

SOS  
404

SUSITNA HYDROELECTRIC PROJECT

INSTREAM ICE SIMULATION STUDY

Report by  
Harza-Ebasco Susitna Joint Venture

Prepared for  
Alaska Power Authority

Draft Report  
September 1984

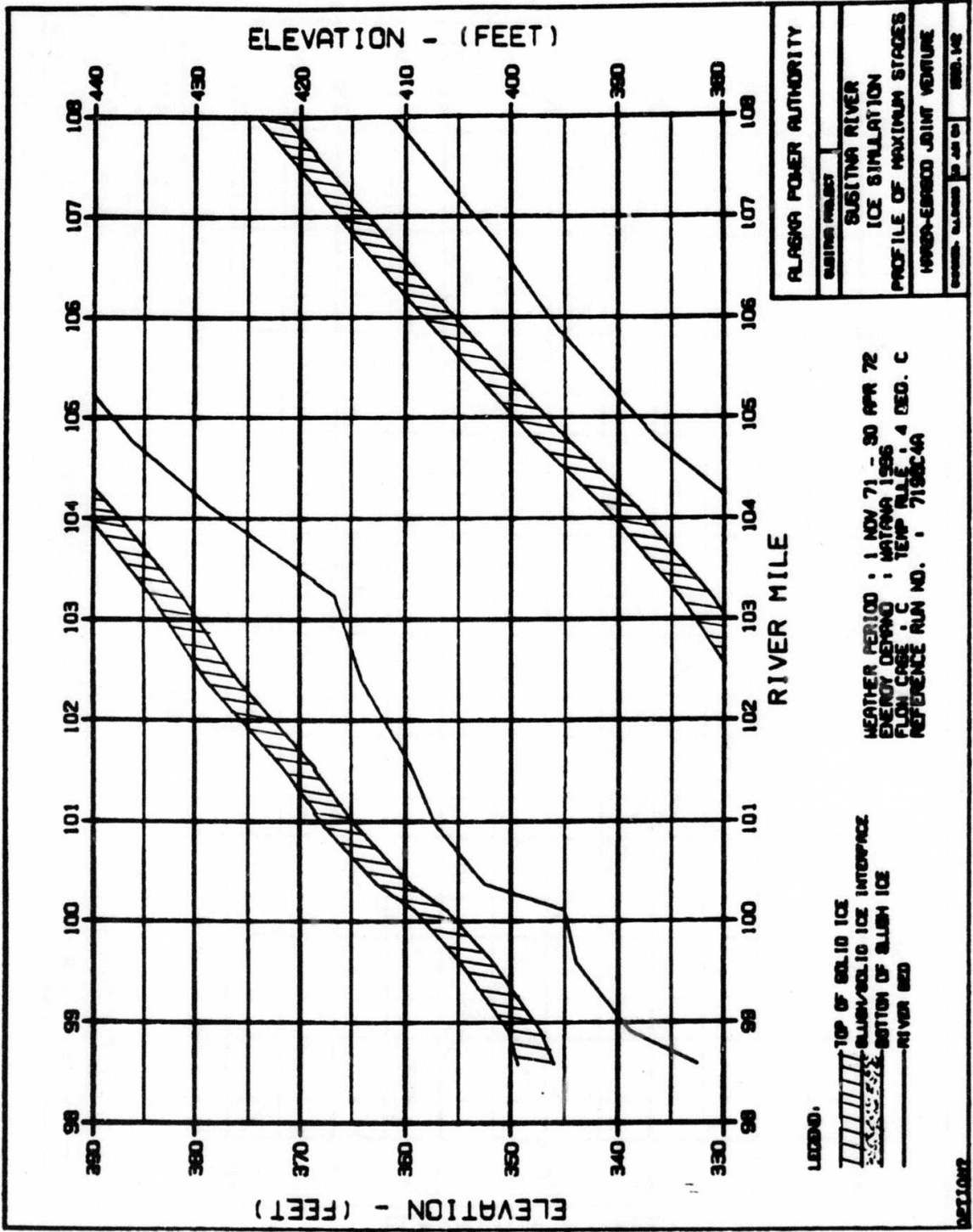
SECTION

2

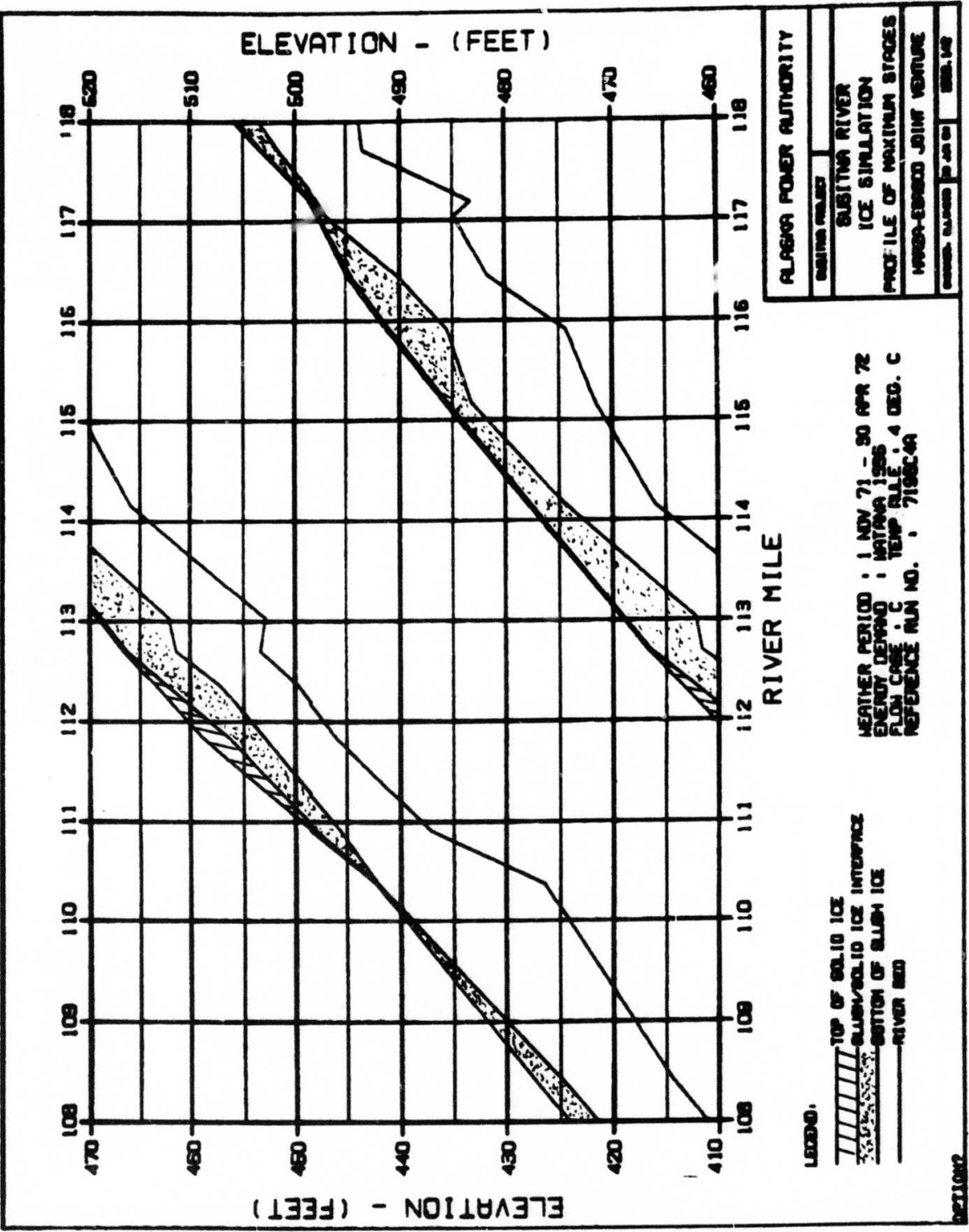
**EXHIBIT I**



c



C



ELEVATION - (FEET)

ELEVATION - (FEET)

RIVER MILE

ALASKA POWER AUTHORITY

SUBITNA RIVER

ICE SIMULATION

PROFILE OF MAXIMUM STAGES

HARVEY-EDBROOK JOINT VENTURE

CONTRACT NUMBER: 70-01-01

SHEET: 149

WEATHER PERIOD: 1 NOV 71 - 30 APR 72

ENERGY DEMAND: MATANA 1986

FLOW CASE: C

TEMP RULE: 4 DEG. C

REFERENCE RUN NO.: 71982CA

LEGEND:

TOP OF SOLID ICE

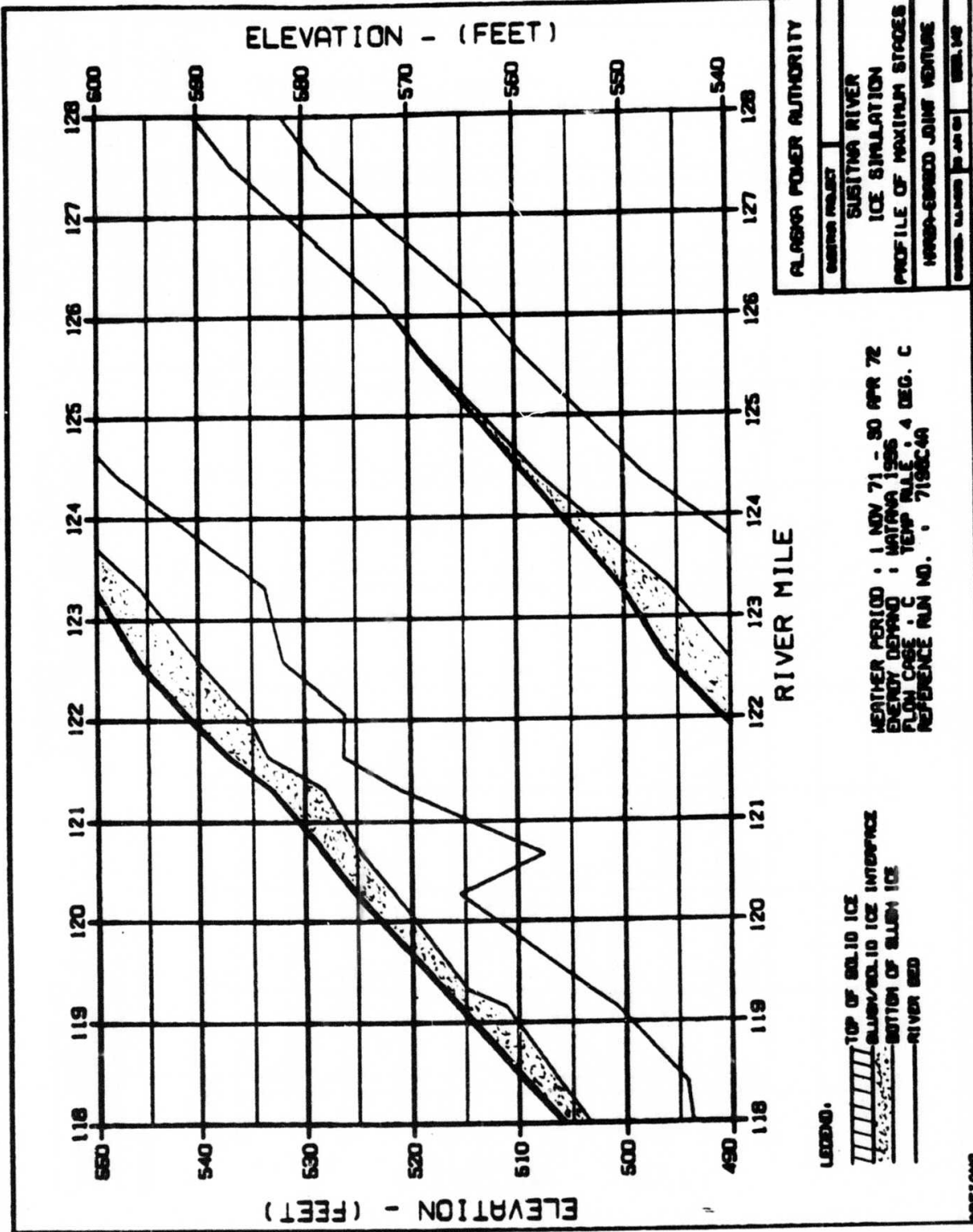
SLUSH/SOLID ICE INTERFACE

BOTTOM OF SLUSH ICE

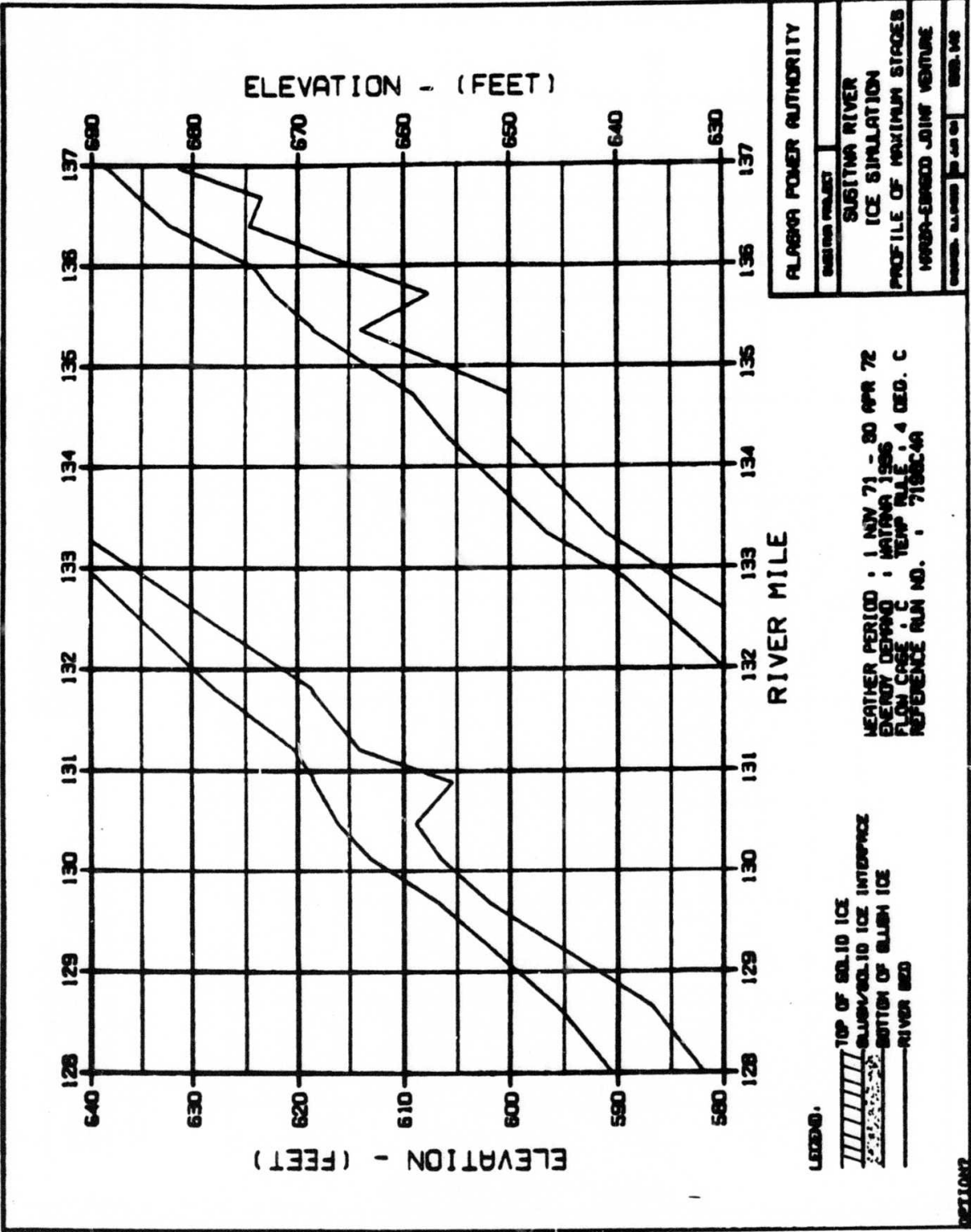
RIVER BED

SECTION

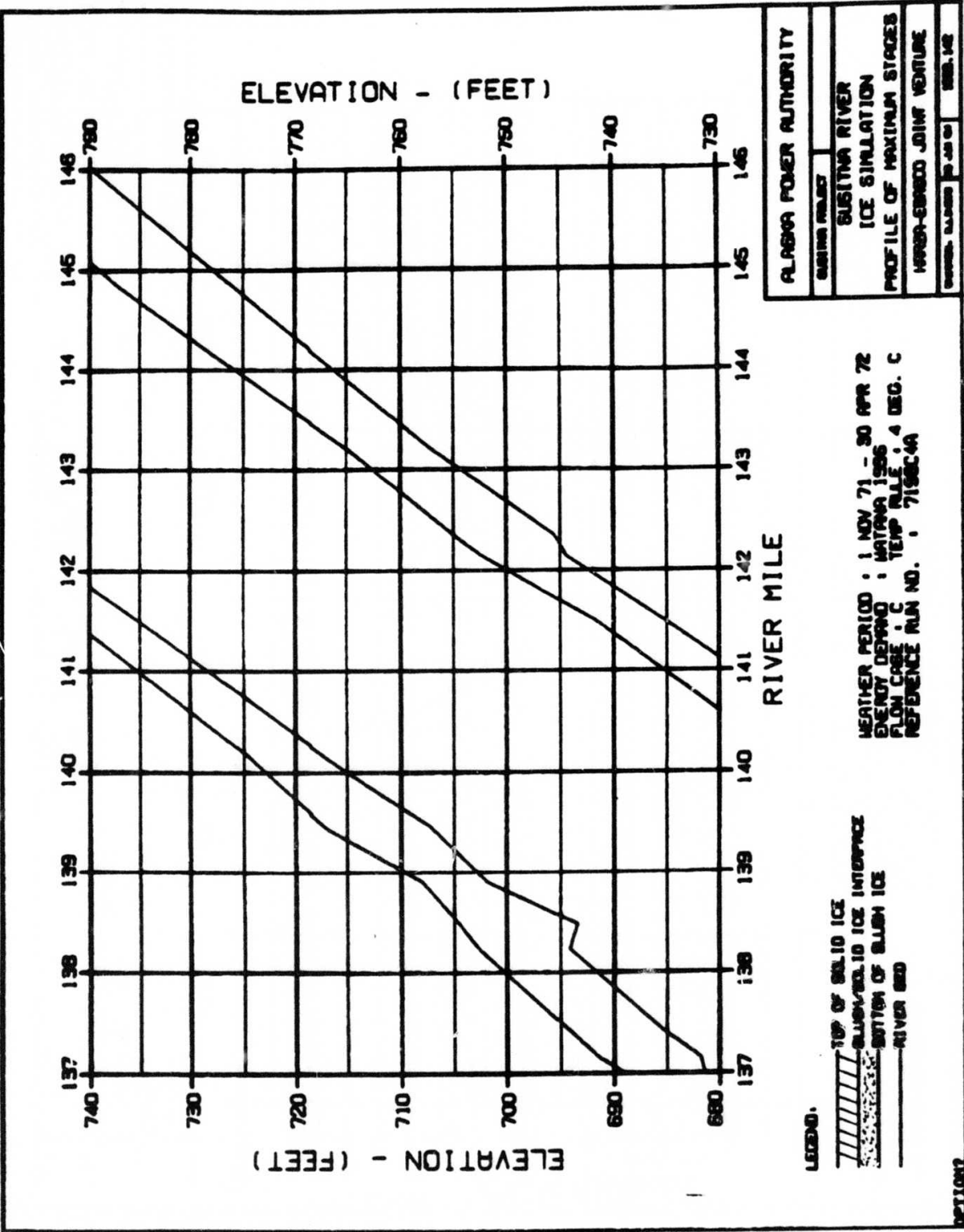
c



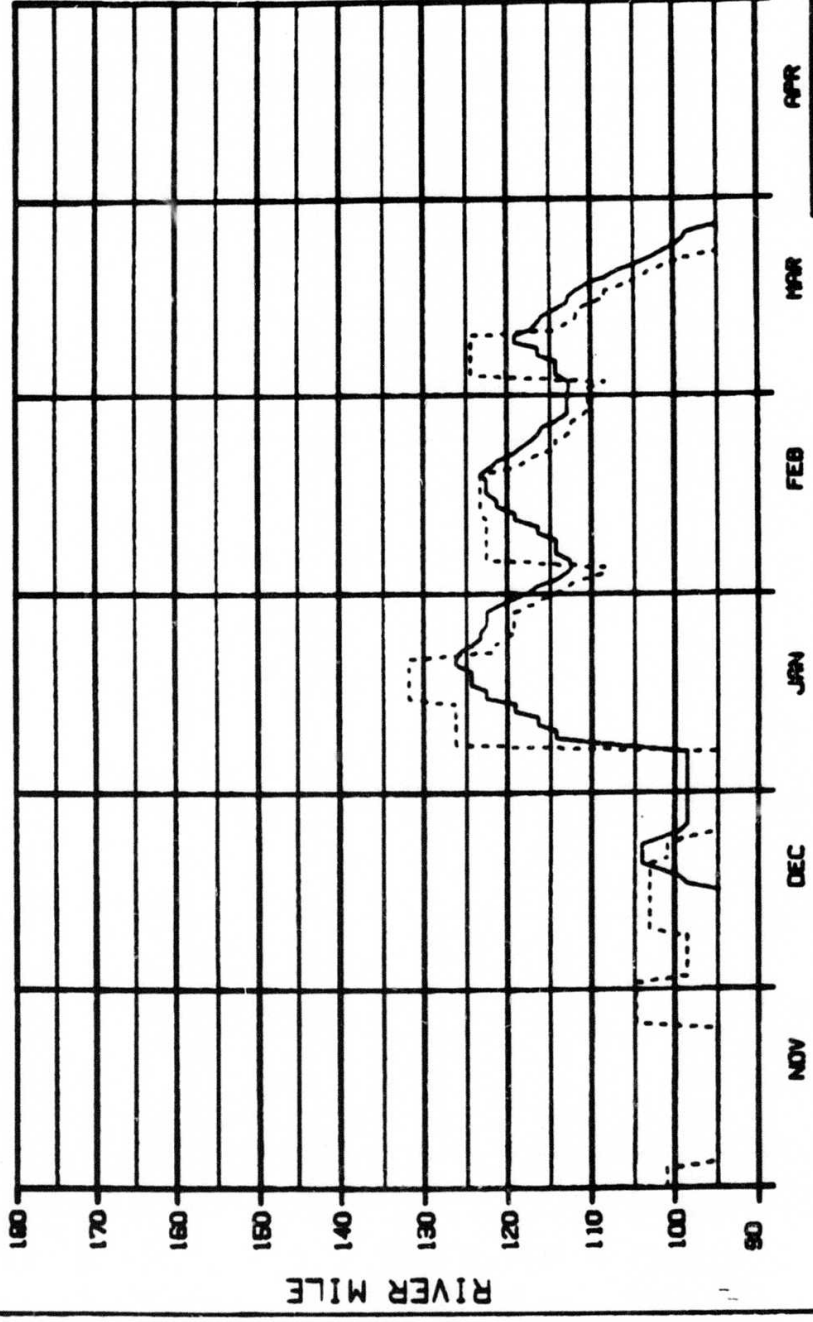
c



c



SECTION 7

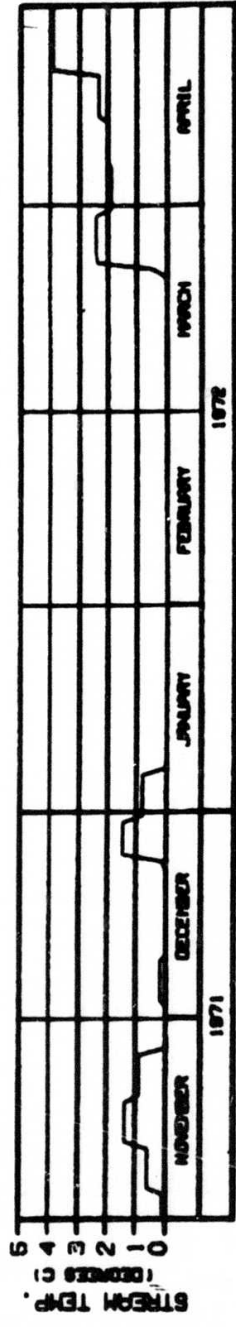
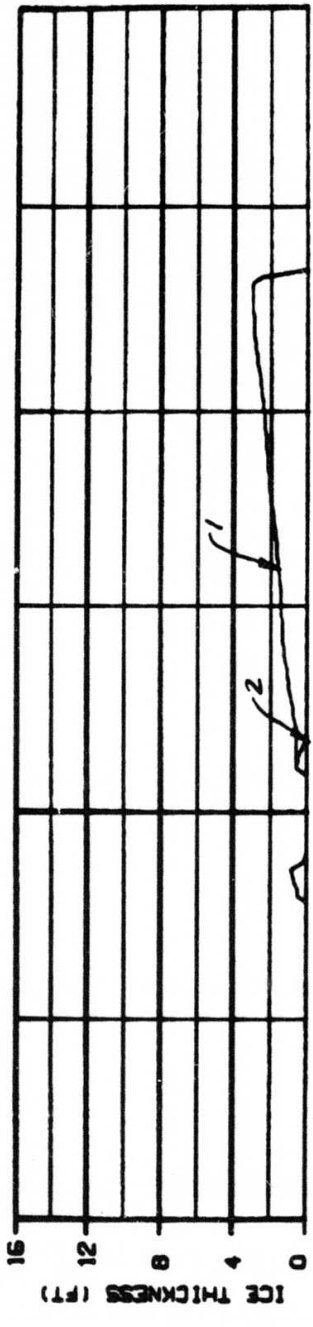
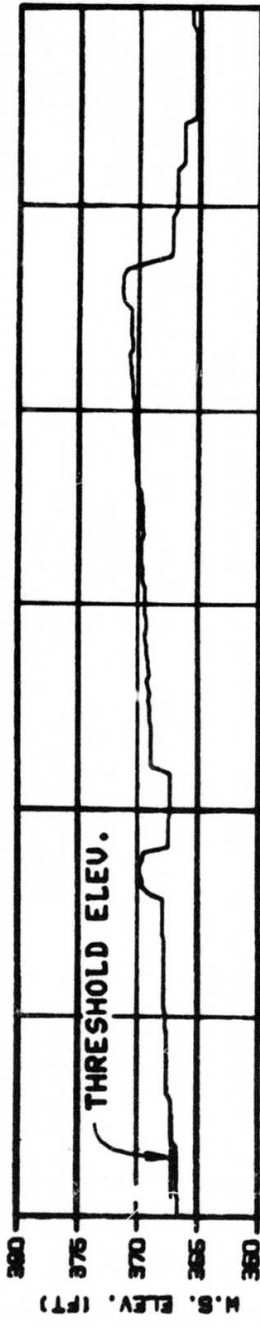


ALASKA POWER AUTHORITY  
 SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM  
 HARBO-EMBED JOINT VENTURE  
 PROJECT NUMBER: 7188C-4A

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 1956  
 FLOW CASE : C TEMP RULE : 4 DEG. C  
 REFERENCE RUN NO. : 7188C-4A

LEGEND:  
 — ICE FRONT  
 - - - ZERO DEGREE ISOTHERM

0211042

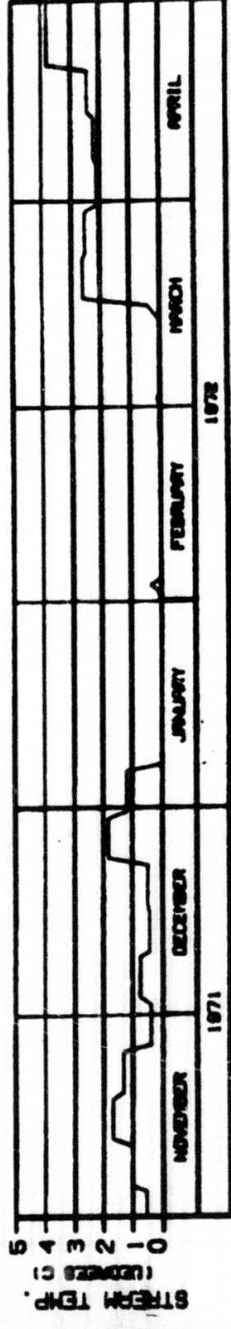
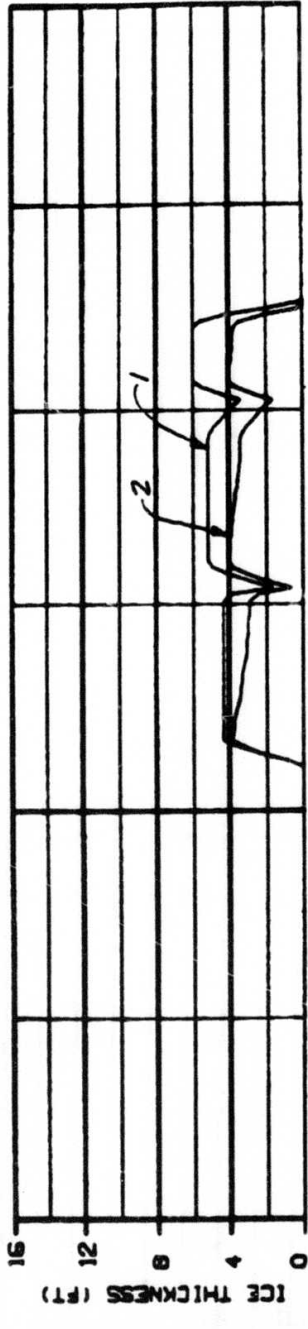
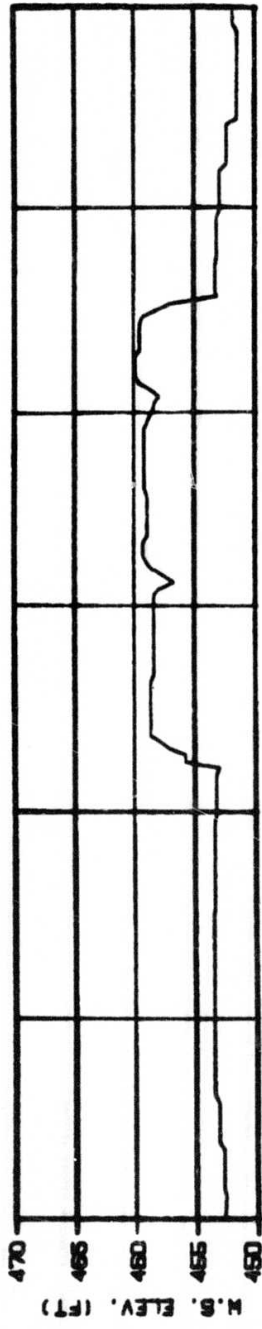


ALASKA POWER AUTHORITY  
 BUSITNA PROJECT  
 BUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 INVER-EMROD JOINT VENTURE  
 ORDER NO. 7198C-4A

HEAD OF WHISKERS SLOUGH  
 RIVER MILE : 101.50  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 1986  
 FLOW CASE : C TEMP RULE : 4 DEG. C  
 REFERENCE RUN NO. : 7198C-4A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



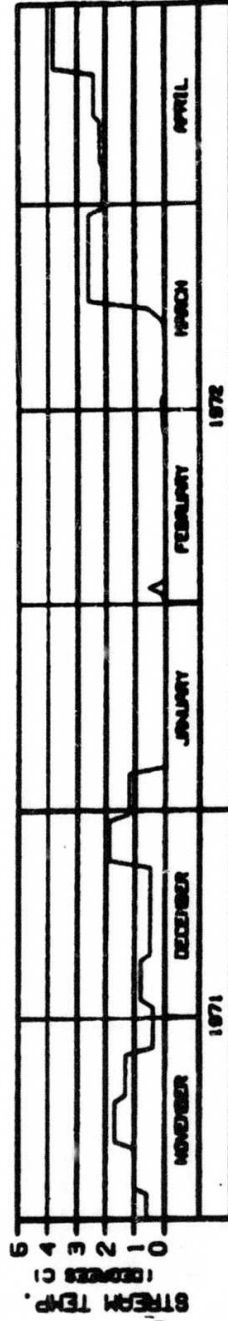
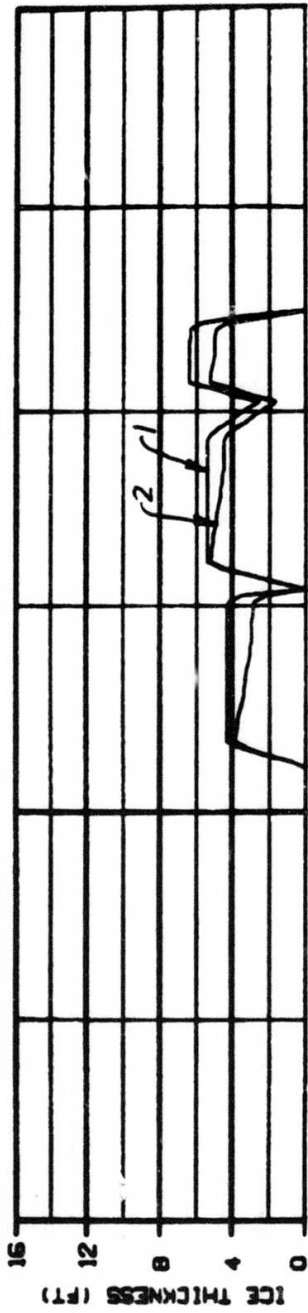
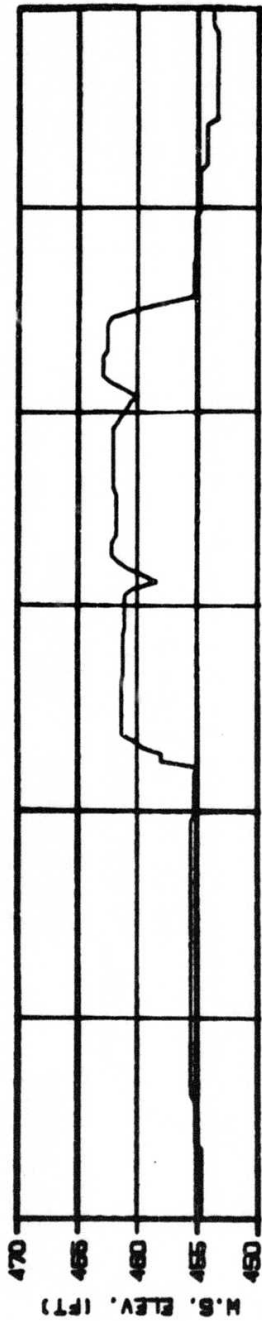


ALASKA POWER AUTHORITY  
 SUBSTATION PROJECT  
 SUBSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HANNA-ERIKSSON JOINT VENTURE  
 CONTRACT NO. 7196C-4A

**SIDE CHANNEL AT HEAD OF GASH CREEK**  
**RIVER MILE : 112.00**  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 1966  
 FLOW CASE : C TEMP RULE : 4 DEG. C  
 REFERENCE RUN NO. : 7196C-4A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

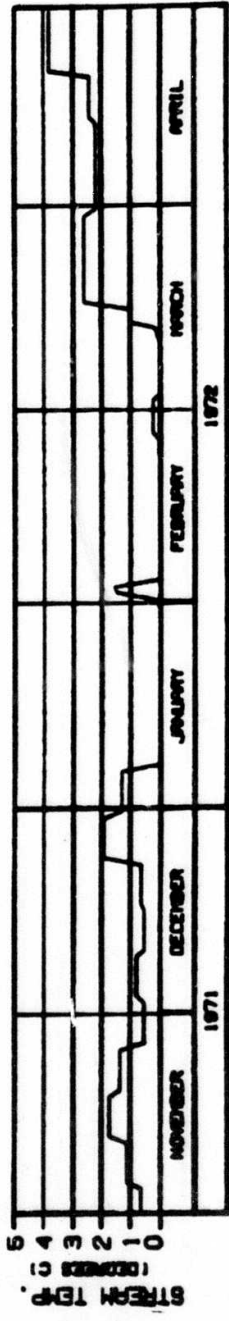
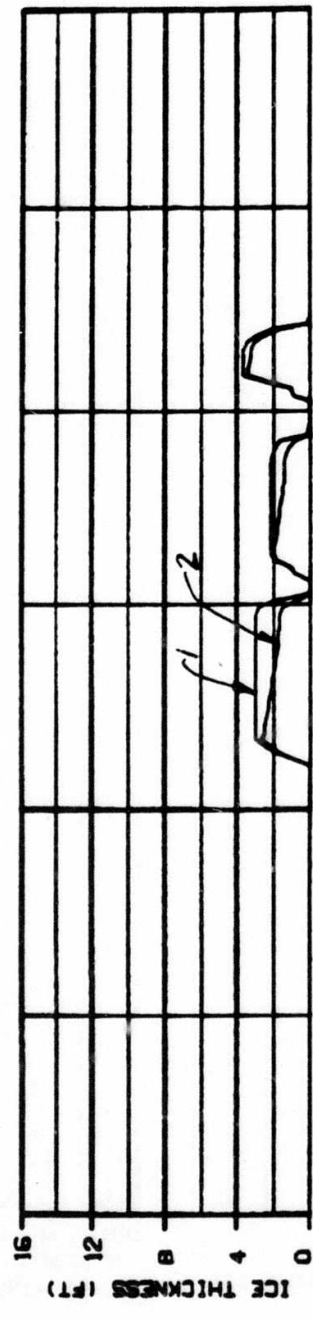
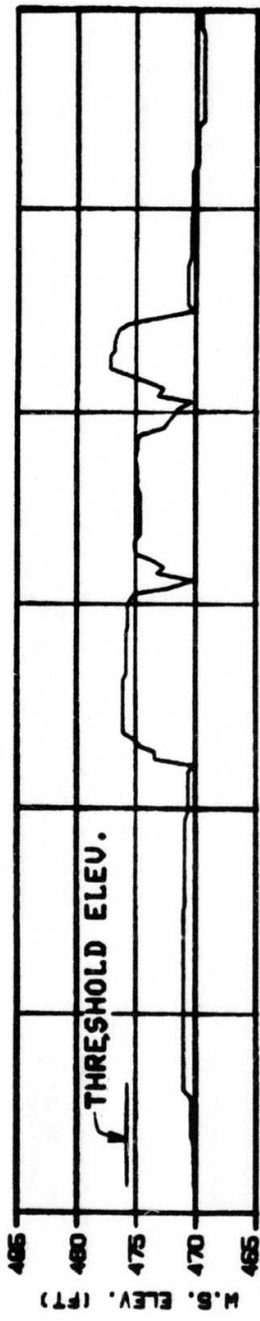




ALASKA POWER AUTHORITY  
 PROJECT NAME: SLUSHINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 WPPA-ERISED JOINT VENTURE  
 DRAWN: SL-0008 P. 01 OF 01  
 SHEET: 142

MOUTH OF SLOUGH 6A  
 RIVER MILE : 112.34  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 1986  
 FLOW CASE : C TEMP RULE : 4 DEG. C  
 REFERENCE PLAN NO. : 7198CAH

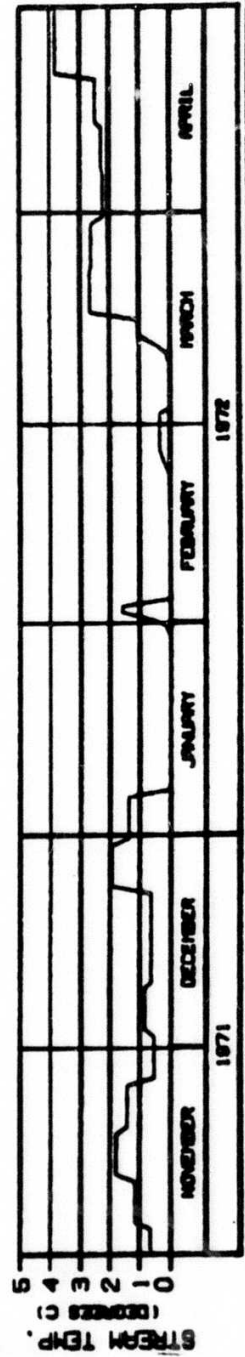
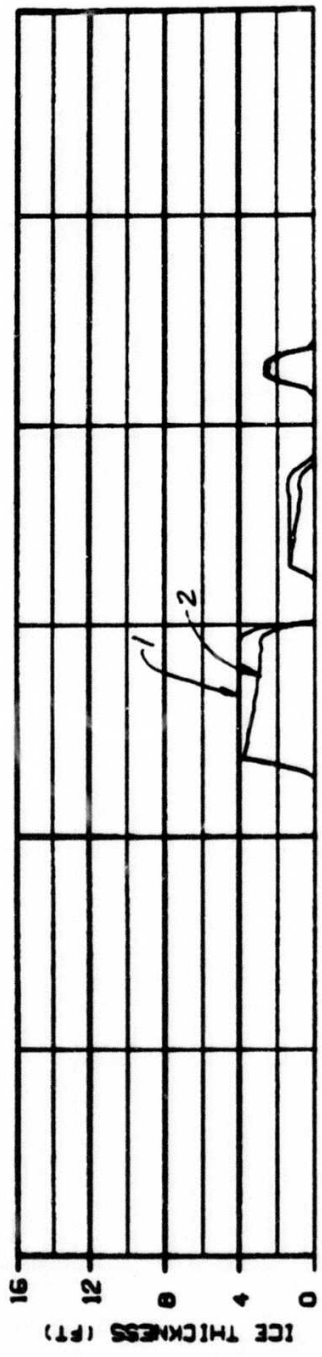
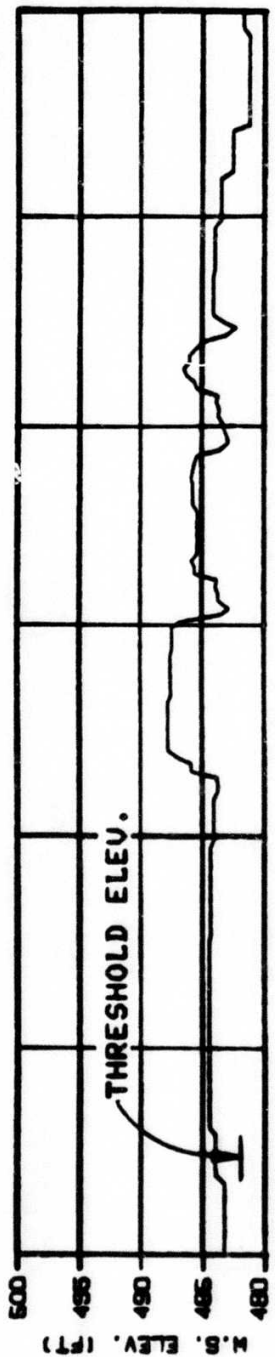
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY	
DESIGN PROJECT	SUSITNA RIVER
	ICE SIMULATION
	TIME HISTORY
DESIGNER	HARRA-EMBED JOINT VENTURE
DATE	NOV. 1971

HEAD OF SLOUGH 8  
 RIVER MILE : 114.10  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 1966  
 FLOW CASE : C TEMP. RILE : 4 DEG. C  
 REFERENCE RUN NO. : 7186C40

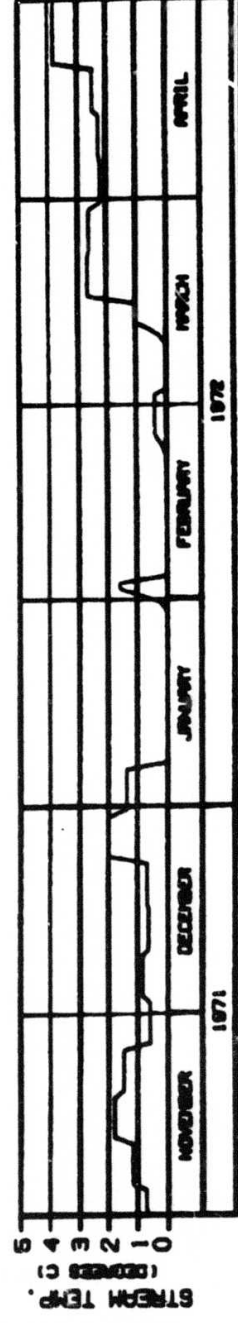
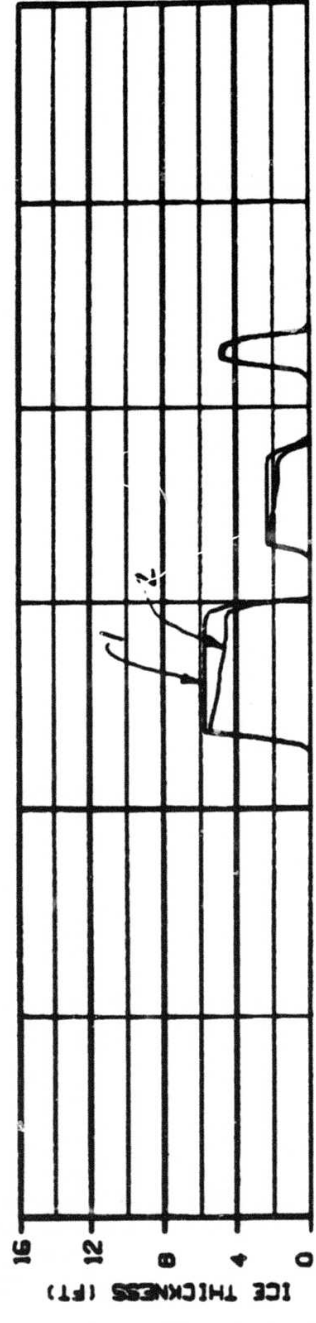
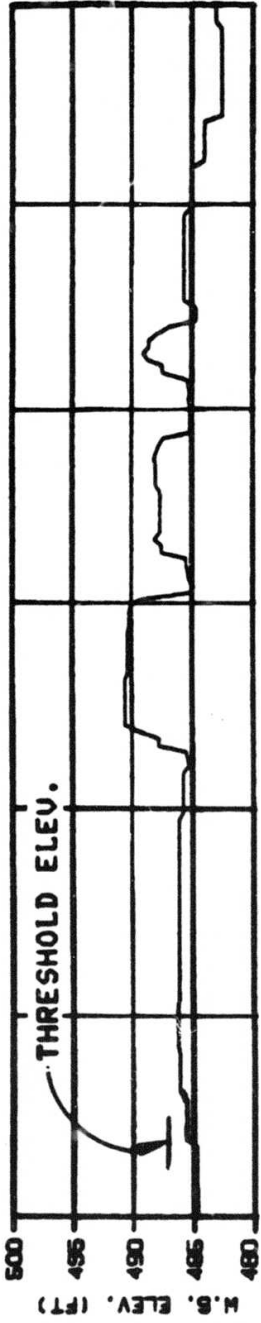
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUOH COVER



ALABAMA POWER AUTHORITY  
 JUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EMBED JOINT VENTURE  
 [Signature]

**SIDE CHANNEL MSII**  
**RIVER MILE : 115.50**  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : HATANA 1986  
 FLOW CASE : C TEMP RULE : 4 DEG. C  
 REFERENCE RUN NO. : 7198C4A

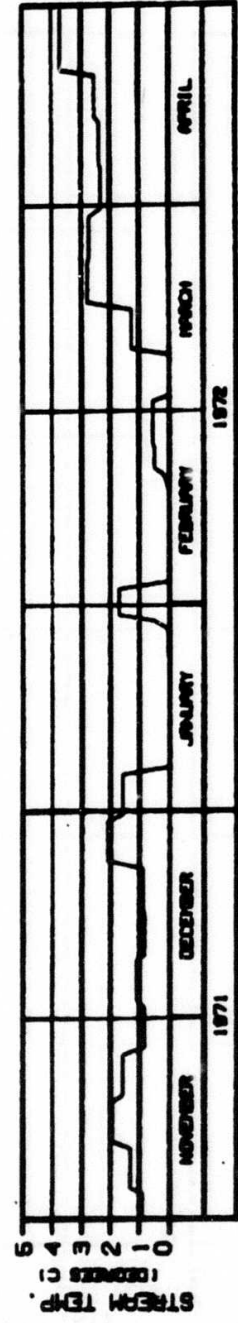
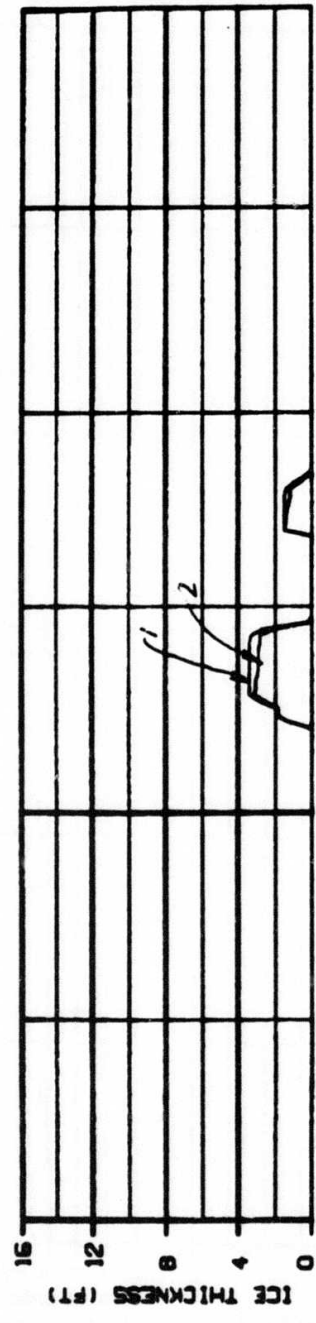
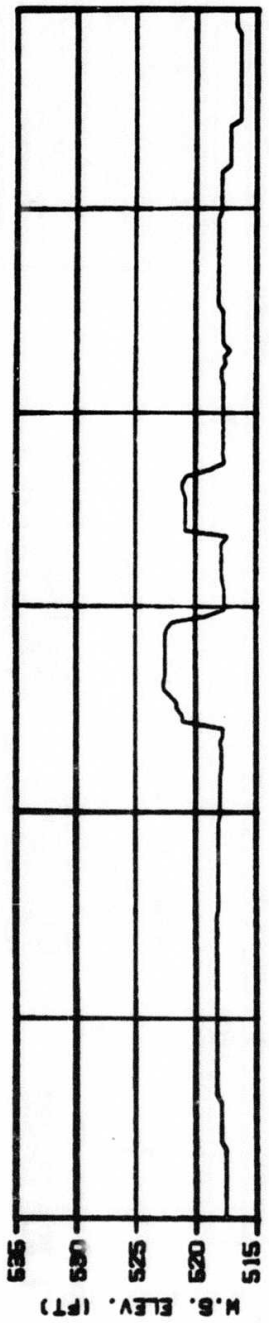
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALABAMA POWER AUTHORITY  
 SUBITINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 WARRA-EDGED JOINT VENTURE  
 ORDER NO. 7198C-4A

HEAD OF SIDE CHANNEL NS11  
 RIVER MILE : 115.90  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 1986  
 FLOW CASE : C TEMP RULE : 4 DEG. C  
 REFERENCE PLAN NO. : 7198C-4A

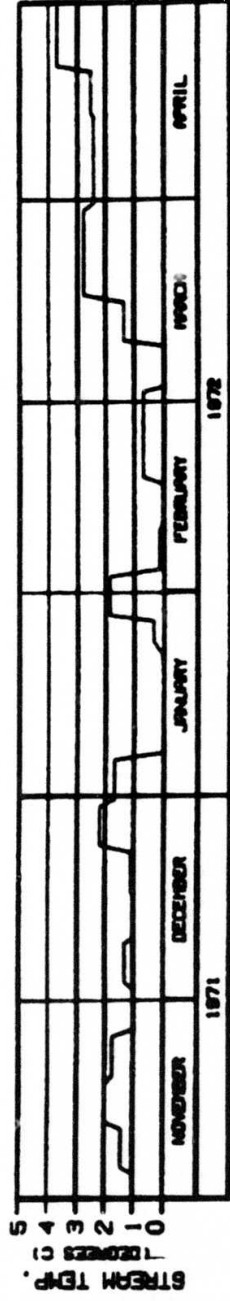
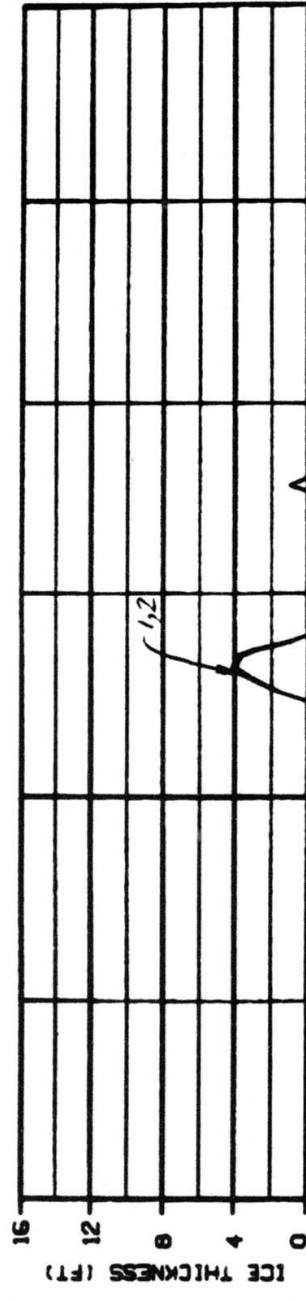
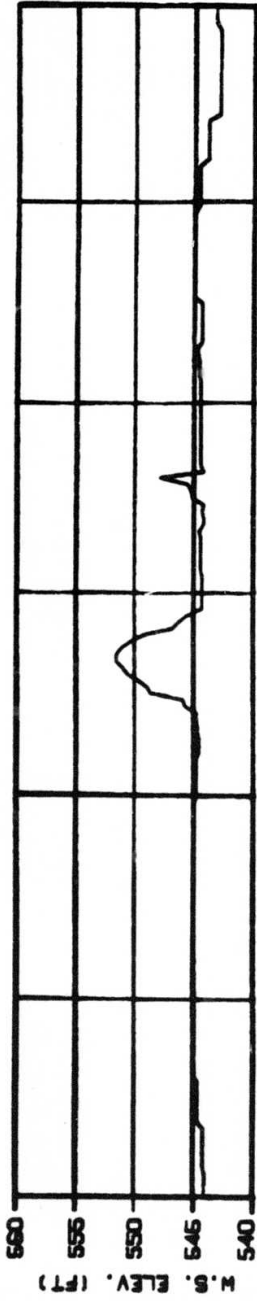
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBJECT: SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 WARRA-CORROD JOINT VENTURE  
 CONTRACT NO. 7198C4A

RIVER MILE : 120.00  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 1996  
 FLOW CASE : C TEMP RULE : 4 DEG. C  
 REFERENCE RUN NO. : 7198C4A

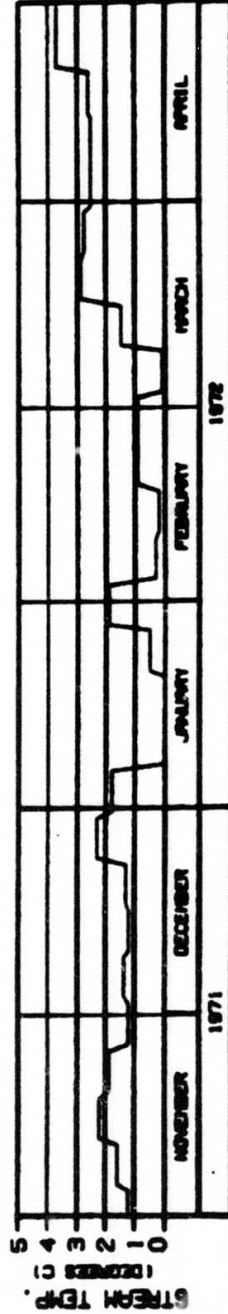
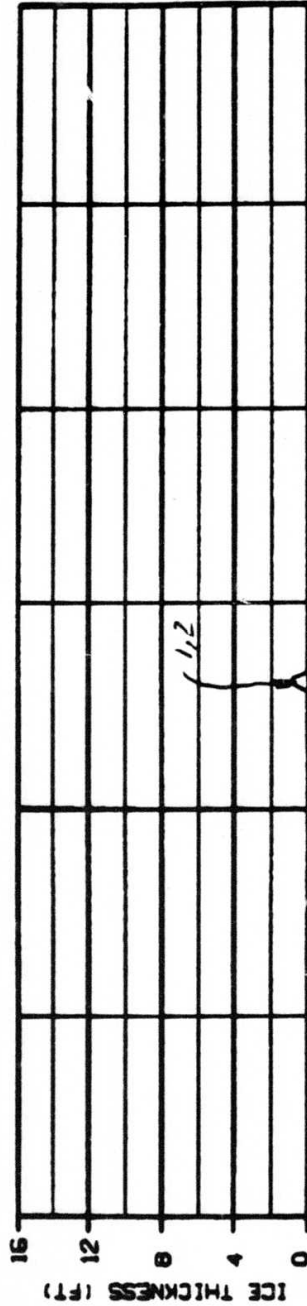
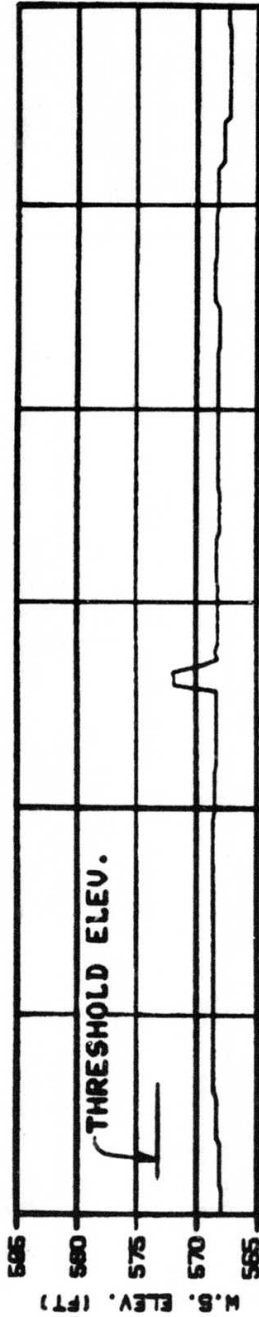
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARPER-ERBOLD JOINT VENTURE  
 1971-72

HEAD OF MOOSE SLOUGH  
 RIVER MILE : 123.50  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 1986  
 FLOW CASE : C TEMP RULE : 4 DEC. C  
 REFERENCE RUN NO. : 7186CAR

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : NATANA 1966  
 FLOW CASE : C TEMP RULE : 4 DEG. C  
 REFERENCE PLAN NO. : 7198C4A

ICE THICKNESS LEGEND:

1. TOTAL THICKNESS  
 2. SLUSH COMPONENT

ALASKA POWER AUTHORITY

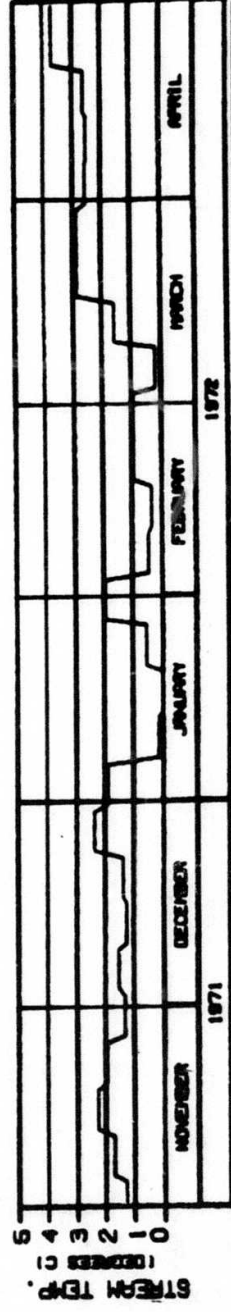
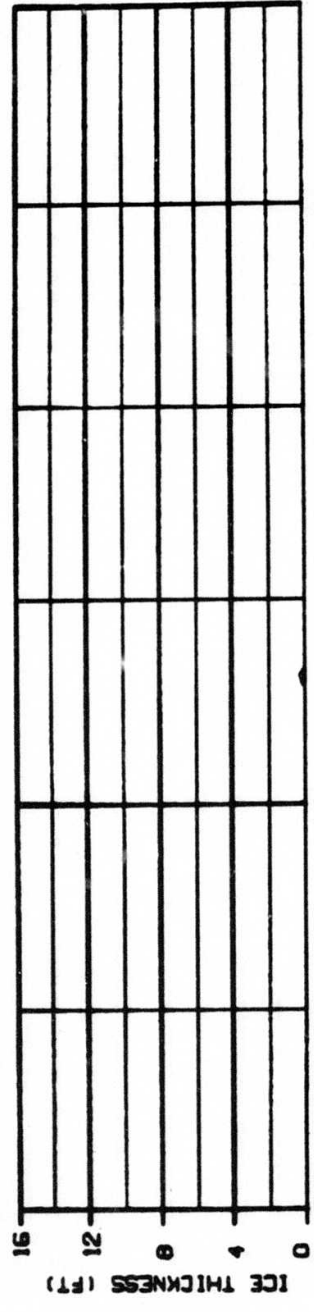
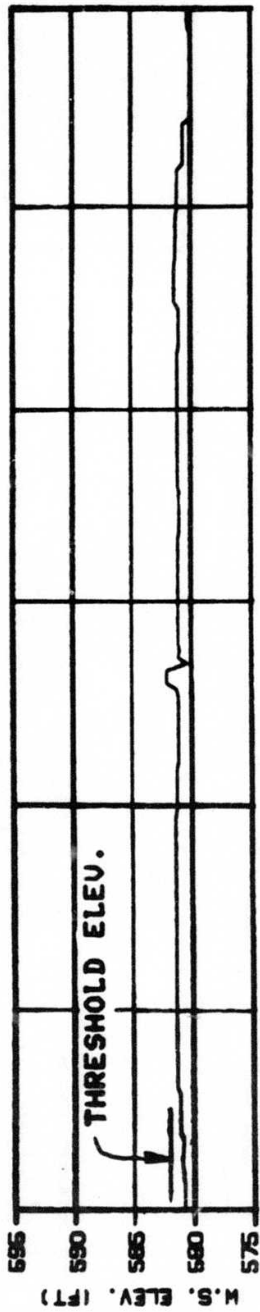
SUBITNA PROJECT

SUBITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HANSEN-ERIKSSON JOINT VENTURE

CONTRACT NO. 7198C4A



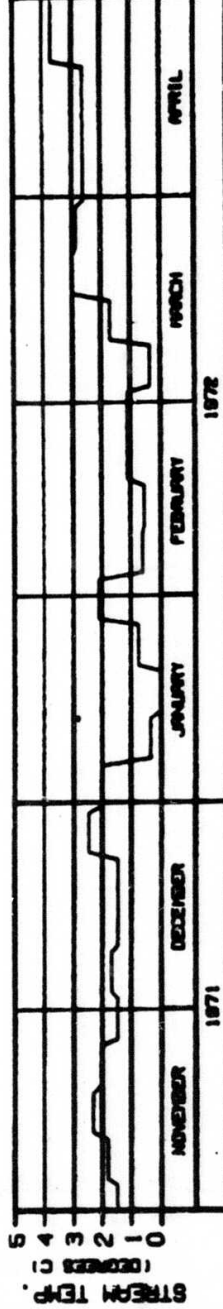
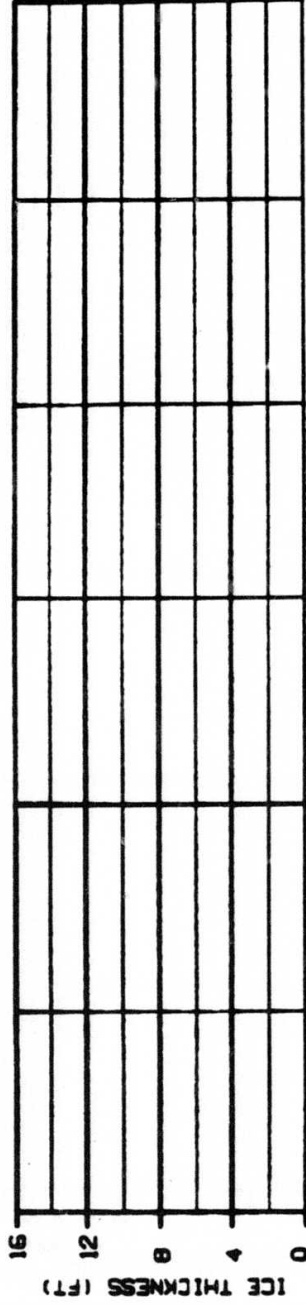
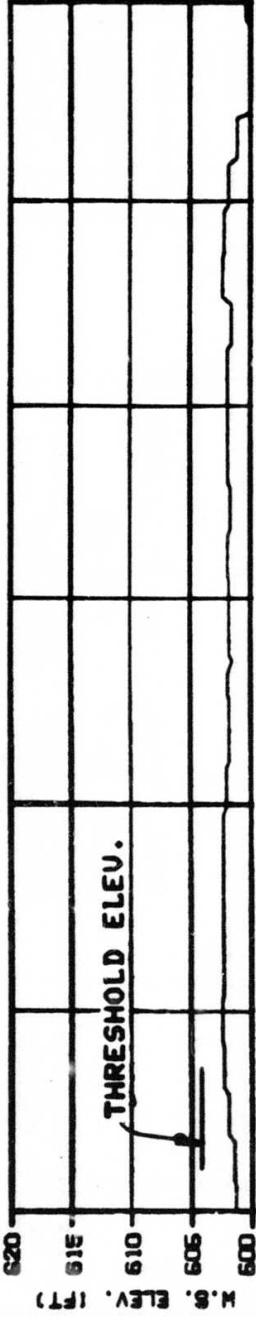


ALASKA POWER AUTHORITY  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EMROD JOINT VENTURE  
 MONTH: 11/1971 TO 4/1972

HEAD OF SLOUGH 8A (EAST)  
 RIVER MILE : 127.10  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 1986  
 FLOW CASE : C TEMP RULE : 4 DEG. C  
 REFERENCE RUN NO. : 7198C4A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT





ALASKA POWER AUTHORITY

SUBJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WATER-RESOURCES DIVISION

PROJECT NO. 7198C4A

HEAD OF SLOUGH 9

RIVER MILE : 129.30

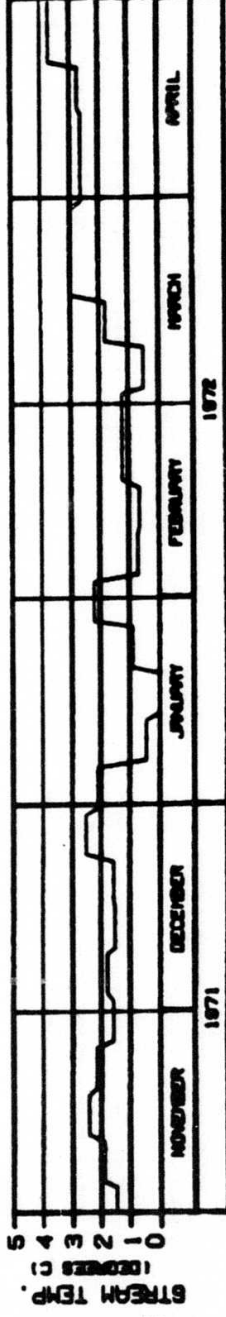
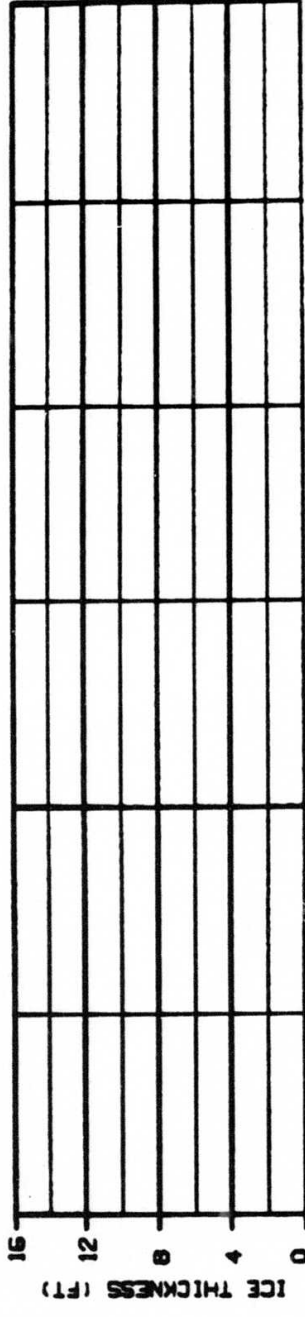
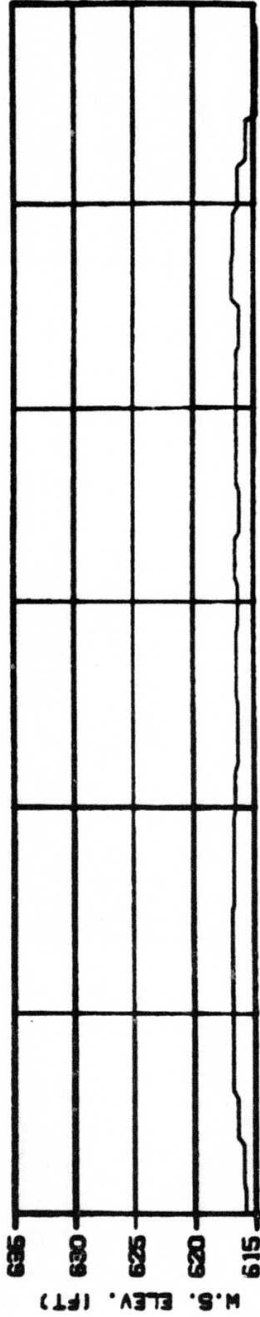
WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : WATANA 1986  
FLOW CASE : C TEMP RULE : 4 DEG. C  
REFERENCE RUN NO. : 7198C4A

ICE THICKNESS LEGEND:

- 1: TOTAL THICKNESS
- 2: SLUSH COMPONENT

SECTION

OPTION 1



**SIDE CHANNEL U/S OF SLOUGH 9**

RIVER MILE : 130.60

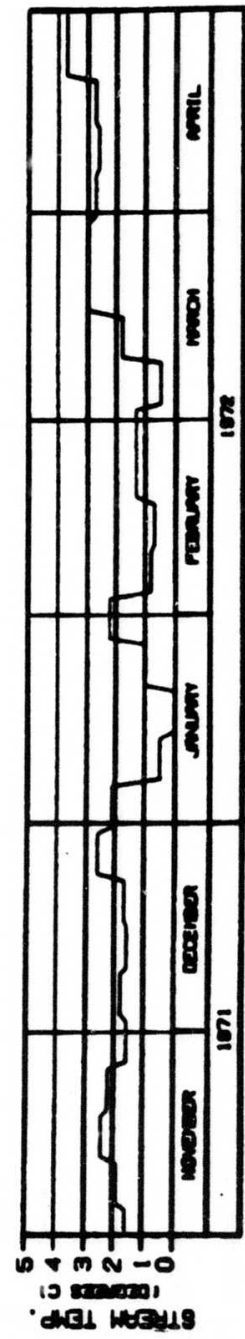
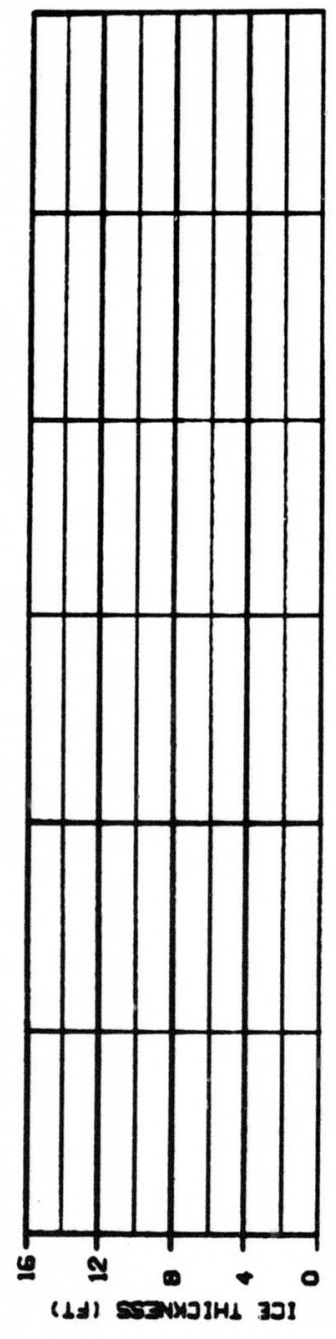
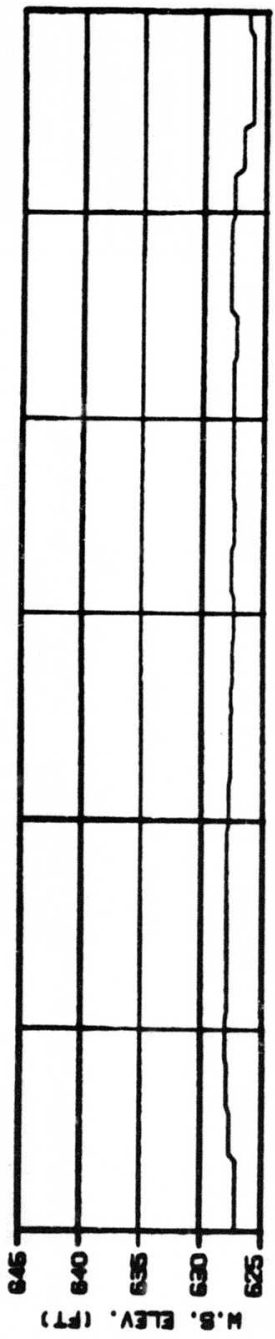
WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATAMA 1986  
 FLOW CASE : C TEMP RILE : 4 DEG. C  
 REFERENCE RUN NO. : 7186CAR

ICE THICKNESS LEGEND:

- 1: TOTAL THICKNESS
- 2: SLUSH COMPONENT

ALABAMA POWER AUTHORITY

PROJECT : SLUICING RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HYDRO-ENERGY JOINT VENTURE  
 DRAWING NO. : 88-01  
 SHEET NO. : 88-01



**SIDE CHANNEL U/S OF 4TH JULY CREEK**

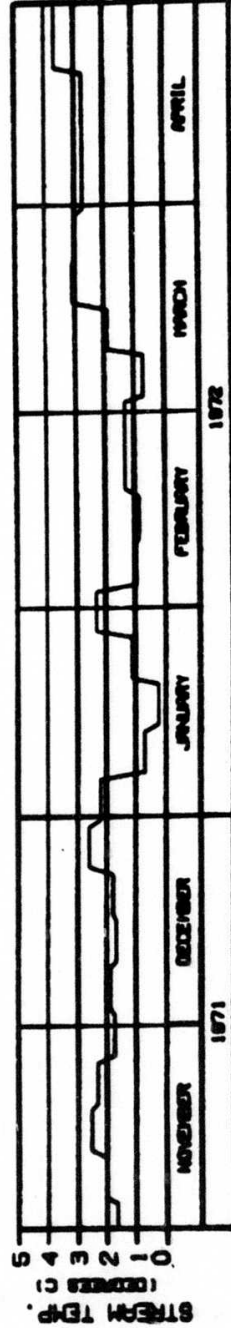
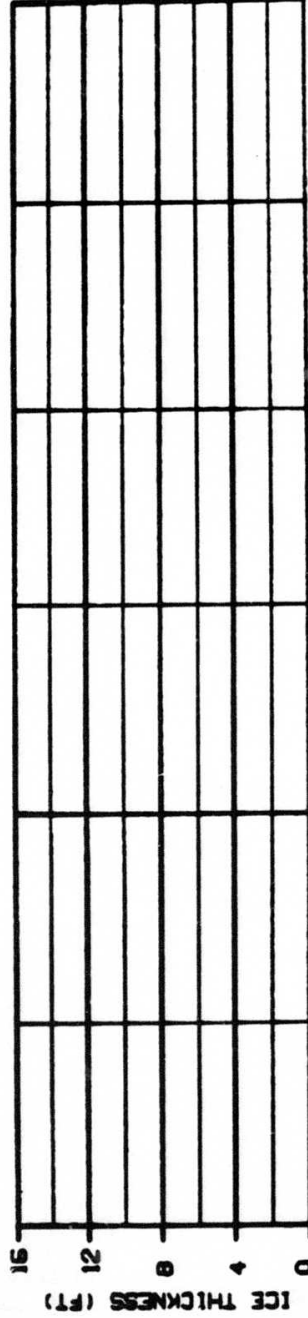
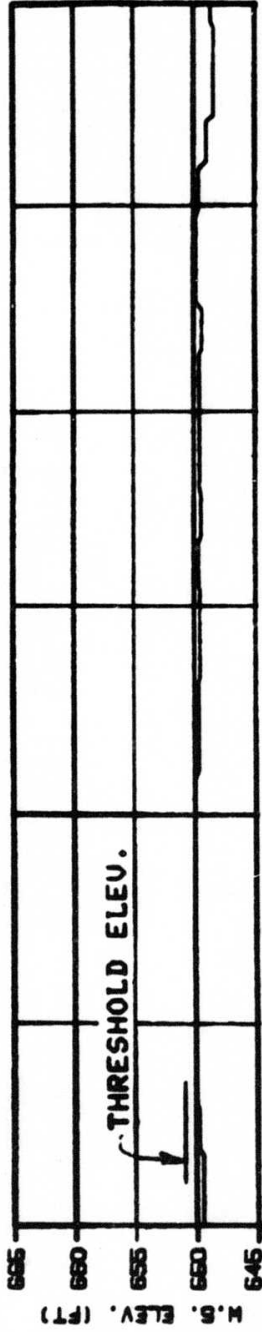
RIVER MILE : 131.80

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 1996  
 FLOW CASE : C TEMP RALE : 4 DEG. C  
 REFERENCE RUN NO. : 71964A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

ALASKA POWER AUTHORITY

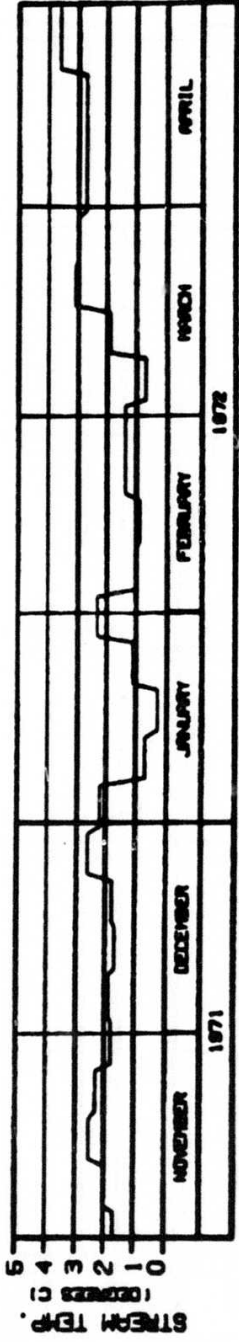
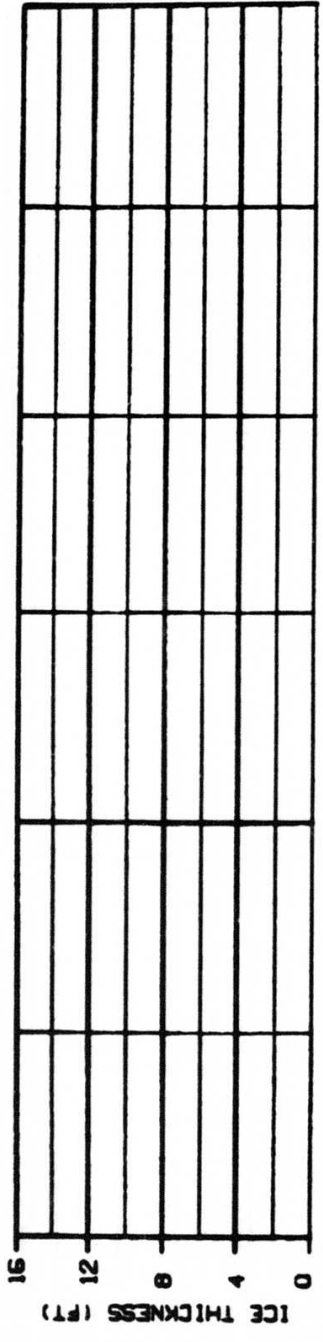
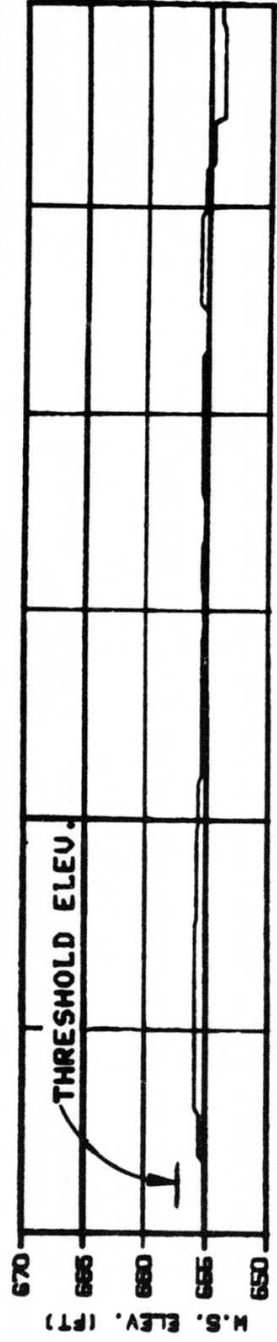
STATION NUMBER	BUSITNA RIVER
ICE SIMULATION	TIME HISTORY
PROJECT NUMBER	HWDA-ESR00 JOINT VENTURE
DATE	SEP 72



ALASKA POWER AUTHORITY  
 DESIGN PROJECT  
 SUBITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 WARD-ERBOLD JOINT VENTURE  
 SHEET: 6-10000 10/21/72 1000.102

HEAD OF SLOUGH 9A  
 RIVER MILE : 133.70  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 1986  
 FLOW CASE : C TEMP RULE : 4 DEG. C  
 REFERENCE RUN NO. : 7198CA

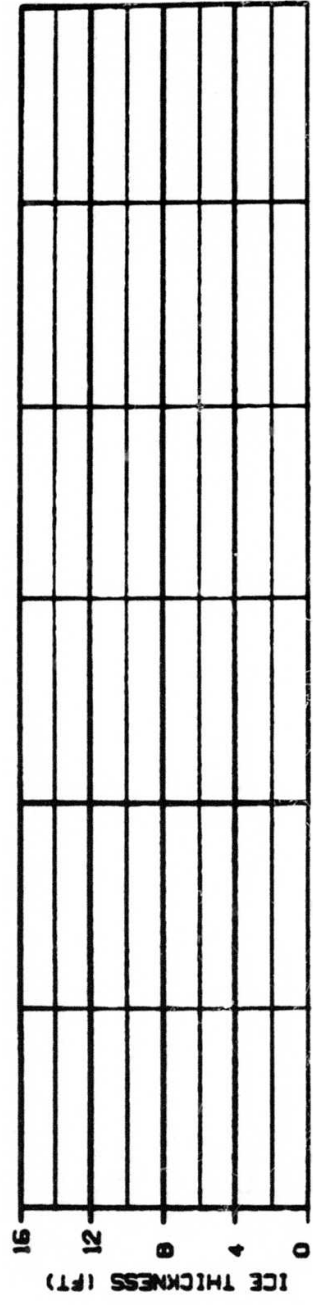
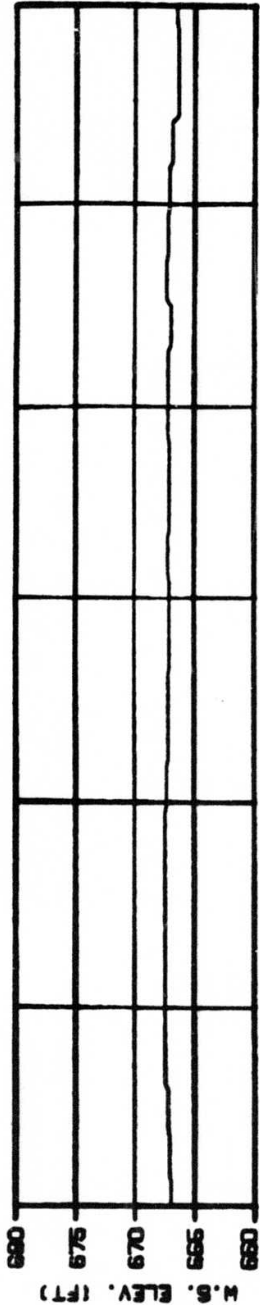
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBJECT: SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 UPPER-EDGECOD JOINT VENTURE  
 DRAWING NO. 7198C-4A

SIDE CHANNEL U/S OF SLOUGH 10  
 RIVER MILE : 134.30  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 1986  
 FLOW CASE : C TEMP RULE : 4 DEG. C  
 REFERENCE RUN NO. : 7198C-4A

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT



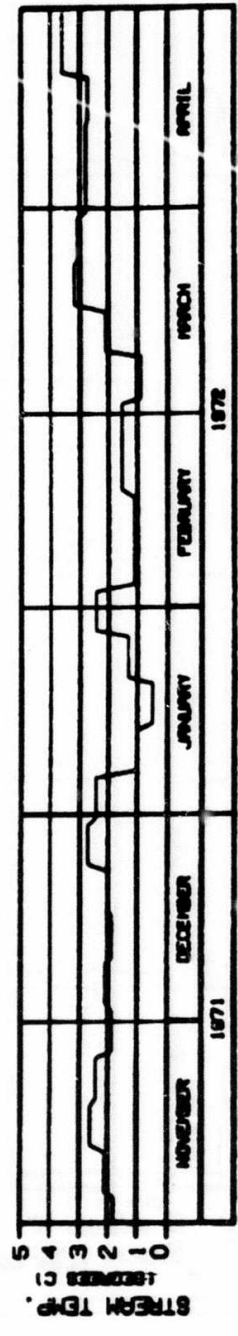
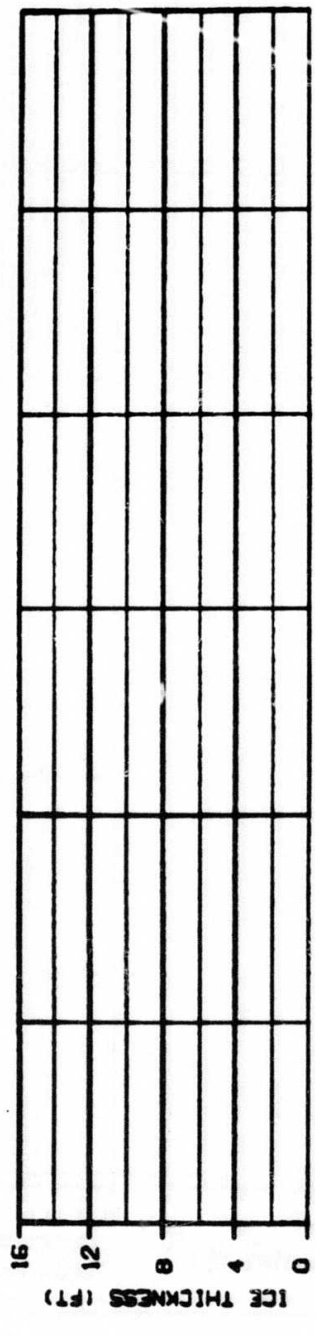
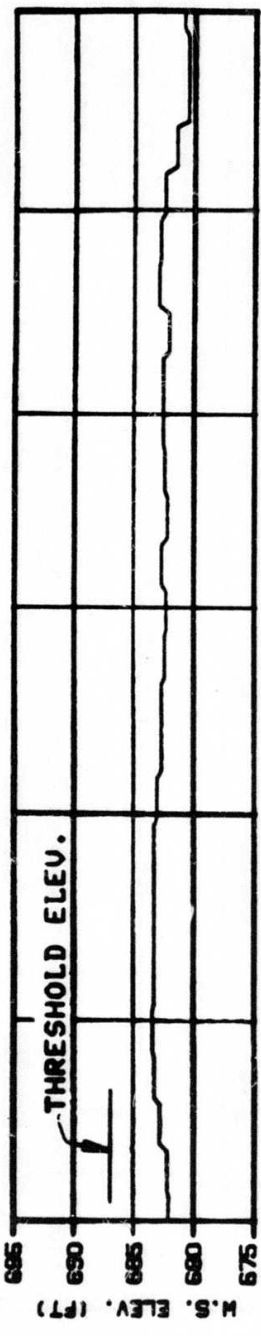
ALASKA POWER AUTHORITY  
 SUBITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 WASH-BEARD JOINT VENTURE  
 DRAWN: BARRY BATES  
 SHEET: 142

SIDE CHANNEL D/S OF SLOUGH 11

RIVER MILE : 135.30

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 1986  
 FLOW CASE : C  
 TEMP RULE : 4 DEG. C  
 REFERENCE RUN NO. : 7188CA4

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT

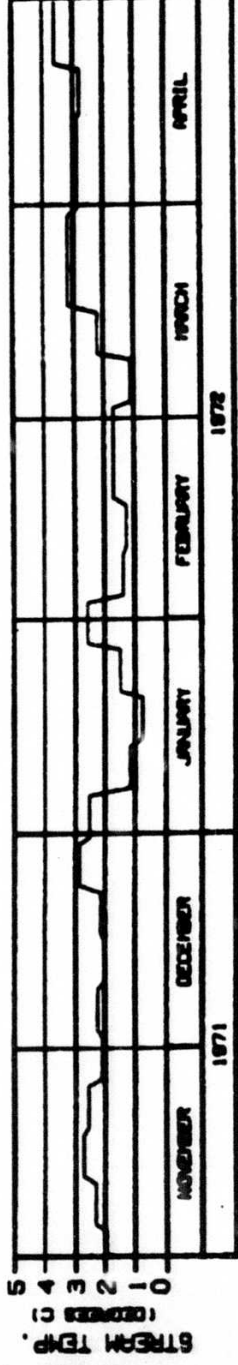
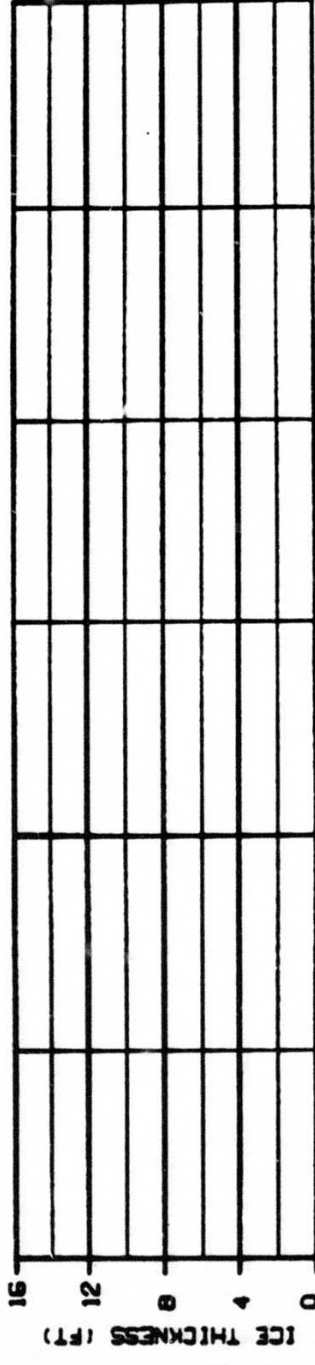
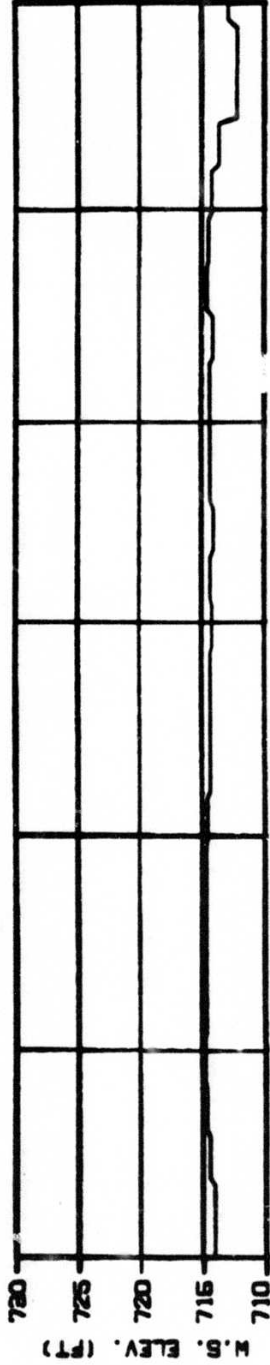


ALASKA POWER AUTHORITY  
 SUBITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HYDRO-ENERGY JOINT VENTURE

HEAD OF SLOUGH 11  
 RIVER MILE : 136.50  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 1986  
 FLOW CASE : C TEMP RULE : 4 DEC. C  
 REFERENCE RUN NO. : 7196C4A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



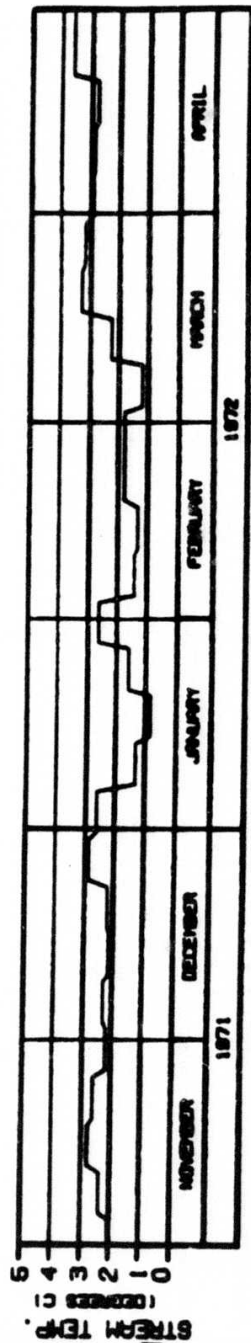
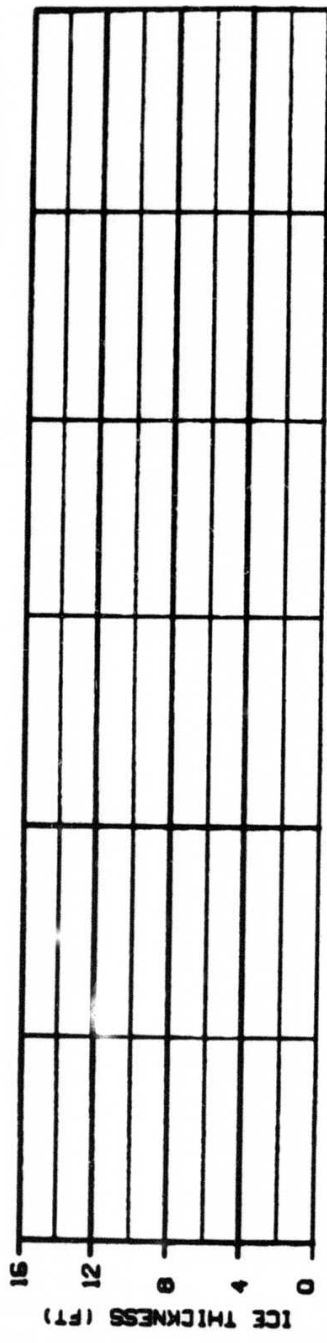
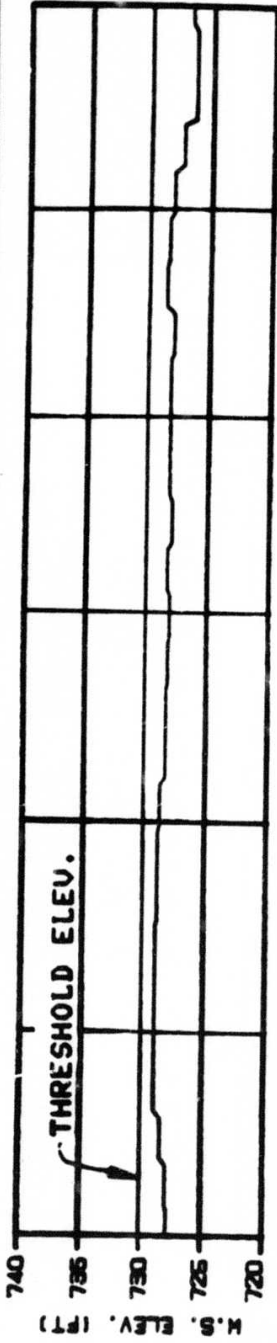


FLORIDA POWER AUTHORITY  
 SUJUTNA RIVER  
 SUJUTNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HYDROLOGICAL DATA CENTER  
 TAMPA, FLORIDA 33604

HEAD OF SLOUGH 17  
 RIVER MILE : 139.30  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : NATANA 1986  
 FLOW CASE : C  
 FLOW RATE : 4 UELU. C  
 FLOW VELOCITY : 7188CAR

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

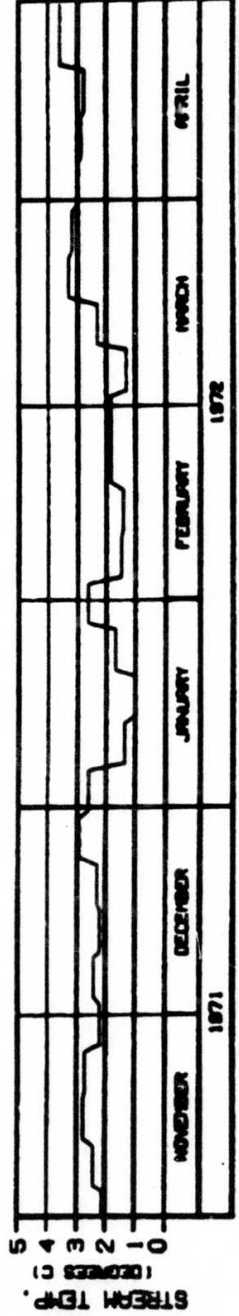
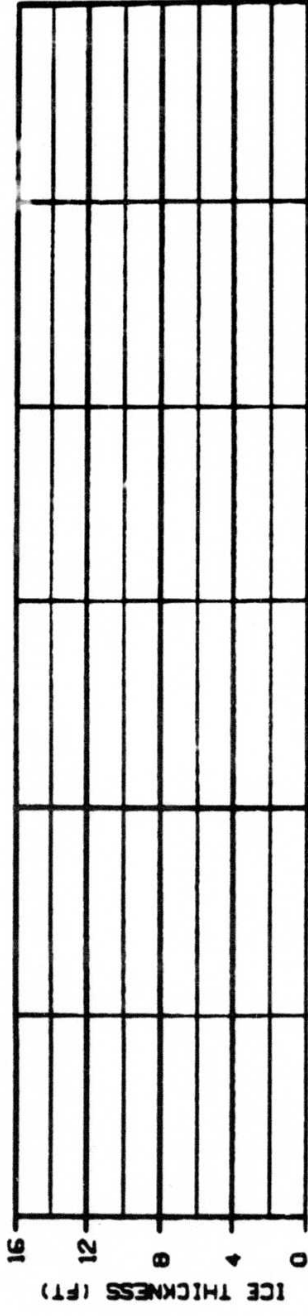
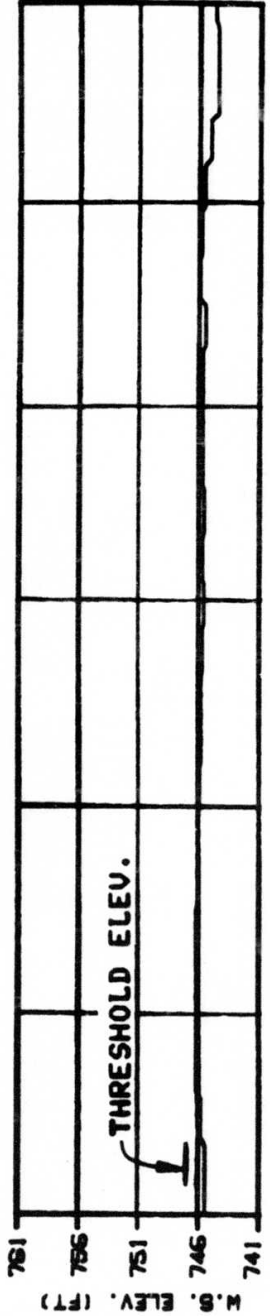




FLORIDA POWER AUTHORITY  
SUSTAINA RIVER  
ICE SIMULATION  
TIME HISTORY  
HARRIS-EMERSON JOINT VENTURE  
DESIGNED BY: [ ] DRAWN BY: [ ]

HEAD OF SLOUGH 20  
RIVER MILE : 140.50  
WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : MATANA 1986  
FLOW CASE : C TEMP RULE : 4 DEG. C  
REFERENCE RUN NO. : 7198C4A

ICE THICKNESS LEGEND:  
1: TOTAL THICKNESS  
2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
SUBITNA RIVER  
ICE SIMULATION  
TIME HISTORY  
HARRIS-EDWARD JOINT VENTURE  
PROJECT NUMBER: 7158C4A

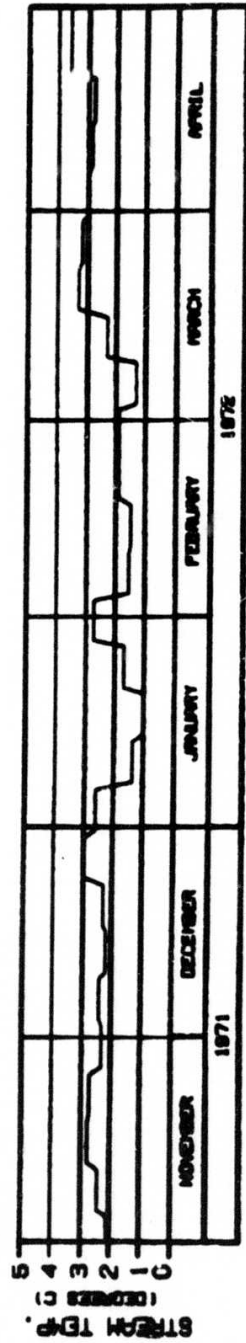
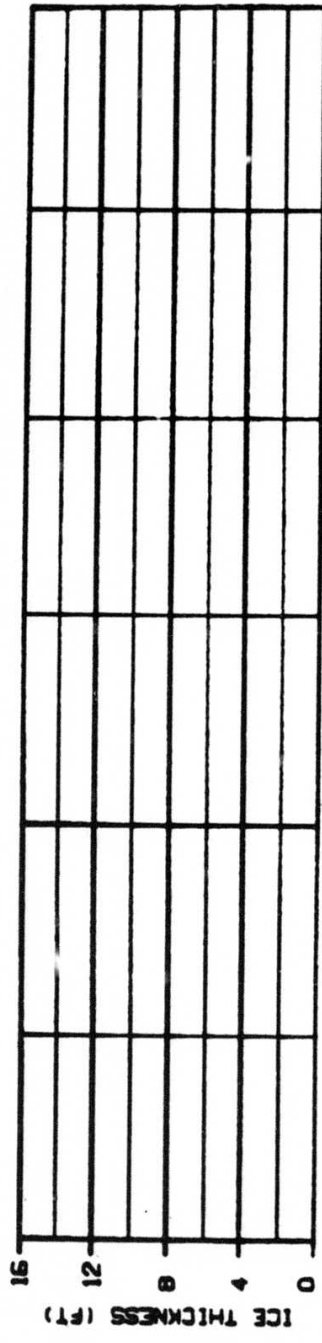
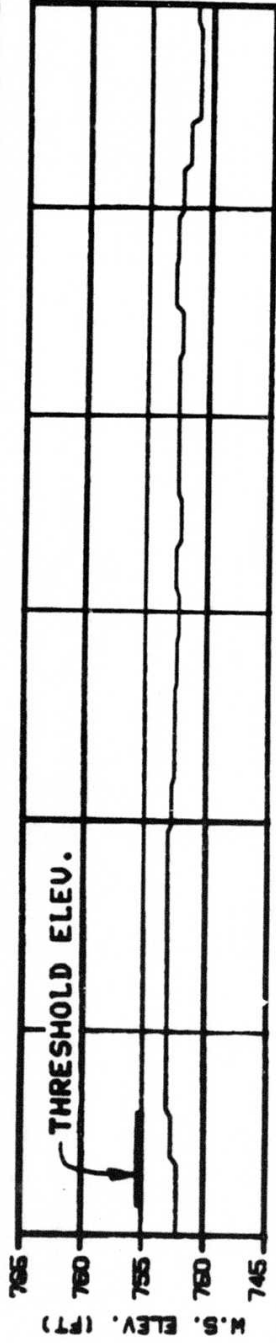
SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : MATANA 1986  
FLOW CASE : C TEMP RULE : 4 DEC. C  
REFERENCE RUN NO. : 7158C4A

ICE THICKNESS LEGEND:

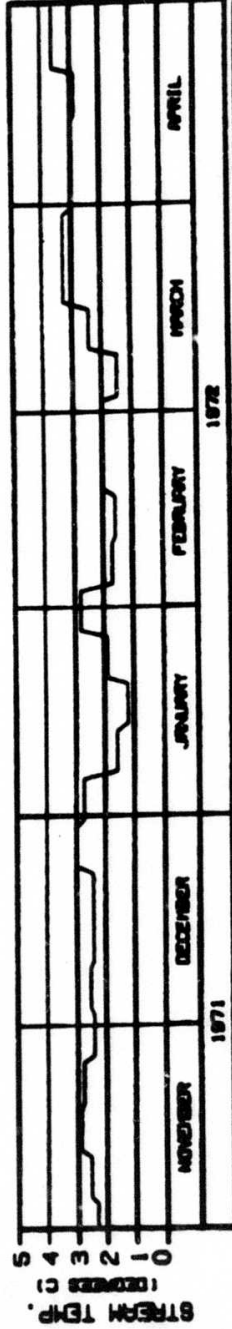
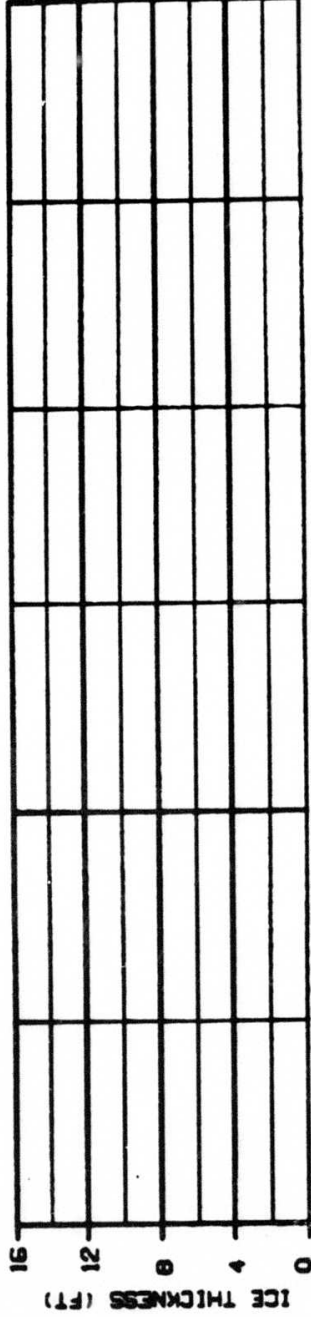
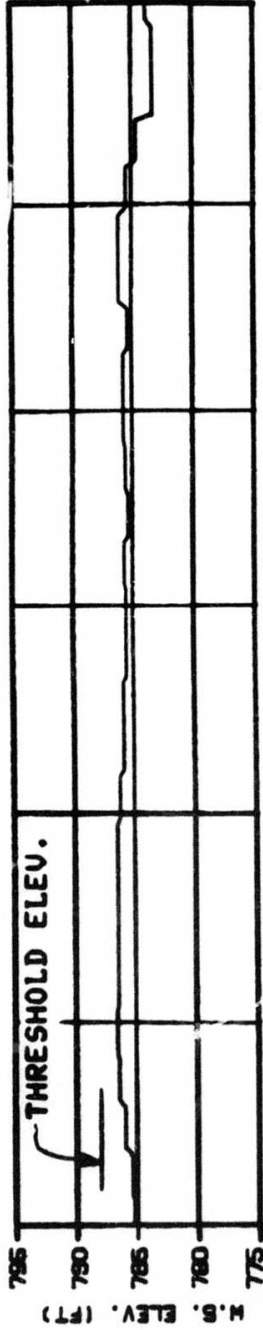
- 1: TOTAL THICKNESS
- 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SLUETH PROJECT  
 SLUETH RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 1969-1980 JOINT VENTURE  
 1980-1981

HEAD OF SLOUGH 21  
 RIVER MILE : 142.20  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 1986  
 FLOW CASE : C TEMP RULE : 4 DEG. C  
 REFERENCE RUN NO. : 7196CA4

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 CUSTOMER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARVEY-EDGECOD JOINT VENTURE  
 REPORT - 8-1-1988 10 JUN 88 8802.142

HEAD OF SLOUGH 22  
 RIVER MILE : 144.80  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 1986  
 FLOW CASE : C TEMP RULE : 4 DEG. C  
 REFERENCE RUN NO. : 7198C-4A

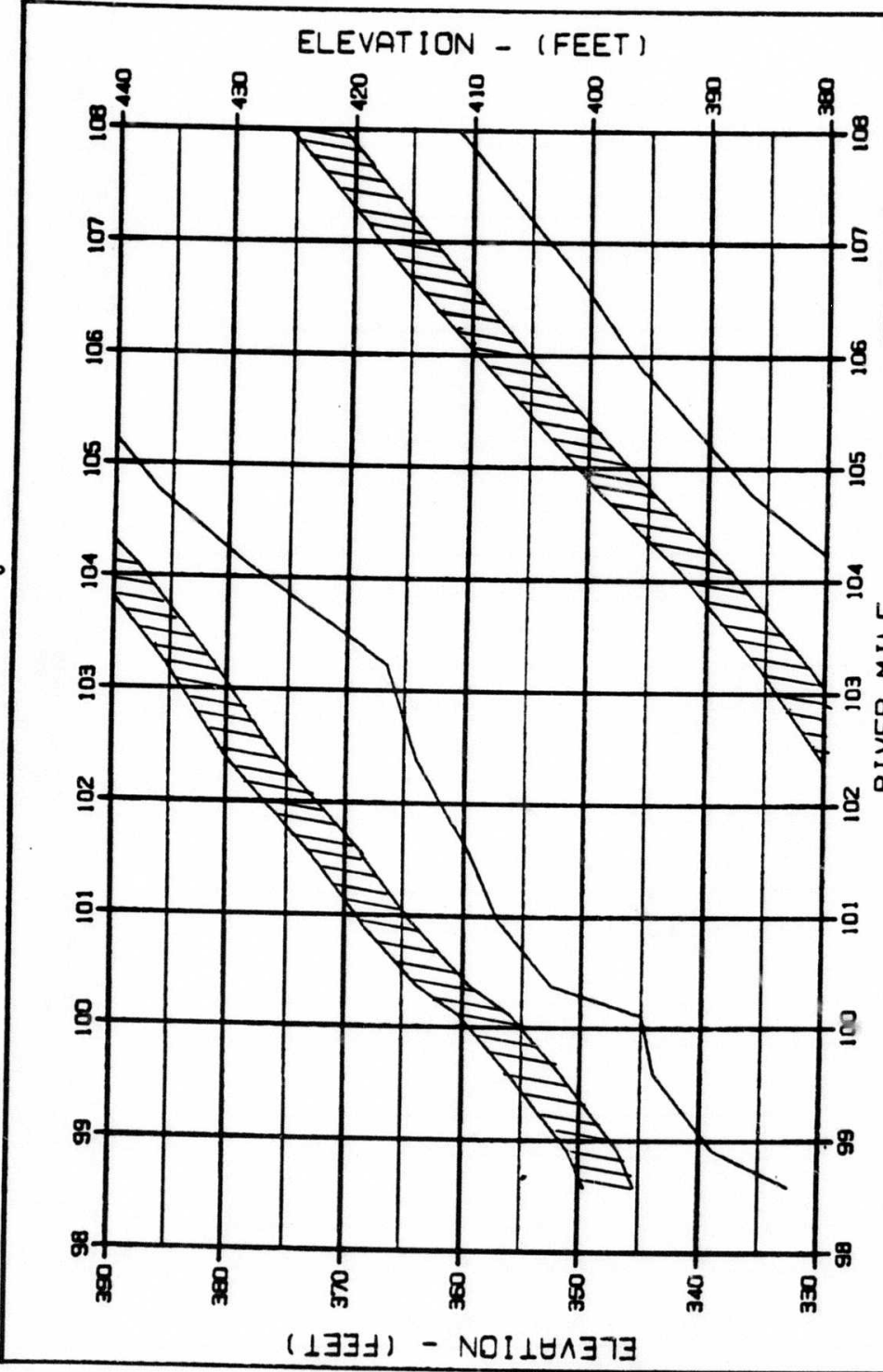
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

OPTIONAL

**EXHIBIT J**



C



ALASKA POWER AUTHORITY	
SUBMITTA PROJECT	SUSITNA RIVER
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
HARZA-EBREDD JOINT VENTURE	
DATE: 8.1.88	BY: J.S. G.
REV: 1.02	

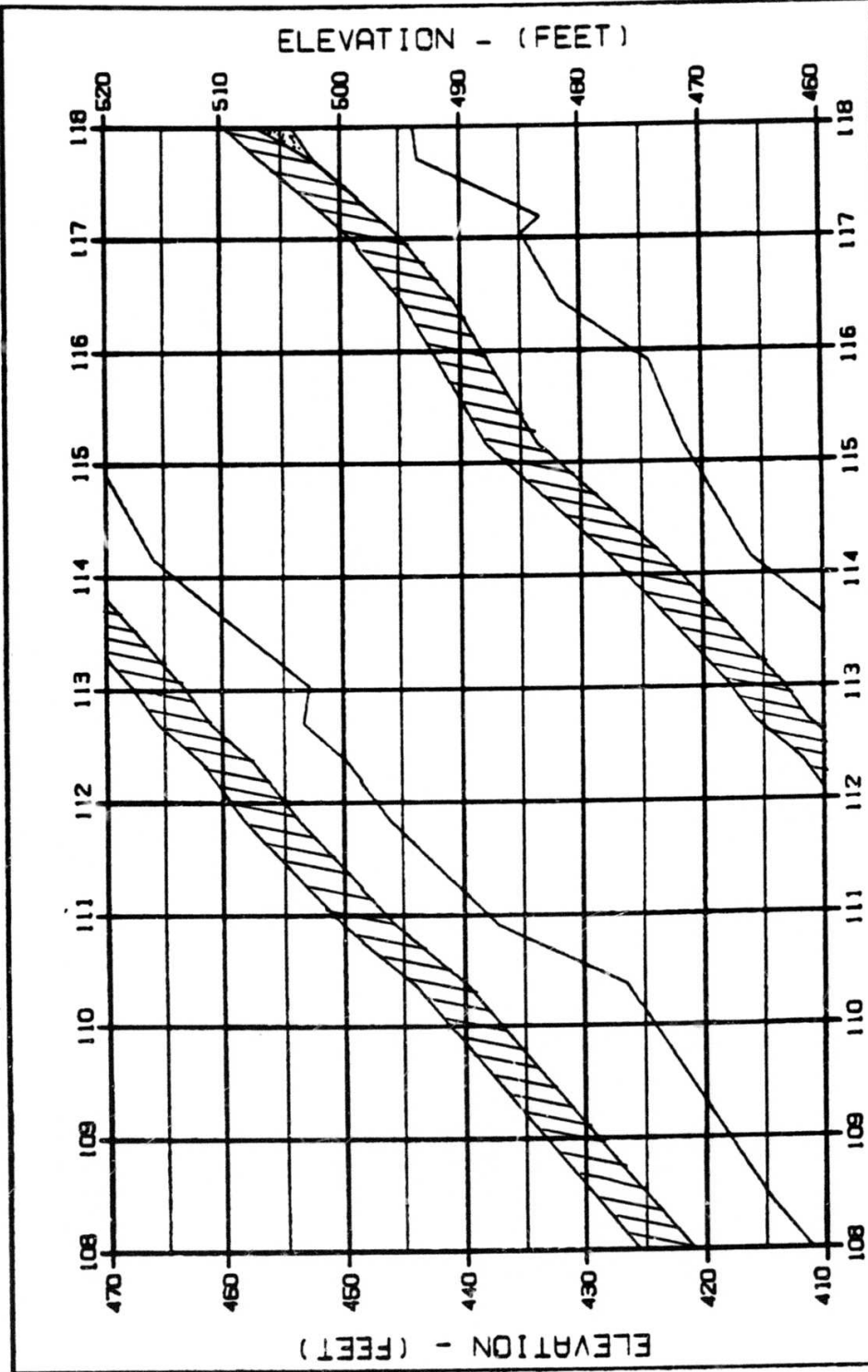
WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7101CNA

LEGEND:

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

OPTION#2

c

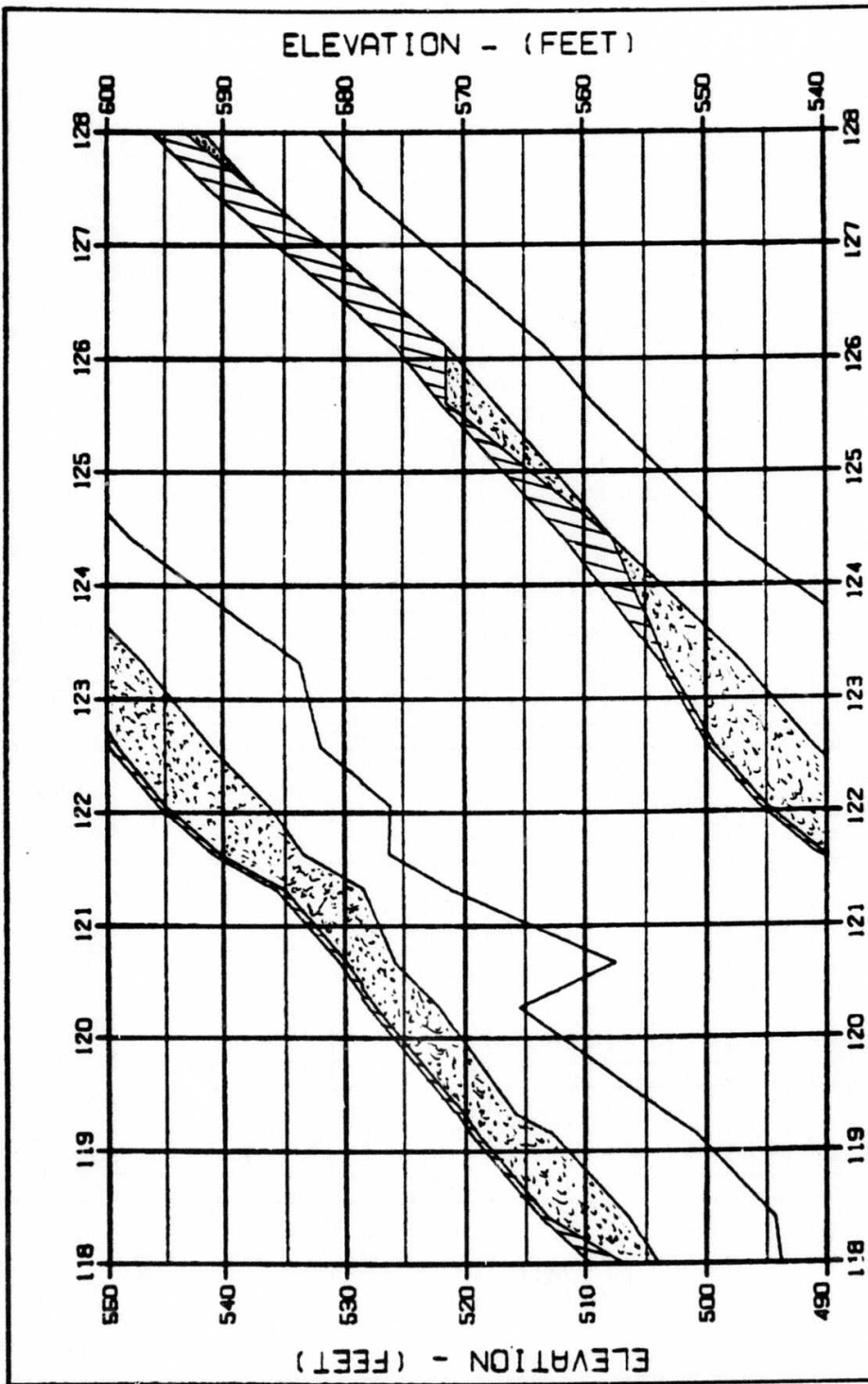


ALASKA POWER AUTHORITY	
SUBITNA PROJECT	SUSITNA RIVER
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
HARZA-EBRSCO JOINT VENTURE	
DESIGNED BY: HAZEN	DATE: 17 JAN 72
PROJECT NO.: 1000-142	

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7101CNA

LEGEND:  
 TOP OF SOLID ICE  
 SLUSH/SOLID ICE INTERFACE  
 BOTTOM OF SLUSH ICE  
 RIVER BED

OPTION 7



ALASKA POWER AUTHORITY	
SUSTINA PROJECT	SUSTINA RIVER
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
HARZA-ERBACCO JOINT VENTURE	
DATE: 11.1988	BY: JAB/SL
1988.142	

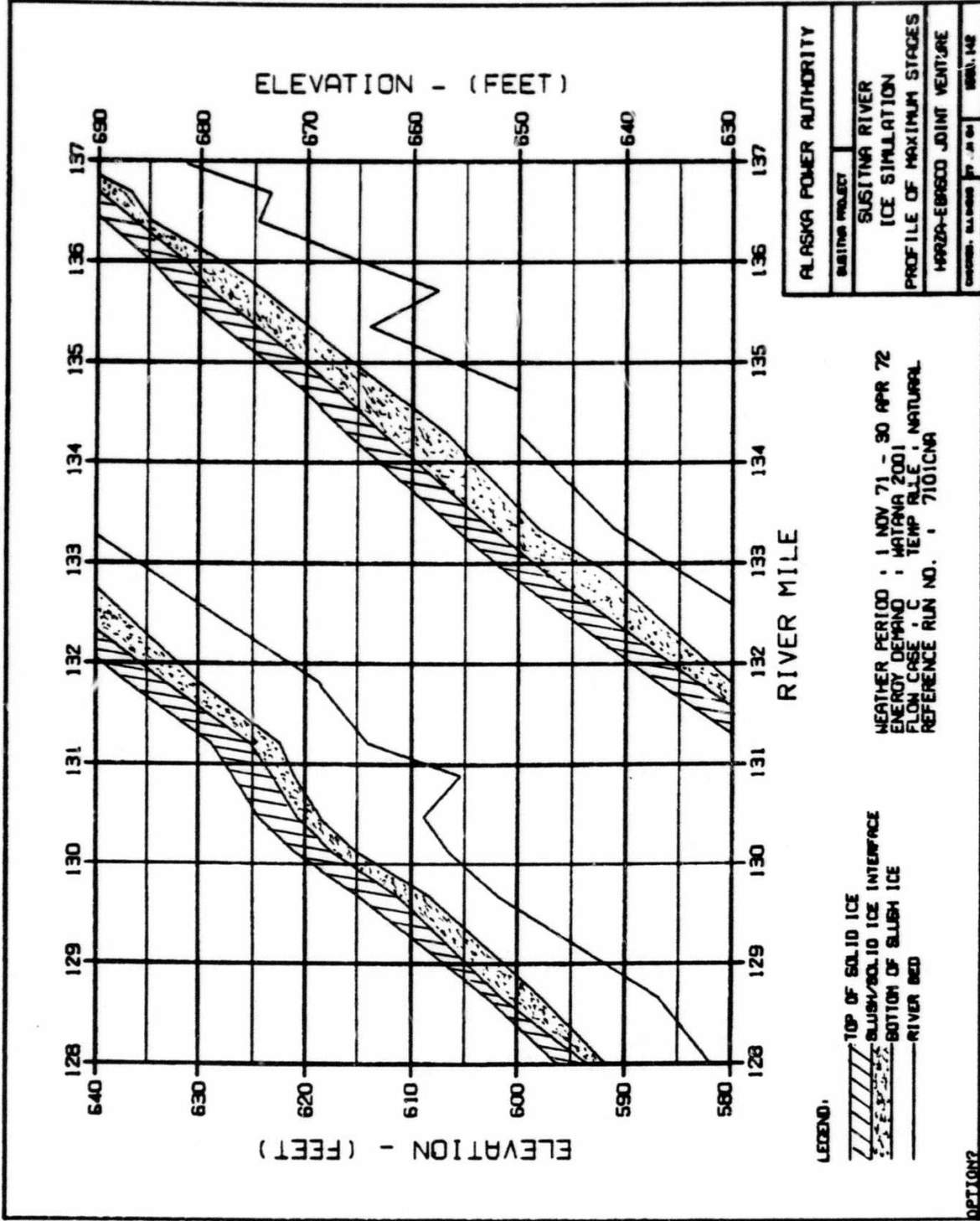
WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7101CINA

LEGEND:  
 TOP OF SOLID ICE  
 SLUSH/SOLID ICE INTERFACE  
 BOTTOM OF SLUSH ICE  
 RIVER BED

OPTION?



c



LEGEND.

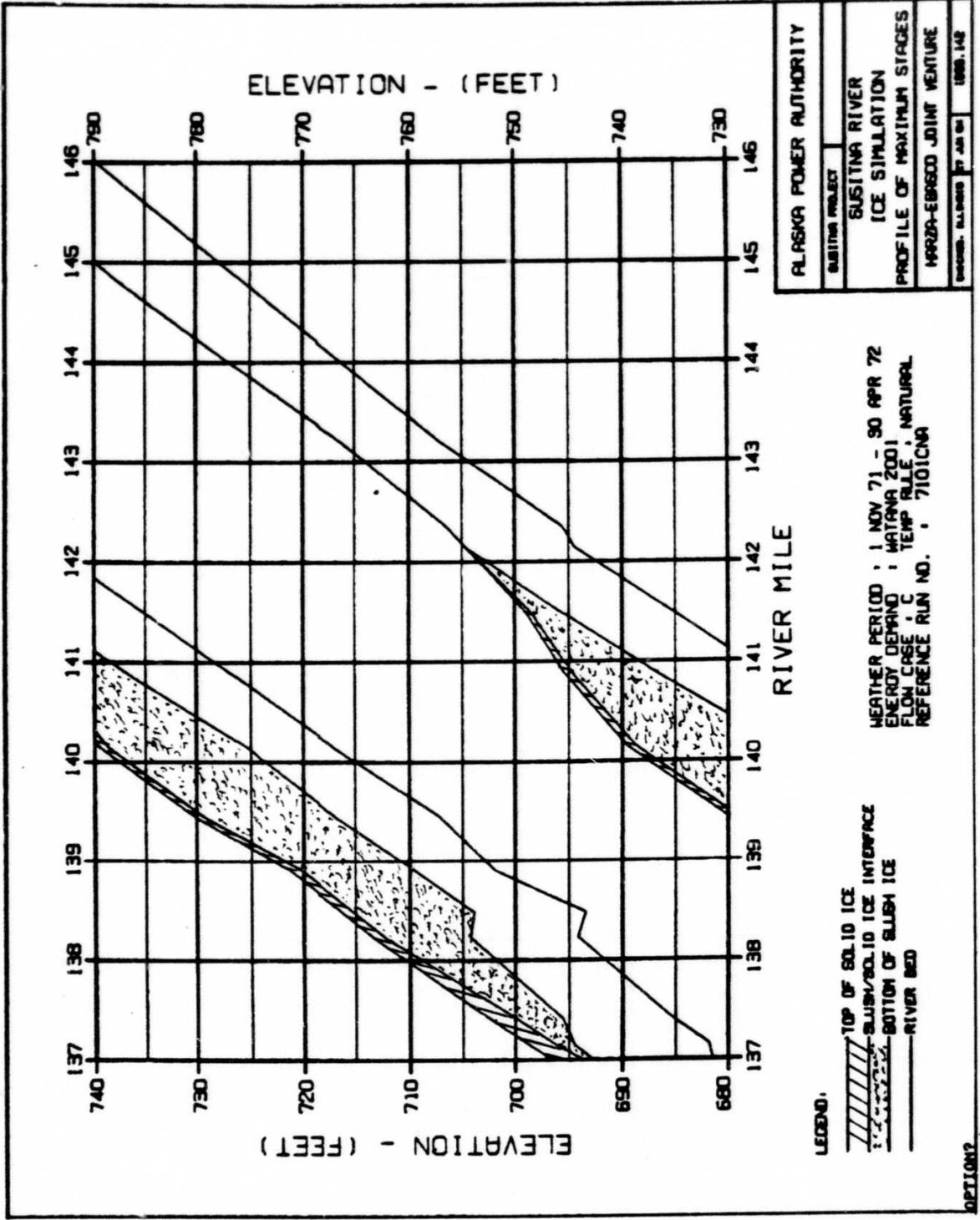
- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7101CNA

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	SUSITNA RIVER
	ICE SIMULATION
	PROFILE OF MAXIMUM STAGES
	HARZA-ERBROD JOINT VENTURE
DESIGN. SHEET NO. 12-61	SCALE: 1/4" = 1'

SECTION 2

c



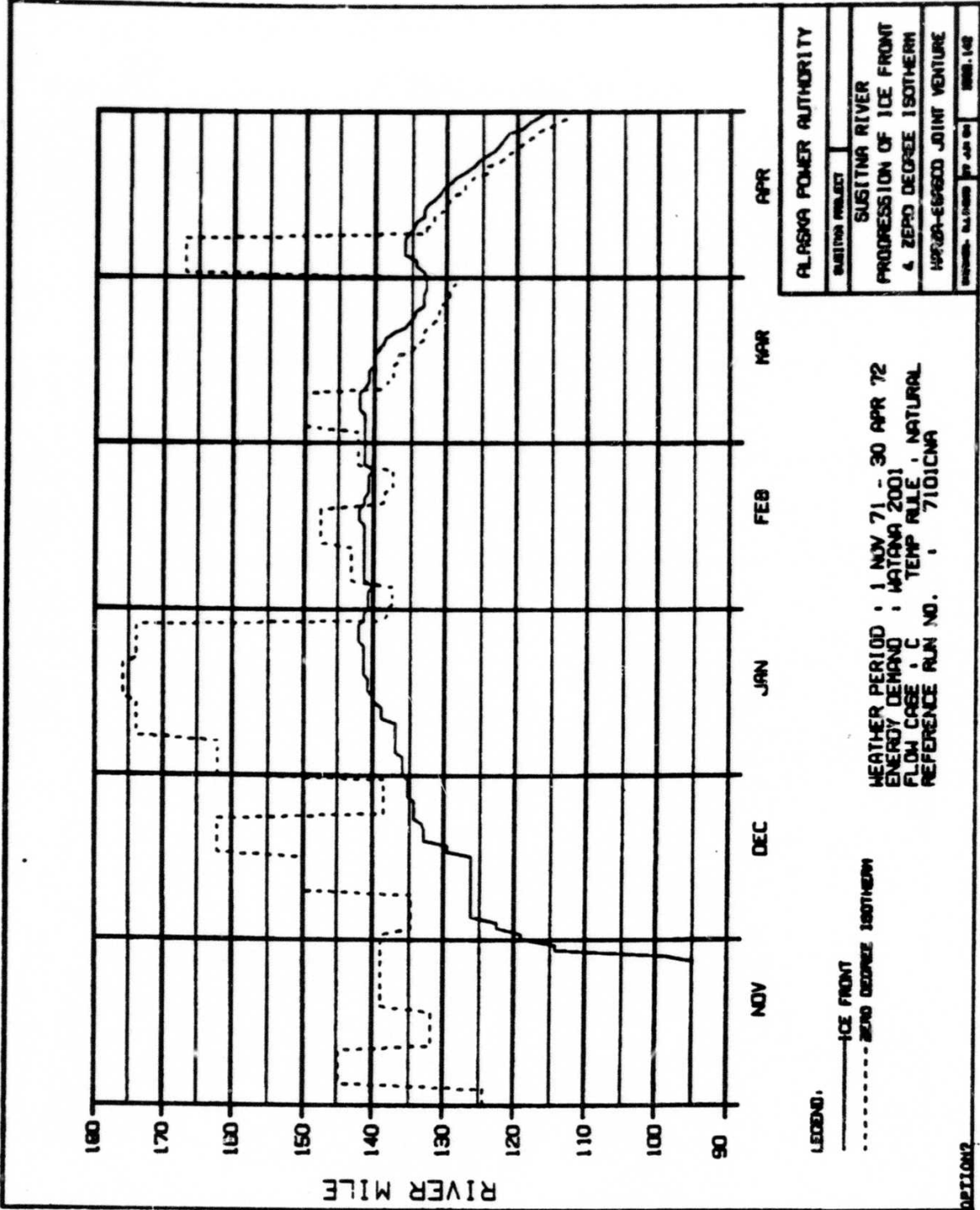
LEGEND.

- 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  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7101CNA

ALASKA POWER AUTHORITY	
SUBMITTING PROJECT	SUSITNA RIVER
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
MARZA-EBERGO JOINT VENTURE	
DESIGNED BY	DATE
DRG NO.	1000.142

OPTION 2

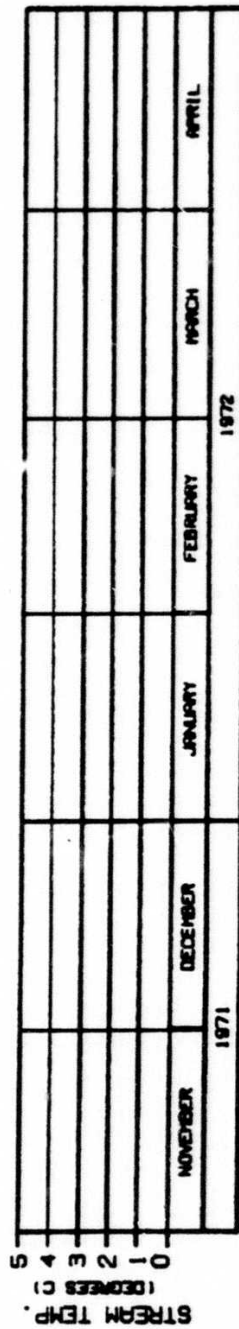
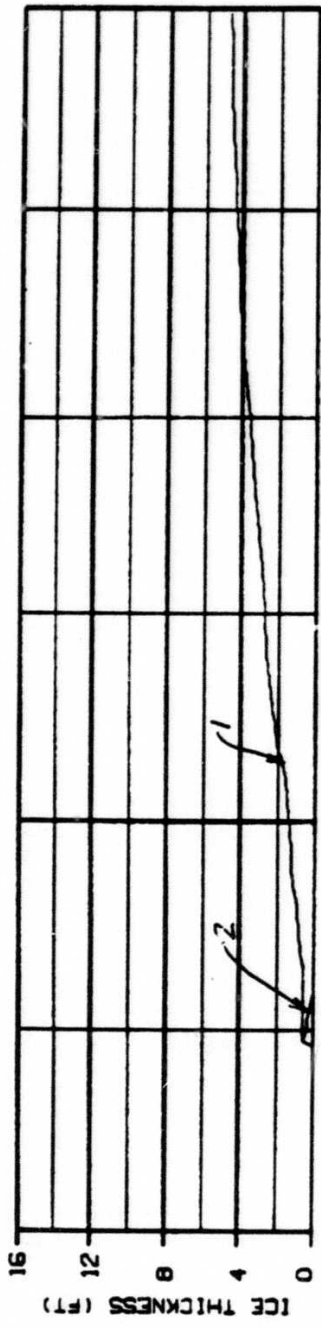
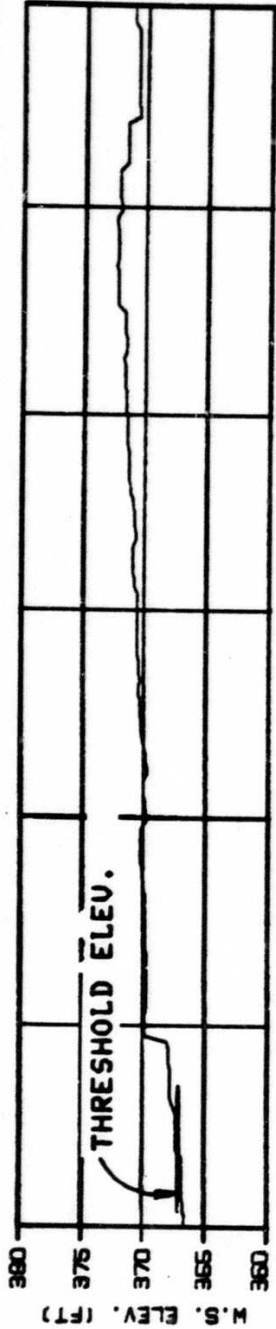


ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM  
 HARPER-ESPINO JOINT VENTURE  
 PROJECT NUMBER: 72-018

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP FILE : NATURAL  
 REFERENCE RUN NO. : 7101CNA

LEGEND:  
 — ICE FRONT  
 - - - ZERO DEGREE ISOTHERM

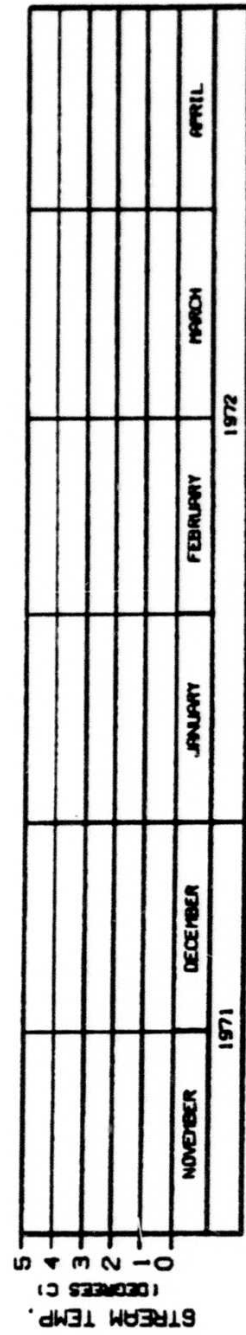
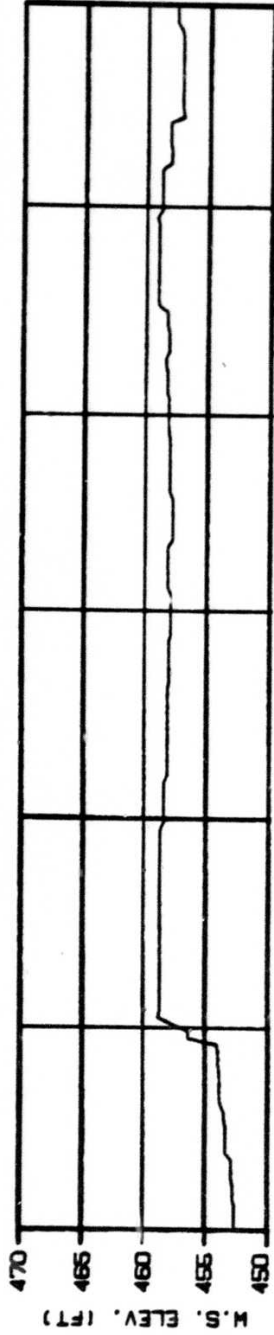
OPTION 2



ALASKA POWER AUTHORITY  
 SUBSTATION PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERD JOINT VENTURE  
 PROJECT NO. 77-048-01 0000-1-02

HEAD OF WHISKERS SLOUGH  
 RIVER MILE : 101.50  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 710101A

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT



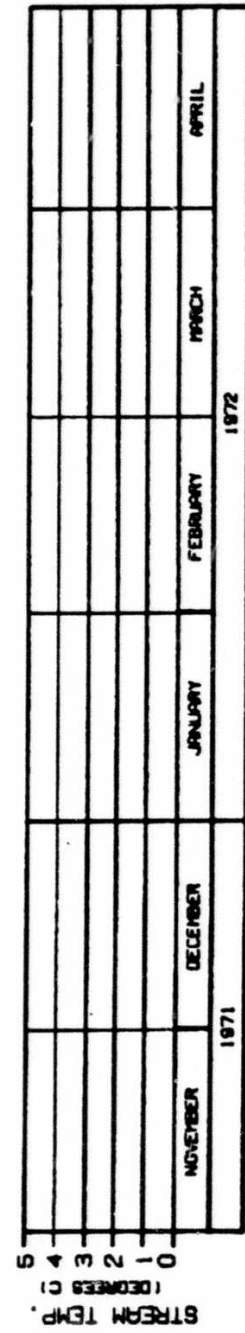
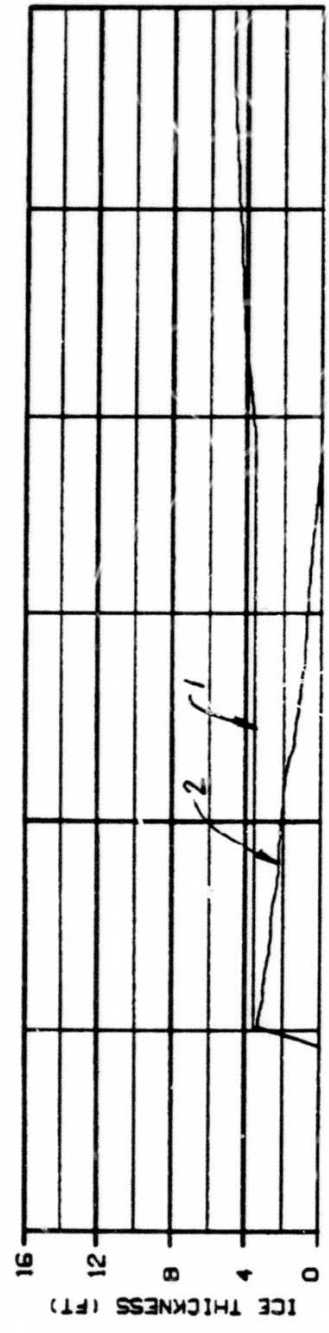
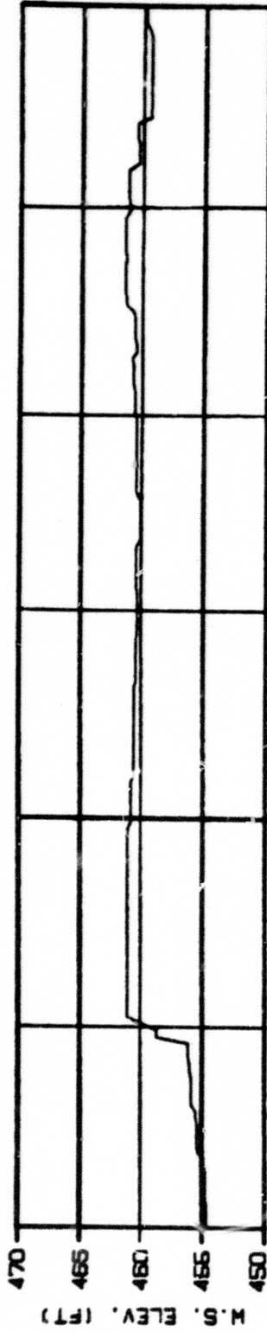
ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 145970-FR0500 JOINT VENTURE  
 0888-145

SIDE CHANNEL AT HEAD OF GASH CREEK  
 RIVER MILE : 112.00  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 711101A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

1971

1972

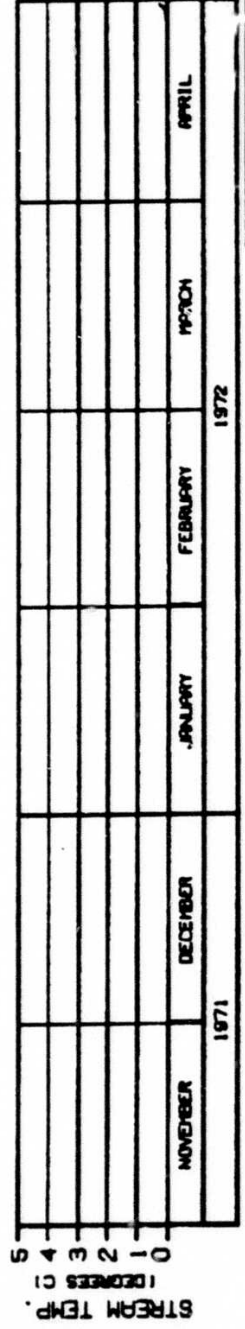
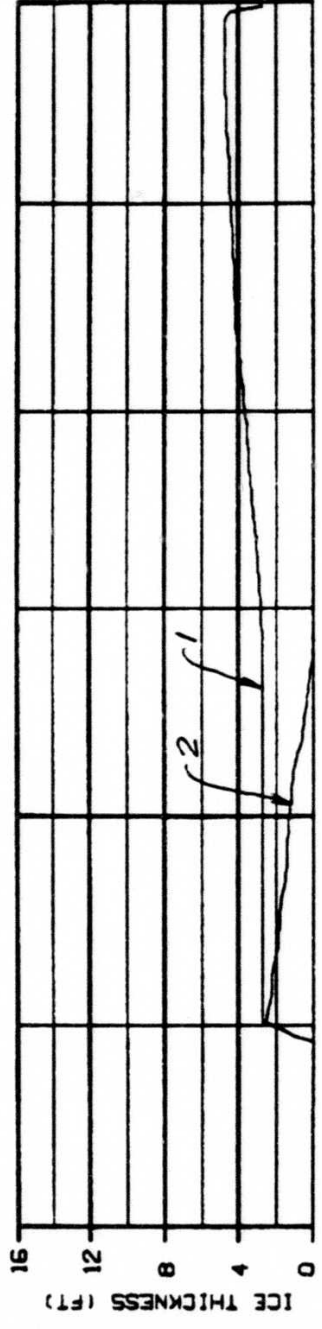
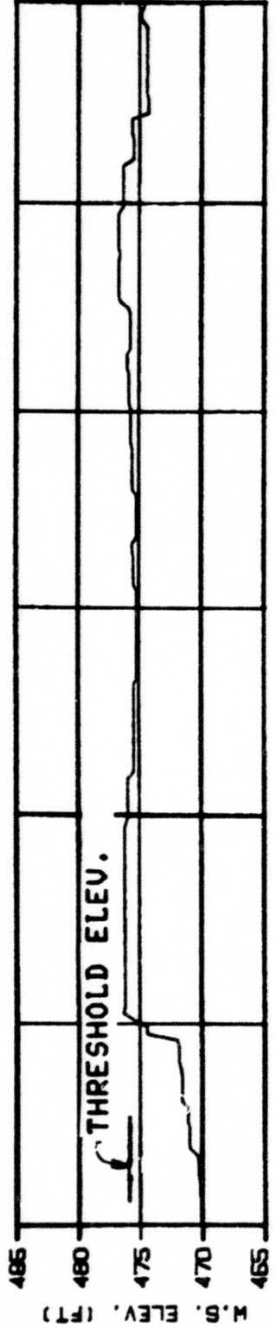


ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARRIS-ERBOLD JOINT VENTURE  
 DRAWING NO. 7101CNA

**MOUTH OF SLOUGH 6A**  
 RIVER MILE : 112.34  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7101CNA

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

NOVEMBER 1971  
 DECEMBER  
 JANUARY  
 FEBRUARY  
 MARCH  
 APRIL 1972



ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER

ICE SIMULATION

TIME HISTORY

HARRIS-ERBOLD JOINT VENTURE

DESIGN: 11/80 BY JAS/CS

ISSN: 142

HEAD OF SLOUGH 8

RIVER MILE : 114.10

WEATHER PERIOD : 1 NOV 71 - 30 APR 72

ENERGY DEMAND : MATANA 2001

FLOW CASE : C TEMP RULE : NATURAL

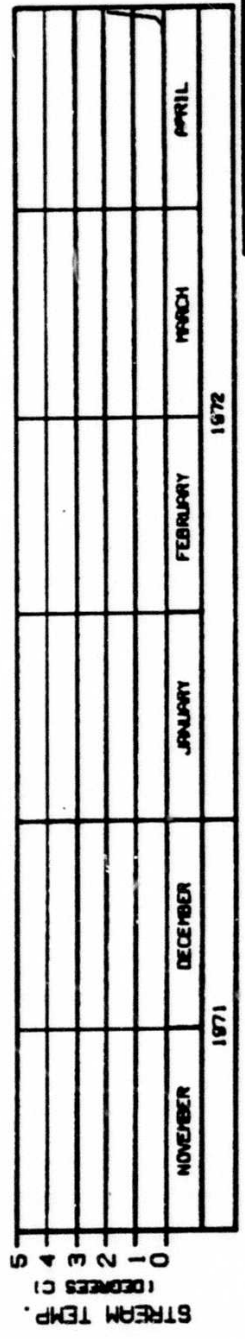
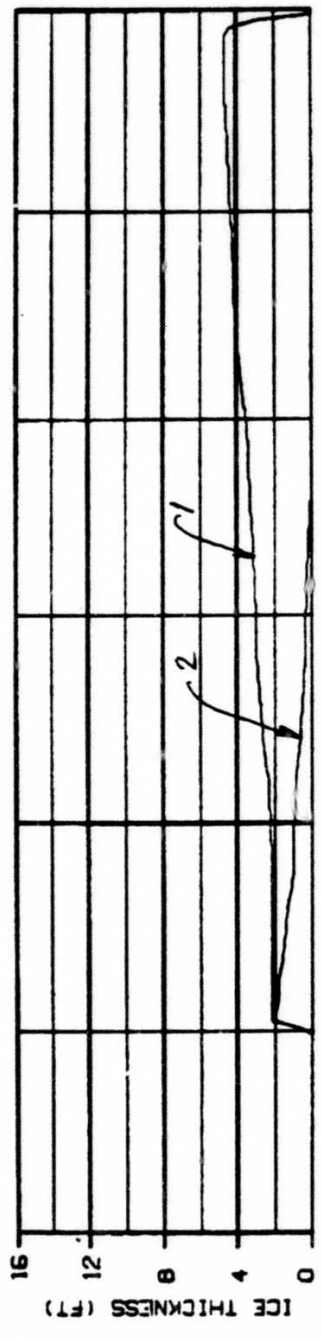
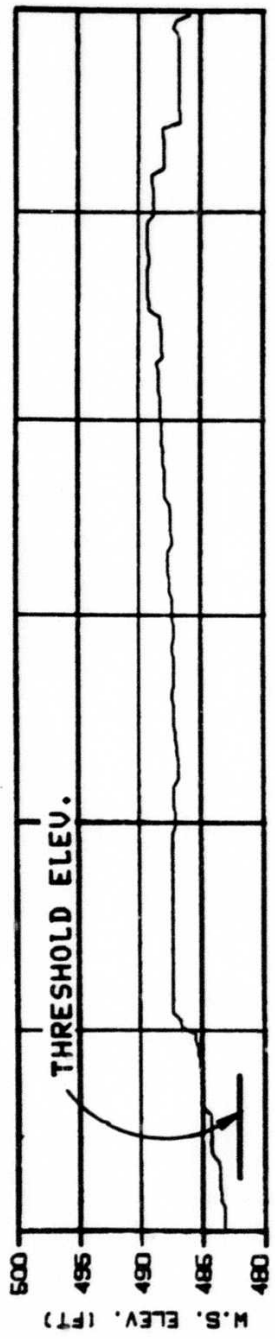
REFERENCE RUN NO. : 710101A

ICE THICKNESS LEGEND:

1. TOTAL THICKNESS

2. SLUGH COMPONENT



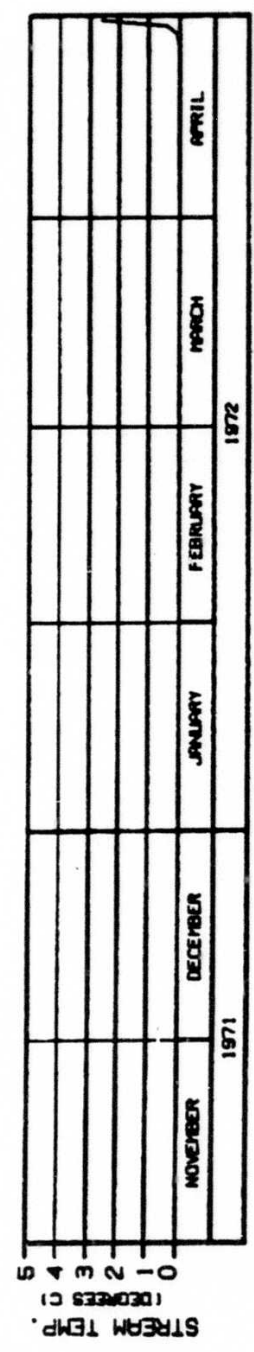
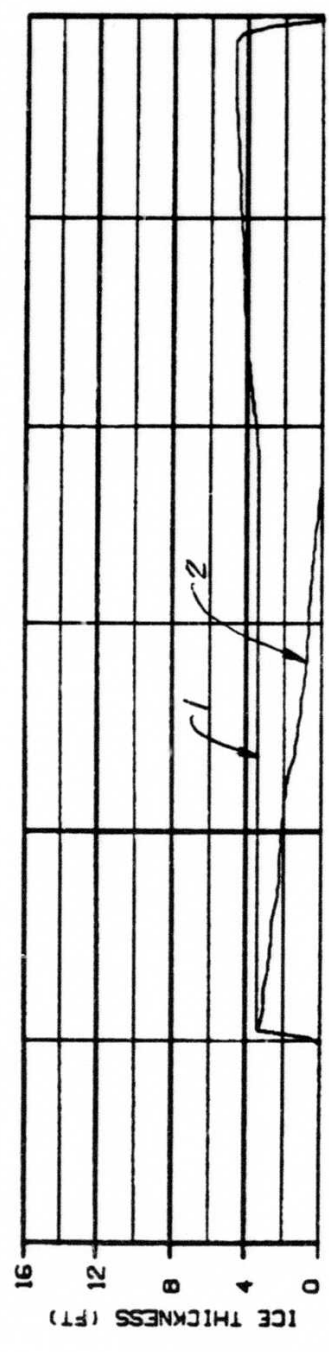
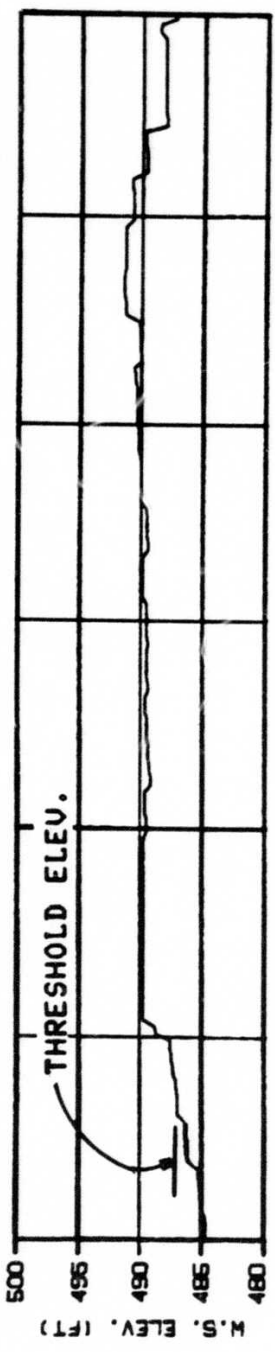


ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 ORDER NO. 81-0000 17 JAN 81 888.142

SIDE CHANNEL MSII  
 RIVER MILE : 115.50  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 710101A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

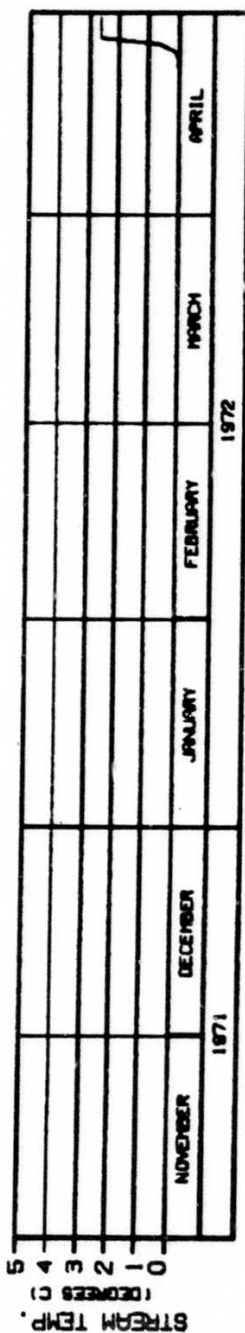
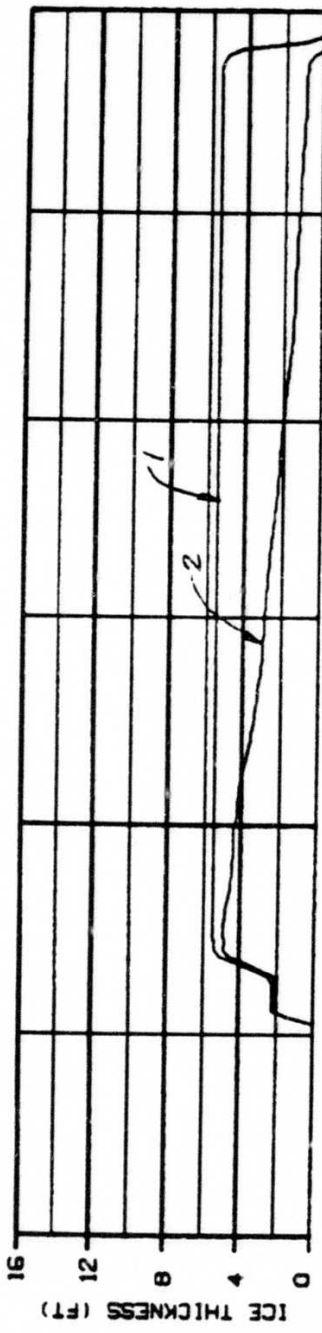
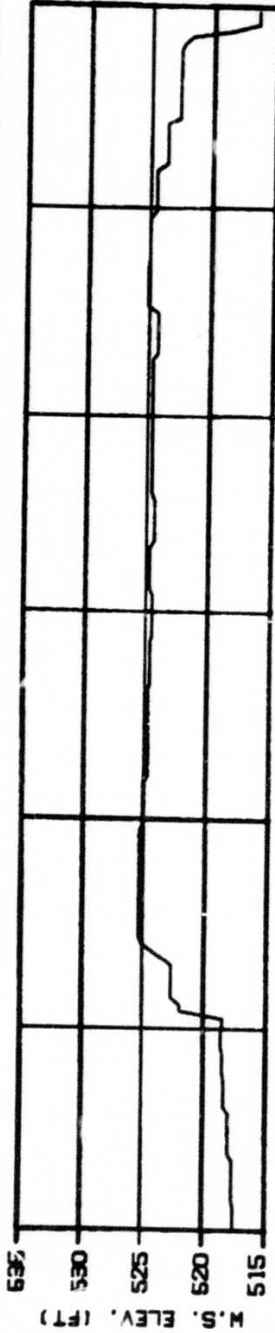




ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HORZA-ERBEC JOINT VENTURE  
 SHEET: 11.010 OF 11.010 1000-1.02

HEAD OF SIDE CHANNEL MSII  
 RIVER MILE : 115.90  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : NATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 71010NA

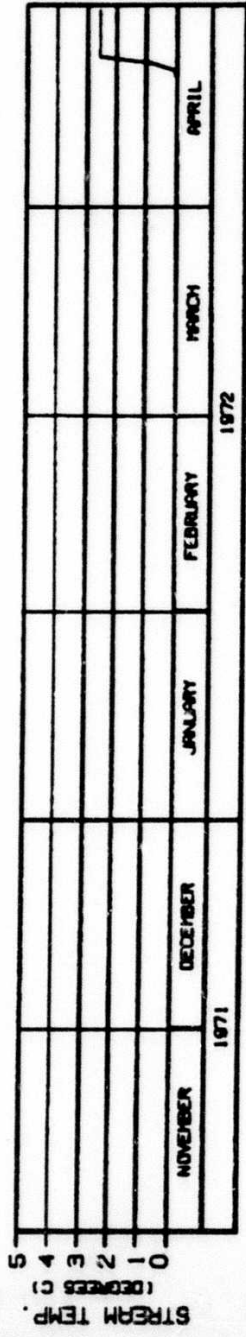
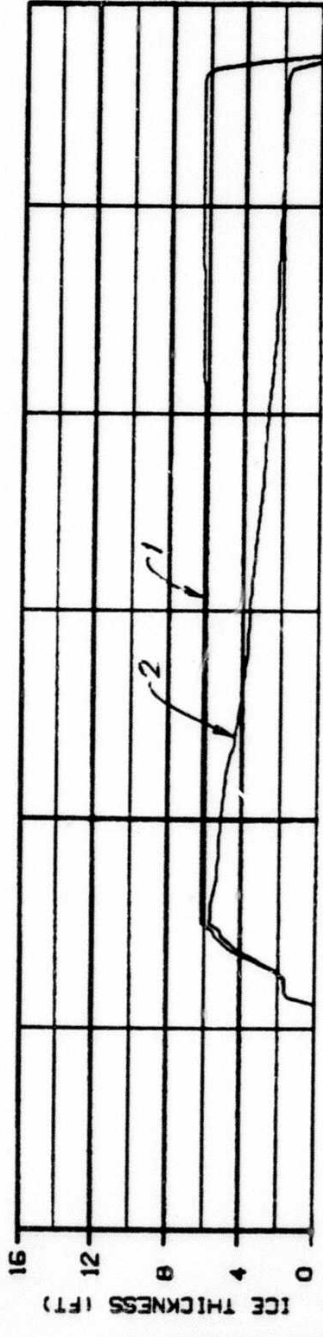
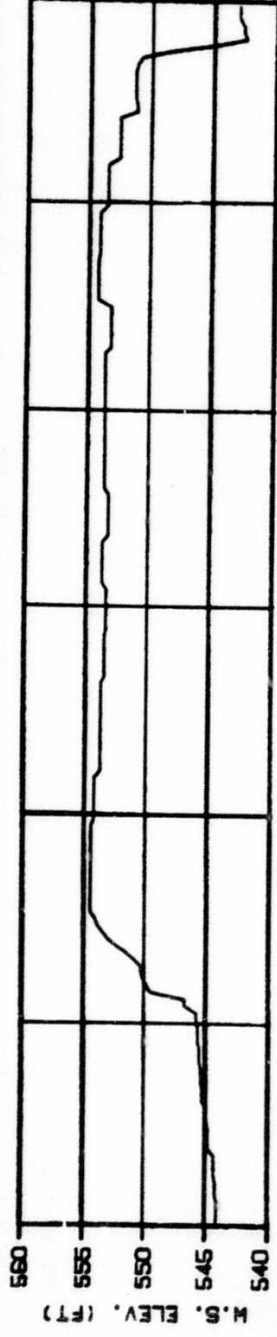
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBACO JOINT VENTURE  
 RECORD: 81-0000 07 JAN 84 0000.142

RIVER MILE : 120.00  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C  
 TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7101CVA

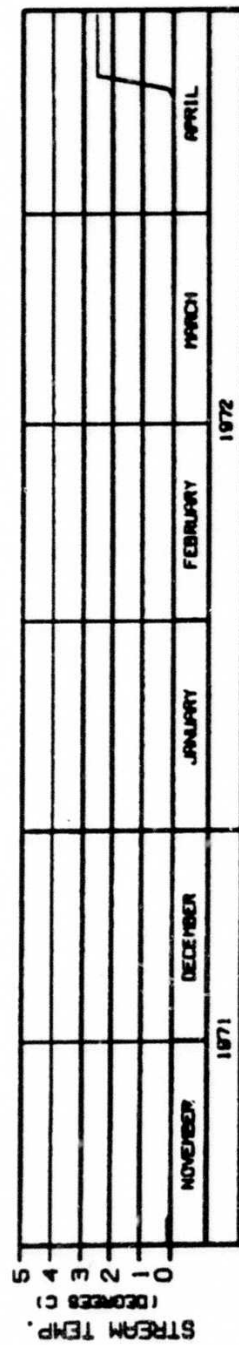
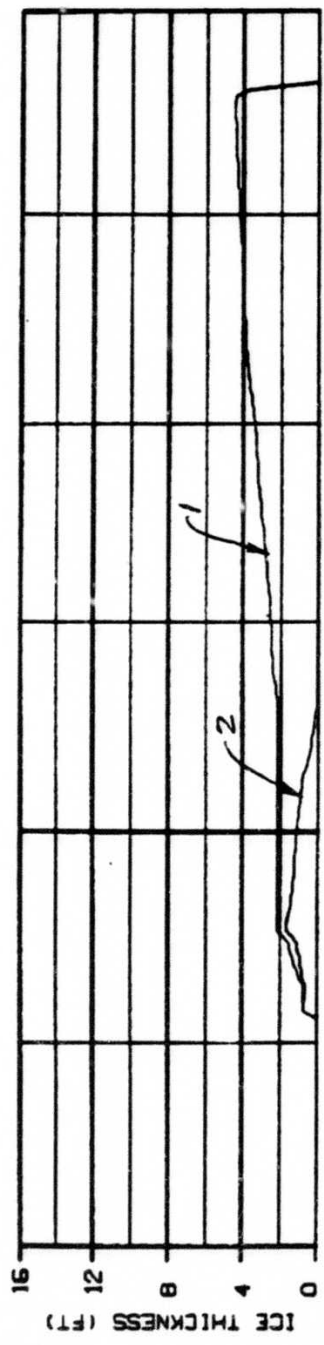
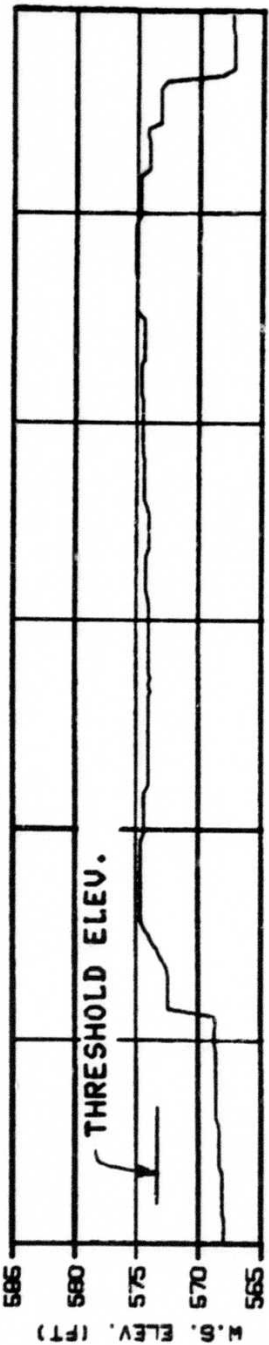
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBACD JOINT VENTURE  
 ORDER NUMBER: 7110101A

HEAD OF MOOSE SLOUGH  
 RIVER MILE : 123.50  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 710101A

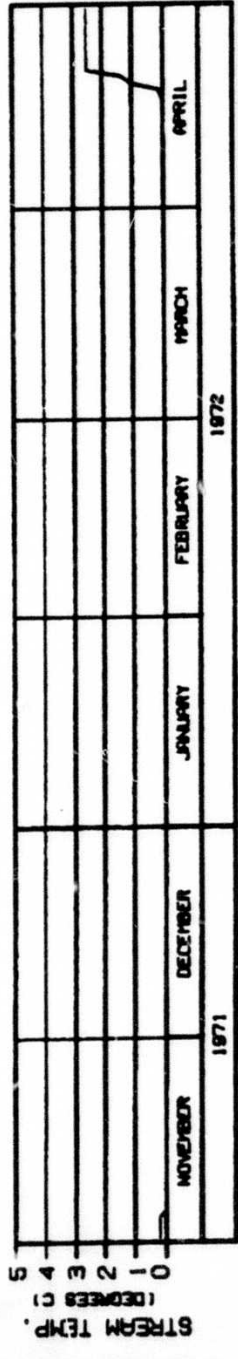
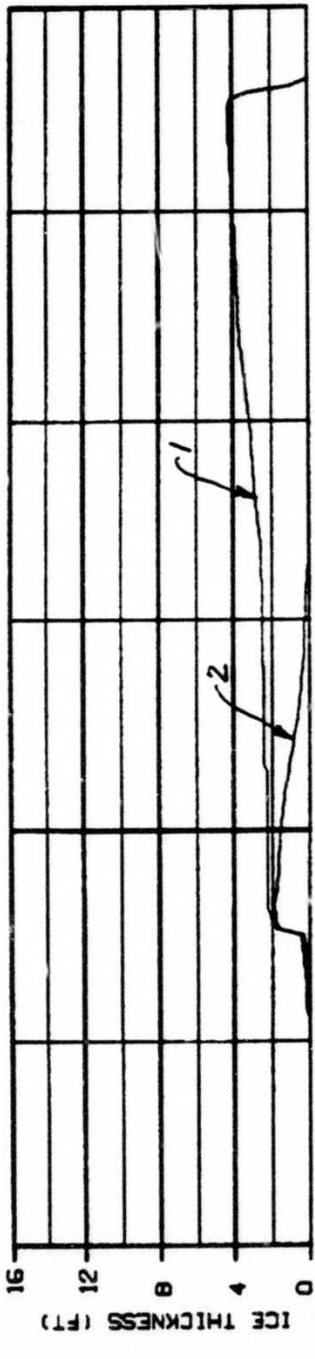
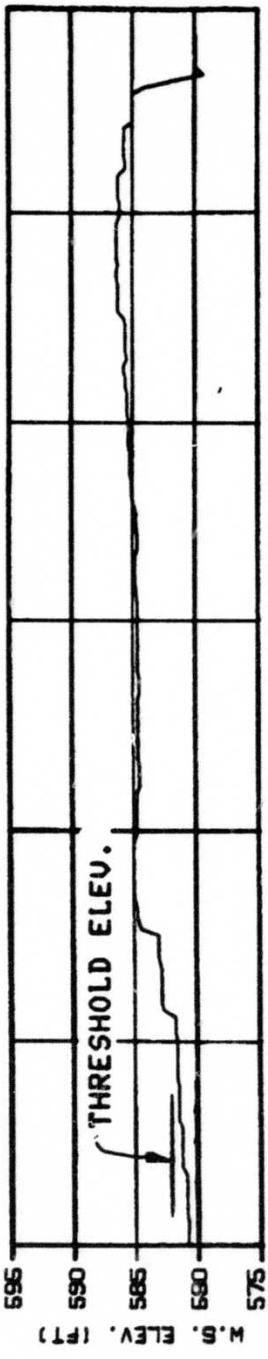
ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SLEITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EDGECO JOINT VENTURE  
 DRAWING NO. 71-1010A

HEAD OF SLOUGH 8A (WEST)  
 RIVER MILE : 126.10  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : NATANA 2001  
 FLOW CASE : C  
 TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 71010A

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT

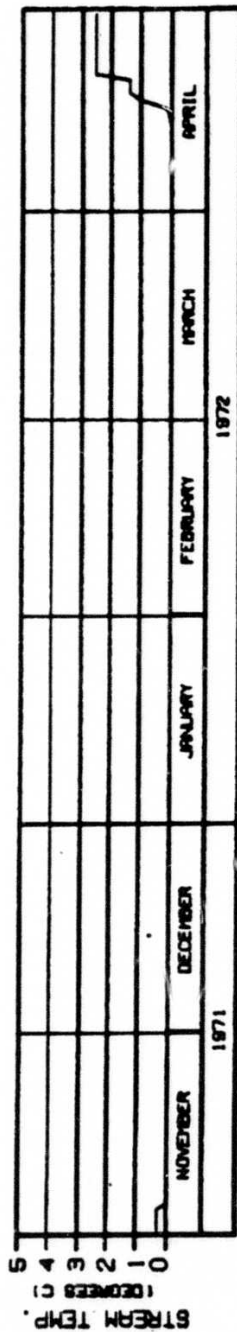
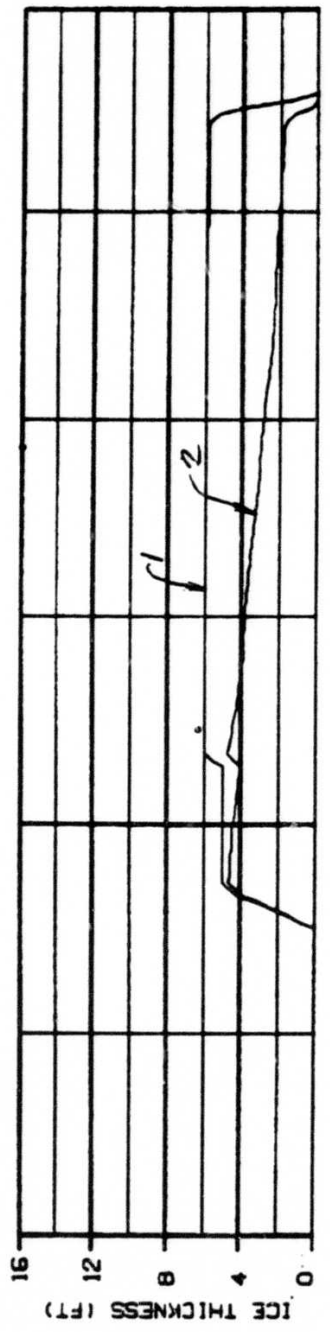
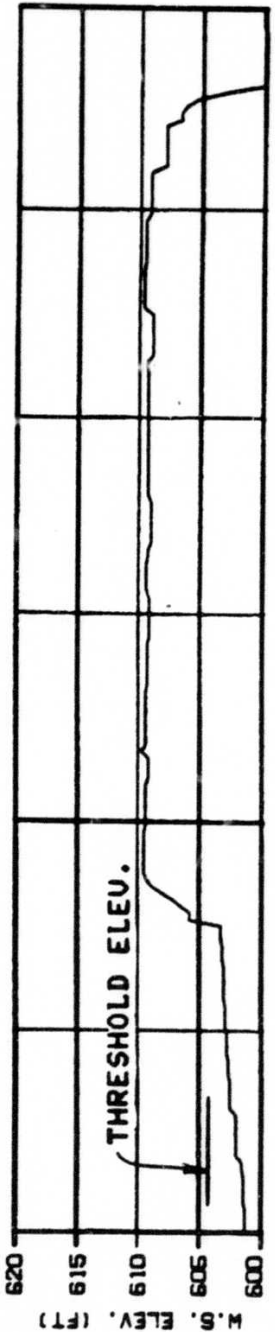


ALASKA POWER AUTHORITY  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBACD JOINT VENTURE  
 SCALE: 1/8" = 1' HORIZ. 1" = 10' VERT.

HEAD OF SLOUGH 8A (EAST)  
 RIVER MILE : 127.10  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : NATANA 2001  
 FLOW CASE : C  
 TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 71010NA

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

c



ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBED JOINT VENTURE  
 ORDER NUMBER 87 JAN 80  
 SHEET 148

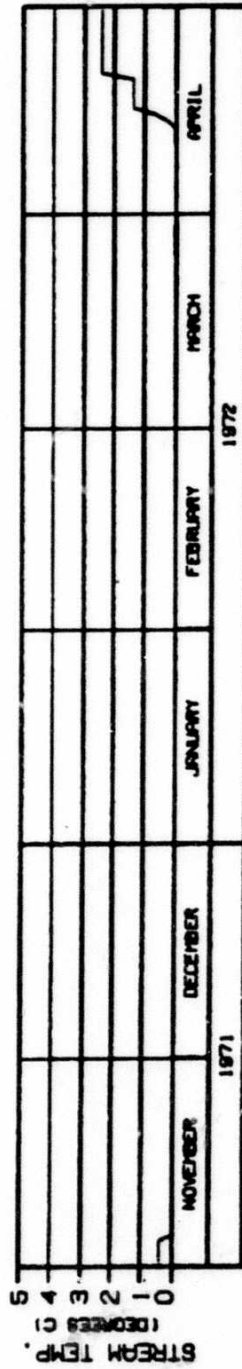
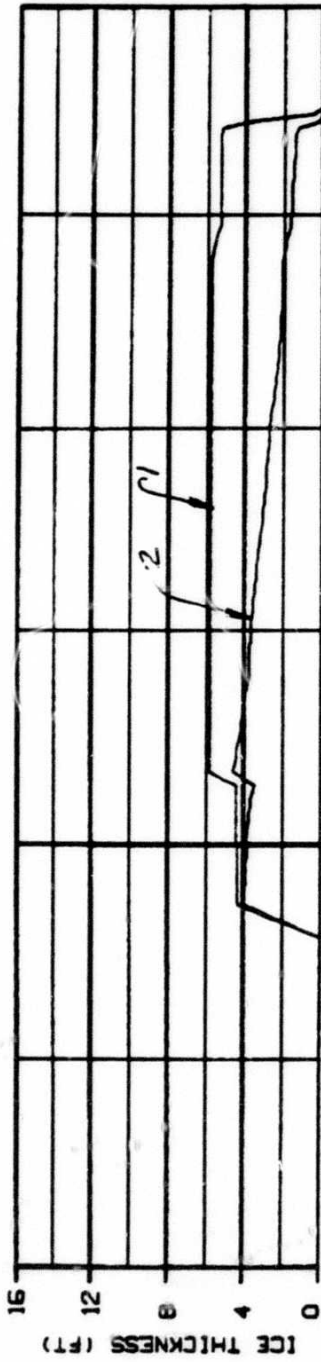
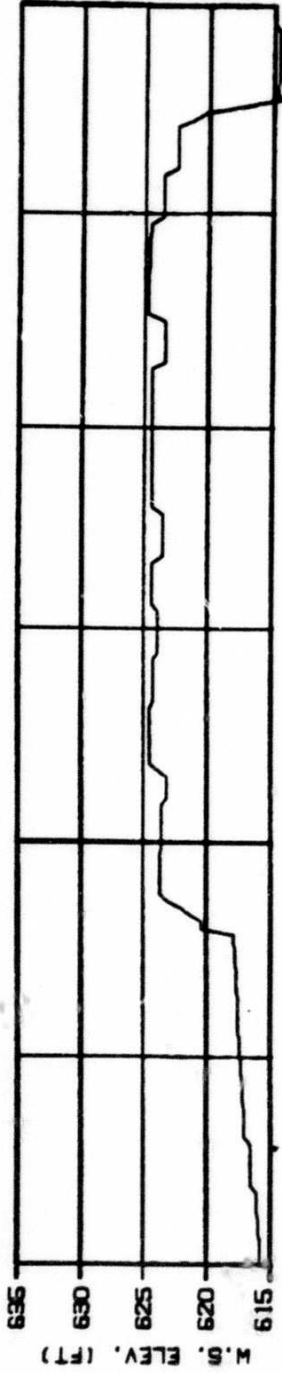
HEAD OF SLOUGH 9  
 RIVER MILE : 129.30  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C  
 TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 710101A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

OPTION



OPTION?



**SIDE CHANNEL U/S OF SLOUGH 9**

**RIVER MILE : 130.60**

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : NATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 710101A

- ICE THICKNESS LEGEND:
1. TOTAL THICKNESS
  2. SLUSH COMPONENT

ALASKA POWER AUTHORITY

SUSITNA PROJECT

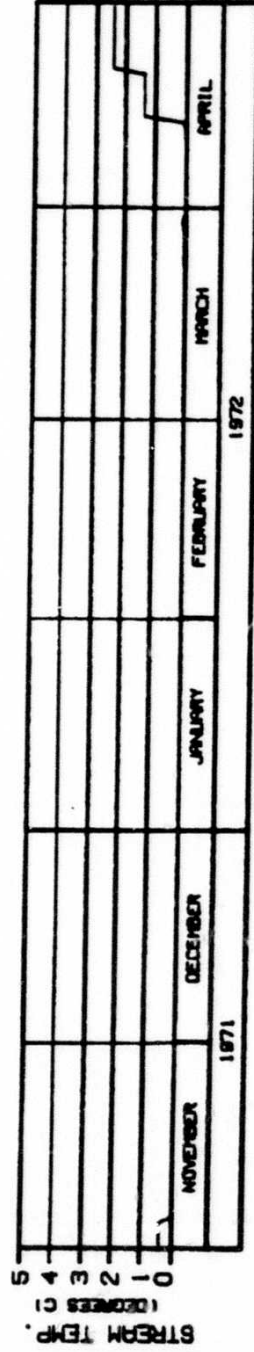
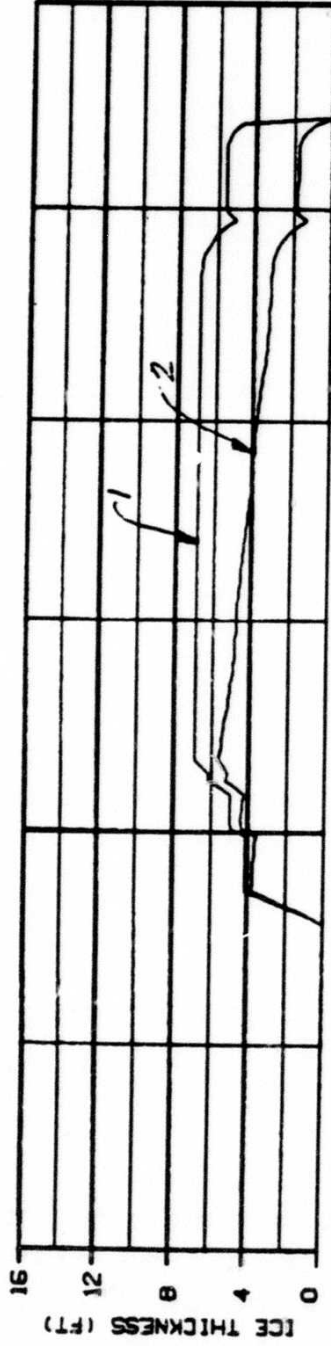
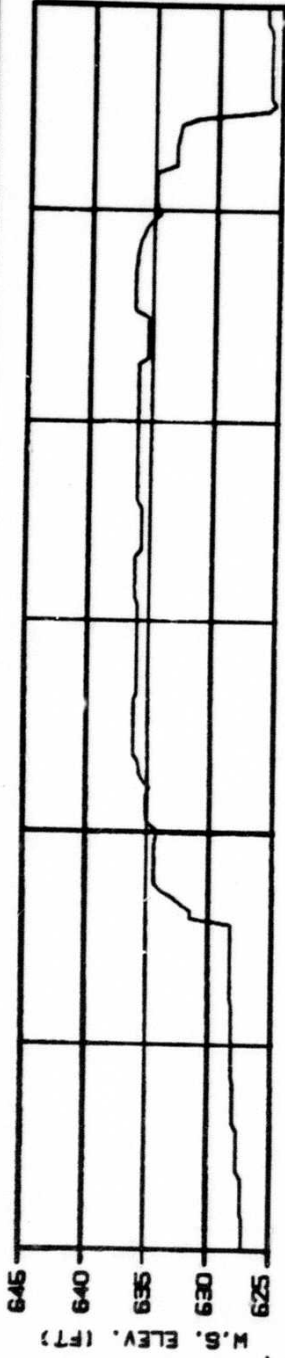
SUSITNA RIVER

ICE SIMULATION

TIME HISTORY

HARZA-EBRACOD JOINT VENTURE

DESIGN: 11/80/80 [ ] JUN 81 [ ] 888.142



ALASKA POWER AUTHORITY

BASELINE PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-ERBACO JOINT VENTURE

ENCLOSURE 11-10000 10 JAN 82 888.142

### SIDE CHANNEL U/S OF 4TH JULY CREEK

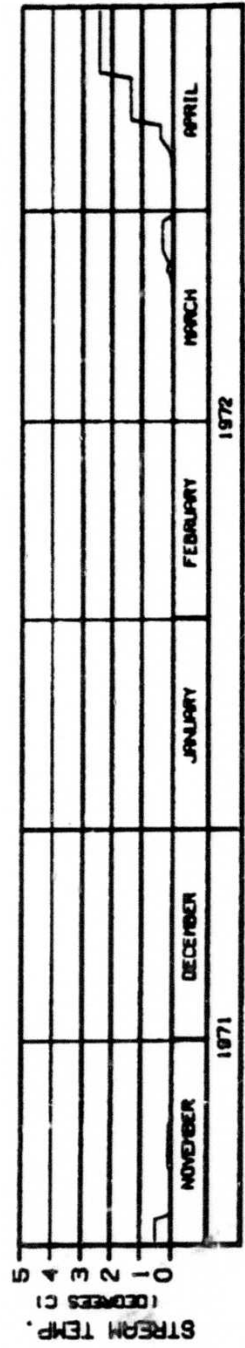
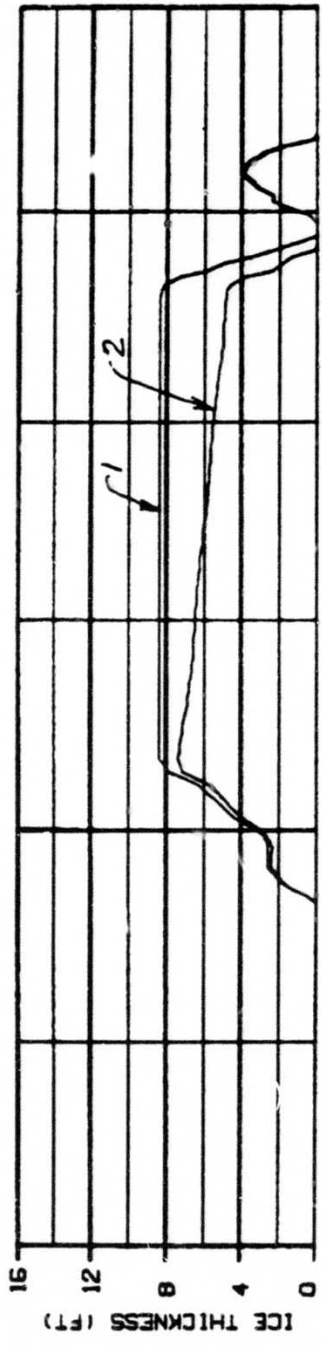
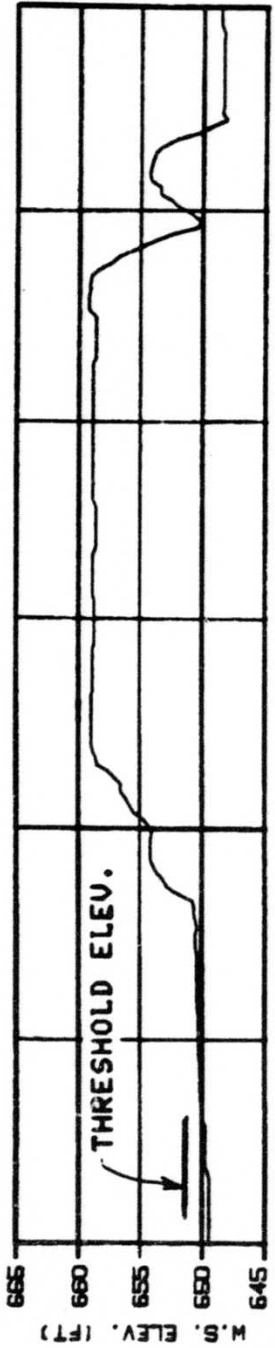
RIVER MILE : 131.80

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : HATANNA 2001  
FLOW CASE : C  
TEMP RULLE : NATURAL  
REFERENCE RUN NO. : 7101CNA

#### ICE THICKNESS LEGEND:

- 1: TOTAL THICKNESS
- 2: SLUSH COMPONENT

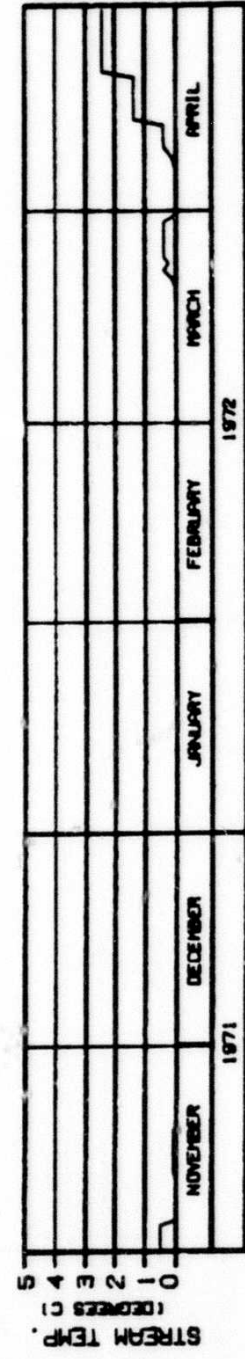
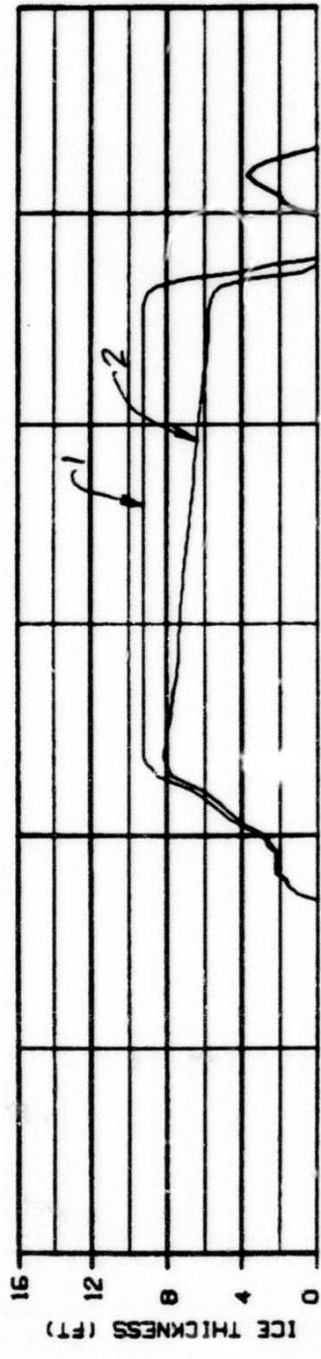
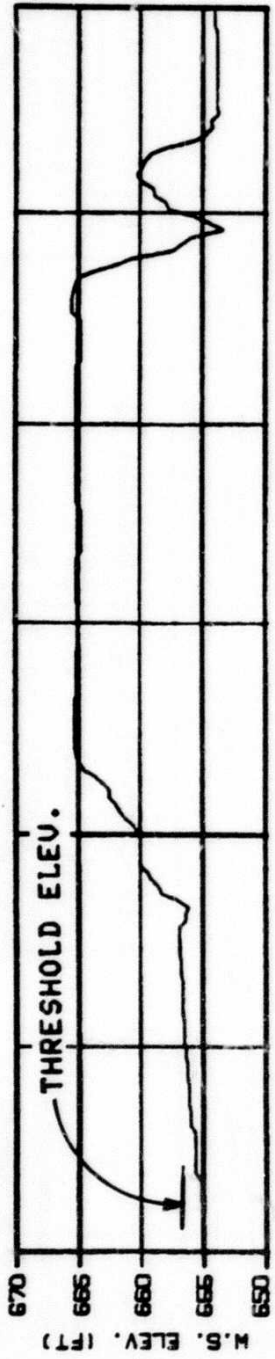




ALASKA POWER AUTHORITY  
 BUSITNA PROJECT  
 BUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 DESIGN - 11/20/71 BY JAS TO MBM, 142

HEAD OF SLOUGH 9A  
 RIVER MILE : 133.70  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 710101A

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT

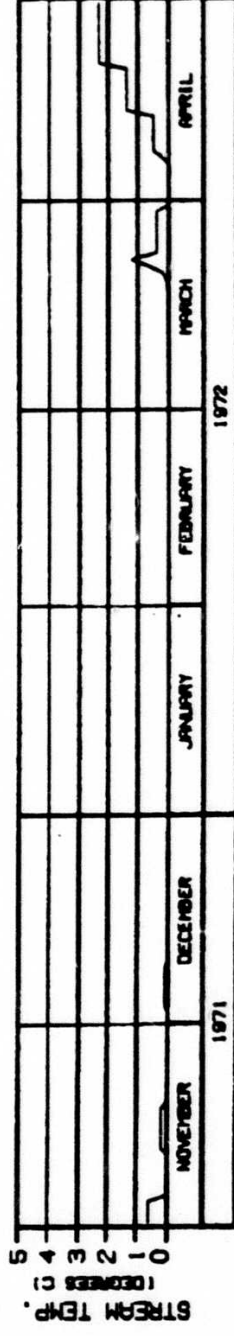
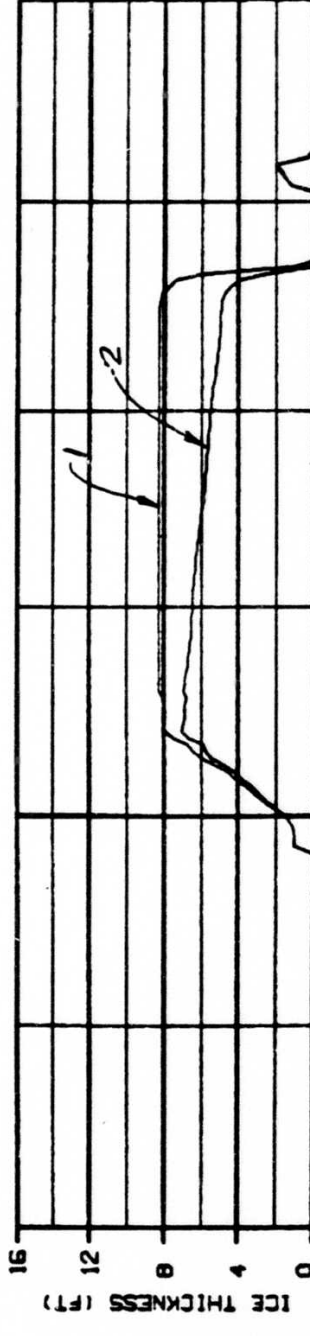
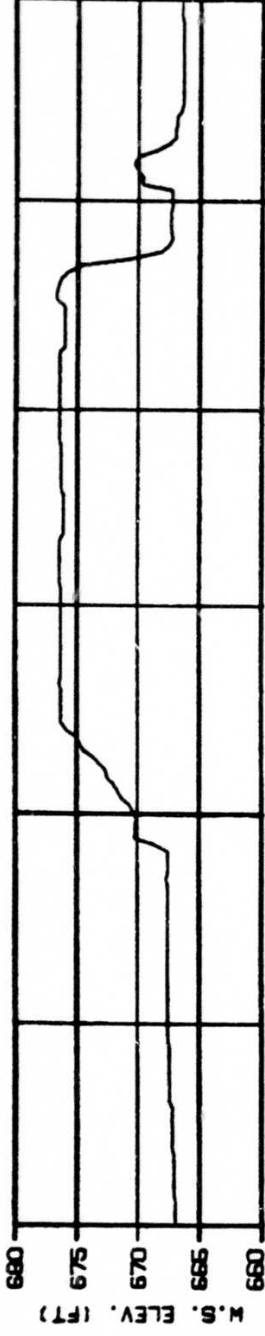


ALASKA POWER AUTHORITY  
 SUBMITTAL PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 PROJECT NUMBER: 71010NA  
 DRAWING NUMBER: 71010NA

SIDE CHANNEL U/S OF SLOUGH 10  
 RIVER MILE : 134.30  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C  
 TEMP. RULE : MATANA  
 REFERENCE : MATANA, 71010NA

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT

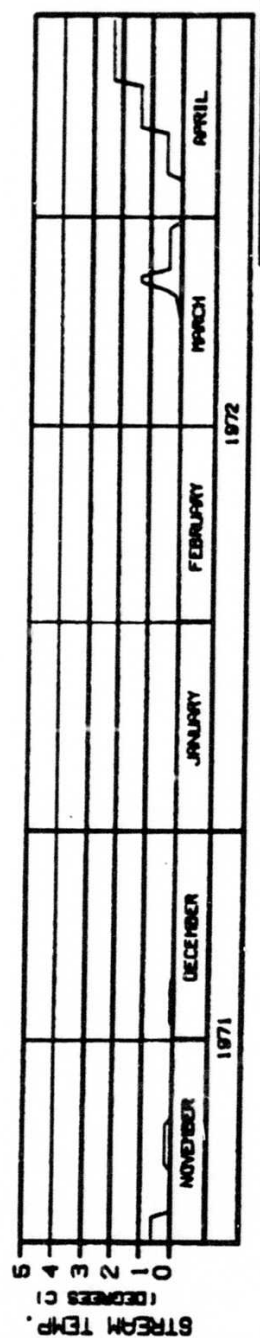
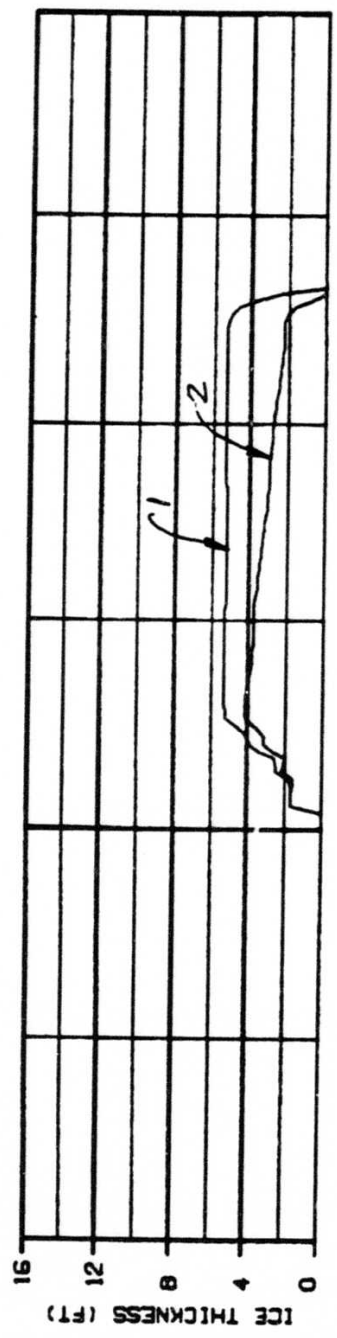
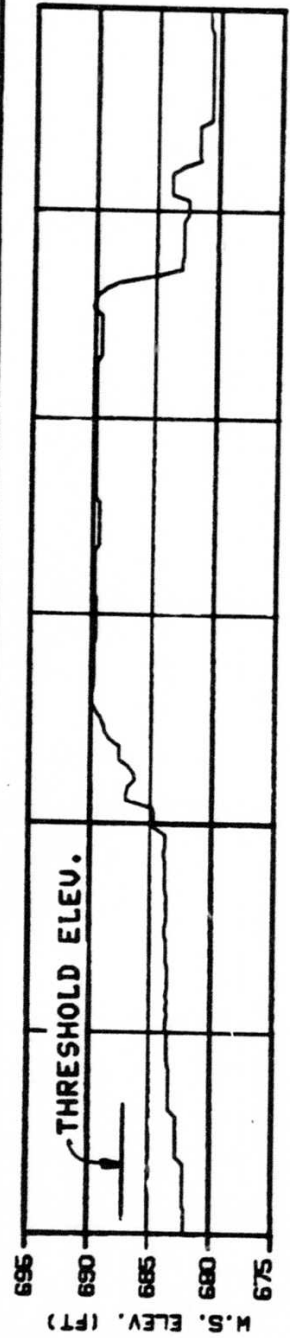
DATE: 11/28/71  
 BY: JLS



ALASKA POWER AUTHORITY  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBOSD JOINT VENTURE  
 DRAWING NO. 142

SIDE CHANNEL D/S OF SLOUGH 11  
 RIVER MILE : 135.30  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 71010A

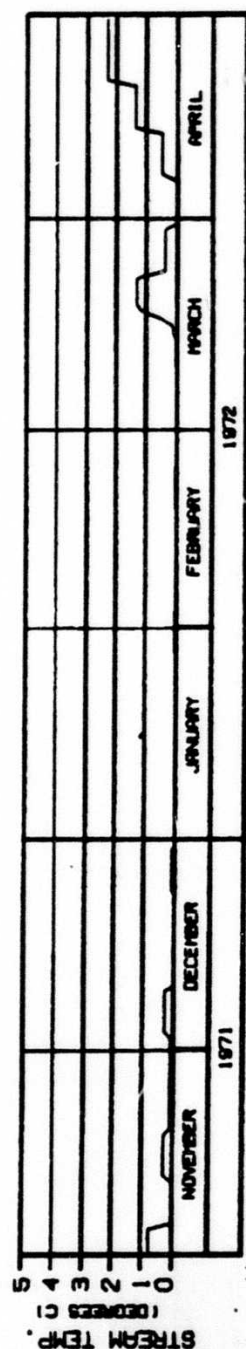
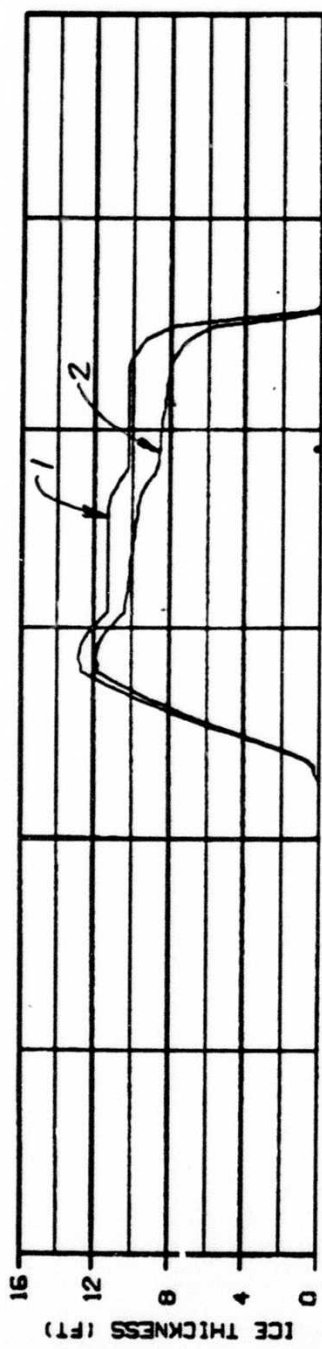
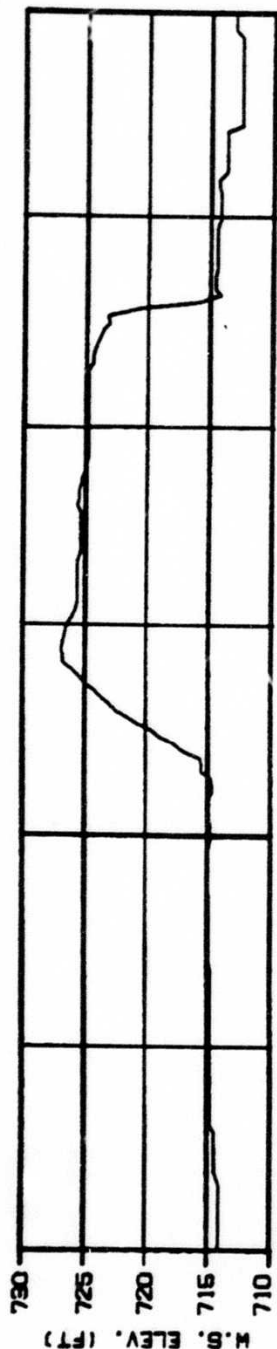
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERCO JOINT VENTURE  
 PROJECT NO. 87-000000-01

HEAD OF SLOUGH 11  
 RIVER MILE : 136.50  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7101CNA

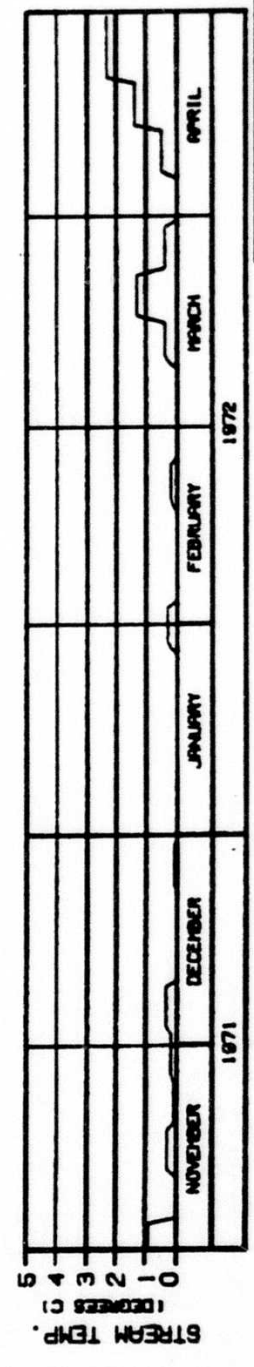
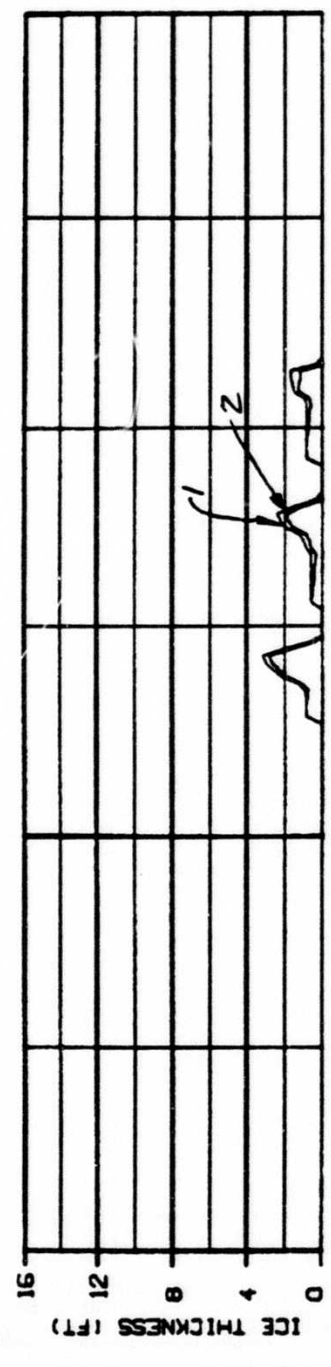
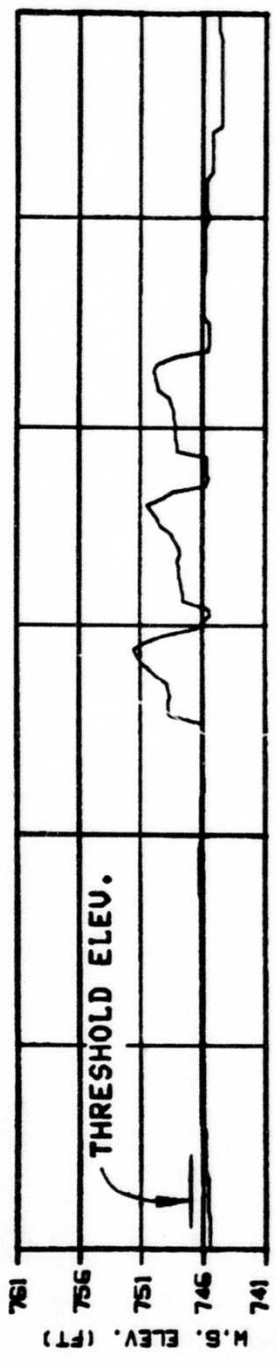
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUGH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZD-ERBSCD JOINT VENTURE  
 DRAWING NO. 17 JAN 81  
 SHEET NO. 102

HEAD OF SLOUGH 17  
 RIVER MILE : 139.30  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 710101A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

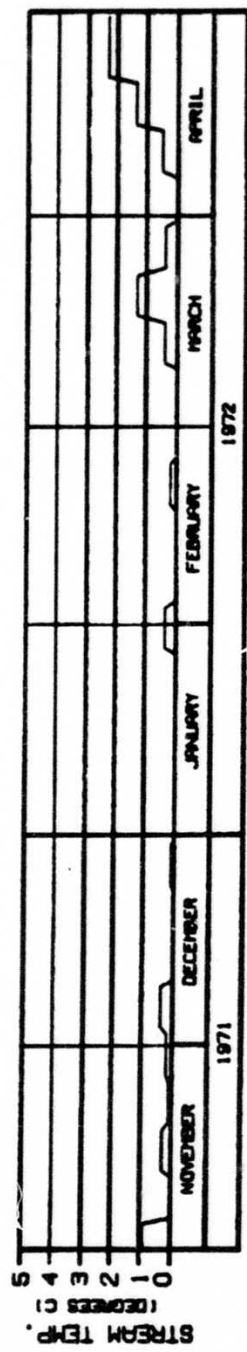
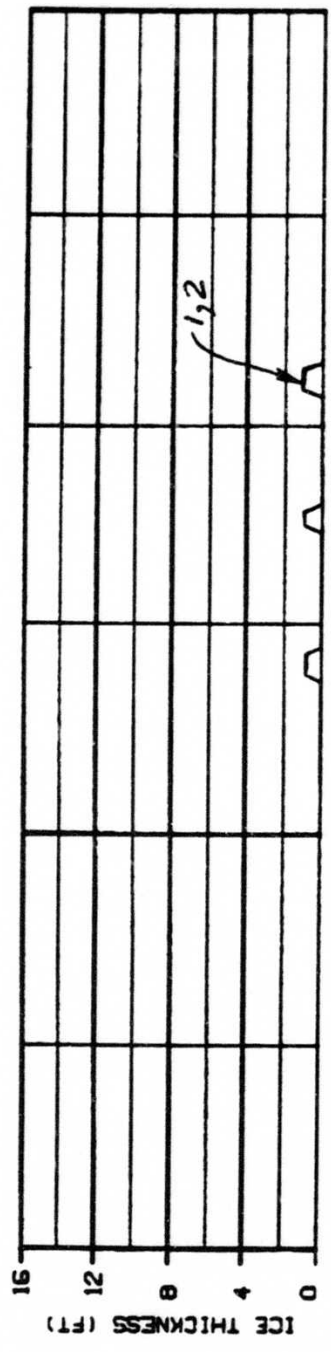
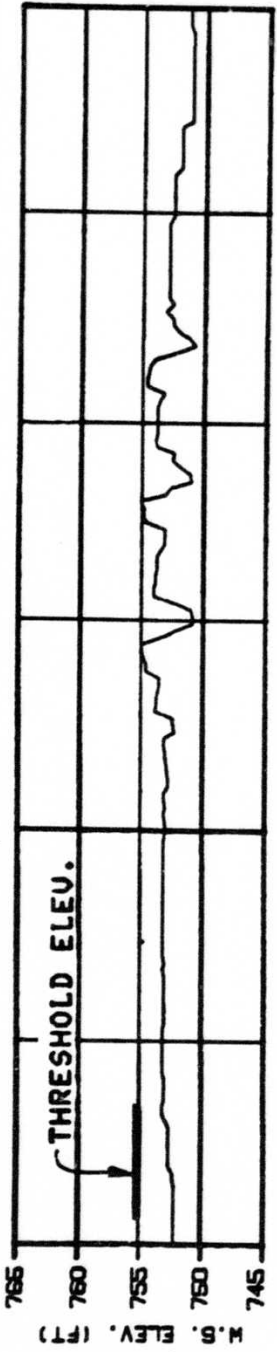


ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRARD JOINT VENTURE  
 DRAWN: A.L. WOOD 17 JAN 82 888-142

SLOUGH 21 (ENTRANCE A6)  
 RIVER MILE : 141.80  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7101CNA

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



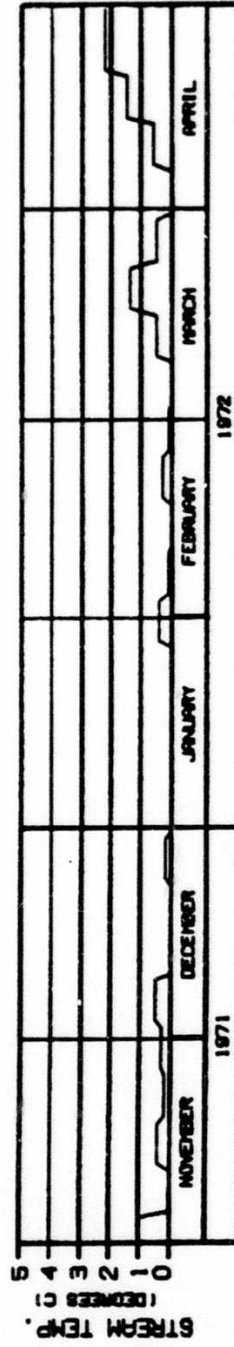
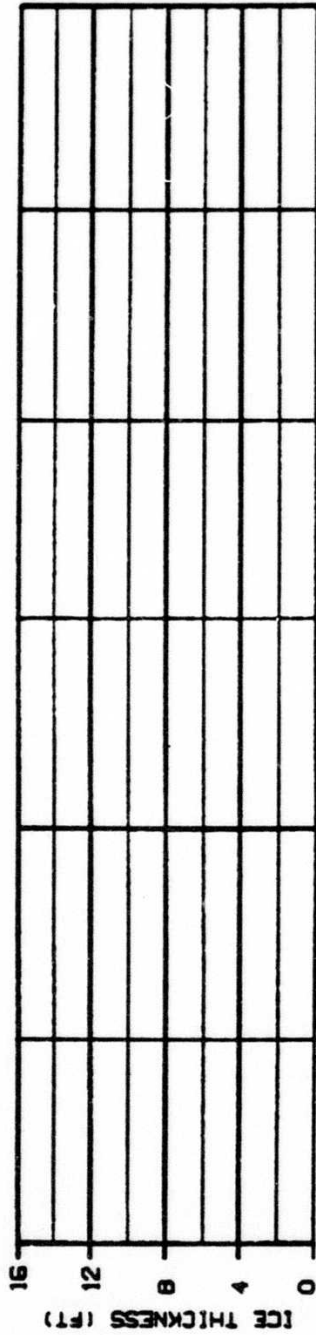
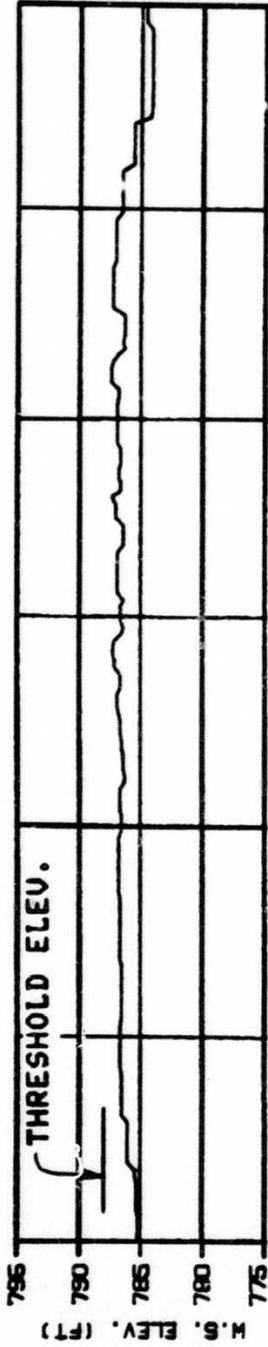


ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRSCO JOINT VENTURE  
 DRAWING NO. 148

HEAD OF SLOUGH 21  
 RIVER MILE : 142.20  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : NATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7101CNA

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT





ALASKA POWER AUTHORITY

SUSTINA PROJECT  
SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY  
WARZA-EBERD JOINT VENTURE  
REVISED: 11/28/72 BY: JAS/CS

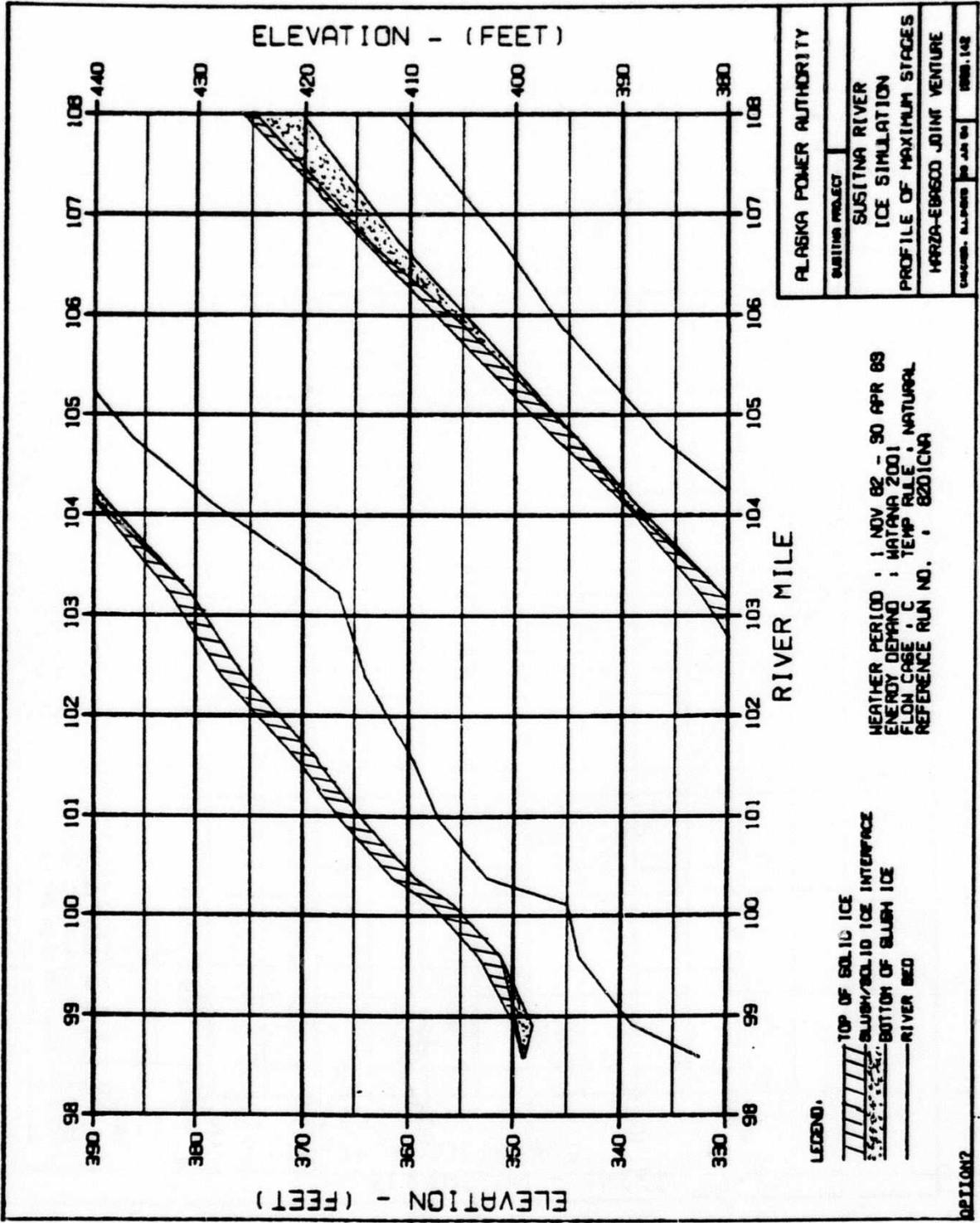
HEAD OF SLOUGH 22  
RIVER MILE : 144.80  
WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : NATANA 2001  
FLOW CASE : C TEMP RULE : NATURAL  
REFERENCE RUN NO. : 7101CNA

ICE THICKNESS LEGEND:  
1: TOTAL THICKNESS  
2: SLUSH COMPONENT

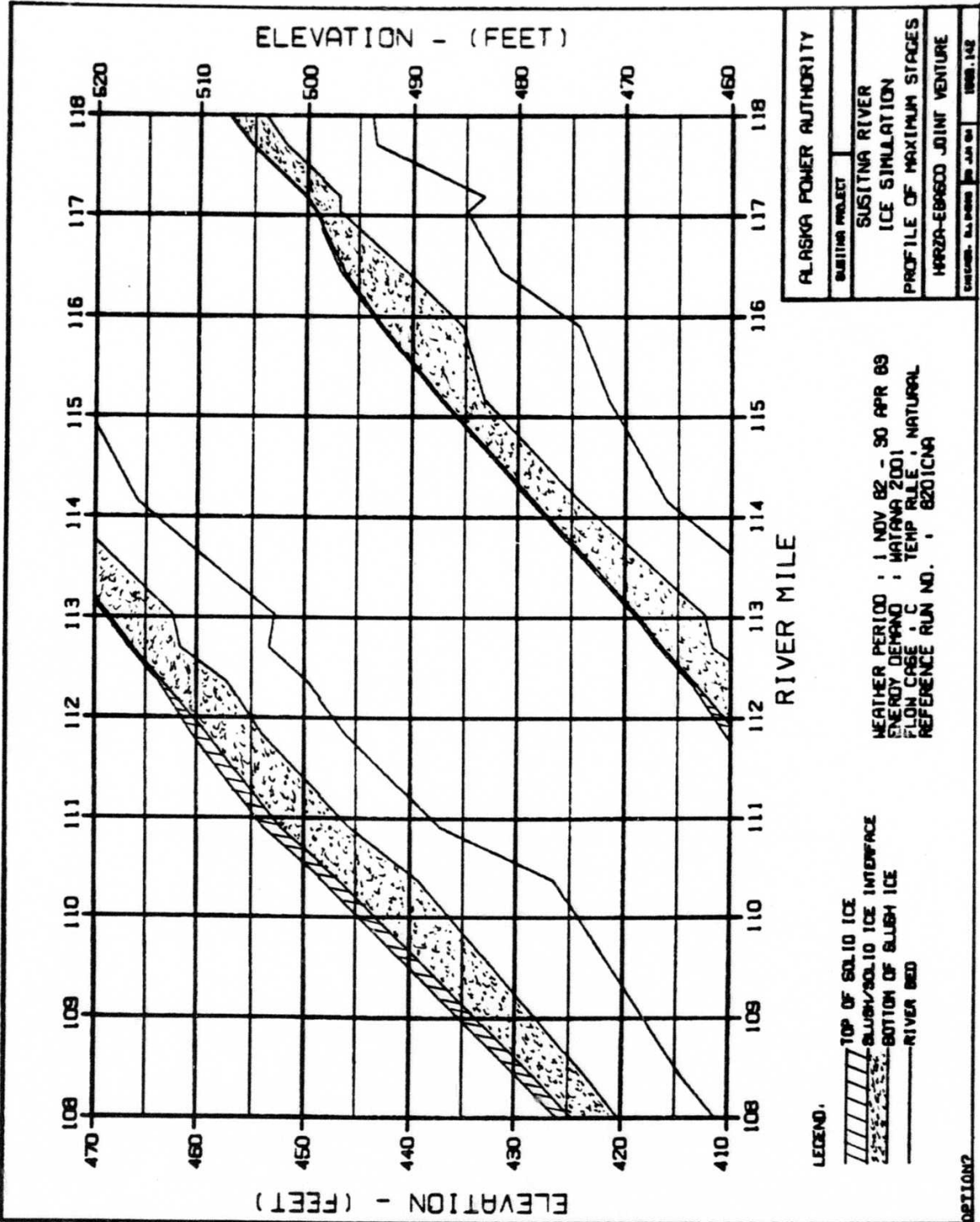
OPTION?

**EXHIBIT K**

c

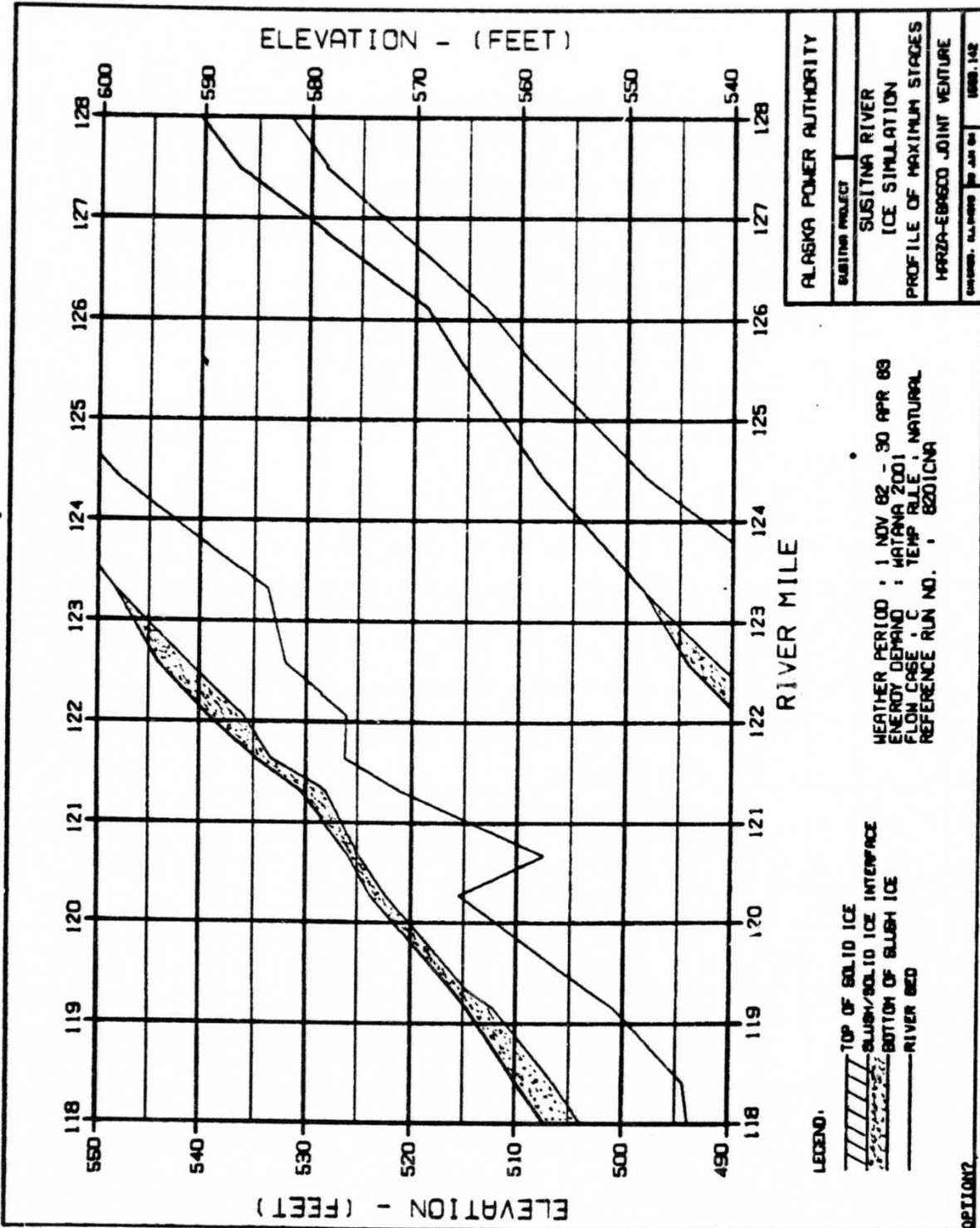


C

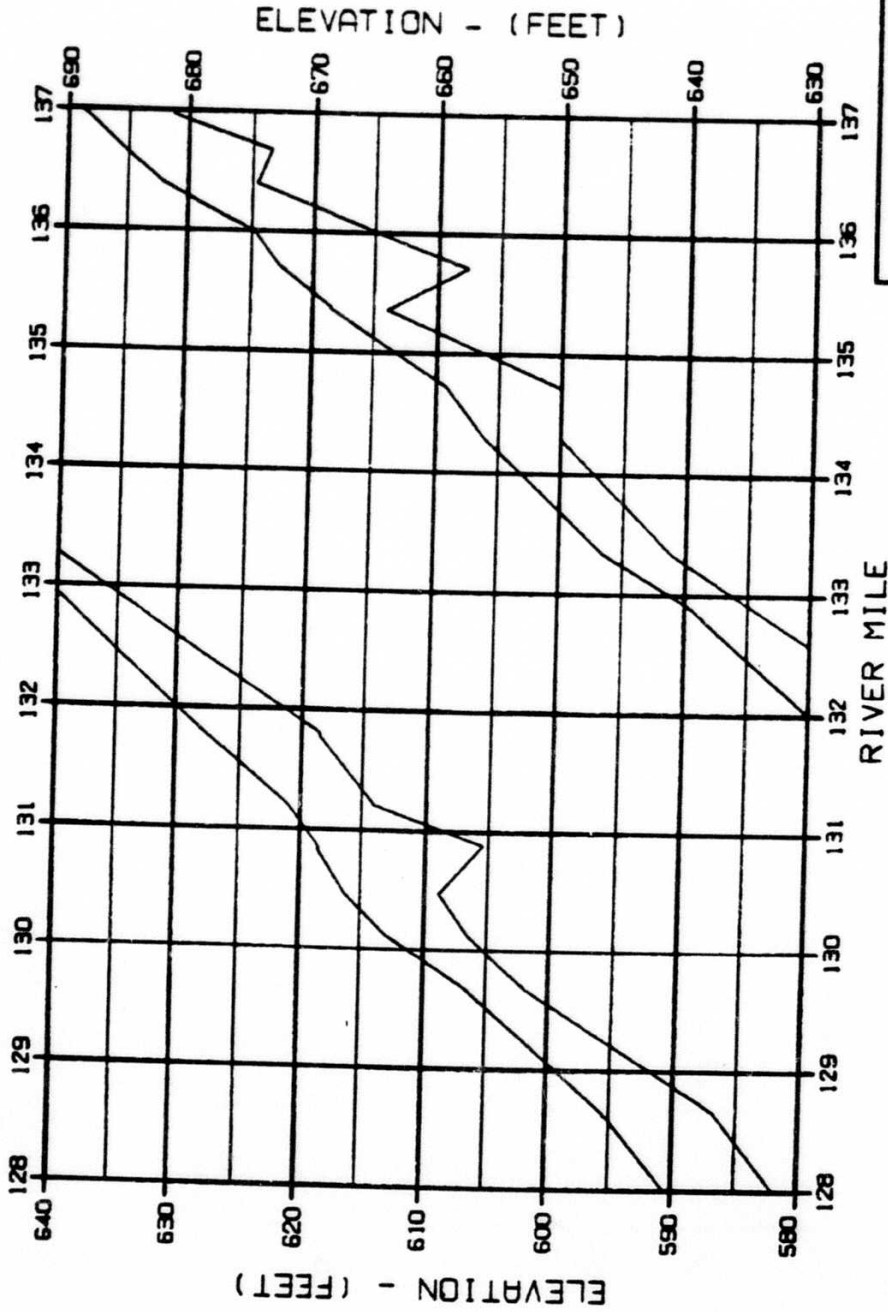




c



c



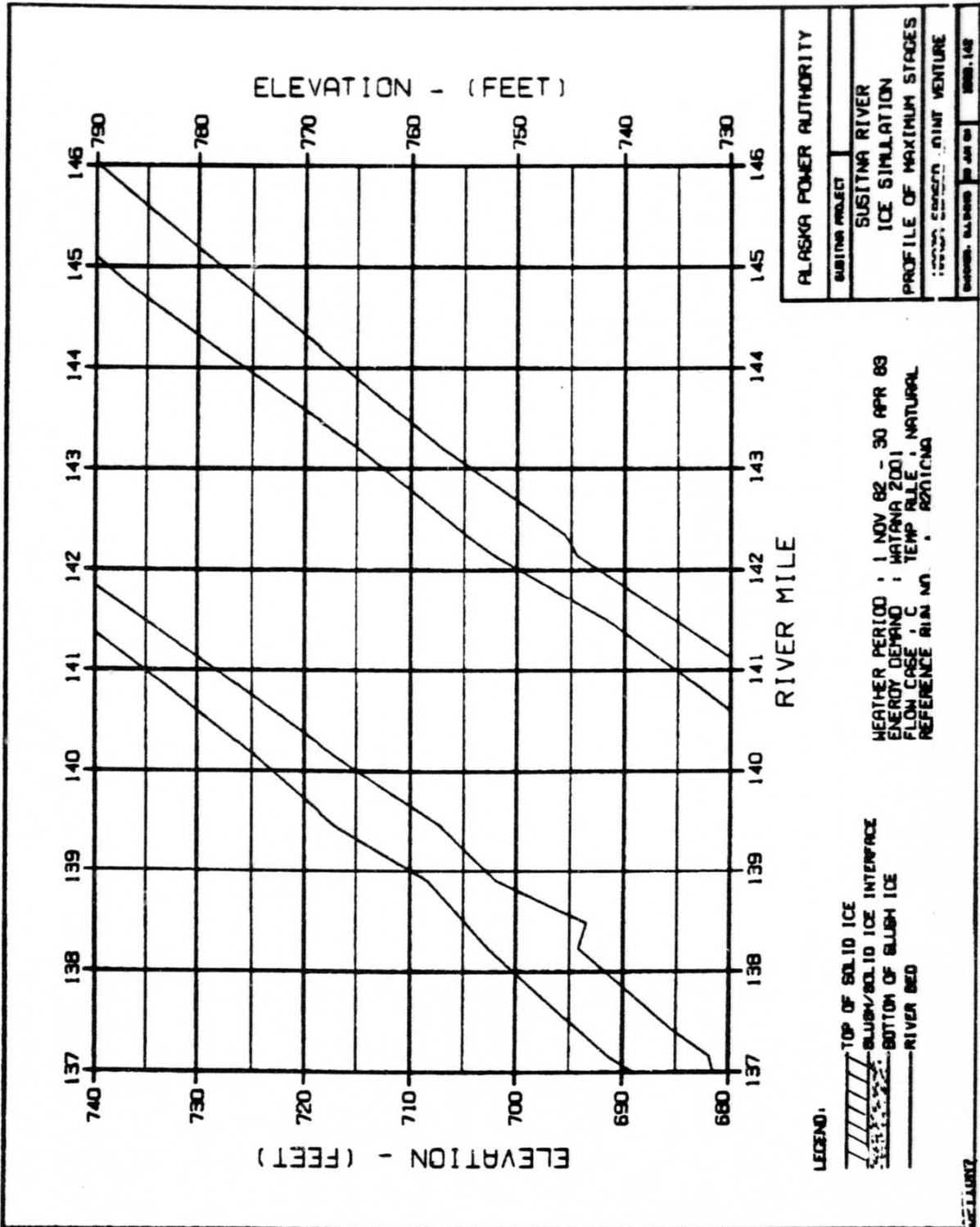
ALASKA POWER AUTHORITY	
BLUSHING PROJECT	SUSITNA RIVER
	ICE SIMULATION
	PROFILE OF MAXIMUM STAGES
HARZA-EBERSCO JOINT VENTURE	
DATE: 01.09.00	BY: JJA 03
	ISSUE: 1.02

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP FILE : NATURAL  
 REFERENCE RUN NO. : 8201CNA

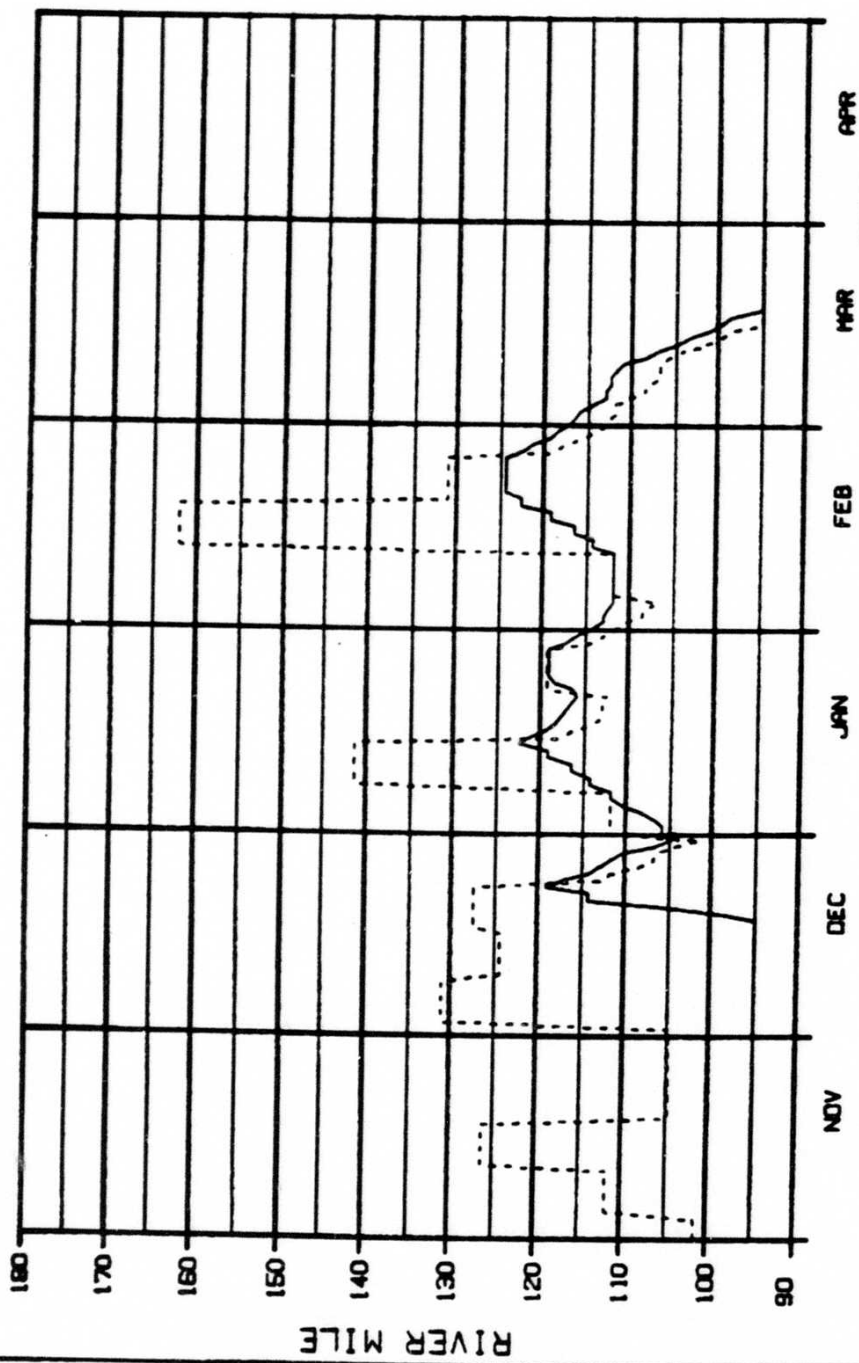
LEGEND:  
 [Solid line] TOP OF SOLID ICE  
 [Dashed line] BLUSH/SOLID ICE INTERFACE  
 [Dotted line] BOTTOM OF BLUSH ICE  
 [Horizontal line] RIVER BED

OPTION 2

c





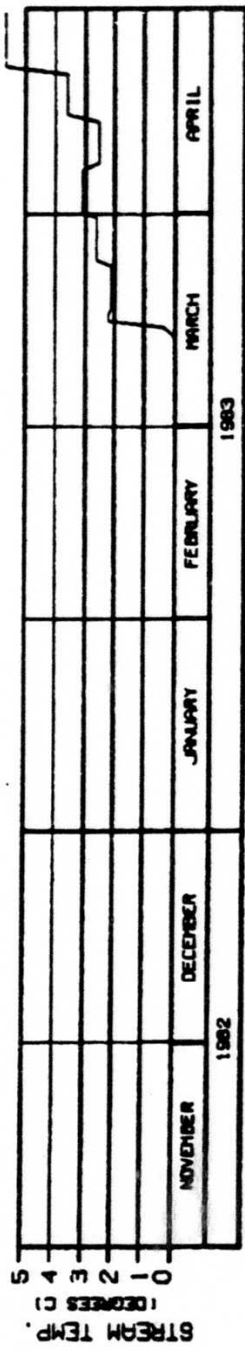
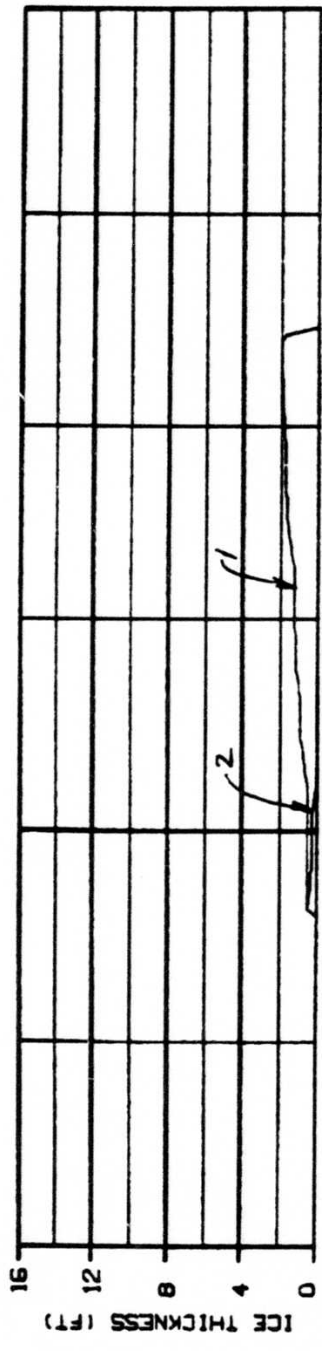
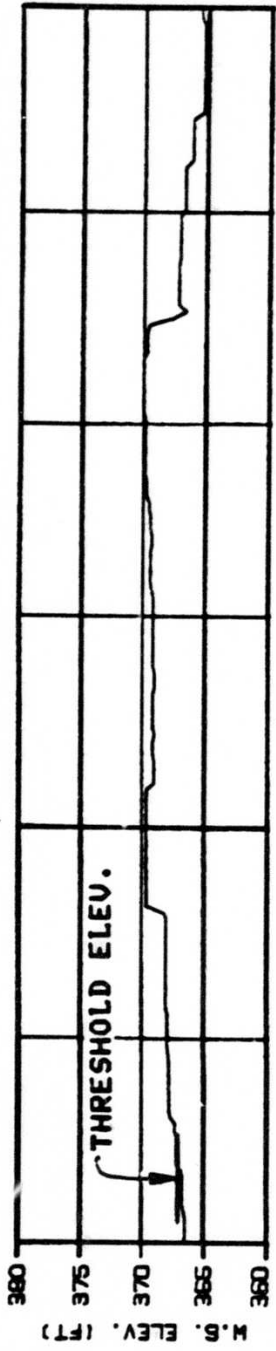


ALASKA POWER AUTHORITY  
 SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM  
 HARZA-EBERCO JOINT VENTURE  
 SOURCE: ALASKA POWER AUTHORITY

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 8201CWA

LEGEND:  
 — ICE FRONT  
 - - - ZERO DEGREE ISOTHERM

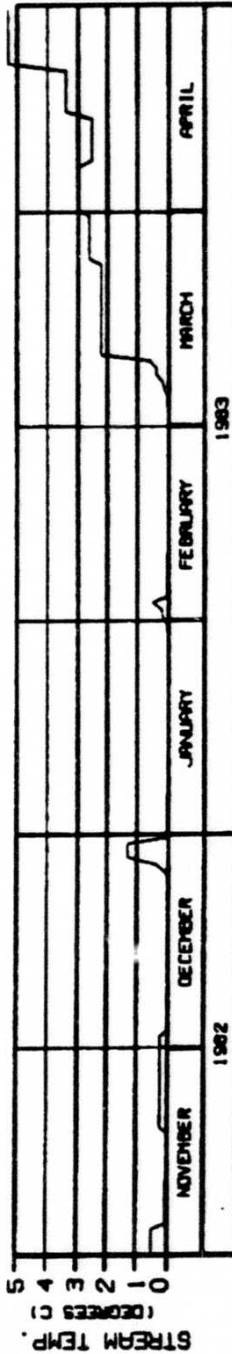
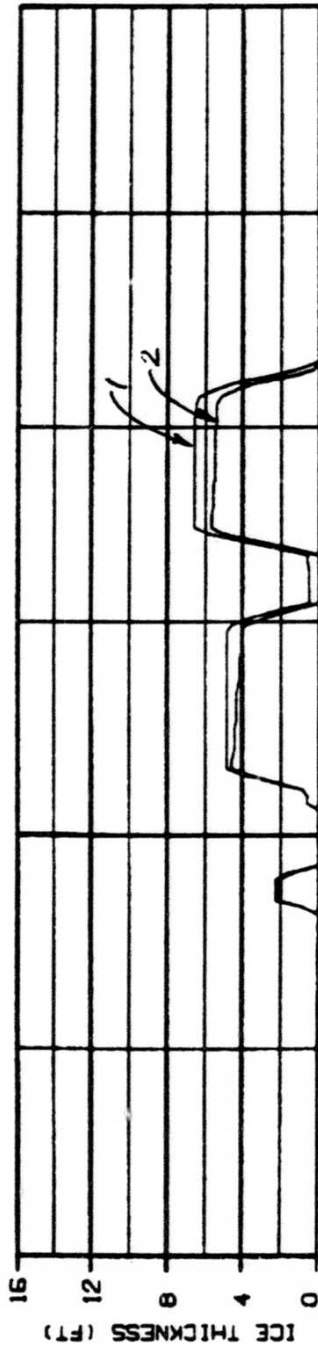
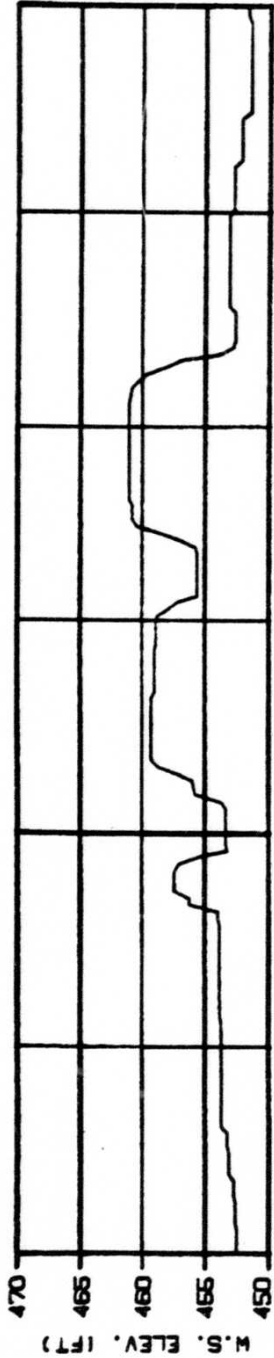
OPTION?



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBECO JOINT VENTURE  
 OCTOBER, 1982 TO JANUARY, 1983, 148

HEAD OF WHISKERS SLOUGH  
 RIVER MILE : 101.50  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C  
 TEMP RULE : NATURAL  
 REFERENCE RUN NO. : BZ0101A

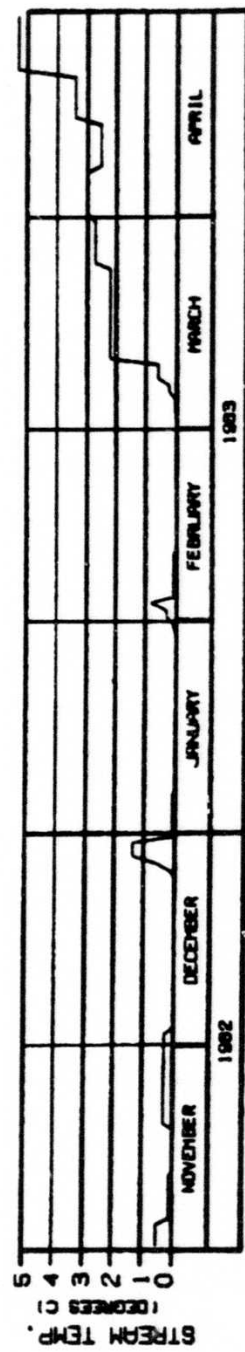
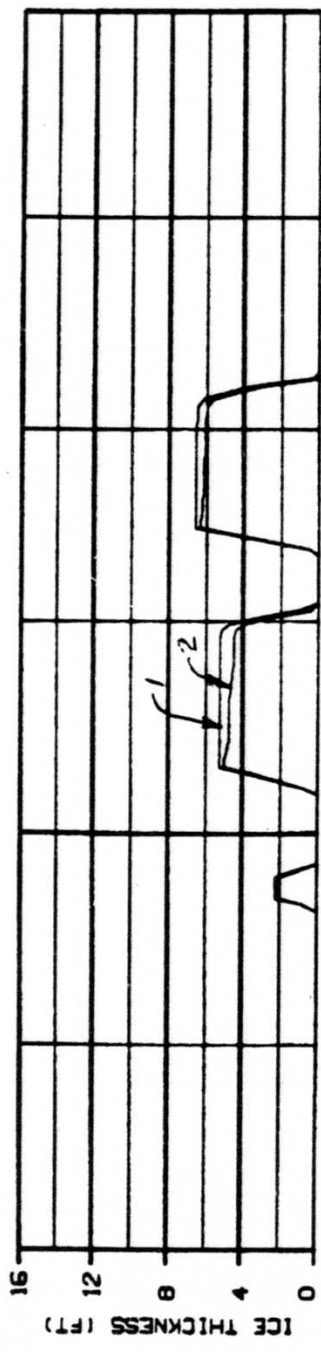
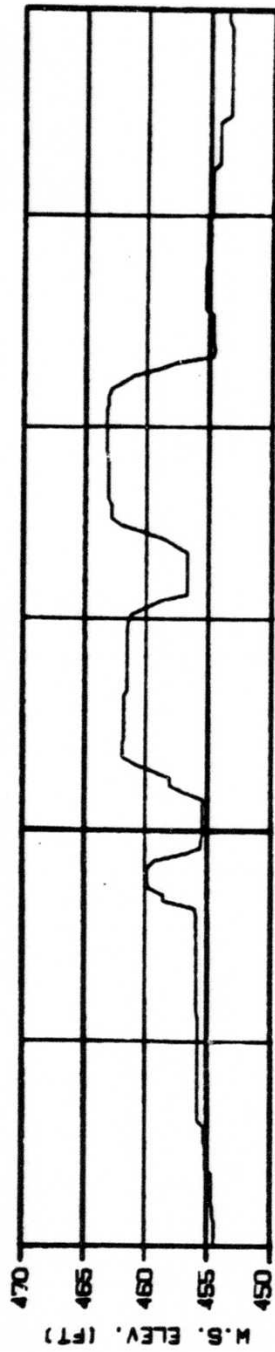
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBROD JOINT VENTURE  
 PROJECT NUMBER: 1000-142

**SIDE CHANNEL AT HEAD OF GASH CREEK**  
 RIVER MILE : 112.00  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE : C  
 TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 820101A

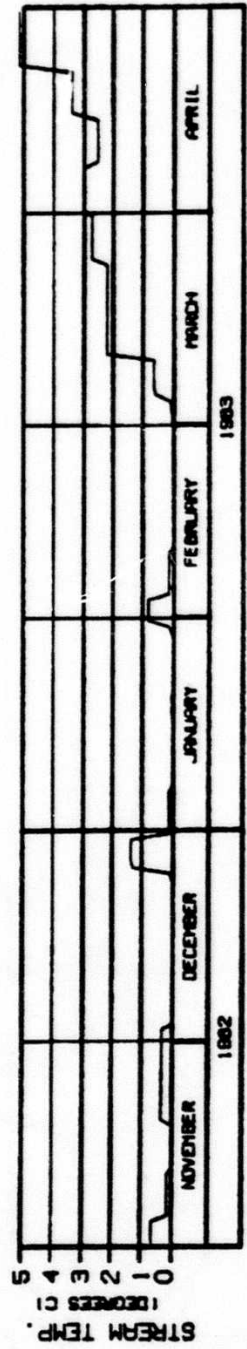
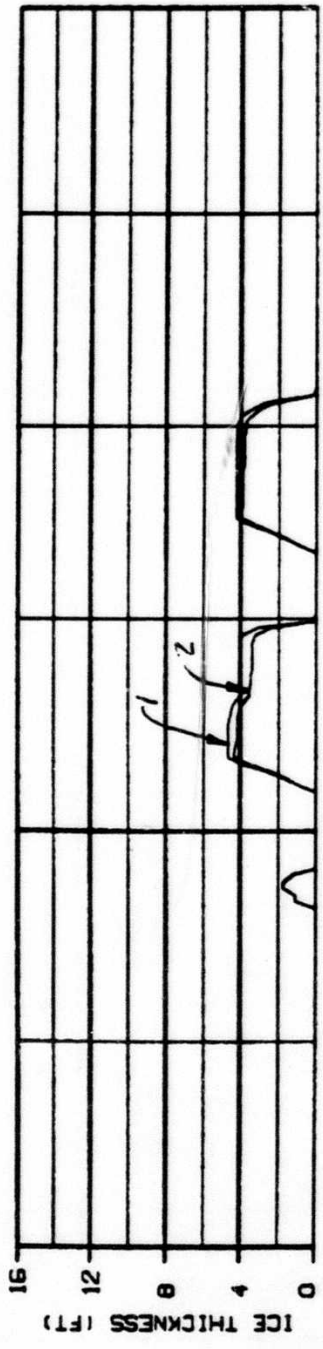
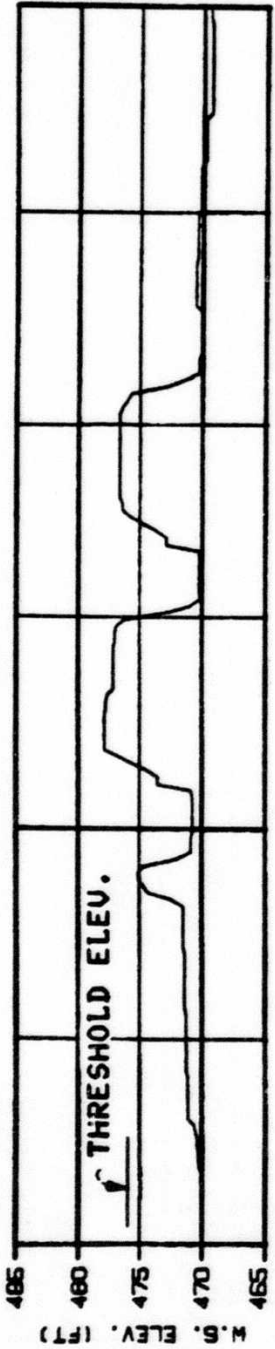
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY	
EXISTING PROJECT	SUSTITNA RIVER
	ICE SIMULATION
	TIME HISTORY
	HARZA-EBERD JOINT VENTURE
DATE: 01/08/83	BY: JAL/CL
	8888.142

**MOUTH OF SLOUGH 6A**  
**RIVER MILE : 112.34**  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 820101A

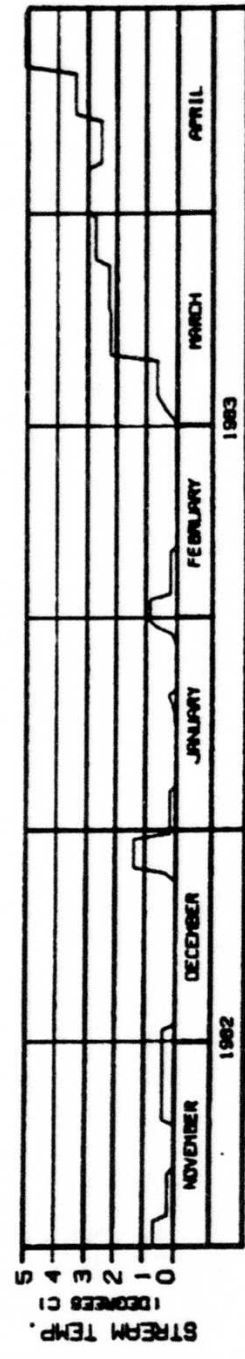
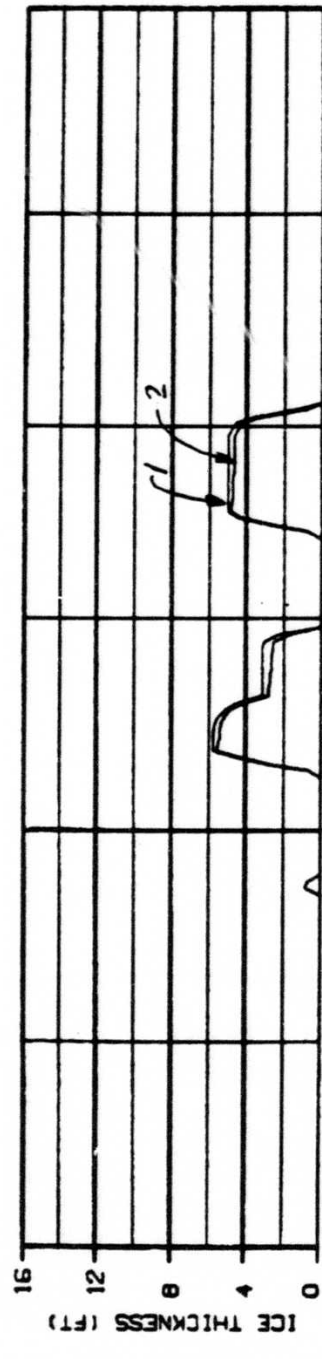
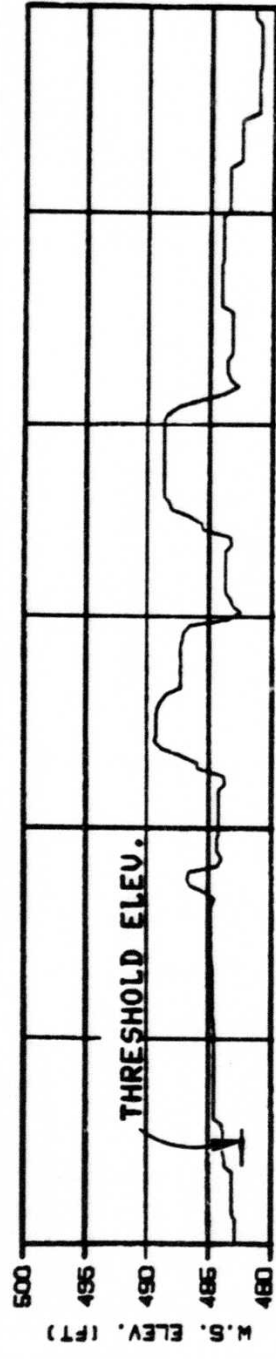
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 CONTRACT NO. 81-00000 DRAWING NO. 8000.142

HEAD OF SLOUGH 8  
 RIVER MILE : 114.10  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : HATANNA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 80010NA

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY

SUSTITNA PROJECT

SUSTITNA RIVER

ICE SIMULATION

TIME HISTORY

HARZA-ERBACD JOINT VENTURE

DATE: 11-1983 BY: JAW/SL

1000-148

**SIDE CHANNEL MSII**

**RIVER MILE : 115.50**

WEATHER PERIOD : 1 NOV 82 - 30 APR 83

ENERGY DEMAND : MATANA 2001

FLOW CASE : C

TEMP RULE : NATURAL

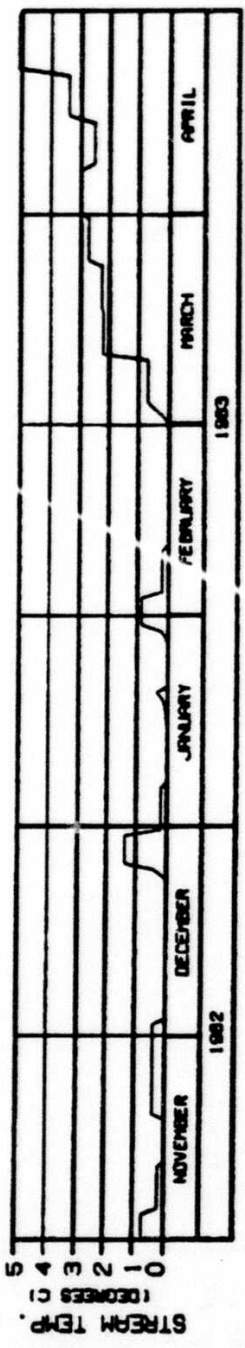
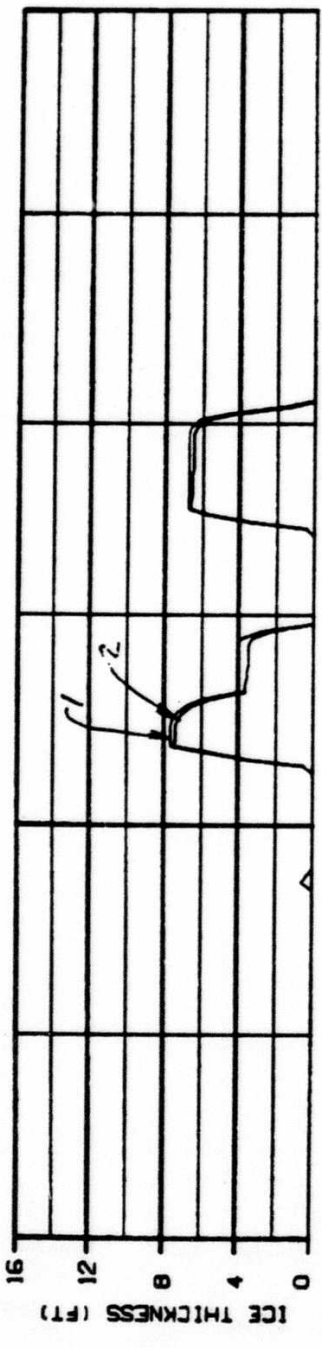
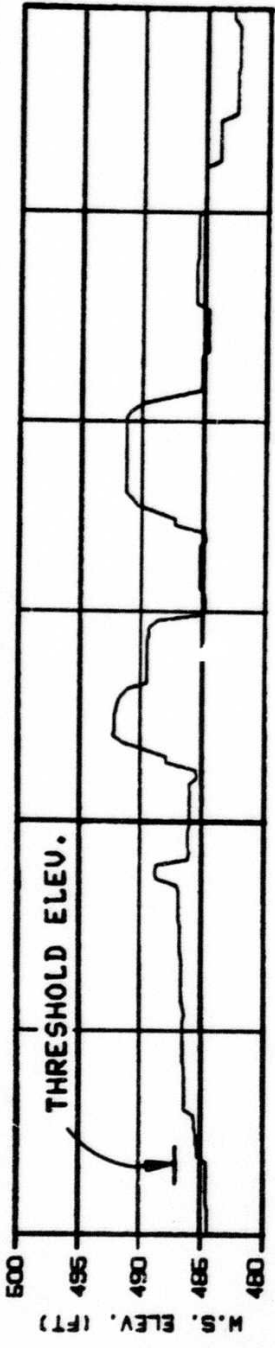
REFERENCE RUN NO. : 820101A

ICE THICKNESS LEGEND:

1: TOTAL THICKNESS

2: SLUSH COMPONENT



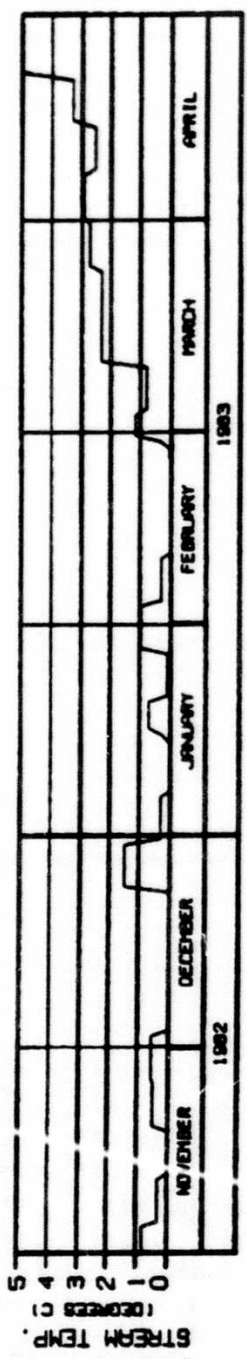
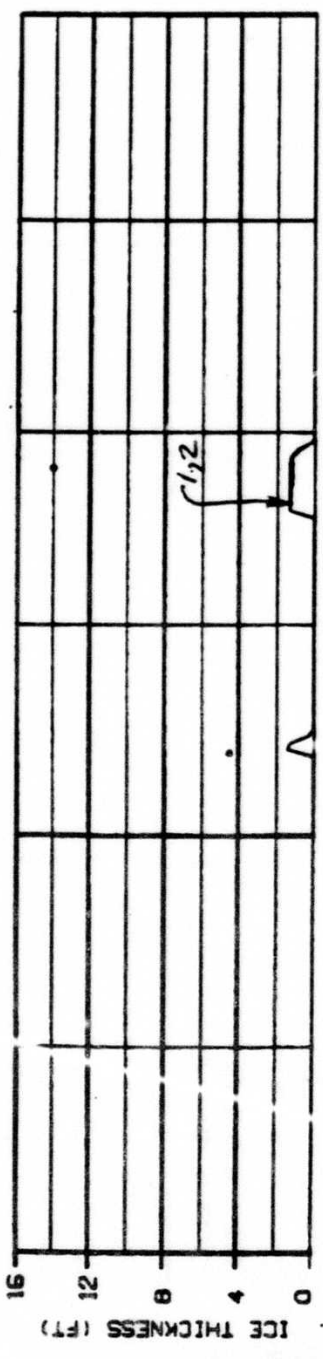
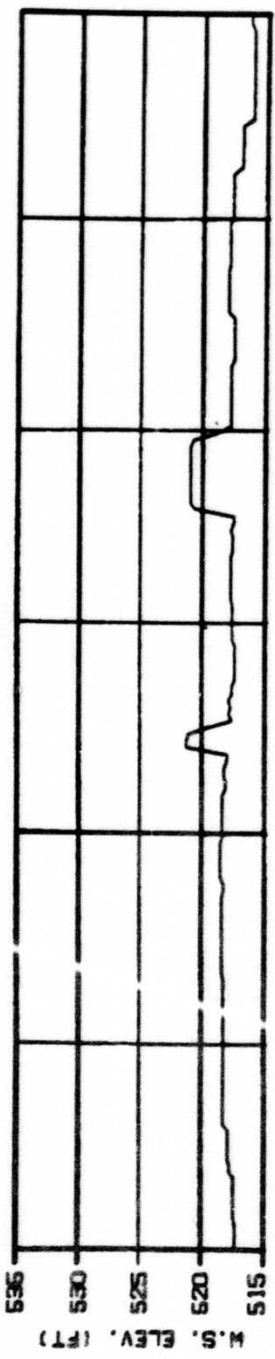


ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRACO JOINT VENTURE  
 DRAWING NUMBER: J-100 1982-142

HEAD OF SIDE CHANNEL NSII  
 RIVER MILE : 115.90  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : NAT/NA 2001  
 FLOW CASE : C  
 TEMP. RULE : NATURAL  
 REFERENCE RUN NO. : BZ010NA

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT

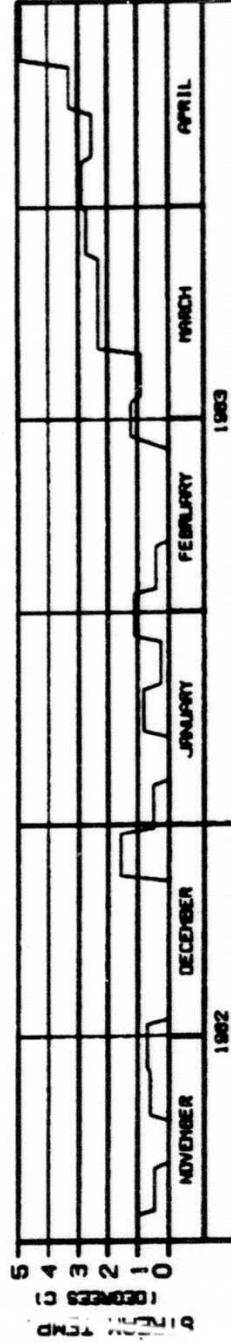
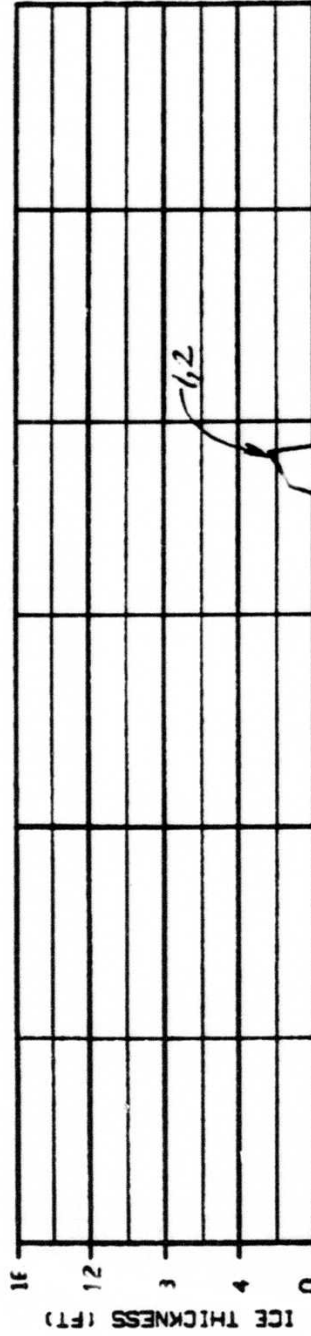
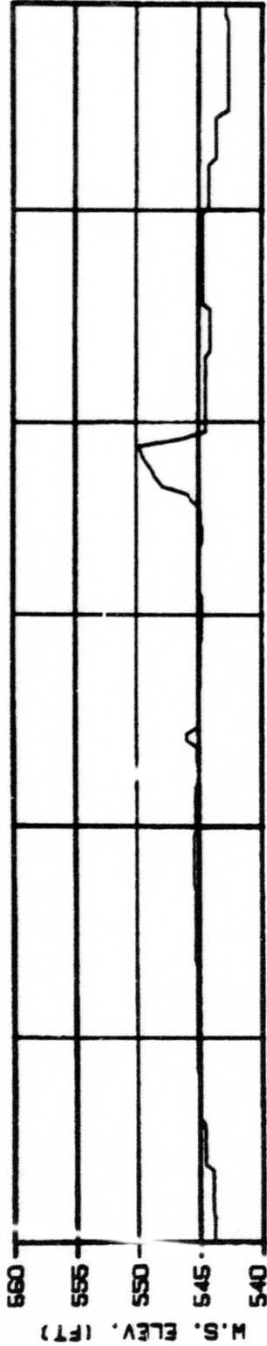




ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRACO JOINT VENTURE  
 DRAWING: ILS-8808 20 JAN 83 8808.148

RIVER MILE : 120.00  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 8201CNA

ICE THICKENING LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

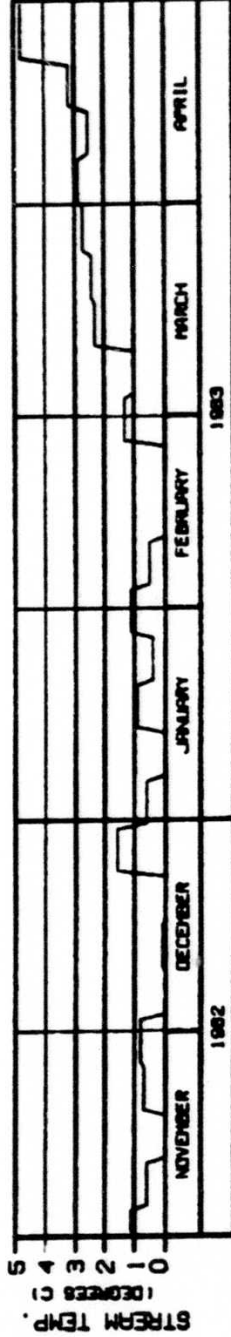
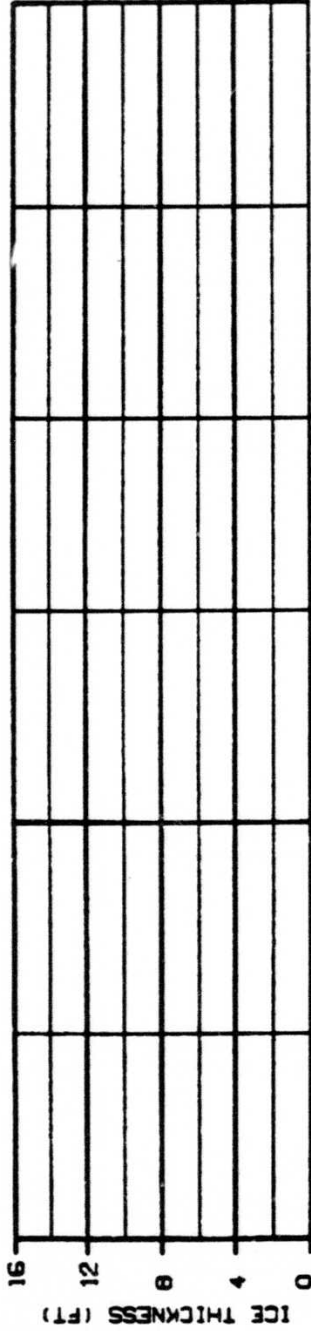
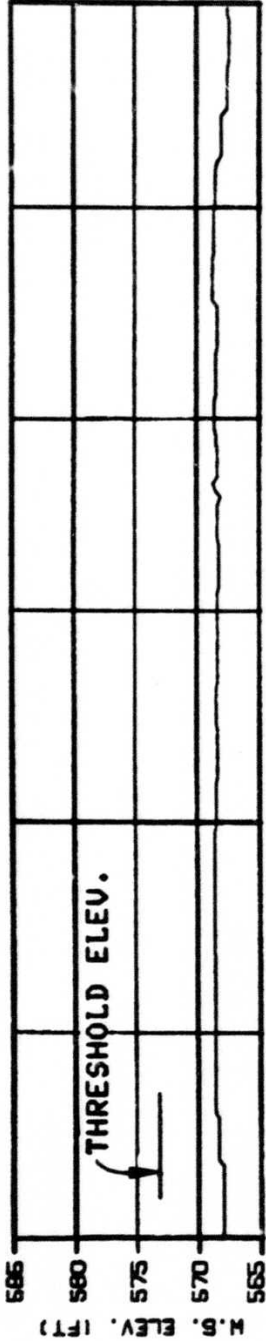


**HEAD OF MOOSE SLOUGH  
RIVER MILE : 123.50**

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 82010NA

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT

ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT : SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRECO JOINT VENTURE  
 DATE: 08/08/83 BY: JLS/83 0888.142



HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : NATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 82010NA

ICE THICKNESS LEGEND:

- 1: TOTAL THICKNESS
- 2: SLUSH COMPONENT

ALASKA POWER AUTHORITY

SUSITNA PROJECT

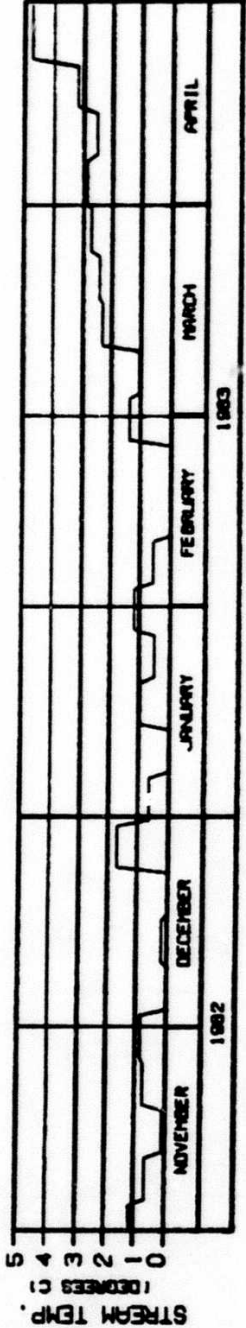
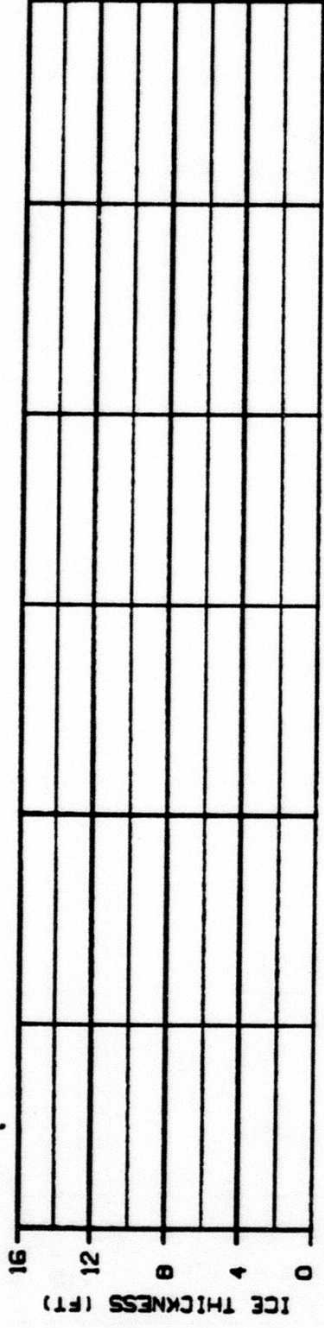
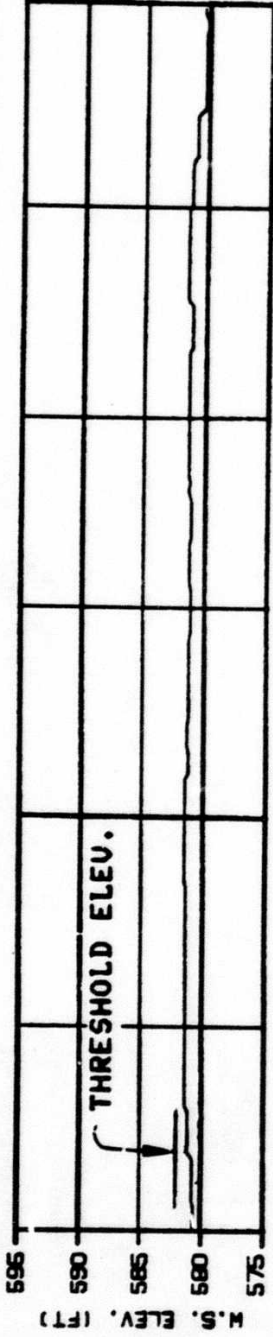
SUSITNA RIVER

ICE SIMULATION

TIME HISTORY

PARZA-EBRISCO JOINT VENTURE

DESIGNED BY JAS 82 1000.142



**HEAD OF SLOUGH 8A (EAST)**

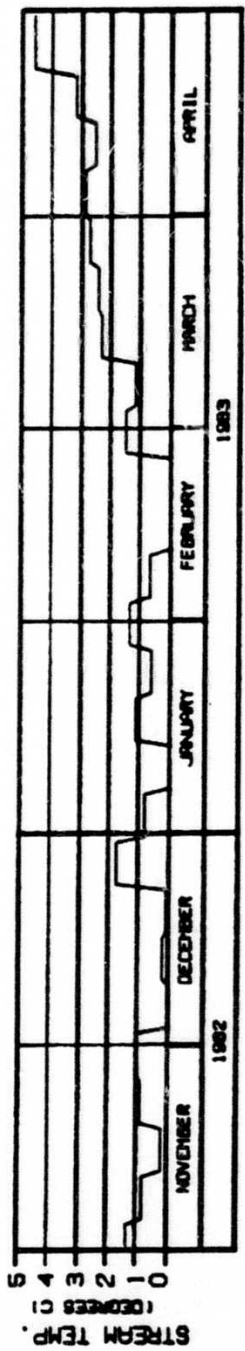
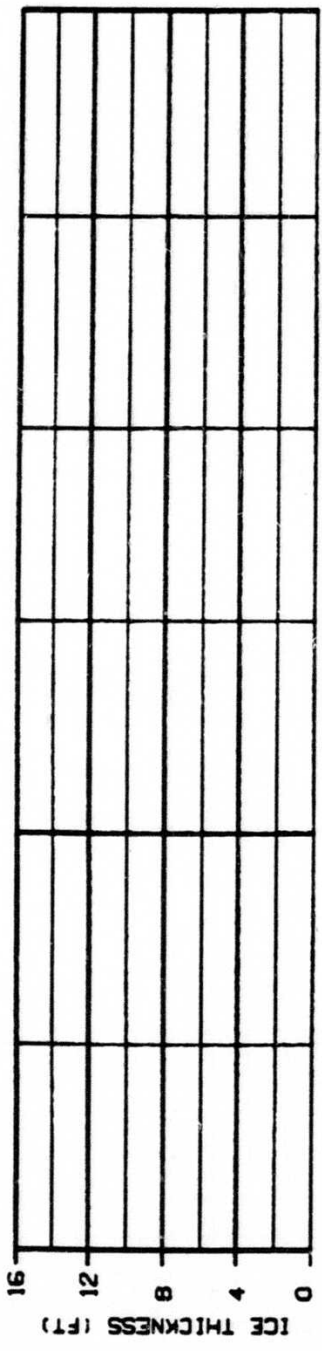
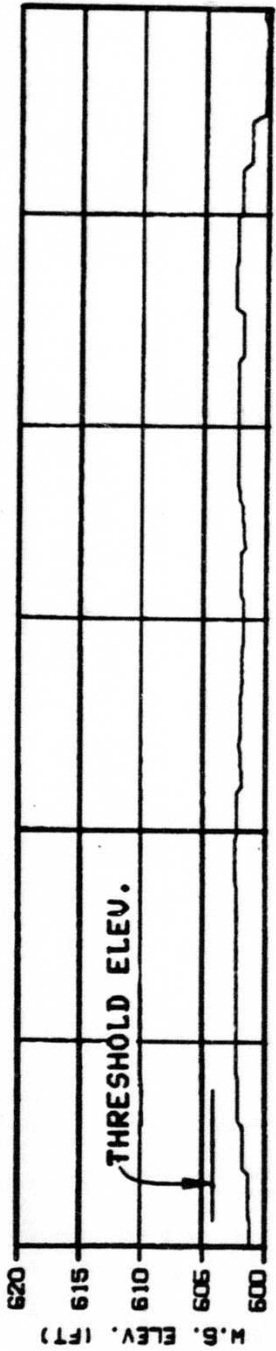
RIVER MILE : 127.10

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : NATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 820101A

ICE THICKNESS LEGEND:

- 1. TOTAL THICKNESS
- 2. SLUSH COMPONENT

ALASKA POWER AUTHORITY	
SUBMITTER PROJECT	SUSTITNA RIVER
ICE SIMULATION	
TIME HISTORY	
HARZO-EBERCO JOINT VENTURE	
DESIGNER: S. L. BERRY	DATE: JAN 83
DRAWN: HAZ	



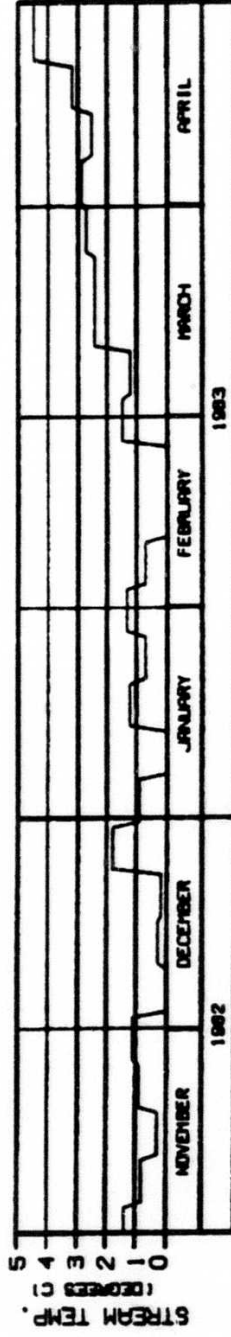
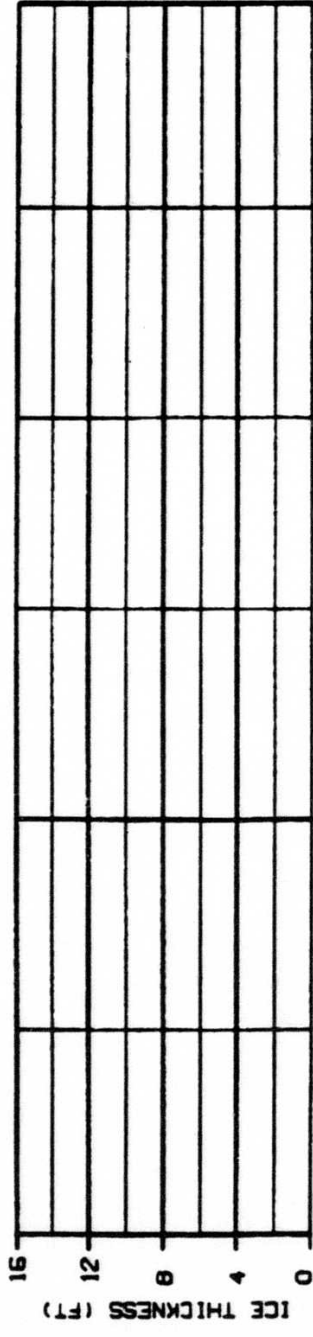
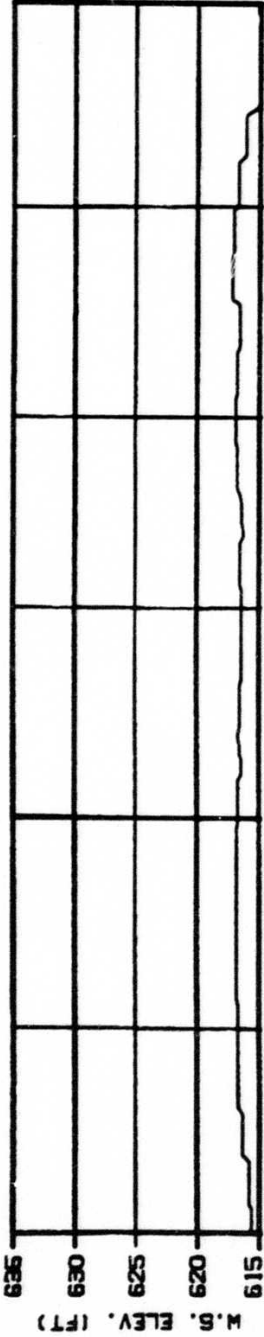
ALASKA POWER AUTHORITY  
SUBMITTER PROJECT  
SUSTITNA RIVER  
ICE SIMULATION  
TIME HISTORY  
HARZA-ERSSCO JOINT VENTURE  
DRAWING NUMBER: 88-001-148

HEAD OF SLOUGH 9  
RIVER MILE : 129.30  
WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
ENERGY DEMAND : MATANA 2001  
FLOW CASE : C TEMP RULE : NATURAL  
REFERENCE RUN NO. : 820101A

ICE THICKNESS LEGEND:  
1: TOTAL THICKNESS  
2: SLUSH COMPONENT

OPTION 2

OPTION?



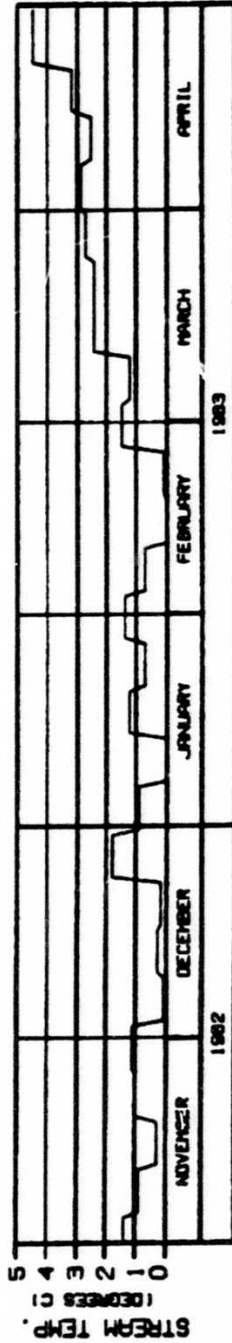
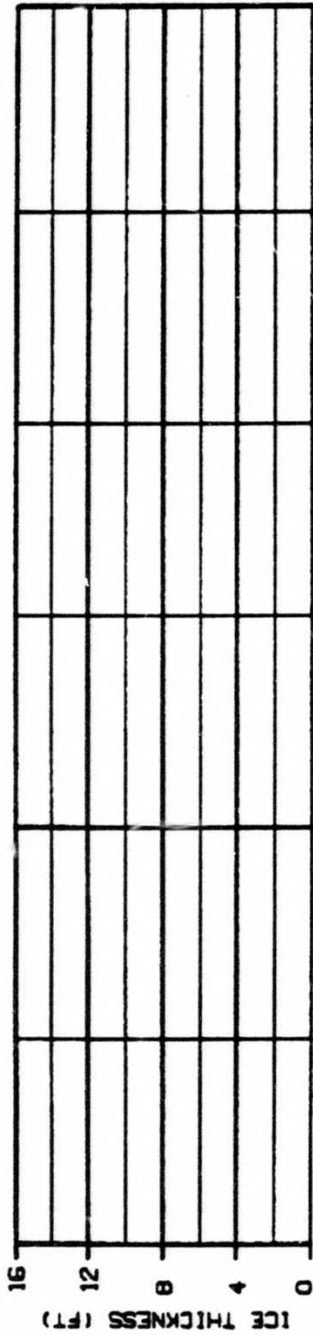
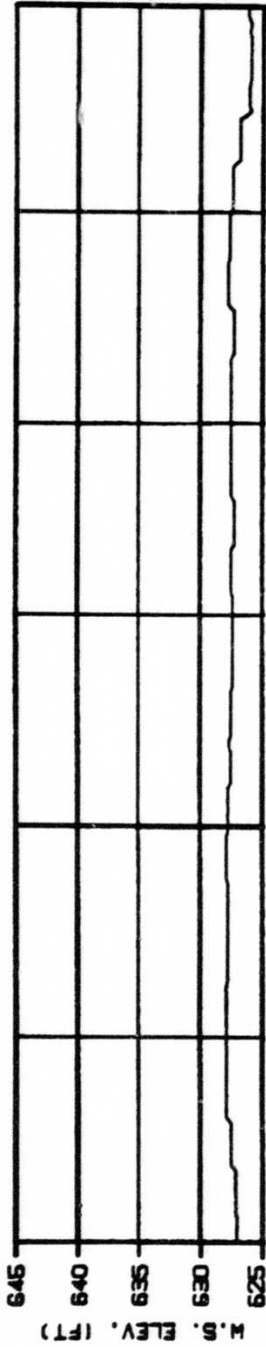
**SIDE CHANNEL U/S OF SLOUGH 9  
RIVER MILE : 130.60**

ICE THICKNESS LEGEND:  
1: TOTAL THICKNESS  
2: SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
ENERGY DEMAND : NATANA 2001  
FLOW CASE : C TEMP RULE : NATURAL  
REFERENCE RUN NO. : 820101A

ALASKA POWER AUTHORITY
SUBITNA PROJECT
SUSITNA RIVER
ICE SIMULATION
TIME HISTORY
HARZA-EBRSCO JOINT VENTURE





**SIDE CHANNEL U/S OF 4TH JULY CREEK**

RIVER MILE : 131.80

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : WATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : BZ010NA

ICE THICKNESS LEGEND:

- 1: TOTAL THICKNESS
- 2: SLUSH COMPONENT

ALASKA POWER AUTHORITY

SUBMITTING PROJECT

SUSITNA RIVER

ICE SIMULATION

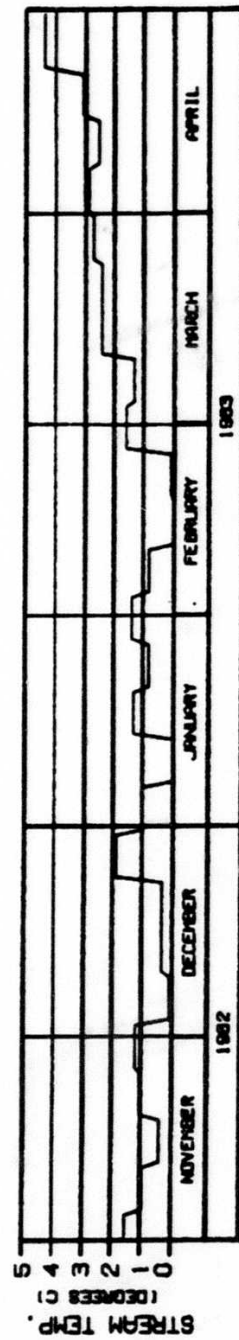
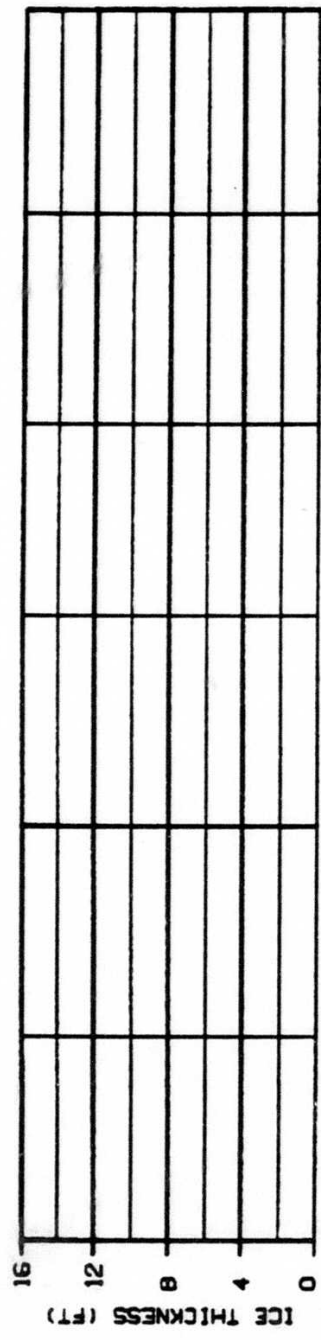
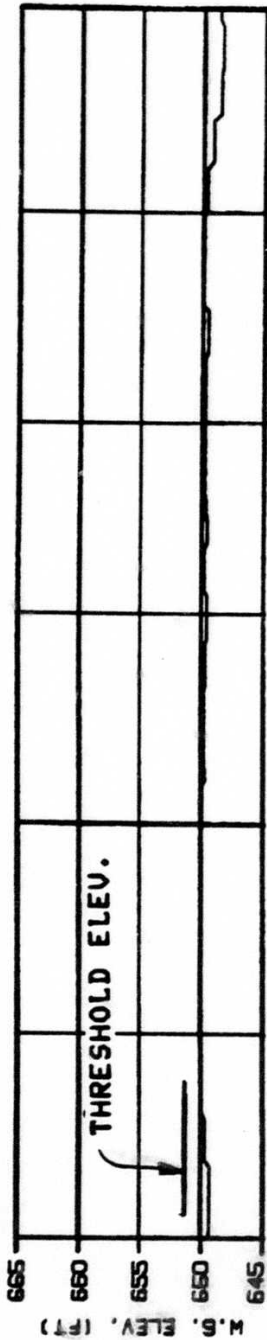
TIME HISTORY

HRZA-EBASCO JOINT VENTURE

DATE: 01-01-83

NO. 142

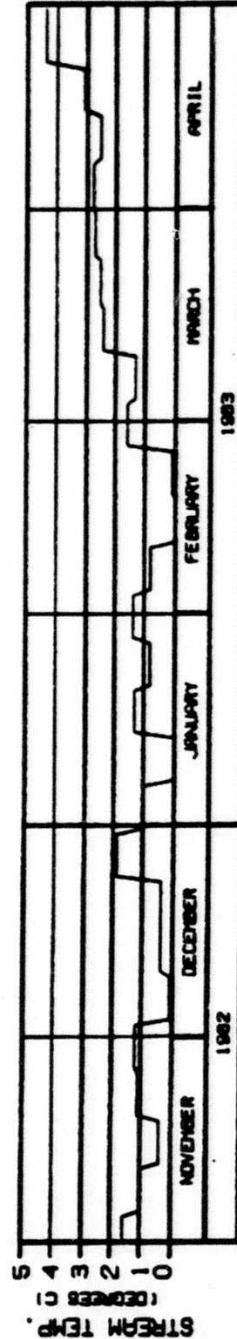
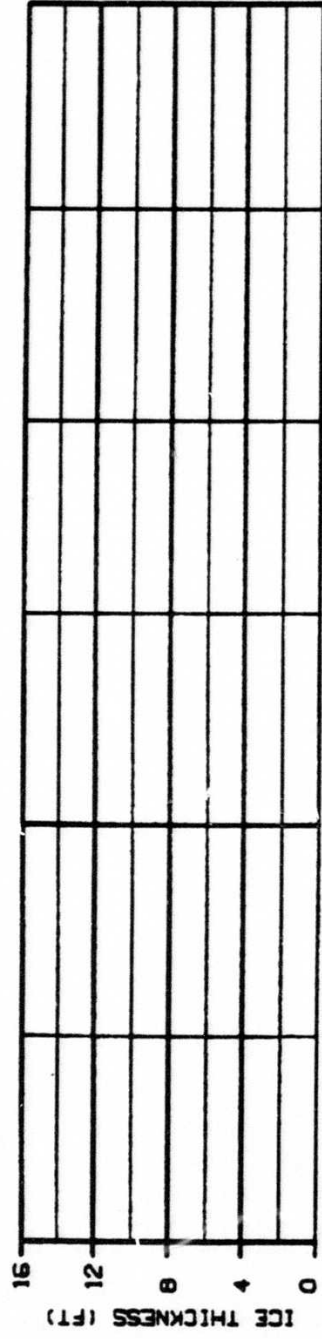
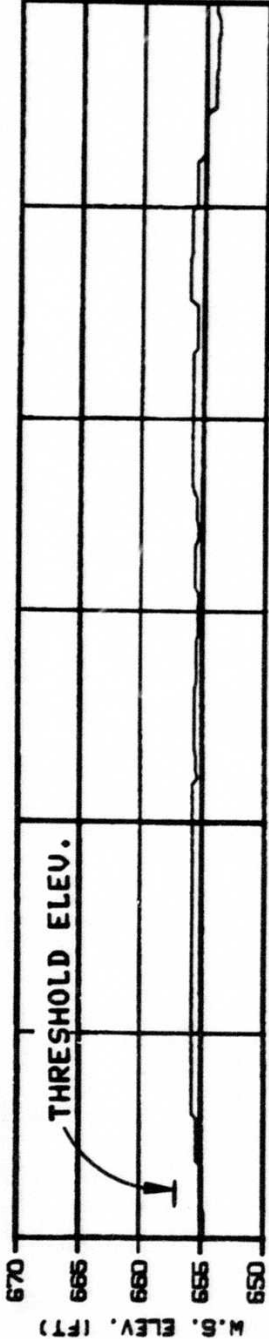




ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERCO JOINT VENTURE  
 DRAWN: S.J. BROWN    29 JAN 83    8202.142

HEAD OF SLOUGH 9A  
 RIVER MILE : 133.70  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : NATANA 2001  
 FLOW CASE : C    TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 820101A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

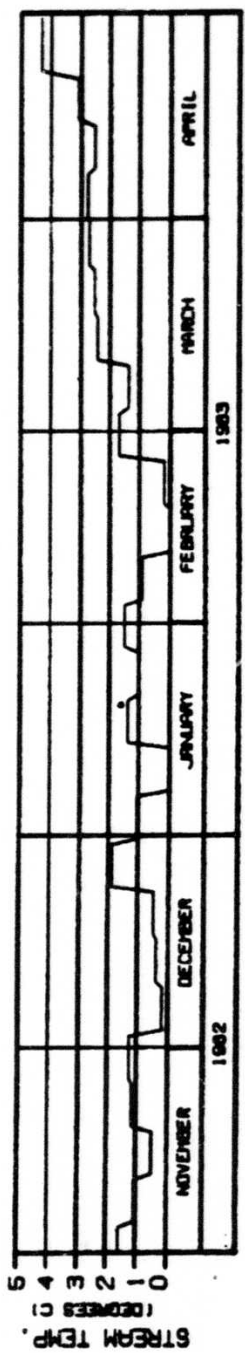
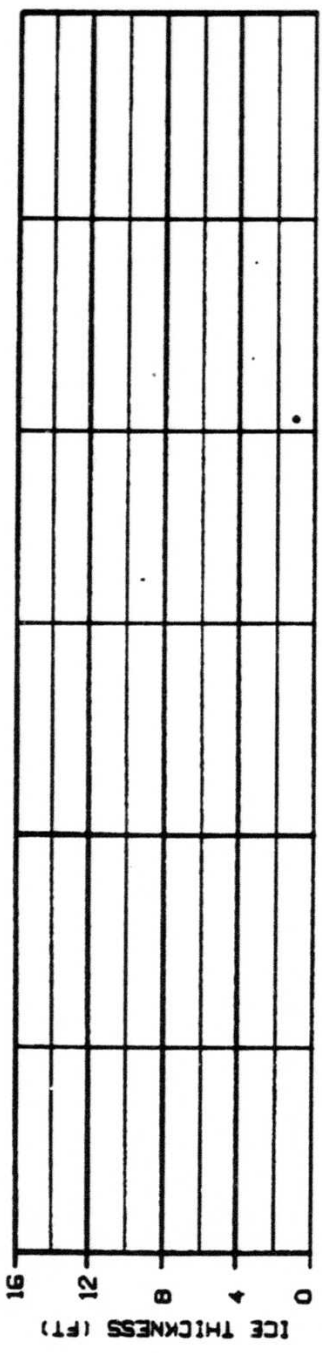
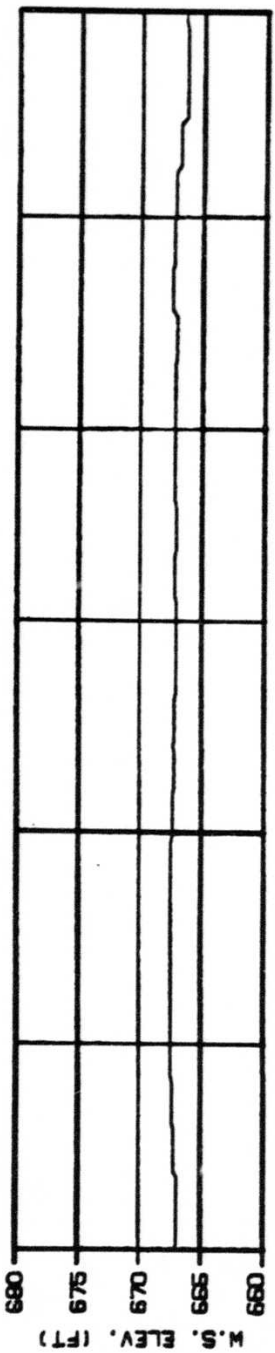


ALASKA POWER AUTHORITY  
 SUBMITTA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 DRAWING NO. APR 83 1000-148

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

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 820101A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

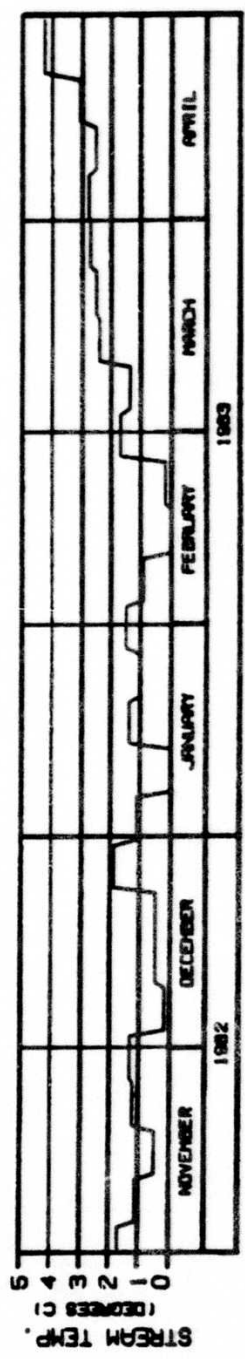
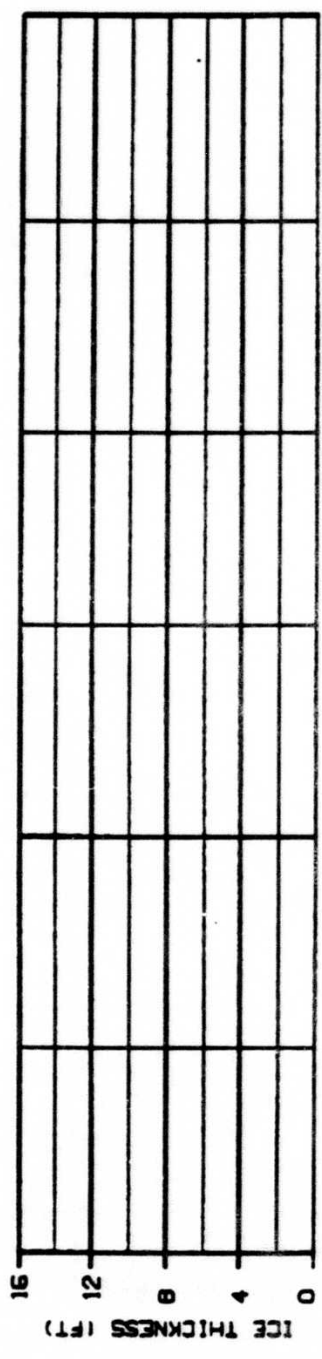
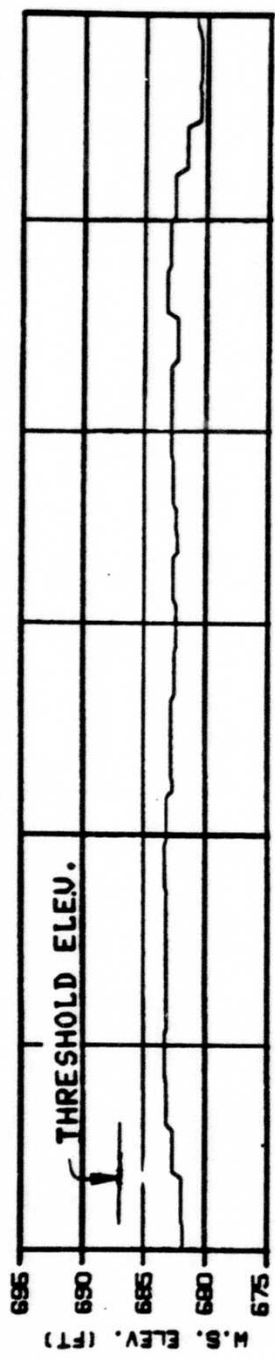


ALASKA POWER AUTHORITY  
 SUBJECT: SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBEDO JOINT VENTURE  
 DRAWING NO. 88-008 20 JUL 81 8801.142

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

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : BZ0101NA

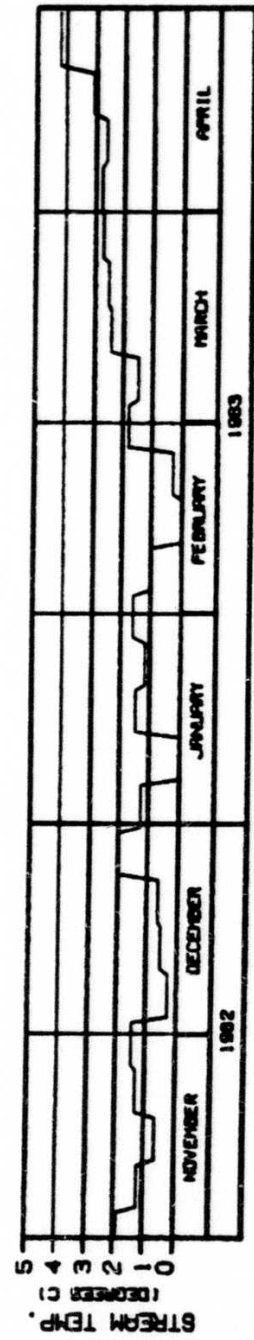
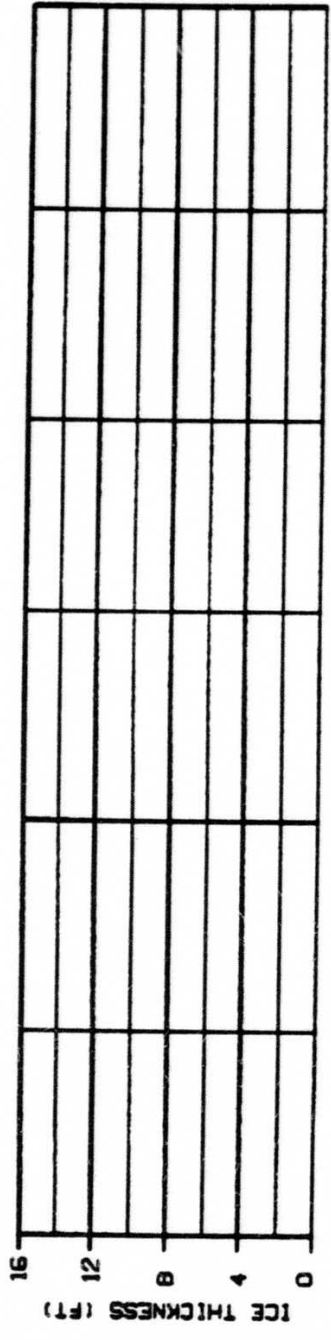
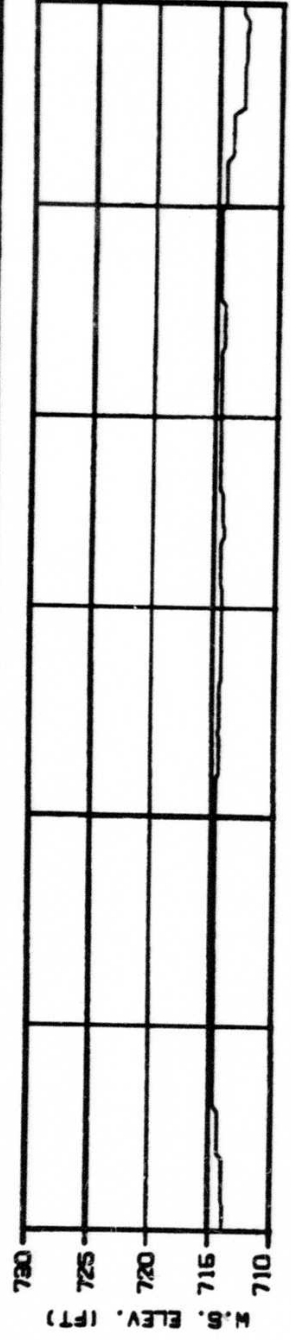
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERD JOINT VENTURE  
 DRAWING NO. 82-0000 Rev. 04/83 8208.102

HEAD OF SLOUGH 11  
 RIVER MILE : 136.50  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : B2010NA

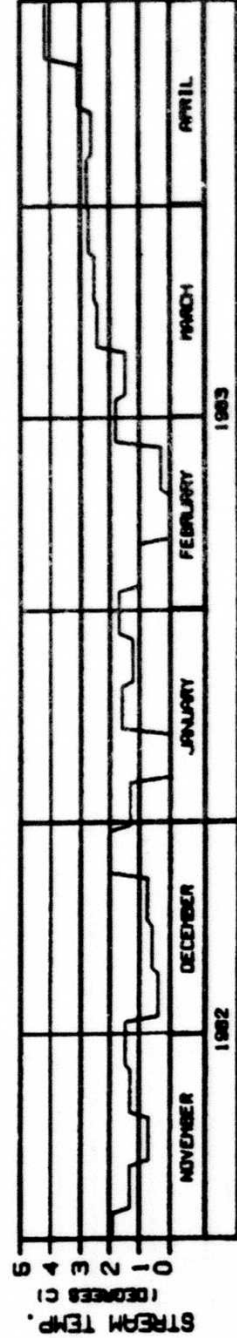
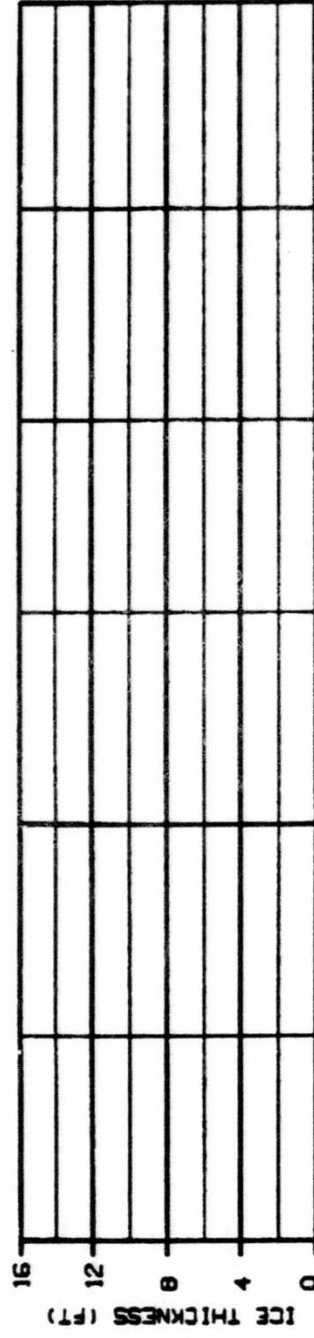
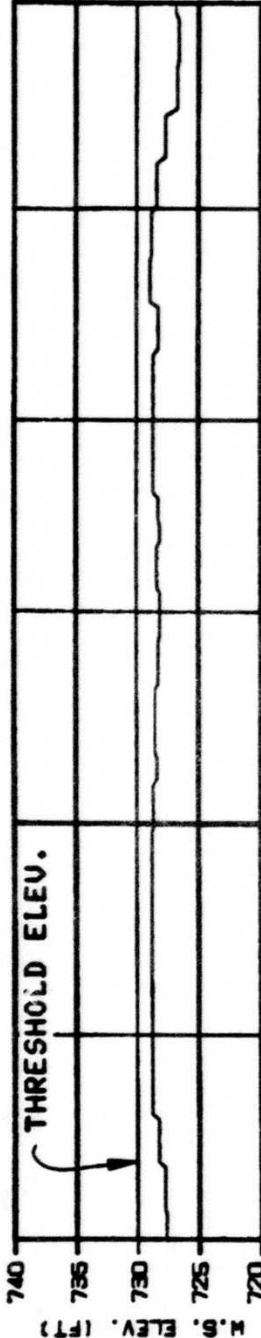
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRACO JOINT VENTURE  
 DRAWN: S. JAMES | 17 JAN 83 | 8202.142

HEAD OF SLOUGH 17  
 RIVER MILE : 139.30  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : NATURAL 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 8201CNA

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

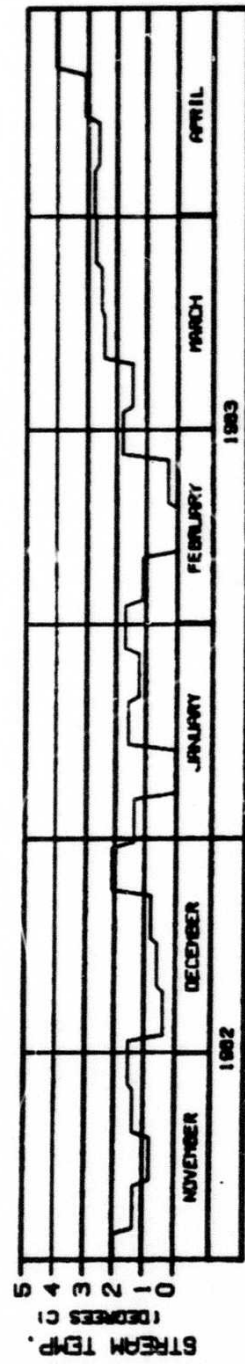
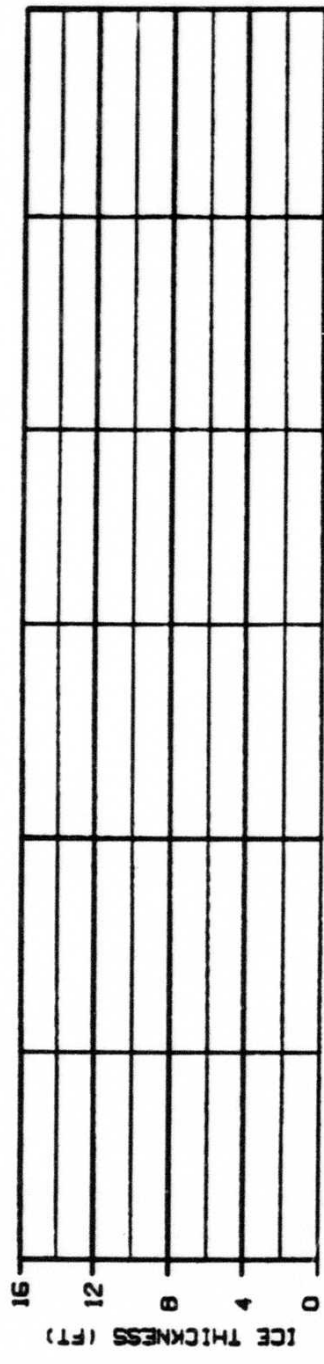
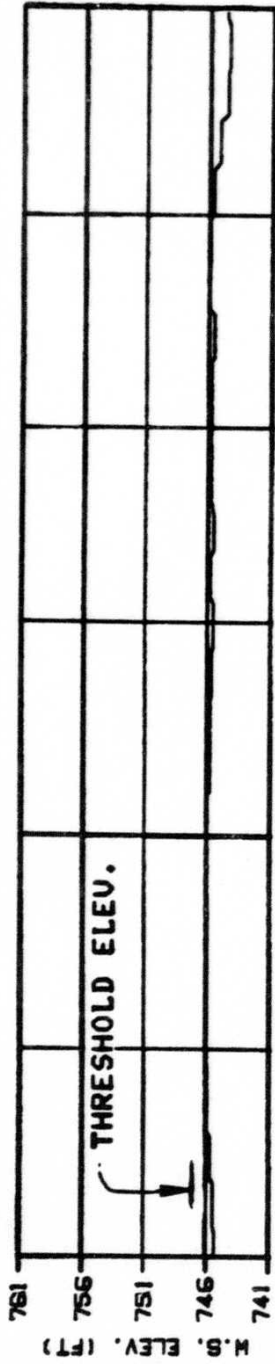


ALASKA POWER AUTHORITY  
SUSTINA PROJECT  
SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY  
HARZA-ERBOSD JOINT VENTURE  
ORDER: 44-0000 JAN 83 1983.142

HEAD OF SLOUGH 20  
RIVER MILE : 140.50  
WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
ENERGY DEMAND : NATANA 2001  
FLOW CASE : C TEMP RULE : NATURAL  
REFERENCE RUN NO. : 822101A

ICE THICKNESS LOADING:  
1. TOTAL THICKNESS  
2. SLUSH COMPONENT





**SLOUGH 21 (ENTRANCE A6)**

**RIVER MILE : 141.80**

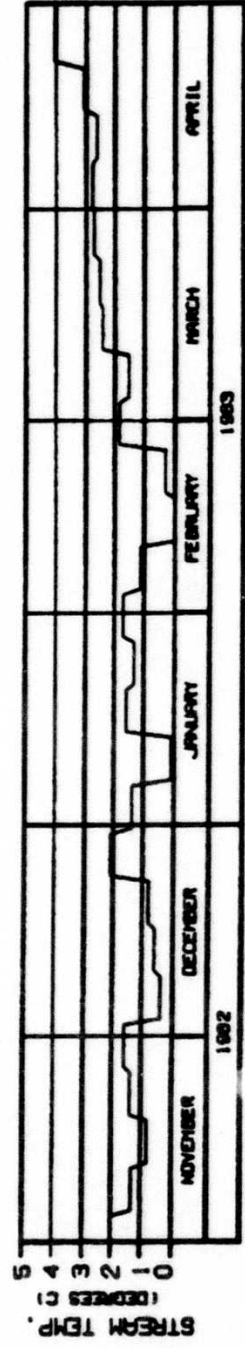
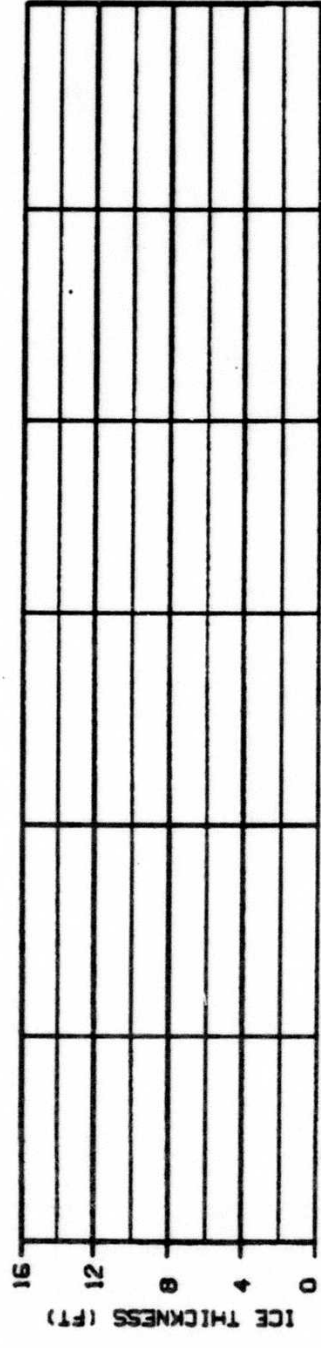
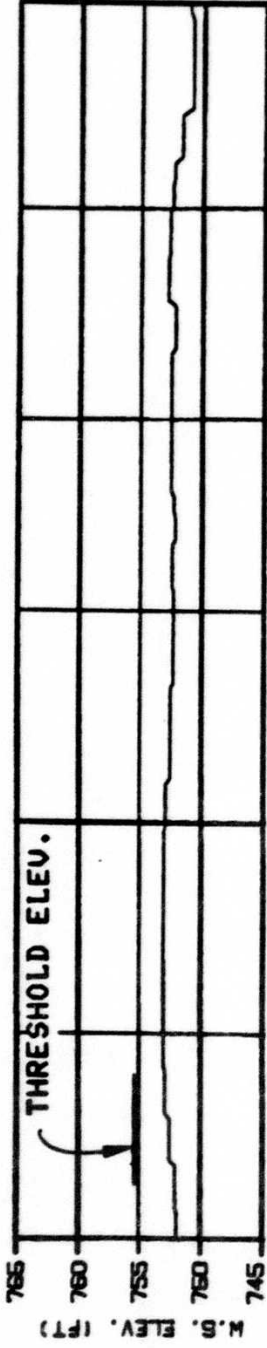
WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 2001  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : B20101A

ICE THICKNESS LEGEND:

- 1: TOTAL THICKNESS
- 2: SLUSH COMPONENT

ALASKA POWER AUTHORITY	
SUSTINA PROJECT	SUSTINA RIVER
ICE SIMULATION	
TIME HISTORY	
HARRIS-EBERD JOINT VENTURE	
DATE: 11/1982	BY: JAL/BJ
DRAWN: 1/82	



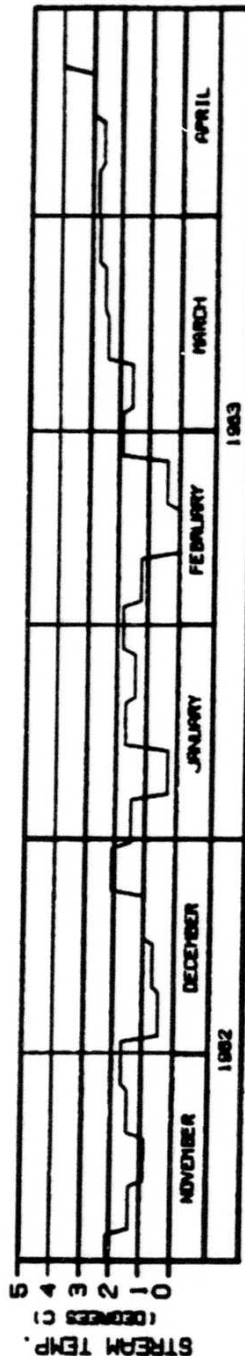
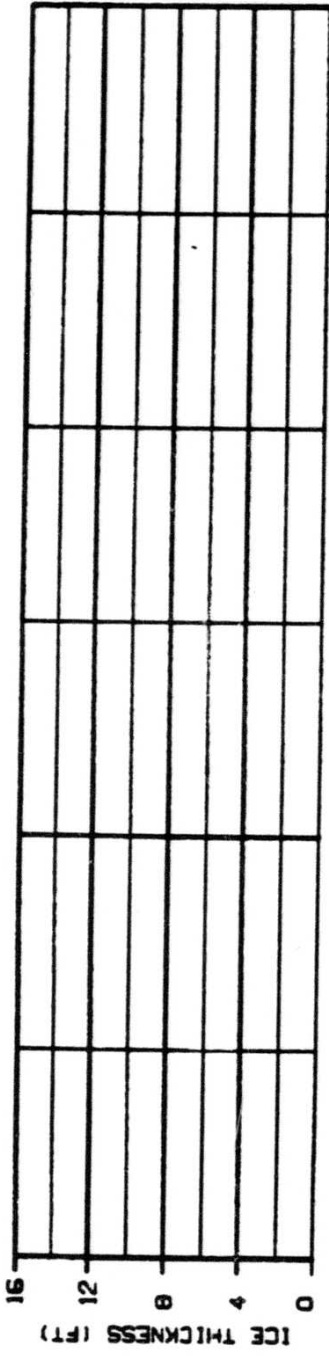
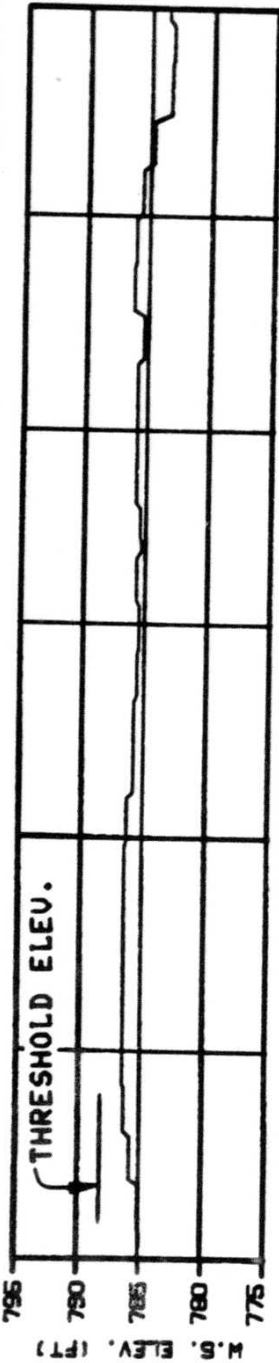


ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EDRISCO JOINT VENTURE  
 DRAWING NO. 82-010

HEAD OF SLOUGH 21  
 RIVER MILE : 142.20  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : NATURAL  
 FLOW CASE : C      TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 82010A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

C



ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBERD JOINT VENTURE

DESIGN - 61-0000 JAN 83 1982.142

HEAD OF SLOUGH 22

RIVER MILE : 144.80

WEATHER PERIOD : 1 NOV 82 - 30 APR 83

ENERGY DEMAND : NATANA 2001

FLOW CASE : C TEMP RULE : NATURAL

REFERENCE RUN NO. : 820101A

ICE THICKNESS LEGEND:

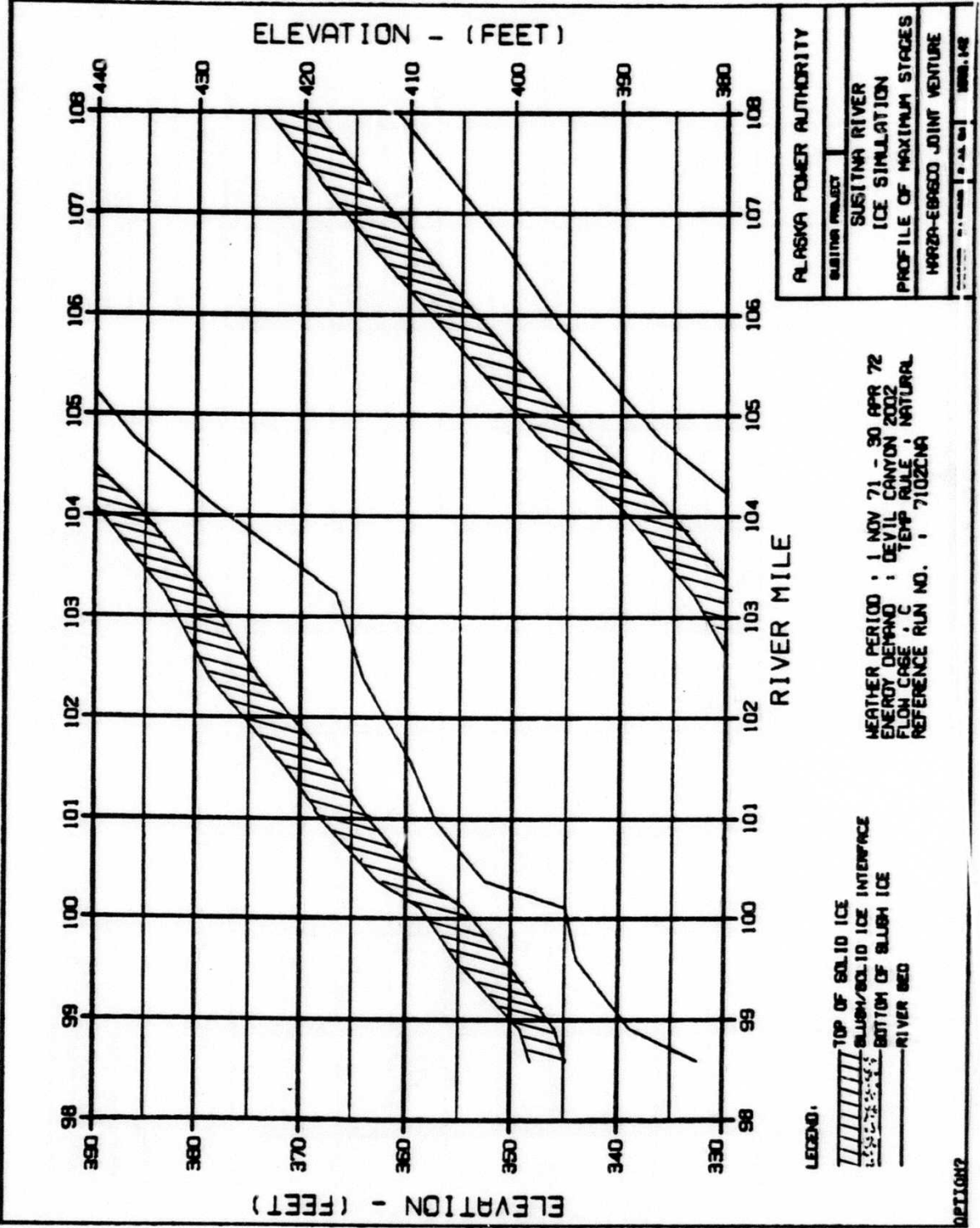
1. TOTAL THICKNESS

2. SLUSH COMPONENT

OPTION?

**EXHIBIT L**

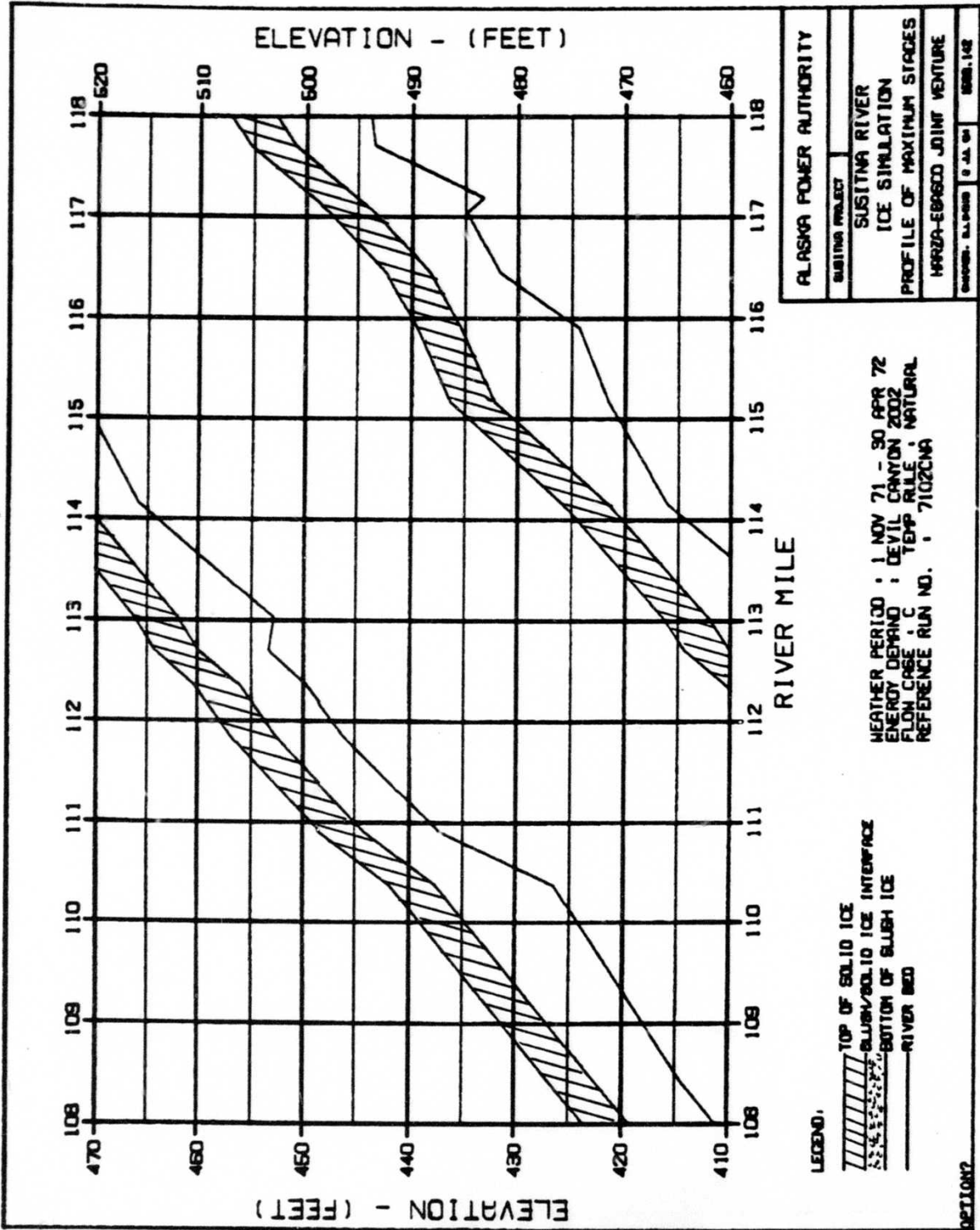
c



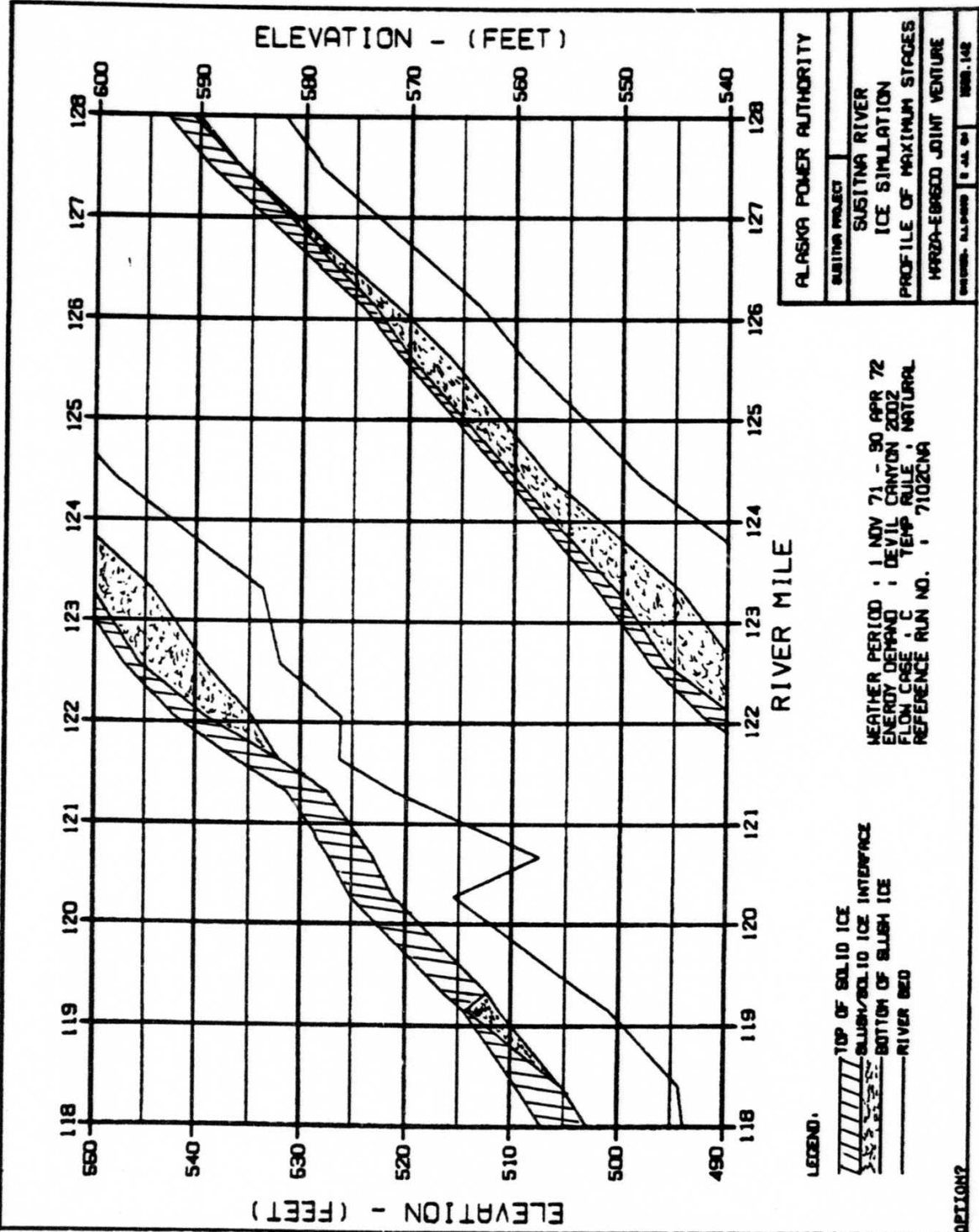
SECTION 142



c



c



LEGEND.

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

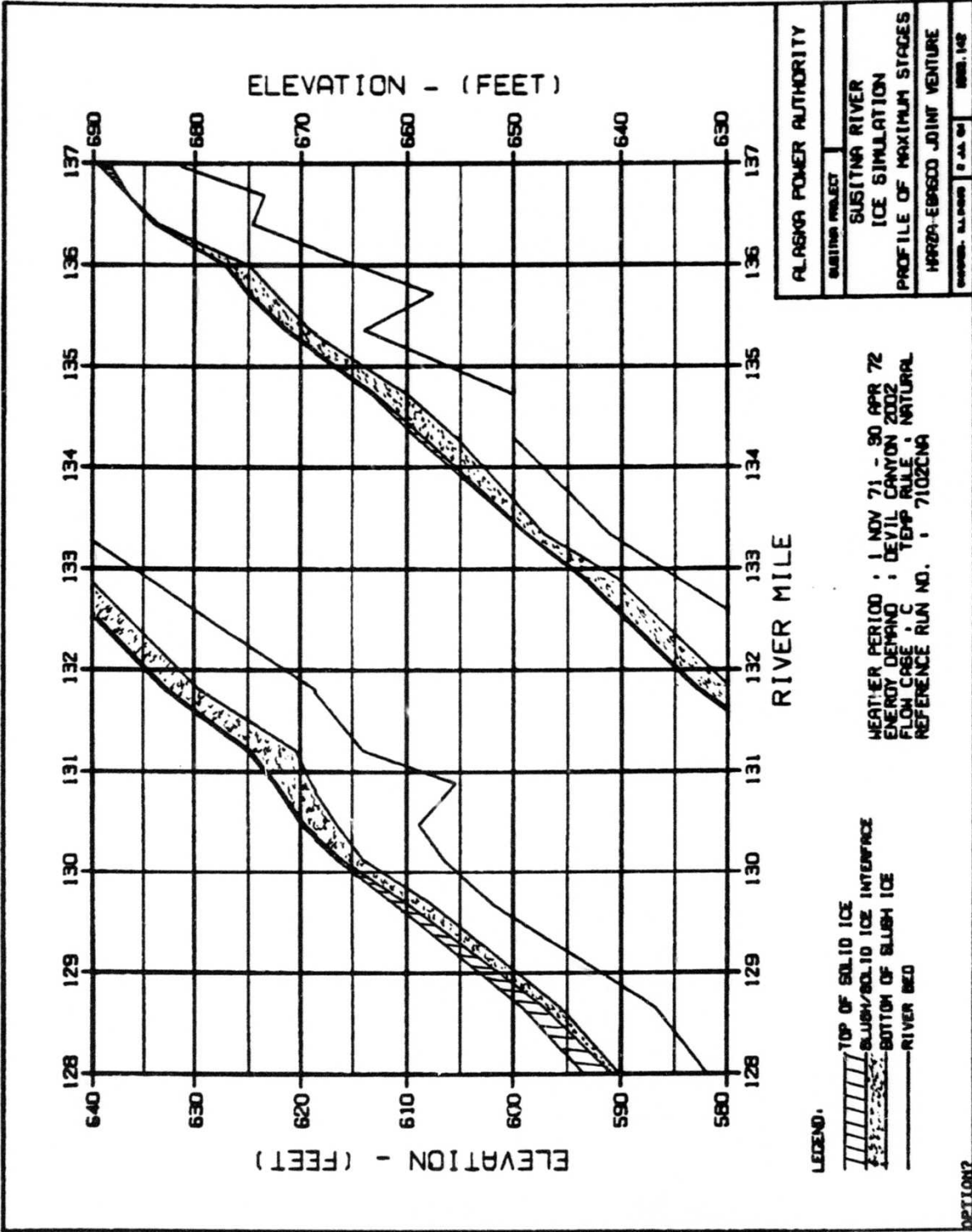
WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7102CNA

ALASKA POWER AUTHORITY	
SUBMITTA PROJECT	SUSITNA RIVER
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
HARZA-EDGED JOINT VENTURE	
DESIGNED BY	B. J. J. JR.
DATE	NOV. 1972

SECTION 2



c

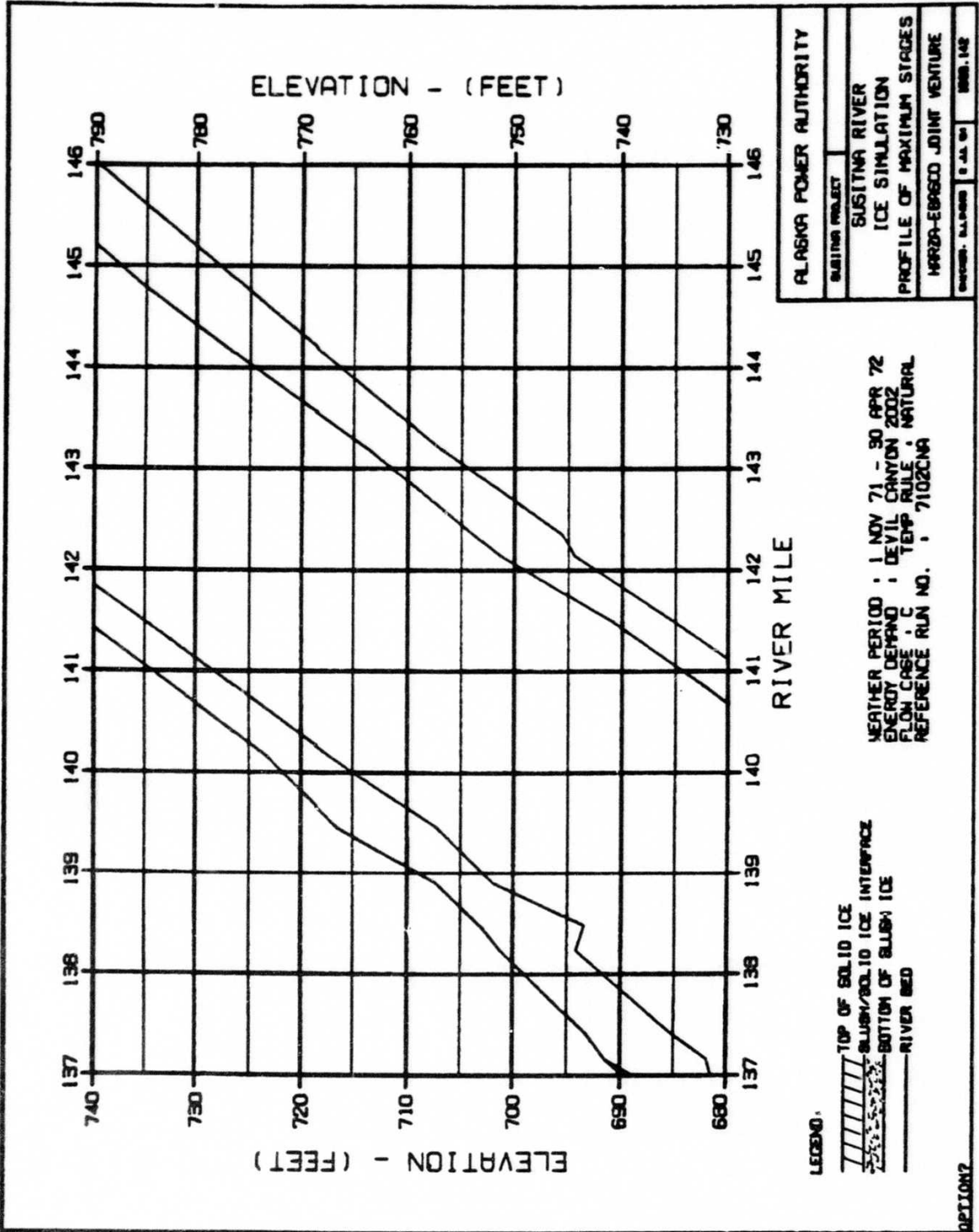


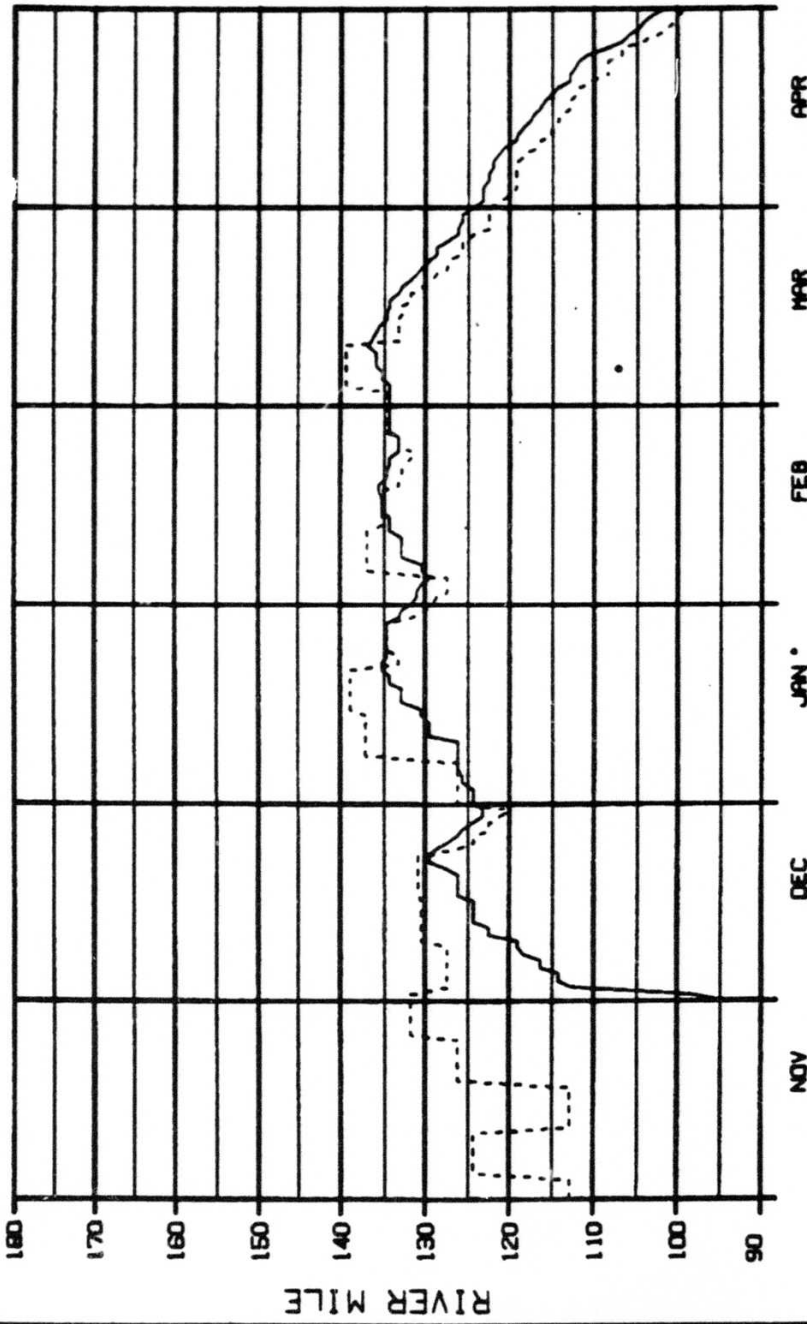
ALASKA POWER AUTHORITY  
 SUSITNA RIVER  
 ICE SIMULATION  
 PROFILE OF MAXIMUM STAGES  
 HARZA-ERBECO JOINT VENTURE  
 DATE: 11/09/02  
 DRAWN: JJA 01

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7102CNA

LEGEND:  
 TOP OF SOLID ICE  
 SLUSH/SOLID ICE INTERFACE  
 BOTTOM OF SLUSH ICE  
 RIVER BED

SECTION 2



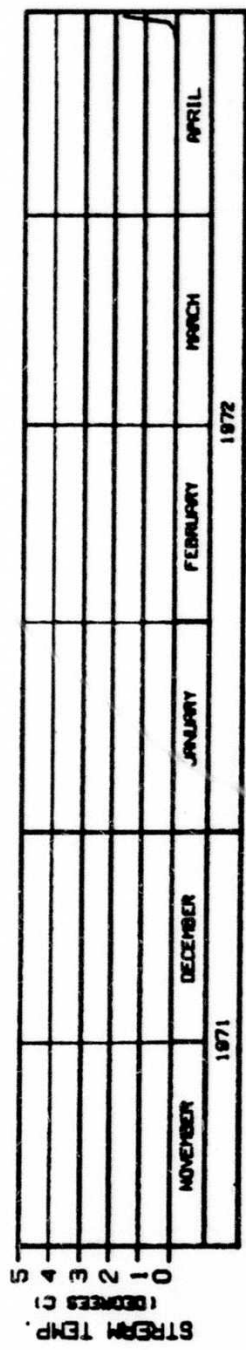
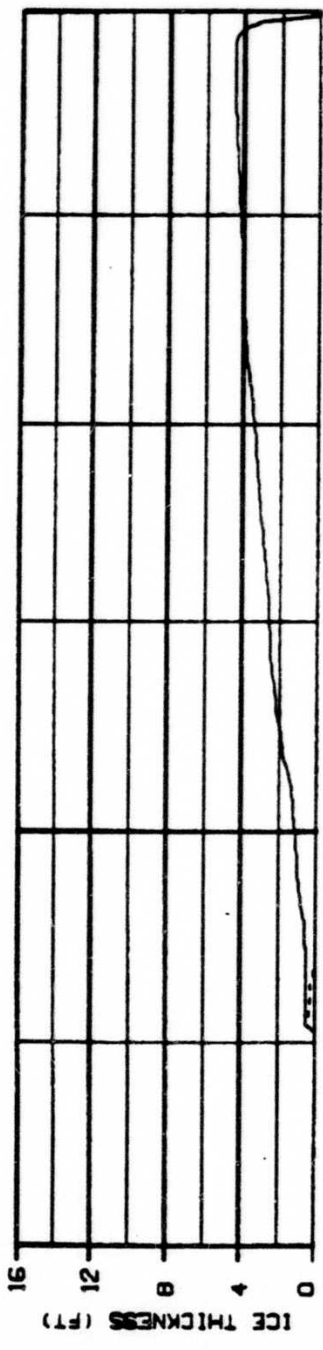
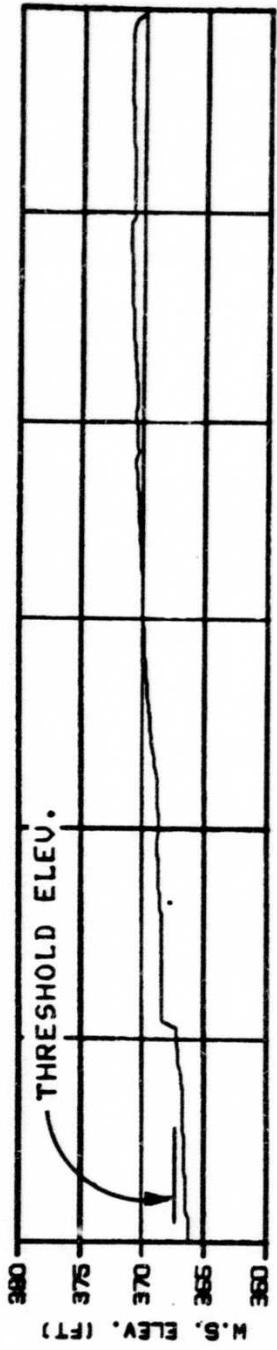


ALASKA POWER AUTHORITY  
 SUSTINA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM  
 HARZA-EBERCO JOINT VENTURE  
 DRAWN: S. ALPHEO 8 JUL 84  
 SHEET: 142

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7102CNA

LEGEND:  
 — ICE FRONT  
 - - - ZERO DEGREE ISOTHERM

OPTION?

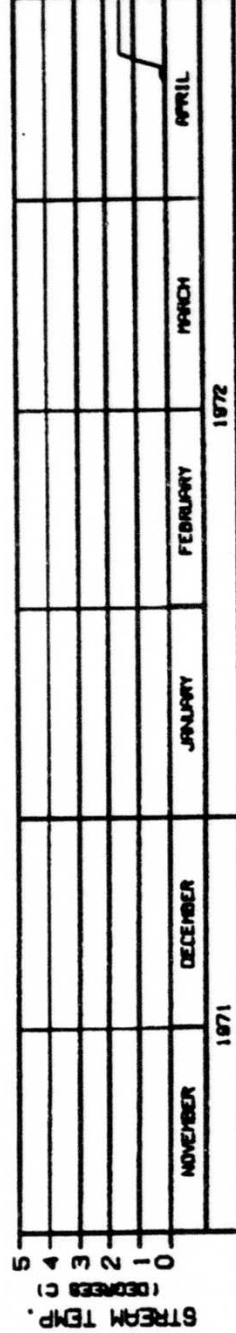
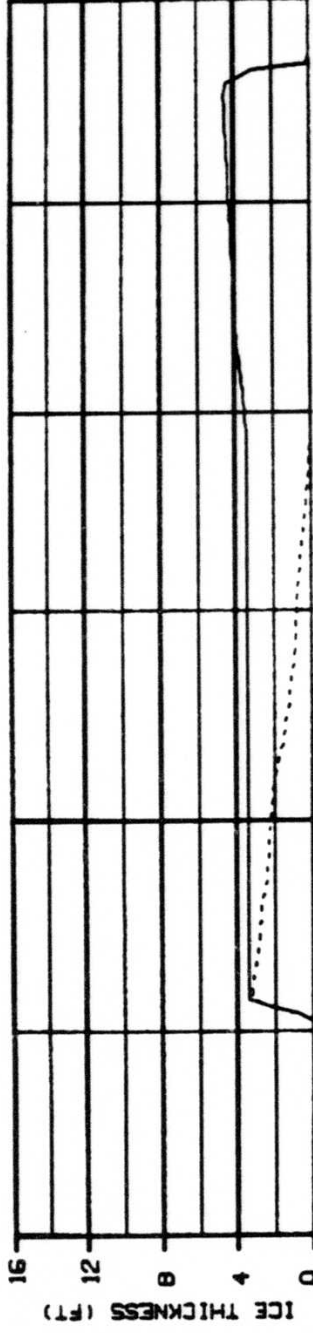
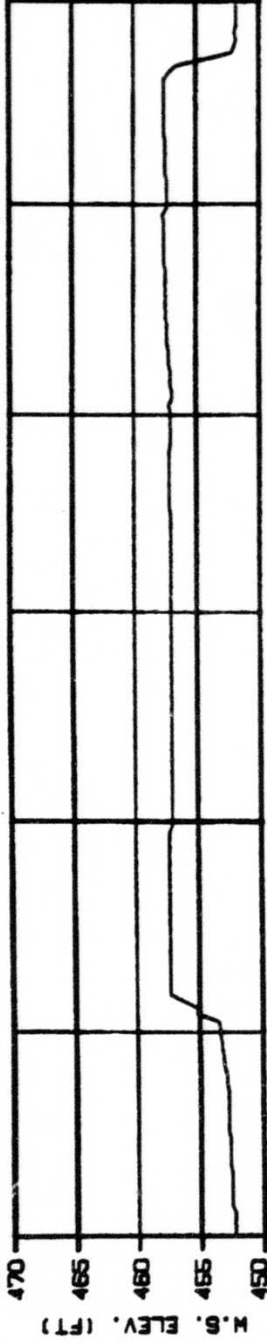


ALASKA POWER AUTHORITY  
 SUBJECT: SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBECO JOINT VENTURE  
 DATE: 08-11-80 9:44 AM 0000142

HEAD OF WHISKERS SLOUGH  
 RIVER MILE : 101.50

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RILE : NATURAL  
 REFERENCE RUN NO. : 71020NA

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



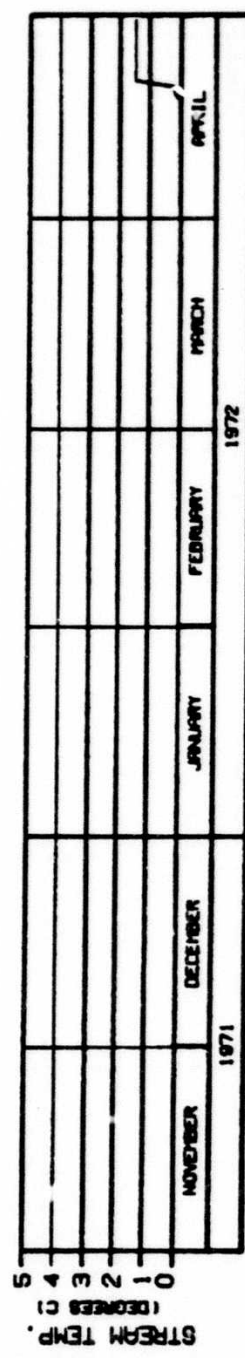
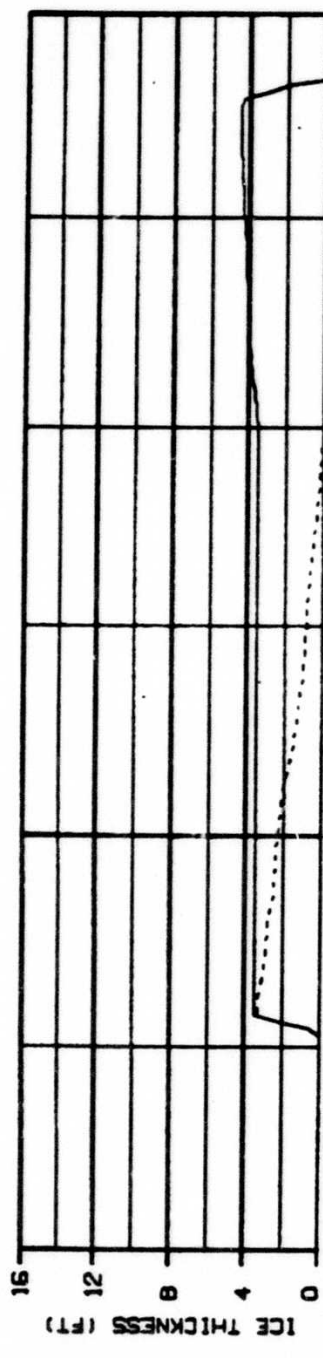
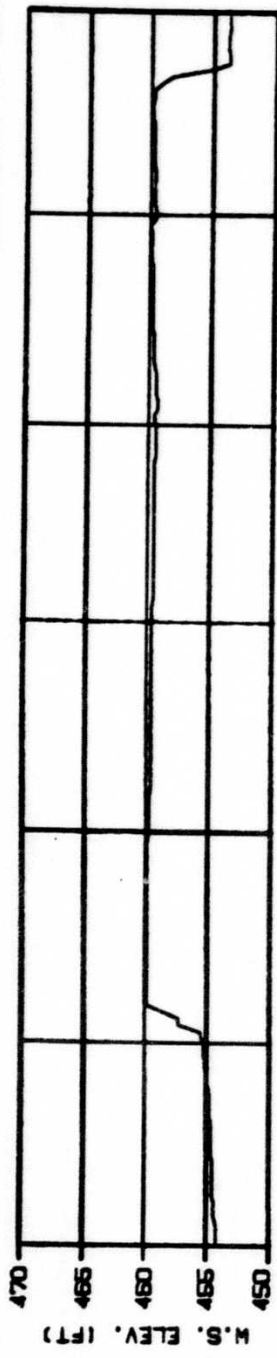
**SIDE CHANNEL AT HEAD OF GASH CREEK**

RIVER MILE : 112.00

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 71020NA

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

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	SUSITNA RIVER
ICE SIMULATION	
TIME HISTORY	
HARZA-EBERCO JOINT VENTURE	
DATE: 01.04.72	BY: J.L. DE
SHEET: 142	

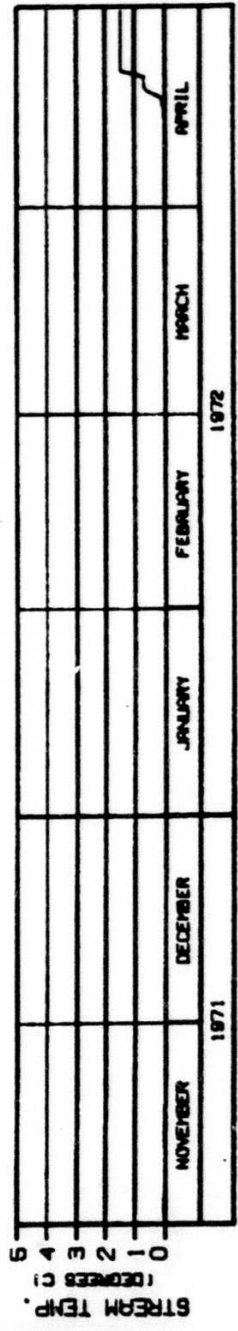
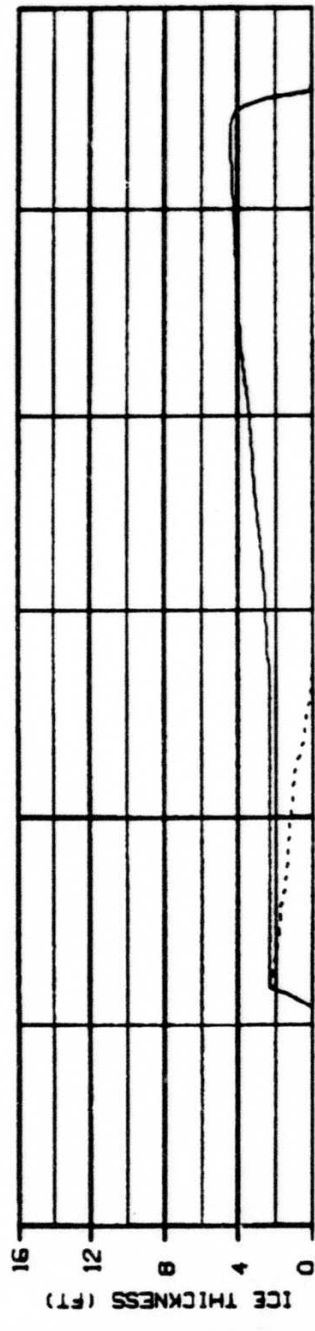
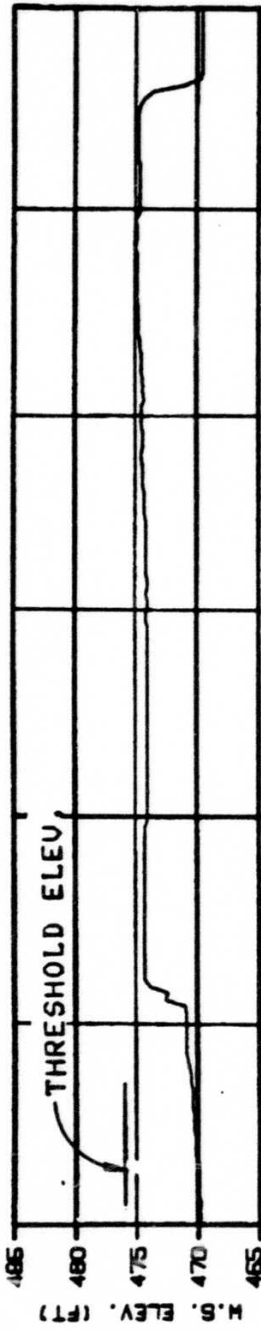


ALASKA POWER AUTHORITY  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRSCO JOINT VENTURE  
 DRAWN: S.A. 0000 8 JAN 81 5881.142

MOUTH OF SLOUGH 6A  
 RIVER MILE : 112.34  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 710201A

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

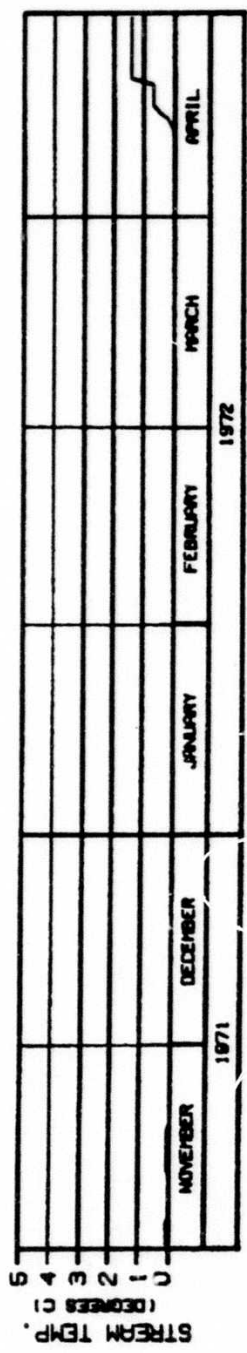
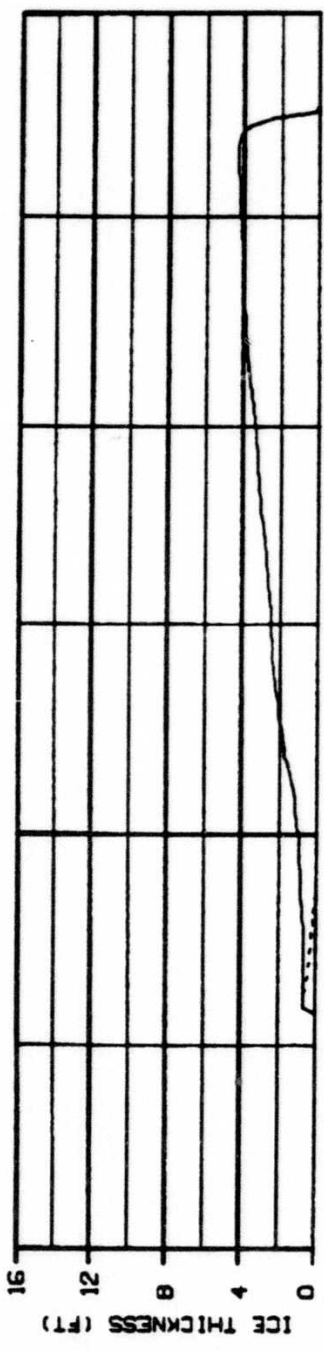
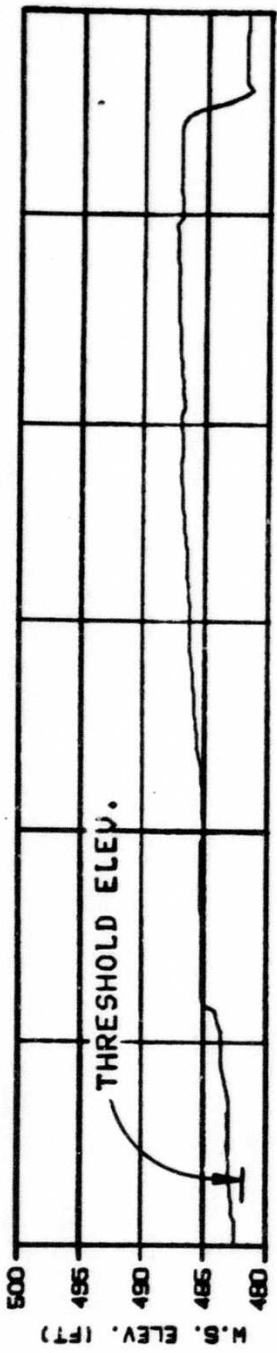




ALASKA POWER AUTHORITY  
 BUILDING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRASCO JOINT VENTURE  
 DESIGN: S. J. BROWN & ASSOCIATES  
 MOBILE, ALA.

HEAD OF SLOUGH 8  
 RIVER MILE : 114.10  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 710202NA

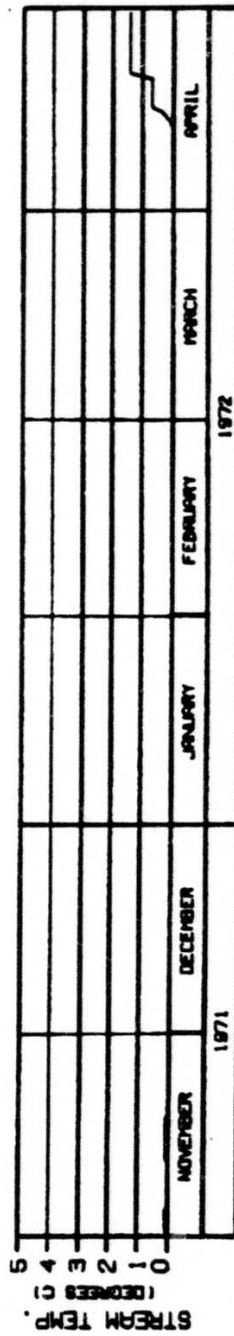
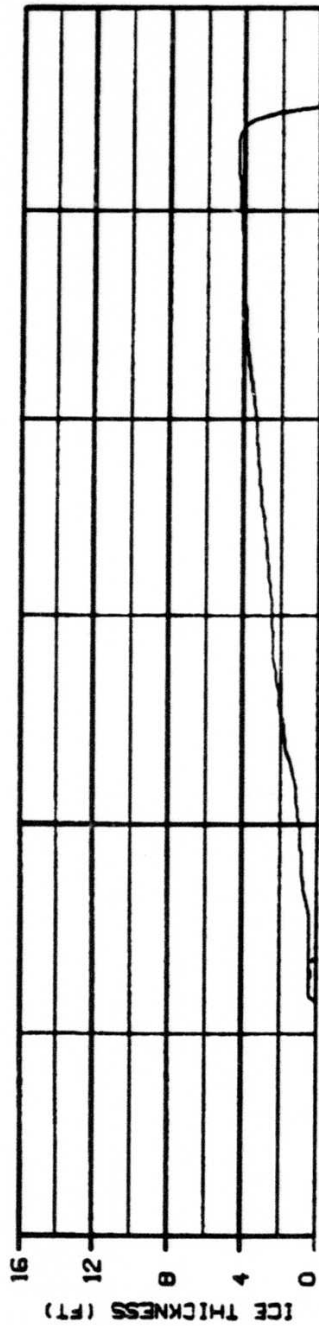
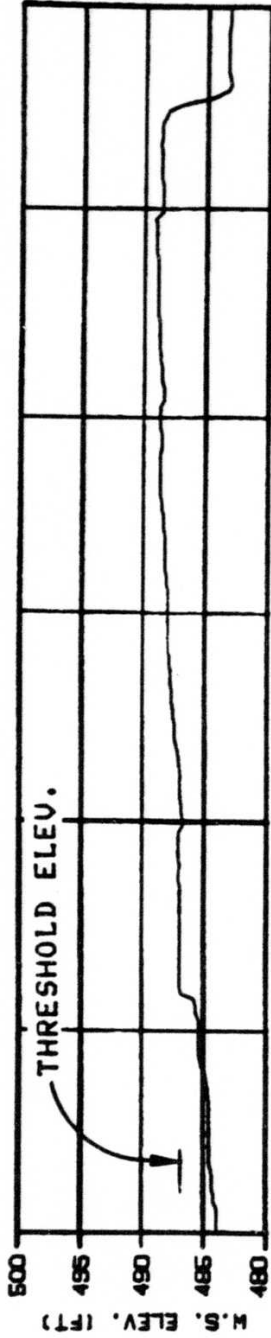
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EDBECO JOINT VENTURE  
 SHEET: 0-11-01 000-142

**SIDE CHANNEL MSII**  
**RIVER MILE : 115.50**  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7102CNA

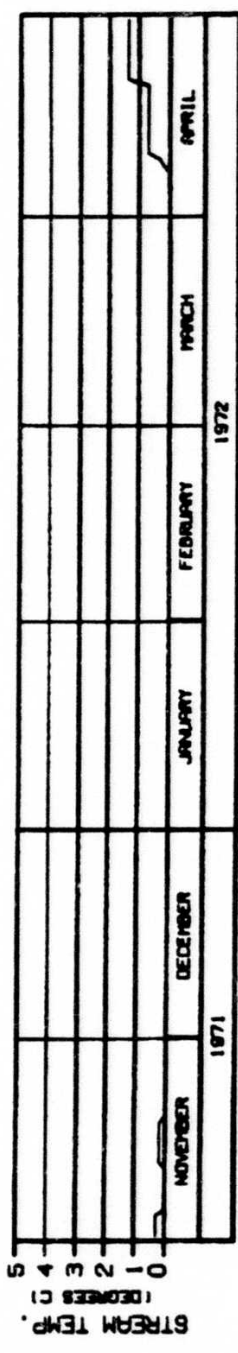
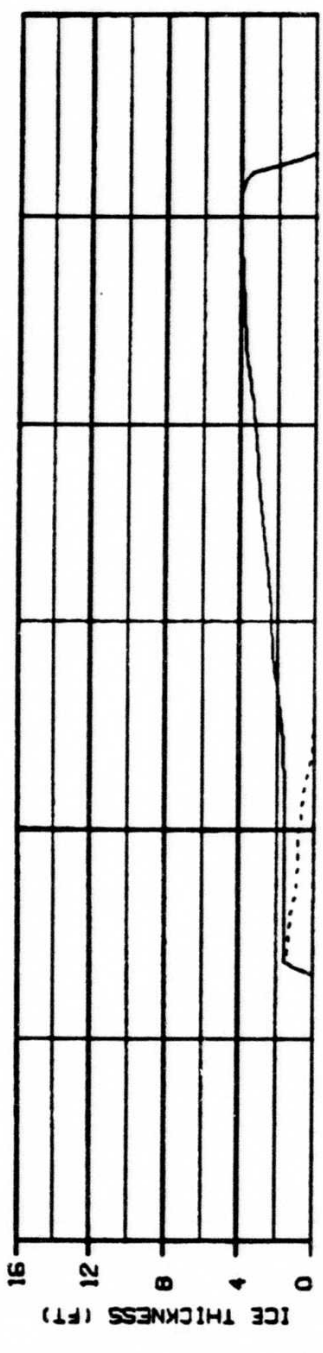
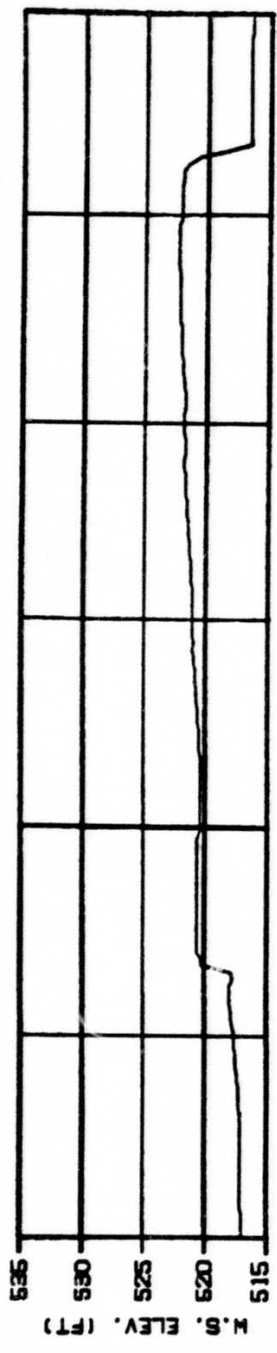
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 SHEET: 8-142

HEAD OF SIDE CHANNEL MSII  
 RIVER MILE : 115.90  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 710201A

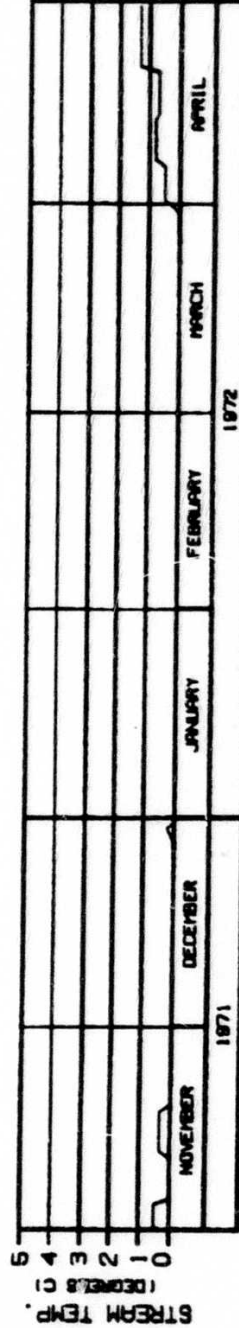
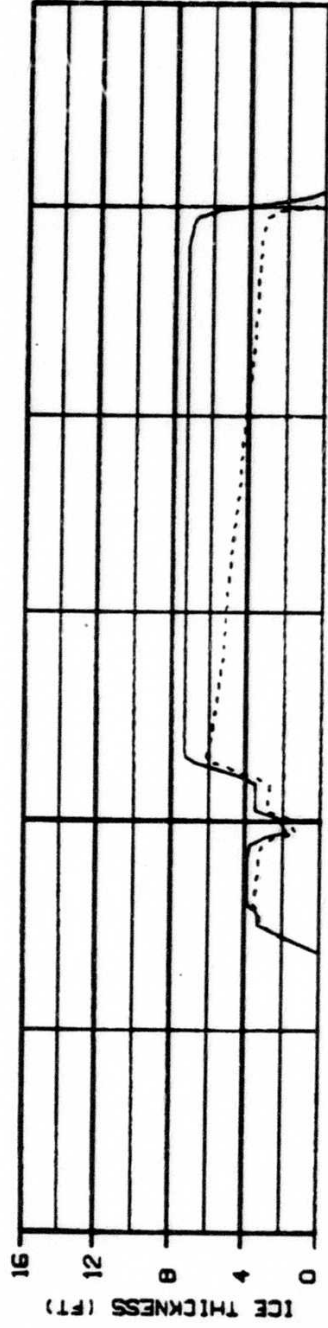
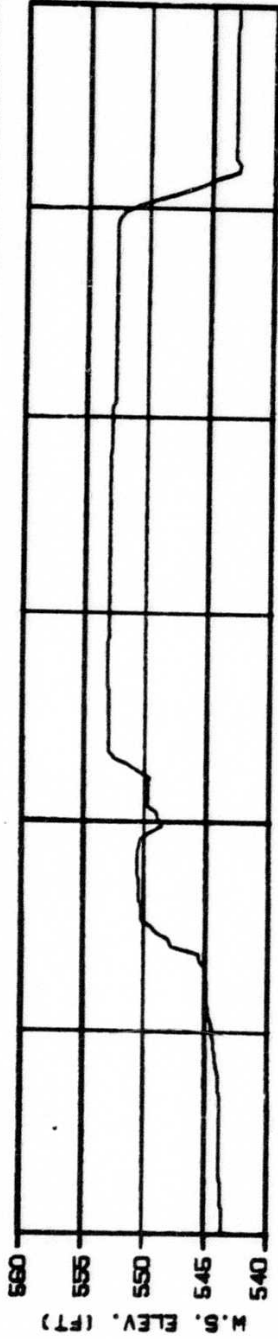
ICE THICKNESS LEGEND:  
 --- TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERD JOINT VENTURE  
 DRAWING NO. 8-A-01 1000-142

RIVER MILE : 120.00  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP ALLE. NATURAL  
 REFERENCE RUN NO. : 71020NA

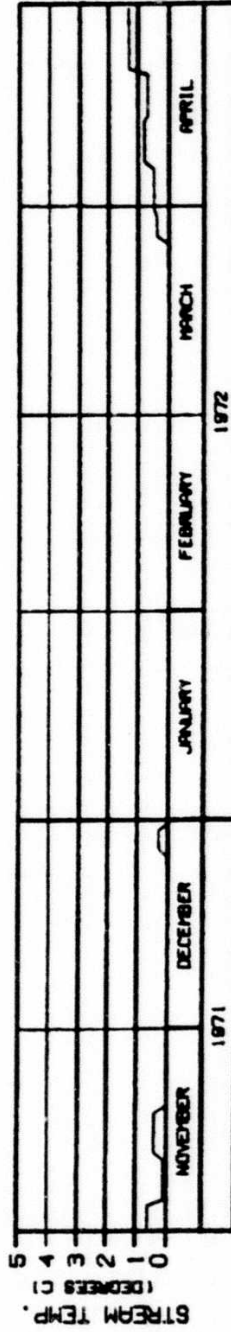
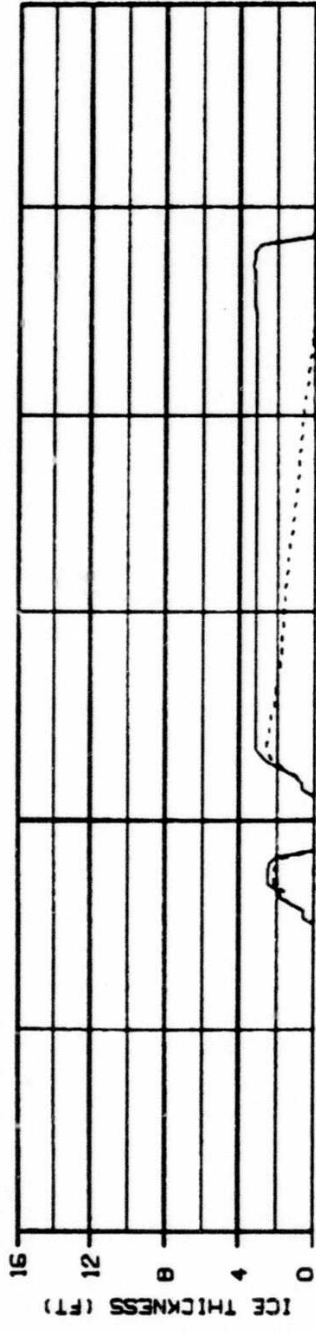
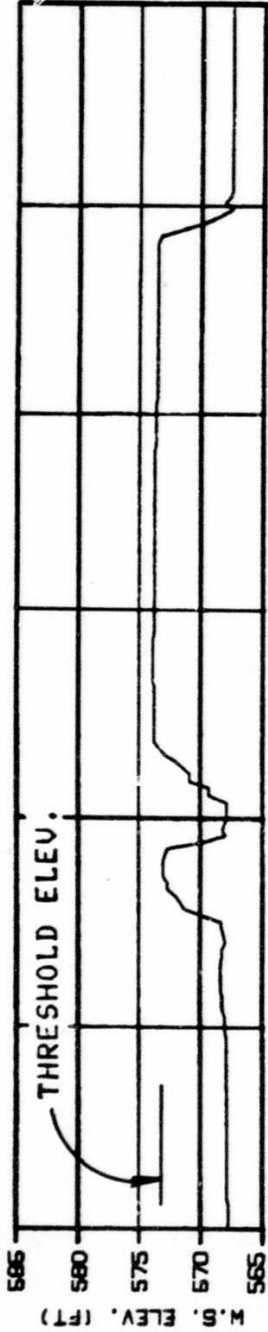
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 W-222-EB-800 JOINT VENTURE  
 DRAWING: 8-142 8-A-01 800-142

HEAD OF MOOSE SLOUGH  
 RIVER MILE : 123.50  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : 2  
 REFERENCE RUN NO. : 71020NA

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



ALASKA POWER AUTHORITY  
 SUBITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRSCO JOINT VENTURE  
 ORDER: U.S. 8000 8 JAN 81 880.142

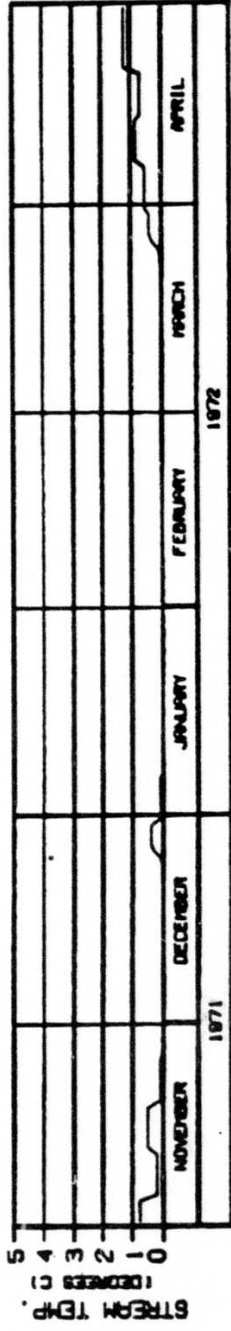
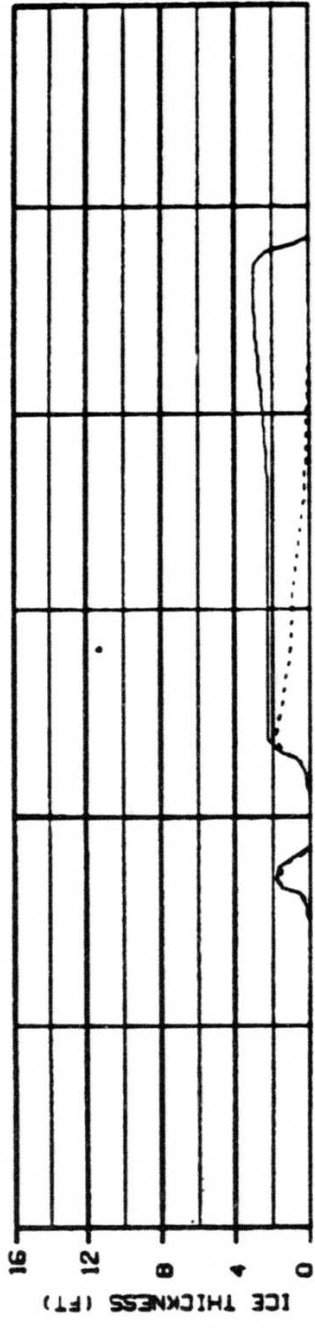
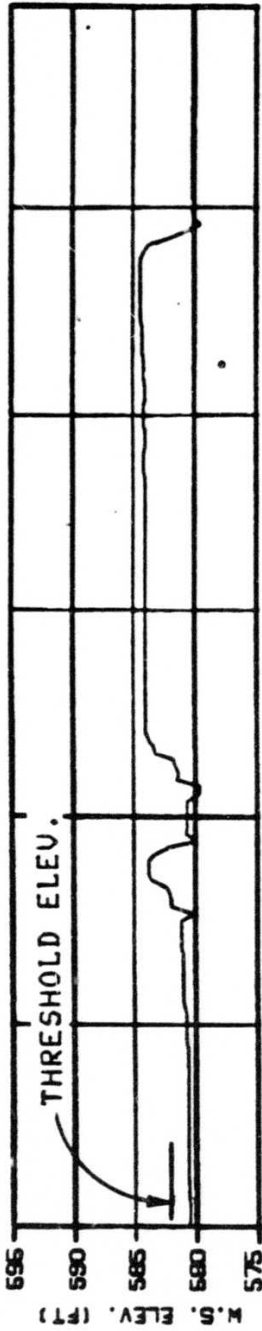
HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7102CNA

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

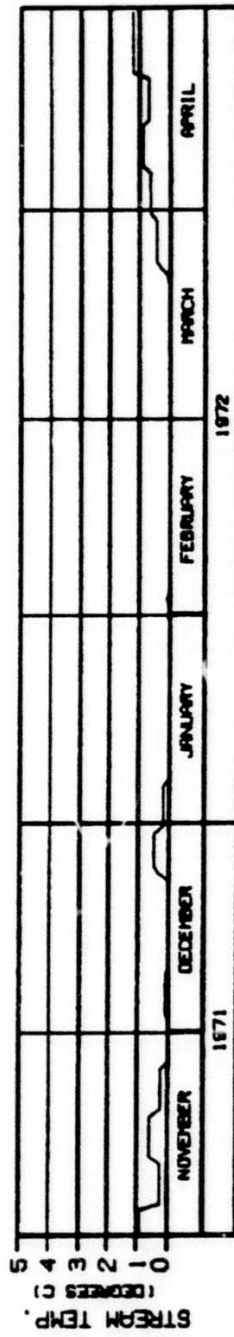
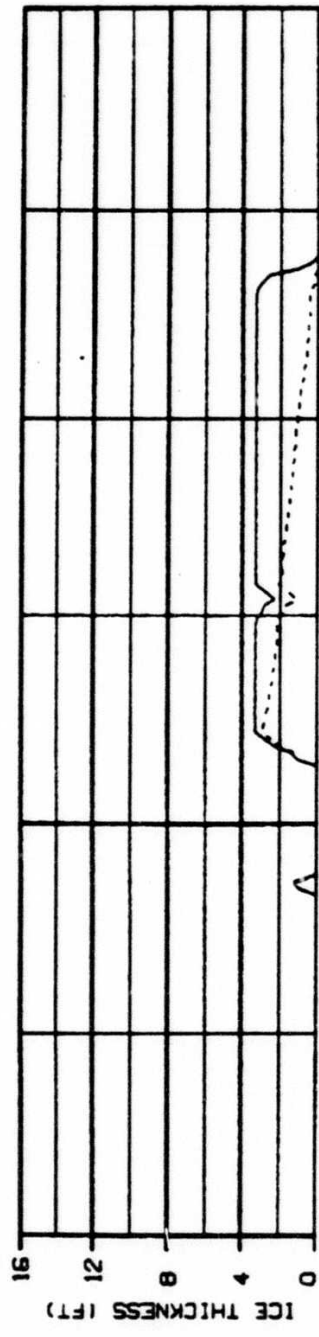
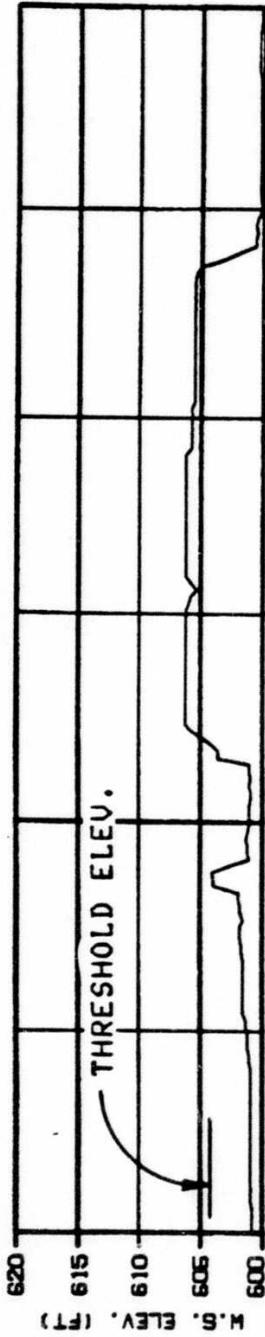




ALASKA POWER AUTHORITY  
 SUBMITTAL PROJECT  
 SLUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 SHEET NO. 8 OF 10  
 M88.142

HEAD OF SLOUGH 8A (EAST)  
 RIVER MILE : 127.10  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEFEND : DEVIL CANYON 2002  
 FLOW CASE : C  
 TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 710209A

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



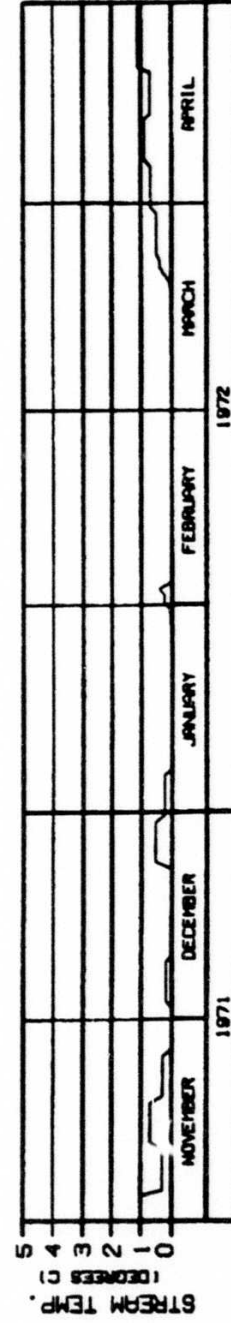
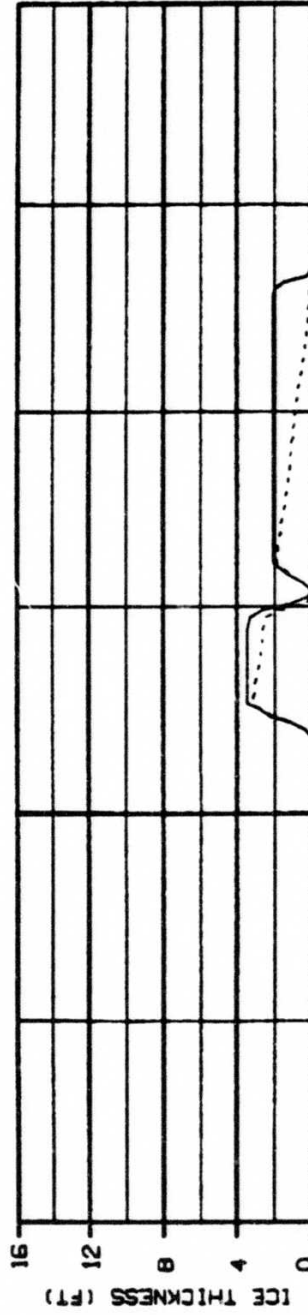
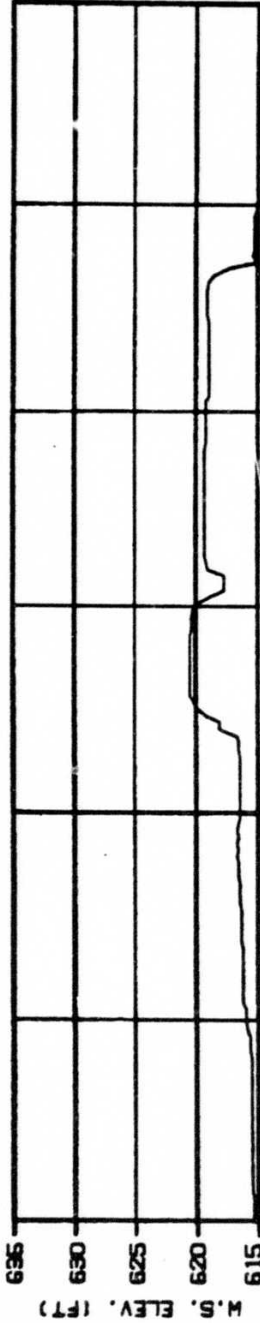
ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EDBECO JOINT VENTURE  
 OFFICE: S.W. 9000 S. 4th St. URB. 142

HEAD OF SLOUGH 9  
 RIVER MILE : 129.30  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RILE : NATURAL  
 REFERENCE RUN NO. : 710207A

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

OPTION?

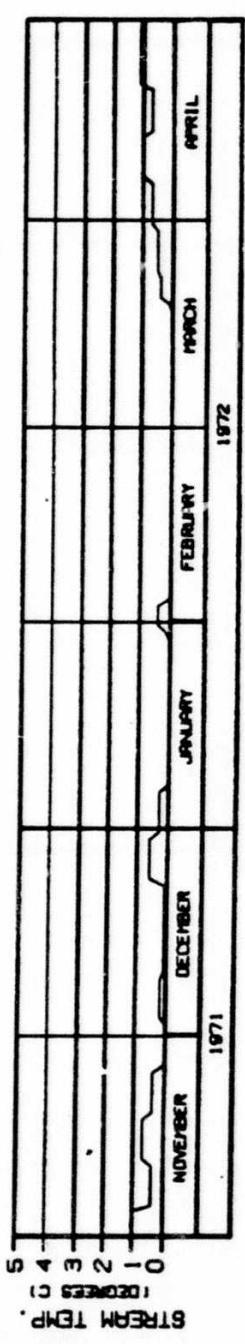
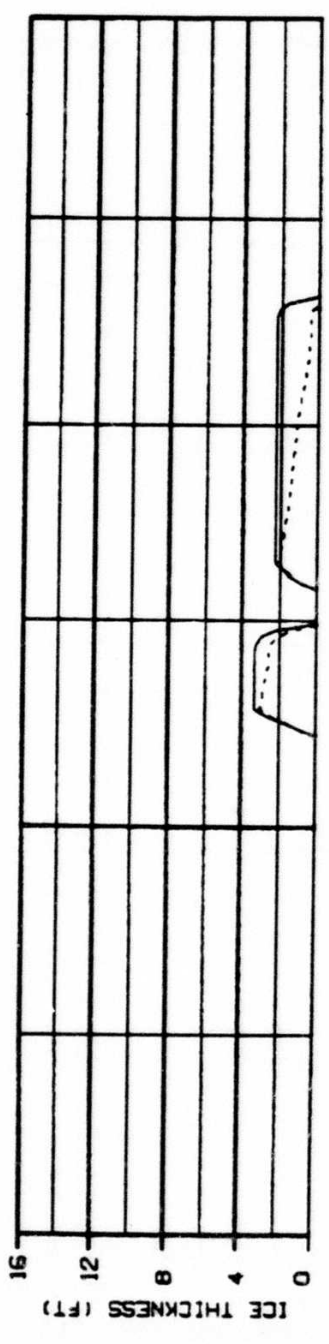
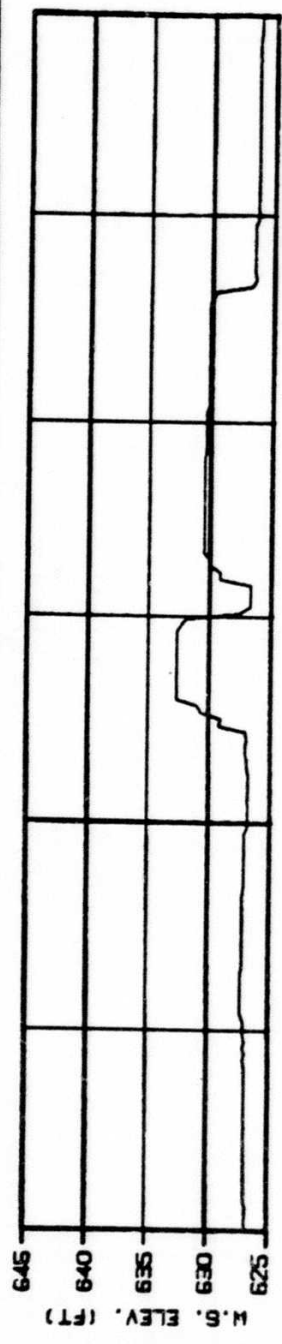
OPTION?



ALASKA POWER AUTHORITY  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRASC JOINT VENTURE  
 DRAWN: U.S. 009 8 JUL 81 1000.142

**SIDE CHANNEL U/S OF SLOUGH 9**  
 RIVER MILE : 130.60  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7102CNA

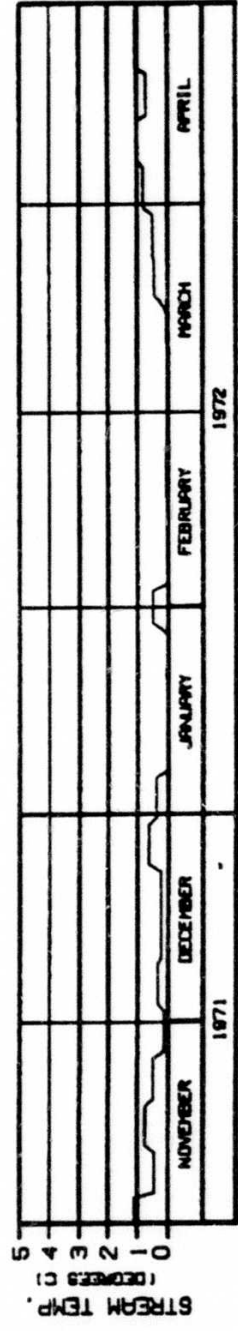
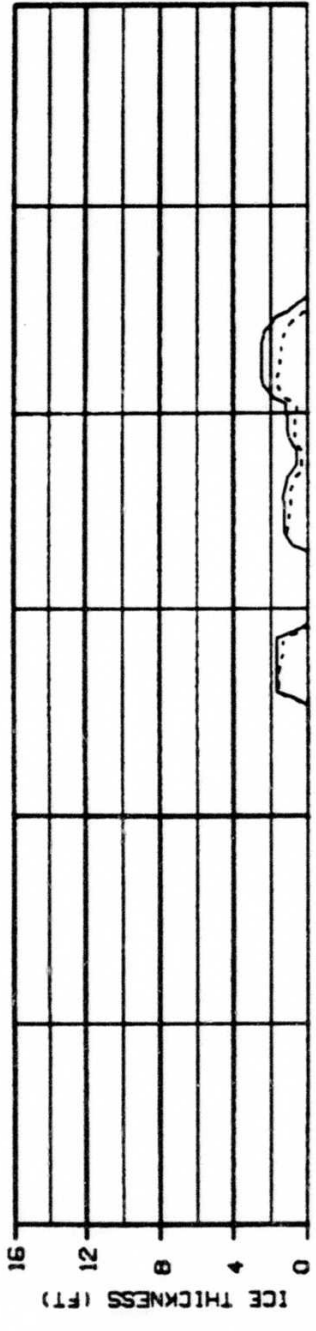
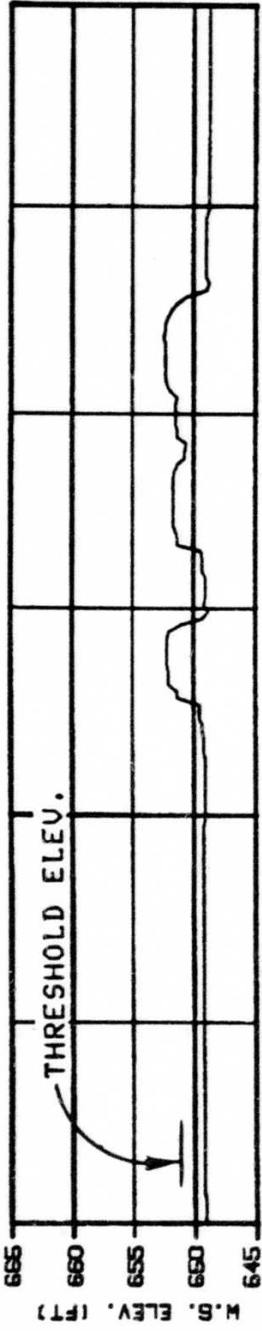
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 BUILDING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBBECO JOINT VENTURE  
 REPORT: A.I. 9888 8-14-81 8888.142

**SIDE CHANNEL U/S OF 4TH JULY CREEK**  
 RIVER MILE : 131.80  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RILE : NATURAL  
 REFERENCE RUN NO. : 710202A

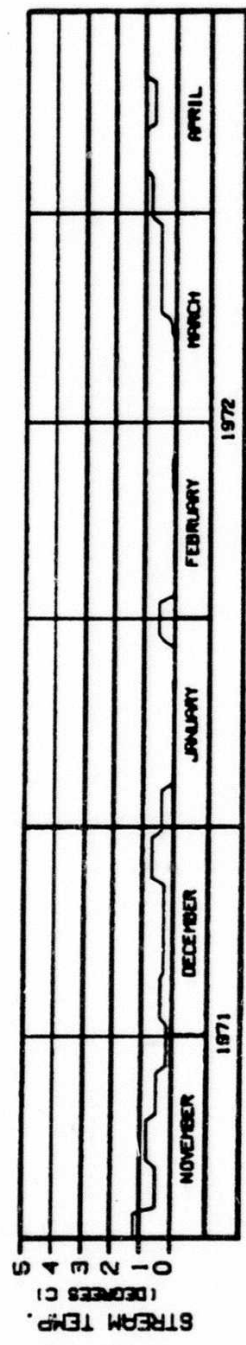
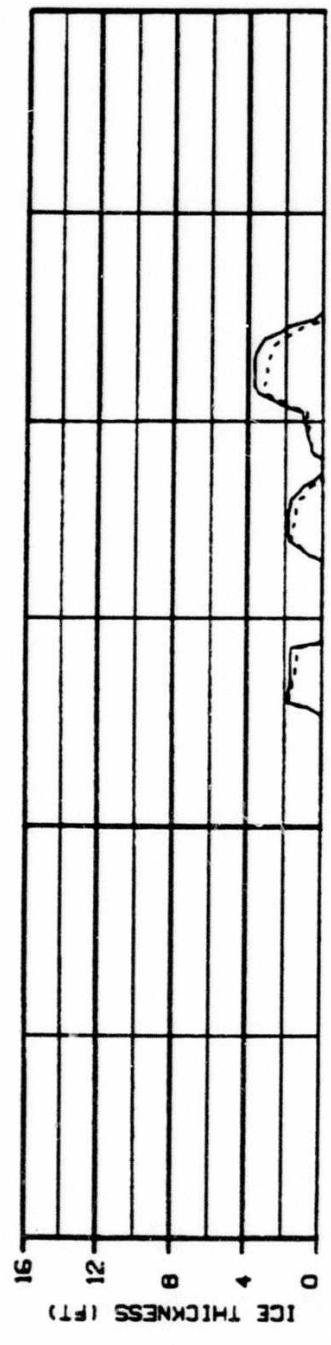
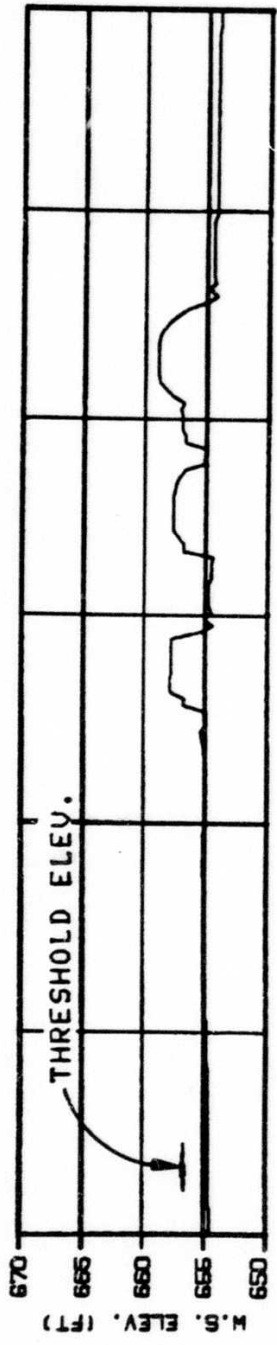
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
SUBITNA PROJECT  
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY  
HARZA-EBERD JOINT VENTURE  
DESIGNED BY: H. J. GIBSON  
DRAWN BY: M. J. GIBSON

HEAD OF SLOUGH 9A  
RIVER MILE : 133.70  
WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
ENERGY DEMAND : DEVIL CANYON 2002  
FLOW CASE : C TEMP RULE ; NATURAL  
REFERENCE RUN NO. : 710202A

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

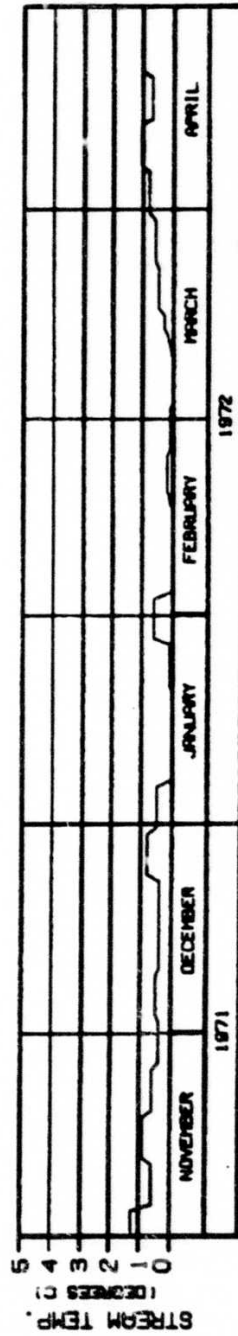
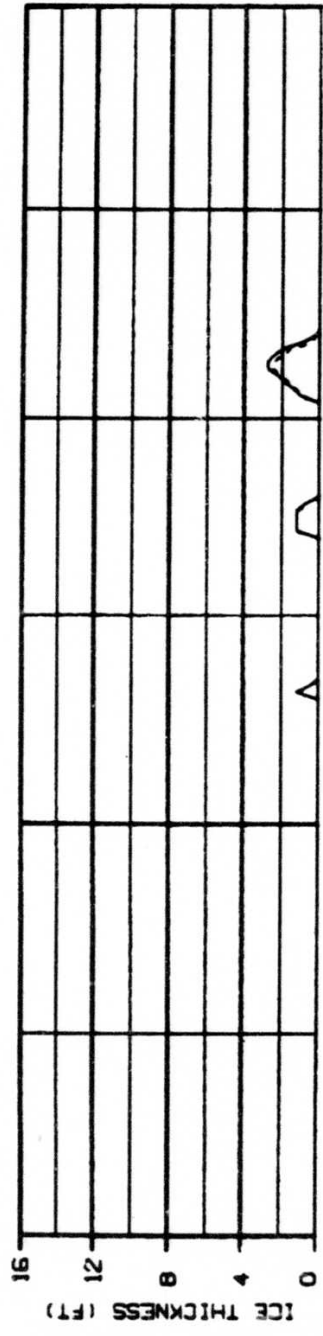
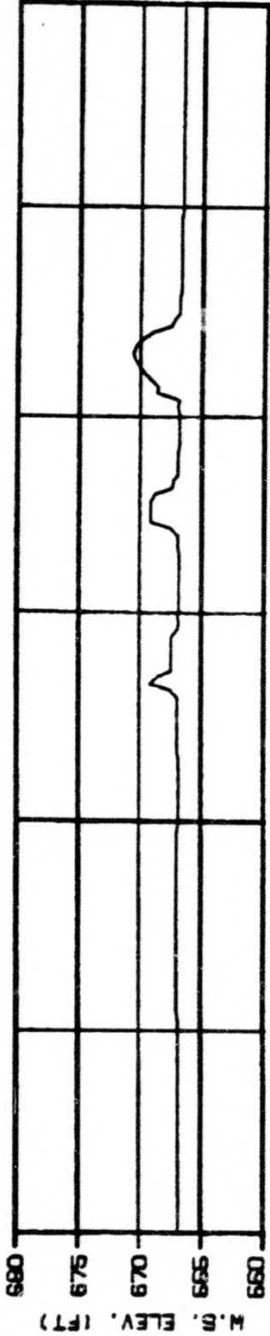


ALASKA POWER AUTHORITY	
SUSTINA PROJECT	SUSTINA RIVER
	ICE SIMULATION
	TIME HISTORY
	HARRIS-ERBACD JOINT VENTURE
DESIGNED BY: J.A. HARRIS	DATE: 08-11-72
	SCALE: 1:42

**SIDE CHANNEL U/S OF SLOUGH 10**  
**RIVER MILE : 134.30**  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 71020NA

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



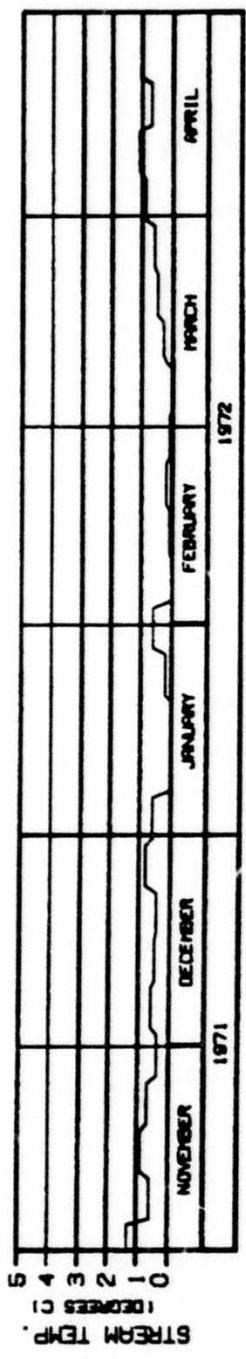
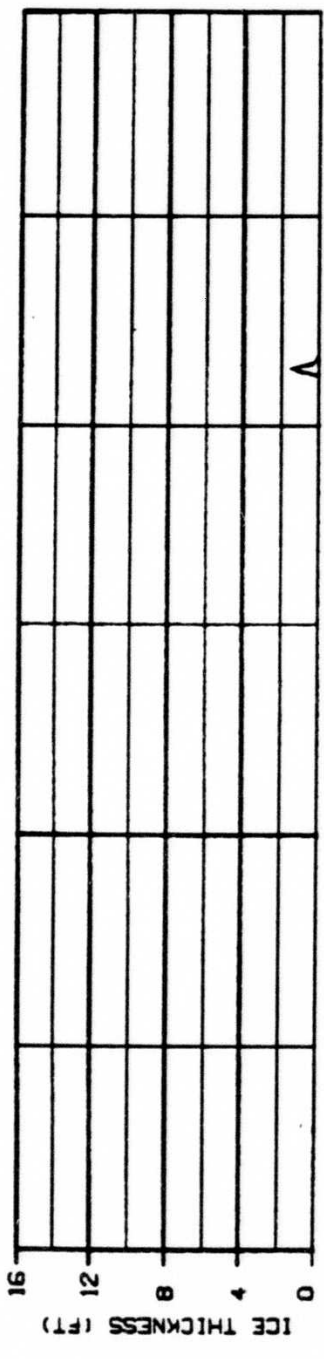
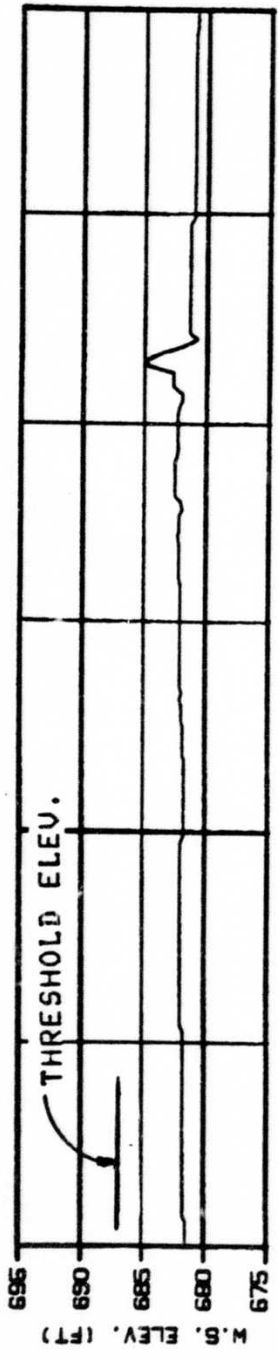


**SIDE CHANNEL D/S OF SLOUGH 11**  
**RIVER MILE : 135.30**

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 710201A

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

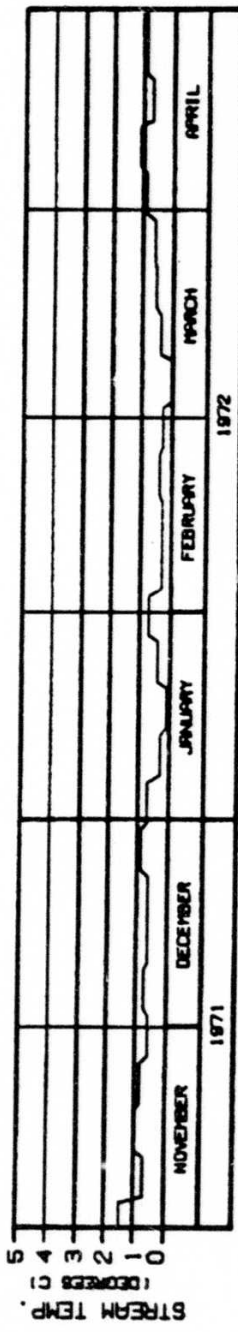
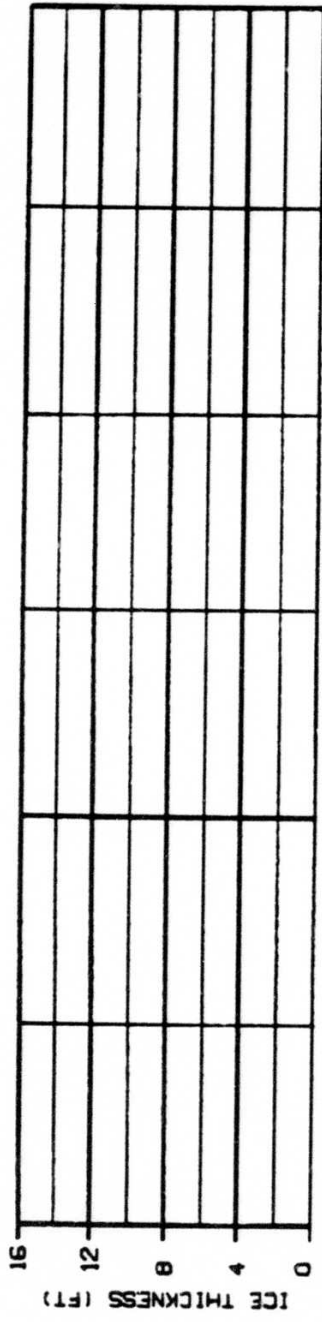
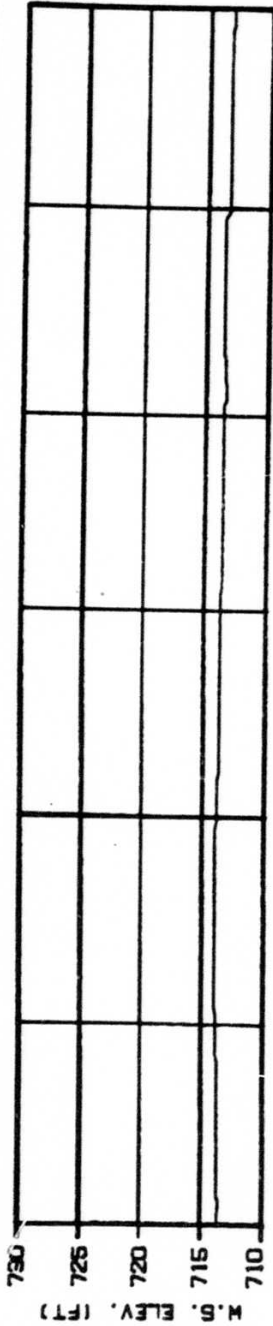
ALASKA POWER AUTHORITY	
SUBMITTER PROJECT	SUSITNA RIVER
	ICE SIMULATION
	TIME HISTORY
HARZA-ERBACD JOINT VENTURE	
DESIGNER: HARZA	DRAWN BY: MMB-142



ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBSCO JOINT VENTURE  
 DIST. NO. SA 9408 8 JUL 82 888.142

HEAD OF SLOUGH 11  
 RIVER MILE : 136.50  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 710201A

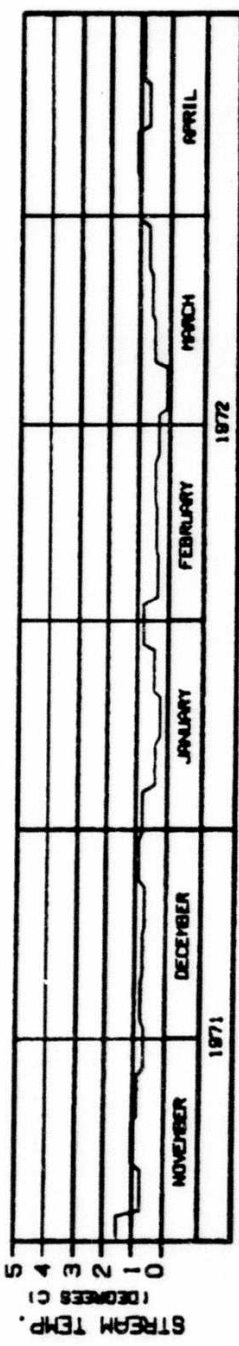
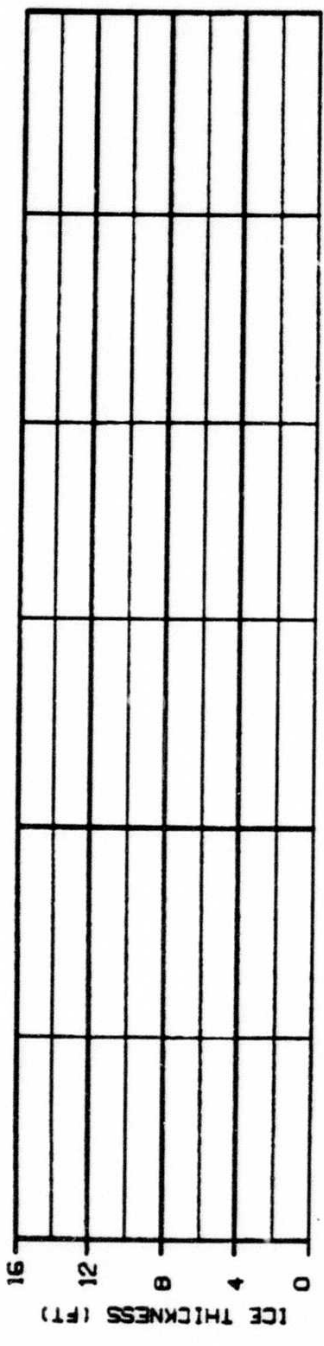
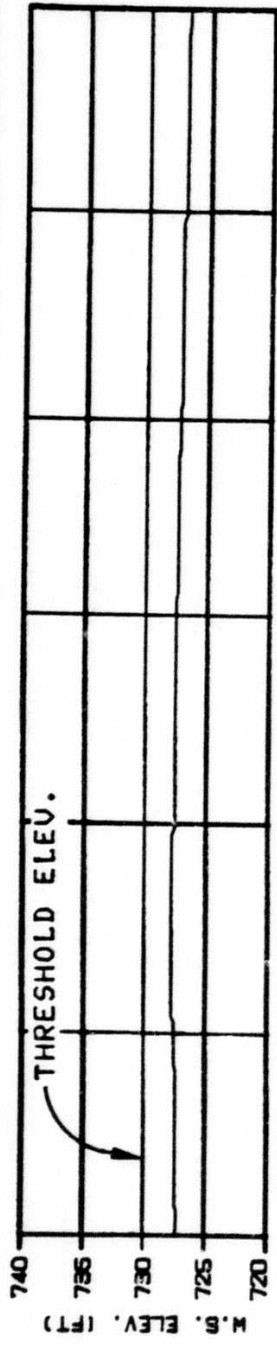
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT : SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRACO JOINT VENTURE  
 DRAWN: A.L. BROWN | 8 JUL 82 | MBB.142

HEAD OF SLOUGH 17  
 RIVER MILE : 139.30  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RILE : NATURAL  
 REFERENCE RUN NO. : 71020NA

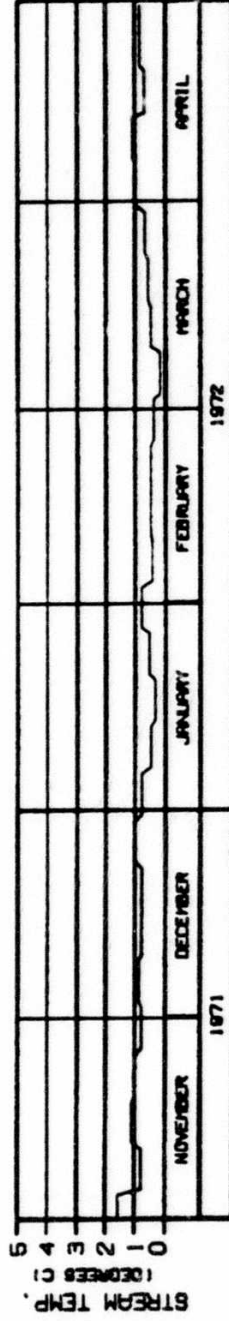
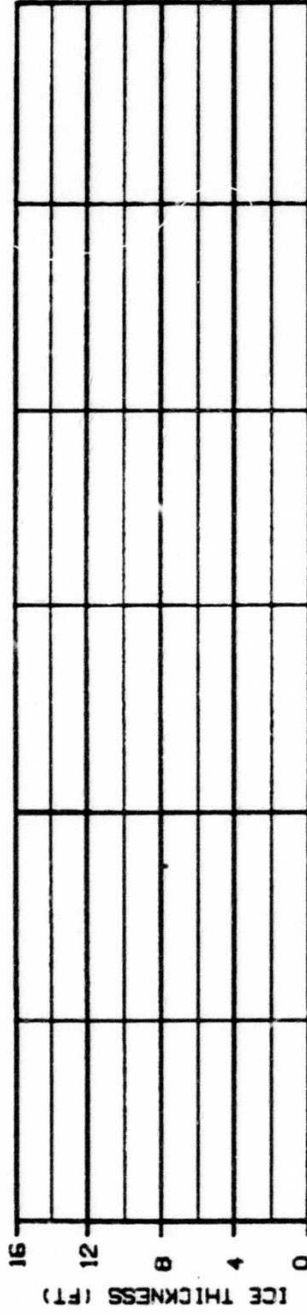
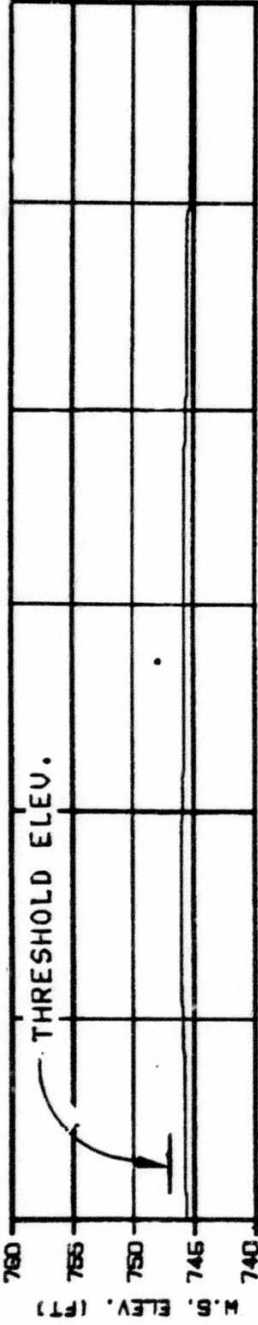
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTING AGENCY  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERD JOINT VENTURE  
 REPORT NO. 8-11-72

HEAD OF SLOUGH 20  
 RIVER MILE : 140.50  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C  
 TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 71020NA

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 : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 710201A

ICE THICKNESS LEGEND:

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

OPTION?

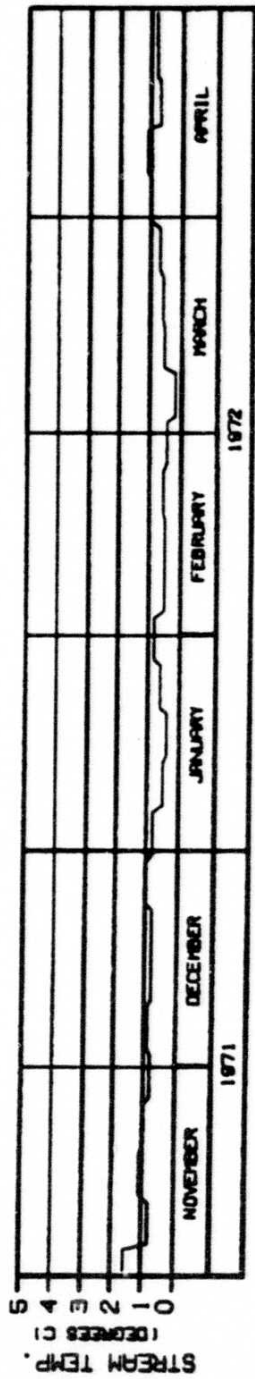
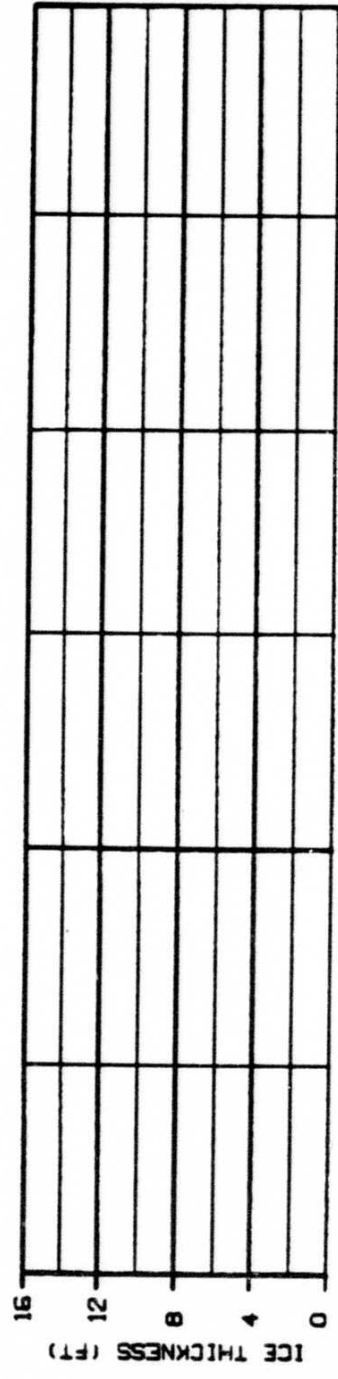
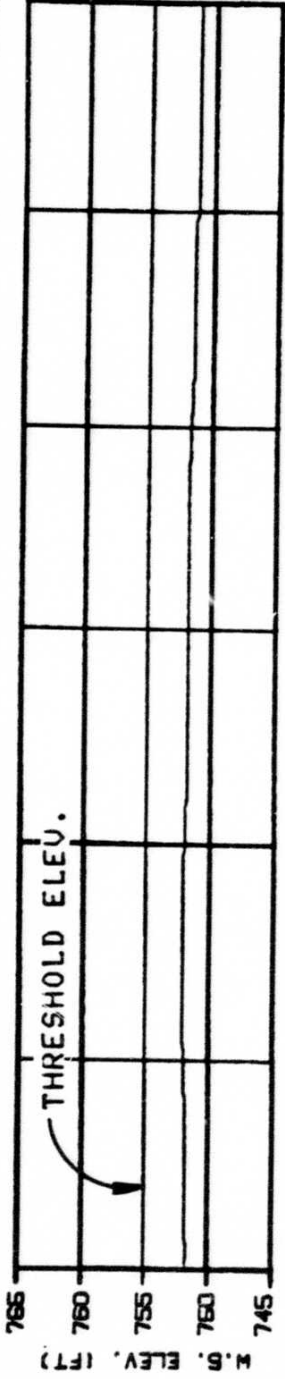
ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRACD JOINT VENTURE

DRAWN: S.L. 0489 9 JAN 81 8888.142

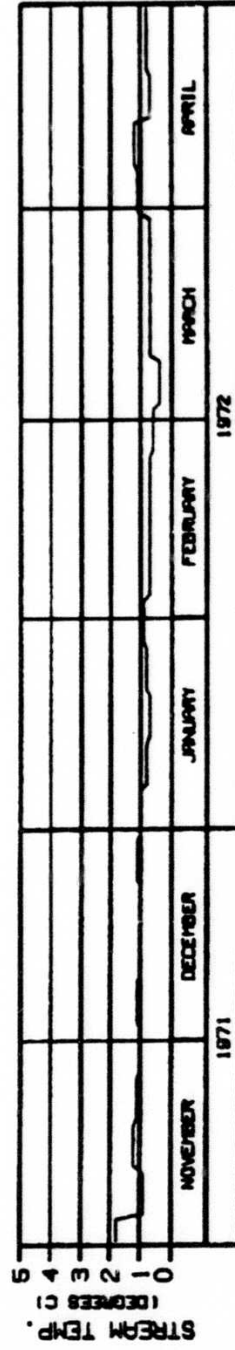
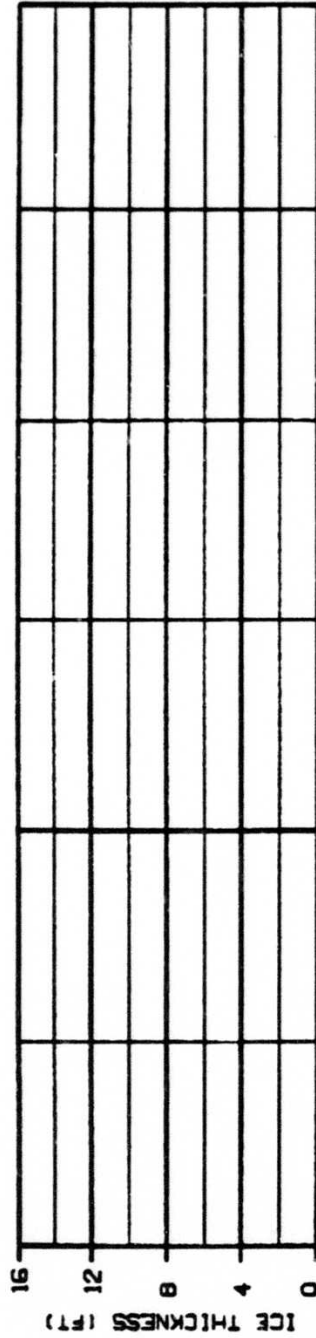
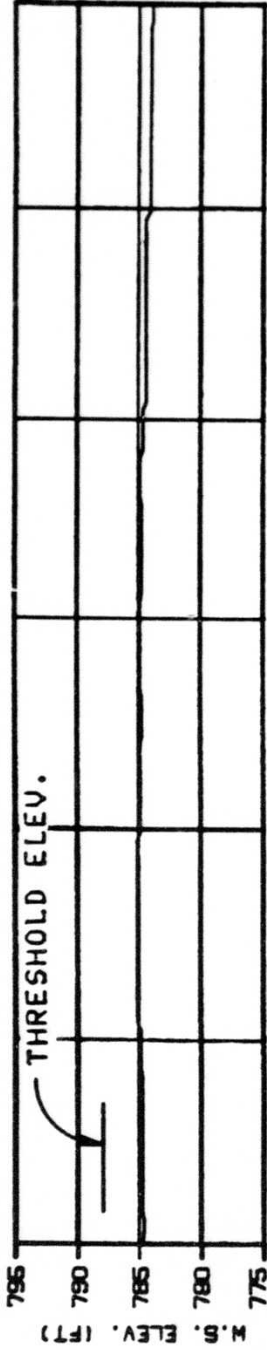


ALASKA POWER AUTHORITY  
SUBMITTER PROJECT: GUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY  
KARZA-EBERCO JOINT VENTURE  
PROJECT NO. 8-44-78      SHEET 142

HEAD OF SLOUGH 21  
RIVER MILE : 142.20  
WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
STATION : LEPPANU ; DEVIL CANYON 2002  
FLOW CASE : C      TEMP ALLE : NATURAL  
REFERENCE RUN NO. : 710202A

ICE THICKNESS LEGEND:  
—— TOTAL THICKNESS  
- - - - - IN TIME OF JUNEAT





ALASKA POWER AUTHORITY  
 SUBSTNA PROJECT  
 SUBSTNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 DRAWN: B.L. 0009 9 JUL 80  
 SHEET: 142

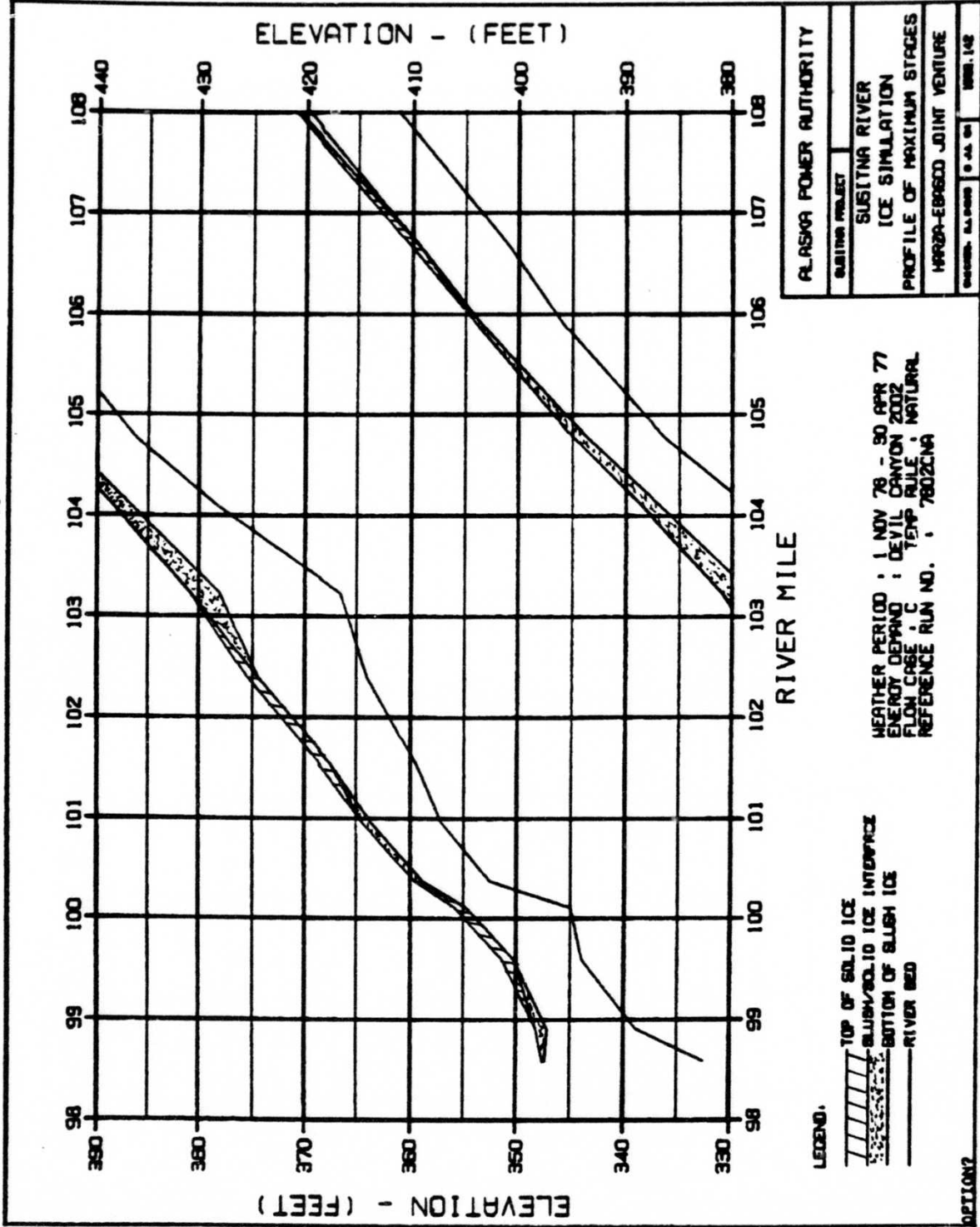
HEAD OF SLOUGH 22  
 RIVER MILE : 144.80  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 710200A

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

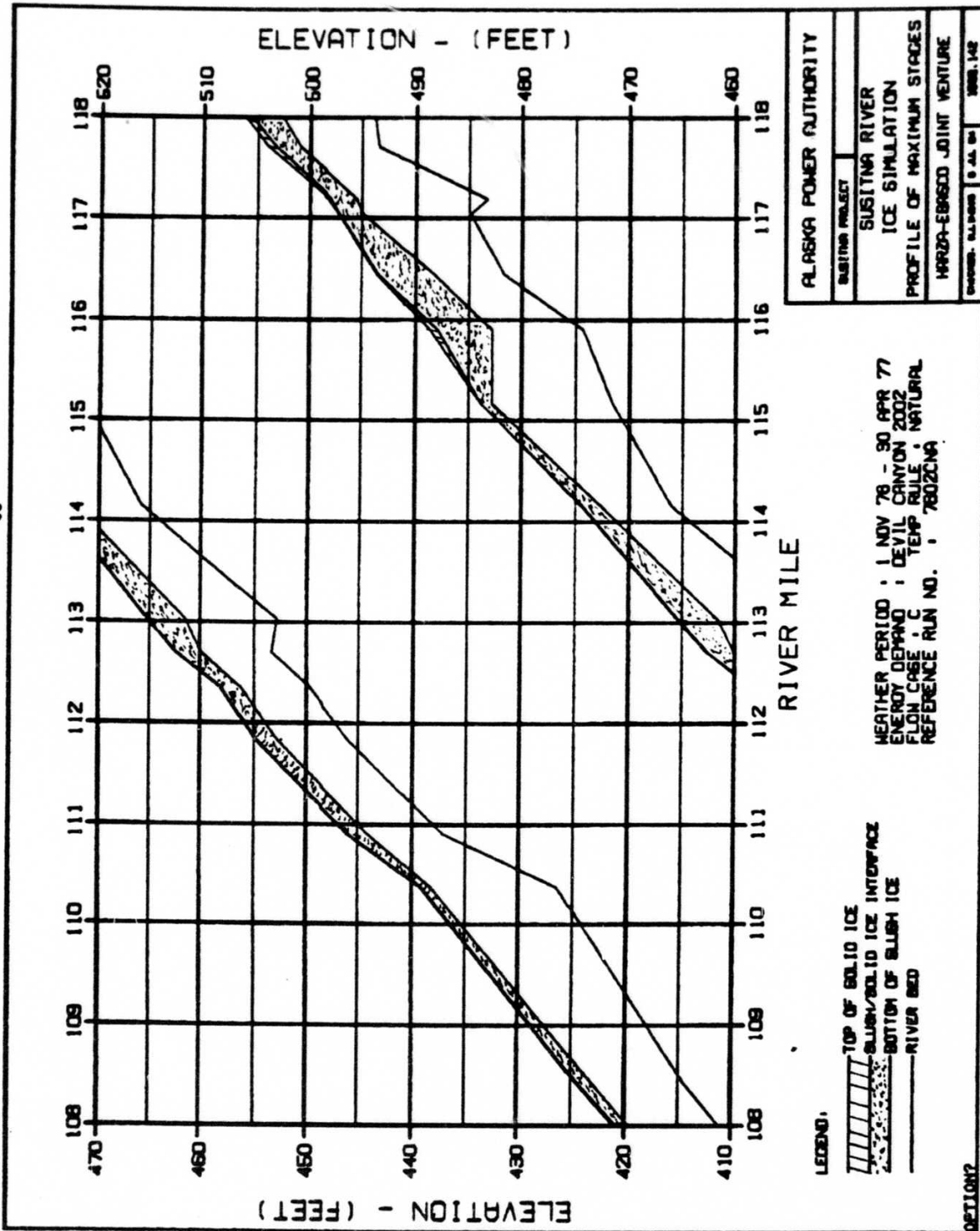
OPTION?

**EXHIBIT M**

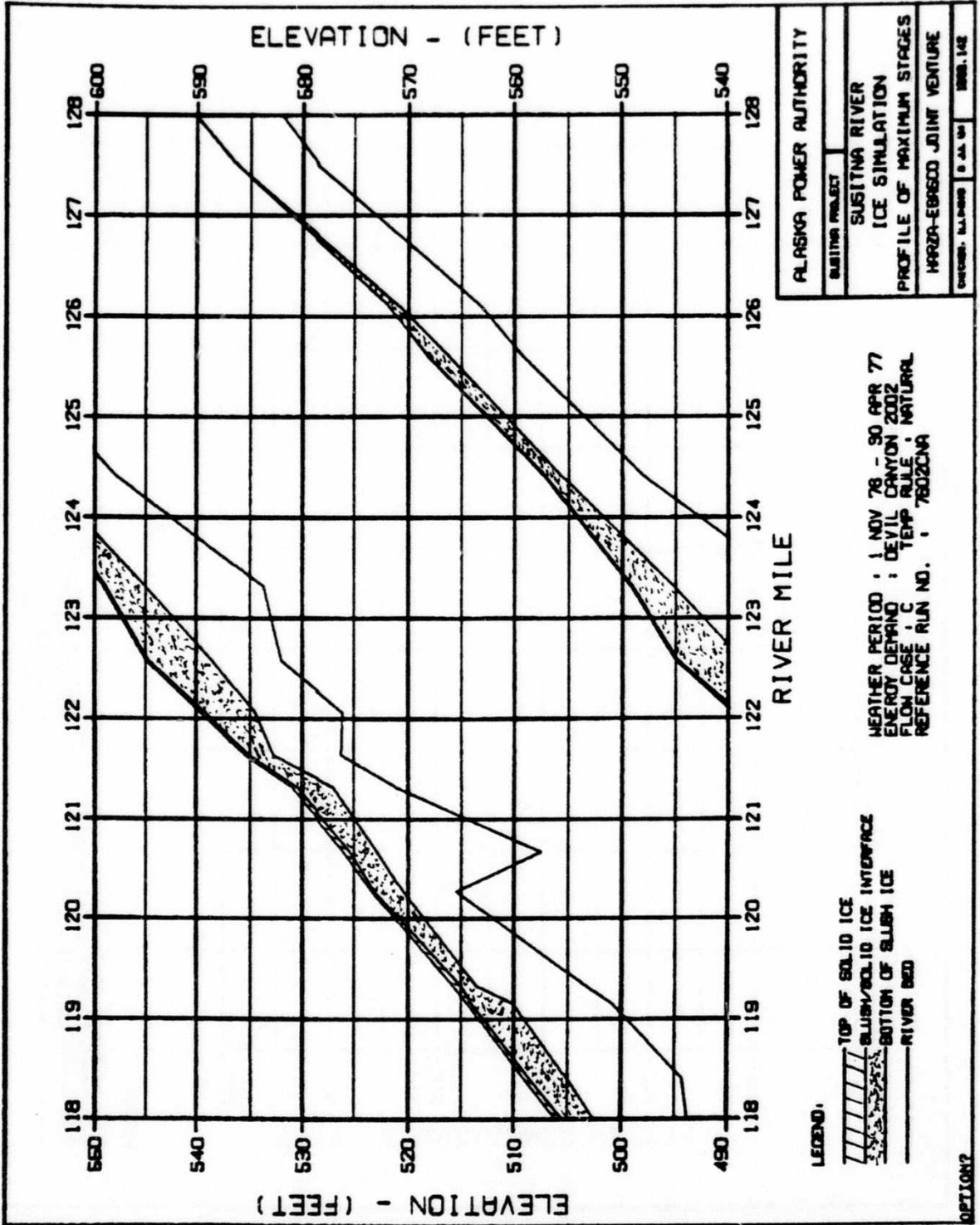
32



cc

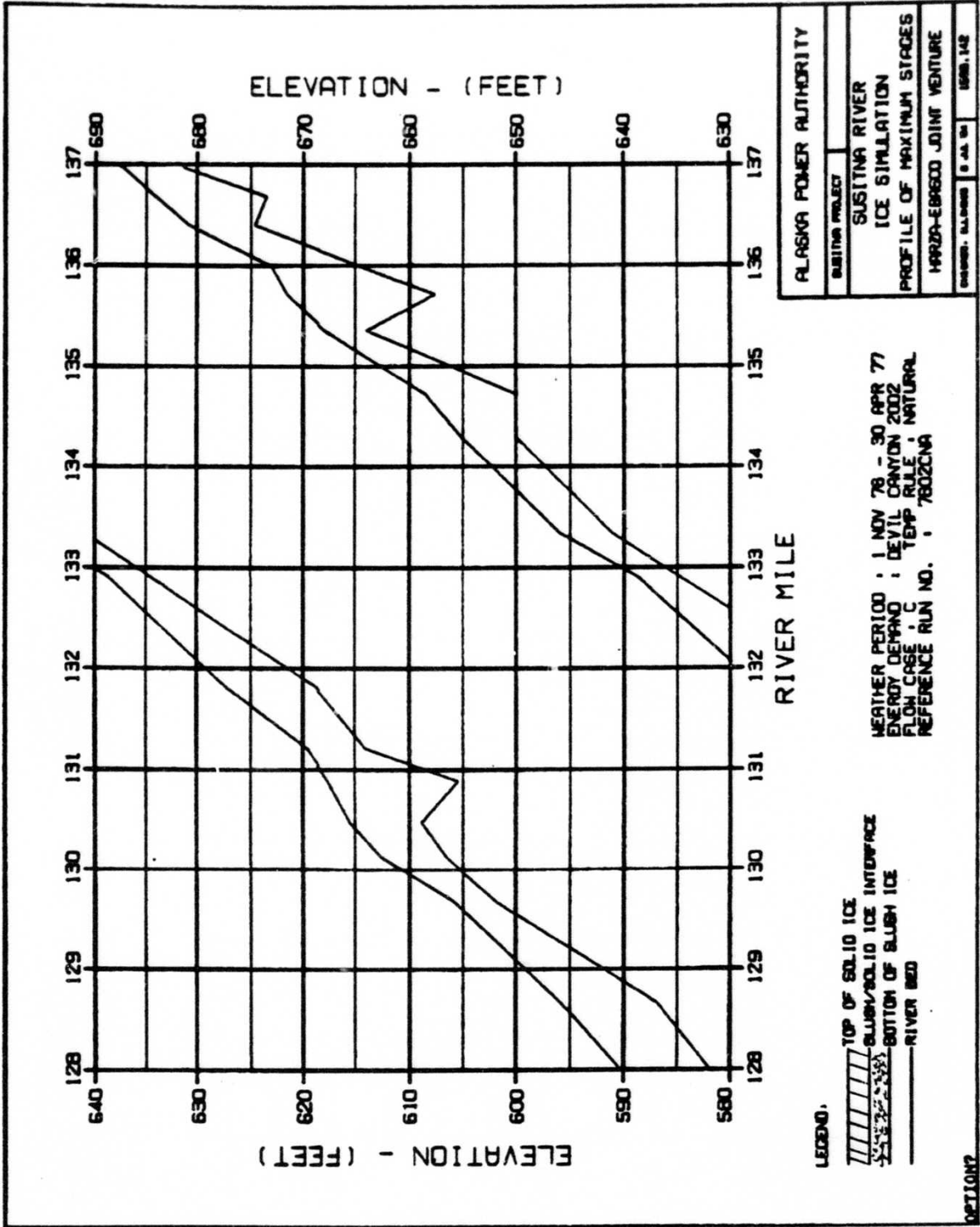


CC



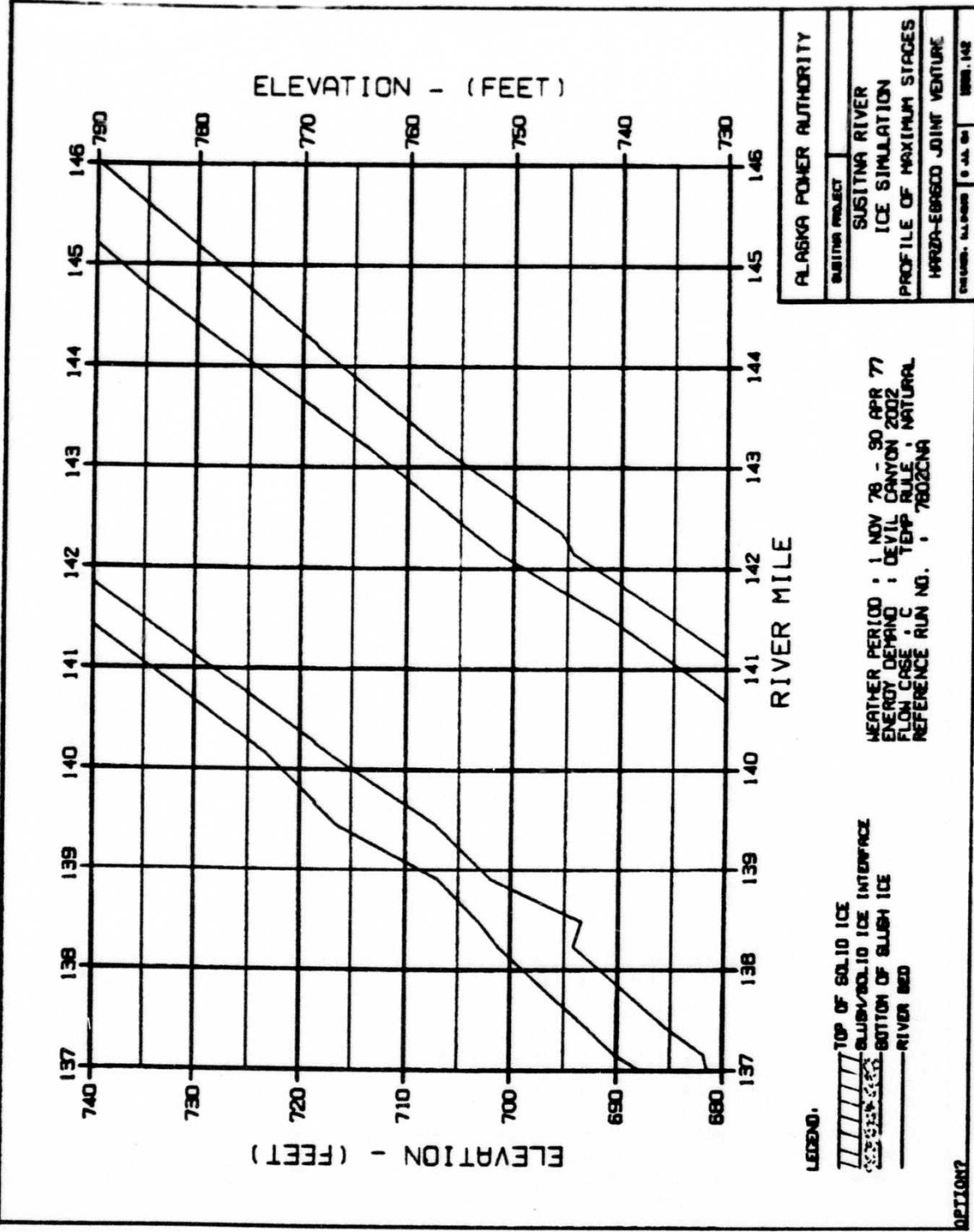


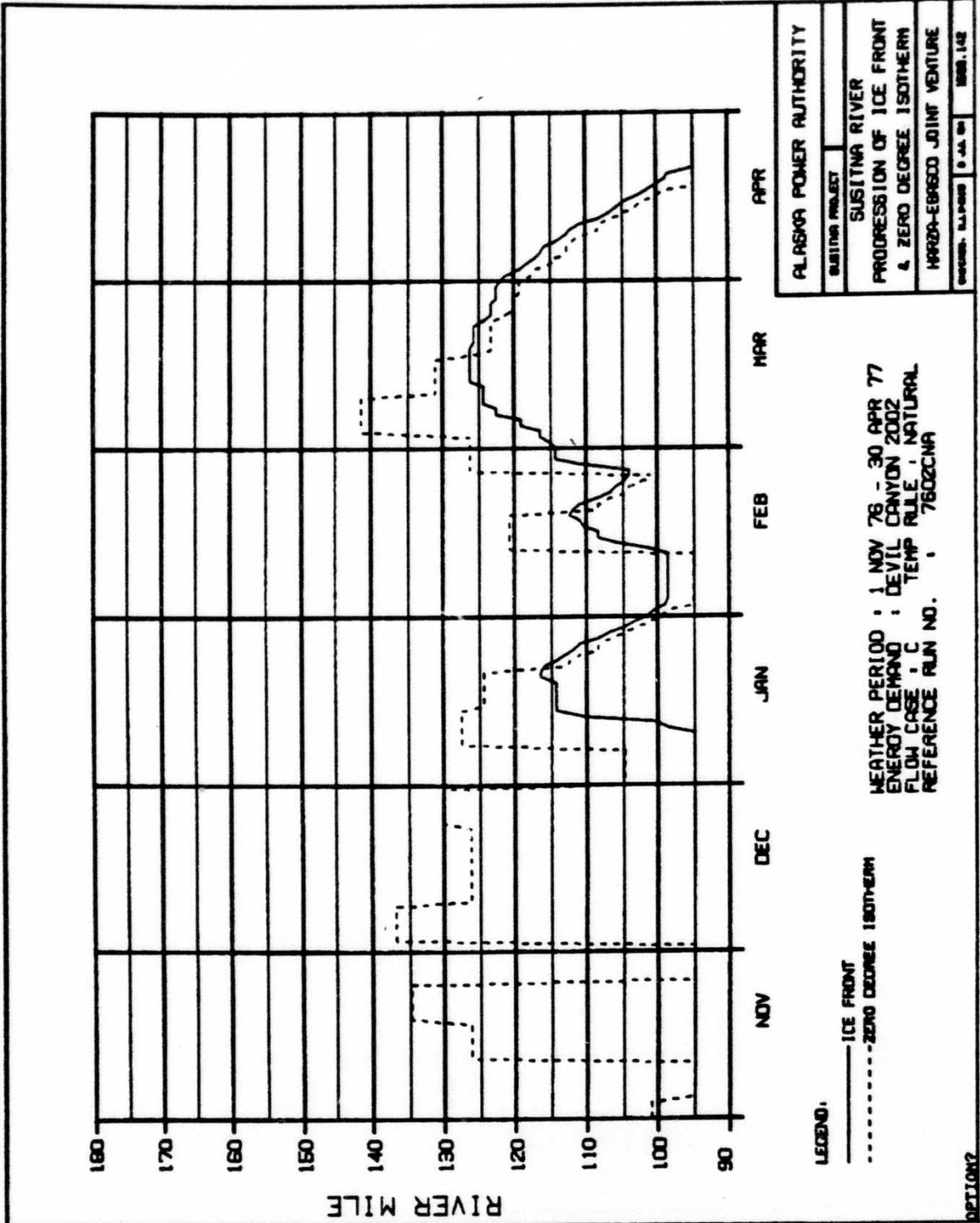
CC





cc



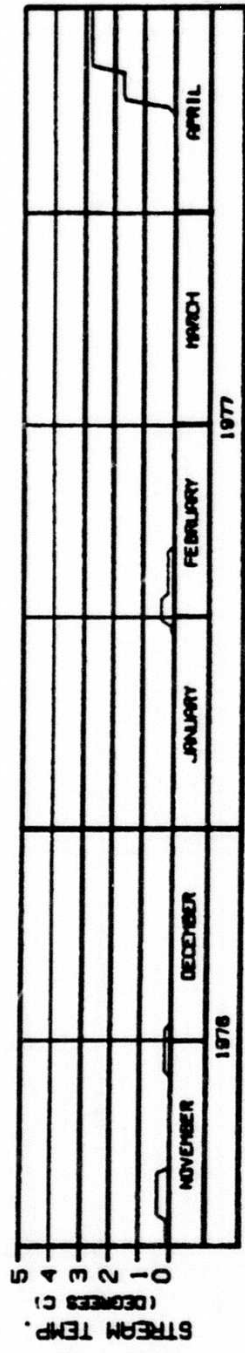
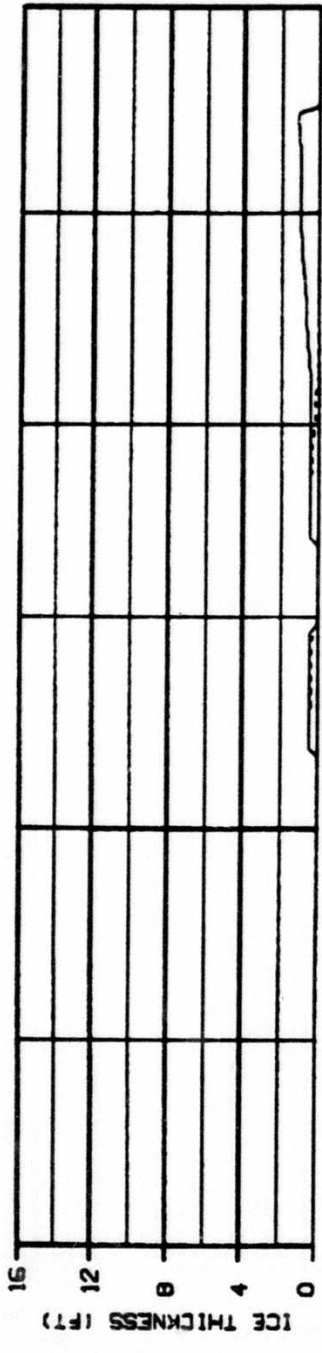
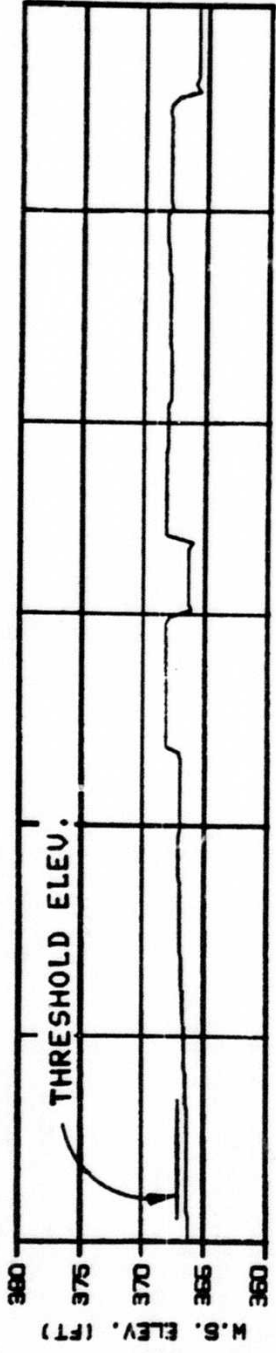


ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM  
 HARZA-EBRACO JOINT VENTURE  
 DRAWN: S.L.P. 80 8 A.A. 80 800.142

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

LEGEND:  
 — ICE FRONT  
 - - - ZERO DEGREE ISOTHERM

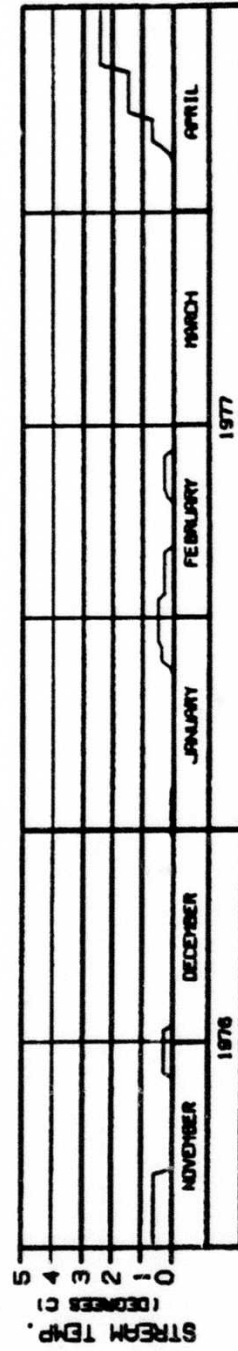
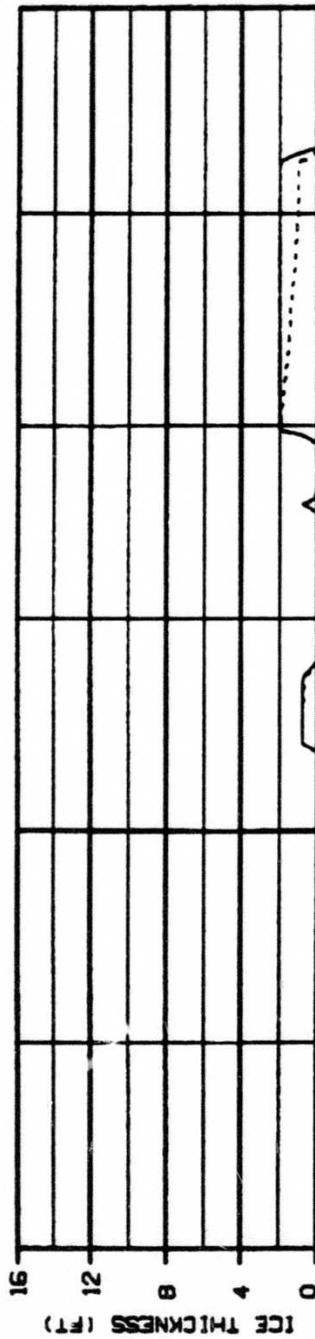
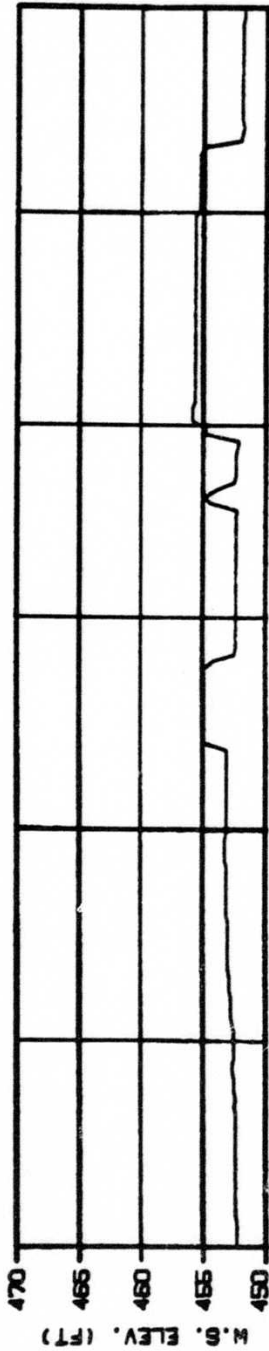
OPTION?



ALASKA POWER AUTHORITY  
 JUSTINA PROJECT  
 JUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBED JOINT VENTURE  
 ORDER: 44-000 0 01 01 1988.142

HEAD OF WHISKERS SLOUGH  
 RIVER MILE : 101.50  
 WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RILE : NATURAL  
 REFERENCE RUN NO. : 760201A

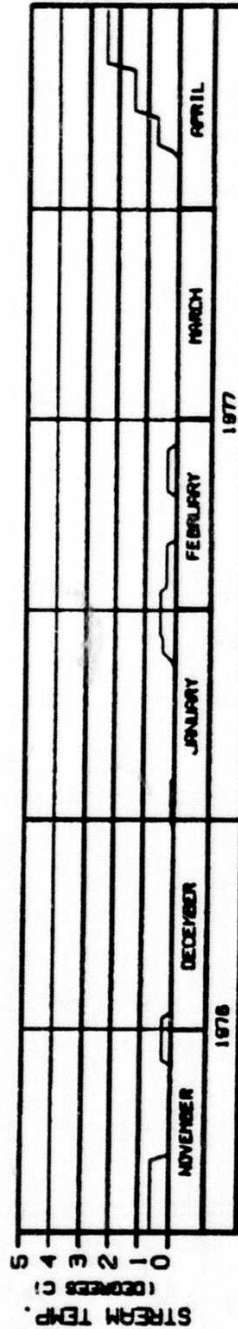
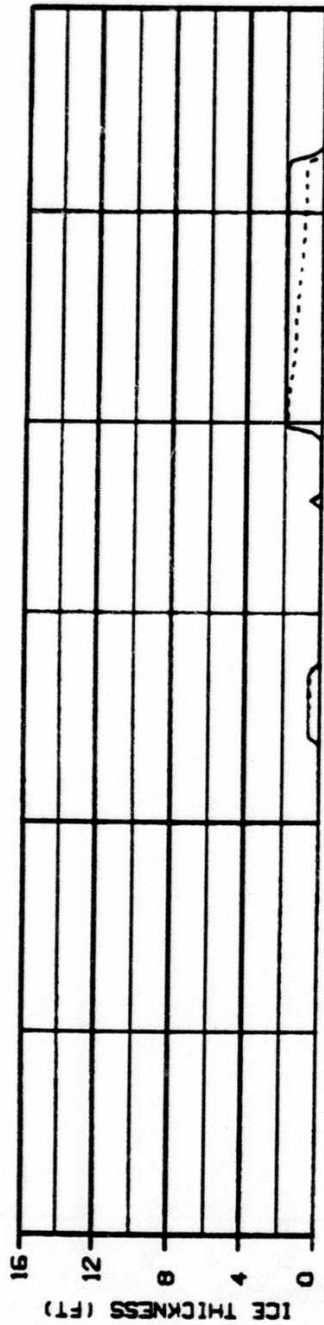
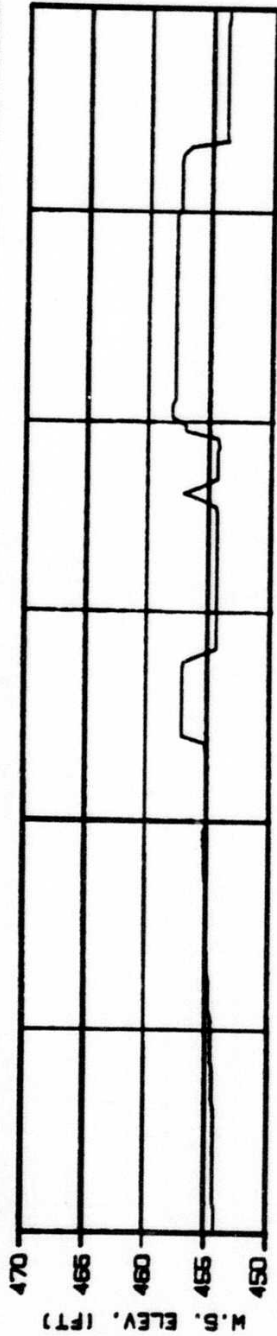
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRARD JOINT VENTURE  
 ORDER: 8-8888 8 JUL 87 888.142

SIDE CHANNEL AT HEAD OF GASH CREEK  
 RIVER MILE : 112.00  
 WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RUN : NATURAL  
 REFERENCE RUN NO. : 760209A

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



ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

HARRIS-ERBOLD JOINT VENTURE

PROJECT: S.A. 1000 | P. 11. 00 | 1000. 102

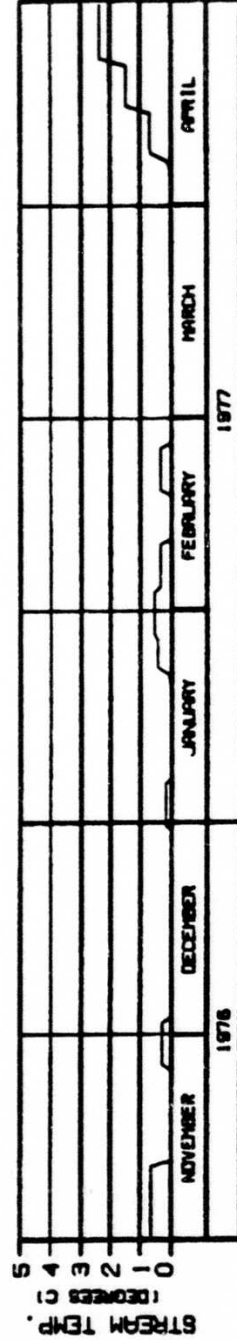
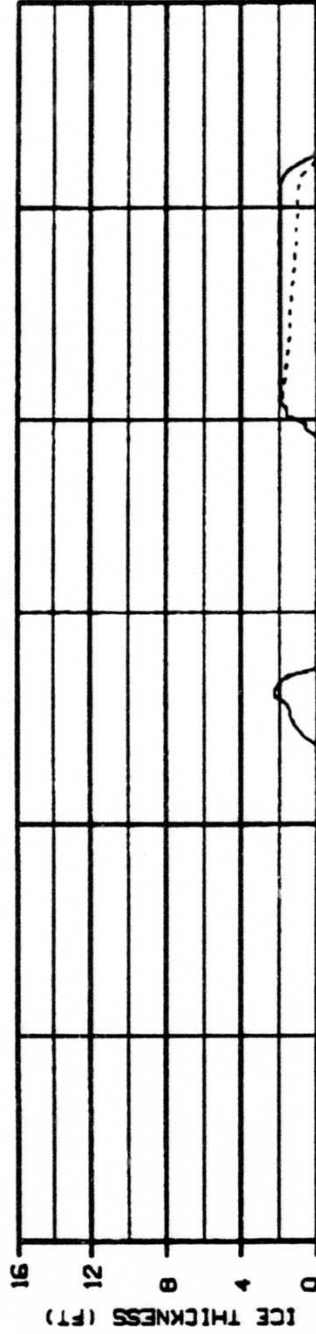
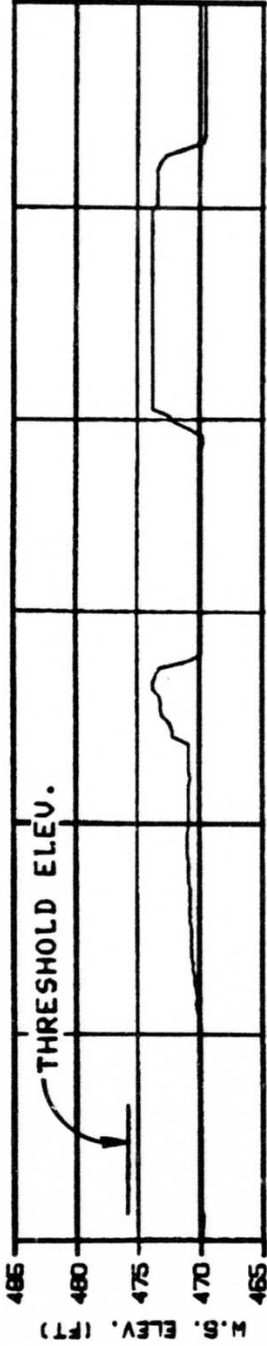
**MOUTH OF SLOUGH 6A**

RIVER MILE : 112.34

WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
ENERGY DEMAND : DEVIL CANYON 2002  
FLOW CASE : C  
TEMP R/L E : NATURAL  
REFERENCE RUN NO. : 760207A

**ICE THICKNESS LEGEND.**

—— TOTAL THICKNESS  
- - - - SLUSH COMPONENT

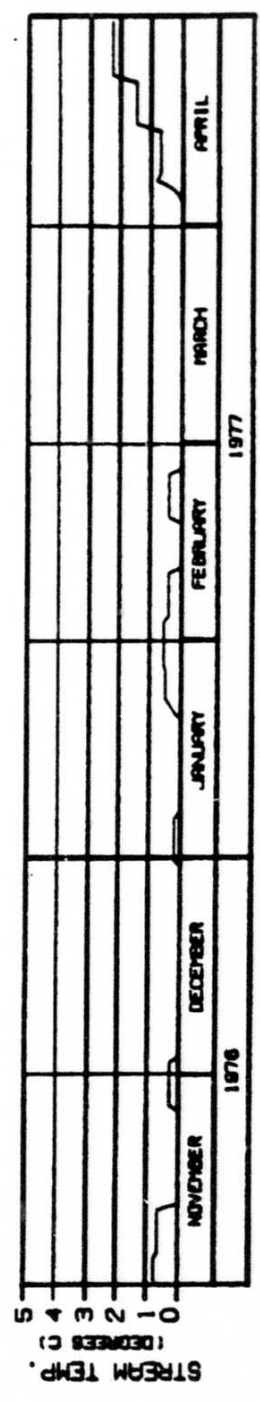
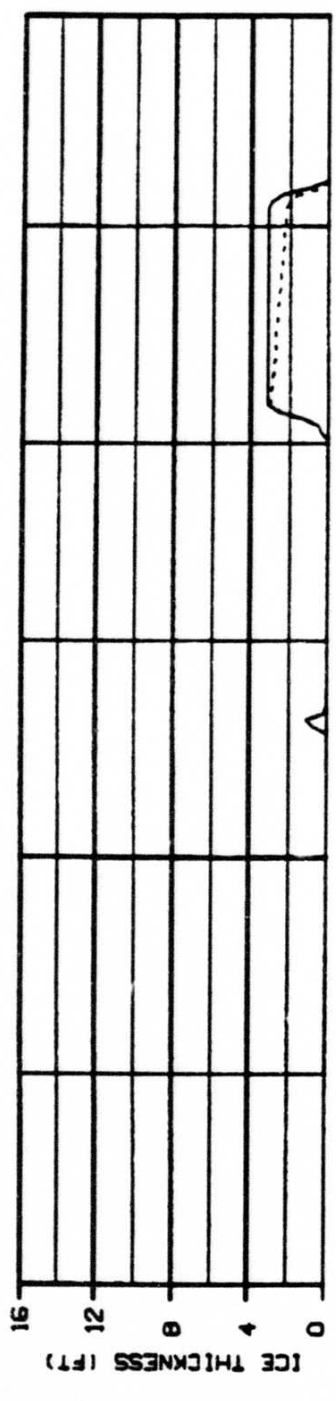
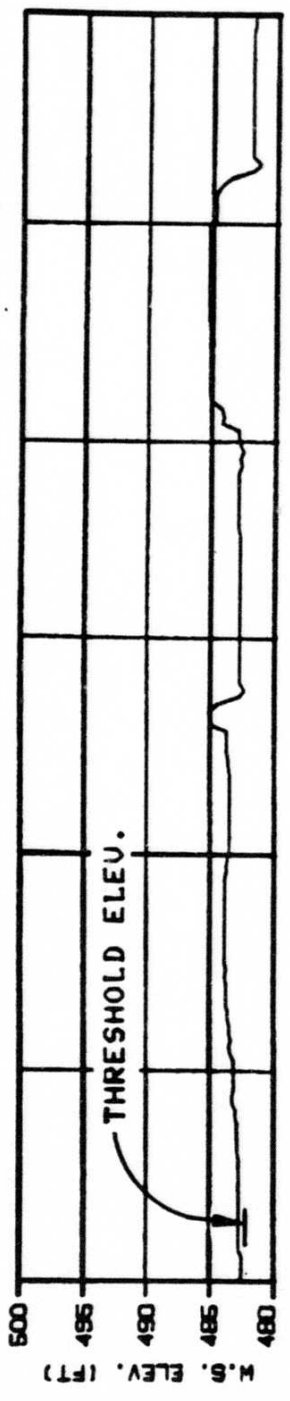


ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-BASCO JOINT VENTURE  
 DESIGNED BY: J.A. GIBSON | DRAWN BY: J.A. GIBSON

HEAD OF SLOUGH 8  
 RIVER MILE : 114.10  
 WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 760202A

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

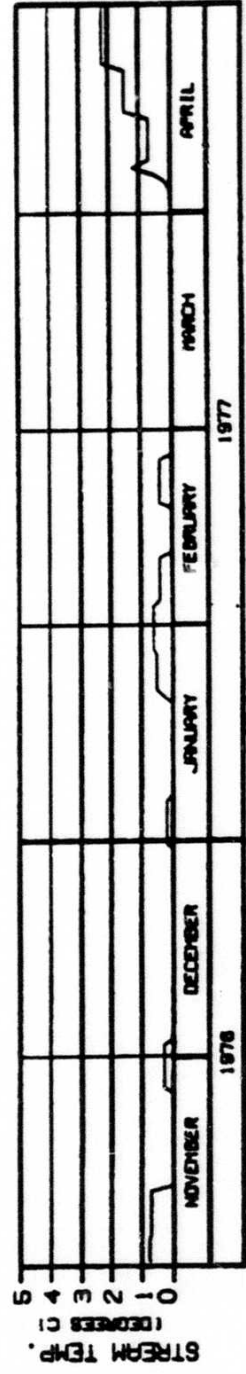
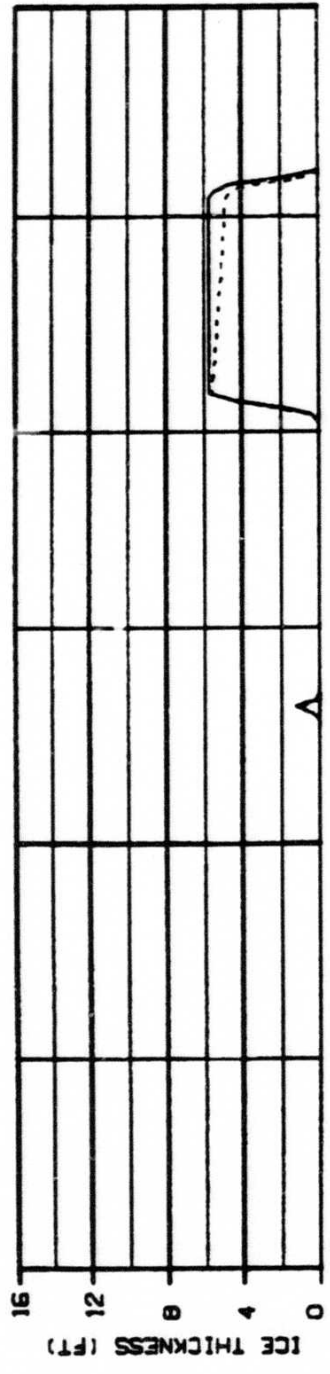
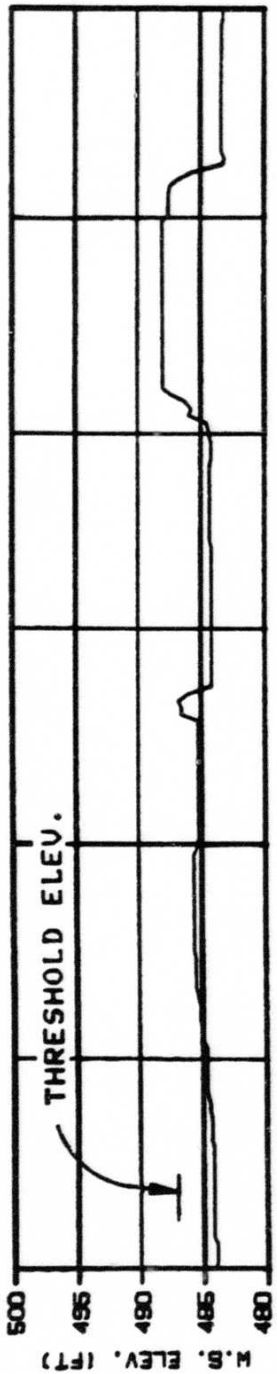




ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBECO JOINT VENTURE  
 DRAWING: S.A. 2008 9 JUL 80 1000-108

SIDE CHANNEL MSII  
 RIVER MILE : 115.50  
 WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7609000

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



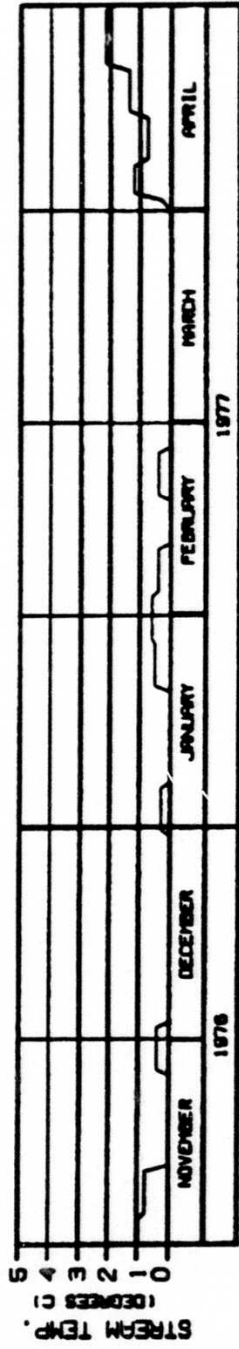
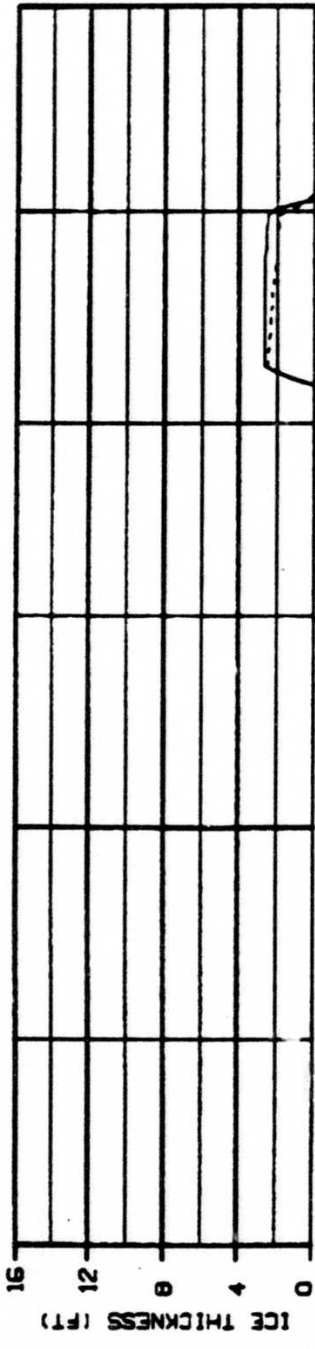
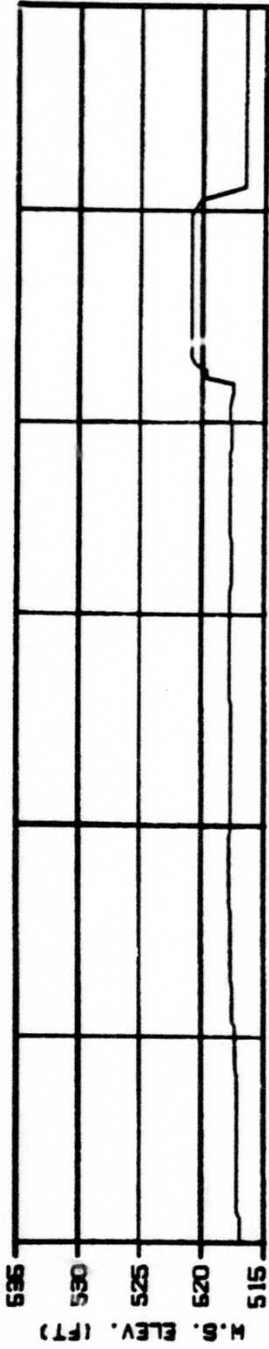
ALASKA POWER AUTHORITY  
 SUBMITTA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRSCO JOINT VENTURE  
 DESIGNED BY: J.A. GIBSON  
 DRAWING NO.: 1000-1-102

HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 760201A

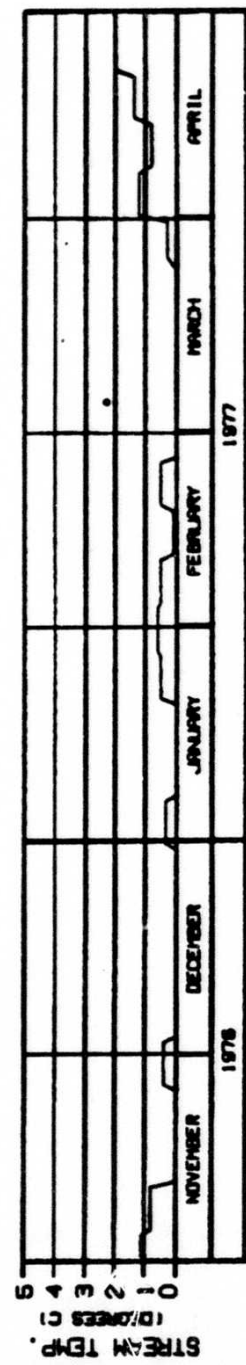
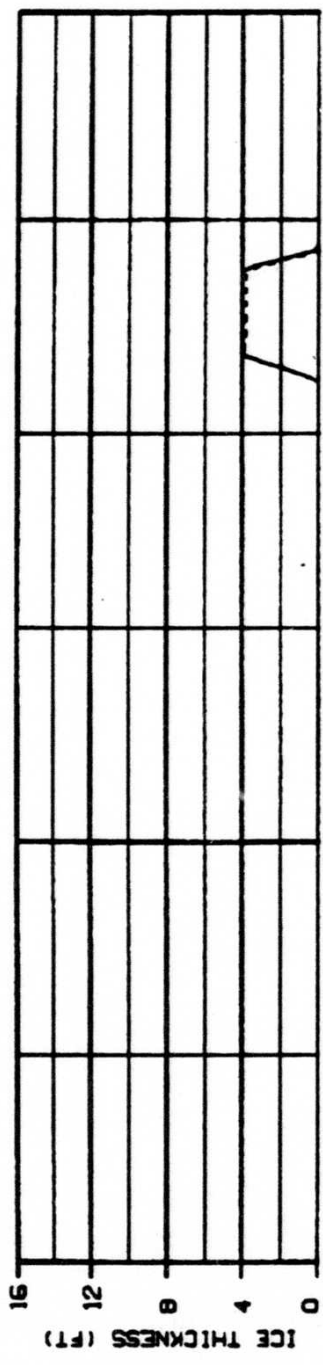
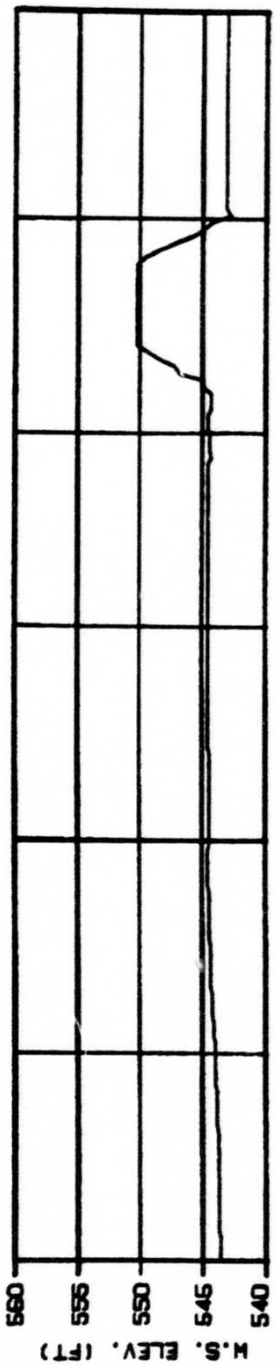
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRICO JOINT VENTURE  
 ORDER: 84-008 8-24-80 1000-142

RIVER MILE : 120.00  
 WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7602CNA

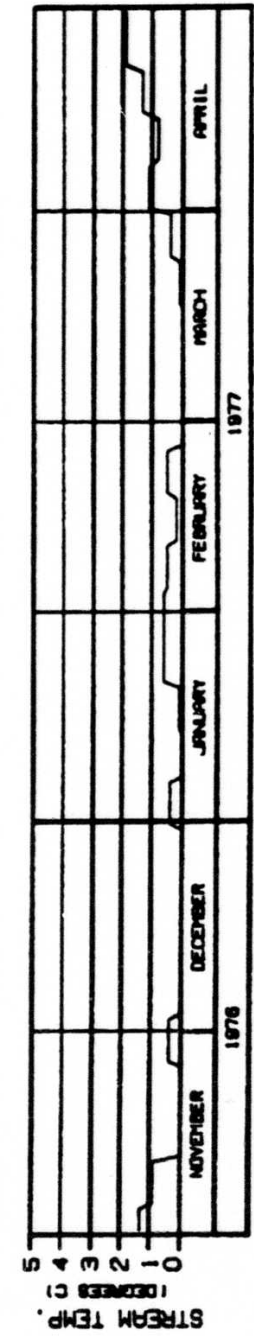
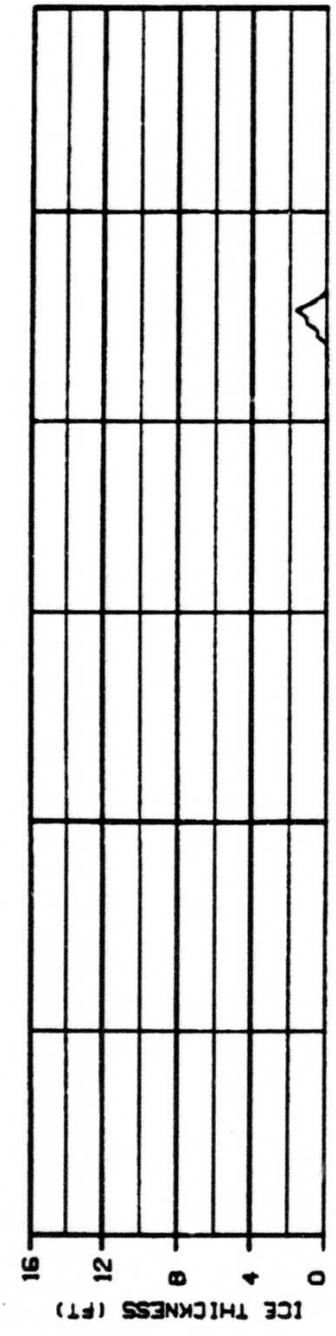
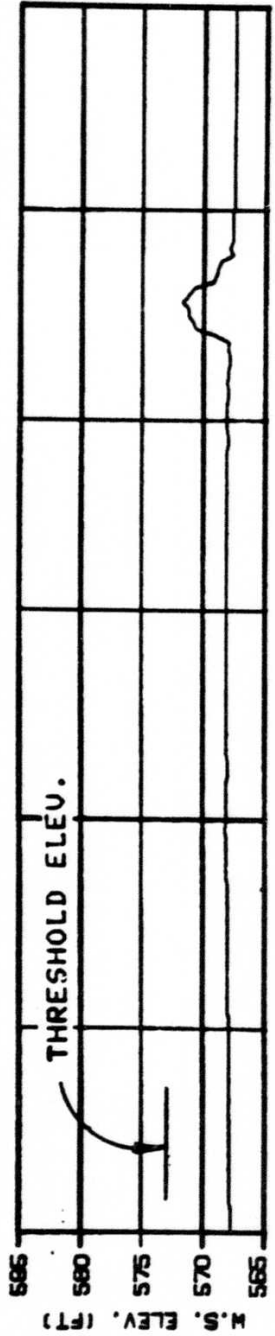
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 ..... SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBACD JOINT VENTURE  
 ORDER: 8-8-88 9 A.A. 01 888.142

HEAD OF MOOSE SLOUGH  
 RIVER MILE : 123.50  
 WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 76020NA

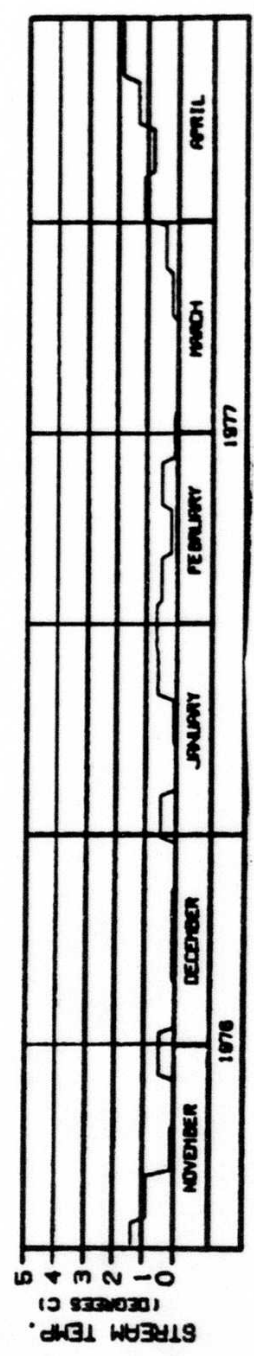
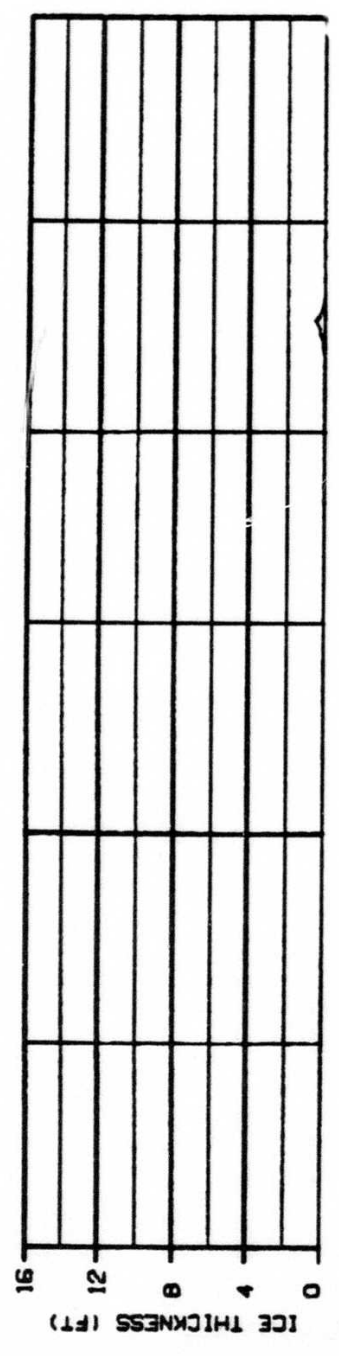
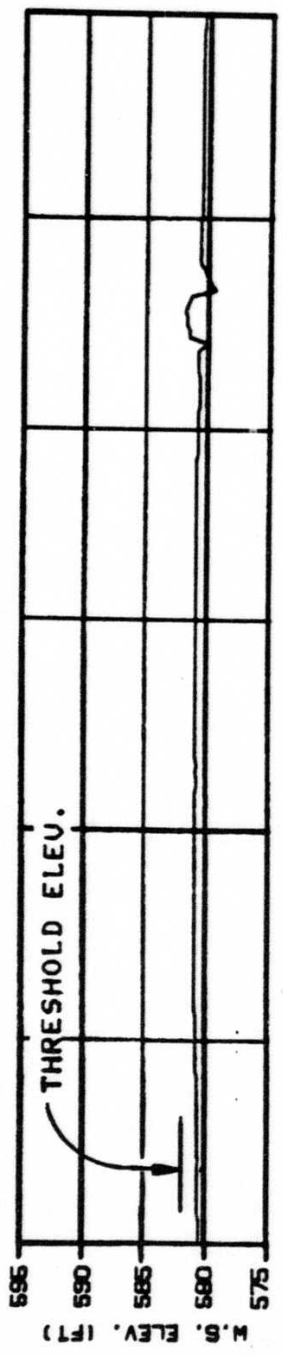
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 ..... BLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 October, 21, 1978 8 A.M. 80 1000.142

HEAD OF SLOUGH 8A (WEST)  
 RIVER MILE : 126.10  
 WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C  
 TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 76020NA

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

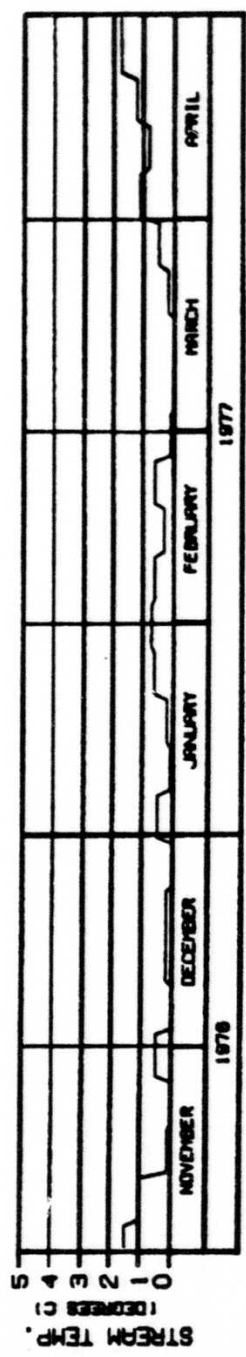
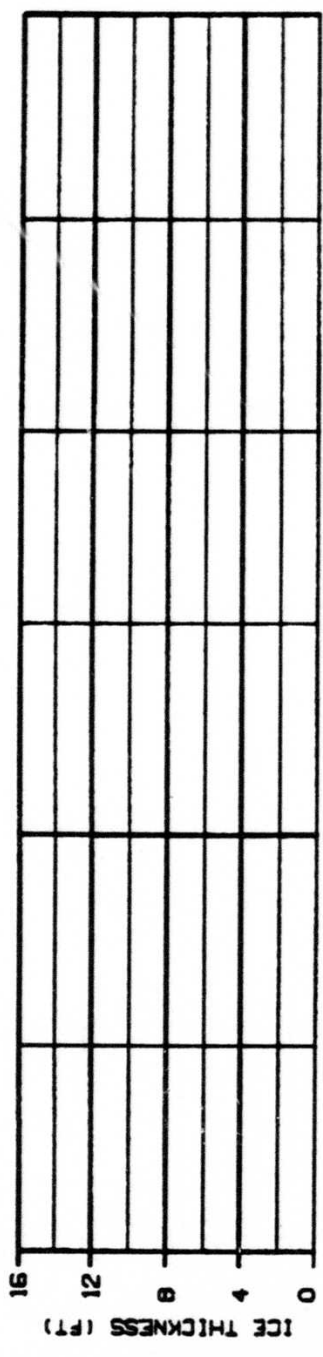
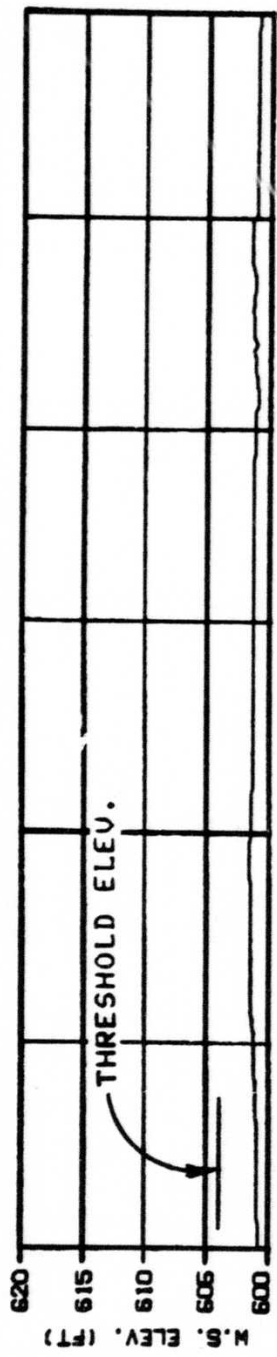


ALASKA POWER AUTHORITY  
 SUBITNA PROJECT  
 SUBITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 MARZA-EBBECO JOINT VENTURE  
 REPORT: SL 8088 8 JUL 87 888.148

HEAD OF SLOUGH 8A (EAST)  
 RIVER MILE : 127.10  
 WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 760207A

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





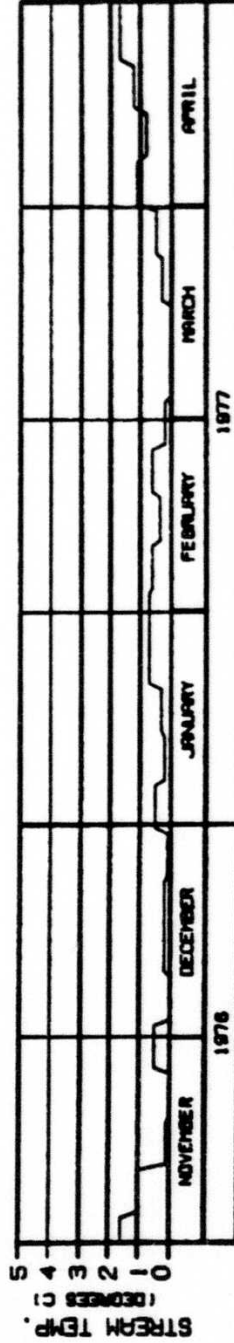
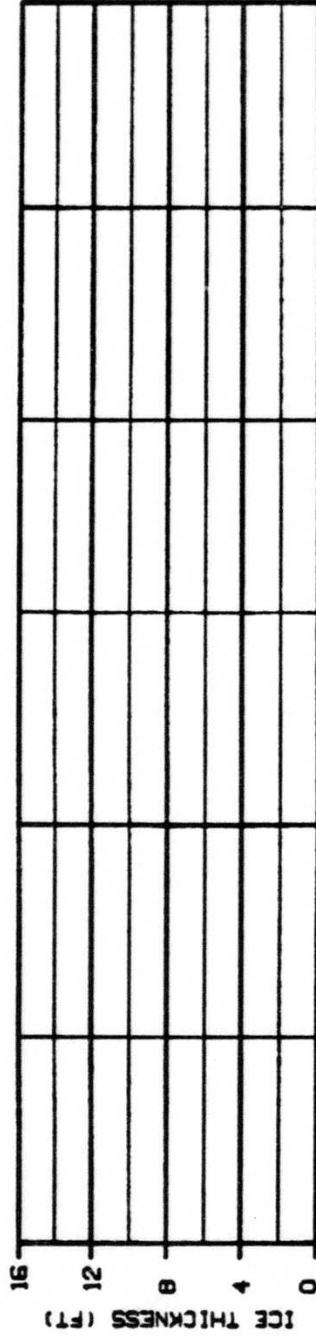
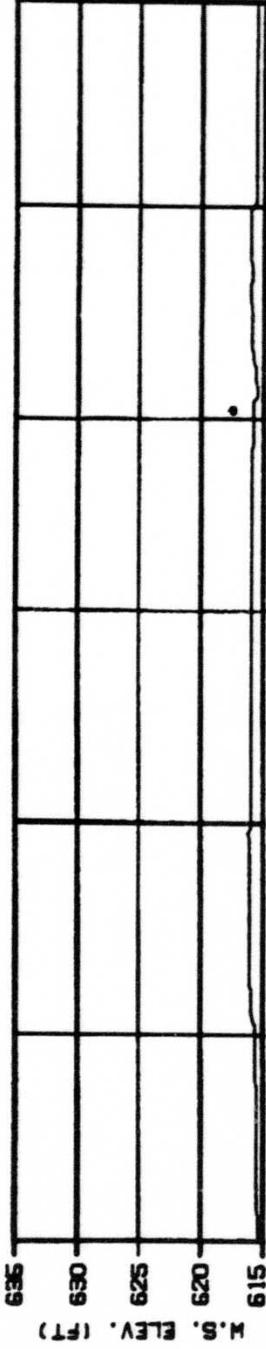
ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EDGED JOINT VENTURE  
 PROJECT NO. AL-0008 D. J. L. 08 1000.142

HEAD OF SLOUGH 9  
 RIVER MILE : 129.30  
 WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULLE : NATURAL  
 REFERENCE RUN NO. : 760207A

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

OPTION 7

OPTION?



**SIDE CHANNEL U/S OF SLOUGH 9**

**RIVER MILE : 130.60**

WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RILE : NATURAL  
 REFERENCE RUN NO. : 76020NA

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

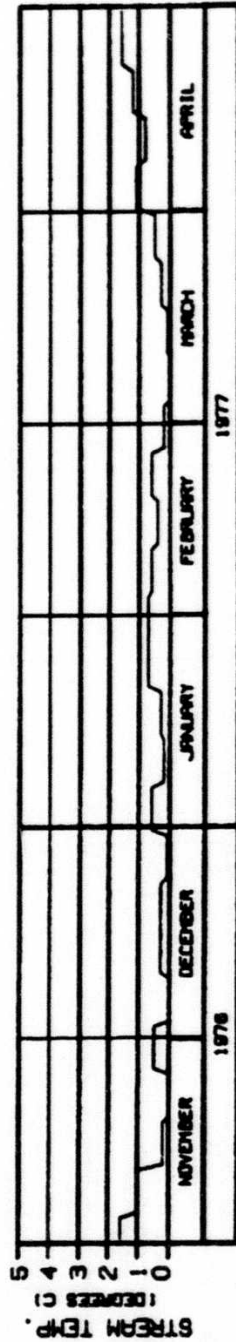
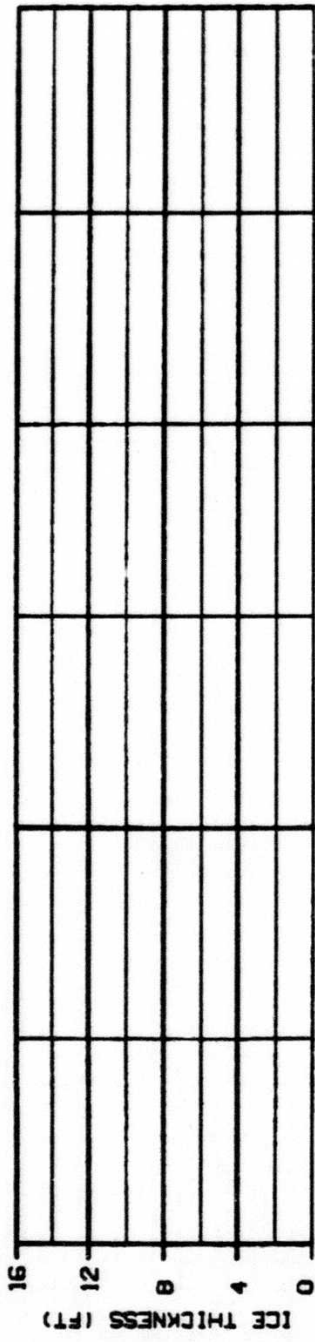
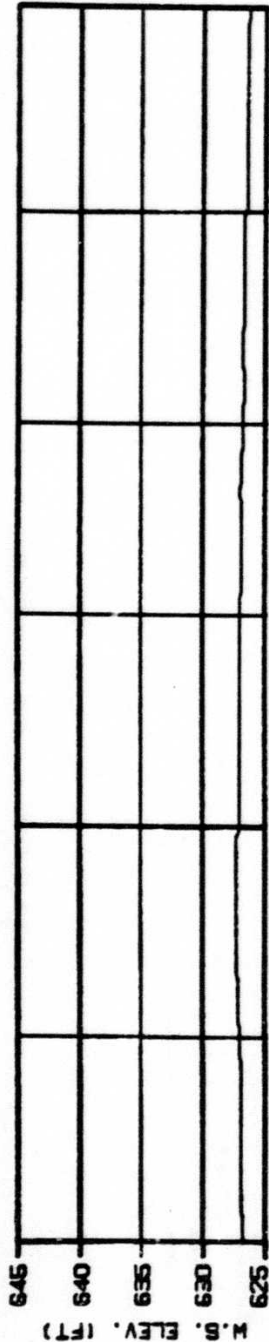
ALASKA POWER AUTHORITY

SUBMITTING PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRARD JOINT VENTURE

DESIGNED BY: G. J. G. 1988.142



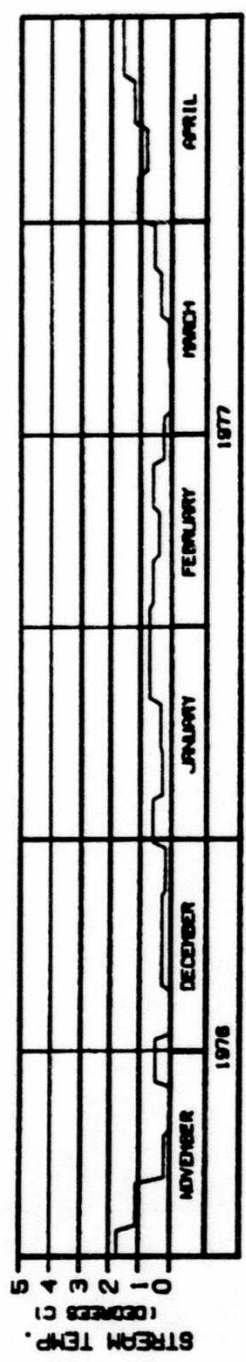
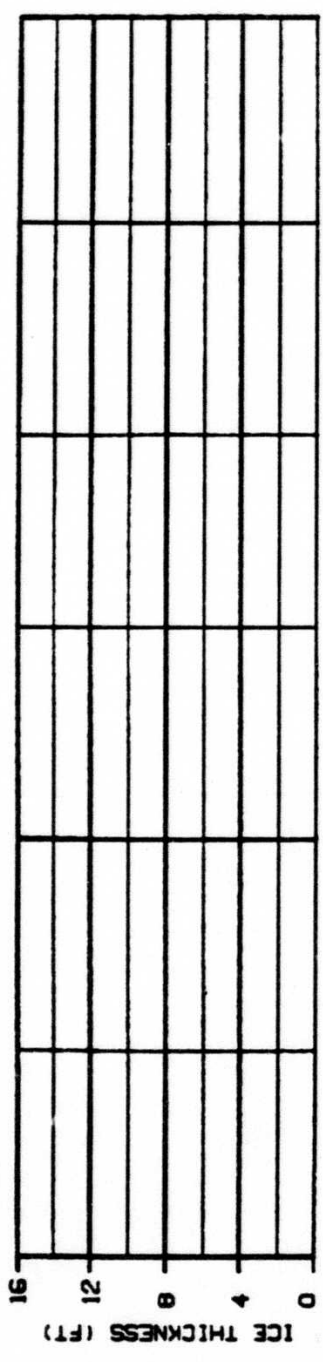
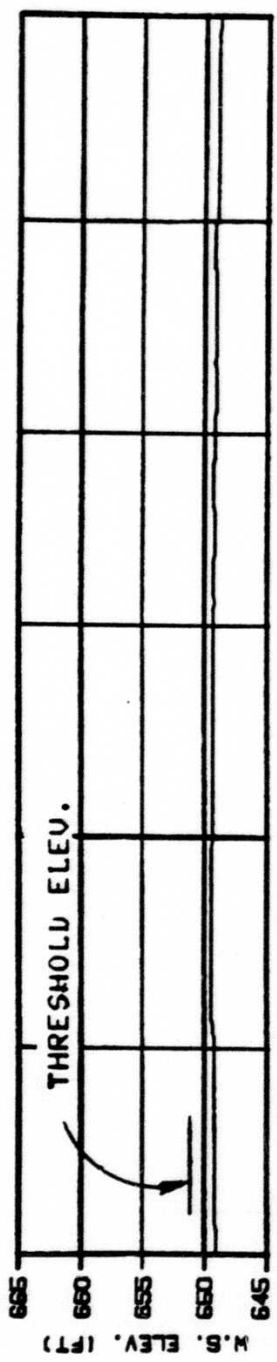
ALASKA POWER AUTHORITY  
 SUBMITTA PROJECT  
 SUBMITTA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBEGOO JOINT VENTURE  
 SHEET: 01.0000 8-A-10 000.148

**SIDE CHANNEL U/S OF 4TH JULY CREEK**

RIVER MILE : 131.80

WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULLE : NATURAL  
 REFERENCE RUN NO. : 760202A

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



ALASKA POWER AUTHORITY

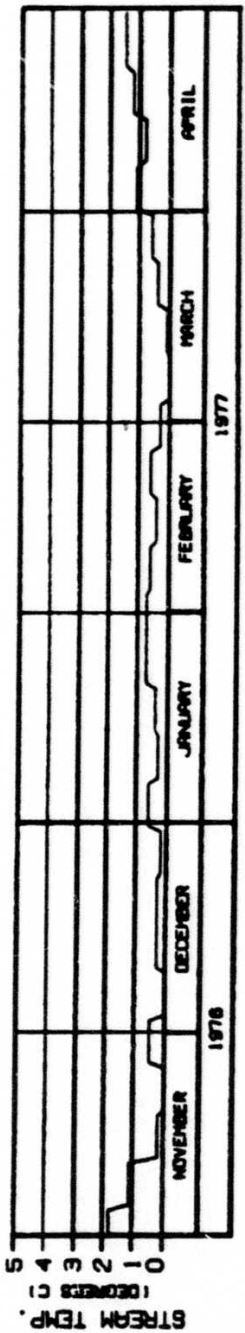
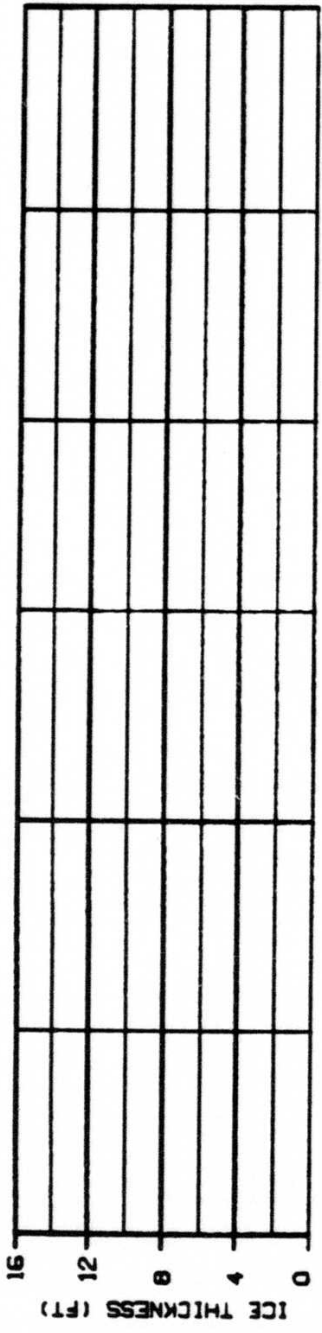
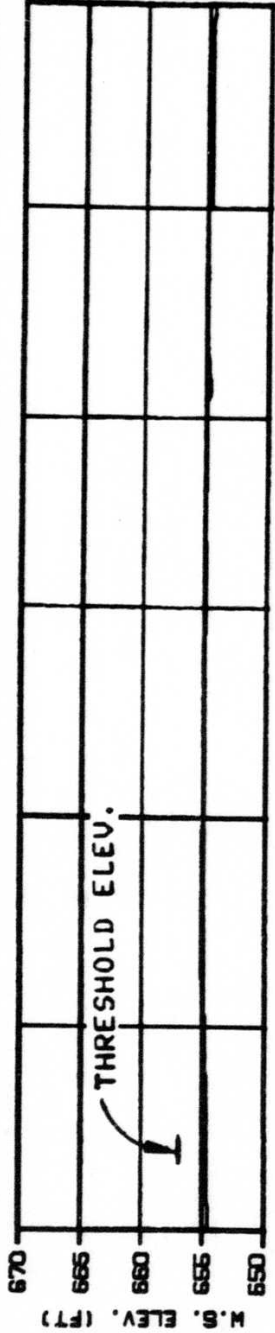
SUBMITTER PROJECT: SUSITNA RIVER ICE SIMULATION TIME HISTORY

HAZOP-ESR800 JOINT VENTURE

DESIGNED BY: B. J. GRIFFIN      DRAWN BY: B. J. GRIFFIN

HEAD OF SLOUGH 9A  
RIVER MILE : 133.70  
WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
ENERGY DEMAND : DEVIL CANYON 2002  
FLOW CASE : C      TEMP RULE : NATURAL  
REFERENCE RUN NO. : 760201A

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



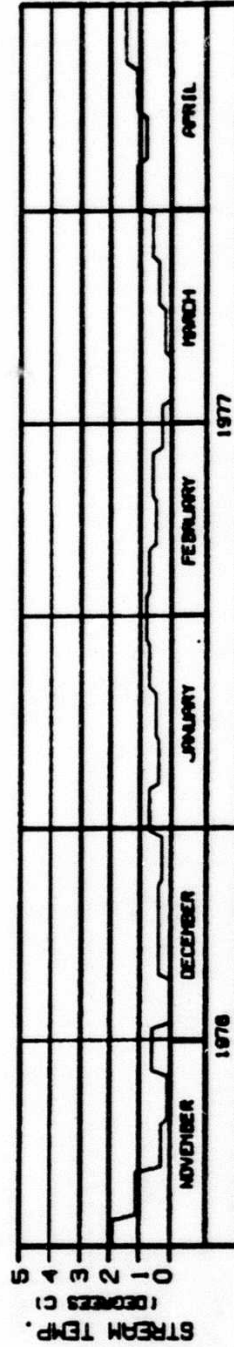
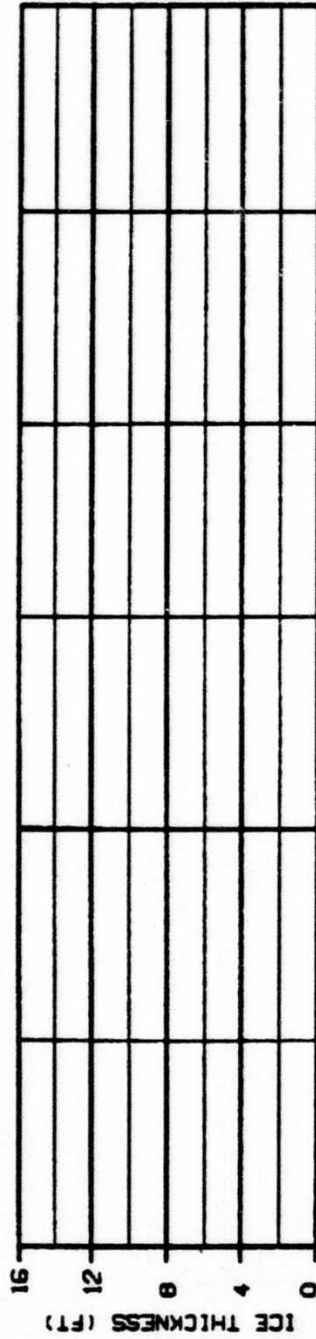
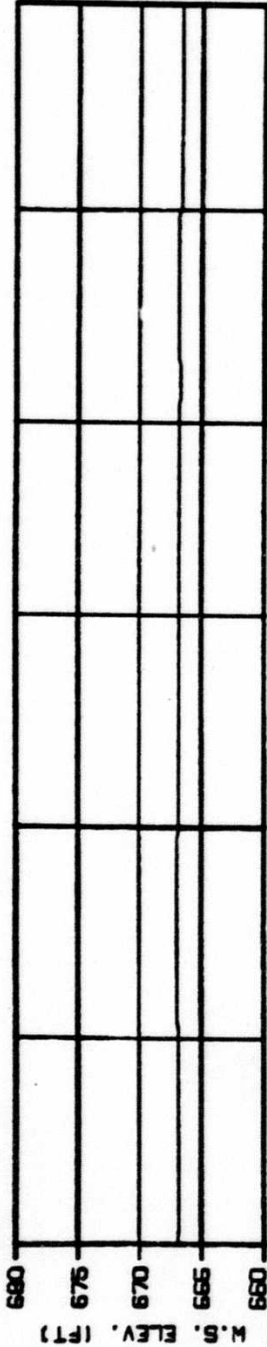
ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-BASCO JOINT VENTURE  
 DRAWN: S. J. W. 8. A. 88 1000. 142

SIDE CHANNEL U/S OF SLOUGH 10

RIVER MILE : 134.30

WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RILE : NATURAL  
 REFERENCE RUN NO. : 760204A

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



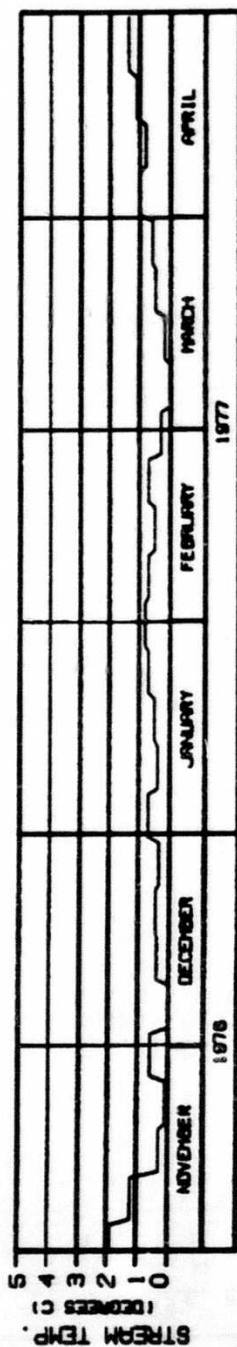
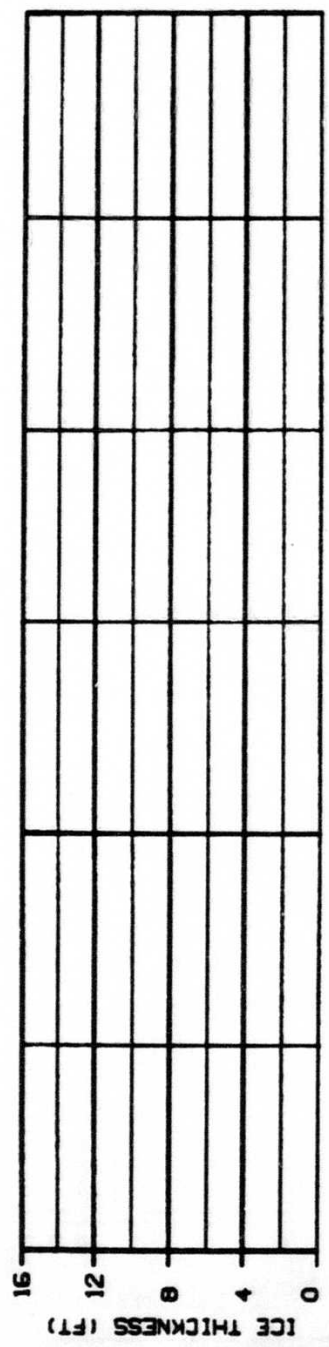
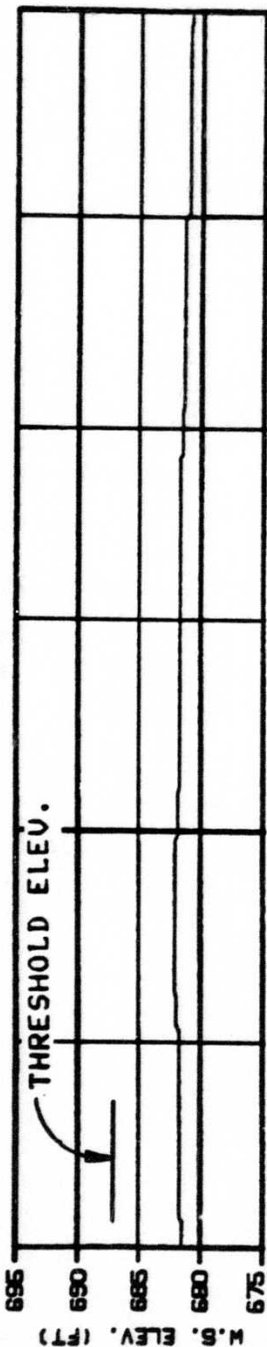
ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBECQ JOINT VENTURE  
 DRAWN: S. L. BROWN | 8 JUL 81 | 10001-02

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

WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULLE, NATURAL  
 REFERENCE RUN NO. : 760202A

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

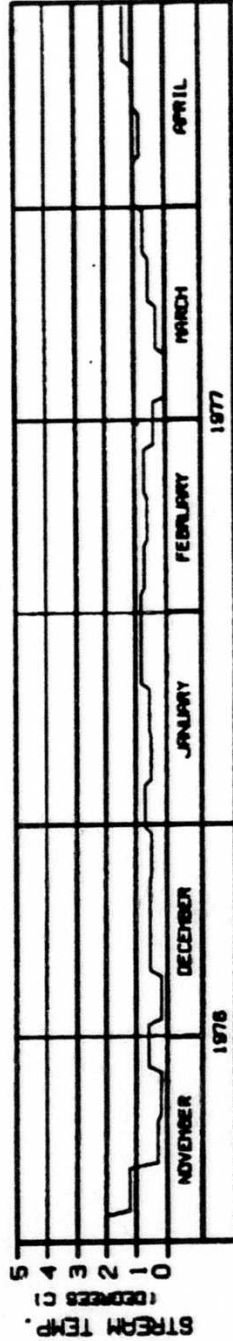
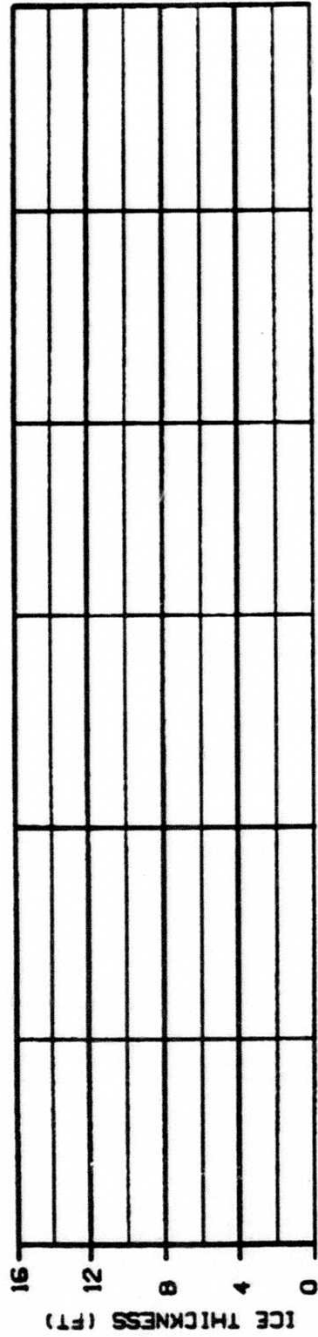
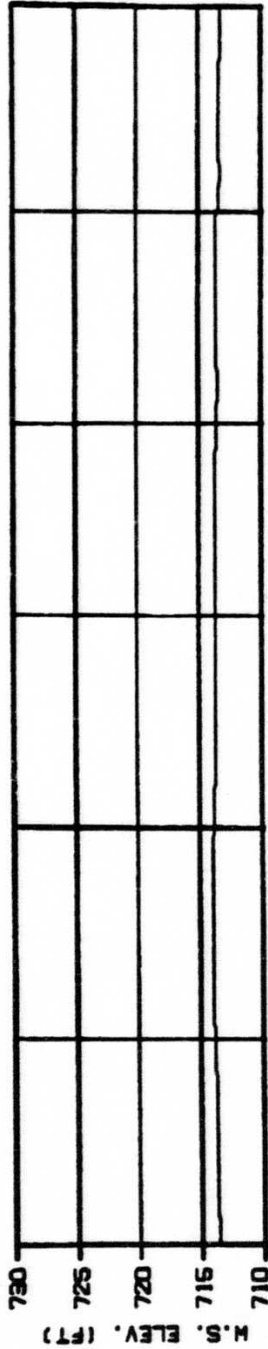




ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBECO JOINT VENTURE  
 HARZA-AL-ERBECO  
 8-4-78  
 1000-142

HEAD OF SLOUGH 11  
 RIVER MILE : 136.50  
 WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 76020NA

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



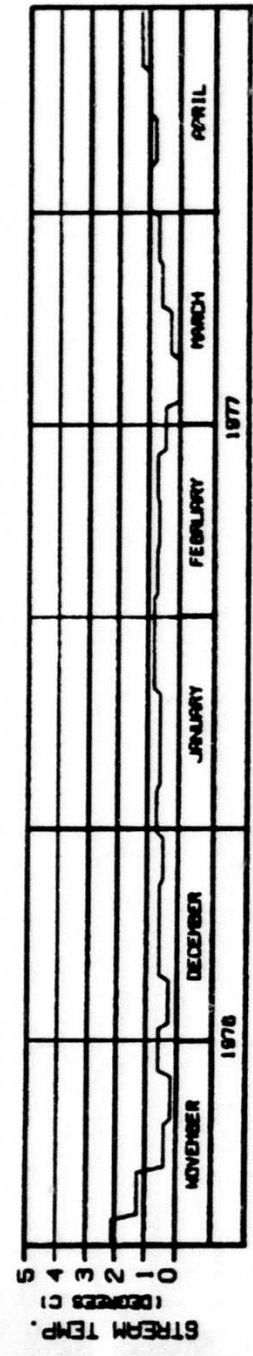
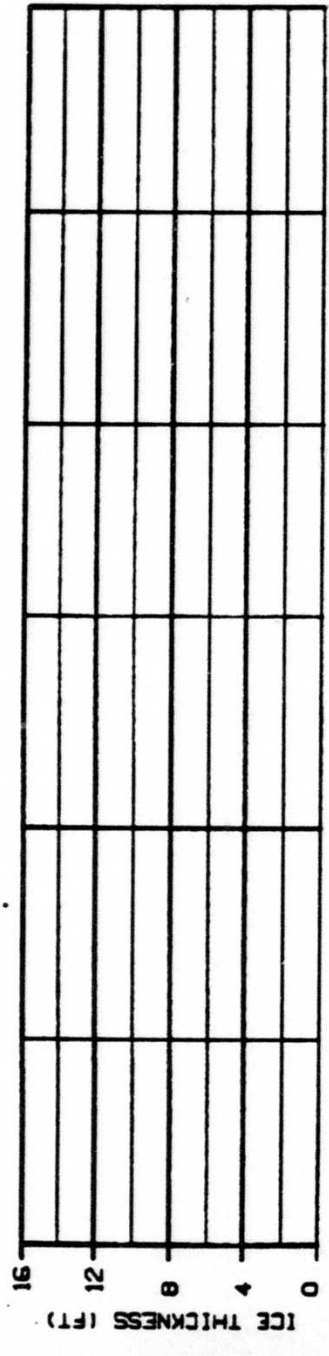
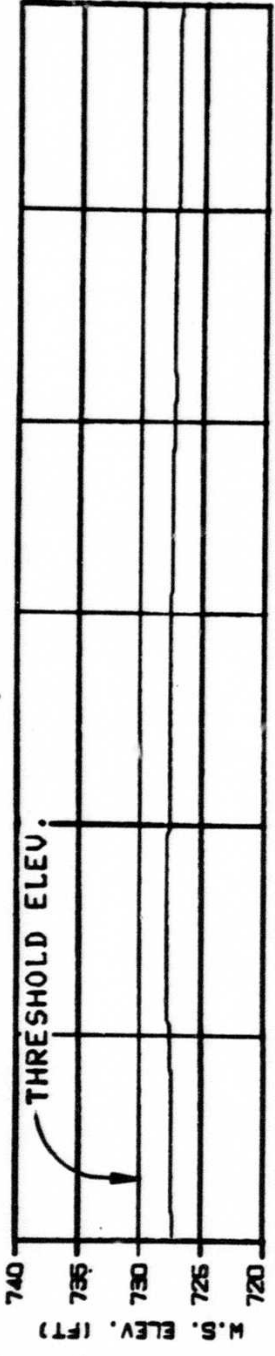
**HEAD OF SLOUGH 17**

**RIVER MILE : 139.30**

**WEATHER PERIOD : 1 NOV 76 - 30 APR 77**  
**ENERGY DEMAND : DEVIL CANYON 2002**  
**FLOW CASE : C TEMP RULE : NATURAL**  
**REFERENCE RUN NO. : 76020NA**

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

ALASKA POWER AUTHORITY	
SLUSHINA PROJECT	
SLUSHINA RIVER	
ICE SIMULATION	
TIME HISTORY	
HARZA-ERSSCO JOINT VENTURE	
DATE: 11/11/77	BY: J.A. CH
MOR. 148	



ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARREN-ERBACD JOINT VENTURE

DESIGNED BY: S. L. BROWN    8 JUL 80    1088-148

HEAD OF SLOUGH 20

RIVER MILE : 140.50

WEATHER PERIOD : 1 NOV 76 - 30 APR 77

ENERGY DEMAND : DEVIL CANYON 2002

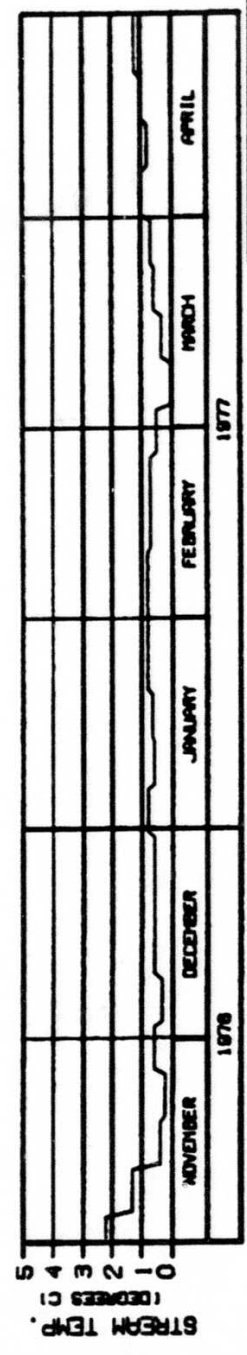
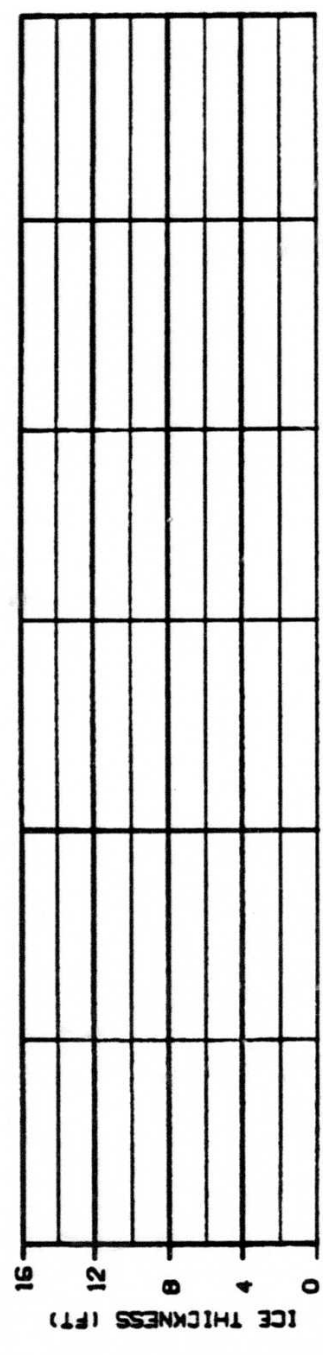
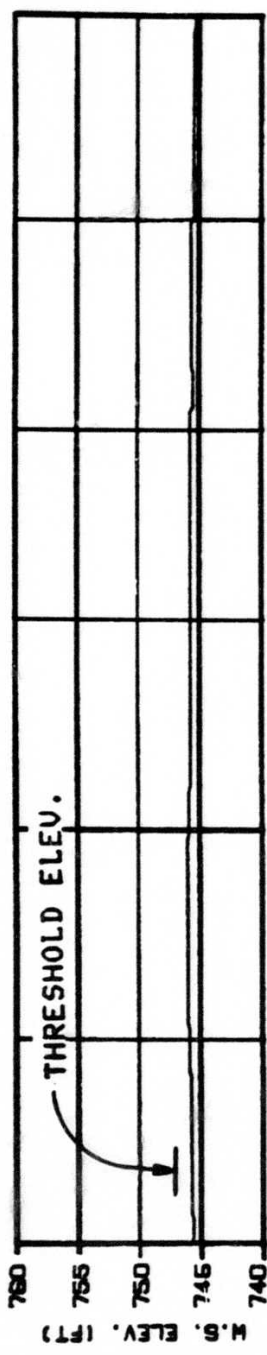
FLOW CASE : C    TEMP RULE : NATURAL

REFERENCE RUN NO. : 760202A

ICE THICKNESS LEGEND:

— TOTAL THICKNESS

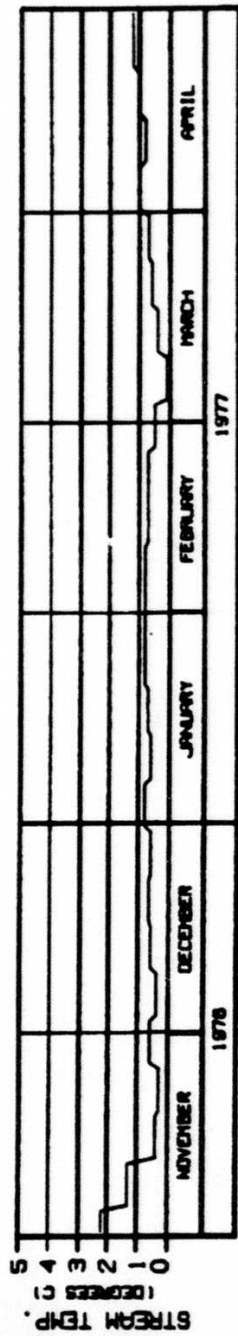
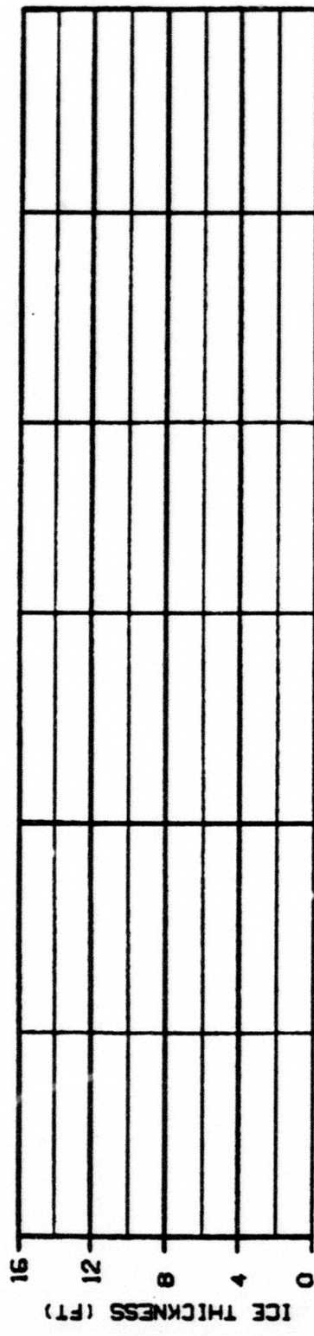
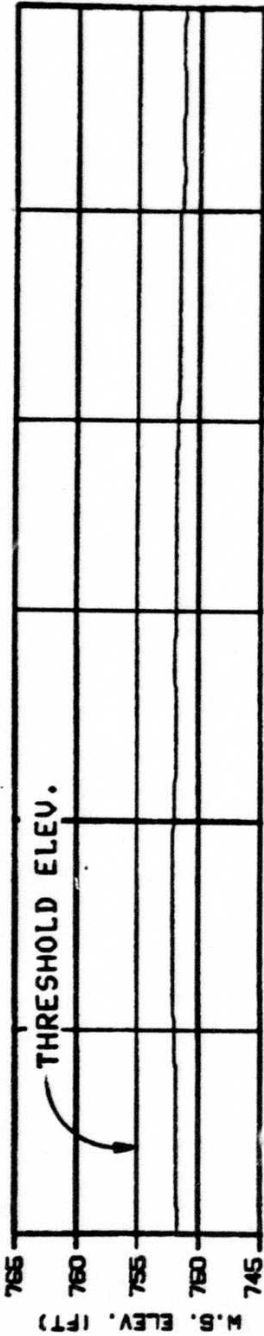
..... SLUSH COMPONENT



ALASKA POWER AUTHORITY  
SUBITNA PROJECT  
SUBITNA RIVER  
ICE SIMULATION  
TIME HISTORY  
HARRA-ERBOLD JOINT VENTURE  
DRAWN: S. LARSEN    8 JUL 81    SHEET 142

SLOUGH 21 (ENTRANCE A6)  
RIVER MILE : 141.80  
WEATHER PERIOD : 1 NOV 76 - 30 APR 77  
ENERGY DEMAND : DEVIL CANYON 2002  
FLOW CASE : C      TEMP RULE : NATURAL  
REFERENCE RUN NO. : 760202A

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



ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

MAPZA-ERBACD JOINT VENTURE

DESIGN: A.L. 0000 | 0 JUL 80 | 0000.142

HEAD OF SLOUGH 21

RIVER MILE : 142.20

WEATHER PERIOD : 1 NOV 76 - 30 APR 77

ENERGY DEMAND : DEVIL CANYON 2002

FLOW CASE : C TEMP RULE ; NATURAL

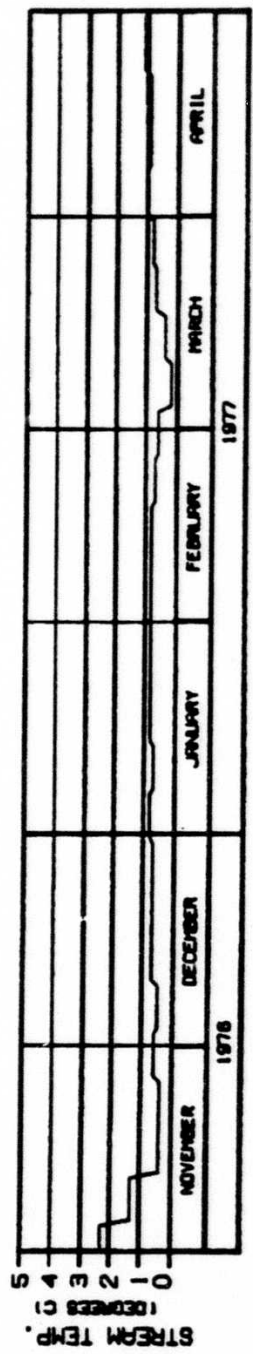
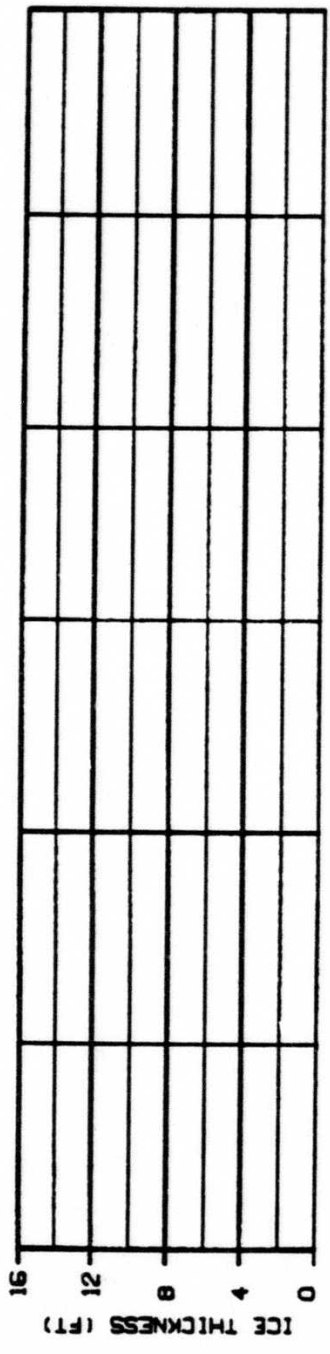
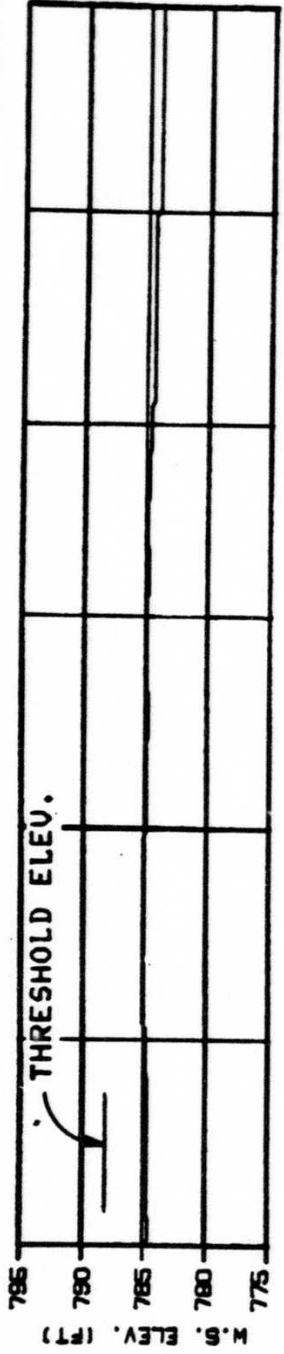
REFERENCE RUN NO. : 76020VA

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS

----- SLUSH COMPONENT

CC



ALASKA POWER AUTHORITY	
SLUICING PROJECT	SUSTINA RIVER
	ICE SIMULATION
	TIME HISTORY
DESIGNED BY	HARZA-ERSSO JOINT VENTURE
DRAWN BY	DATE

HEAD OF SLOUGH 22	RIVER MILE : 144.80
WEATHER PERIOD : 1 NOV 76 - 30 APR 77	ENERGY DEMAND : DEVIL CANYON 2002
FLOW CASE : C	TEMP RULE : NATURAL
REFERENCE RUN NO. :	7602CNA

ICE THICKNESS LEGEND:

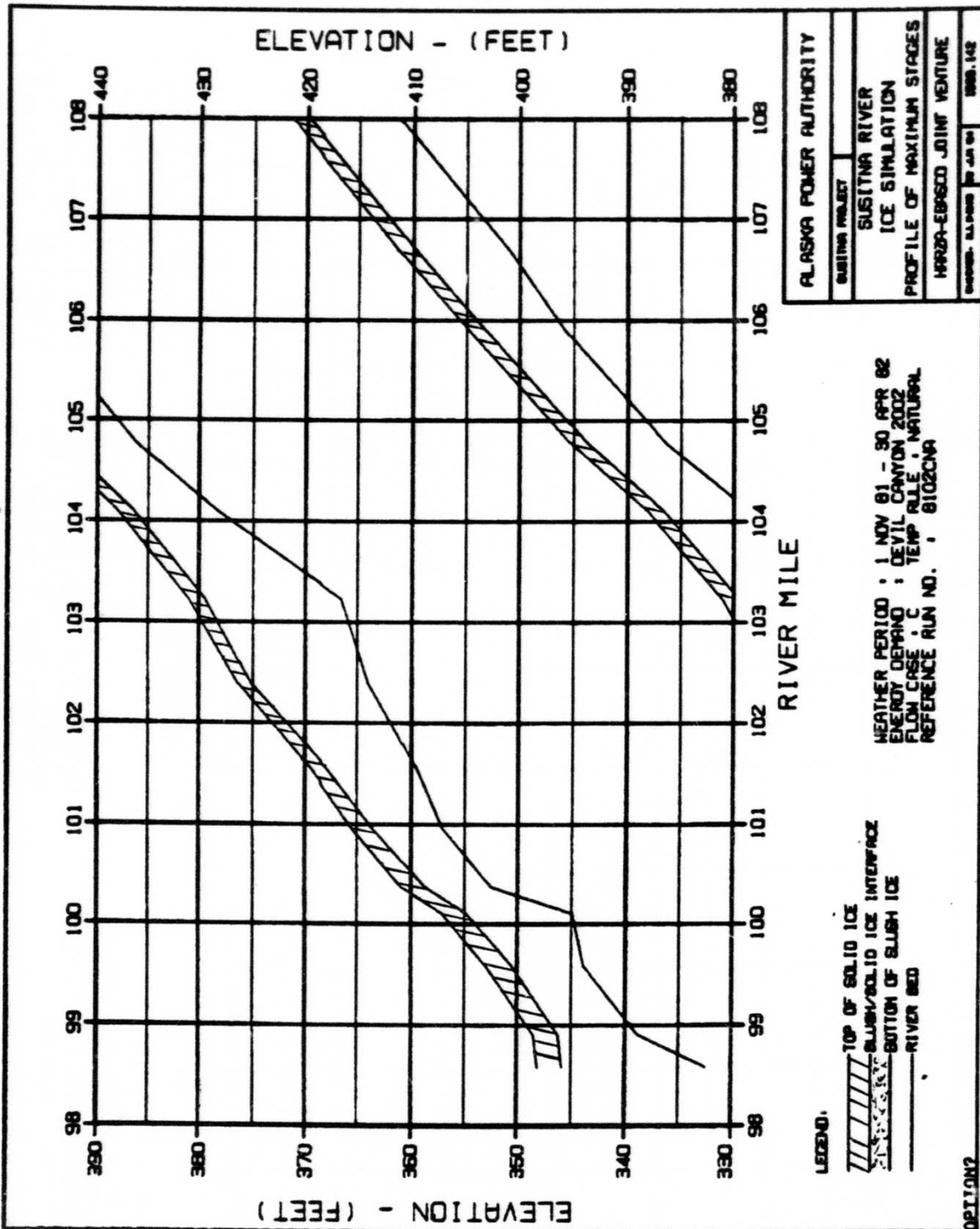
- TOTAL THICKNESS
- SLUSH COMPONENT

SECTION

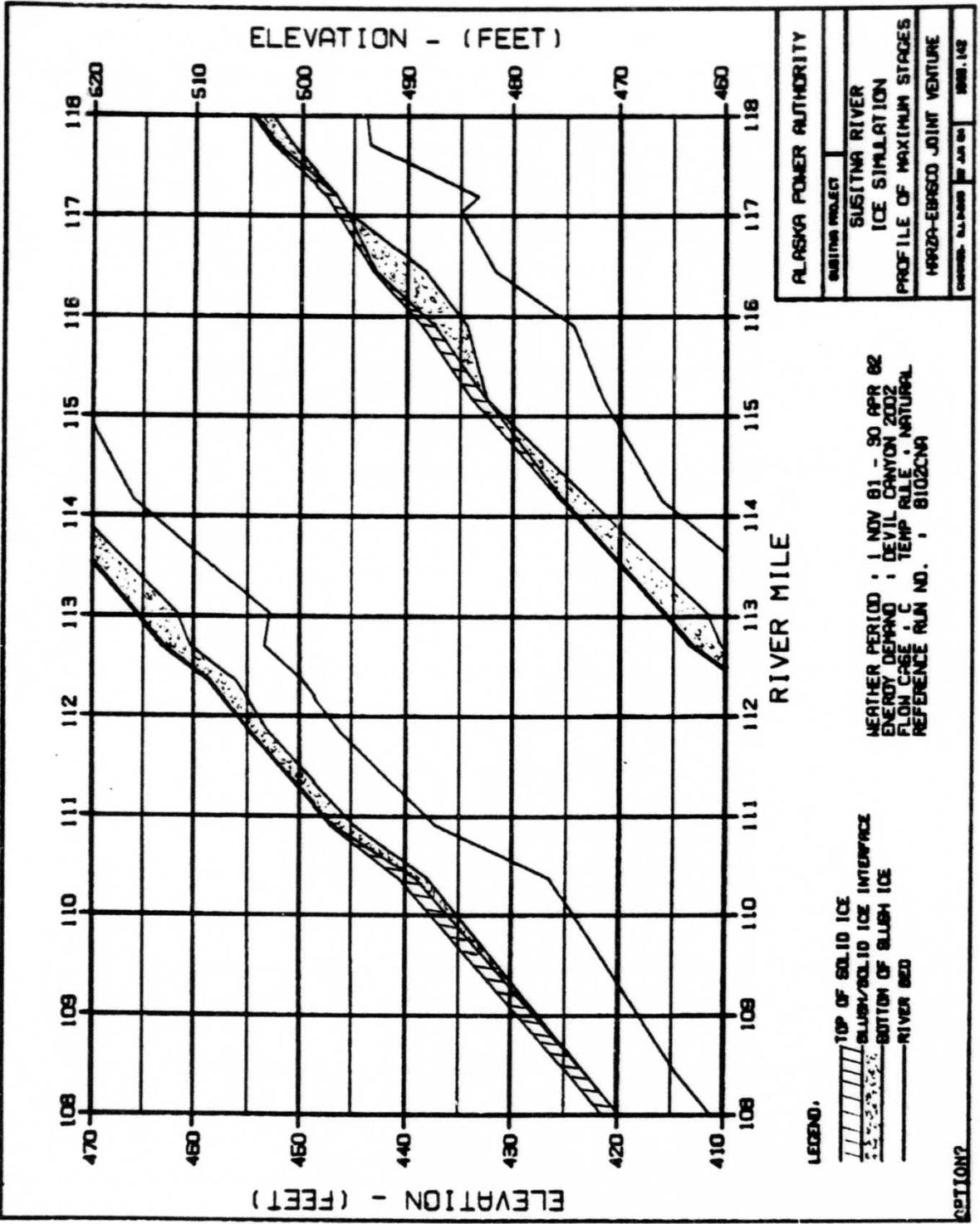


**EXHIBIT N**

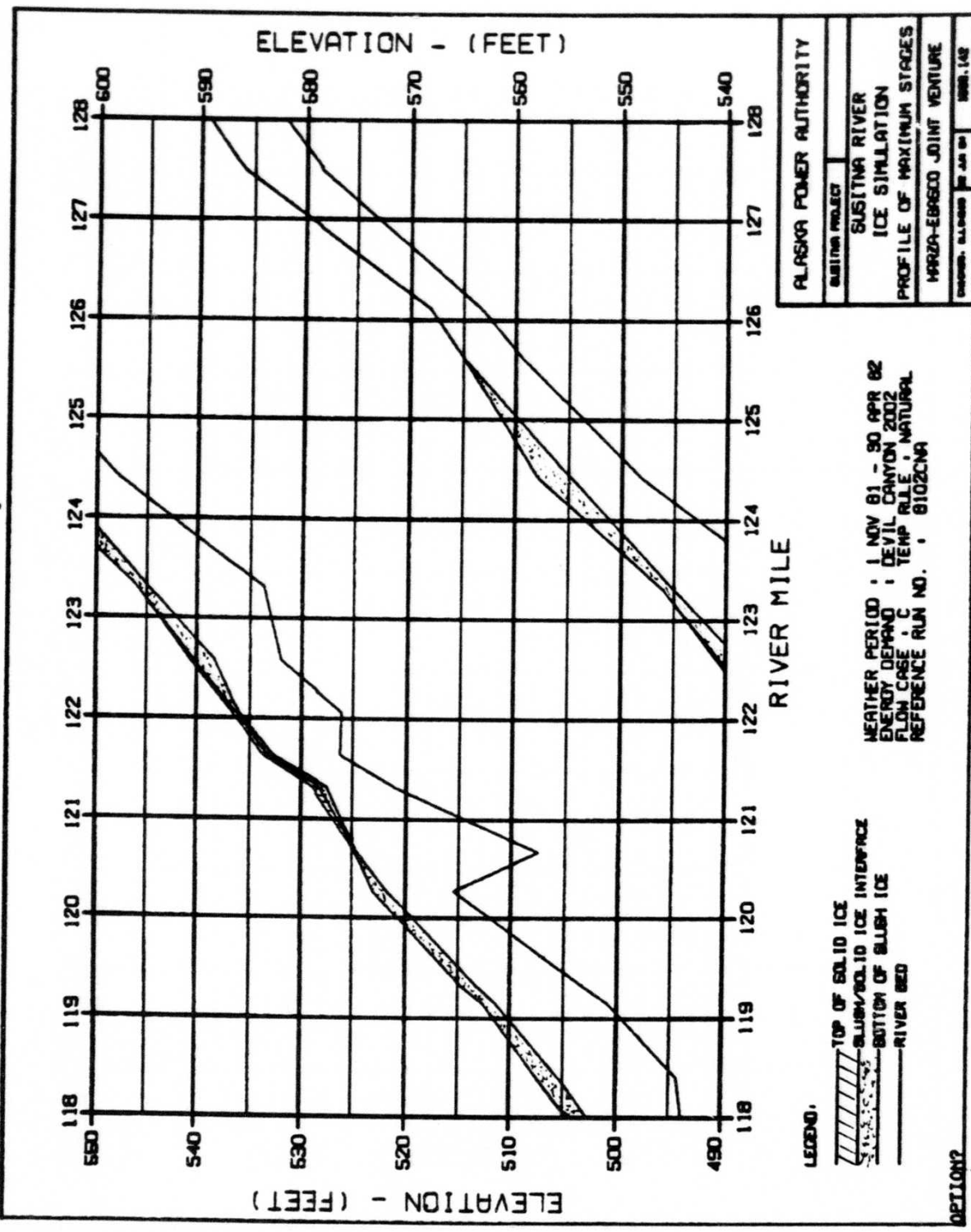
C



C



c



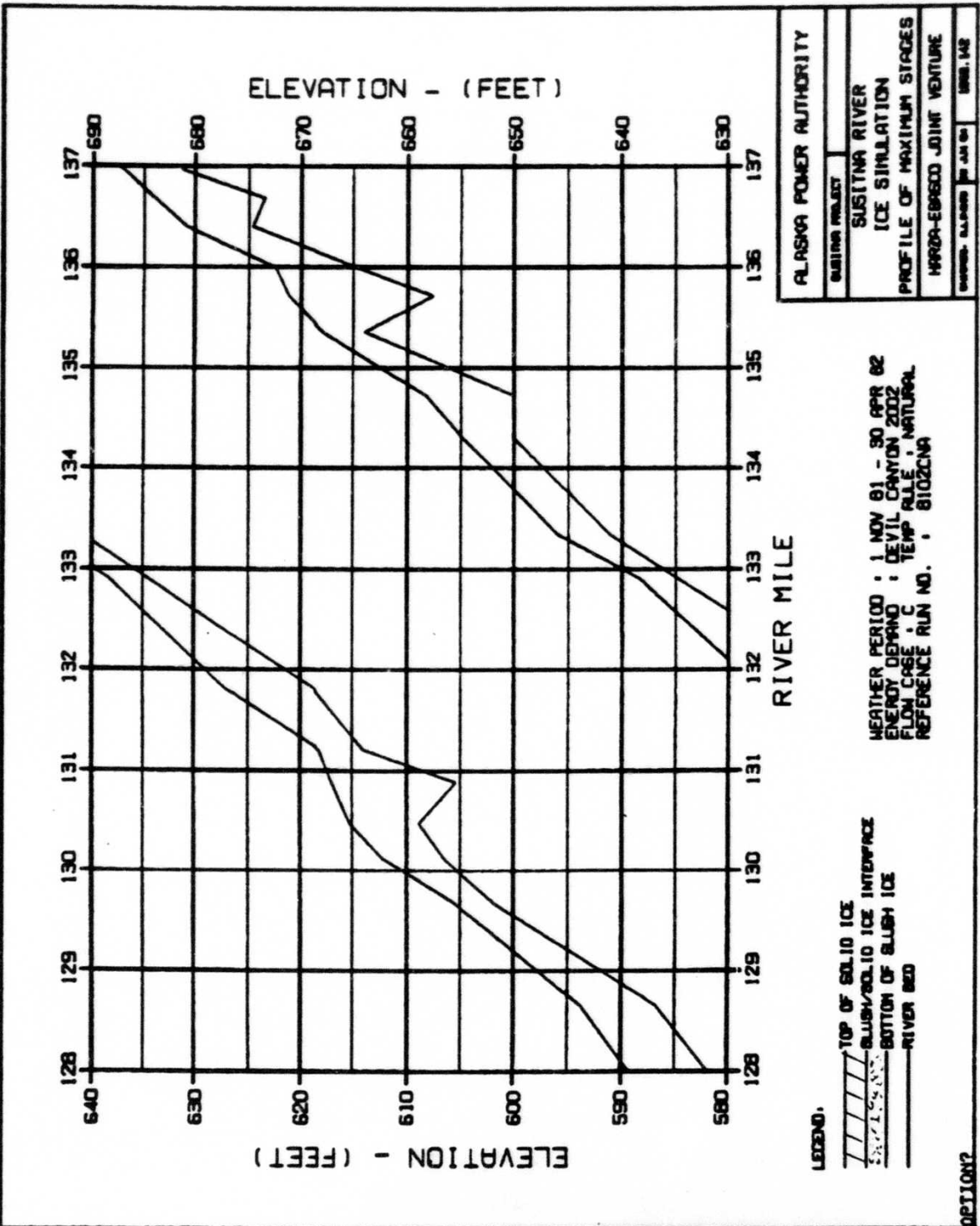
ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER	
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
MARZA-EBERCO JOINT VENTURE	
DESIGN: A.L. GARDNER	DATE: JAN 82
	DRAWN: L.G.E.

WEATHER PERIOD: 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND: DEVIL CANYON 2002  
 FLOW CASE: C  
 TEMP. RULE: NATURAL  
 REFERENCE RUN NO.: 8102CNA

LEGEND:  
 TOP OF SOLID ICE  
 SLUSH/SOLID ICE INTERFACE  
 BOTTOM OF SLUSH ICE  
 RIVER BED

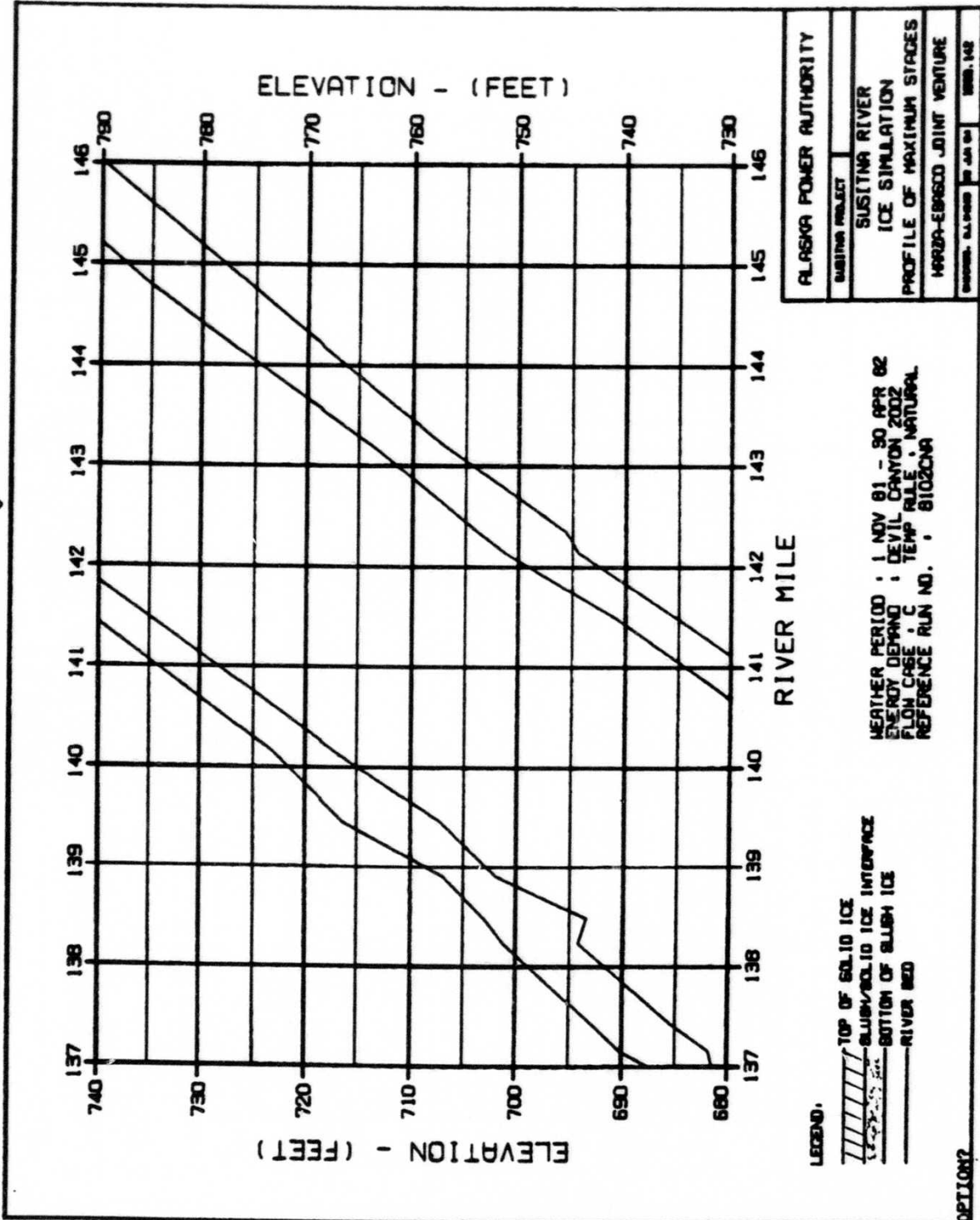
OPTION?

C

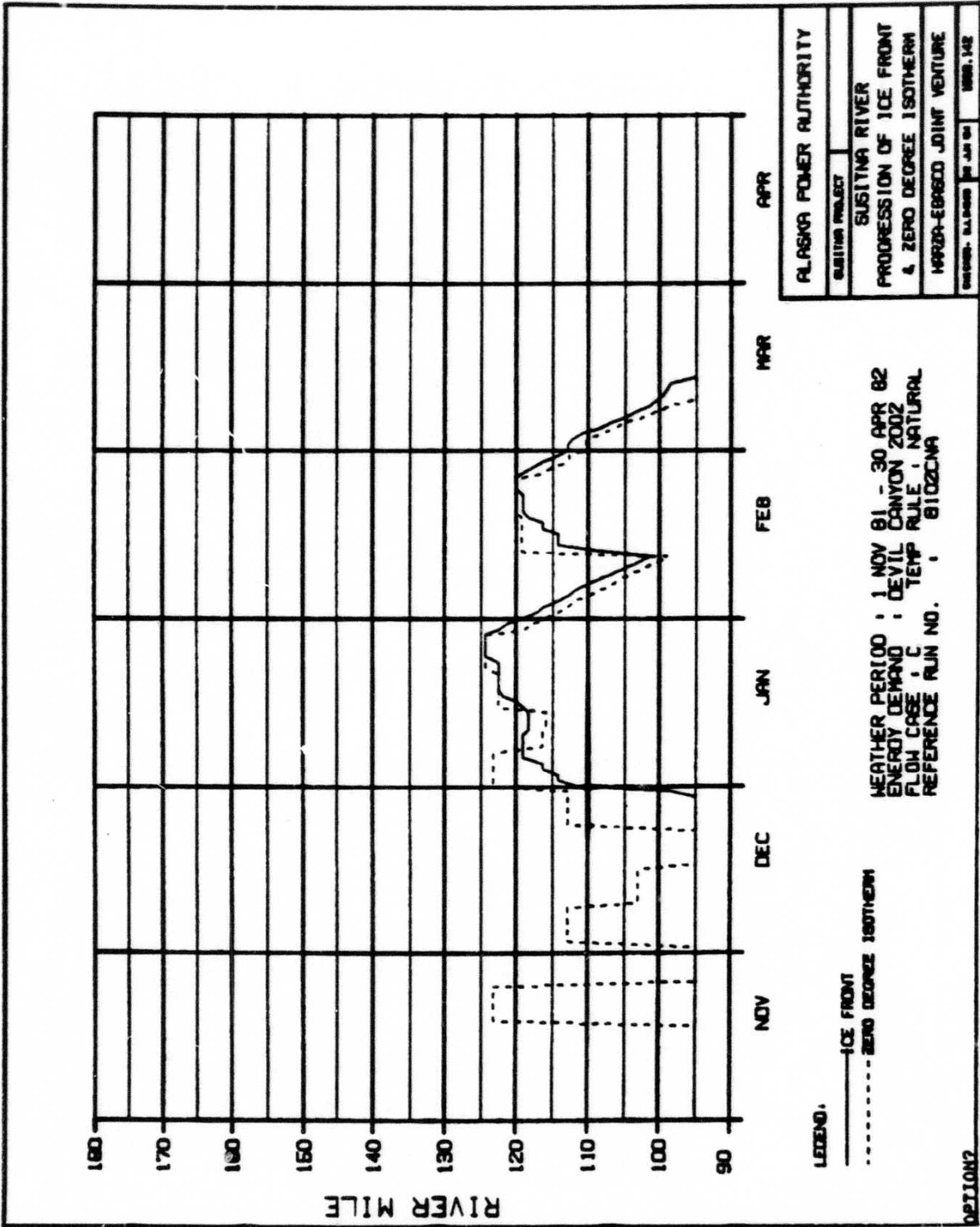




C





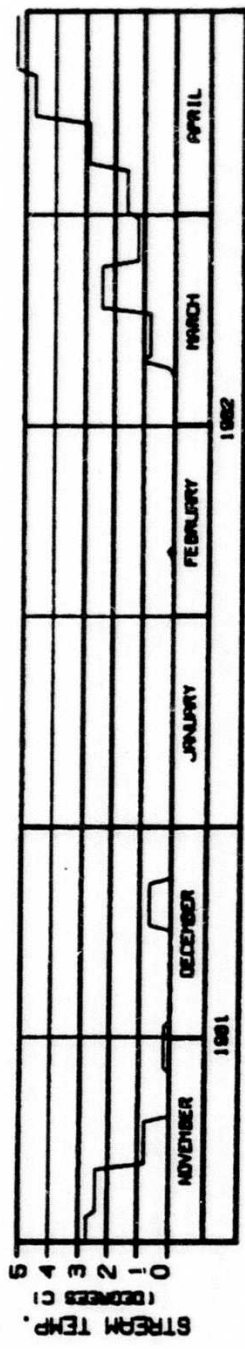
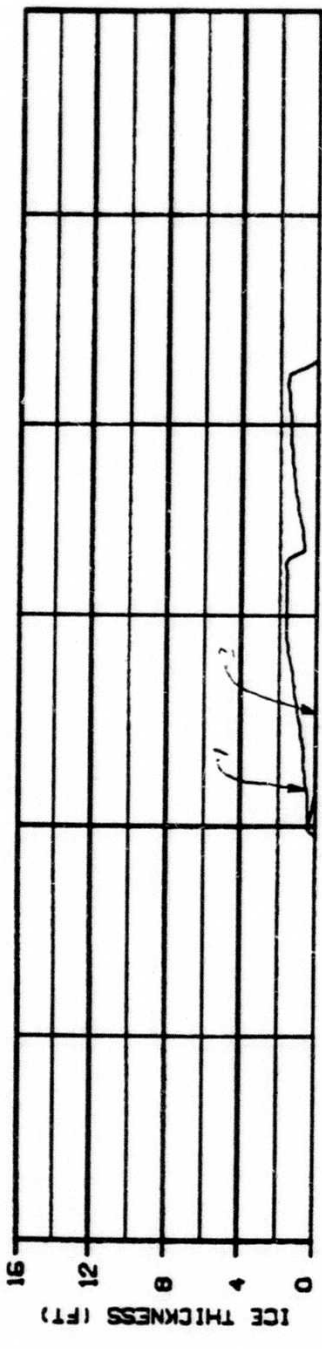
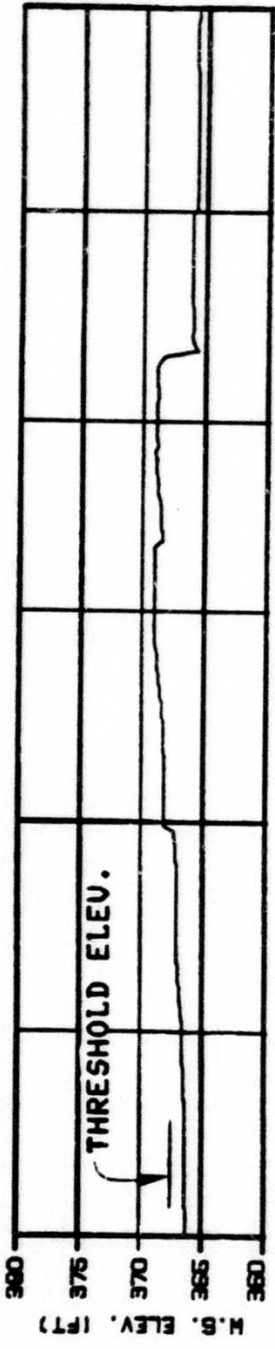


ALASKA POWER AUTHORITY  
 SUBMITTAL PROJECT  
 SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM  
 HARZA-EDGED JOINT VENTURE  
 DESIGNER: S.A. 04/02 FOR J.A. 04/02 1000.142

WEATHER PERIOD : 1 NOV 91 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C  
 REFERENCE RUN NO. : 8102CNA

LEGEND:  
 — ICE FRONT  
 - - - ZERO DEGREE ISOTHERM

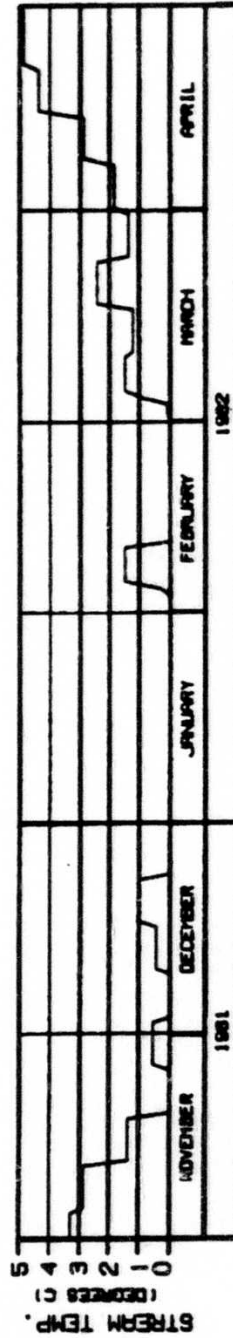
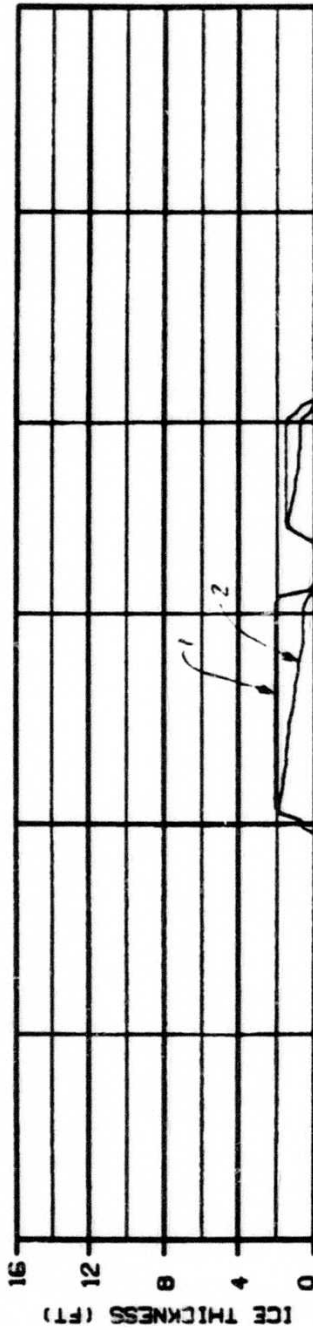
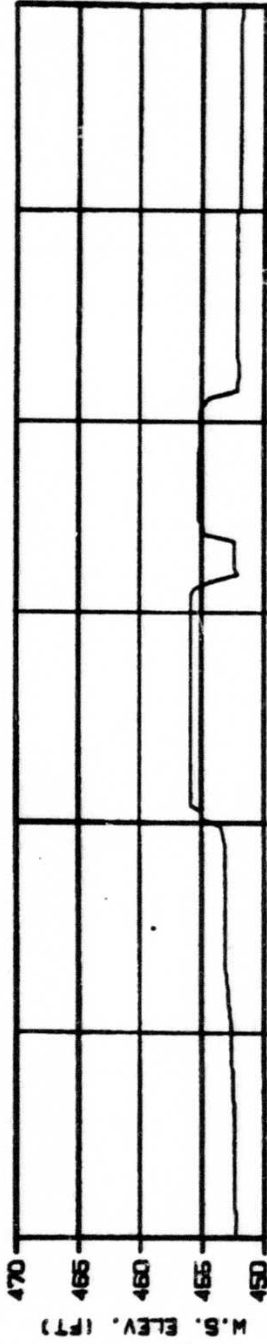
OPTION 2



ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERD JOINT VENTURE  
 DRAWING NO. 8008.142

HEAD OF WHISKERS SLOUGH  
 RIVER MILE : 101.50  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 810201A

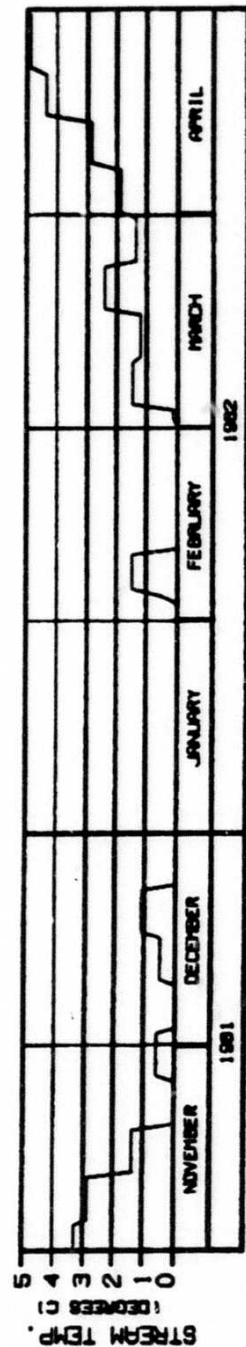
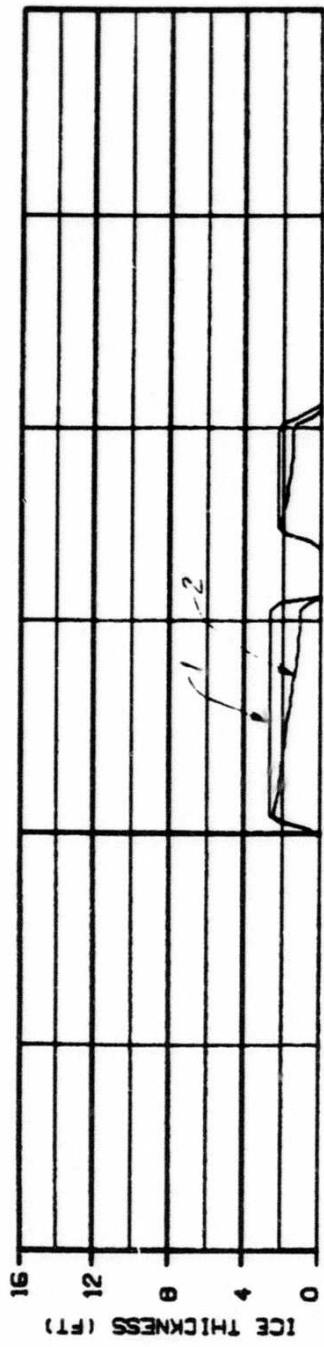
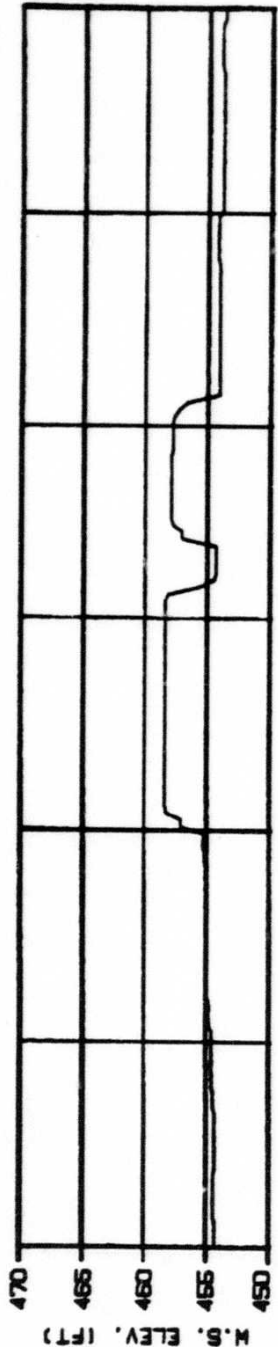
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EDBECO JOINT VENTURE

**SIDE CHANNEL AT HEAD OF GASH CREEK**  
 RIVER MILE : 112.00  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 810208A

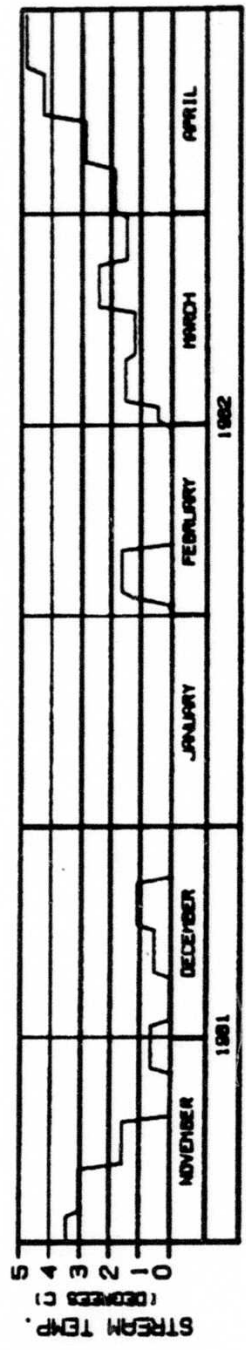
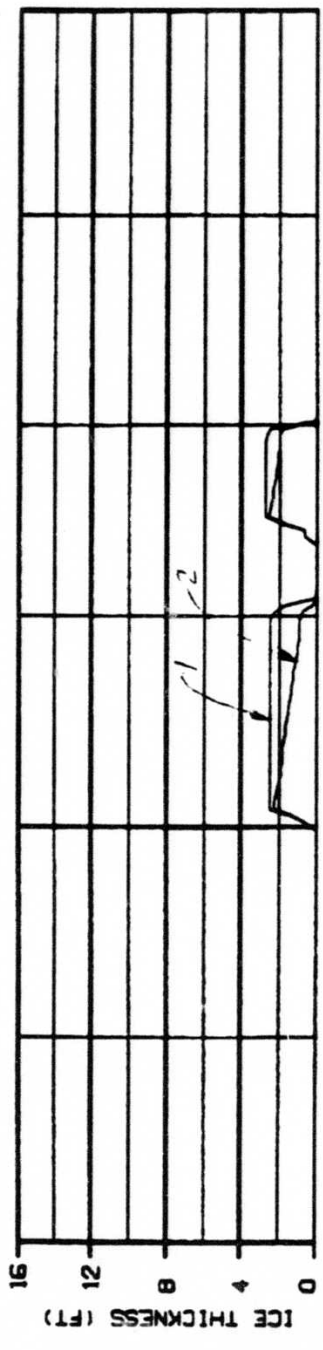
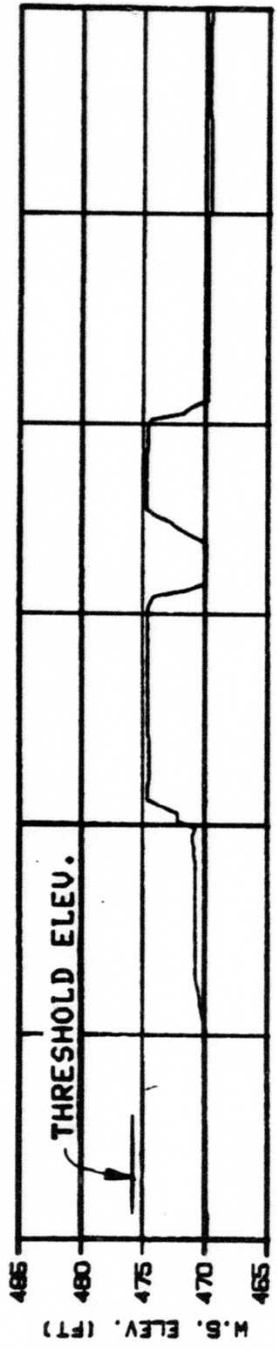
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERISCO JOINT VENTURE  
 DRAWING: 11.0000 1st JUN 82 1991.142

MOUTH OF SLOUGH 6A  
 RIVER MILE : 112.34  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 810209A

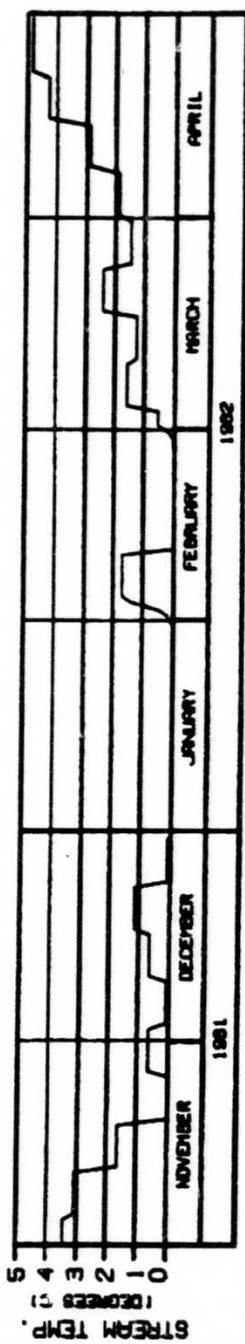
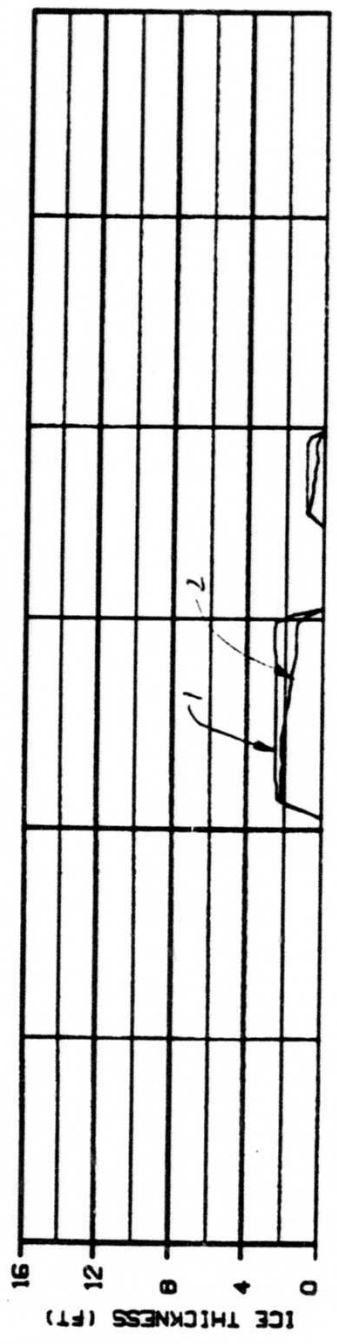
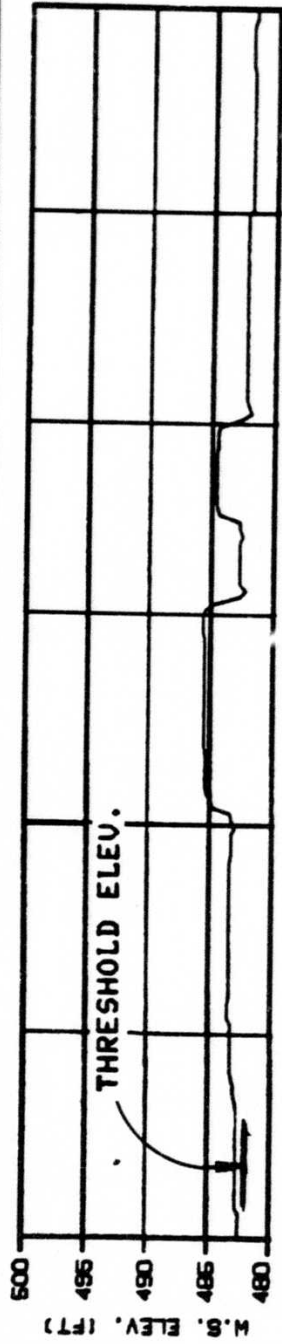
ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBJECT: SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 WAPDA-EBRACO JOINT VENTURE  
 DATES: 11/01/81 TO 04/30/82

HEAD OF SLOUGH 8  
 RIVER MILE : 114.10  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 810201A

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLOUGH COMPONENT

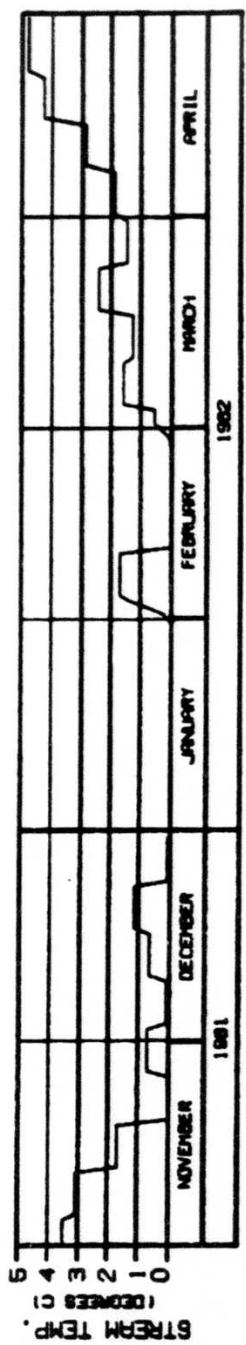
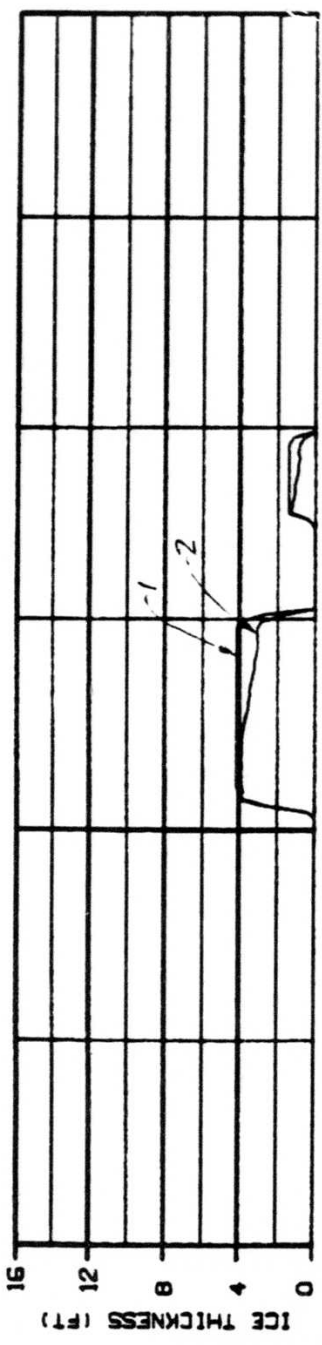
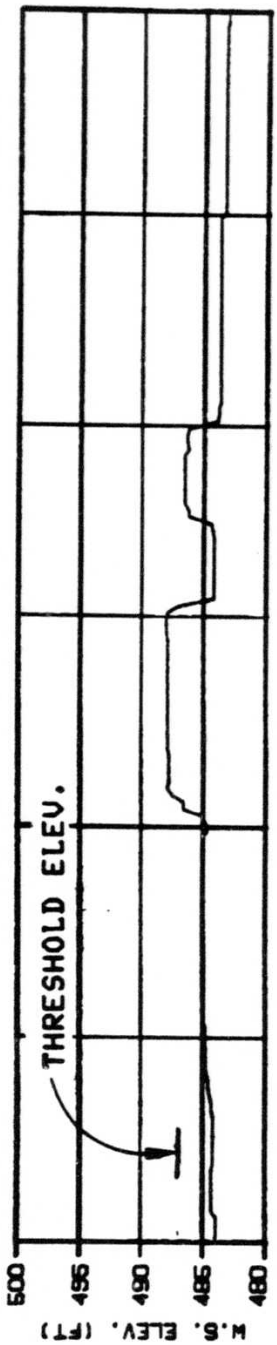


ALASKA POWER AUTHORITY	
QUALITY PROJECT	SUSTINA RIVER
	ICE SIMULATION
	TIME HISTORY
HARZA-EBROD JOINT VENTURE	
DATE: 11/28/82	BY: JLS
	1000.142

**SIDE CHANNEL MSII**  
**RIVER MILE : 115.50**  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C  
 REFERENCE RUN NO. : 810200A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

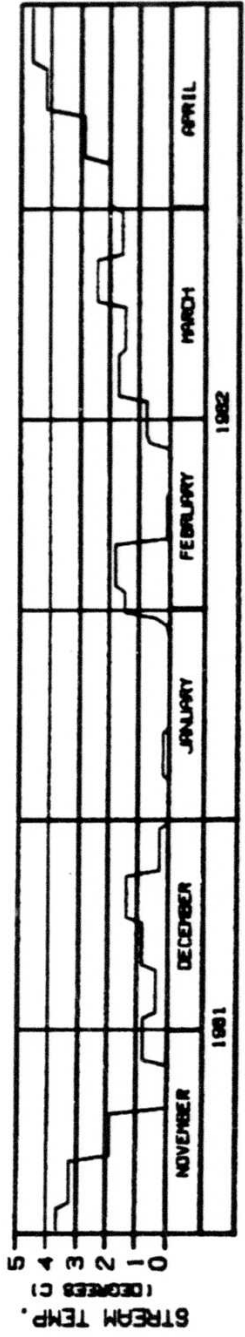
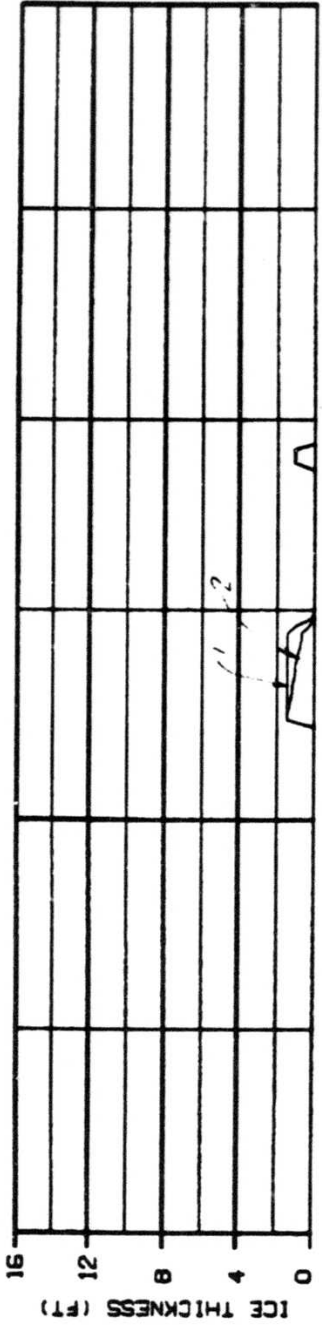
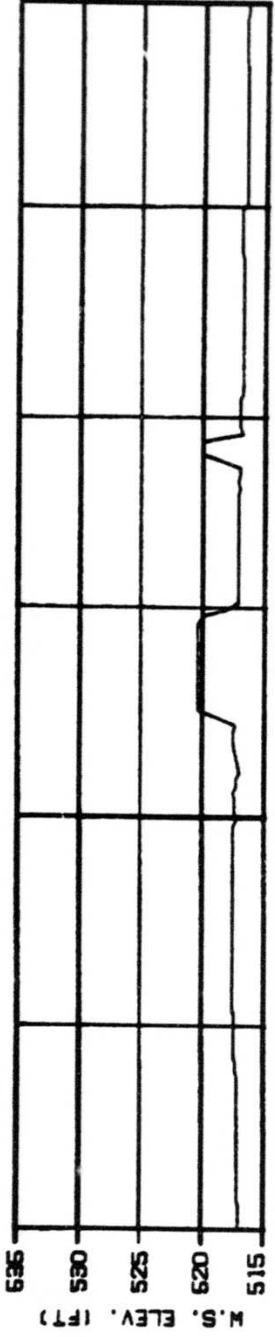




ALASKA POWER AUTHORITY  
 SUBSTINA PROJECT  
 SUBSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRISCO JOINT VENTURE  
 DRAWING: AL-9000 JAN 81 8889.142

HEAD OF SIDE CHANNEL MSII  
 RIVER MILE : 115.90  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOWN CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 810202A

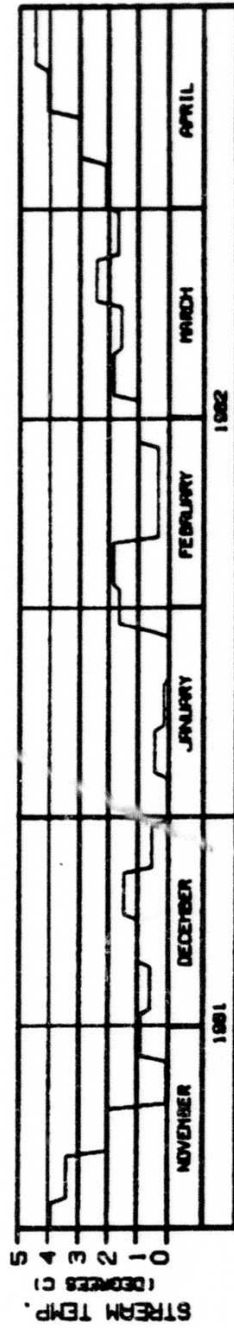
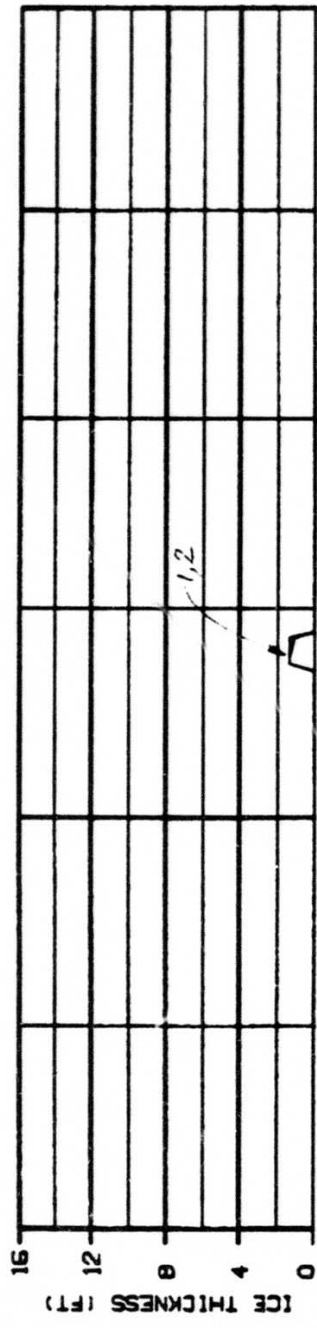
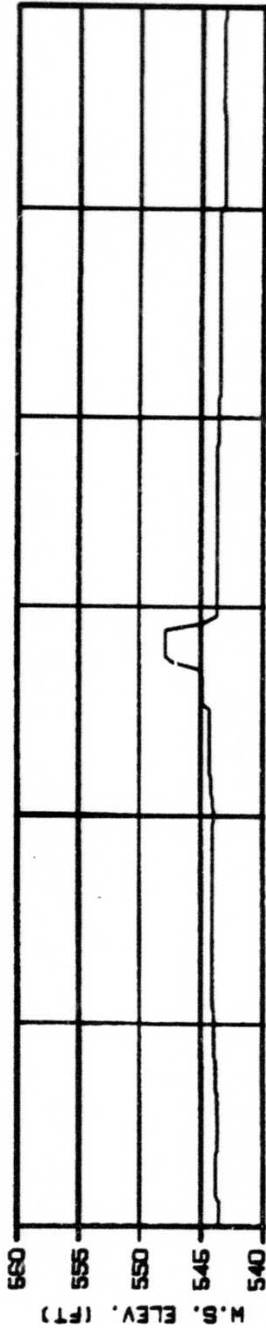
ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT : SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERCO JOINT VENTURE  
 DRAWING NO. : 810200 FOR JULY 81 8008.142

RIVER MILE : 120.00  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 810200A

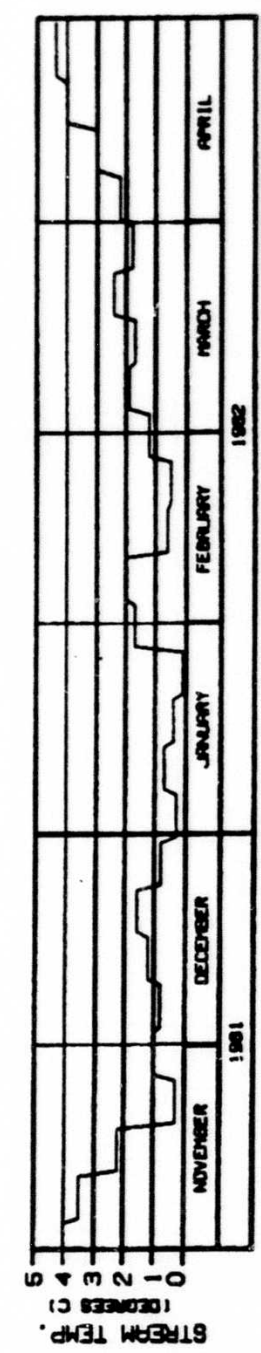
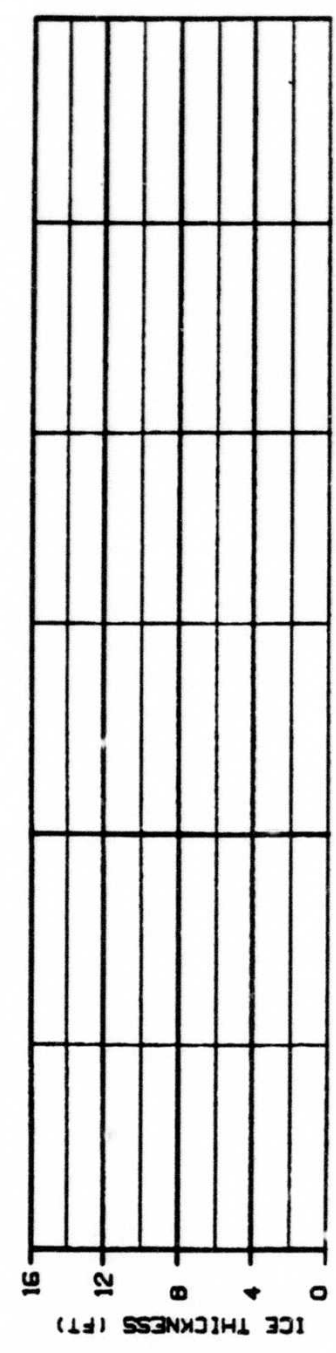
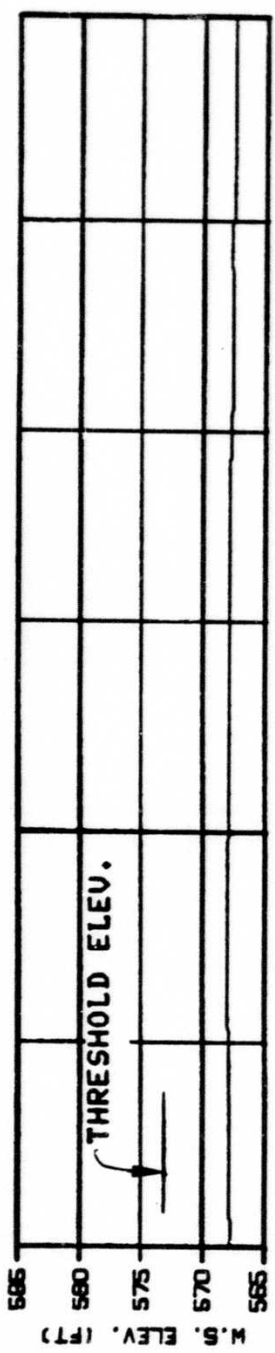
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERCO JOINT VENTURE  
 DRAWN: S.J. EBERCO BY: JAS. SM. 88B.142

HEAD OF MOOSE SLOUGH  
 RIVER MILE : 123.50  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C  
 TEMP. RULE : NATURAL  
 REFERENCE RUN NO. : 81020NA

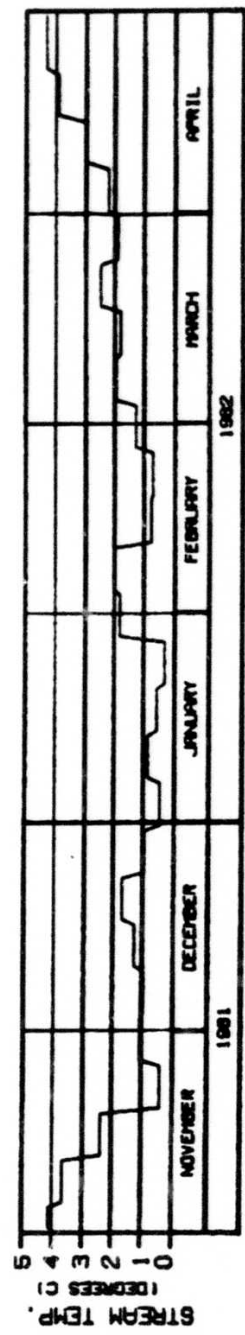
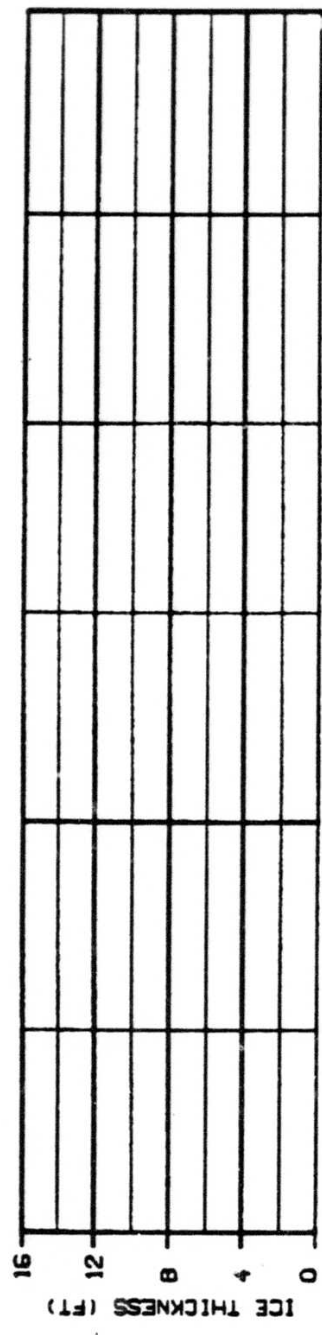
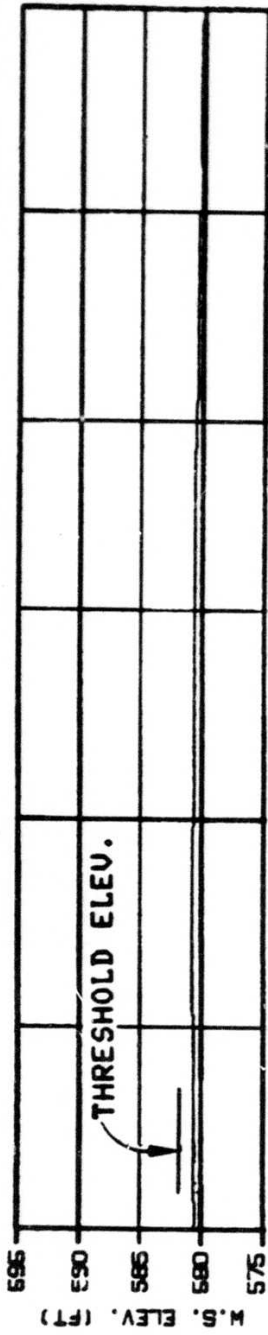
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT: SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRSCO JOINT VENTURE  
 PROJECT: SUSITNA RIVER  
 SHEET: 142

HEAD OF SLOUGH 8A (WEST)  
 RIVER MILE : 126.10  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 810208A

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT



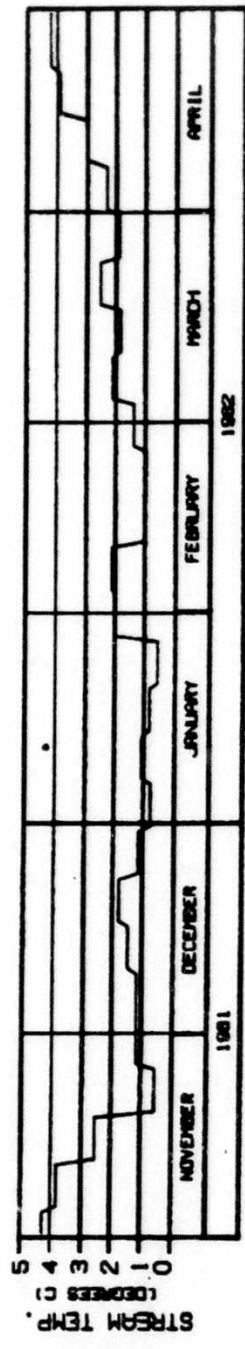
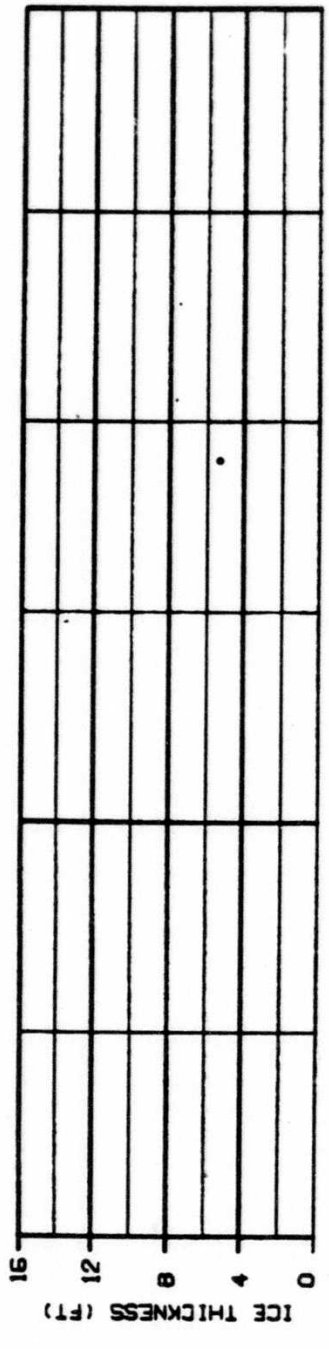
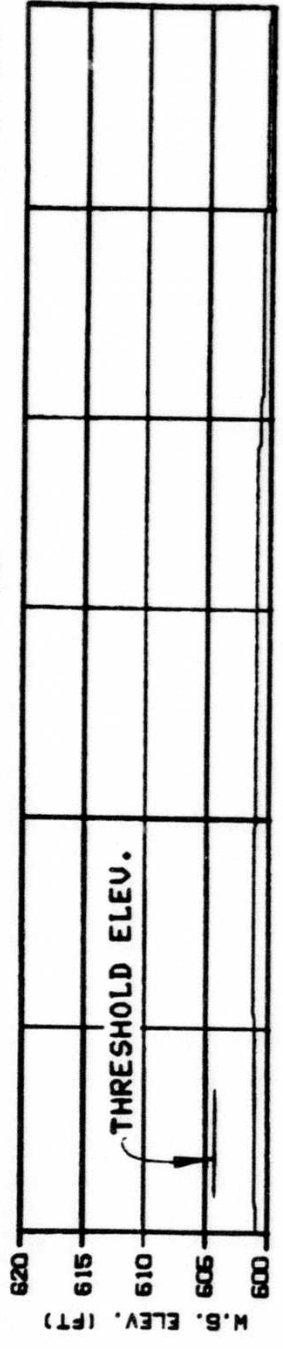
ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 DECISION NO. 81-0000 JAN 81 1981, 142

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

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 81020VA

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT

STOP C



ALASKA POWER AUTHORITY  
 SUBITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERD JOINT VENTURE  
 DESIGNER: S.L. BROWN FOR A.P.A. 81 8888.142

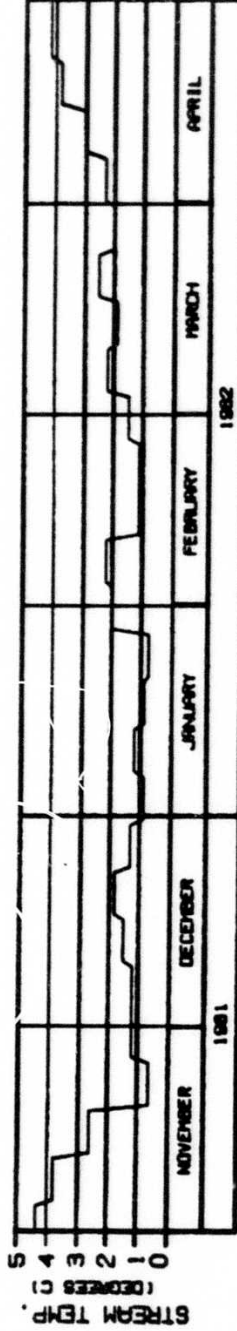
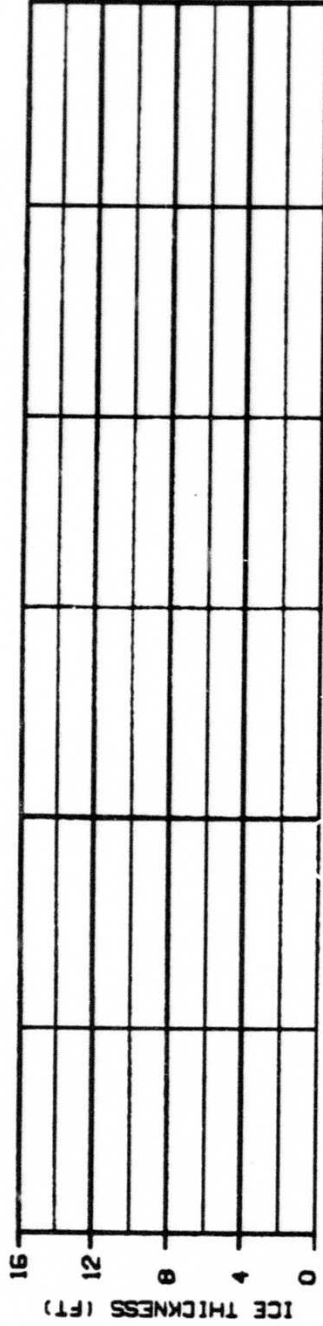
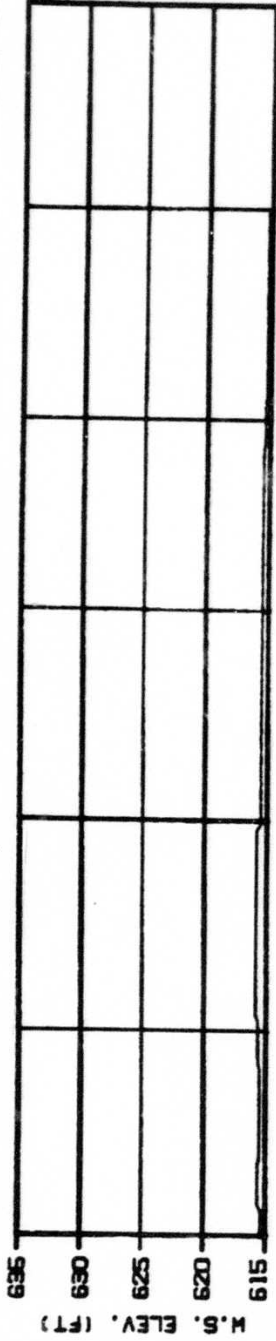
HEAD OF SLOUGH 9  
 RIVER MILE : 129.30  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C  
 TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 810202A

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT

OPTION?



OPTION?

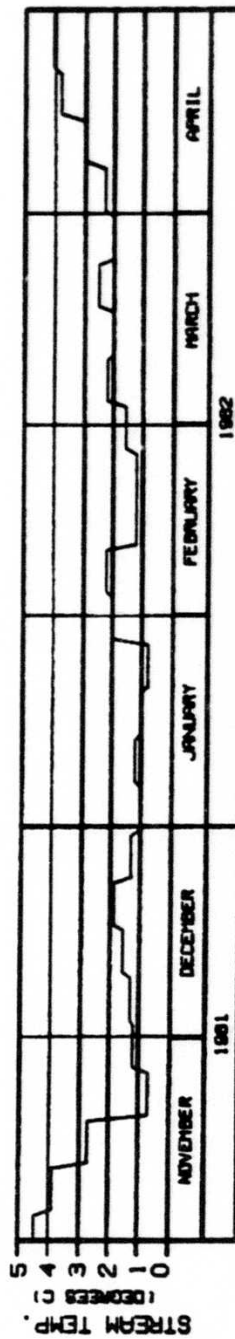
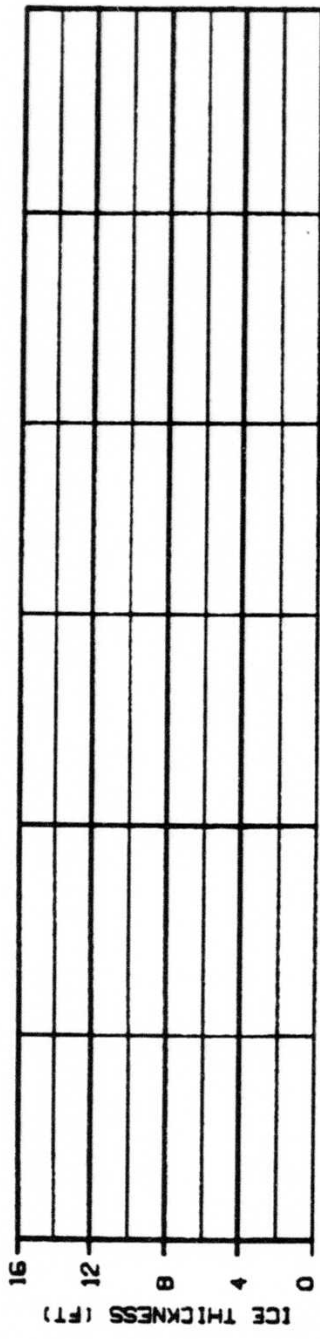
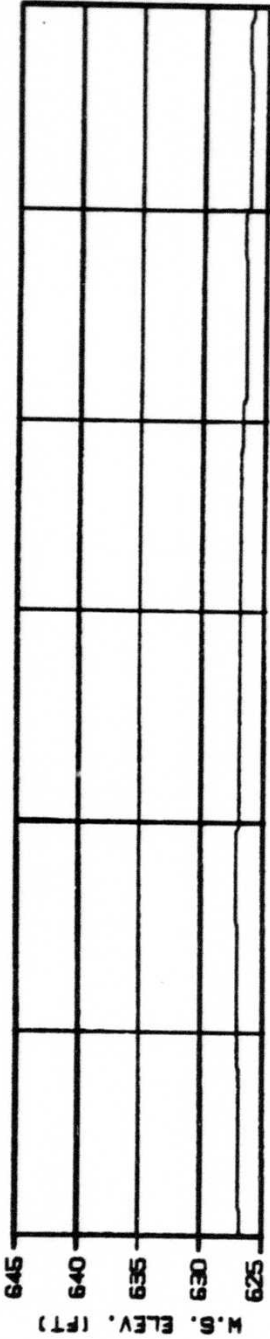


**SIDE CHANNEL U/S OF SLOUGH 9  
RIVER MILE : 130.60**

ICE THICKNESS LEGEND:  
1. TOTAL THICKNESS  
2. SLUSH COMPONENT

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
ENERGY DEMAND : DEVIL CANYON 2002  
FLOW CASE : C  
TEMP RULE : NATURAL  
REFERENCE RUN NO. : 81020NA

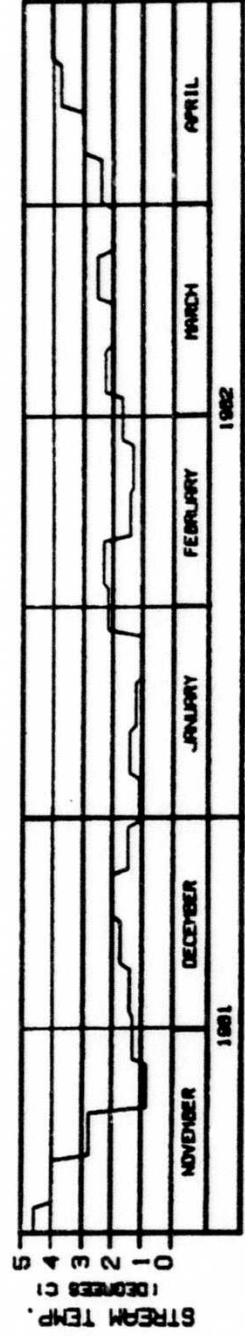
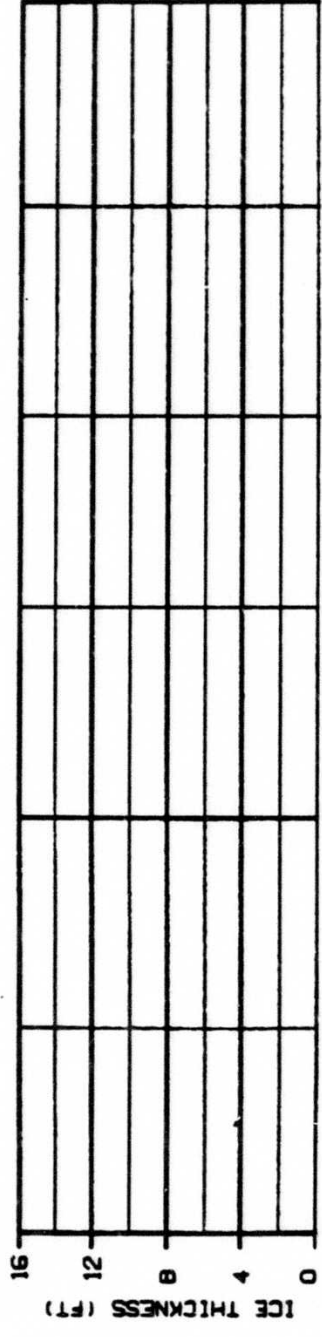
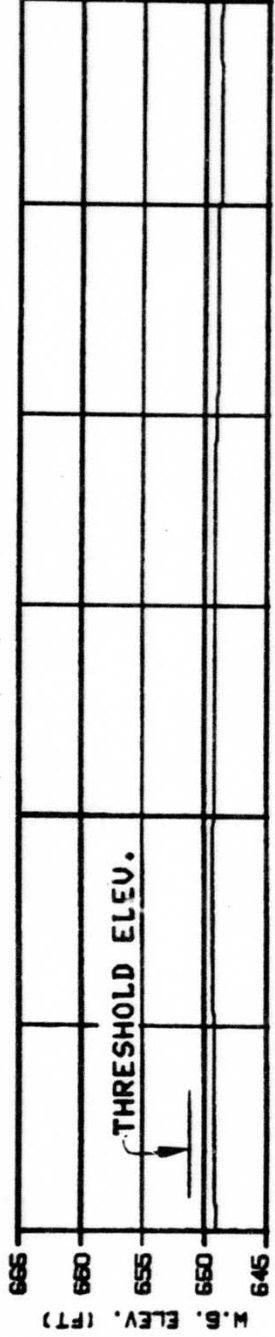
ALASKA POWER AUTHORITY	
SUSTINA PROJECT	SUSTINA RIVER
ICE SIMULATION	
TIME HISTORY	
HARZA-EBERCO JOINT VENTURE	
DESIGNED BY: J.A. BROWN	DATE: JUL 81
DRAWN BY: J.A. BROWN	



ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT : SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRSCO JOINT VENTURE  
 DRAWING NUMBER : 810202A  
 SHEET : 142

**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  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 810202A

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT



ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HAZUA-ERASCO JOINT VENTURE

CONTRACT NO. 80-001

HEAD OF SLOUGH 9A

RIVER MILE : 133.70

WEATHER PERIOD : 1 NOV 81 - 30 APR 82

ENERGY DEMAND : DEVIL CANYON 2002

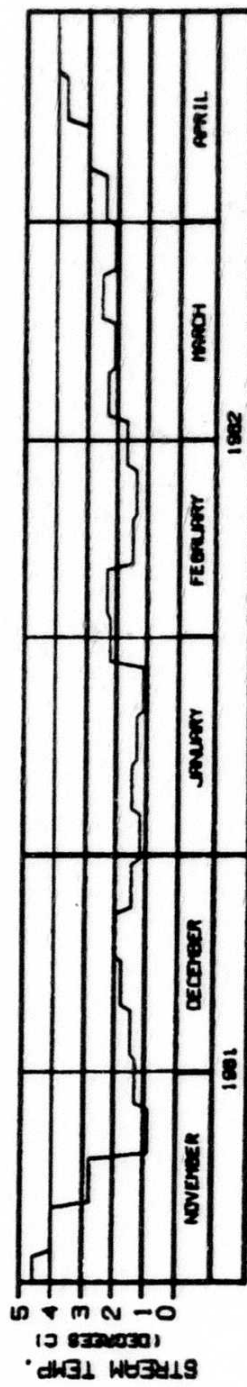
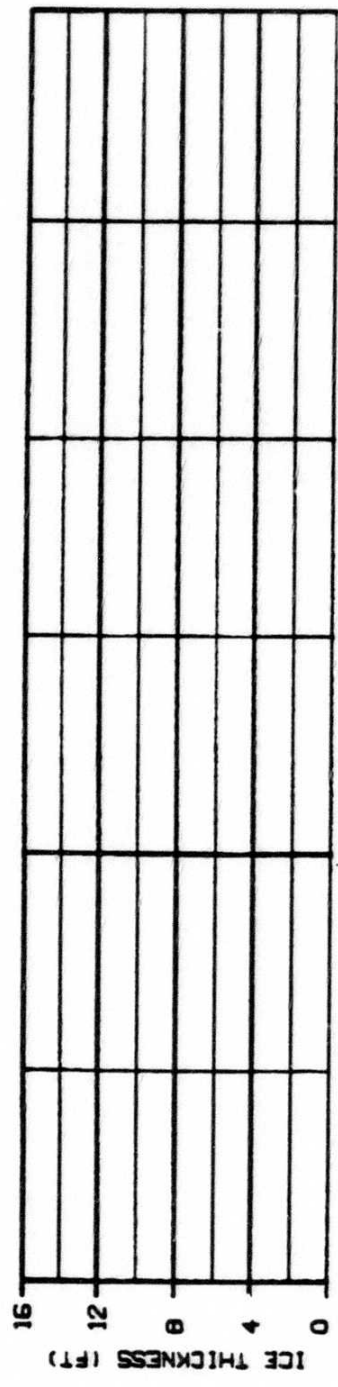
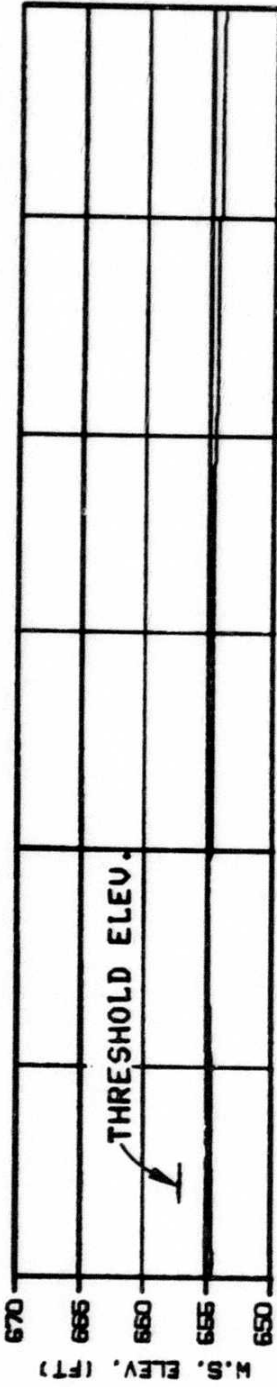
FLOW CASE : C TEMP RULE : NATURAL

REFERENCE RUN NO. : 810202A

ICE THICKNESS LEGEND:

1: TOTAL THICKNESS

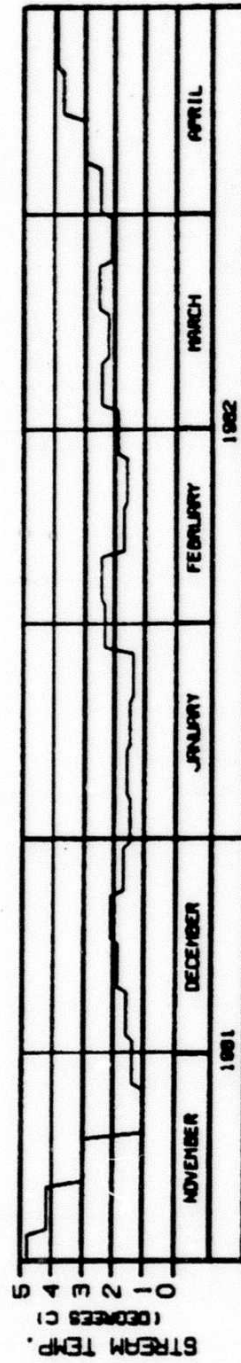
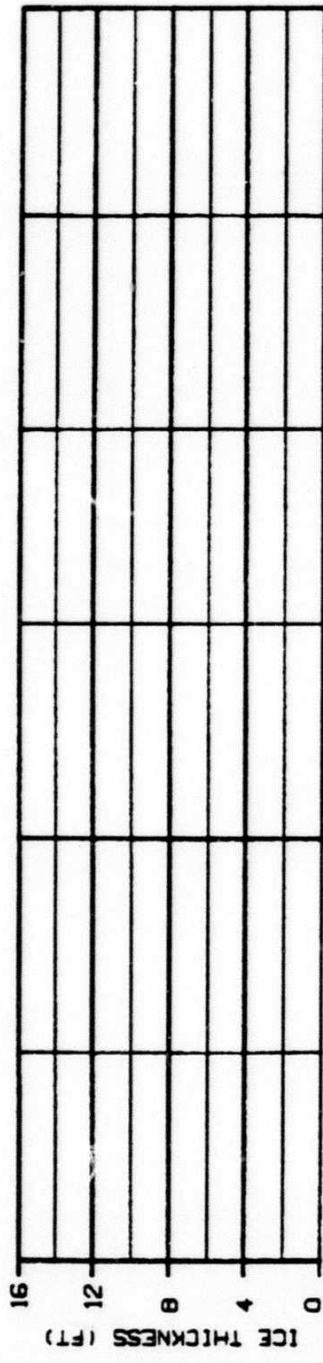
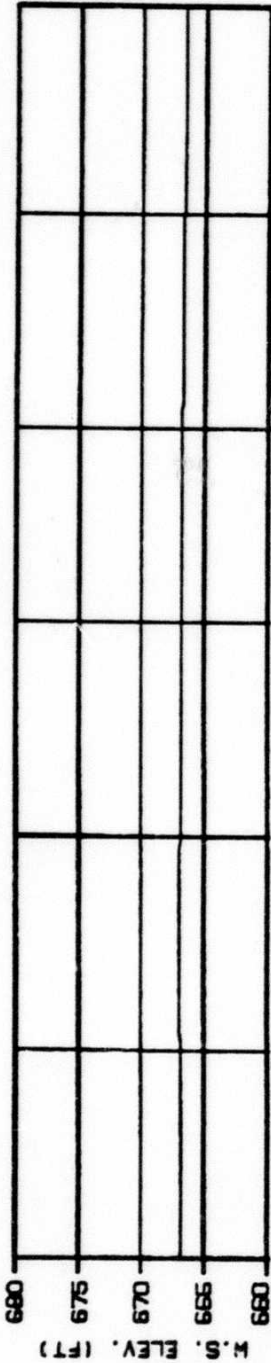
2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERD JOINT VENTURE  
 ORDER: 84-0000 JAN 82 1982.142

SIDE CHANNEL U/S OF SLOUGH 10  
 RIVER MILE : 134.30  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : 0FVII  
 FLOW LAISE : C  
 REFERENCE RUN NO. : 8102CNA

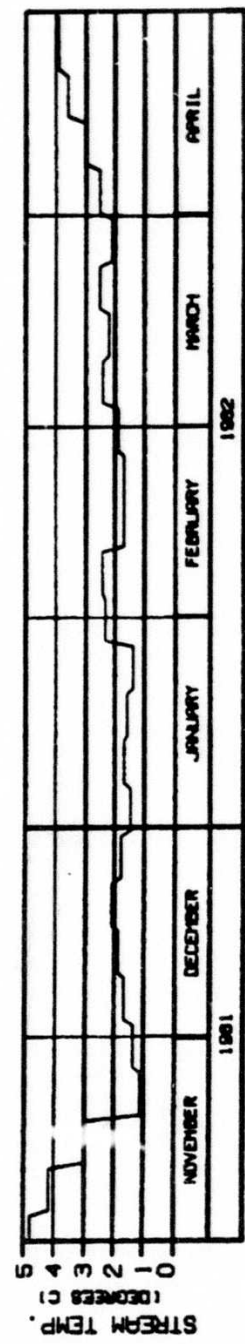
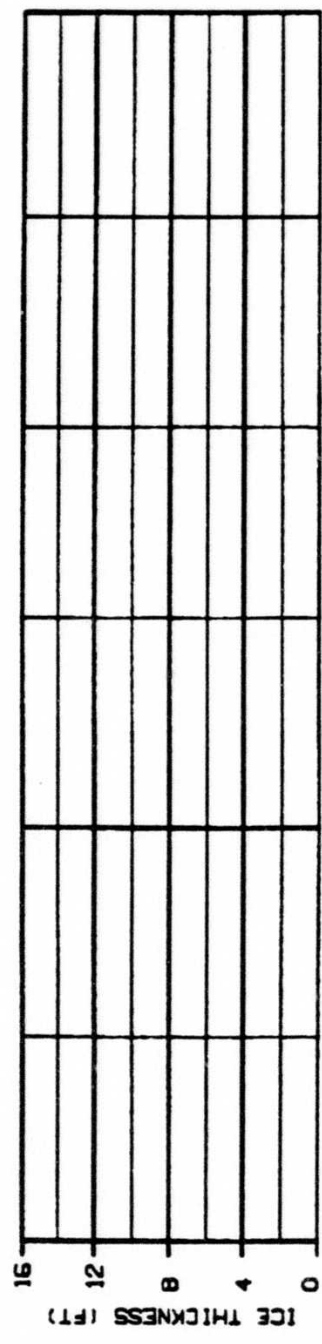
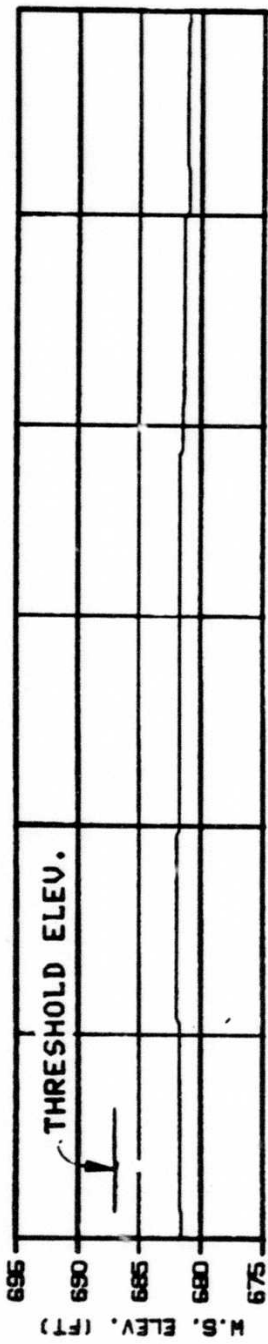
ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBBSCO JOINT VENTURE  
 SHEET NO. 142

**SIDE CHANNEL D/S OF SLOUGH 11**  
 RIVER MILE : 135.30  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C  
 TEMP RULE : NATURAL  
 REFERENCE RUN NO. : BIOZONA

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT

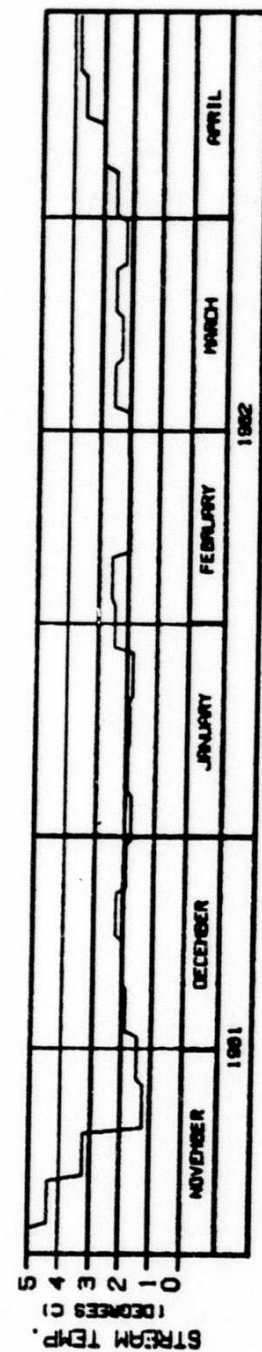
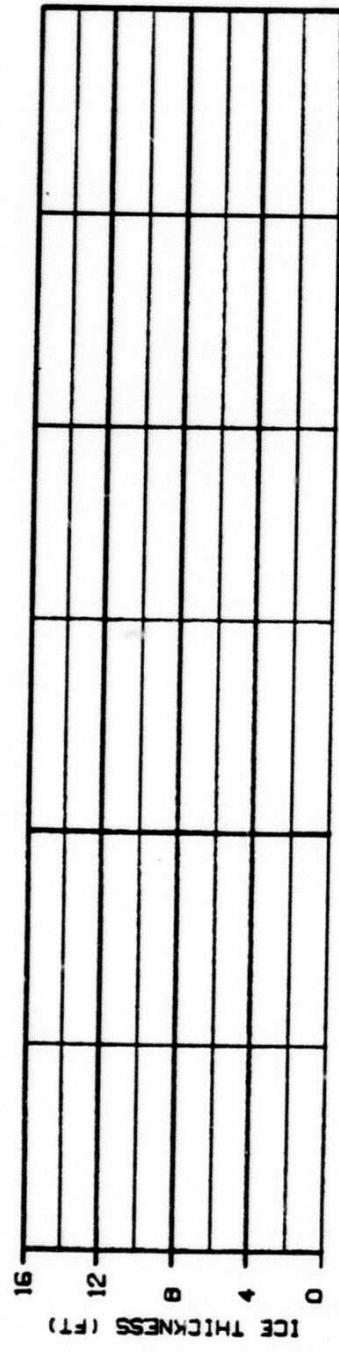
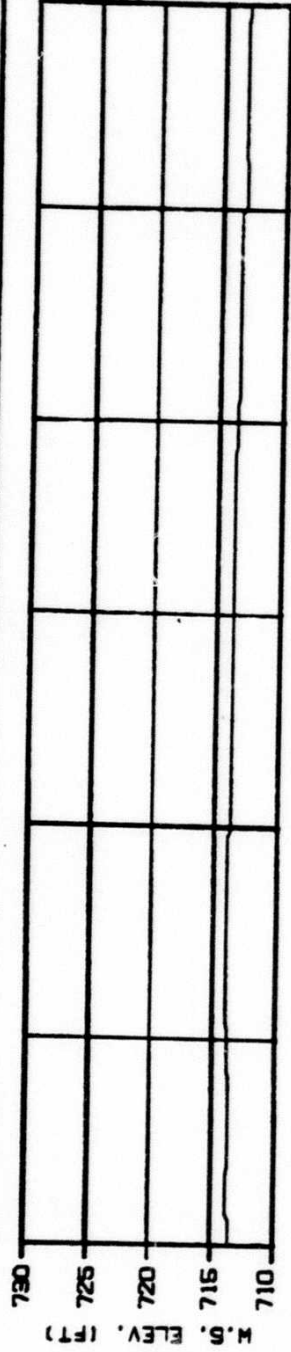


ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HRR2A-EBR600 JOINT VENTURE  
 CONTRACT NO. 80-0000 JAN 81 1980, 142

HEAD OF SLOUGH 11  
 RIVER MILE : 136.50  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : B10202A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

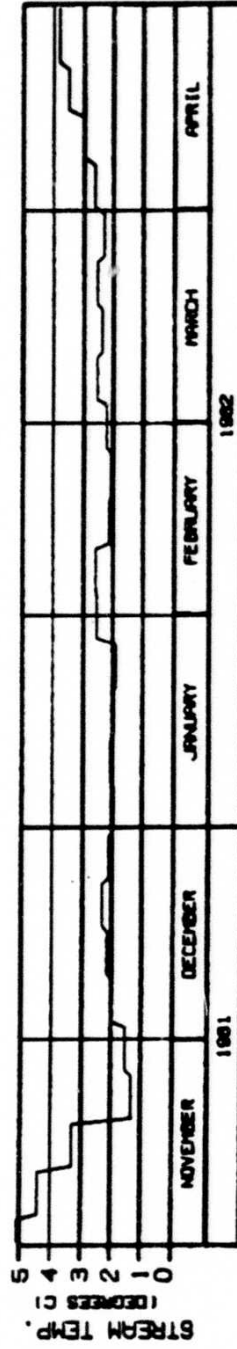
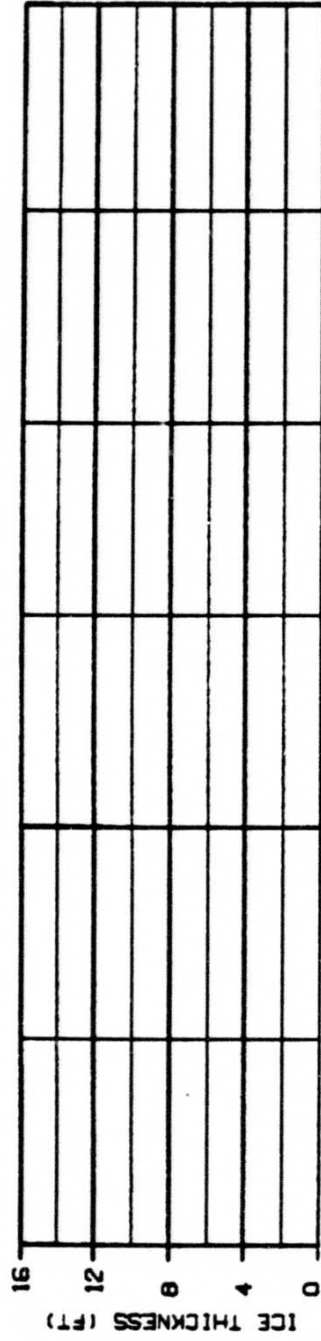
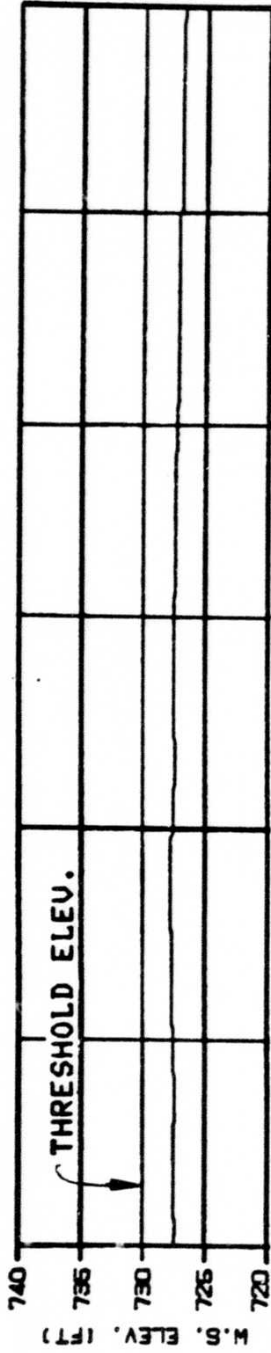




ALASKA POWER AUTHORITY  
 SUBJECT: SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBACD JOINT VENTURE  
 DRAWN: S.L. HARRIS JAN 62 888.142

HEAD OF SLOUGH 17  
 RIVER MILE : 139.30  
 WEATHER PERIOD : 1 NOV 61 - 30 APR 62  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 8102CNA

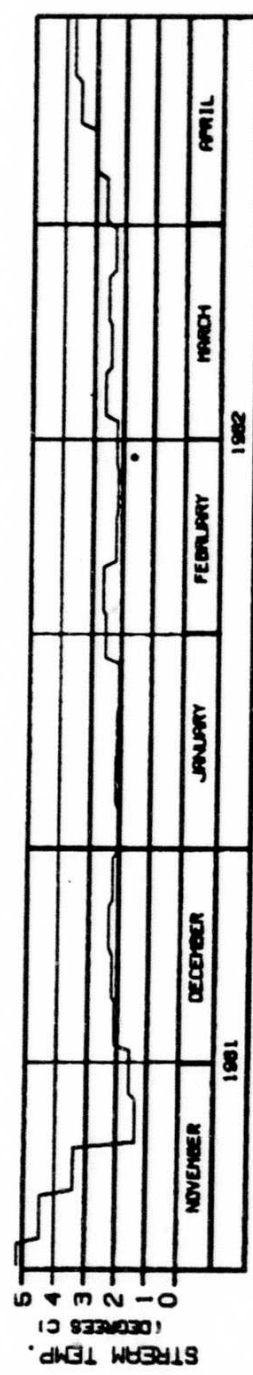
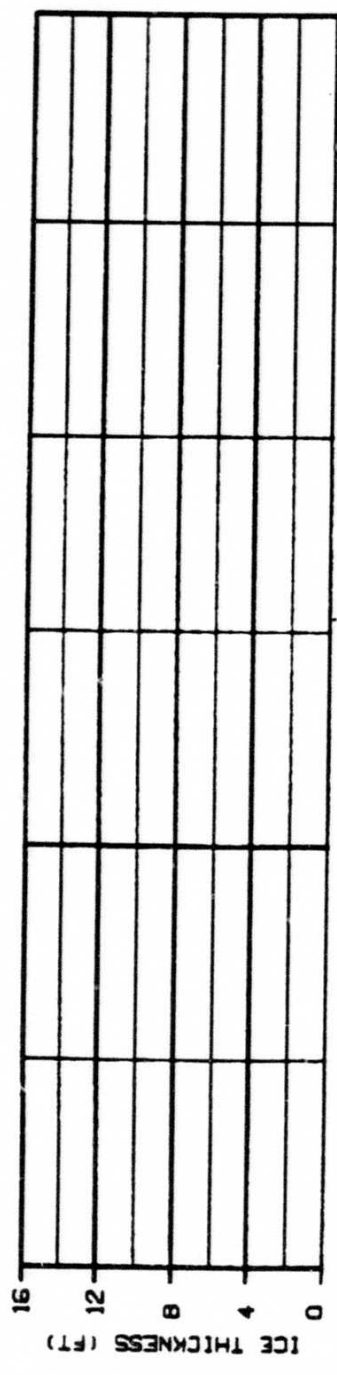
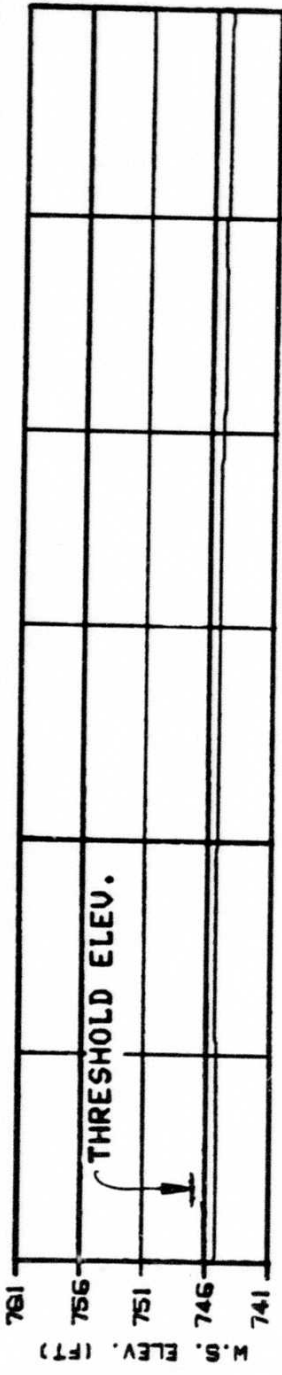
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRACO JOINT VENTURE  
 ORDER: 81-0008 JAN 82 888-142

HEAD OF SLOUGH 20  
 RIVER MILE : 140.50  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 810202A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



**SLOUGH 21 (ENTRANCE A6)**

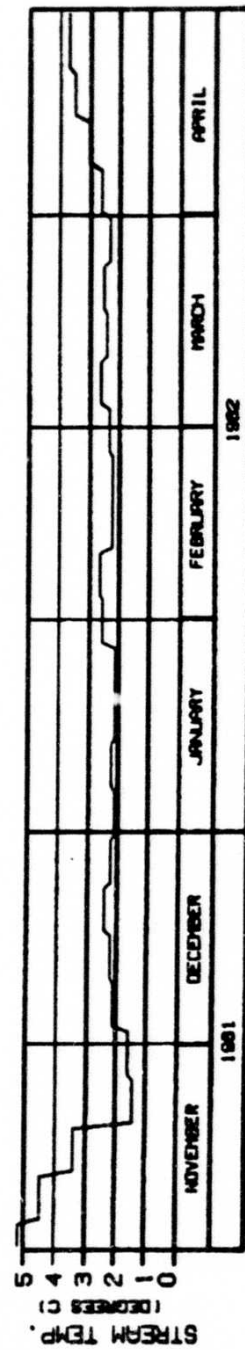
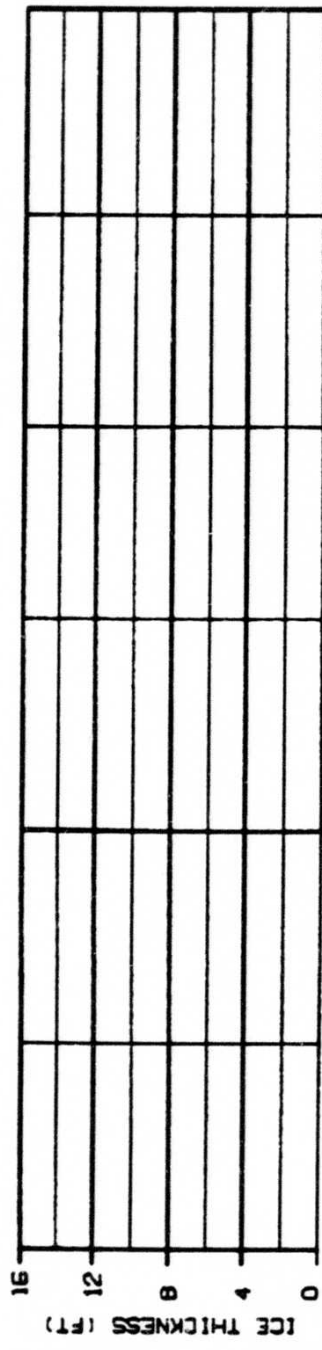
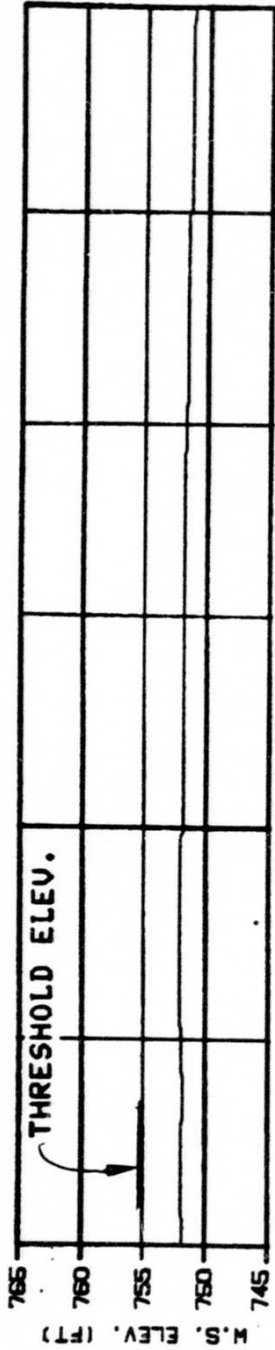
RIVER MILE : 141.80

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C  
 TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 8102CNA

**ICE THICKNESS LEGEND:**

- 1: TOTAL THICKNESS
- 2: SLUSH COMPONENT

ALASKA POWER AUTHORITY	
BUILDING PROJECT	SUSITNA RIVER
	ICE SIMULATION
	TIME HISTORY
HARZA-EBERCO JOINT VENTURE	
Revised: 01.08.82	Per: JJA 04 1000.142

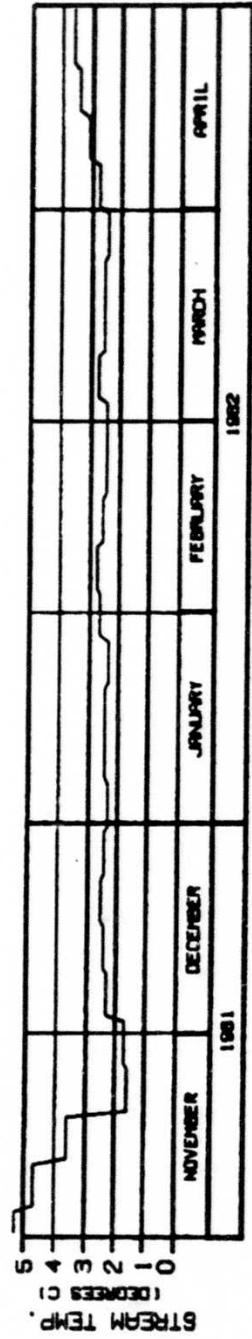
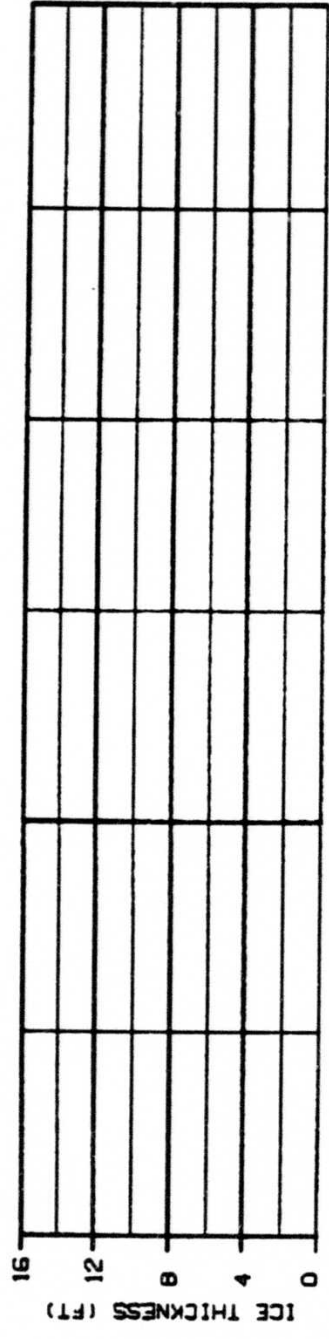
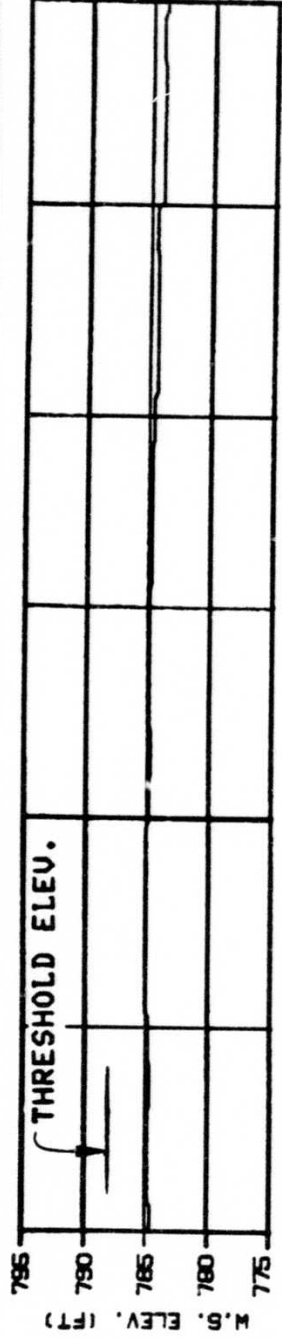


ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HERRZA-EBERD JOINT VENTURE  
 SHEET: 812020A OF 812020A

HEAD OF SLOUGH 21  
 RIVER MILE : 142.20  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 810202A

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT

c



ALASKA POWER AUTHORITY  
 SUITING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBEGCO JOINT VENTURE  
 PROJECT NUMBER: 81020NA  
 SHEET: 142

HEAD OF SLOUGH 22  
 RIVER MILE : 144.80  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C  
 TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 81020NA

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT

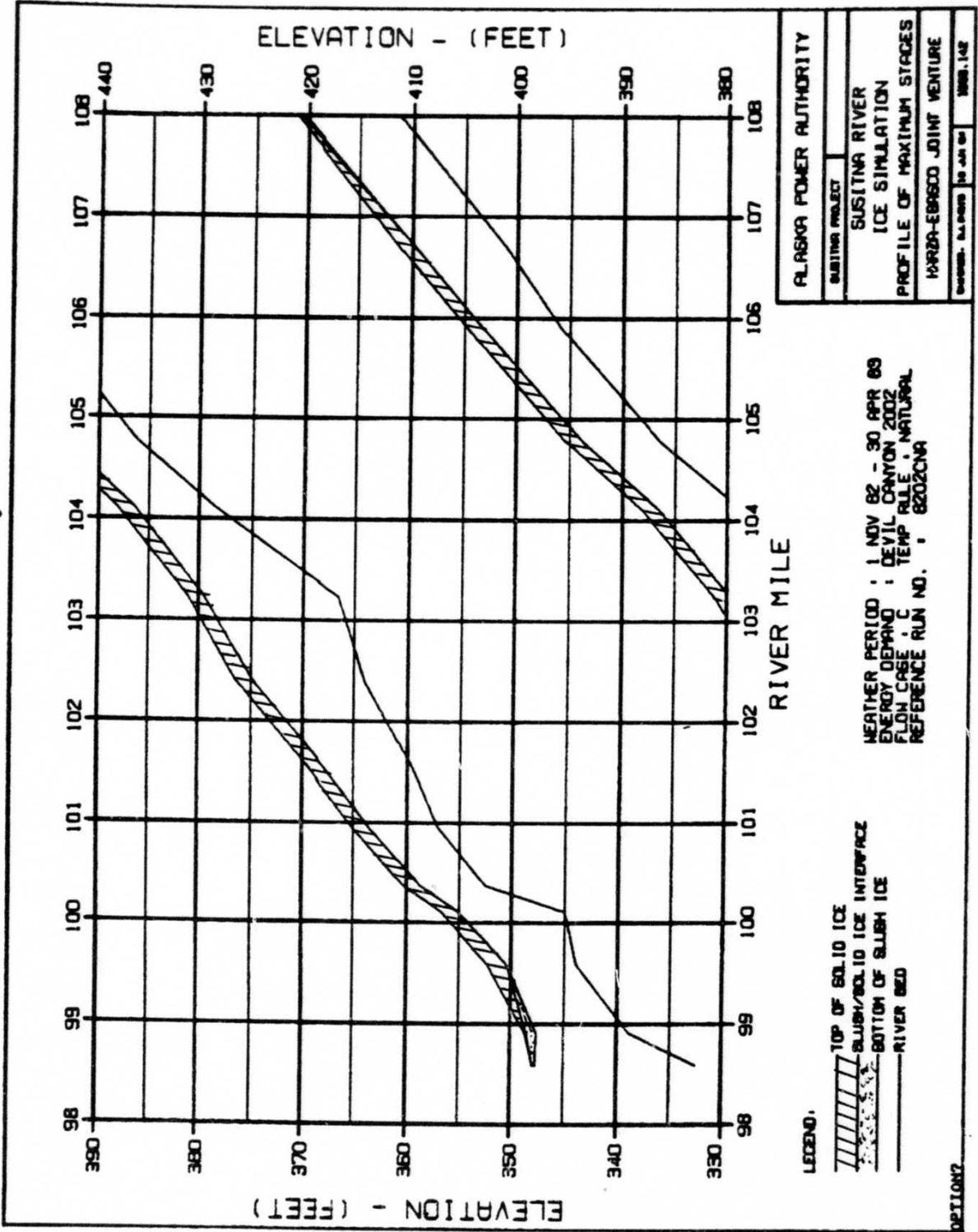
OPTION?



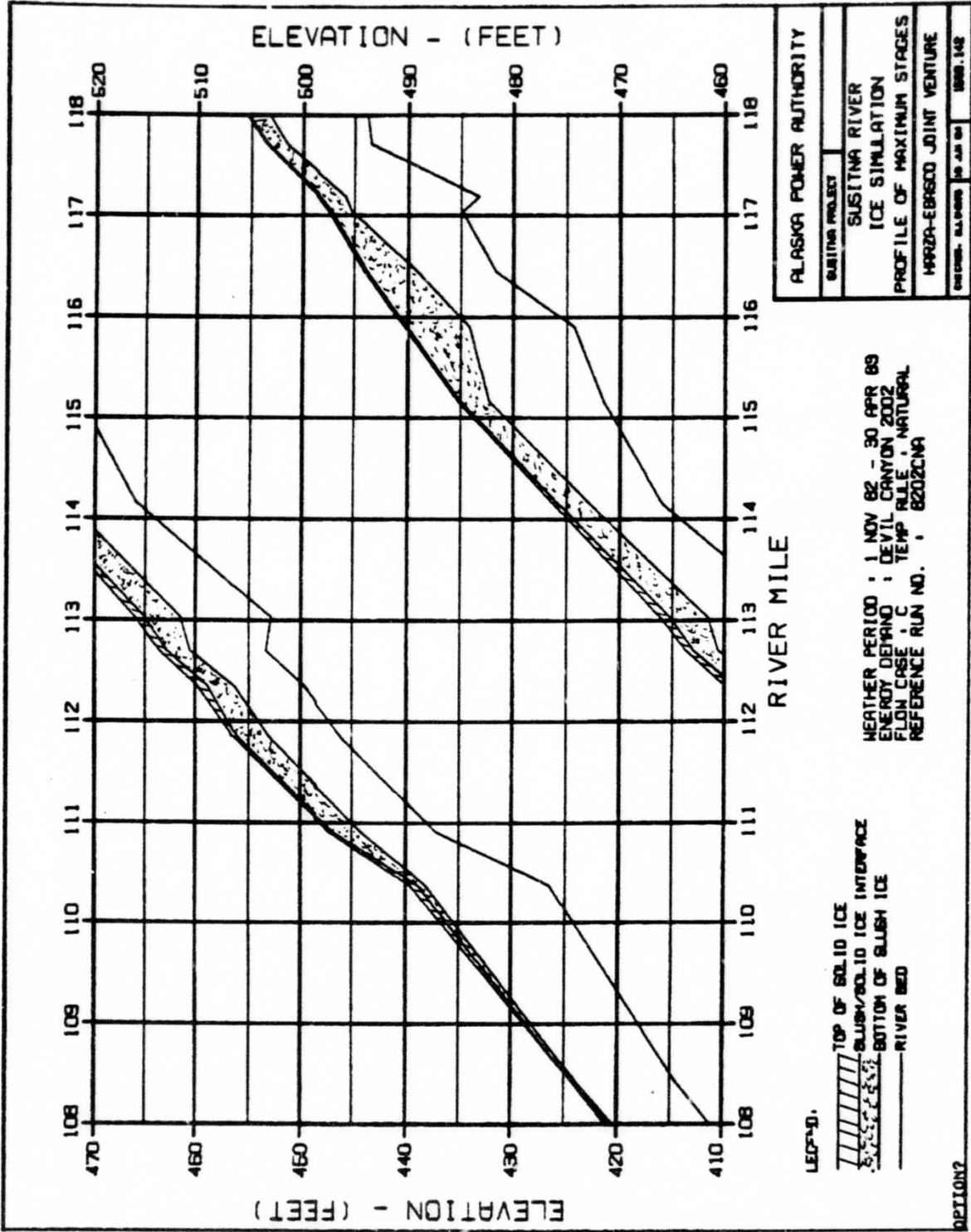
**EXHIBIT O**



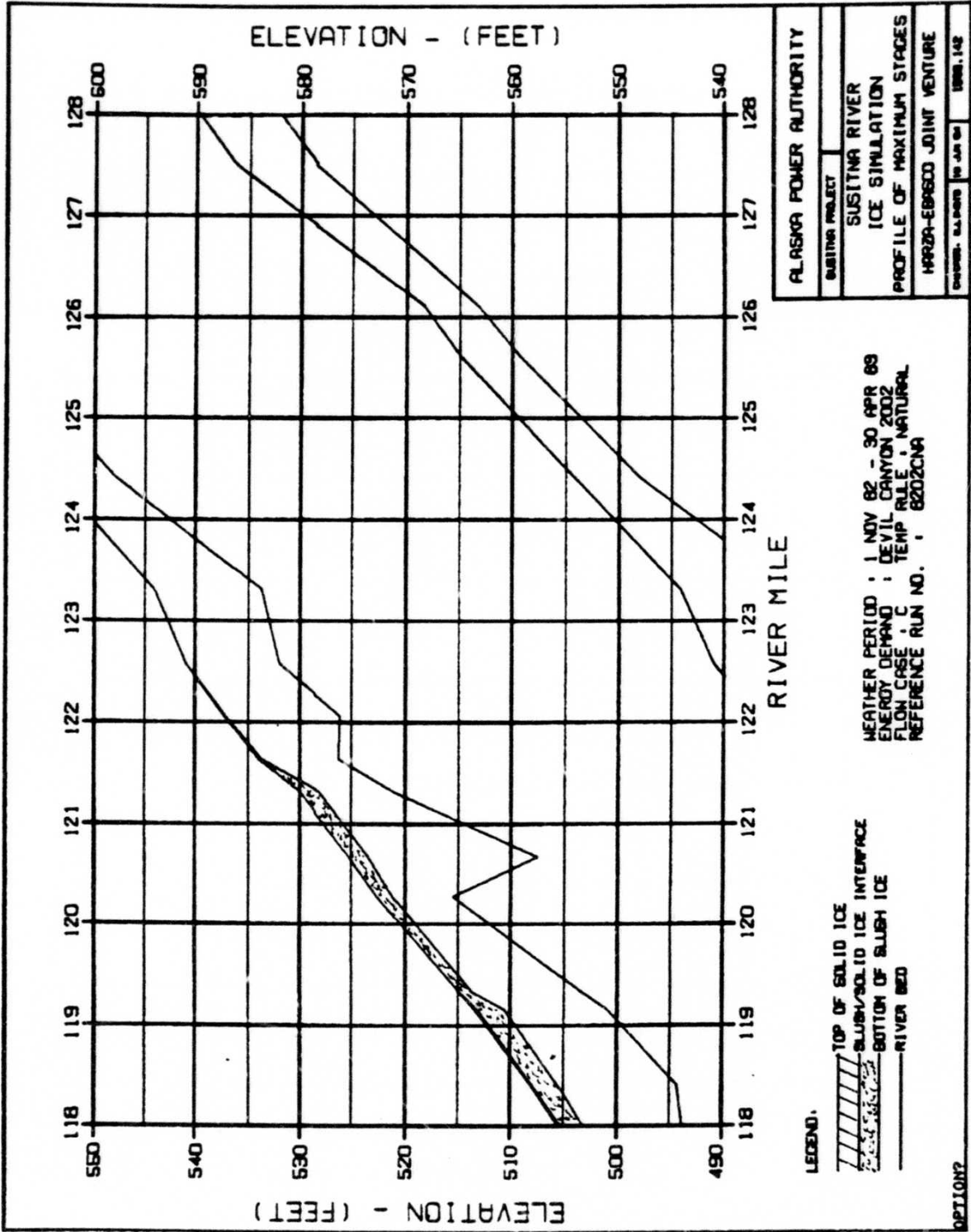
c



c

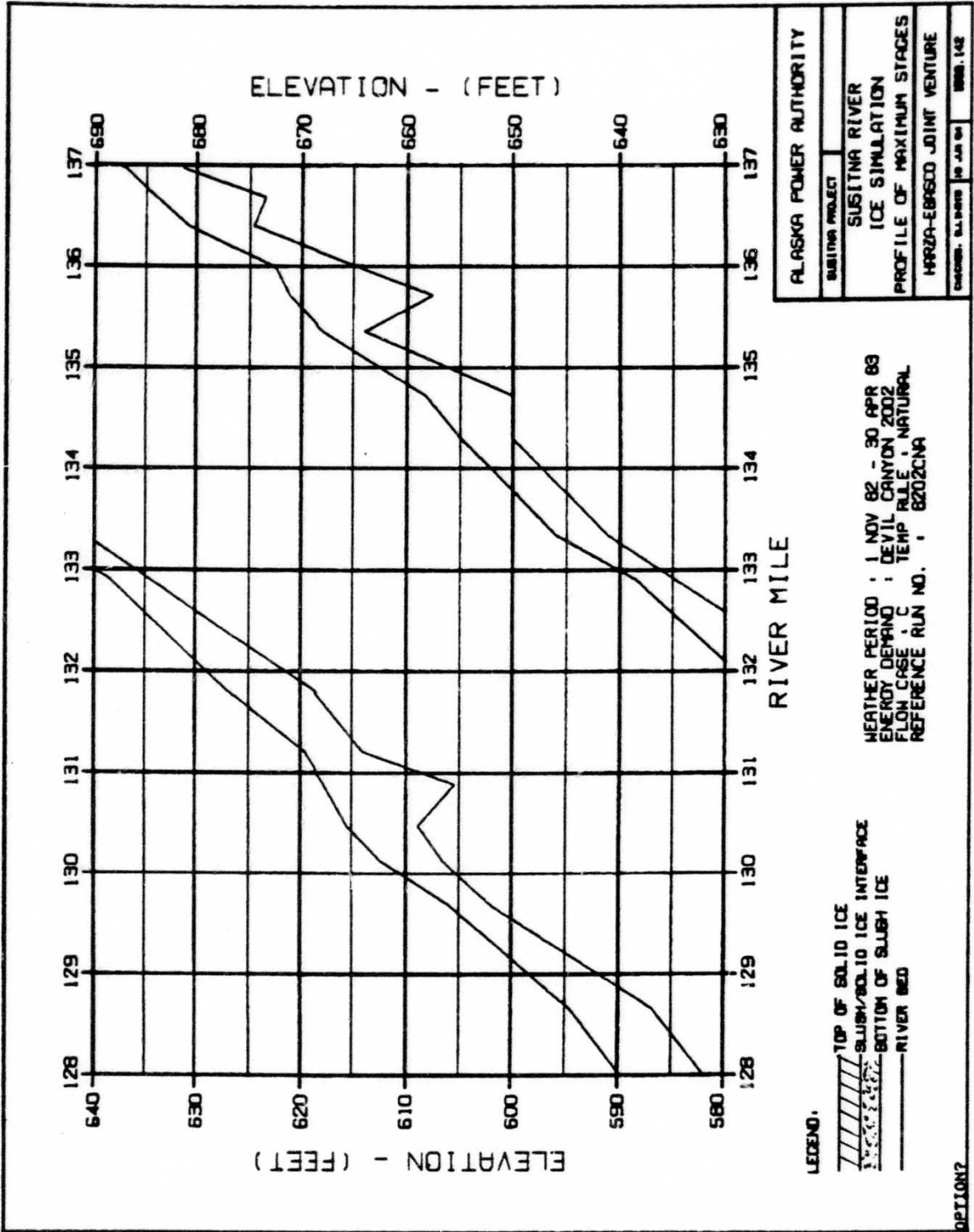


C

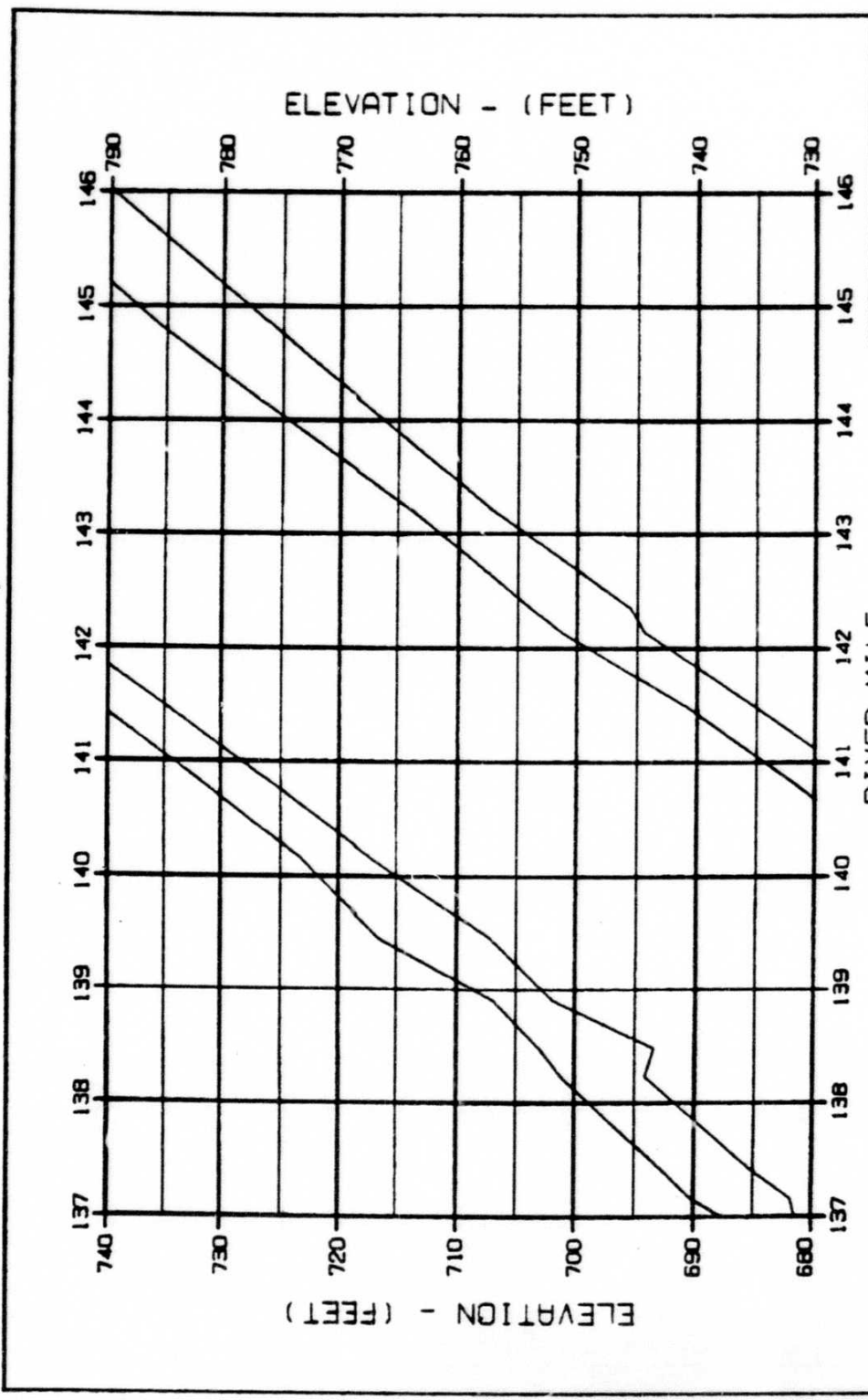


OPTION?

c



c



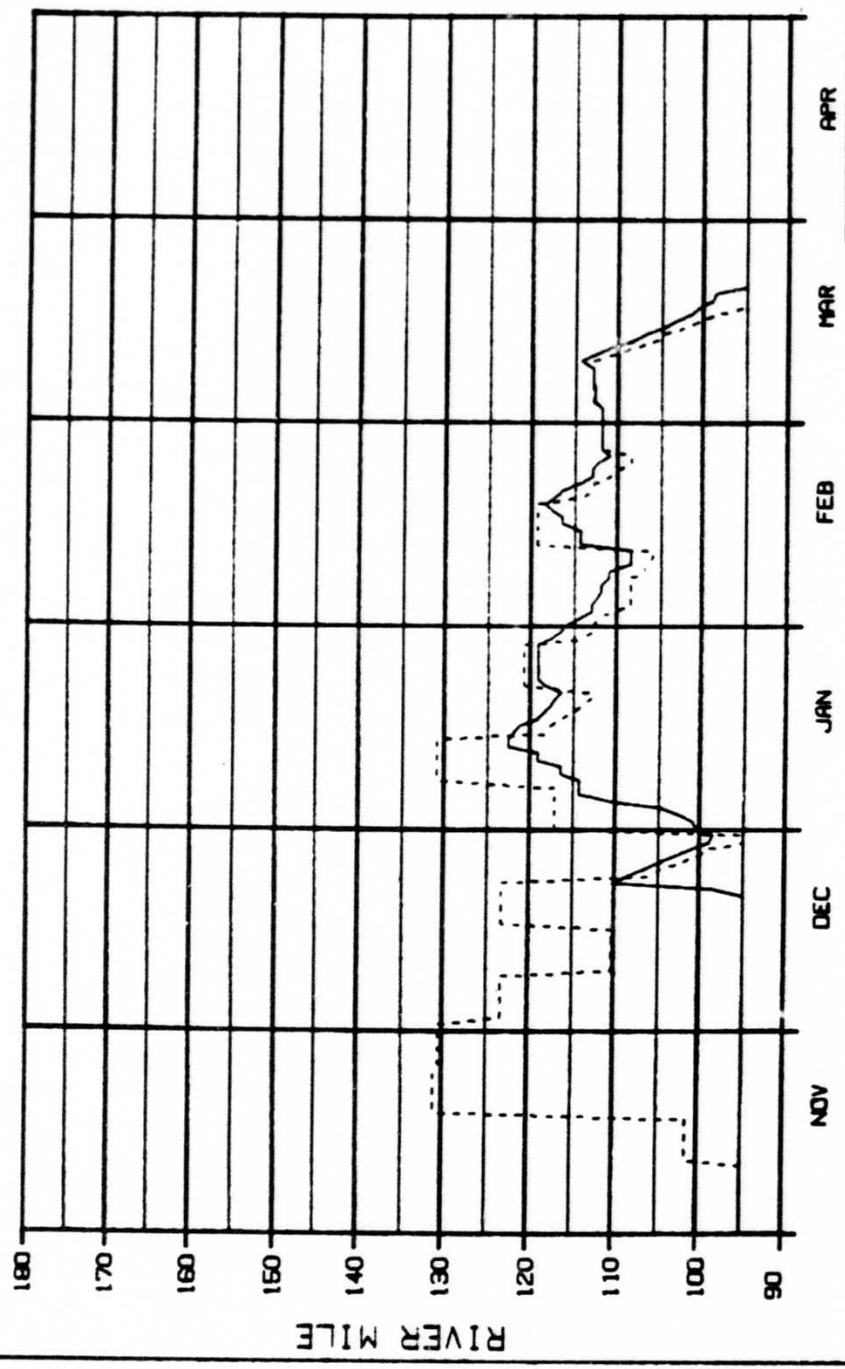
ALASKA POWER AUTHORITY	
BUILDING PROJECT	SUSTINA RIVER
	ICE SIMULATION
PROFILE OF MAXIMUM STAGE 2	
WARZA-EBREGO JOINT VENTURE	
DATE: 01.14.89	BY: JLN/GR
	ISSUE: 1.02

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ELEVATION : 1000 FT  
 FLOW CASE : C  
 REFERENCE RUN NO. : 8202CMA

LEGEND:  
 TOP OF SOLID ICE  
 SLUSH/SOLID ICE INTERFACE  
 BOTTOM OF SLUSH ICE  
 RIVER BED

OPTION 2

C



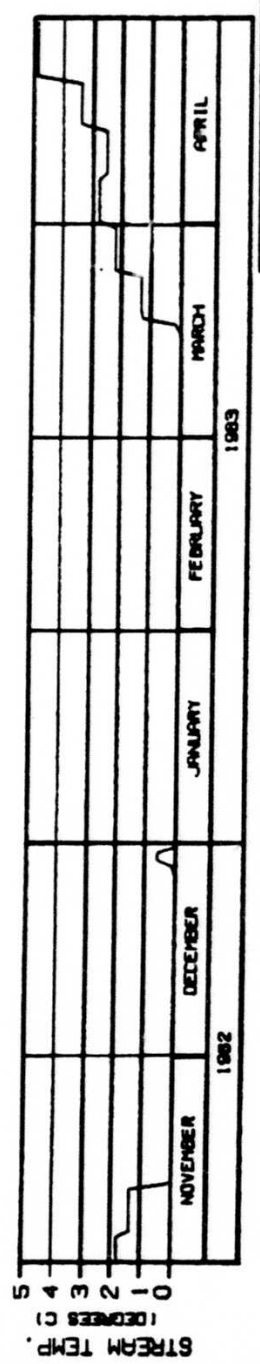
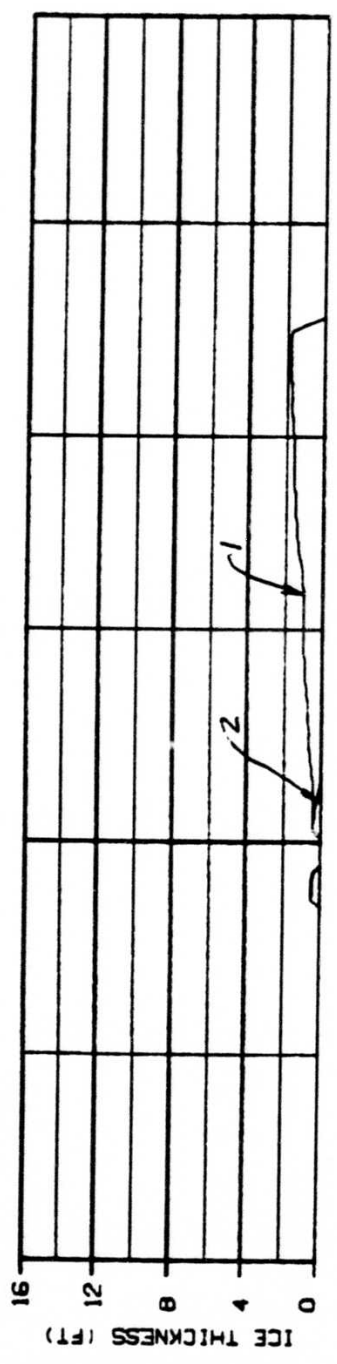
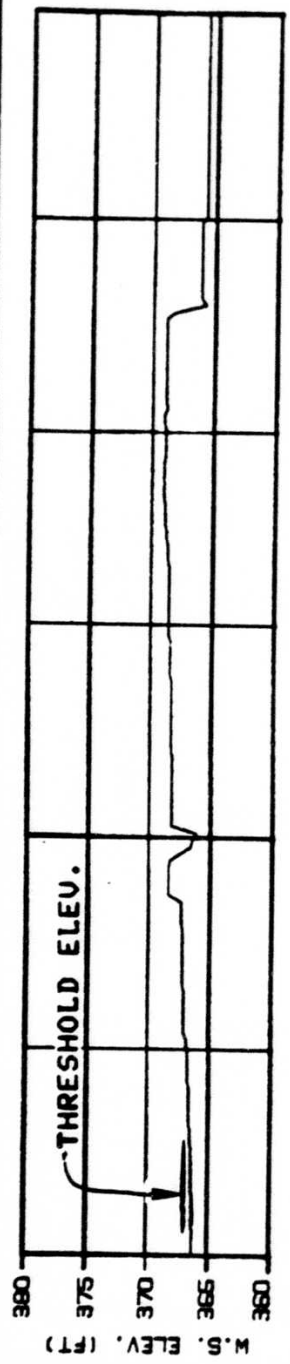
ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM  
 HARZA-EBASCO JOINT VENTURE  
 DRAWN: S.J. HARRIS 10 JUN 83  
 1988-142

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 8202CNA

LEGEND:  
 — ICE FRONT  
 - - - - - ZERO DEGREE ISOTHERM

OPTION 2011012

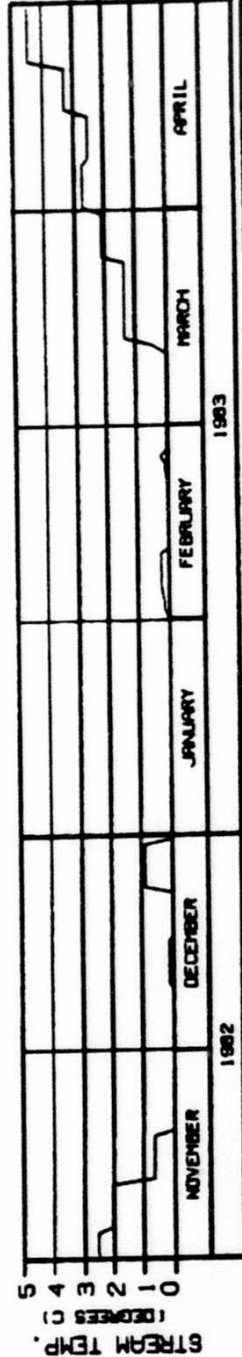
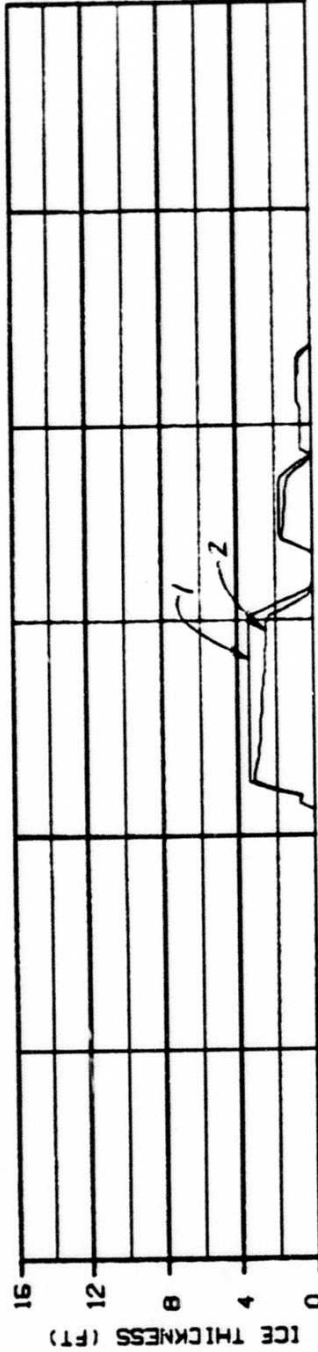
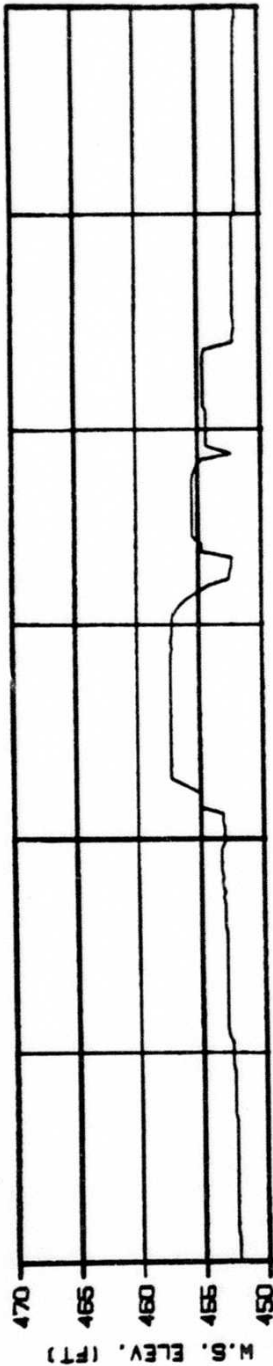




ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRSCO JOINT VENTURE  
 OCTOBER 1982 TO APRIL 1983

**HEAD OF WHISKERS SLOUGH**  
 RIVER MILE : 101.50  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : B202CNA

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT



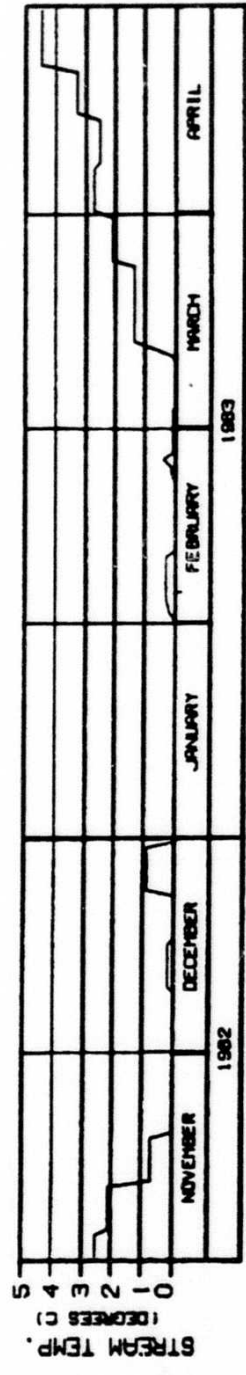
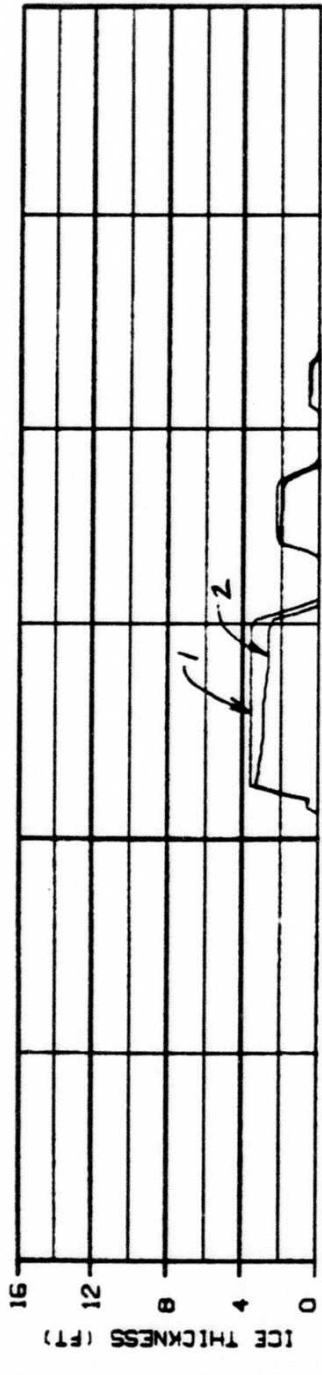
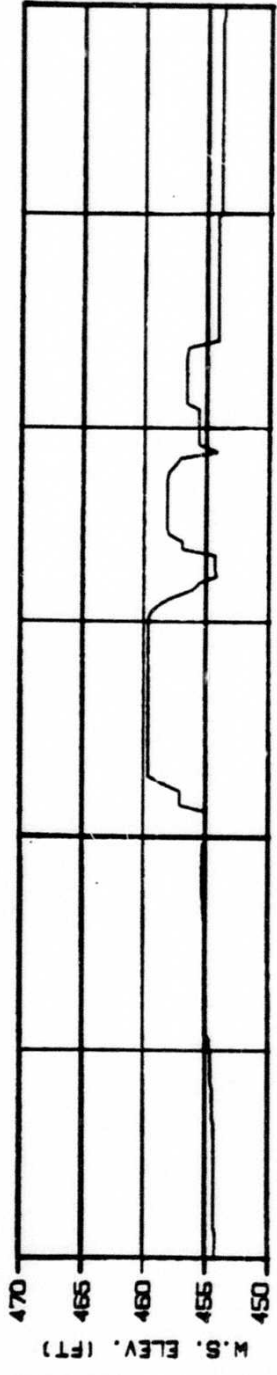
**SIDE CHANNEL AT HEAD OF GASH CREEK**

RIVER MILE : 112.00

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 8202CNA

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT

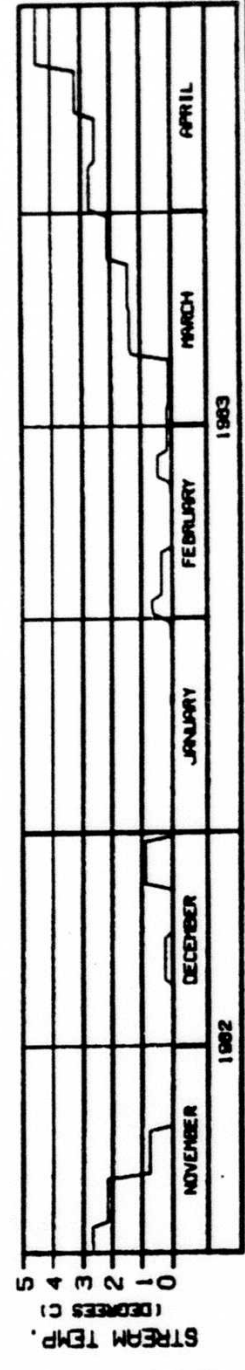
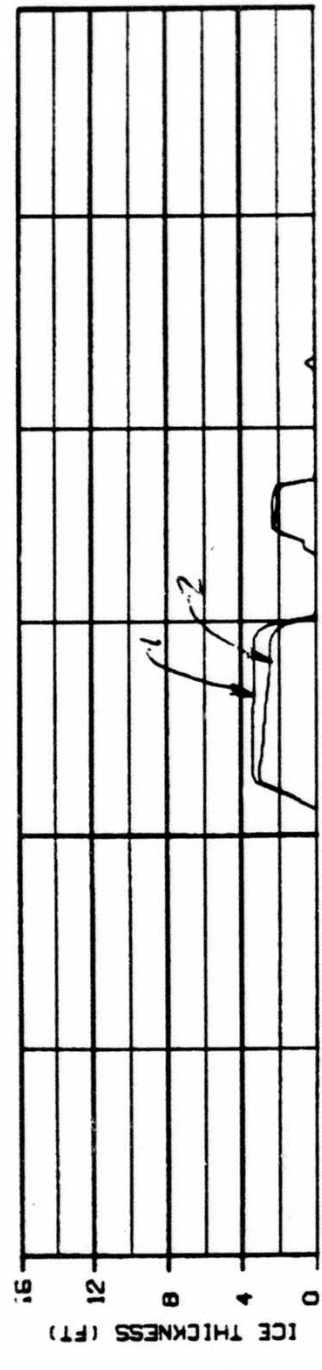
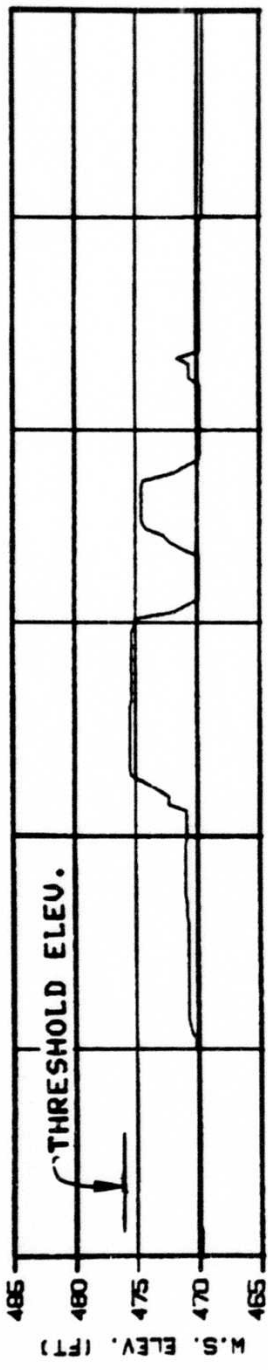
ALASKA POWER AUTHORITY	
SUBMITTING PROJECT	SUSITNA RIVER
	ICE SIMULATION
	TIME HISTORY
	HARZA-EBRACCO JOINT VENTURE
DATE: 01.04.83	BY: JAL
	1988.142



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBASCO JOINT VENTURE  
 DRAWING: N.L.0000 10 JAN 84 1000.142

**MOUTH OF SLOUGH 6A**  
 RIVER MILE : 112.34  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 820202NA

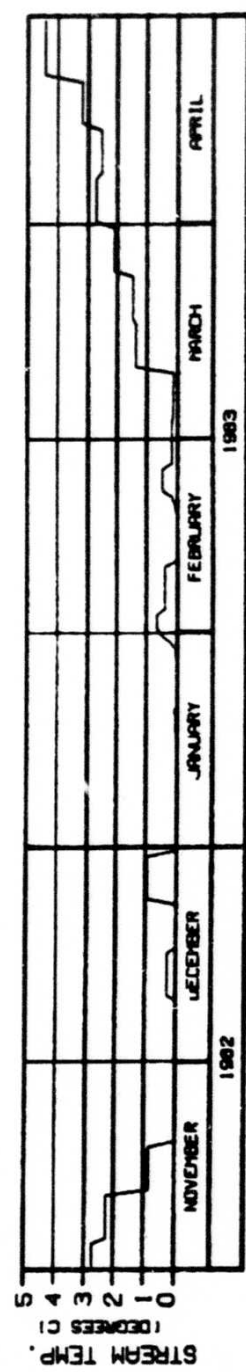
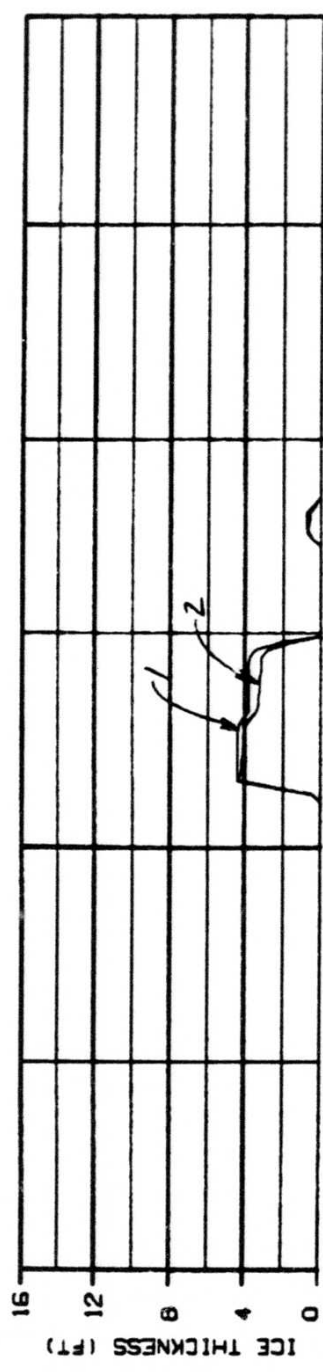
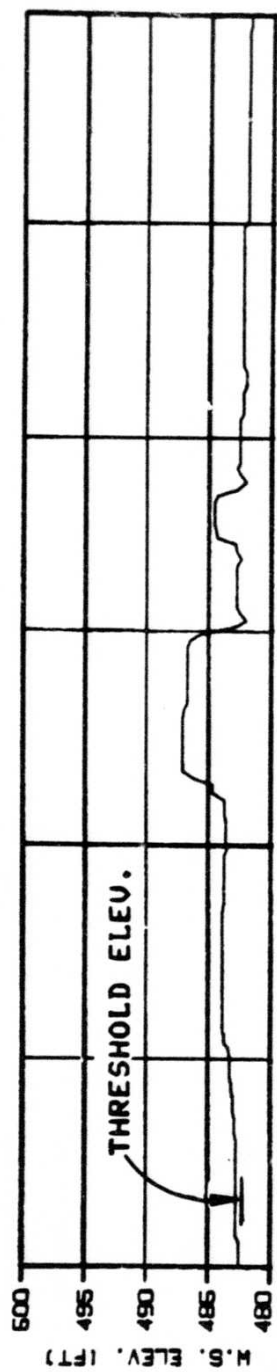
ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EDBECO JOINT VENTURE  
 PROJECT: S.A. 8819 10 JAN 83 1988.142

HEAD OF SLOUGH 8  
 RIVER MILE : 114.10  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 82020NA

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT



ALASKA POWER AUTHORITY	
SUBMITTER PROJECT	SUSITNA RIVER
	ICE SIMULATION
	TIME HISTORY
	HARZA-ERSSCO JOINT VENTURE
DATE: 11.1983	BY: JLN
	1983.142

**SIDE CHANNEL MSII**

RIVER MILE : 115.50

WEATHER PERIOD : 1 NOV 82 - 30 APR 83

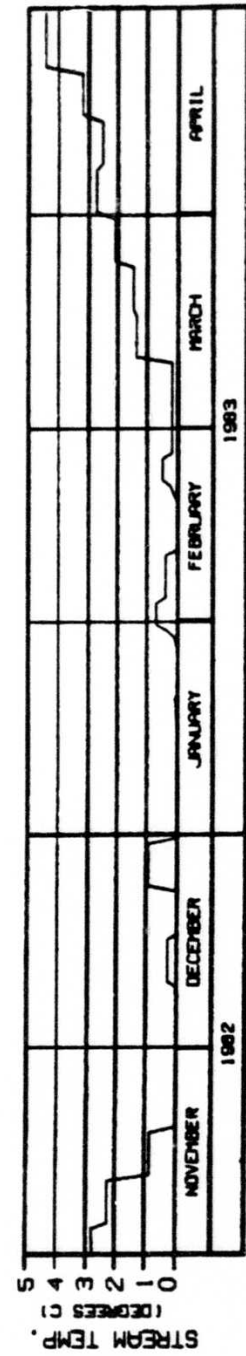
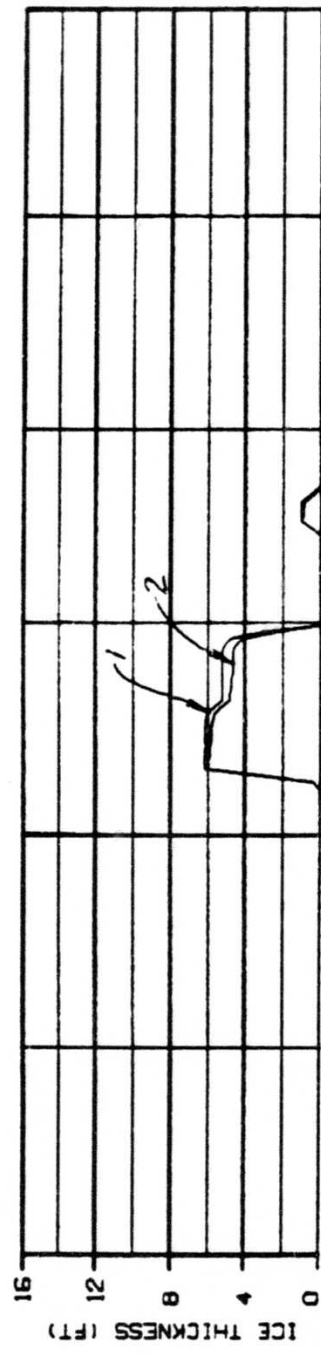
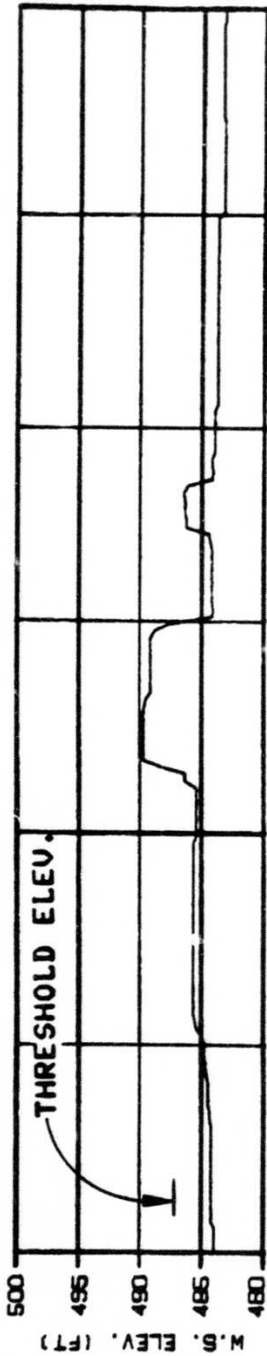
ENERGY DEMAND : JEVIL CANYON 2002

FLOW CASE : C

TEMP RULE : NATURAL

REFERENCE RUN NO. : 820202NA

- ICE THICKNESS LEGEND:
1. TOTAL THICKNESS
  2. SLUSH COMPONENT

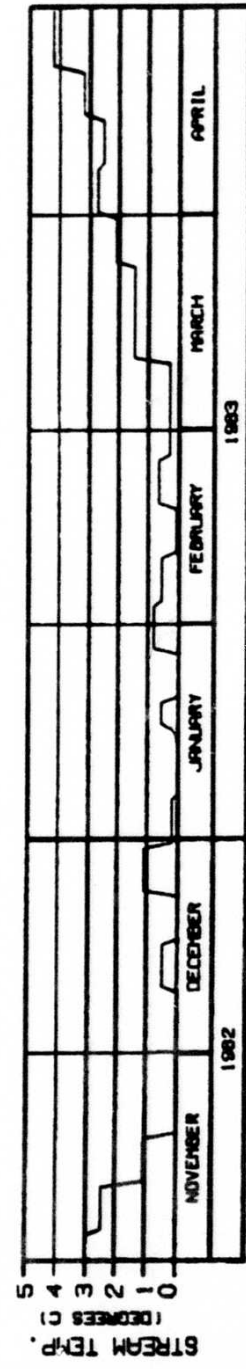
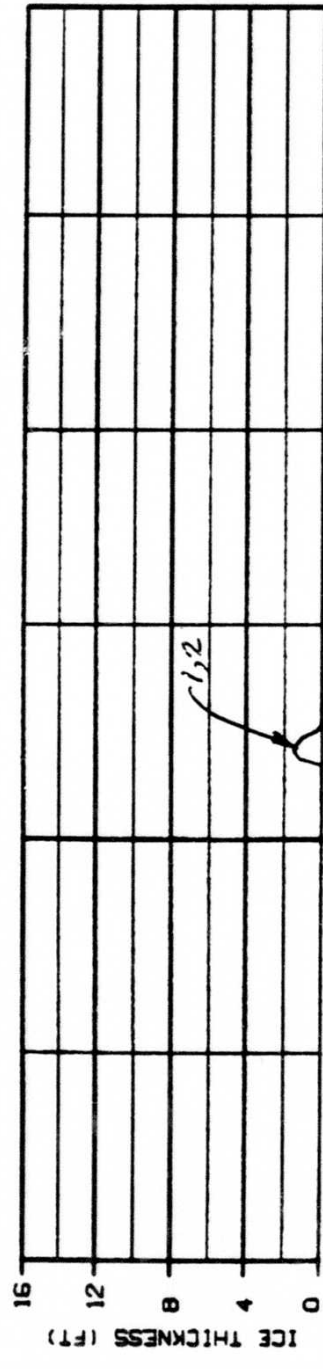
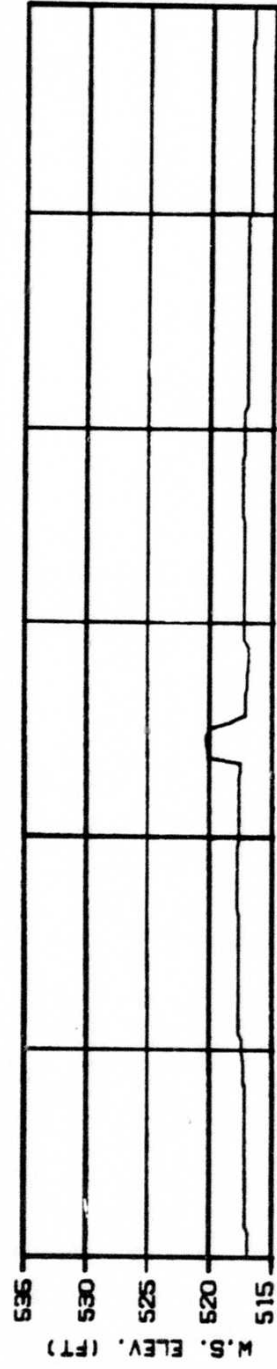


ALASKA POWER AUTHORITY	
SUBMITTER PROJECT	SUSITNA RIVER ICE SIMULATION TIME HISTORY
PROJECT NO.	WARZA-EBASCO JOINT VENTURE
DATE	NOV. 1982

**HEAD OF SIDE CHANNEL MSII**  
**RIVER MILE : 115.90**  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 8202CNA

**ICE THICKNESS LEGEND:**  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

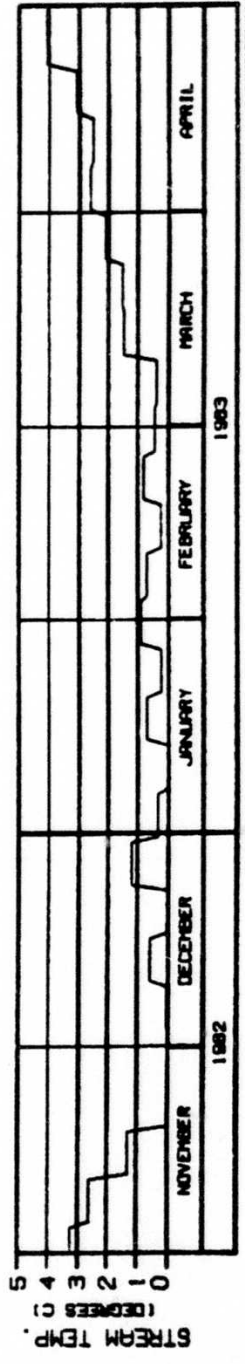
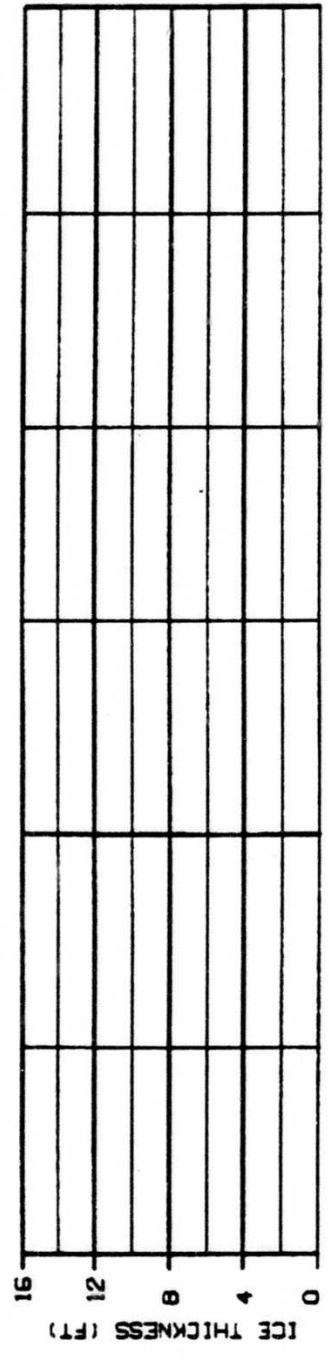
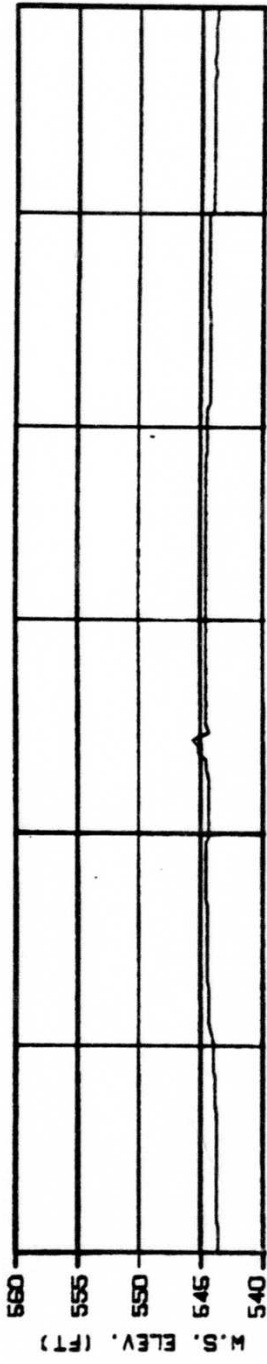




ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBR600 JOINT VENTURE  
 DRAWING NO. 820203A

RIVER MILE : 120.00  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 820203A

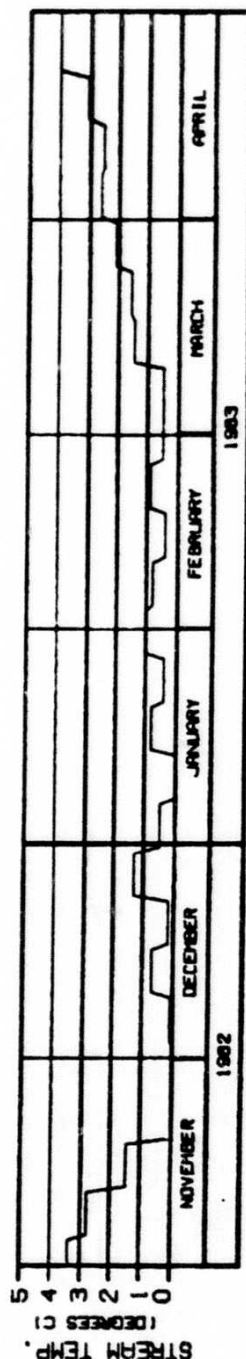
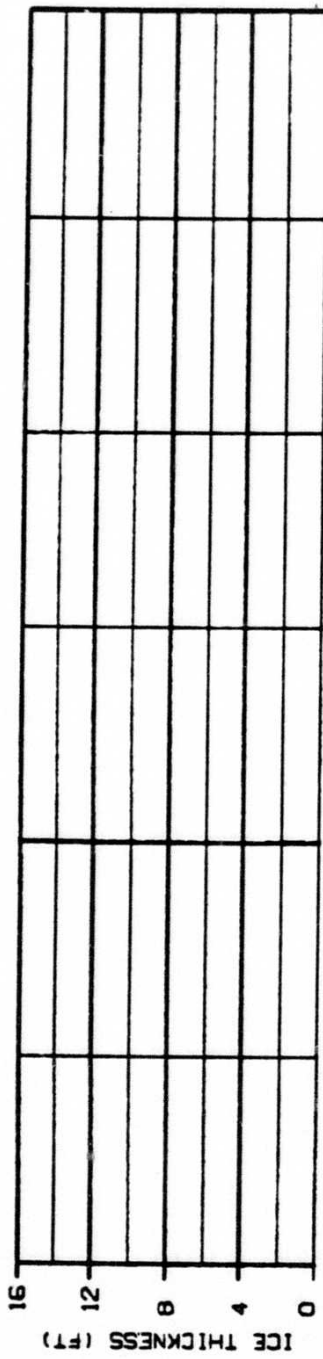
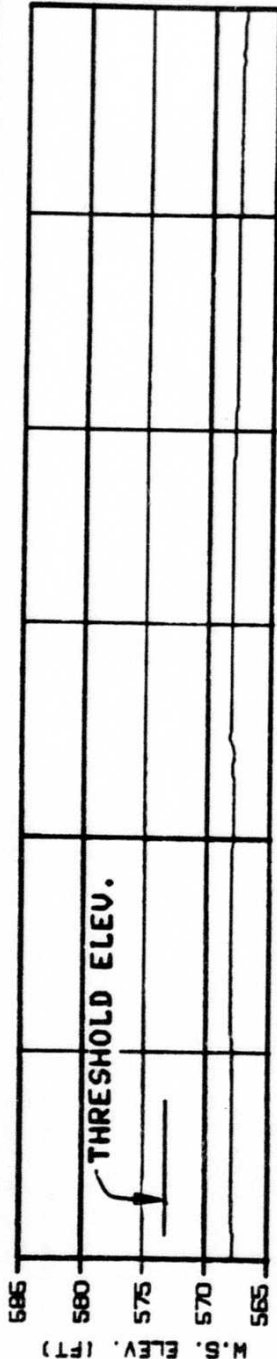
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERSCO JOINT VENTURE  
 PROJECT: ILL-8888 10 JUN 83 1000.142

**HEAD OF MOOSE SLOUGH**  
**RIVER MILE : 123.50**  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 820202A

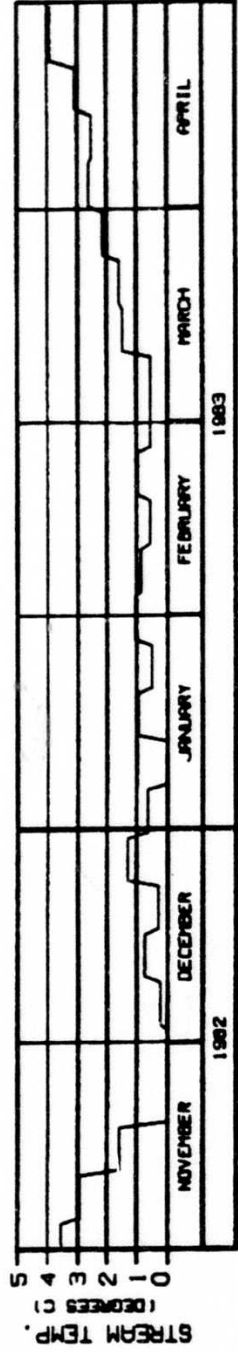
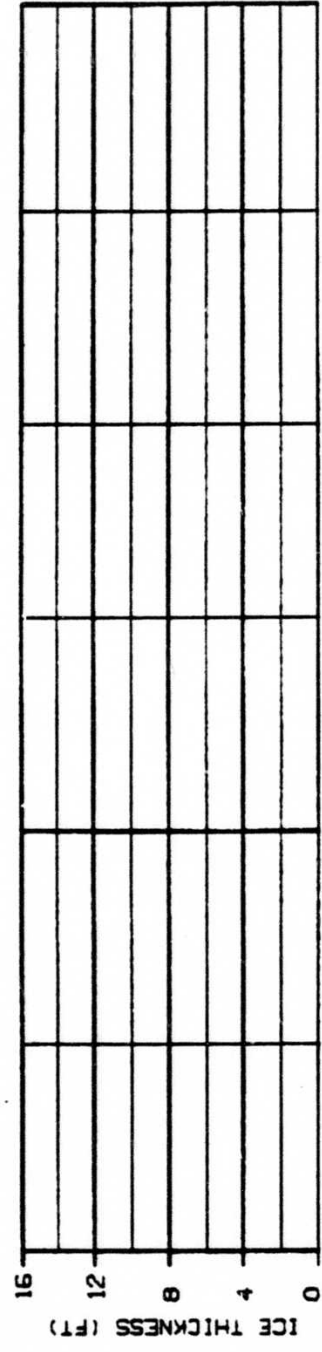
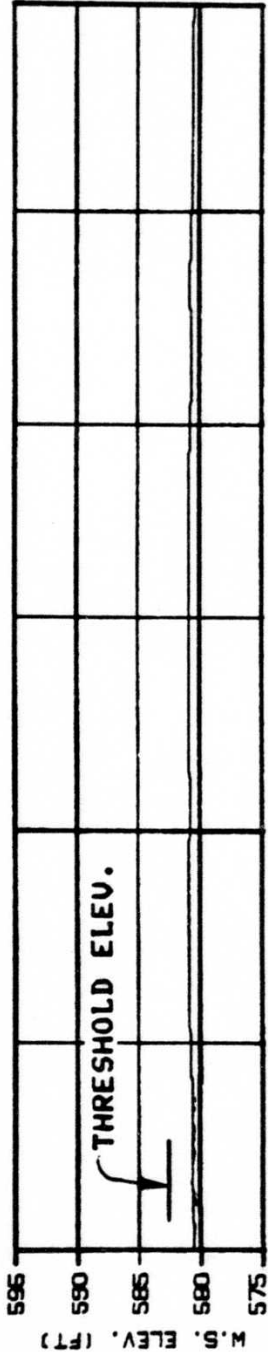
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT: SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBASCO JOINT VENTURE  
 DATE: 01/08/83 10 AM '83  
 SHEET NO.: 142

HEAD OF SLOUGH 8A (WEST)  
 RIVER MILE : 126.10  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : BZ0202A

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT



ALASKA POWER AUTHORITY  
SUBMITTAL PROJECT  
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY  
HARZA-EBRECO JOINT VENTURE  
CHRONO. 11.19.82 10 JUN 83 1988.142

HEAD OF SLOUGH 8A (EAST)

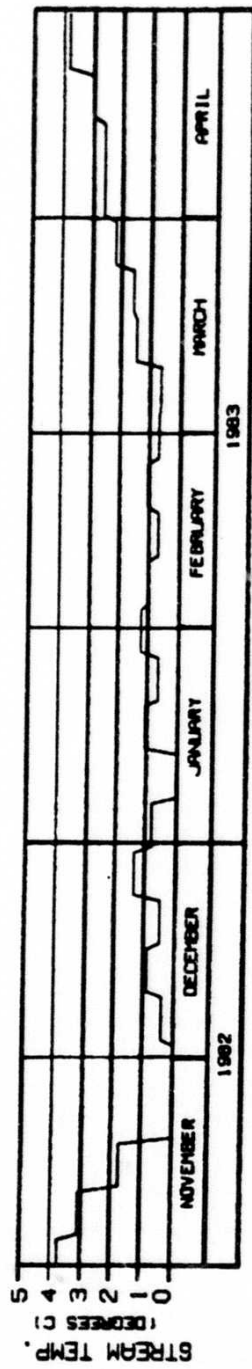
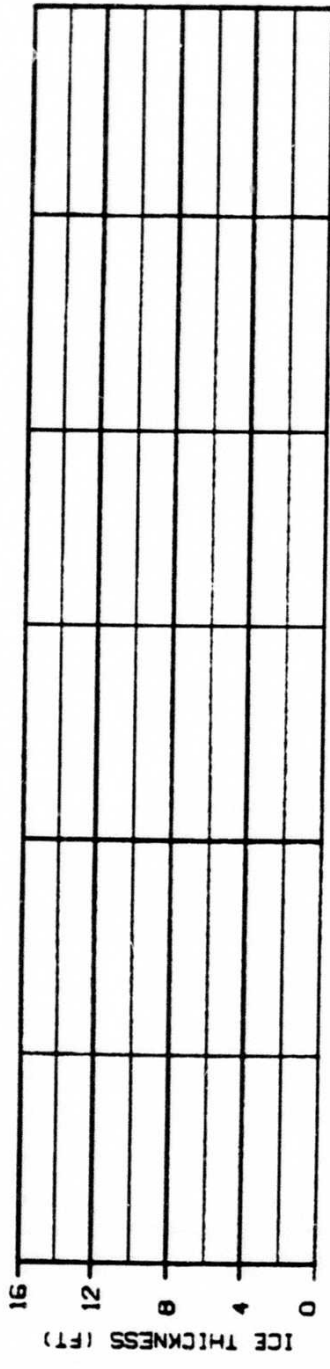
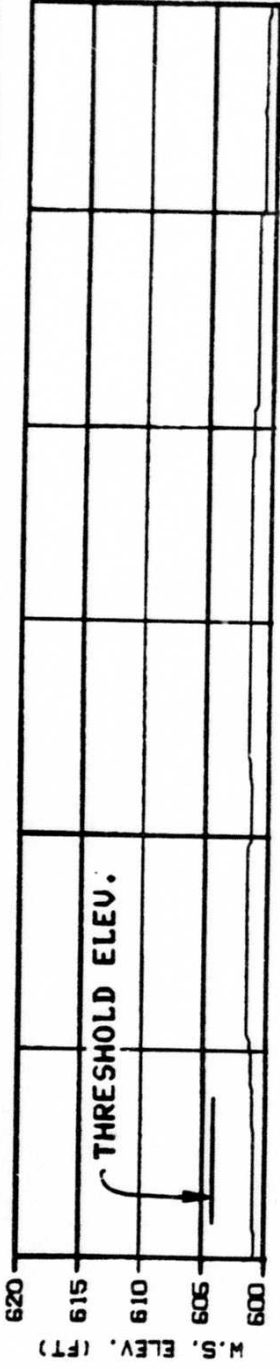
RIVER MILE : 127.10

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
ENERGY DEMAND : DEVIL CANYON 2002  
FLOWS CASE : C TEMP RULE : NATURAL  
REFERENCE RUN NO. : 820202A

ICE THICKNESS LEGEND:

- 1: TOTAL THICKNESS
- 2: SLUSH COMPONENT

C



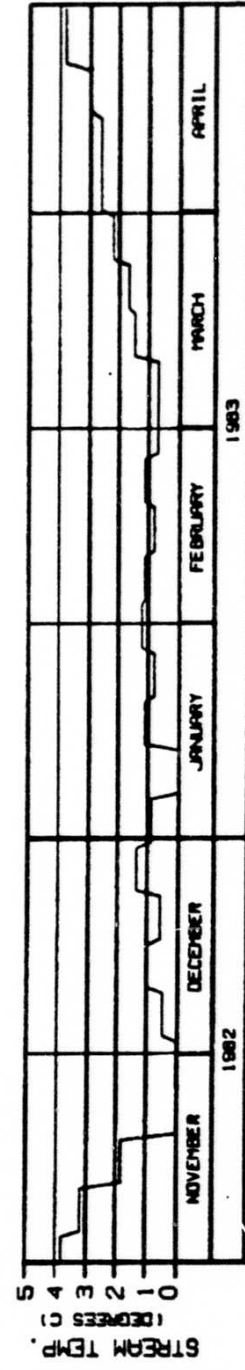
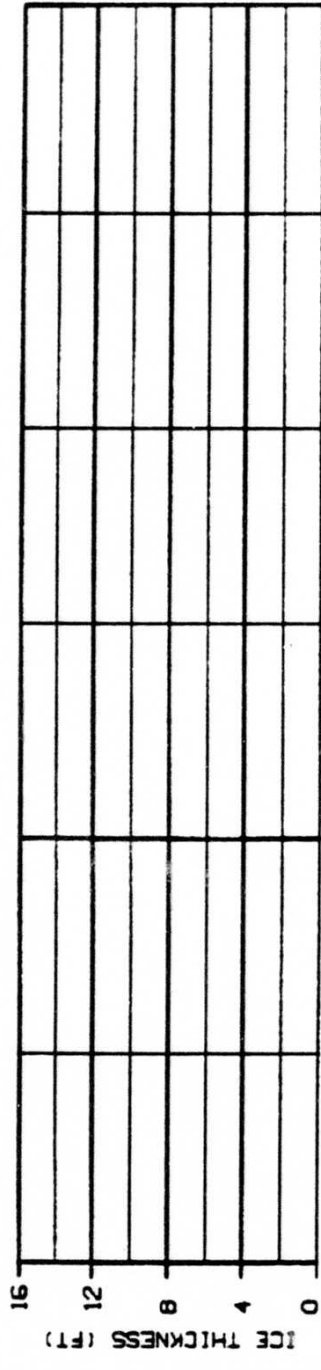
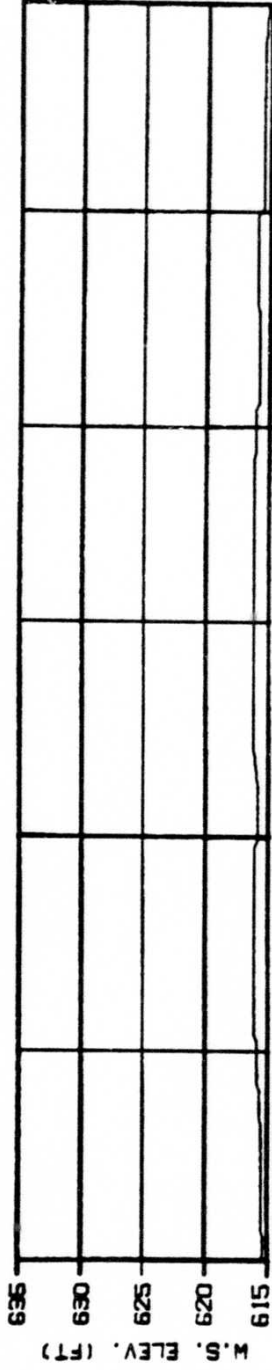
ALASKA POWER AUTHORITY	
SUSTINA PROJECT	SUSTINA RIVER
	ICE SIMULATION
	TIME HISTORY
HARZA-EBRECO JOINT VENTURE	
PROJECT: S.A. 8420	10 JUN 83
DESIGN: 1.12	1022.1.12

**HEAD OF SLOUGH 9**  
**RIVER MILE : 129.30**  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 820202A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

OPTION:

OPTION?



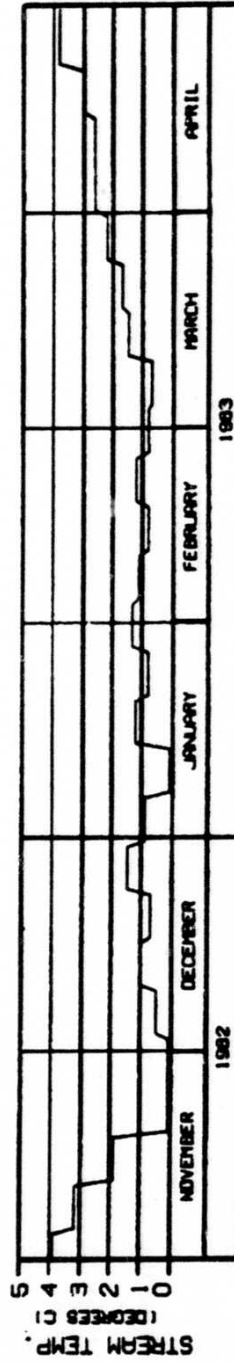
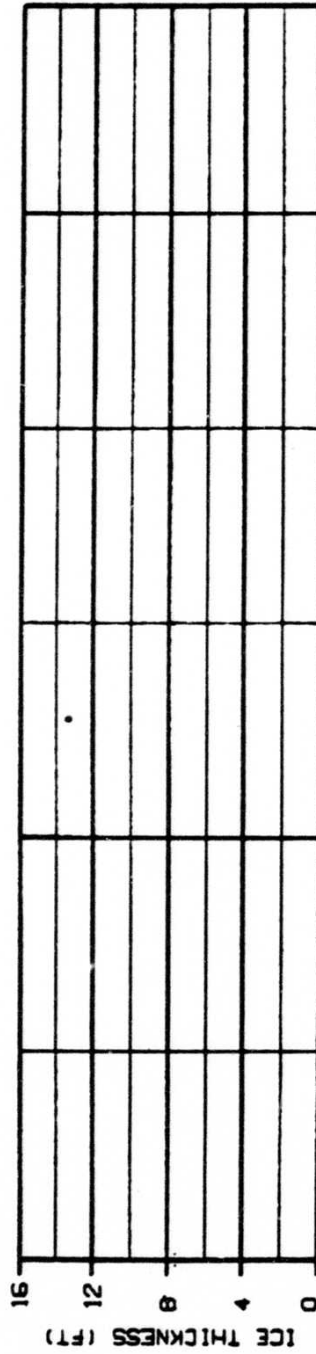
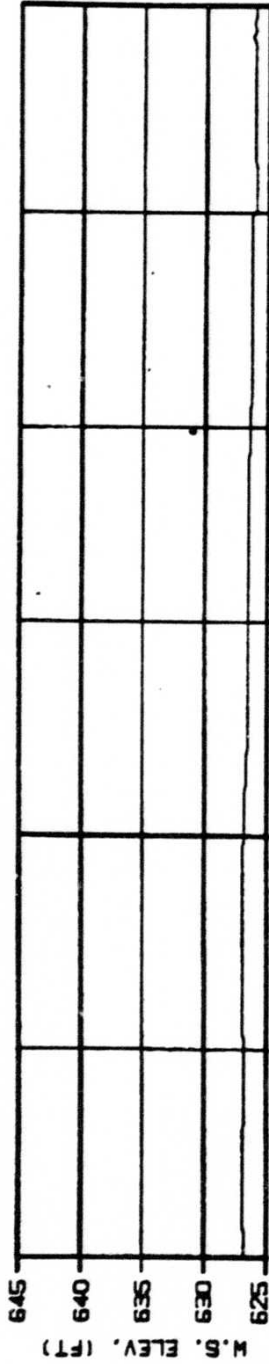
ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRSCO JOINT VENTURE

**SIDE CHANNEL U/S OF SLOUGH 3**  
 RIVER MILE : 130.60  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C  
 TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 820202A

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT

DATE: 10/1/83  
 BY: JAS 834  
 8889.148



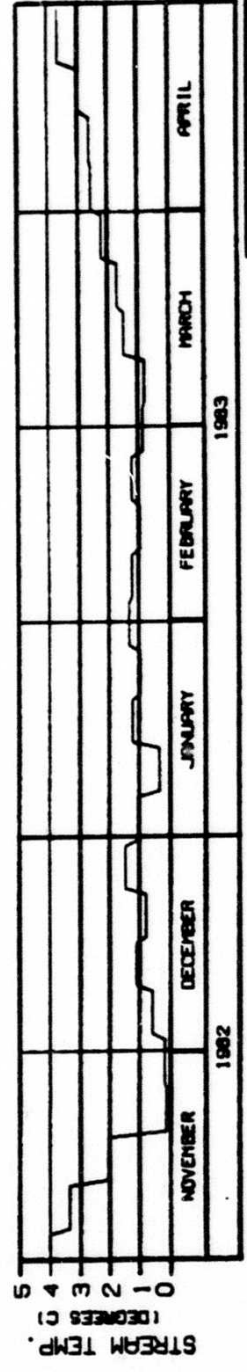
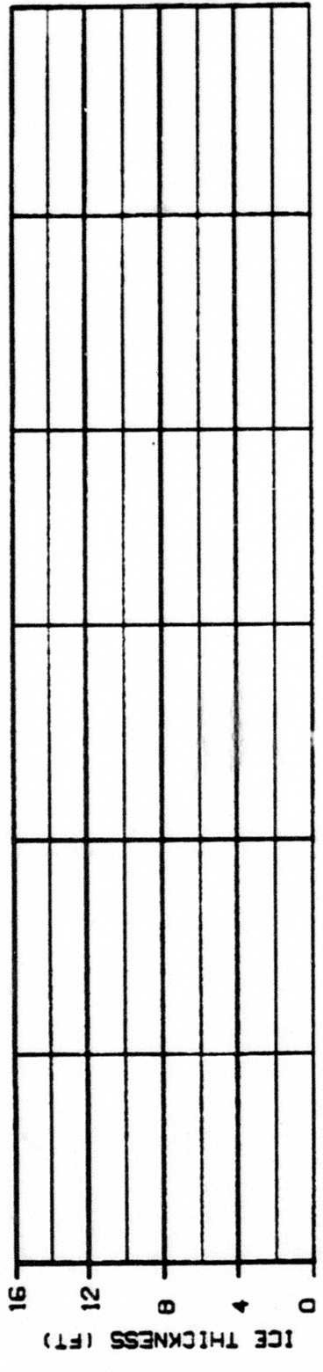
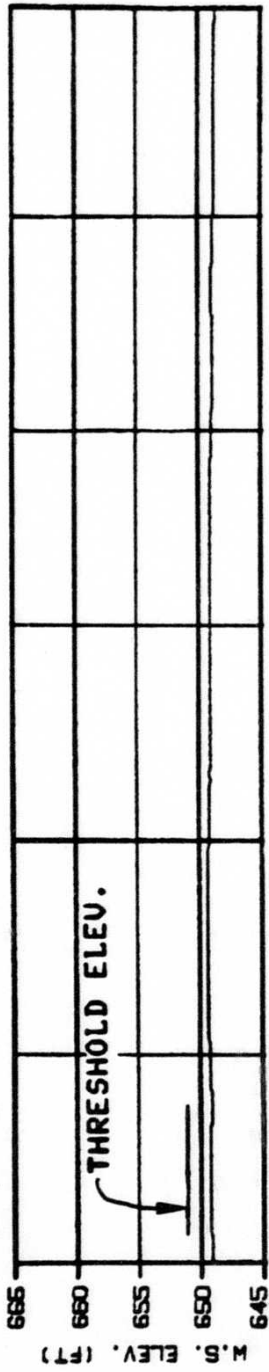


ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERSCO JOINT VENTURE  
 DATE: 11/04/82 BY: JLN/SL 1000.148

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

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : BZ0202NA

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



ALASKA POWER AUTHORITY

SUBMITTA PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARZA-EBRSCO JOINT VENTURE

DESIGN: AL 82018 10 JUN 83 1983.142

**HEAD OF SLOUGH 9A**

RIVER MILE : 133.70

WEATHER PERIOD : 1 NOV 82 - 30 APR 83

ENERGY DEMAND : DEVIL CANYON 2002

FLOW CASE : C

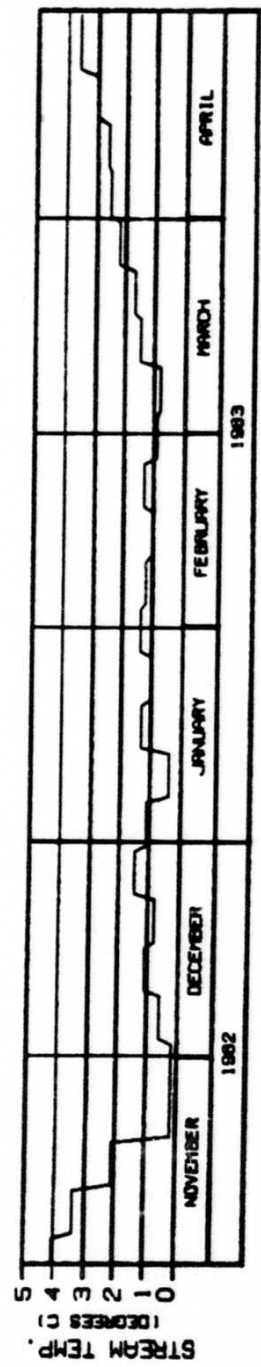
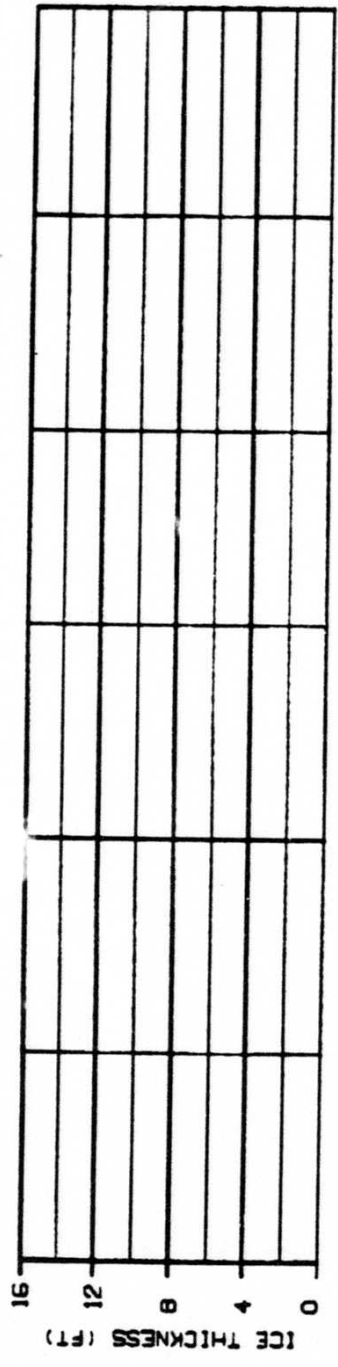
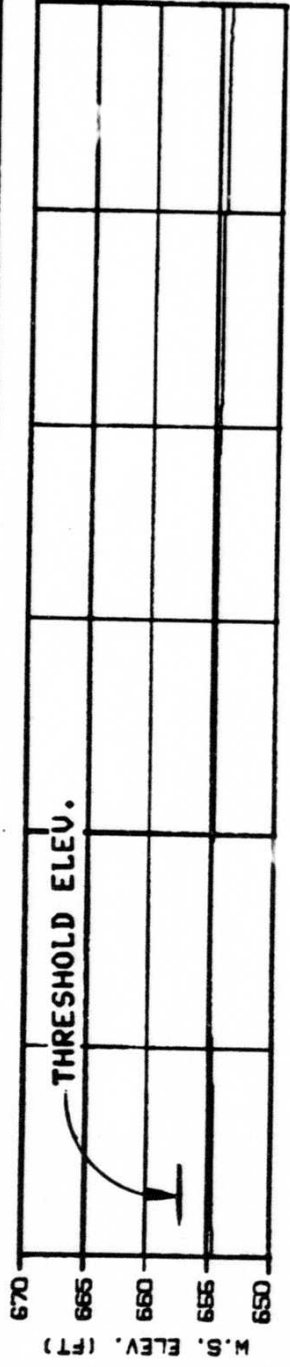
TEMP RULE : NATURAL

REFERENCE RUN NO. : B202CNR

ICE THICKNESS LEGEND:

1: TOTAL THICKNESS

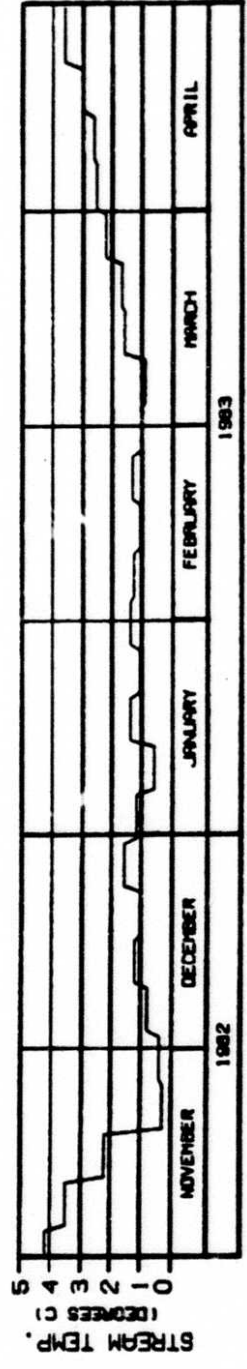
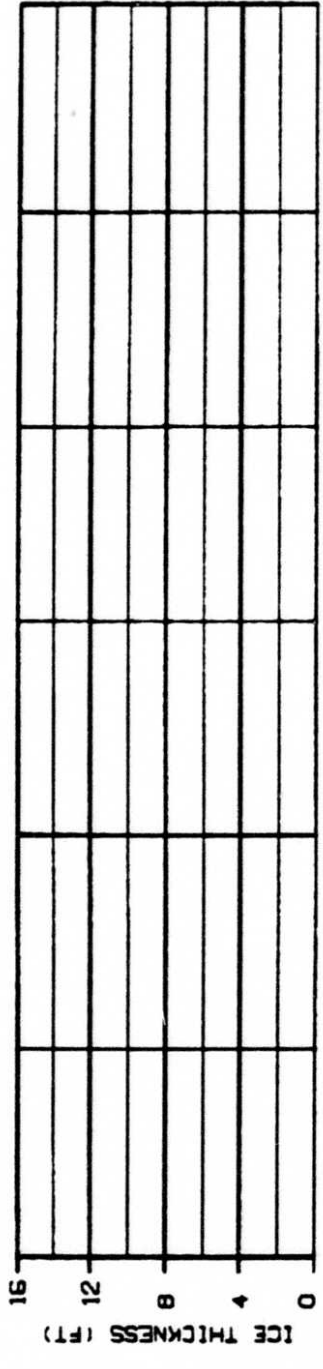
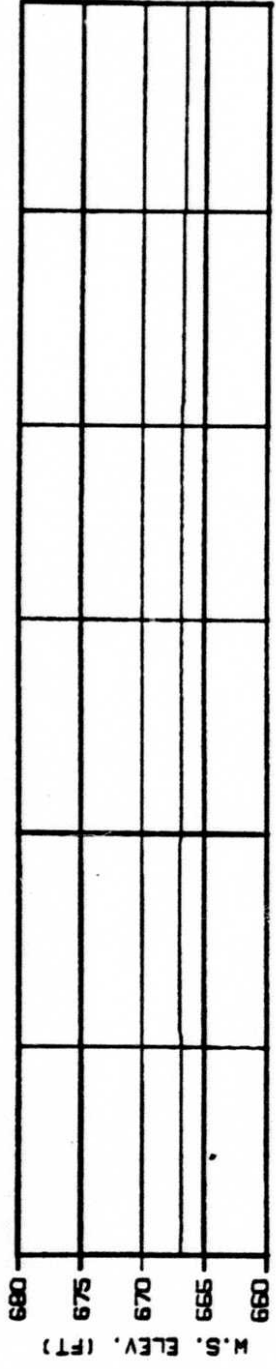
2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRARD JOINT VENTURE  
 REVISED: 01-08-83 10 JAN 83 1983.102

**SIDE CHANNEL U/S OF SLOUGH 10**  
 RIVER MILE : 134.30  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C      TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 820202NA

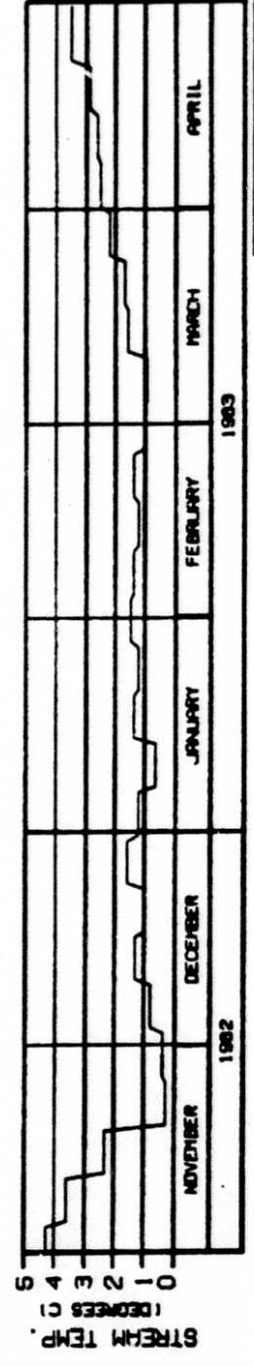
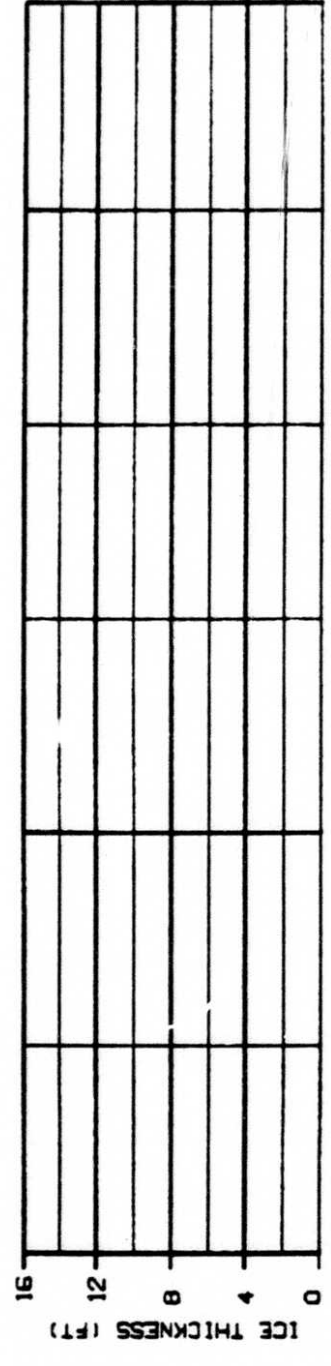
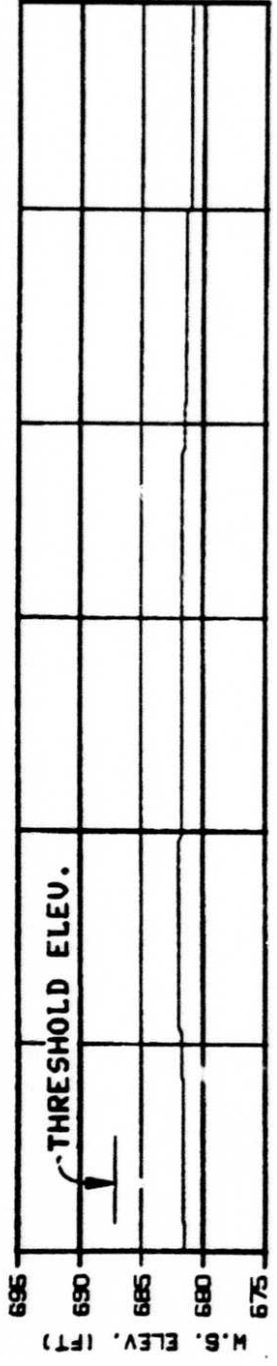
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBASCO JOINT VENTURE  
 ORDER: AL-8888 10 APR 83 8888.142

**SIDE CHANNEL D/S OF SLOUGH 11**  
 RIVER MILE : 135.30  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 8202CNA

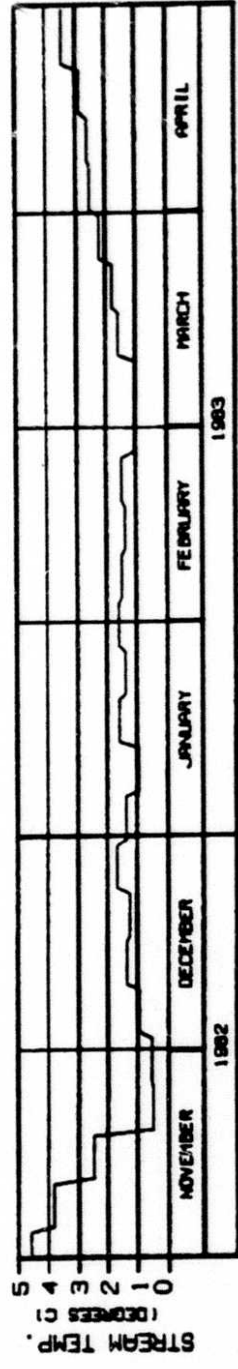
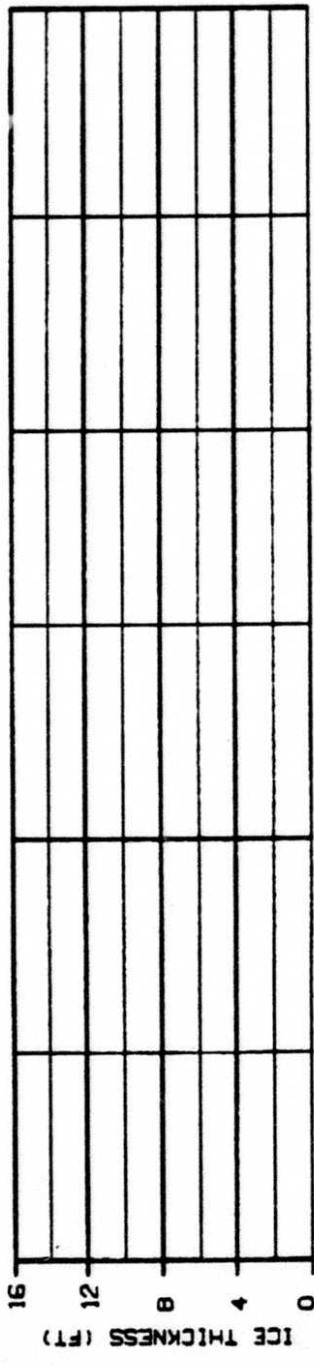
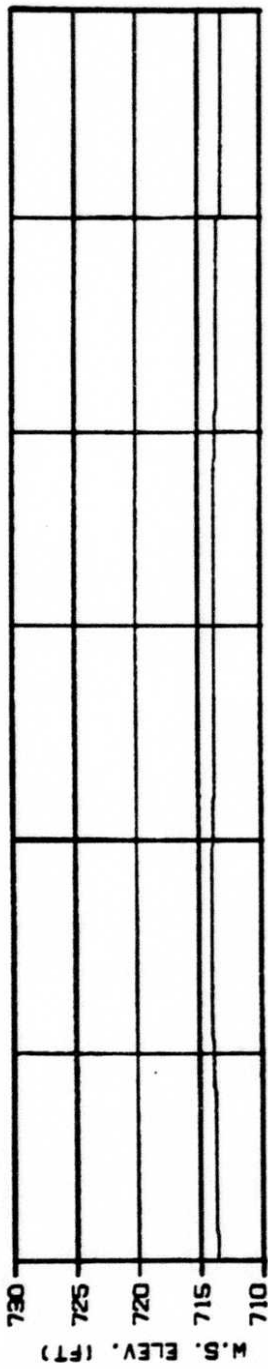
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 DESIGN: N.J. PERRY    10 JUL 83    1983.142

HEAD OF SLOUGH 11  
 RIVER MILE : 136.50  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C    TEMP RULE : NATURAL  
 REFERENCE RUN NO. : BZ02CNA

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT

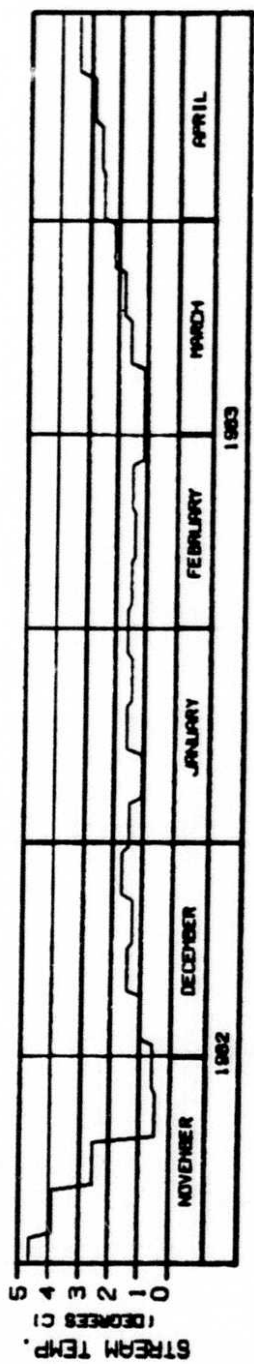
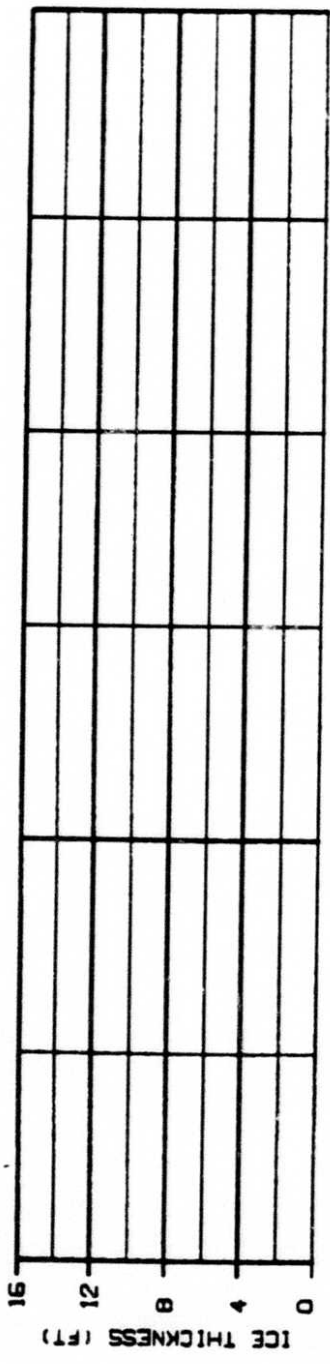
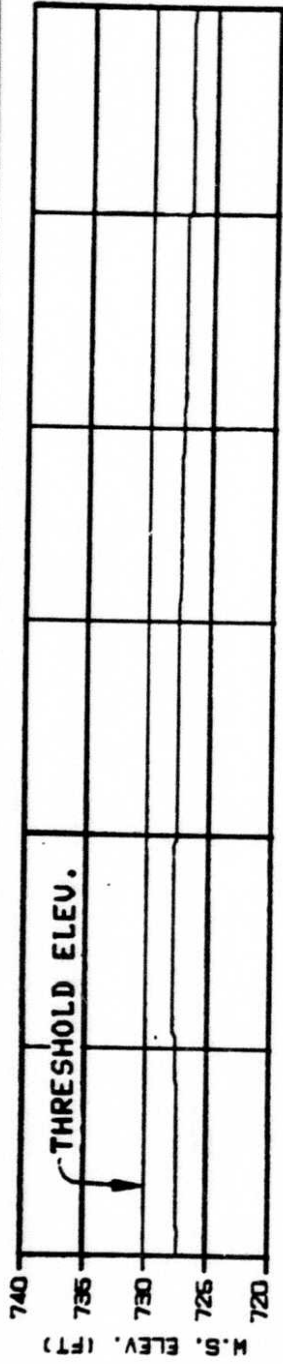


ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBBECO JOINT VENTURE  
 ORDER: 811000 10 JUN 83 888.142

**HEAD OF SLOUGH 17**  
 RIVER MILE : 139.30  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 820202A

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT

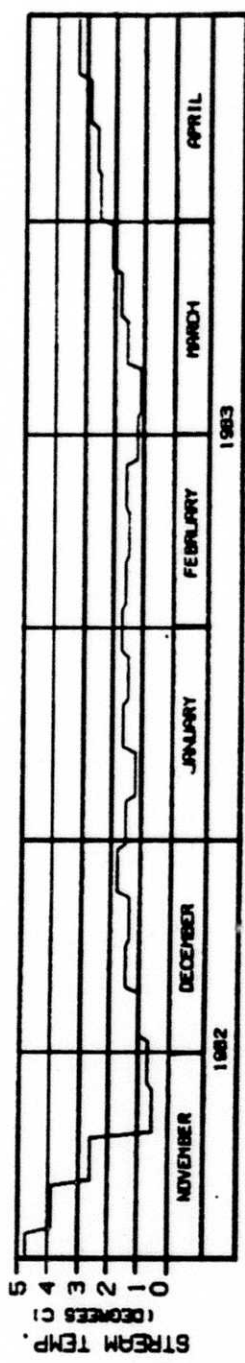
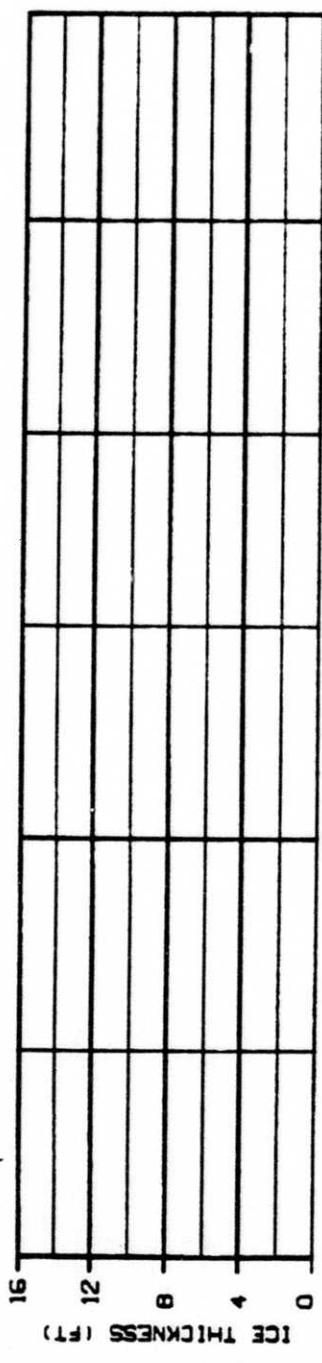
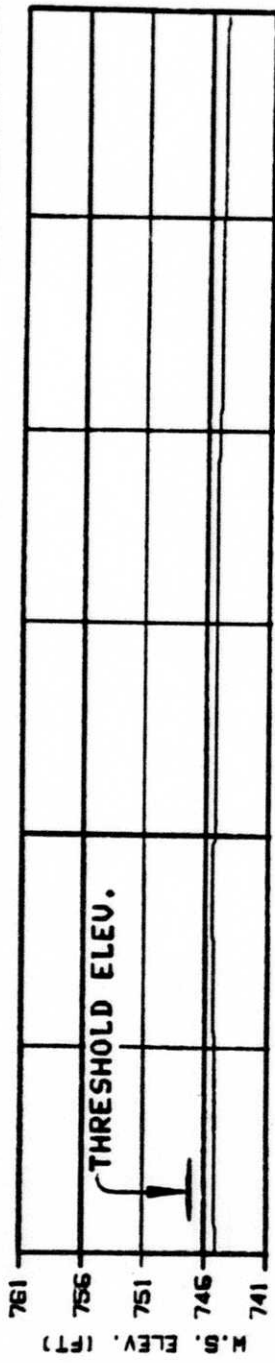




ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT: SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBASCO JOINT VENTURE  
 DRAWING NUMBER: 820201A

HEAD OF SLOUGH 20  
 RIVER MILE : 140.50  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 820201A

ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT



ALASKA POWER AUTHORITY

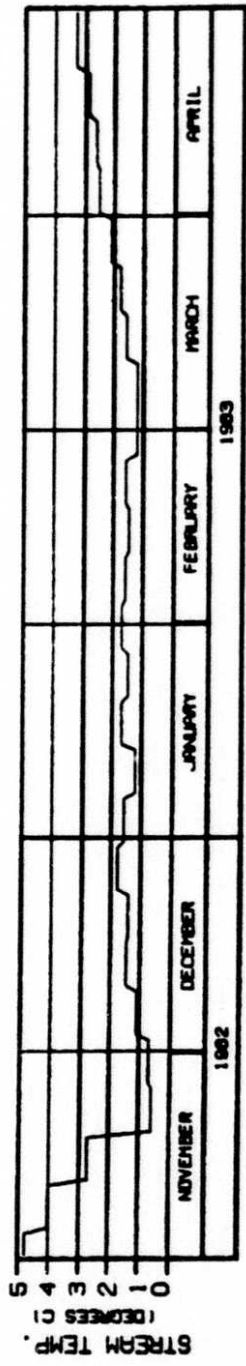
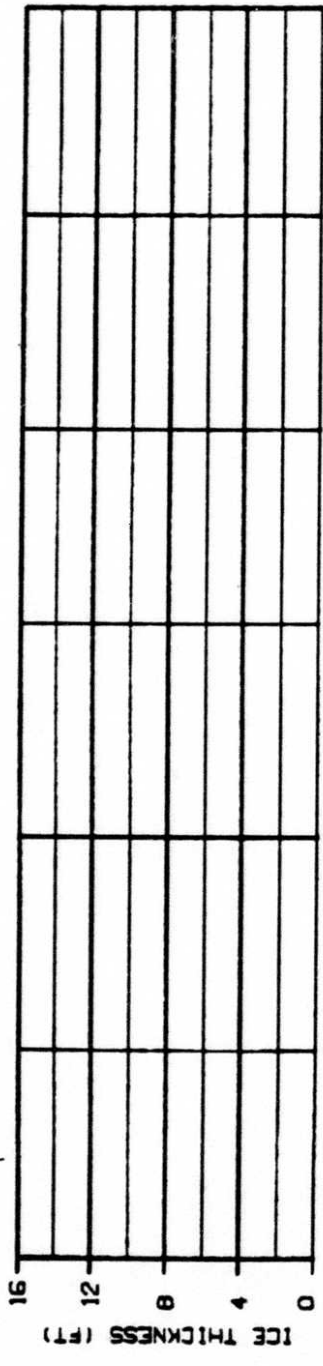
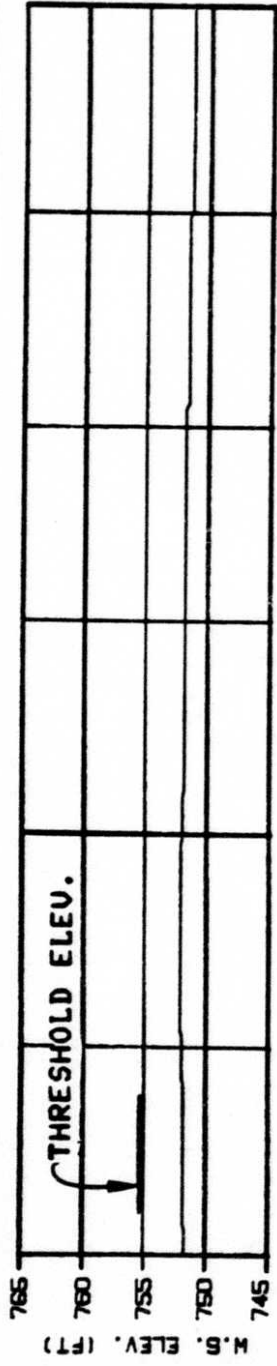
SUBMITTER PROJECT  
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

PROJECT NO. 88008      10 JAN 83      10000.142

SLOUGH 21 (ENTRANCE A6)  
RIVER MILE : 141.80

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
ENERGY DEMAND : DEVIL CANYON 2002  
FLOOD CASE : C TEMP RULE : NATURAL  
REFERENCE RUN NO. : BZ0202A

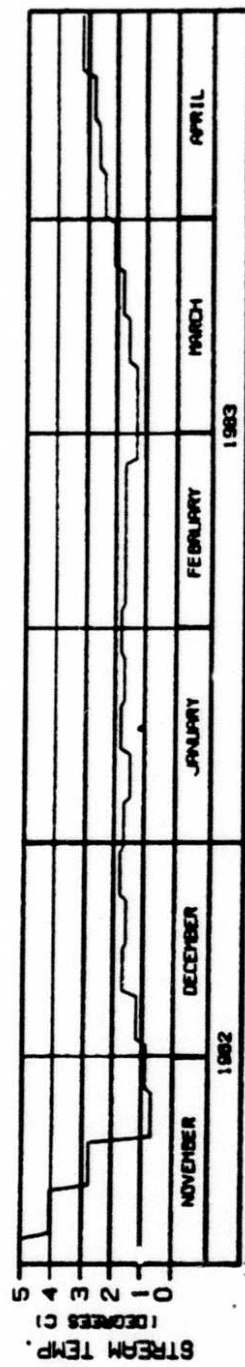
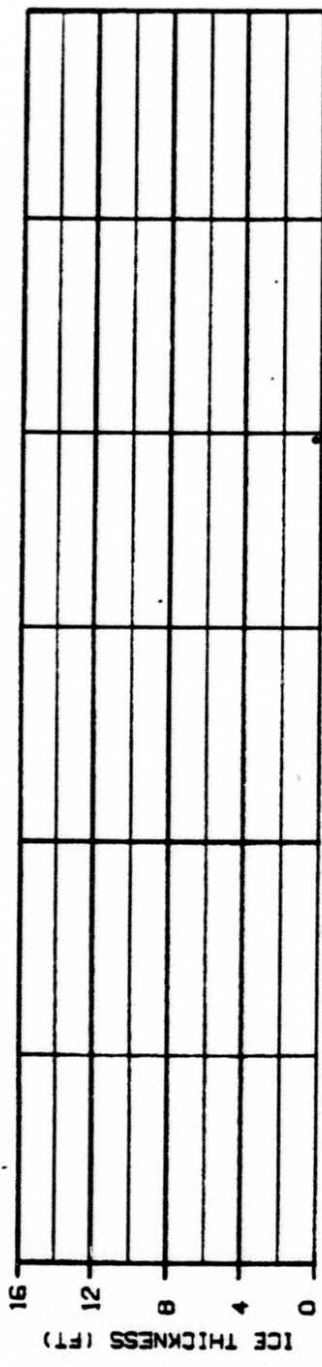
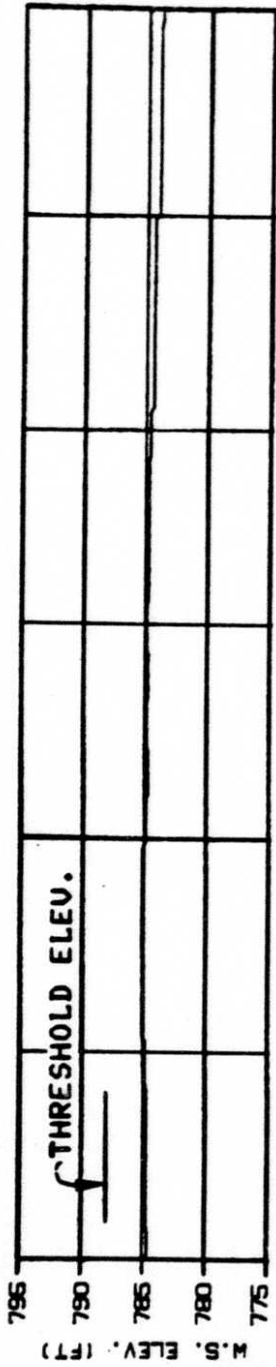
ICE THICKNESS LEGEND:  
1: TOTAL THICKNESS  
2: SLUGH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARRIS-EDGECOCK JOINT VENTURE  
 PROJECT NO. 820201A  
 SHEET NO. 142

HEAD OF SLOUGH 21  
 RIVER MILE : 142.20  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 820201A

ICE THICKNESS LEGEND:  
 1. TOTAL THICKNESS  
 2. SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EDBECO JOINT VENTURE  
 DRAWING: SL-0010 10 JAN 83 1000.142

HEAD OF SLOUGH 22  
 RIVER MILE : 144.80  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2002  
 FLOW CASE : C      TEMP. RULE : NATURAL  
 REFERENCE RUN NO. : 820202NR

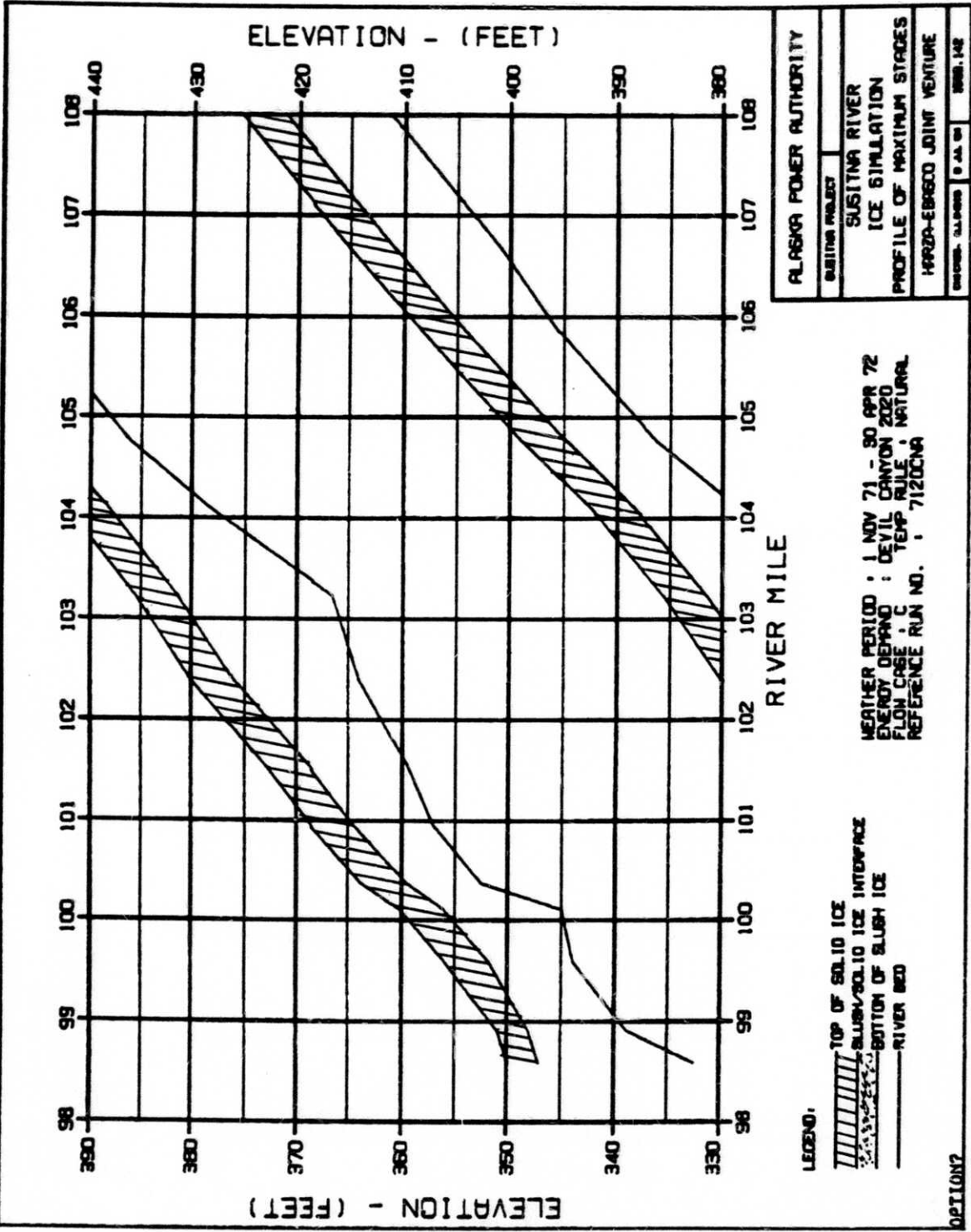
ICE THICKNESS LEGEND:  
 1: TOTAL THICKNESS  
 2: SLUSH COMPONENT

OPTION?

**EXHIBIT P**



C



LEGEND:

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

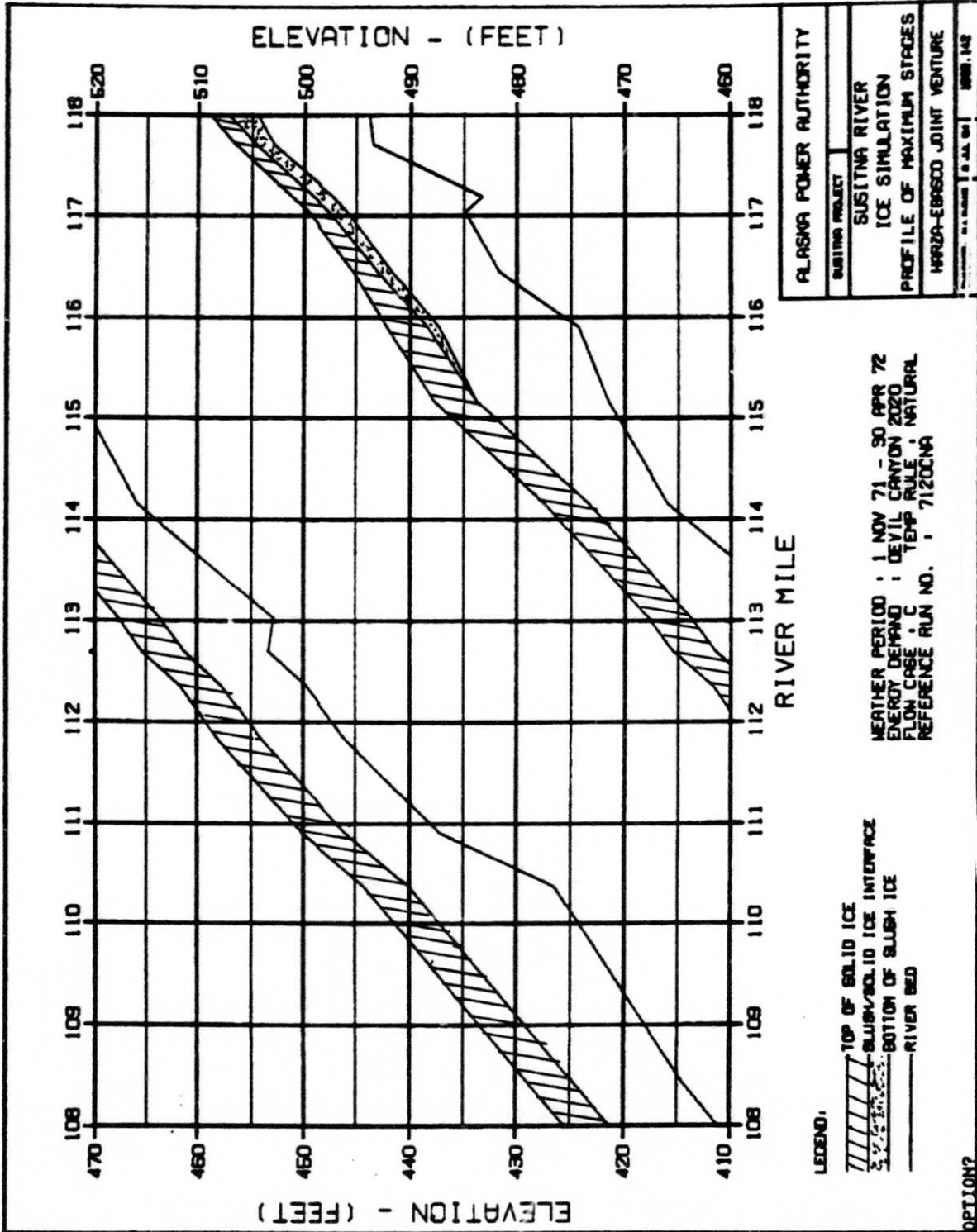
WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7120CNA

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	SUSITNA RIVER
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
HARZO-EBERCO JOINT VENTURE	
DESIGN: G.L. 0009	9 JAN 81
SHEET: 148	

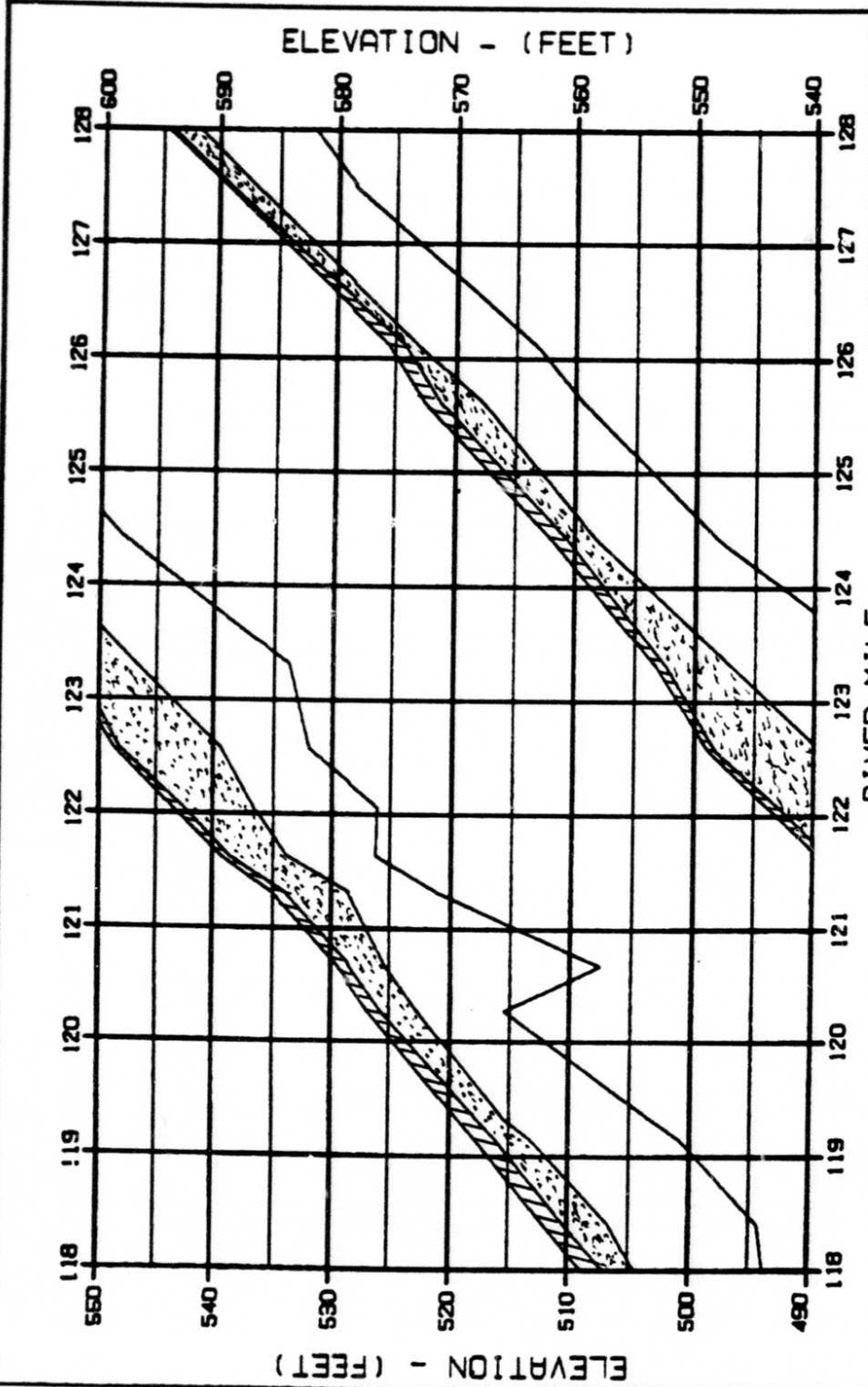
OPTION?



C



C



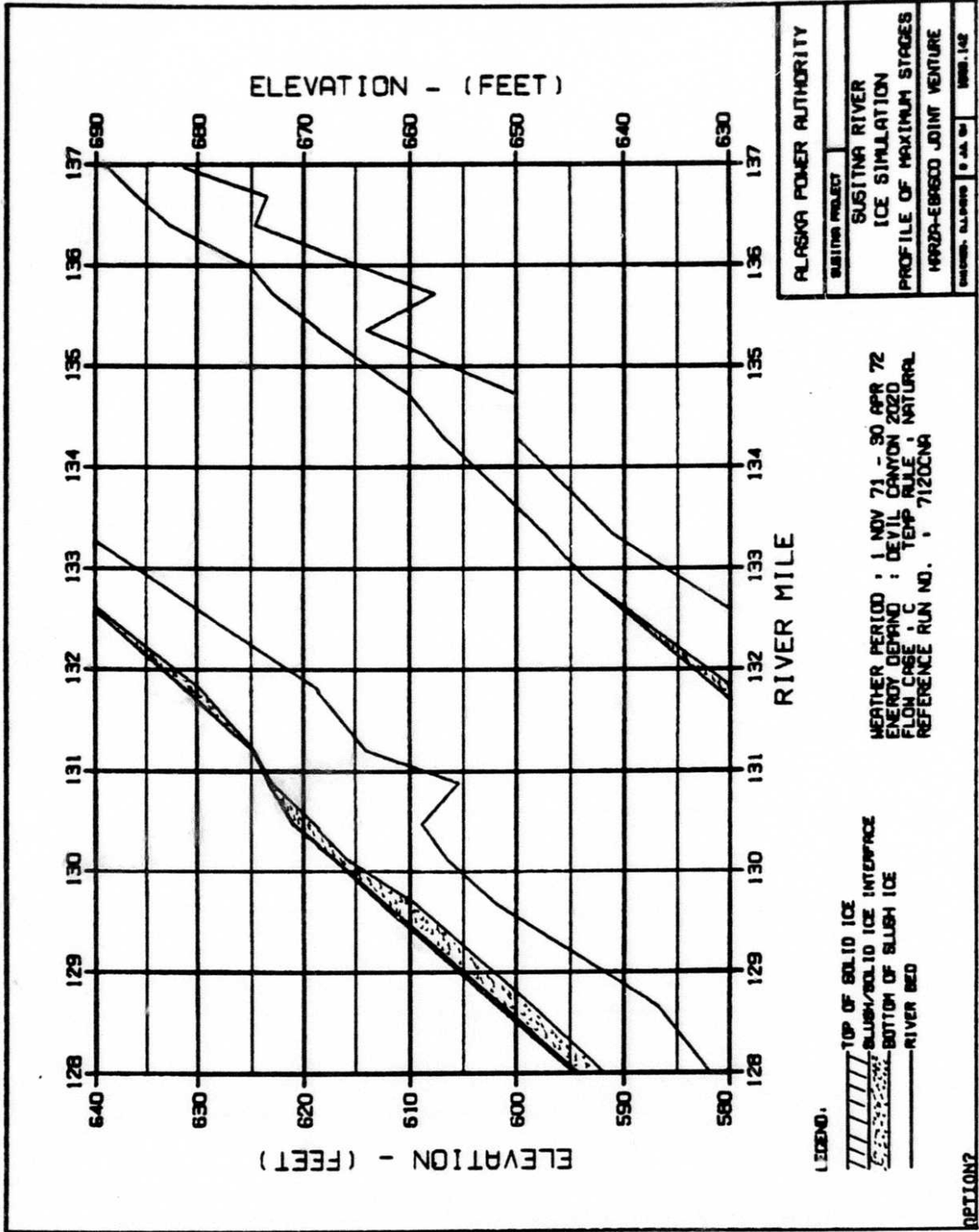
ALASKA POWER AUTHORITY	
GLACIER PROJECT	SUSTINA RIVER
	ICE SIMULATION
PROFILE OF MAXIMUM STAGES	
HARZA-EBERCO JOINT VENTURE	
PROJECT: 84-0000	D.A. 01 8808.142

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7120CNA

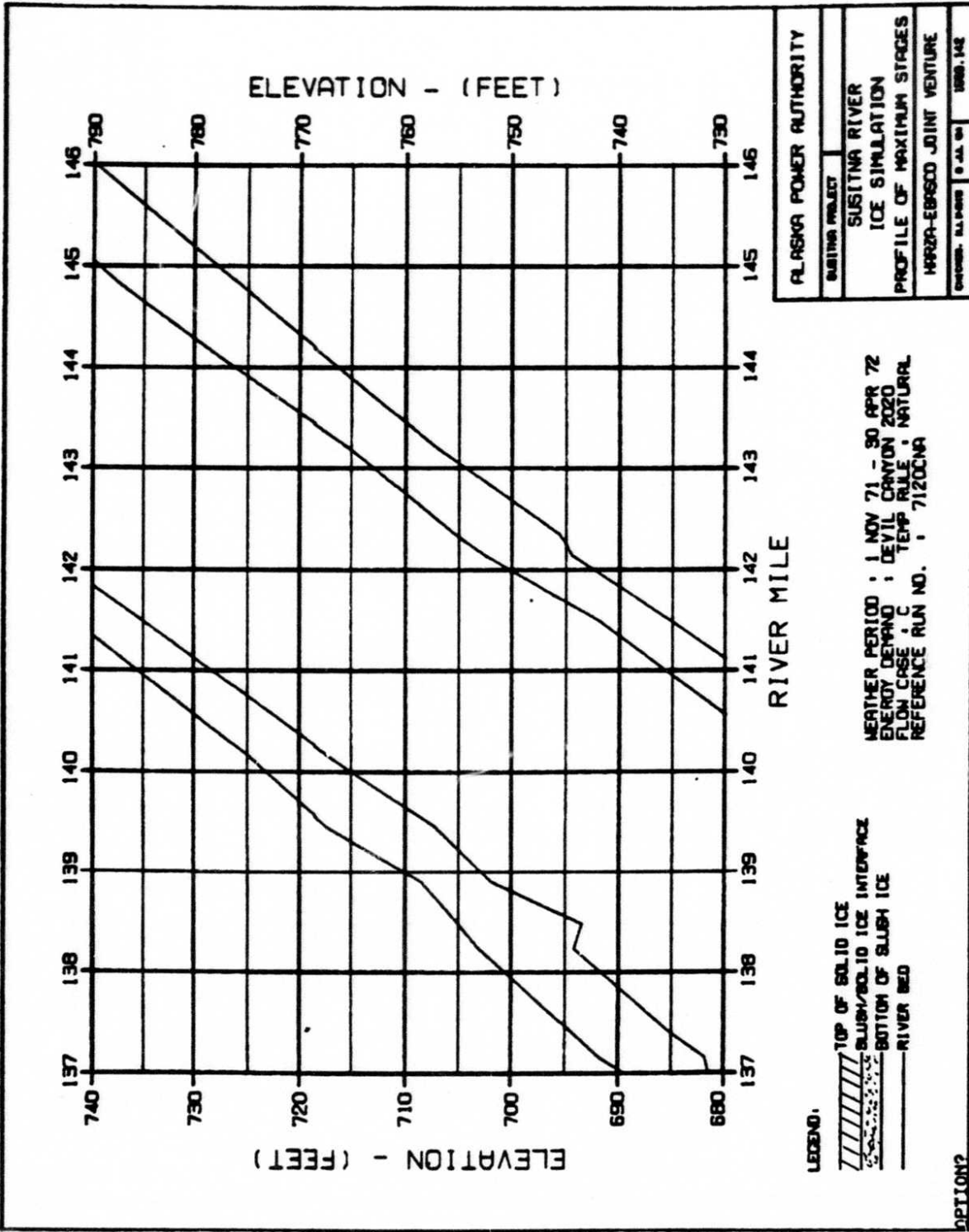
LEGEND:  
 TOP OF SOLID ICE  
 SLUSH/SOLID ICE INTERFACE  
 BOTTOM OF SLUSH ICE  
 RIVER BED

OPTION?

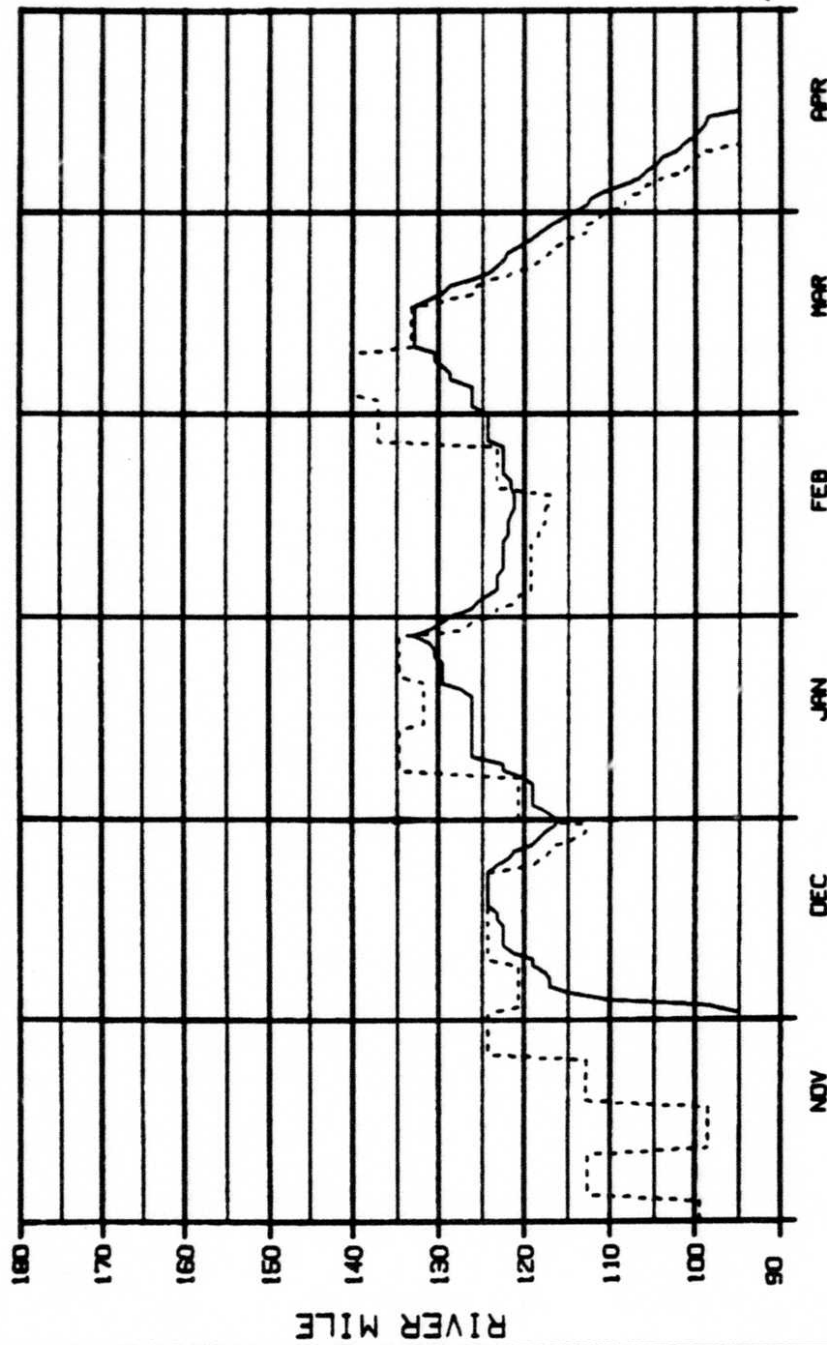
C



c



C

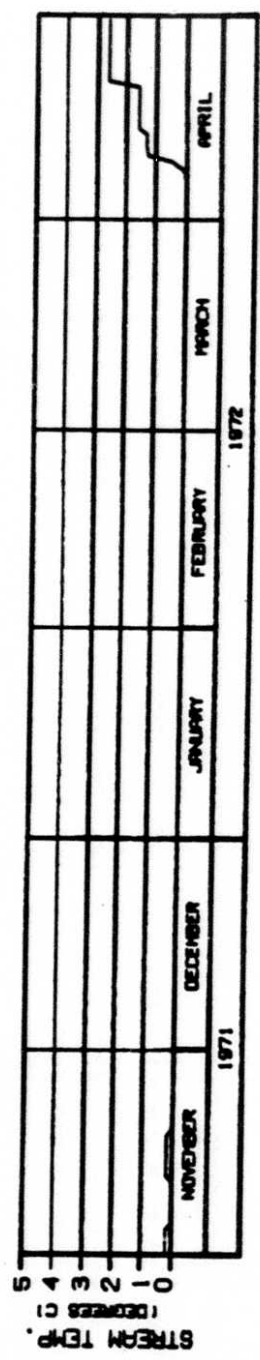
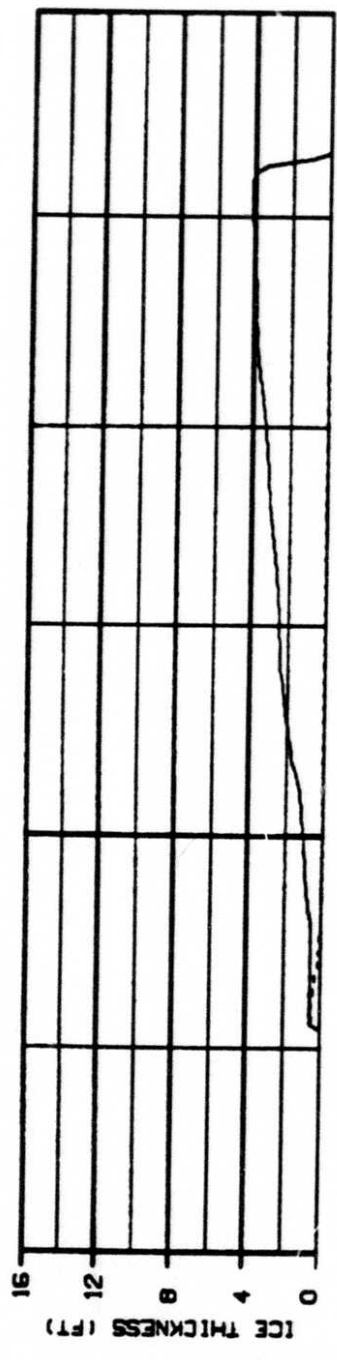
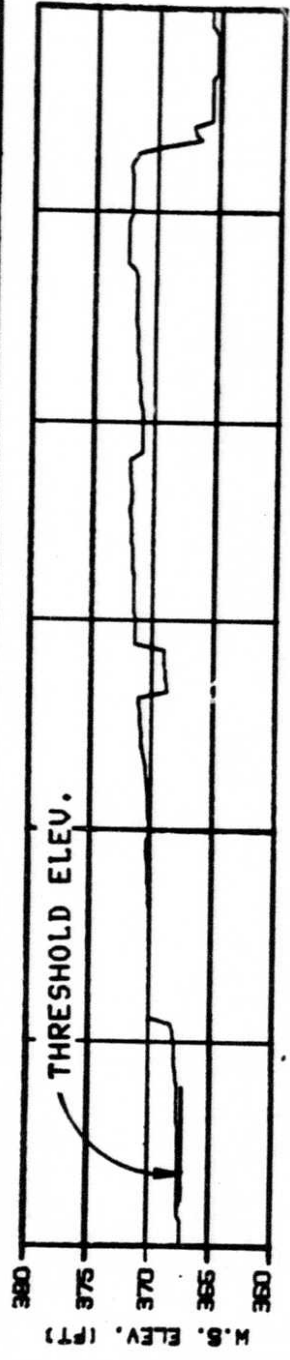


ALASKA POWER AUTHORITY  
 SUSTINA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM  
 HARZA-EBREDO JOINT VENTURE  
 ORDER: 84808 8 JAN 84 108B.142

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 7120CNA

LEGEND:  
 — ICE FRONT  
 - - - ZERO DEGREE ISOTHERM

OPTION?



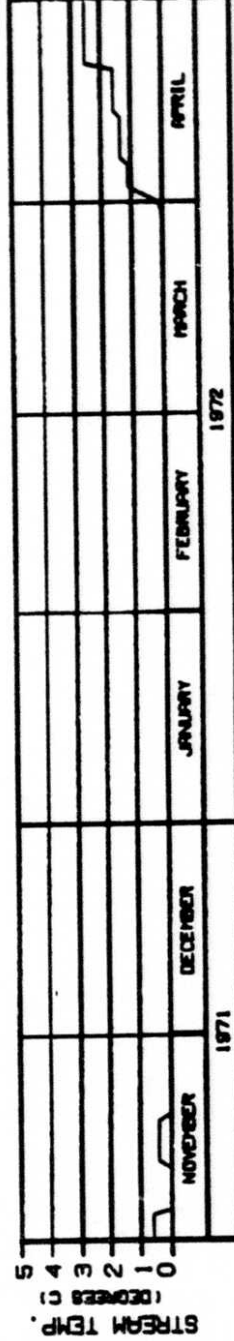
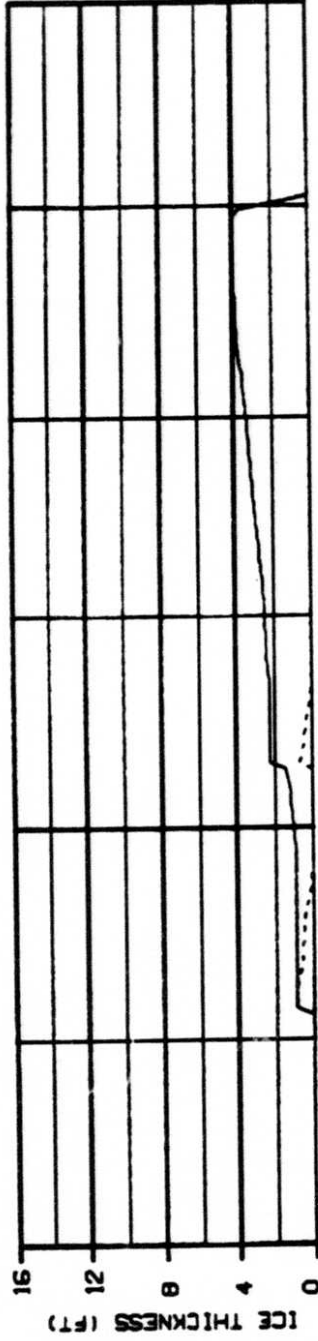
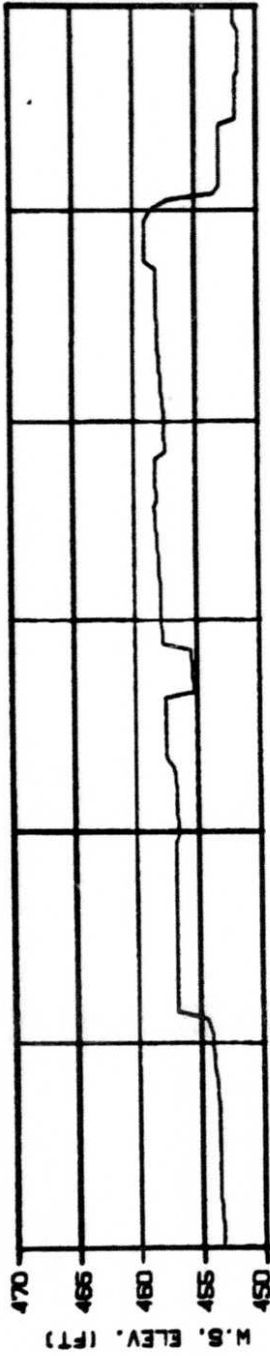
ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 DRAWN: S. L. HARRIS 9 JUL 72 1000.142

HEAD OF WHISKERS SLOUGH  
 RIVER MILE : 101.50

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 712000A

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

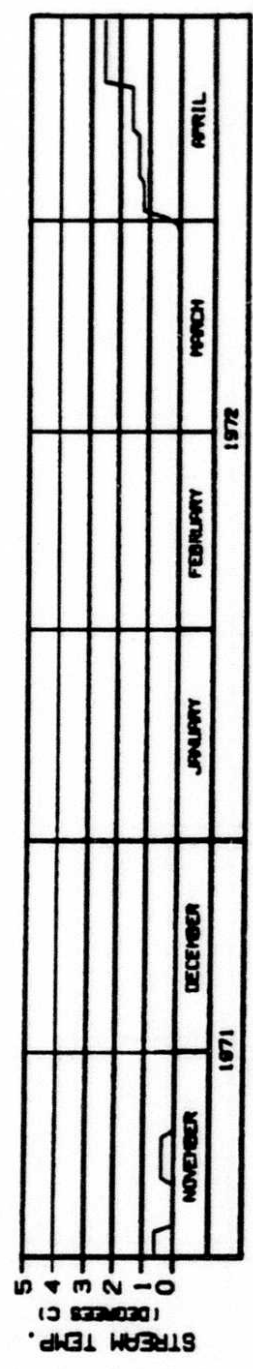
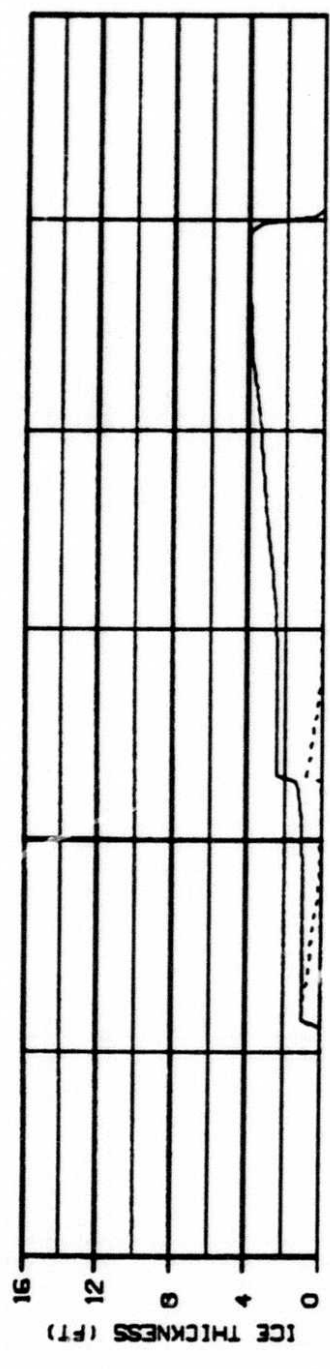
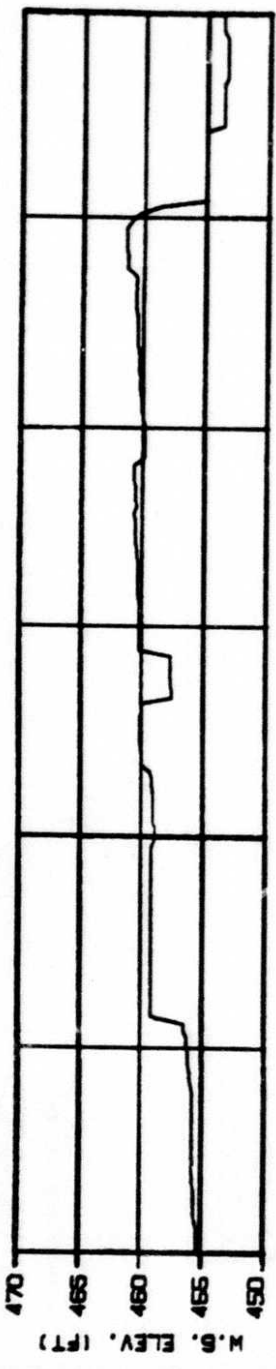




ALASKA POWER AUTHORITY  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERD JOINT VENTURE  
 ORDER: AL-8488    D. A. 80    SHEET 142

SIDE CHANNEL AT HEAD OF GASH CREEK  
 RIVER MILE : 112.00  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C    TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 712000A

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



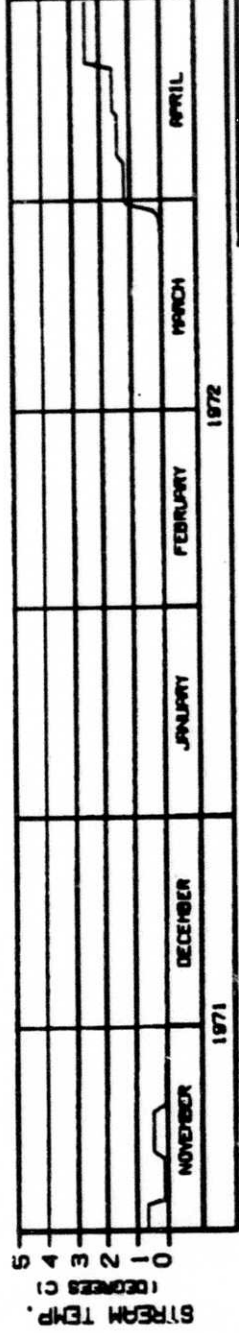
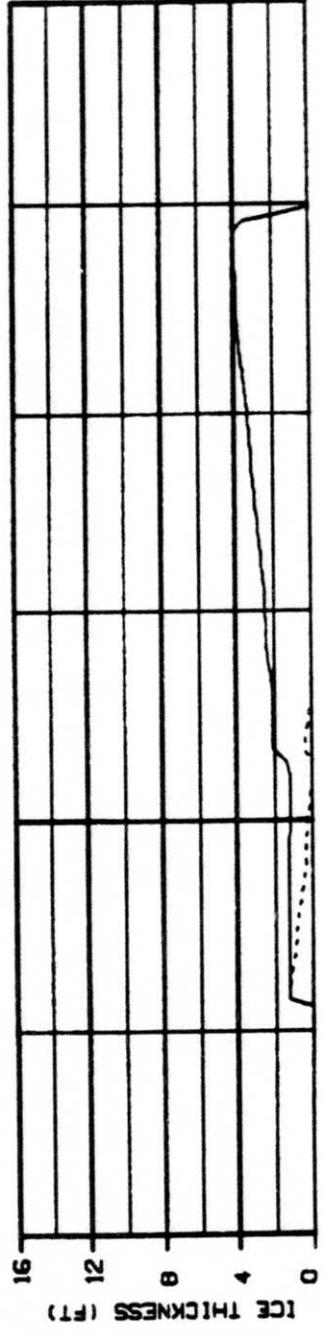
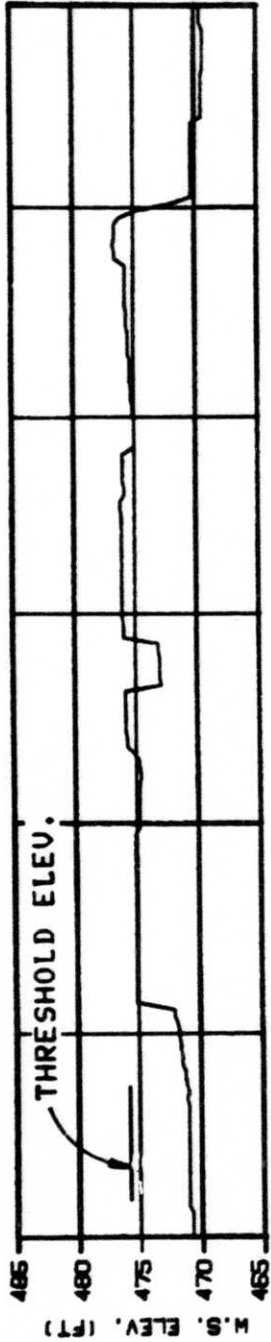
ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARRO-ERBECO JOINT VENTURE  
 REPORT - 81-0009 8 JUL 80 8888.142

**MOUTH OF SLOUGH 6A**

RIVER MILE : 112.34

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 71200NA

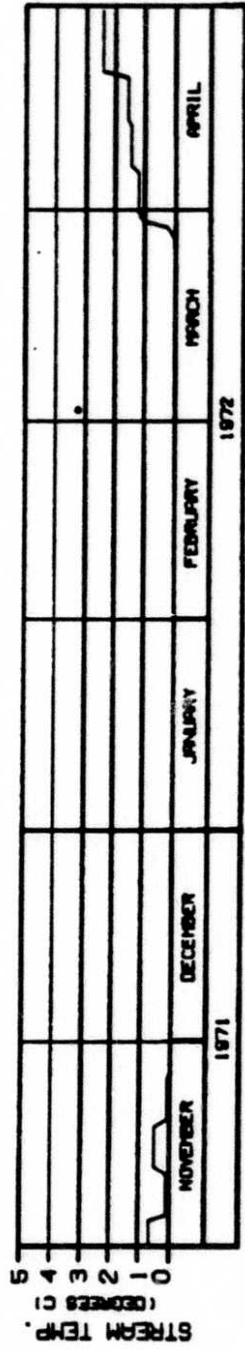
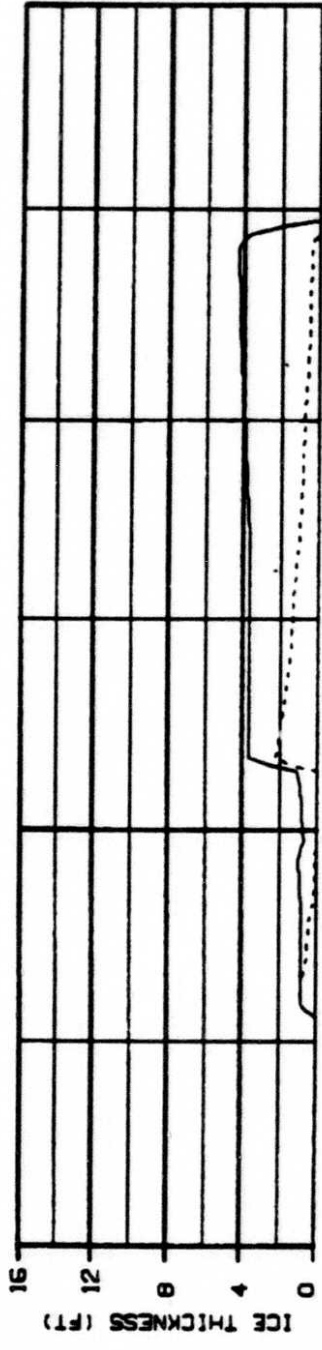
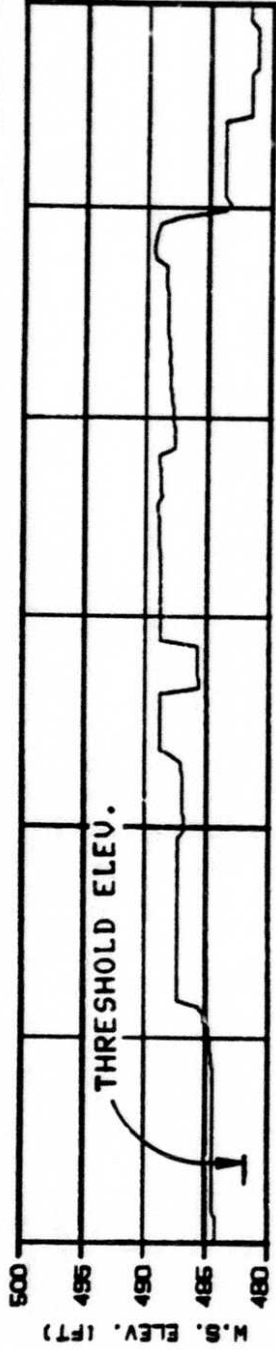
ICE THICKNESS LEGEND:  
 ----- TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERSON JOINT VENTURE  
 DATED: 8 MAR 72

HEAD OF SLOUGH 8  
 RIVER MILE : 114.10  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOOD CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 71200NA

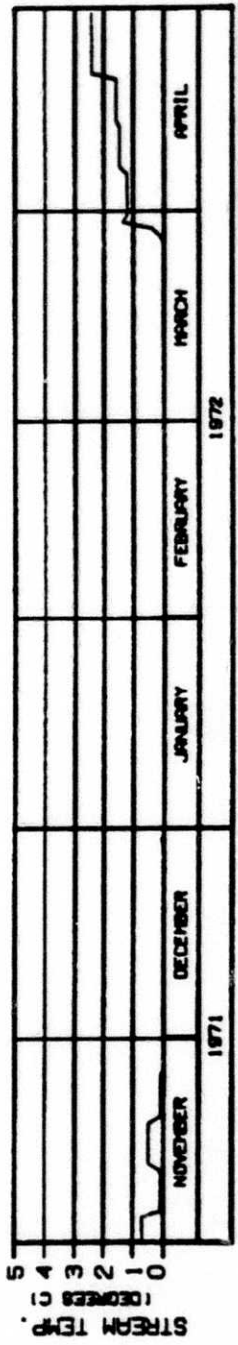
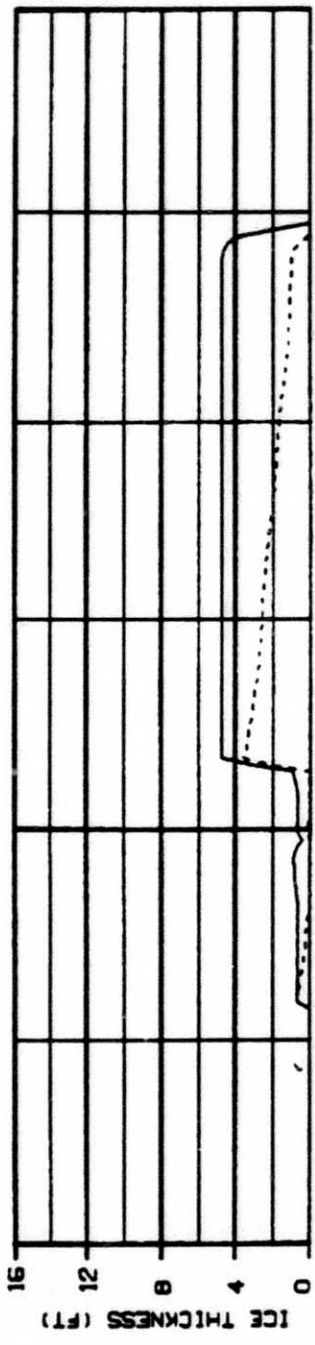
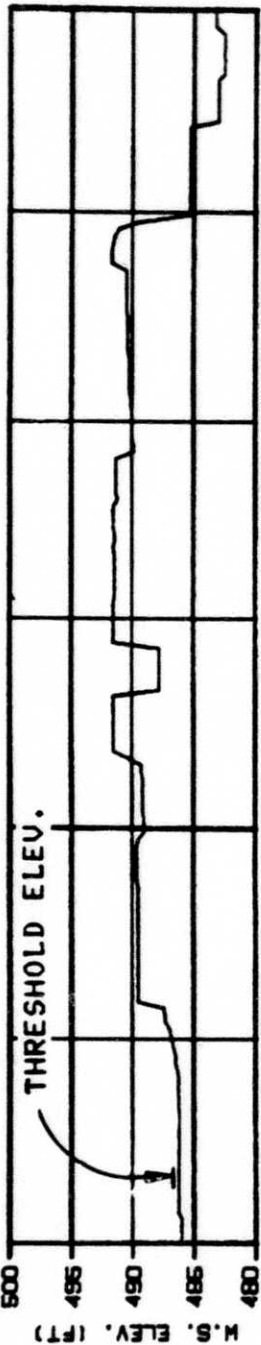
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - BLUISH COMPONENT



ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSO JOINT VENTURE  
 ORDER: 8-1-68 8-1-68 1000-1-68

**SIDE CHANNEL MSII**  
 RIVER MILE : 115.50  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 71200NA

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



ALASKA POWER AUTHORITY

SUSITNA PROJECT

SUSITNA RIVER

ICE SIMULATION

TIME HISTORY

HARRIS-ERSSCO JOINT VENTURE

DESIGNED BY: J.A. DE WOOD, 142

HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

WEATHER PERIOD : 1 NOV 71 - 30 APR 72

ENERGY DEMAND : DEVIL CANYON 2020

FLOH CASE : C

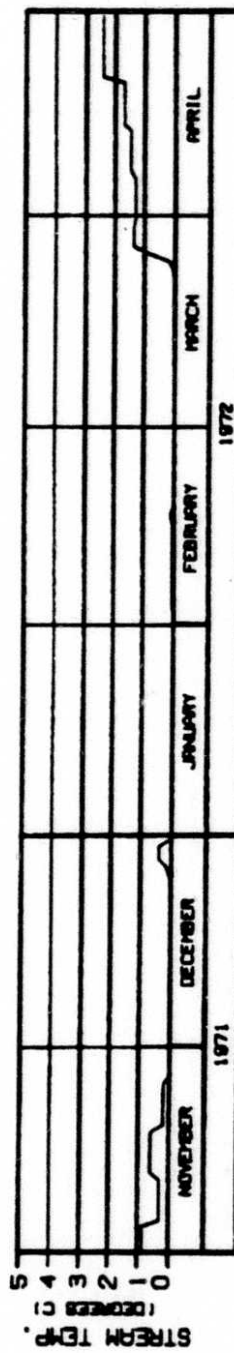
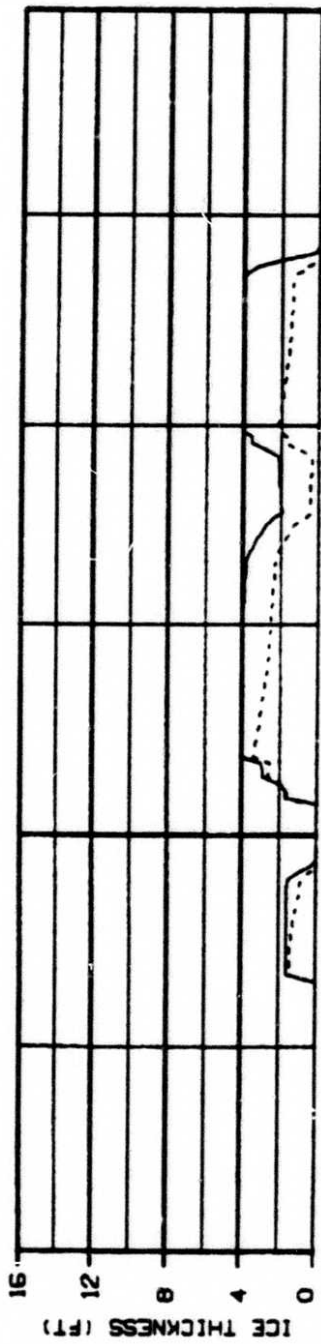
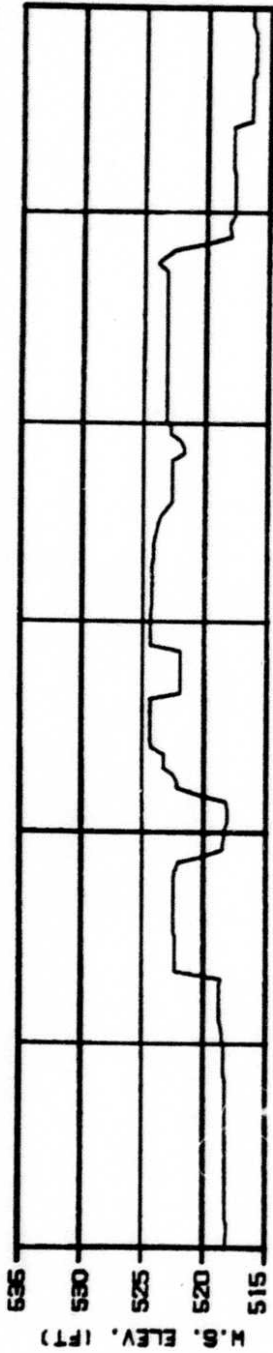
TEMP RULE : NATURAL

REFERENCE RUN NO. : 71200NA

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS

----- SLUSH COMPONENT

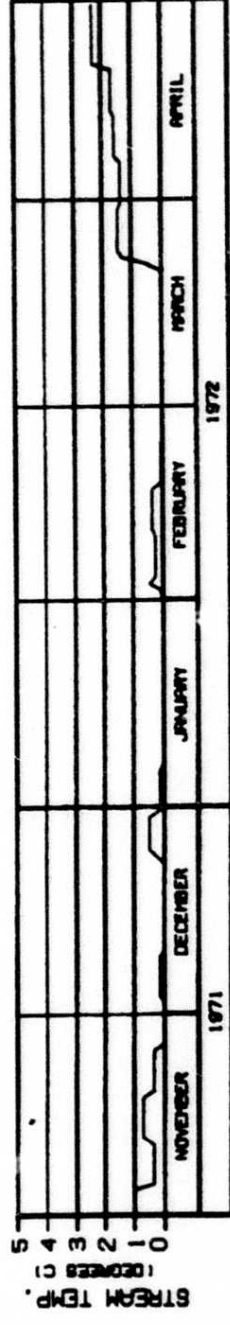
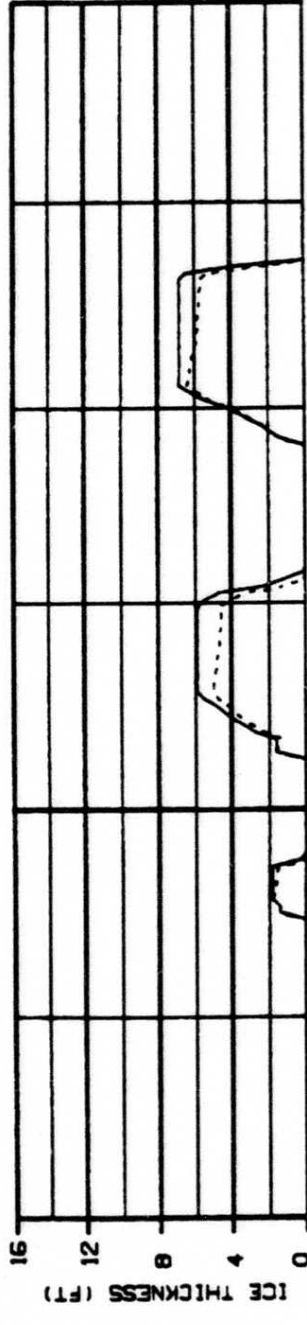
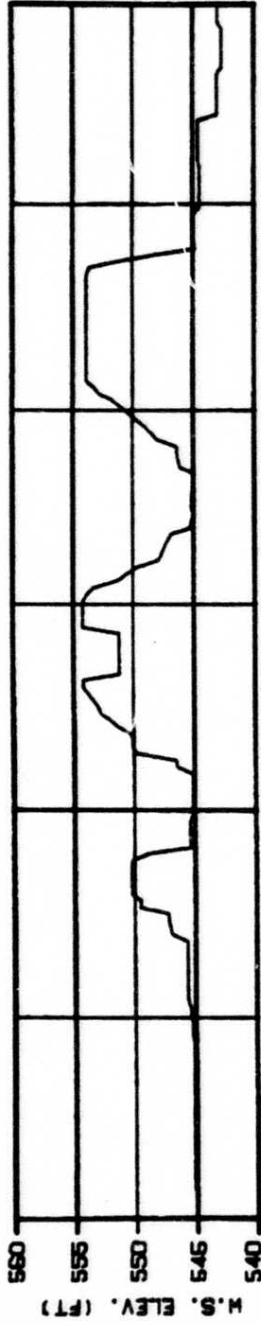


ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERCO JOINT VENTURE  
 DRAWING: H.A. 1000 8 JAN 81 1000.102

RIVER MILE : 120.00  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 712000A

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

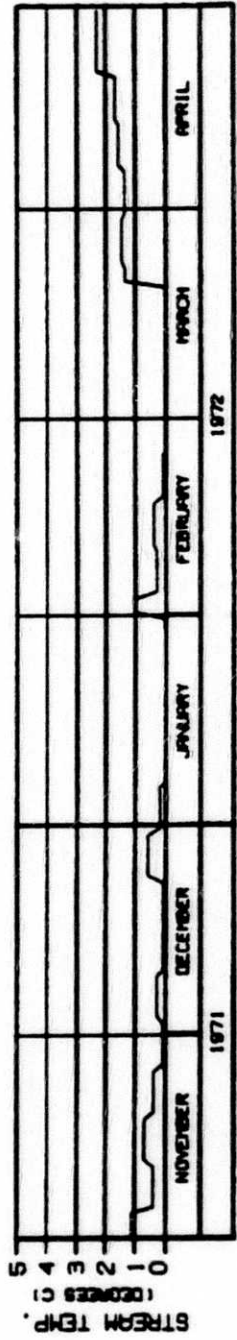
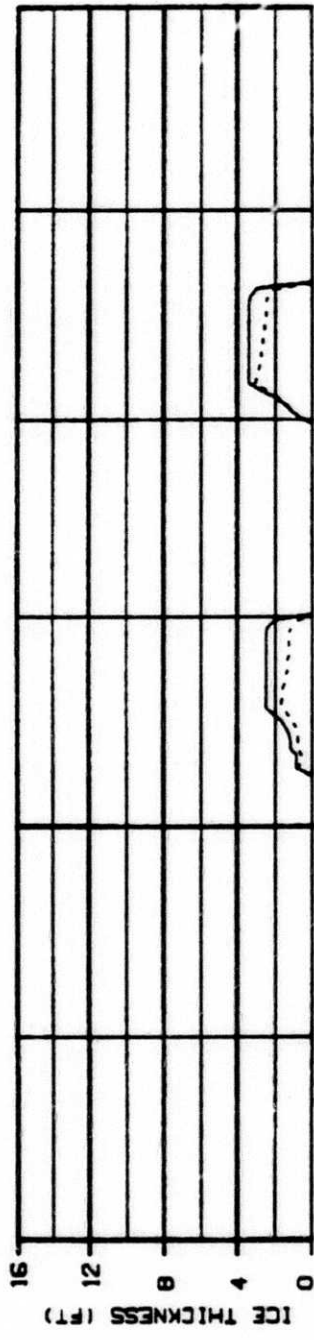
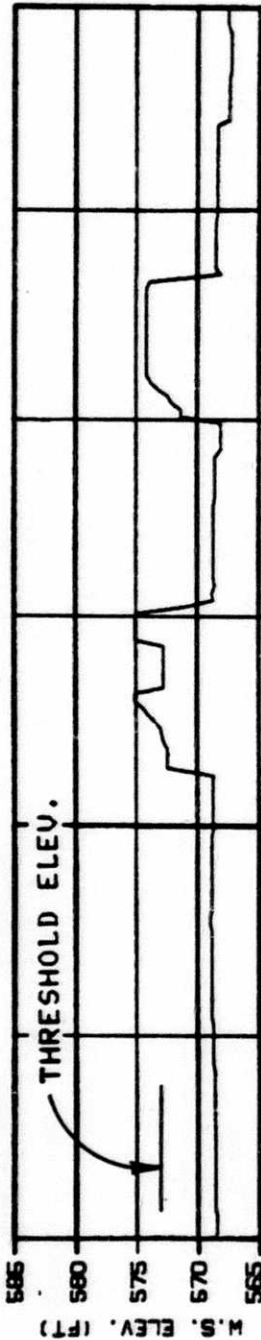




ALASKA POWER AUTHORITY  
 SUBSTATION PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBACO JOINT VENTURE  
 DESIGNED BY: A.L. BROWN | 9 JUL 72 | SHEET 142

HEAD OF MOOSE SLOUGH  
 RIVER MILE : 123.50  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 71200NA

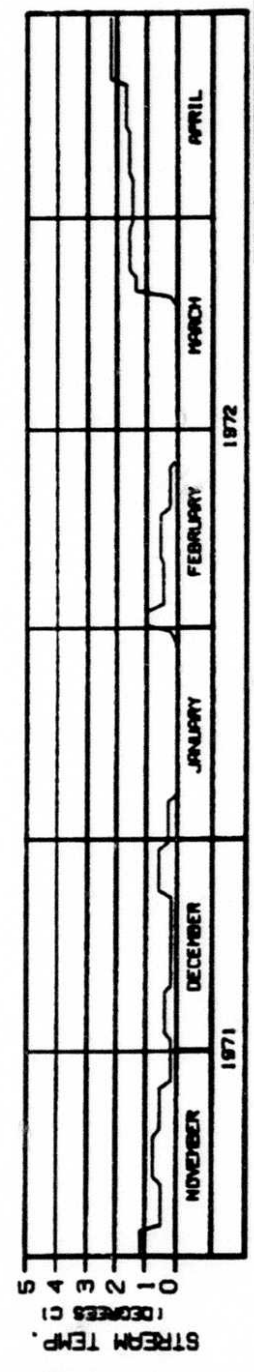
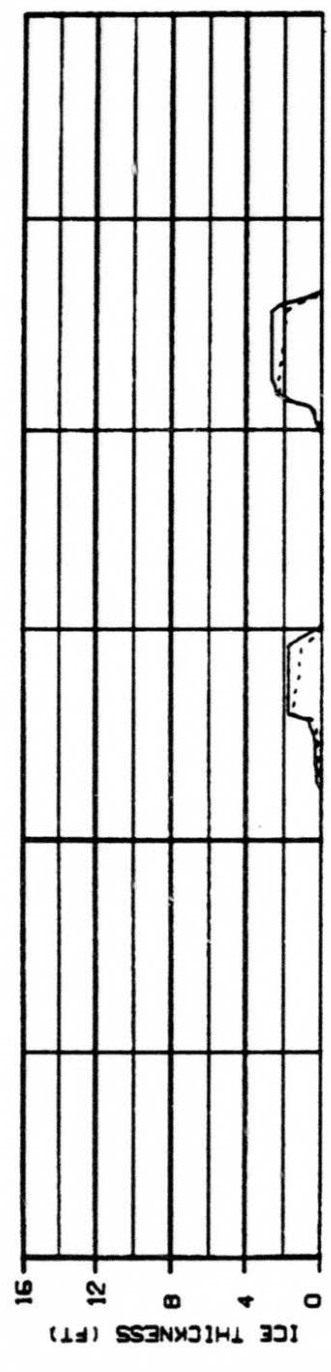
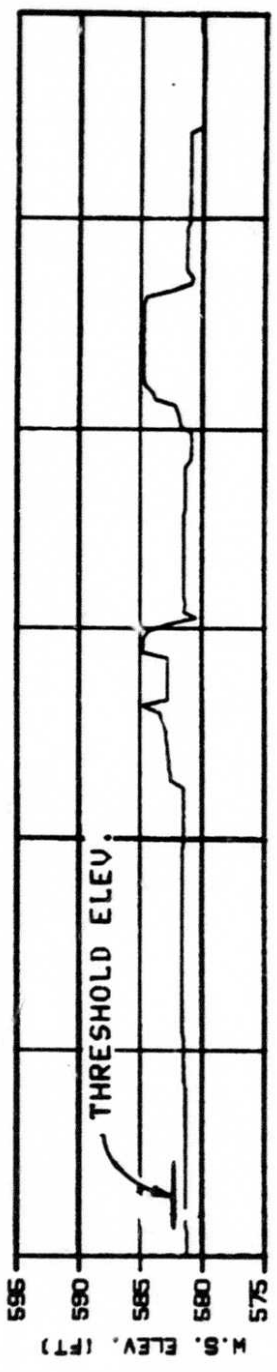
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRARD JOINT VENTURE  
 ORDER: 84889 8 JAN 80 0808.142

HEAD OF SLOUGH 8A (WEST)  
 RIVER MILE : 126.10  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RILE : NATURAL  
 REFERENCE RUN NO. : 7127004

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

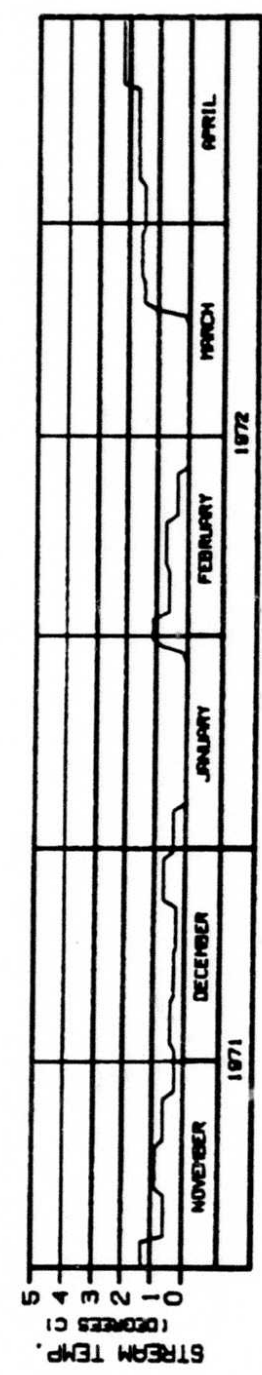
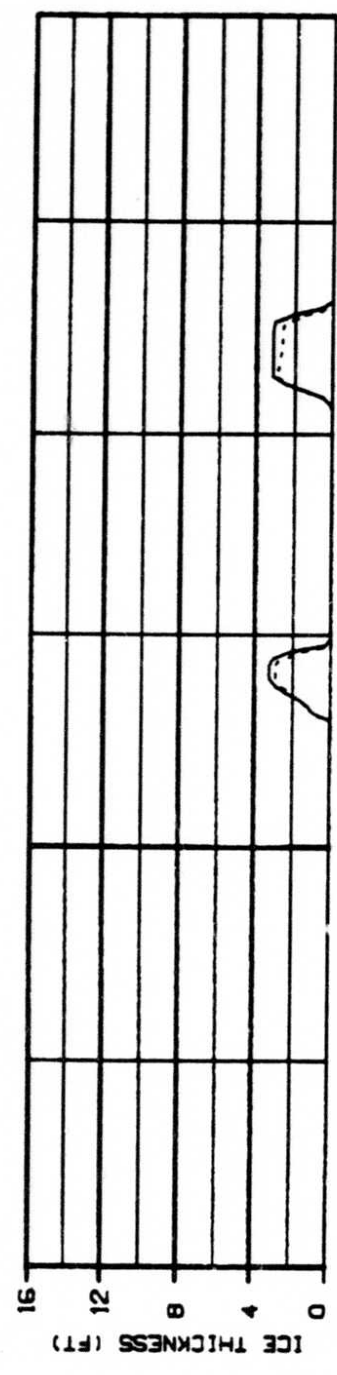
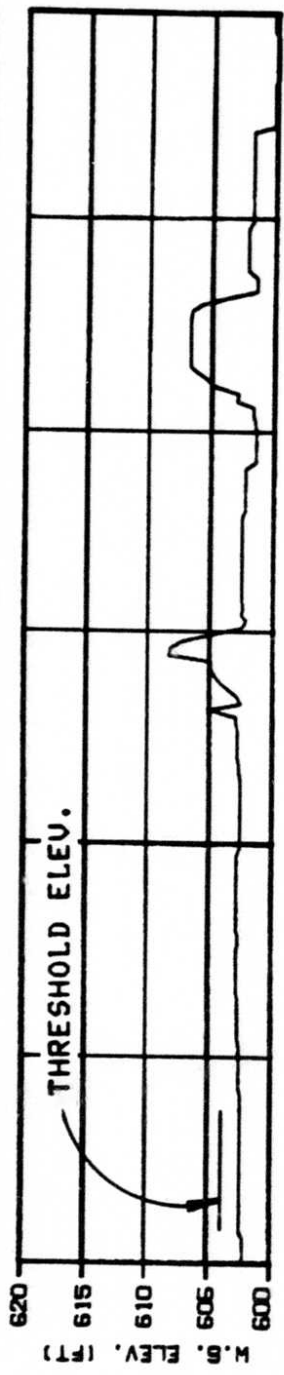


ALASKA POWER AUTHORITY  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRARD JOINT VENTURE  
 SHEET: SA-808 | 3 OF 3 | SHEET 142

HEAD OF SLOUGH 8A (EAST)  
 RIVER MILE : 127.10  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 71200NA

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

C



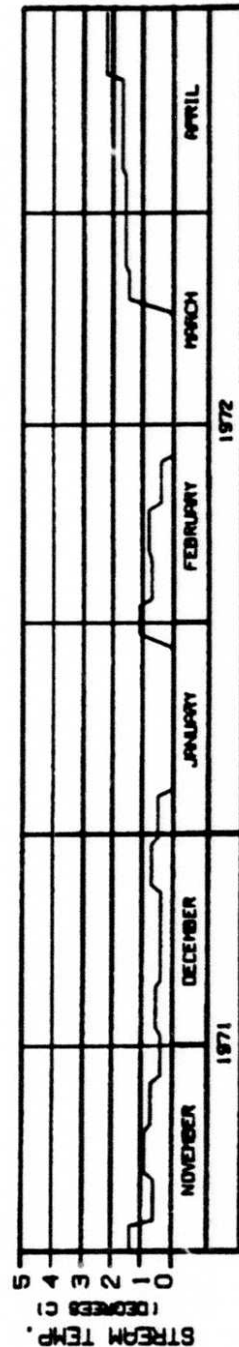
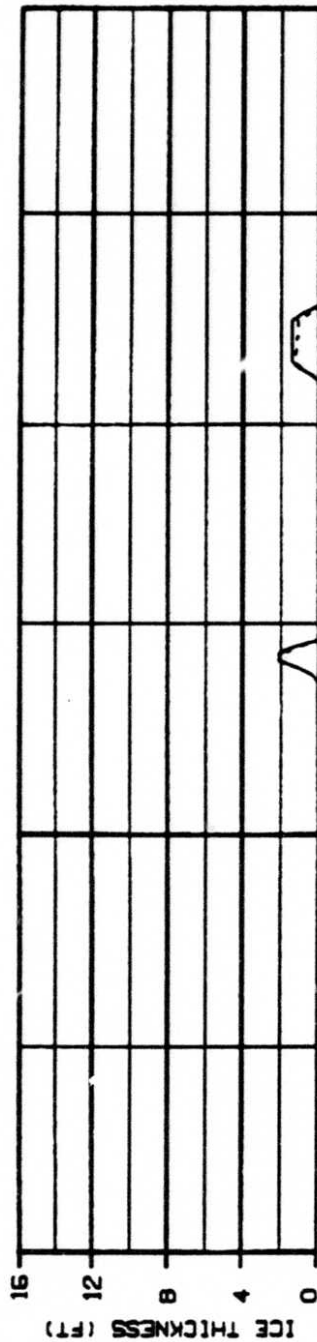
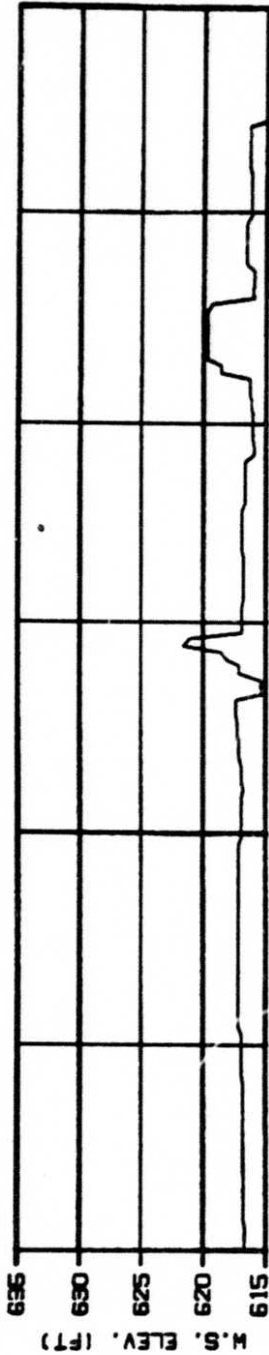
ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ENRSO JOINT VENTURE  
 DRAWING NO. 8-11-71  
 SHEET 142

HEAD OF SLOUGH 9  
 RIVER MILE : 129.30  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE ; NATURAL  
 REFERENCE RUN NO. : 7120CNA

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

OPTION?

OPTION#



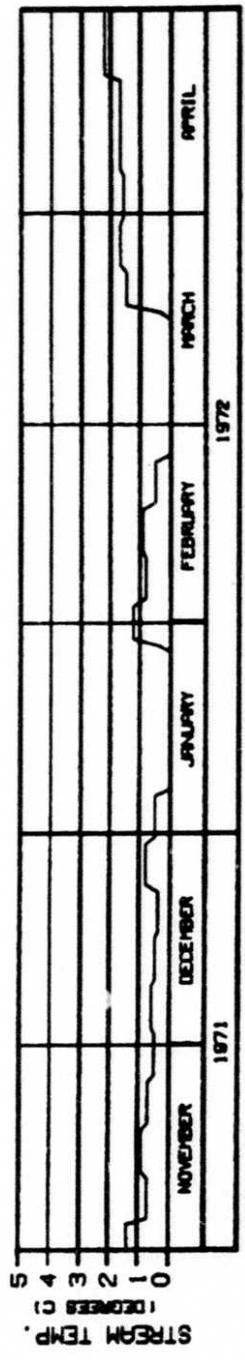
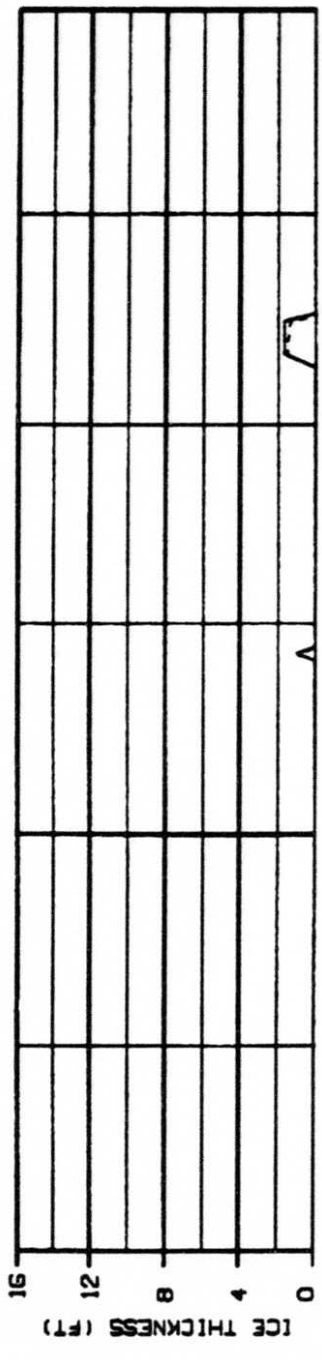
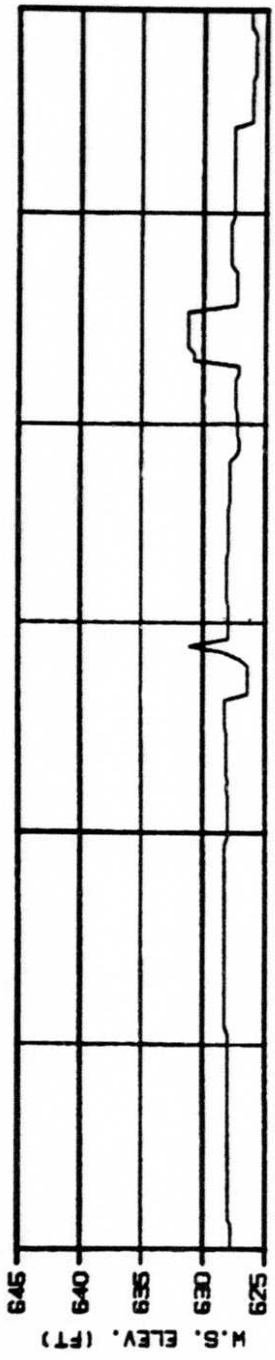
**SIDE CHANNEL U/S OF SLOUGH 9**

RIVER MILE : 130.60

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 71200NA

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

ALASKA POWER AUTHORITY	
SUBMITTING PROJECT	SUSITNA RIVER
	ICE SIMULATION
	TIME HISTORY
PREPARED BY: HARZA-EBASCO JOINT VENTURE	
PROJECT NUMBER	8-11-80
	ISSUE 142

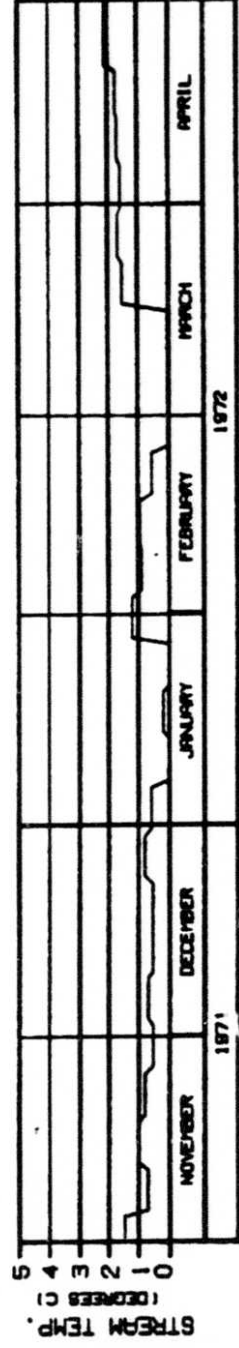
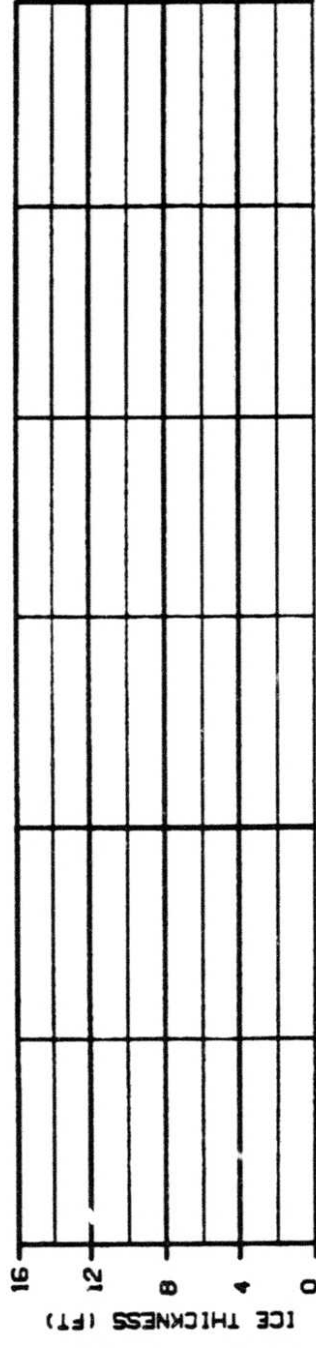
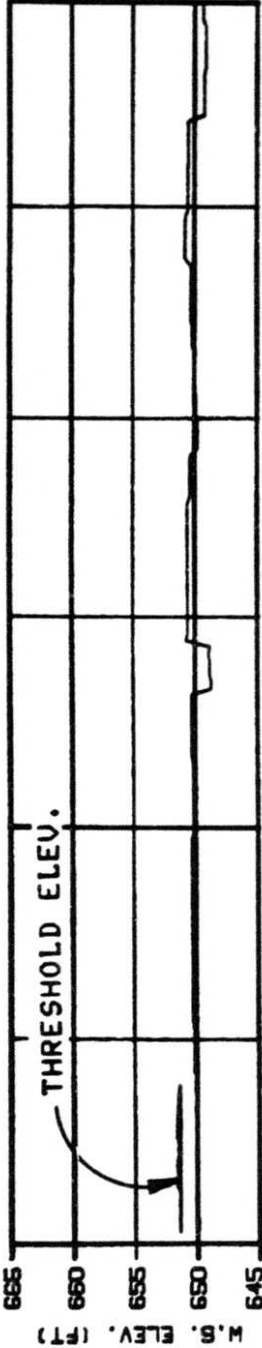


ALASKA POWER AUTHORITY  
 SUBITNA PROJECT  
 SUBITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERD JOINT VENTURE  
 DRAWN: A.L. 0000 8 JUL 80 1000.142

SIDE CHANNEL U/S OF 4TH JULY CREEK  
 RIVER MILE : 131.80  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 712001A

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

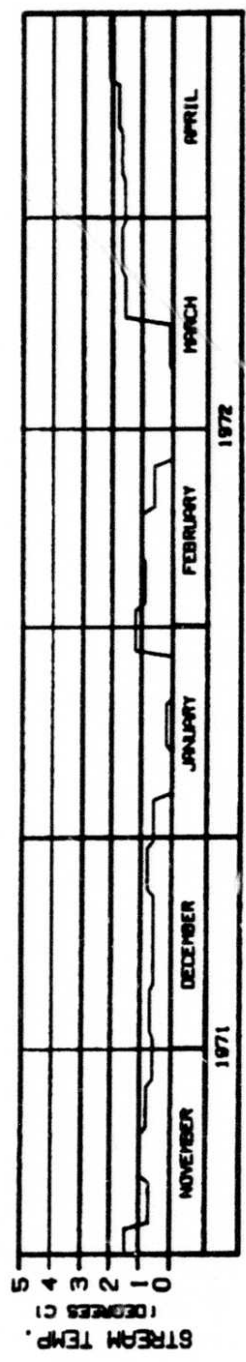
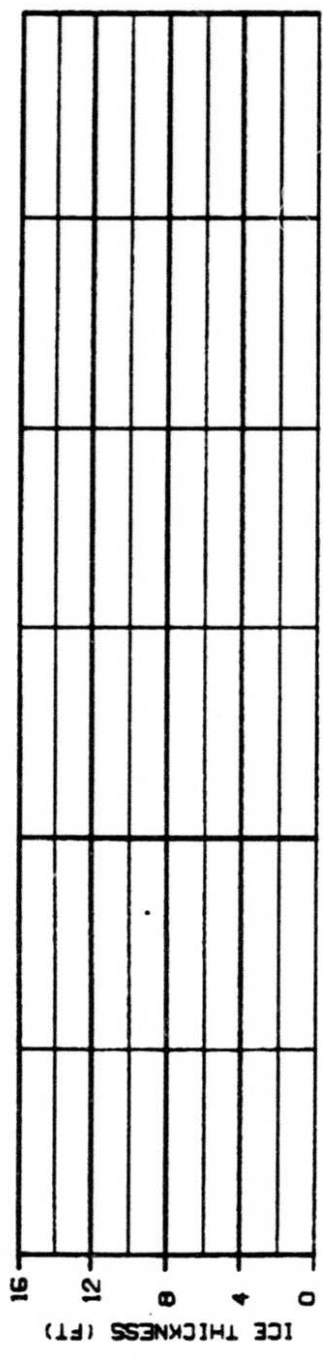
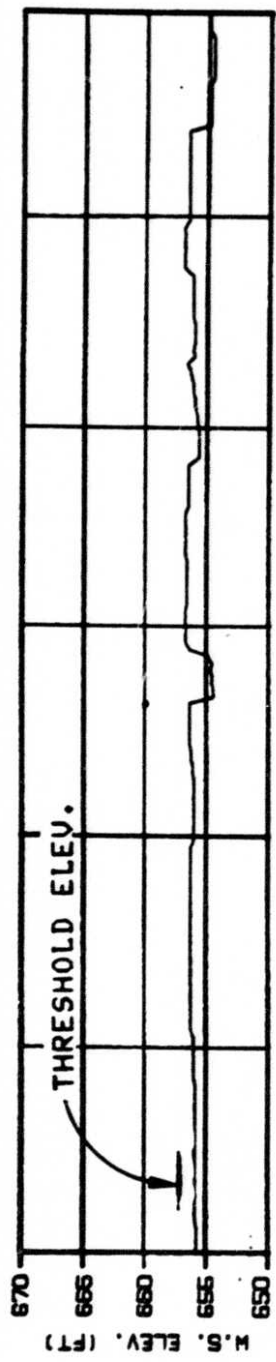




ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRSCO JOINT VENTURE  
 DRAWING: ILS-10000 3 SHE. 04 1000.142

HEAD OF SLOUGH 9A  
 RIVER MILE : 133.70  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 712000A

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



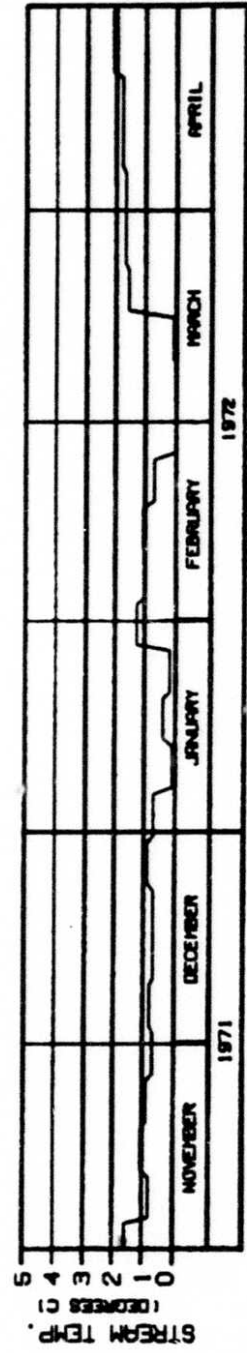
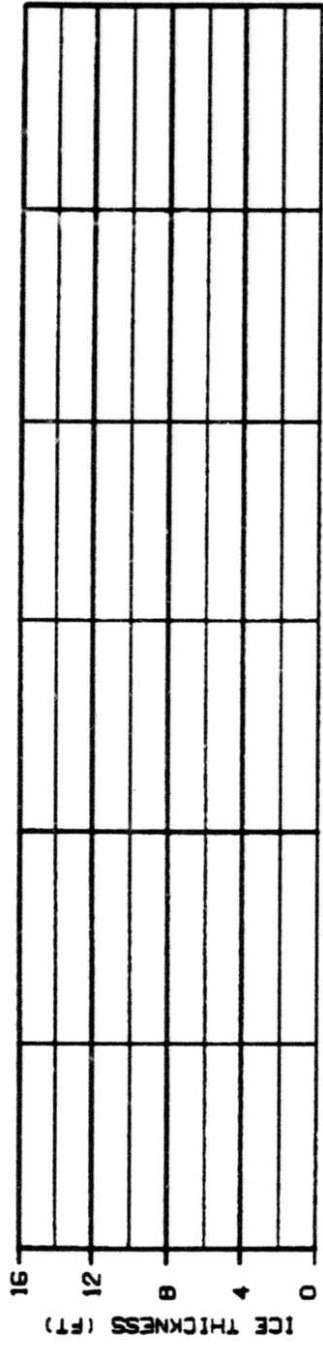
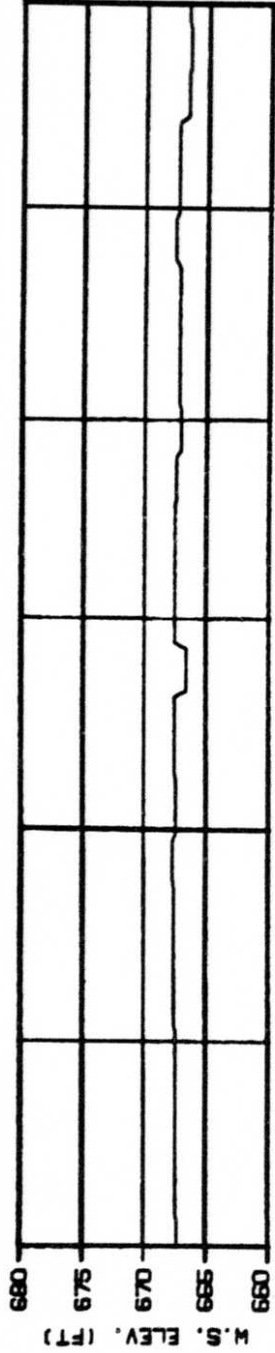
**SIDE CHANNEL U/S OF SLOUGH 10**

**RIVER MILE : 134.30**

WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 71200NA

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

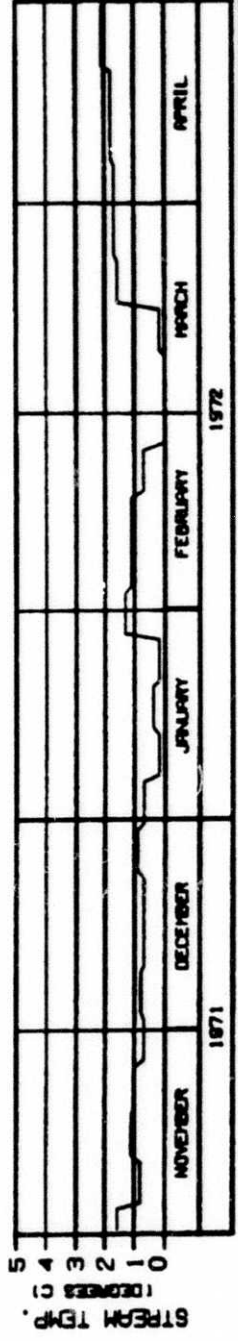
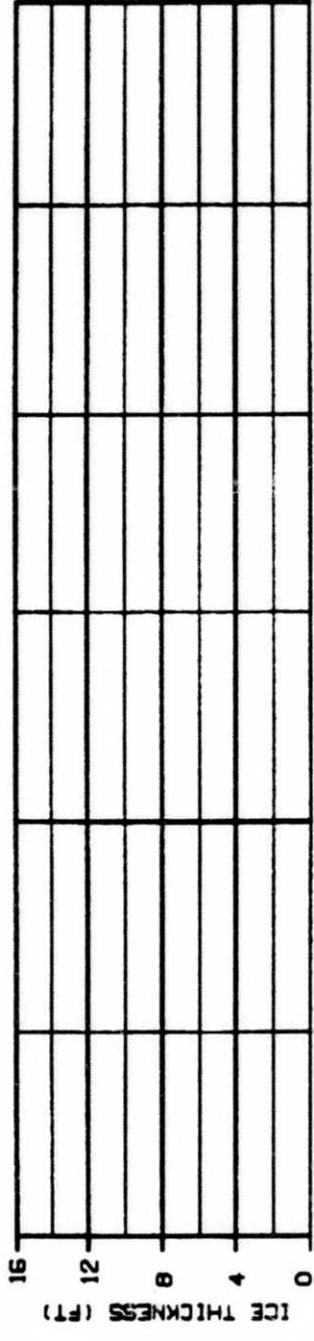
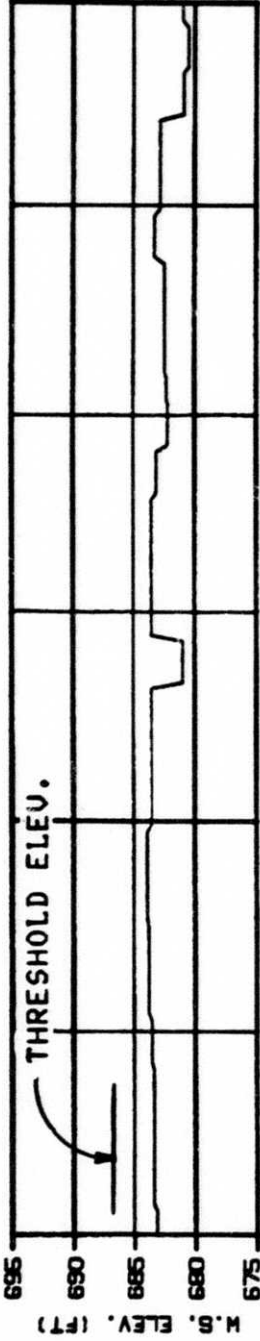
ALASKA POWER AUTHORITY	
SUBMITTER PROJECT	SUSITNA RIVER
ICE SIMULATION	
TIME HISTORY	
HARZA-EBR600 JOINT VENTURE	
DESIGNED BY	DATE
U.S. 1000	9 JUL 81
1000-142	



ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERD JOINT VENTURE  
 DRAWING NUMBER : 8-14-72  
 SHEET : 142

**SIDE CHANNEL D/S OF SLOUGH 11**  
**RIVER MILE : 135.30**  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RISE, NATURAL  
 REFERENCE RUN NO. : 712000A

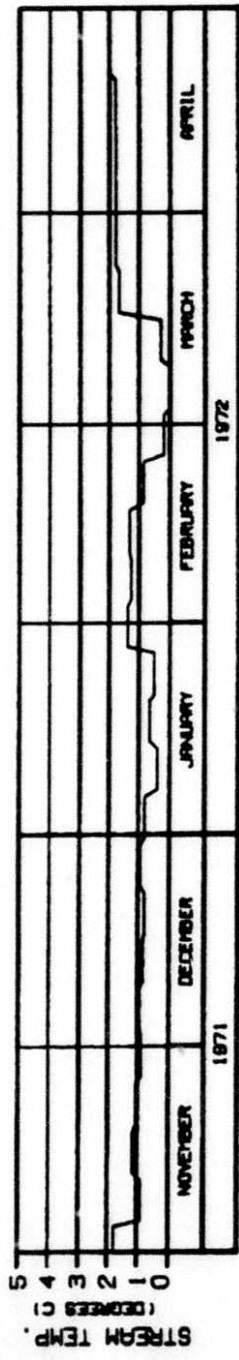
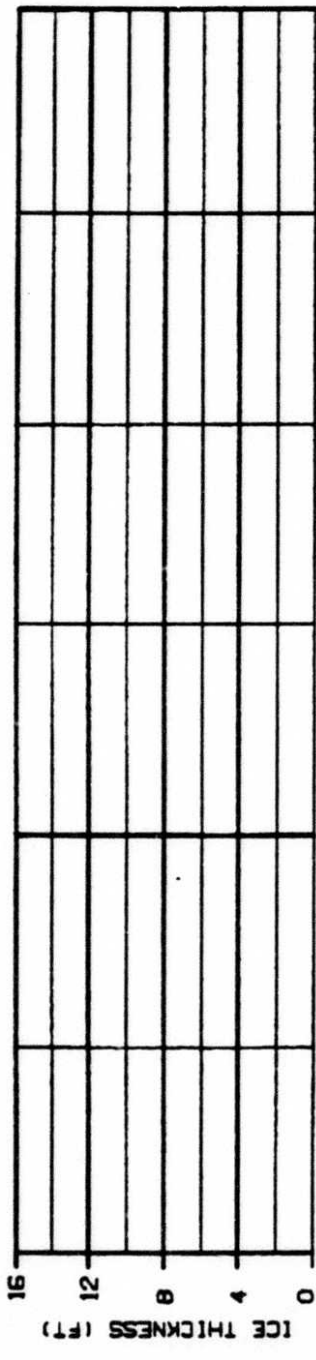
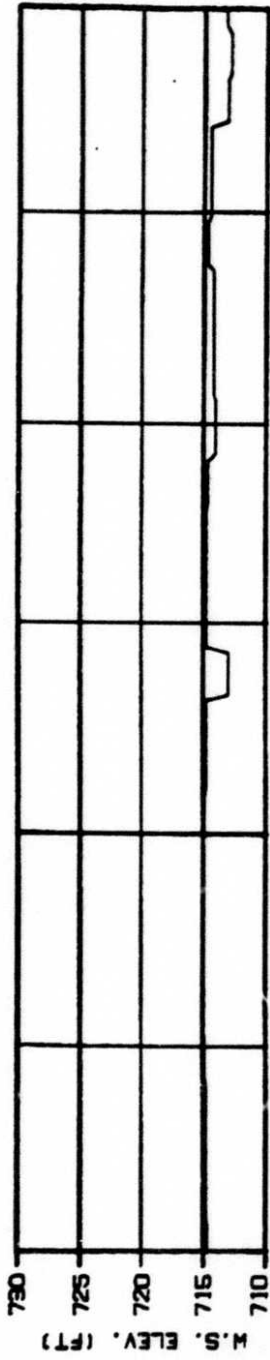
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY	
SUSTITNA PROJECT	SUSTITNA RIVER
	ICE SIMULATION
	TIME HISTORY
	HARZA-EBERD JOINT VENTURE
DESIGN. DATE	0 JUL 80
	DRW. 142

HEAD OF SLOUGH 11  
 RIVER MILE : 136.50  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 71200NA

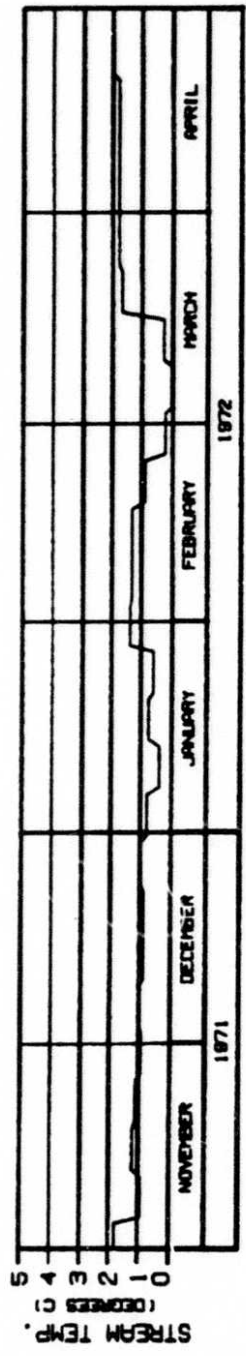
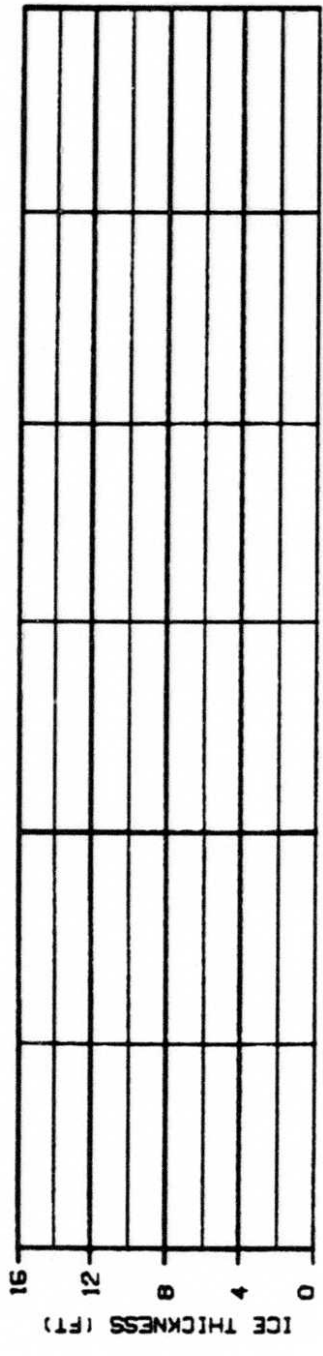
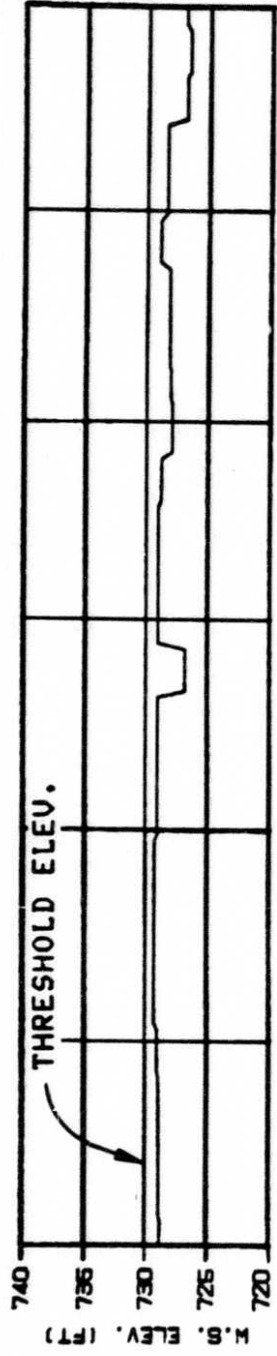
ICE THICKNESS LEGEND:  
 - - - - - TOTAL THICKNESS  
 - - - - - SLOUGH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRSCO JOINT VENTURE  
 DRAWN: J.J. BROWN | 8 JUL 72 | 1000.142

HEAD OF SLOUGH 17  
 RIVER MILE : 139.30  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C  
 REFERENCE RUN NO. : 712000A

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

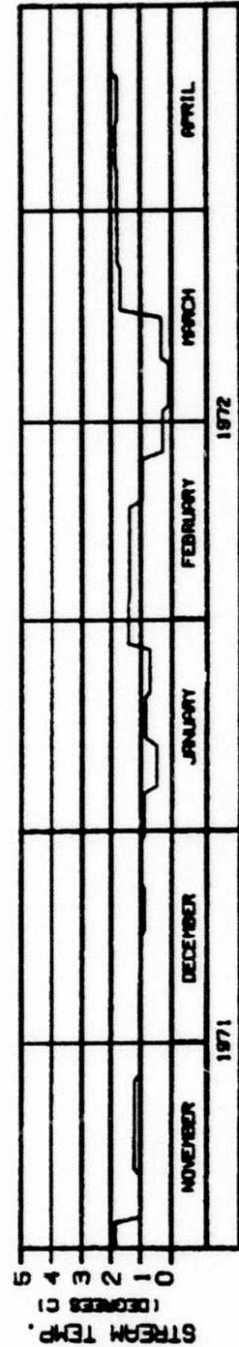
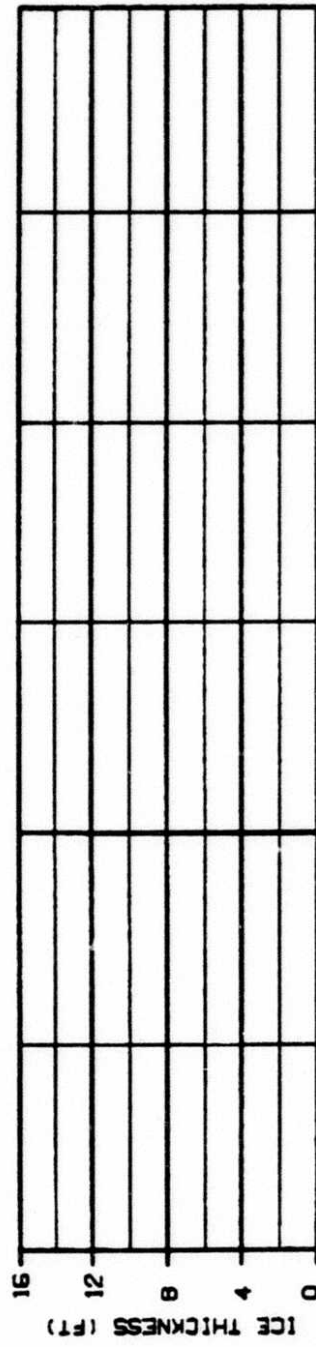
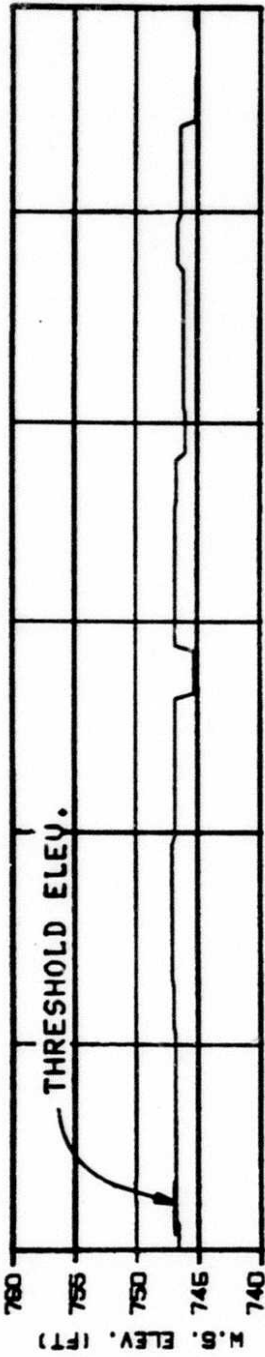


ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRARD JOINT VENTURE  
 DRAWN: B.A. 8/82 P. 14. 82  
 SHEET: 142

HEAD OF SLOUGH 20  
 RIVER MILE : 140.50  
 WEATHER PERIOD : NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RILE : NATURAL  
 REFERENCE RUN NO. : 712000A

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

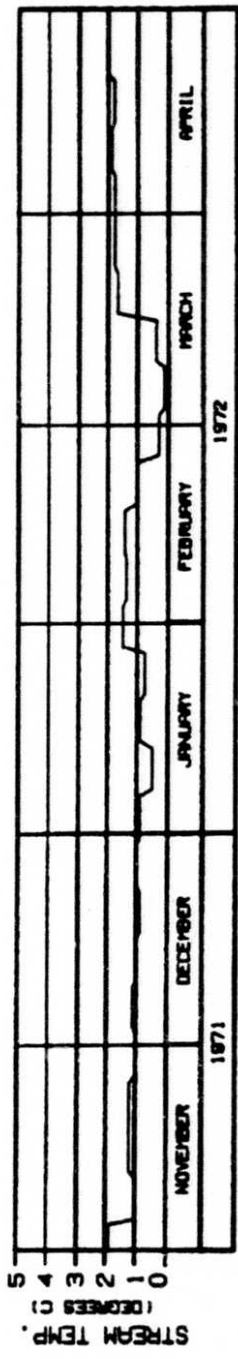
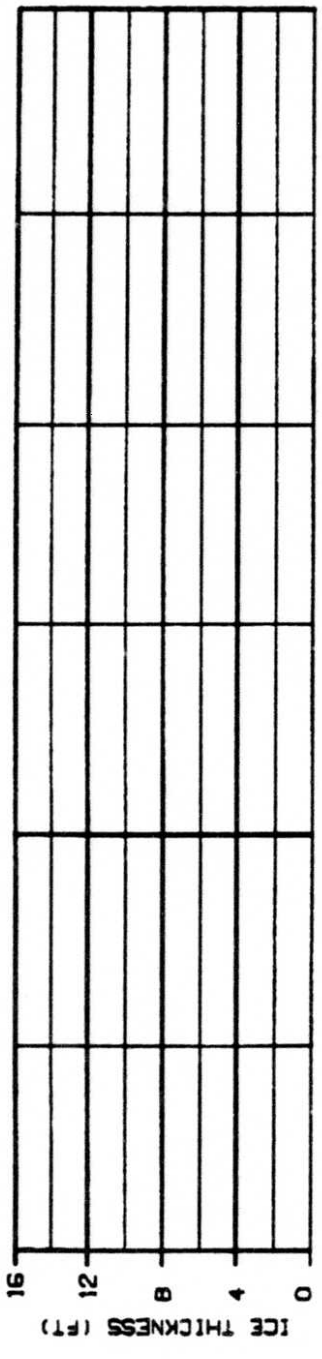
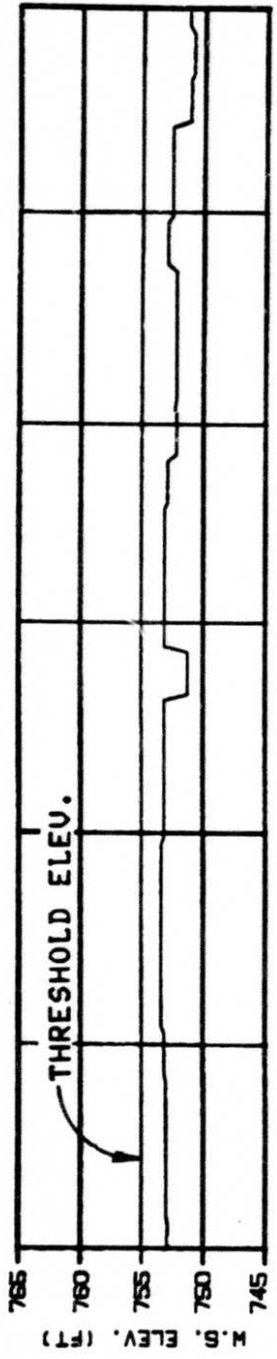




ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARPER-ERBACD JOINT VENTURE  
 DRAWN: S. L. BROWN 5 JUL 80 1000-1-142

SLOUGH 21 (ENTRANCE A6)  
 RIVER MILE : 141.80  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 712000A

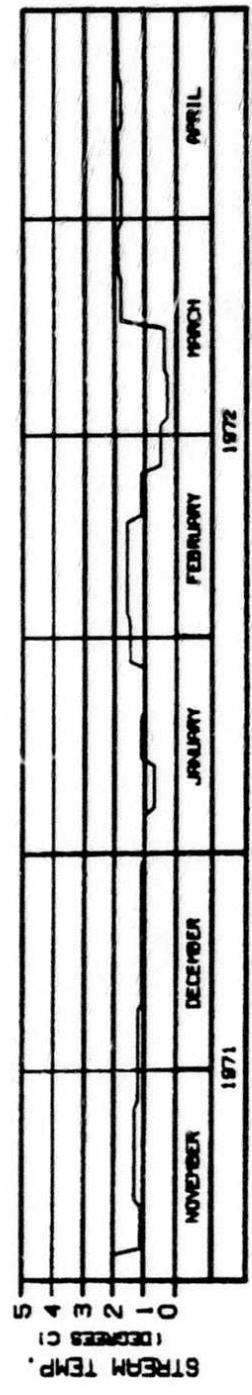
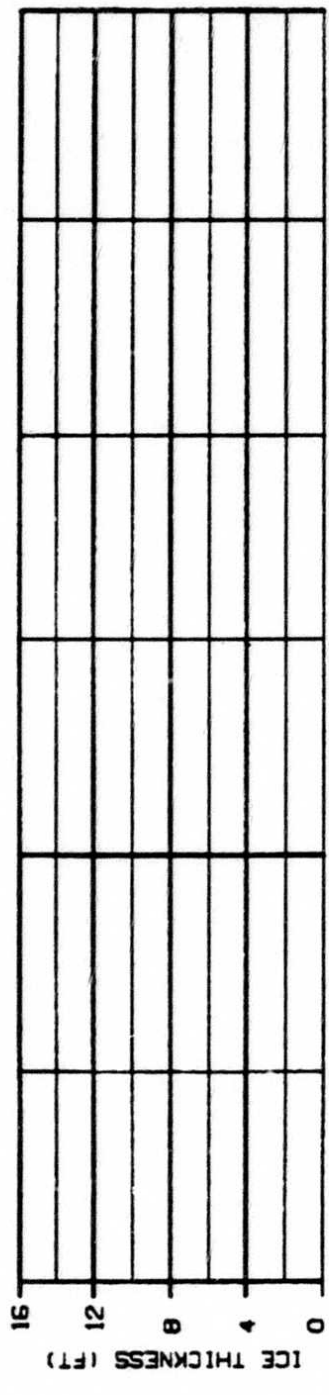
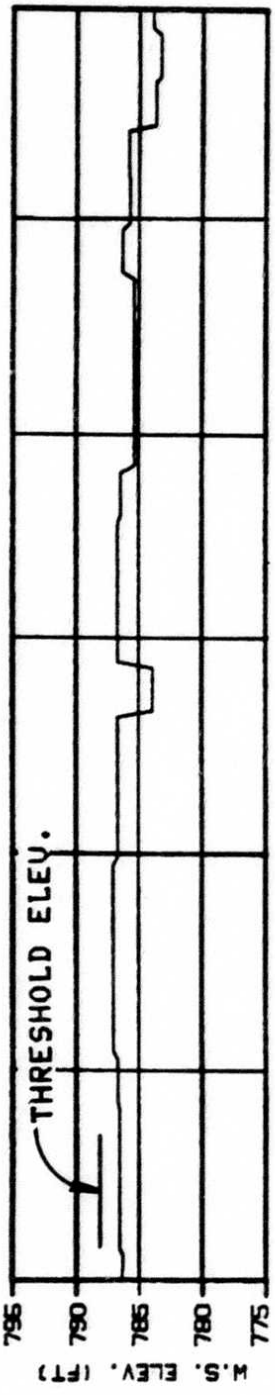
ICE THICKNESS LEGEND:  
 ----- TOTAL THICKNESS  
 ..... SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBBSCO JOINT VENTURE  
 DRAWING: A.L. 9499 8 JUL 72 9888.142

HEAD OF SLOUGH 21  
 RIVER MILE : 142.20  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP RULE : NATURAL  
 REFERENCE RUN NO. : 71200NA

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



ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBEDO JOINT VENTURE  
 ORDER NO. AL-1408 9 JUL 81 MSB.148

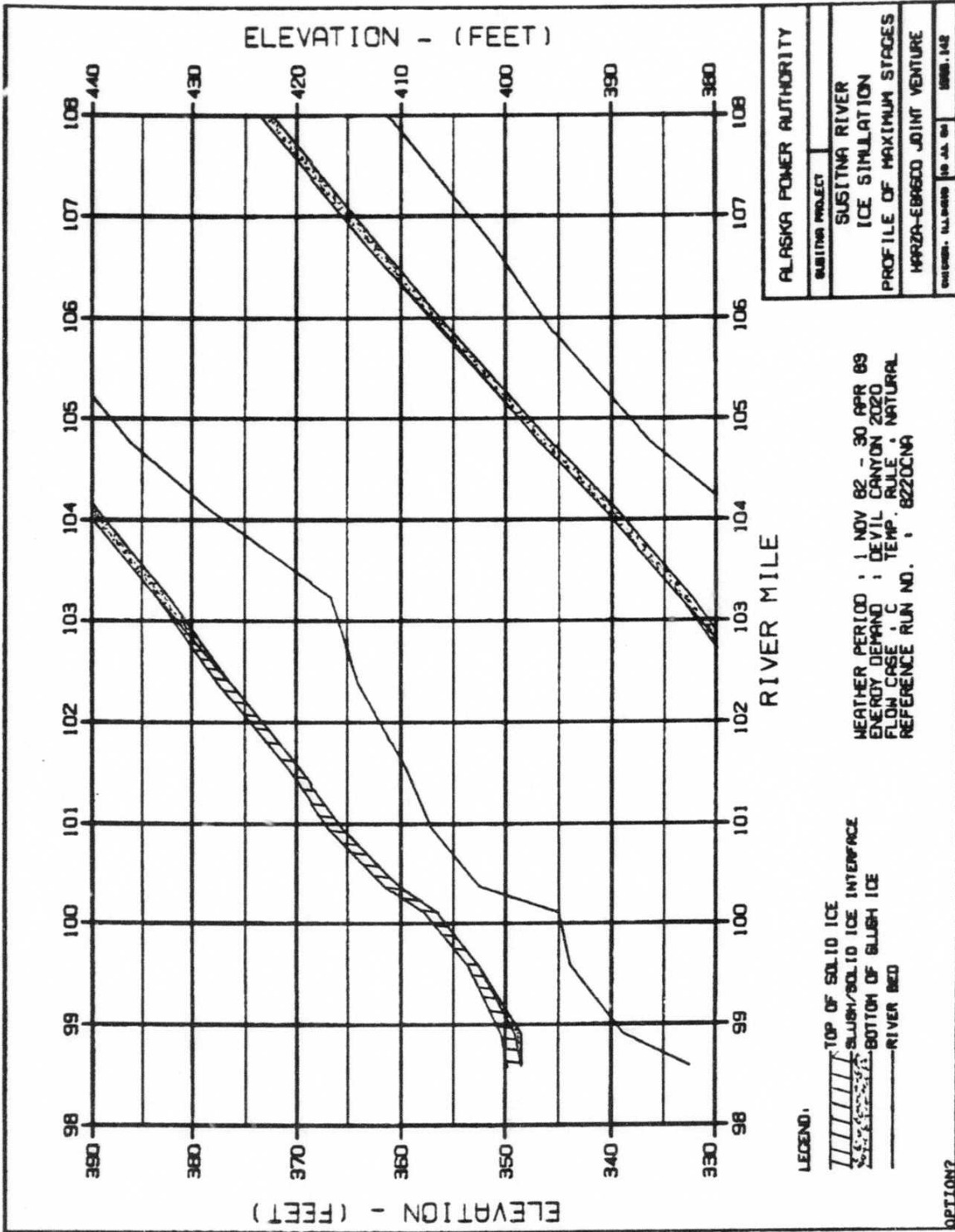
HEAD OF SLOUGH 22  
 RIVER MILE : 144.80  
 WEATHER PERIOD : 1 NOV 71 - 30 APR 72  
 ENERGY DEMAND : 0.000  
 FLOW CASE : C  
 REFERENCE RUN NO. : 712009A

ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SUBST. COMPONENT

OPTION 7

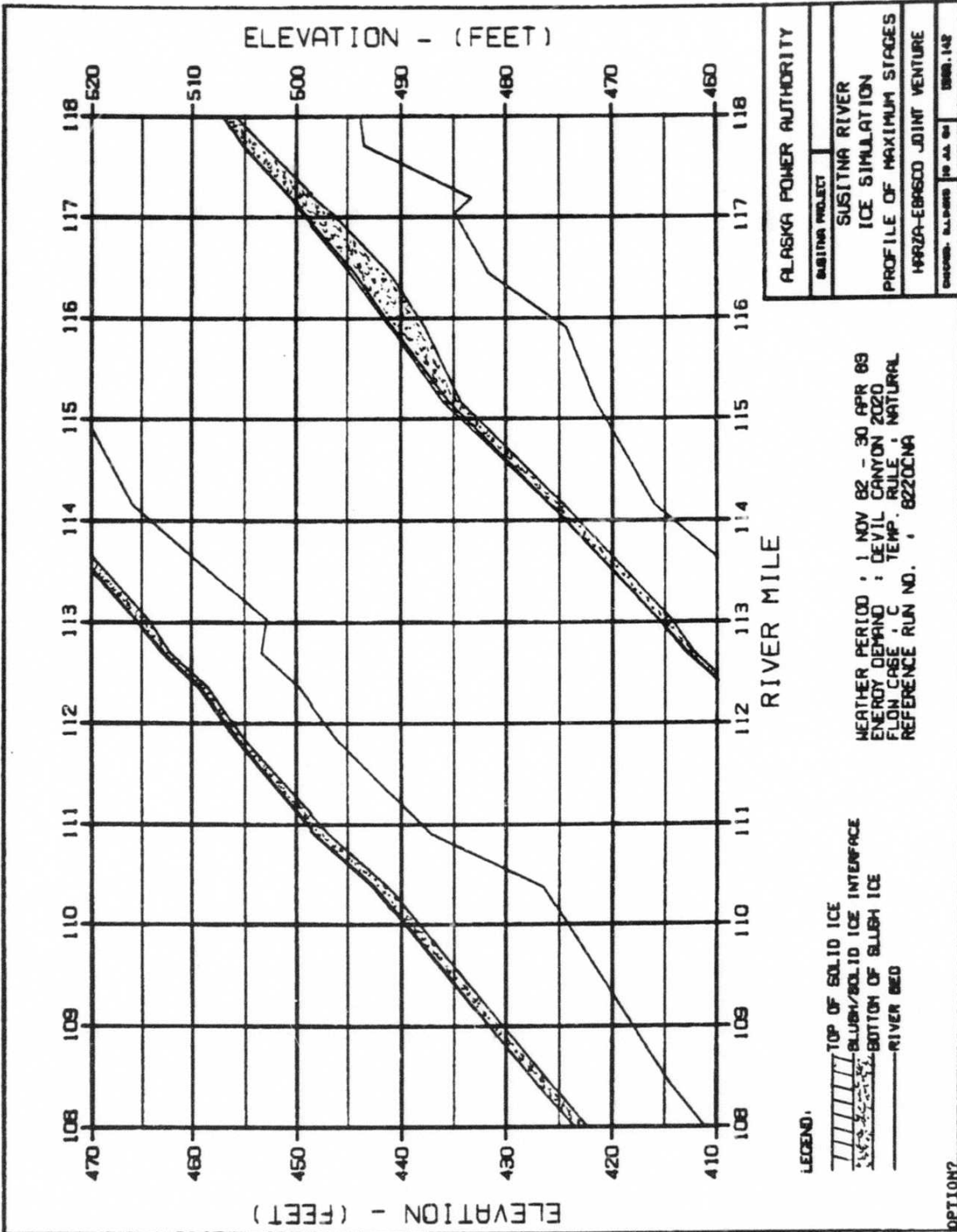
**EXHIBIT Q**

cc



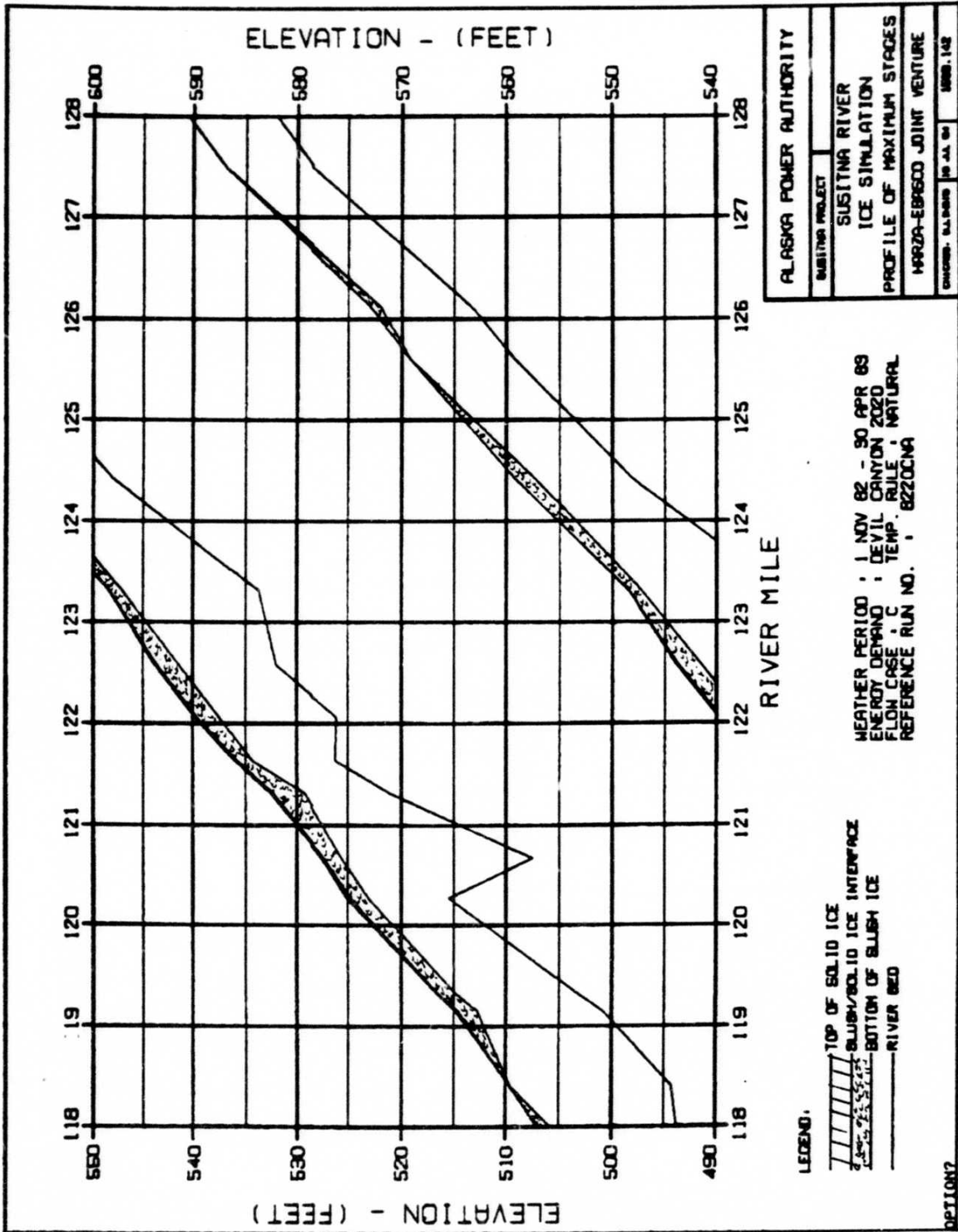


CC

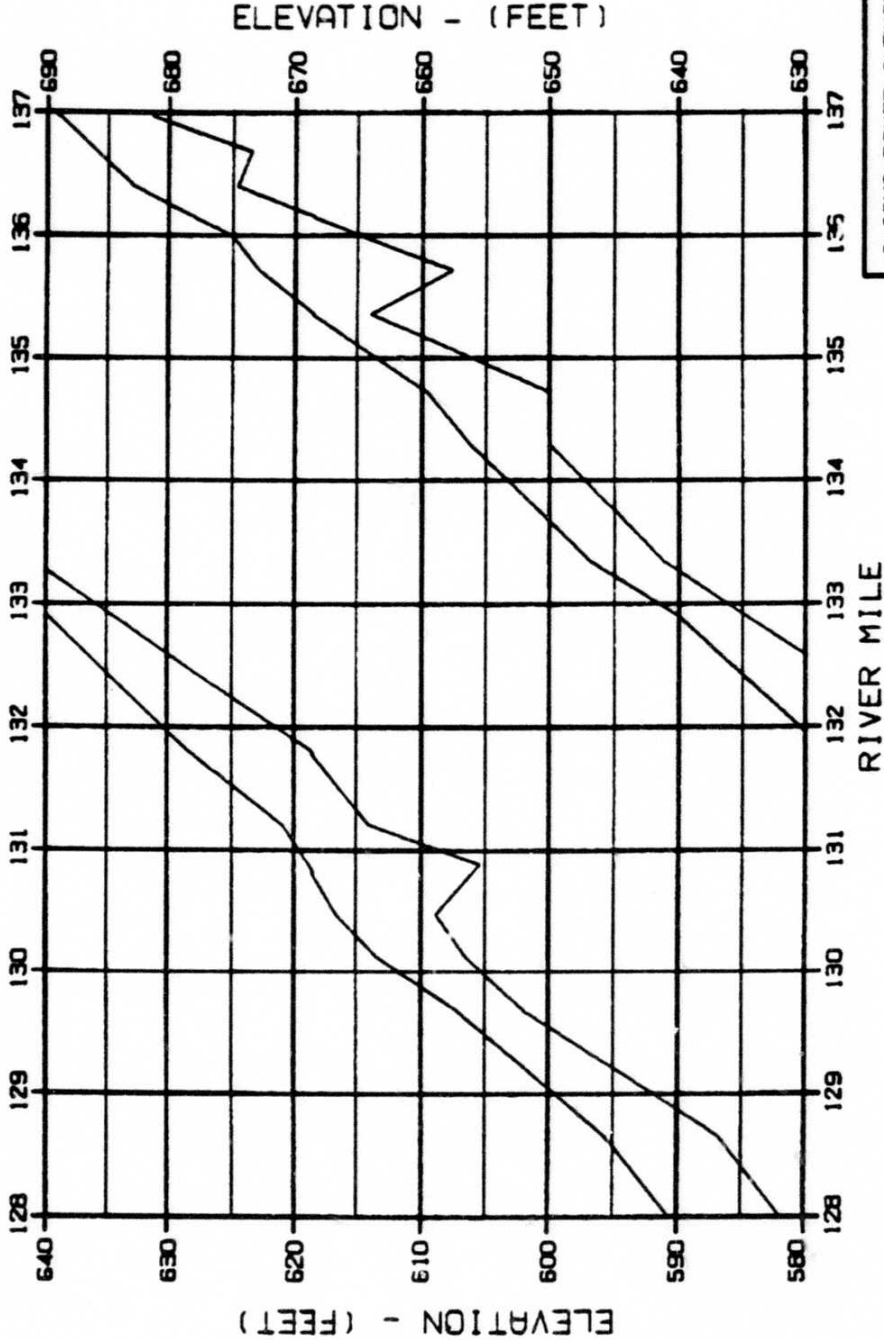




cc



CC



LEGEND:

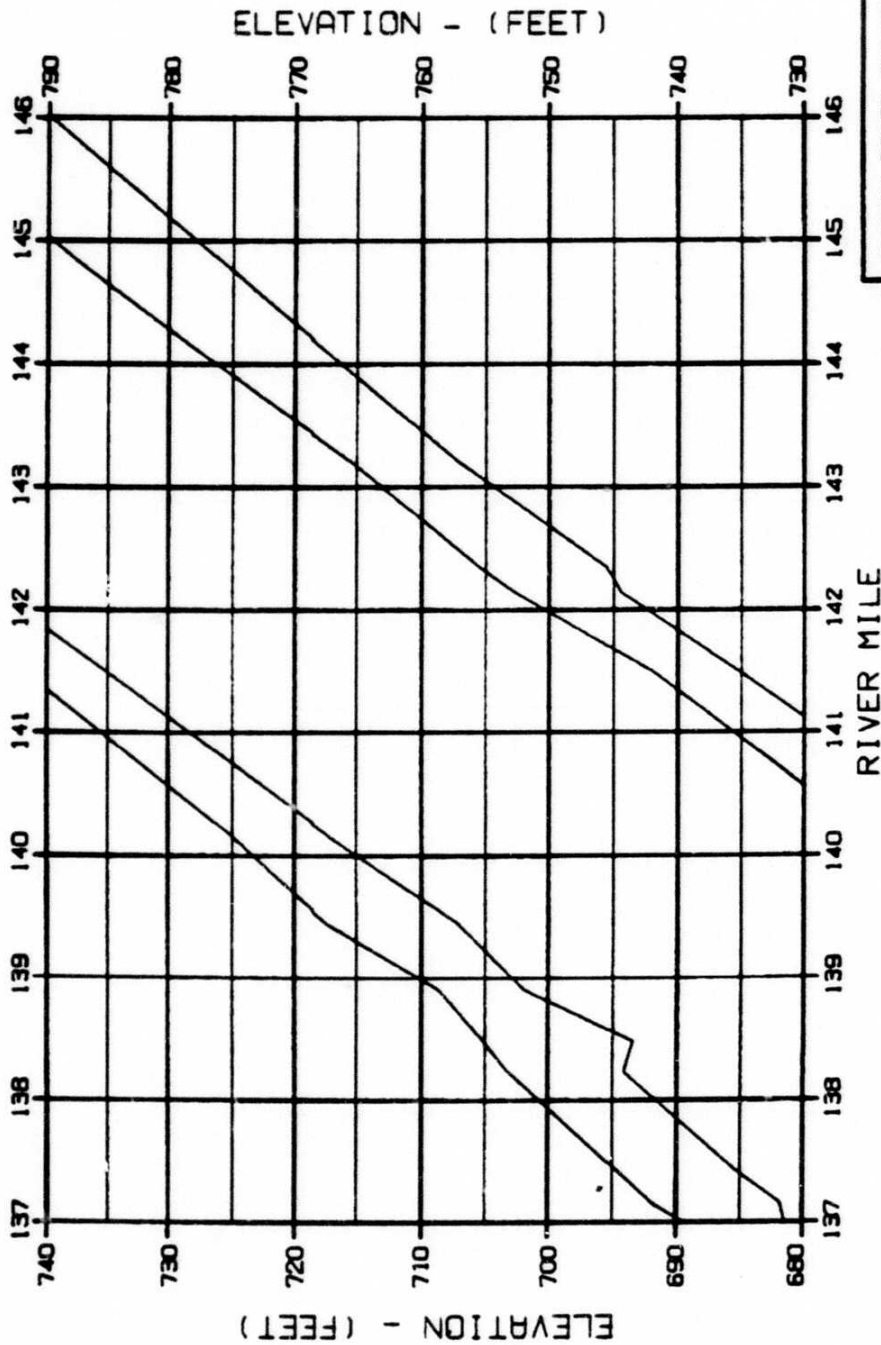
- ▬ TOP OF SOLID ICE
- - - SLUSH/SOLID ICE INTERFACE
- ⋯ BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 82 - 30 APR 89  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP : NATURAL  
 REFERENCE RUN NO. : 82200CA

ALASKA POWER AUTHORITY	
SUBMITTA PROJECT	SUSITNA RIVER
	ICE SIMULATION
	PROFILE OF MAXIMUM STAGES
	HARZA-EBRISCO JOINT VENTURE
DESIGNED BY	10 JUL 84
PROJECT NO.	82200.142

OPTION 2

CC



LEGEND:

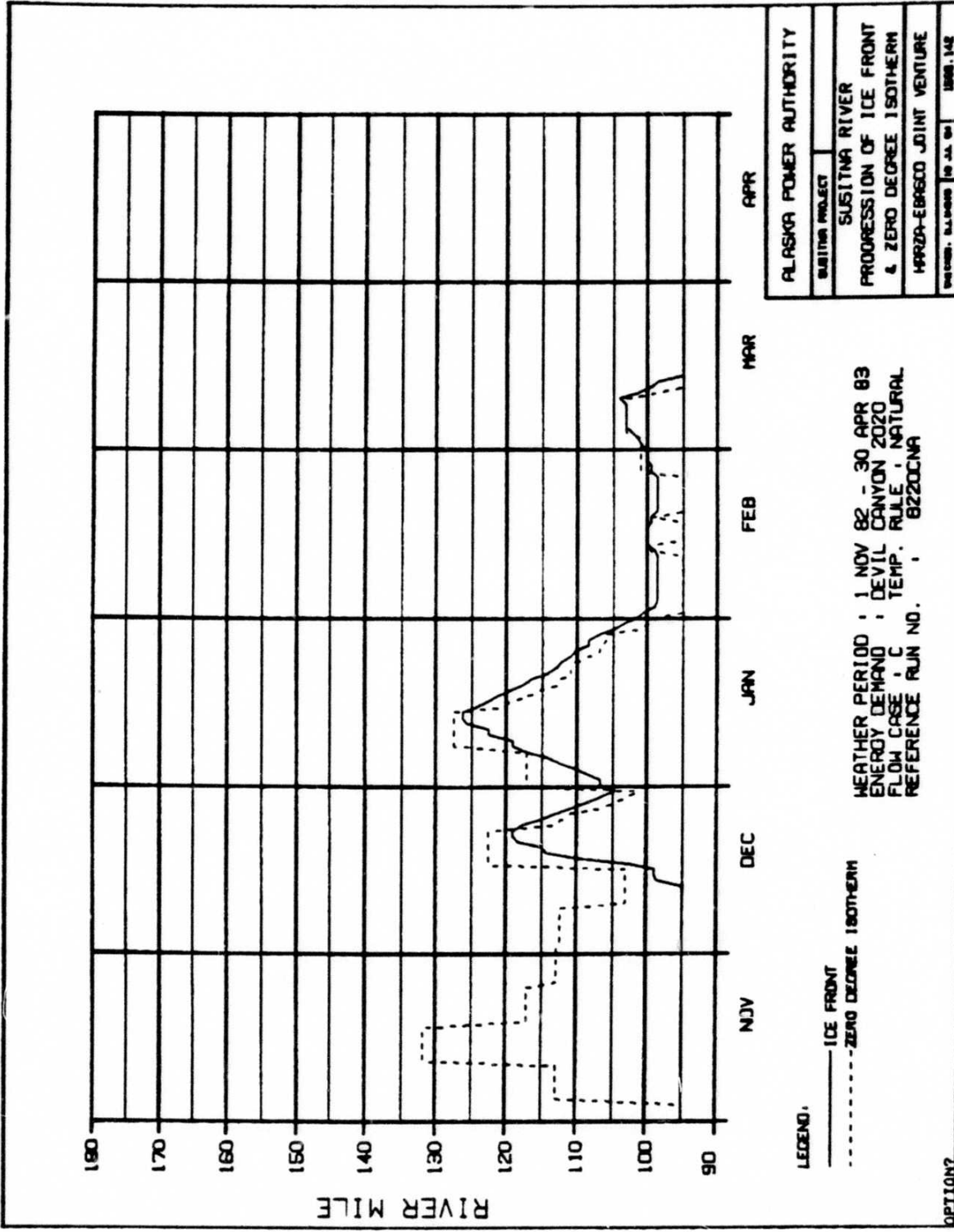
- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- BOTTOM OF SLUSH ICE
- RIVER BED

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP. RULE : NATURAL  
 REFERENCE RUN NO. : 8220CNA

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	SUSITNA RIVER
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
HARZA-ERBACD JOINT VENTURE	
DATE: 8.2.88	BY: J. A. W.
888.142	

OPTION?

CC

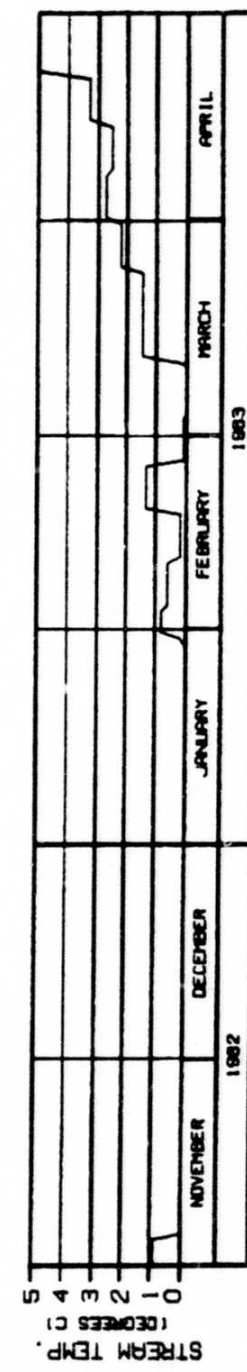
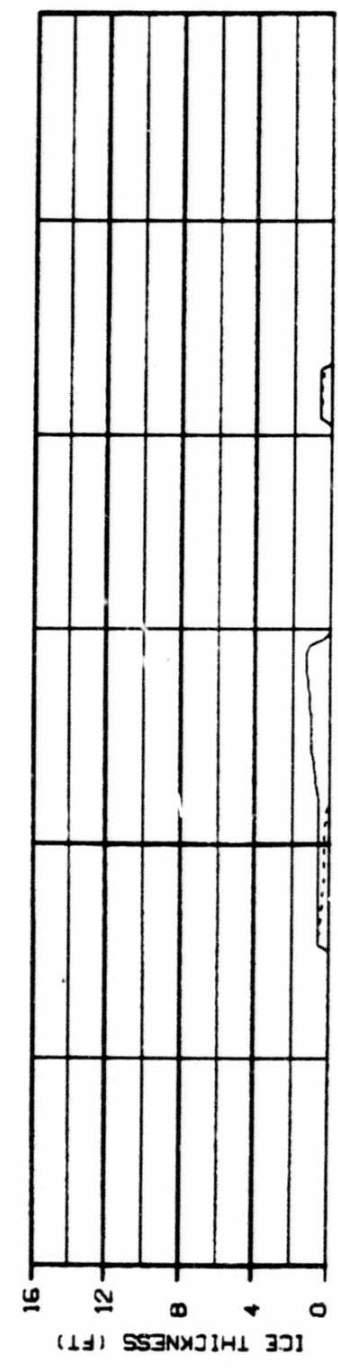
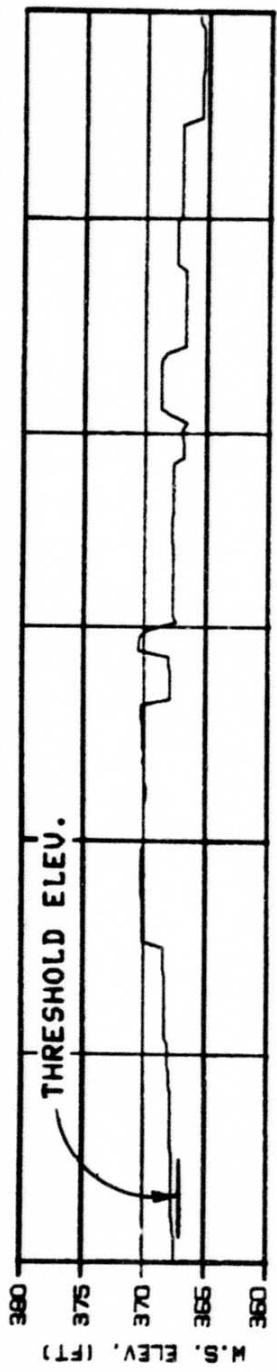


ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOOTHERM  
 HARZA-ERBACO JOINT VENTURE  
 PROJECT NUMBER: 8220CNA  
 10 JAN 83  
 1988.142

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP. RULE : NATURAL  
 REFERENCE RUN NO. : 8220CNA

LEGEND:  
 — ICE FRONT  
 - - - ZERO DEGREE ISOOTHERM

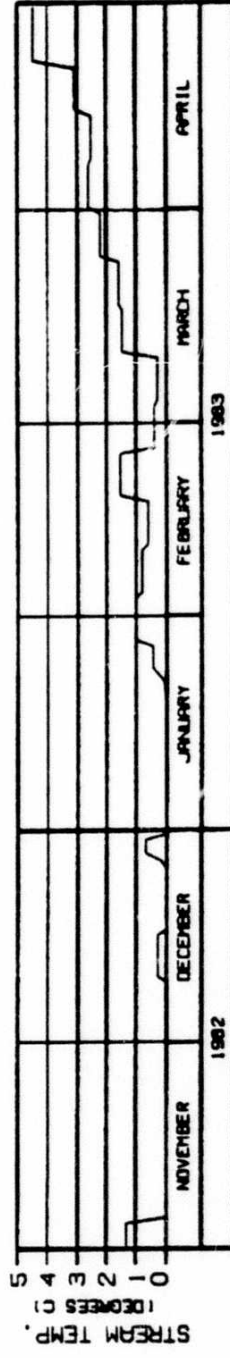
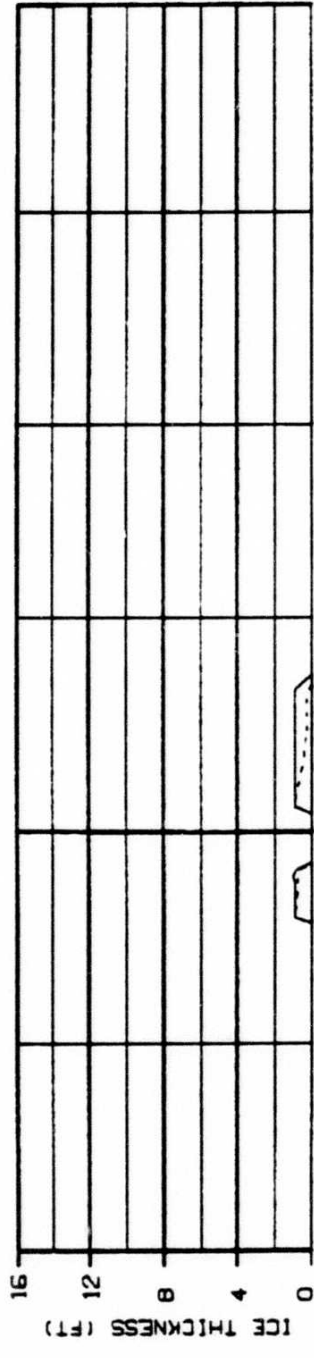
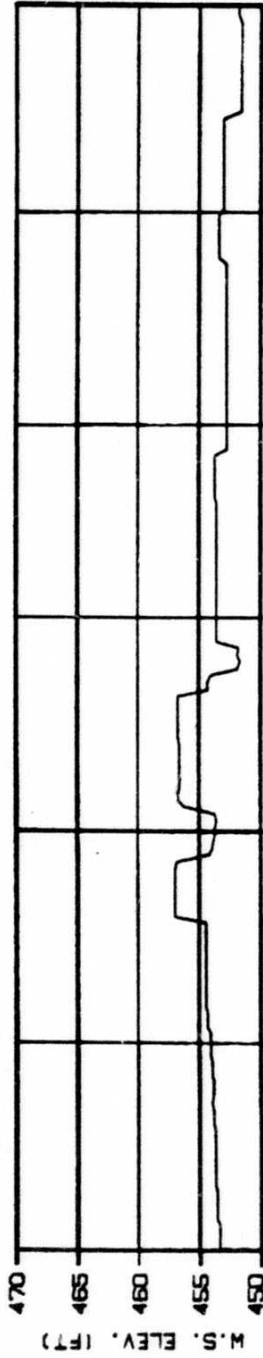
OPTION?



ALASKA POWER AUTHORITY  
 SUBSTINA PROJECT  
 SUBSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBBECO JOINT VENTURE  
 ORDER: 4.1.8818 10 A.A. 01 1883.142

HEAD OF WHISKERS SLOUGH  
 RIVER MILE : 101.50  
 WEATHER PERIOD : NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C RULLE, NATURAL  
 REFERENCE RUN NO. : 82200NA

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



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRISCO JOINT VENTURE  
 ORDER: 81-0819 10 JAN 84 1989.142

**SIDE CHANNEL AT HEAD OF GASH CREEK**  
 RIVER MILE : 112.00  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C  
 TEMP. RULE : NATURAL  
 REFERENCE RUN NO. : 822000A

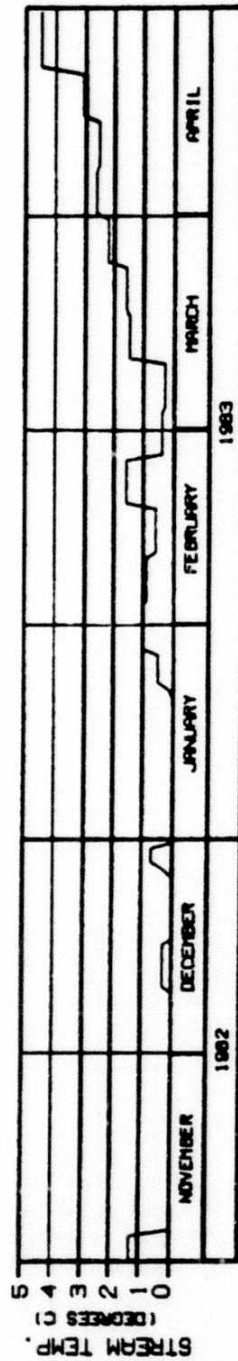
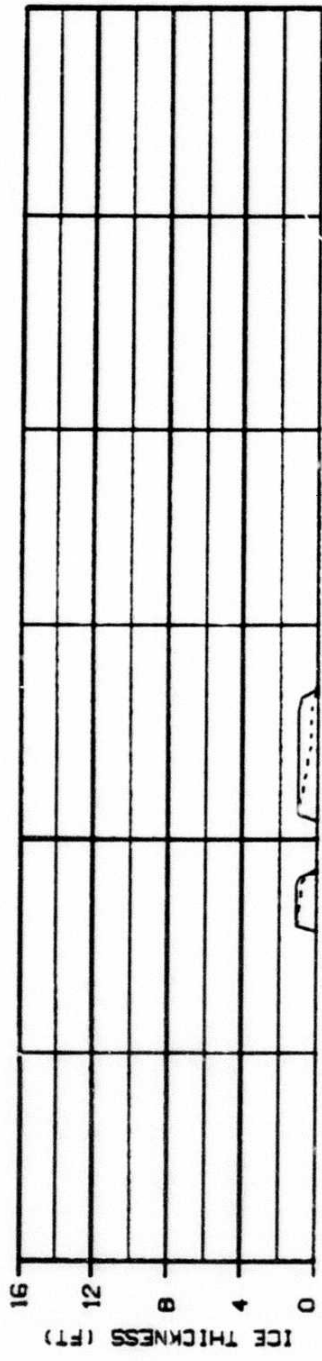
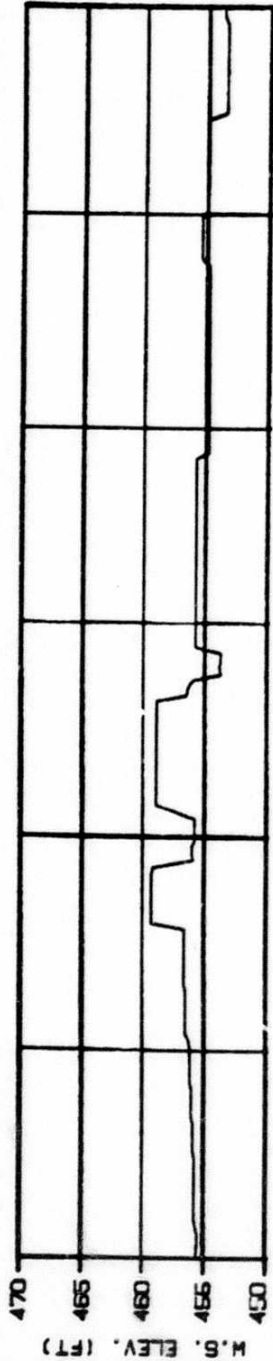
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT

1983

1982

NOVEMBER DECEMBER JANUARY FEBRUARY MARCH APRIL

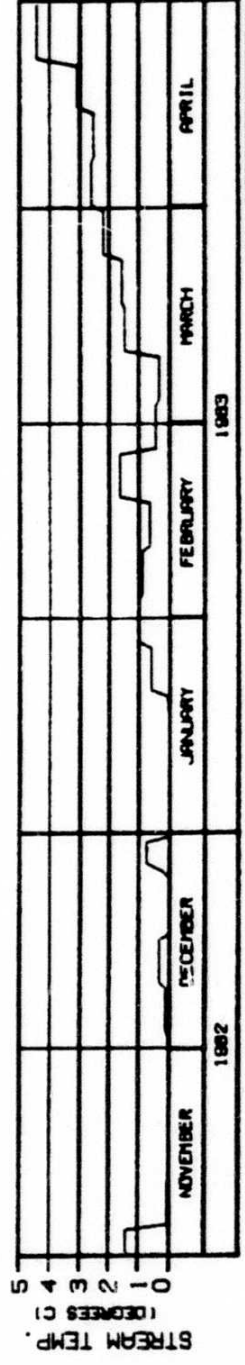
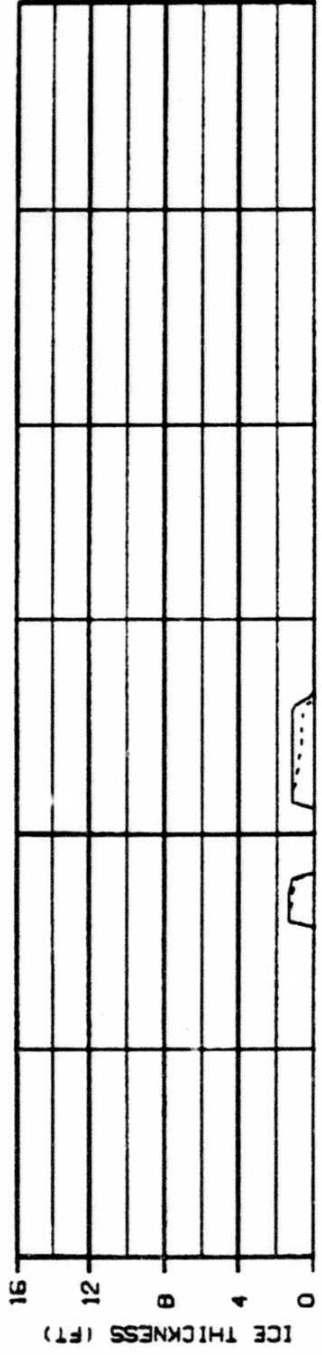
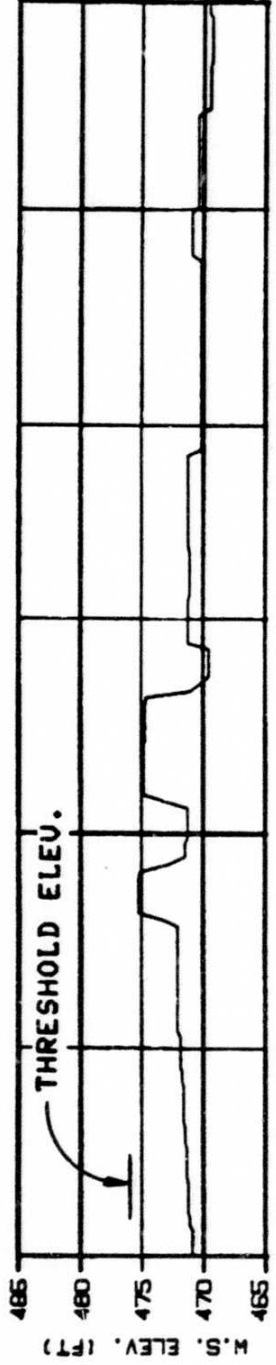




ALASKA POWER AUTHORITY  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERASCO JOINT VENTURE  
 ORDER NUMBER 80 AA 08  
 SHEET 142

MOUTH OF SLOUGH 6A  
 RIVER MILE : 112.34  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP : RULE : NATURAL  
 REFERENCE RUN NO. : BZZOONA

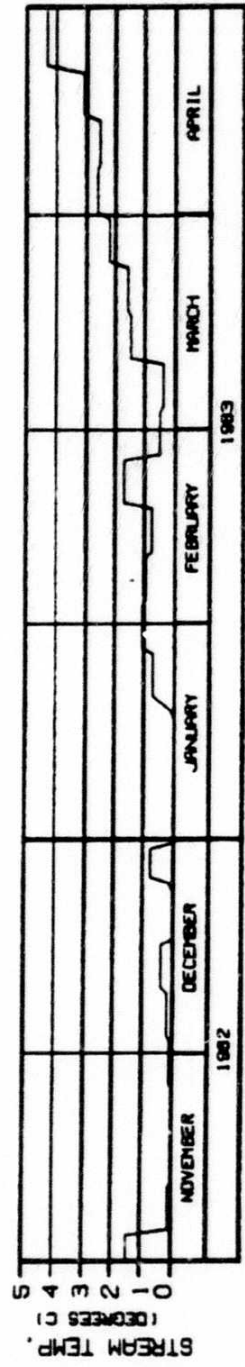
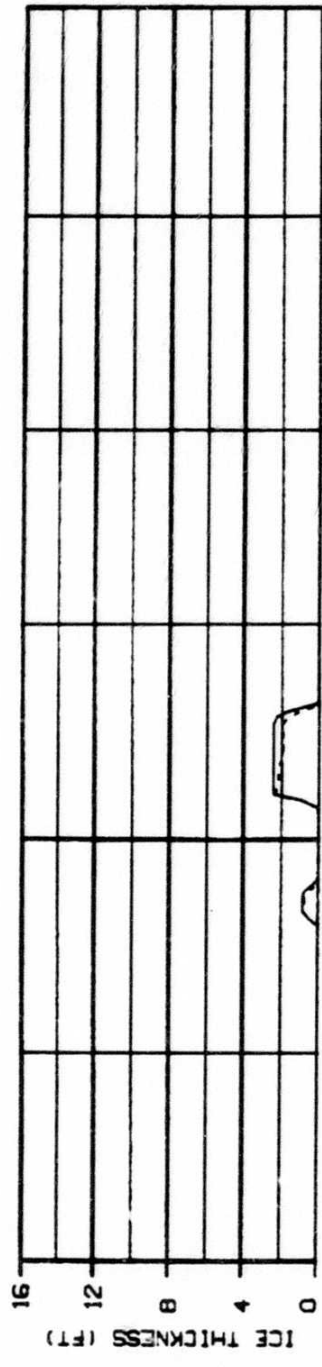
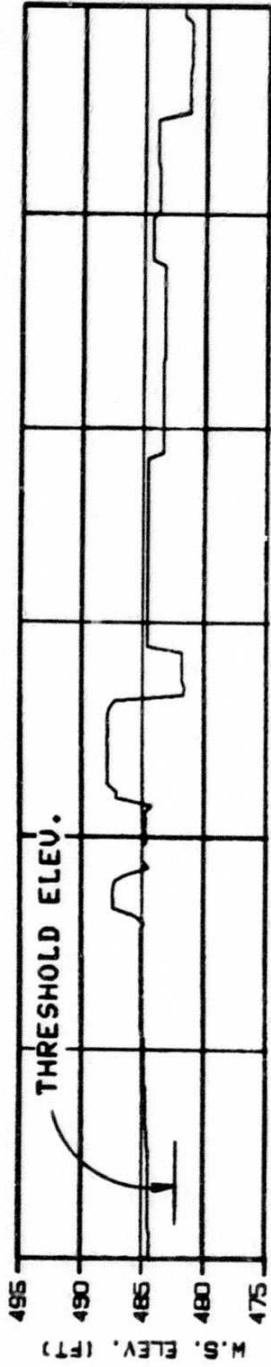
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLOUGH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBASCO JOINT VENTURE  
 ORDER: 81-0009 10 24 83 1000.142

HEAD OF SLOUGH 8  
 RIVER MILE : 114.10  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP. : NATURAL  
 REFERENCE RUN NO. : 822000A

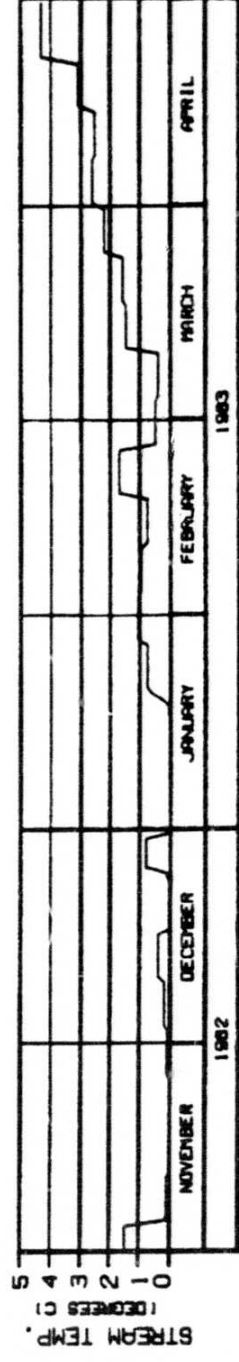
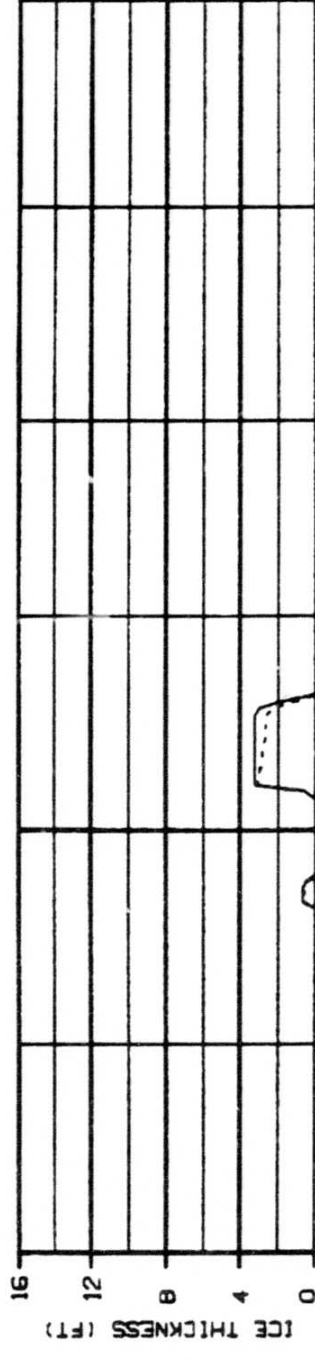
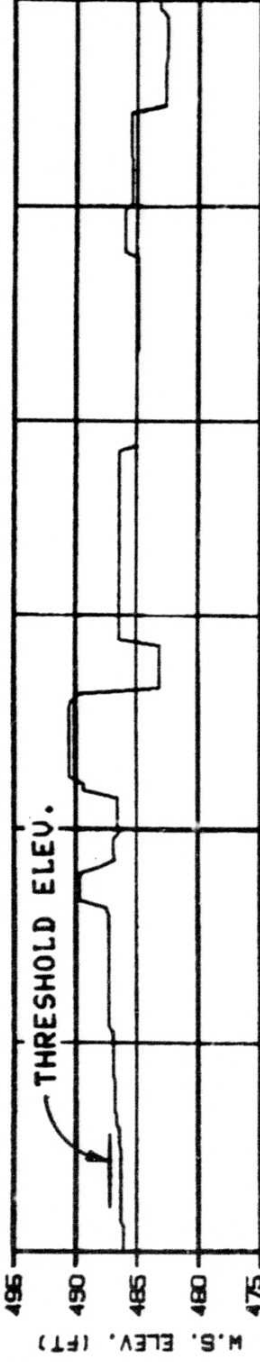
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRACO JOINT VENTURE  
 DESIGN: A.L. 8888 10 JUL 83 1988.14E

**SIDE CHANNEL MSII**  
 RIVER MILE : 115.50  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP. : NATURAL  
 REFERENCE RUN NO. : 82200NA

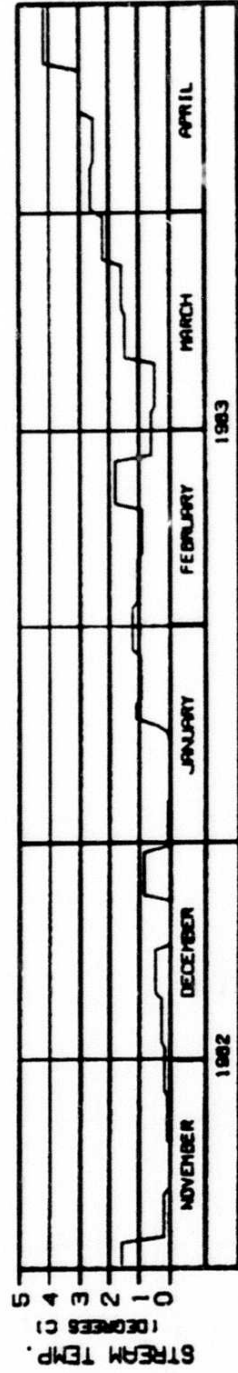
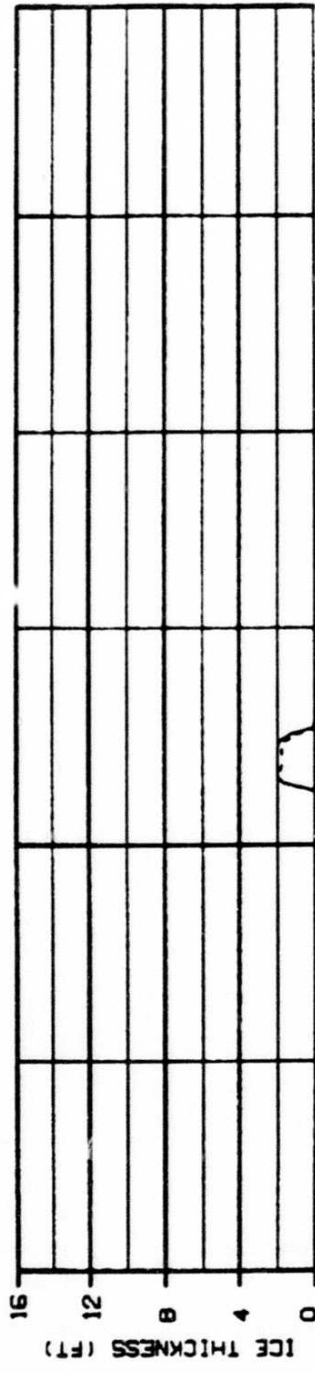
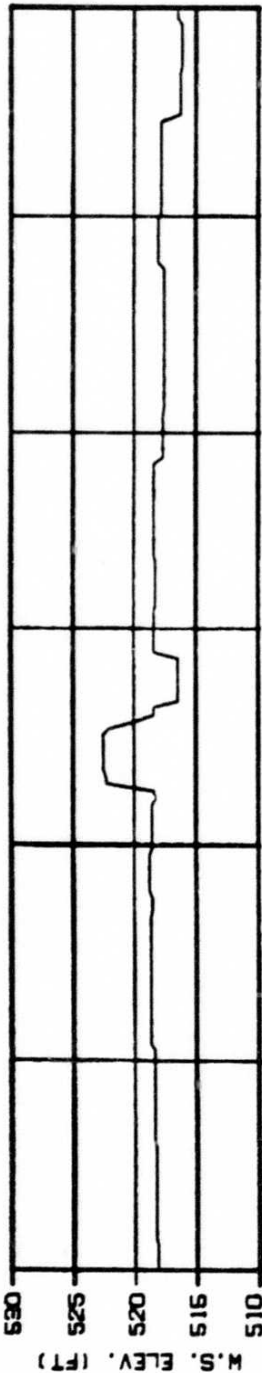
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 PROJECT: 8202070 - RIVER VENTURE  
 REPORT: AL-8209 10 JUL 83 1983. 142

HEAD OF SIDE CHANNEL MSII  
 RIVER MILE : 115.90  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP. ALL F, NATURAL  
 REFERENCE RUN NO. : BZZOONA

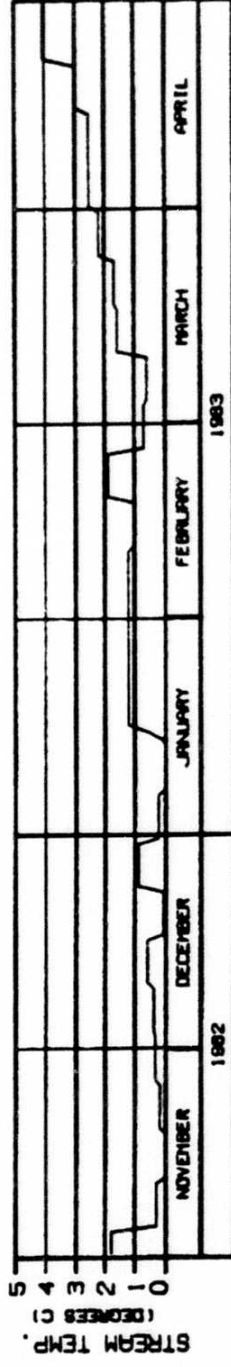
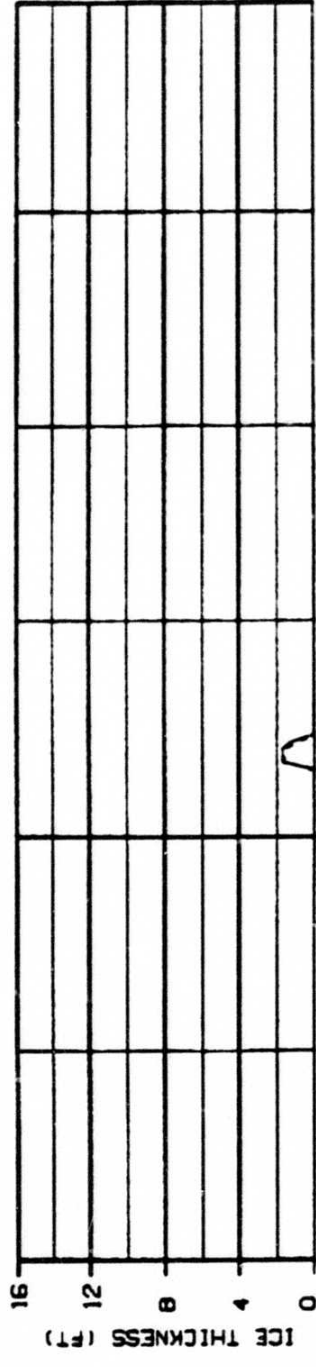
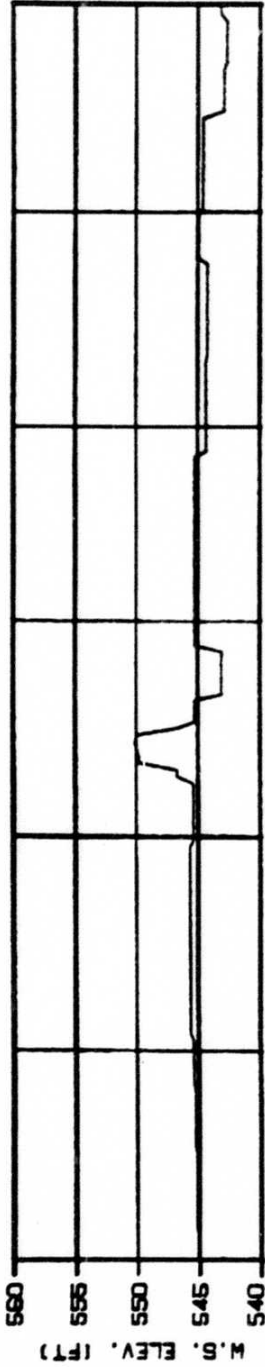
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 WYRZA-EBRACO JOINT VENTURE  
 PROJECT: AL-1988 10 JUL 81 1988.142

RIVER MILE : 120.00  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOOD CASE : C TEMP. RULLE, NATURAL  
 REFERENCE RUN NO. : 822002NA

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

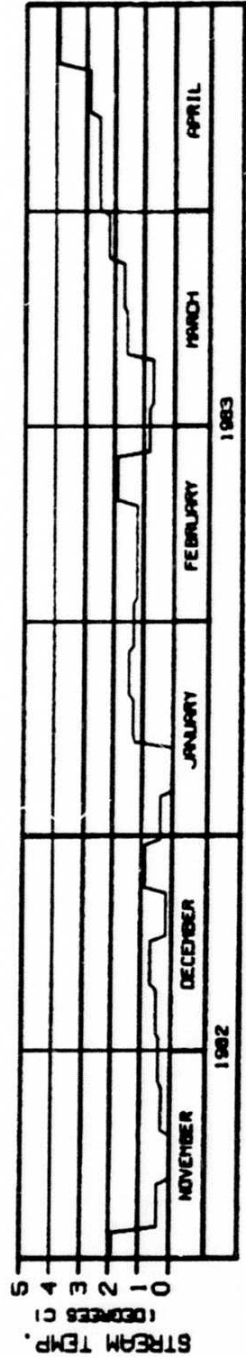
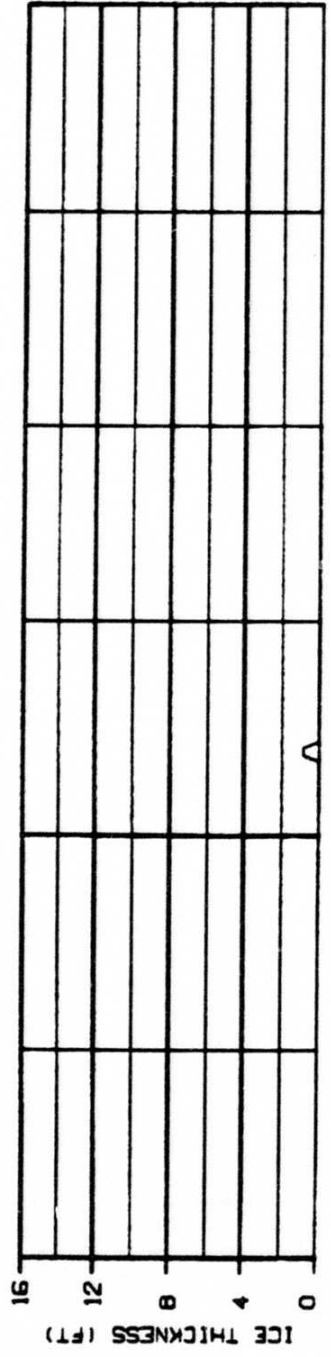
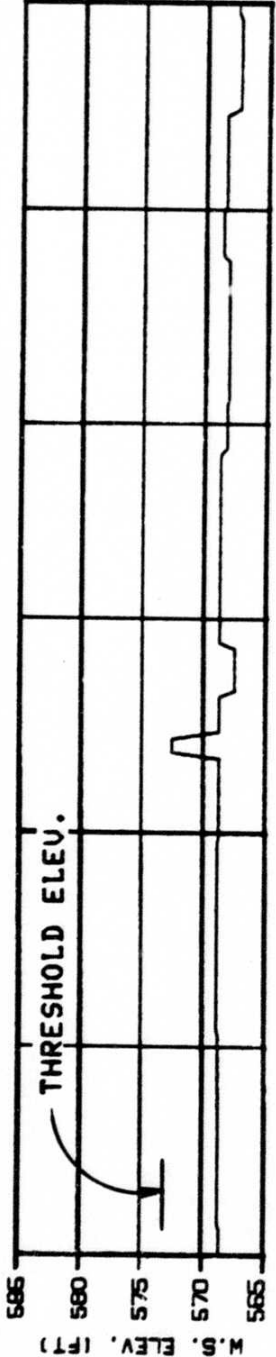


ALASKA POWER AUTHORITY  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRSCO JOINT VENTURE  
 DRAWN: R.L. BARR 10 JUL 83 1983. 142

HEAD OF MOOSE SLOUGH  
 RIVER MILE : 123.50  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C  
 REFERENCE RUN NO. : B220CNA

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

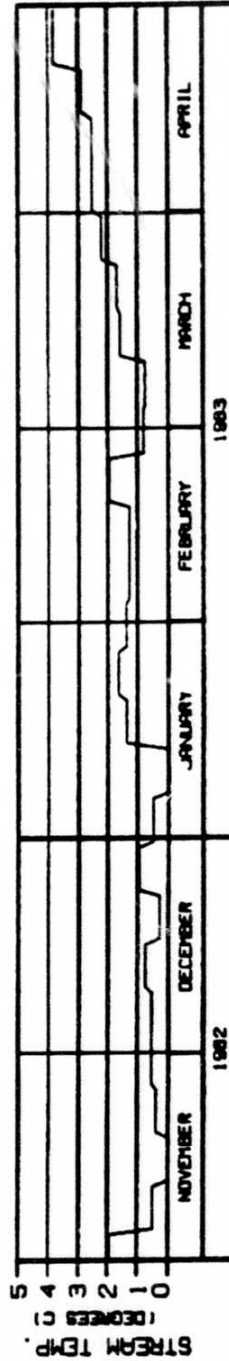
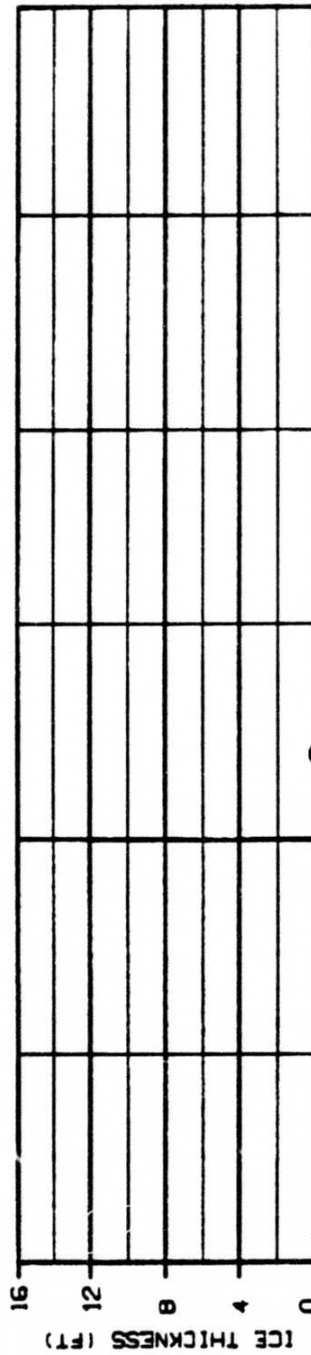
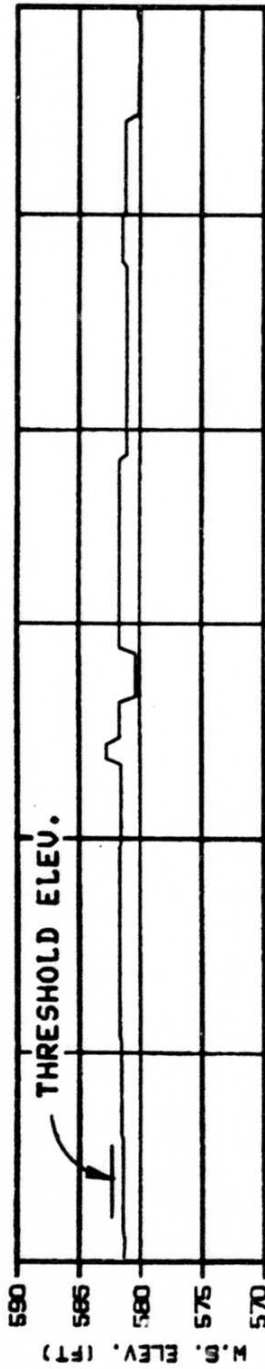




ALASKA POWER AUTHORITY  
 SUSTAINA PROJECT  
 SUSTAINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBECO JOINT VENTURE  
 DRAWN: S.L.P. 88 10 JAN 89 1000.148

HEAD OF SLOUGH 8A (WEST)  
 RIVER MILE : 126.10  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP. : RULE : NATURAL  
 REFERENCE RUN NO. : 822000A

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



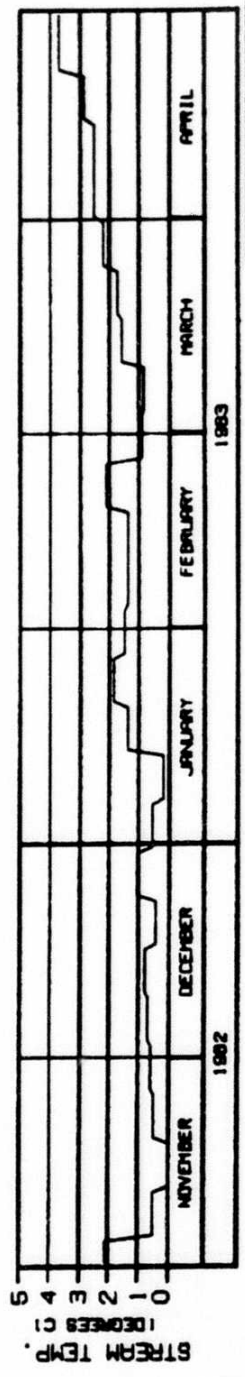
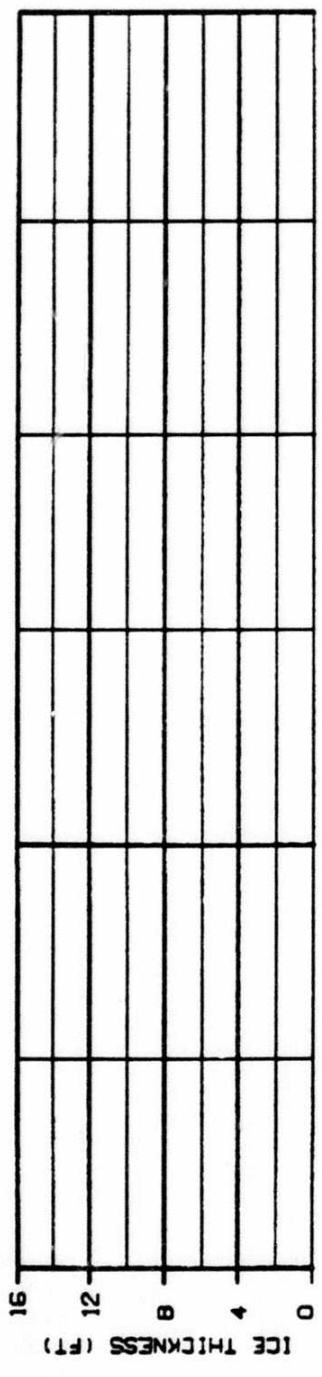
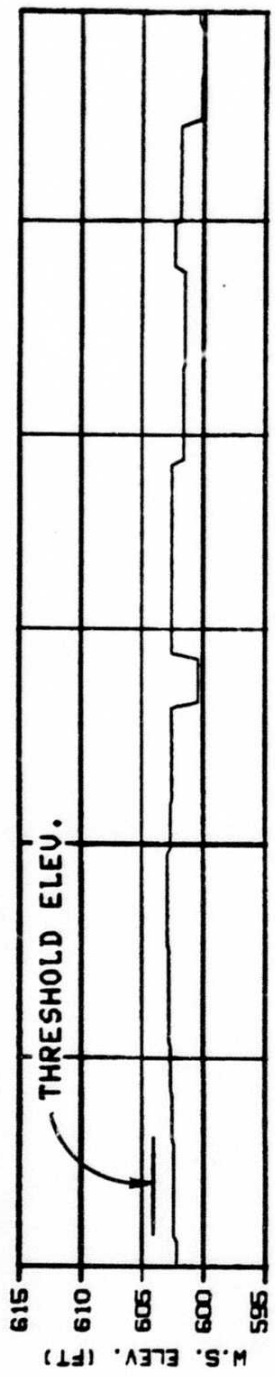
ALASKA POWER AUTHORITY	
SUBMITTING PROJECT	SUSITNA RIVER
	ICE SIMULATION
	TIME HISTORY
	WARZA-ERBESCO JOINT VENTURE
DATE: 11-2-83	BY: J.A. OR
	2008.142

HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP. RULE : NATURAL  
 REFERENCE RUN NO. : BZZOONRA

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



ALASKA POWER AUTHORITY

SUBMITTER PROJECT  
SUSTITNA RIVER  
ICE SIMULATION  
TIME HISTORY

PREPARED BY  
MARZA-EBRACO JOINT VENTURE

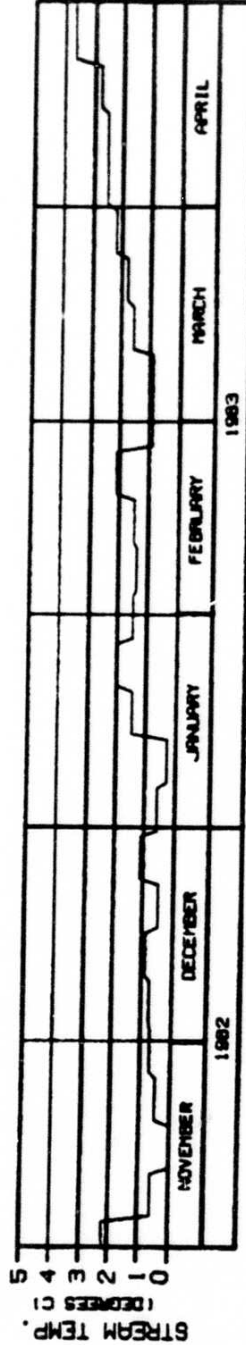
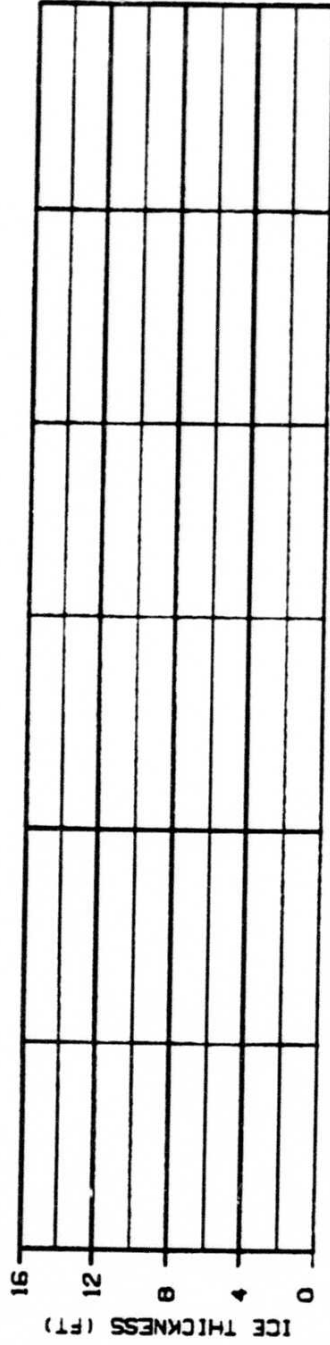
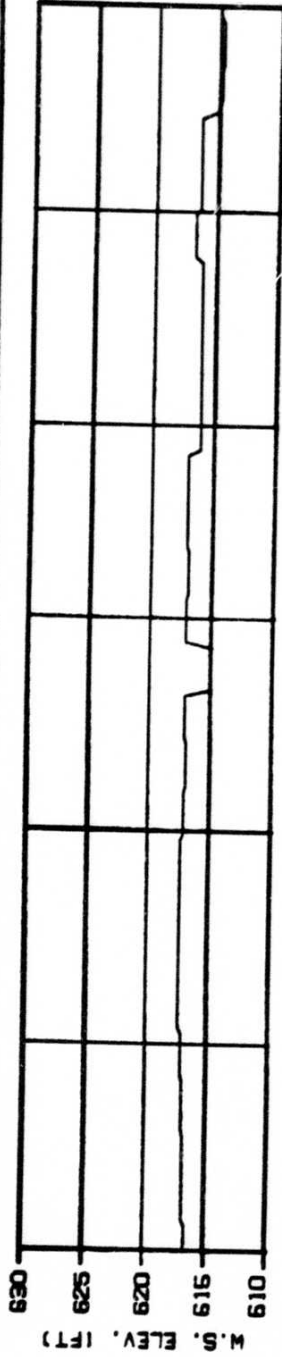
DATE  
1982.142

HEAD OF SLOUGH 9  
RIVER MILE : 129.30  
WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
ENERGY DEMAND : DEVIL CANYON 2020  
FLOW CASE : C  
TEMP. : NATURAL  
REFERENCE RUN NO. : 822000A

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

OPTION?

OPTION#



**SIDE CHANNEL U/S OF SLOUGH 9**

RIVER MILE : 130.60

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP. RULE : NATURAL  
 REFERENCE RUN NO. : 82200NA

ALASKA POWER AUTHORITY

BUILDING PROJECT

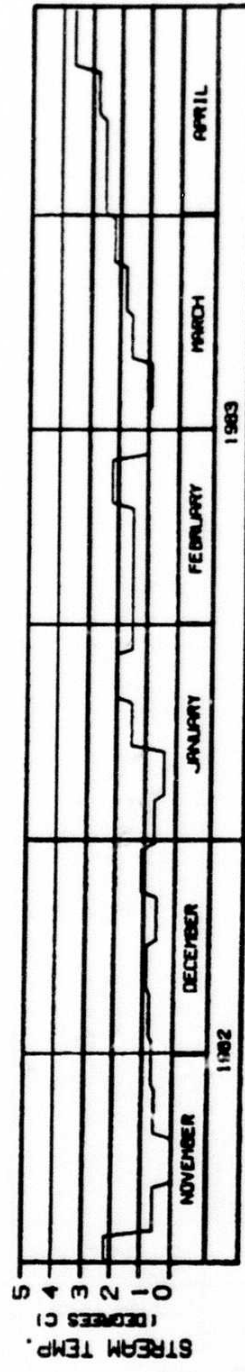
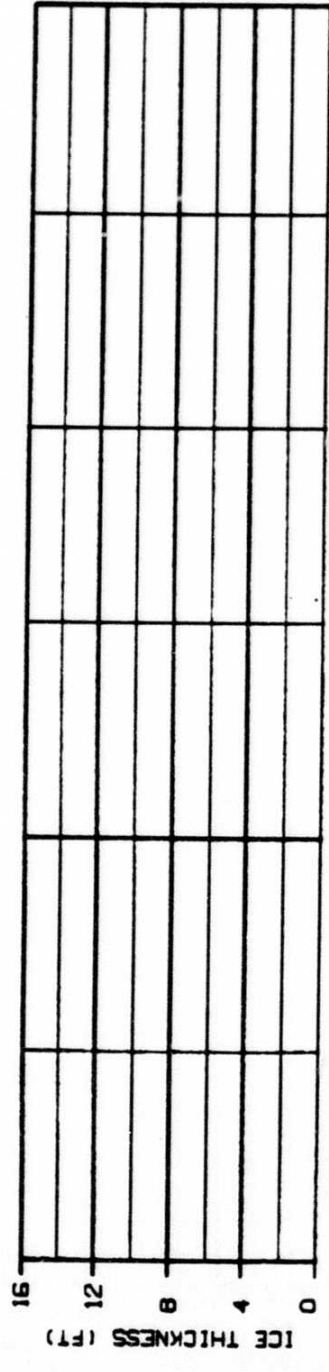
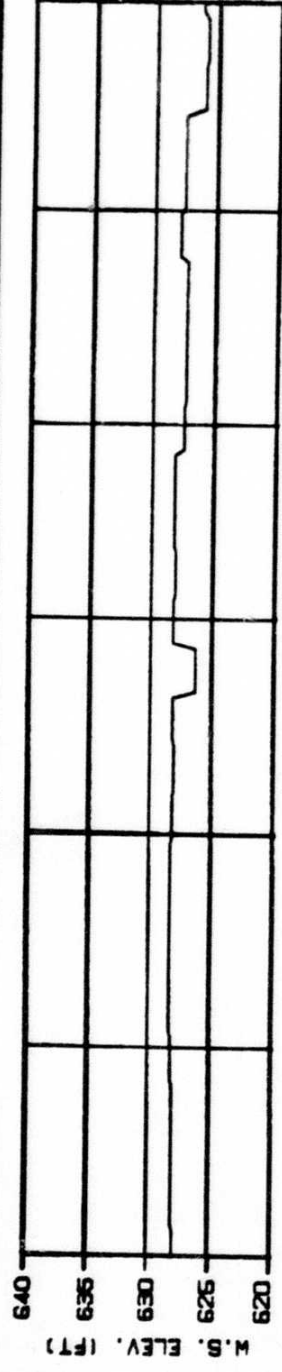
SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBRSCO JOINT VENTURE

DATE: 01.1983 10:44 AM 1983.142

ICE THICKNESS LEGEND:

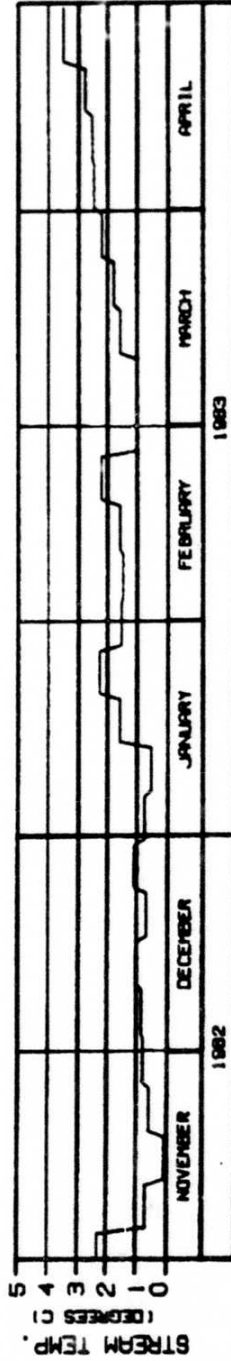
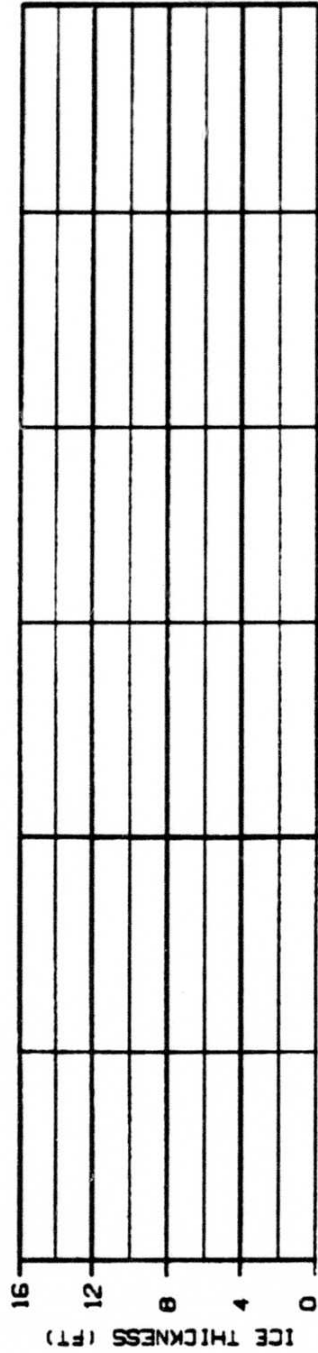
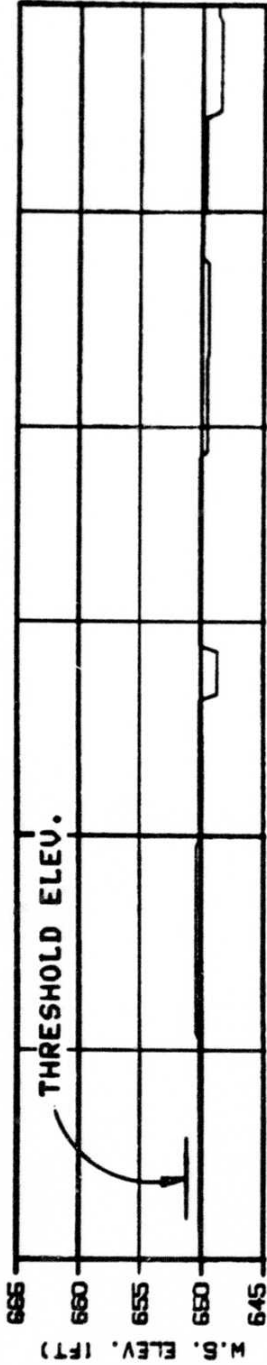
----- TOTAL THICKNESS  
 ..... SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRSCO JOINT VENTURE  
 DRAWN: A.J. BOER | 10 JAN 83 | SHEET 142

SIDE CHANNEL U/S OF 4TH JULY CREEK  
 RIVER MILE : 131.80  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP. RILEE ; NATURAL  
 REFERENCE RUN NO. : 822000A

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



ALASKA POWER AUTHORITY

SUBMITTING PROJECT

SUSTINA RIVER

ICE SIMULATION

TIME HISTORY

HARZA-EBRISCO JOINT VENTURE

PROJECT NO. 82200NA

DATE 10 JUL 83

ISSUE 142

HEAD OF SLOUGH 9A

RIVER MILE : 133.70

WEATHER PERIOD : 1 NOV 82 - 30 APR 83

ENERGY DEMAND : DEVIL CANYON 2020

FLOW CASE : C

TEMP. RULE : NATURAL

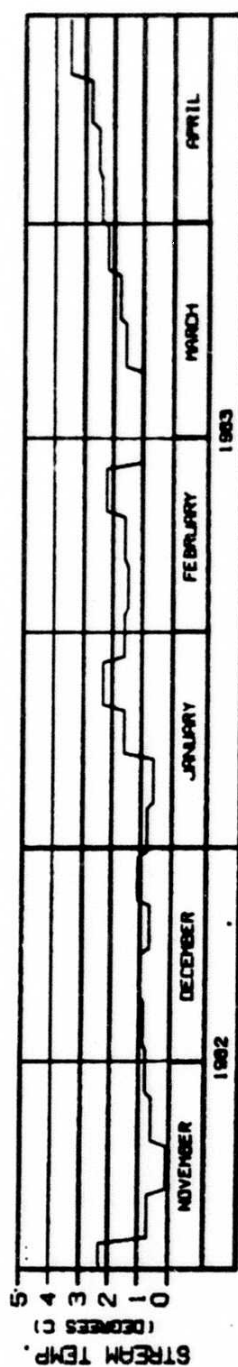
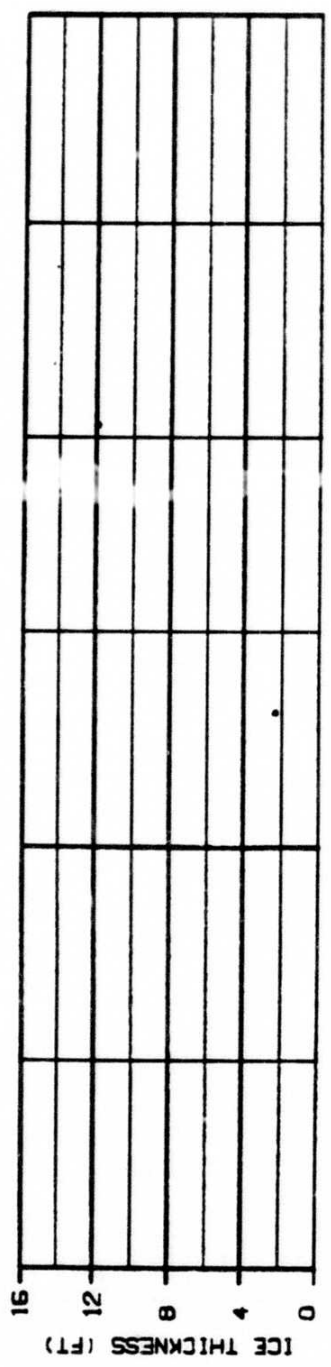
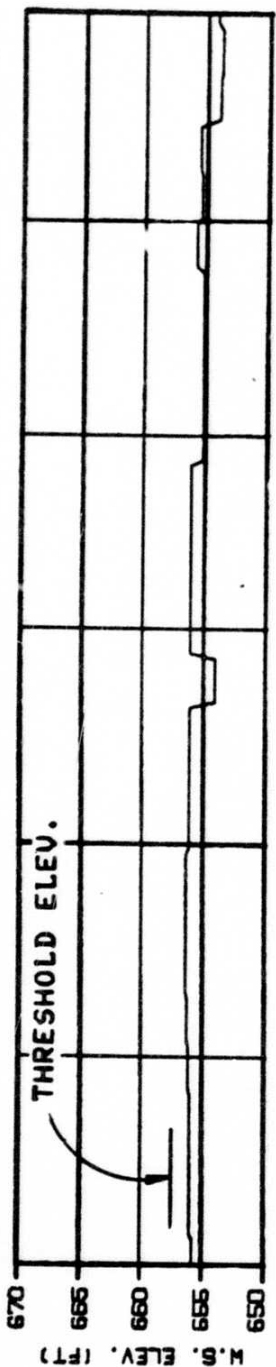
REFERENCE RUN NO. : 82200NA

ICE THICKNESS LEGEND:

— TOTAL THICKNESS

- - - - - SLUSH COMPONENT

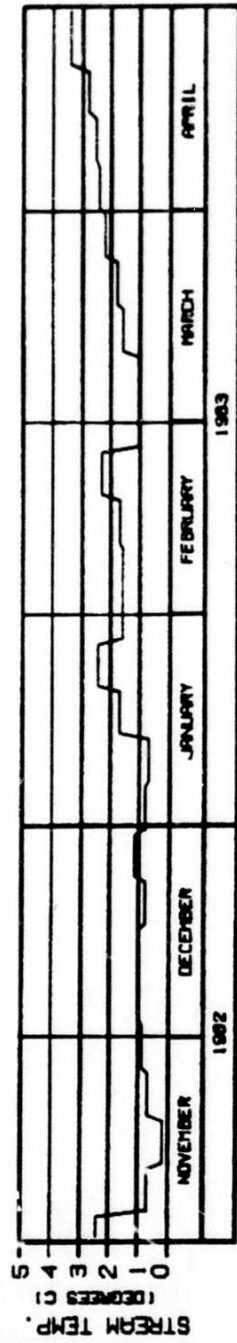
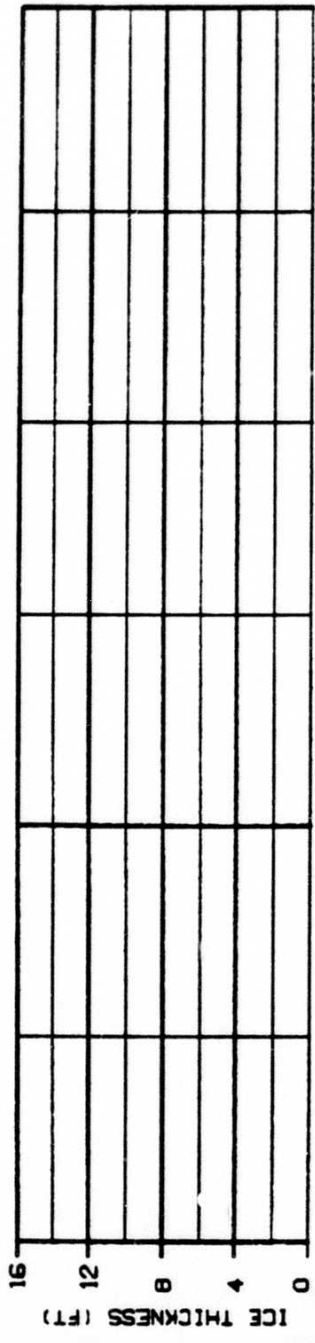
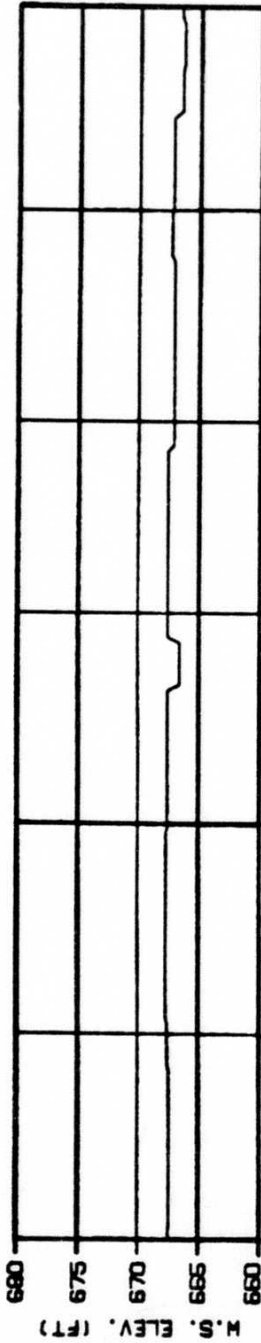




ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT: SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERCO JOINT VENTURE  
 DATE: 01/08/83 BY: J.A. CH  
 SHEET: 142

SIDE CHANNEL U/S OF SLOUGH 10  
 RIVER MILE : 134.30  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C  
 REFERENCE RJN NO. : 82200NA

ICE THICKNESS LEGEND:  
 - - - - - TOTAL THICKNESS  
 - - - - - BLUEN COMPONENT



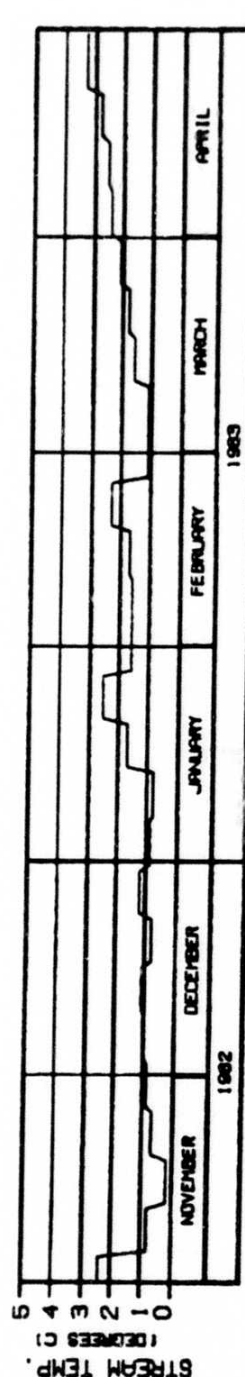
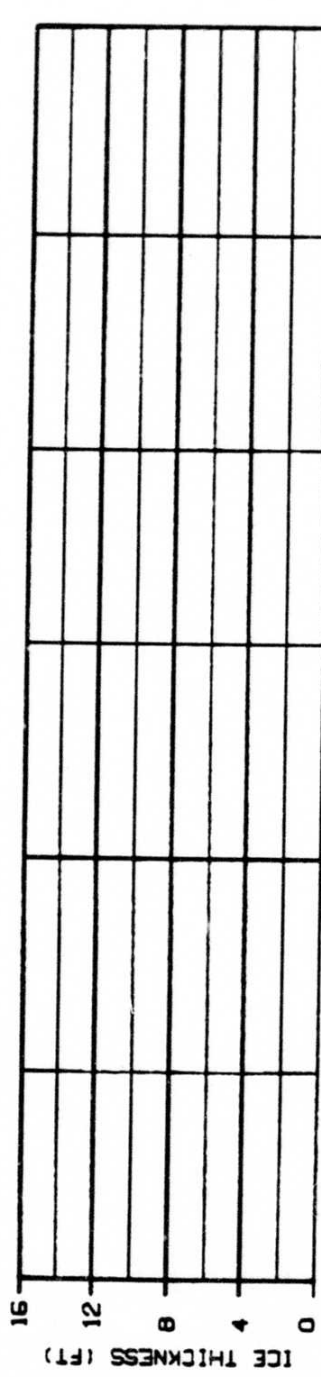
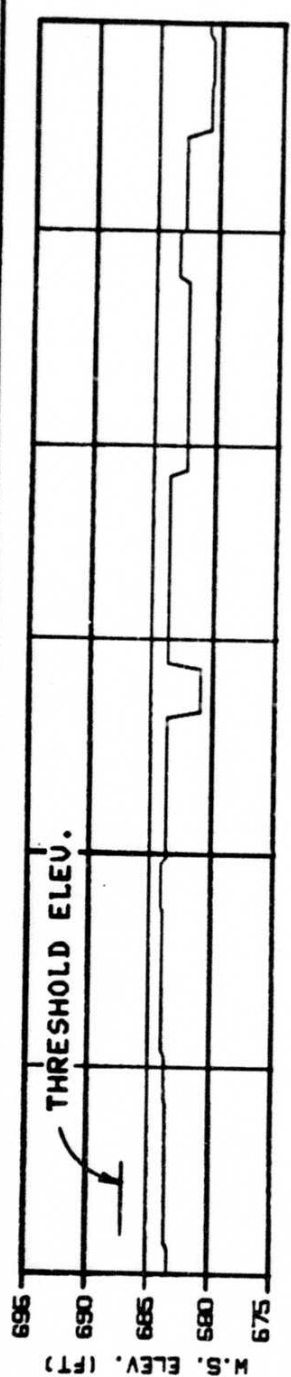
ALASKA POWER AUTHORITY  
 BUILDING PROJECT : SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRASC JOINT VENTURE  
 DECIBR. 81.0000 10 JUL 81 1500.142

SIDE CHANNEL D/S OF SLOUGH 11

RIVER MILE : 135.30

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP. RILE : NATURAL  
 REFERENCE RUN NO. : BZZOONA

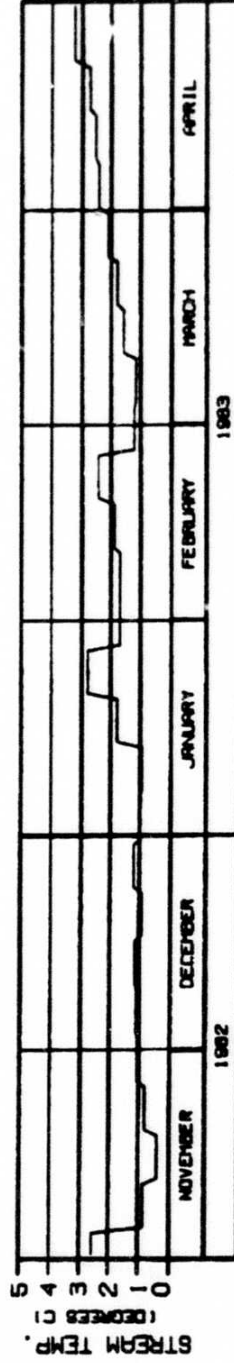
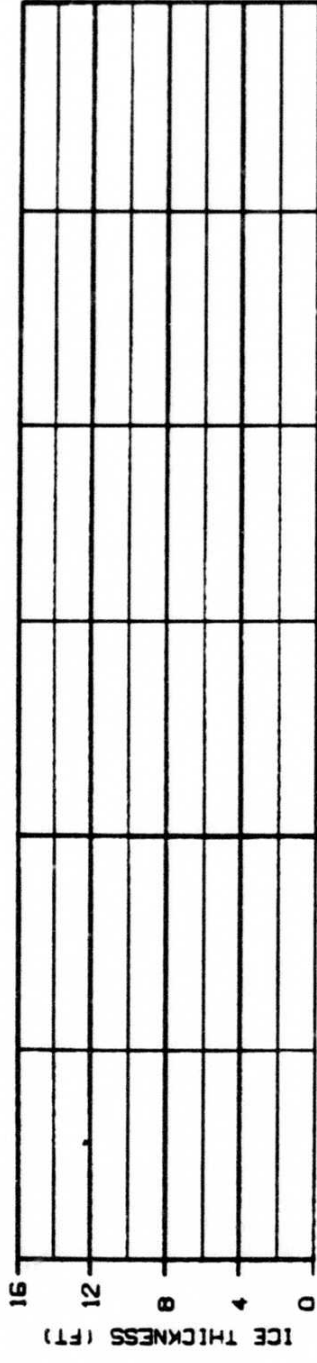
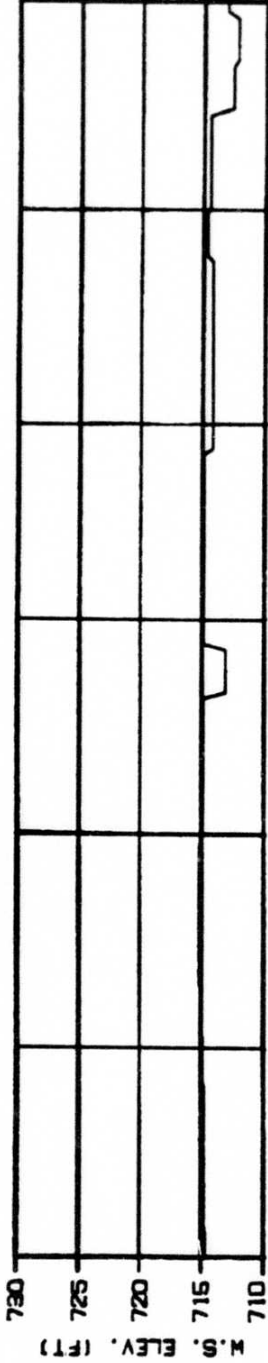
ICE THICKNESS LEGEND.  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY	
SUBMITTER PROJECT	SUSITNA RIVER
	ICE SIMULATION
	TIME HISTORY
HARRIS-ERBACO JOINT VENTURE	
DESIGNER: A.L. BROWN	DATE: JUL 80
	SCALE: 1:12

HEAD OF SLOUGH 11  
 RIVER MILE : 136.50  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C  
 REFERENCE RUN NO. : BZZOONA  
 TEMP. RULE : NATURAL

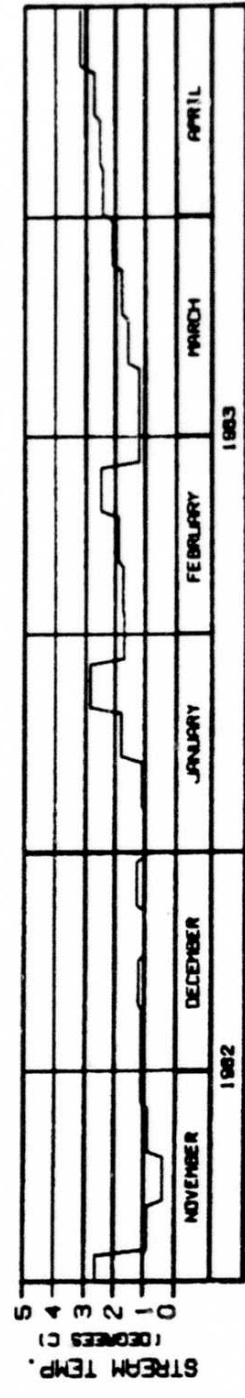
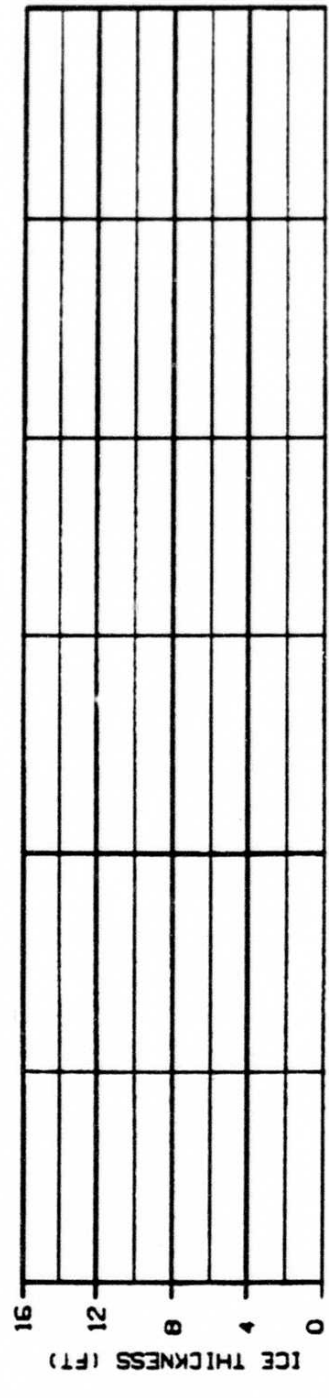
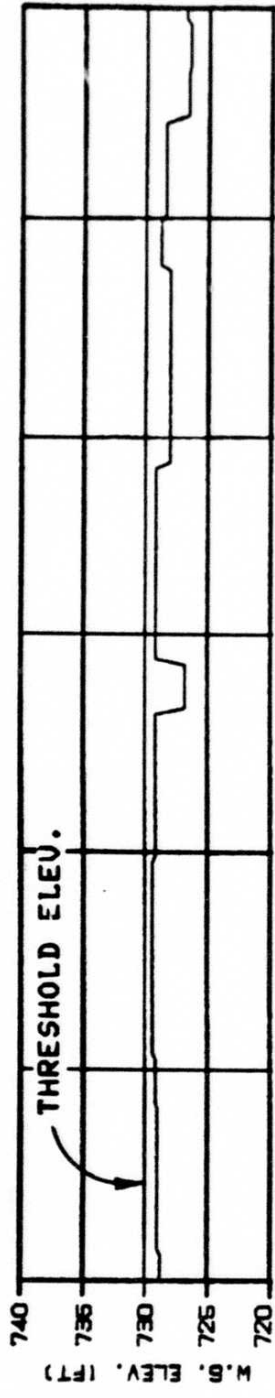
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 ORDER NO. 84-0099 10-04-83 1000.142

HEAD OF SLOUGH 17  
 RIVER MILE : 139.30  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP. RULE : NATURAL  
 REFERENCE RUN NO. : BZZOCONA

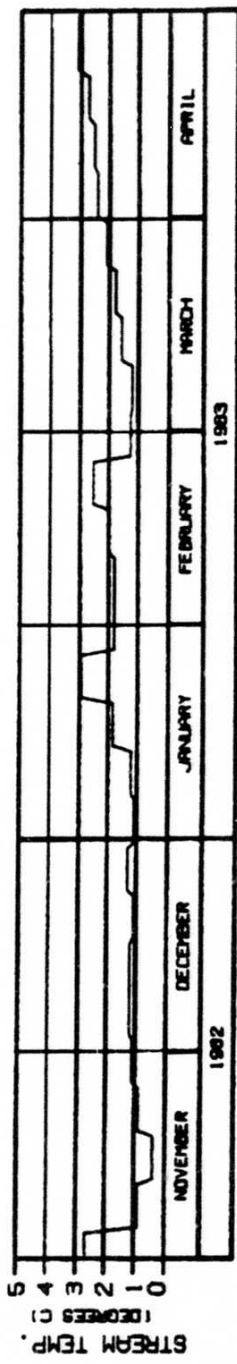
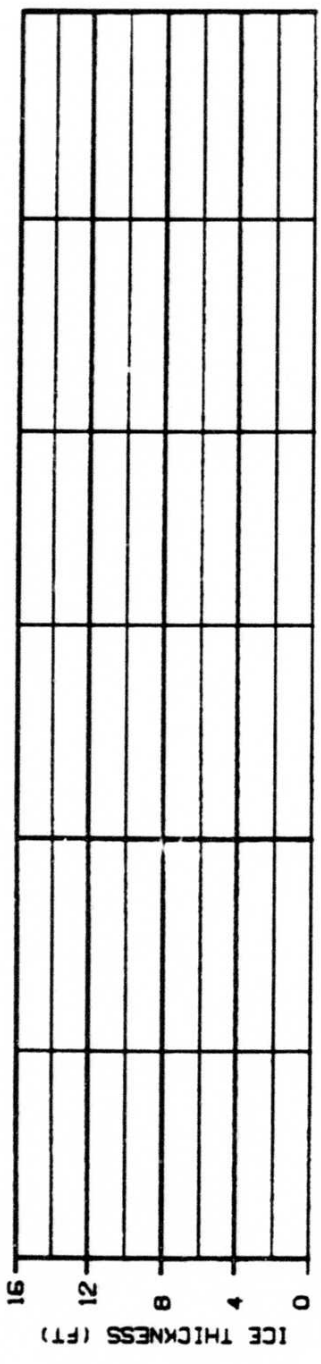
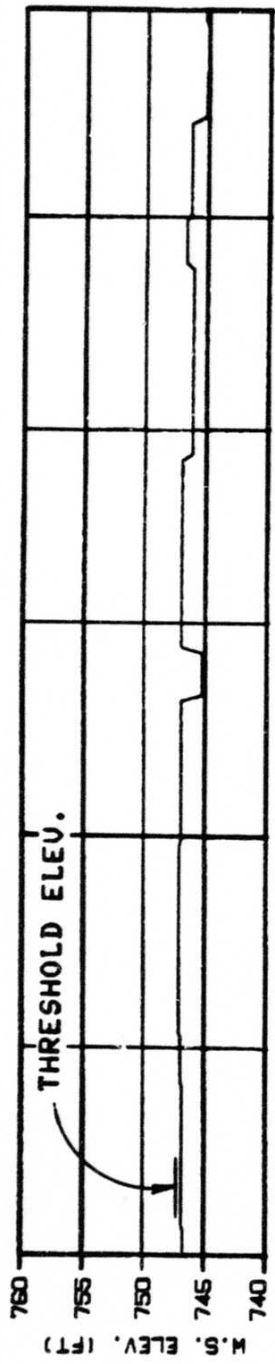
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLOUGH COMPONENT



ALASKA POWER AUTHORITY  
SUBITNA PROJECT  
SUBITNA RIVER  
ICE SIMULATION  
TIME HISTORY  
WARZA-BESSED JOINT VENTURE

HEAD OF SLOUGH 20  
RIVER MILE : 140.50  
WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
ENERGY DEMAND : DEVIL CANYON 2020  
FLOW CASE : C  
TEMP. RULE : NATURAL  
REFERENCE RUN NO. : 82200NA

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

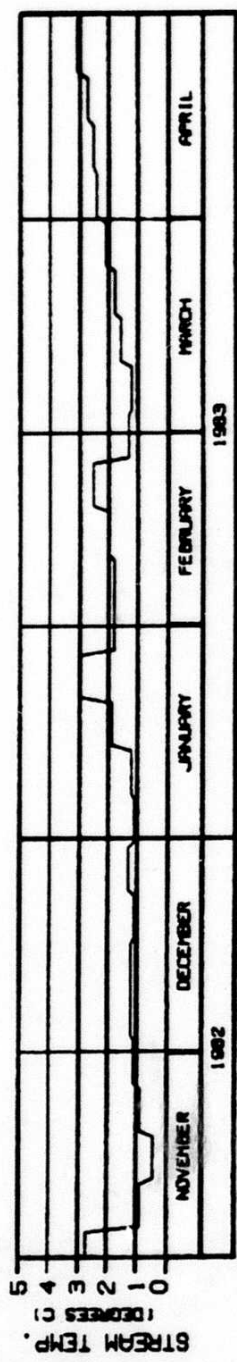
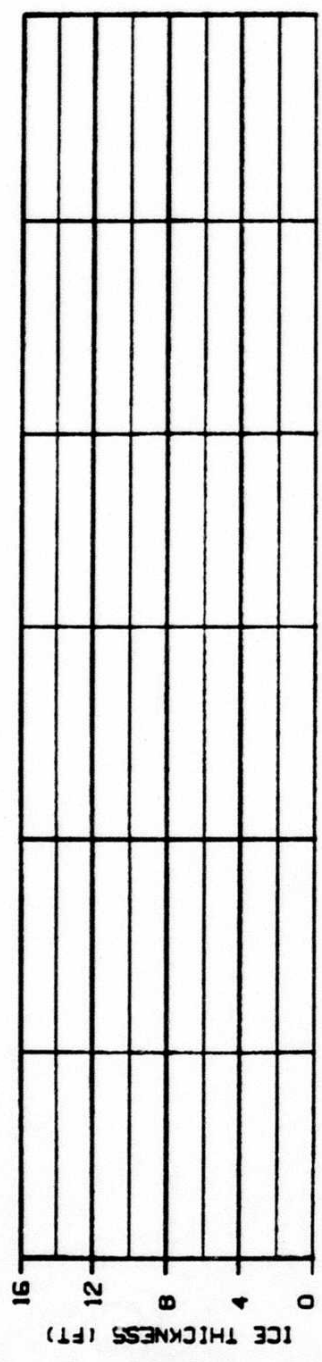
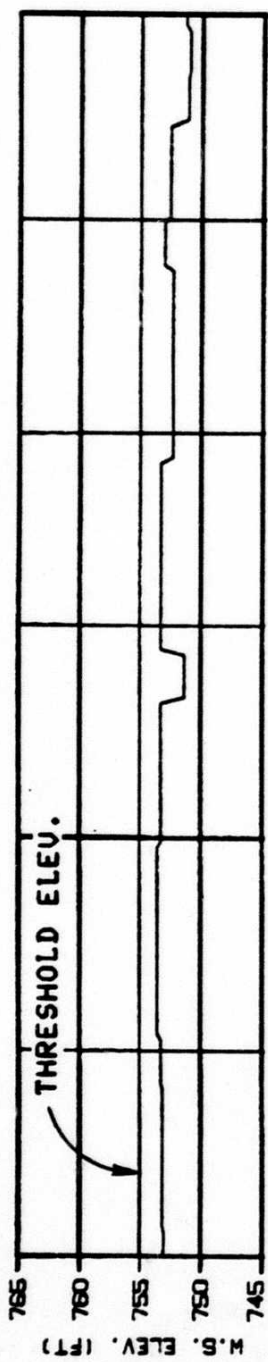


ALASKA POWER AUTHORITY  
 SUBSTNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBACD JOINT VENTURE  
 ORDER: 81-9018 10 11 81 1988.142

SLOUGH 21 (ENTRANCE A6)  
 RIVER MILE : 141.80  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C  
 REFERENCE RUN NO. : 822008A

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





ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER

ICE SIMULATION

TIME HISTORY

HARZA-EBRASC JOINT VENTURE

DRAWN: J.L. HARRIS 10 JAN 83

NO. 142

HEAD OF SLOUGH 21

RIVER MILE : 142.20

WEATHER PERIOD : 1 NOV 82 - 30 APR 83

ENERGY DEMAND : DEVIL CANYON 2020

FLOW CASE : C

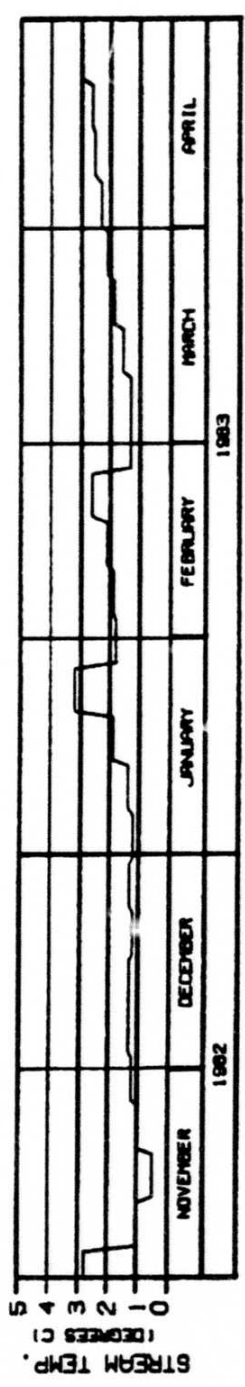
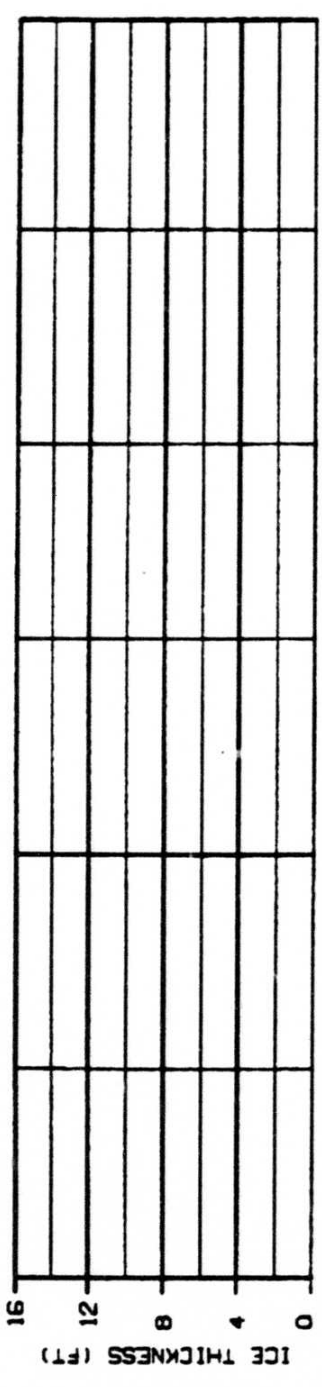
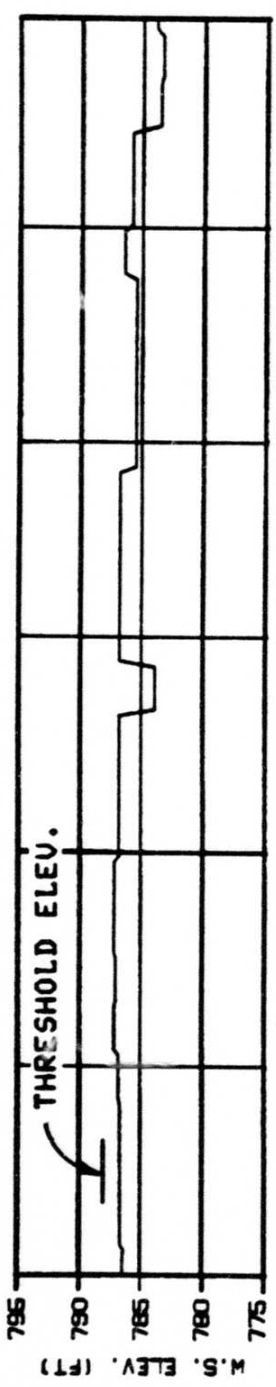
TEMP. RULE : NATURAL

REFERENCE RUN NO. : 8220CNA

ICE THICKNESS LEGEND.

—— TOTAL THICKNESS

..... SLUSH COMPONENT



ALASKA POWER AUTHORITY	
SUBMITTER PROJECT	SUSTITNA RIVER
	ICE SIMULATION
	TIME HISTORY
	HARZA-EBRACCO JOINT VENTURE
DATE	10 JAN 83
	1983.142

HEAD OF SLOUGH 22  
 RIVER MILE : 144.80  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : DEVIL CANYON 2020  
 FLOW CASE : C TEMP. RULE ; NATURAL  
 REFERENCE RUN NO. : 822002A

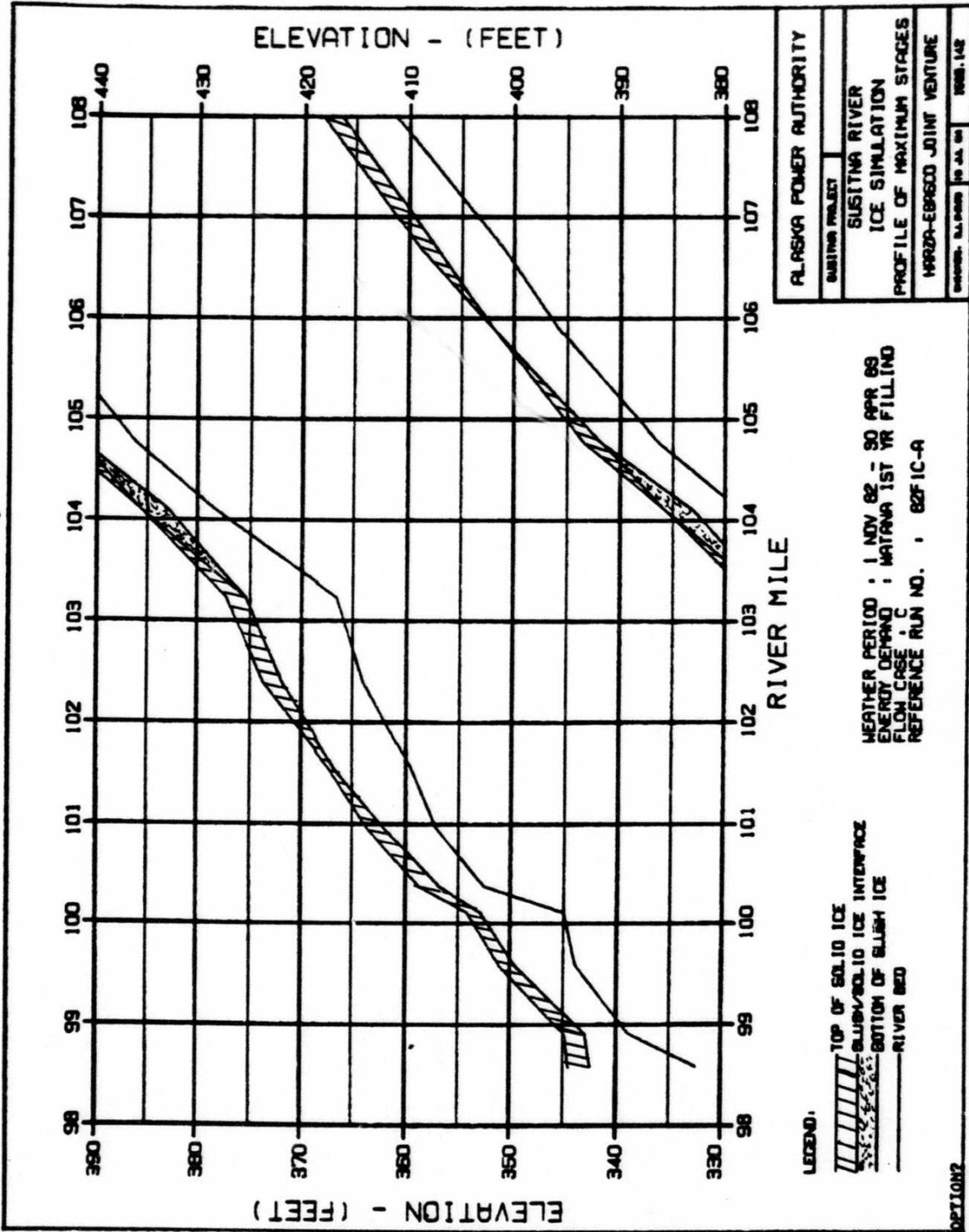
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLOUGH COMPONENT

027L02

**EXHIBIT R**

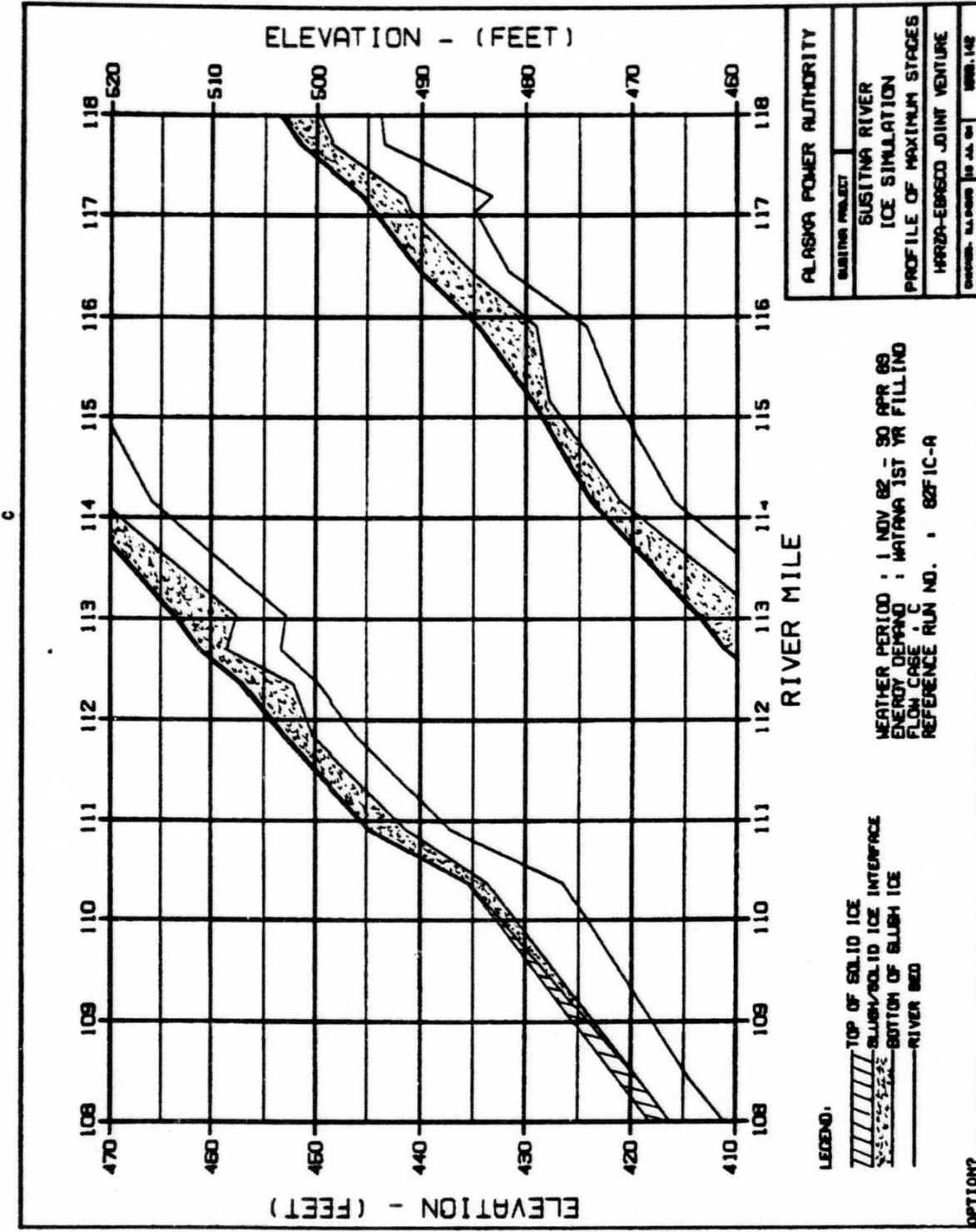
The following study, entitled "Watana-First Year Filling" corresponds to the winter of 1991-92, as depicted in Exhibit E.2.138 of the License Application. The weather used corresponds to the winter of 1982-83, which is a mild winter. Releases from Watana under these conditions would be made thru the low-level outlet.

c

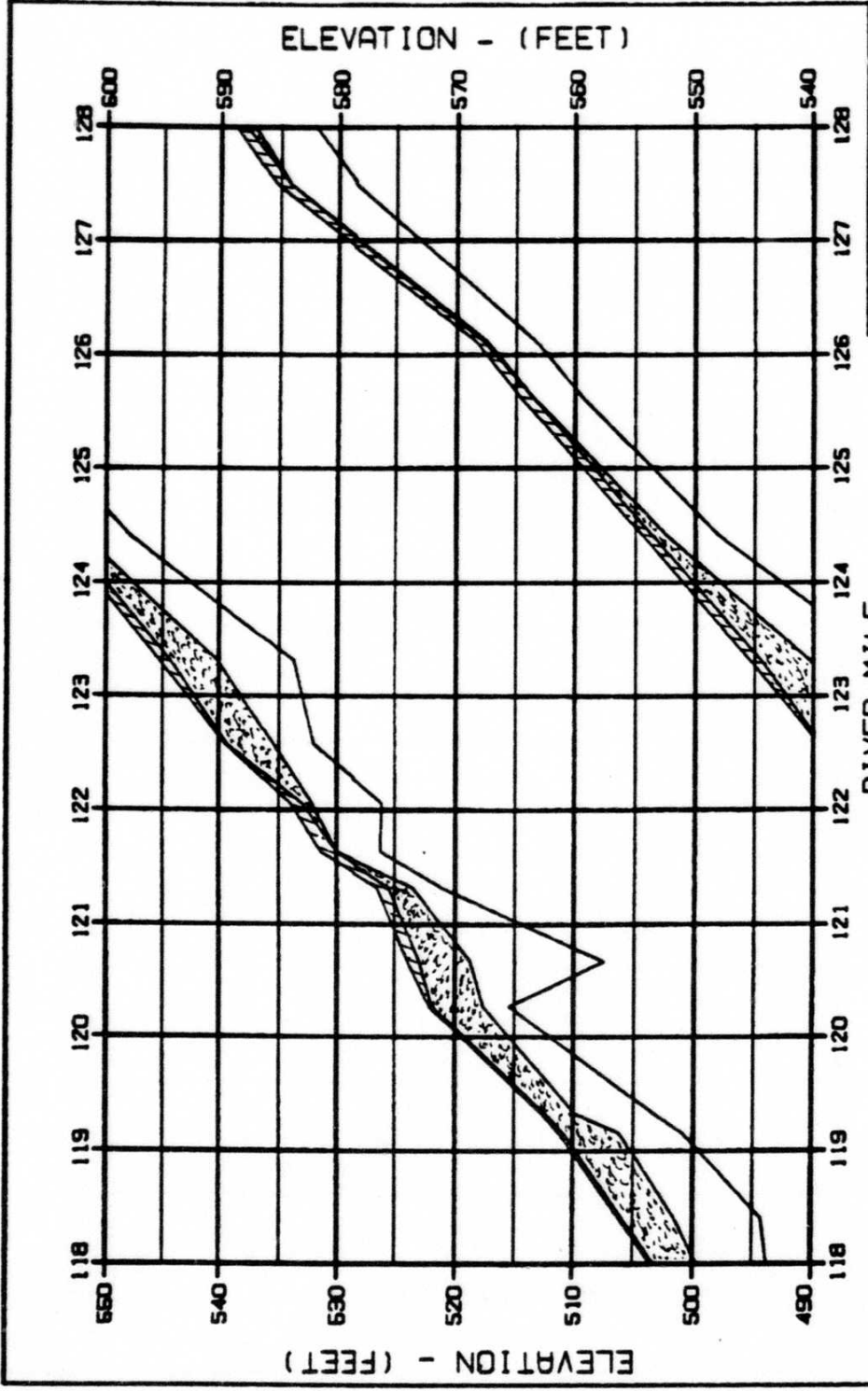


OPTION#2









ALASKA POWER AUTHORITY	
STUDY PROJECT	SUSITNA RIVER
	ICE SIMULATION
	PROFILE OF MAXIMUM STAGES
	HARZA-EBERD JOINT VENTURE
DATE	10 JAN 89
BY	BBB:JAE

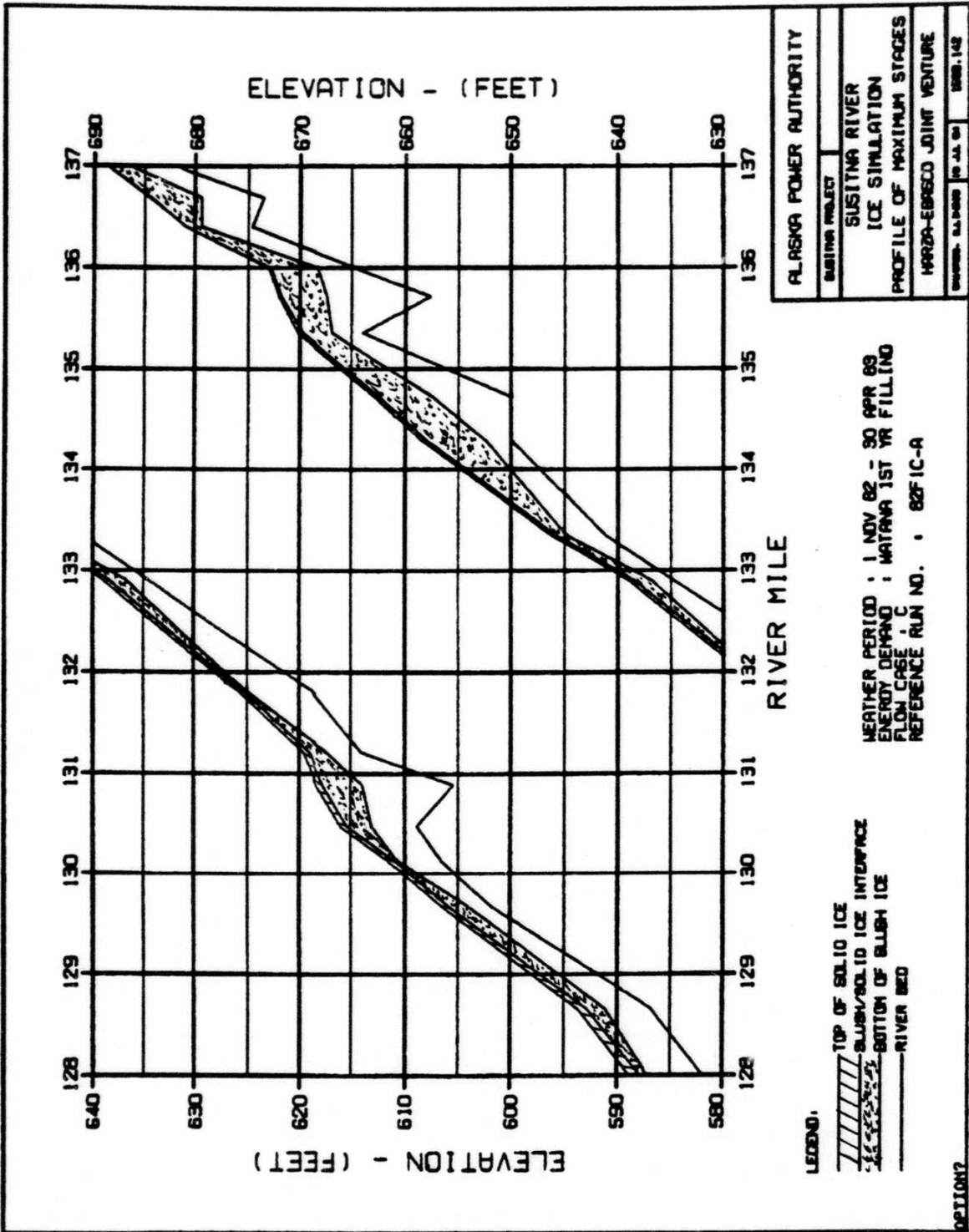
WEATHER PERIOD : 1 NOV 82 - 30 APR 89  
 ENERGY DEMAND : WATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82FIC-A

LEGEND:

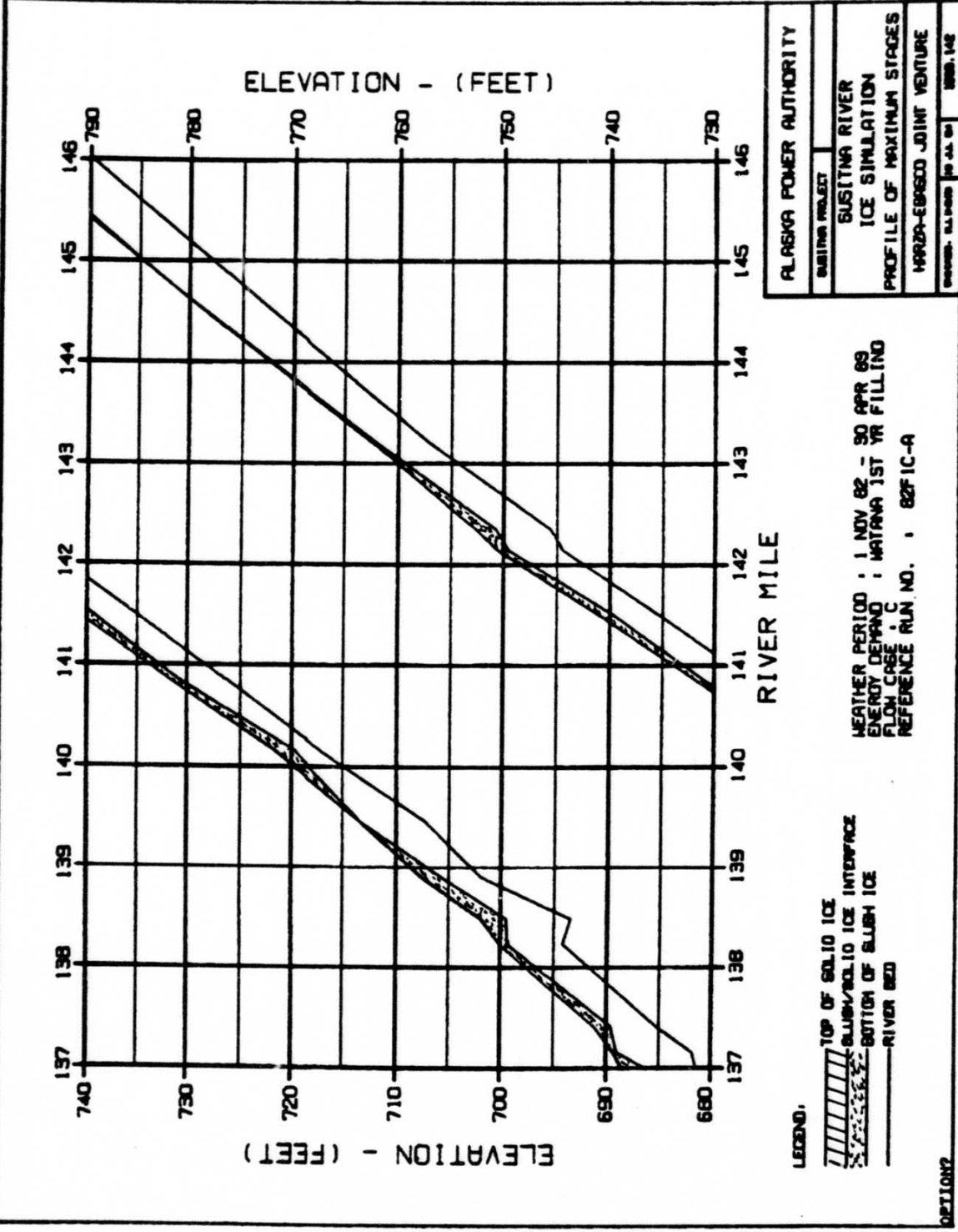
- TOP OF SOLID ICE
- SLUSH/SOLID ICE INTERFACE
- BOTTOM OF SLUSH ICE
- RIVER BED

SECTION 7

c

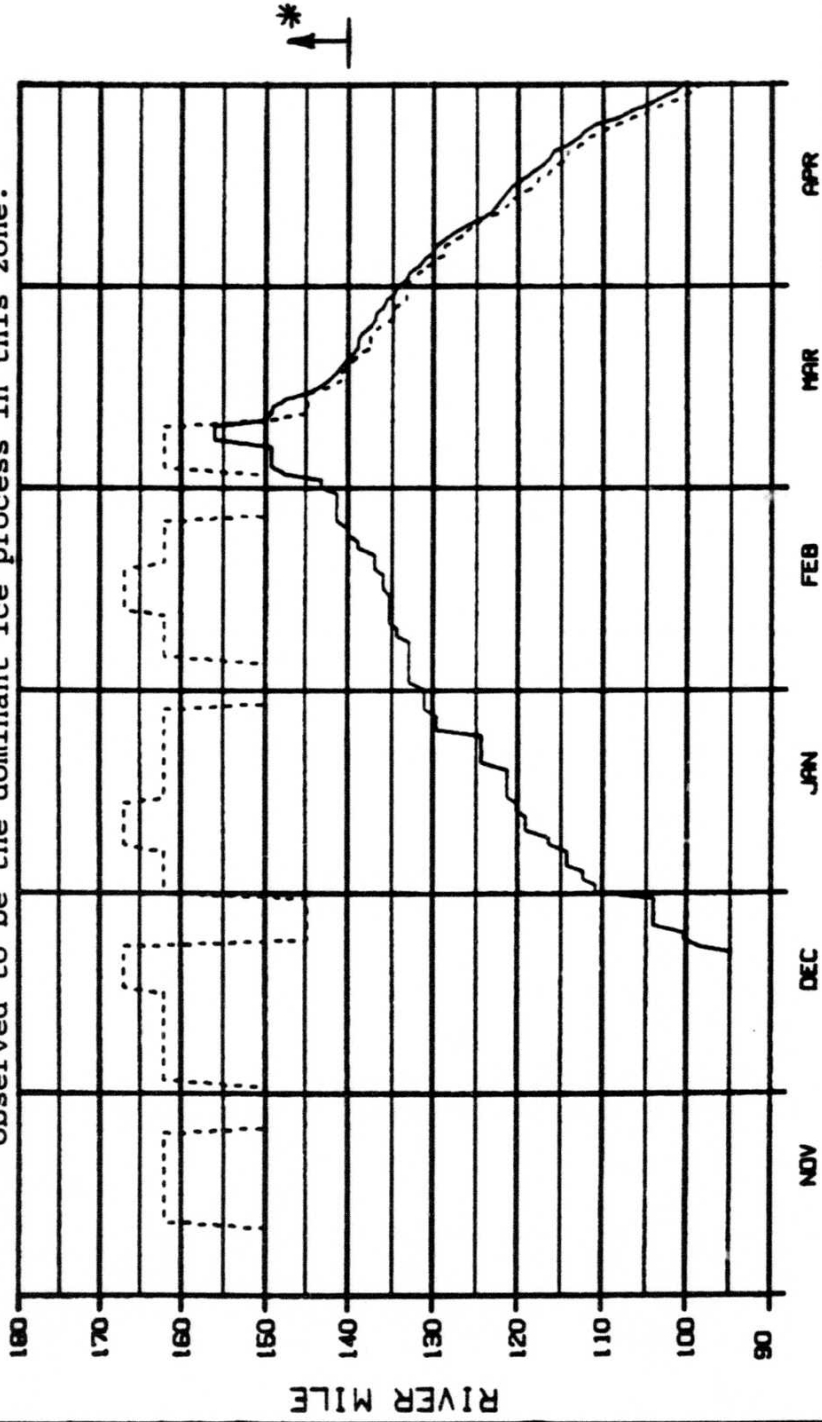


c



OPTION 2

\* Note: Simulation of progression u/s of River Mile 140 † is considered approximate since intermittent bridging of border ice has been observed to be the dominant ice process in this zone.



LEGEND:

— ICE FRONT

- - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : HATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82F1C-A

ALASKA POWER AUTHORITY

SUSITNA PROJECT

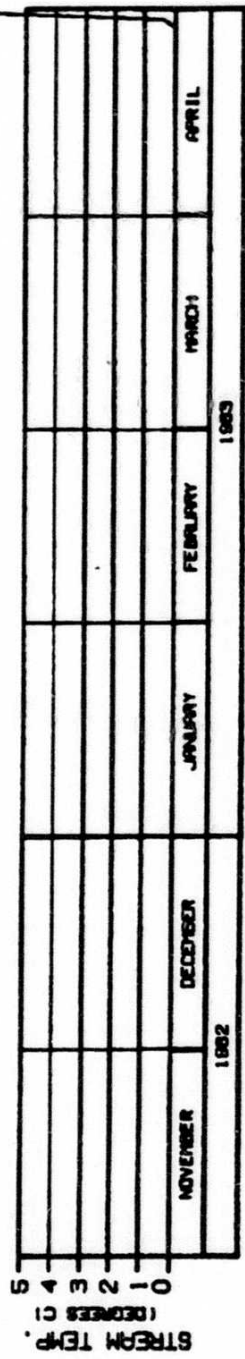
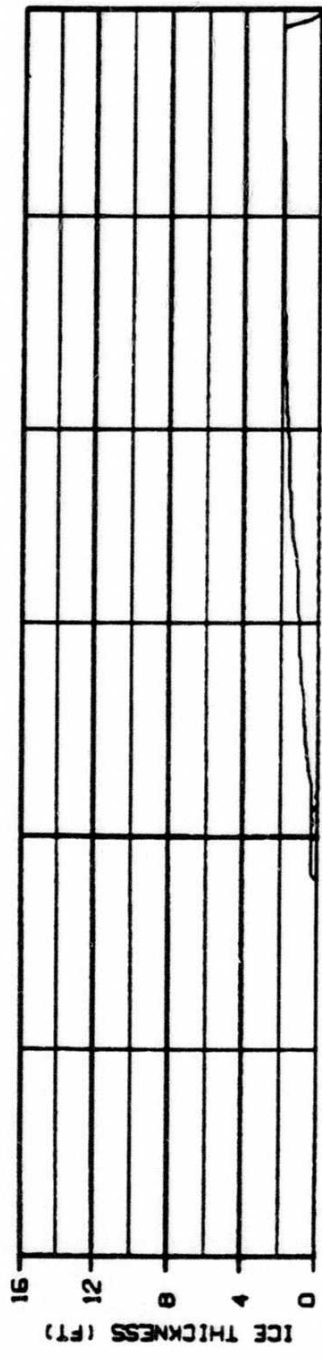
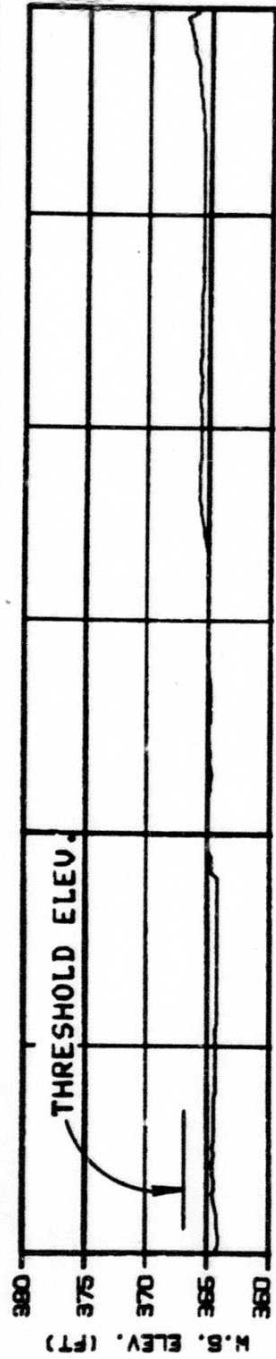
SUSITNA RIVER

PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

HARZA-EBERCO JOINT VENTURE

DATE: 11/11/82 10:44:01 1888.14E

02T10M2



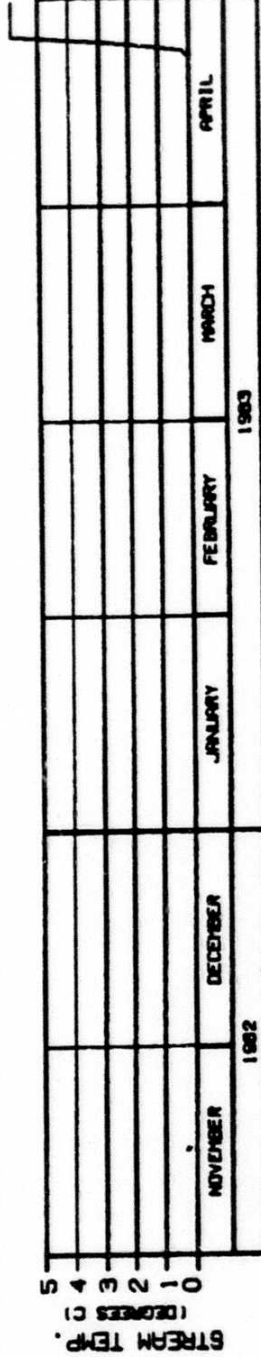
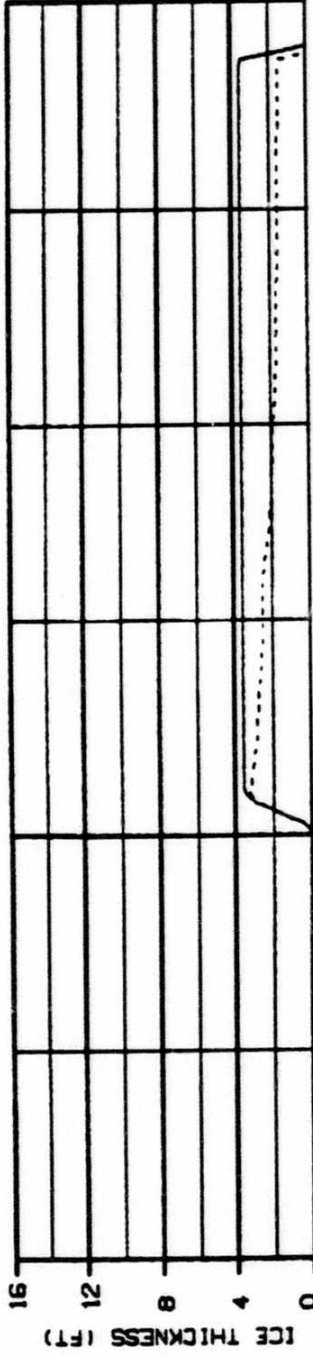
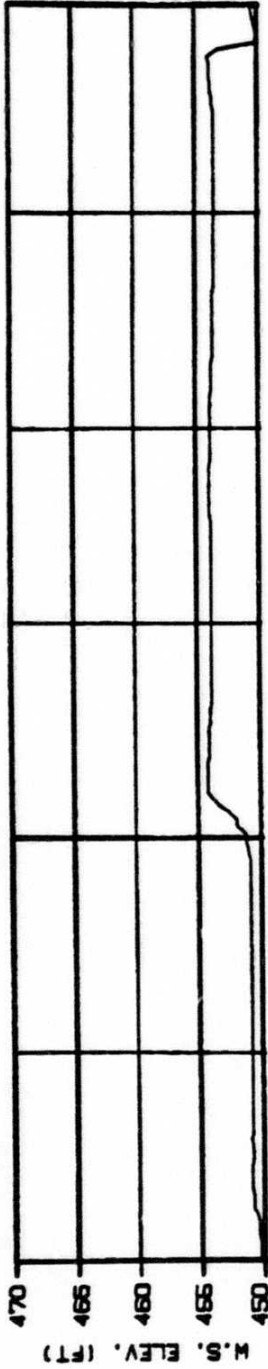
**HEAD OF WHISKERS SLOUGH**

RIVER MILE : 101.50

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82FIC-A

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

ALASKA POWER AUTHORITY	
SUBMITTER PROJECT	SUSITNA RIVER ICE SIMULATION TIME HISTORY
PROJECT NO. & DATE	14822-14828 10 24 82 1882.148



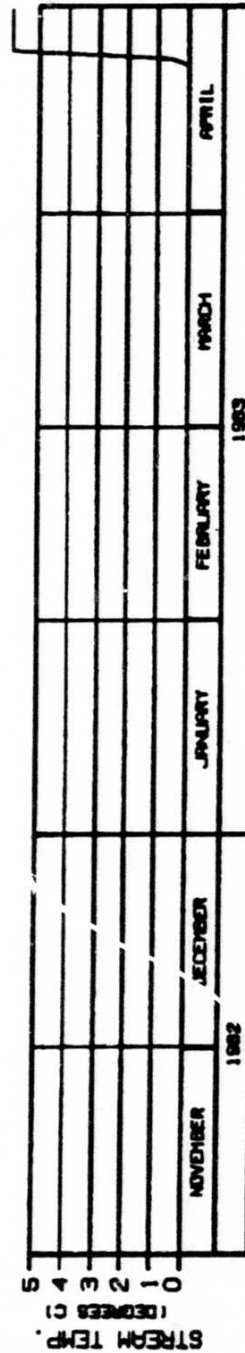
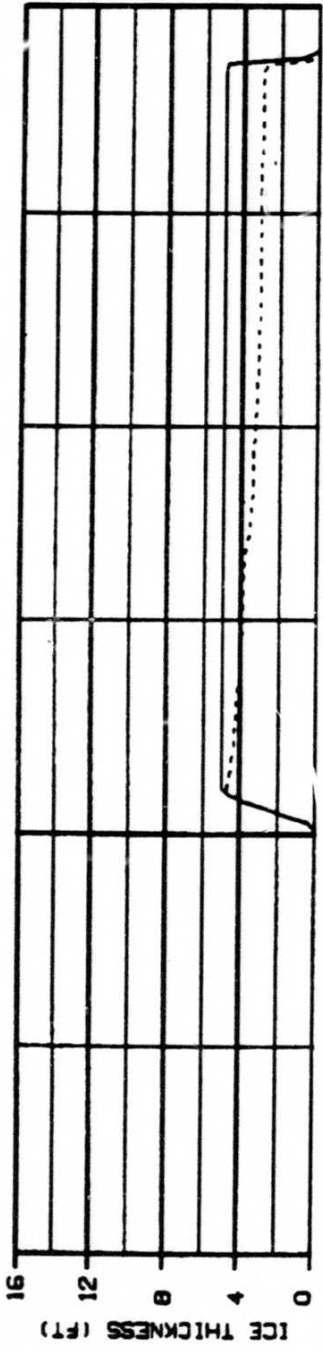
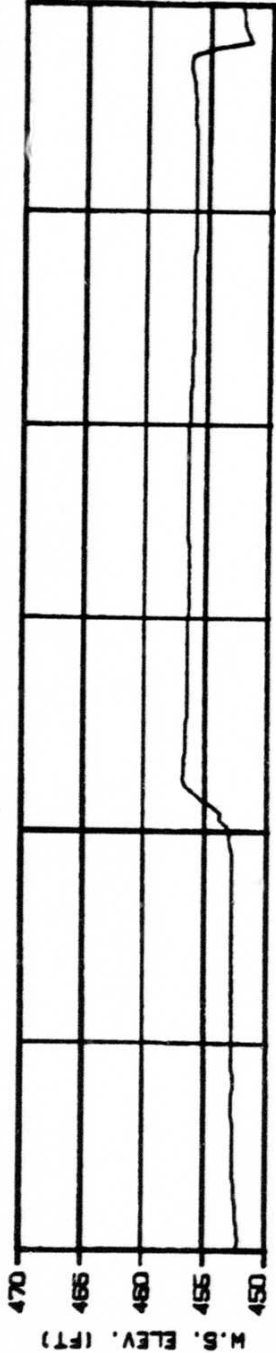
ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBACD JOINT VENTURE  
 11-82-83

**SIDE CHANNEL AT HEAD OF GASH CREEK**  
 RIVER MILE : 112.00  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82F1C-A

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

NOVEMBER 1982  
 DECEMBER  
 JANUARY  
 FEBRUARY  
 MARCH  
 APRIL  
 1983

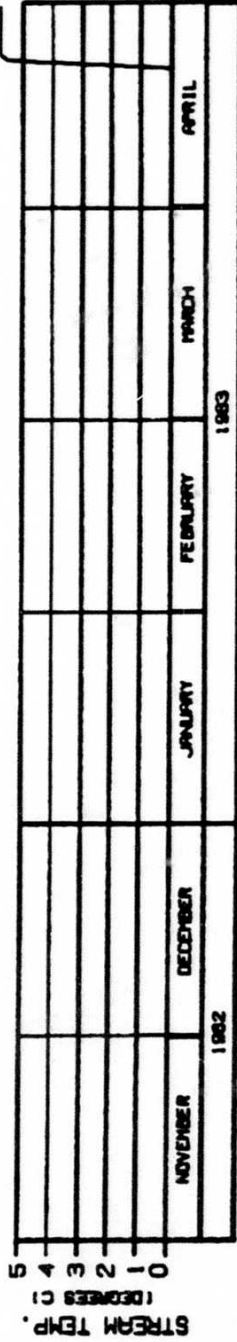
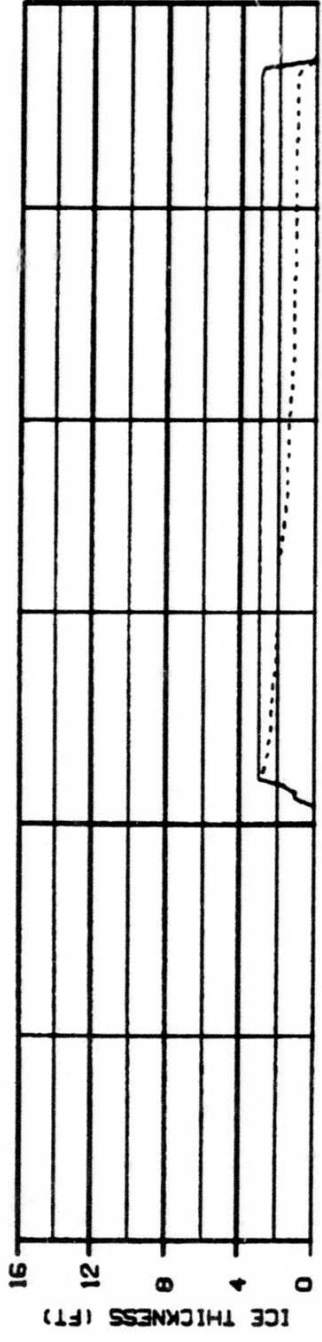
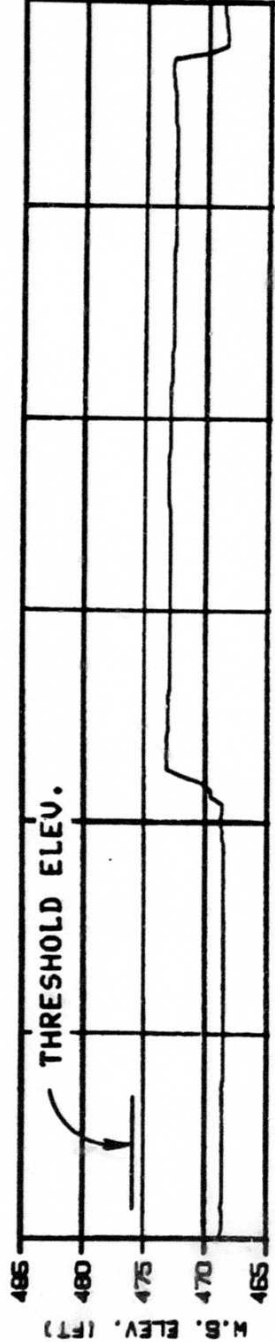




ALASKA POWER AUTHORITY  
 SUBMITTAL PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 DRAWING NO. 82F1C-A

MOUTH OF SLOUGH 6A  
 RIVER MILE : 112.34  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : WATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82F1C-A

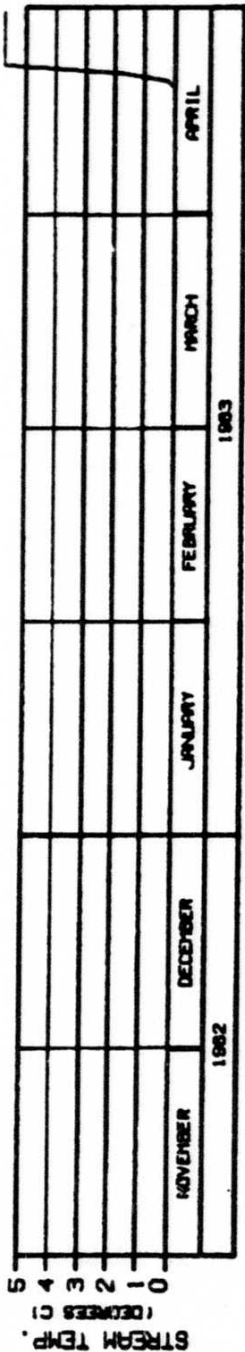
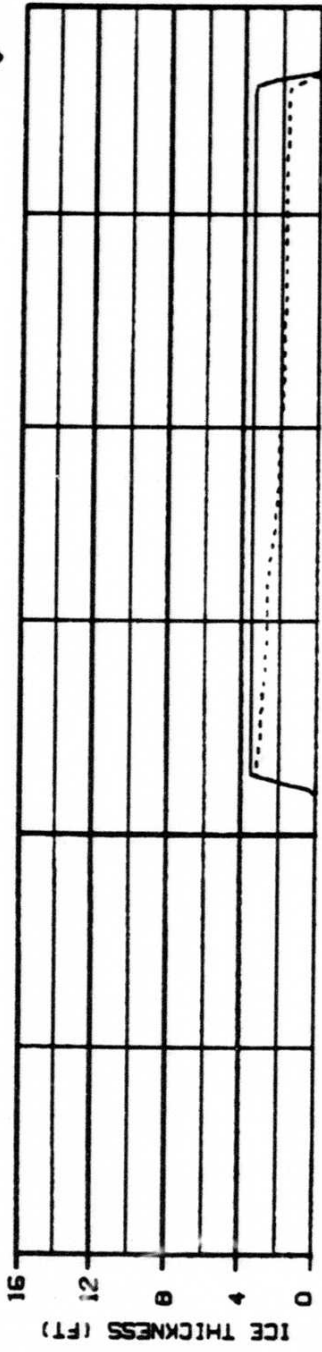
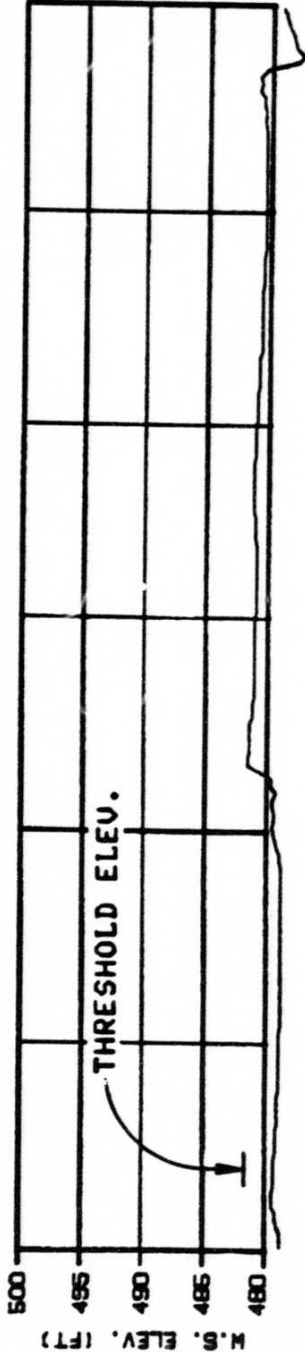
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-BEGGED JOINT VENTURE  
 PROJECT NO. 82-0000 (P. 1) OF 10 0000. 142

HEAD OF SLOUGH 8  
 RIVER MILE : 114.10  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82F1C-A

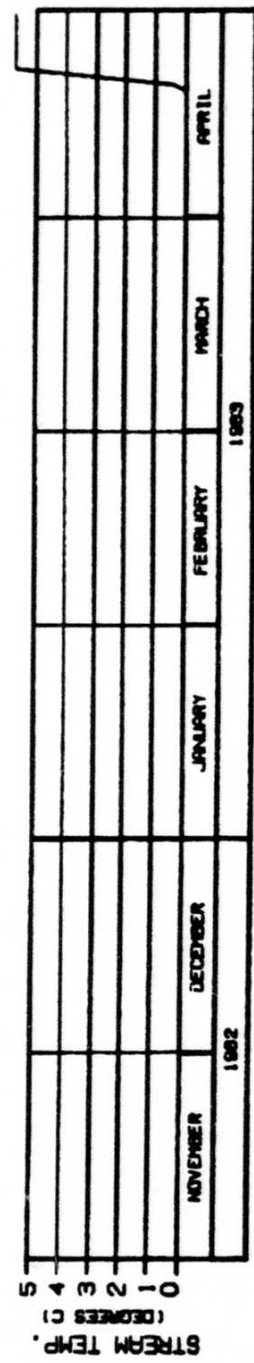
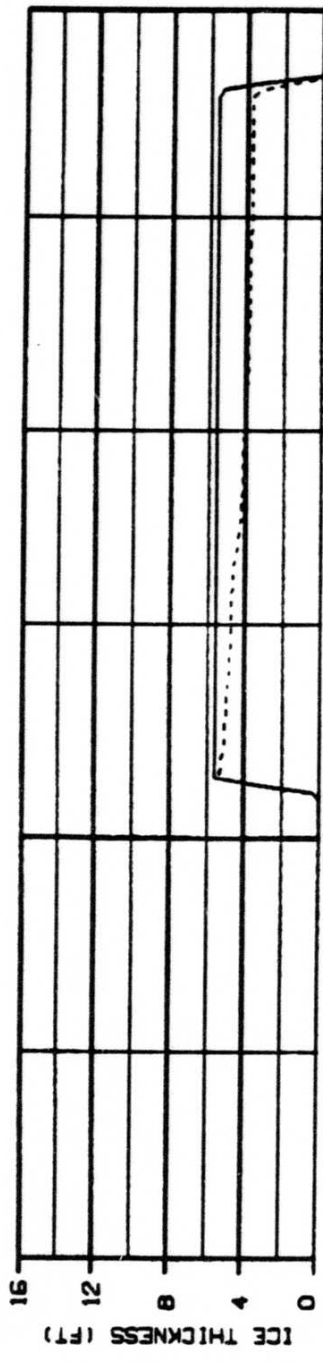
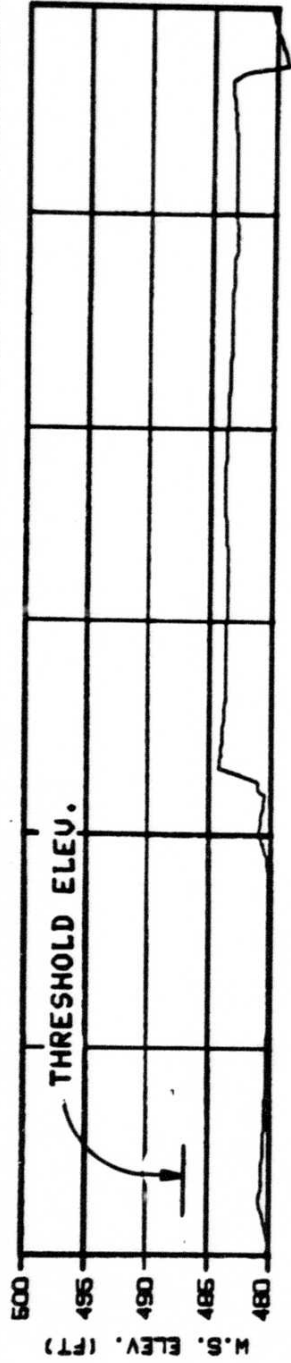
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARRIS-ERBEC JOINT VENTURE  
 DRAWING NO. 82F1C-A

**SIDE CHANNEL MSII**  
 RIVER MILE : 115.50  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82F1C-A

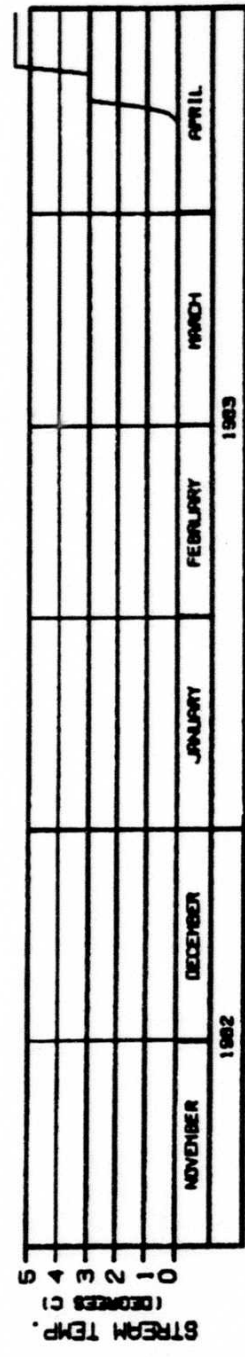
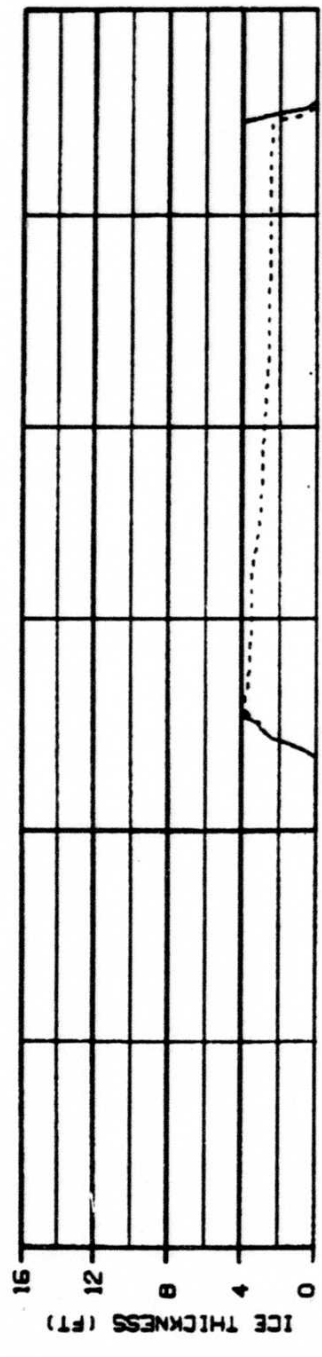
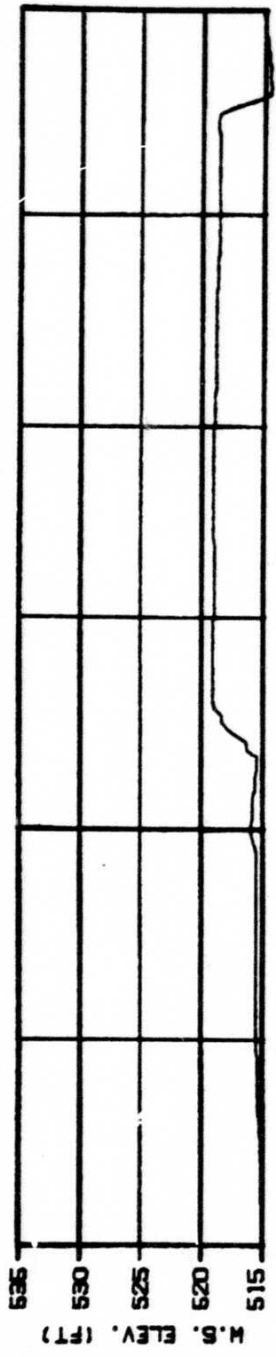
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - BLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERCO JOINT VENTURE  
 SHEET - S.I. 1000 OF 14 OF 1000, 148

HEAD OF SIDE CHANNEL MS11  
 RIVER MILE : 115.90  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82FIC-A

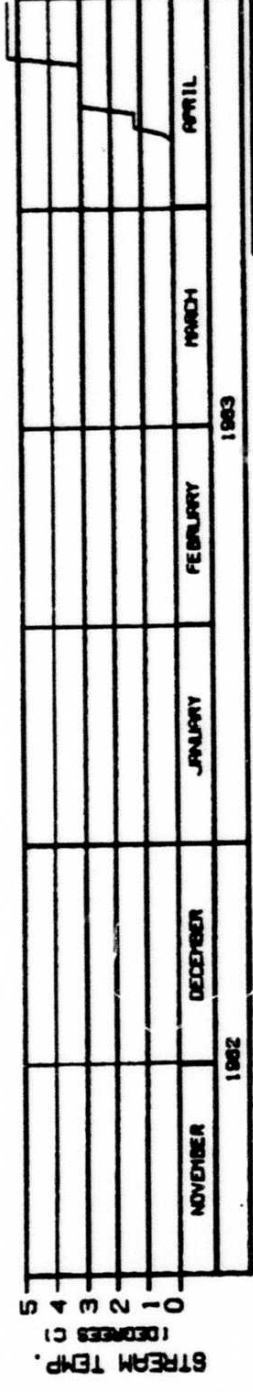
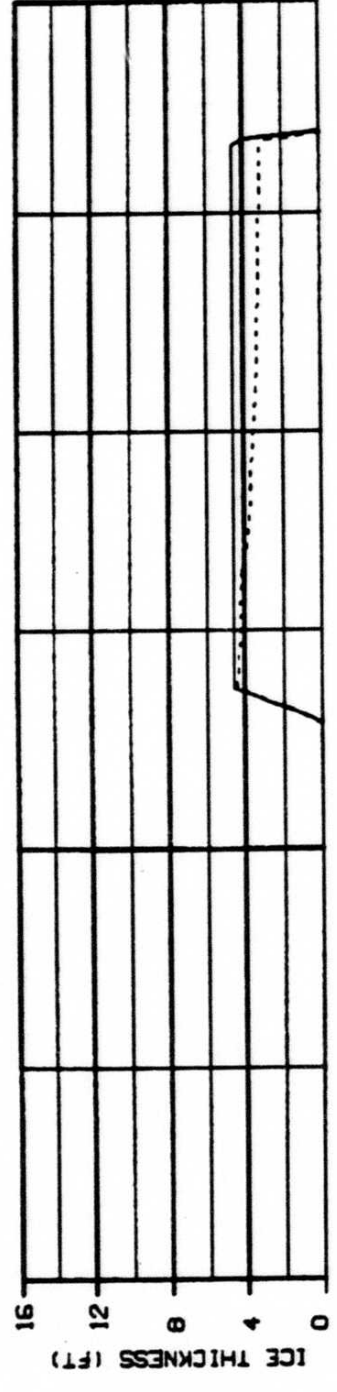
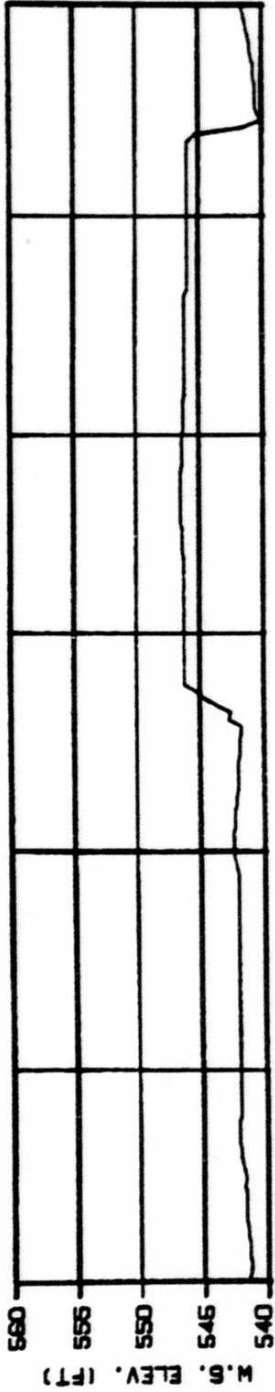
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 DRAWING NO. 82F1C-A

RIVER MILE : 120.00  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82F1C-A

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

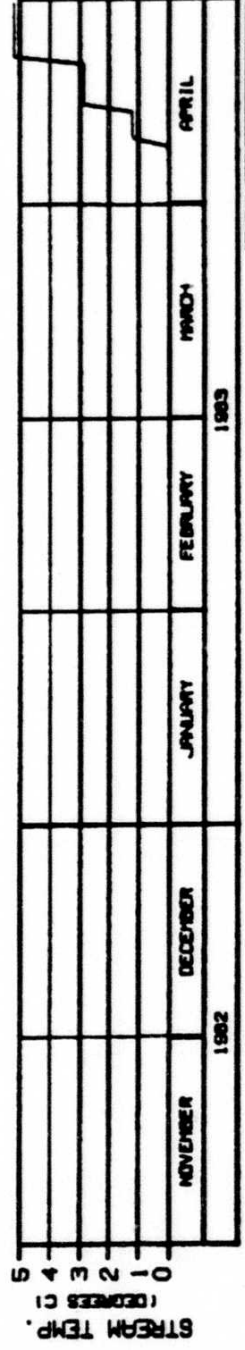
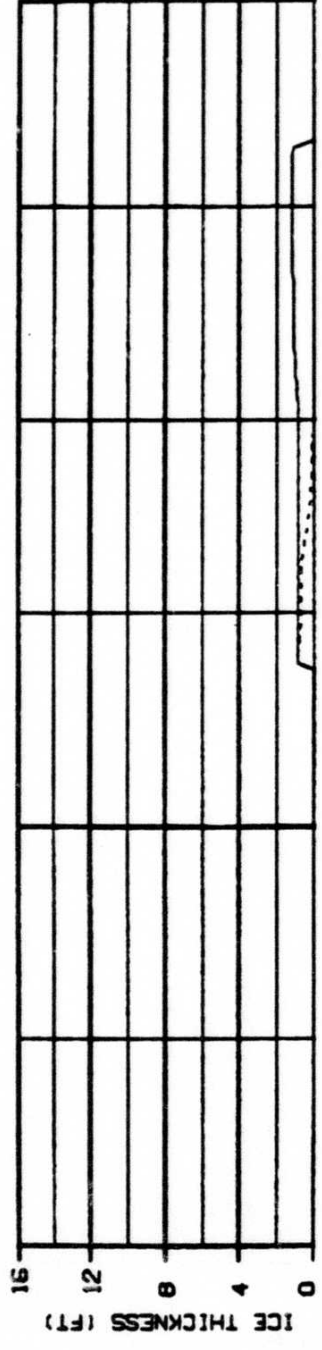
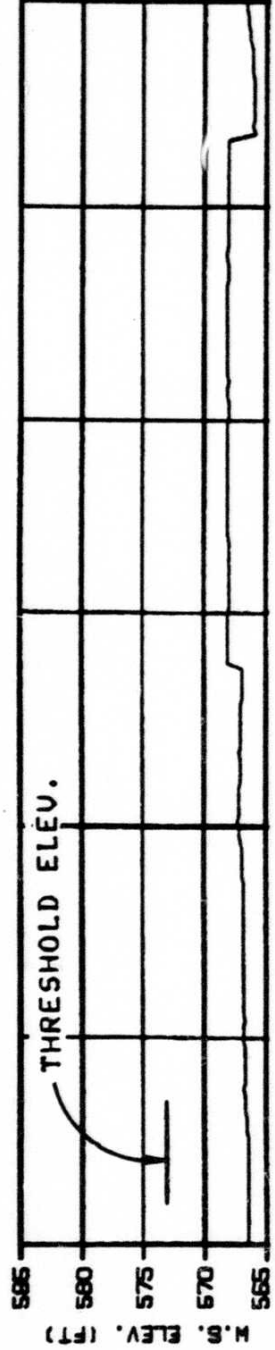


ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 WARRA-EBBSCO JOINT VENTURE  
 October, 24, 1983 10:44:00 AM 1983.148

HEAD OF MOOSE SLOUGH  
 RIVER MILE : 123.50  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : NATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82FIC-A

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



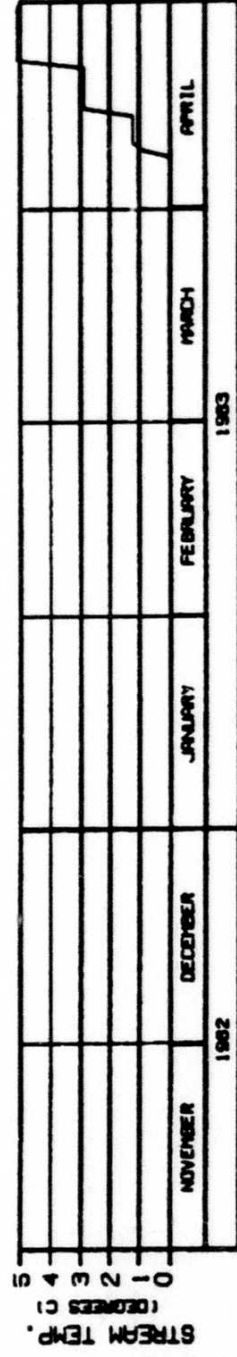
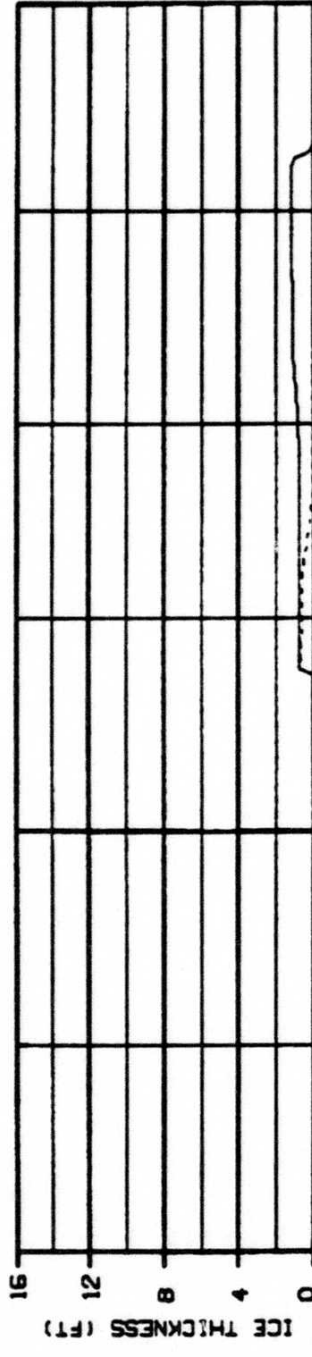
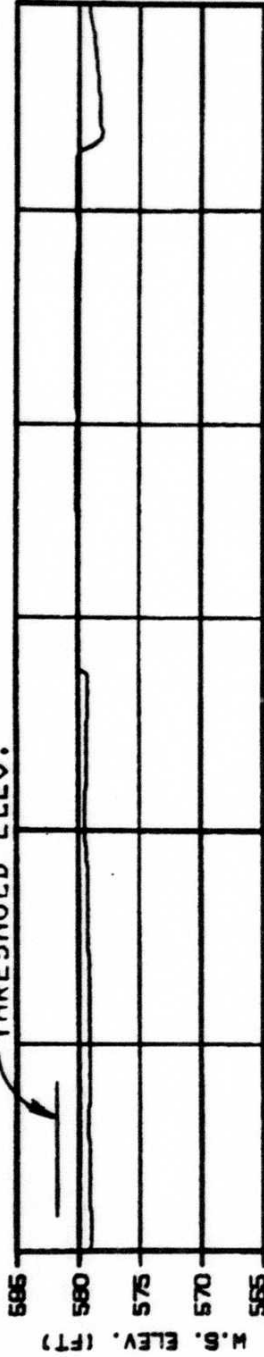


ALASKA POWER AUTHORITY  
 SUBLINE PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBEGOD JOINT VENTURE  
 DRAWING NO. 82FIC-A

HEAD OF SLOUGH 8A (WEST)  
 RIVER MILE : 126.10  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : NATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82FIC-A

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

THRESHOLD ELEV.



ALASKA POWER AUTHORITY  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 DRAWN: A.L. BOND 10 JUL 83 2000.142

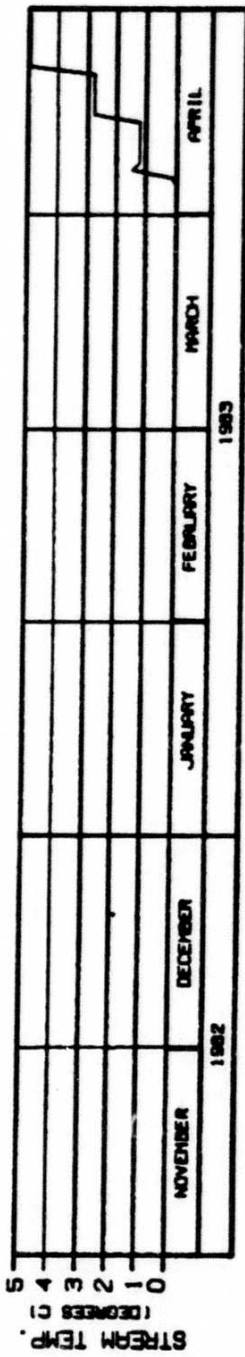
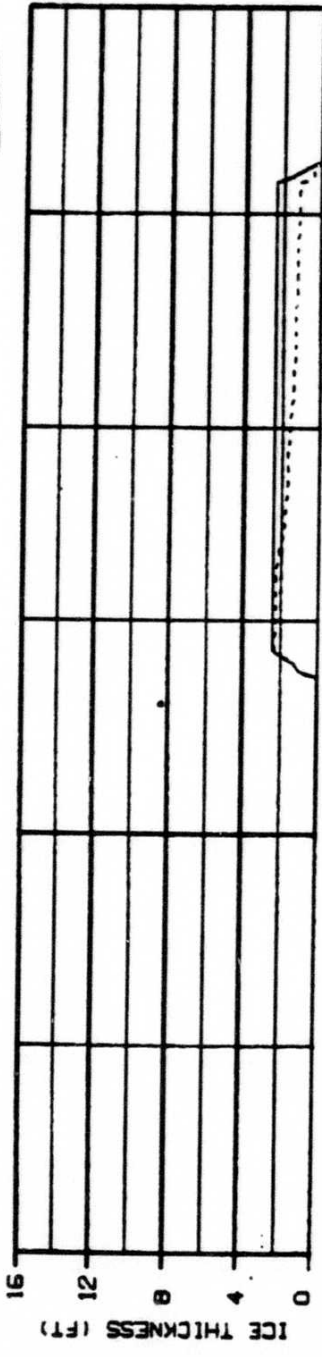
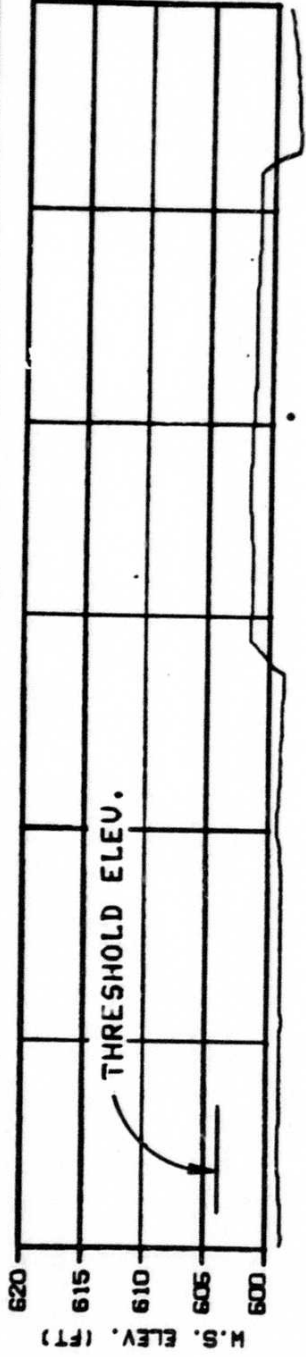
HEAD OF SLOUGH 8A (EAST)

RIVER MILE : 127.10

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : NATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82FIC-A

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

C



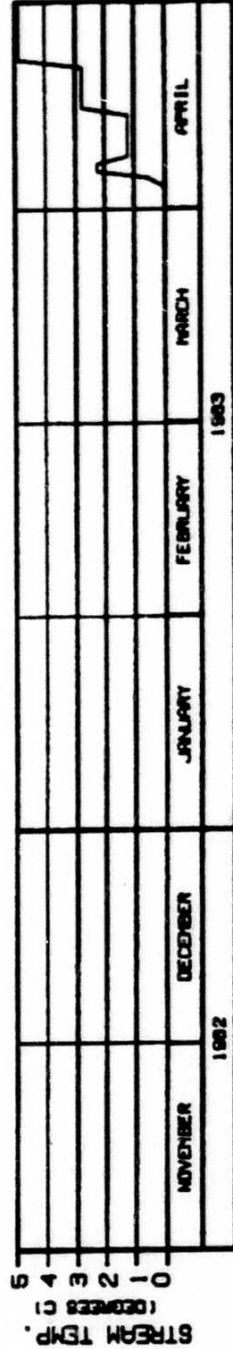
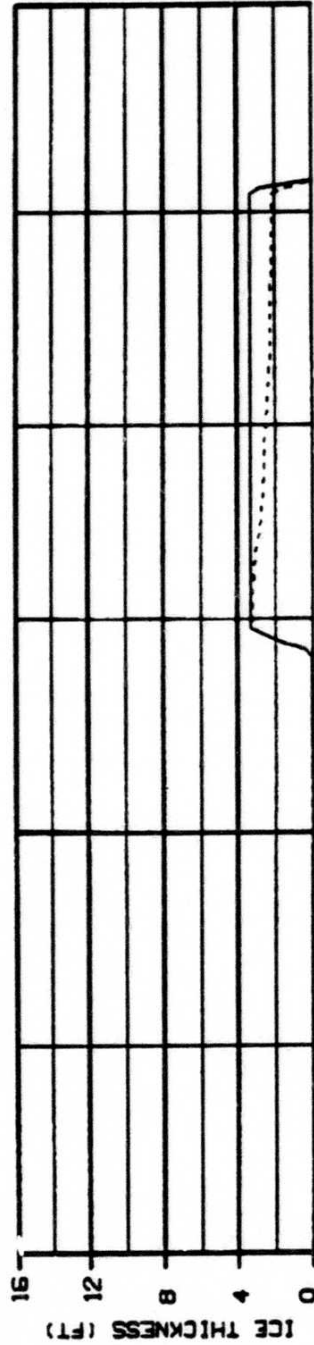
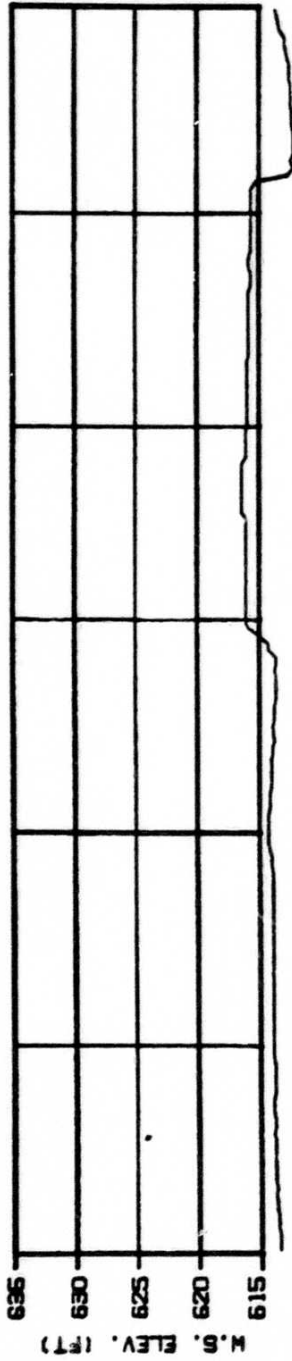
ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBECO JOINT VENTURE  
 PROJECT NO. 82-0000 (P. 4) OF 04 0000 148

HEAD OF SLOUGH 9  
 RIVER MILE : 129.30  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82FIC-A

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

OPTION 7

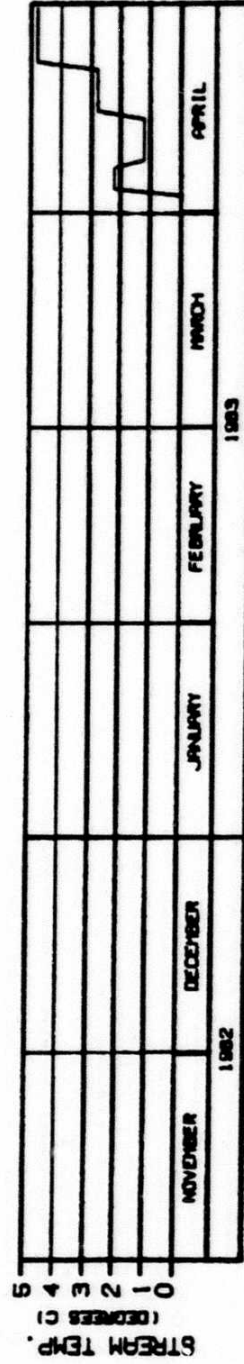
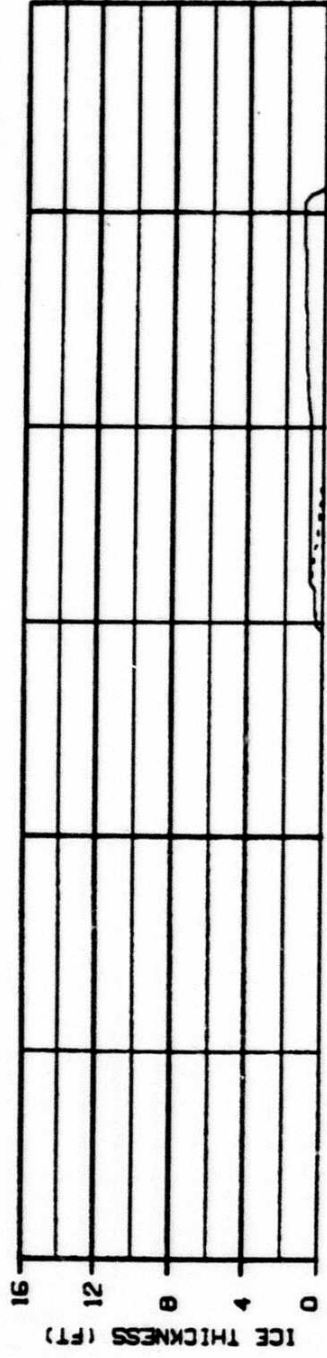
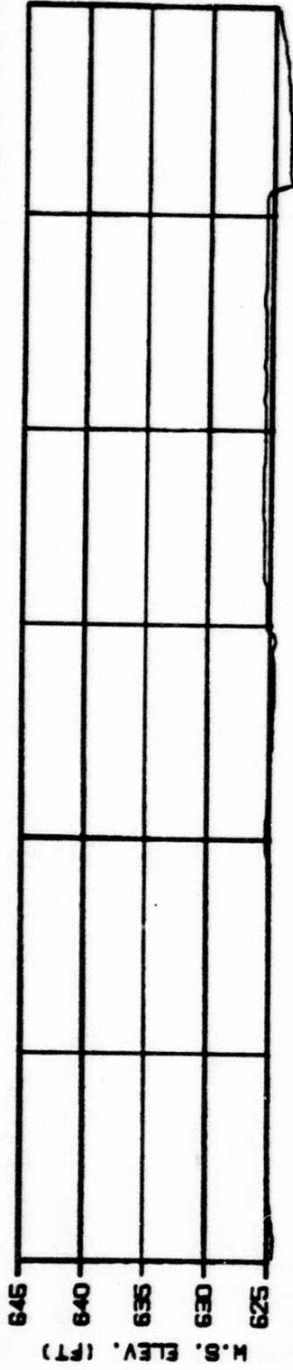
OPTION?



ALASKA POWER AUTHORITY  
 SUBITNA PROJECT  
 SUBITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBARD JOINT VENTURE  
 ORDER. 84-0000 10 11 81 888.142

**SIDE CHANNEL U/S OF SLOUGH 9**  
 RIVER MILE : 130.60  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : WATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82F1C-A

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



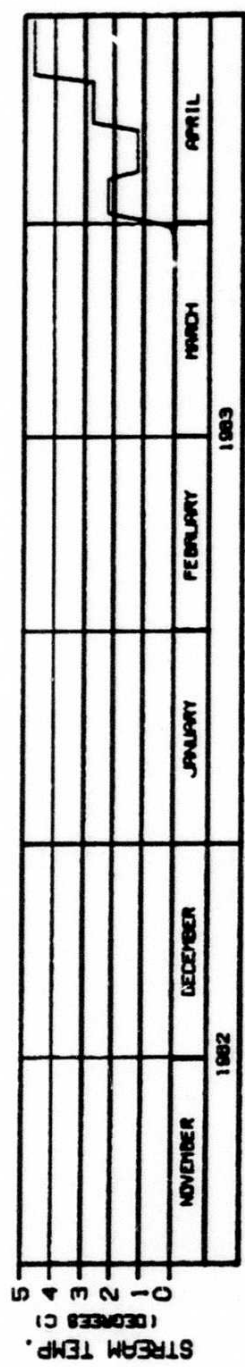
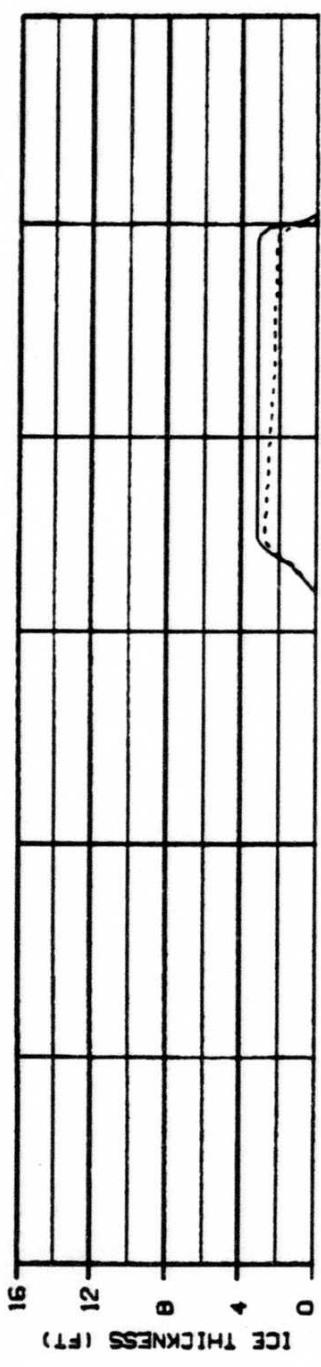
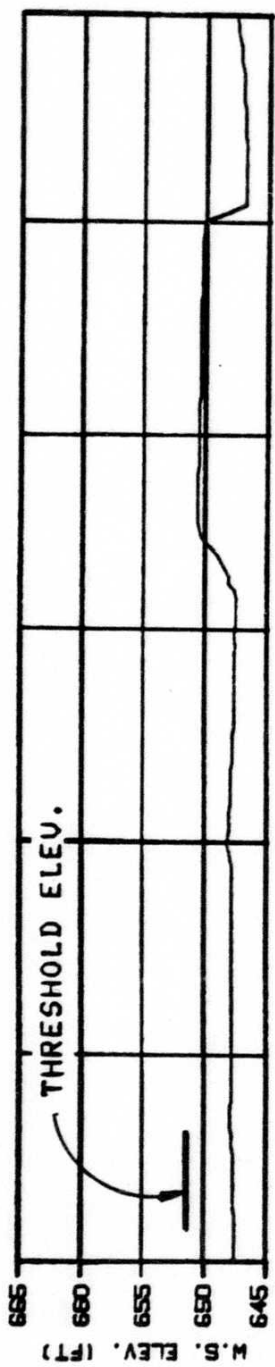
**SIDE CHANNEL U/S OF 4TH JULY CREEK**

RIVER MILE : 131.80

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : BZFIC-A

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

ALASKA POWER AUTHORITY	
SUBJECT PROJECT	SUSITNA RIVER
	ICE SIMULATION
	TIME HISTORY
HORZA-ERBECO JOINT VENTURE	
DESIGNER: B.L. BERRY JR. & ASSOCIATES	DATE: 08/83

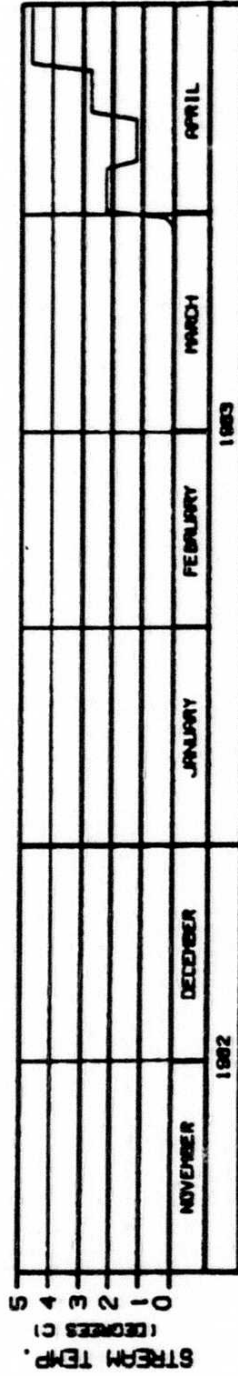
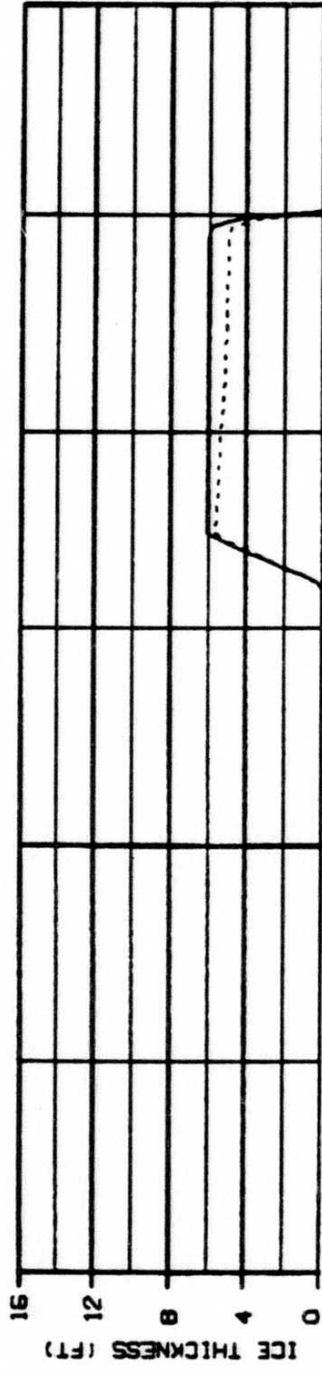
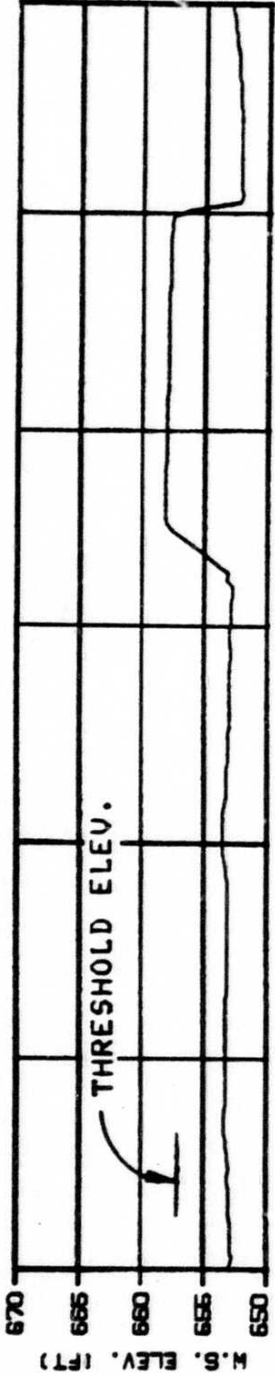


ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRARD JOINT VENTURE  
 DRAWING NUMBER: 82-142

HEAD OF SLOUGH 9A  
 RIVER MILE : 133.70  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : NATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82F1C-A

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

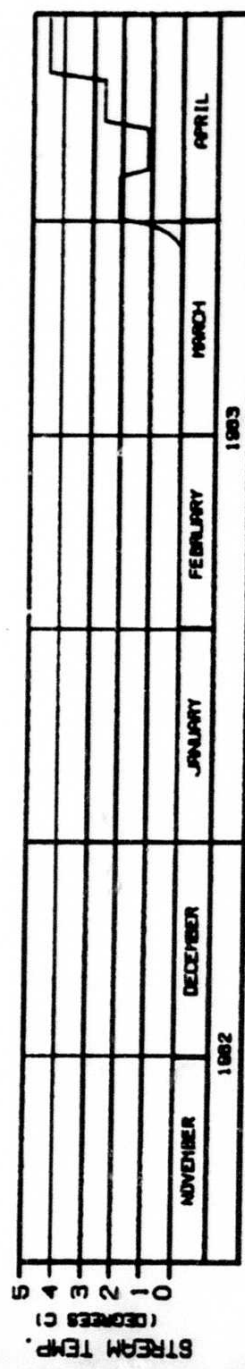
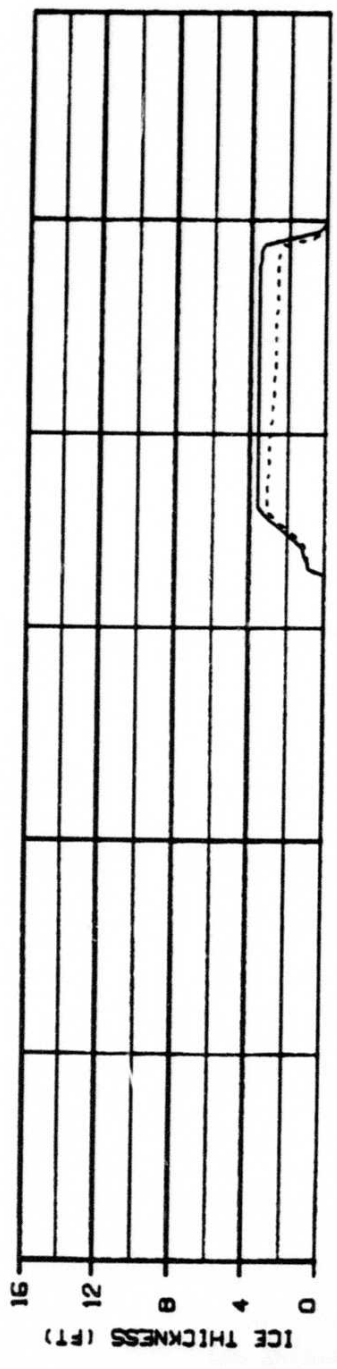
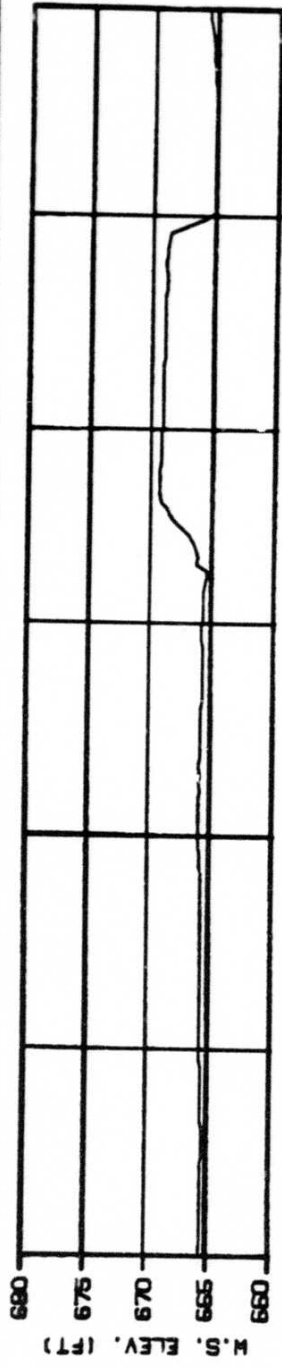




ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 PROJECT NUMBER 801111  
 DATE 10/11/83  
 SHEET NO. 142

SIDE CHANNEL U/S OF SLOUGH 10  
 RIVER MILE : 134.30  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82FIC-A

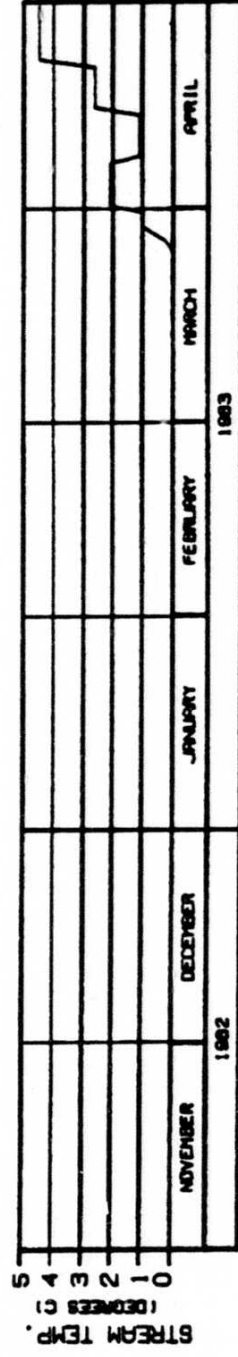
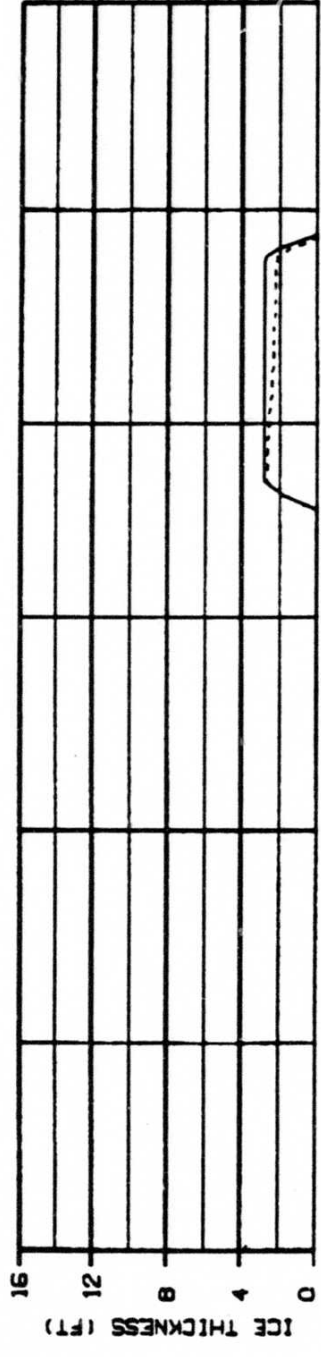
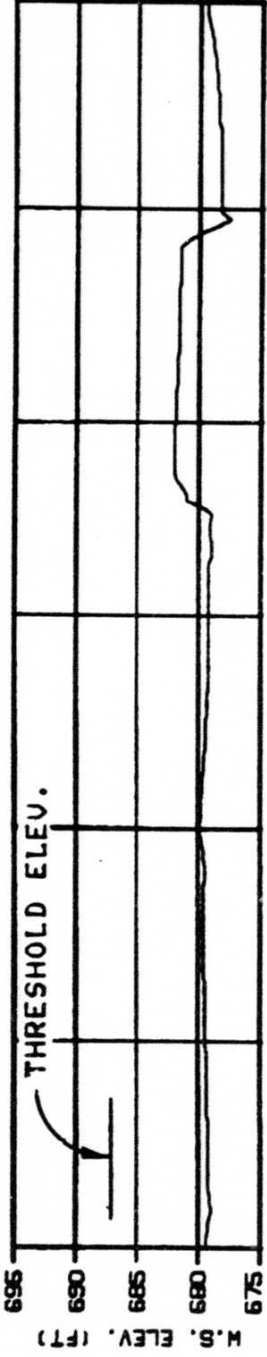
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 ······ BUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HR20A-EBRSCO JOINT VENTURE  
 ORDER: 84-0008 10 04 01 1000.142

SIDE CHANNEL D/S OF SLOUGH 11  
 RIVER MILE : 135.30  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : BZFC-A

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



ALASKA POWER AUTHORITY

SUBMITTER PROJECT: SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

HARRZA-EBRACCO JOINT VENTURE

DESIGN: S.A. 8800    10 JUL 81    8800.1.1.2

HEAD OF SLOUGH 11

RIVER MILE : 136.50

WEATHER PERIOD : 1 NOV 82 - 30 APR 83

ENERGY DEMAND : MATANA 1ST YR FILLING

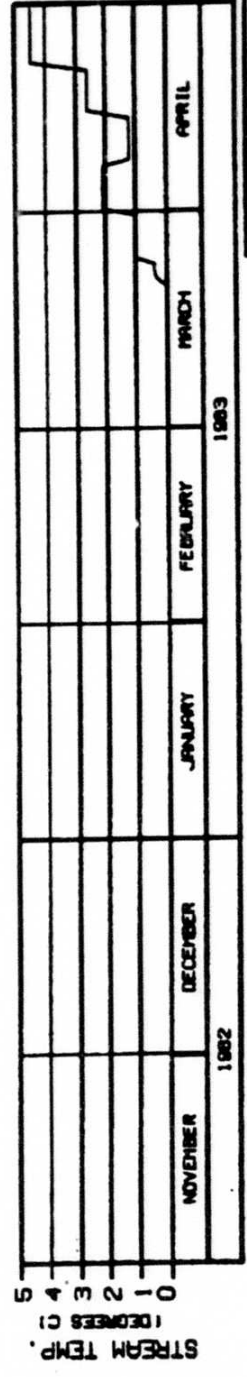
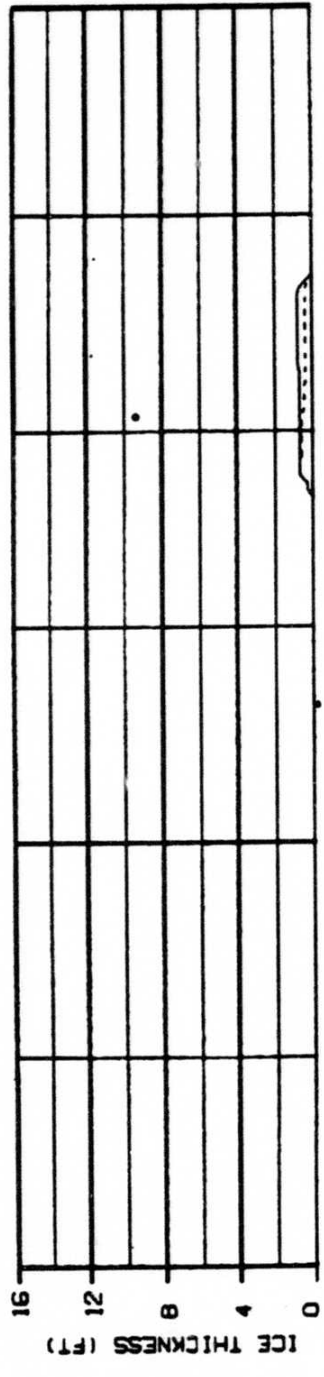
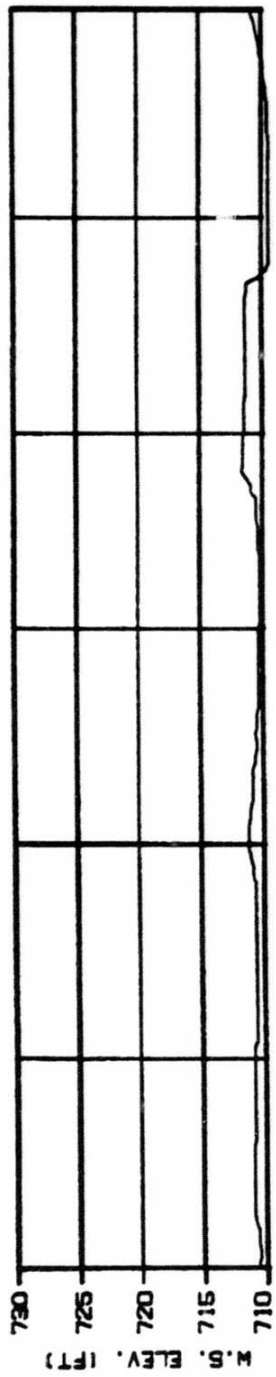
FLOW CASE : C

REFERENCE RUN NO. : 82F1C-A

ICE THICKNESS LEGEND:

——— TOTAL THICKNESS

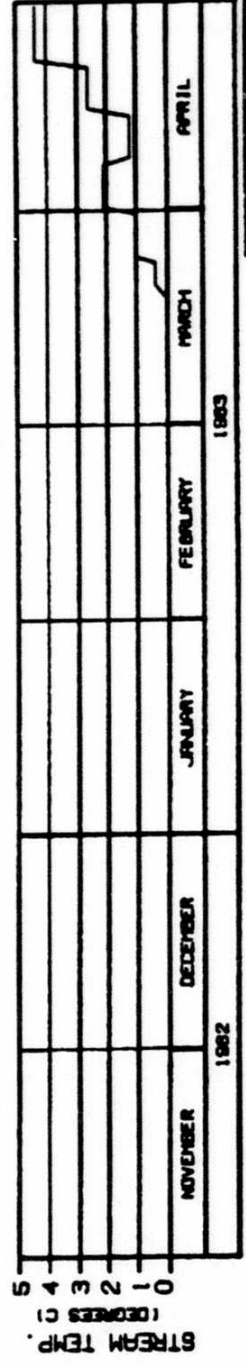
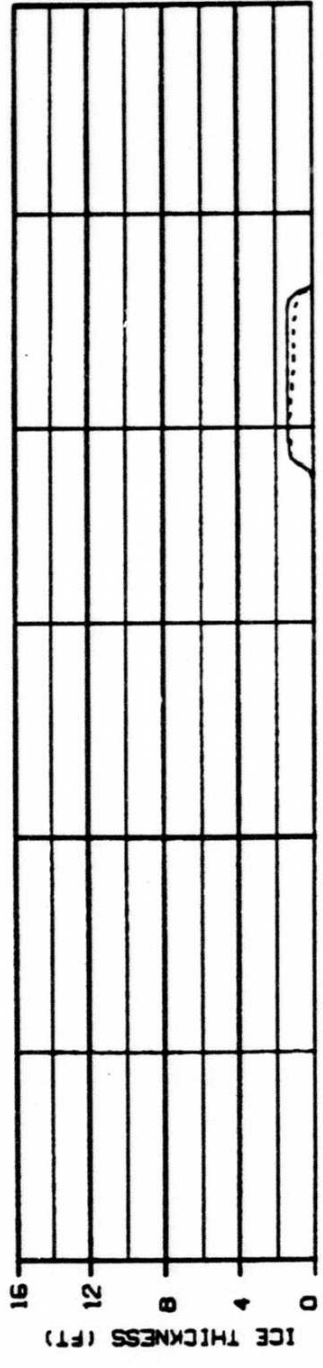
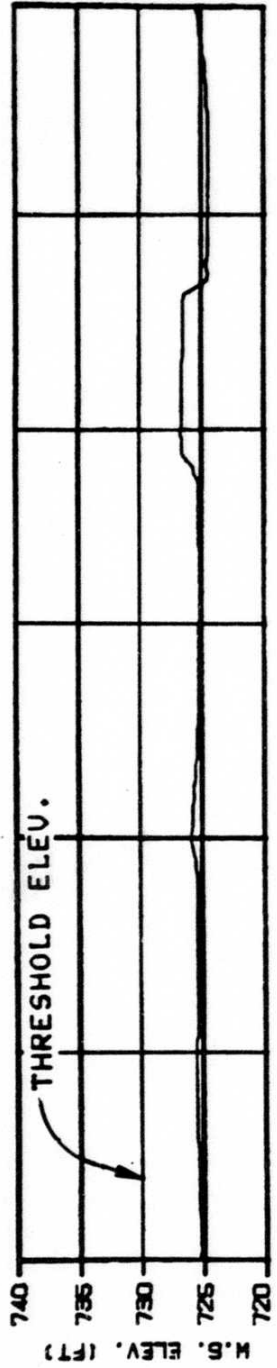
----- SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZD-ERBSCO JOINT VENTURE  
 DESIGN: L.L. DAVIS JR. & ASSOCIATES  
 1983.1.4

HEAD OF SLOUGH 17  
 RIVER MILE : 139.30  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : BZF1C-A

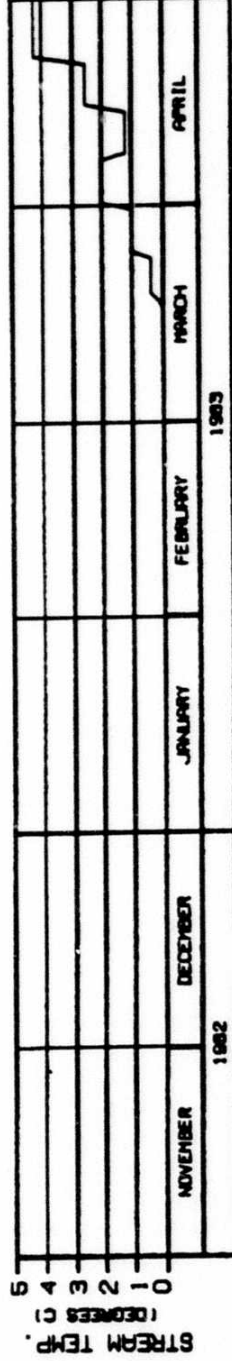
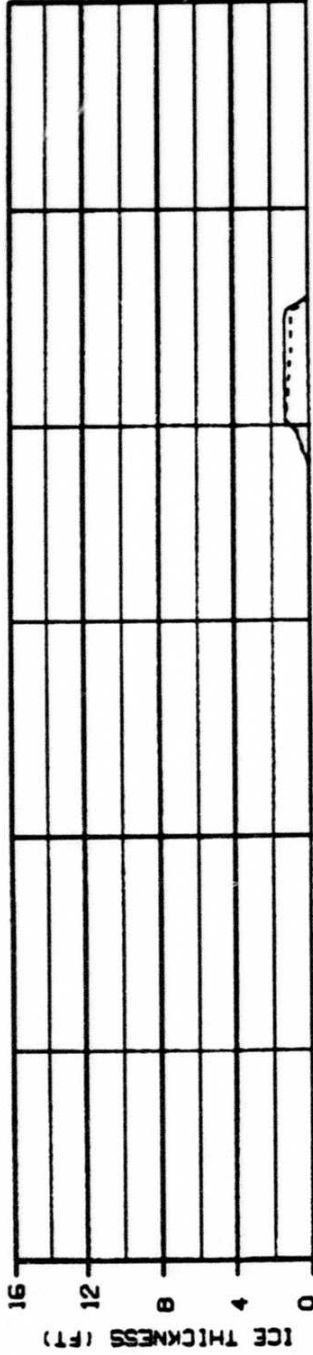
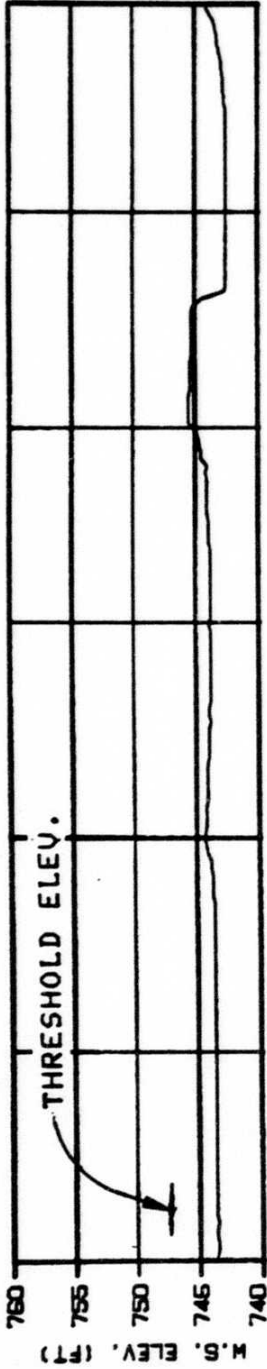
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLOUGH COMPONENT



ALASKA POWER AUTHORITY  
 SUBSTRA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBACD JOINT VENTURE  
 DRAWING NO. AA 80 1982.142

HEAD OF SLOUGH 20  
 RIVER MILE : 140.50  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 82FIC-A

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



SLOUGH 21 (ENTRANCE A6)

RIVER MILE : 141.80

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 8201C-A

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

ALASKA POWER AUTHORITY

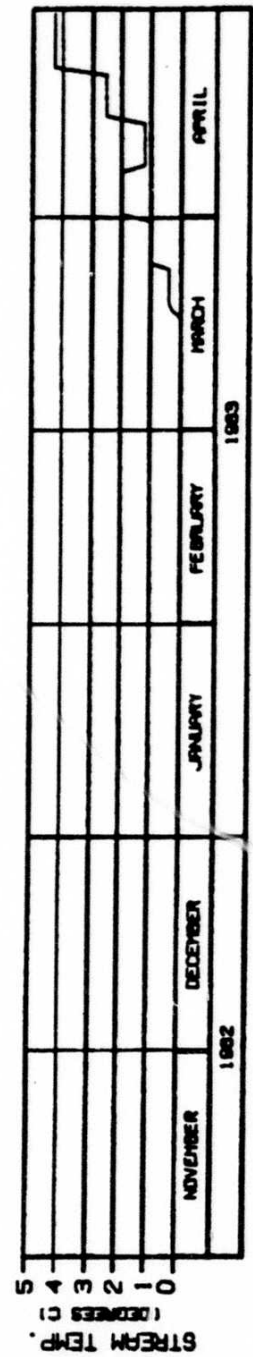
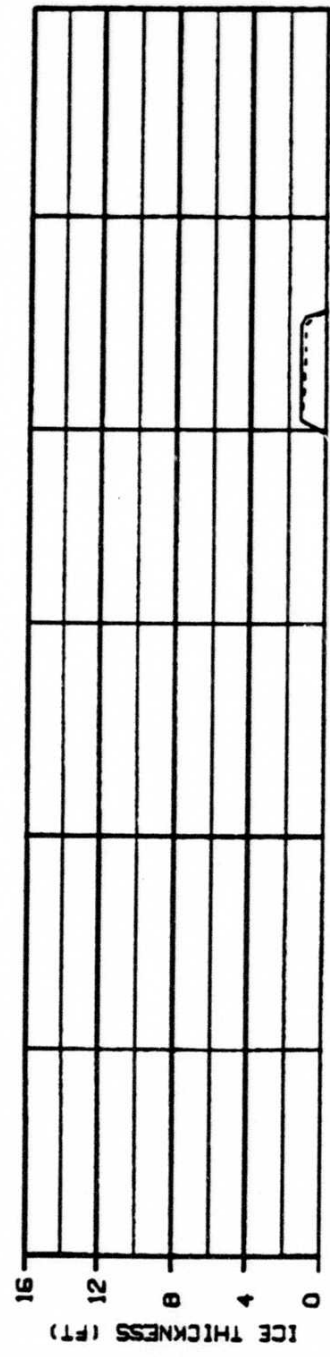
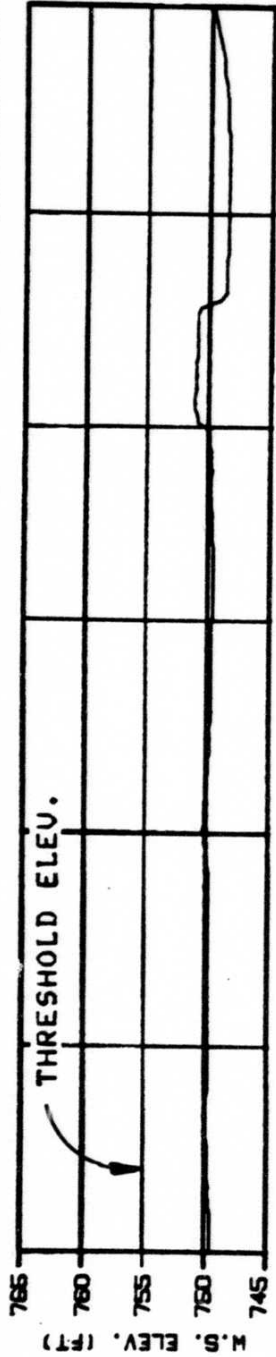
SUBMITTER PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

WARREN-EBERCO JOINT VENTURE

PROJECT: S.S. 8201C-A 10-82-83 8201C-A

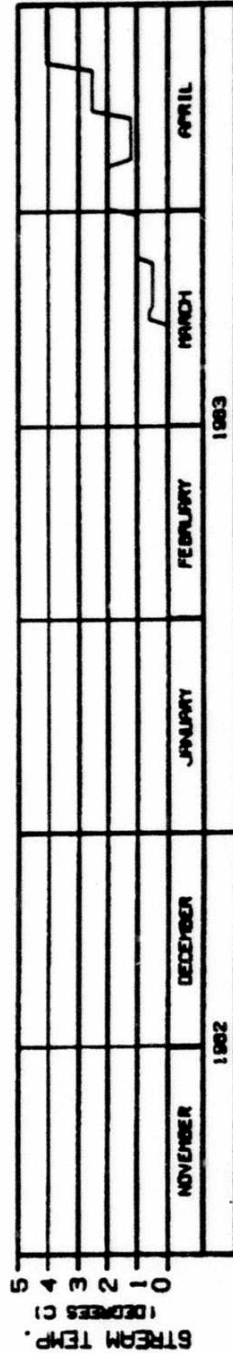
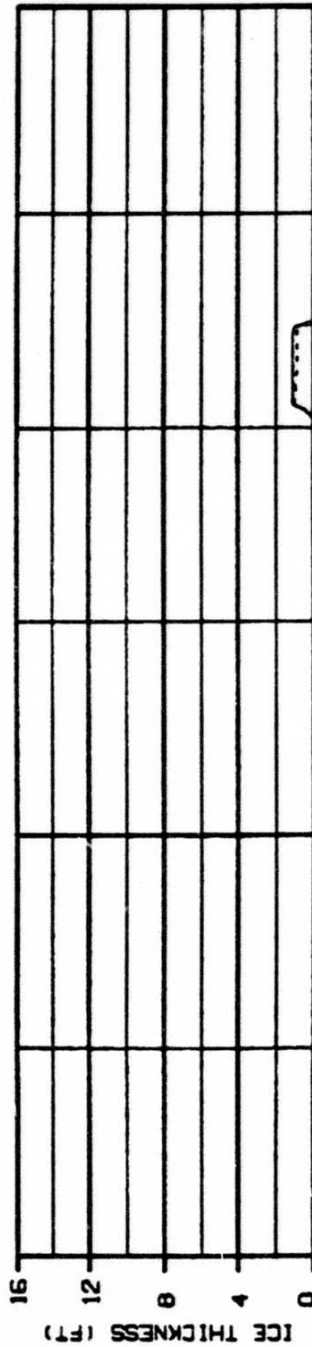
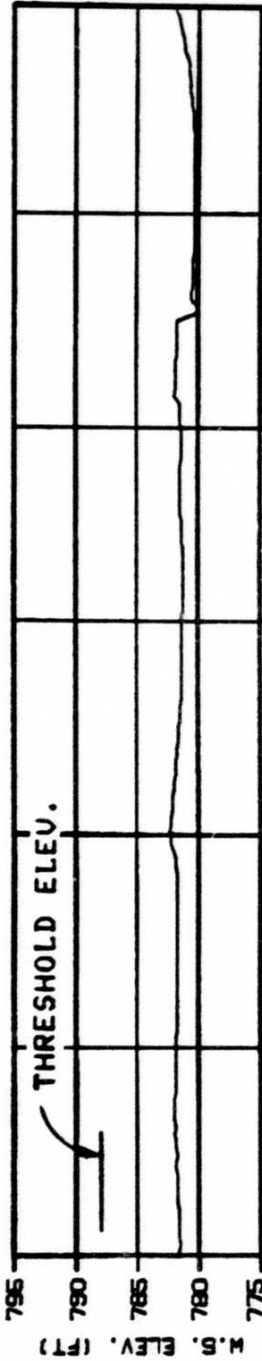




ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-BASCO JOINT VENTURE  
 DRAWN: B.A. 8809 10 11 83 1000.142

HEAD OF SLOUGH 21  
 RIVER MILE : 142.20  
 WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
 ENERGY DEMAND : MATANA 1ST YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : BZF1C-A

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



ALASKA POWER AUTHORITY

EXISTING PROJECT

SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZO-ERBACD JOINT VENTURE

DATE: 11/19/83 10:45:00 1983.142

HEAD OF SLOUGH 22

RIVER MILE : 144.80

WEATHER PERIOD : 1 NOV 82 - 30 APR 83  
ENERGY DEMAND : NATANA 1ST YR FILLING  
FLOW CASE : C  
REFERENCE RUN NO. : 82FIC-A

ICE THICKNESS LEGEND:

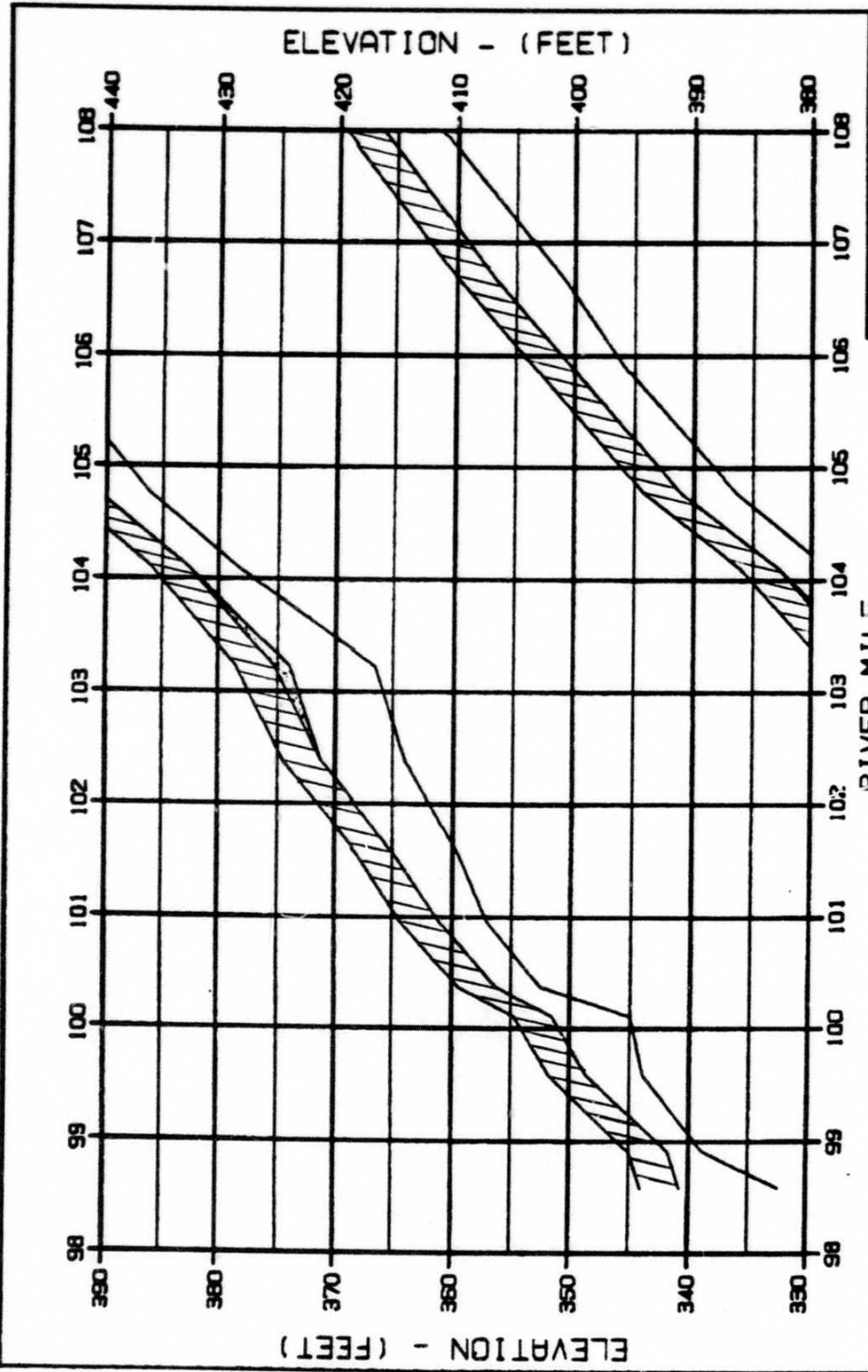
— TOTAL THICKNESS  
- - - - - SLOUGH COMPONENT

SECTION 2

**EXHIBIT S**

The following study, entitled "Watana-Second Year Filling" corresponds to the winter of 1992-93, as depicted in Exhibit E.2.138 of the License Application. The weather used corresponds to the winter of 1981-82, which is a cold winter. Releases from Watana under these conditions would be made thru the mid-level outlet.

c



ALASKA POWER AUTHORITY
SUSITNA PROJECT
SUSITNA RIVER
ICE SIMULATION
PROFILE OF MAXIMUM STAGES
HARZA-EBRARD JOINT VENTURE
DESIGNED BY: J.A. 80
DRAWN BY: J.A. 80

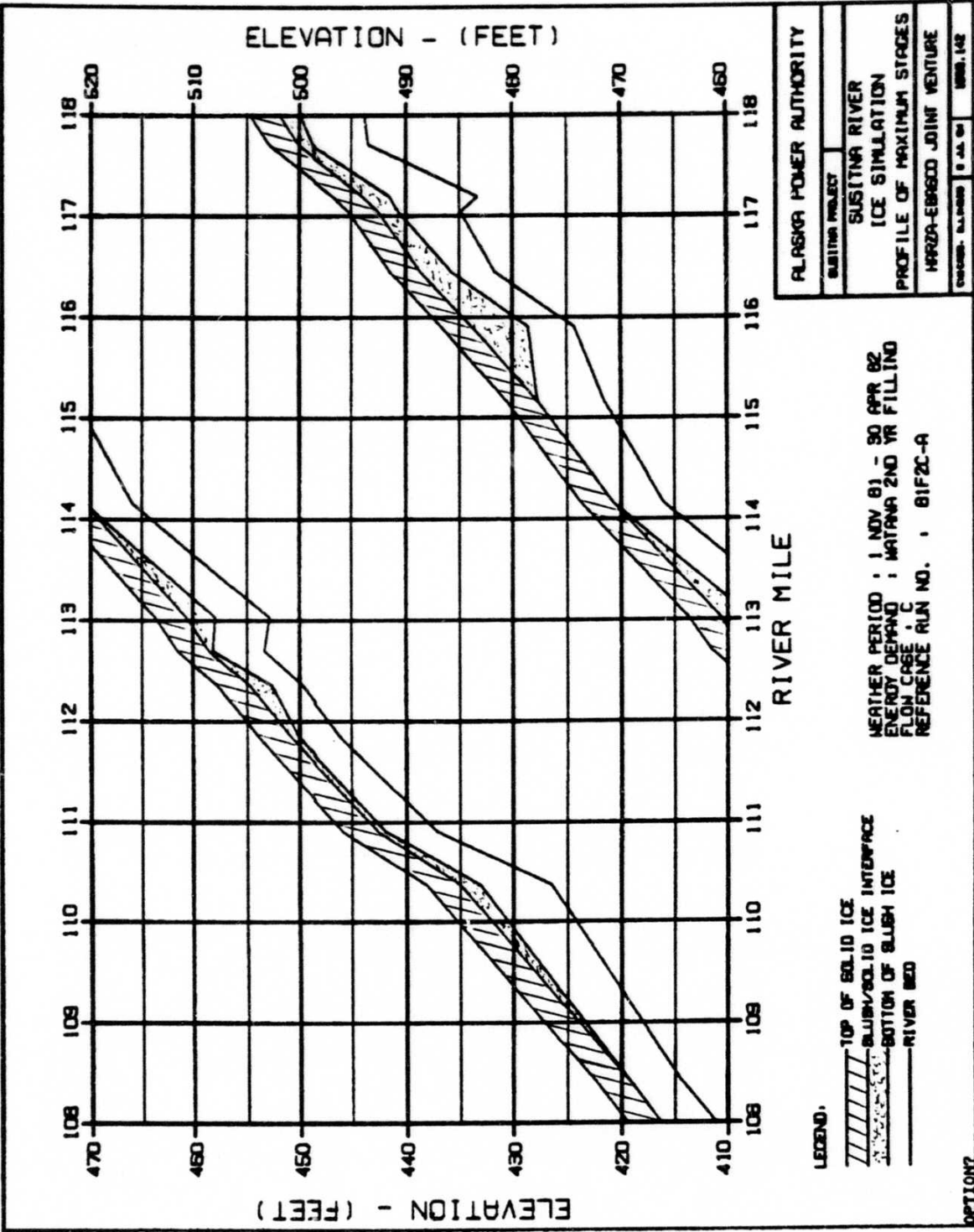
WEATHER PERIOD : 1 NOV 61 - 30 APR 62  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

LEGEND:  
 [Hatched Area] TOP OF SOLID ICE  
 [Dotted Area] SLUSH/SOLID ICE INTERFACE  
 [Solid Line] BOTTOM OF SLUSH ICE  
 [Dashed Line] RIVER BED

021108Z



6



ALASKA POWER AUTHORITY	
SUSITNA PROJECT	SUSITNA RIVER
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
HARZA-EDGED JOINT VENTURE	
PROJECT: AL-1000	D. J. G. 82
NOV. 82	

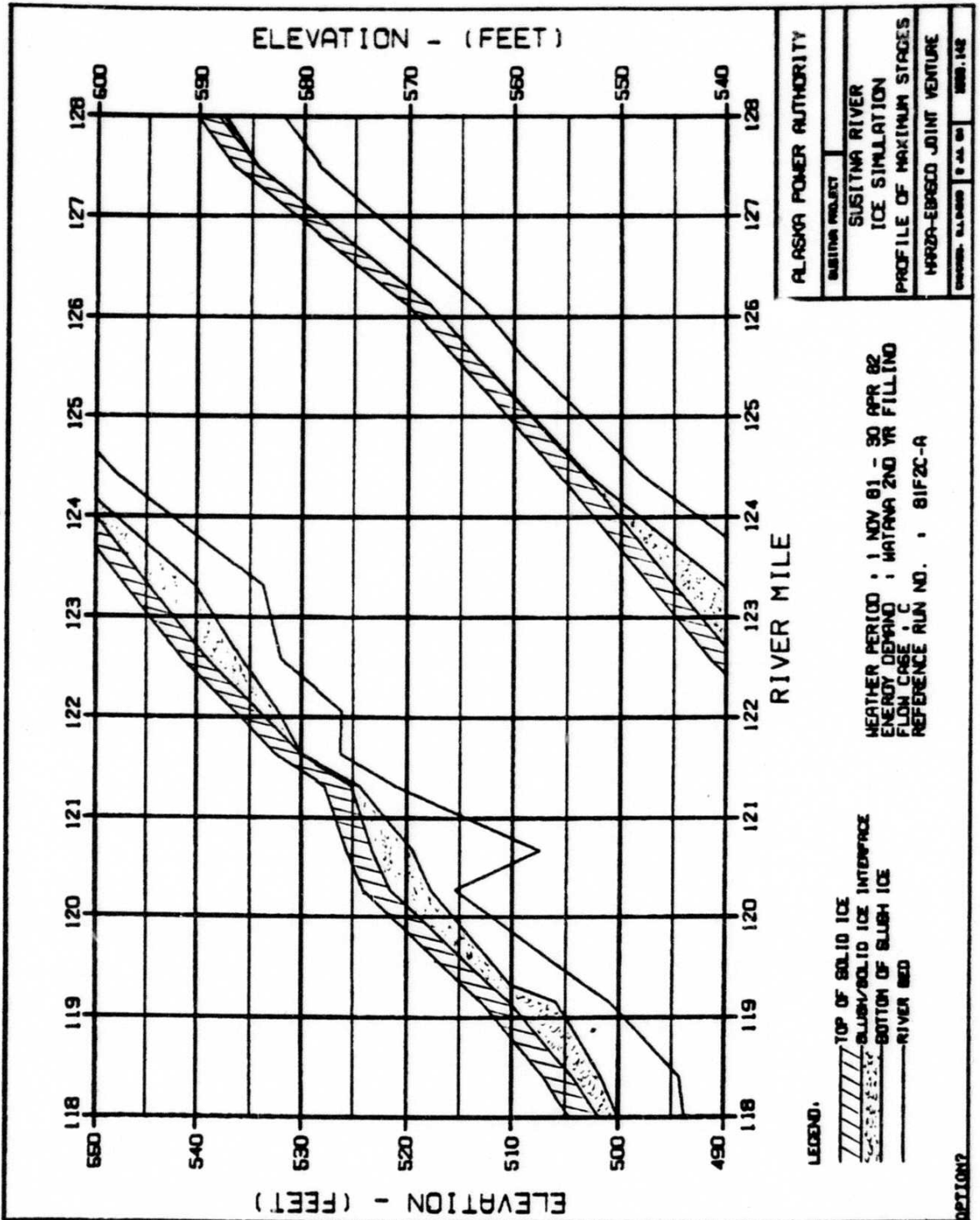
WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

LEGEND:  
 TOP OF SOLID ICE  
 SLUSH/SOLID ICE INTERFACE  
 BOTTOM OF SLUSH ICE  
 RIVER BED

OPTION 7



c



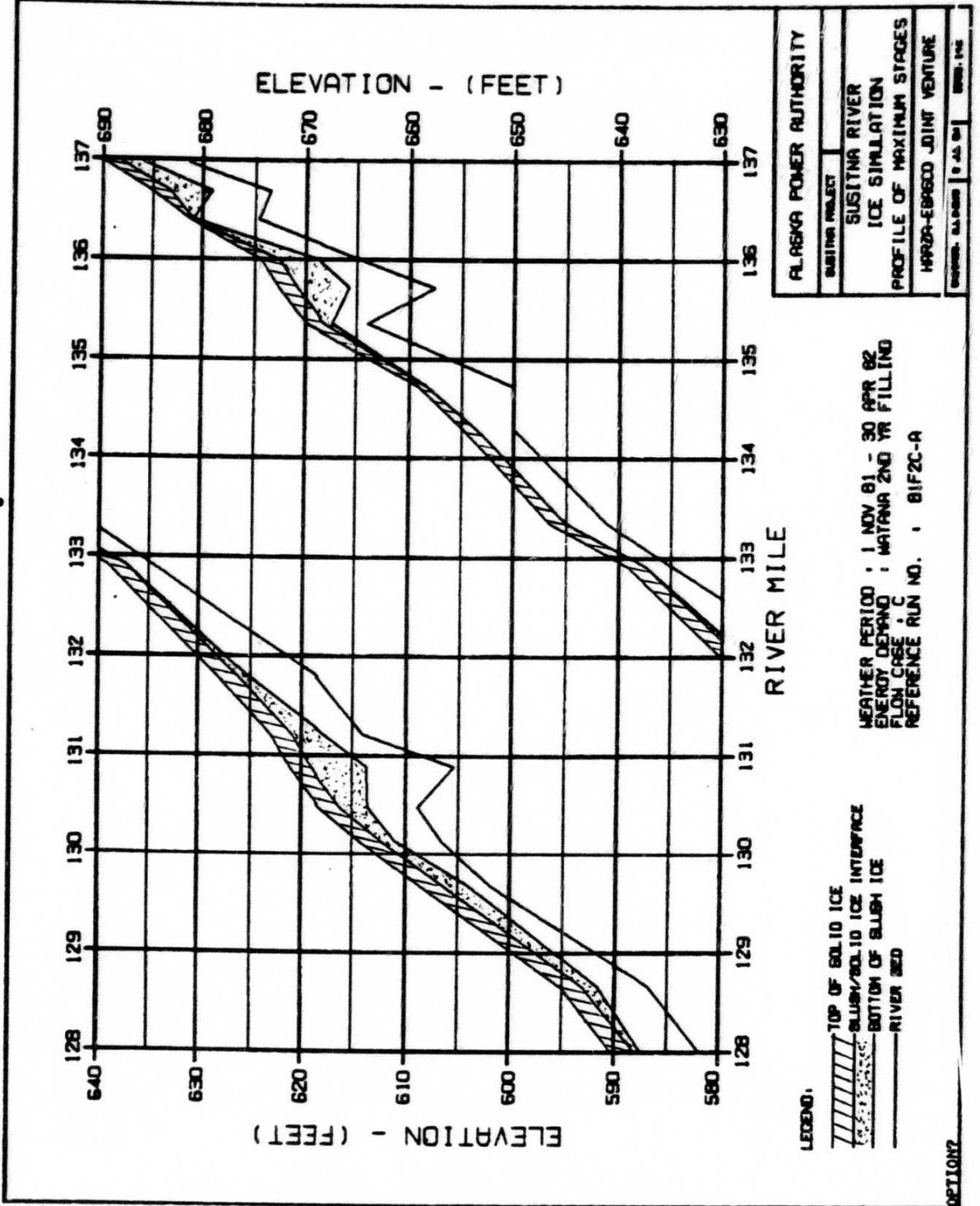
LEGEND:

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

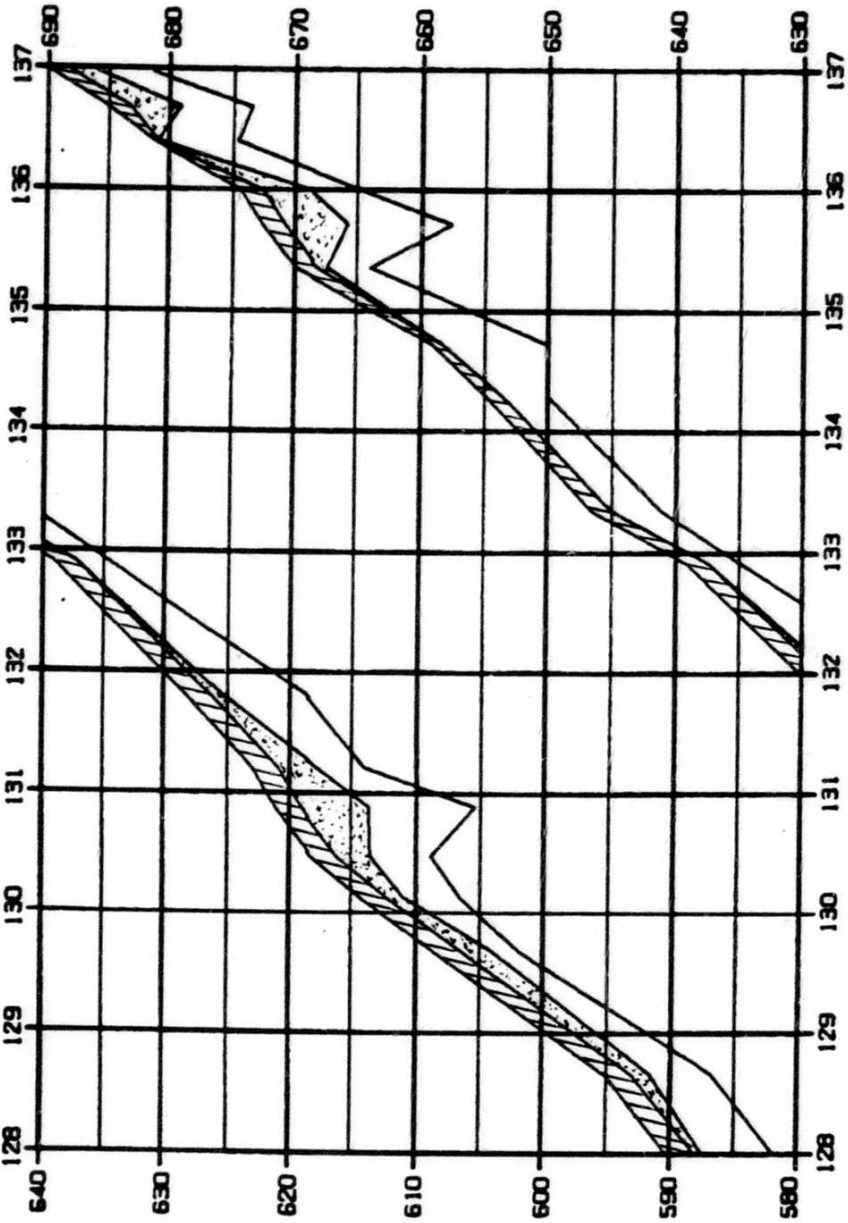
WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	SUSITNA RIVER
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
HARZA-EBERCO JOINT VENTURE	
DESIGNED BY: S.A. 8200	DRAWN BY: S.A. 8200
NOV. 1982	

OPTION?



ELEVATION - (FEET)



ELEVATION - (FEET)

RIVER MILE

ALASKA POWER AUTHORITY	
SUSITNA PROJECT	
SUSITNA RIVER	
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
HARRIS-EMASCO JOINT VENTURE	
DESIGNED BY: J. J. JONES	DRAWN BY: J. J. JONES
DATE: 11/82	SCALE: 1"=100'

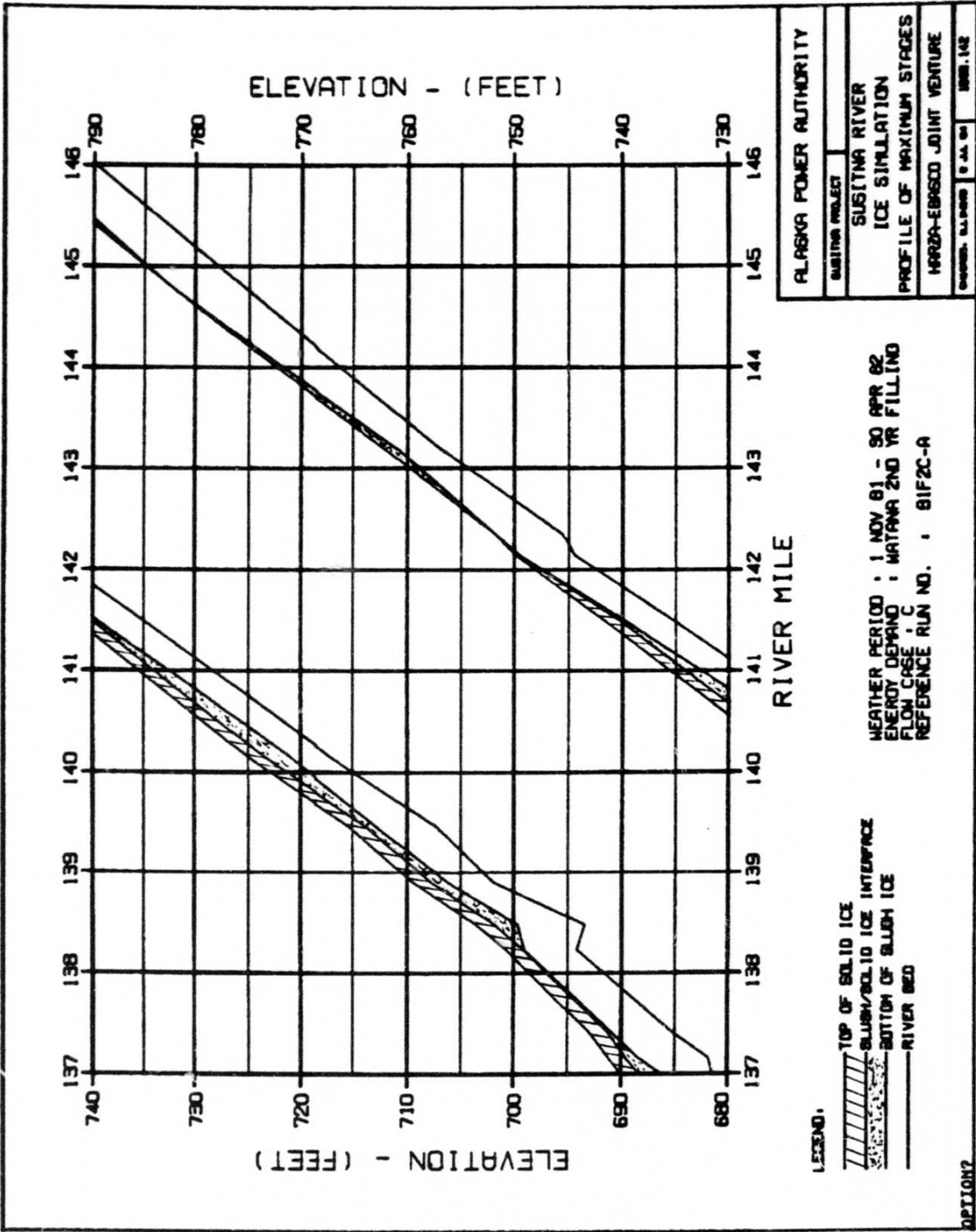
LEGEND:

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

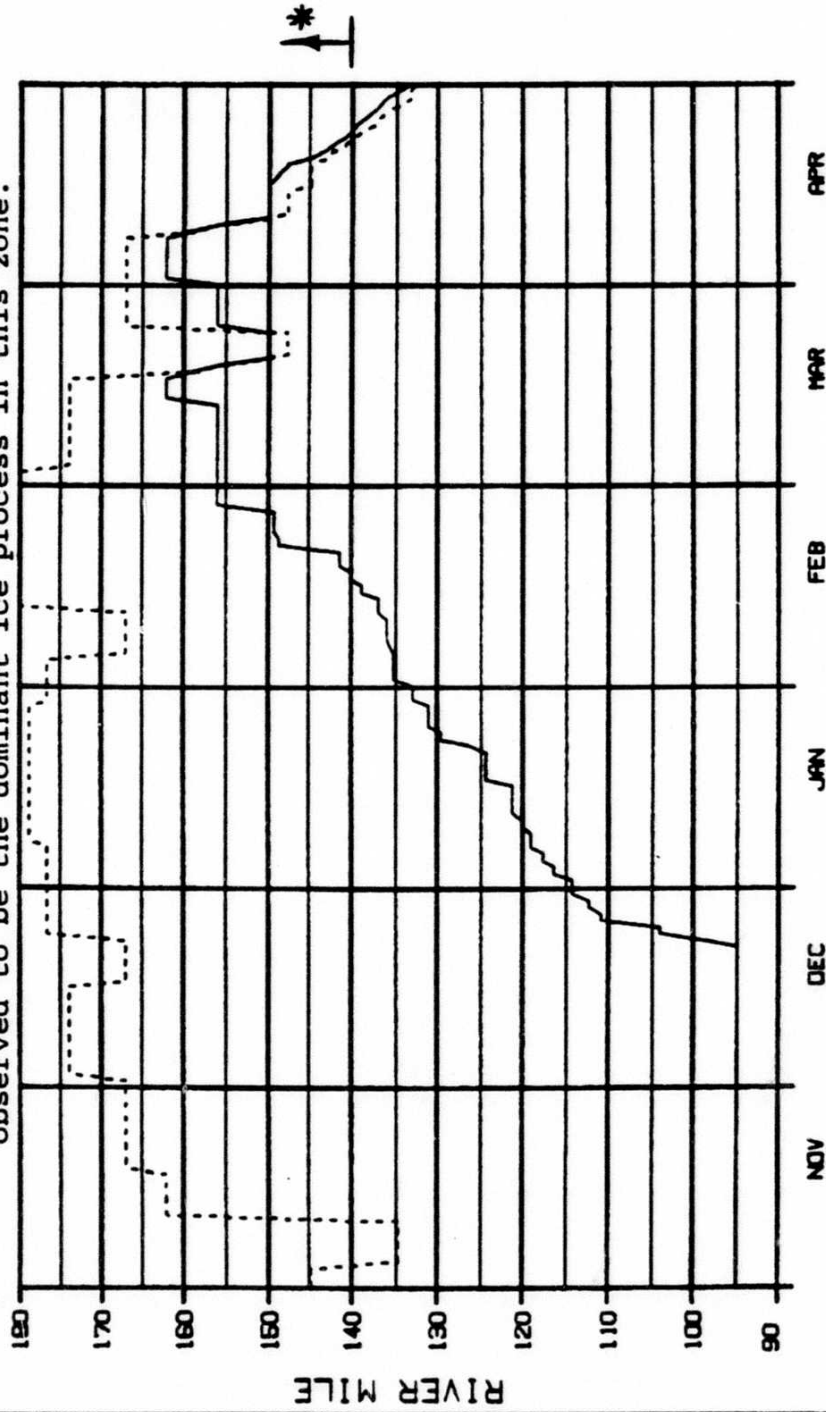
WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

SECTION?

C



\* Note: Simulation of progression u/s of River Mile 140 † is considered approximate since intermittent bridging of border ice has been observed to be the dominant ice process in this zone.



LEGEND:

— ICE FRONT  
 - - - ZERO DEGREE ISOTHERM

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

ALASKA POWER AUTHORITY

SUBMITTAL PROJECT

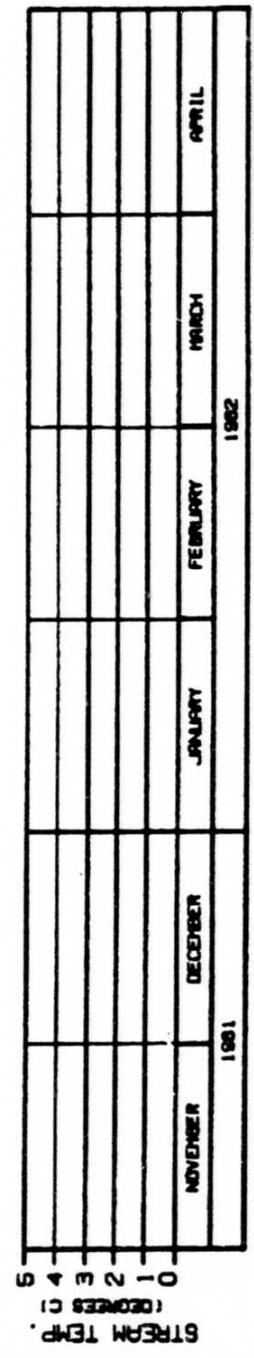
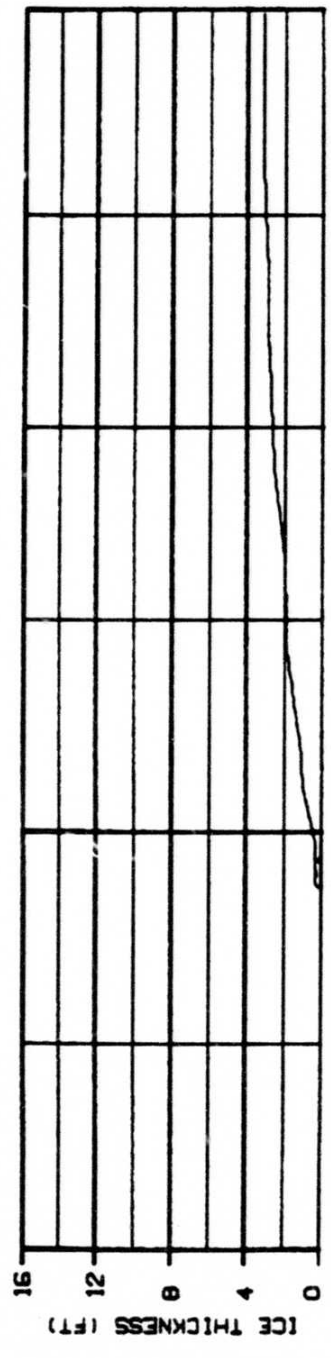
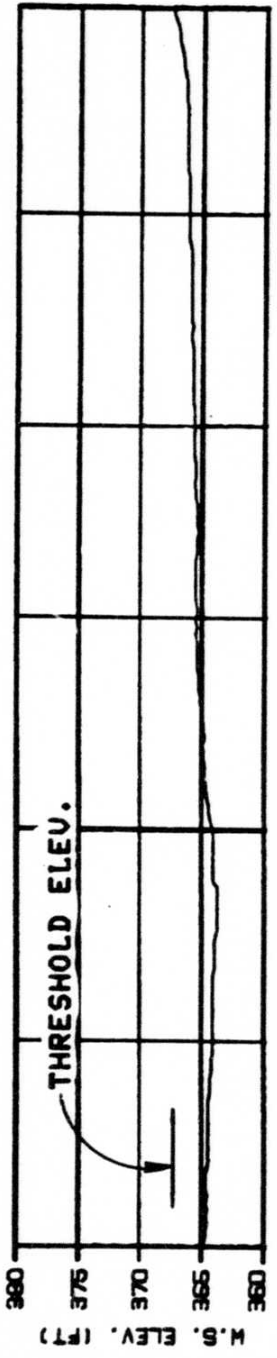
SUSITNA RIVER  
 PROGRESSION OF ICE FRONT  
 & ZERO DEGREE ISOTHERM

HARZA-EBRASCOR JOINT VENTURE

ISSUED: 5.1.82

MSB.142

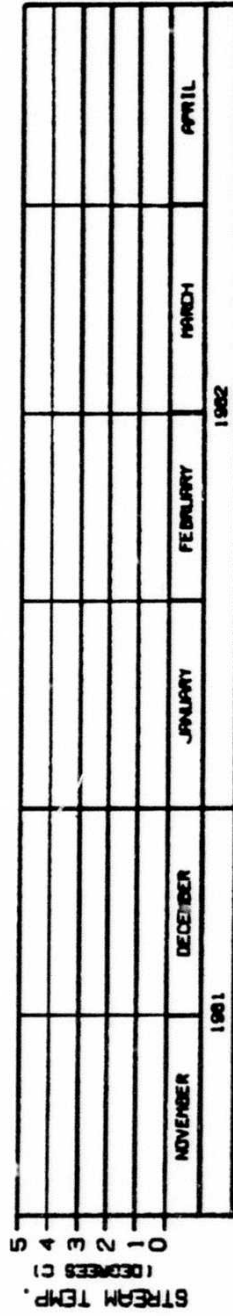
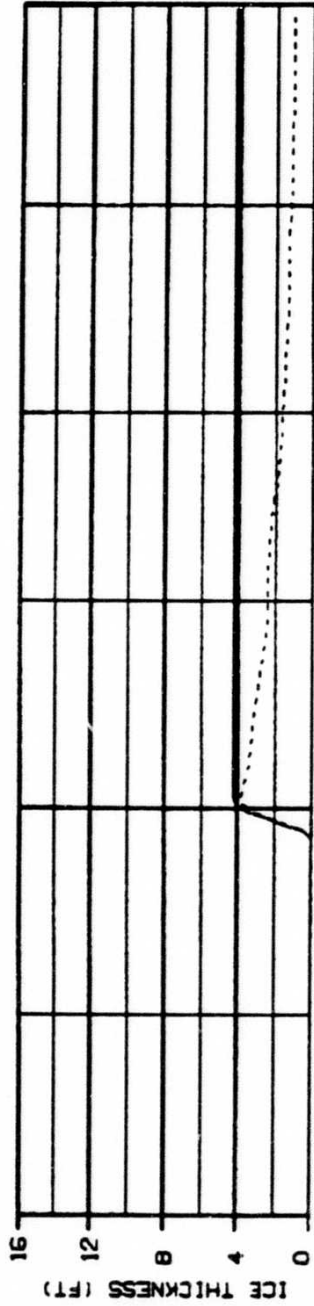
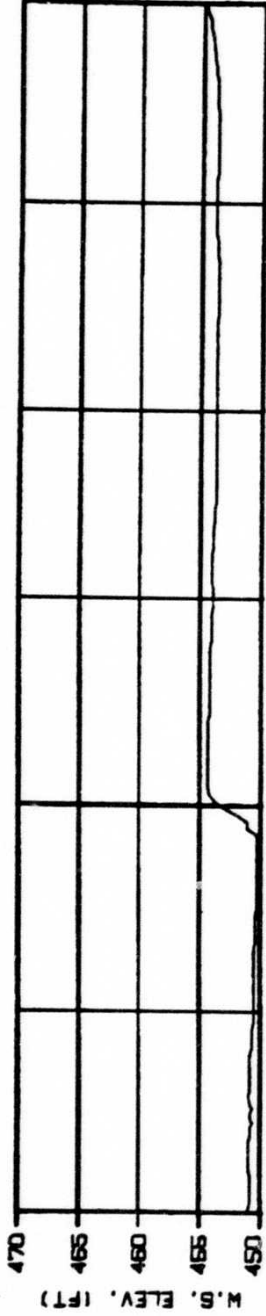
SECTION 2



ALASKA POWER AUTHORITY  
 SUBMITT. PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EDRSCO JOINT VENTURE  
 SHEET NO. 8-1A-01  
 1982.142

HEAD OF WHISKERS SLOUGH  
 RIVER MILE : 101.50  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

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



**SIDE CHANNEL AT HEAD OF GASH CREEK**

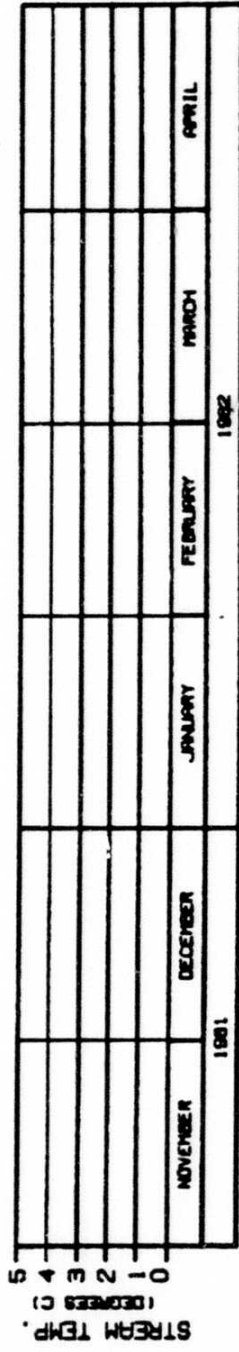
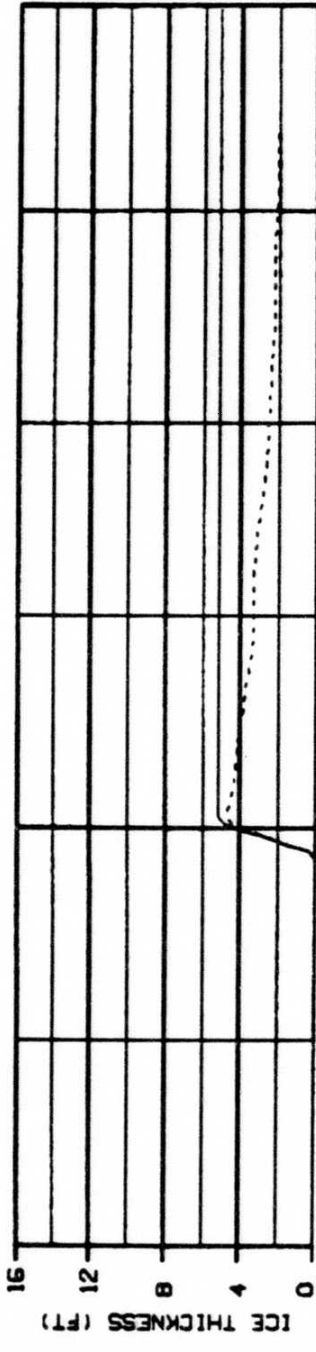
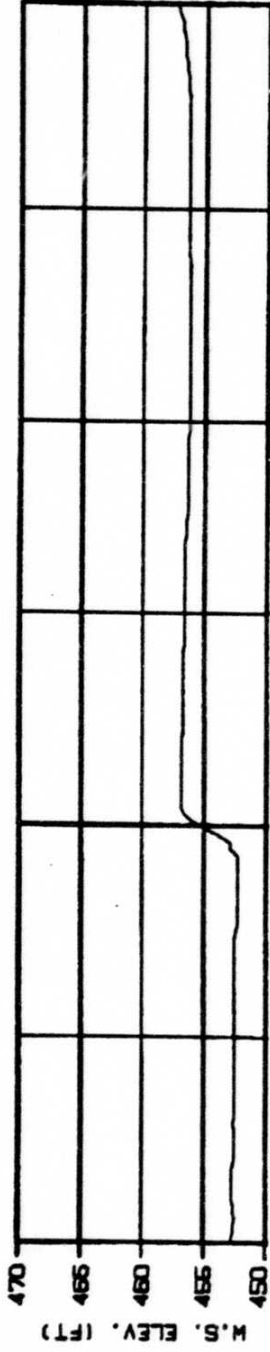
RIVER MILE : 112.00

WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

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

ALASKA POWER AUTHORITY	
STATION PROJECT	SUSTINA RIVER
	ICE SIMULATION
	TIME HISTORY
HRZZA-EBRSD JOINT VENTURE	
ORDER - DRAWING	8 JAN 82
	8888.142

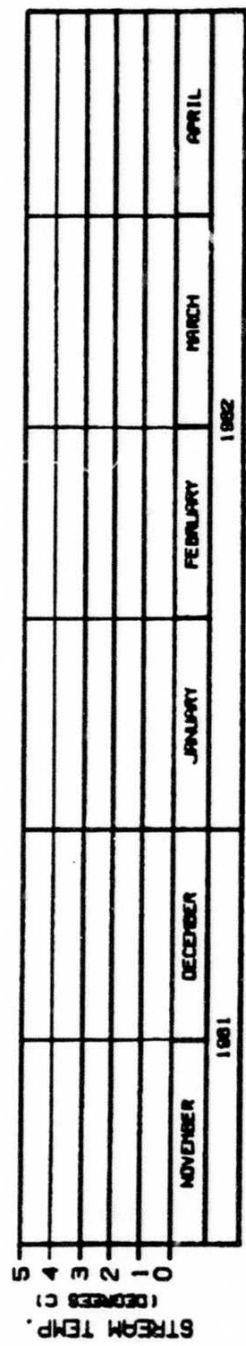
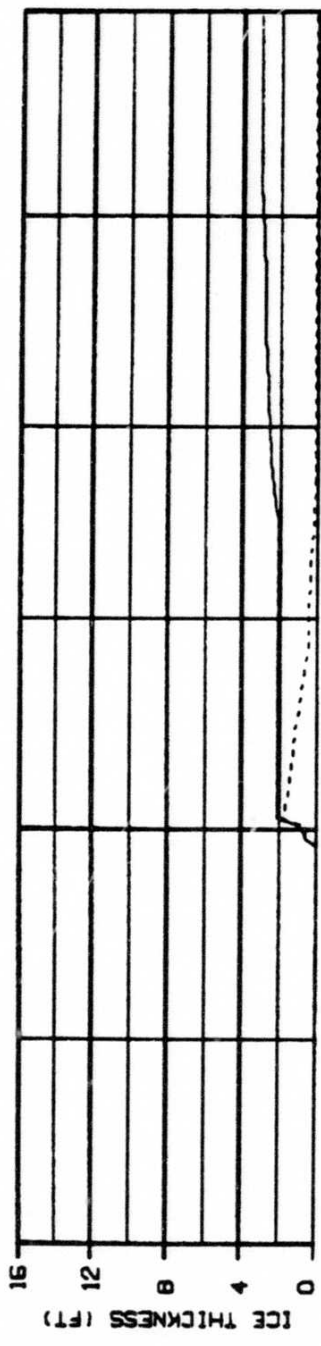
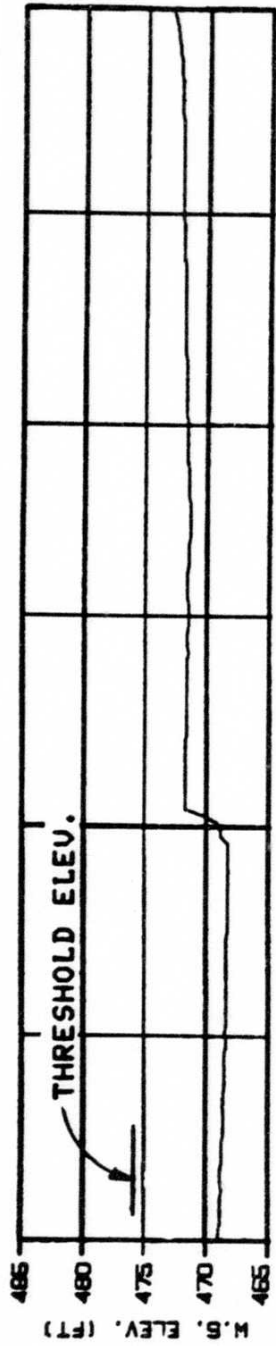




ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 SHEET: A.1.000 8-A.10 000.142

MOUTH OF SLOUGH 6A  
 RIVER MILE : 112.34  
 WEATHER PERIOD : 1 NOV 91 - 30 APR 92  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLDN CASE : C  
 REFERENCE RUN NO. : 81F2C-A

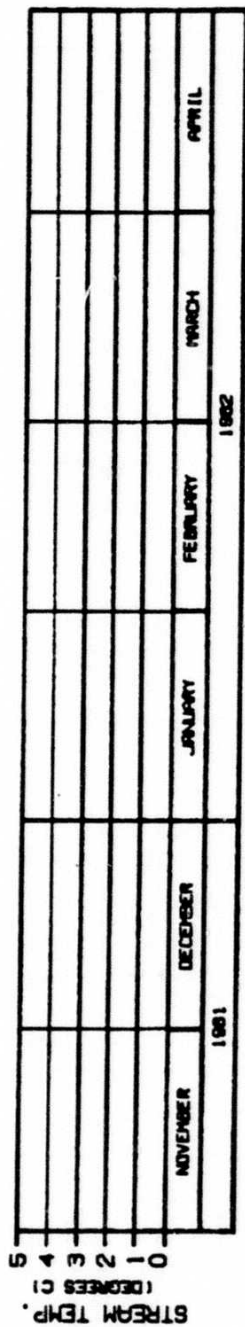
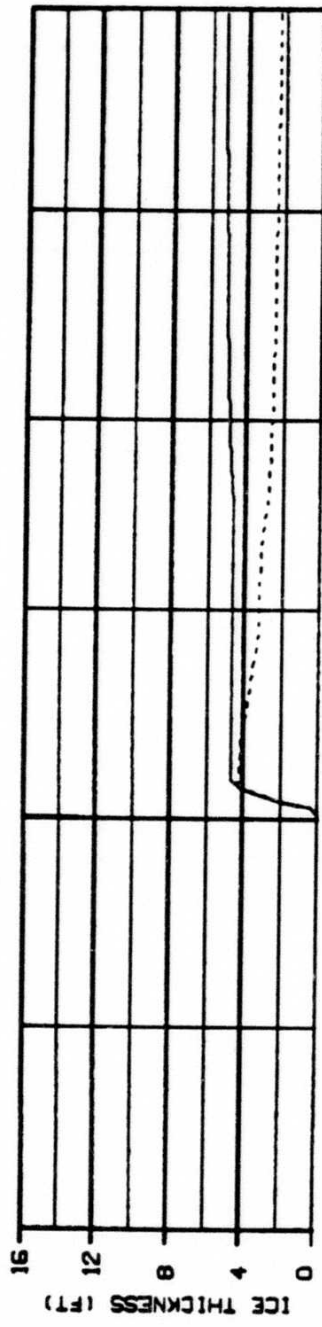
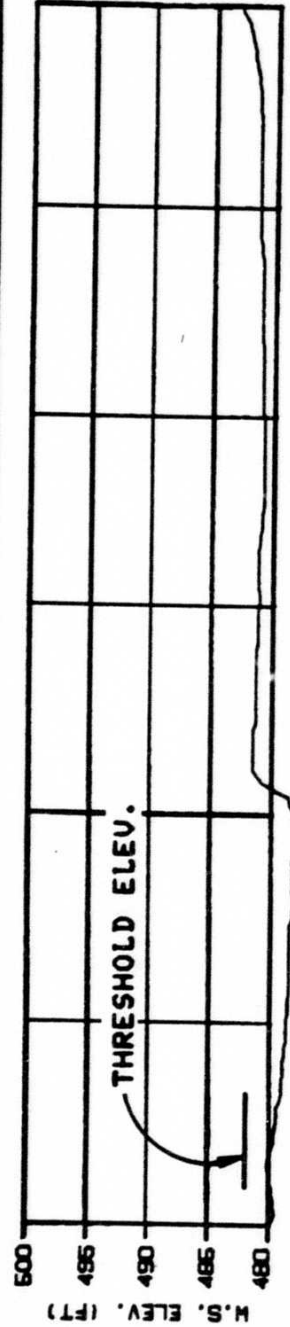
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERCO JOINT VENTURE  
 DESIGN - 81-008 8 JUL 81 888B.142

HEAD OF SLOUGH 8  
 RIVER MILE : 114.10  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

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



ALASKA POWER AUTHORITY

SUBMITTER PROJECT: SUSITNA RIVER ICE SIMULATION TIME HISTORY

PROJECT: HARRIS-EGASCO JOINT VENTURE

DATE: 8 MAR 82

SIDE CHANNEL MSII

RIVER MILE : 115.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82

ENERGY DEMAND : WATANA 2ND YR FILLING

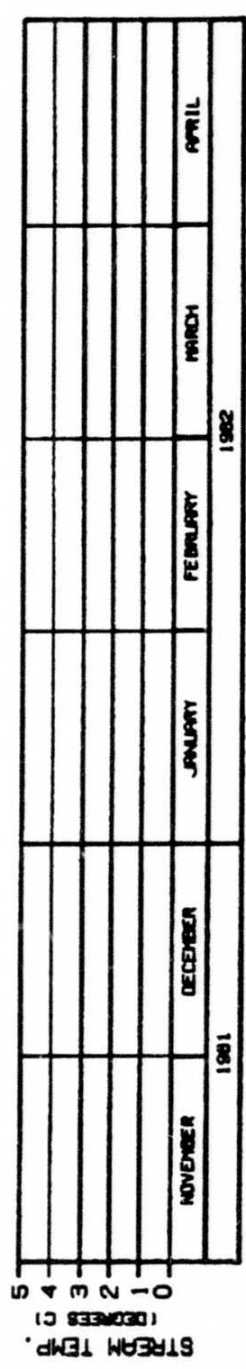
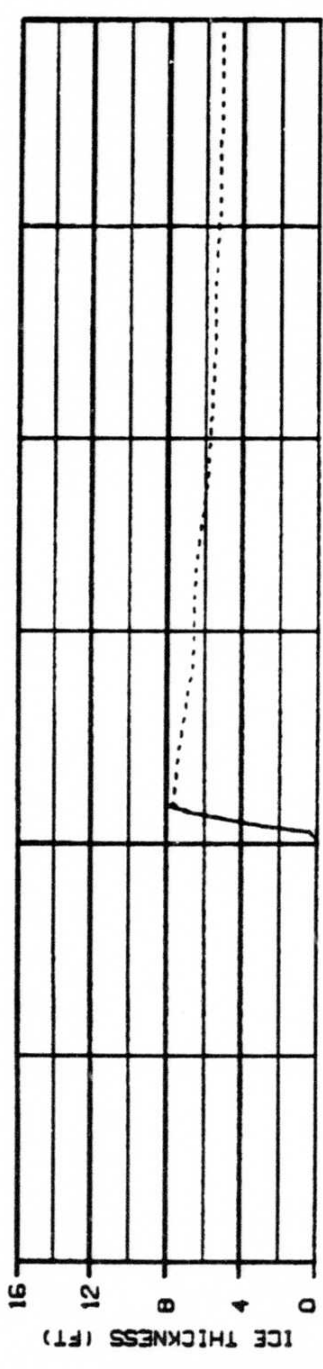
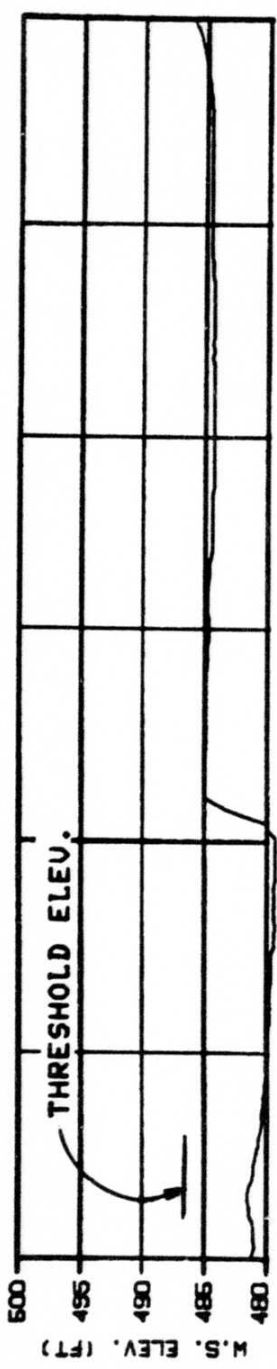
FLOW CASE : C

REFERENCE RUN NO. : 81F2C-A

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS

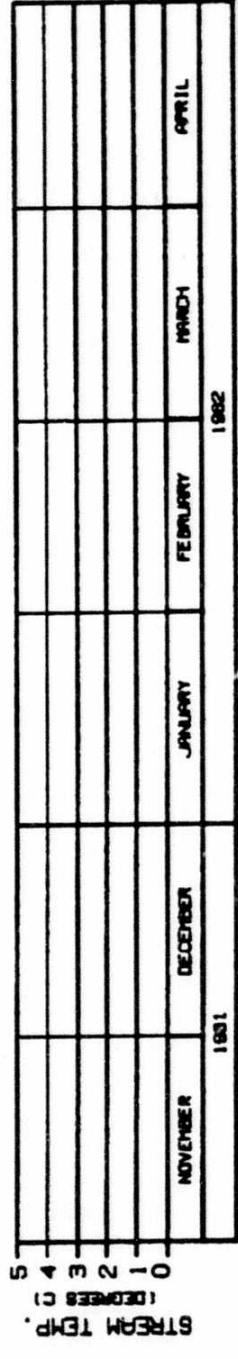
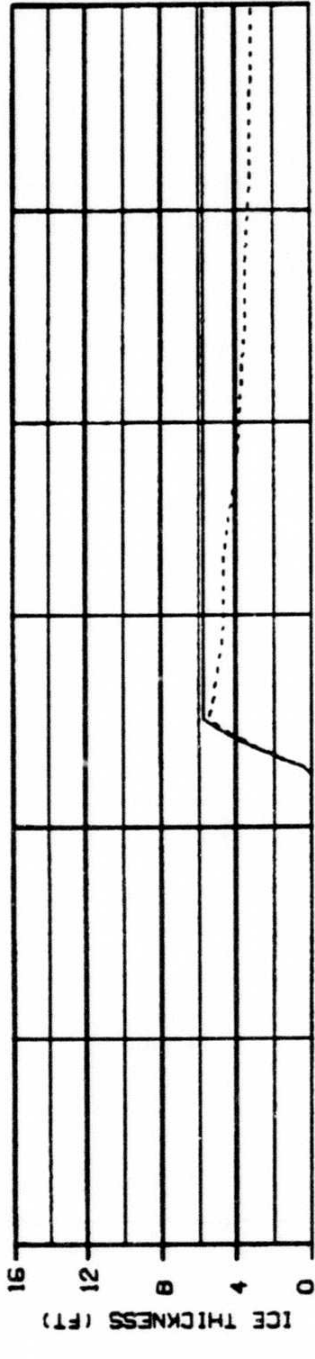
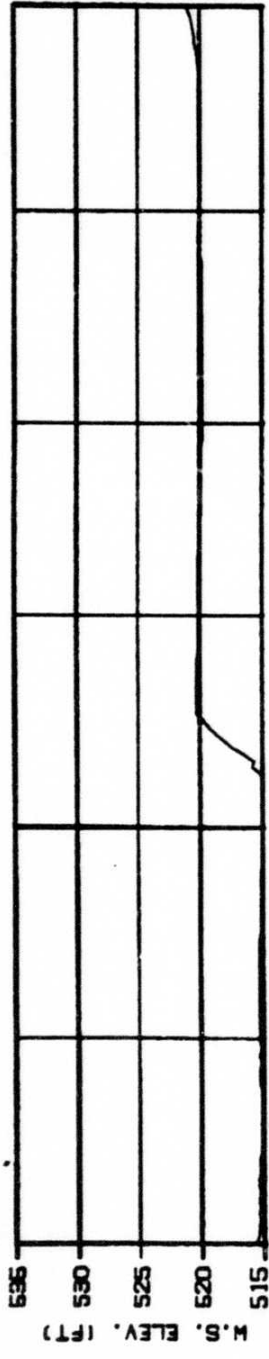
----- BLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBACO JOINT VENTURE  
 DESIGN: HARZA | 9 JAN 82 | SHEET 142

HEAD OF SIDE CHANNEL MSII  
 RIVER MILE : 115.90  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

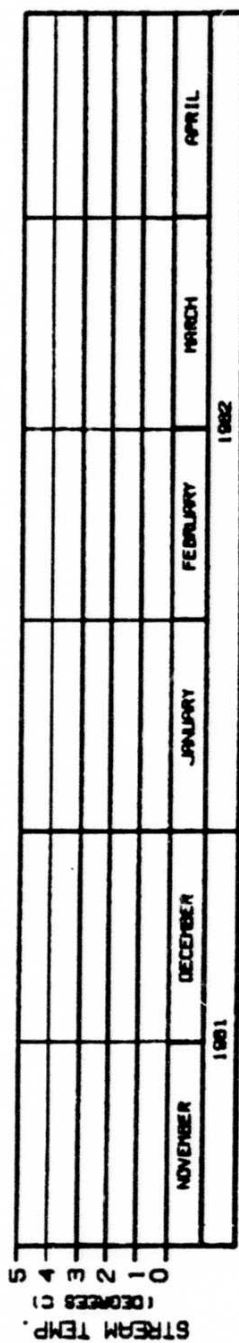
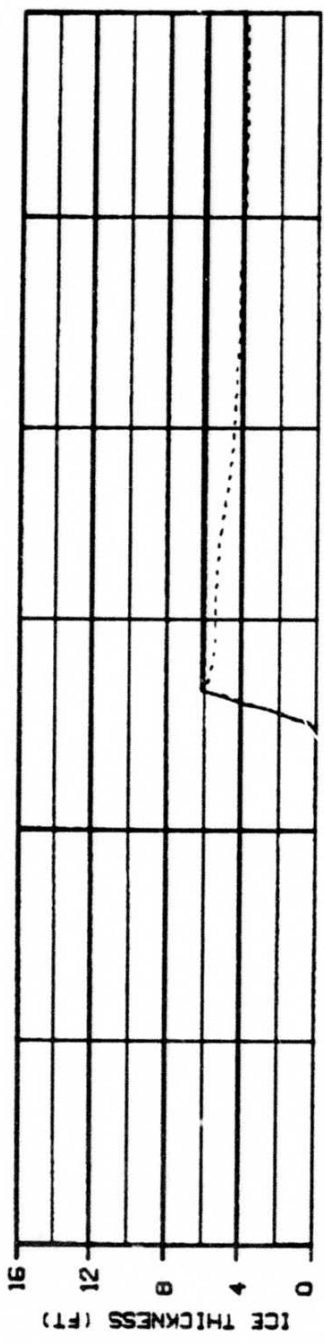
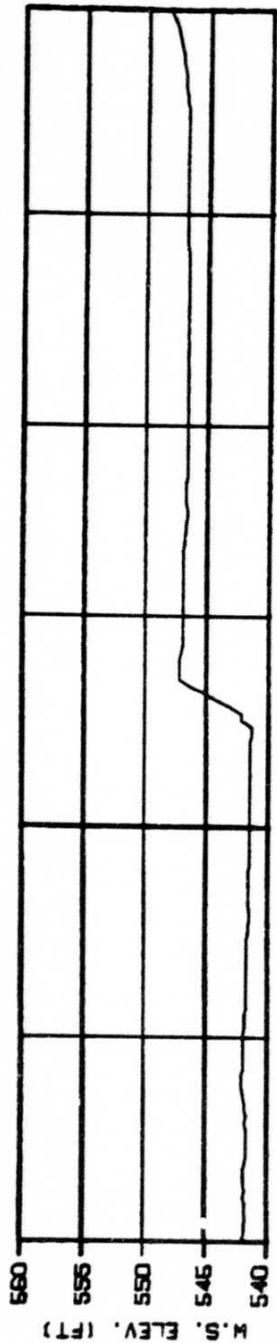
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - BLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EDRSCO JOINT VENTURE  
 DRAWING: SA 8008 P. 4A. 01 1000. 142

RIVER MILE : 120.00  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

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



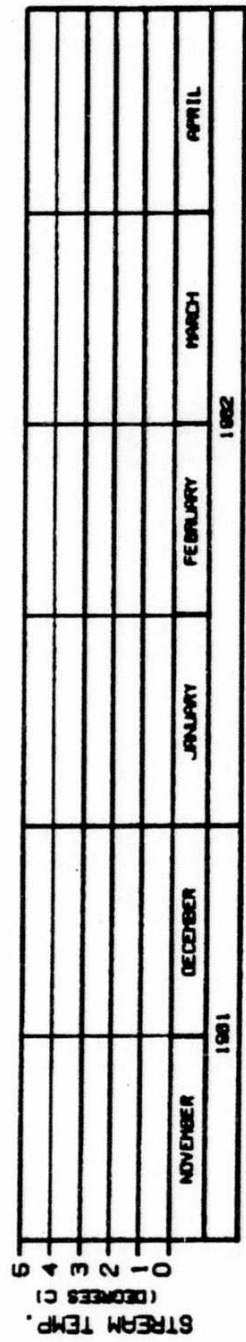
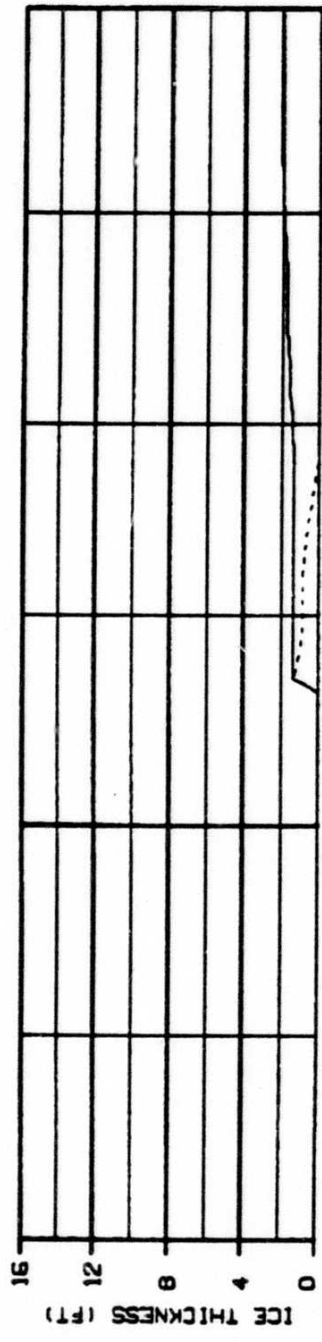
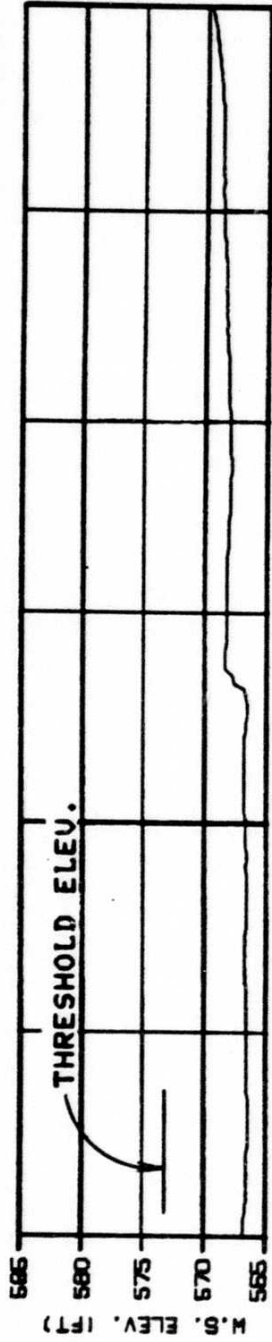
ALASKA POWER AUTHORITY  
 SUBJECT: SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EMSCO JOINT VENTURE  
 DESIGN: SLD/MS 8 JAN 81 MSB-142

HEAD OF MOOSE SLOUGH  
 RIVER MILE : 123.50  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

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

NOVEMBER 1981 DECEMBER JANUARY FEBRUARY MARCH APRIL 1982





ALASKA POWER AUTHORITY

SUBMITTER PROJECT  
SUSITNA RIVER  
ICE SIMULATION  
TIME HISTORY

PREPARED BY  
HARZA-ERBACO JOINT VENTURE

DATE  
8 JUL 82

PROJECT NO.  
8888.142

HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

WEATHER PERIOD : 1 NOV 81 - 30 APR 82

ENERGY DEMAND : MATANA 2ND YR FILLING

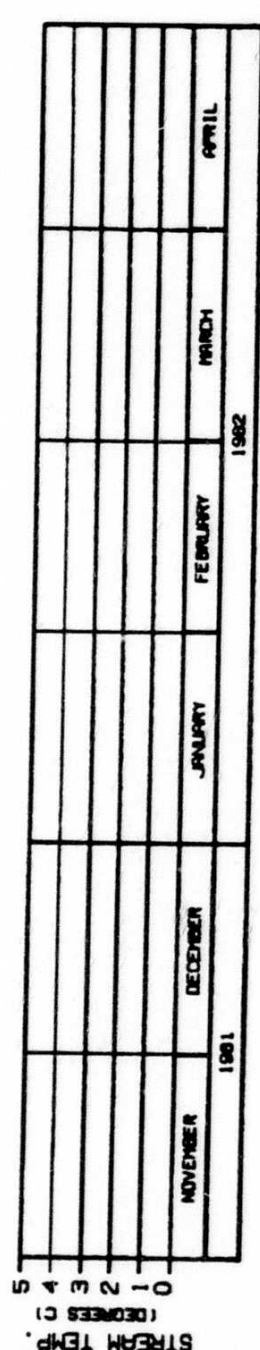
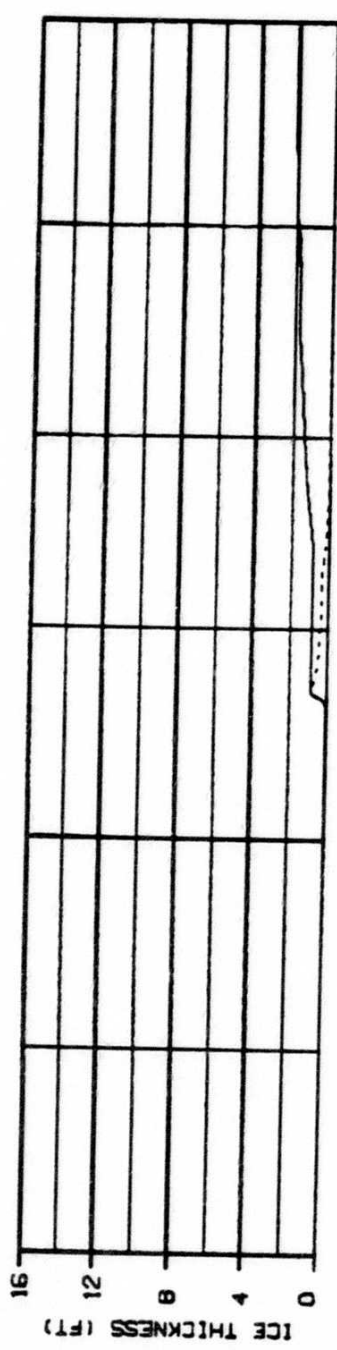
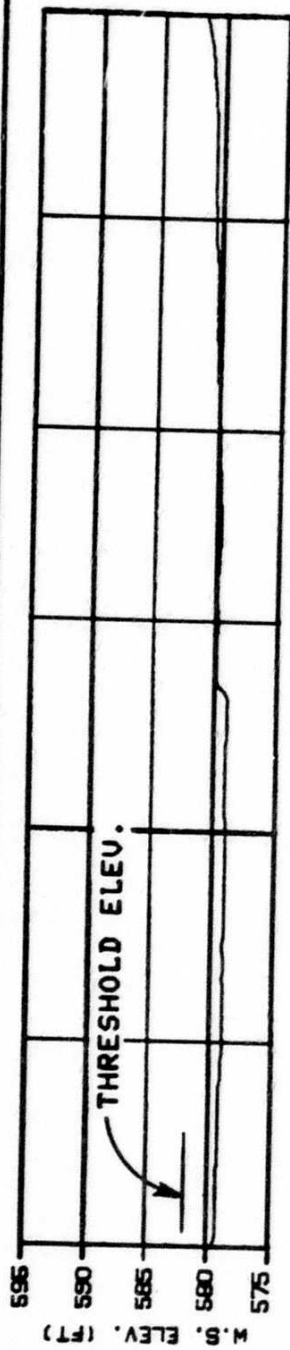
FLOW CASE : C

REFERENCE RUN NO. : B1F2C-A

ICE THICKNESS LEGEND:

—— TOTAL THICKNESS

----- SLOUGH COMPONENT

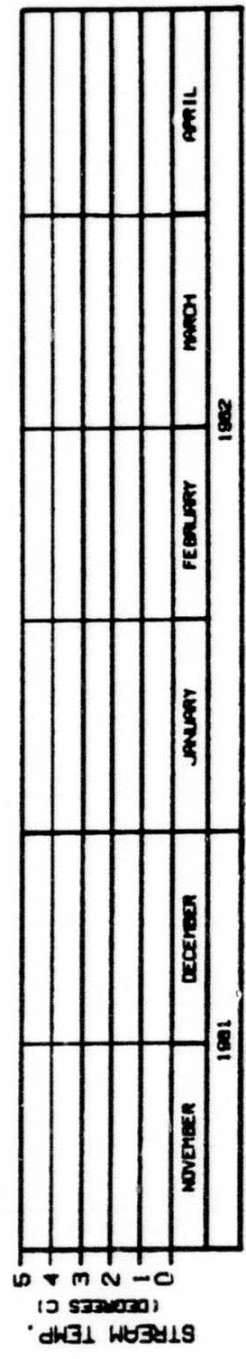
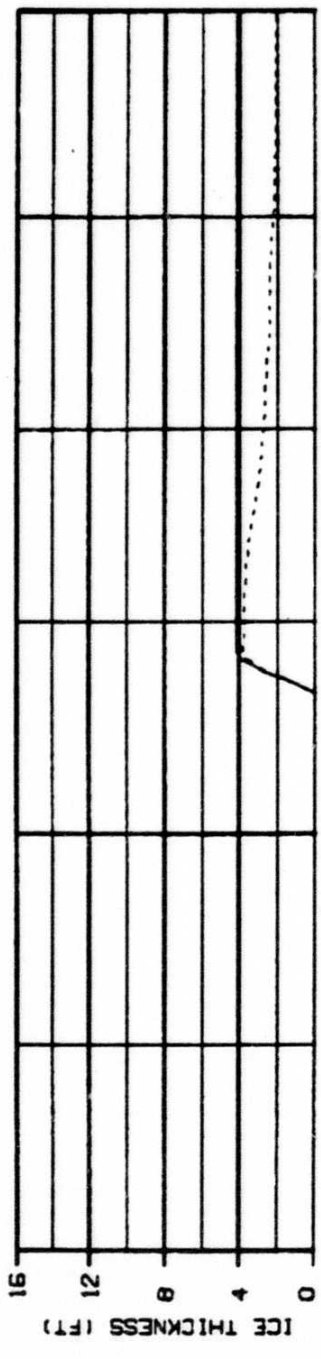
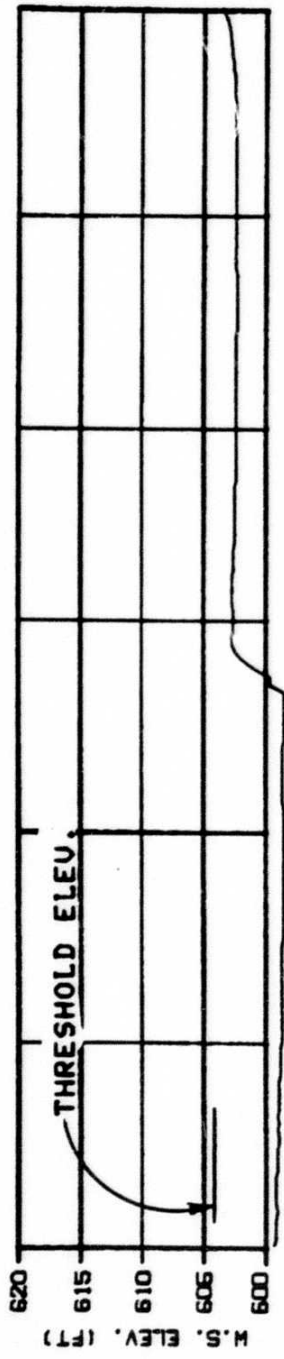


ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERD JOINT VENTURE  
 PROJECT NO. 811200 P. 44 OF 48 1982, 142

HEAD OF SLOUGH 8A (EAST)  
 RIVER MILE : 127.10  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

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

C



ALASKA POWER AUTHORITY

SUSTINA RIVER

ICE SIMULATION

TIME HISTORY

HARZA-ERBACO JOINT VENTURE

NOVEMBER 1981

JANUARY

FEBRUARY

MARCH

APRIL

1982

HEAD OF SLOUGH 9

RIVER MILE : 129.30

WEATHER PERIOD : 1 NOV 81 - 30 APR 82

ENERGY DEMAND : 100000000 BTU

FLOW CASE : C

REFERENCE RUN NO. : 81F2C-A

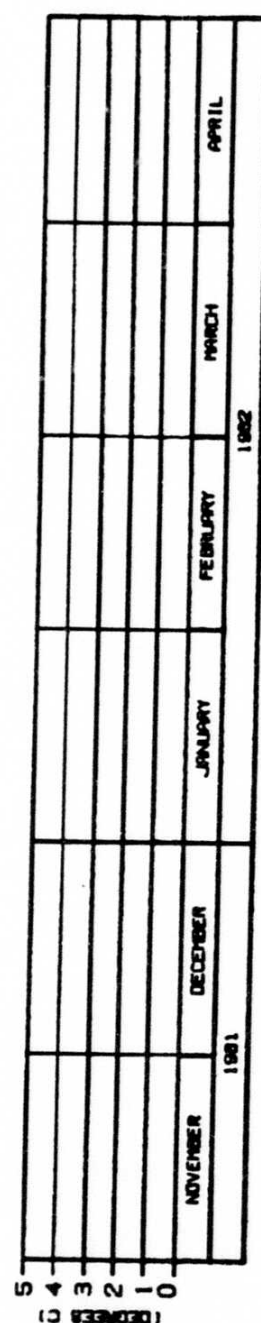
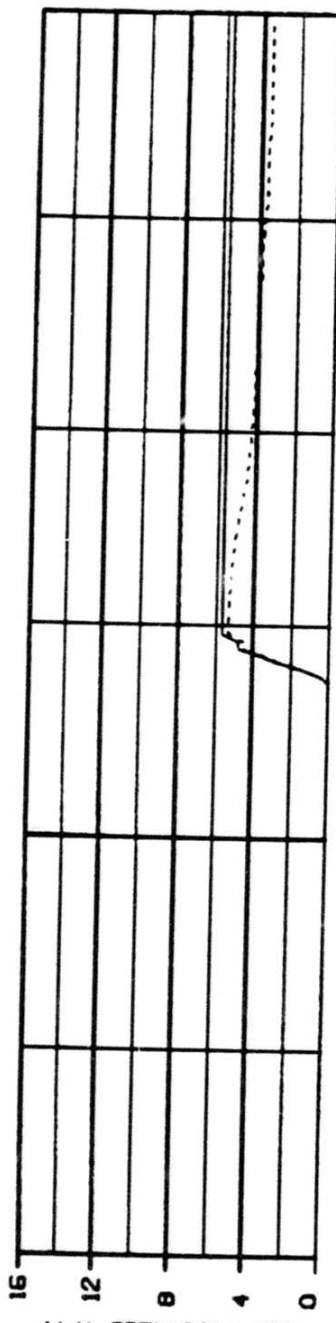
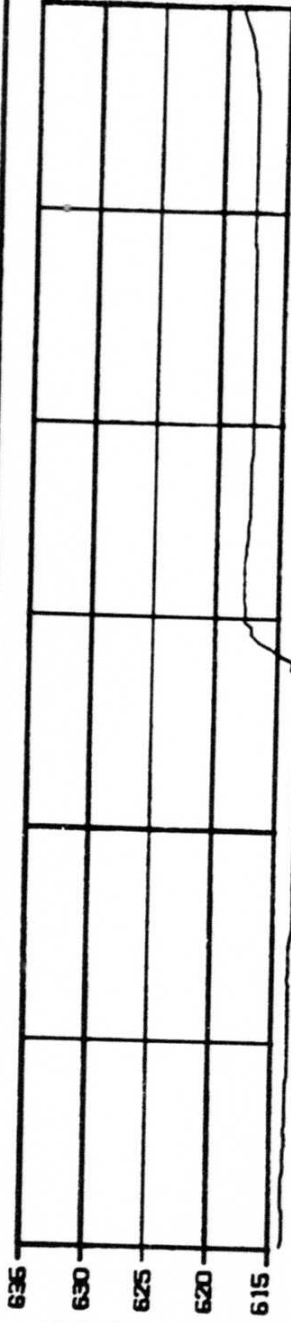
ICE THICKNESS LEGEND:

— TOTAL THICKNESS

--- (DEGREES C)

OPTION?

OPTION?

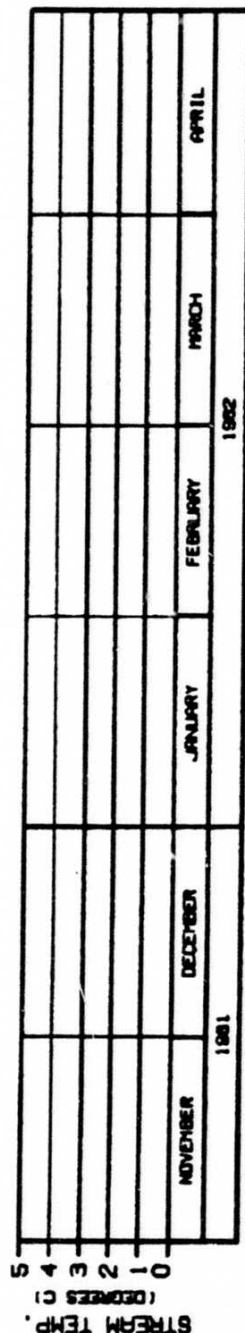
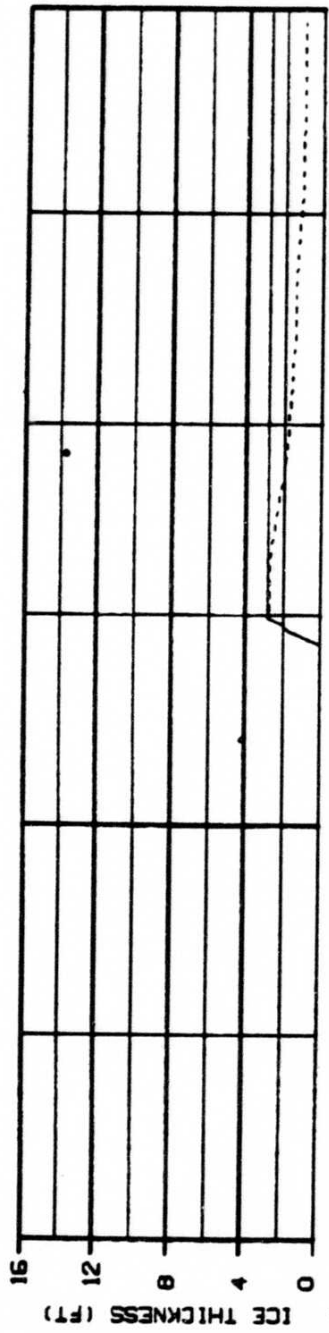
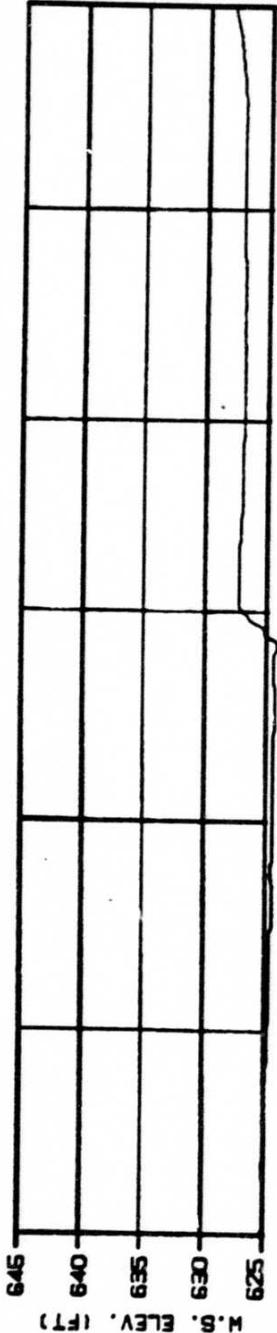


ALASKA POWER AUTHORITY	
SUBMITTING PROJECT	SUSITNA RIVER
	ICE SIMULATION
	TIME HISTORY
HARZA-EBERCO JOINT VENTURE	
DATE: 11.20.82	8 A.A. 82
	MSB.142

**SIDE CHANNEL U/S OF SLOUGH 9**  
**RIVER MILE : 130.60**  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

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

NOVEMBER 1981  
 DECEMBER  
 JANUARY  
 FEBRUARY  
 MARCH  
 APRIL  
 1982



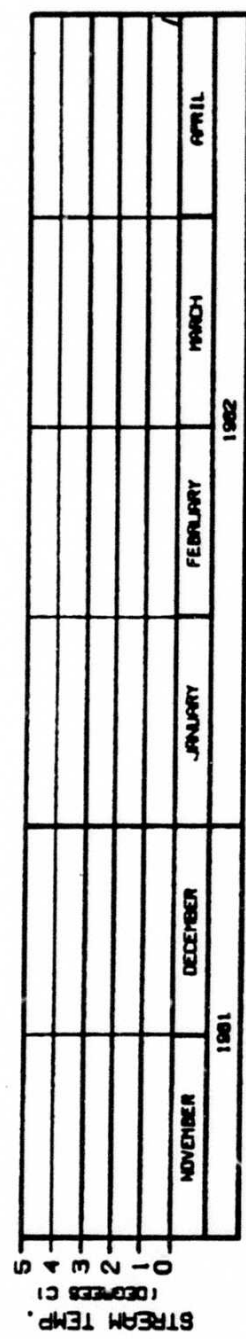
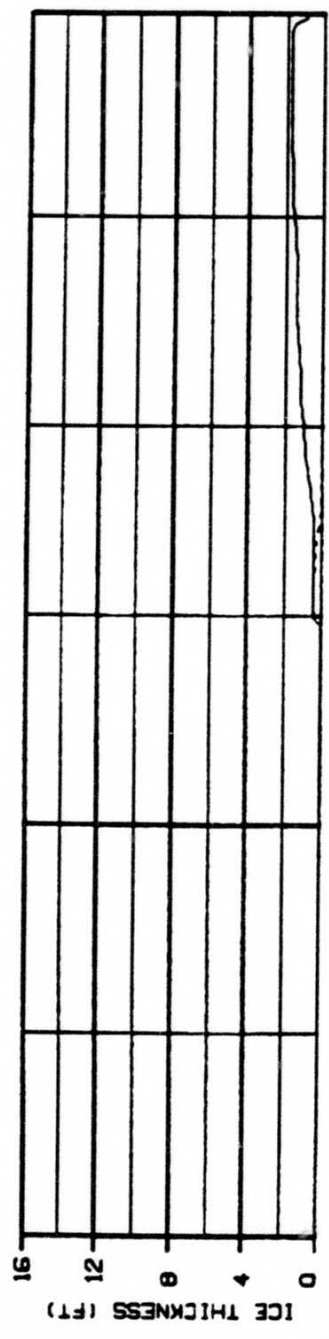
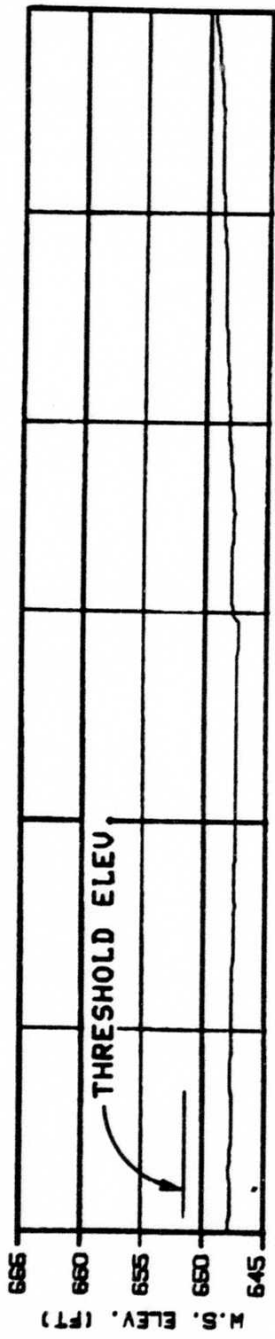
ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRACO JOINT VENTURE  
 DRAWING: S.A. 8808 8 JUL 80 8808.142

**SIDE CHANNEL U/S OF 4TH JULY CREEK**  
**RIVER MILE : 131.80**  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

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

1982

1981

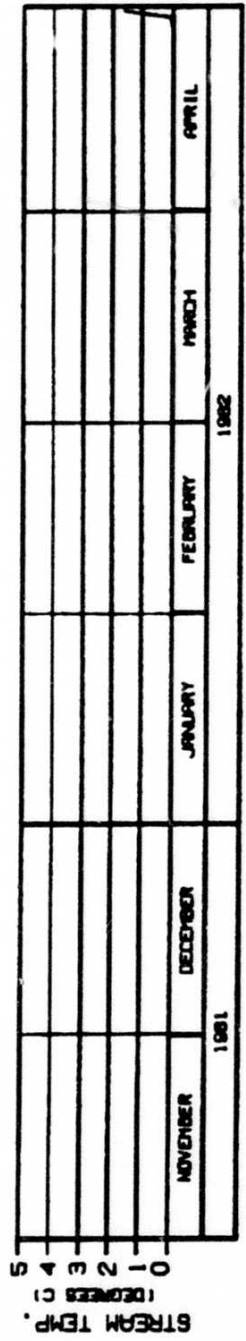
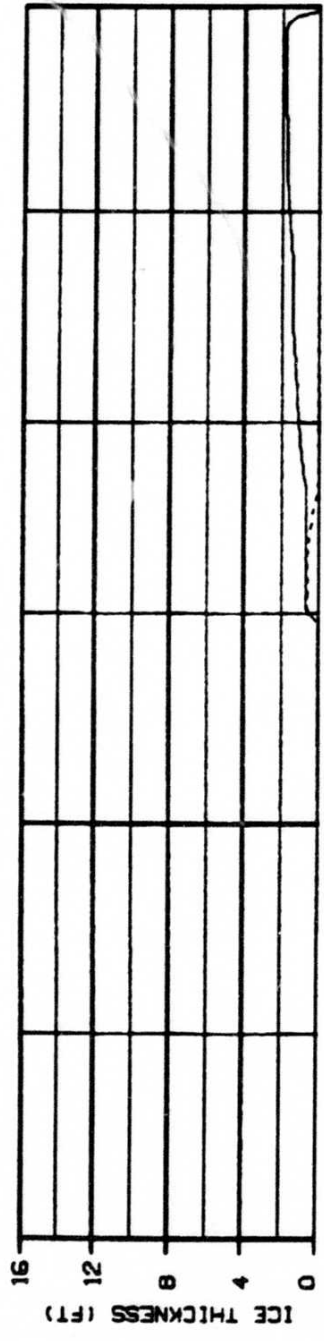
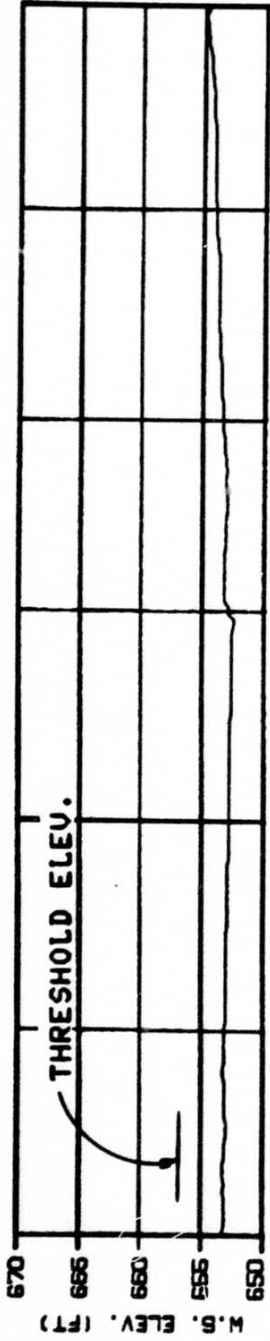


ALASKA POWER AUTHORITY	
SUSTINA PROJECT	SUSTINA RIVER
	ICE SIMULATION
	TIME HISTORY
	WARZA-ERBACD JOINT VENTURE
DESIGNED BY: B.A. BROWN	DATE: 11/82

**HEAD OF SLOUGH 9A**  
**RIVER MILE : 133.70**  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

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

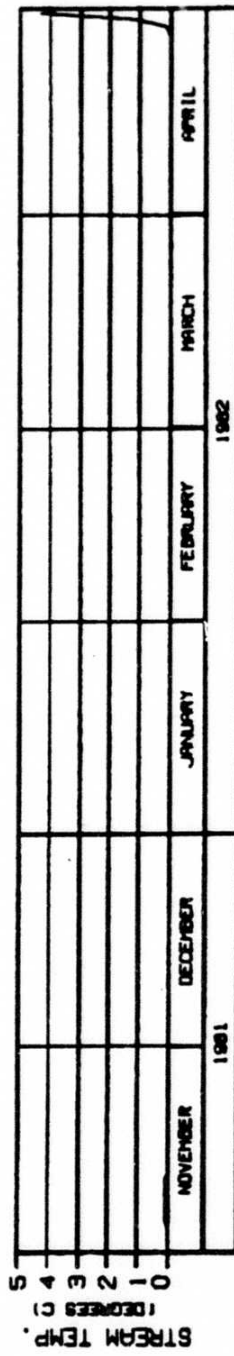
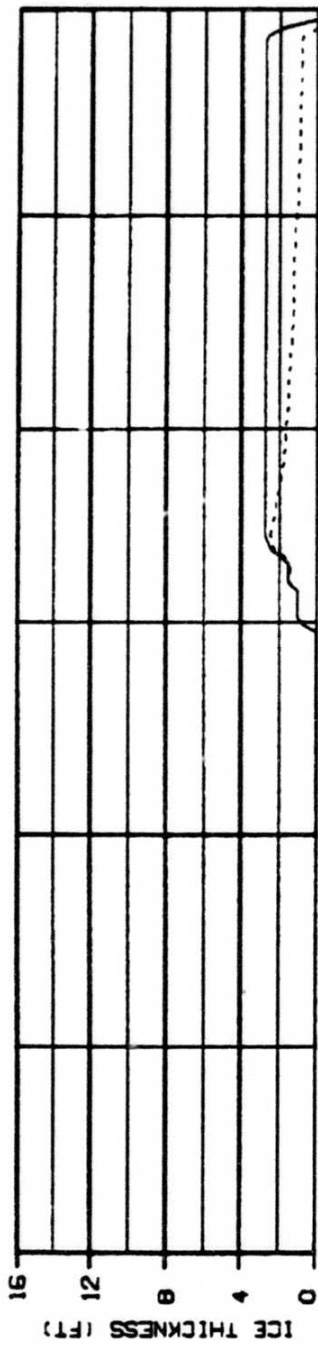
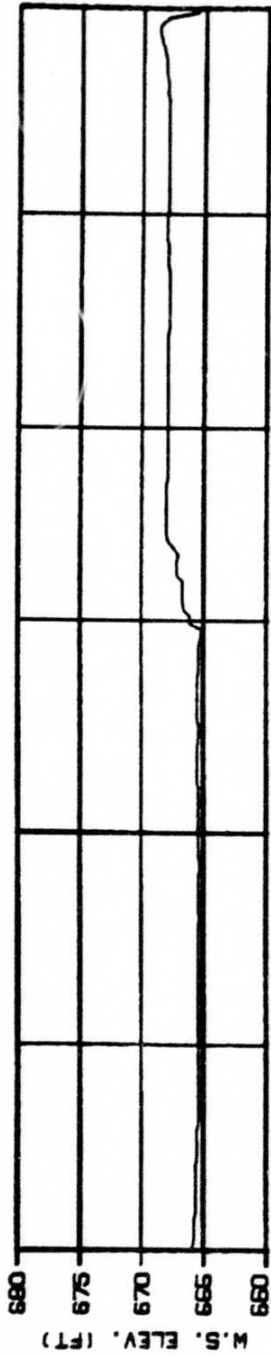




ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERSO JOINT VENTURE  
 DRAWING: SA-0009 P. 04. 01 0000. 142

SIDE CHANNEL U/S OF SLOUGH 10  
 RIVER MILE : 134.30  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

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 : NATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

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

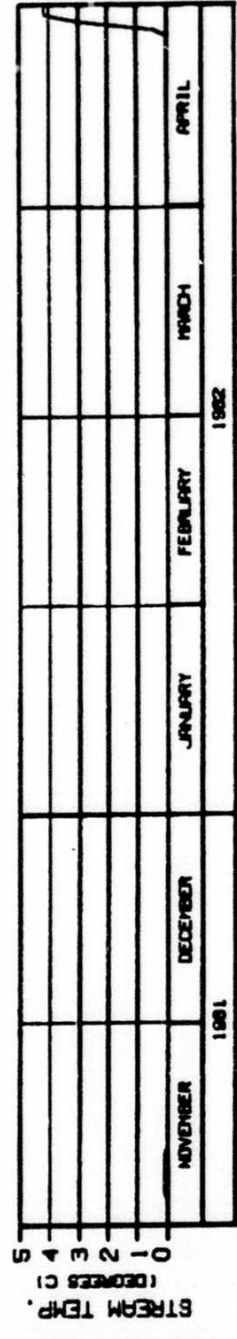
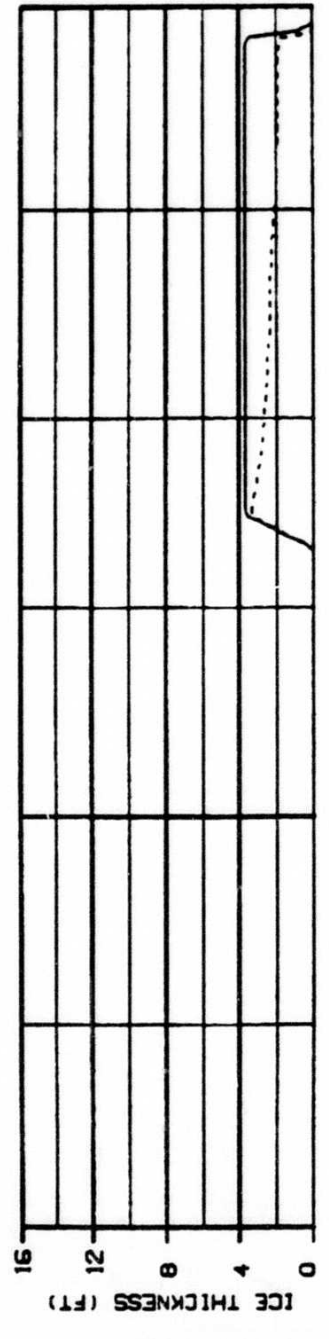
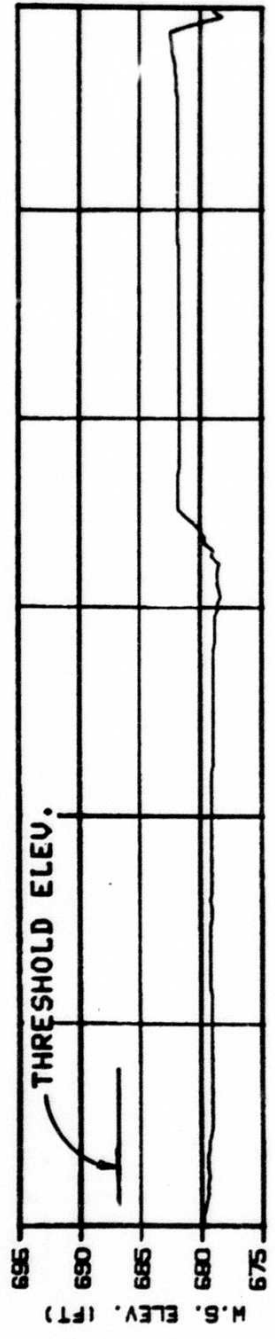
ALASKA POWER AUTHORITY

BUILDING PROJECT

SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY

HARZA-EBR600 JOINT VENTURE

DESIGNER: S.A. 1989 P. 44 OF 60 SHEET 142



ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

WARZA-ERBACD JOINT VENTURE

REPORT: S.A.P. 8807 P.A. 88    8808.142

HEAD OF SLOUGH 11

RIVER MILE : 136.50

WEATHER PERIOD : 1 NOV 81 - 30 APR 82

ENERGY DEMAND : NATANA 2ND YR FILLING

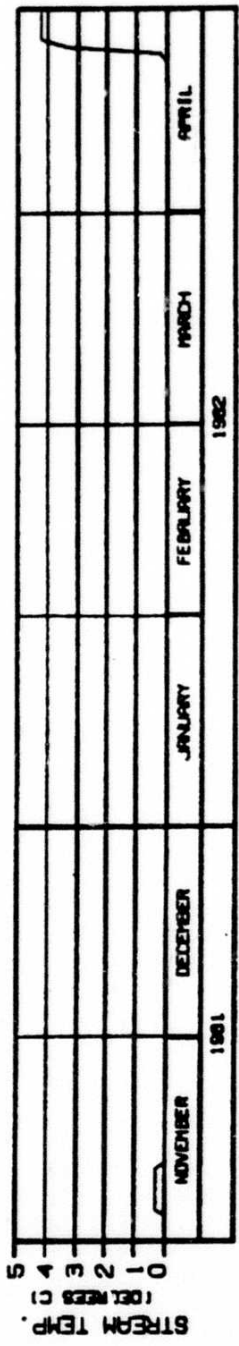
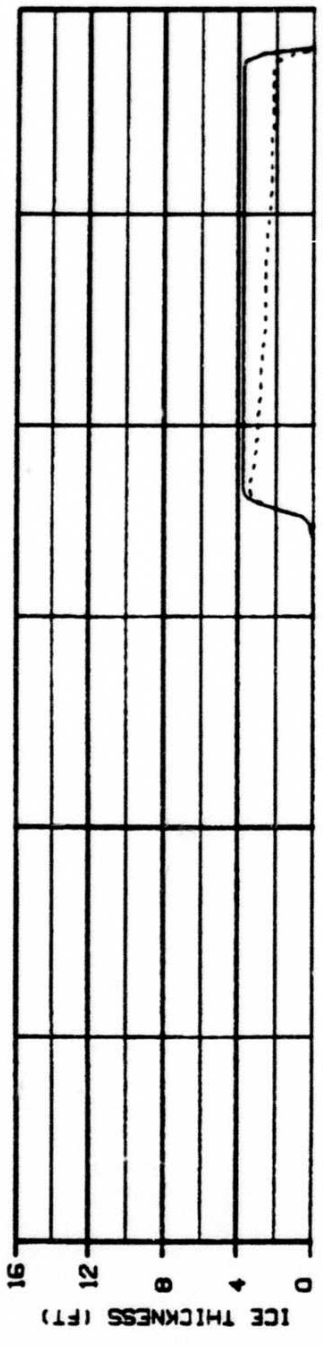
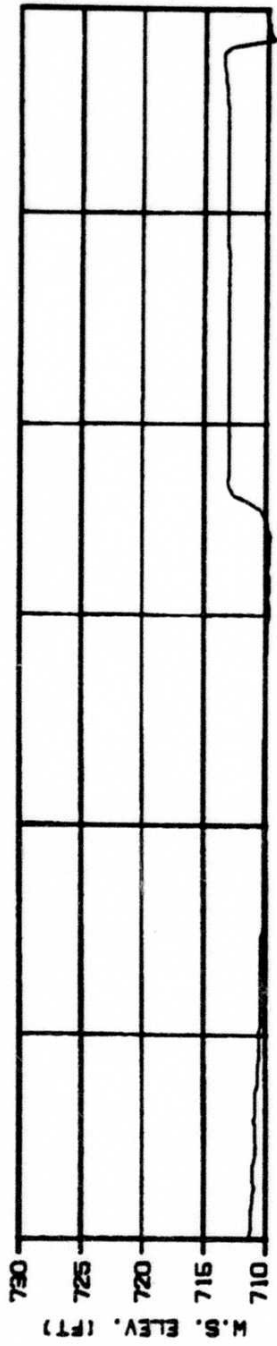
FLOW CASE : C

REFERENCE RUN NO. : 81F2C-A

ICE THICKNESS LEGEND:

——— TOTAL THICKNESS

----- SLUSH COMPONENT



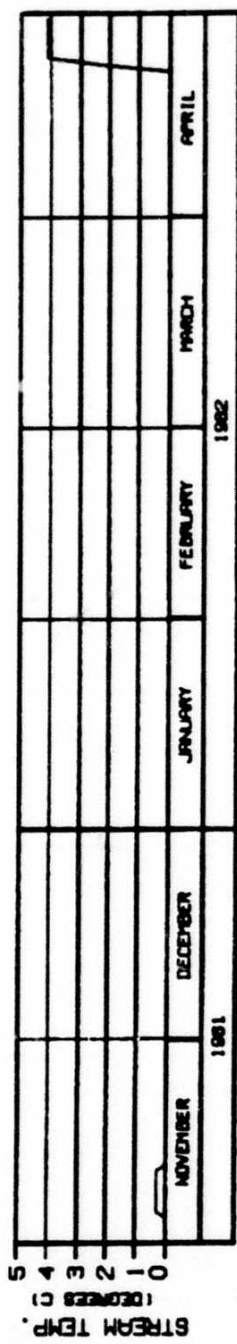
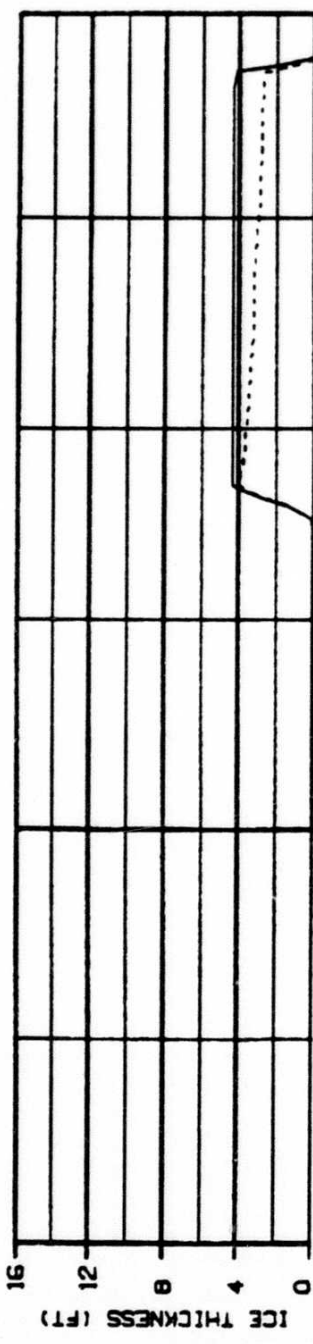
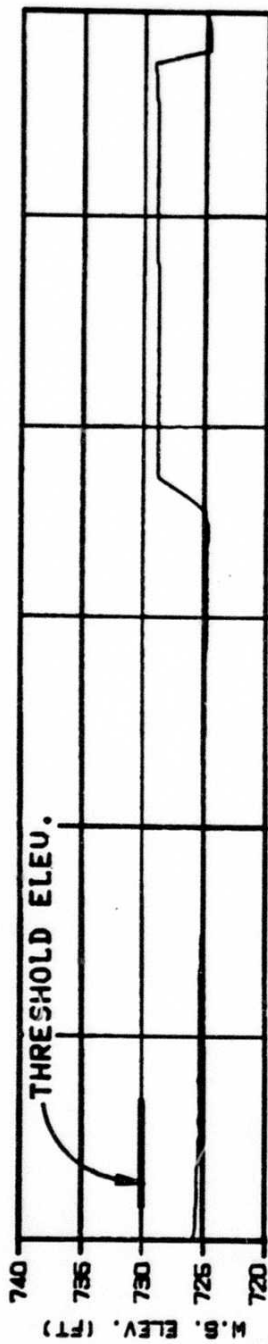
ALASKA POWER AUTHORITY  
 SUBMITTA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERSSCO JOINT VENTURE  
 DRAWING: SLD-0009 8 JUL 80 9809.142

HEAD OF SLOUGH 17  
 RIVER MILE : 139.30  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : HATANAN 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

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

1982

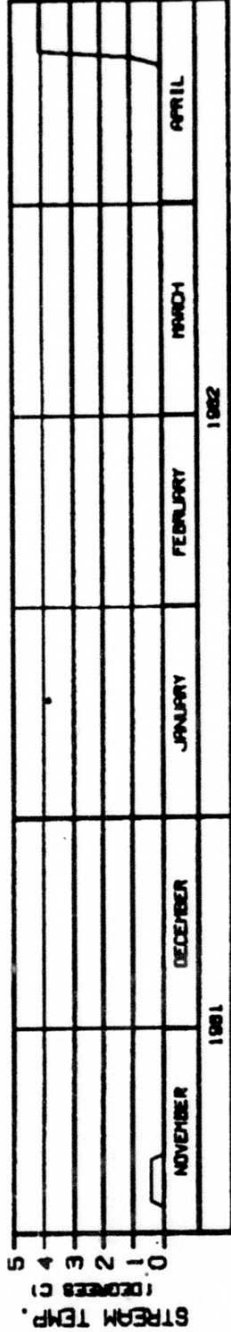
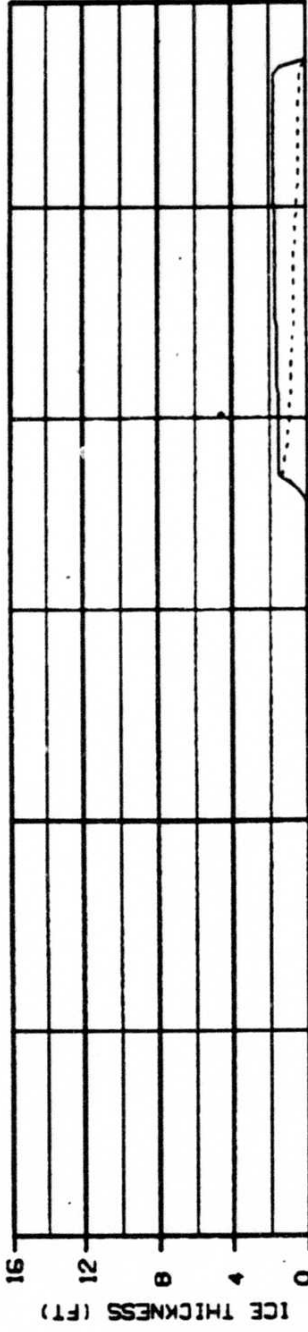
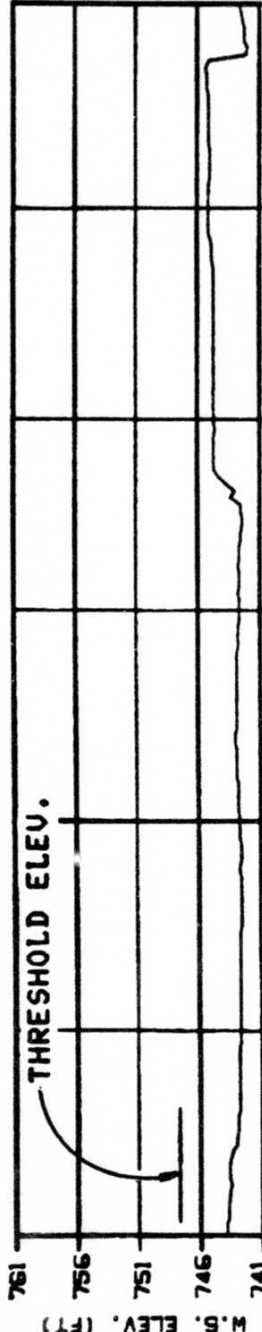
1981



ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT: SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBACCO JOINT VENTURE  
 DESIGN: HARZA ENGINEERS P.A.C. 801 568-148

HEAD OF SLOUGH 20  
 RIVER MILE : 140.50  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

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

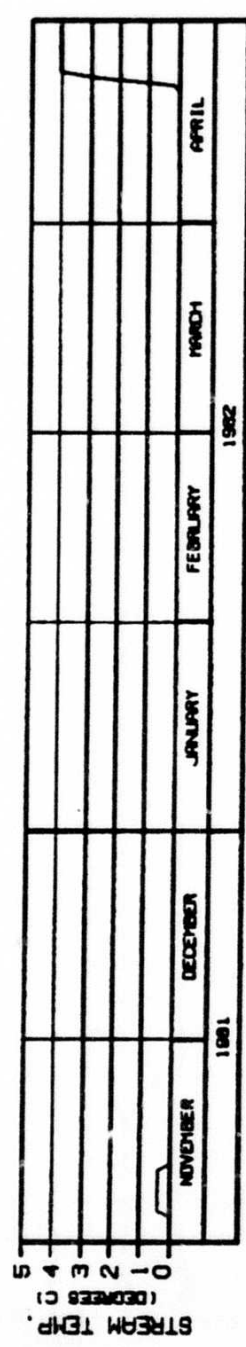
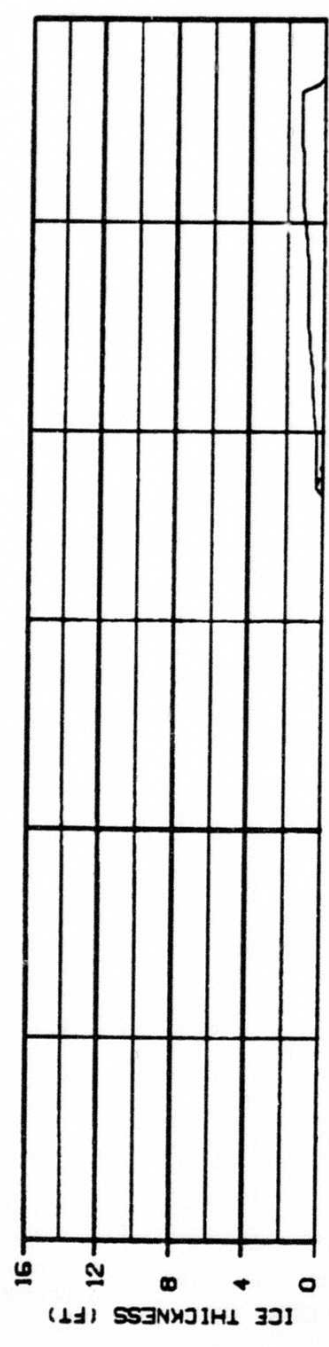
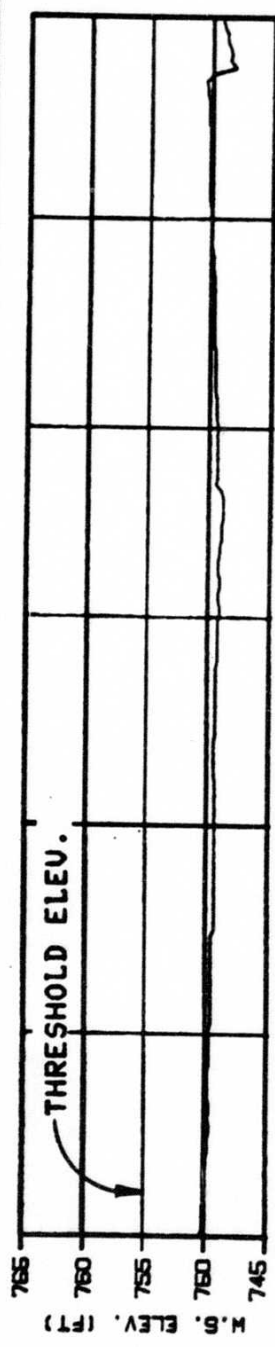


ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBERD JOINT VENTURE  
 DRAWN: B.A. 8/88 P. 11. 82 0001.142

SLOUGH 21 (ENTRANCE A6)  
 RIVER MILE : 141.80  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

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



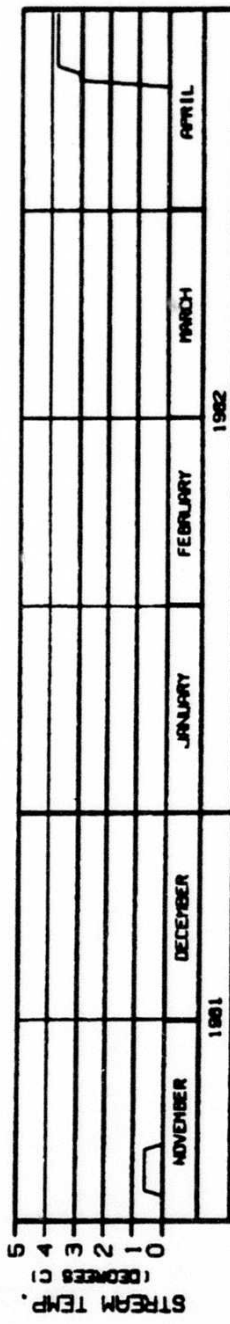
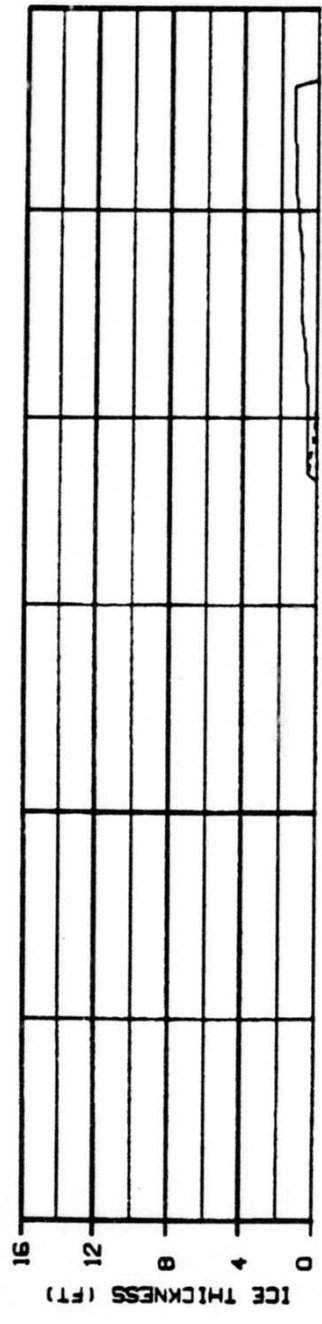
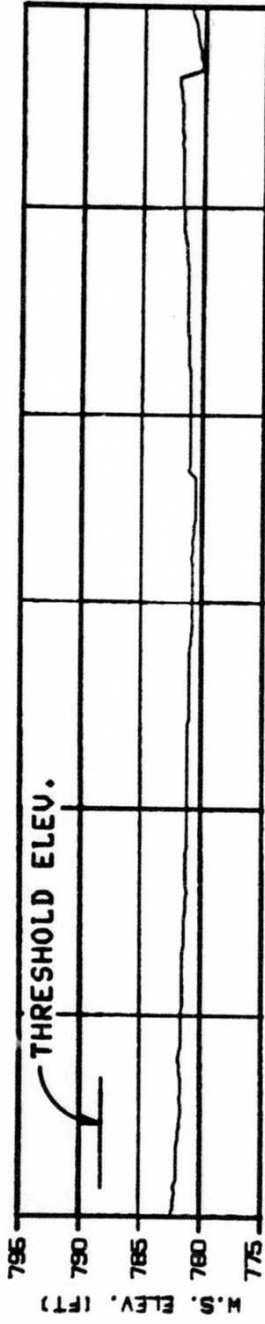


ALASKA POWER AUTHORITY	
SUSTINA PROJECT	SUSTINA RIVER
	ICE SIMULATION
	TIME HISTORY
DESIGNED BY	HARZA-ENGECO JOINT VENTURE
DRAWN BY	J. A. G.
	0888-142

HEAD OF SLOUGH 21  
 RIVER MILE : 142.20  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : MATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

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

C



ALASKA POWER AUTHORITY  
 SUBMITTING PROJECT SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBACO JOINT VENTURE  
 DRAWING NO. 81F2C-A  
 SHEET NO. 142

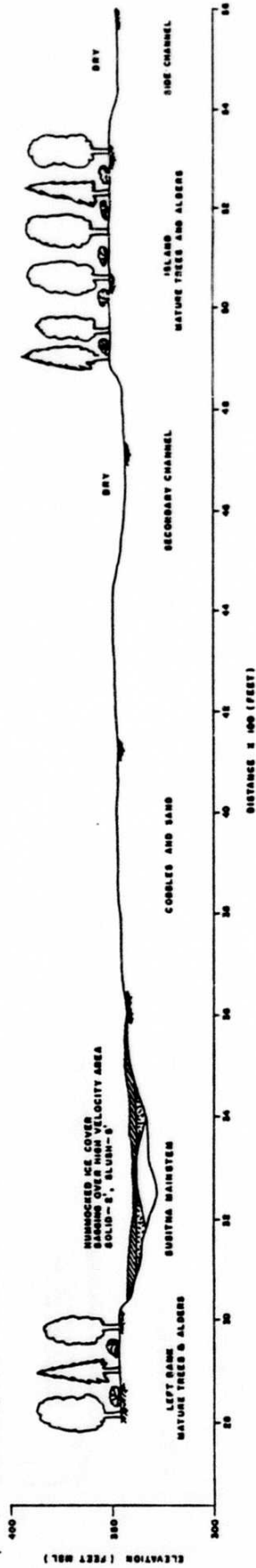
HEAD OF SLOUGH 22  
 RIVER MILE : 144.80  
 WEATHER PERIOD : 1 NOV 81 - 30 APR 82  
 ENERGY DEMAND : WATANA 2ND YR FILLING  
 FLOW CASE : C  
 REFERENCE RUN NO. : 81F2C-A

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

01PTL0102

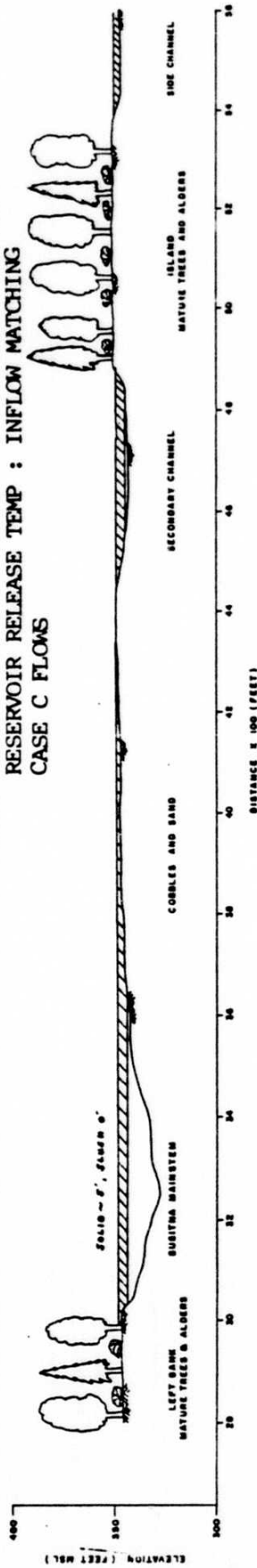
Exhibit T

1. Natural Ice Conditions (1983)

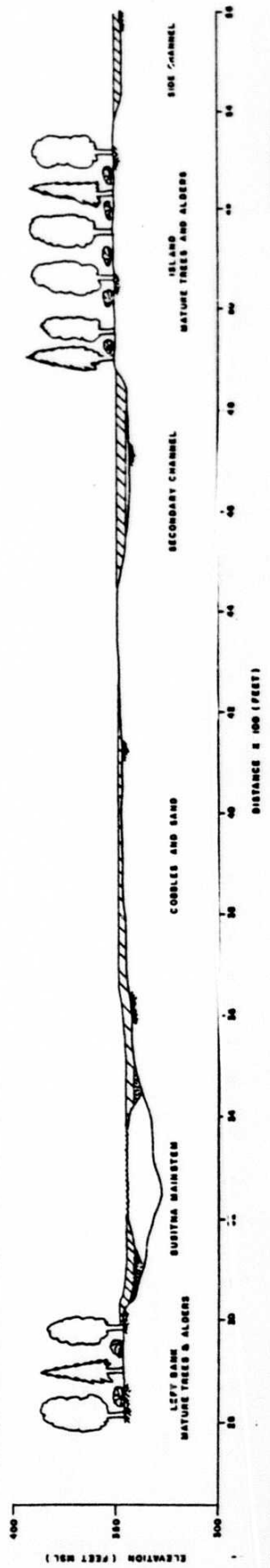


2. ICECAL Simulated with Project Ice Conditions  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

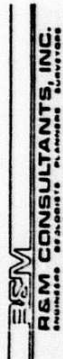
WINTER 1971-72  
 RUN #7196CNA



3. Interpreted with Project Ice Conditions



PREPARED BY:



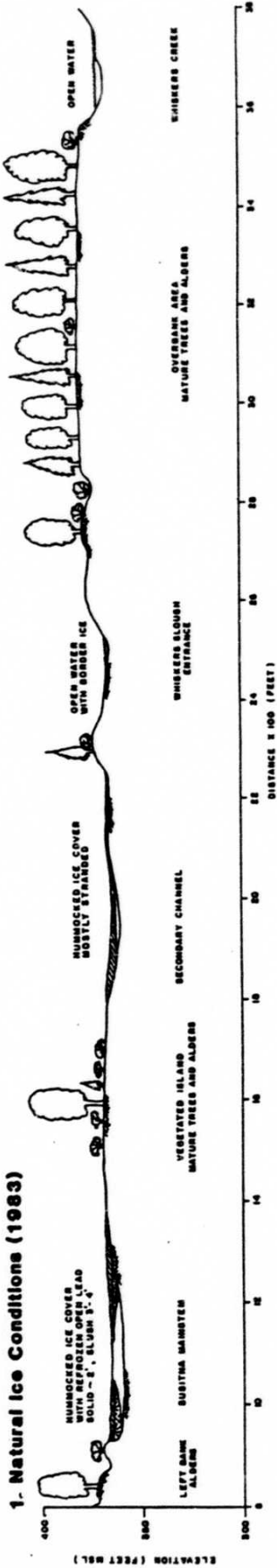
RSM CONSULTANTS, INC.  
 ENGINEERS AND ARCHITECTS  
 2000 10TH AVENUE, SUITE 100  
 DENVER, COLORADO 80202

LRX-3  
 1982 CROSS SECTION SURVEY  
 RIVER MILE 98.6  
 VERTICAL EXAGGERATION 4:1

PREPARED FOR:

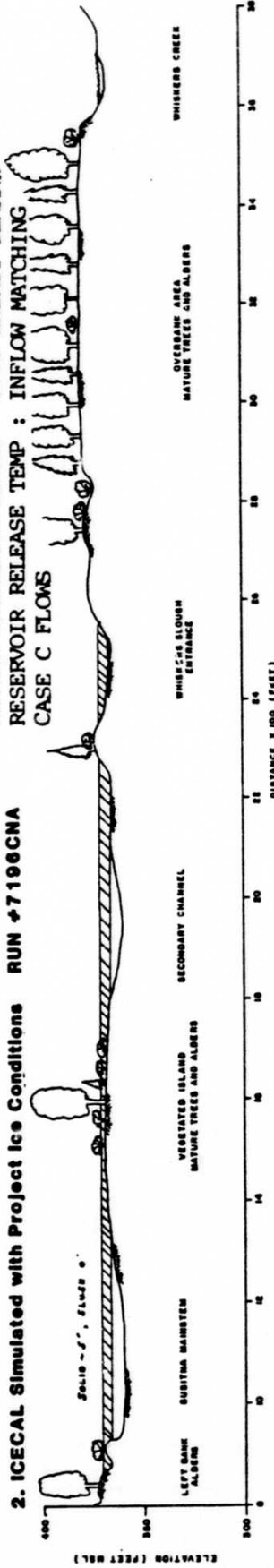


**1. Natural Ice Conditions (1983)**

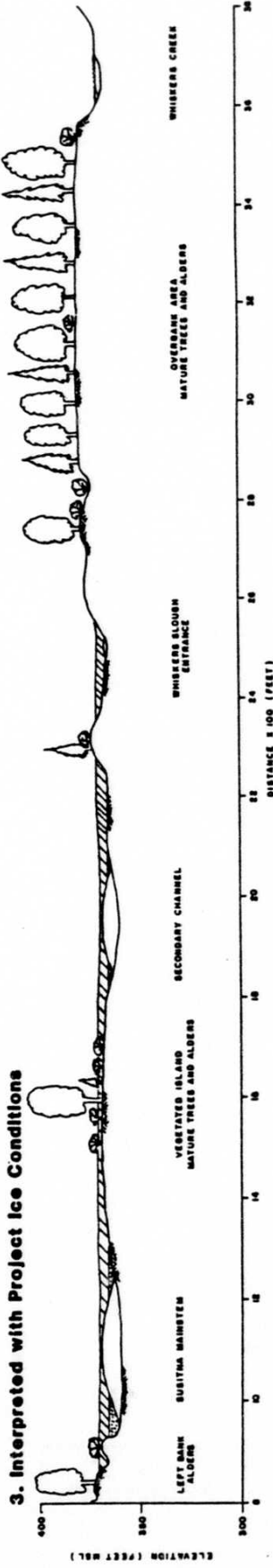


WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

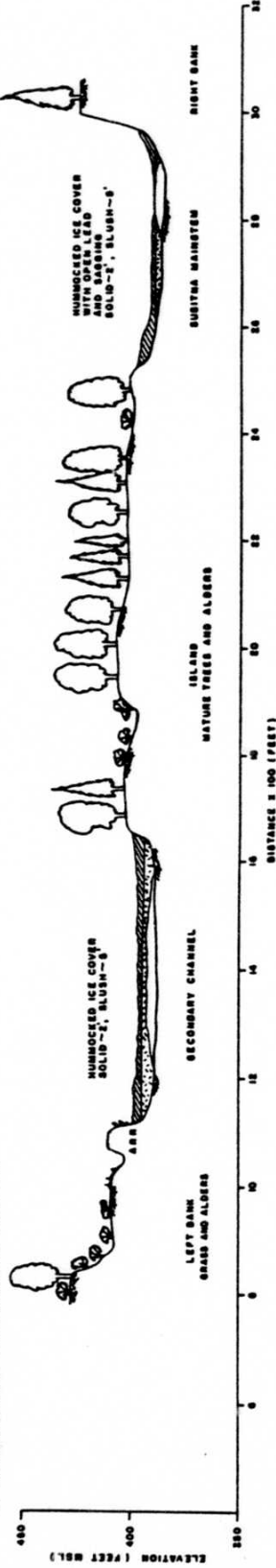
**2. ICECAL Simulated with Project Ice Conditions RUN #7196CNA**



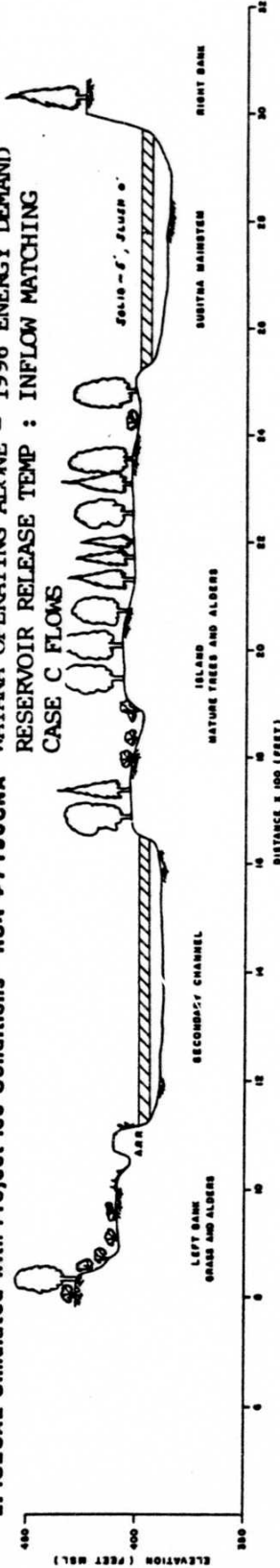
**3. Interpreted with Project Ice Conditions**



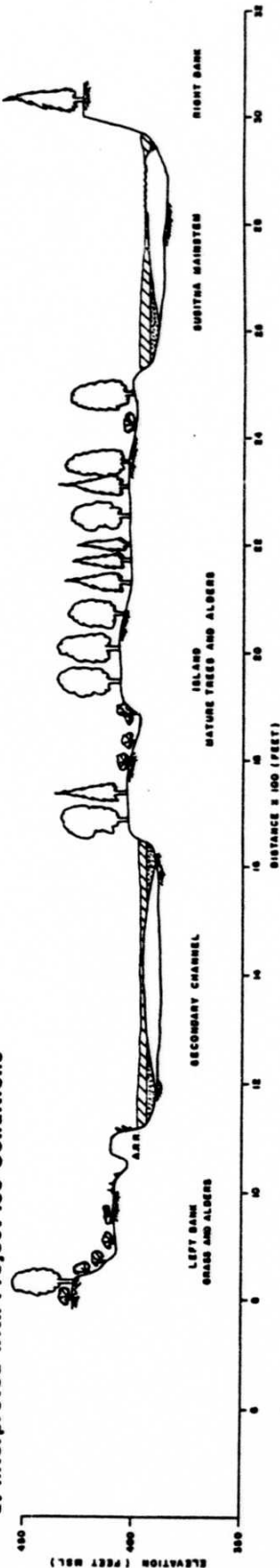
1. Natural Ice Conditions (1983)



2. ICECAL Simulated with Project Ice Conditions RUN #7196CNA  
 WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

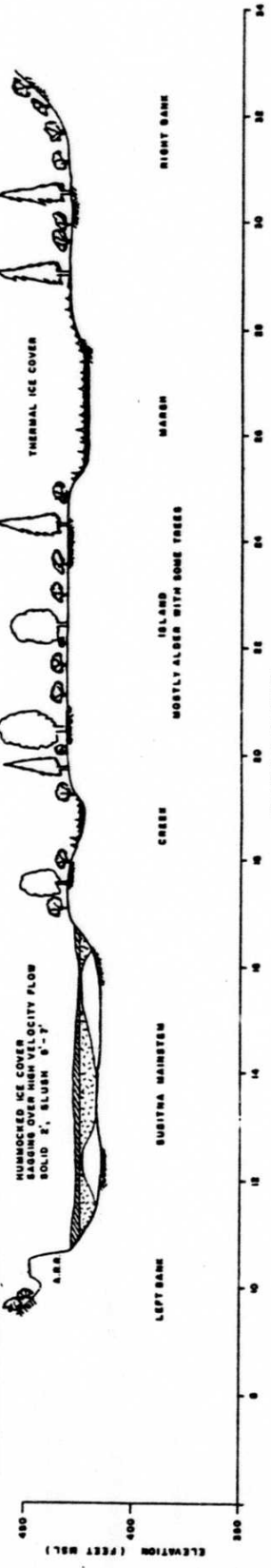


3. Interpreted with Project Ice Conditions

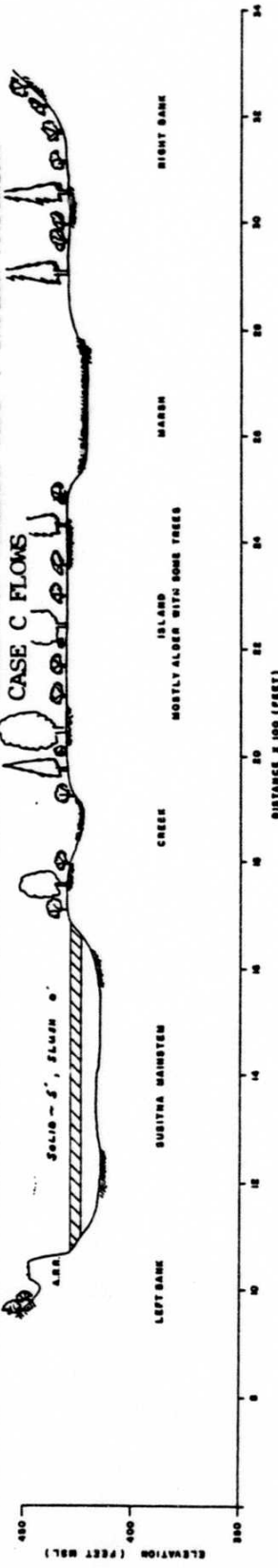




**1. Natural Ice Conditions (1983)**

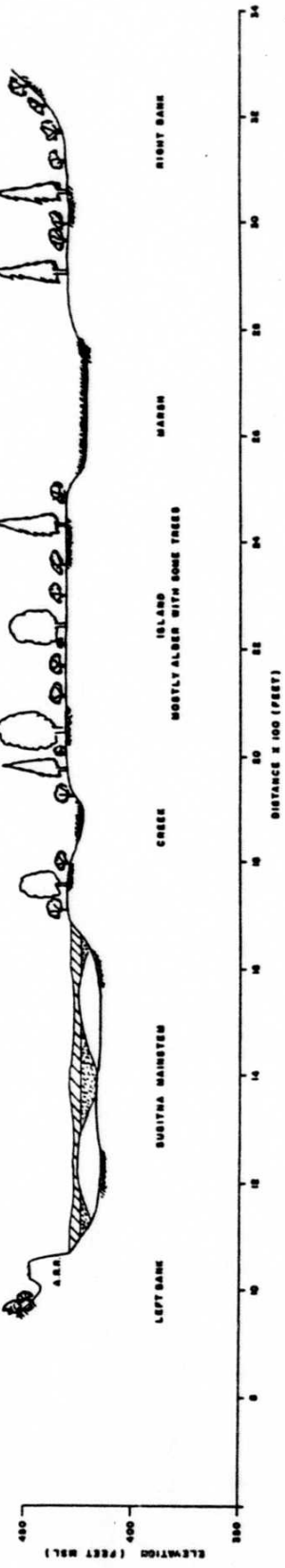


**2. ICECAL Simulated with Project Ice Conditions RUN #7196CNA**



WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

**3. Interpreted with Project Ice Conditions**



PREPARED BY:

**P&M**  
**PEM CONSULTANTS, INC.**  
 ENGINEERS, CONSULTANTS, PLANNERS, SCIENTISTS

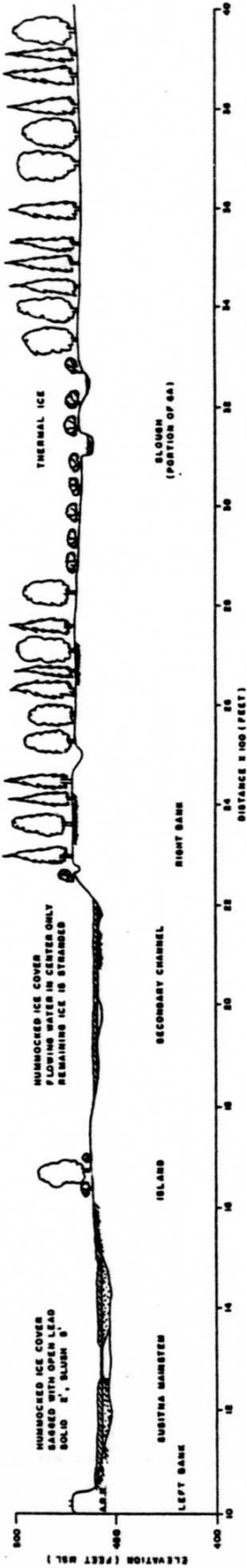
**LRX-12**

1981 CROSS SECTION SURVEY  
 RIVER MILE 108.4  
 VERTICAL EXAGGERATION 4:1

PREPARED FOR:

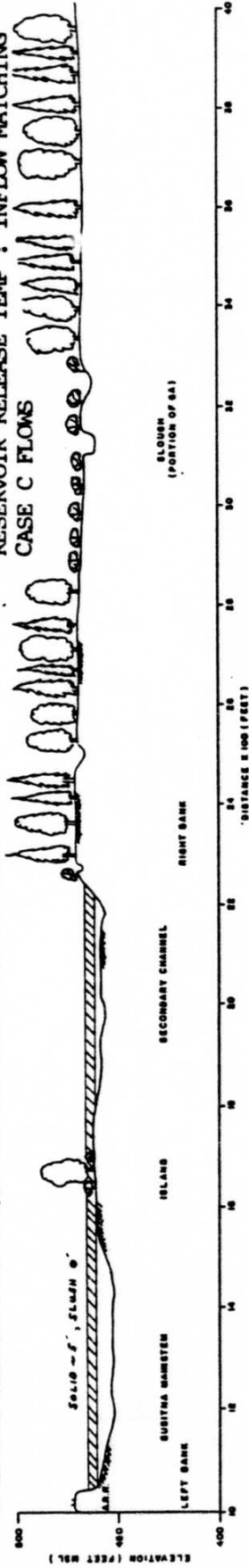
**HARZA-EBASCO**  
 SUSITNA JOINT VENTURE

**1. Natural Ice Conditions (1983)**

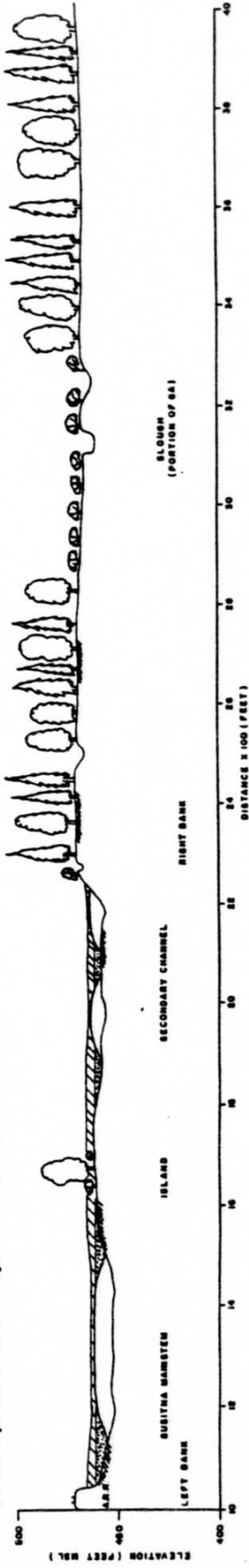


WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

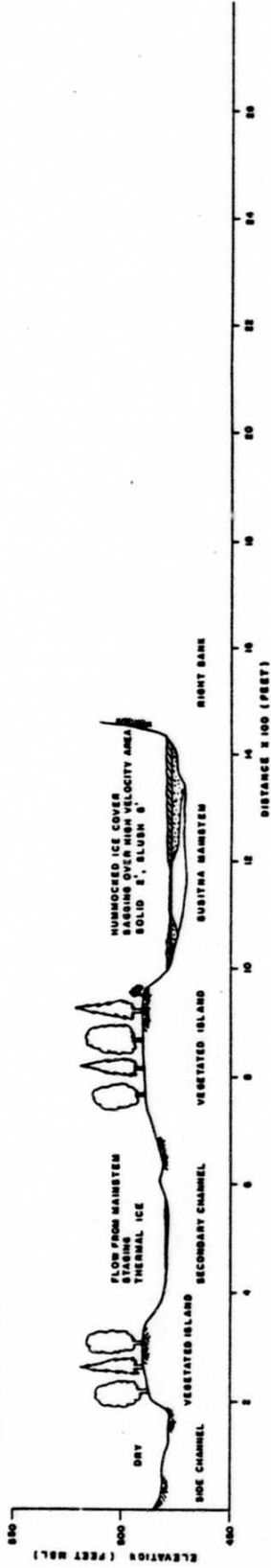
**2. ICECAL Simulated with Project Ice Conditions RUN #7196CNA**



**3. Interpreted with Project Ice Conditions**

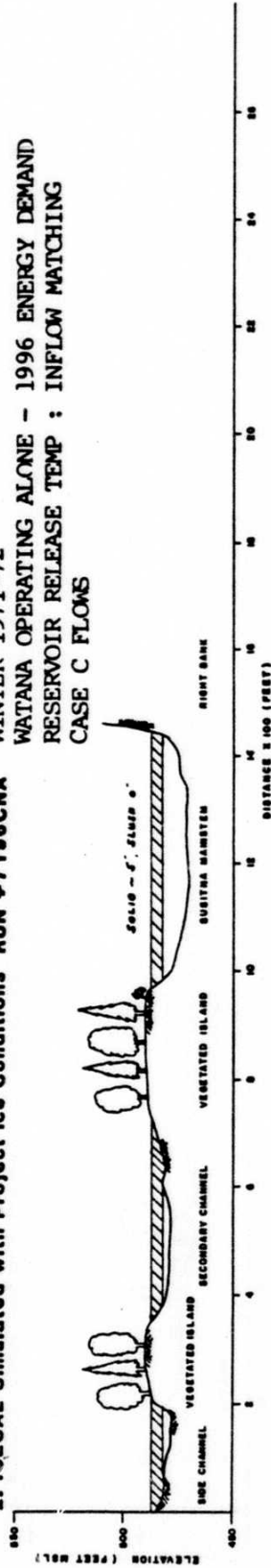


1. Natural Ice Conditions (1983)



2. ICECAL Simulated with Project Ice Conditions RUN #7196CNA  
 WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

3. Interpreted with Project Ice Conditions



PREPARED BY:

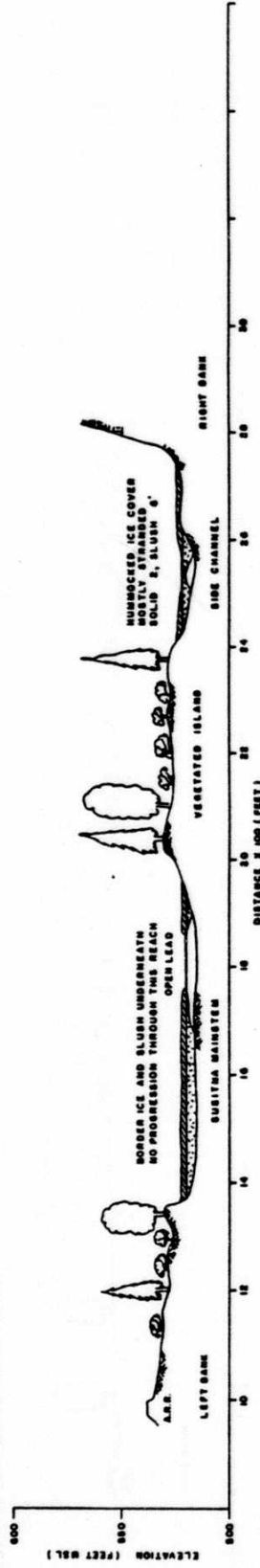
**R&M CONSULTANTS, INC.**  
 PROFESSIONAL ENGINEERING CONSULTANTS

**LRX-18.2**  
 1982 CROSS SECTION SURVEY  
 RIVER MILE 115.1  
 VERTICAL EXAGGERATION 4:1

PREPARED FOR:

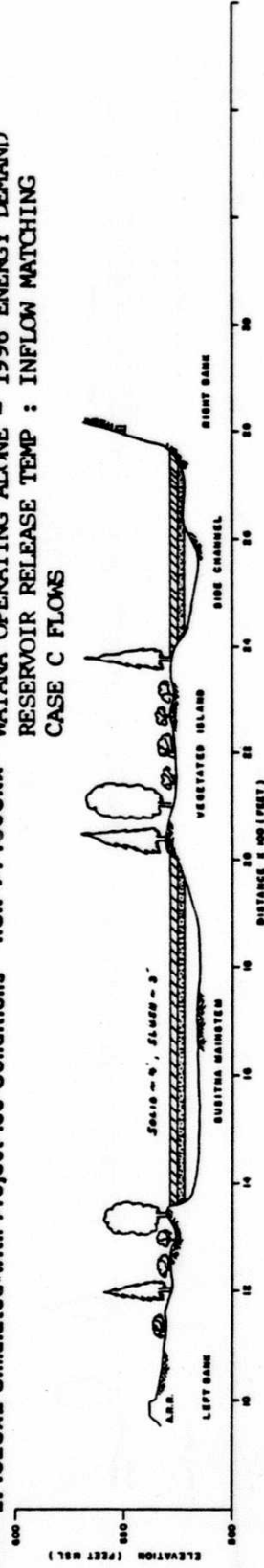
**HARZA-EBASCO**  
 SUSITNA JOINT VENTURE

1. Natural Ice Conditions (1983)

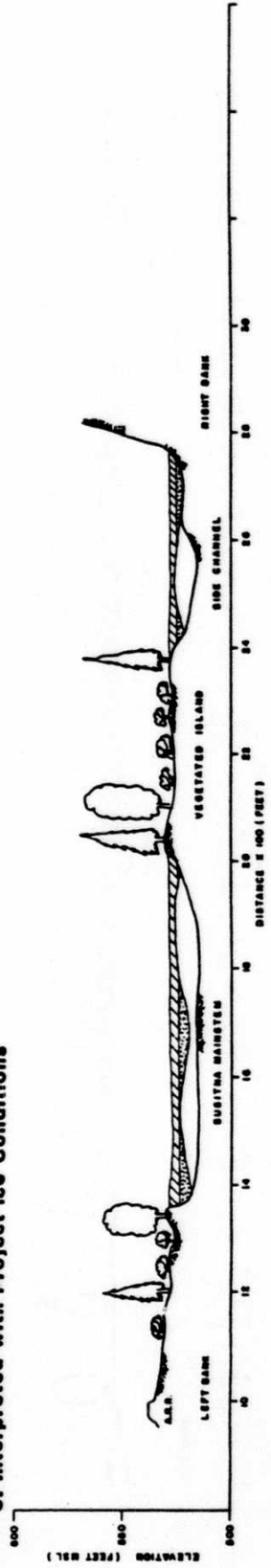


WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

2. ICECAL Simulated with Project Ice Conditions RUN #7196CNA



3. Interpreted with Project Ice Conditions



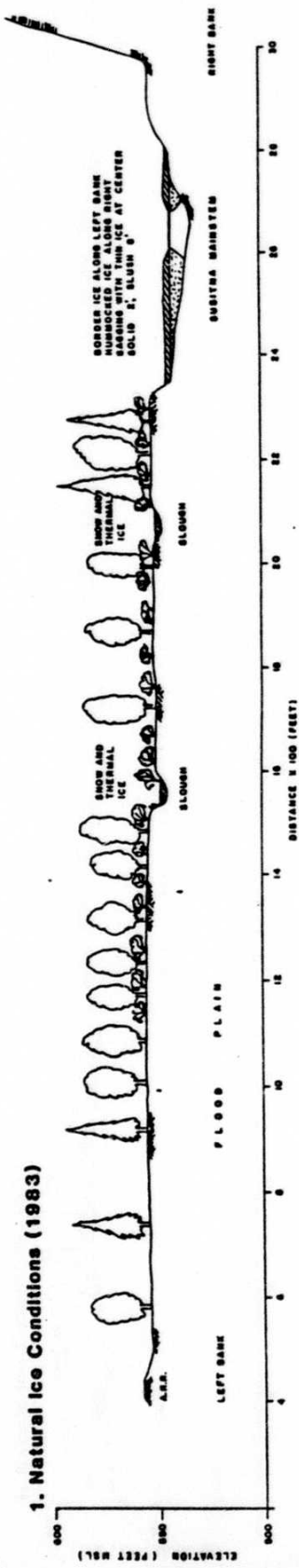
PREPARED BY:

**FSM**  
**RSM CONSULTANTS, INC.**  
 ENGINEERS ARCHITECTS PLANNERS SURVEYORS

1980 CROSS SECTION SURVEY  
 RIVER MILE 120.2  
 VERTICAL EXAGGERATION 4:1

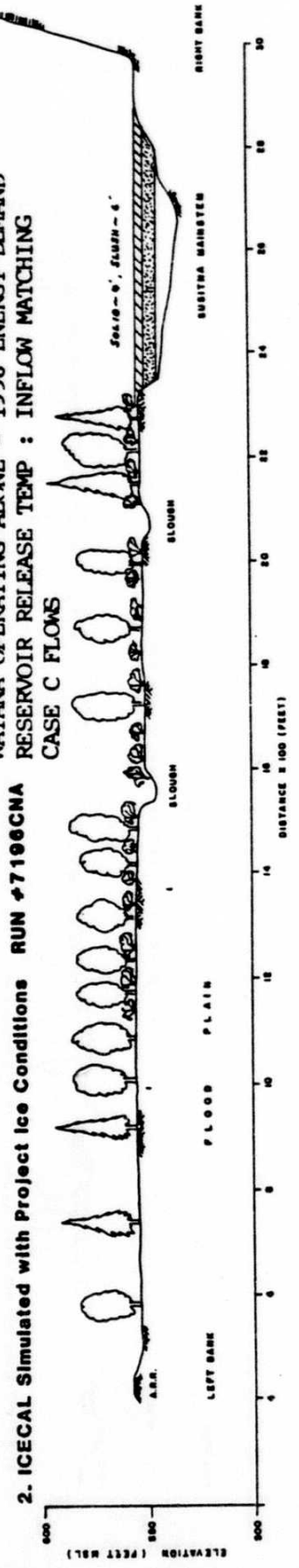
LRX-23

PREPARED FOR:  
**HARZA-EBASCO**  
 SUSITNA JOINT VENTURE

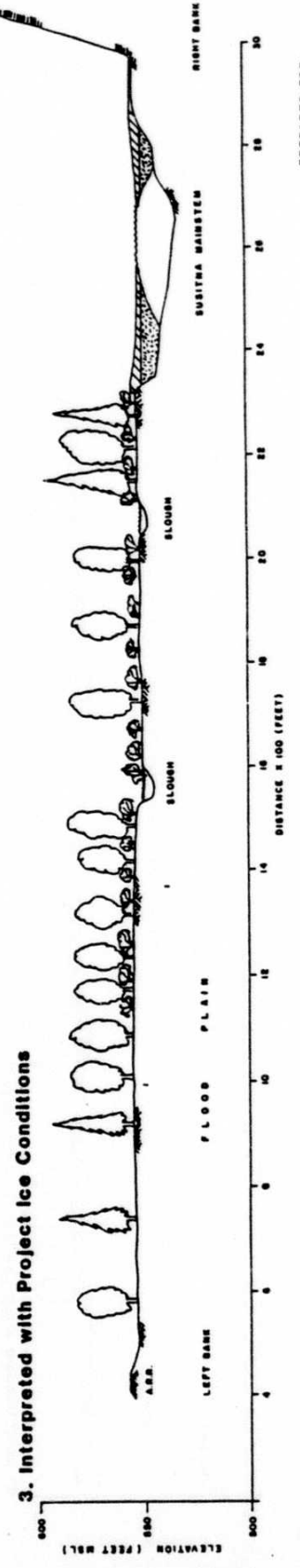


1. Natural ice Conditions (1983)

WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

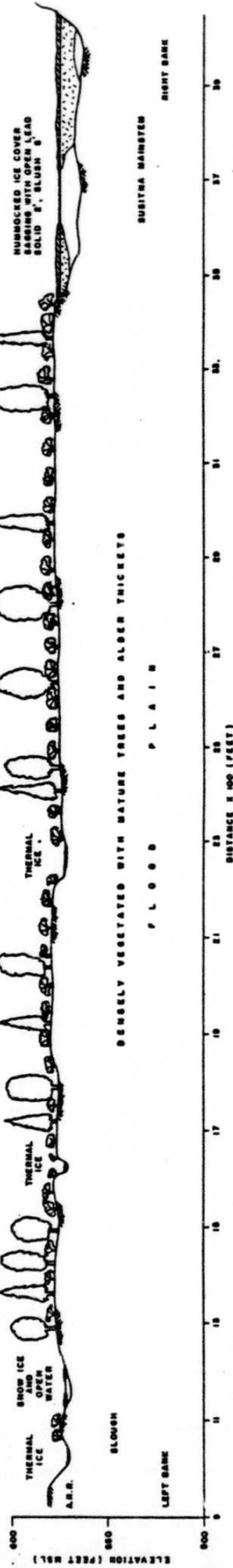


2. ICECAL Simulated with Project ice Conditions RUN #7196CNA



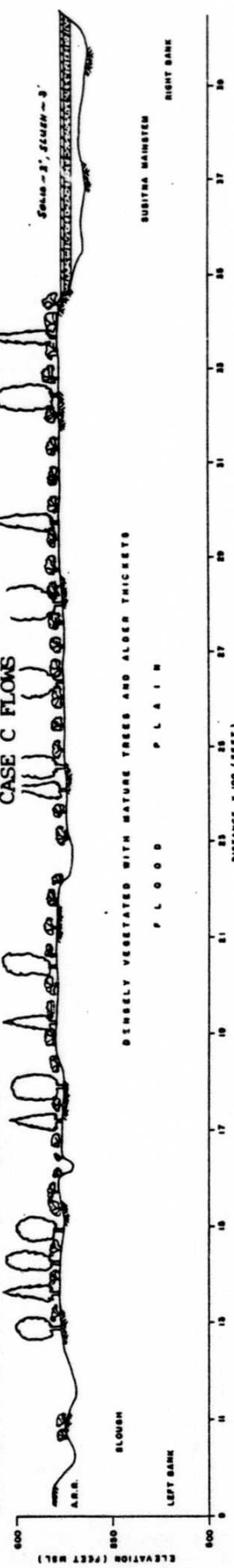
3. Interpreted with Project ice Conditions

**1. Natural Ice Conditions (1983)**

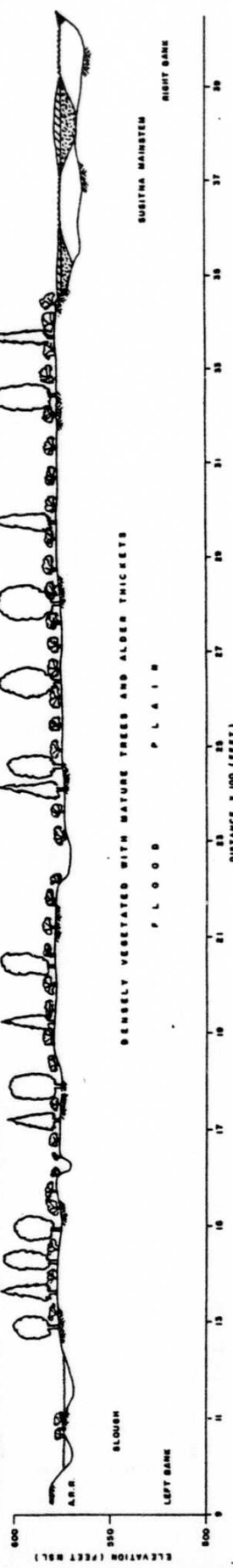


WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

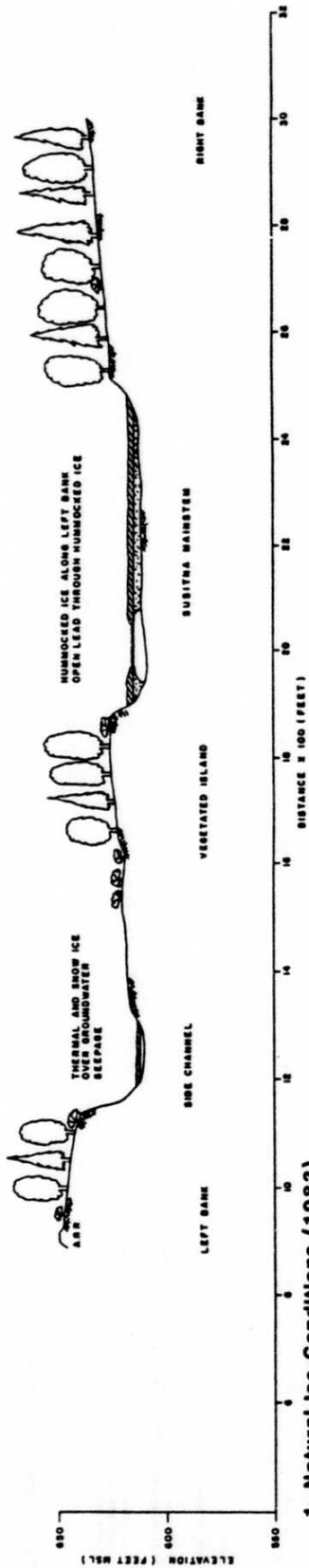
**2. ICECAL Simulated with Project Ice Conditions RUN #7196CNA**



**3. Interpreted with Project Ice Conditions**

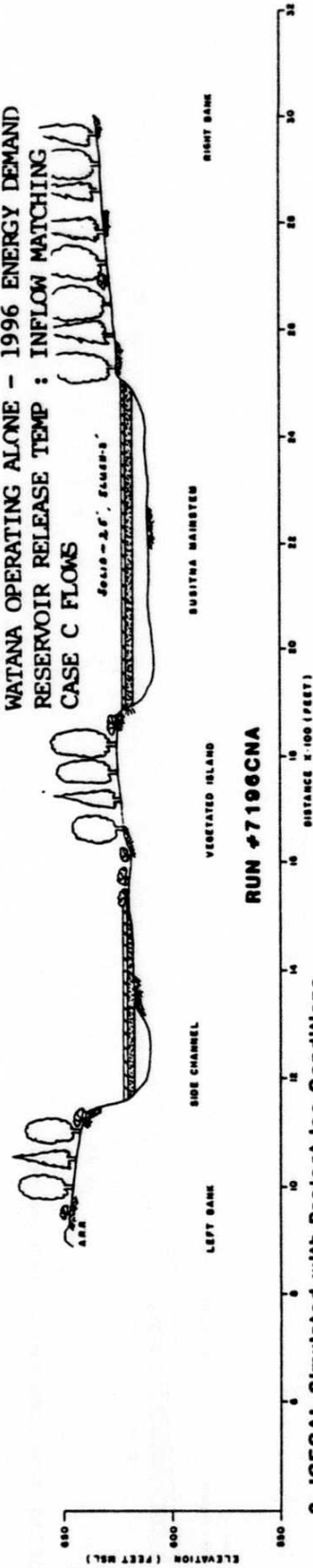




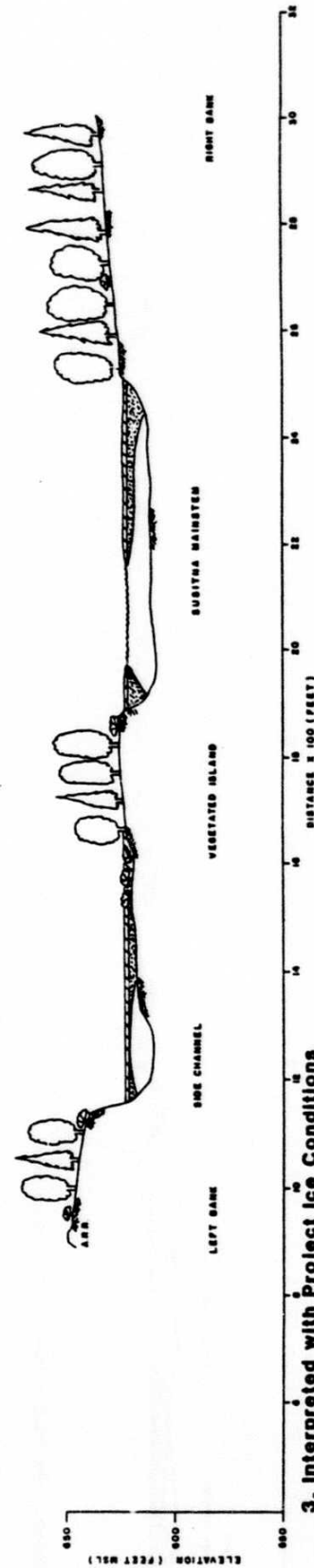


1. Natural ice Conditions (1983)

WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS  
*Scale - 2.5" = 1000'*

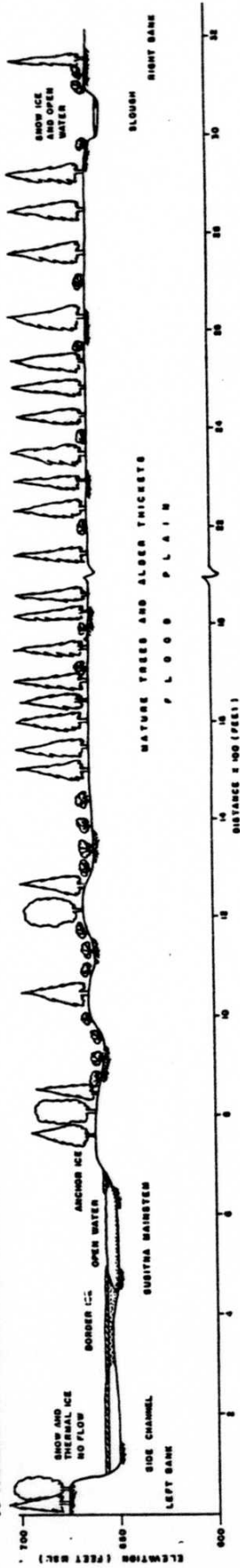


2. ICECAL Simulated with Project ice Conditions



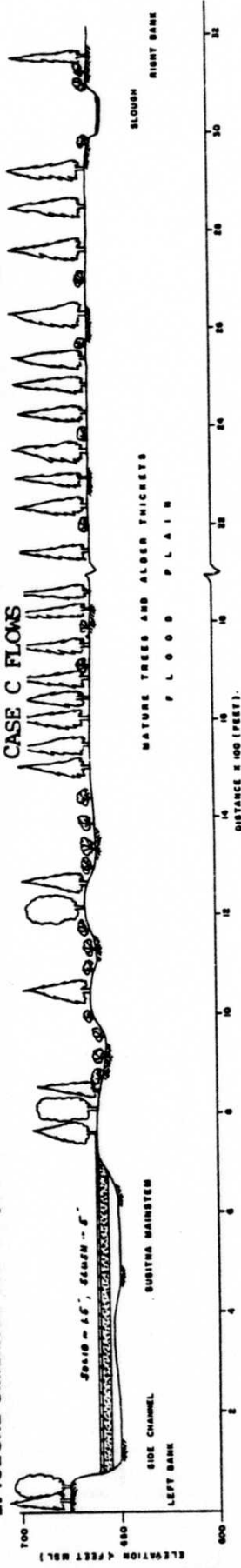
3. Interpreted with Project ice Conditions

**1. Natural Ice Conditions (1983)**

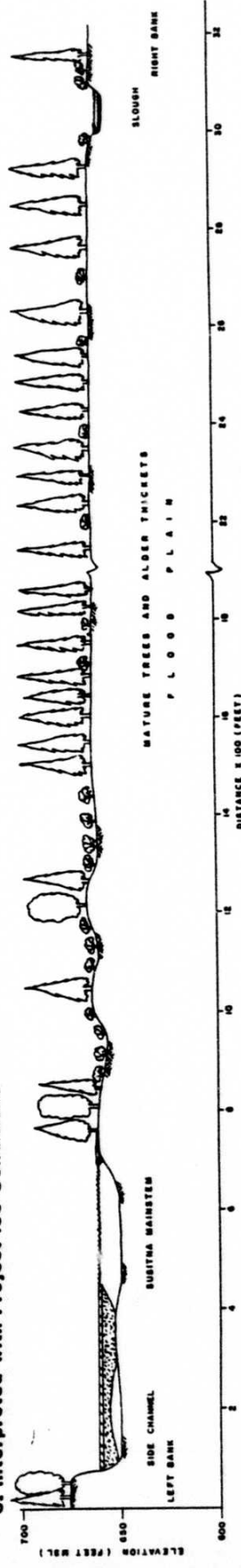


WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

**2. ICECAL Simulated with Project Ice Conditions RUN #7196CNA**



**3. Interpreted with Project Ice Conditions**



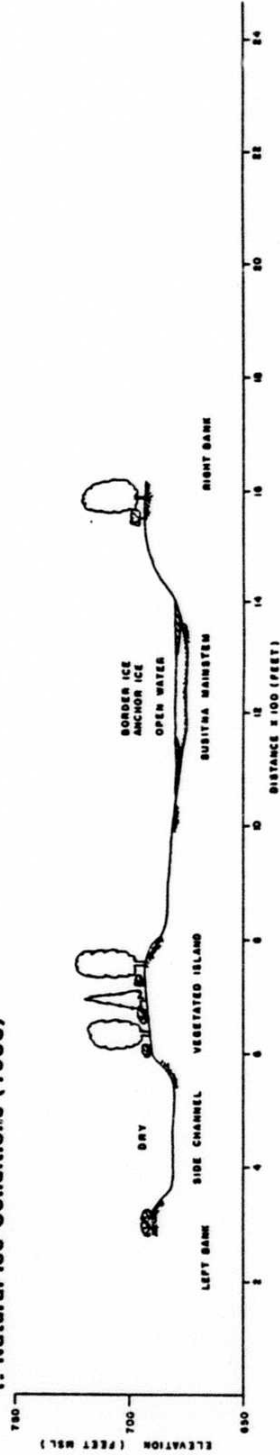
PREPARED FOR:  
**HARZA-EBASCO**  
 SUSITNA JOINT VENTURE

1980 CROSS SECTION SURVEY  
 RIVER MILE 134.2  
 VERTICAL EXAGGERATION 4:1

**LRX-40**

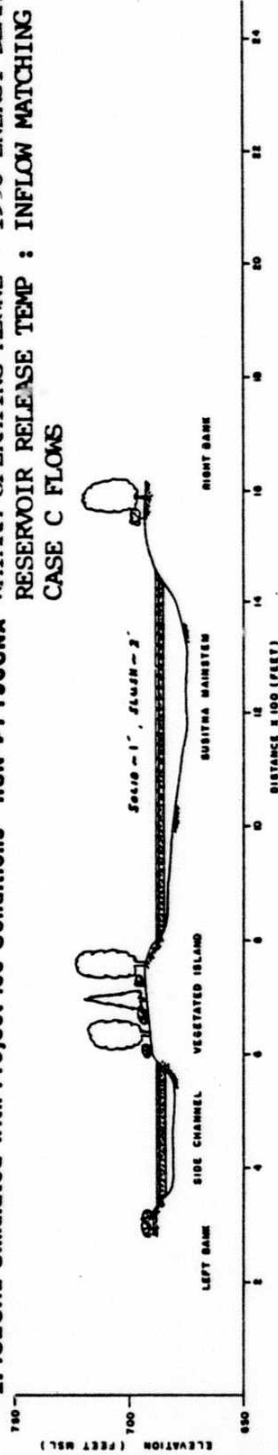
PREPARED BY:  
**R&M CONSULTANTS, INC.**  
 ENGINEERS, GEOLOGISTS, PLANNERS, SURVEYORS

1. Natural Ice Conditions (1983)

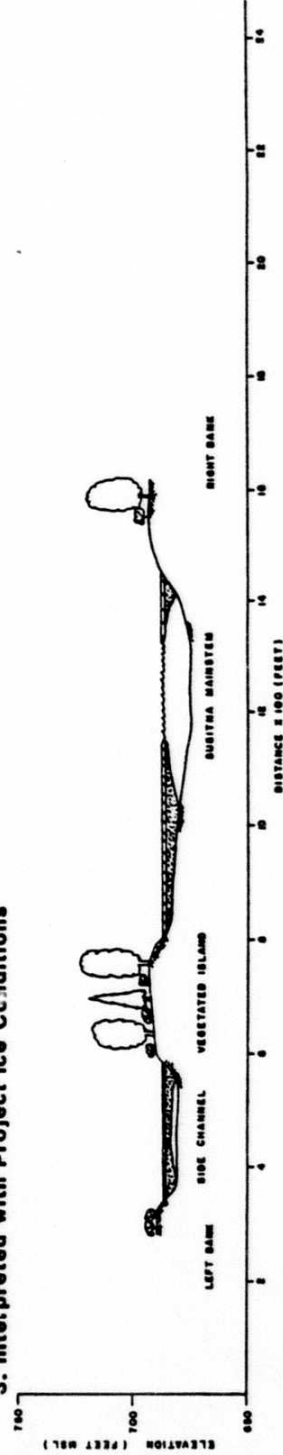


WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

2. ICECAL Simulated with Project Ice Conditions RUN #7196CNA



3. Interpreted with Project Ice Conditions



PREPARED BY:

**RSM**  
**R&M CONSULTANTS, INC.**  
 ENGINEERING GEOLOGISTS PLANNERS SURVEYORS

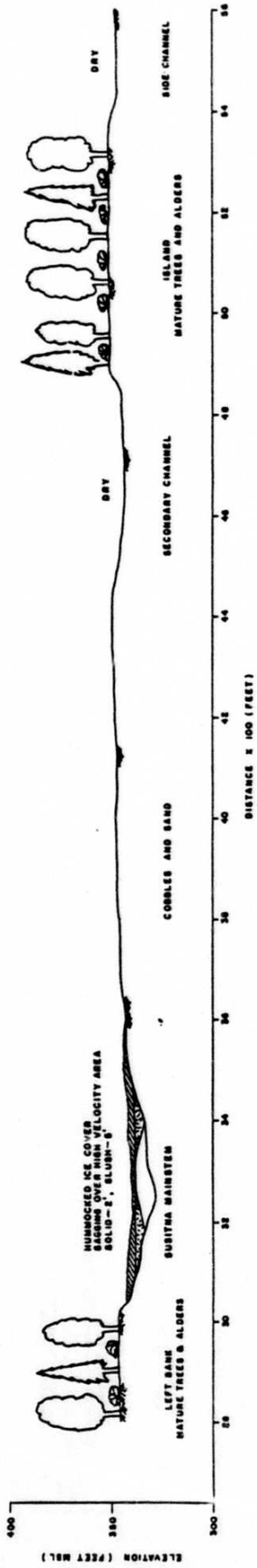
1980 CROSS SECTION SURVEY  
 RIVER MILE 136.4  
 VERTICAL EXAGGERATION 4:1

LRX-44

PREPARED FOR:  
**MARZA-EBASSO**  
 SUSITMA JOINT VENTURE

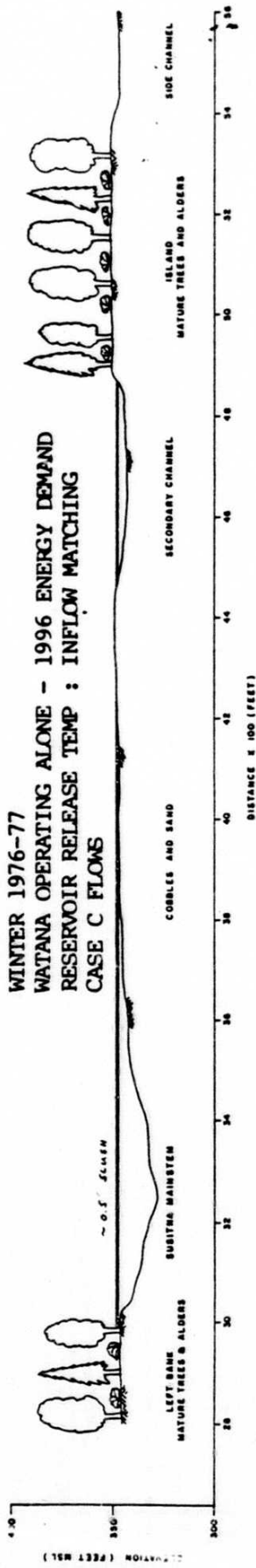
Exhibit U

**1. Natural Ice Conditions (1983)**

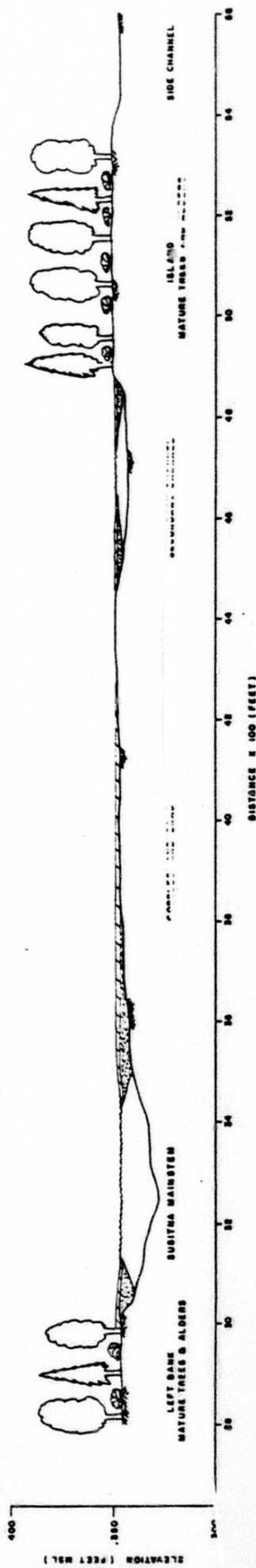


**2. ICECAL Simulated with Project Ice Conditions RUN #7696CNA**

WINTER 1976-77  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



**3. Interpreted with Project Ice Conditions**



PREPARED BY:

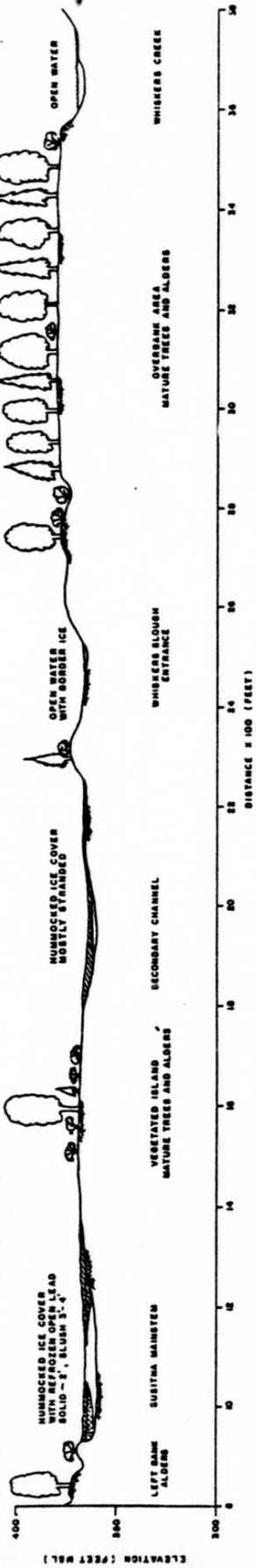
**FSM**  
**R&M CONSULTANTS, INC.**

**LRX-3**  
 1982 CROSS SECTION SURVEY  
 RIVER MILE 98.6  
 FEDERAL BUREAU OF INVESTIGATION

PREPARED FOR:

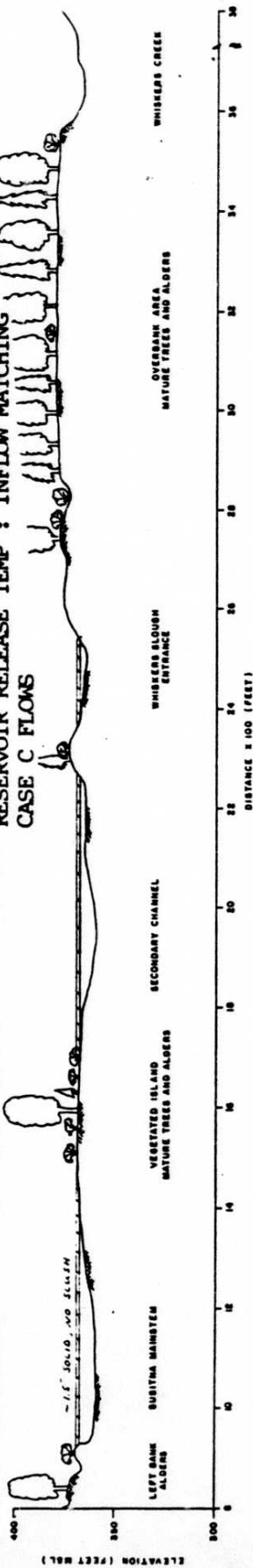
**HARZA-EELASCO**  
 SUSITNA JOINT VENTURE

**1. Natural Ice Conditions (1983)**

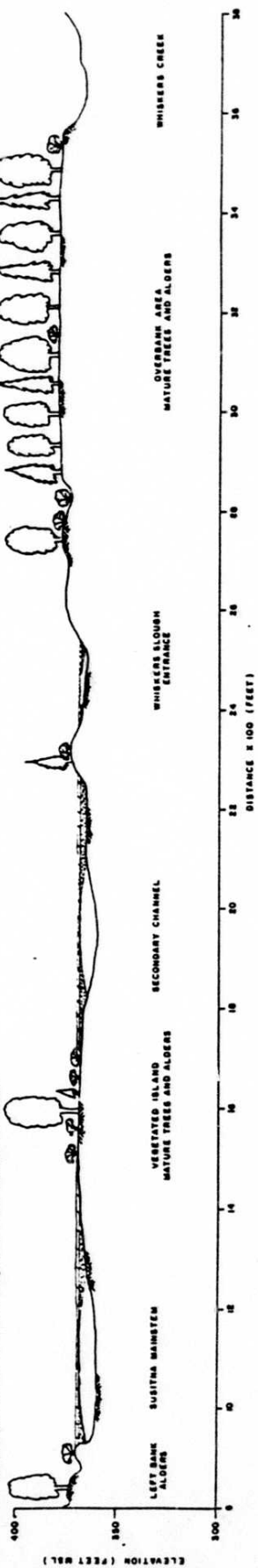


**2. ICECAL Simulated with Project Ice Conditions RUN #7696CNA**

WINTER 1976-77  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



**3. Interpreted with Project Ice Conditions**



PREPARED BY:

**RPM**  
**RSM CONSULTANTS, INC.**  
 ENGINEERING, SURVEYING, PLANNING, SCIENTISTS

**LRX-7**

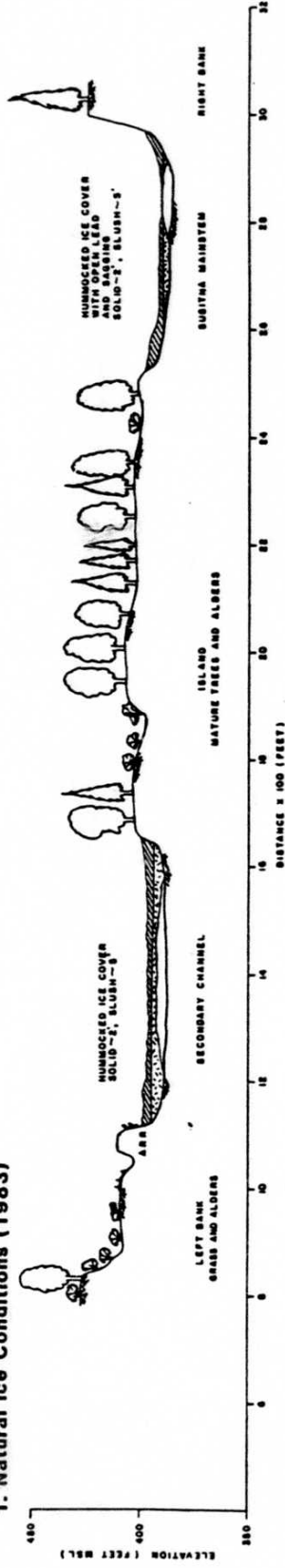
**1980 CROSS SECTION SURVEY**  
**RIVER MILE 101.5**  
**VERTICAL EXAGGERATION 4:1**

PREPARED FOR:

**HARZA-EBASCO**  
 SUSITNA JOINT VENTURE

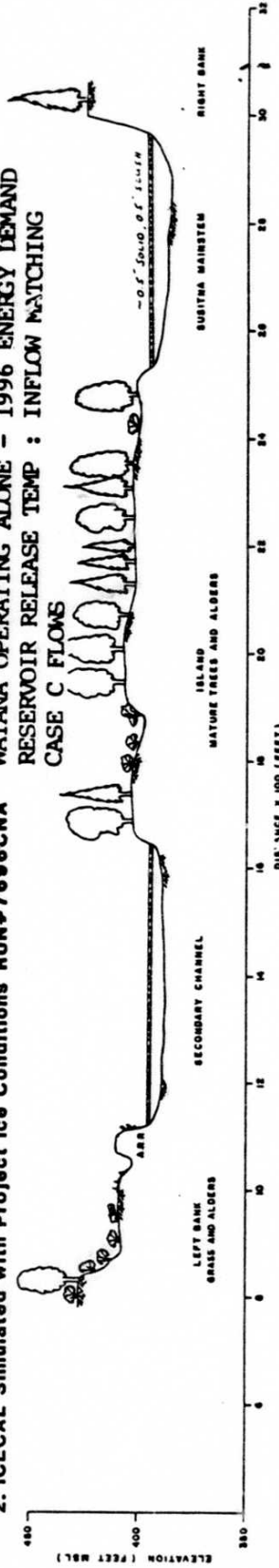


1. Natural Ice Conditions (1983)

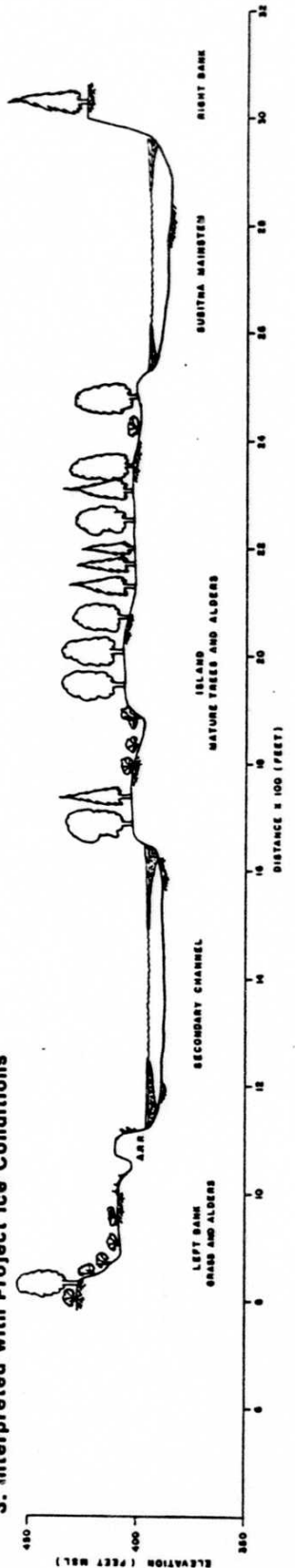


2. ICECAL Simulated with Project Ice Conditions RUN#7696CNA

WINTER 1976-77  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



3. Interpreted with Project Ice Conditions



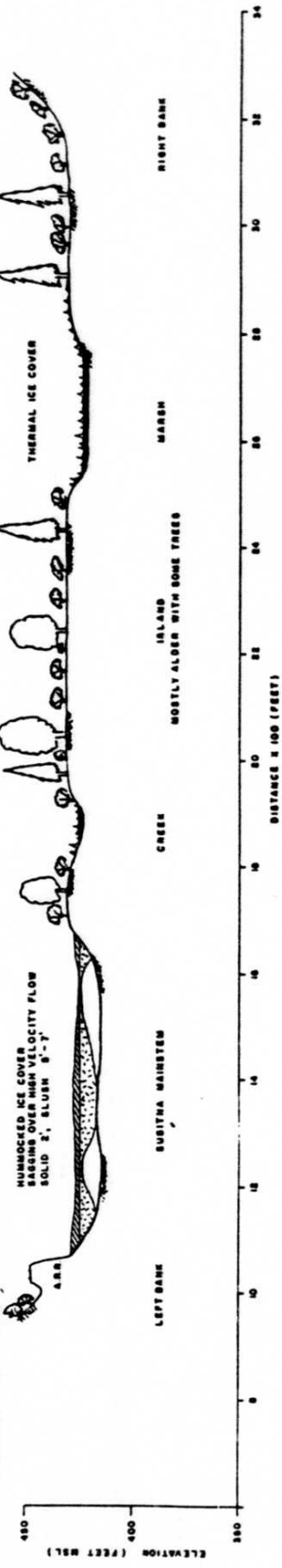
PREPARED BY:

**RSM**  
**R&M CONSULTANTS, INC.**  
 10000 140th Ave, NE, Redmond, WA 98073

1980 CROSS SECTION SURVEY  
 RIVER MILE 104.8  
 VERTICAL EXAGGERATION 4:1

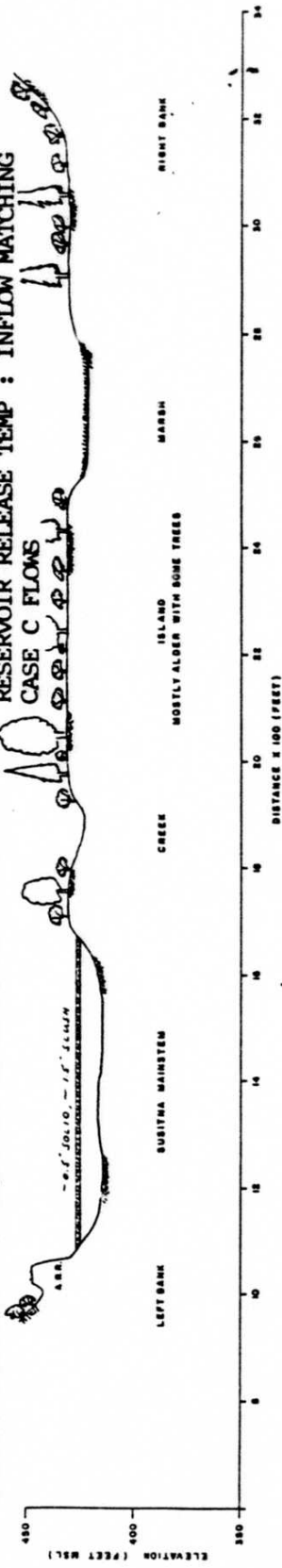
PREPARED FOR:  
**HARZA-EBASCO**  
 SUSTINA JOINT VENTURE

**1. Natural ice Conditions (1983)**

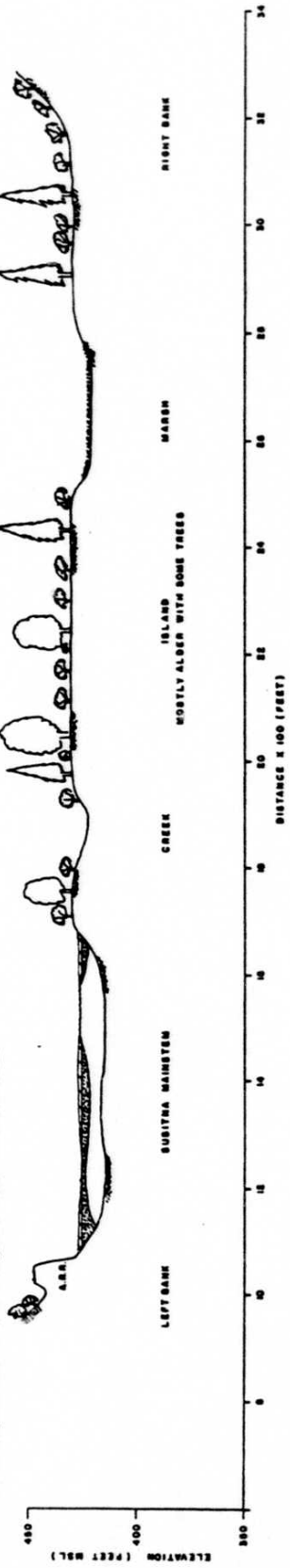


**2. ICECAL Simulated with Project Ice Conditions RUN#7396CNA**

WINTER 1976-77  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



**3. Interpreted with Project Ice Conditions**



PREPARED BY:

**R&M CONSULTANTS, INC.**  
 ENGINEERS, ARCHITECTS, PLANNERS, SURVEYORS

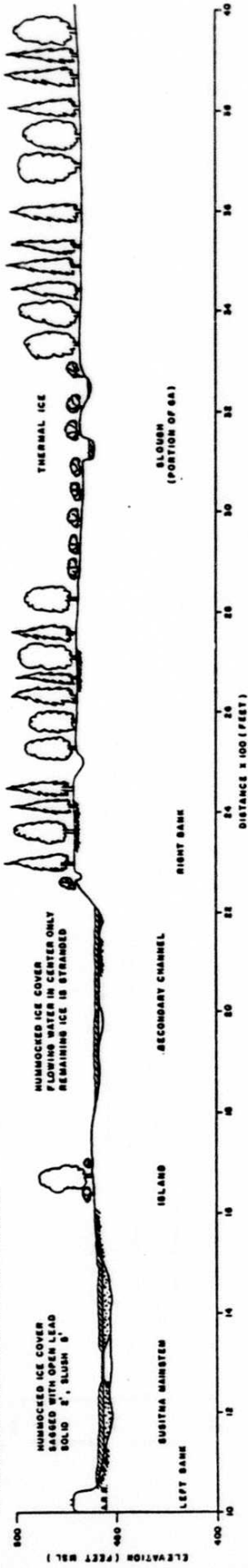
**LRX-12**

1981 CROSS SECTION SURVEY  
 RIVER MILE 108.4  
 VERTICAL EXAGGERATION 4:1

PREPARED FOR:

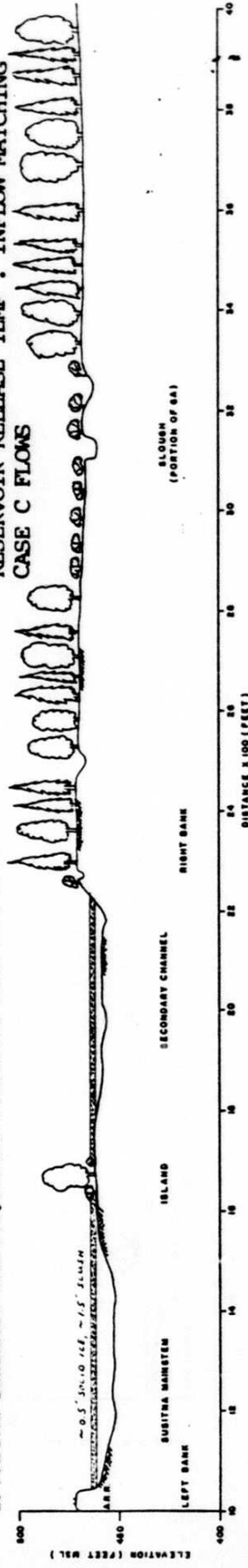
**HARZA-EBASCO**  
 SUSTAINA JOINT VENTURE

**1. Natural Ice Conditions (1983)**

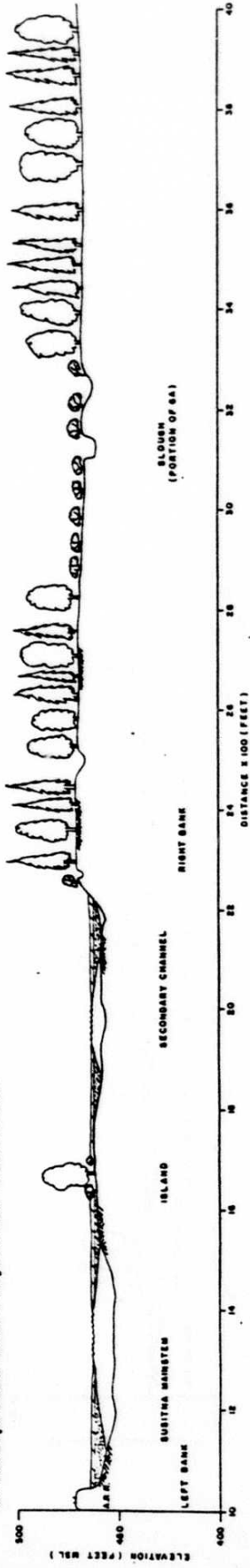


WINTER 1976-77  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

**2. ICECAL Simulated with Project Ice Conditions RUN#7696CNA**



**3. Interpreted with Project Ice Conditions**



PREPARED BY:

**PCM**  
**PCM CONSULTANTS, INC.**  
 ENGINEERS ARCHITECTS PLANNERS SURVEYORS

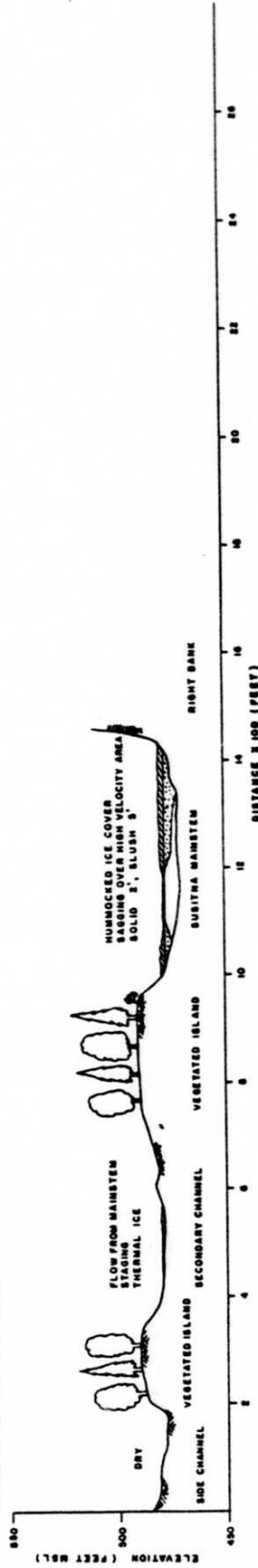
**LRX-17**

1980 CROSS SECTION SURVEY  
 RIVER MILE 112.7  
 VERTICAL EXAGGERATION 4:1

PREPARED FOR:

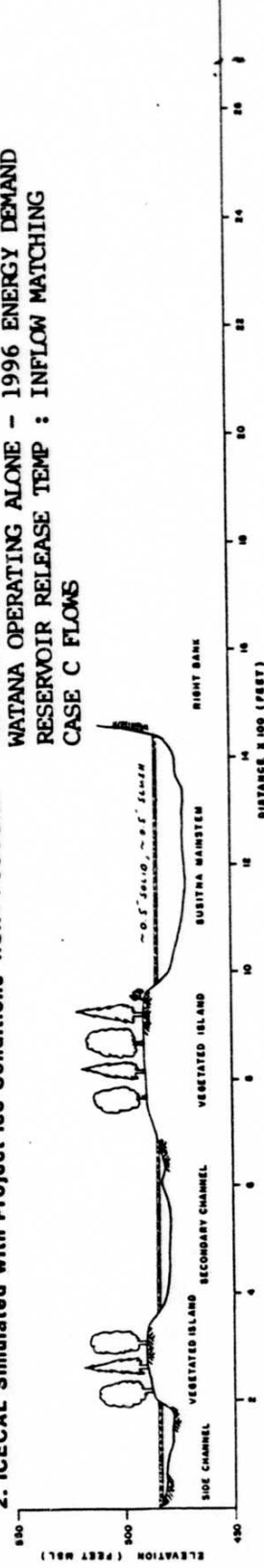
**HARZA-EBASCO**  
 SUSITNA JOINT VENTURE

1. Natural Ice Conditions (1983)

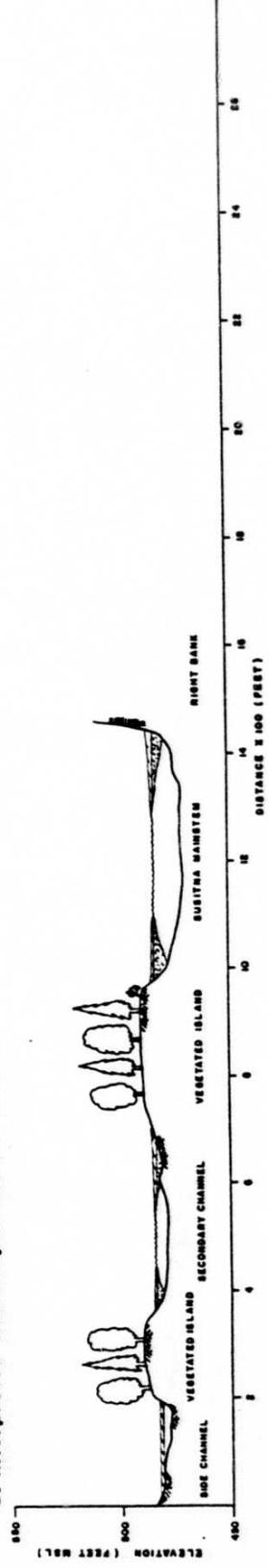


2. ICECAL Simulated with Project Ice Conditions RUN#7696CNA

WINTER 1976-77  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



3. Interpreted with Project Ice Conditions



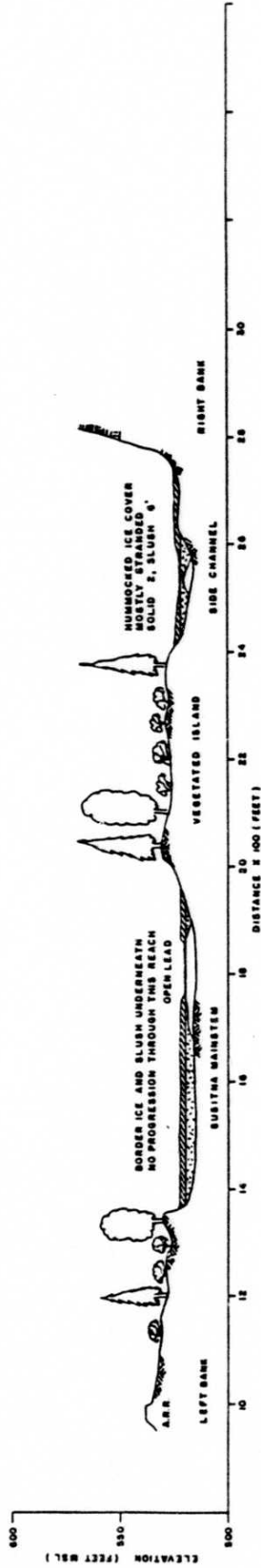
PREPARED BY:

**R&M CONSULTANTS, INC.**  
 ENGINEERS ARCHITECTS PLANNERS SURVEYORS

**LRX-18.2**  
 1982 CROSS SECTION SURVEY  
 RIVER MILE 115.1  
 VERTICAL EXAGGERATION 4:1

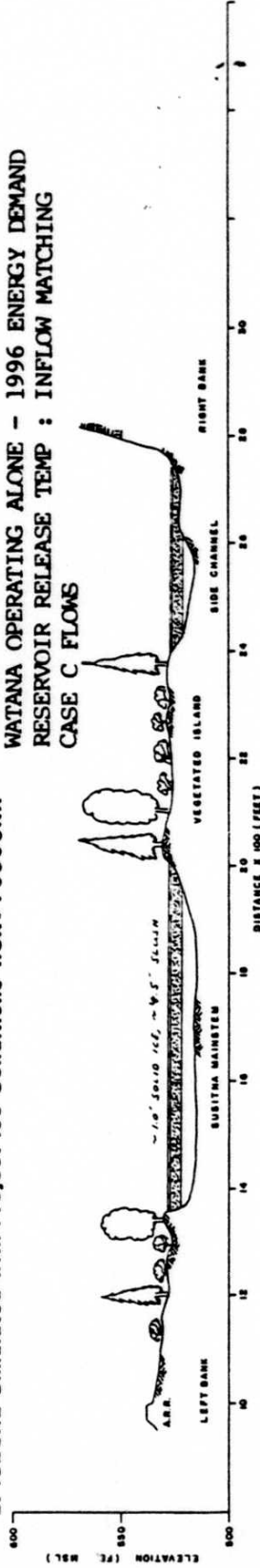
PREPARED FOR:  
**HARZA-EBASCO**  
 SUSITNA JOINT VENTURE

**1. Natural Ice Conditions (1983)**

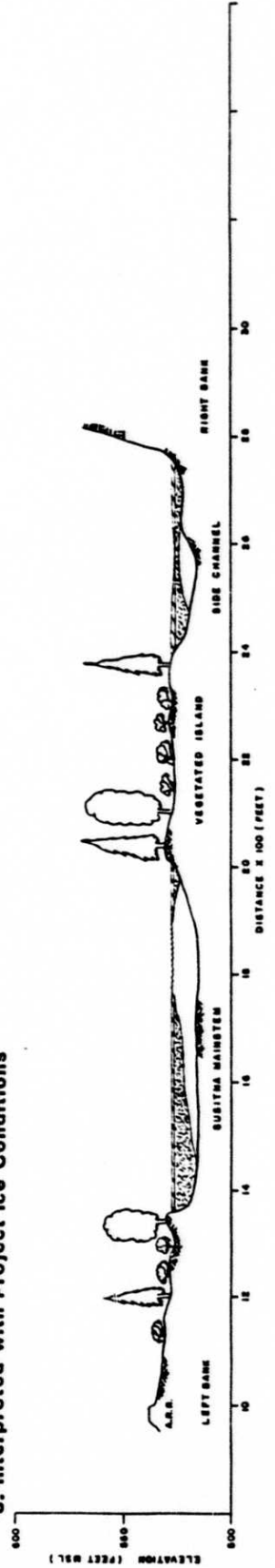


**2. ICECAL Simulated with Project Ice Conditions RUN #7696CNA**

WINTER 1976-77  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



**3. Interpreted with Project Ice Conditions**



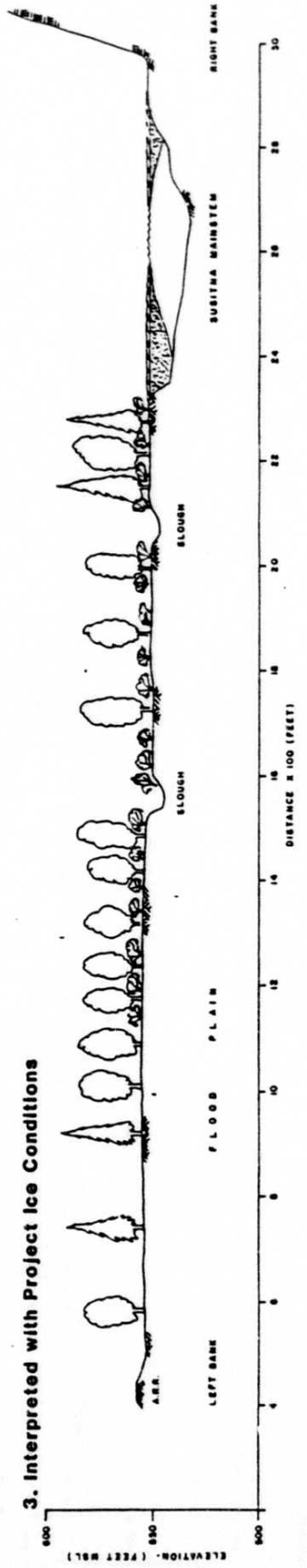
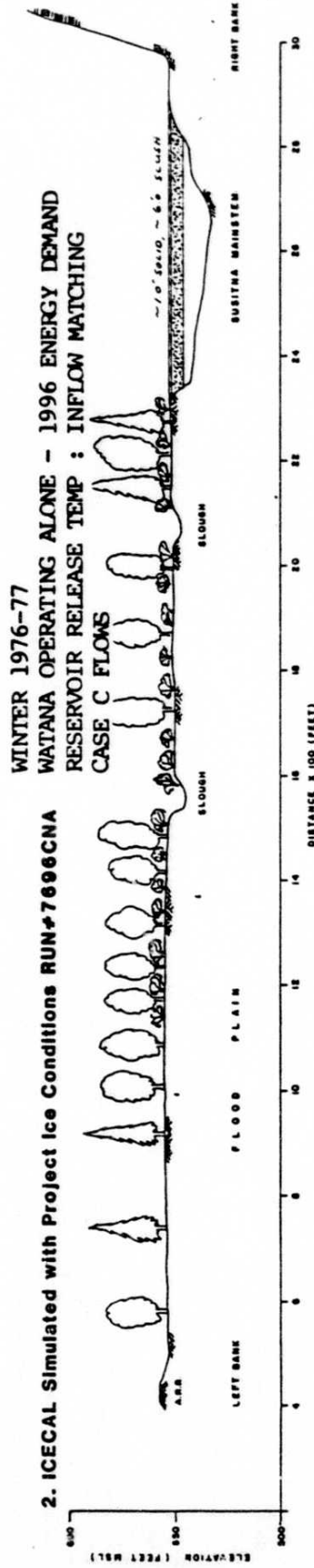
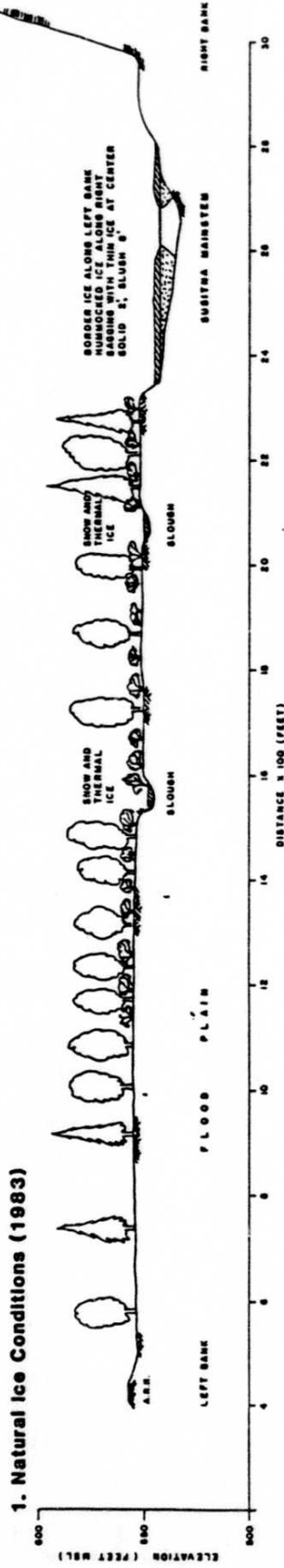
PREPARED BY:

**ERM**  
 R&M CONSULTANTS, INC.  
 10000 14TH AVENUE, SUITE 100  
 DENVER, CO 80202

**LRX-23**

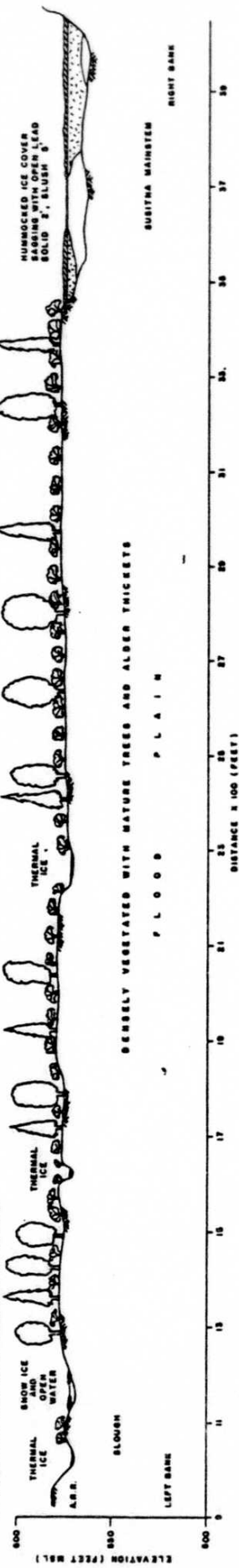
1980 CROSS SECTION SURVEY  
 RIVER MILE 120.2  
 VERTICAL EXAGGERATION 4:1

PREPARED FOR:  
**HARZA-EBASCO**  
 SUSTAINA JOINT VENTURE



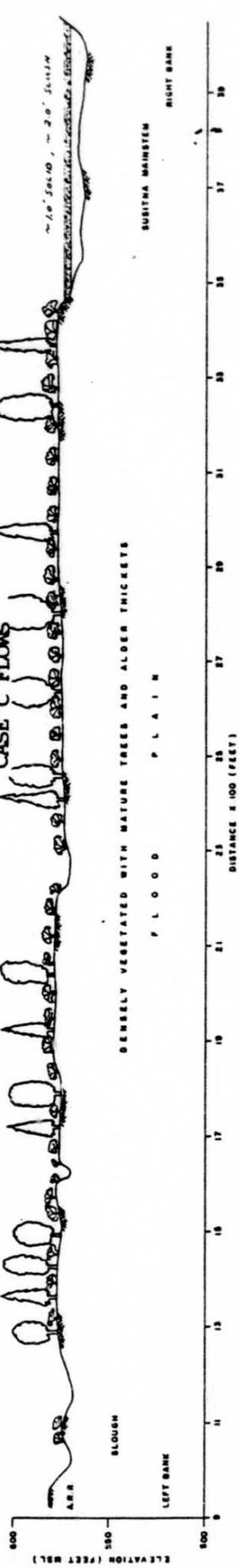


1. Natural Ice Conditions (1983)

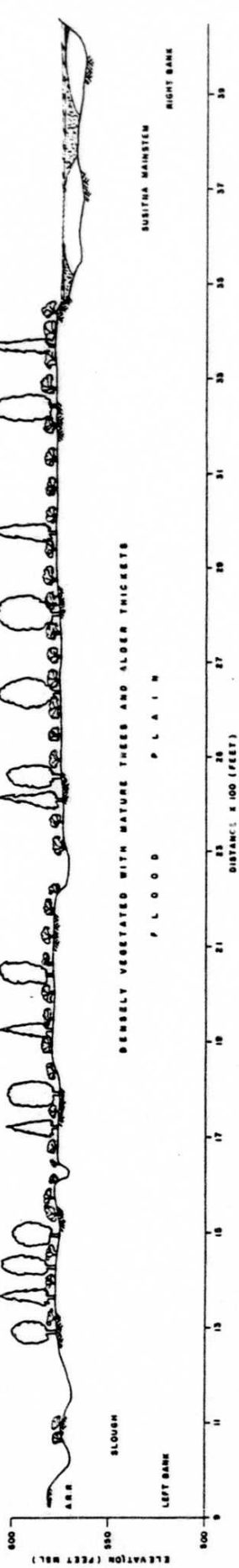


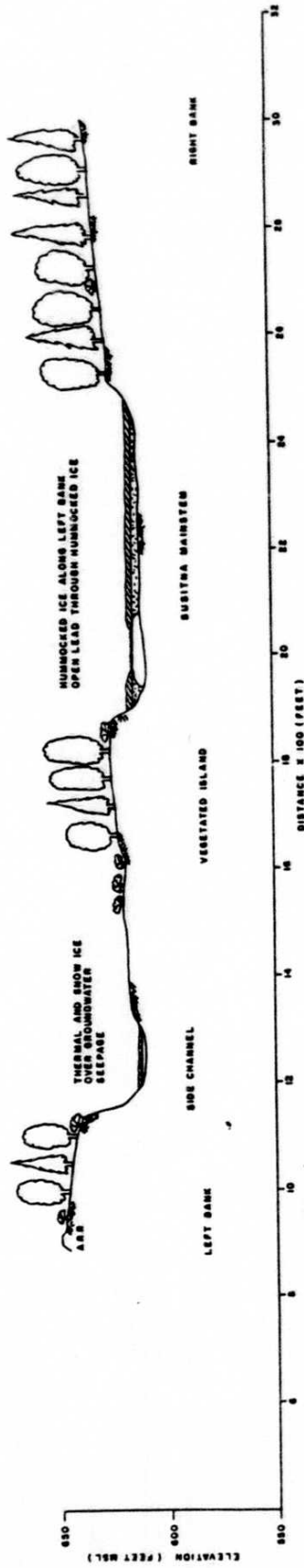
WINTER 1976-77  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

2. ICECAL Simulated with Project Ice Conditions RUN#7696CNA

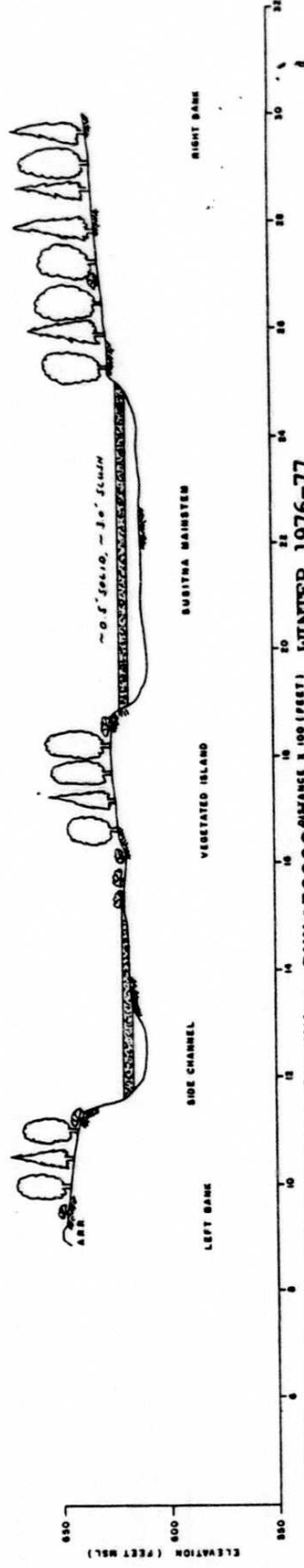


3. Interpreted with Project Ice Conditions



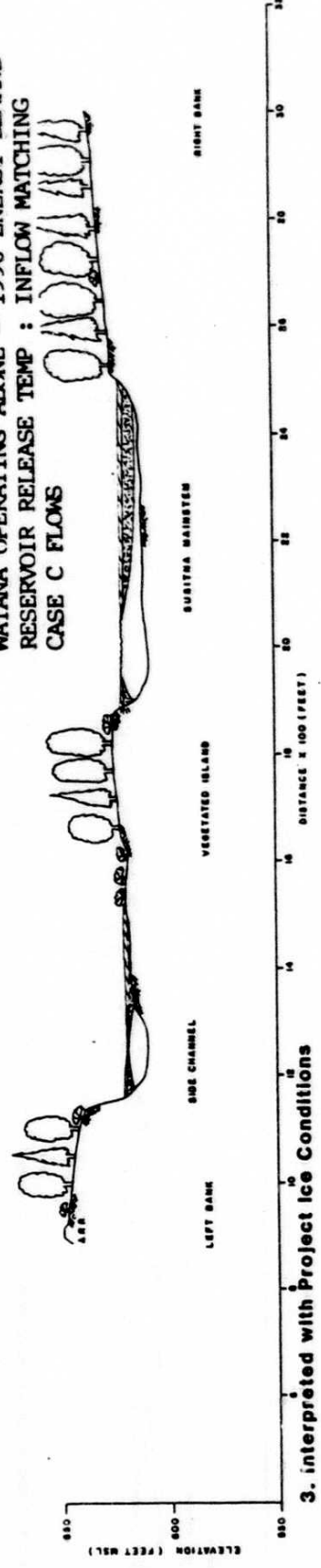


1. Natural ice Conditions (1983)



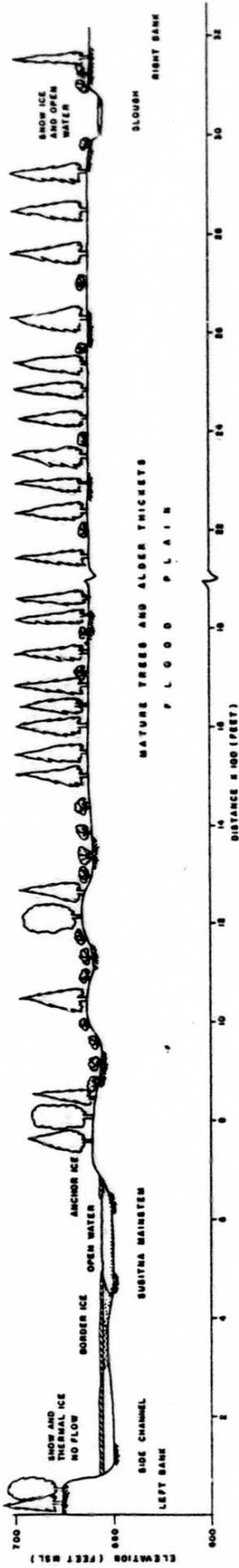
2. ICECAL Simulated with Project Ice Conditions RUN #7696CNX

WINTER 1976-77  
WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
RESERVOIR RELEASE TEMP : INFLOW MATCHING  
CASE C FLOWS



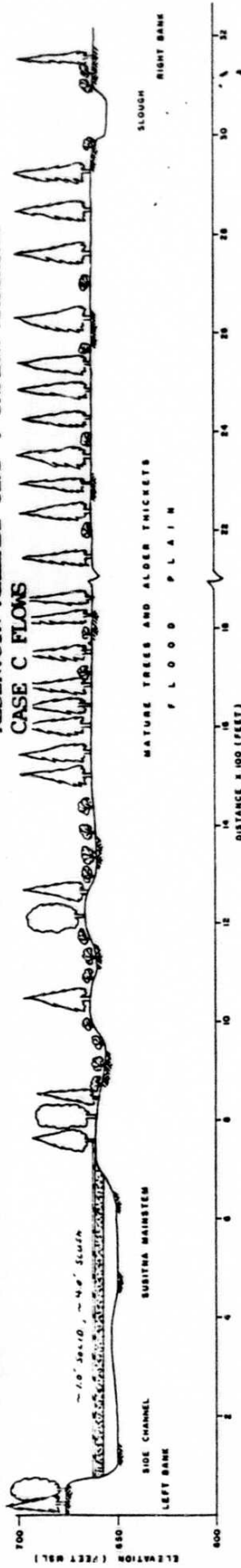
3. Interpreted with Project Ice Conditions

1. Natural Ice Conditions (1983)

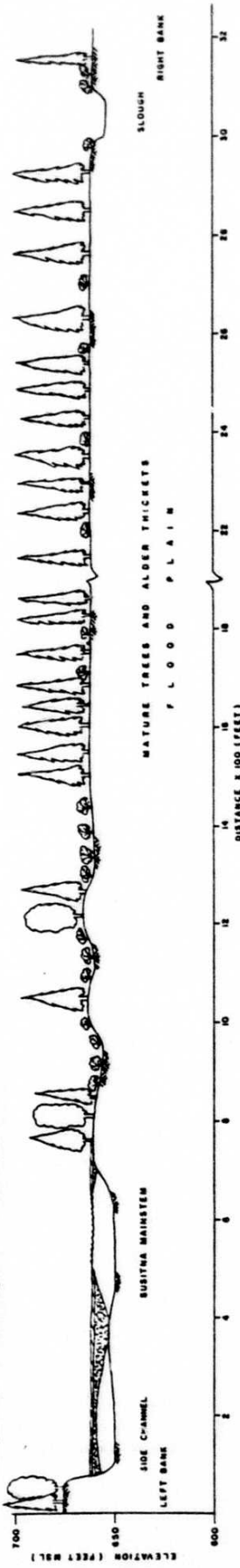


2. ICECAL Simulated with Project Ice Conditions RUN#7696CNA

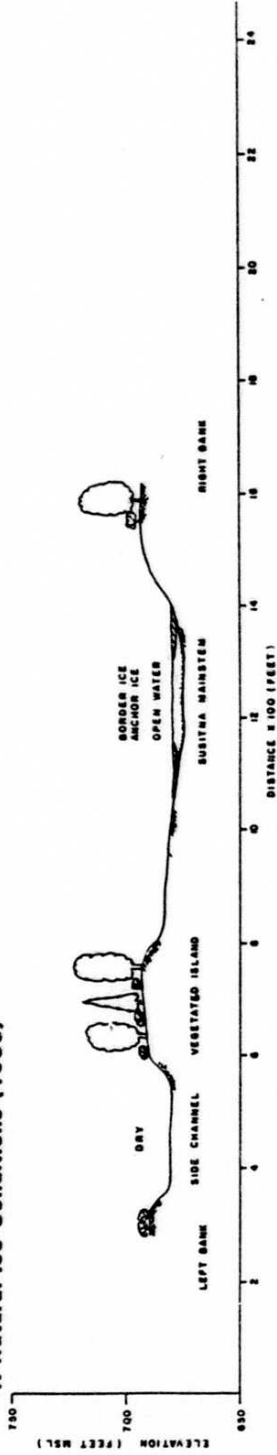
WINTER 1976-77  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



3. Interpreted with Project Ice Conditions

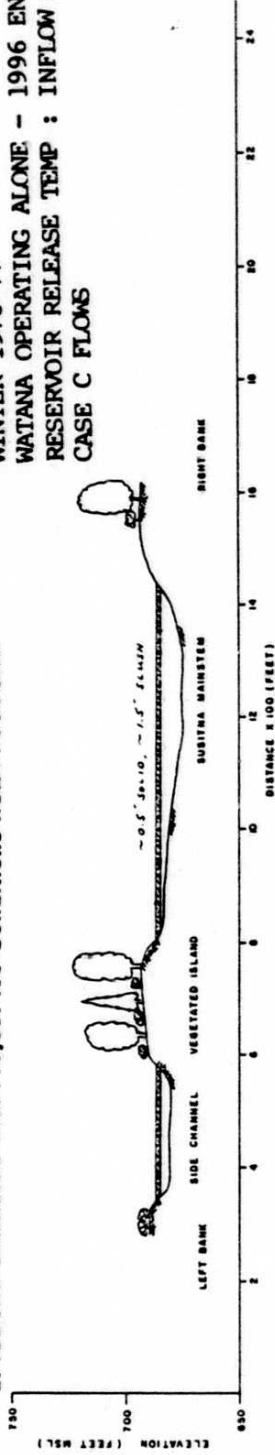


**1. Natural Ice Conditions (1983)**

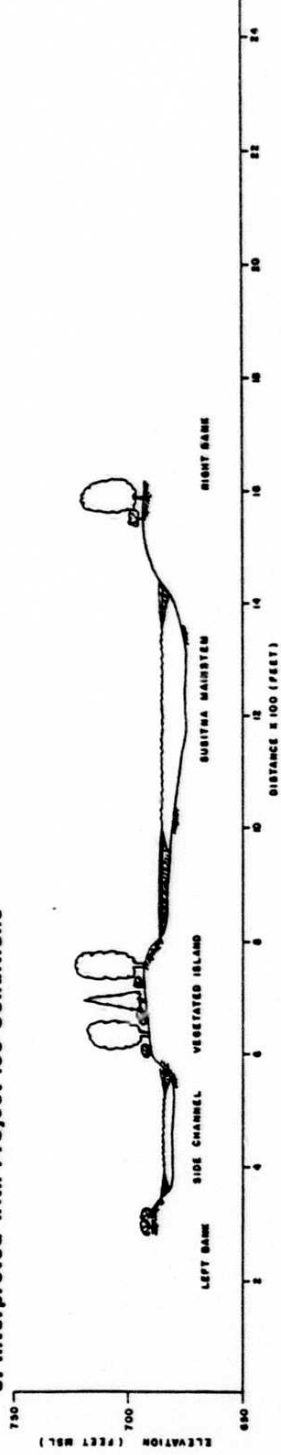


**2. ICECAL Simulated with Project Ice Conditions RUN #7696CNA**

WINTER 1976-77  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



**3. Interpreted with Project Ice Conditions**



PREPARED BY:

**R&M CONSULTANTS, INC.**  
 ENGINEERS, ARCHITECTS, PLANNERS, SURVEYORS

**LRX-44**

1980 CROSS SECTION SURVEY  
 RIVER MILE 136.4  
 VERTICAL EXAGGERATION 4:1

PREPARED FOR:  
**HARZA-EBASCO**  
 SUSITNA JOINT VENTURE

# Exhibit V



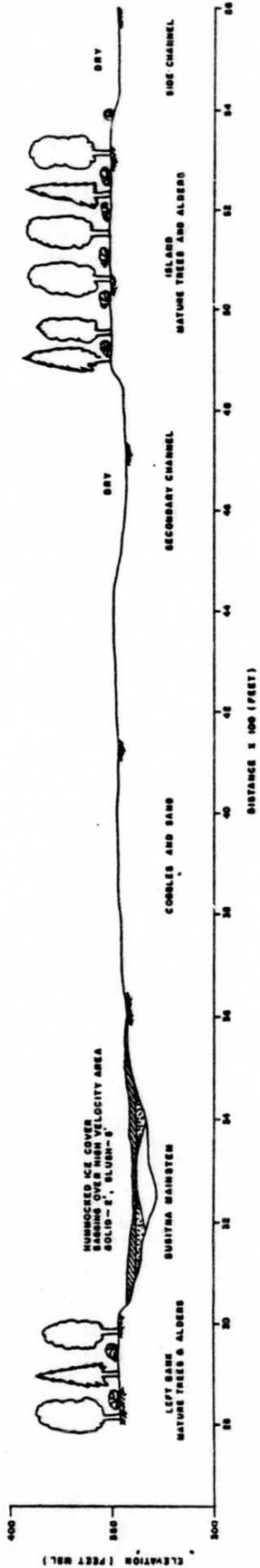
1. Top view (see drawing 100001)

2. Side view (see drawing 100002)

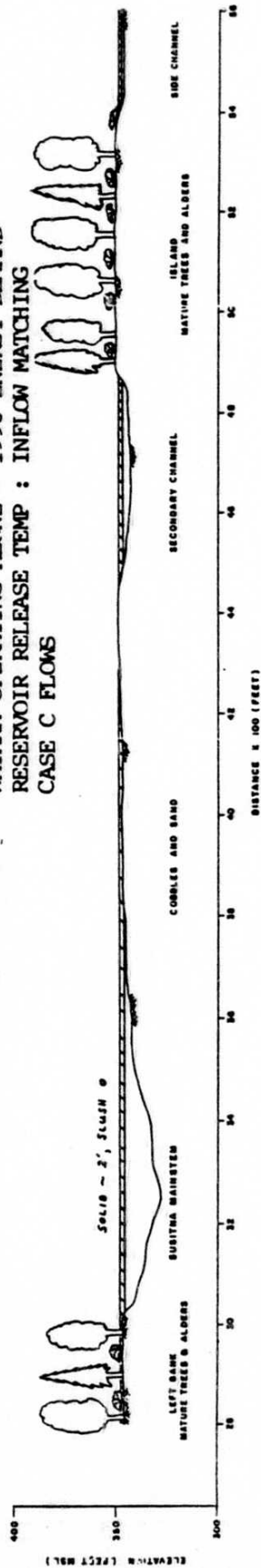
3. Front view (see drawing 100003)

4. Detail view (see drawing 100004)

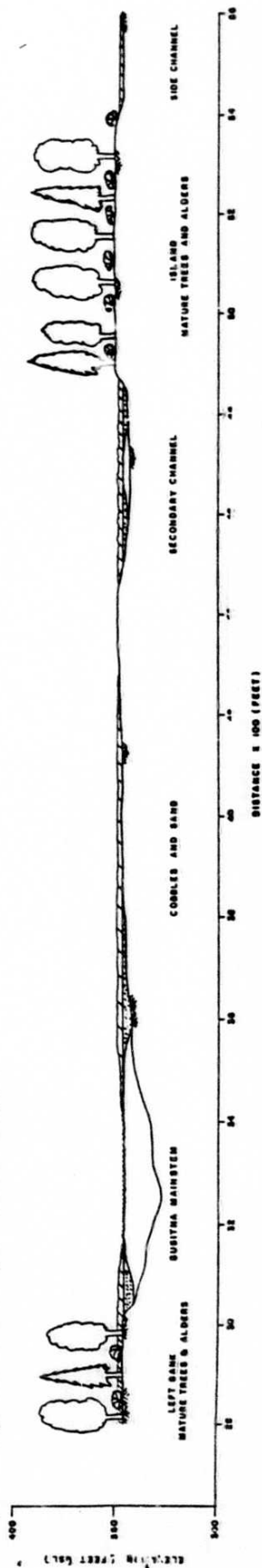
**1. Natural Ice Conditions (1983)**



**2. ICECAL Simulated with Project Ice Conditions RUN #8296CNA  
WINTER 1982-83  
WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
RESERVOIR RELEASE TEMP : INFLOW MATCHING  
CASE C FLOWS**

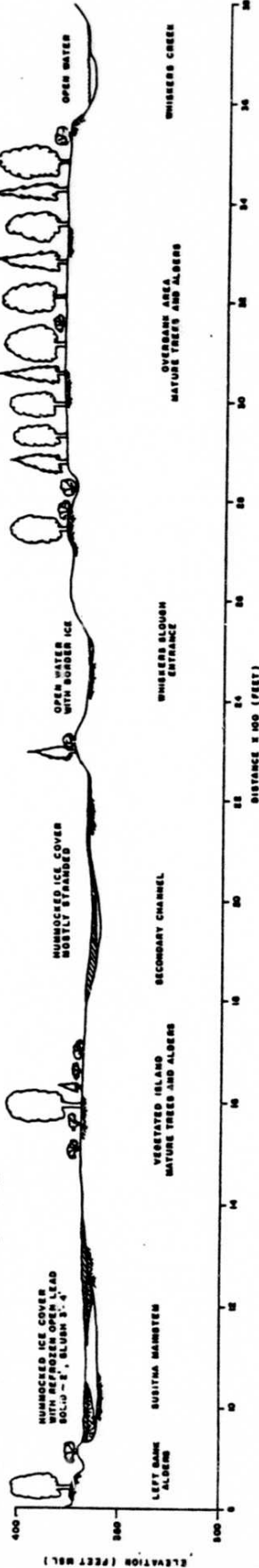


**3. Interpreted with Project Ice Conditions**

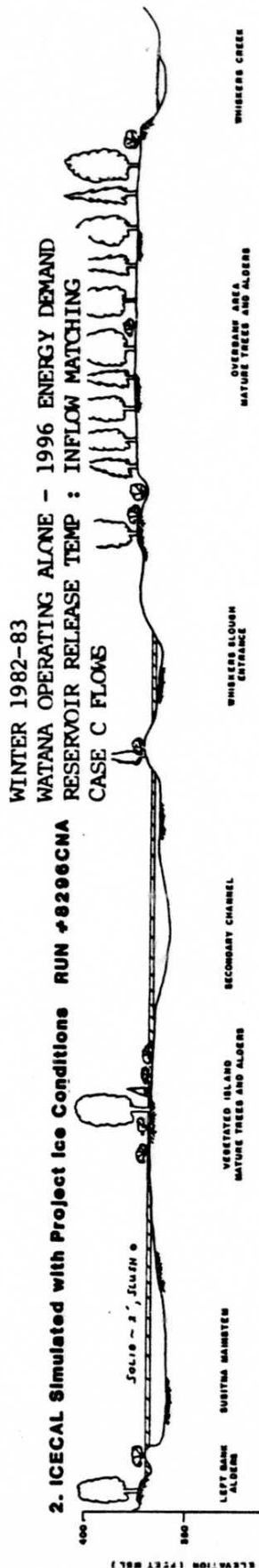




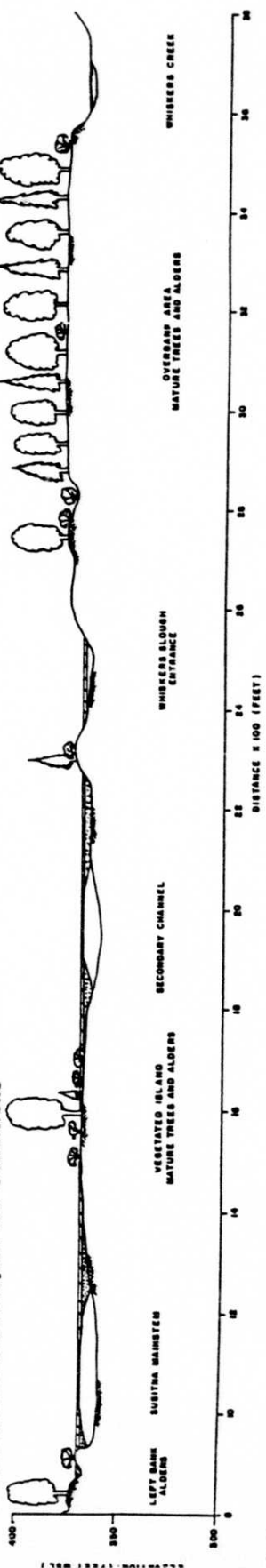
**1. Natural Ice Conditions (1983)**



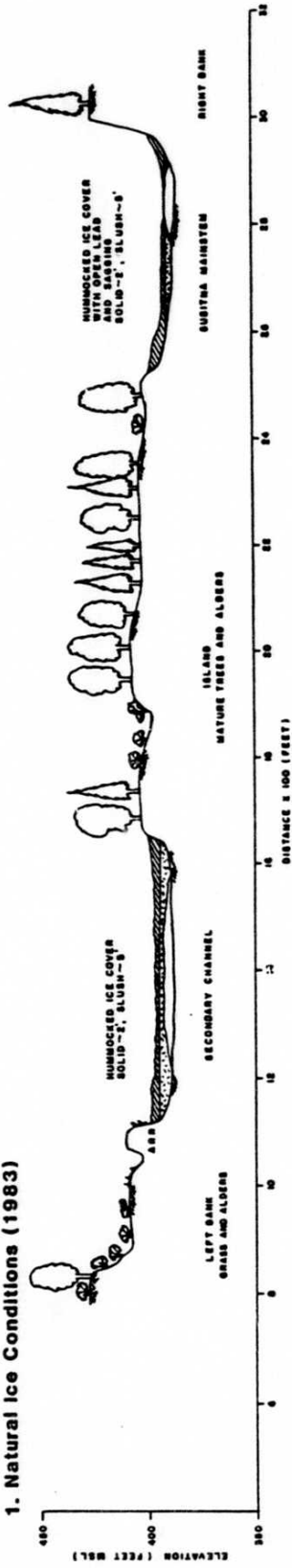
**2. ICECAL Simulated with Project Ice Conditions RUN #8296CNA**  
**WINTER 1982-83**  
**WATANA OPERATING ALONE - 1996 ENERGY DEMAND**  
**RESERVOIR RELEASE TEMP : INFLOW MATCHING**  
**CASE C FLOWS**



**3. Interpreted with Project Ice Conditions**

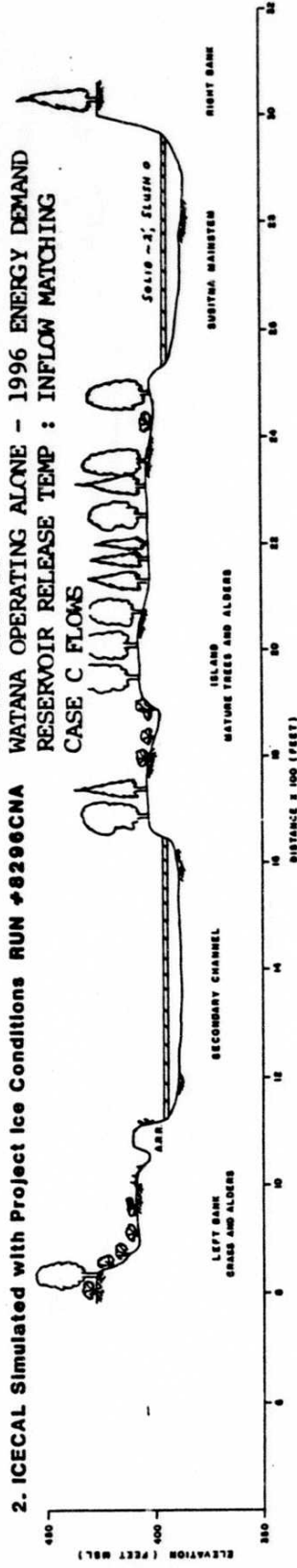


1. Natural Ice Conditions (1983)

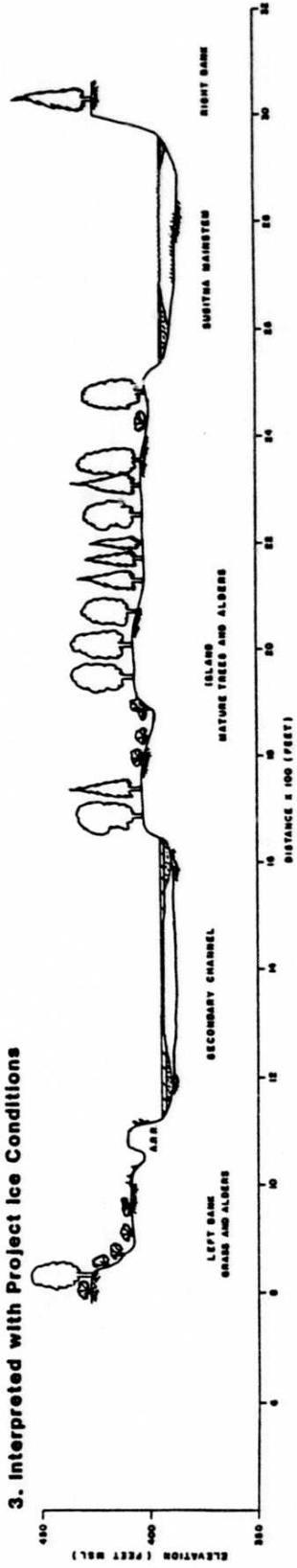


WINTER 1982-83  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

2. ICECAL Simulated with Project Ice Conditions RUN #8296CNA



3. Interpreted with Project Ice Conditions



PREPARED BY:

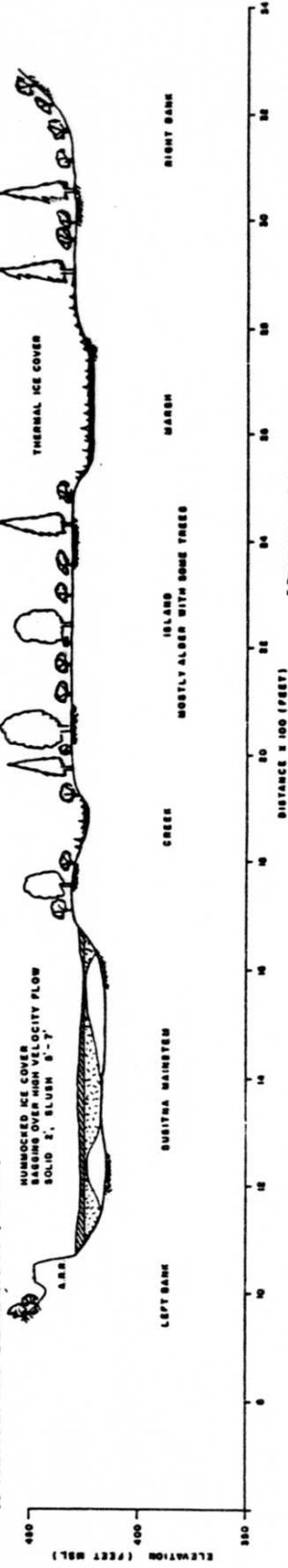
**PSM**  
 R&M CONSULTANTS, INC.  
 CHESTERFIELD, MISSOURI 63005

LRX-10

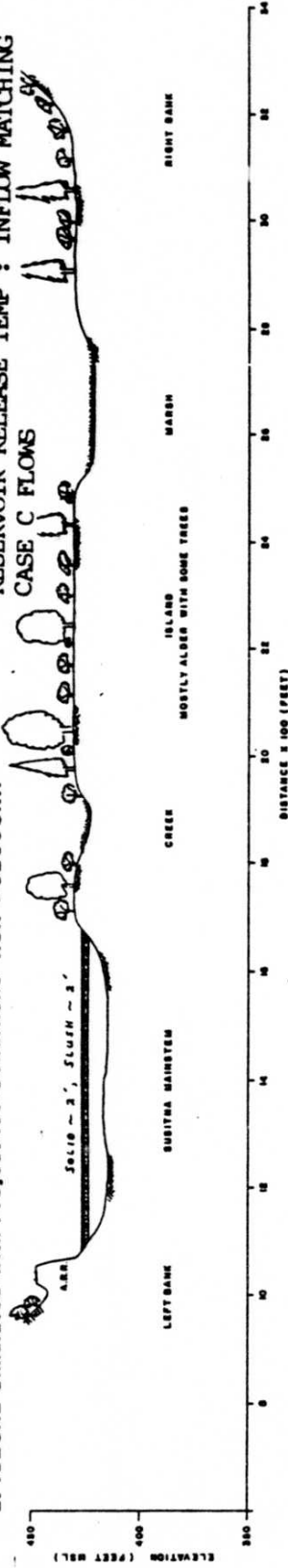
1980 CROSS SECTION SURVEY  
 RIVER MILE 104.8  
 VERTICAL EXAGGERATION 4:1

PREPARED FOR:  
**HARZA-EBASCO**  
 SUSITNA JOINT VENTURE

**1. Natural Ice Conditions (1983)**

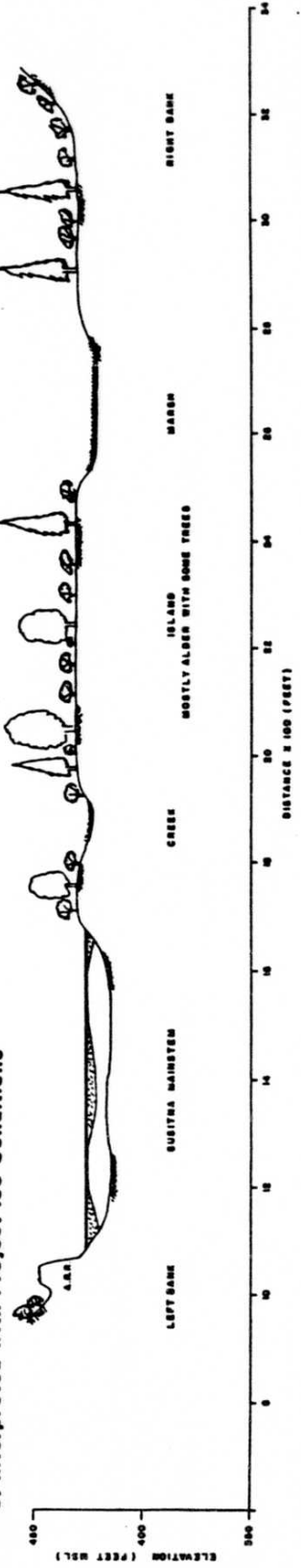


**2. ICECAL Simulated with Project Ice Conditions RUN #8296CNA**



WINTER 1982-83  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

**3. Interpreted with Project Ice Conditions**



PREPARED BY:

**RSM**  
 RSM CONSULTANTS, INC.  
 ENGINEERING, ARCHITECTURE, PLANNING, ENVIRONMENTAL SCIENCE

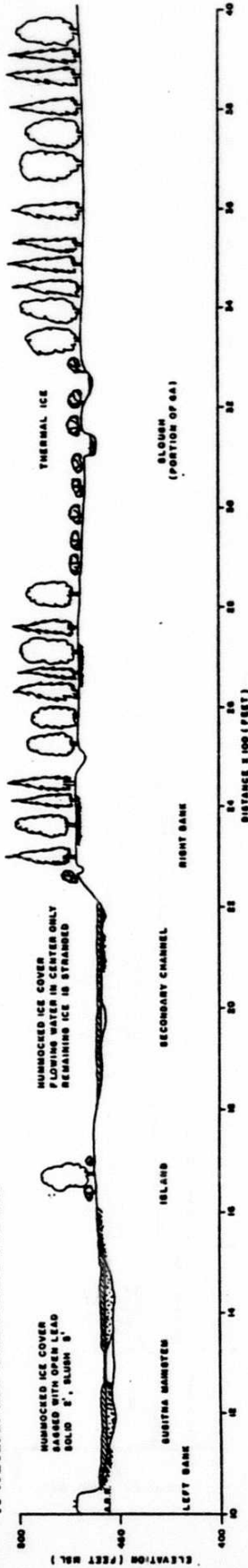
**LRX-12**

1981 CROSS SECTION SURVEY  
 RIVER MILE 108.4  
 VERTICAL EXAGGERATION 4:1

PREPARED FOR:

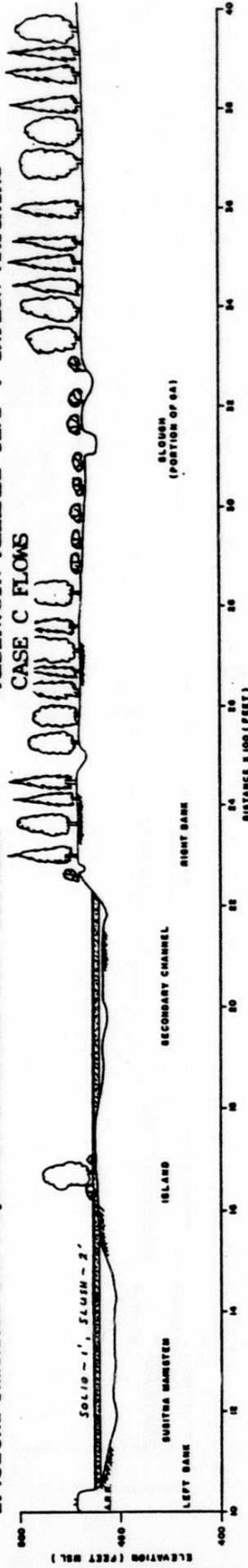
**HARZA-EBASCO**  
 SUSITNA JOINT VENTURE

**1. Natural Ice Conditions (1983)**

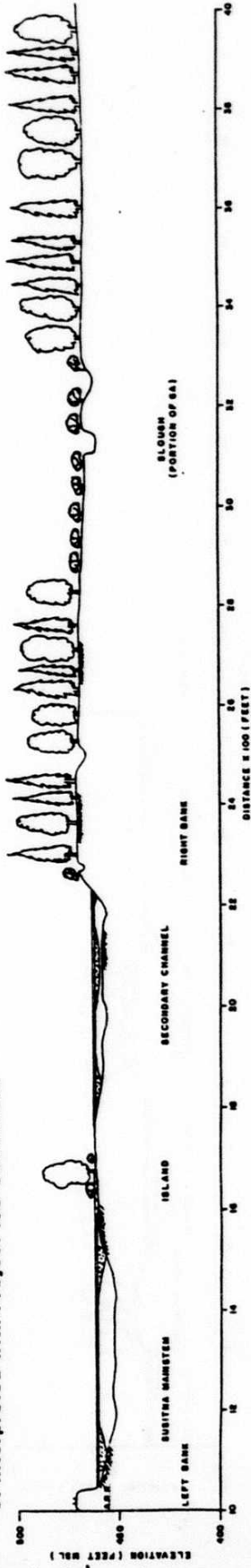


WINTER 1982-83  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING

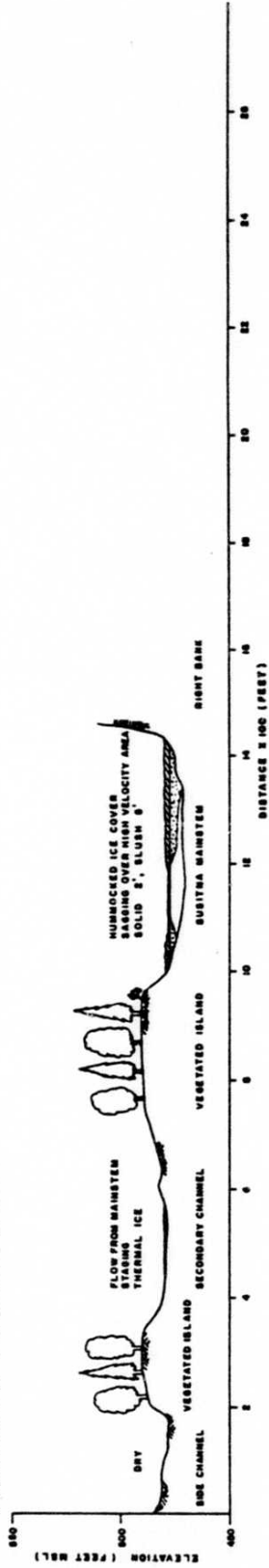
**2. ICECAL Simulated with Project Ice Conditions RUN #9296CNA**



**3. Interpreted with Project Ice Conditions**

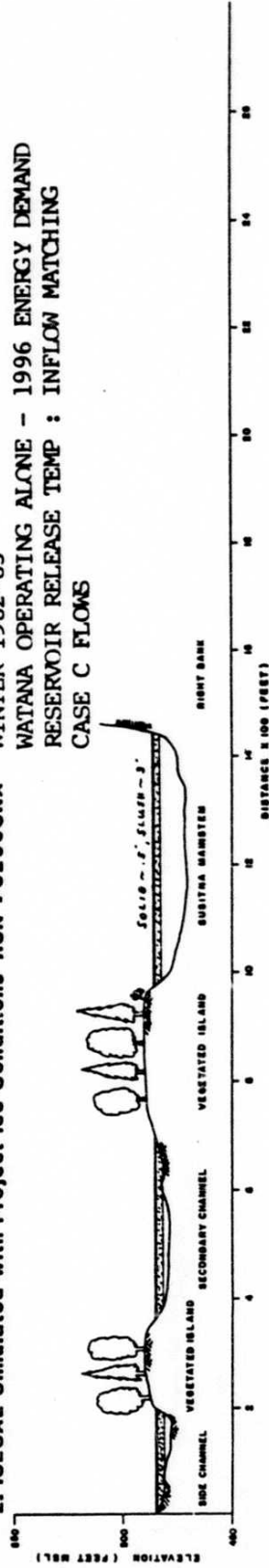


1. Natural Ice Conditions (1983)

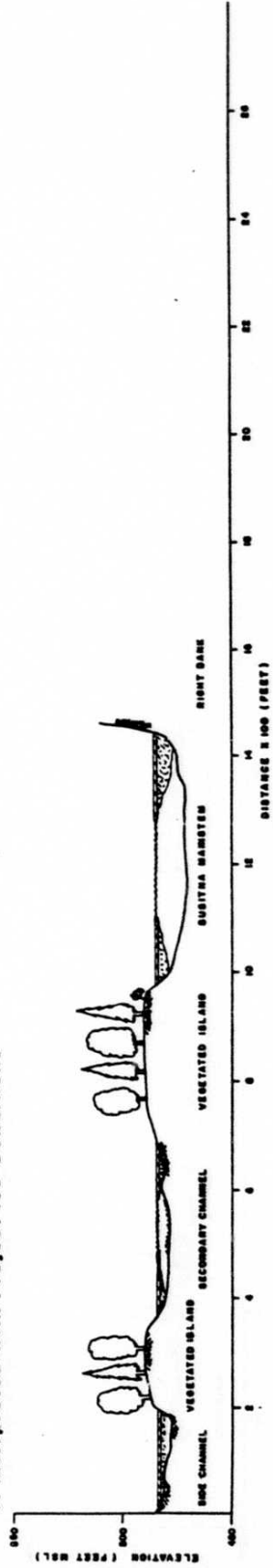


2. ICECAL Simulated with Project Ice Conditions RUN #8296CNA

WINTER 1982-83  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



3. Interpreted with Project Ice Conditions



PREPARED BY:

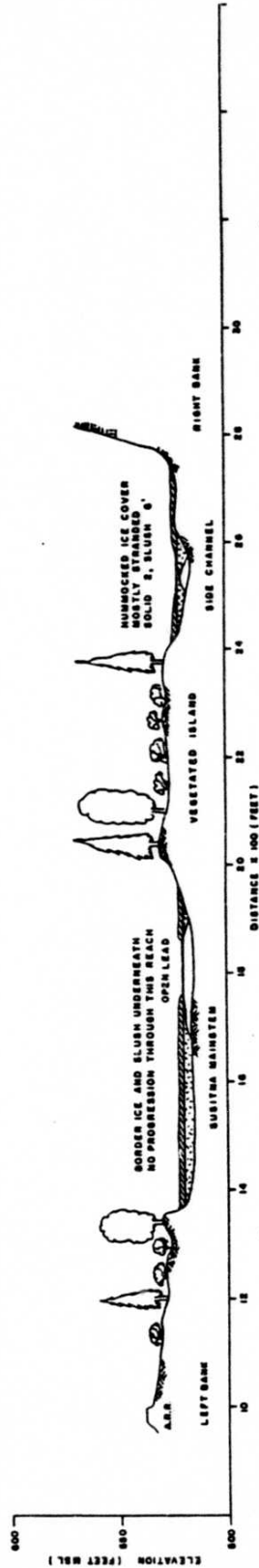
**PSM**  
**R&M CONSULTANTS, INC.**  
 ENGINEERS GEOLOGISTS PLANNERS ENVIRONMENTAL SCIENTISTS

**LRX-18.2**  
 1982 CROSS SECTION SURVEY  
 RIVER MILE 118.1  
 VERTICAL EXAGGERATION 4:1

PREPARED FOR:

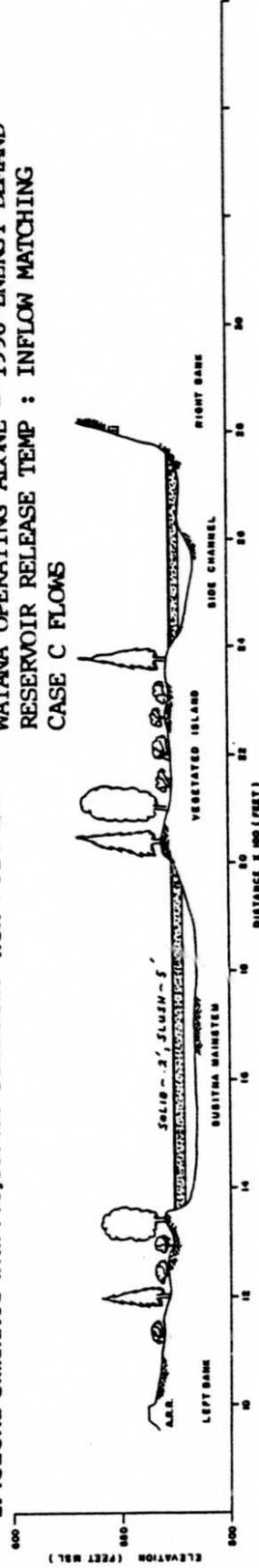
**HARZA-EDASCO**  
 SUSITNA JOINT VENTURE

1. Natural Ice Conditions (1983)

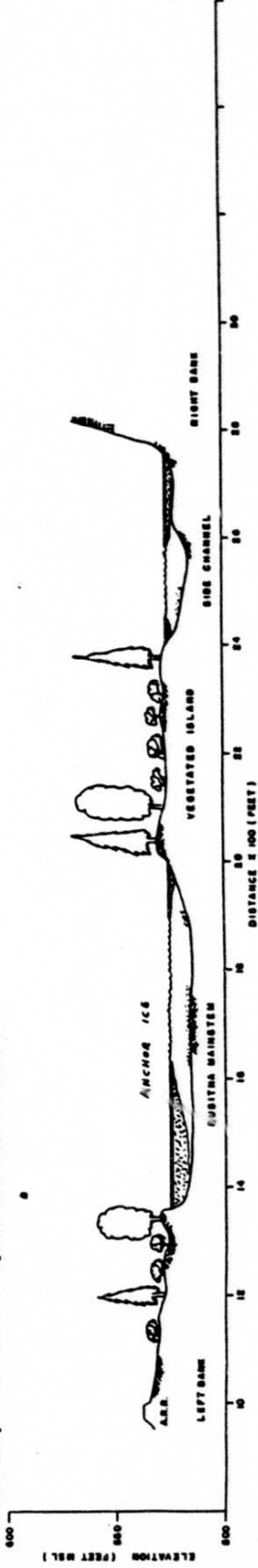


WINTER 1982-83  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

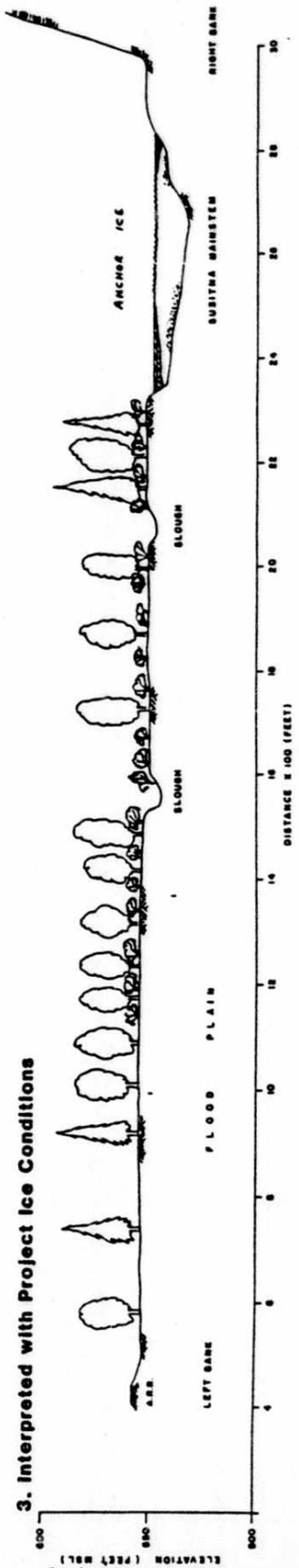
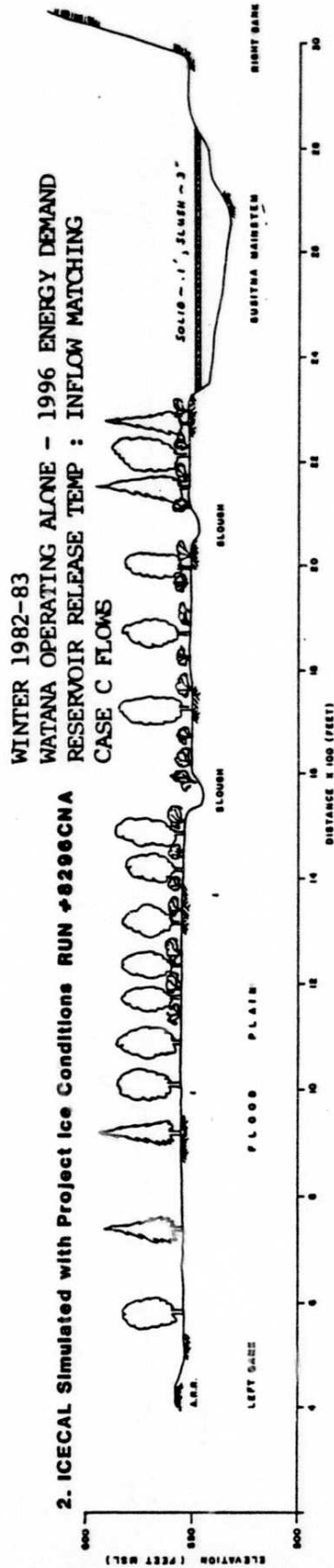
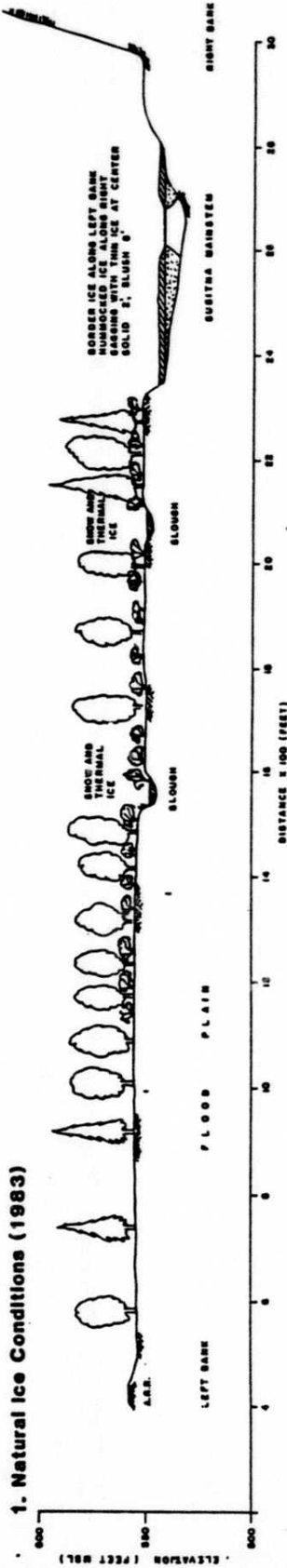
2. ICECAL Simulated with Project Ice Conditions RUN #8296CNA



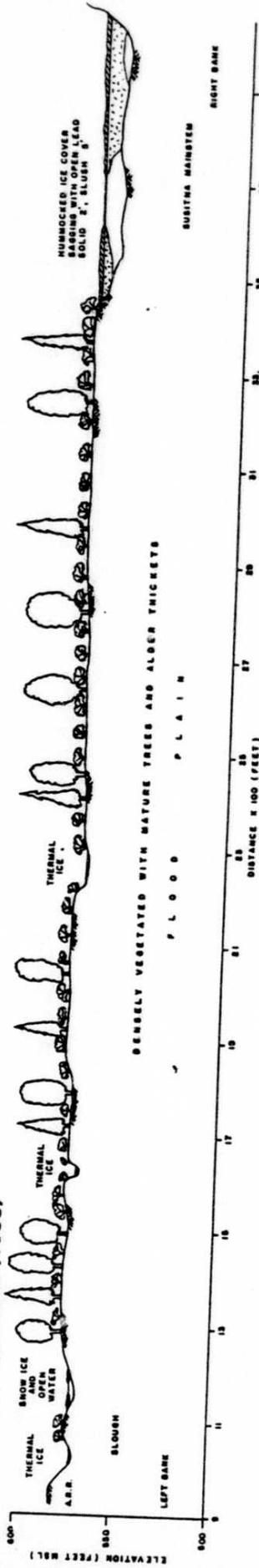
3. Interpreted with Project Ice Conditions





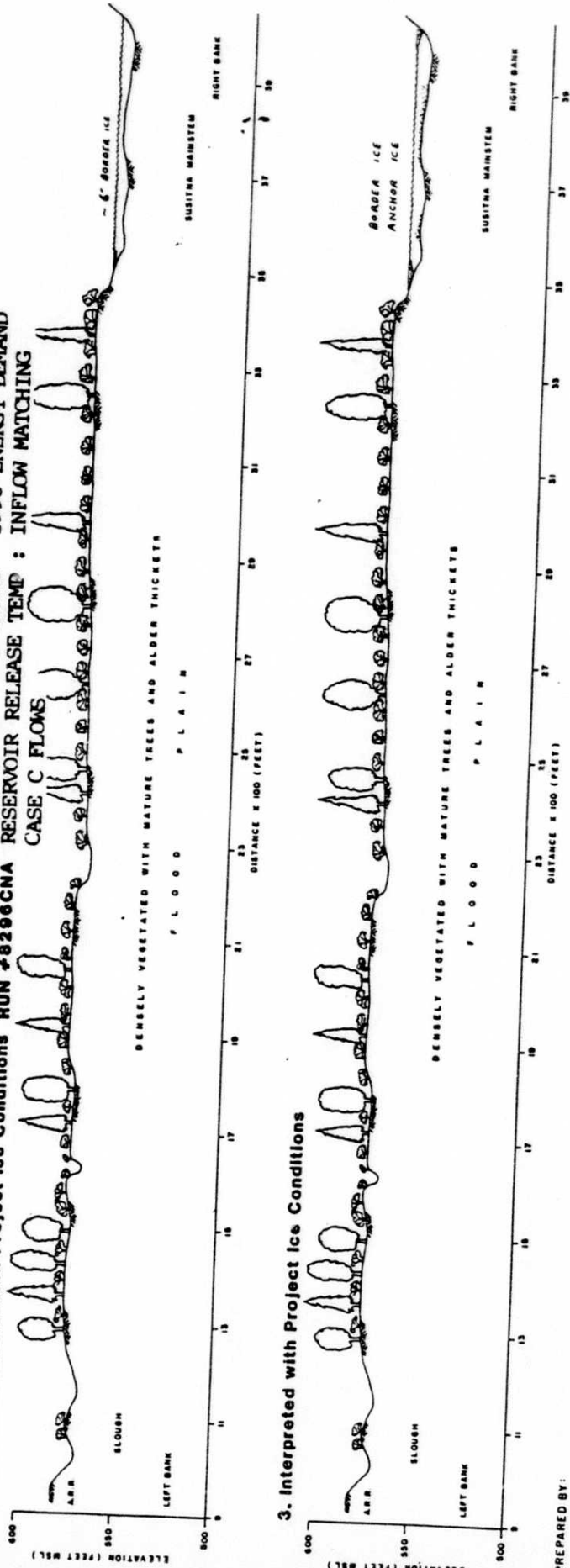


**1. Natural Ice Conditions (1983)**



**2. ICECAL Simulated with Project Ice Conditions RUN #8296CNA**  
**WINTER 1982-83**  
**WATANA OPERATING ALONE - 1996 ENERGY DEMAND**  
**RESERVOIR RELEASE TEMP : INFLOW MATCHING**  
**CASE C FLOWS**

**3. Interpreted with Project Ice Conditions**



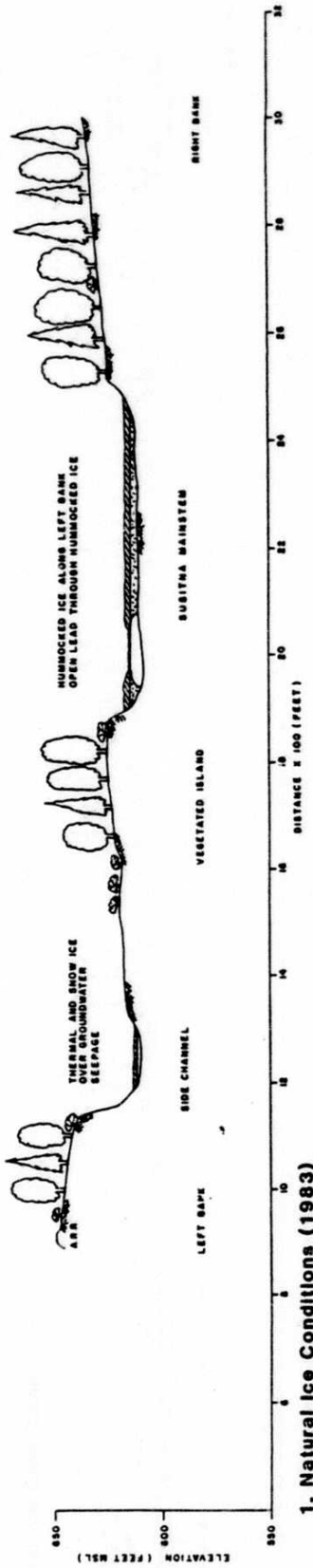
PREPARED BY:

**FCM**  
**FCM CONSULTANTS, INC.**  
 ENGINEERS, ARCHITECTS, PLANNERS, SURVEYORS

**LRX-29**

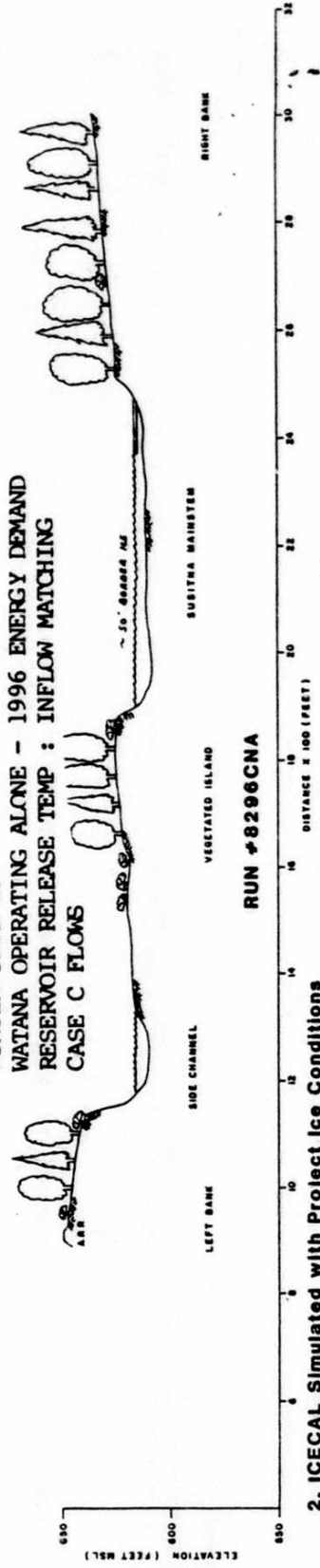
**1980 CROSS SECTION SURVEY**  
**RIVER MILE 126.1**  
**VERTICAL EXAGGERATION 4:1**

PREPARED FOR:  
**HARZA-EBASCO**  
 SUSITNA JOINT VENTURE

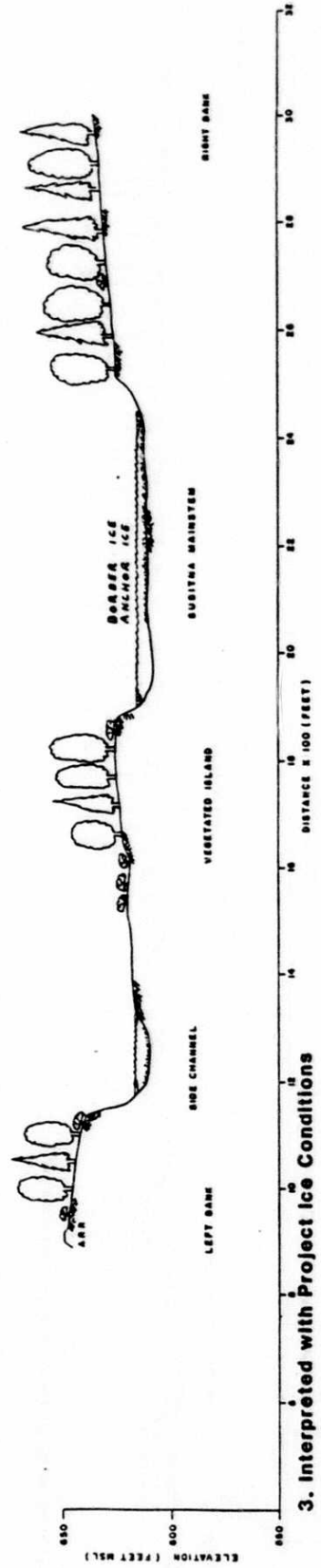


1. Natural Ice Conditions (1983)

WINTER 1982-83  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

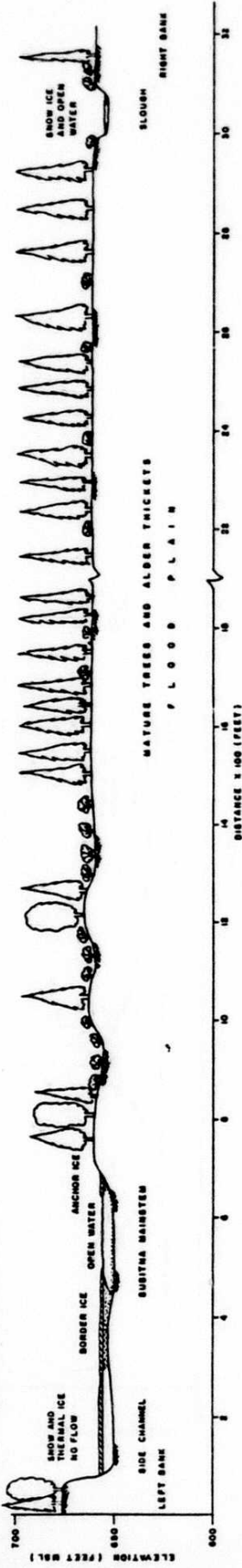


2. ICECAL Simulated with Project Ice Conditions



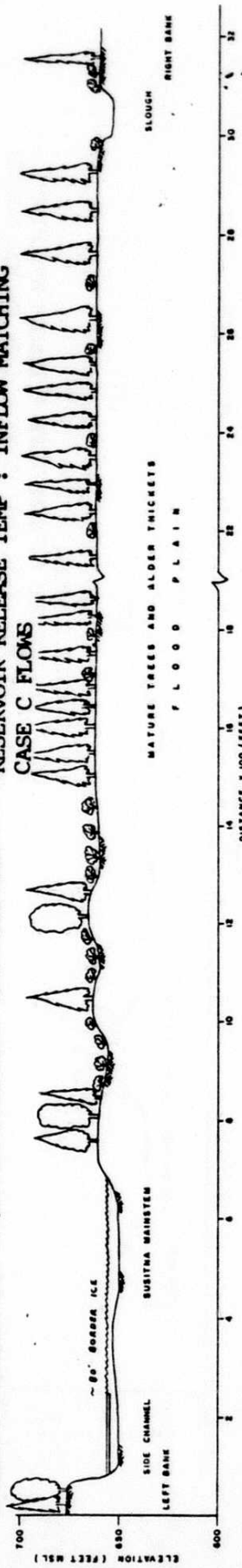
3. Interpreted with Project Ice Conditions

**1. Natural Ice Conditions (1983)**

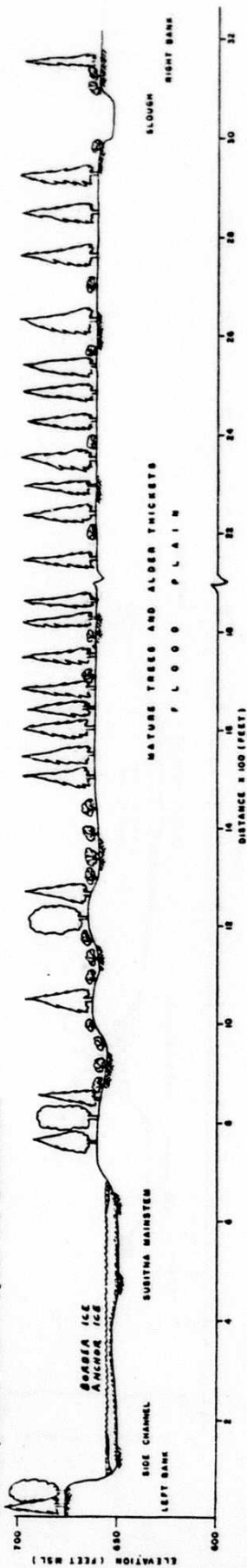


WINTER 1982-83  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

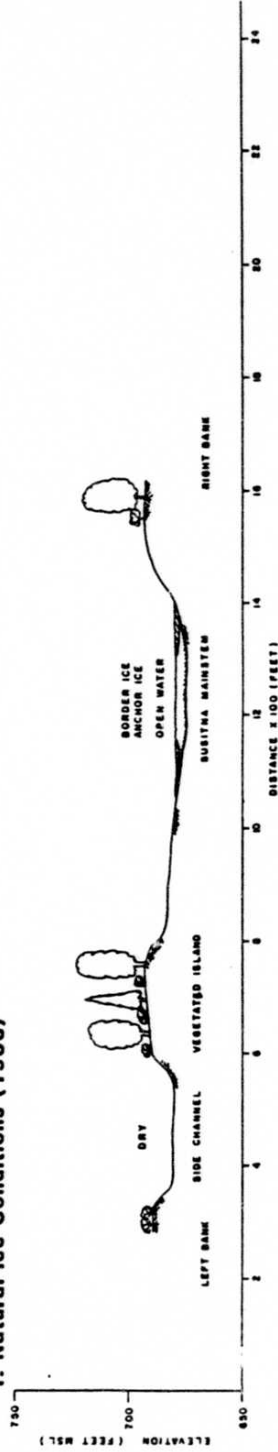
**2. ICECAL Simulated with Project Ice Conditions RUN #8296CNA**



**3. Interpreted with Project Ice Conditions**

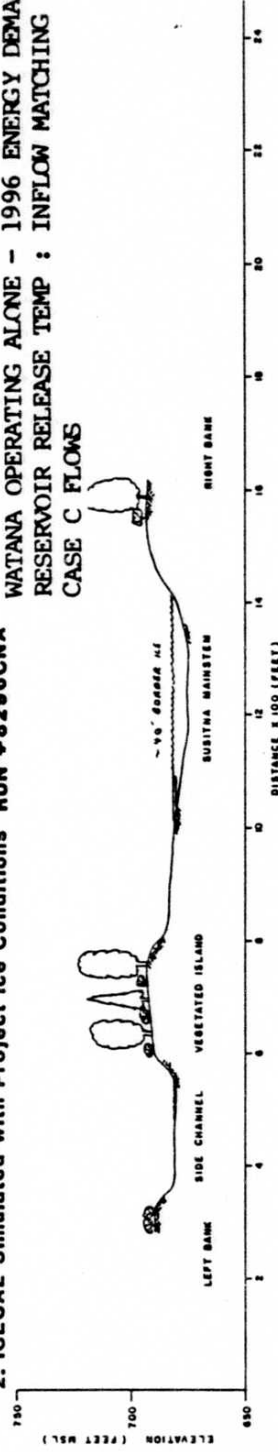


**1. Natural Ice Conditions (1983)**

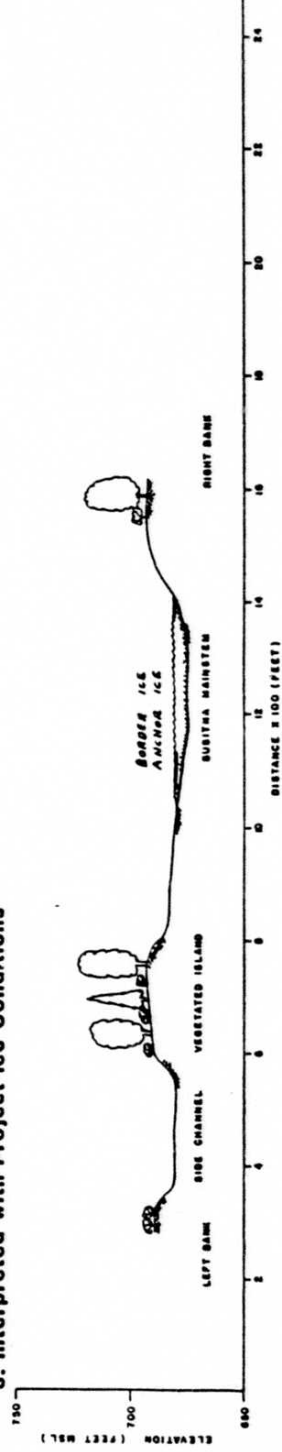


**2. ICECAL Simulated with Project Ice Conditions RUN #8296CNA**

WINTER 1982-83  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



**3. Interpreted with Project Ice Conditions**



PREPARED BY:

**PCM**  
**R&M CONSULTANTS, INC.**  
 FEDERAL GOVERNMENT CONTRACTORS

1980 CROSS SECTION SURVEY  
 RIVER MILE 136.4  
 VERTICAL EXAGGERATION 4:1

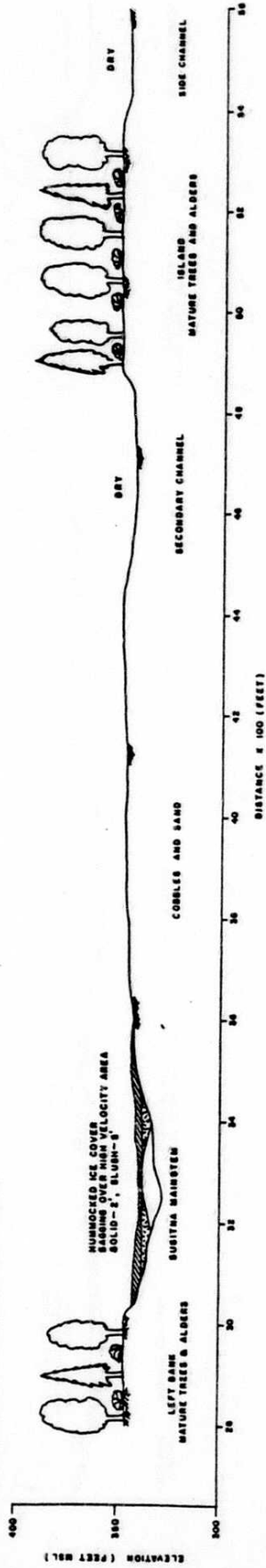
**LRX-44**

PREPARED FOR:  
**HARZA-EBASCO**  
 SUSITNA JOINT VENTURE

Exhibit W

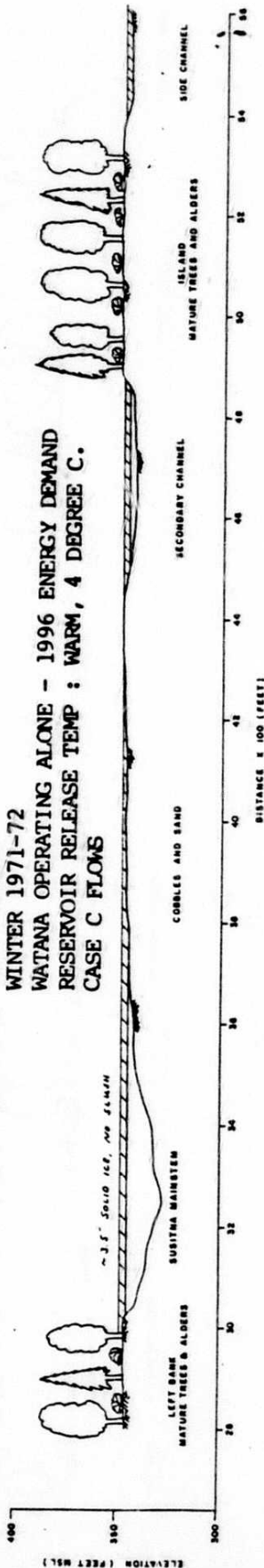


1. Natural Ice Conditions (1983)

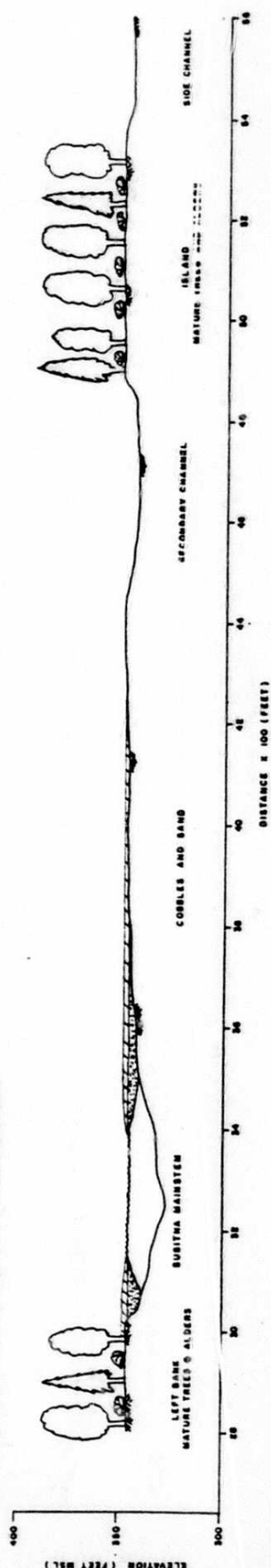


2. ICECAL Simulated with Project Ice Conditions RUN#7196C4A

WINTER 1971-72  
WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
RESERVOIR RELEASE TEMP : WARM, 4 DEGREE C.  
CASE C FLOWS



3. Interpreted with Project Ice Conditions



PREPARED BY:

**RSM CONSULTANTS, INC.**  
ENGINEERS, ARCHITECTS, PLANNERS, SCIENTISTS

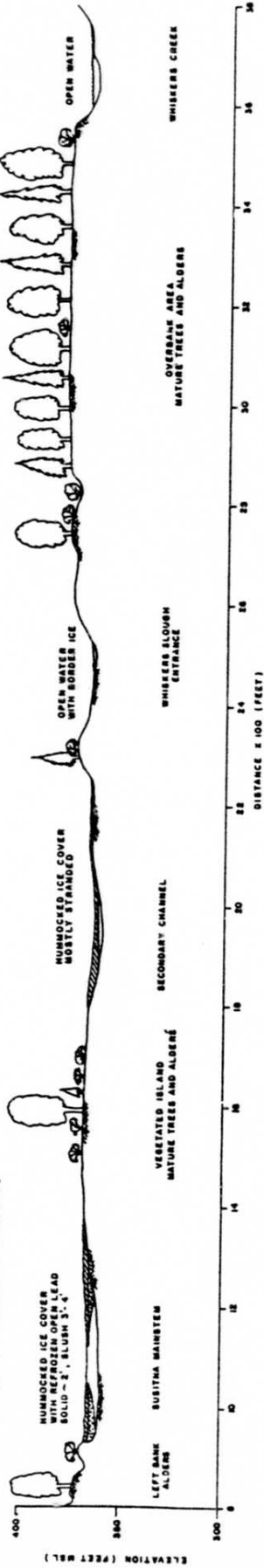
**LRX-3**

1982 CROSS SECTION SURVEY  
RIVER MILE 98.6  
VERTICAL EXAGGERATION 4-1

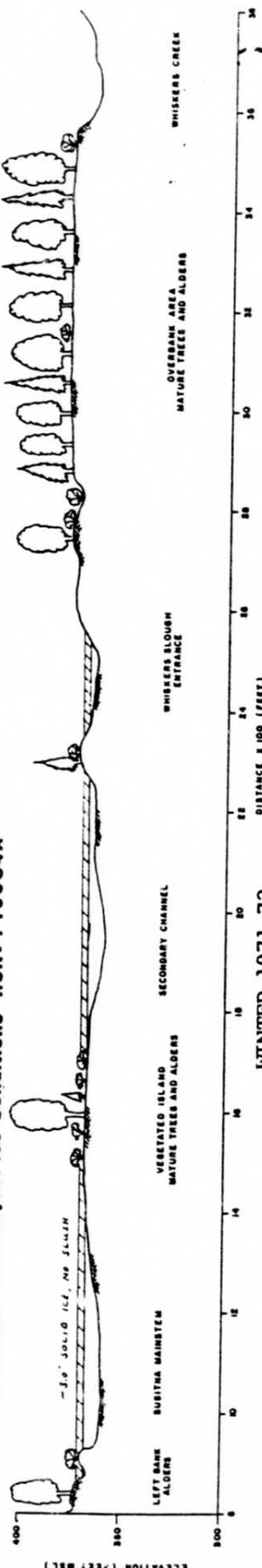
PREPARED FOR:

**HARZA-ELASCO**  
SUSITNA JOINT VENTURE

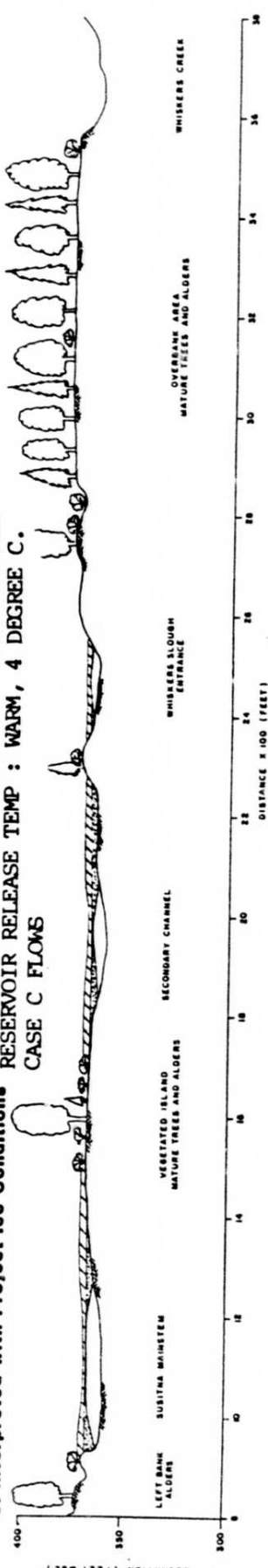
**1. Natural Ice Conditions (1983)**



**2. ICECAL Simulated with Project Ice Conditions RUN #7196C4A**



**3. Interpreted with Project Ice Conditions**  
 WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : WARM, 4 DEGREE C.  
 CASE C FLOWS



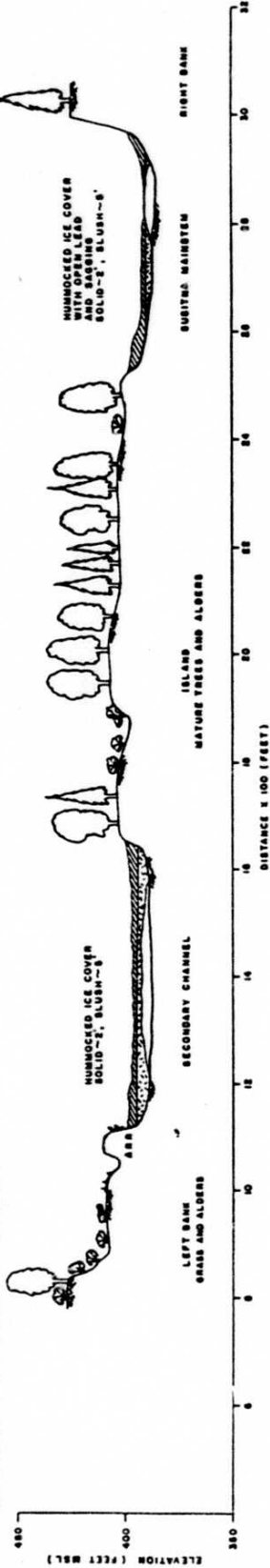
PREPARED BY:

  
**REM CONSULTANTS, INC.**  
 ENGINEERS, ARCHITECTS, PLANNERS, ENVIRONMENTALISTS

**LRX-7**

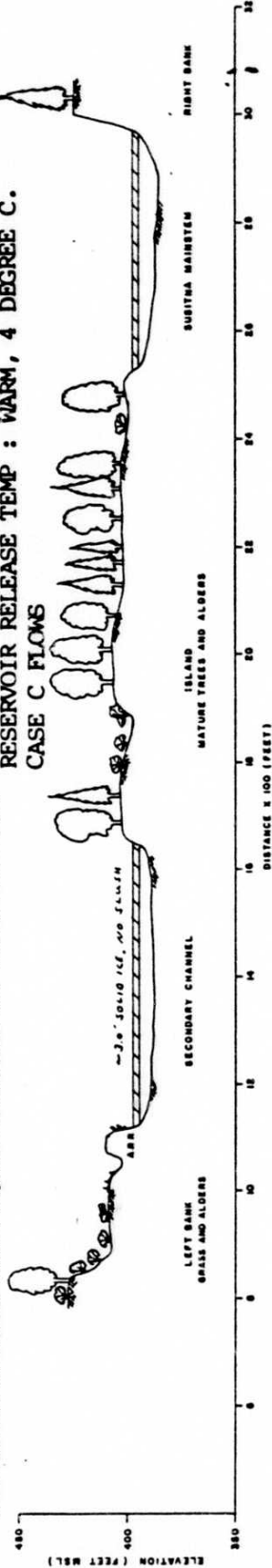
PREPARED FOR:  
**HARZA-EBASCO**  
 SUSITNA JOINT VENTURE  
 1980 CROSS SECTION SURVEY  
 RIVER MILE 101.5  
 VERTICAL EXAGGERATION 4:1

1. Natural Ice Conditions (1983)

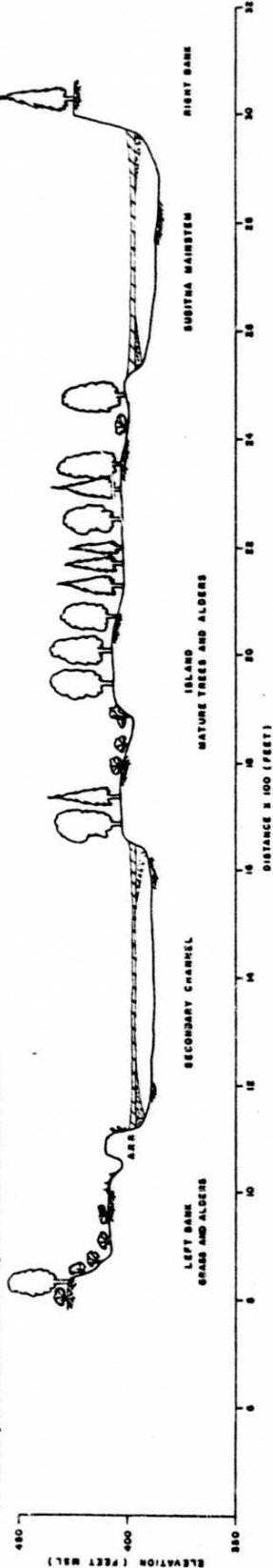


WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : WARM, 4 DEGREE C.  
 CASE C FLOWS

2. ICECAL Simulated with Project Ice Conditions RUN #7196C4A



3. Interpreted with Project Ice Conditions



PREPARED BY:

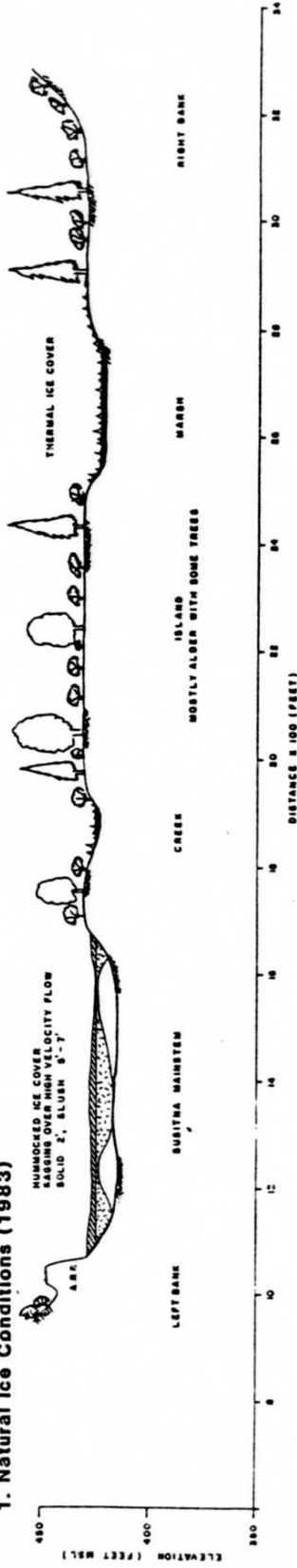
**FGM**  
**RGM CONSULTANTS, INC.**  
 ENGINEERS, GEOLOGISTS, PLANNERS, SURVEYORS

**LRX-10**

1980 CROSS SECTION SURVEY  
 RIVER MILE 104.8  
 VERTICAL EXAGGERATION 4:1

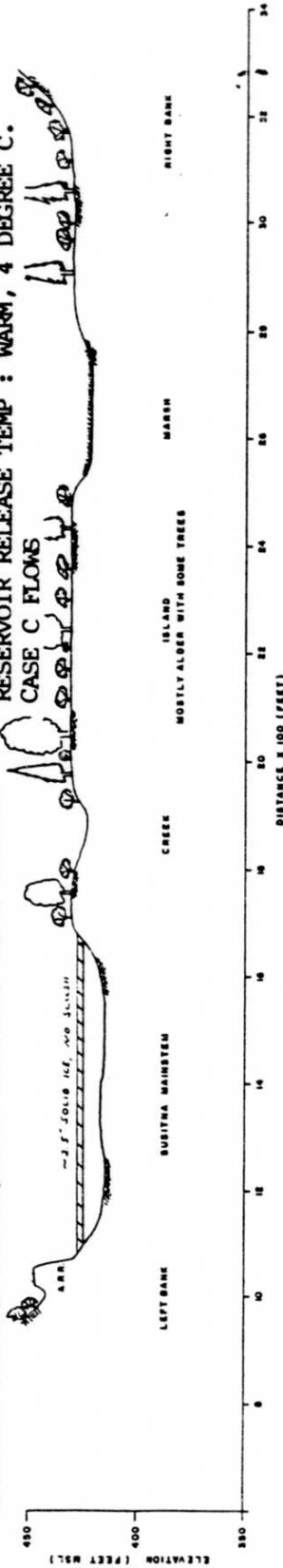
PREPARED FOR:  
**HARZA-EBASCO**  
 SUSITNA JOINT VENTURE

1. Natural Ice Conditions (1983)

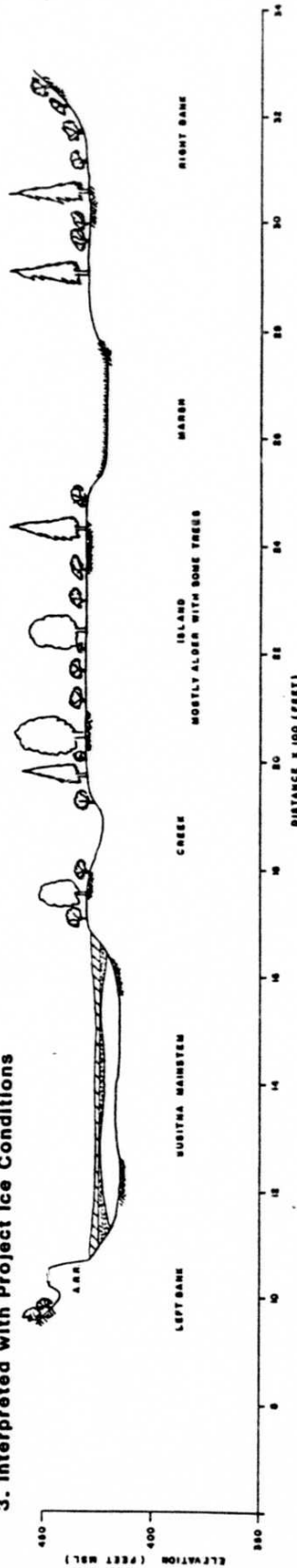


2. ICECAL Simulated with Project Ice Conditions RUN#7196C4A

WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : WARM, 4 DEGREE C.  
 CASE C FLOWS



3. Interpreted with Project Ice Conditions



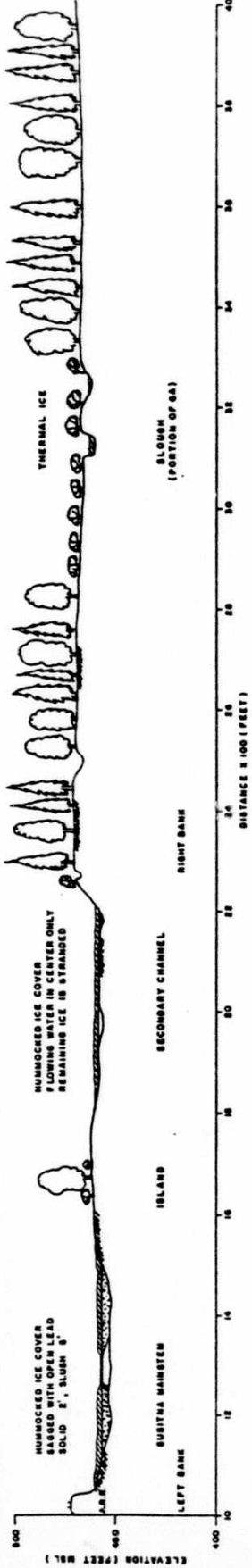
PREPARED BY:



1981 CROSS SECTION SURVEY  
 RIVER MILE 108.4  
 VERTICAL EXAGGERATION 4:1

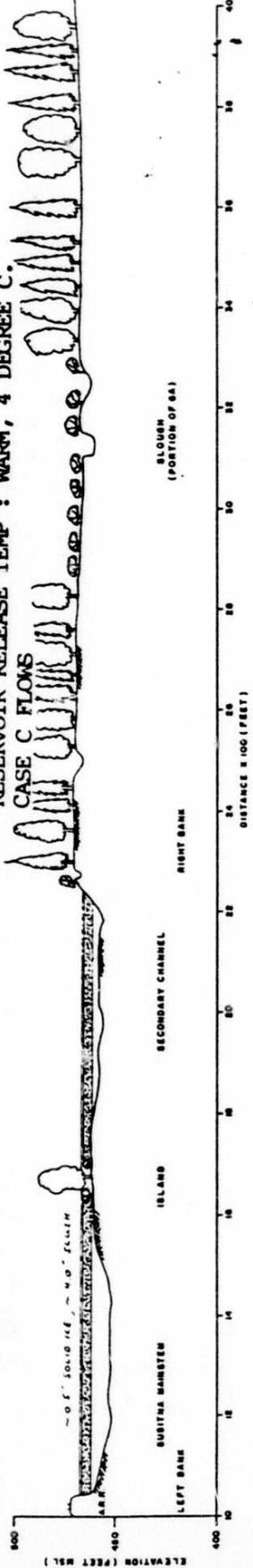
PREPARED FOR:  
**HARZA-EBASCO**  
 SOUTHERN JOINT VENTURE

**1. Natural Ice Conditions (1983)**

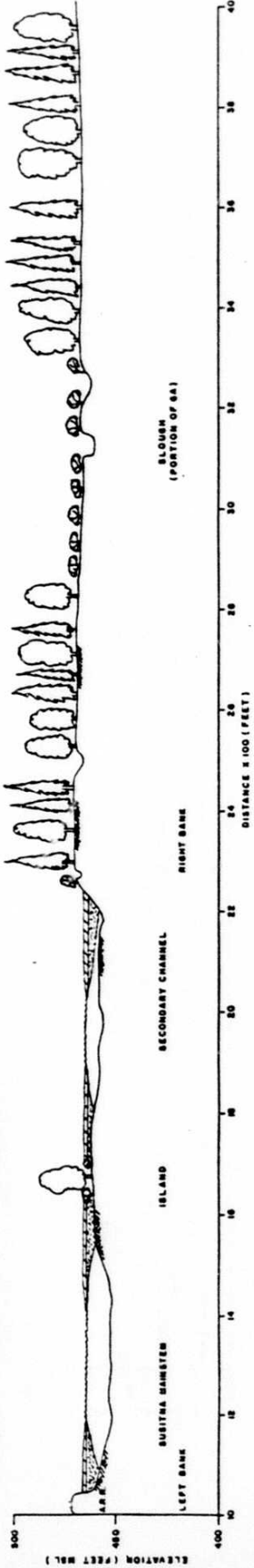


WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : WARM, 4 DEGREE C.

**2. ICECAL Simulated with Project Ice Conditions RUN#7196C4A**

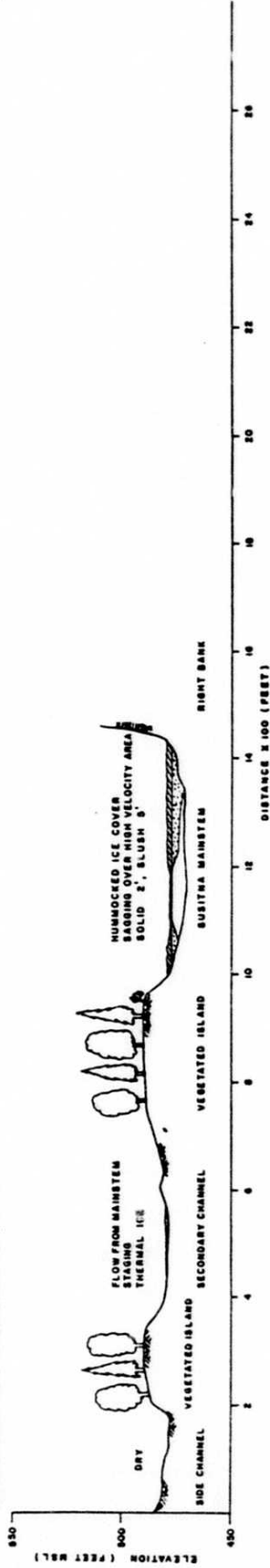


**3. Interpreted with Project Ice Conditions**



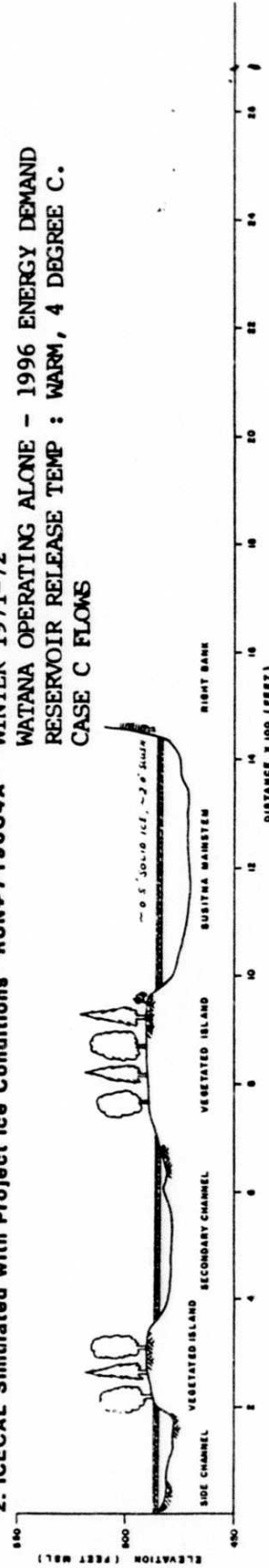
11-11-83 10:30 AM 11-11-83 10:30 AM 11-11-83 10:30 AM 11-11-83 10:30 AM 11-11-83 10:30 AM

1. Natural Ice Conditions (1983)

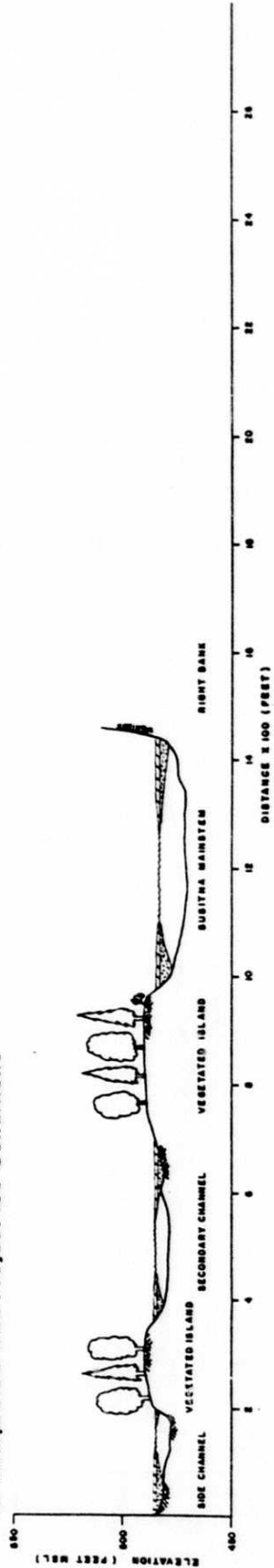


2. ICECAL Simulated with Project Ice Conditions RUN#7196C4A

WINTER 1971-72  
WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
RESERVOIR RELEASE TEMP : WARM, 4 DEGREE C.  
CASE C FLOWS



3. Interpreted with Project Ice Conditions



PREPARED BY:

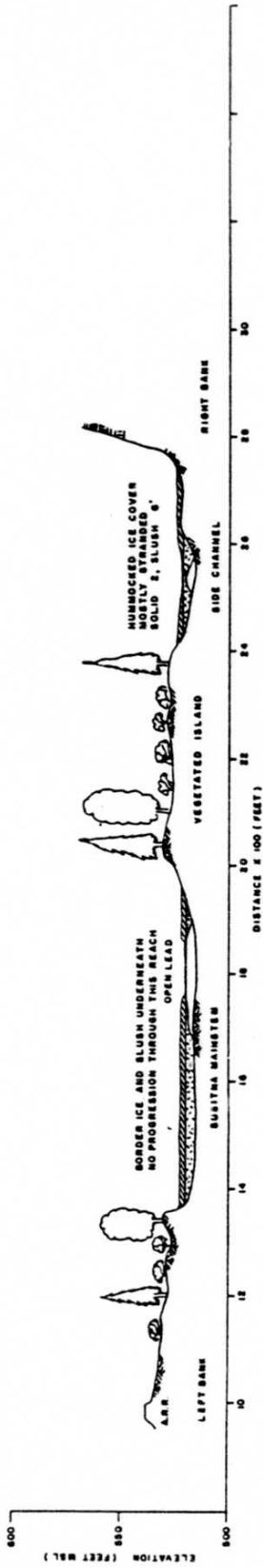
PCM  
R&M CONSULTANTS, INC.  
ENGINEERING SURVEYING PLANNING

LRX-18.2  
1982 CROSS SECTION SURVEY  
RIVER MILE 115.1  
VERTICAL EXAGGERATION 4:1

PREPARED FOR:  
MARZA-EBASCO  
SUSITNA JOINT VENTURE

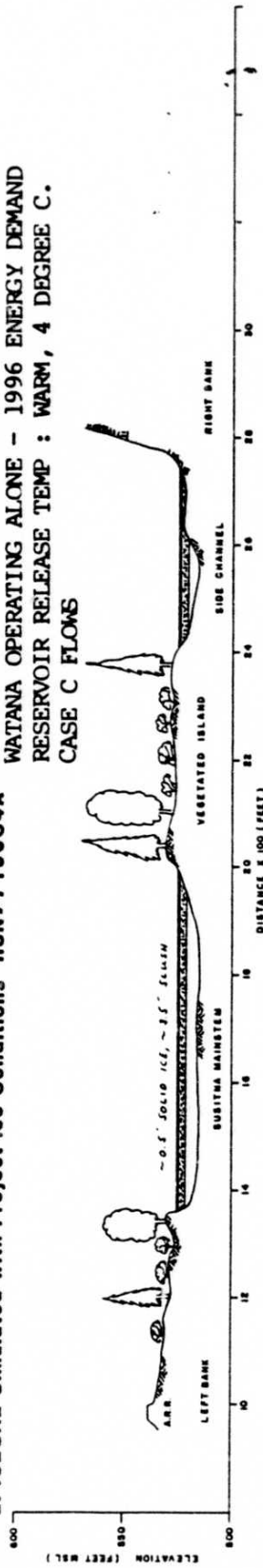


1. Natural Ice Conditions (1983)

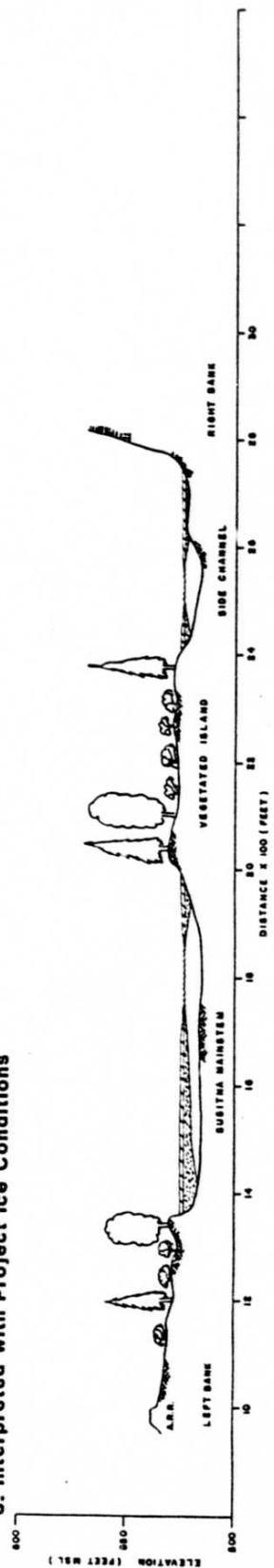


2. ICECAL Simulated with Project Ice Conditions RUN#7196C4A

WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : WARM, 4 DEGREE C.  
 CASE C FLOWS



3. Interpreted with Project Ice Conditions



PREPARED BY:

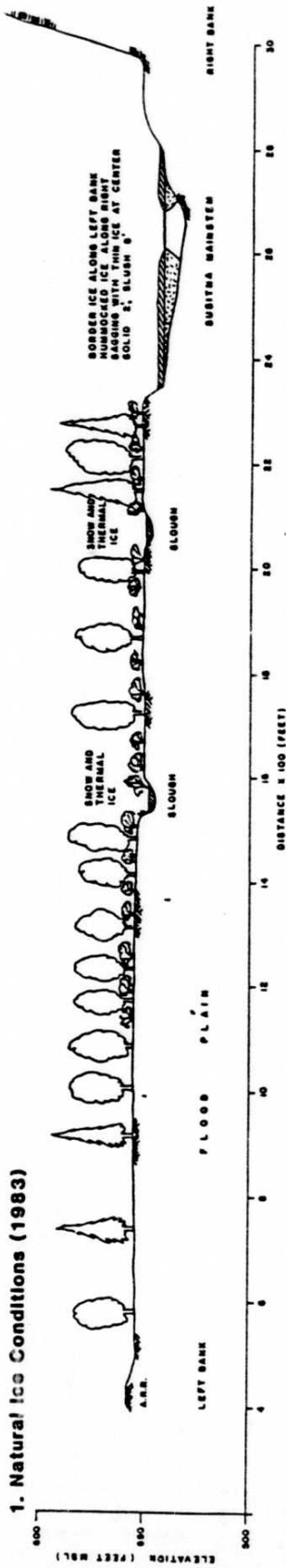
**R&M CONSULTANTS, INC.**  
 ENGINEERS, ARCHITECTS, PLANNERS, SURVEYORS

**LRX-23**

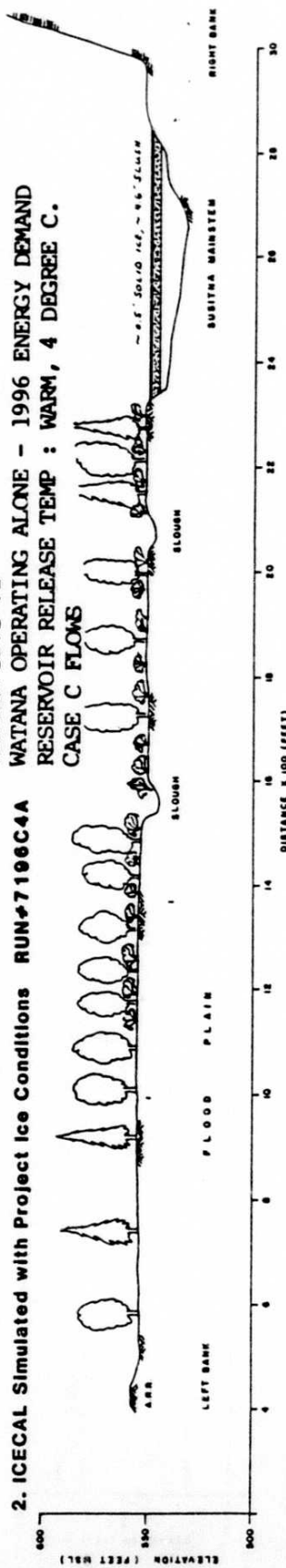
1980 CROSS SECTION SURVEY  
 RIVER MILE 120.2  
 VERTICAL EXAGGERATION 4:1

PREPARED FOR:  
**HARZA-EBAY**  
 SUSITNA JOINT VENT

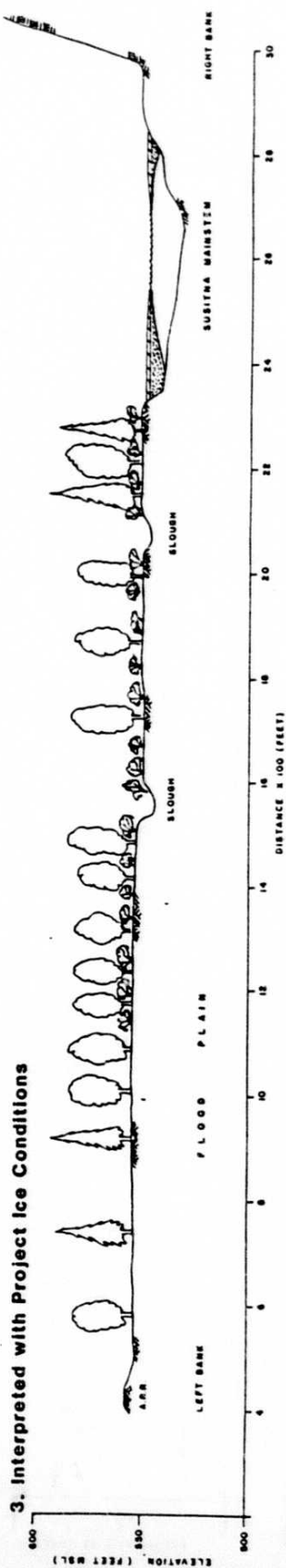
1. Natural Ice Conditions (1983)



2. ICECAL Simulated with Project Ice Conditions RUN#7196C4A  
 WINTER 1971-72  
 WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : WARM, 4 DEGREE C.  
 CASE C FLOWS



3. Interpreted with Project Ice Conditions



PREPARED BY:

**R&M CONSULTANTS, INC.**  
 1000 WEST 10TH AVENUE, SUITE 100  
 DENVER, COLORADO 80202

1980 CROSS SECTION SURVEY  
 RIVER MILE 123.3  
 VERTICAL EXAGGERATION 4:1

**LRX -27**

PREPARED FOR:

**HARZA-EBASCO**  
 SUSTAINA JOINT VENTURE

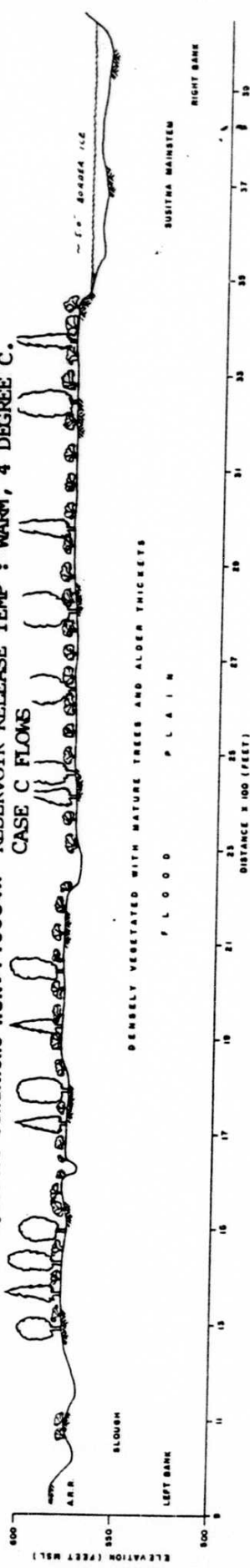
**1. Natural Ice Conditions (1983)**



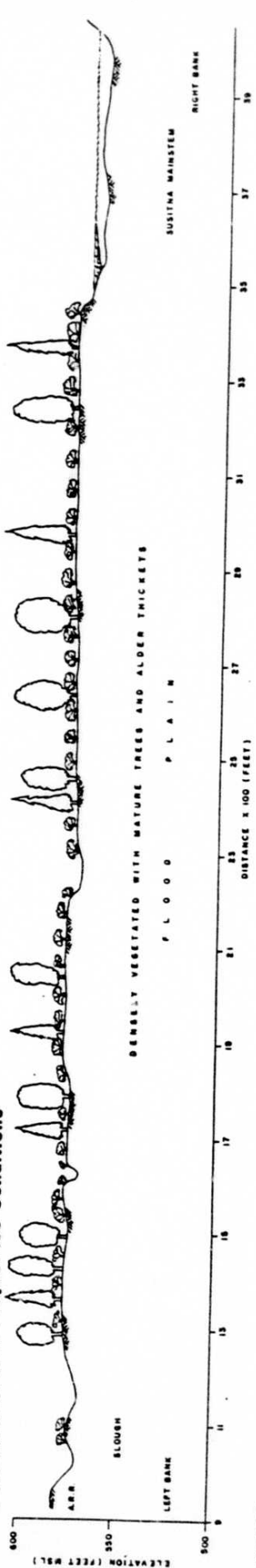
**WINTER 1971-72**

WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
RESERVOIR RELEASE TEMP : WARM, 4 DEGREE C.  
CASE C FLOWS

**2. ICECAL Simulated with Project Ice Conditions RUN#7196C4A**



**3. Interpreted with Project ice Conditions**

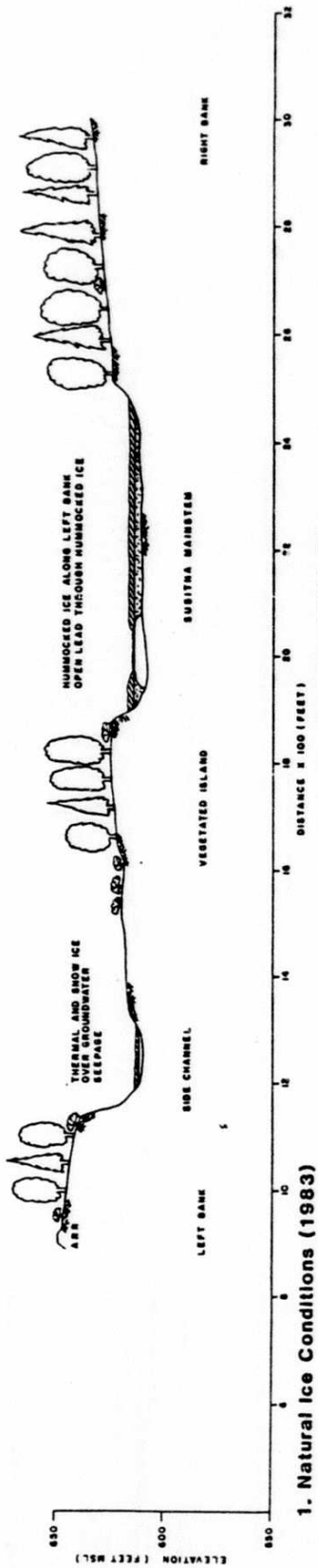


PREPARED BY:

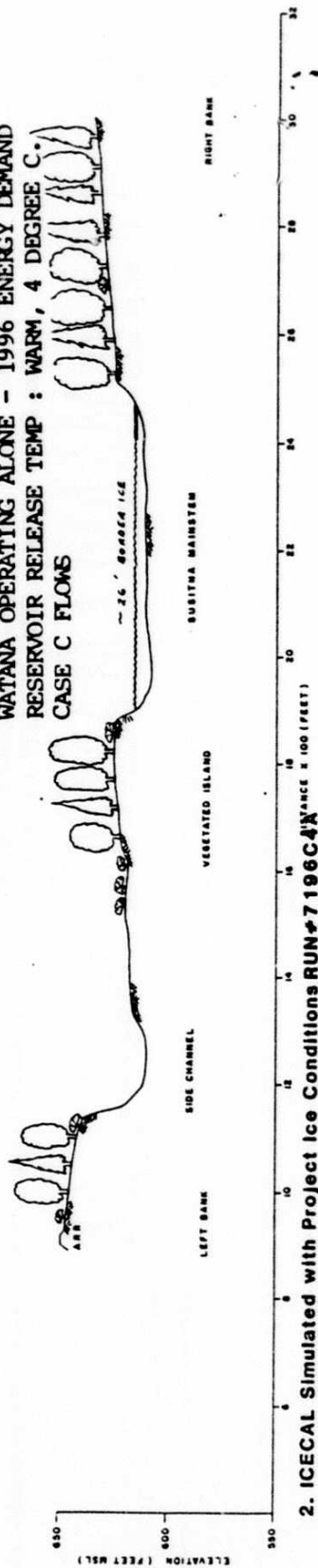
**ERM**  
R.M.I. CONSULTANTS, INC.  
PLANNING CONSULTANTS IN ENGINEERING

**LRX-29**  
1980 CROSS SECTION SURVEY  
RIVER MILE 126.1  
VERTICAL EXAGGERATION 4:1

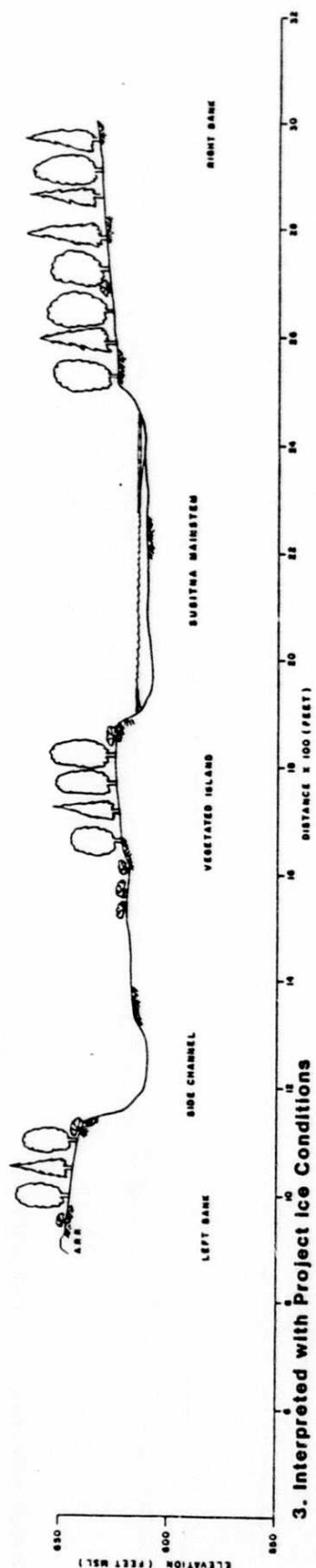
PREPARED FOR:  
**HARZA-ERASSCO**  
SUSITNA JOINT VENTURE



1. Natural Ice Conditions (1983)



2. ICECAL Simulated with Project Ice Conditions RUN # 7196C#X



3. Interpreted with Project Ice Conditions

PREPARED BY:

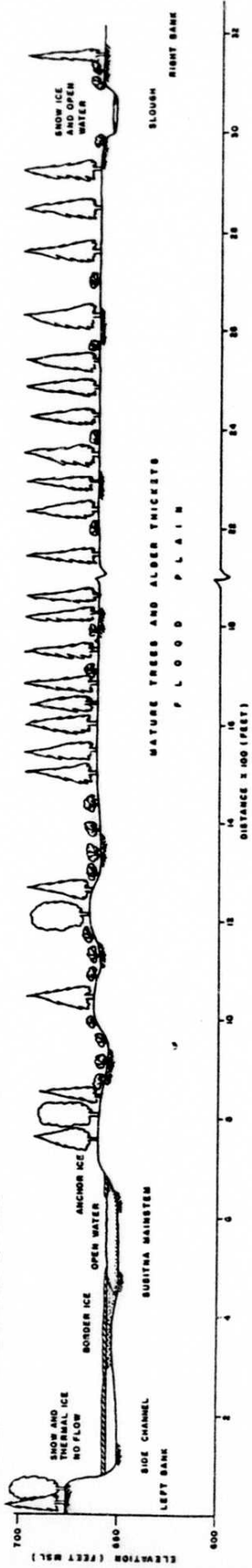
**R&M**  
R&M CONSULTANTS, INC.  
ENGINEERING, ARCHITECTURE, PLANNING, SURVEYING

LRX-34

1980 CROSS SECTION SURVEY  
RIVER MILE 130.5  
VERTICAL EXAGGERATION 4:1

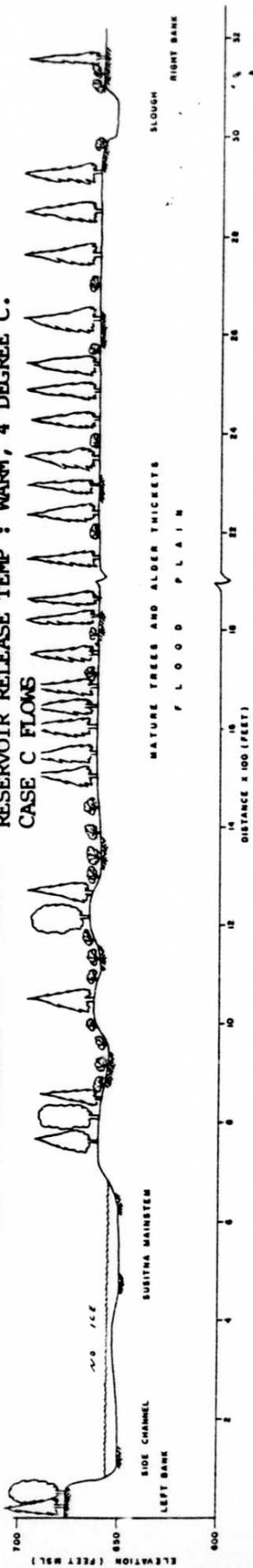
PREPARED FOR:  
**HARZA-EBASCO**  
SUSTITNA JOINT VENTURE

**1. Natural Ice Conditions (1983)**

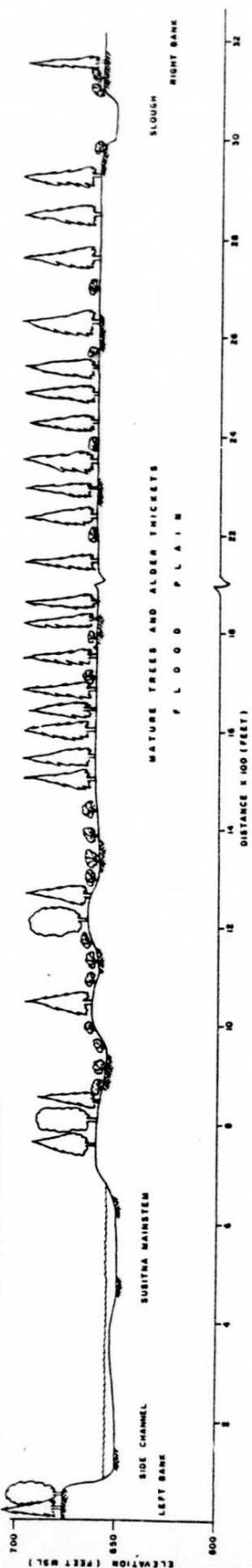


WINTER 1971-72  
WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
RESERVOIR RELEASE TEMP: WARM, 4 DEGREE C.  
CASE C FLOWS

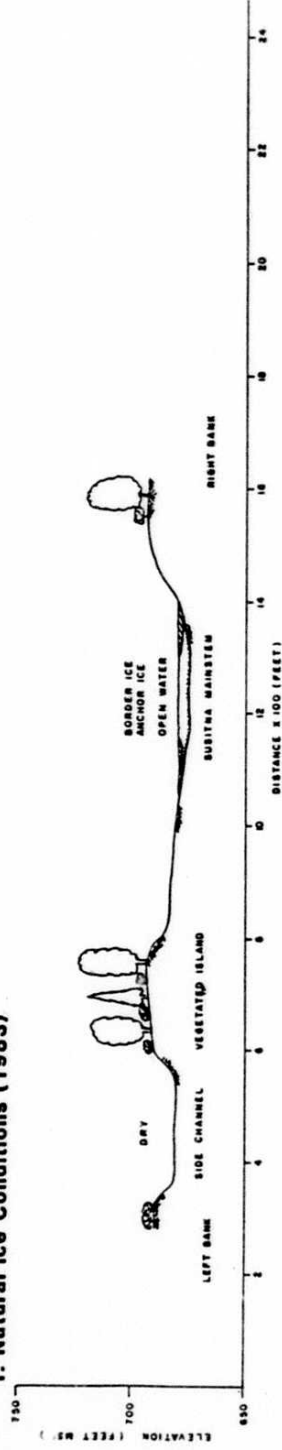
**2. ICECAL Simulated with Project Ice Conditions RUN#7196C4A**



**3. Interpreted with Project Ice Conditions**

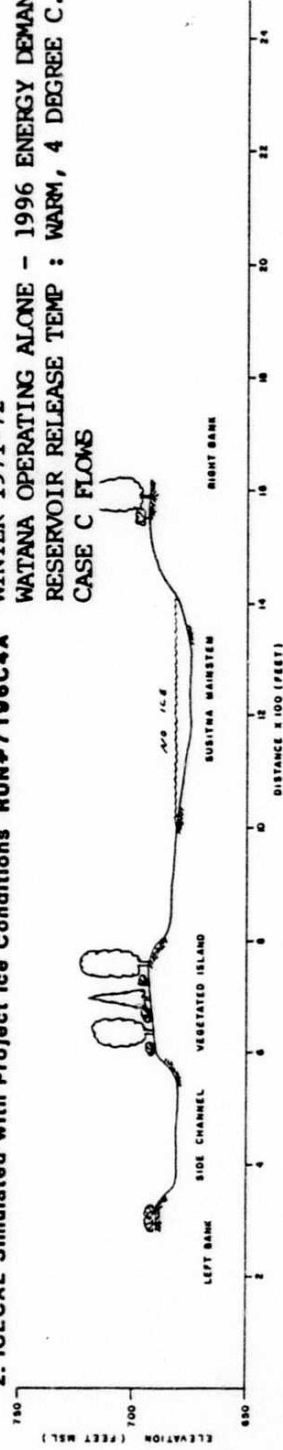


**1. Natural Ice Conditions (1983)**

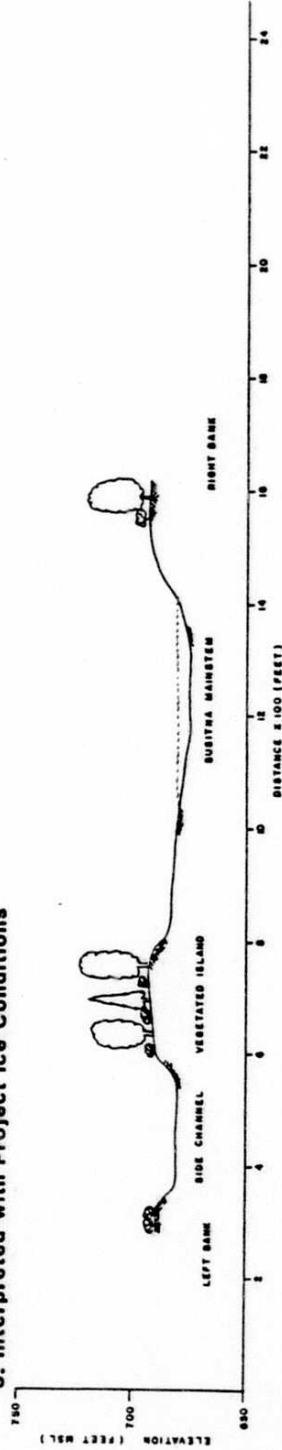


**2. ICECAL Simulated with Project Ice Conditions RUN #7196C4A**

WINTER 1971-72  
WATANA OPERATING ALONE - 1996 ENERGY DEMAND  
RESERVOIR RELEASE TEMP : WARM, 4 DEGREE C.  
CASE C FLOWS



**3. Interpreted with Project Ice Conditions**



PREPARED BY:

**R&M CONSULTANTS, INC.**  
REGISTERED PROFESSIONAL ENGINEERS  
PLANNERS SURVEYORS

**LRX-44**

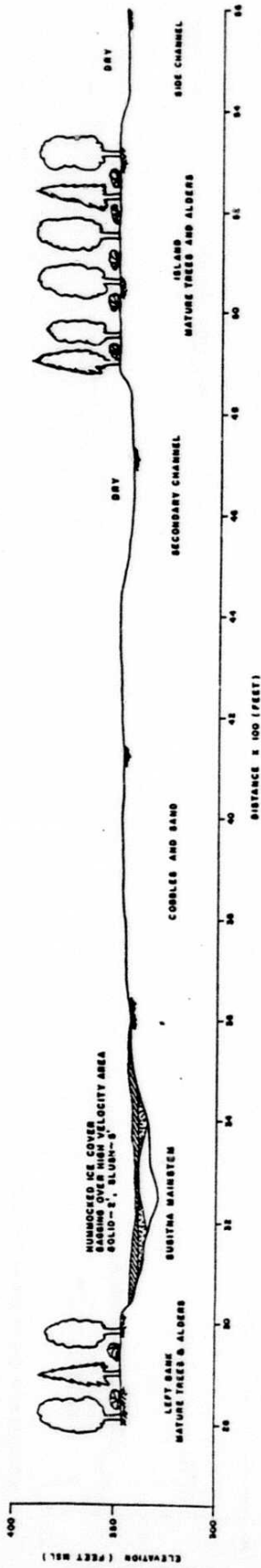
1980 CROSS SECTION SURVEY  
RIVER MILE 136.4  
VERTICAL EXAGGERATION 4:1

PREPARED FOR:  
**HARZA-EBASCO**  
SUSTAINA JOINT VENTURE



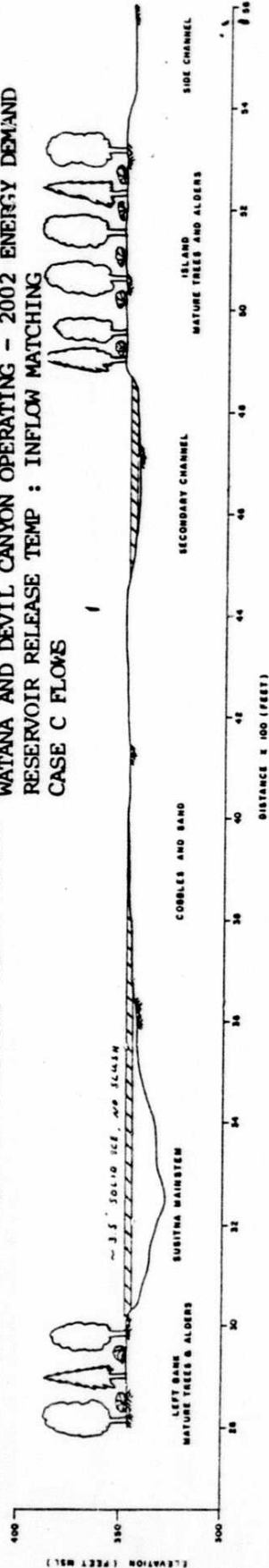
Exhibit X

1. Natural Ice Conditions (1983)

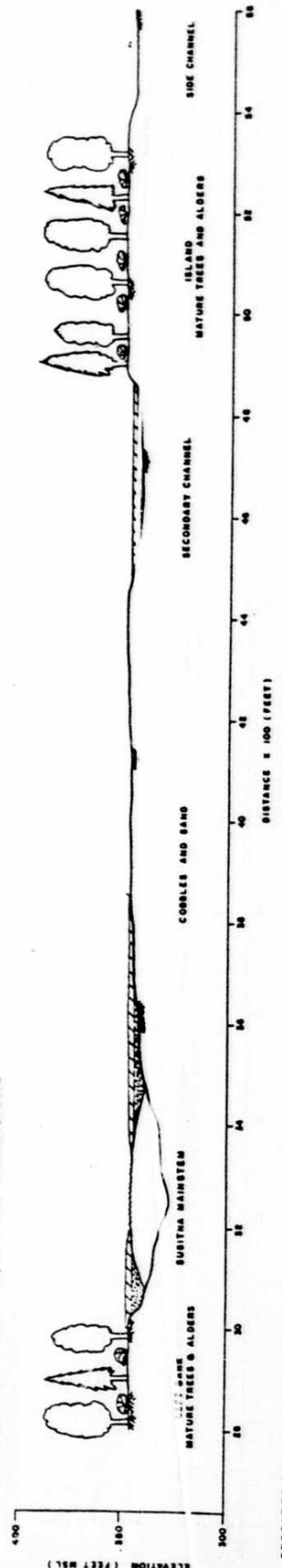


2. ICECAL Simulated with Project Ice Conditions RUN#7102CNA

WINTER 1971-72  
WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
RESERVOIR RELEASE TEMP : INFLOW MATCHING  
CASE C FLOWS



3. Interpreted with Project Ice Conditions



PREPARED BY:

**RSM**  
RSM CONSULTANTS, INC.  
ENGINEERS ARCHITECTS PLANNERS SURVEYORS

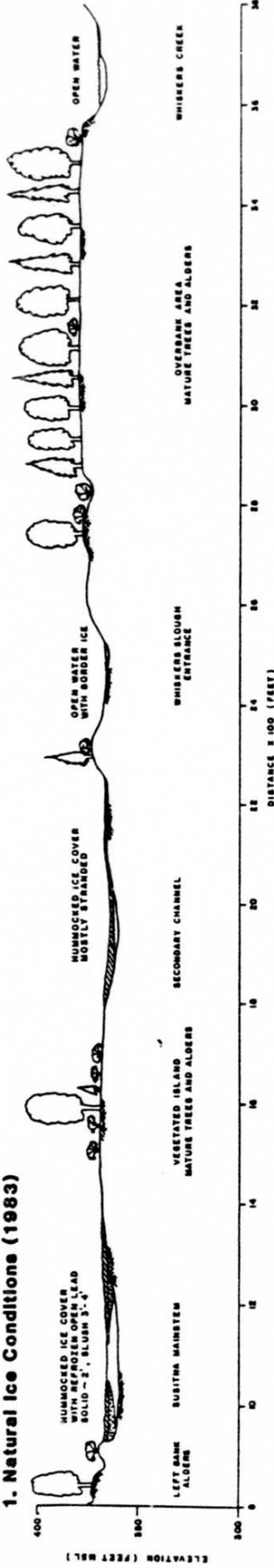
LRX-3

1982 CROSS SECTION SURVEY  
RIVER MILE 98.6  
VERTICAL EXAGGERATION 4.0

PREPARED FOR:

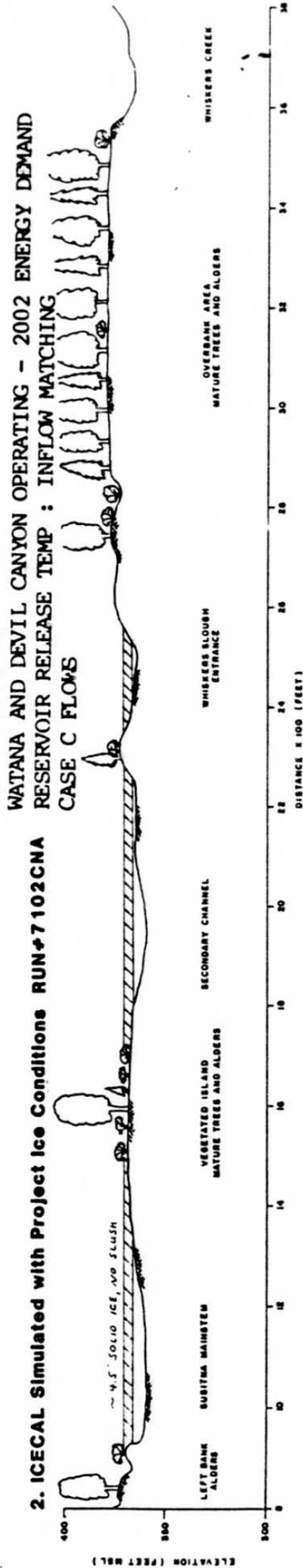
**HARZA-EBASCO**  
SYSTEMS UNIT - JEFFERSON

**1. Natural Ice Conditions (1983)**

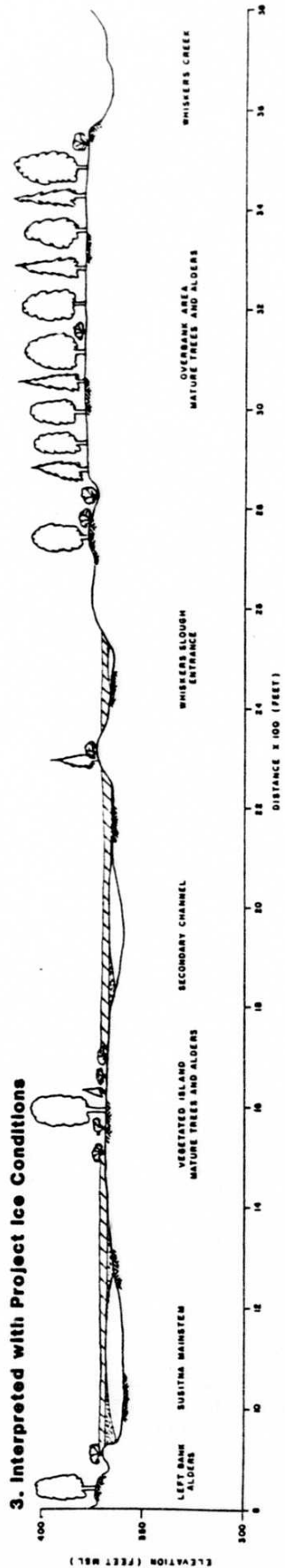


**2. ICECAL Simulated with Project Ice Conditions RUN #7102CNA**

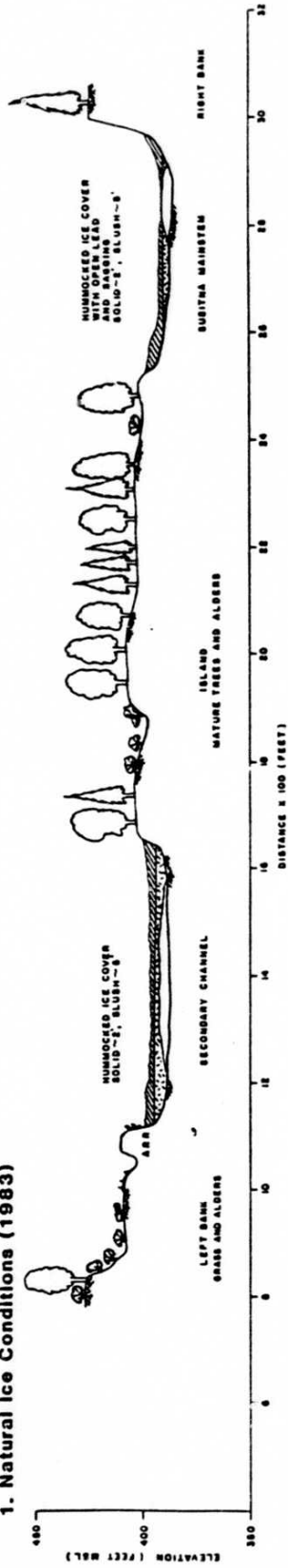
WINTER 1971-72  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



**3. Interpreted with Project Ice Conditions**

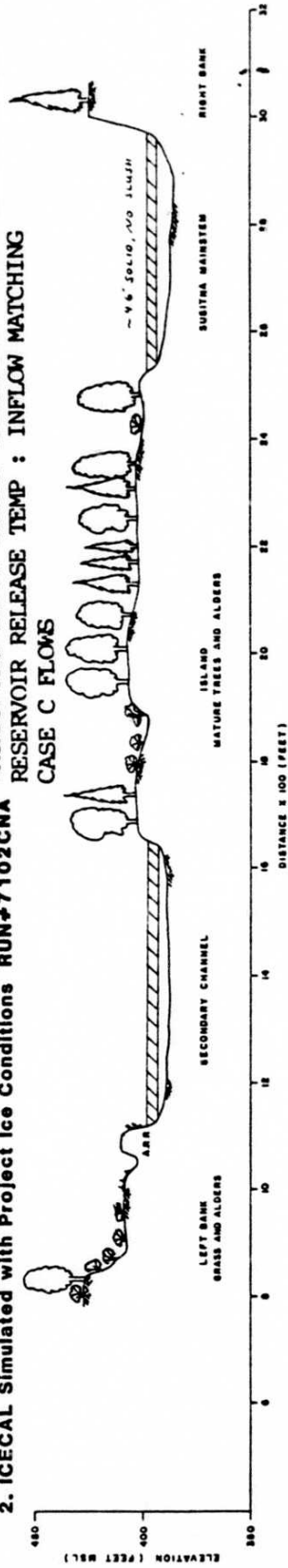


1. Natural Ice Conditions (1983)

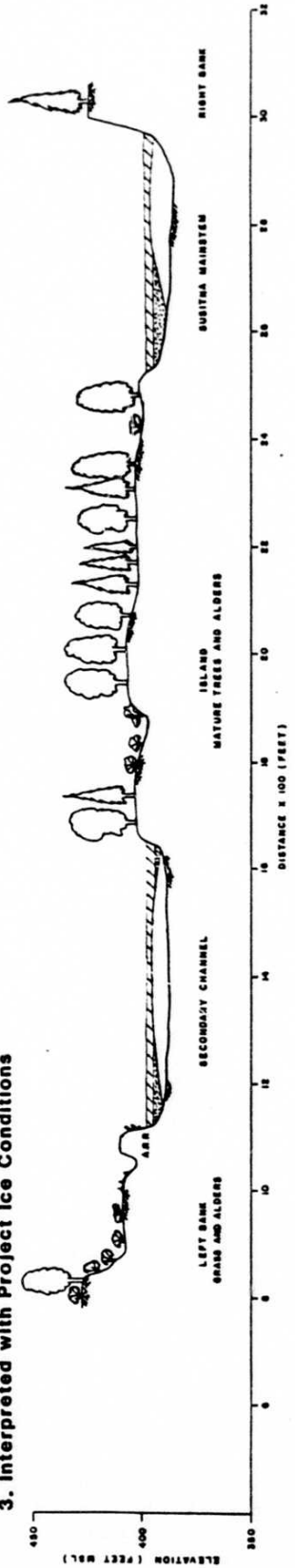


WINTER 1971-72  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

2. ICECAL Simulated with Project Ice Conditions RUN#7102CNA



3. Interpreted with Project Ice Conditions



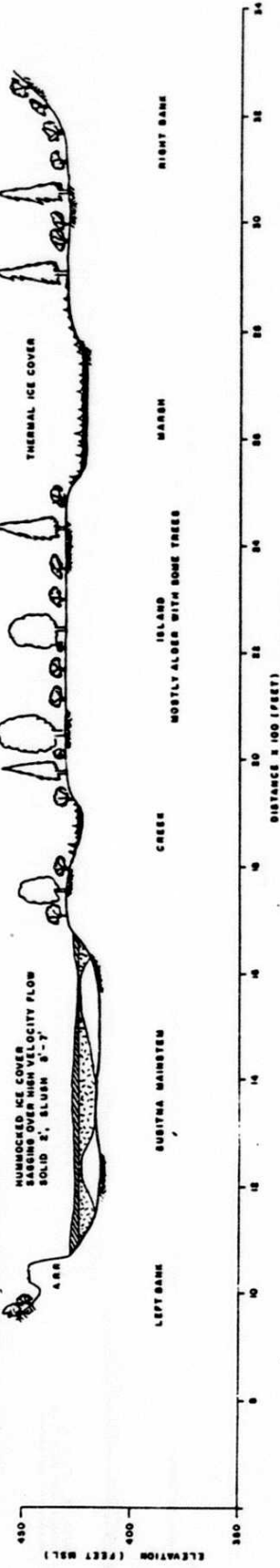
PREPARED BY:

**PCM**  
**R&M CONSULTANTS, INC.**  
 ENGINEERS, PLANNERS, ARCHITECTS

1980 CROSS SECTION SURVEY  
 RIVER MILE 104.8  
 VERTICAL EXAGGERATION 4:1

PREPARED FOR:  
**WARZA-EBASCO**  
 SUSITNA JOINT VENTURE

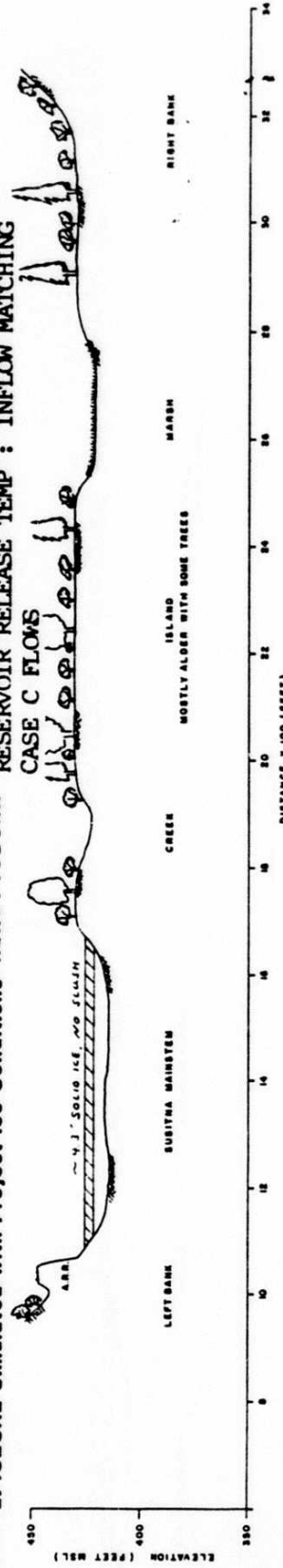
1. Natural Ice Conditions (1983)



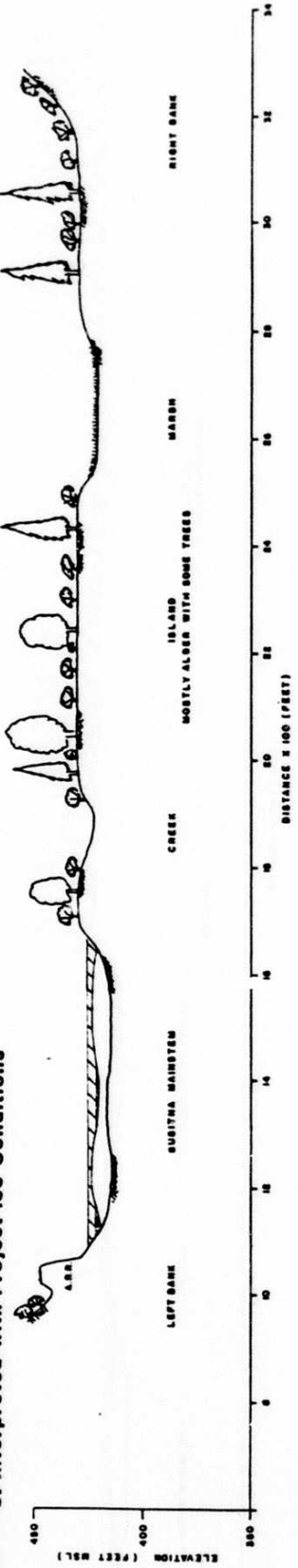
2. ICECAL Simulated with Project Ice Conditions RIJN#7102CNA

WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

WINTER 1971-72



3. Interpreted with Project Ice Conditions



PREPARED BY:

**REM CONSULTANTS, INC.**  
 ENGINEERS, ARCHITECTS, PLANNERS, ENVIRONMENTAL SCIENTISTS

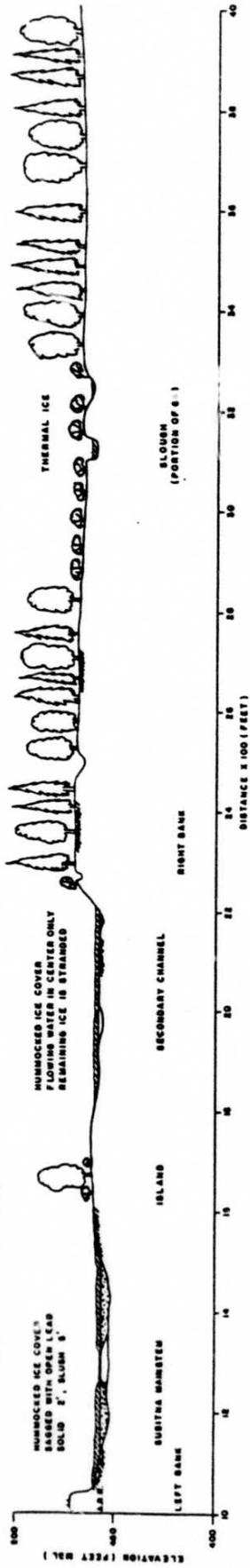
**LRX-12**

1981 CROSS SECTION SURVEY  
 RIVER MILE 108.4  
 VERTICAL EXAGGERATION 4:1

PREPARED FOR:

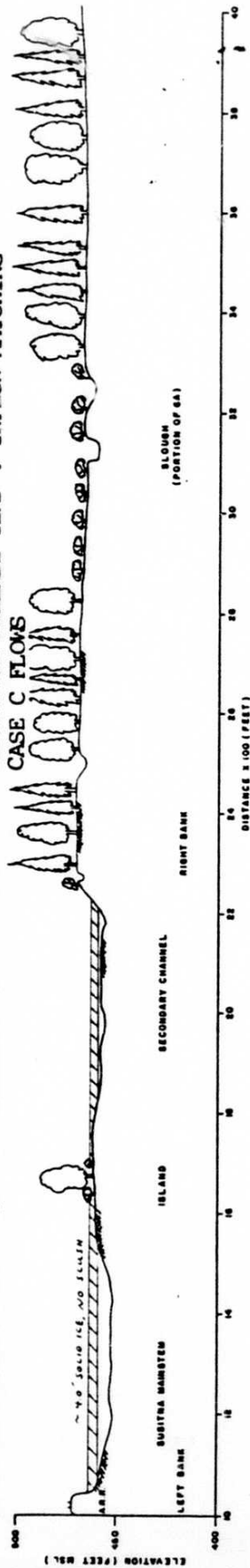
**HARZA-EBASC**  
 SUSITNA JOINT VENTURE

**1. Natural Ice Conditions (1983)**

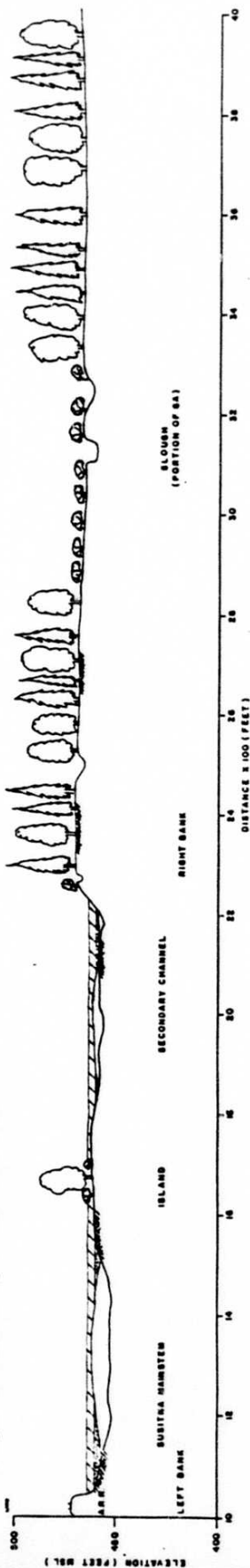


WINTER 1971-72  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING

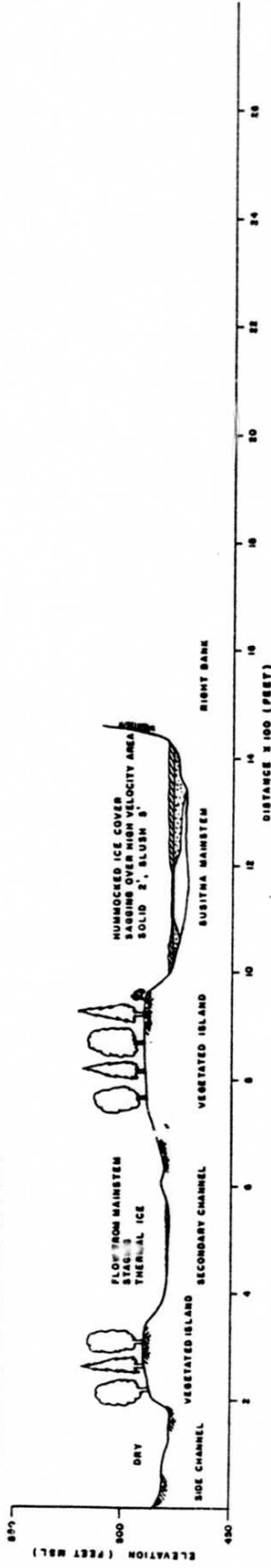
**2. ICECAL Simulated with Project Ice Conditions RUN#7102CNA**



**3. Interpreted with Project Ice Conditions**

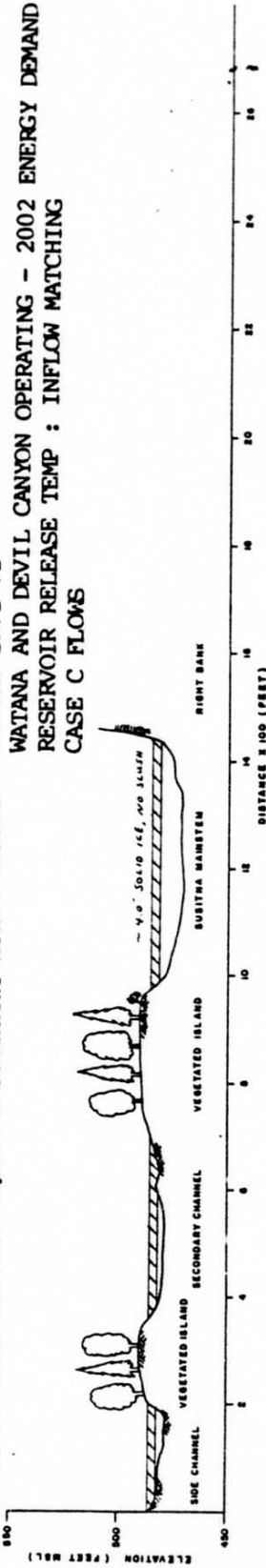


**1. Natural ice Conditions (1983)**

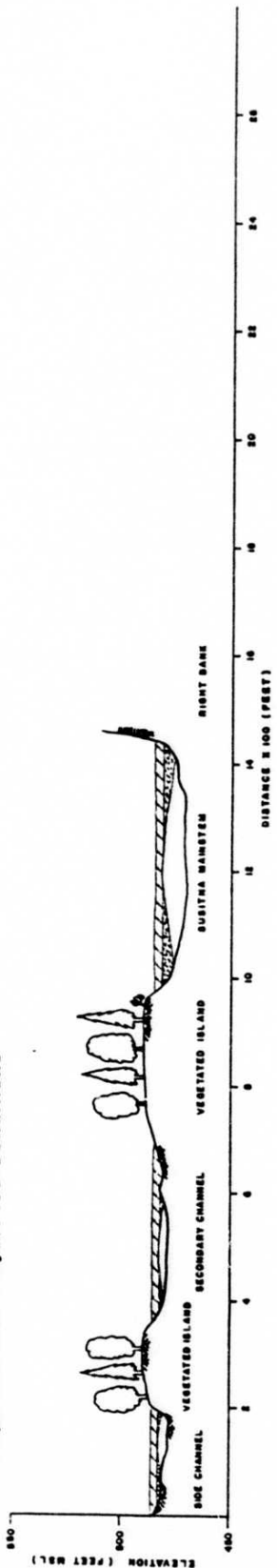


**2. ICECAL Simulated with Project Ice Conditions RUN#7102CNA**

WINTER 1971-72  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



**3. Interpreted with Project Ice Conditions**



PREPARED BY:

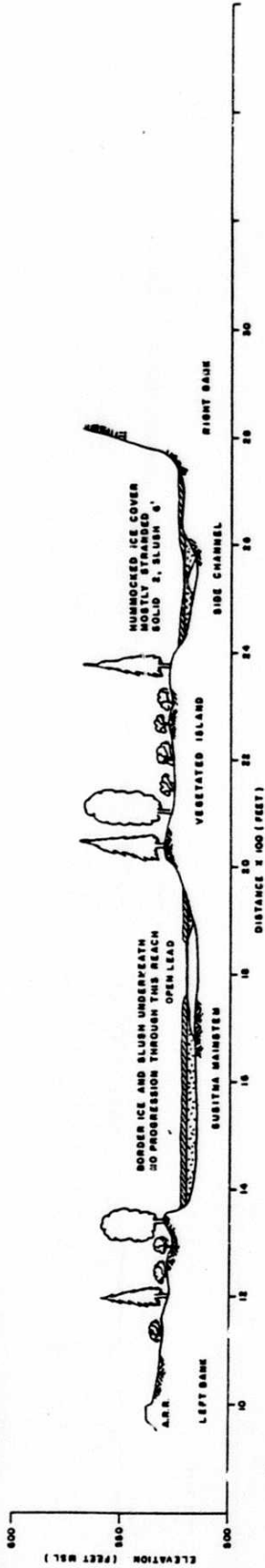
**R&M CONSULTANTS, INC.**  
 PROFESSIONAL ENGINEERS, PLANNERS, SURVEYORS

**LRX-18.2**  
 1982 CROSS SECTION SURVEY  
 RIVER MILE 115.1  
 VERTICAL EXAGGERATION 4:1

PREPARED FOR:  
**HARZA-EBASCO**  
 SUSTAINA JOINT VENTURE

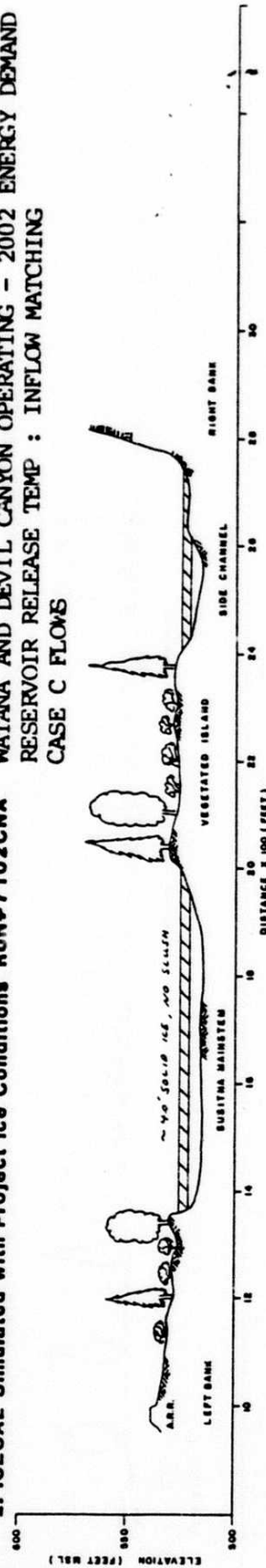


1. Natural Ice Conditions (1983)

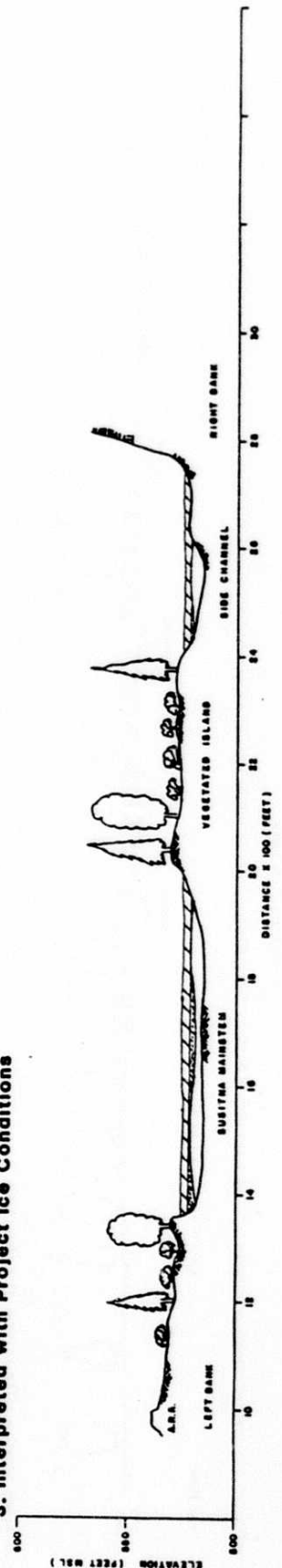


2. ICECAL Simulated with Project Ice Conditions RUN#7102CNA

WINTER 1971-72  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



3. Interpreted with Project Ice Conditions



PREPARED BY:

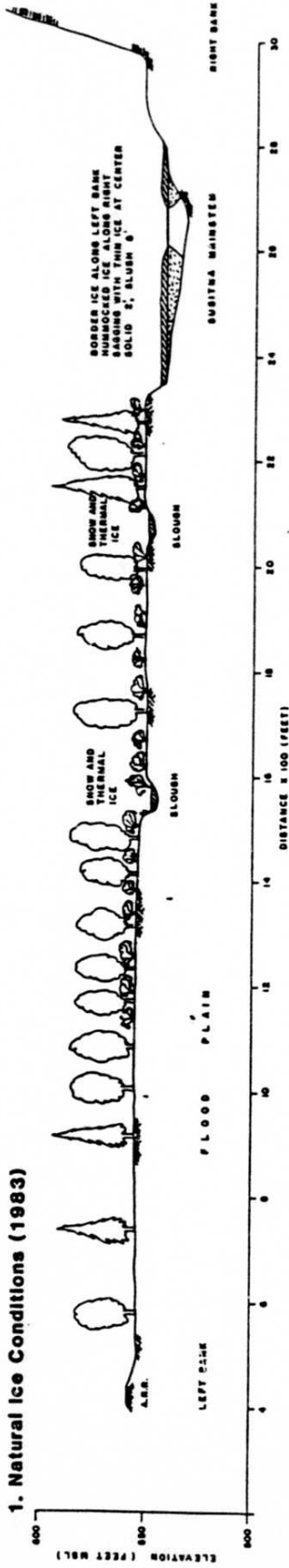
**RSM**  
**R&M CONSULTANTS, INC.**  
 ENGINEERS, ARCHITECTS, PLANNERS, SURVEYORS

**LRX-23**

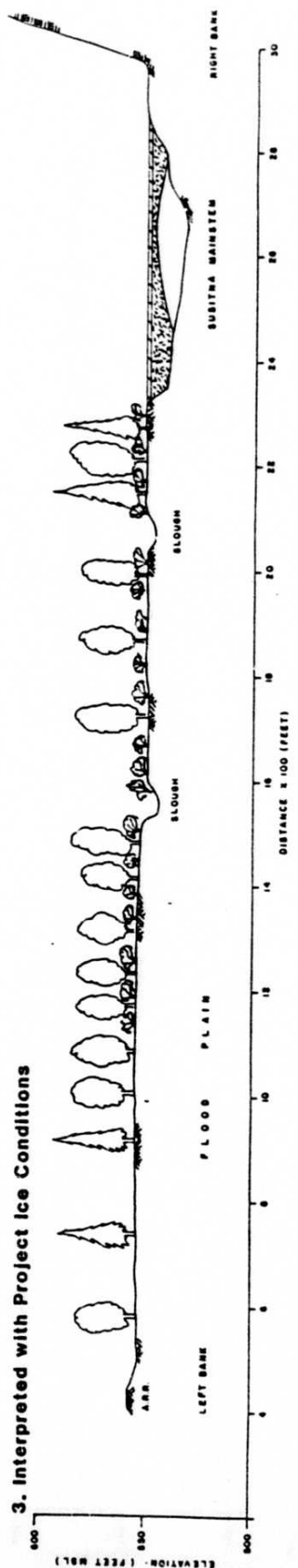
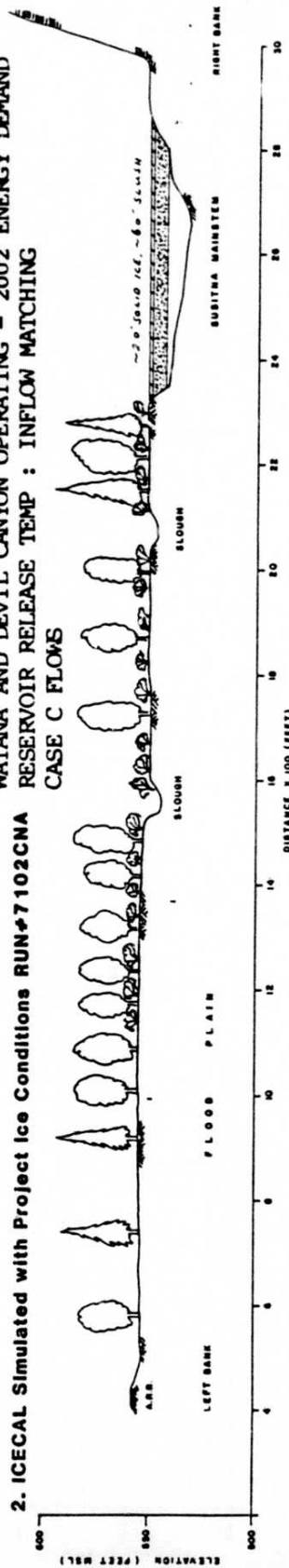
1980 CROSS SECTION SURVEY  
 RIVER MILE 120.2  
 VERTICAL EXAGGERATION 4:1

PREPARED FOR:

**HARZA-EBASCO**  
 SUSTINA JOINT VENTURE



WINTER 1971-72  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



PREPARED BY:

**R&M CONSULTANTS, INC.**  
 1000 WEST 10TH AVENUE, SUITE 100  
 DENVER, COLORADO 80202

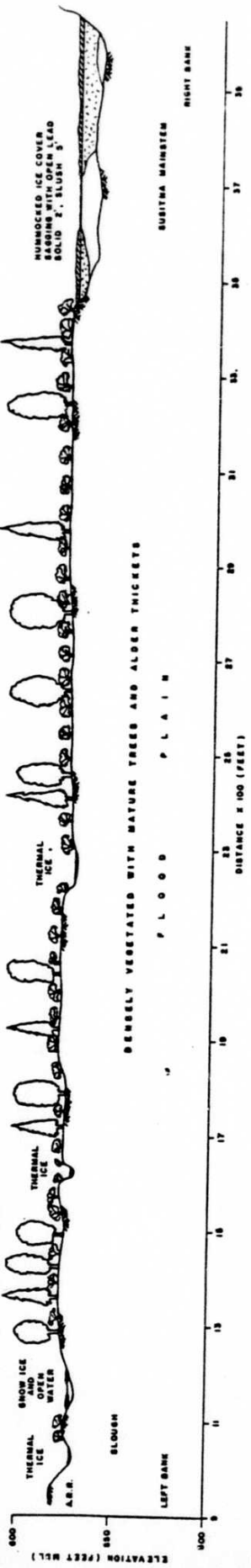
**LRX -27**

**1980 CROSS SECTION SURVEY  
 RIVER MILE 123.3  
 VERTICAL EXAGGERATION 4:1**

PREPARED FOR:

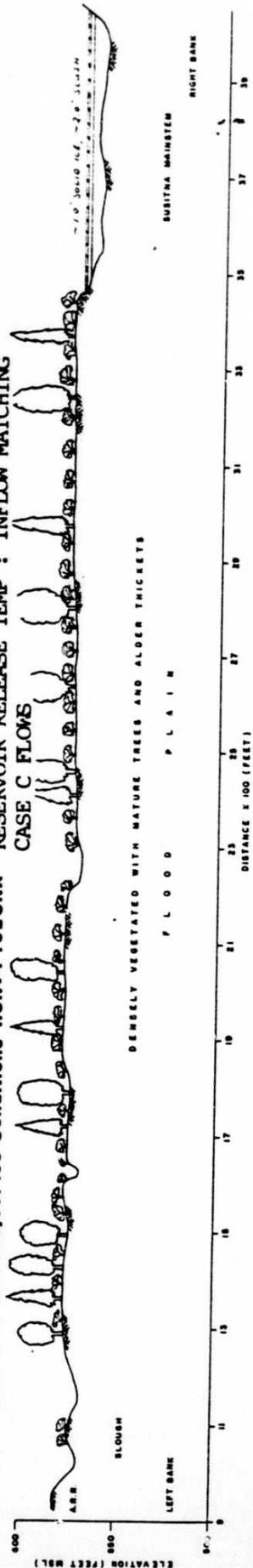
**HARZA-EEAGCO**  
 SUSTAINABLE ENERGY PARTNERS

**1. Natural Ice Conditions (1983)**

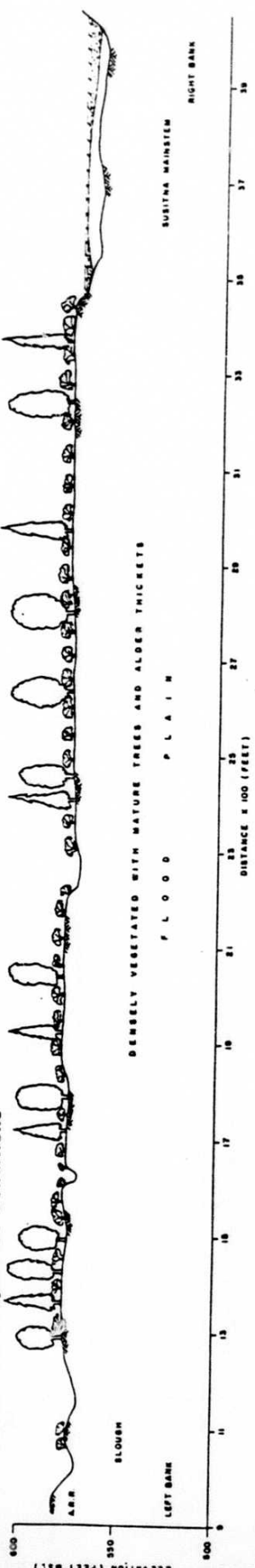


WINTER 1971-72

**2. ICECAL Simulated with Project Ice Conditions RUN #7102CNA  
WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
RESERVOIR RELEASE TEMP : INFLOW MATCHING  
CASE C FLOWS**



**3. Interpreted with Project Ice Conditions**

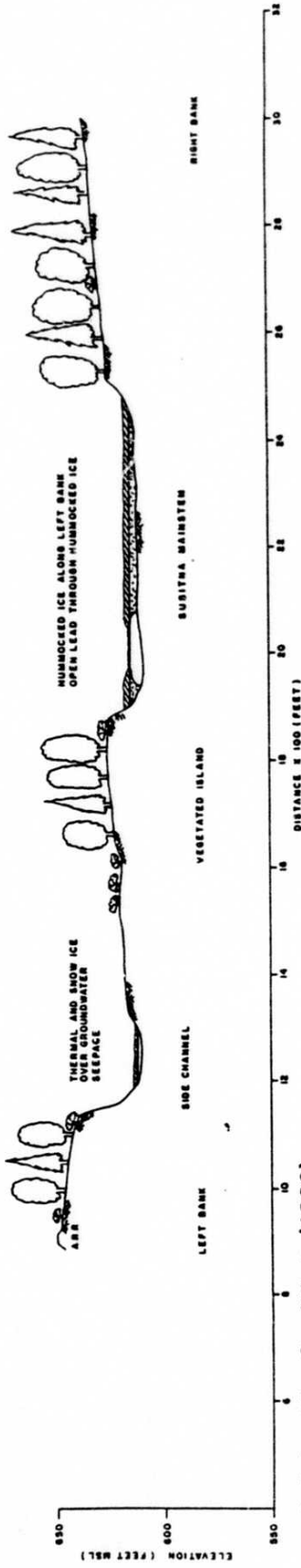


PREPARED BY:

**R&M CONSULTANTS, INC.**  
ENGINEERING CONSULTING ARCHITECTURE PLANNING

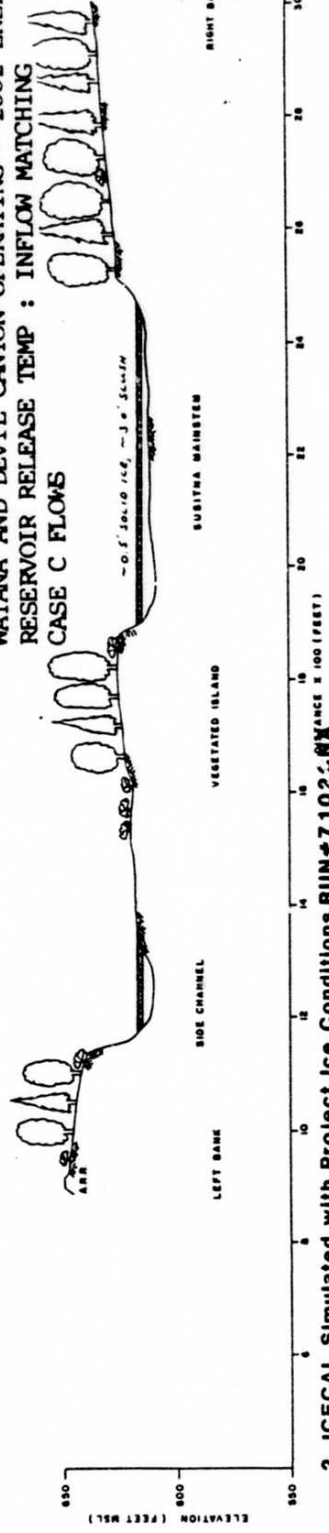
**LRX-29**  
1980 CROSS SECTION SURVEY  
RIVER MILE 126.1  
VERTICAL EXAGGERATION 4:1

PREPARED FOR:  
**HARZA-EBASCO**  
SUSTINA JOINT VENTURE

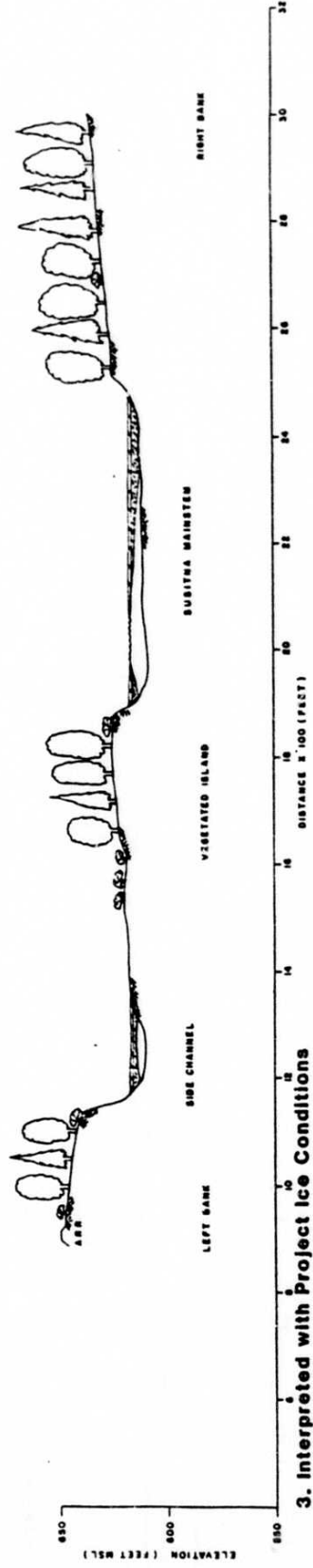


1. Natural ice Conditions (1983)

WINTER 1971-72  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP: INFLOW MATCHING  
 CASE C FLOWS

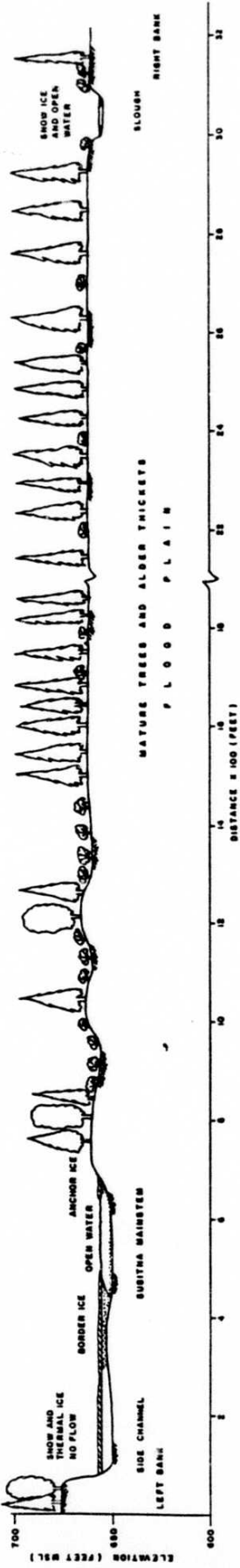


2. ICECAL Simulated with Project Ice Conditions RUN # 7102 - MWX



3. Interpreted with Project Ice Conditions

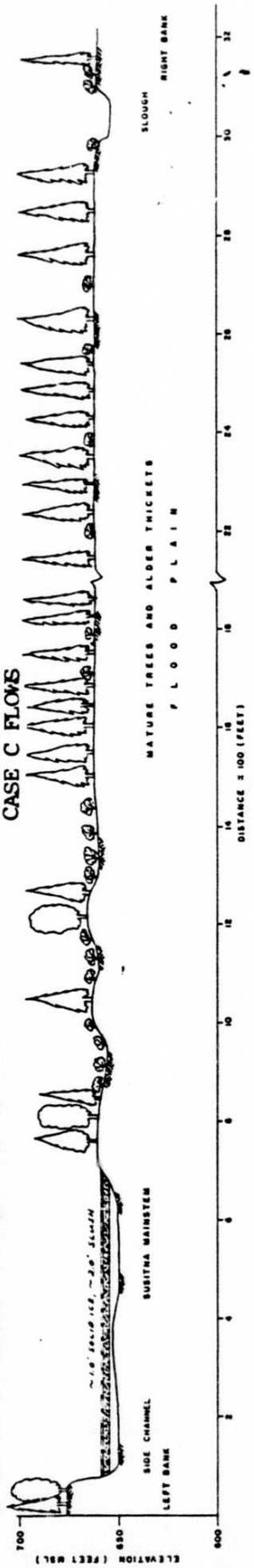
**1. Natural Ice Conditions (1983)**



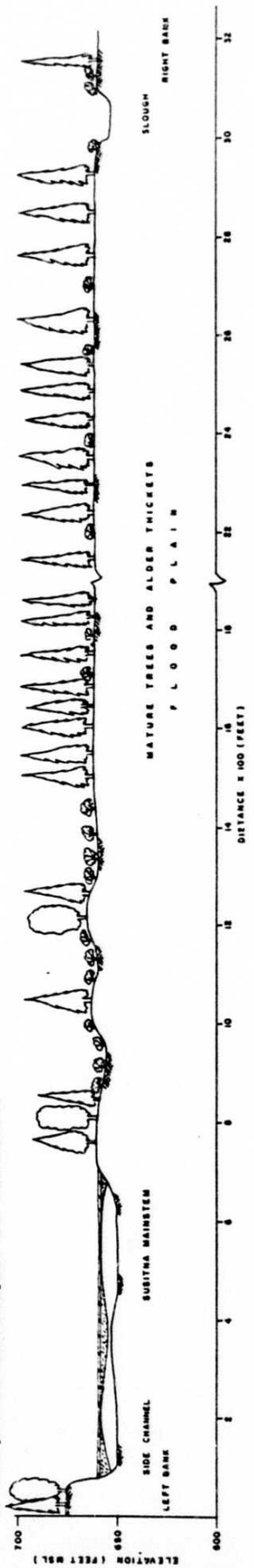
WINTER 1971-72

WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

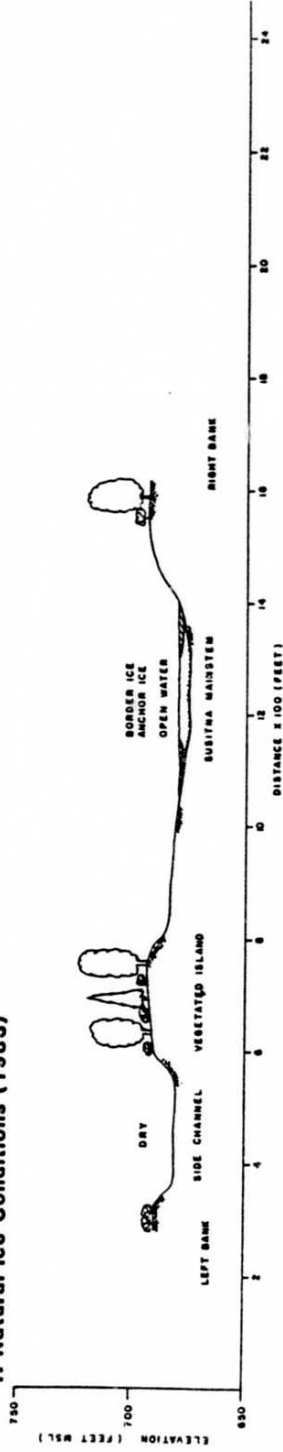
**2. ICECAL Simulated with Project Ice Conditions RUN#7102CNA**



**3. Interpreted with Project Ice Conditions**

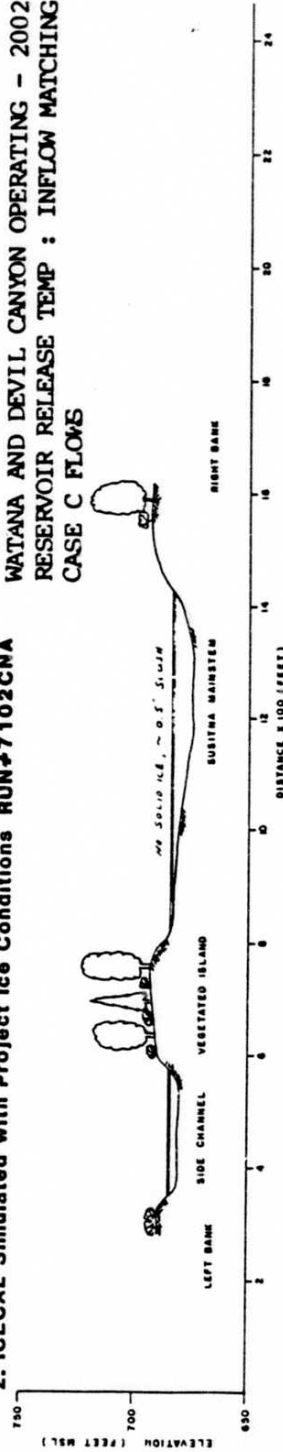


**1. Natural Ice Conditions (1983)**

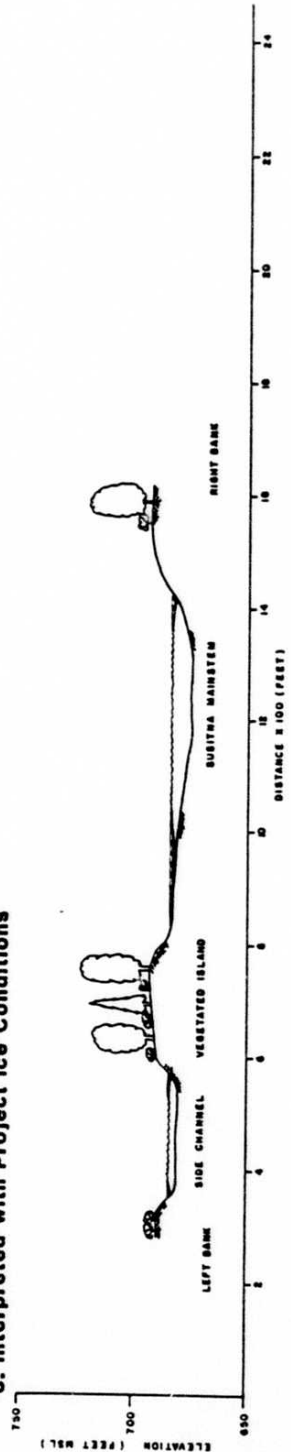


**2. ICECAL Simulated with Project Ice Conditions RUN#7102CNA**

WINTER 1971-72  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



**3. Interpreted with Project Ice Conditions**



PREPARED BY:

**PCM**  
 R.M. CONSULTANTS, INC.  
 PROJECT MANAGEMENT SERVICES

**LRX-44**

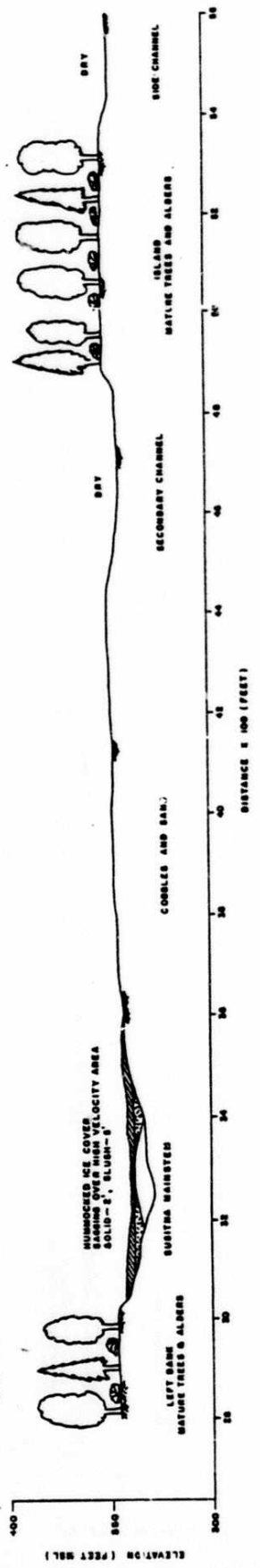
1980 CROSS SECTION SURVEY  
 RIVER MILE 136.4  
 VERTICAL EXAGGERATION 4:1

PREPARED FOR:  
**HARZA-EBASCH**  
 SUSTAINA JOINT VENTURE

Exhibit Y

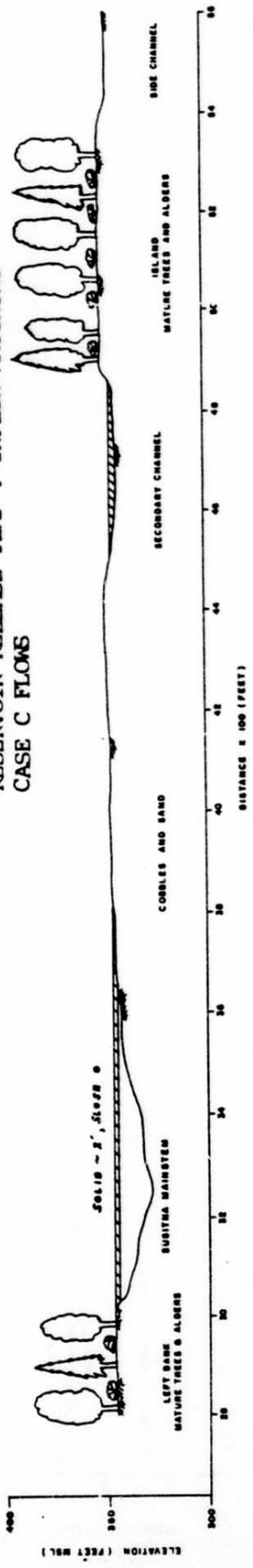


**1. Natural Ice Conditions (1983)**

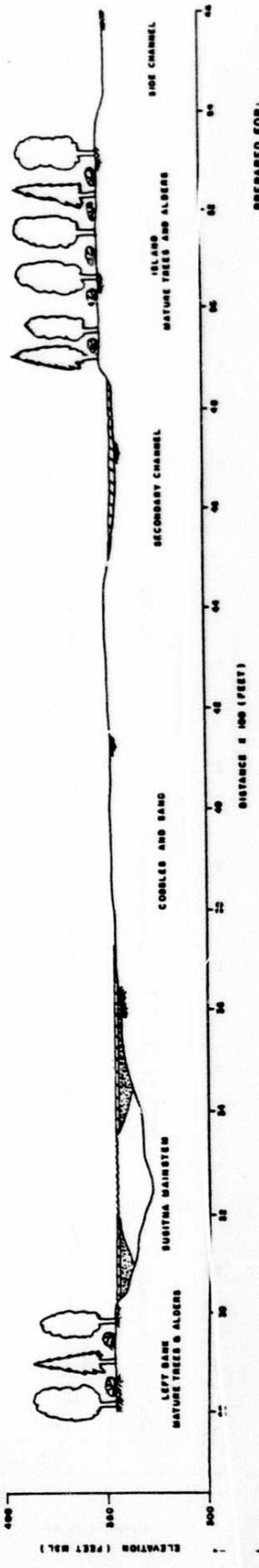


WINTER 1982-83  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

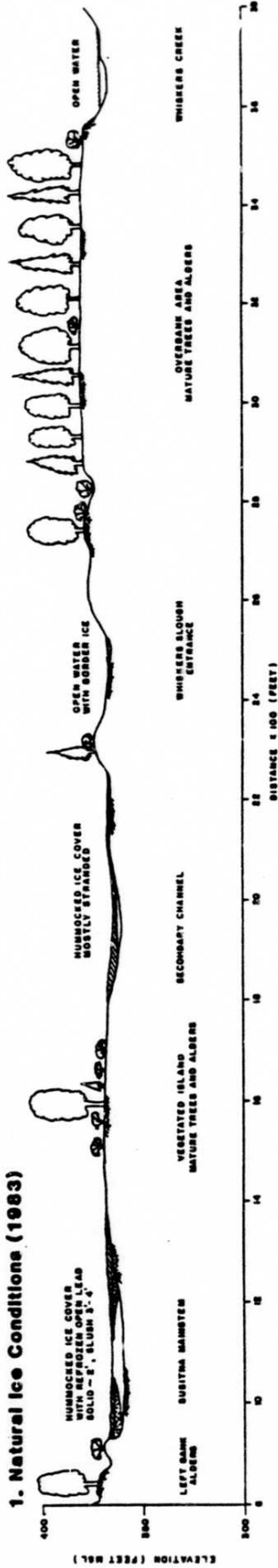
**2. ICECAL Simulated with Project Ice Conditions RUN #6202CNA**



**3. Interpreted with Project Ice Conditions**

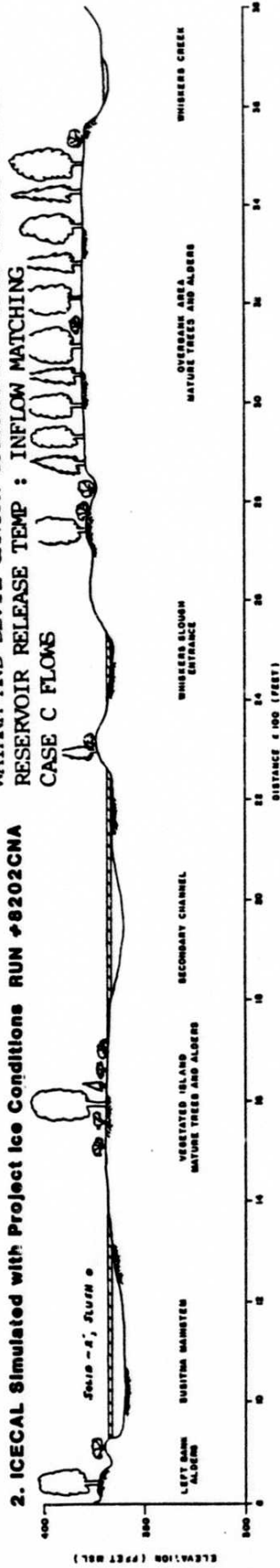


**1. Natural Ice Conditions (1983)**

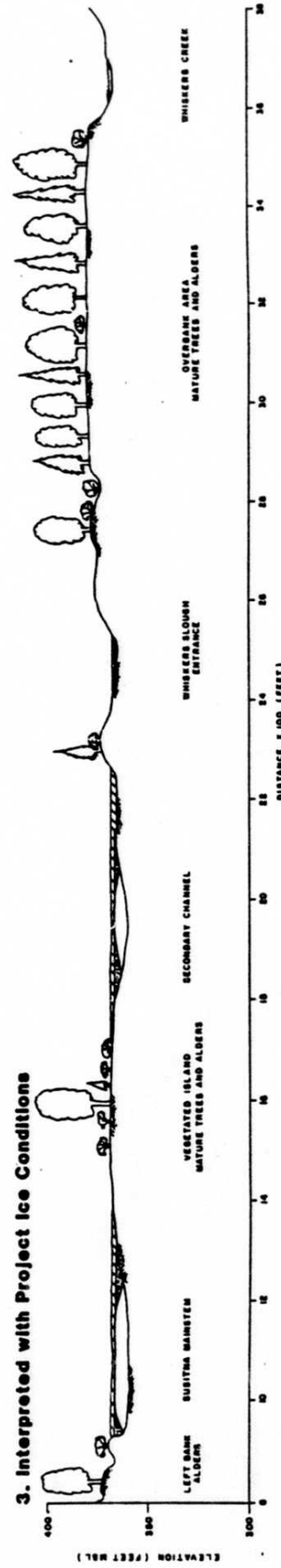


WINTER 1982-83  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

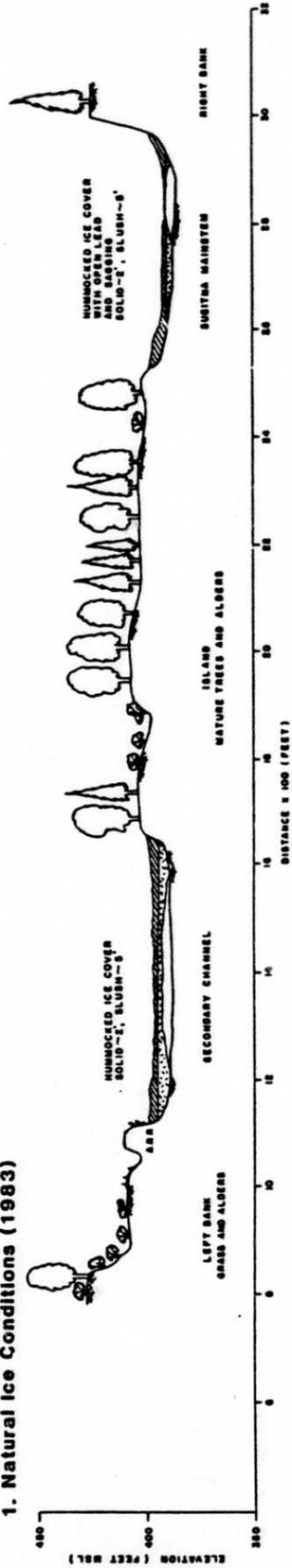
**2. ICECAL Simulated with Project Ice Conditions RUN #8202CNA**



**3. Interpreted with Project Ice Conditions**

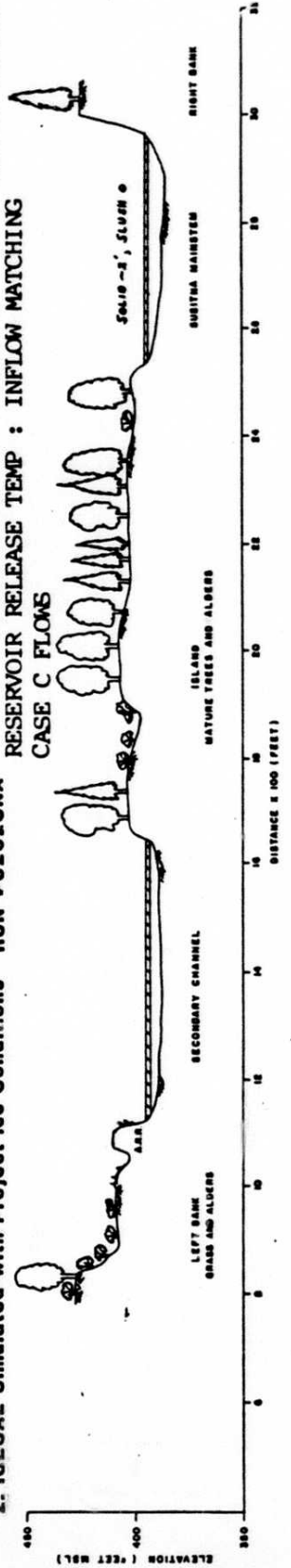


1. Natural Ice Conditions (1983)

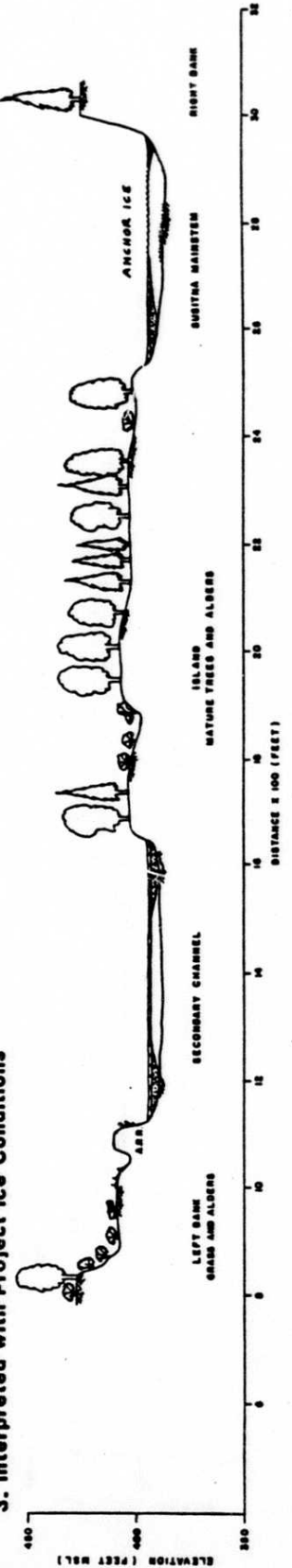


WINTER 1982-83  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

2. ICECAL Simulated with Project Ice Conditions RUN #8202CNA



3. Interpreted with Project Ice Conditions



PREPARED BY:

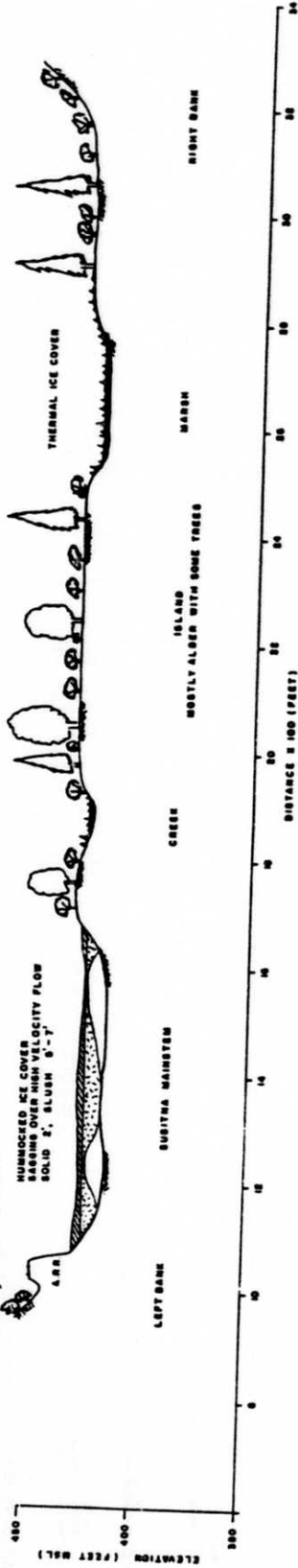
**REM**  
 R&M CONSULTANTS, INC.  
 CONSULTING ENGINEERS

1980 CROSS SECTION SURVEY  
 RIVER MILE 104.8  
 VERTICAL EXAGGERATION 4:1

LRX-10

PREPARED FOR:  
**HARZA-EBASCO**  
 SUSITNA JOINT VENTURE

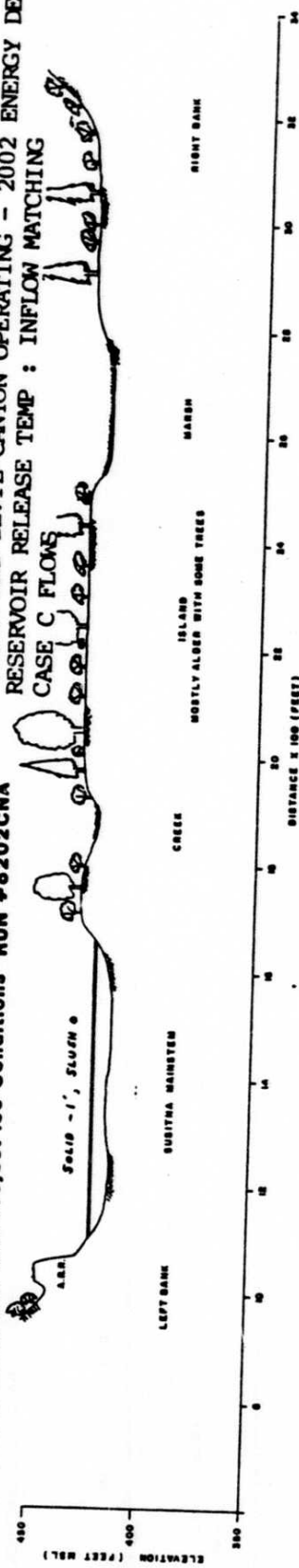
**1. Natural Ice Conditions (1983)**



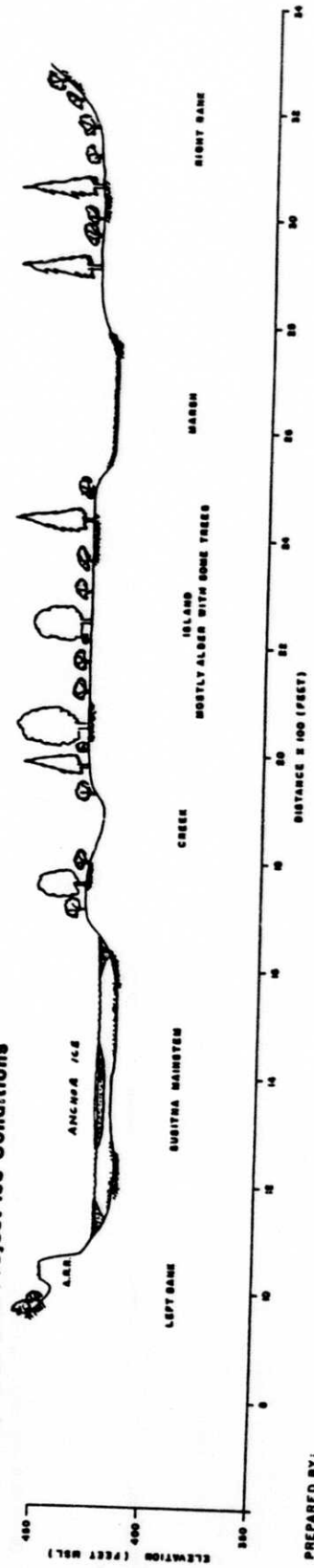
**2. ICECAL Simulated with Project Ice Conditions RUN #8202CNA**

WINTER 1982-83

WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
RESERVOIR RELEASE TEMP : INFLOW MATCHING  
CASE C FLOWS



**3. Interpreted with Project Ice Conditions**



PREPARED BY:

**ESM**  
**REM CONSULTANTS, INC.**  
FERRIS, CALIFORNIA, U.S.A.

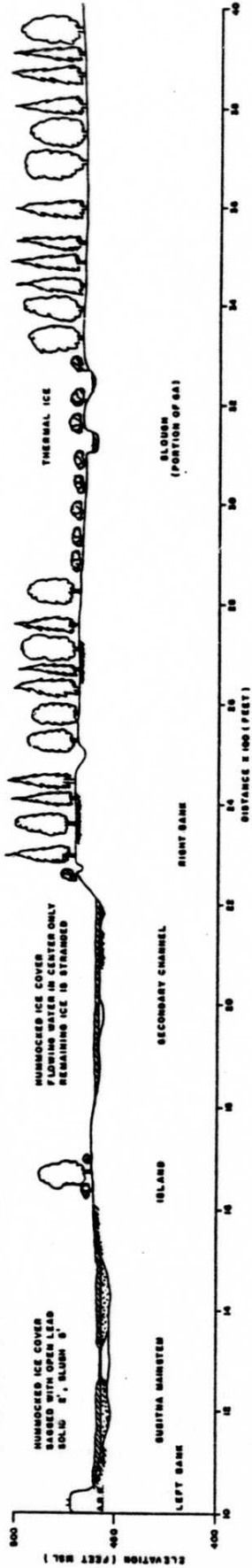
**LRX-12**

**1981 CROSS SECTION SURVEY  
RIVER MILE 109.4  
VERTICAL EXAGGERATION 4:1**

PREPARED FOR:

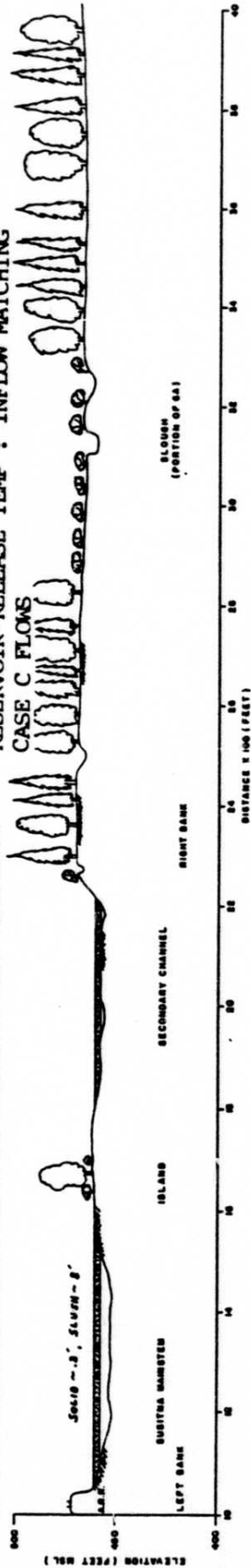
**HARZA-EBASCO**  
SUSITNA JOINT VENTURE

**1. Natural Ice Conditions (1983)**

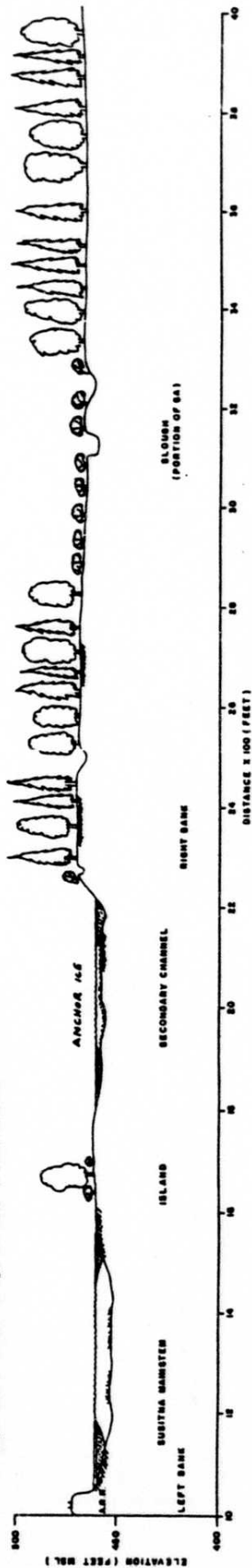


WINTER 1982-83  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

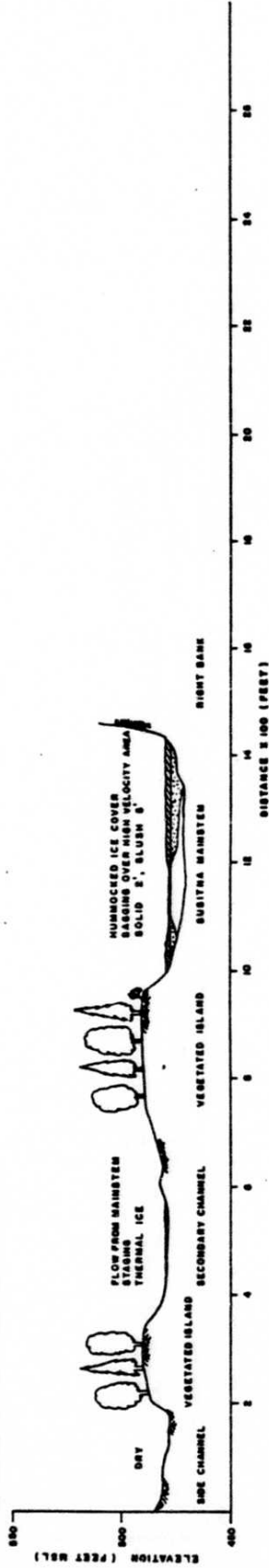
**2. ICECAL Simulated with Project Ice Conditions RUN #8202CNA**



**3. Interpreted with Project Ice Conditions**

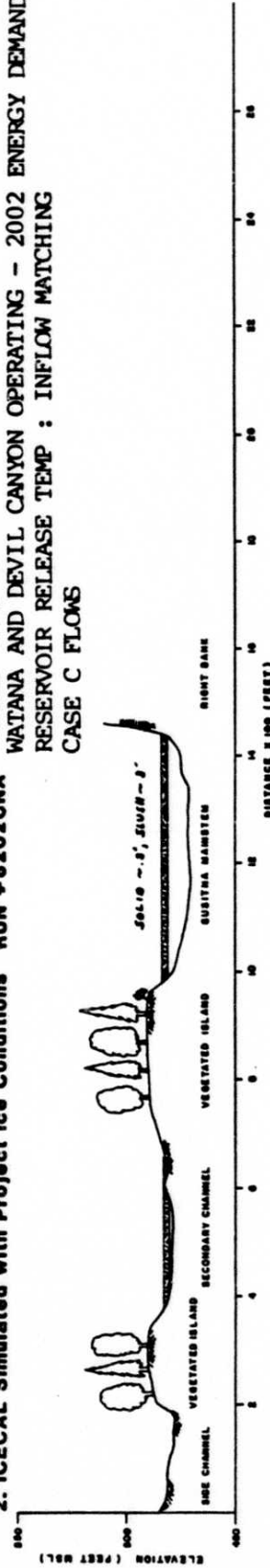


1. Natural Ice Conditions (1983)

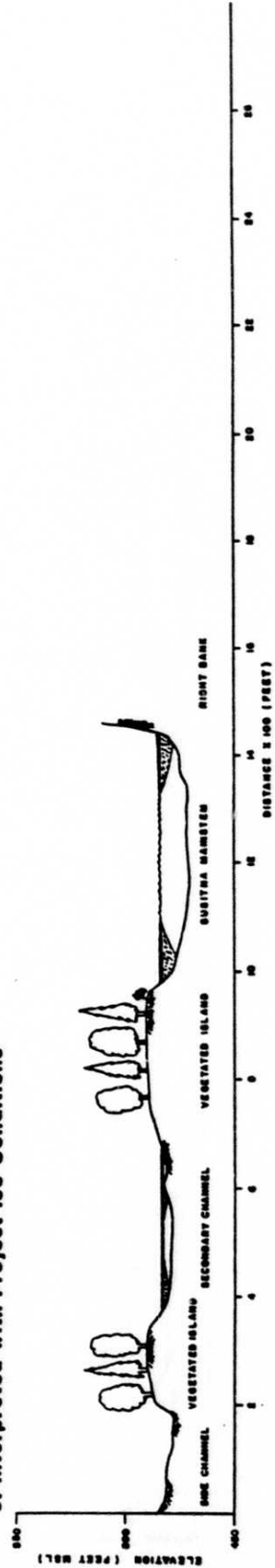


2. ICECAL Simulated with Project Ice Conditions RUN #8202CNA

WINTER 1982-83  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



3. Interpreted with Project Ice Conditions



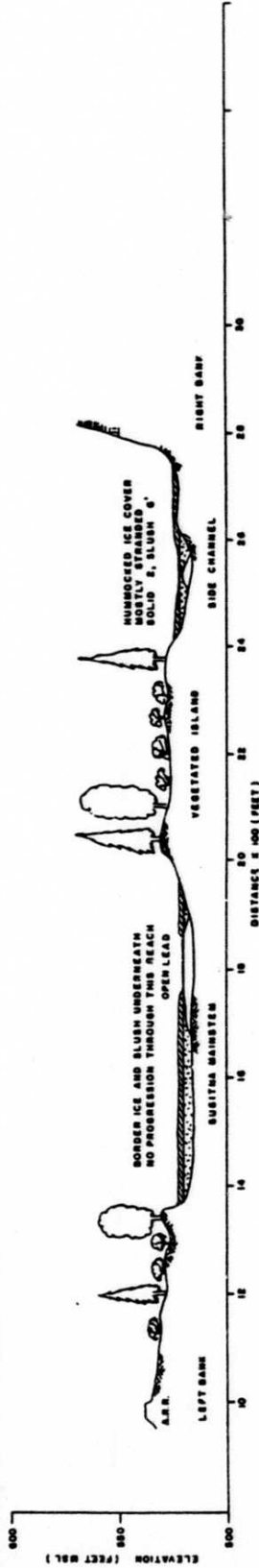
PREPARED BY:

**RSM**  
 R&M CONSULTANTS, INC.  
 CONSULTING ENGINEERS

1982 CROSS SECTION SURVEY  
 RIVER MILE 115.1  
 VERTICAL EXAGGERATION 4:1

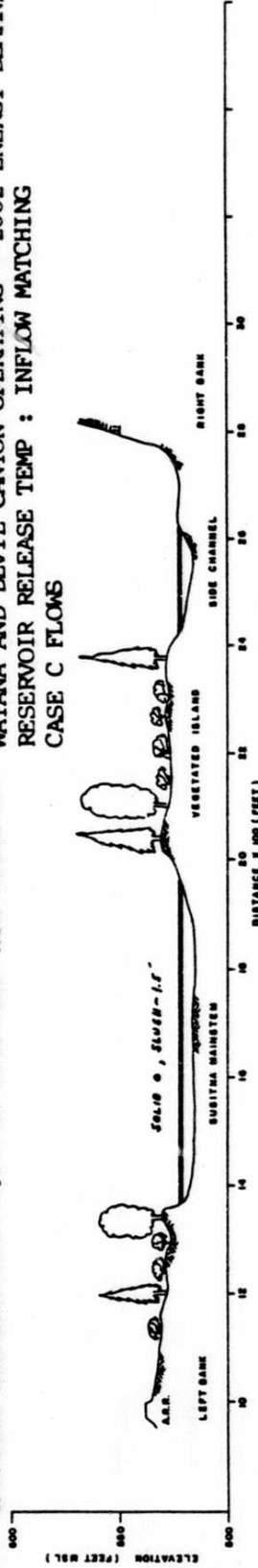
PREPARED FOR:  
**HARZA-EBASCO**  
 SUSTINA JOINT VENTURE

1. Natural Ice Conditions (1983)

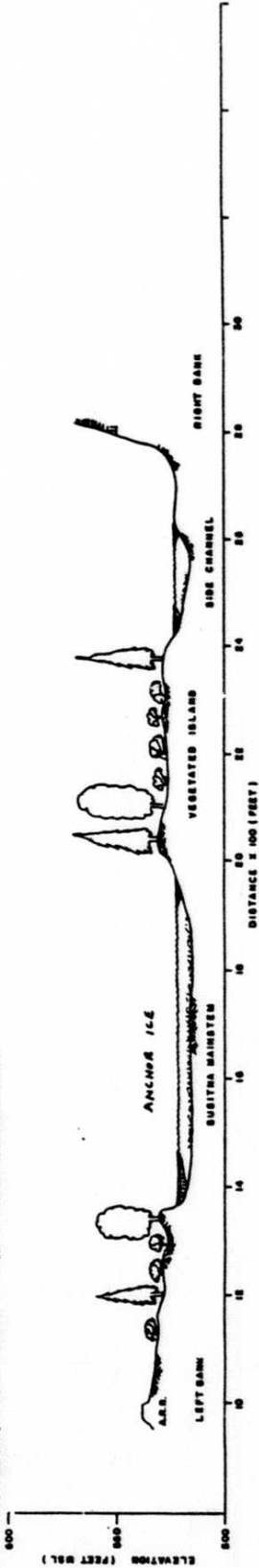


WINTER 1982-83  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

2. ICECAL Simulated with Project Ice Conditions RUN #8202CNA

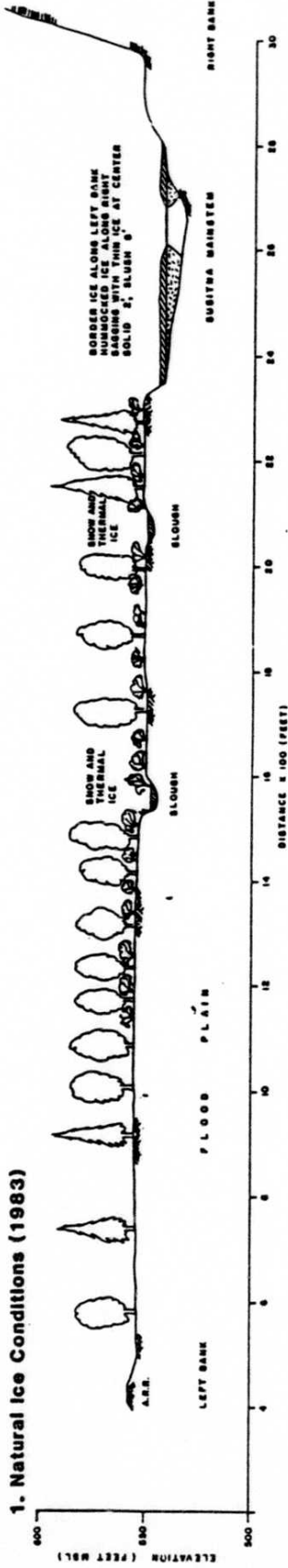


3. Interpreted with Project Ice Conditions



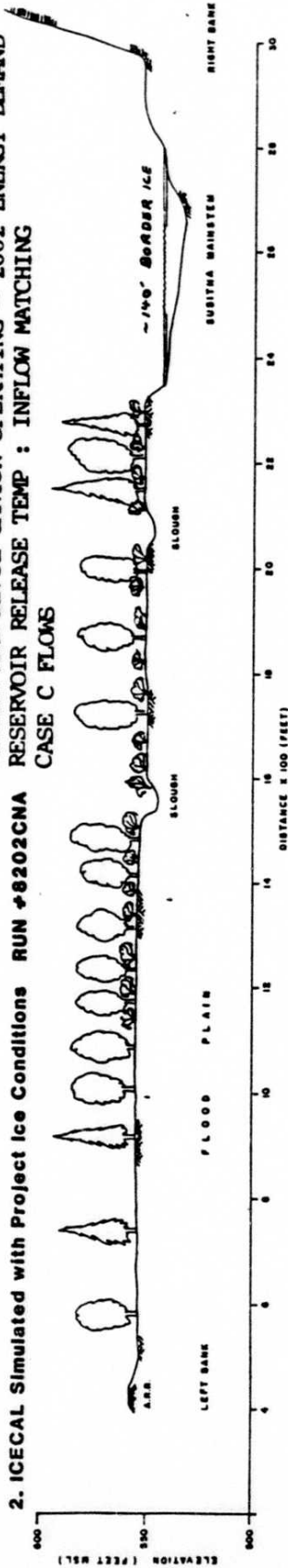


1. Natural Ice Conditions (1983)

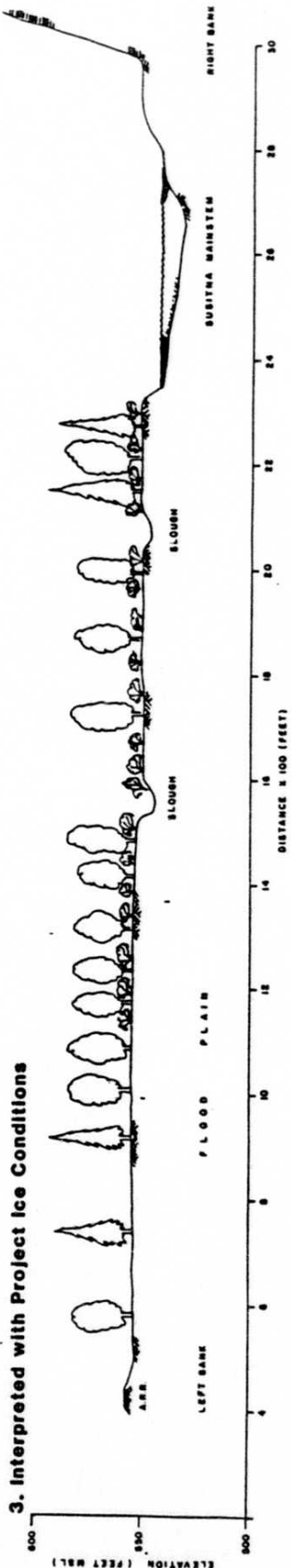


WINTER 1982-83  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

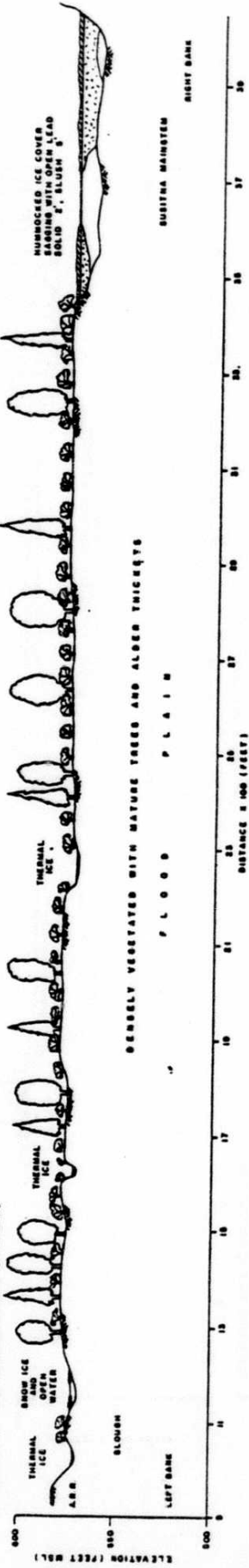
2. ICECAL Simulated with Project Ice Conditions RUN #8202CNA



3. Interpreted with Project Ice Conditions

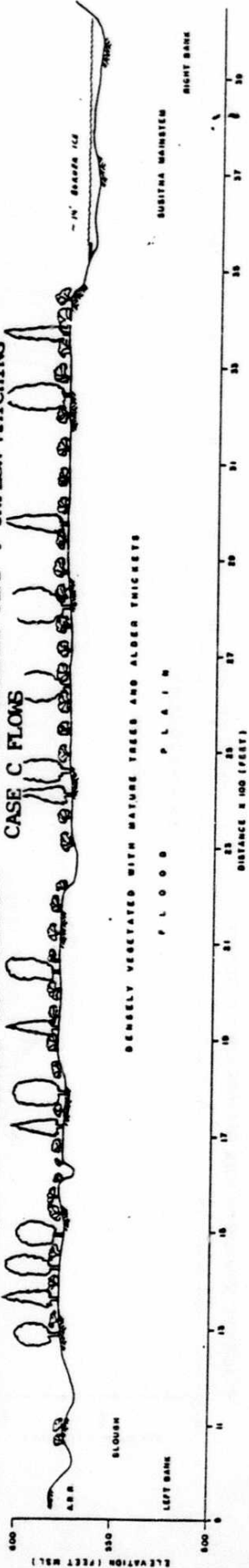


1. Natural Ice Conditions (1983)

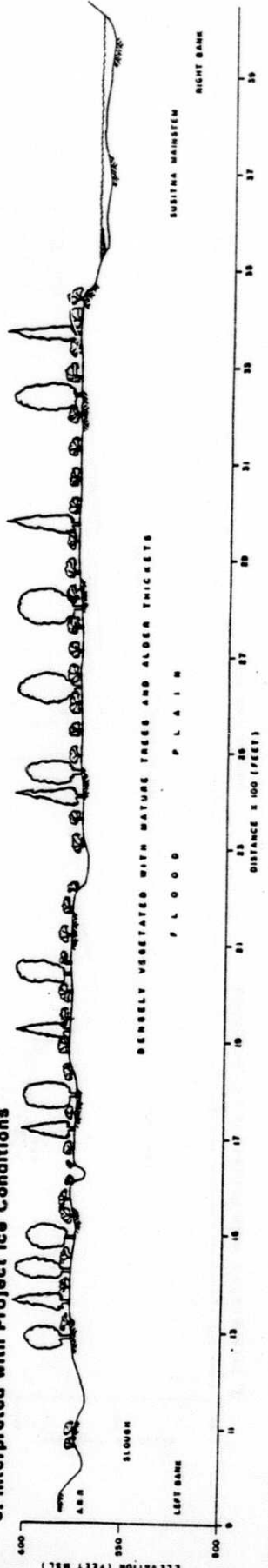


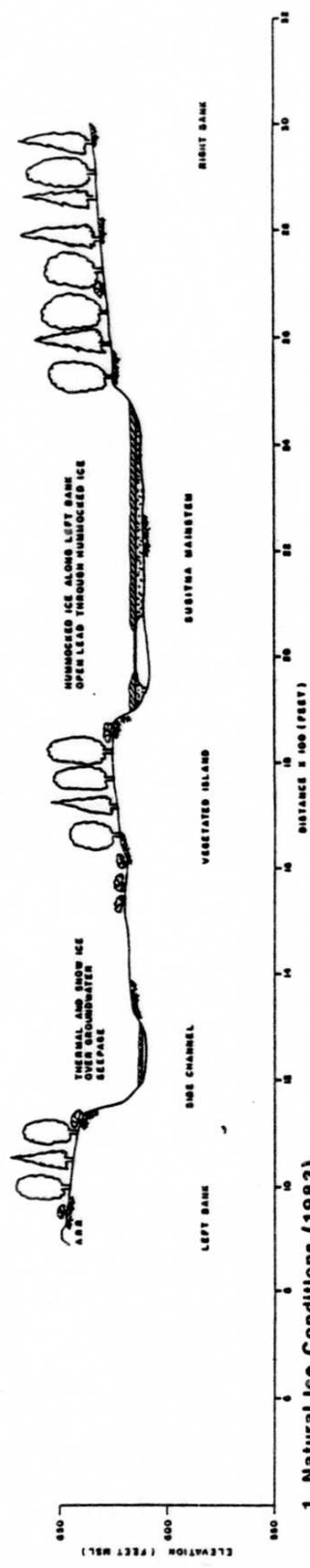
2. ICECAL Simulated with Project Ice Conditions RUN #8202CNA

WINTER 1982-83  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS



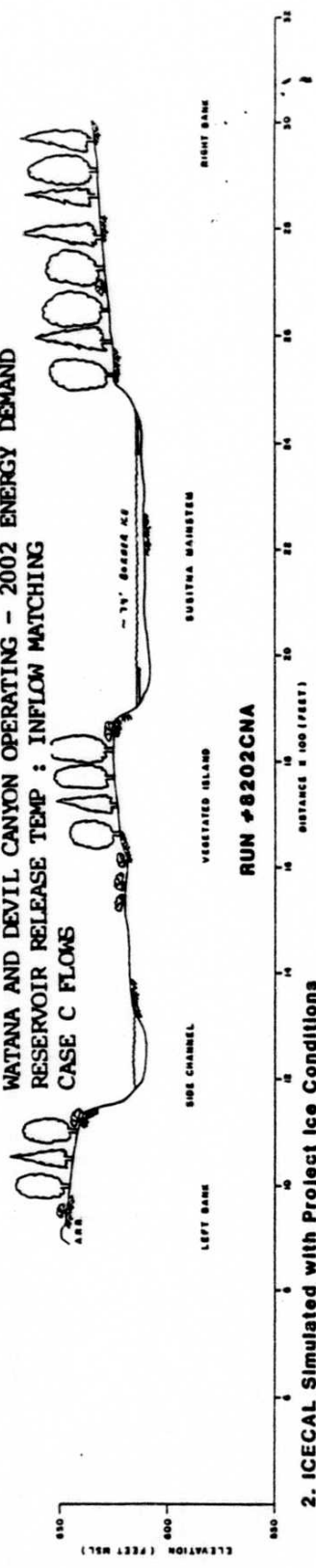
3. Interpreted with Project Ice Conditions



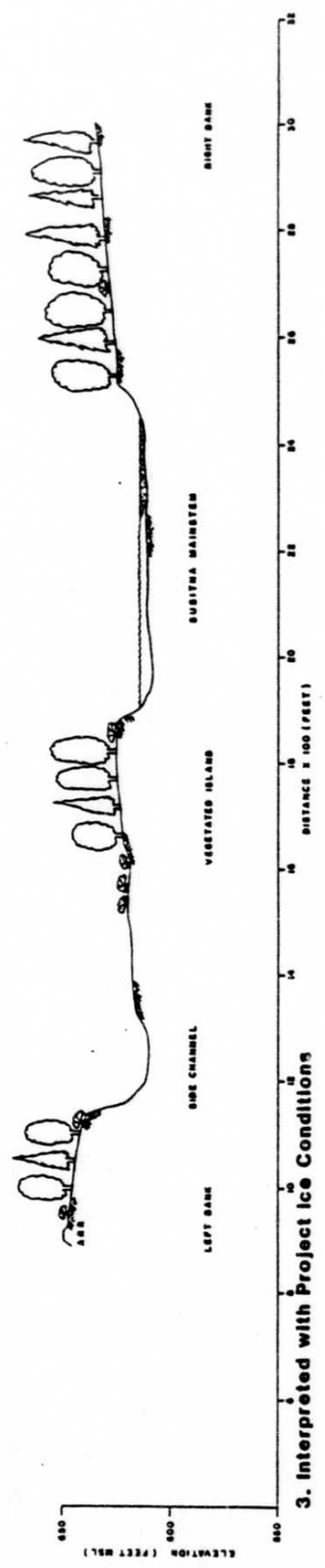


1. Natural ice Conditions (1983)

WINTER 1982-83  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

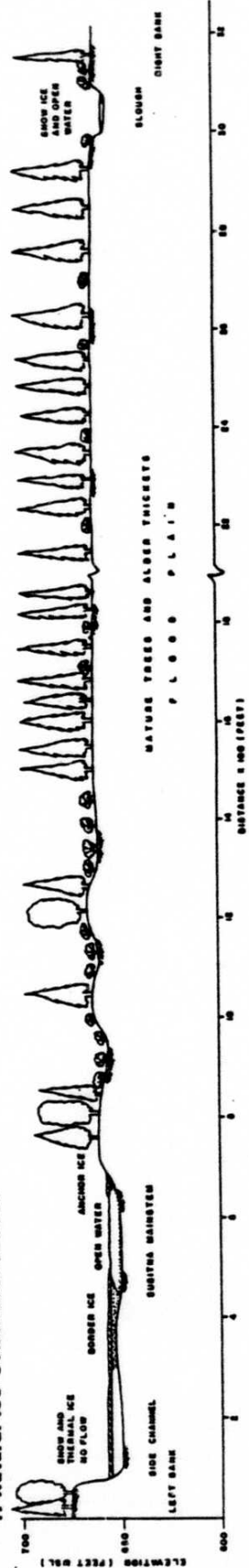


2. ICECAL Simulated with Project Ice Conditions



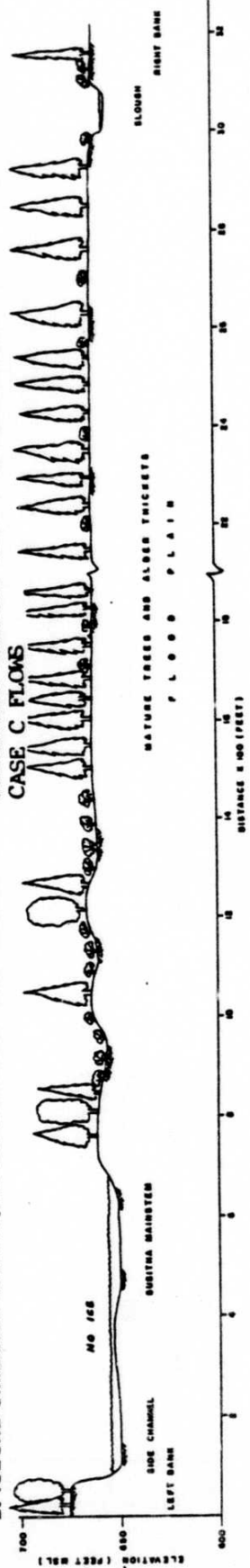
3. Interpreted with Project Ice Conditions

**1. Natural Ice Conditions (1983)**

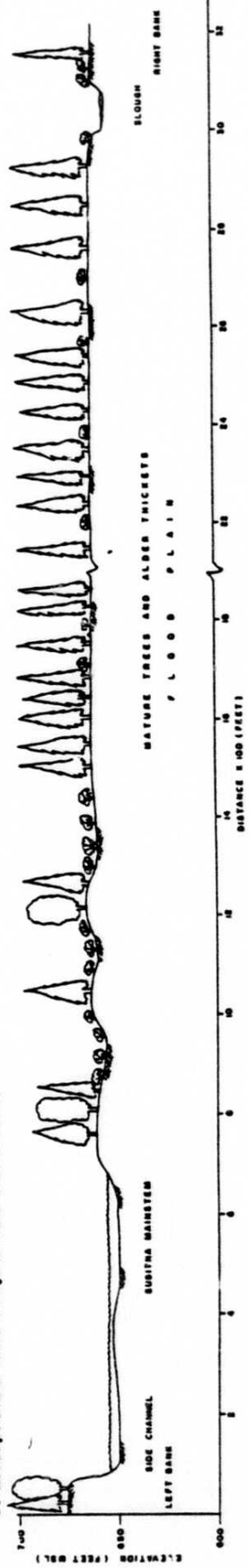


WINTER 1982-83  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

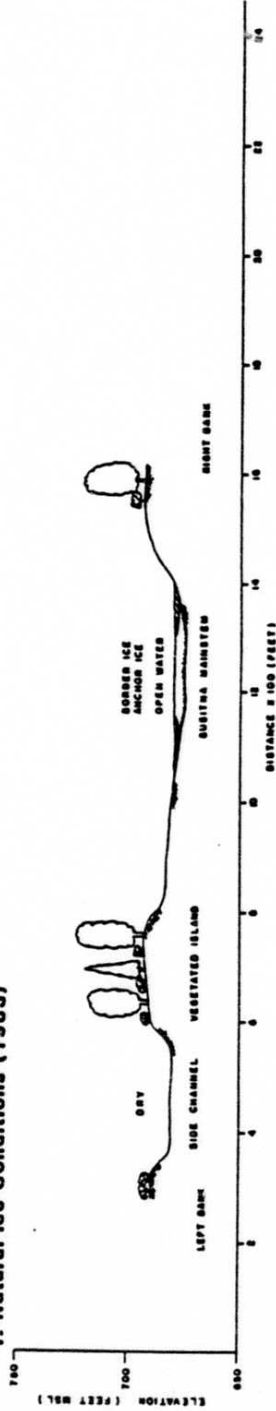
**2. ICECAL Simulated with Project Ice Conditions RUN #8202CNA**



**3. Interpreted with Project Ice Conditions**

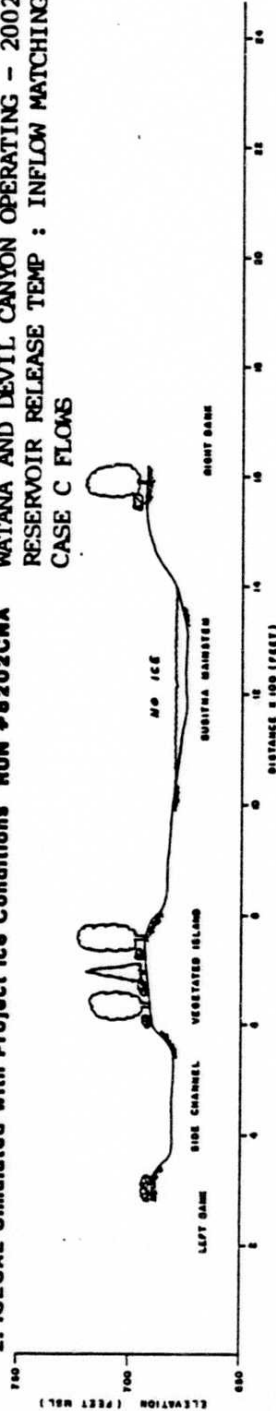


1. Natural ice Conditions (1983)

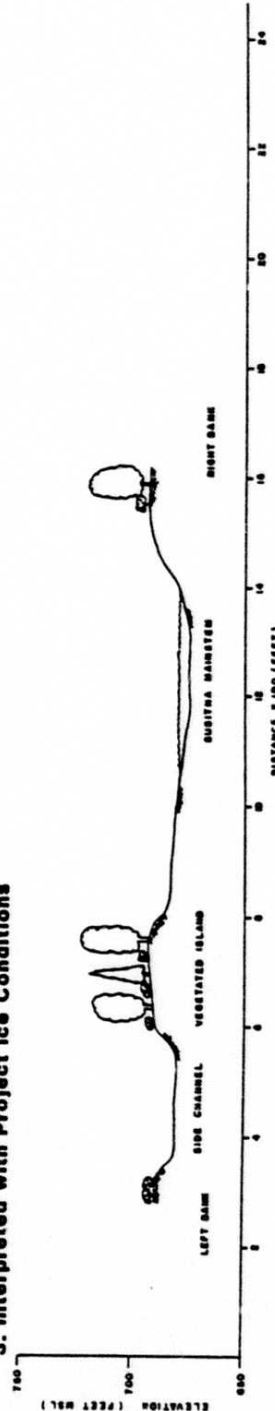


WINTER 1982-83  
 WATANA AND DEVIL CANYON OPERATING - 2002 ENERGY DEMAND  
 RESERVOIR RELEASE TEMP : INFLOW MATCHING  
 CASE C FLOWS

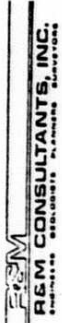
2. ICECAL Simulated with Project Ice Conditions RUN #8202CNA



3. Interpreted with Project Ice Conditions



PREPARED BY:



1980 CROSS SECTION SURVEY  
 RIVER MILE 138.4  
 VERTICAL EXAGGERATION 4:1

LRX-44

PREPARED FOR:  
**HARZA-EBASCO**  
 SUSTINA JOINT VENTURE

Exhibit Z

1. National Security Council (NSC)

NSC

2. Central Intelligence Agency (CIA)

CIA

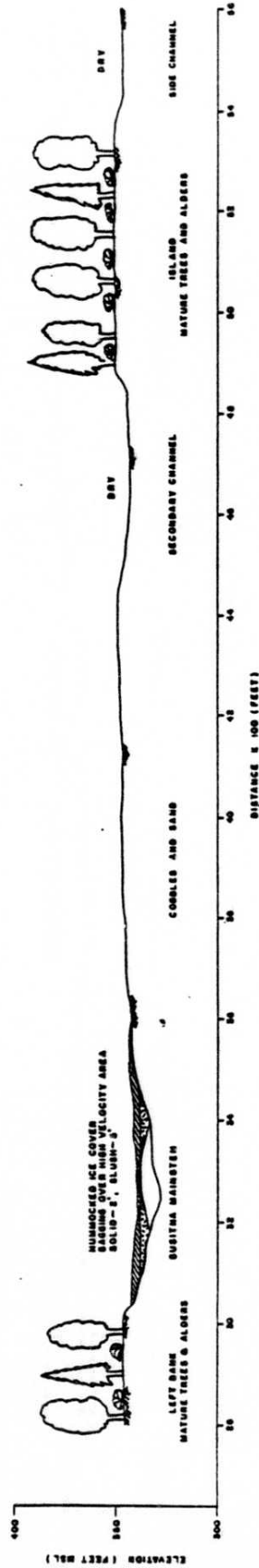
3. Department of Defense (DOD)

DOD

4. State Department

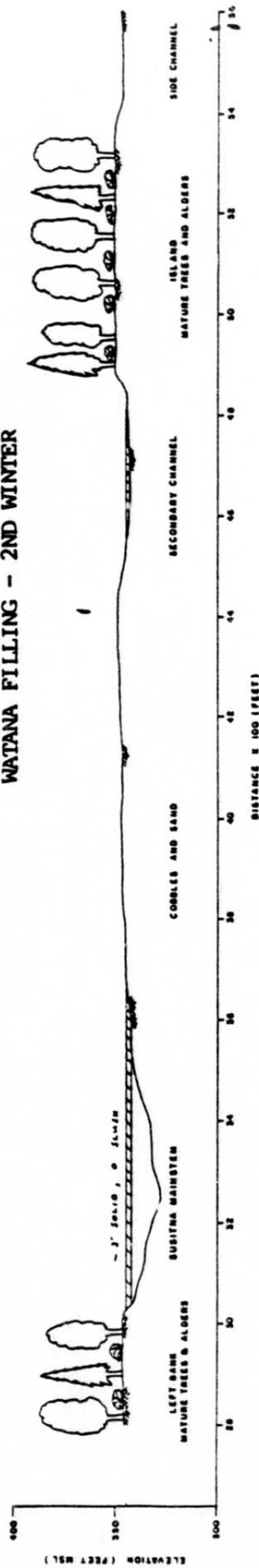
State

1. Natural Ice Conditions (1983)

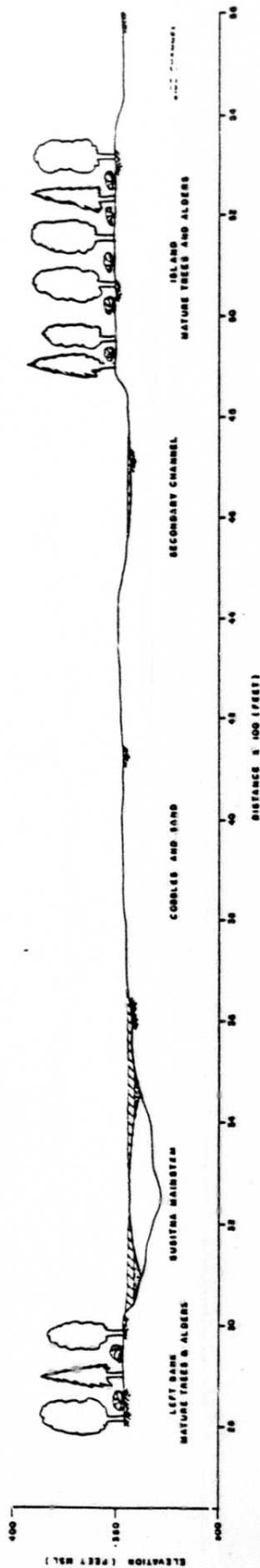


2. ICECAL Simulated with Project Ice Conditions RUN#81F2C-A

WINTER 1981-82  
WATANA FILLING - 2ND WINTER



3. Interpreted with Project Ice Conditions



PREPARED BY:

WATER ENGINEERS & SURVEYORS, INC.

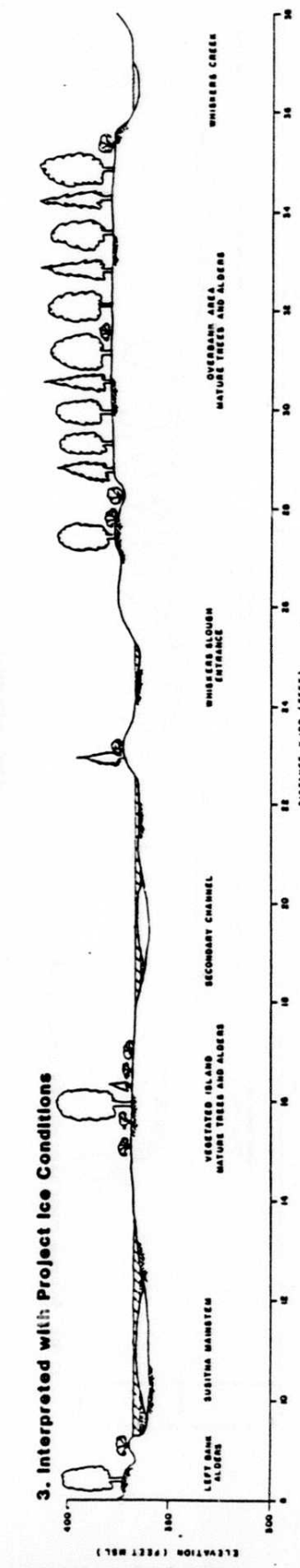
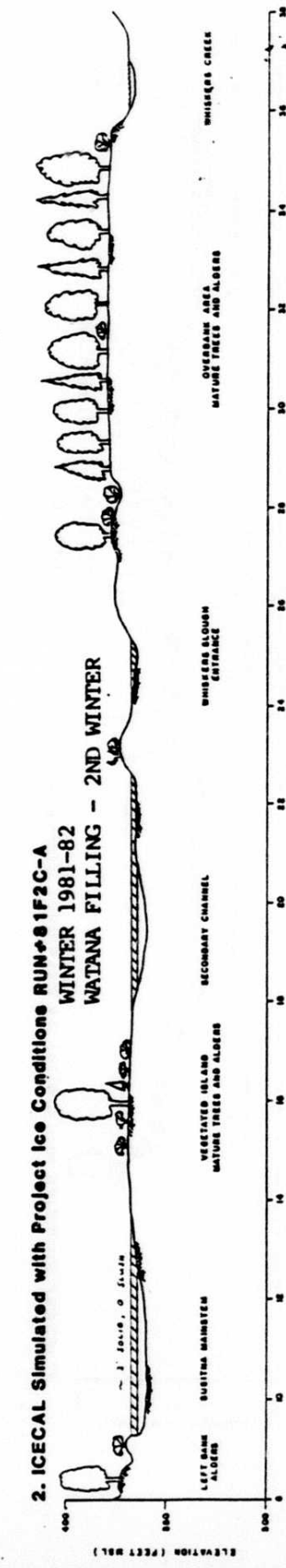
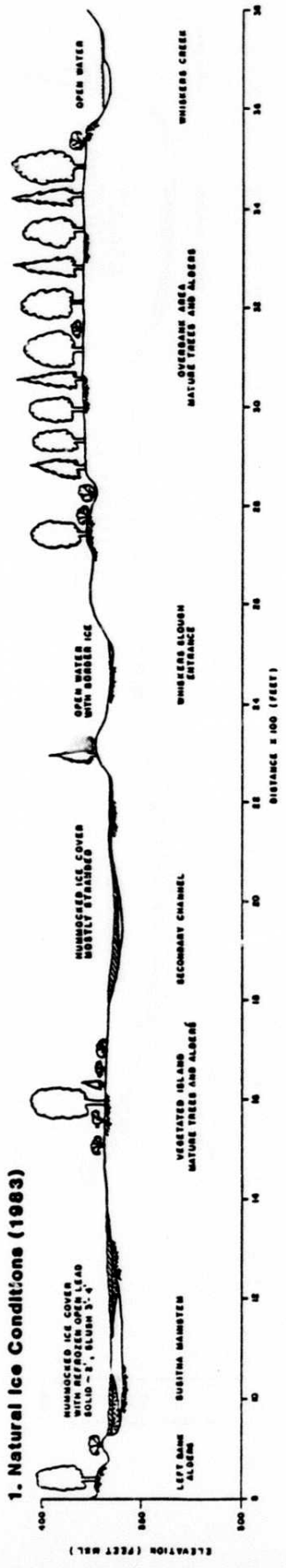
RX-

1982 CROSS SECTION SURVEY  
RI MAILE 6

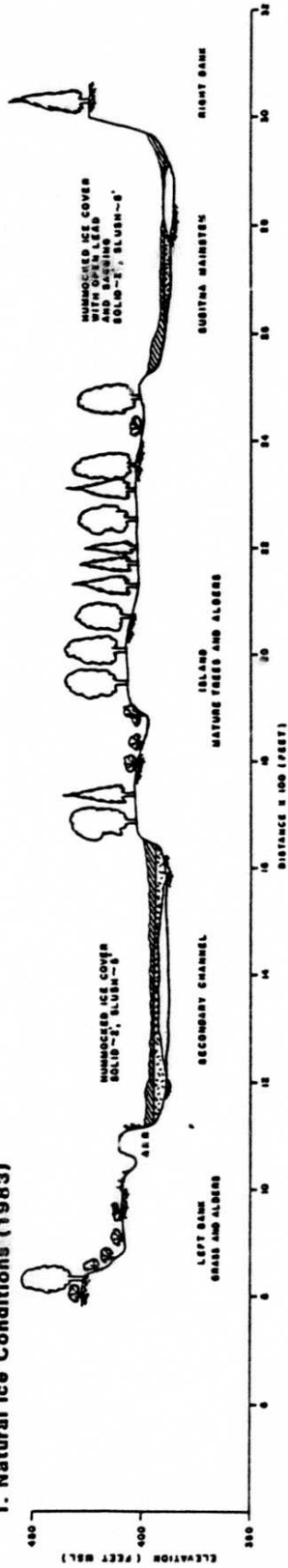
PREPARED FOR:

WATER ENGINEERS & SURVEYORS, INC.



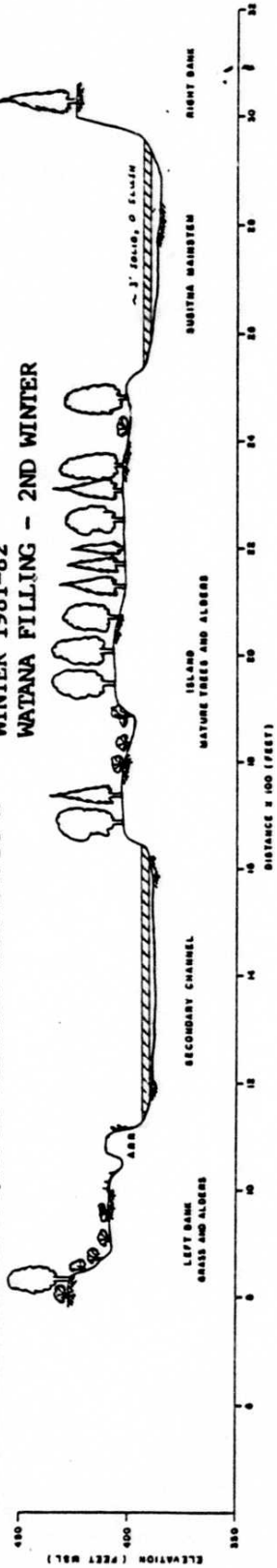


1. Natural Ice Conditions (1983)

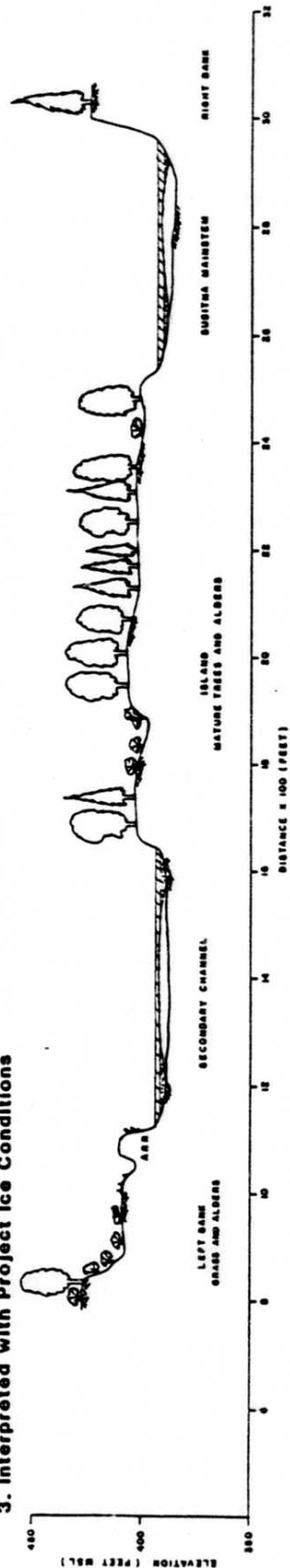


2. ICECAL Simulated with Project Ice Conditions RUN#81F2C-A

WINTER 1981-82  
WATANA FILLING - 2ND WINTER



3. Interpreted with Project Ice Conditions



PREPARED BY:

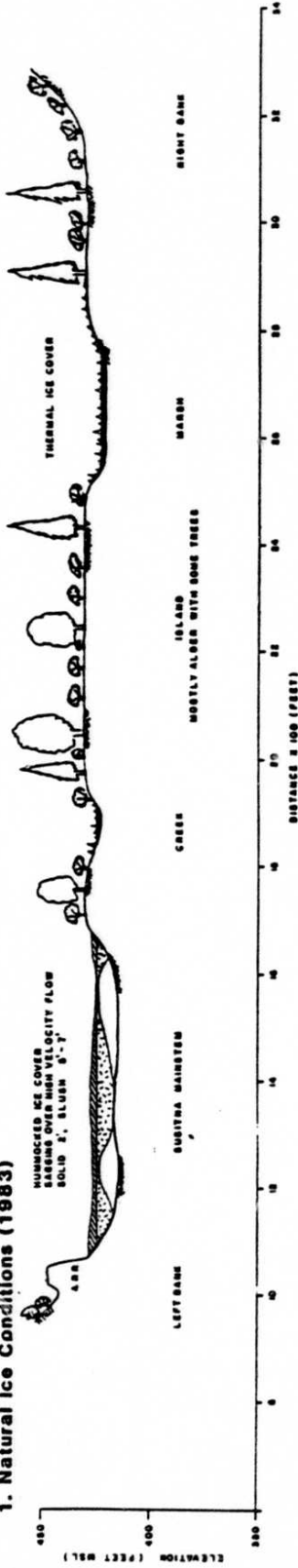
BEEM LUNSLIANTIS, INC.  
10000 10TH AVENUE S.W.  
BOULDER, COLORADO 80501

X

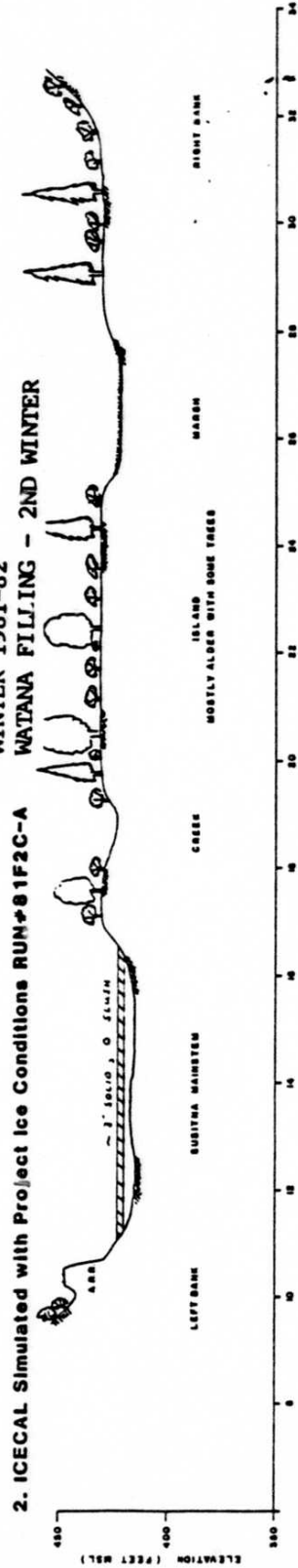
1980 CROSS SECTION SURVEY  
R MIL 4.8  
VERTICAL EXAGGERATION 4:1

PREPARED FOR:  
"JAN" EBA  
CENTRA JOINT VENTURE

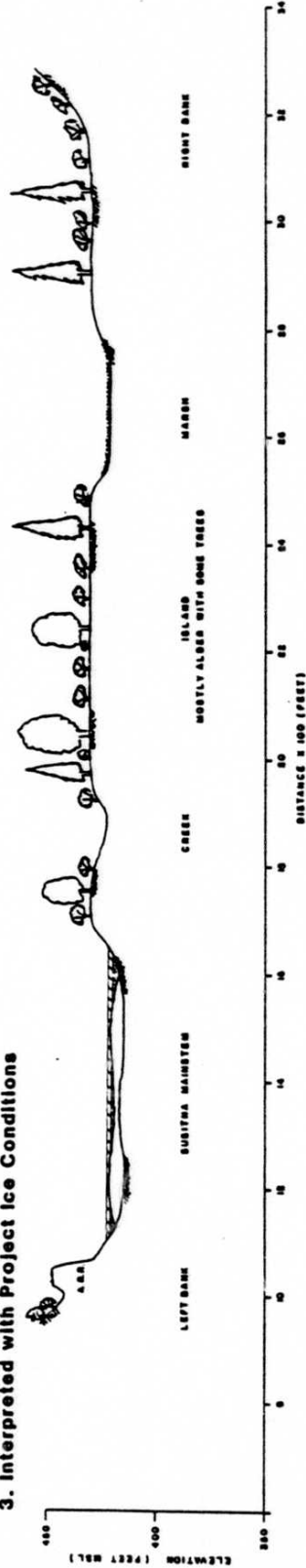
1. Natural Ice Conditions (1983)



2. ICECAL Simulated with Project Ice Conditions RUN#81F2C-A  
WINTER 1981-82  
WATANA FILLING - 2ND WINTER



3. Interpreted with Project Ice Conditions



PREPARED BY:

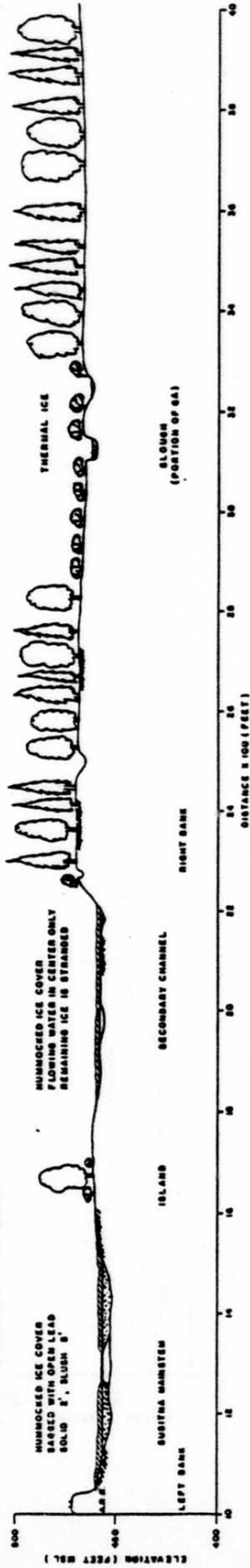
ES&M  
R.L. CONLANT, INC.  
CONSULTING ENGINEERS

19X-10

1981 CROSS SECTION SURVEY  
R.M. - 108.  
VERTICAL ENLARGEMENT 4:1

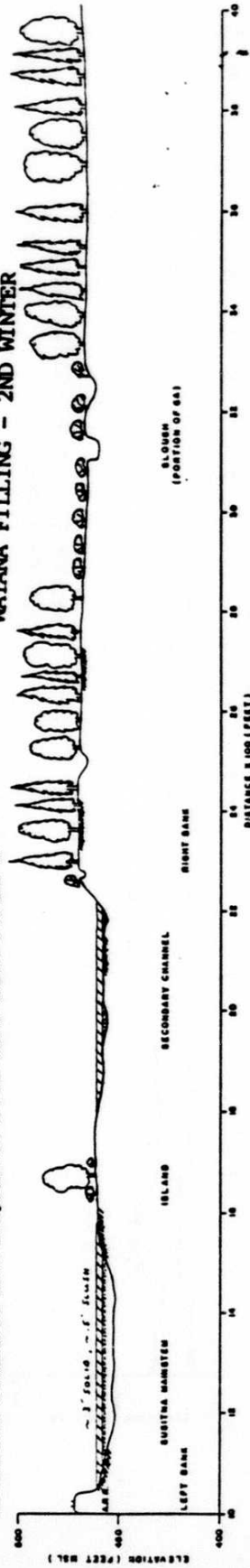
PREPARED FOR:  
HWA-EP-65  
SUSTINA JOINT VENTURE

1. Natural Ice Conditions (1983)

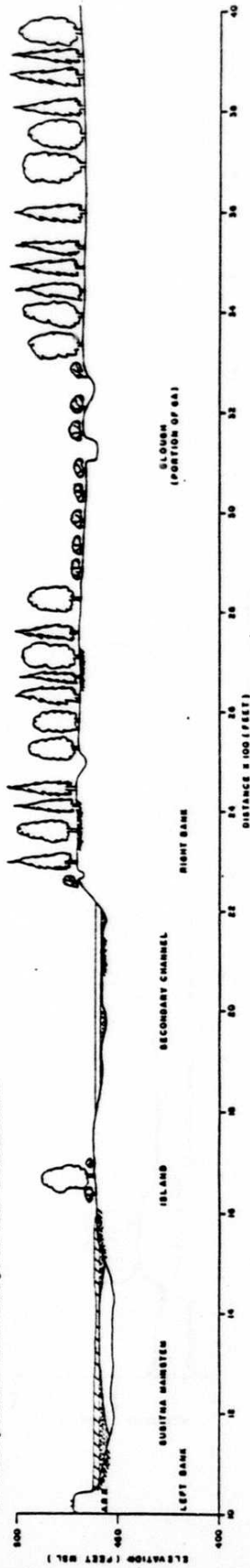


2. ICECAL Simulated with Project Ice Conditions RUN #81F2C-A

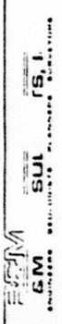
WINTER 1981-82  
WATANA FILLING - 2ND WINTER



3. Interpreted with Project Ice Conditions



PREPARED BY:



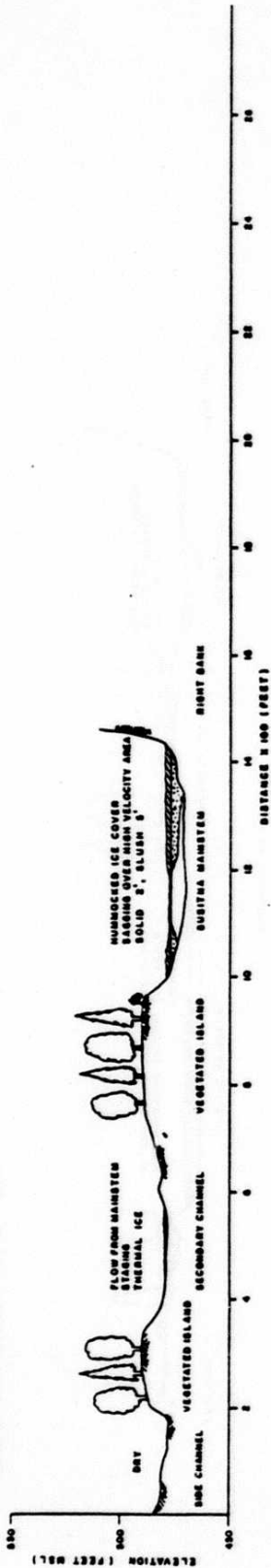
SUI CONSULTANTS, INC.  
SUI  
15

LRX-17

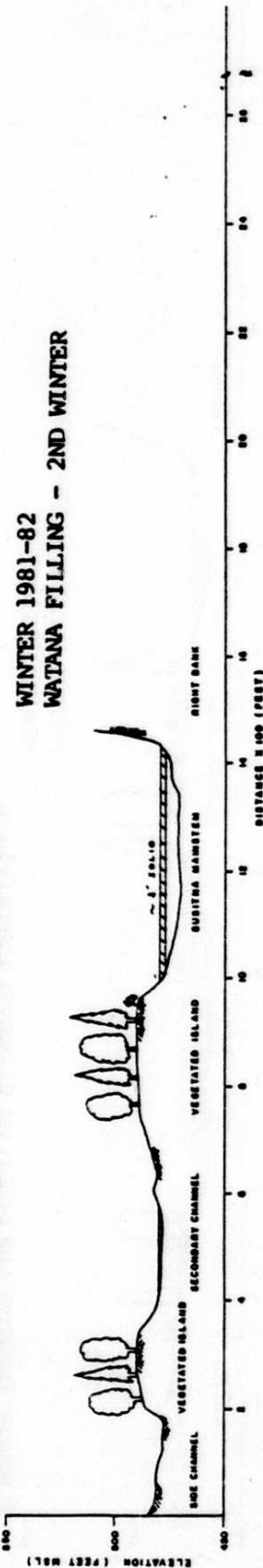
1980 CROSS SECTION SURVEY  
RIVER MILE 112.7  
VE. AL I. GE. JN 4

PREPARED FOR:  
MARZA-BASCOM  
SITNA VENT.

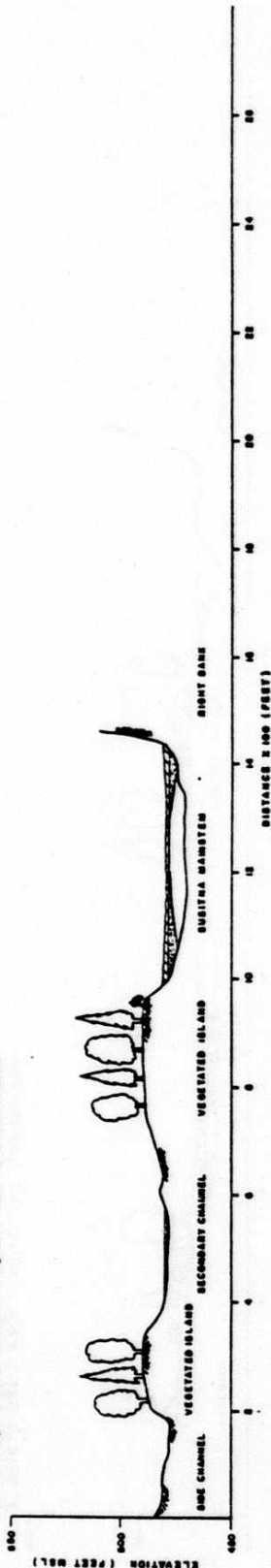
**1. Natural Ice Conditions (1983)**



**2. ICECAL Simulated with Project Ice Conditions RUN#81F2C-A**



**3. Interpreted with Project Ice Conditions**



WINTER 1981-82  
WATANA FILLING - 2ND WINTER

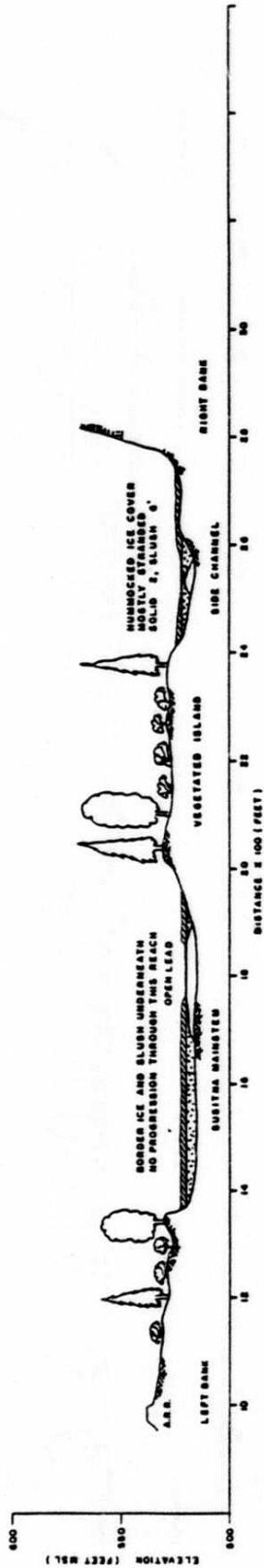
PREPARED BY:

**PRM**  
R E DINE ANT C.  
ENGINEERS ARCHITECTS SURVEYORS

LRX-18.2 RIVER MILE 115.1  
TIC: AG: TIO:

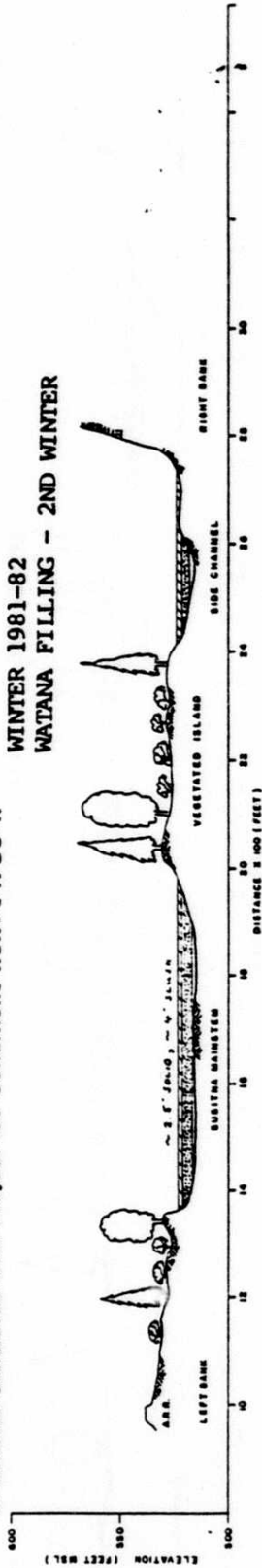
PREPARED FOR:  
**MARZA-EBASCO**  
SUS OINT IE

1. Natural Ice Conditions (1983)

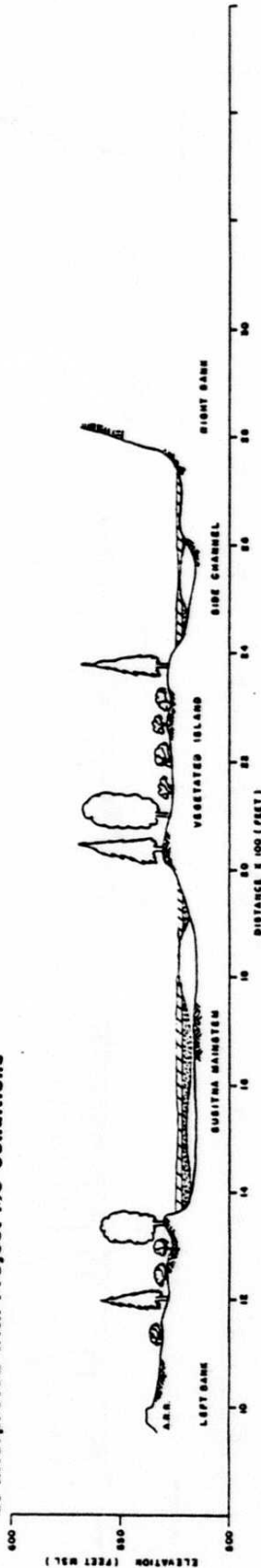


2. ICECAL Simulated with Project Ice Conditions RUN # 212C-A

WINTER 1981-82  
WATANA FILLING - 2ND WINTER



3. Interpreted with Project Ice Conditions



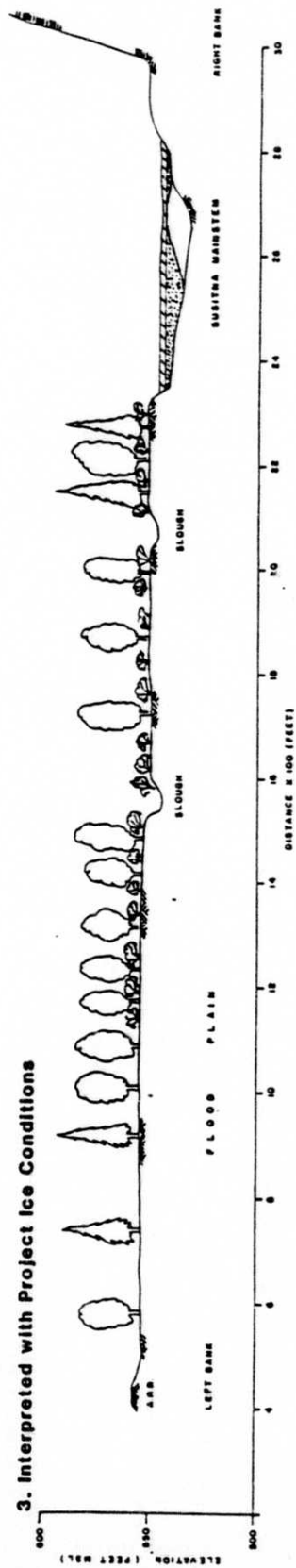
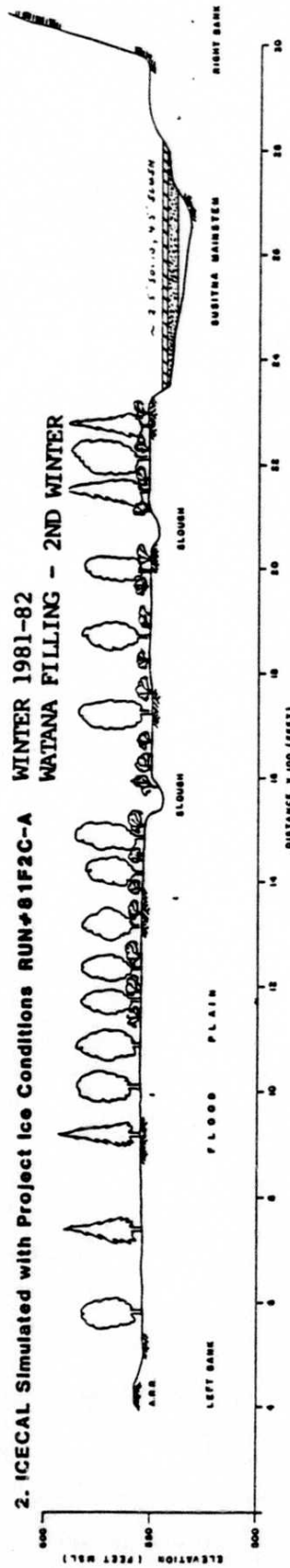
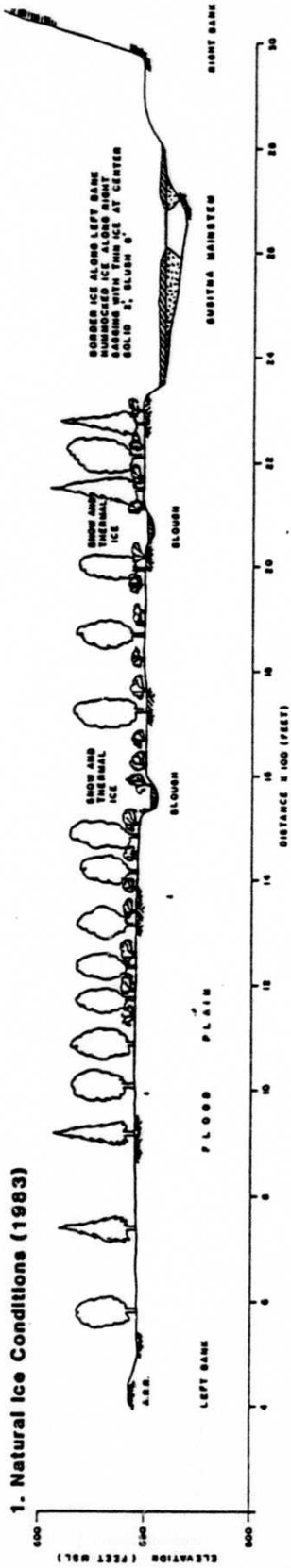
PREPARED BY:

RIWA CONSULTANTS, INC.  
SUSTANA JOINT VENTURE

7X-22

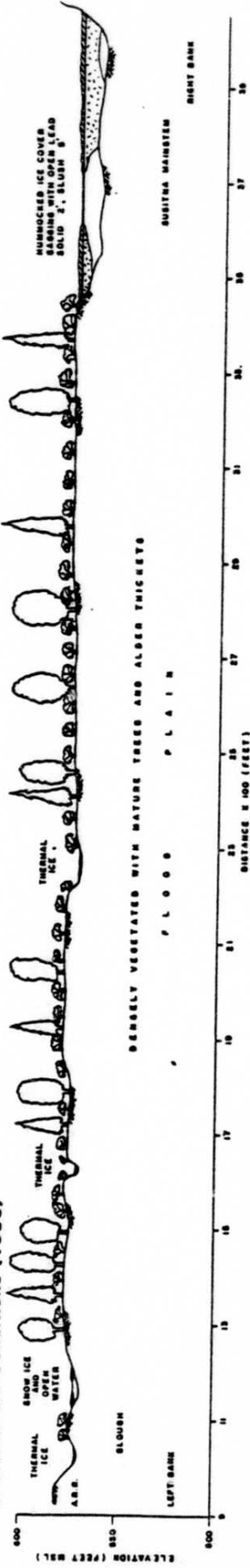
1980 CROSS SECTION SURVEY  
STATION M... 120.  
VERTICAL EXAGGERATION 4:1

PREPARED FOR:  
RIWA CONSULTANTS, INC.  
SUSTANA JOINT VENTURE



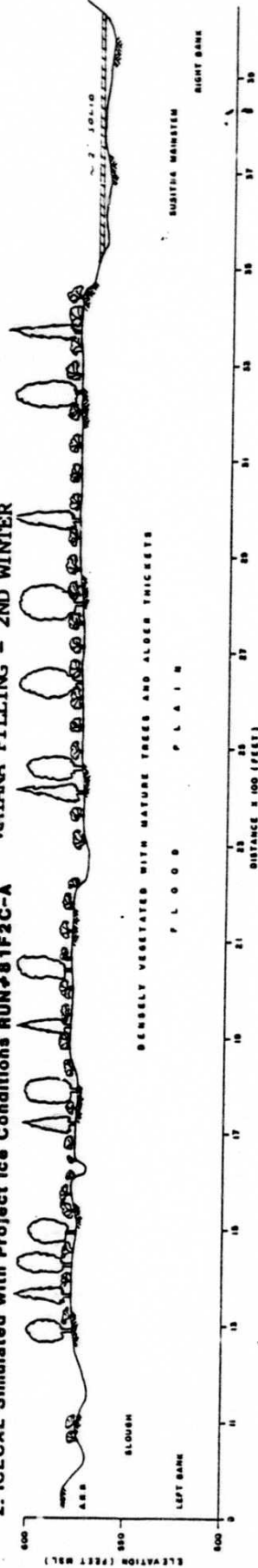


1. Natural Ice Conditions (1983)

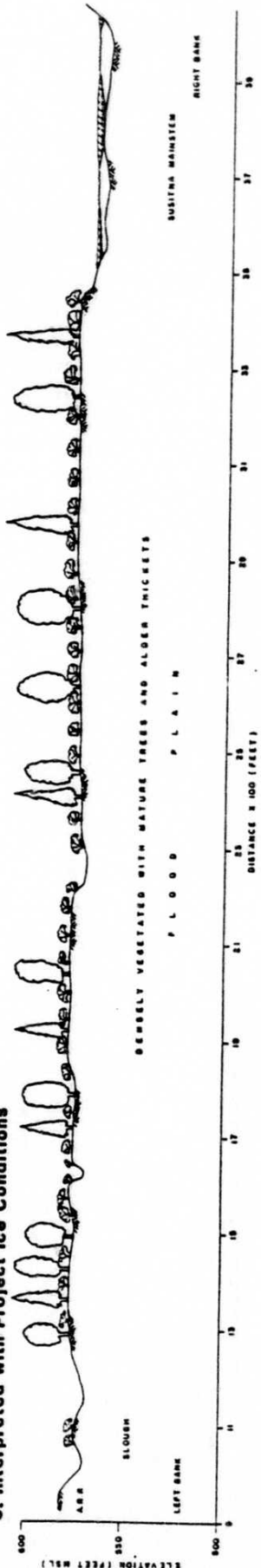


2. ICECAL Simulated with Project Ice Conditions RUN#81F2C-A

WINTER 1981-82  
WATANA FILLING - 2ND WINTER



3. Interpreted with Project Ice Conditions

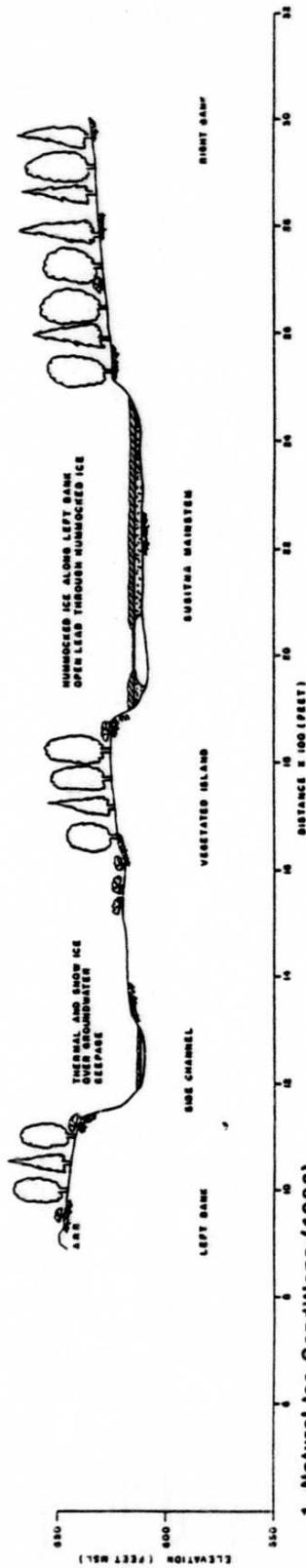


PREPARED BY:

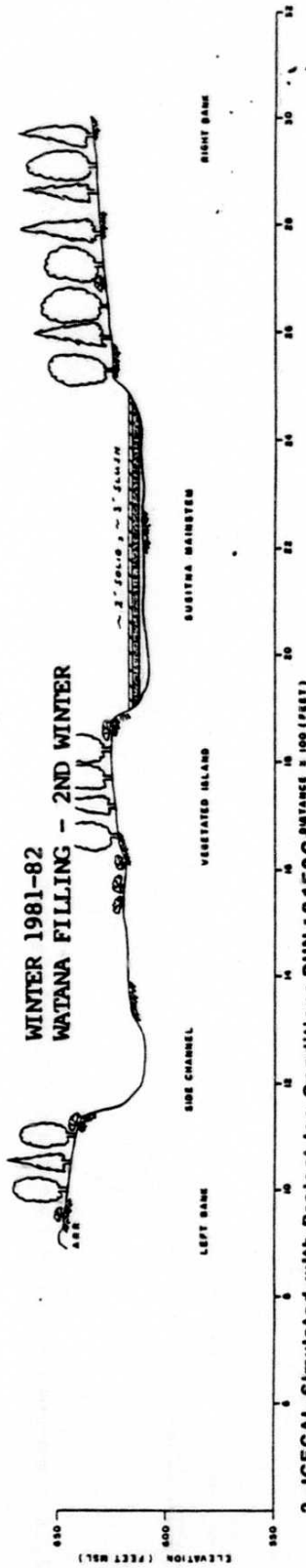


1980 CROSS SECTION SURVEY  
RIVER MILE 4.22.1  
VERTICAL ENLARGEMENT 4:1

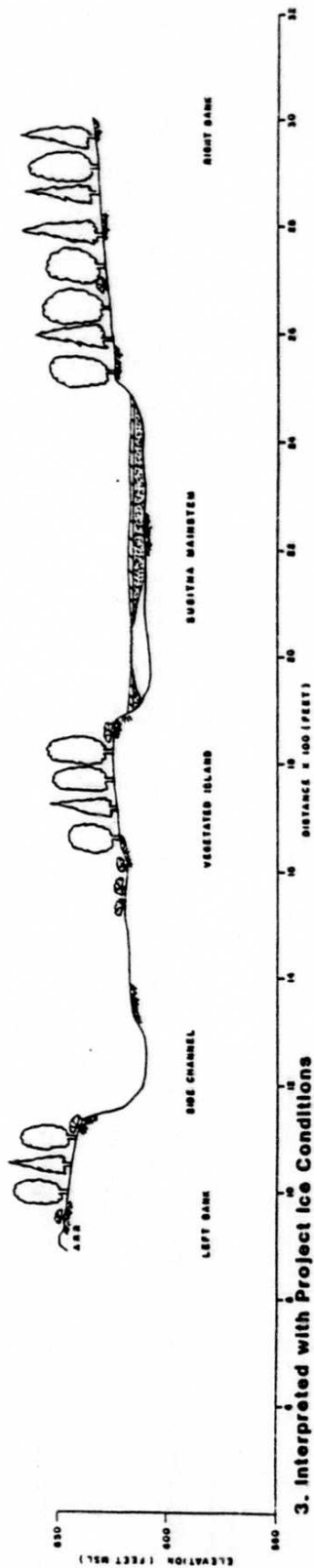
PREPARED FOR:  
JULY 1983  
SUSITNA JOINT VENTURE



1. Natural ice Conditions (1983)

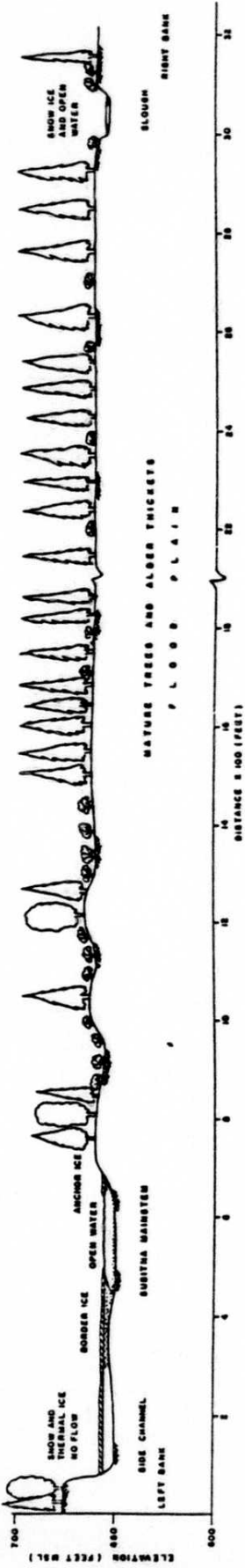


2. ICECAL Simulated with Project Ice Conditions RUN #81F2C-JA



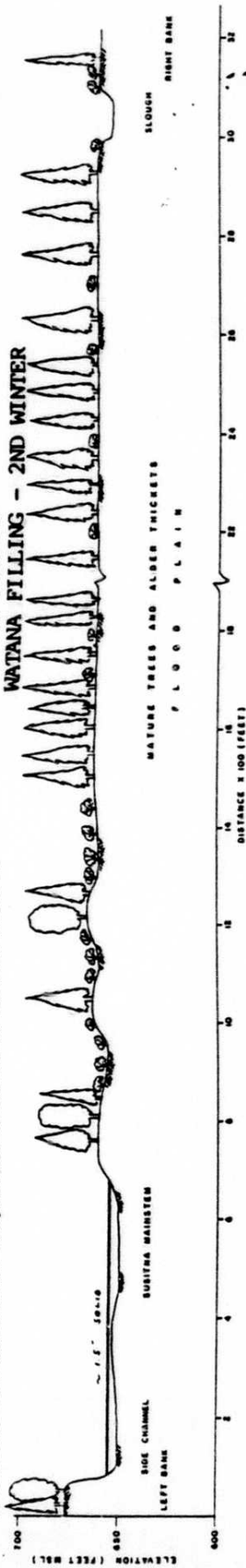
3. Interpreted with Project Ice Conditions

1. Natural Ice Conditions (1983)

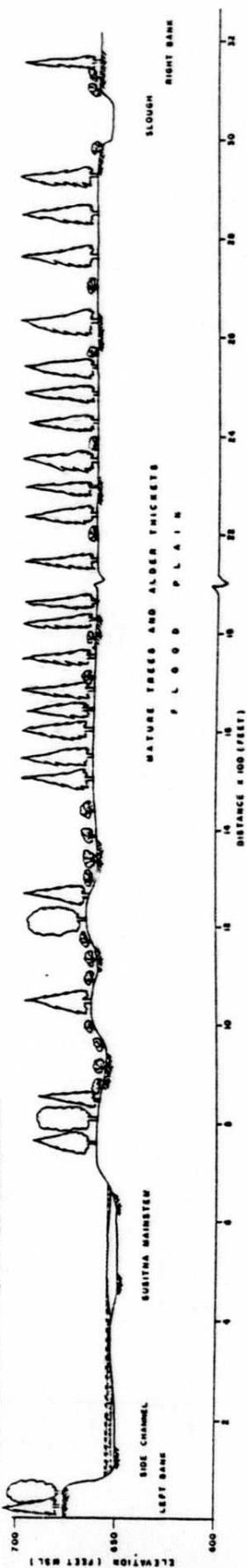


2. ICECAL Simulated with Project Ice Conditions RUN#81F2C-A

WINTER 1981-82  
WATANA FILLING - 2ND WINTER



3. Interpreted with Project Ice Conditions



PREPARED BY:

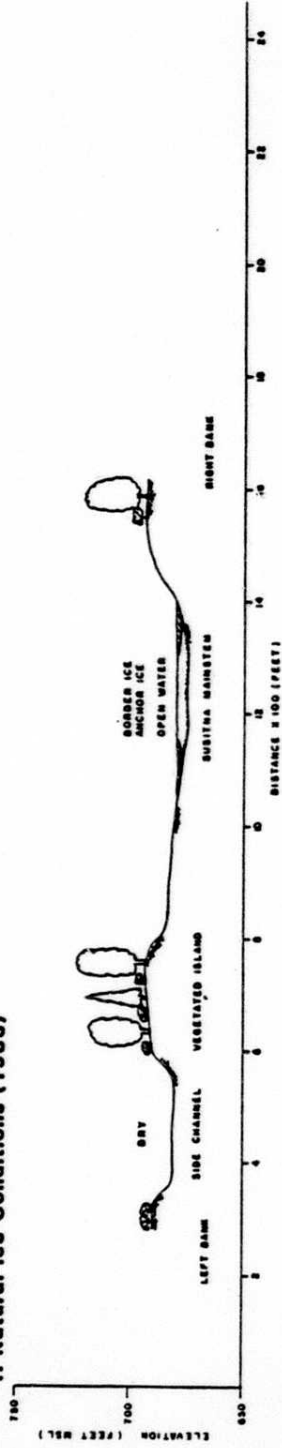
**ERM**  
L.M. (S) S. IN  
DATE

1980 CROSS SECTION SURVEY  
RIVER MILE 134.2  
VER L E: ier/ 4:

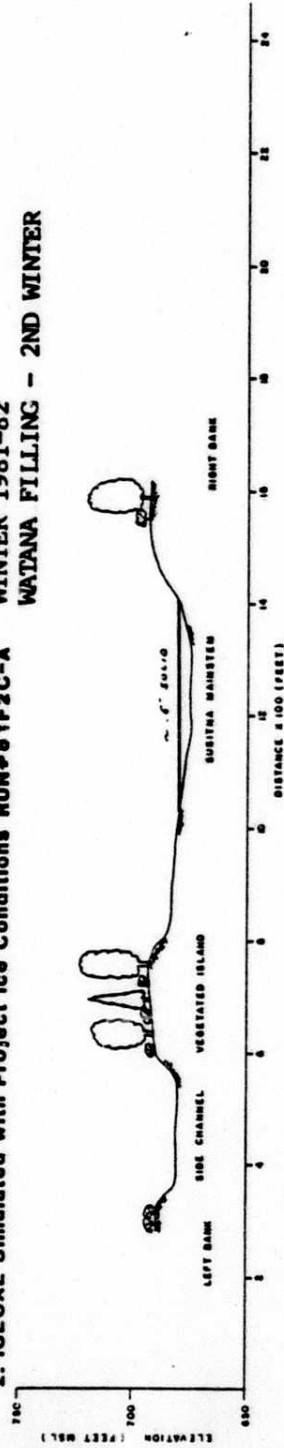
LRX-40

PREPARED FOR:  
**MAKZA-EBASCO**  
TNA - 'ENTU

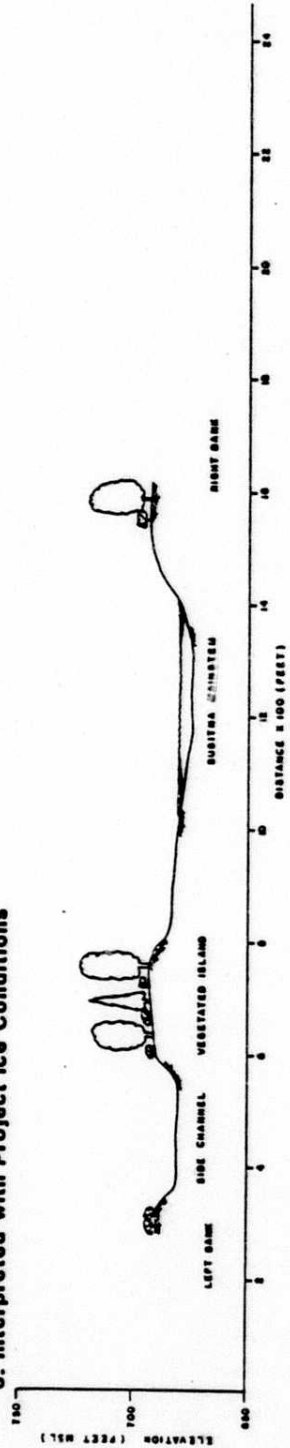
1. Natural Ice Conditions (1983)

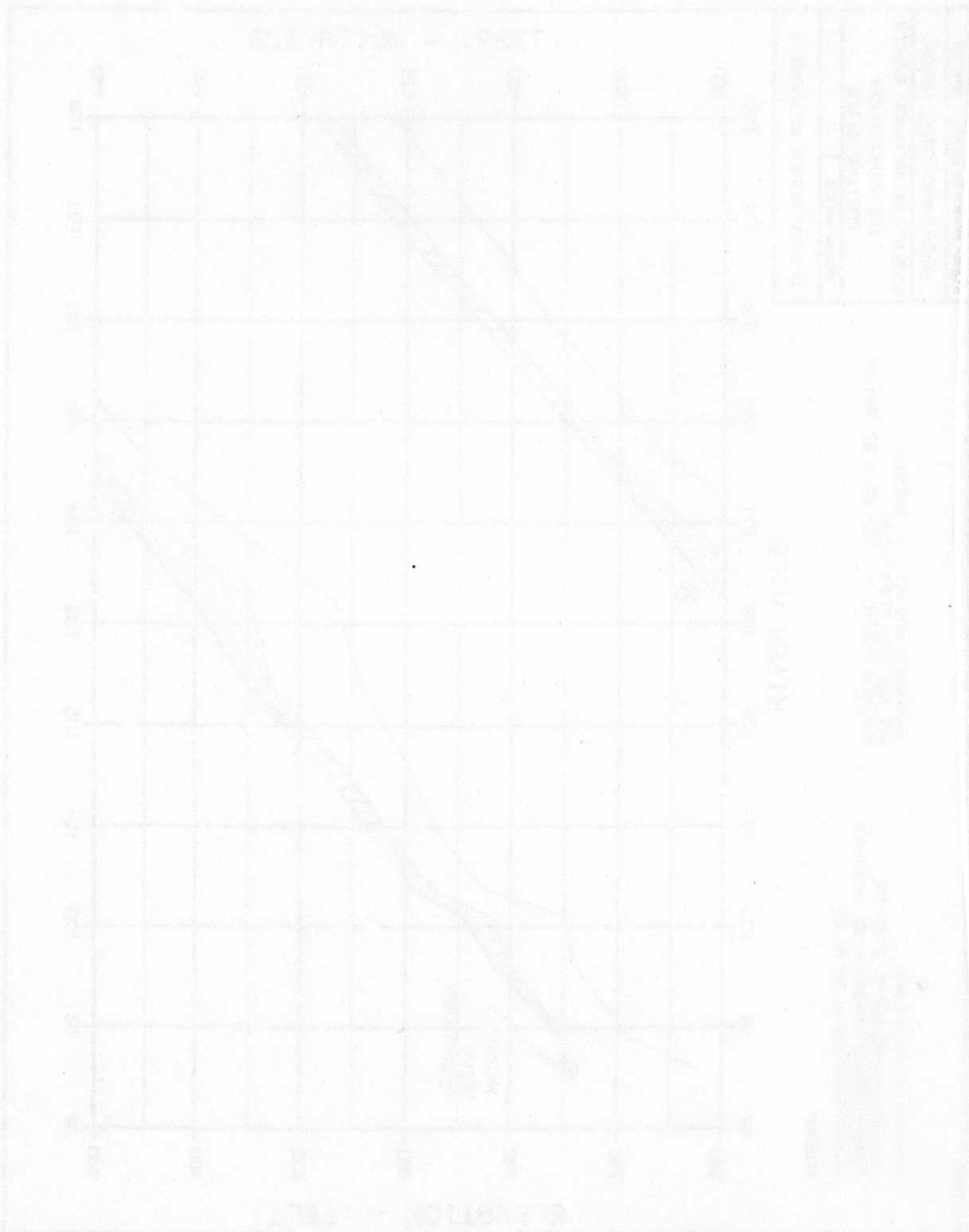


2. ICECAL Simulated with Project Ice Conditions RUN #01F2C-A  
WINTER 1981-82  
WATANA FILLING - 2ND WINTER

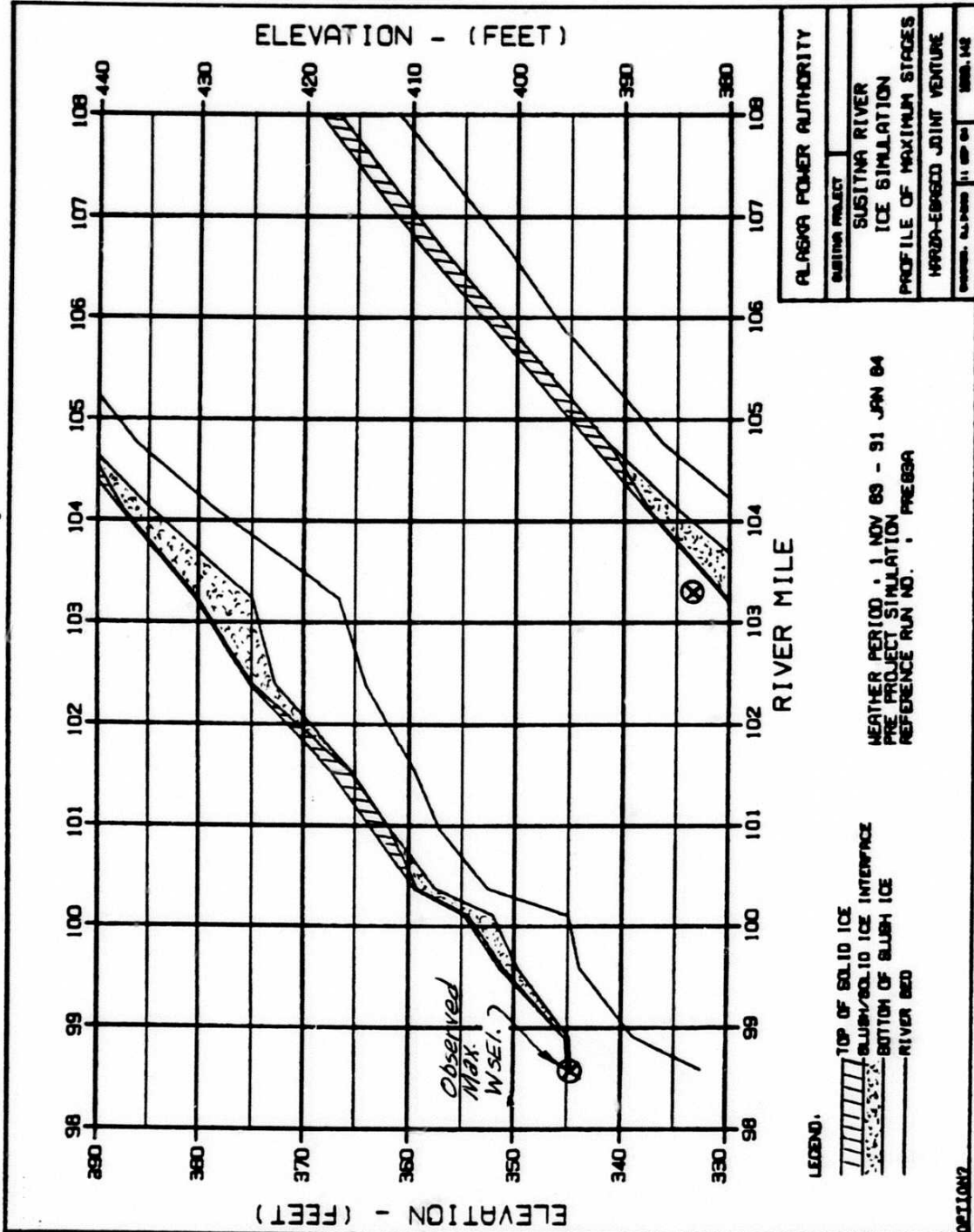


3. Interpreted with Project Ice Conditions

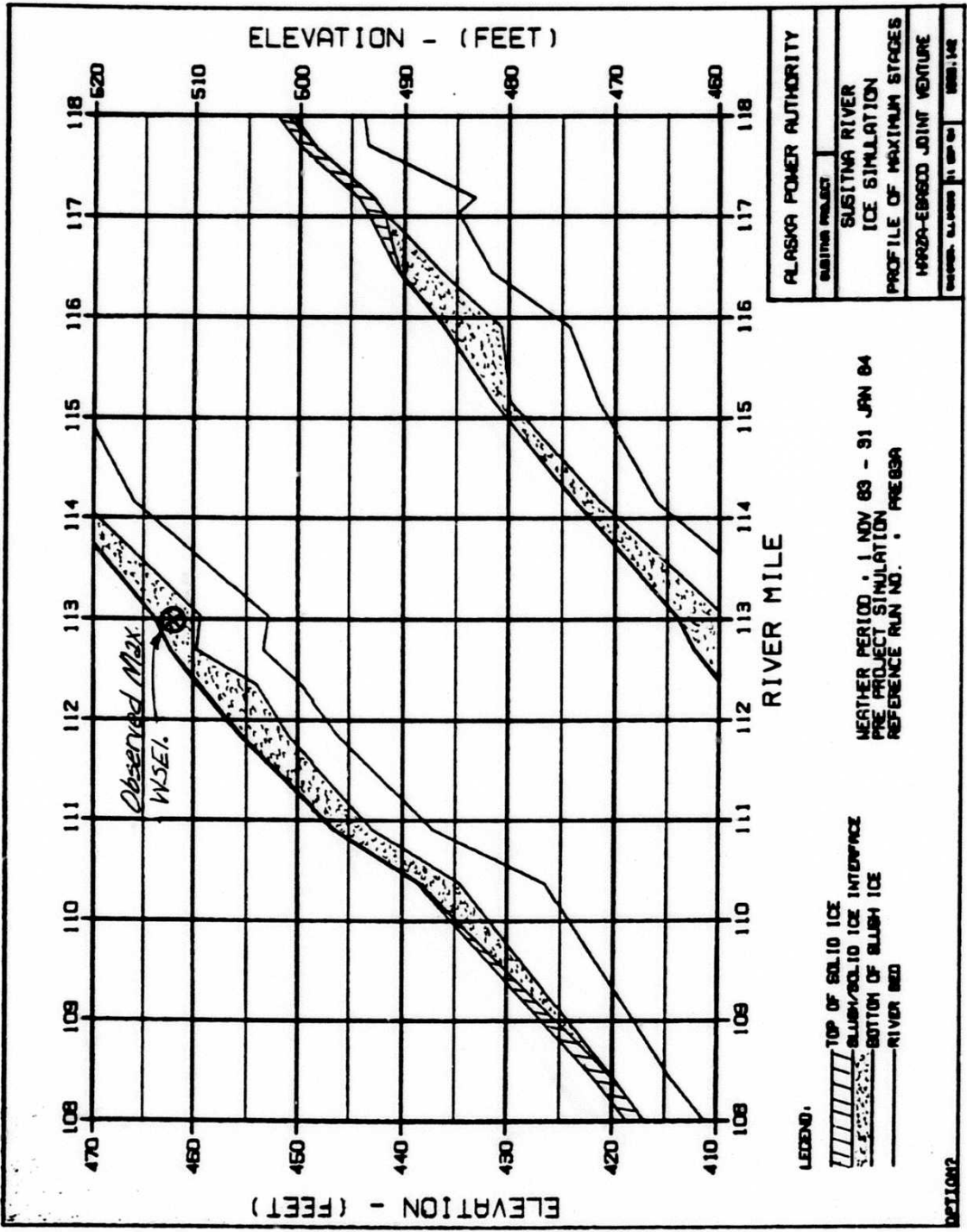




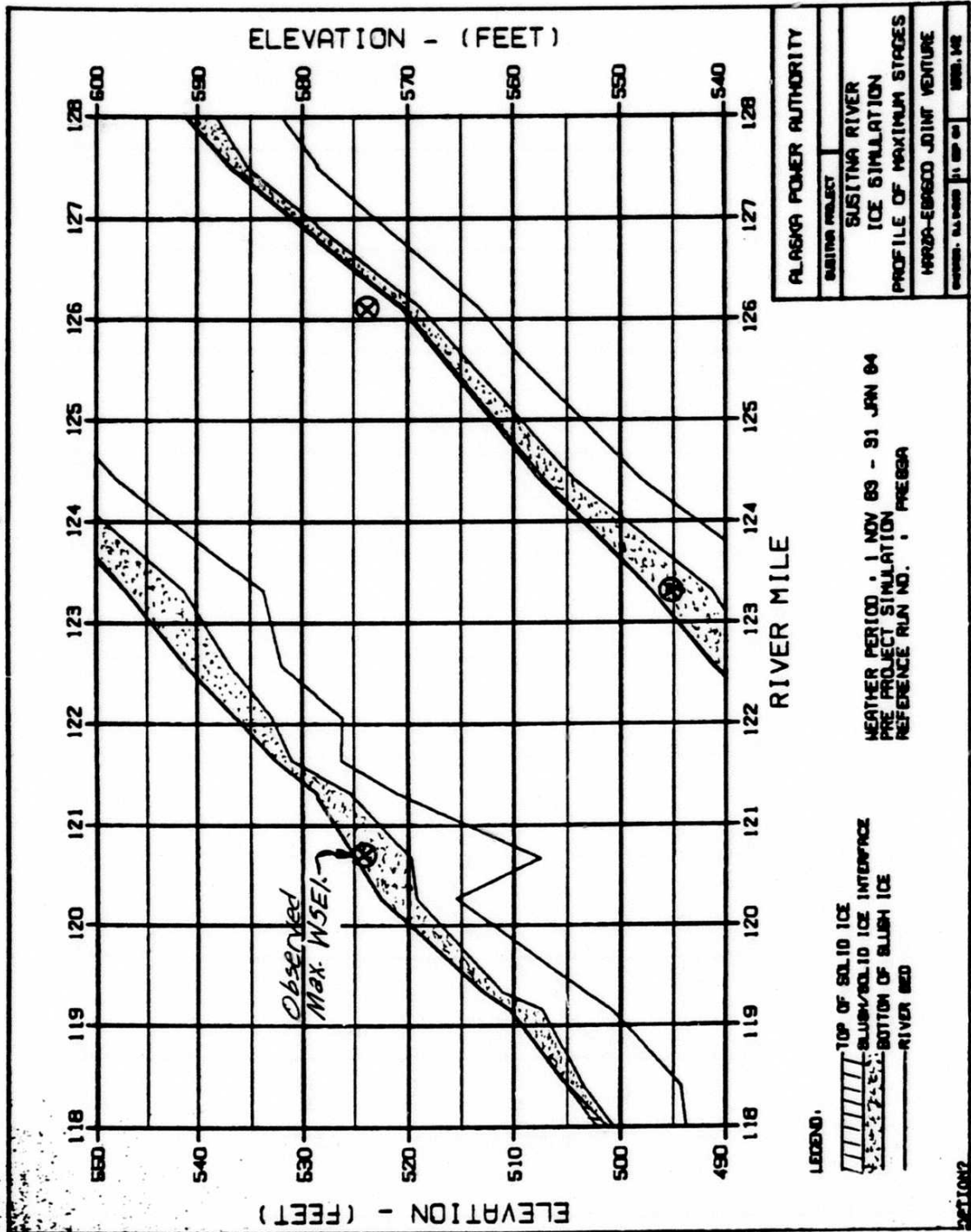
c



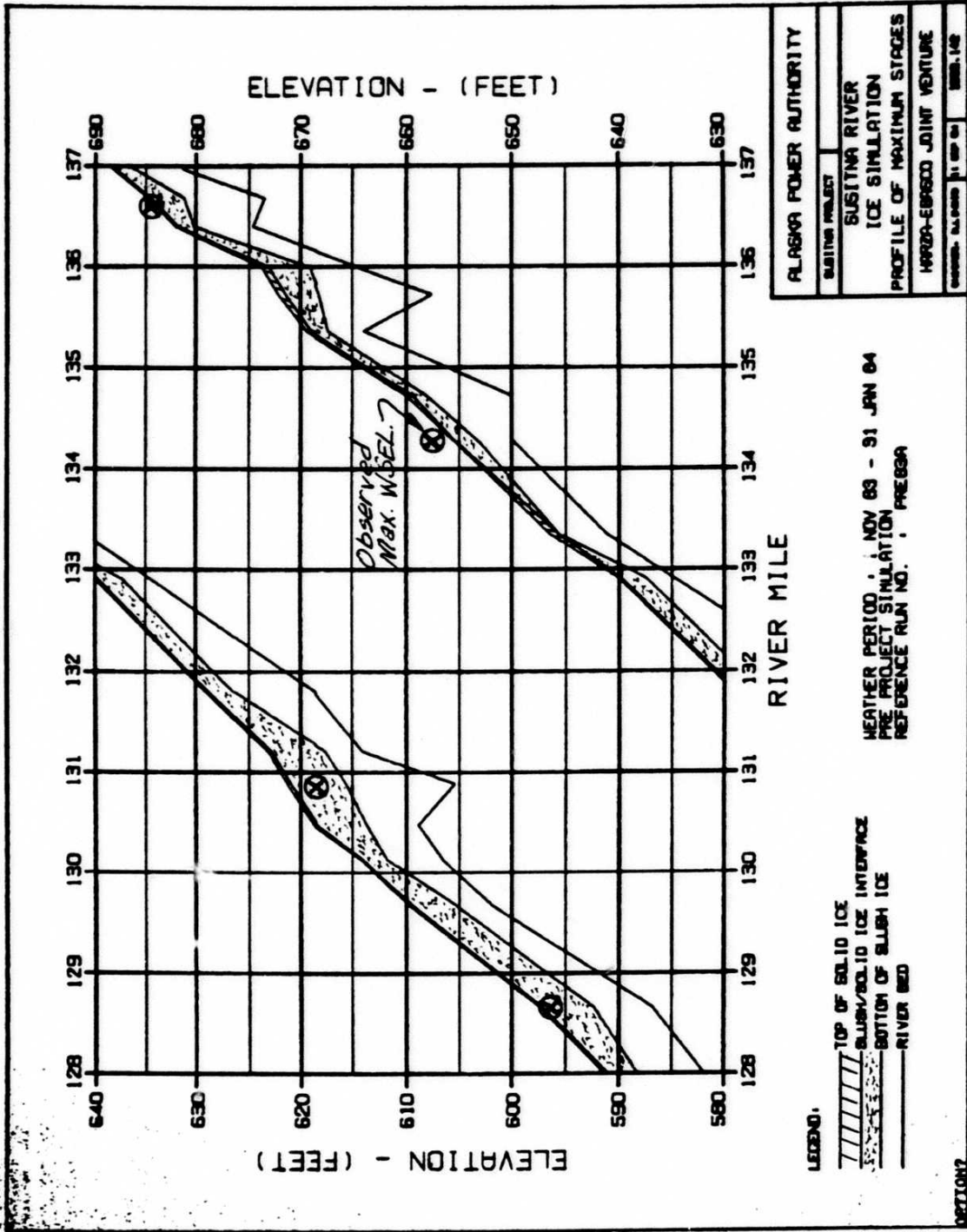
c



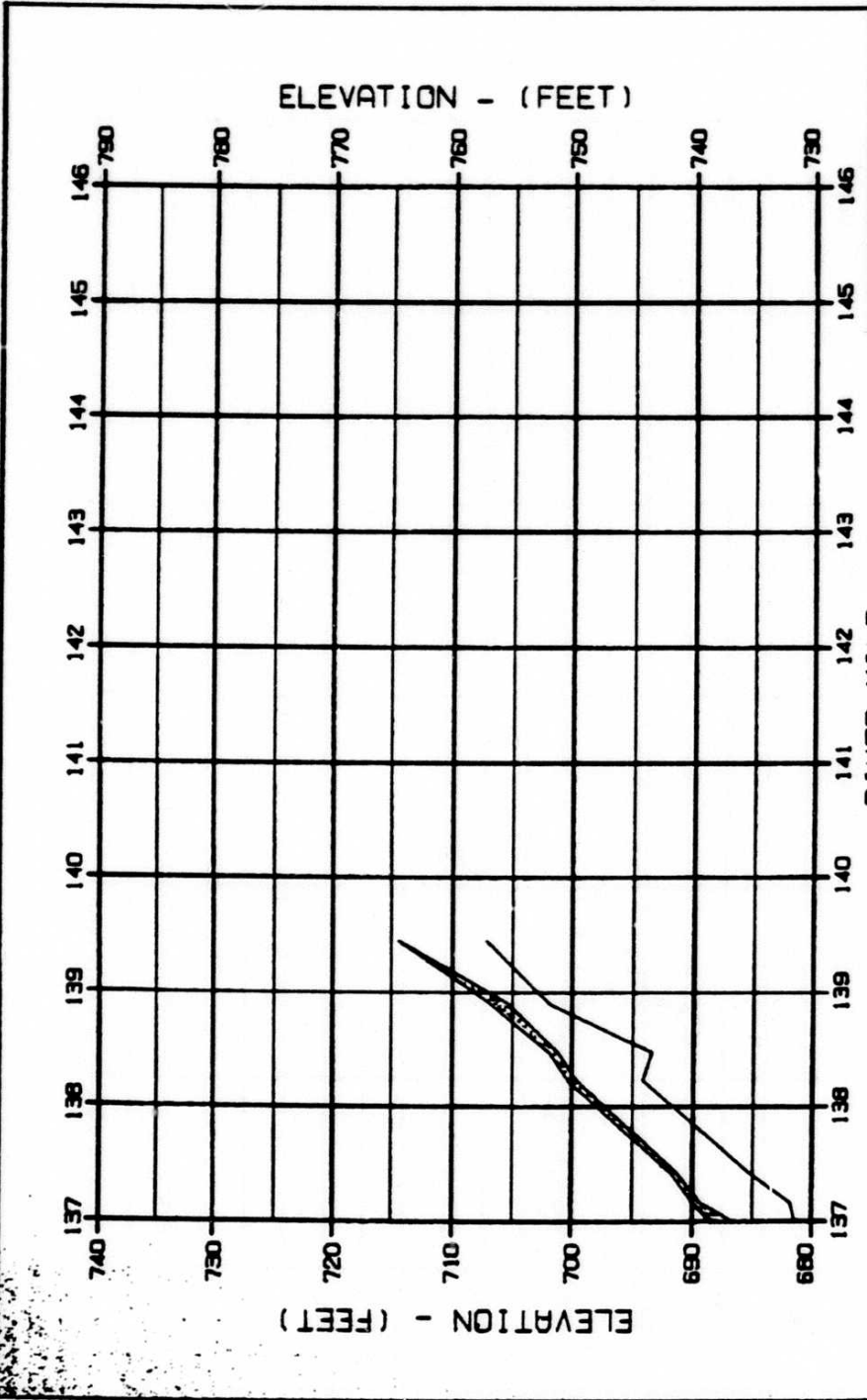




c



c



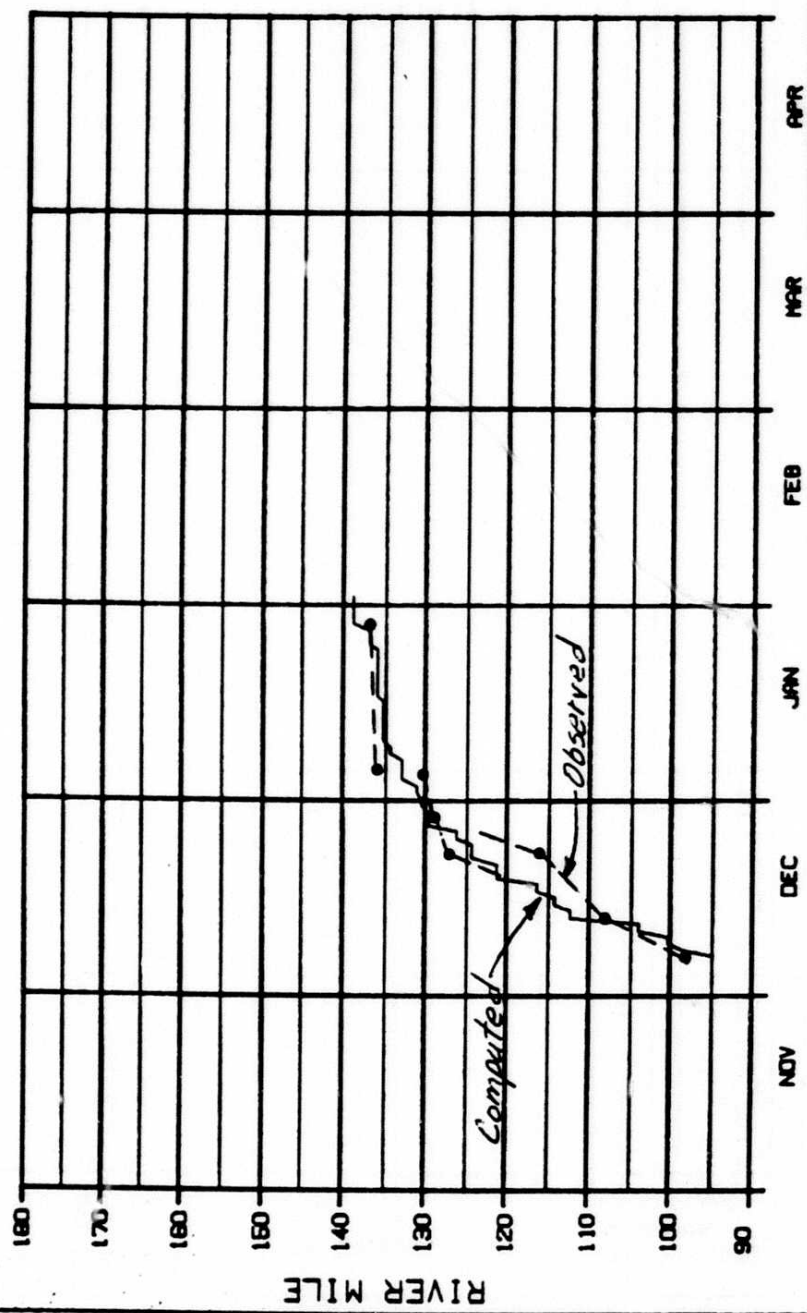
ALASKA POWER AUTHORITY	
SUBMITTER PROJECT	SUSITNA RIVER
ICE SIMULATION	
PROFILE OF MAXIMUM STAGES	
HARZD-ERBROD JOINT VENTURE	
DATE: 11 SEP 83	ISS: 142

WEATHER PERIOD: 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE RUN NO. 1, PRE88A

LEGEND:

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

08/10/87

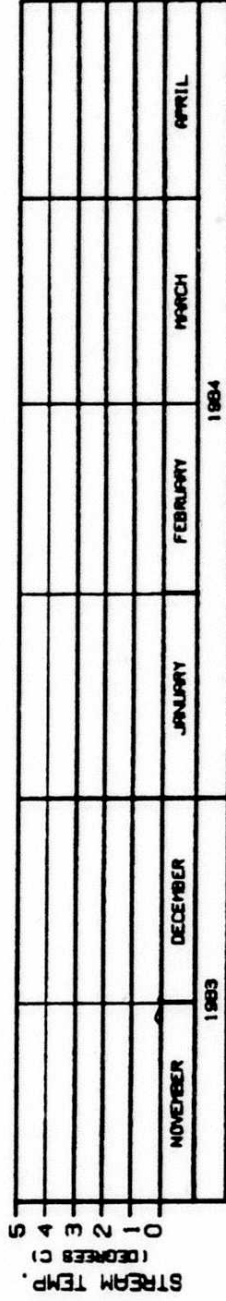
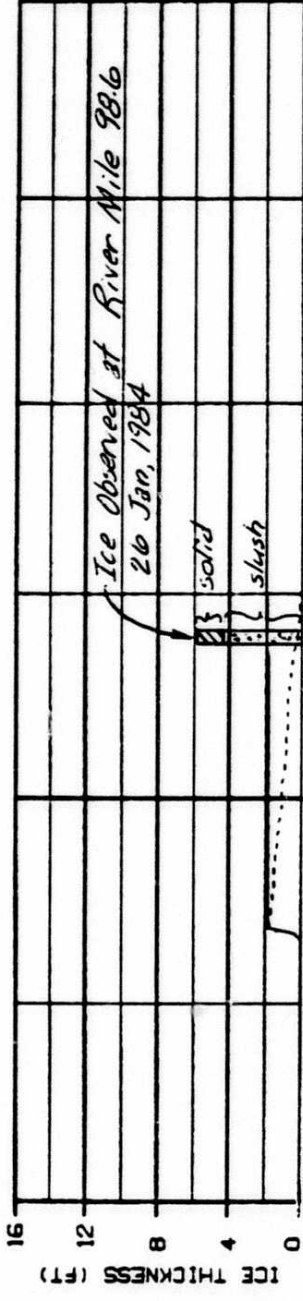
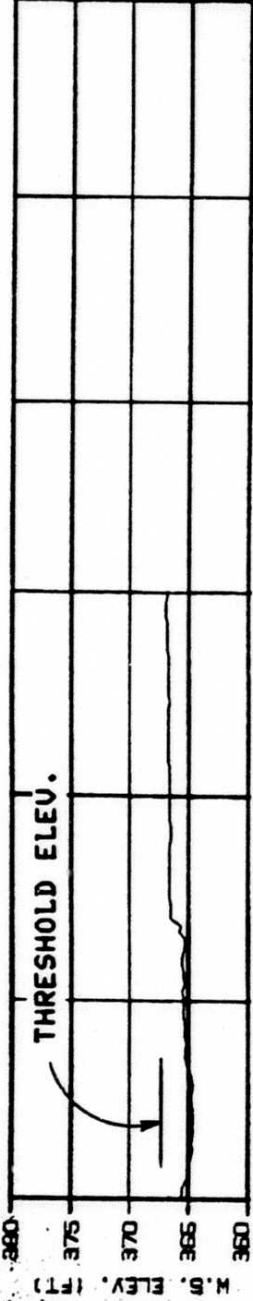


LEGEND:

— ICE FRONT

WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE RUN NO. : PR083A

ALASKA POWER AUTHORITY	
SUBJECT	SUSITNA RIVER
PROGRESSION OF ICE FRONT	
4 ZERO DEGREE ISOTHERM	
HARZA-EMRACO JOINT VENTURE	
DATE	11 SEP 84
BY	WSS:MLC

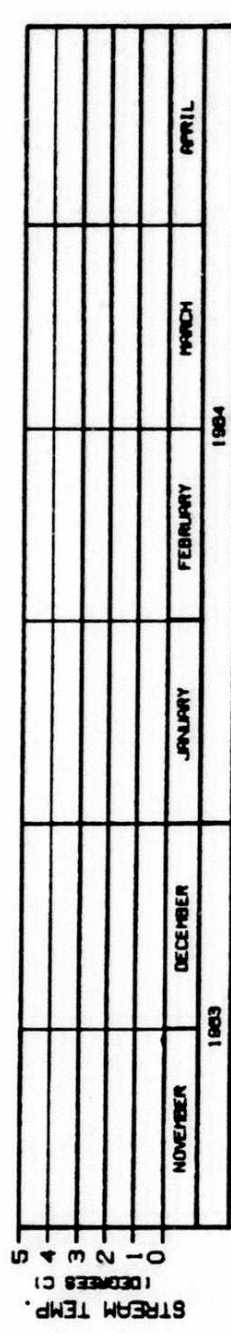
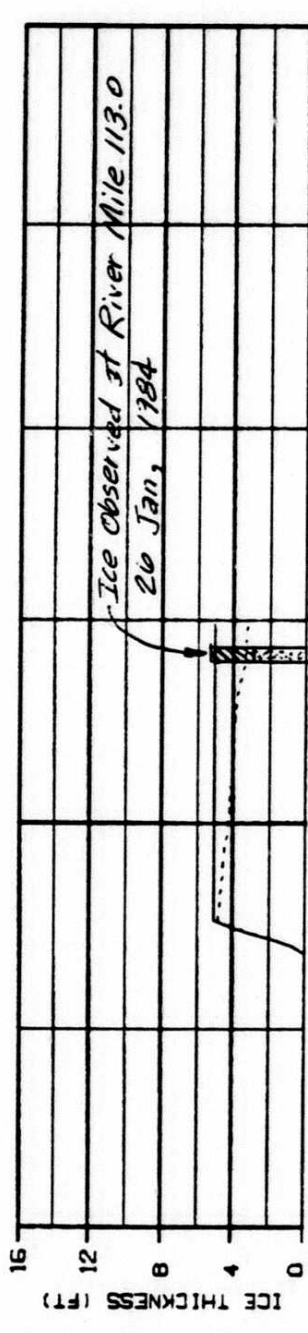
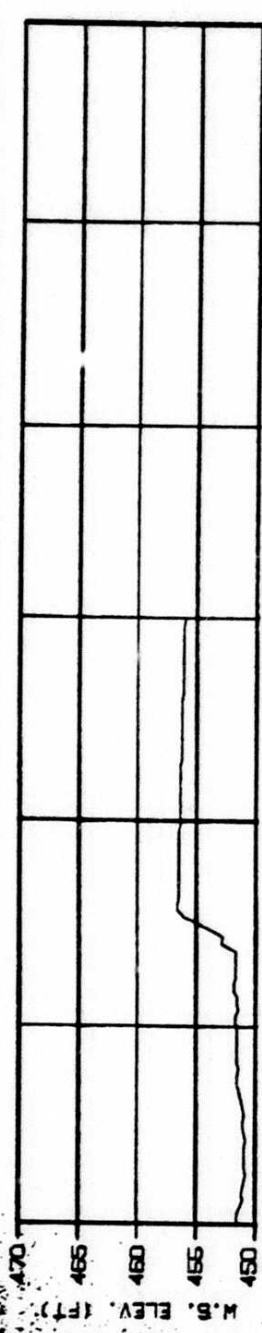


ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRSCO JOINT VENTURE  
 ORDER: 81000 11 SEP 84 888.142

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

WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE RUN NO. : PRE83A

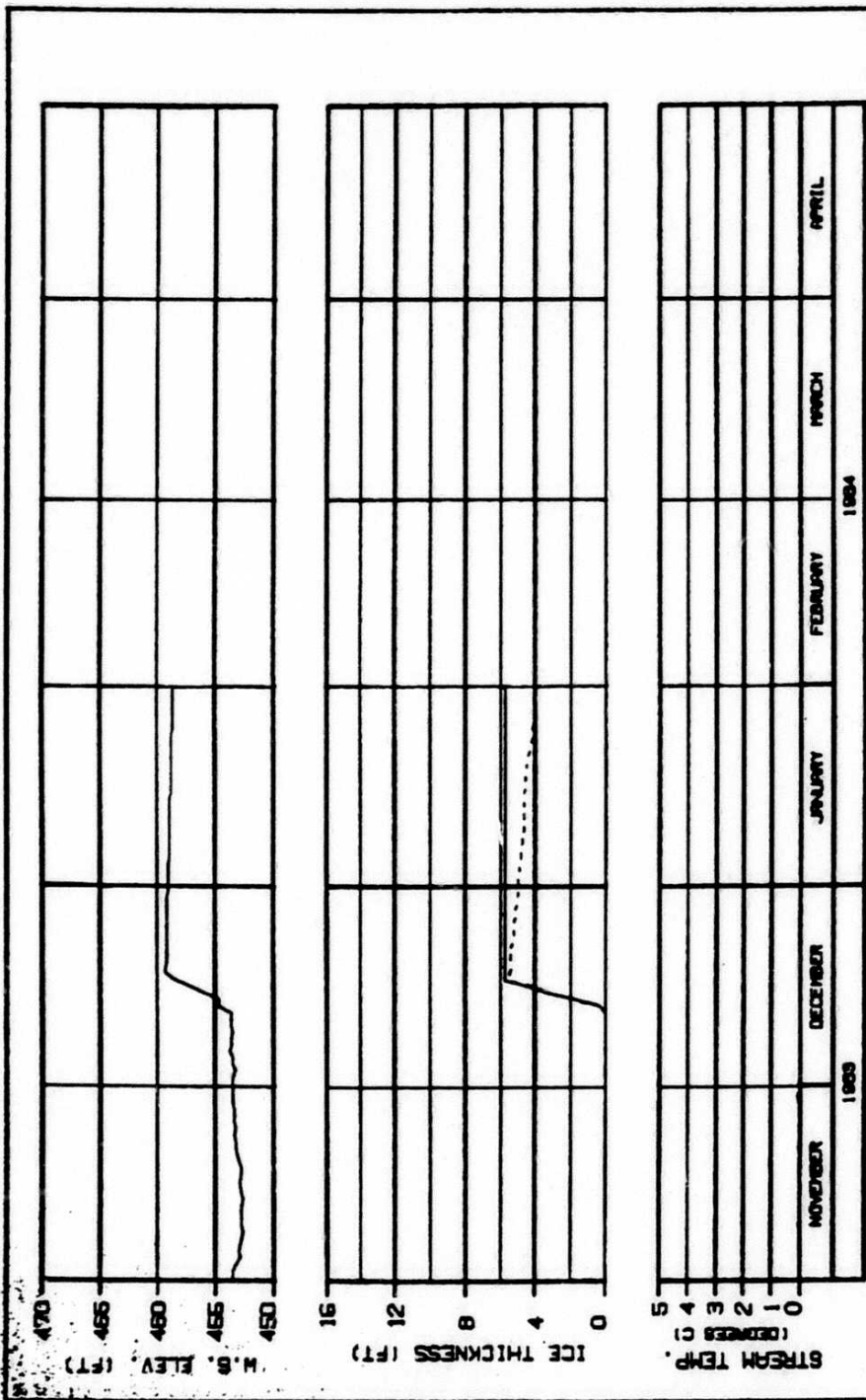
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSTINA PROJECT  
 SUSTINA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRSCO JOINT VENTURE  
 GROUP: S.1.0-101 11 01 01 0000.142

**SIDE CHANNEL AT HEAD OF GASH CREEK**  
 RIVER MILE : 112.00  
 WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE RUN NO. : PRE83A

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

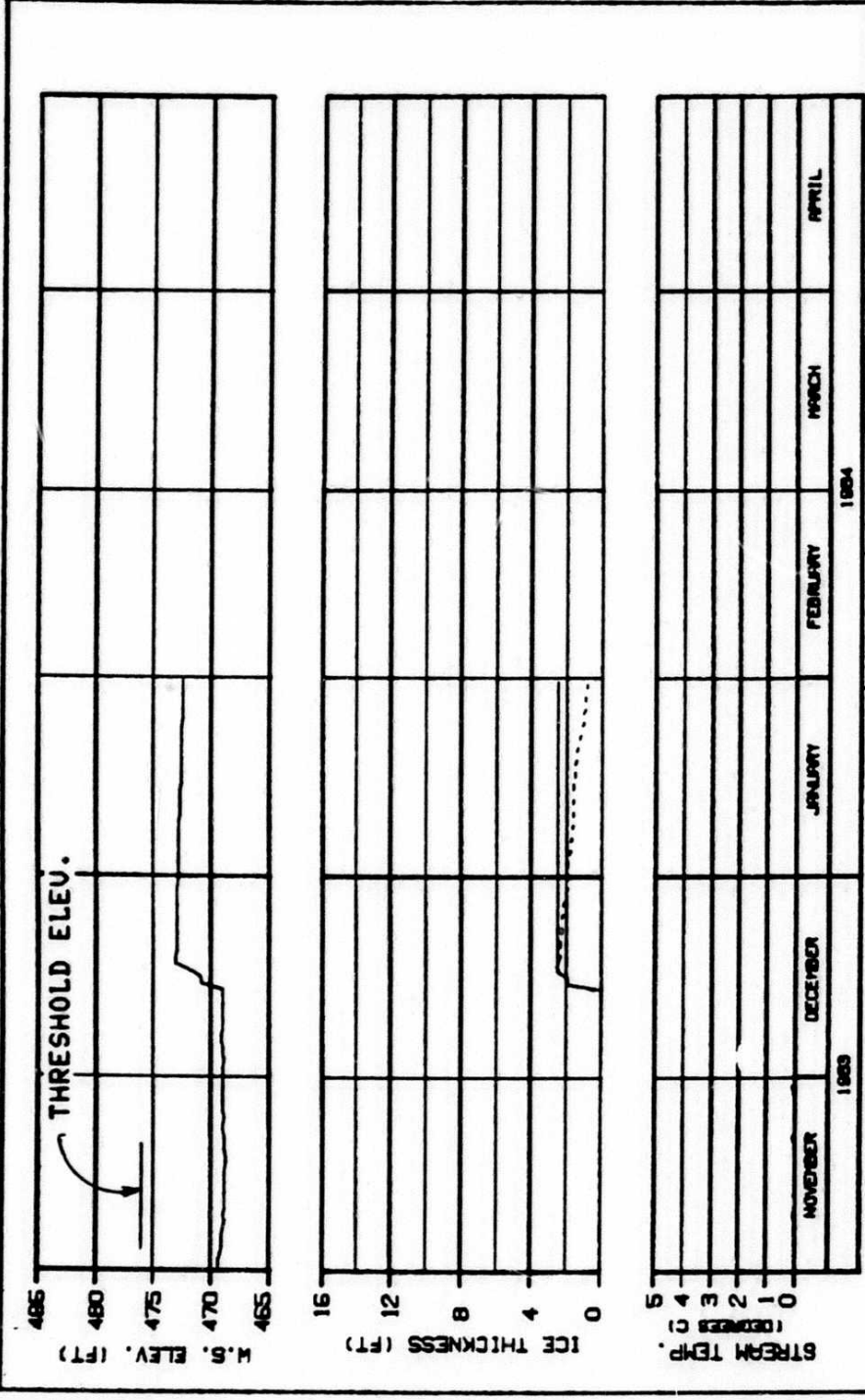


ALASKA POWER AUTHORITY  
 SUBAREA PROJECT  
 SLEISTNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 W882A-EBR82C JOINT VENTURE  
 SHEET: 4.1.882B 11 OF 14 888.142

MOUTH OF SLOUGH 6A  
 RIVER MILE : 112.34  
 WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE PLIN NO. : PRE83A

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





ALASKA POWER AUTHORITY

SUSTINA PROJECT

SUSTINA RIVER  
ICE SIMULATION  
TIME HISTORY

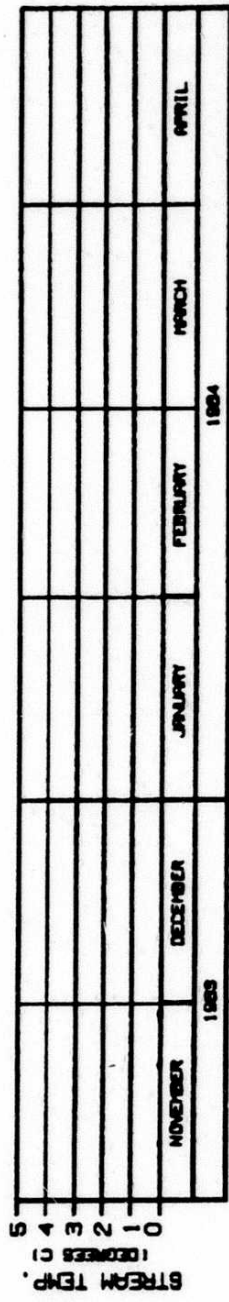
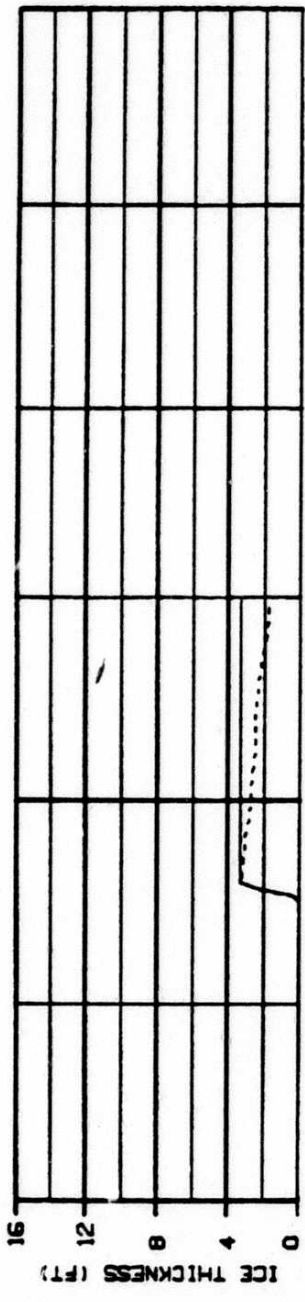
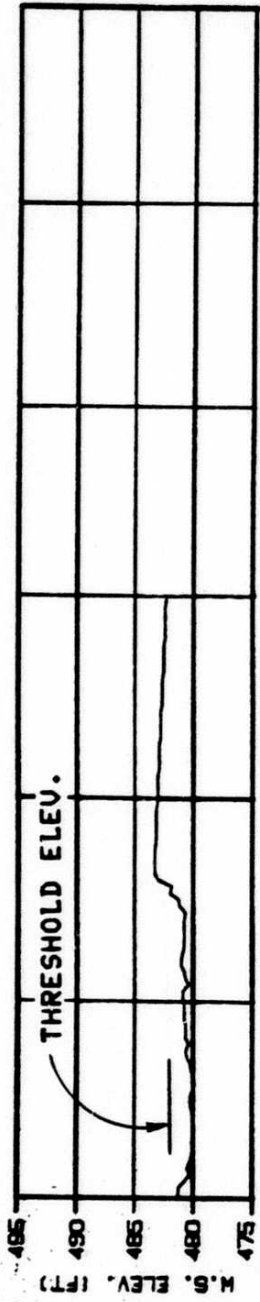
HEAD OF SLOUGH 8  
RIVER MILE : 114.10

WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
PRE PROJECT SIMULATION  
REFERENCE RUN NO. : PRE83A

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

NOVEMBER 1983      DECEMBER      JANUARY      FEBRUARY      MARCH      APRIL 1984

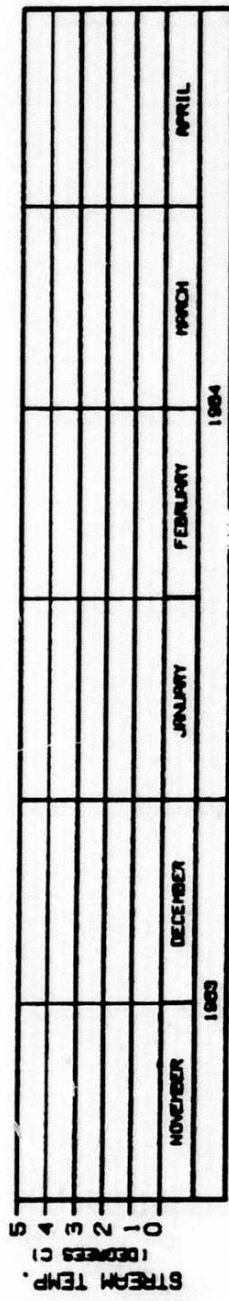
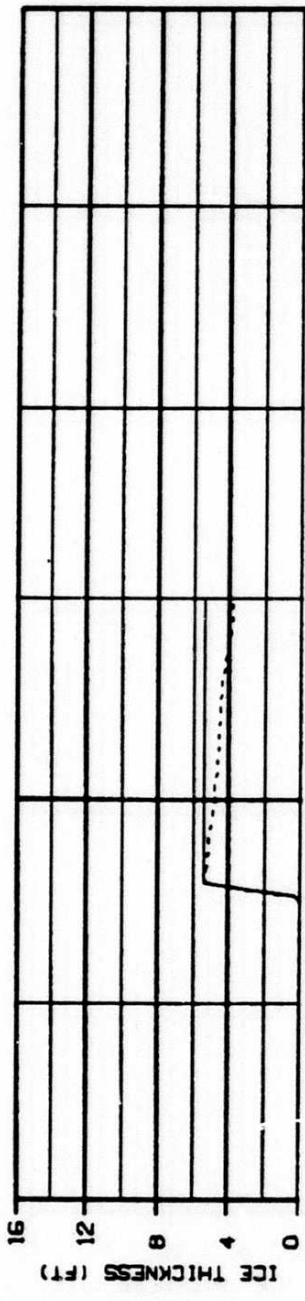
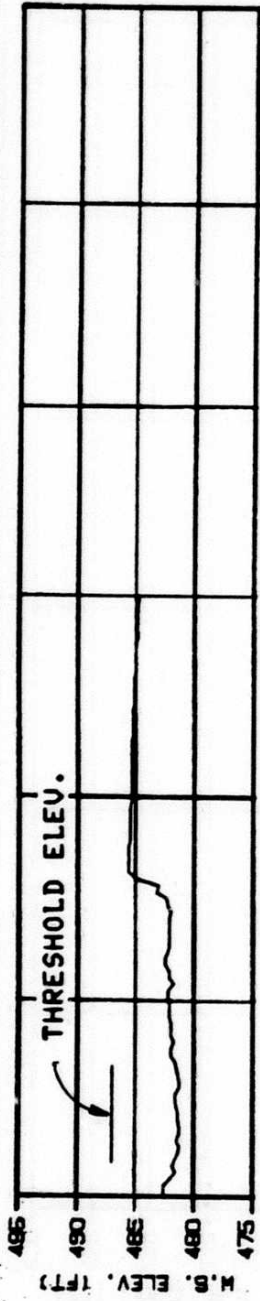
DESIGN. DRAWING NO. 11 83 04      SHEET NO. 102



ALASKA POWER AUTHORITY  
 SUBMITTA SUBJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 W9920-EBR600 JOINT VENTURE  
 DATE: 11/28/84 BY: 148

SIDE CHANNEL MSII  
 RIVER MILE : 115.50  
 WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE RUN NO. : PRE83A

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



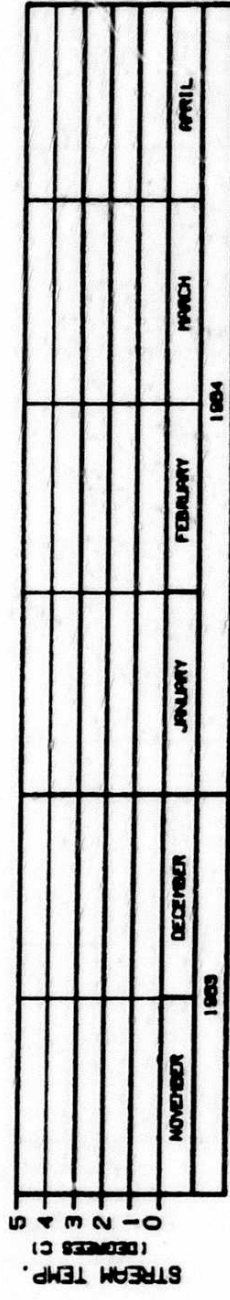
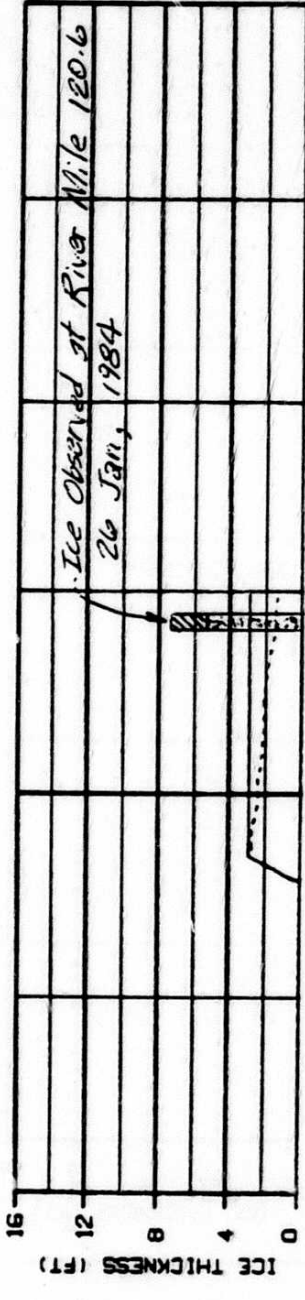
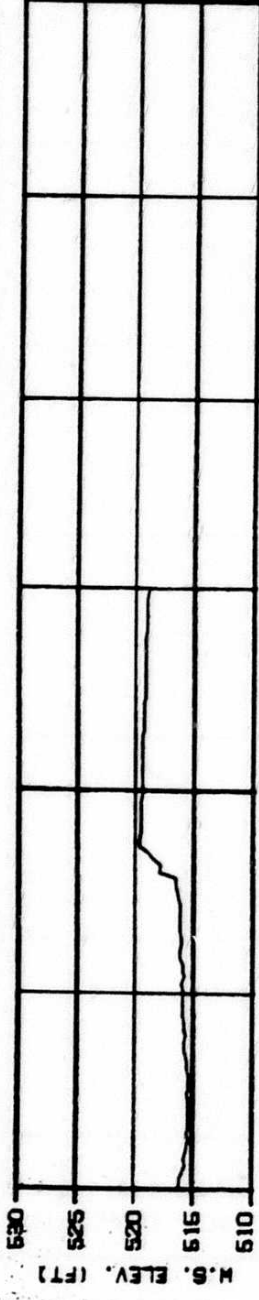
ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 WPA&A-EB&BCO JOINT VENTURE  
 SHEET NO. 11 OF 18  
 1983, 1984

HEAD OF SIDE CHANNEL MSII

RIVER MILE : 115.90

WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE RUN NO. : PRE83A

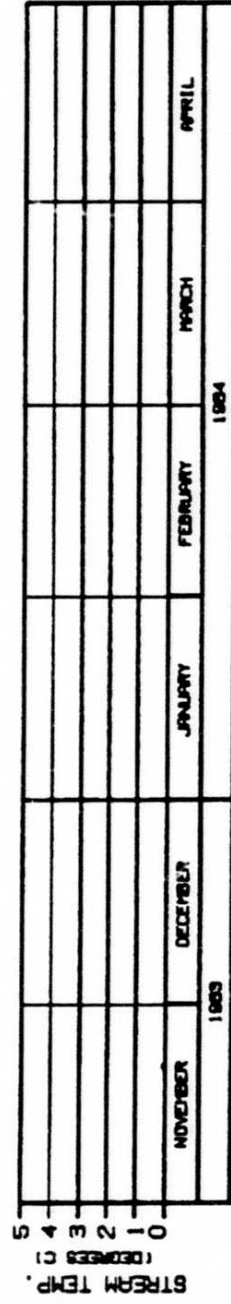
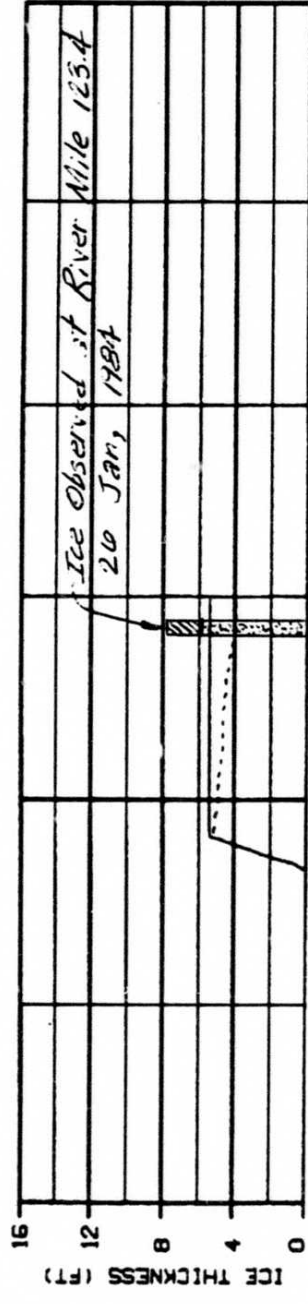
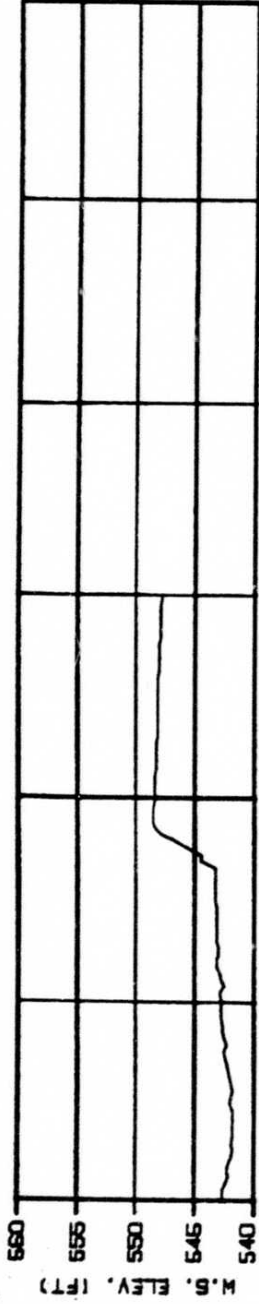
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUBLINE PROJECT  
 GUSTITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 PROJECT NUMBER: 11 87 04  
 SHEET: 102

RIVER MILE : 120.00  
 WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE RUN NO. :

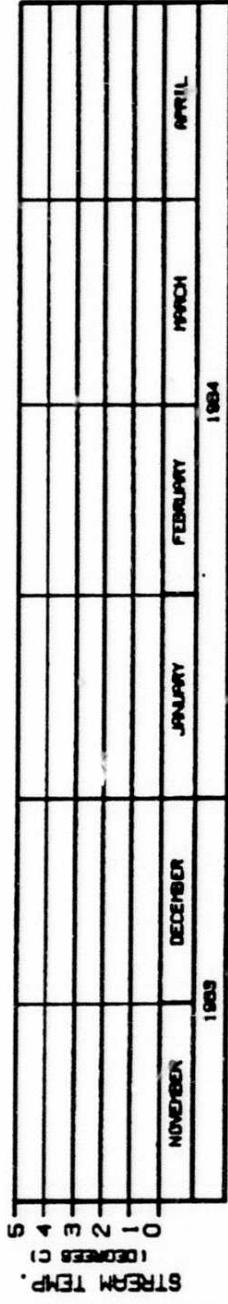
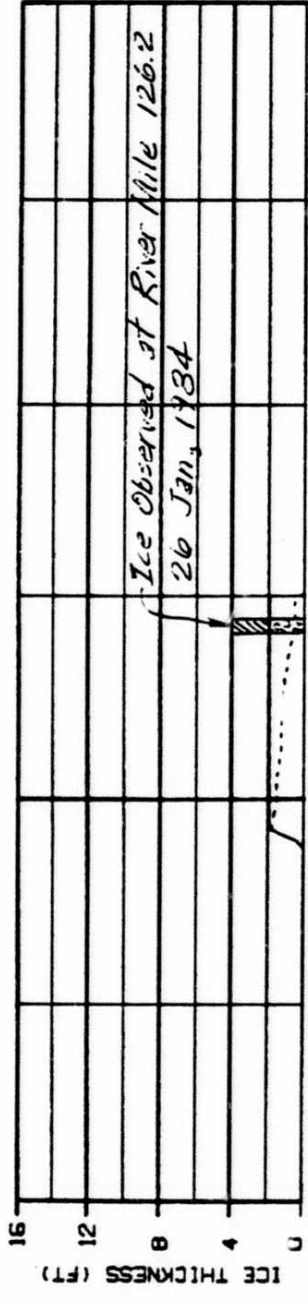
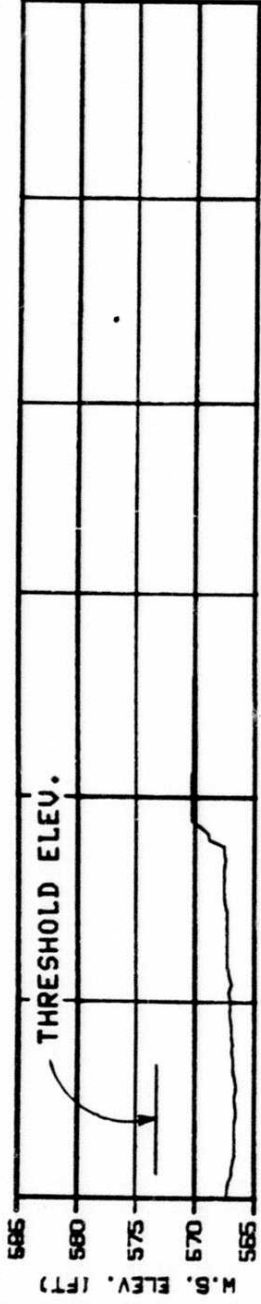
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY	
BUILDING PROJECT	SUSITNA RIVER
	ICE SIMULATION
	TIME HISTORY
HARZA-ERBECO JOINT VENTURE	
DESIGN. DATES	11 SEP 83 - 1988, 142

HEAD OF MOOSE SLOUGH  
 RIVER MILE : 123.50  
 WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE RUN NO. : PRE83A

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



ALASKA POWER AUTHORITY  
SUBITNA PROJECT  
SUBITNA RIVER  
ICE SIMULATION  
TIME HISTORY  
HARZO-ELWOOD JOINT VENTURE  
DESIGNED BY: HARZO-ELWOOD  
DRAWN BY: J. W. B. 11 SEP 84  
SHEET NO. 142

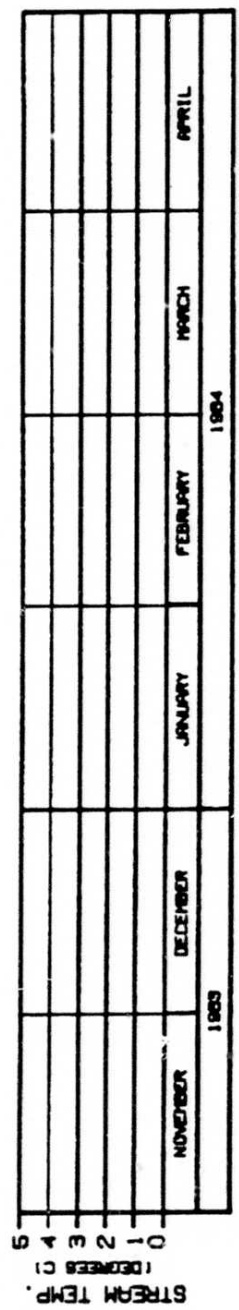
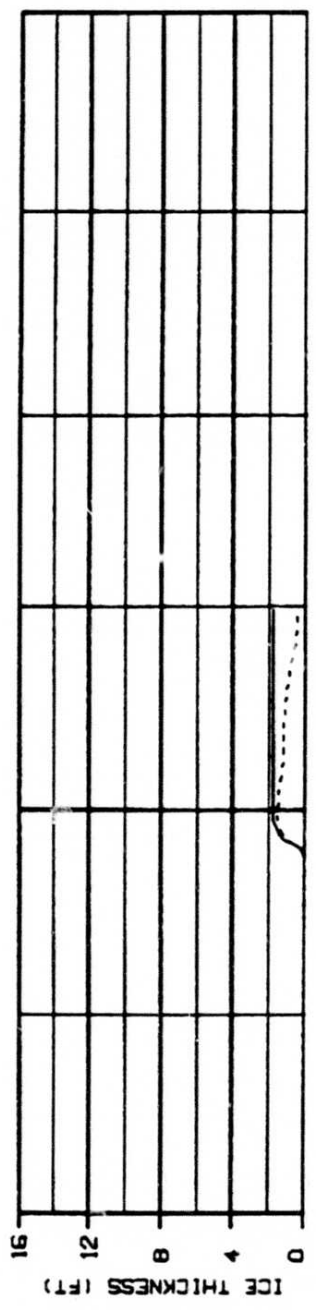
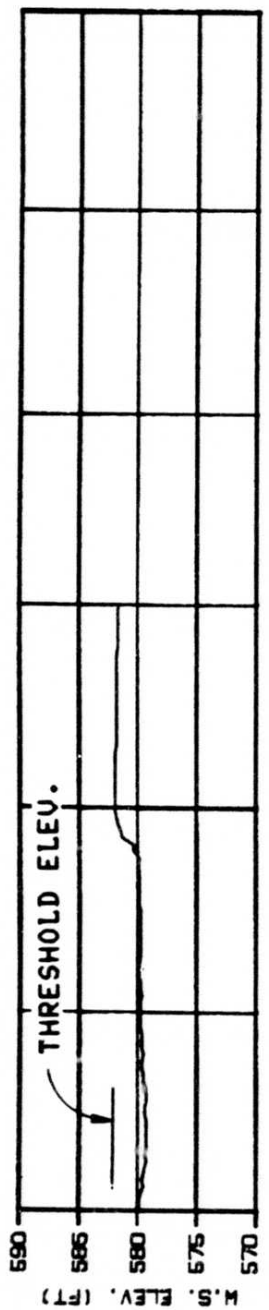
HEAD OF SLOUGH 8A (WEST)

RIVER MILE : 126.10

WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
PRE PROJECT SIMULATION  
REFERENCE RUN NO. : PRE83A

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





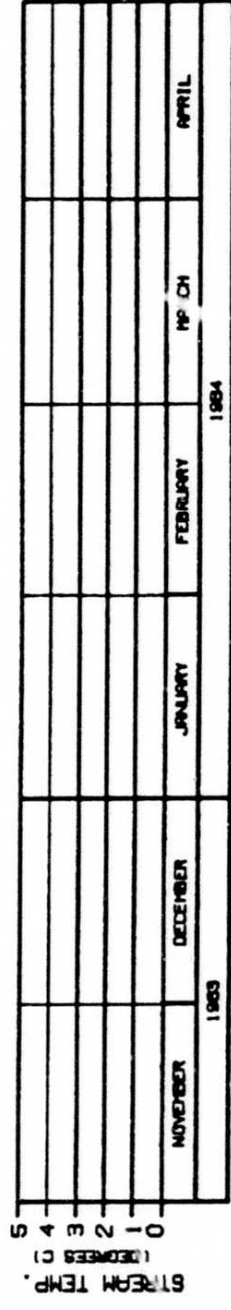
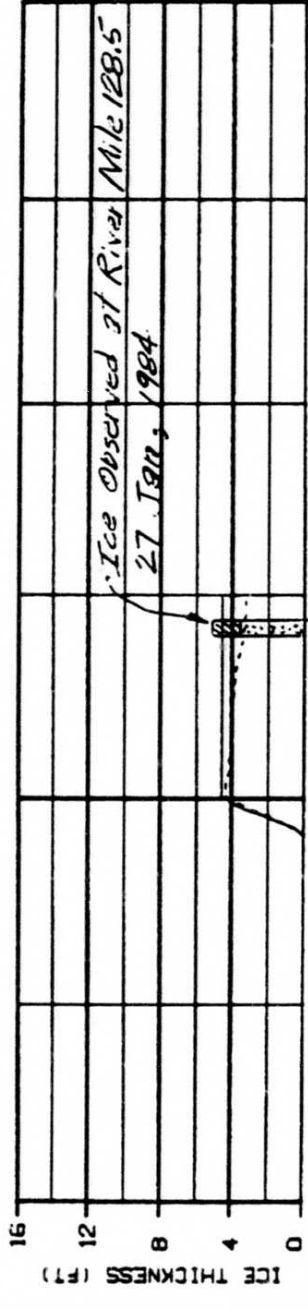
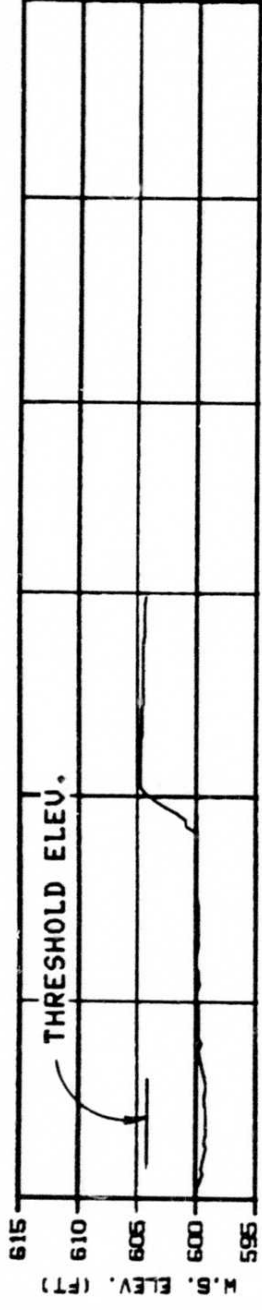
ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBRACO JOINT VENTURE  
 SHEET: 8-1008 11 OF 12 888-102

HEAD OF SLOUGH 8A (EAST)  
 RIVER MILE : 127.10  
 WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE RUN NO. : PRE83A

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



C



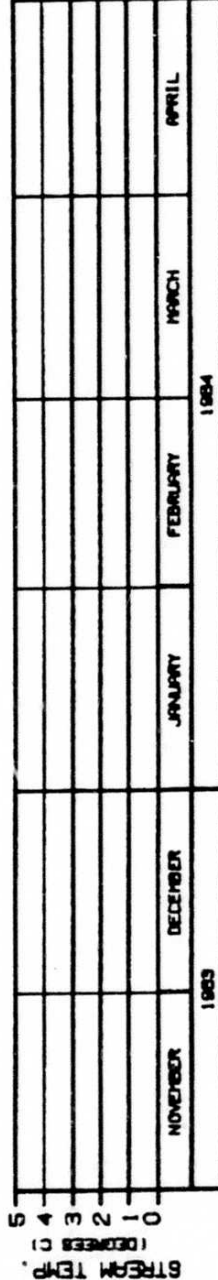
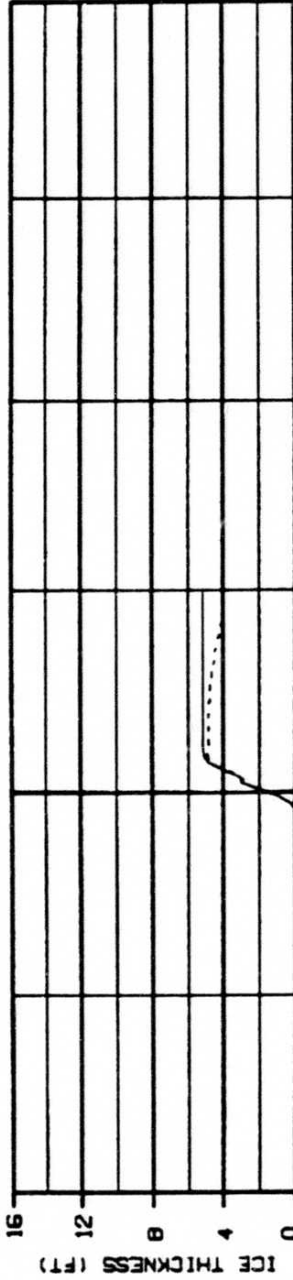
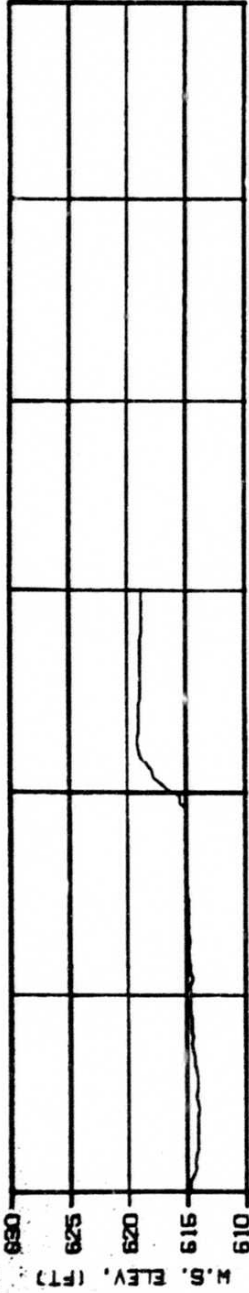
ALASKA POWER AUTHORITY	
SUBMITAL PROJECT	SUSITNA RIVER
	ICE SIMULATION
	TIME HISTORY
HARZA-EBRISCO JOINT VENTURE	
DESIGN: S.L. PERRY	11 SEP 84
	MSB-142

HEAD OF SLOUGH 9  
 RIVER MILE : 129.30  
 WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE RUN NO. : PRE83A

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

OPTION 2

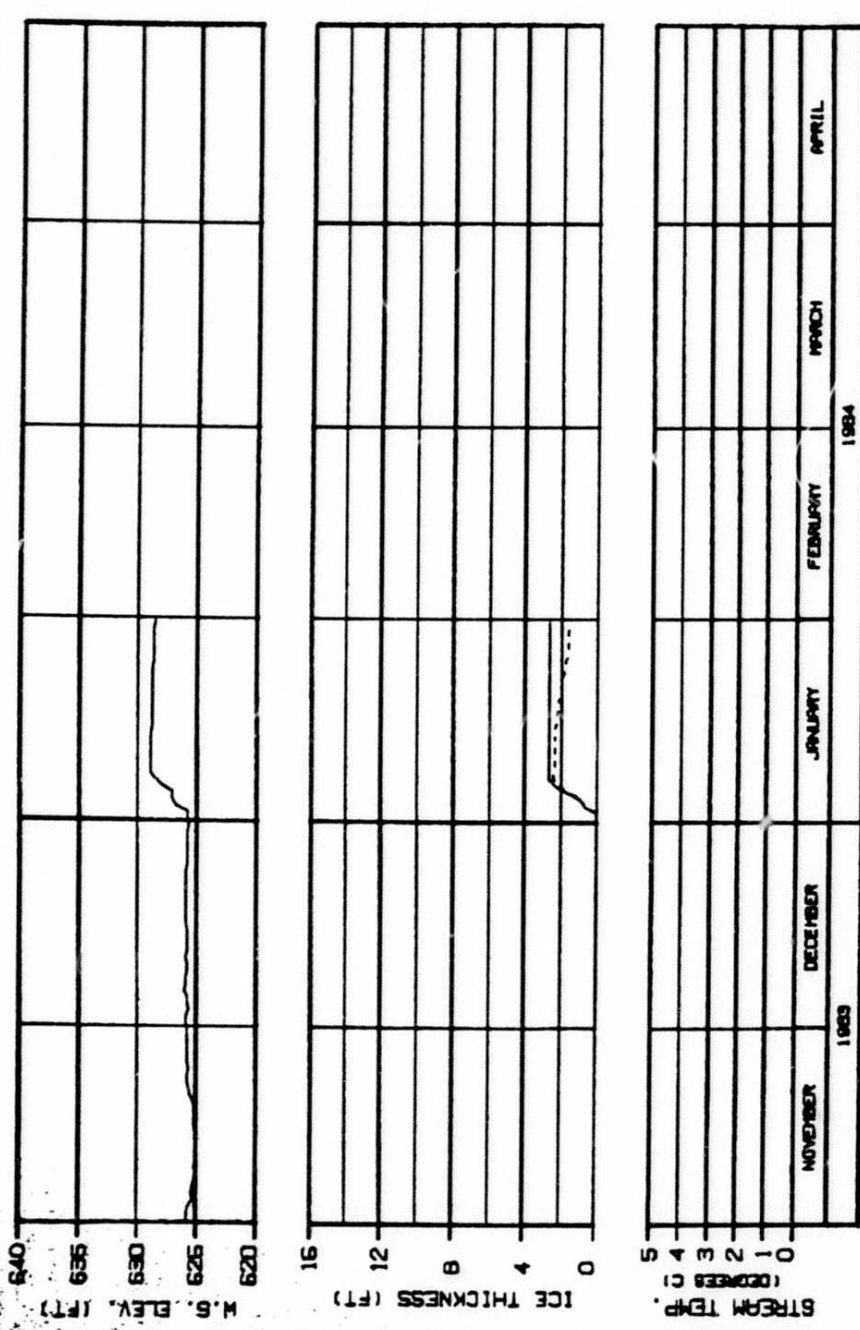
OPTION#



ALASKA POWER AUTHORITY  
 SUBMITTER PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERBECO JOINT VENTURE  
 SHEET NO. 11 OF 12  
 8888-142

SIDE CHANNEL U/S OF SLOUGH 9  
 RIVER MILE : 130.60  
 WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE RUN NO. : PRE83A

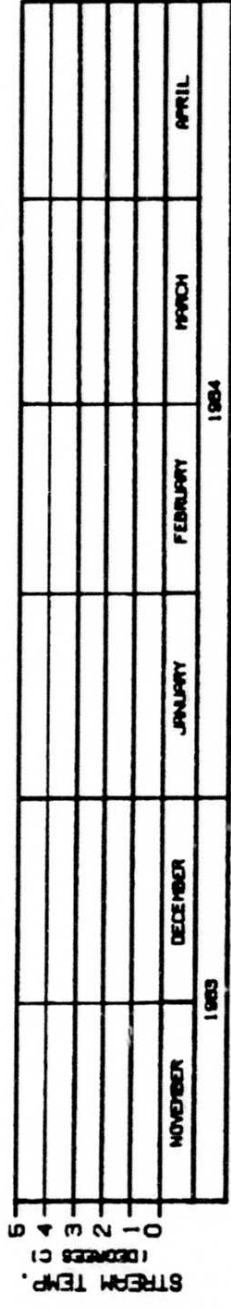
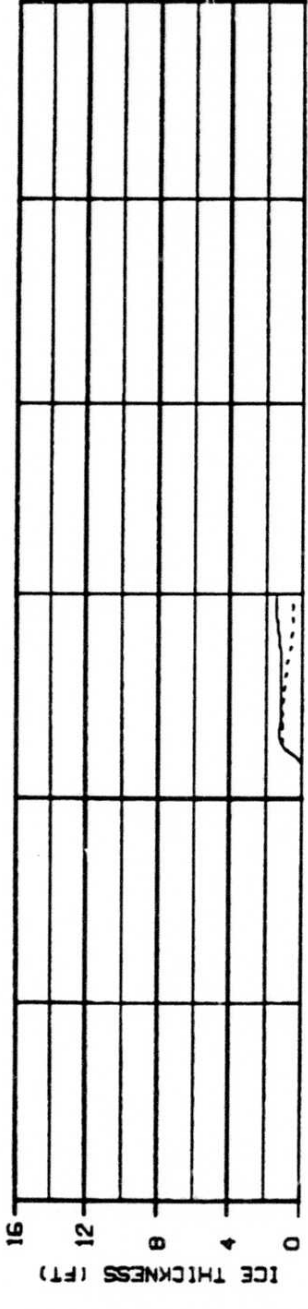
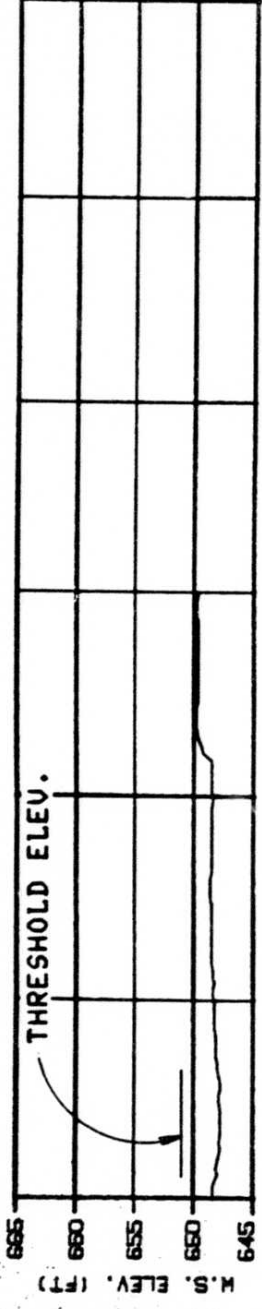
ICE THICKENING LEGEND:  
 ——— TOTAL THICKENING  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUITING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EBR600 JOINT VENTURE  
 DRAWING NO. 11 00 01 000,142

SIDE CHANNEL U/S OF 4TH JULY CREEK  
 RIVER MILE : 131.80  
 WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE RUN NO. : PRE83A

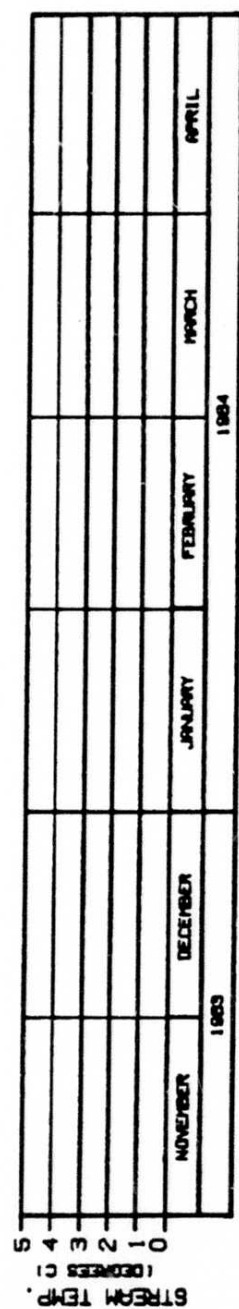
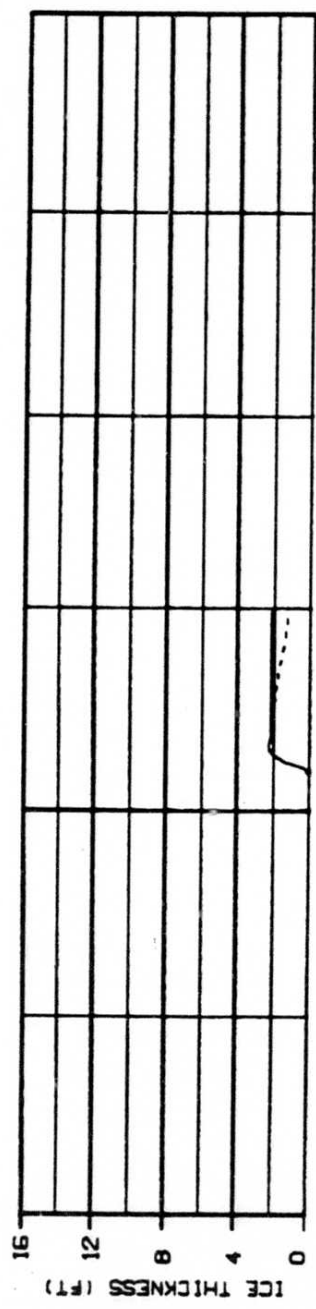
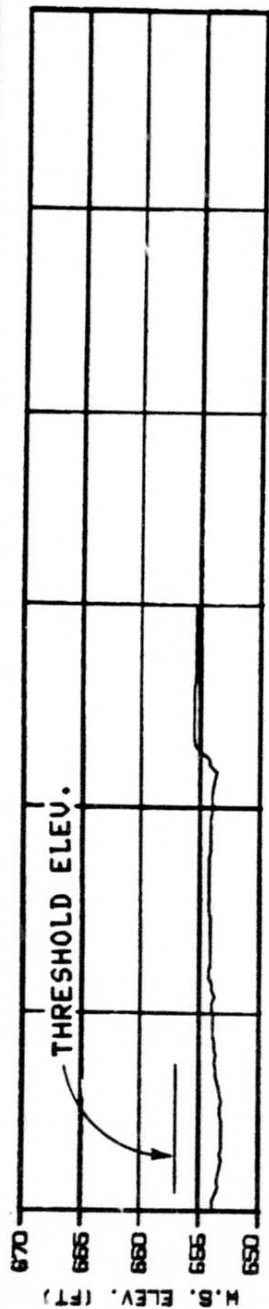
ICE THICKNESS LEGEND:  
 ——— TOTAL THICKNESS  
 - - - - - BLUSH COMPONENT



ALASKA POWER AUTHORITY  
 BUILDING PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARRIS-EBERSON JOINT VENTURE  
 DRAWING: A1.0000 11 SEP 84 0000.142

HEAD OF SLOUGH 9A  
 RIVER MILE : 133.70  
 WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE RUN NO. : PRE83A

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

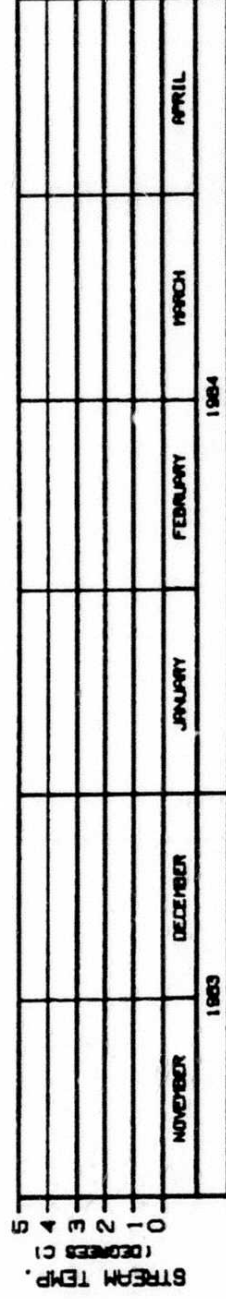
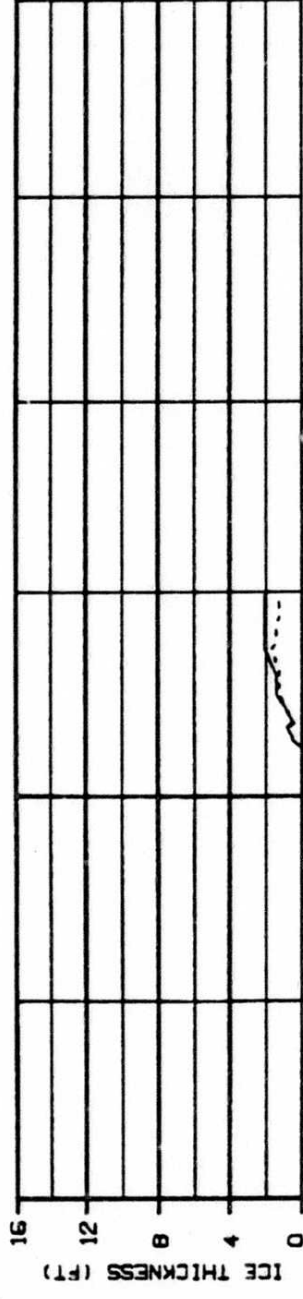
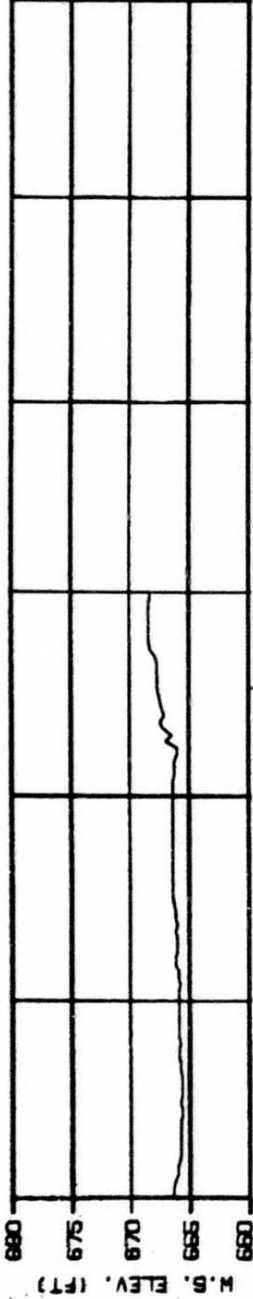


ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-ERISCO JOINT VENTURE  
 SHEET: 11 OF 11  
 SHEET: 142

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

WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE RUN NO. : PRE83A

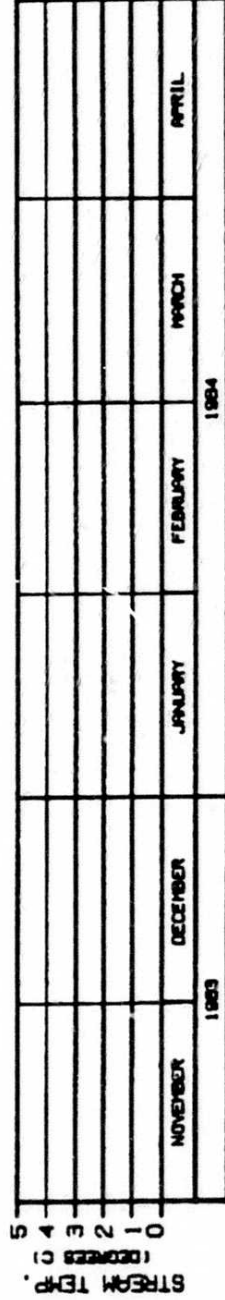
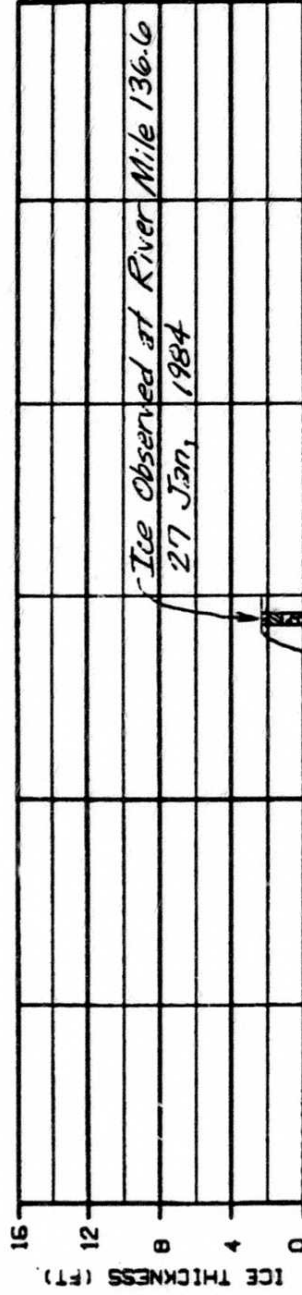
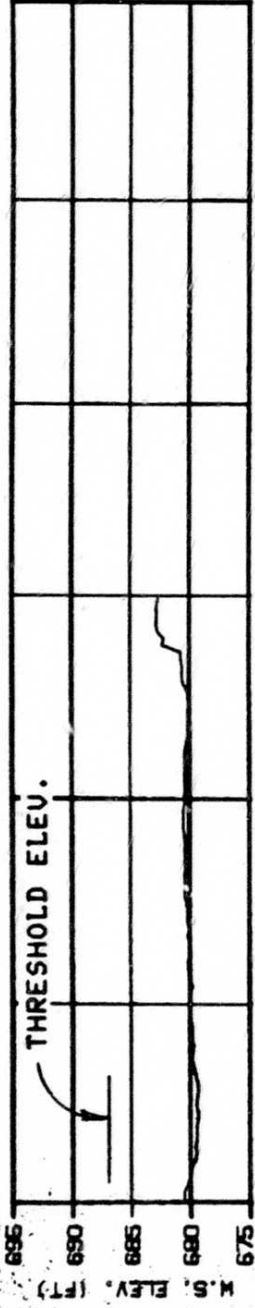
ICE THICKNESS LEGEND:  
 --- TOTAL THICKNESS  
 - - - - - SLUSH COMPONENT



ALASKA POWER AUTHORITY  
 SUSITNA PROJECT  
 SUSITNA RIVER  
 ICE SIMULATION  
 TIME HISTORY  
 HARZA-EDBECO JOINT VENTURE  
 PROJECT: SUSITNA RIVER  
 SHEET: 11 OF 14

SIDE CHANNEL D/S OF SLOUGH 11  
 RIVER MILE : 135.30  
 WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE RUN NO. : PRE83A

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



HEAD OF SLOUGH 11  
 RIVER MILE : 136.50  
 WEATHER PERIOD : 1 NOV 83 - 31 JAN 84  
 PRE PROJECT SIMULATION  
 REFERENCE RUN NO. : PRE83A

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

ALASKA POWER AUTHORITY	
SUBMITTER PROJECT	SUSITNA RIVER
ICE SIMULATION	
TIME HISTORY	
HARZA-EBERCO JOINT VENTURE	
DATE: 11 SEP 84	DESIGNER: 142



