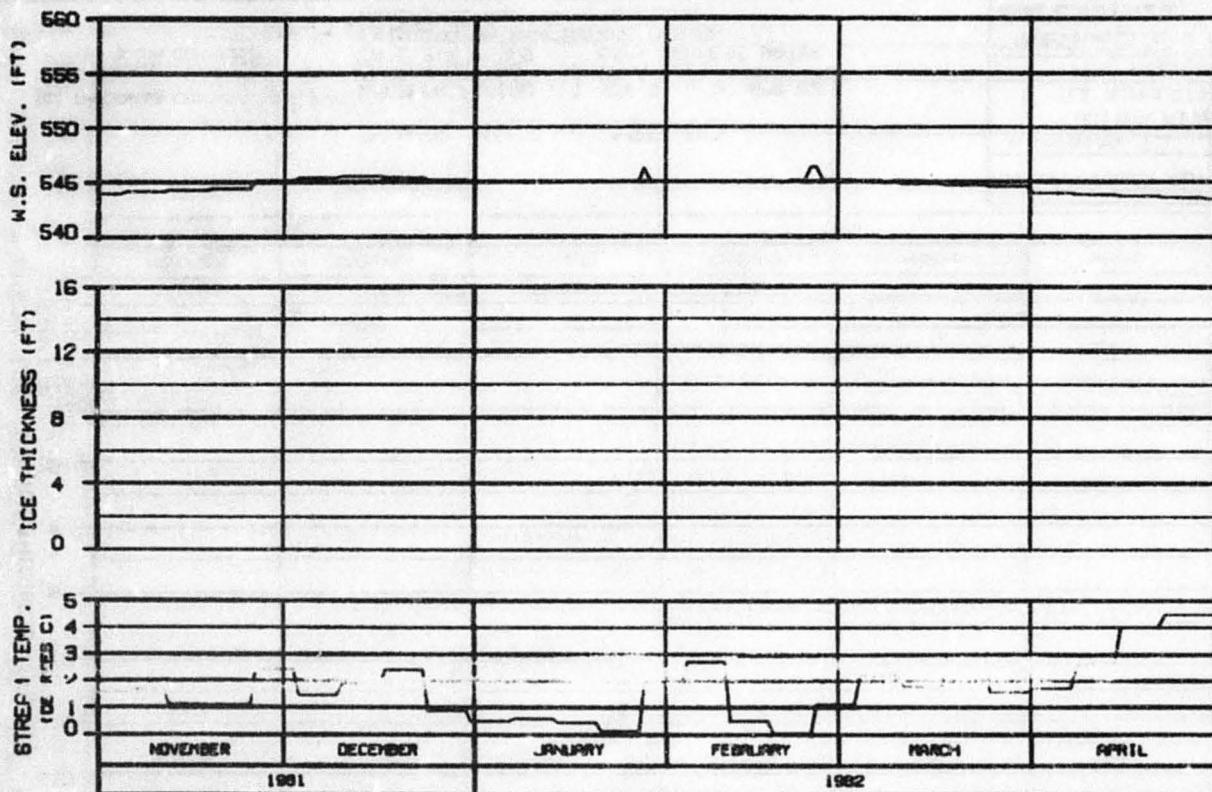
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACO JOINT VENTURE

DESIGN- SLP-8102 5 FEB 82 1000-142



HEAD OF MOOSE SLOUGH  
RIVER MILE : 123.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- BLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-6 FLOWS TEMP. WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8101EWA

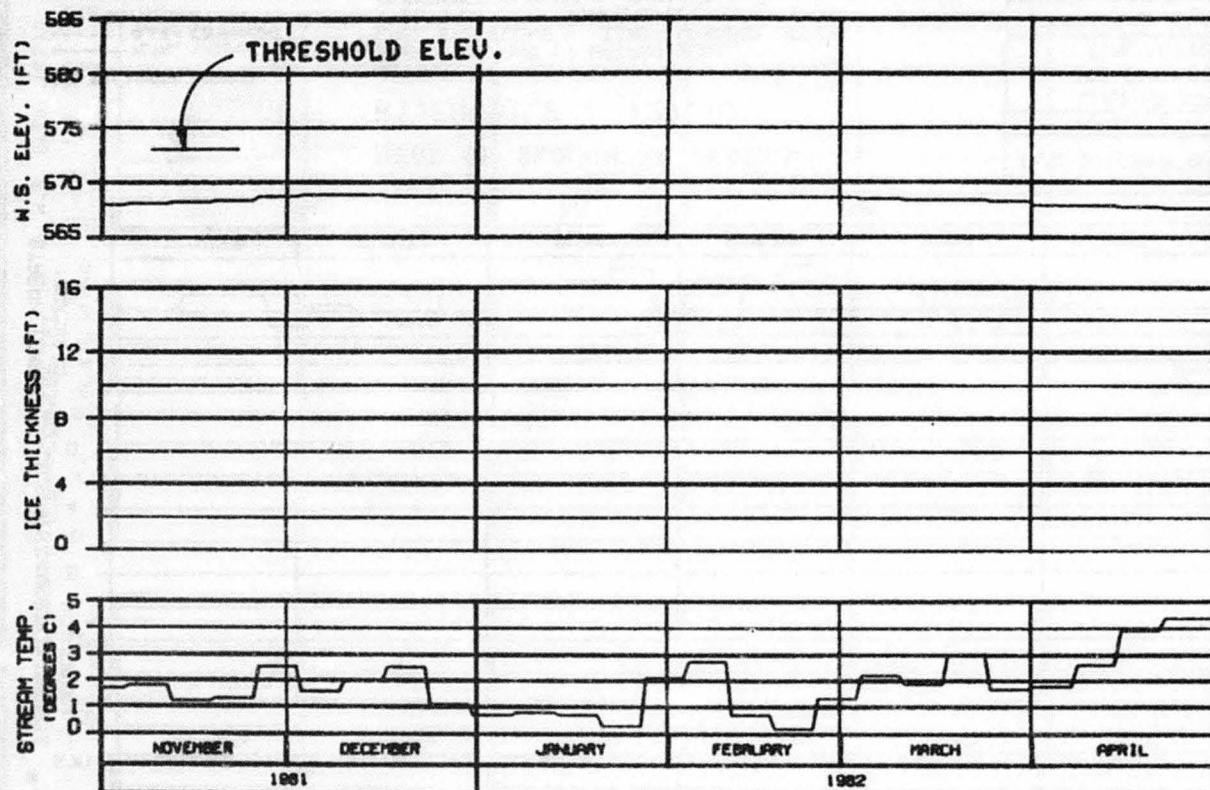
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRSCO JOINT VENTURE

DESIGN. BL. 0005 8 FEB 82 1982.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 8A (WEST)  
 RIVER MILE : 126.10

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-S FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101EWA

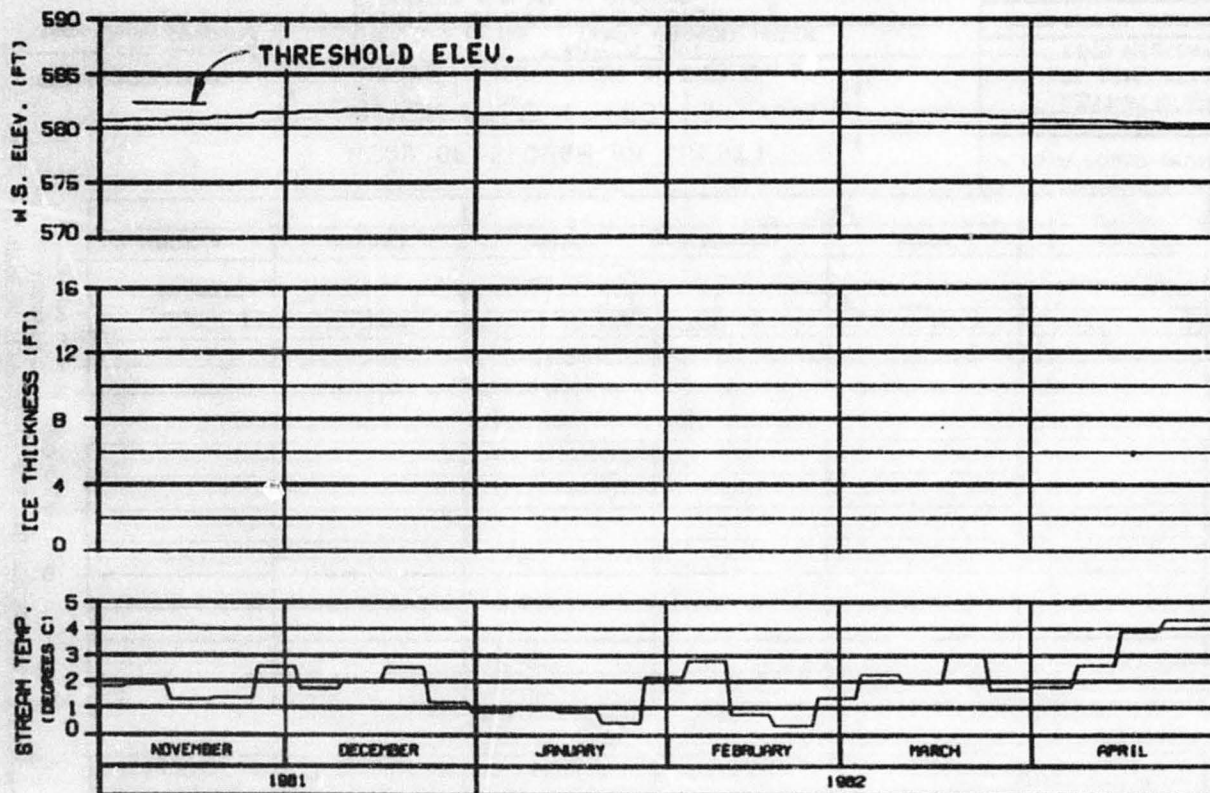
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACO JOINT VENTURE

DRAWN: JLL/PST 8 FEB 82 1000.142



HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-B FLOWS TEMP: WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101EWA

ALASKA POWER AUTHORITY

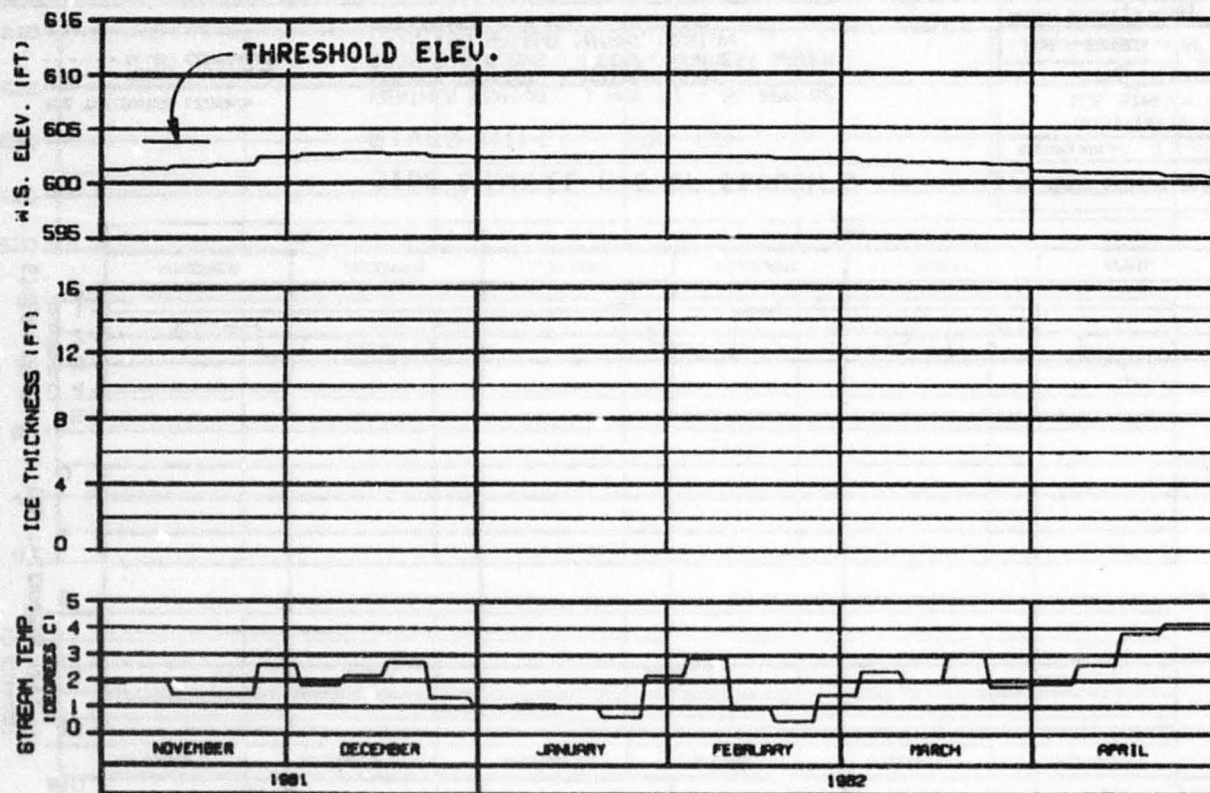
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBASCO JOINT VENTURE

CHANGES - 8/2/82 5 FEB 82 1588.142





**HEAD OF SLOUGH 9**  
**RIVER MILE : 129.30**

**ICE THICKNESS LEGEND.**  
—— TOTAL THICKNESS  
----- BLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-B FLOWS TEMP. WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8101EWA

**ALASKA POWER AUTHORITY**

**SUSITNA PROJECT**

**SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY**

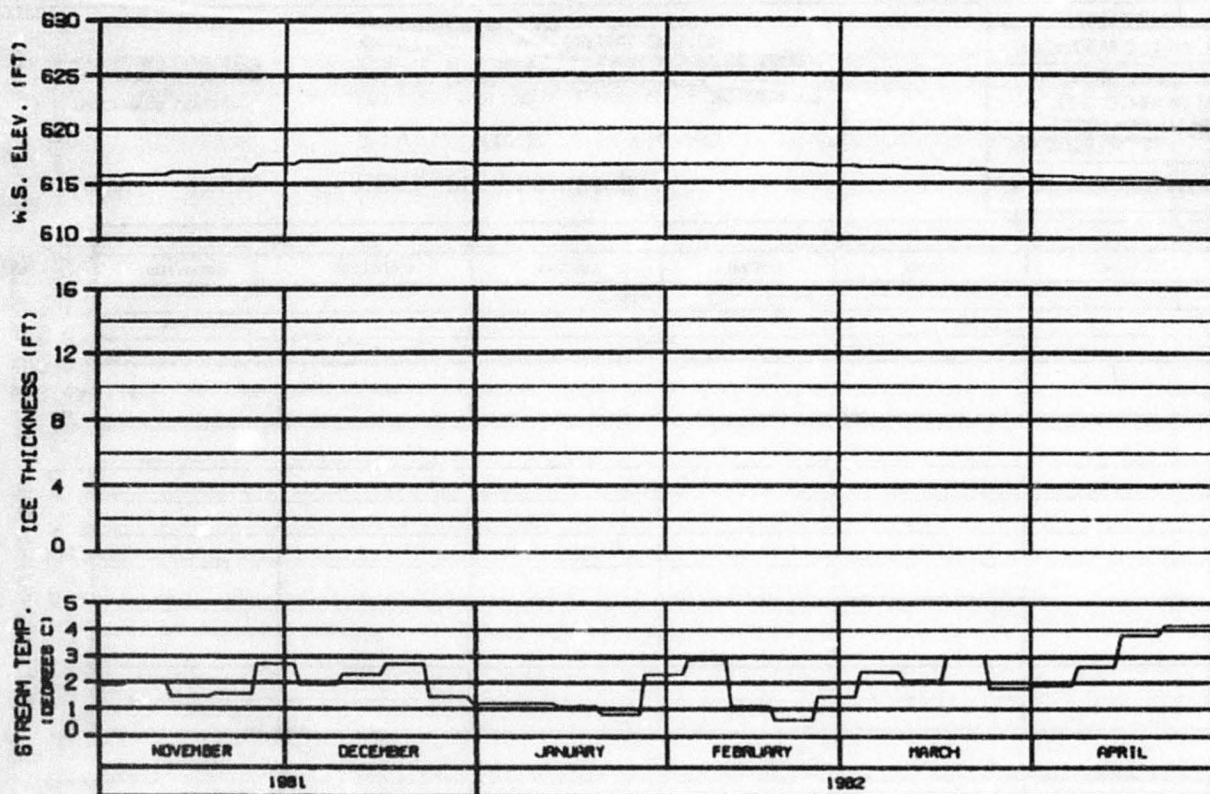
**WARZA-EPASCO JOINT VENTURE**

DESIGNED - ELLIOTT 6 FEB 82 1000.142

OPTION?



OPTION 7



SIDE CHANNEL U/S OF SLOUGH 9  
RIVER MILE : 130.60

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-6 FLOWS TEMP: WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8101EWA

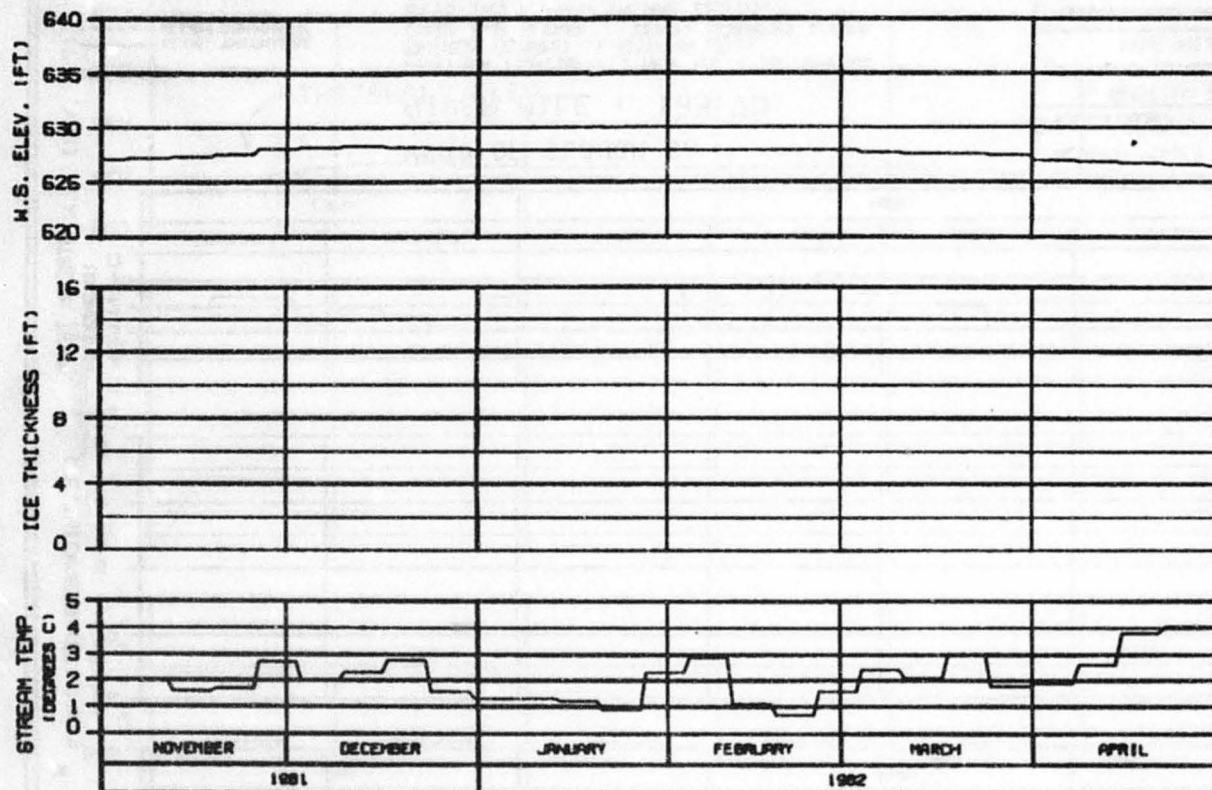
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EDS&CO JOINT VENTURE

DESIGNED BY: JLD/000 5 FEB 82 1000.142



**SIDE CHANNEL U/S OF 4TH JULY CREEK  
RIVER MILE : 131.80**

**ICE THICKNESS LEGEND:**

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-6 FLOWS TEMP: WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8101EWA

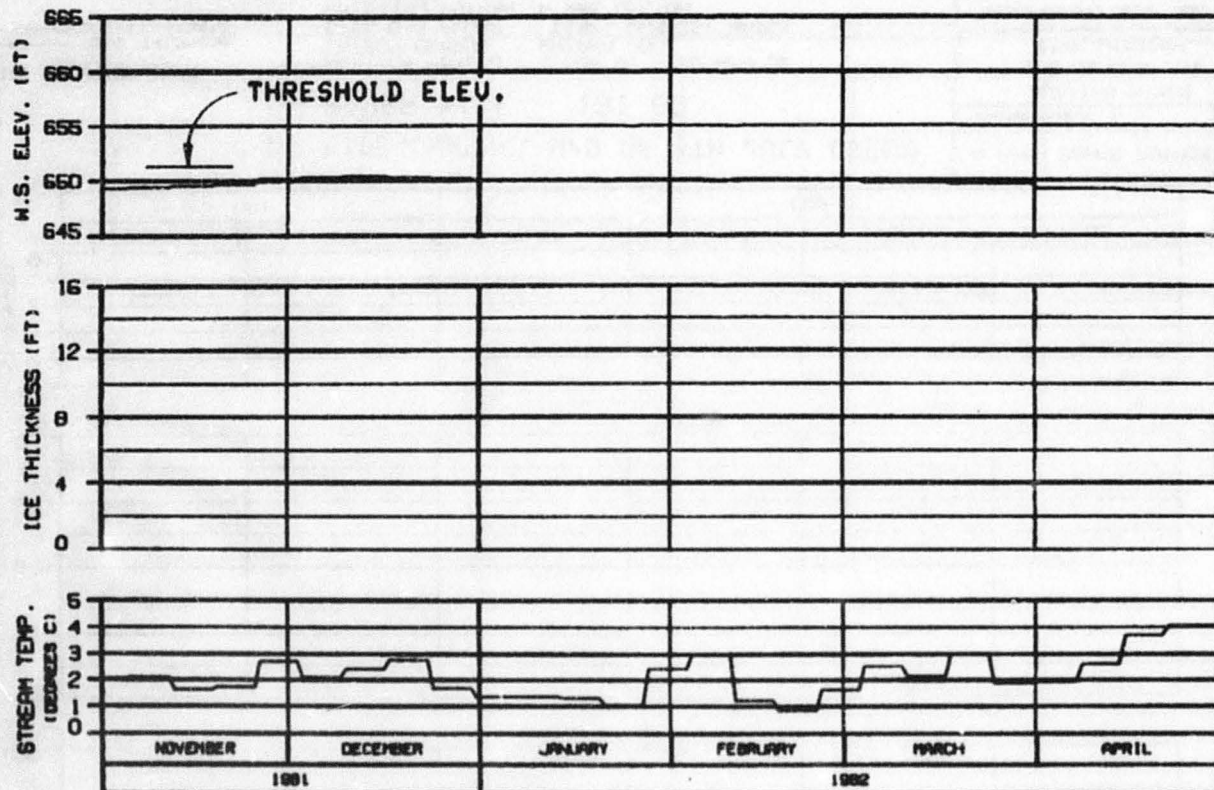
**ALASKA POWER AUTHORITY**

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED BY: B. J. BROWN 5 FEB 82 1000.142

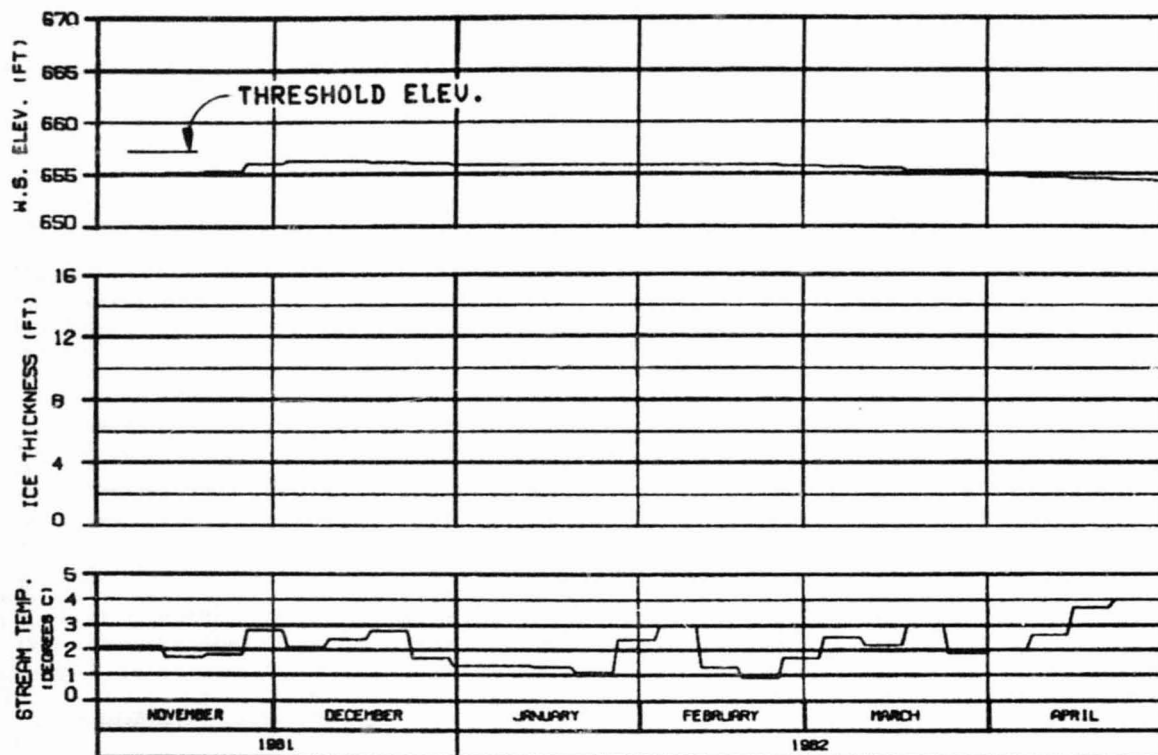


HEAD OF SLOUGH 9A  
RIVER MILE : 133.70

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-6 FLOWS TEMP: WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8101EWA

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER	
ICE SIMULATION	
TIME HISTORY	
HARZA-EBASCO JOINT VENTURE	
CHART NO. E-6-82-001	DATE: 10 FEB 82



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF SLOUGH 10  
 RIVER MILE : 134.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS : TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101EWA

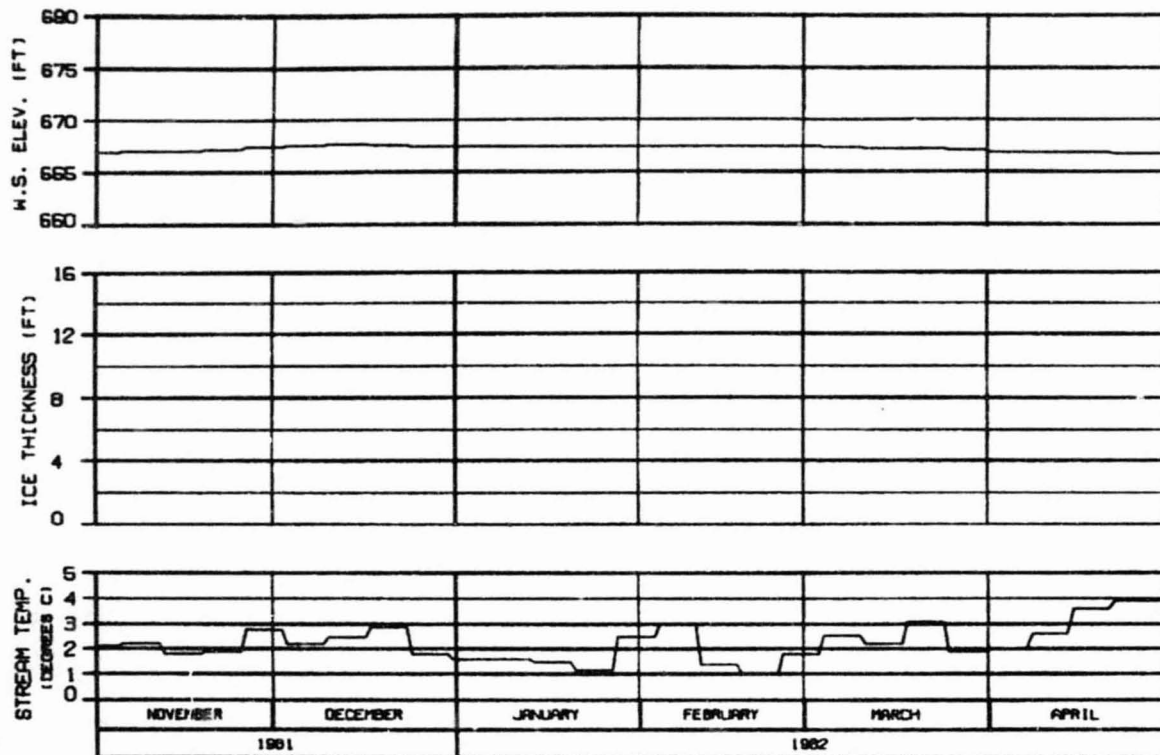
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHGCR. 81-000 8 FEB 82 1000 142



SIDE CHANNEL D/S OF SLOUGH 11

RIVER MILE : 135.30

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-S FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101EWA

ALASKA POWER AUTHORITY.

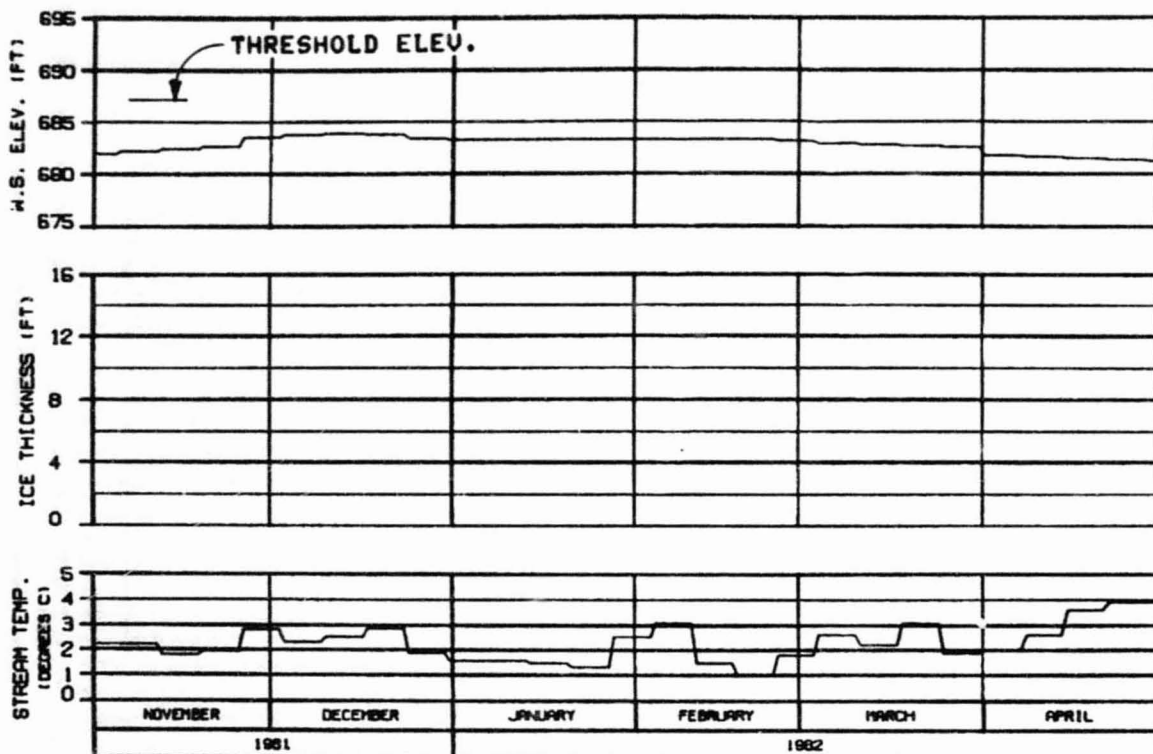
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: B.L.P. 8 FEB 82 1583.142





HEAD OF SLOUGH 11

RIVER MILE : 136.50

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS TEMP: WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101EWA

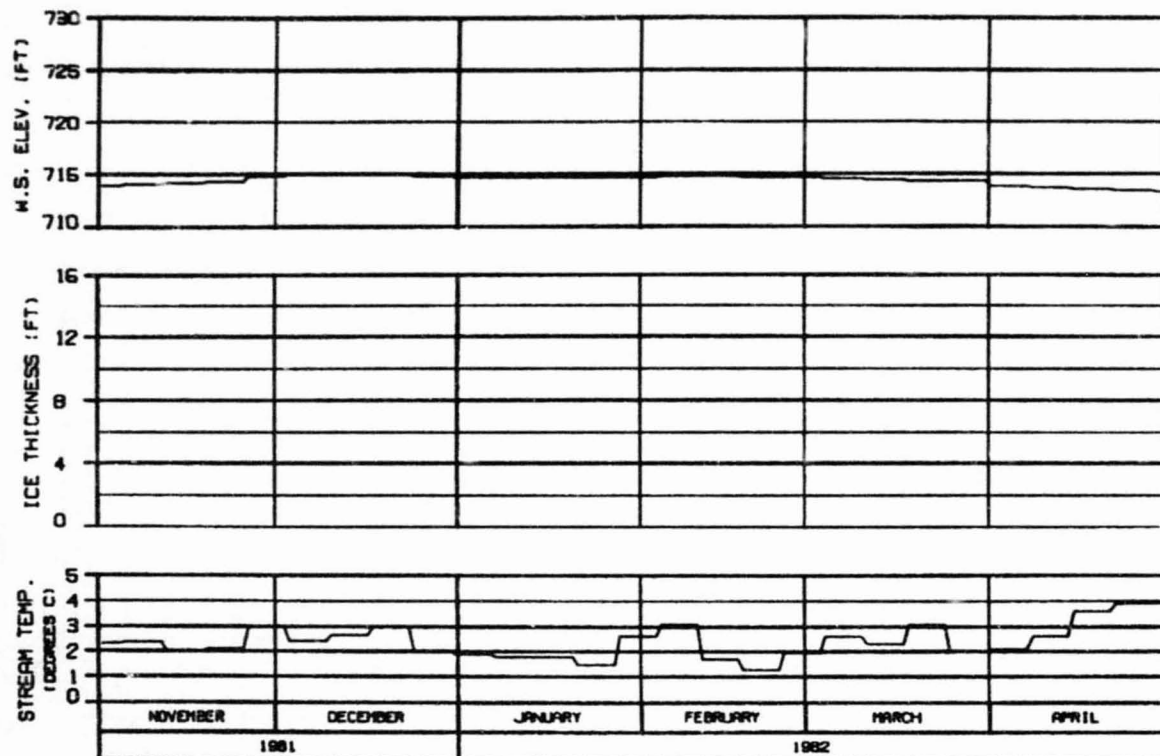
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DISTRICT: SL 0000 0 FEB 82 3000-142



HEAD OF SLOUGH 17  
RIVER MILE : 139.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-6 FLOWS TEMP. WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8101EWA

ALASKA POWER AUTHORITY

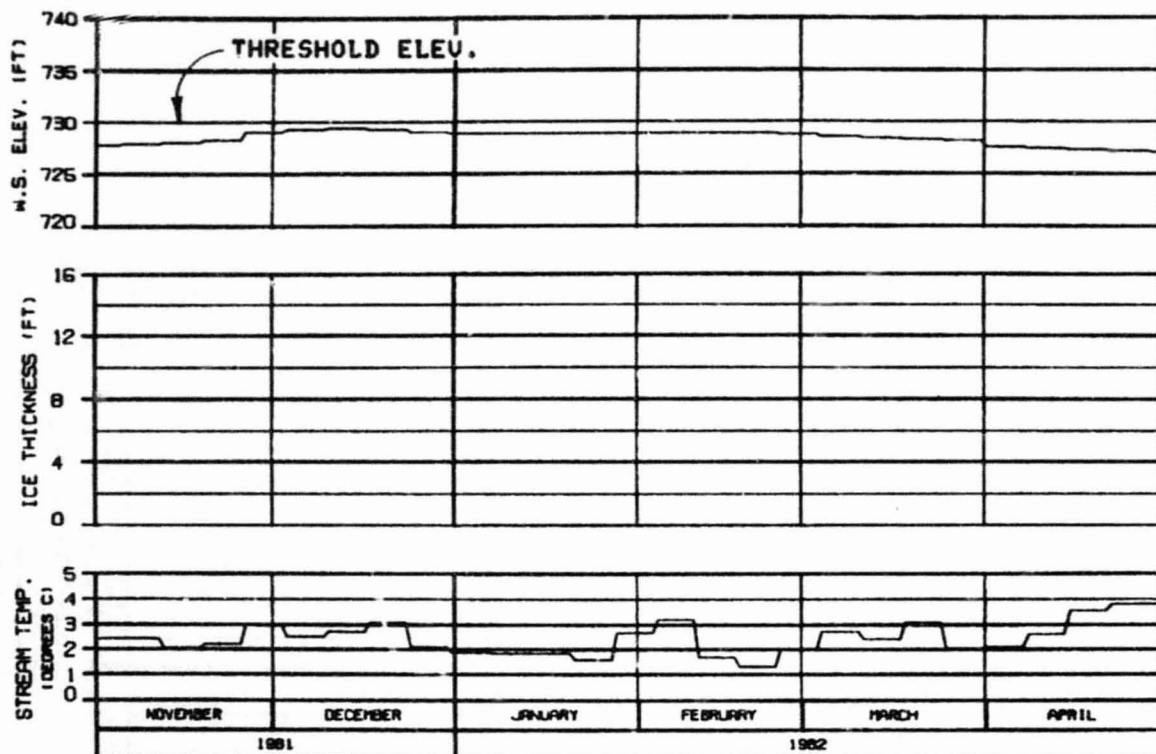
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBASCO JOINT VENTURE

CHESTER, ALASKA 9 FEB 82

1000.142



HEAD OF SLOUGH 20

RIVER MILE : 140.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE E-6 FLOWS TEMP. WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8101EWA

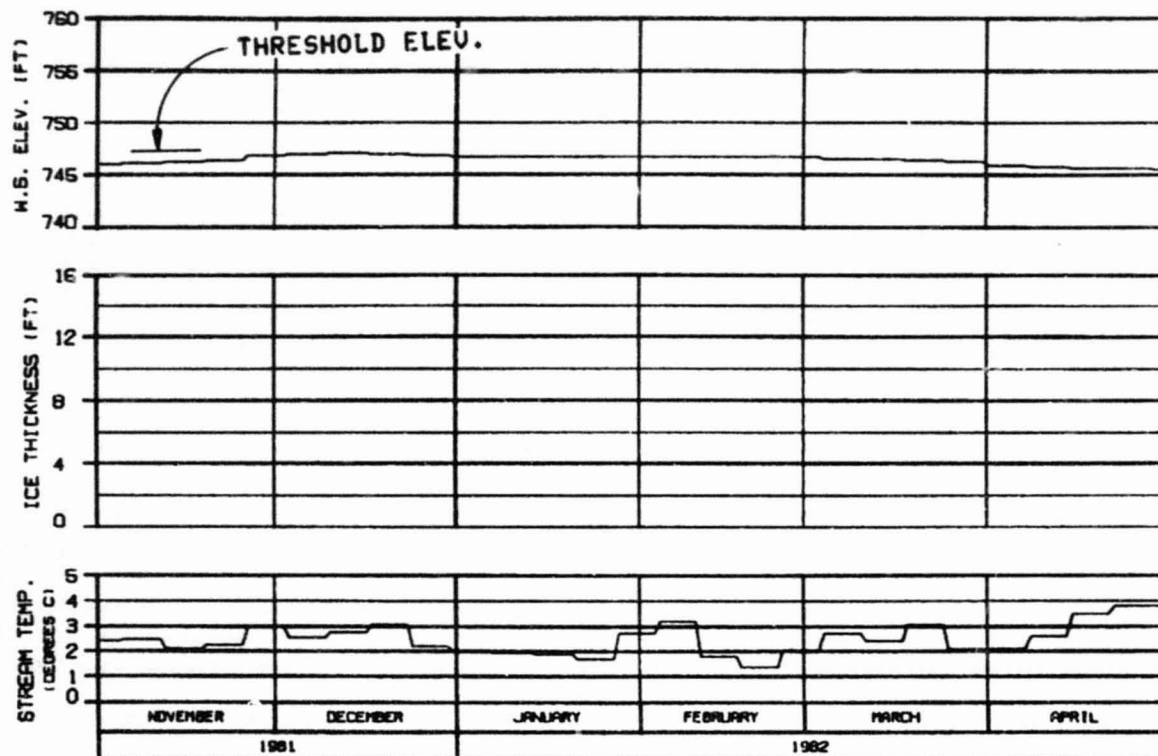
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED BY: ELLIOTT 3 FEB 82 1982, 142



SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS TEMP, WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101EWA

ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER

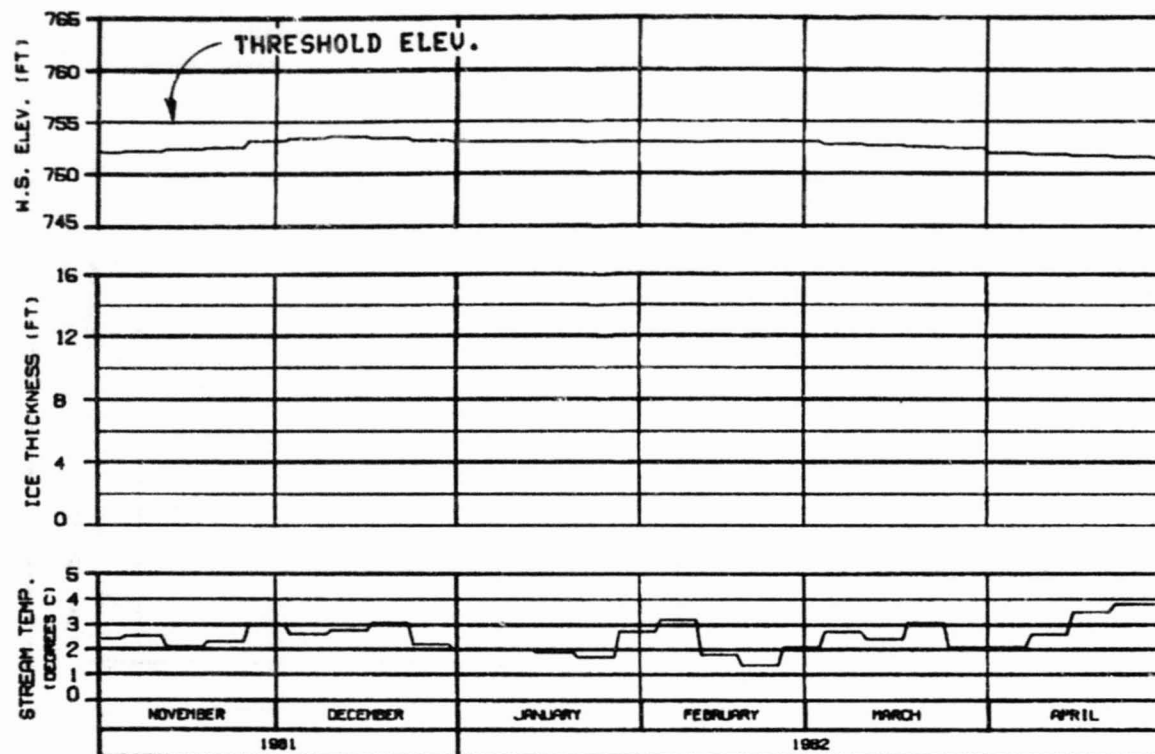
ICE SIMULATION

TIME HISTORY

HAZARD-EBASCO JOINT VENTURE

CHARGE: 81-0101 8 FEB 82

1000.142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 21  
 RIVER MILE : 142.20

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS TEMP: WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101EWA

ALASKA POWER AUTHORITY

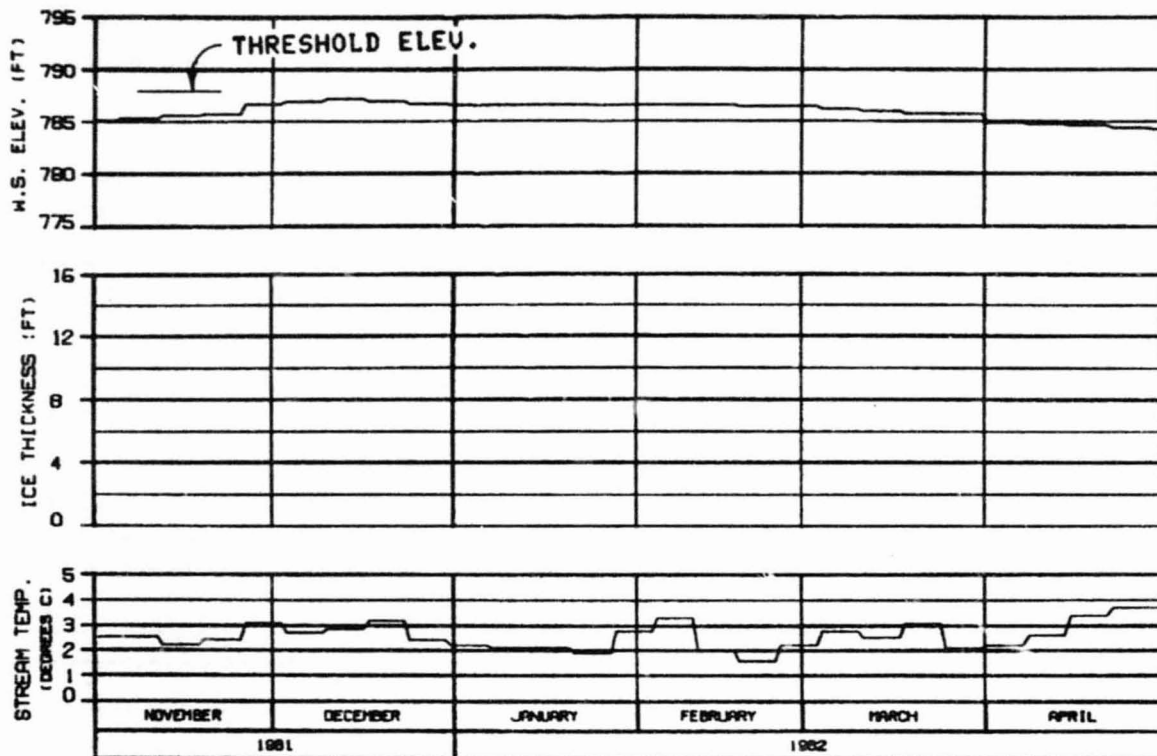
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACO JOINT VENTURE

CHECKED: S.L.D. 8 FEB 82 1982, 142





HEAD OF SLOUGH 22

RIVER MILE : 144.80

## ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE E-6 FLOWS TEMP: WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8101EWA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

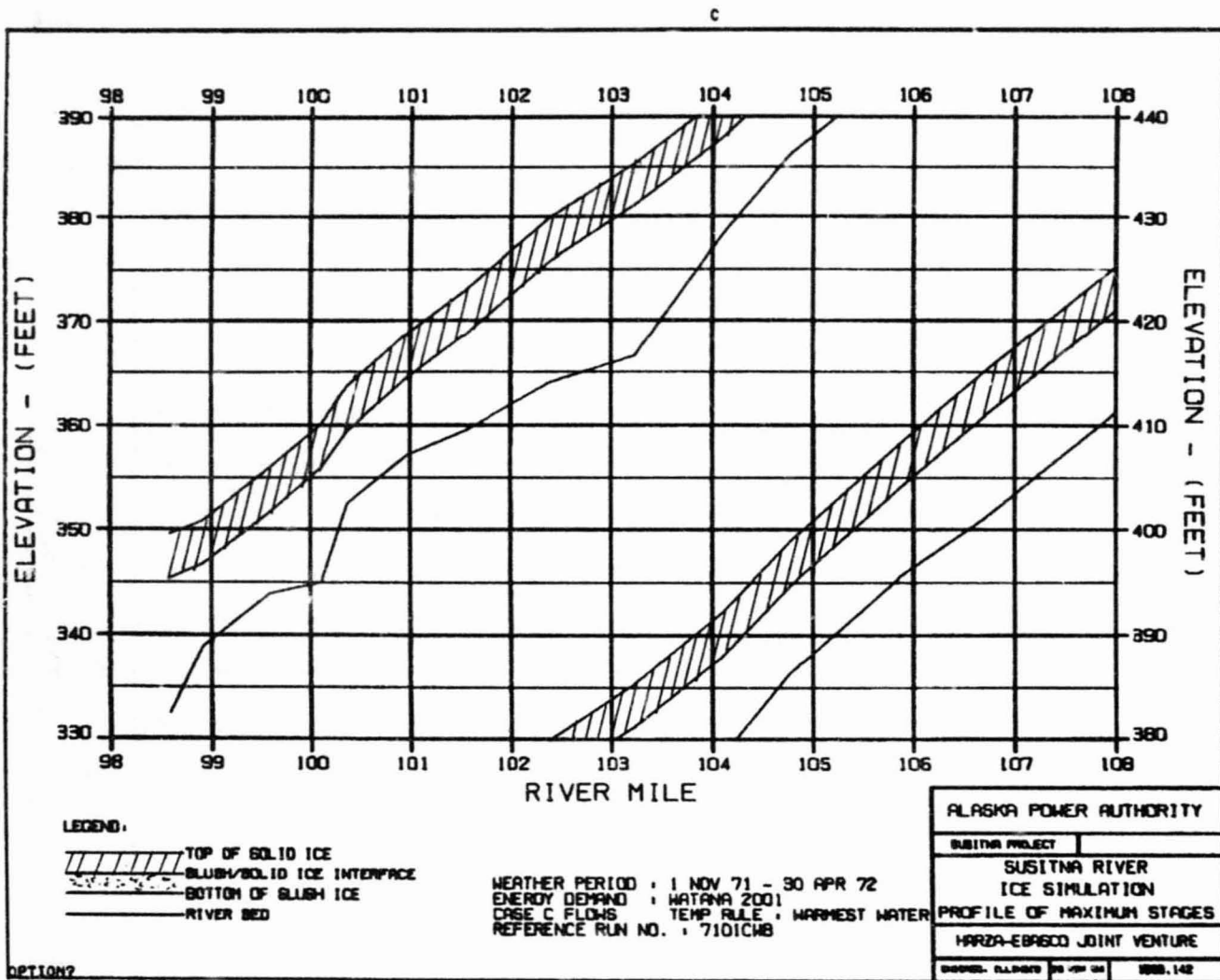
DESIGNED BY HARZA

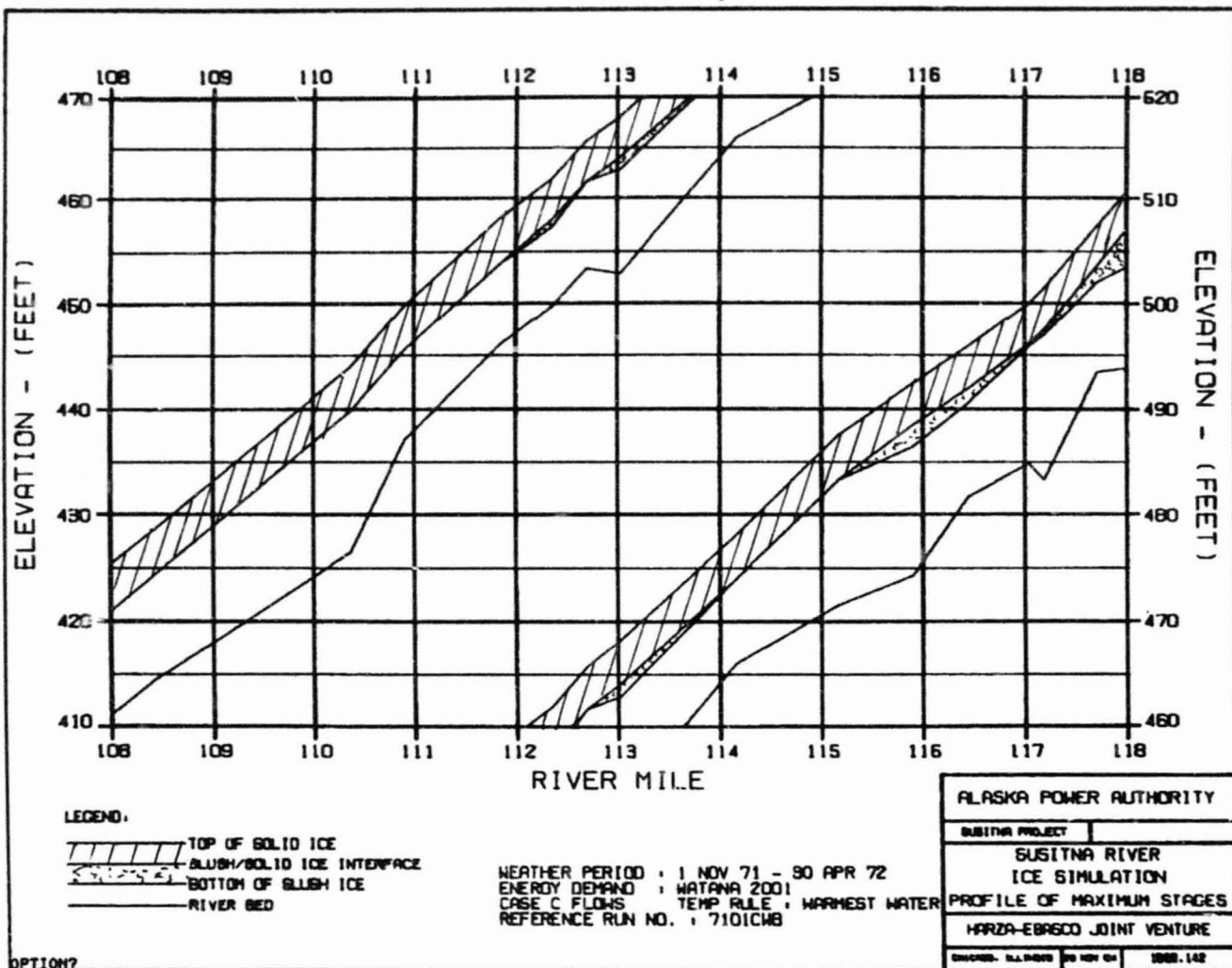
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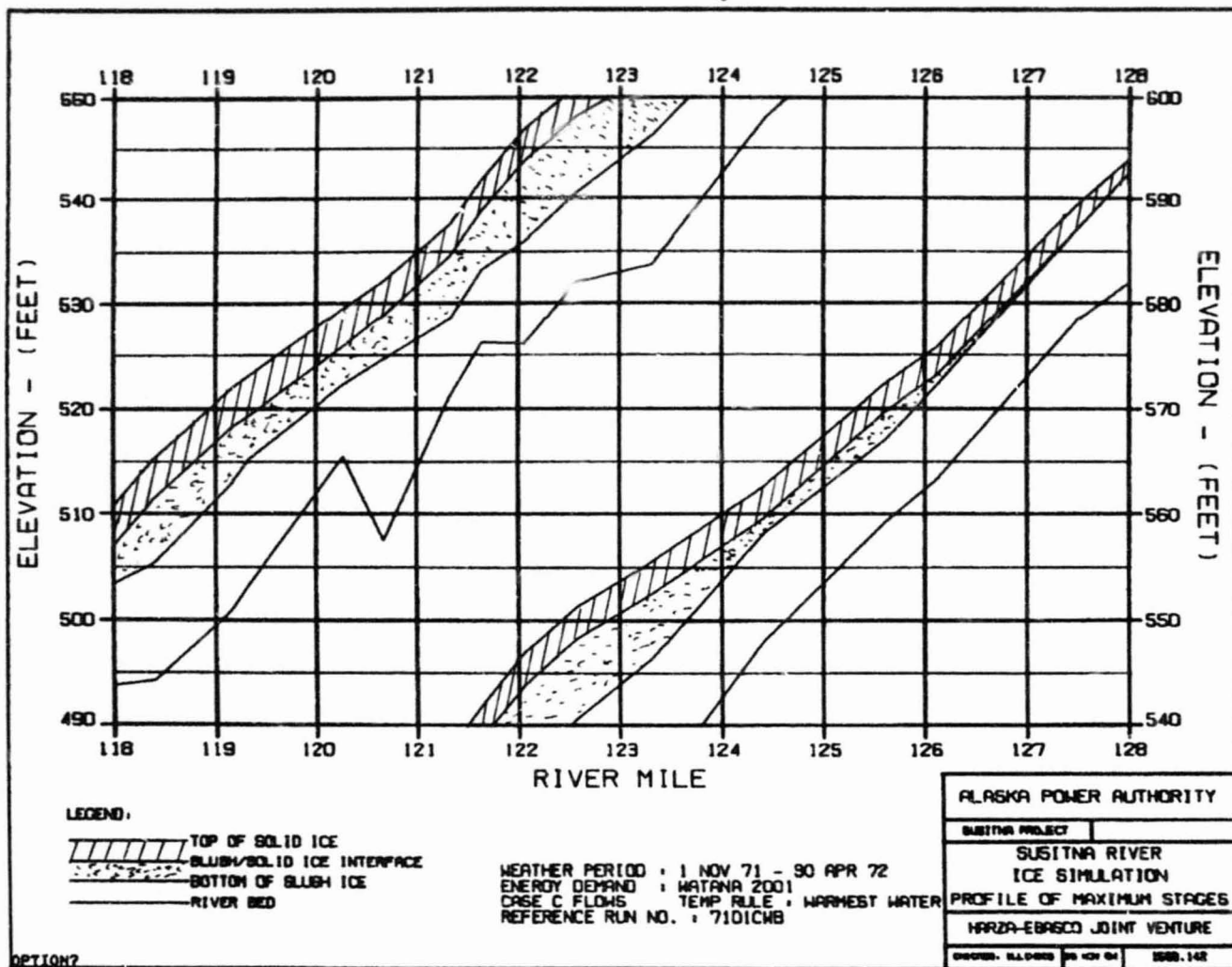
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OPTION?

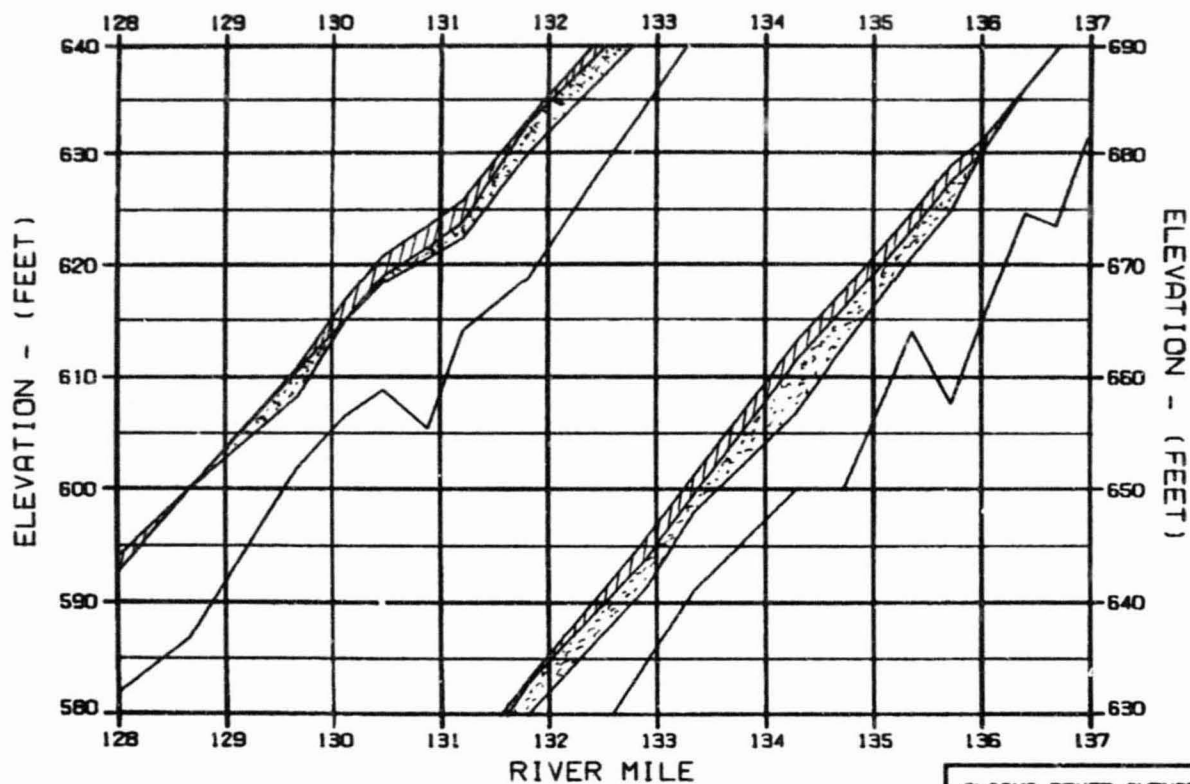
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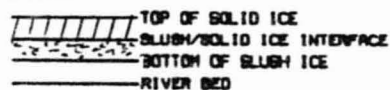








LEGEND:



WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101CMB

ALASKA POWER AUTHORITY

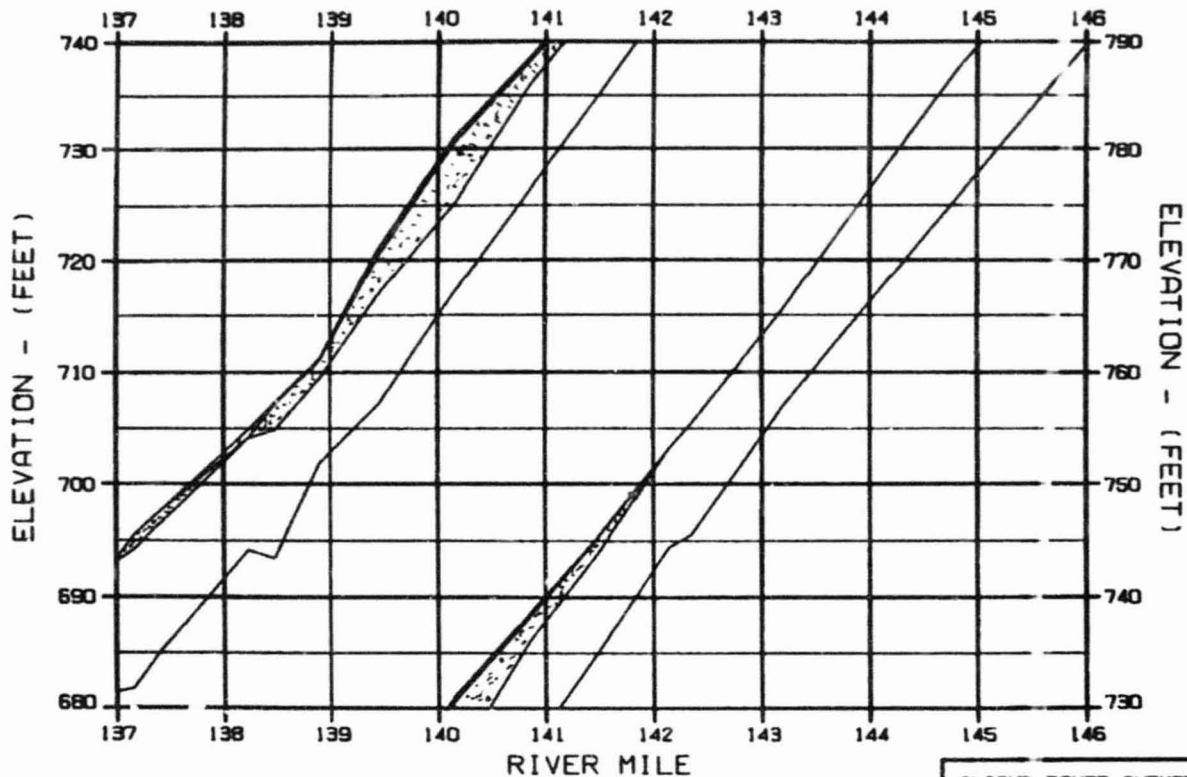
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

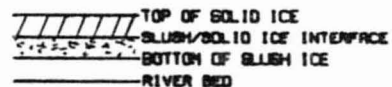
HARZA-EBASCO JOINT VENTURE

DRAWN: AL-0000 25 NOV 71 1000.142

OPTION 2



LEGEND:



WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS : TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101CHB

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER

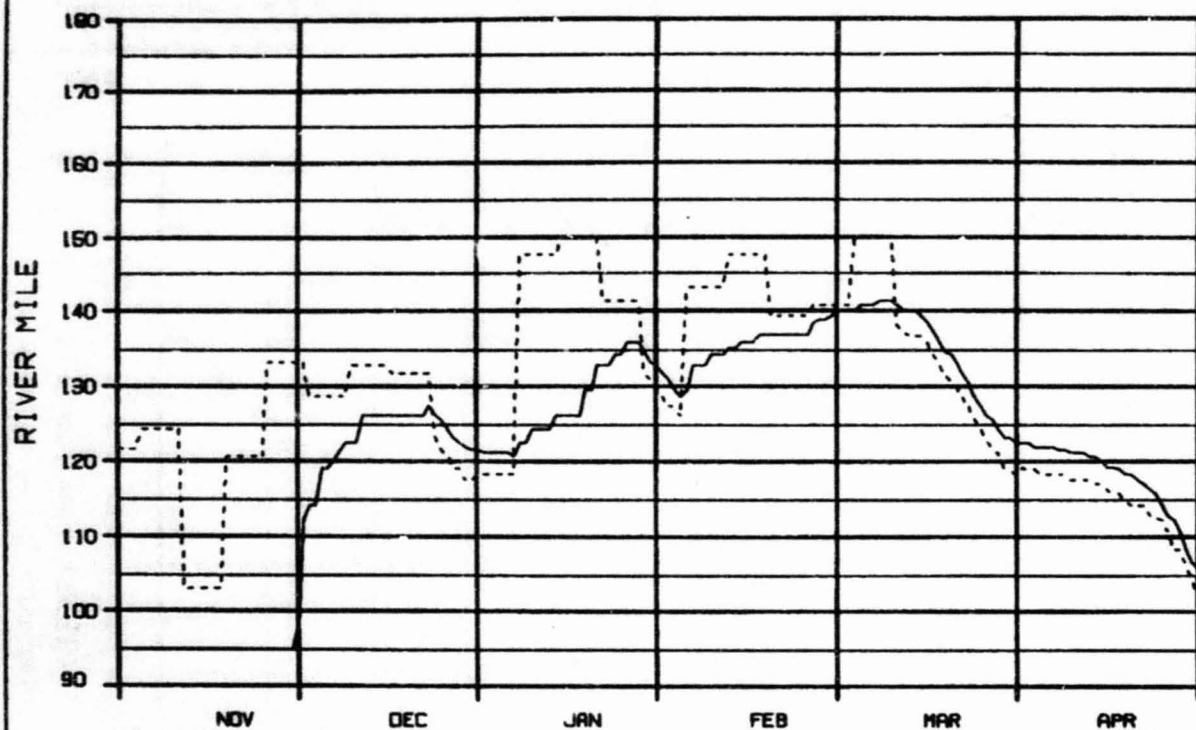
ICE SIMULATION

PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

DESIGNED BY: [ ] DRAWN BY: [ ] DATE: 1988.142

OPTION 7



LEGEND:

—— ICE FRONT  
 - - - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE C TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101CWB

OPTION 7

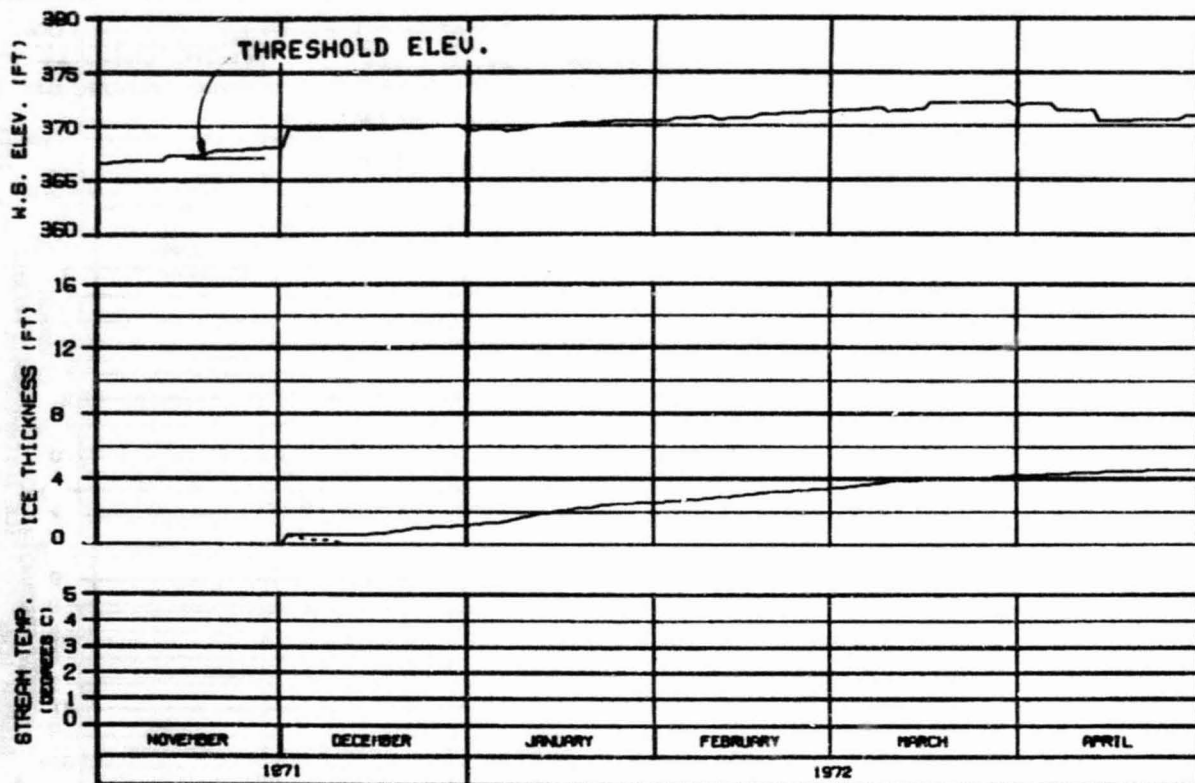
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

HAZRA-EBASCO JOINT VENTURE

GRAPH: 511-005 25 NOV 81 1000.142



# HEAD OF WHISKERS SLOUGH RIVER MILE : 101.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : 7101CHB

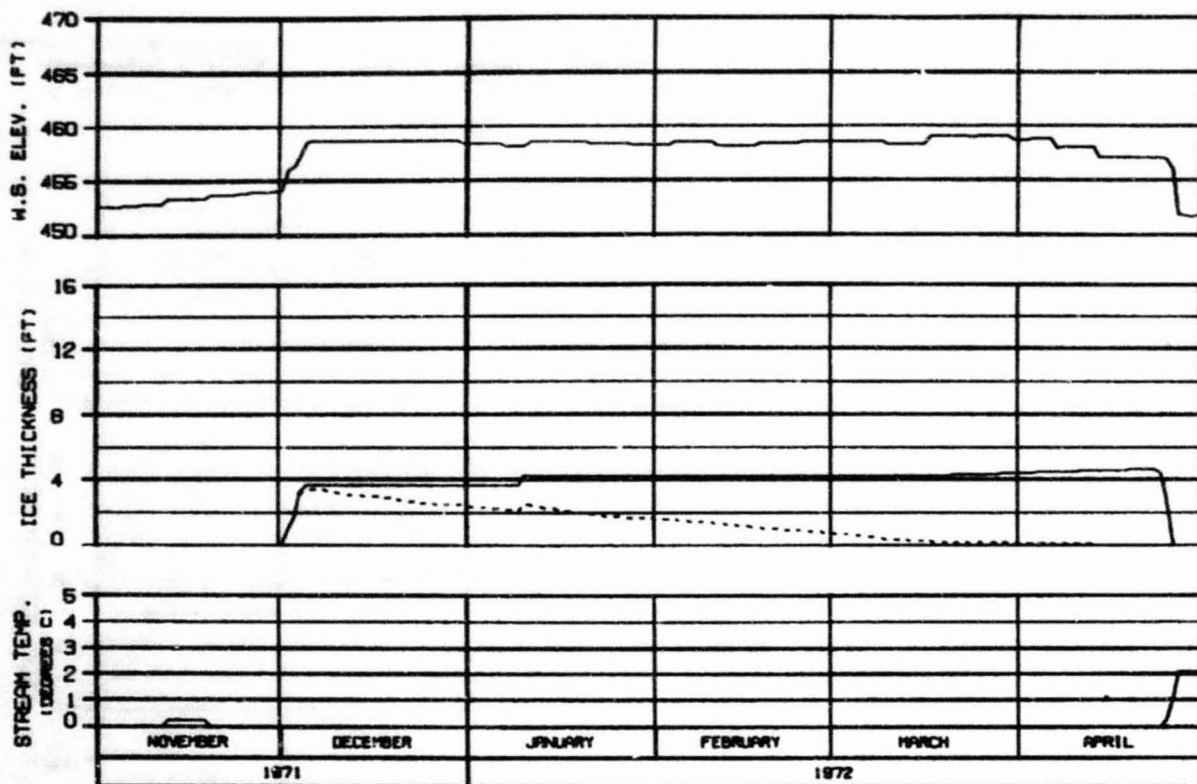
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHGNO. 01.0000 01 MAY 71 000.142



**SIDE CHANNEL AT HEAD OF GASH CREEK**  
**RIVER MILE : 112.00**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101CH8

**ALASKA POWER AUTHORITY**

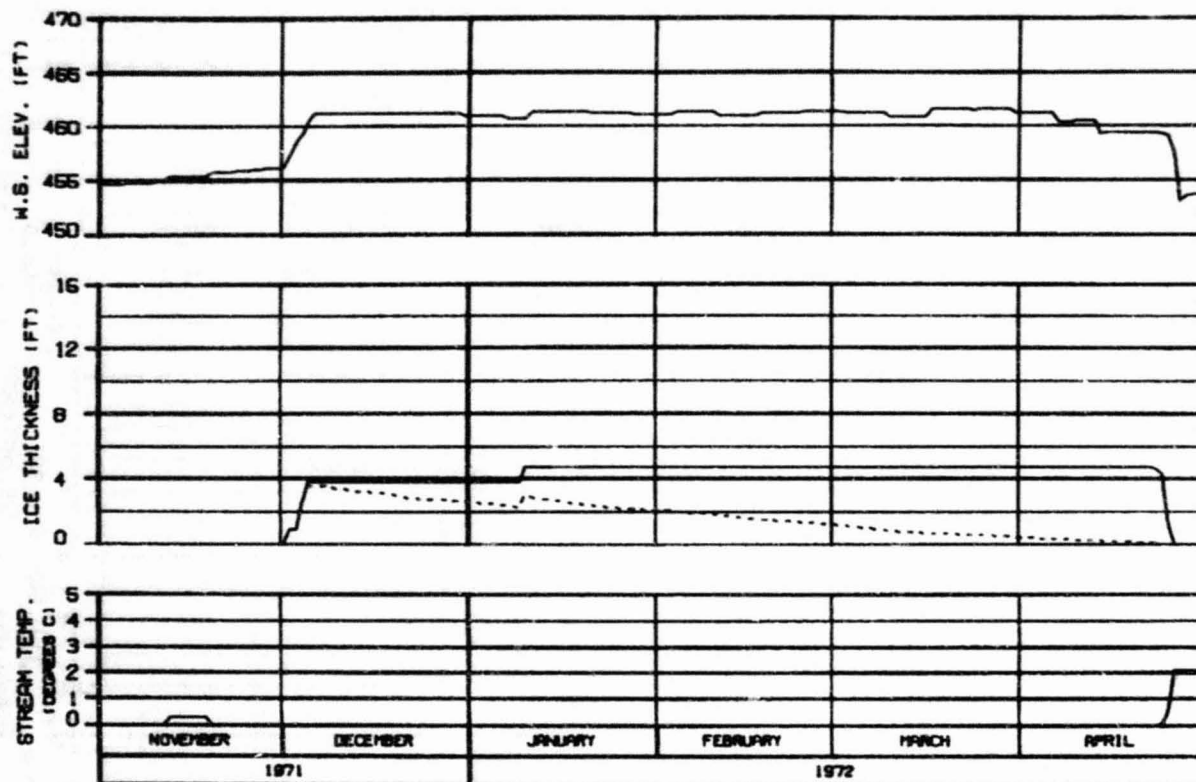
**SUSITNA PROJECT**

**SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY**

**HAZRA-EBRISCO JOINT VENTURE**

CHUBB, S.L. & SONS 30 APR 72 1000.142





MOUTH OF SLOUGH 6A

RIVER MILE : 112.34

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - BLUISH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101C-8

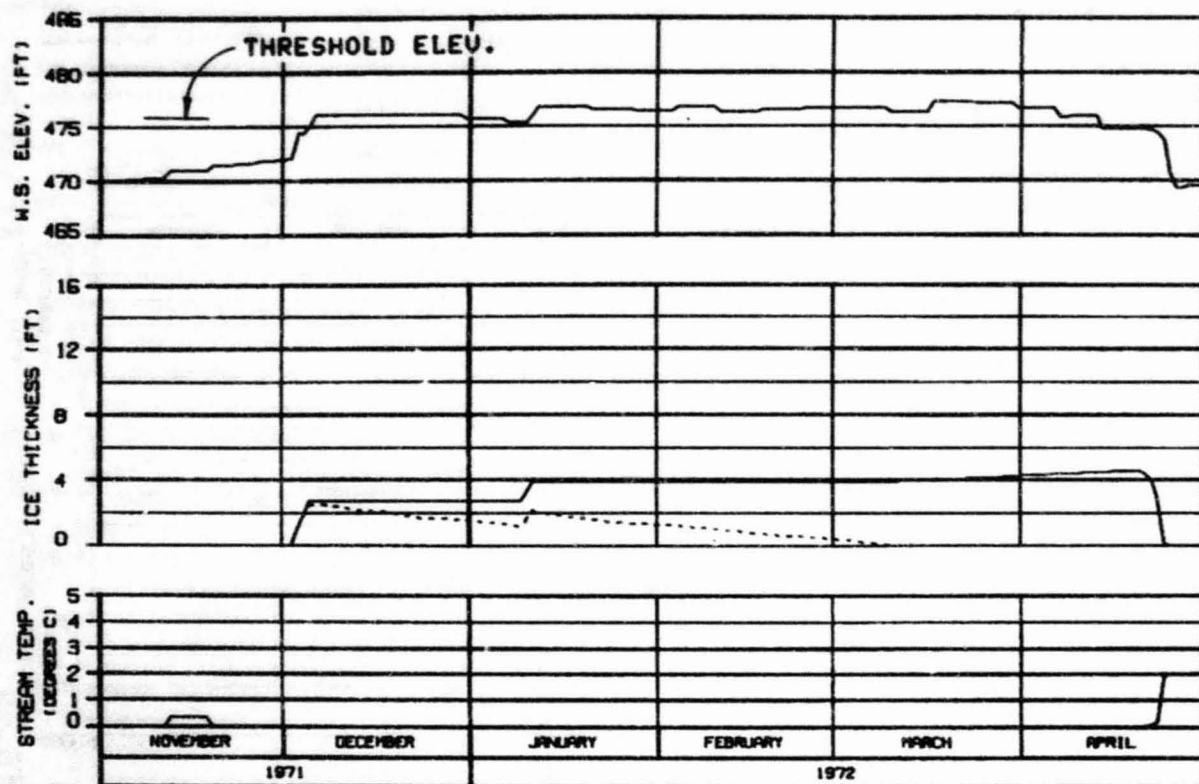
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EG&G JOINT VENTURE

DESIGNED BY: J. L. HARRIS 20 NOV 71 1982.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 8  
 RIVER MILE : 114.10

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101CH8

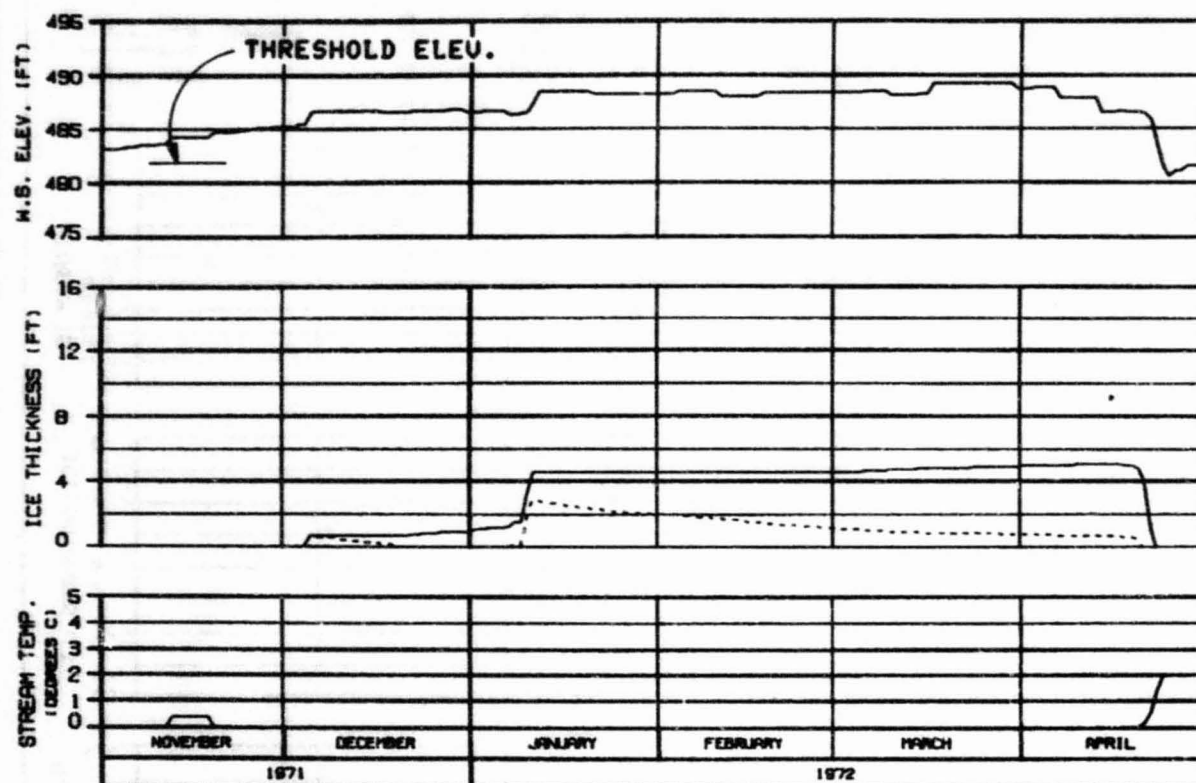
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: A.L.D. 000 25 APR 72 000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL MSII

RIVER MILE : 115.50

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS : TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101C4B

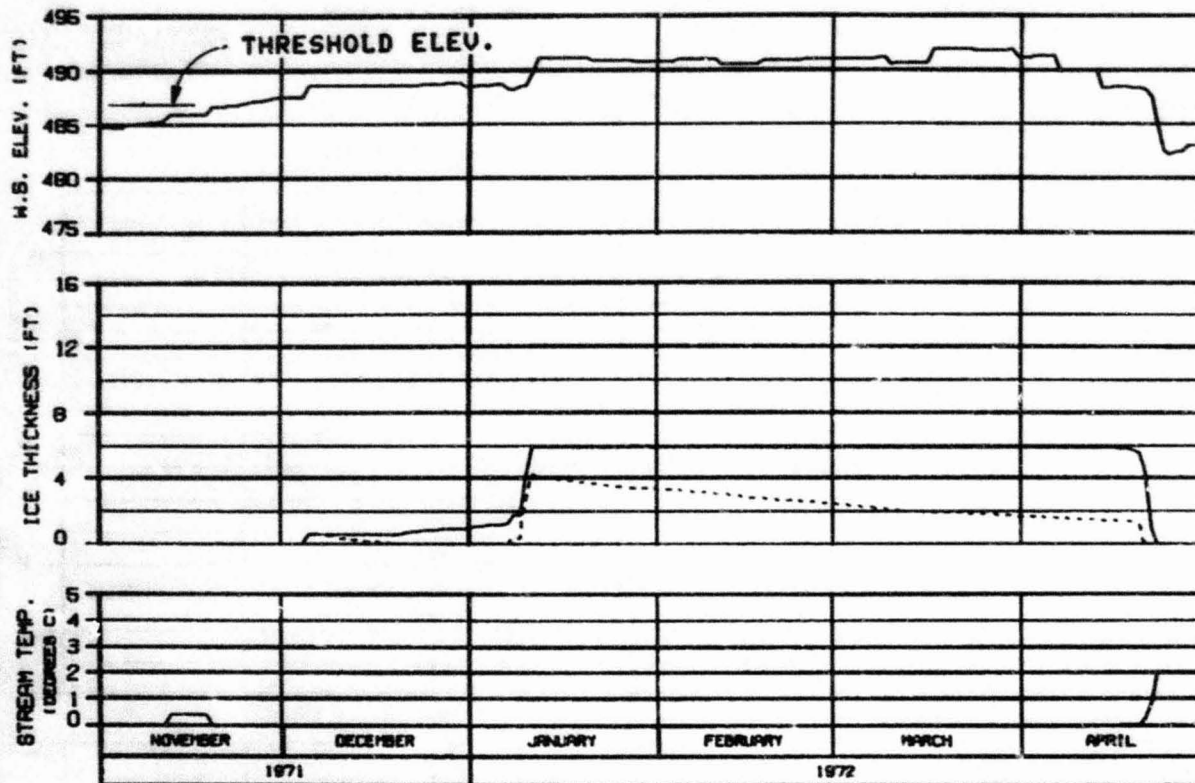
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

MARZA-EBASCO JOINT VENTURE

DESIGN - 11/71 12/71 1/72 2/72 3/72 4/72



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SIDE CHANNEL MSII  
 RIVER MILE : 115.90

WEATHER PERIOD : 1 NOV '71 - 30 APR '72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101CWB

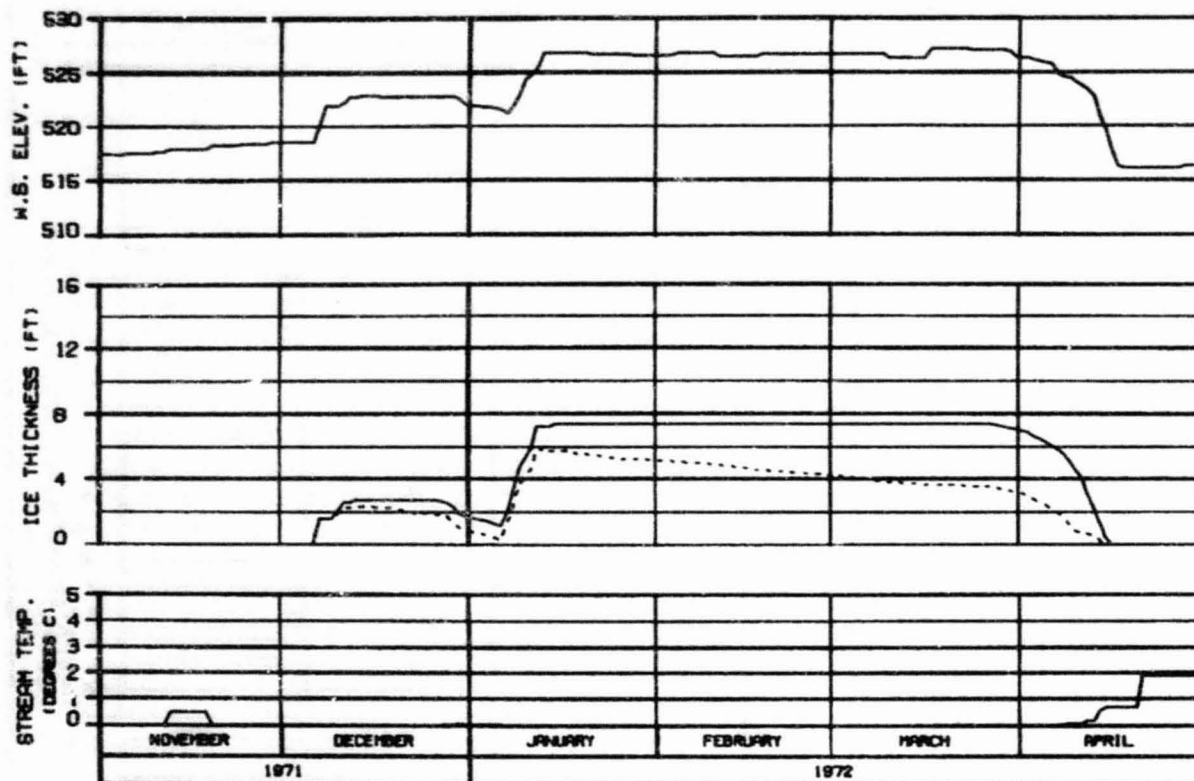
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHARGE: 01.0000 00 NOV 81 0000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101CHB

ALASKA POWER AUTHORITY

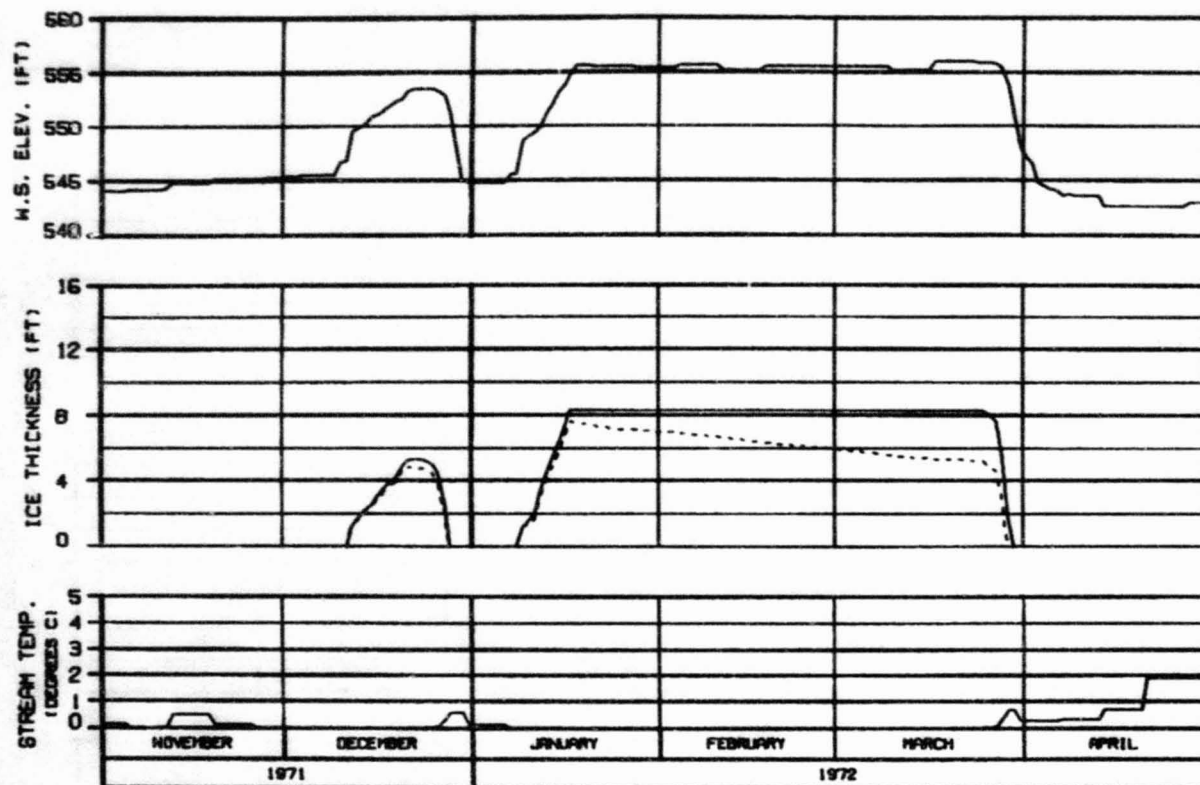
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EDSICO JOINT VENTURE

DESIGN: SLD/SHS 20 NOV 81 1000.142





# HEAD OF MOOSE SLOUGH RIVER MILE : 123.50

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101C4B

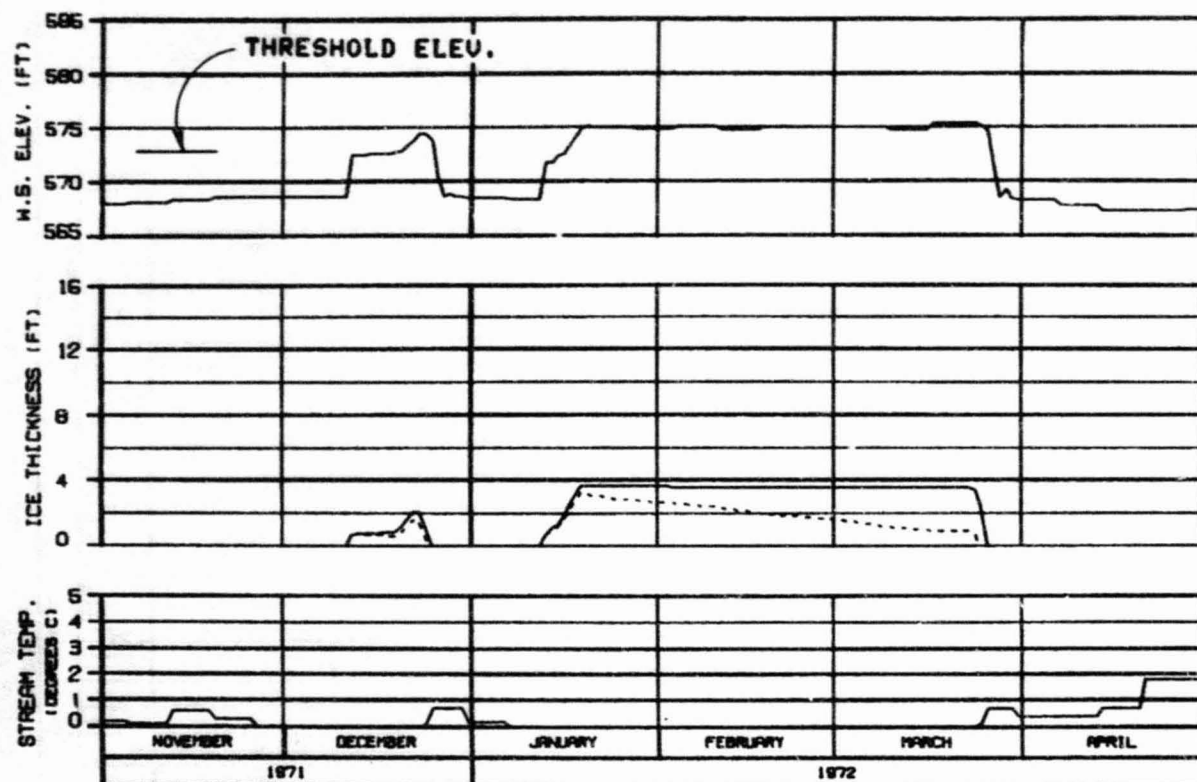
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: J. L. HARRIS 28 NOV 74 1000.142



HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101048

ALASKA POWER AUTHORITY

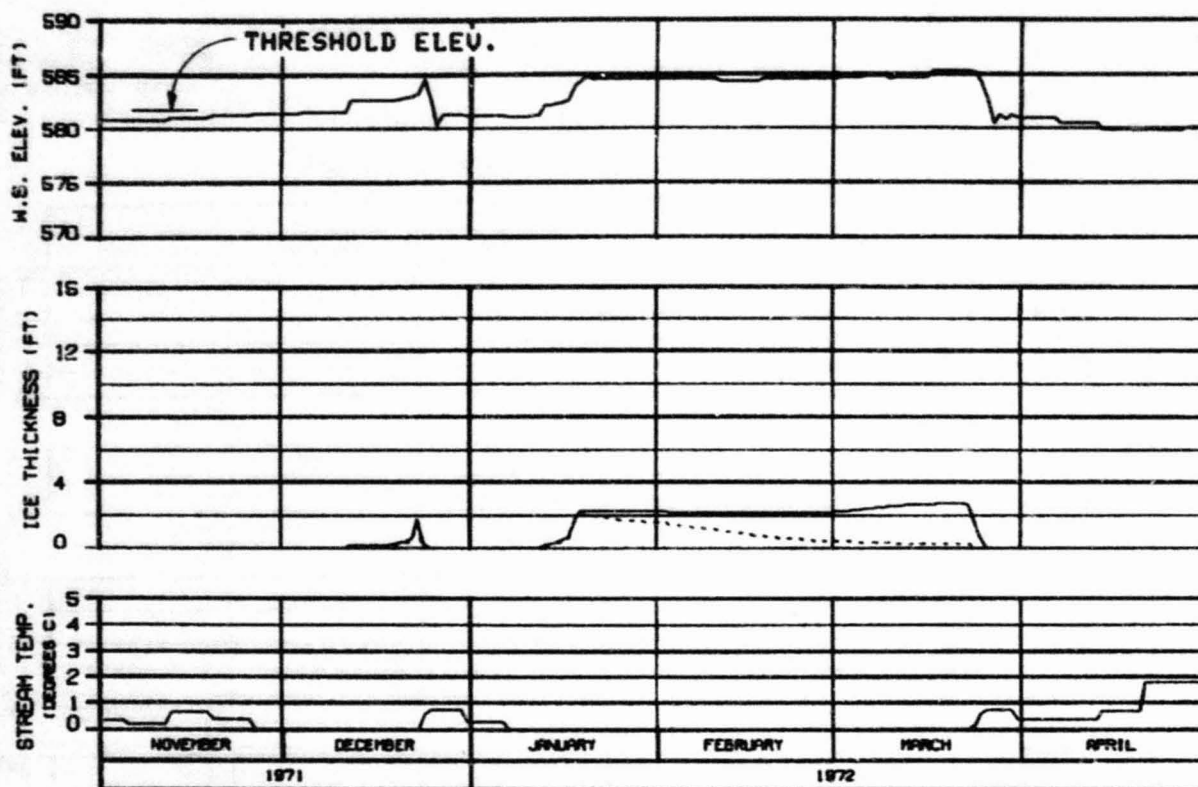
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED - S.L. PETERSON DRAWN - S.L. PETERSON

1982-142



HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101CHB

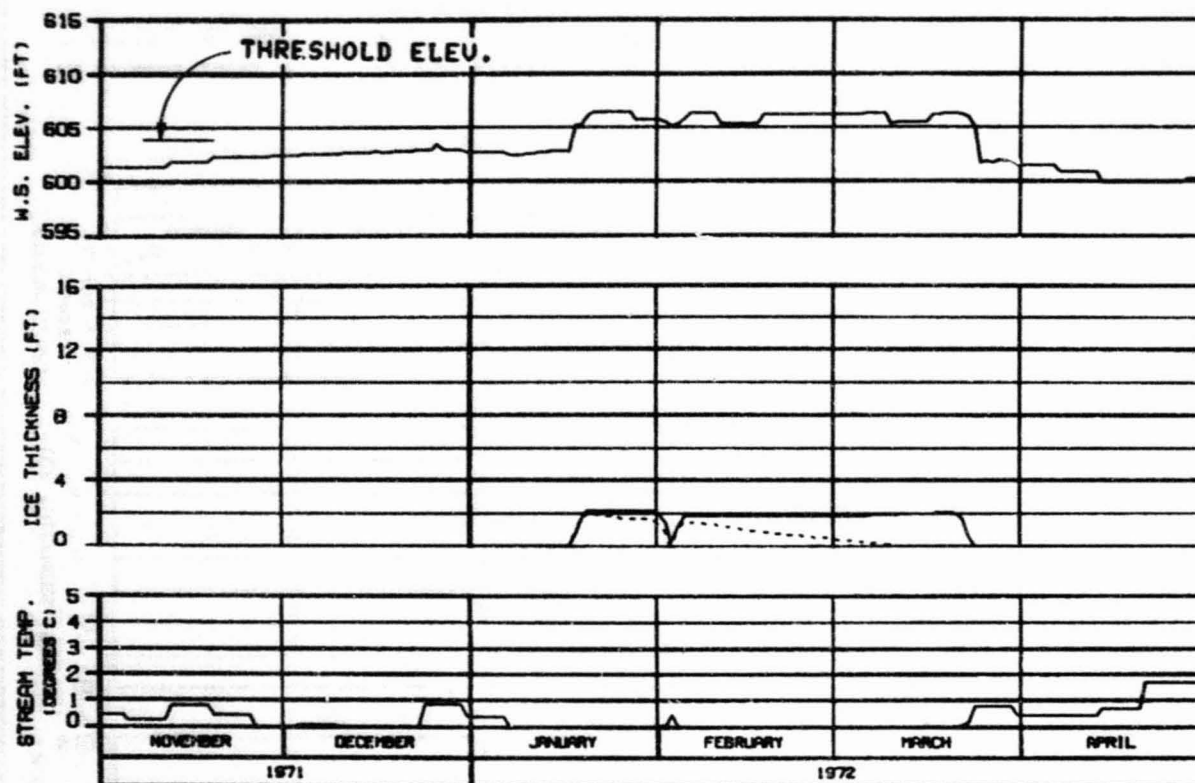
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHG-000-01-0000 20 NOV 71 0000-142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

HEAD OF SLOUGH 9  
 RIVER MILE : 129.30

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101C48

ALASKA POWER AUTHORITY

SUSITNA PROJECT

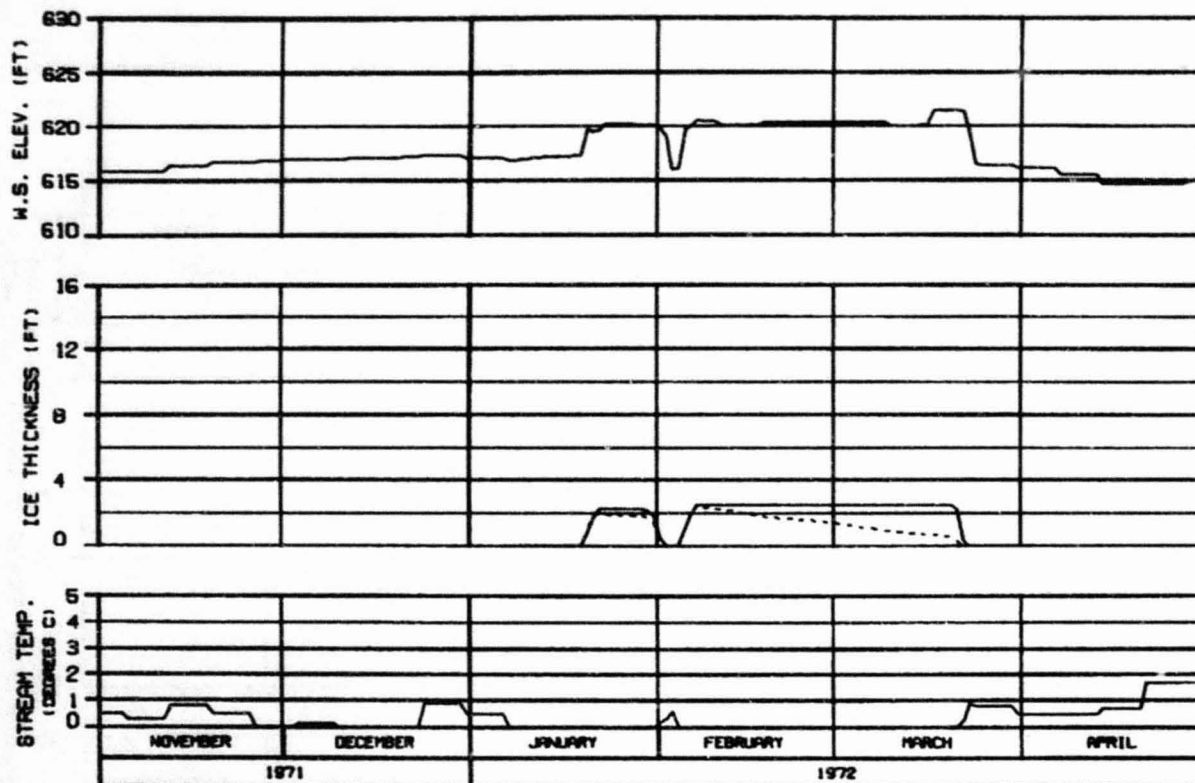
SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHARTED - 11/1/80 20 NOV 81 1988.148

OPTION?

OPTION?



SIDE CHANNEL U/S OF SLOUGH 9  
RIVER MILE : 130.60

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : MATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : 7101CHB

ALASKA POWER AUTHORITY

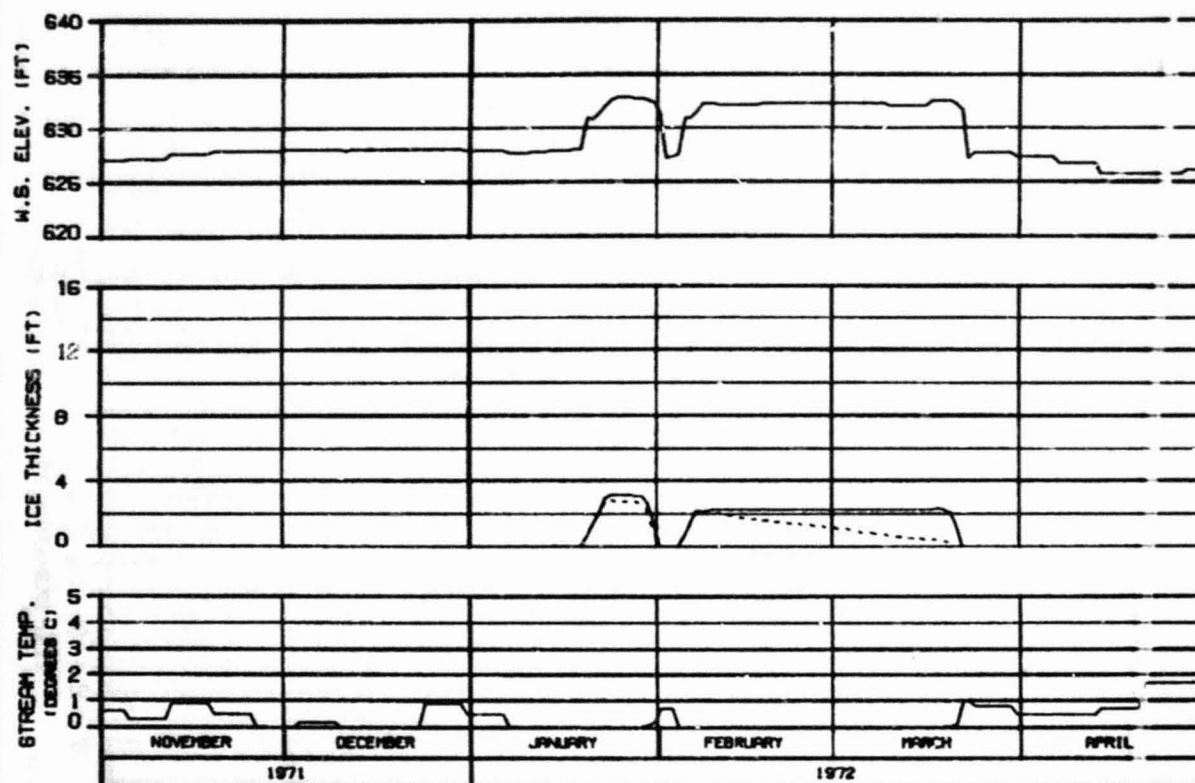
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBR600 JOINT VENTURE

DESIGNED BY: J. L. BROWN 28 NOV 71 1005.142





SIDE CHANNEL U/S OF 4TH JULY CREEK  
RIVER MILE : 131.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : NATANA 2001  
CASE C FLOWS : TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : 7101CWB

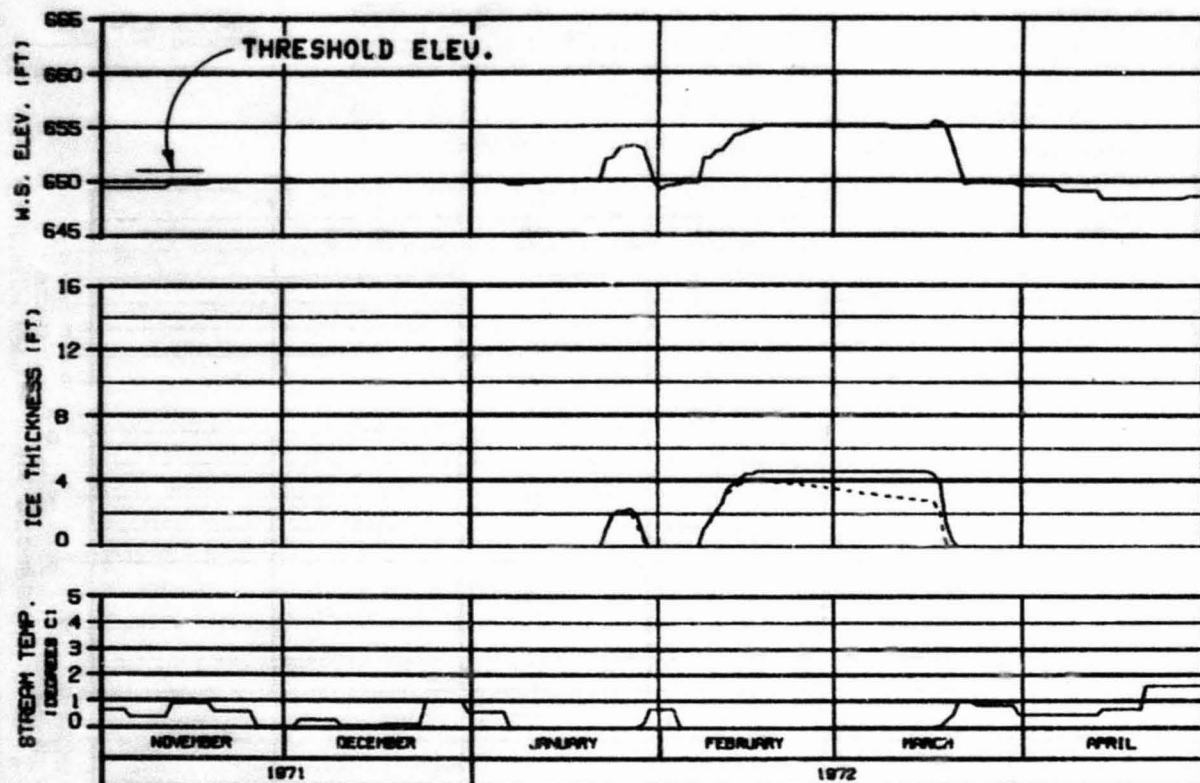
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRACO JOINT VENTURE

DESIGN: S. L. BROWN 30 BY 34 1000, 142



HEAD OF SLOUGH 9A  
RIVER MILE : 133.70

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : 7101C48

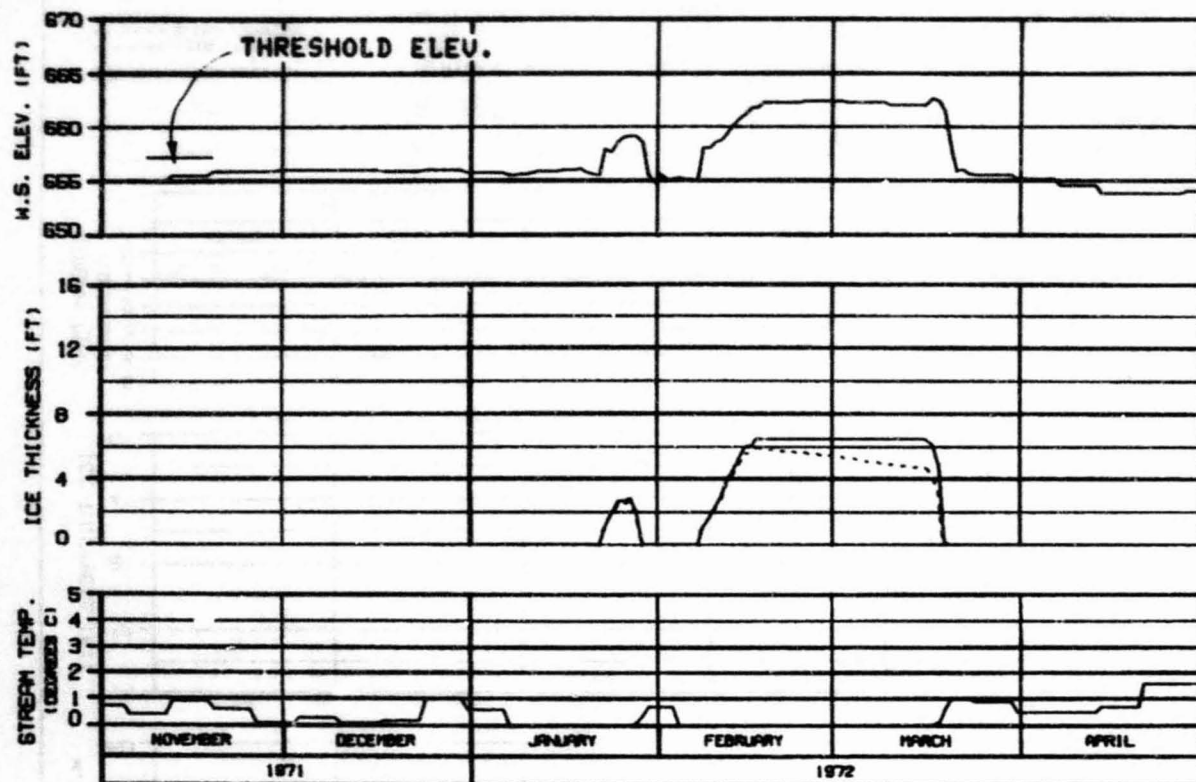
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRARD JOINT VENTURE

DRAWN: J. L. DAVIS BY: J. L. DAVIS 1000, 142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF SLOUGH 10  
 RIVER MILE : 134.30

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 710104B

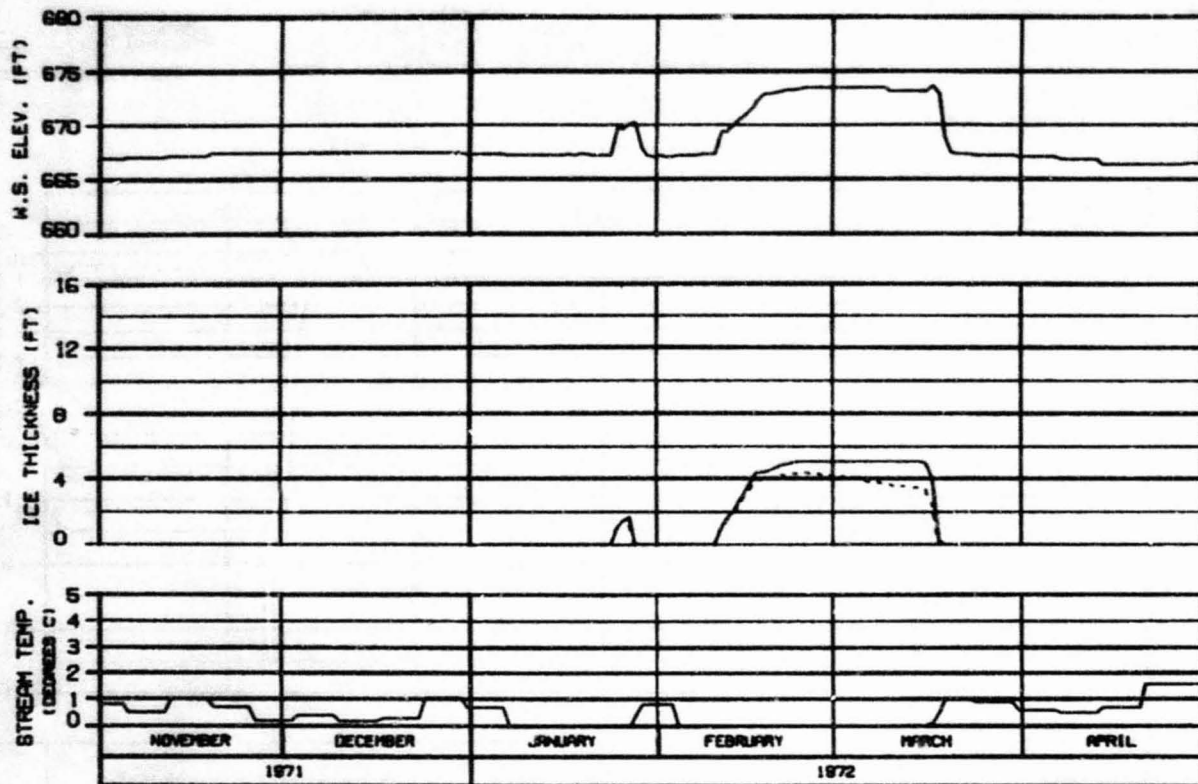
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HEARZ-EBASCO JOINT VENTURE

DESIGNED: ALP/MSD 30 NOV 71 1000, 142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL D/S OF SLOUGH 11  
 RIVER MILE : 135.30

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101C4B

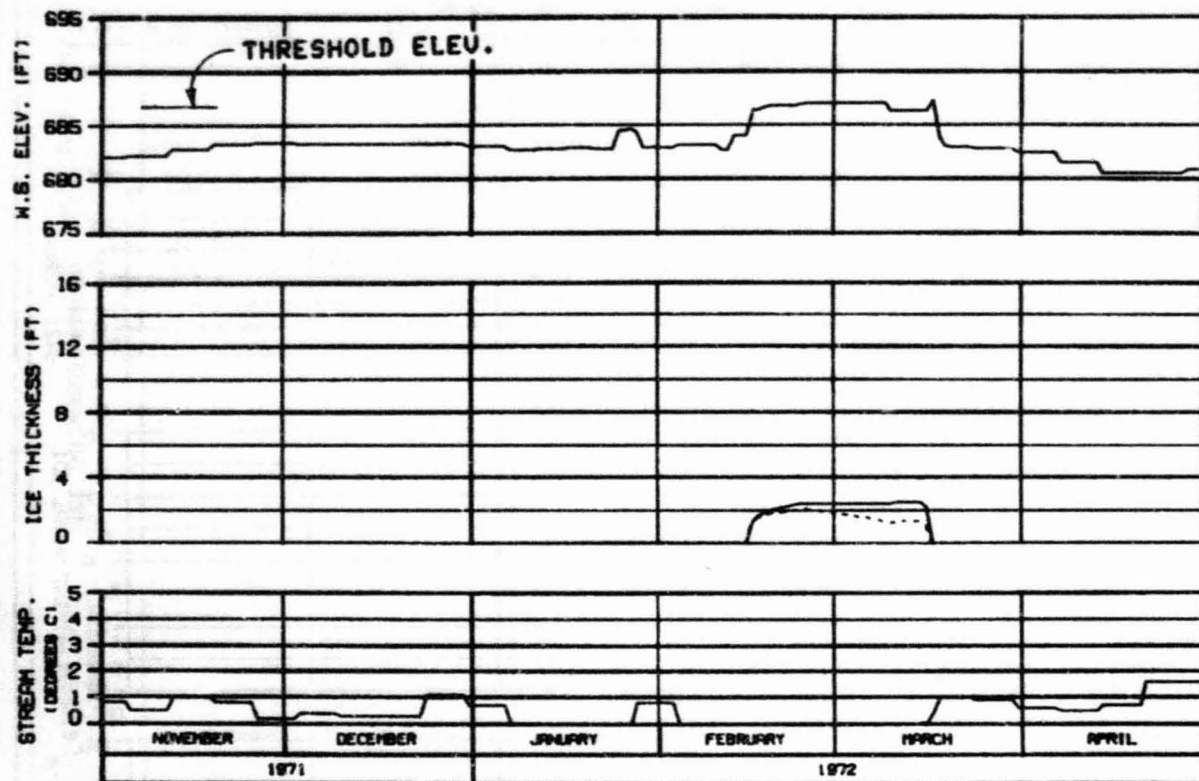
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACCO JOINT VENTURE

DESIGN: EBRACCO 25 NOV 71 1000, 142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 11  
 RIVER MILE : 136.50

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101C4B

ALASKA POWER AUTHORITY

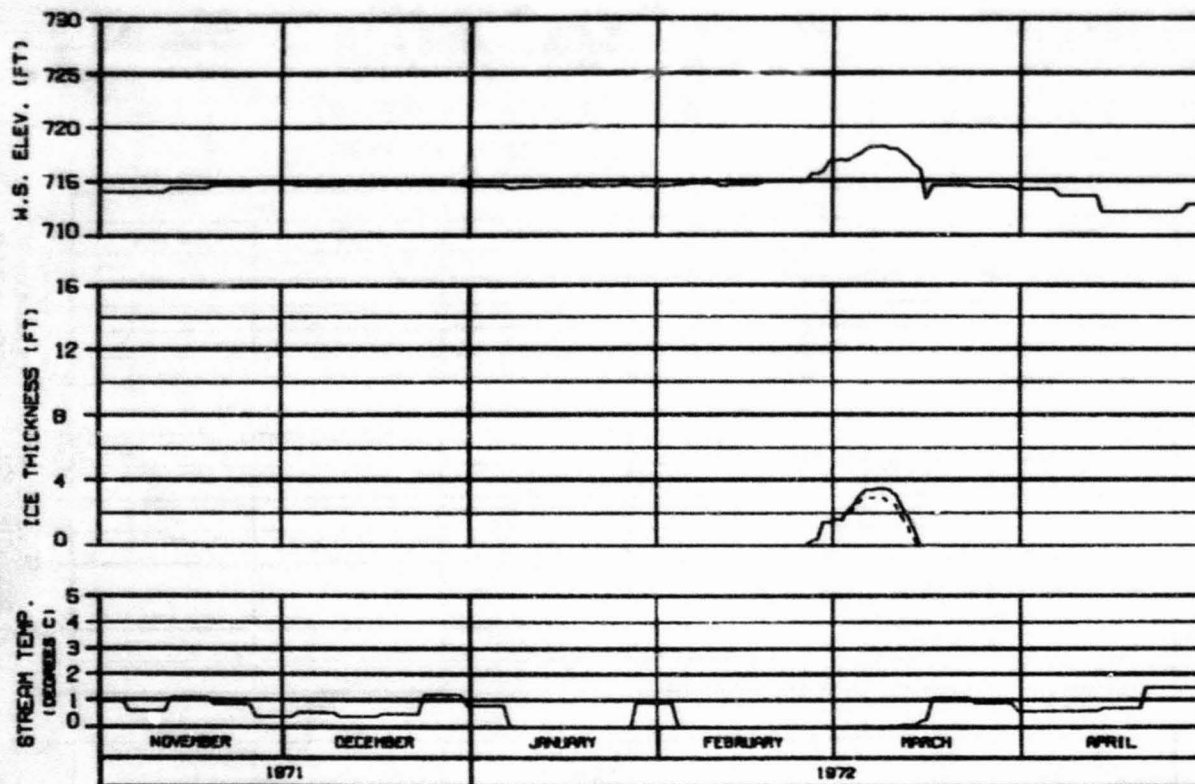
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED: A.L. HARRIS 28 NOV 71 1000.142





HEAD OF SLOUGH 17  
RIVER MILE : 139.30

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : NATANA 2001  
CASE C FLOWS : TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : 7101C48

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

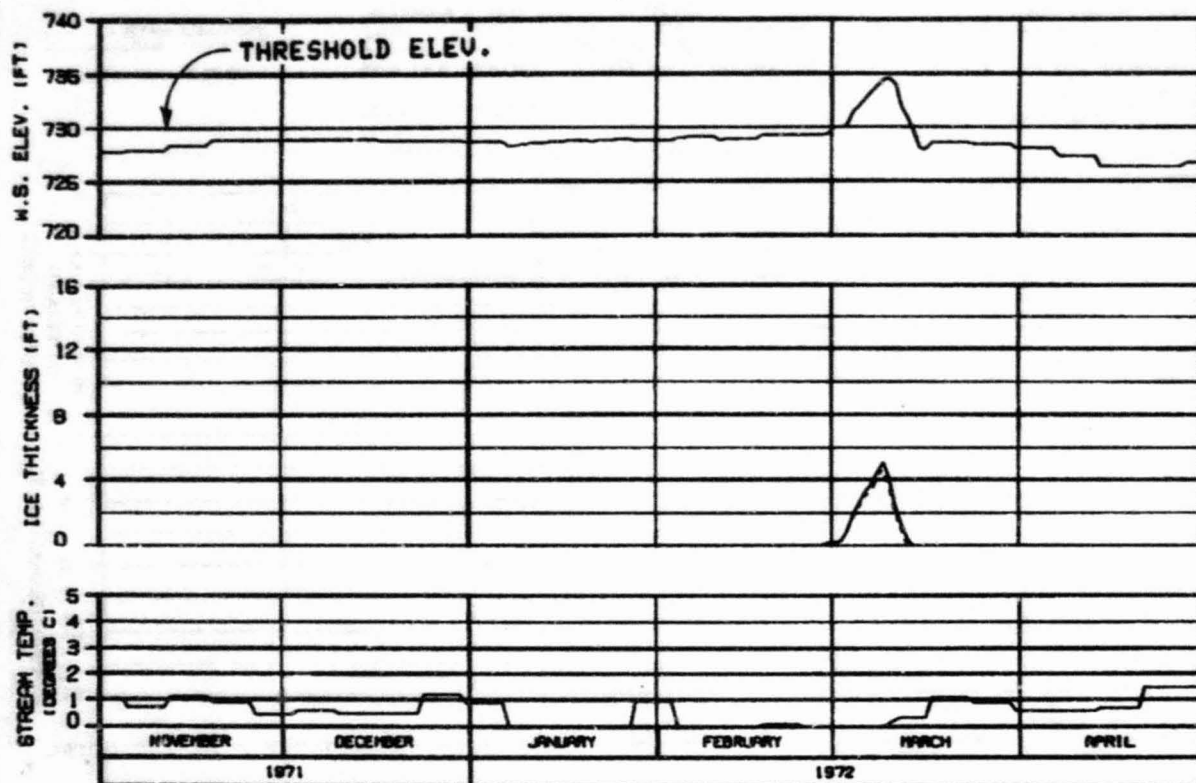
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHECKED: SLD/MS BY: HEN/MS 1000.142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 20  
 RIVER MILE : 140.50

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 710104B

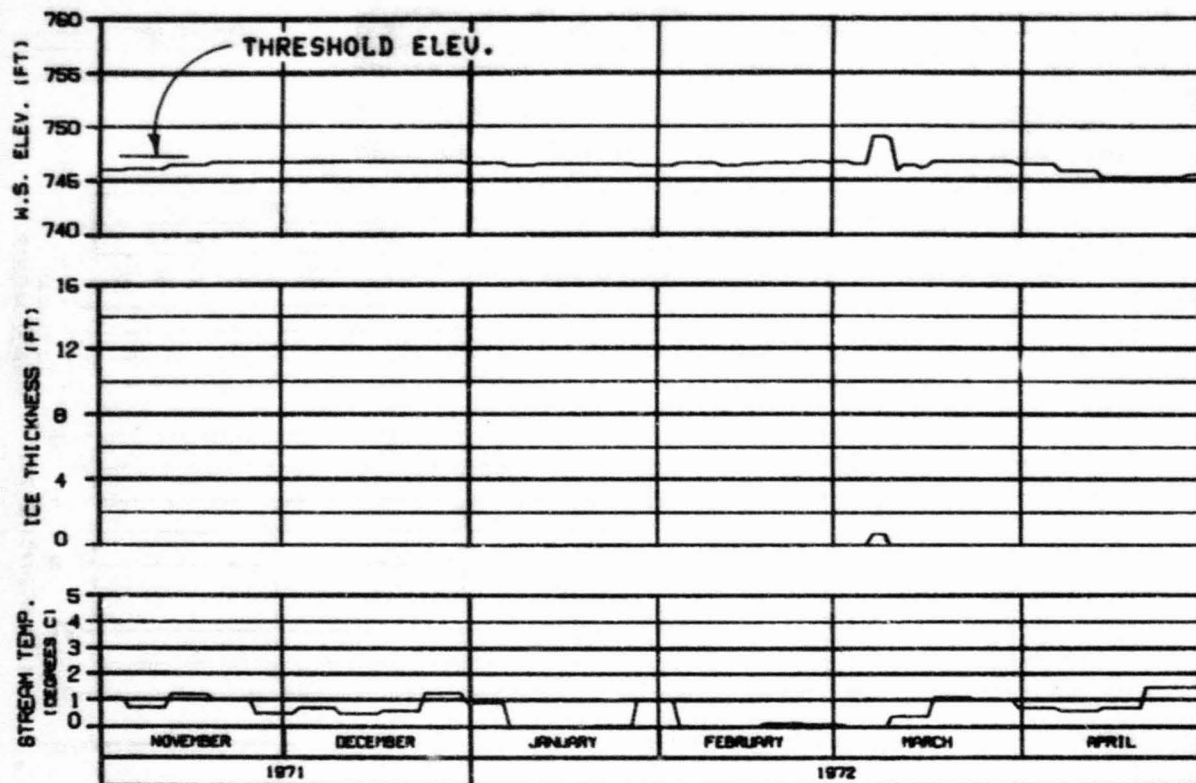
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARDA-EBRACO JOINT VENTURE

DESIGN: 8-10-00 10 NOV 01 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101C-48

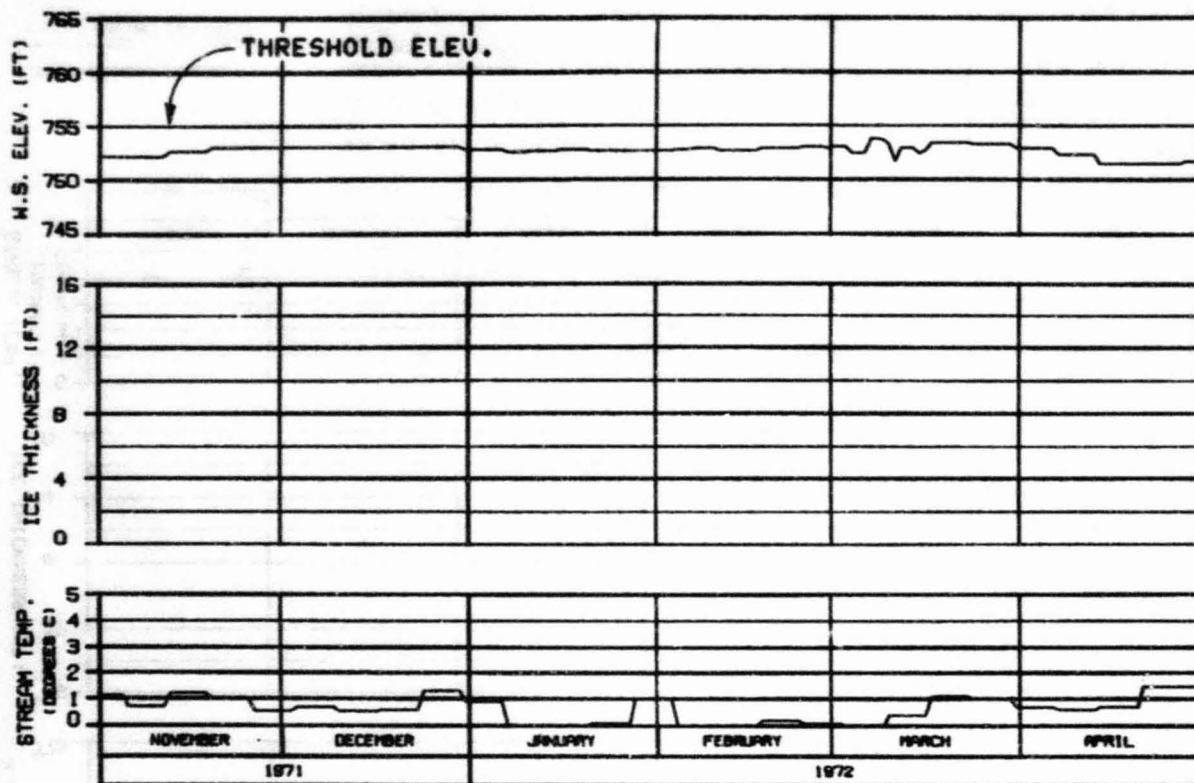
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN - SLOUGH 21 NOV 71 1980.142



HEAD OF SLOUGH 21  
RIVER MILE : 142.20

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : 7101C48

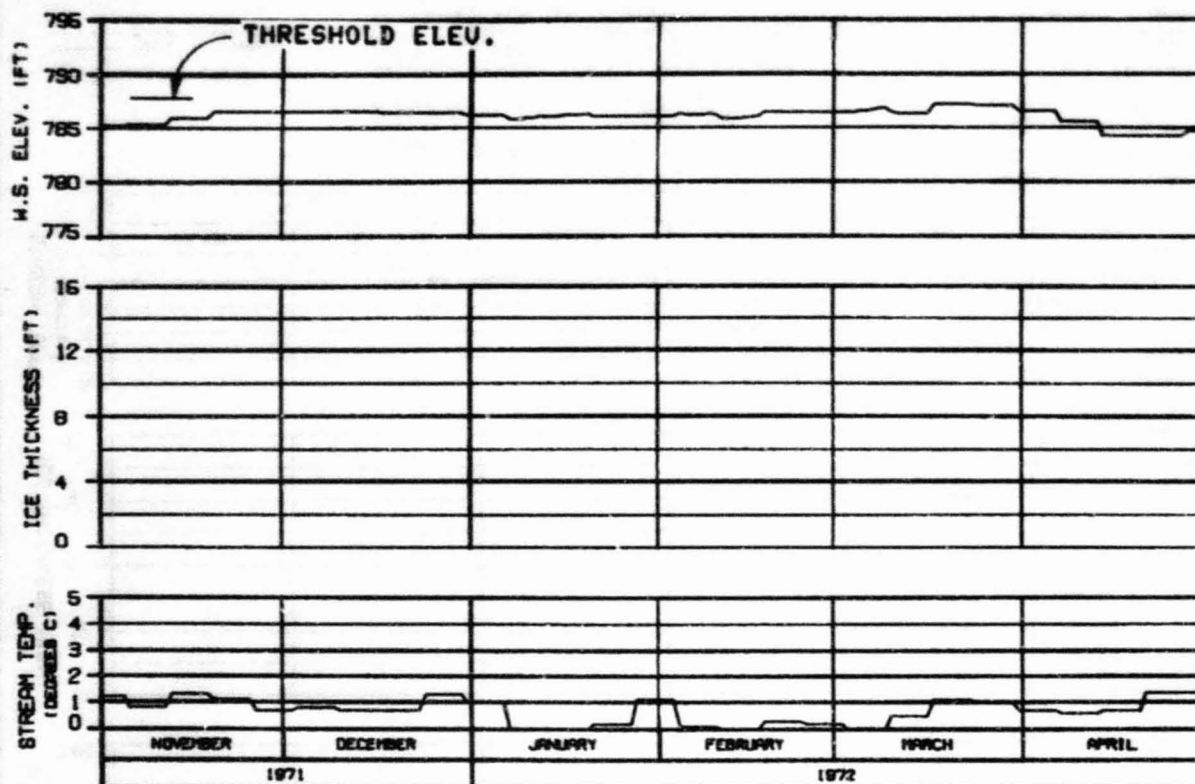
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBRACCO JOINT VENTURE

DESIGN. E.A.P. 1000 10 10 71 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

HEAD OF SLOUGH 22  
 RIVER MILE : 144.80

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 7101CH8

OPTION?

ALASKA POWER AUTHORITY

SUSTINA PROJECT

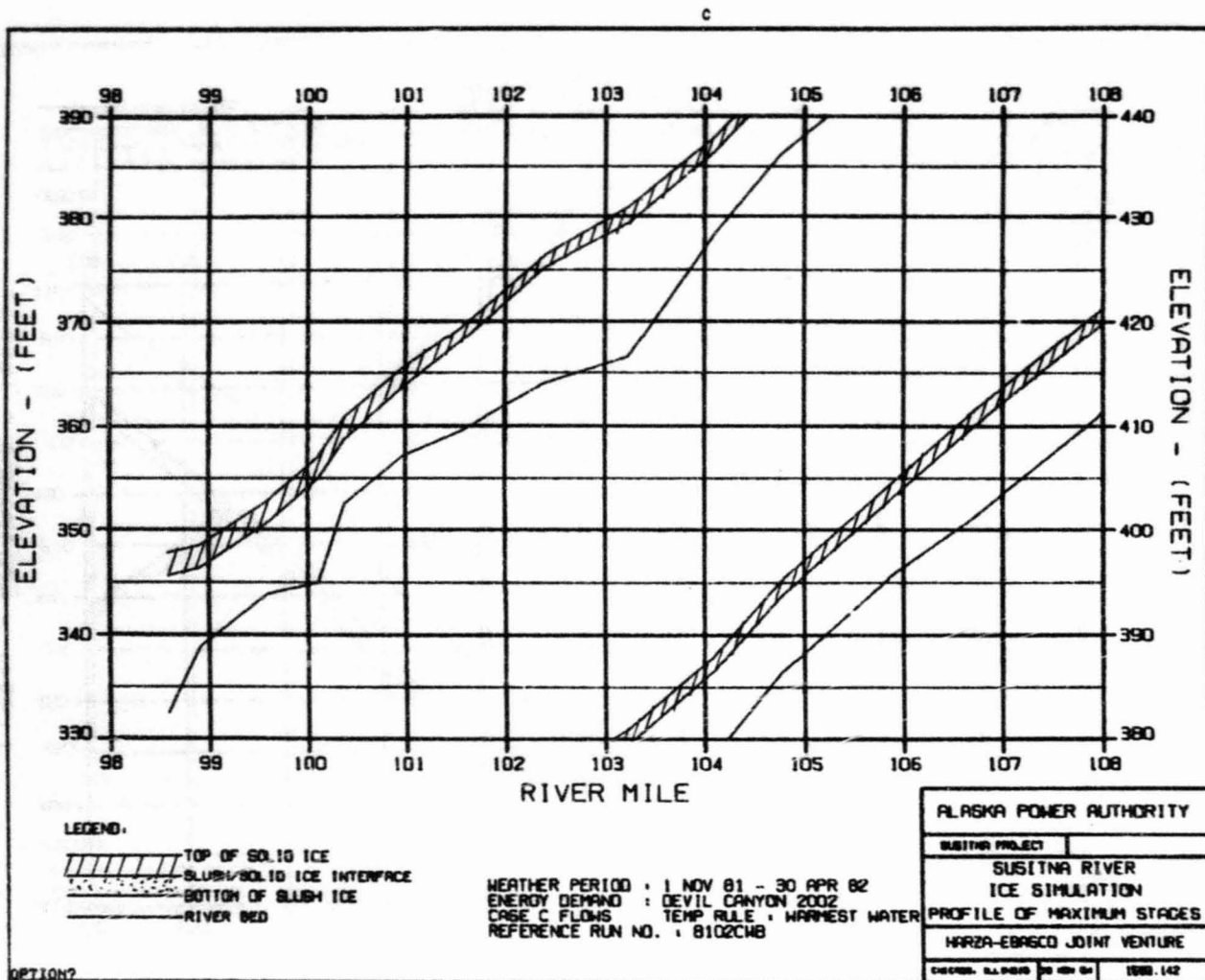
SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

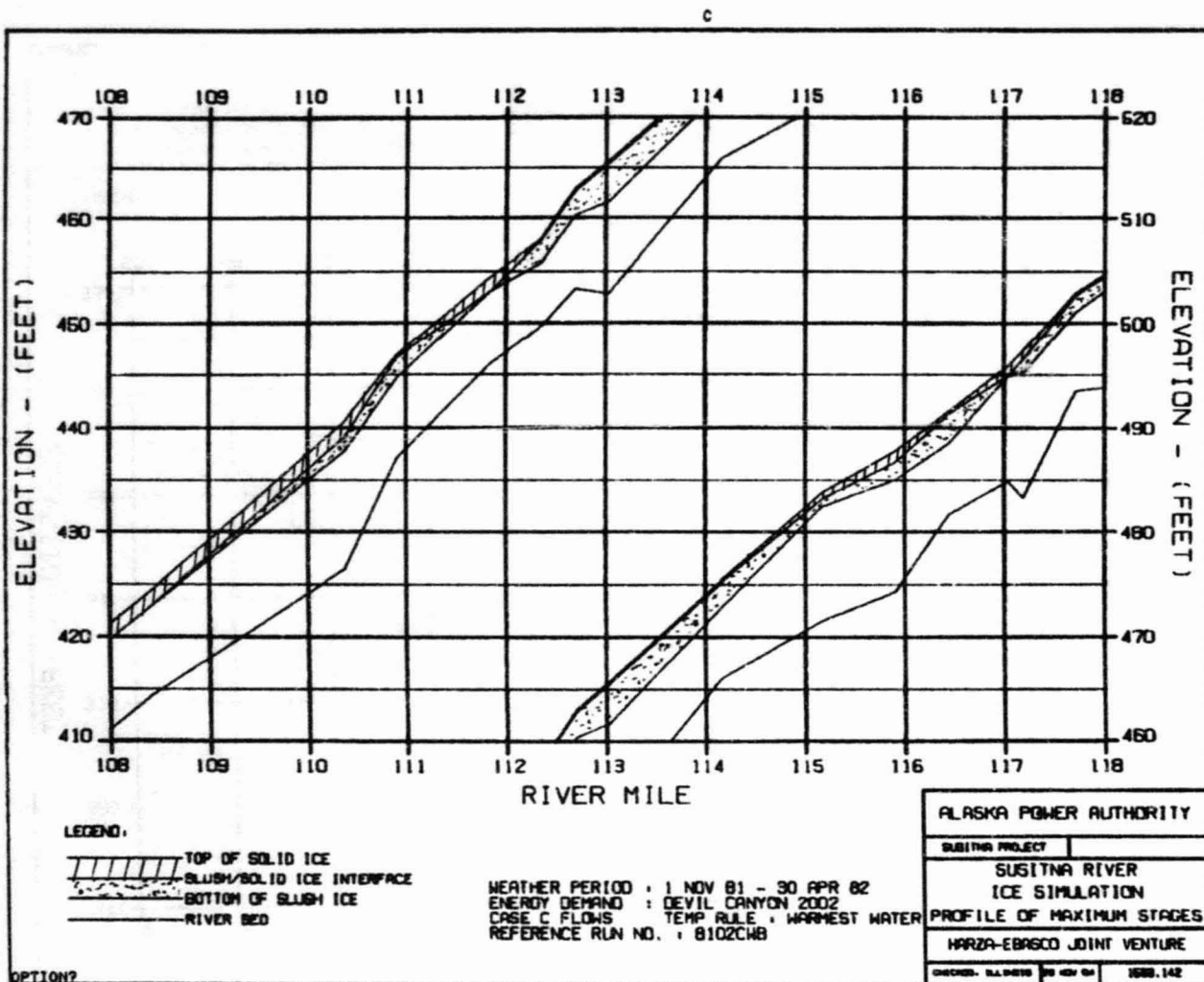
WARZA-EBASCO JOINT VENTURE

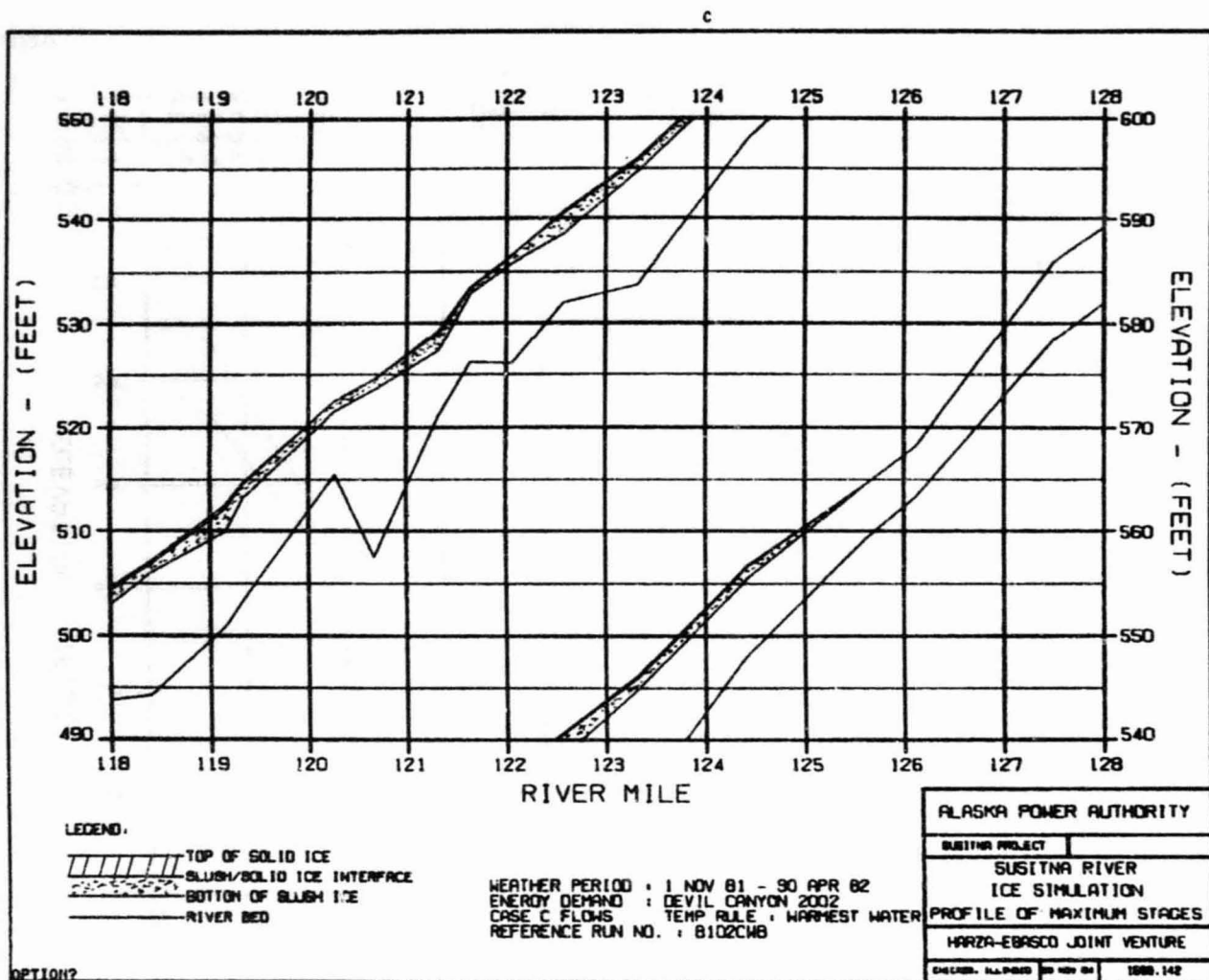
DESIGN: 8/1/72 BY: 8/1/72

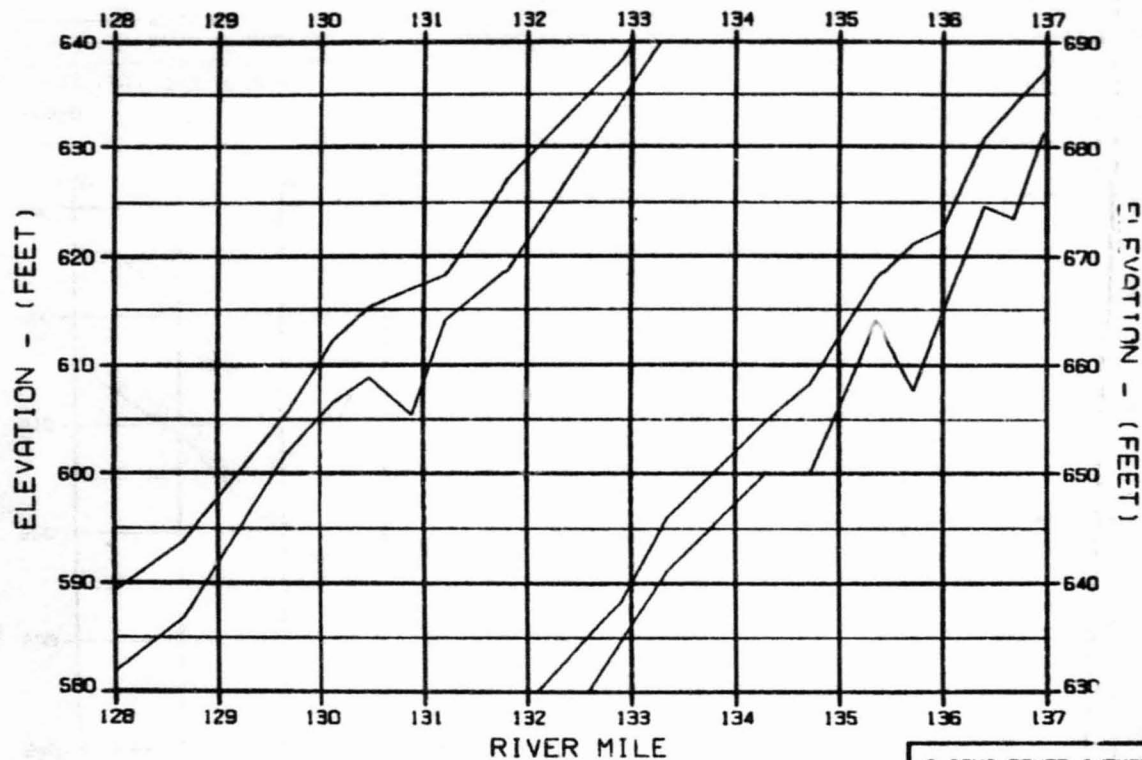


**EXHIBIT M**

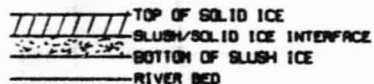








LEGEND:



WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102CMB

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER

ICE SIMULATION

PROFILE OF MAXIMUM STAGES

HARZA-EBRSCO JOINT VENTURE

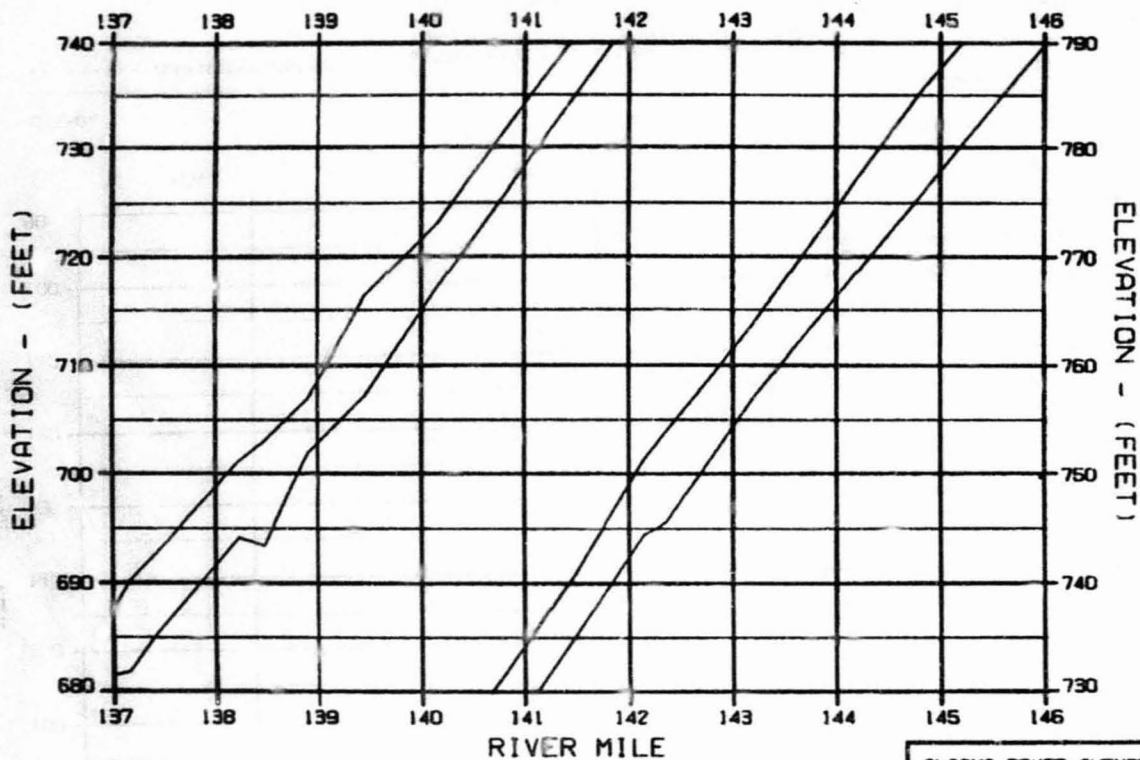
ENGINEER - S. L. PETER

30 APR 82

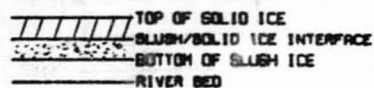
1000.142

OPTION?





LEGEND:



WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102CWB

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER

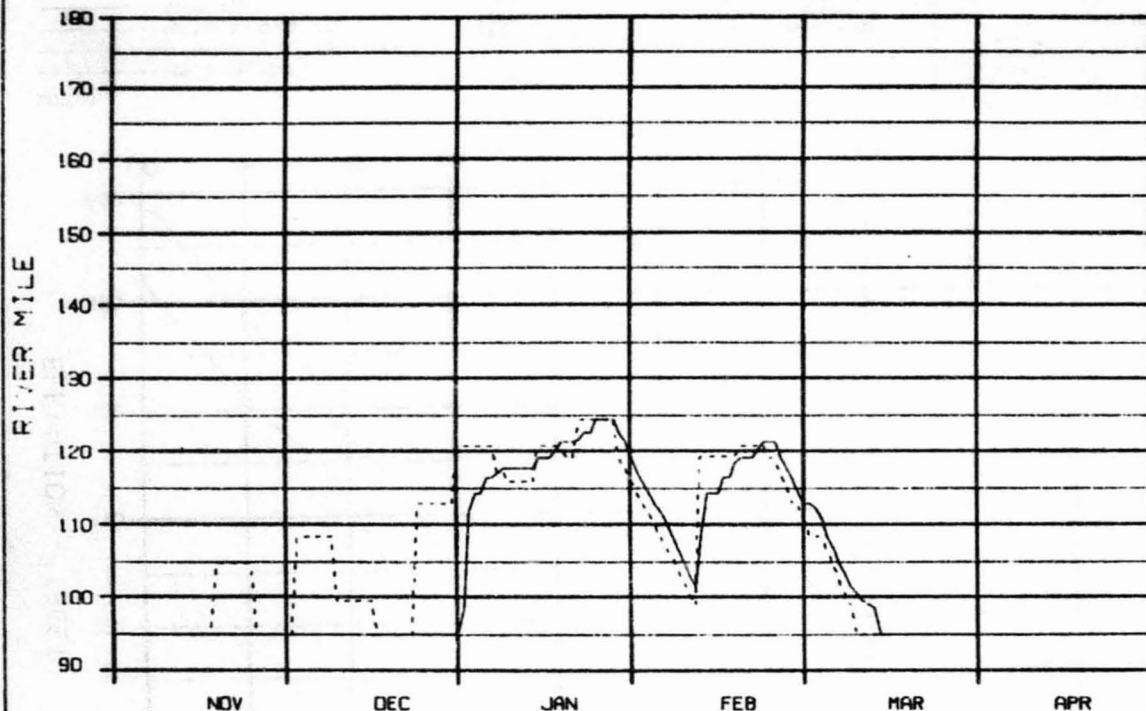
ICE SIMULATION

PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

DESIGNED - E. L. HARRIS 20 NOV 81 1002.142

OPTION?



LEGEND.

— ICE FRONT  
 - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE C TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102CWB

ALASKA POWER AUTHORITY

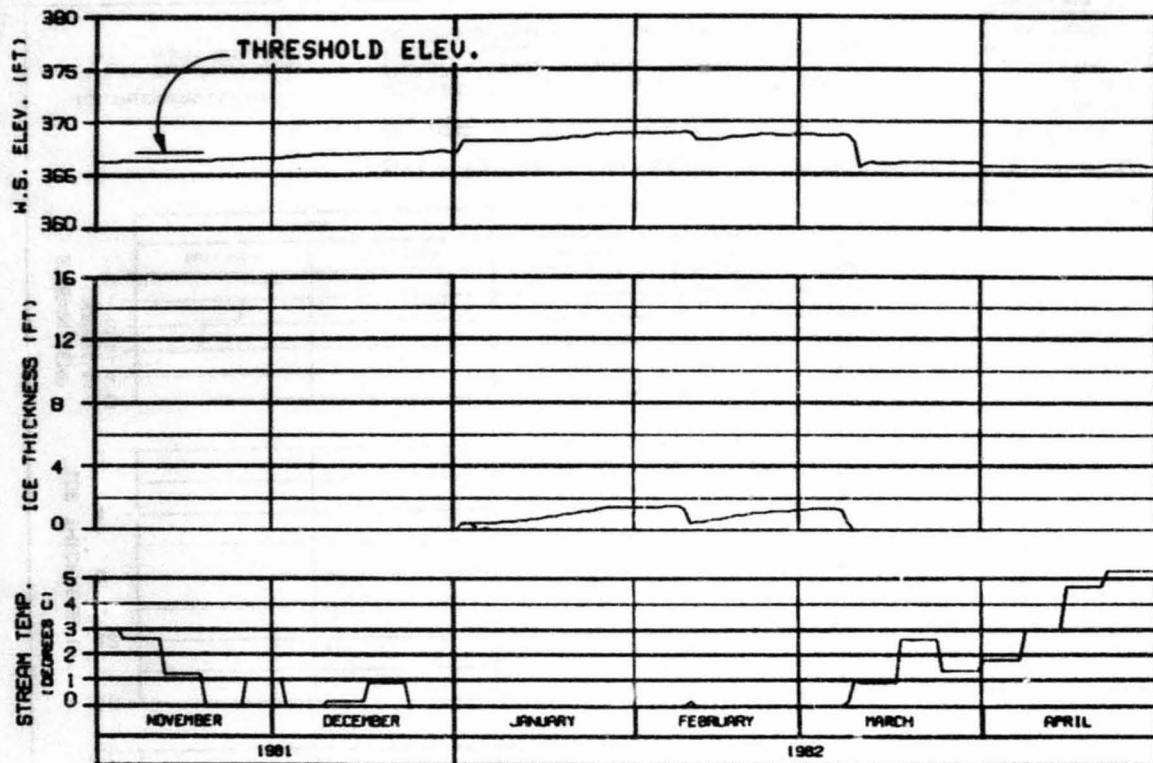
SUSITNA PROJECT

SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

HARZA-EBASCO JOINT VENTURE

CHIEF: S. L. HART 30 NOV 81 1503.142

OPTION?



# HEAD OF WHISKERS SLOUGH

RIVER MILE : 101.50

## ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS : TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102C4B

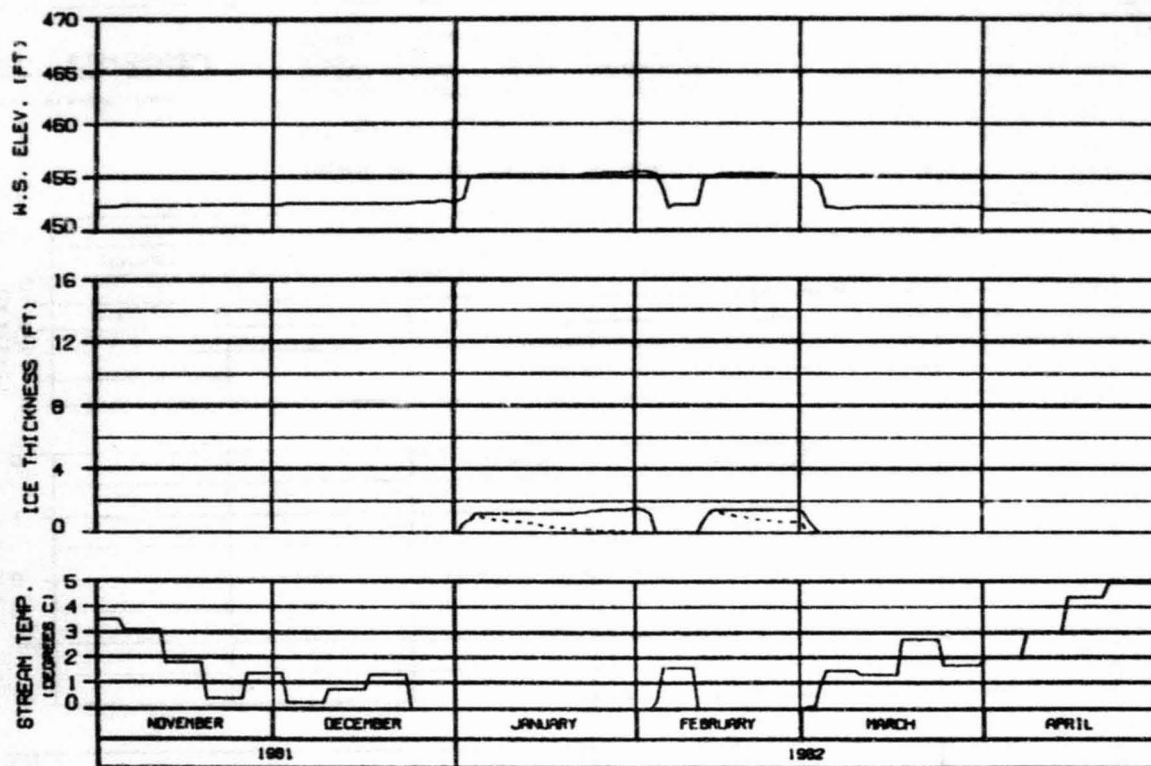
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHECKED: ALL PAGES 09 MAY 84 1000.142



**SIDE CHANNEL AT HEAD OF GASH CREEK**  
**RIVER MILE : 112.00**

**ICE THICKNESS LEGEND:**

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS : TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102CH8

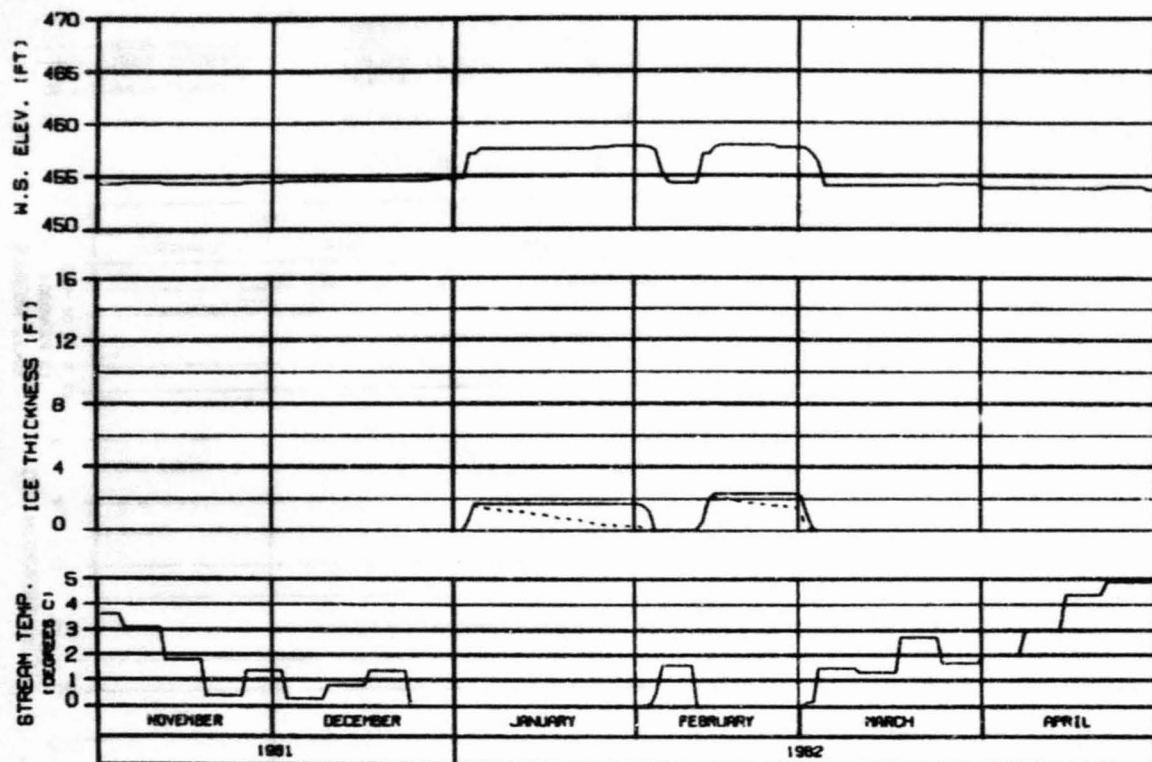
**ALASKA POWER AUTHORITY**

**SUSTINA PROJECT**

**SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY**

**HARZA-EBASCO JOINT VENTURE**

CHGSR - ALL DTS 00 NOV 81 1000.142



MOUTH OF SLOUGH 6A  
RIVER MILE : 112.34

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : 8102CH8

ALASKA POWER AUTHORITY

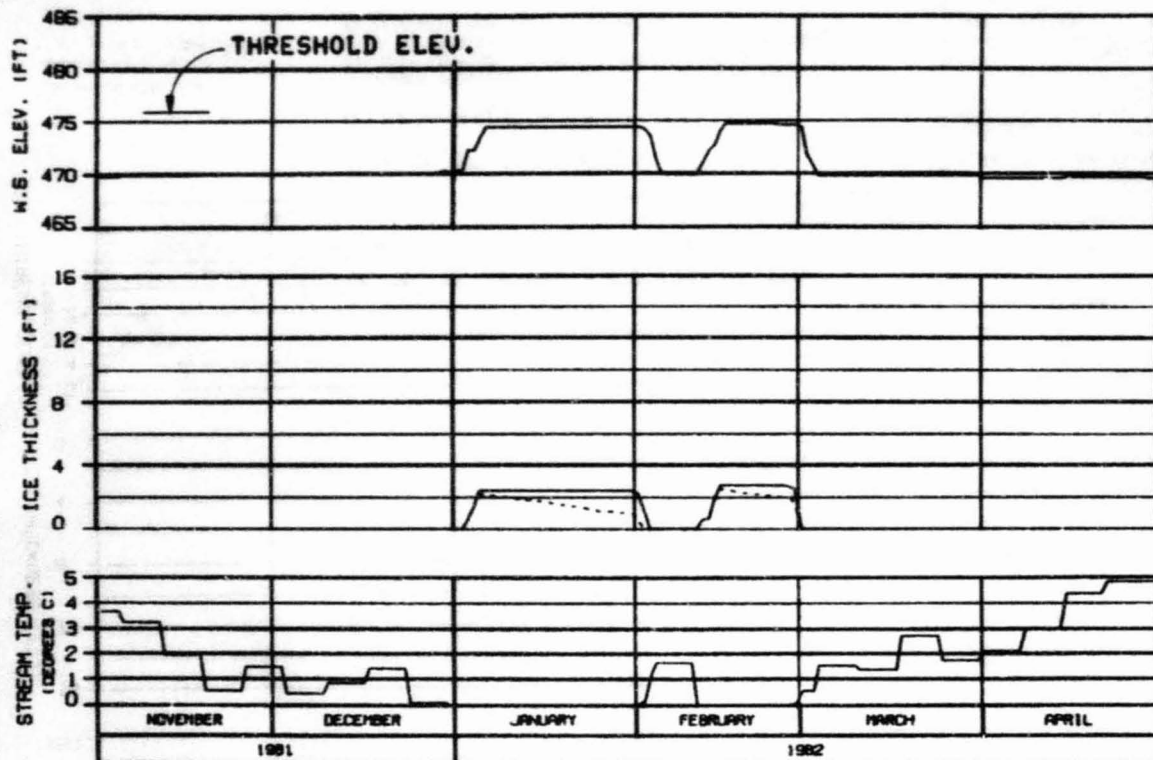
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: J.L. HARRIS BY: J.W. SMITH 1982.142





HEAD OF SLOUGH 8

RIVER MILE : 114.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102048

ALASKA POWER AUTHORITY

SUSITNA PROJECT

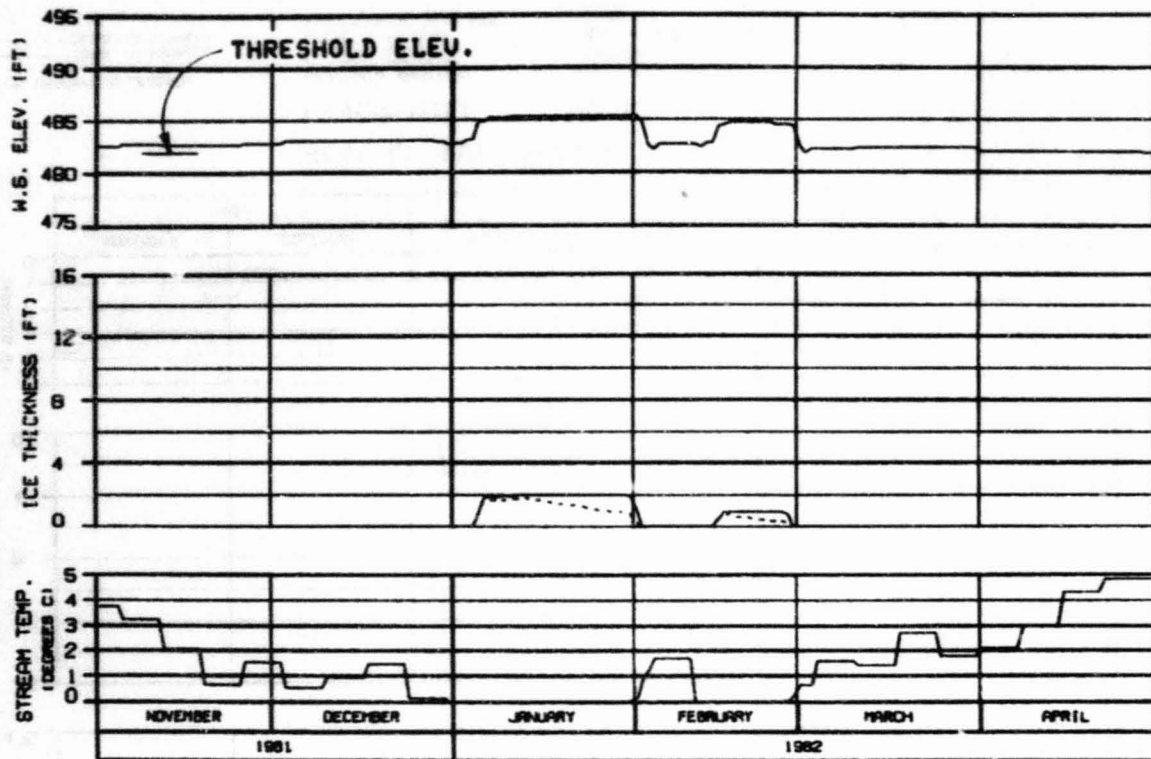
SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHARGE: 011-000

00 000 00

1000.142



**SIDE CHANNEL MSII**  
**RIVER MILE : 115.50**

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102048

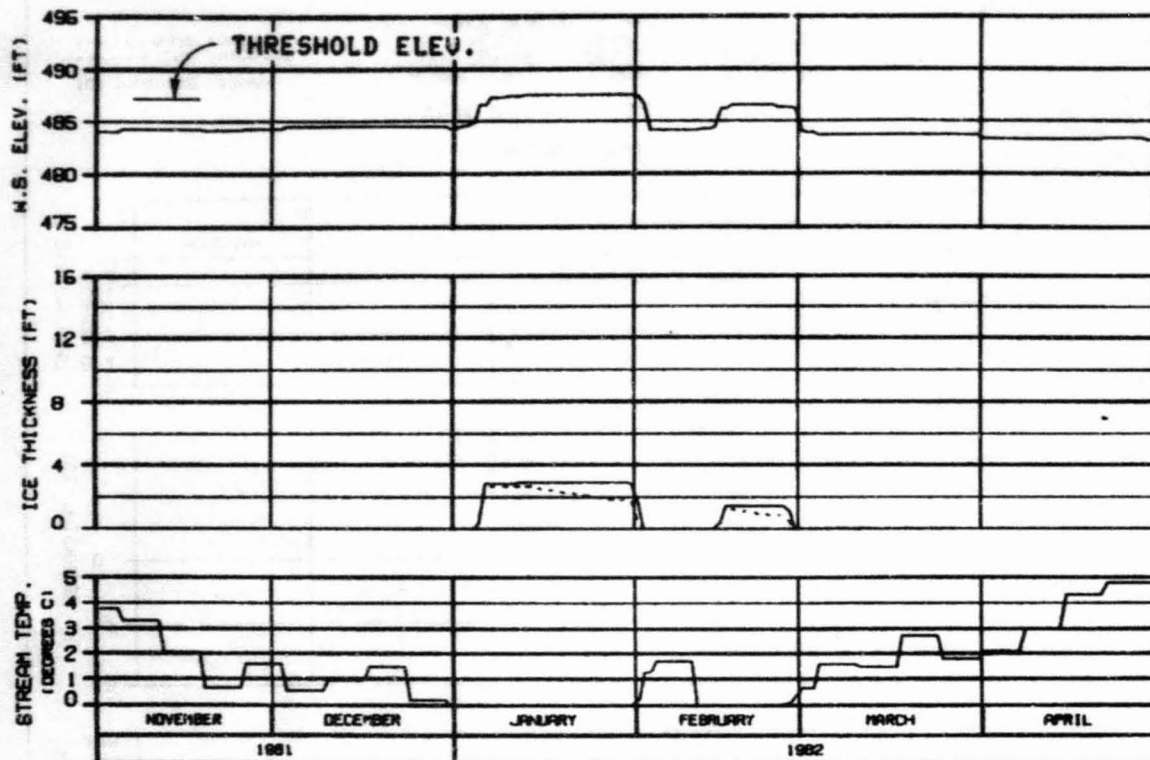
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBRSCO JOINT VENTURE

DESIGN: SLP/MSI 30 APR 82 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102048

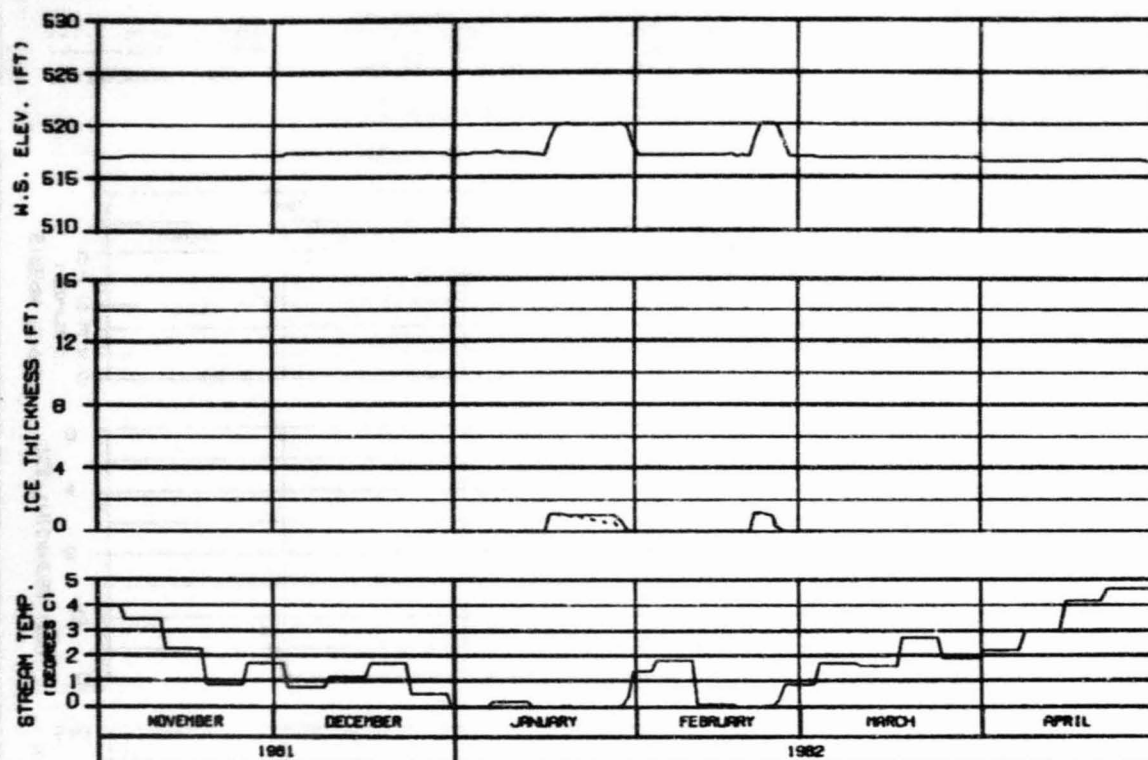
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRASC JOINT VENTURE

DIVISION: ALASKA POWER AUTHORITY 1982.142



RIVER MILE : 120.00

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS : TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102048

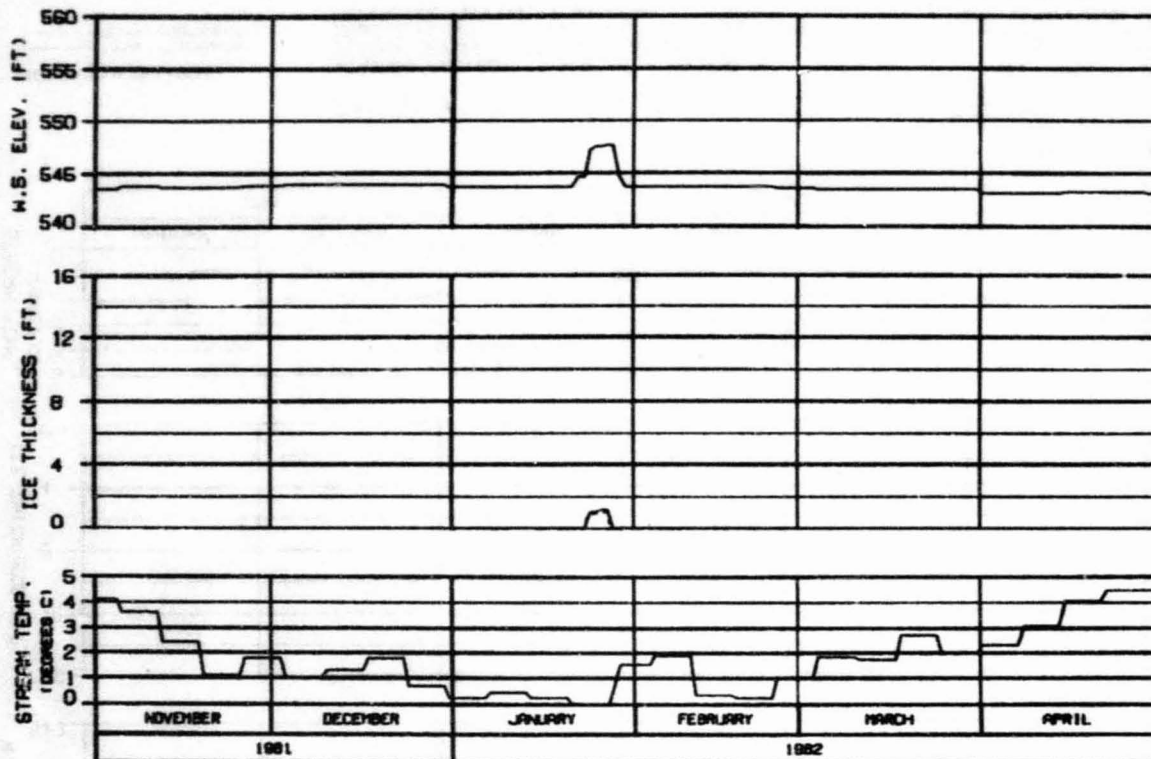
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHARGE: ALL PAGES 30 APR 82 1508.142



HEAD OF MOOSE SLOUGH

RIVER MILE : 123.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS : TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102CH8

ALASKA POWER AUTHORITY

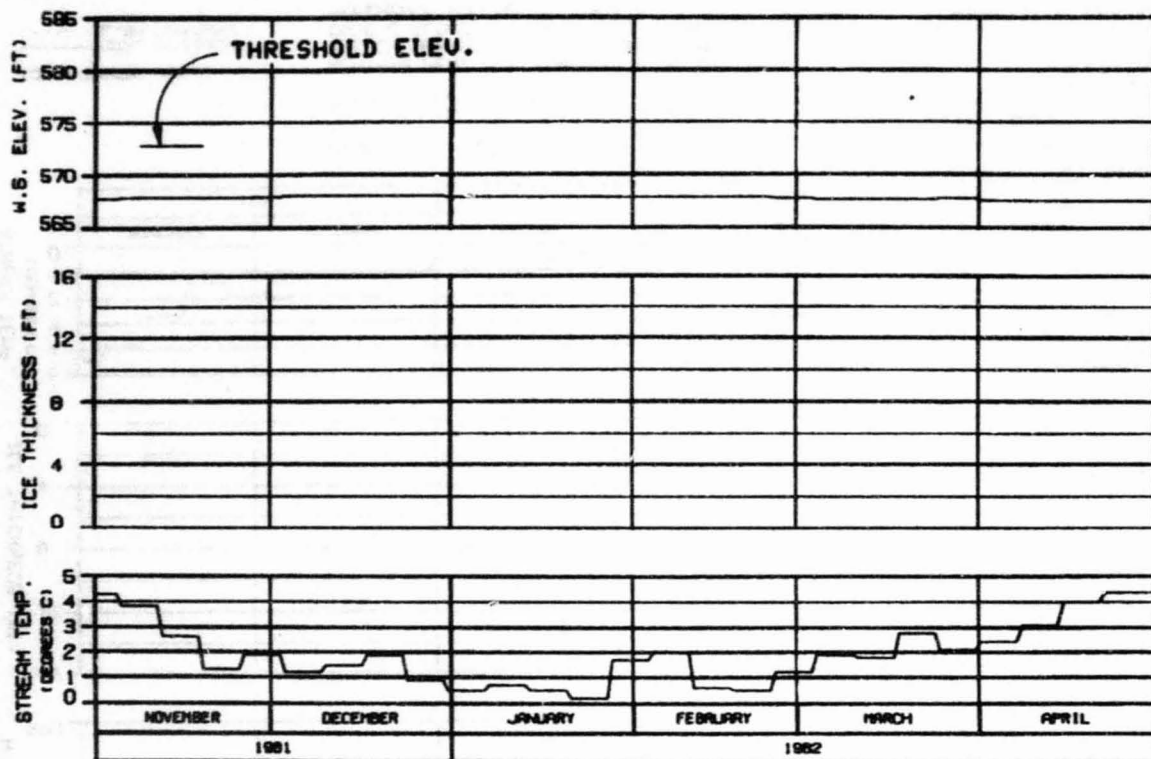
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHARTS, ILLUSTRATIONS AND DATA SHEETS 1000.142





ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102C4B

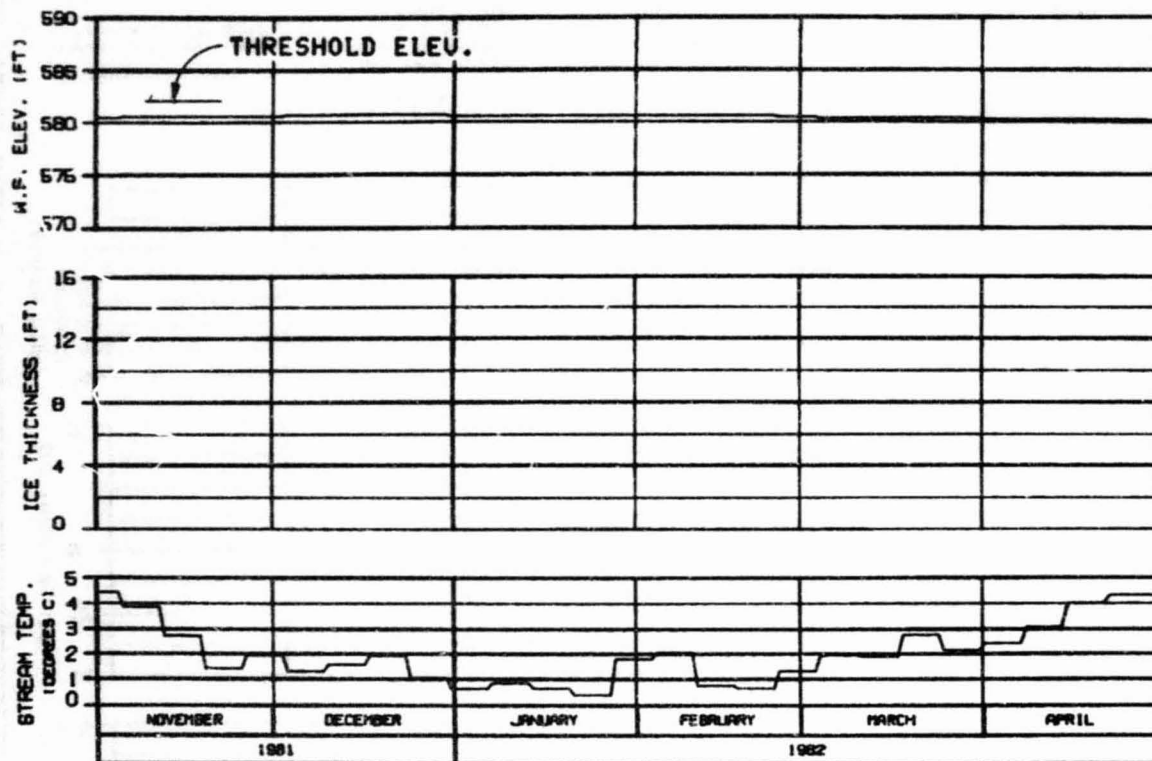
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACO JOINT VENTURE

DESIGNED BY: 8102C4B 8102C4B 8102C4B 8102C4B



HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 810204B

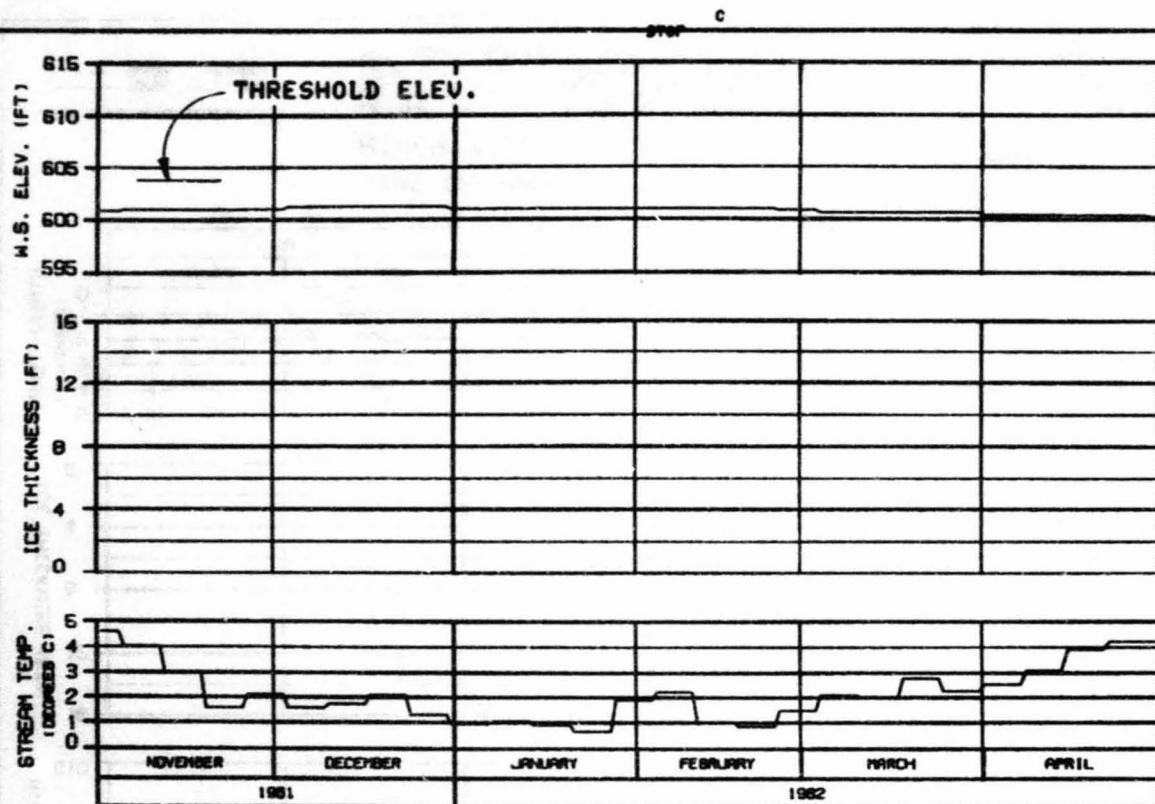
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

DESIGN: ALLEGIS BY REV 04 1000.142



HEAD OF SLOUGH 9

RIVER MILE : 129.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUM COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102CH8

ALASKA POWER AUTHORITY

SUSITNA PROJECT

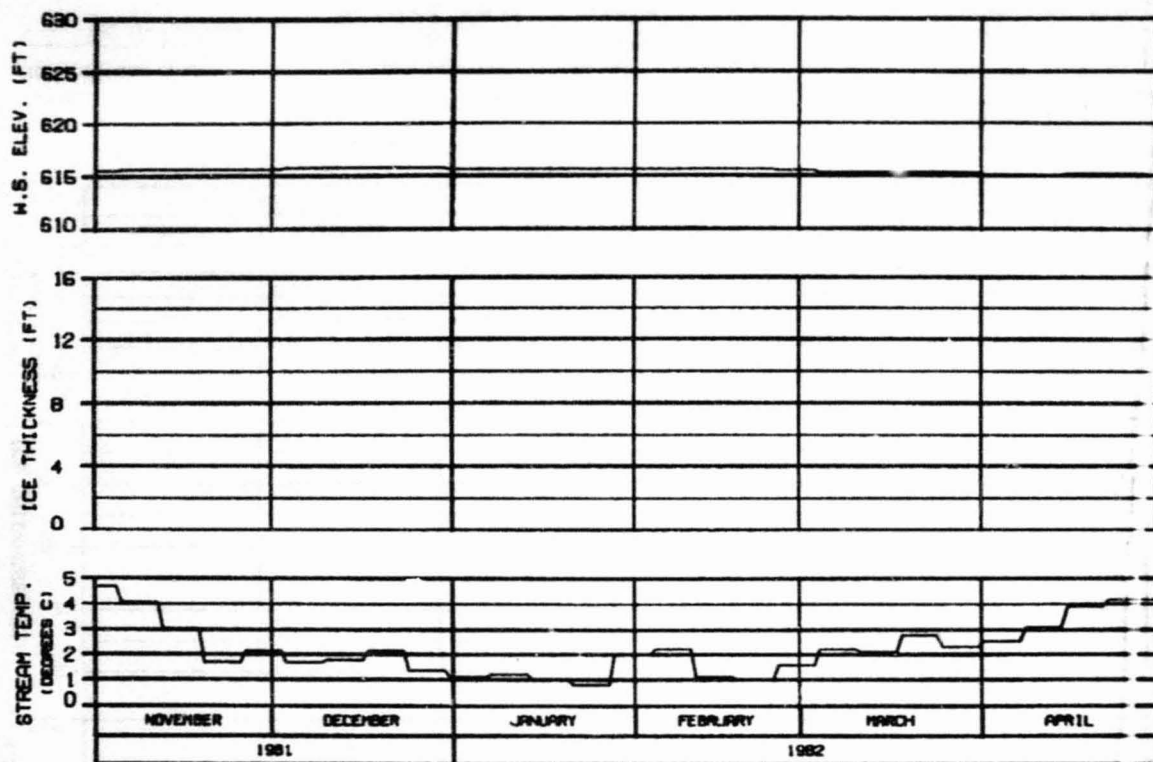
SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED BY: ALASKA POWER AUTHORITY 100-142

OPTION?

OPTION7



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF SLOUGH 9  
 RIVER MILE : 130.60

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102048

ALASKA POWER AUTHORITY

SUSTINA PROJECT

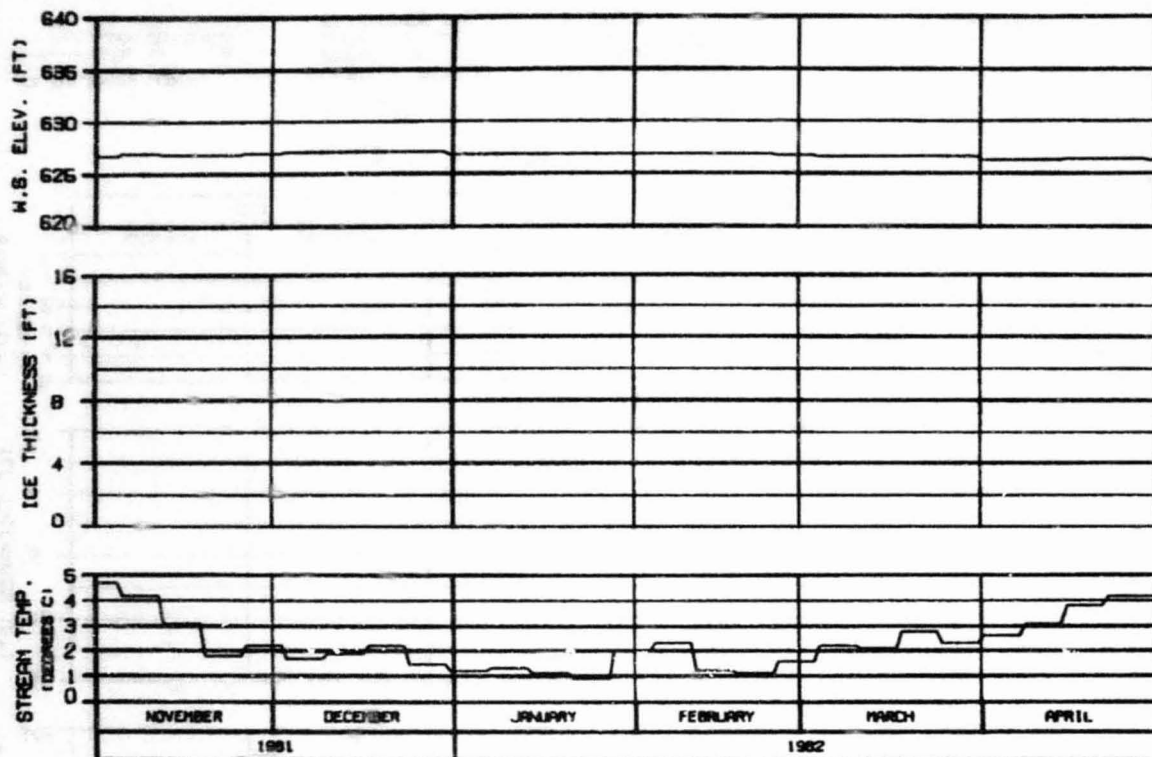
SUSTINA FIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: SLP/MS

BY: MS

1982.142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF 4TH JULY CREEK  
 RIVER MILE : 131.80

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102CH8

ALASKA POWER AUTHORITY

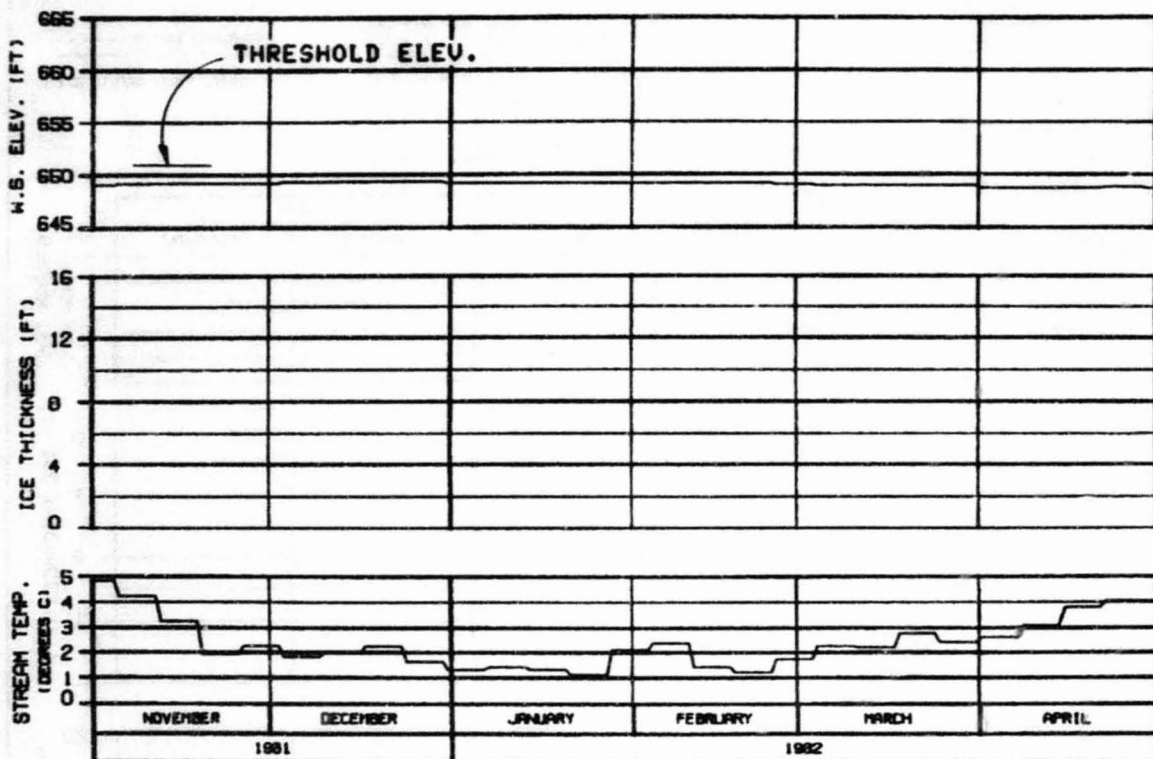
SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHGNO: 811008 00 NOV 81 1000.142





HEAD OF SLOUGH 9A

RIVER MILE : 133.70

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 810204B

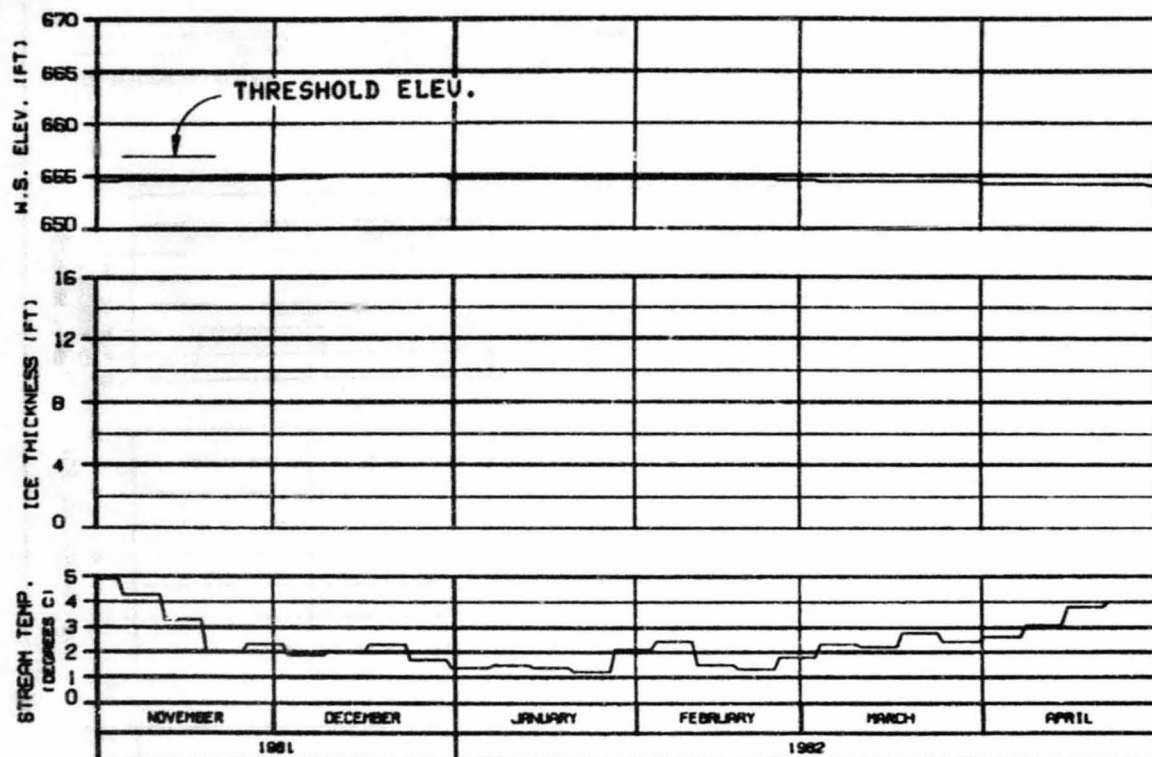
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBASCO JOINT VENTURE

DESIGN - 810204B 30 NOV 81 100% 142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF SLOUGH 10

RIVER MILE : 134.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS : TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102CH8

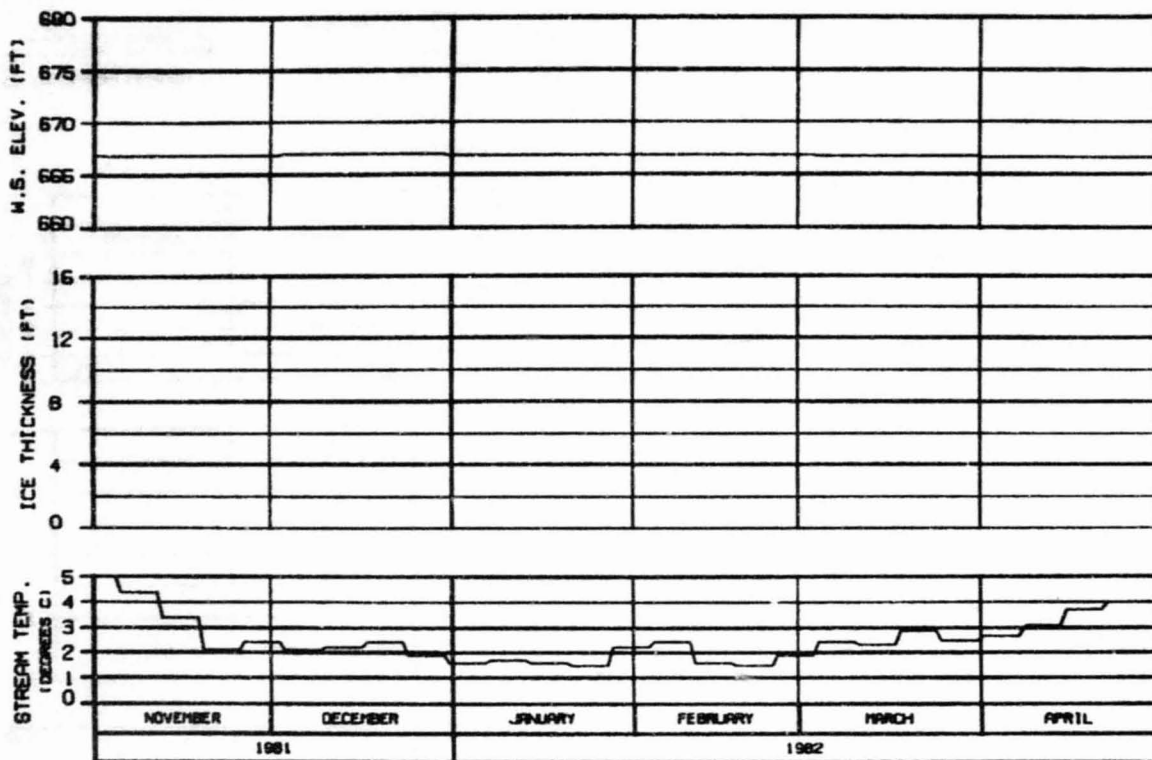
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACCO JOINT VENTURE

DESIGNER: B.L. BROSIE 30 NOV 81 1000, 142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL D/S OF SLOUGH 11

RIVER MILE : 135.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS : TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102C48

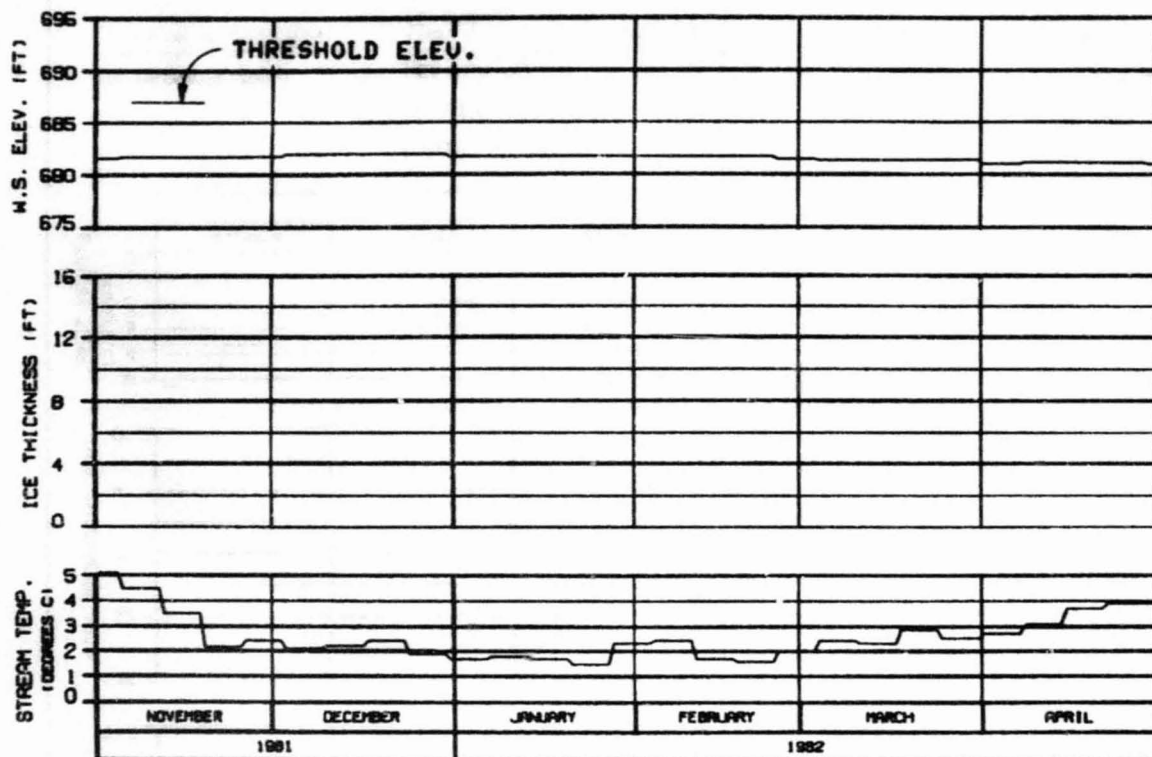
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHENGE, ALASKA 30 NOV 81 1982.142



HEAD OF SLOUGH 11

RIVER MILE : 136.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102CH8

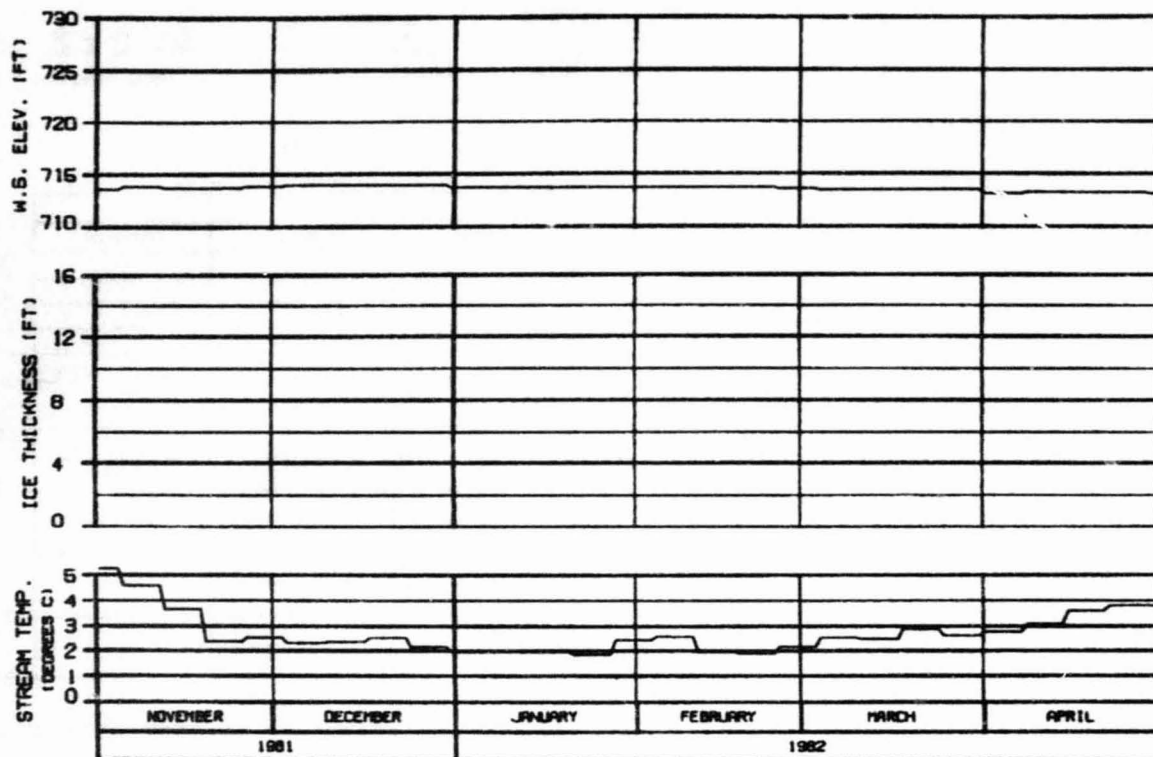
ALASKA POWER AUTHORITY

EXISTING PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRISCO JOINT VENTURE

DESIGNED: 11/1/81 BY: 11/1/81 11/1/81



HEAD OF SLOUGH 17  
RIVER MILE : 139.30

ICE THICKNESS LEGEND:  
——— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : 8102CH8

ALASKA POWER AUTHORITY

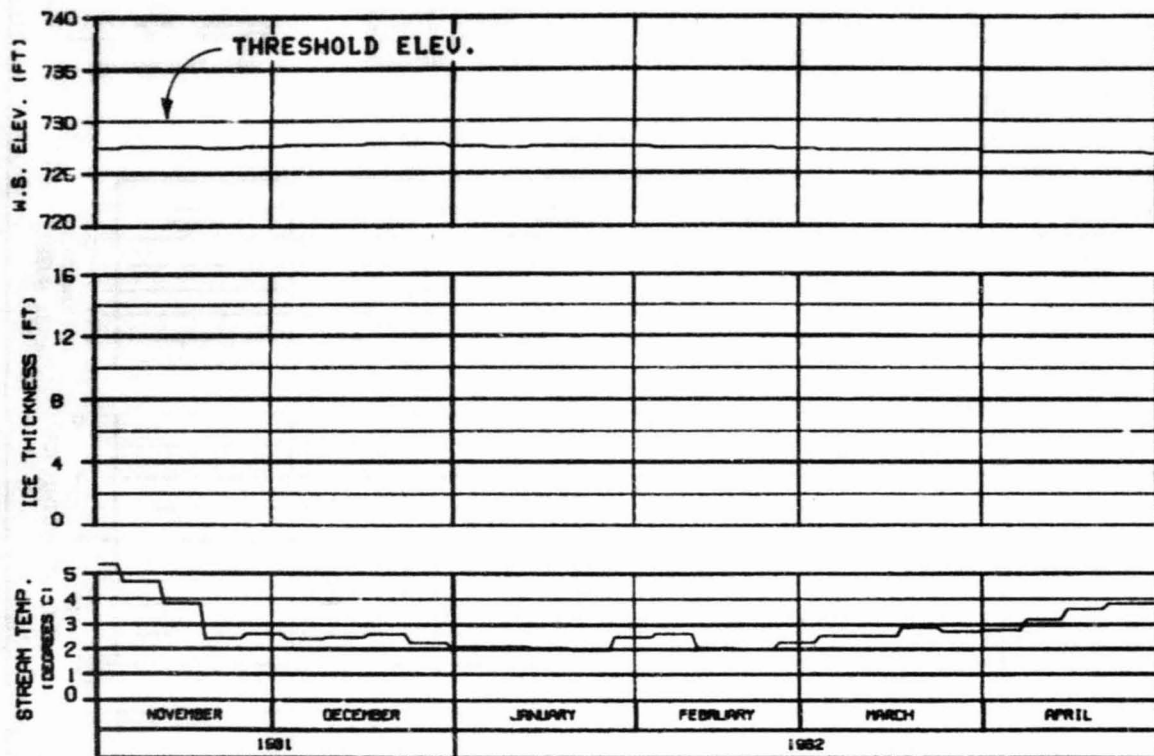
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBRSCO JOINT VENTURE

DESIGN: AL-0000 NO. REV: 01 1000.142





HEAD OF SLOUGH 20

RIVER MILE : 140.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : B102CWB

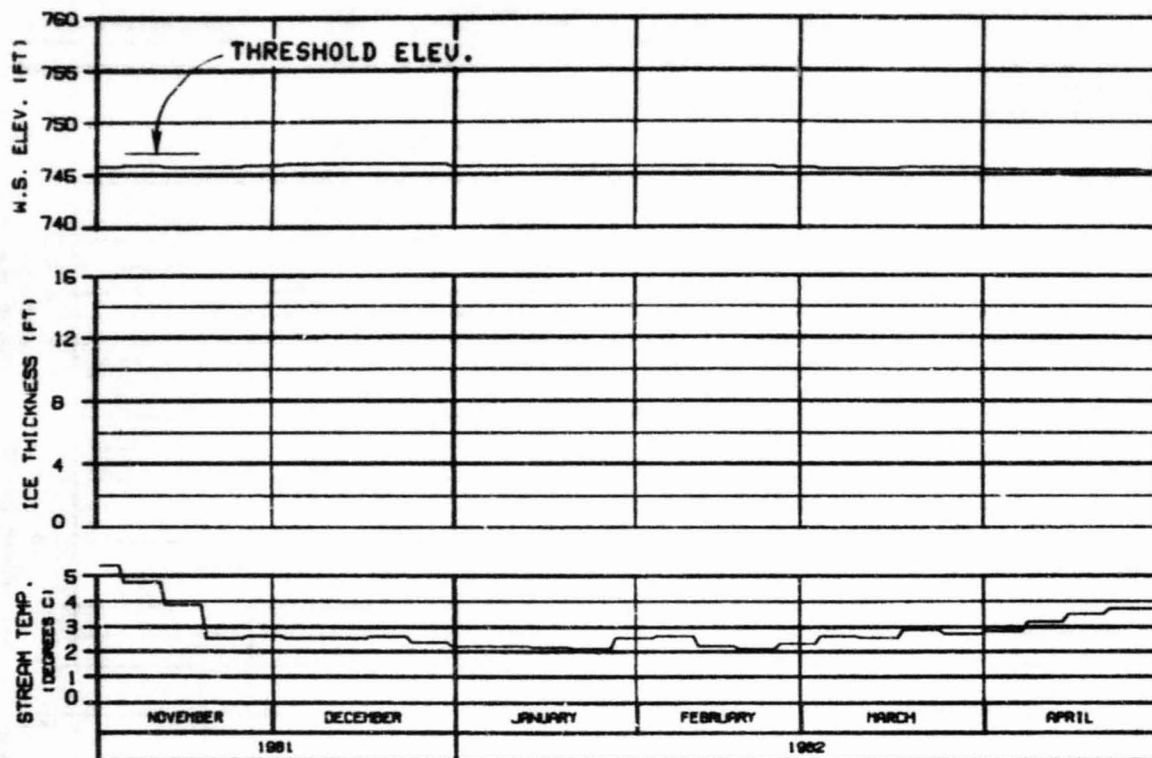
ALASKA POWER AUTHORITY

BUILDING PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: S.A. 0400 30 APR 82 1000. 142



SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP RULE : WARMEST WATER  
 REFERENCE RUN NO. : 8102CH8

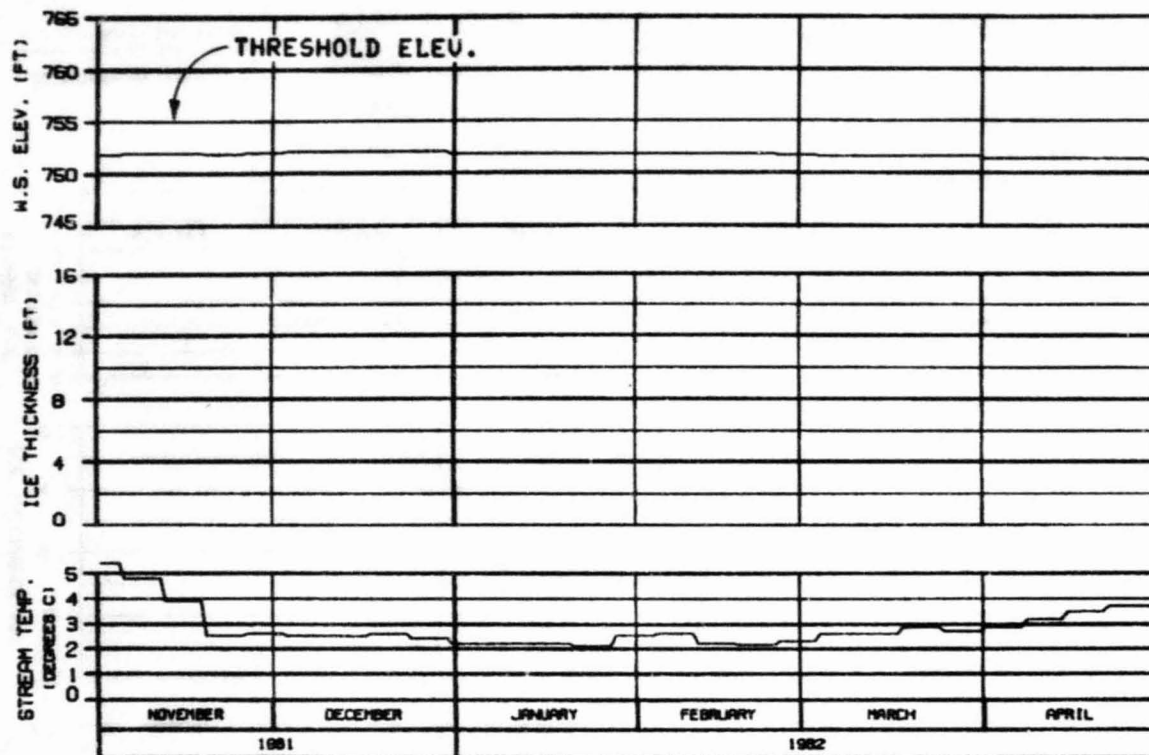
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DIGRAM- 11-1000 10 APR 82 1000.142



HEAD OF SLOUGH 21  
RIVER MILE : 142.20

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : 8102CH8

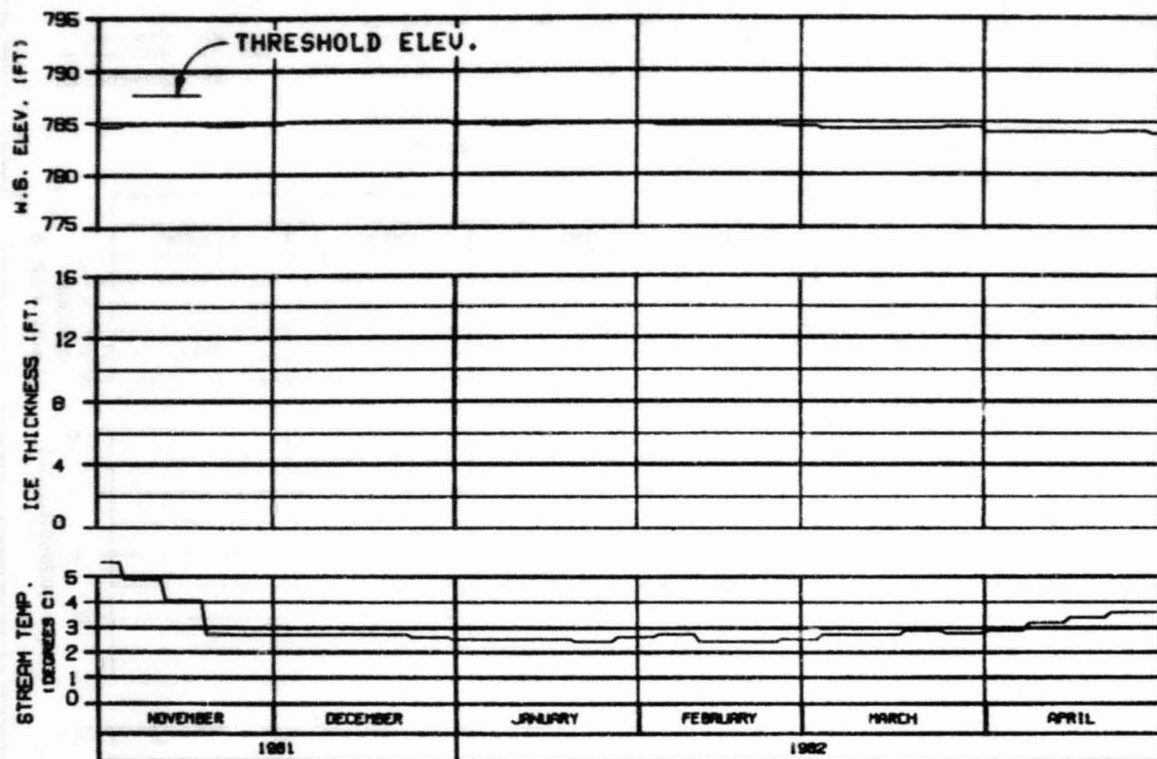
ALASKA POWER AUTHORITY

SUSTITNA PROJECT

SUSTITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHARTS - ALL PAGES 28 NOV 84 1985.142



HEAD OF SLOUGH 22  
RIVER MILE : 144.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS : TEMP RULE : WARMEST WATER  
REFERENCE RUN NO. : 8102048

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

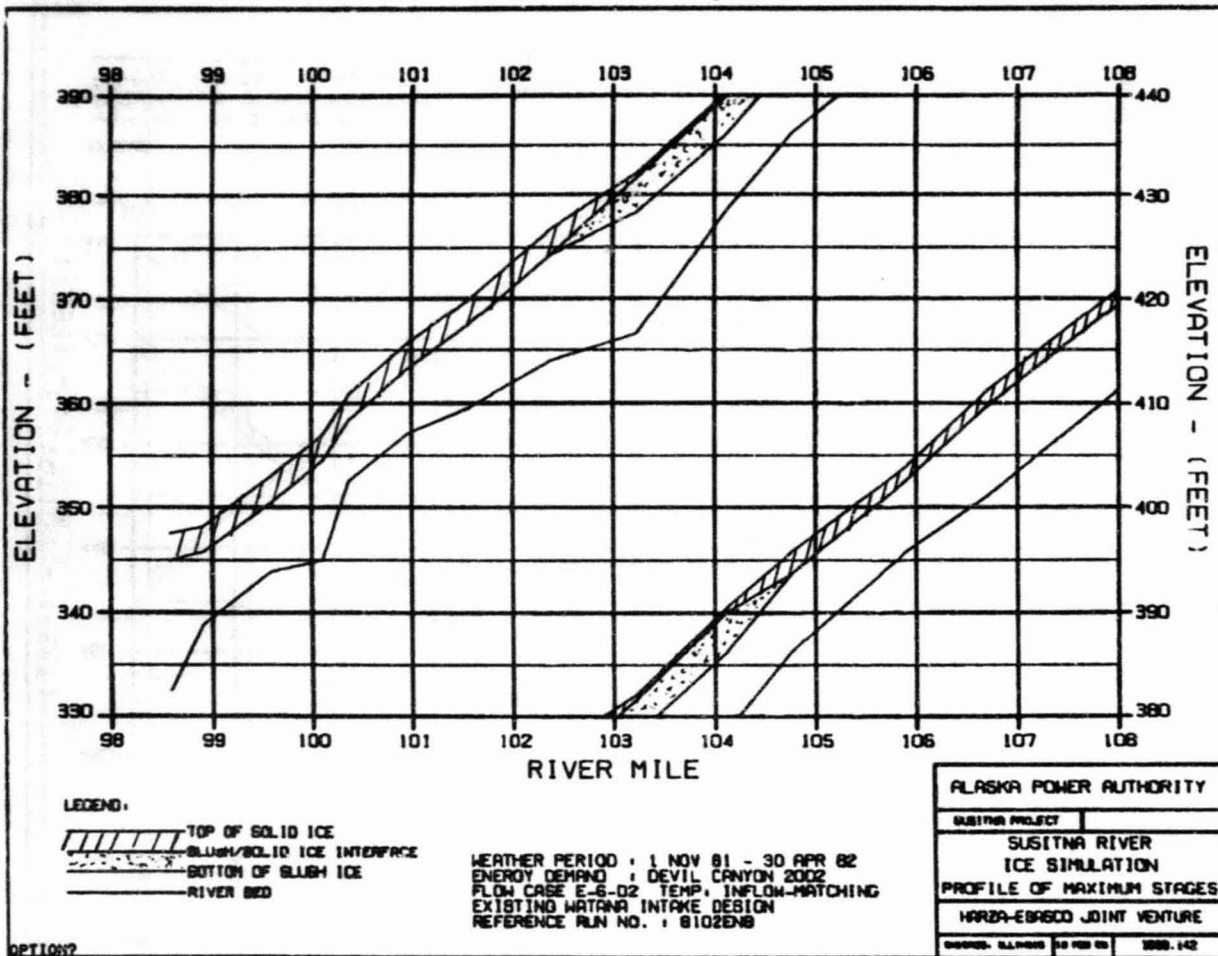
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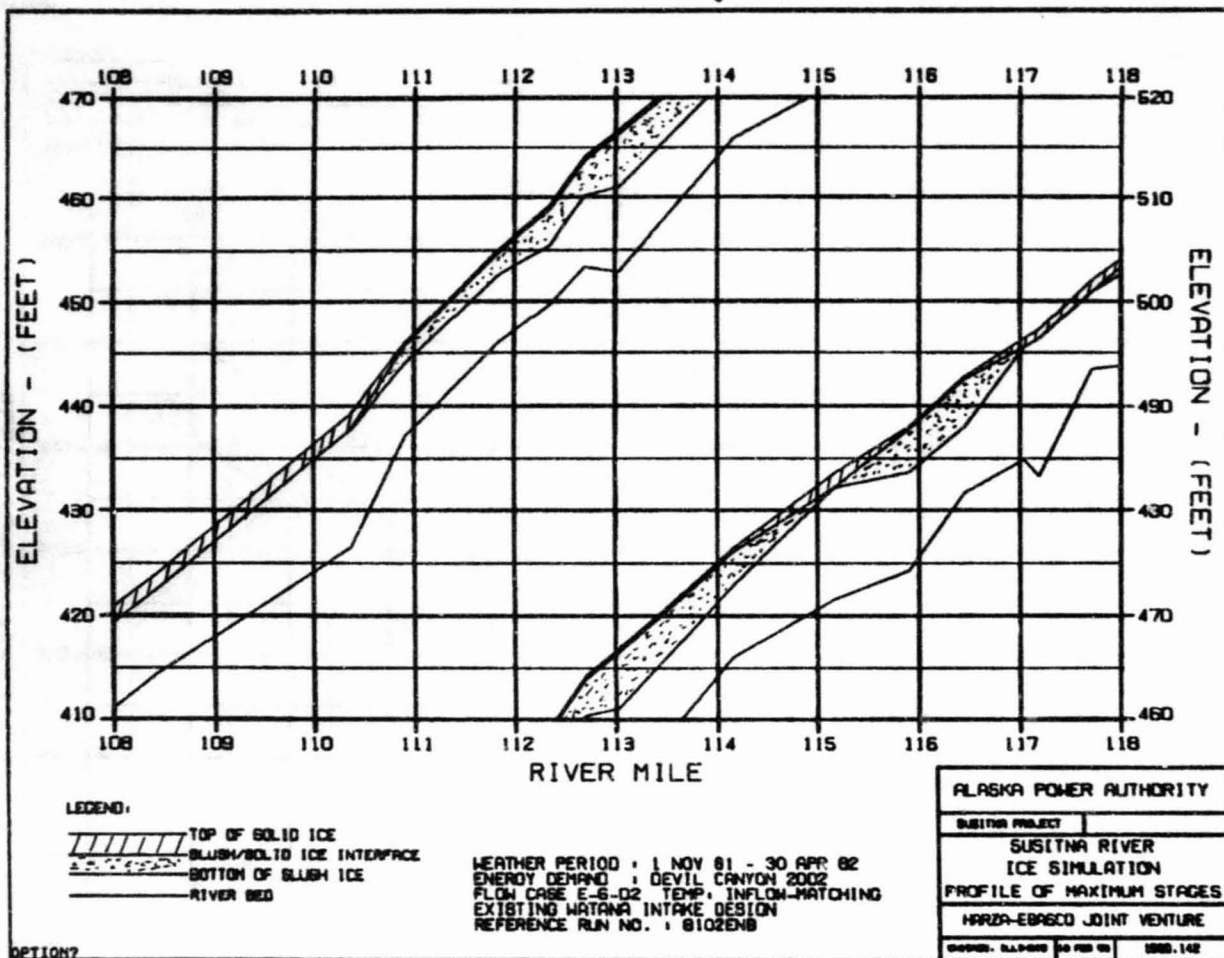
CHARGE: 11-1981 30 APR 82 1982, 142

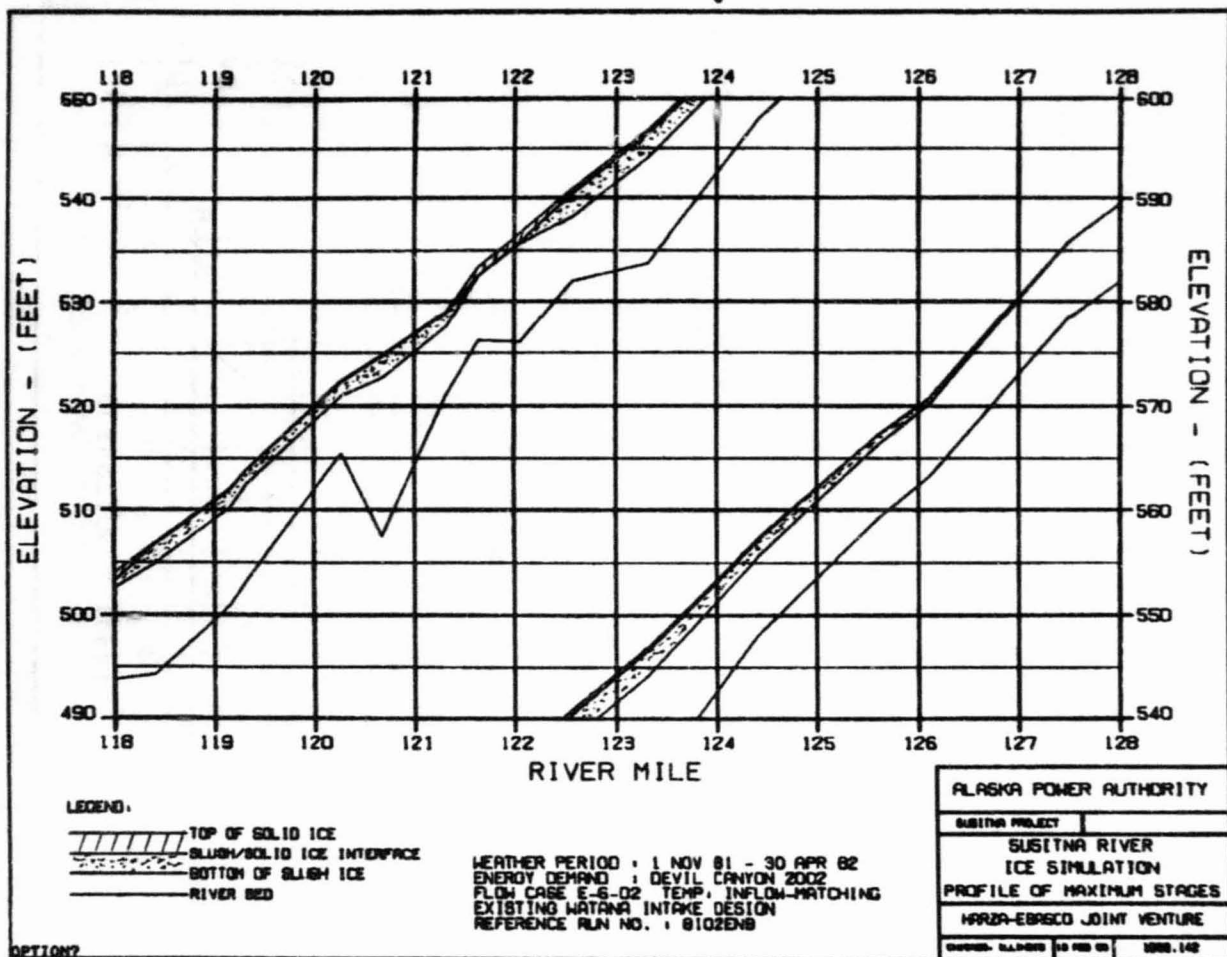
OPTION?

**EXHIBIT N**

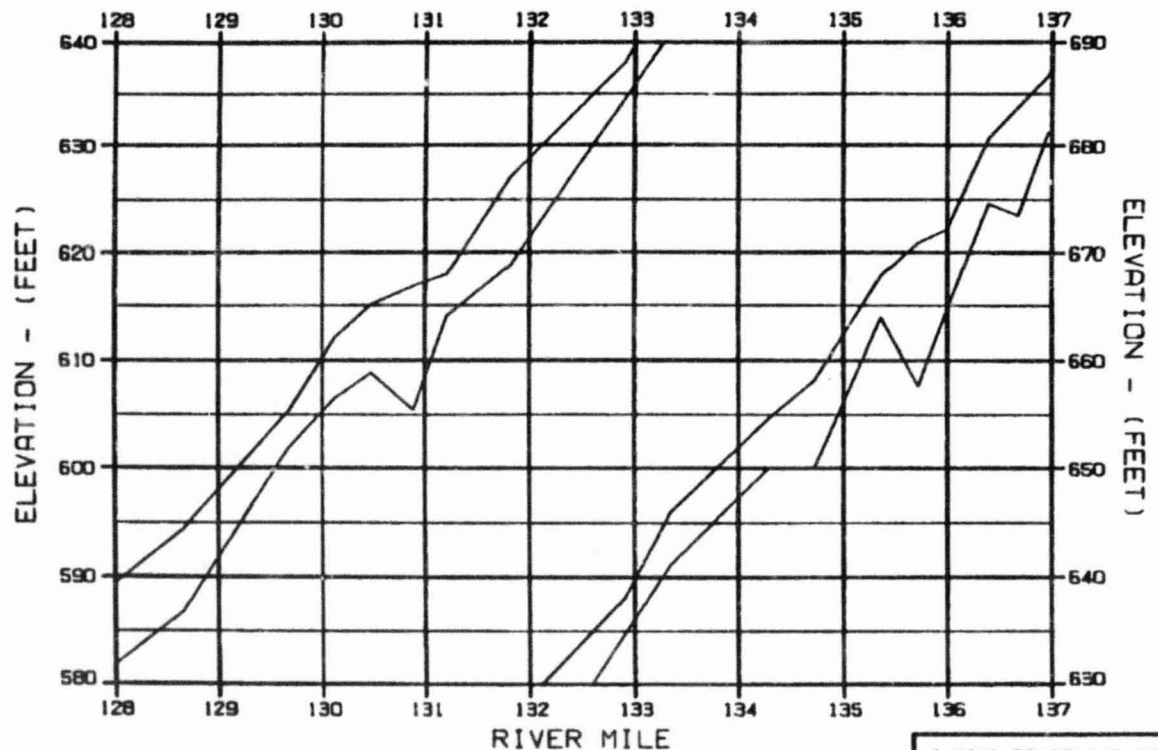








C



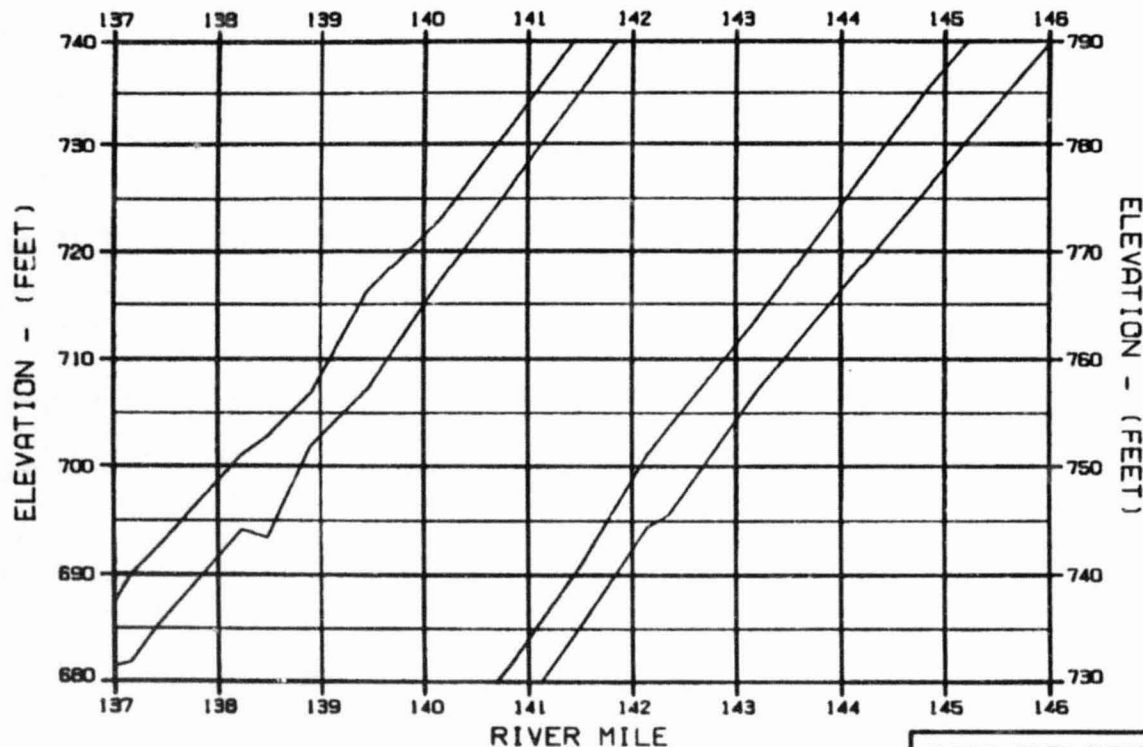
LEGEND:

- TOP OF SOLID ICE
- BLUISH/SOLID ICE INTERFACE
- BOTTOM OF BLUISH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE E-6-02 TEMP: INFLOW-MATCHING  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102ENB

ALASKA POWER AUTHORITY		
SUSITNA PROJECT		
SUSITNA RIVER		
ICE SIMULATION		
PROFILE OF MAXIMUM STAGES		
HARZA-EBRACO JOINT VENTURE		
DESIGNED BY	DATE	NO. 142

OPTION?



WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE E-6-02 TEMP. INFLOW-MATCHING  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102ENB

**ALASKA POWER AUTHORITY**

SUSITNA PROJECT

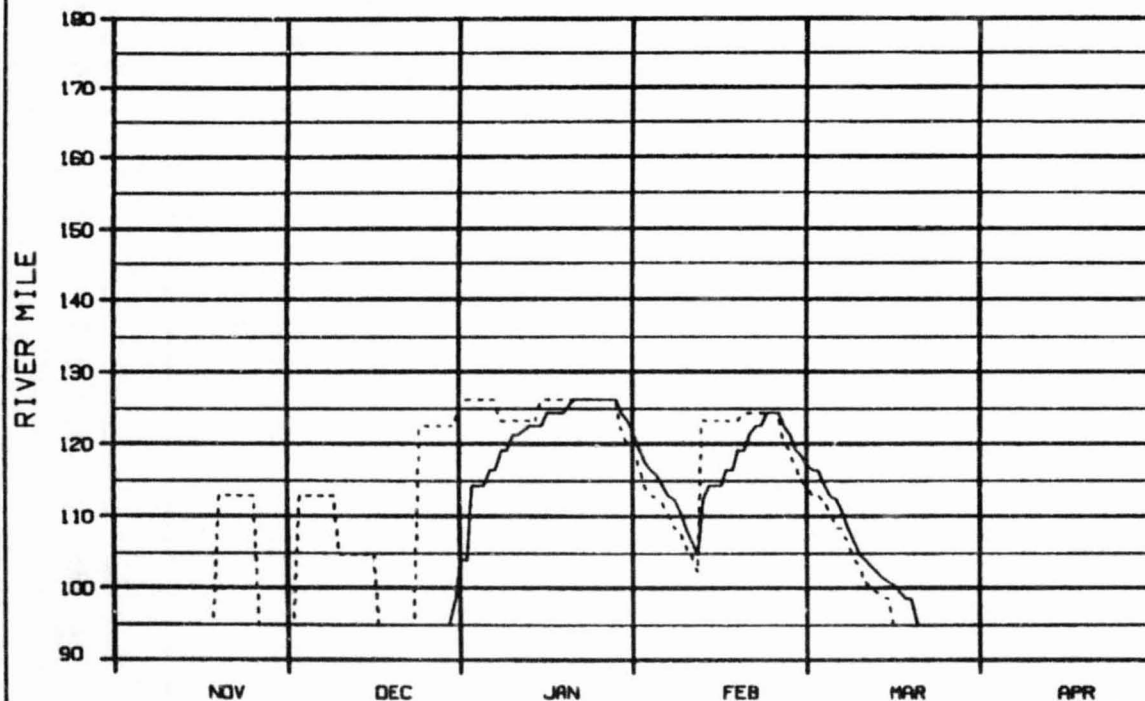
SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

DESIGNED BY: 10 FEB 82 1988.142

OPTION?





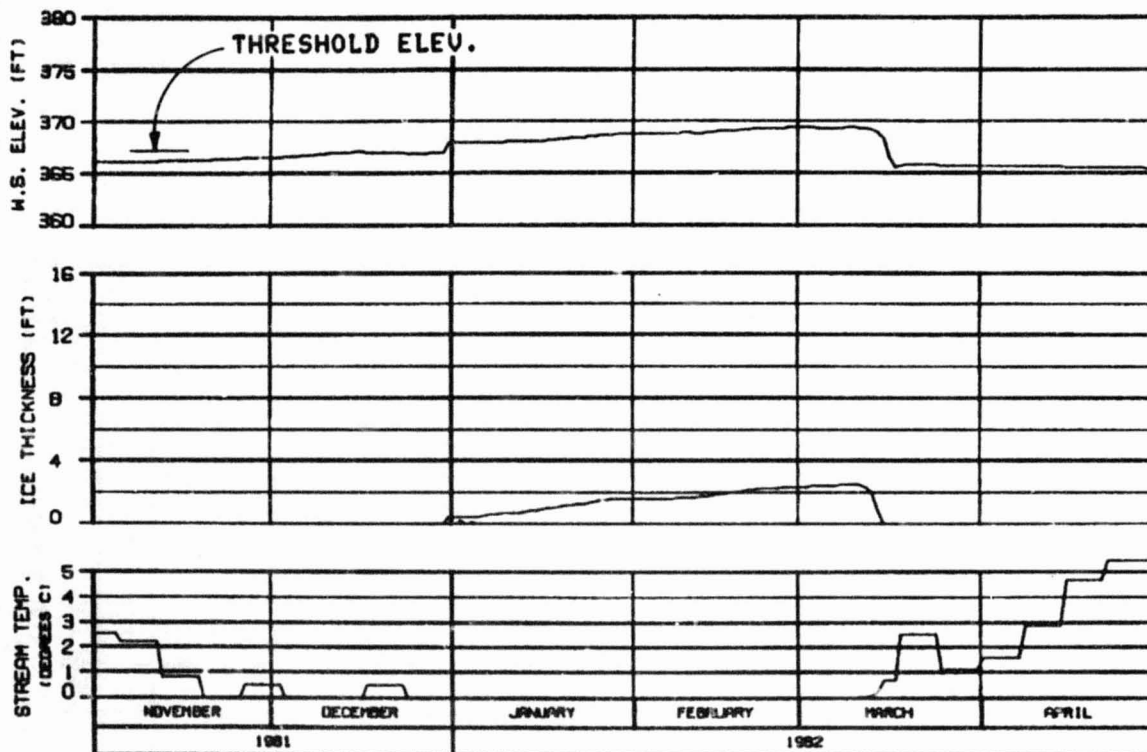
## LEGEND.

———— ICE FRONT  
 - - - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE E-6-02 TEMP. INFLOW-MATCHING  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 810ZENB

ALASKA POWER AUTHORITY		
SUSITNA PROJECT		
SUSITNA RIVER		
PROGRESSION OF ICE FRONT		
& ZERO DEGREE ISOTHERM		
HARZA-EBASCO JOINT VENTURE		
DESIGNED BY	DATE	REVISION
DAVIDSON	10 FEB 82	1000, 142

OPTION?



# HEAD OF WHISKERS SLOUGH

RIVER MILE : 101.50

## ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102ENB

## ALASKA POWER AUTHORITY

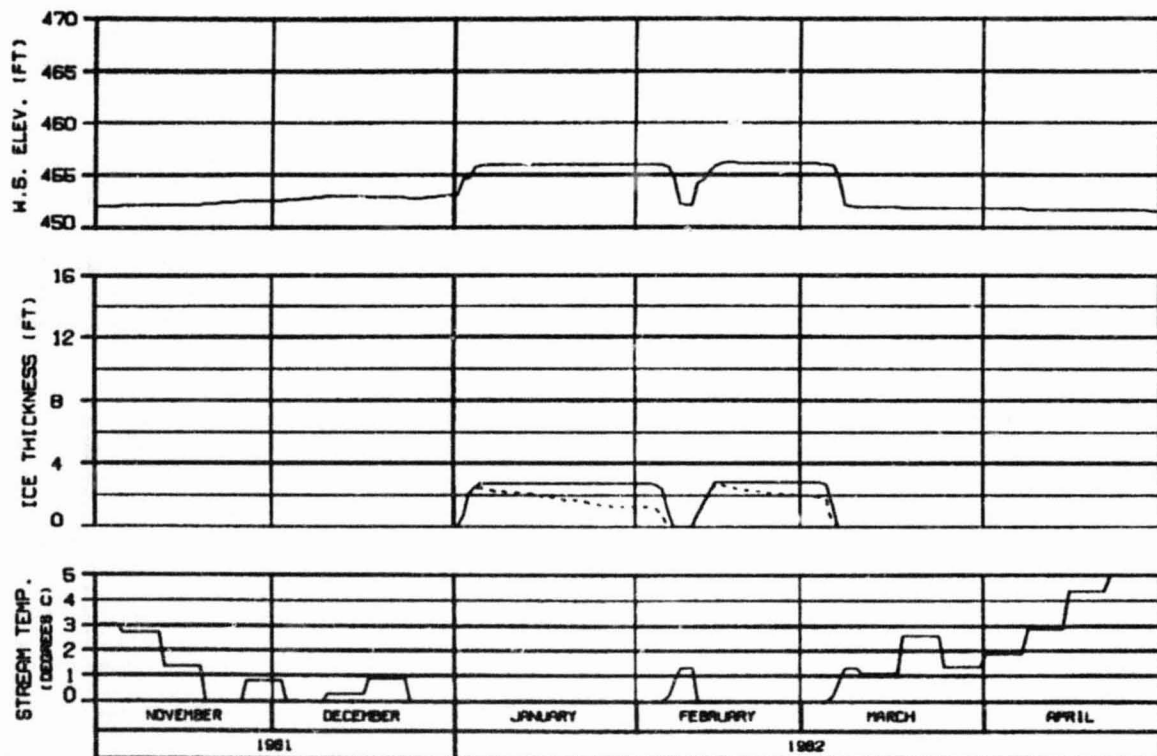
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBRISCO JOINT VENTURE

ENCL. 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 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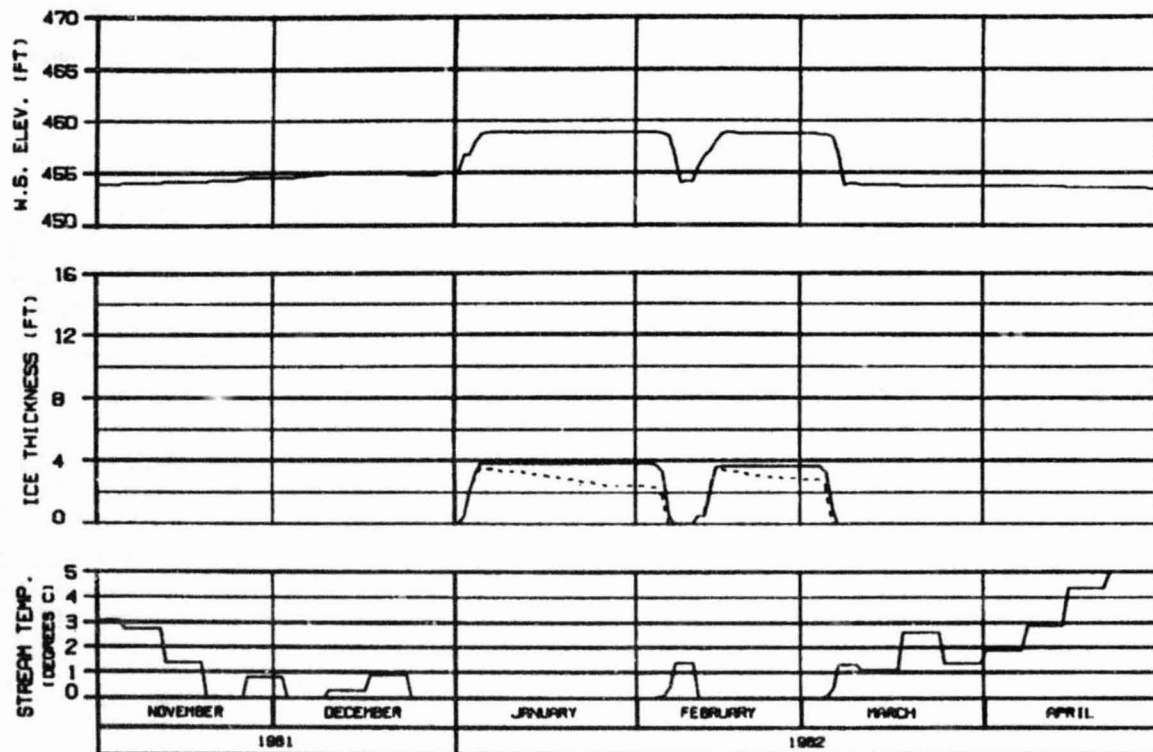


**SIDE CHANNEL AT HEAD OF GASH CREEK**  
**RIVER MILE : 112.00**

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP: INFLOW-MATCHING  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102ENB

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER	
ICE SIMULATION	
TIME HISTORY	
HARZA-EBASCO JOINT VENTURE	
SHOWN: 11/1/81 10:00 AM	1981.142



MOUTH OF SLOUGH 6A  
RIVER MILE : 112.34

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- BLUISH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8102ENB

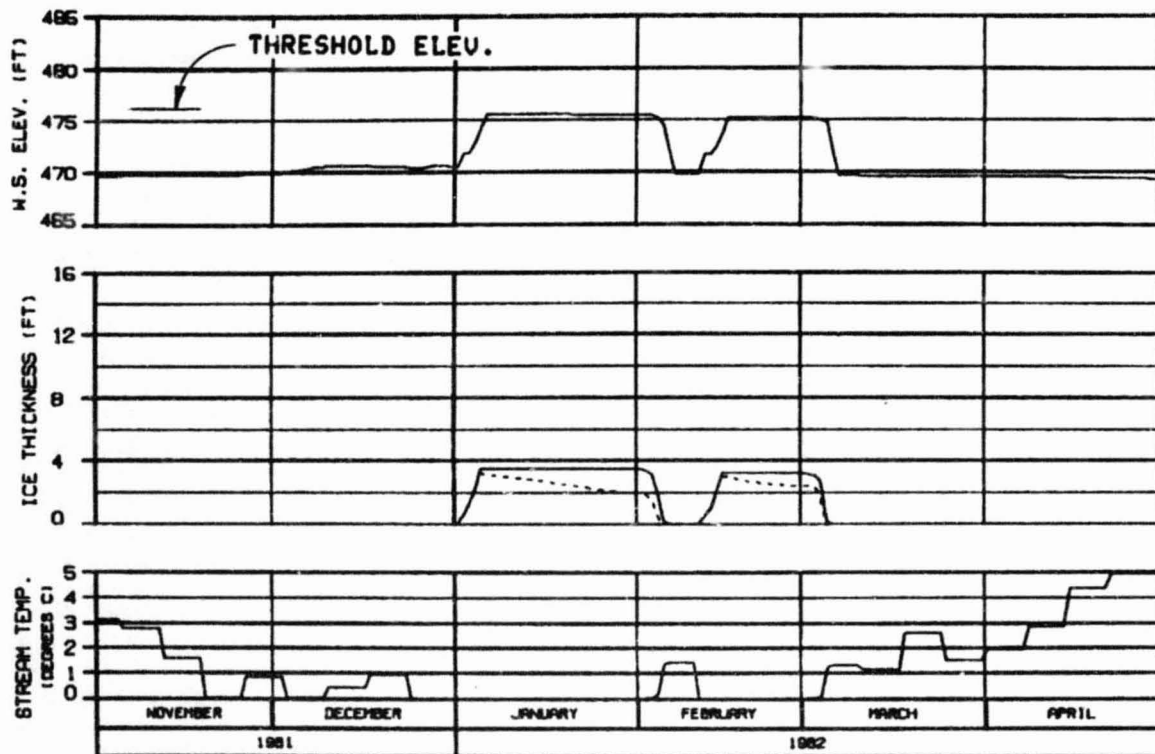
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBRACCO JOINT VENTURE

DESIGN: 8102ENB 15 FEB 82 1000.142



HEAD OF SLOUGH 8  
RIVER MILE : 114.10

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- BLUISH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8102ENB

ALASKA POWER AUTHORITY

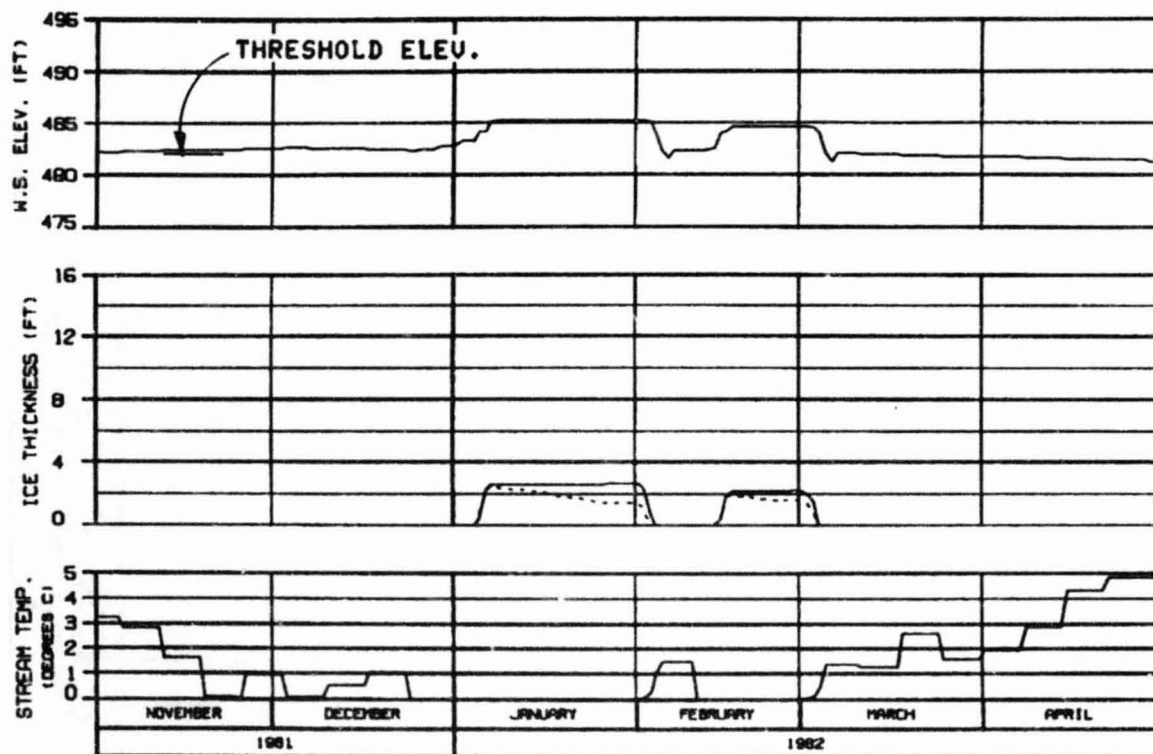
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRARD JOINT VENTURE

DESIGN: S.L. 04/82 10 FEB 82 1000.142





**SIDE CHANNEL MSII**  
**RIVER MILE : 115.50**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102ENB

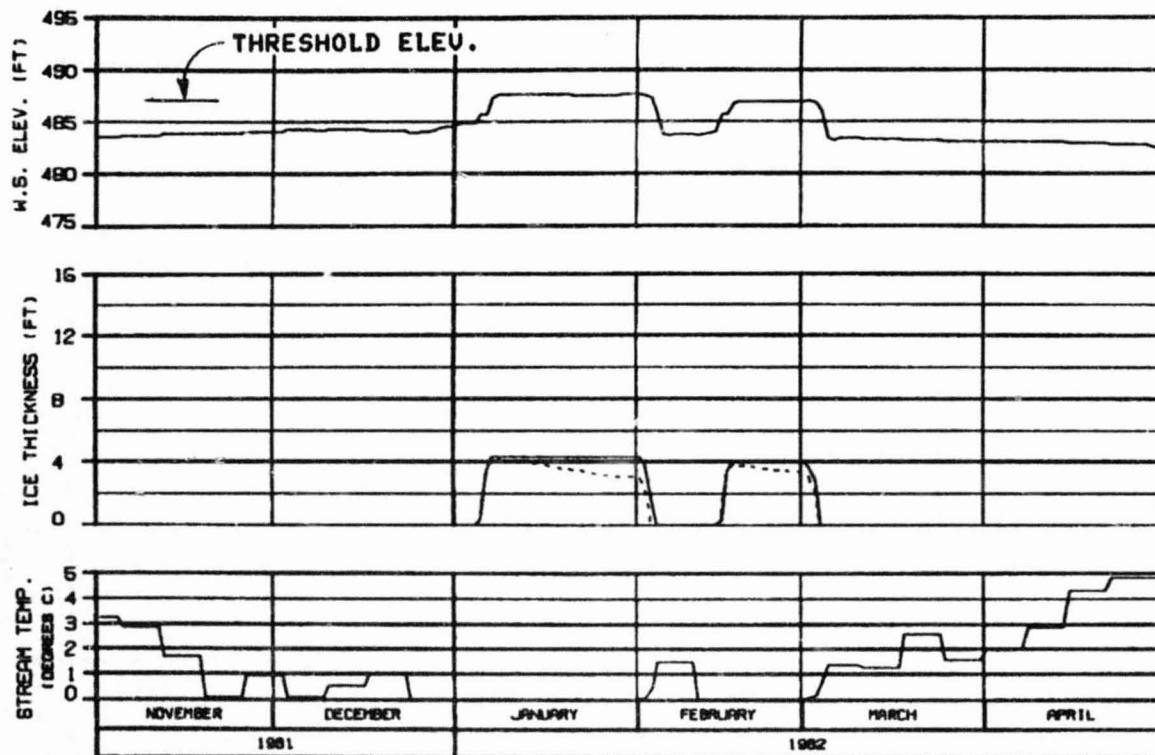
**ALASKA POWER AUTHORITY**

**SUSITNA PROJECT**

**SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY**

**HARZA-EBASCO JOINT VENTURE**

DESIGNED BY HARZA ENGINEERS 10 FEB 82 1000.142



HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102ENB

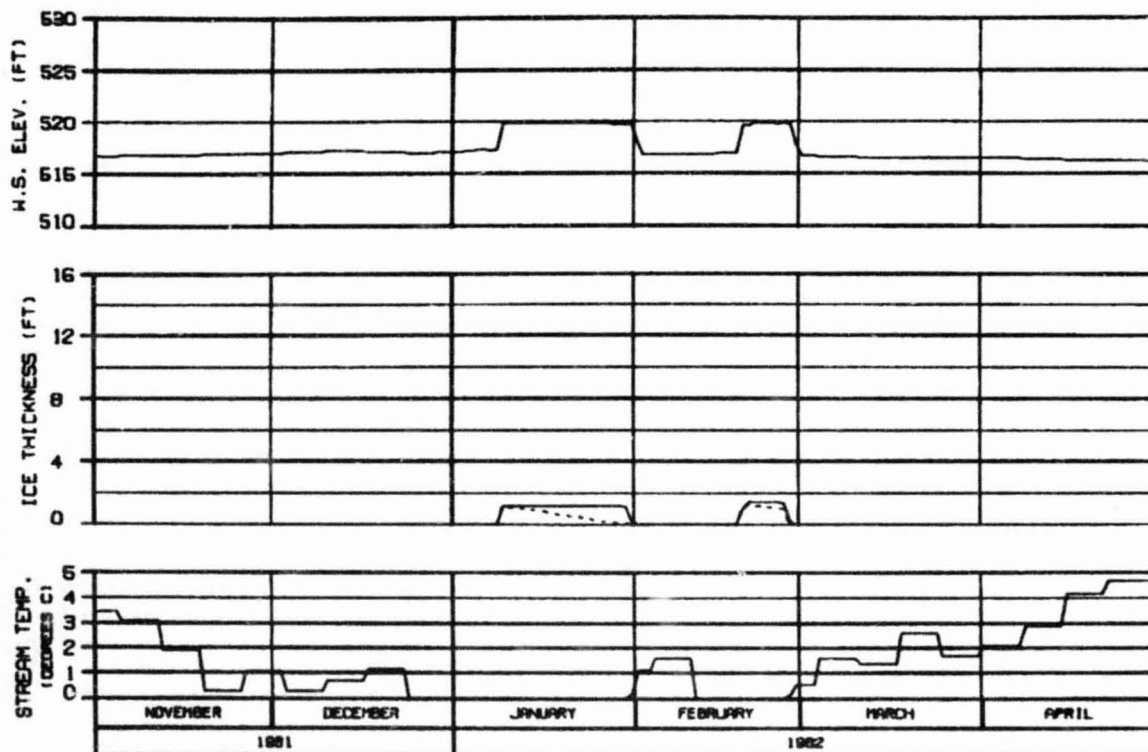
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

DESIGNED: S.A.P. 0000 30 FEB 82 1000.142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102ENB

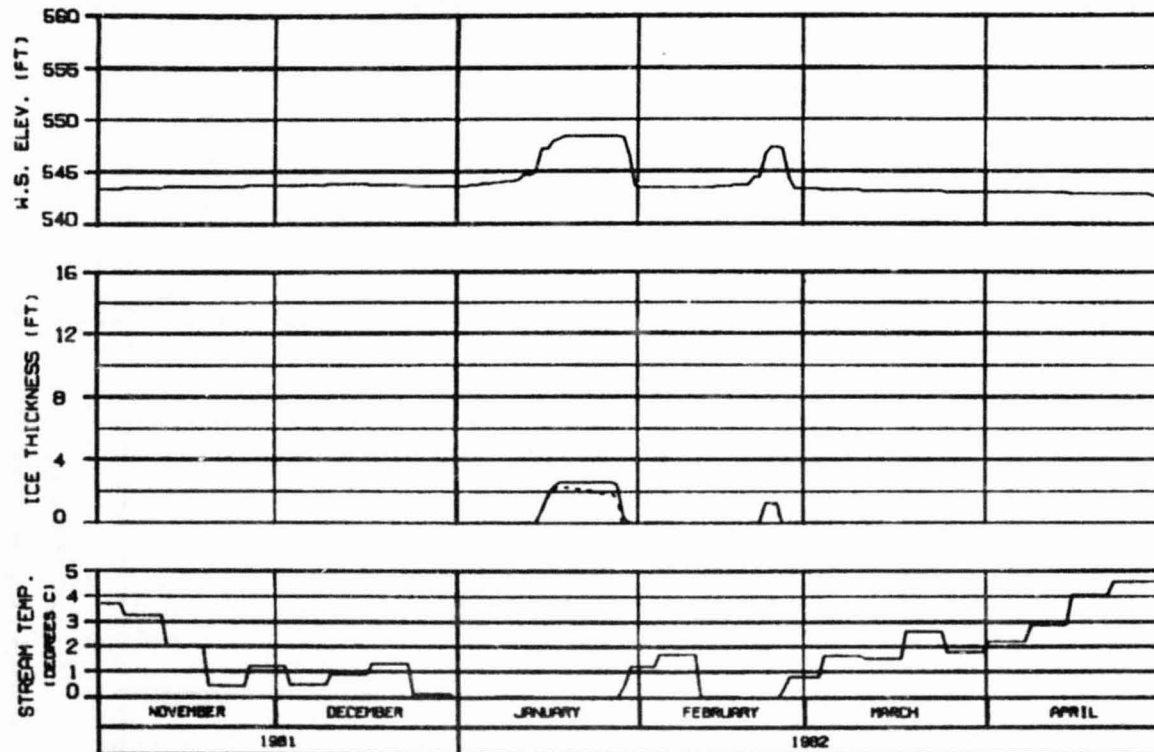
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACO JOINT VENTURE

DESIGNED: S.A.P.-800 10 FEB 82 1000.142



HEAD OF MOOSE SLOUGH

RIVER MILE : 123.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 810ZENB

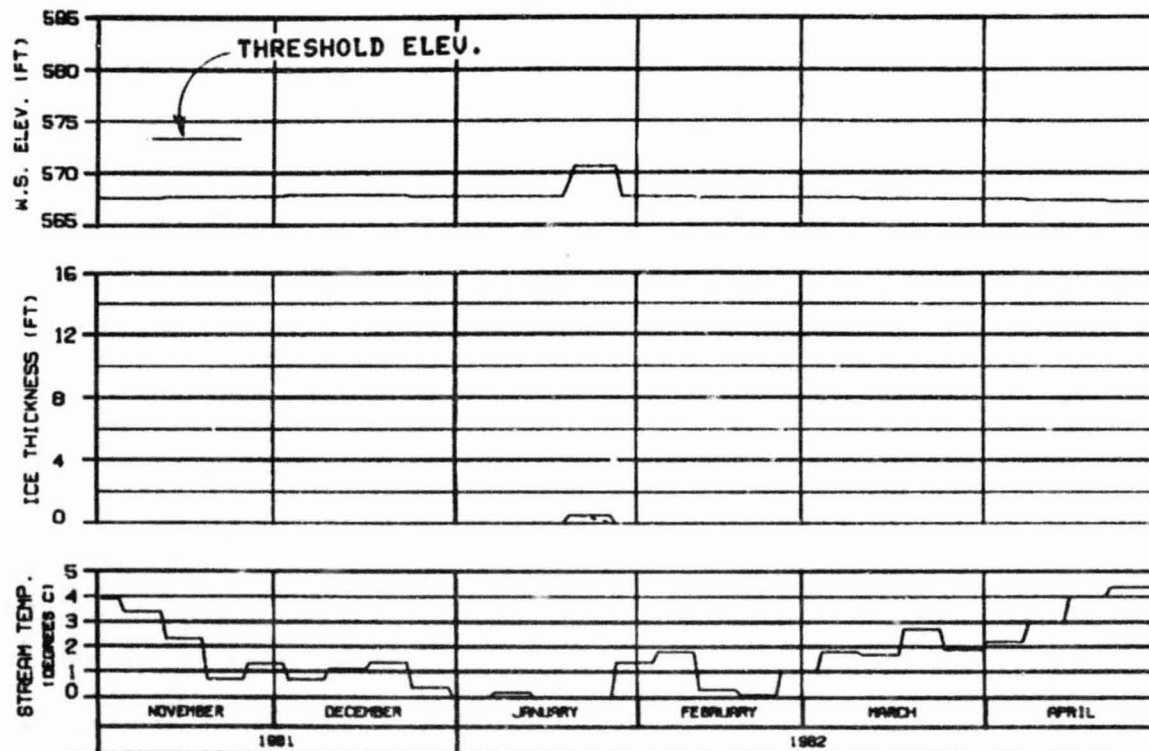
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN. REPORT NO. 10 FEB 82 1982. 142



HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - BLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102ENB

ALASKA POWER AUTHORITY

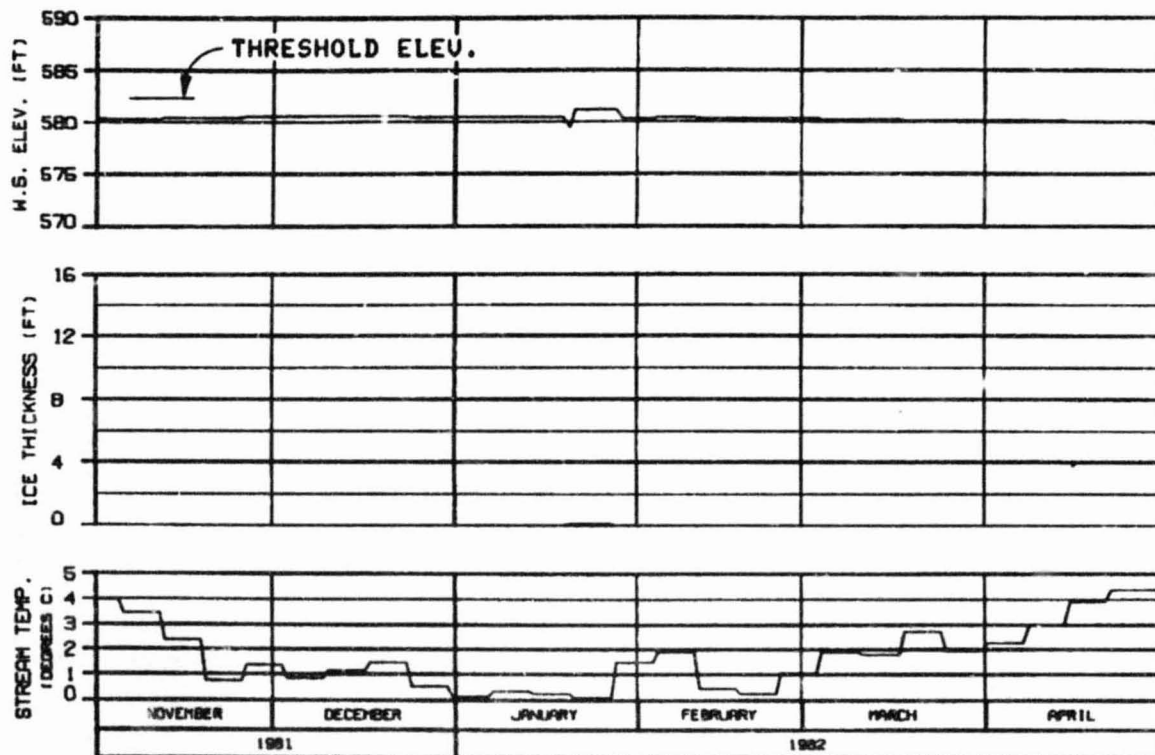
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBASCO JOINT VENTURE

DESIGNED BY: HAZRA-EBASCO 10 APR 82 (000.142)





HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-D2 FLOWS TEMP. INFLOW-MATCHING  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102ENB

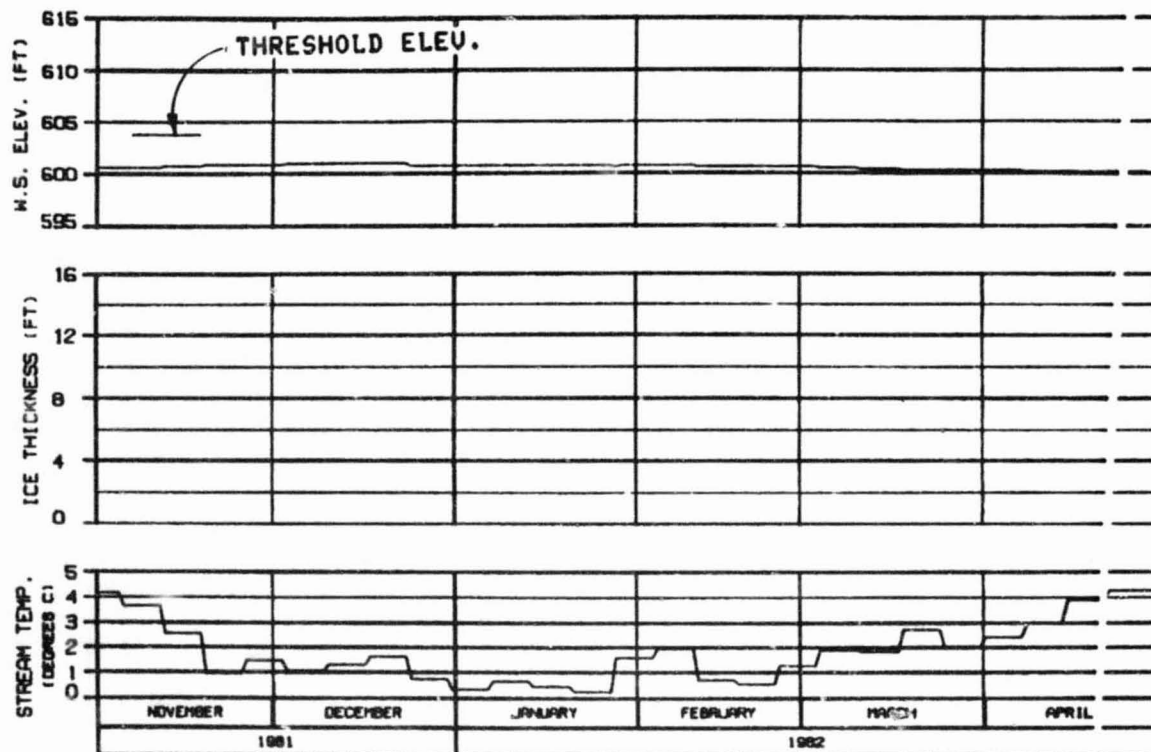
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBERLE JOINT VENTURE

DESIGNED - S.A. PETER 18 FEB 82 1982.142



HEAD OF SLOUGH 9  
RIVER MILE : 129.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8102ENB

ALASKA POWER AUTHORITY

SUSITNA PROJECT

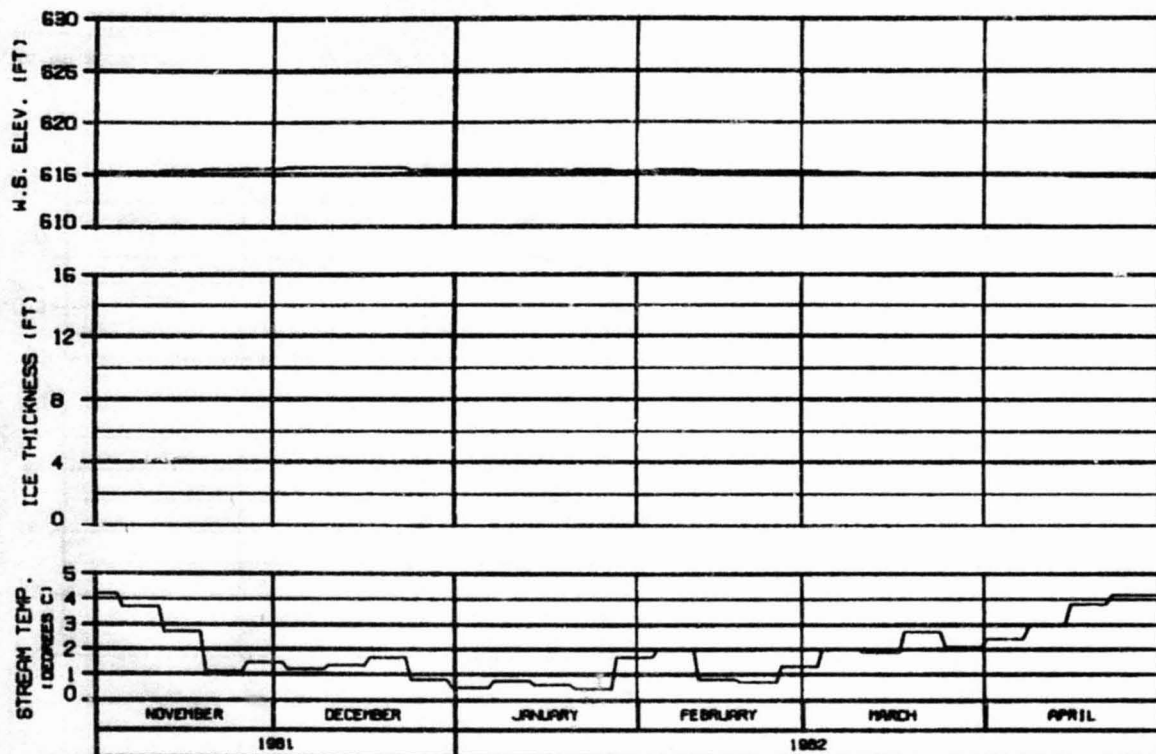
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBAGGE JOINT VENTURE

DRAWN: J.A. DAVIS 15 000 000 1982. 142

OPTION?

OPTION?



SIDE CHANNEL U/S OF SLOUGH 9  
RIVER MILE : 130.60

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-6-D2 FLOWS TEMP. INFLOW-MATCHING  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8102ENB

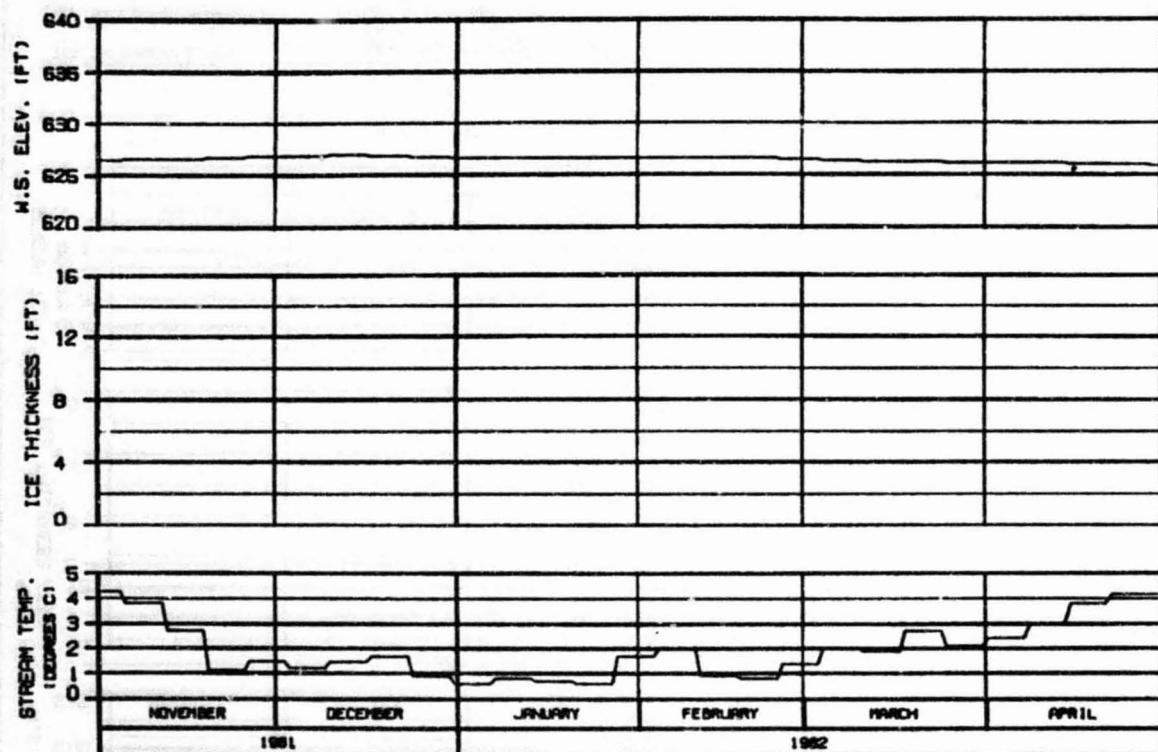
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

REVISED: 04-04-82 14 FEB 82 1000.142



**SIDE CHANNEL U/S OF 4TH JULY CREEK  
RIVER MILE : 131.80**

**ICE THICKNESS LEGEND:**

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-6-02 FLOWS TEMP, INFLOW-MATCHING  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8102ENB

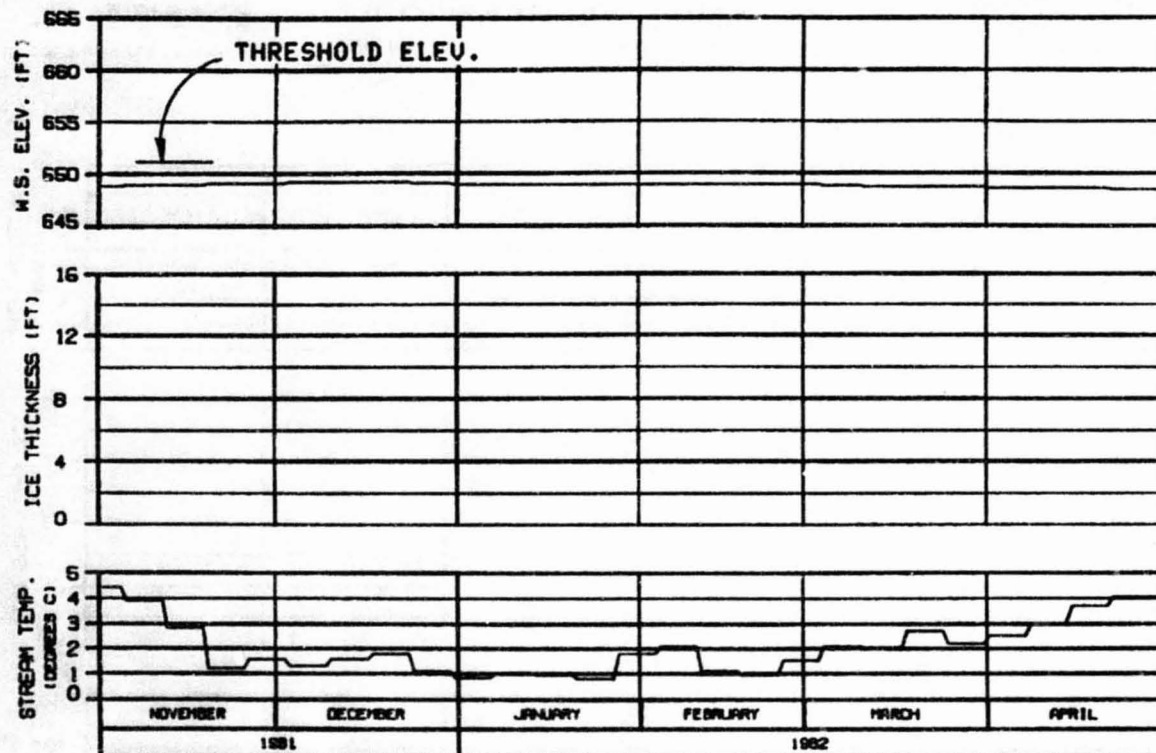
**ALASKA POWER AUTHORITY**

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EDSACO JOINT VENTURE

DIGESTED, ALASKA 15 FEB 83 1983, 142



HEAD OF SLOUGH 9A  
RIVER MILE : 133.70

ICE THICKNESS LEGEND:

———— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8102ENB

ALASKA POWER AUTHORITY

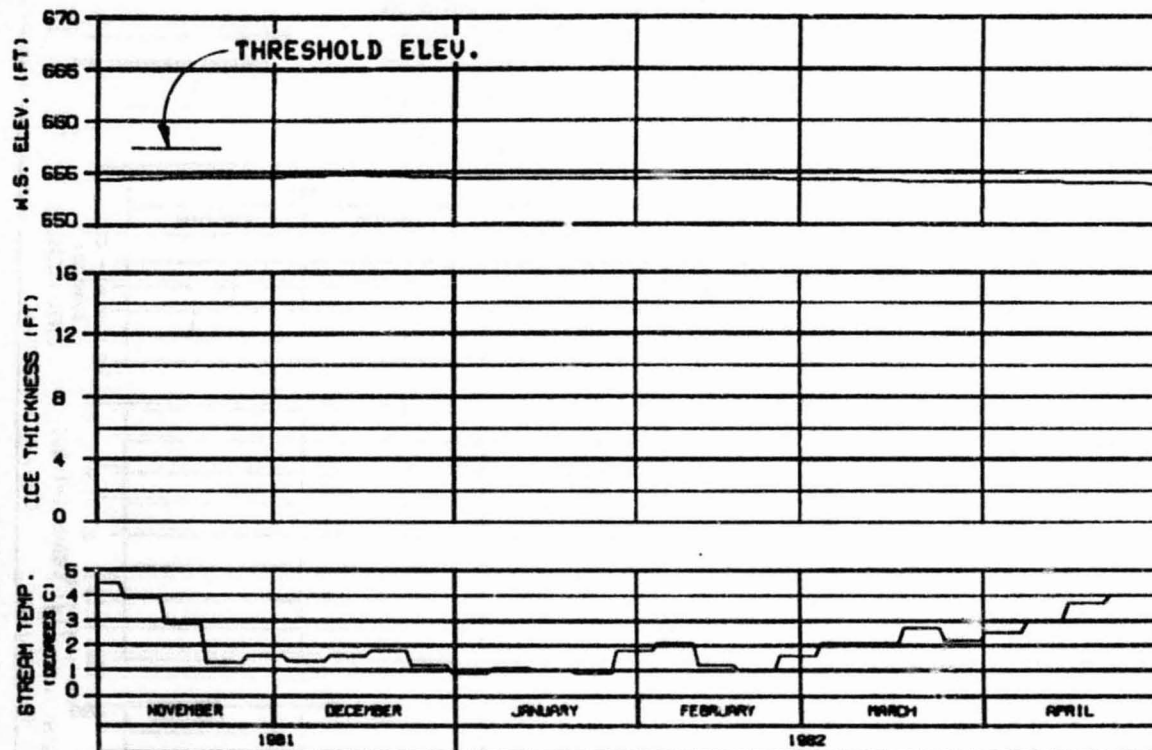
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRACCO JOINT VENTURE

ISSUED: 01-09-82 10 FEB 82 0000.142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF SLOUGH 10  
 RIVER MILE : 134.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102ENB

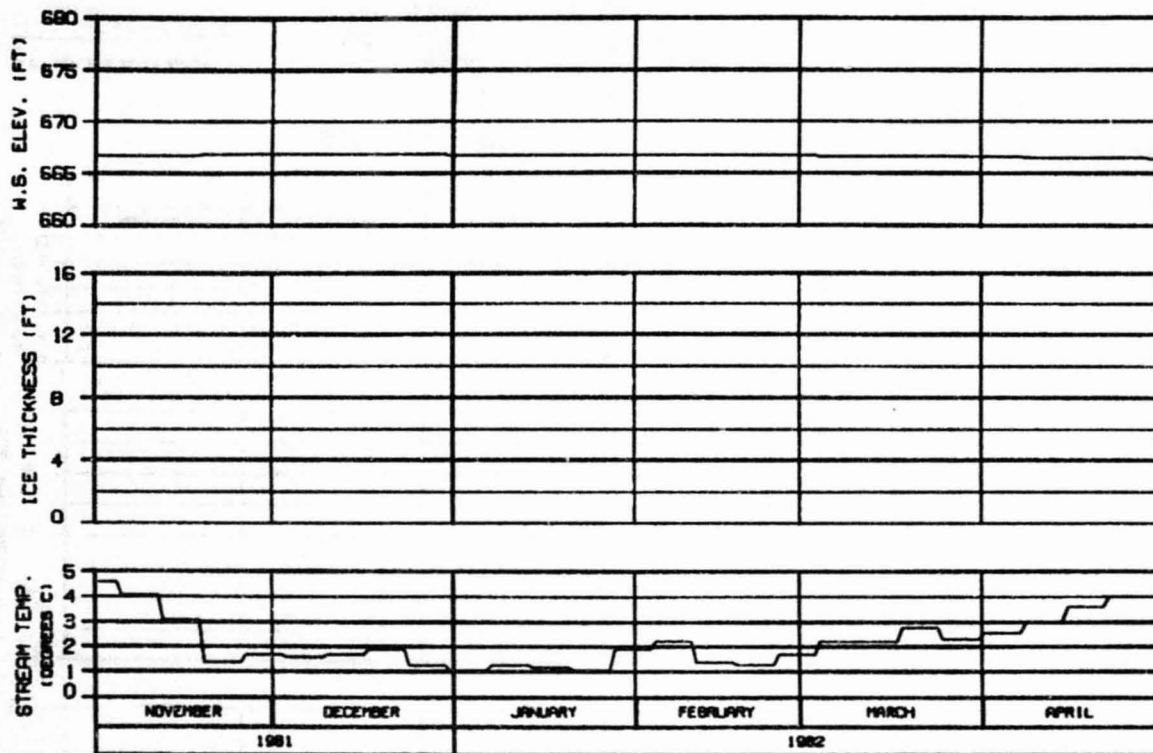
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED BY: JLD/MS 10 FEB 82 1000.142



SIDE CHANNEL D/S OF SLOUGH 11  
RIVER MILE : 135.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
EXISTING WATANA INTAKE DESIGN  
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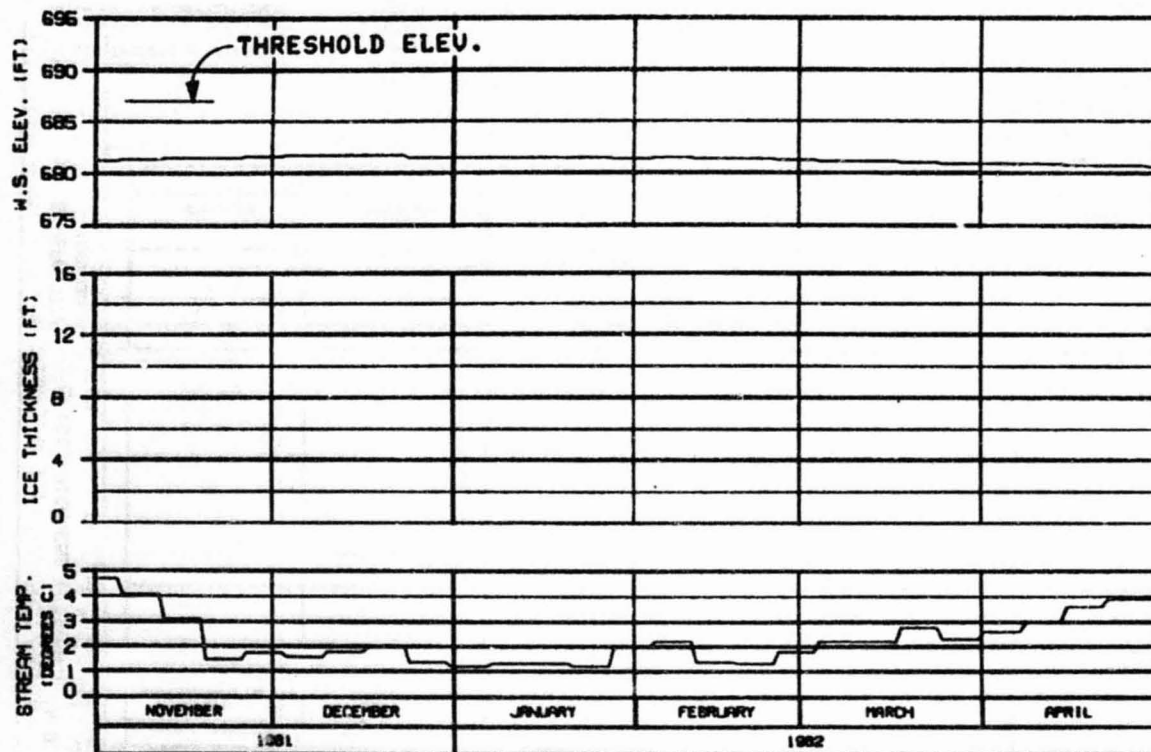
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNER: AL 0-000 NO. REV: 01 1000, 142



HEAD OF SLOUGH 11  
RIVER MILE : 136.50

ICE THICKNESS LEGEND:  
——— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-6-02 FLOWS TEMP, INFLOW-MATCHING  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8102ENB

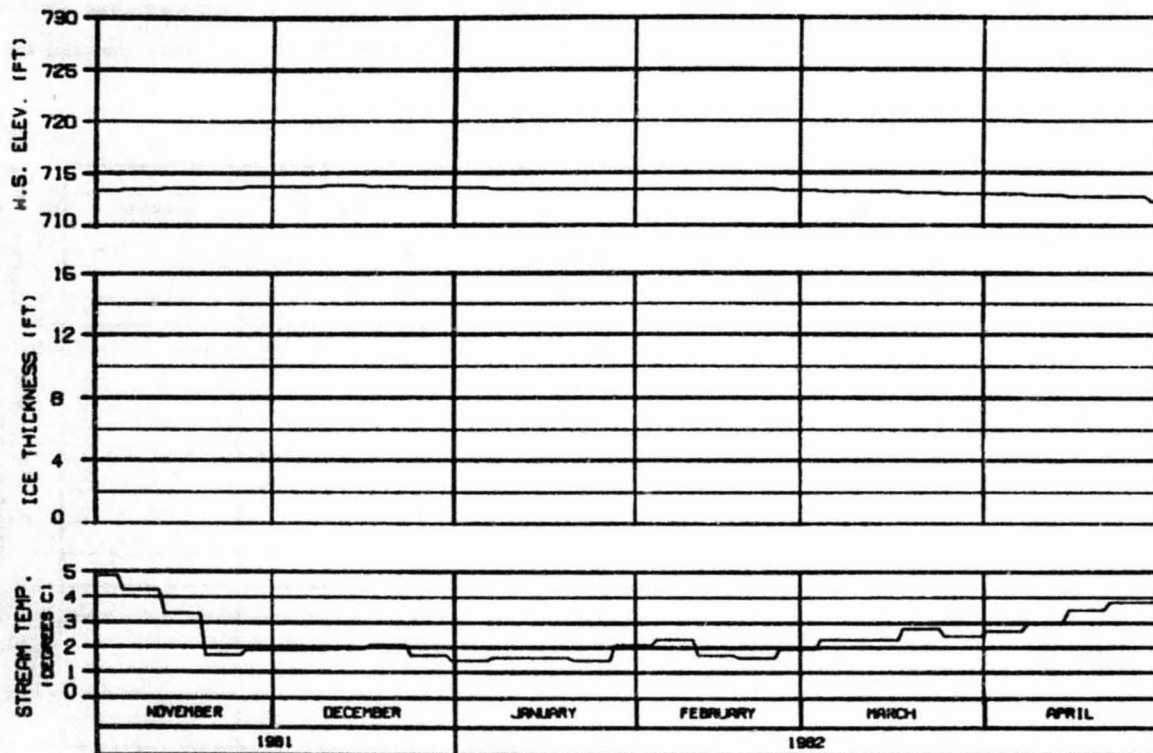
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBERCO JOINT VENTURE

DESIGN: S.A. 0010 10 FEB 82 1000.142



HEAD OF SLOUGH 17

RIVER MILE : 139.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
 EXISTING NATANA INTAKE DESIGN  
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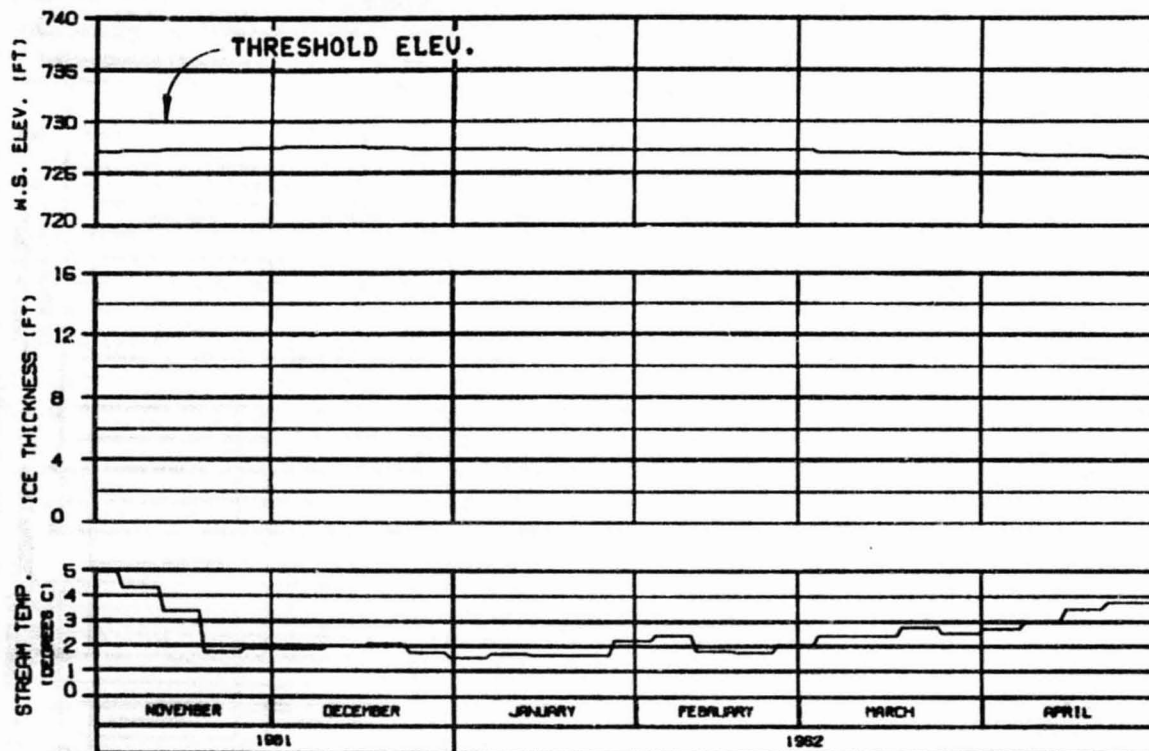
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: S.A. P. 005 100 FEB 82 1000. 142



HEAD OF SLOUGH 20

RIVER MILE : 140.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102ENB

ALASKA POWER AUTHORITY

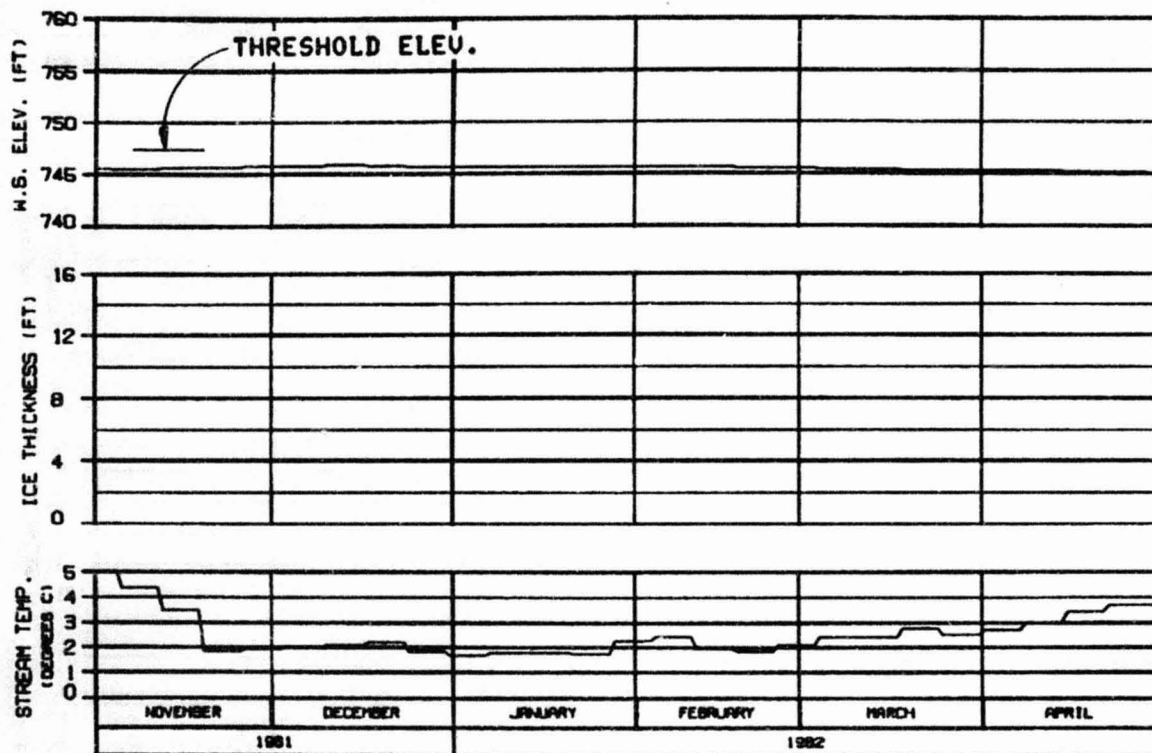
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBRACCO JOINT VENTURE

DESIGNED: S.A.P. 0000 30 FEB 82 0000.142





SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 ..... SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 810ZEN8

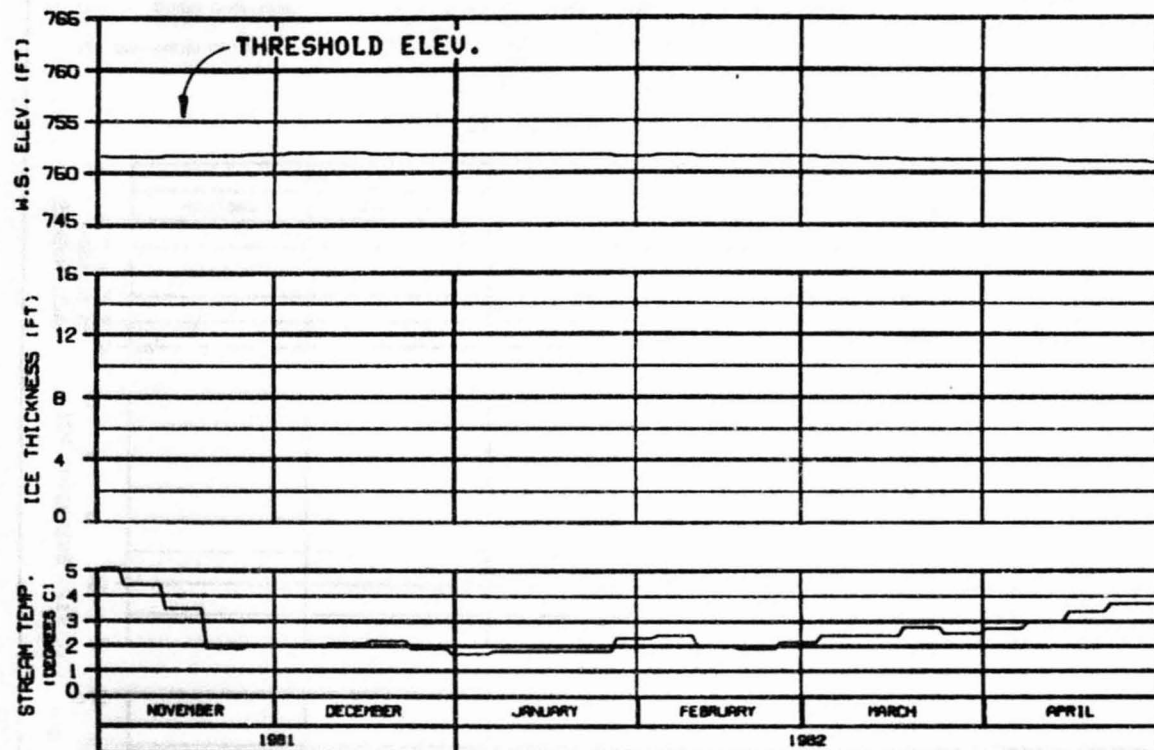
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

ISSUED: 04-08-82 10 FEB 82 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 ..... SLUSH COMPONENT

HEAD OF SLOUGH 21  
 RIVER MILE : 142.20

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102ENB

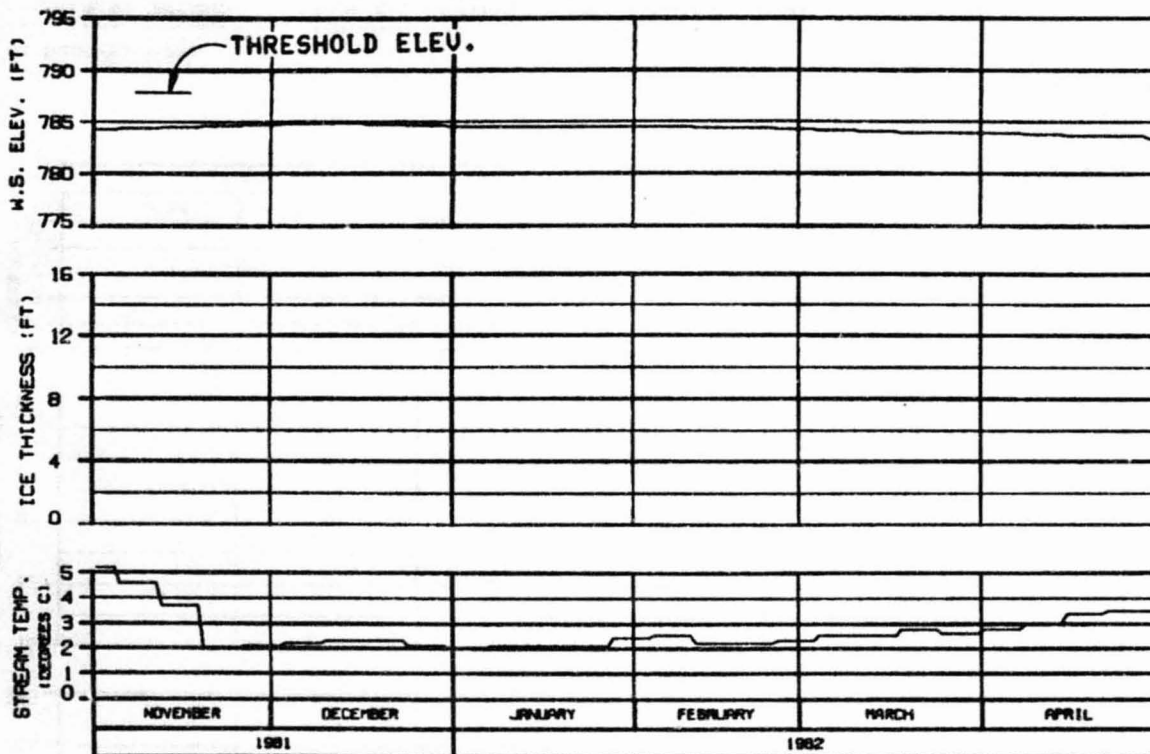
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRASC JOINT VENTURE

SHOWN: 01.0000 10 FEB 82 1000.142



HEAD OF SLOUGH 22  
RIVER MILE : 144.80

ICE THICKNESS LEGEND:  
——— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-6-02 FLOWS TEMP. INFLOW-MATCHING  
EXISTING WATANA INTAKE DESIGN  
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ALASKA POWER AUTHORITY

SUSITNA PROJECT

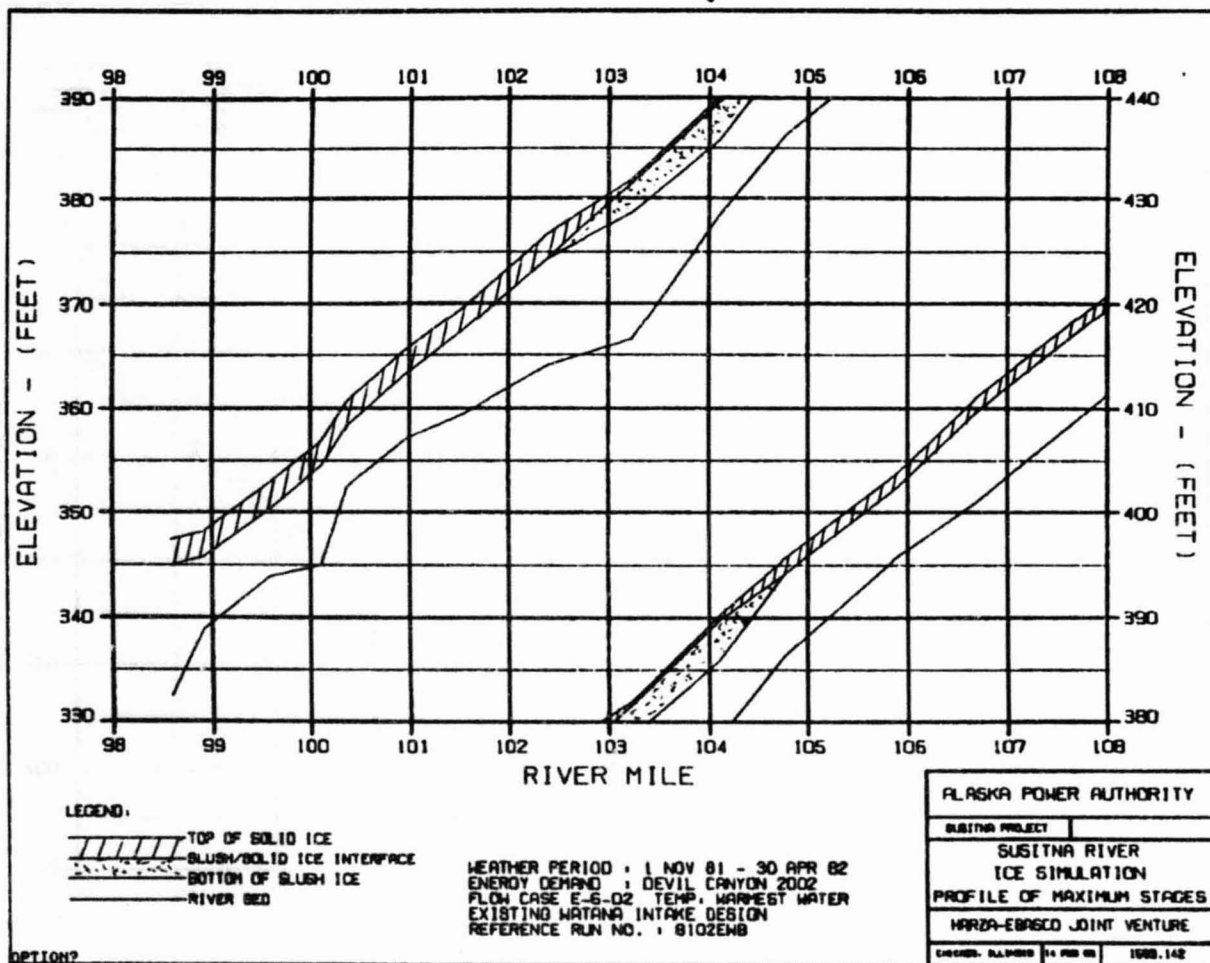
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

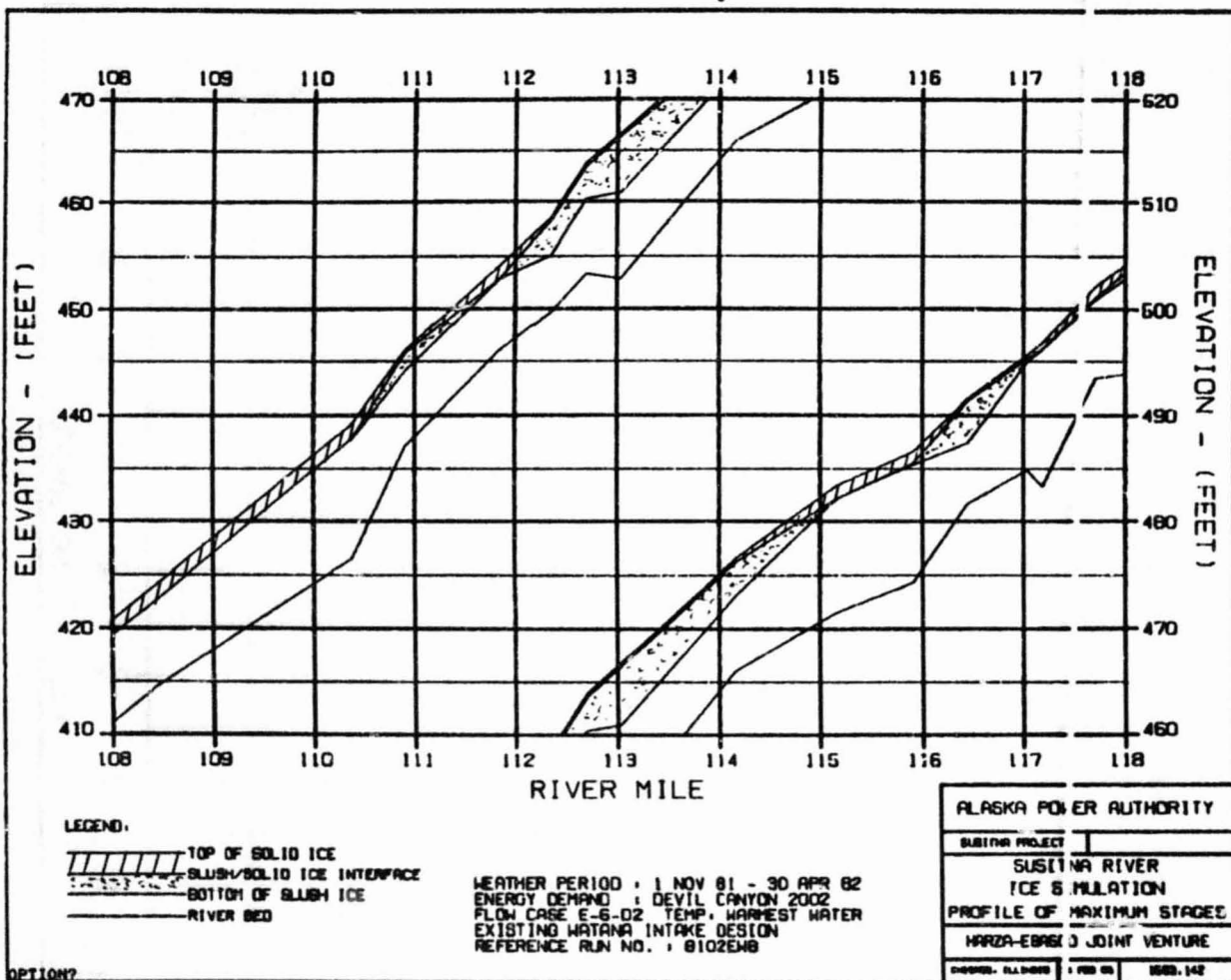
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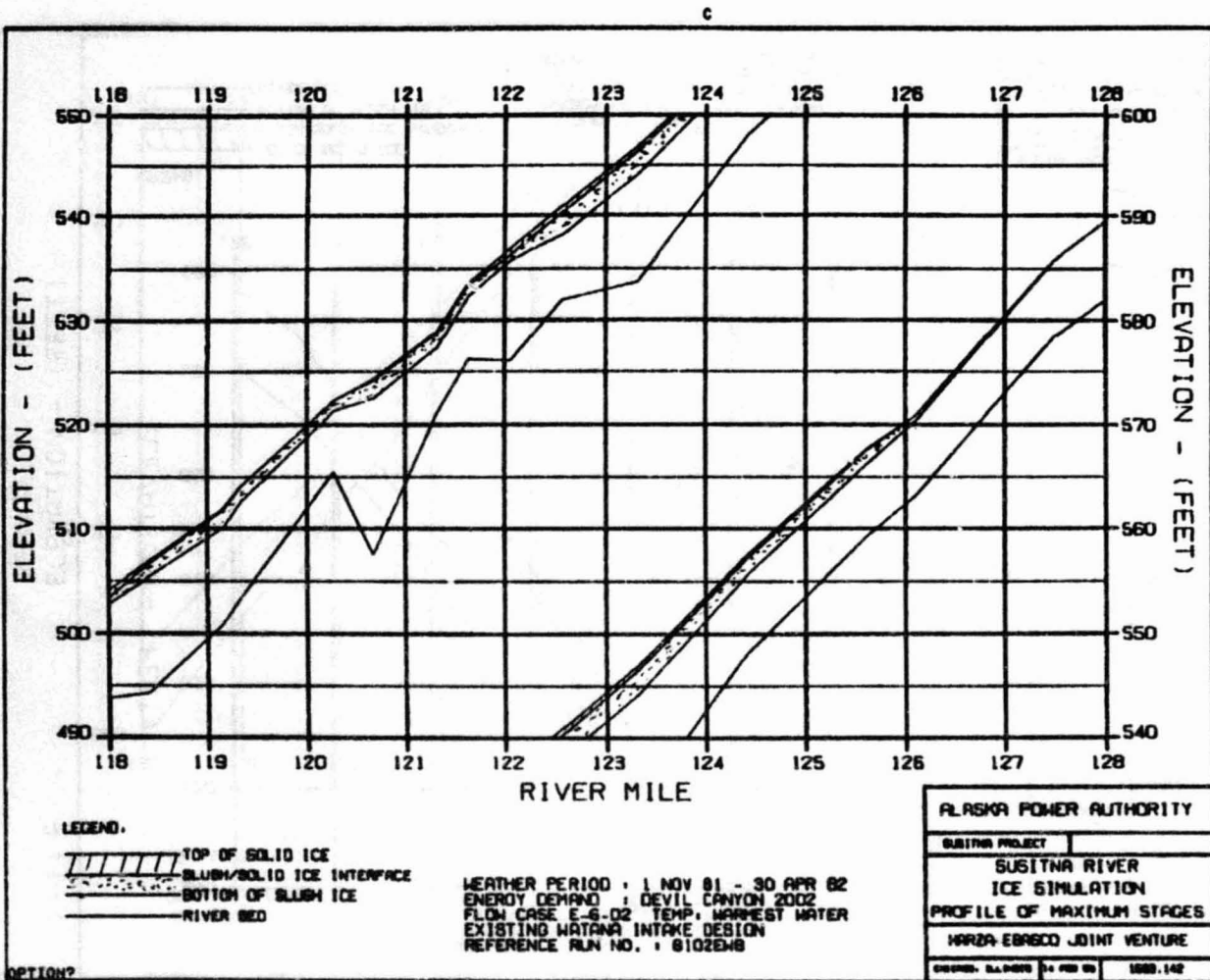
OPTION?

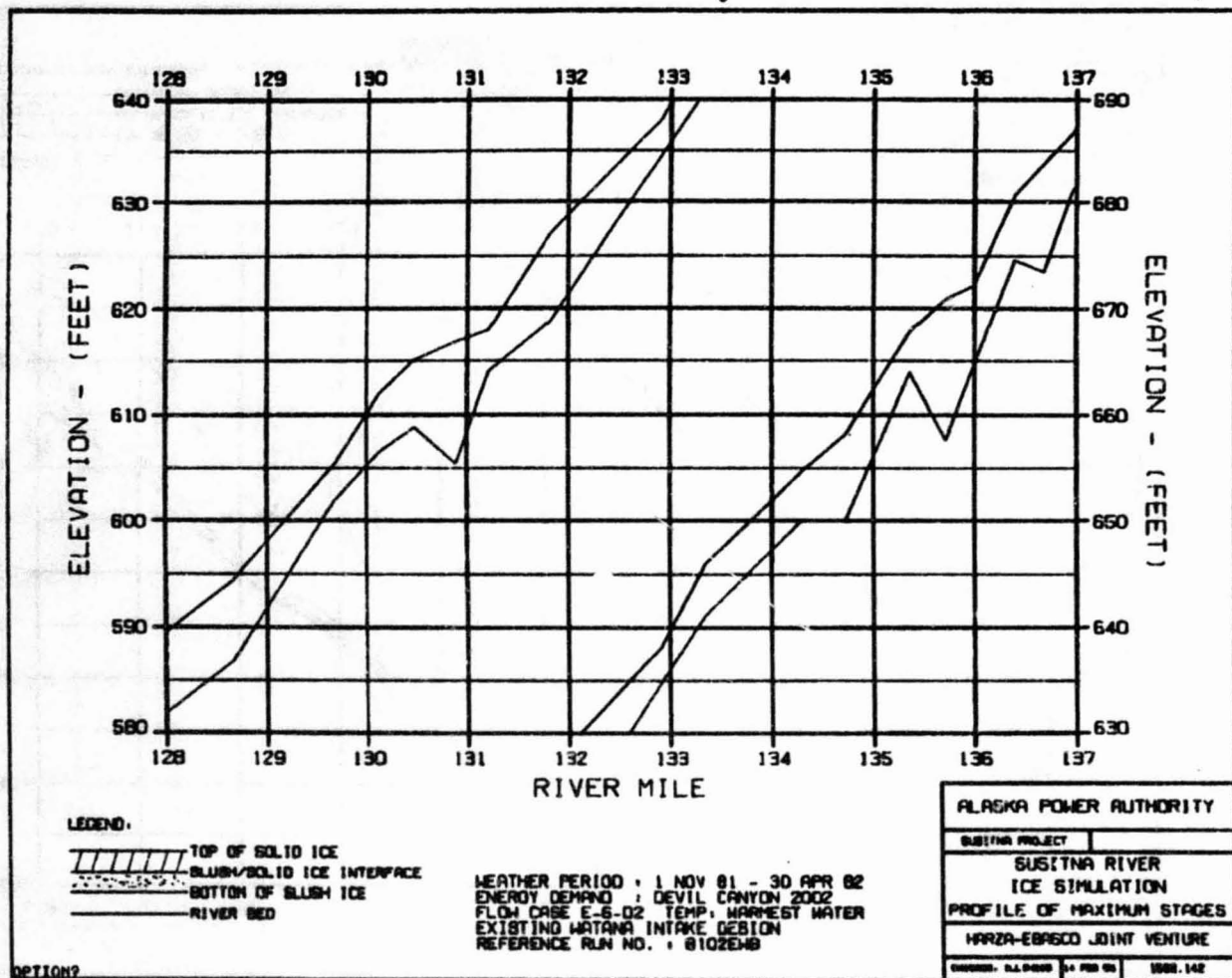
**EXHIBIT O**

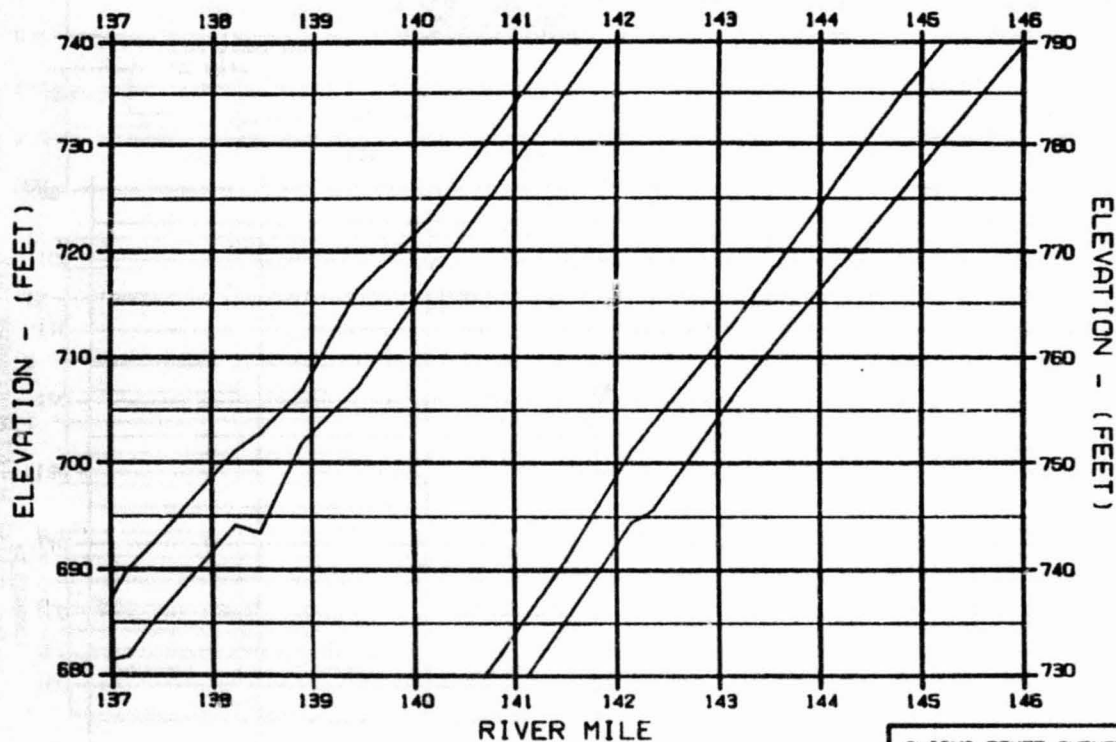




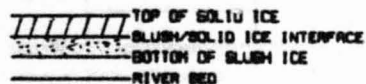








## LEGEND:



WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE E-B-02 TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102ENB

## ALASKA POWER AUTHORITY

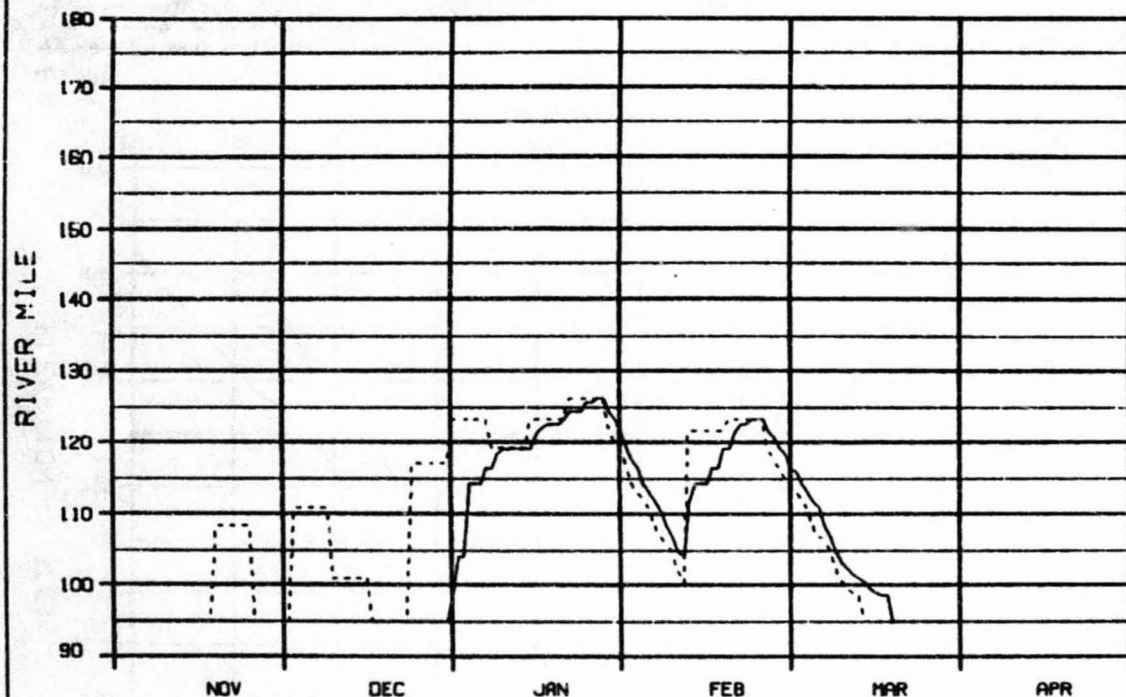
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-ENGEL JOINT VENTURE

DESIGNED BY: J. L. HARRIS 14 FEB 82 1000.142

OPTION 2



## LEGEND:

—— ICE FRONT  
 - - - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE E-6-02 TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102ENB

OPTION?

## ALASKA POWER AUTHORITY

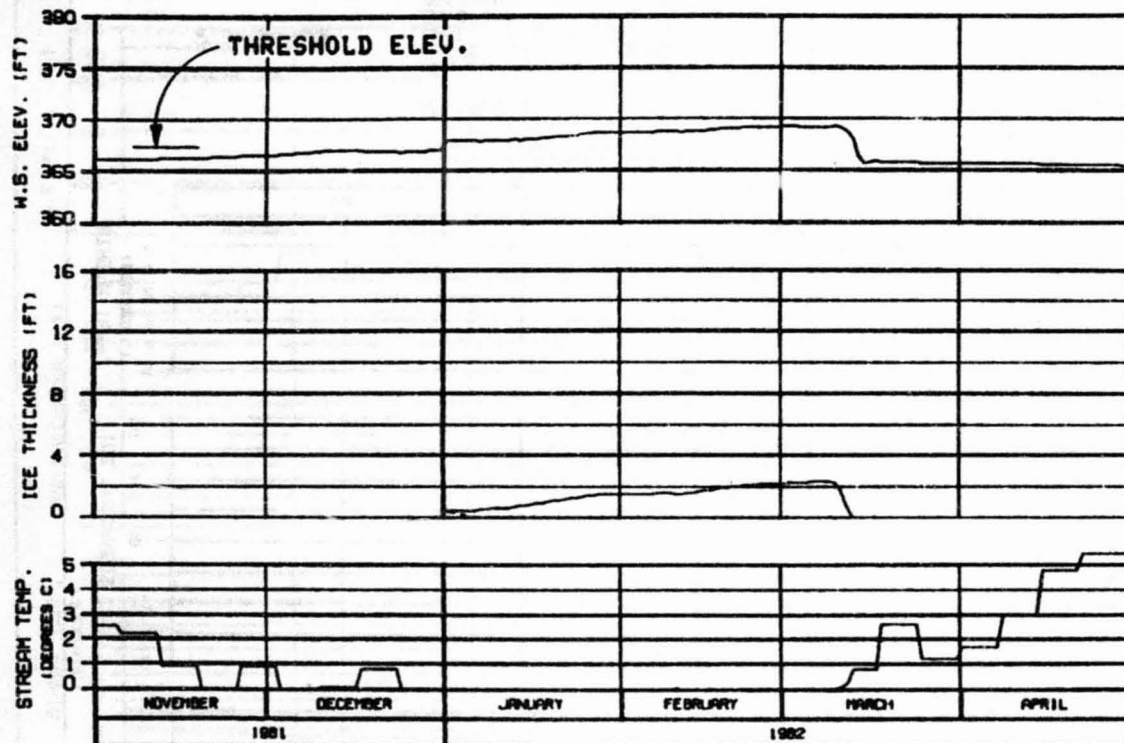
SUSITNA PROJECT

SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

HARZA-EBASCO JOINT VENTURE

DESIGNED BY HARZA 14 FEB 82 1000.142





**HEAD OF WHISKERS SLOUGH**  
**RIVER MILE : 101.50**

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. WARMEST WATER  
 EXISTING NATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102E4B

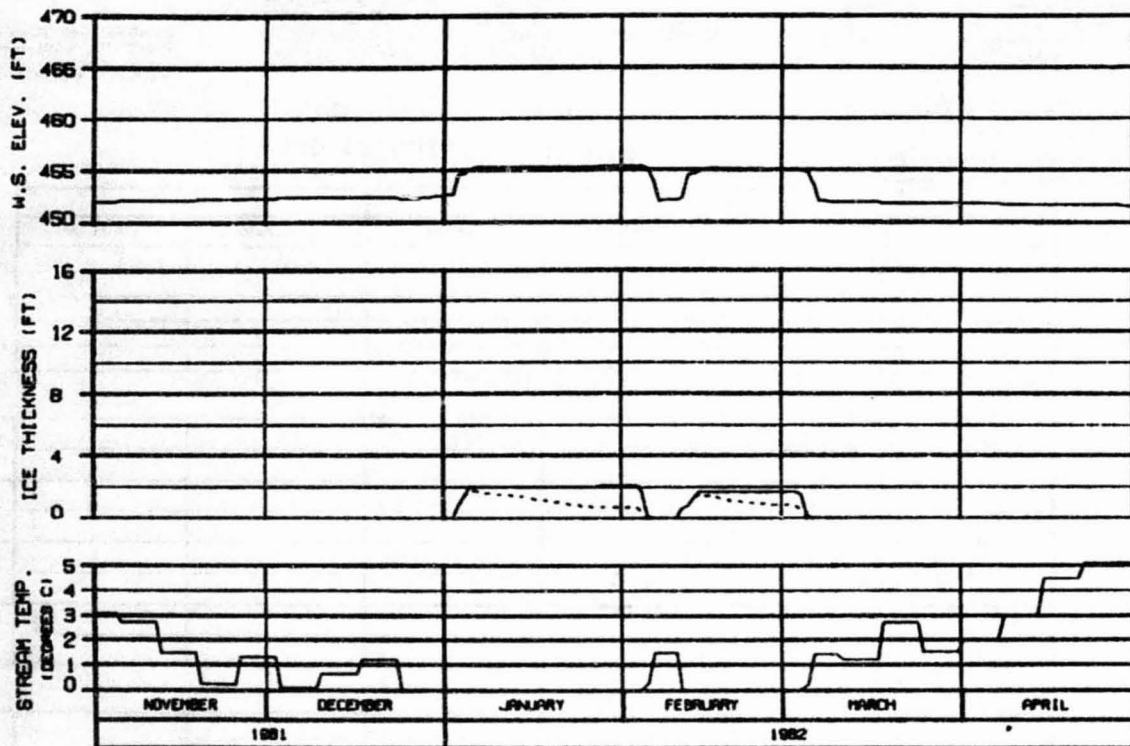
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBASCO JOINT VENTURE

CHARGE: 8102E4B 11 FEB 82 1000.142



# SIDE CHANNEL AT HEAD OF GASH CREEK

RIVER MILE : 112.00

## ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP: WARMEST WATER  
 EXISTING NATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102EMB

## ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBASCO JOINT VENTURE

DRAWN: B.L. 1000 14 FEB 82 1000.142



MOUTH OF SLOUGH 6A

RIVER MILE : 112.34

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 0102EWB

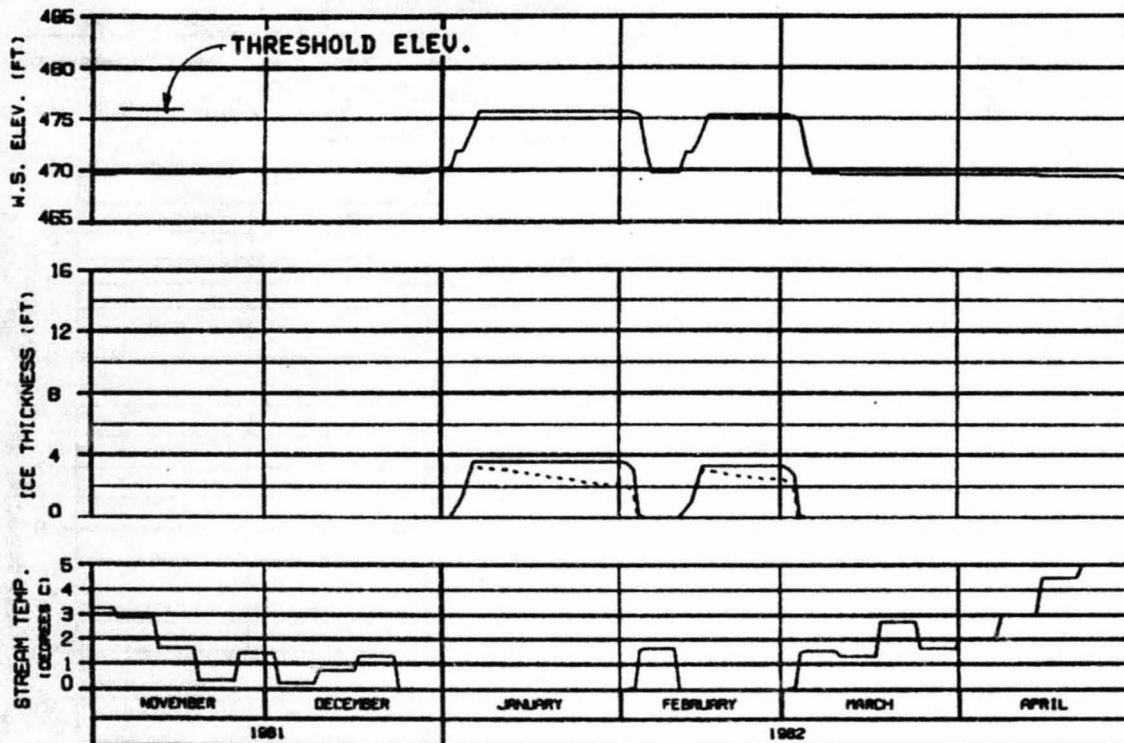
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBRSCO JOINT VENTURE

CHIEF: SLD/010 14 FEB 82 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

# HEAD OF SLOUGH 8 RIVER MILE : 114.10

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102EW8

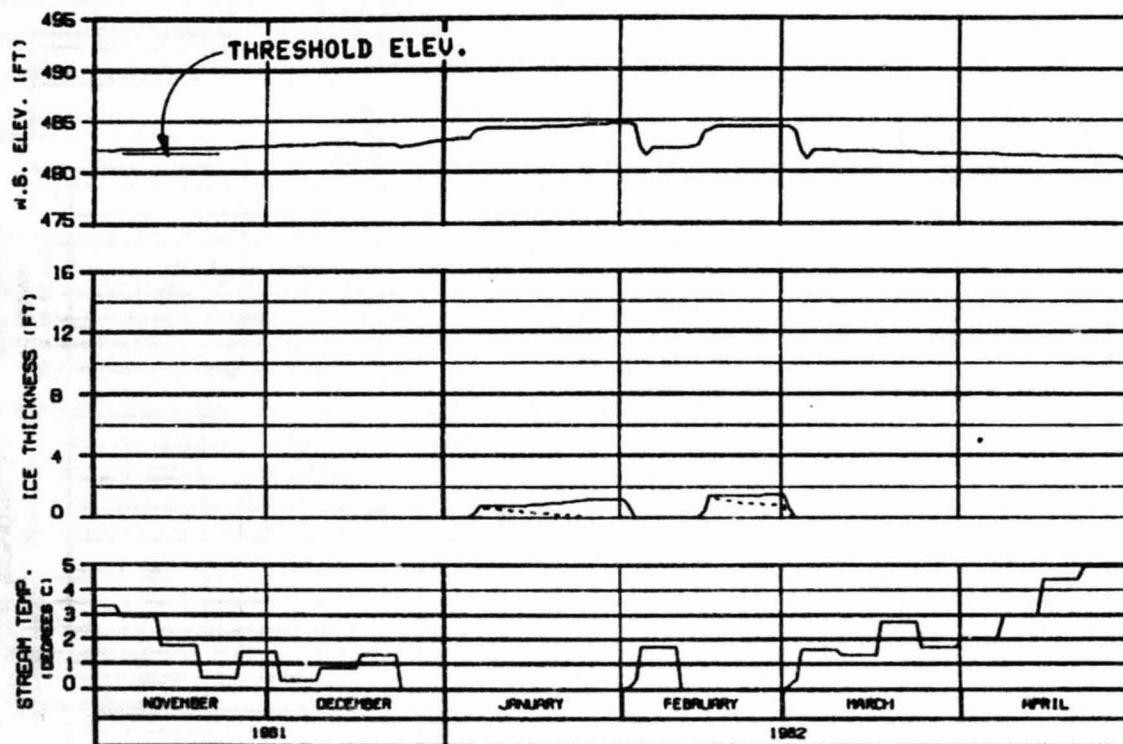
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EGASCO JOINT VENTURE

DESIGNED BY: SL-0000 14 FEB 82 1000.142



**SIDE CHANNEL MSII**  
**RIVER MILE : 115.50**

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- BLUISH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-6-02 FLOWS TEMP, WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8102EW8

ALASKA POWER AUTHORITY

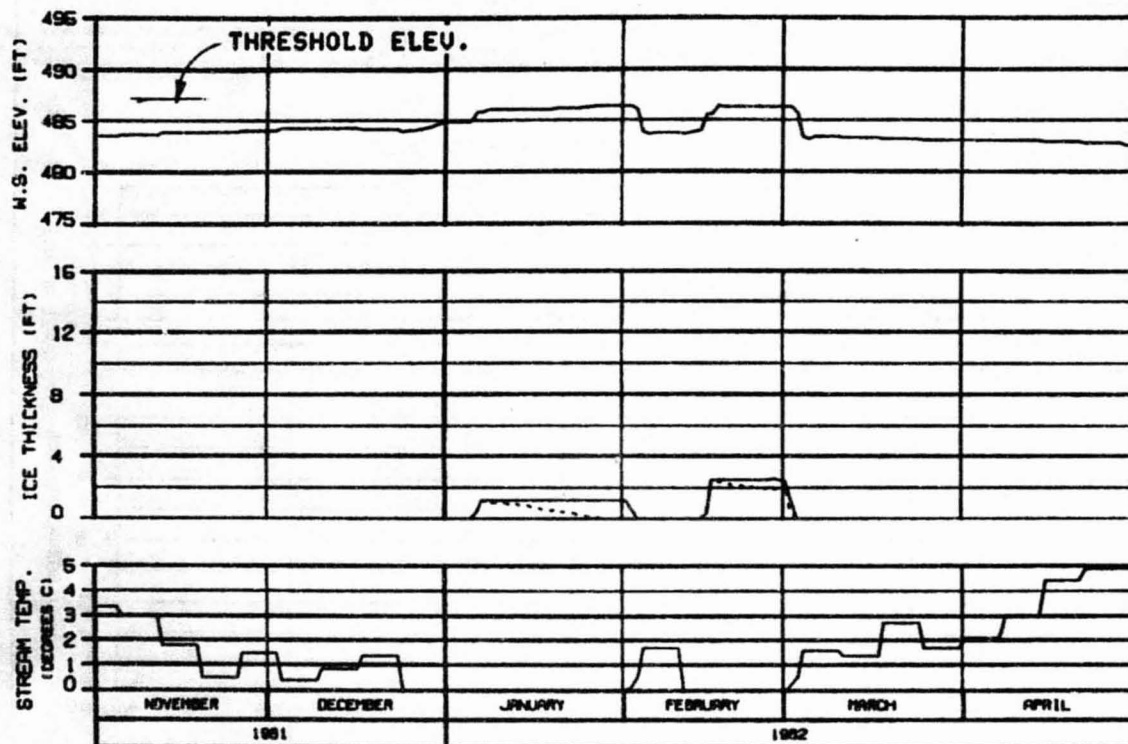
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBR600 JOINT VENTURE

DESIGN: SLD-000 31 FEB 82 0000.142





HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102ENB

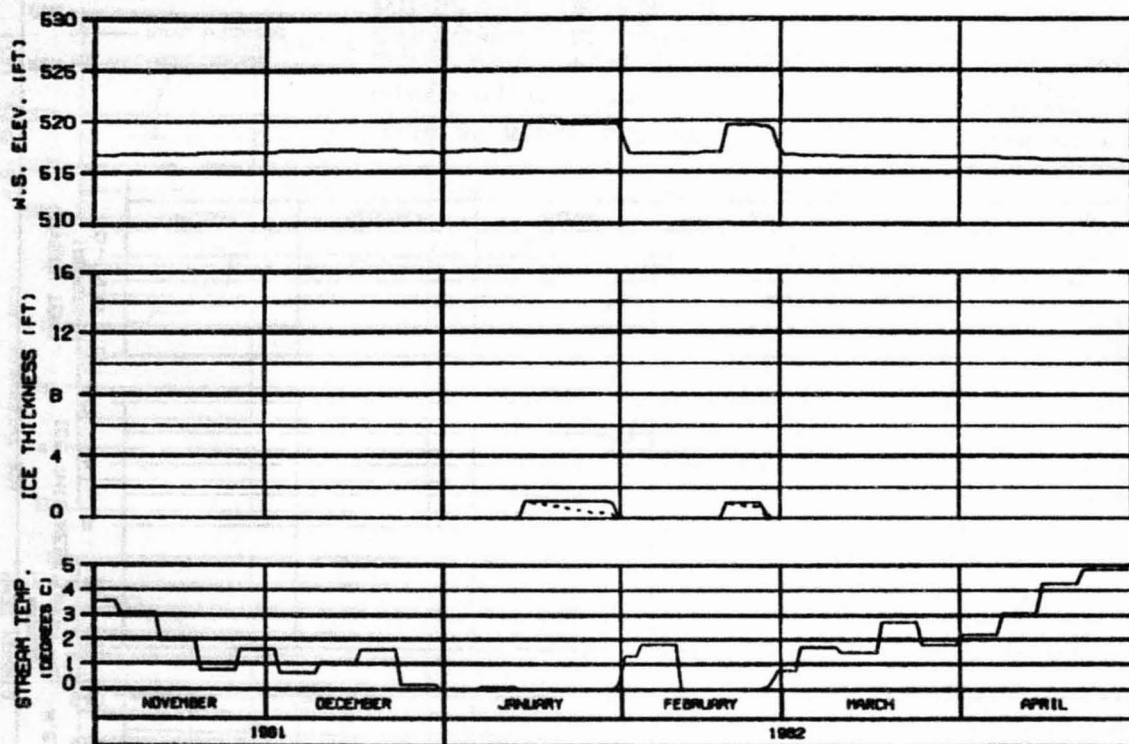
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EDBSCO JOINT VENTURE

DESIGNER: AL-0000 DRAWN BY: 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102E4B

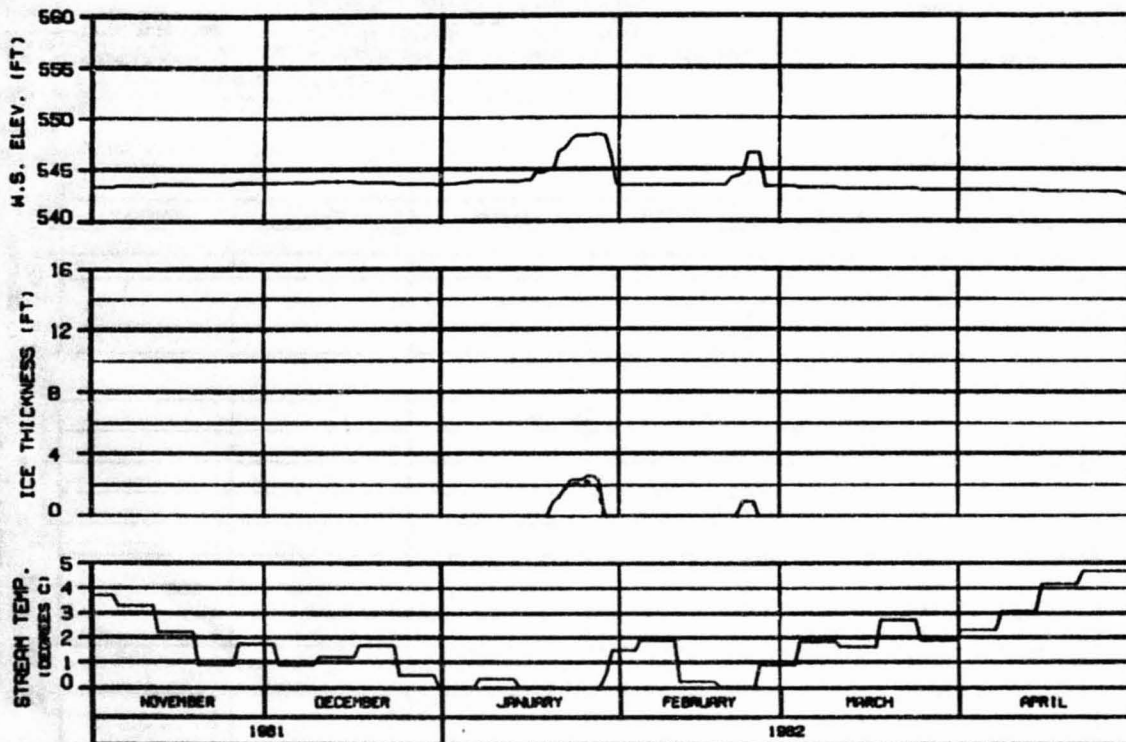
ALASKA POWER AUTHORITY

SUSITNA RIVER

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EDBECO JOINT VENTURE

DESIGN: D.A. 2002 24 FEB 82 2002.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

# HEAD OF MOOSE SLOUGH RIVER MILE : 123.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP, WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102EHB

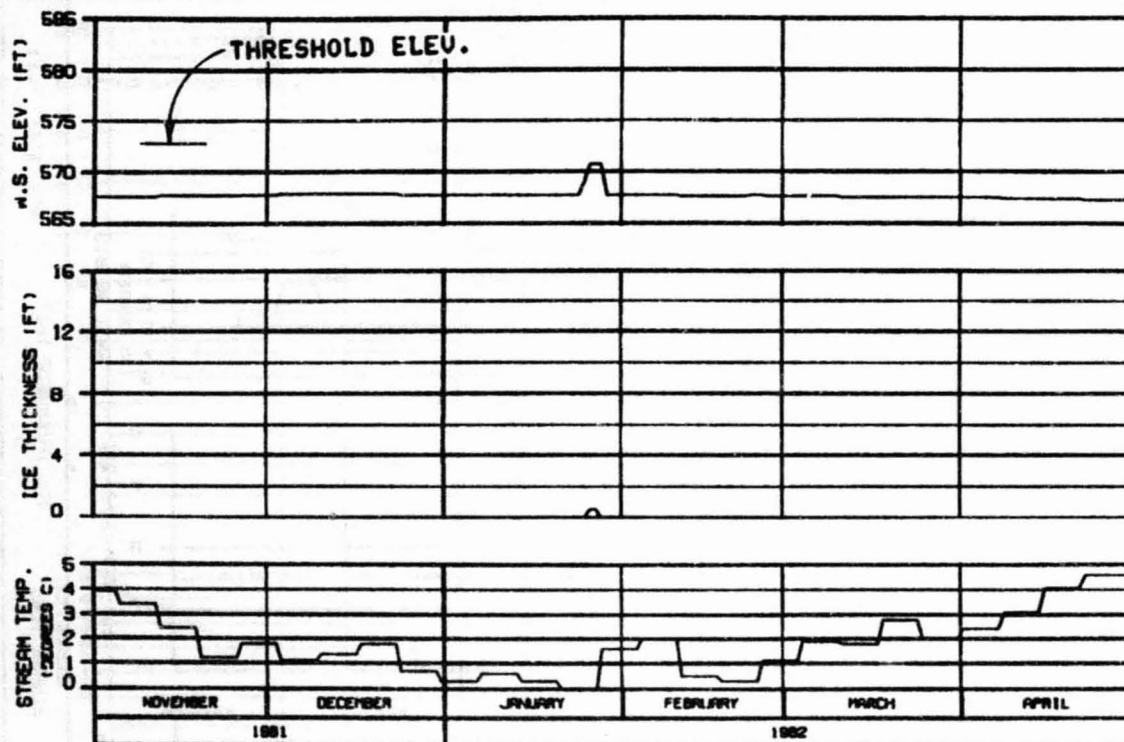
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EDASCO JOINT VENTURE

DESIGNED: A.L. DUBOIS 14 FEB 82 1588, 142



HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 ..... SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102EH8

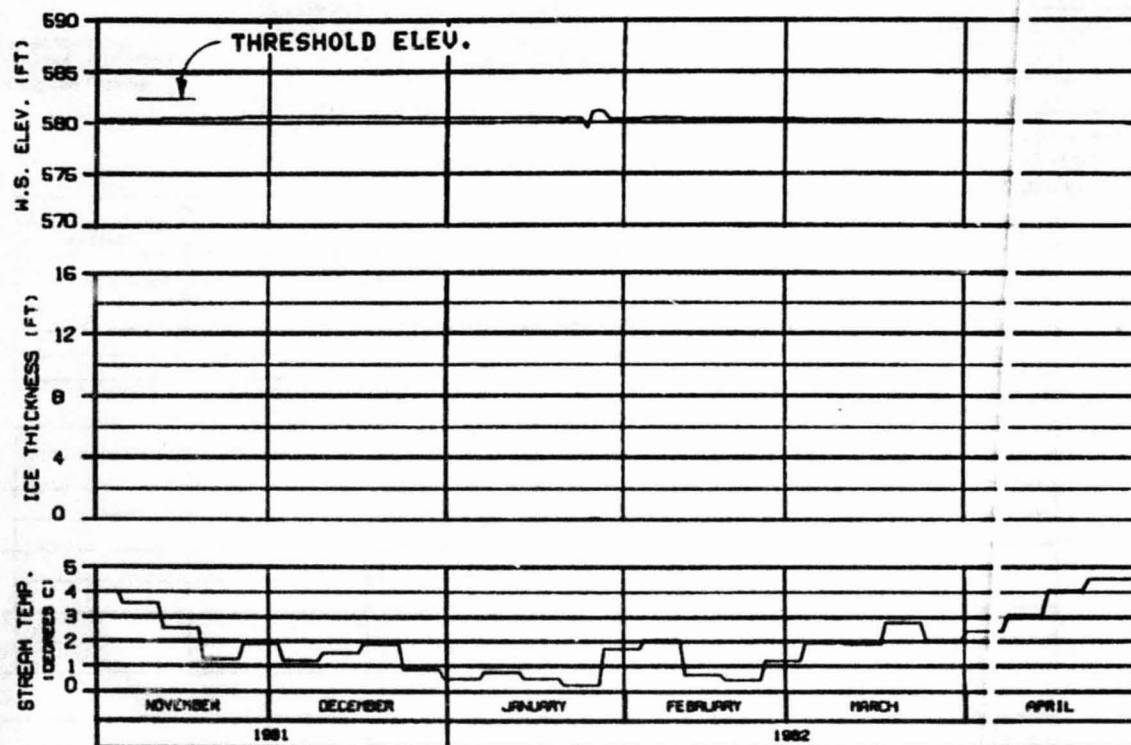
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBRSCO JOINT VENTURE

DESIGNED: SL-0000 04 FEB 82 1089.142



HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102E48

ALAMOGA POWER AUTHORITY

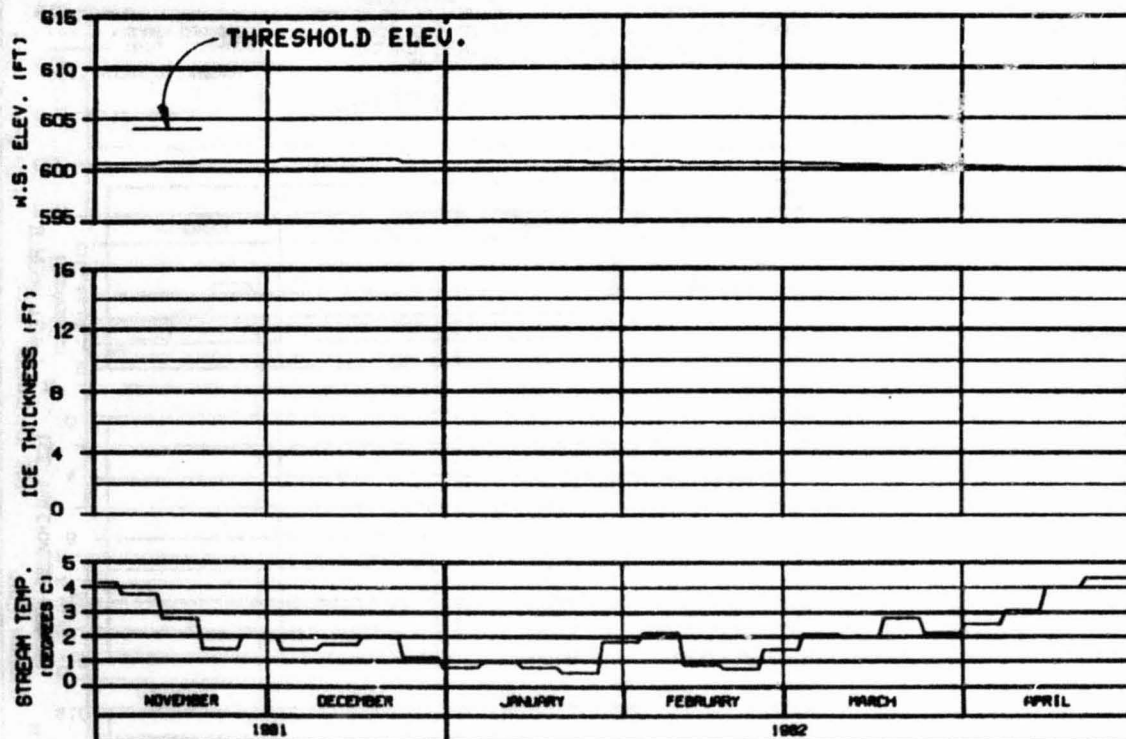
SUBJECT & PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAF 2A-EDRISCO JOINT VENTURE

00000 - 014000 14 FEB 82 1982.142





HEAD OF SLOUGH 9  
RIVER MILE : 129.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-6-02 FLOWS TEMP. WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8102EH8

ALASKA POWER AUTHORITY

SUSITNA PROJECT

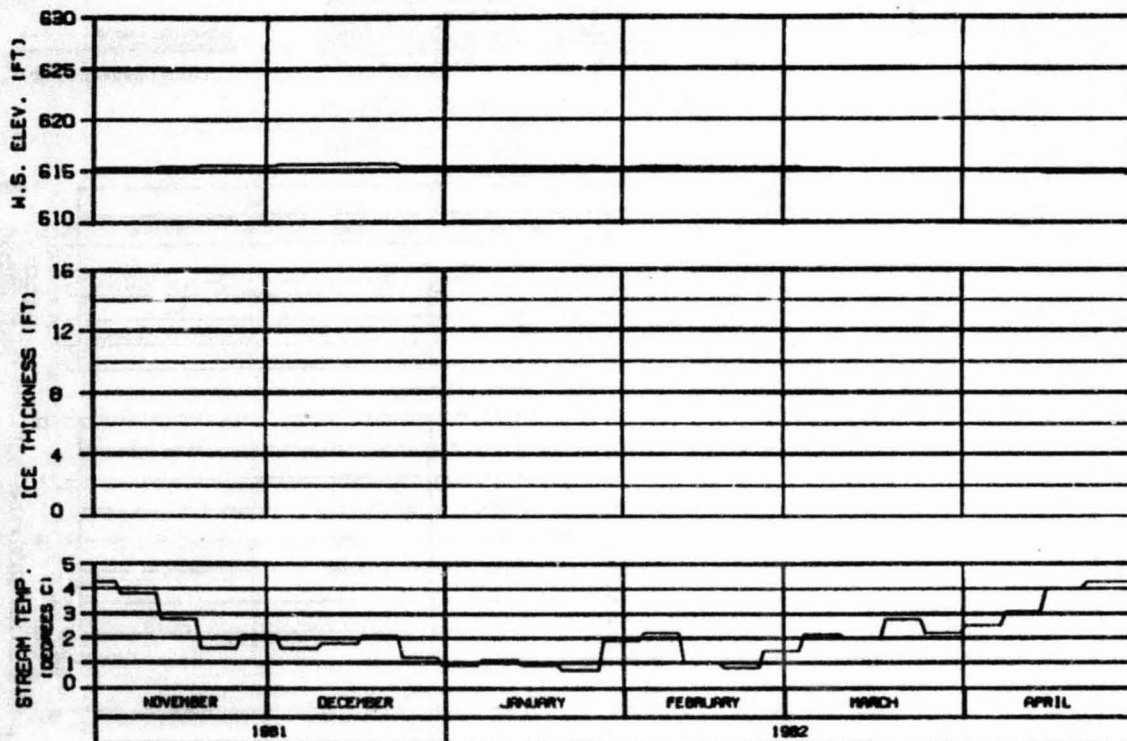
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EGESCO JOINT VENTURE

DESIGN. ALASKA 15 FEB 82 1000.142

OPTION?

OPTION 7



SIDE CHANNEL U/S OF SLOUGH 9  
RIVER MILE : 130.60

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-S-02 FLOWS TEMP, WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8102EHB

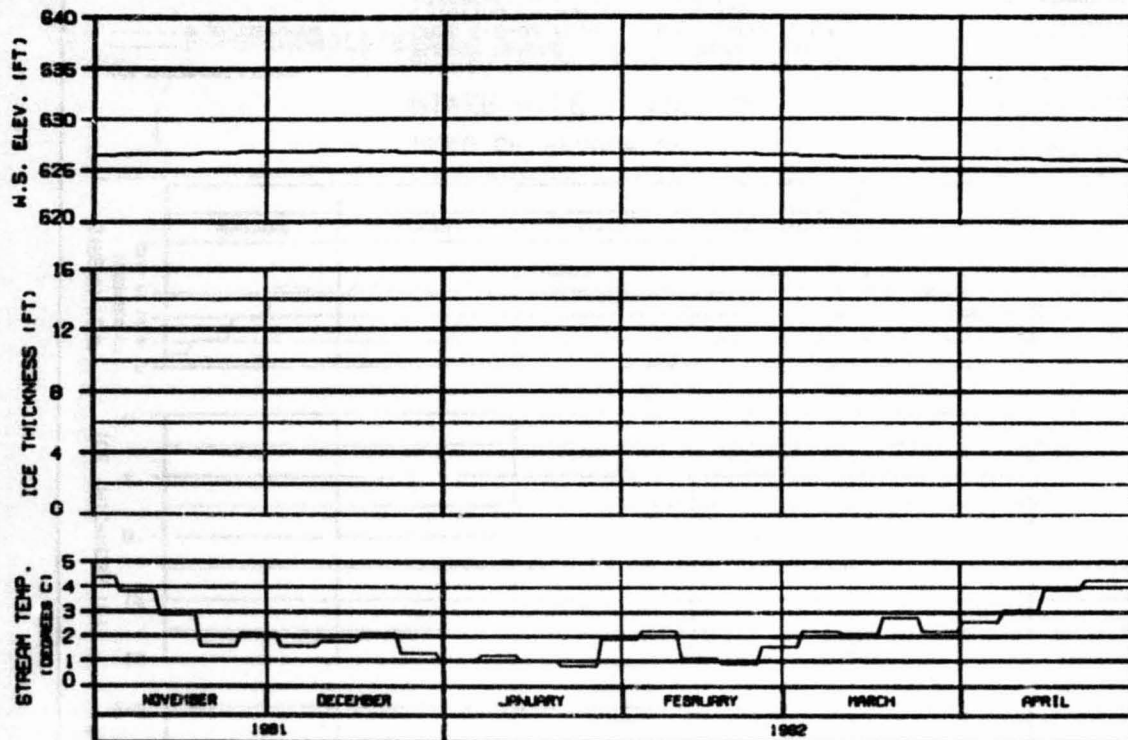
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARDA-EBRSCO JOINT VENTURE

DESIGN: SL-0005 14 FEB 82 1982.142



**SIDE CHANNEL U/S OF 4TH JULY CREEK  
RIVER MILE : 131.80**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102E48

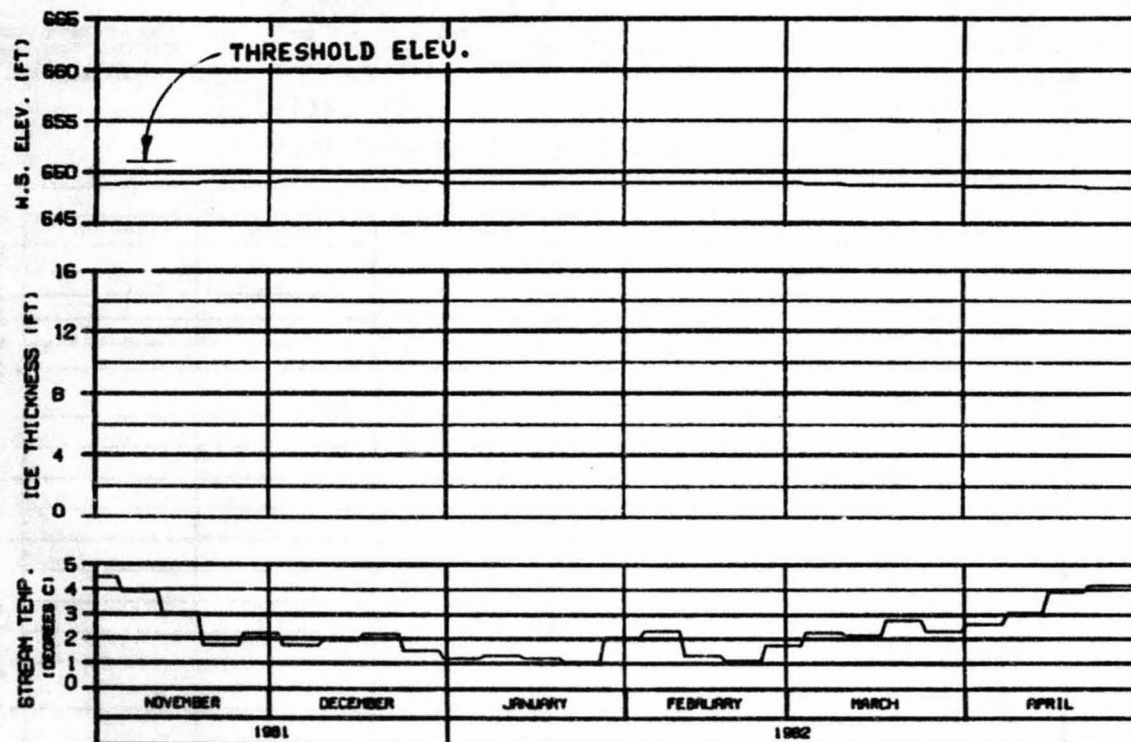
**ALASKA POWER AUTHORITY**

**EXISTING PROJECT**

**SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY**

**HARZA-EBRECO JOINT VENTURE**

DESIGNED BY: H. J. BROWN 14 FEB 82 1000.142



HEAD OF SLOUGH 9A  
RIVER MILE : 133.70

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-6-D2 FLOWS TEMP. WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8102EMB

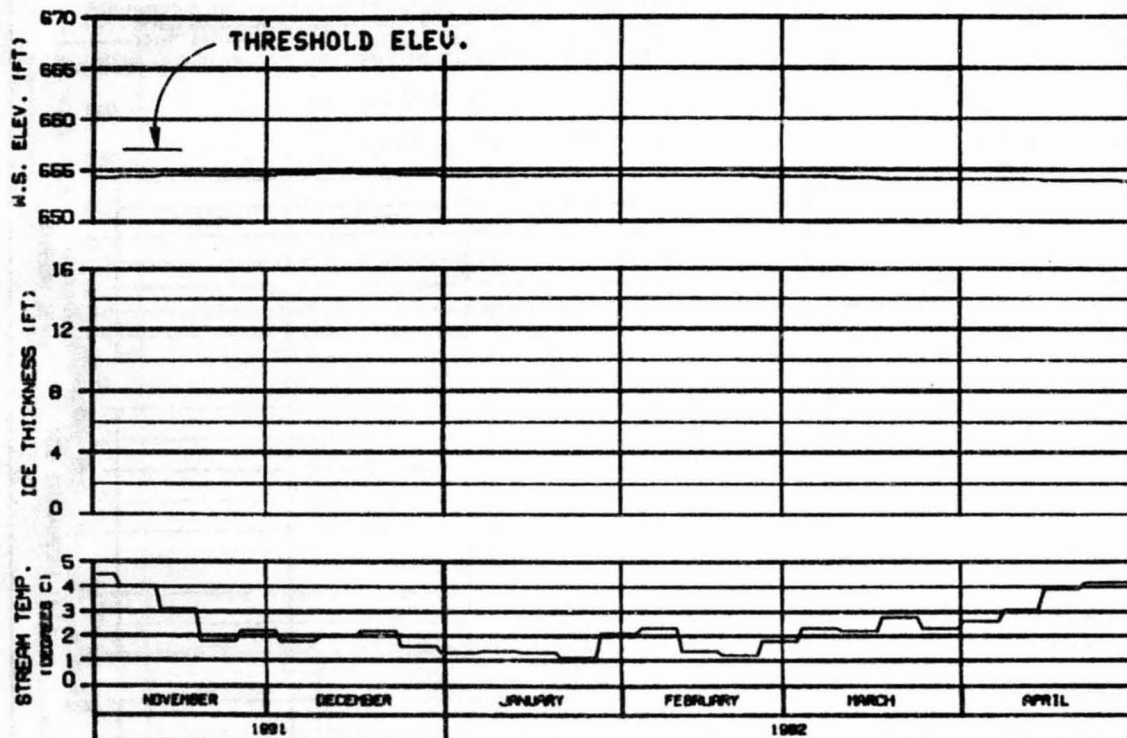
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRSCO JOINT VENTURE

REVISED: 8/1/82 BY: 82-100 100-142



SIDE CHANNEL U/S OF SLOUGH 10  
RIVER MILE : 134.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- BLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-6-02 FLOWS TEMP. WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8102ENB

ALASKA POWER AUTHORITY

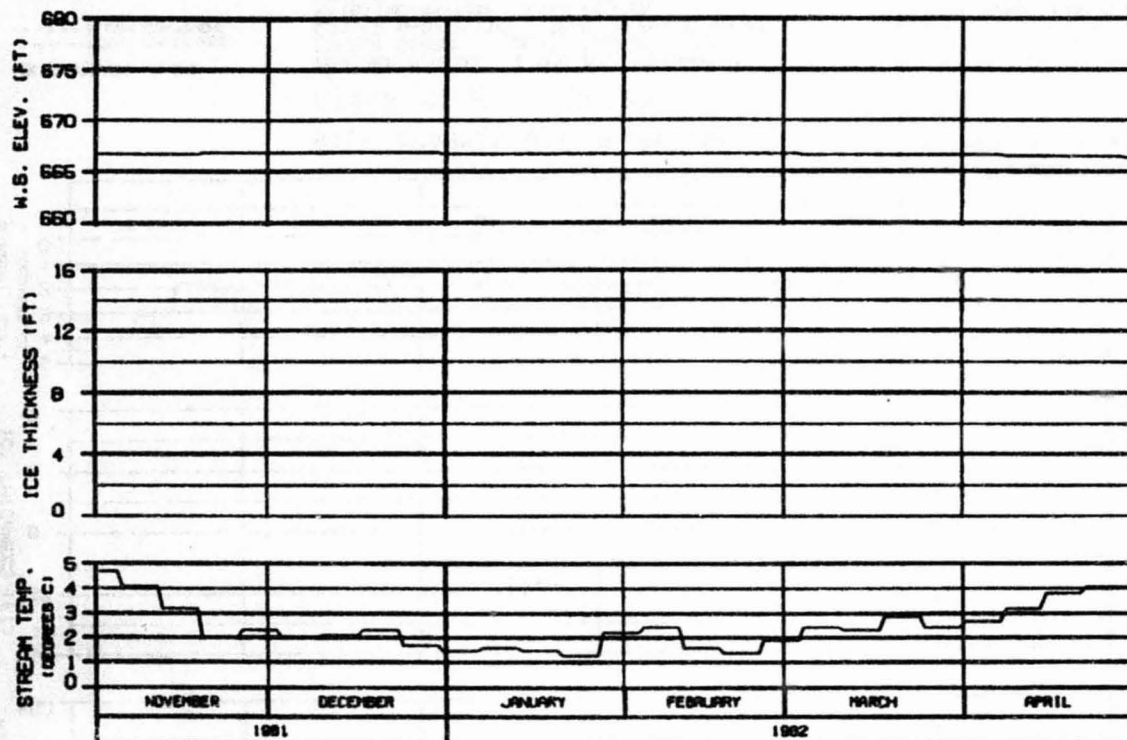
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBRACO JOINT VENTURE

DESIGNED BY: HAZRA-EBRACO 14 FEB 82 1000.142





**SIDE CHANNEL D/S OF SLOUGH 11**  
**RIVER MILE : 135.30**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102EW8

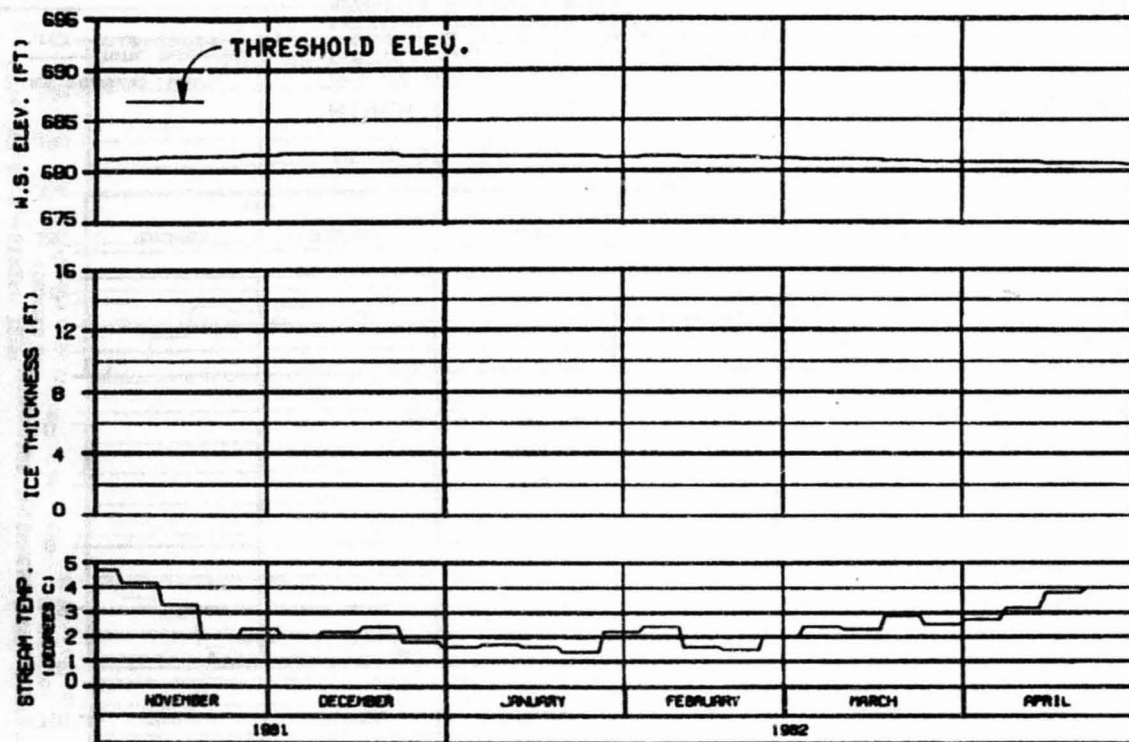
**ALASKA POWER AUTHORITY**

**SUSITNA PROJECT**

**SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY**

**HAZRA-EBRSCO JOINT VENTURE**

DESIGNED BY: EBRSCO 14 FEB 82 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 11  
 RIVER MILE : 136.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-8-02 FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102E4B

ALASKA POWER AUTHORITY

SUSITNA PROJECT

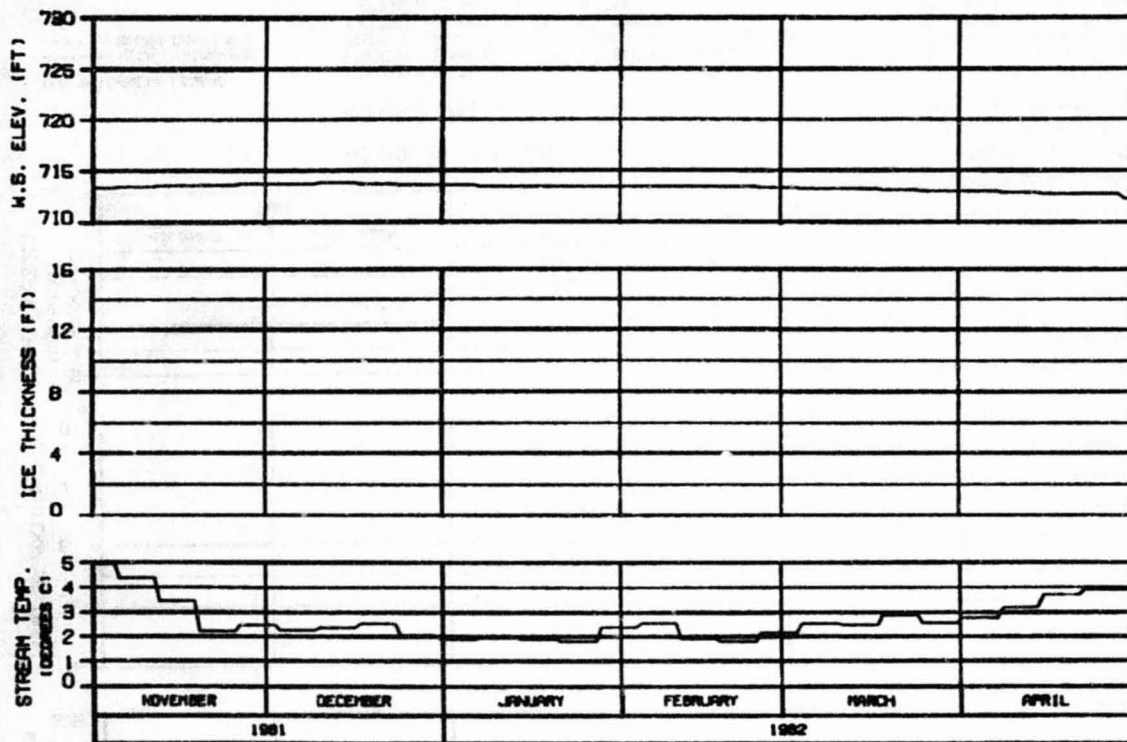
SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBRSCO JOINT VENTURE

DESIGNED BY: D. L. P. 0000

16 FEB 82

0000.140



HEAD OF SLOUGH 17  
RIVER MILE : 139.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-6-02 FLOWS TEMP. WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
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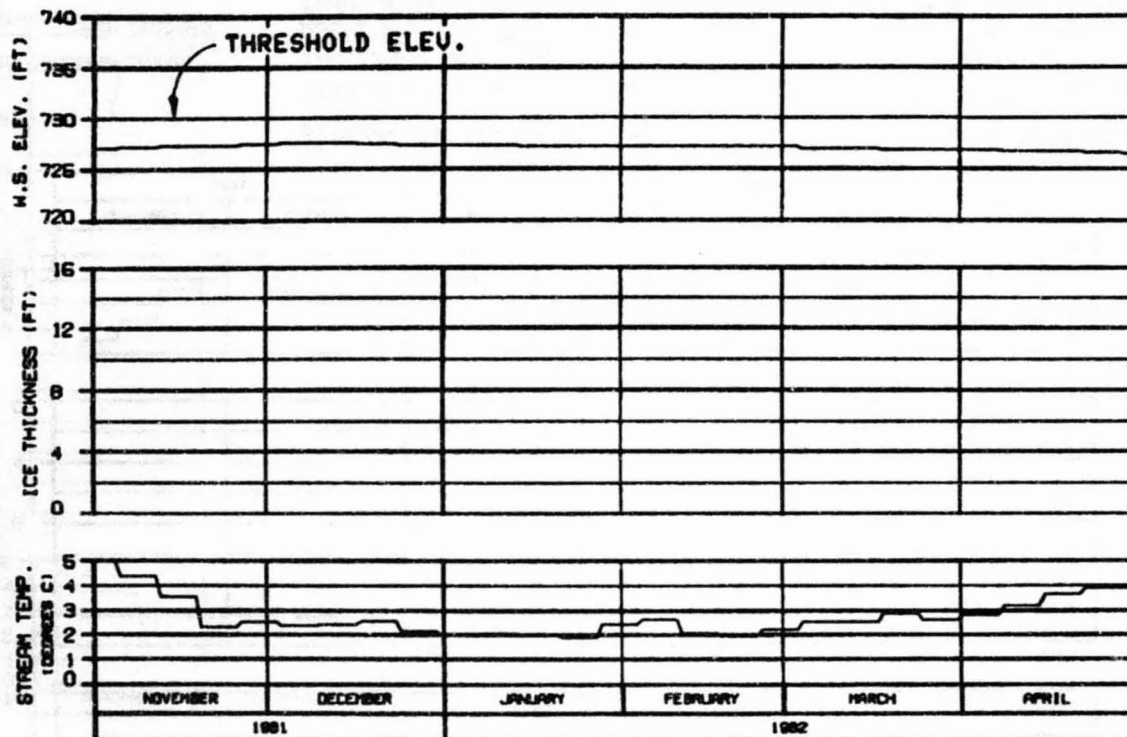
ALASKA POWER AUTHORITY

BUILDING PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBRSCO JOINT VENTURE

WORKED: 5/1/82 BY: 54 APR 82 1982, 142



HEAD OF SLOUGH 20  
RIVER MILE : 140.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-8-02 FLOWS TEMP: WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8102EHB

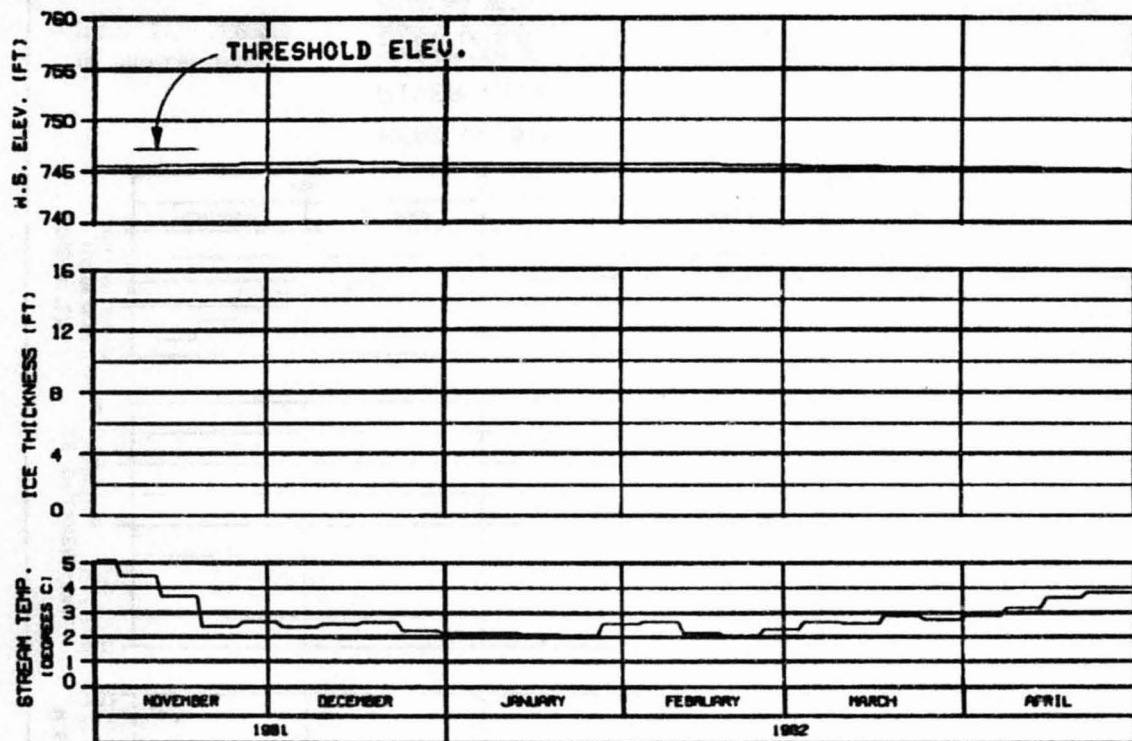
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARBA-EBASCO JOINT VENTURE

CHARGE: 81-0200 24 FEB 82 1508.142



SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE E-6-02 FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE DESIGN  
 REFERENCE RUN NO. : 8102EHB

ALASKA POWER AUTHORITY

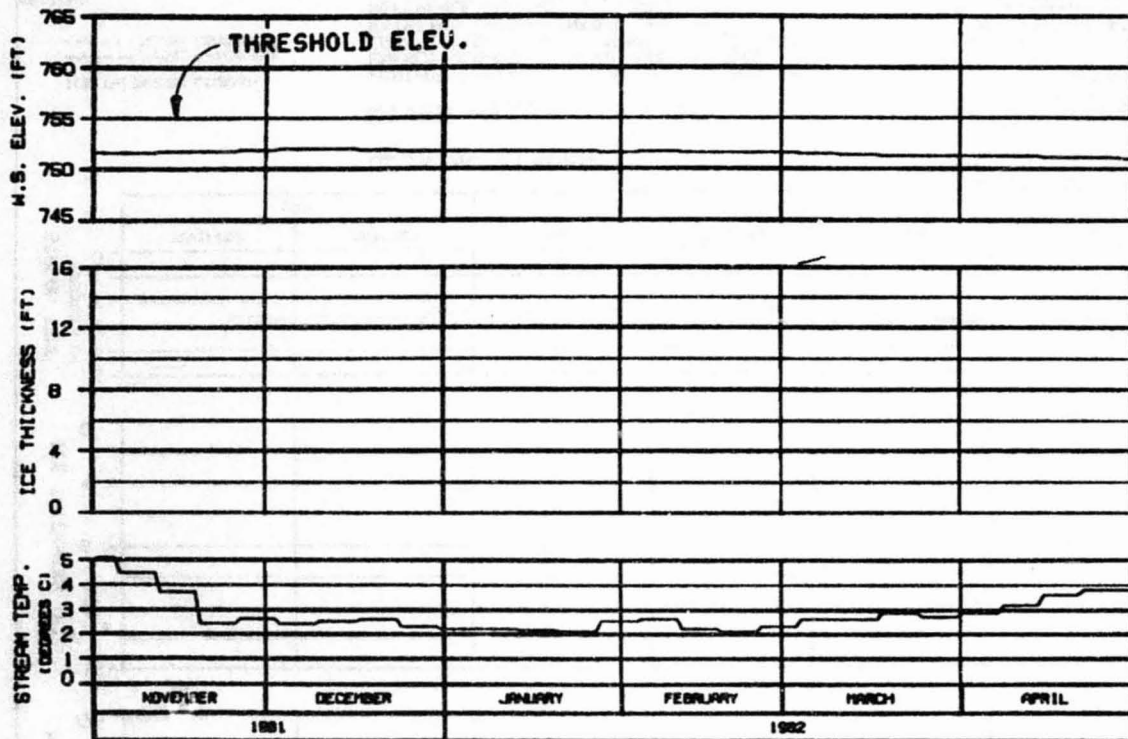
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACCO JOINT VENTURE

SHOWN: 8102EHB 24 FEB 82 1000.142





HEAD OF SLOUGH 21  
RIVER MILE : 142.20

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-6-02 FLOWS TEMP. WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8102EWS

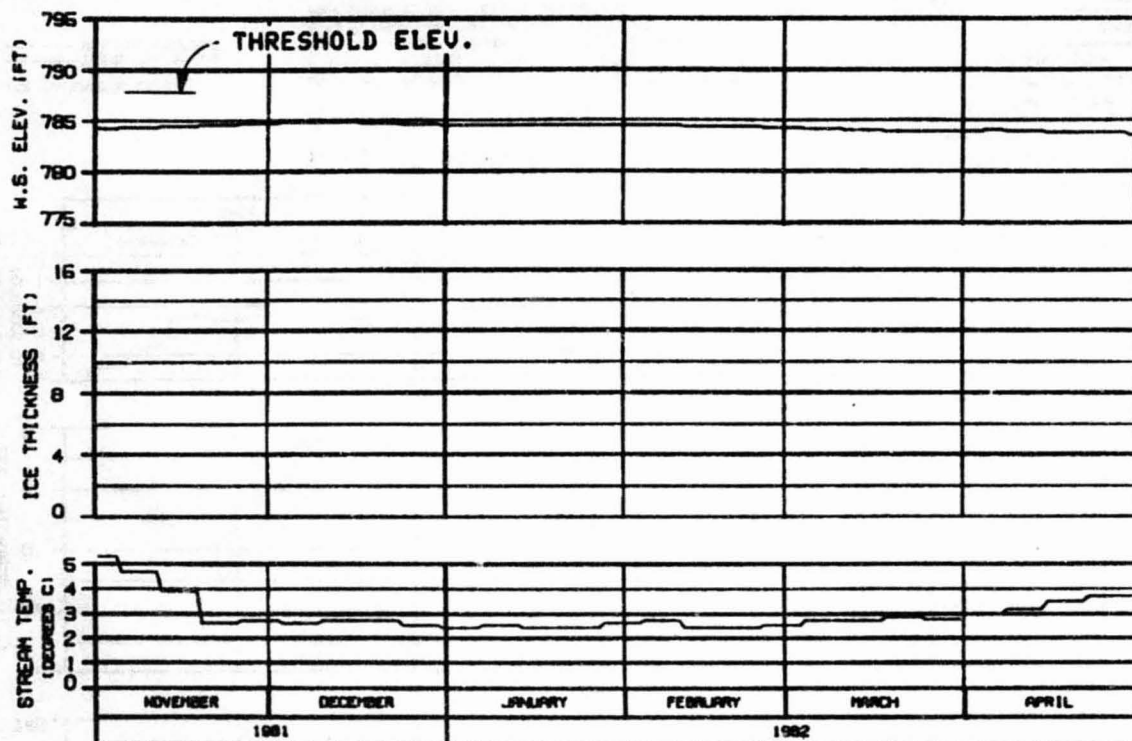
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZA-EBAGCO JOINT VENTURE

DESIGN: SL-8000 24 FEB 82 1982.142



HEAD OF SLOUGH 22

RIVER MILE : 144.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE E-6-02 FLOWS TEMP. WARMEST WATER  
EXISTING WATANA INTAKE DESIGN  
REFERENCE RUN NO. : 8102EWS

ALASKA POWER AUTHORITY

SUSITNA PROJECT

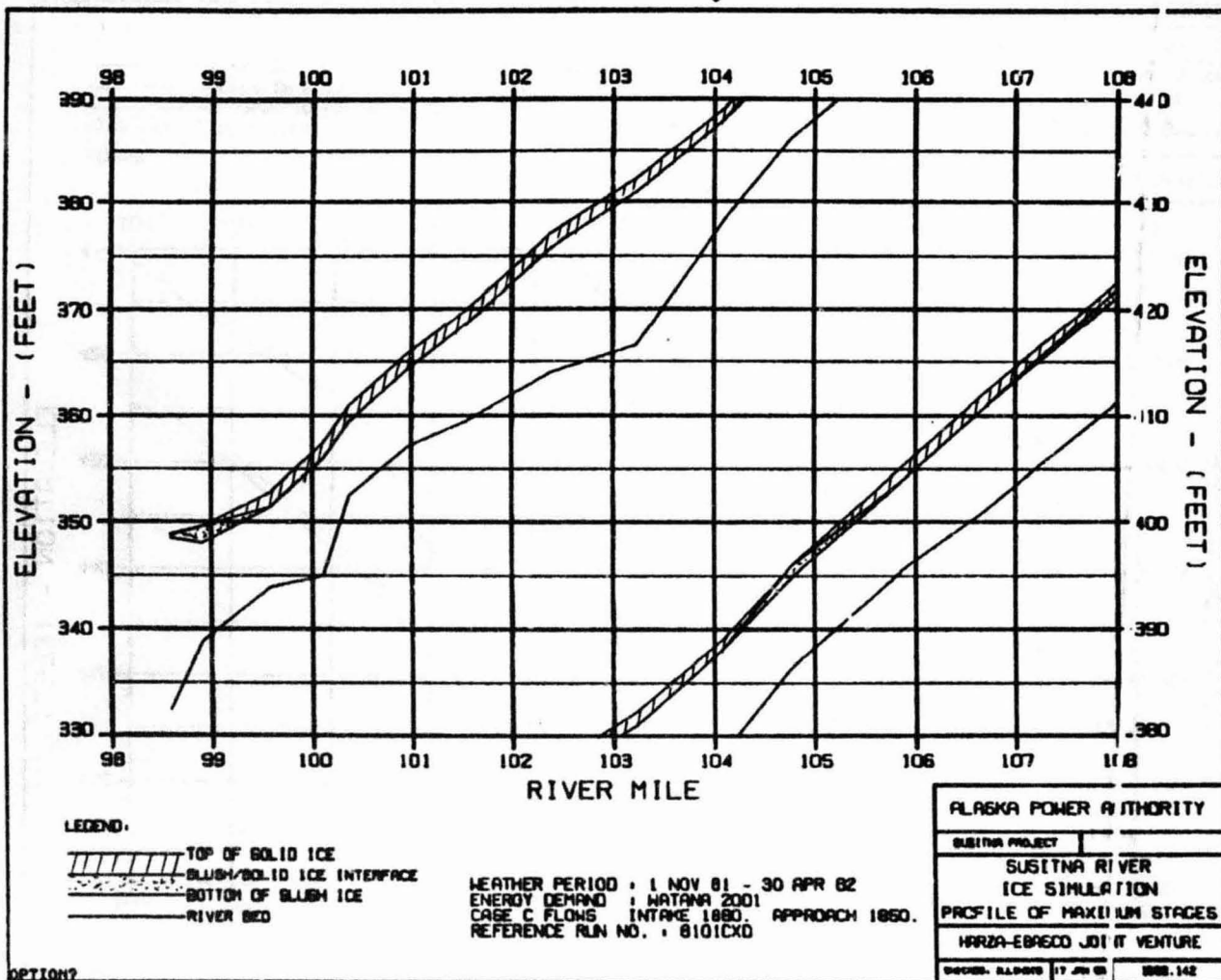
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

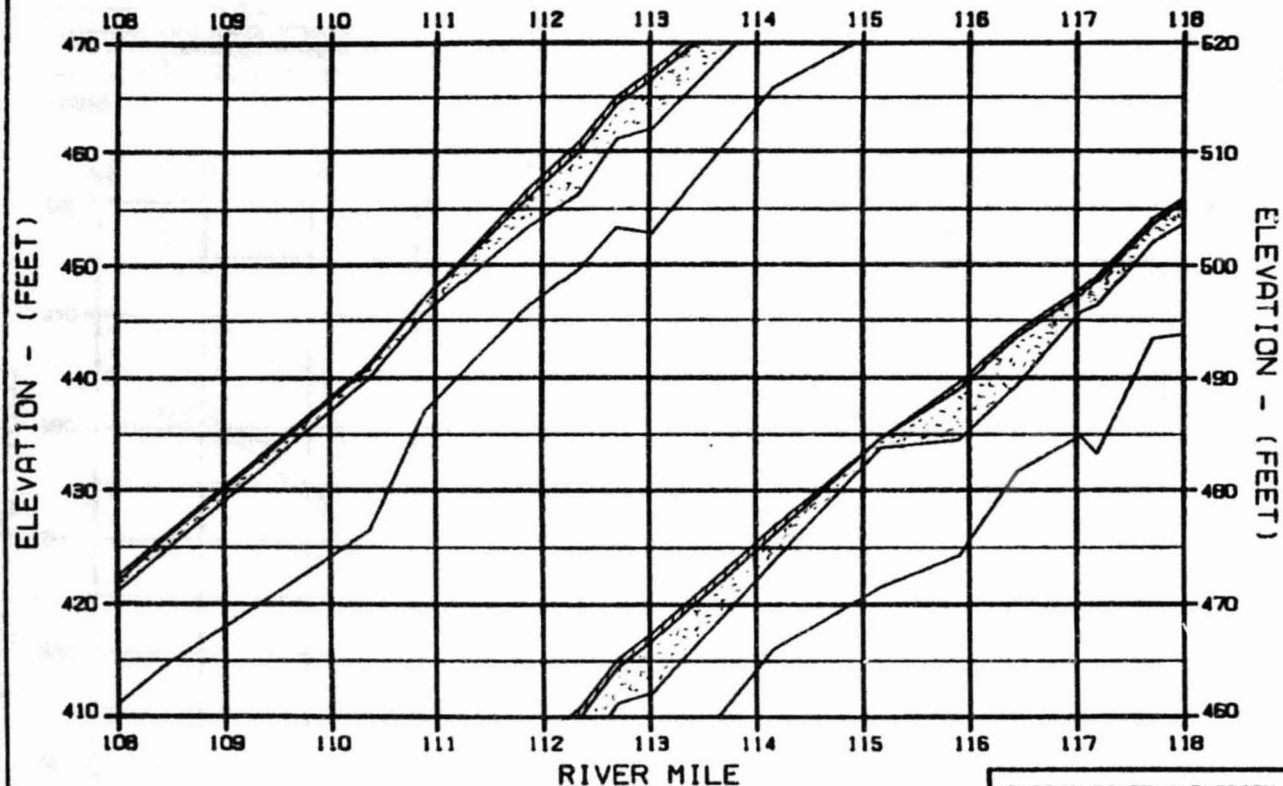
WARZA-EBRACCO JOINT VENTURE

DESIGN, ANALYSIS, & CONSTRUCTION 1981-1982

OPTION?

**EXHIBIT P**





## LEGEND:

- TOP OF SOLID ICE
- BLUISH/SOLID ICE INTERFACE
- BOTTOM OF BLUISH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880 APPROACH 1860.  
 REFERENCE RUN NO. : 8101CX0

## ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION

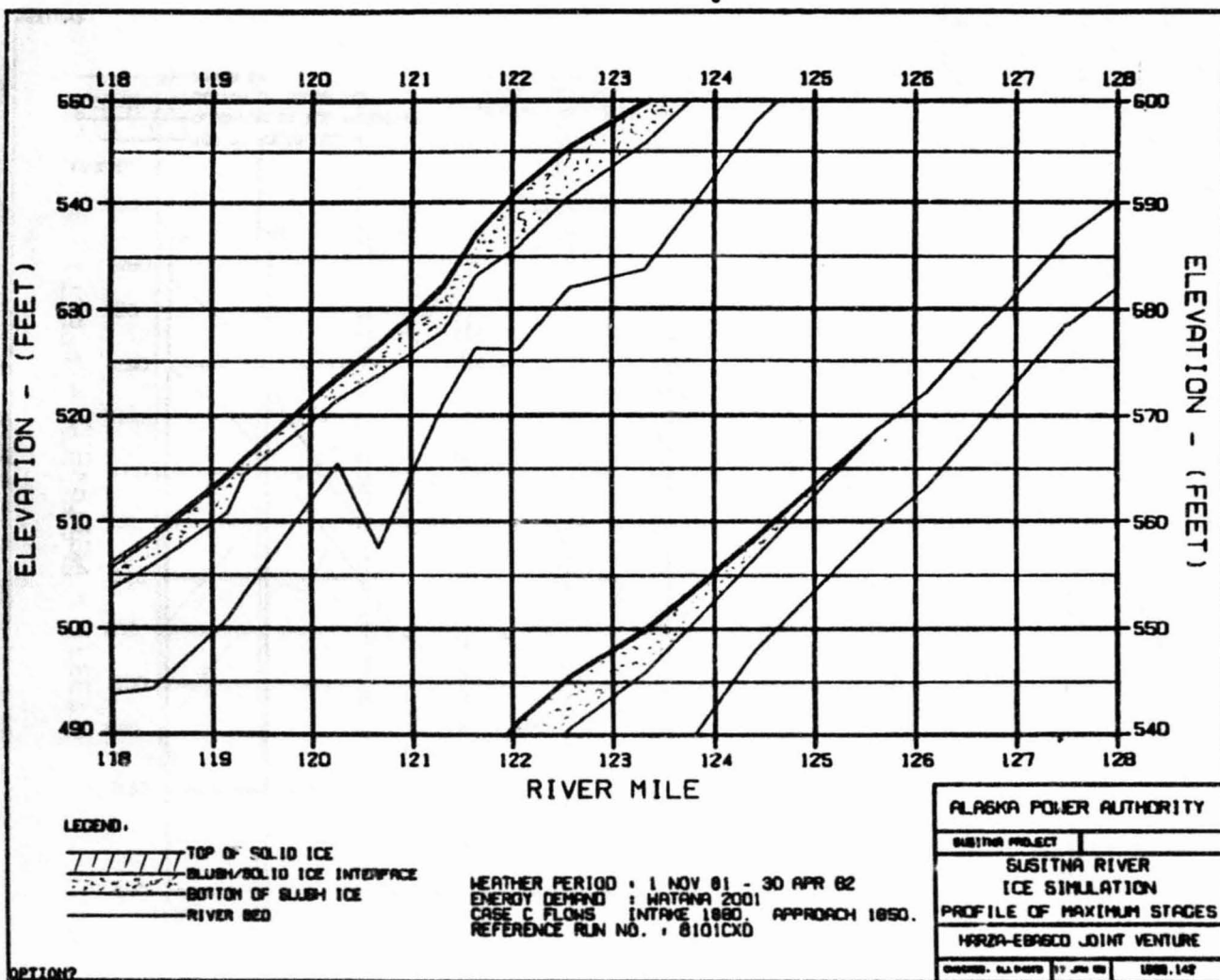
PROFILE OF MAXIMUM STAGES

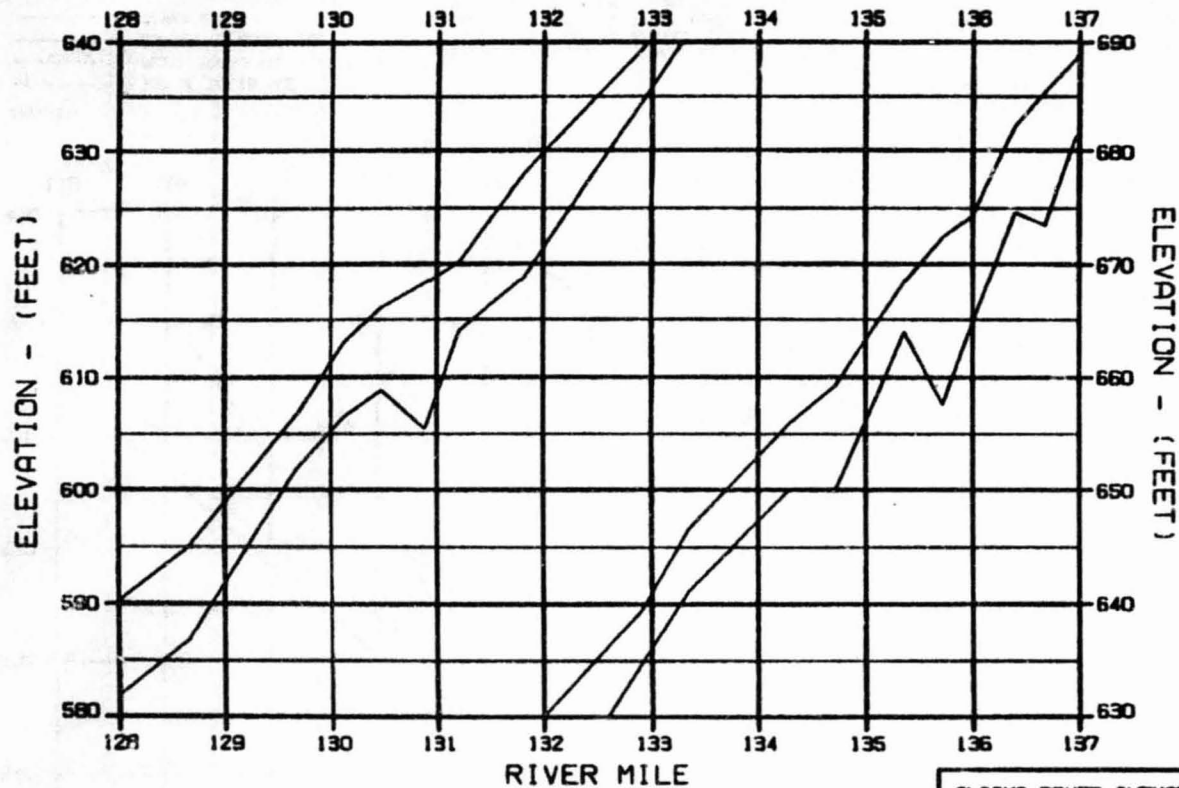
MARZA-EBASCO JOINT VENTURE

DESIGNED: S. L. HARRIS 17 JAN 82 1982-142

OPTION?







LEGEND.

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : 8101CX0

ALASKA POWER AUTHORITY

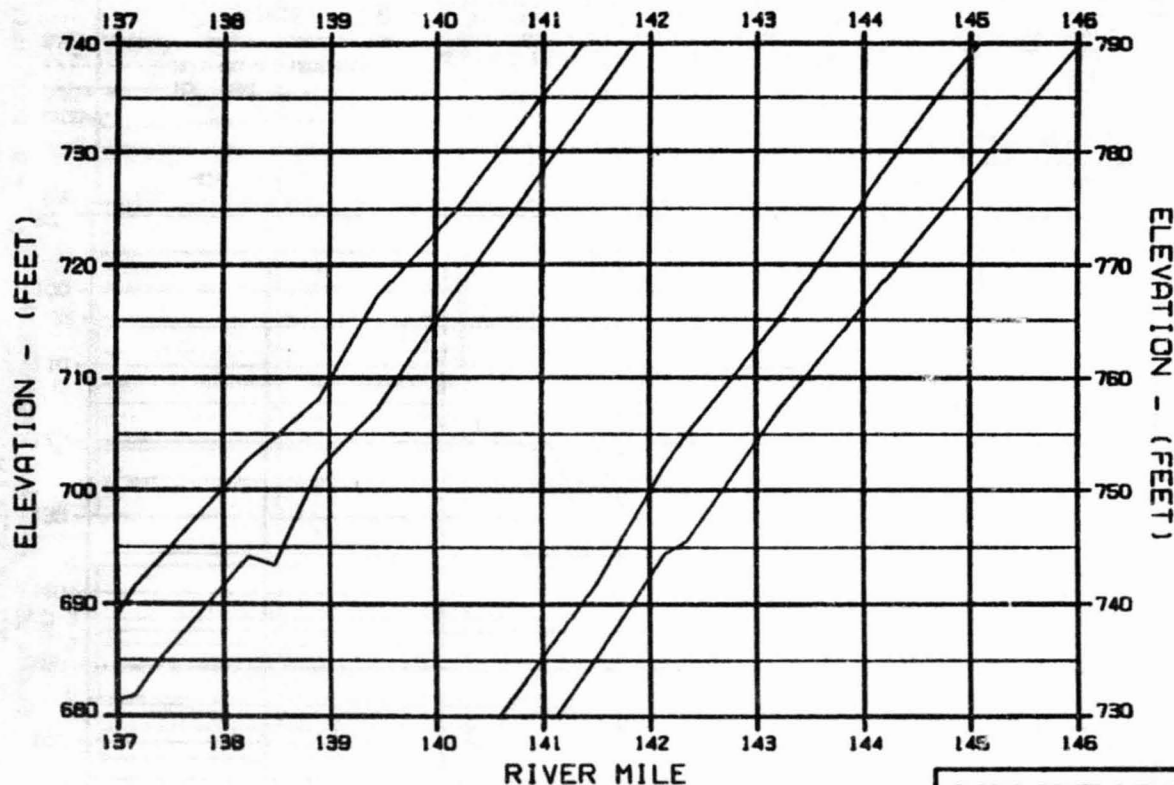
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

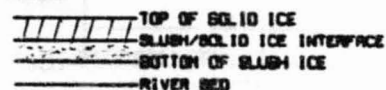
HARZA-EBASCO JOINT VENTURE

CHART: SL-880 17 JAN 82 880.142

OPTION?



**LEGEND.**

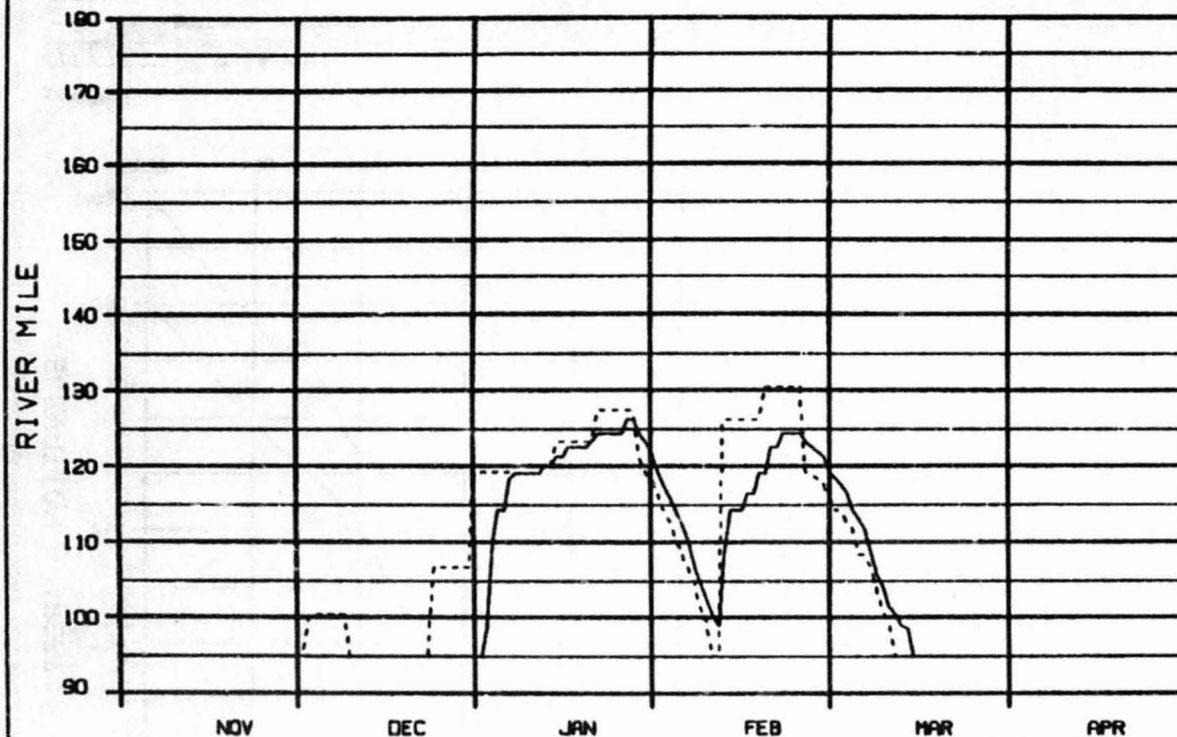


WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2001  
 CASE C FLOWS INTAKE 1980. APPROACH 1980.  
 REFERENCE RUN NO. : 8101CXD

**ALASKA POWER AUTHORITY**

SUSITNA PROJECT	
SUSITNA RIVER	
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
HARZA-EBASCO JOINT VENTURE	
DRAWN: B.L. 0000	17 JAN 82
1980.142	

OPTION?



LEGEND:

—— ICE FRONT  
 - - - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE C INTAKE 1880 APPROACH 1850.  
 REFERENCE RUN NO. : 8101CX0

ALASKA POWER AUTHORITY

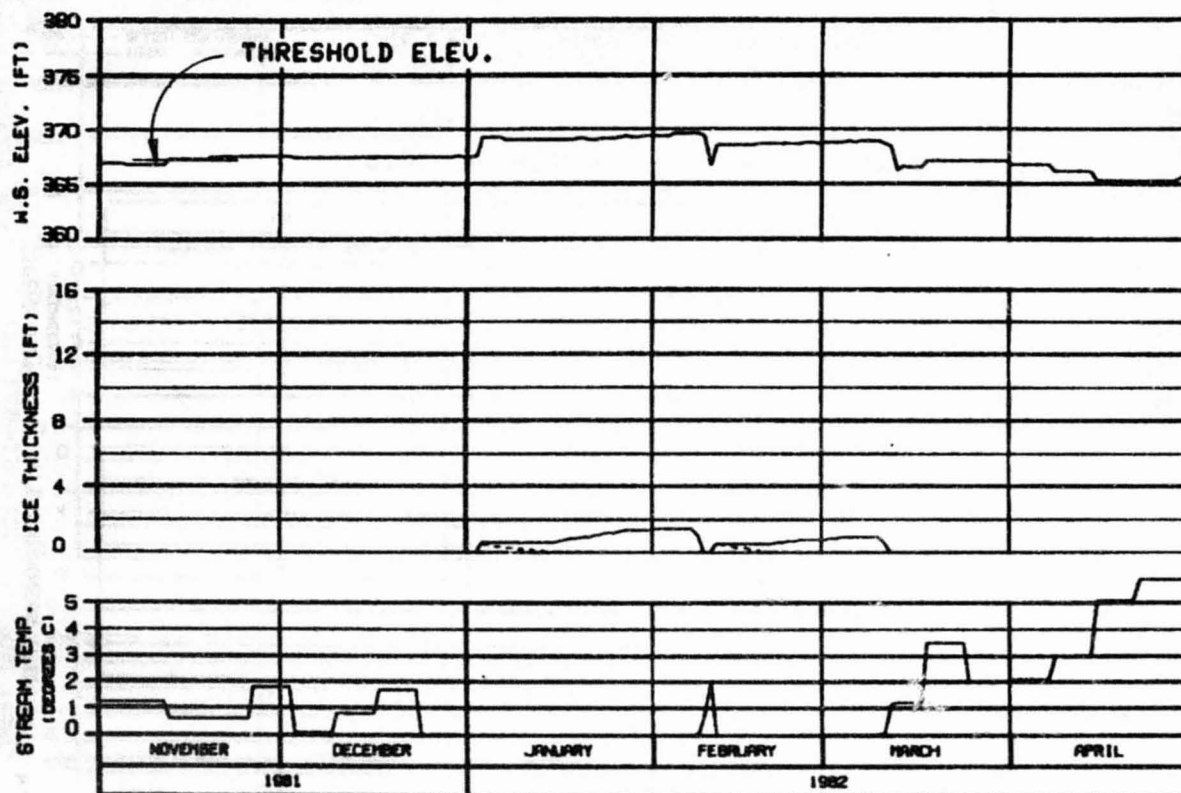
SUSITNA PROJECT

SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

HAZA-EBASCO JOINT VENTURE

CHUCKLE, ALASKA 27 JAN 82 1982.142

OPTION?



# HEAD OF WHISKERS SLOUGH RIVER MILE : 101.50

## ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1880. APPROACH 1850.  
REFERENCE RUN NO. : 8101CX0

ALASKA POWER AUTHORITY

SUSITNA PROJECT

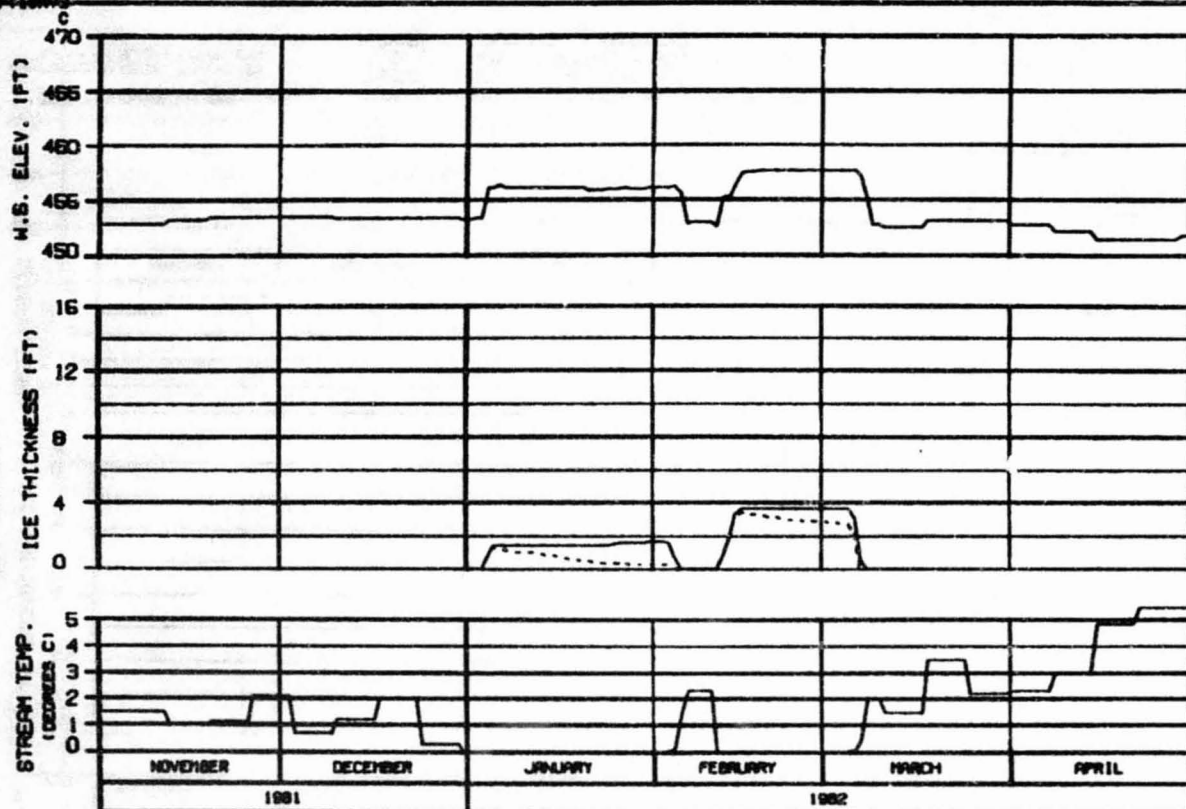
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBR600 JOINT VENTURE

DATE: 01-08-82 BY: JH 02 0000.142



OPTION?  
APPENDIX



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

# SIDE CHANNEL AT HEAD OF GASH CREEK RIVER MILE : 112.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880, APPROACH 1850.  
 REFERENCE RUN NO. : 8101CX0

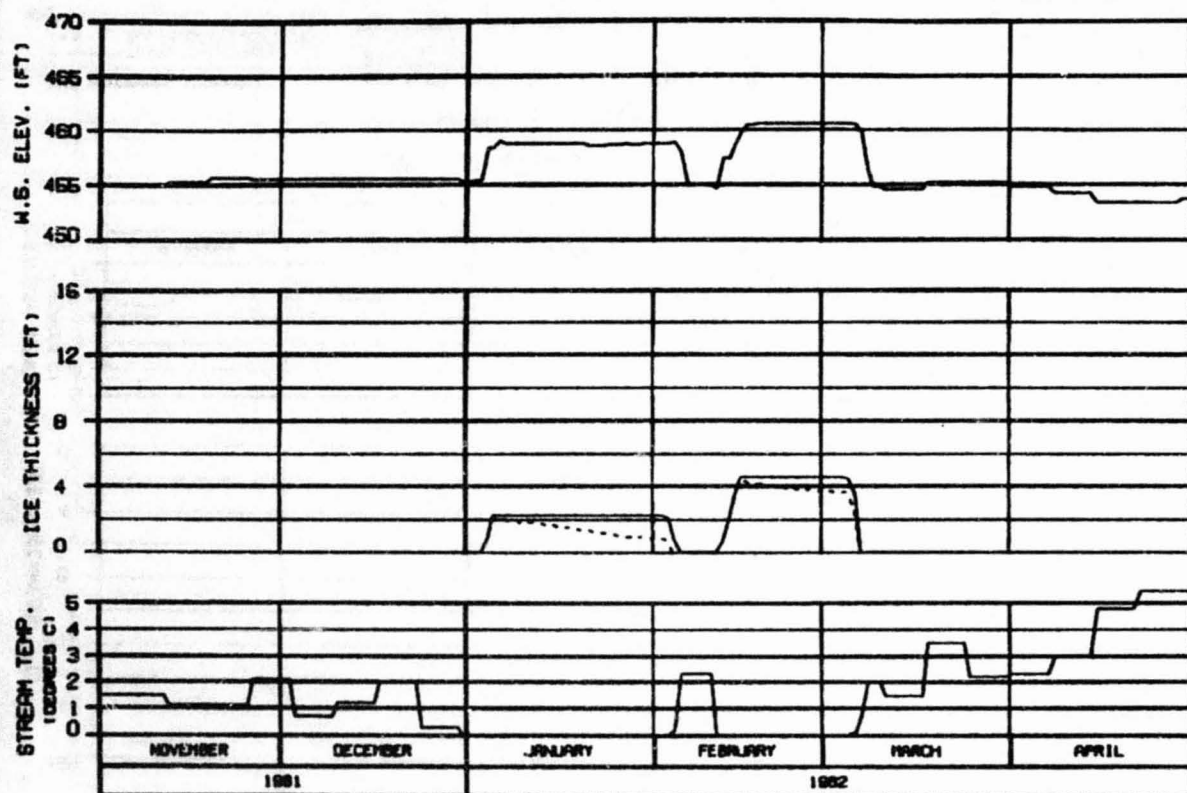
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRSCO JOINT VENTURE

DESIGN: R. L. BROWN 27 JAN 82 1982.142



MOUTH OF SLOUGH 6A  
RIVER MILE : 112.34

ICE THICKNESS LEGEND:

———— TOTAL THICKNESS  
----- BLUISH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1850. APPROACH 1850.  
REFERENCE RUN NO. : 8101CXD

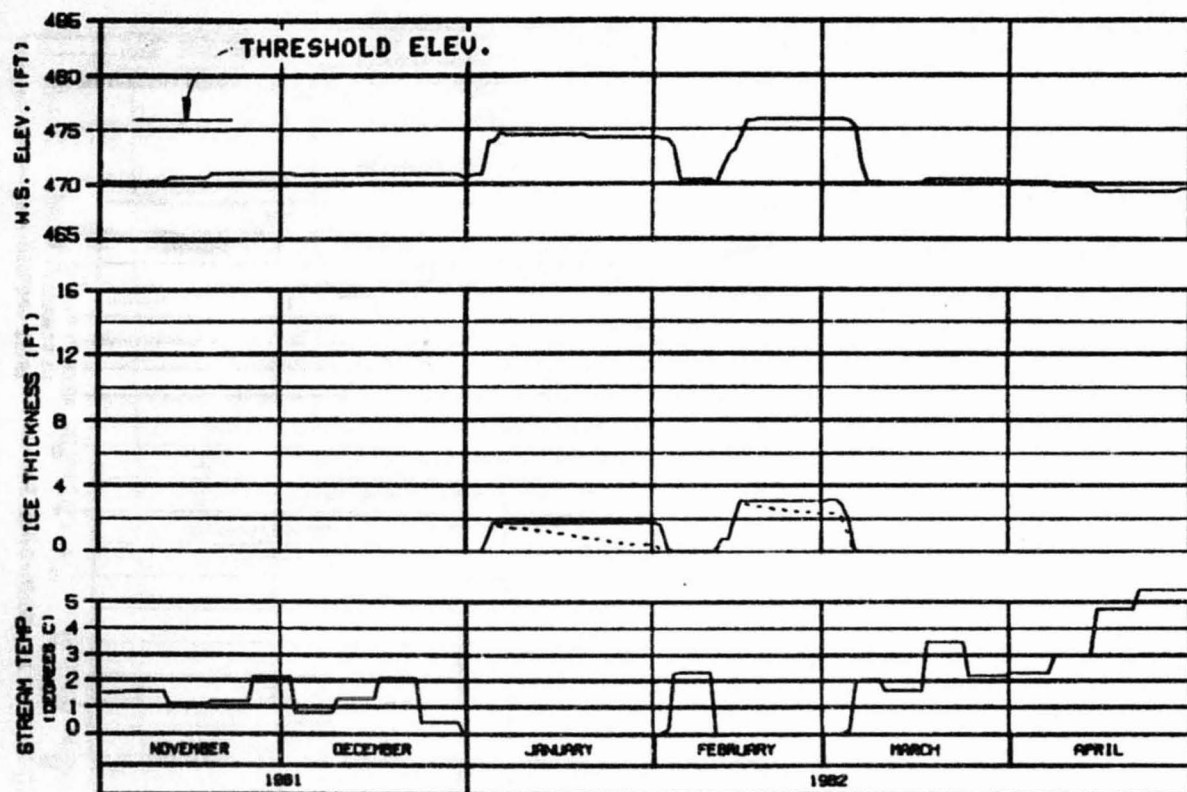
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DWG. NO. 8101CXD 17 JAN 82 1982.142



HEAD OF SLOUGH 8

RIVER MILE : 114.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - BLUISH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1850. APPROACH 1850.  
 REFERENCE RUN NO. : 8101CX0

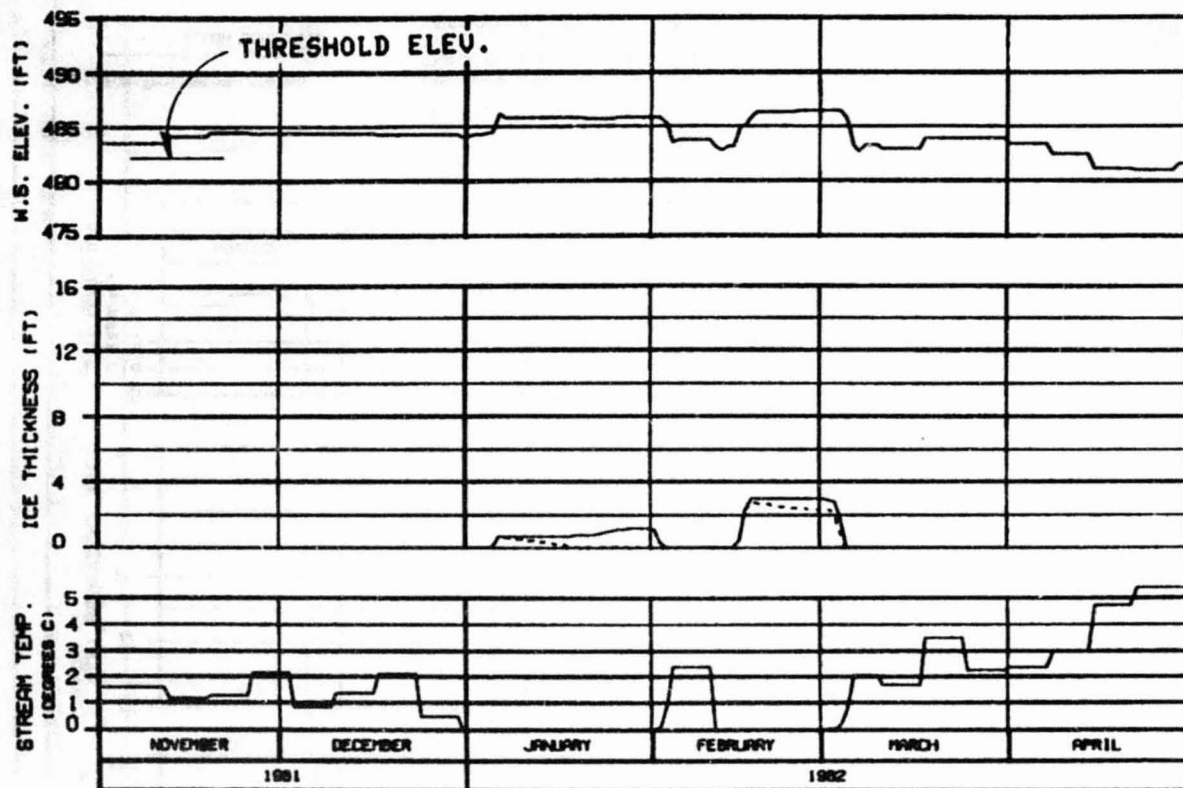
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

DRAWN: BLD/820 17 JUN 82 1982.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - BLUISH COMPONENT

SIDE CHANNEL MSII  
 RIVER MILE : 115.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : B101CX0

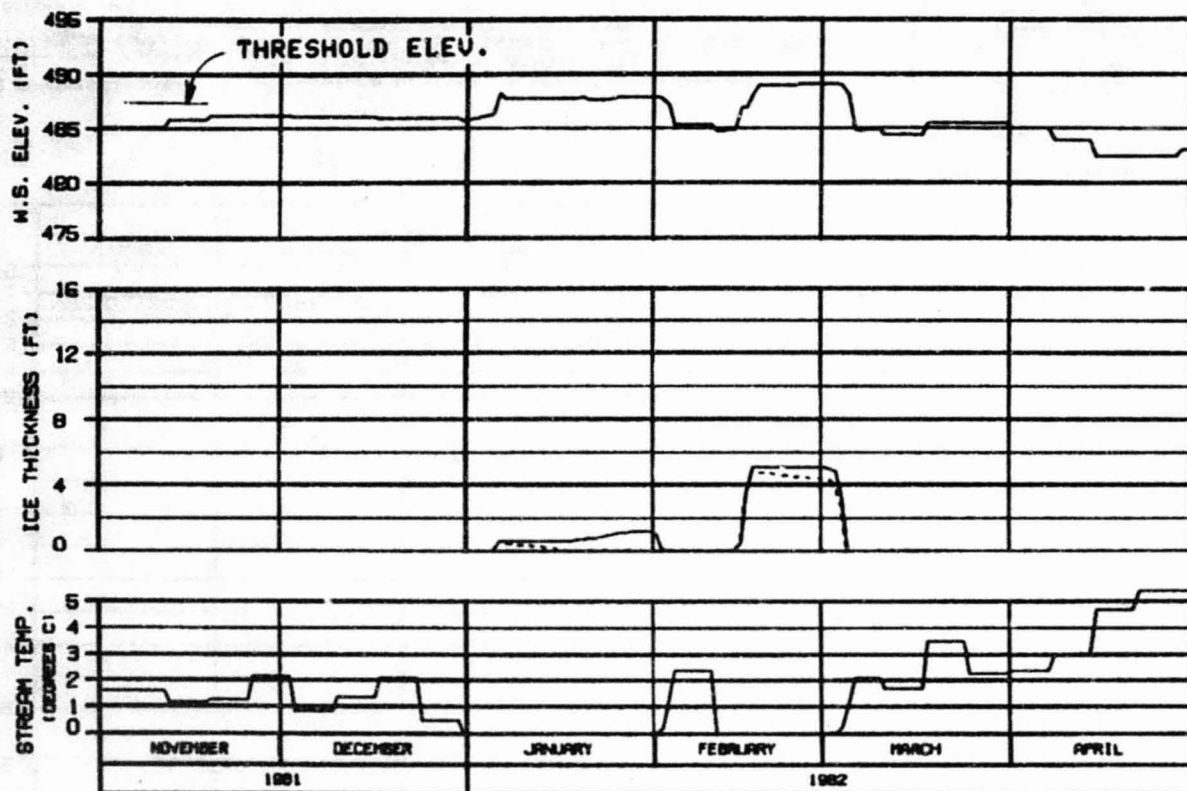
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EDBECO JOINT VENTURE

CHECKED: S.A. 9/82 BY J.M. 9/82 1008.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

# HEAD OF SIDE CHANNEL MSII RIVER MILE : 115.90

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : 8101CX0

ALASKA POWER AUTHORITY

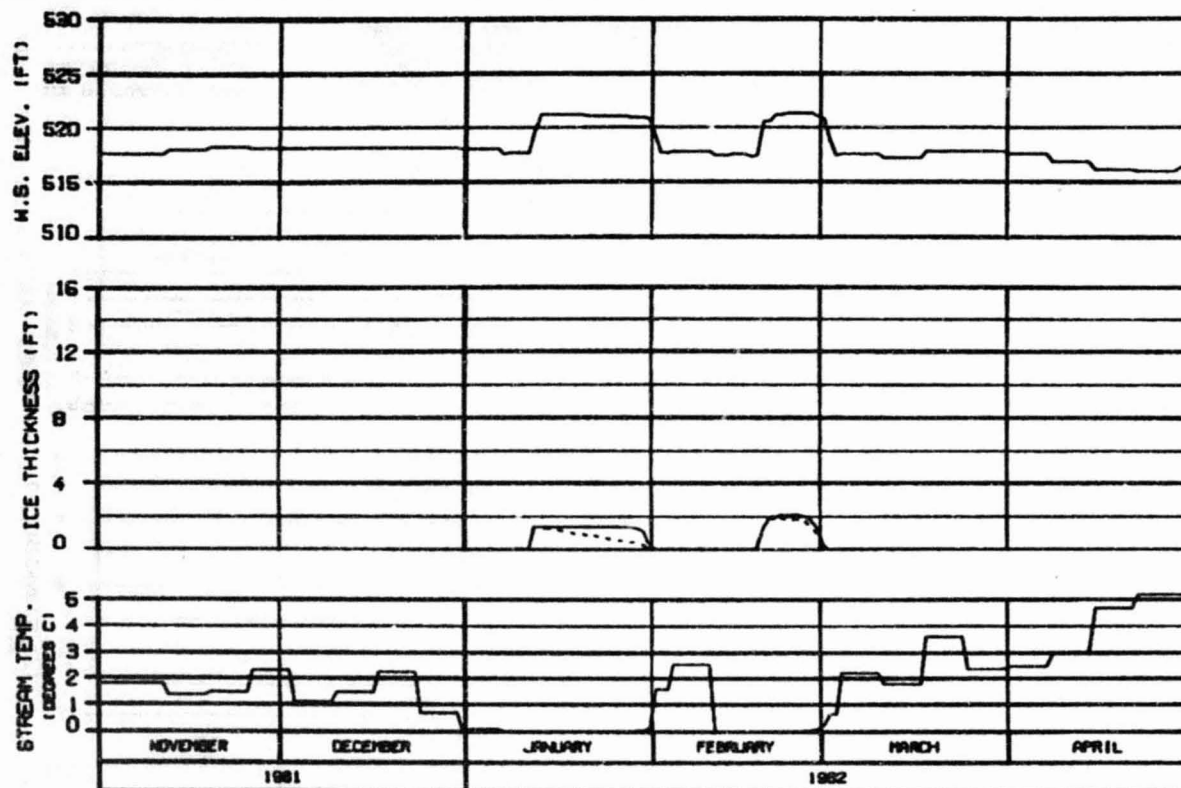
GUSTINA PROJECT

GUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HRZA-EBRSCO JOINT VENTURE

DESIGNED: B.L. HART 17 JAN 82 1000, 142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2001  
 CASE C FLOWS INTAKE 1880, APPROACH 1850.  
 REFERENCE RUN NO. : 8101CXD

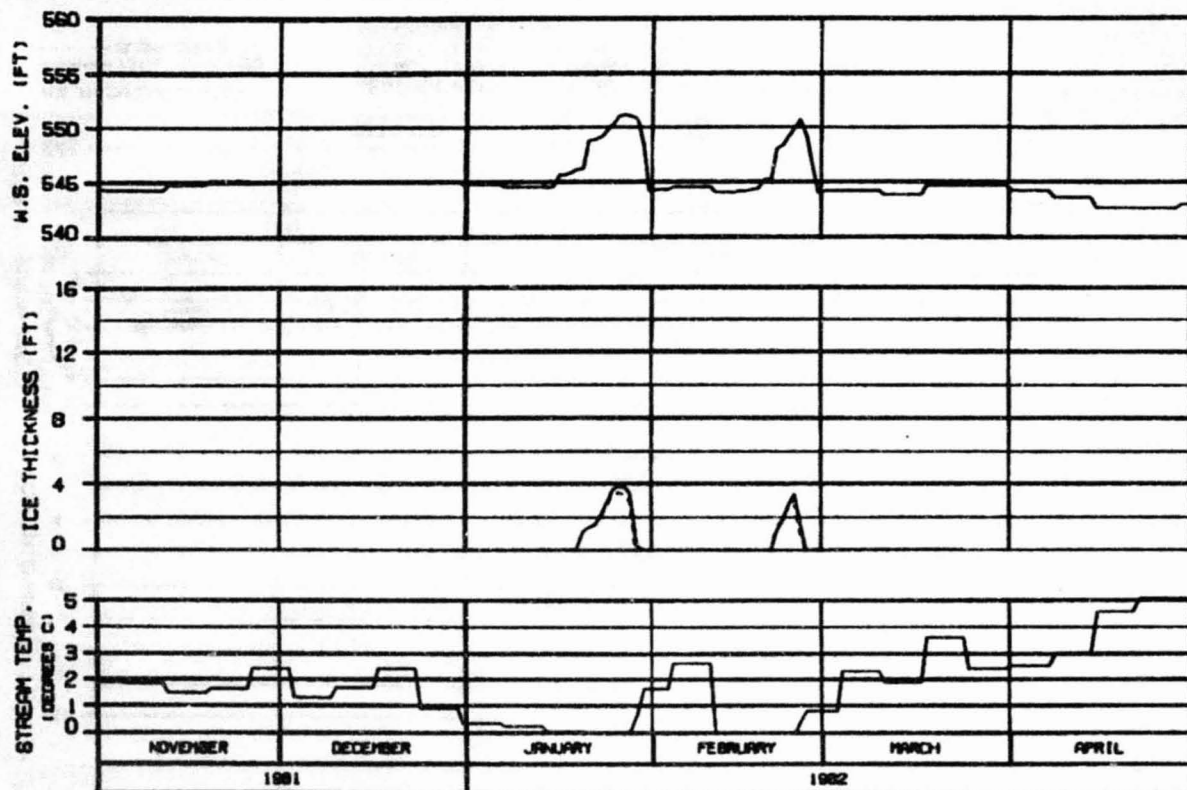
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN. DATED 27 JUN 82 1982.142



HEAD OF MOOSE SLOUGH  
RIVER MILE : 123.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1850. APPROACH 1850.  
REFERENCE RUN NO. : 8101CXD

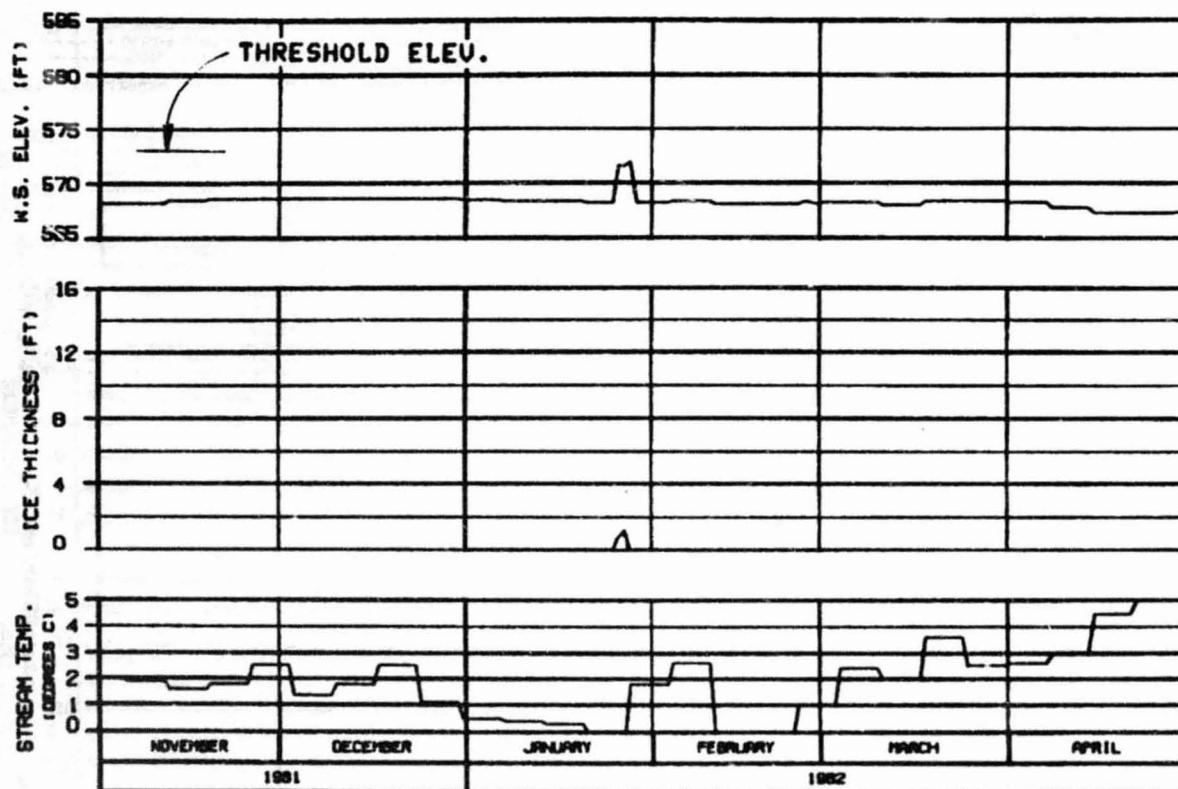
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHARGE- SLABED BY JH ON 1982.142



HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : 8101CXD

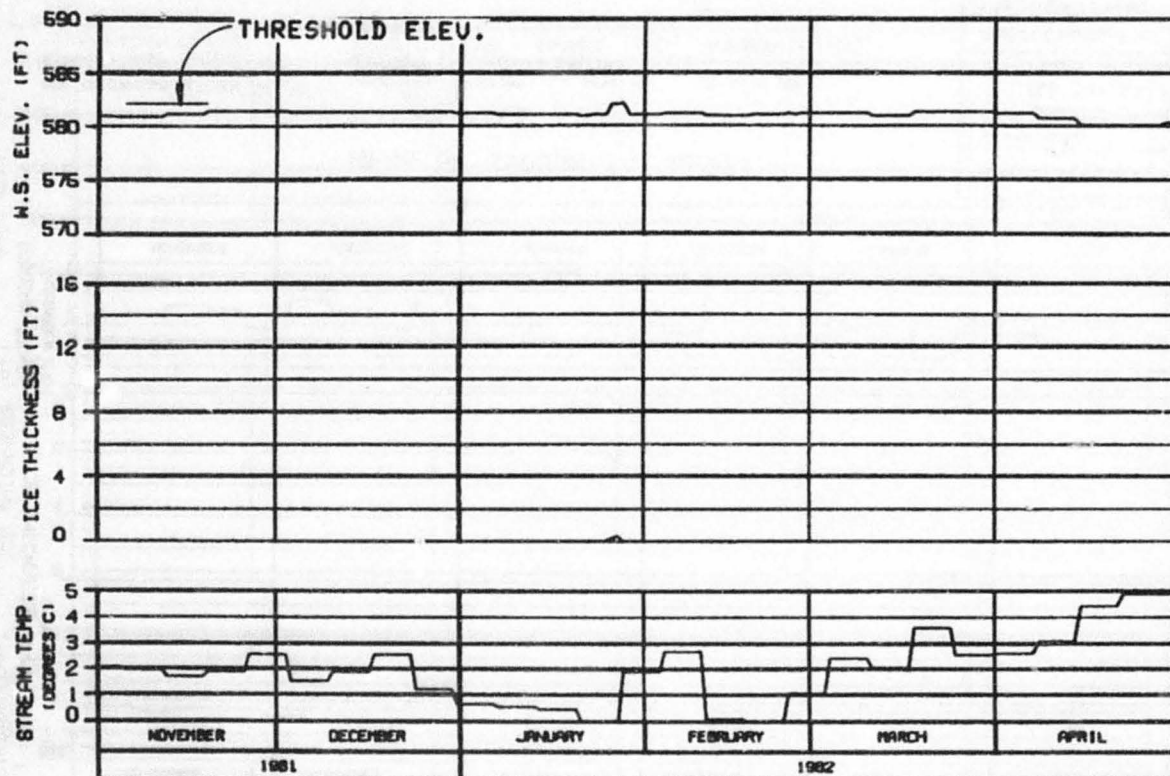
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBRSCO JOINT VENTURE

CHECKED: S.A. 0300 27 JAN 82 1000.142



HEAD OF SLOUGH 8A (EAST)  
RIVER MILE : 127.10

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1880. APPROACH 1850.  
REFERENCE RUN NO. : 8101CX0

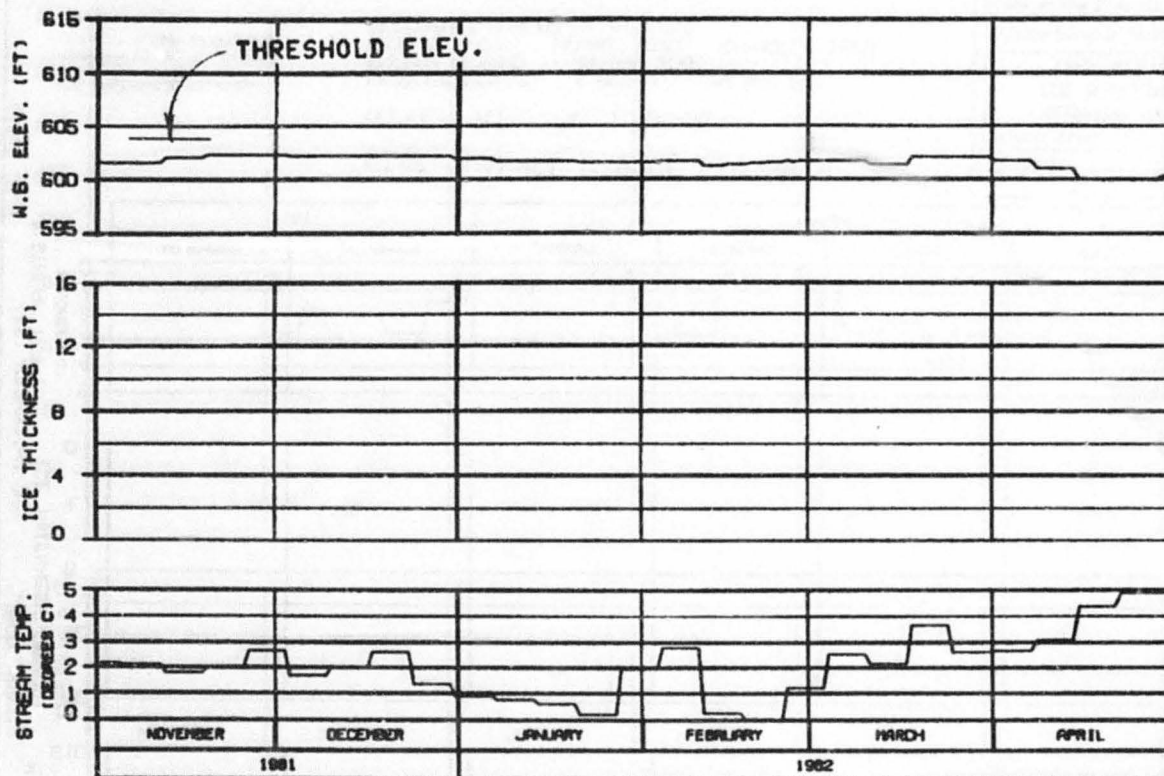
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRSCO JOINT VENTURE

BRIDGE- SLEWED 17 JAN 82 1000.142



HEAD OF SLOUGH 9

RIVER MILE : 129.30

ICE THICKNESS LEGEND.

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1880. APPROACH 1850.  
REFERENCE RUN NO. : 8101CXD

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

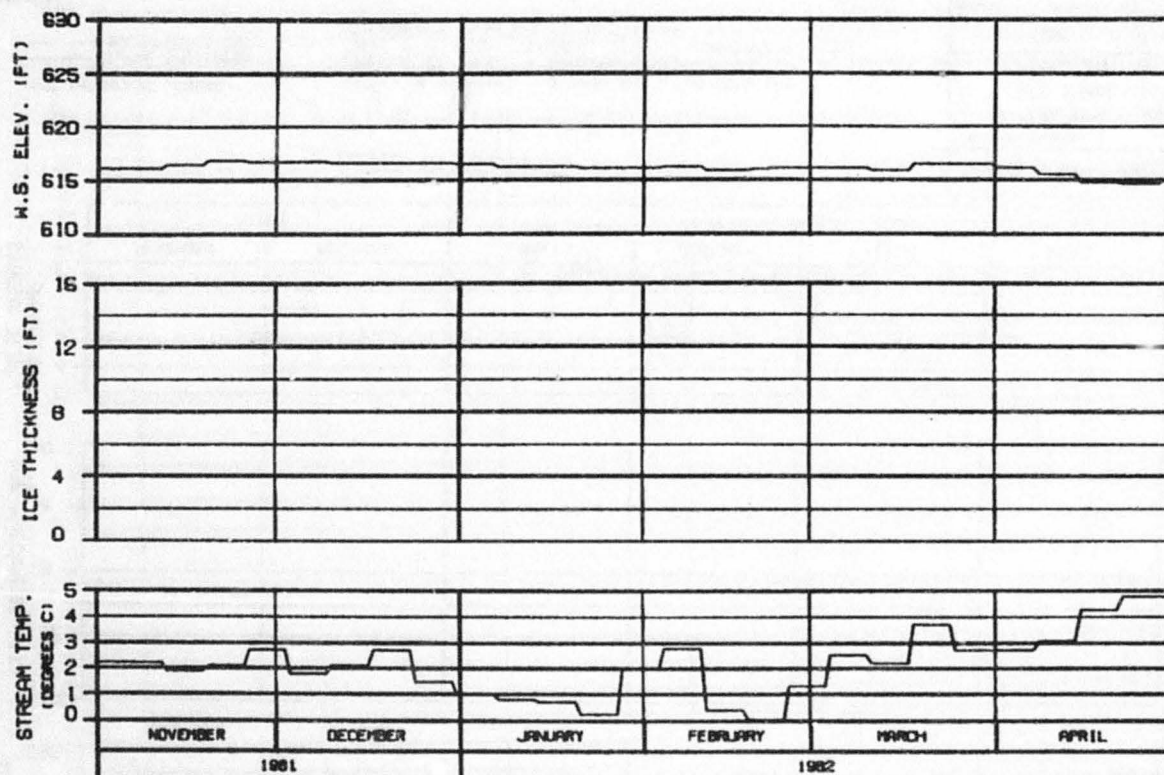
HAZRA-EBR600 JOINT VENTURE

DESIGN. 8.1.82 17 JAN 83 1880.142

OPTION?



OPTION 7



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF SLOUGH 9  
 RIVER MILE : 130.60

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : 8101CXD

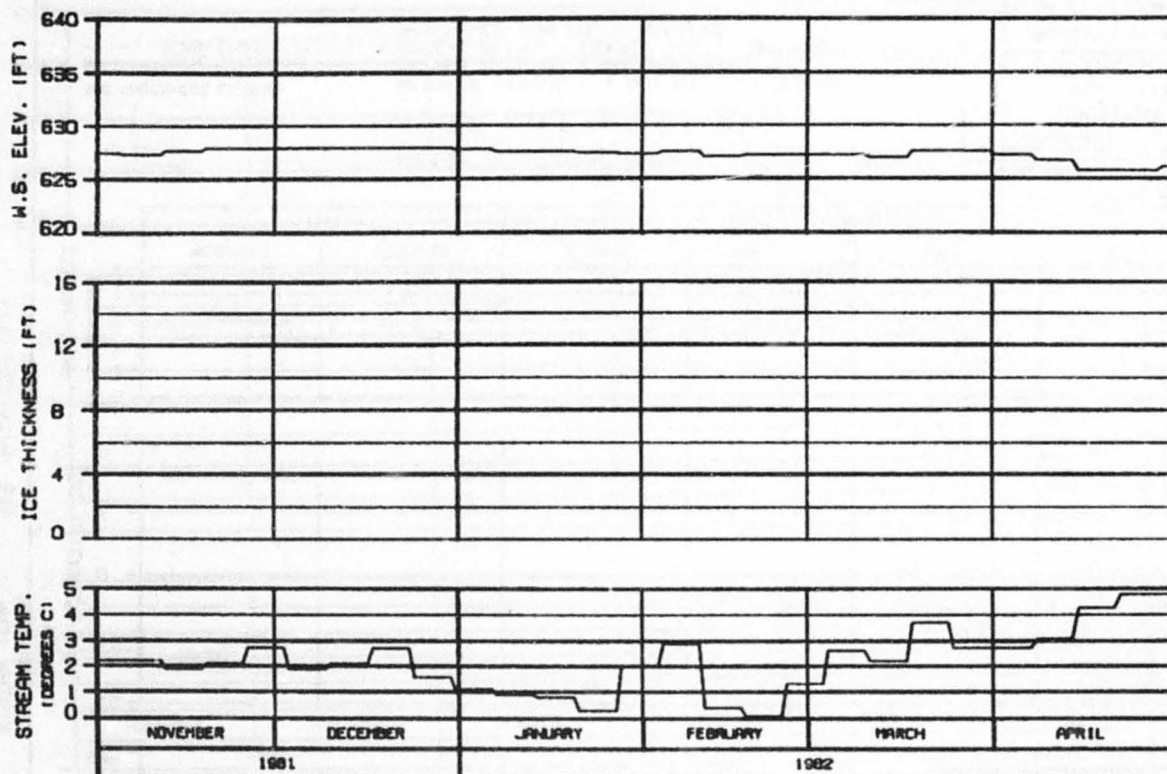
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

CHICGO, ALASKA 17 JUN 82 1008.142



SIDE CHANNEL U/S OF 4TH JULY CREEK  
RIVER MILE : 131.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1880. APPROACH 1850.  
REFERENCE RUN NO. : 8101CXD

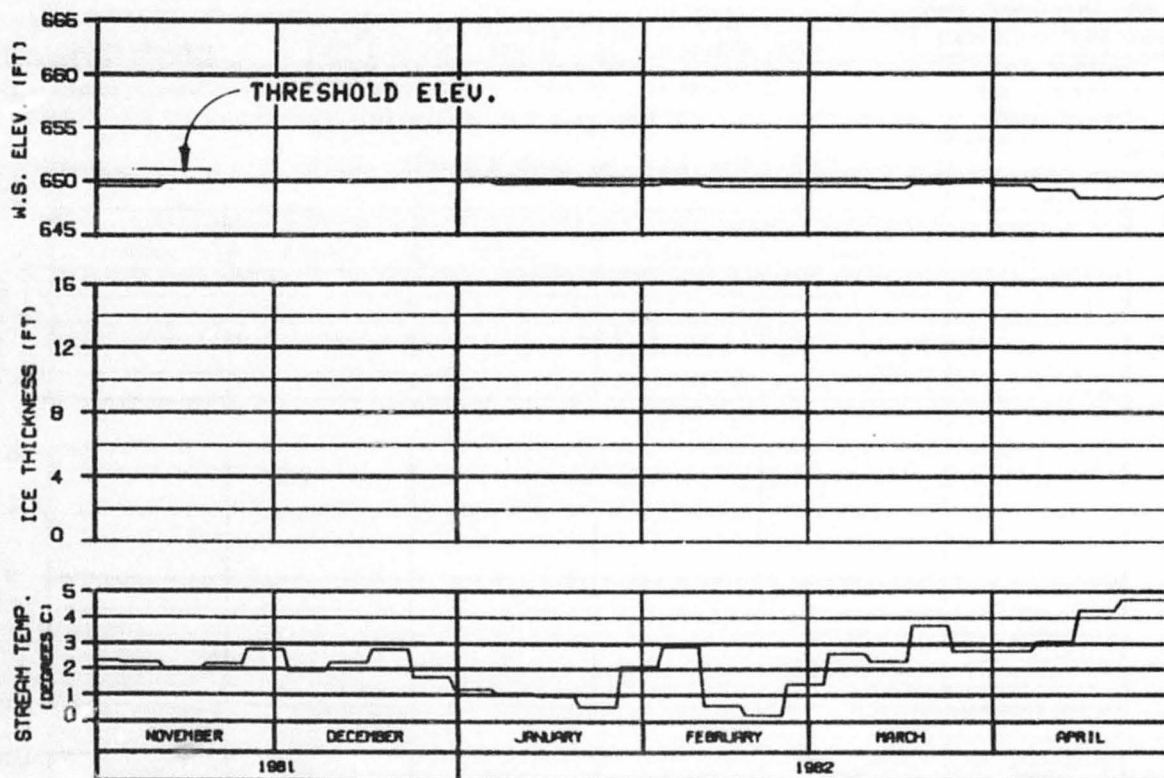
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: TLL DATED 17 JAN 82 1880.142



HEAD OF SLOUGH 9A  
RIVER MILE : 133.70

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1880. APPROACH 1850.  
REFERENCE RUN NO. : 8101CX0

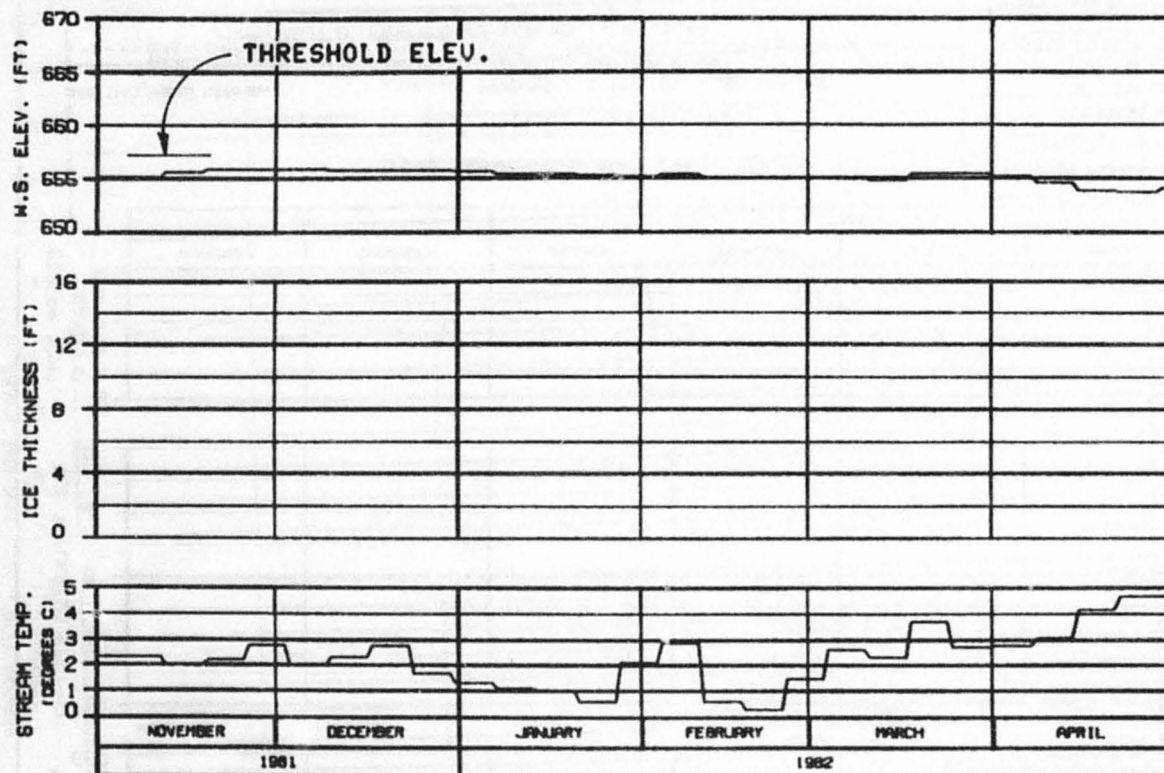
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN - 11-81-82 17 JAN 82 1588-142



SIDE CHANNEL U/S OF SLOUGH 10  
RIVER MILE : 134.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1880. APPROACH 1850.  
REFERENCE RUN NO. : 8101CX0

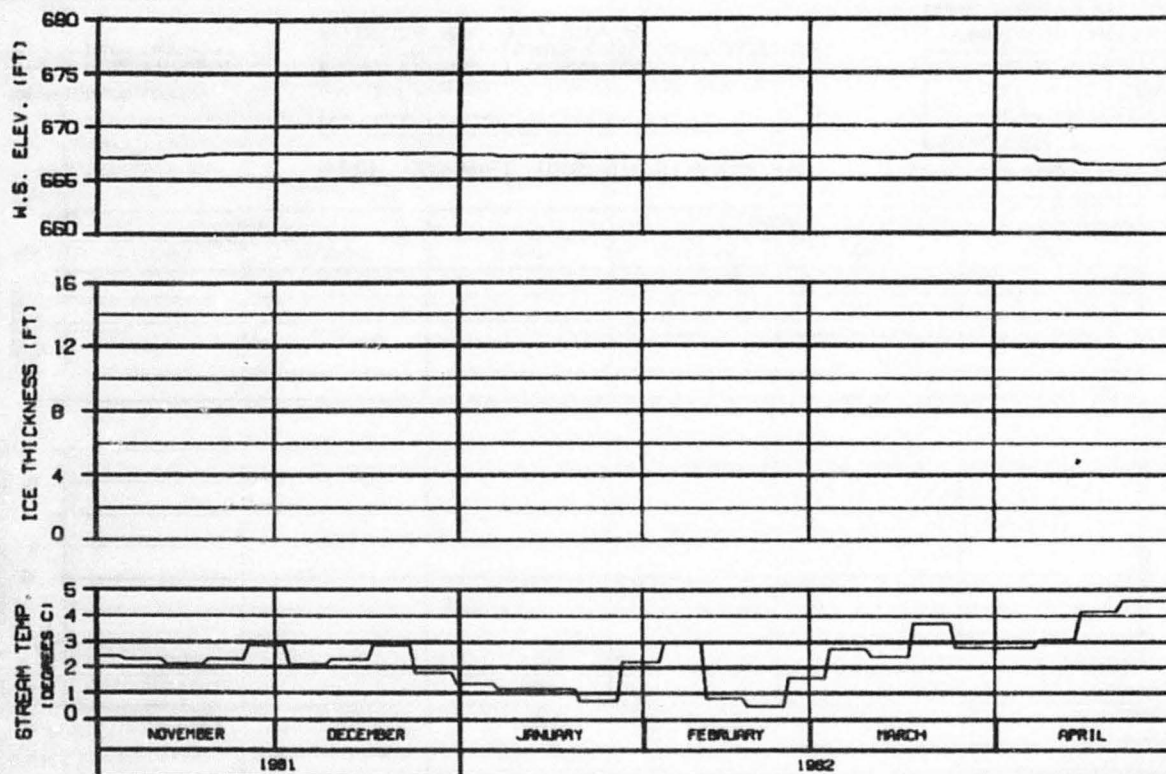
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRACCO JOINT VENTURE

DESIGN: ALDING 17 JAN 82 1982. 142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 ..... SLUSH COMPONENT

SIDE CHANNEL D/S OF SLOUGH 11  
 RIVER MILE : 135.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : 8101CX0

ALASKA POWER AUTHORITY

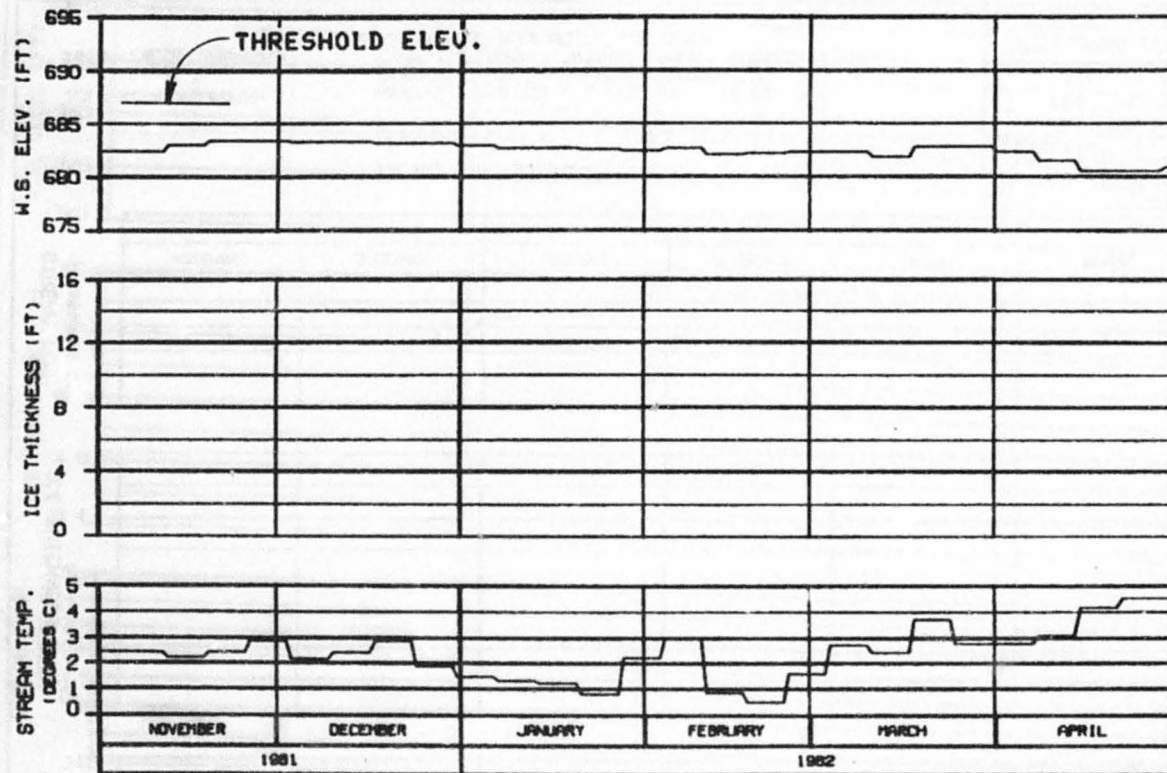
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACCO JOINT VENTURE

CHECKED: B.L.D-88 BY JPH 88 1988.142





HEAD OF SLOUGH 11  
RIVER MILE : 136.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1880. APPROACH 1850.  
REFERENCE RUN NO. : 8101CX0

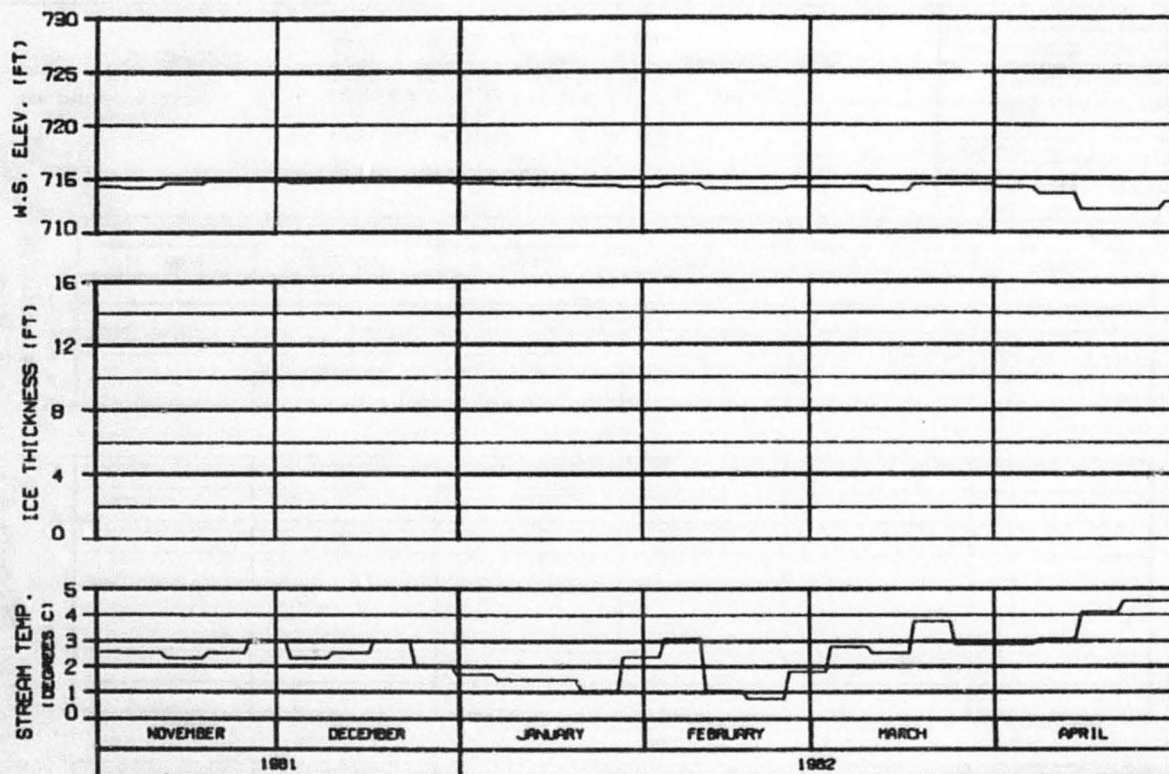
ALASKA POWER AUTHORITY

SUSTITNA PROJECT

SUSTITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: ALLIANCE 17 JAN 82 8803.142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

HEAD OF SLOUGH 17  
 RIVER MILE : 139.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880, APPROACH 1850.  
 REFERENCE RUN NO. : 8101CX0

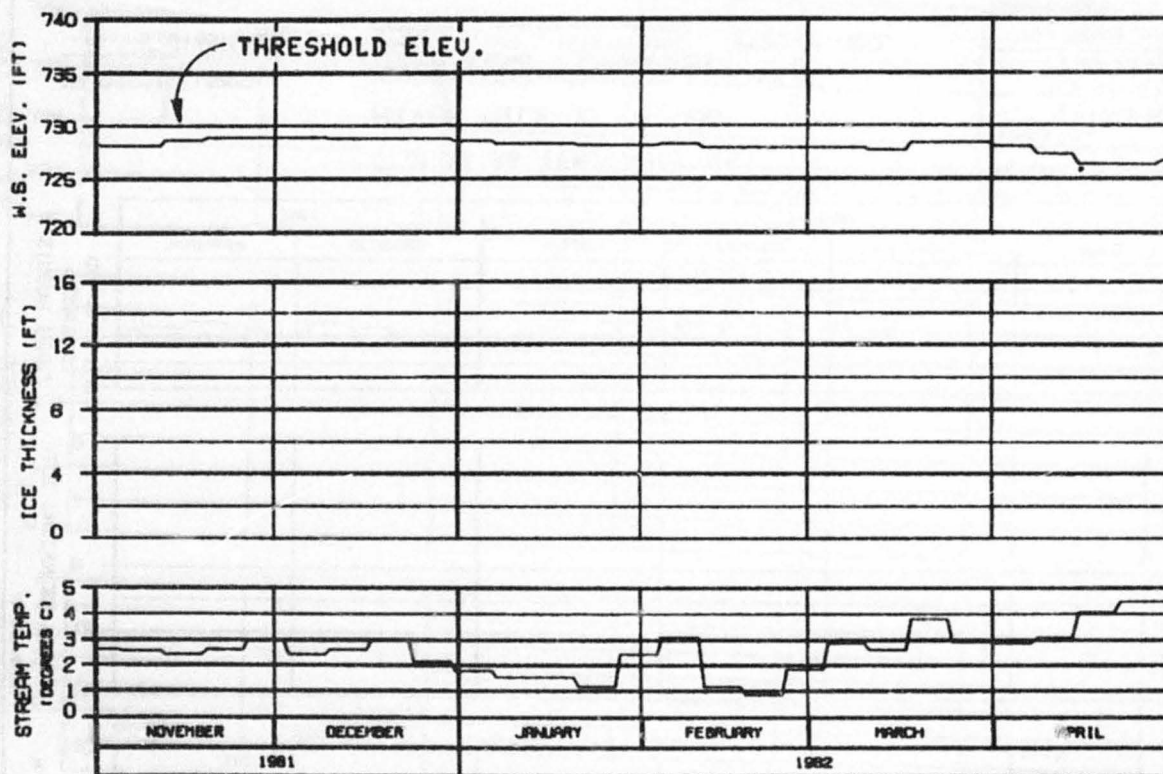
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACCO JOINT VENTURE

ENCLOSURE: 11-1988 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 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HEAD OF SLOUGH 20  
RIVER MILE : 140.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1880. APPROACH 1850.  
REFERENCE RUN NO. : 8101CX0

ALASKA POWER AUTHORITY

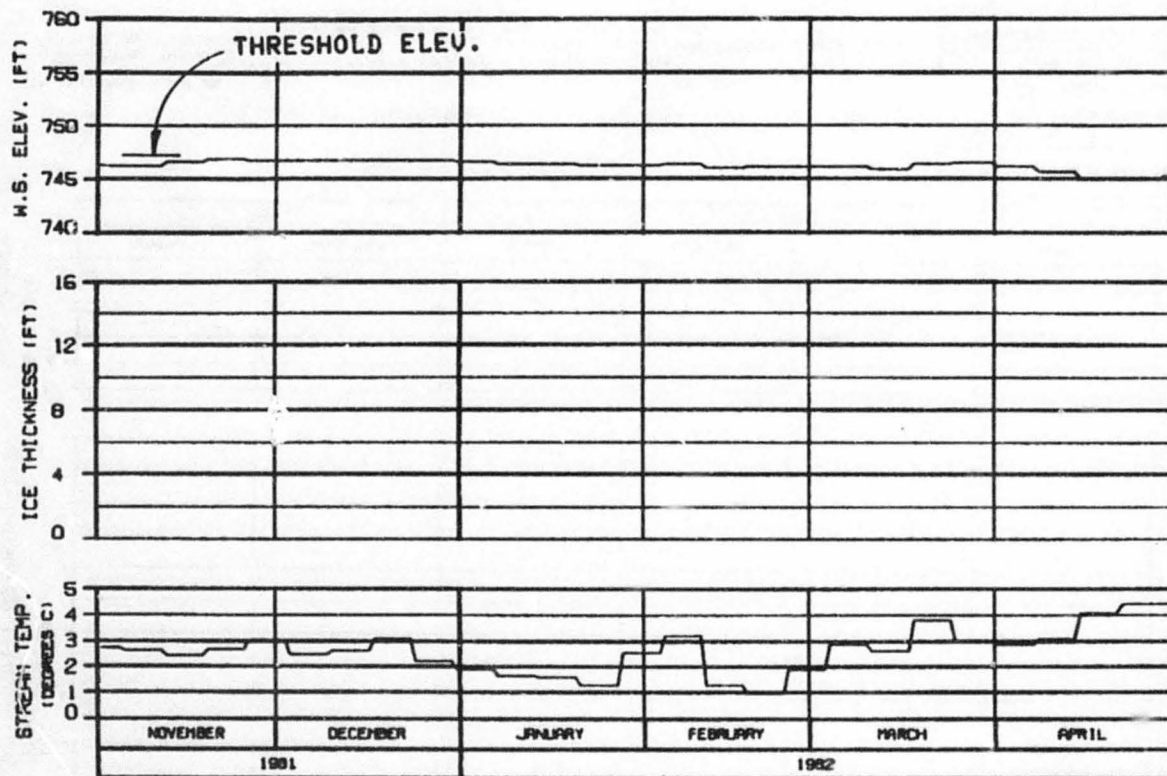
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHECKED: SLD/STB 17 JAN 82

1982.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : 8101CX

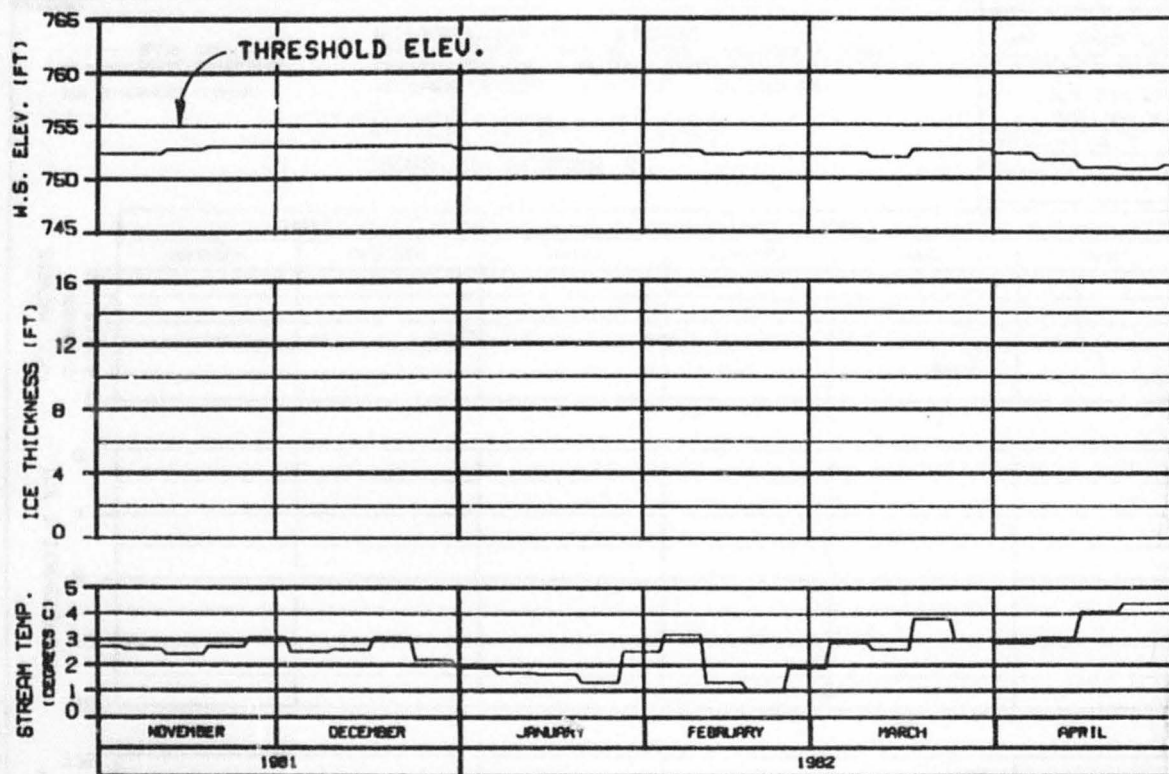
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBR600 JOINT VENTURE

CHUCK. SLUSH 17 JUN 82 1000.142



HEAD OF SLOUGH 21  
RIVER MILE : 142.20

ICE THICKNESS LEGEND:  
——— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1880. APPROACH 1850.  
REFERENCE RUN NO. : 8101CXD

ALASKA POWER AUTHORITY

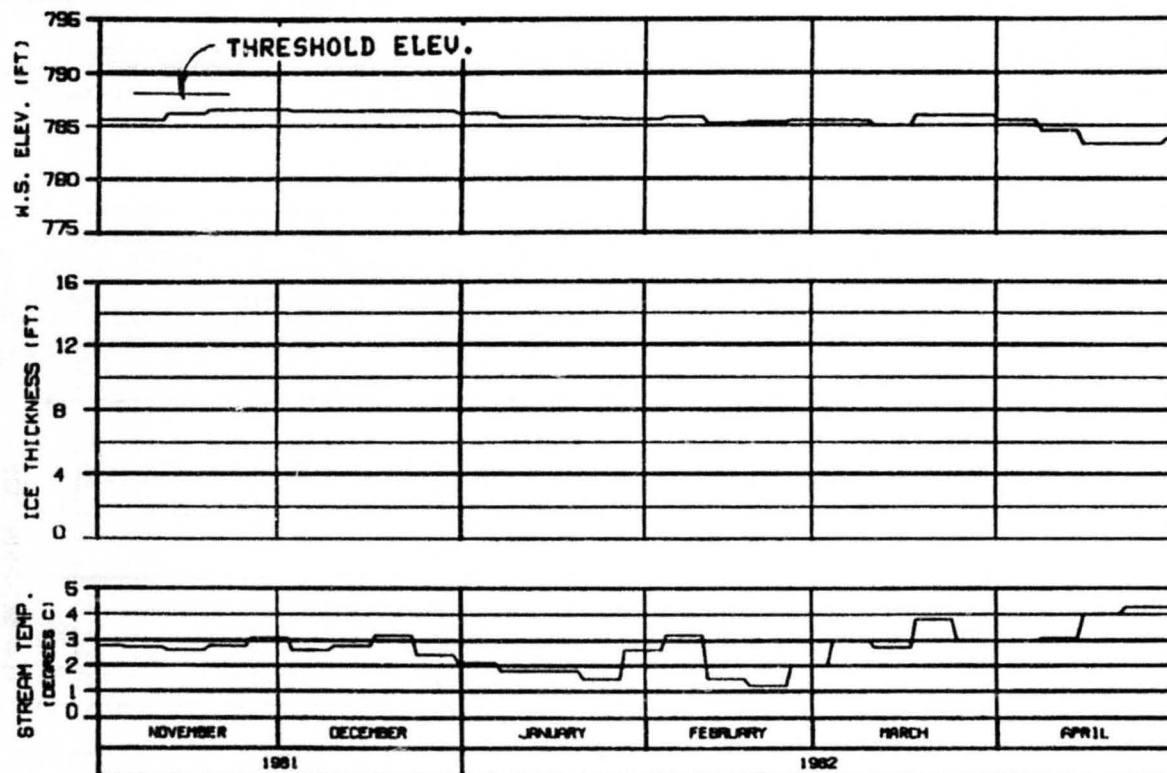
SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DIGEST: SLUSH 17 JAN 82 1982.142





HEAD OF SLOUGH 22  
RIVER MILE : 144.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1880. APPROACH 1850.  
REFERENCE RUN NO. : 8101CX0

ALASKA POWER AUTHORITY

SUSITNA PROJECT

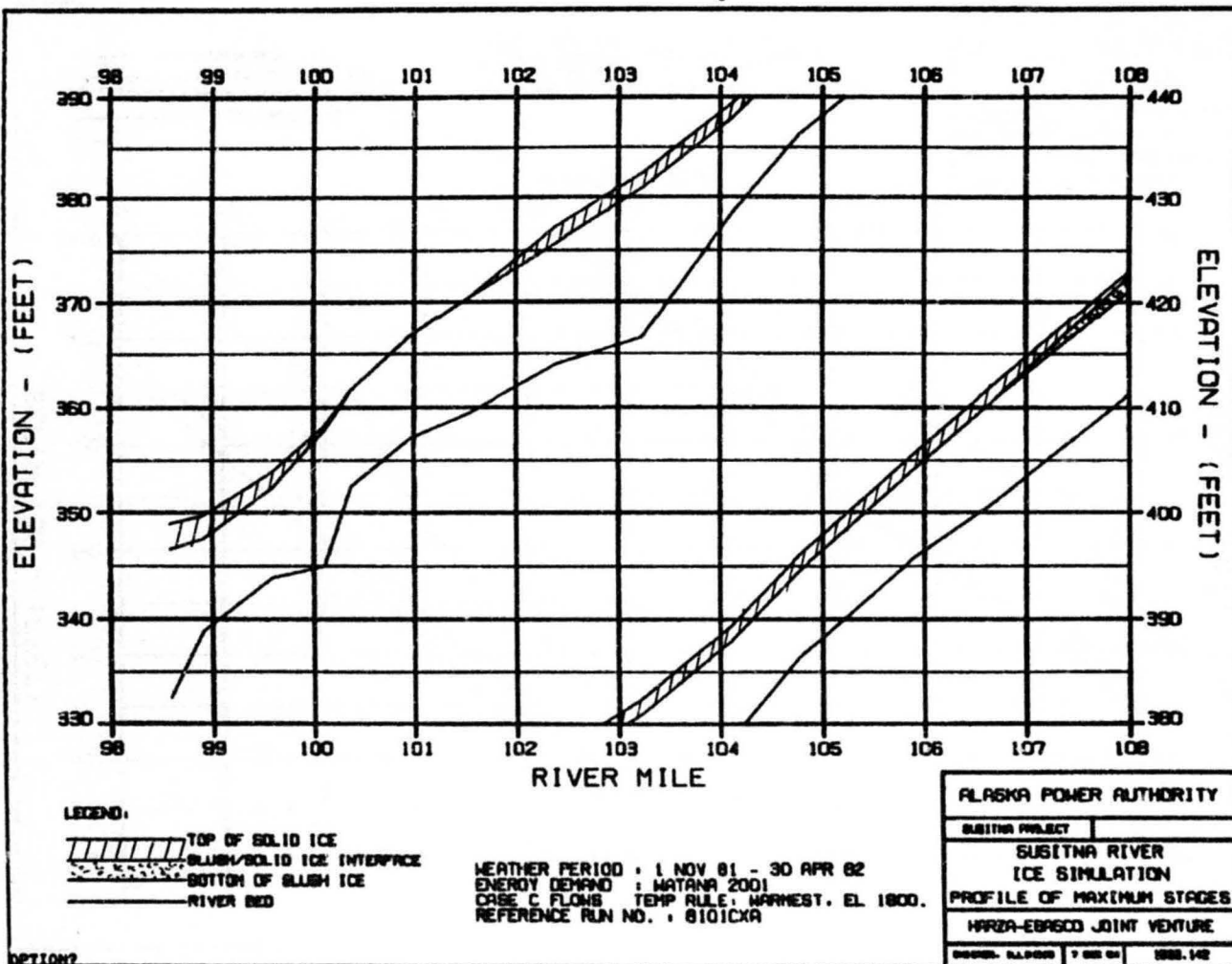
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

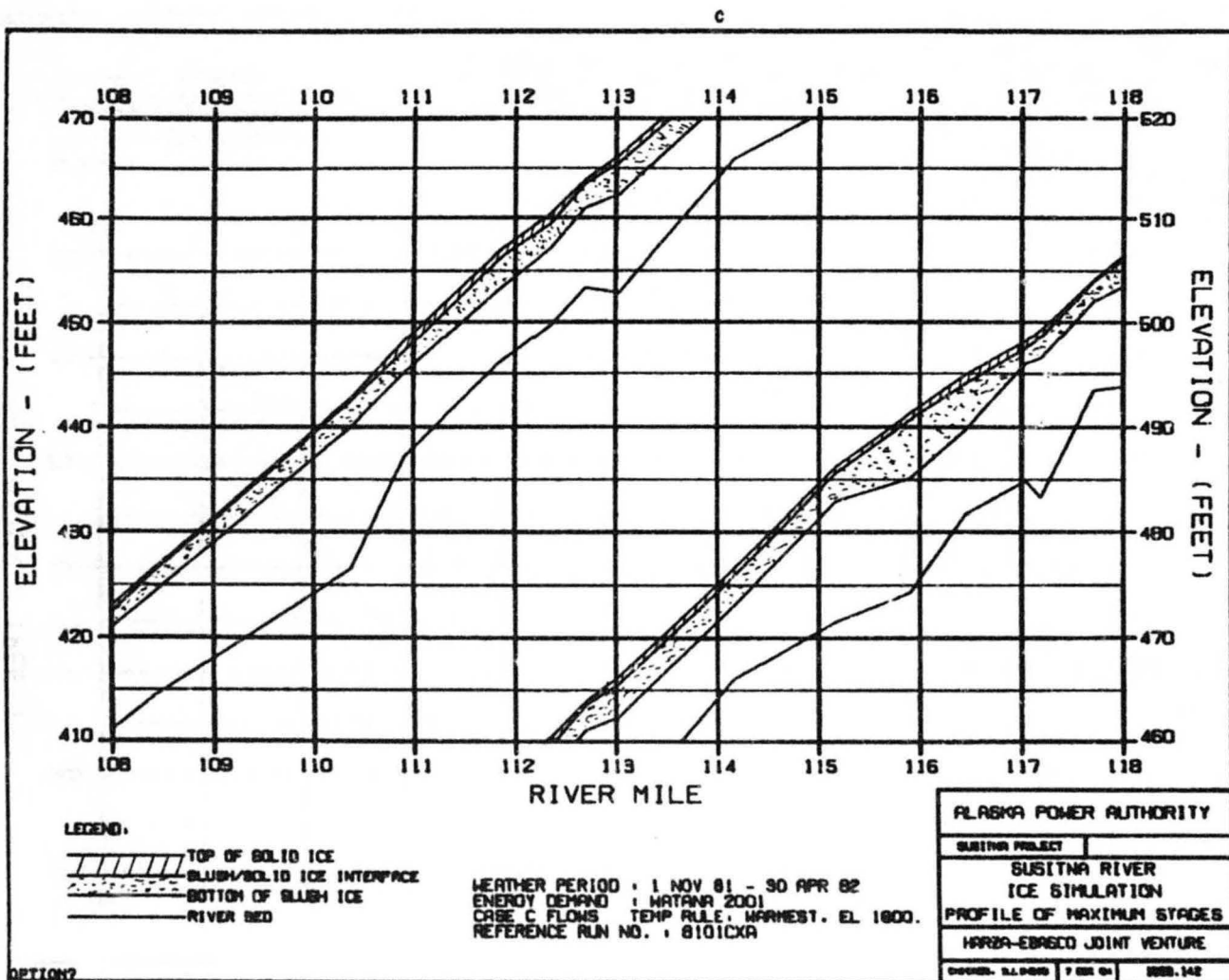
HARZA-EBASCO JOINT VENTURE

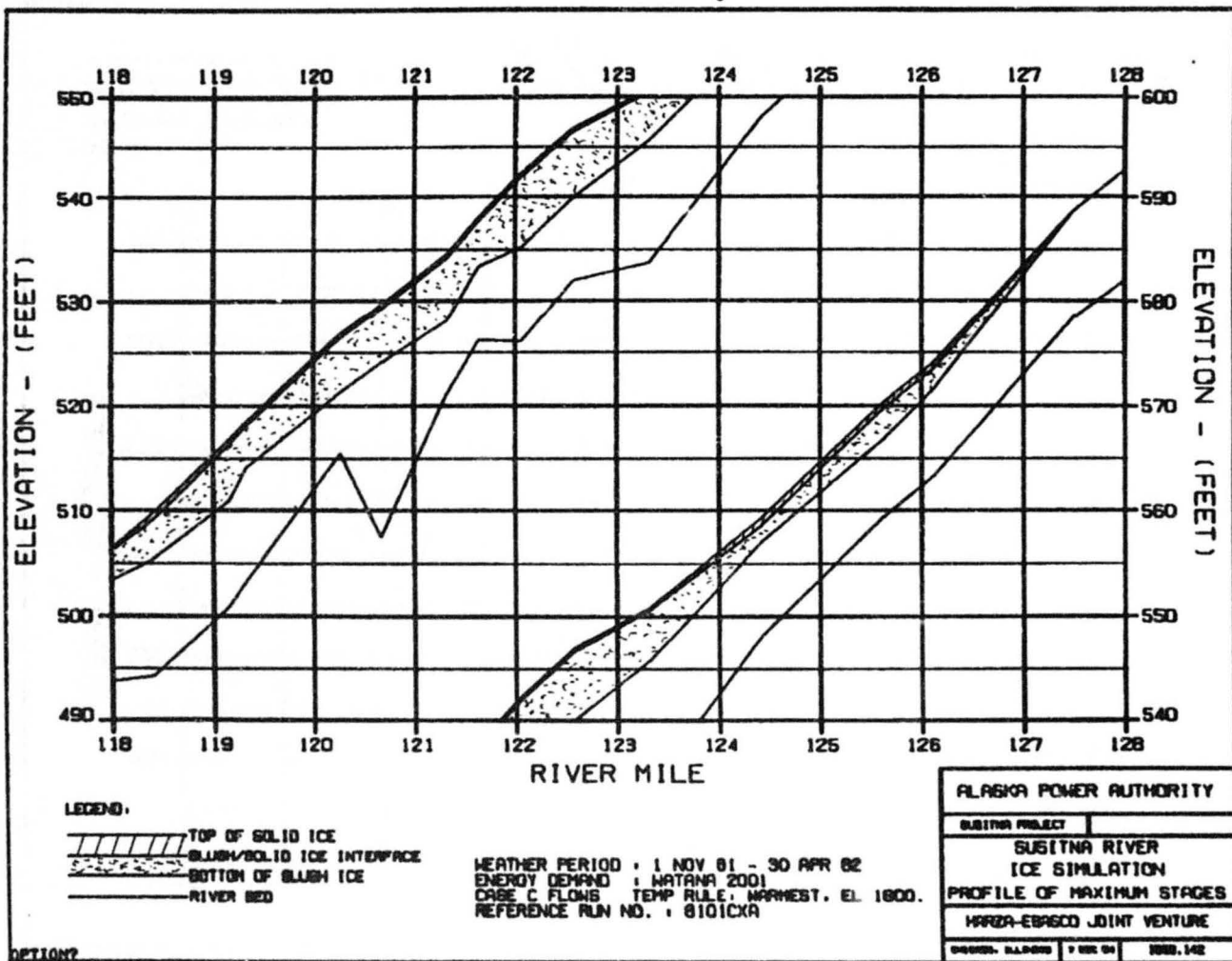
UNIVERS. ALASKA 07 JUN 82 1880.142

OPTION?

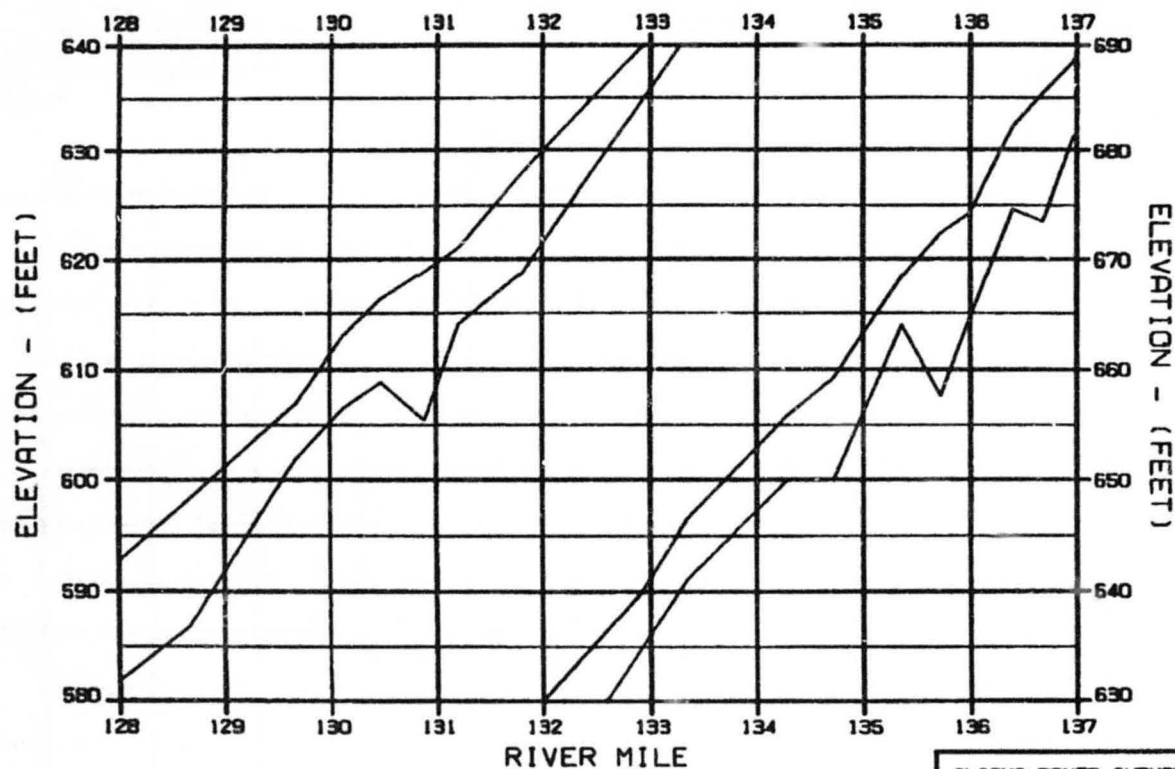
**EXHIBIT Q**



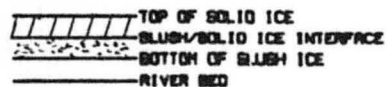








**LEGEND:**



WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE: C FLOWS TEMP RULE: WARMEST, EL 1800.  
 REFERENCE RUN NO. : 8101CKA

OPTION?

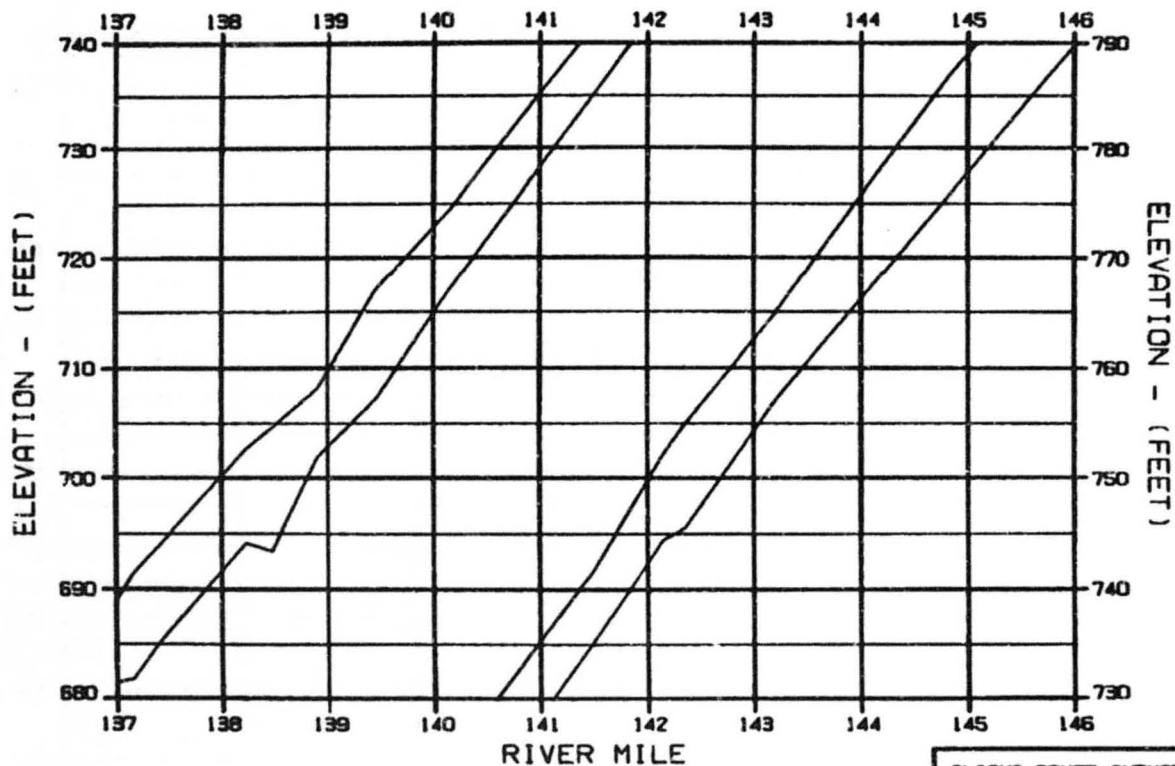
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

WARZA-EBASCO JOINT VENTURE

DESIGN: S.A. 1000 1 OF 1 1000.142



**LEGEND:**

- TOP OF SOLID ICE
- BLUISH/SOLID ICE INTERFACE
- BOTTOM OF BLUISH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE: HARVEST. EL 1800.  
 REFERENCE RUN NO. : 8101CXA

**ALASKA POWER AUTHORITY**

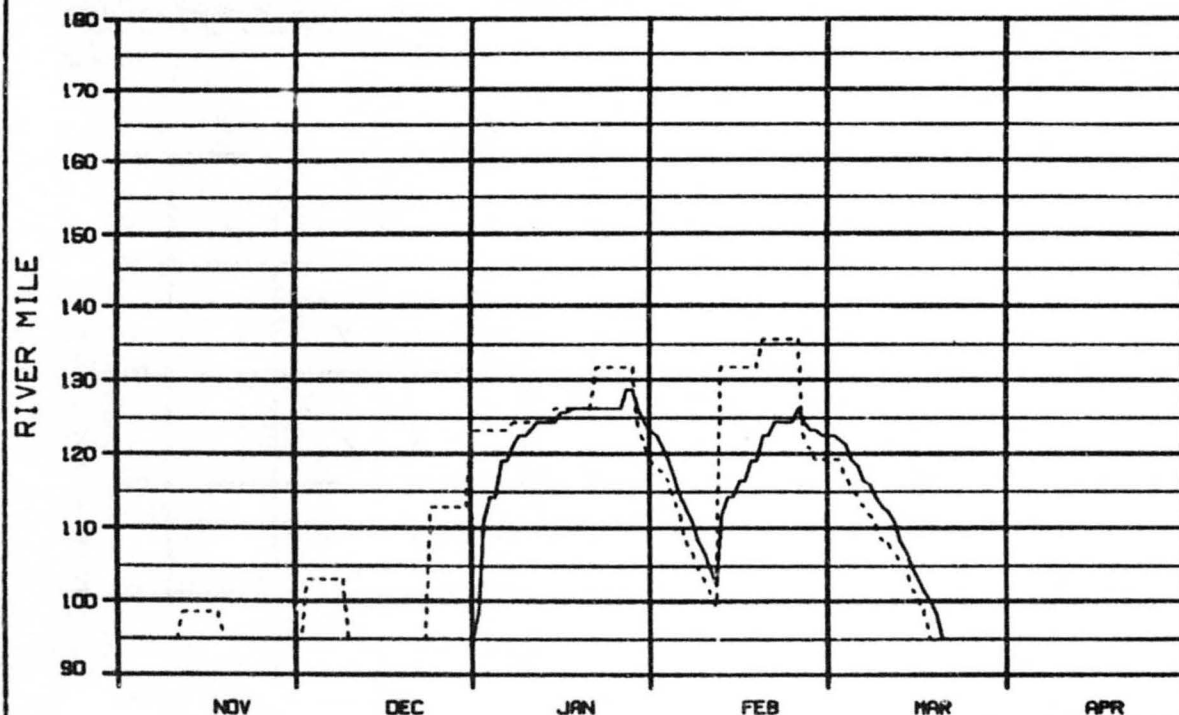
**SUSITNA PROJECT**

**SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES**

**HARZA-EDBSCO JOINT VENTURE**

**DESIGN: 11/82 7 000 001 1000.142**

OPTION?



## LEGEND:

— ICE FRONT  
 - - - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE C TEMP RULE : WARMEST, EL 1800  
 REFERENCE RUN NO. : 8101CXA

OPTION2

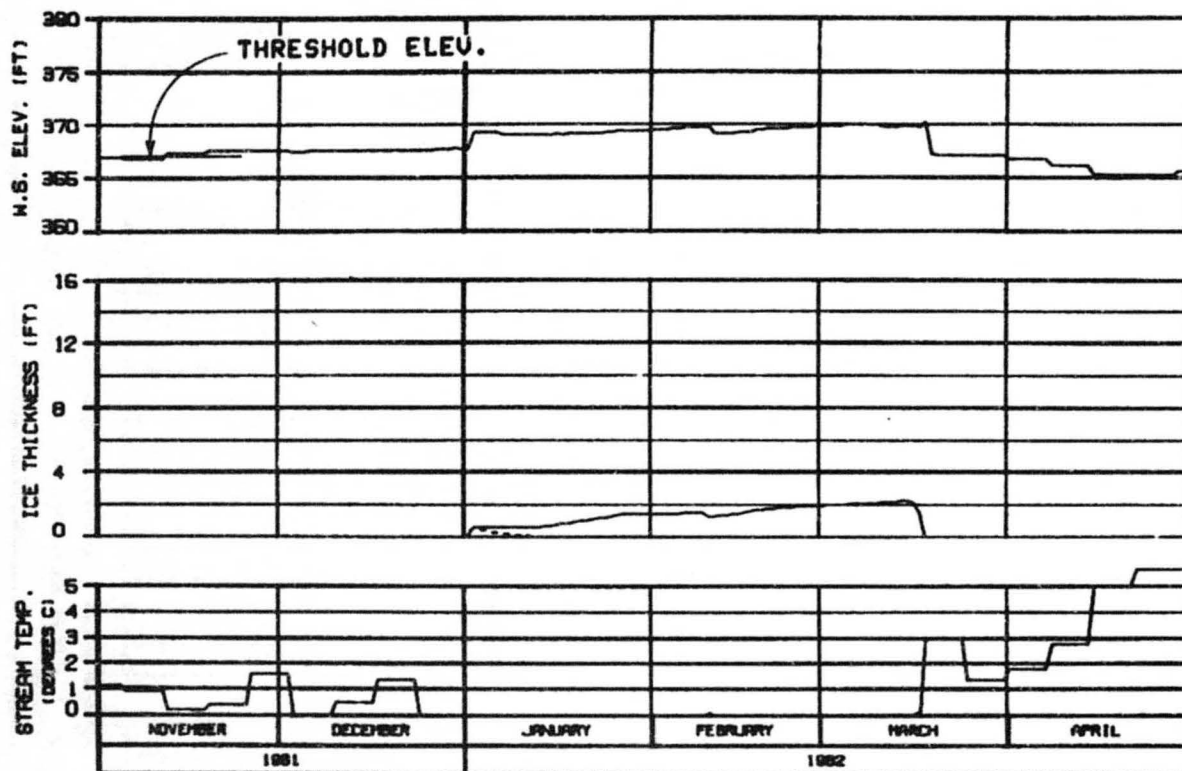
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

HARZA-EBASCO JOINT VENTURE

DRAWN: J. J. BROWN 7 FEB 84 1000.142



HEAD OF WHISKERS SLOUGH  
RIVER MILE : 101.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : KATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST. EL 1800.  
REFERENCE RUN NO. : 8101CXA

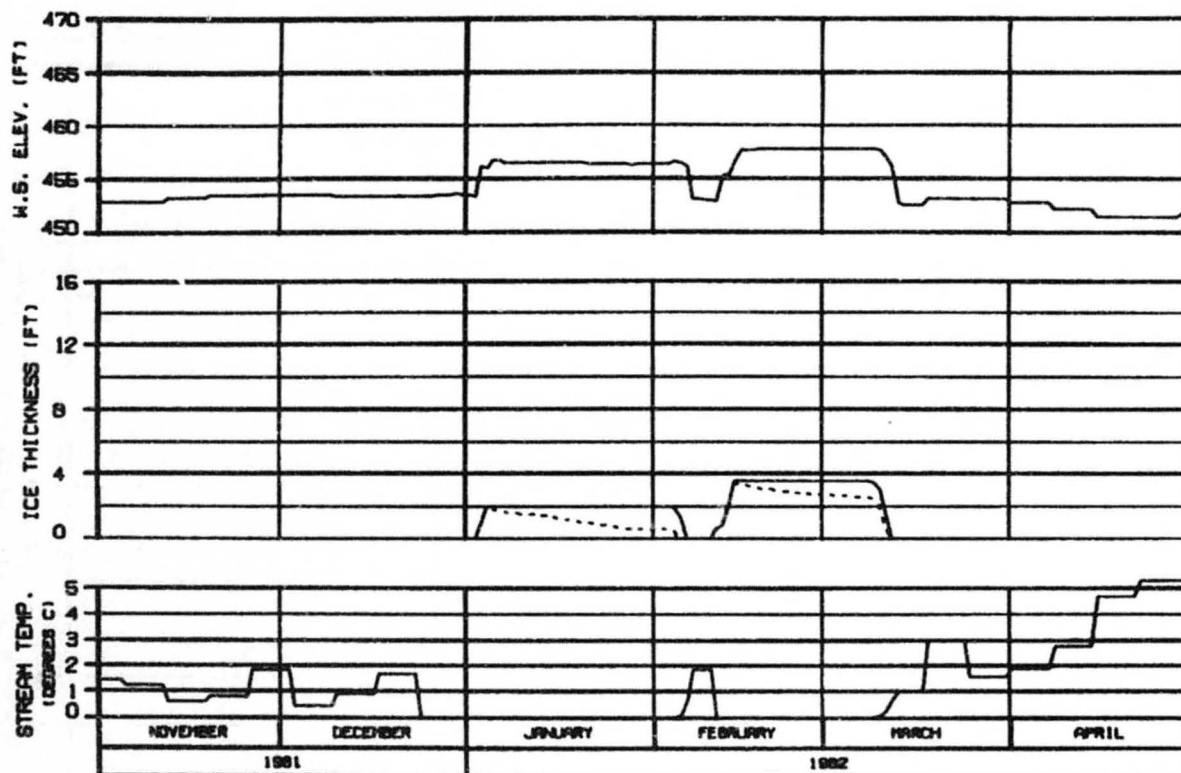
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHART NO. 8-1-1000 7 APR 84 1000-142



**SIDE CHANNEL AT HEAD OF GASH CREEK**  
**RIVER MILE : 112.00**

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - BLUISH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST. EL 1800.  
 REFERENCE RUN NO. : B101CXA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

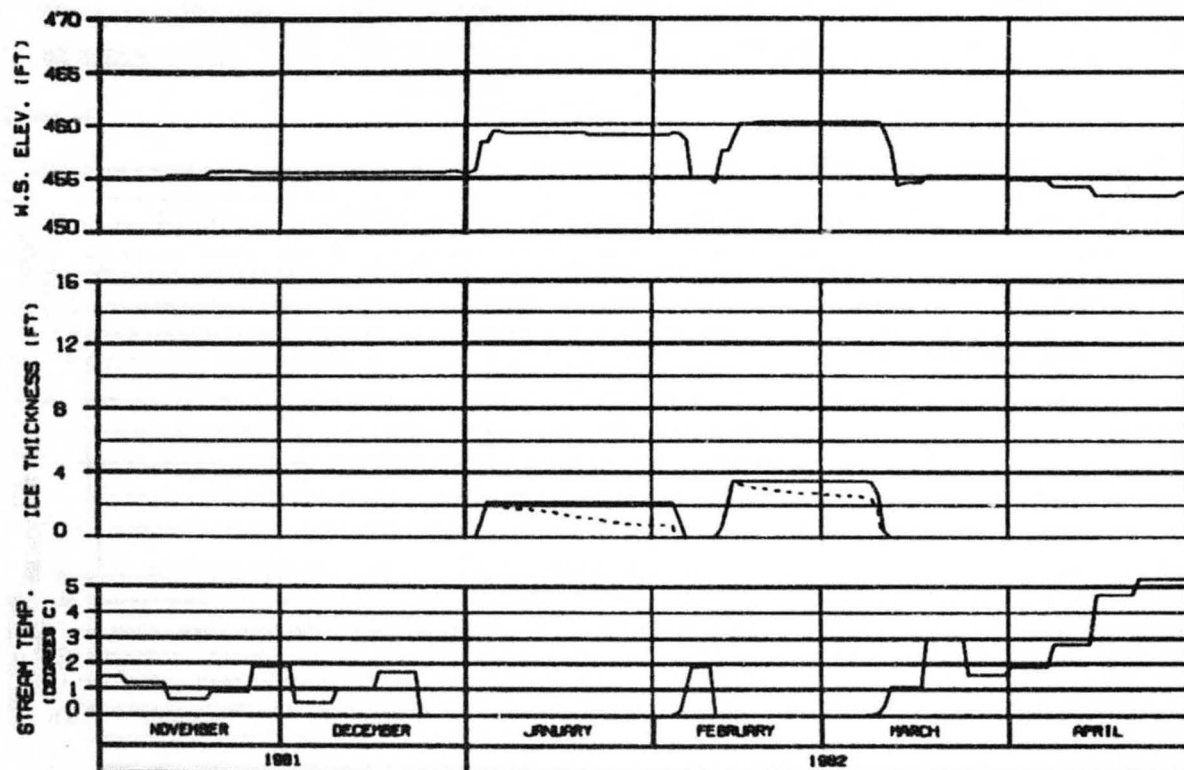
WARDA-EBASCO JOINT VENTURE

DRAWN: B.L.PHILLIPS

7 FEB 82

1000.142





MOUTH OF SLOUGH 6A  
RIVER MILE : 112.34

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST, EL 1800.  
REFERENCE RUN NO. : 9101CXA

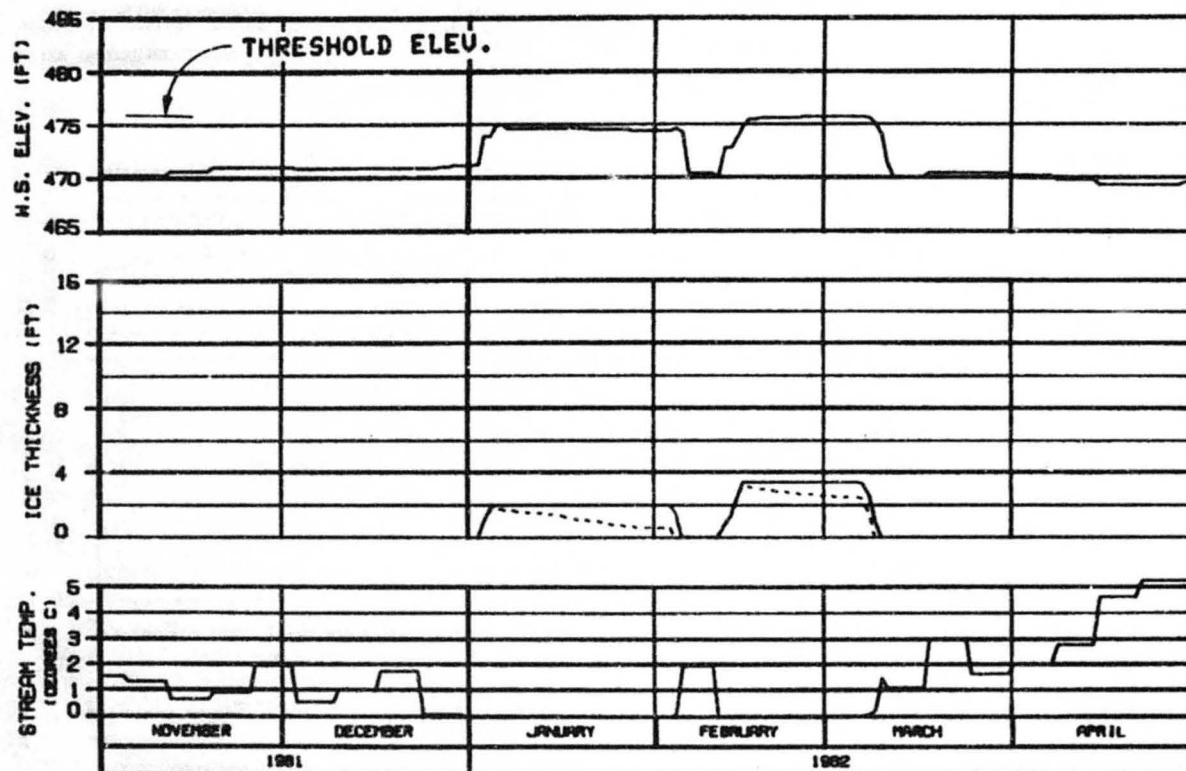
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EDBROCO JOINT VENTURE

DESIGNED BY: 9-10-81 P. 100 142



HEAD OF SLOUGH 8

RIVER MILE : 114.10

ICE THICKNESS LEGEND.

———— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST. EL 1800.  
 REFERENCE RUN NO. : 8101CXA

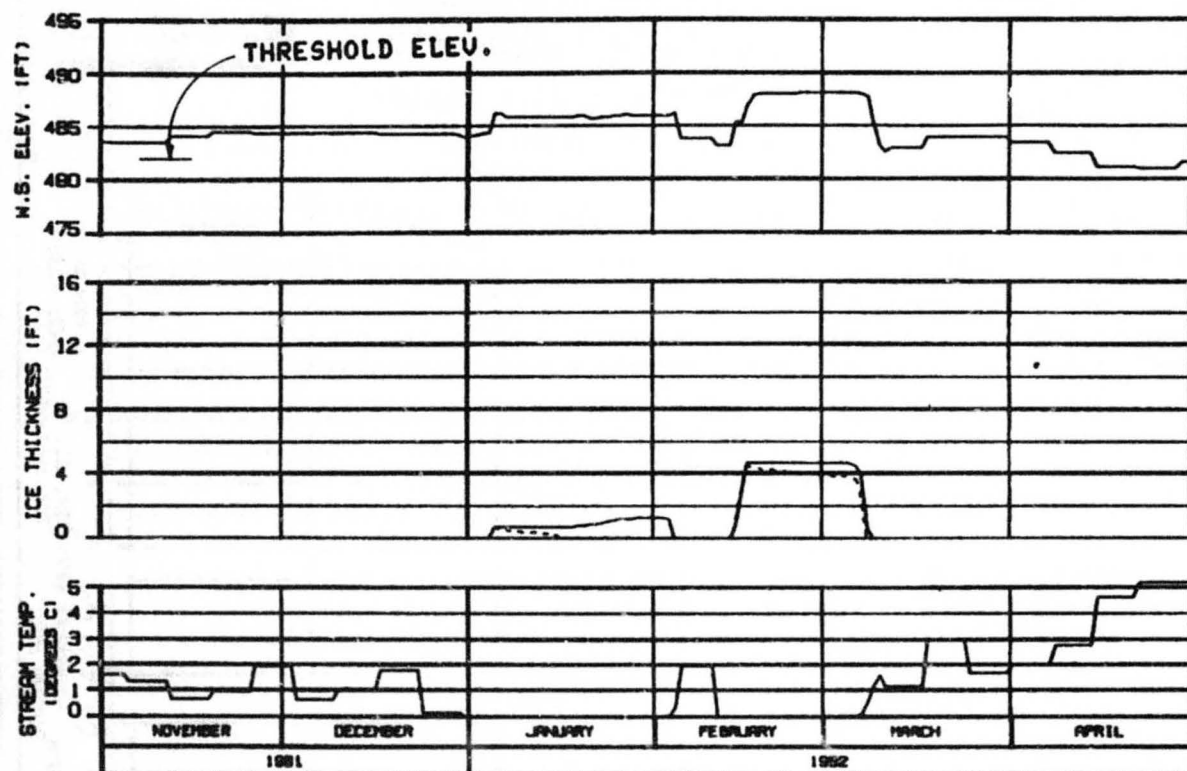
ALASKA POWER AUTHORITY

OUTSTANDING PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARDA-EBASCO JOINT VENTURE

CHARTER: AL-0000 7 SEE CH 1000.142



**SIDE CHANNEL MSII  
RIVER MILE : 115.50**

**ICE THICKNESS LEGEND:**

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : MATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST, EL 1800.  
REFERENCE RUN NO. : B101CXA

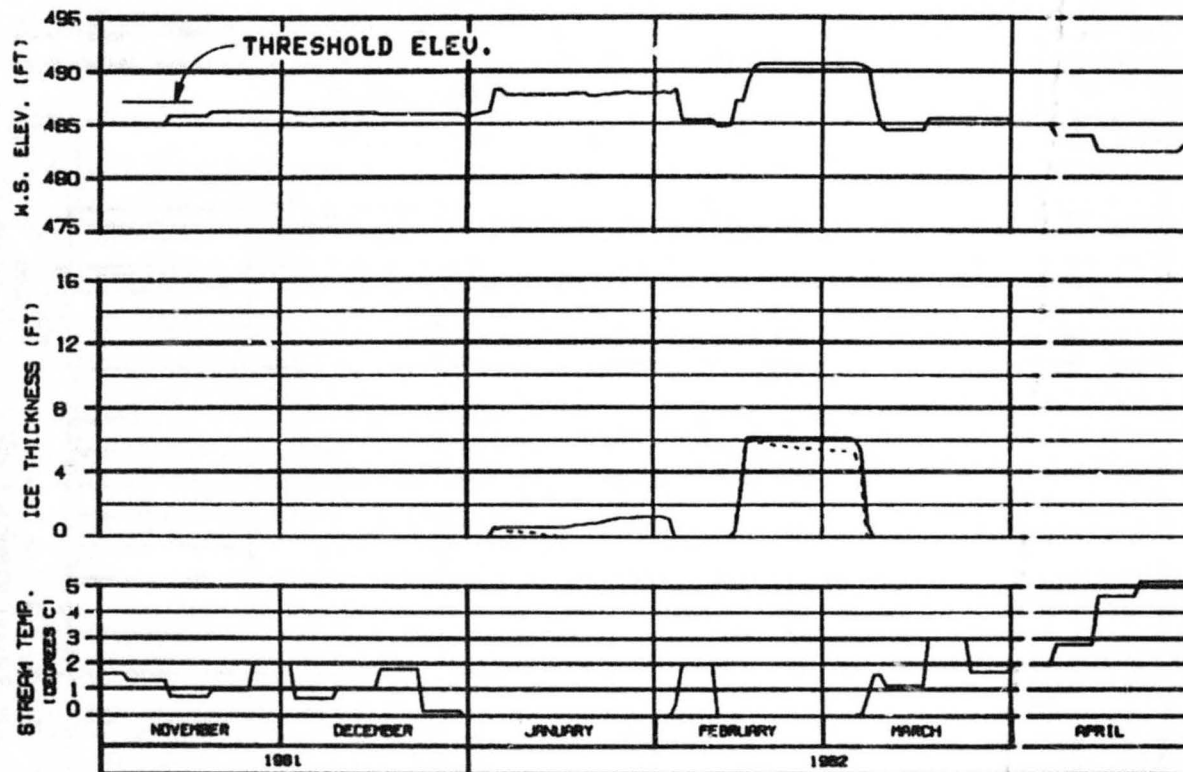
**ALASKA POWER AUTHORITY**

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRACO JOINT VENTURE

SHOWN: SLUSH T HSE ON 1280.142



HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST. EL 1800.  
 REFERENCE RUN NO. : 8101CKA

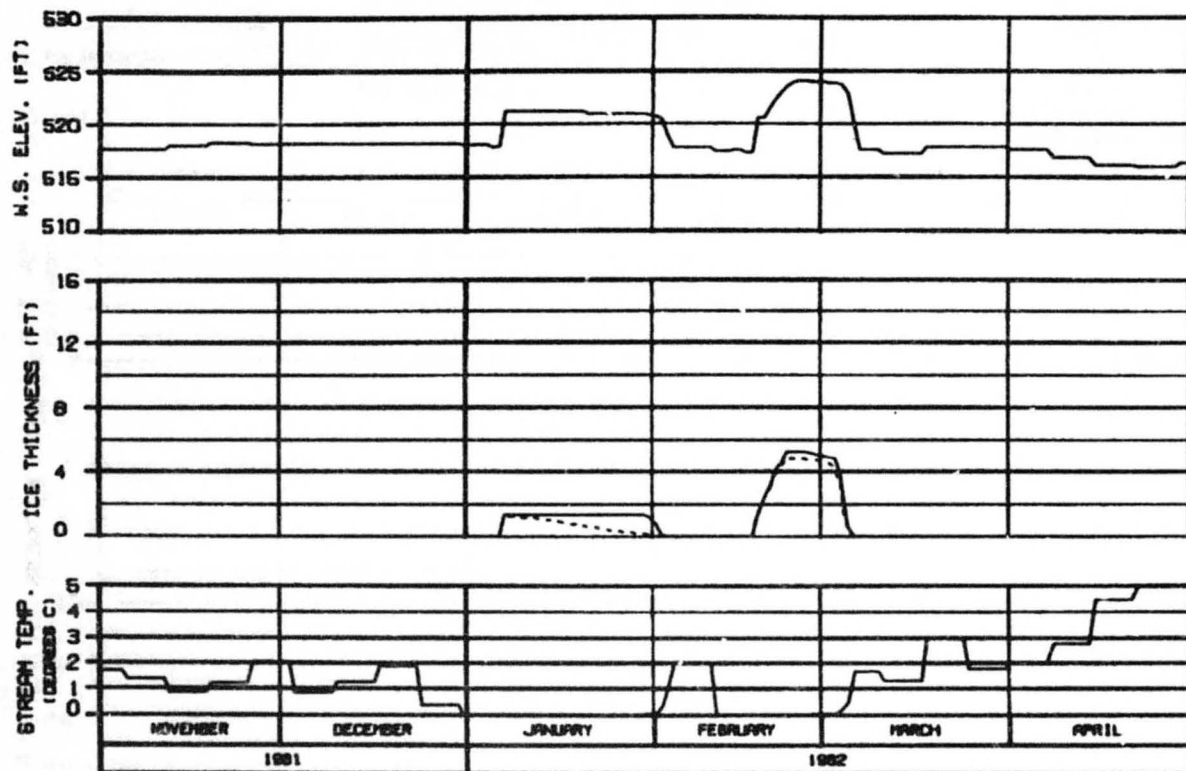
ALASKA POWER AUTHORITY

SLUICING PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

PARA-EBASCO JOINT VENTURE

REV 001 01/01/82 1 OF 1 0000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST, EL 1800.  
 REFERENCE RUN NO. : 8101CX

ALASKA POWER AUTHORITY

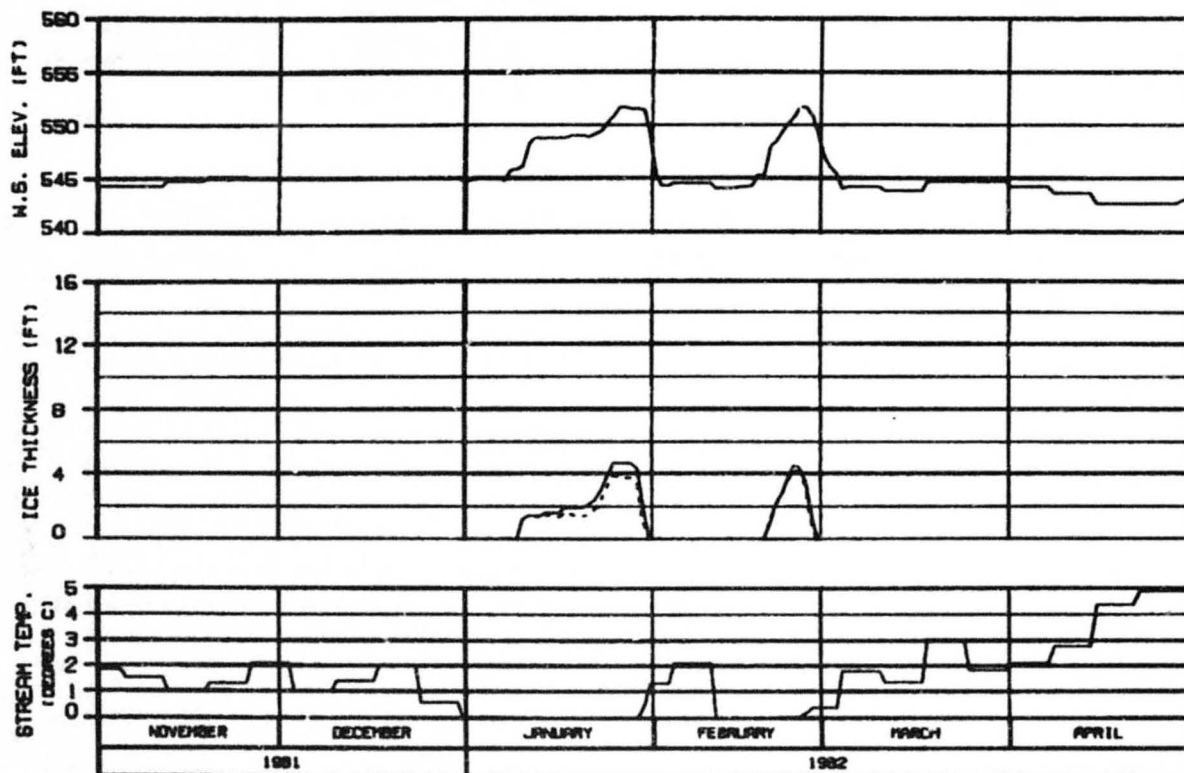
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EDRACO JOINT VENTURE

DESIGNED BY: J. H. HARRIS 2 APR 84 1000.142



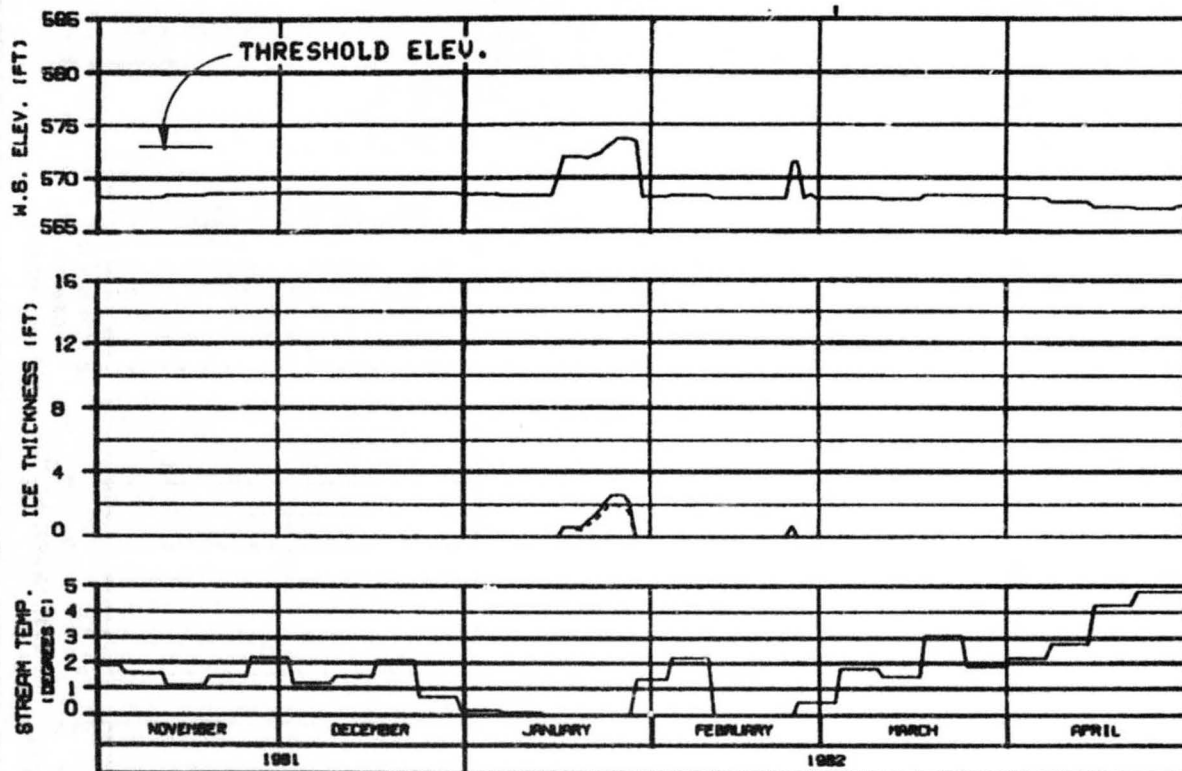


# HEAD OF MOOSE SLOUGH RIVER MILE : 123.50

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : NATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST, EL 1800.  
 REFERENCE RUN NO. : 81D1CXA

ALASKA POWER AUTHORITY		
SUSITNA PROJECT		
SUSITNA RIVER ICE SIMULATION TIME HISTORY		
HARZA-EBASCO JOINT VENTURE		
DRAWN: S. J. BIRD	7 MAY 82	1000.142



HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST, EL 1800.  
 REFERENCE RUN NO. : B101CXA

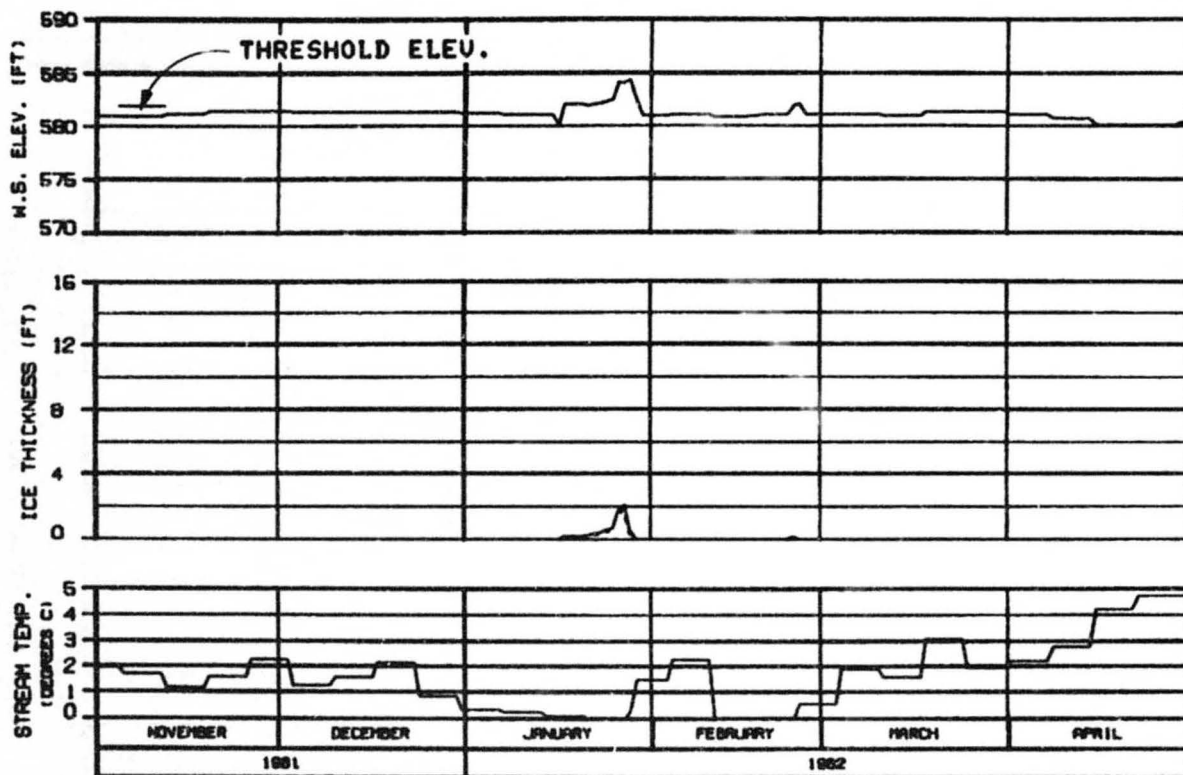
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBRISCO JOINT VENTURE

DESIGNED BY: J. D. HARRIS    DRAWN BY: J. D. HARRIS    1000.142



HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 ----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST, EL 1800.  
 REFERENCE RUN NO. : B101CA

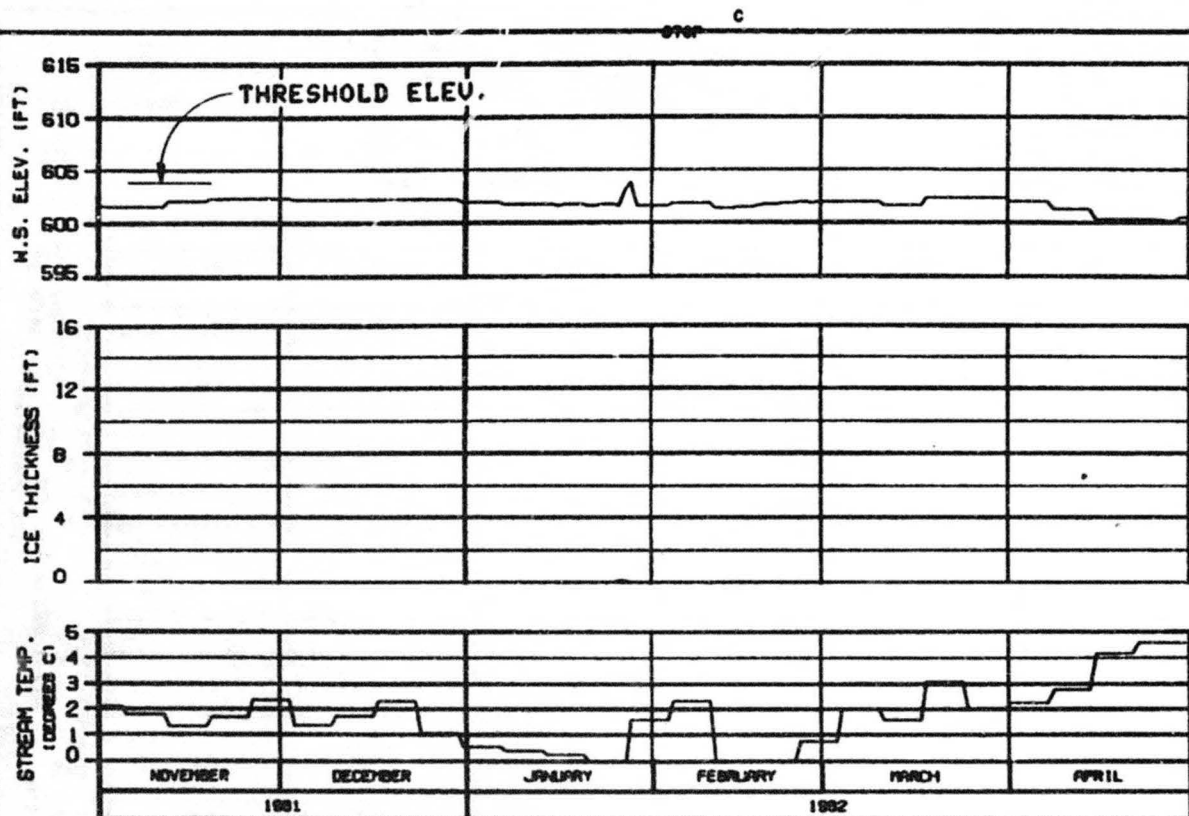
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBR600 JOINT VENTURE

DESIGN: G.L. 0000 7 OF 11 1000.142



HEAD OF SLOUGH 9  
RIVER MILE : 129.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST, EL 1800.  
REFERENCE RUN NO. : 8101CXA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

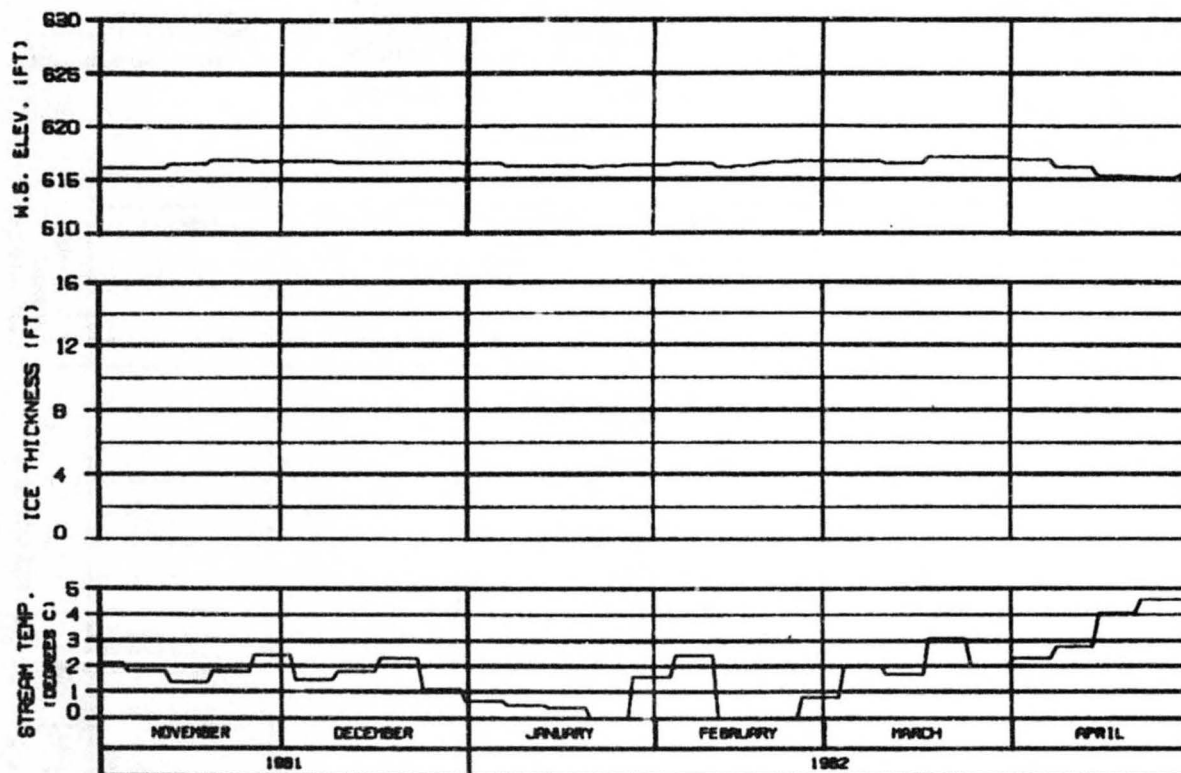
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EDBROO JOINT VENTURE

DWGNO: ILS-0870 7 SHE 04 1982, 142

OPTION?

OPTION?



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF SLOUGH 9  
 RIVER MILE : 130.60

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST. EL 1800.  
 REFERENCE RUN NO. : 8101CXA

ALASKA POWER AUTHORITY

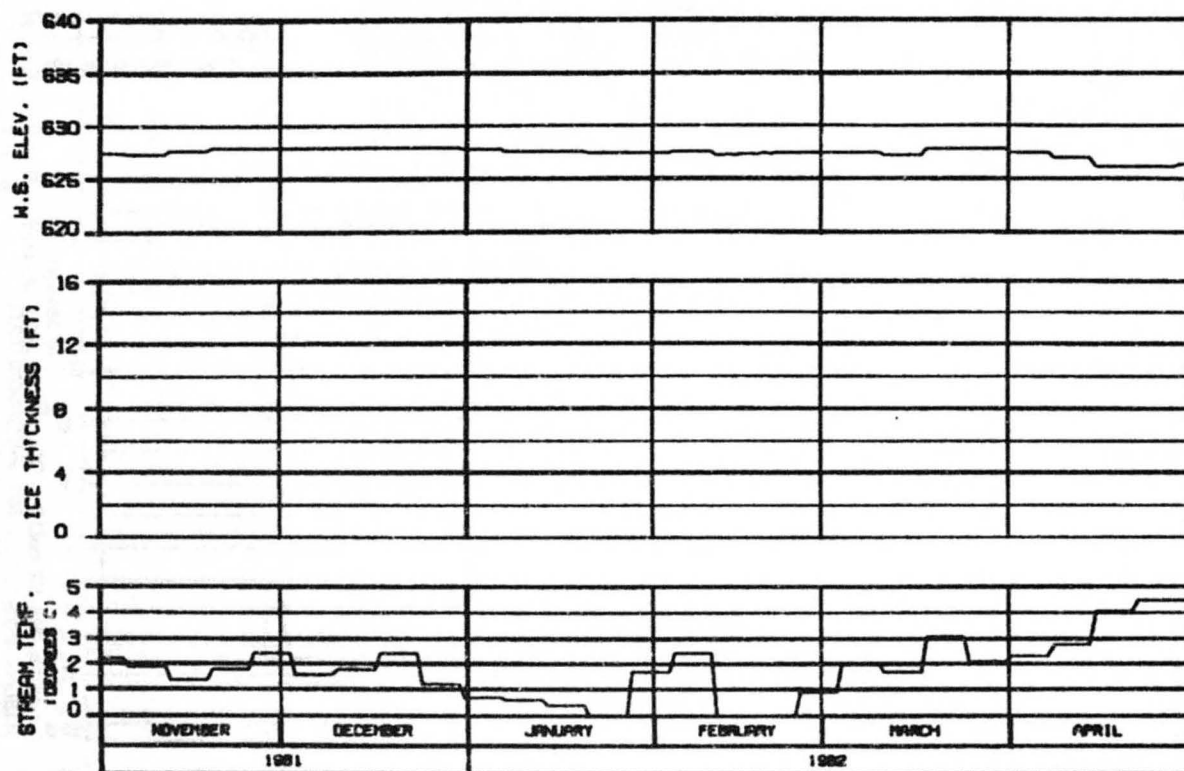
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

DESIGN: J. J. JENSEN FILE NO: 1000.142





SIDE CHANNEL U/S OF 4TH JULY CREEK  
RIVER MILE : 131.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST. EL 1800.  
REFERENCE RUN NO. : 8101CXA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

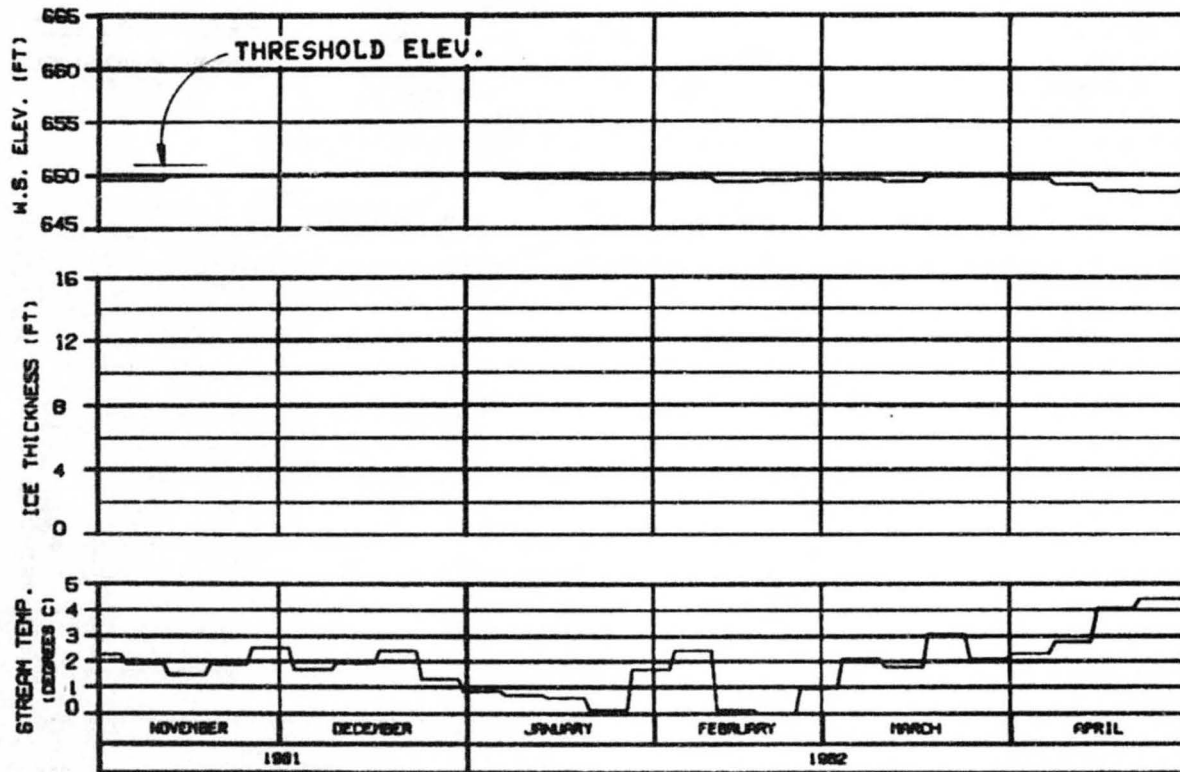
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: ALBINO

7 SEP 81

SSS-142



# HEAD OF SLOUGH 9A RIVER MILE : 133.70

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST. EL 1800.  
REFERENCE RUN NO. : 8101CA

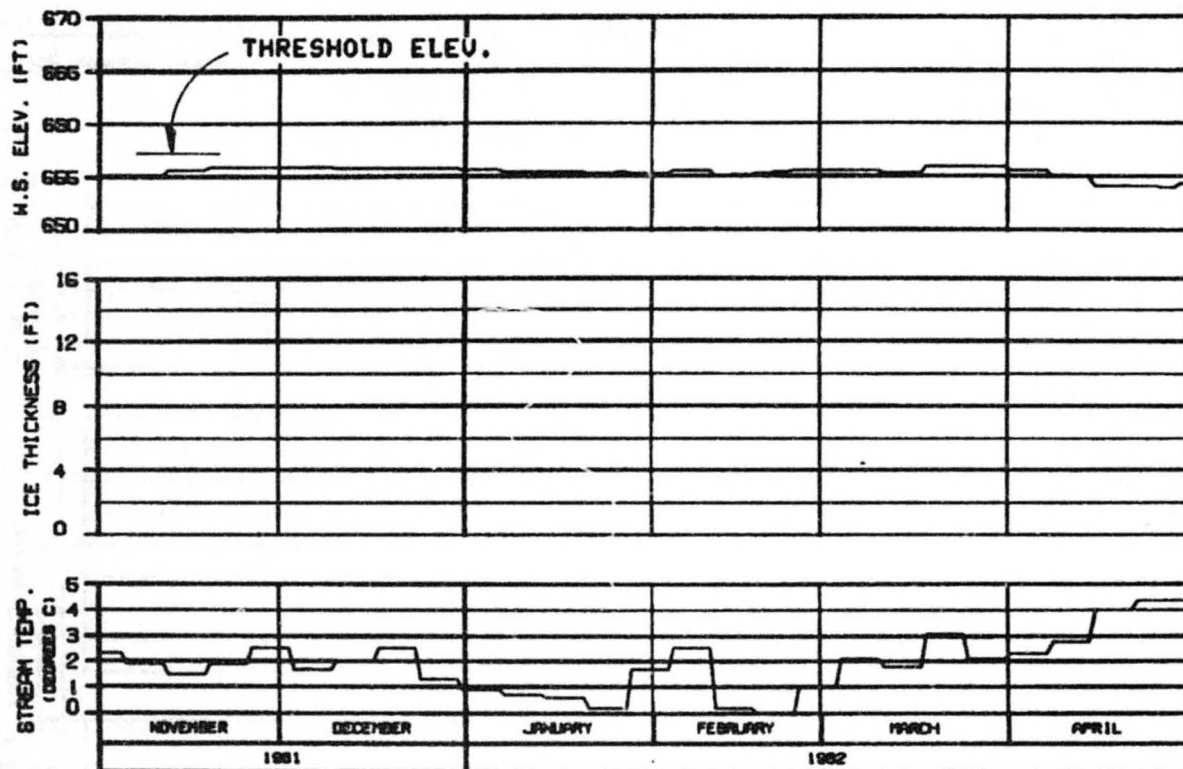
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARDA-EBAGCO JOINT VENTURE

DESIGN: ALP/PS 7 DEC 81 1000.142



SIDE CHANNEL U/S OF SLOUGH 10

RIVER MILE : 134.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST. EL 1800.  
 REFERENCE RUN NO. : 8101CXA

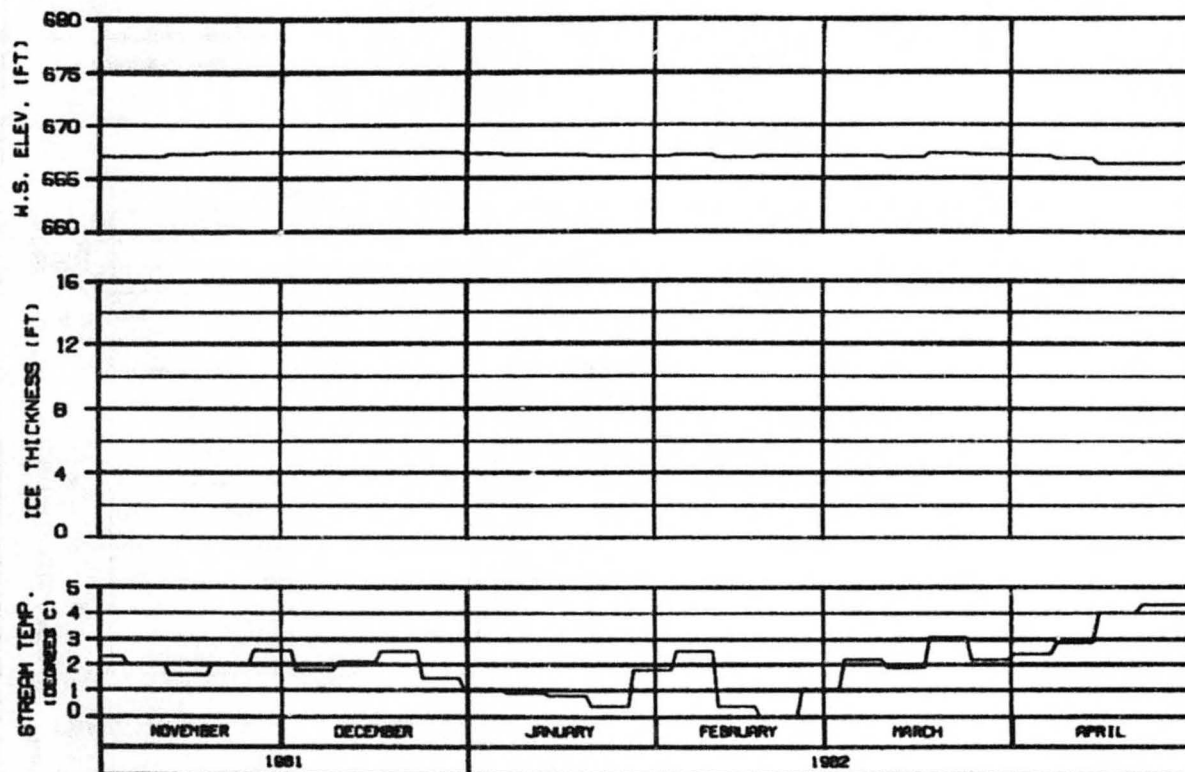
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EDBECO JOINT VENTURE

DESIGN: EAP/EDB 7 FEB 84 1985.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL D/S OF SLOUGH 11  
 RIVER MILE : 135.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST. EL 1800.  
 REFERENCE RUN NO. : 8101CXA

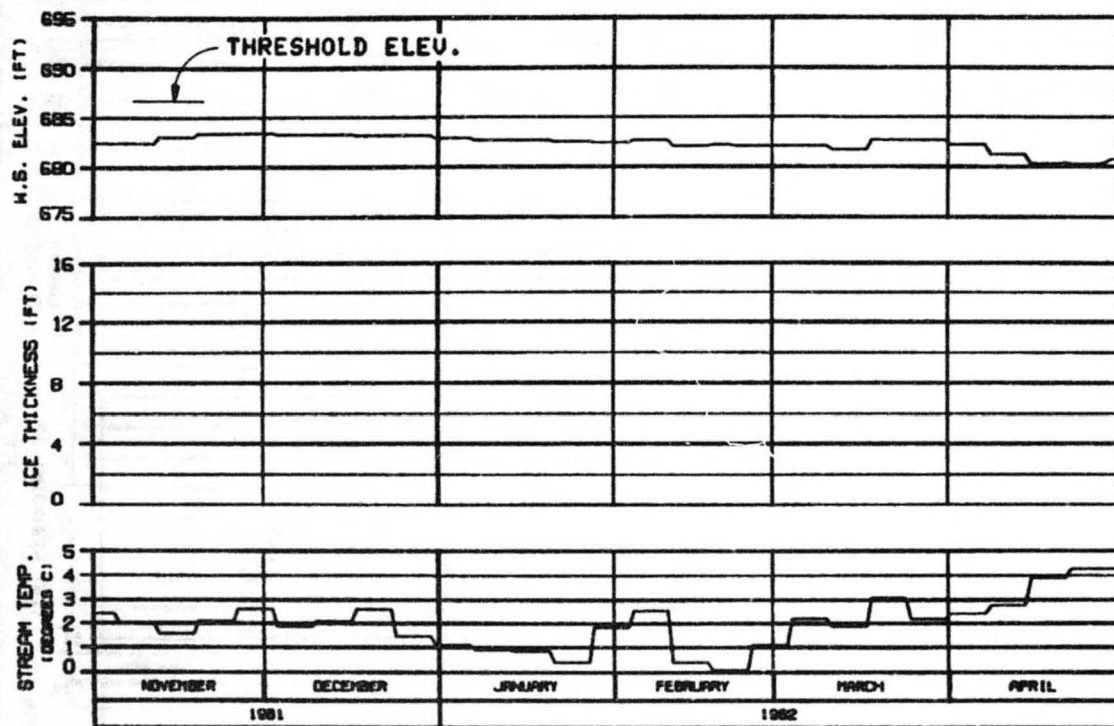
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBRACO JOINT VENTURE

DESIGNED BY: J. B. BROWN 7 000 04 1982. 142



ICE THICKNESS LEGEND:

———— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 11  
 RIVER MILE : 136.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST, EL 1800.  
 REFERENCE RUN NO. : 8101CXA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

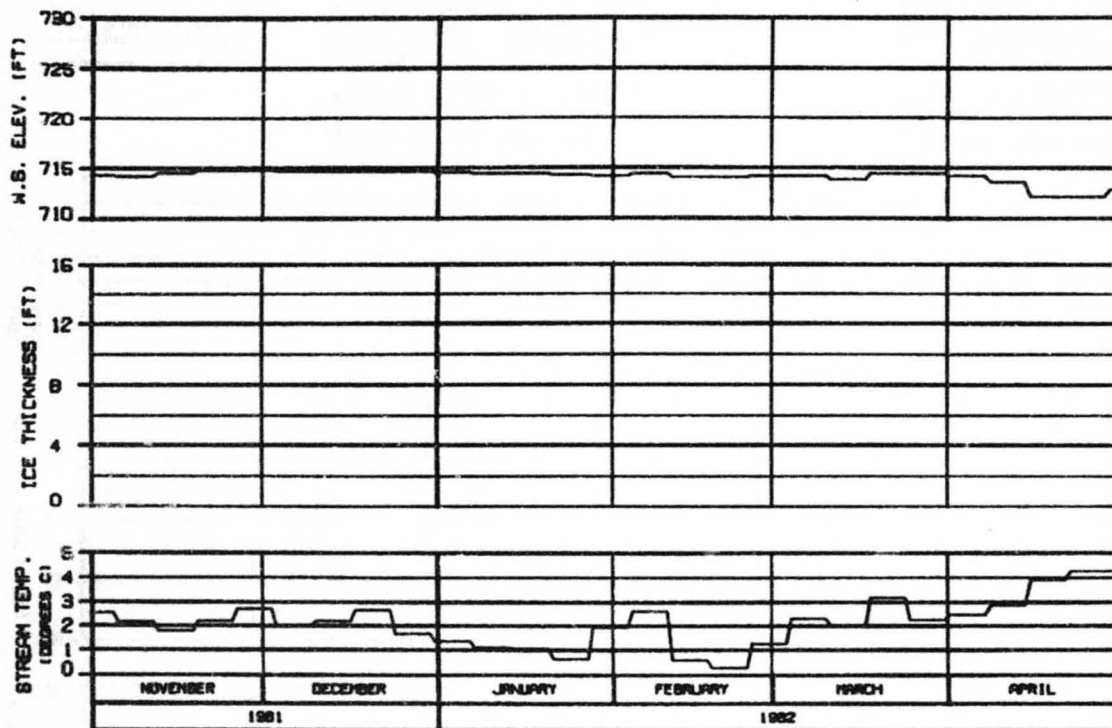
HAZRA-ENRSCO JOINT VENTURE

DESIGN: SLASH

7 FEB 82

ISS. 142





HEAD OF SLOUGH 17  
RIVER MILE : 139.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST, EL 1800.  
REFERENCE RUN NO. : 8101CKA

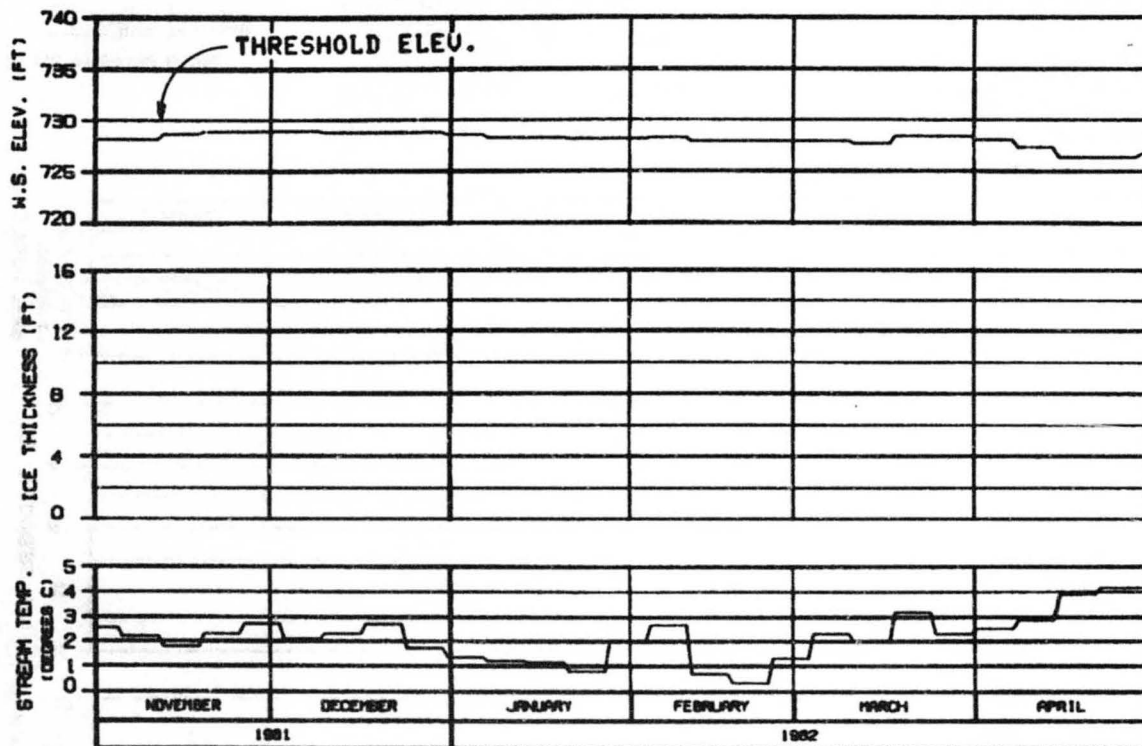
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBRACO JOINT VENTURE

DESIGN: S.A.P.S. 7 DEC 81 1982.142



HEAD OF SLOUGH 20  
RIVER MILE : 140.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST. EL 1800.  
REFERENCE RUN NO. : 8101CXA

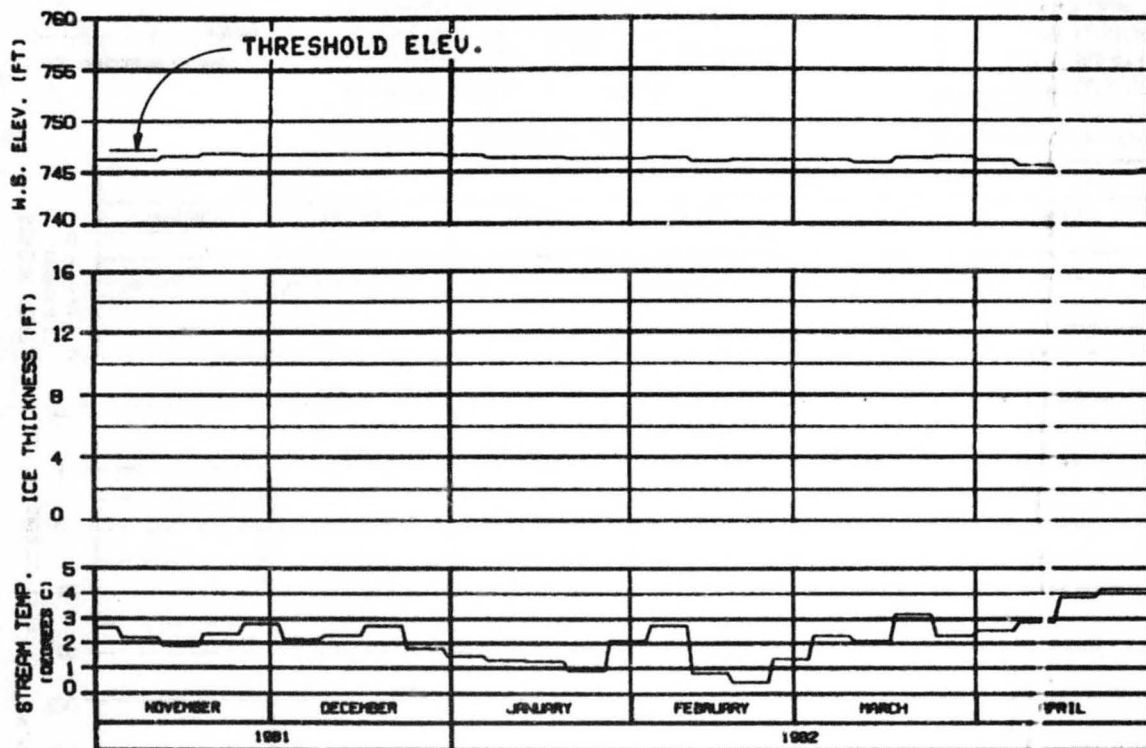
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED: ALASKA POWER AUTHORITY 7 DEC 81 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SLOUGH 21 (ENTRANCE A6)  
 RIVER MILE : 141.80

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : NATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST, EL 1800.  
 REFERENCE RUN NO. : 8101CXA

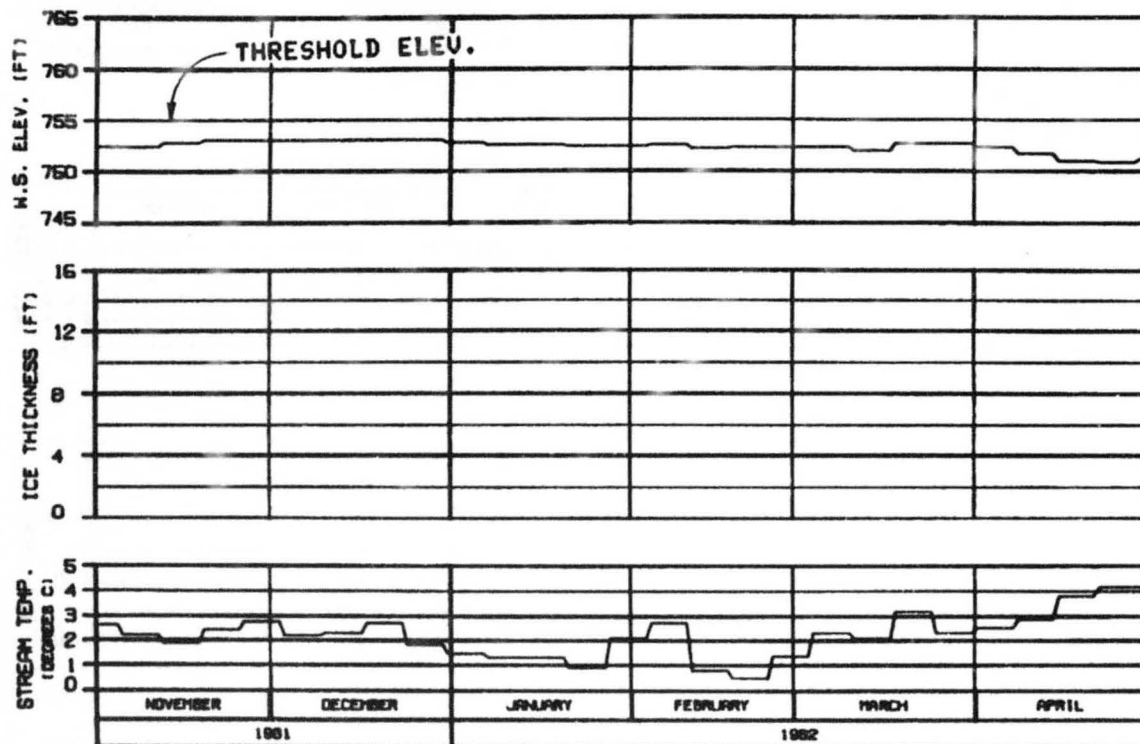
ALASKA POWER AUTHORITY

SLEUTH REC 827

SUKTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZDA-E/ASCO JOINT VENTURE

DESIGN: SLD-88 PAGE 04 1988-148



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 21  
 RIVER MILE : 142.20

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST, EL 1800.  
 REFERENCE RUN NO. : 8101CXA

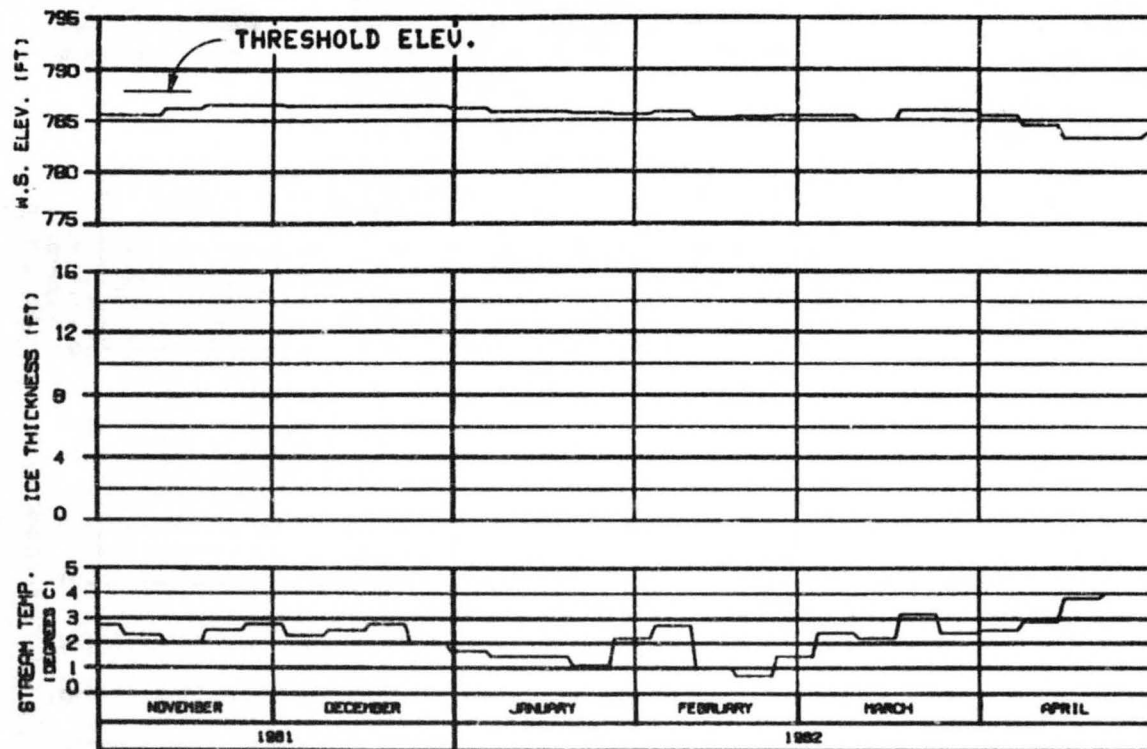
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBRACO JOINT VENTURE

GRAPHED, 04.08.82 7:00 PM 1982.142



HEAD OF SLOUGH 22  
RIVER MILE : 144.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST, EL 1800.  
REFERENCE RUN NO. : 8101CXA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

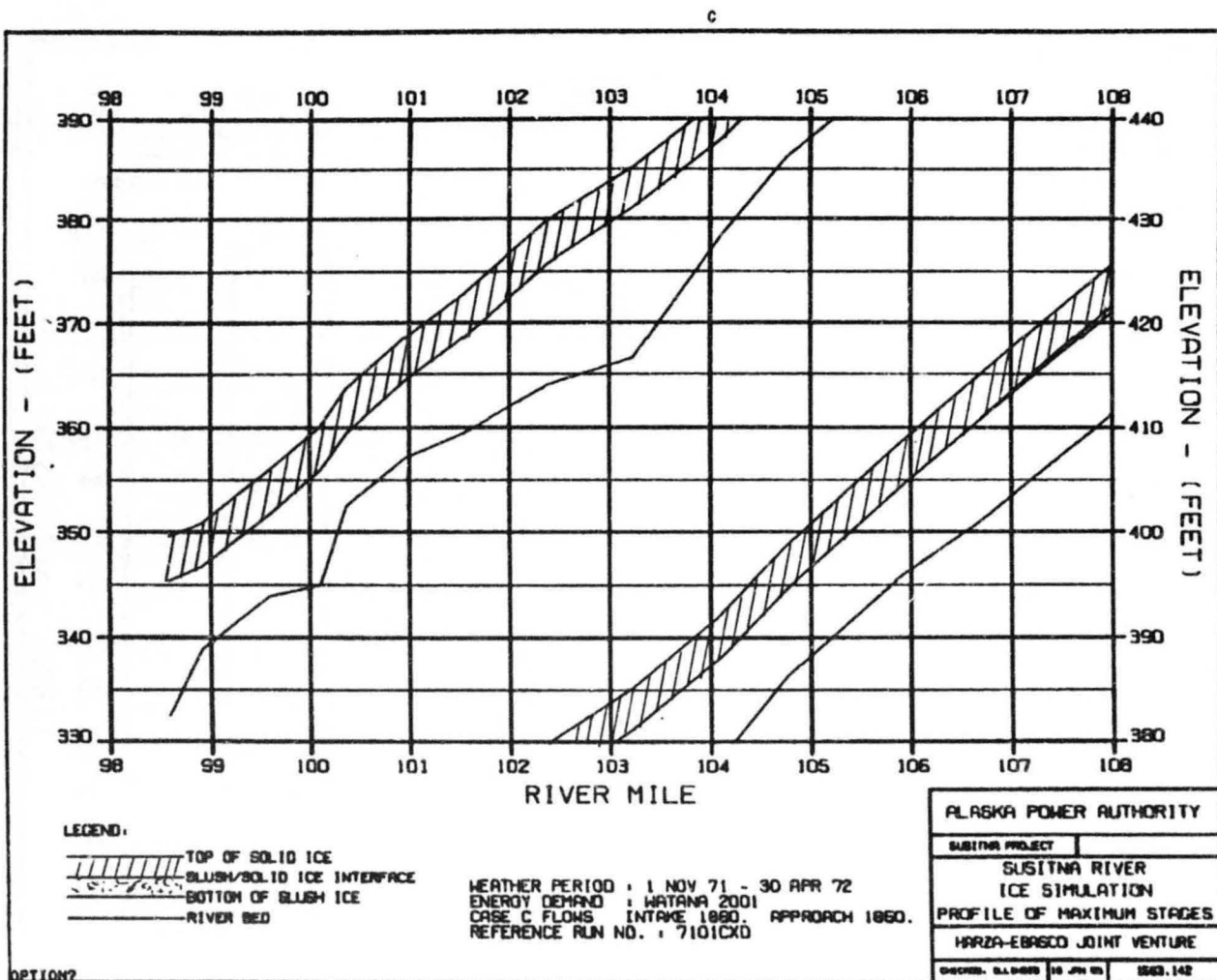
MPRZA-EDBSCO JOINT VENTURE

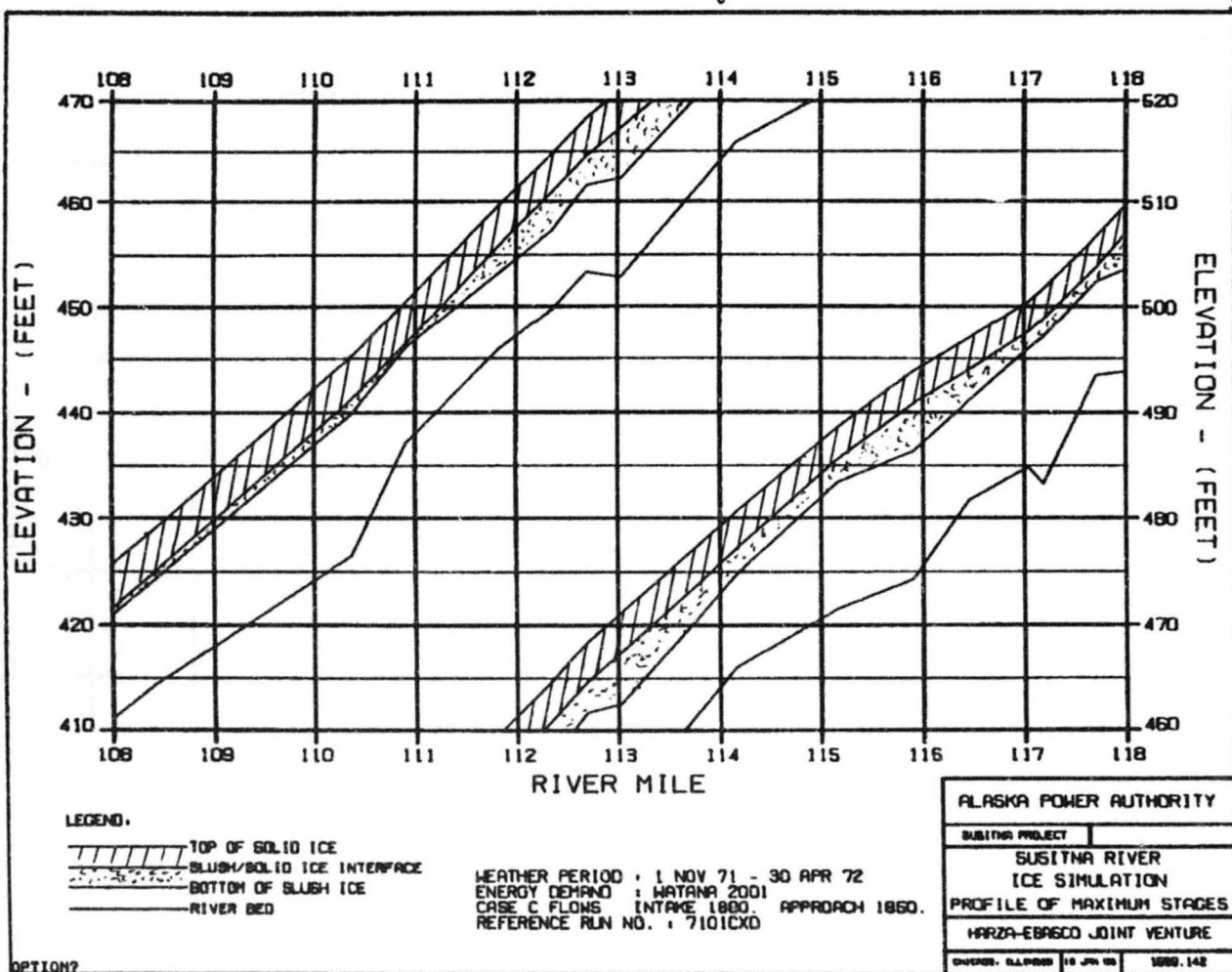
DESIGNED: SLP/MSD P 1002 04 1000.142

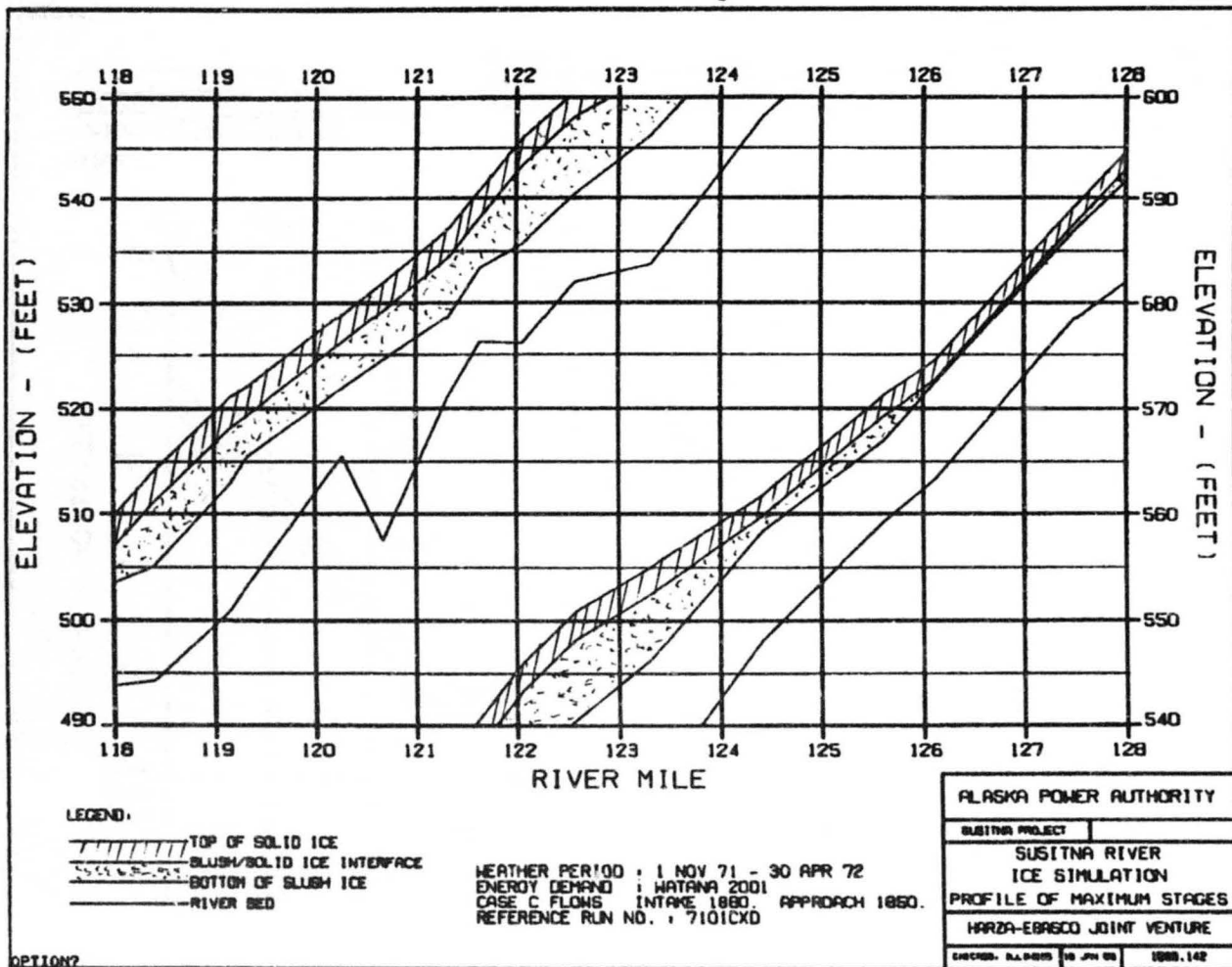
OPTION 7

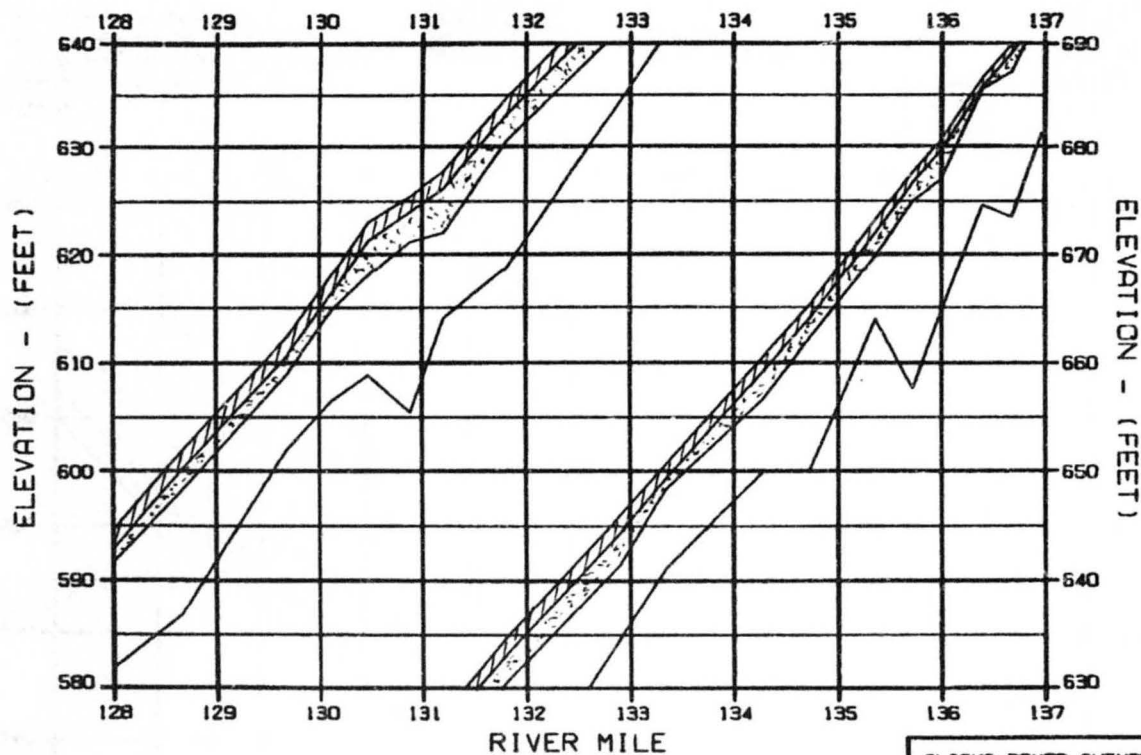


**EXHIBIT R**









LEGEND.

TOP OF SOLID ICE  
 SLUSH/SOLID ICE INTERFACE  
 BOTTOM OF SLUSH ICE  
 RIVER BED

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1860 APPROACH 1850.  
 REFERENCE RUN NO. : 7101CXD

ALASKA POWER AUTHORITY

SUSITNA PROJECT

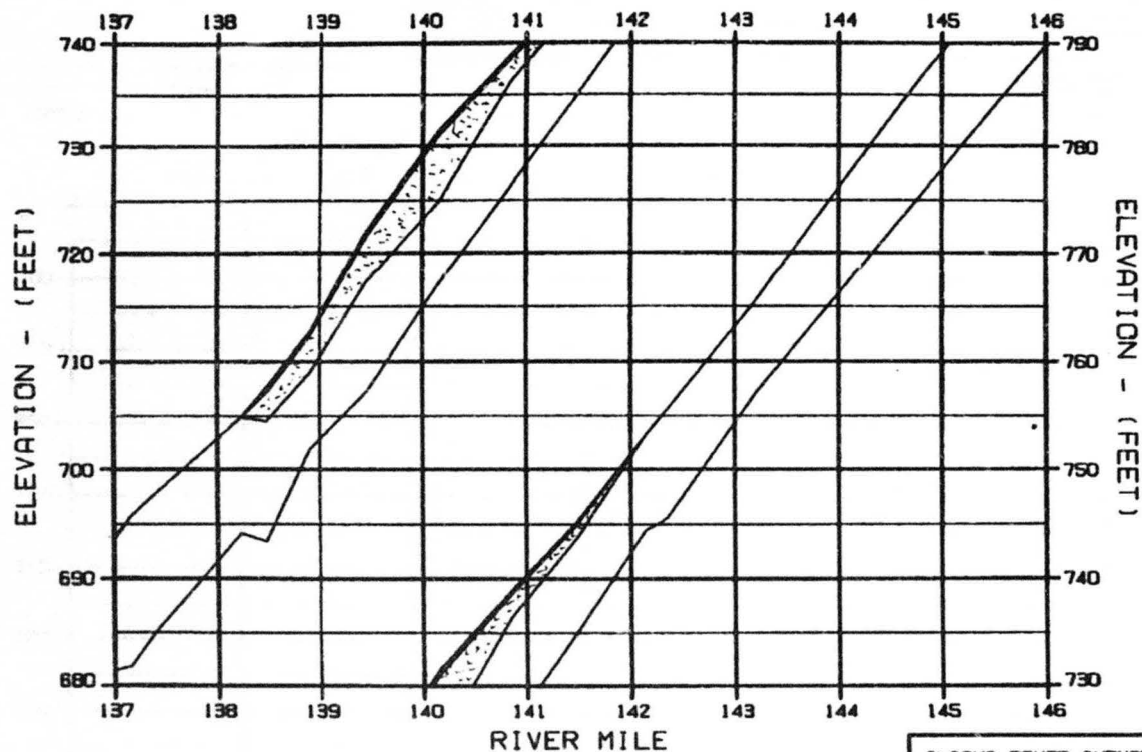
SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EGASCO JOINT VENTURE

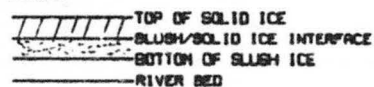
CHECKED: SLP-002 26 JAN 82 1022.142

OPTION 2





LEGEND:



WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1860.  
 REFERENCE RUN NO. : 7101CKD

ALASKA POWER AUTHORITY

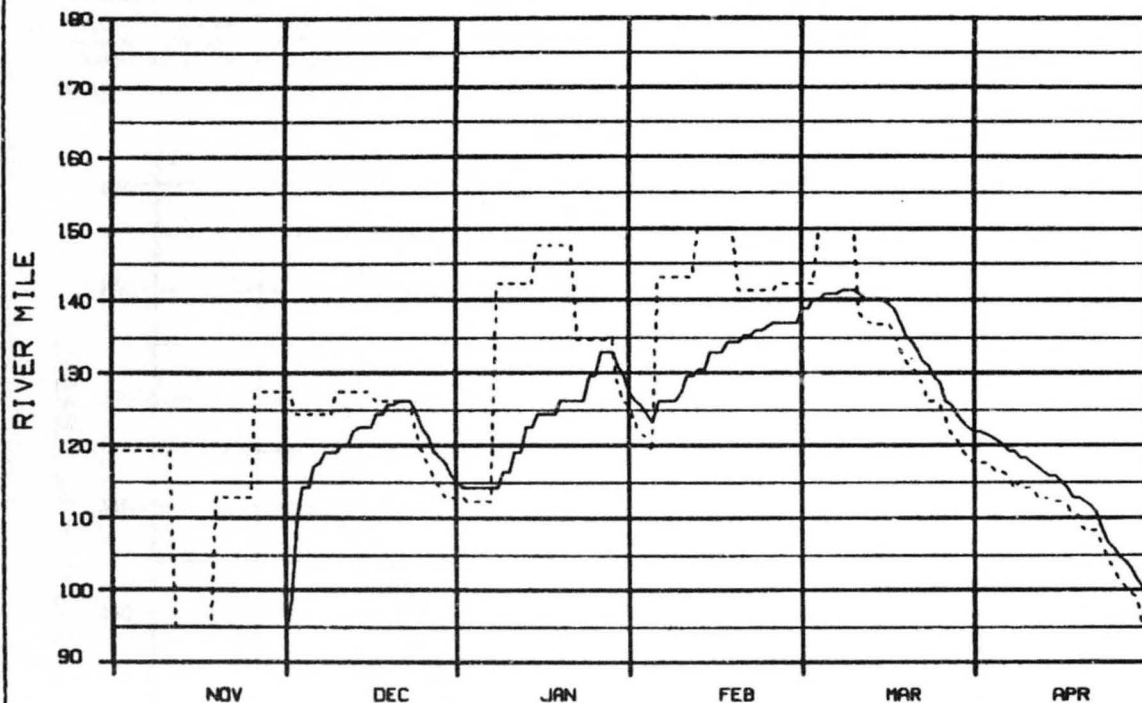
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HPA-EBACCO JOINT VENTURE

DESIGN: 11/01/71 10 JAN 72 1000.142

OPTION?



## LEGEND:

———— ICE FRONT  
 - - - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE C INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : 7101CXD

## ALASKA POWER AUTHORITY

SUSITNA PROJECT

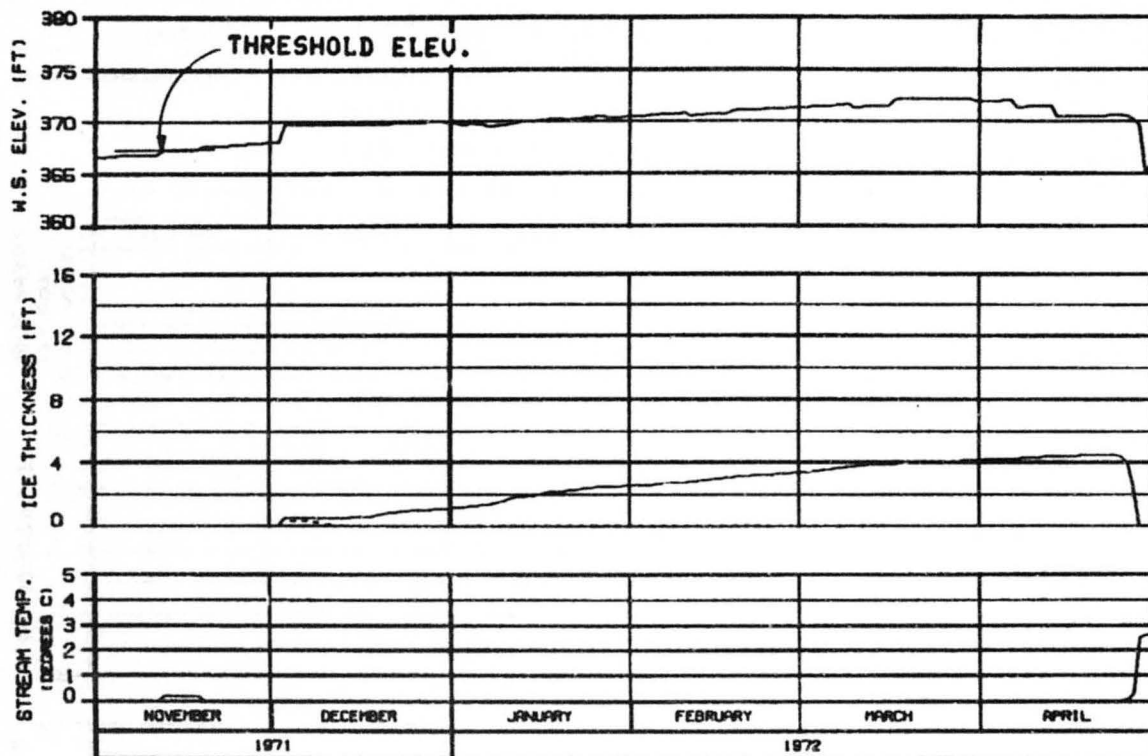
SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

MARZA-EBASCO JOINT VENTURE

CHARGE: D.L.P-815 16 JUN 85

0000.142

OPTION2



# HEAD OF WHISKERS SLOUGH RIVER MILE : 101.50

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : 7101CX0

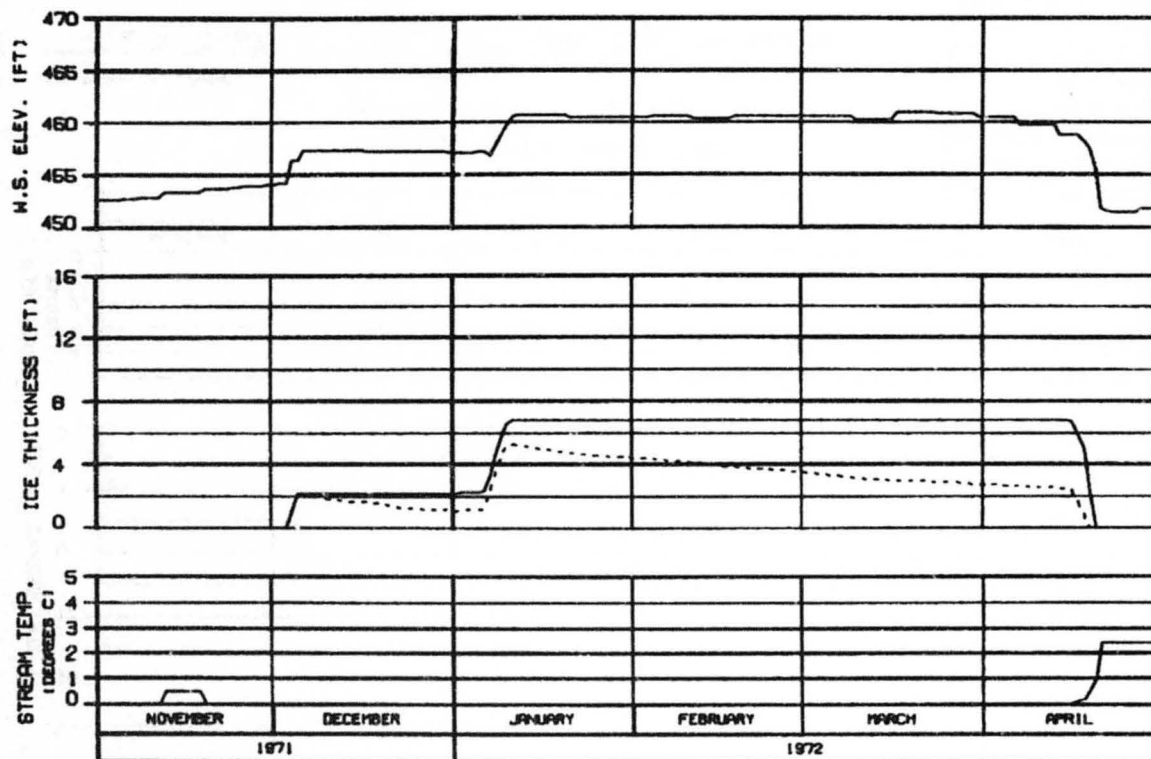
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRACD JOINT VENTURE

DESIGN: SLD-009 16 JAN 82 1000.142



**SIDE CHANNEL AT HEAD OF GASH CREEK**  
**RIVER MILE : 112.00**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : 7101CXD

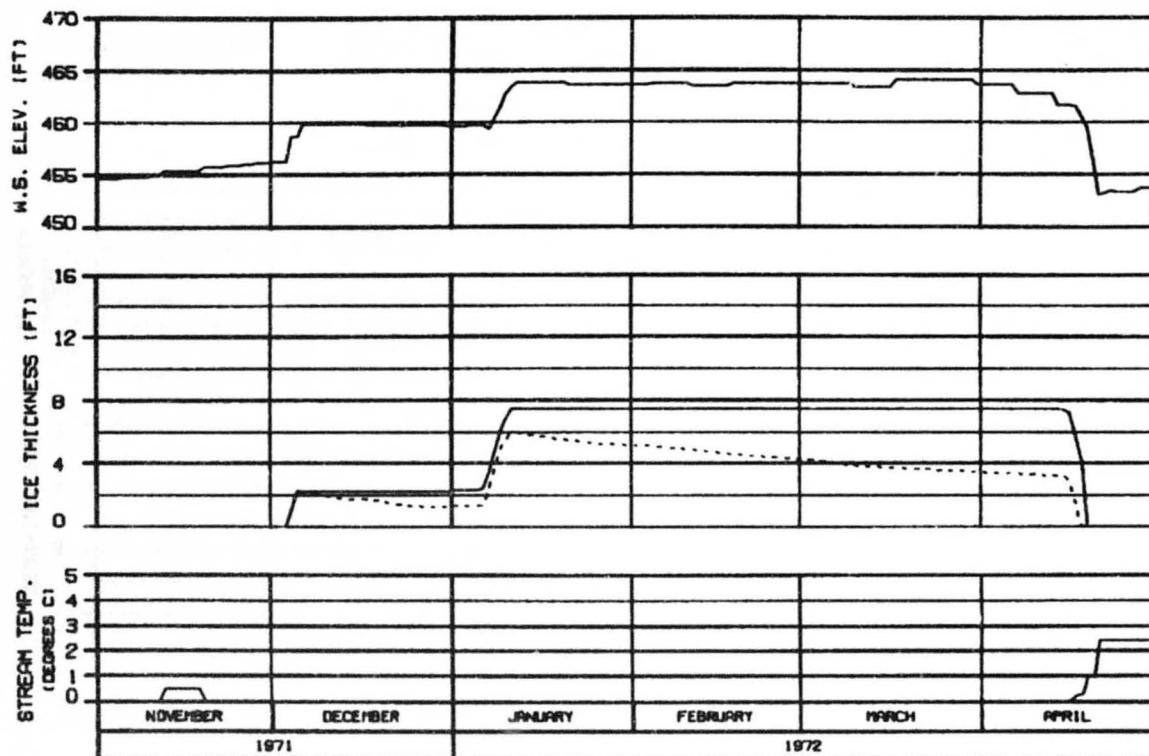
**ALASKA POWER AUTHORITY**

**SUSITNA PROJECT**

**SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY**

**WARZA-EBRACO JOINT VENTURE**

CHGSR. 01-0-070 18 JUN 82 1880.142



MOUTH OF SLOUGH 6A

RIVER MILE : 112.34

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : 7101CX0

ALASKA POWER AUTHORITY

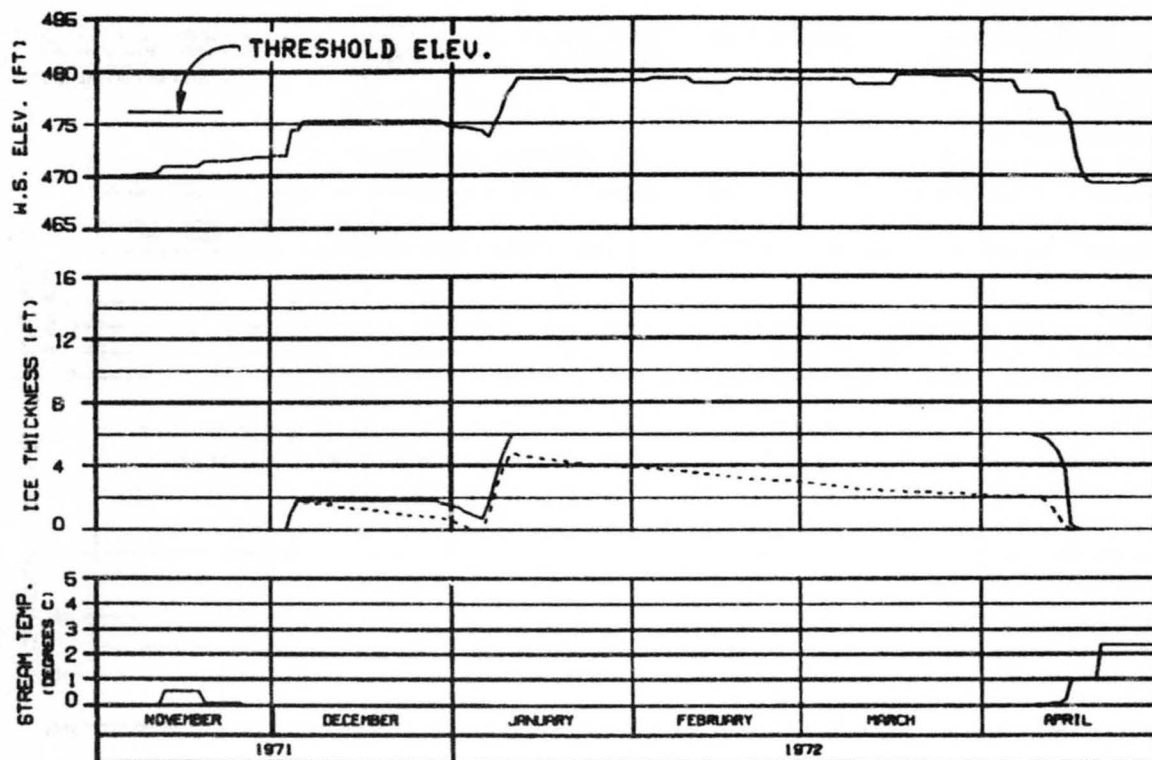
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DIVISION: SLEWING 10 APR 82 1000.142





HEAD OF SLOUGH 8  
RIVER MILE : 114.10

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1880. APPROACH 1850.  
REFERENCE RUN NO. : 7101CX0

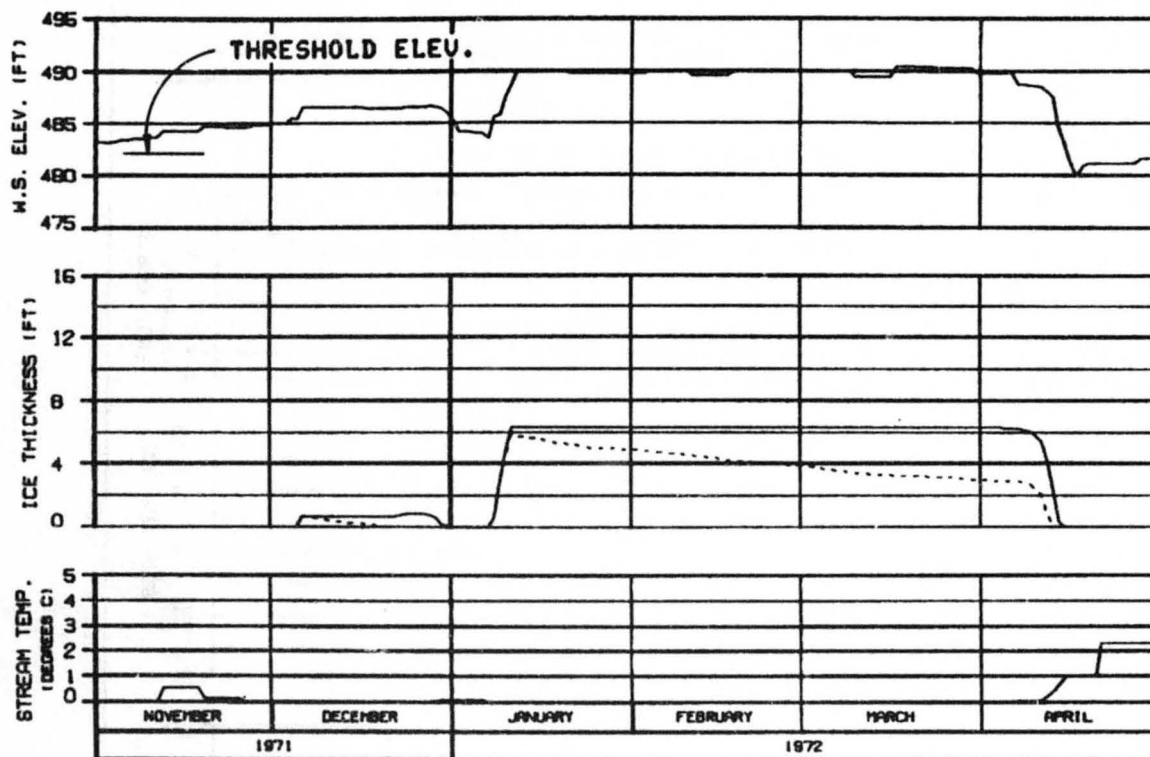
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DISC NO. 114.1000 10 JUN 72 1000.142



SIDE CHANNEL MSII

RIVER MILE : 115.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - BLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : 7101CX0

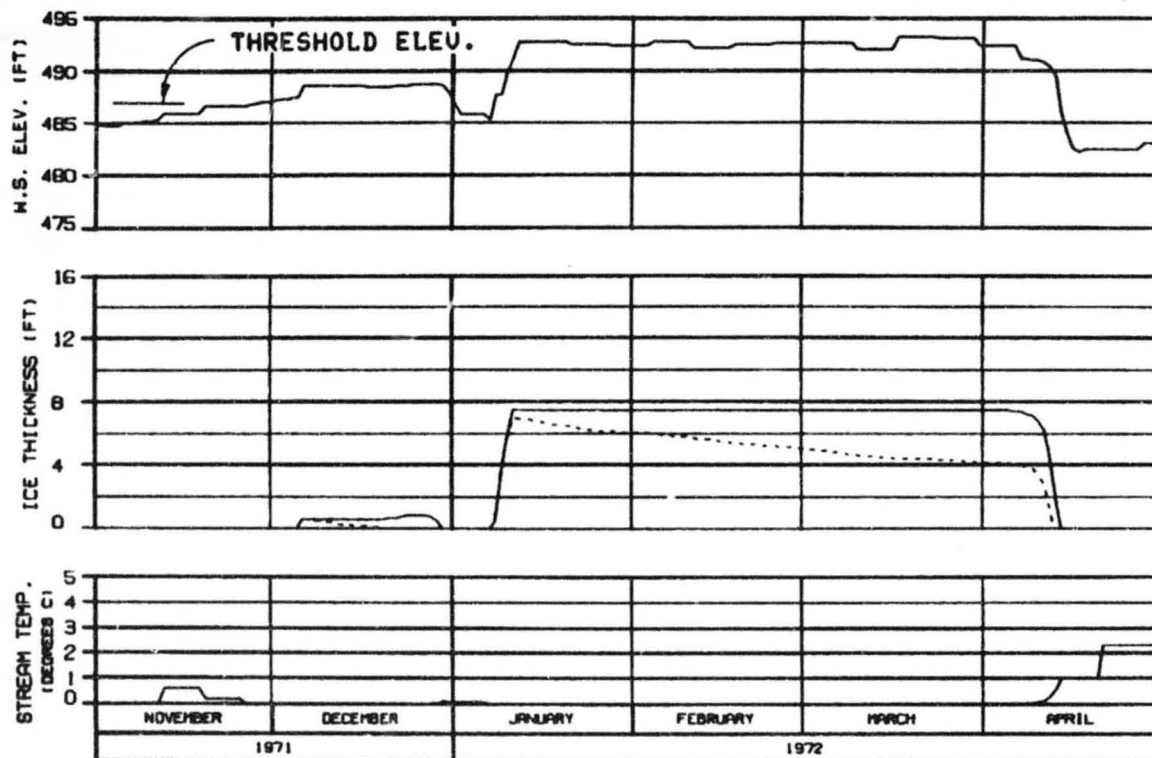
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHARGE: BLUSH 10 JAN 72 1982.14



# HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

## ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - BLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : 7101CXD

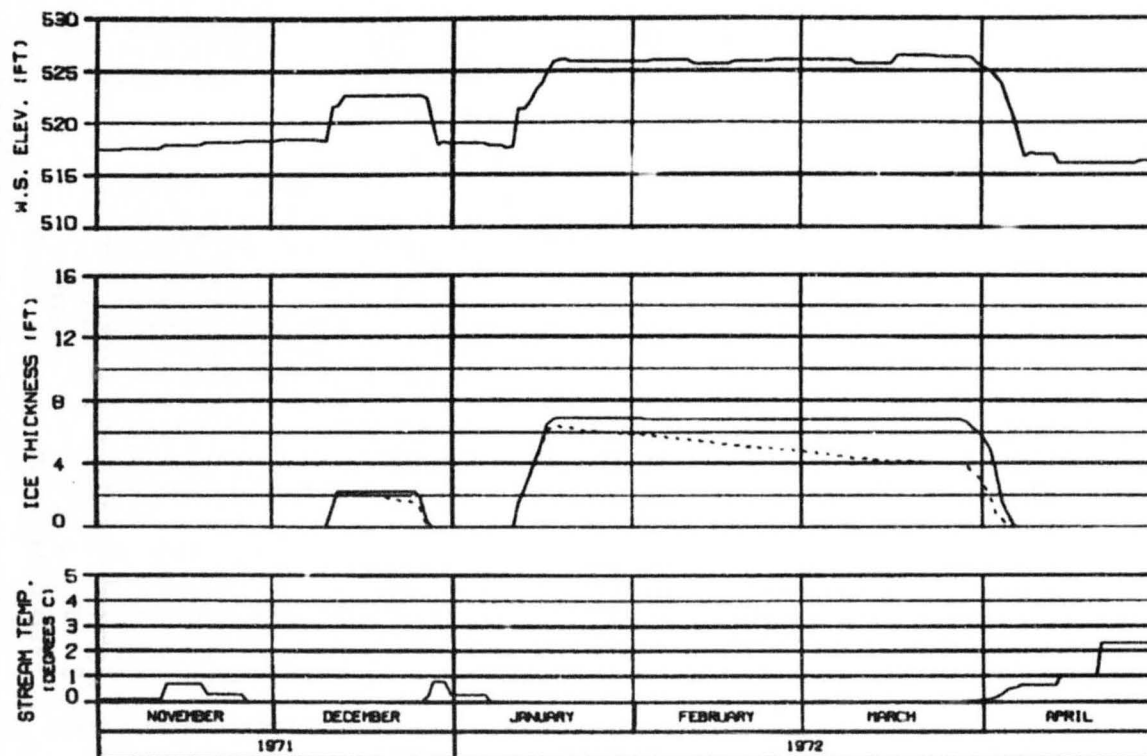
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBRISCO JOINT VENTURE

DIGESTED BY: 10 JAN 72 1880.142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : NATANA 2001  
 CASE C FLOWS INTAKE 1850. APPROACH 1850.  
 REFERENCE RUN NO. : 7101CXD

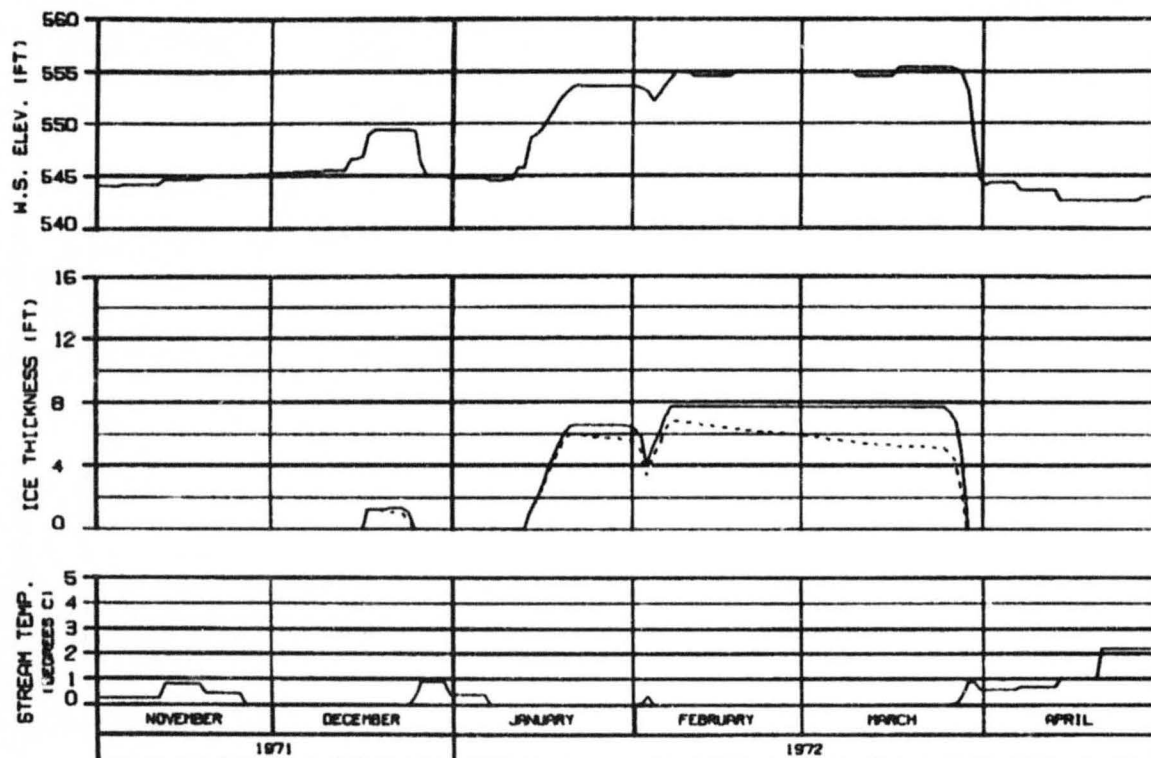
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHICAGO, ILLINOIS 18 JUN 82 1508.14Z



# HEAD OF MOOSE SLOUGH

RIVER MILE : 123.50

## ICE THICKNESS LEGEND:

———— TOTAL THICKNESS  
 - - - - - BLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880, APPROACH 1850.  
 REFERENCE RUN NO. : 7101CXD

## ALASKA POWER AUTHORITY

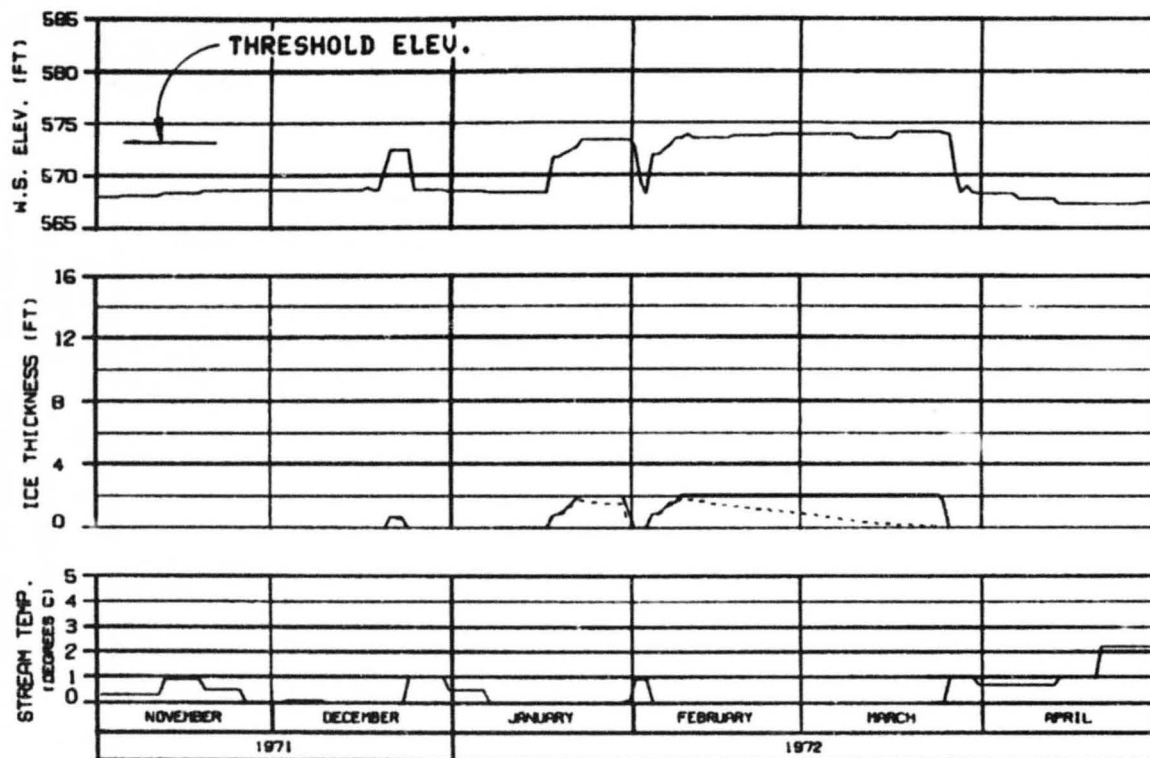
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBERD JOINT VENTURE

DWGNO. 1114019 10 JAN 83 1000.142





HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

ICE THICKNESS LEGEND.

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1850, APPROACH 1850.  
 REFERENCE RUN NO. : 7101CXD

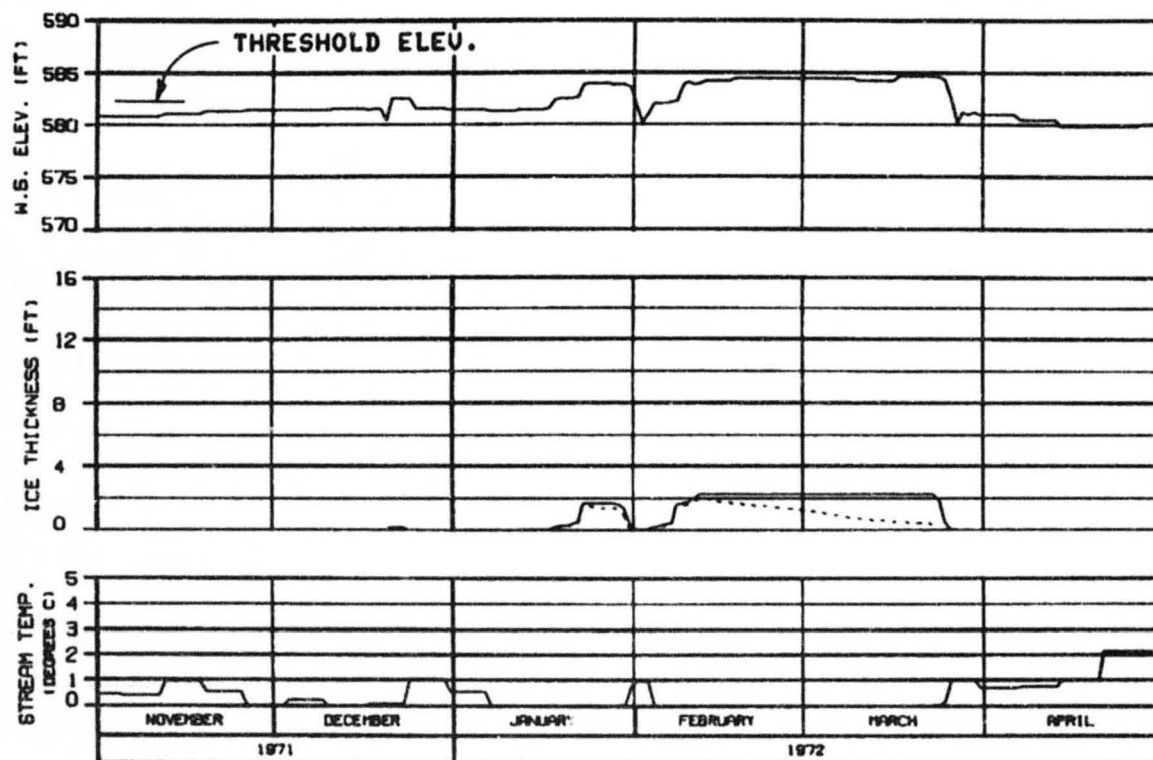
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBASCO JOINT VENTURE

DUCKER, SULLIVAN 18 APR 72 1555.142



HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : 7101CX0

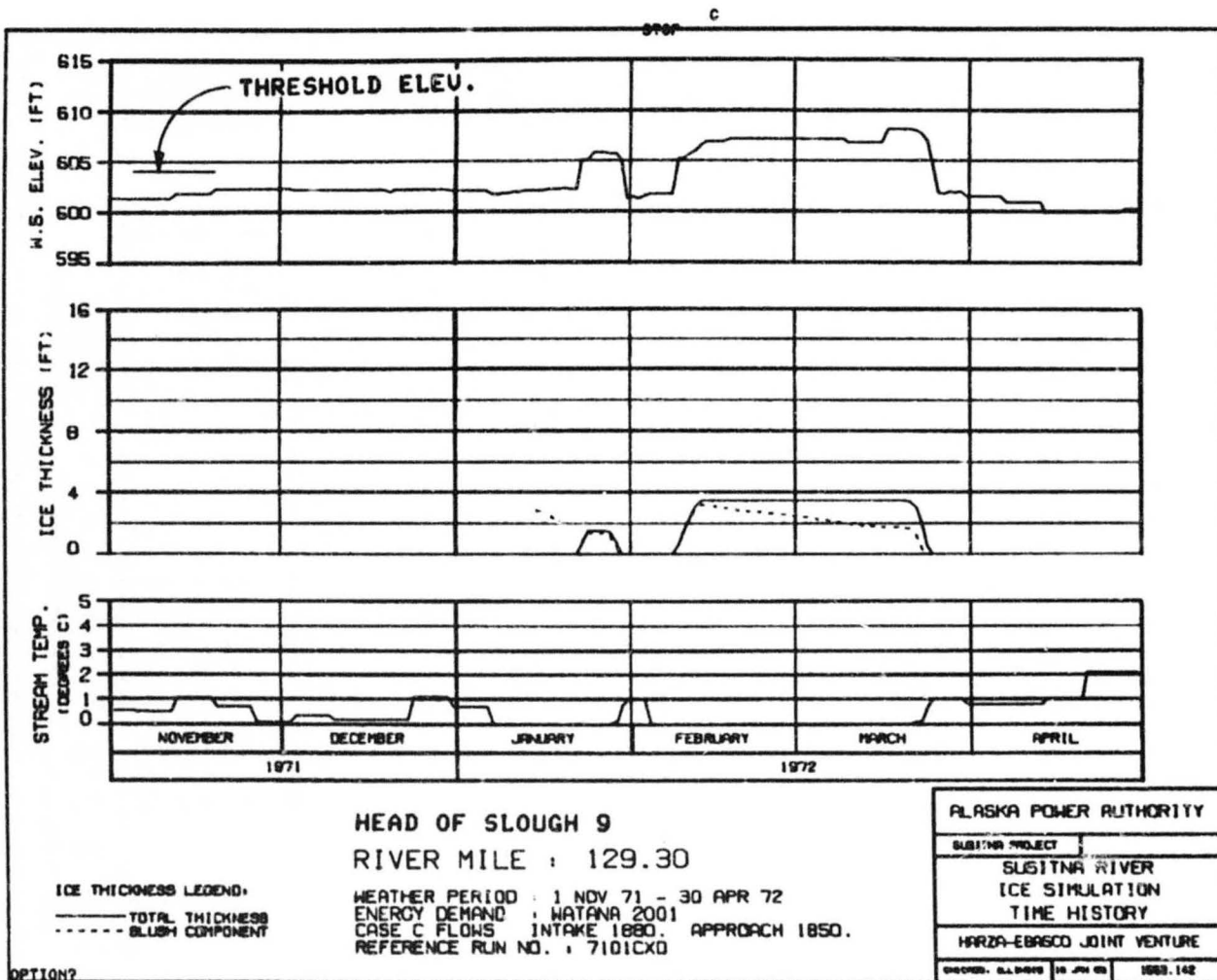
ALASKA POWER AUTHORITY

SUSITNA PROJECT

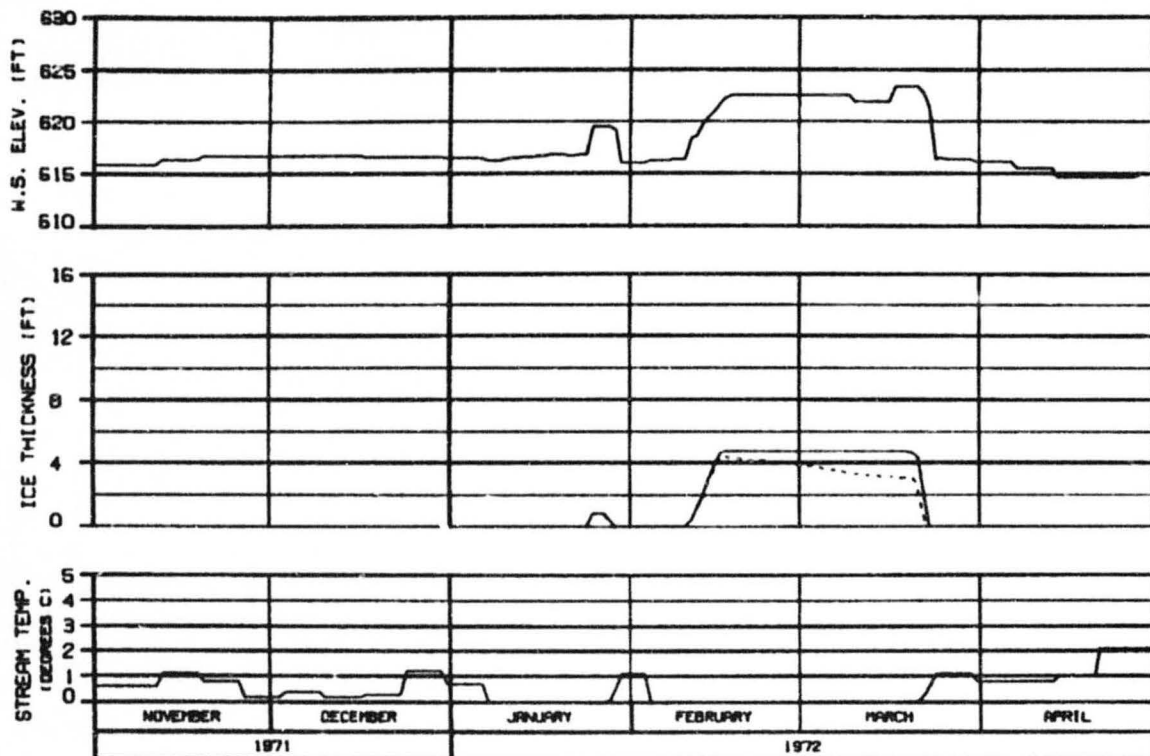
SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: S.A. DAVIS 18 JUN 72 1888.142



OPTION?



**SIDE CHANNEL U/S OF SLOUGH 9**  
**RIVER MILE : 130.60**

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1860. APPROACH 1850.  
 REFERENCE RUN NO. : 7101CX0

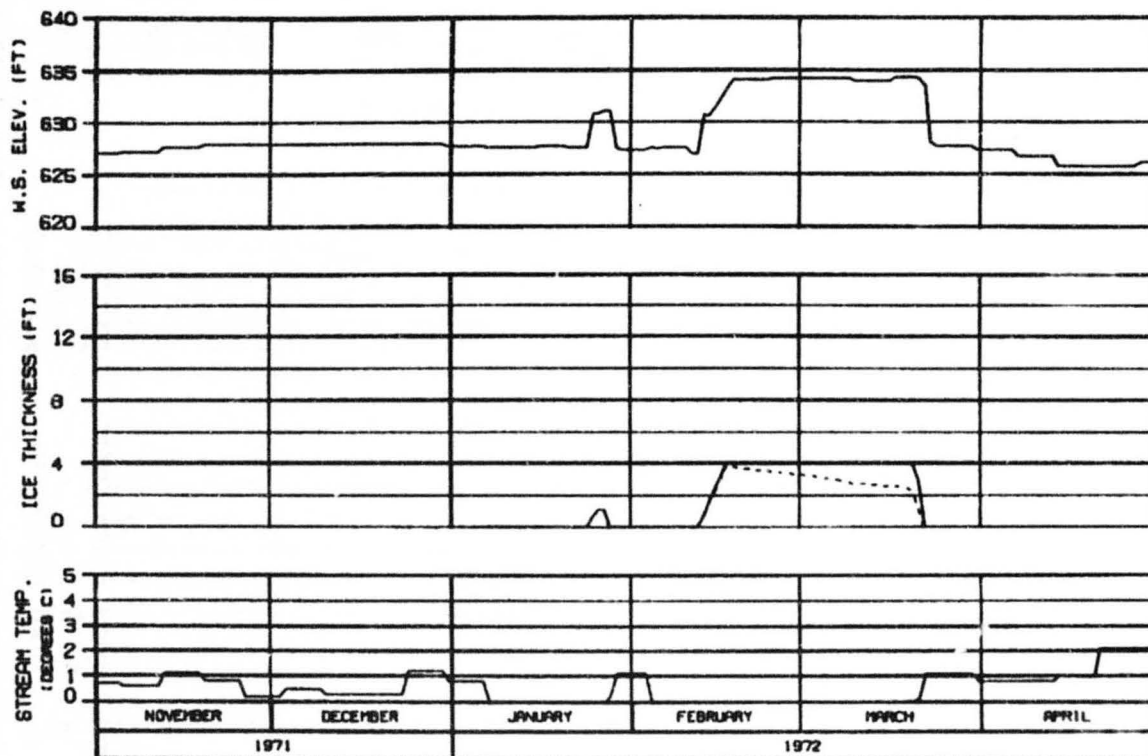
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHICAGO - ILLINOIS 10 JUN 72 1992.142



SIDE CHANNEL U/S OF 4TH JULY CREEK  
RIVER MILE : 131.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1880. APPROACH 1850.  
REFERENCE RUN NO. : 7101CXD

ALASKA POWER AUTHORITY

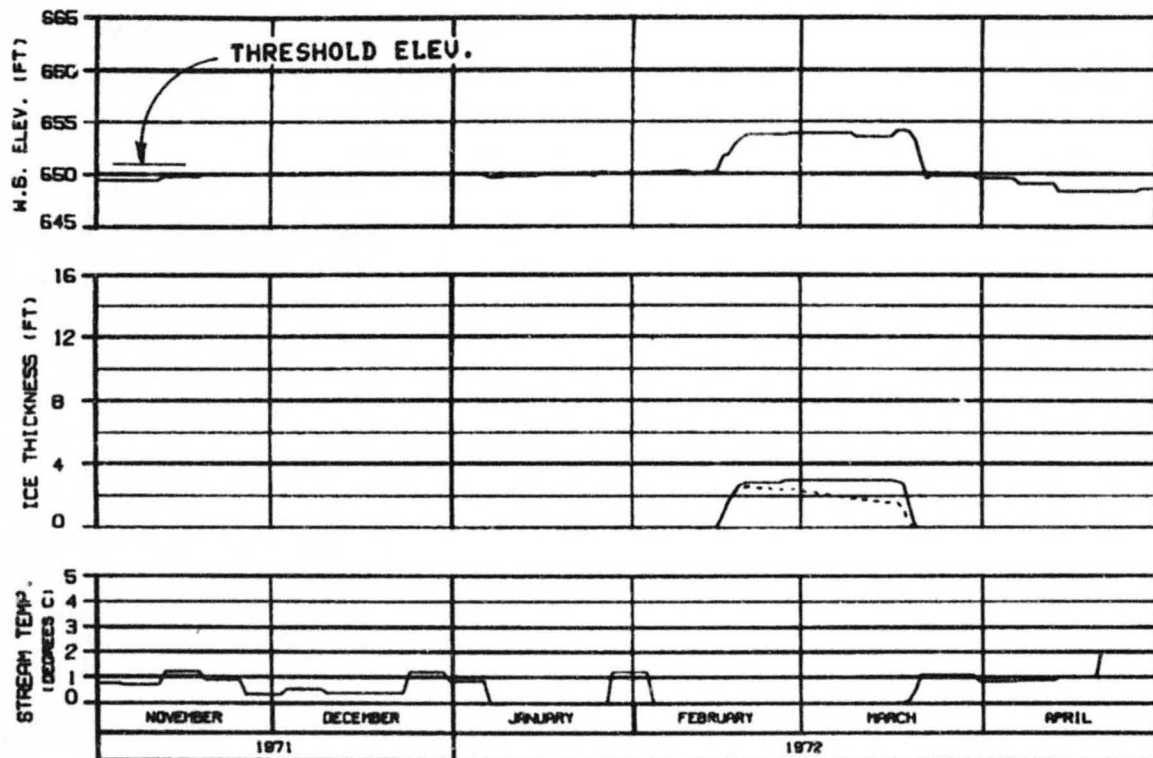
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHUCKER - ALL PAGES 16 JUN 85 1985.142





# HEAD OF SLOUGH 9A RIVER MILE : 133.70

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLOUGH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1880. APPROACH 1850.  
REFERENCE RUN NO. : 7101CX0

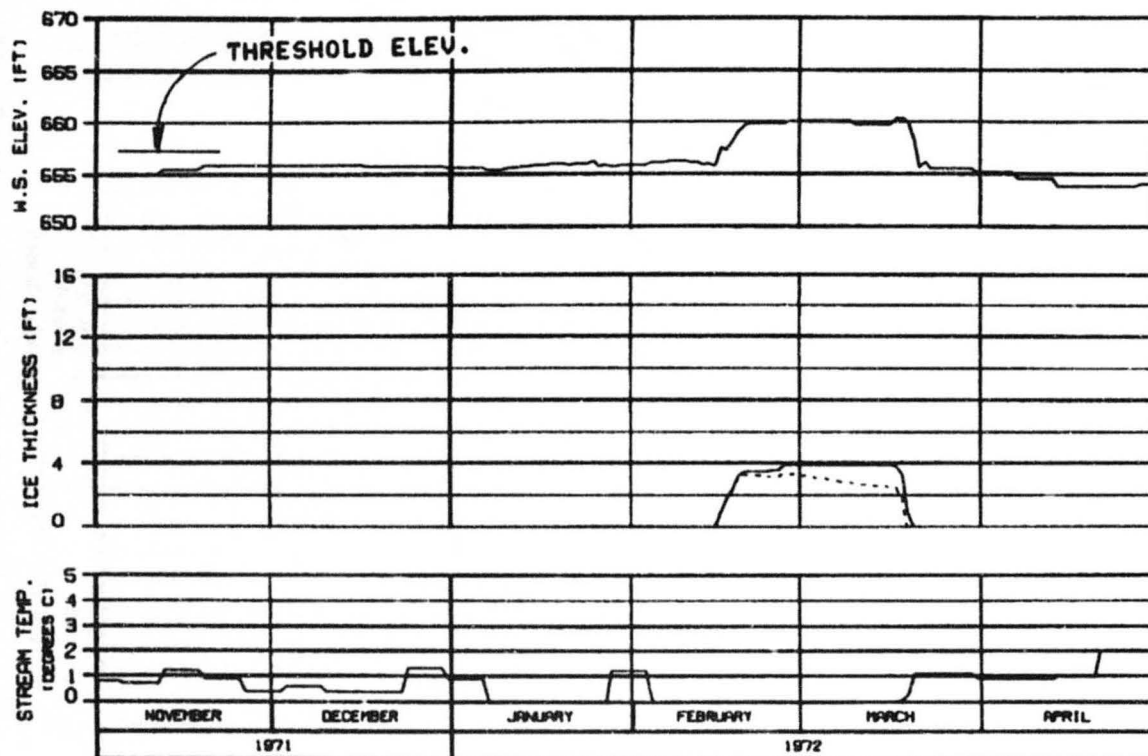
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBAGCO JOINT VENTURE

CHECKED: ALB 0808 18 APR 72 1000.142



SIDE CHANNEL U/S OF SLOUGH 10

RIVER MILE : 134.30

ICE THICKNESS LEGEND:

———— TOTAL THICKNESS  
 - - - - - BLUISH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : 7101CXD

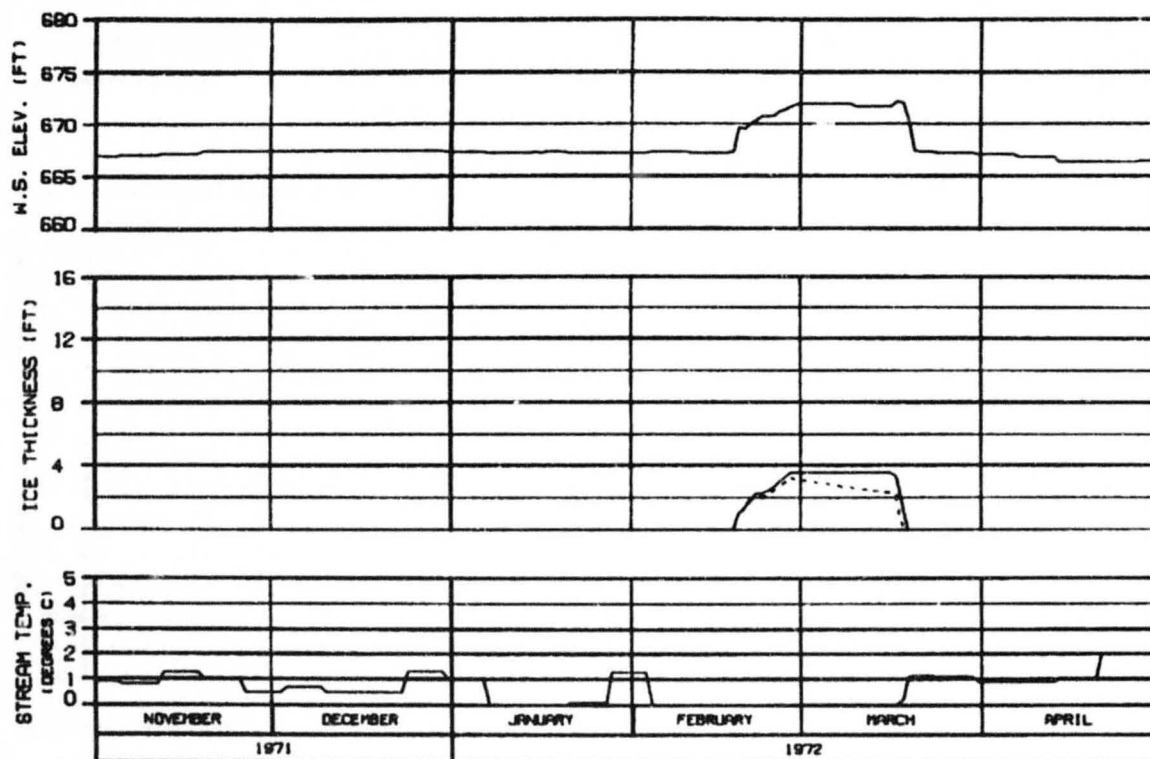
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: BLDG 10 JAN 72 1000.142



SIDE CHANNEL D/S OF SLOUGH 11  
RIVER MILE : 135.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1880. APPROACH 1850.  
REFERENCE RUN NO. : 7101CX0

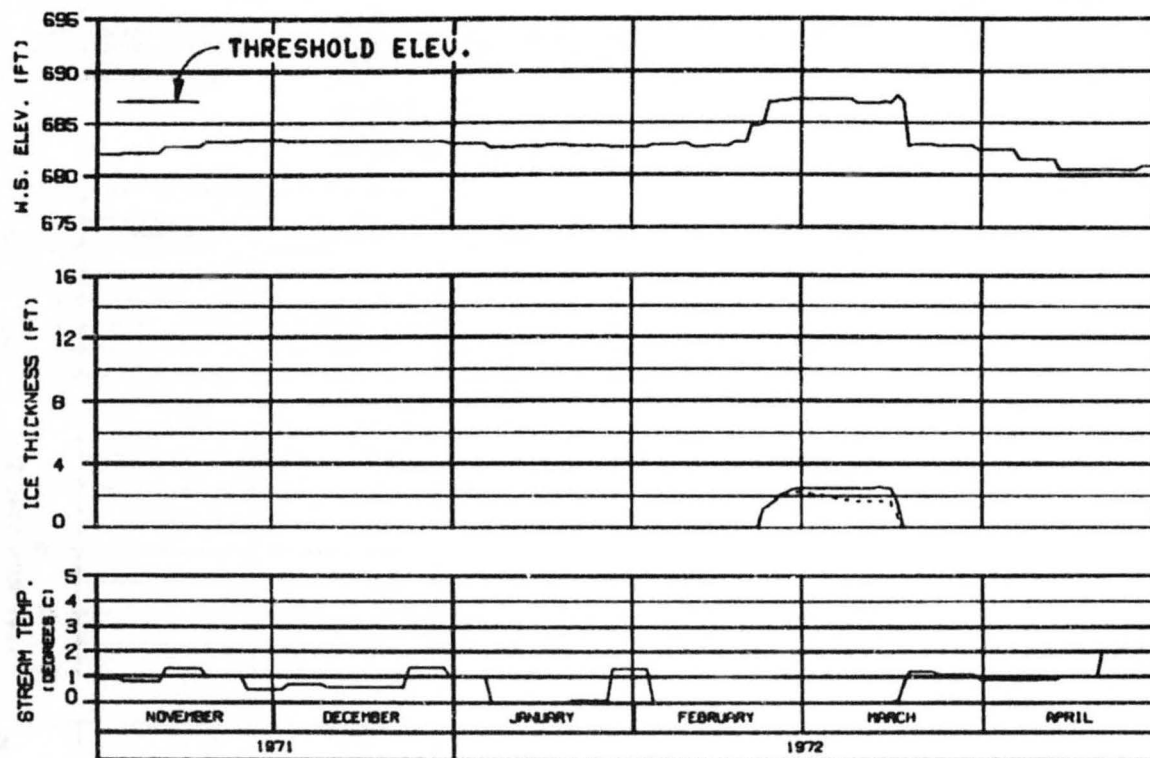
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBASCO JOINT VENTURE

CHICAGO, ILLINOIS 18 JAN 85 1000.142



HEAD OF SLOUGH 11

RIVER MILE : 136.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880, APPROACH 1850.  
 REFERENCE RUN NO. : 7101CX0

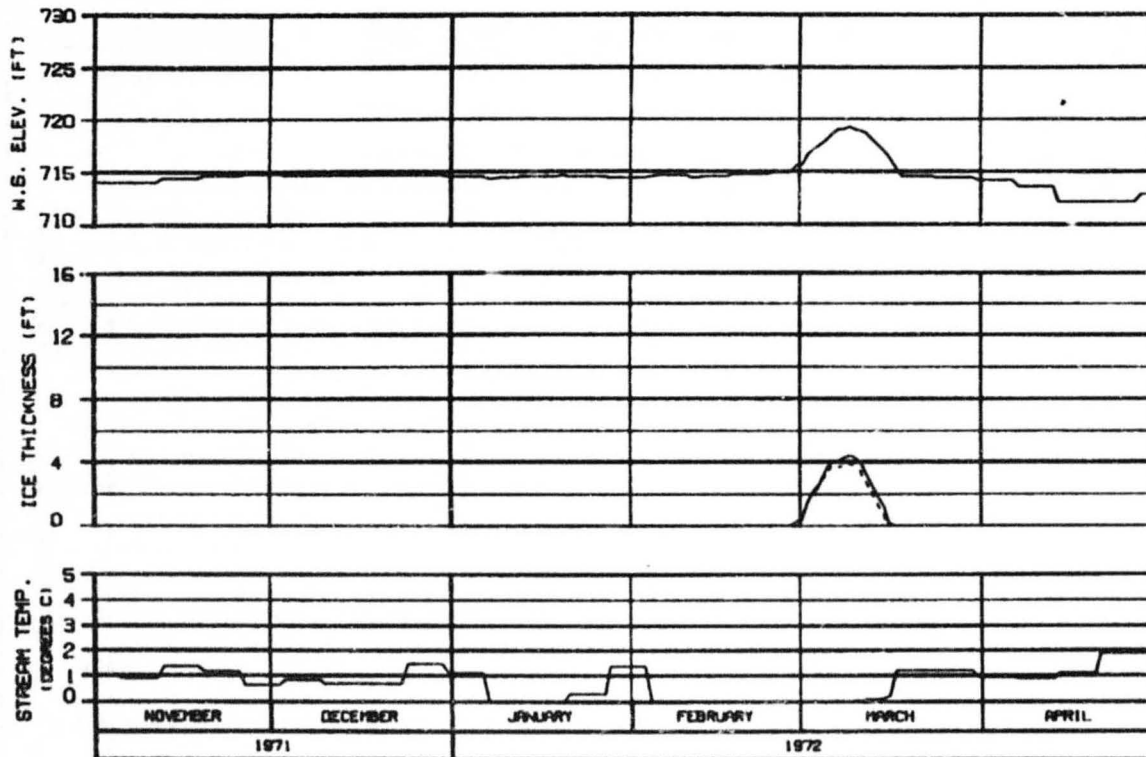
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHORD - 5/14/72 18 JUN 72 1588.142



HEAD OF SLOUGH 17  
RIVER MILE : 139.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1880. APPROACH 1850.  
REFERENCE RUN NO. : 7101CX0

ALASKA POWER AUTHORITY

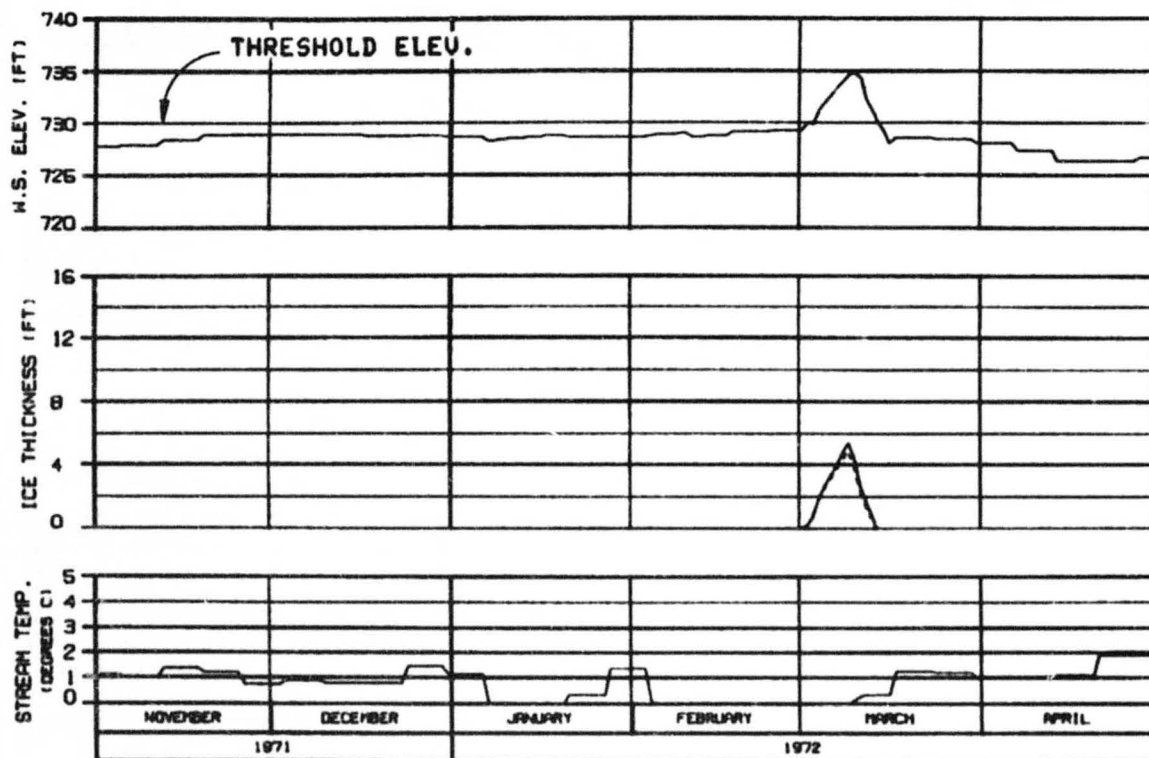
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBRECO JOINT VENTURE

CHUCKER, S.A. 8-8-75 10 APR 76 1000.142





HEAD OF SLOUGH 20  
RIVER MILE : 140.50

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : 7101CX0

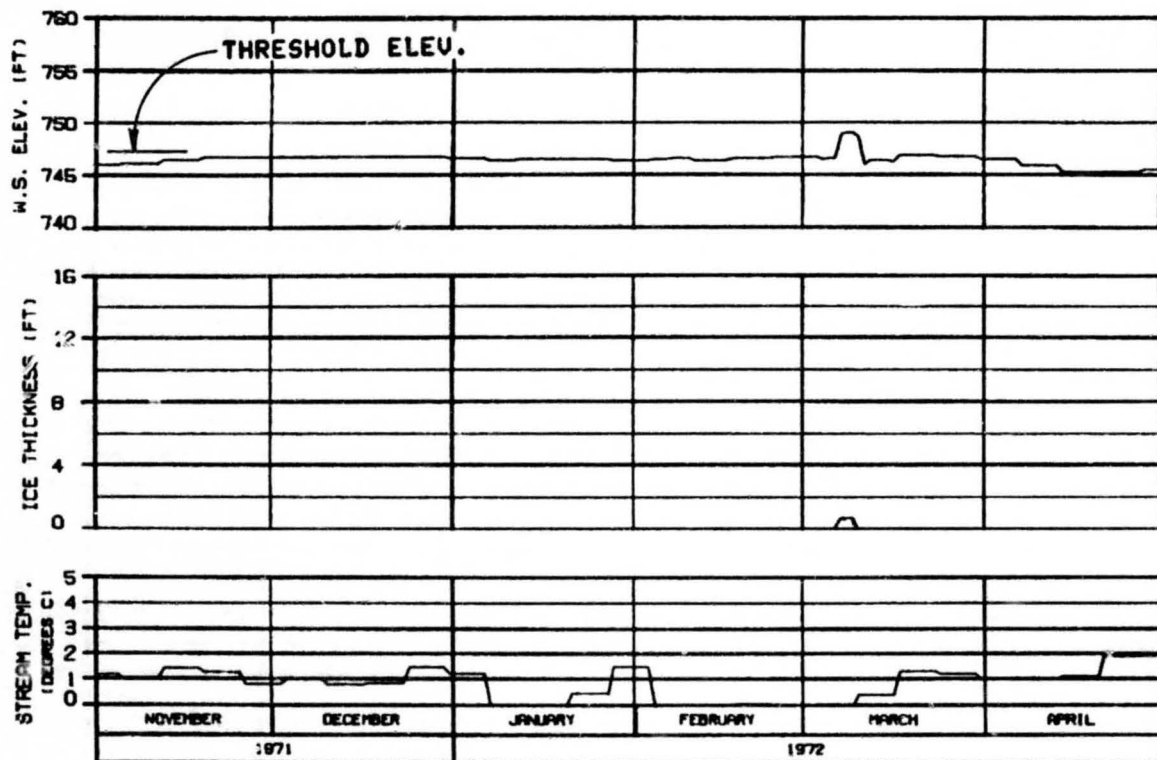
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED - ALASKA 12 JUN 72 1982. 14



SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1880. APPROACH 1850.  
 REFERENCE RUN NO. : 7101CX0

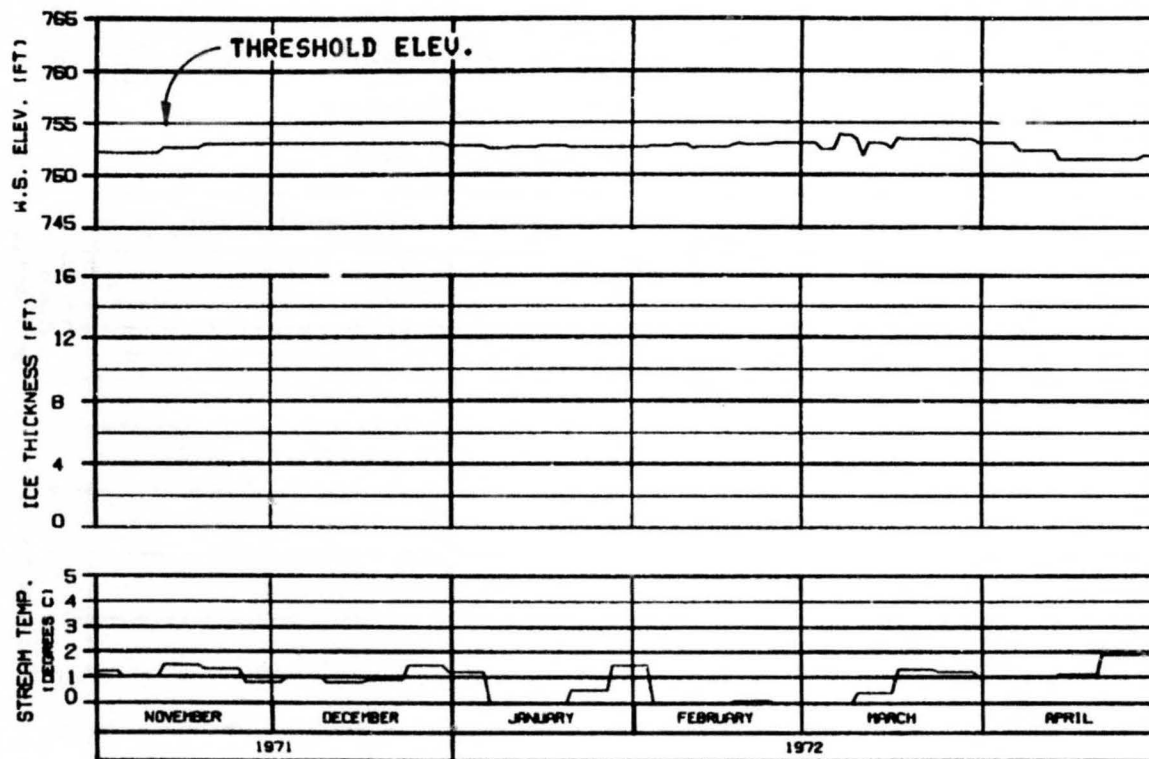
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: AL-0415 10 JAN 72 1880.142



HEAD OF SLOUGH 21  
RIVER MILE : 142.20

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1860. APPROACH 1850.  
REFERENCE RUN NO. : 7101CX0

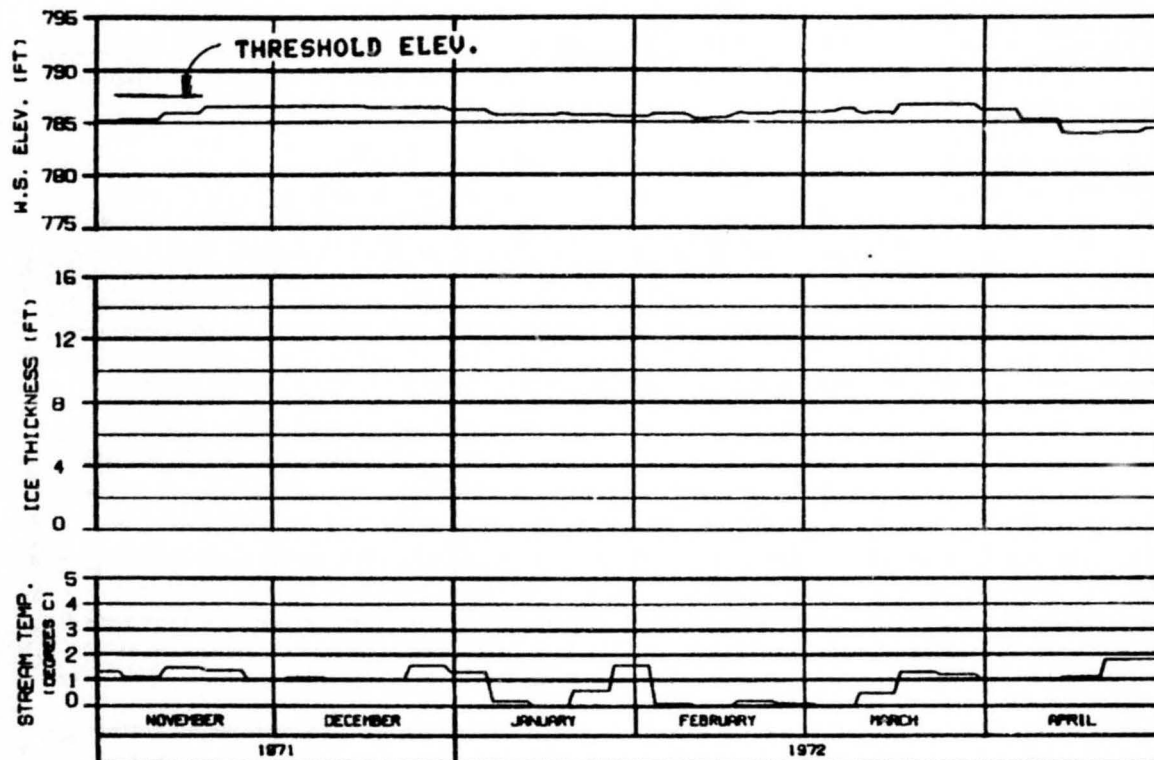
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: ALASKA 10 JUN 72 1000.142



HEAD OF SLOUGH 22  
RIVER MILE : 144.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1880. APPROACH 1850.  
REFERENCE RUN NO. : 7101CX0

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

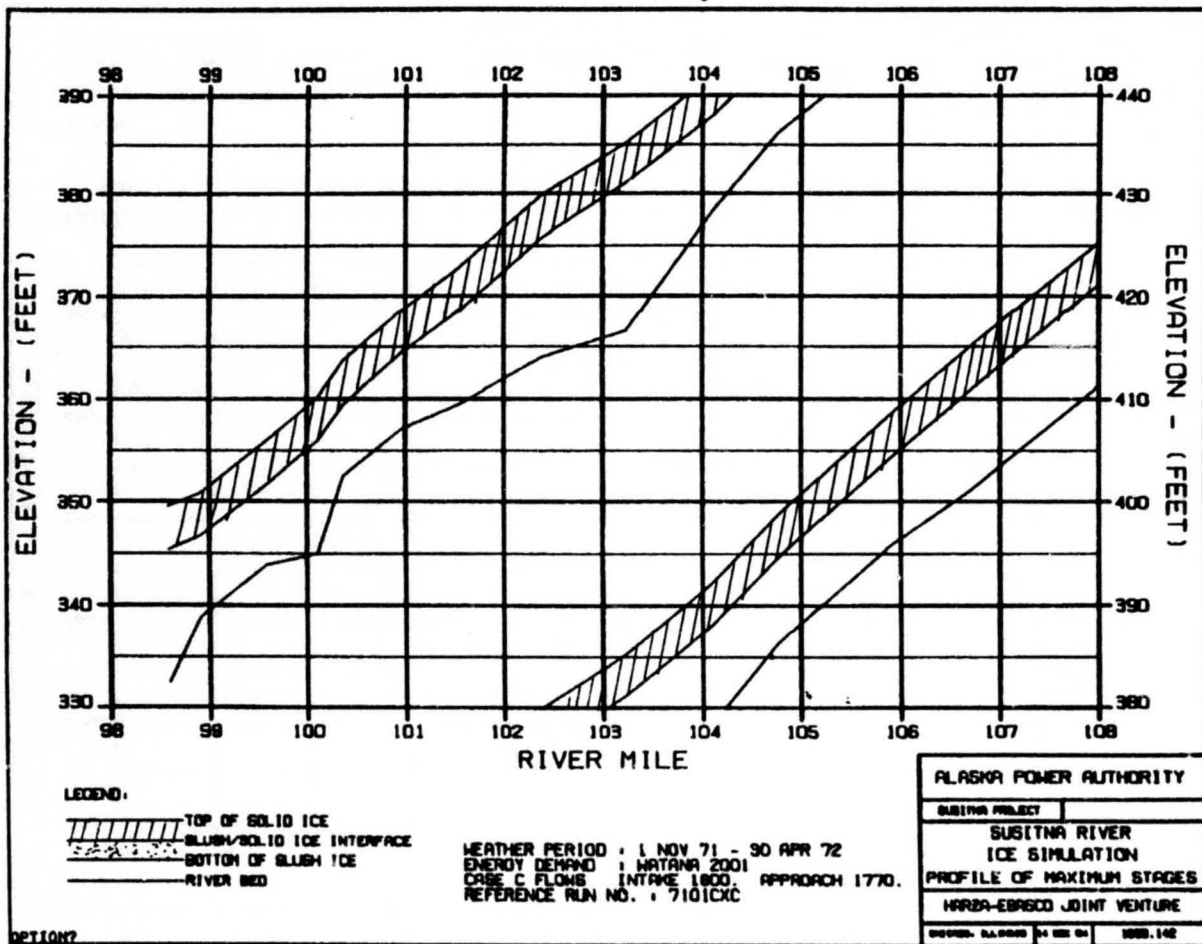
HARZA-EBASCO JOINT VENTURE

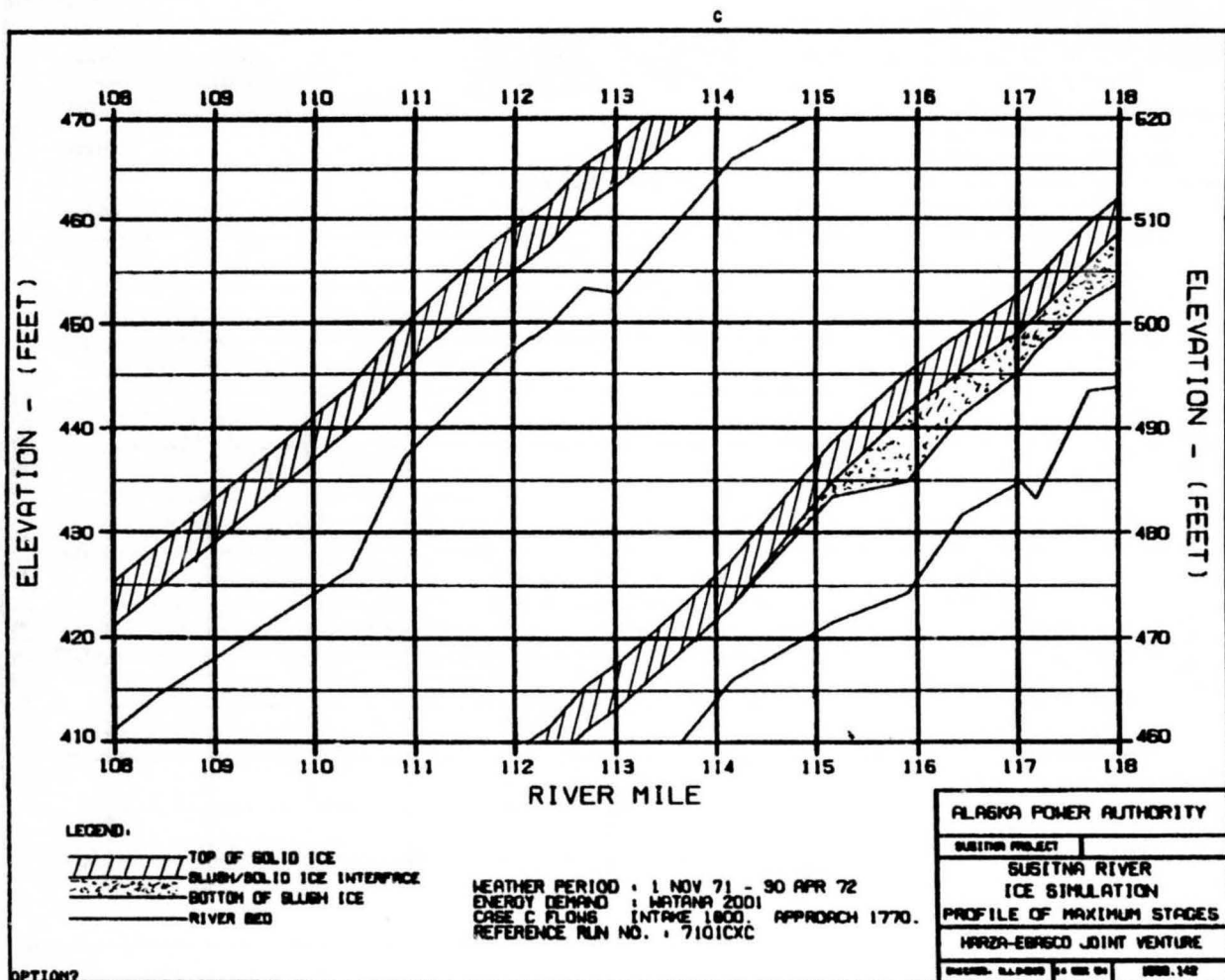
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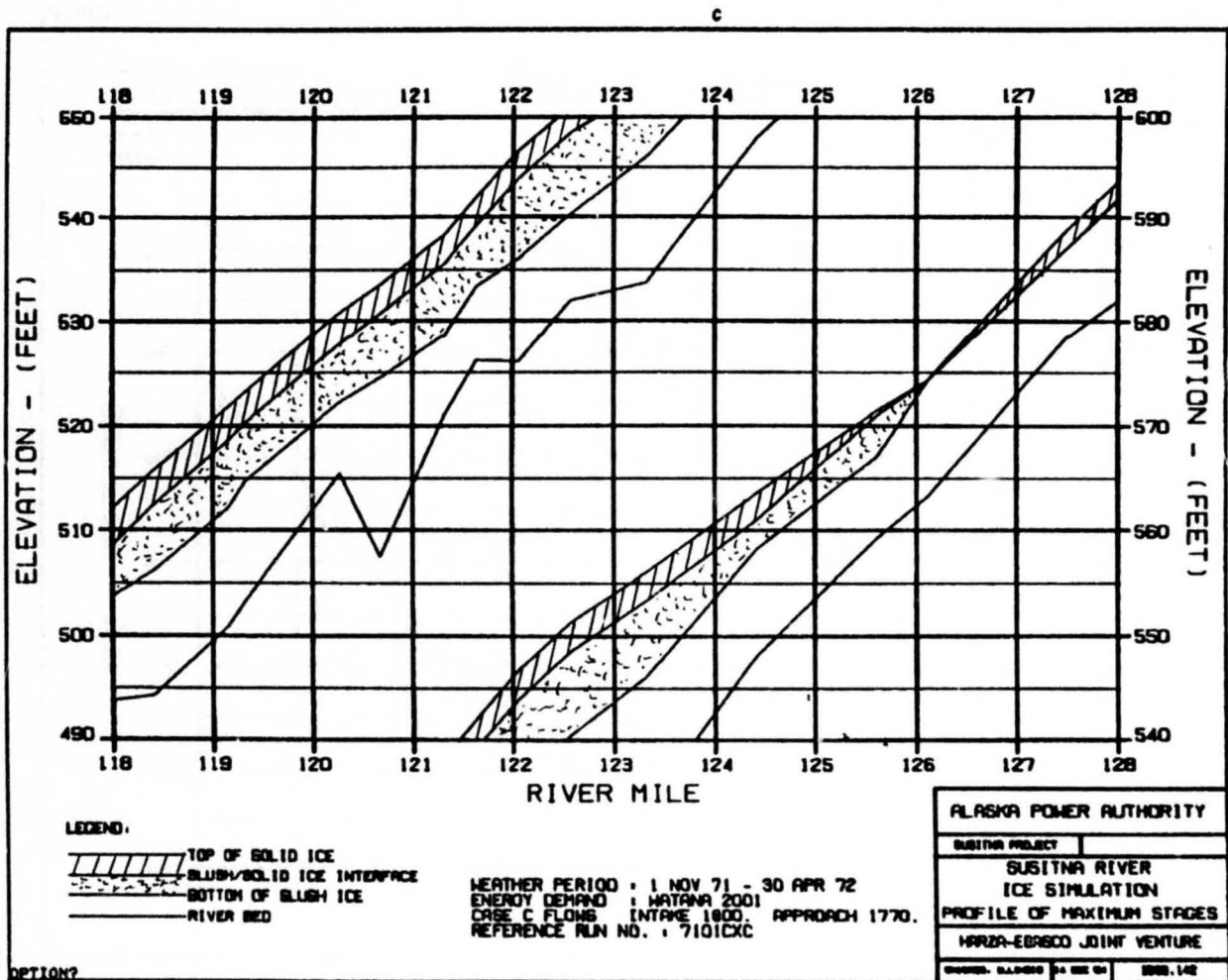
OPTION?

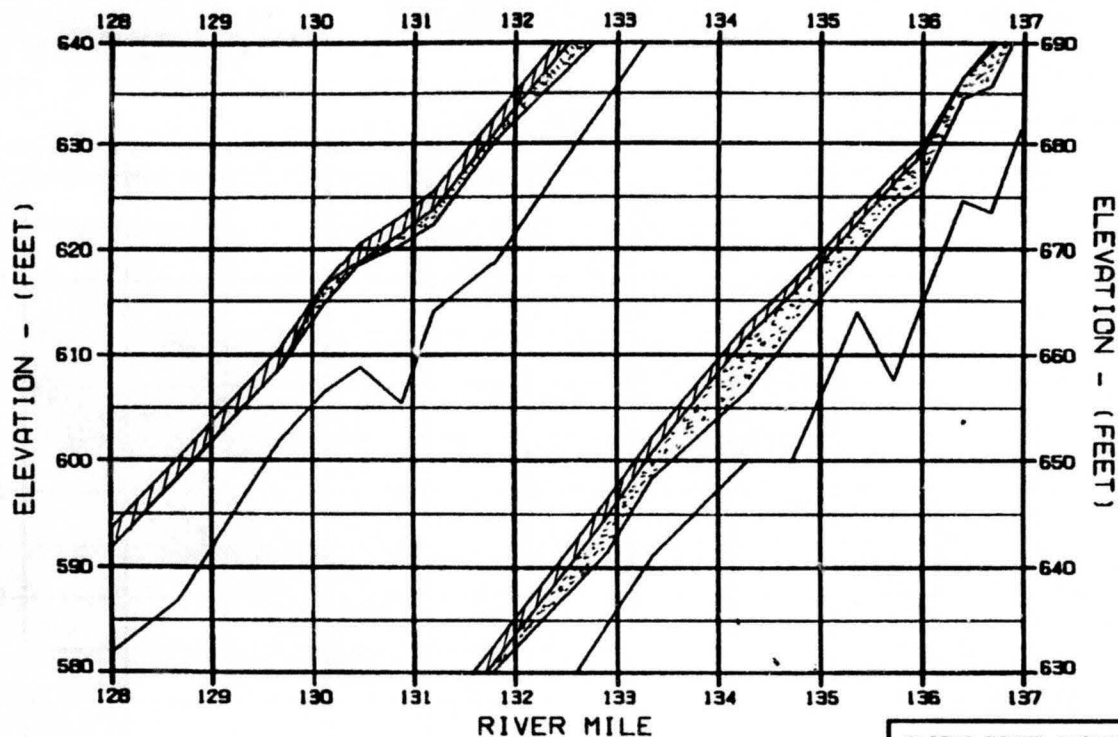
**EXHIBIT S**











LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800 APPROACH 1770.  
 REFERENCE RUN NO. : 7101CX

OPTION?

ALASKA POWER AUTHORITY

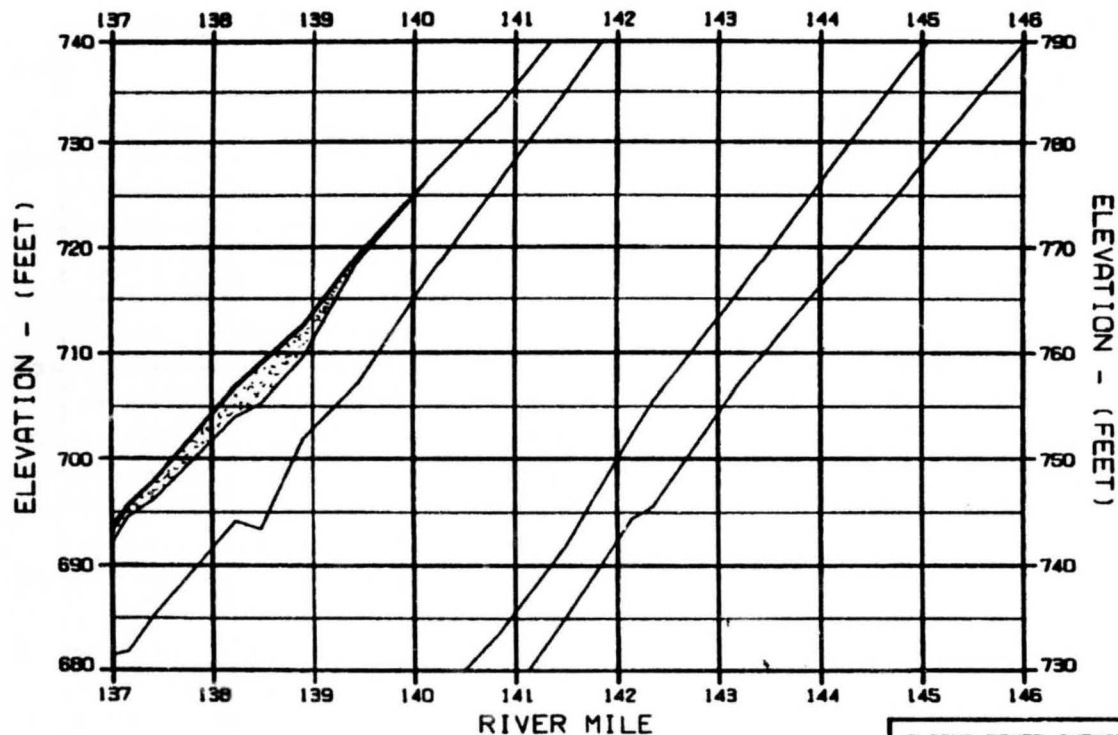
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION

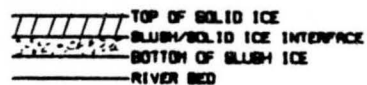
PROFILE OF MAXIMUM STAGES

HARZA-EBRSCO JOINT VENTURE

DESIGNED: RALPHED BY: RALPHED 1988.142



## LEGEND.



WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800 APPROACH 1770.  
 REFERENCE RUN NO. : 7101CX

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER

ICE SIMULATION

PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

SHEET 142 OF 142

OPTION?





## LEGEND:

— ICE FRONT  
 - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE C INTAKE 1800, APPROACH 1770.  
 REFERENCE RUN NO. : 7101CXC

## ALASKA POWER AUTHORITY

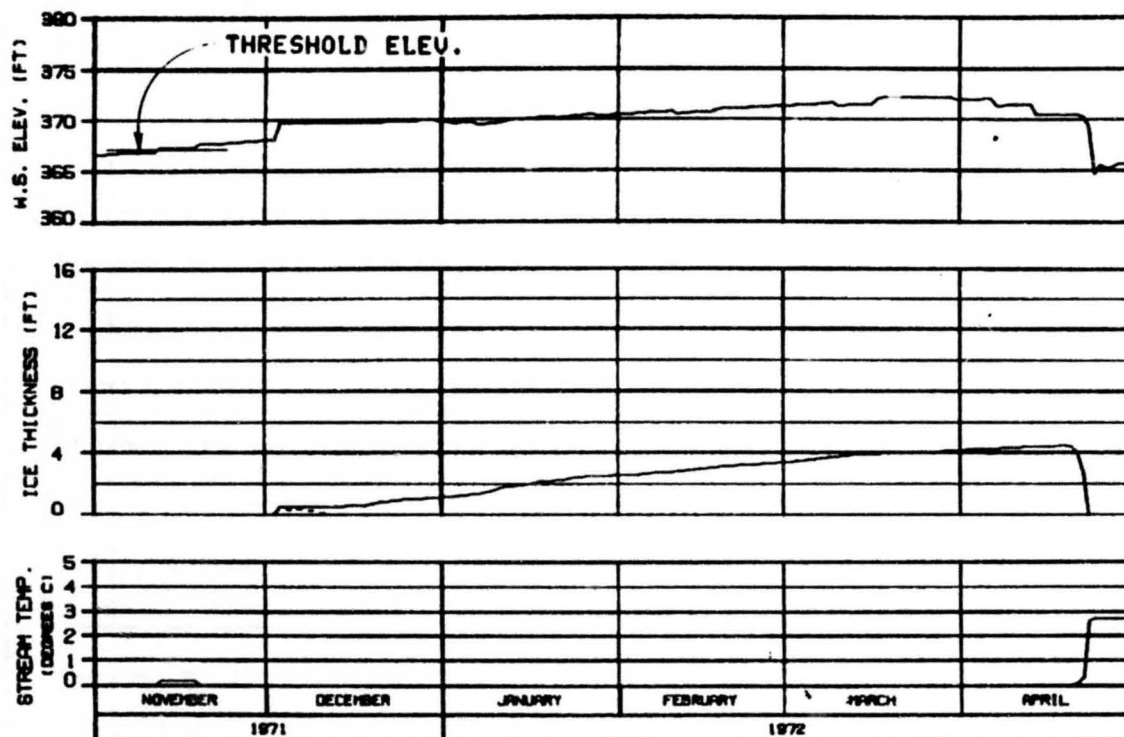
SUSITNA PROJECT

SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

HARZA-EBASCO JOINT VENTURE

DESIGN - ELLPERS 14 DEC 81 1988.142

OPTION?



# HEAD OF WHISKERS SLOUGH

RIVER MILE : 101.50

## ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800 APPROACH 1770.  
 REFERENCE RUN NO. : 7101CXC

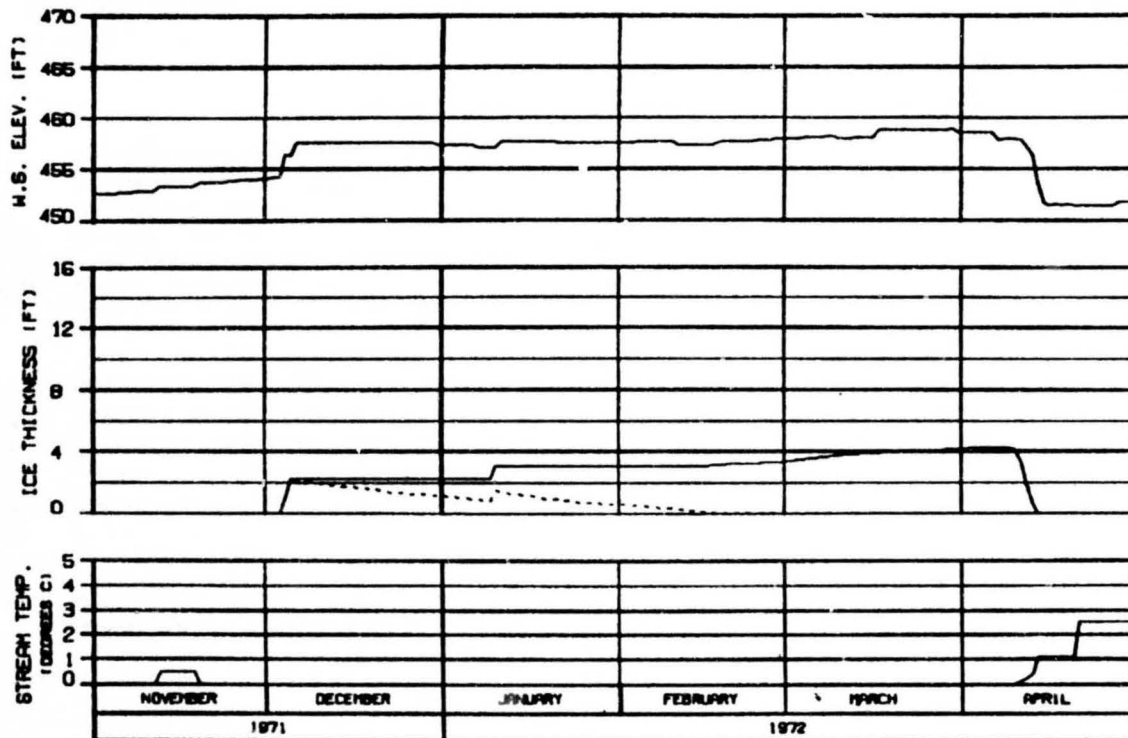
## ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBR600 JOINT VENTURE

BOOKED, 01.0000 04 DEC 84 1000.142



**SIDE CHANNEL AT HEAD OF GASH CREEK  
RIVER MILE : 112.00**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 7101CXC

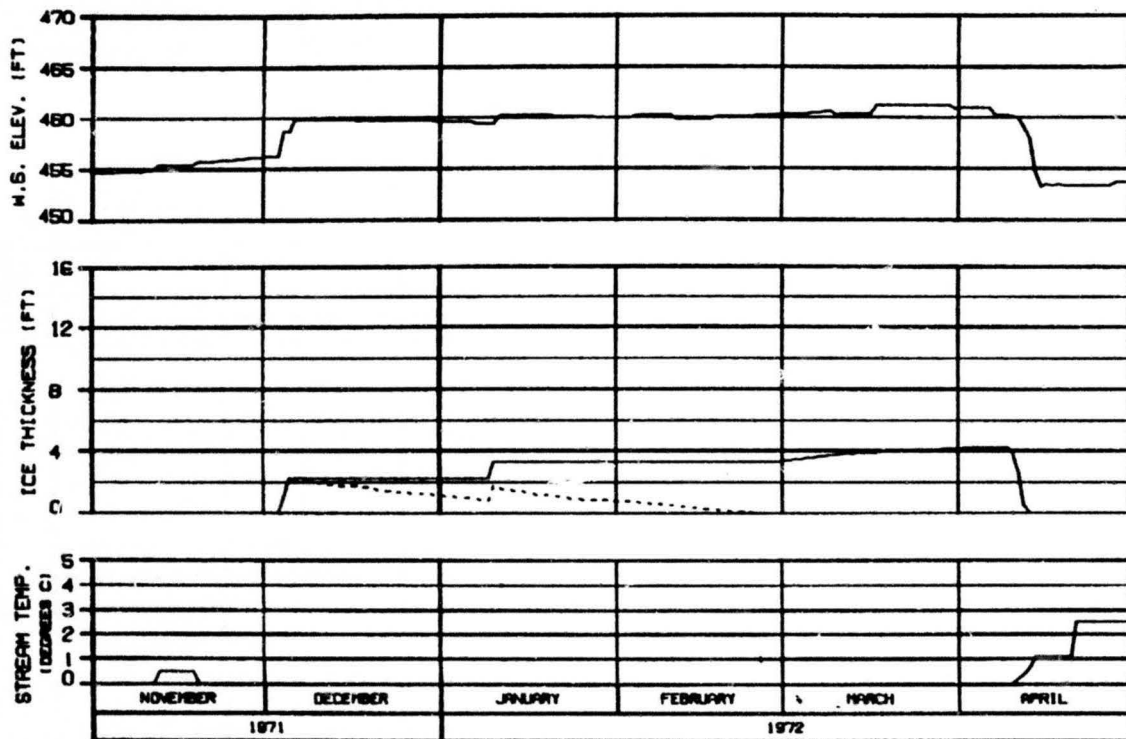
**ALASKA POWER AUTHORITY**

**SUSITNA PROJECT**

**SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY**

**WARZA-EBRACO JOINT VENTURE**

DESIGN: AL-0000 34 REV 04 1980.142



MOUTH OF SLOUGH 6A

RIVER MILE : 112.34

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 7101CXC

ALASKA POWER AUTHORITY

SUSITNA PROJECT

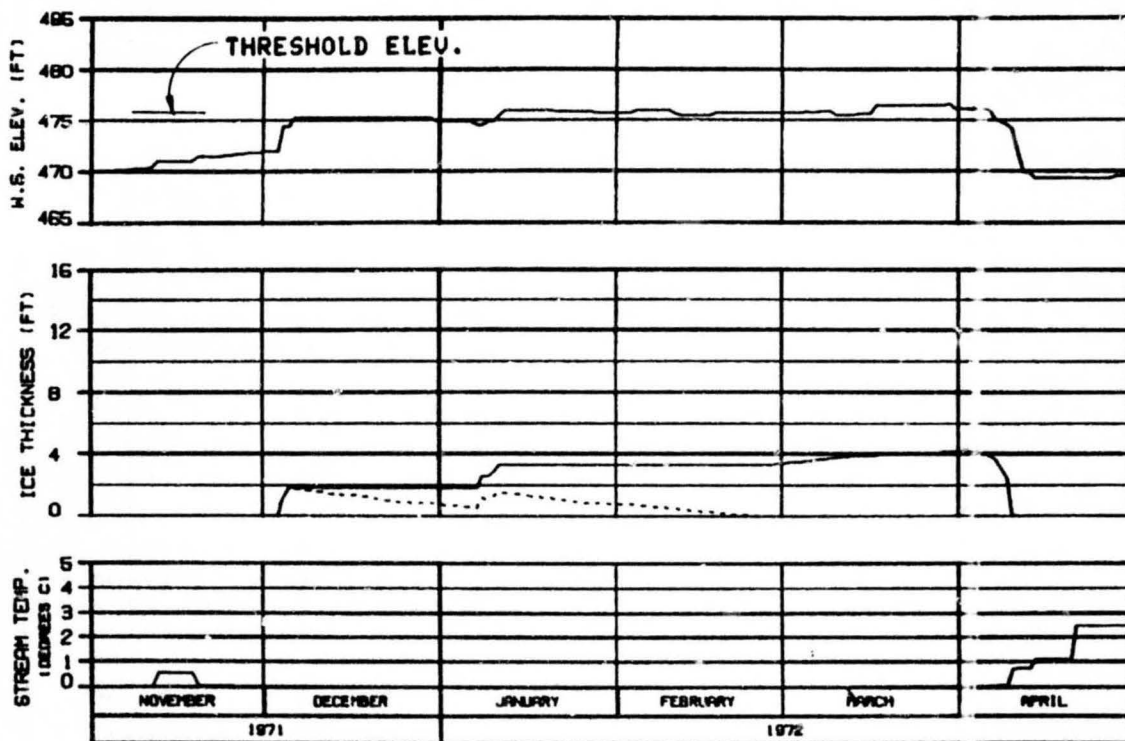
SUSITNA RIVER

ICE SIMULATION

TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: SLL/MSD 3: 000 00 1000.142



HEAD OF SLOUGH 8  
RIVER MILE : 114.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 7101CXC

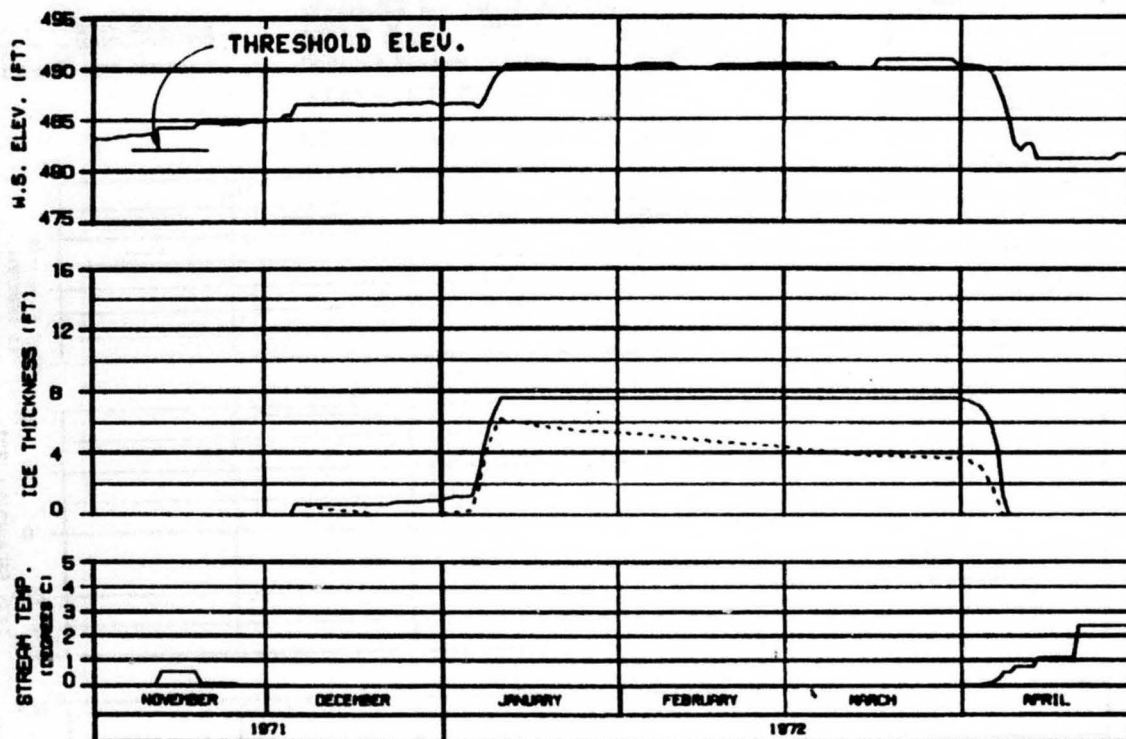
ALASKA POWER AUTHORITY

DATE: 11/1/72

SLATINA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZAR-EMASCO JOINT VENTURE

WATER RESOURCES DIVISION



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL MSII  
 RIVER MILE : 115.50

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 7101CX

ALASKA POWER AUTHORITY

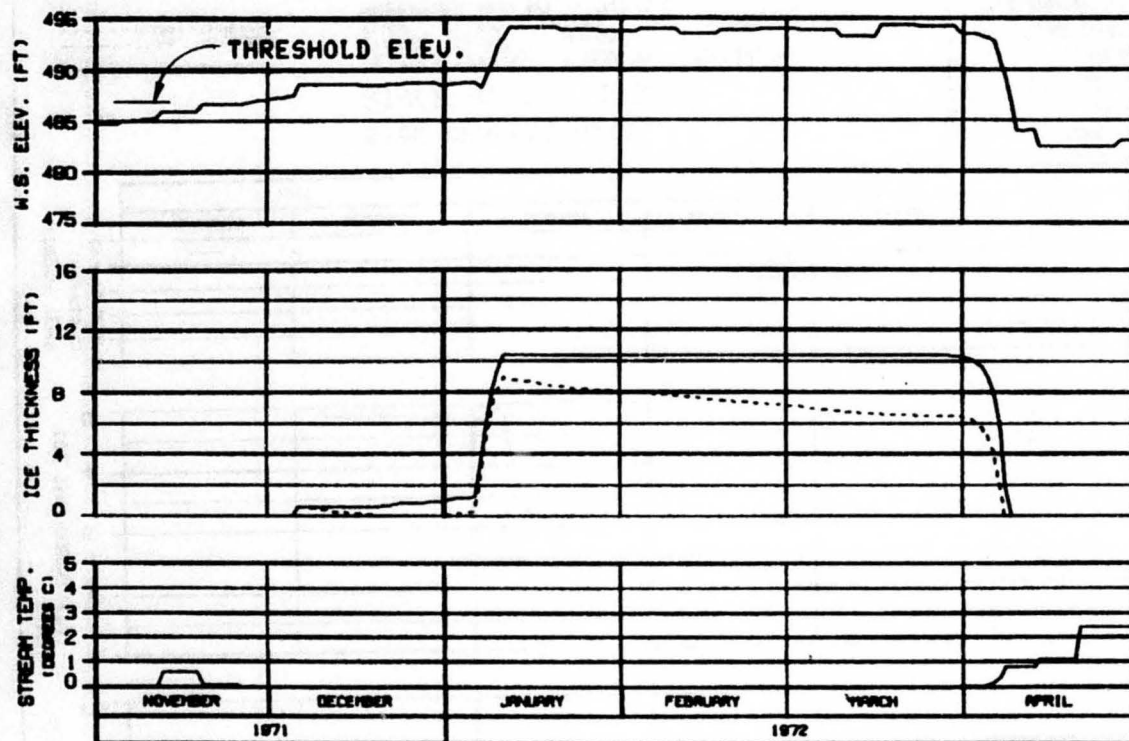
SUBITNA PROJECT

SUBITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARSA-ERACCO JOINT VENTURE

DRAWN: ALP/MSI BY: MS/MS 000.142





HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - BLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 7101CX

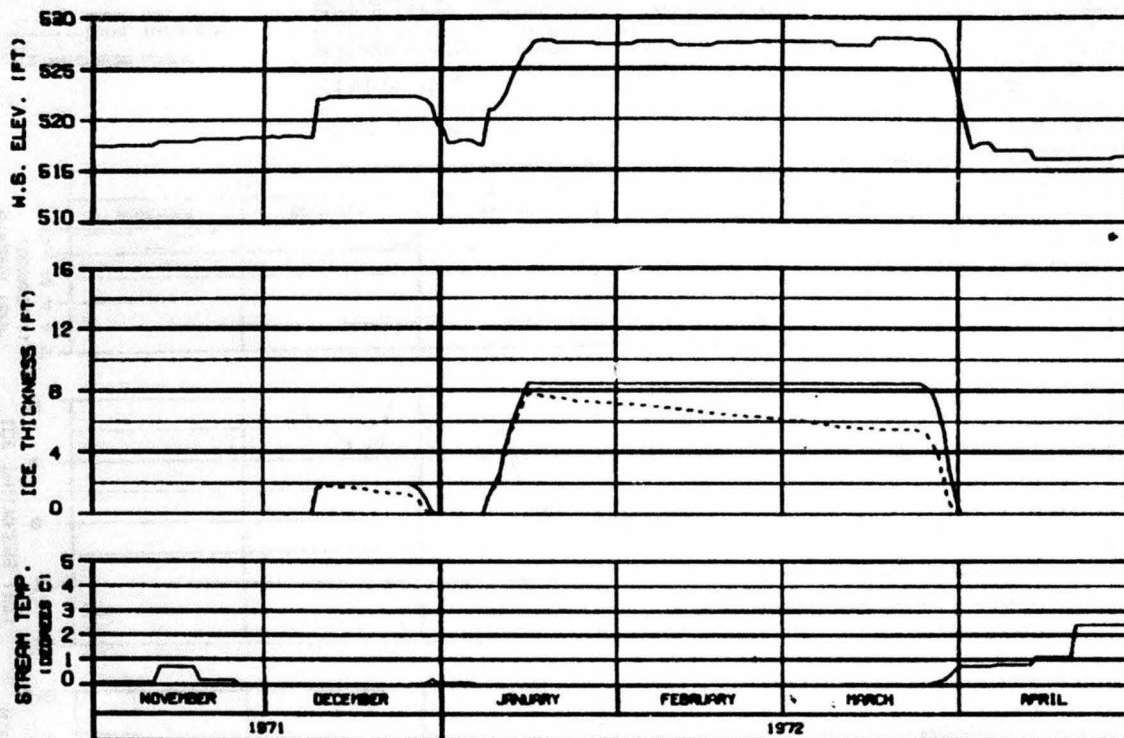
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBERG JOINT VENTURE

DESIGNED BY: J. J. JENSEN DATE: 04/08/72



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 7101CX

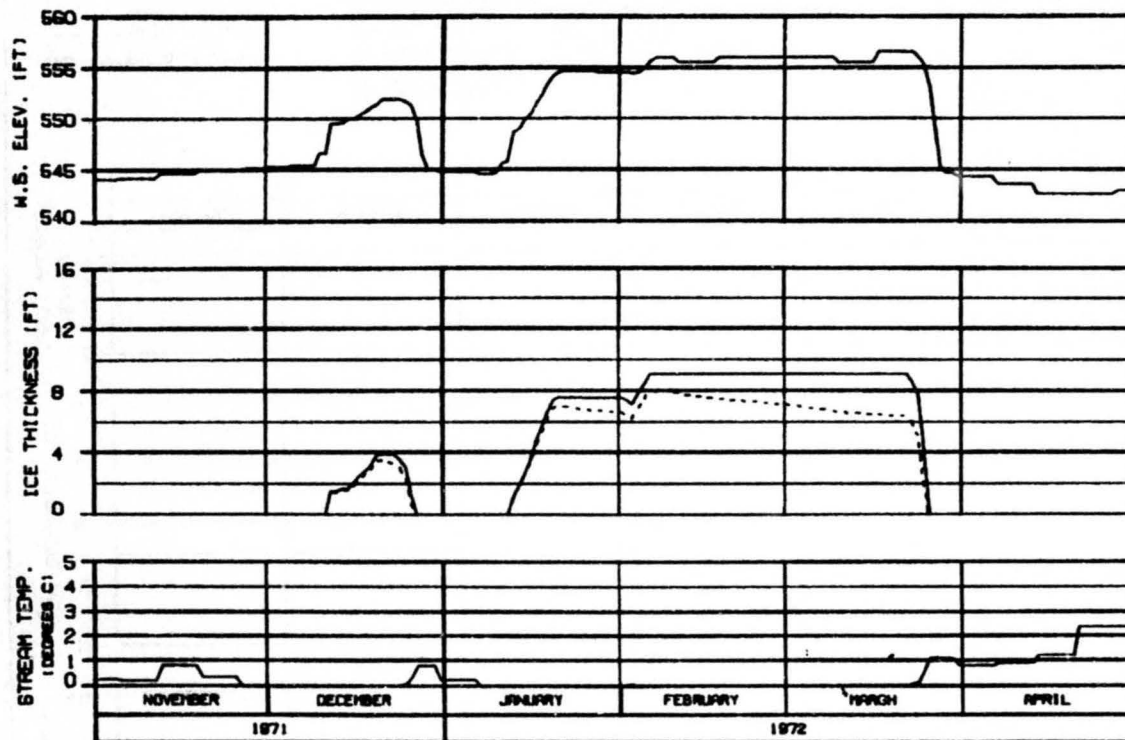
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-ESBACO JOINT VENTURE

DESIGNED BY: J. L. DODD DRAWN BY: J. L. DODD 1000.142



HEAD OF MOOSE SLOUGH  
RIVER MILE : 123.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 7101CXC

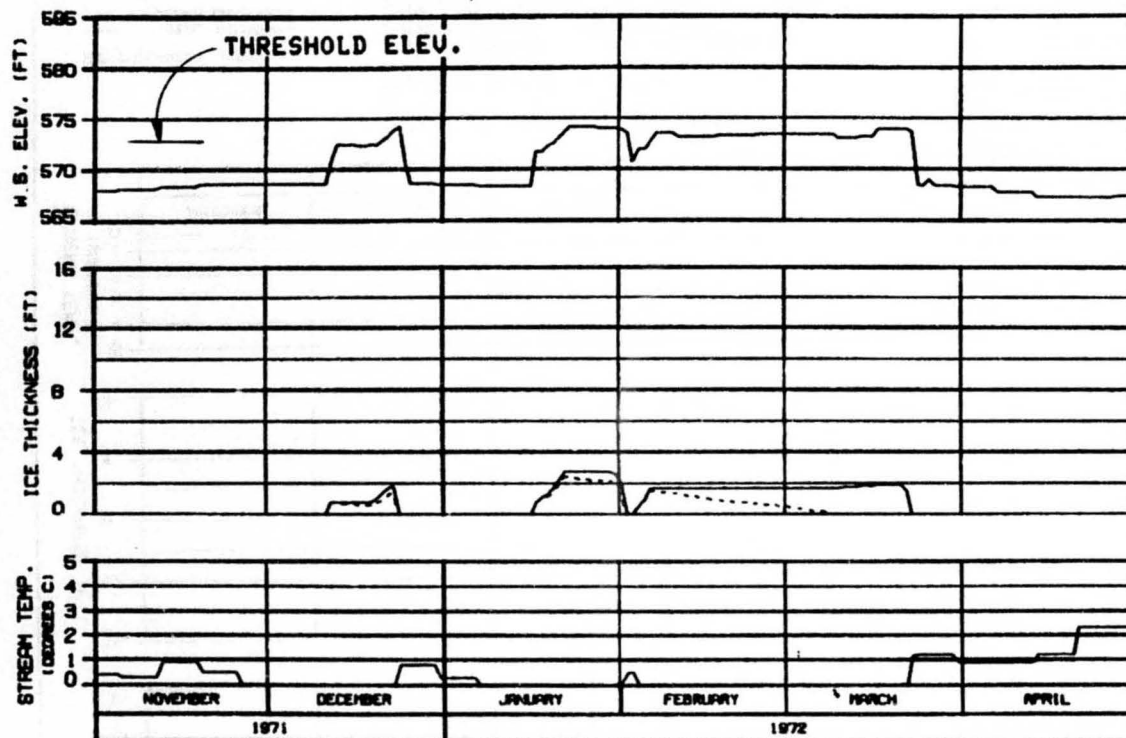
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRACO JOINT VENTURE

ENCLOSURE 5.1-5.2 OF 5.1-5.2 1000.142



HEAD OF SLOUGH 8A (WEST)  
RIVER MILE : 126.10

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 7101CXC

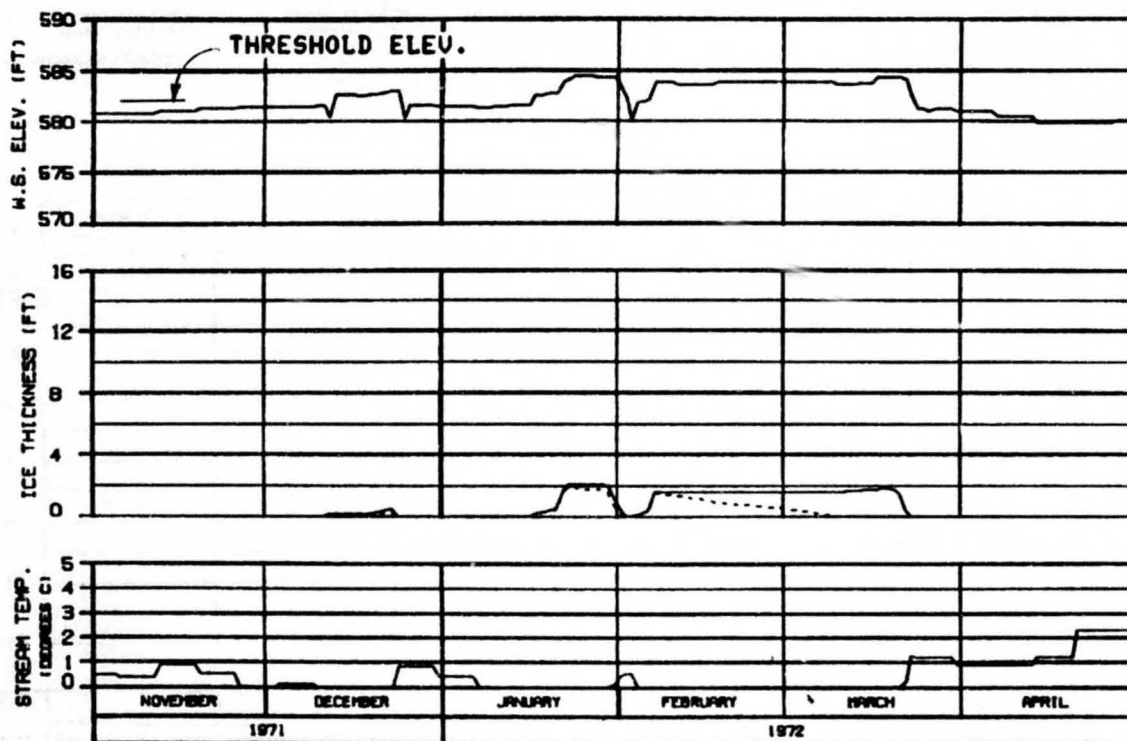
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBERD JOINT VENTURE

DESIGNED: AL 04000 DRAWN: AL 000 04 0000.142



HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 7101CX

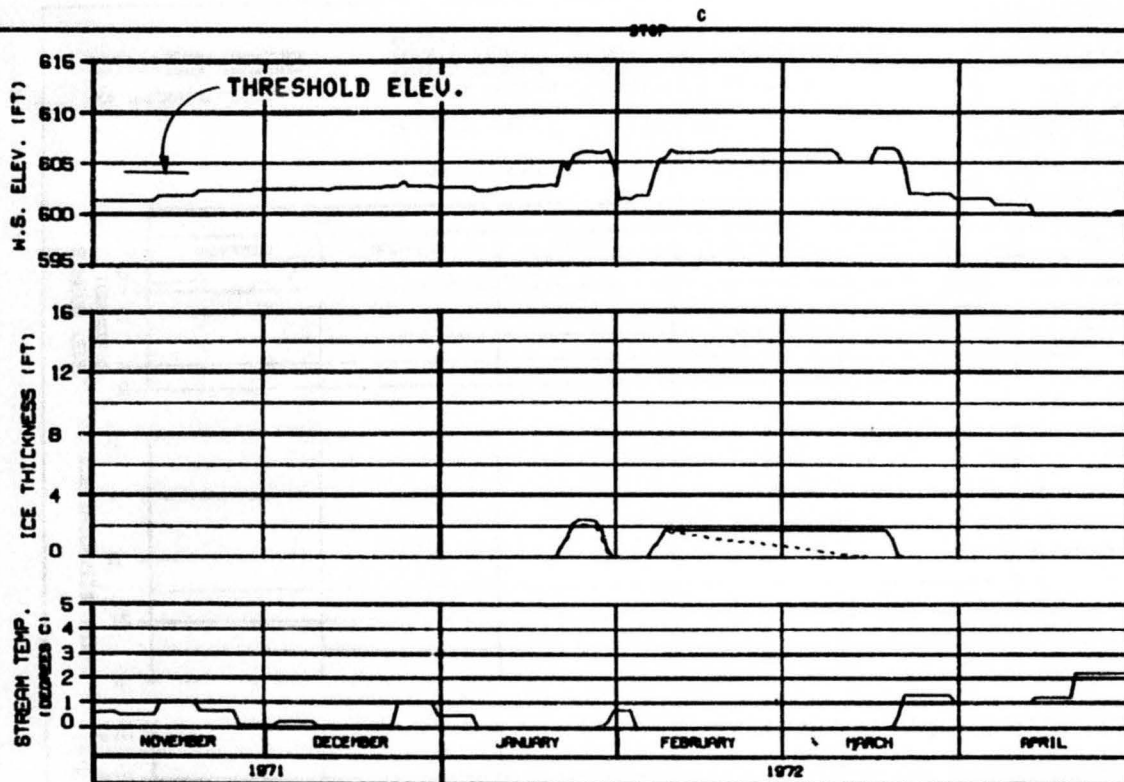
ALASKA POWER AUTHORITY

SUBMITTER PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZDA-EBASCO JOINT VENTURE

DESIGNED BY: J. J. J. 142



**HEAD OF SLOUGH 9**  
**RIVER MILE : 129.30**

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 7101CX

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

OPTION?

ALASKA POWER AUTHORITY

SUSITNA PROJECT

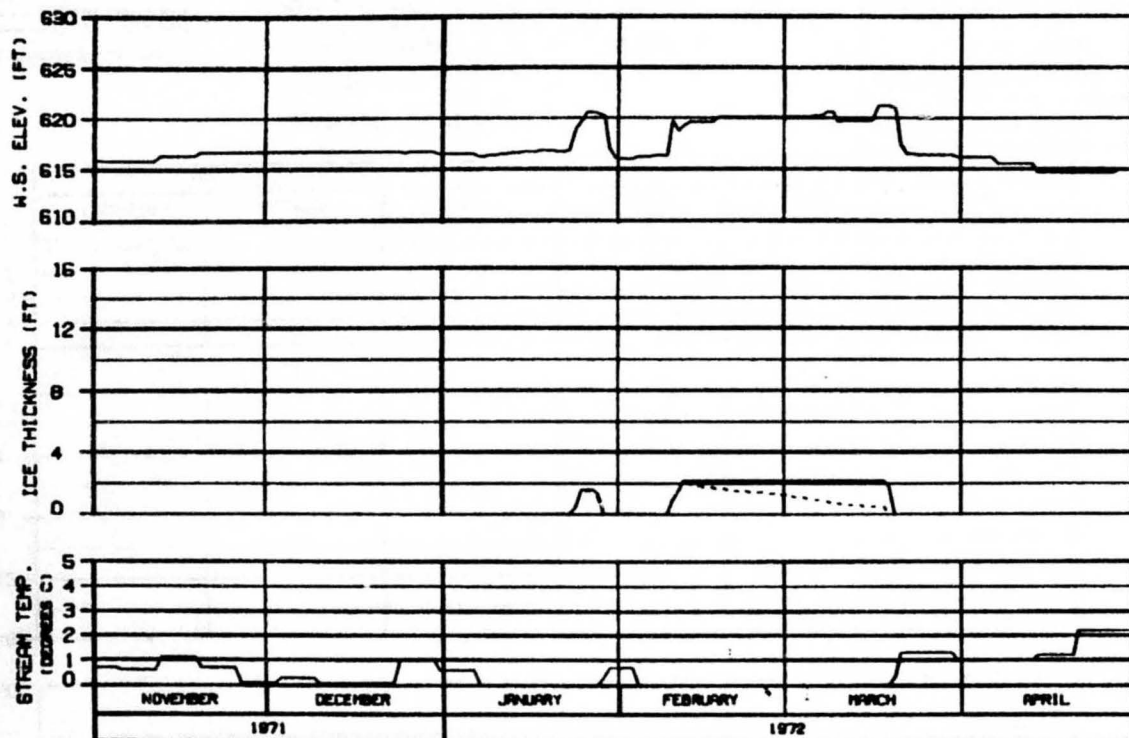
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBASCO JOINT VENTURE

DESIGNED BY: J. D. GIBSON & ASSOCIATES, INC. DRAWING NO. 142



OPTION?



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF SLOUGH 9  
 RIVER MILE : 130.60

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : NATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 7101CX

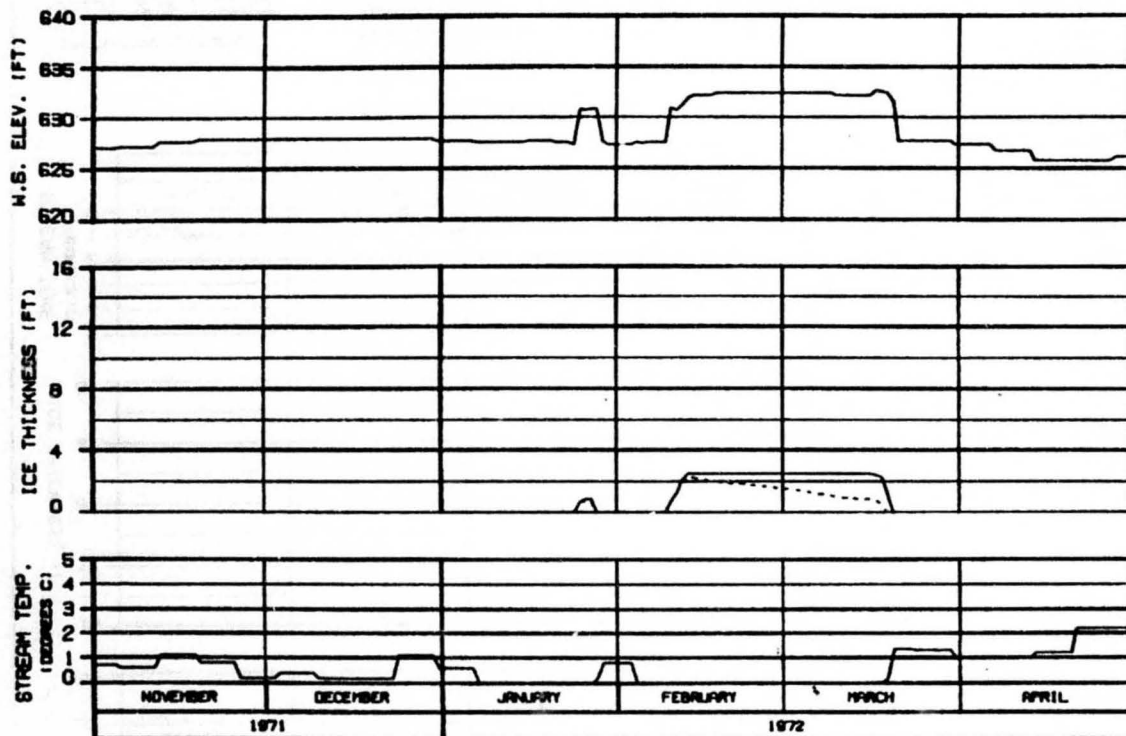
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACO JOINT VENTURE

DESIGNED BY: J. L. DAVIS 14 DEC 84 1000.142



SIDE CHANNEL U/S OF 4TH JULY CREEK  
RIVER MILE : 131.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 7101CXC

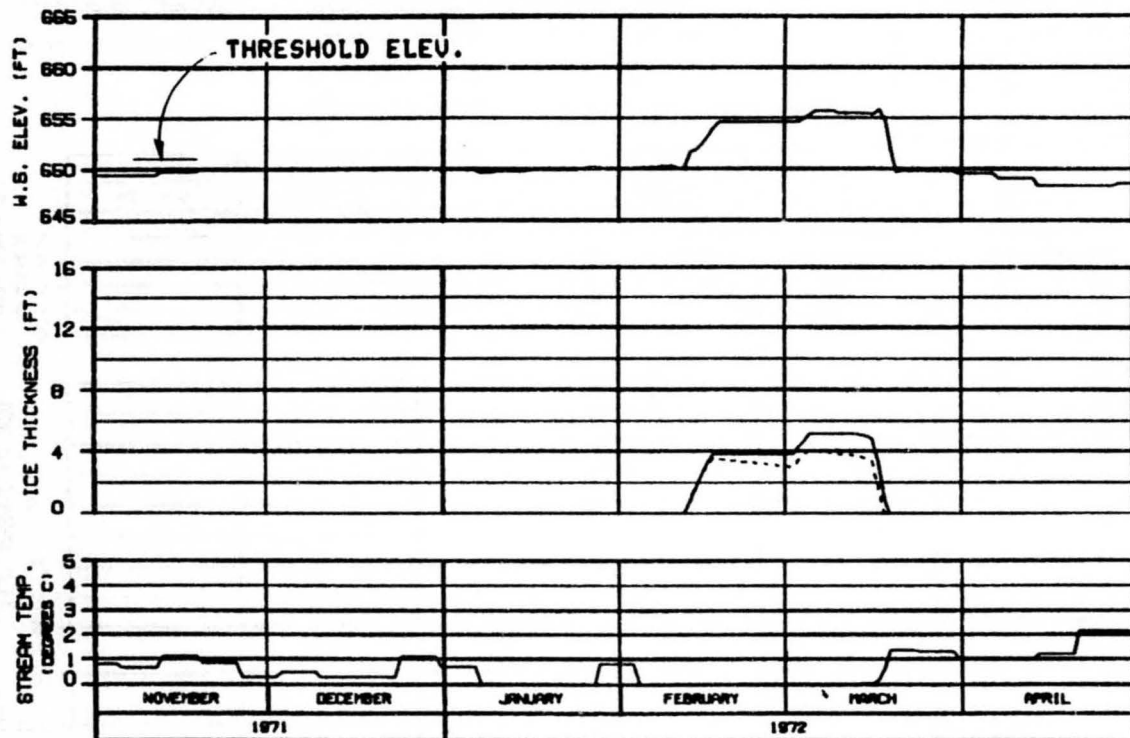
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED BY: S. L. HARRIS 14 DEC 71 1000.142



HEAD OF SLOUGH 9A  
RIVER MILE : 133.70

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 7101CXC

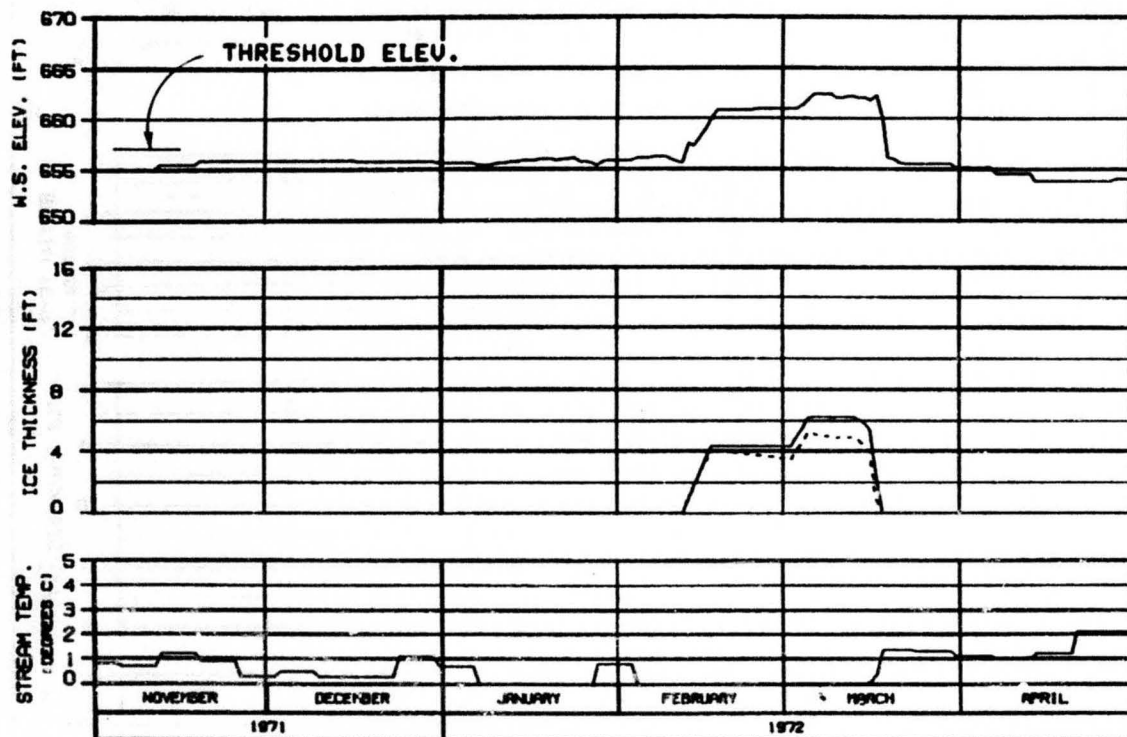
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: SLD/DBB 14 DEC 71 1000.142



SIDE CHANNEL U/S OF SLOUGH 10  
RIVER MILE : 134.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : NATANA 2001  
CASE C FLOWS INTAKE 1800. APPROX 1770.  
REFERENCE RUN NO. : 7101CXC

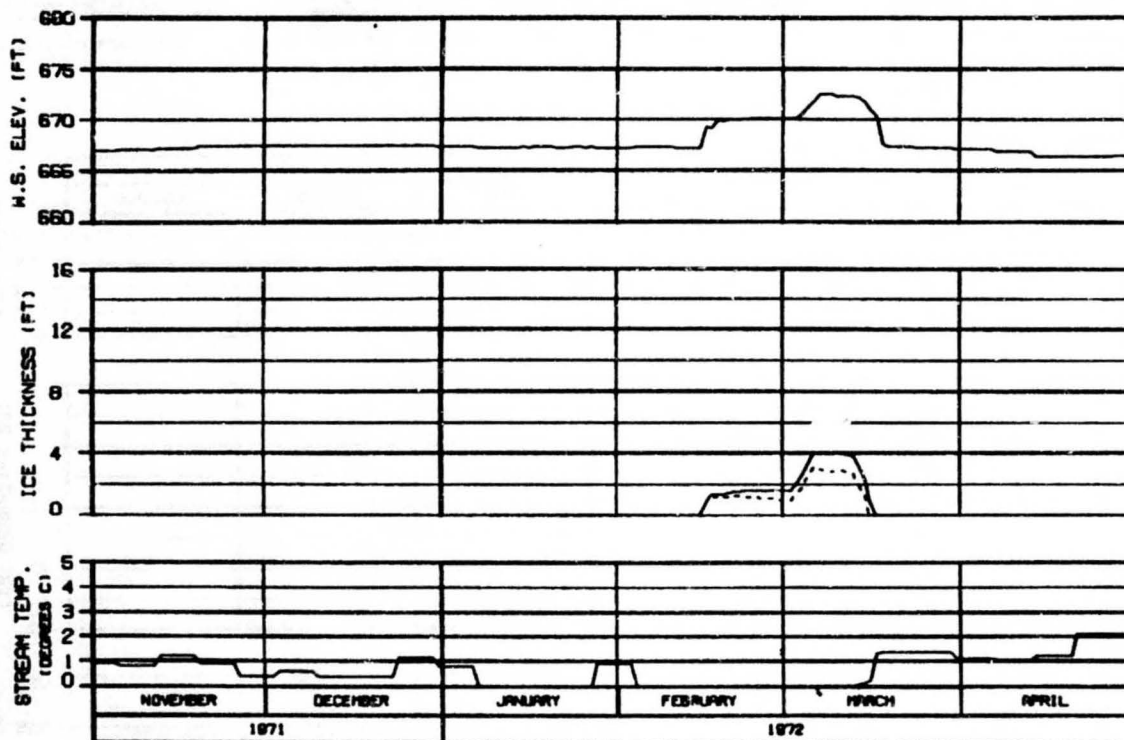
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EDSICO JOINT VENTURE

DRAWN: ALP/MS 14 APR 74 200.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL D/S OF SLOUGH 11  
 RIVER MILE : 135.30

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 7101CX

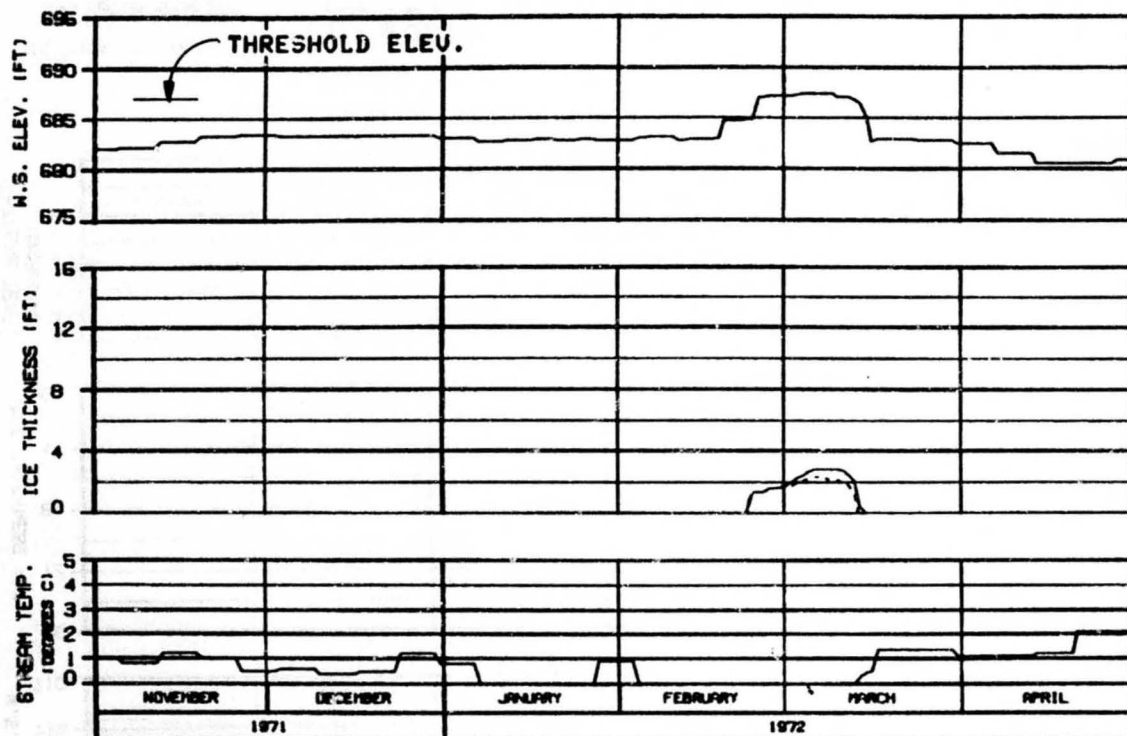
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHARTED: 01-0000 04 DEC 81 1982. 142



HEAD OF SLOUGH 11  
RIVER MILE : 136.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 7101CXC

ALASKA POWER AUTHORITY

SUSTITNA PROJECT

SUSTITNA RIVER  
ICE SIMULATION  
TIME HISTORY

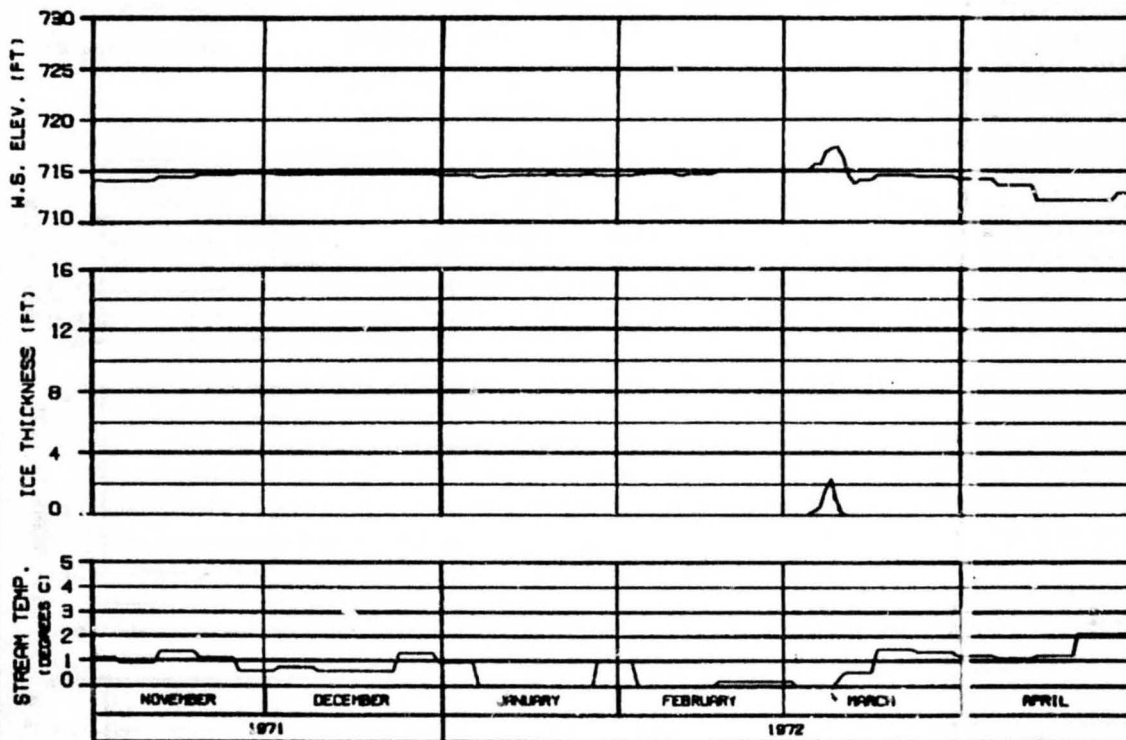
HARZA-EBASCO JOINT VENTURE

DESIGNED BY HARZA

BY EBS

1972.142





HEAD OF SLOUGH 17  
RIVER MILE : 139.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 7101CXC

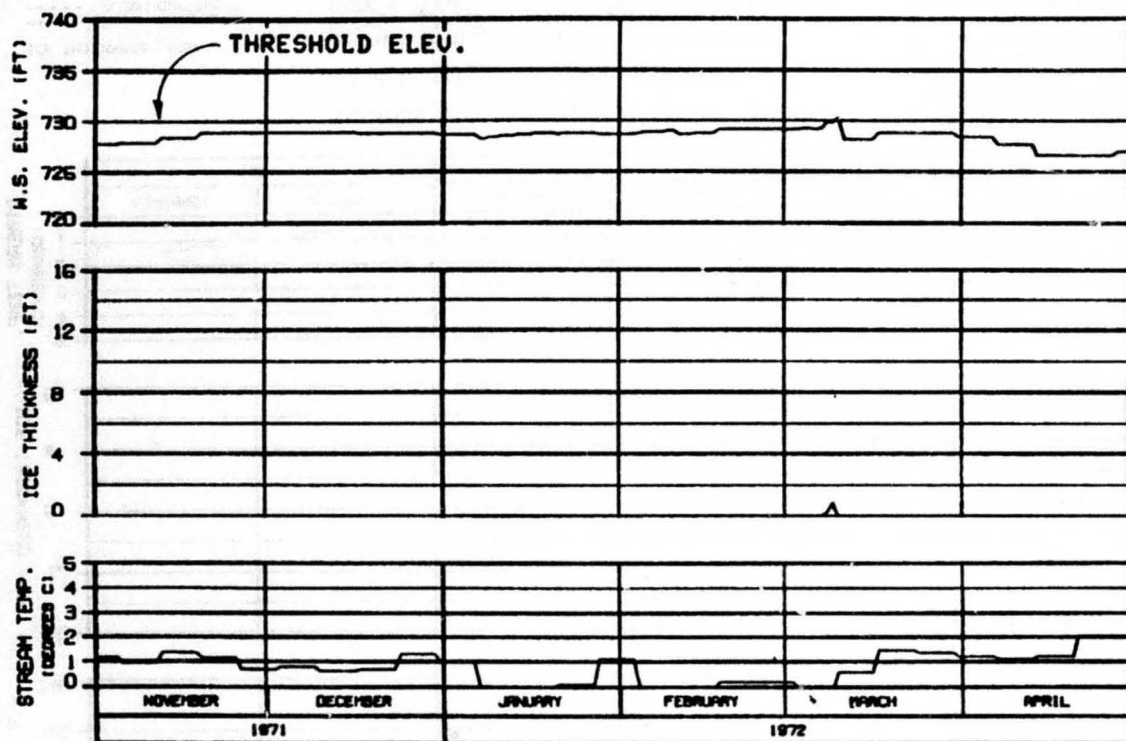
ALASKA POWER AUTHORITY

BY: THIS PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

H. RDA-ESBSCO JOINT VENTURE

DATE: 05-01-0000 BY: 010-01 0000-142



HEAD OF SLOUGH 20  
RIVER MILE : 140.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 7101CXC

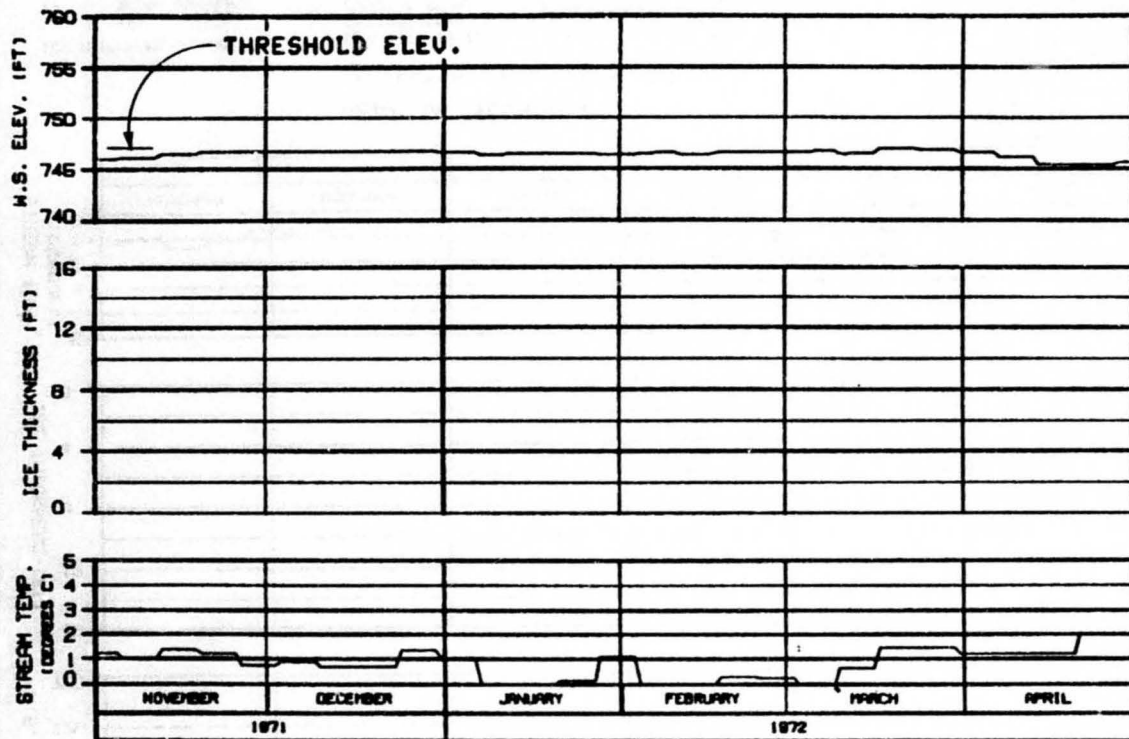
ALASKA POWER AUTHORITY

SUBITNA PROJECT

SUBITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBRACO JOINT VENTURE

CHIEF: ALASKA POWER AUTHORITY 140.50 140.50



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 7101CXC

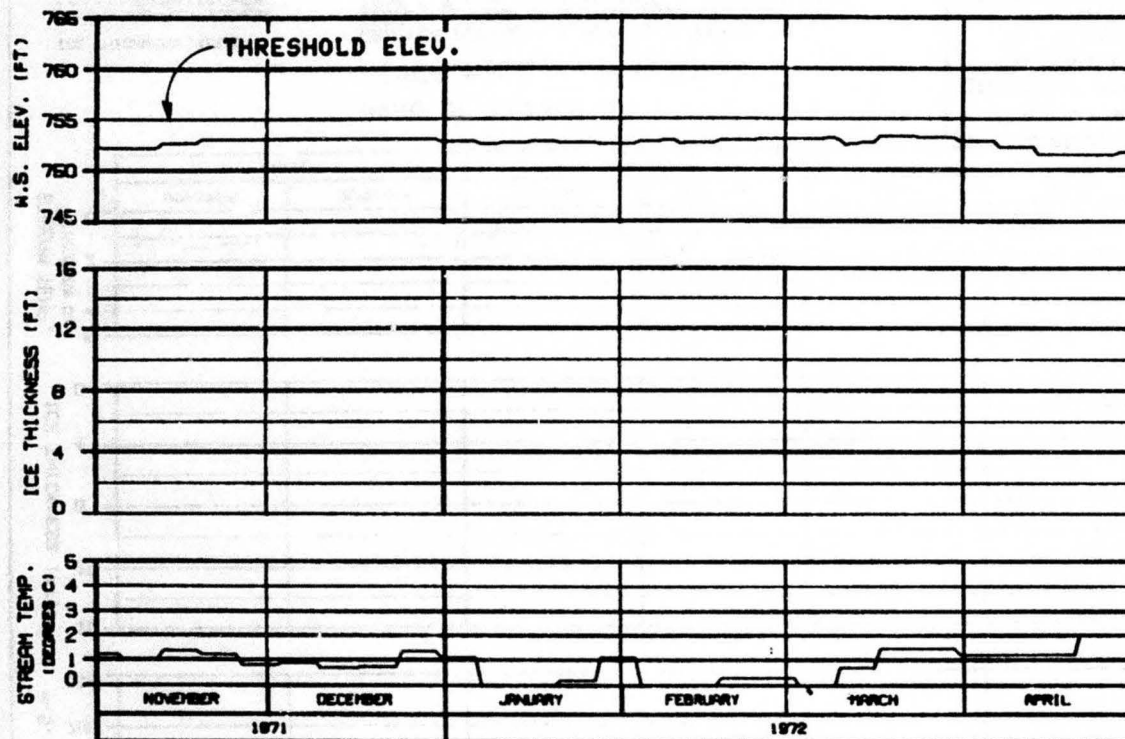
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARSA-EBRISCO JOINT VENTURE

ORDER: 84000 34 SEE CH 1000.142



HEAD OF SLOUGH 21  
RIVER MILE : 142.20

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 7101CX

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

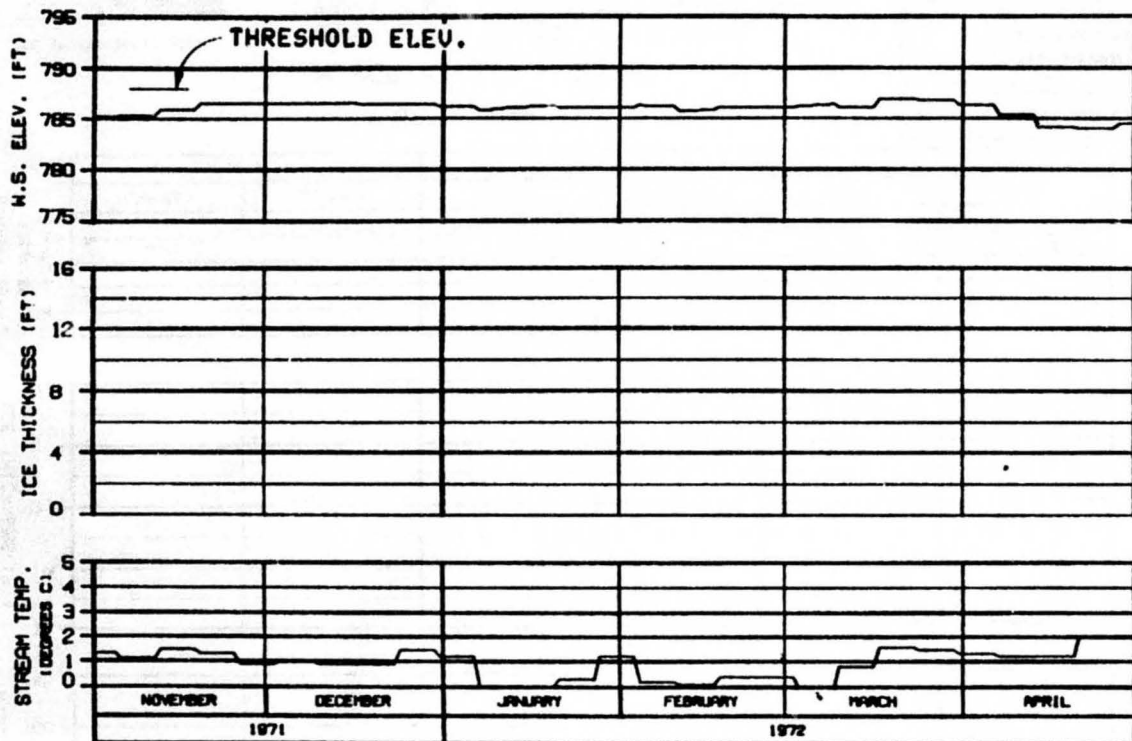
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EDBACO JOINT VENTURE

DESIGN. CALIBER 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 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798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044 1045 1046 1047 1048 1049 1050 1051 1052 1053 1054 1055 1056 1057 1058 1059 1060 1061 1062 1063 1064 1065 1066 1067 1068 1069 1070 1071 1072 1073 1074 1075 1076 1077 1078 1079 1080 1081 1082 1083 1084 1085 1086 1087 1088 1089 1090 1091 1092 1093 1094 1095 1096 1097 1098 1099 1100 1101 1102 1103 1104 1105 1106 1107 1108 1109 1110 1111 1112 1113 1114 1115 1116 1117 1118 1119 1120 1121 1122 1123 1124 1125 1126 1127 1128 1129 1130 1131 1132 1133 1134 1135 1136 1137 1138 1139 1140 1141 1142 1143 1144 1145 1146 1147 1148 1149 1150 1151 1152 1153 1154 1155 1156 1157 1158 1159 1160 1161 1162 1163 1164 1165 1166 1167 1168 1169 1170 1171 1172 1173 1174 1175 1176 1177 1178 1179 1180 1181 1182 1183 1184 1185 1186 1187 1188 1189 1190 1191 1192 1193 1194 1195 1196 1197 1198 1199 1200 1201 1202 1203 1204 1205 1206 1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1219 1220 1221 1222 1223 1224 1225 1226 1227 1228 1229 1230 1231 1232 1233 1234 1235 1236 1237 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1638 1639 1640 1641 1642 1643 1644 1645 1646 1647 1648 1649 1650 1651 1652 1653 1654 1655 1656 1657 1658 1659 1660 1661 1662 1663 1664 1665 1666 1667 1668 1669 1670 1671 1672 1673 1674 1675 1676 1677 1678 1679 1680 1681 1682 1683 1684 1685 1686 1687 1688 1689 1690 1691 1692 1693 1694 1695 1696 1697 1698 1699 1700 1701 1702 1703 1704 1705 1706 1707 1708 1709 1710 1711 1712 1713 1714 1715 1716 1717 1718 1719 1720 1721 1722 1723 1724 1725 1726 1727 1728 1729 1730 1731 1732 1733 1734 1735 1736 1737 1738 1739 1740 1741 1742 1743 1744 1745 1746 1747 1748 1749 1750 1751 1752 1753 1754 1755 1756 1757 1758 1759 1760 1761 1762 1763 1764 1765 1766 1767 1768 1769 1770 1771 1772 1773 1774 1775 1776 1777 1778 1779 1780 1781 1782 1783 1784 1785 1786 1787 1788 1789 1790 1791 1792 1793 1794 1795 1796 1797 1798 1799 1800 1801 1802 1803 1804 1805 1806 1807 1808 1809 1810 1811 1812 1813 1814 1815 1816 1817 1818 1819 1820 1821 1822 1823 1824 1825 1826 1827 1828 1829 1830 1831 1832 1833 1834 1835 1836 1837 1838 1839 1840 1841 1842 1843 1844 1845 1846 1847 1848 1849 1850 1851 1852 1853 1854 1855 1856 1857 1858 1859 1860 1861 1862 1863 1864 1865 1866 1867 1868 1869 1870 1871 1872 1873 1874 1875 1876 1877 1878 1879 1880 1881 1882 1883 1884 1885 1886 1887 1888 1889 1890 1891 1892 1893 1894 1895 1896 1897 1898 1899 1900 1901 1902 1903 1904 1905 1906 1907 1908 1909 1910 1911 1912 1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 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2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 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HEAD OF SLOUGH 22  
RIVER MILE : 144.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 7101CX

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBRACCO JOINT VENTURE

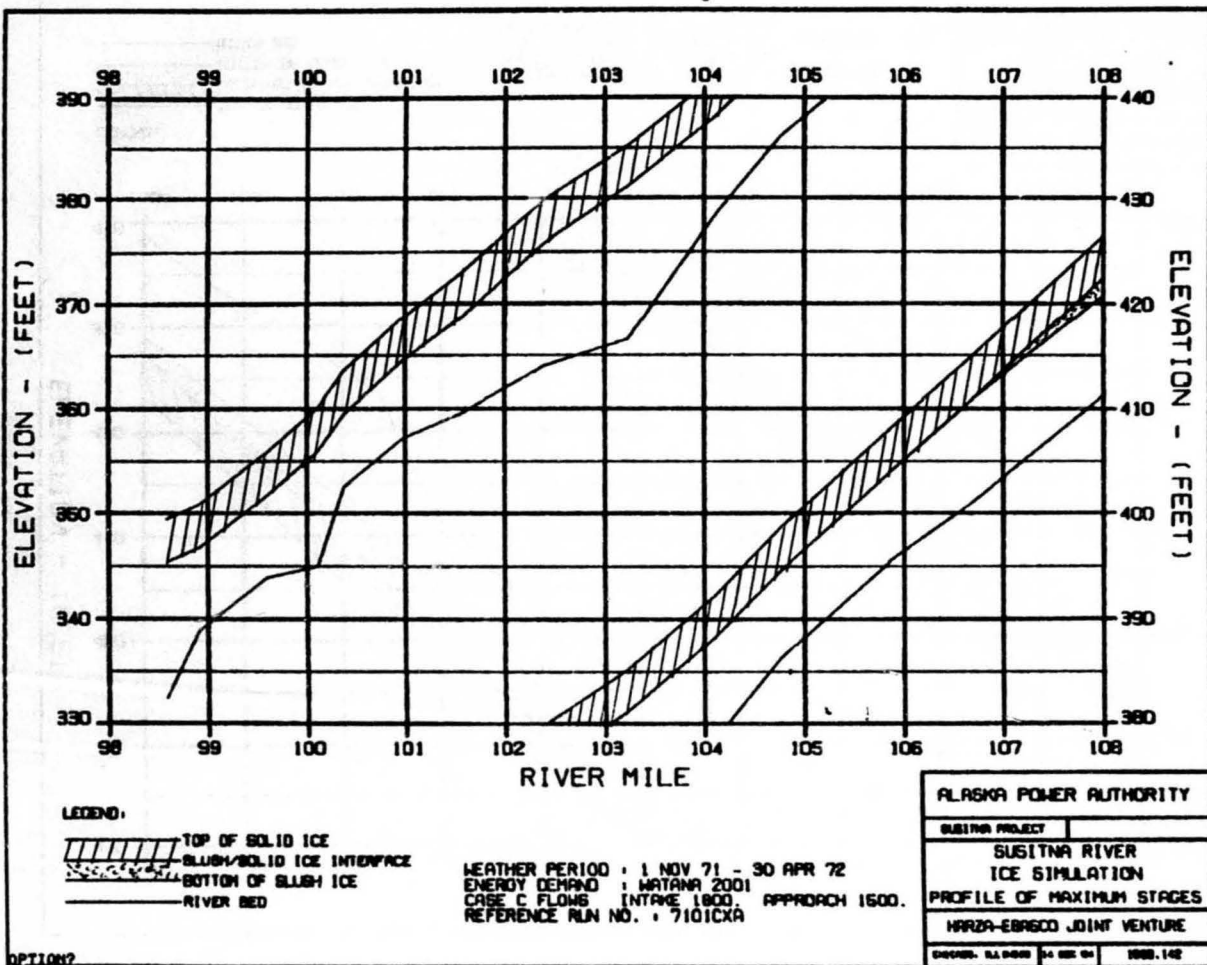
CHIEF: S. L. PETER 14 DEC 72 1000.142

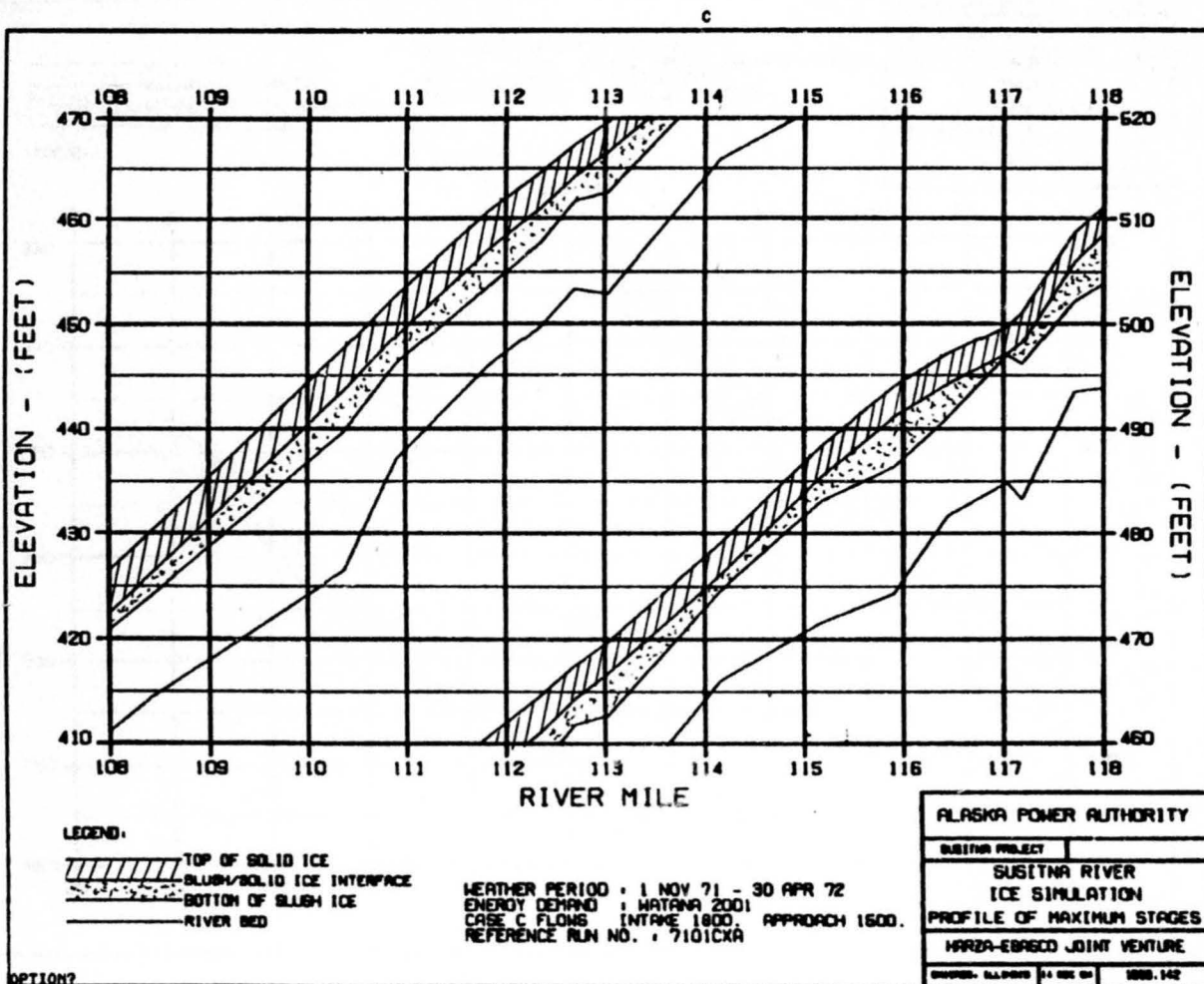
OPTION?

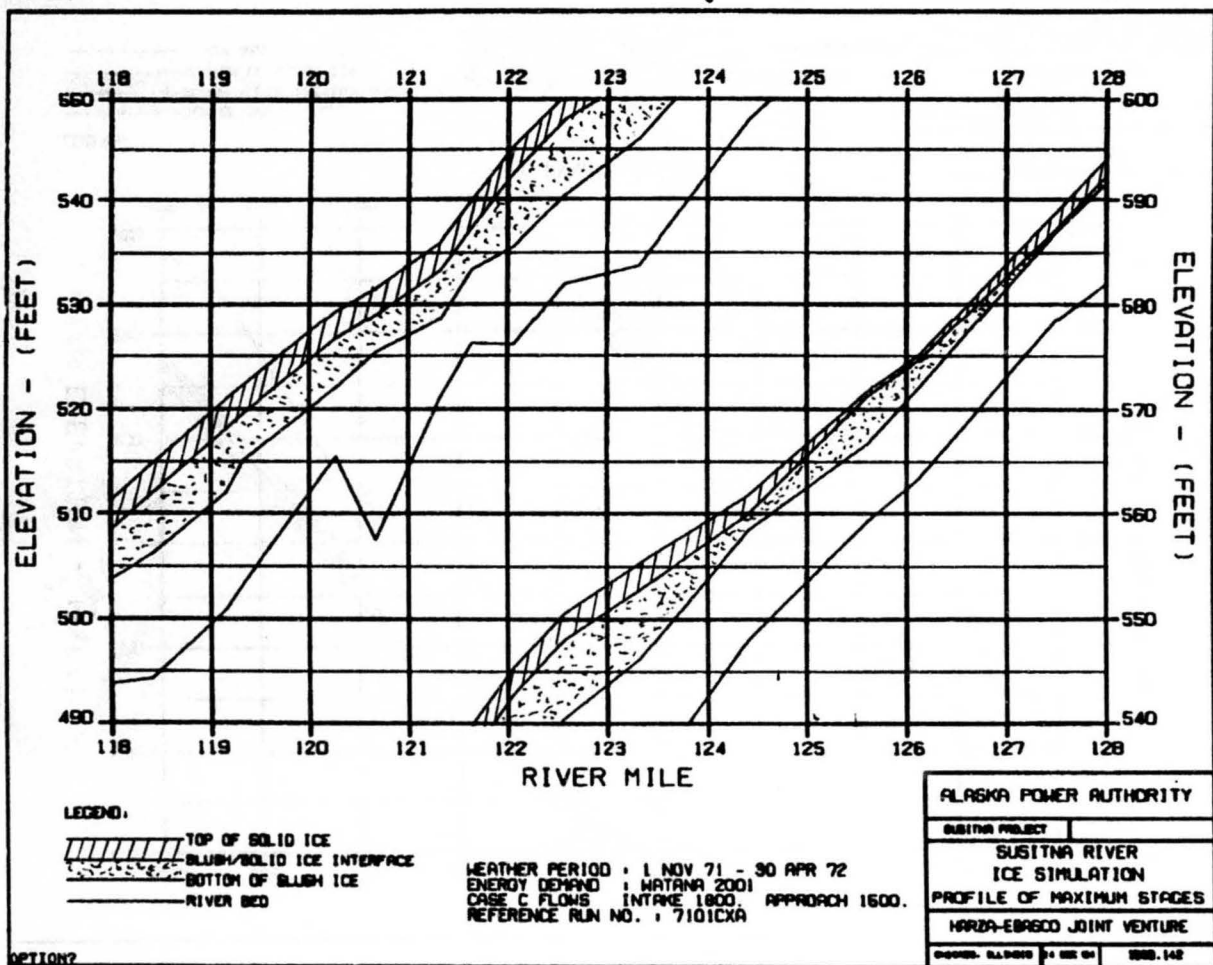


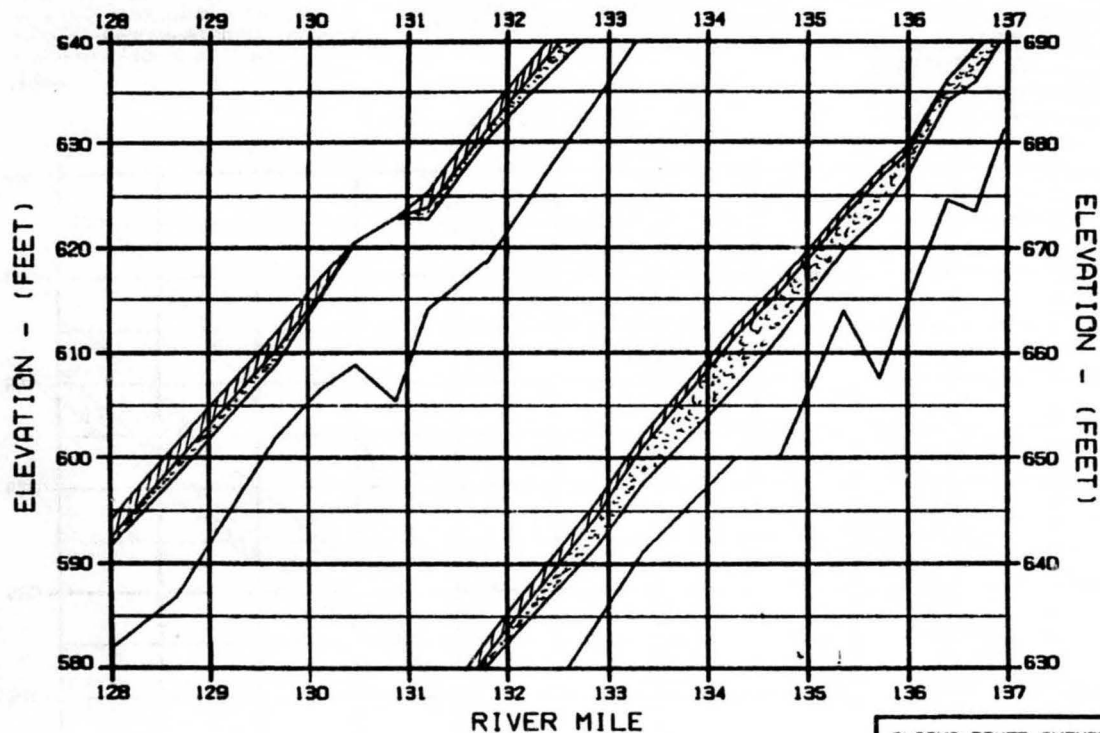
**EXHIBIT T**



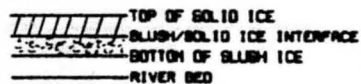








LEGEND:



WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1500.  
 REFERENCE RUN NO. : 7101CXA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

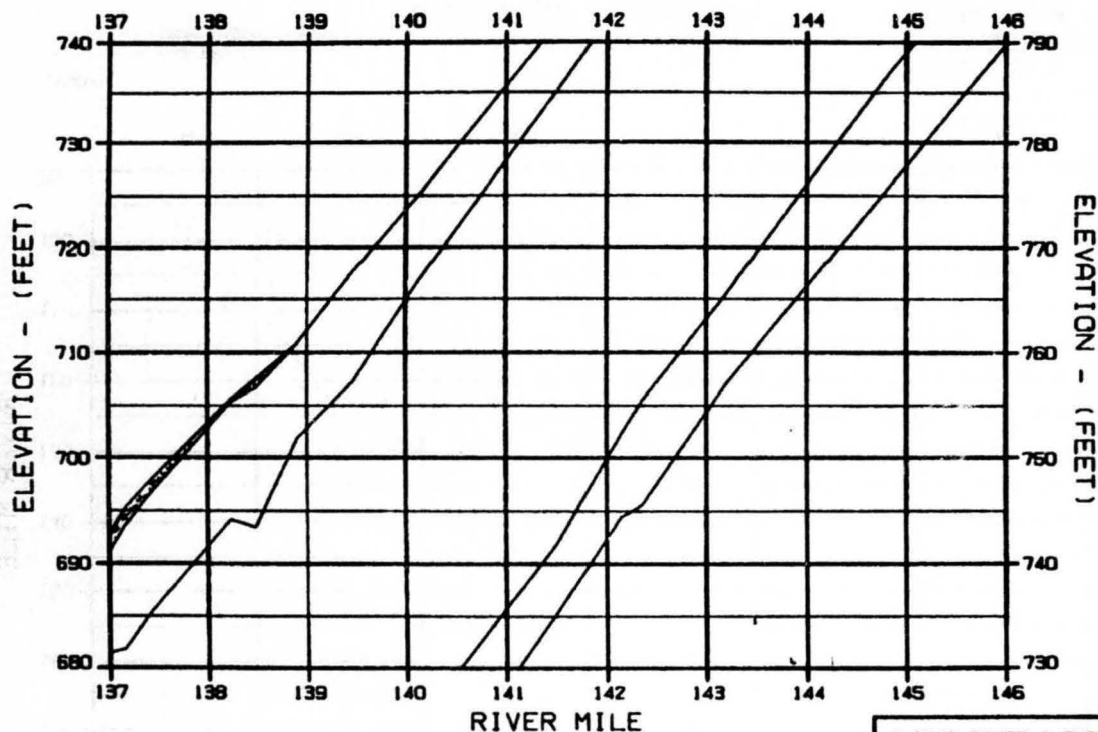
HARZA-EBASCO JOINT VENTURE

DESIGNED BY: B. J. BROWN

DATE: DEC 71

FIG. 142

OPTION 7



**LEGEND.**

TOP OF SOLID ICE  
 SLUSH/SOLID ICE INTERFACE  
 BOTTOM OF SLUSH ICE  
 RIVER BED

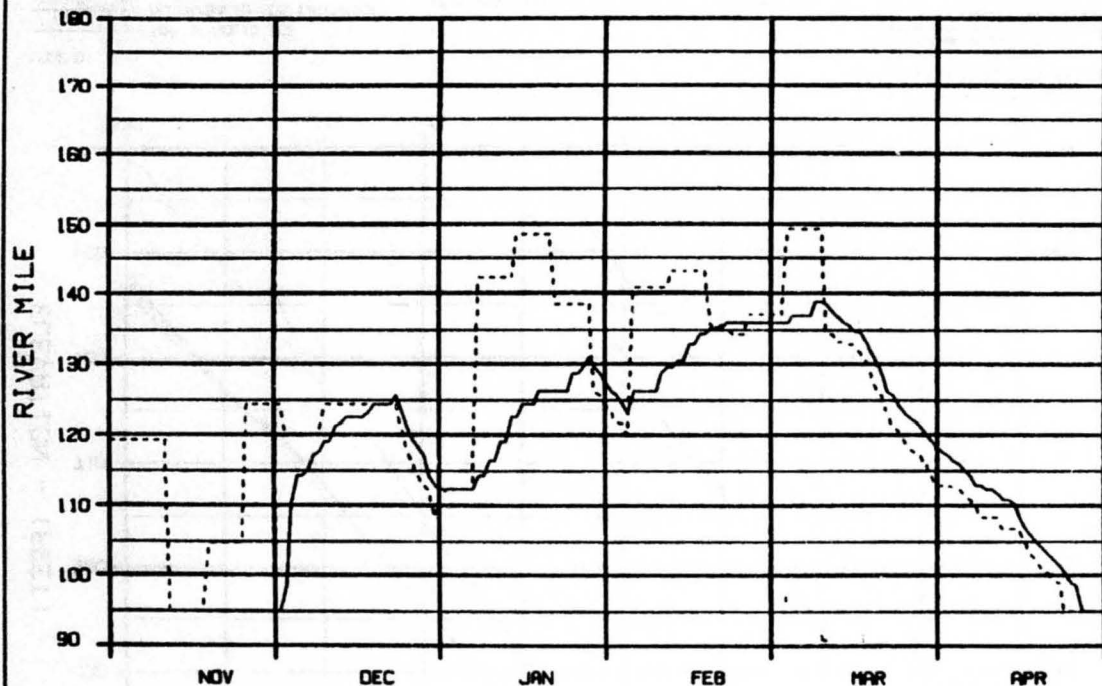
WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800 APPROACH 1500.  
 REFERENCE RUN NO. : 7101CXA

**ALASKA POWER AUTHORITY**

SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES  
 HARZA-EBASCO JOINT VENTURE

DRAWN: A.L. 0400 BY: K.E. 04 0000, 142

OPTION?



## LEGEND.

—— ICE FRONT  
 - - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE C INTAKE 1800. APPROACH 1500.  
 REFERENCE RUN NO. : 7101CXA

## ALASKA POWER AUTHORITY

SUSITNA PROJECT

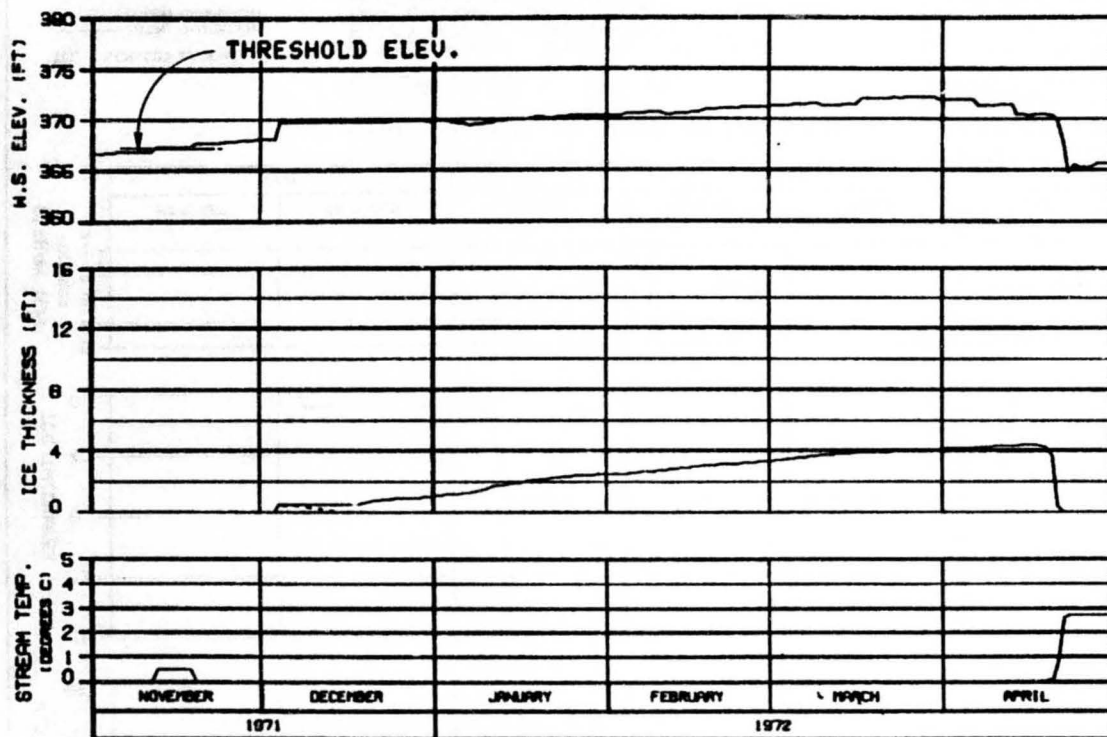
SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

HARZA-EBASCO JOINT VENTURE

DESIGNED BY HARZA ENGINEERS INC. 1000.142

OPTION?





HEAD OF WHISKERS SLOUGH

RIVER MILE : 101.50

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1500.  
 REFERENCE R/I N. NO. : 7101CXA

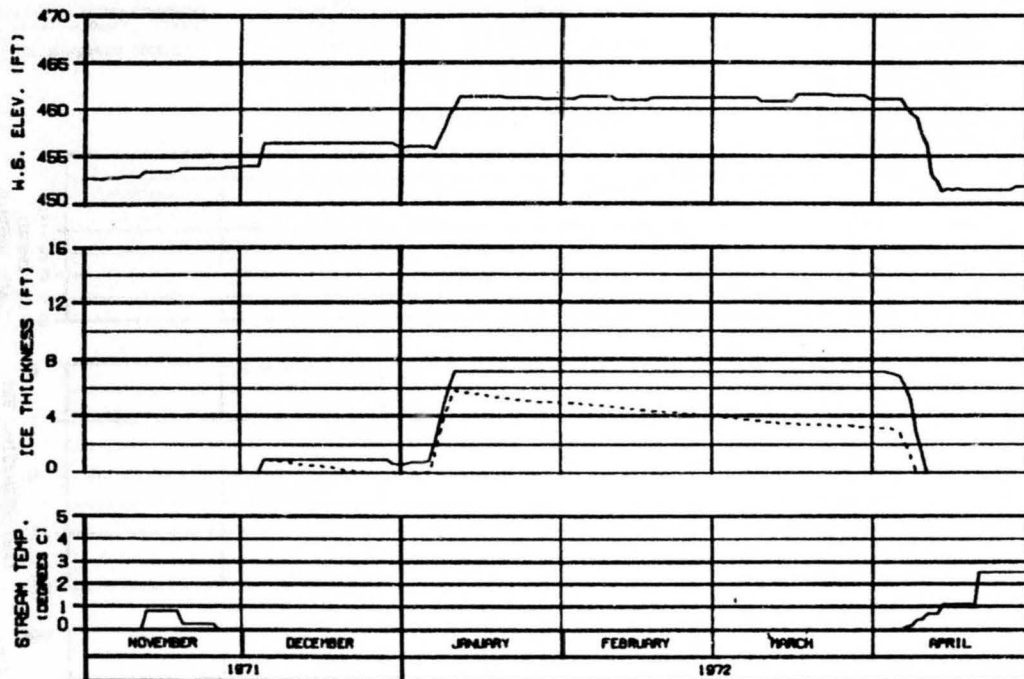
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBERG JOINT VENTURE

DESIGN: B.L. BROWN 3-1 000 04 1000.142



**SIDE CHANNEL AT HEAD OF GASH CREEK**  
**RIVER MILE : 112.00**

**ICE THICKNESS LEGEND:**

—— TOTAL THICKNESS  
 - - - - - BLUISH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1500.  
 REFERENCE RUN NO. : 7101CXA

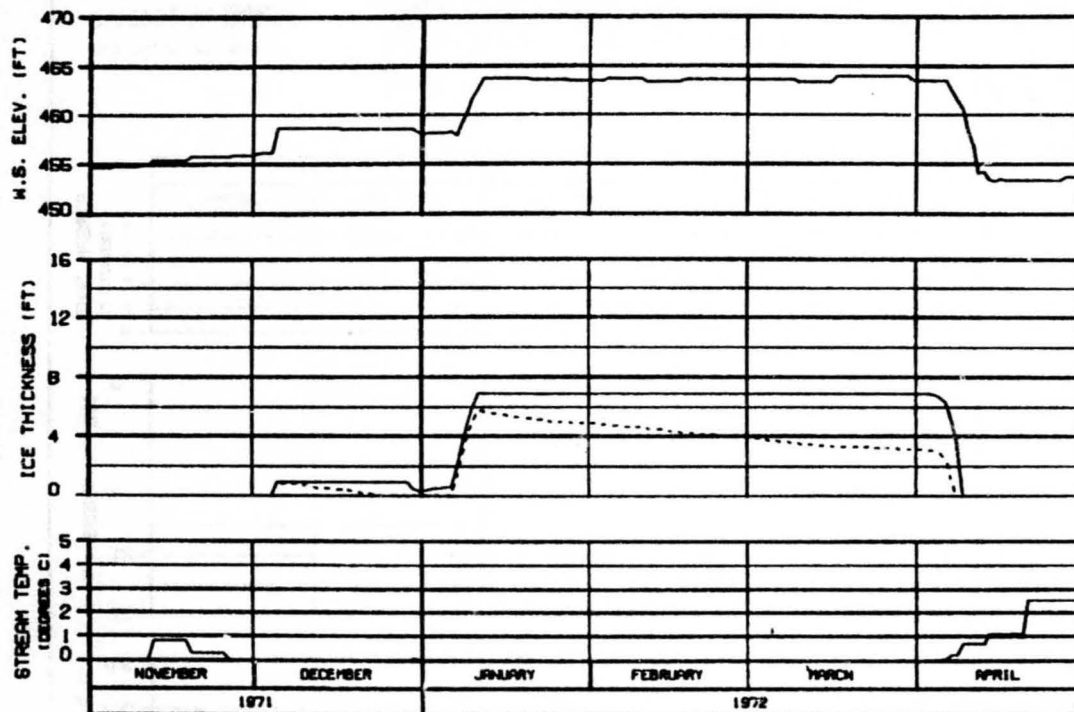
**ALASKA POWER AUTHORITY**

**SUSITNA PROJECT**

**SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY**

**HARZA-EBERD JOINT VENTURE**

CHARTS, ALASKA POWER AUTHORITY 1980, 142



MOUTH OF SLOUGH 6A

RIVER MILE : 112.34

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : NATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1500.  
 REFERENCE RUN NO. : 7101CXA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER

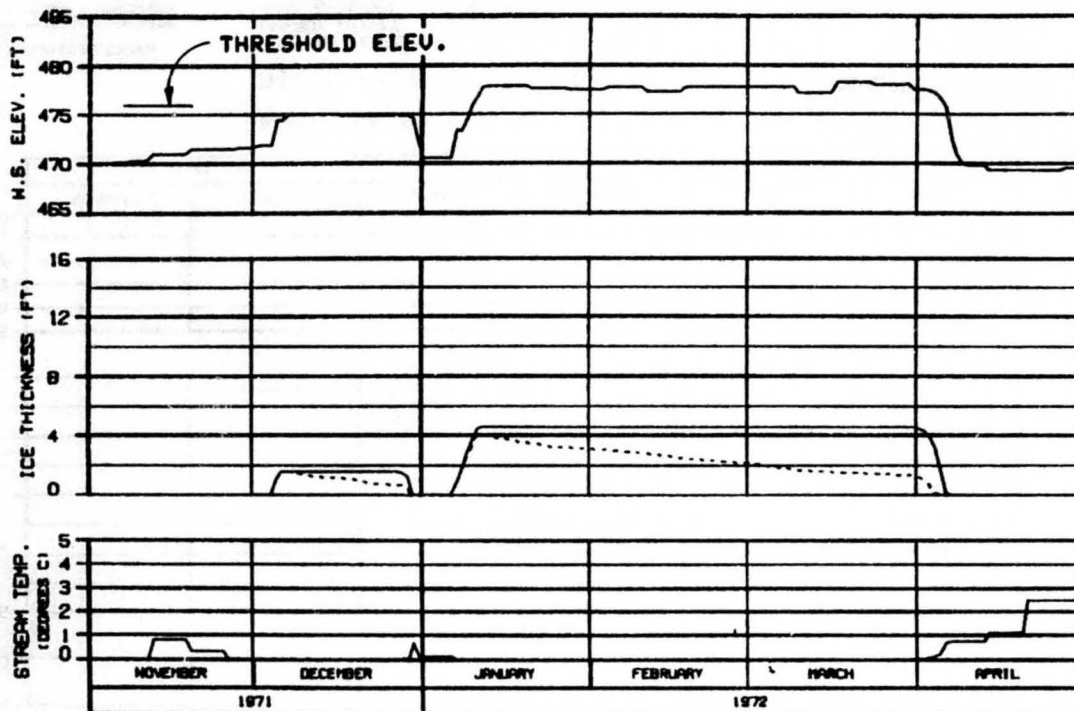
ICE SIMULATION

TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: ALLP/SS BY: SEE 04

ISS. 142



HEAD OF SLOUGH 8

RIVER MILE : 114.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - BLUISH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1500.  
 REFERENCE RUN NO. : 7101CXA

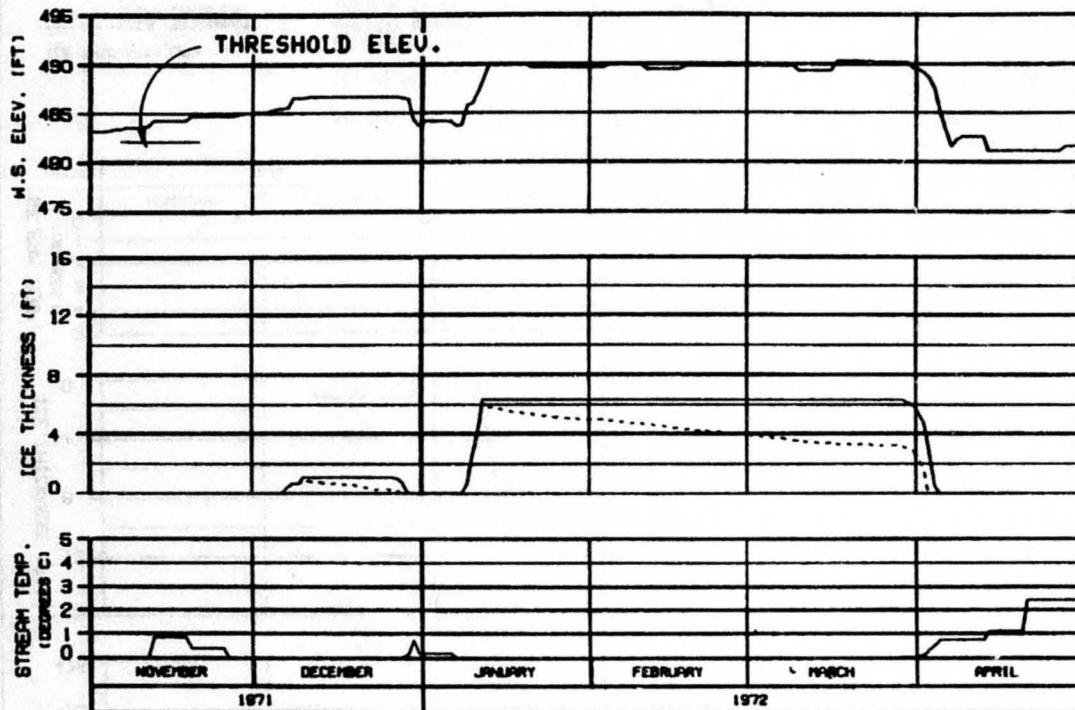
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

COMPUTED BY: J. J. JENSEN 24 APR 72 1982, 142



**SIDE CHANNEL MSII**  
**RIVER MILE : 115.50**

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1500.  
 REFERENCE RUN NO. : 7101CKA

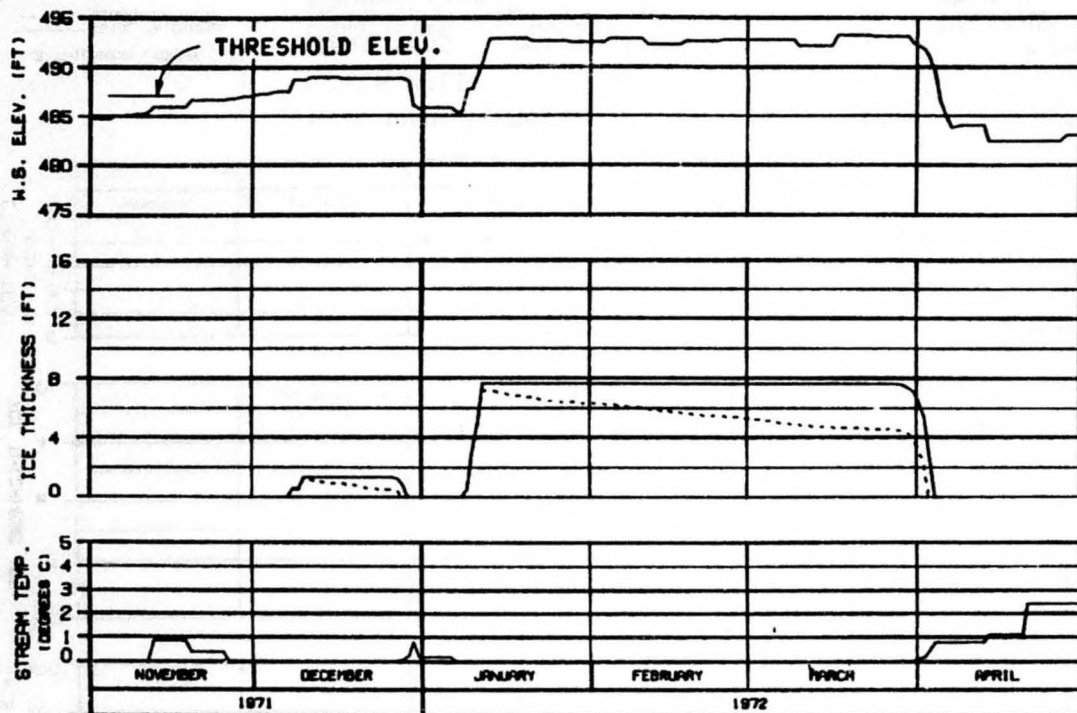
**ALASKA POWER AUTHORITY**

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBERLE JOINT VENTURE

DESIGNED BY: ALASKA POWER AUTHORITY



HEAD OF SIDE CHANNEL MSII  
RIVER MILE : 115.90

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800. APPROXCH 1500.  
REFERENCE RUN NO. : 7101CXA

ICE THICKNESS LEGEND:

———— TOTAL THICKNESS  
----- SLUSH COMPONENT

ALASKA POWER AUTHORITY

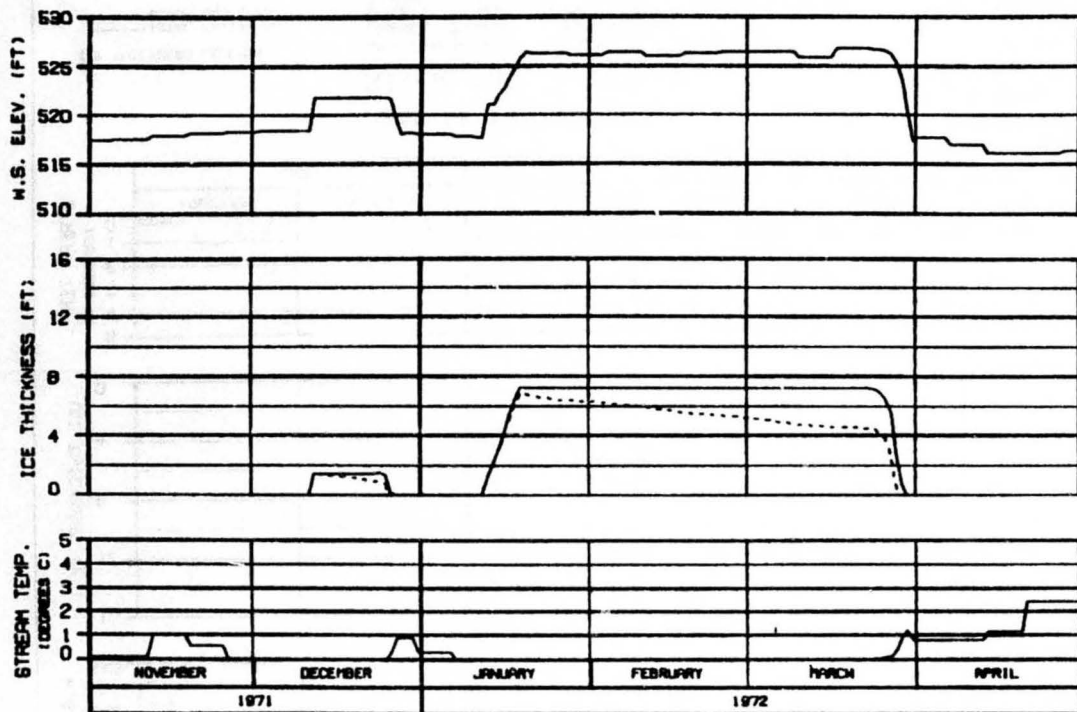
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN. 3-1-72 BY 34 100. 142





ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - BLUISH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1500.  
 REFERENCE RUN NO. : 7101CXA

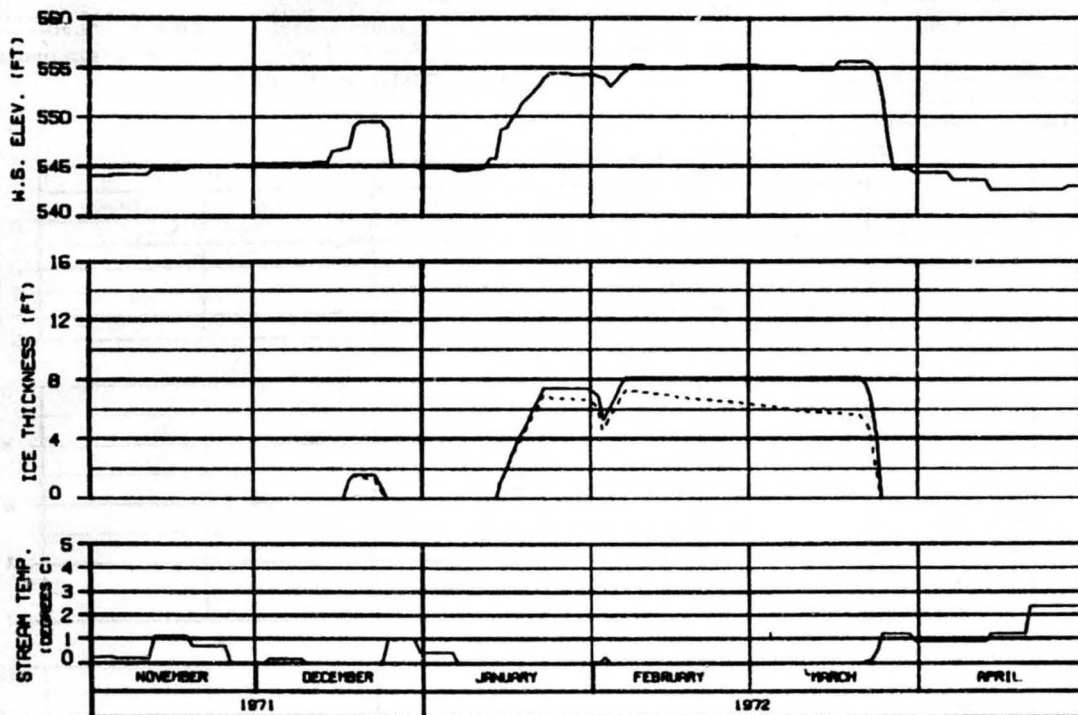
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACO JOINT VENTURE

DESIGNED BY HARZA ENGINEERS INC. DRAWING NO. 142

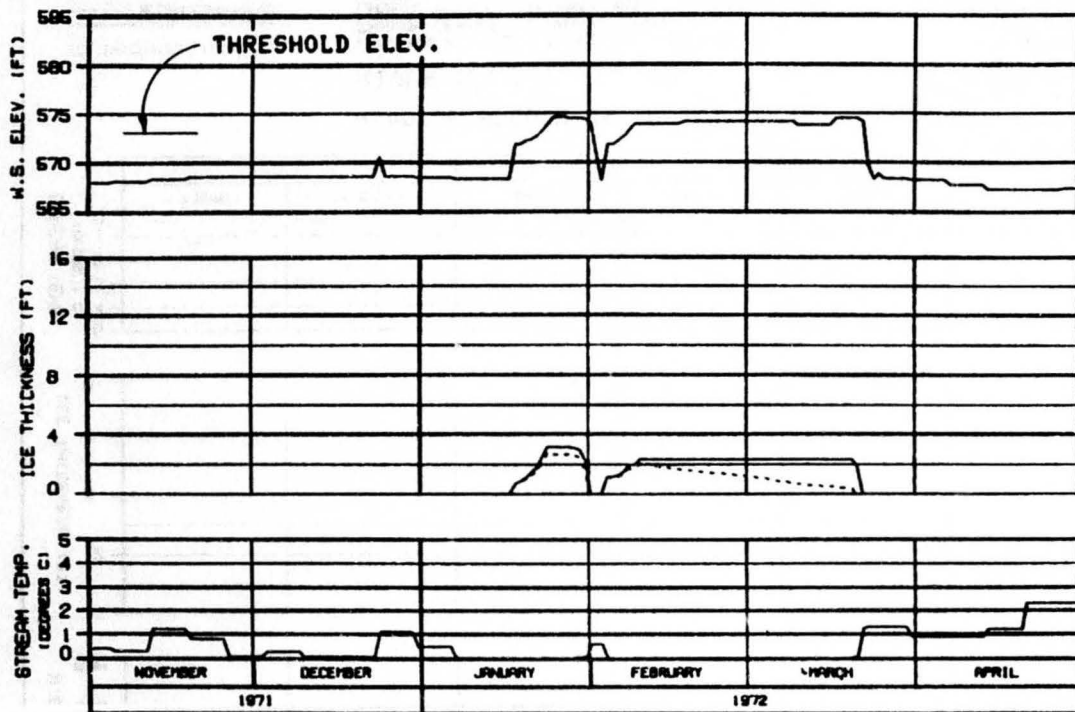


# HEAD OF MOOSE SLOUGH RIVER MILE : 123.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800. APPROACH 1500.  
REFERENCE RUN NO. : 7101CXA

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER	
ICE SIMULATION	
TIME HISTORY	
WARZA-EBRARD JOINT VENTURE	
OWNER: ALASKA	ISSN: 142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : NATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1500.  
 REFERENCE RUN NO. : 7101CXA

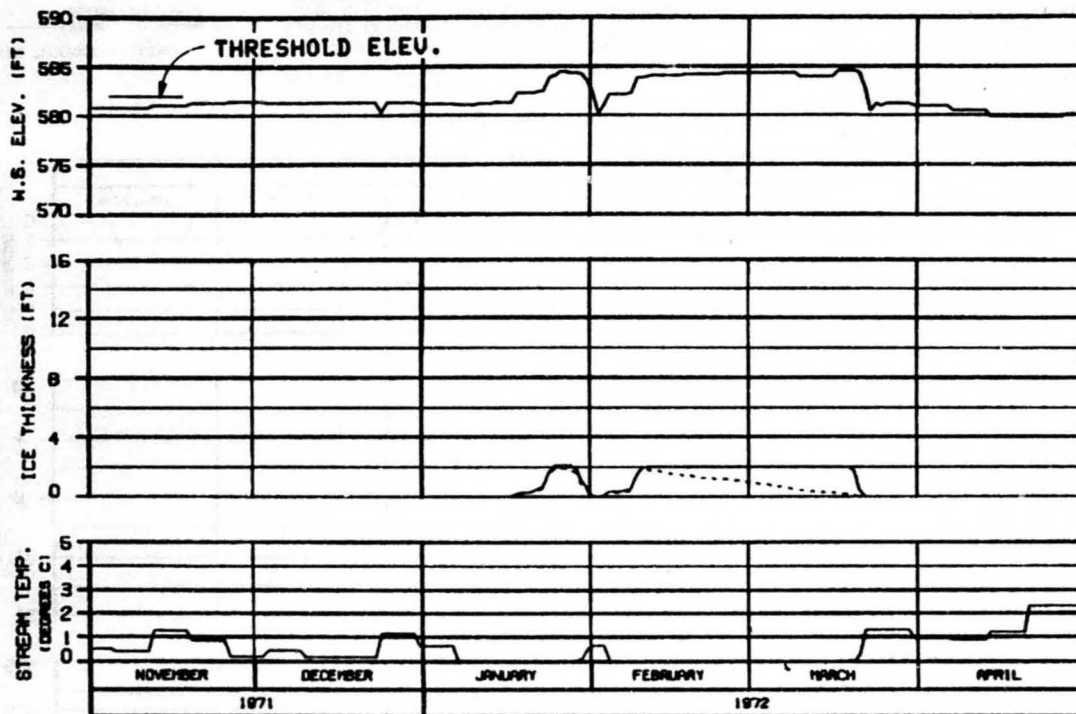
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EDBECO JOINT VENTURE

SHOWN: 01-0000 1A SEE 0A 0000.142



HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

———— TOTAL THICKNESS  
 - - - - - BLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800, APPROACH 1500.  
 REFERENCE RUN NO. : 7101CXA

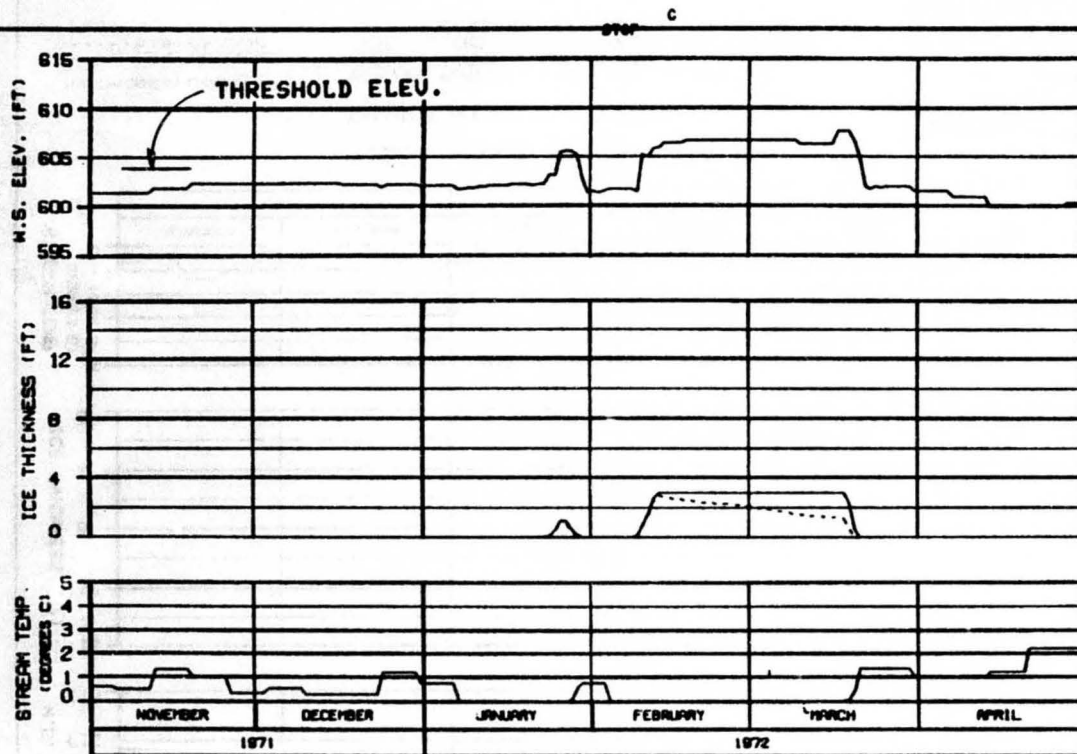
ALASKA POWER AUTHORITY

GUSTINA PROJECT

GUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRSCO JOINT VENTURE

DESIGN: B.L. BROWN BY: R.E. GRIFFIN 1000.142



HEAD OF SLOUGH 9

RIVER MILE : 129.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1500.  
 REFERENCE RUN NO. : 7101CXA

ALASKA POWER AUTHORITY

SUSTINA PROJECT

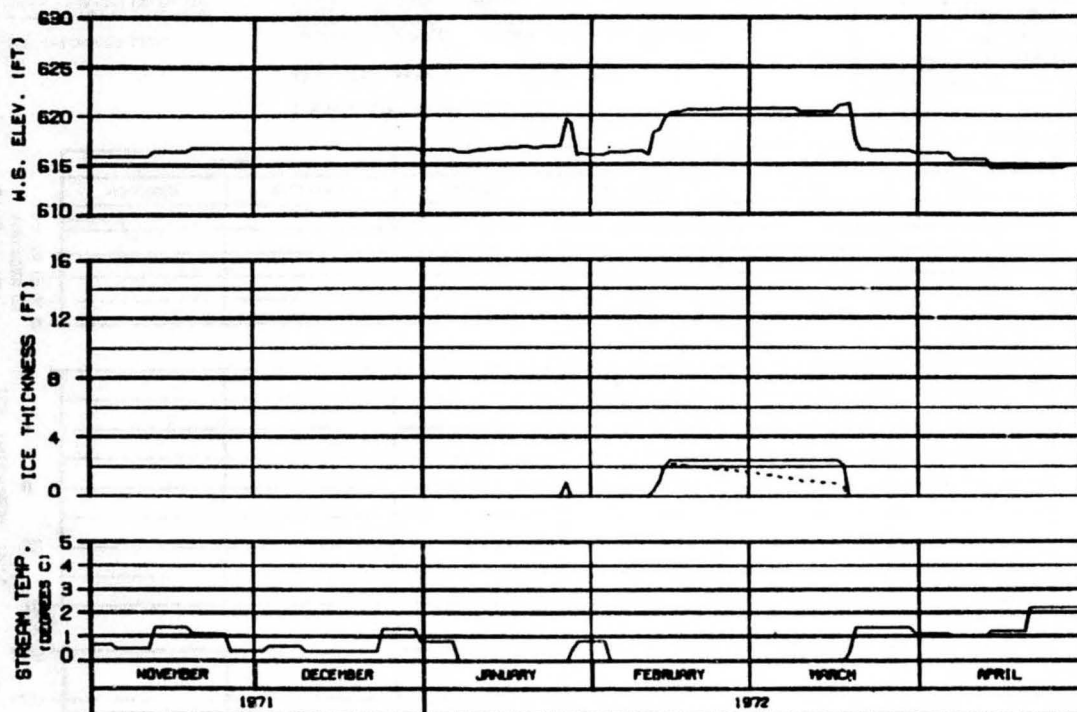
SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRARD JOINT VENTURE

DESIGN: EBRARD & ASSOCIATES INC. 1988.142

OPTION?

OPTION 7



SIDE CHANNEL U/S OF SLOUGH 9

RIVER MILE : 130.60

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1500.  
 REFERENCE RUN NO. : 7101CXA

ALASKA POWER AUTHORITY

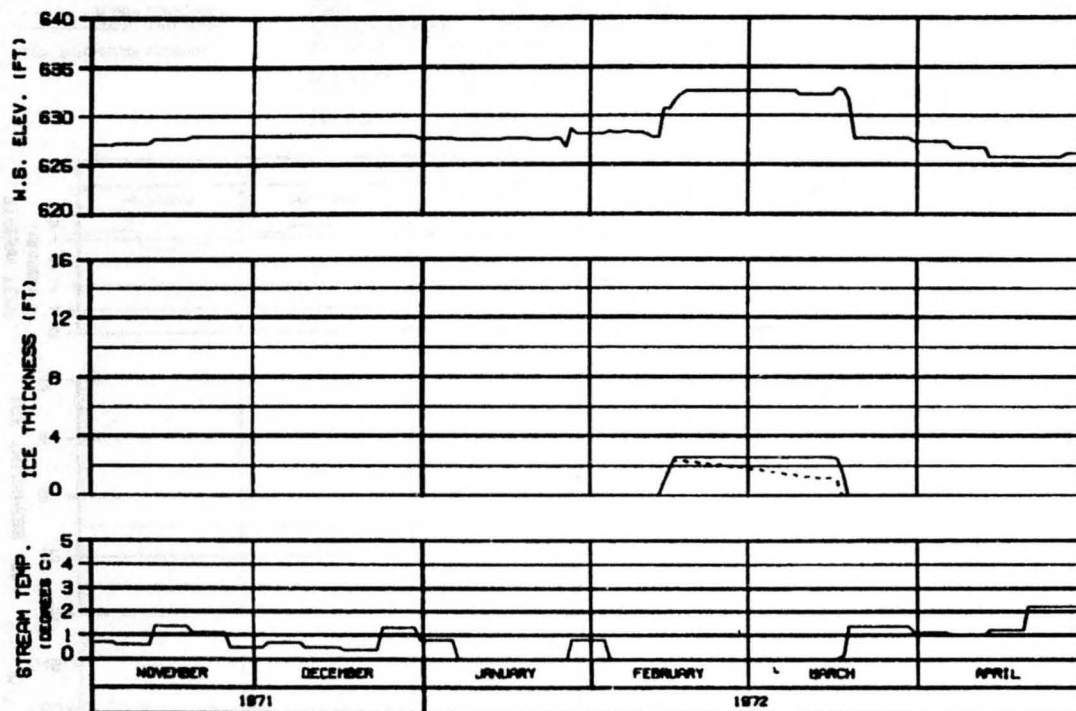
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBASCO JOINT VENTURE

DESIGNED: AL-01000 14 DEC 81 1000.142





SIDE CHANNEL U/S OF 4TH JULY CREEK  
RIVER MILE : 131.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800. APPROACH 1500.  
REFERENCE RUN NO. : 7101CXA

ALASKA POWER AUTHORITY

SUSTINA PROJECT

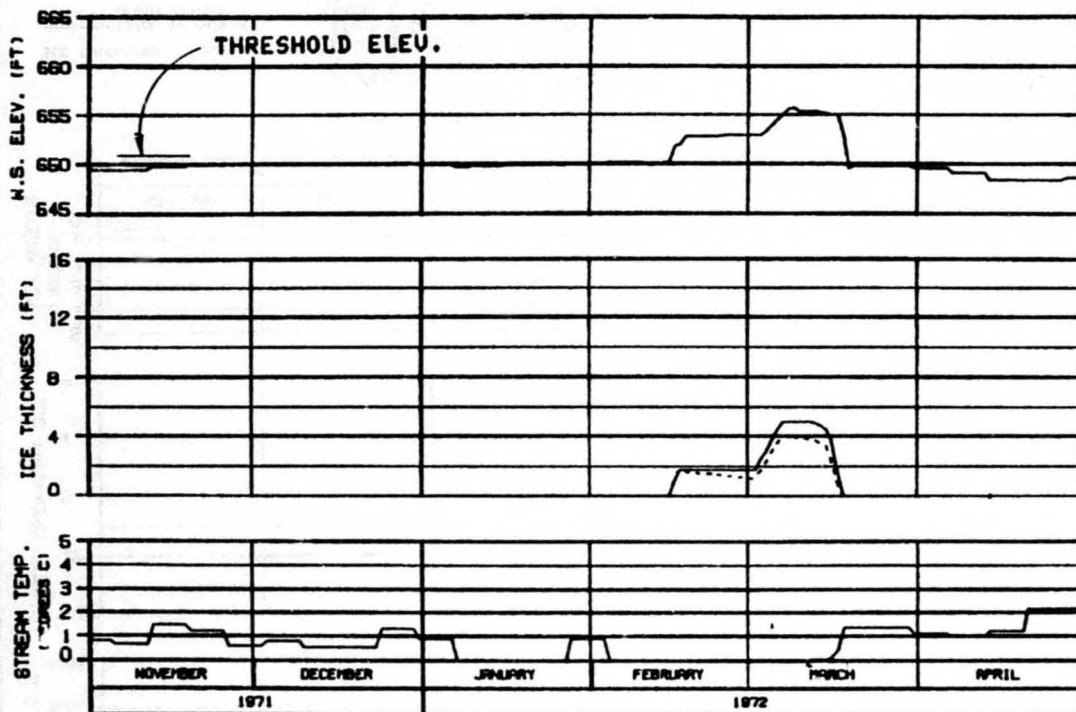
SUSTITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARDA-EBRSCO JOINT VENTURE

DESIGN: ALP/MS

DATE: 04/82

1000.142



HEAD OF SLOUGH 9A  
RIVER MILE : 133.70

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800. APPROACH 1500.  
REFERENCE RUN NO. : 7101CXA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

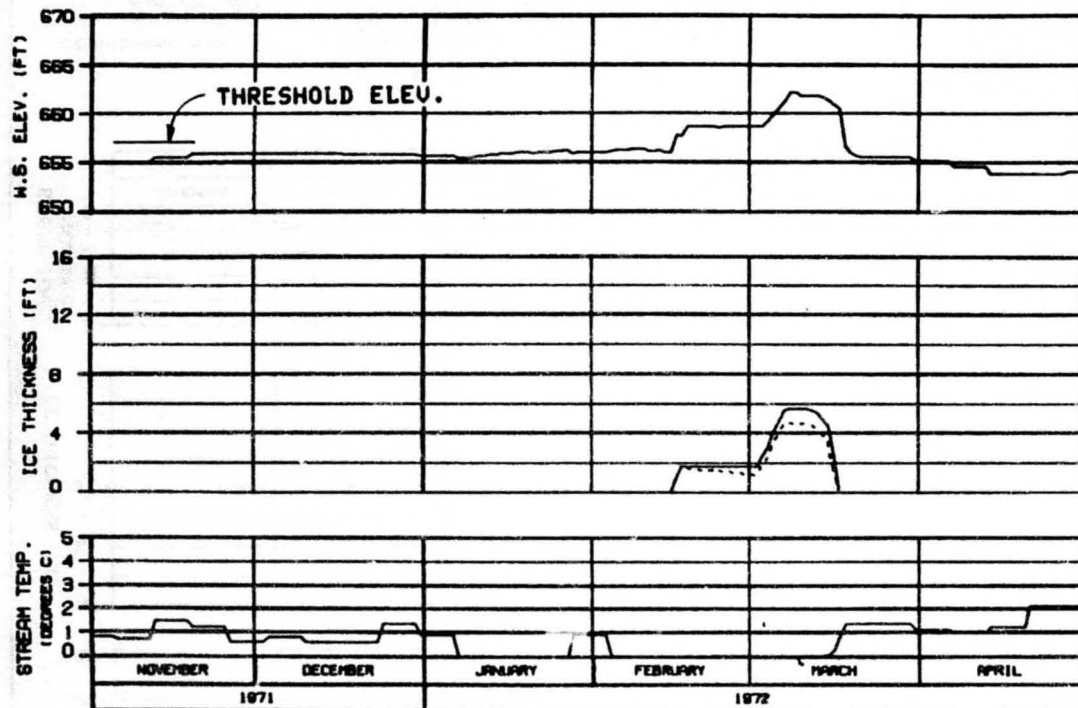
HARZA-EBASCO JOINT VENTURE

DESIGNED BY

ALASKA

14 DEC 72

1000.142



**SIDE CHANNEL U/S OF SLOUGH 10**  
**RIVER MILE : 134.30**

**ICE THICKNESS LEGEND:**

—— TOTAL THICKNESS  
 - - - - BLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANAI 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1500.  
 REFERENCE RUN NO. : 71-11CX

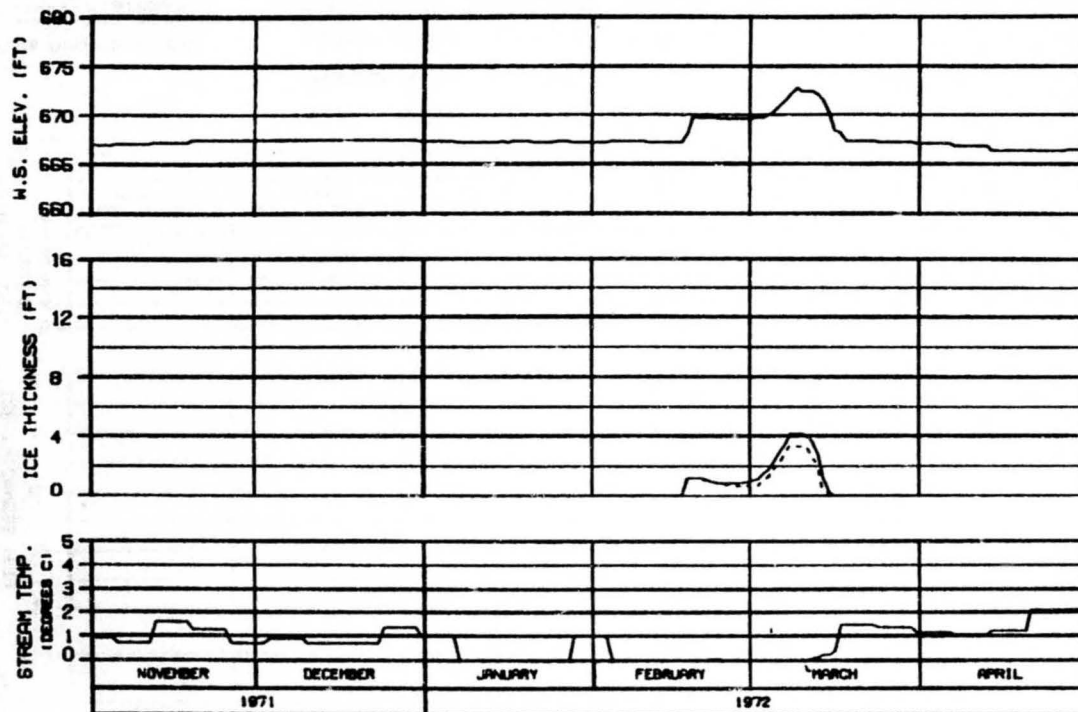
**ALASKA POWER AUTHORITY**

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACO JOINT VENTURE

CHIEF, ALASKA P. & E. DIV. 1000.142



SIDE CHANNEL D/S OF SLOUGH 11

RIVER MILE : 135.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1500.  
 REFERENCE RUN NO. : 7101CXA

ALASKA POWER AUTHORITY

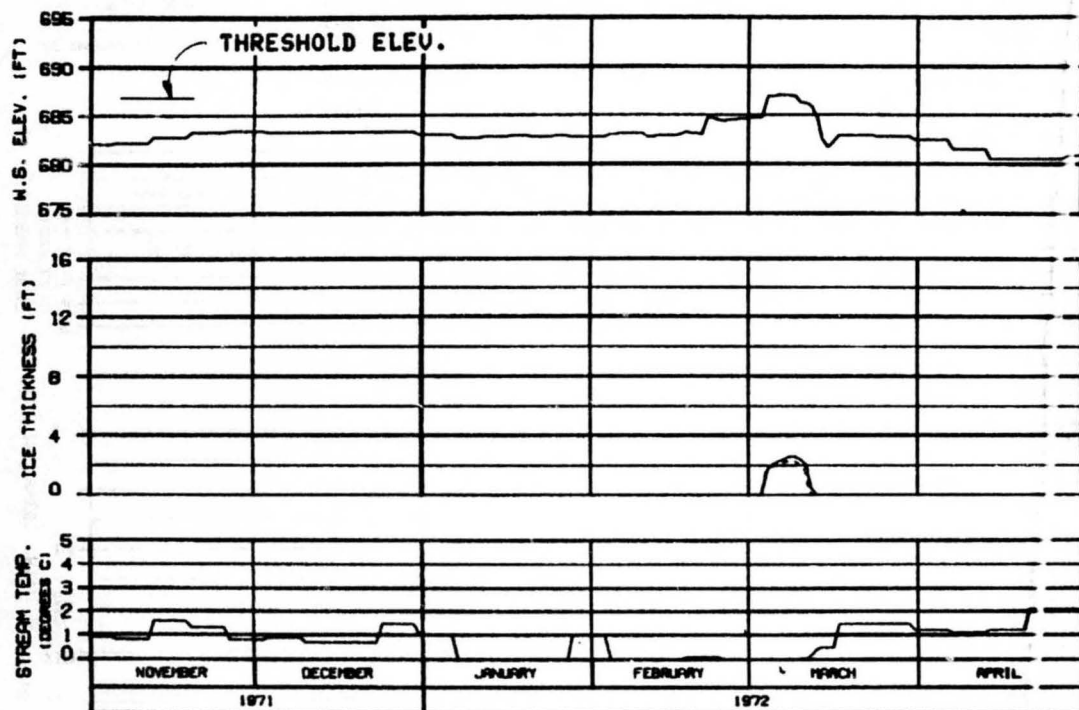
SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN, ALASKA POWER AUTHORITY

NOV. 1972



HEAD OF SLOUGH 11  
RIVER MILE : 136.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800. APPROACH 1500.  
REFERENCE RUN NO. : 7101CXA

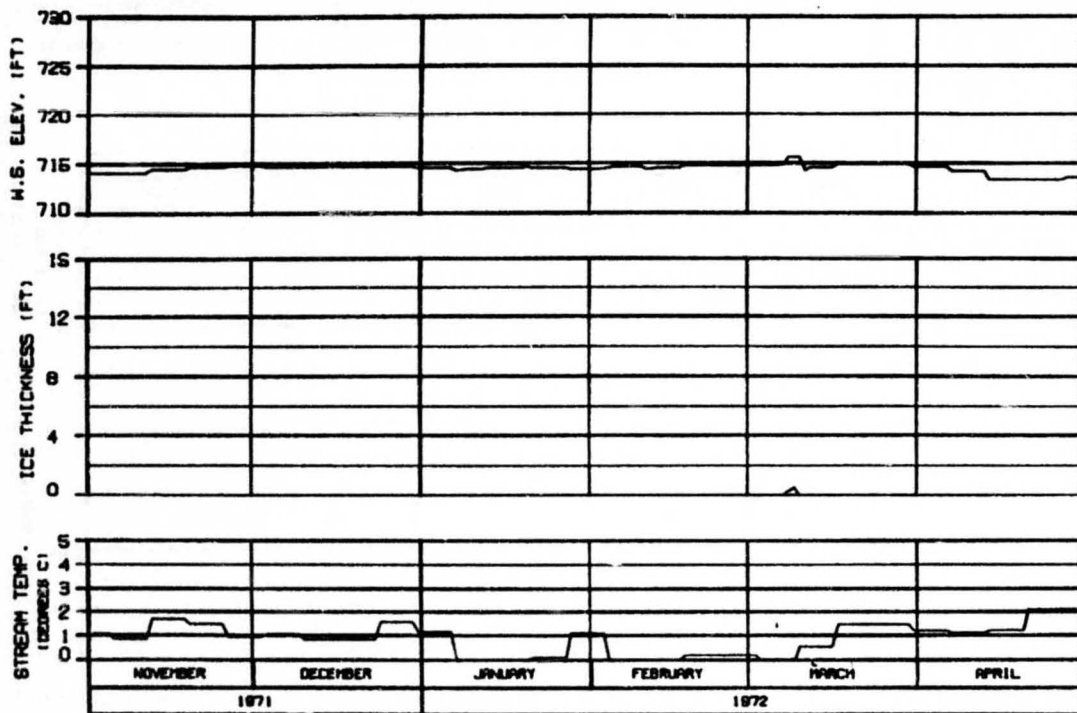
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN - ANALYSIS BY CH 1000.142



HEAD OF SLOUGH 17  
RIVER MILE : 139.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLOUGH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800, APPROACH 1500.  
REFERENCE RUN NO. : 7101CXA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

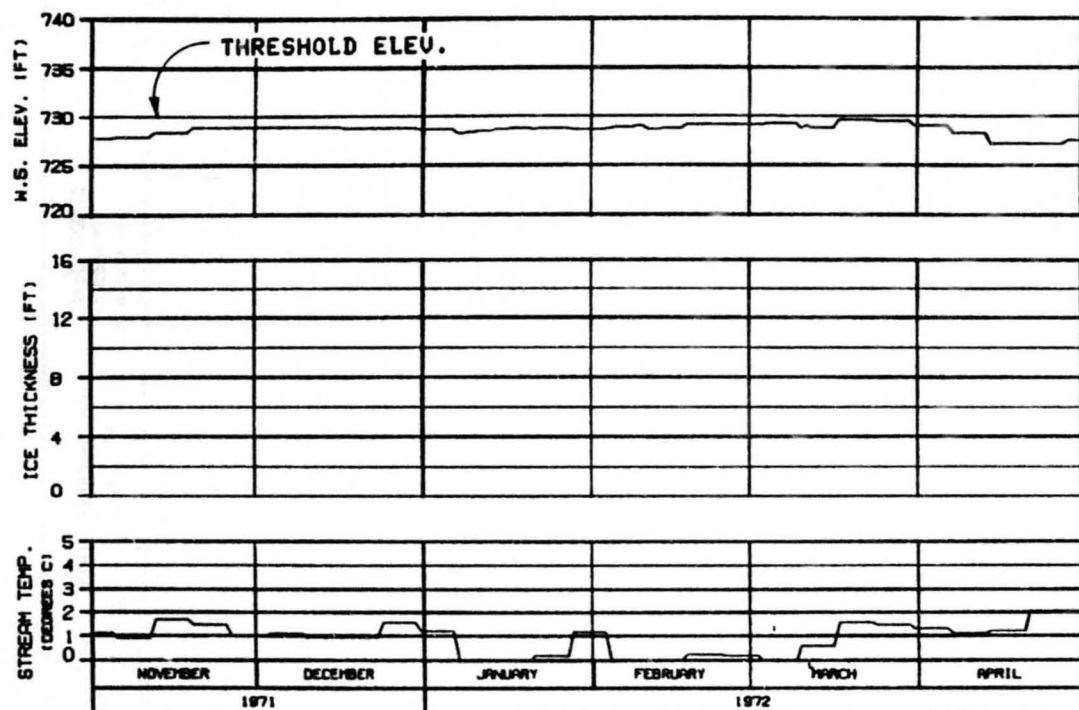
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBRACCO JOINT VENTURE

DRAWN: AL-0000 10 DEC 81

ISS. 142





HEAD OF SLOUGH 20

RIVER MILE : 140.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : HATANA 2001  
 CASE C FLOWS INTAKE 1800, APPROACH 1500.  
 REFERENCE RUN NO. : 7101CXA

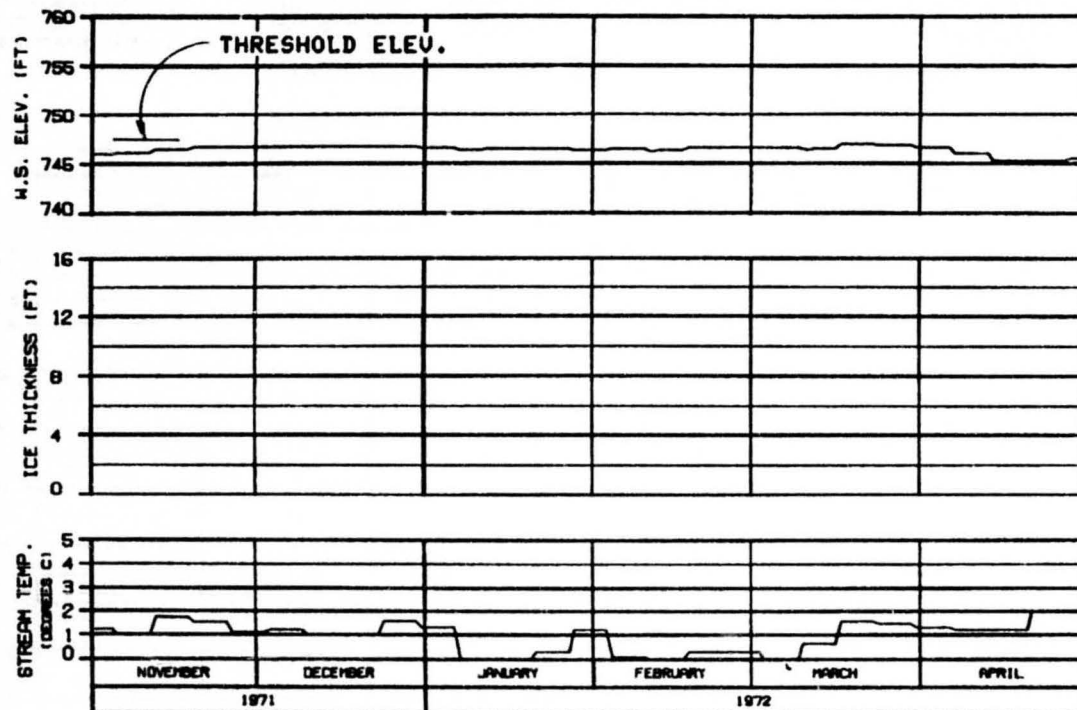
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACCO JOINT VENTURE

ENGINEER, ALASKA POWER AUTHORITY 1500.142



SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1500.  
 REFERENCE RUN NO. : 7101CXA

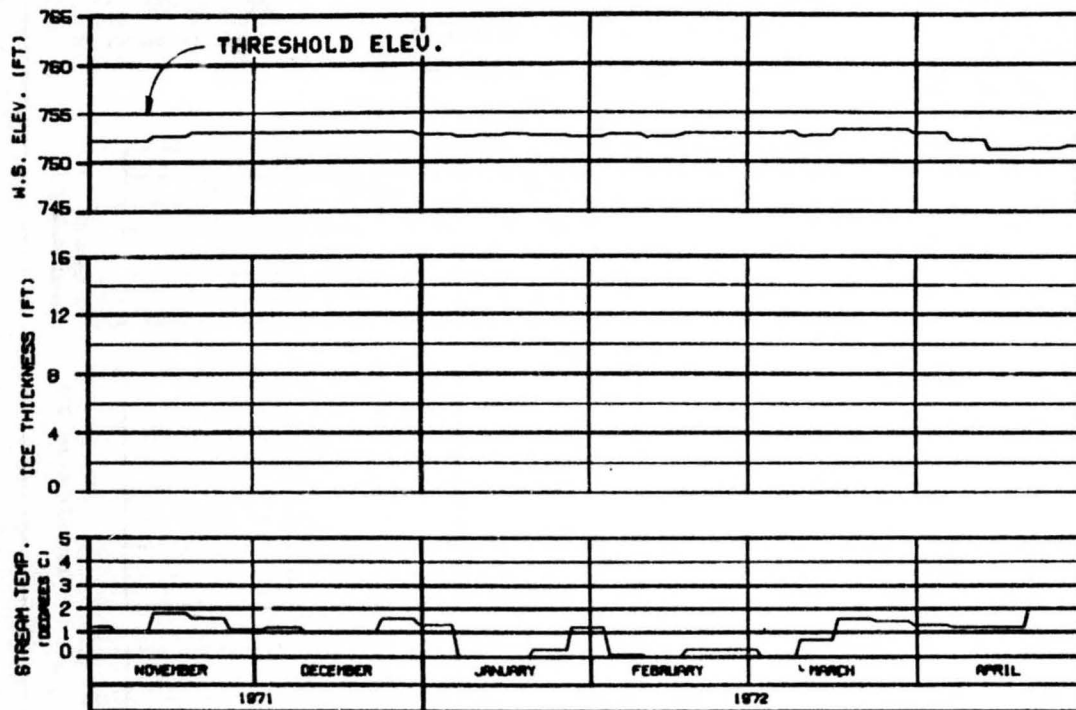
ALASKA POWER AUTHORITY

SUSTITNA PROJECT

SUSTITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED BY: H. H. HARRIS 14 APR 74 1000.142



HEAD OF SLOUGH 21

RIVER MILE : 142.20

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS INTAKE 1800. APPROACH 1500.  
 REFERENCE RUN NO. : 7101CXA

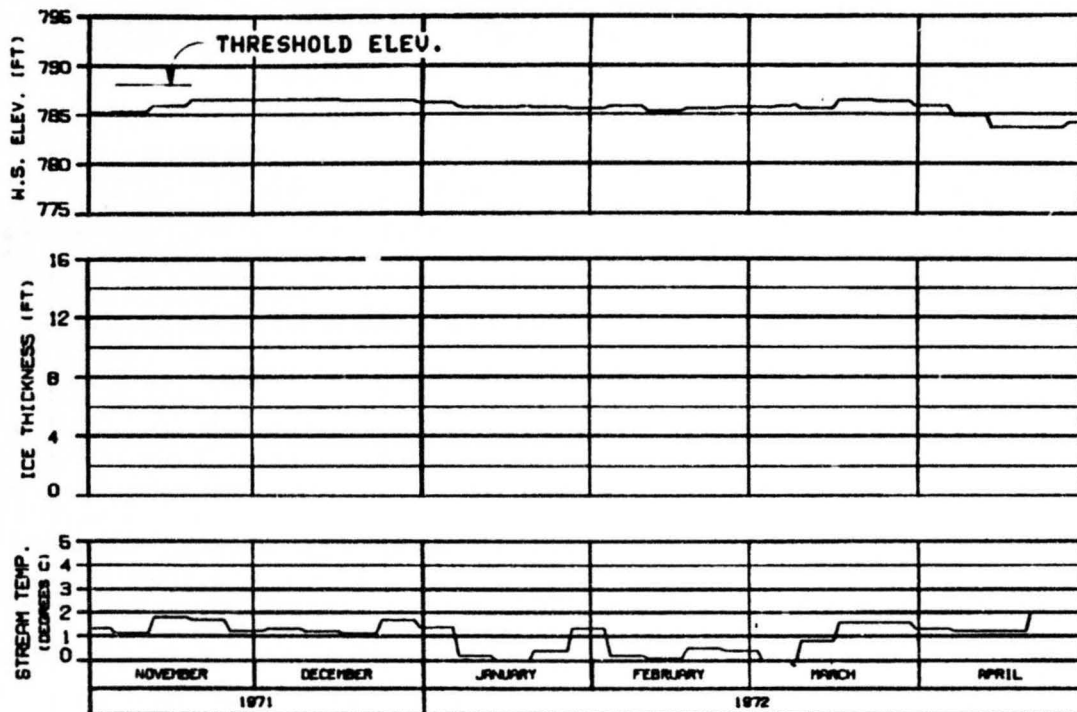
ALASKA POWER AUTHORITY

SUSTITNA PROJECT

SUSTITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGNED - S. J. DAVIS BY S. J. DAVIS 1000-142



HEAD OF SLOUGH 22  
RIVER MILE : 144.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS INTAKE 1800 APPROACH 1500.  
REFERENCE RUN NO. : 7101CXA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

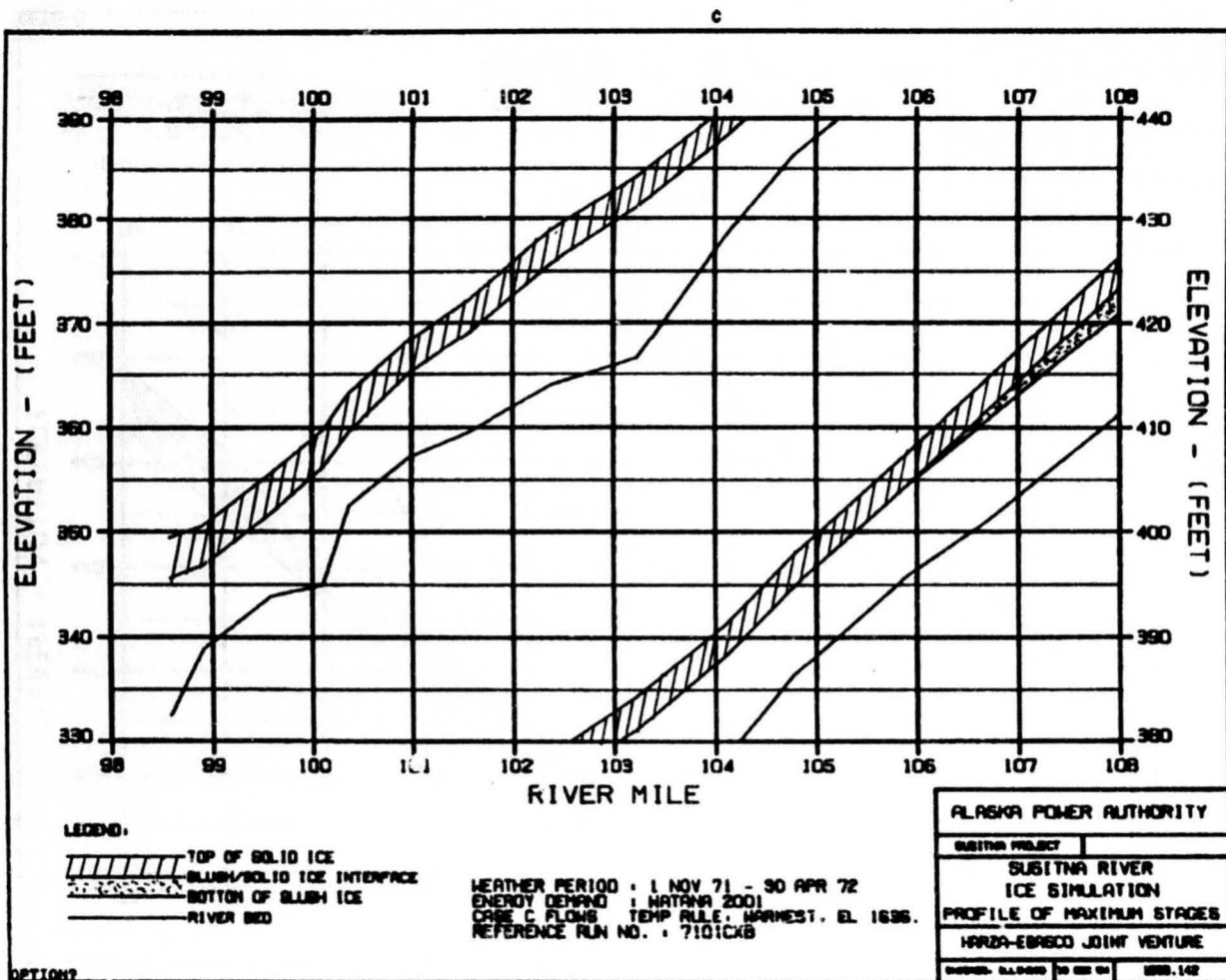
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBR600 JOINT VENTURE

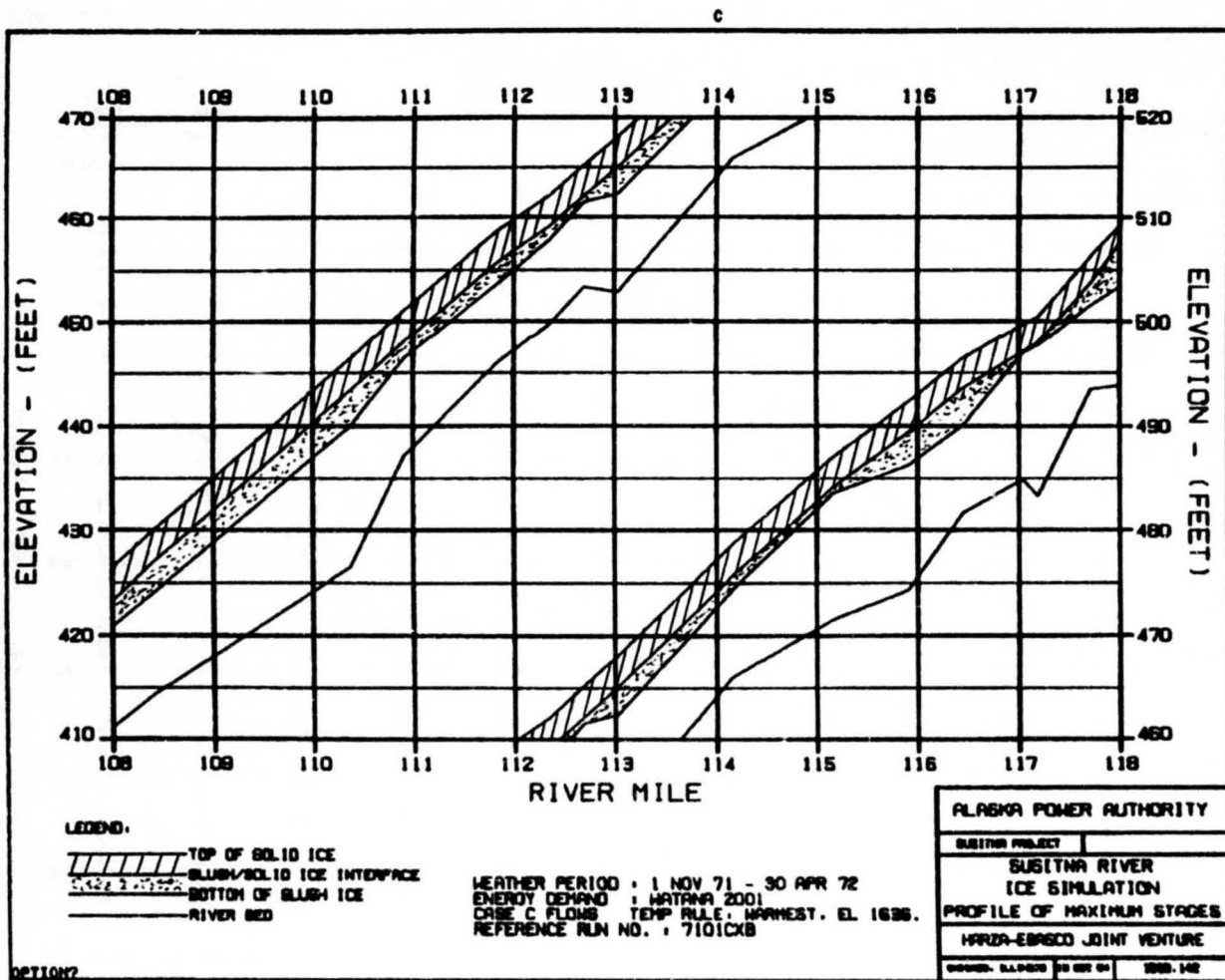
SHOWN: SLUSH 14 ME 01 1000.142

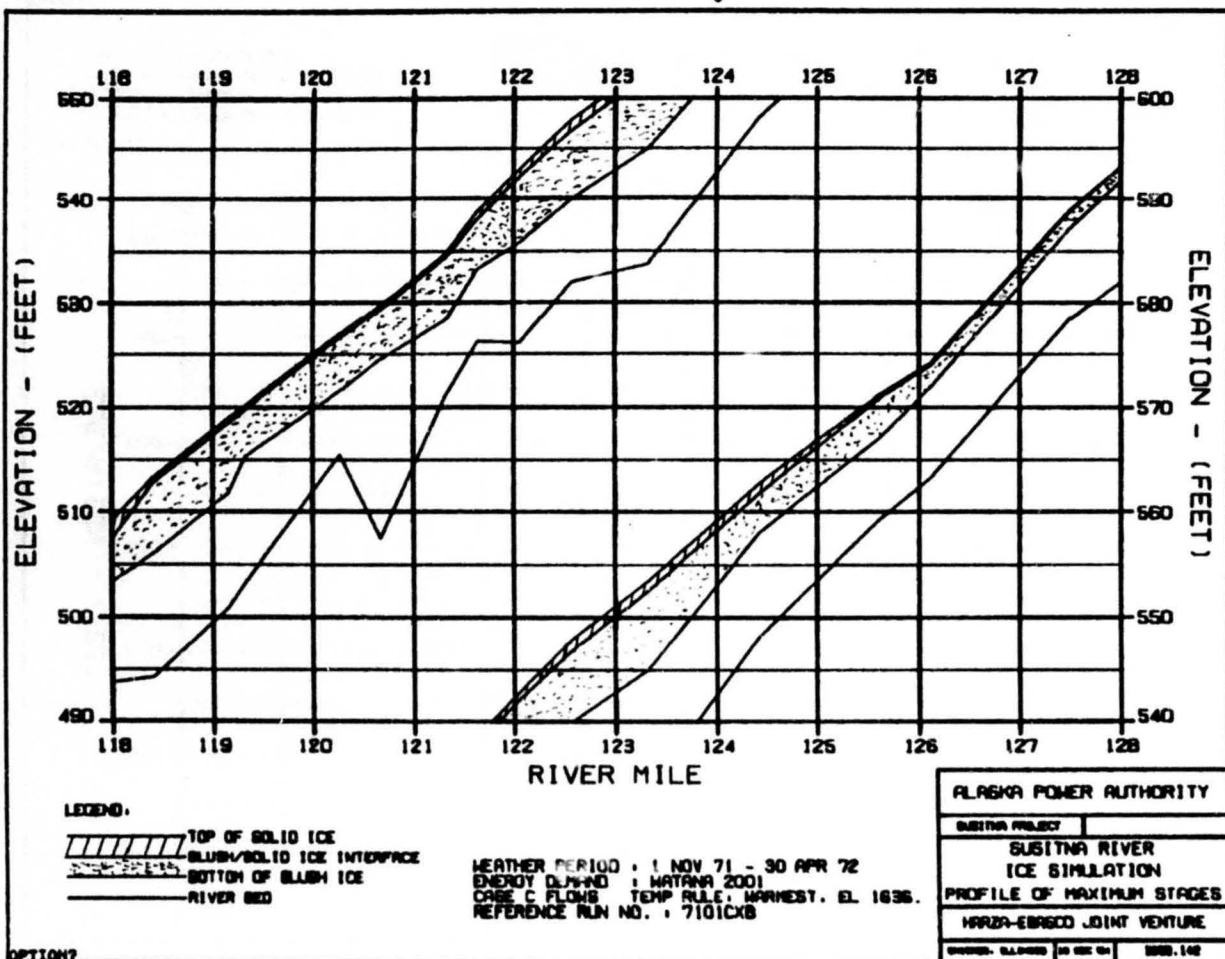
OPTION?

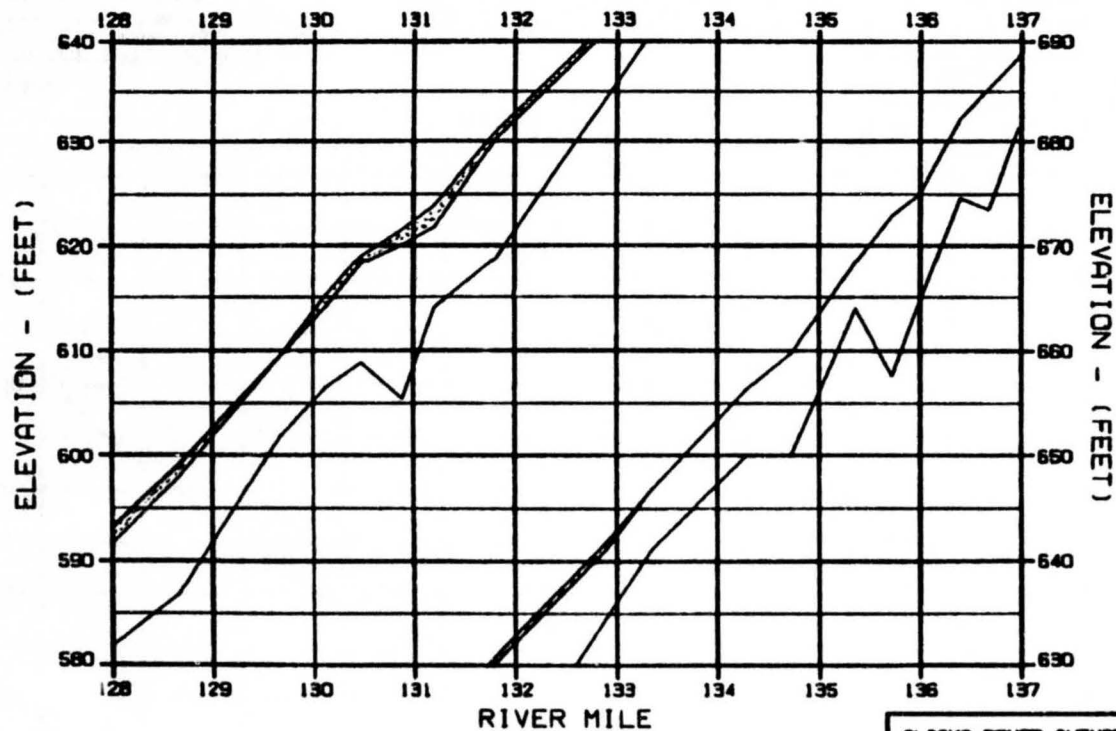
**EXHIBIT U**












**LEGEND:**


 TOP OF SOLID ICE  
 SLUSH/SOLID ICE INTERFACE  
 BOTTOM OF SLUSH ICE  
 RIVER BED

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE, HARVEST, EL 1636.  
REFERENCE RUN NO. : 7101CXB

ALASKA POWER AUTHORITY

### SLIP-IT-OUT PROJECT

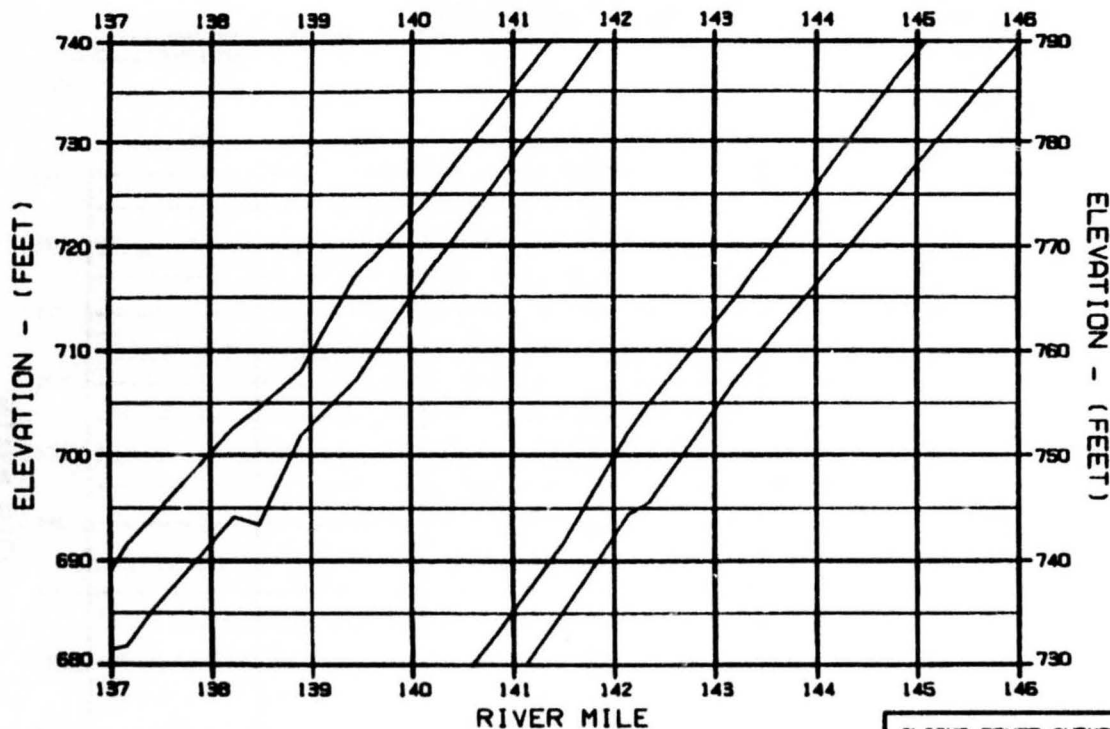
SUBITNA RIVER  
ICE SIMULATION

### PROFILE OF MAXIMUM STAGES

## HARZA-EBASCO JOINT VENTURE

UNCLAS- OLC 000	10 12N 01	1000. 142
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## OPTION?



## LEGEND.

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : NATANA 2001  
 CASE C FLOWS TEMP RULE: WARMEST. EL 1636.  
 REFERENCE RUN NO. : 7101CXB

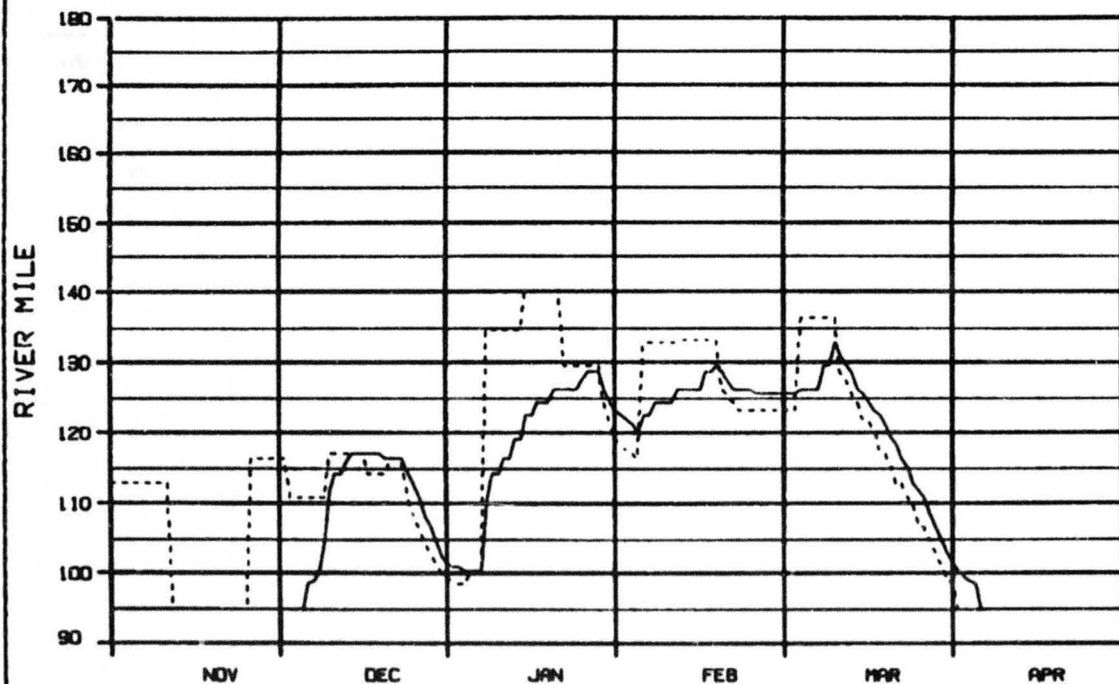
## ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARDA-EBERCO JOINT VENTURE

DESIGN: 1-1-72 100% 1-1-72



## LEGEND:

—— ICE FRONT  
 - - - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : NATANA 2001  
 FLOW CASE C TEMP RULE : WARMEST. EL 1636  
 REFERENCE RUN NO. : 7101CXB

OPTION2

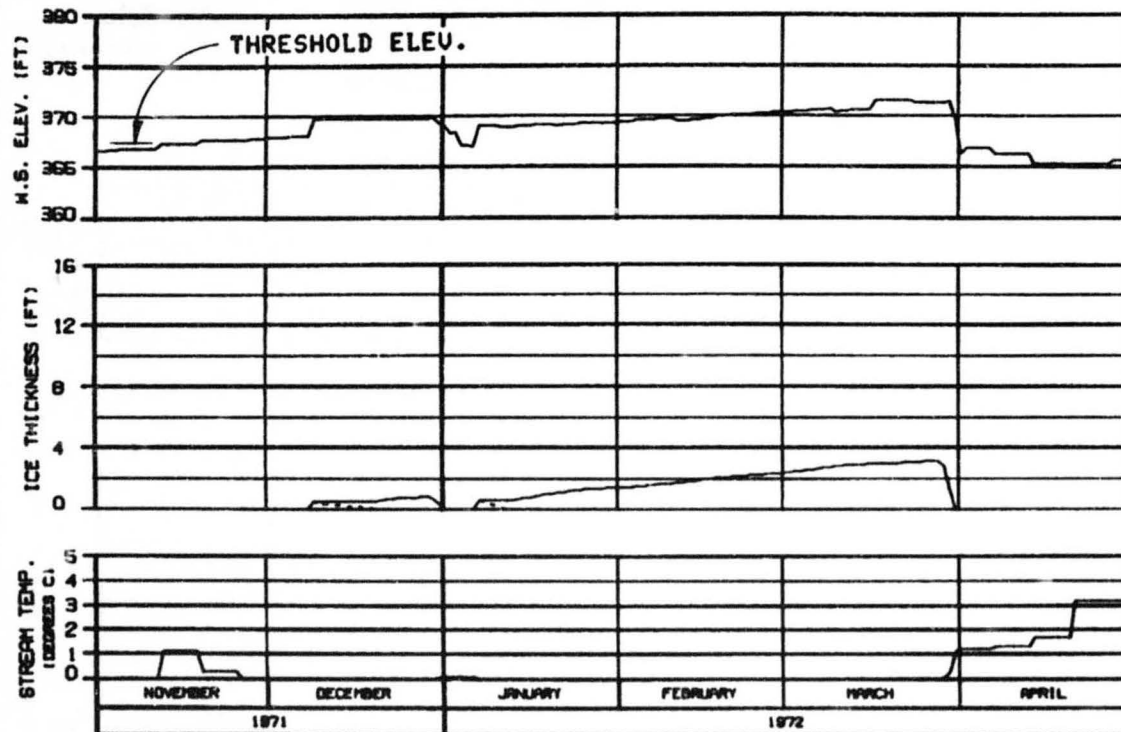
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

HARZA-EBRARD JOINT VENTURE

DESIGNED BY: J. L. DODD IN CHARGE: J. L. DODD



# HEAD OF WHISKERS SLOUGH

RIVER MILE : 101.50

## ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST, EL 1636.  
 REFERENCE RUN NO. : 7101CX8

## ALASKA POWER AUTHORITY

SLISTING PROJECT

SUSITNA RIVER

ICE SIMULATION

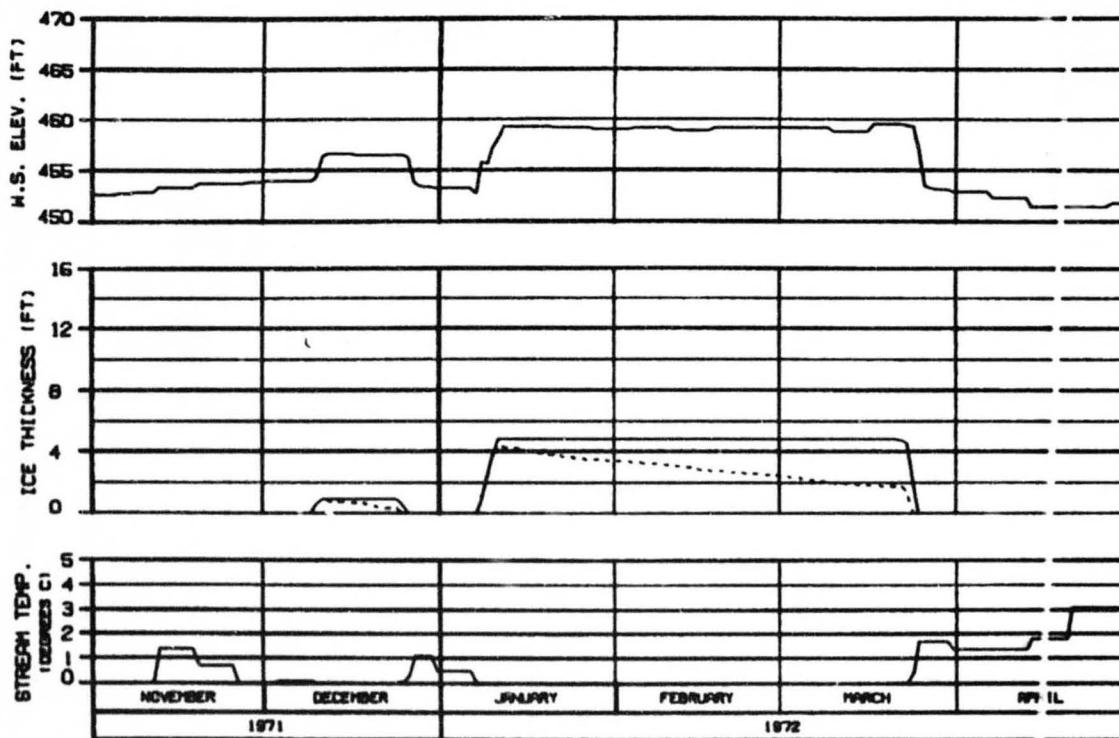
TIME HISTORY

HAZDA-EBRSCO JOINT VENTURE

DESIGN: S.L. 0008 10 00 01 0000.142



OPTION?



**SIDE CHANNEL AT HEAD OF GASH CREEK**  
**RIVER MILE : 112.00**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : NATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST. EL 1636.  
 REFERENCE RUN NO. : 7101CXB

ALASKA POWER AUTHORITY

SUBMITTAL NO.

SUSITNA RIVER

ICE SIMULATION

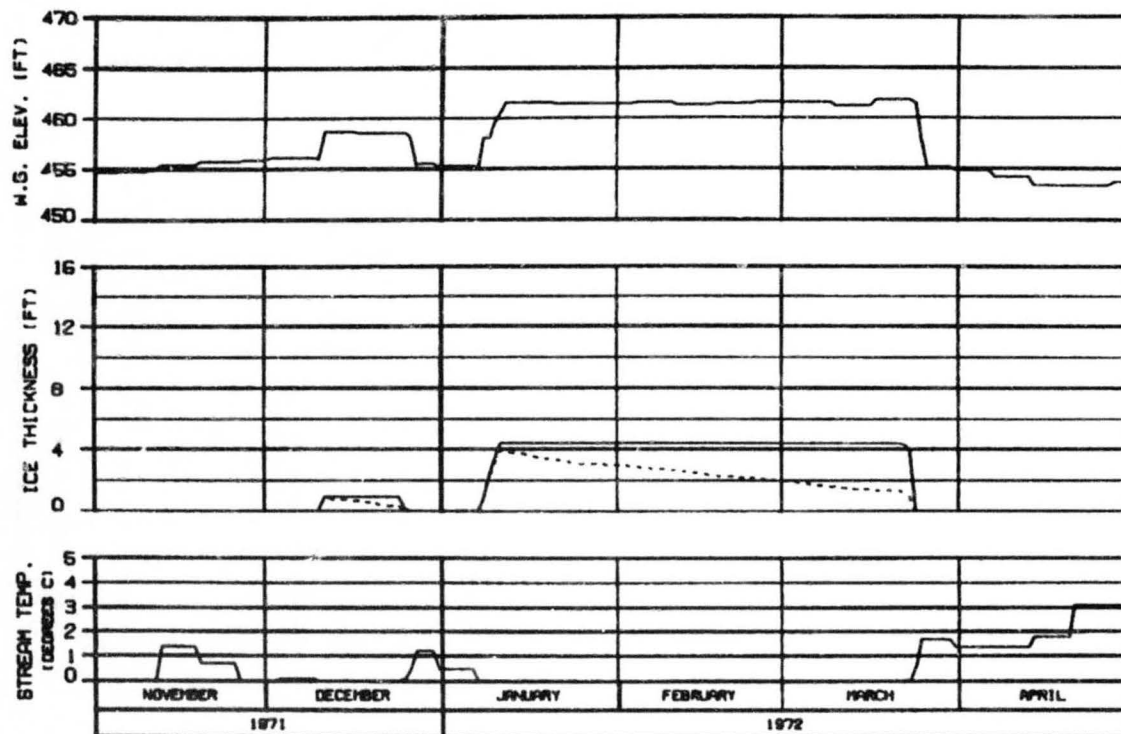
TIME HISTORY

WARDA-EBW CO JOINT VENTURE

CHART - 112.00

15 DEC 71

1982.142



MOUTH OF SLOUGH 6A  
RIVER MILE : 112.34

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST, EL 1636.  
REFERENCE RUN NO. : 7101CX8

ALASKA POWER AUTHORITY

SUSITNA PROJECT

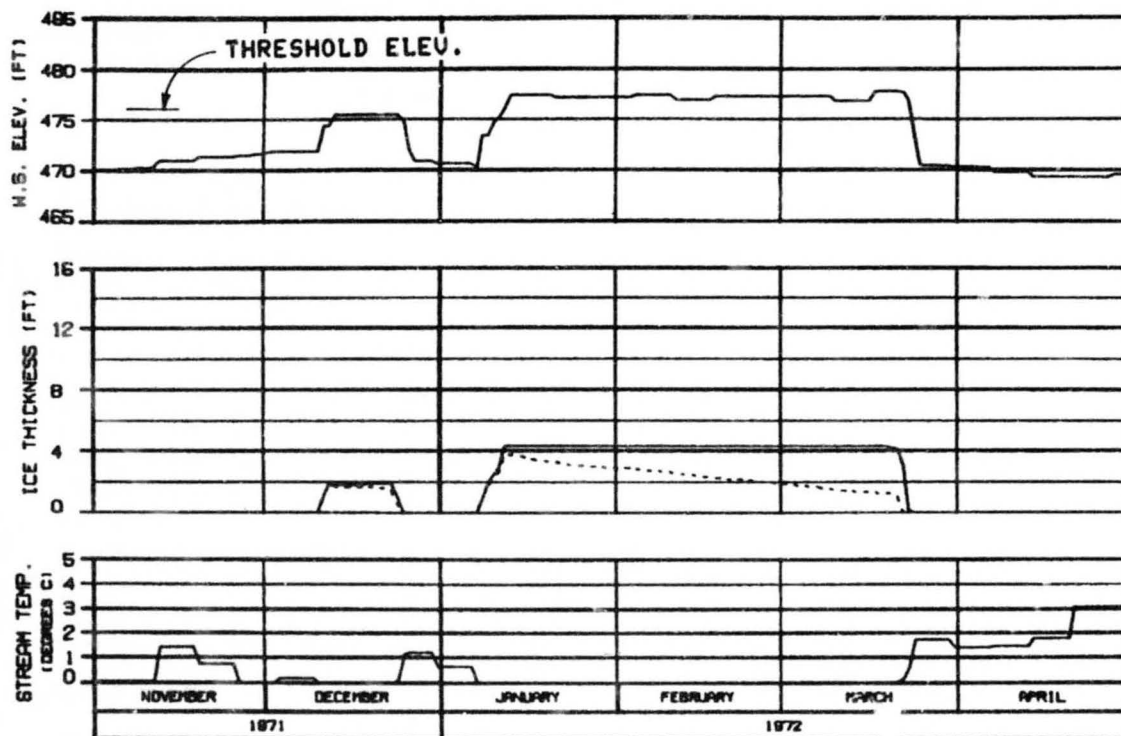
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZDA-EBASCO JOINT VENTURE

DESIGNED BY: J. A. HAZDA

DATE: 10/8/71

10000-142



HEAD OF SLOUGH 8  
RIVER MILE : 114.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST, EL 1636.  
REFERENCE RUN NO. : 7101CXB

ALASKA POWER AUTHORITY

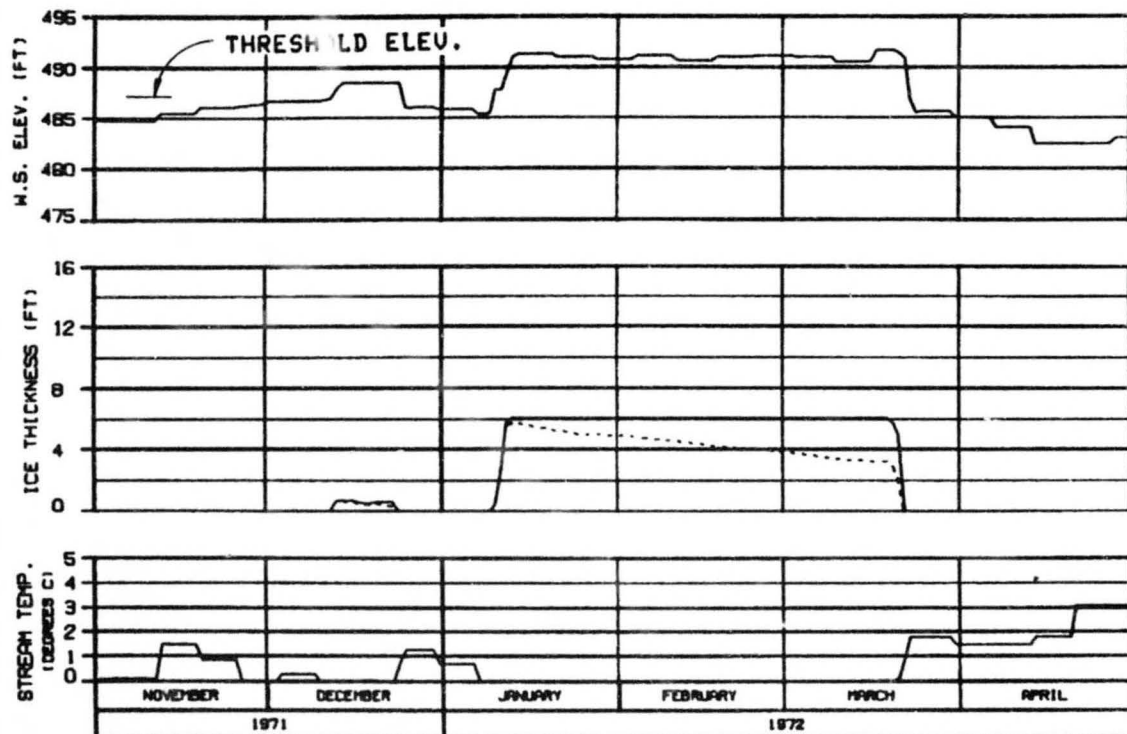
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBASCO JOINT VENTURE

DRAWN: A.L.DONN 30 DEC 84 1000.142





# HEAD OF SIDE CHANNEL MSII RIVER MILE : 115.90

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST. EL 1636.  
REFERENCE RUN NO. : 7101CX8

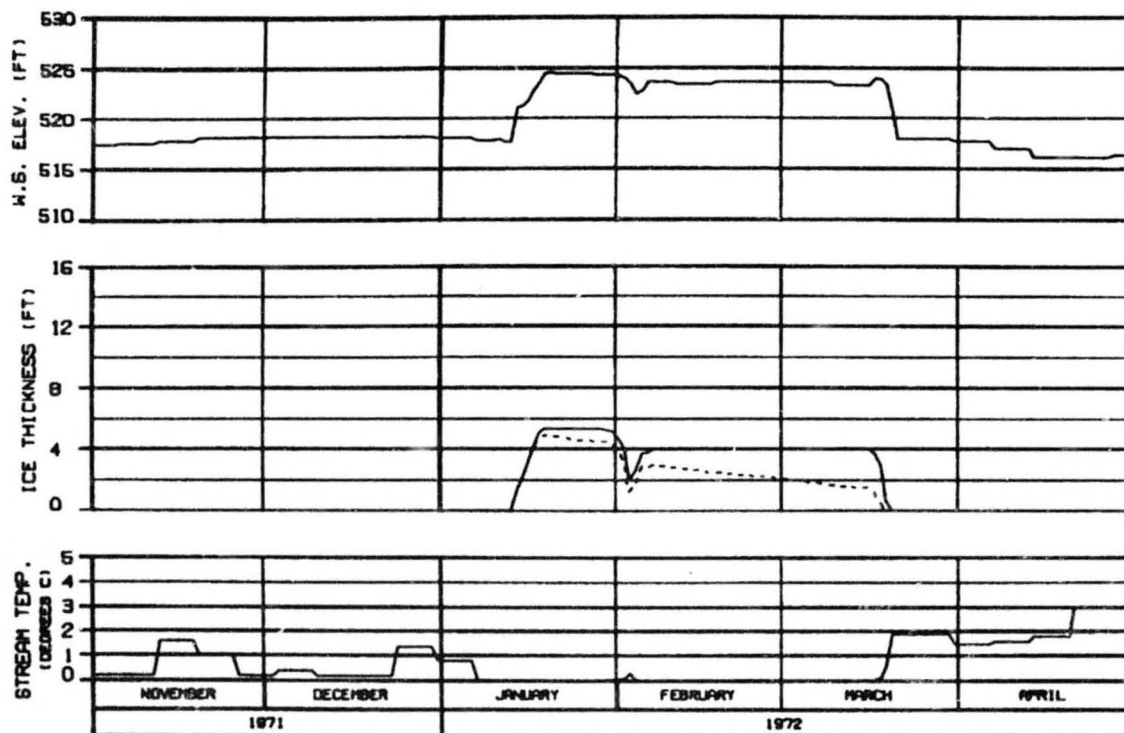
ALASKA POWER AUTHORITY

SUSTITNA PROJECT

SUSTITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZDA-EBRSCO JOINT VENTURE

DESIGN: SLASH 30 DEC 71 DES. 142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST. EL 1636.  
 REFERENCE RUN NO. : 7101CXB

ALASKA POWER AUTHORITY

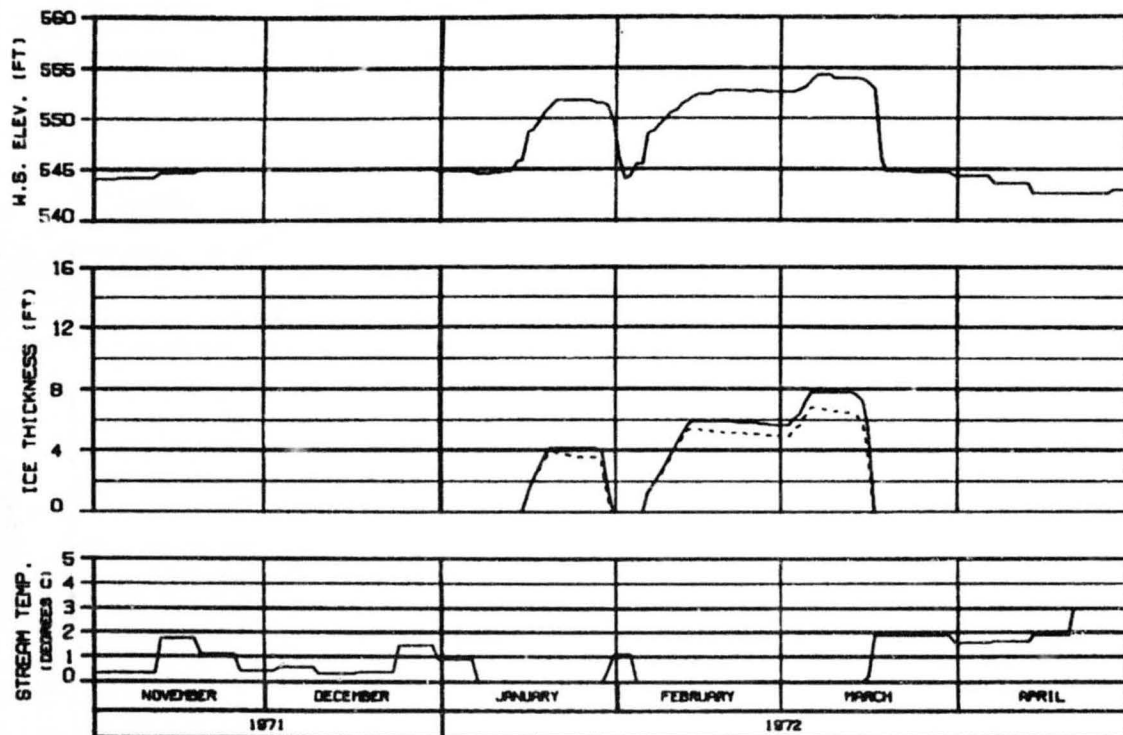
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHGDN. 04-08-72 10 DEC 72 1988.1/12





HEAD OF MOOSE SLOUGH  
RIVER MILE : 123.50

ICE THICKNESS LEGEND:  
——— TOTAL THICKNESS  
----- BLUISH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST. EL 1636.  
REFERENCE RUN NO. : 7101CX8

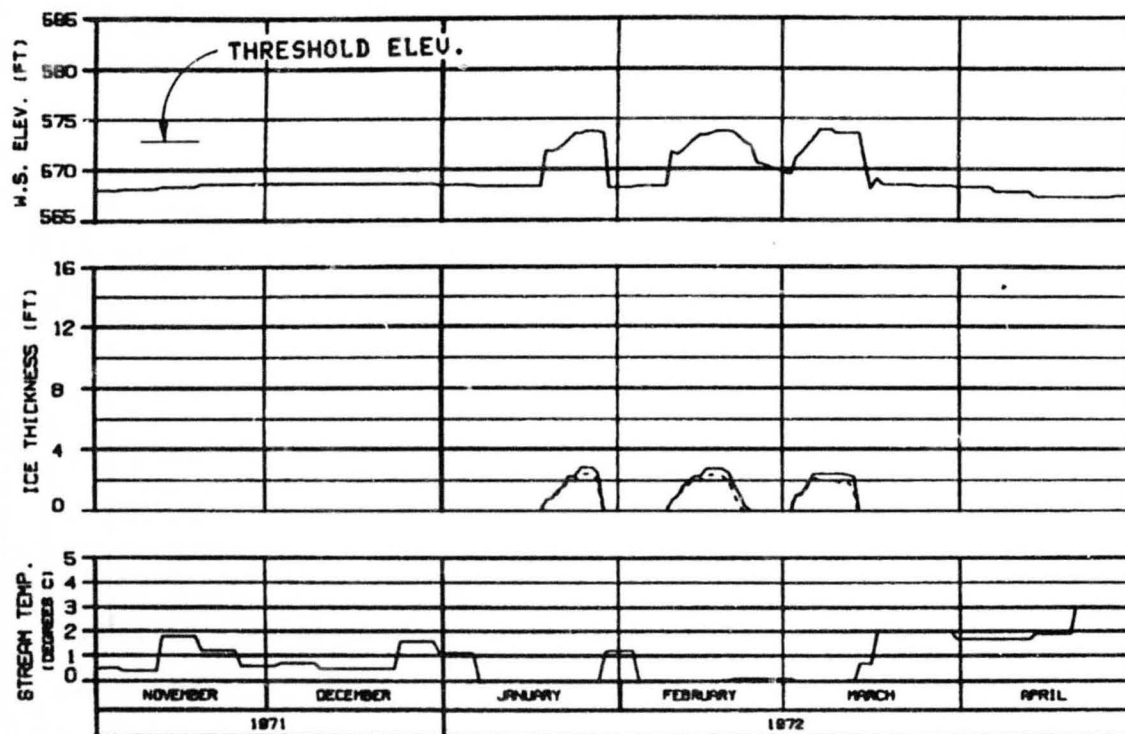
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBASCO JOINT VENTURE

DESIGN: S.A.P.S. TO BE IN 1988.142



HEAD OF SLOUGH 8A (WEST)  
RIVER MILE : 126.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLOUGH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST, EL 1636.  
REFERENCE RUN NO. : 7101CXB

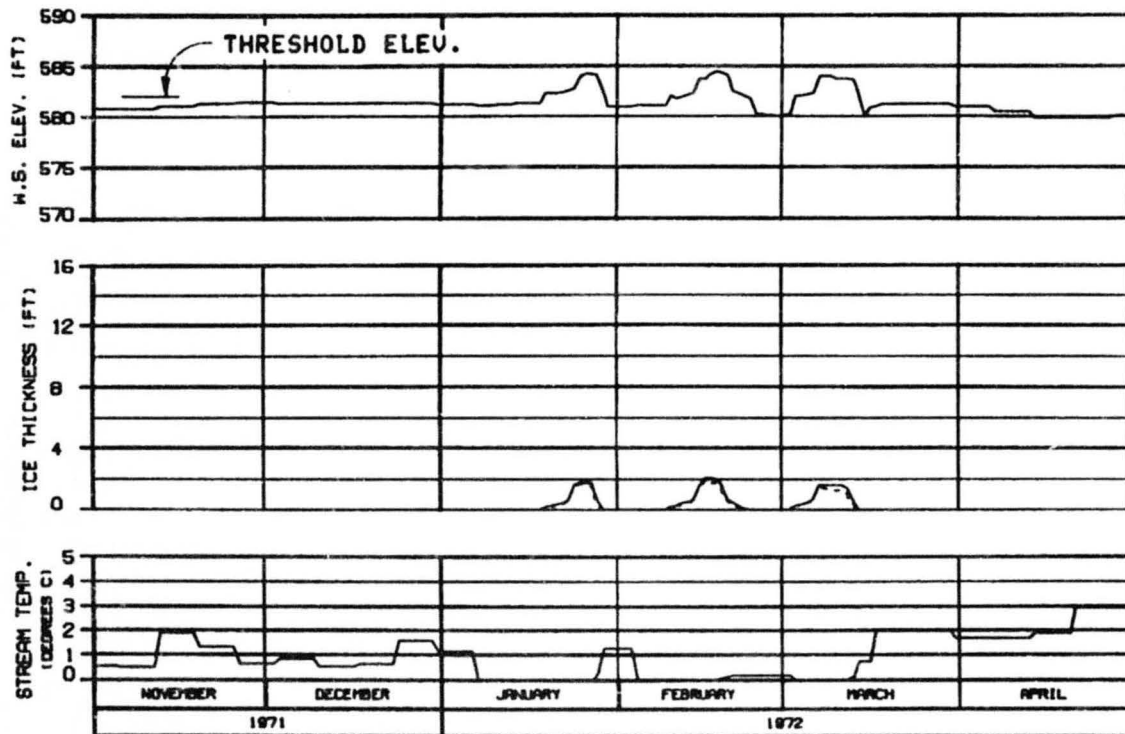
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBRACO JOINT VENTURE

CHARTED: 11-1-72 BY: 1000, 142



HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST, EL 1636.  
 REFERENCE RUN NO. : 7101CXB

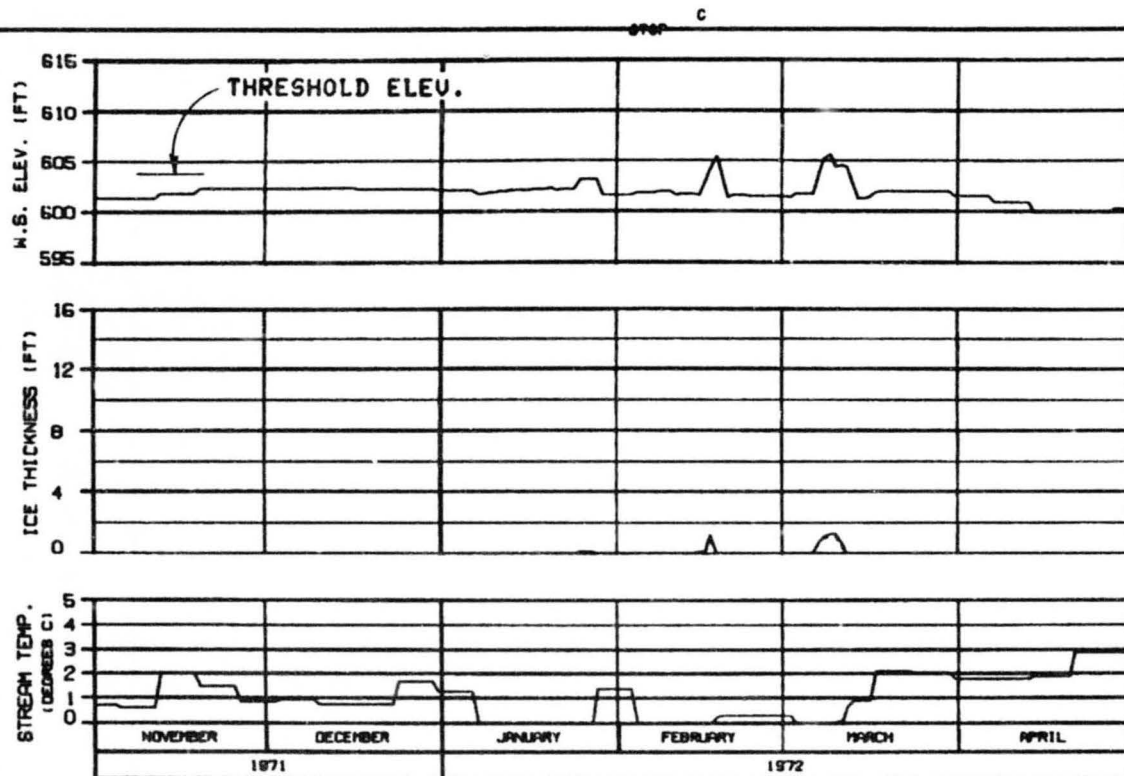
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZDA-EBAGCO JOINT VENTURE

CHARTED: 8.1.8.88 10 000 04 1000.142



HEAD OF SLOUGH 9  
RIVER MILE : 129.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST, EL 1636.  
REFERENCE RUN NO. : 7101CK8

ALASKA POWER AUTHORITY

SUSITNA PROJECT

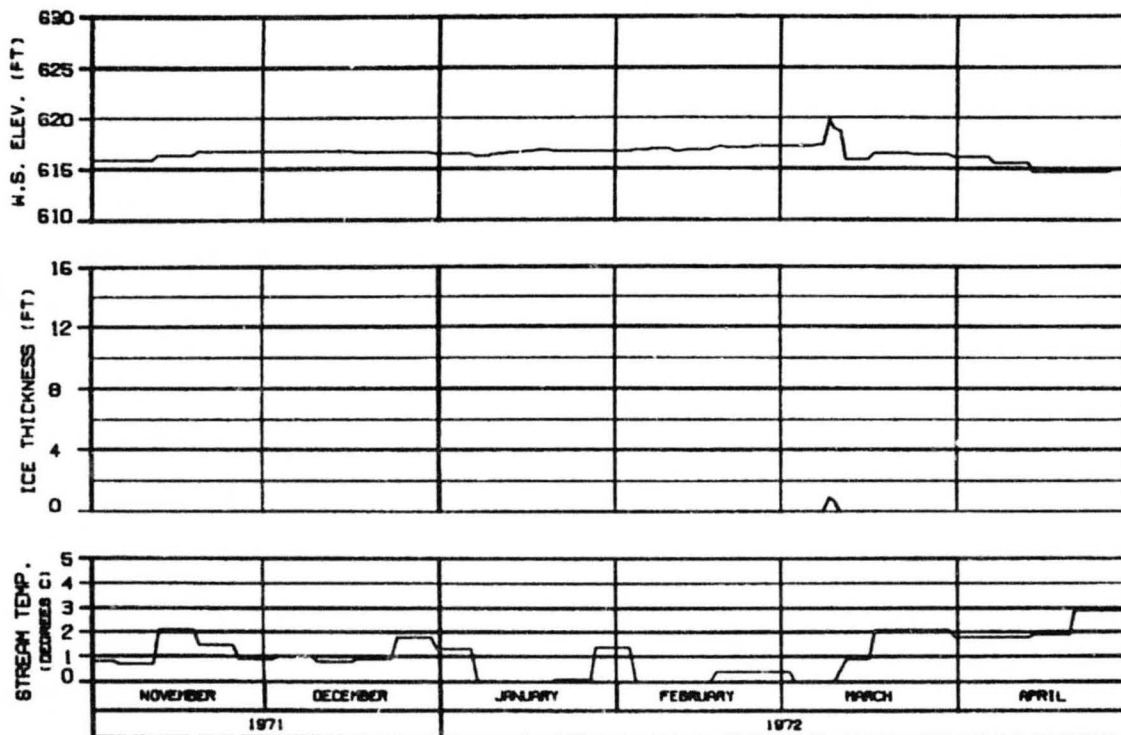
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBRACCO JOINT VENTURE

DESIGNED BY: J. L. PETERSON 10 DEC 84 1000.142

OPTION?

OPTION9



SIDE CHANNEL U/S OF SLOUGH 9

RIVER MILE : 130.60

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST, EL 1636.  
 REFERENCE RUN NO. : 7101CXB

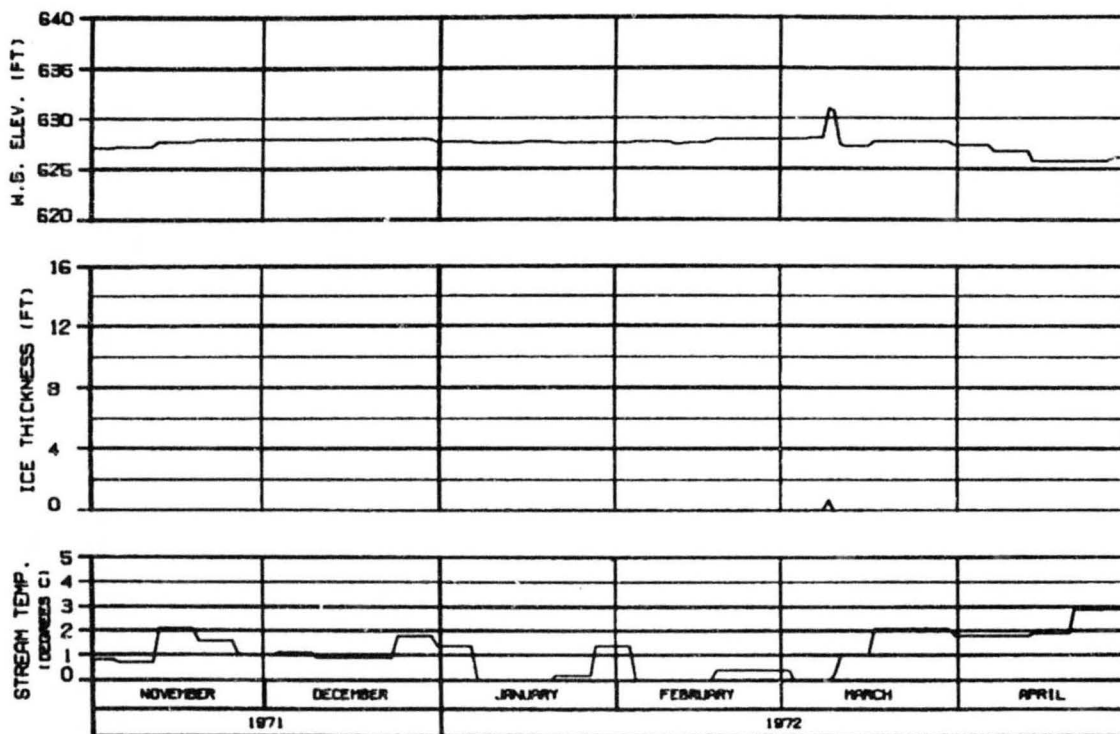
ALASKA POWER AUTHORITY

GUSTINA PROJECT

GUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBRISCO JOINT VENTURE

DESIGNED BY: J. J. JENSEN 20 APR 72 1000.142



SIDE CHANNEL U/S OF 4TH JULY CREEK  
RIVER MILE : 131.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST, EL 1636.  
REFERENCE RUN NO. : 7101CXB

ALASKA POWER AUTHORITY

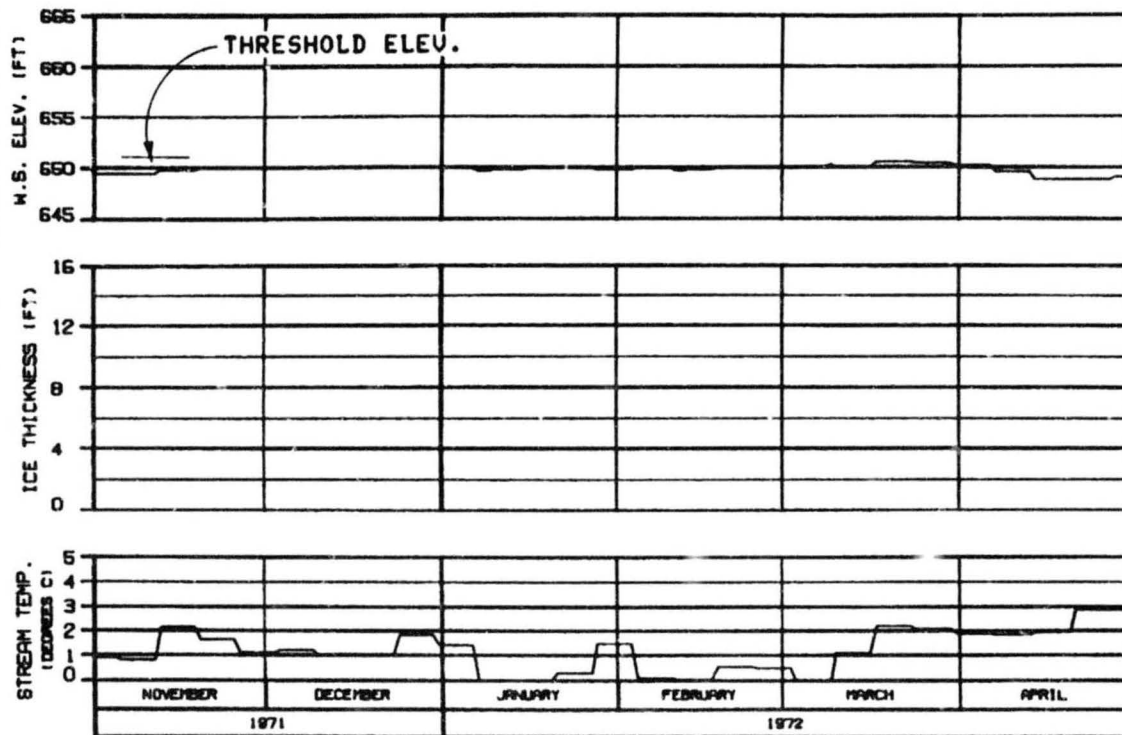
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HRPZA-EBRSCO JOINT VENTURE

CHGNO. 51.0000 10 001 01 1982.142





ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 9A

RIVER MILE : 133.70

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST. EL 1636.  
 REFERENCE RUN NO. : 7101CXB

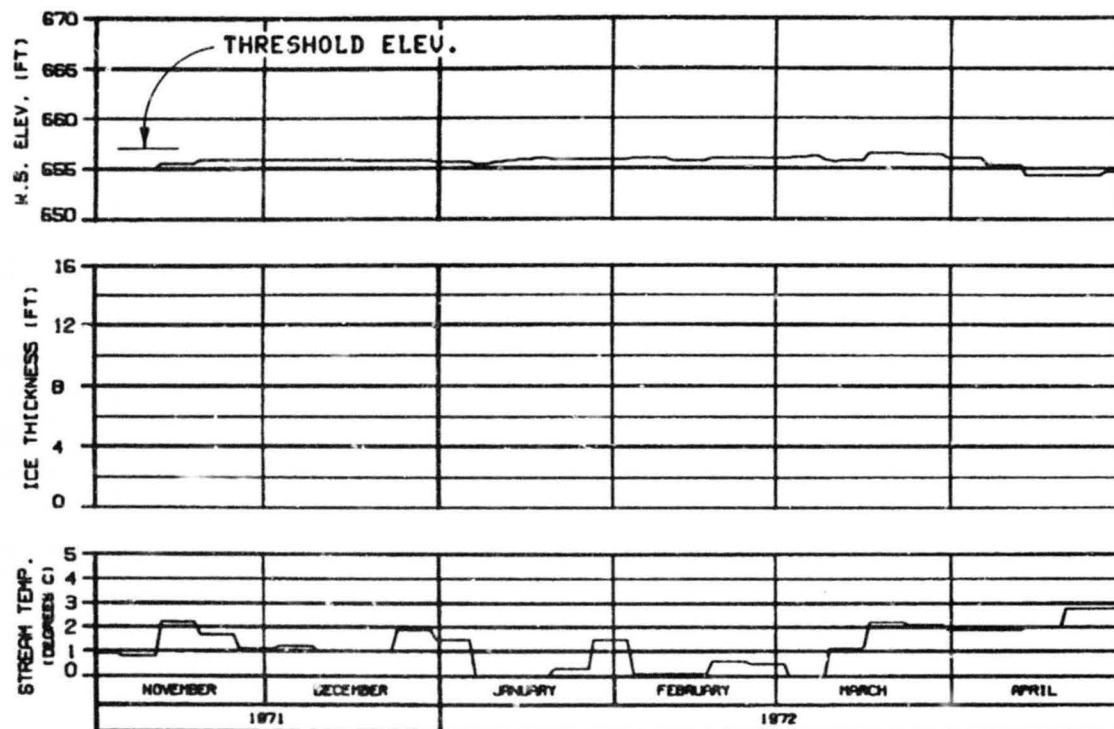
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACO JOINT VENTURE

DESIGNED BY: J. A. PETERSON FOR: EBRACO INC. DRAWING NO.: 142



SIDE CHANNEL U/S OF SLOUGH 10  
RIVER MILE : 134.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST. EL 1636.  
REFERENCE RUN NO. : 7101CX8

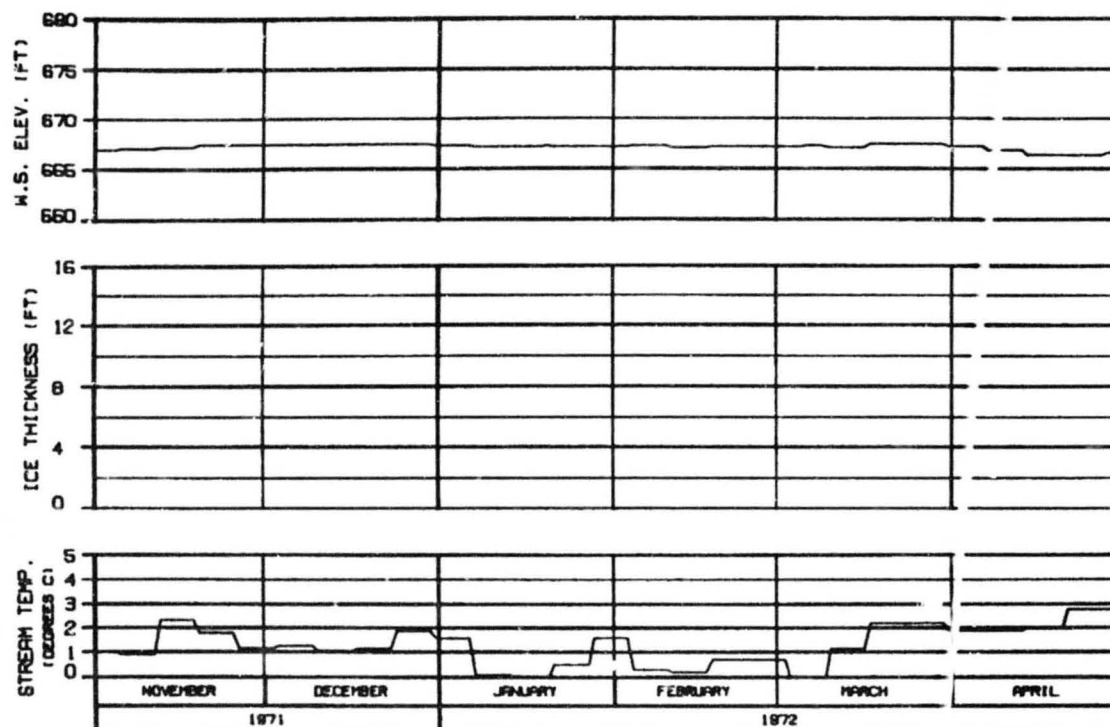
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBAGCO JOINT VENTURE

CHARTS: AL-4-800 24 DEC 74 1000.142



SIDE CHANNEL D/S OF SLOUGH 11  
RIVER MILE : 135.30

ICE THICKNESS LEGEND:

———— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST, EL 1636.  
REFERENCE RUN NO. : 7101CX8

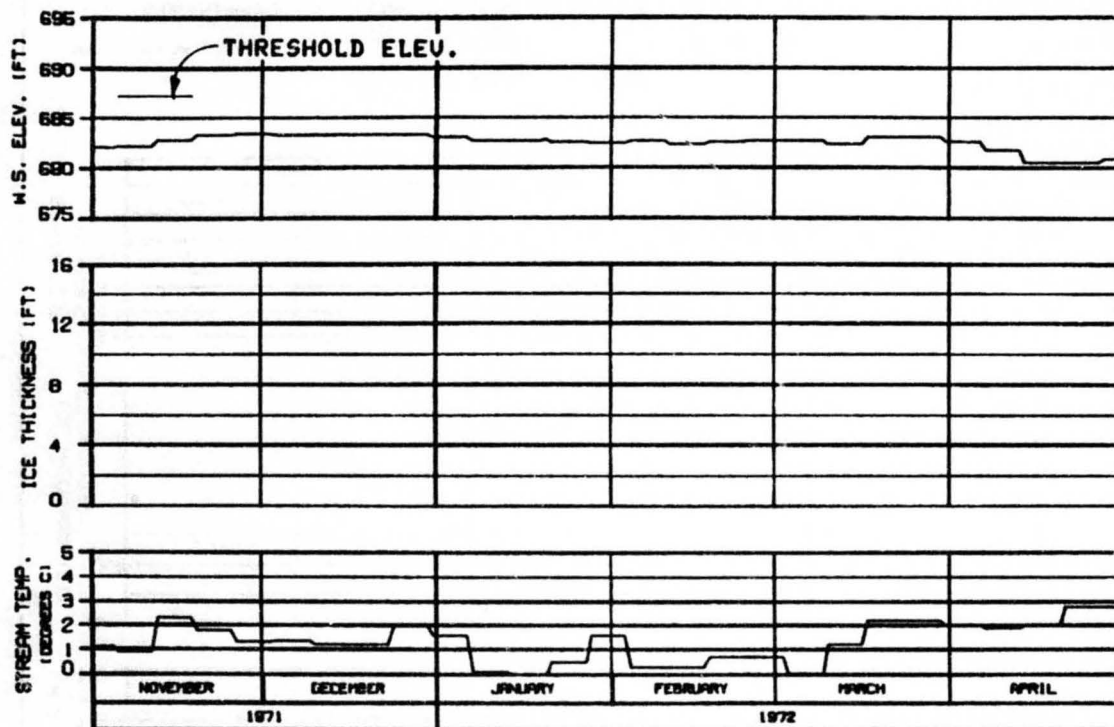
FLASKA POWER AUTHORITY

LEITER PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

NOV. 1971 30 APR 72 1998.142



HEAD OF SLOUGH 11  
RIVER MILE : 136.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : MATANA 2001  
CASE C FLOWS TEMP RULE : WARMEST, EL 1636.  
REFERENCE RUN NO. : 7101CX8

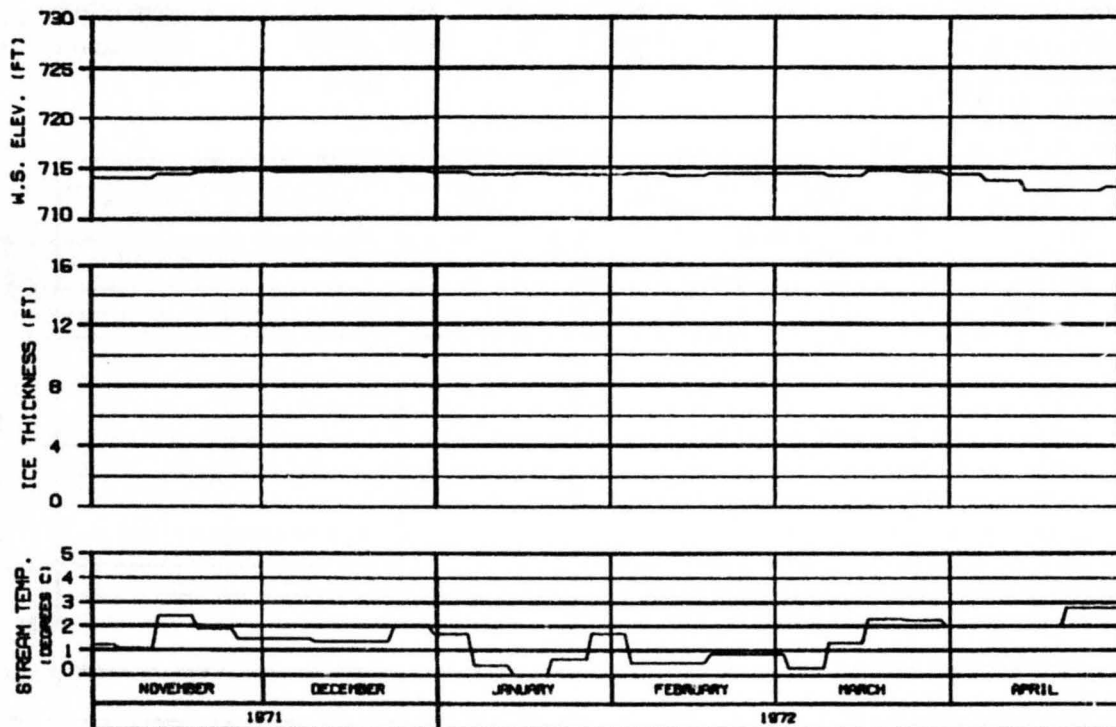
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBRSCO JOINT VENTURE

ISSUED: 04-0000 20 000 01 1000.142



HEAD OF SLOUGH 17

RIVER MILE : 139.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLOUGH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST. EL 1636.  
 REFERENCE RUN NO. : 7101CX8

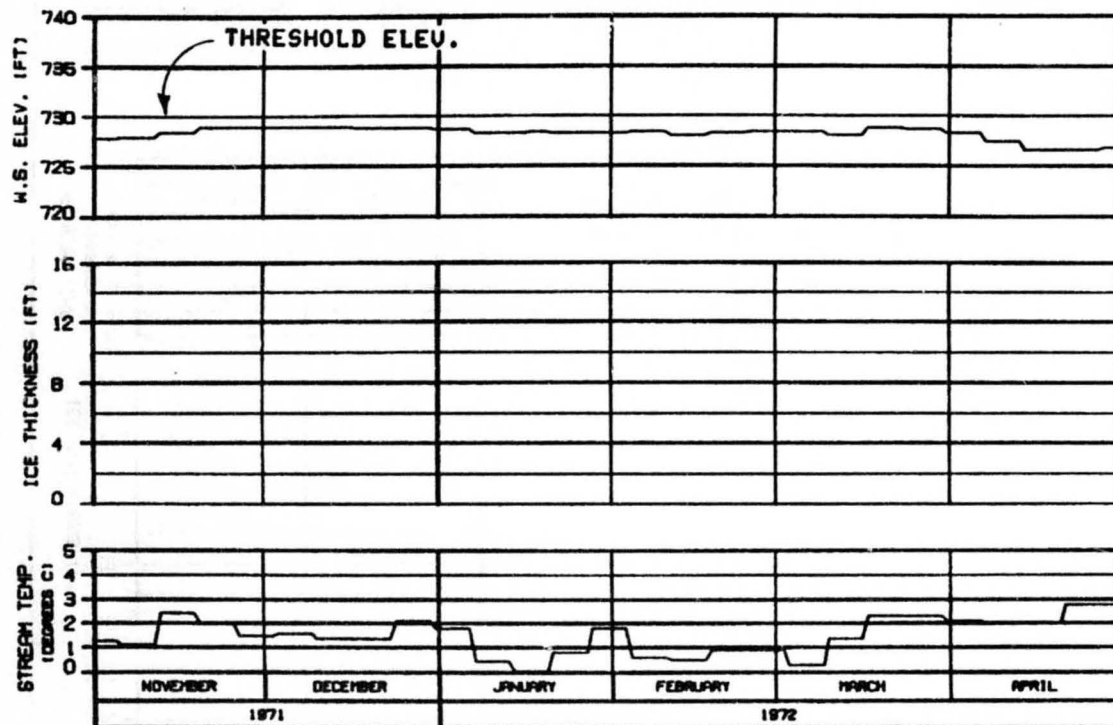
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRSCO JOINT VENTURE

DESIGNED BY: J. L. HARRIS DATE: 04/01/72



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 20  
 RIVER MILE : 140.50

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST. EL 1636.  
 REFERENCE RUN NO. : 7101CXB

ALASKA POWER AUTHORITY

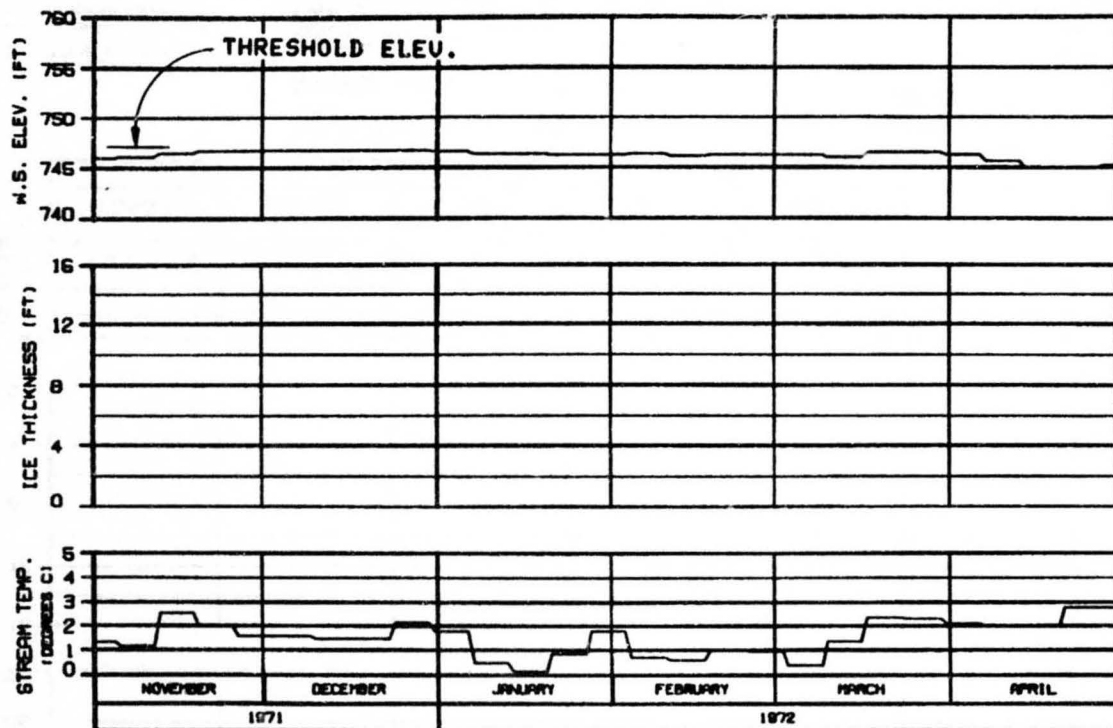
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: J.L.DAVIS 10 DEC 74 1000.142





SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLOUGH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST. EL 1636.  
 REFERENCE RUN NO. : 7101CX8

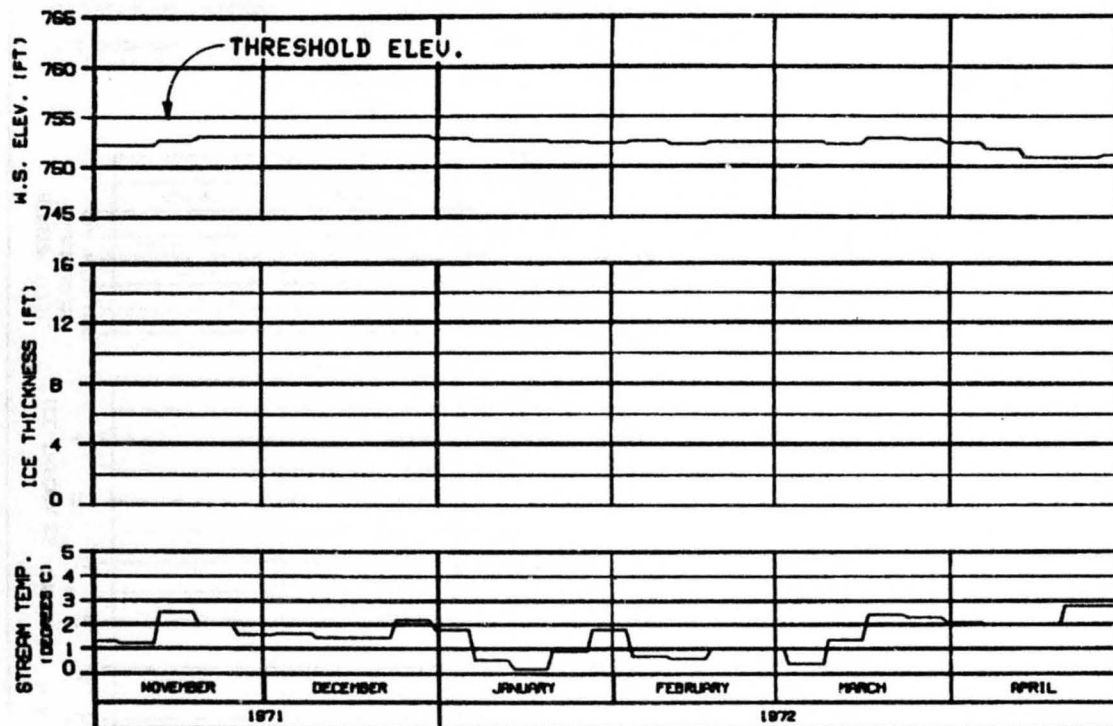
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-ESBACO JOINT VENTURE

CHARTER: AL-9005 30 DEC 71 1000.142



HEAD OF SLOUGH 21

RIVER MILE : 142.20

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 CASE C FLOWS TEMP RULE : WARMEST, EL 1636.  
 REFERENCE RUN NO. : 7101CX8

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER

ICE SIMULATION

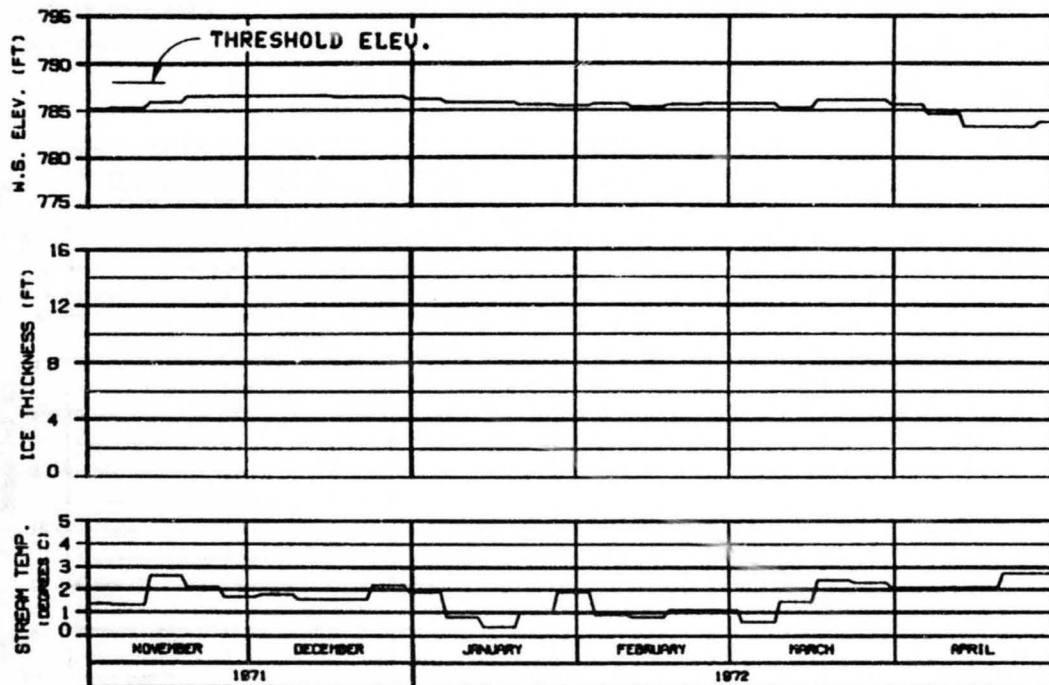
TIME HISTORY

WARDA-EBRACO JOINT VENTURE

DESIGN: SLUSH

IN RE: CH

END. 142



HEAD OF SLOUGH 22  
RIVER MILE : 144.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 2001  
CASE C FLOWS TEMP RULE : WARREST. EL 1636.  
REFERENCE RUN NO. : 7101CXB

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRASC JOINT VENTURE

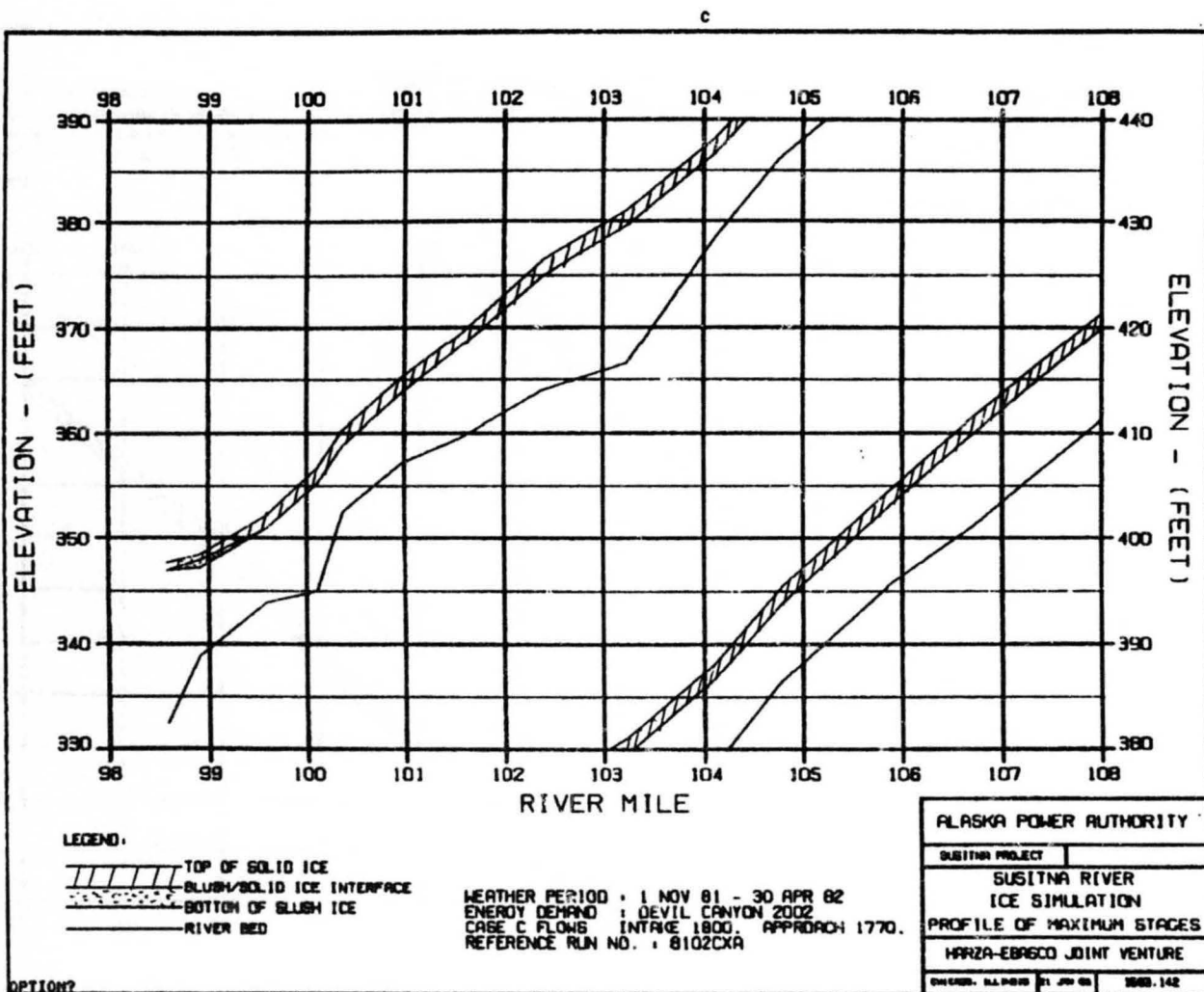
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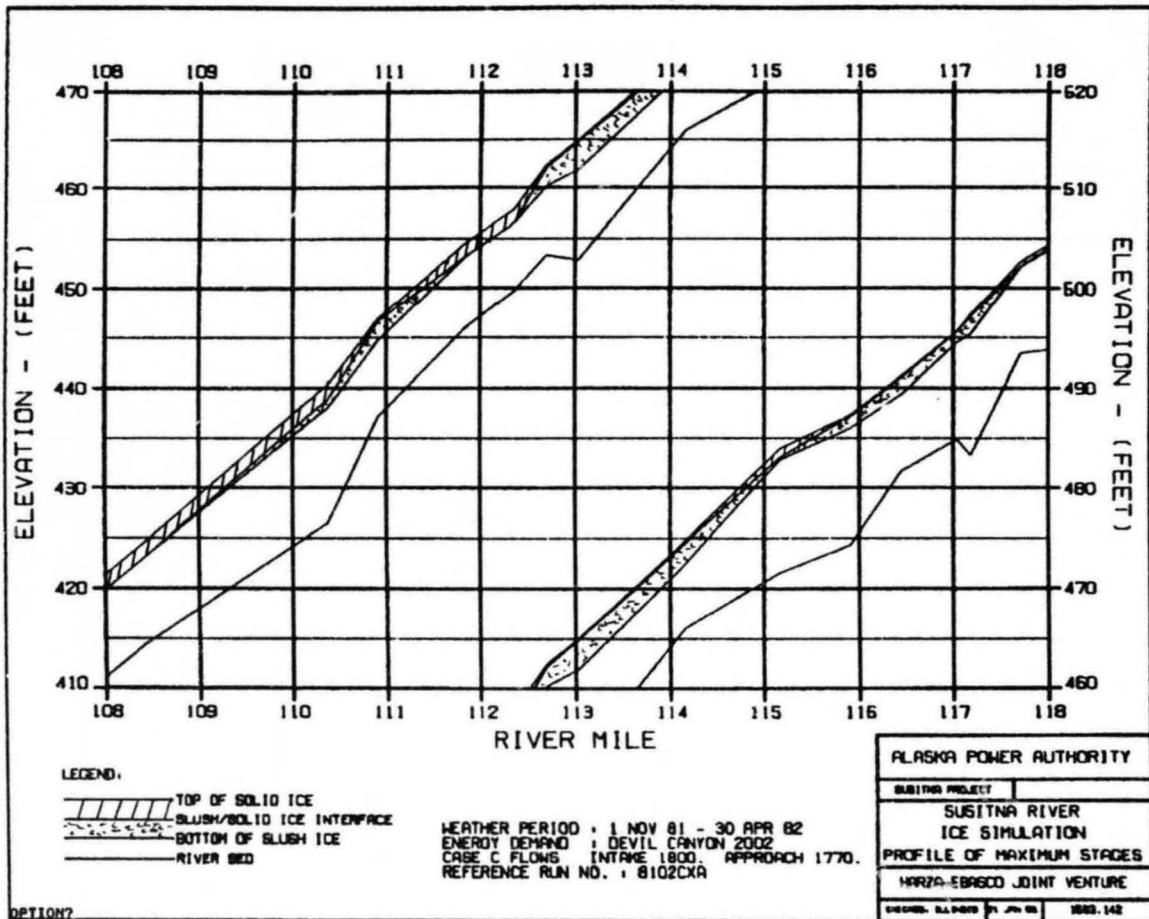
NO 88 54

1988.142

OPTION?

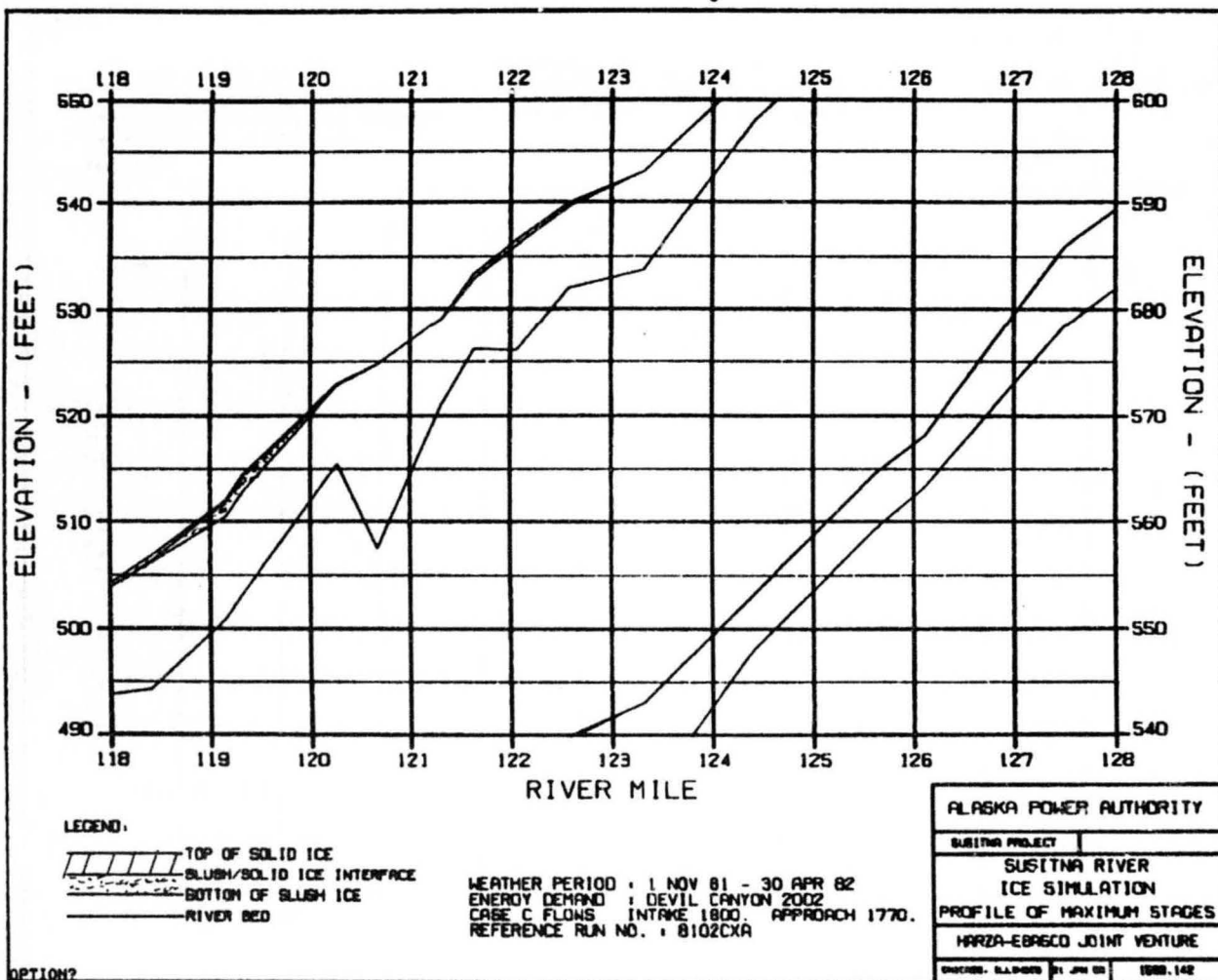
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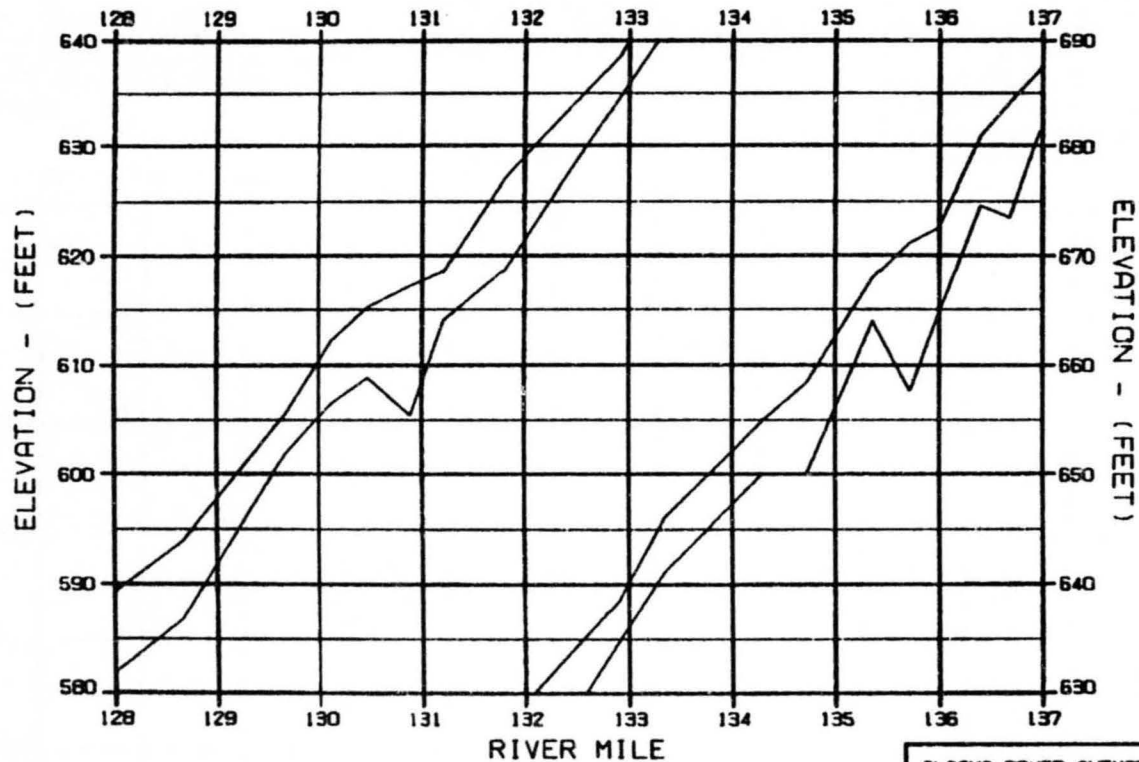




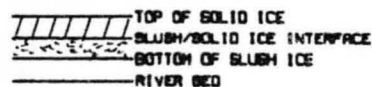
OPTION?







LEGEND:



WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 8102CXA

ALASKA POWER AUTHORITY

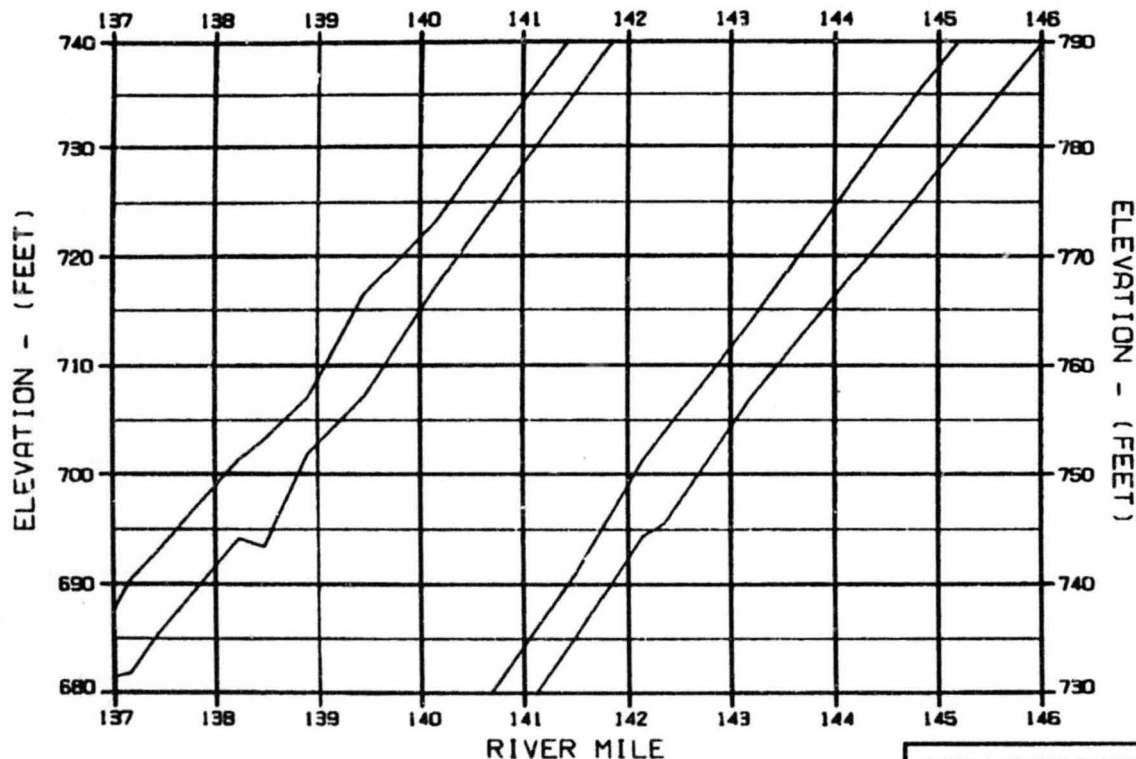
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

DESIGNED - ELLIOTT & J. JAN 82  
 1582.142

OPTION?



**LEGEND.**

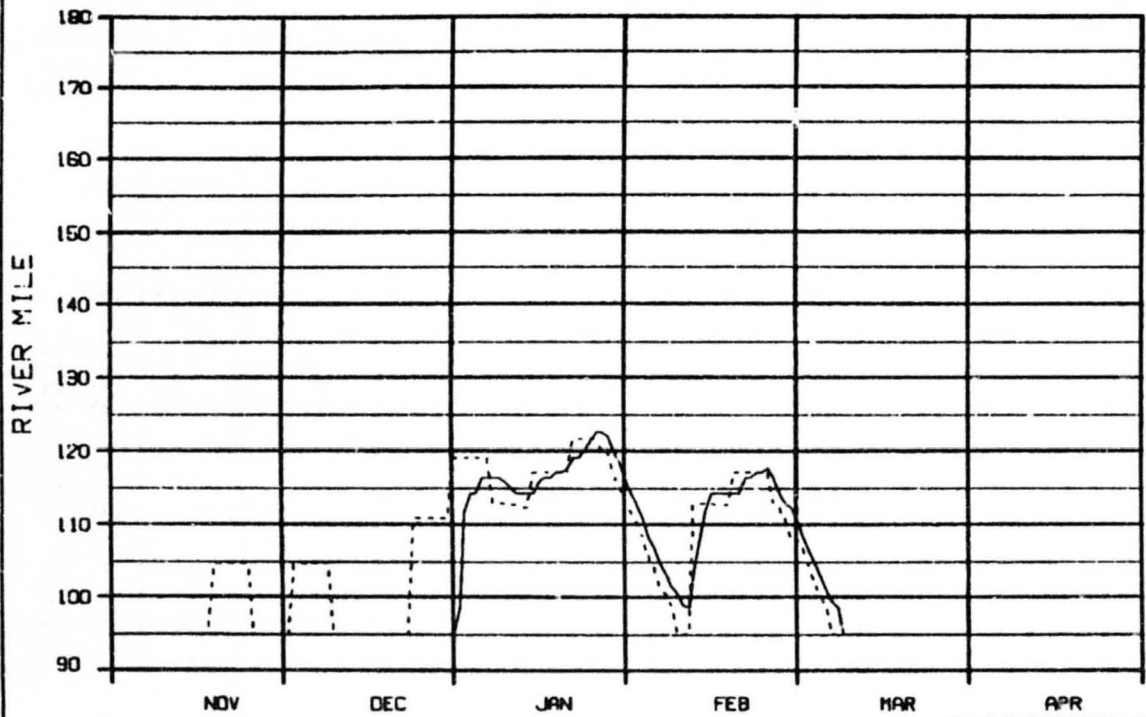
- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 3 APR 82  
 ENERGY DEMAND : 1 DEVIL CAN 2002  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 8102CXA

**ALASKA POWER AUTHORITY.**

SUSITNA PROJECT	
SUSITNA RIVER ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
HARZA-EBASCO JOINT VENTURE	
DRAWN: S.A. PAPER 01 JUN 82	1982.142

OPTION 2



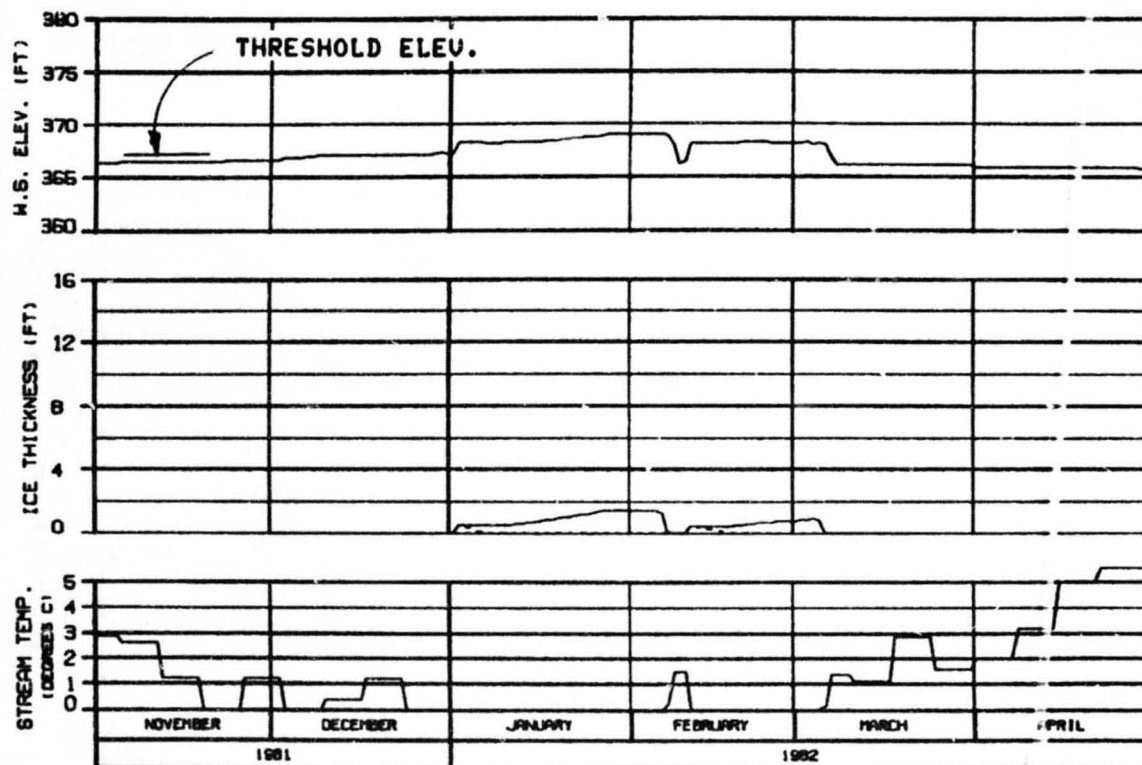
LEGEND.

- ICE FRONT
- ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE C INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 8102CXA

ALASKA POWER AUTHORITY		
SUSITNA PROJECT		
SUSITNA RIVER		
PROGRESSION OF ICE FRONT		
& ZERO DEGREE ISOTHERM		
HARZA-EBASCO JOINT VENTURE		
ENCLOS. 11.1-11.10	21 JAN 82	1000.142

OPTION?



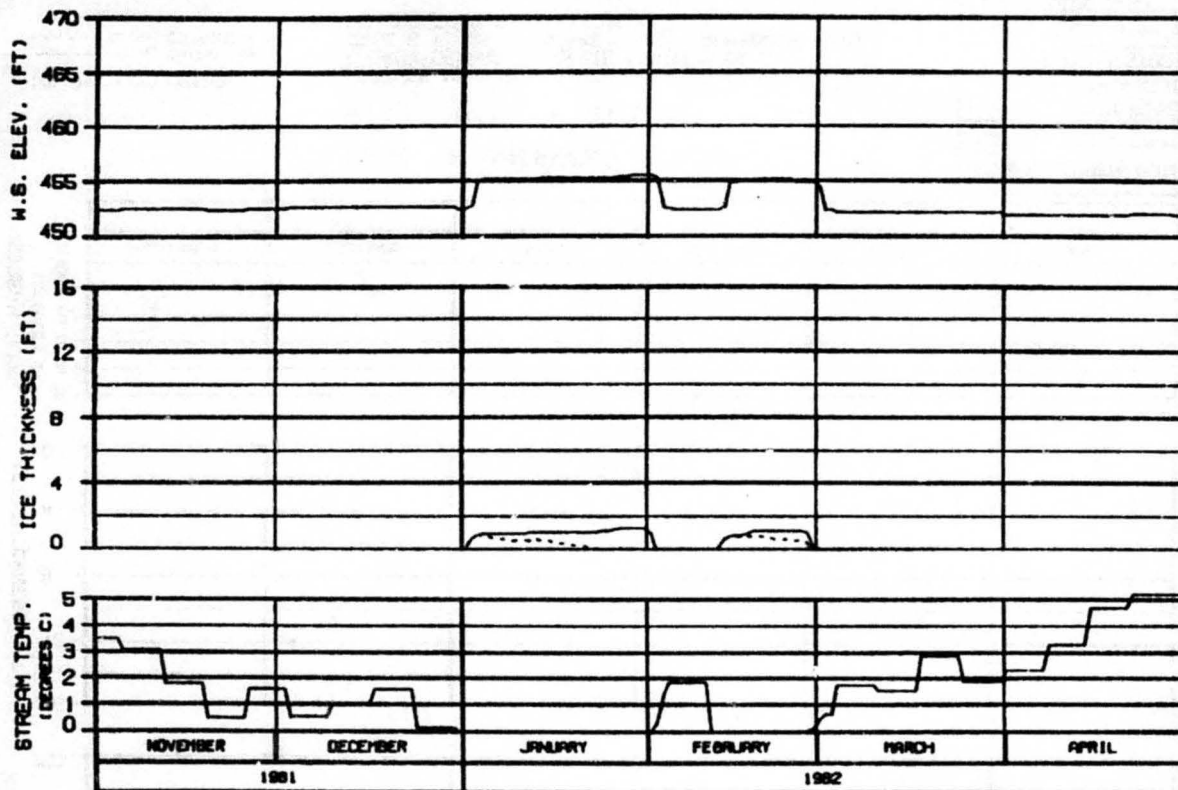
HEAD OF WHISKERS SLOUGH  
RIVER MILE : 101.50

ICE THICKNESS LEGEND:  
——— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 8102CKA

ALASKA POWER AUTHORITY	
SUBMITTER PROJECT	
SUSITNA RIVER	
ICE SIMULATION	
TIME HISTORY	
KARZA-E AGCO JOINT VENTURE	
DESIGNED BY	30 APR 82
DATE	1982.142

OPTION?



# SIDE CHANNEL AT HEAD OF GASH CREEK

RIVER MILE : 112.00

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CAYON 2002  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 8102CXA

ALASKA POWER AUTHORITY

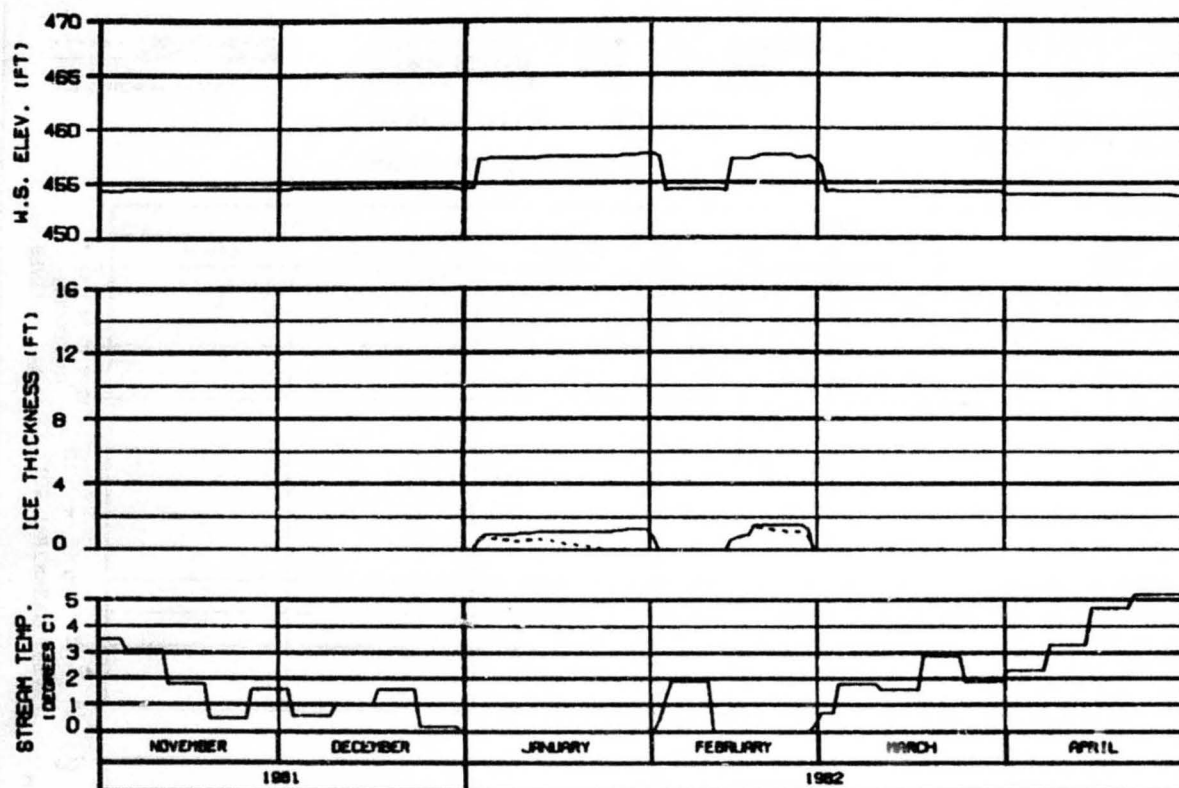
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRSCO JOINT VENTURE

DESIGNED: R. L. BROWN 01 JUN 82 2075.142





MOUTH OF SLOUGH 6A

RIVER MILE : 112.34

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 ..... SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CAYON 2002  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 8102CXA

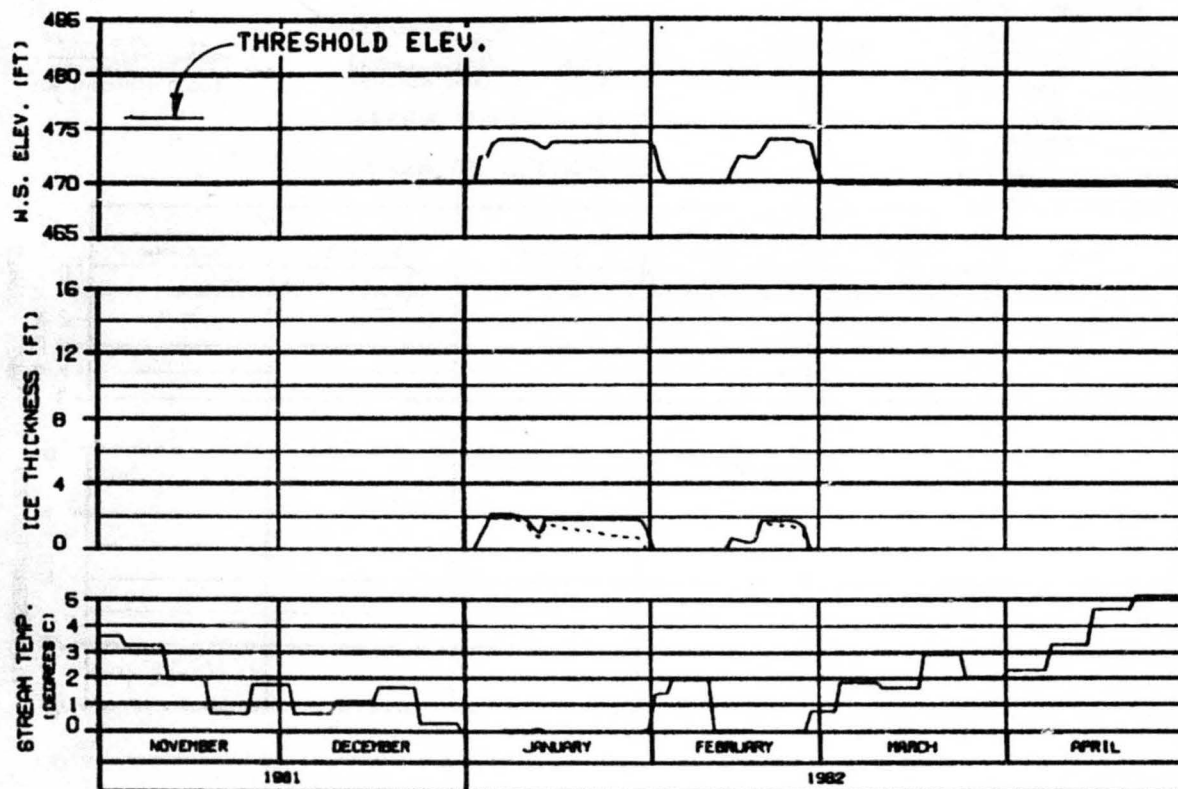
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRSCO JOINT VENTURE

DRAWN: S.L. DODD BY J.W. 02 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 8  
 RIVER MILE : 114.10

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CAYON 2002  
 CASE C FLOWS INTAKE 1800, APPROACH 1770.  
 REFERENCE RUN NO. : 8102CXA

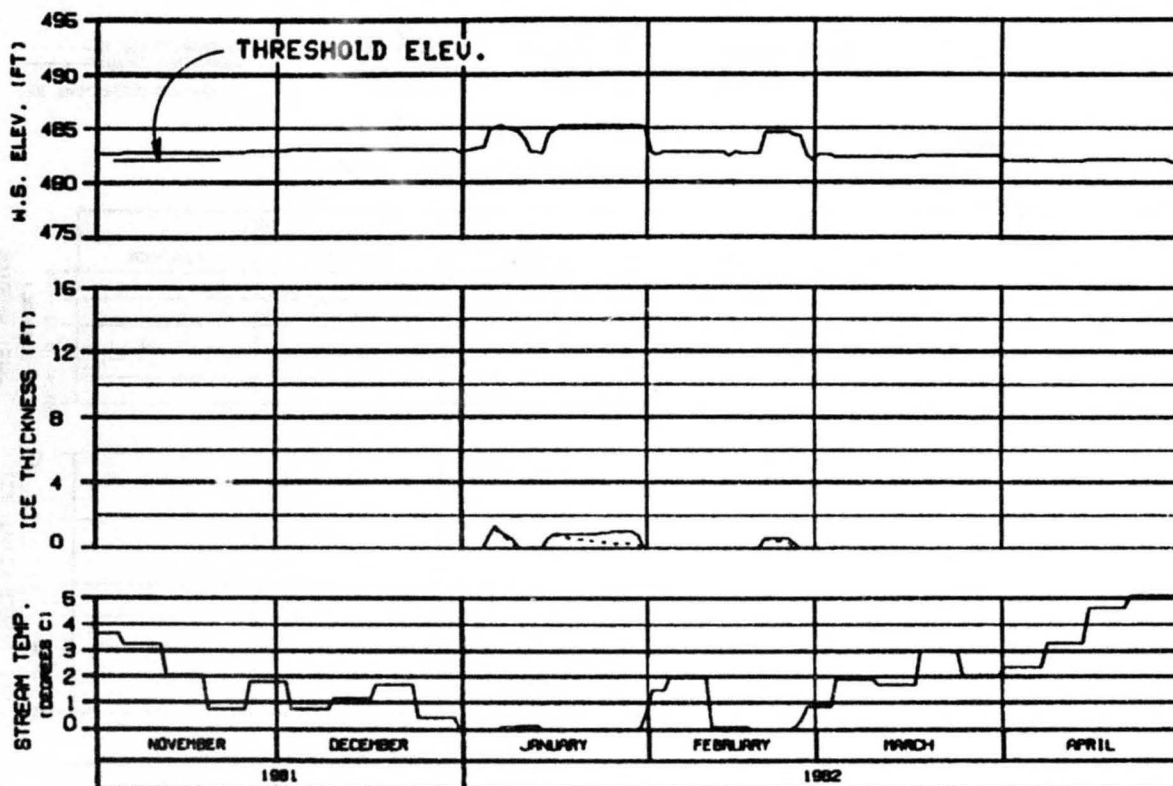
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBASCO JOINT VENTURE

DESIGN: S. L. P. 81 JAN 82 1000.142



SIDE CHANNEL MSII

RIVER MILE : 115.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CAYON 2002  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 8102CXA

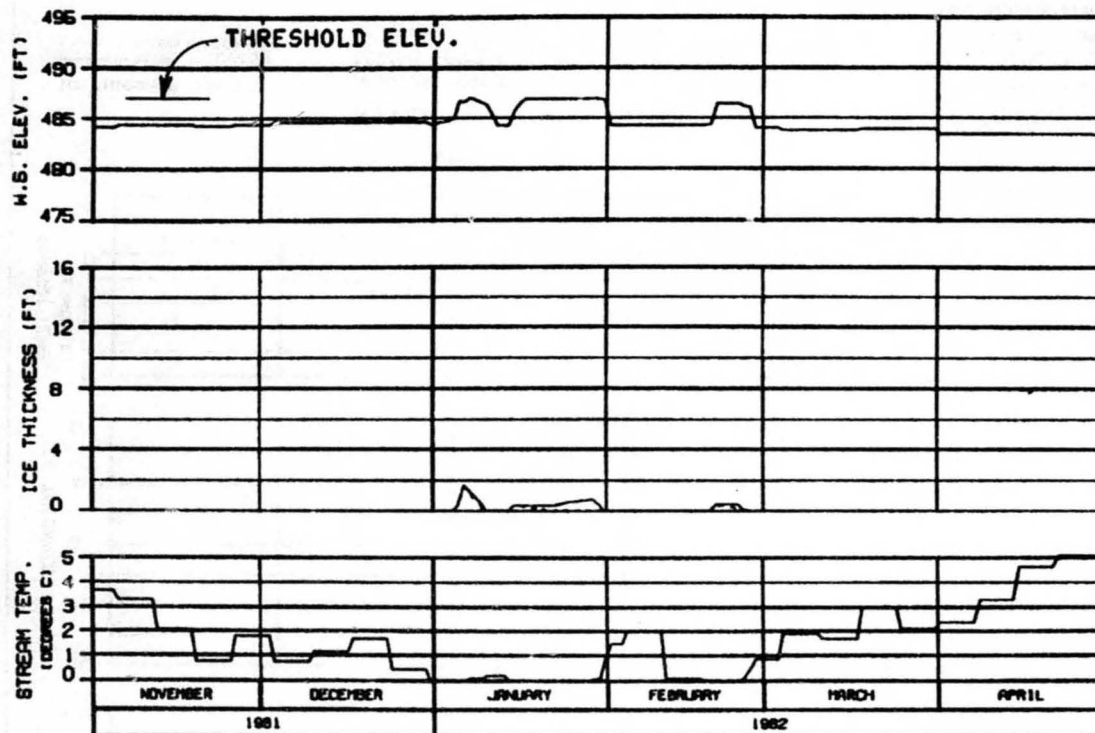
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZRA-EBRISCO JOINT VENTURE

DESIGNED BY HAZRA 01 JAN 82 1000 142



HEAD OF SIDE CHANNEL MSII  
RIVER MILE : 115.90

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CAYON 2002  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 8102CXA

ALASKA POWER AUTHORITY

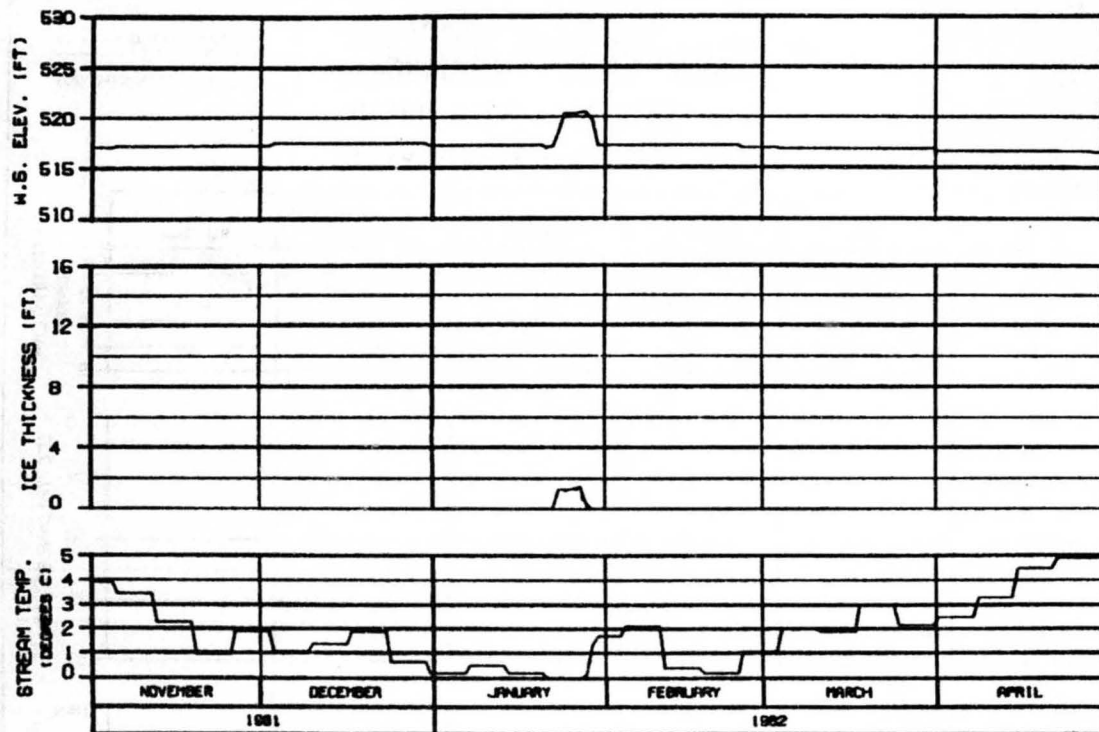
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRISCO JOINT VENTURE

DESIGN, ANALYSIS BY JPM

ISSN. 142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - BLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CAYON 2002  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 8102CXA

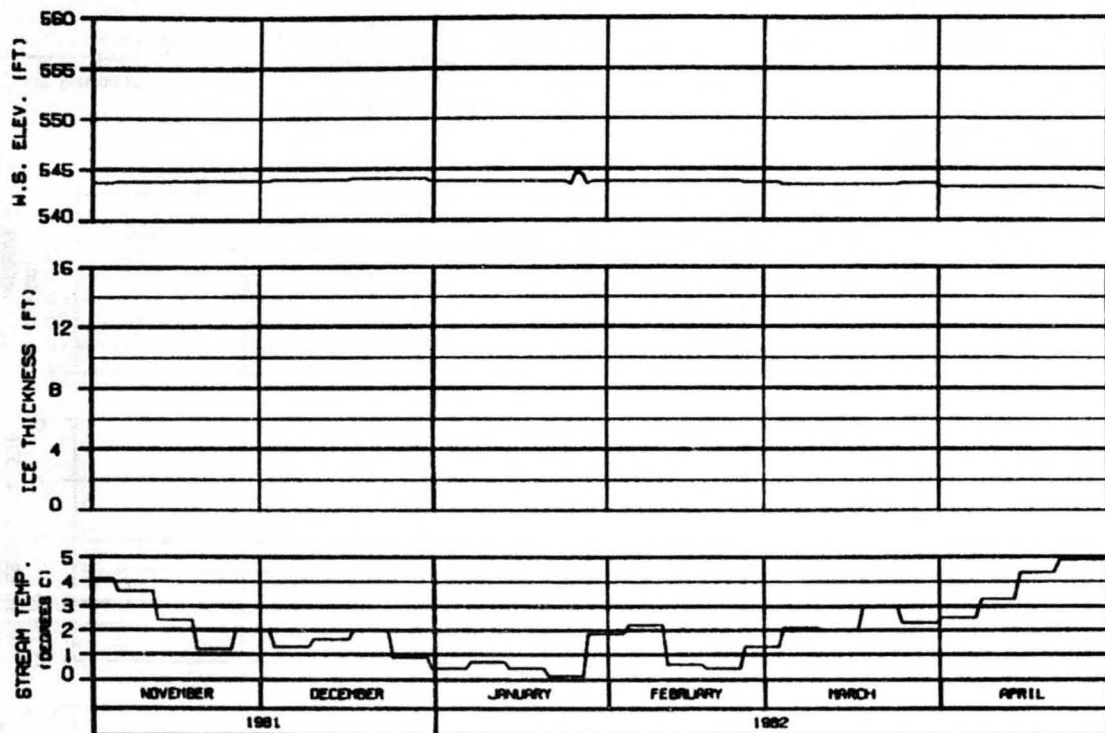
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHARTER: 8-1-82 01 JUN 82 0000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF MOOSE SLOUGH  
 RIVER MILE : 123.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CAYON 2002  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 8102CXA

ALASKA POWER AUTHORITY

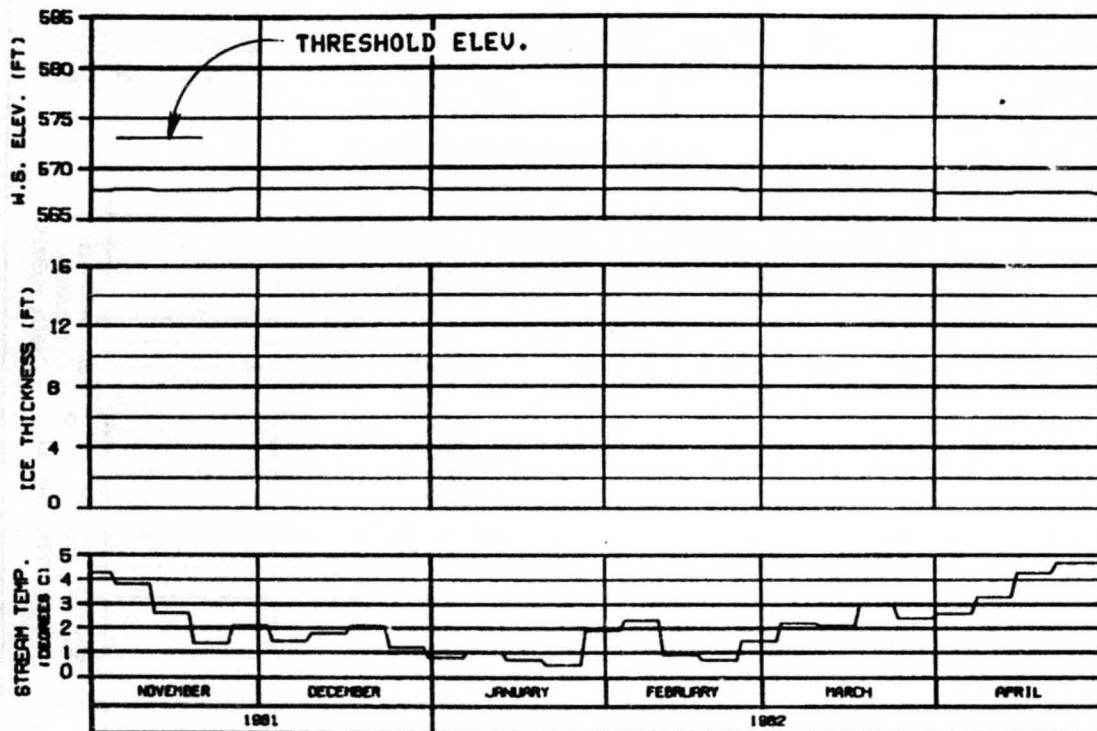
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBRSCO JOINT VENTURE

CHART NO. 81-0008 DT JPN 82 1000.142





HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CAYON 2002  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 8102CXA

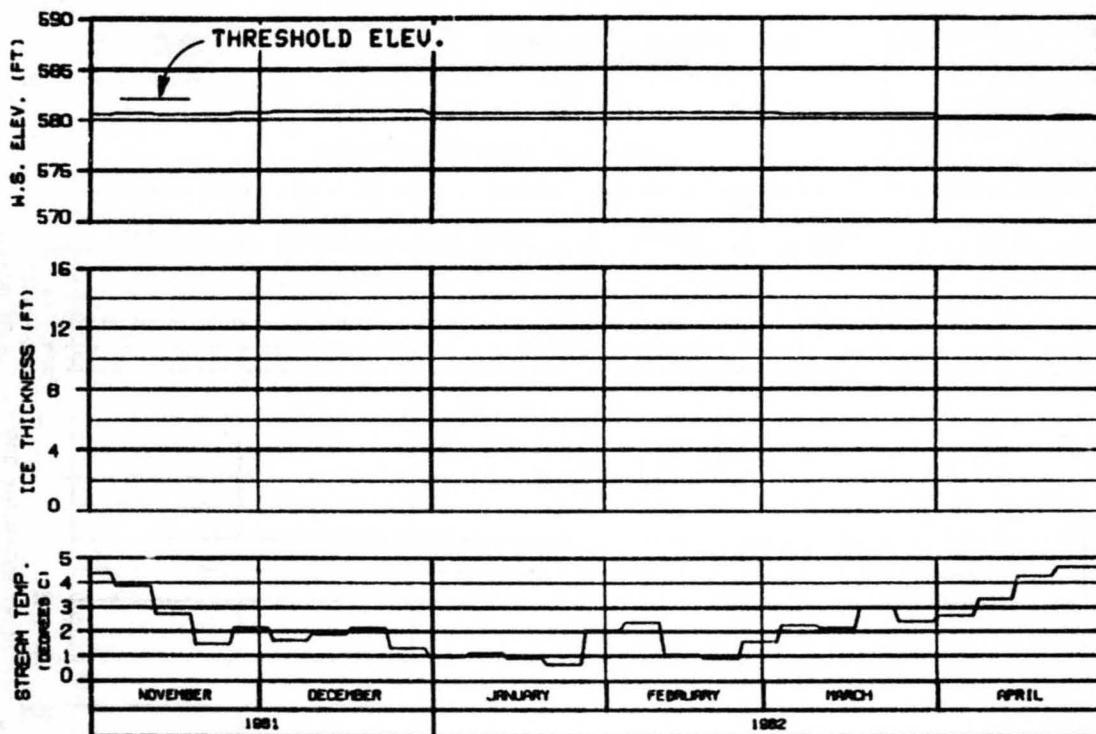
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHARTED - 04 APR 82 BY JPM/GB 1000.142



HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CAYON 2002  
 CASE C FLOWS INTAKE 1800, APPROACH 1770.  
 REFERENCE RUN NO. : 8102CXA

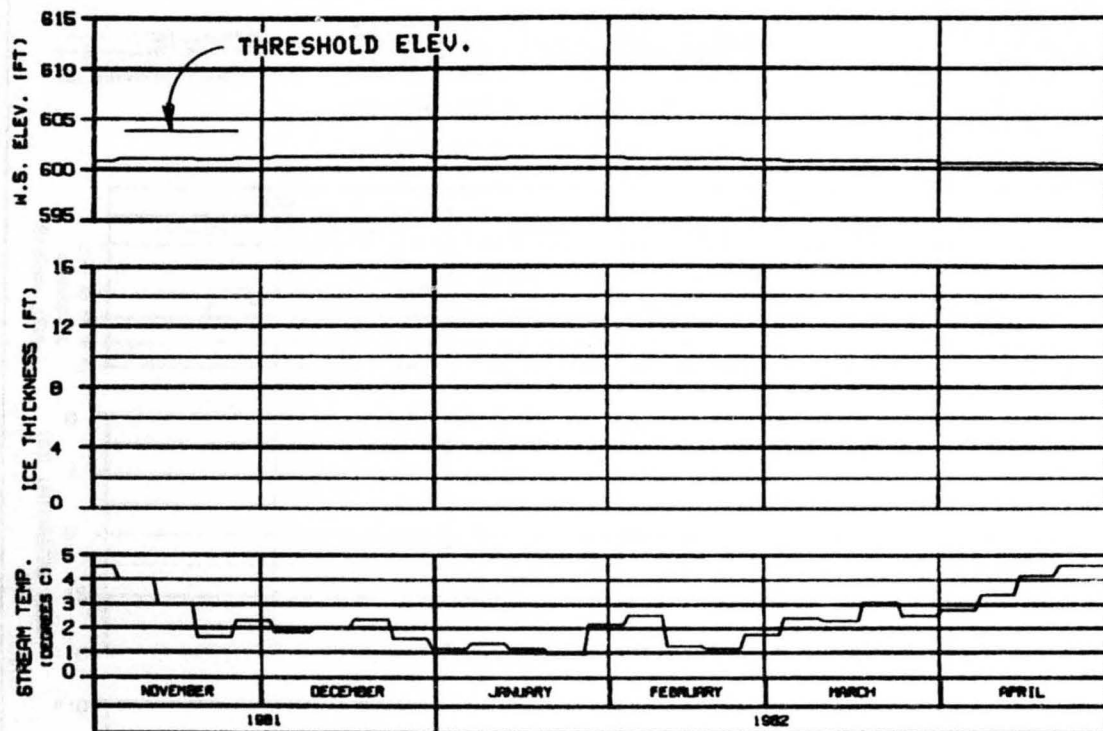
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACO JOINT VENTURE

DIVISION, ALASKA DIVISION OF WATER RESOURCES 1000.142



HEAD OF SLOUGH 9  
RIVER MILE : 129.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CAYON 2002  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 8102CXA

ALASKA POWER AUTHORITY

SUSTINA PROJECT

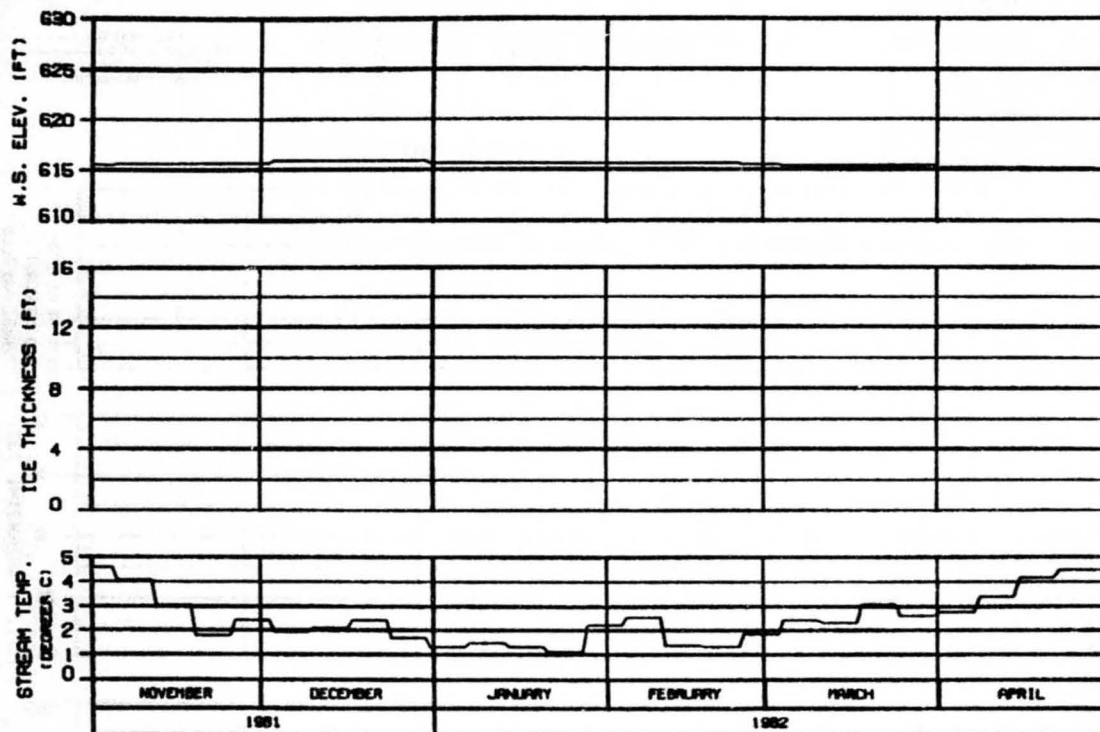
SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHARTER: 81-0000 BY: JPM/MS 8908.142

OPTION?

OPTION?



SIDE CHANNEL U/S OF SLOUGH 9

RIVER MILE : 130.60

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 8102CXA

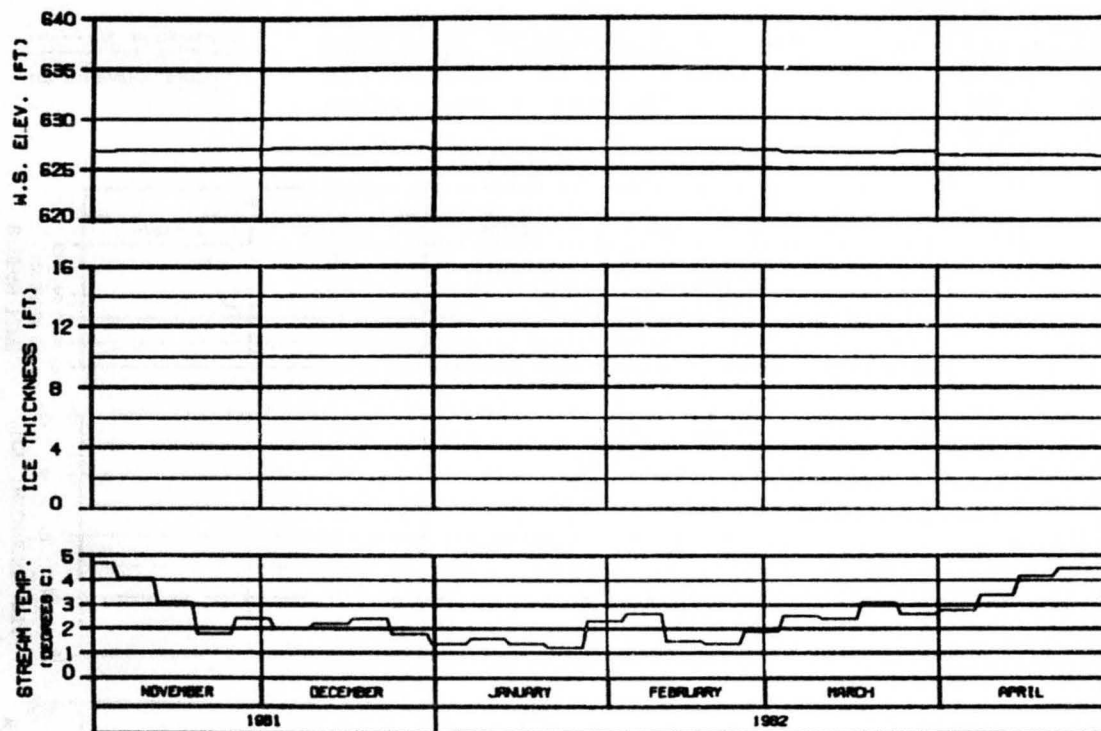
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACD JOINT VENTURE

DESIGN: S. L. HARRIS 21 JUN 82 1000.142



SIDE CHANNEL U/S OF 4TH JULY CREEK  
RIVER MILE : 131.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CAYON 2002  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 8102CXA

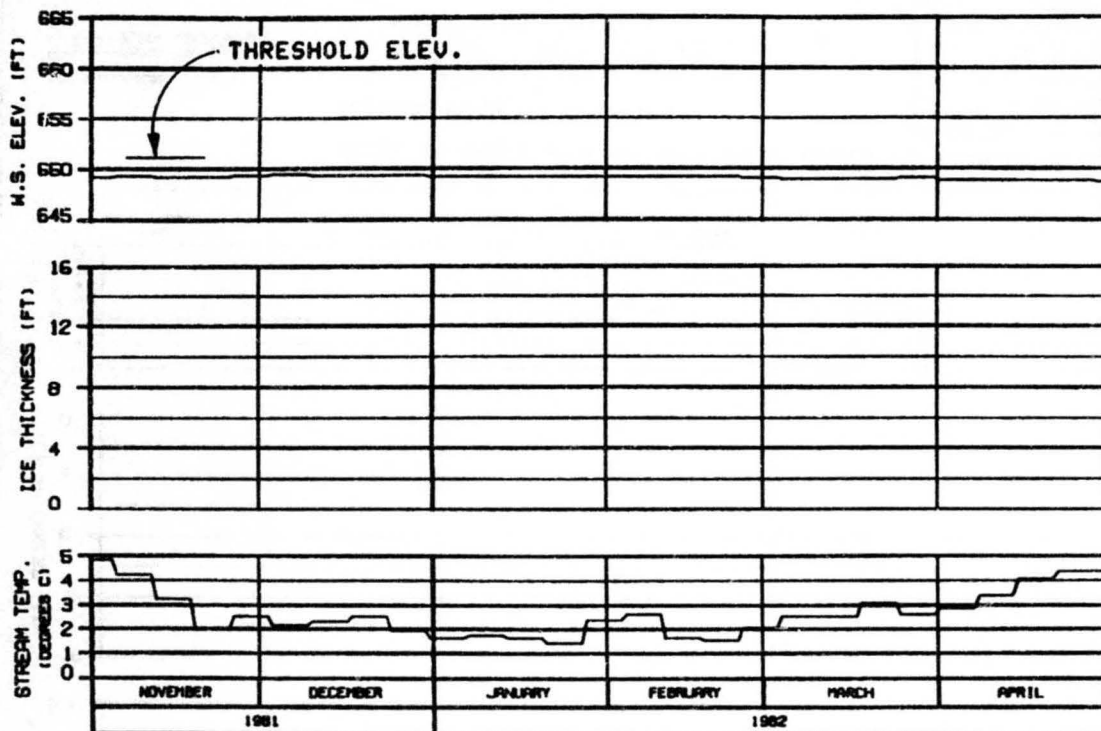
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

REVISED: 04.08.82 BY JHM/GB 1588.142



HEAD OF SLOUGH 9A  
RIVER MILE : 133.70

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 8102CKA

ALASKA POWER AUTHORITY

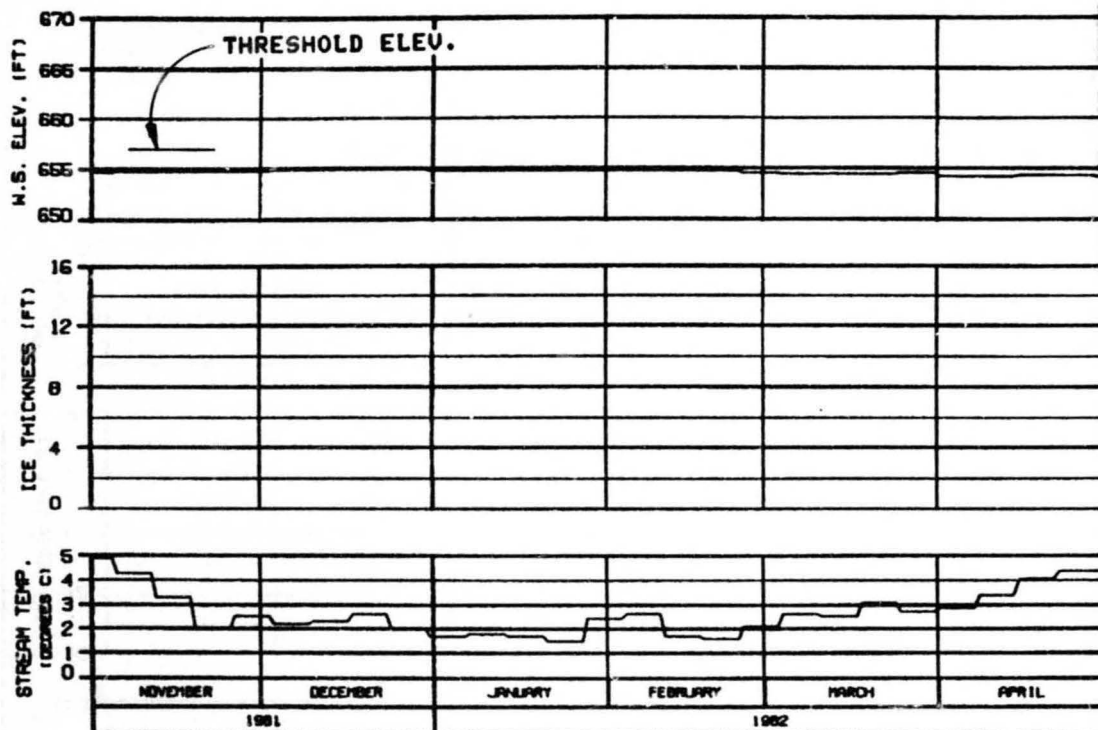
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBASCO JOINT VENTURE

DESIGN: 04-0000 21 JUN 82 1000.142





SIDE CHANNEL U/S OF SLOUGH 10  
RIVER MILE : 134.30

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CAYON 2002  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 81020XA

ALASKA POWER AUTHORITY

SUSITNA PROJECT

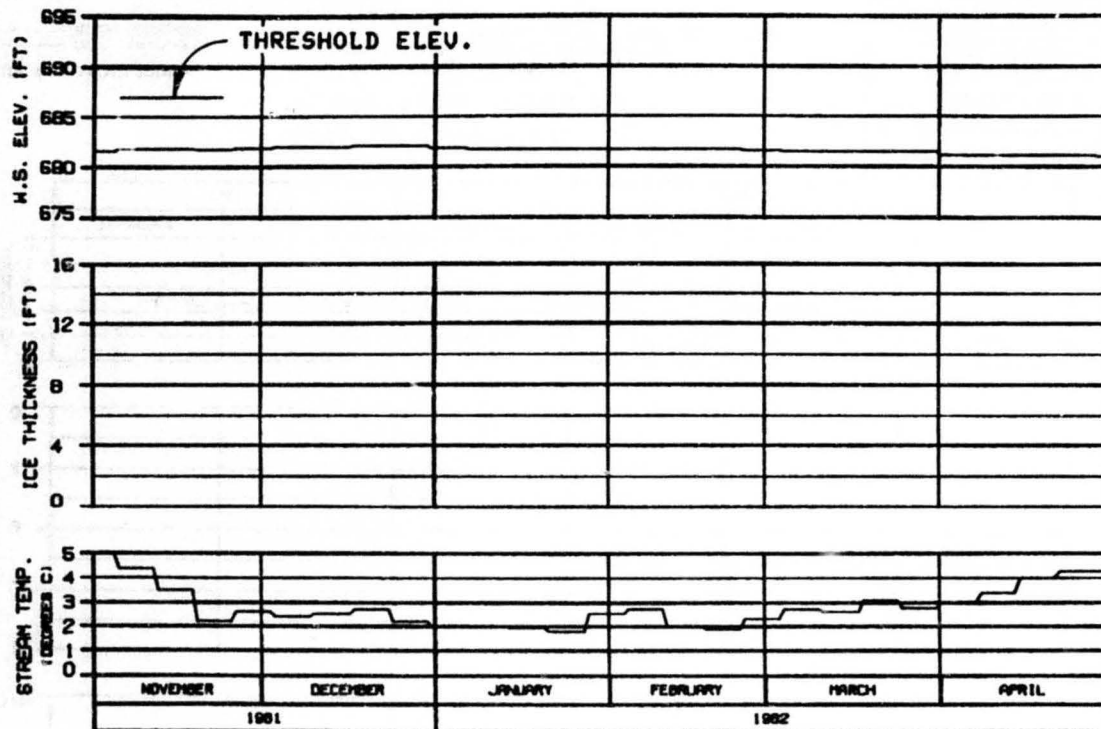
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HRZA-EBASCO JOINT VENTURE

DESIGNER: ALLIANCE

1 OF 142





HEAD OF SLOUGH 11  
RIVER MILE : 136.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS INTAKE 1800, APPROACH 1770.  
REFERENCE RUN NO. : 8102CXA

ALASKA POWER AUTHORITY

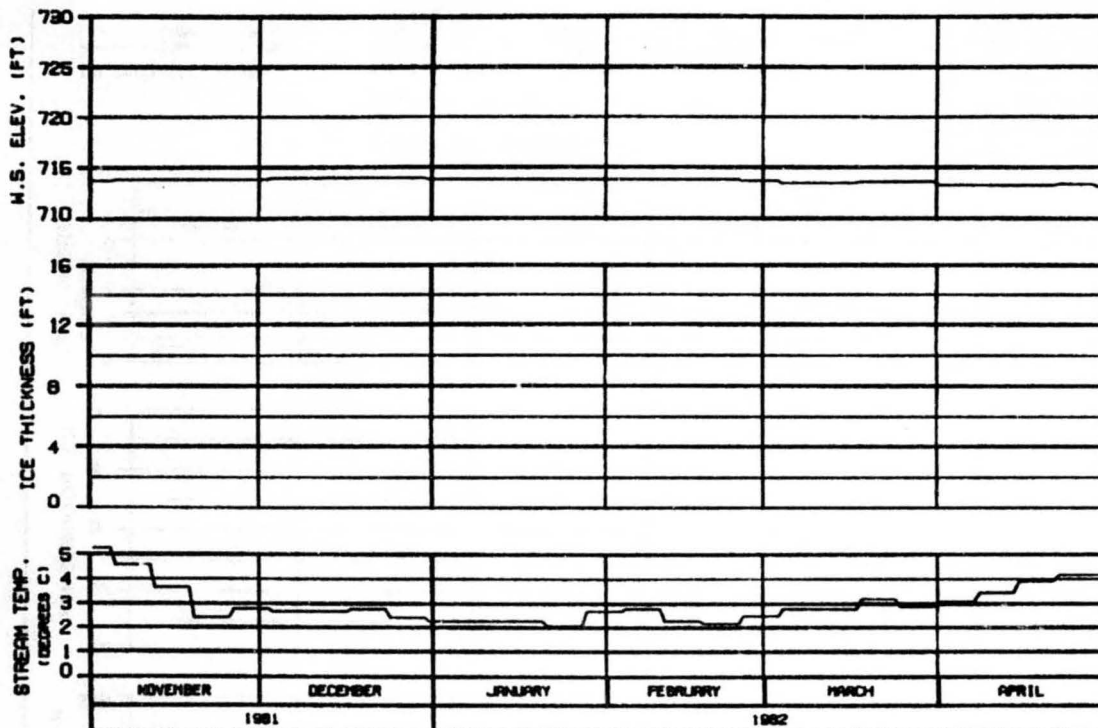
SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

OWNER: ALASKA POWER AUTHORITY

ISS. 142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 17  
 RIVER MILE : 139.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CAYON 2002  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 8102CXA

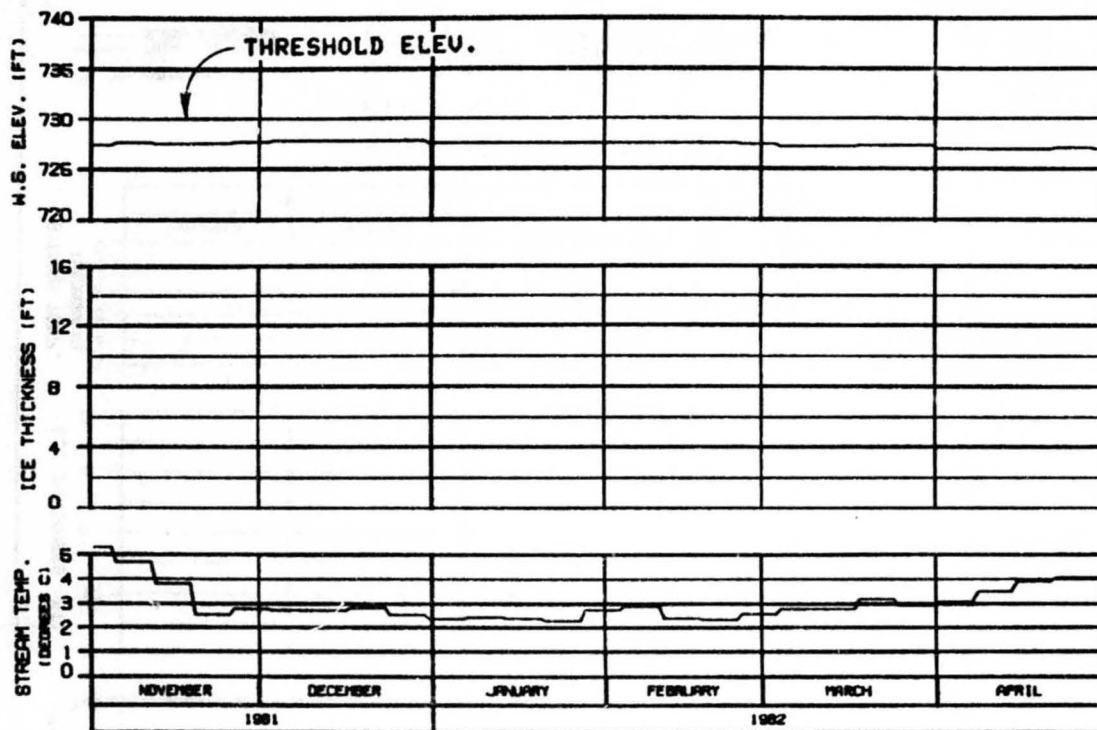
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: A.L.D. 05 01 JUN 82 1000.142



HEAD OF SLOUGH 20  
RIVER MILE : 140.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CAYON 2002  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 8102CXA

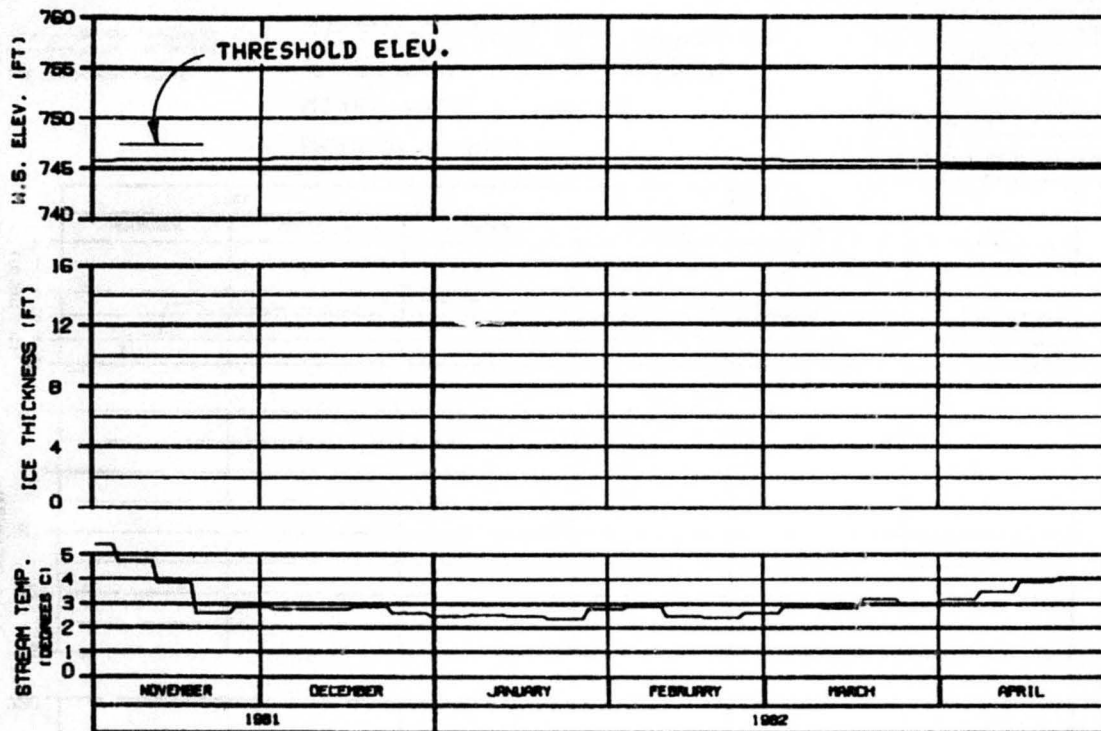
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRACD JOINT VENTURE

DESIGN: ALASKA BY JPA 03 1000.142



SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CAYON 2002  
 CASE C FLOWS INTAKE 1800. APPROACH 1770.  
 REFERENCE RUN NO. : 8102CKA

ALASKA POWER AUTHORITY

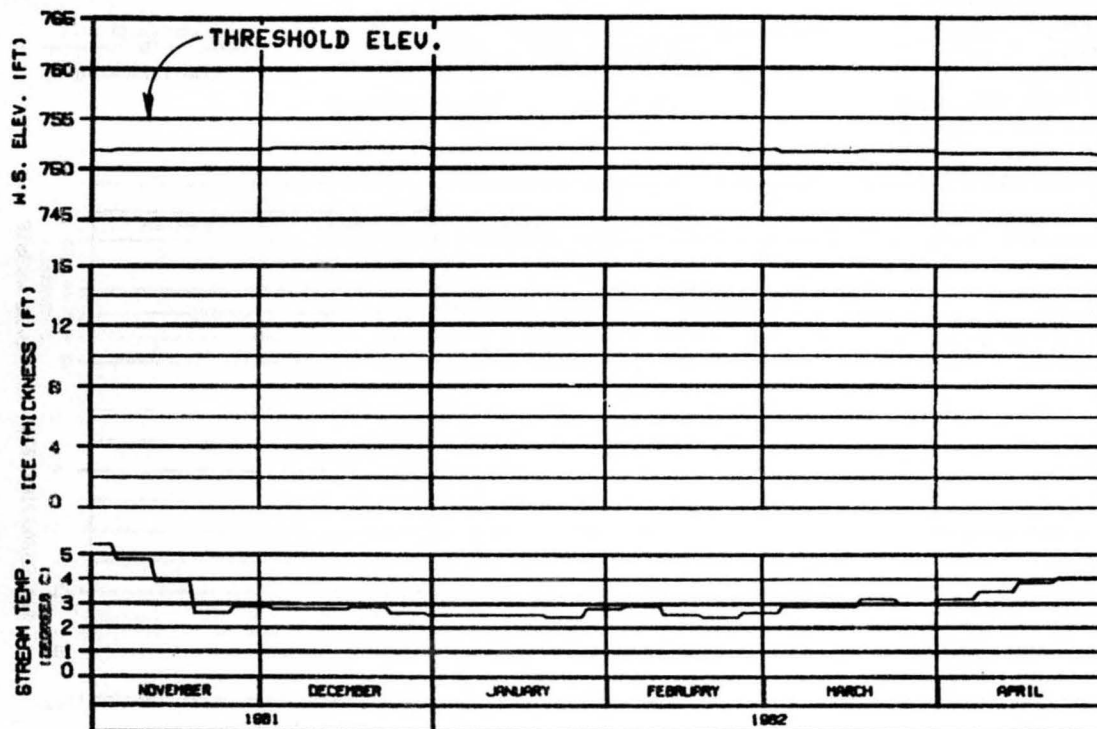
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHART: SLOUGH 21 JAN 82 1500.142





HEAD OF SLOUGH 21  
RIVER MILE : 142.20

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CAYON 2002  
CASE C FLOWS INTAKE 1800. APPROACH 1770.  
REFERENCE RUN NO. : 8102CKA

ALASKA POWER AUTHORITY

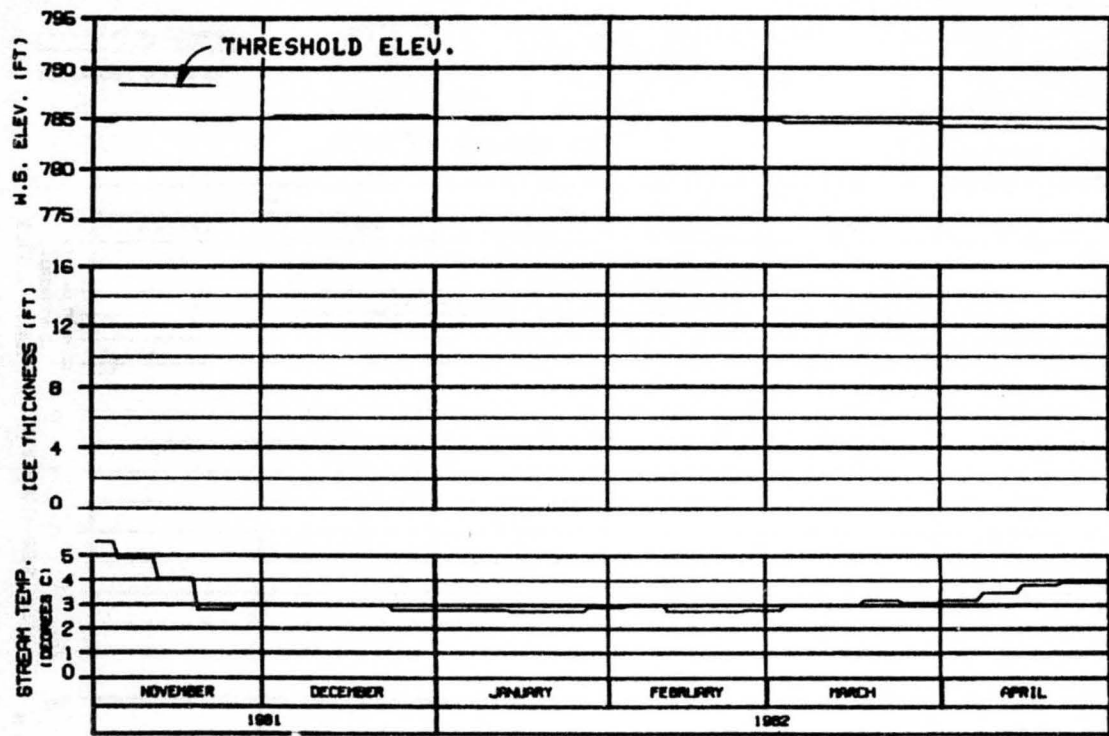
SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZRA-EBERD JOINT VENTURE

DATE: 11/11/82 BY: JWS/MS 1000.142

C



HEAD OF SLOUGH 22  
RIVER MILE : 144.80

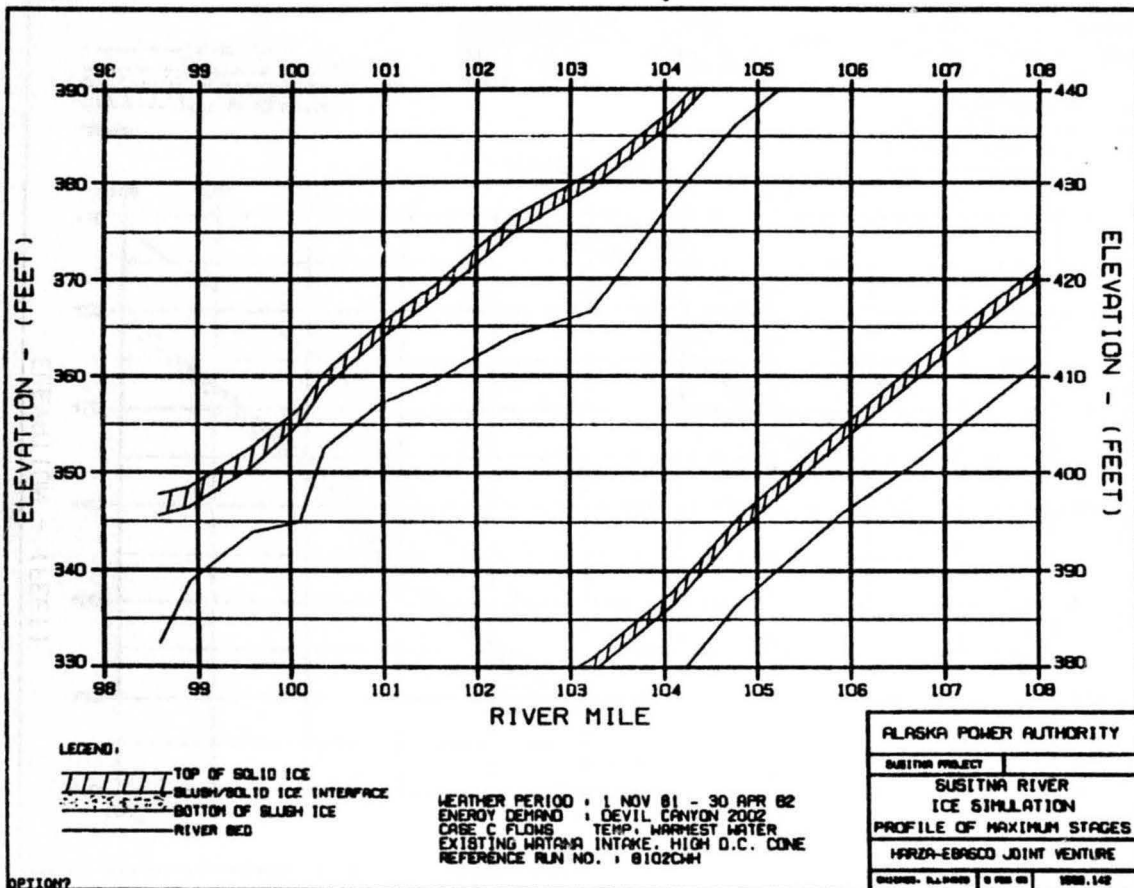
ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

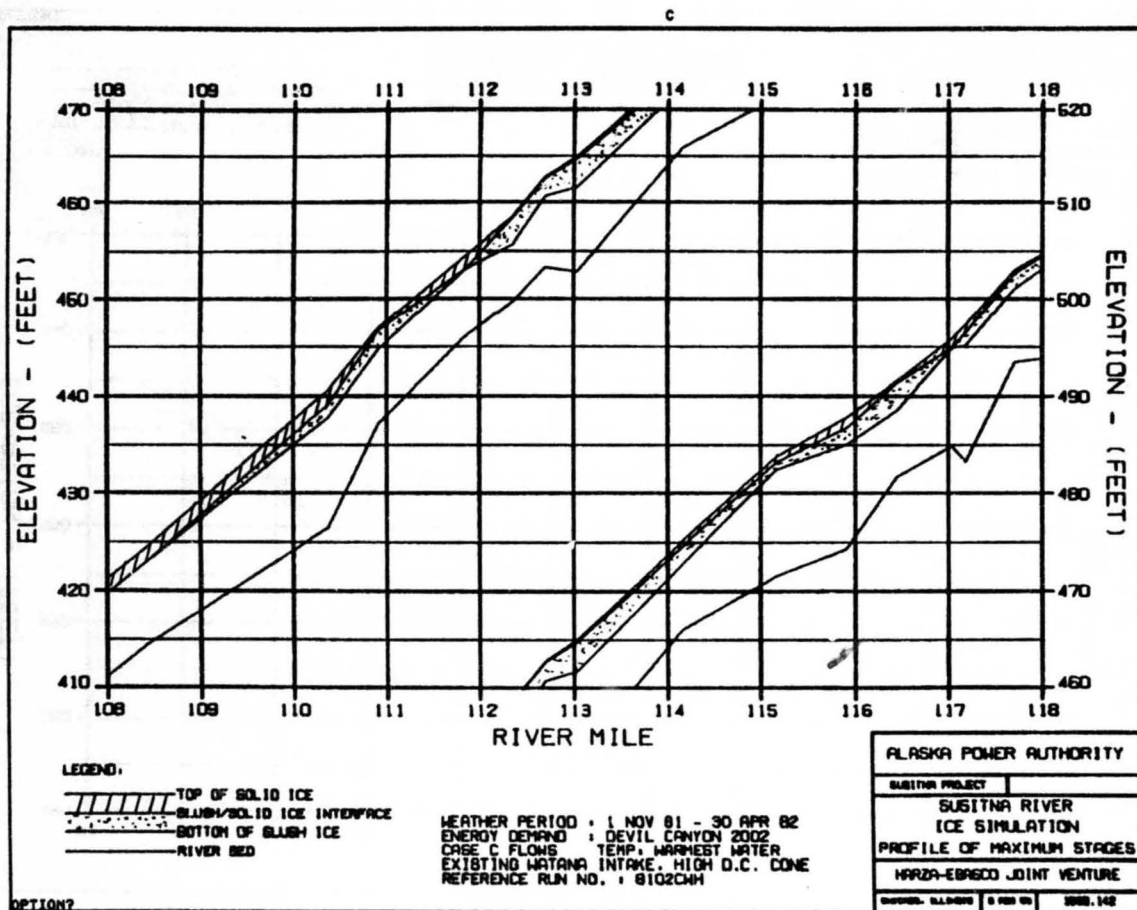
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REFERENCE RUN NO. : B102CXA

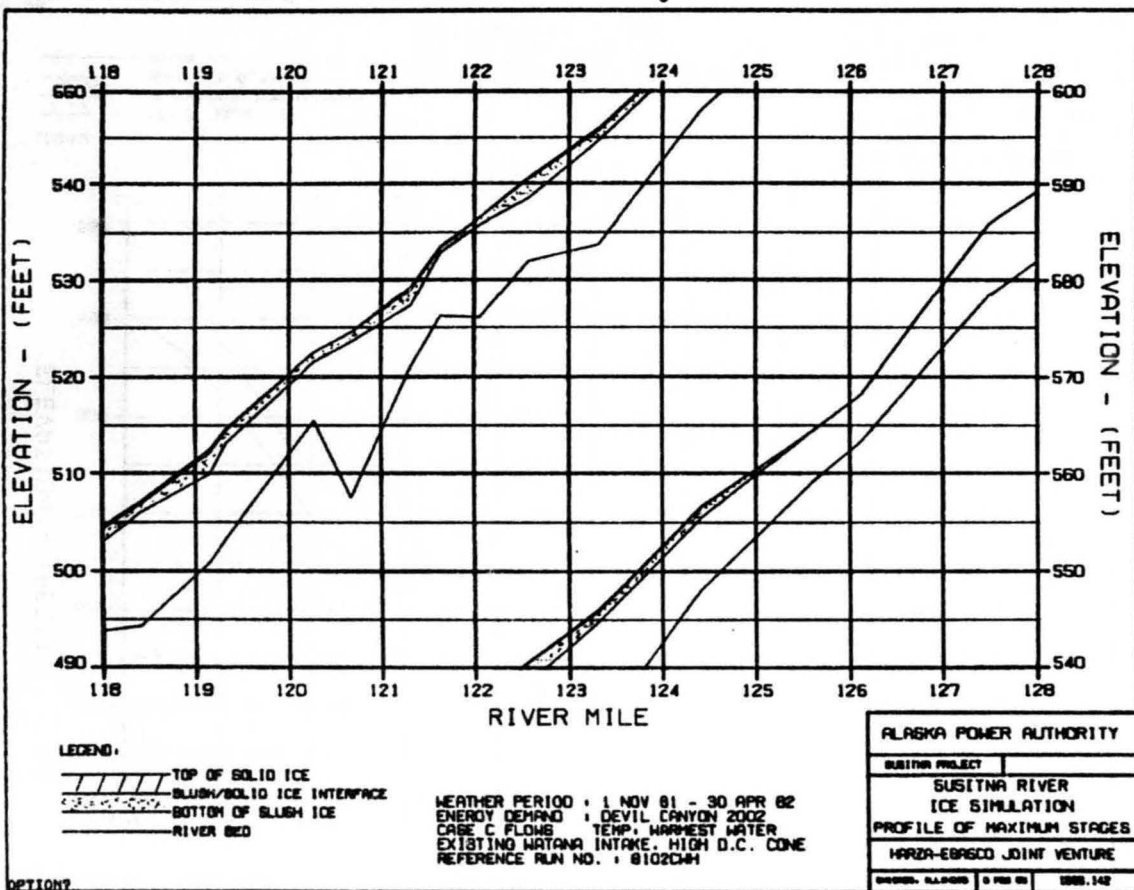
ALASKA POWER AUTHORITY	
SUSTAINA PROJECT	
SUSITNA RIVER	
ICE SIMULATION	
TIME HISTORY	
HARZA-EBRACD JOINT VENTURE	
DESIGNED BY	1000-142

OPTION?

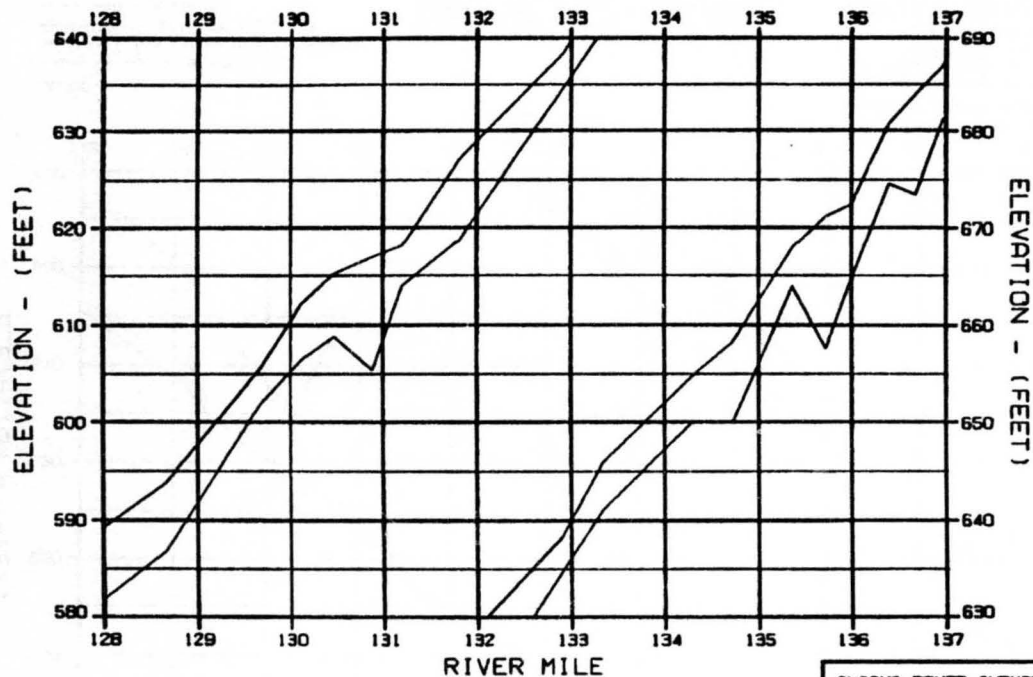
**EXHIBIT W**



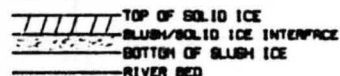








LEGEND:



WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP, WARMEST WATER  
 EXISTING NATANK INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : 8102CH

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION

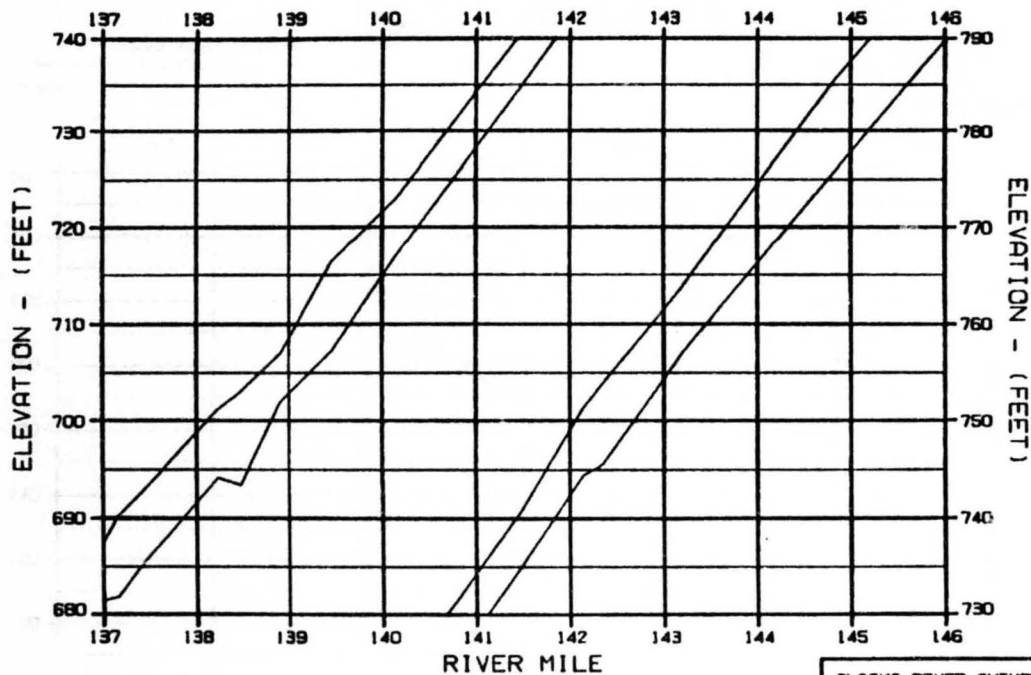
PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

DESIGNED BY: J. J. JENSEN 8 FEB 82 12008-142

OPTION?

C



## LEGEND:

TOP OF SOLID ICE  
 SLUSH/SOLID ICE INTERFACE  
 BOTTOM OF SLUSH ICE  
 RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS : TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : 8102C-41

## ALASKA POWER AUTHORITY

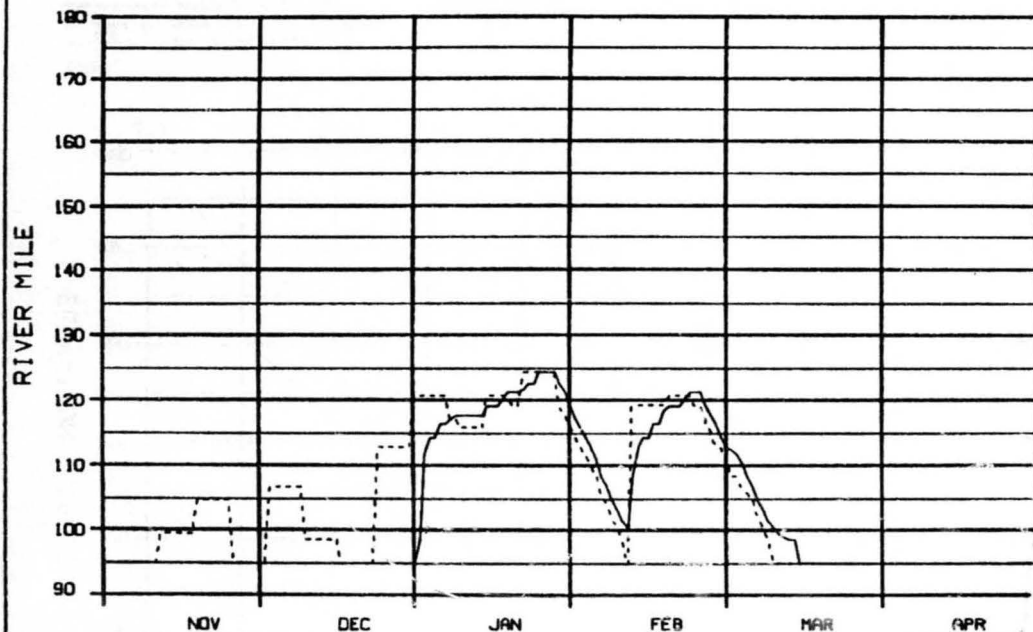
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES

HARZA-EBASCO JOINT VENTURE

DESIGNED - S. J. PETERSON 8 FEB 82 10000 - 142

OPTION?



LEGEND.

— ICE FRONT  
 - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE C TEMP: WARMEST WATER  
 EXISTING WATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO : 8102CHH

ALASKA POWER AUTHORITY

SUSITNA PROJECT

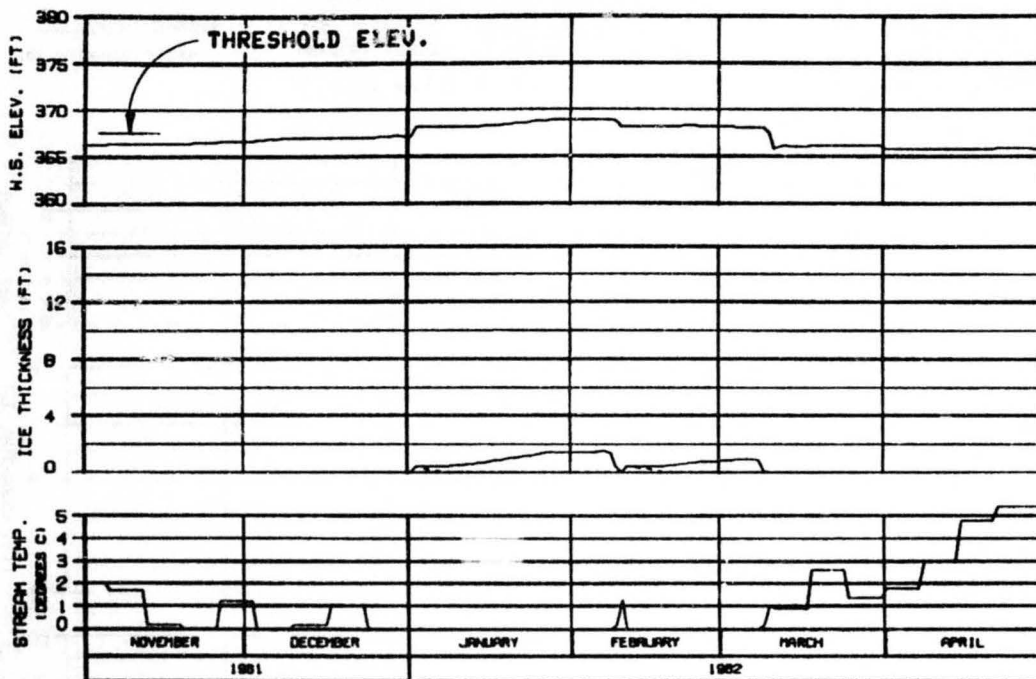
SUSITNA RIVER

PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

HARZA-EBASCO, JOINT VENTURE

CHART NO. AL-8000 C 80 1000, 142

OPTION?



# HEAD OF WHISKERS SLOUGH

RIVER MILE : 101.50

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP: WARMEST WATER  
 EXISTING WATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : 810204H

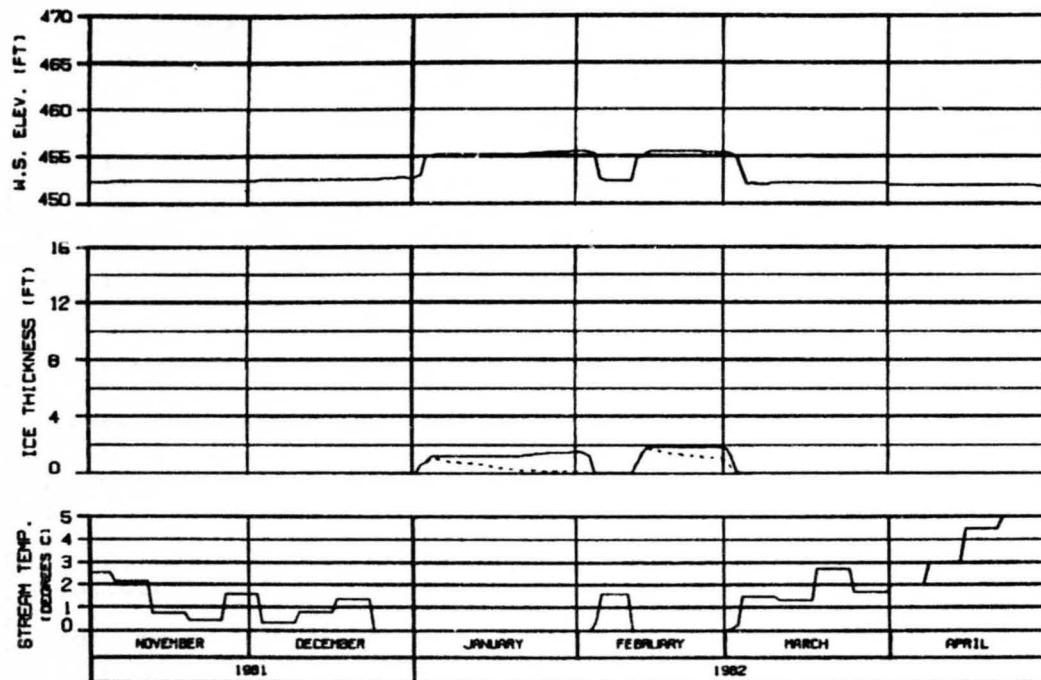
## ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: ALL PHOTO 8 FEB 82 1000.142

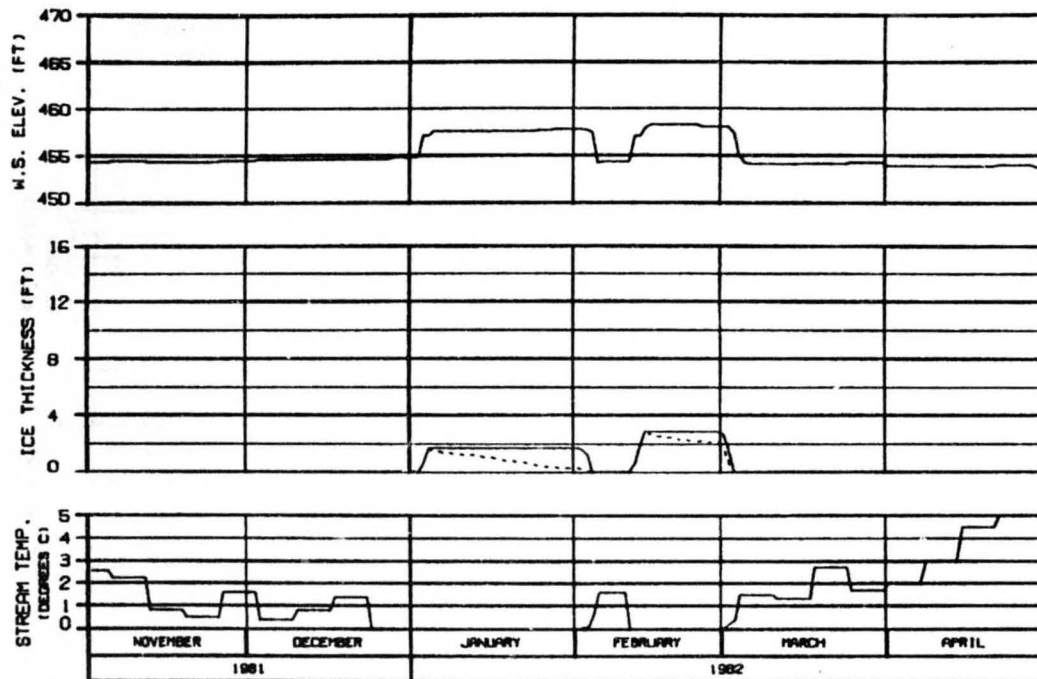


**SIDE CHANNEL AT HEAD OF GASH CREEK**  
**RIVER MILE : 112.00**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : 8102CHH

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER	
ICE SIMULATION	
TIME HISTORY	
HARZA-EBASCO JOINT VENTURE	
DESIGNED - S. L. HARRIS	8 FEB 82
2000.142	



MOUTH OF SLOUGH 6A

RIVER MILE : 112.34

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP: WARMEST WATER  
 EXISTING WATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : 8102CHH

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER

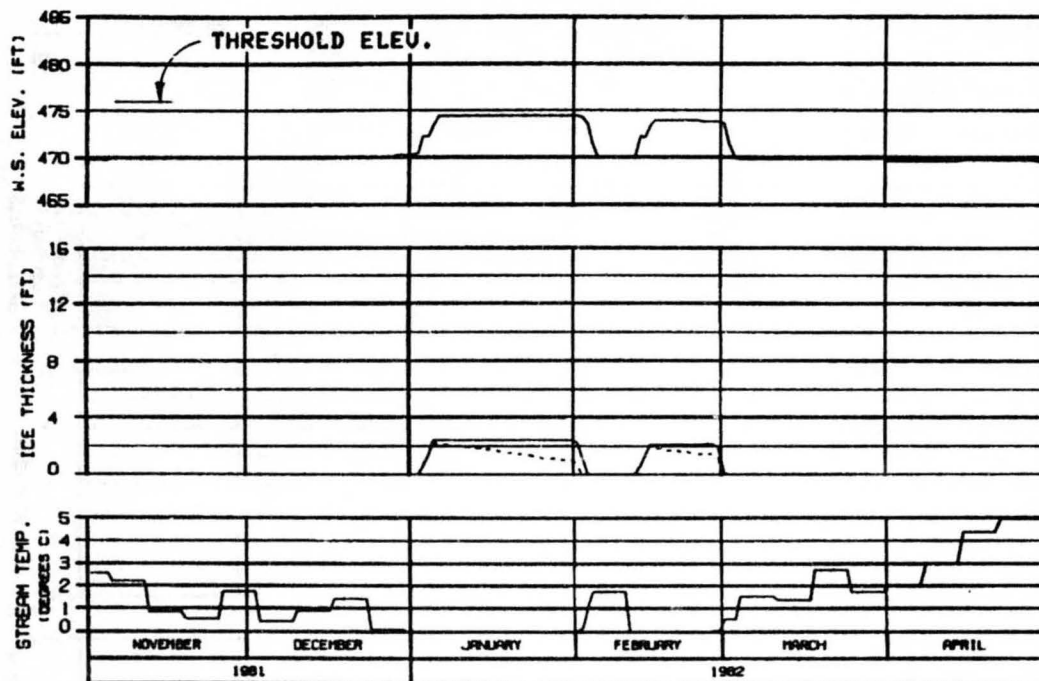
ICE SIMULATION

TIME HISTORY

MARZA-EBASCO JOINT VENTURE

CHARGE: AL-0000 8 FEB 82 1500.142





# HEAD OF SLOUGH 8 RIVER MILE : 114.10

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP: WARMEST WATER  
 EXISTING WATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : 8102CH1

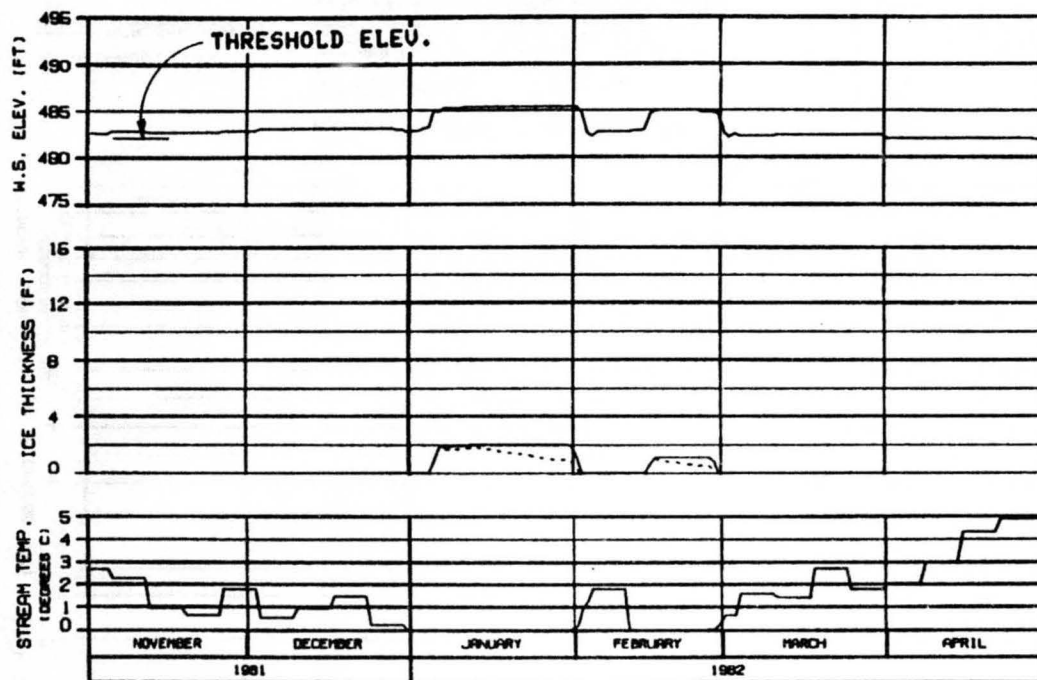
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBRSCO JOINT VENTURE

OSWEGO, AL-0000 8 FEB 82 1000.142



SIDE CHANNEL MSII

RIVER MILE : 115.50

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP, WARMEST WATER  
 EXISTING WATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : 8102CHH

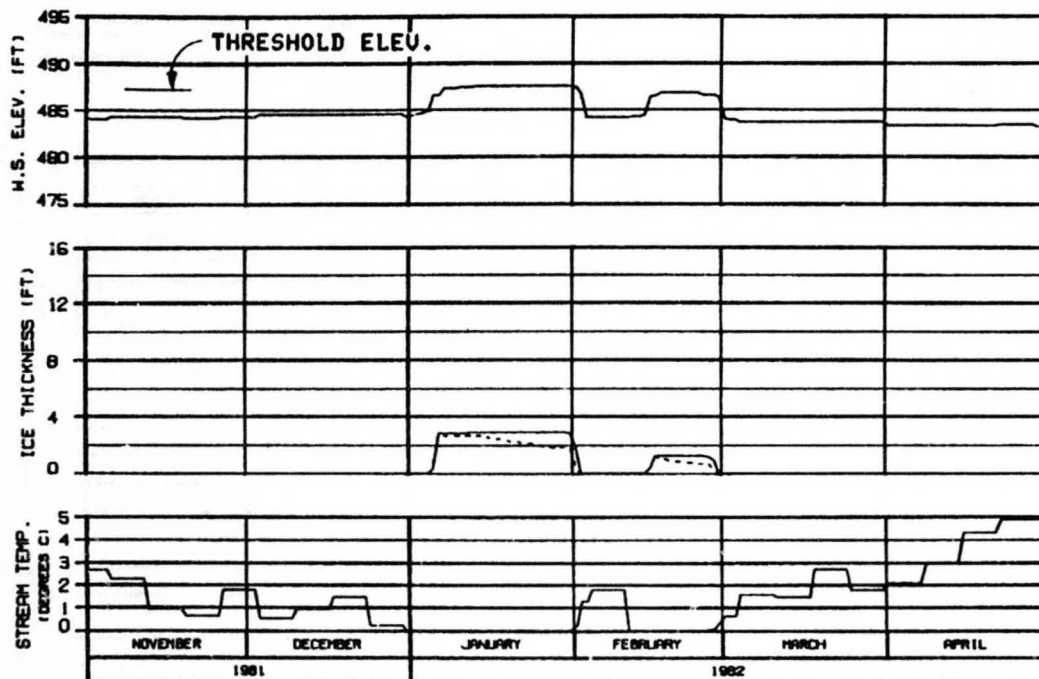
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: AL 0000 8 FEB 82 1000.142



HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP: WARMEST WATER  
 EXISTING WATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : 8102CHH

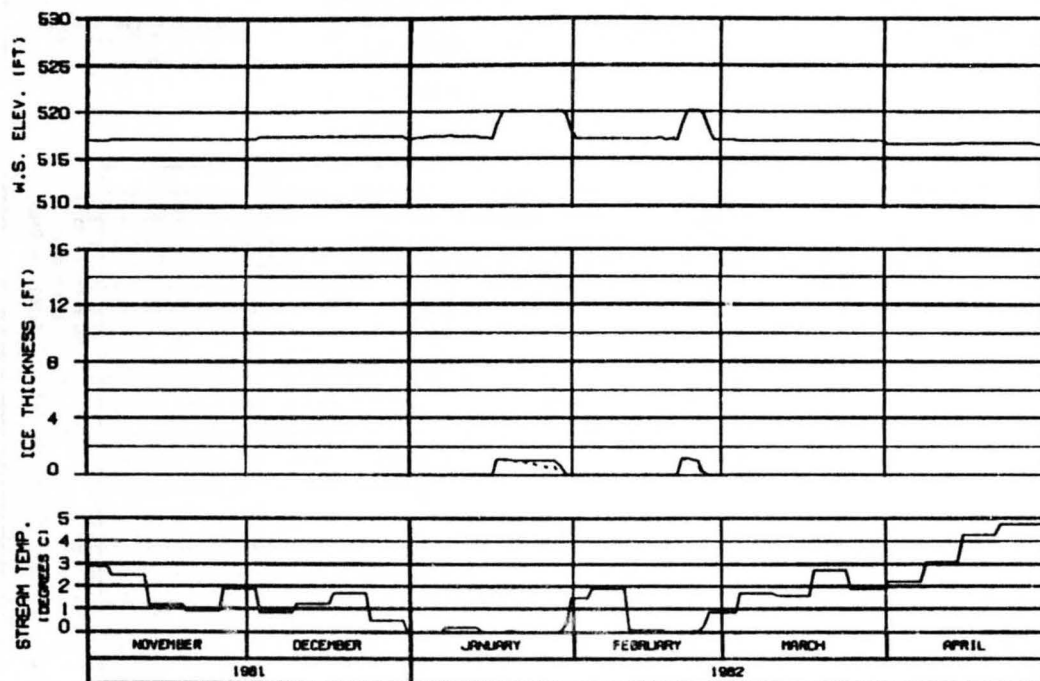
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACD JOINT VENTURE

CHARGE: 01-0000 0 FEB 82 1000.142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS : TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : 8102CHH

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER

ICE SIMULATION

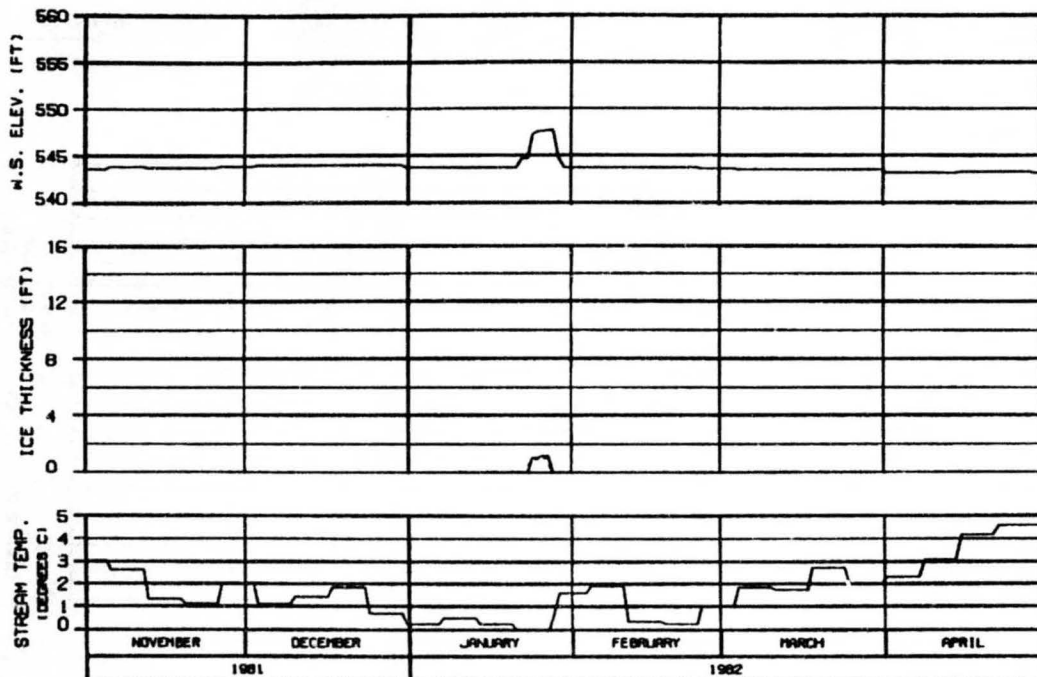
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: ALL-448

5 FEB 82

100% L&E



HEAD OF MOOSE SLOUGH

RIVER MILE : 123.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : 8102CHH

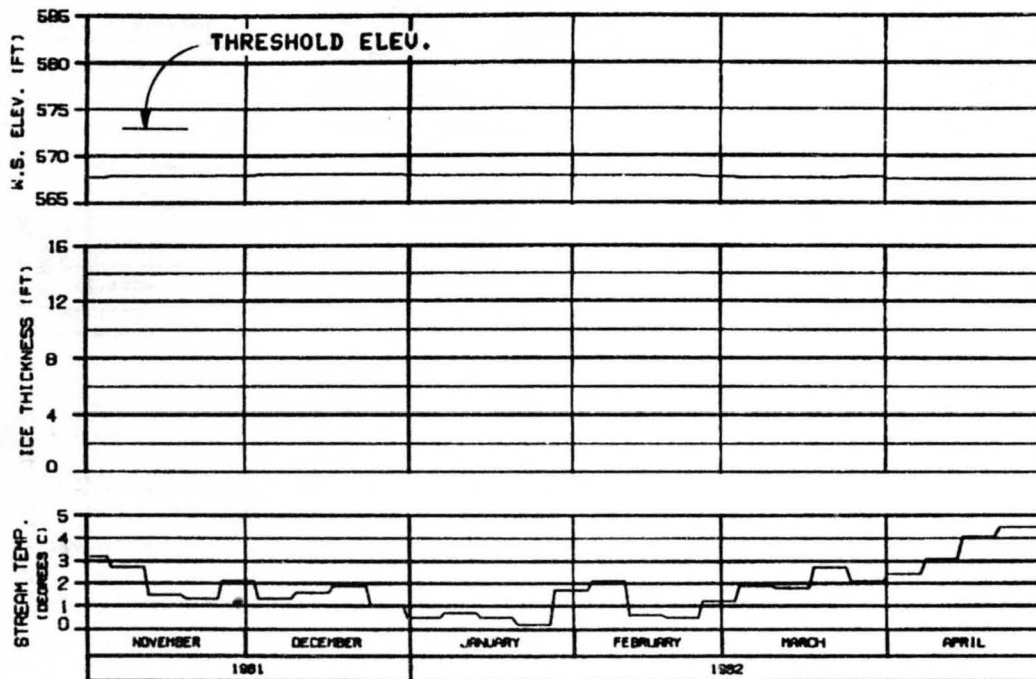
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN BY: J. J. JONES 8 FEB 82 5000-142



HEAD OF SLOUGH 8A (WEST)  
RIVER MILE : 126.10

ICE THICKNESS LEGEND:  
——— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS TEMP: WARMEST WATER  
EXISTING WATANA INTAKE, HIGH D.C. CONE  
REFERENCE RUN NO. : 8102CHH

ALASKA POWER AUTHORITY

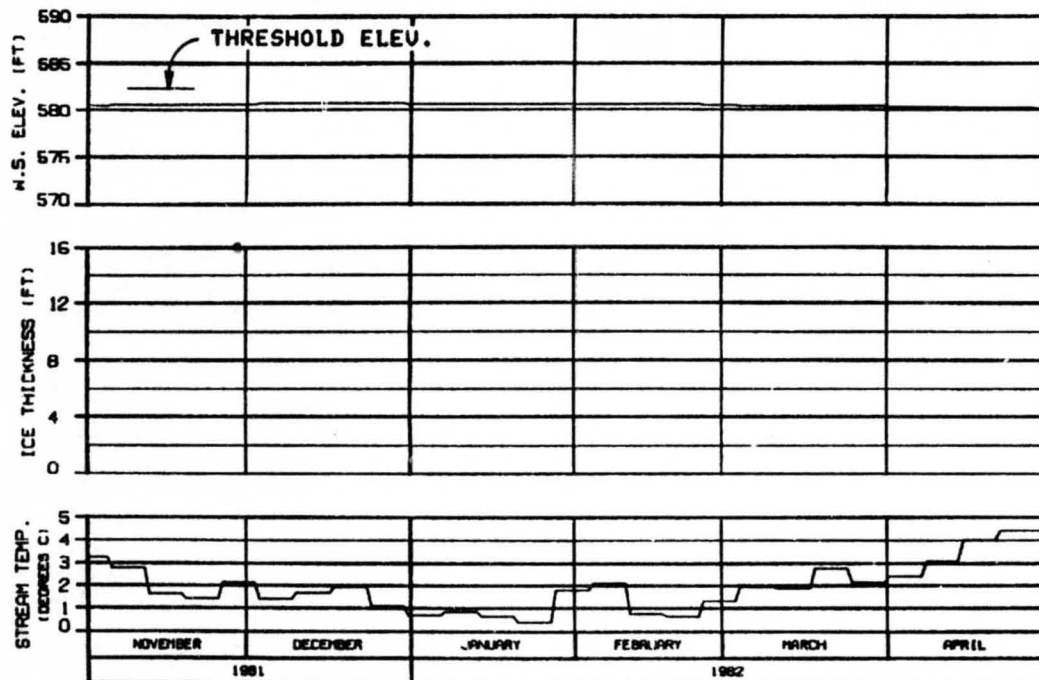
SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHS-400, SL-0400 5 FEB 82 1000, 142





HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : 810204H

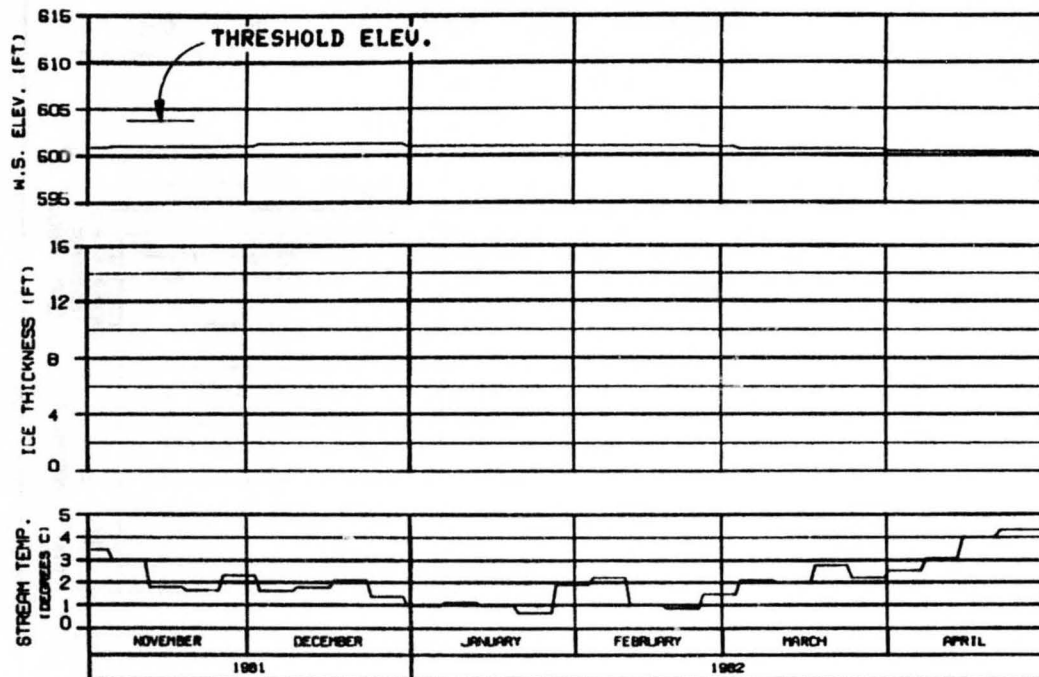
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRASCO JOINT VENTURE

DESIGNED BY: SLD/STW 5 FEB 82 1000.142



HEAD OF SLOUGH 9  
RIVER MILE : 129.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS TEMP: WARMEST WATER  
EXISTING WATANA INTAKE, HIGH D.C. CONE  
REFERENCE RUN NO. : 8102CH4

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

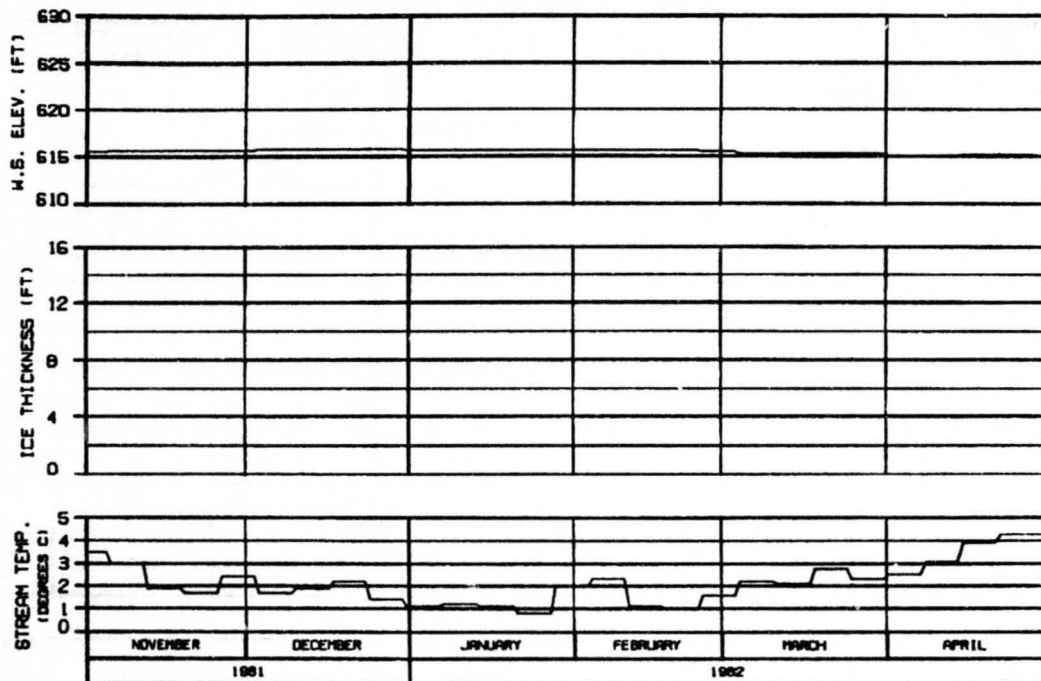
CHARTED, SLL-8808

9 FEB 82

129.30-142

OPTION?

OPTION?

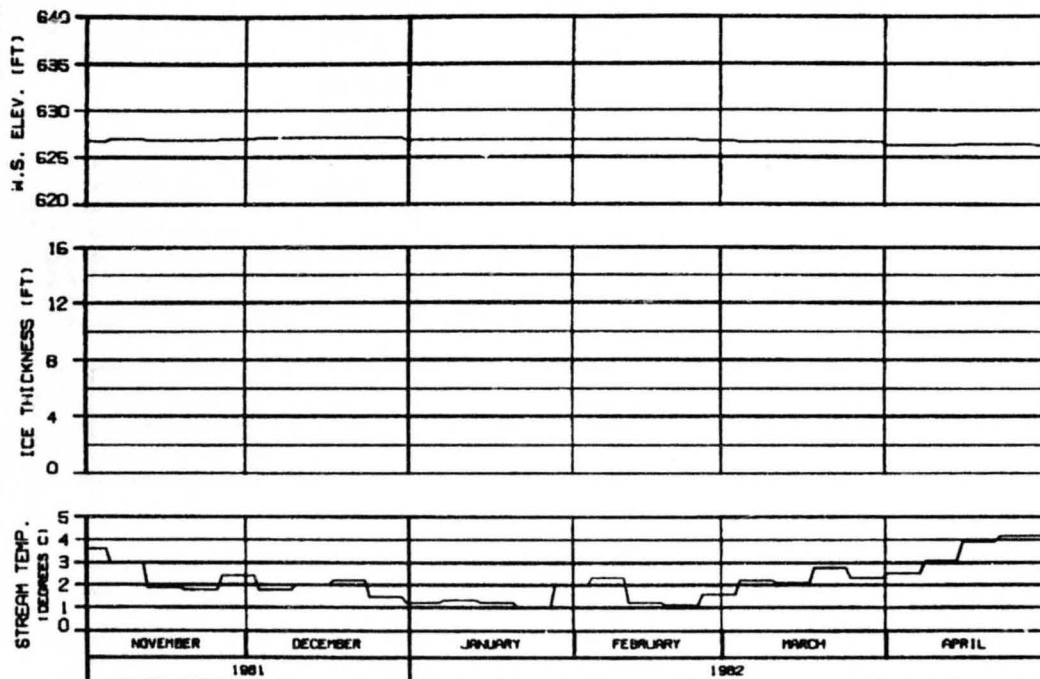


ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF SLOUGH 9  
 RIVER MILE : 130.60

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP, WARMEST WATER  
 EXISTING WATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : 8102CWH

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER	
ICE SIMULATION	
TIME HISTORY	
HARZA-EBASCO JOINT VENTURE	
DESIGNED: DA 9010	8 FEB 82
2002.142	



SIDE CHANNEL U/S OF 4TH JULY CREEK  
RIVER MILE : 131.80

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS TEMP. WARMEST WATER  
EXISTING WATANA INTAKE, HIGH D.C. CONE  
REFERENCE RUN NO. : 0102CWH

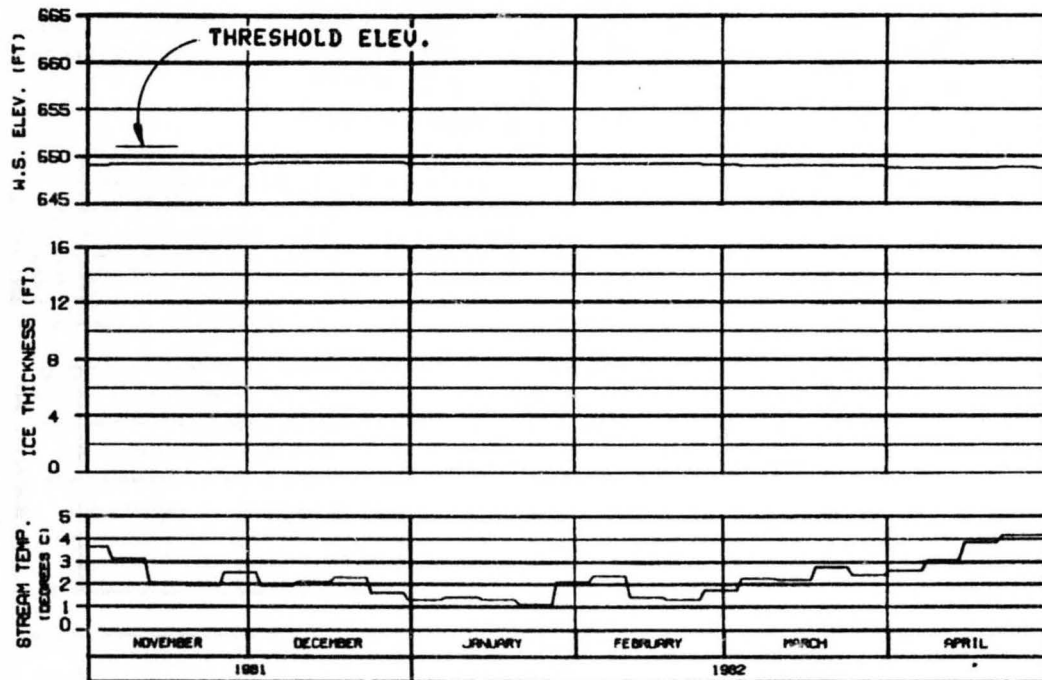
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: SLL/PHS 9 FEB 82 1000 142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 9A  
 RIVER MILE : 133.70

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 EXISTING NATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : 8102CWH

ALASKA POWER AUTHORITY

SUSTINA PROJECT

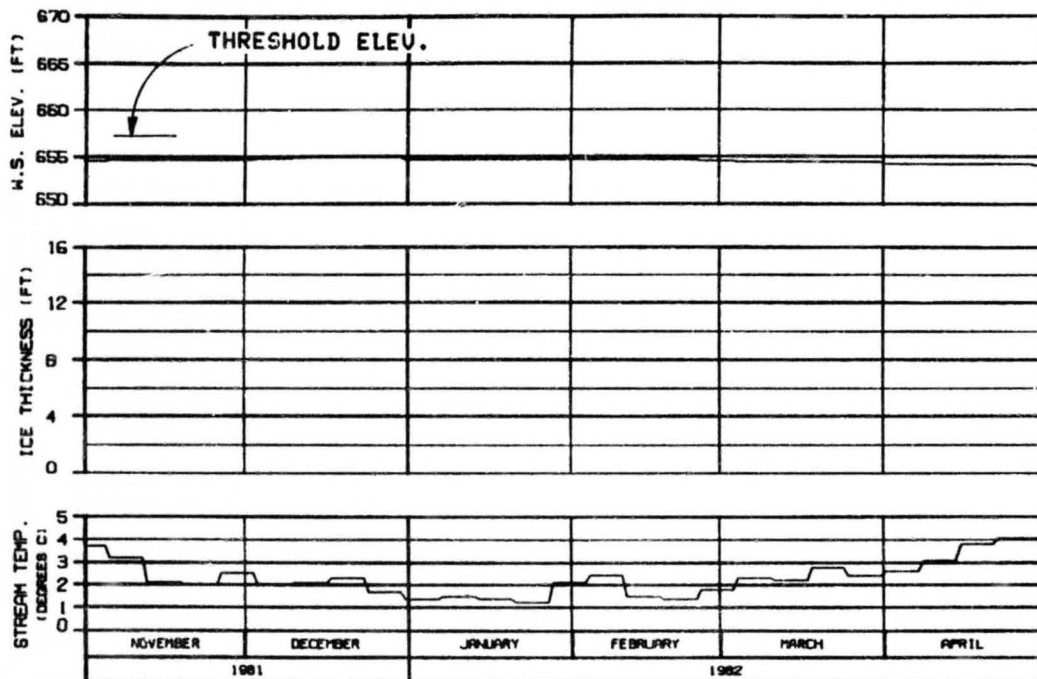
SUSTINA RIVER

ICE SIMULATION

TIME HISTORY

HARZA-EBRSCO JOINT VENTURE

DESIGN: AL 1000 8 FEB 82 18 18.142



SIDE CHANNEL U/S OF SLOUGH 10

RIVER MILE : 134.30

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS : TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : B102CHH

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

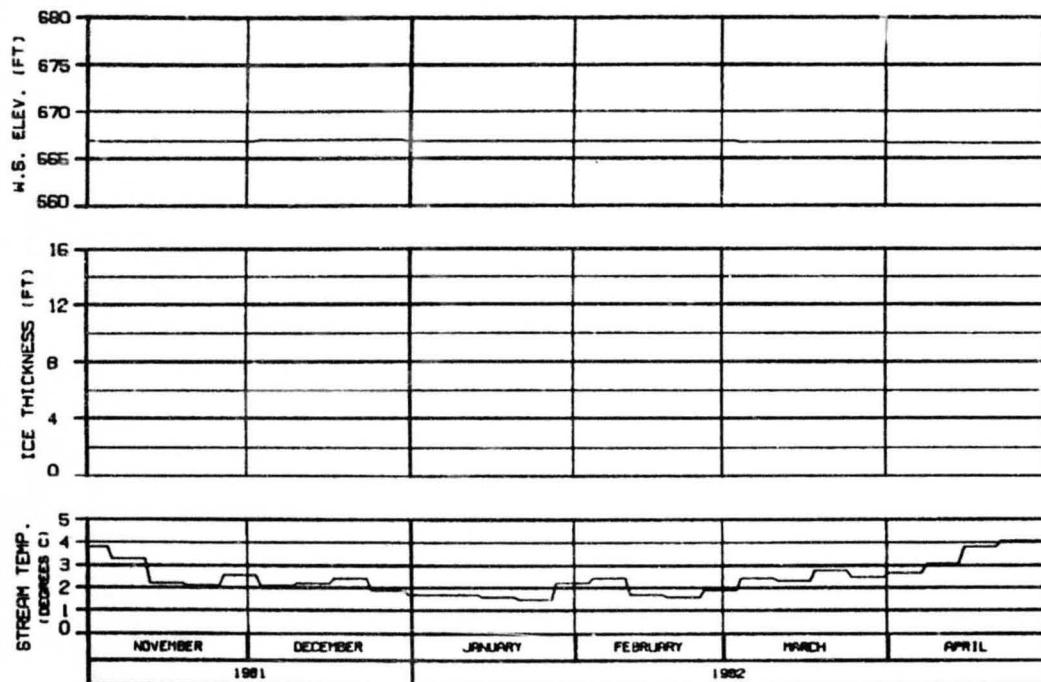
HARZA-EBASCO JOINT VENTURE

DESIGNED - TLL-P&W

6 FEB 82

1000.142





SIDE CHANNEL D/S OF SLOUGH 11  
RIVER MILE : 135.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS : TEMP, WARMEST WATER  
EXISTING WATANA INTAKE, HIGH O.C. CONE  
REFERENCE RUN NO. : 8102CHH

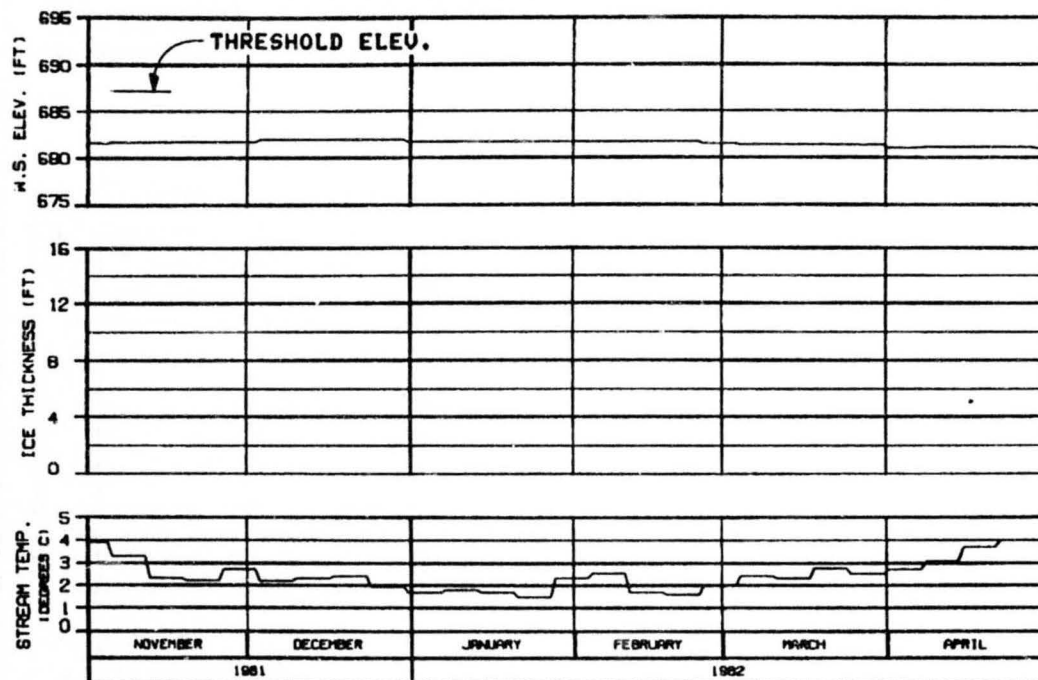
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRSCO JOINT VENTURE

DESIGNED BY: SLL/DBS 8 FEB 82 10000, 142



HEAD OF SLOUGH 11  
RIVER MILE : 136.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS TEMP. WARMEST WATER  
EXISTING WATANA INTAKE, HIGH D.C. CONE  
REFERENCE RUN NO. : 810204H

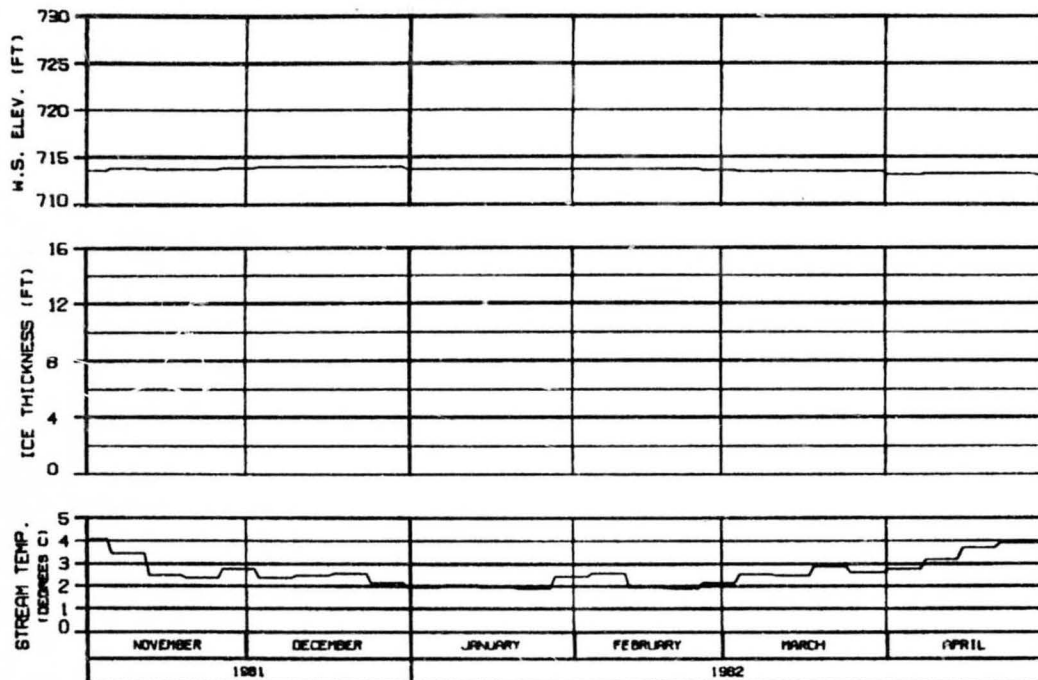
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZDA-EBRACCO JOINT VENTURE

DRAWN BY: S.A. HARRIS 8 FEB 82 1982, 142



HEAD OF SLOUGH 17

RIVER MILE : 139.30

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP: WARMEST WATER  
 EXISTING WATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : 8102CHH

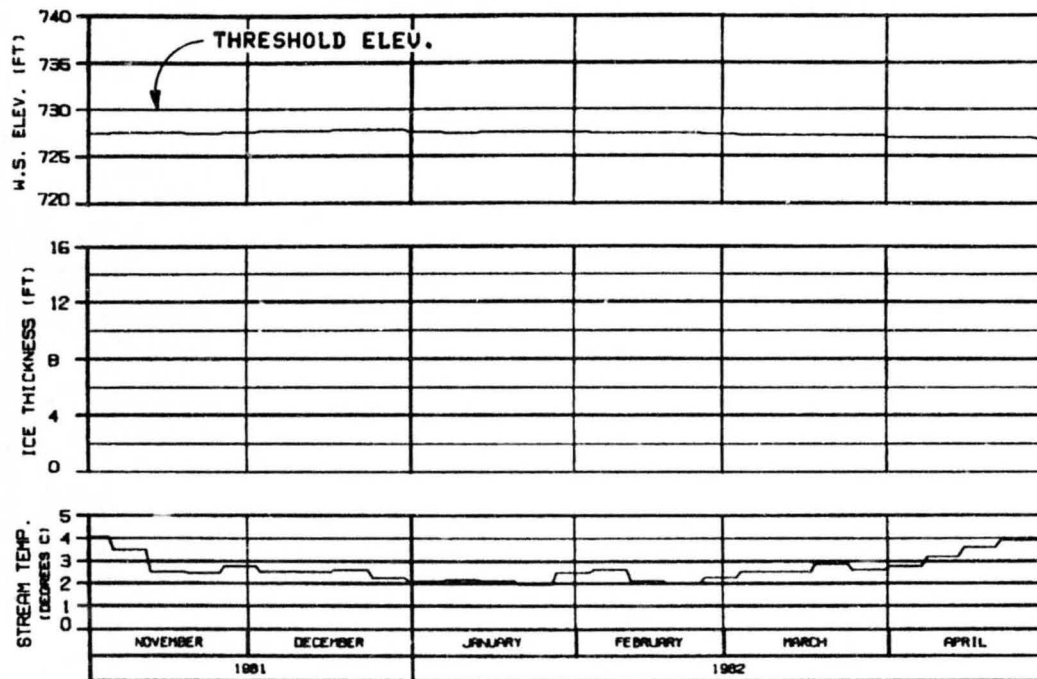
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACO JOINT VENTURE

DATED: 01/04/82 0 000 00 0000.142



HEAD OF SLOUGH 20

RIVER MILE : 140.50

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 EXISTING WATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : 8102CWH

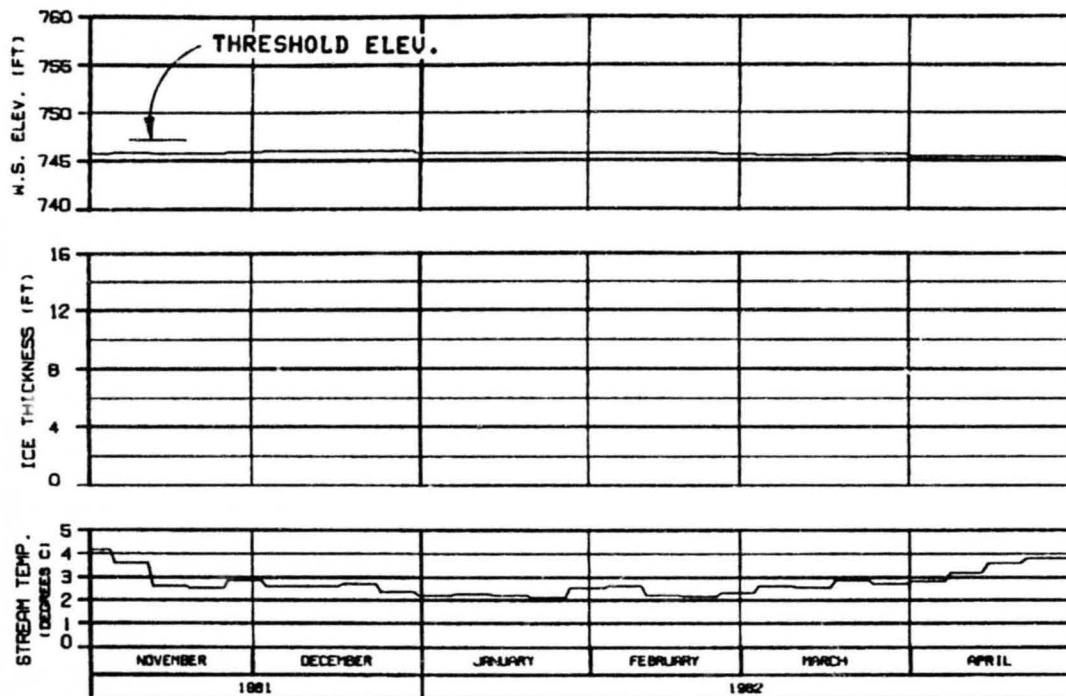
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBAGCO JOINT VENTURE

CHUCKS, S.L. 8/8/88 8 FEB 89 1989, 142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP: WARMEST WATER  
 EXISTING MATANA INTAKE: HIGH D.C. CONE  
 REFERENCE RUN NO. : 8102CHH

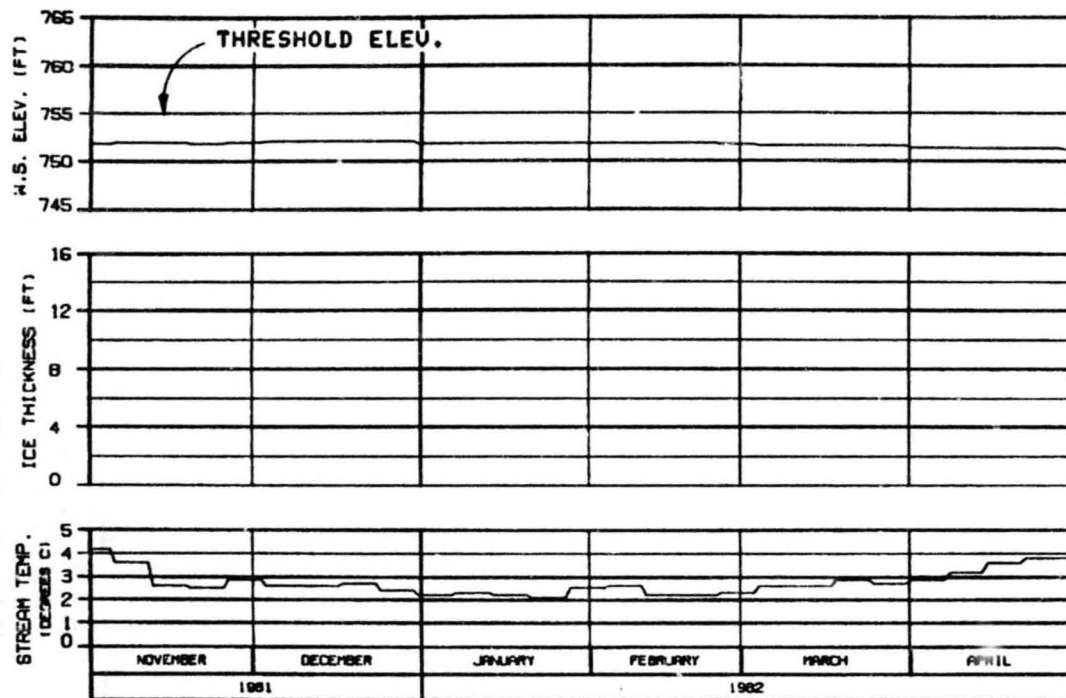
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HAZARDA-EBASCO JOINT VENTURE

DESIGNED BY: HAZARDA 8 FEB 82 1000.142



HEAD OF SLOUGH 21  
RIVER MILE : 142.20

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS : TEMP. WARMEST WATER  
EXISTING WATANA INTAKE. HIGH D.C. CONE  
REFERENCE RUN NO. : 8102CHM

ALASKA POWER AUTHORITY

SUSTINA PROJECT

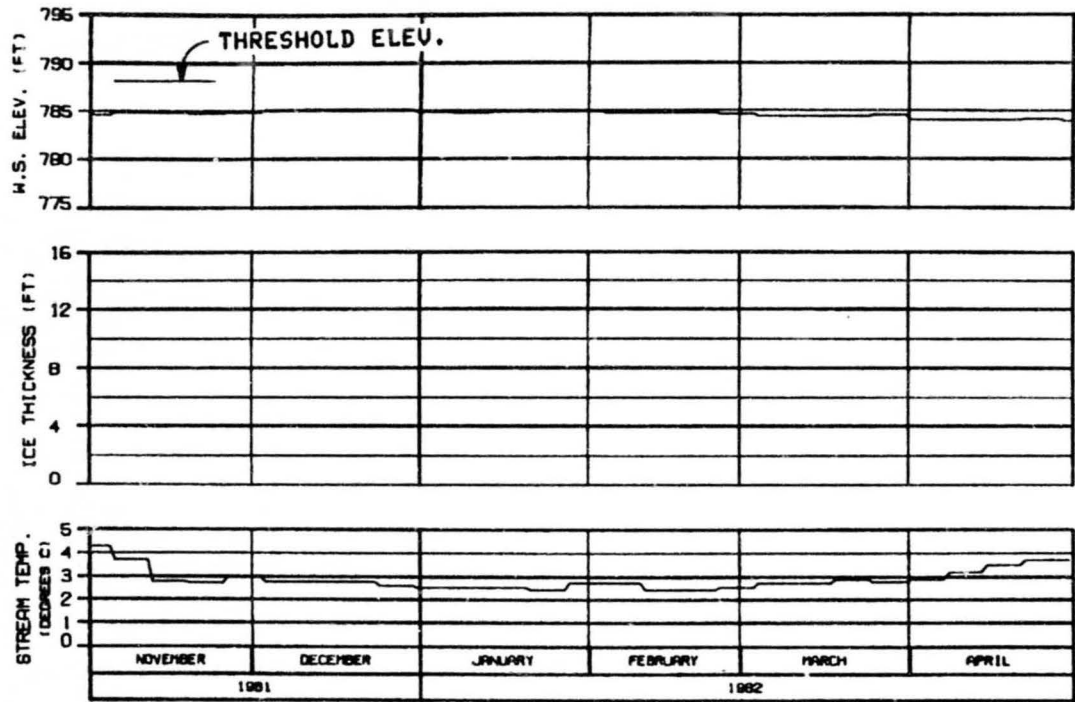
SUSTITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARDA-EBASCO JOINT VENTURE

DESIGN: 01/82 0 FEB 82 1982. 142



C



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

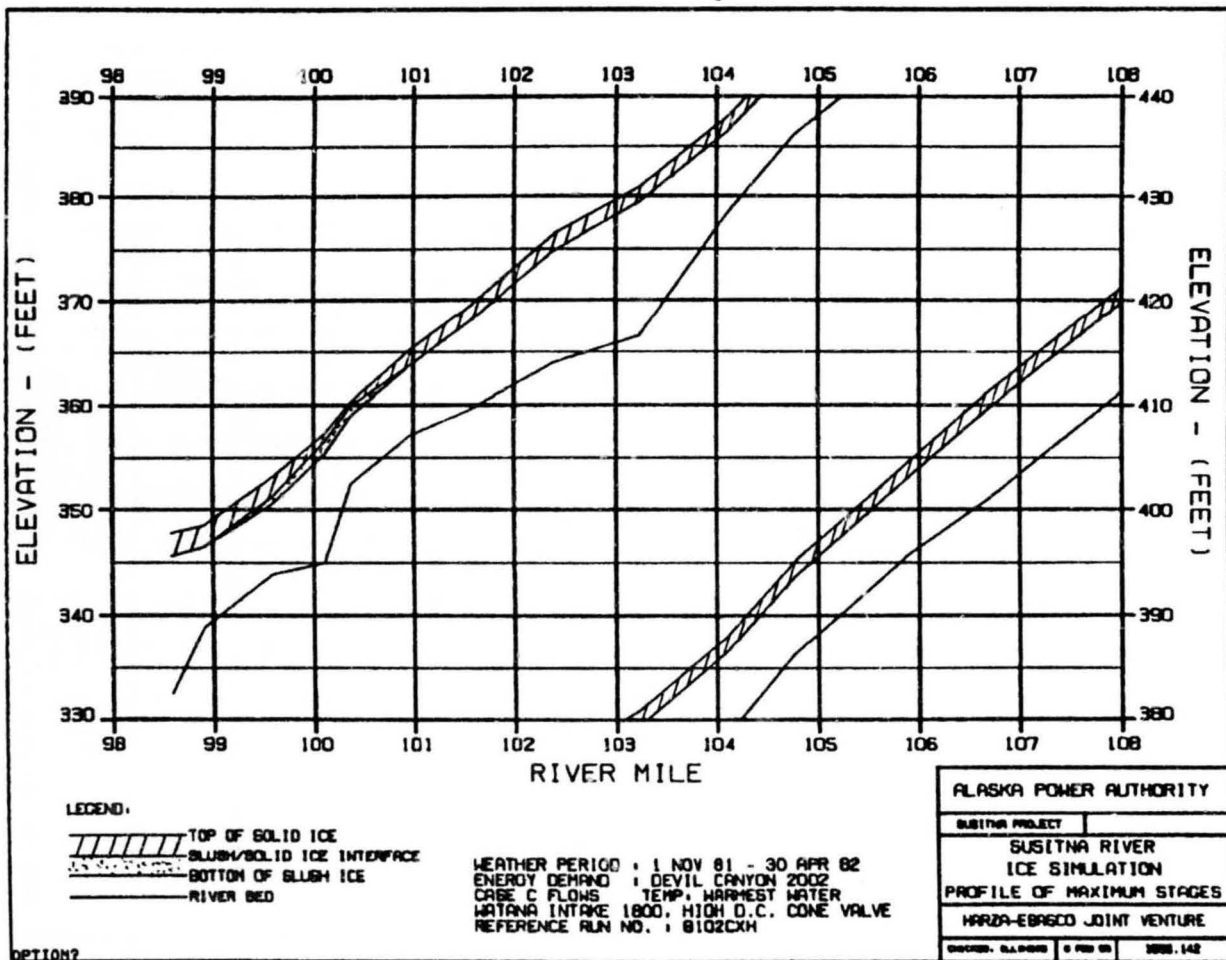
HEAD OF SLOUGH 22  
 RIVER MILE : 144.80

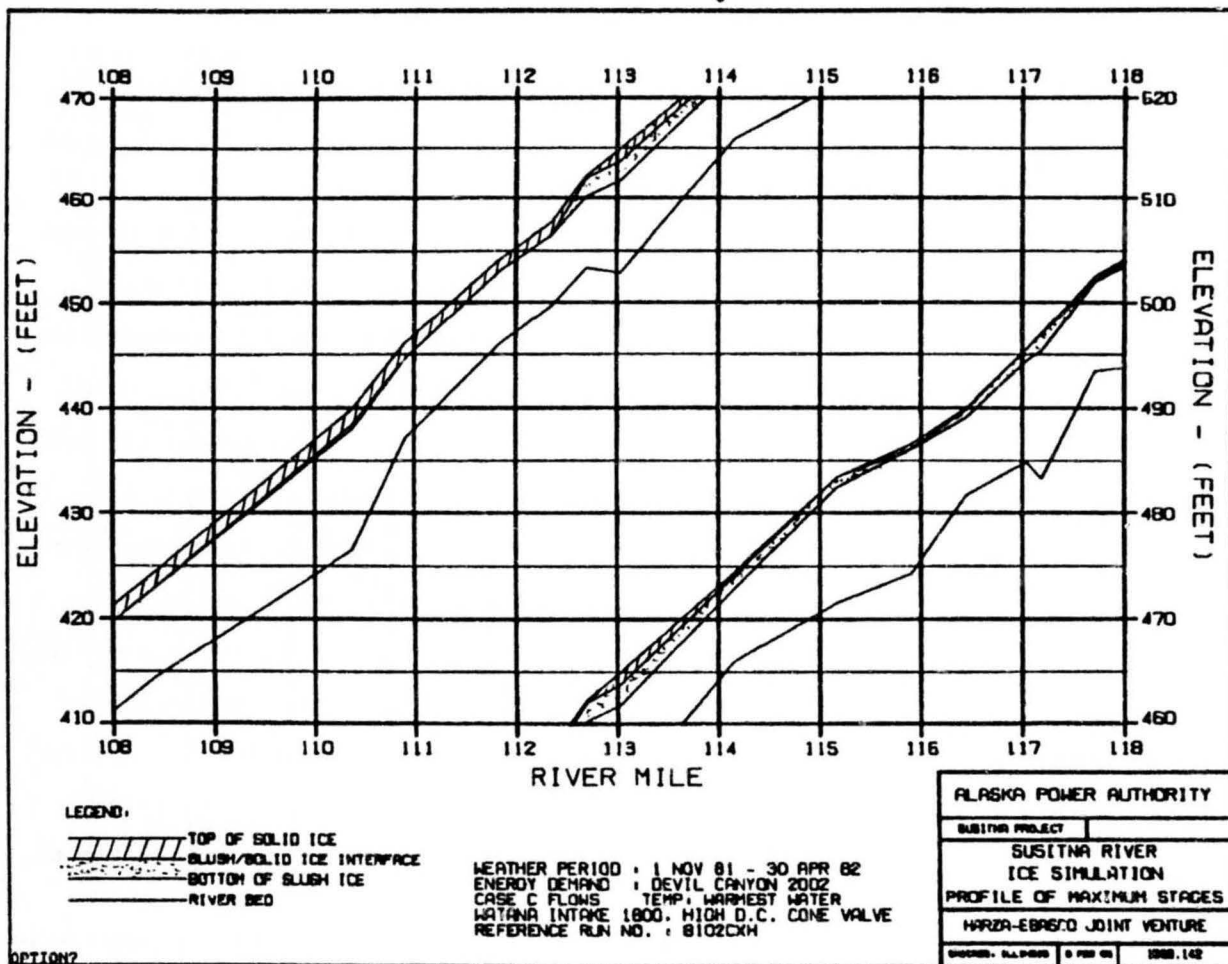
WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP, WARMEST WATER  
 EXISTING WATANA INTAKE, HIGH D.C. CONE  
 REFERENCE RUN NO. : 8102CWH

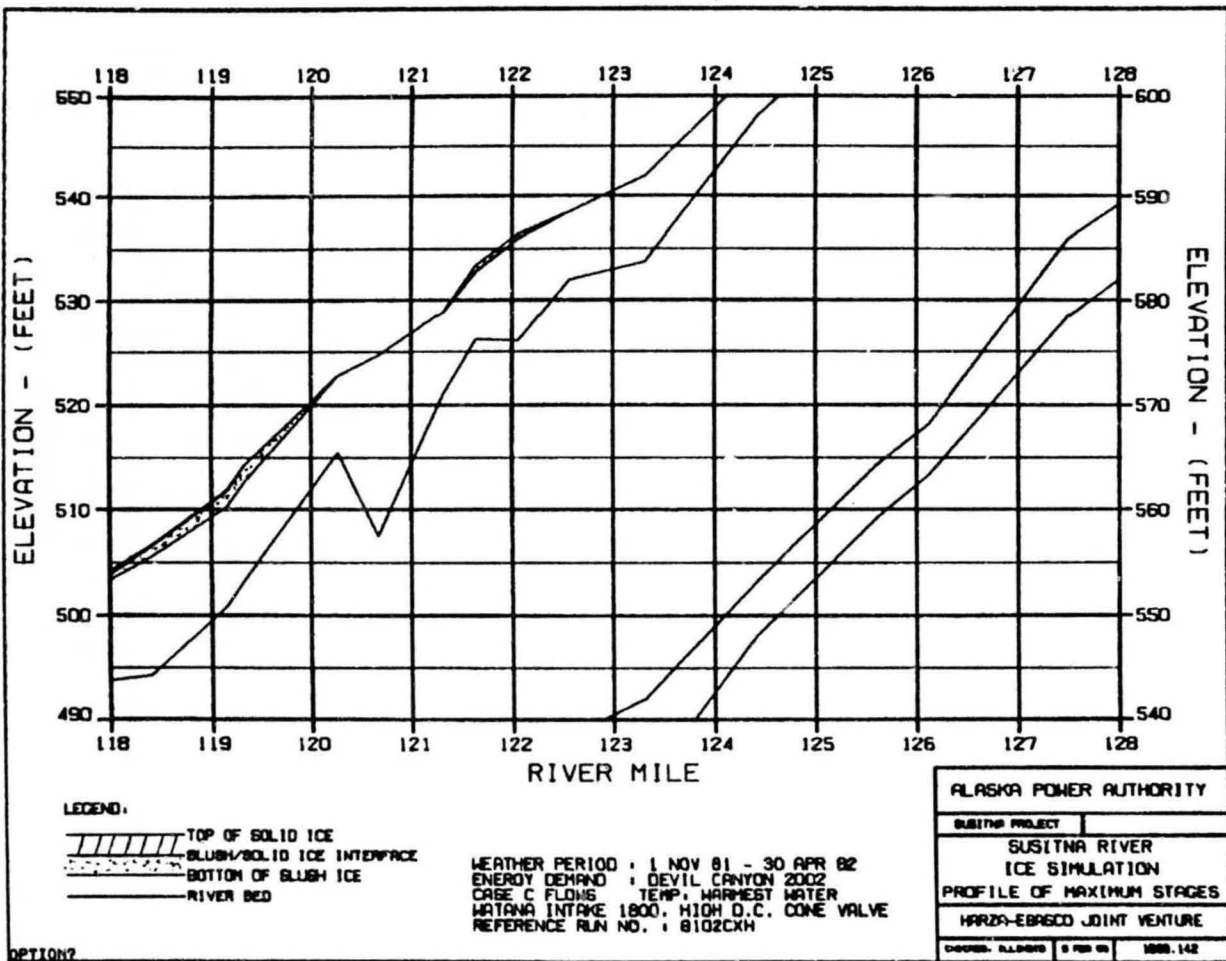
ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER ICE SIMULATION TIME HISTORY	
HARZA-EBRISCO JOINT VENTURE	
REVISED: 8-1-82	8 FEB 82 1000 - 142

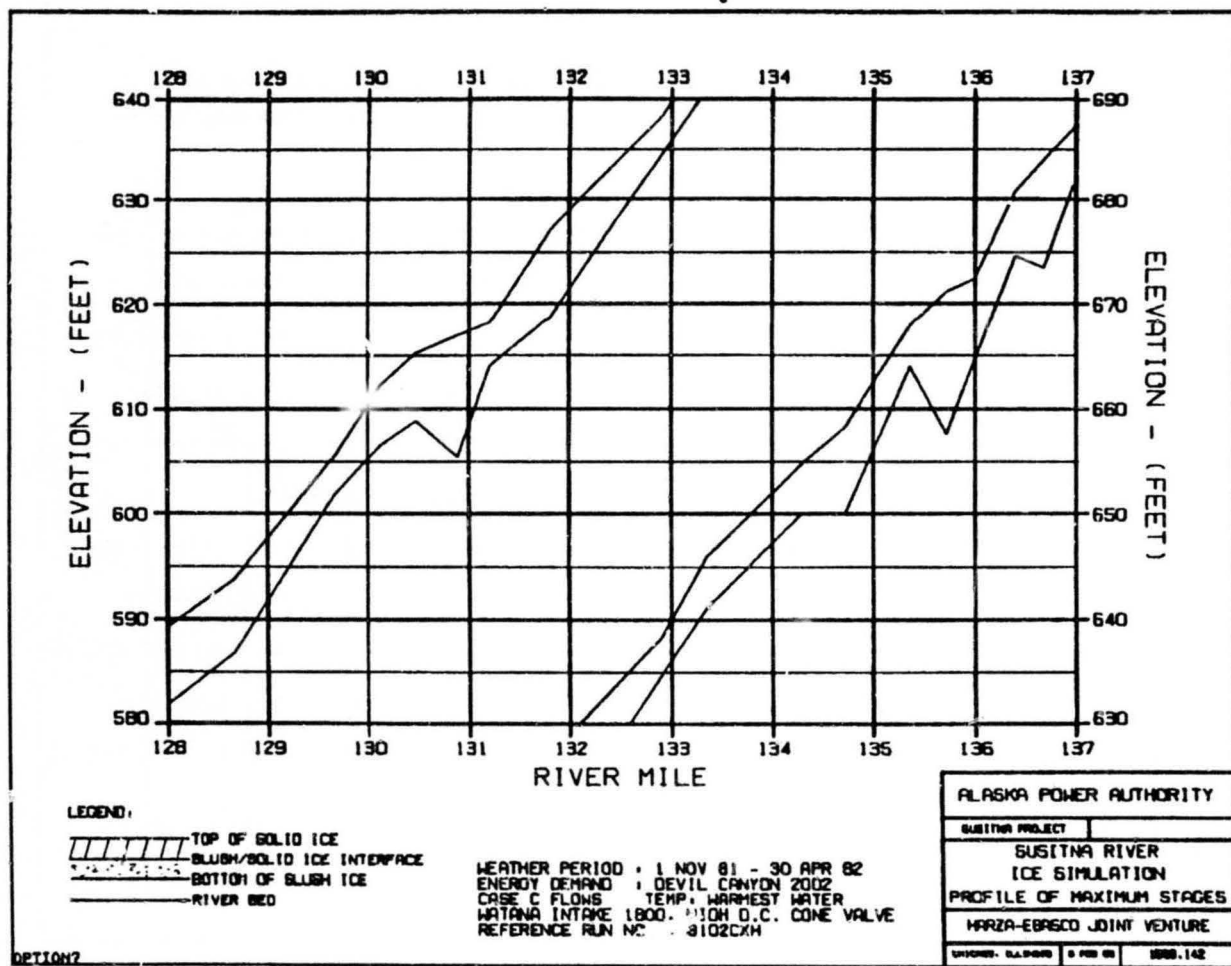
OPTION 7

**EXHIBIT X**

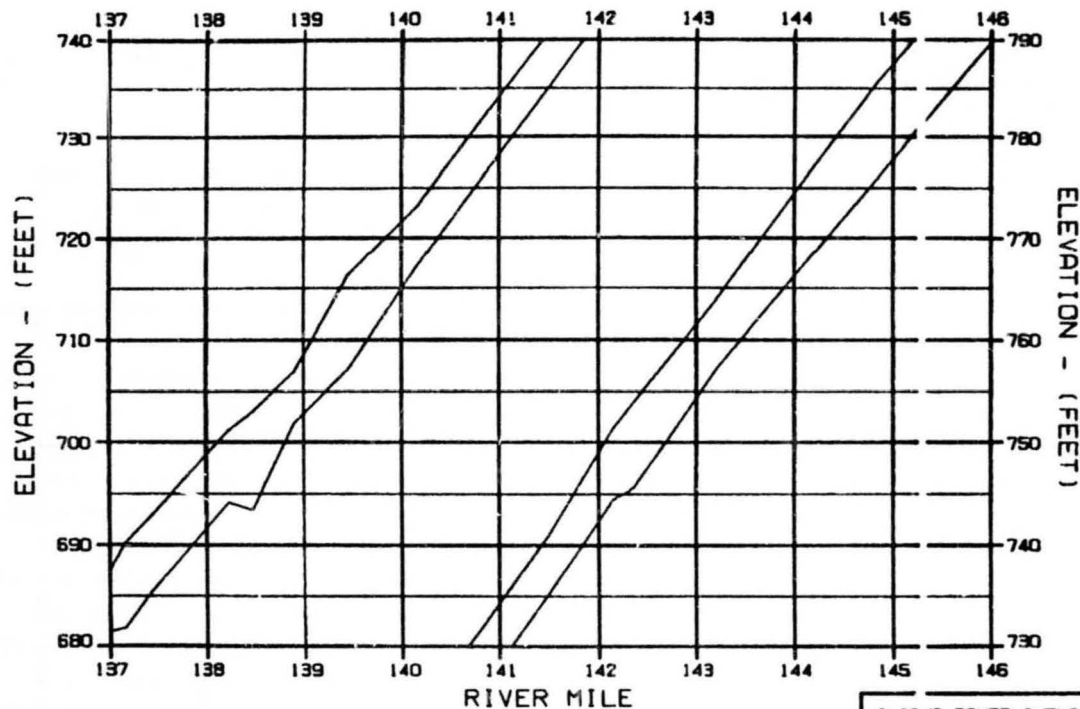












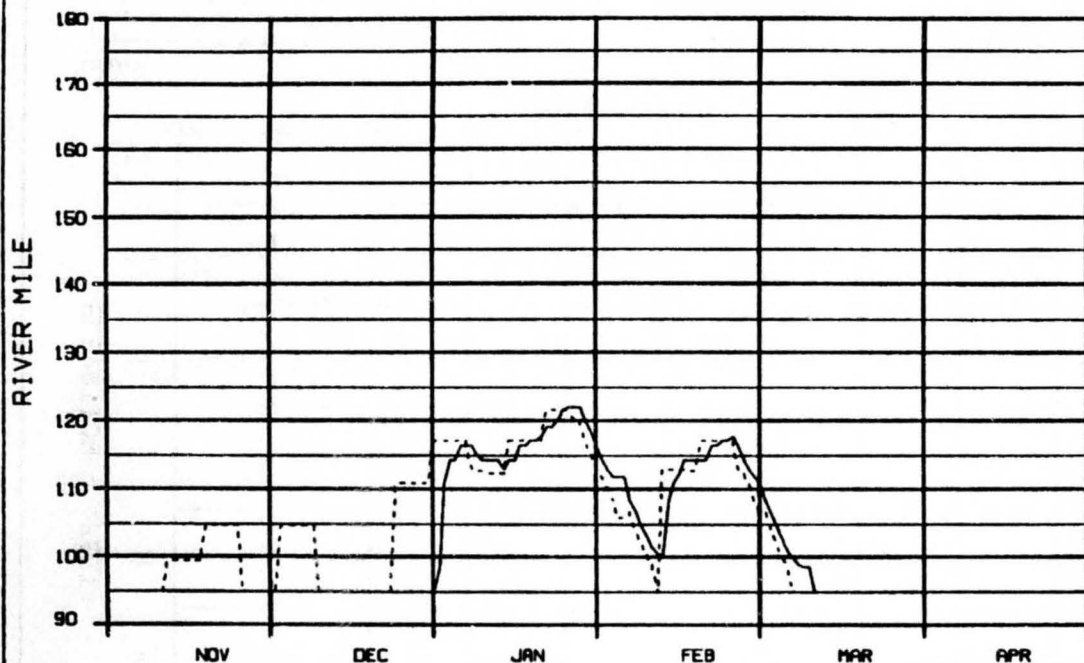
## LEGEND:

- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 NATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

ALASKA POWER AUTHORITY	
SUSTNA	PROJECT
SUSITNA RIVER	
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
HARZ - EBRACO JOINT VENTURE	
DESIGNED BY: S. S. S. S.	DATE: 142

OPTION?



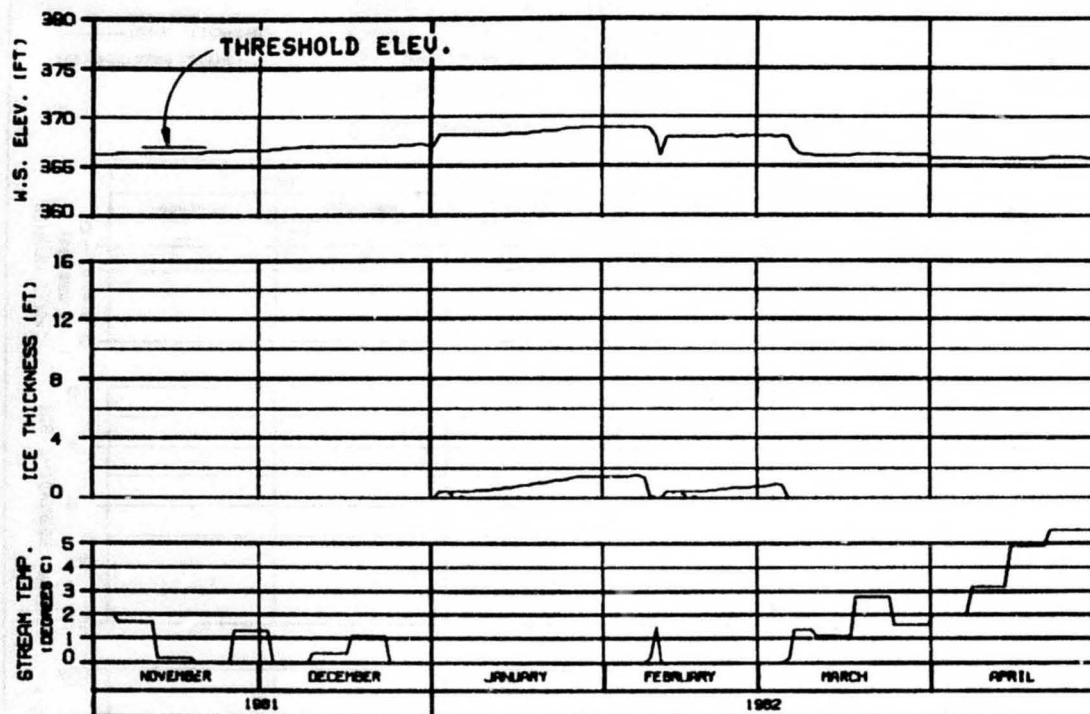
LEGEND:

— ICE FRONT  
 - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE C TEMP: WARMEST WATER  
 WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

OPTION?

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER	
PROGRESSION OF ICE FRONT	
& ZERO DEGREE ISOTHERM	
HARZA-EBRSCO JOINT VENTURE	
OWNER: ALASKA	9 FEB 82 1000.142



# HEAD OF WHISKERS SLOUGH

RIVER MILE : 101.50

## ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

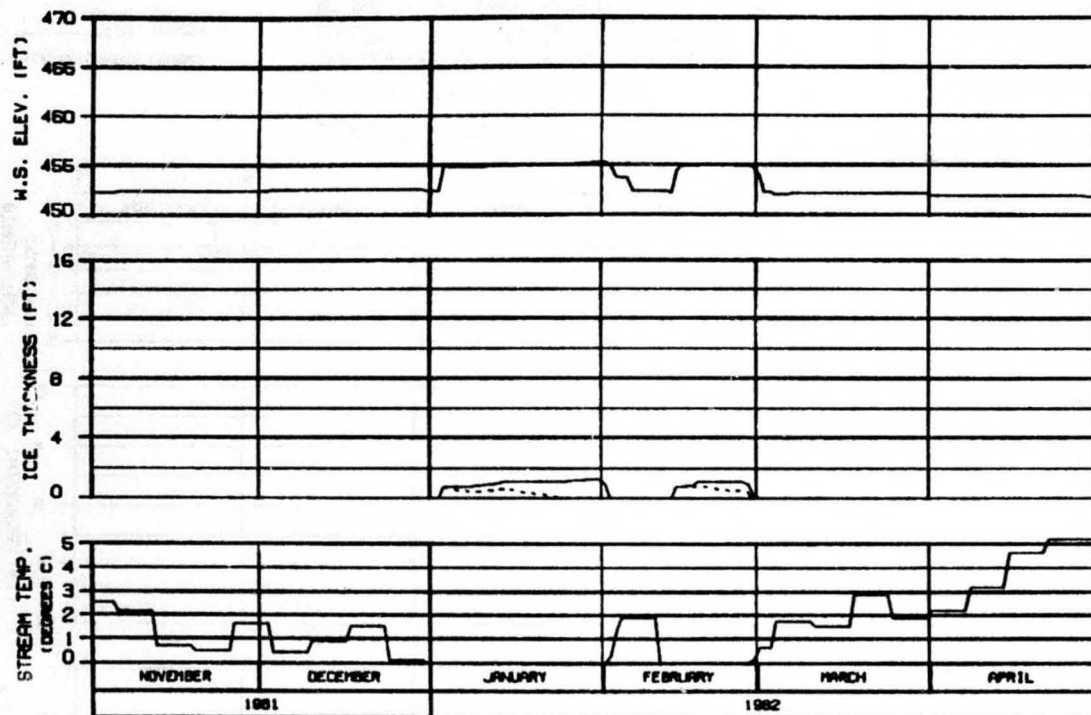
## ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

ISSUED: 5/1/82 5 FEB 82 1000.142



# SIDE CHANNEL AT HEAD OF GASH CREEK

RIVER MILE : 112.00

## ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

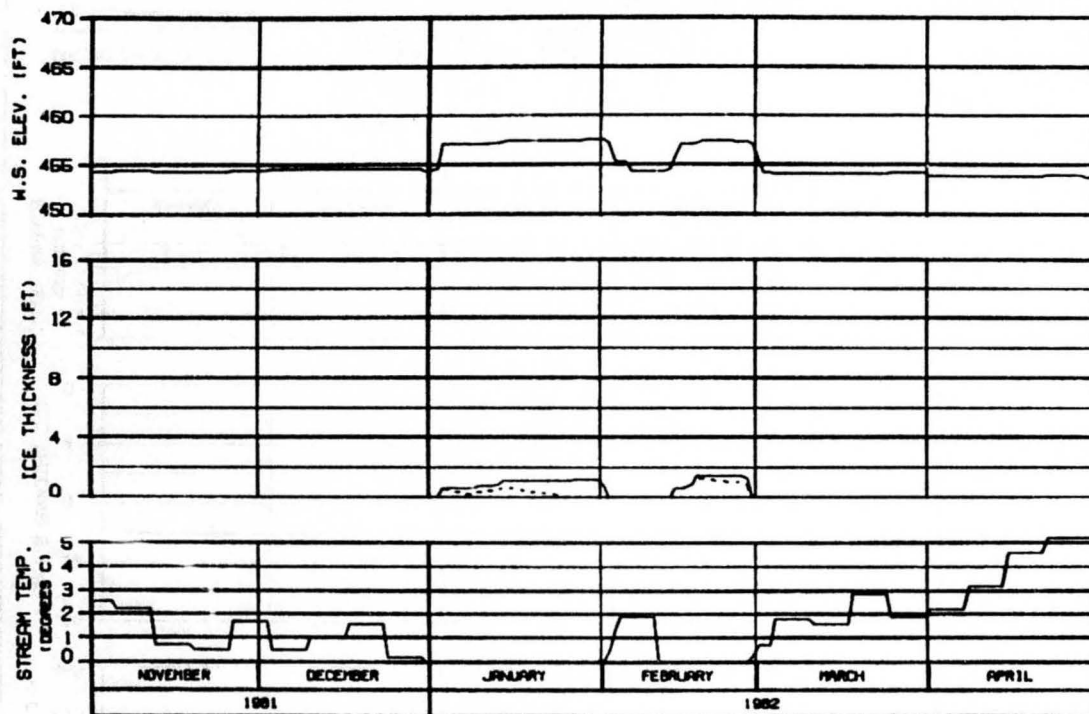
## ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBR600 JOINT VENTURE

DESIGN: S.A. HUNT © FEB 82 1000.142



**MOUTH OF SLOUGH 6A**  
**RIVER MILE : 112.34**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP, WARMEST WATER  
 WATANA INTAKE 1800, HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

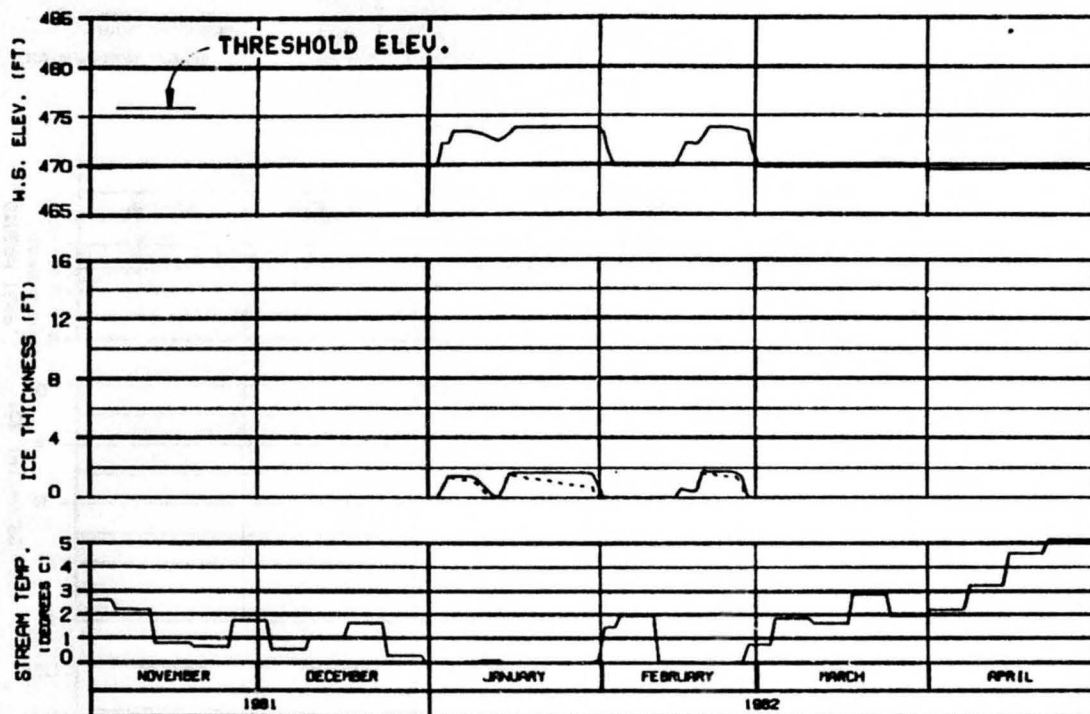
**ALASKA POWER AUTHORITY**

**SUSITNA PROJECT**

**SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY**

**HARZA-EBASCO JOINT VENTURE**

DESIGNED: J.A. GIBSON 8 FEB 82 10000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

# HEAD OF SLOUGH 8 RIVER MILE : 114.10

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

## ALASKA POWER AUTHORITY

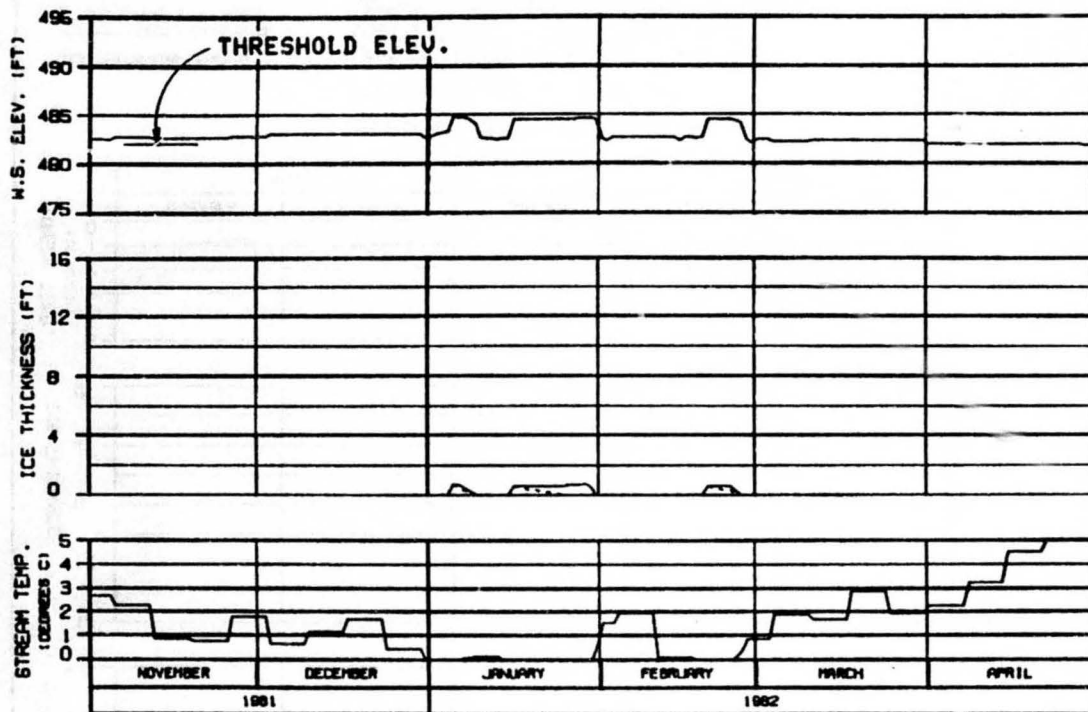
SUBITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHART NO. SL-0010 3 FEB 82 1982.142





**SIDE CHANNEL MSII**  
**RIVER MILE : 115.50**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

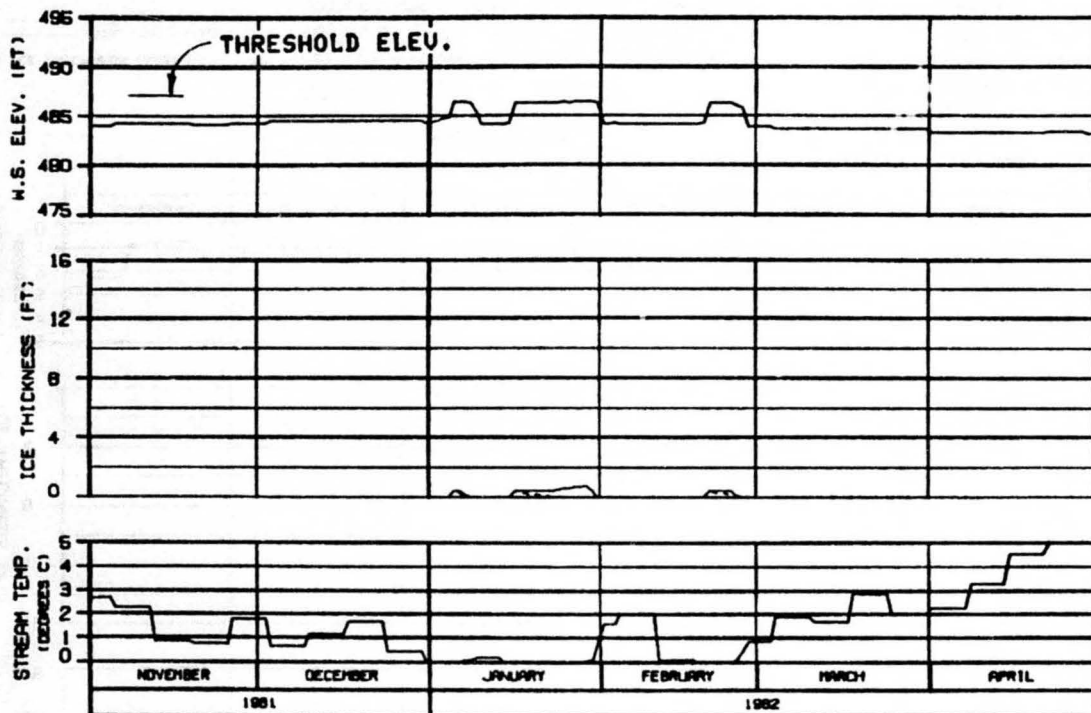
**ALASKA POWER AUTHORITY**

**SUSTINA PROJECT**

**SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY**

**HARZA-EBRDC JOINT VENTURE**

DESIGNED - ALASKA 8 FEB 82 1000-142



# HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

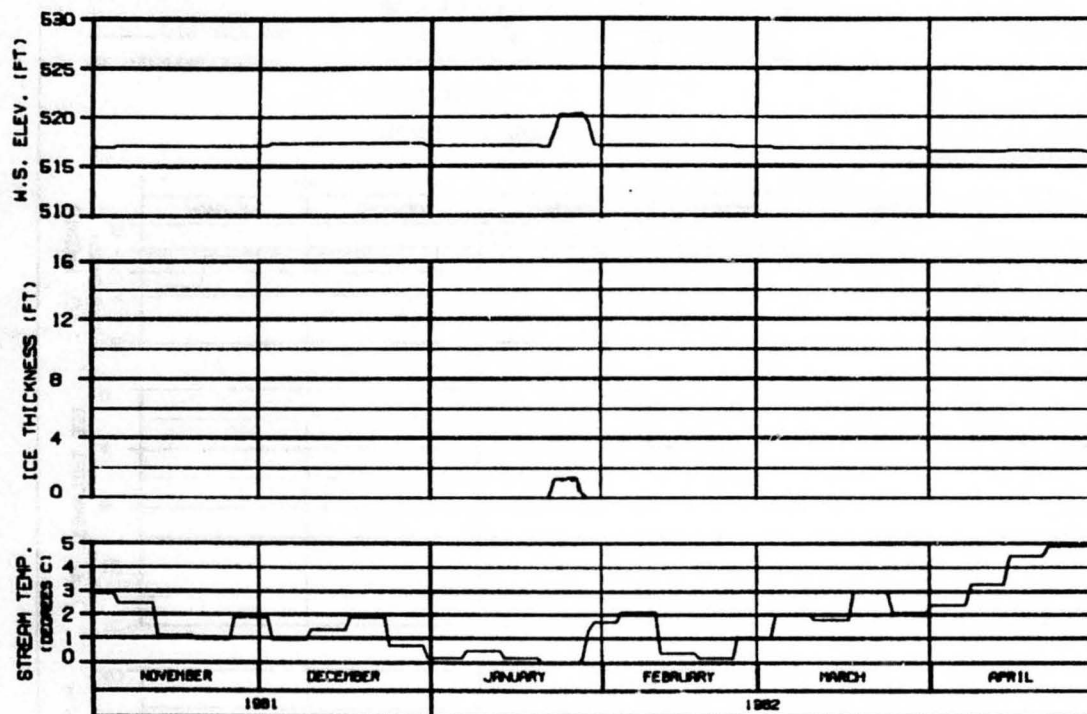
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBRACO JOINT VENTURE

DESIGN: AL-8007 8 FEB 82 1982, 142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 ..... SLUSH COMPONENT

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS : TEMP. WARMEST WATER  
 WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CKH

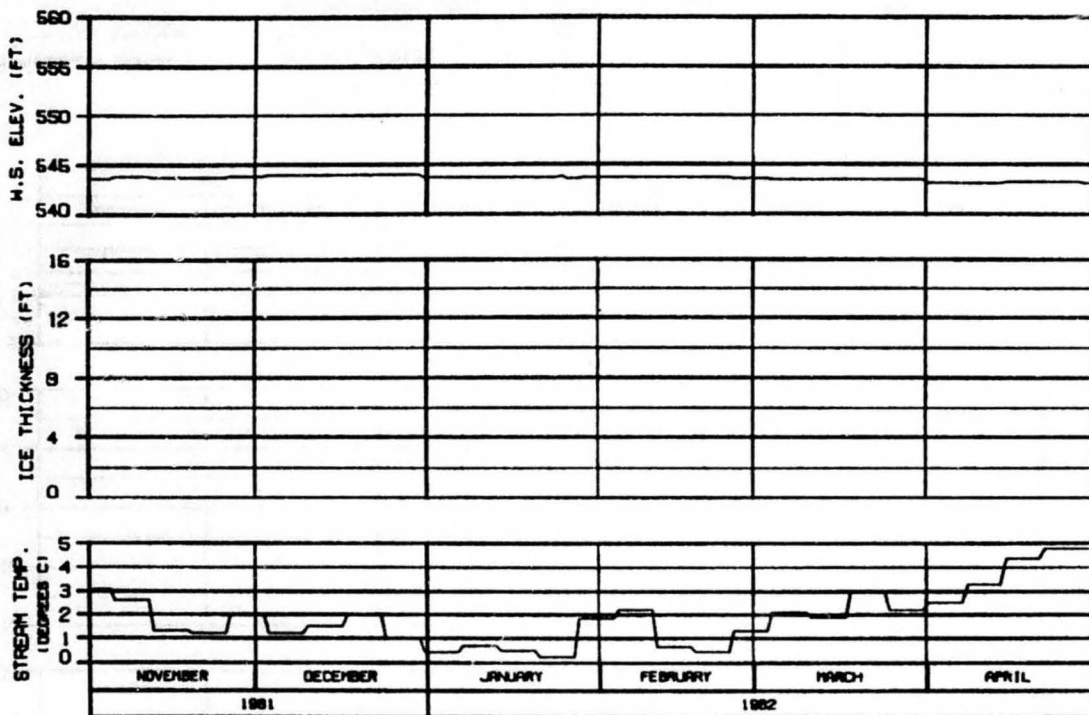
ALASKA POWER AUTHORITY

SUGITNA PROJECT

SUGITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

ISSUED: 8/1/82 8 FEB 83 1000.142



HEAD OF MOOSE SLOUGH

RIVER MILE : 123.50

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

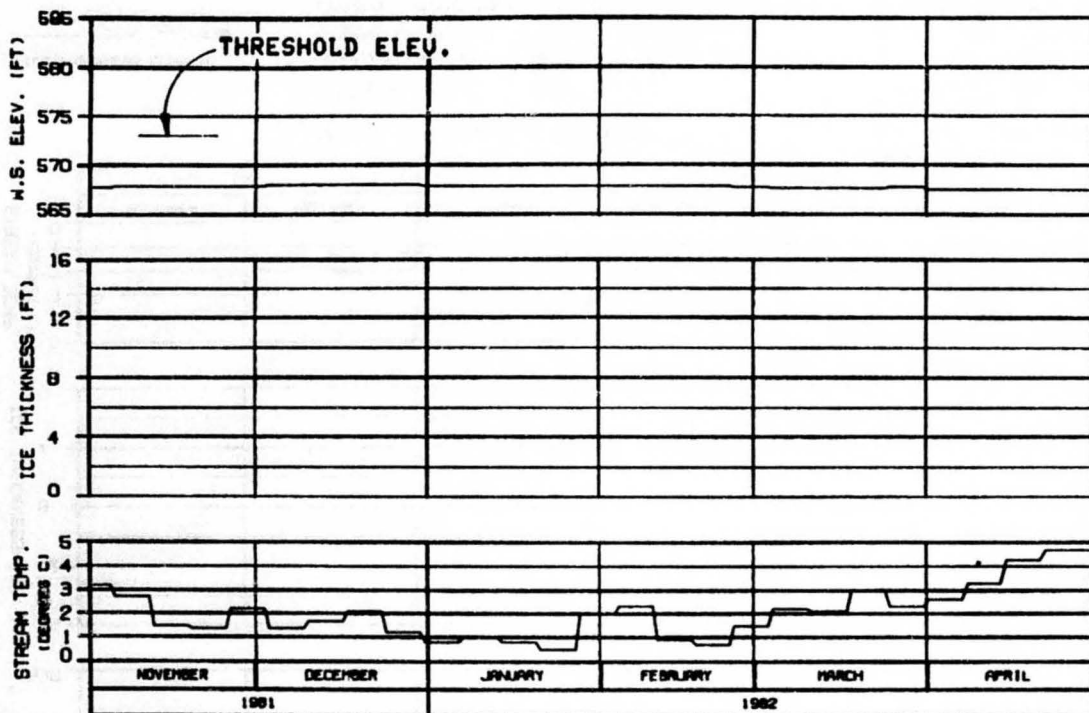
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRISCO JOINT VENTURE

DOORDS - SLP010 8 FEB 82 1982, 142



HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS TEMP. WARMEST WATER  
WATANA INTAKE 1800, HIGH D.C. CONE VALVE  
REFERENCE RUN NO. : 8102CXH

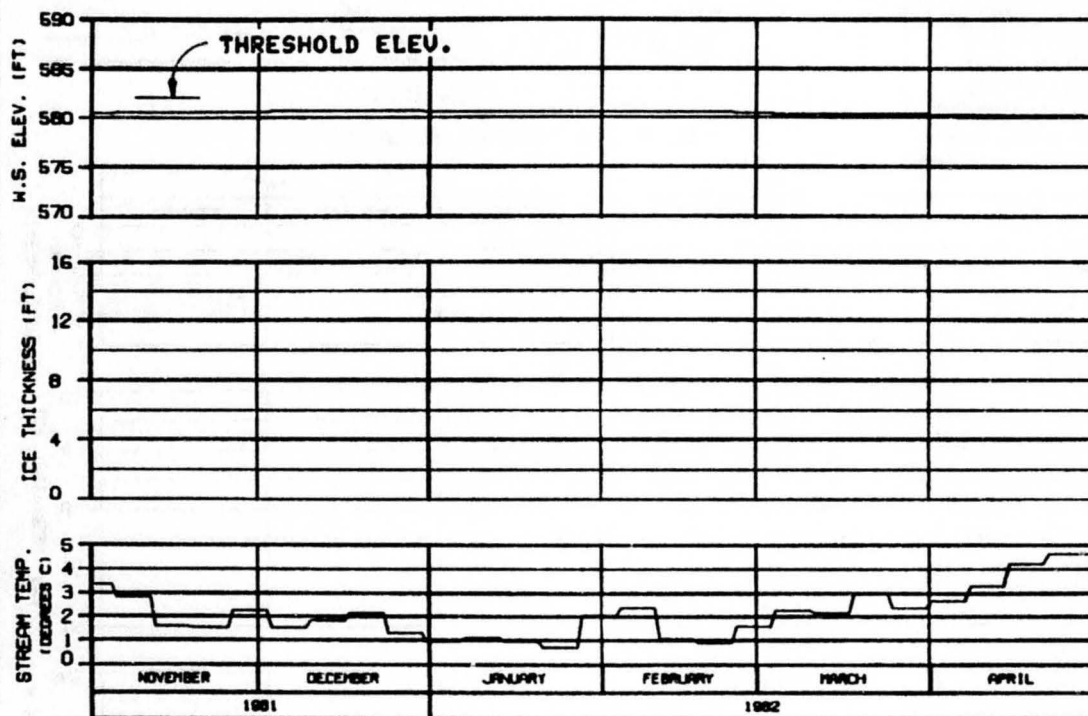
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZDA-EBASCO JOINT VENTURE

CHARTED - 8/4/82 9 FEB 83 1988.142



HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 ..... SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

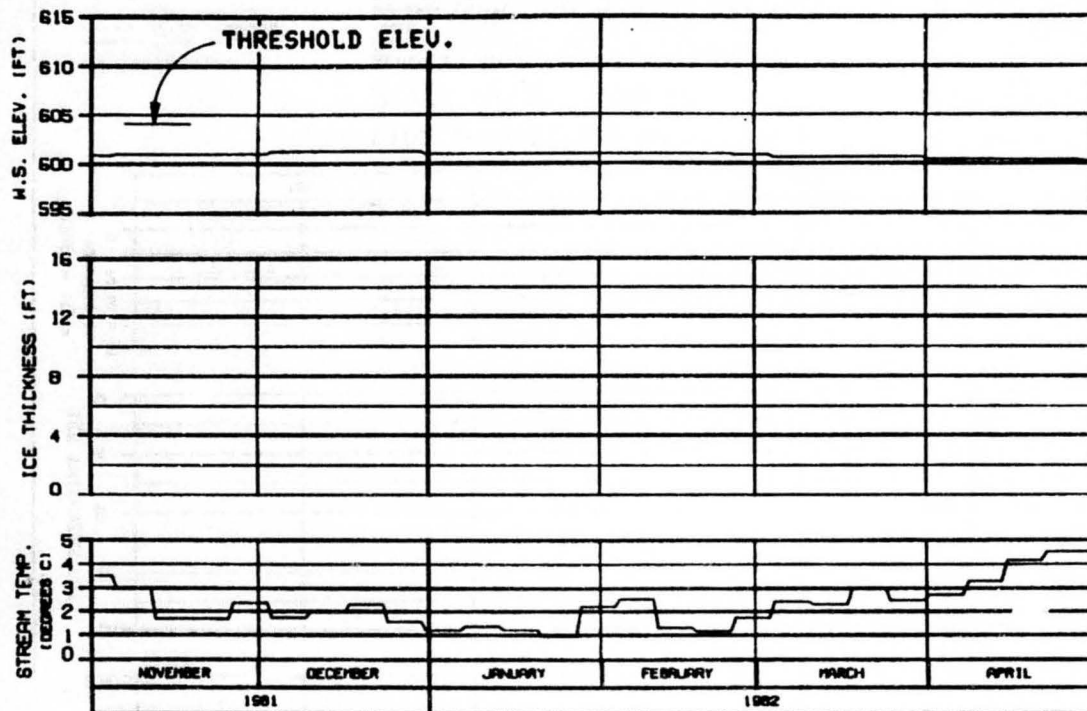
WARZA-EBASCO JOINT VENTURE

DESIGNED BY: J. J. JONES

8 APR 82

ISSN: 142





HEAD OF SLOUGH 9  
RIVER MILE : 129.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS TEMP, WARMEST WATER  
WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
REFERENCE RUN NO. : 8102CXH

ALASKA POWER AUTHORITY

SUSITNA PROJECT

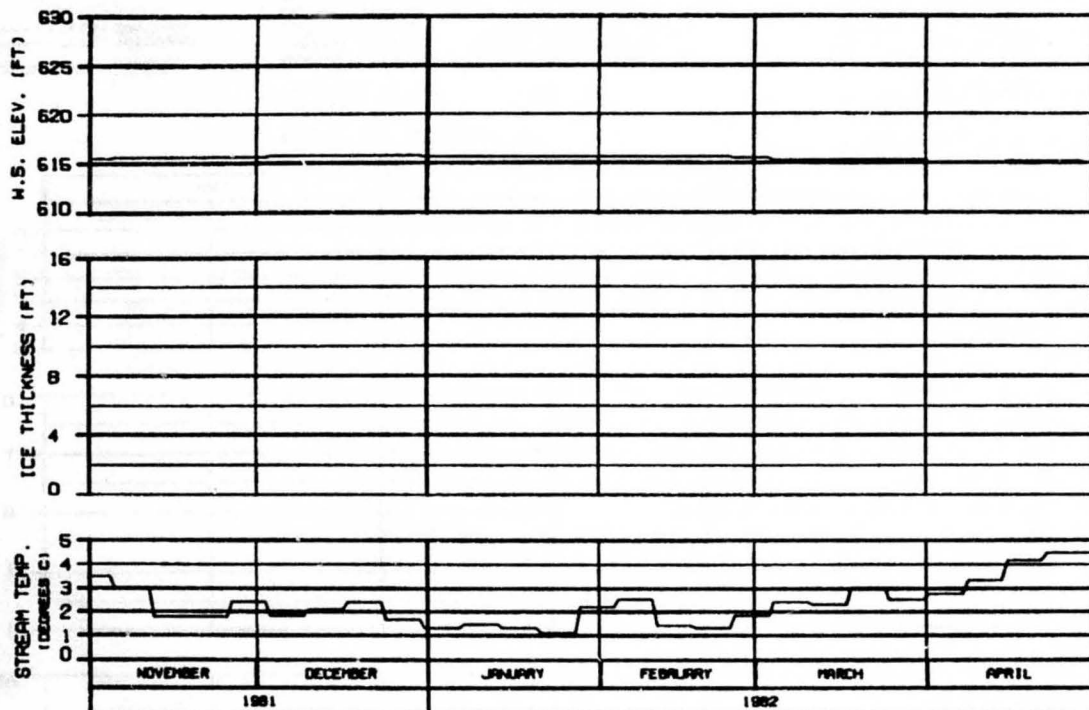
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-ERAGCO JOINT VENTURE

CHART NO. 8-1000 9 FEB 82 1000-142

OPTION?

OPTION?



SIDE CHANNEL U/S OF SLOUGH 9

RIVER MILE : 130.60

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

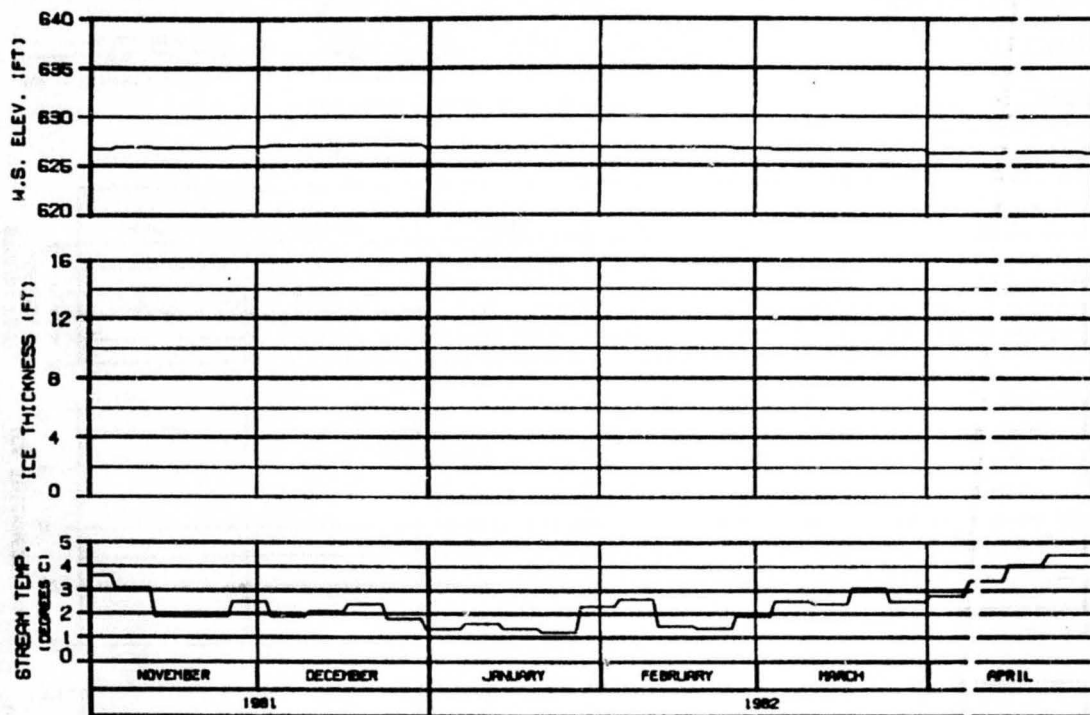
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRSCO JOINT VENTURE

DESIGNED BY ALP/DAW 9 FEB 82 1000.142



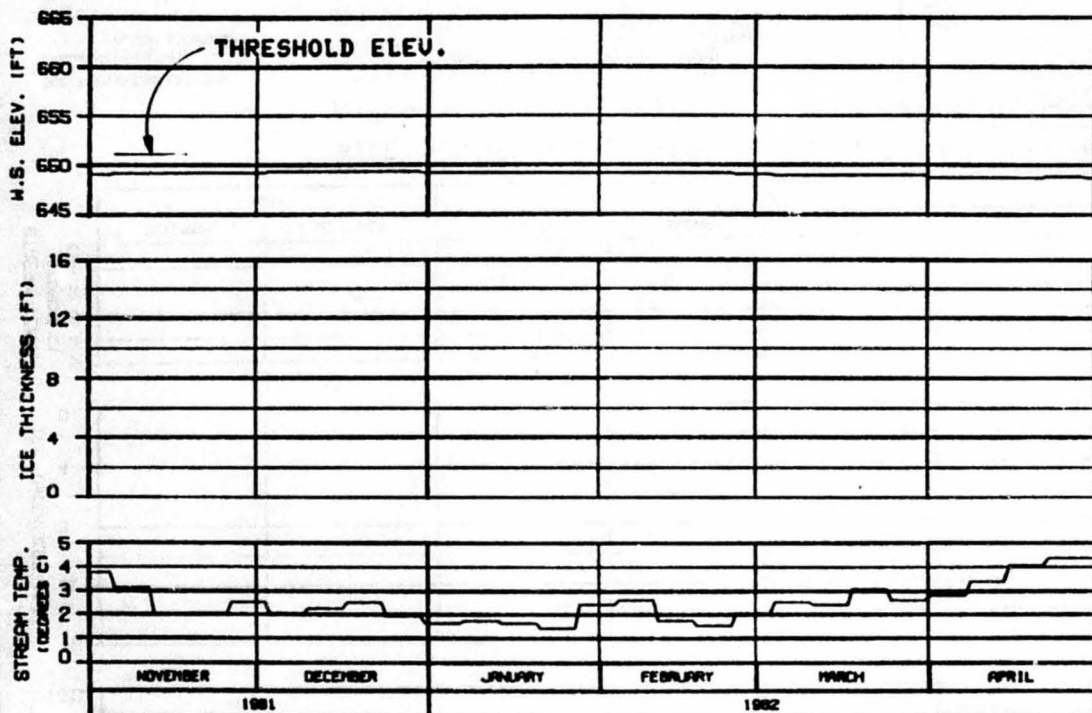
**SIDE CHANNEL U/S OF 4TH JULY CREEK**  
**RIVER MILE : 131.80**

**ICE THICKNESS LEGEND:**  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP: WARMEST WATER  
 WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

**ALASKA POWER AUTHORITY**

SUBJECT	PROJECT
JUSTINA RIVER	ICE SIMULATION
	TIME HISTORY
HARD - EBRSCO JOINT VENTURE	
DATE	U.S. 8 FEB 82 1982.142



**ICE THICKNESS LEGEND:**

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

**HEAD OF SLOUGH 9A**  
**RIVER MILE : 133.70**

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

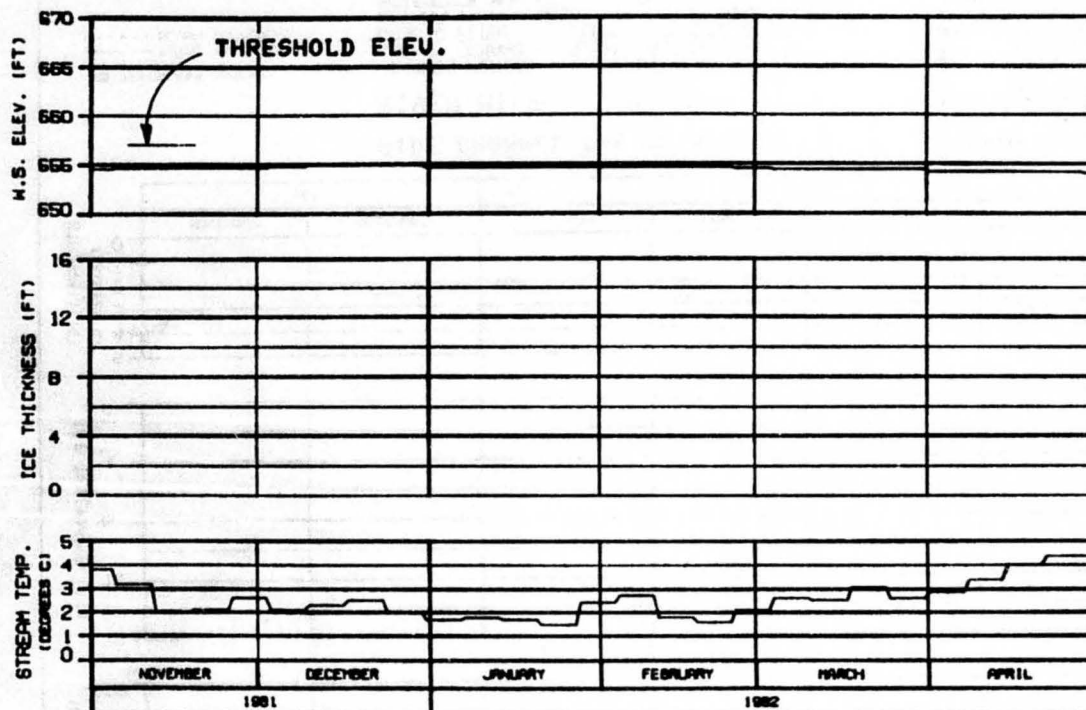
**ALASKA POWER AUTHORITY**

**SUSITNA PROJECT**

**SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY**

**HARZA-EBRACO JOINT VENTURE**

DESIGN: 81-0000 0 FEB 82 1000.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL U/S OF SLOUGH 10  
 RIVER MILE : 134.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

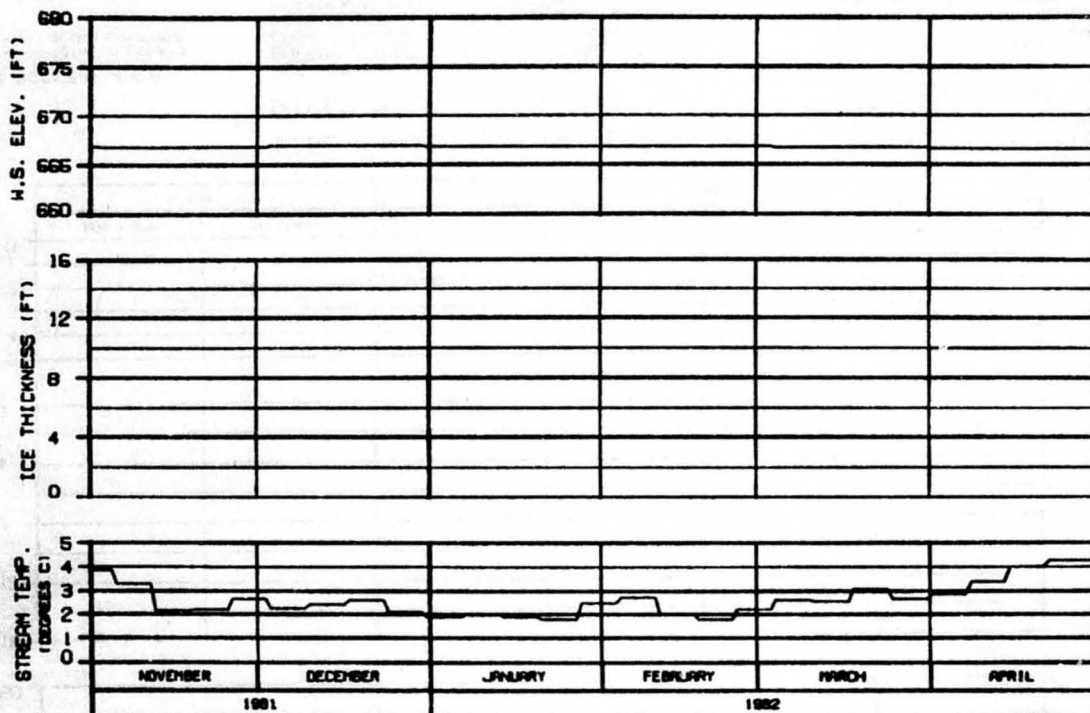
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACO JOINT VENTURE

DESIGN- AL-0000 8 FEB 82 0000.142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

SIDE CHANNEL D/S OF SLOUGH 11

RIVER MILE : 135.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

ALASKA POWER AUTHORITY

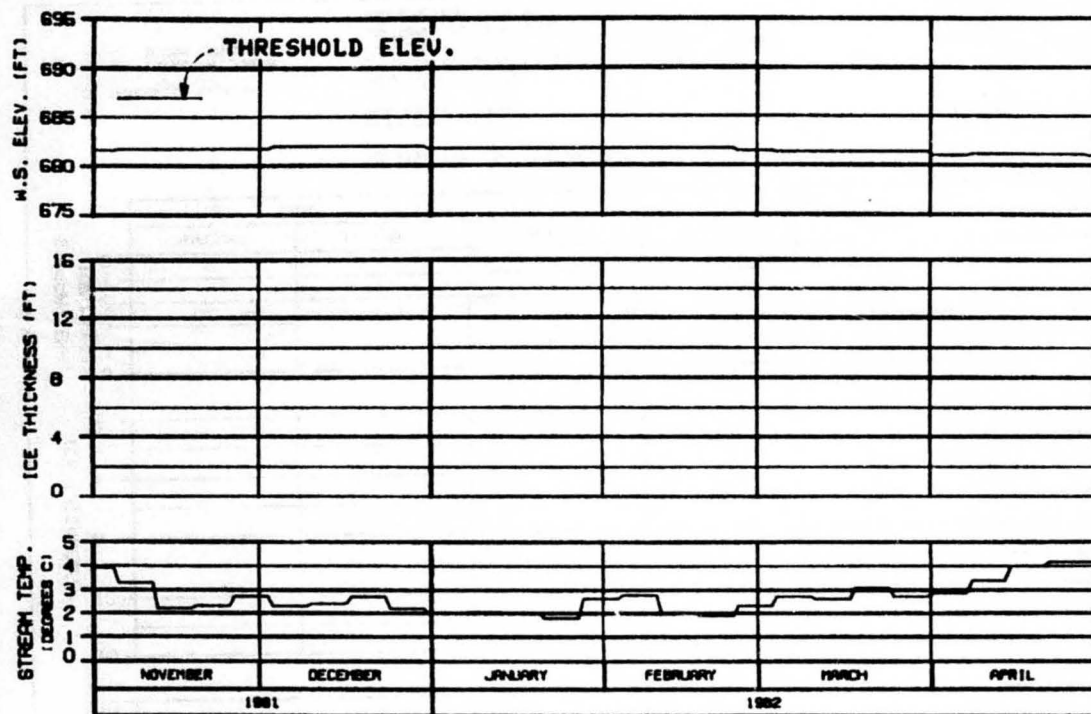
SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EDRSCO JOINT VENTURE

DRAWN: AL-0405 8 FEB 82 1000.142





HEAD OF SLOUGH 11  
RIVER MILE : 136.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS TEMP. WARMEST WATER  
WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
REFERENCE RUN NO. : 8102CXH

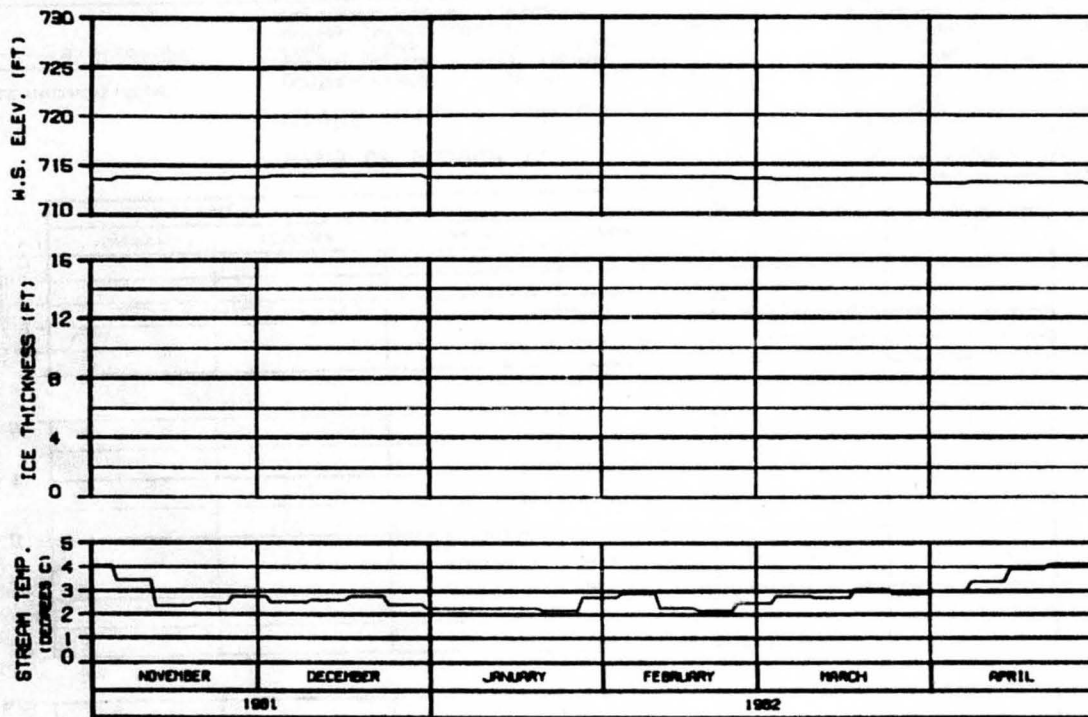
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRACO JOINT VENTURE

DRAFTED: K.L. GIBBS 6 FEB 82 1000.142



HEAD OF SLOUGH 17  
RIVER MILE : 139.30

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLOUGH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS TEMP. WARMEST WATER  
WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
REFERENCE RUN NO. : 810ZCXH

ALASKA POWER AUTHORITY

SUSITNA PROJECT

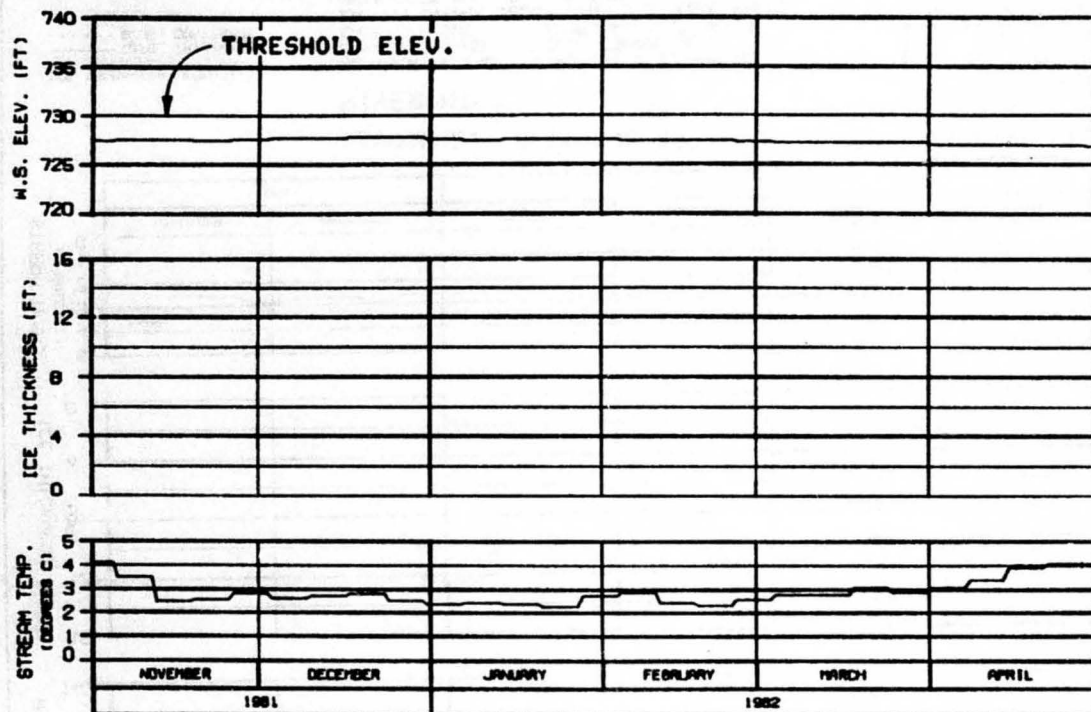
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-EBASCO JOINT VENTURE

DIVISION - ELECTRIC

8 FEB 82

1000.142



HEAD OF SLOUGH 20  
RIVER MILE : 140.50

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
----- SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
CASE C FLOWS TEMP : WARMEST WATER  
WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
REFERENCE RUN NO. : 8102CXH

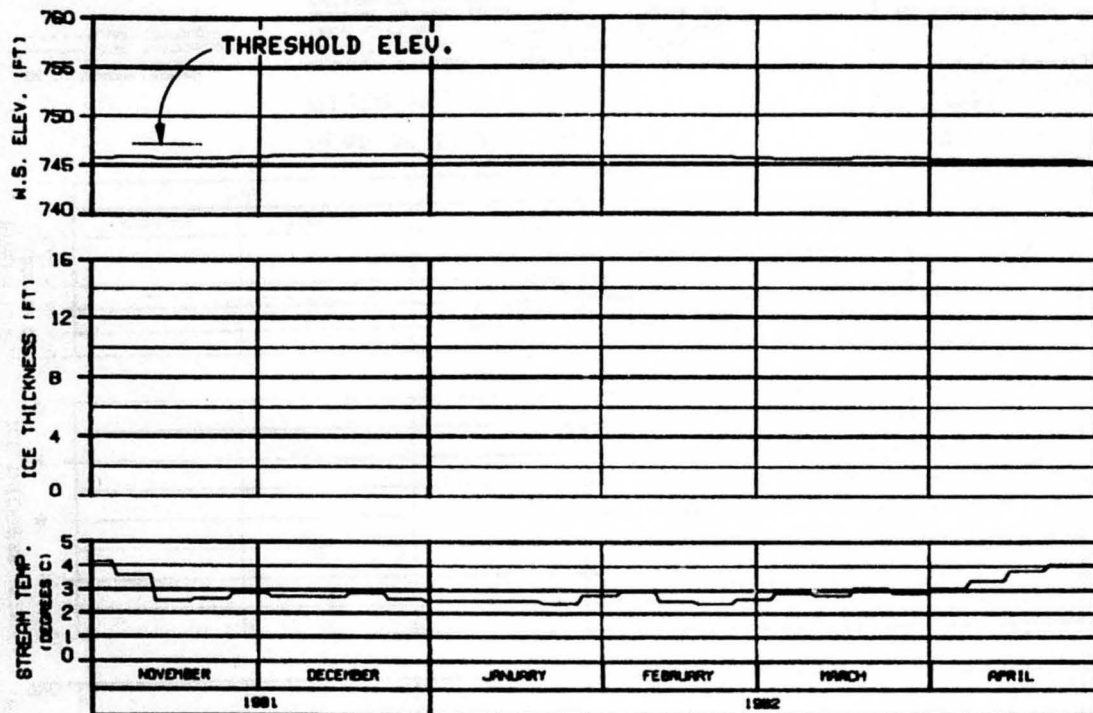
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EDSICO JOINT VENTURE

GRAPHIC: ILL-0010 6 FEB 82 1000.142



SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

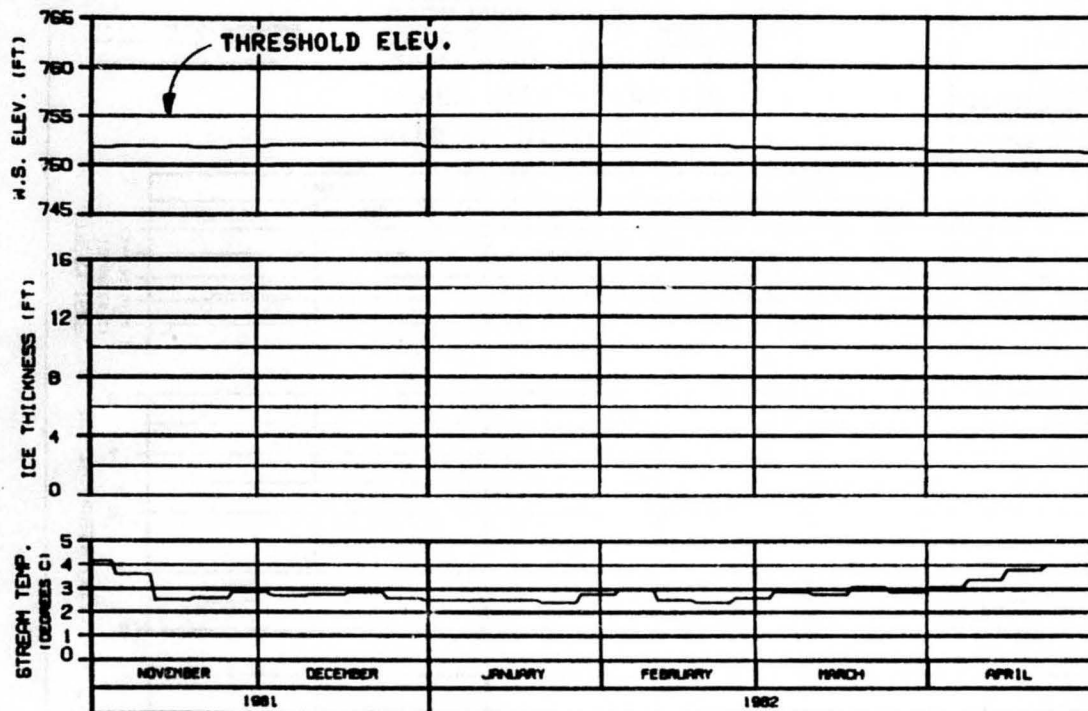
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-ENGSCD JOINT VENTURE

DRAWN: B.L. DATE: 5 FEB 82 1000.142



ICE THICKNESS LEGEND:

—— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

HEAD OF SLOUGH 21  
 RIVER MILE : 142.20

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP. WARMEST WATER  
 WATANA INTAKE 1900. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CXH

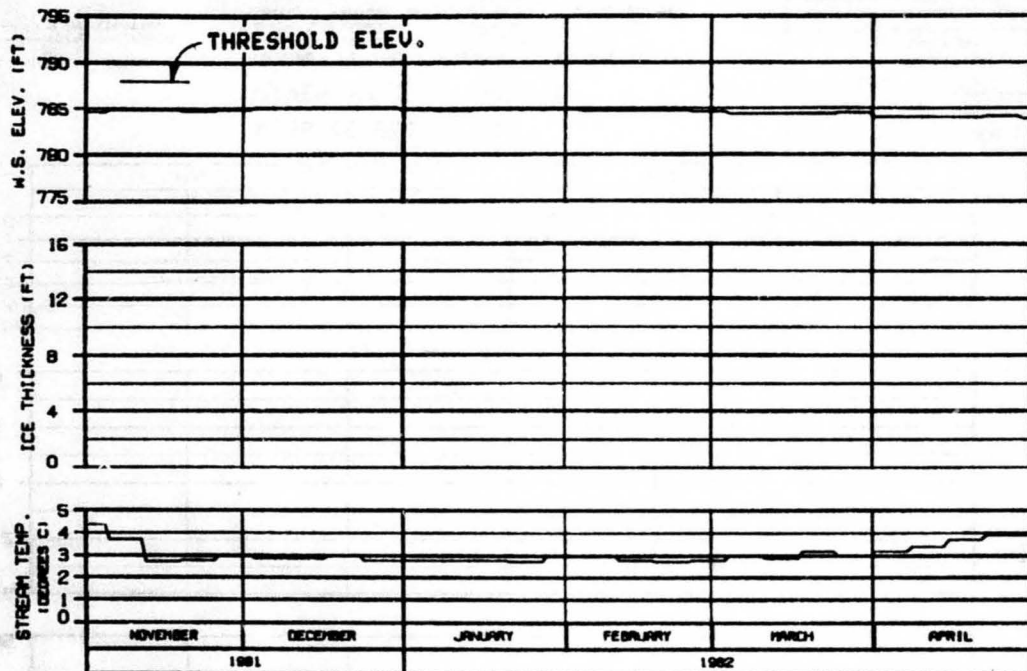
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DRAWN: B. B. B. 9 FEB 82 2002.142



ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - SLUSH COMPONENT

# HEAD OF SLOUGH 22 RIVER MILE : 144.80

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 CASE C FLOWS TEMP: WARMEST WATER  
 WATANA INTAKE 1800. HIGH D.C. CONE VALVE  
 REFERENCE RUN NO. : 8102CKH

## ALASKA POWER AUTHORITY

SUSTITNA PROJECT

SUSTITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARZA-EBRACCO JOINT VENTURE

GRAPHIC: SLP4000 0 APR 82 1000.142

OPTION7