

515
47

APPENDIX - I

Refinement to Reservoir and River
Temperature and Ice Studies
For Simulation Period
October 1976 to May 1977

Text Changes and
New Exhibits
G and N

For

Instream Ice Simulation Study by Harza-Ebasco for the Alaska Power
Authority. Transmitted to the Federal Energy Regulatory Commission
on November 2, 1984.

SUSITNA HYDROELECTRIC PROJECT
INSTREAM ICE SIMULATION STUDY
FINAL REPORT, OCTOBER 1984
DOCUMENT NO. 1986

ERRATA

TEXT

- a) Section 3.3, first paragraph, 4th sentence should read, "The maximum upstream extent of the ice front ranges from River Mile 126 (1976-77 winter) to River Mile 140 (1971-72 winter)."
- b) Section 3.3, third paragraph should read, "The mildest simulated river ice conditions for the 1996 energy demand occur for the winter of 1976-77 (Exhibit G). Maximum total ice thicknesses for this simulation range from 1 ft. to 6 ft., of which 1 ft. is solid ice. These thicknesses exist downstream of River Mile 126 and are generally similar to those of natural 1976-77 conditions in the same reach. However, the maximum with-project river stages in this reach are 2 ft. to 7 ft. higher than natural conditions due to the higher with-project winter flows. Maximum river stages for the 1976-77 with-project simulation are 1 ft. to 8 ft. lower than those of the 1971-72 simulation."
- c) Section 3.3, fourth paragraph, fourth sentence should read, "Maximum extent of the ice cover with the warm releases is River Mile 126, versus River Mile 140 with inflow-matching release temperatures."
- d) Section 3.5, first paragraph, second sentence should read, "Results show that the beginning of the ice front progression at the Chulitna confluence ranges from early December to early January, approximately 0-2 weeks later than the corresponding Watana-only simulations, and 4-7 weeks later than natural conditions for the same winters."
- e) Section 3.5, first paragraph, third sentence should read, "Maximum upstream extent of the ice front ranges from River Mile 123 to 137, and is 2-13 miles downstream of that with Watana only and 1996 energy demand."
- f) Section 3.5, third paragraph, fourth sentence should read, "Maximum river stages, where an ice cover exists, are 1 ft. to 6 ft. higher than corresponding natural conditions."
- g) Section 4.0, item number one, first sentence should read, "Relative to natural conditions, initial progression of the Middle Susitna ice front at the Chulitna confluence (River Mile 98.6) is expected to be delayed by 2 to 6 weeks with Watana operating alone, and 4 to 7 weeks with Watana and Devil Canyon operating together."

TABLES

Replace Tables IV, V, VI, VII, VIII and IX with the corresponding new tables attached.

EXHIBITS

Replace Exhibits G and N with the corresponding new Exhibits attached. (Reference Run #7696CNB replaces #7696CNA, and Reference Run #7602CNB replaces #7602CNA).

**SUSITNA HYDROELECTRIC PROJECT
MAXIMUM SIMULATED WINTER RIVER STAGES**

TABLE IV

Slough or Side Channel	River Mile	Threshold Elevation	NATURAL CONDITIONS		WATANA ONLY					WATANA AND DEVIL CANYON					WATANA FILLING						
					1996 DEMAND					2001 DEMAND		2002 DEMAND				2020 DEMAND		YR. 1	YR. 2		
					1971-72	1976-77	1981-82	1982-83	1971-72	1976-77	1981-82	1982-83	1971-72 ^W	1971-72	1982-83	1971-72	1976-77	1981-82	1982-83	1971-72	1982-83
Whiskers	101.5	367	369	366	368	367	372	370	371	370	371	372	370	371	368	369	369	372	370	367	367
Gash Creek	112.0	Unknown	456	455	455	456	459	457	460	459	460	459	461	458	456	456	457	459	457	455	455
6A	112.3	(Upland)	459	457	457	459	462	460	462	462	463	461	463	460	459	458	460	461	459	457	457
8	114.1	476	474	472	472	474	478	475	477	476	477	476	478	475	474	475	475	476	475	473	473
MS II	115.5	482	484	480	484	484	490	486	488	488	488	489	489	487	486	485	487	490	488	481	483
MS II	115.9	487	485	482	486	486	492	489	491	491	490	491	492	489	489	488	490	492	490	485	486
Curry	120.0	Unknown	522	520	523	520	526	525	527	525	523	525	521	522	520	520	520	525	523	520	521
Moose	123.5	Unknown	552	546	549	548	556	552	555	550	552	555	550	553	547	548	545	555	550	546	548
8A West	126.1	573	572	569	571	570	576	574	574	572	572	575	568	574	568	568	568	575	572	568	570
8A East	127.1	582	584	581	583	582	587	583	585	582	582	586	581	584	581	580	581	585	582	580	582
9	129.3	604	605	603	606	605	609	603	607	603	603	610	603	606	601	601	602	608	603	602	603
9 u/s	130.6	Unknown	622	616	620	621	624	617	620	617	617	625	617	620	616	616	616	621	617	616	618
4th July	131.8	Unknown	632	626	629	630	635	628	631	628	628	636	628	633	627	627	627	631	628	625	628
9A	133.7	651	655	649	651	651	657	650	653	650	650	659	650	652	650	650	650	651	650	650	650
10 u/s	134.3	657	662	654	657	658	663	656	659	656	656	665	656	659	655	655	655	657	656	658	655
11 d/s	135.3	Unknown	673	667	670	672	675	667	670	668	668	676	668	670	667	667	667	668	668	670	668
11	136.5	687	684	681	683	684	688	684	687	683	683	690	683	685	682	682	682	684	684	682	682
17	139.3	Unknown	-	-	-	-	717	715	715	715	715	727	715	714	714	714	714	715	715	712	713
20	140.5	730	-	-	-	-	732	729	729	729	729	741	729	728	728	728	728	729	729	727	729
21 (A6)	141.8	747	-	-	-	-	746	746	746	746	746	751	746	746	746	746	746	747	747	745	745
21	142.2	755	-	-	-	-	753	753	753	753	753	755	753	752	752	752	752	753	754	751	750
22	144.8	788	-	-	-	-	787	787	787	786	787	787	786	785	785	785	785	787	787	782	782

NOTES:

- Indicates locations where maximum river stage equals or exceeds a known slough threshold elevation. See Exhibits A-T for duration of overtoppings.
- "Case C" operating guide is assumed for with-project simulations.
- 1971-72^W simulation assumes warm, 4° C reservoir releases. All other with-project simulations assume an "inflow-matching" temperature policy.
- Upstream extent of simulated ice cover progression for Watana filling occurs upstream of River Mile 144.8.

- All river stages in feet.
- Winter air temperatures:
1971-72 cold
1976-77 very warm
1981-82 average
1982-83 warm

Upstream Boundary of Natural Simulations

Upstream Extent of Ice Cover Progression

TABLE V

SUSITNA HYDROELECTRIC PROJECT
 OCCURRENCES WHERE WITH-PROJECT MAXIMUM RIVER STAGES
 ARE HIGHER THAN NATURAL CONDITIONS

<u>Slough or Side Channel</u>	<u>River Mile</u>	<u>Watana Only Operating</u>	<u>Watana and Devil Canyon Operating</u>	<u>Watana Filling</u>
Whiskers	101.5	6/6	6/6	0/2
Gash Creek	112.0	6/6	6/6	0/2
6A	112.3	6/6	5/6	0/2
8	114.1	6/6	6/6	1/2
MSII	115.5	6/6	6/6	0/2
MSII	115.9	6/6	6/6	0/2
Curry	120.0	6/6	2/6	0/2
Moose	123.5	6/6	4/6	0/2
8A West	126.1	5/6	3/6	0/2
8A East	127.1	4/6	1/6	0/2
9	129.3	3/6	2/6	0/2
9 u/s	130.6	3/6	0/6	0/2
4th July	131.8	3/6	2/6	0/2
9A	133.7	3/6	1/6	0/2
10 u/s	134.3	4/6	1/6	0/2
11 d/s	135.3	2/6	0/6	0/2
11	136.5	4/6	2/6	0/2

Notes:

1. For example, 4/6 means that 4 of the 6 with-project simulations resulted in a higher maximum river stage than the natural conditions for corresponding winters.
2. "Case C" operating guide and "inflow-matching" reservoir release temperatures are assumed for with-project simulations.

**SUSITNA HYDROELECTRIC PROJECT
EXPECTED PROJECT EFFECTS ON WINTER SLOUGH OVERTOPPING**

TABLE VI

	River Elev	WATANA ONLY					WATANA AND DEVIL CANYON					WATANA FILLING				
		1996 DEMAND					2001 DEMAND		2002 DEMAND			2020 DEMAND		YR. 1	YR. 2	
Slough or Side Channel		1971-72	1976-77	1981-82	1982-83	1971-72 ^W	1971-72	1982-83	1971-72	1976-77	1981-82	1982-83	1971-72	1982-83	1982-83	1981-82
Whiskers	101.8		X						X					O	O	
S	114.1	X		X	X	X	X	X					X			
MS II	116.8		X						X					O		
MS N	111.9	X	X	X	X	X	X	X	X	X	X	X	X			
SA West	120.1	X	X	X			X		X				X			
SA East	127.1		X					O		O	O			O		
9	129.3				O	O		O		O	O			O	O	
SA	133.7				O	O		O		O	O			O	O	
10 w/s	134.3				O	O		O		O	O			O	O	
11	138.8	X		X			X									

LEGEND:

- X Slough is overtopped with project, but not under simulated natural conditions for the corresponding winter.
- O Slough is overtopped with simulated natural conditions, but not overtopped with project.

NOTES:

1. "Case C" operating guide is assumed for with-project simulations.
2. 1971-72^W simulation assumes warm, 4° C reservoir releases. All other with-project simulations assume an "inflow-matching" temperature policy.
3. Winter air Temperatures:
 1971-72 cold
 1976-77 very warm
 1981-82 average
 1982-83 warm

TABLE VII

**SUSITNA HYDROELECTRIC PROJECT
SIMULATED ICE FRONT PROGRESSION**

	<u>Starting Date at Chulitna Confluence</u>	<u>Melt-Out Date</u>	<u>Maximum Upstream Extent</u> (River Mile)
Natural Conditions			
1971-72	Nov. 5	--	137 ^N
1976-77	Dec. 8	--	137 ^N
1981-82	Nov. 18	May 10-15 ^B	137 ^N
1982-83	Nov. 5	May 10 ^B	137 ^N
Watana Only - 1996 Demand			
1971-72	Nov. 28	May 15 ^E	140
1976-77	Dec. 26	April 18	126
1981-82	Dec. 28	April 3	137
1982-83 ^W	Dec. 12	Mar. 20	126
1971-72 ^W	Dec. 17	Mar. 27	126
Watana Only - 2001 Demand			
1971-72	Nov. 28	May 15 ^E	142
1982-83	Dec. 19	March 16	124
Both Dams - 2002 Demand			
1971-72	Dec. 2	May 3 ^E	137
1976-77	Jan. 8	April 14	124
1981-82	Dec. 30	Mar. 12	124
1982-83	Dec. 22	Mar. 20	123
Both Dams - 2020 Demand			
1971-72	Dec. 3	April 15	133
1982-83	Dec. 14	Mar. 12	126
Watana Filling			
1982-83 (YR.1)	Dec. 23	May 2 ^E	156 ^I
1981-82 (YR.2)	Dec. 23	May 30 ^E	162 ^I

Legend:

- B - Observed natural break-up.
- E - Melt-out date is extrapolated from results when occurring beyond April 30.
- N - Ice cover for natural conditions extends upstream of Gold Creek (River Mile 137) by means of lateral ice bridging.
- I - Computed ice front progression upstream of Gold Creek (River Mile 137) is approximation only. Observations indicate closure of river by lateral ice in this reach for natural conditions.

Notes:

1. "Case C" operating guide is assumed for with-project simulations.
2. 1971-72^W simulation assumes 4°C reservoir releases. All other with-project simulations assume an "inflow-matching" temperature policy.
3. Weather conditions:

1971-72: Cold winter	1981-82: Average winter
1976-77: Very warm winter	1982-83: Warm winter

**SUSITNA HYDROELECTRIC PROJECT
TOTAL ICE THICKNESS
MAXIMUM SIMULATED VALUES**

TABLE VIII

Slough or Side Channel	River Mile	NATURAL CONDITIONS				WATANA ONLY					WATANA AND DEVIL CANYON				WATANA FILLING					
		1971-72	1976-77	1981-82	1982-83	1971-72	1976-77	1981-82	1982-83	1971-72 ^w	1971-72	1982-83	2002 DEMAND	2020 DEMAND	1971-72	1982-83	YR. 1	YR. 2		
Whiskers	101.5	5	2	4	3	5	1	3	2	3	5	2	5	1	2	2	4	1	2	3
Gash Creek	112.0	5	4	4	4	5	3	5	5	6	5	7	5	2	2	3	4	1	3	4
6A	112.3	6	5	4	5	5	3	5	4	6	5	7	5	3	3	4	4	1	5	5
8	114.1	5	2	4	4	5	3	4	3	4	5	5	4	2	3	3	4	1	3	3
MSII	115.5	5	2	5	5	6	2	5	5	4	5	6	4	4	3	4	4	2	3	5
MSII	115.9	5	3	7	6	7	4	7	6	6	5	8	4	6	4	6	5	3	5	8
Curry	120.0	6	5	7	4	7	5	8	5	3	5	1	4	1	1	1	4	2	4	6
Moose	123.5	10	4	7	5	9	5	8	2	4	6	2	7	1	1	7	2	5	6	
8A West	126.1	5	2	3	3	5	2	3	1	1	5	3	3	1	3	1	1	2		
8A East	127.1	5	2	3	3	4	2	4	4	4	4	3	3	3	3	1	2			
9	129.3	6	4	7	6	5	3	6	6	6	6	3	3	3	2	4				
9 u/s	130.6	8	3	6	7	5	2	6	6	6	6	3	2	2	3	6				
4th July	131.8	7	1	3	5	5	2	7	7	7	7	3	2	2	1	3				
9A	133.7	7	1	3	3	6	2	8	8	8	8	3	3	3	3	2				
10 u/s	134.3	11	1	3	4	7	2	9	9	9	9	4	4	4	6	2				
11 d/s	135.3	6	1	3	5	6	2	8	8	8	8	3	3	3	3	3				
11	136.5	5	1	3	4	3	2	5	5	5	5	1	1	1	3	4				
17	139.3	Upstream Boundary of Natural Simulations				2	2	13	13	13	13	13	13	13	13	1	4			
20	140.5					2	2	12	12	12	12	12	12	12	12	12	12	1	4	
21 (A6)	141.8					3	3	3	3	3	3	3	3	3	3	3	3	1	2	
21	142.2					1	1	1	1	1	1	1	1	1	1	1	1	1	1	
22	144.8	Upstream Extent of Ice Cover Progression				1	1	1	1	1	1	1	1	1	1	1	1			
						1	1	1	1	1	1	1	1	1	1	1	1	1	1	

NOTES:

- "Case C" operating guide is assumed for with-project simulations.
- 1971-72^w simulation assumes warm, 4°C reservoir releases. All other with-project simulations assume an "inflow-matching" temperature policy.
- Upstream extent of simulated ice cover progression for Watana filling occurs upstream of River Mile 144.8.
- All ice thickness in feet.
- Winter air temperatures:
1971-72 cold
1976-77 very warm
1981-82 average
1982-83 warm

**SUSITNA HYDROELECTRIC PROJECT
SOLID ICE THICKNESS
MAXIMUM SIMULATED VALUES**

TABLE IX

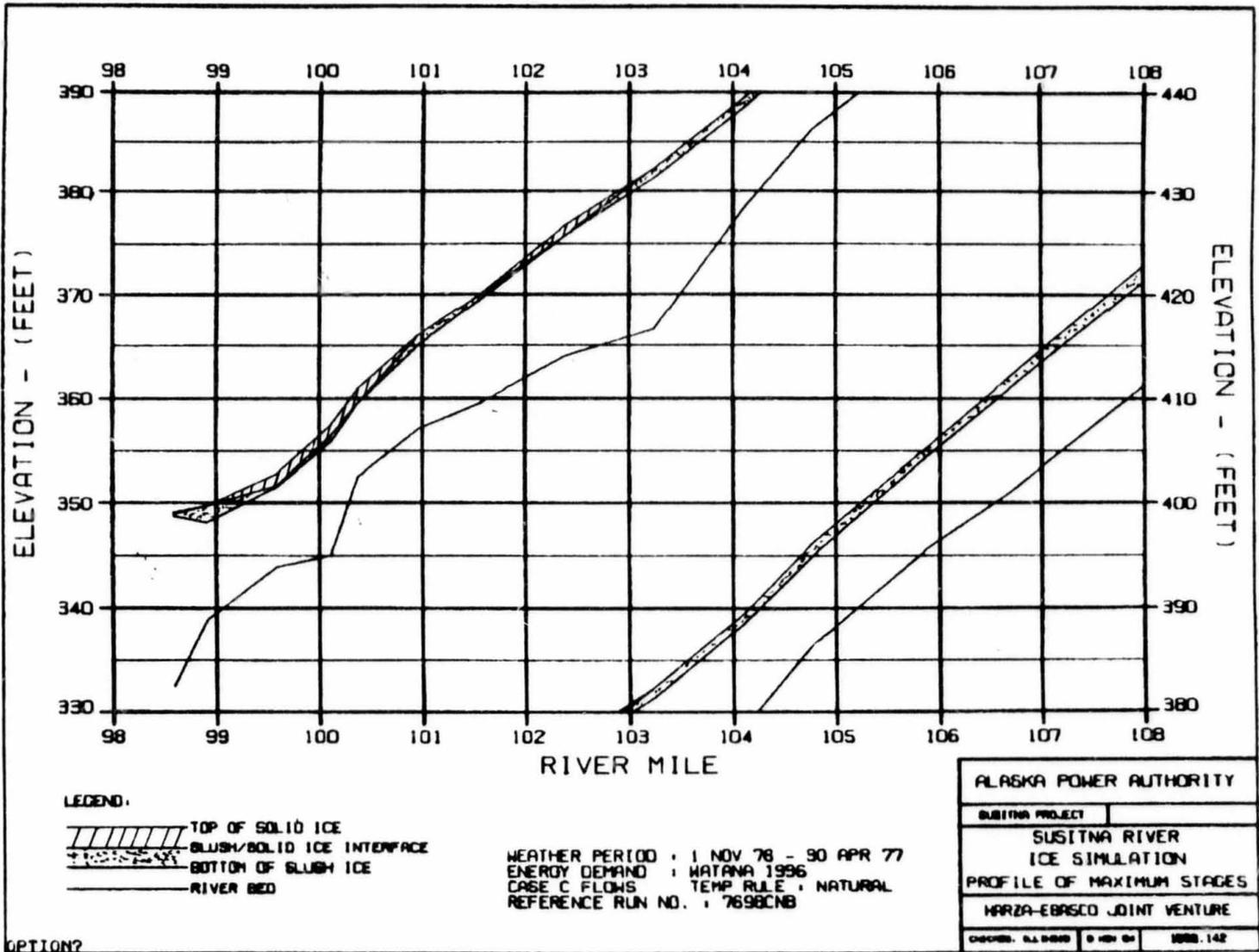
Slough or Side Channel	River Mile	NATURAL CONDITIONS				WATANA ONLY					WATANA AND DEVIL CANYON				WATANA FILLING					
		1971-72	1976-77	1981-82	1982-83	1971-72	1976-77	1981-82	1982-83	1971-72 ^W	2001 DEMAND	2002 DEMAND	2002 DEMAND	2020 DEMAND	YR. 1	YR. 2				
Whiskers	101.5	5	2	4	3	5	1	3	2	3	5	2	5	1	2	2	4	1	2	3
Gash Creek	112.0	5	2	4	3	5	1	3	2	2	5	1	5	1	2	1	4	1	2	3
6A	112.3	5	2	4	3	5	1	3	2	2	5	1	5	1	2	1	4	1	2	3
8	114.1	5	2	4	3	5	1	3	2	2	5	1	5	1	2	1	4	1	2	3
MSII	115.5	5	2	4	3	5	1	3	2	1	5	1	4	1	1	1	4	1	2	3
MSII	115.9	5	2	4	3	5	1	3	1	1	5	0	4	1	1	1	4	1	2	3
Curry	120.0	5	2	4	3	5	1	2	0	1	5	0	4	1	1	0	3	0	2	3
Moose	123.5	5	2	4	3	4	1	2	0	0	4	0	4	0	0	2	0	2	2	
8A West	126.1	5	2	3	3	4	0	1	0	0	4	3	1	0	1	0	1	2		
8A East	127.1	5	2	3	3	3	1	0	0	0	4	3	1	0	1	0	1	2		
9	129.3	5	2	3	3	3	1	0	0	0	4	3	1	0	1	0	1	2		
9 u/s	130.6	5	2	3	3	3	1	0	0	0	4	2	0	0	0	0	1	2		
4th July	131.8	5	1	3	3	2	1	0	0	0	4	2	0	0	0	0	1	2		
9A	133.7	5	1	3	2	2	0	0	0	0	4	1	0	0	0	0	1	2		
10 u/s	134.3	5	1	3	2	2	0	0	0	0	3	1	0	0	0	0	1	2		
11 d/s	135.3	4	1	3	2	2	0	0	0	0	3	0	0	0	0	0	1	2		
11	136.5	4	1	3	2	1	0	0	0	0	3	0	0	0	0	0	1	2		
17	139.3	Upstream Boundary of Natural Simulations				0	0	0	0	0	2	0	0	0	0	0	0	2		
20	140.5					0	0	0	0	0	2	0	0	0	0	0	0	2		
21 (A6)	141.8					0	0	0	0	0	1	0	0	0	0	0	0	2		
21	142.2					0	0	0	0	0	0	0	0	0	0	0	0	1		
22	144.8					0	0	0	0	0	0	0	0	0	0	0	0	1		

NOTES:

- "Case C" operating guide is assumed for with project simulations.
- 1971-72^W simulation assumes warm, 4°C reservoir releases. All other with project simulations assume an "inflow-matching" temperature policy.
- Upstream extent of simulated ice cover progression for Watana filling occurs upstream of River Mile 144.8.
- All ice thickness in feet.
- Winter air temperatures:
1971-72 cold
1976-77 very warm
1981-82 average
1982-83 warm

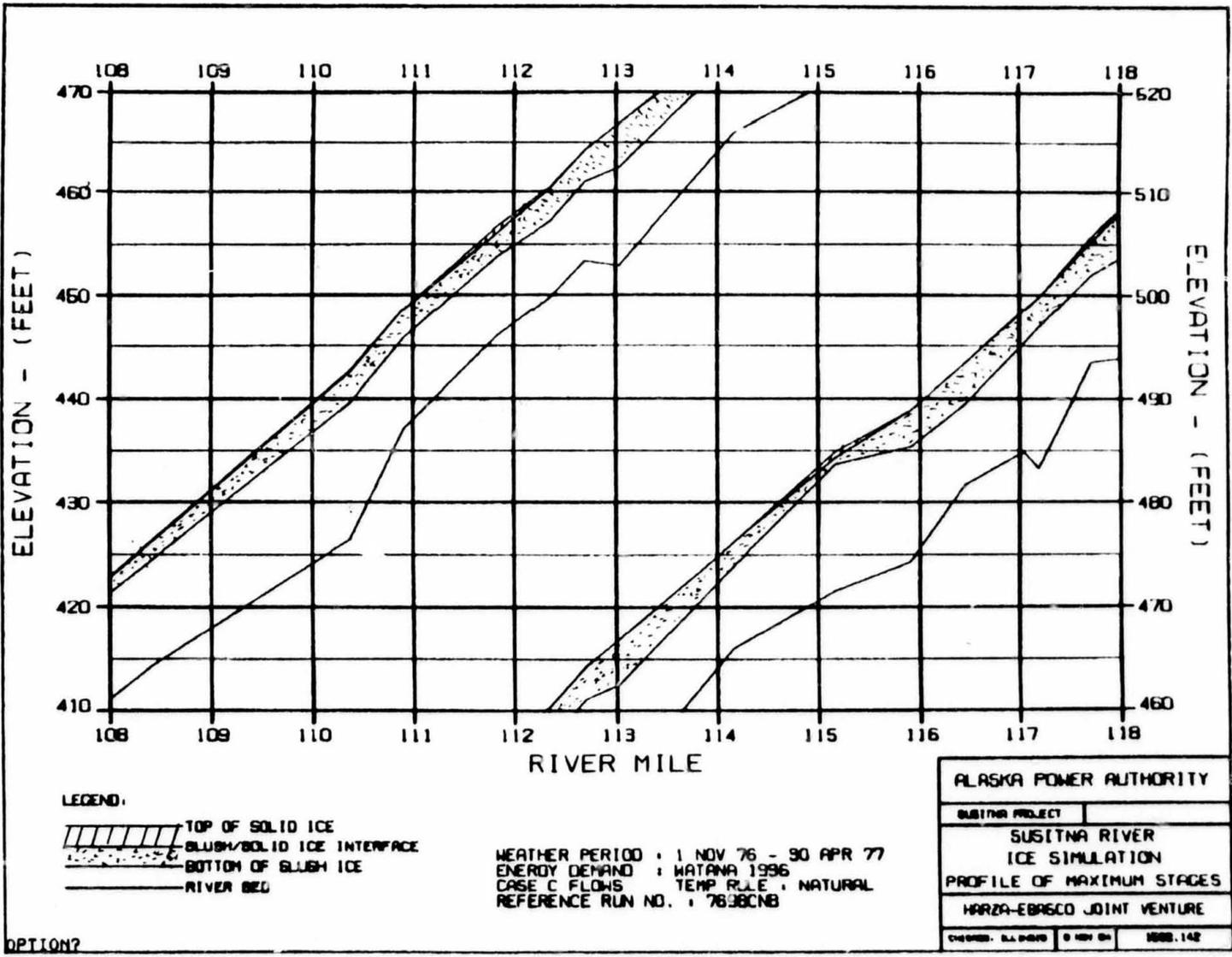
EXHIBIT G

C

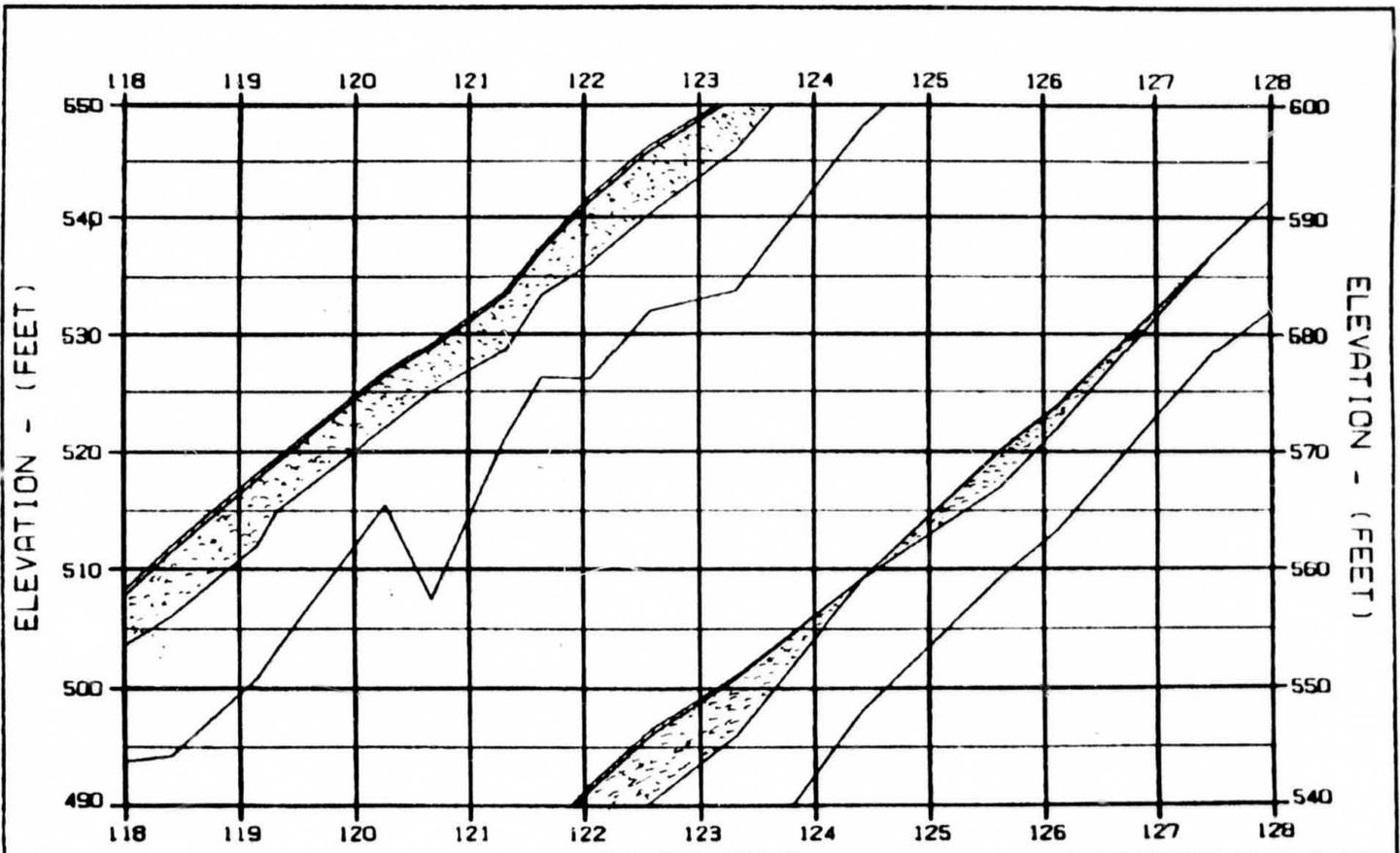


OPTION?

C



OPTION?

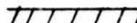
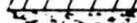
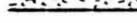


ELEVATION - (FEET)

ELEVATION - (FEET)

RIVER MILE

LEGEND.

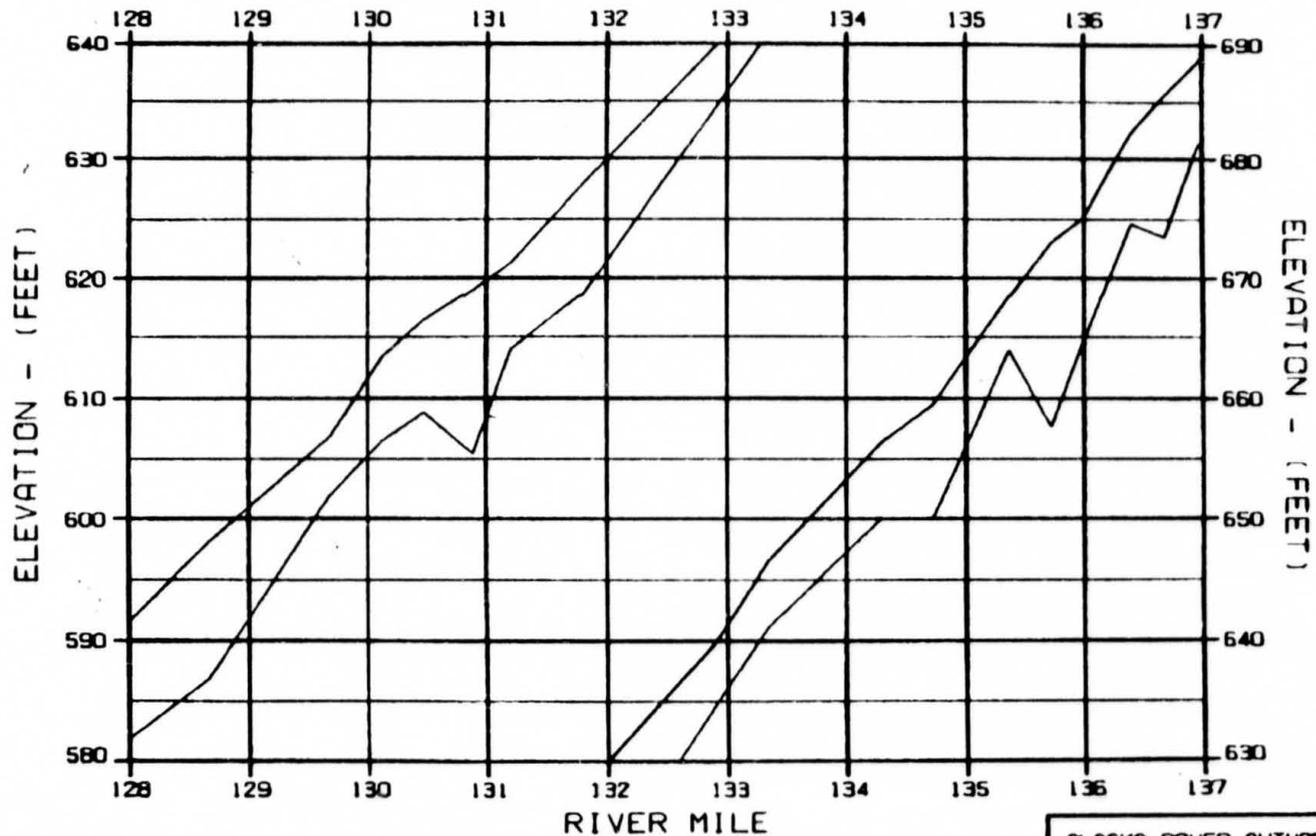
-  TOP OF SOLID ICE
-  SLUSH/SOLID ICE INTERFACE
-  BOTTOM OF SLUSH ICE
-  RIVER BED

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : MATANA 1996
 CASE C FLOWS TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CNB

ALASKA POWER AUTHORITY		
SUSITNA PROJECT		
SUSITNA RIVER ICE SIMULATION		
PROFILE OF MAXIMUM STAGES		
WARZA-EBASCO JOINT VENTURE		
DATE: 11/1/77	BY: HEB/SH	ISSN: 142

OPTION?

C



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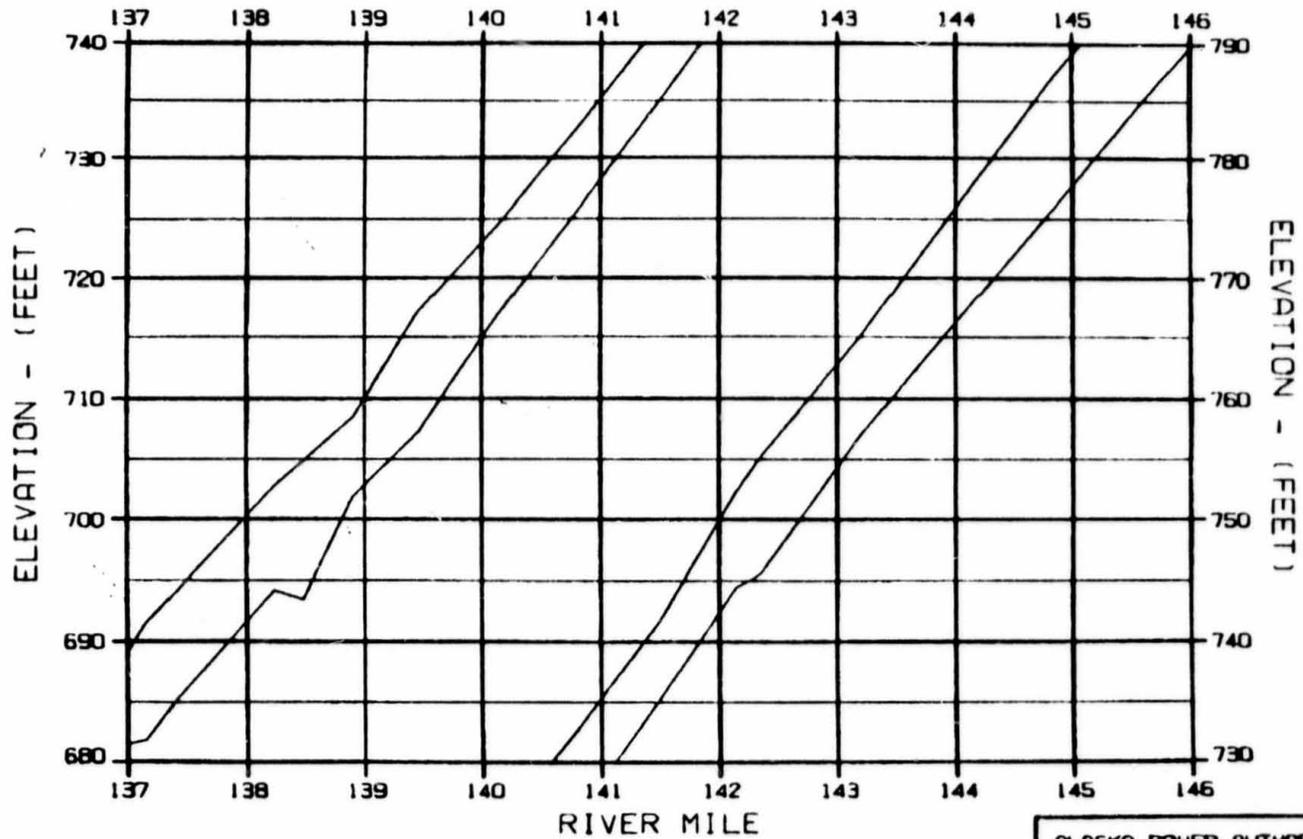
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-  SLUSH/SOLID ICE INTERFACE
-  BOTTOM OF SLUSH ICE
-  RIVER BED

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS : TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7896CNB

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER	
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
WARZA-EBRESCO JOINT VENTURE	
DESIGNED BY: B. J. ...	DATE: ...
DRAWN BY: ...	NO. 142

OPTION?

C



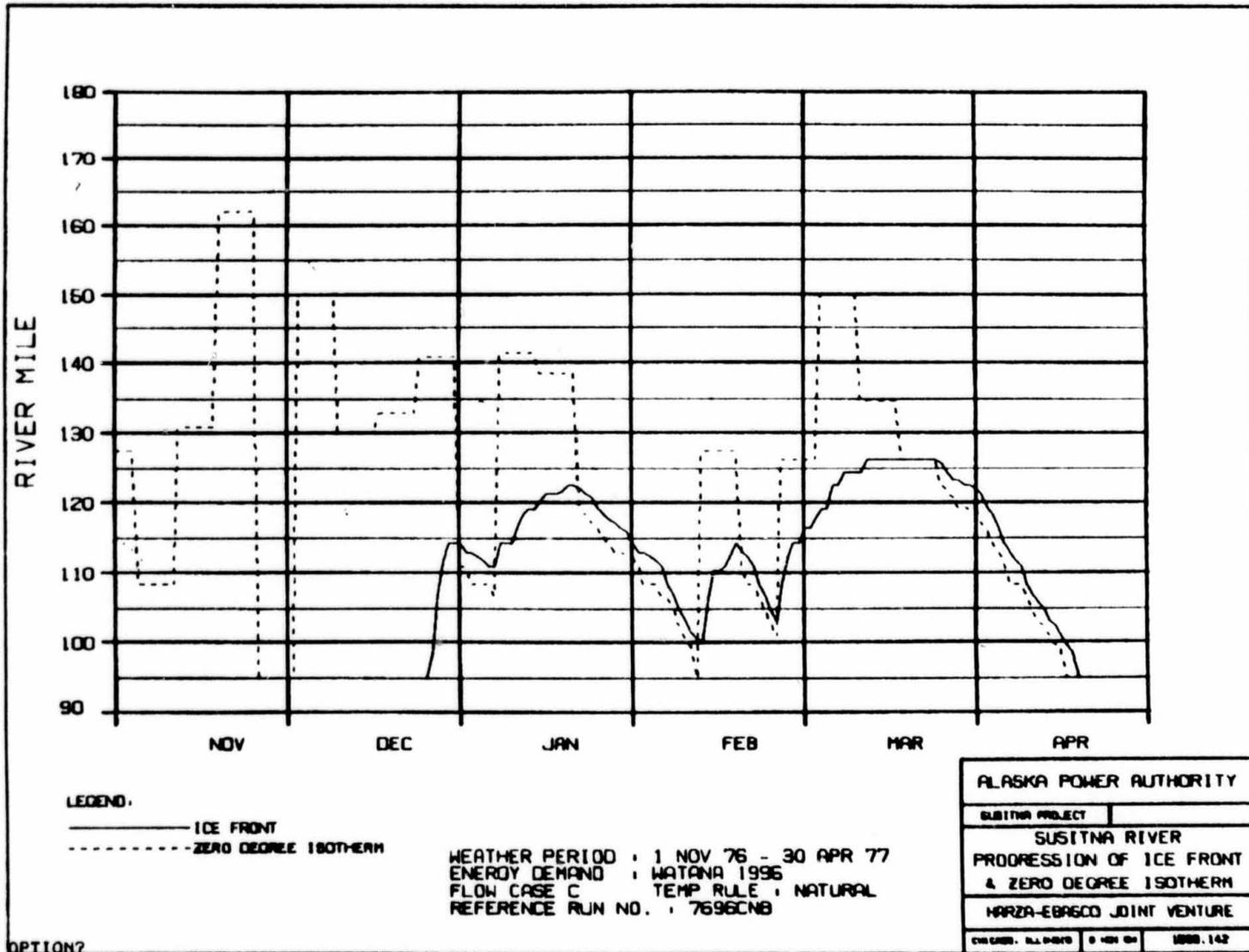
LEGEND.

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7896CMB

ALASKA POWER AUTHORITY	
SUBITNA PROJECT	
SUSITNA RIVER	
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
HARZA-EBASCO JOINT VENTURE	
DESIGNED BY: []	DATE: []
CHECKED BY: []	DATE: []

OPTION?



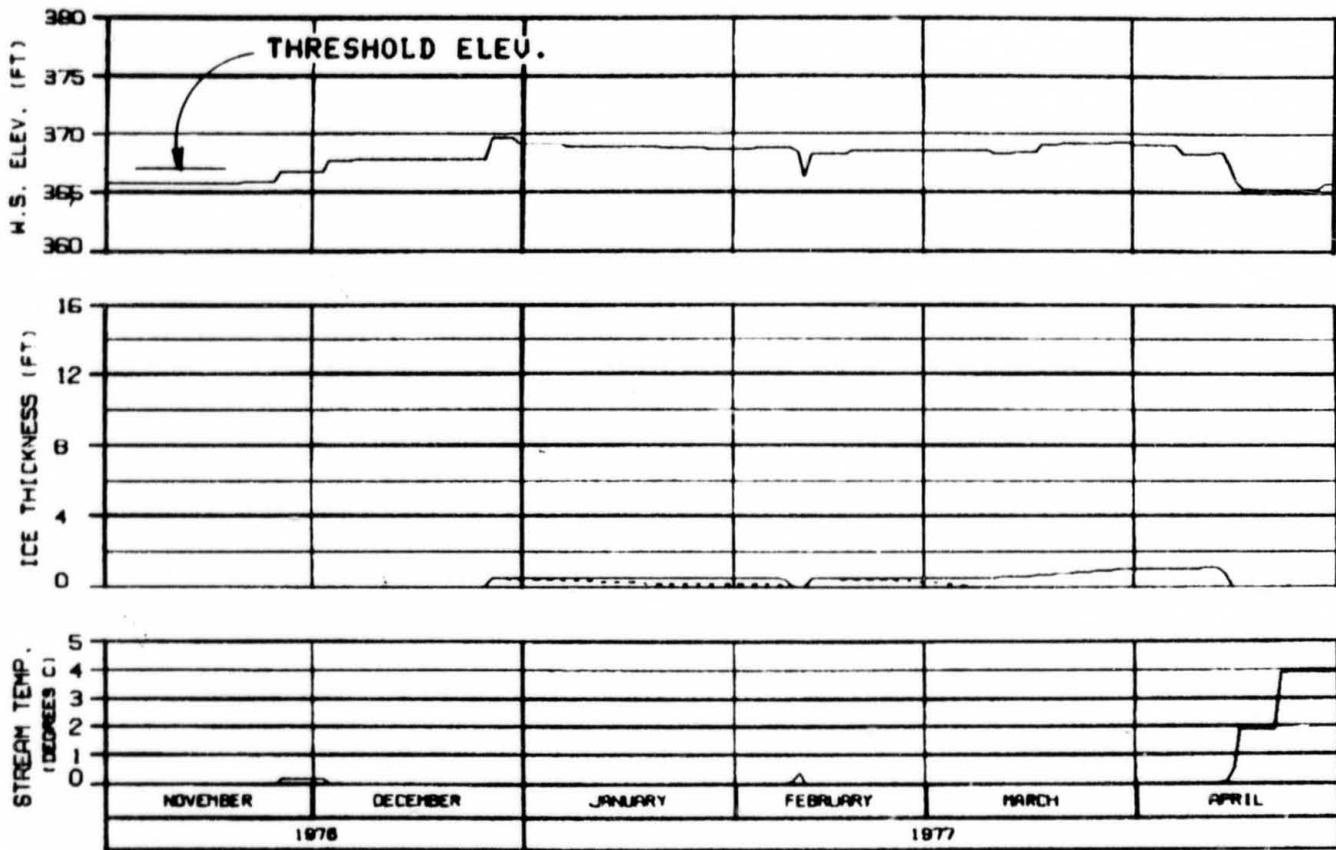
LEGEND:

- ICE FRONT
- - - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 FLOW CASE C TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CMB

ALASKA POWER AUTHORITY		
SUSITNA PROJECT		
SUSITNA RIVER		
PROGRESSION OF ICE FRONT & ZERO DEGREE ISOTHERM		
MARZA-EBASCO JOINT VENTURE		
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OPTION 2



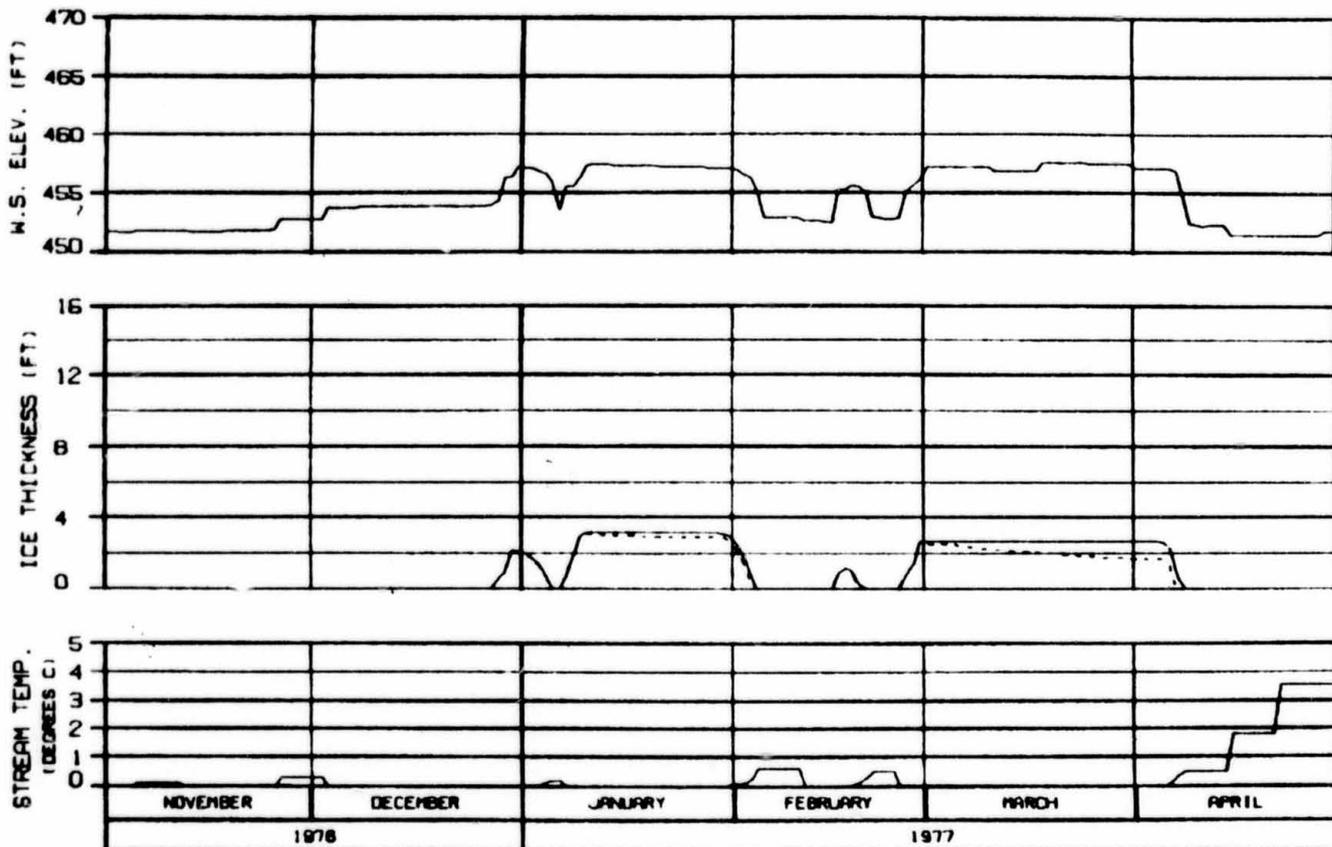
HEAD OF WHISKERS SLOUGH

RIVER MILE : 101.50

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CNG

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER ICE SIMULATION TIME HISTORY	
HARZA-EBASCO JOINT VENTURE	
DESIGNED BY: B. J. BROWN	DATE: 11 NOV 76
ISSUE: 142	

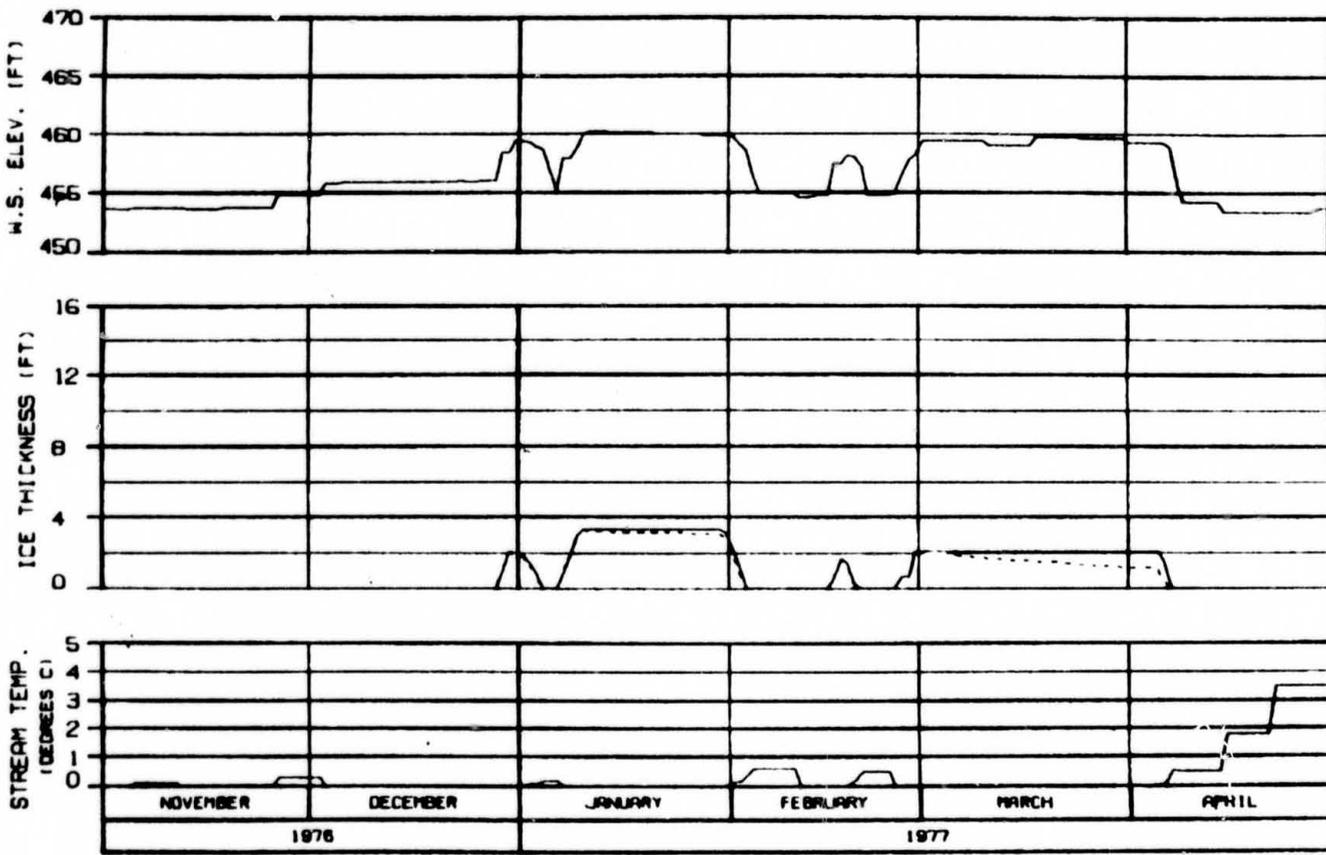


SIDE CHANNEL AT HEAD OF GASH CREEK
RIVER MILE : 112.00

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS : TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CNB

ALASKA POWER AUTHORITY	
SUBITNA PROJECT	
SUSITNA RIVER	
ICE SIMULATION	
TIME HISTORY	
WARZA-EBRISCO JOINT VENTURE	
DESIGN: S.L. PARR	8 APR 84
1000.142	

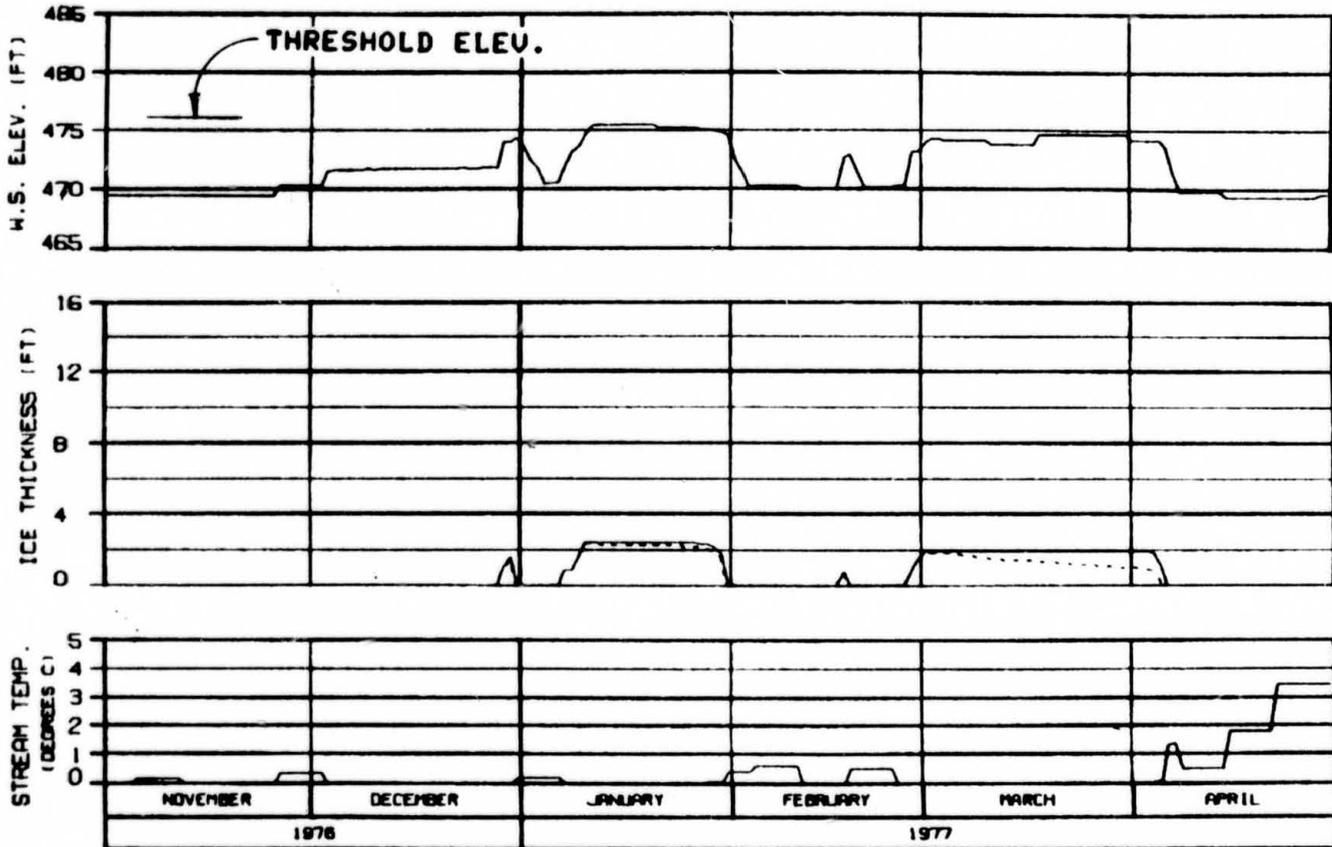


MOUTH OF SLOUGH 6A
RIVER MILE : 112.34

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS : TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CNB

ALASKA POWER AUTHORITY		
SUSITNA PROJECT		
SUSITNA RIVER ICE SIMULATION TIME HISTORY		
WARZA-EBASCO JOINT VENTURE		
ENCLOSURE - 01 0000	0 000 00	0000.142

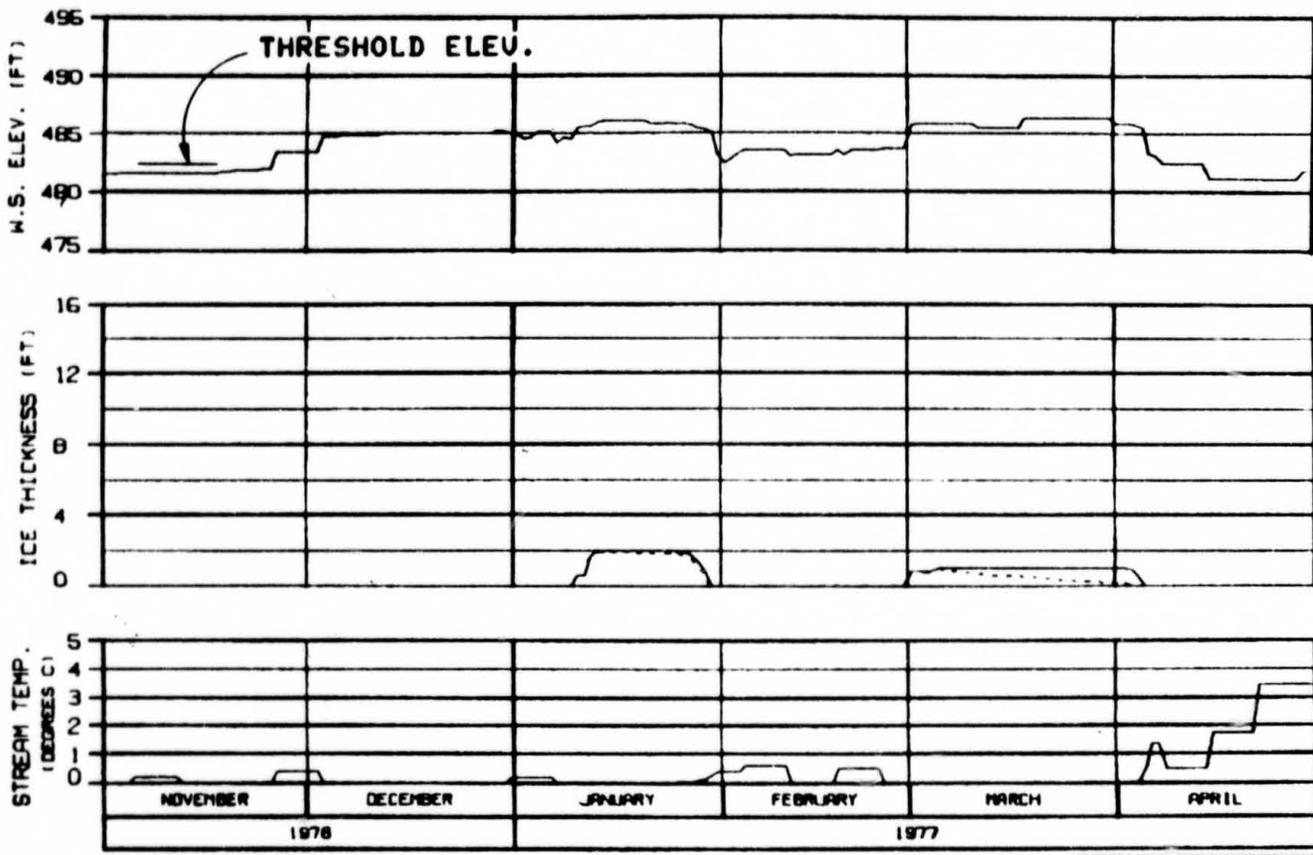


HEAD OF SLOUGH 8
RIVER MILE : 114.10

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS : TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CN8

ALASKA POWER AUTHORITY		
SUBMITTER PROJECT		
SUSITNA RIVER		
ICE SIMULATION		
TIME HISTORY		
MARZEH-EBRACCO JOINT VENTURE		
CHECKED: S.L. PETER	DATE: 8 APR 78	ISSUE: 142



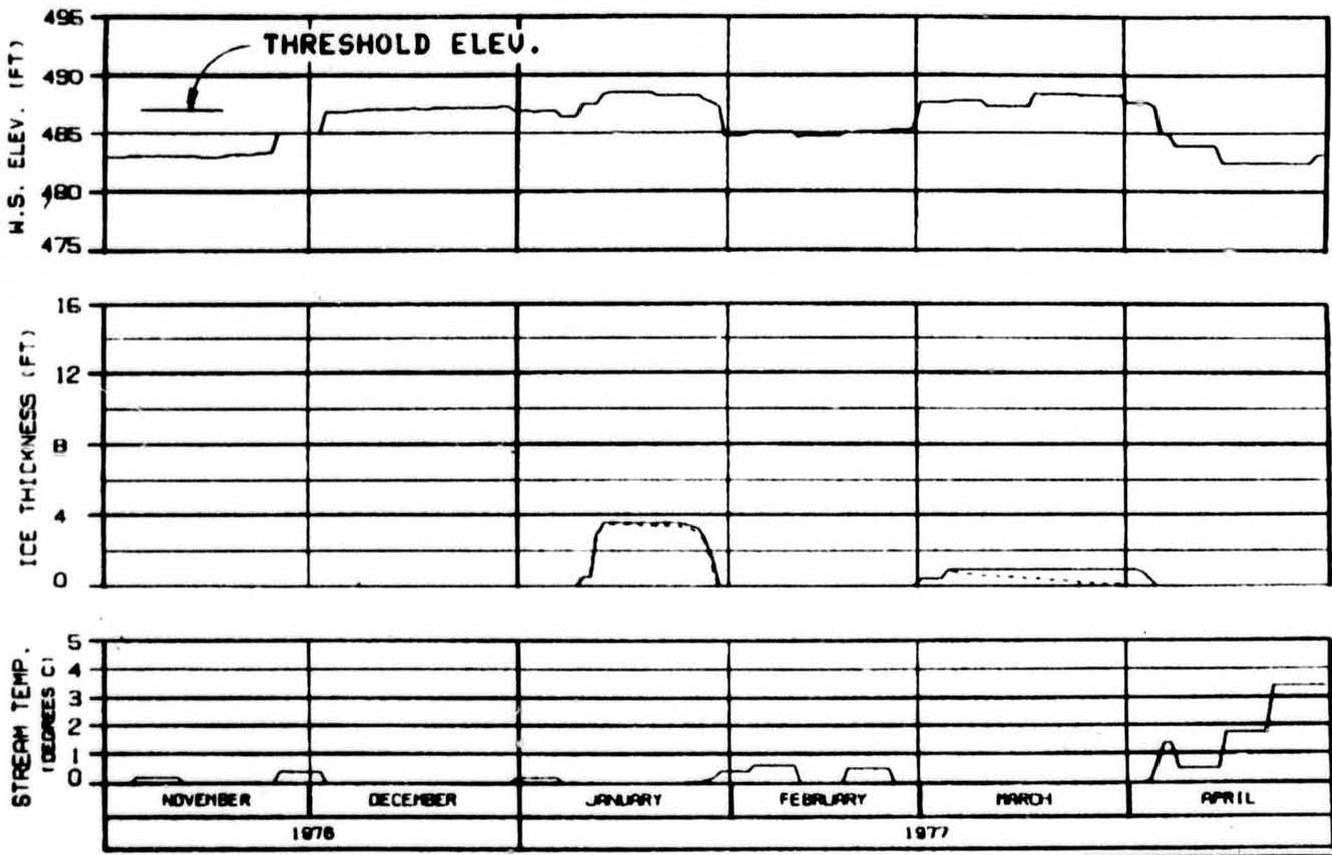
SIDE CHANNEL MSII

RIVER MILE : 115.50

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS : TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CN8

ALASKA POWER AUTHORITY	
SUSTITNA PROJECT	
SUSTITNA RIVER ICE SIMULATION TIME HISTORY	
WARZA-EBRISCO JOINT VENTURE	
DESIGNED BY: AL-0479	DATE: 8 MAR 77
NO. 142	

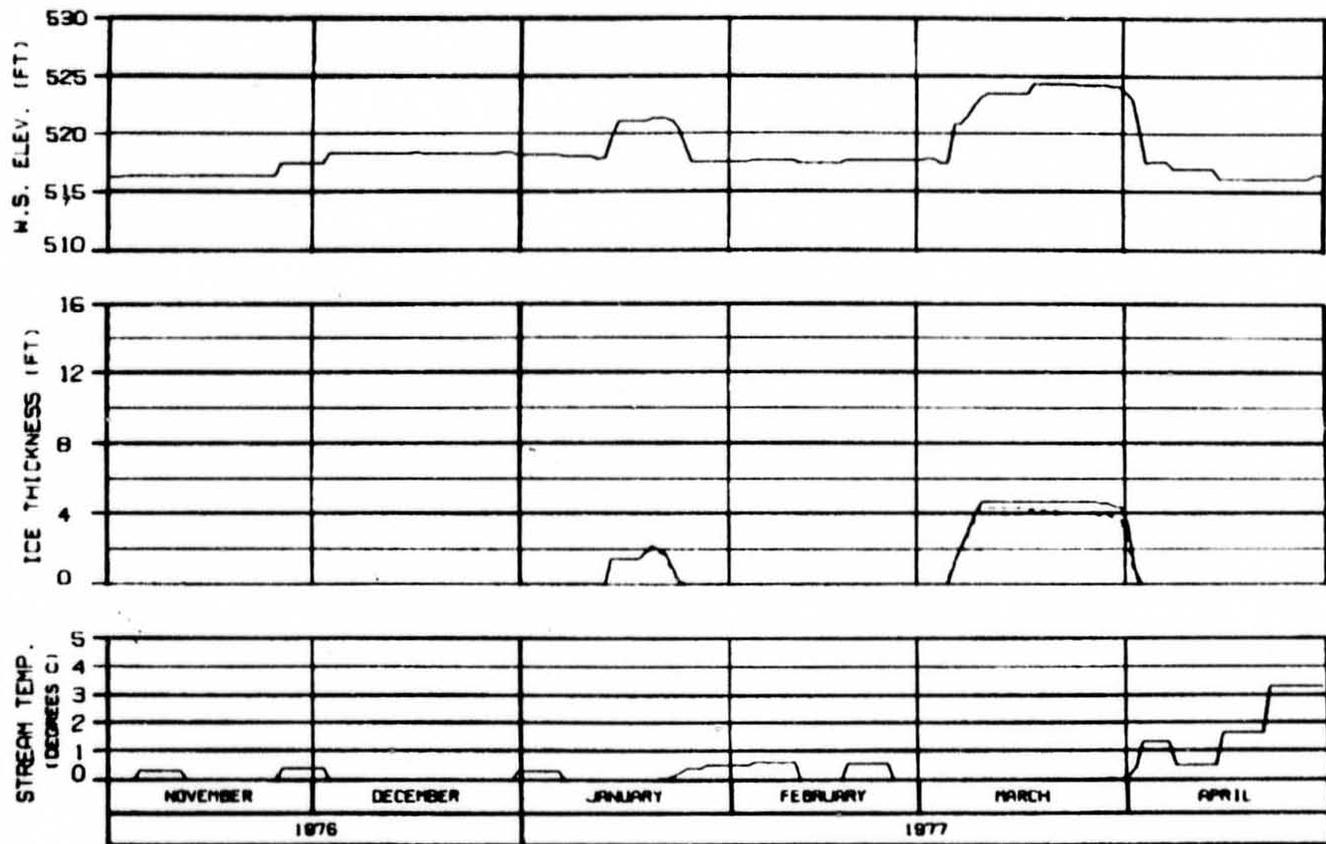


HEAD OF SIDE CHANNEL MSII
RIVER MILE : 115.90

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CNB

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER ICE SIMULATION TIME HISTORY	
HARZA-EBRACCO JOINT VENTURE	
CHGNO. 8.1.9.99	ISS. 142



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

RIVER MILE : 120.00

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : NATANA 1996
 CASE C FLOWS : TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CNS

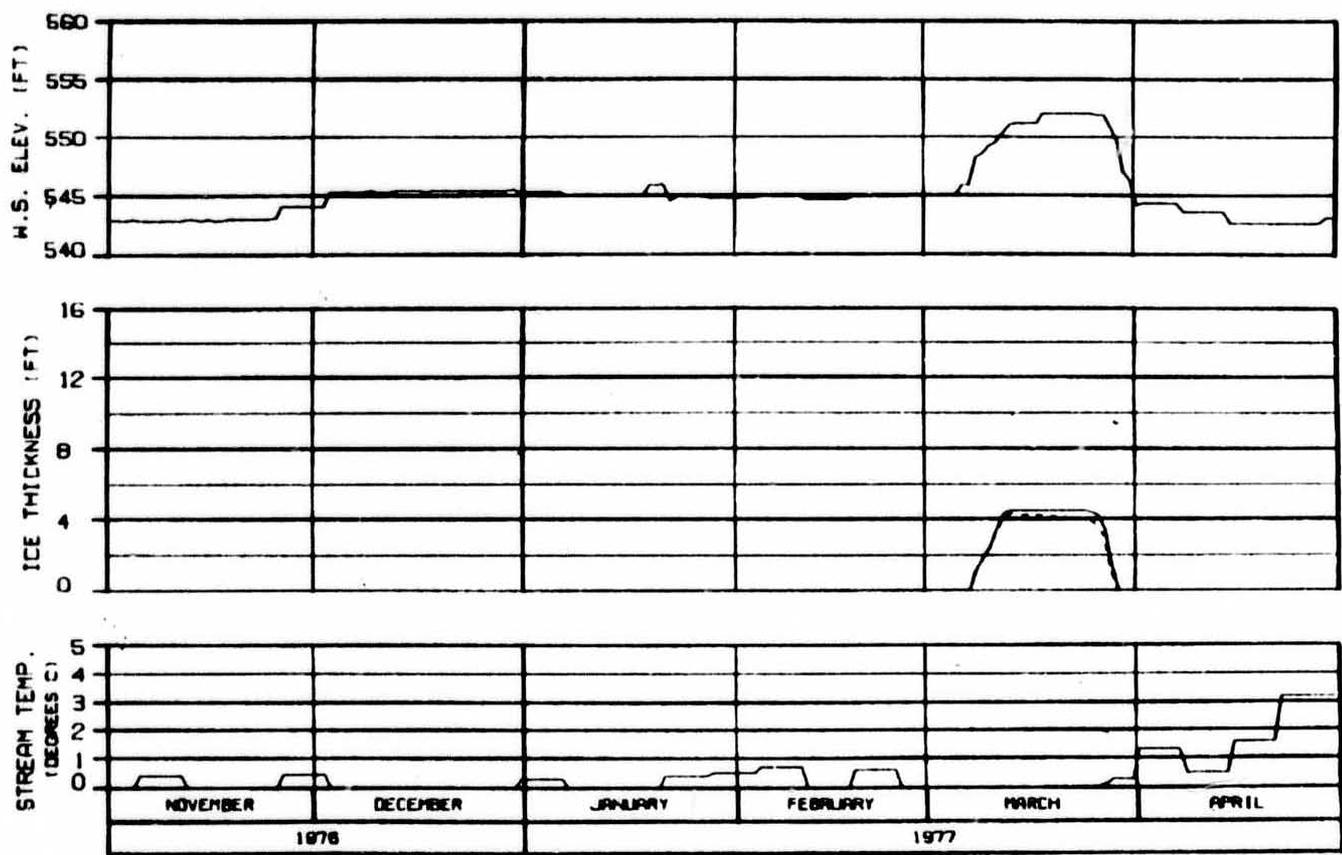
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER
 ICE SIMULATION
 TIME HISTORY

HARZA-EBRACO JOINT VENTURE

DESIGN: D.L. PETERSON © 1987 BY 1000-142

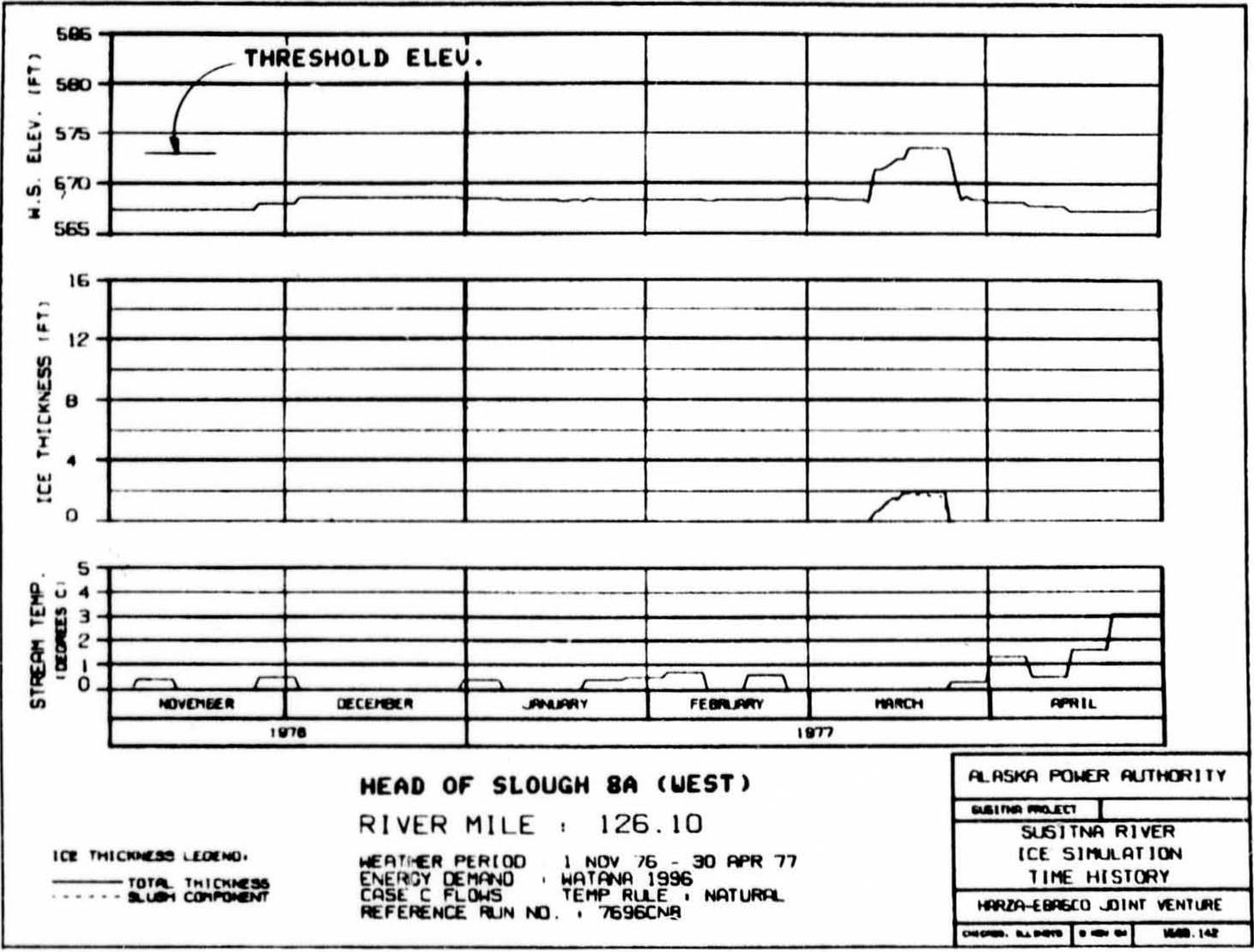


HEAD OF MOOSE SLOUGH
RIVER MILE : 123.50

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

WEATHER PERIOD 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CN8

ALASKA POWER AUTHORITY	
SUSTINA PROJECT	
SUSTINA RIVER ICE SIMULATION TIME HISTORY	
WARZA-EBRACCO JOINT VENTURE	
DESIGNED BY: []	1500-142

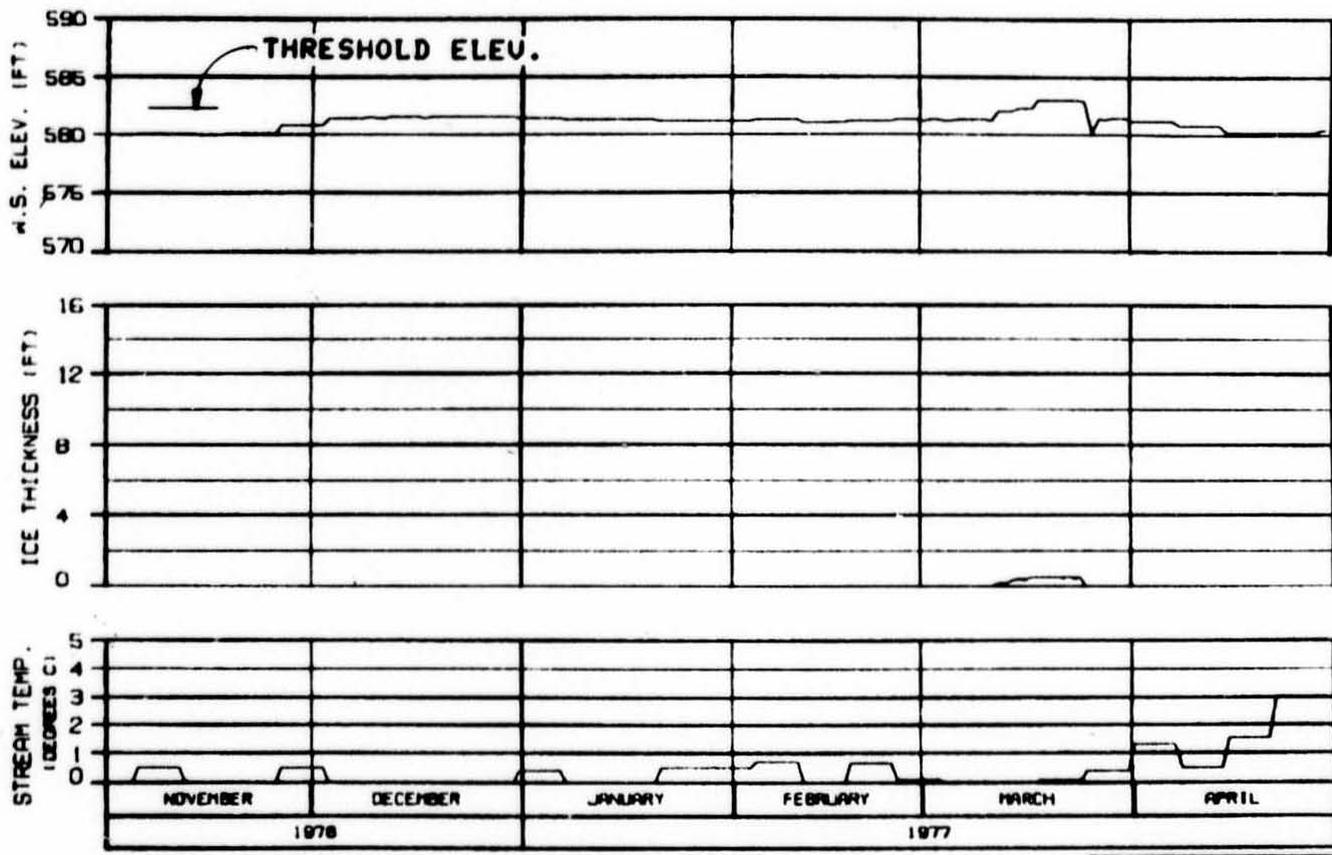


HEAD OF SLOUGH 8A (WEST)
RIVER MILE : 126.10

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS : TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CNR

ALASKA POWER AUTHORITY		
SUSTITNA PROJECT		
SUSTITNA RIVER		
ICE SIMULATION		
TIME HISTORY		
HARZA-EBRSCO JOINT VENTURE		
CHGDR. ALBENS	D 424 04	1688 142



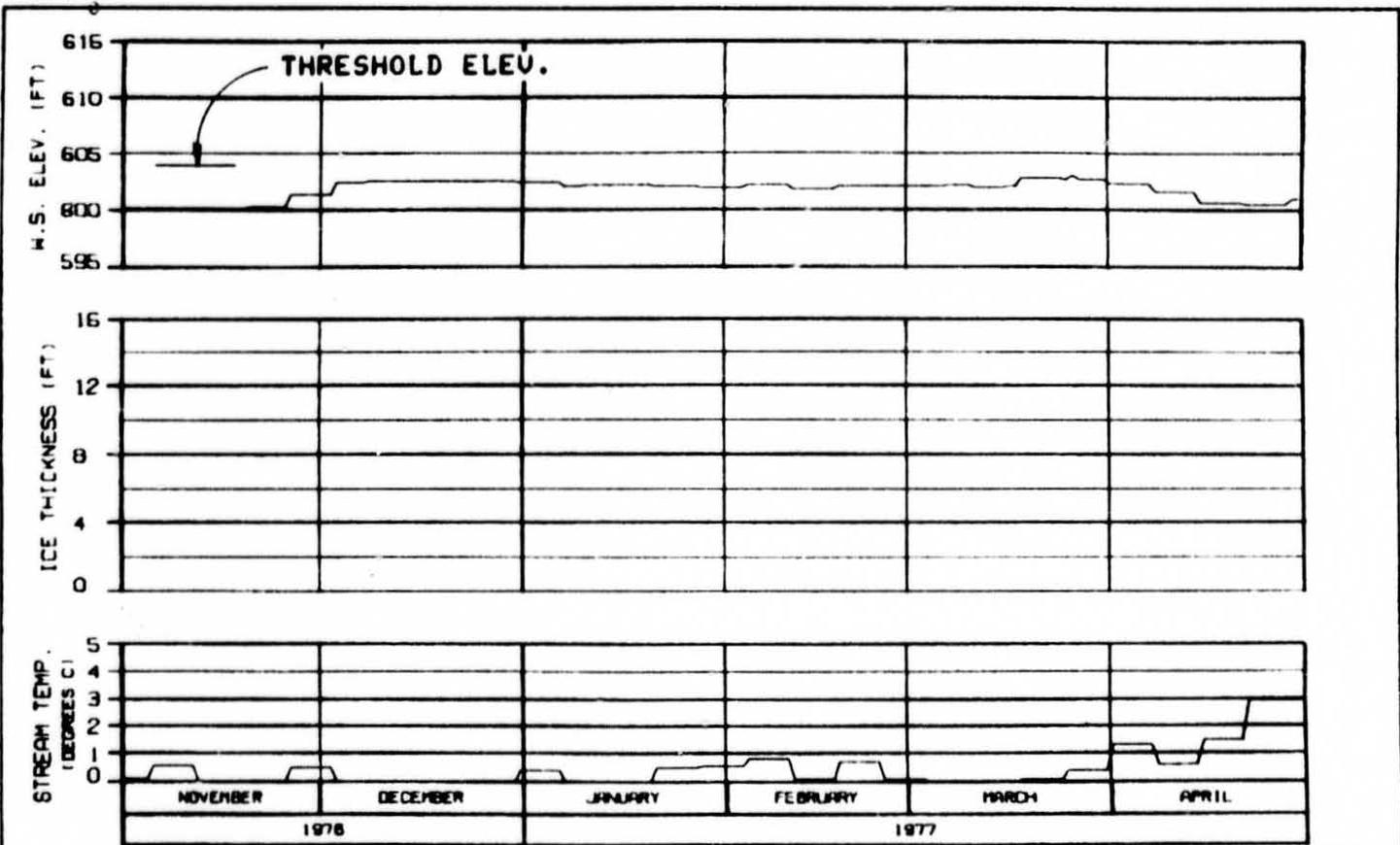
HEAD OF SLOUGH 8A (EAST)
RIVER MILE : 127.10

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : NATANA 1996
 CASE C FLOWS TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CNS

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER ICE SIMULATION TIME HISTORY	
HARZA-EBASCO JOINT VENTURE	
DESIGNED - B.L. GARDNER	MOB. 142

OPTION 2



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

HEAD OF SLOUGH 9

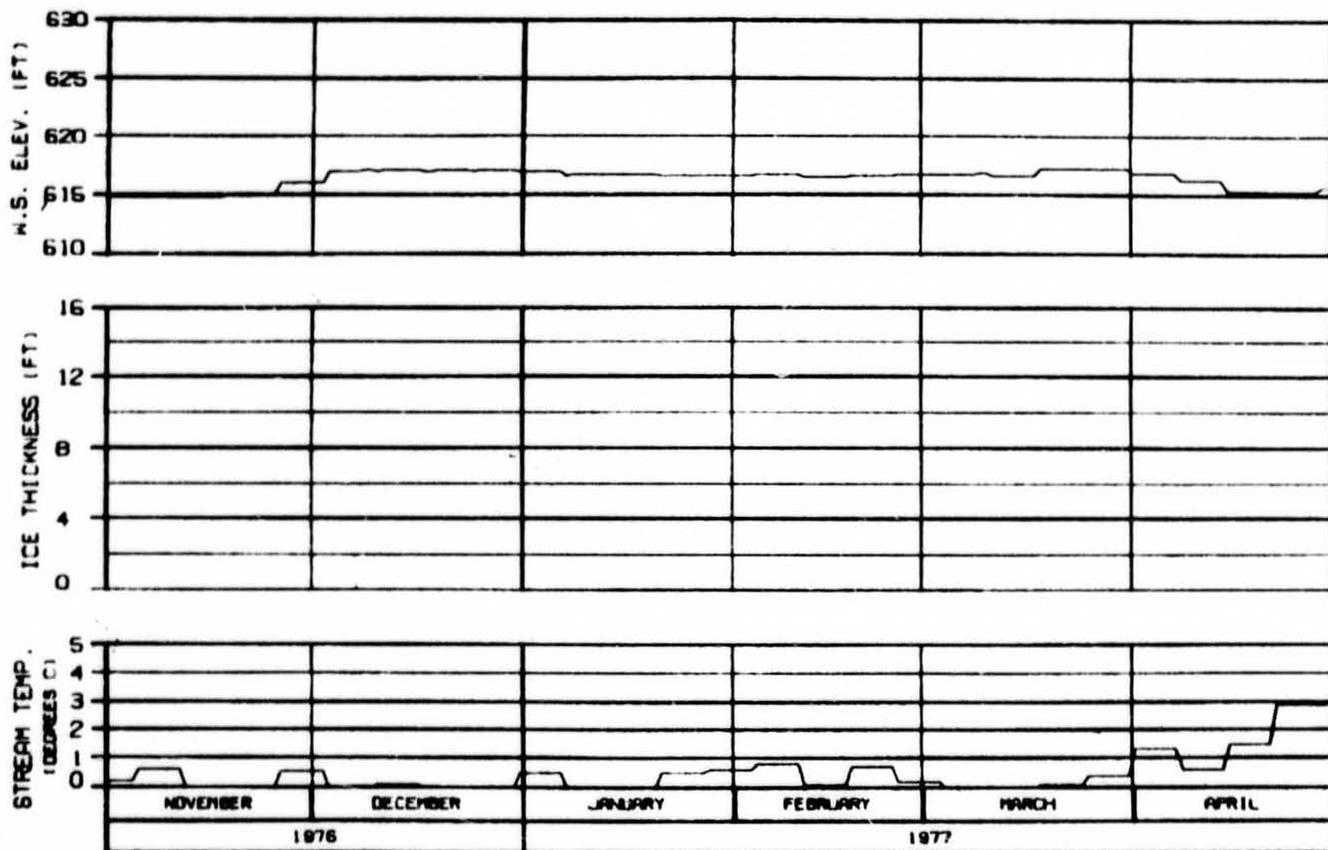
RIVER MILE : 129.30

WEATHER PERIOD : NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS : TEMP RULE : NATURAL
 REFERENCE RUN NO. : 76960NB

ALASKA POWER AUTHORITY	
SUBMITTER PROJECT	
SUSITNA RIVER ICE SIMULATION TIME HISTORY	
HARZA-EBBSCO JOINT VENTURE	
DESIGNED - ILLIUM	8 APR 84
1988 142	

OPTION 2

OPTION 7



SIDE CHANNEL U/S OF SLOUGH 9

RIVER MILE : 130.60

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS : TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696C08

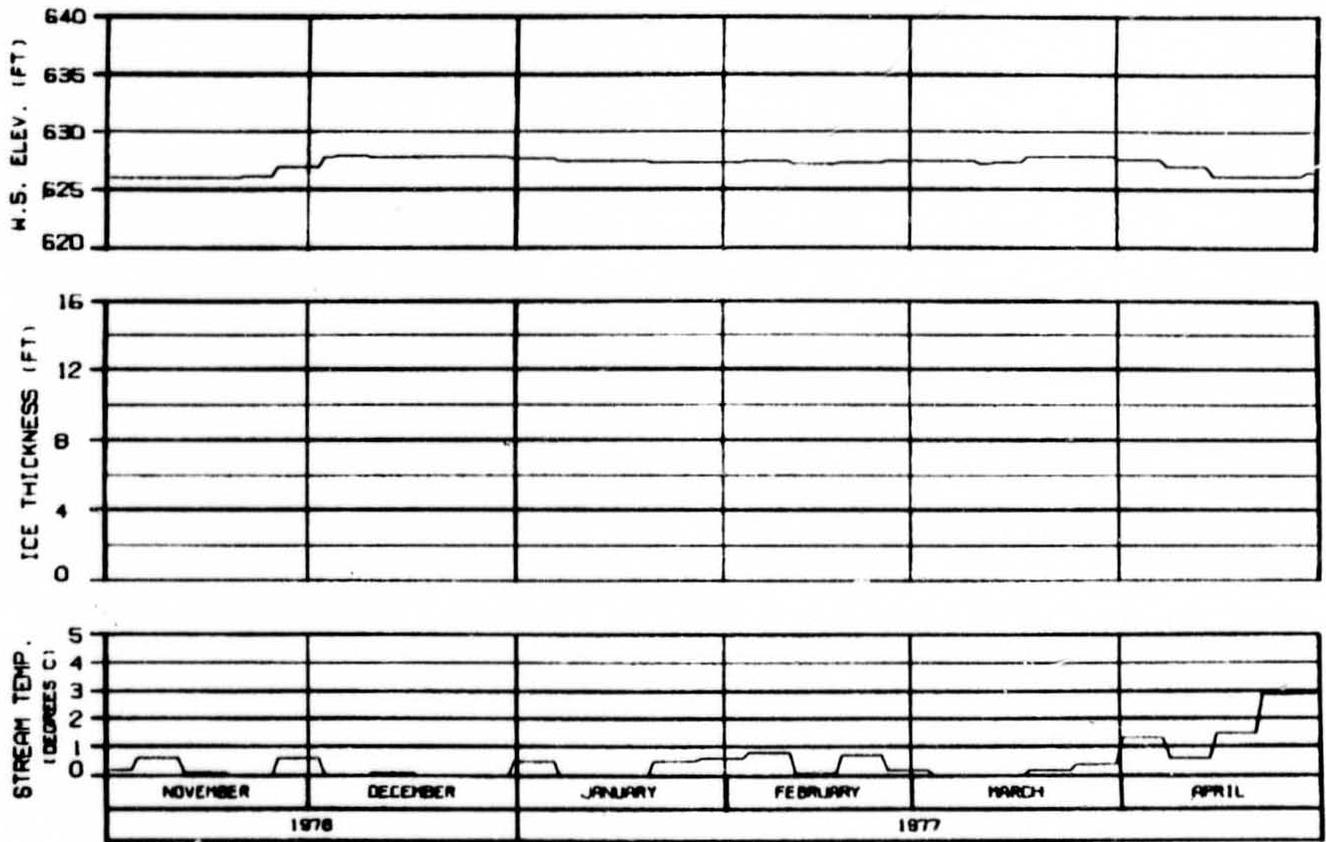
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER
 ICE SIMULATION
 TIME HISTORY

WARDA-EBRSCO JOINT VENTURE

CHANGED: 01.08.76 0 004 04 1000.142

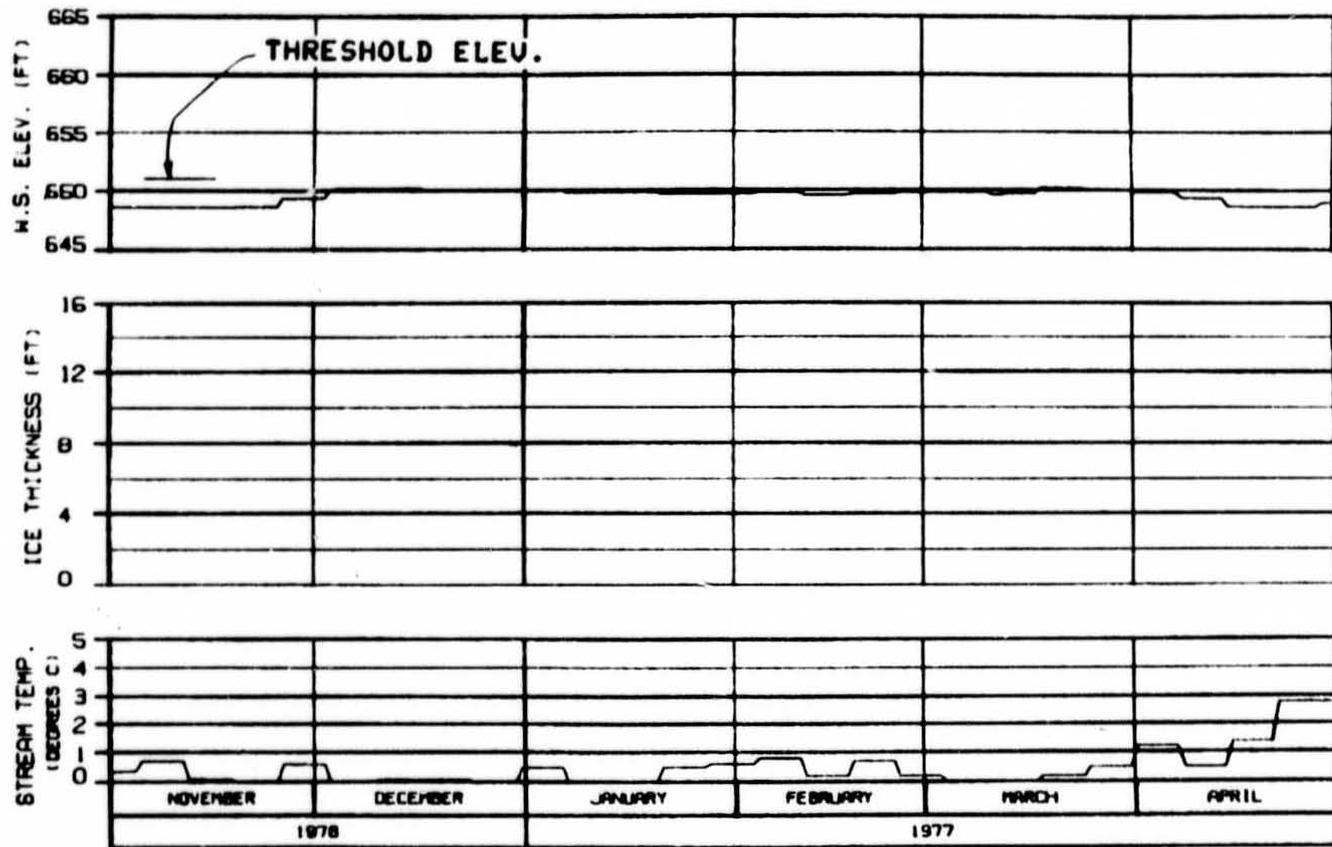


SIDE CHANNEL U/S OF 4TH JULY CREEK
RIVER MILE : 131.80

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS : TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CN8

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER ICE SIMULATION TIME HISTORY	
WARZA-EBRACCO JOINT VENTURE	
ENCLOS. 11/19/76	9 NOV 76
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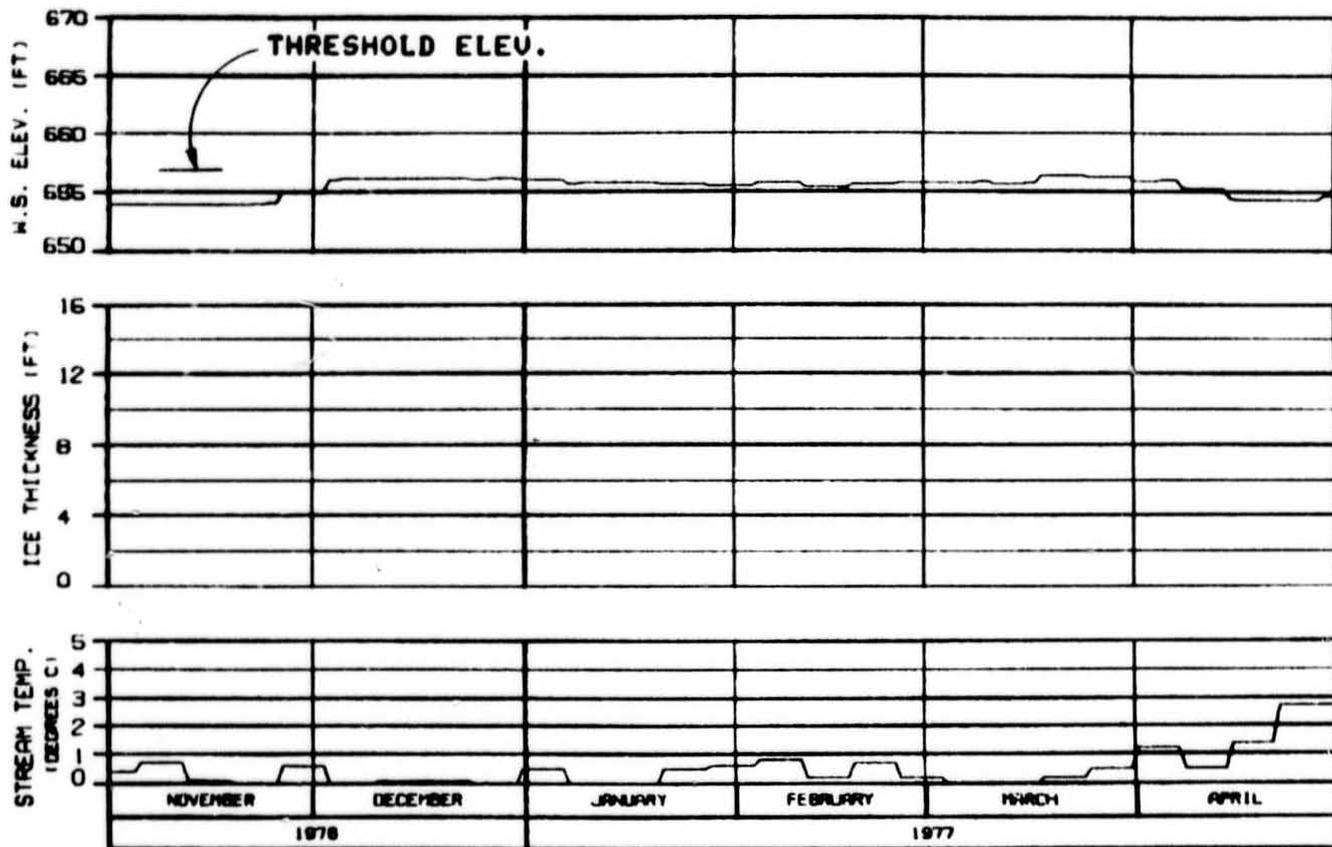


HEAD OF SLOUGH 9A
RIVER MILE : 133.70

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CNB

ALASKA POWER AUTHORITY	
SUBMITTER PROJECT	
SUSITNA RIVER ICE SIMULATION TIME HISTORY	
HARZA-EBASCO JOINT VENTURE	
CHG. NO. 111-0000	ISS. NO. 142



SIDE CHANNEL U/S OF SLOUGH 10

RIVER MILE : 134.30

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS : TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CNB

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

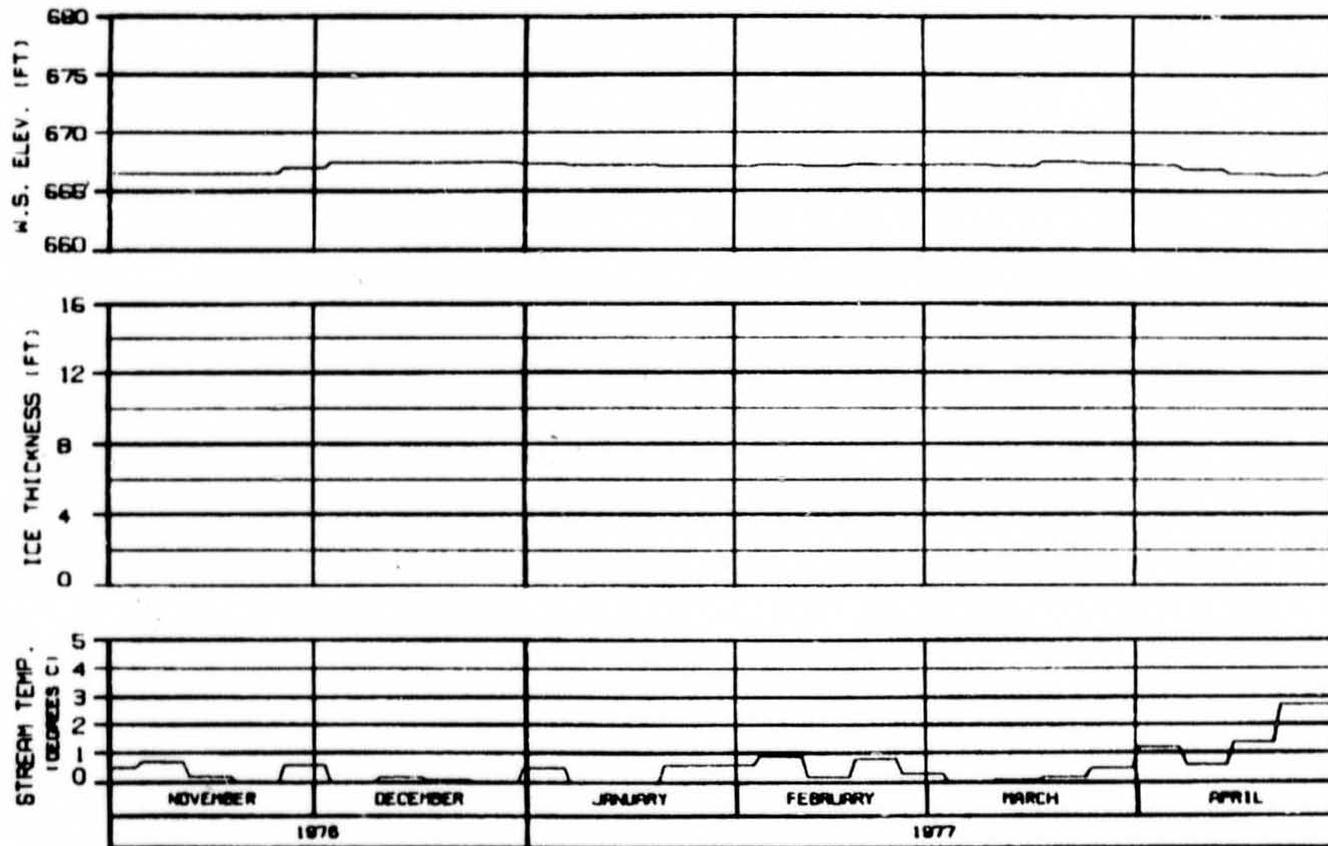
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER
 ICE SIMULATION
 TIME HISTORY

HARZA-EBRECO JOINT VENTURE

DESIGNED BY: [] DRAWN BY: [] REVISION: 142



SIDE CHANNEL D/S OF SLOUGH 11

RIVER MILE : 135.30

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696DN8

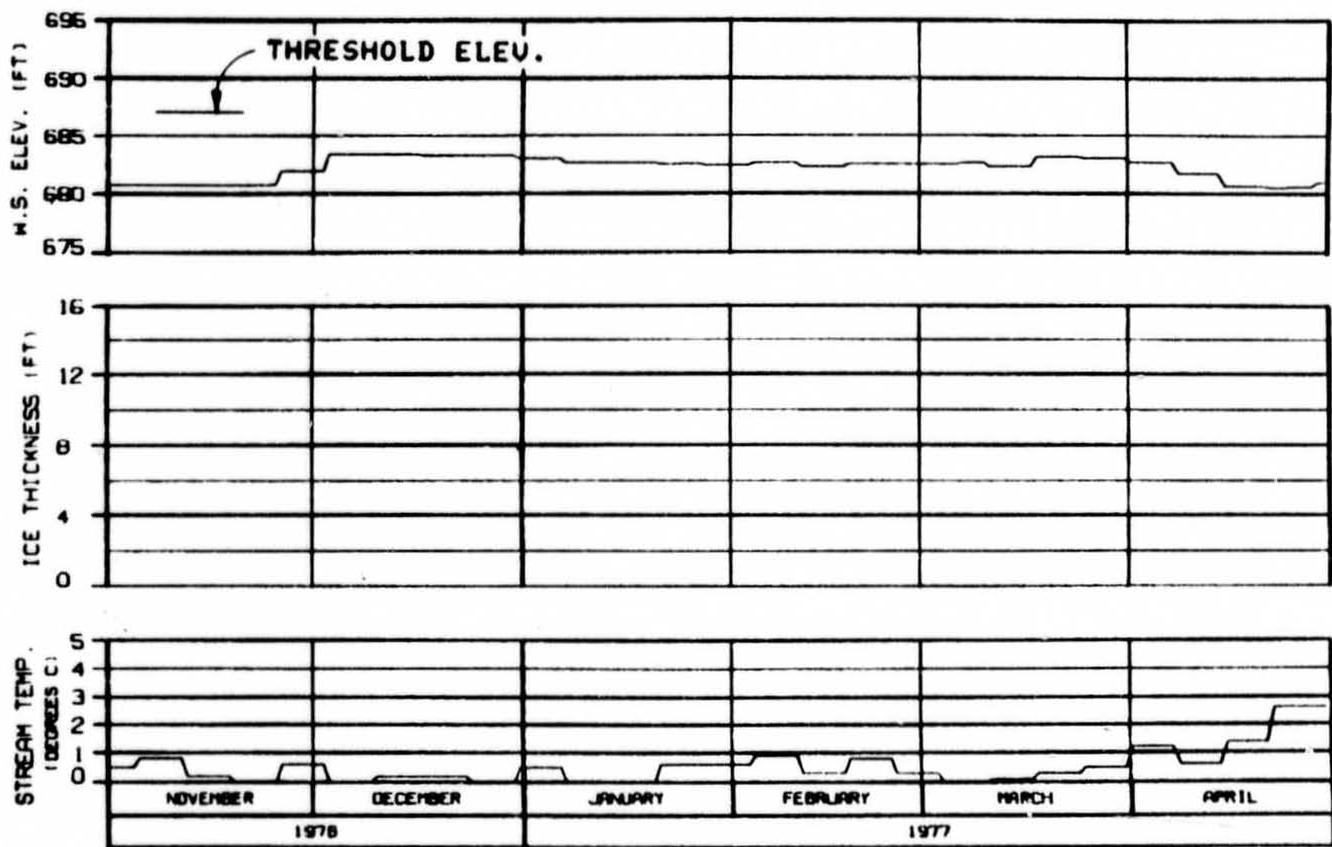
ALASKA POWER AUTHORITY

SUSTITNA PROJECT

SUSTITNA RIVER
 ICE SIMULATION
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHGNO. 8-1-80 8 40 04 1000.142

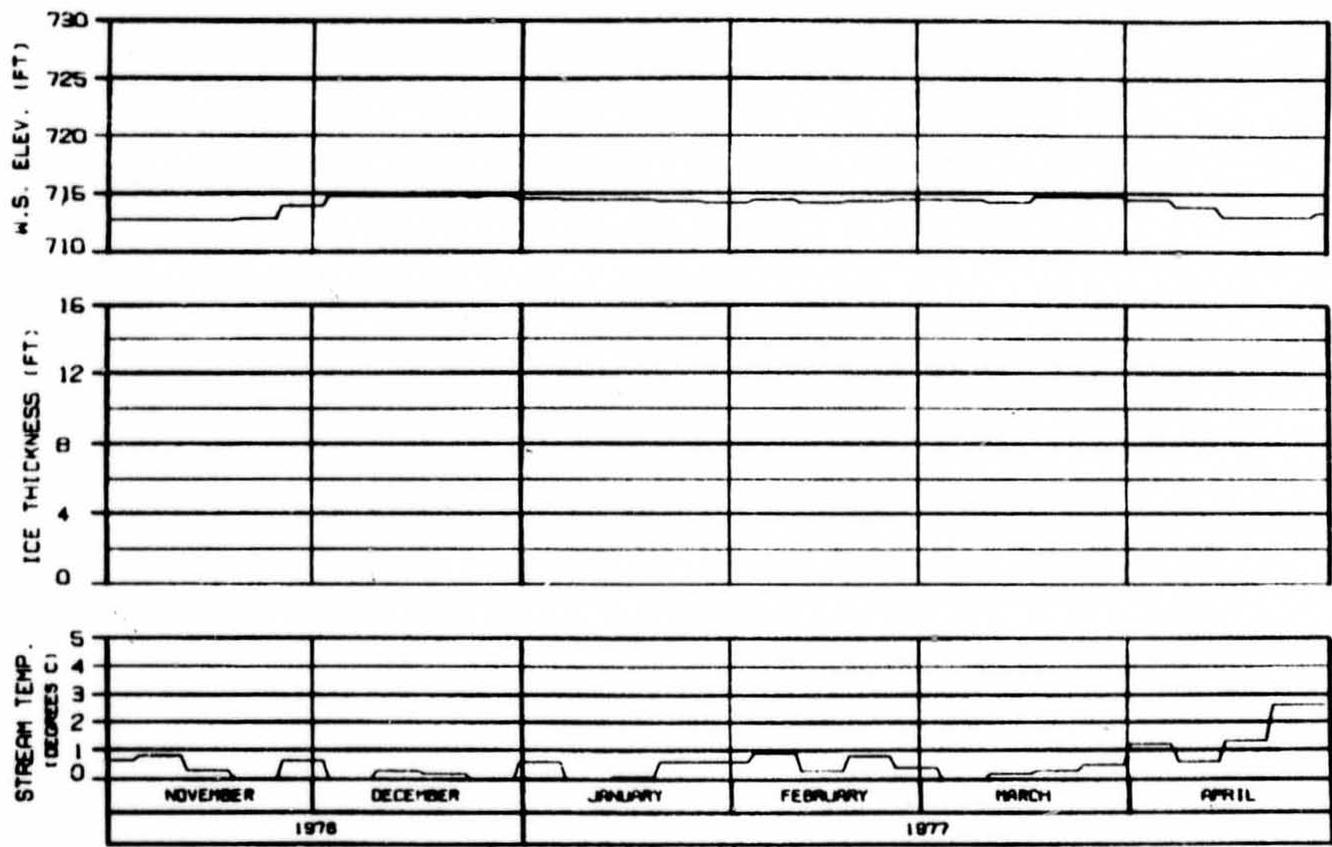


ICE THICKNESS LEGEND:
 ——— TOTAL THICKNESS
 - - - - - SLUSHY COMPONENT

HEAD OF SLOUGH 11
 RIVER MILE : 136.50

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS : TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CN8

ALASKA POWER AUTHORITY	
SUSTINA PROJECT	
SUSTINA RIVER ICE SIMULATION TIME HISTORY	
HARZA-EBRISCO JOINT VENTURE	
CHGNO. 81-0-0-0	0 APR 77
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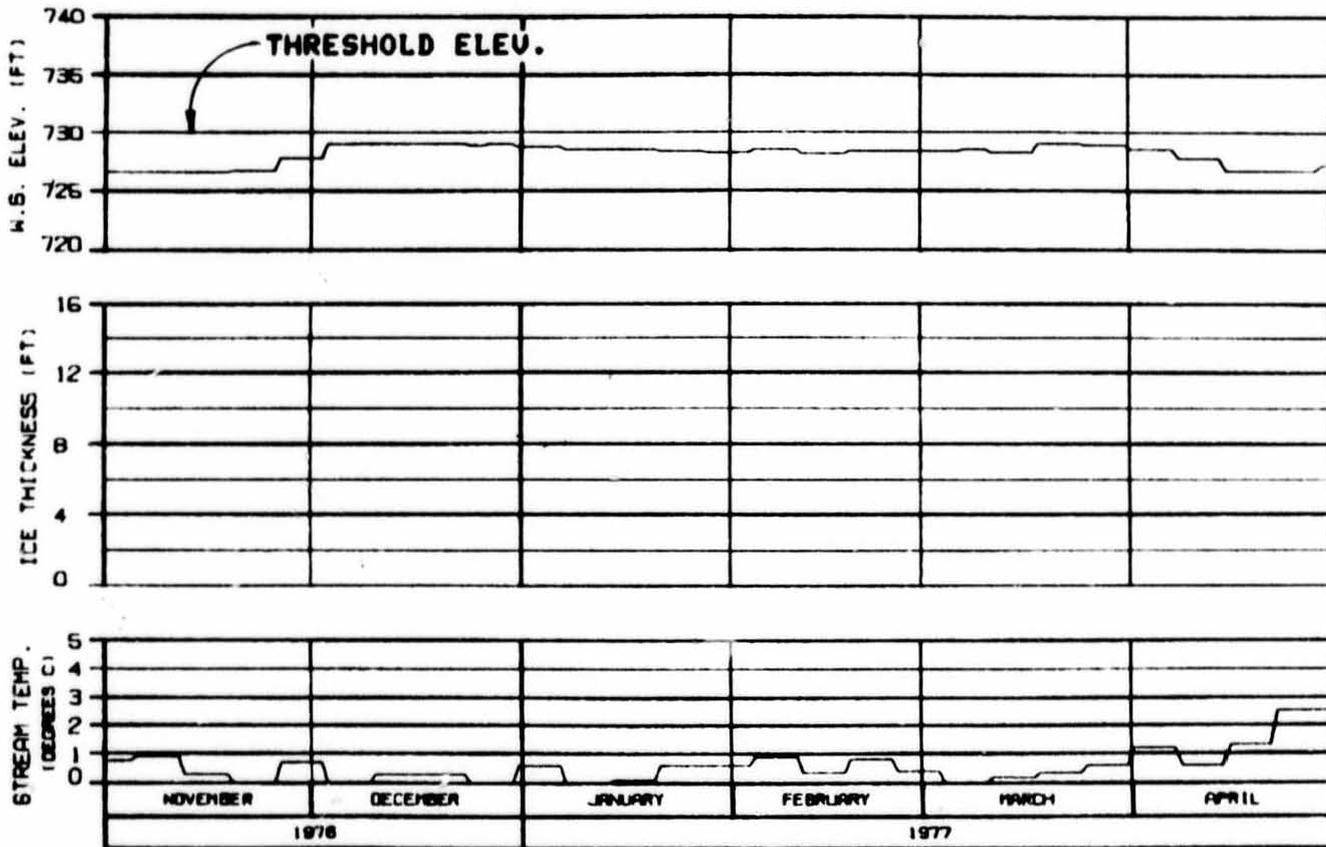
HEAD OF SLOUGH 17

RIVER MILE : 139.30

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS : TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CNB

ALASKA POWER AUTHORITY	
SUSTITNA PROJECT	
SUSTITNA RIVER ICE SIMULATION TIME HISTORY	
WARZA-EBRISCO JOINT VENTURE	
DESIGNED BY: J. L. PERRY	DATE: 01 APR 81
NO. 142	



HEAD OF SLOUGH 20

RIVER MILE : 140.50

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS : TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CNB

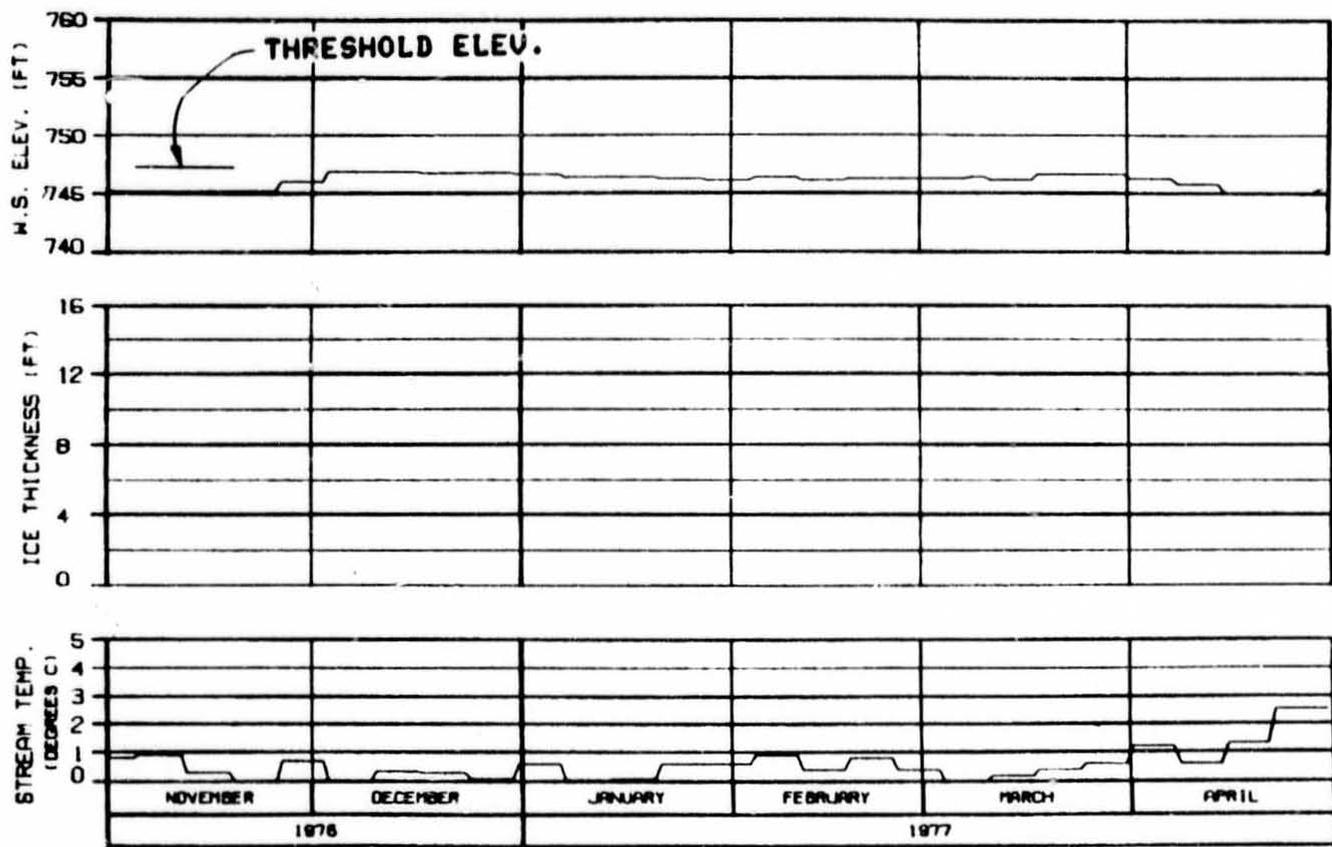
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER
 ICE SIMULATION
 TIME HISTORY

HARZA-EBASCO JOINT VENTURE

CHG 100 - FL 0-070 0 NOV 76 1000 142



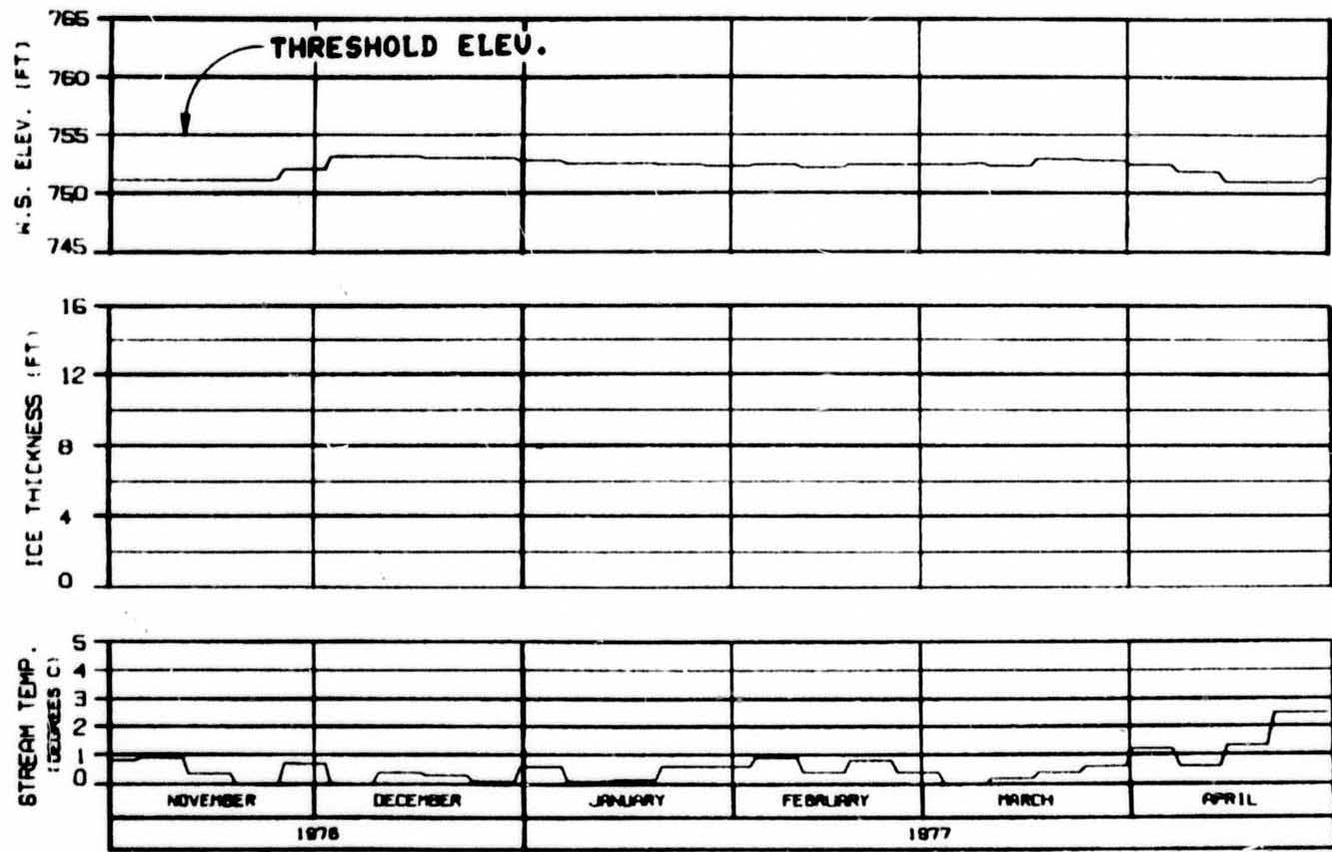
SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CNB

ALASKA POWER AUTHORITY	
SUSTINA PROJECT	
SUSTINA RIVER ICE SIMULATION TIME HISTORY	
WARZA-EBASCO JOINT VENTURE	
ENCLOSURE - ALL PAGES	10000 - 142



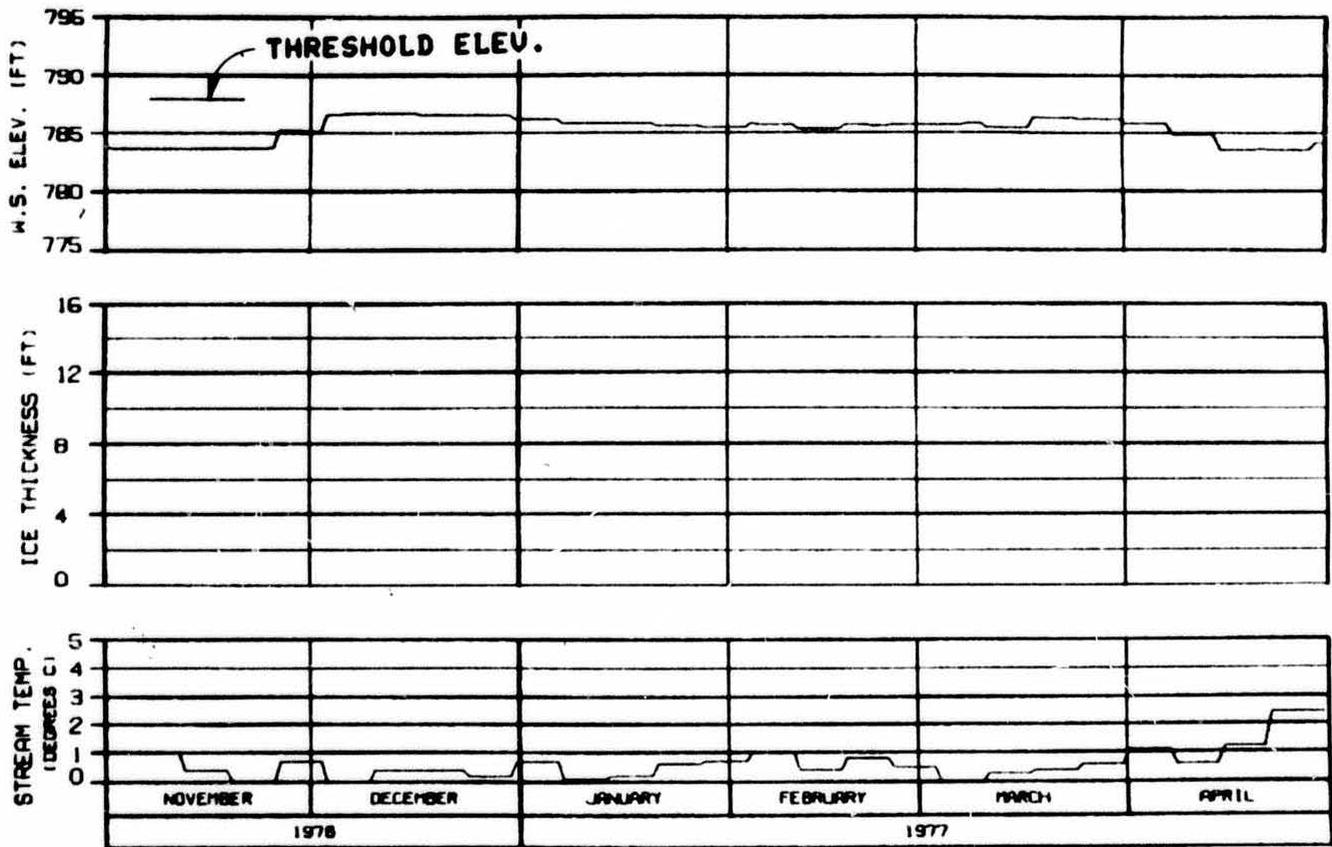
HEAD OF SLOUGH 21

RIVER MILE : 142.20

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS : TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CN8

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

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER ICE SIMULATION TIME HISTORY	
WARZA-EBRASC JOINT VENTURE	
ENRCHN. ALL DATA	0 APR 88
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ICE THICKNESS LEGEND:
 ——— TOTAL THICKNESS
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 22
 RIVER MILE : 144.80

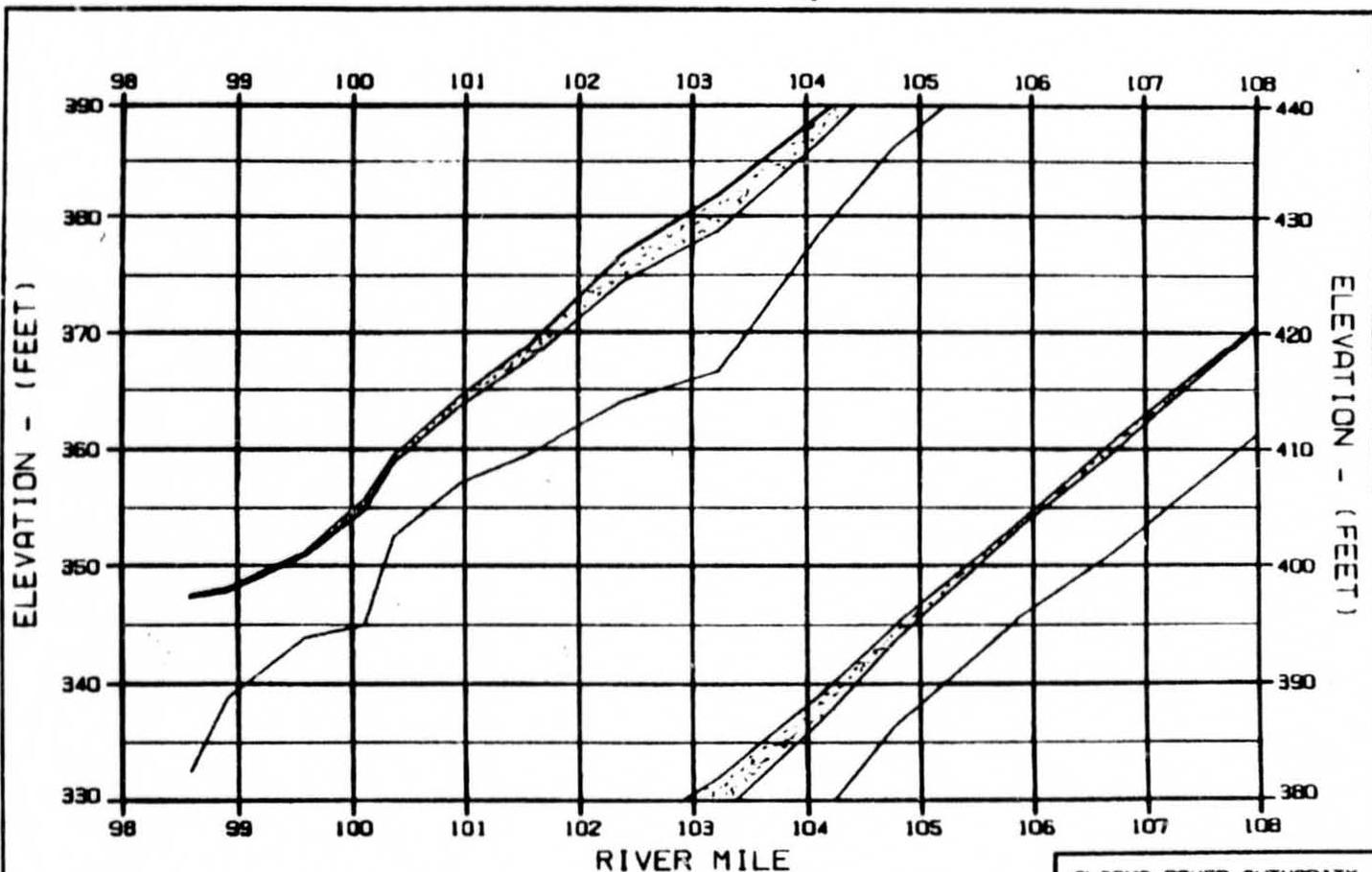
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 ENERGY DEMAND : WATANA 1996
 CASE C FLOWS : TEMP RULE : NATURAL
 REFERENCE RUN NO. : 7696CNB

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER ICE SIMULATION TIME HISTORY	
HARZA-EBRSCO JOINT VENTURE	
CHECKED: ALL-DAYS	8 NOV 76
USBR 142	

OPTION?

EXHIBIT N

C



ELEVATION - (FEET)

ELEVATION - (FEET)

RIVER MILE

LEGEND:

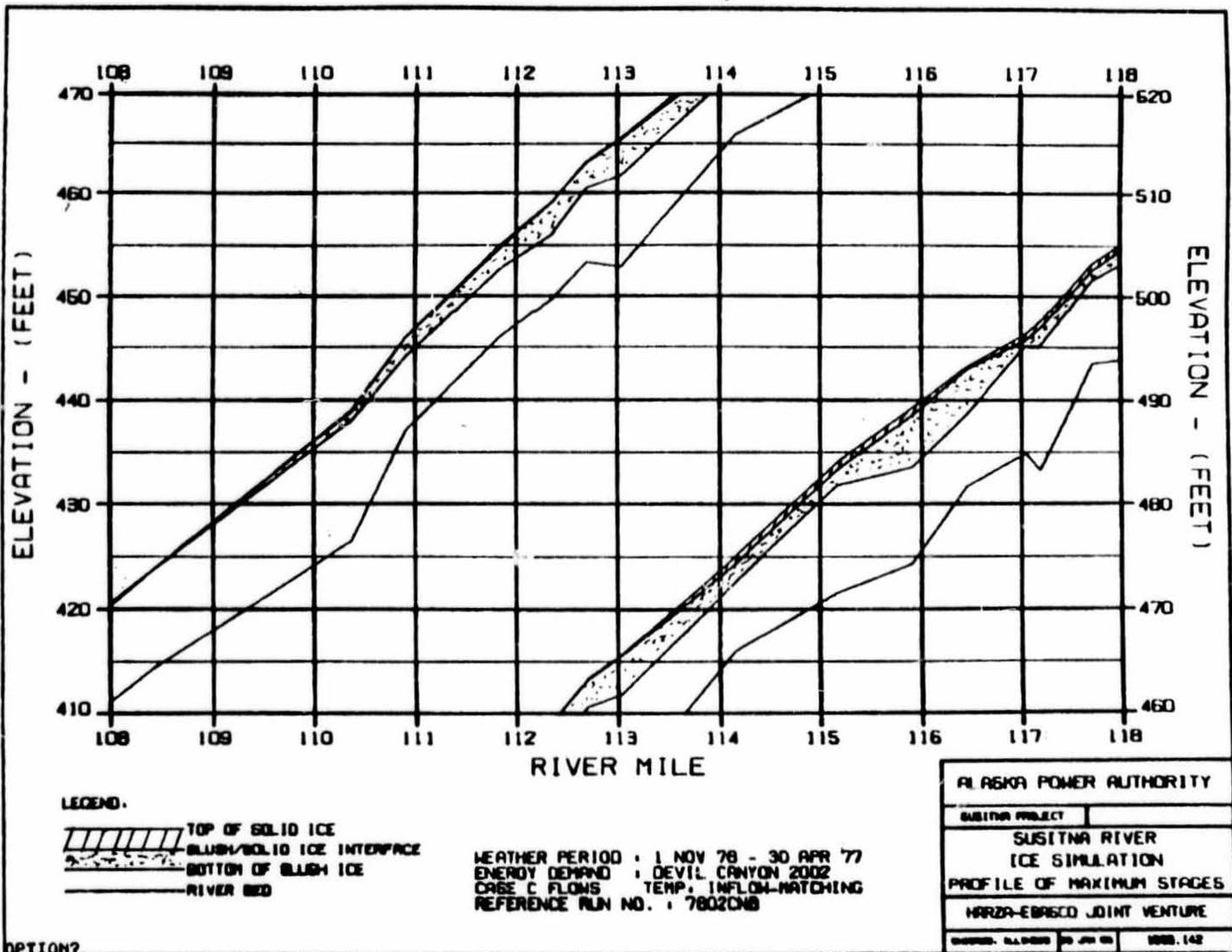
-  TOP OF SOLID ICE
-  SLUSH/SOLID ICE INTERFACE
-  BOTTOM OF SLUSH ICE
-  RIVER BED

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP, INFLOW-MATCHING
 REFERENCE RUN NO. : 78020NB

ALASKA POWER AUTHORITY		
SUSITNA PROJECT		
SUSITNA RIVER		
ICE SIMULATION		
PROFILE OF MAXIMUM STAGES		
HRZA-EBRSCO JOINT VENTURE		
DESIGNED BY	DATE	SCALE

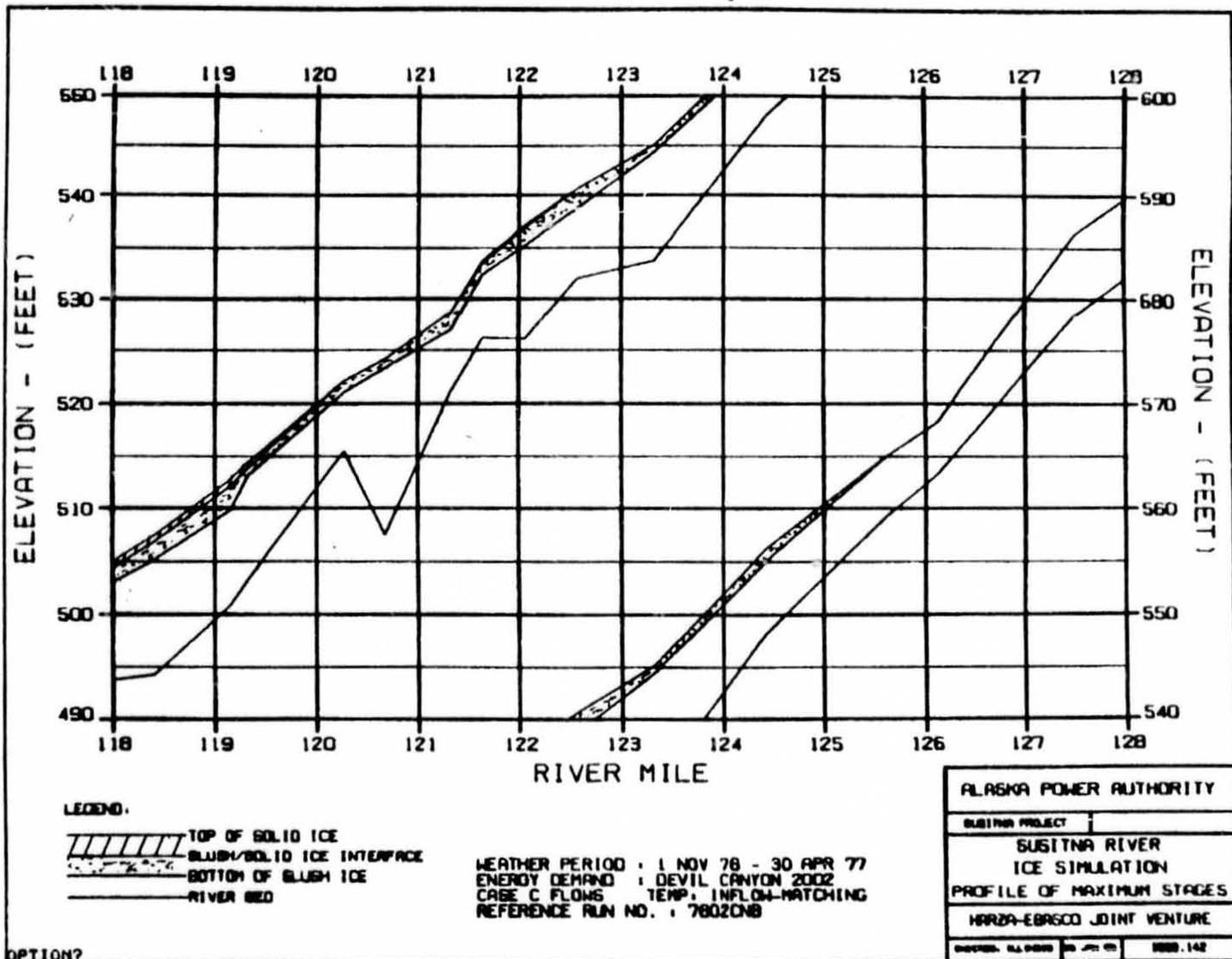
OPTION?

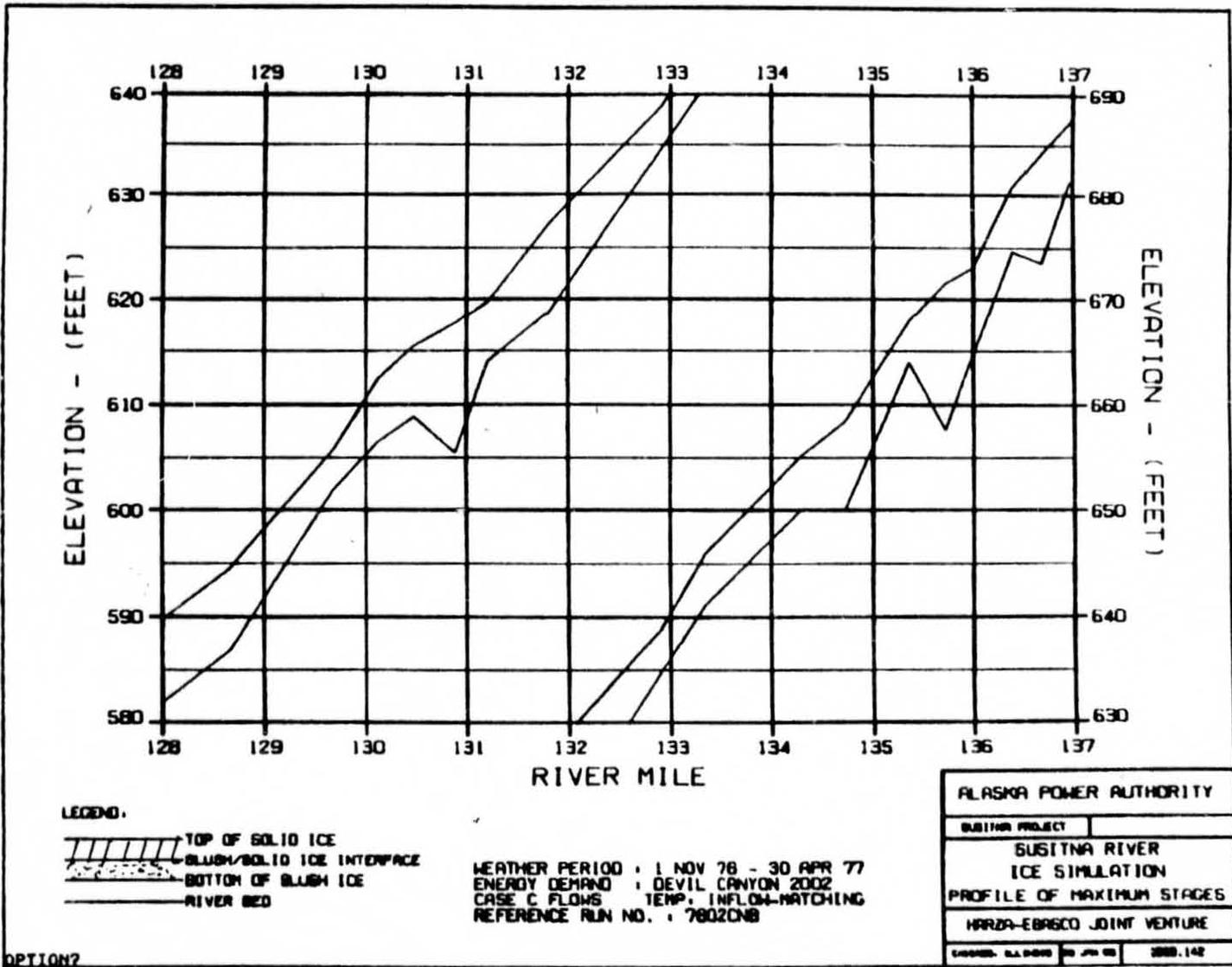
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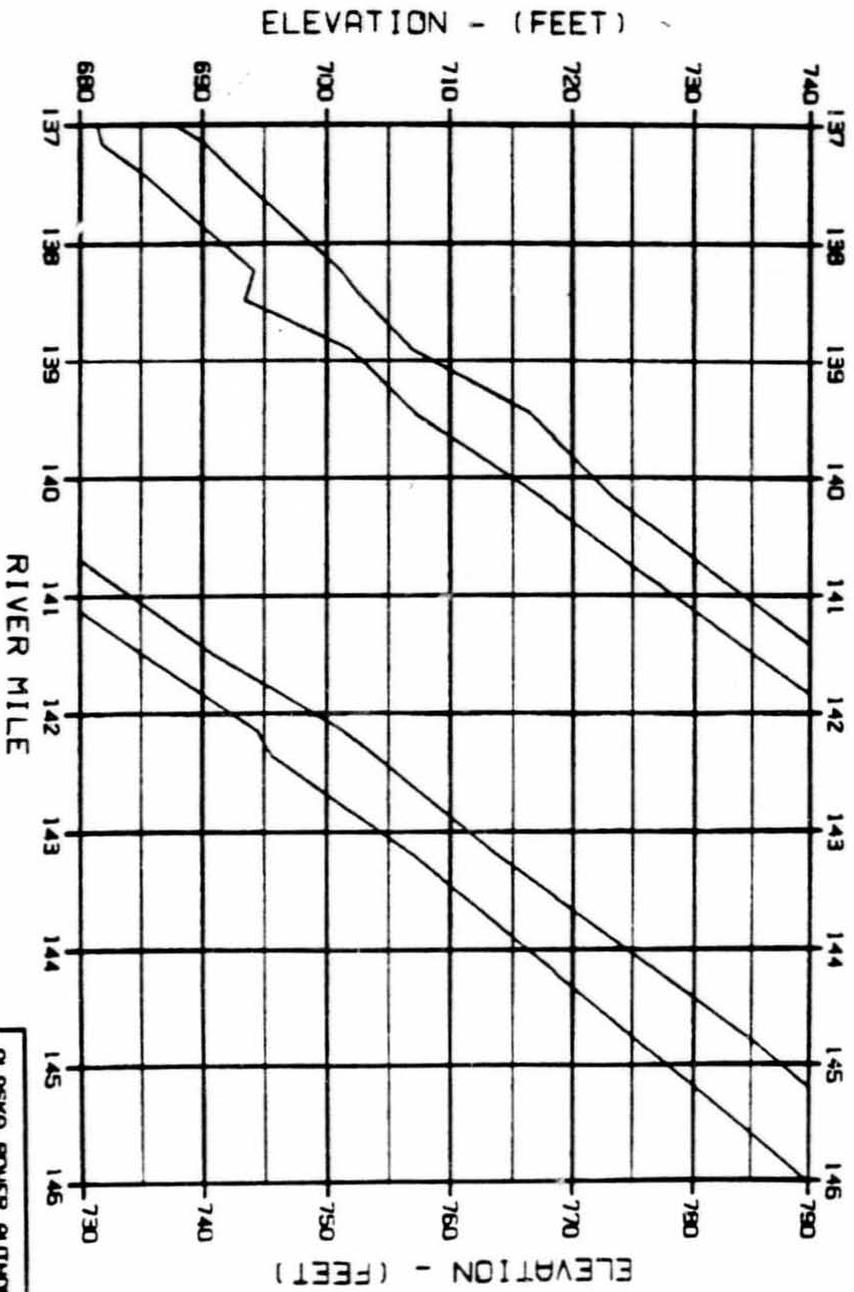


OPTION?

C







LEGEND:

TOP OF SOLID ICE

BOTTOM OF SLUSH ICE

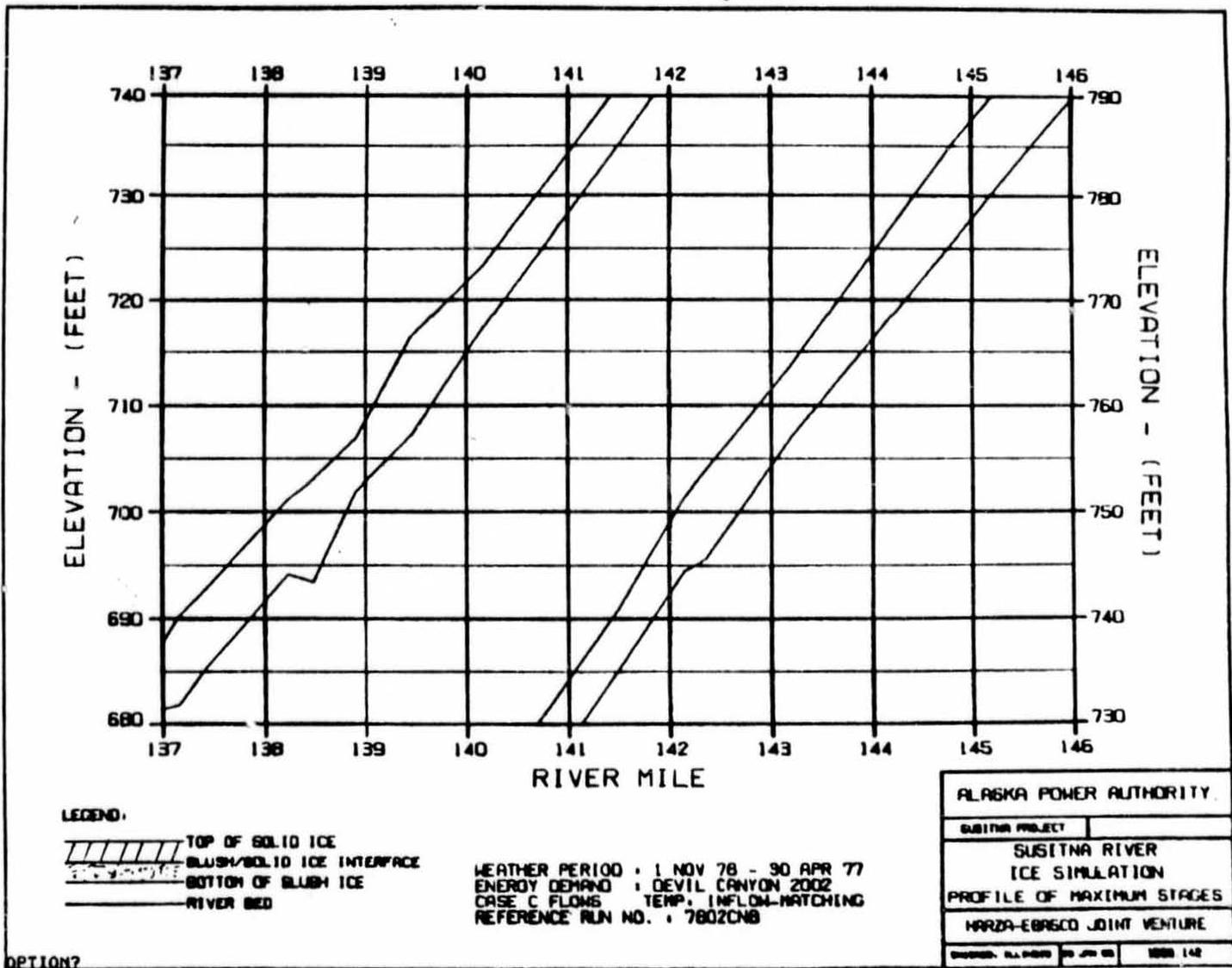
RIVER MILE

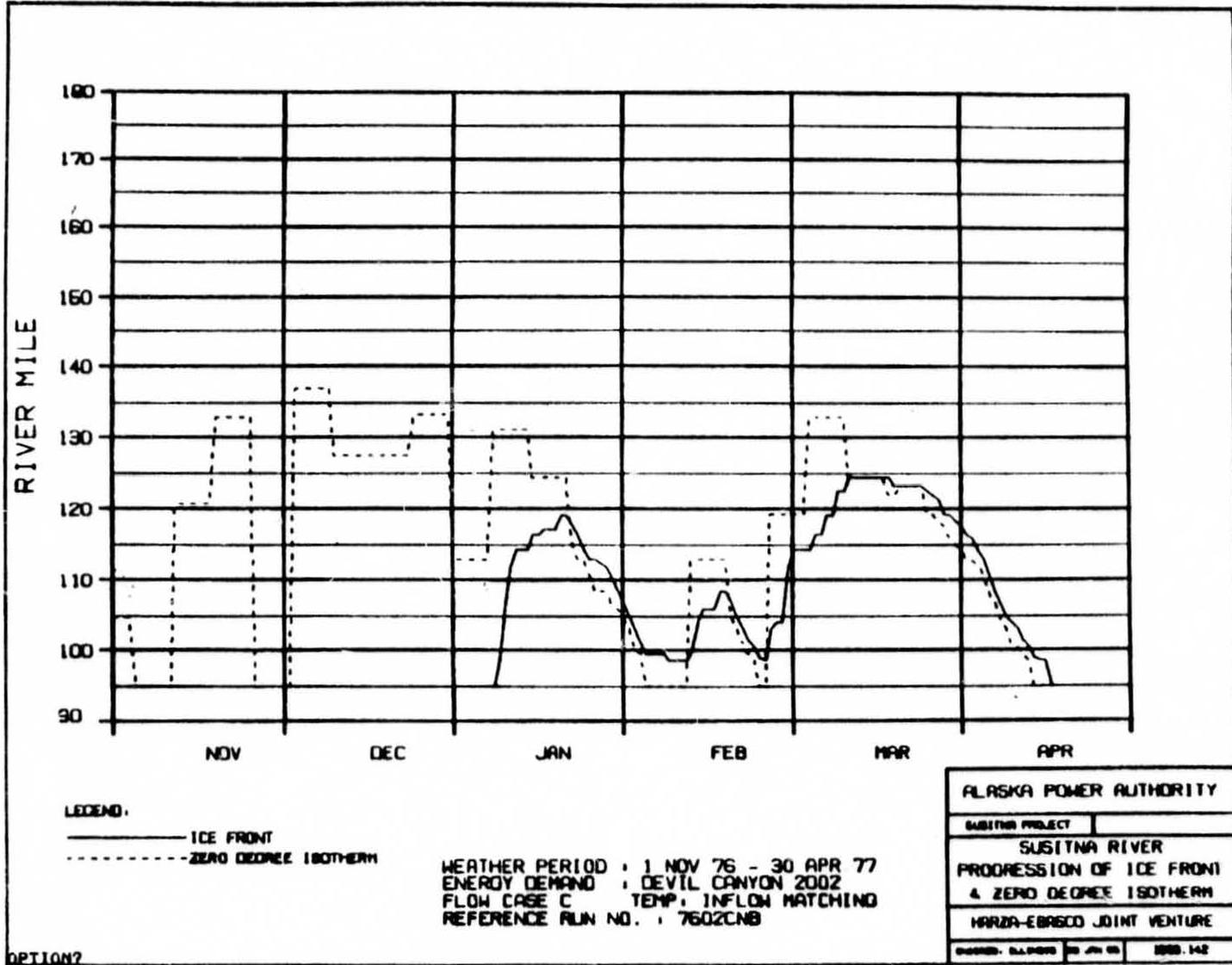
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 ENERGY DEMAND : DEVIL CANYON 2002
 CRACK FLOWS TEMP. INCLUDE WATCHING
 REFERENCE RUN NO. : 7802048

ALASKA POWER AUTHORITY	
SUBJECT	SUSITNA RIVER
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
HORDS-ERESCO JOINT VENTURE	
DATE	NOV 88
BY	14

OPTION 2

C



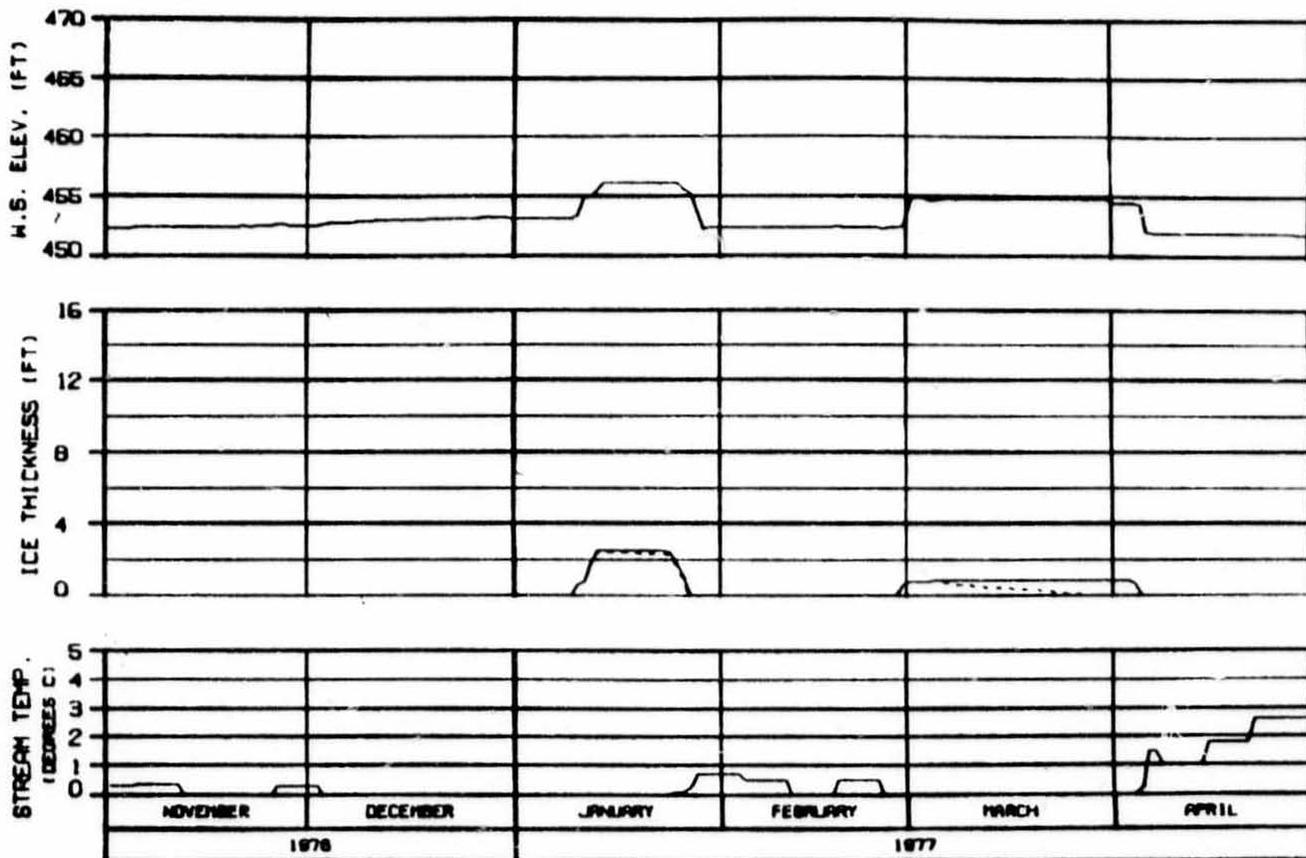


LEGEND:
 — ICE FRONT
 - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 FLOW CASE C TEMP. INFLOW MATCHING
 REFERENCE RUN NO. : 7602CNB

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER PROGRESSION OF ICE FRONT & ZERO DEGREE ISOTHERM	
HARZA-EBASCO JOINT VENTURE	
DESIGNED - DA. PERRY	20 APR 77
SHEET 142	

OPTION 2

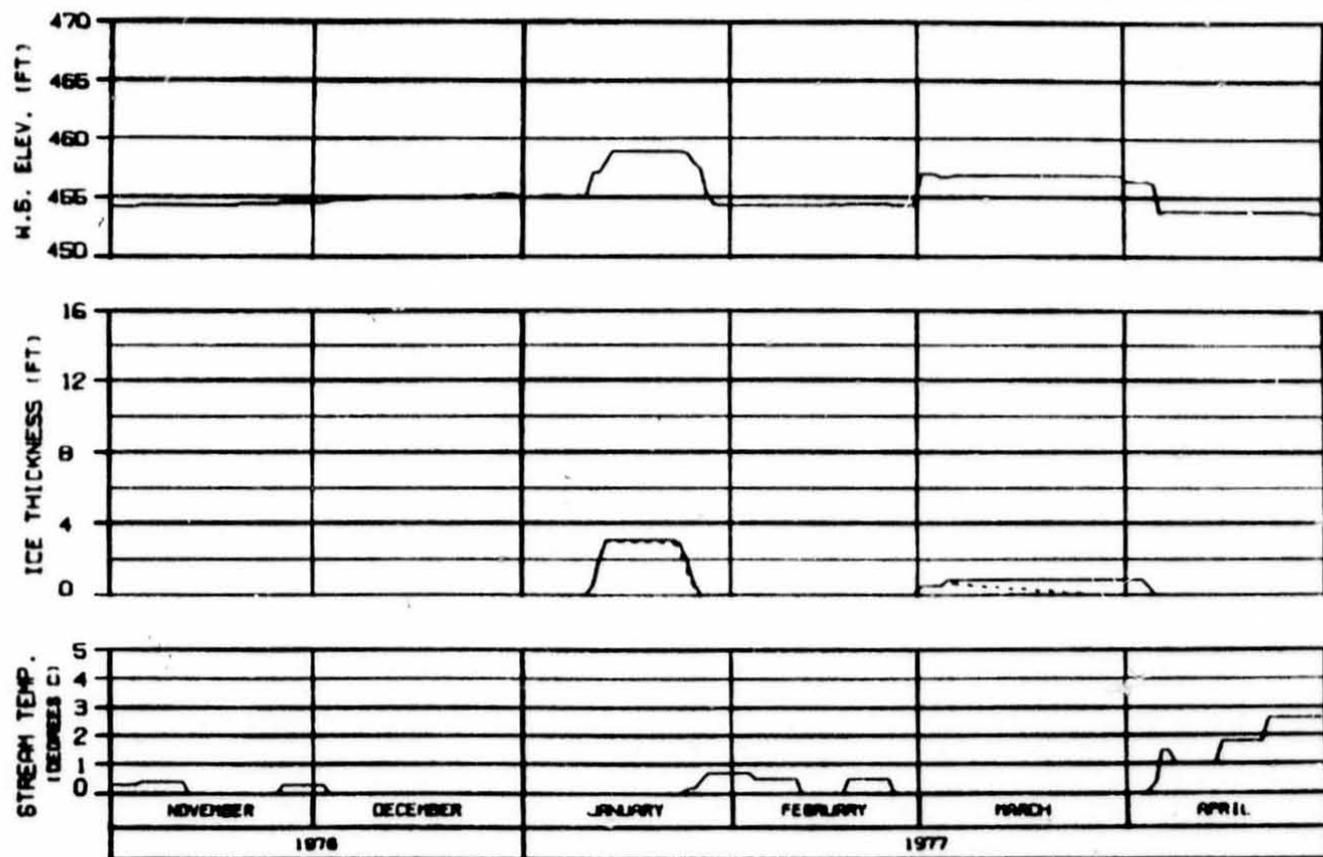


ICE THICKNESS LEGEND:
 ——— TOTAL THICKNESS
 - - - - - BLUSH COMPONENT

SIDE CHANNEL AT HEAD OF GASH CREEK
RIVER MILE : 112.00

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP. INFLOW-MATCHING
 REFERENCE RUN NO. : 7602CN8

ALASKA POWER AUTHORITY	
SUSTINA PROJECT	
SUSTINA RIVER ICE SIMULATION TIME HISTORY	
WARZA-EBRSCO JOINT VENTURE	
DESIGN: B.L. GARDNER	NOV 1977
	5000 142



MOUTH OF SLOUGH 6A

RIVER MILE : 112.34

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS
 - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP: INFLOW-MATCH(ND)
 REFERENCE RUN NO. : 7602CNS

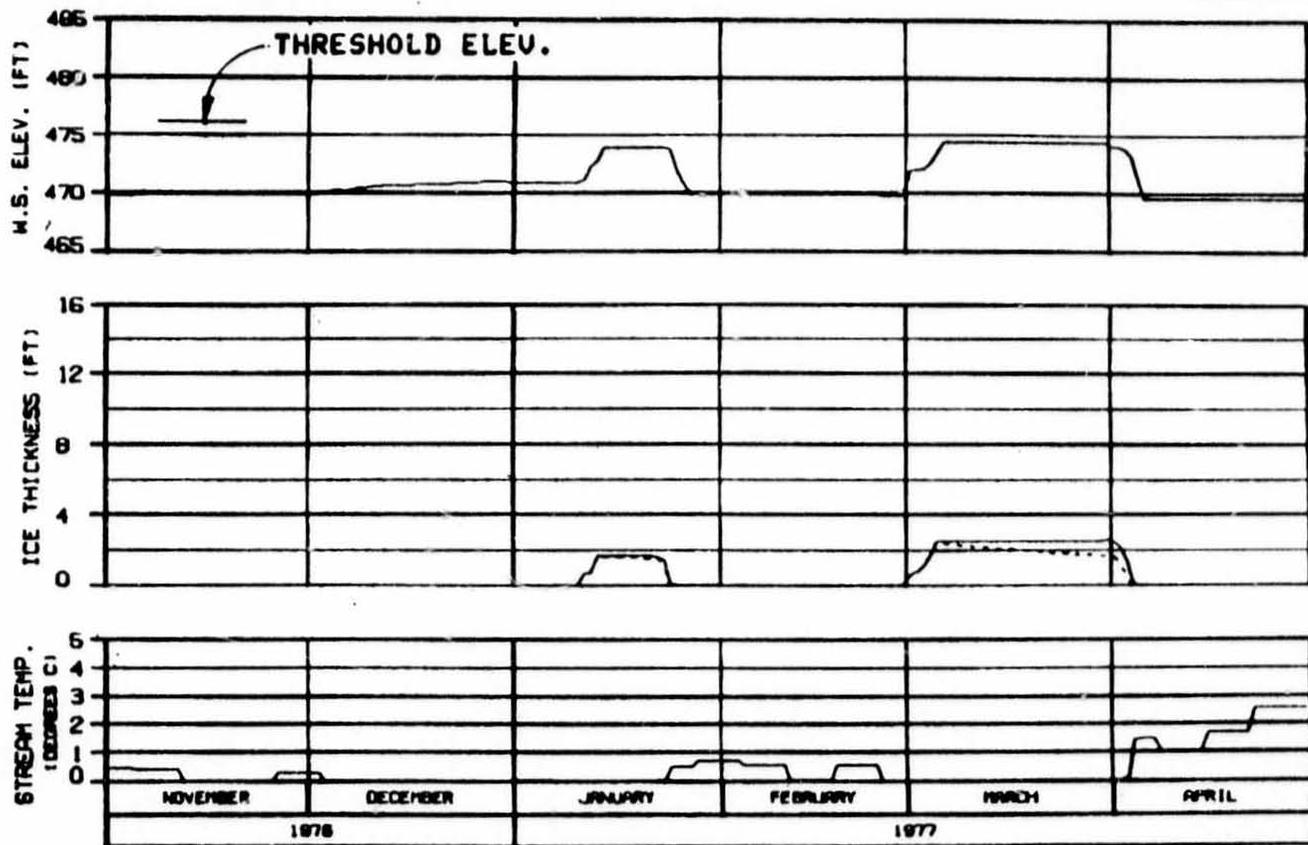
ALASKA POWER AUTHORITY

SUBMITTER PROJECT

SUSITNA RIVER
 ICE SIMULATION
 TIME HISTORY

WARZA-EBRECO JOINT VENTURE

DESIGNED BY: [unreadable] DRAWN BY: [unreadable] DATE: [unreadable]



HEAD OF SLOUGH 8
RIVER MILE : 114.10

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP. INFLOW-MATCHING
 REFERENCE RUN NO. : 7602CN8

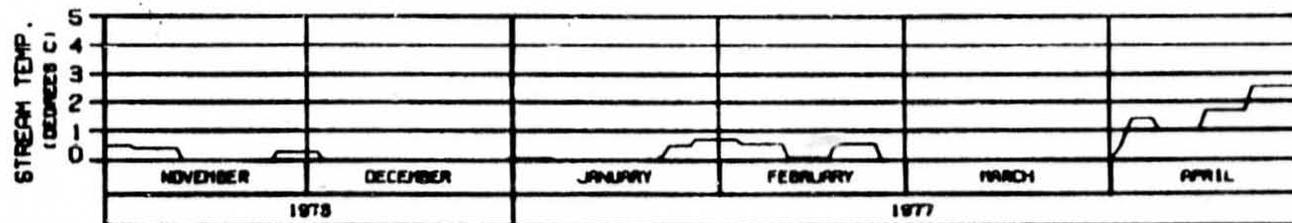
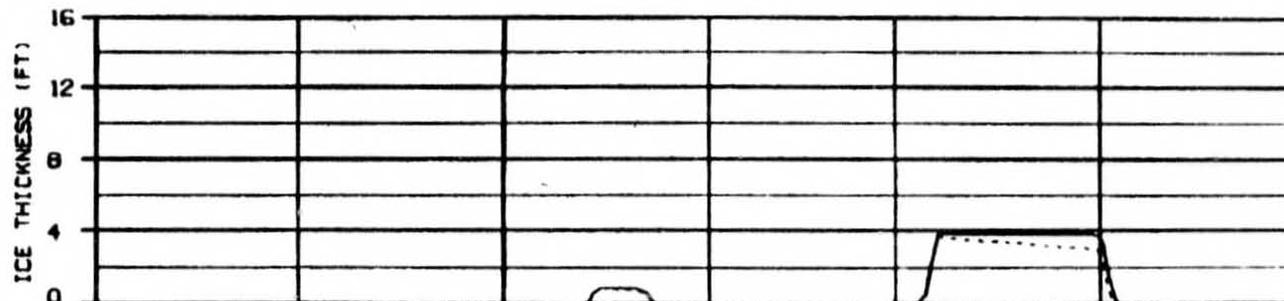
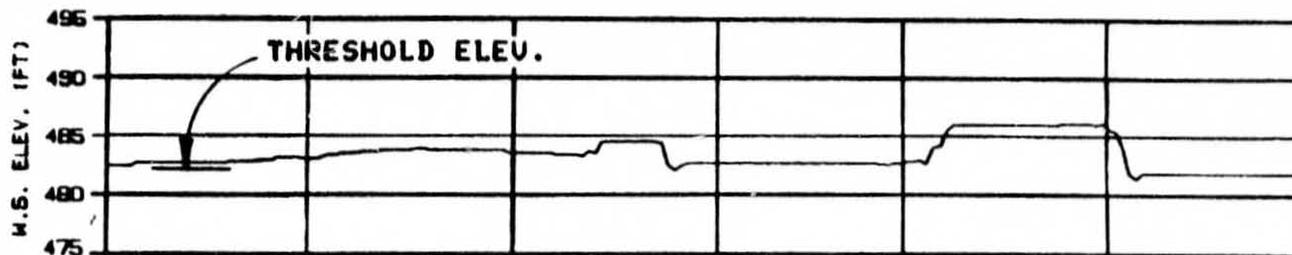
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER
ICE SIMULATION
TIME HISTORY

WARZA-EBRSCO JOINT VENTURE

DESIGN: AL-0000 25 JUN 80 222.142



SIDE CHANNEL MSII
RIVER MILE : 115.50

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP: INFLOW-MATCHING
 REFERENCE RUN NO. : 7602CNS

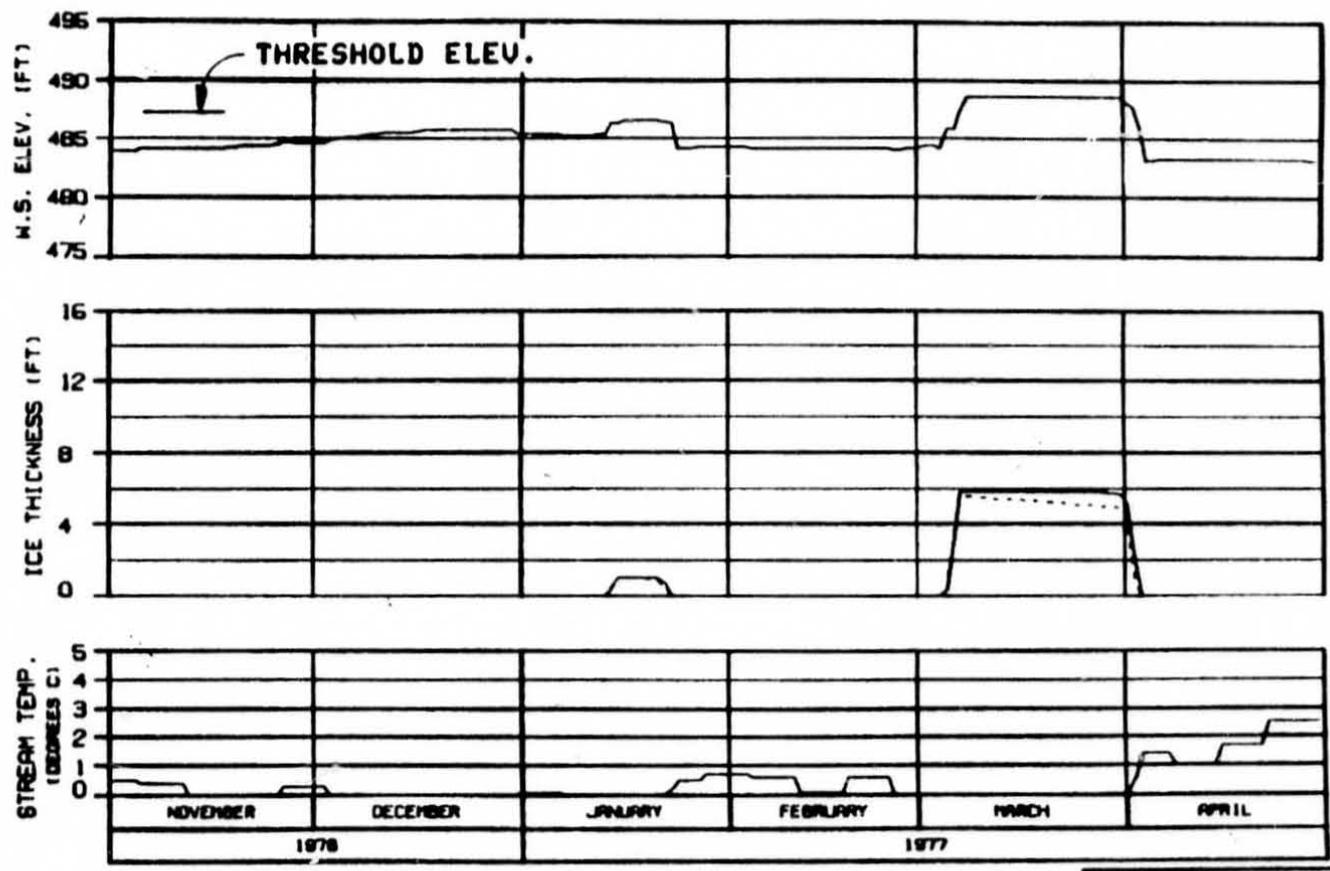
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER
 ICE SIMULATION
 TIME HISTORY

WARZA-EBRSCO JOINT VENTURE

ISSUED: 04.08.77 BY JFB/GR 1000.142

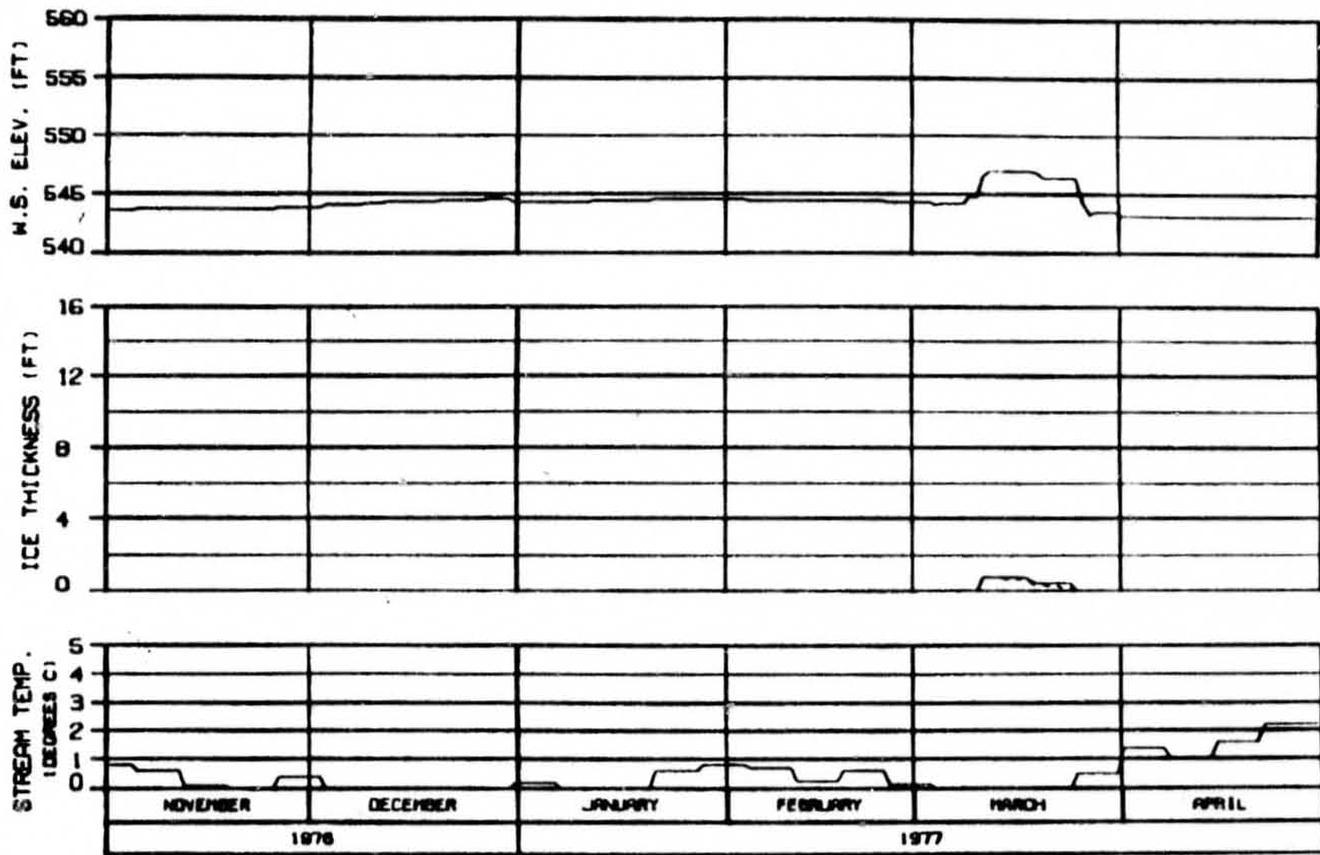


**HEAD OF SIDE CHANNEL MSII
RIVER MILE : 115.90**

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP: INFLOW-MATCHING
 REFERENCE RUN NO. : 7602CNB

ALASKA POWER AUTHORITY	
SUSTINA PROJECT	
SUSTINA RIVER ICE SIMULATION TIME HISTORY	
WARZA-EBRSCO JOINT VENTURE	
DATE: 11/28/77	ISS: 142

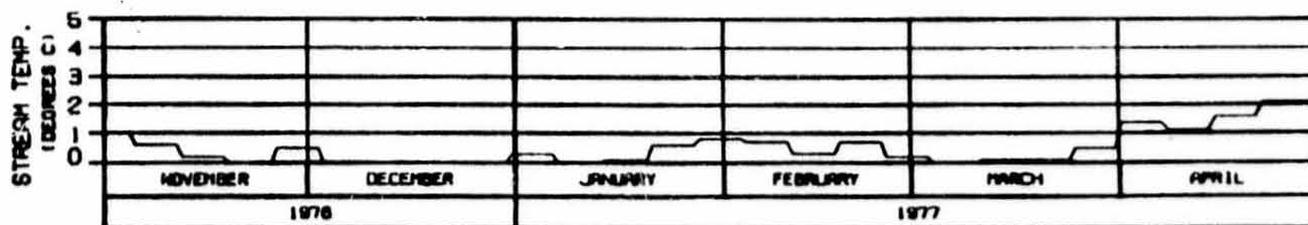
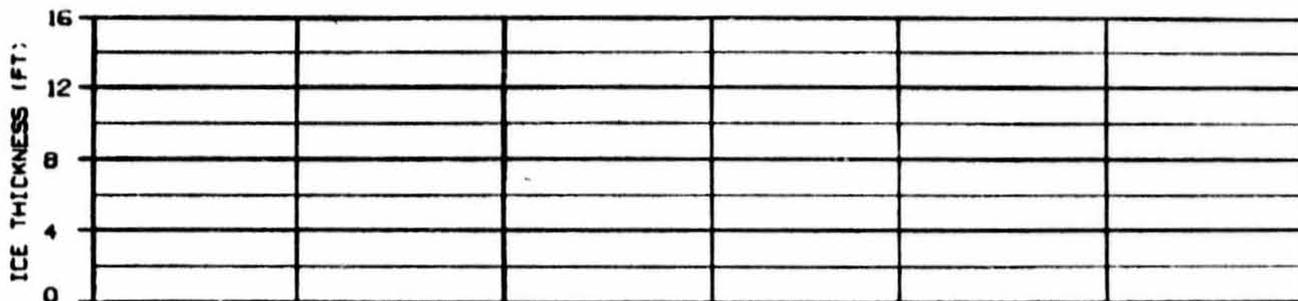
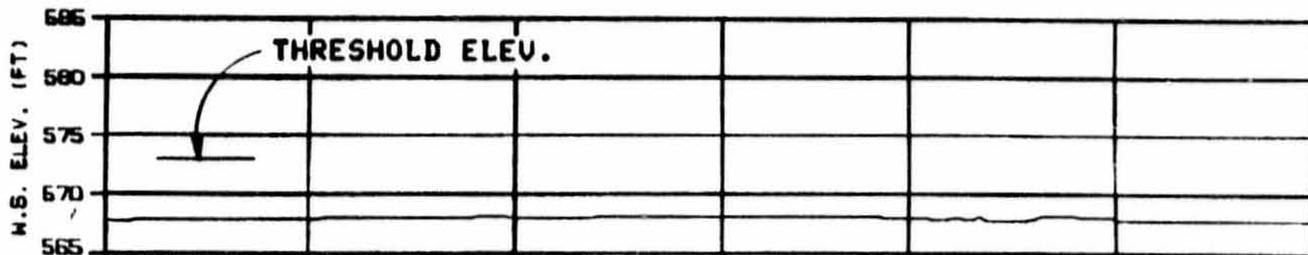


**HEAD OF MOOSE SLOUGH
RIVER MILE : 123.50**

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP, INFLOW-MATCHING
 REFERENCE RUN NO. : 7602CNB

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER ICE SIMULATION TIME HISTORY	
HARZA-EBRACO JOINT VENTURE	
DESIGN: S.L. DODD	DATE: 25 JAN 82
ISSN: 148	



HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP, INFLOW-MATCHING
 REFERENCE RUN NO. : 7602CNB

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

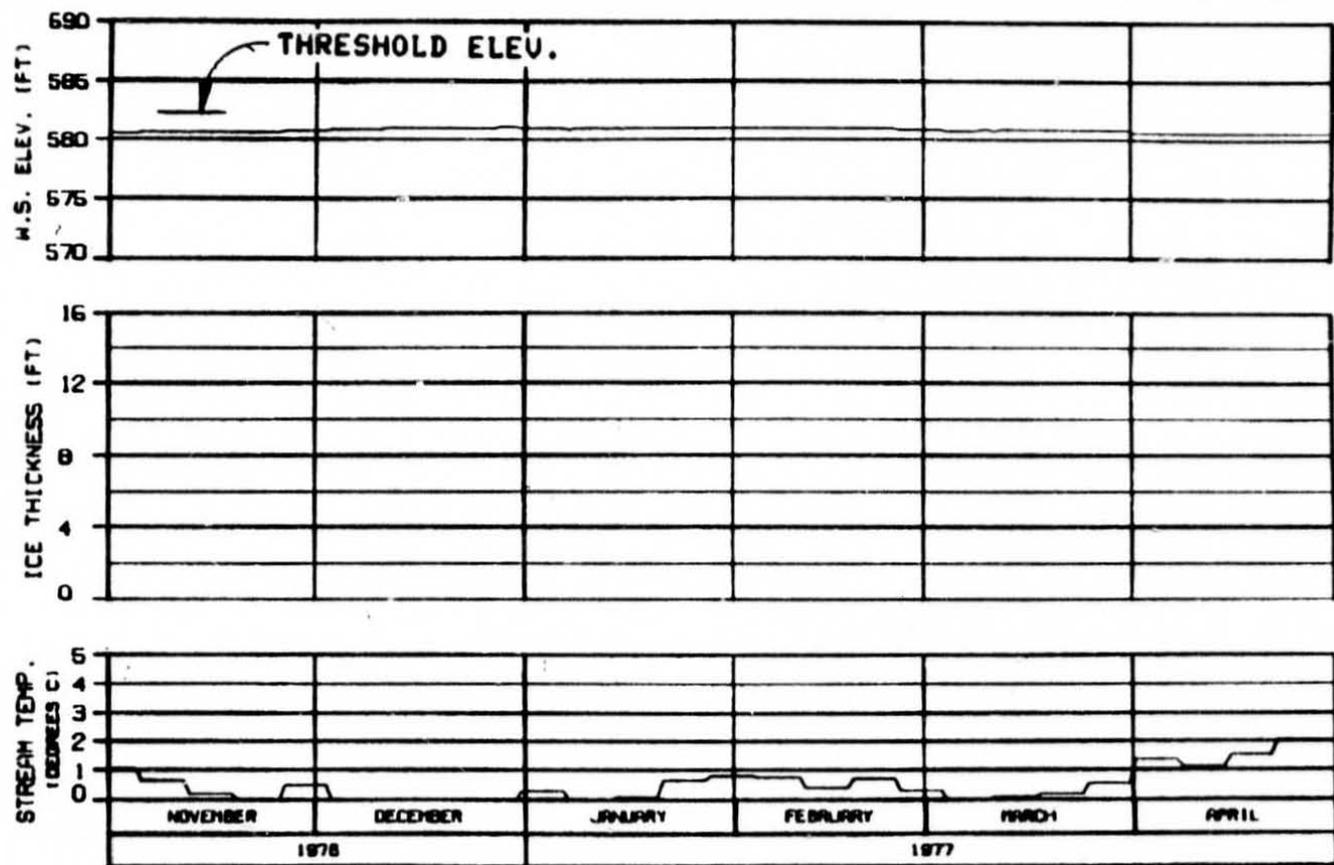
ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER
 ICE SIMULATION
 TIME HISTORY

HRZA-EBASCO JOINT VENTURE

DESIGNED BY: ALLIANCE FOR APR 80 1980 142



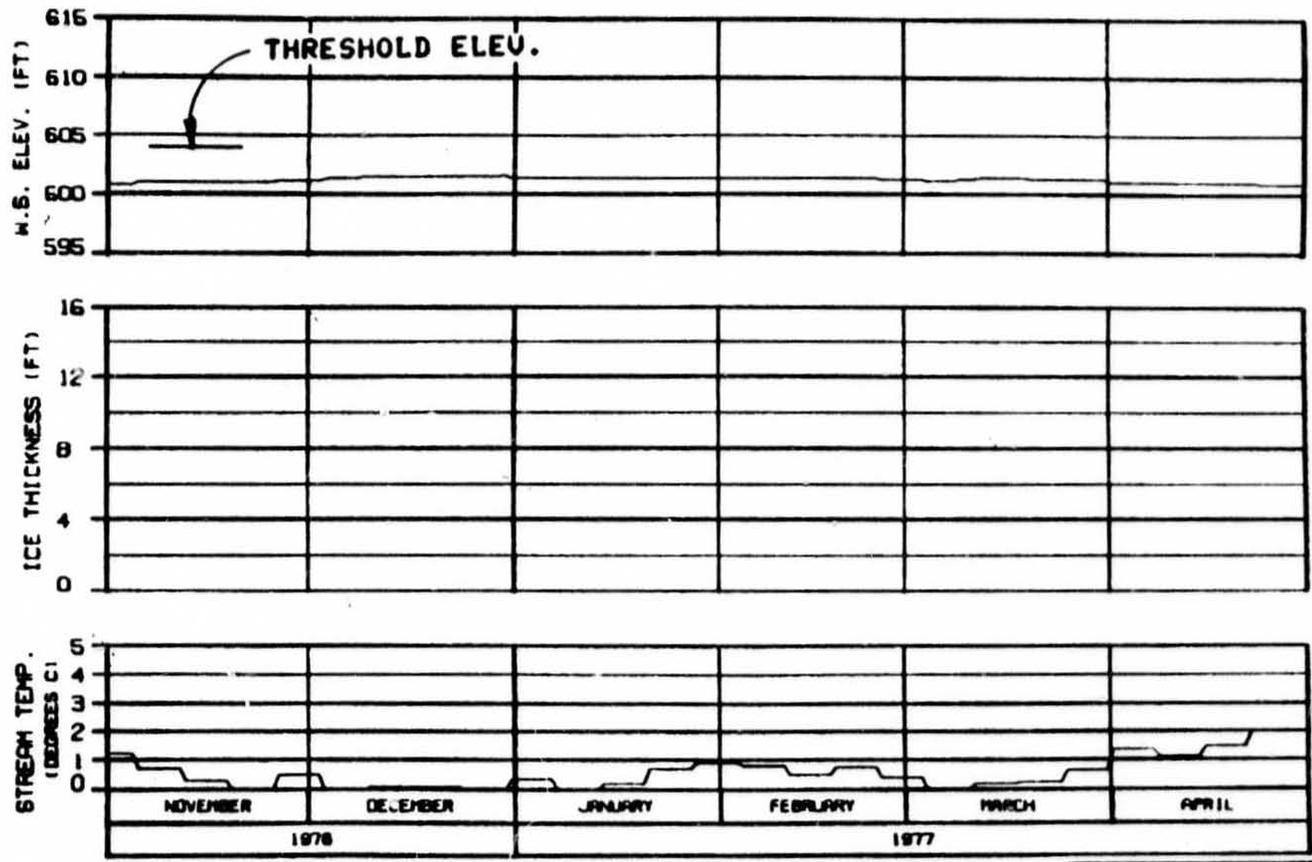
HEAD OF SLOUGH 8A (EAST)
 RIVER MILE : 127.10

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP: INFLOW-MATCHING
 REFERENCE RUN NO. : 76020NB

ALASKA POWER AUTHORITY	
SUBJECT PROJECT	
SUSITNA RIVER	
ICE SIMULATION	
TIME HISTORY	
HARZA-EBRACO JOINT VENTURE	
DESIGNED: B.L. DODD	NO. APR 83
ISS. 142	

3708 C



HEAD OF SLOUGH 9
 RIVER MILE : 129.30

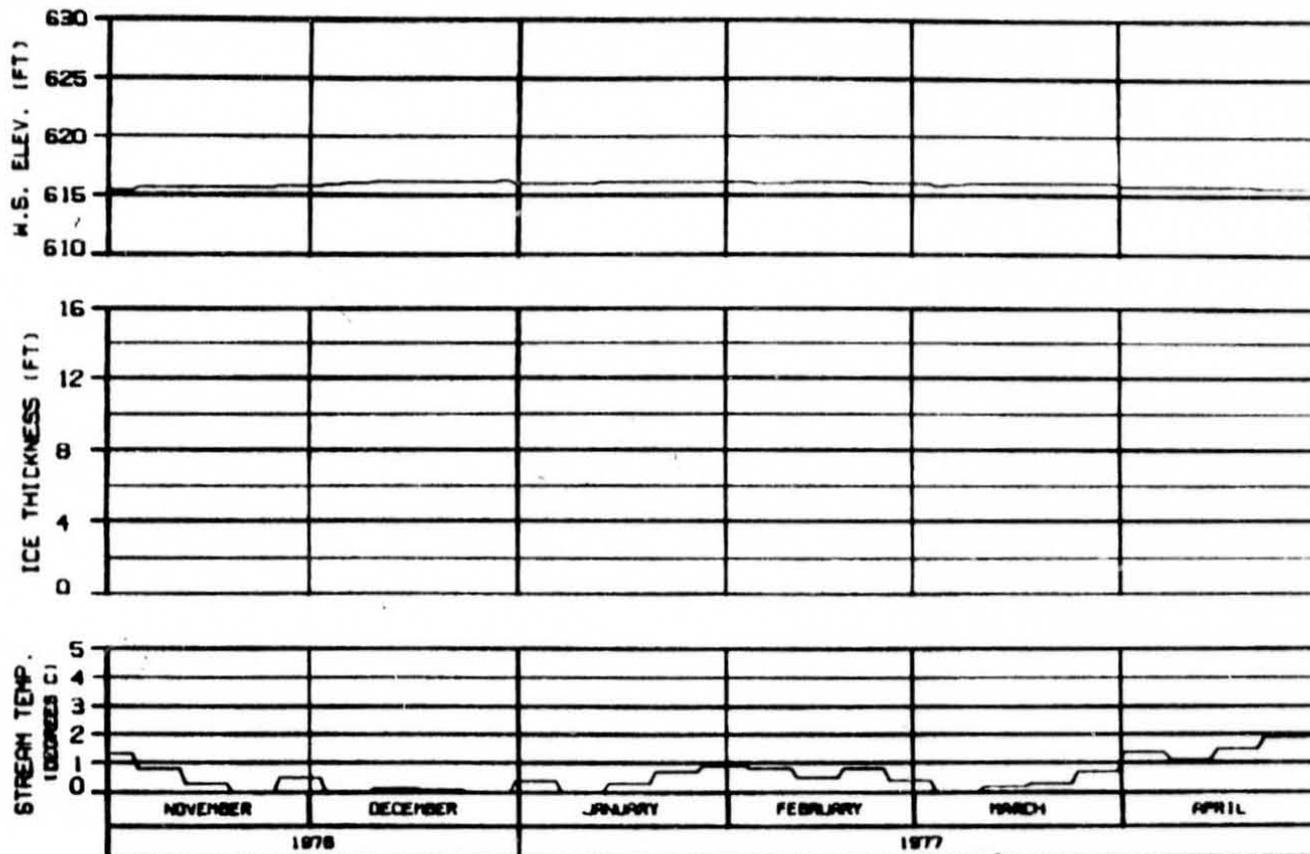
ICE THICKNESS LEGEND:
 ——— TOTAL THICKNESS
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP. INFLOW-MATCHING
 REFERENCE RUN NO. : 76020NB

ALASKA POWER AUTHORITY	
SUBMITTER PROJECT	
SUSTITNA RIVER ICE SIMULATION TIME HISTORY	
HARZA-EBRACCO JOINT VENTURE	
DESIGNED BY: HLL/RSB	DATE: 28 JAN 78
	SSR: 142

OPTION 2

OPTION?

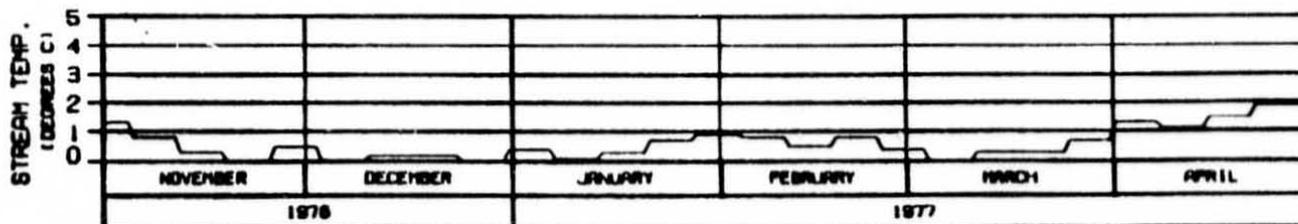
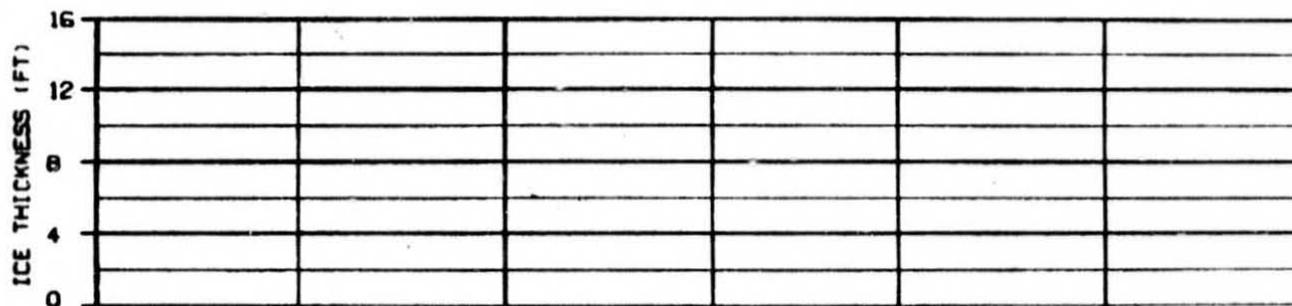
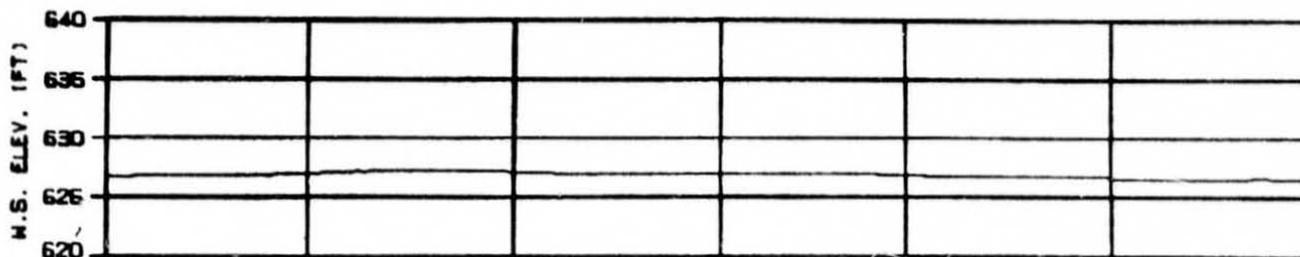


SIDE CHANNEL U/S OF SLOUGH 9
 RIVER MILE : 130.60

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP. INFLOW-MATCHING
 REFERENCE RUN NO. : 7602DN8

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER ICE SIMULATION TIME HISTORY	
MARZA-EPSCO JOINT VENTURE	
DESIGNED BY: AL-2000	DATE: JUN 83
SHEET: 142	



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

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP: INFLOW-MATCHING
 REFERENCE RUN NO. : 7602CNB

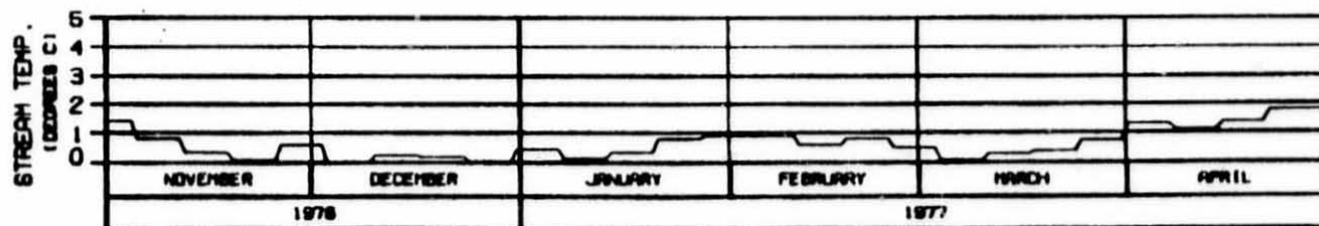
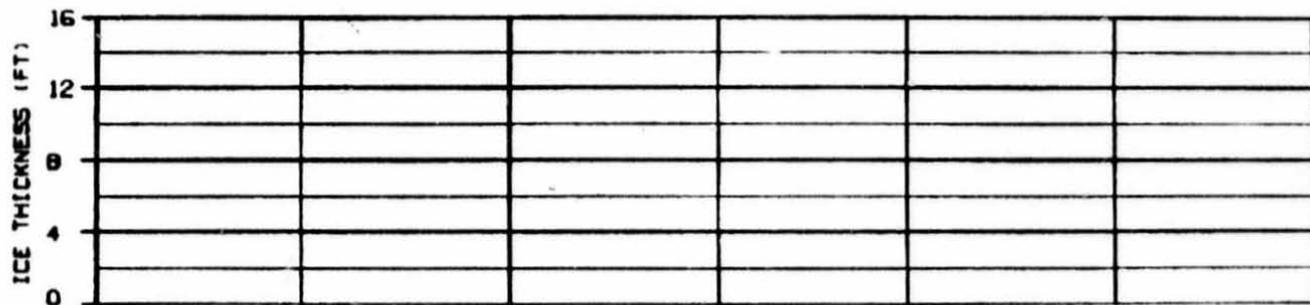
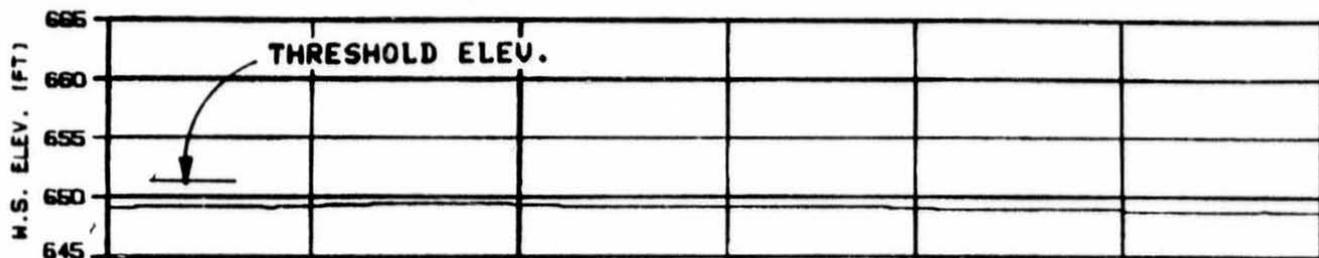
ALASKA POWER AUTHORITY

SUBMITTER PROJECT

SUSITNA RIVER
 ICE SIMULATION
 TIME HISTORY

HARZA-EBRISCO JOINT VENTURE

DATE: 11/19/80 10:40 AM 1980 142



HEAD OF SLOUGH 9A
RIVER MILE : 133.70

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
ENERGY DEMAND : DEVIL CANYON 2002
CASE C FLOWS TEMP: INFLOW-MATCHING
REFERENCE RUN NO. : 7602CNB

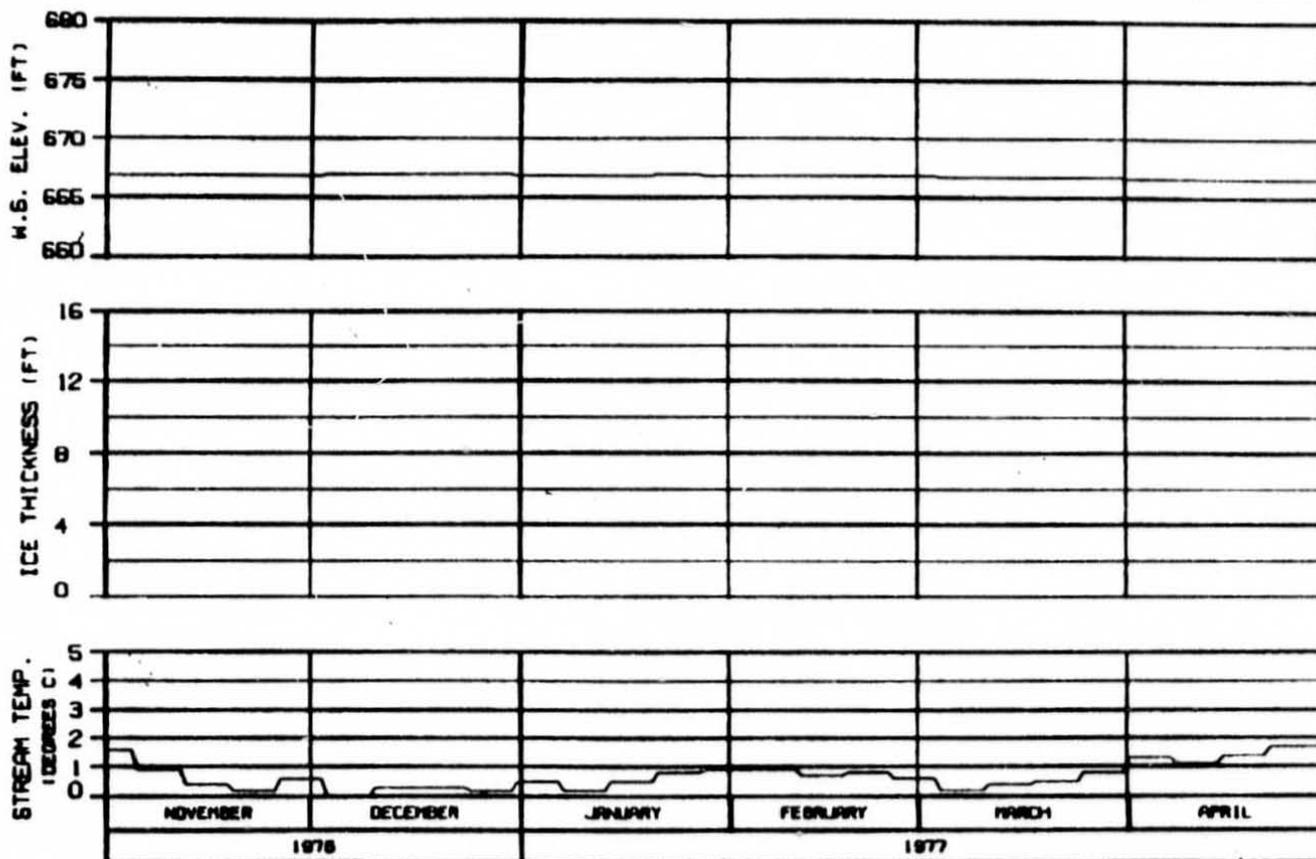
ALASKA POWER AUTHORITY

SUBJECT PROJECT

SUSITNA RIVER
ICE SIMULATION
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

6-64828-01-0000 20 APR 83 1000.142



SIDE CHANNEL D/S OF SLOUGH 11

RIVER MILE : 135.30

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP: INFLOW-MATCHING
 REFERENCE RUN NO. : 7602CNB

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

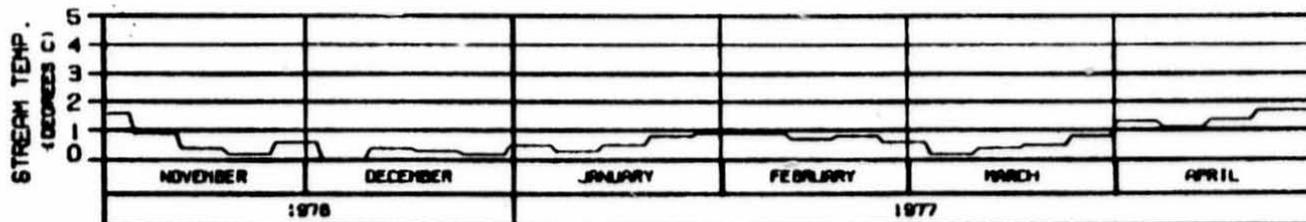
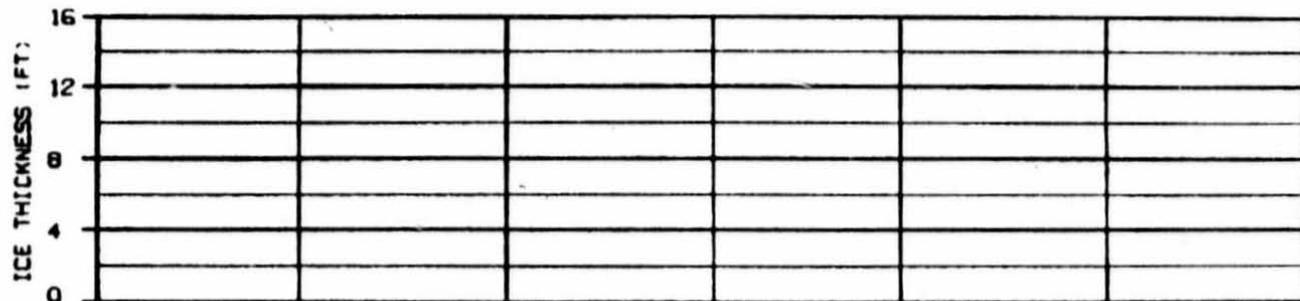
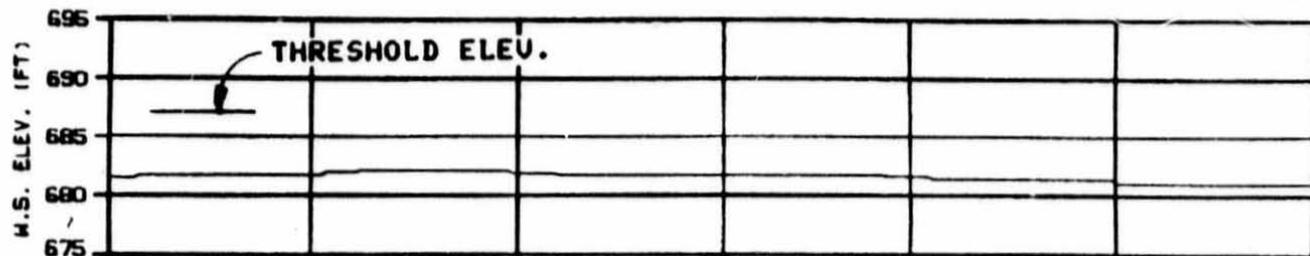
ALASKA POWER AUTHORITY

SUBMITTAL PROJECT

SUSITNA RIVER
 ICE SIMULATION
 TIME HISTORY

HARZA-EBRACCO JOINT VENTURE

DATE: 04/09/77 20 JUN 80 0500.142



HEAD OF SLOUGH 11
RIVER MILE : 136.50

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP. INFLOW-MATCHING
 REFERENCE RUN NO. : 76020NB

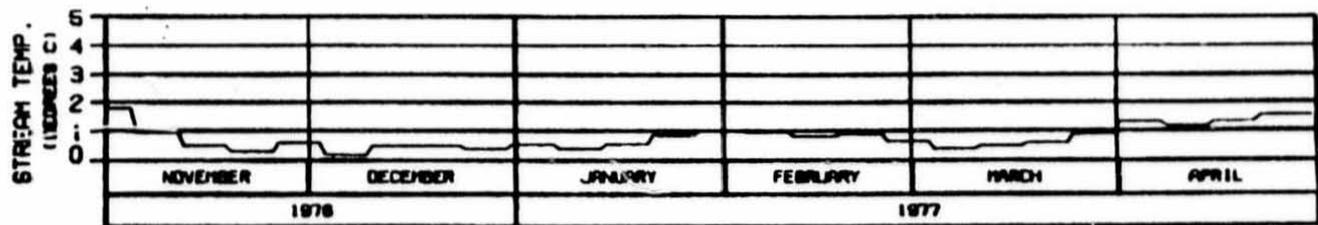
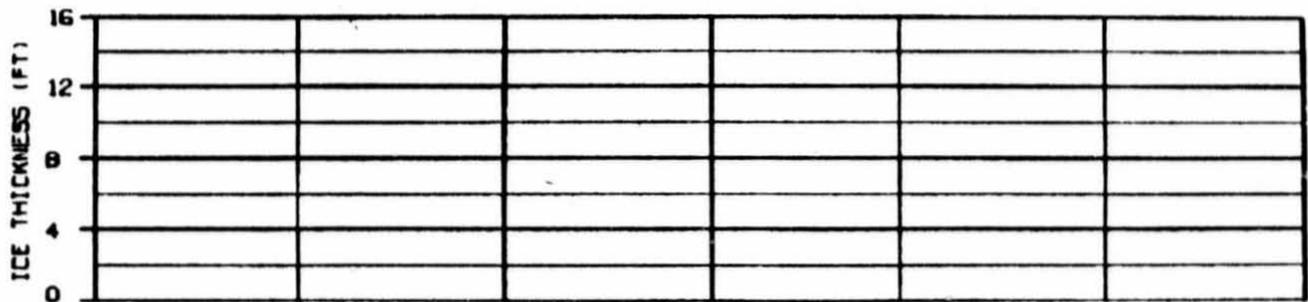
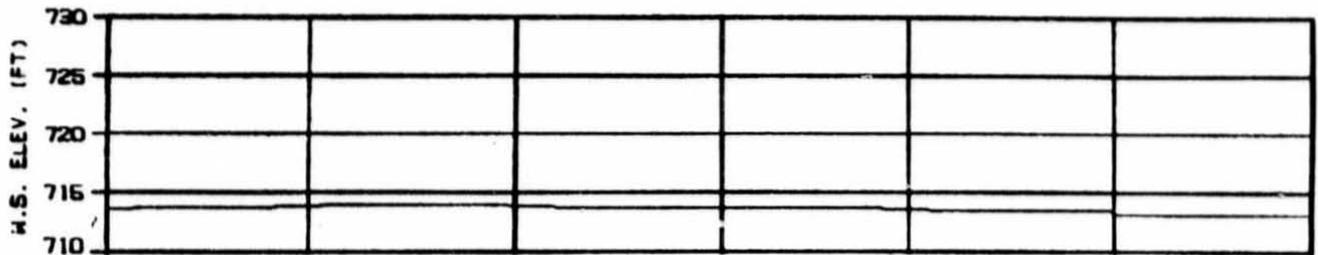
ALASKA POWER AUTHORITY

SUBPROJECT

SUSITNA RIVER
ICE SIMULATION
TIME HISTORY

HARZA-EBASCO JOINT VENTURE

DESIGN: 8-10-76 BY JH/GS SHEET 142

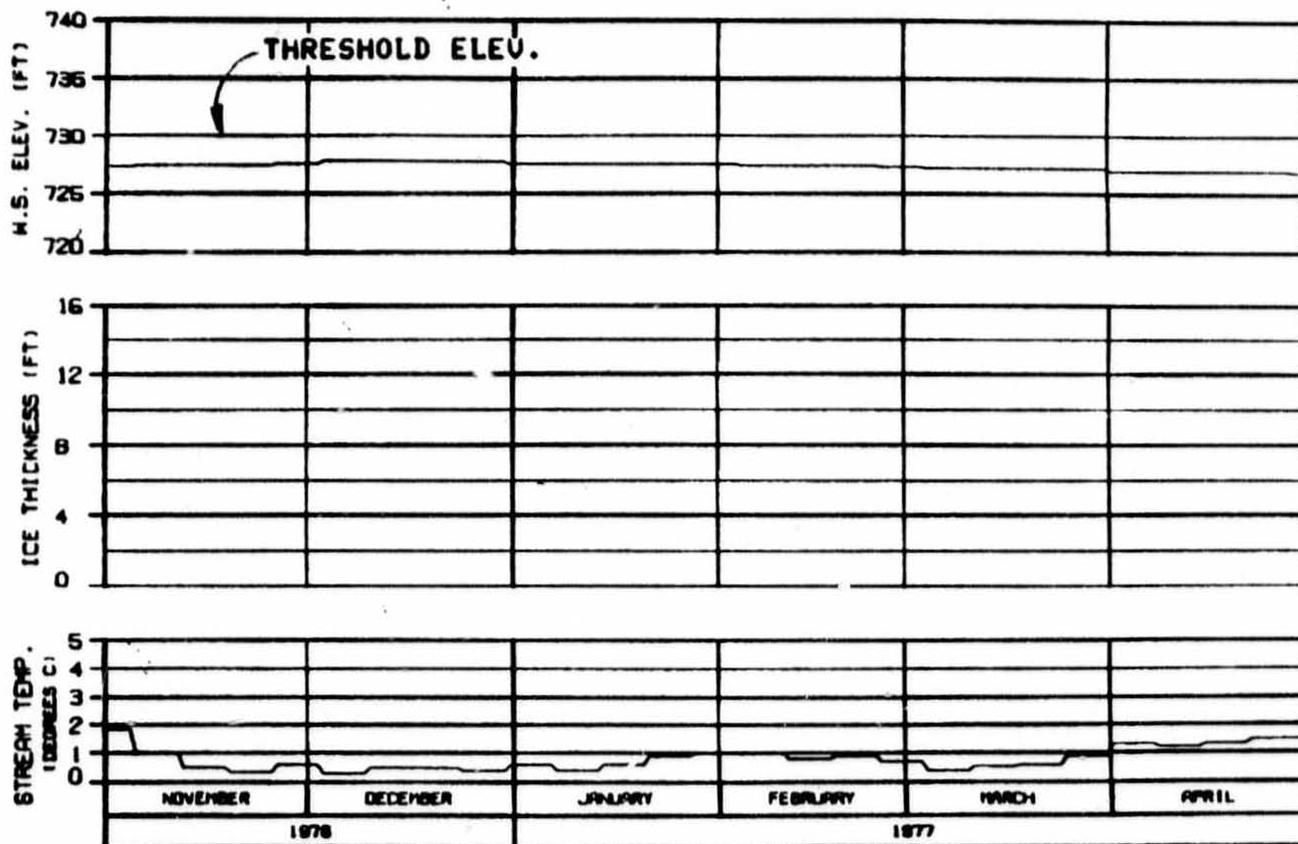


ICE THICKNESS LEGEND:
 ——— TOTAL THICKNESS
 - - - - - SLUSH COMPONENT

HEAD OF SLOUGH 17
 RIVER MILE : 139.30

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP: INFLOW-MATCHING
 REFERENCE RUN NO. : 7602CNB

ALASKA POWER AUTHORITY	
SLISTNA PROJECT	
SUSITNA RIVER ICE SIMULATION TIME HISTORY	
WARZA-EBRSCO JOINT VENTURE	
DESIGN: ALASKA	ISS: 142



HEAD OF SLOUGH 20

RIVER MILE : 140.50

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP. INFLOW-MATCHING
 REFERENCE RUN NO. : 7602CNS

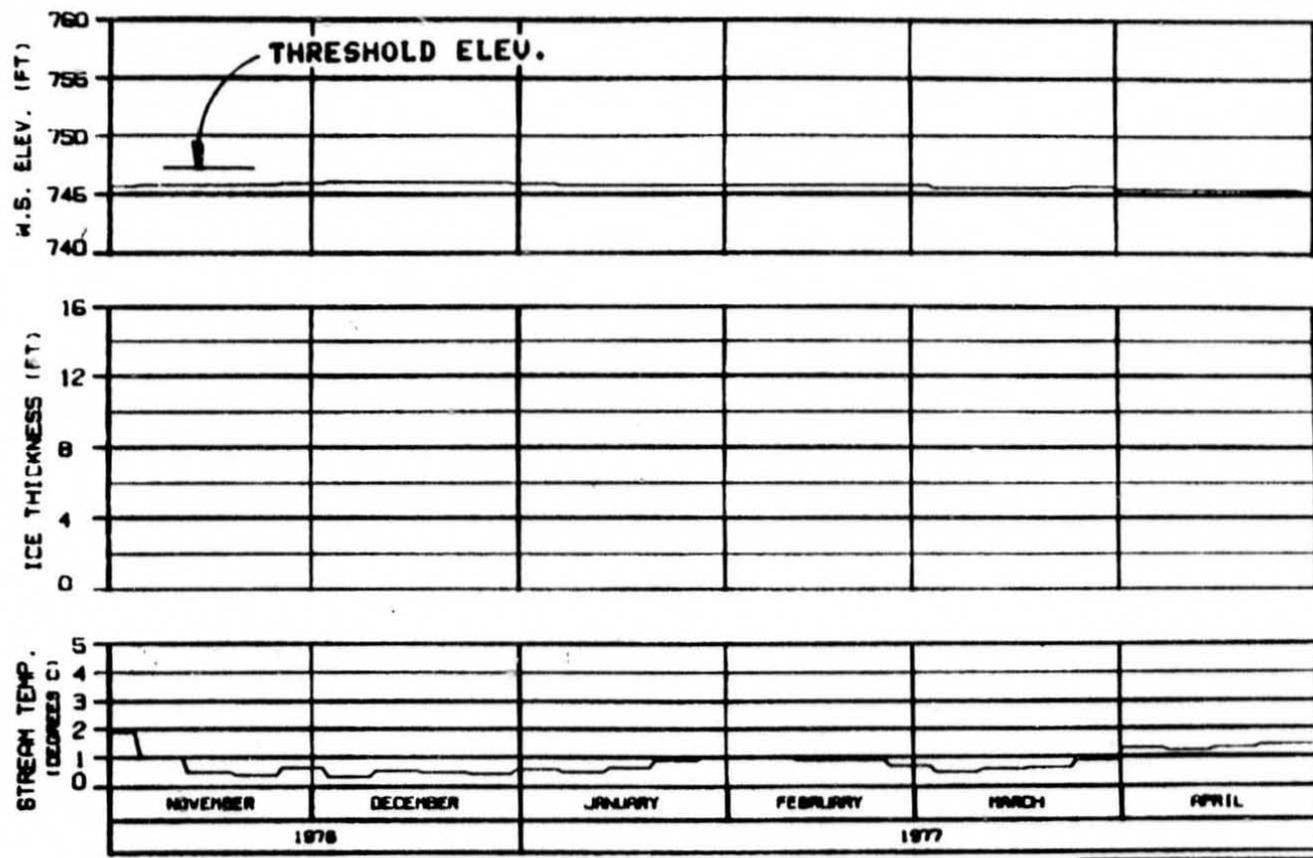
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER
 ICE SIMULATION
 TIME HISTORY

HARZA-EBRSCO JOINT VENTURE

DESIGN: S.L.P. 88 25 JUN 88 1000.142

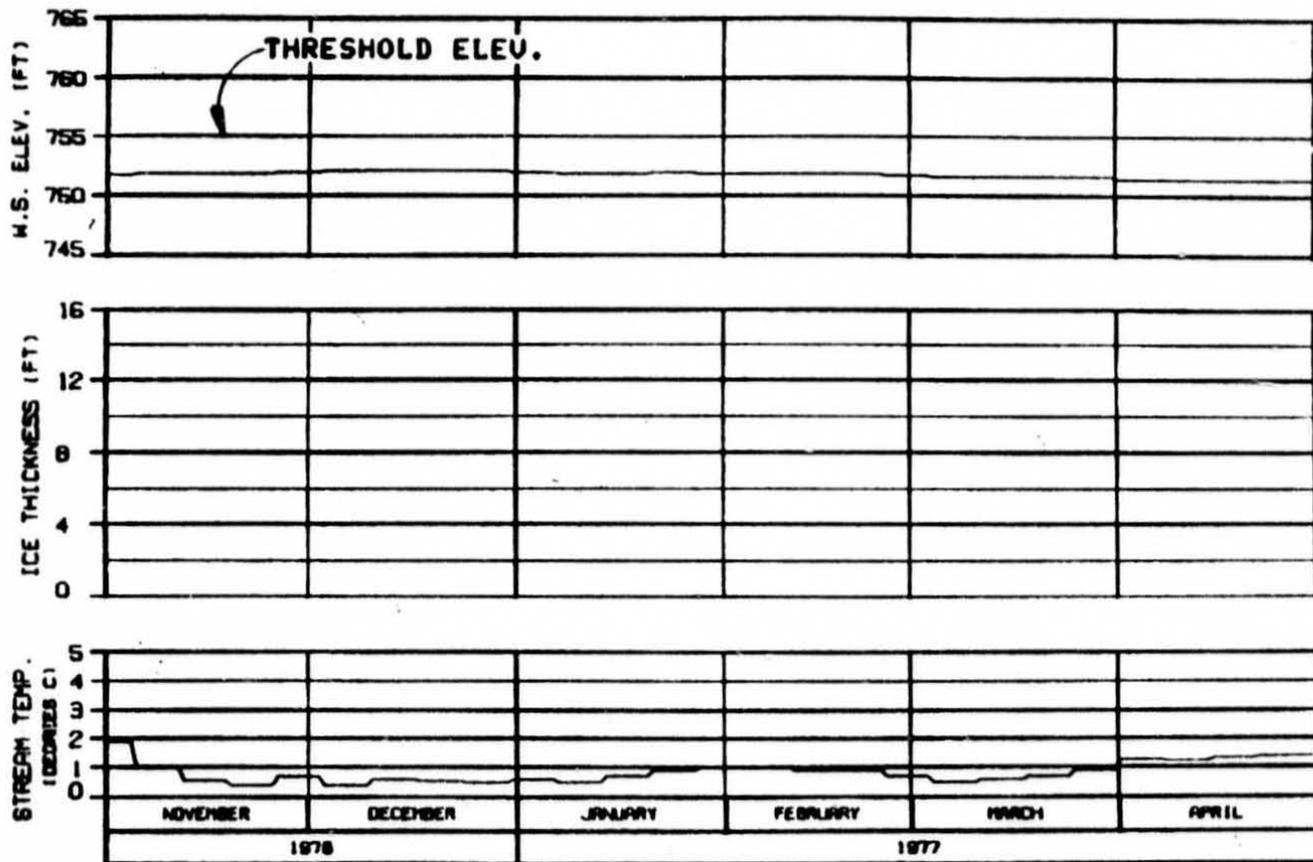


SLOUGH 21 (ENTRANCE A6)
 RIVER MILE : 141.80

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP. INFLOW-MATCHING
 REFERENCE RUN NO. : 7602DN8

ALASKA POWER AUTHORITY		
SUSITNA PROJECT		
SUSITNA RIVER ICE SIMULATION TIME HISTORY		
HARZA-ENERSCO JOINT VENTURE		
DESIGNED BY: S. S. S. S.	DATE: 20 JUN 77	ISSUE: 142



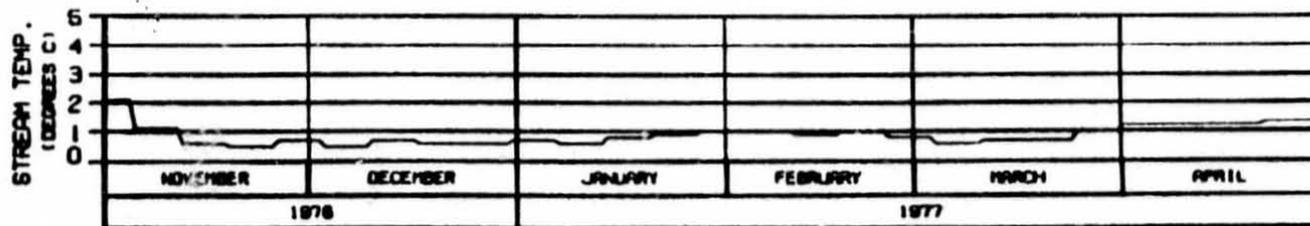
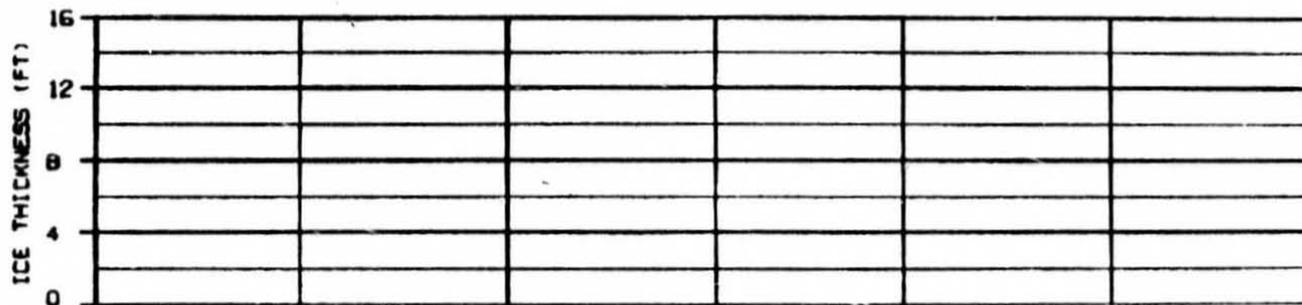
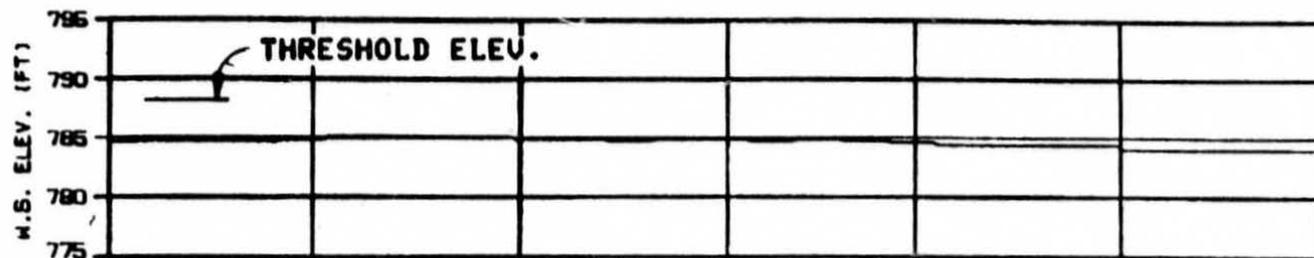
HEAD OF SLOUGH 21
 RIVER MILE : 142.20

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP. INFLOW-MATCHING
 REFERENCE RUN NO. : 76020NB

ALASKA POWER AUTHORITY		
SUSITNA PROJECT		
SUSITNA RIVER		
ICE SIMULATION		
TIME HISTORY		
HARZA-EBASCO JOINT VENTURE		
DESIGNED: G. L. HARRIS	30 JUN 80	8008-142

C



HEAD OF SLOUGH 22

RIVER MILE : 144.80

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS
 - - - - - SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 76 - 30 APR 77
 ENERGY DEMAND : DEVIL CANYON 2002
 CASE C FLOWS TEMP. INFLOW-MATCHING
 REFERENCE RUN NO. : 76020NB

ALASKA POWER AUTHORITY

BUILDING PROJECT

SUSTITNA RIVER
 ICE SIMULATION
 TIME HISTORY

HARZA-EBRSCO JOINT VENTURE

FORMER - 6-1-1980 28 JUN 83 1988.142

OPTION2