

SUSITNA HYDROELECTRIC PROJECT

**TECHNICAL MEMORANDUM
1985 SUSITNA RIVER FREEZE-UP**

Report by
R&M Consultants, Inc.

Under Contract to
Harza-Ebasco Susitna Joint Venture

Prepared for
Alaska Power Authority

Final Report
June 1986

NOTICE

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

TABLE OF CONTENTS

Section	Title	Page
	List of Tables	ii
1.0	INTRODUCTION	1
2.0	SUMMARY	2
3.0	CHRONOLOGY OF 1985 SUSITNA RIVER FREEZEUP	3
4.0	METEOROLOGY AND DATA COLLECTION	9
5.0	REFERENCES	21
	APPENDIX A	
	River Ice Observations and Weather Data From Gold Creek.	
	APPENDIX B	
	Monthly Meteorological Summaries From Weather Stations at Watana and Talkeetna.	

LIST OF TABLES

Number	Title	Page
3.1	1985 Susitna River Freeze-up, Leading Edge Progression Summary	6
3.2	Water Surface Elevations, 1985 Freeze-up	7
4.1	Talkeetna Weather Station Air Temperature and Freezing - Degree Days Summary September, 1985	10
4.2	Talkeetna Weather Station Air Temperature and Freezing - Degree Days Summary October, 1985	11
4.3	Talkeetna Weather Station Air Temperature and Freezing - Degree Days Summary November, 1985	12
4.4	Watana Weather Station Air Temperature and Freezing - Degree Days Summary September, 1985	13

LIST OF TABLES (Continued)

Number	Title	Page
4.5	Watana Weather Station Air Temperature and Freezing - Degree Days Summary October, 1985	14
4.6	Watana Weather Station Air Temperature and Freezing - Degree Days Summary November, 1985	15
4.7	Watana Weather Station Air Temperature and Freezing - Degree Days Summary December, 1985	16
4.8	Watana Streamgage Site, Air Temperature and Freezing - Degree Days Summary September, 1985	17
4.9	Watana Streamgage Site, Air Temperature and Freezing - Degree Days Summary October, 1985	18
4.10	Watana Streamgage Site, Air Temperature and Freezing - Degree Days Summary November, 1985	19
4.11	Watana Streamgage Site, Air Temperature and Freezing - Degree Days Summary December, 1985	20

1.0 INTRODUCTION

The 1985 Susitna River freezeup was documented from Cook Inlet (RM 0) to the Watana damsite (RM 184) by visual measurements, ground measurements and aerial photography. The methods are similar to those used in the previous 5 years of ice observations on the Susitna River (R&M Consultants, 1981, 1982, 1984, 1985 a,b). The 1985 observations were a continuation of baseline hydrologic data collection along the Susitna River, documenting ice processes influencing ice cover formation. The 1985 observations also provided additional calibration and verification data for very cold freezeup conditions for the ICECAL model.

The report documents the chronology of ice cover development in Section 3. Miscellaneous data pertinent to ice modelling are included in Section 4 and in Appendices A and B. Most of the specific processes of freezeup and ice cover progression on the Susitna River have been previously published (R&M Consultants, 1981, 1982, 1984, 1985 a,b). Readers not familiar with these processes should review these reports. This report refers to river miles (RM) numbers for identification of specific sites on the river mainstream, with the river mouth at Cook Inlet corresponding to RM 0.

2.0 SUMMARY

Unusually sustained cold weather from mid-October until early December resulted in a very rapid ice cover progression on the Susitna River in 1985. An ice bridge formed at river mile (RM) 1.9 on October 21 or 22, with the ice cover extending to RM 19.5 by October 23. There was extensive overflow into Alexander Slough. However, complete ice cover had formed over the overflow by October 25 due to border ice growth taking only two days to form instead of the usual 4-6 weeks. This rapid freezeup pattern occurred on most other side-channels which received overflow during freeze-up in 1985. The ice cover advanced rapidly, progressing past Talkeetna and reaching RM 104.5 by November 4. The ice front advanced past the Alaska Railroad bridge at Gold Creek on November 26, several weeks earlier than previous years. The ice front continued to advance by staging up to RM 140.5, the lower end of Slough 21. An increase in air temperature and a decrease in frazil ice from upstream halted the ice cover progression near this point, and the usual ice cover formation processes of anchor ice and border ice growth resumed in this reach.

Increases in water levels due to staging were higher than in previous years. In the middle Susitna River, all sloughs and side-channels downstream of Slough 21 were overtopped. The top of ice was generally within a foot of the top of the river banks.

3.0 CHRONOLOGY OF 1985 SUSITNA RIVER FREEZEUP

On October 15, 1985, slush ice was first observed flowing down the mainstem at Gold Creek. Light concentrations of ice (less than 15%) were observed through October 18, with the maximum daily temperatures at Gold Creek reading 2.8°C - 4.4°C. Slush ice concentrations increased to 50% on the morning of October 19, remaining greater than 50% until the ice front progressed past Gold Creek.

On October 21, the ice concentration was 50%-80% downstream of the head of Alexander Slough. By October 23, an ice bridge had formed at river mile (RM) 1.9, and a continuous ice cover was present to RM 7.5. A second ice bridge had formed at RM 8, and the ice cover had progressed to RM 19.5, just upstream of the head of Alexander Slough. There was extensive overflow into Alexander Slough. At the Susitna-Yentna confluence, the ice concentration was 75%-80% on the Yentna River and 40%-50% on the Susitna River. The Yentna River was contributing about 55%-60% of the ice downstream of the confluence.

A main channel on the east side of the river near the Kashwitna River had jammed. Ice cover was progressing up the easternmost side channel and had advanced upstream past Sheep Creek.

The Susitna River was contributing 50%-55%, the Chulitna 35%-40%, and the Talkeetna River 10% of the ice downstream of their confluences. The Chulitna River had flow in several channels entering the Susitna River.

Clear, cold weather continued. On October 25, Alexander Slough was still overtopped. However, it had already frozen over by border ice growth, much sooner than normally occurs after overtopping. Downstream of the leading edge, numerous side channels had flooded. The ice front had progressed to RM 43.5 up the west channel of the Delta Islands, an average rate of 12.0 miles/day since October 23 (Table 3.1). The east channel through the Delta Islands was open, with only small ice pans floating in it.

Upstream of the Delta Islands, the mainstem was covered by ice concentrations of 50%-70%. The middle Susitna River was contributing about 60%, the Chulitna River 30%, and the Talkeetna River 10% of the ice.

On October 29, the east channel through the Delta Islands was still open from Willow Creek downstream to near the confluence with the west channel. Anchor ice was evident near riffles in this channel. Extensive staging had resulted in most side-channels downstream of the leading edge being breached. Virtually the entire width of the floodplain from RM 72 to RM 74 was covered with ice. The leading edge had reached RM 80.2 by early afternoon, progressing at an average rate of 9.2 miles per day.

The leading edge had progressed to RM 94 by the morning of November 1, an average rate of 4.6 miles per day since October 29. Temperatures were low, with a minimum of -6°F at Gold Creek. The Susitna was contributing

about 60%, the Chulitna River 25%, and the Talkeetna 15% of the ice to the lower Susitna River. No ice bridges had formed on the Susitna River between Talkeetna and Devil Canyon. Ice concentrations were 50%-85%. Anchor ice was evident, but there were no significant ice dams upstream of Gold Creek. The lower two-thirds of Devil Canyon had an ice cover from slush buildup and staging.

There was an open channel on the Chulitna River from Eldridge Glacier south to the Susitna River confluence. Some minor overflow was occurring in braided areas where border ice was constricting flow. The Talkeetna River was open, with about 50% ice concentration. There was extensive anchor ice, with minor anchor ice dams downstream of Chulitna Creek.

Temperatures remained very cold. By November 4, most channels in the lower Susitna River which had breached due to staging had already frozen over. The leading edge was at RM 104.5, progressing at 3.5 miles per day. Ice cover was progressing up both the Chulitna and Talkeetna Rivers. The leading edge on the Chulitna River was about 4 miles upstream of the confluence, while the leading edge on the Talkeetna River was about one-half mile upstream.

By November 6, the leading edge had reached RM 110.5, progressing at an average rate of 3.0 miles per day. The ice front had bypassed the side channel from RM 104.2 to RM 105.5, leaving it open. There was extensive anchor ice in the middle Susitna River.

There was little frazil ice at the Watana streamgage site. It appeared that the river was frozen over upstream of the site for the Watana diversion tunnel, just downstream of Deadman Creek.

The temperature dropped to -19°F at Gold Creek on November 13. By then, the east channel through the Delta Islands had frozen over except for minor leads. Frazil ice concentrations of about 15-20 percent occurred in open leads of the lower river. The leading edge was at RM 119.8, progressing at 1.33 miles per day. Fog was hanging over the open waters upstream of the ice cover. Devil Canyon was frozen over except for about the upstream quarter mile.

The leading edge had reached RM 133.7 by November 21. Maximum staging levels were surveyed at a number of points. Extensive staging had occurred throughout the middle river. At RM 113.7, there was extensive pushing, with ice going overbank into the trees. The river had staged to within about one foot of the top of the bank in many reaches. Staging levels are shown in Table 3.2.

On November 25, the leading edge was approaching the Alaska Railroad bridge at Gold Creek. The water level rose 2.7 feet on November 25, and rose over the border ice. The leading edge moved past Gold Creek on November 26, with the water level staging a total of 5.74 feet above the open water level. There was extensive overflow into Upper Side Channel

11. An open lead developed on November 27, but it closed up again on November 28.

The ice cover continued to progress upstream past Gold Creek. On December 5, the leading edge was at RM 140.5, the lower end of Slough 21. The increased water levels results in breaching of the lower and middle side-channels to Slough 21. Upstream of Devil Canyon, the river was open until roughly RM 170. An ice bridge had formed in this area, and ice cover extended upstream past RM 183.

TABLE 3.1
1985 Susitna River Freezeup
Leading Edge (LE) Progression Summary

Date	Location	Rate of Advance
10/23/85	Ice Bridge RM 1.9 Ice Bridge RM 8 LE RM 19.5	Continuous to RM 7.5 8.5 miles/day
10/25/85	LE RM 43.5	12.0 miles/day
10/29/85	LE RM 80.2	9.2 miles/day
11/1/85	LE RM 94	4.6 miles/day
11/4/85	LE RM 104.5	3.5 miles/day
11/6/85	LE RM 110.5	3.0 miles/day
11/13/85	LE RM 119.8	1.33 miles/day
11/21/85	LE RM 133.7	1.74 miles/day
11/26/85	LE RM 136.5	0.56 miles/day
12/5/85	LE RM 140.5	0.44 miles/day

LE = Leading Edge

TABLE 3.2
Water Surface Elevations
1985 Freeze-Up

Date	10/11/85	10/29/85	11/6/85	11/21/85	12/5/85
Flow (cfs), Susitna R. at Gold Creek	8,640	3,800	3,100	2,400	
Flow (cfs) Susitna R. at Sunshine	20,600	8,600	7,000	5,400	
RM 40	69.86	71.26			
RM 47.8 (East)	103.67	103.67			
RM 47.8 (West)	101.11	105.17			
RM 59.7 (East)	145.59				
RM 59.7 (West)	146.90	148.40			
RM 76.8	234.31	239.62			
RM 93.1 (East)	308.13	305.71	311.66 (ice)		
RM 93.1 (West)	6.98	9.64	2.00 (ice)		
RM 103.3 (LRX-9)			5.40 (ice)		
RM 106.3					
RM 113.0 (LRX-18)			456.59	462.50 (ice)	
RM 113.7			9.94	1.13 (ice)	
RM 120.5 (LRX-24)			519.47	523.61 (ice)	

TABLE 3.2 (continued)
Water Surface Elevations
1985 Freeze-Up

Date	10/11/85	10/29/85	11/6/85	11/21/85	12/5/85
Flow (cfs), Susitna R. at Gold Creek	8,640	3,800	3,100	2,400	
Flow (cfs) Susitna R. at Sunshine	20,600	8,600	7,000	5,400	
RM 123.3 (LRX-27)					545.98 (ice)
RM 126.1 (LRX-29)				576.53 (ice)	
RM 128.7 (LRX-30N3R.B.)				622.36 (ice)	
RM 134.2 (LRX-40)					661.49 (ice)

4.0 METEOROLOGY AND DATA COLLECTION

Daily measurements of ice and meteorological parameters were made at the Gold Creek Bridge by Nancy Larson. Twice per day, usually at sunrise and sunset, she obtained data on the air temperature at the water surface, minimum and maximum daily air temperatures, water temperature, water velocity, stage, shore ice width and thickness, and estimated slush ice concentration on the water surface. These data are listed in Appendix A.

Weather data from the Talkeetna Flight Service Station (National Weather Service) and Watana (R&M Consultants, Inc.) for September through December 1985 are included in Appendix B. Air temperature data for these stations, were summarized and are listed in Tables 4.1 to 4.7 along with accumulated freezing degree-days.

Temperatures were unusually low from mid-October until early December. At Talkeetna, total accumulated freezing degree-days were about twice their normal level at the end of November. At Watana, freezing degree-days were about 50% greater than normal at the end of November, but were about normal by the end of December, as temperatures were relatively high for most of December.

Table 4.1

**Talkeetna Weather Station Air Temperature
and Freezing Degree-Days Summary**

September 1985

Day	Minimum (°C)	Maximum (°C)	Average (°C)
1	9.4	12.8	11.1
2	7.2	15.0	11.1
3	6.1	16.7	11.7
4	1.1	17.2	9.4
5	2.2	18.9	10.6
6	6.7	15.6	11.1
7	5.6	12.8	9.4
8	8.3	13.3	11.1
9	3.3	13.9	8.9
10	-1.7	11.1	5.0
11	1.7	12.2	7.2
12	-0.6	8.9	4.4
13	5.6	11.7	8.9
14	7.2	11.7	9.4
15	5.6	15.0	10.6
16	2.2	15.0	8.9
17	-0.6	11.7	5.6
18	-1.1	3.9	1.7
19	3.3	7.2	5.6
20	-1.1	9.4	4.4
21	-2.8	10.6	3.9
22	0.6	4.4	2.8
23	3.3	5.0	4.4
24	3.3	8.3	6.1
25	0.0	10.0	5.0
26	0.0	5.6	2.8
27	3.3	10.6	7.2
28	5.0	8.3	6.7
29	5.0	10.6	7.8
30	4.4	11.7	8.3

Mean Monthly Air Temperature	7.2°C
Total Monthly Freezing Degree-Days	0.0
Total Accumulated Freezing Degree-Days	0.0
Average Historical Accumulated Freezing Degree-Days	0.0

Table 4.2

**Talkeetna Weather Station Air Temperature
and Freezing Degree-Days Summary**

October 1985

Day	Minimum (°C)	Maximum (°C)	Average (°C)
1	1.1	1.1	6.1
2	-1.1	2.9	3.9
3	-1.1	6.9	3.9
4	-3.9	8.9	2.8
5	-4.4	7.8	1.7
6	-0.6	5.6	2.8
7	1.1	5.0	3.3
8	2.2	6.1	4.4
9	-1.7	8.3	3.3
10	-4.4	6.1	1.1
11	-5.0	7.8	1.7
12	-4.4	5.6	0.6
13	-2.8	7.8	2.8
14	-7.2	5.0	-1.1
15	-2.2	1.7	0.0
16	-1.1	3.3	1.1
17	-7.2	1.1	-2.8
18	-2.8	1.7	-0.6
19	-7.8	1.1	-3.3
20	-11.1	-2.8	-6.7
21	-7.2	-0.6	-3.9
22	-10.6	-1.1	-5.6
23	-11.7	-2.8	-7.2
24	-18.9	-6.1	-12.2
25	-19.4	-7.8	-13.3
26	-13.3	-2.2	-7.8
27	-18.9	-5.0	-11.7
28	-11.1	-2.2	-6.7
29	-16.7	-2.8	-9.4
30	-20.6	-7.2	-13.9
31	-22.2	-10.0	-16.1
Mean Monthly Air Temperature			-2.8°C
Total Monthly Freezing Degree-Days			122.3
Total Accumulated Freezing Degree-Days			122.3
Average Historical Accumulated Freezing Degree-Days			72.0

Table 4.3

**Talkeetna Weather Station Air Temperature
and Freezing Degree-Days Summary**

November 1985

Day	Minimum (°C)	Maximum (°C)	Average (°C)
1	-23.9	-12.2	-18.3
2	-25.6	-15.0	-20.6
3	-22.2	-10.6	-16.1
4	-24.4	-6.7	-15.6
5	-11.1	-5.6	-8.3
6	-16.1	-6.1	-11.1
7	-20.0	-5.6	-12.8
8	-21.1	-7.2	-13.9
9	-8.9	-5.6	-7.2
10	-5.6	-2.8	-3.9
11	-2.8	1.1	-0.6
12	-22.2	-1.1	-11.7
13	-25.0	-7.8	-16.1
14	-25.6	-10.0	-17.8
15	-29.4	-13.9	-21.7
16	-29.4	-11.7	-20.6
17	-22.8	-9.4	-16.1
18	-22.8	-8.9	-15.6
19	-23.9	-11.1	-17.2
20	-23.9	-12.8	-18.3
21	-22.2	-12.8	-17.2
22	-21.7	-12.8	-17.2
23	-22.8	-13.3	-18.3
24	-23.9	-14.4	-19.4
25	-23.9	-7.2	-15.6
26	-7.8	-4.4	-5.6
27	-7.8	-5.6	-6.7
28	-14.4	-6.7	-10.6
29	-18.9	-8.3	-13.3
30	-9.4	-4.4	-6.7

Mean Monthly Air Temperature	-13.8°C
Total Monthly Freezing Degree-Days	414.1
Total Accumulated Freezing Degree-Days	536.4
Average Historical Accumulated Freezing Degree-Days	263.0

Table 4.4

**Watana Weather Station Air Temperature
and Freezing Degree-Days Summary**

September 1985

Day	Minimum (°C)	Maximum (°C)	Average (°C)
1	6.0	9.6	7.8
2	1.9	10.6	6.3
3	1.3	10.9	6.1
4	-1.2	11.1	5.0
5	0.4	13.0	6.7
6	3.0	11.3	7.2
7	4.6	12.4	8.5
8	5.6	9.0	7.3
9	1.4	8.8	5.1
10	0.1	8.2	4.2
11	0.5	8.0	4.3
12	-0.5	5.1	2.3
13	-2.6	9.3	3.4
14	4.7	8.1	6.4
15	3.4	7.0	5.2
16	-2.6	4.0	0.7
17	-3.8	5.8	1.0
18	-2.9	2.4	-0.3
19	0.0	2.8	1.4
20	-3.5	1.2	-1.2
21	-4.7	5.5	0.4
22	-0.6	0.9	0.2
23	-0.3	2.4	1.1
24	0.9	4.9	2.9
25	-2.1	3.9	0.9
26	-0.9	3.1	1.1
27	3.2	8.2	5.7
28	0.5	5.3	2.9
29	0.5	7.7	4.1
30	0.5	6.2	3.4

Mean Monthly Air Temperature	-3.7°C
Total Monthly Freezing Degree-Days	1.5
Total Accumulated Freezing Degree-Days	1.5
Average Historical Accumulated Freezing Degree-Days	13.0

Table 4.5

**Watana Weather Station Air Temperature
and Freezing Degree-Days Summary**

October 1985

Day	Minimum (°C)	Maximum (°C)	Average (°C)
1	-1.0	5.0	2.0
2	-0.9	3.0	1.1
3	-2.5	3.0	0.3
4	-6.2	4.6	-0.8
5	-7.4	4.7	-1.4
6	-2.1	2.6	0.3
7	-1.6	1.2	-0.2
8	0.1	1.8	1.0
9	-1.4	3.7	1.2
10	-4.6	6.0	0.7
11	-3.1	2.8	-0.2
12	-5.1	1.6	-1.8
13	-5.8	2.3	-1.8
14	-6.6	-1.1	-3.9
15	-5.1	-0.5	-2.8
16	-6.7	1.7	-2.5
17	-7.0	0.1	-3.5
18	-9.9	-2.9	-6.4
19	-13.5	-5.1	-9.3
20	-15.9	-9.2	-12.6
21	-12.3	-4.7	-8.5
22	-13.6	-5.9	-9.8
23	-17.2	-7.7	-12.5
24	-21.7	-9.9	-15.8
25	-18.9	-13.1	-16.0
26	-18.9	-9.3	-14.1
27	-19.5	-11.1	-15.3
28	-18.0	-7.0	-12.5
29	-18.7	-8.0	-13.4
30	-20.4	-12.0	-16.2
31	-21.1	-14.4	-17.8
Mean Monthly Air Temperature			-6.2°C
Total Monthly Freezing Degree-Days			199.1
Total Accumulated Freezing Degree-Days			200.6
Average Historical Accumulated Freezing Degree-Days			140.0

Table 4.6

**Watana Weather Station Air Temperature
and Freezing Degree-Days Summary**

November 1985

Day	Minimum (°C)	Maximum (°C)	Average (°C)
1	-22.8	-16.4	-19.6
2	-22.8	-12.0	-17.4
3	-20.8	-10.4	-15.6
4	-22.2	-12.2	-17.2
5	-22.5	-14.3	-18.4
6	-21.6	-11.5	-16.6
7	-24.5	-14.1	-19.3
8	-22.9	-13.0	-18.0
9	-13.9	-10.7	-12.3
10	-11.0	-6.0	-8.5
11	-13.0	-3.6	-8.3
12	-16.1	-8.0	-12.1
13	-21.1	-11.0	-16.1
14	-25.1	-15.6	-20.4
15	-26.5	-15.9	-21.2
16	-26.2	-14.6	-20.4
17	-17.5	-13.5	-15.5
18	-17.8	-10.4	-14.1
19	-19.4	-8.7	-14.1
20	-19.0	-4.2	-11.6
21	-15.9	-4.4	-10.2
22	-18.8	-10.5	-14.7
23	-17.0	-10.7	-13.9
24	-13.6	0.1	-6.8
25	-12.6	-4.3	-8.5
26	-13.4	-9.1	-11.3
27	-12.4	-9.2	-10.8
28	-19.3	-12.1	-15.7
29	-18.2	-14.6	-16.4
30	-19.7	-12.1	-15.9

Mean Monthly Air Temperature	-14.7°C
Total Monthly Freezing Degree-Days	440.9
Total Accumulated Freezing Degree-Days	641.5
Average Historical Accumulated Freezing Degree-Days	420.6

Table 4.7

**Watana Weather Station Air Temperature
and Freezing Degree-Days Summary**

December 1985

Day	Minimum (°C)	Maximum (°C)	Average (°C)
1	-21.0	-11.6	-16.3
2	-18.1	-10.6	-14.4
3	-22.6	-15.1	-18.9
4	-22.9	-9.7	-16.3
5	-19.1	-11.7	-15.4
6	-20.6	-14.7	-17.7
7	-17.4	-7.4	-12.4
8	-7.6	-3.8	-5.7
9	-3.6	0.1	-1.8
10	-2.2	1.7	-0.3
11	0.3	4.8	2.6
12	-9.7	0.4	-4.7
13	-12.7	-7.1	-9.9
14	-9.5	-5.8	-7.7
15	-9.2	-4.8	-7.0
16	-6.9	-3.3	-5.1
17	-8.5	-4.5	-6.5
18	-9.2	-2.6	-5.9
19	-3.0	1.9	-0.6
20	-1.8	3.2	0.7
21	0.8	3.5	2.2
22	-1.2	3.2	1.0
23	-0.4	3.2	1.4
24	-3.5	3.4	-0.1
25	-10.3	-2.5	-6.4
26	-3.6	-2.3	-3.0
27	-4.6	-1.8	-3.2
28	-7.2	-2.7	-5.0
29	-5.6	-3.5	-4.6
30	-6.7	-4.1	-5.4
31	-8.1	-4.8	-6.5

Mean Monthly Air Temperature	-6.2°C
Total Monthly Freezing Degree-Days	200.8
Total Accumulated Freezing Degree-Days	842.3
Average Historical Accumulated Freezing Degree-Days	874.4

Table 4.8

**Watana Streamgage Site
Air Temperature and
Freezing Degree-Days Summary
September 1985**

Date	Minimum (°C)	Maximum (°C)	Average (°C)	Deviation From Watana Weather Station (°C)
1	5.0	13.0	9.0	1.2
2	3.0	16.0	9.5	3.2
3	1.0	16.5	8.8	2.7
4	-1.5	16.0	7.2	2.2
5	-2.0	18.5	8.2	1.5
6	3.5	14.5	9.0	1.8
7	7.5	14.0	10.8	2.3
8	6.0	12.0	9.0	1.7
9	2.5	14.5	8.5	3.4
10	2.0	12.5	7.2	3.0
11	3.5	13.0	8.2	3.9
12	1.0	8.0	4.5	2.2
13	1.5	13.5	7.5	4.1
14	8.0	11.5	9.8	3.4
15	7.0	10.0	8.5	3.3
16	0.0	9.0	4.5	3.8
17	-3.0	12.0	4.5	3.5
18	0.5	5.5	3.0	3.3
19	2.5	6.5	4.5	3.1
20	0.5	5.5	3.0	4.2
21	-1.5	10.5	4.5	4.1
22	2.0	5.0	3.5	3.3
23	3.0	5.5	4.2	3.1
24	3.0	8.5	5.8	2.9
25	0.0	9.5	4.8	3.9
26	1.0	6.5	3.8	2.7
27	5.5	13.0	9.2	3.5
28	4.5	9.0	6.8	3.9
29	2.0	12.0	7.0	2.9
30	2.0	10.5	6.2	2.8
			Average	3.0°C
Mean Monthly Air Temperature			6.7°C	
Total Monthly Freezing Degree-Days			0	
Total Accumulated Freezing Degree-Days			0	

Table 4.9

**Watana Streamgage Site
Air Temperature and
Freezing Degree-Days Summary
October 1985**

Date	Minimum (°C)	Maximum (°C)	Average (°C)	Deviation From Watana Weather Station (°C)
1	0.0	9.5	4.8	2.8
2	0.0	7.5	3.8	2.7
3	2.5	7.5	5.0	4.7
4	-4.5	9.5	2.5	3.3
5	-6.0	9.5	1.8	3.2
6	-0.5	7.0	3.2	2.9
7	2.0	5.0	3.5	3.7
8	2.5	5.0	3.8	2.8
9	2.5	9.0	5.8	4.6
10	-2.0	5.0	1.5	0.8
11	-2.5	5.0	1.2	1.4
12	-9.0	2.5	-3.2	-1.4
13	-6.0	3.0	-1.5	0.3
14	-9.5	0.5	-4.5	-0.6
15	-8.0	0.5	-3.8	-1.0
16	-8.0	4.0	-2.0	0.5
17	-8.0	0.5	-3.8	-0.3
18	-14.0	-3.0	-8.5	-2.1
19	-16.0	-3.5	-9.8	-0.5
20	-14.0	-8.0	-11.0	1.6
21	-11.5	-4.0	-7.8	0.7
22	-17.5	-5.0	-11.2	-1.4
23	-20.5	-7.0	-13.8	-1.3
24	-23.0	-9.5	-16.2	-0.4
25	-21.5	-12.0	-16.8	-0.8
26	-19.0	-8.5	-13.8	0.3
27	-18.5	-11.5	-15.0	0.3
28	-16.0	-8.0	-12.0	0.5
29	-20.5	-8.5	-14.5	-1.1
30	-21.5	-13.0	-17.2	-1.0
31	-19.0	-16.0	-17.5	0.3
			Average	0.8°C
Mean Monthly Air Temperature			-5.4°C	
Total Monthly Freezing Degree-Days			203.9	
Total Accumulated Freezing Degree-Days			203.9	

Table 4.10

**Watana Streamgage Site
Air Temperature and
Freezing Degree-Days Summary
November 1985**

Date	Minimum (°C)	Maximum (°C)	Average (°C)	Deviation From Watana Weather Station (°C)
1	-23.0	-15.0	-19.0	0.6
2	-23.0	-15.0	-19.0	-1.6
3	-24.0	-15.5	-19.8	-3.2
4	-28.0	-12.0	-20.0	-2.8
5	-25.0	-13.0	-19.0	-0.6
6	-24.0	-17.0	-20.5	-3.9
7	-26.5	-19.5	-23.0	-3.7
8	-26.5	-13.0	-19.8	-1.8
9	-15.0	-11.0	-13.0	-0.7
10	-11.0	-7.0	-9.0	-0.5
11	-15.0	-4.0	-9.5	-1.2
12	-23.0	-10.0	-16.5	-4.4
13	-27.5	-20.0	-22.8	-6.7
14	-30.0	-23.5	-26.8	-6.4
15	-33.0	-26.0	-29.5	-8.3
16	-34.5	-14.0	-24.2	-3.8
17	-24.0	-13.5	-18.8	-3.3
18	-24.0	-18.5	-21.2	-7.1
19	-25.5	-21.0	-23.2	-9.1
20	-24.5	-11.0	-17.8	-6.2
21	-22.5	-9.0	-15.8	-5.6
22	-25.0	-20.5	-22.8	-8.1
23	-25.0	-20.0	-22.5	-8.6
24	-26.0	-21.0	-23.5	-16.7
25	-22.5	-10.5	-16.5	-8.0
26	-12.0	-8.5	-10.2	1.1
27	-11.5	-8.0	-9.8	1.0
28	-26.0	-11.0	-18.5	-2.8
29	-27.5	-16.0	-21.8	-5.4
30	-22.0	-12.5	-17.2	-1.3
Average				-4.3°C
Mean Monthly Air Temperature			-19.0°C	
Total Monthly Freezing Degree-Days			571.0	
Total Accumulated Freezing Degree-Days			774.9	

Table 4.11

**Watana Streamgage Site
Air Temperature and
Freezing Degree-Days Summary
December 1985**

Date	Minimum (°C)	Maximum (°C)	Average (°C)	Deviation From Watana Weather Station (°C)
1	-24.0	-15.0	-19.5	-3.2
2	-26.5	-16.5	-21.5	-7.1
3	-31.0	-27.0	-29.0	-10.1
4	-30.0	-22.0	-26.0	-9.7
5	-25.5	-14.0	-19.8	-4.4
6	-27.0	-17.5	-22.2	-4.5
7	-25.5	-17.0	-21.2	-9.8
8	-16.5	-3.0	-9.8	-4.1
9	-3.0	-0.5	-1.8	0.0
10	-5.5	2.0	-1.8	-1.5
11	-1.5	5.0	1.8	-0.8
12	-13.5	-1.0	-7.2	-2.5
13	-20.5	-13.5	-17.0	-7.1
14	-19.5	-9.0	-14.2	-6.5
15	-15.5	-9.0	-12.2	-5.2
16	-12.0	-4.0	-8.0	-2.9
17	-11.0	-3.5	-7.2	-0.7
18	-16.0	-3.0	-9.5	-3.6
19	-5.0	1.5	-1.8	-1.2
20	3.5	2.0	-0.8	-1.5
21	0.0	4.5	2.2	0.0
22	-5.5	4.0	-0.8	-1.8
23	-0.5	4.0	1.8	-0.4
24	2.5	4.0	0.8	-0.9
25	-12.5	-1.5	-7.0	-0.6
26	-6.5	-1.5	-4.0	-1.0
27	-9.5	-3.0	-6.2	-3.0
28	-6.0	-4.0	-5.0	0.0
29	-10.0	-4.0	-7.0	-2.4
30	-10.0	-4.5	-7.2	-2.8
31	-9.5	-4.5	-7.0	-0.5
			Average	-3.1°C
Mean Monthly Air Temperature			-9.3°C	
Total Monthly Freezing Degree-Days			294.7	
Total Accumulated Freezing Degree-Days			1069.6	

6.0 REFERENCES

R&M Consultants, Inc. 1981. Ice Observations 1980-81. Anchorage, Alaska. Alaska Power Authority. Susitna Hydroelectric Project. Report for Acres American, Inc. 1 Vol.

1982. Ice Observations 1981-82. Anchorage, Alaska. Alaska Power Authority. Susitna Hydroelectric Project. Report for Acres American, Inc. 8 Vol.

1983. Susitna River Ice Study 1982-1983. Anchorage, Alaska. Alaska Power Authority. Susitna Hydroelectric Project. Report for Harza-Ebasco Susitna Joint Venture. 1 Vol.

1985. Susitna River Ice Study 1984-1985. Anchorage, Alaska. Alaska Power Authority. Susitna Hydroelectric Project. Report for Harza-Ebasco Susitna Joint Venture. 1 Vol. Document No. 2747.

APPENDIX A

9/17 1

1985
FREEZE-UP OBSERVATION

Location: Susitna River
at Gold Creek

Date	Air Temp.		Water Temp °F	Ice Conc	Level Feet	Velocity Ft/Sec	Shore Ice		Snowfall	Weather
	Min °F	Max °F					Width	(at edge)		
10/01/85	34		39.6	0	53.80		0	0	0	Partly cloudy, showers
		44	39.4	0	53.70	4.4	0	0	0	Overcast, showers
10/02/85	30		39.4	0	53.67	4.3	0	0	0	Light rain
		50	39.2	0	53.61		0	0	0	Overcast
10/03/85	34		38.7	0	53.57	4.6	0	0	0	Clear
		46	38.7	0	53.53		0	0	0	Clear
10/04/85	25		36.9	0	53.44	4.3	0	0	0	Clear
		46	36.5	0	53.39		0	0	0	Clear
10/05/85	22		--	0	53.30	4.4	0	0	0	Clear
		46	36.5	0	53.22		0	0	0	Clear
10/06/85	28		36.3	0	53.10	4.0	0	0	0	Overcast
		42	36.3	0	53.05		0	0	0	Rain
10/07/85	26		36.5	0	53.13	4.0	0	0	1/2"	Rain/snow showers
		44	36.5	0	53.10		0	0		
10/08/85	30		36.7	0	53.15	3.8	0	0	1/2"	Snow and rain
		43	36.5	0	53.15		0	0	1"	
10/09/85	32		37.4	0	53.16	3.9	0	0	0	Mostly cloudy
		46	37.8	0	53.20		0	0	0	Partly cloudy
10/10/85	27		37.4	0	53.14		0	0	0	Clear
		42	37.4	0	53.12	3.8	0	0	0	Clear
10/11/85	31		36.1	0	52.88		0	0	0	Clear
		45	36.5	0	52.95	3.6	0	0	0	Clear
10/12/85	21		35.8	0	52.77		0	0	0	Cloudy
		40	35.8	0	52.75	3.6	0	0	0	Cloudy
10/13/85	28		36.0	0	52.67		0	0	0	Partly cloudy
		40	35.8	0	52.64	3.3	0	0	0	Partly cloudy
10/14/85	24		33.8	0	52.44		0	0	0	Clear
		44	34.0	0	52.45	3.1	0	0	0	Partly cloudy
10/15/85	22		33.8	5	52.40		0	0	0	Overcast with fog, snow
		38	34.2	3	52.35	3.2	0	0	1 1/2"	Snowing
10/16/85	26		33.8	10	52.32		0	0	4"	
		40	33.8	0	52.30	3.1	0	0	0	
10/17/85	18		32.7	15	52.29		2.3	3/4"	0	Clear
		38	33.4	3	52.36	3.3	0	0	0	Overcast, windy
10/18/85	28		33.6	3	52.25		0	0	0	Overcast, strong east wind
		37	33.1	5	52.20	3.2	0	0	0	Windy
10/19/85	16		32.7	50	51.96		5.6'	1 1/2"	0	Clear
		32	32.5	40	51.50	3.0	7.3	6 1/2"	0	Partly cloudy
10/20/85	8		32.4	75	51.20				0	Overcast, wind
		28	32.4	60	51.19	3.0	23		0	Windy
10/21/85	15		32.4	60	50.85		26	18	0	Clear/wind
		32	32.4		50.83	2.5	26	11-16	0	Clear/wind
10/22/85	14		32.2	75	50.81		26	11-16	0	Clear
		30	32.2	75	50.81	2.4	26	11-16	0	Clear

9/17 2

1985
FREEZE-UP OBSERVATION

Location: Susitna River
at Gold Creek

Date	Air Temp.		Water Temp °F	Ice Conc	Level Feet	Velocity Ft/Sec	Shore Ice		Snowfall	Weather
	Min °F	Max °F					Width	(at edge)		
10/23/85	-2		32.2	65	50.79		27	11-16	0	Clear/wind
		30	32.2	65	50.79	2.4	27	11-16	0	Clear/wind
10/24/85	-7		32.2	65	50.54		30	15	0	Clear
		17	32.0	70	50.54	2.4	30.3	15	0	Partly cloudy
10/25/85	3		32.2	60	50.53		30.6	16	0	High overcast/light N wind
		17	32.2	60	50.53	2.8	31.1	16	0	
10/26/85	4		32.2	70	50.53		32	16	0	High overcast/strong NE wind
		24	32.2	75	50.53	2.9	33.5	16	0	
10/27/85	6		32.2	70	50.69		34	14	0	Clear/moderate N wind
		24	32.2	70	50.69	2.8	34.1	14	0	
10/28/85	16		32.2	70	50.61		34.3	6"	0	Partly cloudy/moder N wind
		28	32.2	70	50.67	3.1	34.4	4	0	Clear/light N wind
10/29/85	2		32.0	75	50.65		34.7		0	Clear/calm
		26	32.0	75	50.65	3.1	34.8	6	0	Clear/light N wind
10/30/85	4		32.2	75	50.65		34.8		0	Clear/moderate N wind
		24	32.2	75	50.65	3.0			0	Clear/moderate N wind
10/31/85										
11/01/85	-6		32.2	80	50.70		35.3	4-6	0	Clear/calm
		15	32.2	80	50.70	3.1	35.3	4-6	Trace	Clear/calm
11/02/85	-10		32.2	80	50.71		35.4	4-6	0	Clear/calm
		10	32.2	80	50.71	3.1	35.4	4-6	0	Clear/calm
11/03/85	-10		32.2	75	50.71		35.4	4-6	0	Clear/calm
		10	32.2	75	50.71	2.9	35.7	7	0	Clear/calm
11/04/85	-12		32.2	75	50.70		36	7	0	Clear/moderate N wind
		21	32.2	75	50.70	2.9	36	7	0	Clear/moderate N wind
11/05/85	-2		32.2	75	50.70		36.4	5-8	0	Partly cloudy/calm
		16	32.2	75	50.70	2.7	36.4	5-8	0	Partly cloudy/calm
11/06/85	-4		32.2	80	50.70		37.1	8	0	Partly cloudy
		12	32.2	80	50.70	2.3	37.1	4-10	0	
11/07/85	-10		32.2	80	50.70		37.6	8	0	Clear/moderate N wind
		18	32.2	80	50.70	2.3	38	6-8	0	
11/08/85	-10		32.2	80	50.70		39.3	10-12	0	Clear/moderate N wind
		21	32.2	80	50.70	2.5	29.6	10-12	0	
11/09/85	6		32.4	65	50.72		40	10-12	0	Cloudy/calm
		24	32.4	65	50.72	2.7	40	10-12	Trace	Snowing/calm
11/10/85	15		32.4	55	50.70		42.5	4	2	Snowing/light N wind
		27	32.4	55	50.70	2.9	42.7	4	2	Snowing/light N wind
11/11/85	14		32.4	55	50.70		42.7	4	8	Snowing/light N wind
		25	32.4	55	50.72	2.8	43	4	4	Snowing/moderate N wind
11/12/85	10		32.4	55	50.72		43.4		0	Partly cloudy
		30	32.4	60	50.74	2.7			0	Clear

9/17 2

1985
FREEZE-UP OBSERVATION

Location: Susitna River
at Gold Creek

Date	Air Temp.		Water Temp °F	Ice Conc	Level Feet	Velocity Ft/Sec	Shore Ice		Snowfall	Weather
	Min °F	Max °F					Width	(at edge)		
10/23/85	-2		32.2	65	50.79		27	11-16	0	Clear/wind
		30	32.2	65	50.79	2.4	27	11-16	0	Clear/wind
10/24/85	-7		32.2	65	50.54		30	15	0	Clear
		17	32.0	70	50.54	2.4	30.3	15	0	Partly cloudy
10/25/85	3		32.2	60	50.53		30.6	16	0	High overcast/light N wind
		17	32.2	60	50.53	2.8	31.1	16	0	
10/26/85	4		32.2	70	50.53		32	16	0	High overcast/strong NE wind
		24	32.2	75	50.53	2.9	33.5	16	0	
10/27/85	6		32.2	70	50.69		34	14	0	Clear/moderate N wind
		24	32.2	70	50.69	2.8	34.1	14	0	
10/28/85	16		32.2	70	50.61		34.3	6"	0	Partly cloudy/moder N wind
		28	32.2	70	50.67	3.1	34.4	4	0	Clear/light N wind
10/29/85	2		32.0	75	50.65		34.7		0	Clear/calm
		26	32.0	75	50.65	3.1	34.8	6	0	Clear/light N wind
10/30/85	4		32.2	75	50.65		34.8		0	Clear/moderate N wind
		24	32.2	75	50.65	3.0			0	Clear/moderate N wind
10/31/85										
11/01/85	-6		32.2	80	50.70		35.3	4-6	0	Clear/calm
		15	32.2	80	50.70	3.1	35.3	4-6	Trace	Clear/calm
11/02/85	-10		32.2	80	50.71		35.4	4-6	0	Clear/calm
		10	32.2	80	50.71	3.1	35.4	4-6	0	Clear/calm
11/03/85	-10		32.2	75	50.71		35.4	4-6	0	Clear/calm
		10	32.2	75	50.71	2.9	35.7	7	0	Clear/calm
11/04/85	-12		32.2	75	50.70		36	7	0	Clear/moderate N wind
		21	32.2	75	50.70	2.9	36	7	0	Clear/moderate N wind
11/05/85	-2		32.2	75	50.70		36.4	5-8	0	Partly cloudy/calm
		16	32.2	75	50.70	2.7	36.4	5-8	0	Partly cloudy/calm
11/06/85	-4		32.2	80	50.70		37.1	8	0	Partly cloudy
		12	32.2	80	50.70	2.3	37.1	4-10	0	
11/07/85	-10		32.2	80	50.70		37.6	8	0	Clear/moderate N wind
		18	32.2	80	50.70	2.3	38	6-8	0	
11/08/85	-10		32.2	80	50.70		39.3	10-12	0	Clear/moderate N wind
		21	32.2	80	50.70	2.5	29.6	10-12	0	
11/09/85	6		32.4	65	50.72		40	10-12	0	Cloudy/calm
		24	32.4	65	50.72	2.7	40	10-12	Trace	Snowing/calm
11/10/85	15		32.4	55	50.70		42.5	4	2	Snowing/light N wind
		27	32.4	55	50.70	2.9	42.7	4	2	Snowing/light N wind
11/11/85	14		32.4	55	50.70		42.7	4	8	Snowing/light N wind
		25	32.4	55	50.72	2.8	43	4	4	Snowing/moderate N wind
11/12/85	10		32.4	55	50.72		43.4		0	Partly cloudy
		30	32.4	60	50.74	2.7			0	Clear

9/17 3

1985
FREEZE-UP OBSERVATION

Location: Susitna River
at Gold Creek

Date	Air Temp.		Water Temp °F	Ice Conc	Level Feet	Velocity Ft/Sec	Shore Ice		Snowfall	Weather
	Min °F	Max °F					Width	(at edge)		
11/13/85	-19		32.2	65	50.79	2.7	43.6	2-4	0	Clear/wind
		-2	32.2	70	50.80				0	Strong N wind
11/14/85	-19		32.2	70	50.86	2.5	43.8	2-4	0	Clear
		0	32.2	70					0	
11/15/85	-16		32.2	80	50.84	2.6	44	2-4	0	Clear
		2	32.2	80					0	Calm
11/16/85	-18		32.2	85	50.85	2.7	44	2-4	0	Partly cloudy
		2	32.2	80	50.85				0	Calm
11/17/85	1		32.2	80	50.87	2.7	45.2	3-6	0	Partly cloudy/light N wind
		20	32.2	80	50.87				0	
11/18/85	-8		32.2	85	51.07	2.5	45.7	3-6	0	Clear/light N wind
		18	32.2	85	51.07				0	
11/19/85	-8								0	
		4							0	
11/20/85	-6		32.0		51.13	2.4			0	
		7							0	
11/21/85	-2		32.2		50.97	2.4			0	
		10							0	
11/22/85	-3		32.4	50	51.08	2.5			0	Clear
		4							0	
11/23/85	-4		32.2	75	50.83		Pressure ridges; ice Overshelf & broken		0	Clear
		2							0	
11/24/85	-5		32.0	80	50.81				0	Clear
		3							0	Calm
11/25/85	-4			80	53.50	2.1	Ice dam downstream Water over shelf		0	Clear
		2							0	Calm
11/26/85	-4			100	56.55				0	Cloudy
		24					Ice stopped 1:16 pm Channel open		0	Light snow
11/27/85	14			50 (in channel)	56.50				0	
		24							0	
11/28/85	-12			100	56.54		Jammed again		0	Clear
		16							0	
11/29/85	1						Closed under bridge		0	
									0	
11/30/85		20	Closed under bridge; open leads upstream and downstream						0	
12/01/85									0	
12/02/85	0	12	Closed under bridge; open leads upstream and downstream						0	

APPENDIX B

SEP 1985
TALKEETNA, ALASKA
WEA SER CONTRACT MET OBS

ISSN 0198-0424

LOCAL CLIMATOLOGICAL DATA Monthly Summary



STATE AIRPORT

LATITUDE 62°18'

LONGITUDE 150°06'

ELEVATION (GROUND) 345 FEET

TIME ZONE ALASKA

26528

DATE	TEMPERATURE °F				DEGREE DAYS BASE 65°F		WEATHER TYPES 1 FOG 2 HEAVY FOG 3 THUNDERSTORM 4 ICE PELLETS 5 HAIL 6 GLAZE 7 DUSTSTORM 8 SMOKE, HAZE 9 BLOWING SNOW	SNOW ICE PELLETS OR ICE ON GROUND AT 0200 INCHES	PRECIPITATION		AVERAGE STATION PRESSURE IN INCHES ELEV. 356 FEET ABOVE M. S. L.	WIND (M. P. H.)				SUNSHINE		SKY COVER (TENTHS)		DATE			
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	HEATING (SEASON BEGINS WITH JUL)			COOLING (SEASON BEGINS WITH JAN)	WATER EQUIVALENT (INCHES)		SNOW, ICE PELLETS (INCHES)	RESULTANT DIR.	RESULTANT SPEED	AVERAGE SPEED	FASTEST MILE		MINUTES	PERCENT OF TOTAL POSSIBLE		SUNRISE TO SUNSET	MIDNIGHT TO MIDNIGHT	
																SPEED	DIRECTION						
1	2	3	4	5	6	7A	7P	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
01	55	49	52	1	51	13	0	1	0	0.88	0.0	29.570	17	3.2	6.8	14	15		10	9	01		
02	59	45	52	1	44	13	0		0	0.00	0.0	29.690	18	5.0	6.3	12	18		6	12	02		
03	62	43	53*	2	36	12	0		0	T	0.0					12	18		6	03			
04	63	34	49	-1	36	16	0		0	0.00	0.0	29.630	01	4.0	5.1	12	03		0	04			
05	66*	36	51	1	38	14	0		0	0.00	0.0	29.920	36	3.9	4.8	9	32		2	05			
06	60	44	52	2	44	13	0		0	0.00	0.0	29.960	01	0.4	2.4	7	23		10	8	06		
07	55	42	49	0	47	16	0	1	0	0.17	0.0	29.760	34	1.0	2.2	6	31		10	10	07		
08	56	47	52	3	50	13	0	1	0	0.26	0.0	29.490	17	5.5	7.3	14	17		10	9	08		
09	57	38	48	-1	42	17	0		0	0.00	0.0	29.340	22	2.1	3.8	14	20		6	09			
10	52	29	41	-7	24	0	1		0	0.06	0.0					8	08		10		10		
11	54	35	45	-3	39	20	0	2	0	T	0.0	29.650	19	0.4	3.0	9	18		7		11		
12	48	31	40	-8	38	25	0	1	0	0.06	0.0	29.720	01	2.2	2.6	7	05		10		12		
13	53	42	48	1	42	17	0		0	0.10	0.0	29.630	36	3.0	3.4	7	36		10	10	13		
14	53	45	49	2	47	16	0	1	0	2.33	0.0	29.190	36	2.0	4.2	8	19		10	10	14		
15	59	42	51	5	44	14	0	1	0	0.09	0.0	29.070	17	10.5	11.2	18	17		8	8	15		
16	59	36	48	2	31	17	0		0	T	0.0	29.590	35	2.9	5.2	12	31		3		16		
17	53	31	42	-4	23	0			0	0.00	0.0					10	33		5		17		
18	39	30	35*	-10	34	30	0	1	0	0.41	T	29.390	01	4.2	5.3	14	36		10		18		
19	45	38	42	-3	39	23	0	1	0	0.46	0.0	29.200	11	2.2	6.7	14	11		10		19		
20	49	30	40	-4	31	25	0		0	0.00	0.0	29.660	16	3.8	5.8	13	12		6	5	20		
21	51	27*	39	-5	29	26	0		0	0.00	0.0	29.830	35	2.9	4.3	8	31		1	3	21		
22	40	33	37	-6	35	28	0	1	0	0.26	0.0	29.440	36	4.1	4.7	12	36		10	10	22		
23	41	38	40	-3	39	25	0	1	0	0.62	0.0	29.425	01	2.8	3.5	9	03		10		23		
24	47	38	43	1	22	0	1		0	0.83	0.0					9	36		10		24		
25	50	32	41	-1	35	24	0		0	0.02	0.0	29.790	28	1.8	3.7	9	26		8		25		
26	42	32	37	-5	33	28	0	1	0	0.49	0.0	29.730	36	5.0	5.5	9	36		10		26		
27	51	38	45	4	41	20	0	1	0	0.43	0.0	29.460	36	5.2	5.7	12	01		10	10	27		
28	47	41	44	3	43	21	0	1	0	0.20	0.0	29.595	01	2.8	3.2	7	02		10	10	28		
29	51	41	46	6	39	19	0	1	0	0.08	0.0	29.250	36	5.1	6.2	13	02		10	10	29		
30	53	40	47	8	42	18	0	1	0	0.03	0.0	29.170	36	0.4	3.6	8	13		7		30		
SUN	SUN					TOTAL	TOTAL			TOTAL	TOTAL			FOR THE MONTH:				TOTAL	%	SUN	SUN		
1570	1127					592	0			7.78	T	29.540	36	0.9	4.9	18	17			235			
AVG.	AVG.	AVG.	DEP.	AVG.	DEP.	DEP.		PRECIPITATION		DEP.							DATE: 15	POSSIBLE		7.8			
52.3	37.6	45.0	-0.9	39.6	19	0		> 0.1 INCH	19	3.81													
NUMBER OF DAYS				SEASON TO DATE				SNOW, ICE PELLETS		GREATEST IN 24 HOURS AND DATES				GREATEST DEPTH ON GROUND OF				SNOW, ICE PELLETS OR ICE AND DATE					
TOTAL				TOTAL				> 1.0 INCH		0				0				0					
MAXIMUM TEMP.				MINIMUM TEMP.				1099		3		THUNDERSTORMS				PRECIPITATION		SNOW, ICE PELLETS					
5 70°				2 32°				0°		DEP.		DEP.		1		2.35		13-14		trace		18+	
0				0				8		2		3		CLEAR		4		PARTLY CLOUDY		7		CLOUDY 19	

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.
T TRACE AMOUNT.
+ ALSO ON EARLIER DATE(S).
HEAVY FOG: VISIBILITY 1/4 MILE OR LESS.
BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA.
HOURS OF OPS. MAY BE REDUCED ON A VARIABLE SCHEDULE.

DATA IN COLS 6 AND 12-15 ARE BASED ON 21 OR MORE OBSERVATIONS AT HOURLY INTERVALS. RESULTANT WIND IS THE VECTOR SUM OF WIND SPEEDS AND DIRECTIONS DIVIDED BY THE NUMBER OF OBSERVATIONS. ONE OF THREE WIND SPEEDS IS GIVEN UNDER FASTEST MILE: FASTEST MILE - HIGHEST RECORDED SPEED FOR WHICH A MILE OF WIND PASSES STATION (DIRECTION IN COMPASS POINTS). FASTEST OBSERVED ONE MINUTE WIND - HIGHEST ONE MINUTE SPEED (DIRECTION IN TENS OF DEGREES). PEAK GUST - HIGHEST INSTANTANEOUS WIND SPEED (A / APPEARS IN THE DIRECTION COLUMN). ERRORS WILL BE CORRECTED AND NOTED IN SUBSEQUENT PUBLICATIONS.

I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC DATA CENTER, ASHEVILLE, NORTH CAROLINA, 28801

noaa

NATIONAL
OCEANIC AND
ATMOSPHERIC ADMINISTRATION

NATIONAL
ENVIRONMENTAL SATELLITE, DATA
AND INFORMATION SERVICE

NATIONAL
CLIMATIC DATA CENTER
ASHEVILLE NORTH CAROLINA

Kenneth D. Walden
DIRECTOR
NATIONAL CLIMATIC DATA CENTER

OCT 1985
TALKEETNA, ALASKA
NEA SER CONTRACT MET OBS

ISSN 0198-0424

LOCAL CLIMATOLOGICAL DATA Monthly Summary

STATE AIRPORT



LATITUDE 62°18'

LONGITUDE 150°06'

ELEVATION (GROUND) 345 FEET

TIME ZONE ALASKA

26528

DATE	TEMPERATURE °F			DEGREE DAYS BASE 65°F		WEATHER TYPES		SNOW ICE PELLETS	PRECIPITATION		AVERAGE STATION PRESSURE	WIND (M.P.H.)			SUNSHINE		SKY COVER (TENTHS)					
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	HEATING (SEASON BEGINNS WITH JUL)	COOLING (SEASON BEGINNS WITH JAN)	1 FOG 2 HEAVY FOG 3 THUNDERSTORM 4 ICE PELLETS 5 HAIL 6 GLAZE 7 DUSTSTORM 8 SMOKE, HAZE 9 BLOWING SNOW	OR ICE ON GROUND AT 0200 INCHES	WATER EQUIVALENT (INCHES)	SNOW, ICE PELLETS (INCHES)	IN INCHES ELEV. 356 FEET ABOVE N.S.L.	RESULTANT DIR.	RESULTANT SPEED	AVERAGE SPEED	FASTEST MILE		MINUTES	PERCENT OF TOTAL POSSIBLE	SUNRISE TO SUNSET	TWOIGHT TO MIDNIGHT	DATE
																SPEED	DIRECTION					
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
01	52*	34	43*	4		22	0		0	0.01	0.0					9	36			10		01
02	48	30	39	1	36	26	0	1	0	0.10	0.0	29.410	01	1.4	2.9	8	06			10		02
03	48	30	39	1	34	26	0		0	0.06	0.0	29.775	03	3.3	4.6	9	04			8		03
04	48	25	37	0	29	28	0		0	0.00	0.0	29.900	03	0.8	2.7	6	04			2		04
05	46	24	35	-2	27	30	0		0	0.00	0.0	30.110	34	1.5	2.6	8	35			9		05
06	42	31	37	1	31	28	0	1	0	0.20	0.0	29.830	34	0.9	2.4	7	21			10		06
07	41	34	38	2	36	27	0	1	0	0.23	0.0	29.670	01	3.5	4.0	9	01			10		07
08	43	36	40	5	25	25	0	1	0	0.86	0.0					9	12			10		08
09	47	29	38	3	36	27	0	1	0	0.06	0.0	28.905	31	1.2	3.9	9	28			4		09
10	43	24	34	0	30	31	0		0	0.00	0.0	29.120	06	0.7	2.5	6	04			6		10
11	46	23	35	1	28	30	0		0	0.00	0.0	29.180	23	0.9	2.7	8	21			1		11
12	42	24	33	0	28	32	0		0	0.00	0.0	29.225	01	3.8	4.3	8	06			10		12
13	46	27	37	4	27	28	0		0	0.00	0.0	29.380	07	1.4	3.9	8	16			8		13
14	41	19	30	-2	23	35	0		0	0.00	0.0	29.540	36	0.9	1.8	6	27			4		14
15	35	28	32	0	33	33	0	1	0	0.24	5.1					12	02			10		15
16	38	30	34	3	32	31	0	1	4	0.15	1.5	28.875	34	1.2	1.4	5	33			10		16
17	34	19	27	-4	27	38	0		3	0.00	0.0	29.050	33	1.1	1.2	8	33			10		17
18	35	27	31	1	17	34	0		3	0.00	0.0	29.260	36	10.3	11.0	17	35			10		18
19	34	18	26	-4	9	39	0		2	0.00	0.0	29.410	01	9.9	10.3	21	01			0		19
20	27	12	20	-9	9	45	0		2	0.00	0.0	29.120	36	6.4	6.9	14	03			10		20
21	31	19	25	-4	14	40	0		2	0.00	0.0	28.780	35	3.8	4.7	12	02			6		21
22	30	13	22	-6	4	43	0		2	0.00	0.0					17	03			0		22
23	27	11	19	-9	4	46	0		2	0.00	0.0	29.060	35	5.9	6.4	12	35			0		23
24	21	-2	10	-18	1	55	0		1	0.00	0.0	29.130	35	1.9	3.0	8	28			2		24
25	18	-3	8	-19	0	57	0		1	0.00	0.0	29.230	36	5.0	5.4	12	33			5		25
26	28	8	18	-9	2	47	0		1	0.00	0.0	29.250	36	5.6	8.0	14	02			10		26
27	23	-2	11	-15	4	54	0		1	0.00	0.0	29.170	02	4.9	5.8	14	02			6		27
28	28	12	20	-6	8	45	0		1	0.00	0.0	29.150	01	6.5	6.7	14	01			5		28
29	27	2	15	-10	5	50	0		1	0.00	0.0					6	03			1		29
30	19	-5	7	-18	0	58	0		1	0.00	0.0	29.160	03	2.4	2.9	6	02			4		30
31	14	-8*	3*	-21	0	62	0		1	0.00	0.0	29.270	03	3.1	3.2	7	03			4		31
SUN	SUN					TOTAL	TOTAL	NUMBER OF DAYS		TOTAL	TOTAL	FOR THE MONTH:					TOTAL	%	SUN	SUN		
1102	569					1172	0			1.91	6.6						21	01	FOR	191		
AVG.	AVG.	AVG.	DEP.	AVG.	DEP.	DEP.	DEP.	PRECIPITATION		DEP.							DATE: 19	POSSIBLE	MONTH	AVG.	AVG.	
35.5	18.4	27.0	-4.4			130	0	0.01 INCH.		9	-0.72									6.2		
NUMBER OF DAYS				SEASON TO DATE				SNOW, ICE PELLETS				GREATEST IN 24 HOURS AND DATES				GREATEST DEPTH ON GROUND OF						
				TOTAL				> 1.0 INCH								SNOW, ICE PELLETS OR ICE AND DATE						
MAXIMUM TEMP				MINIMUM TEMP				THUNDERSTORMS				PRECIPITATION				SNOW, ICE PELLETS						
5 700				2 320				0				0.89				08-09 6.6 15-16						
0				12				0				0.89				15-16						
0				28				3				8				4						
0				5				132				8				15						
0				3				CLEAR				PARTLY CLOUDY				CLOUDY						

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.
† TRACE AMOUNT.
+ ALSO ON EARLIER DATE(S).
HEAVY FOG: VISIBILITY 1/4 MILE OR LESS.
BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA.
HOURS OF OPS. MAY BE REDUCED ON A VARIABLE SCHEDULE.

DATA IN COLS 6 AND 12-15 ARE BASED ON 21 OR MORE OBSERVATIONS AT HOURLY INTERVALS. RESULTANT WIND IS THE VECTOR SUM OF WIND SPEEDS AND DIRECTIONS DIVIDED BY THE NUMBER OF OBSERVATIONS. ONE OF THREE WIND SPEEDS IS GIVEN UNDER FASTEST M.P.H.: FASTEST MILE - HIGHEST RECORDED SPEED FOR WHICH A MILE OF WIND PASSES STATION (DIRECTION IN COMPASS POINTS). FASTEST OBSERVED ONE MINUTE WIND - HIGHEST ONE MINUTE SPEED (DIRECTION IN TENS OF DEGREES). PEAK GUST - HIGHEST INSTANTANEOUS WIND SPEED (A / APPEARS IN THE DIRECTION COLUMN). ERRORS WILL BE CORRECTED AND NOTED IN SUBSEQUENT PUBLICATIONS.

I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC DATA CENTER, ASHEVILLE, NORTH CAROLINA, 28801

noaa

NATIONAL
OCEANIC AND
ATMOSPHERIC ADMINISTRATION

NATIONAL
ENVIRONMENTAL SATELLITE, DATA
AND INFORMATION SERVICE

NATIONAL
CLIMATIC DATA CENTER
ASHEVILLE NORTH CAROLINA

Kenneth D. Wade
DIRECTOR
NATIONAL CLIMATIC DATA CENTER

NOV 1985
TALKEETNA, ALASKA
WEA SER CONTRACT MET OBS

ISSN 0198-0424

LOCAL CLIMATOLOGICAL DATA Monthly Summary

STATE AIRPORT



LATITUDE 62°18'

LONGITUDE 150°06'

ELEVATION (GROUND) 345 FEET

TIME ZONE ALASKA

26529

DATE	TEMPERATURE °F					DEGREE DAYS BASE 65°F		WEATHER TYPES 1 FOG 2 HEAVY FOG 3 THUNDERSTORM 4 ICE PELLETS 5 HAIL 6 GLAZE 7 DUSTSTORM 8 SMOKE, HAZE 9 BLOWING SNOW	SNOW ICE PELLETS OR ICE ON GROUND AT 0200 INCHES	PRECIPITATION		AVERAGE STATION PRESSURE IN INCHES ELEV. 356 FEET ABOVE M.S.L.	WIND (M.P.H.)			SUNSHINE		SKY COVER (TENTHS)		DATE	
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE NEW POINT	HEATING SEASON BEGINS WITH JUL	COOLING SEASON BEGINS WITH JAN			WATER EQUIVALENT (INCHES)	SNOW, ICE PELLETS (INCHES)		RESULTANT DIR.	RESULTANT SPEED	FASTEST MILE	MINUTES	PERCENT OF TOTAL POSSIBLE	SUNRISE TO SUNSET	MIDNIGHT TO MIDNIGHT		
01	10	-11	-1	-25	-3	66	0		1	T	0.1	29.280	36	1.2	2.2	6	26	4	3	01	
02	5	-14	-5	-28	-5	70	0		1	0.00	0.0	29.100	04	0.4	1.5	5	36	9	7	02	
03	13	-8	3	-20	0	62	0		1	0.00	0.0	29.440	04	2.1	3.1	6	21	0	1	03	
04	20	-12	4	-18	-2	61	0		1	0.00	0.0	29.370	02	7.4	7.9	14	02	0	0	04	
05	22	12	17	-5	7	48	0		1	T	T					14	36	10		05	
06	21	3	12	-9	7	53	0		1	0.00	0.0	29.540	34	5.2	5.8	8	34	9		06	
07	22	-4	9	-12	-1	56	0		1	0.00	0.0	29.880	01	5.3	5.9	13	02	0		07	
08	19	-6	7	-14	-4	58	0		1	0.00	0.0	30.200	36	6.3	6.7	13	02	2	3	08	
09	22	16	19	-1	7	46	0	1	1	0.12	1.7	30.200	36	8.4	8.8	14	36	10	10	09	
10	27	22	25	5	21	40	0	1	2	0.50	7.2	29.740	02	11.0	11.3	16	03	10	10	10	
11	34*	27	31*	12	28	34	0	1	5	9	0.08	1.0	29.470	17	10.3	10.8	16	16	10		11
12	30	-8	11	-8	54	0	0		10	0.16	1.8					9	16	2		12	
13	18	-13	3	-16	-3	62	0		10	0.00	0.0	29.425	34	4.8	5.8	12	34	0		13	
14	14	-14	0	-18	-9	65	0		10	0.00	0.0	29.520	03	3.3	4.3	8	31	3		14	
15	7	-21	-7*	-25	-17	72	0		9	0.00	0.0	29.800	03	3.2	3.5	6	04	0	0	15	
16	11	-21*	-5	-22	-4	70	0		9	0.00	0.0	30.060	02	2.9	3.8	7	33	9	6	16	
17	15	-9	3	-14	0	62	0		9	0.00	0.0	30.080	04	2.4	2.4	6	03	2	2	17	
18	16	-9	4	-13	-4	61	0		9	0.00	0.0	30.160	04	4.1	4.3	8	04	2		18	
19	12	-11	1	-15	64	0	0		9	0.00	0.0					6	02	0		19	
20	9	-11	-1	-17	-7	66	0		8	0.00	0.0	30.280	03	2.4	2.7	6	36	0		20	
21	9	-8	1	-14	-6	64	0		8	0.00	0.0	30.270	03	2.6	3.3	7	05	0		21	
22	9	-7	1	-14	-6	64	0		8	0.00	0.0	30.280	04	3.5	3.7	6	04	0	0	22	
23	8	-9	-1	-16	-9	66	0		8	0.00	0.0	30.040	03	2.1	2.2	6	02	0		23	
24	6	-11	-3	-17	-13	68	0		7	0.00	0.0	29.790	06	1.3	1.7	6	03	2	1	24	
25	19	-11	4	-10	-9	61	0		7	0.00	0.0	29.660	04	1.8	2.7	7	31	4		25	
26	24	19	22	8	43	0	0		7	T	T					16	02	10		26	
27	22	18	20	7	11	45	0		7	0.00	0.0	29.620	36	9.1	9.6	14	35	9		27	
28	20	6	13	0	5	52	0		7	0.00	0.0	29.825	34	7.1	7.4	10	34	0		28	
29	17	-2	8	-5	1	57	0		7	0.00	0.0	29.840	35	8.7	9.2	15	02	0	3	29	
30	24	15	20	8	8	45	0		7	0.00	0.0	29.810	36	8.7	9.7	15	02	10	8	30	
SUM																					
505																					
-82																					
1735																					
0																					
16.8																					
-2.7																					
7.1																					
-10.6																					
-0.6																					
316																					
0																					
4																					
0																					
4																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					
0																					

DEC 1985
TALKEETNA, ALASKA
NEA SER CONTRACT MET OBS

ISSN 0198-0424

LOCAL CLIMATOLOGICAL DATA Monthly Summary

STATE AIRPORT



LATITUDE 62°18'

LONGITUDE 150°06'

ELEVATION (GROUND) 345 FEET

TIME ZONE ALASKA

26520

DATE	TEMPERATURE °F			DEGREE DAYS BASE 65°F		WEATHER TYPES 1 FOG 2 HEAVY FOG 3 THUNDERSTORM 4 ICE PELLETS 5 HAIL 6 GLAZE 7 DUSTSTORM 8 SMOKE, HAZE 9 BLOWING SNOW	SNOW ICE PELLETS OR ICE ON GROUND AT 0200 INCHES	PRECIPITATION		AVERAGE STATION PRESSURE IN INCHES	WIND (M.P.H.)			SUNSHINE		SKY COVER (TENTHS)		DATE		
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT			HEATING (SEASON BEGINN WITH JUL)	COOLING (SEASON BEGINN WITH JAN)		WATER EQUIVALENT (INCHES)	SNOW, ICE PELLETS (INCHES)	RESULTANT DIR.	RESULTANT SPEED	AVERAGE SPEED	FASTEST MILE	MINUTES		PERCENT OF TOTAL POSSIBLE	SUNRISE TO SUNSET
01	23	14	19	7	8	46	0	7	0.00	0.0	29.540	01	10.9	11.2	17	01		10	10	01
02	21	-11	5	-7	0	60	0	7	0.00	0.0	29.090	01	5.3	6.7	13	02		8	02	02
03	11	-14*	-2	-13	67	0	0	7	0.00	0.0								10	33	03
04	16	-8	4	-7	-2	61	0	6	0.00	0.0	28.660	34	4.1	4.7	12	33		10	04	04
05	1	-12	-6*	-17	-13	71	0	6	0.00	0.0	28.840	05	2.2	2.4	7	04		4	05	05
06	18	-8	5	-6	-1	60	0	6	0.00	0.0	29.290	03	3.5	4.3	8	01		9	7	06
07	25	15	20	10	9	45	0	6	0.00	0.0	29.700	36	7.2	7.9	15	01		2	4	07
08	35	25	30	20	20	35	0	6	0.00	0.0	29.800	01	9.5	9.8	17	02		10	10	08
09	36	32	34	24	30	31	0	6	0.17	0.5	29.720	36	5.5	6.0	15	01		10	10	09
10	42	33	38	28	27	0	0	6	T	0.0					12	34		10	10	10
11	42*	33	38*	29	32	27	0	6	0.23	0.0	29.460	36	2.1	2.9	10	01		10	7	11
12	37	27	32	23	29	33	0	5	0.01	0.0	29.630	36	4.4	4.6	7	02		7	1	12
13	27	14	21	12	14	44	0	5	0.00	0.0	29.555	36	5.1	5.7	9	34		1	1	13
14	31	21	26	17	17	39	0	5	0.00	0.0	29.390	34	7.8	8.2	14	35			7	14
15	30	27	29	21	18	36	0	5	0.00	0.0	29.425	36	5.7	6.0	13	34			9	15
16	30	18	24	16	16	41	0	5	0.00	0.0	29.230	01	5.1	5.3	12	02				16
17	29	18	24	16	41	0	0	7	0.08	2.0					7	35				17
18	35	12	24	16	18	41	0	7	T	T	29.330	36	7.4	7.9	16	36				18
19	36	32	34	26	29	31	0	7	0.47	T	29.190	36	4.5	5.2	12	02				19
20	37	33	35	27	32	30	0	5	0.23	0.0	29.040	01	3.5	3.9	7	02				20
21	40	32	36	28	31	29	0	4	0.03	0.0	29.010	03	4.1	5.1	9	02		10	9	21
22	40	30	35	28	27	30	0	4	0.08	0.0	29.040	02	5.6	6.6	14	35		9	8	22
23	38	33	36	29	32	29	0	4	0.90	0.0	29.160	36	3.0	4.0	8	24		10	20	23
24	36	29	33	26	32	0	0	2	0.27	T					21	14		10	24	24
25	33	27	30	23	20	35	0	2	0.02	0.5	30.110	01	7.8	8.1	14	02		7		25
26	39	29	34	27	19	31	0	2	0.00	0.0	29.730	36	8.7	9.1	14	01		10		26
27	38	32	35	28	22	30	0	2	0.07	T	29.460	35	3.5	4.0	12	34		10	10	27
28	34	31	33	26	30	32	0	2	0.11	T	29.570	36	0.9	1.0	9	34		10	10	28
29	31	28	30	23	26	35	0	2	0.15	2.3	29.550	36	4.7	4.9	9	34		10	10	29
30	31	28	30	23	22	35	0	3	T	T	29.280	01	7.5	7.7	13	02		10		30
31	28	20	24	17	41	0	0	3	0.03	0.3					7	34		10		31
SUM	SUM					TOTAL	TOTAL													
950	620					1225	0		2.85	5.6										
AVG.	AVG.	AVG.	DEP.	AVG.	DEP.	DEP.	PRECIPITATION		DEP.											
30.6	20.0	25.3	16.6		-520	0	> .01 INCH	15	1.44											
NUMBER OF DAYS				SEASON TO DATE				SNOW, ICE PELLETS				GREATEST IN 24 HOURS AND DATES				GREATEST DEPTH ON GROUND & SNOW, ICE PELLETS ON ICE & DATE				
				TOTAL				> 1.0 INCH				PRECIPITATION				SNOW, ICE PELLETS				
MAXIMUM TEMP.				5231				THUNDERSTORMS				0				2				
MINIMUM TEMP.				-72				HEAVY FOG				1				23				
5 700				2 320				2 00				0.90				2.3				
0				15				27				5				-72				

R & M CONSULTANTS, INC.
SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR WATANA WEATHER STATION
 DATA TAKEN DURING September, 1985

DAY	MAX. TEMP. DEG C	MIN. TEMP. DEG C	MEAN TEMP. DEG C	RES. WIND DIR. DEG	RES. WIND SPD. M/S	AUG. WIND SPD. M/S	MAX. GUST DIR. DEG	MAX. GUST SPD. M/S	P'VAL DIR.	MEAN RH %	MEAN DP DEG C	PRECIP MM	DAY'S SOLAR ENERGY WH/SQM	DAY
1	9.6	6.0	7.8	138	.6	2.9	260	9.7	ESE	99	8.2	7.2	1770	1
2	10.6	1.9	6.3	277	1.8	2.4	262	6.9	W	97	6.3	0.0	3505	2
3	10.9	1.3	6.1	319	.6	1.8	277	7.8	ENE	96	5.5	0.0	3265	3
4	11.1	-1.2	5.0	006	1.6	2.2	354	6.9	N	80	1.6	0.0	3605	4
5	13.0	.4	6.7	081	1.8	2.3	097	7.4	ESE	72	1.3	0.0	4570	5
6	11.3	3.0	7.2	119	.2	1.2	086	5.5	NNW	81	4.1	0.0	2065	6
7	12.4	4.6	8.5	016	.3	1.5	091	4.1	NNW	92	7.3	.4	1295	7
8	9.0	5.6	7.3	150	.5	1.9	276	6.9	ESE	99	7.8	9.6	1100	8
9	8.8	1.4	5.1	286	1.2	2.3	227	7.4	W	99	4.9	.8	3610	9
10	8.2	.1	4.2	305	.7	1.3	238	7.8	W	98	3.4	0.0	2306	10
11	8.0	.5	4.3	015	.4	1.4	101	5.1	N	99	4.0	.2	2765	11
12	5.1	-.5	2.3	007	.2	1.1	248	4.6	NE	99	2.0	.2	1550	12
13	9.3	-2.6	3.4	042	.2	1.2	079	3.2	NE	94	2.9	.2	2525	13
14	8.1	4.7	6.4	071	1.8	2.1	068	9.7	E	99	6.2	23.2	945	14
15	7.0	3.4	5.2	273	.7	1.9	248	7.8	NNW	99	5.1	17.2	890	15
16	4.0	-2.6	.7	078	3.2	3.3	088	8.7	E	82	-2.3	0.0	3755	16
17	5.8	-3.8	1.0	082	1.4	1.7	041	4.6	ESE	80	-3.2	0.0	3070	17
18	2.4	-2.9	-.3	073	4.7	4.8	078	10.6	ENE	95	-.7	3.0	1005	18
19	2.8	0.0	1.4	275	.5	1.2	076	5.5	WSW	99	1.2	10.4	1060	19
20	1.2	-3.5	-1.2	236	1.0	1.4	256	4.1	WSW	99	-.7	.2	1455	20
21	5.5	-4.7	.4	050	1.1	1.4	056	5.5	NNE	85	-2.7	2.4	3120	21
22	.9	-.6	.2	065	3.1	3.1	081	7.4	ENE	96	-.4	2.0	1050	22
23	2.4	-.3	1.1	047	1.0	1.4	081	6.9	ENE	99	.7	10.8	905	23
24	4.9	.9	2.9	040	1.1	1.7	045	5.1	NE	99	2.8	4.2	1050	24
25	3.9	-2.1	.9	062	1.4	2.3	069	6.9	NNE	76	-3.6	0.0	3230	25
26	3.1	-.9	1.1	070	4.6	4.7	079	10.1	ENE	99	.5	2.6	895	26
27	8.2	3.2	5.7	075	4.6	4.7	080	12.4	ENE	84	2.6	0.0	975	27
28	5.3	.5	2.9	023	.4	.9	067	3.2	WSW	99	1.8	4.4	1100	28
29	7.7	.5	4.1	077	4.3	4.7	085	12.0	E	97	3.7	0.0	1240	29
30	6.2	.5	3.4	274	.6	1.4	247	5.1	WSW	99	3.3	.4	1795	30
MONTH	13.0	-4.7	3.7	063	1.0	2.2	080	12.4	ENE	92	2.5	99.4	61471	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 10.6
 GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 11.0
 GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 10.1
 GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 9.2

NOTE: RELATIVE HUMIDITY READINGS ARE UNRELIABLE WHEN WIND SPEEDS ARE LESS THAN ONE METER PER SECOND. SUCH READINGS HAVE NOT BEEN INCLUDED IN THE DAILY OR MONTHLY MEAN FOR RELATIVE HUMIDITY AND DEW POINT.

** SEE INTERPRETATION NOTES AT END OF MONTHLY REPORT **

R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR WATANA WEATHER STATION
DATA TAKEN DURING October, 1985

DAY	MAX. TEMP. DEG C	MIN. TEMP. DEG C	MEAN TEMP. DEG C	RES. WIND DIR. DEG	RES. WIND SPD. M/S	AVG. WIND SPD. M/S	MAX. GUST DIR. DEG	MAX. GUST SPD. M/S	P'VAL DIR.	MEAN RH %	MEAN DP DEG C	PRECIP MM	DAY'S SOLAR ENERGY WH/SQM	DAY
1	5.0	-1.0	2.0	061	2.0	2.2	064	6.4	ENE	99	1.7	0.0	1575	1
2	3.0	-.9	1.1	251	.7	1.4	245	4.6	WSW	99	1.0	3.0	1160	2
3	3.0	-2.5	.3	290	.6	1.6	232	4.6	WSW	99	.3	2.0	1505	3
4	4.6	-6.2	-.8	327	1.3	1.9	244	4.1	N	90	-3.3	0.0	2715	4
5	4.7	-7.4	-1.4	050	1.8	2.2	082	6.0	N	88	-3.7	0.0	2195	5
6	2.6	-2.1	.3	050	1.9	2.1	047	5.1	NE	94	-.7	0.0	1040	6
7	1.2	-1.6	-.2	083	2.0	2.3	069	8.3	E	99	-.3	2.8	610	7
8	1.8	.1	1.0	054	2.0	2.6	085	7.4	NE	99	.6	7.2	715	8
9	3.7	-1.4	1.2	357	.9	1.1	065	2.8	N	99	.6	2.8	1400	9
10	6.0	-4.6	.7	045	.7	1.5	033	5.1	E	61	-8.5	.8	1860	10
11	2.8	-3.1	-.2	044	2.9	2.9	040	6.9	NE	38	-13.0	0.0	1790	11
12	1.6	-5.1	-1.8	036	2.1	2.3	027	5.1	NNE	47	-11.7	0.0	1070	12
13	2.3	-5.8	-1.8	098	1.0	1.5	120	5.1	E	52	-11.0	0.0	1400	13
14	-1.1	-6.6	-3.9	068	2.5	2.8	060	6.4	ENE	36	-16.5	0.0	1845	14
15	-.5	-5.1	-2.8	058	2.9	2.9	059	6.0	NE	48	-12.2	0.0	1005	15
16	1.7	-6.7	-2.5	053	1.8	2.2	082	5.5	ENE	54	-10.5	0.0	1310	16
17	.1	-7.0	-3.5	060	1.2	1.5	068	5.5	ENE	48	-12.5	0.0	1090	17
18	-2.9	-9.9	-6.4	044	4.1	4.1	053	8.3	NE	35	-19.3	0.0	1220	18
19	-5.1	-13.5	-9.3	063	2.3	2.4	054	6.0	NE	33	-23.2	0.0	1550	19
20	-9.2	-15.9	-12.6	076	3.4	3.5	074	8.7	ENE	41	-22.6	0.0	1360	20
21	-4.7	-12.3	-8.5	077	3.6	3.7	072	6.9	ENE	45	-18.8	0.0	1250	21
22	-5.9	-13.6	-9.8	077	2.7	3.1	035	7.4	ENE	33	-24.0	0.0	1455	22
23	-7.7	-17.2	-12.5	092	2.6	2.9	122	7.4	ESE	33	-26.1	0.0	1425	23
24	-9.9	-21.7	-15.8	076	2.0	2.3	043	6.0	ENE	37	-28.2	0.0	1415	24
25	-13.1	-18.9	-16.0	076	2.8	3.0	048	7.4	ESE	42	-26.1	0.0	1000	25
26	-9.3	-18.9	-14.1	085	3.5	3.7	069	9.2	E	33	-27.5	0.0	1020	26
27	-11.1	-19.5	-15.3	078	4.0	4.1	090	9.7	ENE	36	-26.9	0.0	1070	27
28	-7.0	-18.0	-12.5	078	3.3	3.4	066	8.3	E	40	-23.7	0.0	1210	28
29	-8.0	-18.7	-13.4	087	3.3	3.4	087	8.3	E	41	-24.9	0.0	1435	29
30	-12.0	-20.4	-16.2	092	2.4	2.6	087	7.8	E	39	-27.7	0.0	1075	30
31	-14.4	-21.1	-17.8	078	2.2	2.3	094	6.9	E	42	-28.1	0.0	1040	31
MONTH	6.0	-21.7	-6.2	067	2.1	2.6	090	9.7	ENE	56	-14.4	18.6	41810	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 8.3
 GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 9.2
 GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 8.7
 GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 8.3

NOTE: RELATIVE HUMIDITY READINGS ARE UNRELIABLE WHEN WIND SPEEDS ARE LESS THAN ONE METER PER SECOND. SUCH READINGS HAVE NOT BEEN INCLUDED IN THE DAILY OR MONTHLY MEAN FOR RELATIVE HUMIDITY AND DEW POINT.

** SEE INTERPRETATION NOTES AT END OF MONTHLY REPORT **

R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR WATANA WEATHER STATION
DATA TAKEN DURING November, 1985

DAY	MAX. TEMP. DEG C	MIN. TEMP. DEG C	MEAN TEMP. DEG C	RES. WIND DIR. DEG	RES. WIND SPD. M/S	AUG. WIND SPD. M/S	MAX. GUST DIR. DEG	MAX. GUST SPD. M/S	P'VAL DIR.	MEAN RH %	MEAN DP DEG C	PRECIP MM	DAY'S SOLAR ENERGY WH/SQ	DAY
1	-16.4	-22.8	-19.6	060	.9	1.2	025	4.6	E	45	-28.9	****	600	1
2	-12.0	-22.8	-17.4	076	2.1	2.5	084	8.3	ENE	45	-24.7	****	940	2
3	-10.4	-20.8	-15.6	077	1.6	1.8	060	6.4	ENE	43	-26.3	****	1250	3
4	-12.2	-22.2	-17.2	071	3.6	3.7	076	9.2	ENE	43	-26.9	****	1070	4
5	-14.3	-22.5	-18.4	101	1.7	1.8	102	3.7	ESE	47	-26.5	****	510	5
6	-11.5	-21.6	-16.6	081	1.6	1.7	059	12.8	ENE	61	-24.0	****	755	6
7	-14.1	-24.5	-19.3	094	1.7	1.9	112	6.0	ESE	71	-23.9	****	1000	7
8	-13.0	-22.9	-18.0	082	3.6	3.6	080	8.3	E	61	-23.2	****	625	8
9	-10.7	-13.9	-12.3	074	4.3	4.4	073	9.7	ENE	58	-19.1	****	180	9
10	-6.0	-11.0	-8.5	050	3.2	3.2	043	6.4	NE	85	-10.2	****	110	10
11	-3.6	-13.0	-8.3	245	1.1	2.5	249	9.7	W	89	-7.9	****	590	11
12	-8.0	-16.1	-12.1	081	1.1	1.5	082	4.6	E	74	-15.5	****	260	12
13	-11.0	-21.1	-16.1	084	1.8	2.0	019	6.9	E	68	-20.3	****	595	13
14	-15.6	-25.1	-20.4	066	1.0	1.4	087	5.1	NNE	68	-23.8	****	585	14
15	-15.9	-26.5	-21.2	083	1.6	1.7	072	4.1	E	71	-27.1	****	640	15
16	-14.6	-26.2	-20.4	073	3.5	3.5	065	8.3	ENE	68	-23.0	****	310	16
17	-13.5	-17.5	-15.5	076	1.4	1.6	082	4.1	E	72	-19.3	****	240	17
18	-10.4	-17.8	-14.1	083	1.8	1.9	093	6.4	E	80	-18.4	****	735	18
19	-8.7	-19.4	-14.1	087	1.5	1.5	111	3.7	E	80	-18.4	****	690	19
20	-4.2	-19.0	-11.6	076	2.4	2.5	076	9.2	E	74	-16.3	****	705	20
21	-4.4	-15.9	-10.2	083	3.1	3.2	089	9.2	E	68	-13.7	****	275	21
22	-10.5	-18.8	-14.7	083	1.6	1.7	071	3.7	E	79	-18.2	****	560	22
23	-10.7	-17.0	-13.9	082	1.9	2.0	086	5.1	E	77	-17.4	****	625	23
24	.1	-13.6	-6.8	078	3.2	3.3	076	8.3	E	60	-12.9	****	320	24
25	-4.3	-12.6	-8.5	075	3.6	3.7	075	8.7	E	60	-13.9	****	280	25
26	-9.1	-13.4	-11.3	080	6.5	6.5	089	12.4	E	70	-15.8	****	110	26
27	-9.2	-12.4	-10.8	062	3.8	3.9	079	8.7	ENE	74	-14.7	****	180	27
28	-12.1	-19.3	-15.7	071	2.8	2.9	075	7.4	ENE	80	-18.3	****	355	28
29	-14.6	-18.2	-16.4	079	4.4	4.5	074	9.7	ENE	77	-19.1	****	400	29
30	-12.1	-19.7	-15.9	096	2.4	2.4	098	6.4	E	77	-18.4	****	55	30
MONTH	.1	-26.5	-14.7	077	2.4	2.7	059	12.8	E	68	-19.5	****	15550	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 2.8
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 2.8
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 3.7
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 2.8

NOTE: RELATIVE HUMIDITY READINGS ARE UNRELIABLE WHEN WIND SPEEDS ARE LESS THAN ONE METER PER SECOND. SUCH READINGS HAVE NOT BEEN INCLUDED IN THE DAILY OR MONTHLY MEAN FOR RELATIVE HUMIDITY AND DEW POINT.

** SEE INTERPRETATION NOTES AT END OF MONTHLY REPORT **

R & M CONSULTANTS, INC.
SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR WATANA WEATHER STATION
 DATA TAKEN DURING December, 1985

DAY	MAX. TEMP. DEG C	MIN. TEMP. DEG C	MEAN TEMP. DEG C	RES. WIND DIR. DEG	RES. WIND SPD. M/S	AUG. WIND SPD. M/S	MAX. GUST DIR. DEG	MAX. GUST SPD. M/S	P'VAL DIR.	MEAN RH %	MEAN DP DEG C	PRECIP MM	DAY'S SOLAR ENERGY WH/52H	DAY
1	-11.6	-21.0	-16.3	072	2.6	2.7	050	6.4	ENE	76	-18.4	****	75	1
2	-10.6	-18.1	-14.4	075	3.5	3.6	085	8.3	E	75	-17.2	****	195	2
3	-15.1	-22.6	-18.9	087	2.6	2.7	084	7.8	E	76	-22.5	****	200	3
4	-9.7	-22.9	-16.3	087	2.9	3.0	066	9.2	E	74	-20.9	****	65	4
5	-11.7	-19.1	-15.4	067	1.6	1.6	057	7.4	ENE	79	-17.9	****	257	5
6	-14.7	-20.6	-17.7	***	****	****	***	****	E	78	-20.3	****	155	6
7	-7.4	-17.4	-12.4	***	****	****	***	****	E	78	-16.3	****	260	7
8	-3.8	-7.6	-5.7	***	****	****	***	****	ENE	78	-9.1	****	30	8
9	.1	-3.6	-1.8	***	****	****	***	****	ENE	84	-3.7	****	30	9
10	1.7	-2.2	-.3	***	****	****	***	****	ENE	87	-1.7	****	40	10
11	4.8	.3	2.6	***	****	****	***	****	E	81	.1	****	30	11
12	.4	-9.7	-4.7	***	****	****	***	****	ENE	91	-5.0	****	60	12
13	-7.1	-12.7	-9.9	***	****	****	***	****	ENE	92	-11.0	****	260	13
14	-5.8	-9.5	-7.7	***	****	****	***	****	ENE	88	-8.7	****	110	14
15	-4.8	-9.2	-7.0	***	****	****	***	****	ENE	89	-9.4	****	55	15
16	-3.3	-6.9	-5.1	***	****	****	***	****	ENE	76	-8.8	****	25	16
17	-4.5	-8.5	-6.5	***	****	****	***	****	ENE	91	-7.0	****	25	17
18	-2.6	-9.2	-5.9	***	****	****	***	****	ENE	84	-7.8	****	0	18
19	1.9	-3.0	-.6	***	****	****	***	****	E	84	-3.5	****	30	19
20	3.2	-1.8	.7	***	****	****	***	****	ENE	89	-.7	****	20	20
21	3.5	.8	2.2	***	****	****	***	****	E	74	-1.7	****	130	21
22	3.2	-1.2	1.0	***	****	****	***	****	E	78	-3.0	****	35	22
23	3.2	-.4	1.4	***	****	****	***	****	E	87	-.5	****	15	23
24	3.4	-3.5	-.1	***	****	****	***	****	E	82	-2.2	****	0	24
25	-2.5	-10.3	-6.4	***	****	****	***	****	ENE	82	-9.5	****	70	25
26	-2.3	-3.6	-3.0	***	****	****	***	****	ENE	63	-8.9	****	30	26
27	-1.8	-4.6	-3.2	***	****	****	***	****	NE	65	-9.0	****	35	27
28	-2.7	-7.2	-5.0	***	****	****	***	****	E	96	-4.6	****	20	28
29	-3.5	-5.6	-4.6	***	****	****	***	****	ENE	96	-5.1	****	25	29
30	-4.1	-6.7	-5.4	***	****	****	***	****	ENE	87	-7.1	****	20	30
31	-4.8	-8.1	-6.5	***	****	****	***	****	E	87	-8.3	****	0	31
MONTH	4.8	-22.9	-6.2	079	2.7	2.8	066	9.2	ENE	82	-8.7	****	2302	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 7.4
 GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 7.8
 GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 8.3
 GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 7.8

NOTE: RELATIVE HUMIDITY READINGS ARE UNRELIABLE WHEN WIND SPEEDS ARE LESS THAN ONE METER PER SECOND. SUCH READINGS HAVE NOT BEEN INCLUDED IN THE DAILY OR MONTHLY MEAN FOR RELATIVE HUMIDITY AND DEW POINT.

** SEE INTERPRETATION NOTES AT END OF MONTHLY REPORT **

15292780
LAT 621042

Susitna River at Sunshine, AK
LONG 1501030 STATE 02 COUNTY 170

PROCESS DATE: 17-JAN-86 11:24 CLP
DATUM OF GAGE: 270.00 FT NGVD DRAINAGE AREA: 11100

PROVISIONAL DATA DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1985 TO SEPTEMBER 1986
MEAN VALUES

[illegible]