W. DYOK

SUSITNA HYDROELECTRIC PROJECT

WINTER 1981 - 82

ICE OBSERVATIONS REPORT

TASK 3 : HYDROLOGY

PRELIMINARY DRAFT

AUGUST 1982

PREPARED BY:

R&M CONSULTANTS, INC.

PREPARED FOR:

ARCTIC

ALASKA POWER AUTHORITY

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ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

TASK 3- HYDROLOGY

ICE OBSERVATIONS, 1981-82

AUGUST 1982

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ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
ICE OBSERVATIONS

WINTER 1981-82

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ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
ICE OBSERVATIONS

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Photographs of ice processes and documentation of field observations are a cumulative effort of the R&M Hydrology Staff: Steve Bredthauer, Jeff Coffin, Lisa Fotherby, Bob Butera and Carl Schoch. The interpretations presented in this report are based upon field observations, meteorologic data and published literature. This report was authored by Carl Schoch, edited by Steve Bredthauer and typed by Joyce Shuman.

1 - INTRODUCTION

This report summarizes the field work and presents the data collected on ice observations during the 1981-82 winter season. This effort is related to the continuing feasibility studies program for the proposed Susitna Hydroelectric Project. Initial ice studies began in 1980 with a comprehensive program designed to define the winter ice regime on the Susitna River. As the study progressed it became apparent that an understanding of the ice processes beyond a rudimentary stage would require more than one season of observations. The ice studies program was continued through the winter of 1981-82 but on a reduced scale. Results of this latest program will supplement existing data from the 1980-81 Ice Observations Report (R&M) and further define ice formation and winter characteristics of the Susitna River. Conclusions based on these reports will help determine what modifications will be necessary during project development and design to mitigate any detrimental effects of regulated flow to areas downstream of the proposed damsite.

1.1 - Objectives

The objectives of the 1981-82 ice study program were to compile data necessary for further analysis of the Susitna River ice regime. These data include:

1. Meteorologic data, primarily air temperature and precipitation, from stations at representative sites along the river.

2. Qualitative documentation of the ice processes during aerial reconnaisance flights and observations from shore.

3. Identify locations of frazil ice generation, accumulation, ice jamming and border ice bridging.

4. Hydrologic information on stage, discharge and velocities at critical areas.

5. Site specific ice thickness measurements, determination of the overall extent of ice coverage and locations of open water leads.

6. Water temperature measurements from first frazil ice observations to formation of an ice cover.

1.2 - Report Contents

The summary in Section 2 provides a brief overview of ice events and the factors controlling the ice regime through the 1981-82

winter season. Section 3 contains the compiled and summarized meteorologic data from four weather stations located within two miles of the river. Graphic analyses are included to facilitate comparison of 1981-82 data with 1980-81 data and any historic records.

Snow course data from the Soil Conservation Service constitute Section 4, along with a discussion summarizing the significance of this year's snowpack relative to ice formation and destruction.

Section 5 discusses ice processes relative to the Susitna, incorporating information from field notes, aerial photographs, surveys, interviews and visual observations. The Alaska Railroad experienced problems during this year's abnormally severe break-up. These sections of track are described and documented with photographs of the damaged track.

Appendix A contains the monthly climate data printouts from the National Weather Service and R&M Consultants for the stations described in Section 3.

Appendix B contains the available streamgage records from U.S.G.S Stations at Denali, near Cantwell (Vee Canyon), Gold Creek and Susitna Station. Also included are the final 1981 records of the R&M streamgage station at Watana. These records indicate the dates of first ice occurrence at each site. No stream-gages were in operation during breakup.

Appendix C is a tabulation of National Weather Service, River Forecast Center, stage and water temperature data collected on the Talkeetna River at Talkeetna. Appendix D presents an inventory and index of oblique aerial photographs of ice formation. The field notes of aerial reconnaissance flights are contained in Appendix E.

2 - SUMMARY

The 1981 freezeup process was prolonged by the lack of any early cold weather episodes, in contrast to 1980 when a November cold snap caused significant ice formation. September 28, 1981 marked the first day of observed frazil and ice pans on the Susitna. Fluctuating air temperatures and relatively heavy precipitation through October precluded the formation of a stable ice cover. Air temperatures were on a gradual decline closely resembling the graphical plot of historical averages. However, the precipitation record is far from normal with an extremely large volume of precipitation in October and sharply decreasing amounts through January, when scarcely any precipitation was recorded. This same general trend shows up in all of the selected climate station summaries. By the second week of December the leading edge of ice on the lower river was just approaching the town of Talkeetna, about two weeks later than in 1980. Long before the leading edge passed Talkeetna, however, an ice bridge formed at the Susitna-Chulitna confluence, and the ice cover progressed upstream from there. The Susitna is by far the most significant ice producer of the three rivers in the Talkeetna area. Whether due to cold temperatures, influences of higher latitude and elevation or the greater velocities and turbulence encountered through Devil Canyon, the Susitna characteristically will show bank to bank ice slush coverage while the Chulitna and Talkeetna show only 10-15 percent areal coverage. Therefore, when the ice bridge formed at the Susitna-Chulitna confluence, a barrier was presented to ice floes, drastically reducing the volume of ice feeding the downstream ice pack. Consequently, it took almost 6 weeks for the confluence area between Talkeetna and the ice bridge on the Susitna to develop an ice cover.

Anchor ice was first observed at the end of November in the Chase area, which could indicate a reach favorable to supercooling of water. The water depth was estimated at 4-5 feet and with a flow of low velocity. No physical measurements were made but the ice deposits appeared to be thick with an unusual dark yellow or brown color.

The rate of ice cover progression increased during January as minimum winter air temperatures were reached. Ice shelves were formed near the proposed Devil Canyon damsite in again 1981-82. However by January these had eroded open to expose a 30-40 foot wide channel which remained ice free for the remainder of the winter. The river reach from the Devil Creek confluence to the Fog Creek confluence resisted freezing over until March, but even then the ice cover was marked by extensive overflows.

Breakup was more dramatic this year than in years previous, as demonstrated by extensive erosion and by damage to the Alaska Railroad tracks. Air temperatures increased during the second

half of April but nighttime lows still dipped below 0°C. By May 7 even minimum daily temperatures averaged 4°C and ice movement began. Jams occurred in most of the areas described for 1981 but with greater consequences, ranging from scarring and denuding of vegetation to flooding and washing away railroad ties from under the tracks. In several areas below Talkeetna massive amounts of soil were removed from cutbanks, jeopardizing at least one residence. In the vicinity of the Watana Damsite, breakup effects were not as dramatic, with more melting in place and less erosion. The jam just downstream of the mouth of Watana Creek caused total channel blockage and ice accumulations for 1 mile upstream.

The only other significant jamming observed in the upper river took place near the mouth of Jay Creek. This jam backed up ice floes and impounded water for several miles. However, since the channel here is confined, no significant flooding took place.

Heavy accumulations of snowfall in November created an above normal snowpack for December. Precipitation was very light through December and January, resulting in a February snowpack in the Upper Susitna Basin 15-20 percent below normal. In March, additional snowfall brought levels back up to 90 percent of normal. Increasing air temperatures in April and May created substantial runoff with subsequent increases in river stage, leading to ice cover fracturing and breakup.

In general, with air temperatures this past winter near normal, the unique characteristics of river morphology and how they effect the ice regime were emphasized, in contrast to the winter of 1980-81 (R&M, Ice Observations Report, August 1981) when widely fluctuating air temperatures resulted in unusual ice phenomena, during freezeup and breakup, which should not be considered as normal. Therefore, river reaches which showed ice bridges, frazil generation and anchor ice formations during 1981-82 warrant special attention and further study to determine how these areas will be affected by regulated flow and relatively higher water temperatures induced by post project releases.

3 - CLIMATE

The climate summaries presented in this report constitute temperature and precipitation data monitored at selected stations in the immediate vicinity of the Upper Susitna River between Talkeetna and the Denali Highway. Data from other weather stations both on the project (R&M) and the surrounding area (NWS) have been omitted since they are of questionable value due to the large variations in weather patterns away from the river valley.

Four stations were selected to best represent the climate directly effecting the river freezeup and breakup processes. The National Weather Service (NWS) station at Talkeetna Airport provides a 41-year record of temperature and precipitation. This record provides the baseline data for control purposes and correlation with R&M weather stations having less extensive records. With its proximity to the Susitna confluence, the Talkeetna station data provides useful input to studies attempting to determine ice effects and processes during post project flow. The Devil Canyon climate station, located near the proposed Devil Canyon damsite, provides representative climate data for the Gold Creek to Devil Creek area. The Watana Camp station, situated on the northern bench above the proposed Watana damsite records temperature and precipitation data which correspond to the river valley between Devil Creek and Mt. Watana. The Denali station, located at Susitna Lodge, represents weather patterns affecting the eastern perimeter of the project as well as the extreme upper river basin. These three stations are operated by R&M Consultants and have provided data since 1980. The geographic locations of these four weather stations are depicted on Figure 3.1.

Table 3.1 lists temperature and precipitation data obtained during the 1981-1982 winter, October through May, from the four weather stations described. These values can be compared to the 1980-1981 winter record on Table 3.2. Figure 3.2 shows a National Weather Service summary of the 40-year average winter temperature and precipitation values from the Talkeetna station. Although additional meteorologic information is available from these weather stations, the compiled data in this section only include average monthly temperature, minimum monthly temperature, maximum monthly temperature, total precipitation (water equivalent) and total monthly snowfall. For any subsequent intensive study effort requiring detailed meteorologic data the complete published National Weather Service and R&M Consultants climate summaries should be consulted.

The historic Talkeetna temperature records of 40 years are shown in comparison to the Talkeetna 1981-1982 data in Figure 3.3.

To facilitate comparisons at a glance, Figures 3.4 to 3.7 provide graphical illustrations of average monthly temperature fluctuations during the 1981-1982 winter relative to the 1980-1981 winter.

Figure 3.8 compares the historical Talkneetna winter precipitation to the 1981-82 precipitation.

Figures 3.9 and 3.10 present the total monthly precipitation data for 1981-82 relative to 1980-1981 data.

TABLE 3.1

CLIMATE SUMMARIES FOR WINTER 1981 - 1982
FOR STATIONS ALONG THE UPPER SUSITNA RIVER

Talkeetna Airport (NWS) Elev. 345 Ft.

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Avg. Temp. (°C)	1.1	-6.8	-11.7	-17.1	-10.0	-4.9	0.0	6.4
Min. Temp. (°C)	-2.8	-11.1	-16.4	-8.2	-14.7	-9.8	-5.3	-5.6
Max. Temp. (°C)	5.0	-2.5	-7.1	-11.9	-5.3	-0.1	5.3	21.7
Total Precip. (in.)	4.17	1.34	0.52	0.03	0.79	1.70	0.39	1.31
Total Snowfall (in.)	5.1	23.2	8.9	0.4	1.8	24.7	7.6	0

Devil Canyon (R&M) Elev. 1350 Ft.

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Avg. Temp. (°C)	-0.4	-8.3	-11.6	-17.0	-12.1	-7.1	-2.7	4.4
Min. Temp. (°C)	-12.4	-20.0	-28.9	-28.7	-30.0	-22.3	-21.9	-5.7
Max. Temp. (°C)	5.4	6.0	3.9	-6.1	5.4	4.3	8.9	17.2
Total Precip. (in.)	Precipitation Not Measured Daily							
Total Snowfall (in.)								

Watana Camp (R&M) Elev. 2350 Ft.

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Avg. Temp. (°C)	-2.1	-10.1	-13.7	-20.1	-	-8.2	-4.5	2.3
Min. Temp. (°C)	-13.6	-24.3	-32.5	-33.8	-	-20.8	-21.2	-27.2
Max. Temp. (°C)	4.5	8.7	1.7	-8.1	-	4.1	6.8	15.6
Total Precip. (in.)	1.02	0.22	0.28	0.0	-	0.60	0.28	1.02
Total Snowfall (in.)	Snowfall Measured as Water Equivalent							

TABLE 3.1 (CONTINUED)

Denali At Susitna Lodge (R&M) Elev. 2700 Ft.

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Avg. Temp. (°C)	-2.8	-12.9	-16.5	-24.6	-18.5	-11.5	-5.9	2.5
Min. Temp. (°C)	-16.1	-29.4	-41.7	-42.4	-48.9	-28.3	-25.6	-10.2
Max. Temp. (°C)	6.8	6.6	5.7	19.1	7.6	2.4	6.8	14.8
Total Precip. (in.)	Precipitation Not Measured Daily							
Total Snowfall (in.)								

TABLE 3.2

CLIMATE SUMMARIES FOR WINTER 1980 - 1981
FOR STATIONS ALONG THE UPPER SUSITNA RIVER

Talkeetna Airport (NWS) Elev. 345 Ft.

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Avg. Temp. (°C)	2.1	-3.5	-20.1	-1.8	-6.1	-0.4	-0.1	10.0
Min. Temp. (°C)	-1.7	-7.3	-24.7	-5.1	-10.1	-6.2	-7.3	3.0
Max. Temp. (°C)	5.8	0.3	-15.5	1.4	-2.0	5.4	7.1	17.0
Total Precip. (in.)	2.14	1.08	0.56	1.19	2.79	0.41	0.12	1.13
Total Snowfall (in.)	4.3	15.5	8.1	13.2	19.8	2.7	3.1	0

Devil Canyon (R&M) Elev. 1350 Ft.

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Avg. Temp. (°C)	0.2	-5.1	-17.9	-2.5	-7.3	-1.8	-1.8	8.7
Min. Temp. (°C)	-13.4	-18.1	-34.4	-16.5	-27.8	-14.8	-15.2	-2.8
Max. Temp. (°C)	11.2	4.2	1.2	5.6	4.4	9.2	12.3	24.0
Total Precip. (in.)	Precipitation Not Measured Daily							
Total Snowfall (in.)								

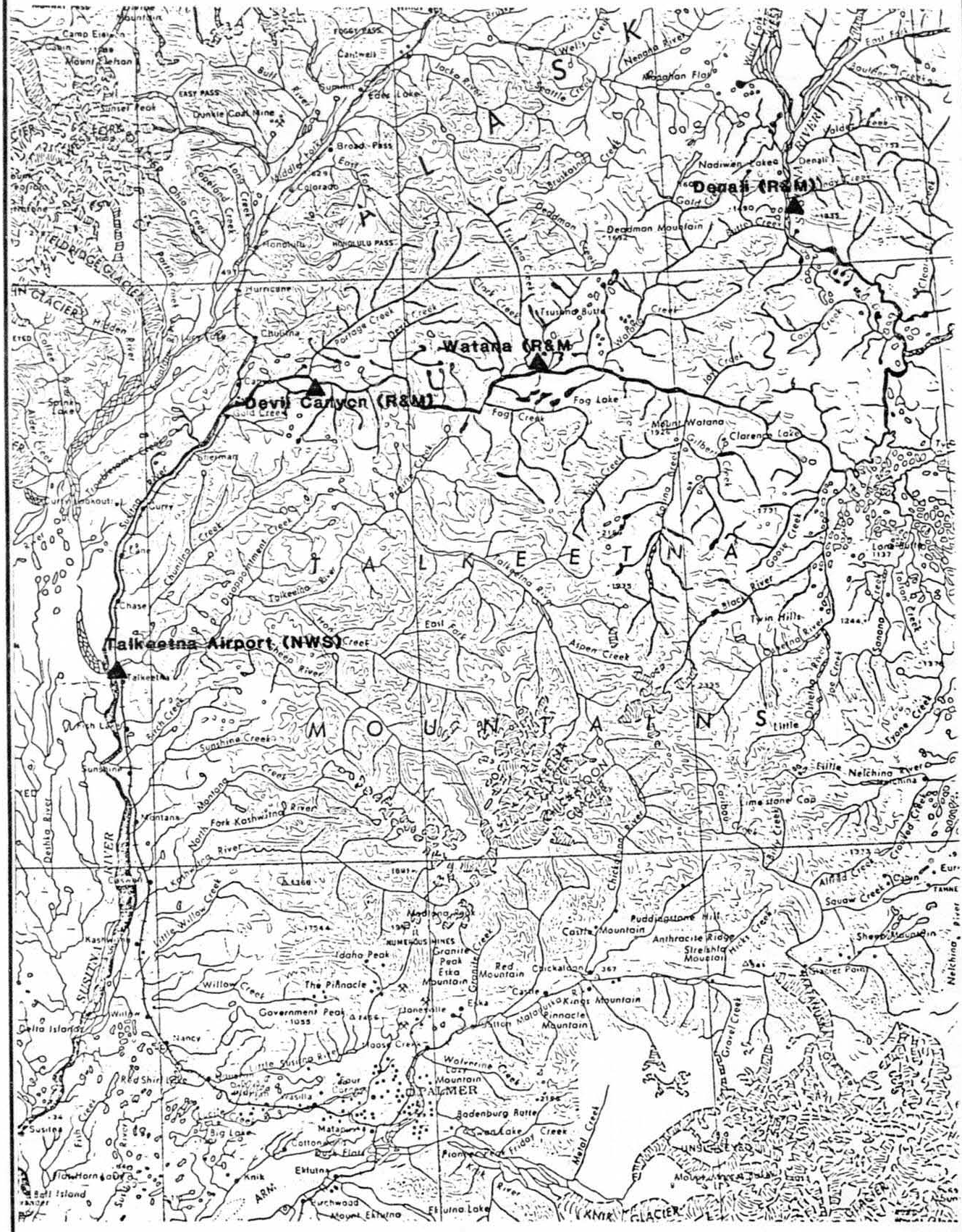
Watana Camp (R&M) Elev. 2350 Ft.

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Avg. Temp. (°C)	-1.8	-7.2	-21.1	-4.5	-5.0	-4.3	-4.3	7.6
Min. Temp. (°C)	-14.5	-21.1	-36.7	-17.7	-17.0	-16.4	-16.8	-2.2
Max. Temp. (°C)	5.1	1.7	3.8	3.5	6.8	7.4	9.4	22.1
Total Precip. (in.)	1.6	0.08	0.01	0.06	0.60	0.72	0.05	1.73
Total Snowfall (in.)	Snowfall Measured as Water Equivalent							

TABLE 3.2 (CONTINUED)

Denali at Susitna Lodge (R&M) Elev. 2700 Ft.

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Avg. Temp. (°C)	-3.1	-9.0	-28.8	-5.5	-11.8	-5.6	-6.2	7.1
Min. Temp. (°C)	-21.0	-27.8	-43.3	-20.2	-33.9	-20.1	-21.4	-2.7
Max. Temp. (°C)	8.9	3.5	5.7	6.7	4.0	8.5	8.1	20.6
Total Precip. (in.)	Precipitation Not Measured Daily							
Total Snowfall (in.)								


Denali (R&M)
Watana (R&M)
Devil Canyon (R&M)
Talkeetna Airport (NWS)
ALASKA
TALKEETNA MOUNTAINS
PALMER
Susitna River
Talkeetna River
Chulitna River
Fog Lake
Clarence Lake
Twin Hills
Deadman Mountain
Mount Watana
Castle Mountain
Government Peak
Kings Mountain
Red Mountain
Idaho Peak
The Pinnacle
Limestone Cap
Anthracite Ridge
Puddingstone Hill
Susitna Glacier
Talkeetna Glacier
Knik Glacier
Fog Creek
Watana Creek
Deadman Creek
Tsusena Butte
Broad Pass
Honolulu Pass
Fog Lake
Big Lake
Knik Arm
Matanuska River
Little Susitna River
Montana Creek
Sunshine Creek
Willow Creek
Kashwitna River
Fish Creek
Caswell
Sunshine
Talkeetna
Chase
Curry
Gold Creek
Cantwell
Nenana River
Nadiwen Lakes
Maclaren River
Susitna Glacier
Eldridge Glacier
Hidden Glacier
Chickaloon
Glacier Point
Nelchina River
Little Nelchina River
Caribou Creek
Gravel Creek
Metal Creek
Moose Creek
Lazy Mountain
Wolverine Creek
Pioneer Peak
Talkeetna Lake
Mount Eklutna
Eklutna
Knik
Wasilla
Houston
Willow
Nancy
Susitna
Fish Creek
Flowerhorn Lake
Bell Island
Red Shirt Lake
Lucille Lake
Cottonwood
Rock Flats
Bodenburg Butte
Sheep Mountain
Squaw Creek
Alfred Creek
Crooked Creek
Tyone Creek
Sanona Creek
Joe Creek
Oshetna River
Black River
Goose Creek
Jay Creek
Kosina Creek
Clarence Lake
Lone Butte
Tsusena Creek
Portage Creek
Devil Creek
Clark Creek
Jack River
Seattle Creek
Wells Creek
Denali
Gold Creek
Valdez Creek
Susitna Glacier
Eldridge Glacier
Hidden Glacier
Mount Eielson
Camp Eielson
Mount Deborah
Foggy Pass
Summit
Eddes Lake
Bull River
East Pass
Sunset Peak
Dunkle Coal Mine
Middle Fork
East Fork
Colorado
Honolulu
Hurricane
Chulitna
Spink Lake
Curry Lookout
Chase
Talkeetna
Birch Lake
Sunshine
Montana
Deshka River
Willow
Delta Islands
Susitna
Big Lake
Cottonwood
Knik
Eklutna
Wasilla
Houston
Palmer
Matanuska River
Little Susitna River
Red Shirt Lake
Lucille Lake
Fish Creek
Flowerhorn Lake
Bell Island
Eagle Bay
Lazy Mountain
Wolverine Creek
Pioneer Peak
Talkeetna Lake
Mount Eklutna
Eklutna
Knik

Average Temperature

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
1941	13.0	23.1	28.9	39.4	45.6	56.8	56.5	58.9	48.6	28.7	13.2	9.6	35.1
1942	17.4	26.1	14.0	34.0	49.4	55.4	58.7	56.2	50.7	36.4	19.6	2.0	34.9
1943	7.2	22.0	27.0	34.4	46.3	57.0	56.6	54.2	46.7	34.2	26.7	21.2	35.7
1944	14.3	24.5	17.0	30.0	44.8	56.5	54.0	54.9	47.0	36.0	21.6	14.2	35.0
1945	23.0	13.6	27.6	29.8	41.6	53.4	58.6	53.6	46.2	32.4	8.4	11.6	33.2
1946	21.9	14.4	10.9	29.8	43.4	56.6	59.2	53.0	47.3	34.4	11.6	1.1	31.2
1947	4.6	19.7	24.2	33.0	45.4	53.2	59.8	54.1	45.0	33.8	25.6	20.6	34.1
1948	14.4	8.0	13.0	34.0	44.0	55.6	55.8	50.6	43.6	33.8	12.4	2.2	29.7
1949	9.0	1.4	25.5	33.8	41.2	50.3	56.4	53.6	47.6	34.6	23.4	1.9	31.0
1950	-1.3	9.0	26.7	35.3	45.0	53.3	56.5	57.8	46.9	30.3	7.9	11.1	31.6
1951	5.2	8.3	9.2	35.7	46.5	57.1	60.3	54.5	47.2	29.9	21.3	3.8	31.3
1952	2.0	17.6	17.2	30.8	39.1	53.4	57.2	53.5	46.5	36.4	28.8	16.2	33.1
1953	6.5	14.3	17.6	36.1	46.4	59.7	60.7	54.5	47.1	31.4	19.8	14.9	34.4
1954	4.7	1.2	27.3	31.8	47.3	55.9	56.7	55.1	47.4	37.0	24.1	1.3	32.2
1955	18.7	11.6	19.2	27.0	41.8	50.7	58.4	52.4	45.1	29.8	5.2	3.8	30.2
1956	7.7	6.9	16.8	33.0	43.4	53.2	57.9	55.4	44.3	24.9	10.2	-1.3	29.4
1957	7.7	10.7	29.4	35.4	47.2	61.0	59.1	55.0	43.1	35.1	17.2	12.6	32.6
1958	16.6	20.1	25.3	37.9	45.8	58.1	56.9	54.4	46.9	36.8	30.4	4.1	35.3
1959	10.3	17.7	13.5	32.3	46.6	59.2	54.7	56.0	46.1	32.0	22.5	12.9	33.7
1960	14.1	20.5	19.4	33.3	48.8	55.0	56.8	53.9	43.3	34.6	17.9	21.9	35.0
1961	19.4	14.4	12.3	33.5	46.0	55.2	56.9	53.6	44.6	24.8	11.5	1.2	31.1
1962	9.9	13.6	14.3	34.6	42.2	55.1	59.1	55.0	43.1	35.1	17.2	12.6	32.6
1963	17.7	23.1	25.9	28.7	44.5	50.3	58.2	54.9	50.1	34.2	10.1	21.6	34.5
1964	11.6	14.0	11.0	29.7	39.0	55.3	58.2	53.9	47.3	31.7	18.4	-1.4	30.6
1965	7.9	7.0	32.3	34.5	42.4	50.2	56.7	52.7	48.9	29.2	13.2	3.8	31.2
1966	9.5	9.7	14.3	33.9	43.0	56.2	57.2	53.8	45.5	30.3	15.9	11.5	31.6
1967	3.5	12.6	27.7	31.5	44.5	56.4	58.7	57.5	47.4	31.6	23.1	8.1	32.8
1968	6.4	19.9	24.1	30.0	45.2	54.8	59.4	56.8	44.1	30.9	17.5	-1.2	32.4
1969	-0.9	14.5	27.3	38.3	47.6	57.8	57.5	50.6	46.0	36.9	19.5	24.3	34.6
1970	4.2	27.5	31.4	32.6	45.5	51.8	56.3	52.6	43.1	26.6	17.6	5.7	32.9
1971	-7.5	12.6	10.3	31.3	40.2	52.8	56.5	55.0	44.9	27.7	10.5	7.8	28.6
1972	0.0	9.0	9.8	21.1	42.0	52.3	61.1	56.4	42.3	28.6	18.3	9.4	29.2
1973	-2.9	10.0	21.0	34.3	43.7	53.7	57.5	52.1	44.2	26.8	7.6	14.3	30.2
1974	1.2	11.5	14.4	35.8	47.6	56.3	56.7	56.0	48.7	32.3	18.2	10.2	32.8
1975	4.1	8.6	16.8	30.9	44.1	52.5	57.9	55.2	47.0	31.1	8.7	4.9	30.2
1976	8.5	7.0	14.8	33.7	44.2	55.4	59.0	56.3	45.7	29.6	28.0	19.3	33.8
1977	27.4	27.8	16.1	30.8	43.2	56.2	60.3	59.2	46.5	33.9	7.7	6.0	34.6
1978	17.9	23.3	25.6	25.6	47.6	52.4	57.2	57.8	47.5	34.0	20.5	14.5	36.1
1979	15.2	5.9	27.8	34.9	47.0	54.0	59.9	57.6	48.2	37.4	27.1	2.1	34.9
1980	7.9	24.3	23.7	37.6	45.4	57.5	58.5	53.7	45.8	35.8	25.7	-4.2	34.0
RECORD													
MEAN	9.8	14.2	19.9	33.3	44.6	54.7	58.0	54.9	46.3	32.4	18.0	9.2	32.9
MAX	19.5	26.0	32.8	44.6	56.3	65.8	68.3	64.9	55.9	40.9	26.5	18.3	43.2
MIN	-1.4	4.4	6.9	21.9	32.8	43.8	47.7	44.	36.1	23.9	9.4	0.0	22.5

Heating Degree Days

TALKEETNA, AK

Season	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Total
1960-61	244	337	444	837	1407	1727	1478	1410	1612	939	592	291	11260
1961-62	244	348	678	1234	1601	1679	1726	1423	1568	925	705	291	12621
1962-63	182	304	651	921	1429	1622	1483	1167	1421	1079	829	438	11704
1963-64	205	307	434	957	1645	1735	1652	1477	1671	1252	829	284	11954
1964-65	201	326	524	1027	1392	2074	1766	1621	1007	908	694	439	11491
1965-66	254	176	474	1229	1545	1894	1752	1545	1572	926	675	254	12449
1966-67	239	347	573	1269	1665	1654	1908	1455	1367	998	625	250	11947
1967-68	164	226	530	1027	1313	1761	1814	1353	1230	1042	804	249	11354
1968-69	165	251	621	1244	1618	2054	2046	1612	1244	795	532	222	11951
1969-70	227	441	594	984	1354	1754	1884	1647	1036	969	671	398	12031
1970-71	268	379	651	1194	1619	1735	2247	1955	1693	1210	762	365	13246
1971-72	260	272	594	1349	1631	1777	2113	1621	1726	1312	703	376	13436
1972-73	131	257	675	1124	1394	1719	2103	1537	1354	914	671	342	12273
1973-74	229	344	617	1174	1720	1768	1973	1493	1407	869	530	256	12235
1974-75	249	273	491	1206	1399	1696	1885	1576	1497	1019	678	369	12081
1975-76	222	266	525	1044	1690	1862	1744	1679	1426	931	640	266	12340
1976-77	179	265	573	1051	1405	1499	1559	1034	1509	1320	669	256	12268
1977-78	145	178	551	958	1714	1930	1955	1554	1214	677	531	372	12496
1978-79	238	226	515	952	1323	1564	1536	1469	1346	894	553	319	10927
1979-80	152	216	470	857	1331	1949	1790	1377	1273	836	597	334	10757
1980-81	202	345	569	869	1372	2144							

Cooling Degree Days

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
1969	0	0	0	7	0	11	1	0	0	0	0	0	19
1970	0	0	0	0	0	0	8	0	0	0	0	0	8
1971	0	0	0	0	0	0	3	0	0	0	0	0	3
1972	0	0	0	0	0	0	19	0	0	0	0	0	19
1973	0	0	0	0	0	0	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0	0	0	0	0	0	0
1975	0	0	0	0	0	10	2	0	0	0	0	0	12
1976	0	0	0	0	0	1	0	4	0	0	0	0	5
1977	0	0	0	0	0	0	6	2	0	0	0	0	8
1978	0	0	0	0	0	0	2	6	0	0	0	0	8
1979	0	0	0	0	0	0	0	1	0	0	0	0	1
1980	0	0	0	0	0	0	5	0	0	0	0	0	5

Precipitation

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
1941	0.41	1.68	0.97	1.87	3.26	2.45	4.11	0.96	1.80	2.95	1.59	1.45	24.20
1942	1.22	1.61	0.55	1.36	0.70	1.04	3.97	5.24	9.92	2.10	0.23	0.71	28.89
1943	0.68	2.96	1.15	0.07	1.01	1.19	3.28	6.35	7.26	1.61	1.11	3.05	30.52
1944	1.42	3.44	1.13	0.26	3.46	1.73	2.35	8.63	5.07	3.20	1.15	2.48	34.32
1945	0.40	2.29	1.83	0.56	1.81	3.59	1.92	11.92	3.54	4.48	1.62	0.39	34.35
1946	0.79	0.62	4.03	0.76	3.48	3.12	2.63	5.70	5.49	6.05	2.89	4.14	40.89
1947	2.05	0.85	2.97	0.76	1.79	1.11	3.65	2.70	9.63	1.54	4.49	2.28	34.95
1948	5.56	2.29	1.91	0.19	0.79	0.48	6.50	3.27	5.67	2.56	2.97	1.73	33.58
1949	4.55	0.78	2.46	1.78	0.27	1.09	2.37	4.39	4.60	1.58	1.99	1.25	27.11
1950	1.58	0.[illegible]	0.06	0.15	0.52	2.88	1.92	2.14	5.27	1.46	0.68	3.34	20.01
1951	2.25	5.57	0.65	0.87	0.31	2.52	3.21	4.76	6.16	1.17	2.15	2.33	31.95
1952	2.36	1.62	1.57	0.69	2.01	0.21	3.09	5.05	2.83	4.54	2.92	0.46	27.35
1953	0.60	3.41	0.20	0.27	1.21	1.92	2.14	6.03	2.32	0.81	0.49	1.33	23.45
1954	2.29	0.89	3.15	0.24	0.56	3.63	5.67	3.12	3.34	2.24	1.91	1.01	26.20
1955	2.01	2.35	1.83	1.58	0.29	3.58	1.54	10.44	2.66	2.17	0.98	2.13	31.96
1956	0.33	1.41	1.50	0.50	1.28	1.55	4.46	3.66	3.62	2.18	3.99	0.44	26.35
1957	4.47	0.42	0.62	0.04	0.57	1.11	1.72	3.09	6.16	1.54	1.73	0.40	22.83
1958	0.83	0.68	1.91	0.64	2.56	1.45	3.64	3.79	3.32	3.25	0.95	0.42	22.64
1959	0.64	2.09	0.38	1.24	0.92	0.60	4.42	6.23	2.64	2.11	1.40	0.88	23.16
1960	1.40	1.58	0.27	0.28	0.64	0.98	5.37	4.56	7.58	1.02	0.75	1.07	25.80
1961	1.21	0.62	0.45	1.04	1.35	1.78	3.47	3.52	5.45	4.10	1.20	1.70	26.79
1962	2.79	1.35	0.39	0.77	1.32	1.22	1.58	3.85	4.07	3.00	0.70	1.28	26.55
1963	3.01	0.91	7.27	3.43	1.74	5.08	5.52	7.84	3.05	3.85	0.09	1.20	44.95
1964	0.39	3.31	1.66	3.47	0.66	2.12	2.67	2.74	2.17	3.66	1.91	0.54	27.23
1965	0.43	0.58	1.63	1.16	2.10	2.36	2.81	6.66	8.20	1.97	1.02	1.13	30.57
1966	1.71	0.82	0.45	1.04	1.35	1.74	3.47	3.52	5.45	4.10	1.20	1.70	27.29
1967	0.67	0.42	3.07	3.11	1.04	4.20	5.72	5.58	2.66	0.26	3.25	4.77	38.79
1968	1.09	3.39	0.31	1.16	2.94	0.54	2.57	1.99	1.27	1.16	0.71	0.98	18.38
1969	0.44	0.62	0.50	0.22	2.10	0.44	3.75	1.91	0.91	2.18	0.87	1.19	15.50
1970	0.47	1.49	1.48	2.37	1.62	6.44	4.62	4.62	3.56	1.20	0.66	2.66	37.47
1971	1.17	2.72	0.84	0.41	1.18	2.38	4.27	7.77	3.99	2.45	1.39	2.09	31.22
1972	1.72	0.76	1.39	1.40	2.07	2.23	1.76	3.09	6.47	4.60	0.57	0.34	27.76
1973	1.74	0.40	1.55	0.79	1.04	2.07	1.57	7.14	1.51	2.69	0.81	0.74	21.42
1974	T	0.71	0.88	1.67	0.79	1.31	2.11	2.36	2.69	3.29	2.99	1.14	19.62
1975	1.64	0.54	1.18	2.19	1.07	2.42	3.67	4.45	8.44	2.45	0.07	1.23	26.40
1976	0.68	1.78	2.71	0.17	0.99	1.39	2.07	2.16	2.85	3.68	4.82	1.31	24.31
1977	2.65	0.86	1.49	4.51	2.52	2.32	1.06	1.74	4.16	1.54	0.24	1.56	28.25
1978	0.19	0.68	0.61	0.37	1.60	4.71	1.14	1.02	2.05	2.68	7.20	5.00	27.15
1979	0.86	T	1.62	2.49	0.77	3.31	4.65	1.77	3.00	5.27	7.04	1.32	34.57
1980	2.78	1.14	0.49	0.52	1.23	5.77	4.68	3.43	2.33	2.14	1.09	0.56	28.51
RECORD													
MEAN	1.60	1.55	1.55	1.14	1.42	2.27	3.24	4.76	4.32	2.47	1.80	1.49	27.96

Snowfall

Season	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Total
1941-42	0.0	0.0	0.0	2.4	13.5	4.7	4.3	13.5	8.0	1.8	0.0	0.0	47.9
1942-43	0.0	0.0	0.0	2.3	5.8	7.8	12.6	20.7	9.2	T	T	0.0	57.9
1943-44	0.0	0.0	0.0	11.2	12.9	27.6	22.5	27.6	9.2	1.4	0.0	0.0	113.3
1944-45	0.0	0.0	T	5.2	14.9	18.7	3.2	22.7	23.4	2.7	1.8	0.0	91.6
1945-46	0.0	0.0	0.0	17.7	21.1	4.7	13.2	20.0	56.3	10.4	0.9	0.0	145.1
1946-47	0.0	0.0	0.0	13.8	26.9	37.1	39.4	11.6	23.2	1.2	3.6	0.0	156.7
1947-48	0.0	0.0	T	4.9	16.3	21.1	47.9	15.3	12.1	2.6	T	0.0	139.8
1948-49	0.0	0.0	0.0	18.8	16.6	42.7	50.3	9.8	34.7	22.4	1.5	0.0	202.7
1949-50	0.0	0.0	0.0	9.7	10.9	27.1	23.2	0.5	1.2	1.0	T	0.0	84.3
1950-51	0.0	0.0	0.0	13.4	7.4	41.5	26.0	71.7	8.0	5.6	T	T	175.5
1951-52	0.0	0.0	0.0	5.4	17.5	34.1	27.4	20.7	20.4	9.3	11.0	T	146.1
1952-53	0.4	T	0.0	17.7	15.5	4.9	11.0	47.4	4.1	3.7	T	0.0	104.0
1953-54	0.0	0.0	0.0	4.1	8.3	17.4	27.7	17.6	47.6	0.7	0.0	0.0	123.4
1954-55	0.0	0.0	0.0	3.4	11.2	11.7	21.3	26.1	17.3	21.6	0.0	0.0	112.7
1955-56	0.0	0.0	0.0	11.4	10.1	34.4	3.8	22.6	12.3	2.4	T	0.0	97.0
1956-57	0.0	0.0	4.3	20.0	23.5	7.7	35.1	5.5	4.2	3.6	T	0.0	103.1
1957-58	0.0	0.0	0.0	T	7.3	4.3	34.7	1.1	16.5	T	0.0	0.0	64.9
1958-59	0.0	0.0	T	4.7	8.4	9.7	0.5	20.5	4.3	1.6	T	0.0	54.1
1959-60	0.0	0.0	0.0	1.7	19.3	10.7	9.7	20.4	5.2	1.4	0.0	0.0	68.4
1960-61	0.0	0.0	T	1.9	7.2	10.7	3.7	6.3	7.5	10.0	0.0	0.0	47.3
1961-62	0.0	0.0	0.0	23.4	15.4	9.1	27.0	35.7	3.4	5.7	0.0	0.0	123.8
1962-63	0.0	0.0	0.0	3.9	5.9	4.5	9.2	7.4	52.4	26.8	T	0.0	110.4
1963-64	0.0	0.0	0.0	1.4	0.4	26.1	3.4	32.5	17.1	40.1	6.1	0.0	133.1
1964-65	0.0	0.0	0.0	15.7	31.1	5.4	8.3	4.6	5.5	4.6	1.7	0.0	76.7
1965-66	0.0	0.0	0.0	15.4	10.2	15.5	5.5	8.6	5.4	2.6	T	0.0	81.9
1966-67	0.0	0.0	0.0	0.4	17.1	14.9	7.5	13.2	33.4	24.7	0.2	0.0	115.7
1967-68	0.0	0.0	0.0	0.7	42.7	11.1	13.1	31.2	2.4	13.8	0.0	0.0	137.3
1968-69	0.0	0.0	0.0	1.4	12.0	15.7	8.3	29.0	8.1	T	0.0	0.0	68.3
1969-70	0.0	0.0	0.0	0.7	5.4	12.4	8.3	10.7	8.1	11.5	T	0.0	57.2
1970-71	0.0	0.0	0.0	13.7	7.0	41.4	7.7	52.2	12.7	12.2	1.7	0.0	148.1
1971-72	0.0	0.0	0.0	25.8	24.3	32.6	27.5	11.4	30.8	28.1	T	0.0	184.0
1972-73	0.0	0.0	1.0	29.4	13.6	4.7	41.3	6.1	32.4	2.7	0.1	0.0	135.5
1973-74	0.2	0.0	0.0	23.4	13.7	14.4	T	19.9	23.1	10.7	0.1	0.0	104.2
1974-75	0.0	0.0	0.0	15.7	31.7	14.9	31.7	11.2	24.9	25.5	0.4	0.0	156.0
1975-76	0.0	0.0	0.0	15.7	7.3	29.7	14.0	19.1	44.3	5.1	0.0	0.0	135.4
1976-77	0.0	0.0	0.0	17.4	19.2	29.5	12.3	3.1	24.4	19.0	T	0.0	125.0
1977-78	0.0	0.0	T	17.4	9.8	29.9	5.0	17.1	17.2	4.3	0.0	0.0	89.5
1978-79	0.0	0.0	0.0	17.7	32.0	44.9	16.2	T	29.4	16.1	2.6	0.0	157.7
1979-80	0.0	0.0	0.0	5.6	25.2	23.5	23.2	15.4	10.4	2.9	0.0	0.0	106.9
1980-81	0.0	0.0	0.0	4.9	15.5	9.1							
RECORD MEAN	0.0	T	0.0	4.7	15.4	14.1	13.8	17.4	18.0	8.0	0.3	T	126.4

* Indicates a station name or relocation of instruments. See Station Location table.

Record snowfall values above are from through the current year for the period beginning in 1941.

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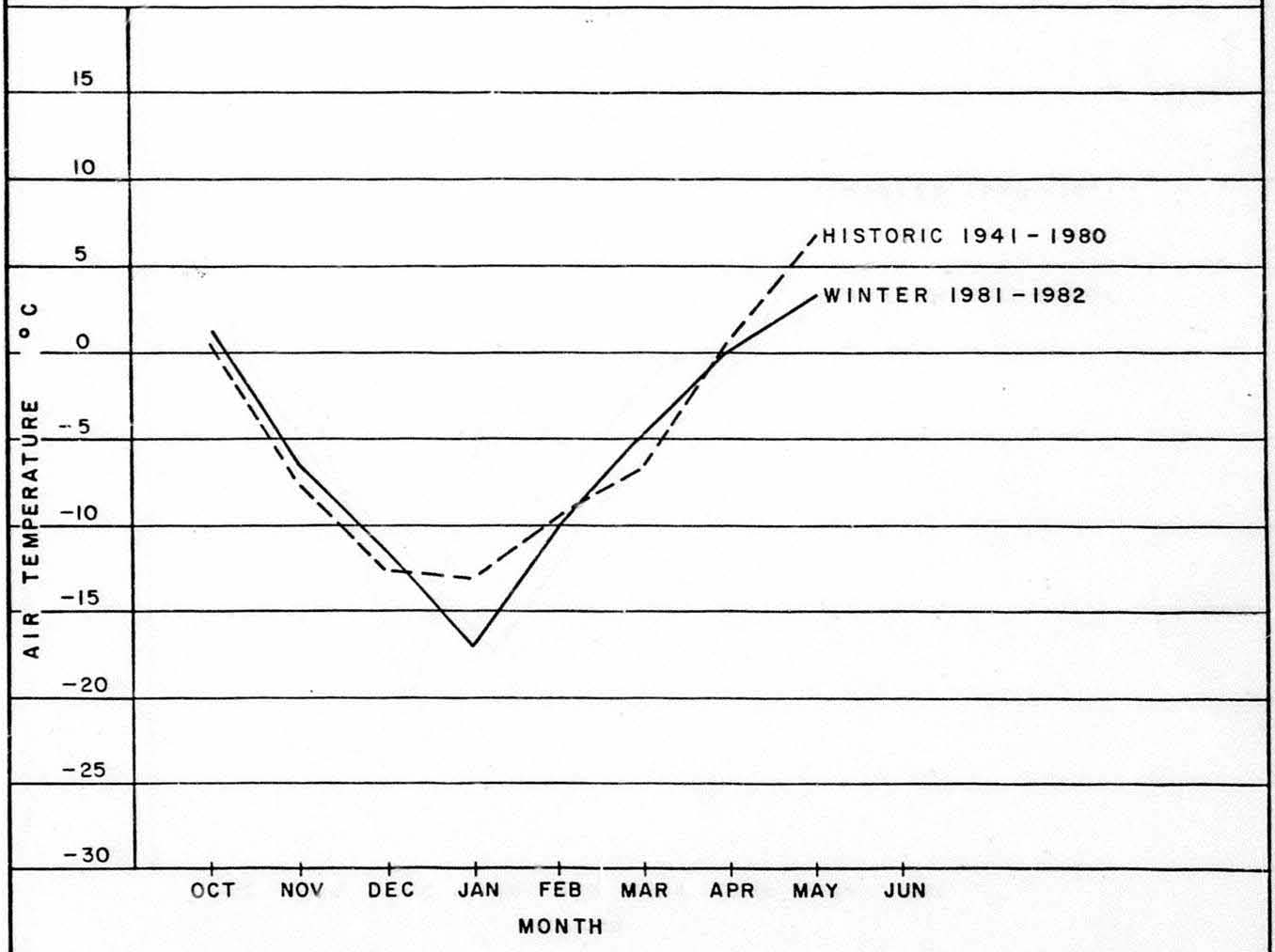
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FIGURE 3.2
NATIONAL WEATHER SERVICE HISTORIC
DATA TABULATION FROM TALKEETNA
1941-1980

AIR TEMPERATURE DATA
FROM NOAA WEATHER
STATION AT TALKEETNA
AIRPORT



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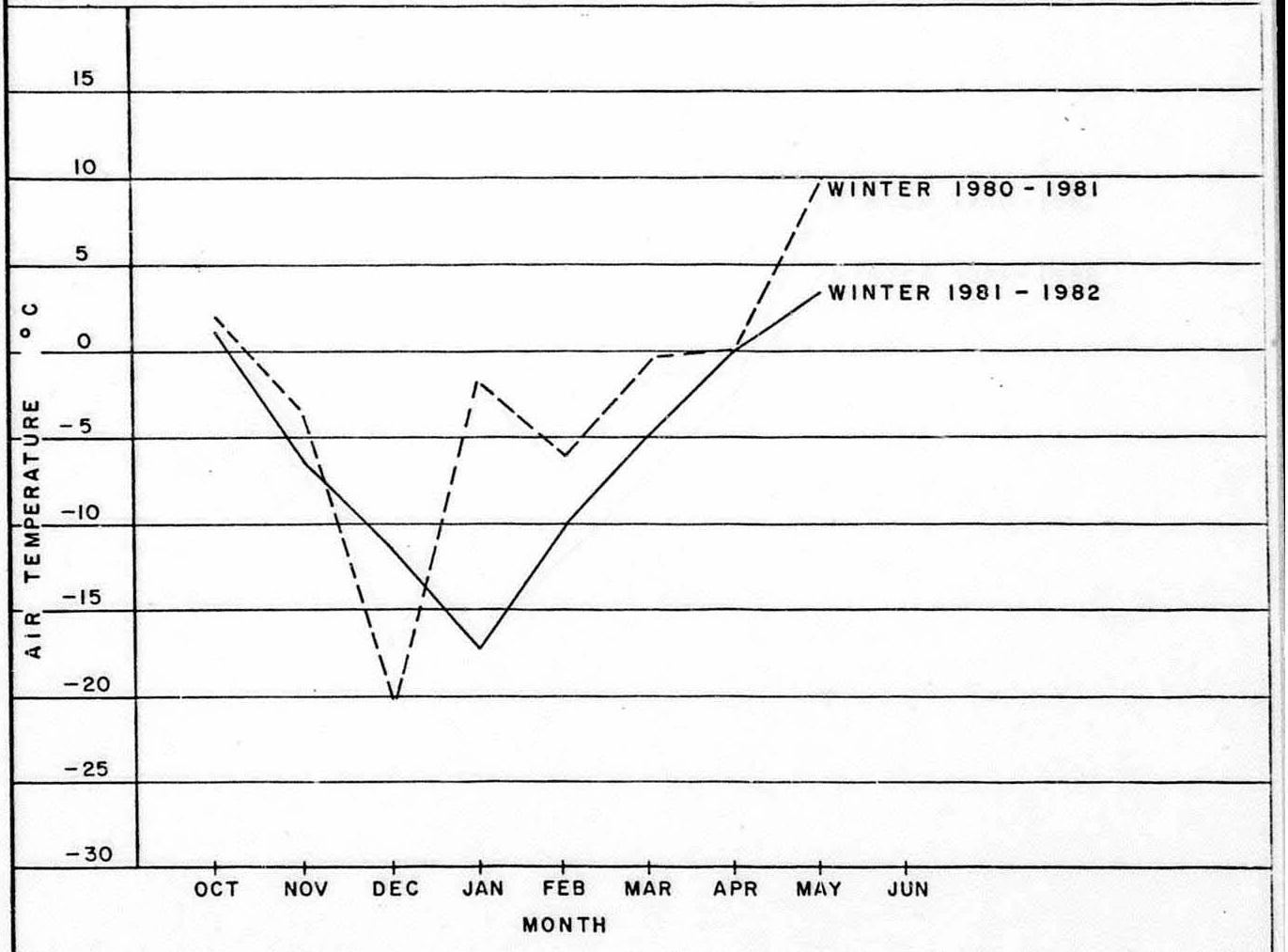
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FIGURE 3.3

MONTHLY AVERAGE AIR TEMPERATURE

AIR TEMPERATURE DATA
FROM NOAA WEATHER
STATION AT TALKEETNA
AIRPORT



Prepared by:

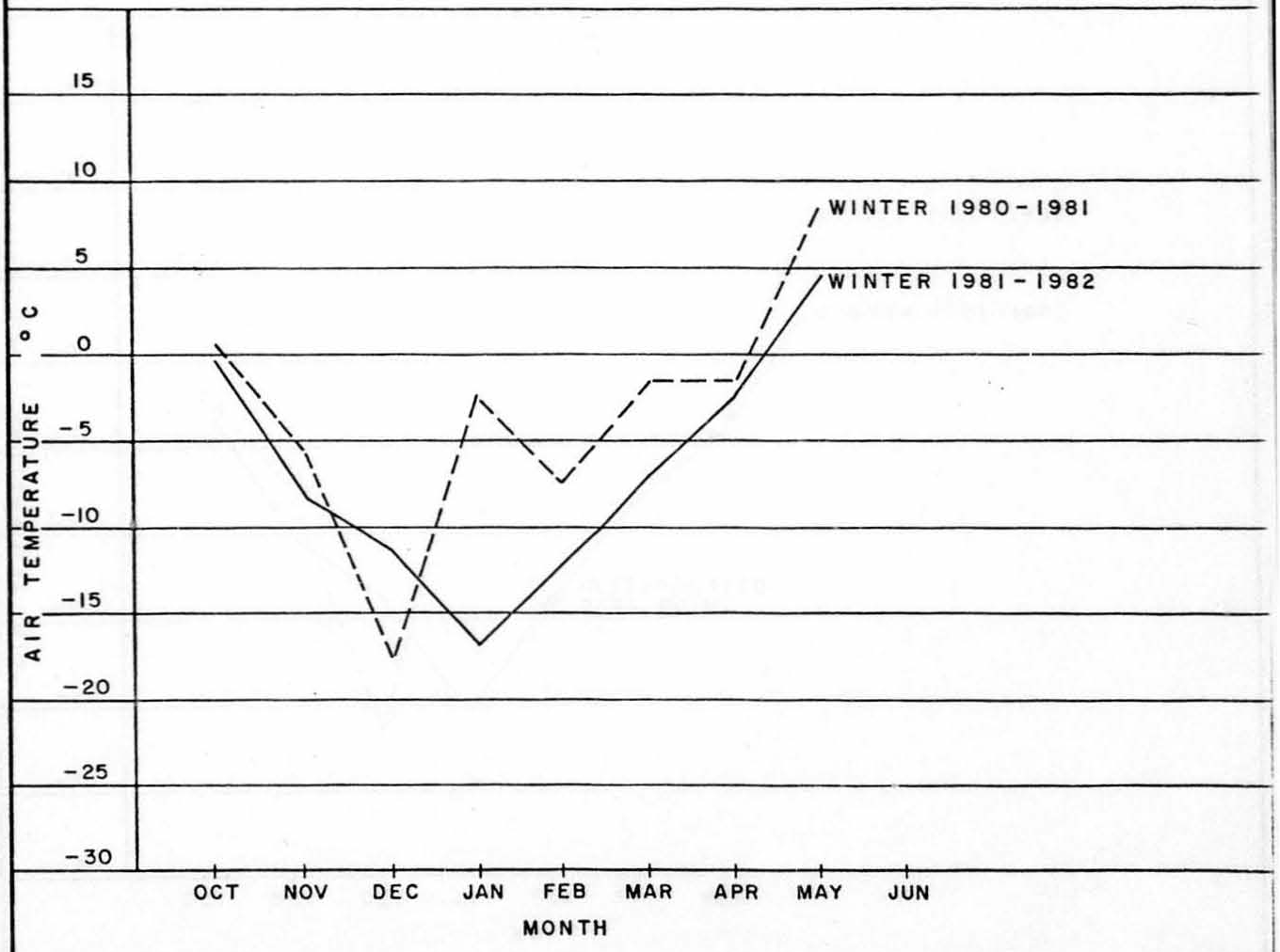
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FIGURE 3.4
MONTHLY AVERAGE AIR TEMPERATURE

AIR TEMPERATURE DATA
FROM R & M WEATHER
STATION AT DEVIL
CANYON



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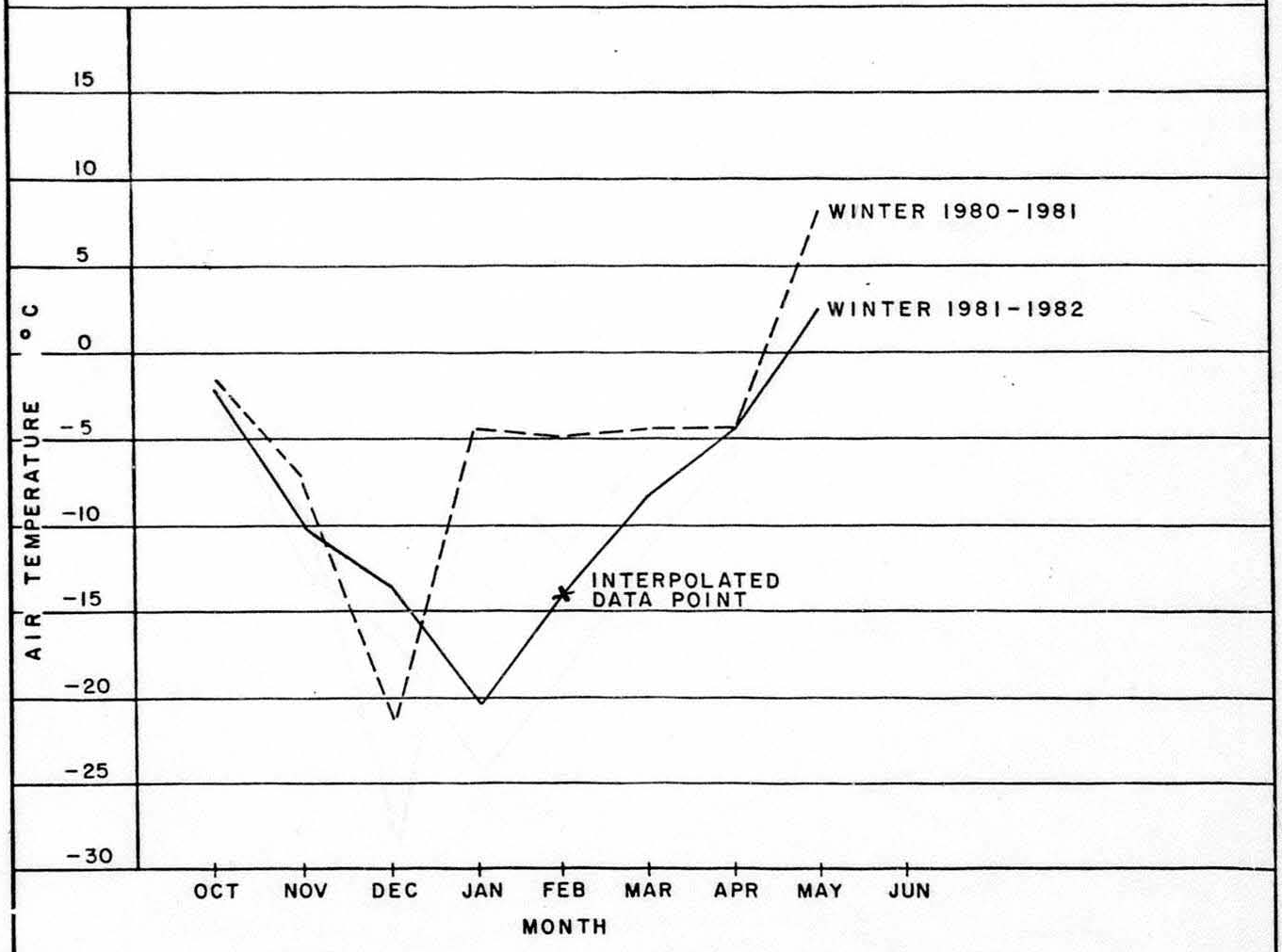
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FIGURE 3.5
MONTHLY AVERAGE AIR TEMPERATURE

AIR TEMPERATURE DATA
FROM R & M WEATHER
STATION AT WATANA
CAMP



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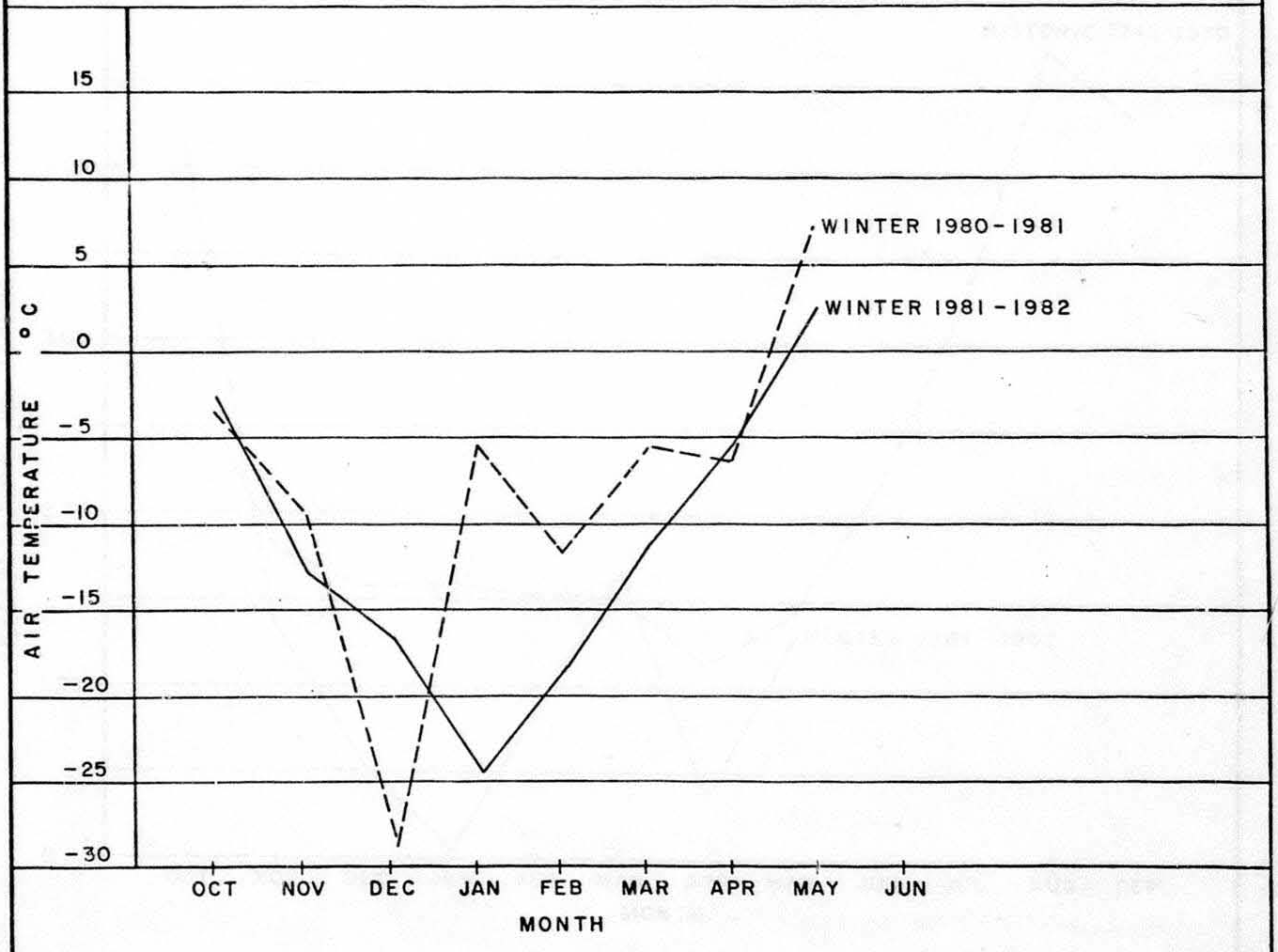
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FIGURE 3.6
MONTHLY AVERAGE AIR TEMPERATURE

AIR TEMPERATURE DATA
FROM R & M WEATHER
STATION AT DENALI



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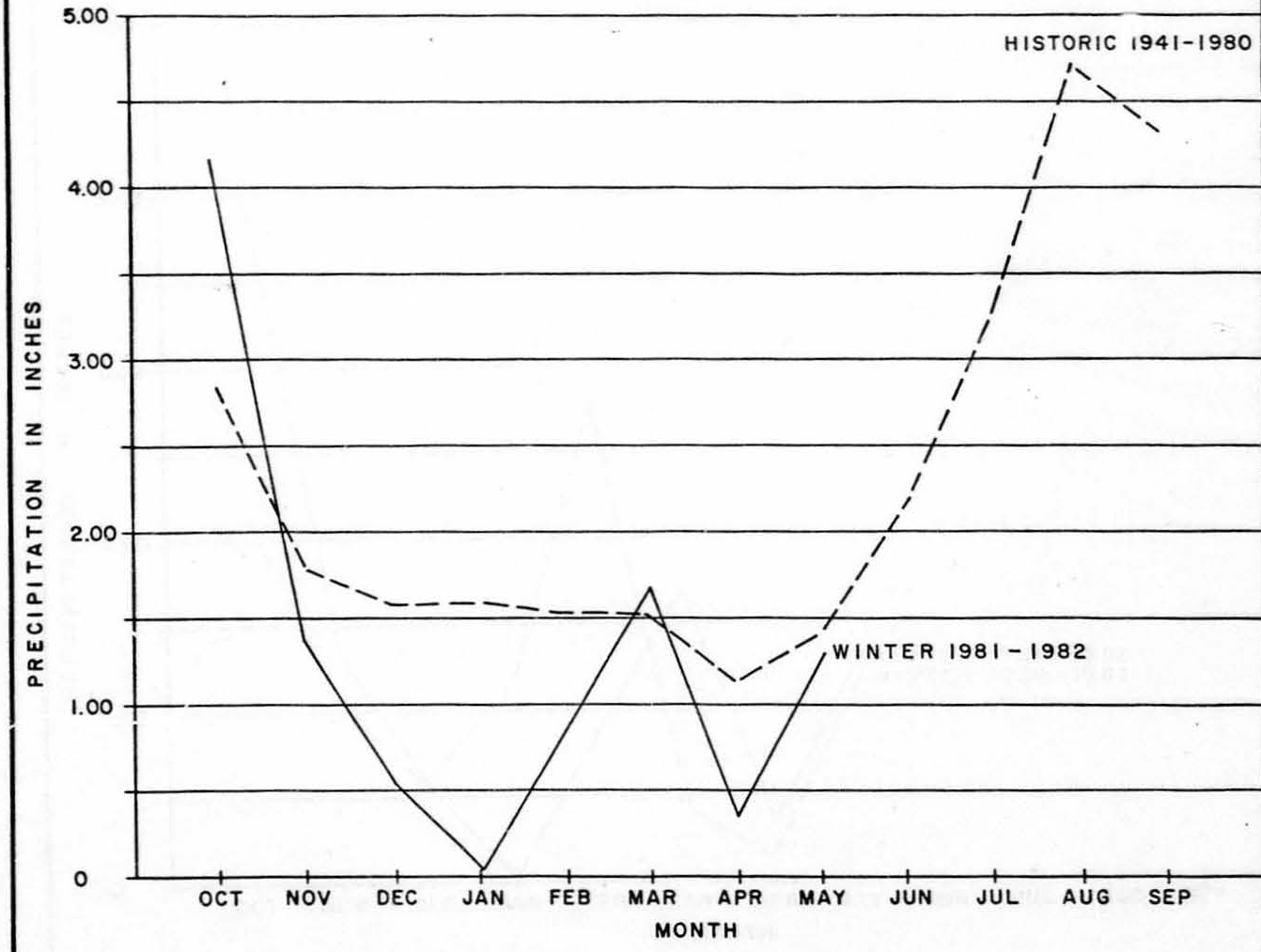
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FIGURE 3.7
MONTHLY AVERAGE AIR TEMPERATURE

PRECIPITATION DATA
FROM TALKEETNA
AIRPORT (NOAA)
WEATHER STATION



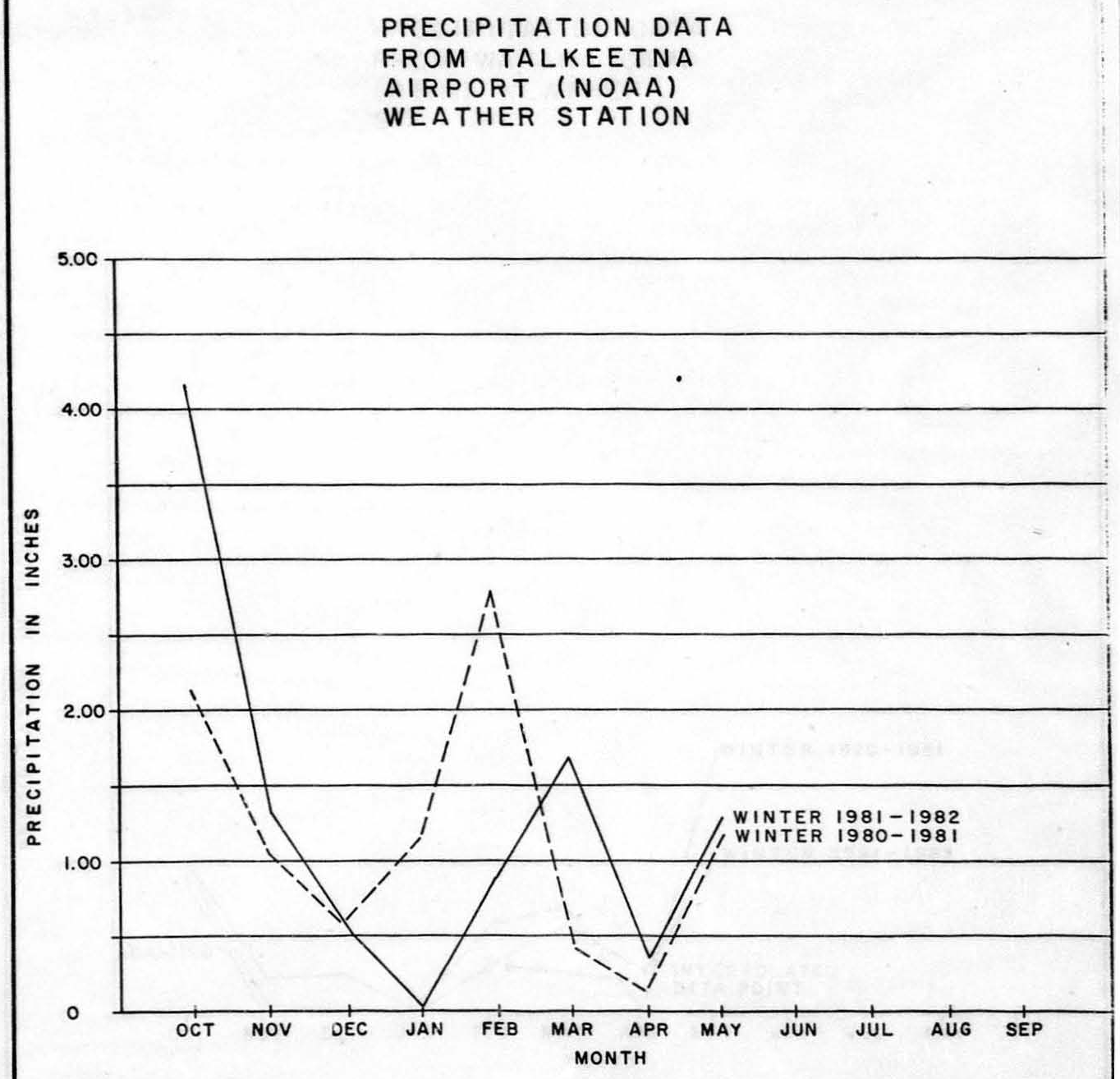
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FIGURE 3.8
MONTHLY TOTAL PRECIPITATION



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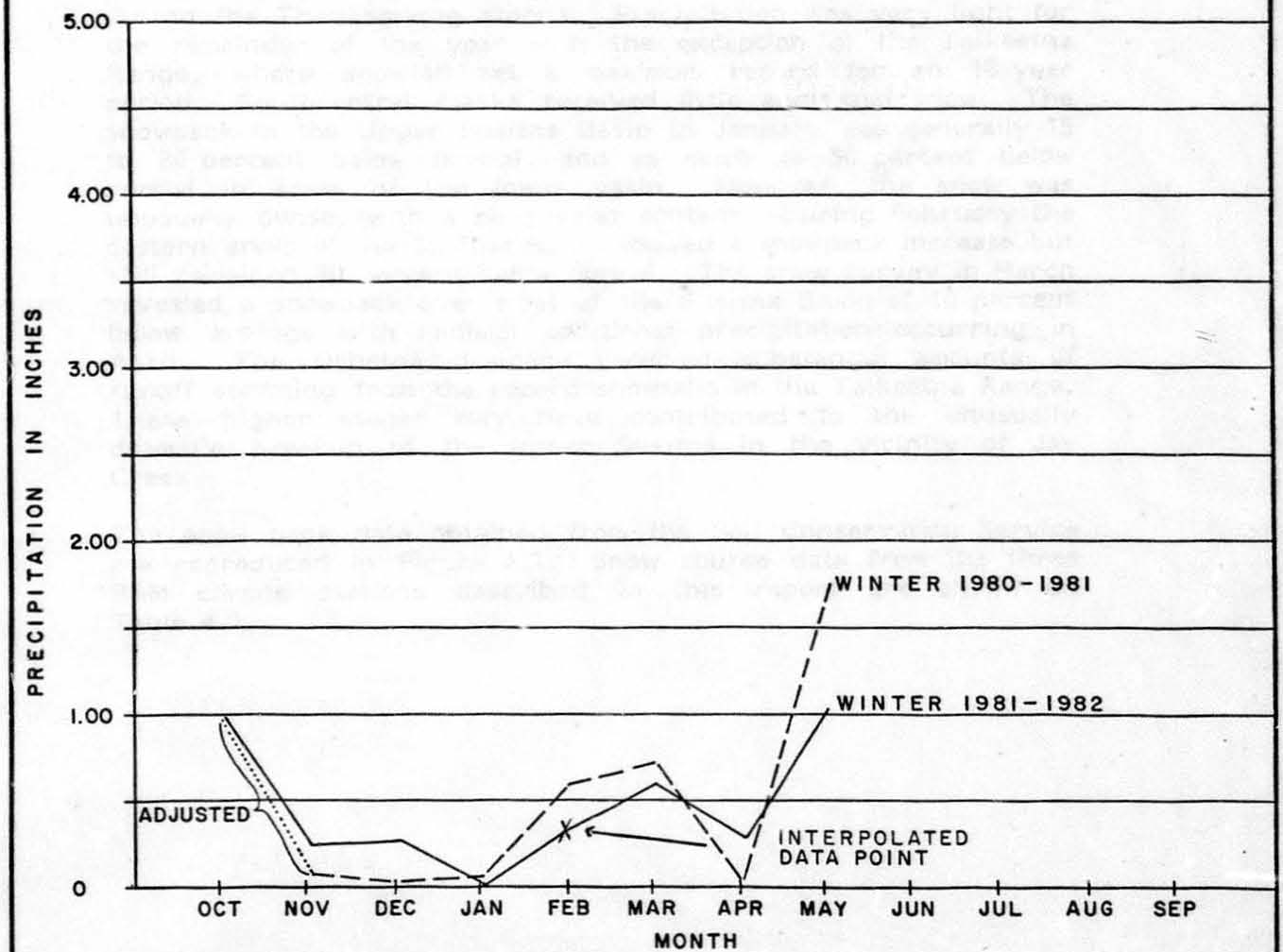
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FIGURE 3.9

MONTHLY TOTAL PRECIPITATION

PRECIPITATION DATA
FROM WATANA CAMP
(R&M) WEATHER
STATION



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FIGURE 3.10
MONTHLY TOTAL PRECIPITATION

4 - SNOW

The snowfall and water content data obtained from snow course surveys is beneficial in monitoring winter precipitation and in predicting spring runoff, with applications in forecasting river ice breakup. With the cooperation of the Soil Conservation Service, the following snowfall, snowpack and water content data have been compiled.

Early December snowpack was significantly above normal in south-central Alaska, with the majority of the accumulation occurring during the Thanksgiving storms. Precipitation was very light for the remainder of the year with the exception of the Talkeetna Range, where snowfall set a maximum record for an 18 year period. Southcentral Alaska received little additional snow. The snowpack in the Upper Susitna Basin in January was generally 15 to 20 percent below normal, and as much as 50 percent below normal in areas of the lower basin. However, the snow was unusually dense, with a high water content. During February the eastern areas of the Susitna Basin showed a snowpack increase but still remained 20 percent below normal. The snow survey in March revealed a snowpack over most of the Susitna Basin of 10 percent below average with minimal additional precipitation occurring in April. The Oshetna drainage received substantial amounts of runoff stemming from the record snowfalls in the Talkeetna Range. These higher stages may have contributed to the unusually dramatic breakup of the upper Susitna in the vicinity of Jay Creek.

The snow pack data obtained from the Soil Conservation Service are reproduced in Figure 4.1. Snow course data from the three R&M climate stations described in this report are shown on Table 4.1.

TABLE 4.1
CLIMATE STATION SNOW SNOW COURSE DATA
COLLECTED BY R&M CONSULTANTS

	1982		1981	
	Snow Depth Inches	Water Content Inches	Snow Depth Inches	Water Content Inches
January				
Devil Canyon	22.3	4.5	No Survey	
Watana Camp	10.0	2.7	7.4	1.5
Denali	9.4	2.1	8.8	2.5
February				
Devil Canyon	21.0	4.0	No Survey	
Watana Camp	10.0	3.4	8.3	1.6
Denali	8.8	2.5	5.7	1.5
March				
Devil Canyon	35.0	6.4	29.1	6.1
Watana	10.5	3.1	No Survey	
Denali	10.0	3.0	No Survey	
April				
Devil Canyon	38.1	4.3	29.7	7.0
Watana Camp	18.0	5.2	13.0	2.3
Denali	8.6	2.1	5.9	1.6
May				
Devil Canyon	22.5	6.0	21.0	5.1
Watana Camp	0	0	0	0
Denali	0	0	0	0

SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			LAST YEAR		HISTORICAL AVERAGE		
NAME	Number	Elevation	Date of Survey	Snow Depth (inches)	Water Content (inches)	Snow Depth (inches)	Water Content (inches)	Snow Depth (inches)	Water Content (inches)	Years of Previous Record
MATANUSKA/SUSITNA:										
Alexander Lake	2C02	140	1/26	24a	6.0e	18	4.0	34	7.6	18
*Bald Mountain Lake	2C03	2150	1/26	11a	3.0e	18a	3.6e	23	4.5	18
*Chelatna Lake	2C04	1650	1/26	20a	4.8e	20a	4.4e	31	6.8	18
Chunilna Creek	2C24	1750	1/26	21a	4.6e	20a	3.8e	--	--	1
Devils Canyon	2C16	1350	2/6	21	4.2	17a	3.1e	--	--	3
*Dutch Hills	2C28	3100	1/26	53a	16.5e	59a	16.5e	--	--	1
Fog Lakes	2C14	2120	1/27	15a	3.2e	11a	2.0e	24	4.3	12
*Horsepasture Pass	2C15	4300	1/27	33a	8.2e	28a	4.5e	22	3.9	14
*Independence Mine	2B06	3300	1/28	41	12.0	25	5.1	--	--	2
*Jatu Pass	2C37	4500	2/5	43	14.1	NO SURVEY		--	--	--
Lake Louise	2C06	2400	1/26	16	3.4	NO SURVEY		18	2.8	18
Little Susitna	New	1700	1/28	25	6.0	--	--	--	--	--
*Monahan Flat	2C07	2710	1/27	20a	4.4	24	4.0	27	5.1	18
*Mt. Hayes	2C42	4200	2/5	27	7.3	40	10.2	--	--	1
*Nugget Bench	2C10	2010	1/26	22a	6.0e	39a	8.6e	46	10.2	14
*Ramsdyke Creek	2C29	2220	1/26	28a	7.0e	NO SURVEY		--	--	1
Risley's	New	930	1/28	18	4.0	--	--	--	--	--
Skwentna	2C11	160	1/26	18	3.6	21	4.2	33	7.0	15
Square Lake	2C13	2950	1/27	28	5.8	16	2.7	16	2.7	18
Talkeetna	2C12	350	1/26	12	2.7	17	3.7	26	5.6	15
*Tokositna Valley	2C30	850	1/26	25a	6.0e	NO SURVEY		--	--	2
Tyone River	2C38	2500	2/3	19	4.1	18	3.0	--	--	1
*W. Fork Glacier	2C41	5050	2/5	62	19.2	94	31.4	--	--	1
Willow Airstrip	2C09	200	2/3	20	4.2	11	1.8	26	5.0	18
MATANUSKA/SUSITNA:										
Alexander Lake	2C02	140	3/1	27a	6.2e	32	6.4	39	9.6	18
*Bald Mountain Lake	2C03	2150	NO SURVEY			33a	7.3e	27	6.1	18
Chelatna Lake	2C04	1650	3/1	20a	5.0e	33a	7.4e	37	8.5	18
Chunilna Creek	2C24	1750	2/24	20a	4.7e	41a	8.6e	--	--	3
Devils Canyon	2C16	1350	2/24	23a	5.1e	30a	5.6e	--	--	5
Dutch Hills	2C28	3100	3/1	61a	18.3e	68a	19.0e	--	--	2
Fog Lakes	2C14	2120	2/24	22	4.9	14a	2.5e	28	6.0	12
*Horsepasture Pass	2C15	4300	2/24	38a	9.1e	32	5.7	25	4.9	14
*Independence Mine	2B06	3300	2/25	35	11.5	42	10.7	55	16.0	18
*Jatu Pass	2C37	4500	DELAYED DATA			64	20.1	--	--	1
Lake Louise	2C06	2400	2/24	19	3.2	14	2.2	21	3.5	18
Little Susitna	New	1700	2/25	21	5.4	--	--	--	--	--
*Monahan Flat	2C07	2710	2/24	19a	4.9e	31	6.1	30	6.4	18
*Mt. Hayes	2C42	4200	DELAYED DATA			43	12.4	--	--	1
*Nugget Bench	2C10	2010	3/1	23a	6.0e	61a	13.4e	54	12.6	14
*Ramsdyke Creek	2C29	2220	3/1	28a	7.6e	NO SURVEY		--	--	3
Risley's	New	930	2/25	12	4.5	--	--	--	--	--
Sheep Mountain	2C08	2900	3/1	28	6.2	32	6.7	23	4.6	24
Skwentna	2C11	160	3/1	21	4.7	33	7.0	37	8.5	15
Square Lake	2C13	2950	2/24	30	6.0	18a	3.1e	19	3.3	18
Talkeetna	2C12	350	2/24	9	2.6	22	5.0	29	6.7	15
*Tokositna Valley	2C30	850	3/1	23a	6.0e	NO SURVEY		--	--	2
Tyone River	2C38	2500	DELAYED DATA			18	3.1	--	--	1
*W. Fork Glacier	2C41	5050	DELAYED DATA			97	30.4	--	--	1
Willow Airstrip	2C09	200	2/24	19	4.2	15	3.0	28	6.0	18

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FIGURE 4.1
SUMMARIZED SNOW COURSE DATA
FROM THE SOIL CONSERVATION SERVICE
Winter 1981-1982

SNOW

DRAINAGE BASIN and/or SNOW COURSE NAME	Number	Elevation	THIS YEAR Date of Survey	THIS YEAR Snow Depth (inches)	THIS YEAR Water Content (inches)	LAST YEAR Snow Depth (inches)	LAST YEAR Water Content (inches)	HISTORICAL AVERAGE* Snow Depth (inches)	HISTORICAL AVERAGE* Water Content (inches)	HISTORICAL AVERAGE* Years of Previous Record
MATANUSKA/SUSITNA: (CONTINUED)										
Lake Louise	2C06	2400	3/25	20	3.6	15	2.7	23	4.1	18
Little Susitna	New	1700	3/30	36	10.8	--	--	--	--	--
*Monahan Flat	2C07	2710	3/25	23	5.0	32	7.2	32	6.9	18
*Mt. Hayes	2C42	4200	DELAYED DATA			42	13.9	--	--	1
*Nugget Bench	2C10	2010	3/26	50a	10.6e	50a	14.5e	59	16.0	13
*Ramsdyke Creek	2C29	2220	3/26	66a	14.5e	NO SURVEY		--	--	3
Risley's	New	930	3/30	16	5.3	--	--	--	--	--
Sheep Mountain	2C08	2900	3/31	30	6.4	34	8.2	24	5.6	24
Skwentna	2C11	160	3/26	24	4.9	24	5.9	39	9.6	15
Square Lake	2C13	2950	3/25	32	6.7	22	3.9	20	3.8	17
Talkeetna	2C12	350	3/25	14	4.3	17	5.1	32	7.7	15
*Tokositna Valley	2C30	850	3/26	48a	10.6e	NO SURVEY		--	--	2
Tyone River	2C38	2500	DELAYED DATA			18	3.1	--	--	1
*W. Fork Glacier	2C41	5050	DELAYED DATA			95	34.1	--	--	1
Willow Airstrip	2C09	200	3/25	21	5.3	11	3.2	27	6.5	17
MATANUSKA/SUSITNA:										
Alexander Lake	2C02	140	3/26	27a	6.2e	25	7.0	40	10.5	18
*Bald Mountain Lake	2C03	2150	NO SURVEY			26a	7.8e	33	8.0	18
Chelatna Lake	2C04	1650	3/26	33a	7.6e	30	8.1	40	10.2	16
Chunilna Creek	2C24	1750	3/25	24a	4.8e	37a	10.0e	--	--	3
Devils Canyon	2C16	1350	3/25	42a	8.4e	30	7.0	--	--	5
Dutch Hills	2C28	3100	3/26	75a	25.5e	67a	22.0e	--	--	2
Fog Lakes	2C14	2120	3/25	30	5.6	20	3.7	28	6.0	12
*Horsepasture Pass	2C15	4300	NO SURVEY			31a	7.2e	27	5.7	14
*Independence Mine	2B06	3300	3/30	64	18.9	41	13.0	66	20.0	16
*Jatu Pass	2C37	4500	DELAYED DATA			63	21.9	--	--	1
MATANUSKA/SUSITNA:										
Alexander Lake	2C02	140	4/28	20a	6.4e	16a	5.0e	28	8.9	16
*Bald Mountain Lake	2C03	2150	NO SURVEY			19a	6.0e	34	9.4	17
Chelatna Lake	2C04	1650	NO SURVEY			24a	7.0e	36	10.5	16
Chunilna Creek	2C24	1750	4/26	32a	7.4e	20a	6.5e	--	--	2
Devils Canyon	2C16	1350	4/26	34a	8.5e	21	5.1	--	--	5
Dutch Hills	2C28	3100	4/26	61a	24.4e	55a	21.0e	--	--	2
Fog Lakes	2C14	2120	4/26	23a	5.8e	10	2.5	22	5.6	12
*Horsepasture Pass	2C15	4300	4/26	41a	10.2e	30a	7.5e	28	7.0	13
*Independence Mine	2B06	3300	4/27	57	19.7	34	11.5	65	22.7	12
*Jatu Pass	2C37	4500	DELAYED DATA			59	19.5	--	--	1
*Kashwitna River Cirque	2C20	3900	4/30	58a	20.3e	NO SURVEY		--	--	3
Lake Louise	2C06	2400	4/25	18	4.3	7	1.9	14	3.4	17
Little Susitna	New	1700	4/27	29	10.6	--	--	--	--	--
*Monahan Flat	2C07	2710	4/26	23	5.2	26	6.5	30	7.8	17
*Mt. Hayes	2C42	4200	DELAYED DATA			30	12.0	--	--	1
*Nugget Bench	2C10	2010	4/26	40a	12.0e	37a	13.0e	54	16.9	14
*Ramsdyke Creek	2C29	2220	4/26	51a	15.3e	48	15.5	--	--	3
Risley's	New	930	4/27	9	2.8	--	--	--	--	--
Sheep Mountain	2C08	2900	4/29	25	5.9	24	6.7	15	4.0	23
*Sheep River	2C19	4100	4/30	38a	11.4e	NO SURVEY		--	--	3
Skwentna	2C11	160	4/28	17	5.4	9a	2.5e	23	7.4	13
Square Lake	2C13	2950	4/26	31	7.2	17	3.7	16	3.7	17
Talkeetna	2C12	350	4/26	6	2.3	2	1.7	17	5.6	15
*Talkeetna River Pass	2C22	5100	4/30	47a	14.1e	NO SURVEY		--	--	3
*Tokositna Valley	2C30	850	4/26	38a	11.4e	33a	7.4e	--	--	2
Tyone River	2C38	2500	DELAYED DATA			0	0.0	--	--	1
*Upper Kashwitna River	2C27	4300	4/30	45a	14.6e	NO SURVEY		--	--	3
*W. Fork Glacier	2C41	5050	DELAYED DATA			82	33.6	--	--	1
Willow Airstrip	2C09	200	4/28	11	4.2	0	0.0	9	2.8	16

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FIGURE 4.1 - CONTINUED

SNOW

DRAINAGE BASIN and/or SNOW COURSE NAME	Number	Elevation	THIS YEAR Date of Survey	THIS YEAR Snow Depth (inches)	THIS YEAR Water Content (inches)	LAST YEAR Snow Depth (inches)	LAST YEAR Water Content (inches)	HISTORICAL AVERAGE Snow Depth (inches)	HISTORICAL AVERAGE Water Content (inches)	HISTORICAL AVERAGE Years of Previous Record
SUPPLEMENTAL DATA (CONTINUED)										
AS OF FEBRUARY										
*MATANUSKA/SUSITNA: (CONTINUED)										
Butte Creek	2C32	2900	2/5	15a	3.3e	11a	2.0e	--	--	1
Caribou	2C33	4100	2/5	25a	6.8e	NO	SURVEY	--	--	--
E. Fork Glacier	New	5200	2/5	29a	8.4e	--	--	--	--	--
Ice Cave	2C40	4000	2/5	52a	16.1e	NO	SURVEY	--	--	--
Malemute	2C34	2600	2/5	22a	4.4e	NO	SURVEY	--	--	--
Pyramid	2C36	4850	2/5	25a	7.0e	24a	9.0e	--	--	1
AS OF MARCH										
Butte Creek	2C32	2900	3/12	18a	4.1e	15a	2.5e	--	--	1
Caribou	2C33	4100	3/12	28a	7.6e	21a	6.5e	--	--	1
Devils Canyon	2C16	1350	3/9	35	6.4	--	--	--	--	--
E. Fork Glacier	New	5200	3/10	27a	17.8e	--	--	--	--	--
Ice Cave	2C40	4000	3/12	52a	16.9e	32a	8.5e	--	--	1
Malemute	2C34	2600	3/12	12a	2.9e	18a	3.4e	--	--	1
Pyramid	2C36	4850	3/10	29a	8.1e	42a	13.0e	--	--	1
AS OF APRIL										
Butte Creek	2C32	2900	4/14	19a	4.6e	14a	2.8e	--	--	1
Caribou	2C33	4100	4/14	38a	12.0e	23a	8.0e	--	--	1
Devils Canyon	2C16	1350	4/16	38	8.5	--	--	--	--	--
E. Fork Glacier	New	5200	4/14	34a	11.0e	--	--	--	--	--
Ice Cave	2C40	4000	4/14	64a	21.8e	32a	10.0e	--	--	1
Malemute	2C34	2600	4/14	16a	3.5e	18a	3.8e	--	--	1
Pyramid	2C36	4850	4/14	34a	11.4e	42a	14.7e	--	--	1
AS OF MAY										
Butte Creek	2C32	2900	5/12	9a	2.0e	8a	2.0e	--	--	1
Caribou	2C33	4100	5/12	32a	10.5e	18a	6.5e	--	--	1
Devils Canyon	2C16	1350	5/11	22	6.2	--	--	--	--	--
E. Fork Glacier	New	5200	5/12	39a	12.5e	--	--	--	--	--
Ice Cave	2C40	4000	5/12	63a	22.6e	32a	9.5e	--	--	1
Malemute	2C34	2600	5/12	9a	2.0e	9a	3.0e	--	--	1
Pyramid	2C36	4850	5/12	36a	12.2e	35a	14.5e	--	--	1

a - aerial marker reading
e - estimated

*The Upper Susitna River aerial markers in the Matanuska/Susitna region are set in very exposed locations. They do not represent a true snowfall, but are indicative of the actual snow on the ground over very large areas. Their locations are generally areas of broad, flat and smooth topography, well away from lee slopes, and drifting snow deposition areas; however, they are occasionally subjected to moderate to severe wind scour.

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FIGURE 4.1 - CONTINUED

5 - ICE

The following is a general description of events recorded during the ice formation and disintegration processes on the Susitna River. Most of the ice phenomena were observed during aerial reconnaissance flights and identified by river mile (RM) locations. Refer to Attachment E or the R&M Susitna River Hydrographic Maps for orientation.

5.1 - Ice Formation General Observations

Individual crystals of ice called "frazil" are generated in the colder turbulent river reaches such as Vee Canyon, Watana and especially Devil Canyon. With air temperatures near -10.0°C the upper layer of water in these areas becomes supercooled and small frazil ice crystals are formed. If the water is well mixed, then a tremendous number of these crystals generated. Upon entering slow water, they tend to consolidate at the surface and can develop a sufficient thickness to emerge and drain. Encountering another section of rapid water these ice pans or sheets are crushed, broken and re-emerge as masses of individual crystals, usually only a few inches in diameter.

Entering slower water, this frazil slush will again agglomerate and form ice sheets which proceed downstream as long ribbons of individual pans measuring 2-3 feet in diameter. Entering Devil Canyon beyond the Devil Creek confluence, these ribbons of ice pans are broken up and mixed with water and additional frazil to form a slurry which, due to the turbulent nature of the canyon has no chance to surface. Nearing Portage Creek the velocities slow and a more laminar flow resumes, causing the emerging mass of slush and frazil from the canyon to form ice rafts. The size of these rafts depends on the nature of their movement and concentration. As the rafts flow downstream they tend to rotate and collide with border ice and other rafts, which breaks them up into smaller plates.

In October, when air temperatures began to fall below 0°C at night, water temperatures also gradually fell to the freezing point and drift ice appeared on the surface. Sheet ice appeared over areas of slack water and frazil ice formed in the more turbulent sections. Anchor ice grew in rather shallow (4-5 feet) but fast water. Slush ice floes formed under certain conditions and due to the fast current of the river, these ice floes were carried downstream and came to rest at sections of diminished velocity. Converging border ice and low velocities of water combined to form ice bridges from which the ice pack progressed upstream by accumulating floes at the leading edge. An ice cover over the entire water surface proceeded up to the foot of a rapids section, which was usually also a frazil ice generator. The ice continued to

pack up against the leading edge, eventually causing an increase in stage upstream which in turn led to decreased velocities and turbulence of the rapids, allowing further ice progression upstream, but at a slower rate due to the elimination of an ice generator.

Ice covers were observed to form over the two most turbulent rapids in the river, at Devil Canyon and Watana, while river reaches above and below these rapids sections remained open. This may be explained by the unique combination of thermal and hydraulic factors controlling these areas, specifically, a cold climate causing continuous cooling of the water, combined with water velocities greater than those critical to ice formation (Newbury, 1969). An ice cover would not normally develop under these conditions. Tremendous quantities of frazil and slush, however, are produced and emerge from these ice generators. Assuming the presence of a relatively calm plunge pool below these rapids, a border ice formation will develop. As these ice shelves converge the remaining open channel would be quickly clogged by drifting ice. Continuous input of large masses of slush and frazil would be deposited underneath this ice cover. Together with anchor ice deposits on the river bottom the channel would become more constricted leading to rises in water level. The impounded water would actually be a slurry of slush ice and could attain depths of 14-17 feet, as plotted on the Map and Profile of Devil Canyon in the back envelope. Once the flow of the impounded water reaches a critical velocity for the formation of ice the leading edge will progress through the rapids. Simultaneously the slurry of slush ice in the pool would quickly freeze solid resulting in an immensely thick but incompetent ice cover. The thickness of the layer is naturally the same as the rise in stage which is controlled by the river gradient and the degree of stability required before ice progression resumes. Therefore, the steeper the river gradient, the thicker the resultant ice cover development. This is verified by the data presented in the R&M report "Preliminary Channel Geometry, Velocity and Water Level Data for the Susitna River at Devil Canyon," April 22, 1981. The ice thicknesses measured were greatest over the steeper gradient sections of the canyon. These ice covers over rapids section, during final stages of ice formation will eventually erode open after the accumulated ice cover has passed through the reach. As will be described later in this section, these rapids generally remain open throughout the winter but characteristically show immense layers of ice on both banks with vertically sheared edges constricting flow to a narrow channel. The relatively weak nature of these shelves causes them to deteriorate by a process of calving. Fractures develop through the shelf and huge blocks periodically fall into the channel and drift downstream. A similar phenomena was documented by Newbury in "The Nelson River: A Study of Subarctic River Processes", (1969).

5.2 - Chronological Field Observation, Freezeup

October 2, 1981 - Frazil ice was first observed at river mile 110 during a morning flight up the Susitna River on October 2, 1981. A nighttime low temperature of -7.5°C was recorded at the Devil Canyon station. The weather stations further upstream also recorded temperatures well below 0°C. No frazil ice was observed in the confluence area. The air temperatures upstream of Talkeetna were apparently cold enough to allow supercooling of the top layer of water, creating conditions suitable for frazil generation in several areas. Increasing concentrations of frazil ice were observed upstream of RM 119, along with ice pans forming in river reaches of lower velocities. The shallow side channels showed border ice forming characteristically on the left or south-east bank only. This indicates that solar radiation may have been warming the water and the north bank sufficiently to prevent shore ice formation. The downstream end of the rapid water section above Curry was extruding a large amount of frazil and slush. Ice pans 2-3 feet in diameter were seen above Gold Creek, with the concentration progressively increasing in density nearer to Devil Canyon. At Portage Creek, the pans extended continuously across the channel. Through the canyon no ice was seen on the surface but the unusual light green shade of water throughout this reach indicated a high density of slush ice through the water column. Floating ice pans were again noticed above the Devil Creek confluence and extended upstream beyond the Deadman Creek confluence area, where ice pans formed an almost continuous layer across the channel. See Figure 5.1. The discharge at Watana streamgage was 5,900 cfs.

October 6, 1981 - In contrast to the first reconnaissance flight, almost no frazil or flowing ice of any form was observed. The low temperature during the previous night was -4.2°C at Watana and -2.0°C at Devil Canyon. Apparently no frazil ice was being generated. Border ice growth continued in several sections of slower moving water upstream of Devil Canyon.

October 29, 1981 - With air temperatures fluctuating above and below 0°C all through October, no permanent ice formations developed. Between October 12-15, temperatures increased sufficiently to melt much of the remaining border ice. Therefore, no further flights were scheduled until a predictable weather pattern developed. By the end of October, air temperatures at all four weather stations were gradually decreasing. Observations were made up to river mile 115 only, due to poor flying conditions. The previous night low temperature was -9.4°C.

In the Chase vicinity concentrations of ice pans of 2-3 feet in diameter were often seen extending from bank to bank. Border ice was again building along both sides of the river, and most sloughs and side channels showed a continuous ice cover. Ice pans and rafts from the Susitna formed 70 percent of the total floating ice below the confluence with the Chulitna River.

November 2, 1981 - Temperatures had remained consistently low for several days, with an average temperature of -11.0°C. Above the mouth of Deadman Creek, the border ice had sufficiently extended into the channel to close the channel and form an ice bridge. Ice pans were accumulating against this obstruction, causing upstream growth of the ice cover. Another channel closure was forming just downstream of Bear Creek confluence, about 1 mile below Tsusena Creek. An extensive ice bridge had developed below Fog Creek confluence but was not progressing further than the rapids section immediately below the Fog Creek confluence. A continuous ice cover had formed over the two mile long rapids section below the Devil Creek confluence, in the process previously described. Many ice bridges were building between RM 155 and RM 160. Devil Canyon had a continuous ice cover from the "elbow" down to RM 150. The discharge at Gold Creek at the time of these observations was 4,100 cfs. Below Gold Creek, the river channel remained open but thick sheets of consolidated slush ice covered most of the channel. These ice rafts were periodically broken up and reformed by local variations in flow. As these slush ice rafts continued to move down channel, more ice was generated on the surface and within rapids. The increased ice concentration assisted the consolidation process by thickening and strengthening the ice rafts. At RM 115 channel constrictions concentrated the ice rafts, and bridging seemed imminent. Below Chase, the ice rafts were almost continuous. The individual rafts averaged about 20 feet across as they entered the Susitna-Chulitna confluence area. See Figure 5.2.

November 6, 1981 - Cold air temperatures persisted, and the following aerial observations were recorded. Below Talkeetna, the Susitna was ice covered from Cook Inlet to approximately Kashwitna Creek. The channel at the Parks Highway Bridge was choked with slush ice rafts. The confluence area showed some frazil ice being contributed by the Chulitna and Talkeetna Rivers, but most of the ice was drifting down from the Susitna. See Figure 5.3. In the Chase area 50-60 percent of the river channel was covered by border ice. The remaining open water contained 70 - 90 percent slush rafts and frazil ice. An apparently stable ice bridge had formed at RM 105.5. Slush ice rafts were accumulating against it, creating an upstream progression of ice coverage. More ice bridge formations were observed at RM 123, RM 131 at Sherman, at RM 136 below Gold Creek, RM 145 and at RM 149 just above the Portage Creek confluence. The ice cover and bridges through Devil Canyon remained stable with no significant growth observed. No further ice formation was reported in the reach from Devil Canyon to Watana. This lack of ice formation may be attributed to the ice covered rapids and frazil generators upstream.

November 18, 1981 - The air temperatures continued to decline, ranging from -13°C at Talkeetna to -16.0°C at Watana. The

leading edge of the ice cover had progressed upstream to within 4 miles of the Parks Highway Bridge. The open water was only 50 feet wide on the main channel at the bridge due to the steady growth of border ice. The Chulitna River showed increasing ice formation activity, with moderate concentrations of frazil ice and ever widening border ice. The Talkeetna River was completely ice covered. The slush ice rafts previously observed on the Susitna River had consolidated and jammed at a border ice constriction at the confluence. A narrow channel of 50 feet in width remained open and showed very dense slush and frazil ice. At RM 108, dense concentrations of anchor ice could be seen. Slush ice had bridged the open channel at RM 110 and a border ice constriction at RM 111 created a bottleneck restricting the flow of ice rafts. The reach between Curry and Sherman was characterized by extensive anchor ice, giving the water a milky appearance. The ice bridge below Gold Creek remained stable, with no ice progression. No further ice formation had occured above the Devil Canyon area.

December 14, 1981 - The ice cover had progressed to RM 95 below Talkeetna. From there to the Susitna-Chulitna confluence, the river maintained an open channel. At the confluence, ice cover resumed on the Susitna River and continued to RM 127 with the exception of narrow open leads of varying lengths, usually less than one-half mile long. The open channel above RM 127 was 40-50 feet wide, and contained 70 percent frazil ice. Extensive patches of anchor ice were also observed. At Gold Creek the channel was 60-70 feet wide with no visible frazil ice. The ice covered reaches in Devil Canyon and below Devil Creek confluence had developed narrow open leads about one-half and 1 mile long, respectively. Above Devil Creek, the river remained open with extensive border ice formations constricting the remaining open water. Ice progression seemed to have stopped above Devil Creek and border ice growth appeared to be the only development.

January 4, 1982 - Air temperatures remained consistently cold through December averaging -12.6°C at Devil Canyon and Watana and -11.7°C at Talkeetna. The Talkeetna, Chulitna and Susitna rivers were frozen at the confluences with the exception of open leads resulting from either high water velocities or groundwater intrusions. See Figure 5.4. The Susitna above the confluence was generally ice covered, with many reaches of narrow open leads. Near Sherman at RM 127, an open channel about 1 mile long persisted. Above Sherman, the open leads became more numerous and generally longer. Above Gold Creek, the river was open but had many ice bridges. Little had changed through the Devil Canyon reach and further upstream.

March 10, 1982 - The lowest temperatures of the season were recorded in January, with a general warming through February and March.

A reconnaissance flight revealed that the Susitna River was entirely frozen from Talkeetna to Devil Canyon with only a few areas of open leads. See Figure 5.5. Areas showing overflow were becoming more frequent throughout the reach from Talkeetna to Denali. Plates 1 through 7 in Appendix E present descriptions of ice formations as documented during the reconnaissance flights. These notes provide additional insight to ice formations in specific river reaches.

5.3 - Ice Breakup, General Observations

The ice disintegration process on northern rivers is characteristically related to an increased discharge resulting from greater solar radiation influence and subsequent melting of the watershed snowpack. Meltwater trickles down the banks and tends to pool along the sides of the channel. Narrow leads of open water develop along the edge of the shorefast ice. Increasing air temperatures and precipitation create marked increases in runoff contributing to the existing river flow, causing pressure to be exerted on the ice cover. Once critical stresses are exceeded in the ice cover, shore cracks develop and the decaying ice splits into numerious large rafts. In areas of high velocity, the water will actually be forced through surface cracks, resulting in flow over the ice cover. Any remaining snow cover on the ice is quickly eroded and the weakening ice becomes candled.

The ice at this stage is undergoing a process of deterioration called "candling". Impurities in the water are rejected during crystallization and tend to be concentrated on the vertical crystal boundaries. The vertical crystal structure is revealed at breakup by accelerated melting in the columns of impurities between crystals. The ice cover as a result weakens, fractures and down-stream ice movement begins, (Newbury, 1969).

The downstream movement of ice was at first sporadic and slow, as some sections of the ice cover remained shorefast or anchored in shallow reaches. Downstream movement accelerated until jamming occurred at natural constrictions and sharp bends. At this point of ice movement, the river was subdivided by a series of ice barriers which had formed during freezeup, as ice bridges.

Drifting ice blocks acted against these barriers. High velocities caused them to submerge under the ice covering the deeper channel. The friction of bed material and surface ice may restrict the passage of some ice blocks, and additional floes will accumulate upstream. With the flow constricted, the water level upstream will rise. If the jam can resist such pressure, the water continues to rise until it overflows into an existing side channel or creates a new channel, (Pariset, 1966), (Newbury, 1969), Although the latter event is rare in the relatively confined channel of the Susitna, the slough below the Gold Creek Bridge provides an example.

Figure 5.9 shows a section of the U.S.G.S. topographic map, D-6, Talkeetna Mountains Quadrangle. Below the Gold Creek railroad bridge on the left bank there now exists a secondary overflow channel (Slough 11) which is not on the U.S.G.S. map published in 1951. This relatively new channel approximately follows the base of the terrace at the 700-foot contour line. The exact date of this event could not be provided by the Alaska Railroad or the National Weather Service. The jam which created this channel re-occurs almost every year very close to LRX-43 below Gold Creek Bridge. On-going slough surveys (during the summer of 1982) will determine whether Slough 11 is also flooded during peak summer flows or only as a result of ice jam flooding. The presence of an unusually high berm at the head of this Slough indicates flooding at only the most extreme main channel stages.

Ice jams remain stable until increasing pressure from upstream ice accumulations and impounded water weaken and lift the ice barrier. The release causes a surge of ice, water and debris to rush downstream, often driving large ice blocks far from the normal channel, scarring shoreline vegetation and creating a "trim" line.

The principal effects of river ice breakup are summarized by Newbury (1969):

1. An annual cycle of bed erosion and infilling occur(s) where unconsolidated material was present in zones of ice accumulation.

2. Bank and bed material of a size greater than that corresponding to the hydraulic competency of the river were striated and shifted downstream in local zones of ice cover movement.

3. A vegetation trim line was developed along the channel boundaries corresponding to the maximum ice level.

4. Local sections of terraces and braiding were developed by flow shifts in rapids zones during the annual period of ice accumulation.

The 1982 breakup on the Susitna occurred from May 10 through the 15th, very close to previously recorded breakup dates (R&M Consultants, Inc. 1981). Field observations covering the breakup period began on April 12 to determine the general ice regime before deterioration began. The average air temperature through April ranged from 0°C at Talkeetna to -6°C at Denali. Table 5.1 tabulates the snow depths and water content prior to breakup.

5.4 - Chronological Field Observations, Breakup

April 12, 1982 - The river ice in the Chase area was snow-covered, with narrow leads showing no change in size since the previous reconnaisance flight. A continuous ice cover generally extended to Gold Creek, with leads becoming more prevalent towards Portage Creek. Devil Canyon was entirely open from the proposed damsite to Devil Creek, with the exception of the same ice bridges reported all winter. At Devil Creek, the continuous ice cover resumed and extended to the Watana Creek confluence. Occasional open leads had persisted all winter through this reach. No significant changes were observed since the March 10th flight.

April 26, 1982 - The river below Talkeetna remained ice covered, with many areas showing overflow. South of Bell Island, however the ice had gone out, and the river was open. The Talkeetna River was still frozen, with open leads beginning to extend and connect. Heavy overflows were observed near Chase, indicating some localized runoff. Open leads dominated side channels and some sloughs which were influenced by seeping groundwater. With the exception of high velocity reaches the ice cover remained stable and continuous from Sherman to Gold Creek. In rapids zones, usually marked by open water leads, ice rafts were breaking away from the ice cover and drifting downstream. From Gold Creek to Indian River the Susitna had a narrow open channel, probably a direct result of flows from Indian River which was beginning to breakup. The ice bridges, between Devil Canyon damsite and Devil Creek, were beginning to show accumulations of ice floes and some jamming activity. No significant water level increases were reported. Above Devil Creek the areas of overflow previously observed, were showing open water. The quantity and extent of open leads were less upstream of the Fog Creek confluence, with no change in river ice above the Watana damsite.

May 10-15, 1982 - Upstream of Devil Creek, the river showed little change except for the open leads getting wider and more numerous. The ice in this stretch of lower gradient was formed by border ice that converged but never formed stable ice bridges or ice barriers, resulting in long, narrow open leads. It seemed that the existing ice cover in this area was melting in place rather than "breaking up". Ice movement began on many reaches of the Susitna River below Devil Creek. All ice bridges had disappeared except for one at river mile 153, where an accumulation of ice floes had jammed and extended several hundred yards upstream. From Portage Creek to Gold Creek, the river was open, with ice jamming at RM 142 and RM 139. The ice cover remained stable about one-half mile below the Gold Creek Bridge. Below Sherman, at RM 129 and 130, ice had jammed but appeared unstable and reportedly did not last long. The main channel between RM 118 and RM 120 retained its ice cover and appeared stable. Several jams of lesser consequence appeared at RM 115 to 117. At RM 107 (LRX-11), the river remained entirely frozen over. A continuous open lead had formed from Chase upstream to the mouth of Lane

Creek. The confluence area was characterized by opening leads on the Susitna, the Chulitna was in final stages of breakup with no ice remaining over the channel. Many ice blocks were stranded on sand bars and bank areas adjacent to the Chulitna.

From May 12-15 a jam occurred at RM 107, flooding the railroad tracks and scouring the east bank. Although the jam responsible for the damage has occurred, in generally the same location before, this year's breakup caused unusually severe erosion. The section of railroad track adjacent to the Susitna River at RM 108.5 was undermined when impounded water rose about 15 feet. The ice cover was shorefast, far out into the river channel, constricting the flow to a narrow deep channel against the right (west) bank. This cover was very resistent to lifting. Drifting ice blocks were up-ended upon striking this barrier causing water inpoundment and subsequent increases in stage upstream of the jams. Witnesses claim the impounded water rose high enough to erode the railroad grade and wash away several ties (Figure 5.6) and damage the support structure on a bridge (Figure 5.7) crossing a tributary at RM 110. The jam persisted for three days and backed up ice floes for approximately 1 mile (Figure 5.8) before releasing on May 15. While the jam held, some water flowed over the ice. An extensive area on the right overbank was also flooded. This was by far the most significant damage in recent years according to railroad personnel.

May 27, 1982 - After the final ice drive, a river reconnaissance was made by boat to observe the damage caused during breakup. The river reach just below Talkeetna was characterized by much erosion of river banks on the outside of natural bends. A significant erosion problem exists just downstream of Talkeetna where a cabin, situated on a 10-15 foot bank, is potentially threatened by future breakup scouring of equal severity as this year's. At the confluence, the Susitna left bank at LRX-3 had eroded 3-4 feet, with many mature cottonwood trees now overhanging the river. At RM 99 and 100, ice blocks measuring 20-30 feet diameter had been pushed up onto the banks and sand bars. The upstream ends of vegetated islands had been scoured by ice, some being completely denuded of any vegetation for 100 feet or more from the bank. The left river bank had eroded 4-5 feet at RM 102. Areas most notably damaged by ice were characterized by mature (15-20 inch) cottonwoods and birch trees knocked down and piled up against the upstream ends of islands. The Alaska Railroad had been heavily reinforcing the grade by depositing large rip-rap on the river bank at RM 104 to 105 and 108 to 116. At Slough 9 (RM 129) the effects of breakup were particularly evident. The berm at the head of the slough consisted of unconsolidated cobbles and sand, suggesting recent deposition. The ground on the islands was covered by 3-4 inches of freshly deposited silt, and ice blocks were observed within the forest, all evidence of a major flooding event. The jam which caused this flooding was not observed.

In addition to the ice jam at Chase, the Alaska Railroad reported damage to tracks at several locations along the river up to Gold Creek. The most extensively damaged section of railroad track lies between Curry and Chase where recurring ice jams are formed between LRX-29 and LRX-30. Additional jamming and damage was reported at Railroad Mile 260 (River Mile 132) following an ice jam near LRX-37.

Upstream of Gold Greek between RM 141 and 142 is another overflow channel (Slough 21) which receives flood waters during breakup and high summer flows. Extensive damage to the channel and overbank vegetation was reported after this year's breakup. Scarring of 30 inch cottonwoods to heights of 5 feet above ground level were estimated. These trees had never seen ice damage before and are situated well above and away from the normal channel.

Most of the jams reported in these field observations are reccuring every year and vary only in the degree of resultant destruction. Since observations were limited during the 1982 breakup, the 1980-81 Ice Observations Report should be consulted for further documentation of additional jam locations.

5.5 - Ice Thickness

To further define the 1982 ice regime and to strengthen the data established in 1980 and 1981, ice thicknesses were measured at several of the crest gage sites. These locations were selected since open water stage vs. discharge relationships had been established and cross sections had been surveyed at all crest gage locations, as well as the fact that these gages were easily located, even in deep snow.

Holes were drilled through the ice cover at several representative stations across the channel. With a survey level rod the ice thickness could be measured directly. Table 4.1 lists the average ice thickness as well as the maximum and minimum observed. These data can be compared with the 1980-81 Susitna River ice thicknesses tabulated on Table 3.1 in the 1981 Ice Observations Report (R&M). All available historical data on ice thicknesses have been fully documented in the 1981 report and will not be presented here.

5.6 - Devil Canyon Ice Shelves

During the winter of 1980-1981, an extensive leveling survey was conducted through Devil Canyon. The formation of broad ice shelves made it possible to obtain a thalweg bottom profile, a water surface profile, and top of ice elevations. For a distance of approximately 1 mile through the canyon, beginning at a temporary bench mark 800 feet downstream of the proposed dam centerline, stations were established at 200-feet intervals and at significant slope breaks. The three required elevations were determined. For a detailed discussion on field procedures and the data acquired refer to Preliminary Channel Geometry, Velocity and Water Level Data for the Susitna River at Devil Canyon, (R&M, April 22, 1981).

An abbreviated and lower order survey was conducted in March of 1982 to determine ice thicknesses through the canyon. The data will be useful in defining ice thickness fluctuations from year to year, as well as determining the effects of ice jamming in the canyon. The data obtained during the 1982 survey are presented in Table 5.2. For illustration purposes, the 1982 stations and corresponding elevations are plotted relative to the 1981 data on the Devil Canyon Map and Profile included in the back envelope.

In 1982, the ice shelves measured both narrower (horizontally) and thinner (vertically) than in 1981. The upper section of the canyon at the date of survey showed open water with stable ice shelves forming approximately at the proposed location of the dam centerline. An open water lead continued through the canyon to Station "D" where the ice cover resumes. The survey was conducted only on the norther side of the river channel due to access limitations.

TABLE 5.1

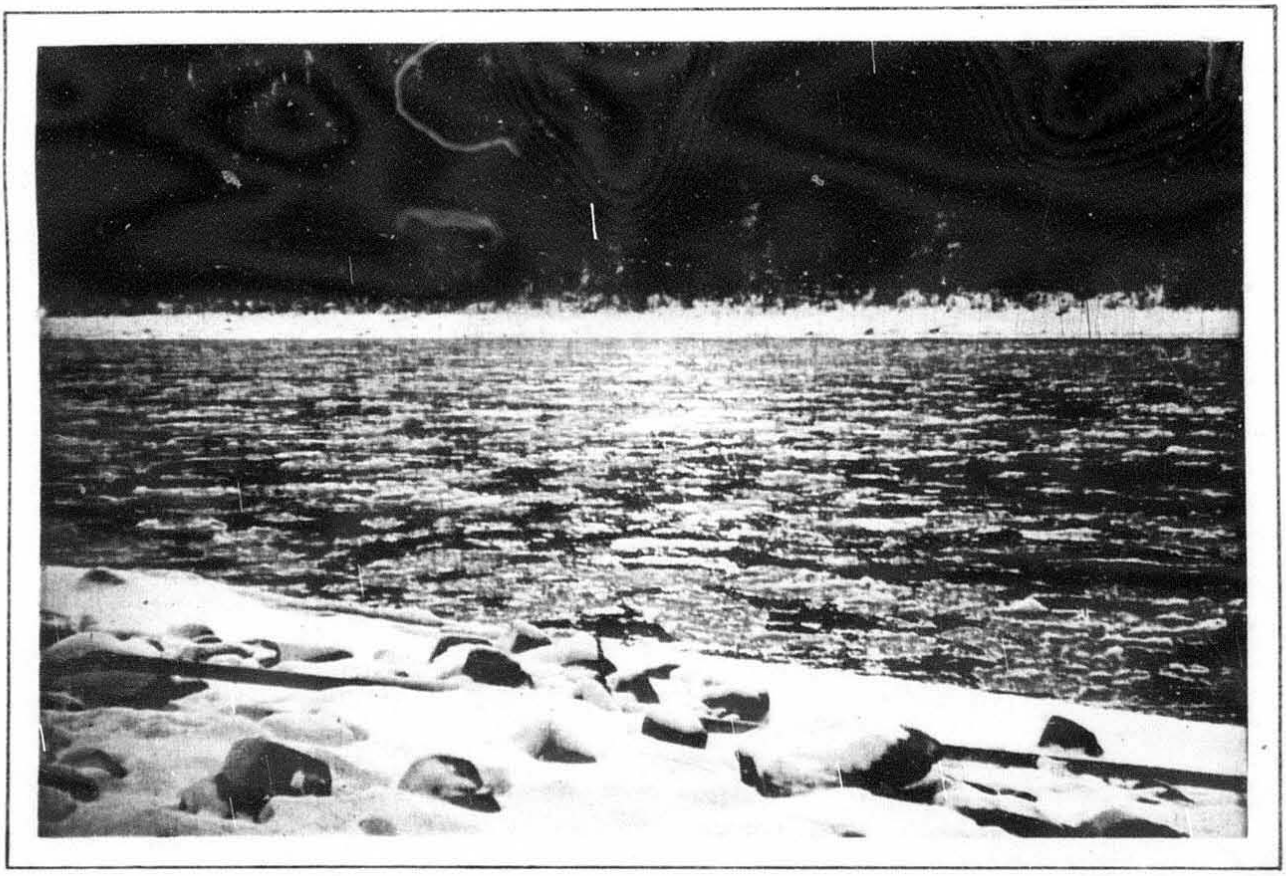
SUSITNA RIVER ICE THICKNESS

Location	Date	Ice Thickness (ft.) Average	Maximum	Minimum	Number of Observations	Snow Cover (ft.)
Crest Gages at Deadman Creek	3-11-82	4.8	7.3	2.9	3	1
Crest Gages at Watana Damsite	3-11-82	6.7	-	-	1	-
Watana Streamgage	3-11-82	4.5	5.0	3.6	12	-
Crest Gages at Devil Creek	3-13-82	3.7	4.0	3.4	2	-
Portage Cr.	3-13-82	4.2	4.5	3.9	2	2
LRX-61	4-16-82	3.8	6.0	3.0	24	1
LRX-53	4-13-82	3.0	4.5	1.0	30	-
Gold Cr.	3-13-82	3.5	3.5	3.4	2	-
Crest Gages at Curry	3-13-82	4.7	4.9	4.6	2	-

TABLE 5.2

PRELIMINARY ELEVATIONS ALONG ICE SHELF
THROUGH DEVIL CANYON
Date of Observation: March 12, 1982

1982 Station Designations	Distance From Initial Point (feet)	Top of Ice Elevation (feet)	Ice Thickness (feet)	Water Surface Elevation (feet)
A	0	881.6	12	870.1
B	300	880.0	10	869.6
C	800	878.0	10	862.0
D	1050	874.6	16	858.6
E	1250	871.7	22	-
F	1350	871.4	16	-



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FIGURE 5.1
FRAZIL, FRAZIL SLUSH AND ICE PANS
AT WATANA STREAMGAGE
OCTOBER 2, 1981

PREPARED FOR:

ACRES



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R&M CONSULTANTS, INC.

FIGURE 5.2
TALKEETNA RIVER CONFLUENCE SHOWING
RELATIVE CONTRIBUTIONS OF ICE.
SUSITNA RIVER IS ENTERING FROM THE LOWER LEFT
NOVEMBER 2, 1981

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5-16

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FIGURE 5.3
DOWNSTREAM VIEW OF SUSITNA CHULITNA CONFLUENCE
WITH THE SUSITNA COMING IN FROM THE LEFT AND
THE CHULITNA FROM THE RIGHT. TALKEETNA IS ON
THE FAR LEFT BANK AT THE TOP OF THE PHOTO
NOVEMBER 6, 1981

PREPARED FOR:

ACRES



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FIGURE 5.4
DOWNSTREAM VIEW, ALONG THE SUSITNA, OF THE CHULITNA CONFLUENCE
CHULITNA RIVER IS COMING IN FROM THE UPPER RIGHT
JANUARY 4, 1982

PREPARED FOR:

ACRES



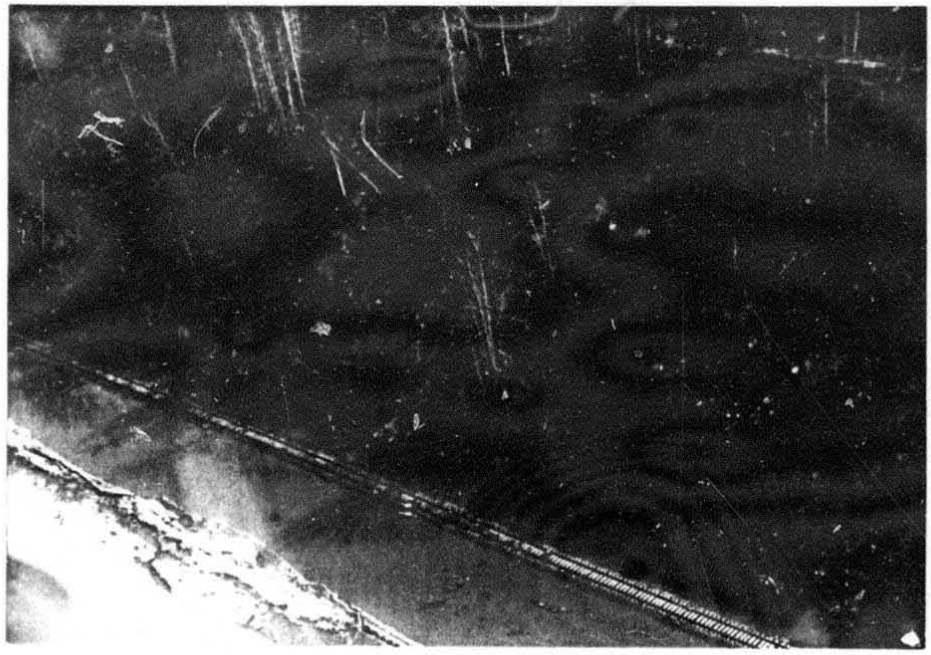
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FIGURE 5.5
GOLD CREEK BRIDGE WITH OPEN
LEADS EXTENDING TO INDIAN RIVER
FLOW IS FROM RIGHT TO LEFT
MARCH 10, 1982

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FIGURE 5.6
FLOODED TRACKS AND OVERBANK
CAUSED BY ICE JAM AT CRX-11
MAY 13, 1982
PHOTOGRAPHY COURTESY OF THE ALASKA RAILROAD

PREPARED FOR:

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FIGURE 5.7
DAMAGED BRIDGE SUPPORT AND TRACK
SECTION ADJACENT TO RIVER MLE 108
MAY 13, 1982
PHOTOGRAPHS COURTESY OF THE ALASKA RAILROAD

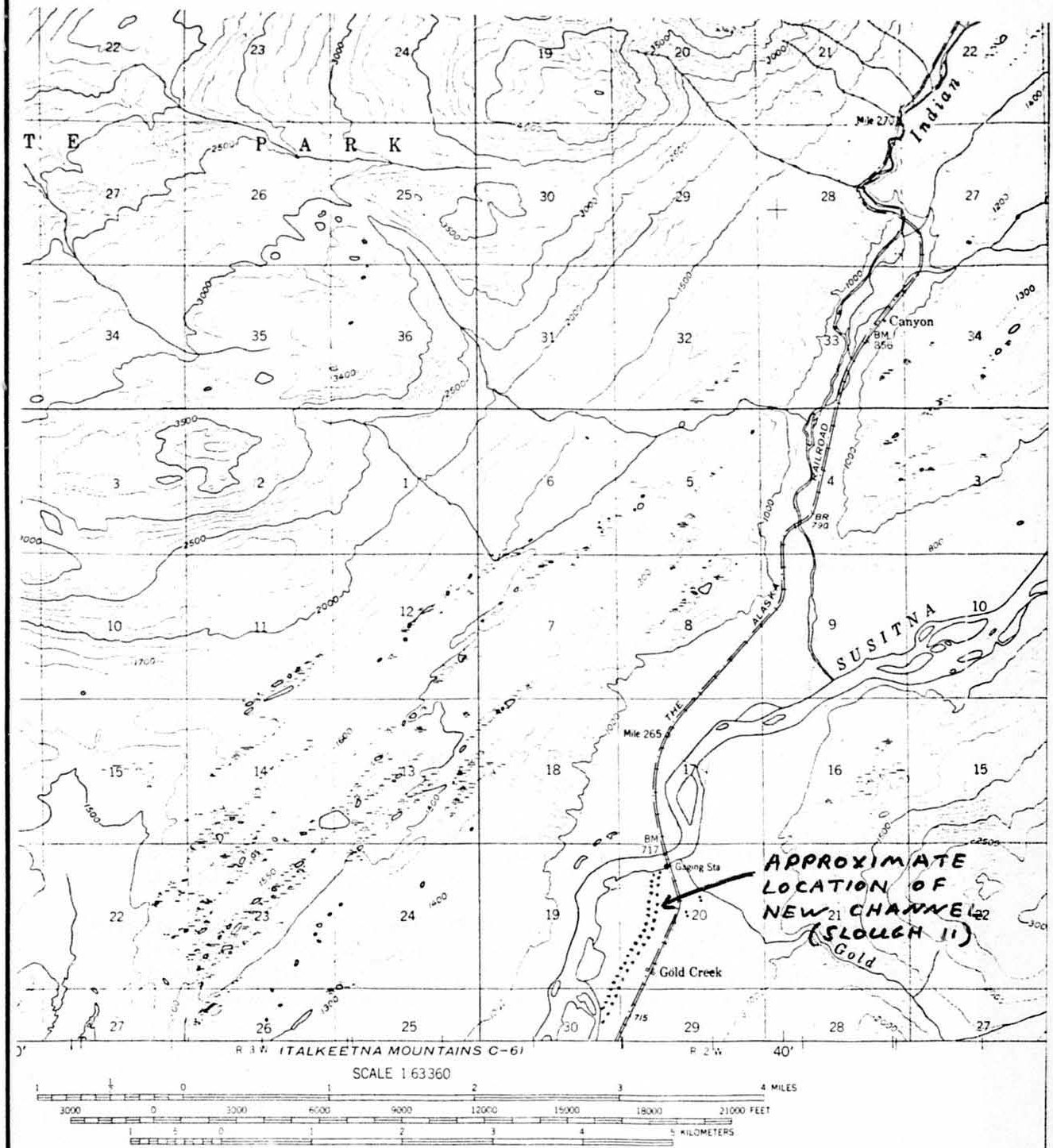




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FIGURE 5.8
VIEW OF ICE JAM LOOKING DOWNSTREAM
SHOWING EXTENT OF ICE ACCUMULATION AND
VIEW ACROSS CHANNEL AT RM 108
MAY 13, 1982
PHOTOGRAPHS COURTESY OF THE ALASKA RAILROAD



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Figure 5.9

APPROXIMATE LOCATION OF BYPASS CHANNEL
CREATED DURING AN ICE JAM FLOOD

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ATTACHMENT A

DAILY CLIMATOLOGICAL SUMMARIES FROM OCTOBER 1981 THROUGH MAY 1982 FOR WEATHER STATIONS AT TALKEETNA, DEVIL CANYON, WATANA CAMP AND DENALI.

OCT 1981
TALKEETNA, ALASKA
WEA SVC CONTRACT MET OBSY
TALKEETNA AIRPORT

Local Climatological Data

MONTHLY SUMMARY

LATITUDE 62 °18 'N LONGITUDE 150 °06 'W ELEVATION (GROUND) 345 FT. STANDARD TIME USED: ALASKAN WBAN #26528

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65° HEATING (SEASON BEGINS WITH JULY)	COOLING (SEASON BEGINS WITH JAN.)	WEATHER TYPES ON DATES OF OCCURRENCE 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 0800 LST IN.	PRECIPITATION WATER EQUIVALENT IN	SNOW, ICE PELLETS IN.	AVG. STATION PRESSURE IN. ELEV. 356 FEET M.S.L.	WIND RESULTANT DIR.	RESULTANT SPEED M.P.H.	AVERAGE SPEED M.P.H.	FASTEST MILE SPEED M.P.H.	FASTEST MILE DIRECTION	SUNSHINE MINUTES	SUNSHINE PERCENT OF POSSIBLE	SKY COVER TENTHS SUNRISE TO SUNSET	SKY COVER TENTHS MIDNIGHT TO MIDNIGHT	DATE
1	50	23	37	-3	23	28	0		0	0	0	29.41	02	3.6	4.3	13	05			0		1
2	46	20	33	-6	19	32	0		0	0	0	29.67	36	4.5	5.0	8	36			1	1	2
3	40	25	33	-6	23	32	0		0	0	0	29.55	34	5.8	5.9	7	33			10	10	3
4	41	32	37	-1	29	28	0	1	T	.11	1.7	29.18	33	6.2	6.5	16	35			10	10	4
5	48	30	39	1	30	26	0		1	0	0	29.28	01	.6	1.5	7	34					5
6	46	28	37	0		28	0		0	0	0					10	18			7		6
7	44	25	35	-2	21	30	0		0	0	0	29.20	01	5.0	6.4	17	04			0		7
8	40	23	32	-4	24	33	0		0	0	0	29.20	36	.1	2.0	6	23			10		8
9	35	21	28	-8	28	37	0		0	T	T	29.44	02	1.6	2.0	6	01			9		9
10	44	25	35	0		30	0		0	0	0					9	01			5		10
11	36	32	34	-1		31	0	1	T	.45	3.3					10	02			10		11
12	42	35	39	5	38	26	0		1	.39	0	29.36	35	4.1	5.1	7	35					12
13	44	38	41	7		24	0	1	0	.13	0					8	18			10		13
14	43	37	40	7	40	25	0	1	0	.03	0	29.36	35	5	2.5	6	36			10		14
15	50*	34	42*	9	38	23	0	1	0	.09	0	29.33	29	.9	3.3	7	02			8		15
16	46	35	41	9	37	24	0	1	0	.18	0	29.54	01	5.3	6.9	13	02			9	9	16
17	45	30	38	6	32	27	0		0	T	0	29.28	36	5.1	5.6	13	01			7	8	17
18	41	23	32	1	30	33	0		0	T	0	29.51	14	.5	2.9	15	02			10	8	18
19	39	21	30	-1	21	35	0		0	0	0	29.99	01	3.6	4.6	10	35					19
20	39	33	36	6		29	0		0	.32	.1					13	36			10		20
21	40	35	38	8	38	27	0	1	0	1.08	0	29.60	35	4.1	4.9	8	02			10		21
22	42	38	40	11	40	25	0	2	0	.47	0	29.78	01	3.3	3.9	8	01			10		22
23	43	38	41	13	41	24	0	1	0	.87	0	29.57	36	4.5	4.6	9	36			10	10	23
24	46	30	38	10	35	27	0	1	0	.05	0	29.48	17	9.7	10.1	18	18			9	8	24
25	41	29	35	8		30	0	1	0	0	0					8	27			6		25
26	30	22	26	-1	27	39	0	2	0	0	0	28.93	14	1.5	2.0	6	18			10		26
27	37	17	27	1		38	0	1	0	0	0					7	34			7		27
28	35	18	27	1	23	38	0		0	0	0	28.61	34	.5	1.6	5	20			9		28
29	35	15	25	0	22	40	0		0	0	0	28.68	02	4.3	4.9	14	03			9		29
30	32	11	22	-3	16	43	0		0	0	0	28.85	02	1.8	2.5	5	01			4	4	30
31	31	11*	21*	-3	14	44	0		0	0	0	29.16	35	5.4	5.9	9	33			5	4	31
	SUM	SUM				TOTAL	TOTAL			TOTAL	TOTAL			FOR THE MONTH:				TOTAL	% FOR MONTH	SUM	SUM	
	1271	834				956	0	NUMBER OF DAYS		4.17	5.1					18	18					
	AVG.	AVG.	AVG.	DEP.	AVG.	DEP.	DEP.	PRECIPITATION		DEP.						DATE: 24		POSSIBLE		AVG.	AVG.	
	41.0	26.9	34.0	1.9		-64	0	.01 INCH	12	1.63												

NUMBER OF DAYS MAXIMUM TEMP. ≥ 90°	MAXIMUM TEMP. ≤ 32°	MINIMUM TEMP. ≤ 32°	MINIMUM TEMP. ≤ 0°
0	3	22	0

SEASON TO DATE	TOTAL	TOTAL
DEP.	2106	0
DEP.	-23	-6

SNOW, ICE PELLETS	
≥ 1.0 INCH	2
THUNDERSTORMS	0
HEAVY FOG	2
CLEAR	PARTLY CLOUDY CLOUDY

GREATEST IN 24 HOURS AND DATES		
PRECIPITATION	1.31	20-21
SNOW, ICE PELLETS	3.3	11

GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE	
2	4

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.
T TRACE AMOUNT
+ ALSO ON AN EARLIER DATE, OR DATES.
HEAVY FOG: - VISIBILITY 1/4 MILE OR LESS.
FIGURES FOR WIND DIRECTIONS ARE TENS OF DEGREES CLOCKWISE FROM TRUE NORTH. 00 = CALM.
DATA IN COLS. 6 AND 12-15 ARE BASED ON 7 OR MORE OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
FASTEST MILE WIND SPEEDS ARE FASTEST OBSERVED ONE-MINUTE VALUES WHEN DIRECTIONS ARE IN TENS OF DEGREES. THE / WITH THE DIRECTION INDICATES PEAK GUST SPEED.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY

HOURS OF OPERATION REDUCED ON A VARIABLE SCHEDULE.

SUMMARY BY HOURS

HOUR LOCAL TIME	AVERAGES SKY COVER TENTHS	STATION PRESSURE IN.	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	DEW PT. °F	RELATIVE HUMIDITY %	WIND SPEED M.P.H.	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED M.P.H.
02	7	29.34	31	30	28	90	3.1	36	1.5
05									
08	8	29.34	31	30	28	89	4.4	36	2.6
11	7	29.35	37	34	30	78	5.7	36	2.3
14	7	29.33	40	36	30	71	6.1	35	2.4
17	8	29.33	37	35	30	79	3.9	36	3.0
20	7	29.32	33	32	28	83	3.9	36	3.4
23	7	29.33	32	31	28	89	4.0	01	2.4

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES) - NOT RECORDED

DATE	A. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	P. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	DATE
1																									1
2																									2
3																									3
4																									4
5																									5
6																									6
7																									7
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27																									27
28																									28
29																									29
30																									30
31																									31

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Daniel B. Mitchell
DIRECTOR, NATIONAL CLIMATIC CENTER

USCOMM--NOAA--ASHEVILLE 11/30/81 250

OCT 1981 TALKEETNA, ALASKA

NOV 1981

TALKEETNA, ALASKA

WEA SVC CONTRACT MET OBSY

TALKEETNA AIRPORT

Local Climatological Data

MONTHLY SUMMARY

LATITUDE 62 °18 'N LONGITUDE 150 °06 'W ELEVATION (GROUND) 345 FT. STANDARD TIME USED: ALASKAN WBAN #26528

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65° HEATING (SEASON BEGINS WITH JULY)	COOLING (SEASON BEGINS WITH JAN.)	WEATHER TYPES ON DATES OF OCCURRENCE (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 0BAM IN.	PRECIPITATION WATER EQUIVALENT IN	SNOW, ICE PELLETS IN.	AVG. STATION PRESSURE IN. - - - ELEV. 356 FEET M.S.L.	WIND RESULTANT DIR.	RESULTANT SPEED M.P.H.	AVERAGE SPEED M.P.H.	FASTEST MILE SPEED M.P.H.	FASTEST MILE DIRECTION	SUNSHINE MINUTES	SUNSHINE PERCENT OF POSSIBLE	SKY COVER TENTHS SUNRISE TO SUNSET	SKY COVER TENTHS MIDNIGHT TO MIDNIGHT	DATE
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	26	10	18	-6	13	47	0		0	0	0	29.37	02	4.7	5.0	15	02			9	7	1
2	26	17	22	-1	15	43	0		0	T	.4	29.23	12	4.6	8.2	20	16			10		2
3	22	9	16	-7		49	0		T	T	T					10	02			10		3
4	23	10	21	-1	16	44	0	1	T	.13	1.7	28.84	15	3.9	5.0	14	17			10		4
5	18	-3	8	-14	9	57	0	1	2	.04	1.2	29.21	15	3.0	4.3	9	12			10		5
6	16	-14*	1*	-20	-1	64	0	1	3	T	.3	29.59	36	4.4	4.8	12	01			9	7	6
7	31	16	24	3	18	41	0	1	4	.01	.2	29.35	35	11.0	11.5	18	36			10	10	7
8	32	19	26	5	20	39	0		4	0	0	29.04	36	4.7	5.0	13	33			8	7	8
9	44	26	35	15	23	30	0		3	0	0	28.93	36	11.2	11.5	18	36			9		9
10	50*	32	41*	21		24	0		2	0	0					12	36			8		10
11	48	31	40	21	28	25	0		1	0	0	28.33	01	3.8	6.0	12	04			8		11
12	41	29	35	16	28	30	0		1	0	0	28.83	02	7.5	8.3	14	02			6		12
13	34	13	24	6	16	41	0		1	0	0	29.00	36	4.9	5.5	9	34			4	3	13
14	28	10	19	1	8	46	0		1	0	0	29.11	35	4.2	4.9	8	33			0	1	14
15	29	10	20	3	10	45	0		1	0	0	29.32	02	5.4	6.5	10	36			0	0	15
16	24	4	14	-3	5	51	0		1	0	0	29.47	03	4.4	4.8	7	01			0		16
17	22	3	13	-4		52	0		T	0	0					21	01			0		17
18	24	8	16	0	4	49	0		T	0	0	29.54	02	10.6	11.1	18	03			1		18
19	16	-4	6	-10	-4	59	0		T	0	0	29.22	05	1.3	1.3	8	34			0		19
20	15	-6	5	-11	-7	60	0		T	0	0	29.26	01	6.5	7.6	14	01			0	0	20
21	22	6	14	-1	2	51	0		T	0	0	29.09	36	11.0	12.1	17	01			3	1	21
22	19	13	16	1	7	49	0	1	T	.05	.8	29.12	02	5.6	5.8	17	03			10	7	22
23	16	-3	7	-7	5	58	0		1	.01	.2	29.14	04	1.3	1.4	5	02			3		23
24	26	-1	13	-1		52	0	1	4	.41	8.3					14	01			10		24
25	26	8	17	3	18	48	0		8	T	T	29.39	17	1.7	5.3	14	01			3		25
26	29	21	25	12	23	40	0	1	7	.56	8.8	29.25	01	9.5	9.9	17	03			10		26
27	30	25	28	15	28	37	0	1	16	.07	.2	28.98	13	1.1	3.3	8	15			10	10	27
28	29	24	27	14	24	38	0	1	16	.01	.5	29.08	34	1.8	2.6	5	02			10	10	28
29	25	18	22	10	17	43	0	1	17	.05	.6	29.06	01	6.8	6.9	18	01			6	9	29
30	35	23	29	17	20	36	0		16	0	0	28.25	35	7.8	8.1	18	01			9		30

SUM	SUM				TOTAL	TOTAL		TOTAL	TOTAL	FOR THE MONTH:						TOTAL	%	SUM	SUM	
826	342				1348	0	NUMBER OF DAYS	1.34	23.2							21	01	FOR	182	
AVG.	AVG.	AVG.	DEP.	AVG.	DEP.	DEP.	PRECIPITATION	DEP.								DATE: 17		POSSIBLE	MONTH	AVG.	AVG.
27.5	12.1	19.8	2.3		-77	0	.01 INCH 10	-0.45												6.1	

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	
MAXIMUM TEMP.		MINIMUM TEMP.		TOTAL	TOTAL	> 1.0 INCH 4		PRECIPITATION		SNOW, ICE PELLETS		
>90 °F	<32 °F	<32 °F	<0 °F	DEP.	DEP.	THUNDERSTORMS 0		1.62	26-27	8.8	26	17 29
0	24	30	6	-100	-6	HEAVY FOG 0	CLEAR 10	PARTLY CLOUDY 4		CLOUDY 16		

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.
T TRACE AMOUNT
+ ALSO ON AN EARLIER DATE, OR DATES.
HEAVY FOG: - VISIBILITY 1/4 MILE OR LESS.
FIGURES FOR WIND DIRECTIONS ARE TENS OF DEGREES CLOCKWISE FROM TRUE NORTH. 00 = CALM. DATA IN COLS. 6 AND 12-15 ARE BASED ON 7 OR MORE OBSERVATIONS PER DAY AT 3-HOUR INTERVALS. FASTEST MILE WIND SPEEDS ARE FASTEST OBSERVED ONE-MINUTE VALUES WHEN DIRECTIONS ARE IN TENS OF DEGREES. THE / WITH THE DIRECTION INDICATES PEAK GUST SPEED.
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HOUR LOCAL TIME	AVERAGES SKY COVER TENTHS	STATION PRESSURE IN.	TEMPERATURE AIR °F	TEMPERATURE WET BULB °F	TEMPERATURE DEW PT. °F	RELATIVE HUMIDITY %	WIND SPEED M.P.H.	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED M.P.H.
02	6	29.13	19	18	13	78	5.8	01	4.6
05	6	29.11	18	17	12	78	5.9	01	4.8
08	6	29.10	18	17	12	80	6.7	03	4.1
11	6	29.11	22	21	16	77	7.8	01	4.6
14	6	29.11	25	23	16	72	7.0	02	5.1
17	7	29.10	22	20	14	72	6.9	01	5.2
20	6	29.10	20	19	13	76	6.6	01	5.4
23	6	29.10	20	19	14	77	5.9	36	4.8

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES) - NOT RECORDED.

DATE	A. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	P. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	DATE
1																									1
2																									2
3																									3
4																									4
5																									5
6																									6
7																									7
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USCOMM--NOAA--ASHEVILLE 12/31/81 250

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NOV 1981 TALKEETNA, ALASKA

DEC 1981
TALKEETNA, ALASKA
WEA SVC CONTRACT MET OBSV
TALKEETNA AIRPORT

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DEPARTMENT OF COMMERCE • UNITED STATES OF AMERICA •

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DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65° HEATING (SEASON BEGINS WITH JULY)	COOLING (SEASON BEGINS WITH JAN.)	WEATHER TYPES ON DATES OF OCCURRENCE (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 ON ICE ON GROUND AT 0BAM IN.	PRECIPITATION WATER EQUIVALENT IN	SNOW, ICE PELLETS IN.	AVG. STATION PRESSURE IN. - - - ELEV. 356 FEET M.S.L.	WIND RESULTANT DIR.	RESULTANT SPEED M.P.H.	AVERAGE SPEED M.P.H.	FASTEST MILE SPEED M.P.H.	FASTEST MILE DIRECTION	SUNSHINE MINUTES	SUNSHINE PERCENT OF POSSIBLE	SKY COVER TENTHS SUNRISE TO SUNSET	SKY COVER TENTHS MIDNIGHT TO MIDNIGHT	DATE
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	31	23	27	15		38	0		15	.12	3.3									10		1
2	23	10	17	6	12	48	0		18	T	T	28.82	12	1.4	7.9	13	15			2		2
3	23	14	19	8	14	46	0	1	17	.16	2.1	28.79	14	3.8	4.6	13	17			10		3
4	21	-10	6	-5	6	59	0		18	T	T	28.84	01	2.6	3.6	9	34			9	7	4
5	12	-10	1	-10	2	64	0	1	18	T	T	28.71	36	2.4	2.6	6	34			10	10	5
6	12	-13	-1	-11	-3	66	0		18	0	0	29.24	06	2.4	2.6	7	02			10	5	6
7	-9	-20	-15	-25	-21	80	0		17	0	0	29.75	04	4.5	4.8	7	04			4		7
8	11	-22	-6	-16		71	0		17	0	0					9	35			6		8
9	17	0	9	-1	6	56	0		16	T	T	29.66	35	5.0	5.3	8	01			10		9
10	7	-4	2	-8	-4	63	0		16	0	0	29.40	05	1.5	1.7	5	05			10		10
11	22	0	11	2	10	54	0	1	15	.08	1.6	29.48	01	9.7	9.9	15	02			10	10	11
12	33	22	28	19	21	37	0		16	0	0	29.43	01	9.7	9.9	16	01			10	10	12
13	33	3	18	9	16	47	0		16	0	0	29.30	01	7.7	8.2	14	01			8	6	13
14	23	-1	11	2	4	54	0		15	T	T	29.14	03	3.4	4.9	13	01			9		14
15	29	21	25	16		40	0		15	0	0					16	36			9		15
16	39	27	33	25	23	32	0		14	0	0	28.83	01	11.0	11.4	18	02			10		16
17	43*	29	36*	28	26	29	0		13	0	0	28.57	01	8.9	9.8	17	35			9		17
18	40	23	32	24	29	33	0		12	.02	0	28.53	03	2.8	3.6	9	35			10	8	18
19	23	5	14	6	7	51	0		10	0	0	28.79	07	1.4	1.4	7	03			4	3	19
20	16	5	11	3	7	54	0		10	T	T	29.15	03	1.5	2.2	6	05			9	8	20
21	20	15	18	10	15	47	0		10	.01	.2	29.54	01	1.5	1.6	8	35			10		21
22	25	13	19	11		46	0		10	0	0					17	02			7		22
23	32	25	29	21	19	36	0		10	.02	.2	29.13	01	10.6	10.8	16	03			10		23
24	28	22	25	17	23	40	0	1	9	.02	.6	29.16	02	.4	.4	6	16			10		24
25	26	21	24	16	22	41	0	1 6	10	.06	.5	29.44	23	.8	1.2	6	28			10	10	25
26	23	-2	11	3	3	54	0		10	.02	.1	29.71	36	7.0	8.6	17	02			0	2	26
27	12	-12	0	-8	-19	65	0		10	0	0	29.97	35	6.5	7.1	12	34			0	0	27
28	-12	-26	-19	-27	-25	84	0		10	0	0	29.87	05	3.4	3.7	6	07			2		28
29	-19	-27	-23*	-31		89	0		10	0	0					6	06			0		29
30	5	-30*	-13	-21	-29	78	0		10	.01	.2	29.73	01	4.2	5.2	7	33			9		30
31	6	-22	-8	-16	-13	73	0		9	T	.1	29.66	01	3.2	3.6	8	35			7		31
	SUM	SUM				TOTAL	TOTAL			TOTAL	TOTAL		FOR THE MONTH:					TOTAL	%	SUM	SUM	
	595	79				1674	0	NUMBER OF DAYS		.52	8.9					18	02		FOR	234		
	AVG.	AVG.	AVG.	DEP.	AVG.	DEP.	DEP.	PRECIPITATION		DEP.						DATE:	16	POSSIBLE	MONTH	AVG.	AVG.	
	19.2	2.5	10.9	1.9		-62	0	.01 INCH	10	-1.19										7.5		

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
MAXIMUM TEMP		MINIMUM TEMP		TOTAL	TOTAL			PRECIPITATION	SNOW, ICE PELLETS		
≥ 70 ° F	≤ 32 ° F	≤ 32 ° F	≤ 0 ° F	5128	0	≥ 1.0 INCH	3				
0	26	31	15	-162	-6	THUNDERSTORMS	0	.16	3	1	18 6*
				DEP.	DEP.	HEAVY FOG	0	3	1		
						CLEAR 5	PARTLY CLOUDY 5	CLOUDY 21			

* EXTREME FOR THE MONTH - LAST OCCURRENCE IF MORE THAN ONE.
T TRACE AMOUNT
- ALSO ON AN EARLIER DATE, OR DATES.
HEAVY FOG: - VISIBILITY 1/4 MILE OR LESS.
FIGURES FOR WIND DIRECTIONS ARE TENS OF DEGREES CLOCKWISE FROM TRUE NORTH. 00 = CALM.
DATA IN COLS. 6 AND 12-15 ARE BASED ON 7 OR MORE OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.
FASTEST MILE WIND SPEEDS ARE FASTEST OBSERVED ONE-MINUTE VALUES WHEN DIRECTIONS ARE IN TENS OF DEGREES. THE / WITH THE DIRECTION INDICATES PEAK GUST SPEED.
ANY ERRORS DETECTED WILL BE CORRECTED AND CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL SUMMARY

HOURS OF OPERATION REDUCED ON A VARIABLE SCHEDULE.

SUMMARY BY HOURS

HOUR LOCAL TIME	AVERAGES SKY COVER TENTHS	STATION PRESSURE IN.	TEMPERATURE °F AIR	WET BULB	DEW PT.	RELATIVE HUMIDITY %	WIND SPEED M.P.H.	RESULTANT WIND DIRECTION	RESULTANT WIND SPEED M.P.H.
02	7	29.22	12	12	7	79	5.7	03	4.3
05	7	29.24	12	11	7	79	5.6	02	4.0
08	7	29.26	11	10	4	75	6.1	01	4.8
11	7	29.28	12	11	5	74	5.0	01	4.2
14	8	29.27	14	13	7	75	4.6	01	4.4
17	7	29.27	13	11	5	74	4.8	01	4.2
20	7	29.27	11	10	4	74	6.5	02	4.1
23	6	29.28	10	9	4	75	6.0	36	3.9

HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES) - NOT RECORDED.

DATE	A. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	P. M. HOUR ENDING AT 1	2	3	4	5	6	7	8	9	10	11	12	DATE
1																									1
2																									2
3																									3
4																									4
5																									5
6																									6
7																									7
8																									8
9																									9
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27																									27
28																									28
29																									29
30																									30
31																									31

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noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / ENVIRONMENTAL DATA AND INFORMATION SERVICE

Daniel B. Mitchell
DIRECTOR, NATIONAL CLIMATIC CENTER

USCOMM--NOAA--ASHEVILLE 250

DEC 1981 TALKEETNA, ALASKA

JAN 1982 26528
TALKEETNA, ALASKA
TALKEETNA AIRPORT

ISSN 0190-0420

LOCAL CLIMATOLOGICAL DATA

Monthly Summary

MEA SVC CONTRACT MET OBSV

LATITUDE 62° 18' N LONGITUDE 150° 06' W ELEVATION (GROUND) 345 TIME ZONE ALASKAN WBAN #26528

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65°F HEATING (SEASON BEGINS WITH JULY)	COOLING (SEASON BEGINS WITH JAN)	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 08AM INCHES	PRECIPITATION WATER EQUIVALENT (INCHES)	SNOW, ICE PELLETS (INCHES)	AVERAGE STATION PRESSURE IN INCHES ELEV. 356 FEET ABOVE M.S.L.	WIND (M.P.H.) RESULTANT DIR.	RESULTANT SPEED	AVERAGE SPEED	FASTEST MILE SPEED	FASTEST MILE DIRECTION	SUNSHINE MINUTES	PERCENT OF TOTAL POSSIBLE	SKY COVER (TENTHS) SUNRISE TO SUNSET	MIDNIGHT TO MIDNIGHT	DATE
1	-3	-25	-14	-22	-19	79	0	1	9	0	0	29.59	06	1.3	1.3	6	04			9	4	1
2	-12	-24	-18	-26	-26	83	0		9	0	0	29.65	02	2.4	2.7	7	03			1	0	2
3	-7	-25	-16	-24	-24	81	0		9	0	0	29.65	05	3.4	3.7	6	05			6	3	3
4	7	-16	-5	-13	- 8	70	0		9	0	0	29.59	02	1.2	2.9	8	20			7		4
5	-11	-27	-19#	-27		84	0		9	0	0					8	20			0		5
6	1	-30#	-15	-23	-25	80	0		9	0	0	29.89	36	7.6	8.2	22	03			0		6
7	10	-10	0	-8	-18	65	0		9	0	0	29.85	04	9.7	10.5	16	05			0		7
8	16	2	9	1	-11	56	0		9	0	0	29.57	36	12.6	13.2	21	36			0	0	8
9	16	-12	2	-6	-10	63	0		9	0	0	29.51	36	5.7	6.6	16	36			9	7	9
10	24	14	19	11	5	46	0		9	0	0	29.60	35	9.2	9.5	17	02			9	9	10
11	25	15	20	12	11	45	0		9	0	0	29.57	01	11.9	12.1	17	01			10		11
12	28#	12	20	12		45	0		9	T	T					12	35			9		12
13	14	-8	3	-6	- 2	62	0		9	0	0	29.34	02	4.6	5.0	9	36			0		13
14	13	-8	3	-6	- 7	62	0		9	0	0	29.69	01	9.7	10.1	15	01			9		14
15	15	8	12	3	- 3	53	0		9	0	0	29.48	01	11.2	13.0	17	36			9		15
16	8	-18	-5	-14	-10	70	0		9	0	0	29.18	01	3.4	4.4	9	34			0		16
17	-3	-19	-11	-20	-20	76	0		9	0	0	29.60	04	1.4	1.4	5	33			1	1	17
18	5	-16	-6	-15	-11	71	0		9	0	0	29.80	03	2.1	2.5	7	03			3		18
19	4	-18	-7	-17		72	0		9	0	0					7	32			0		19
20	16	-11	3	-7	- 7	62	0		9	0	0	29.84	01	5.8	6.3	15	01			10		20
21	18	11	15	5	0	50	0		9	T	T	29.56	36	11.0	11.5	17	01			10		21
22	11	-13	-1	-11	-10	66	0		9	0	0	29.50	36	9.4	9.8	16	01			0	2	22
23	-3	-22	-13	-23	-22	78	0		9	0	0	29.07	03	1.9	2.5	5	09			0	0	23
24	8	-25	-9	-20	-22	74	0		9	0	0	29.30	36	5.8	6.0	15	02			0	0	24
25	4	-23	-10	-21	-24	75	0		9	0	0	29.33	01	3.7	4.8	8	03			0		25
26	4	-25	-11	-22		76	0		9	0	0					7	32			0		26
27	13	-16	-2	-13	- 7	67	0	9	9	.03	.4	29.21	01	13.1	13.4	17	03			10		27
28	25	13	19	8	10	46	0	9	9	T	T	29.03	02	13.9	14.1	18	03			10		28
29	27	20	24	12	14	41	0		9	0	0	29.25	36	9.3	9.6	15	01			10	7	29
30	27	20	24	12	12	41	0		9	0	0	29.44	36	7.9	8.1	14	01			9	9	30
31	27	22	25#	13	12	40	0		9	0	0	29.49	01	13.4	13.7	17	01			8	8	31
SUM	327	-254				1979	0			.03	.4					22	03			SUM 149		SUM
AVG.	10.5	-8.2	1.2	-8.2		255	0			-1.60						DATE: 06				AVG. 4.8		AVG.

TOTAL | % FOR MONTH | POSSIBLE

FOR THE MONTH:

| NUMBER OF DAYS | | | | | |

FEB 1982 26528
TALKEETNA, ALASKA
TALKEETNA AIRPORT

ISSN 0198-042

LOCAL CLIMATOLOGICAL DATA

Monthly Summary

MEA SVC CONTRACT MET OBSV

LATITUDE 62° 18' N LONGITUDE 150° 06' W ELEVATION (GROUND) 345FEET TIME ZONE ALASKAN WBAN #26528

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65°F HEATING (SEASON BEGINS WITH JULY)	COOLING (SEASON BEGINS WITH JAN)	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 0800 INCHES	PRECIPITATION WATER EQUIVALENT (INCHES)	SNOW, ICE PELLETS (INCHES)	AVERAGE STATION PRESSURE IN INCHES ELEV. 356 FEET ABOVE M.S.L.	WIND (M.P.H.) RESULTANT DIR.	RESULTANT SPEED	AVERAGE SPEED	FASTEST MILE SPEED	FASTEST MILE DIRECTION	SUNSHINE MINUTES	PERCENT OF TOTAL POSSIBLE	SKY COVER (TENTHS) SUNRISE TO SUNSET	MIDNIGHT TO MIDNIGHT	DATE
1	31	25	28	15	20	37	0	1	9	.17	1.4	29.66	01	11.2	11.4	16	36			10		1
2	40	30	35	22		30	0		10	.05	0					17	36			10		2
3	43*	36	40*	27	34	25	0		10	.19	0	29.89	02	9.1	9.5	14	02			10		3
4	41	27	34	21	35	31	0	1	8	.35	0	29.97	36	2.3	2.6	9	03			9		4
5	31	21	26	12	25	39	0	1	6	0	0	30.16	08	.2	1.9	5	02			9	6	5
6	35	16	26	12	21	39	0		6	0	0	30.36	19	.4	.5	5	01			2		6
7	35	18	27	13	22	38	0	1	6	0	0	30.36	04	.6	2.0	5	04			5		7
8	28	15	22	8	22	43	0	2	6	.03	.4	30.06	12	.3	1.7	7	20			10		8
9	32	7	20	5		45	0	1	6	T	T					9	34			1		9
10	26	-1	13	-2	3	52	0		6	0	0	29.78	03	8.5	9.6	21	02			0		10
11	23	16	20	5	2	45	0		6	0	0	29.80	01	12.8	14.2	23	01			0		11
12	21	-3	9	-6	0	56	0		6	0	0	29.77	02	5.6	9.1	25	01			3	2	12
13	15	-9	3	-12	- 8	62	0		6	0	0	29.40	01	1.3	1.7	6	02			1	2	13
14	7	-13	-3	-18	-14	68	0		6	T	T	28.89	35	5.7	7.1	17	01			8	4	14
15	2	-7	-3	-19	-22	68	0		6	0	0	28.55	35	10.1	10.4	17	02			9		15
16	1	-11	-5	-21		70	0		6	T	T					6	17			9		16
17	3	-18	-8	-24	-16	73	0		6	0	0	28.95	01	1.3	2.0	7	34			9		17
18	5	-22	-9*	-25	-19	74	0		6	0	0	28.81	16	.2	1.0	5	31			4		18
19	12	-23*	-6	-22	-17	71	0		6	0	0	28.98	34	2.8	4.0	17	03			2	3	19
20	13	1	7	-9	-11	58	0		6	0	0	29.37	01	13.5	14.1	21	03			3	3	20
21	11	-1	5	-11	-20	60	0		6	0	0	29.87	34	10.9	11.2	17	02			0	0	21
22	13	-1	6	-10	-13	59	0		6	0	0	30.11	02	12.5	13.2	17	01			0		22
23	20	4	12	-5		53	0		5	0	0					15	01			0		23
24	23	5	14	-3	- 7	51	0		5	0	0	30.18	01	10.2	11.4	22	03			0		24
25	26	12	19	2	- 6	46	0		5	0	0	29.94	36	12.6	13.7	25	01			0		25
26	30	16	23	6	1	42	0		5	0	0	29.74	36	8.7	9.4	18	35			1	1	26
27	31	13	22	5	5	43	0		5	0	0	29.59	01	8.5	8.9	20	03			6	5	27
28	28	2	15	-2	- 2	50	0		5	0	0	29.71	02	8.0	8.2	16	02			0	0	28

SUM	SUM				TOTAL	TOTAL	NUMBER OF DAYS		TOTAL	TOTAL	FOR THE MONTH:						TOTAL	%	SUM	SUM	
526	155				1428	0			.79	1.8					25	01		FOR	121		
AVG.	AVG.	AVG.	DEP.	AVG.	DEP.	DEP.	PRECIPITATION		DEP.						DATE:	25+	POSSIBLE	MONTH	AVG.	AVG.	
22.4	5.9	14.0	-1.8		36	0	> .01 INCH.	5	-1.00										4.3		

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	
MAXIMUM TEMP.		MINIMUM TEMP.		TOTAL	TOTAL	> 1.0 INCH	1	PRECIPITATION	SNOW, ICE PELLETS			
≥ 90°	≤ 32°	≤ 32°	≤ 0°	DEP.	DEP.	THUNDERSTORMS	0					
0	23	27	11	8535	0	HEAVY FOG	1	.53	3- 4	1.4	1	10 3+
				129	0	CLEAR 15	PARTLY CLOUDY 3		CLOUDY 10			

* 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 DATA.
HOURS OF OPS. MAY BE REDUCED ON A VARIABLE SCHEDULE.

DATA IN COLS 6 AND 12-15 ARE BASED ON 7 OR MORE OBSERVATIONS AT 3-HOUR 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 CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN THE ANNUAL PUBLICATION.

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Daniel B. Mitchell
DIRECTOR
NATIONAL CLIMATIC CENTER

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / ENVIRONMENTAL DATA AND INFORMATION SERVICE / NATIONAL CLIMATIC CENTER ASHEVILLE, NORTH CAROLINA

FEB 1982
TALKEETNA, ALASKA

MAR 1982 26528
TALKEETNA, ALASKA
TALKEETNA AIRPORT

ISSN 0198-042

LOCAL CLIMATOLOGICAL DATA

Monthly Summary

MEA SVC CONTRACT MET OBSY

LATITUDE 62° 18' N LONGITUDE 150° 06' W ELEVATION (GROUND) 345FEET TIME ZONE ALASKAN WBAN #26528

MAR 1982
TALKEETNA, ALASKA

DATE	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	DEGREE DAYS BASE 65°F HEATING (SEASON BEGINS WITH JULY)	COOLING (SEASON BEGINS WITH JAN)	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 08AM INCHES	PRECIPITATION WATER EQUIVALENT (INCHES)	PRECIPITATION SNOW, ICE PELLETS (INCHES)	AVERAGE STATION PRESSURE IN INCHES ELEV. 356 FEET ABOVE M.S.L.	WIND (M.P.H.) RESULTANT DIR.	RESULTANT SPEED	AVERAGE SPEED	FASTEST MILE SPEED	FASTEST MILE DIRECTION	SUNSHINE MINUTES	PERCENT OF TOTAL POSSIBLE	SKY COVER (TENTHS) SUNRISE TO SUNSET	SKY COVER (TENTHS) MIDNIGHT TO MIDNIGHT	DATE
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	36	8	22	5	10	43	0		5	0	0	29.37	01	10.5	11.4	27	01			0		1
2	29	3	16	-1		49	0		4	0	0					14	01			0		2
3	26	-6	10	-7	- 2	55	0		4	0	0	29.77	35	3.3	4.8	9	27			0		3
4	22	-6	8*	-9	0	57	0		4	0	0	29.88	34	3.9	5.0	10	32			10		4
5	31	18	25	8	15	40	0		4	T	T	29.81	35	4.0	4.9	12	34			10	10	5
6	30	26	28	11	22	37	0	1	4	.11	1.7	29.62	34	5.2	5.3	7	36			10	10	6
7	32	25	29	11	27	36	0	1 6	7	.05	1.7	29.59	04	1.4	4.2	9	19			10	10	7
8	33	16	25	7	25	40	0	1	7	.10	1.5	29.42	17	.8	2.0	9	17			10		8
9	28	16	22	4		43	0	1	9	.17	4.7					15	01			10		9
10	29	7	18	0	19	47	0		12	0	0	29.16	25	2.6	4.9	13	18			6		10
11	32	-6	13	-5	6	52	0		11	0	0	28.92	02	5.0	5.3	13	03			6		11
12	30	1	16	-2	6	49	0		11	0	0	29.10	02	5.7	7.3	18	03			8	6	12
13	27	-9*	9	-10	- 1	56	0		11	0	0	29.35	34	4.9	5.9	9	23			0	0	13
14	21	3	12	-7	6	53	0	1	11	.01	.3	29.24	35	7.4	7.6	13	01			10	9	14
15	31	20	26	7	17	39	0	1	11	T	T	29.48	31	3.7	3.9	7	32			9		15
16	30	20	25	6		40	0	1 6	11	.23	3.0					10	02			10		16
17	35	26	31	11	30	34	0	1	15	.41	6.6	29.40	02	5.7	6.0	12	03			10		17
18	39	32	36*	16	32	29	0		18	.01	T	29.28	02	4.5	5.3	8	03			10		18
19	35	31	33	13	33	32	0	1	17	.21	3.3	29.41	03	4.5	4.6	8	01			10	10	19
20	37	32	35	14	33	30	0	1	18	.15	.7	29.56	19	1.9	3.9	14	19			10	10	20
21	37	32	35	14	33	30	0	1	16	.06	.4	29.50	16	6.8	9.6	17	15			10	10	21
22	39	31	35	14	31	30	0	1	15	.10	T	29.68	16	6.2	7.5	13	15					22
23	35	27	31	9		34	0	1	12	.09	.8					10	17					23
24	42*	24	33	11	23	32	0		12	0	0	29.21	01	12.0	12.4	20	04					24
25	33	23	28	5	21	37	0		11	0	0	29.21	01	13.4	13.5	17	04					25
26	31	14	23	0		42	0		10	0	0					18	02					26
27	31	8	20	-3		45	0		10	0	0					13	36					27
28	35	8	22	-2		43	0		10	0	0					7	24					28
29	34	6	20	-4	11	45	0		10	0	0	29.21	32	3.7	5.8	10	28					29
30	30	9	20	-5		45	0		9	0	0					15	01					30
31	27	5	16	-9	2	49	0		9	0	0	29.43	35	8.8	9.6	15	01					31
SUM	987	SUM	444			TOTAL 1293	TOTAL 0			TOTAL 1.70	TOTAL 24.7	FOR THE MONTH:				27	01	TOTAL	% FOR MONTH	SUM	SUM	
AVG.	31.8	AVG.	14.3	DEP.	3.1	AVG.	DEP. -102	DEP. 0	PRECIPITATION > .01 INCH 13			DEP. 0.16				DATE: 01		POSSIBLE		AVG.	AVG.	

NUMBER OF DAYS				SEASON TO DATE	
MAXIMUM TEMP.		MINIMUM TEMP.		TOTAL	TOTAL
≥ 90°	≤ 32°	≤ 32°	≤ 0°	9828	0
0	18	31	4	DEP. 27	DEP. 0

SNOW, ICE PELLETS	
> 1.0 INCH	7
THUNDERSTORMS	0
HEAVY FOG	0
CLEAR	PARTLY CLOUDY CLOUDY

GREATEST IN 24 HOURS AND DATES			
PRECIPITATION		SNOW, ICE PELLETS	
.56	16-17	8.6	16-17

GREATEST DEPTH ON GROUND OF SNOW, ICE PELLETS OR ICE AND DATE	
20	17

* 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 DATA.
HOURS OF OPS. MAY BE REDUCED ON A VARIABLE SCHEDULE.

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Daniel B. Mitchell
DIRECTOR
NATIONAL CLIMATIC CENTER

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / ENVIRONMENTAL DATA AND INFORMATION SERVICE / NATIONAL CLIMATIC CENTER ASHEVILLE, NORTH CAROLINA

APRIL 1982 26528
TALKEETNA, ALASKA
TALKEETNA AIRPORT

ISSN 0198-042

LOCAL CLIMATOLOGICAL DATA

Monthly Summary

WEA SVC CONTRACT MET OBSY

LATITUDE 62° 18' N LONGITUDE 150° 06' W ELEVATION (GROUND) 345FEET TIME ZONE ALASKAN WBAN #26528

DATE	TEMPERATURE °F					DEGREE DAYS BASE 65°F		WEATHER TYPES	SNOW ICE PELLETS OR ICE ON GROUND AT 0800	PRECIPITATION		AVERAGE STATION PRESSURE	WIND (M.P.H.)					SUNSHINE		SKY COVER (TENTHS)		DATE
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	AVERAGE DEW POINT	HEATING ISEASON BEGINS WITH JULY	COOLING ISEASON BEGINS WITH JAN	1 FOG 2 HEAVY FOG 3 THUNDERSTORM 4 ICE PELLETS 5 HAIL 6 GLAZE 7 DUSTSTORM 8 SMOKE, HAZE 9 BLOWING SNOW	INCHES	WATER EQUIVALENT (INCHES)	SNOW, ICE PELLETS (INCHES)	IN INCHES ELEV. 356 FEET ABOVE M.S.L.	RESULTANT DIR.	RESULTANT SPEED	AVERAGE SPEED	FASTEST MILE SPEED	FASTEST MILE DIRECTION	MINUTES	PERCENT OF TOTAL POSSIBLE	SUNRISE TO SUNSET	MIDNIGHT TO MIDNIGHT	
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	25	10	18	-8	- 1	47	0		9	0	0	29.65	36	12.2	13.7	23	03					1
2	24	8	16*	-10	3	49	0		8	0	0	29.81	36	8.7	11.0	23	36					2
3	34	2*	18	-9		47	0		8	0	0					13	02					3
4	39	10	25	-2		40	0		8	0	0					10	28					4
5	41	12	27	-1	18	38	0		7	0	0	29.93	33	1.3	2.9	8	27					5
6	42	7	25	-3		40	0		6	0	0					8	29					6
7	46	27	37	8	29	28	0		6	.02	T	29.91	16	4.8	7.5	17	18					7
8	36	26	31	2	28	34	0	1	6	.10	.9	29.74	16	3.2	4.2	14	16					8
9	41	23	32	2		33	0		7	T	T					12	02					9
10	37	22	30	0		35	0		6	0	0					9	02					10
11	40	19	30	-1		35	0		5	0	0					14	35					11
12	39	27	33	2	22	32	0		5	0	0	28.88	36	11.7	11.9	18	36					12
13	38	20	29	-3		36	0		5	0	0					17	29					13
14	33	17	25	-7	19	40	0		5	.02	.3	29.01	29	3.8	5.0	13	28					14
15	42	26	34	1	24	31	0		5	T	.1	28.93	35	3.9	5.9	13	03					15
16	48	22	35	2		30	0		5	0	0					10	29					16
17	40	27	34	1		31	0	1	4	T	T					8	21					17
18	35	23	29	-5		36	0	1	4	.15	4.8					12	19					18
19	41	21	31	-3	21	34	0		8	T	T	29.15	35	8.6	9.2	17	36					19
20	50	31	41	6		24	0		7	0	0					12	04					20
21	49	30	40	5	27	25	0		3	0	0	29.69	19	3.9	4.8	9	17					21
22	45	28	37	1	26	28	0		2	0	0	29.78	19	6.6	7.2	14	19					22
23	42	28	35	-1		30	0	1	2	.03	.5					12	18					23
24	42	32	37	1		28	0		3	.04	1.0					12	35					24
25	51	29	40	3		25	0		2	0	0					13	18					25
26	48	26	37	0		28	0		T	0	0					12	36					26
27	52*	38	45*	7		20	0		T	.02	0					14	14					27
28	50	33	42	4	33	23	0		T	.01	0	28.95	04	2.8	4.8	14	20					28
29	50	27	39	1	29	26	0		T	0	0	29.18	22	1.4	4.1	13	17					29
30	49	22	36	-3		29	0		0	0	0					12	26					30
SUM	SUM					TOTAL	TOTAL	NUMBER OF DAYS		TOTAL	TOTAL	FOR THE MONTH:						TOTAL	% FOR MONTH	SUM	SUM	
1249	673					982	0			.39	7.6					23	36					
AVG.	AVG.	AVG	DEP	AVG.		DEP.	DEP.	PRECIPITATION		DEP.						DATE:	02+	POSSIBLE		AVG.	AVG.	
41 6	22 4	32.0	-0.6			10	0	> .01 INCH.	8	-0.73												

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	
MAXIMUM TEMP		MINIMUM TEMP		TOTAL	TOTAL	> 1.0 INCH	2	PRECIPITATION		SNOW, ICE PELLETS			
≥ 90°	≤ 32°	≤ 32°	≤ 0°	DEP.	DEP.	THUNDERSTORMS	0						
0	2	28	0	37	0	HEAVY FOG	0	15	18	4.8	18	9	1
						CLEAR	PARTLY CLOUDY		CLOUDY				

* 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.
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APRIL 1982
TALKEETNA, ALASKA

NS FORM F-6 (1-79)

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

PRELIMINARY LOCAL CLIMATOLOGICAL DATA

STATION: WSCMO, TALKEETNA, ALASKA

MONTH: MAY

YEAR: 1982

LATITUDE: 62 ° 18 ' N

LONGITUDE: 150 ° 06 ' W

GROUND ELEVATION (ft): #345 FT.

STANDARD TIME: ALASKAN

DAY	TEMPERATURE °F MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS (Base 65°) HEATING	COOLING	PRECIPITATION (In.) TOTAL (Water equivalent)	SNOWFALL, ICE PELLETS	SNOW, ICE PELLETS OR ICE ON GROUND AT 0200A	WIND * AVERAGE SPEED (m.p.h.)	FASTEST MILE # SPEED (m.p.h.)	DIRECTION	SUNSHINE * TOTAL (Min.)	PERCENT OF POSSIBLE	SKY COVER 0200 GMT (Tenths)	WEATHER OCCURRENCES	0200 ●	0700 ●	1400 ●	2000 ●
1	49	22	36	-29	0		0	0	0	1.5	12	15	17		M					0
2	47	23	36	-29	0		0	0	0	3.7	9	24	17		M		1			0
3	47	29	38	-27	0		T	T	0	(4.5)	14	18	23		M		1			
4	47	27	37	-28	0		T	T	0+	5.7	13	03	19		M		0	8		
5	53	24	38	-27	0		0	0	0	7.0	17	33	23		M					
6	60	28	44	-21	0		.04	0	0	5.1	12	19	23		M					
7	51	39	45	-20	0		.01	0	0	3.1	7	12	17		M					0
8	50	39	45	-20	0		.06	0	0	4.0	8	25	17		M		1			0
9	47	38	43	-22	0		.20	0	0	(3.3)	7	32	17		M		1			0
10	50	37	44	-21	0		.47	0	0	5.0	9	12	22		M		1			
11	49	37	43	-23	0		.41	0	0+	(5.3)	9	01	19		M	1	0	8		
12	48	31	40	-25	0		.05	0	0	4.8	12	27	23		M					
13	51	30	41	-24	0		T	0	0	3.6	7	13	23		M					
14	52	28	40	-25	0		0	0	0	4.3	8	15			7					
15	55	31	43	-22	0		0	0	0	5.6	12	17			6					
16	59	29	44	-21	0		0	0	0	6.4	17	05	23		M					0
17	48	35	42	-23	0		0	0	0	(5.3)	14	21	23		M		1			
18	53	35	44	-21	0		.20	0	0+	5.9	14	17	19		M		0	8		
19	54	31	43	-22	0		T	0	0	5.0	14	10	23		M					
20	54	31	43	-22	0		T	0	0	5.5	12	17	22		M					
21	56	32	44	-21	0		0	0	0	5.6	15	27			7					
22	60	28	44	-21	0		0	0	0	5.3	16	18			4					
23	63	31	47	-18	0		0	0	0	8.4	17	03			7					
24	59	37	48	-17	0		.02	0	0	5.9	17	18	23		M					
25	55	42	49	-16	0		T	0	0+	6.8	13	20	19		M		0	8		
26	53	40	47	-18	0		.01	0	0	(3.1)	8	31	23		M					
27	55	41	48	-17	0		.06	0	0	4.9	15	18	23		M					
28	52	41	47	-18	0		.14	0	0	5.3	8	15			10	1				
29	51	42	47	-18	0		.04	0	0	5.3	9	16			10					
30	54	38	46	-19	0		T	0	0	3.1	7	34			7	1				
31	71	37	54	-11	0		0	0	0	(5.2)	13	21	23		M					
SUM	1669	1037	—	—	659	0	1.31	T	—	156.5	—	—	—	—						
AVG	53.8	33.1	—	—	—	—	—	—	—	5.0	FASTEST	DIRECTION	POSSIBLE	%	M					
MISC.										—	17	18								

TEMPERATURE DATA

AVERAGE MONTHLY: 43.5

DEPARTURE FROM NORMAL: -1.2

HIGHEST: 71 ON: 31

LOWEST: 32 ON: 1

NUMBER OF DAYS WITH –

MAX. 32° OR BELOW: 0

MAX. 70 OR ABOVE: 1

MIN. 32° OR BELOW: 16

MIN. 0° OR BELOW: 0

HEATING DEGREE DAYS (Base 65°)

TOTAL THIS MONTH: 659

DEPARTURE FROM NORMAL: +70

SEASONAL TOTAL: 11469

DEPARTURE FROM NORMAL: +67

COOLING DEGREE DAYS (Base 65°)

TOTAL THIS MONTH: 0

DEPARTURE FROM NORMAL: 0

SEASONAL TOTAL: 0

DEPARTURE FROM NORMAL: 0

PRECIPITATION DATA

TOTAL FOR THE MONTH: 1.31 IN.

DEPARTURE FROM NORMAL: -.15 IN.

GREATEST IN 24 HRS.: .30 ON 10-11

SNOWFALL, ICE PELLETS

TOTAL FOR THE MONTH: T IN.

GREATEST IN 24 HRS.: T ON 4

GREATEST DEPTH ON GROUND: T ON 4

PRESSURE DATA

HIGHEST SEA-LEVEL: 30.45 IN. ON 29

LOWEST SEA-LEVEL: 29.41 IN. ON 23

WEATHER

NUMBER OF DAYS –

CLEAR (Scale 0–3): M

PARTLY CLOUDY (Scale 4–7): M

CLOUDY (Scale 8–10): M

WITH 0.01 INCH OR MORE PRECIP.: 13

WITH 0.10 INCH OR MORE PRECIP.: 2

WITH 0.50 INCH OR MORE PRECIP.: 0

WITH 1.00 INCH OR MORE PRECIP.: 0

SYMBOLS USED IN COLUMN 16

1 = FOG
2 = FOG REDUCING VISIBILITY TO ¼ MILE OR LESS
3 = THUNDER
4 = ICE PELLETS
5 = HAIL
6 = GLAZE OR RIME
7 = SAND REDUCING VSBY TO ¼ MILE OR LESS
8 = SMOKE OR HAZE
9 = BLOWING SNOW
X = TORNADO

MAXIMUM PRECIPITATION

Δt (Minutes)	5	10	15	20	30	45	60	80	100	120	150	180
PRECIPITATION (Inches)												
ENDED: DATE												
TIME												

* Average wind speed is based on 24 hours unless otherwise indicated.
# Fastest one minute wind speed and its direction.
● Synoptic data is based on 6 hours unless otherwise indicated.
+ Snow data is obtained at CO2OA where indicated.
1/ Indicated only the last of several occurrences.

NS FORM F-6 SUPERSEDES NS FORM F-6 (5-76) WHICH SHOULD BE USED UNTIL EXISTING STOCK IS DEPLETED.

☆ U.S. G.P.O. 1980-665-115/1020 REG. #6

R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR WATANA WEATHER STATION
DATA TAKEN DURING October, 1981

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	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	1
2	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	2
3	-.9	-11.0	-6.0	047	2.3	2.4	066	6.3	NE					
260.417 DD														
											-28.9	0.0	2003	3
4	.1	-3.8	-1.9	044	5.3	5.5	034	9.5	NE	23	-21.6	0.0	1518	4
5	2.4	-2.5	-.1	047	2.6	2.8	036	8.3	NE	23	-19.6	0.0	1883	5
6	.3	-4.2	-2.0	058	2.7	2.9	076	8.3	NE	24	-20.4	.6	1468	6
7	-1.5	-7.7	-4.6	043	3.9	4.1	017	8.9	NNE	19	-24.1	0.0	2438	7
8	-.5	-3.0	-1.8	053	3.8	3.9	064	7.6	NE	22	-21.2	0.0	1605	8
9	2.6	-3.3	-.4	069	2.5	2.7	084	7.0	ENE	29	-17.0	.2	2080	9
10	1.8	-4.8	-1.5	036	1.7	1.9	064	7.6	NE	31	-18.3	0.0	2089	10
11	-.1	-2.8	-1.5	060	5.1	5.2	063	11.4	ENE	43	-12.5	.6	948	11
12	2.3	-.1	1.1	045	4.4	4.5	060	7.6	NE	41	-10.8	4.4	1320	12
13	3.7	.4	2.1	036	1.2	1.5	054	7.6	NE	48	-8.1	4.0	1405	13
14	4.5	-.2	2.2	018	.3	.9	258	3.2	E	47	-9.2	0.0	1330	14
15	3.4	-2.3	.6	029	1.1	1.5	085	3.2	E	32	-15.5	0.0	1598	15
16	2.5	-2.9	-.2	036	2.6	2.7	044	6.3	NE	33	-14.9	0.0	1325	16
17	3.4	-1.9	.8	019	1.0	2.5	345	8.3	WSW	26	-18.0	0.0	1373	17
18	.3	-7.3	-3.5	273	.3	.9	056	3.2	WSW	35	-16.3	1.0	795	18
19	-2.8	-12.3	-7.6	038	2.5	2.7	042	6.3	NE	21	-26.3	0.0	1328	19
20	-.8	-4.8	-2.8	054	5.2	5.3	066	10.8	ENE	26	-19.5	0.0	985	20
21	4.3	-1.0	1.7	060	4.7	5.3	067	12.7	ENE	30	-14.6	6.6	843	21
22	2.6	.1	1.4	060	1.2	1.5	064	7.0	ENE	33	-14.2	2.0	883	22
23	2.8	1.0	1.9	052	2.5	2.9	073	8.3	NNE	28	-15.0	4.8	705	23
24	2.8	-2.5	.2	245	2.0	2.6	245	7.0	WSW	25	-19.3	.8	913	24
25	-.3	-3.1	-1.7	079	1.0	1.9	057	5.1	SW	20	-25.0	0.0	733	25
26	-.3	-5.0	-2.7	045	2.9	3.1	024	5.7	NNE	10	-30.2	0.0	1050	26
27	-2.2	-5.9	-4.1	060	4.7	4.9	078	9.5	NE	10	-30.8	0.0	1630	27
28	-2.5	-6.0	-4.3	049	5.7	5.8	056	9.5	NE	11	-31.0	0.0	868	28
29	-5.0	-10.7	-7.9	050	5.2	5.3	066	10.8	NE	11	-32.0	0.0	960	29
30	-3.6	-11.6	-7.6	057	2.7	2.8	066	7.6	ENE	12	-32.3	0.0	928	30
31	-6.7	-13.6	-10.2	038	1.9	2.0	058	6.3	NNE	15	-33.5	0.0	1075	31
MONTH	4.5	-13.6	-2.1	049	2.7	3.2	067	12.7	NE	34	-20.7	25.0	38063	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 10.8
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 12.1
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 10.8
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 10.8

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 NOTES AT THE BACK OF THIS REPORT ****

MONTHLY SUMMARY FOR WATANA WEATHER STATION
DATA TAKEN DURING November, 1981

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	-7.7	-14.8	-11.3	059	3.8	4.0	057	8.9	ENE	13	-34.2	0.0	1030	1
2	-2.1	-12.3	-7.2	062	1.4	4.8	079	13.3	NE	15	-30.5	0.0	720	2
3	-8.6	-15.4	-12.0	052	1.7	2.4	083	7.0	ENE	15	-33.7	0.0	860	3
4	-6.7	-14.8	-10.8	020	.8	2.1	025	7.0	NNW	17	-31.0	1.2	440	4
5	-11.5	-17.7	-14.6	359	.8	1.1	023	2.5	NNW	15	-36.5	0.0	690	5
6	-12.8	-20.5	-16.7	049	2.4	2.8	053	8.9	ENE	15	-37.2	0.0	640	6
7	-4.8	-12.7	-8.8	049	5.5	5.6	048	9.5	NE	12	-32.8	.2	398	7
8	-3.1	-12.2	-7.7	059	3.4	3.5	079	9.5	ENE	17	-29.7	0.0	540	8
9	-.4	-11.9	-6.2	054	5.2	5.6	071	10.8	ENE	18	-27.7	0.0	475	9
10	2.6	-1.3	.7	073	6.2	6.6	085	14.6	E	14	-26.3	0.0	438	10
11	2.7	-3.7	-.5	062	4.3	4.4	071	12.1	ENE	9	-29.0	0.0	620	11
12	.3	-9.3	-4.5	046	4.0	4.1	050	8.9	NE	10	-30.5	0.0	543	12
13	-4.3	-13.1	-8.7	059	2.2	2.4	083	5.7	ENE	12	-33.0	0.0	638	13
14	-12.2	-20.2	-16.2	068	1.9	2.0	074	4.4	ENE	16	-35.3	0.0	348	14
15	-7.5	-14.6	-11.1	075	3.8	4.0	067	7.6	ENE	34	-33.2	0.0	1158	15
16	-9.8	-14.8	-12.3	074	6.7	6.7	073	10.8	ENE	74	-34.0	0.0	492	16
17	-11.7	-12.8	-12.3	065	6.4	6.4	071	8.9	ENE					
111.7 DD														
											-34.8	0.0	1920	17
18	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	18
19	-15.6	-16.4	-16.0	087	2.0	2.2	099	3.8	E					
261 DD														
											-36.6	0.0	0	19
20	-18.9	-24.3	-21.6	077	2.4	2.4	082	3.8	E					
297.543 DD														
											-40.1	.6	970	20
21	-12.5	-24.2	-18.4	070	4.2	4.5	056	10.8	ENE					
136.593 DD														
											-37.1	0.0	606	21
22	-12.2	-18.6	-15.4	059	7.3	7.2	067	10.8	ENE	94	-35.6	0.0	252	22
23	8.7	-14.7	-3.0	069	3.2	3.4	070	9.5	ENE	99	-34.3	0.0	237	23
24	-8.7	-11.8	-10.3	052	2.2	2.6	066	8.9	NE	51	-30.8	.8	445	24
25	-4.9	-14.6	-9.8	059	.9	1.2	043	7.0	NNE	52	-28.6	0.0	705	25
26	-4.9	-8.5	-6.7	055	4.6	4.7	060	9.5	NE	31	-26.5	2.8	288	26
27	-4.2	-7.0	-5.6	250	1.2	2.0	226	6.3	WSW	26	-22.3	0.0	393	27
28	-5.7	-10.6	-8.2	348	.6	1.0	263	2.5	N	23	-26.0	0.0	380	28
29	-9.2	-11.7	-10.5	056	4.7	4.9	064	11.4	NE	19	-29.7	0.0	543	29
30	-4.5	-10.1	-7.3	045	5.4	5.6	062	12.1	NE	12	-31.7	0.0	253	30
MONTH	8.7	-24.3	-10.1	058	3.2	3.8	085	14.6	ENE	37	-32.0	5.6	16998	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 13.3
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 14.0
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 14.6
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 14.0

R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR WATANA WEATHER STATION
DATA TAKEN DURING December, 1981

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	-5.3	-9.8	-7.6	066	6.3	6.4	066	14.6	ENE	15	-29.6	0.0	235	1
2	-7.4	-14.3	-10.9	057	.2	2.7	231	6.3	ENE	20	-29.9	1.4	390	2
3	-6.9	-12.1	-9.5	274	.8	1.5	241	8.9	WSW	23	-27.6	3.0	310	3
4	-8.8	-16.8	-12.8	021	1.7	2.5	066	9.5	N	20	-31.6	2.4	300	4
5	-10.1	-16.0	-13.1	073	2.4	2.6	068	9.5	E	14	-35.3	0.0	165	5
6	-9.6	-18.9	-14.3	053	2.8	2.9	073	7.0	NE	15	-34.6	0.0	198	6
7	-17.1	-23.7	-20.4	058	1.7	1.8	055	5.7	ENE	16	-39.2	0.0	390	7
8	-16.9	-25.3	-21.1	064	2.7	2.8	053	7.6	ENE	17	-40.4	0.0	348	8
9	-18.4	-24.2	-21.3	077	2.0	2.1	082	4.4	E	17	-39.6	0.0	125	9
10	-12.6	-21.5	-17.1	070	4.9	5.1	073	10.2	ENE	15	-37.2	0.0	123	10
11	-10.8	-16.6	-13.7	047	6.1	6.2	046	9.5	NE	15	-34.8	0.0	138	11
12	-5.6	-10.5	-8.1	048	6.0	6.1	061	8.9	NE	19	-29.7	0.0	98	12
13	-4.2	-15.6	-9.9	057	3.7	3.8	054	10.2	ENE	15	-32.2	0.0	113	13
14	-9.3	-17.1	-13.2	069	2.8	2.9	074	7.0	ENE	15	-34.6	0.0	148	14
15	-5.5	-12.6	-9.1	054	5.8	5.9	049	10.8	NE	12	-32.8	0.0	118	15
16	-2.4	-10.3	-6.4	058	7.3	7.6	090	15.9	ENE	15	-29.5	0.0	178	16
17	.8	-3.2	-1.2	069	6.4	6.6	062	13.3	ENE	14	-25.8	0.0	255	17
18	1.7	-4.1	-1.2	066	4.8	5.0	062	14.6	ENE	20	-22.0	0.0	275	18
19	-3.3	-11.7	-7.5	047	1.2	1.5	078	5.1	NNE	25	-25.2	.2	320	19
20	-5.5	-11.7	-8.6	053	2.3	2.5	046	6.3	NE	16	-30.3	0.0	200	20
21	-9.2	-15.8	-12.5	169	.4	1.0	088	3.8	SSW	24	-27.7	0.0	313	21
22	-11.2	-19.3	-15.3	044	4.5	4.7	053	9.5	NE	20	-32.5	0.0	293	22
23	-6.2	-11.4	-8.8	048	5.7	5.9	070	13.3	NE	14	-31.4	0.0	220	23
24	-6.5	-12.1	-9.3	345	1.7	1.8	032	4.4	NNW	22	-27.8	0.0	335	24
25	-8.8	-14.2	-11.5	063	1.6	2.2	026	7.0	E	21	-29.5	0.0	295	25
26	-8.7	-20.3	-14.5	004	2.2	2.6	028	8.3	NNE	14	-35.0	0.0	130	26
27	-17.2	-26.7	-22.0	076	3.1	3.3	073	8.3	E	17	-40.7	0.0	138	27
28	-19.4	-27.8	-23.6	084	3.4	3.5	083	8.3	E	18	-41.9	0.0	163	28
29	-25.1	-32.0	-28.6	064	2.3	2.4	061	5.7	ENE	19	-44.7	0.0	153	29
30	-21.1	-32.5	-26.8	066	3.7	3.7	055	9.5	ENE	19	-43.5	0.0	155	30
31	-21.5	-26.1	-23.8	078	2.1	2.2	060	7.0	E	17	-41.6	0.0	110	31
MONTH	1.7	-32.5	-13.7	058	3.1	3.6	090	15.9	ENE	18	-33.5	7.0	6725	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 12.1
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 13.3
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 14.0
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 11.4

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 NOTES AT THE BACK OF THIS REPORT ****

MONTHLY SUMMARY FOR WATANA WEATHER STATION
DATA TAKEN DURING January, 1982

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	-20.6	-26.4	-23.5	074	2.0	2.1	085	5.7	E	18	-41.6	0.0	133	1
2	-22.9	-27.0	-25.0	065	1.8	1.9	071	3.8	ENE	18	-42.4	0.0	280	2
3	-23.2	-27.2	-25.2	071	2.0	2.1	081	4.4	ENE	18	-42.3	0.0	223	3
4	-16.3	-23.8	-20.1	086	1.5	1.7	058	5.7	E	16	-39.1	0.0	130	4
5	-17.9	-27.9	-22.9	087	2.9	3.6	090	10.2	E	18	-41.9	0.0	185	5
6	-24.6	-33.8	-29.2	085	4.4	4.6	085	10.2	E	19	-44.4	0.0	165	6
7	-25.5	-32.4	-29.0	052	2.6	2.8	077	6.1	NE	20	-45.2	0.0	185	7
8	-16.3	-31.4	-23.9	057	4.5	4.8	053	10.2	NE	17	-40.6	0.0	205	8
9	-17.6	-20.2	-18.9	061	8.2	8.3	064	14.6	ENE	16	-38.3	0.0	133	9
10	-12.6	-17.7	-15.2	062	5.5	5.6	051	12.7	ENE	15	-36.7	0.0	215	10
11	-9.8	-16.3	-13.1	070	4.5	4.5	064	8.9	ENE	14	-35.2	0.0	185	11
12	-8.1	-16.0	-12.1	089	2.5	2.5	085	5.7	E	20	-32.1	0.0	330	12
13	-11.8	-20.9	-16.4	065	2.7	3.0	054	15.2	ENE	17	-35.8	0.0	725	13
14	-14.6	-18.7	-16.7	051	8.8	8.9	062	14.6	NE	15	-37.1	0.0	243	14
15	-18.4	-23.6	-21.0	057	4.1	4.3	042	10.8	ENE	18	-39.5	0.0	0	15
16	-19.2	-27.8	-23.5	064	2.1	2.2	081	4.4	ENE	55	-41.6	0.0	129	16
17	-11.8	-24.5	-18.2	065	1.5	1.8	094	6.3	ENE	15	-38.3	0.0	323	17
18	-16.0	-23.4	-19.7	056	1.5	2.2	075	8.3	ENE	16	-39.3	0.0	285	18
19	-13.3	-20.8	-17.1	022	2.5	2.9	051	6.3	NNW	15	-37.8	0.0	413	19
20	-15.1	-21.8	-18.5	068	5.8	5.9	071	10.8	ENE	15	-37.2	0.0	313	20
21	-14.7	-17.7	-16.2	057	10.4	10.4	055	15.2	ENE	15	-37.0	0.0	0	21
22	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	22
23	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	23
24	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	24
25	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	25
26	-28.1	-30.3	-29.2	075	2.9	3.1	075	5.7	ENE					
123.517 DD														
											-43.8	0.0	107	26
27	-20.3	-24.0	-22.2	050	7.5	7.6	045	10.2	NE					
126.148 DD														
											-40.8	0.0	845	27
28	-10.7	-22.5	-16.6	052	6.9	7.0	059	12.7	NE	31	-34.5	0.0	283	28
29	-10.2	-26.7	-18.5	084	3.0	3.2	067	7.6	E	25	-35.2	0.0	480	29
30	-11.8	-26.7	-19.3	095	2.2	2.5	095	8.4	E					
174.446 DD														
											-35.8	0.0	670	30
31	-10.1	-13.0	-11.6	048	6.6	6.6	058	9.5	NE	16	-33.6	0.0	566	31
MONTH	-8.1	-33.8	-20.1	063	3.7	4.0	054	15.2	ENE	25	-38.8	0.0	7747	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 12.7
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 13.3
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 14.0
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 13.3

R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR WATANA WEATHER STATION
DATA TAKEN DURING March, 1982

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	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	1
2	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	2
3	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	3
4	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	4
5	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	5
6	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	6
7	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	7
8	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	8
9	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	9
10	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	10
11	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	11
12	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	12
13	-16.1	-16.1	-16.1	038	2.0	2.0	038	3.2	NE	15	-36.7	****	0	13
14	-10.3	-19.7	-15.0	048	3.5	3.7	035	7.0	NE	14	-35.8	0.0	0	14
15	-8.4	-19.3	-13.9	057	4.6	4.7	056	8.9	ENE	15	-35.1	.2	0	15
16	-5.7	-11.7	-8.7	052	2.9	3.1	062	7.6	ENE	12	-32.7	.6	0	16
17	2.3	-7.4	-2.6	051	2.6	3.4	064	8.9	NE	11	-30.5	2.0	5	17
18	-.8	-4.1	-2.5	045	1.8	2.8	069	7.0	W	10	-30.2	0.0	2245	18
19	2.1	-7.0	-2.5	067	2.6	2.9	067	8.9	ENE	14	-28.7	0.0	2743	19
20	4.1	-3.1	.5	073	1.1	3.5	071	8.3	ENE	13	-28.1	.2	3020	20
21	1.8	-3.7	-1.0	225	1.4	2.6	222	10.2	W	11	-29.6	11.0	1048	21
22	3.8	-4.5	-.4	138	.4	2.4	222	8.3	SW	10	-29.6	.6	3555	22
23	-1.2	-6.8	-4.0	054	2.1	2.9	075	8.9	ENE	12	-30.1	.6	3095	23
24	-2.2	-10.5	-6.4	041	3.9	4.3	018	9.5	NNE	12	-31.2	0.0	3078	24
25	-5.7	-11.8	-8.8	008	4.3	4.4	009	8.9	N	15	-31.4	0.0	3518	25
26	-8.6	-16.0	-12.3	047	3.9	4.3	067	10.2	NNE	14	-34.3	0.0	3950	26
27	-7.4	-18.2	-12.8	054	3.9	4.1	063	7.6	ENE	13	-34.4	0.0	3543	27
28	-4.9	-15.1	-10.0	023	1.9	2.3	064	5.7	NNW	13	-33.7	0.0	3895	28
29	-5.0	-16.8	-10.9	047	2.2	2.4	066	7.0	NE	13	-34.2	0.0	3795	29
30	-9.3	-17.4	-13.4	039	3.8	4.2	038	8.9	NNE	14	-35.0	0.0	4378	30
31	-11.3	-20.8	-16.1	030	4.4	4.5	060	9.5	NNE	14	-36.2	0.0	4425	31
MONTH	4.1	-20.8	-8.2	044	2.5	3.5	222	10.2	ENE	13	-32.5	15.2	46290	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS	6.3
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL	6.3
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL	9.5
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS	8.9

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 NOTES AT THE BACK OF THIS REPORT ****

R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR WATANA WEATHER STATION
DATA TAKEN DURING April, 1982

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	-11.1	-16.8	-14.0	019	4.1	4.4	021	9.5	NNE	14	-35.8	0.0	4455	1
2	-12.1	-19.8	-16.0	045	4.5	4.7	051	9.5	NE	15	-36.3	0.0	4583	2
3	-7.7	-21.2	-14.5	068	4.6	4.8	077	9.5	ENE	14	-35.3	0.0	4663	3
4	-3.9	-14.3	-9.1	049	3.6	3.8	063	9.5	NE	12	-33.1	0.0	4308	4
5	-.5	-13.9	-7.2	015	1.5	1.7	350	3.8	N	11	-32.1	0.0	4520	5
6	1.9	-7.1	-2.6	044	1.7	2.2	067	7.0	NE	10	-30.4	0.0	4310	6
7	2.1	-7.7	-2.8	279	2.1	3.1	240	10.8	WSW	11	-29.7	1.2	2940	7
8	.8	-9.1	-4.2	028	.5	2.5	076	8.3	SW	11	-30.5	3.8	2285	8
9	6.8	-10.1	-1.7	011	1.1	1.6	281	4.4	NE	11	-31.1	0.0	5603	9
10	-2.8	-13.4	-8.1	059	3.0	3.3	071	7.6	ENE	12	-32.5	0.0	4773	10
11	-2.7	-9.9	-6.3	036	3.7	4.1	084	8.3	NNE	11	-31.8	0.0	13	11
12	-3.1	-10.9	-7.0	021	4.0	4.5	010	8.9	NNE	11	-31.5	0.0	2713	12
13	1.6	-8.6	-3.5	060	2.2	2.7	071	7.6	ENE	11	-30.3	0.0	4273	13
14	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	14
15	-1.7	-6.9	-4.3	037	3.0	3.2	012	5.1	NNE	10	-30.8	0.0	240	15
16	2.3	-8.8	-3.3	045	2.4	2.7	053	5.7	NNE	10	-30.6	0.0	5325	16
17	-1.0	-9.9	-5.5	006	1.9	2.0	359	4.4	NNE	11	-31.2	0.0	5240	17
18	-2.9	-13.3	-8.1	283	1.4	3.4	232	8.9	W	13	-31.0	0.0	4855	18
19	-2.5	-14.9	-8.7	044	4.2	4.4	027	8.9	NE	14	-31.3	0.0	4453	19
20	4.2	-6.5	-1.2	058	3.9	4.3	077	10.8	ENE	14	-27.6	0.0	5868	20
21	4.5	-4.8	-.2	270	1.2	2.1	263	7.0	WSW	10	-28.8	0.0	4420	21
22	3.2	-3.9	-.4	244	2.1	2.4	207	7.0	WSW	11	-28.8	0.0	4345	22
23	3.4	-6.6	-1.6	022	1.0	1.4	082	4.4	ENE	11	-29.7	.2	4863	23
24	1.8	-4.7	-1.5	057	3.8	3.9	072	8.3	ENE	11	-28.7	0.0	5125	24
25	5.5	-3.6	1.0	091	1.3	4.2	077	10.8	ENE	12	-28.0	1.4	5340	25
26	1.9	-6.3	-2.2	045	2.5	3.0	013	7.6	ENE	11	-29.2	.2	6258	26
27	5.6	-1.2	2.2	057	3.5	3.7	093	10.2	NE	11	-27.6	0.0	4660	27
28	5.0	-1.6	1.7	055	.9	3.0	236	8.3	ENE	10	-27.8	0.0	5250	28
29	5.6	-5.7	-.1	266	1.7	2.4	243	5.7	WSW	12	-28.3	.4	5380	29
30	3.3	-6.4	-1.6	013	2.0	2.1	000	4.4	NNE	12	-28.9	0.0	6130	30
MONTH	6.8	-21.2	-4.5	038	1.9	3.2	240	10.8	NNE	12	-30.6	7.2	127185	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 5.7
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 8.3
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 10.8
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 9.5

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 NOTES AT THE BACK OF THIS REPORT ****

R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR WATANA WEATHER STATION
DATA TAKEN DURING May, 1982

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	3.8	-8.4	-2.3	002	1.5	1.7	324	5.1	N	**	*****	0.0	6580	1
2	3.0	-5.6	-1.3	020	2.2	2.4	021	5.7	NNE	**	*****	0.0	7343	2
3	2.2	-8.1	-3.0	032	1.3	2.0	007	5.1	N	**	*****	1.2	798	3
4	5.7	-23.2	-8.8	066	1.6	2.2	098	5.1	E	**	*****	.4	0	4
5	5.1	-27.2	-11.1	040	3.1	3.4	040	6.3	NNE	**	*****	0.0	0	5
6	7.3	-4.1	1.6	039	1.8	2.5	065	6.3	NNW	**	*****	0.0	0	6
7	9.1	1.1	5.1	261	1.2	1.5	230	5.7	WSW	**	*****	0.0	0	7
8	8.5	.2	4.4	267	1.1	2.3	236	5.7	WSW	**	*****	0.0	0	8
9	7.8	0.0	3.9	031	.7	1.7	065	5.7	ENE	**	*****	.8	0	9
10	9.6	-.1	4.8	325	.2	1.1	236	5.1	N	**	*****	3.6	220	10
11	3.6	-1.6	1.0	253	2.7	2.8	251	6.3	WSW	**	*****	7.4	5248	11
12	7.0	-2.1	2.5	259	1.8	2.1	249	5.7	WSW	**	*****	0.0	5863	12
13	5.1	-2.2	1.5	269	1.7	2.3	236	6.3	WSW	**	*****	0.0	5058	13
14	6.8	-4.1	1.4	281	1.8	2.2	239	5.1	WNW	**	*****	0.0	7253	14
15	7.5	-3.3	2.1	303	1.6	2.2	290	5.1	WNW	**	*****	0.0	7243	15
16	7.7	-3.8	2.0	013	2.4	2.6	013	6.3	NNE	**	*****	0.0	7917	16
17	7.5	.1	3.8	032	2.2	3.1	099	7.0	NNE	**	*****	0.0	6483	17
18	7.2	-.2	3.5	237	.3	2.0	145	6.3	SW	**	*****	.6	4643	18
19	8.2	-.9	3.7	046	1.6	2.8	031	8.3	ENE	**	*****	3.0	7955	19
20	2.8	-1.0	.9	214	.7	2.1	219	7.0	SW	**	*****	6.6	3049	20
21	7.3	-2.3	2.5	311	1.3	1.8	243	5.1	NNW	**	*****	0.0	6099	21
22	9.5	-3.3	3.1	015	1.7	2.2	013	6.3	NNE	**	*****	0.0	7570	22
23	11.1	-.1	5.5	043	2.6	3.2	109	7.0	NNE	**	*****	0.0	8036	23
24	9.4	1.8	5.6	235	3.1	3.8	231	10.2	SW	**	*****	0.0	7437	24
25	7.1	.6	3.9	215	1.2	2.4	261	7.0	WSW	**	*****	1.2	4340	25
26	8.1	.2	4.2	238	1.2	1.9	242	6.3	WSW	**	*****	.2	5336	26
27	11.1	1.6	6.4	259	2.0	3.4	246	9.5	WSW	**	*****	0.0	5874	27
28	6.2	2.0	4.1	227	2.8	3.0	219	8.9	SW	**	*****	.8	4621	28
29	5.5	1.9	3.7	243	2.1	2.5	262	5.7	WSW	**	*****	0.0	5007	29
30	12.2	1.3	6.8	269	1.8	2.6	258	6.3	WSW	**	*****	0.0	7403	30
31	15.6	2.2	8.9	018	2.7	2.9	024	7.0	NNE	**	*****	0.0	9317	31
MONTH	15.6	-27.2	2.3	326	.6	2.4	231	10.2	WSW					
99.666 DD											*****	25.8	146692	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 9.5
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 8.9
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 9.5
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 8.9

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.

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R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR DEVIL CANYON WEATHER STATION
DATA TAKEN DURING October, 1981

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	5.4	-4.4	.5	117	1.6	1.9	116	5.7	E	53	-9.7	****	2130	1
2	3.2	-7.5	-2.2	116	1.2	1.5	148	3.8	E	47	-13.0	****	2942	2
3	*****	*****	*****	***	****	****	***	****	***	**	*****	****	******	3
4	3.2	.7	2.0	123	1.1	1.4	088	7.0	ESE	57	-5.7	****	720	4
5	5.2	-1.6	1.8	132	.6	1.0	023	4.4	S	63	-5.4	****	1523	5
6	3.3	-2.0	.7	126	1.0	1.3	094	7.0	ESE	67	-5.1	****	1095	6
7	2.6	-6.3	-1.9	137	1.0	1.3	148	5.1	SSE	56	-9.8	****	1833	7
8	1.9	-3.6	-.9	127	1.3	1.5	104	6.3	ESE	58	-7.7	****	1208	8
9	3.8	-3.9	-.1	234	.7	1.1	276	4.4	S	72	-5.5	****	1553	9
10	3.0	-3.2	-.1	110	1.1	1.2	100	5.1	ESE	73	-5.4	****	1463	10
11	.8	-2.8	-1.0	105	.6	.7	104	3.8	ESE	87	-2.6	****	333	11
12	4.3	.1	2.2	142	.7	.9	091	3.2	S	86	.5	****	788	12
13	4.9	1.4	3.2	099	.5	.8	088	3.2	SE	86	1.0	****	1128	13
14	4.6	.5	2.6	116	.7	.9	099	3.2	SE	88	.7	****	975	14
15	5.1	-.5	2.3	109	.8	.9	123	3.8	ESE	82	-1.3	****	1220	15
16	4.7	.1	2.4	119	.9	1.2	119	5.1	ESE	83	-1.0	****	1063	16
17	4.3	-1.7	1.3	169	.7	1.0	120	6.3	SSW	72	-3.8	****	1145	17
18	3.4	-5.6	-1.1	104	.8	1.1	085	3.8	ENE	65	-6.4	****	1113	18
19	-.7	-8.8	-4.8	102	1.5	1.6	113	4.4	ESE	65	-10.2	****	1118	19
20	1.9	-2.2	-.2	110	1.4	1.6	086	6.3	ESE	66	-6.3	****	865	20
21	2.3	.1	1.2	159	.4	.5	193	1.9	S	87	-.2	****	340	21
22	4.0	1.0	2.5	096	.4	.8	080	3.2	NE	90	.7	****	665	22
23	3.8	.9	2.4	134	.3	.6	085	3.2	SW	89	.8	****	595	23
24	4.3	-.5	1.9	301	.7	1.1	295	6.3	WNW	83	-.3	****	850	24
25	2.7	-2.4	.2	157	.3	.5	048	1.9	S	84	-3.4	****	700	25
26	2.1	-5.4	-1.7	149	.7	.8	113	4.4	SSE	70	-8.3	****	598	26
27	-.1	-7.0	-3.6	136	1.0	1.2	106	5.1	ESE	73	-8.1	****	738	27
28	.9	-6.1	-2.6	134	1.7	2.0	118	7.6	ESE	57	-9.4	****	765	28
29	-.8	-6.1	-3.5	139	1.5	1.6	111	5.7	SE	57	-10.3	****	720	29
30	-1.2	-9.9	-5.6	130	1.4	1.6	122	4.4	ESE	71	-10.3	****	570	30
31	-5.7	-12.4	-9.1	121	1.3	1.5	119	3.8	ESE	77	-13.0	****	563	31
MONTH	5.4	-12.4	-.4	126	.8	1.2	118	7.6	ESE	73	-5.3	****	31312	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS	5.7
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL	5.7
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL	4.4
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS	5.1

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.

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R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR DEVIL CANYON WEATHER STATION
DATA TAKEN DURING November, 1981

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	-11.9	-8.5	106	1.4	1.6	106	4.4	E	65	-14.0	****	550	1
2	.7	-11.1	-5.2	273	.3	1.5	314	7.6	WNW	76	-10.3	****	728	2
3	-9.5	-15.7	-12.6	139	.7	.9	144	3.2	SE	81	-15.0	****	403	3
4	-7.6	-11.4	-9.5	245	.2	.8	301	4.4	ESE	87	-10.5	****	345	4
5	-10.5	-15.8	-13.2	112	.4	.8	117	2.5	ENE	82	-15.3	****	350	5
6	-11.3	-18.3	-14.8	087	.8	.9	087	3.8	ENE	81	-19.0	****	330	6
7	-3.3	-11.1	-7.2	166	.9	1.2	127	2.5	SSW	81	-8.7	****	310	7
8	-1.2	-9.5	-5.4	174	1.1	1.3	187	3.8	S	79	-9.1	****	323	8
9	2.4	-10.9	-4.3	130	1.5	2.0	074	11.4	S	72	-6.9	****	320	9
10	4.9	-.5	2.2	114	2.6	2.9	107	12.1	ESE	62	-3.7	****	570	10
11	6.0	-.9	2.6	125	1.5	1.7	106	7.6	ESE	60	-4.9	****	555	11
12	2.8	-5.8	-1.5	147	1.3	1.4	138	4.4	SE	60	-7.5	****	415	12
13	-2.7	-11.4	-7.1	107	1.8	1.9	136	5.1	ESE	69	-11.9	****	353	13
14	-8.2	-13.1	-10.7	083	2.2	2.4	071	4.4	ENE	69	-16.0	****	355	14
15	-5.3	-13.9	-9.6	108	1.5	1.7	091	3.8	E	70	-15.3	****	440	15
16	-8.9	-13.3	-11.1	123	1.8	1.9	135	4.4	SE	64	-16.7	****	350	16
17	-8.0	-14.1	-11.1	137	1.5	1.7	117	5.1	SE	57	-18.1	****	350	17
18	-9.8	-13.7	-11.8	136	2.3	2.4	103	7.0	SE	51	-19.4	****	380	18
19	-7.5	-15.4	-11.5	114	2.0	2.2	070	8.3	ESE	52	-18.5	****	353	19
20	-15.4	-19.0	-17.2	116	3.1	3.2	120	7.0	ESE	66	-21.8	****	345	20
21	-6.4	-20.0	-13.2	117	1.9	2.1	135	6.3	ESE	58	-19.8	****	338	21
22	-8.9	-11.6	-10.3	099	2.2	2.2	078	5.7	E	54	-17.9	****	403	22
23	-8.1	-13.5	-10.8	124	1.2	1.4	142	4.4	SE	70	-14.4	****	373	23
24	-6.8	-9.0	-7.9	095	1.6	1.7	098	5.7	E	86	-9.8	****	315	24
25	-4.6	-11.8	-8.2	080	.9	1.2	069	3.8	ENE	85	-10.8	****	425	25
26	-3.8	-10.9	-7.4	120	.7	1.0	096	4.4	S	88	-8.7	****	240	26
27	-3.4	-5.2	-4.3	209	.4	.7	267	2.5	S	88	-6.1	****	270	27
28	-4.5	-7.3	-5.9	124	.5	.7	121	3.2	SSE	87	-8.7	****	268	28
29	-7.3	-11.5	-9.4	137	1.6	1.7	119	4.4	SSE	81	-11.5	****	283	29
30	-2.3	-8.1	-5.2	143	1.7	1.9	110	8.3	SSE	60	-11.8	****	278	30
MONTH	6.0	-20.0	-8.3	120	1.2	1.6	107	12.1	ESE	71	-12.7	****	11313	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 9.5
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 10.2
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 10.8
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 9.5

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.

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R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR DEVIL CANYON WEATHER STATION
DATA TAKEN DURING December, 1981

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	-2.2	-6.4	-4.3	122	1.2	1.5	120	6.3	ESE	73	-8.6	****	300	1
2	-6.6	-14.0	-10.3	270	.1	1.1	319	4.4	NW	84	-12.2	****	285	2
3	-8.4	-10.8	-9.6	224	.3	.5	294	3.8	SSW	88	-11.3	****	258	3
4	-7.0	-14.3	-10.7	142	.5	1.0	209	3.2	SSW	83	-13.7	****	275	4
5	-14.2	-18.5	-16.4	213	.3	.5	119	2.5	SSW	83	-17.4	****	275	5
6	-8.8	-16.9	-12.9	092	.7	1.1	064	3.8	ENE	82	-15.1	****	275	6
7	-16.8	-21.1	-19.0	064	2.1	2.1	065	3.8	ENE	79	-22.1	****	263	7
8	-16.1	-19.7	-17.9	080	1.8	1.9	121	5.1	ENE	73	-21.6	****	263	8
9	-14.7	-19.0	-16.9	056	1.8	1.8	061	4.4	NE	77	-19.5	****	268	9
10	-11.4	-18.3	-14.9	083	2.0	2.2	068	4.4	ENE	76	-18.9	****	278	10
11	-7.6	-14.2	-10.9	115	1.2	1.3	123	4.4	ESE	79	-15.2	****	253	11
12	-2.8	-7.5	-5.2	170	.9	1.2	096	3.2	SSW	78	-8.2	****	248	12
13	-1.7	-13.0	-7.4	107	1.6	1.9	113	4.4	ESE	68	-10.9	****	258	13
14	-9.0	-15.3	-12.2	091	2.5	2.7	069	5.7	ENE	77	-15.3	****	265	14
15	-3.4	-10.3	-6.9	113	1.1	1.5	142	6.3	SE	72	-11.7	****	310	15
16	1.2	-6.9	-2.9	110	2.8	2.9	104	10.2	ESE	59	-8.8	****	290	16
17	3.0	-1.0	1.0	129	1.6	1.9	098	7.6	SE	64	-5.3	****	320	17
18	3.9	-1.9	1.0	122	1.5	1.7	097	10.2	SE	72	-3.2	****	270	18
19	-1.6	-12.1	-6.9	102	.9	1.0	105	4.4	ESE	87	-8.3	****	278	19
20	-4.1	-11.8	-8.0	172	.3	.7	085	2.5	SE	86	-10.2	****	275	20
21	-7.5	-9.5	-8.5	137	.3	.5	139	2.5	SE	88	-10.6	****	268	21
22	-7.0	-17.6	-12.3	106	1.3	1.5	112	4.4	E	79	-15.6	****	263	22
23	-2.5	-7.6	-5.1	116	1.6	1.8	087	6.3	ESE	66	-10.3	****	288	23
24	-5.1	-9.7	-7.4	079	.4	.7	089	3.2	E	85	-9.6	****	298	24
25	-8.2	-9.7	-9.0	072	.5	.6	079	3.2	NE	87	-10.8	****	268	25
26	-8.7	-20.2	-14.5	131	1.1	1.4	125	5.1	E	70	-19.3	****	275	26
27	-16.0	-24.4	-20.2	097	1.5	1.7	101	5.7	E	56	-27.5	****	328	27
28	-19.4	-24.6	-22.0	111	2.5	2.7	141	7.0	ESE	51	-29.3	****	360	28
29	-21.8	-28.9	-25.4	101	3.0	3.4	136	7.6	ENE	53	-32.7	****	308	29
30	-19.8	-28.3	-24.1	086	2.5	2.7	073	5.7	ENE	55	-31.2	****	343	30
31	-17.5	-24.8	-21.2	107	2.1	2.3	124	7.0	ESE	58	-26.9	****	355	31
MONTH	3.9	-28.9	-11.6	103	1.2	1.6	104	10.2	ESE	74	-15.5	****	8853	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS	8.9
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL	9.5
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL	8.9
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS	7.6

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 NOTES AT THE BACK OF THIS REPORT ****

R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR DEVIL CANYON WEATHER STATION
DATA TAKEN DURING January, 1982

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	-18.1	-25.2	-21.7	088	1.9	2.1	121	5.1	ENE	69	-26.0	****	320	1
2	-21.2	-24.2	-22.7	052	2.0	2.0	060	5.1	NE	68	-27.3	****	310	2
3	-19.1	-24.0	-21.6	094	2.5	3.0	112	6.3	ESE	67	-26.2	****	303	3
4	-15.1	-19.0	-17.1	117	2.9	2.9	132	6.3	ESE	65	-21.5	****	315	4
5	-16.6	-27.0	-21.8	120	1.7	1.9	108	5.7	ESE	61	-28.7	****	348	5
6	-22.7	-25.6	-24.2	114	1.8	2.0	086	5.7	ESE	44	-33.2	****	425	6
7	-19.2	-28.7	-24.0	108	.9	1.1	105	4.4	E	52	-34.2	****	335	7
8	-15.0	-27.6	-21.3	130	2.2	2.4	103	8.3	SE	26	-33.3	****	583	8
9	-13.0	-16.8	-14.9	102	3.4	3.5	105	11.4	ESE	35	-27.4	****	520	9
10	-11.3	-13.9	-12.6	102	3.5	3.5	101	7.6	ESE	49	-21.1	****	385	10
11	-8.5	-13.9	-11.2	113	3.3	3.3	121	7.6	ESE	59	-17.4	****	353	11
12	-7.5	-13.4	-10.5	105	2.4	2.5	120	5.7	ESE	76	-12.9	****	358	12
13	-10.8	-18.5	-14.7	092	2.0	2.2	193	6.3	ENE	70	-19.4	****	353	13
14	-11.0	-13.8	-12.4	121	2.6	2.7	103	9.5	ESE	24	-28.8	****	650	14
15	-12.6	-17.7	-15.2	111	3.0	3.1	111	8.9	ESE	24	-30.6	****	683	15
16	-17.7	-24.4	-21.1	086	2.7	3.0	100	7.0	ENE	40	-31.5	****	445	16
17	-13.6	-24.7	-19.2	102	1.4	1.5	084	5.1	E	62	-26.1	****	348	17
18	-16.0	-22.7	-19.4	085	1.8	1.9	122	5.1	ENE	57	-25.5	****	388	18
19	-18.2	-24.8	-21.5	105	1.3	1.5	145	4.4	ESE	71	-25.9	****	335	19
20	-11.5	-20.2	-15.9	100	1.9	2.0	120	5.1	ESE	46	-24.7	****	553	20
21	-10.5	-17.6	-14.1	082	3.5	3.6	088	12.1	E	29	-28.2	****	593	21
22	-11.8	-19.7	-15.8	109	2.8	3.2	068	11.4	ESE	27	-30.7	****	598	22
23	-11.7	-16.9	-14.3	094	2.9	3.4	077	10.8	E	27	-29.0	****	608	23
24	-15.4	-19.7	-17.6	132	1.8	2.0	129	5.1	ESE	30	-30.7	****	595	24
25	-19.6	-25.8	-22.7	098	2.3	2.5	121	7.6	ENE	42	-31.7	****	488	25
26	-20.9	-27.5	-24.2	072	2.2	2.3	056	5.7	ENE	54	-31.7	****	355	26
27	-13.0	-22.7	-17.9	104	1.8	1.9	107	5.1	ESE	53	-24.6	****	505	27
28	-7.5	-13.0	-10.3	111	2.0	2.1	109	6.3	ESE	64	-14.8	****	418	28
29	-7.6	-10.3	-9.0	110	2.9	3.0	120	7.0	ESE	60	-15.1	****	543	29
30	-7.1	-11.7	-9.4	118	3.0	3.1	128	7.0	ESE	62	-15.3	****	523	30
31	-6.1	-12.3	-9.2	112	1.8	2.0	114	5.7	ESE	62	-14.9	****	395	31
MONTH	-6.1	-28.7	-17.0	103	2.2	2.5	088	12.1	ESE	51	-25.4	****	13923	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 8.3
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 10.8
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 10.8
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 10.2

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.

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R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR DEVIL CANYON WEATHER STATION
DATA TAKEN DURING February, 1982

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	-2.9	-8.6	-5.8	105	1.5	1.6	124	5.1	ESE	70	-9.5	****	390	1
2	3.5	-3.4	.1	108	1.7	1.8	077	5.7	ESE	71	-4.2	****	535	2
3	5.4	-.4	2.5	100	1.2	1.4	111	4.4	E	74	-2.1	****	508	3
4	3.4	-.9	1.3	102	.8	1.0	129	4.4	SE	86	-.6	****	525	4
5	4.3	-3.4	.5	123	1.2	1.2	124	5.7	ESE	81	-2.5	****	640	5
6	-2.1	-7.3	-4.7	063	.2	.2	081	3.2	NE	82	-5.7	****	428	6
7	.1	-6.2	-3.1	087	.7	.8	080	3.8	E	80	-5.3	****	555	7
8	-2.9	-7.1	-5.0	078	1.2	1.4	092	5.1	ENE	85	-7.0	****	425	8
9	.5	-8.9	-4.2	002	1.1	2.5	356	9.5	ESE	45	-13.2	****	590	9
10	-6.6	-16.8	-11.7	059	1.7	2.9	025	13.3	ESE	47	-19.9	****	530	10
11	-10.3	-20.7	-15.5	129	1.7	1.8	114	8.3	ESE	44	-25.5	****	638	11
12	-7.4	-15.8	-11.6	131	2.3	2.5	114	7.0	ESE	23	-28.9	****	895	12
13	-7.7	-19.4	-13.6	087	1.8	2.1	067	5.1	ENE	39	-25.3	****	1065	13
14	-12.2	-24.1	-18.2	027	2.5	3.5	010	13.3	NNE	48	-29.9	****	745	14
15	-20.4	-25.4	-22.9	081	1.4	2.6	009	10.8	SE	37	-33.9	****	998	15
16	-16.4	-24.6	-20.5	109	1.4	1.6	093	5.7	ESE	43	-29.4	****	895	16
17	-14.8	-23.2	-19.0	111	.8	1.1	112	3.8	ESE	56	-26.5	****	855	17
18	-14.8	-23.1	-19.0	167	.6	1.0	137	3.2	S	57	-26.7	****	933	18
19	-14.3	-25.1	-19.7	113	1.4	1.6	088	6.3	ESE	40	-30.9	****	1288	19
20	-14.8	-26.6	-20.7	103	2.0	2.2	123	8.3	E	33	-33.6	****	1103	20
21	-16.6	-30.0	-23.3	110	1.6	1.9	106	7.6	ESE	32	-35.7	****	1175	21
22	-16.2	-24.7	-20.5	114	2.2	2.4	071	5.7	ESE	26	-35.7	****	1295	22
23	-11.6	-28.4	-20.0	096	1.9	2.3	118	6.3	ENE	29	-34.8	****	1318	23
24	-10.5	-26.1	-18.3	117	1.1	1.5	075	4.4	SE	28	-34.0	****	1395	24
25	-8.6	-24.0	-16.3	116	1.8	1.9	112	7.0	ESE	25	-32.3	****	1500	25
26	-6.7	-21.6	-14.2	120	2.0	2.2	115	8.3	ESE	21	-31.0	****	1580	26
27	-5.0	-10.6	-7.8	128	2.1	2.3	106	5.7	SE	19	-27.8	****	1600	27
28	-4.5	-12.0	-8.3	125	2.8	3.0	112	9.5	ESE	17	-29.1	****	1725	28
MONTH	5.4	-30.0	-12.1	104	1.3	1.9	025	13.3	ESE	48	-22.2	****	26125	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 5.1
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 5.1
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 10.2
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 8.9

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.

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R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR DEVIL CANYON WEATHER STATION
DATA TAKEN DURING March, 1982

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	-3.2	-10.1	-6.7	141	2.8	2.9	138	7.6	SE	15	-29.4	****	1830	1
2	-5.8	-13.3	-9.2	117	2.4	2.6	077	7.6	ESE	15	-30.2	****	1740	2
3	-6.7	-18.0	-12.4	106	1.5	1.9	086	5.1	E	21	-30.9	****	0	3
4	-8.8	-22.3	-15.6	080	2.1	2.4	059	5.1	ESE	32	-27.8	****	0	4
5	-4.4	-10.5	-7.5	112	2.1	2.2	131	5.1	ESE	31	-21.9	****	0	5
6	-2.5	-7.5	-5.0	093	1.6	1.7	069	5.1	ESE	44	-16.4	****	0	6
7	.5	-6.4	-3.0	097	1.0	1.2	130	3.8	ESE	59	-10.8	****	0	7
8	-1.7	-7.5	-4.6	056	.4	.9	128	2.5	E	69	-10.4	****	0	8
9	-4.6	-9.7	-7.2	095	1.1	1.3	082	3.8	E	71	-10.8	****	0	9
10	-3.3	-14.3	-8.8	063	.1	.8	102	3.2	E	70	-12.9	****	0	10
11	-3.5	-16.8	-10.2	126	1.2	1.4	124	5.7	ESE	59	-17.2	****	0	11
12	-3.9	-17.1	-10.5	081	1.6	2.1	014	8.9	E	46	-22.0	****	0	12
13	-6.9	-21.3	-14.1	121	1.5	1.7	081	5.1	SE	38	-26.5	****	0	13
14	-7.9	-21.2	-14.6	095	1.8	1.9	095	7.0	E	45	-22.6	****	0	14
15	-3.4	-9.9	-6.7	096	1.4	1.6	117	4.4	ESE	57	-13.9	****	0	15
16	-3.3	-8.3	-5.8	086	1.2	1.3	067	4.4	ENE	61	-12.9	****	0	16
17	.2	-4.8	-2.3	104	.7	.9	085	3.8	E	71	-11.9	****	0	17
18	1.6	-3.2	-.8	170	.5	.8	192	3.2	SSW	48	-12.1	****	0	18
19	2.1	-3.7	-.8	204	.2	.8	190	3.2	S	52	-11.1	****	0	19
20	2.4	-2.4	0.0	273	.4	.9	337	5.7	SSW	53	-9.4	****	0	20
21	1.8	-1.9	-.1	288	.7	1.0	275	7.0	S	52	-9.8	****	0	21
22	4.3	-3.0	.7	352	.3	1.1	283	5.7	WNW	45	-11.2	****	0	22
23	1.4	-5.7	-2.2	064	.2	.7	038	3.8	S	43	-17.4	****	0	23
24	2.4	-9.5	-3.6	055	.8	1.9	014	12.7	S	28	-23.4	****	0	24
25	-2.8	-14.1	-8.5	063	1.8	2.5	026	12.1	E	21	-26.3	****	0	25
26	-4.2	-16.5	-10.4	125	1.7	1.8	103	5.7	SE	19	-29.7	****	0	26
27	-4.2	-17.0	-10.6	088	1.4	1.6	050	5.7	ENE	19	-28.5	****	0	27
28	-1.5	-13.4	-7.5	110	1.3	1.6	060	4.4	ESE	18	-28.3	****	0	28
29	-1.7	-18.2	-10.0	095	1.5	1.8	128	7.0	ENE	21	-28.0	****	0	29
30	-4.3	-17.3	-10.8	106	1.7	2.0	130	5.7	E	18	-29.9	****	0	30
31	-6.9	-20.2	-13.6	103	1.6	1.9	112	7.0	ESE	20	-31.9	****	0	31
MONTH	4.3	-22.3	-7.1	102	1.1	1.6	014	12.7	ESE	41	-20.2	****	3570	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 8.3
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 11.4
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 12.1
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 10.8

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.

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R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR DEVIL CANYON WEATHER STATION
DATA TAKEN DURING April, 1982

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	-8.2	-20.8	-14.5	101	2.3	2.6	099	8.3	E	20	-31.7	0.0	0	1
2	-7.6	-21.9	-14.8	113	1.8	2.1	100	7.0	ESE	19	-32.0	0.0	0	2
3	-2.4	-18.7	-10.6	112	1.6	1.8	113	7.0	ESE	17	-29.4	0.0	0	3
4	-.1	-12.9	-6.5	092	1.8	2.0	069	5.7	ENE	16	-28.0	0.0	0	4
5	3.2	-13.0	-4.9	089	1.0	1.5	062	4.4	SE	16	-26.5	0.0	0	5
6	5.0	-4.3	.4	105	1.6	1.7	062	5.1	ESE	24	-21.7	1.4	0	6
7	4.5	-4.2	.2	050	.3	1.4	299	6.3	ESE	38	-15.7	6.0	0	7
8	.4	-5.1	-2.4	062	.5	1.3	138	3.8	ENE	37	-16.9	.2	0	8
9	2.4	-8.8	-3.2	044	.3	1.2	253	5.7	NNW	29	-22.8	1.6	0	9
10	.5	-11.9	-5.7	099	1.5	1.8	043	5.1	E	18	-26.4	0.0	0	10
11	.5	-10.5	-5.0	047	1.7	2.5	027	9.5	NNE	18	-26.1	0.0	0	11
12	1.0	-13.8	-6.4	042	2.5	2.9	024	11.4	NNE	17	-27.3	0.0	0	12
13	-1.8	-10.7	-6.3	050	1.9	2.7	014	8.9	NNE	16	-27.7	0.0	0	13
14	.8	-13.2	-6.2	098	1.6	2.2	112	8.9	ESE	19	-27.0	0.0	0	14
15	3.5	-6.2	-1.4	077	.8	1.6	020	7.6	NNE	29	-20.8	.2	0	15
16	6.0	-7.5	-.8	117	1.3	1.6	079	5.7	SE	18	-22.5	0.0	4045	16
17	1.9	-6.9	-2.5	196	.2	1.2	327	3.8	SSE	21	-21.7	0.0	3825	17
18	-.2	-8.6	-4.4	290	.9	1.7	322	7.6	NW	38	-18.3	1.6	3585	18
19	1.5	-13.7	-6.1	091	1.6	1.9	046	8.3	ENE	32	-22.8	0.0	4418	19
20	6.5	-3.2	1.7	116	1.1	1.6	053	5.7	ESE	29	-18.2	7.0	4053	20
21	6.3	-3.4	1.5	301	.5	1.5	259	7.0	WNW	20	-20.2	0.0	4748	21
22	5.1	-2.7	1.2	274	.9	1.4	345	5.7	W	17	-21.9	0.0	5543	22
23	4.3	-4.1	.1	264	.3	1.3	198	5.7	WSW	29	-20.2	0.0	4678	23
24	4.3	-2.2	1.1	064	.7	1.2	069	5.1	NE	36	-17.7	1.6	3388	24
25	8.8	-.1	4.4	171	.4	1.6	120	6.3	S	24	-17.5	0.0	5298	25
26	5.0	-3.1	1.0	085	1.6	2.0	036	7.0	ENE	22	-20.0	0.0	6023	26
27	8.9	-.5	4.2	082	.6	1.5	094	7.0	S	20	-18.5	0.0	4160	27
28	6.9	0.0	3.5	129	.7	1.5	104	5.1	ESE	34	-13.8	1.4	3678	28
29	6.8	-3.2	1.8	185	.1	1.4	337	5.7	S	23	-20.9	0.0	6713	29
30	6.8	-4.6	1.1	082	1.0	1.6	007	5.1	NE	19	-21.8	0.0	5818	30
MONTH	8.9	-21.9	-2.7	087	.8	1.7	024	11.4	ESE	24	-22.5	21.0	69968	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 8.9
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 10.2
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 10.8
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 9.5

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 NOTES AT THE BACK OF THIS REPORT ****

R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR DEVIL CANYON WEATHER STATION
DATA TAKEN DURING May, 1982

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	6.9	-4.3	1.3	142	.8	1.7	204	5.7	SE	21	-20.8	0.0	6345	1
2	5.8	-3.1	1.4	020	.8	1.5	014	5.7	NNE	22	-20.8	.2	6080	2
3	4.4	-5.0	-.3	122	.6	1.6	306	5.7	ESE	18	-22.1	0.0	5113	3
4	5.5	-3.9	.8	034	.4	1.4	241	6.3	NNE	26	-19.9	1.8	5360	4
5	7.4	-5.7	.9	071	1.5	2.0	046	8.3	NE	17	-22.1	0.0	6120	5
6	11.2	-1.8	4.7	141	1.1	1.4	095	5.7	SSE	13	-21.7	0.0	6275	6
7	8.2	1.9	5.1	250	.5	.9	208	3.8	SSW	32	-13.7	.2	3188	7
8	8.1	1.7	4.9	236	.5	1.0	094	3.8	SSW	27	-18.3	.6	3543	8
9	5.2	.8	3.0	290	.4	.9	305	3.2	WNW	51	-6.9	4.4	2745	9
10	8.8	1.3	5.1	303	.9	1.1	270	5.1	NW	42	-9.9	3.2	3640	10
11	6.6	-.6	3.0	297	.9	1.3	315	5.7	NW	50	-9.2	3.2	3663	11
12	7.6	-1.1	3.3	290	.6	1.3	256	5.1	NW	33	-14.0	0.0	4090	12
13	7.5	-1.3	3.1	252	.4	1.1	332	5.1	S	30	-16.0	0.0	3935	13
14	9.6	-2.2	3.7	234	.7	1.2	191	5.7	S	26	-19.0	0.0	5363	14
15	10.5	-2.6	4.0	247	.5	1.3	334	5.1	S	20	-20.5	0.0	6810	15
16	10.0	-2.8	3.6	032	1.5	2.1	032	7.6	NNE	18	-20.7	0.0	6948	16
17	10.4	-1.6	4.4	121	.8	1.5	031	6.3	S	19	-19.1	2.6	6550	17
18	9.4	.9	5.2	299	.6	1.1	310	4.4	NW	37	-12.9	1.2	5083	18
19	10.5	0.0	5.3	083	.7	1.7	098	5.7	E	28	-13.5	0.0	6638	19
20	8.6	-.6	4.0	144	.3	1.4	067	5.7	ESE	26	-14.5	0.0	3863	20
21	10.4	-1.3	4.6	223	.7	1.4	210	5.1	WSW	25	-14.4	0.0	7228	21
22	12.7	-2.1	5.3	176	.2	1.4	358	4.4	NE	22	-14.3	0.0	7490	22
23	11.9	-1.3	5.3	045	1.8	2.4	020	7.6	NNE	21	-13.9	0.0	6373	23
24	12.7	3.2	8.0	233	.7	1.4	020	8.3	SW	20	-13.6	0.0	5325	24
25	8.1	1.8	5.0	294	.5	1.1	297	4.4	WNW	43	-7.0	1.4	2610	25
26	8.4	1.2	4.8	326	.5	1.4	274	4.4	NW	34	-10.8	.4	3240	26
27	11.9	2.5	7.2	292	.7	1.2	286	5.7	WNW	41	-9.5	1.4	3518	27
28	8.6	3.0	5.8	286	.6	1.2	310	8.3	SSW	36	-11.0	.8	3290	28
29	8.5	3.4	6.0	272	.9	1.2	308	5.1	SW	27	-13.6	.4	2883	29
30	14.2	3.1	8.7	282	.7	1.3	258	4.4	WNW	32	-11.7	.2	5740	30
31	17.2	.9	9.1	034	1.6	2.2	011	7.0	NNE	25	-9.0	0.0	7800	31
MONTH	17.2	-5.7	4.4	334	.1	1.4	046	8.3	NW	29	-15.0	22.0	156845	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 5.7
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 5.1
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 5.7
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 7.0

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.

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R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR DENALI WEATHER STATION
DATA TAKEN DURING October, 1981

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	0.0	-6.4	-3.2	012	5.4	5.5	356	11.4	NNE	40	-14.6	****	2575	1
2	-2.5	-10.9	-6.7	012	3.4	3.5	359	7.0	N	44	-16.7	****	2583	2
3	-1.4	-12.7	-7.1	201	.3	1.2	209	6.3	NNE	58	-13.8	****	1618	3
4	-.8	-4.9	-2.9	351	1.8	4.1	357	9.5	N	64	-9.2	****	1453	4
5	-.5	-4.2	-2.4	001	4.7	4.7	359	9.5	N	60	-9.4	****	2415	5
6	-1.7	-5.1	-3.4	004	3.5	3.5	355	10.8	N	56	-10.9	****	1630	6
7	-3.6	-6.8	-5.2	004	4.9	4.9	002	10.2	N	54	-13.6	****	2253	7
8	-4.2	-6.2	-5.2	003	3.3	3.3	001	8.9	N	51	-15.2	****	1400	8
9	1.0	-6.9	-3.0	293	.4	2.3	007	7.0	N	61	-9.8	****	1635	9
10	2.3	-5.2	-1.5	196	1.0	1.7	146	5.7	SSW	52	-10.9	****	1768	10
11	1.4	-4.3	-1.5	165	2.8	3.5	145	15.2	SSW	52	-10.4	****	1193	11
12	2.2	-.7	.8	195	3.8	3.8	205	8.9	SSW	50	-10.7	****	1333	12
13	4.0	.4	2.2	192	.9	1.6	183	7.0	S	61	-6.9	****	1410	13
14	3.5	.4	2.0	234	.4	1.4	195	5.1	N	57	-7.9	****	1535	14
15	1.7	-2.0	-.2	358	.2	.9	150	5.7	N	72	-4.6	****	1140	15
16	4.1	-1.6	1.3	185	1.7	2.1	152	16.5	SSW	66	-5.1	****	1345	16
17	4.2	-1.8	1.2	029	2.0	3.9	150	15.2	N	50	-8.6	****	1268	17
18	-1.6	-5.5	-3.6	011	5.1	5.2	004	11.4	N	46	-13.0	****	1230	18
19	-1.1	-12.4	-6.8	168	.3	1.9	185	6.3	S	48	-15.9	****	1830	19
20	1.8	-5.2	-1.7	172	3.5	4.5	191	15.9	S	51	-10.7	****	1090	20
21	6.8	.9	3.9	145	6.8	7.0	150	19.7	SE	54	-4.8	****	803	21
22	3.6	.6	2.1	168	1.7	2.1	151	15.9	SSE	64	-7.9	****	835	22
23	3.9	1.0	2.5	168	3.3	3.7	155	12.7	SSE	62	-4.5	****	790	23
24	4.0	-2.1	1.0	353	1.5	2.0	357	7.0	N	60	-6.8	****	953	24
25	-.8	-5.2	-3.0	017	2.6	2.7	039	6.3	N	65	-8.6	****	1238	25
26	-2.4	-4.6	-3.5	358	2.9	2.9	357	7.0	N	53	-12.2	****	880	26
27	-3.7	-9.0	-6.4	356	1.5	1.5	356	6.3	N	62	-11.5	****	688	27
28	-1.6	-12.4	-7.0	355	1.0	1.2	356	5.1	N	59	-15.6	****	1793	28
29	-6.0	-14.2	-10.1	185	1.3	2.1	190	8.3	S	62	-15.9	****	1575	29
30	-3.8	-13.8	-8.8	360	.6	.9	356	3.2	N	60	-16.3	****	1945	30
31	-7.4	-16.1	-11.8	173	.9	1.9	185	7.6	S	62	-17.5	****	1150	31
MONTH	6.8	-16.1	-2.8	027	.6	2.9	150	19.7	N	57	-11.0	****	45348	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 17.8
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 14.6
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 13.3
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 14.6

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.

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R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR DENALI WEATHER STATION
DATA TAKEN DURING November, 1981

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	-9.4	-17.2	-13.3	192	1.5	3.1	188	8.9	S	62	-17.4	****	755	1
2	-1.3	-12.7	-7.0	174	1.8	3.1	008	19.0	SSE	56	-14.6	****	528	2
3	-9.9	-15.5	-12.7	003	1.3	2.3	008	8.3	N	57	-19.0	****	800	3
4	-8.3	-16.2	-12.3	002	4.2	4.2	003	10.2	N	57	-17.9	****	640	4
5	-13.5	-19.7	-16.6	010	3.8	3.8	003	8.9	N					
105.875 DD														
											-24.9	****	792	5
6	-14.0	-21.9	-18.0	353	.7	2.1	007	5.1	N	49	-26.7	****	913	6
7	-2.5	-13.7	-8.1	184	.9	2.1	136	13.3	SSW	50	-16.1	****	590	7
8	-5.8	-14.4	-10.1	187	1.8	2.7	188	10.8	S	59	-15.9	****	710	8
9	-1.5	-14.6	-8.1	291	.2	1.2	174	7.6	N	61	-12.9	****	628	9
10	6.6	-1.4	2.6	157	4.2	5.0	130	23.5	SSE	41	-9.9	****	958	10
11	3.7	-6.8	-1.6	179	1.5	2.9	142	17.1	S	52	-11.2	****	815	11
12	-.8	-12.7	-6.8	093	.3	1.3	164	5.7	NNE	50	-14.3	****	833	12
13	-7.3	-19.1	-13.2	329	.2	.9	309	2.5	N	58	-20.8	****	1230	13
14	-10.7	-21.1	-15.9	347	.2	.6	286	3.2	NNE	55	-25.2	****	1230	14
15	-9.6	-22.6	-16.1	339	.3	.9	353	2.5	N	53	-26.2	****	1085	15
16	-14.3	-25.2	-19.8	358	.3	.8	006	3.2	NNE	52	-28.7	****	1153	16
17	-14.3	-26.2	-20.3	336	.3	.8	164	2.5	N	50	-30.2	****	1148	17
18	-15.9	-27.1	-21.5	011	.6	1.1	096	4.4	N	49	-30.4	****	1080	18
19	-15.1	-27.3	-21.2	359	.3	1.0	359	2.5	NNE	48	-31.2	****	1098	19
20	-18.5	-29.4	-24.0	359	.5	1.0	013	3.2	NNE	47	-34.5	****	1088	20
21	-18.5	-29.0	-23.8	348	.4	1.0	276	3.2	N	48	-33.2	****	1040	21
22	-15.1	-24.8	-20.0	018	1.3	1.4	016	4.4	NNE	53	-25.9	****	530	22
23	-12.8	-17.2	-15.0	195	1.2	1.8	192	9.5	SSW	58	-20.4	****	365	23
24	-5.9	-13.1	-9.5	193	2.0	2.6	192	10.8	S	63	-15.6	****	320	24
25	-4.8	-17.4	-11.1	344	.2	1.4	306	6.3	NNE	58	-16.7	****	438	25
26	-2.0	-11.8	-6.9	217	2.3	3.1	131	12.7	S	60	-12.7	****	280	26
27	-3.3	-6.0	-4.7	347	1.7	2.1	293	8.3	N	63	-11.1	****	343	27
28	-5.0	-15.7	-10.4	000	2.1	2.3	356	8.3	N	60	-16.9	****	545	28
29	-9.0	-16.2	-12.6	196	3.7	4.0	193	14.0	SSW	60	-17.9	****	348	29
30	-4.8	-12.8	-8.8	132	.9	2.4	140	11.4	N	42	-19.5	****	495	30
MONTH	6.6	-29.4	-12.9	201	.1	2.1	130	23.5	N	56	-20.6	****	22772	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 15.2
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 22.2
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 16.5
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 17.8

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.

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R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR DENALI WEATHER STATION
DATA TAKEN DURING December, 1981

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	-1.9	-11.8	-6.9	167	5.7	6.4	147	17.8	SE	42	-17.1	****	403	1
2	-7.3	-15.4	-11.4	220	.6	1.9	228	6.3	SSW	57	-17.0	****	403	2
3	-4.7	-10.2	-7.5	267	.4	3.1	181	12.7	N	61	-14.6	****	288	3
4	-5.9	-17.5	-11.7	004	.5	2.4	191	10.2	N	51	-20.3	****	393	4
5	-14.4	-21.5	-18.0	332	.6	1.5	206	5.7	N	52	-25.2	****	423	5
6	-10.8	-25.9	-18.4	207	.3	1.5	171	6.3	N	55	-23.2	****	500	6
7	-19.8	-29.5	-24.7	345	.4	.9	357	4.4	N	51	-33.4	****	590	7
8	-22.3	-32.0	-27.2	008	.4	.7	339	2.5	N	48	-35.4	****	610	8
9	-21.9	-26.1	-24.0	179	.3	.5	158	1.9	S	51	-30.9	****	343	9
10	-20.3	-30.2	-25.3	032	.5	1.0	094	5.1	NNE	49	-32.5	****	353	10
11	-11.5	-24.1	-17.8	228	.6	2.0	196	6.3	N	55	-25.6	****	398	11
12	-6.6	-12.6	-9.6	202	2.0	2.6	222	7.6	SSW	62	-15.3	****	328	12
13	-10.2	-18.7	-14.5	354	.6	1.0	277	3.2	N	60	-21.8	****	478	13
14	-16.8	-25.3	-21.1	002	.4	.8	122	2.5	N	55	-27.6	****	413	14
15	-10.8	-19.9	-15.4	009	.4	.8	173	3.8	N	69	-21.7	****	318	15
16	1.2	-18.4	-8.6	188	2.7	3.2	187	20.3	S	59	-15.2	****	290	16
17	5.7	-3.4	1.2	174	4.0	5.1	145	22.2	SSW	63	-9.4	****	333	17
18	5.6	-3.5	1.1	164	4.7	5.3	139	31.7	SSW	51	-9.5	****	330	18
19	-2.6	-9.5	-6.1	007	2.7	3.5	005	10.2	N	56	-14.3	****	423	19
20	-7.8	-11.7	-9.8	055	.1	2.4	170	8.3	N	57	-17.0	****	335	20
21	-8.9	-15.6	-12.3	024	.3	1.5	066	5.1	N	61	-16.8	****	290	21
22	-10.7	-22.6	-16.7	195	.8	1.6	200	7.6	SSW	59	-22.0	****	295	22
23	-5.8	-17.0	-11.4	200	2.2	3.2	188	11.4	S	59	-16.5	****	293	23
24	-5.9	-11.5	-8.7	354	1.2	2.0	356	4.4	N	63	-14.6	****	335	24
25	-9.4	-17.1	-13.3	001	1.3	1.7	014	5.7	N	60	-19.5	****	375	25
26	-11.8	-18.7	-15.3	018	4.1	4.1	005	8.3	NNE	32	-29.2	****	440	26
27	-17.2	-35.6	-26.4	012	1.1	1.8	035	6.3	NNE	34	-39.3	****	478	27
28	-30.3	-38.3	-34.3	334	.3	.9	001	3.2	N	43	-42.4	****	508	28
29	-32.9	-40.7	-36.8	012	.2	.8	233	2.5	N	40	-42.4	****	583	29
30	-30.3	-41.7	-36.0	234	.1	.7	182	2.5	SSW	40	-41.6	****	453	30
31	-15.9	-34.5	-25.2	357	1.1	1.6	356	5.1	N	44	-33.5	****	398	31
MONTH	5.7	-41.7	-16.5	171	.2	2.1	139	31.7	N	53	-24.0	****	12391	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 29.2
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 27.9
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 21.0
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 16.5

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.

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R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR DENALI WEATHER STATION
DATA TAKEN DURING January, 1982

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	-26.1	-33.6	-29.9	194	.2	.8	139	3.2	SSW	46	-37.7	****	535	1
2	-26.0	-30.4	-28.2	205	.3	.6	213	2.5	SSW	45	-37.4	****	505	2
3	-29.6	-33.9	-31.8	311	.2	.6	116	1.9	N	43	-39.6	****	568	3
4	-17.4	-31.2	-24.3	019	.7	1.5	137	8.3	NNE	49	-28.8	****	403	4
5	-18.3	-29.0	-23.7	011	7.7	7.8	359	14.6	N	83	-41.0	****	341	5
6	-28.4	-39.8	-34.1	014	1.5	2.3	015	8.9	NNE	22	-45.1	****	435	6
7	-33.1	-42.4	-37.8	346	.7	1.3	346	3.8	N	23	-39.8	****	540	7
8	-22.2	-42.2	-32.2	353	1.6	2.1	359	5.7	N	24	-42.4	****	603	8
9	-19.0	-25.8	-22.4	150	3.6	4.6	138	12.1	SSE	21	-38.6	****	413	9
10	-18.1	-23.3	-20.7	035	1.1	1.8	166	8.3	NNE	43	-30.0	****	445	10
11	-16.8	-21.6	-19.2	011	1.4	1.5	018	5.1	NNE	54	-26.7	****	408	11
12	-15.3	-20.9	-18.1	359	.8	1.2	025	3.8	N	56	-24.0	****	375	12
13	-11.4	-24.7	-18.1	008	1.6	2.1	266	7.6	N	45	-28.7	****	688	13
14	-16.8	-29.5	-23.2	150	1.1	3.1	153	13.3	N	31	-36.6	****	578	14
15	-20.3	-31.6	-26.0	145	.2	2.1	192	11.4	N	37	-39.5	****	433	15
16	-13.4	-33.7	-23.6	004	1.1	1.6	011	7.6	N	36	-37.6	****	733	16
17	-13.0	-27.9	-20.5	014	3.2	3.6	018	9.5	NNE	29	-34.2	****	598	17
18	-11.7	-30.7	-21.2	010	2.6	2.9	010	13.3	N	42	-29.7	****	495	18
19	-12.4	-27.1	-19.8	003	2.0	2.2	007	11.4	N	40	-30.2	****	715	19
20	-23.4	-32.0	-27.7	357	.8	1.2	004	5.1	N	46	-36.4	****	630	20
21	19.1	-29.4	-5.2	188	7.4	7.7	185	19.0	S	28	-37.0	****	823	21
22	-21.9	-33.4	-27.7	198	1.9	3.6	190	14.0	N	19	-43.6	****	648	22
23	-24.3	-34.4	-29.4	350	.9	1.3	000	7.0	N	34	-41.7	****	845	23
24	-25.4	-33.5	-29.5	350	.9	1.2	009	5.1	N	41	-40.4	****	540	24
25	-27.0	-35.6	-31.3	206	.2	.7	198	2.5	S	37	-42.8	****	1059	25
26	-28.7	-38.1	-33.4	350	.4	1.0	019	4.4	N	39	-41.7	****	1078	26
27	-21.0	-36.3	-28.7	178	1.9	3.8	189	14.0	N	44	-35.5	****	493	27
28	-13.5	-22.6	-18.1	187	1.1	3.7	186	15.9	NNE	52	-25.0	****	445	28
29	-14.5	-21.2	-17.9	006	1.0	1.6	031	5.1	N	53	-24.9	****	603	29
30	-16.6	-23.8	-20.2	297	.6	1.2	342	3.2	NNW	52	-26.8	****	715	30
31	-15.1	-25.0	-20.1	004	1.1	1.2	017	3.2	N	52	-29.5	****	940	31
MONTH	19.1	-42.4	-24.6	016	.4	2.3	185	19.0	N	41	-35.3	****	18622	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 13.3
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 13.3
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 16.5
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 15.2

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 NOTES AT THE BACK OF THIS REPORT ****

R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR DENALI WEATHER STATION
DATA TAKEN DURING February, 1982

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	7.6	-22.8	-7.6	186	2.7	3.4	156	10.2	S	59	-16.8	****	568	1
2	-.8	-9.1	-5.0	185	7.2	7.3	190	14.6	S	58	-11.0	****	730	2
3	3.7	-5.0	-.7	188	5.5	5.6	186	10.8	S	59	-7.0	****	633	3
4	3.0	-.9	1.1	004	1.4	1.7	004	6.3	N	84	-4.8	****	636	4
5	-.8	-8.0	-4.4	***	0.0	0.0	248	.6	***	63	*****	****	1060	5
6	-3.8	-13.1	-8.5	328	.3	.4	324	3.2	NW	61	-14.8	****	1313	6
7	-5.0	-10.9	-8.0	300	.8	1.6	324	5.7	NW	59	-14.3	****	1258	7
8	-2.8	-15.7	-9.3	157	1.8	1.9	118	10.2	SSE	60	-14.4	****	510	8
9	-2.8	-8.4	-5.6	358	7.4	7.6	350	17.8	N	43	-16.4	****	1118	9
10	-7.9	-17.6	-12.8	011	5.4	5.5	021	13.3	N	27	-29.0	****	1145	10
11	-14.5	-25.9	-20.2	006	1.3	2.0	016	6.3	N	40	-33.8	****	1367	11
12	-19.8	-30.1	-25.0	334	.3	1.3	355	4.4	N	27	-38.3	****	1576	12
13	-11.7	-29.4	-20.6	002	1.9	2.4	356	9.5	N	31	-35.2	****	1093	13
14	-19.0	-28.7	-23.9	010	4.8	5.1	017	14.0	N	43	-37.7	****	887	14
15	-27.6	-30.6	-29.1	004	6.8	6.9	005	12.1	N	51	-44.8	****	1119	15
16	-21.4	-48.9	-35.2	355	1.9	3.3	359	14.1	N	49	-40.3	****	1346	16
17	-22.2	-29.8	-26.0	348	1.3	1.8	003	6.3	N	48	-36.1	****	1225	17
18	-19.7	-27.8	-23.8	002	7.6	7.6	002	15.9	N	32	-37.1	****	1510	18
19	-23.3	-28.2	-25.8	005	6.2	6.2	359	11.4	N	18	-42.4	****	1365	19
20	-22.4	-25.6	-24.0	019	6.1	6.2	006	10.8	NNE	18	-41.7	****	1613	20
21	-23.1	-28.7	-25.9	021	5.3	5.4	001	12.1	NNE	18	-42.8	****	1690	21
22	-24.4	-35.8	-30.1	011	1.0	1.8	025	7.0	NNE	20	-45.0	****	1728	22
23	-21.4	-36.8	-29.1	355	1.3	1.7	028	5.7	N	20	-43.7	****	1870	23
24	-21.8	-36.6	-29.2	353	.7	1.4	358	4.4	N	19	-43.8	****	1910	24
25	-18.9	-33.5	-26.2	353	1.4	1.7	006	4.4	N	18	-43.1	****	1933	25
26	-18.6	-31.8	-25.2	339	.5	1.2	337	4.4	N	18	-41.7	****	2003	26
27	-10.9	-24.4	-17.7	352	.4	1.1	358	3.8	N	16	-39.3	****	1923	27
28	-12.9	-26.2	-19.6	346	.5	1.1	306	3.2	N	30	-38.4	****	2109	28
MONTH	7.6	-48.9	-18.5	005	1.6	3.3	350	17.8	N	39	-31.6	****	37233	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 12.7
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 15.2
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 17.8
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 14.0

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 NOTES AT THE BACK OF THIS REPORT ****

MONTHLY SUMMARY FOR DENALI WEATHER STATION
DATA TAKEN DURING March, 1982

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	-13.5	-27.9	-20.7	359	.7	1.2	215	3.8	N	25	-37.6	****	2313	1
2	-12.6	-26.7	-19.7	346	.6	1.1	013	5.1	N	16	-39.7	****	2188	2
3	-12.8	-28.3	-20.6	356	.9	1.0	066	4.4	N	17	-39.1	****	2268	3
4	-15.3	-28.3	-21.8	286	.1	.9	136	3.2	N	20	-37.9	****	2068	4
5	-9.2	-19.0	-14.1	183	1.2	1.8	184	6.3	S	18	-34.0	****	1808	5
6	-8.3	-14.7	-11.5	167	1.5	2.9	181	8.9	S	40	-22.6	****	1650	6
7	-4.1	-13.5	-8.8	357	1.4	1.8	167	4.4	N	50	-17.9	****	2625	7
8	-5.2	-14.6	-9.9	003	1.3	1.5	004	4.4	N	52	-18.0	****	2058	8
9	-5.4	-15.9	-10.7	185	2.3	3.1	156	12.1	SSW	61	-17.5	****	1564	9
10	-6.2	-13.1	-9.7	005	2.5	2.6	353	6.3	N	61	-18.4	****	2491	10
11	-5.0	-15.8	-10.4	357	1.2	1.3	355	3.8	N	46	-21.4	****	1680	11
12	-9.6	-17.7	-13.7	013	3.6	3.6	000	8.9	NNE	55	-30.6	****	3156	12
13	-13.1	-24.9	-19.0	001	1.4	2.0	028	6.3	N					
192.059 DD														
											-36.3	****	3407	13
14	-14.2	-26.9	-20.6	357	1.5	1.5	356	3.2	N					
108.714 DD														
											-27.0	****	1809	14
15	-7.9	-16.5	-12.2	351	1.2	1.2	357	3.2	N	45	-22.4	****	1645	15
16	-7.2	-15.9	-11.6	194	2.6	3.2	192	9.5	SSW	49	-18.6	****	1715	16
17	2.2	-6.7	-2.3	161	8.9	9.1	146	18.4	SSE	36	-14.7	****	2283	17
18	-.3	-5.0	-2.7	169	3.1	3.8	158	12.7	SSE	40	-14.6	****	1910	18
19	2.4	-6.7	-2.2	153	7.0	7.4	150	19.0	SE	36	-14.6	****	2578	19
20	2.3	-3.2	-.5	155	7.8	8.4	135	17.8	SE	36	-14.2	****	3020	20
21	.6	-3.0	-1.2	158	7.5	8.0	162	15.9	SSE	40	-13.6	****	1953	21
22	.6	-6.4	-2.9	195	3.5	3.7	178	10.2	SSW	44	-13.9	****	3430	22
23	.5	-8.2	-3.9	196	1.6	2.5	165	10.8	S	43	-17.2	****	2913	23
24	-5.1	-12.2	-8.7	001	5.8	5.8	007	11.4	N	38	-22.5	****	3445	24
25	-8.9	-14.8	-11.9	004	7.1	7.1	357	12.1	N	32	-30.4	****	3523	25
26	-11.7	-19.6	-15.7	009	3.3	3.6	000	8.3	N	20	-34.9	****	3773	26
27	-7.2	-22.3	-14.8	285	.2	1.2	198	5.7	N	32	-30.5	****	3115	27
28	-7.4	-17.6	-12.5	356	1.4	1.8	357	5.1	N	30	-28.6	****	3815	28
29	-3.5	-17.8	-10.7	003	1.2	1.6	357	4.4	N	30	-27.6	****	4090	29
30	-10.3	-18.7	-14.5	012	3.4	3.4	358	6.3	NNE	20	-33.1	****	4168	30
31	-14.0	-24.5	-19.3	001	3.5	3.8	357	8.3	N	21	-36.8	****	4213	31
MONTH	2.4	-28.3	-11.5	106	.4	3.3	150	19.0	N	42	-25.4	****	82666	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 14.0
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 15.9
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 17.1
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 15.9

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

R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR DENALI WEATHER STATION
DATA TAKEN DURING April, 1982

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	-13.7	-19.7	-16.7	013	5.2	5.3	003	9.5	NNE	15	-37.3	0.0	4268	1
2	-14.3	-23.6	-19.0	011	4.1	4.2	002	7.6	N	15	-38.0	0.0	4325	2
3	-8.5	-25.6	-17.1	346	.6	1.0	002	4.4	N	21	-36.2	0.0	4548	3
4	-5.5	-22.2	-13.9	319	.2	1.4	193	6.3	N	13	-34.1	0.0	4115	4
5	1.7	-13.7	-6.0	322	.5	1.0	356	3.2	N	17	-28.6	0.0	4410	5
6	.8	-9.5	-4.4	191	2.8	3.2	182	10.8	SSW	11	-29.8	0.0	4578	6
7	2.6	-8.4	-2.9	350	2.3	3.1	355	8.9	N	22	-21.8	0.0	4155	7
8	1.2	-9.9	-4.4	221	.5	2.4	161	8.9	N	27	-22.7	0.0	3490	8
9	-2.0	-13.4	-7.7	006	3.3	3.3	001	7.6	N	35	-21.9	0.0	4988	9
10	-3.3	-15.8	-9.6	248	.3	1.8	173	9.5	N	26	-26.9	0.0	4668	10
11	-3.7	-11.2	-7.5	001	5.1	5.1	002	9.5	N	33	-23.1	0.0	5173	11
12	-5.3	-10.2	-7.8	358	8.4	8.4	356	13.3	N	12	-32.7	0.0	4475	12
13	-6.4	-11.8	-9.1	358	6.6	6.6	358	10.8	N	12	-33.0	0.0	4848	13
14	-.8	-13.4	-7.1	156	1.0	3.2	117	16.5	N	15	-29.8	0.0	4835	14
15	1.1	-8.7	-3.8	184	.8	2.8	141	12.7	SSW	15	-27.1	0.0	3763	15
16	-1.6	-13.4	-7.5	358	3.6	3.6	355	8.3	N	21	-27.6	0.0	5283	16
17	-3.5	-9.8	-6.7	005	3.9	4.0	005	7.6	N	12	-31.6	0.0	5328	17
18	-1.6	-11.8	-6.7	225	1.0	3.0	139	12.1	N	34	-22.1	0.0	4378	18
19	-5.6	-16.9	-11.3	005	2.6	2.7	004	8.9	N	46	-19.0	0.0	4860	19
20	3.5	-7.0	-1.8	141	1.7	4.3	159	17.1	N	37	-16.8	.6	4783	20
21	5.5	-6.5	-.5	290	.9	1.8	305	7.0	N	33	-18.8	0.0	5623	21
22	2.0	-4.1	-1.1	297	.6	2.0	282	9.5	WNW	25	-21.6	0.0	5323	22
23	.1	-8.0	-4.0	203	1.5	1.9	175	5.7	SSW	40	-16.8	0.0	4968	23
24	1.8	-5.0	-1.6	188	3.1	3.9	158	15.2	S	38	-15.5	0.0	5748	24
25	4.3	-2.8	.8	157	5.2	5.9	150	18.4	SSE	27	-18.6	0.0	5410	25
26	3.2	-5.9	-1.4	003	.7	1.9	347	7.0	N	33	-19.4	.2	5498	26
27	6.8	-3.6	1.6	113	1.1	3.1	148	18.4	N	27	-19.4	.2	4970	27
28	5.0	-1.5	1.8	124	2.1	3.5	127	15.9	SE	17	-24.2	0.0	5420	28
29	3.4	-5.7	-1.2	245	1.0	2.0	275	6.3	SSW	27	-22.1	0.0	6615	29
30	5.9	-7.2	-.7	357	3.3	3.3	356	6.3	N	37	-15.7	0.0	6343	30
MONTH	6.8	-25.6	-5.9	004	1.1	3.3	150	18.4	N	25	-25.1	1.0	146382	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 14.0
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 14.0
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 14.0
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 12.1

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.

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R & M CONSULTANTS, INC.

SUSITNA HYDROELECTRIC PROJECT

MONTHLY SUMMARY FOR DENALI WEATHER STATION
DATA TAKEN DURING May, 1982

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	3.4	-10.2	-3.4	355	1.4	1.6	345	3.8	N	24	-24.6	0.0	7010	1
2	.4	-8.1	-3.9	356	3.2	3.4	354	7.0	N	30	-19.9	0.0	6938	2
3	1.8	-9.1	-3.7	355	2.0	2.1	359	5.1	N	30	-21.6	0.0	6815	3
4	3.4	-6.9	-1.8	334	.9	2.0	356	7.0	N	33	-20.6	0.0	6238	4
5	4.9	-9.1	-2.1	004	2.4	2.7	332	6.3	N	17	-26.3	0.0	7018	5
6	7.4	-4.9	1.3	321	.8	2.2	199	7.0	N	20	-21.9	0.0	7065	6
7	6.9	.9	3.9	314	.6	1.5	288	6.3	N	33	-12.2	0.0	5343	7
8	7.0	1.2	4.1	235	.5	1.5	187	7.0	WSW	38	-10.7	0.0	4343	8
9	4.5	.6	2.6	197	3.5	3.7	183	10.2	SSW	52	-6.5	0.0	3330	9
10	6.9	.1	3.5	188	.9	1.8	173	4.4	S	50	-6.9	.4	4195	10
11	4.4	-.2	2.1	276	2.1	2.7	280	8.3	WNW	36	-15.6	2.2	6013	11
12	4.0	-2.3	.9	017	.8	1.6	185	5.1	N	65	-14.2	0.0	2967	12
13	4.5	-2.8	.9	346	1.9	2.0	353	7.6	N	25	-21.1	1.6	6120	13
14	6.6	-5.0	.8	350	2.4	2.6	319	6.3	N	21	-21.5	0.0	7295	14
15	7.4	-4.0	1.7	342	2.3	2.4	340	5.7	N	18	-23.2	0.0	7673	15
16	8.4	-3.8	2.3	032	2.2	2.7	068	7.0	N	15	-24.3	0.0	7198	16
17	6.8	-1.2	2.8	177	1.1	2.0	125	7.0	S	19	-24.8	0.0	4858	17
18	7.4	-.5	3.5	207	.1	1.5	350	7.6	N	51	-8.7	1.2	3570	18
19	6.9	-2.4	2.3	023	.9	2.6	195	7.6	N	25	-18.5	0.0	6840	19
20	4.6	-.8	1.9	237	.8	2.7	156	8.3	SSW	40	-10.6	.2	3393	20
21	6.8	-1.7	2.6	319	1.4	2.5	332	7.0	NW	23	-22.3	.2	6693	21
22	8.1	-2.8	2.7	041	.3	3.1	056	9.5	N	17	-23.2	0.0	6180	22
23	10.3	-.6	4.9	086	1.3	2.0	067	7.0	ENE	17	-24.4	0.0	7208	23
24	9.4	1.3	5.4	245	.5	2.6	292	9.5	S	22	-17.1	0.0	5178	24
25	8.7	2.2	5.5	307	1.7	2.4	278	9.5	WNW	29	-14.2	.2	4043	25
26	10.9	-.3	5.3	202	1.8	2.2	185	7.0	SSW	25	-18.2	0.0	4498	26
27	13.1	3.1	8.1	181	2.7	4.3	164	14.0	SSE	12	-23.5	0.0	6210	27
28	7.1	2.1	4.6	282	2.1	2.9	276	9.5	W	22	-18.9	0.0	5418	28
29	8.4	1.1	4.8	334	1.3	2.0	351	5.1	N	21	-19.3	0.0	4133	29
30	11.0	.9	6.0	356	3.3	3.4	000	7.6	N	25	-18.1	.2	6493	30
31	14.8	-.9	7.0	350	2.6	2.8	321	7.0	N	10	-25.2	0.0	8330	31
MONTH	14.8	-10.2	2.5	331	.7	2.4	164	14.0	N	28	-18.7	6.2	178601	

GUST VEL. AT MAX. GUST MINUS 2 INTERVALS 9.5
GUST VEL. AT MAX. GUST MINUS 1 INTERVAL 11.4
GUST VEL. AT MAX. GUST PLUS 1 INTERVAL 11.4
GUST VEL. AT MAX. GUST PLUS 2 INTERVALS 8.9

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 NOTES AT THE BACK OF THIS REPORT ****

ATTACHMENT B

STREAMGAGE RECORDS PRIOR TO FREEZEUP FROM DENALI, NEAR CANTWELL (VEE CANYON), WATANA, GOLD CREEK AND SUSITNA STATION

9-192-a. (Rev. May 1971)

Daily Gage Height, in Feet, and Discharge, in Cubic Feet, per Second, of Susitna

At / Near Susitna Station **for the Year Ending September 30, 19**92

Drainage Area ..... **Square Miles.** **Water-Stage Recorder** ..... **Ratio** ..... : .....

Day	October		November		December		January		February		March	
	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge
1	7.64	33,300										
2		32,000										
3		30,900										
4		30,300										
5		29,900										
6		29,300										
7	7.06	28,500										
8		—										
9		27,000										
10		—										
11		—										
12		—										
13		28,700										
14		33,400										
15		33,900										
16		32,400										
17	7.94	32,400										
18		—										
19		—										
20	—	27,000										
21	—	27,000										
22		—										
23		—										
24		68,400										
25		—										
26		—										
27		—										
28		—										
29	—	32,000	ice on		Oct 30							
30			and dead		bat's							
31												
Total												
Mean												
Maximum												
Minimum												
Cfsm												
Runoff in inches												
Acre-feet												

Max. G. H. ..... ft. at ..... on .....

Min. G. H. ..... ft. on .....

(G. H. ..... ft.).

(G. H. ..... ft.).

Max Disch. ..... CFS at ..... on .....

Min. Disch. ..... CFS on .....

Calendar Year .....

U.S. GOVERNMENT

)-192-a. (Rev. May 1971)

Daily Gage Height, in Feet, and Discharge, in Cubic Feet, per Second, of SUSITNA

At GOLD CREEK ALASKA for the Year Ending September 30, 1982

Drainage Area 6160 Square Miles. Water-Stage Recorder Ratio 1 : 12

Max Disch. ..... CFS at ..... on ..... (G. H. ..... ft.). Max. G. H. ..... ft. at ..... on .....

Min. Disch. ..... CFS on ..... (G. H. ..... ft.). Min. G. H. ..... ft. on .....

Day	October		November		December		January		February		March	
	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Dis
1	7.15	8250	5.76	4420								
2	7.03	7890										
3	6.91	7550									E205	
4	6.88	7490										
5	6.93	7590										
6	6.90	7500										
7	6.83	7290										
8	6.79	7170										
9	6.76	7080										
10	6.75	7050										
11	6.70	6900										
12	6.70	6900										
13	6.87	7410										
14	7.03	7890										
15	7.21	8440										
16	7.17	8310										
17	7.02	7860										
18	6.92	7560										
19	6.67	6810										
20	6.44	6180					E6.4					
21	6.63	6690										
22	6.94	7620										
23	7.27	8640										
24	7.65	10,000										
25	7.56	9660										
26	7.29	8720										
27	7.04	7920										
28	6.75	7050		ice started								
29	6.38	5950		to show on				free				
30	6.05	5120		from orifice							E206	
31	5.81	4520										
Total												
Mean												
Maximum												
Minimum												
Cfsm												
Runoff in inches												
Acre-feet												

Calendar Year

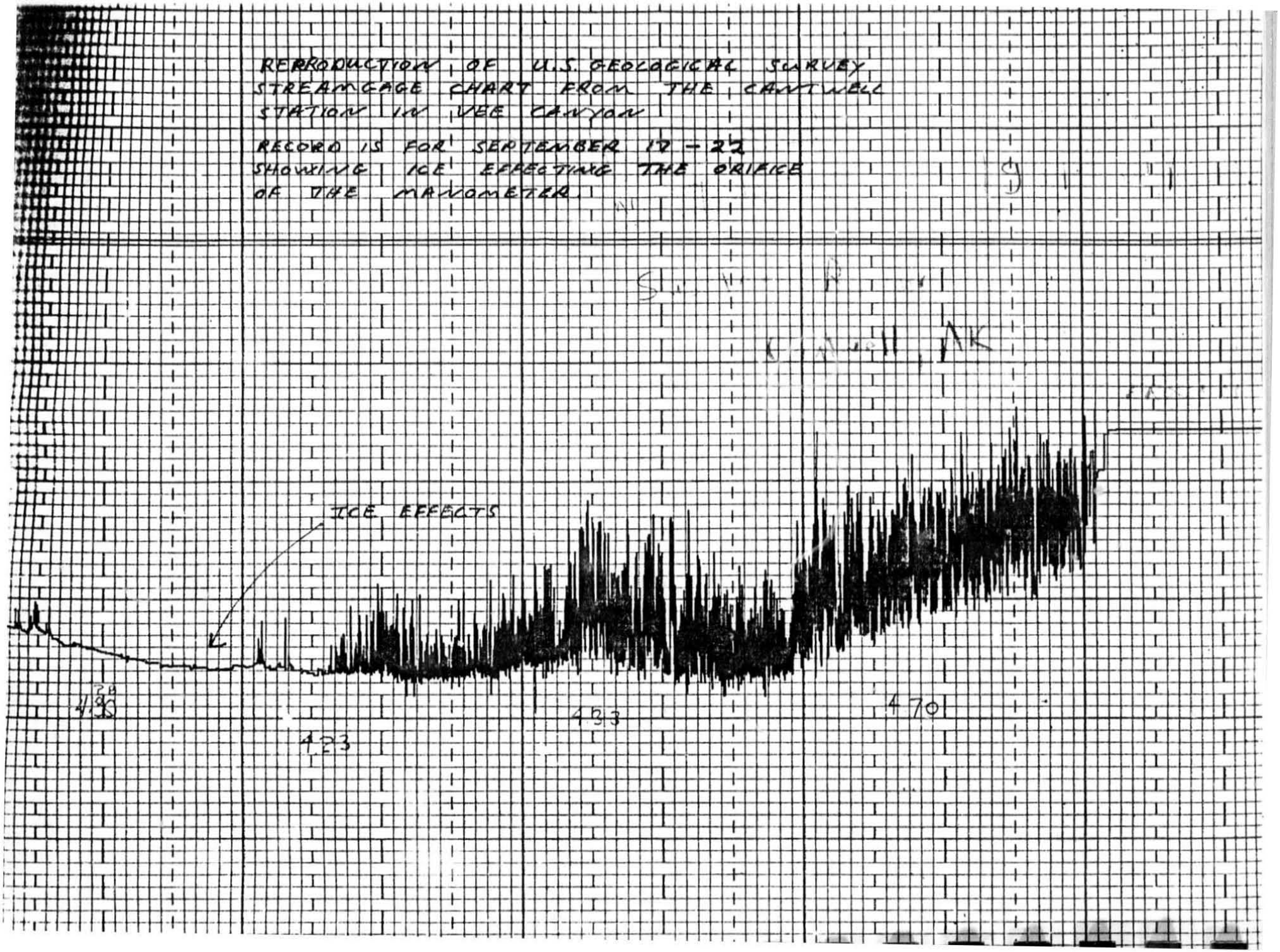
Daily Gage Height, in feet, and discharge, in cubic feet per second Susitna River at Watana for the year ending September 30, 1982.

Day	October		November		December		January		February		March	
	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge
1	35.35	6,200	34.10	2,600								
2	35.21	5,700	34.09	2,600								
3	35.12	5,500	34.02	2,400								
4	35.20	5,700	34.10	2,600								
5	35.20	5,700	34.17	2,800								
6	35.14	5,500	34.12	2,600								
7	35.10	5,400	34.11	2,600								
8	35.10	5,400	34.07	2,550								
9	35.07	5,300	34.09	2,600								
10	35.05	5,200	34.20	2,900								
11	35.01	5,100	34.34	3,250								
12	35.02	5,100	34.35	3,250								
13	35.13	5,500	34.10	2,600								
14	35.37	6,300	34.00	2,400								
15	35.53	7,000	33.95	2,300								
16	35.41	6,400	33.90	2,200								
17	35.28	5,900	33.95	2,300								
18	35.17	5,600	34.12	2,650								
19	34.84	4,650	34.25	3,000								
20	34.74	4,350	34.37	3,300								
21	34.93	4,900	*									
22	35.12	5,450										
23	35.43	6,500										
24	35.64	7,450										
25	35.51	6,800										
26	35.32	6,050										
27	35.10	5,400										
28	34.80	4,500										
29	34.43	3,500										
30	34.22	2,950										
31	34.10	2,600										
Total		167,600										
Mean		5,407										
Maximum		7,450										
Minimum		2,600										
Cfsm		3.24										
Runoff in inches												
Acre-feet												

Year

REPRODUCTION OF U.S. GEOLOGICAL SURVEY STREAMGAGE CHART FROM THE CANTWELL STATION IN VEE CANYON

RECORD IS FOR SEPTEMBER 19 - 22 SHOWING ICE EFFECTING THE ORIFICE OF THE MANOMETER.



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Susitna River at Denali — Station Number 15291000

1981 WY

Used rating table dated # 5

Gage Read to ..... Once / Twice a Day by .....

Gage heights used to half tenths between ..... and ..... feet; hundredths below and tenths above these limits.

Day	April Gage height	April Discharge	May Gage height	May Discharge	June Gage height	June Discharge	July Gage height	July Discharge	August Gage height	August Discharge	September 81 Gage height	September Discharge
1		220		260	11.08	9,740	10.30	4,900	S	12,100	10.70	8,190
2				300	10.83	7,910	10.08	4,020	11.98	18,600	10.33	5,900
3				350	10.72	7,220	9.96	3,580	11.67	15,000	10.06	4,620
4				500	10.59	6,440	10.07	3,980	11.24	11,000	10.05	4,580
5				650	10.73	7,280	10.28	4820	11.15	10,300	9.93	4,100
6				1000	10.53	6,070	10.65	6,800	11.03	9,340	10.05	4,580
7				1500	10.42	5,500	10.75	7,400	11.37	12,100	10.08	4,700
8				2500	10.40	5,400	10.83	7,910	12.18	21,000	9.75	3,460
9				2200	10.32	5,000	10.94	8,680	12.25	22,000	9.56	2,890
10		220		2100	10.10	4,100	11.51	13 400	12.25	22,000	9.52	2,770
11		200		1900	10.16	4,340	12.03	19,200	11.94	18,100	9.48	2,660
12				1800	10.20	4,500	12.10	20,000	11.70	15,300	9.45	2,580
13				1600	10.36	5,200	11.72	15,500	11.90	17,600	9.33	2,260
14				1900	10.51	5,960	11.35	12,000	11.76	16,100	9.14	1,780
15				2200	10.63	6,680	11.48	13,100	11.46	13,200	9.12	1,740
16				2600	10.75	7,400	11.80	16,400	11.26	11,500	9.35	2,310
17			9.90	2930	10.83	7,910	12.03	19,200	10.66	7,220	9.25	2,050
18			10.00	3280	10.86	8,120	12.02	19,000	10.33	5,400	9.15	1810
19			10.20	3940	10.85	8,050	12.00	18,800	10.42	5,960	9.22	1,980
20			10.14	3740	10.89	8,330	11.80	16,400	10.90	9,100	9.58	2,950
21			10.09	3610	10.90	8,400	11.67	15,000	10.98	9,820	9.41	2,470
22			9.87	3010	10.90	8,400	11.49	13,200	11.06	10,600	9.16	1,830
23			9.78	2770	11.00	9,100	11.48	13,100	11.04	10,500	9.03	1,540
24			9.88	3100	11.00	9,100	11.61	14,400	10.65	7,770	9.02	1400
25			9.96	3370	10.98	8,960	11.53	13,600	10.48	6,800	9.02	1300
26		200	10.13	3980	11.00	9,100	11.64	14,700	10.50	6,920	9.02	1300
27		220	10.36	4950	11.07	9,660	11.32	11,700	10.79	8,820	9.02	1200
28			10.58	6200	10.95	8,750	11.09	9,820	10.87	9,420	9.02	1200
29		220	10.68	6860	10.52	6,020	11.02	9,260	10.96	10,100	9.02	1100
30		240	10.82	7,770	10.55	6,200	11.01	9,180	10.85	9,260	SHUT DOWN	1000
31			11.16	10400			10.91	8,470	10.85	9,260		
Period		6300		93,320		214,850		367,520		372,190		82,250
Year												1239,350

Quarter — Computed — Checked — Date: 12/23/82

First: — WM

Second: WM

Third: TN SWL

Fourth: TN SWL

Disch. applied — Disch. checked — Date: SWL

G.H. copied: G.S. — G.H. checked: SWL — Date

Q = 3,395

ATTACHMENT C

DAILY NATIONAL WEATHER SERVICE RECORDS OF STAGE AND WATER TEMPERATURE FOR THE TALKEETNA RIVER FROM SEPTMEBER 1981 TO OCTOBER 1981 AND APRIL 1982 THROUGH MAY 1982.

STATION (Climatological) TALKeetna (River Station, if different) River

MONTH Sept 1981

RIVER TALKeetna

TYPE OF RIVER GAGE Wire

COUNTY M-S-B

TIME (local) OF OBSERVATION RIVER | TEMPERATURE | PRECIPITATION

STANDARD TIME IN USE A.S.T.

STATE ALASKA

ELEVATION OF RIVER GAGE ZERO Ft.

FLOOD STAGE Ft.

NORMAL POOL STAGE Ft.

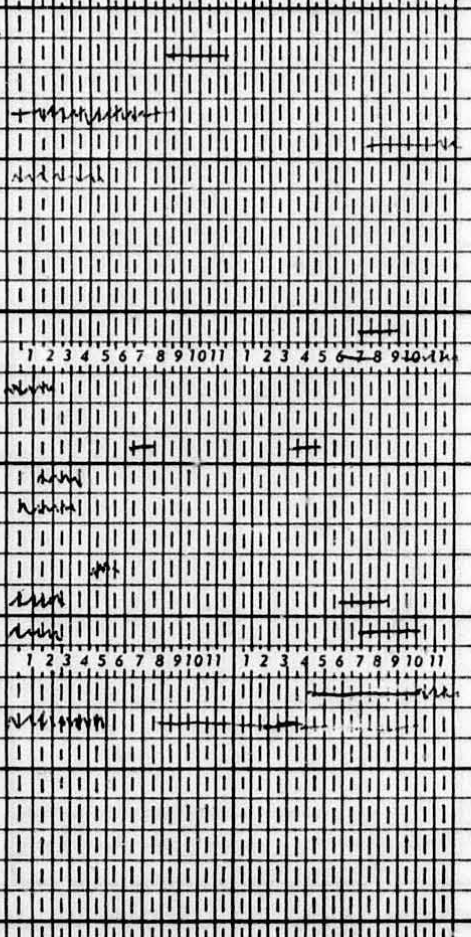
WS FORM E-15 (10-77)

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

DATE	RIVER STAGE: CONDITION	RIVER STAGE: GAGE READING AT 7:30 A.M.	RIVER STAGE: TENDENCY	TEMPERATURE °F: 24 HRS. ENDING AT OBSERVATION: MAX.	TEMPERATURE °F: 24 HRS. ENDING AT OBSERVATION: MIN.	TEMPERATURE °F: AT OBSN.	PRECIPITATION: 24-HR AMOUNTS: Rain, melted snow, etc. (ins. & hundredths)	PRECIPITATION: 24-HR AMOUNTS: Snow, ice pellets, hail (ins. & tenths)	PRECIPITATION: At Ob. Snow, ice pellets, hail, ice on ground (ins.)	WEATHER (Calendar Day): MARK 'X' FOR ALL TYPES OCCURRING EACH DAY: FOG	ICE PELLETS	GLAZE	THUNDER	HAIL	DAMAGING WINDS	Time of Obsn. if different from above
1		3-05	F			42										
2		2-80	F			43										
3		2-60	F			43										
4		2-50	F			50										
5		2-20	F			40										
6		2-20	S			40										
7		2-20	S			36										
8		2-10	F			40										
9		1-90	F			38										
10		1-60	F			42										
11		1-60	S			40										
12		1-60	S			38										
13		1-70	R			32										
14		1-50	F			30										
15		1-30	F			40										
16		1-40	R			38										
17		1-20	F			40										
18		1-20	S			45										
19		1-10	F			42										
20		1-10	S			30										
21		1-20	R			30										
22		0-00	F			20										
23		0-95	F			38										
24		1-20	R			32										
25		1-30	R			20										
26		1-10	F			10										
27		0-90	F			28										
28		0-90	S			18										
29		0-80	F			30										
30		0-70				20										
31																
SUM			X			X			X	Fog	Ice Pel.	Glaze	Thun-der	Hail	Damag winds	

PRECIPITATION — Draw a straight line (———) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved.



SPECIAL OBSERVATIONS OF PRECIPITATION & RIVER STAGES

DATE	TIME OF OBSERVATION	PRECIPITATION SINCE 7 A.M.	RIVER: STAGE	RIVER: TENDENCY	CREST STAGE, DATE AND TIME, DEPTH OF SNOW OR ICE, STATE OF WEATHER AT TIME OF OBSERVATION

IF MORE SPACE IS NEEDED, USE ADDITIONAL FORM

REMARKS

CONDITION OF RIVER AT GAGE
A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

SUM

Greatest

CHECK BAR (For wire-weight) NORMAL CK BAR

READING 23-85 DATE 1st OF MONTH

23-85 Last Day of Month

SUPERVISING OFFICE R.F.C. Anchorage

STATION INDEX NO.

OBSERVER Nellie Atwater

C-2

STATION (Climatological) TALKEETNA (River Station, if different) | MONTH OCT | 19 81

RIVER TALKEETNA | TYPE OF RIVER GAGE WIRE | COUNTY MAT-SU-BOR

TIME (local) OF OBSERVATION RIVER | TEMPERATURE | PRECIPITATION | STANDARD TIME IN USE A.S.T.

STATE ALASKA | ELEVATION OF RIVER GAGE ZERO Ft. | FLOOD STAGE Ft. | NORMAL POOL STAGE Ft.

WS FORM E-15 (10-77)

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

DATE	CONDITION	RIVER STAGE: GAGE READING AT 7:30 A.M.	RIVER STAGE: TENDENCY	TEMPERATURE F.: 24 HRS. ENDING AT OBSERVATION: MAX.	TEMPERATURE F.: 24 HRS. ENDING AT OBSERVATION: MIN.	TEMPERATURE F.: AT OBSN.	PRECIPITATION: Draw a straight line (———) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved. A.M. 1 2 3 4 5 6 7 8 9 10 11 NOON P.M. 1 2 3 4 5 6 7 8 9 10 11	24-HR AMOUNTS: Rain, melted snow, etc. (Ins. & hundredths)	24-HR AMOUNTS: Snow, ice pellets, hail (Ins. & tenths)	At Ob. Time: Snow, ice pellets, hail, ice on ground (Ins.)	WEATHER (Calendar Day) MARK 'X' FOR ALL TYPES OCCURRING EACH DAY: FOG	ICE PELLETS	GLAZE	THUNDER	HAIL	DAMAGING WINDS	Time of Obsn. if different from above
1		0-70	S			18											
2		0-70	S			20											
3		0-60	F			30											
4		0-50	F			30											
5		0-50	S			28											
6		0-40	F			28											
7		0-40	S			20											
8		0-40	S			26											
9		0-30	F			20											
10		0-30	S			20											
11		0-30	S			30											
12		0-30	S			34											
13		0-40	R			36											
14		0-60	R			38											
15		0-60	S			32											
16		0-60	S			30											
17		0-60	S			24											
18		0-50	F			32											
19		0-50	S			14											
20		0-20	F			30											
21		0-20	S			34											
22		0-80	R			40											
23		1-10	R			36											
24		1-60	R			40											
25		1-50	F			30											
26		1-20	F			24											
27	G	0-80	F			12											
28	F	0-70	F			24											
29	G	0-70	S			18											
30	G	0-40	F			16											
31		0-40	S			18											
SUM			X			X											

SPECIAL OBSERVATIONS OF PRECIPITATION & RIVER STAGES

DATE	TIME OF OBSERVATION	PRECIPITATION SINCE 7 A.M.	RIVER: STAGE	RIVER: TENDENCY	CREST STAGE, DATE AND TIME, DEPTH OF SNOW OR ICE, STATE OF WEATHER AT TIME OF OBSERVATION

IF MORE SPACE IS NEEDED, USE ADDITIONAL FORM

REMARKS

CHECK BAR (For wire-weight) NORMAL CK. BAR

READING 23-85 | DATE 15TH OF MONTH

CONDITION OF RIVER AT GAGE
A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice
G. Floating
H. Special stage

SUM | Greatest

SUM: Fog | Ice Pel. | Glaze | Thun-der | Hail | Damag winds

OBSERVER Nellie A Twater

SUPERVISING OFFICE R. [illegible]

STATION INDEX NO.

C-3

STATION (Climatological) TALKEETNA (River Station, if different)

MONTH April 19 82

RIVER TALKEETNA

TYPE OF RIVER GAGE WIRE

COUNTY MAT-SU-BOR

TIME (local) OF OBSERVATION RIVER 7.30 AM

TEMPERATURE — PRECIPITATION —

STANDARD TIME IN USE AST

STATE ALASKA

ELEVATION OF RIVER GAGE ZERO ~~~ Ft.

FLOOD STAGE — Ft.

NORMAL POOL STAGE — Ft.

WS FORM E-15 (10-77)

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

DATE	RIVER STAGE: CONDITION	RIVER STAGE: GAGE READING AT 7.30 A.M.	RIVER STAGE: TENDENCY	TEMPERATURE °F: 24 HRS. ENDING AT OBSERVATION: MAX.	TEMPERATURE °F: 24 HRS. ENDING AT OBSERVATION: MIN.	TEMPERATURE °F: AT OBSN.
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22	B	Frozen				32
23						
24						
25						
26						
27		Frozen as yet				34
28						
29						
30						
31						
SUM			X			X

PRECIPITATION

Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved.

A.M. NOON P.M.
1 2 3 4 5 6 7 8 9 10 11 | 1 2 3 4 5 6 7 8 9 10 11

24-HR AMOUNTS

DATE	Rain, melted snow, etc. (ins. & hundreths)	Snow, ice pellets, hail (ins. & tenths)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
SUM		

WEATHER (Calendar Day)

DATE	At Ob. Snow, ice pellets, hail, ice on ground (ins.)	FOG	ICE PELLETS	GLAZE	THUNDER	HAIL	DAMAGING WINDS	Time of Obsn. if different from above
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
SUM	X							

MARK 'X' FOR ALL TYPES OCCURRING EACH DAY

SPECIAL OBSERVATIONS OF PRECIPITATION & RIVER STAGES

DATE	TIME OF OBSERVATION	PRECIPITATION SINCE 7 A.M.	RIVER: STAGE	RIVER: TENDENCY	CREST STAGE, DATE AND TIME, DEPTH OF SNOW OR ICE, STATE OF WEATHER AT TIME OF OBSERVATION

IF MORE SPACE IS NEEDED, USE ADDITIONAL FORM

REMARKS

CHECK BAR (For wire-weight) NORMAL CK. BAR

READING	DATE

CONDITION OF RIVER AT GAGE
A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

	SUM	Fog	Ice Pel.	Glaze	Thunder	Hail	Damag winds
Greatest							

OBSERVER Nellie Atwater

SUPERVISING OFFICE R.F.C. Anchorage

STATION INDEX NO.

C-4

STATION (Climatological) Talkeetna (River Station, if different) | MONTH May | 19 82

RIVER Talkeetna | TYPE OF RIVER GAGE Wire | COUNTY Mat-Su-Bor

TIME (local) OF OBSERVATION RIVER 7.30 AM. | TEMPERATURE | PRECIPITATION | STANDARD TIME IN USE A.S.T.

STATE Alaska | ELEVATION OF RIVER GAGE ZERO ——— Ft. | FLOOD STAGE ——— Ft. | NORMAL POOL STAGE ——— Ft.

WS FORM E-15 (10-77)

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

DATE	RIVER STAGE: CONDITION	RIVER STAGE: GAGE READING AT 7.30 A.M.	RIVER STAGE: TENDENCY	TEMPERATURE °F.: 24 HRS. ENDING AT OBSERVATION: MAX.	TEMPERATURE °F.: 24 HRS. ENDING AT OBSERVATION: MIN.	TEMPERATURE °F.: AT OBSN.	PRECIPITATION: Rain, melted snow, etc. (Ins. & hundredths)	PRECIPITATION: Snow, ice pellets, hail (Ins. & tenths)	PRECIPITATION: At Ob. Snow, ice pellets, hail, ice on ground (Ins.)	WEATHER (Calendar Day): FOG	ICE PELLETS	GLAZE	THUNDER	HAIL	DAMAGING WINDS	Time of Obsn. if different from above
1	F	1-80				30								X		
2	F	1-80	S			30								Trace		
3	F	1-80	S			30										
4	F	1-80	S			30										
5	F	1-80	S			30										
6	F	1-80	S			34										
7	F	1-80	S			32										
8	F	2-10	F			40										
9	F	2-20	S			40										
10	F	0-60	F			40										
11	F	0-70	R			34										
12	F	0-70	S			34										
13	F	0-60	F			37										
14	F	0-50	F			38										
15	F	0-70	R			40										
16	F	0-70	S			38										
17	F	1-20	R			40										
18	F	1-20	S			34										
19	F	1-30	R			40										
20	F	1-50	R			40										
21		1-20	F			40										
22		1-15	F			38										
23		1-30	R			45										
24		1-60	R			40										
25		1-80	R			44										
26		2-00	R			42										
27		1-90	F			46										
28		2-10	R			40										
29		2-15	R			40										
30		1-90	F			44										
31		2-35	R			46										
SUM																

PRECIPITATION — Draw a straight line (———) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved.

A.M. 1 2 3 4 5 6 7 8 9 10 11 NOON 1 2 3 4 5 6 7 8 9 10 11 P.M.

WEATHER (Calendar Day) — 24-HR AMOUNTS; MARK 'X' FOR ALL TYPES OCCURRING EACH DAY

SPECIAL OBSERVATIONS OF PRECIPITATION & RIVER STAGES

DATE	TIME OF OBSERVATION	PRECIPITATION SINCE 7 A.M.	RIVER: STAGE	RIVER: TENDENCY	CREST STAGE, DATE AND TIME, DEPTH OF SNOW OR ICE, STATE OF WEATHER AT TIME OF OBSERVATION

IF MORE SPACE IS NEEDED, USE ADDITIONAL FORM

REMARKS

CONDITION OF RIVER AT GAGE
A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice
D. Ice gorge above gage.
E. Ice gorge below gage.
[illegible] ice
[illegible] floating
[illegible] pool sta

CHECK BAR (For wire-weight) NORMAL CK BAR | READING 23-95 | DATE 5-31-82

SUPERVISING OFFICE [illegible] R C [illegible] Nor [illegible]

STATION INDEX NO.

OBSERVER Nellie Atwater

C-5

ATTACHMENT D

WINTER 1981 - 1982
R&M PHOTOGRAPHY INDEX

AERIAL RECONNAISANCE OF THE SUSITNA RIVER
R&M PHOTOGRAPHY INDEX*

Date: October 2, 1981

Slide Number	Description
1	Near confluence
2	Slough near LRX-4
3	Susitna near Whiskers Creek
4	Mainchannel near Curry
5	At Curry
6	Upstream of Curry
7	Downstream of Gold Creek
8	Near Slough 21
9	At Devil Canyon
10	Upper Devil Canyon
11	Upstream of Devil Creek
12	Upstream of Devil Creek
13	Mainchannel Downstream of Fog Creek
14	Fog Creek Confluence
15	Watana Streamgage
16	Near Damsite at Watana
17	Mainchannel at water quality monitor
18	Near water quality monitor site
19	At W.Q. monitor site
20	Upstream of Deadman Confluence
21	Upstream of Deadman Confluence
22	Downstream of Vee Canyon

* Note: All photographs are kept on file at R&M Consultants, 5024 Cordova Street, Anchorage, Alaska 99503

AERIAL RECONNAISANCE OF THE SUSITNA RIVER
PHOTOGRAPHY INDEX

Date: October 6, 1981

Slide Number	Description
1	Lower river near mouth, no ice, light snow
2	At River Mile 28*
3	Deshka Confluence
4	Deshka Confluence
5	Susitna Landing
6	Susitna Landing
7	Susitna Landing
8	Parks Highway Bridge
9	At River Mile 90
10	At River Mile 91
11	At River Mile 92
12	Talkeetna And Talkeetna River Confluence
13	Susitna and Chulitna Confluence
14	Chuitna at Confluence
15	At River Mile 99
16	River Mile 103 at LRX-9
17	At Curry
18	Curry and Deadhorse Creek
19	At River Mile 122
20	At River Mile 122
21	River Mile 124 at LRX-28
22	River Mile 125 at Slough 8
23	River Mile 129 at Slough 9
24	River Mile 130 at Slough 9

* Note: Refer to the R&M Hydrographic Survey maps for river mile orientation.

AERIAL RECONNAISANCE OF THE SUSITNA RIVER
PHOTOGRAPHY INDEX

Date: October 6, 1981 - Continued

Slide Number	Description
25	River Mile 136 Below Gold Creek
26	At Gold Creek
27	River Mile 140 at Slough 20
28	River Mile 141 at Slough 21
29	River Mile 142 at Slough 21
30	At River Mile 143
31	River Mile 144 at Slough 22
32	River Mile 144 at Jacklong Creek
33	At Devil Canyon

Date: October 29, 1981

Slide Number	Description
10A	Mouth of Susitna
11A	Mouth of Susitna
12A	Near Mouth of Susitna
13A	Near Mouth of Susitna
14A	Near Mouth of Susitna
15A	Near Mouth of Susitna
16A	Lower Susitna Shore Ice
17A	Lower Susitna Shore Ice
18A	Alexander Slough

AERIAL RECONNAISANCE OF THE SUSITNA RIVER
PHOTOGRAPHY INDEX

Date: October 29, 1981 - Continued

Slide Number	Description
19A	Main Channel, Near Flathorn Lake
20A	Main Channel, Near Flathorn Lake
21A	Alexander Slough cutoff
22A	Susitna Station
23A	Susitna Station
24A	Yentna River Confluence
25A	Yentna River Confluence
27A	Upstream of Yentna Confluence
28A	Near Kroto Slough
29A	Kroto Slough
30A	Kroto Slough
31A	Near Deshka Confluence
33A	Deshka River Confluence
34A	East Side of Delta Islands
35A	East Side of Delta Islands
2B	Below Montana Creek Confluence
3B	Montana Creek Confluence
4B	Parks Highway Bridge
5B	Parks Highway Bridge
6B	Parks Highway Bridge
7B	Parks Highway Bridge
8B	Susitna Main Channel at Sunshine
9B	Main Channel, 3 miles above Sunshine Bridge
10B	River Mile 87
11B	River Mile 95, Below Talkeetna
12B	Talkeetna River at Talkeetna

AERIAL RECONNAISANCE OF THE SUSITNA RIVER
PHOTOGRAPHY INDEX

Date: October 29, 1981 - Continued

Slide Number	Description
13B	Talkeetna River Confluence
14B	Talkeetna River Confluence
15B	Talkeetna River Confluence
16B	Chulitna and Susitna Confluence
17B	Chulitna River at Confluence
18B	Chulitna River Above Confluence
19B	Chulitna and Susitna Confluence
21B	Chulitna and Susitna Confluence
22B	Chulitna and Susitna Confluence
23B	Susitna about 5 miles above confluence
24B	Chase at LRX-9
26B	Main channel at Chase siding
27B	About 1 mile above Chase
28B	River Mile 111
29B	River Mile 114
30B	River Mile 116
31B	River Mile 117.4
32B	Talkeetna River

Date: November 2, 1981

Slide Number	Description
9A	Susitna Confluence
10A	Susitna Mainchannel at LRX-4
11A	Mainchannel at LRX-9

AERIAL RECONNAISANCE OF THE SUSITNA RIVER
PHOTOGRAPHY INDEX

Date: November 2, 1981 - Continued

Slide Number	Description
12A	Ice Pans near Chase
13A	Ice Floes Upstream of Chase
14A	Mainchannel at Curry, River Mile 120
15A	Mainchannel Upstream of Curry
16A	Near LRX-25
17A	Near LRX-28
18A	Near LRX-28
19A	Mouth of Skull Creek
20A	Near River Mile 127
21A	Near River Mile 136
22A	Near Gold Creek Bridge
23A	At Gold Creek Bridge
24A	At Gold Creek Bridge
25A	Indian River Confluence
26A	Rock near Indian River Confluence
27A	Portage Creek Confluence
28A	Portage Creek, looking upstream
29A	Mouth of Devil Canyon
30A	Near Devil Canyon, Looking Downstream
31A	Ice Cover in Devil Canyon
32A	Upstream end of ice cover in Devil Canyon
33A	Downstream through Devil Canyon
34A	Devil Canyon near Crest Gages
35A	Upper Devil Canyon
36A	Upper Devil Canyon
37A	Upper Devil Canyon

AERIAL RECONNAISANCE OF THE SUSITNA RIVER
PHOTOGRAPHY INDEX

Date: November 2, 1981 - Continued

Slide Number	Description
38A	Near Deadman Creek Confluence
4B	Mainchannel at Deadman Creek Crest Gage
5B	Near Watana Creek Confluence
6B	Watana Creek Confluence
7B	Watana Creek Confluence
8B	Multi-Channel Reach Upstream of Watana Creek
9B	Kosina Creek Confluence
10B	Jay Creek Confluence
11B	Mouth of Vee Canyon
12B	Vee Canyon
13B	Entrance to Vee Canyon
14B	Near Watana Streamgage Site
15B	View Downstream at Watana Stream Gage Site
20B	Susitna and Chulitna Confluence
21B	Susitna and Chulitna Confluence
22B	Talkeetna River Confluence

Date: November 18, 1981

Slide Number	Description
3	Mouth of Susitna River
4	Mouth of Susitna River

AERIAL RECONNAISANCE OF THE SUSITNA RIVER
PHOTOGRAPHY INDEX

Date: November 18, 1981 - Continued

Slide Number	Description
5	Head of Alexander Slough
8	Parks Highway Bridge
9	Talkeetna River at Confluence
10	Chulitna Confluence
11	Susitna near Chase
12	Susitna near Chase
13	Susitna at Curry
14	Susitna at LRX-28
15	Susitna at Sherman
16	Gold Creek
17	Portage Creek
18	Head of Devil Canyon
19	Devil Canyon
20	Downstream of Devil Canyon
21	Devil Canyon
25	Alexander Slough near mouth
26	Susitna Landing
27	Parks Highway Bridge
29	Chulitna Confluence
30	Talkeetna Confluence
31	Curry Siding
32	Gold Creek Bridge
33	Portage Creek Confluence
34	Devil Canyon
35	Devil Creek Confluence

AERIAL RECONNAISANCE OF THE SUSITNA RIVER
PHOTOGRAPHY INDEX

Date: December 2, 1981

Slide Number	Description
28	Talkeetna River Confluence
29	Susitna Confluence
30	Upstream of Devil Canyon

Date: January 4, 1982

Slide Number	Description
1A	Susitna Confluence
2A	Susitna Confluence
3A	Susitna near Curry
4A	Curry
5A	Near Sherman
6A	Sherman and 4th of July Creek
7A	Gold Creek Bridge and Slough 11
8A	Gold Creek Bridge
9A	Indian River Confluence
10A	Indian River Confluence
11A	Portage Creek Confluence
12A	Devil Canyon
13A	Devil Canyon
14A	Upper Devil Canyon
15A	Upper Devil Canyon
16A	Tsusena Creek
17A	Watana Streamgage Site
18A	Water Quality Monitor Site

AERIAL RECONNAISANCE OF THE SUSITNA RIVER
PHOTOGRAPHY INDEX

Date: December 2, 1981

Slide Number	Description
28	Talkeetna River Confluence
29	Susitna Confluence
30	Upstream of Devil Canyon

Date: January 4, 1982

Slide Number	Description
1A	Susitna Confluence
2A	Susitna Confluence
3A	Susitna near Curry
4A	Curry
5A	Near Sherman
6A	Sherman and 4th of July Creek
7A	Gold Creek Bridge and Slough 11
8A	Gold Creek Bridge
9A	Indian River Confluence
10A	Indian River Confluence
11A	Portage Creek Confluence
12A	Devil Canyon
13A	Devil Canyon
14A	Upper Devil Canyon
15A	Upper Devil Canyon
16A	Tsusena Creek
17A	Watana Streamgage Site
18A	Water Quality Monitor Site

AERIAL RECONNAISANCE OF THE SUSITNA RIVER
PHOTOGRAPHY INDEX

Date: January 4, 1982 - Continued

Slide Number	Description
19A	Upstream of Watana Creek
20A	Near Kosina Creek Confluence
21A	Kosina Confluence
20B	Susitna near Confluence
21B	Susitna
22B	Susitna at Slough 10
23B	Susitna near Slough 11
24B	Susitna at Gold Creek
25B	Susitna at Devil Canyon
26B	Vee Canyon
28B	Valdez Creek
29B	Susitna Lodge
30B	Near Kosina Creek
31B	Near Watana Damsite
32B	Deadman Creek Confluence
25C	Devil Canyon
26C	Devil Canyon
27C	Devil Canyon

Date: March 10, 1982

Slide Number	Description
24	Devil Canyon
25	Devil Canyon

AERIAL RECONNAISANCE OF THE SUSITNA RIVER
PHOTOGRAPHY INDEX

Date: March 10, 1982 - Continued

Slide Number	Description
26	Devil Canyon
27	Devil Canyon
28	Watana Streamgage Site
29	Watana Streamgage Site
36	Devil Canyon
37	Devil Canyon
2	Devil Canyon
3	Devil Canyon
4	Devil Canyon
7	Portage Creek Confluence

Date: April 26, 1982

Slide Number	Description
30	Susitna Confluence
31	Susitna Confluence
32	Above Confluence
33	Curry
34	Slough 8
35	Slough 9
36	Slough 9
37	Slough 9

AERIAL RECONNAISANCE OF THE SUSITNA RIVER
PHOTOGRAPHY INDEX

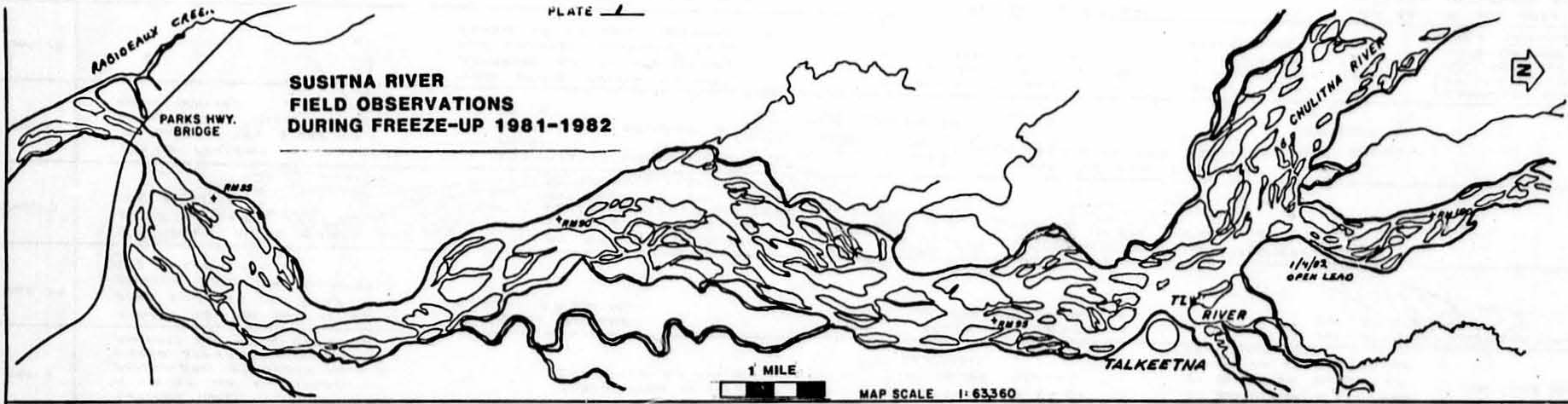
Date: May 10, 1982

Slide Number	Description
1	Portage Creek Confluence
2	View upstream along Portage Creek
4	Ice Jam about 1 mile upstream of Devil Canyon
5	Overflow above Devil Canyon
10	Devil Canyon
11	Portage Creek
12	Portage Creek
13	Portage Creek
14	Portage Creek
15	Portage Creek
16	Portage Creek
17	Portage Creek
18	Portage Creek
19	Portage Creek
20	Portage Creek
21	Ice Jam Below Gold Creek

ATTACHMENT E

FIELD NOTES OF FREEZEUP AND BREAKUP OBSERVATIONS WINTER 1981-82

PLATE 1

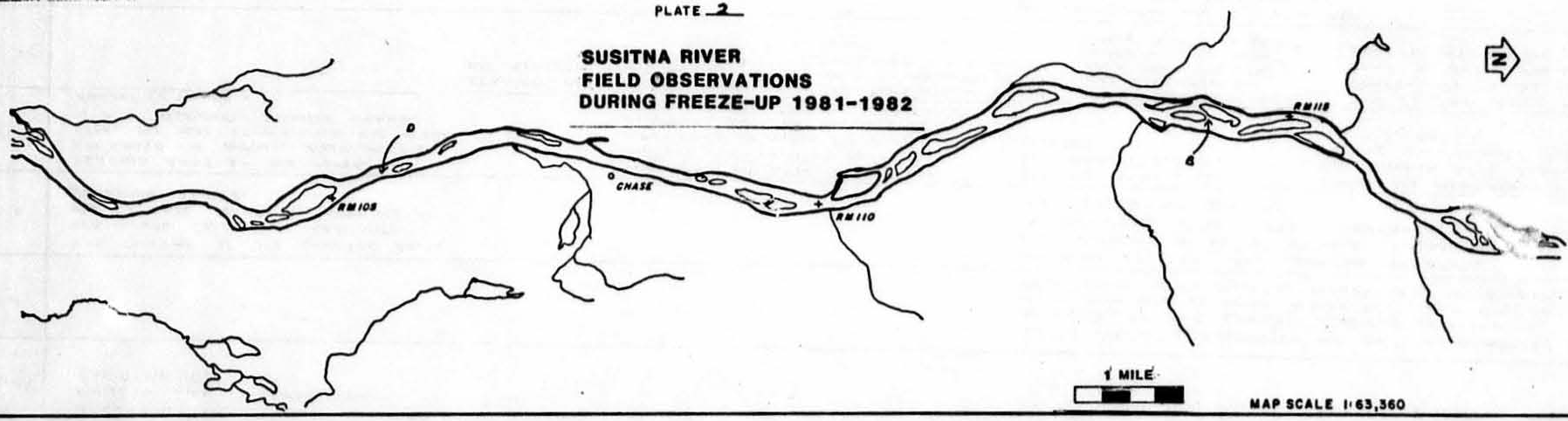


E-12

OCT. 29	A BUILD UP OF ICE PANS OBSERVED ALONG W. SIDE OF RIVER NEAR RABIDEAUX CR.			70 PERCENT OF THE ICE IN THE CONFLUENCE AREA COMES FROM THE SUSITNA. THIS ICE IS MOSTLY PANS AND SHORE ICE.	
NOV. 2				LARGE ICE PANS, ESTIMATED AT 30" IN DIAMETER, OBSERVED AT THE CHULITNA/SUSITNA CONFLUENCE. MOST PANS ARE SMALLER, ABOUT 2-3', AND EXTEND FROM BANK TO BANK. MANY SLOUGHS ARE ICE COVERED.	
NOV. 6	THE SUSITNA IS ICE COVERED FROM THE MOUTH TO APPROX. KASHWITNA. THE CHANNEL IS CHOKED WITH ICE AT SUNSHINE BRIDGE.			ICE PANS OF 2'-3' ARE CLUMPED TOGETHER IN THE SUSITNA CREATING ISLANDS ABOUT 20"-30" IN DIAMETER. SOME FRAZIL OBSERVED IN CHULITNA AND TALKEETNA RIVERS.	
NOV. 18	LEADING EDGE OF ICE COVER HAS ADVANCED TO APPROX. RIVER MILE 80. SHORE ICE HAS CONTRICTED THE FLOW TO ONE RELATIVELY NARROW CHANNEL ABOUT 50' WIDE.	THE CHULITNA RIVER, DISPITE WIDE ICE SHELVES REMAINS FREE OF ANY JAMS OR HEAVY ICE FLOES. CONCENTRATION OF FRAZIL, HOWEVER, IS THICKER THAN PREVIOUSLY OBSERVED.		THE TALKEETNA RIVER IS NOW COMPLETELY ICE COVERED.	LARGE ICE PAN FLOES ON THE SUSITNA HAVE JAMMED AT THE CONFLUENCE FORMING AN ICE BRIDGE.
DEC. 14		LEADING EDGE OF ICE COVER HAS REACHED RIVER MILE 95.	THE CHULITNA STILL HAS AN OPEN CHANNEL WHICH INDICATES LITTLE FRAZIL FLOW.	THE TALKEETNA RIVER HAS DEVELOPED AN OPEN LEAD FROM THE CONFLUENCE TO ABOUT 1 MILE ABOVE THE BRIDGE.	THE SUSITNA ABOVE THE CONFLUENCE IS ICE COVERED BANK TO BANK. THE LEADING EDGE IS AT RM 110.
JAN. 4 - JAN. 7				AT CONFLUENCE ALL 3 RIVERS ARE FROZEN WITH THE EXCEPTION OF OPEN VELOCITY LEADS OR OPEN LEADS RESULTING FROM GROUNDWATER INTRUSION.	
FEB. 3		RIVER FROZEN No FURTHER OBSERVATIONS IN THIS REACH			
MAR. 10	BETWEEN TALKEETNA AND DEVIL CANYON THE RIVER IS FROZEN WITH ONLY A FEW OPEN LEADS AND OVERFLOW AREAS.				

PLATE 2

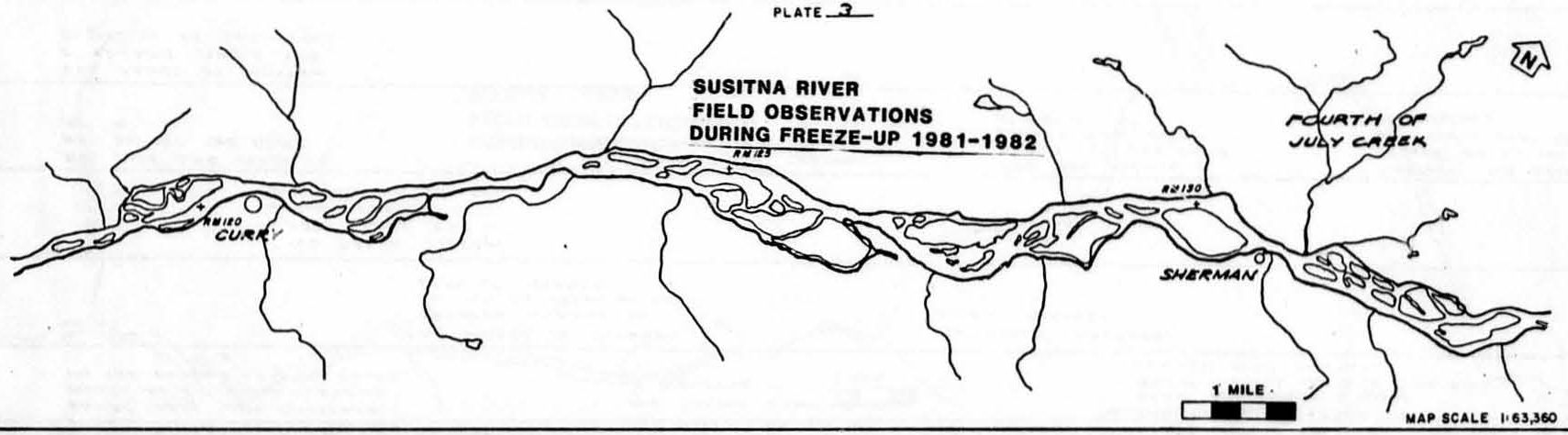
SUSITNA RIVER FIELD OBSERVATIONS DURING FREEZE-UP 1981-1982



MAP SCALE 1:63,360

OCT. 2	SUSITNA RIVER SLOUGHS HAVE A LOT OF ICE ACCUMULATION, PRESUMABLY STRANDED FROM A HIGHER STAGE. NO SIGNIFICANT AMOUNTS OF FRAZIL OBSERVED.	1'-2' ICE PANS HAVE ACCUMULATED IN SIDE CHANNELS AT RM 101.	HEAVY FRAZIL FLOW OBSERVED AT RM 110 ON NORTH SIDE OF CHANNEL.	2'-3' OF SHORE ICE BUILDUP AT 'B' IN MIDDLE CHANNEL. SHORE ICE OR BUILDUP OF FRAZIL ON LEFT BANK OF LEFT CHANNEL.	DENSE CONCENTRATION OF ICE PANS AT RM 119
OCT. 29	SHORE ICE HAS BUILTUP ALONG BOTH SIDES OF THE RIVER. SLOUGHS AND SIDE CHANNELS ARE FROZEN OVER.	2'-3' PANS FLOWING HEAVILY AT RM 105.	DENSE CONCENTRATIONS OF PAN ICE AT RM 113.	NO FURTHER OBSERVATIONS ON OCT. 29.	
NOV. 2	ICE PANS NEAR CHASE ARE BANK TO BANK, VERY DENSE ICE FLOES.	AT RM 107 FEW AREAS OF ICE FREE WATER WERE OBSERVED. FEWER ICE PANS BUT DENSE SHEETS OF SLUSH AT CHANNEL CONSTRICTIONS	CONCENTRATIONS OF ICE BECOME LESS DENSE AT RM 115.		
NOV. 6	50-60 PERCENT OF CHANNEL IS COVERED BY SHORE ICE. HEAVY FRAZIL FLOW IN REMAINING OPEN WATER.	CHANNEL CONTAINS 60-90 % FRAZIL. CHANNEL IS BRIDGED BY ICE AT 'D'.	ALL SLOUGHS AND SIDE CHANNELS IN ISLAND GROUPS ARE ICE COVERED.		
NOV. 18		VERY DENSE ANCHOR ICE IS APPARENT AT RM 108 (CHASE). THE CHANNEL CONTAINS 90% FRAZIL OR ICE PAN COVERAGE.	CHANNEL IS BRIDGED AT RM 110 BY A ICE PAN AND SLUSH ICE JAM.	RM 111 THE CHANNEL IS CONSTRICTED RESULTING IN A FRAZIL ICE BOTTLENECK.	ANOTHER BOTTLENECK AT RM 115 DUE TO SHORE ICE CONSTRICTING THE OPEN CHANNEL.
DEC. 14	THIS REACH IS ENTIRELY ICE COVERED EXCEPT FOR THE NOTED LEADS.	AN OPEN LEAD RUNS FROM 1/3 MILE ABOVE RM 110 TO ABOUT 1/2 MILE BELOW.	AT RM 113 AN OPEN LEAD OF ABOUT 1 MILE IN LENGTH WAS OBSERVED AGAINST THE RIGHT BANK.	AT RM 115 AN OPEN LEAD 2 MILES IN LENGTH AGAINST THE RIGHT BANK.	
JAN. 4-JAN. 7		OPEN LEADS AT RM 104 CONTAINING FRAZIL AND/OR SLUSH ICE.	OPEN LEADS OF VARYING LENGTH OCCUR THROUGHOUT THIS REACH.		
[redacted]	[redacted]	[redacted]	THIS REACH IS ICE COVERED WITH SECTIONS OF OPEN LEADS [redacted]	[redacted]	[redacted]

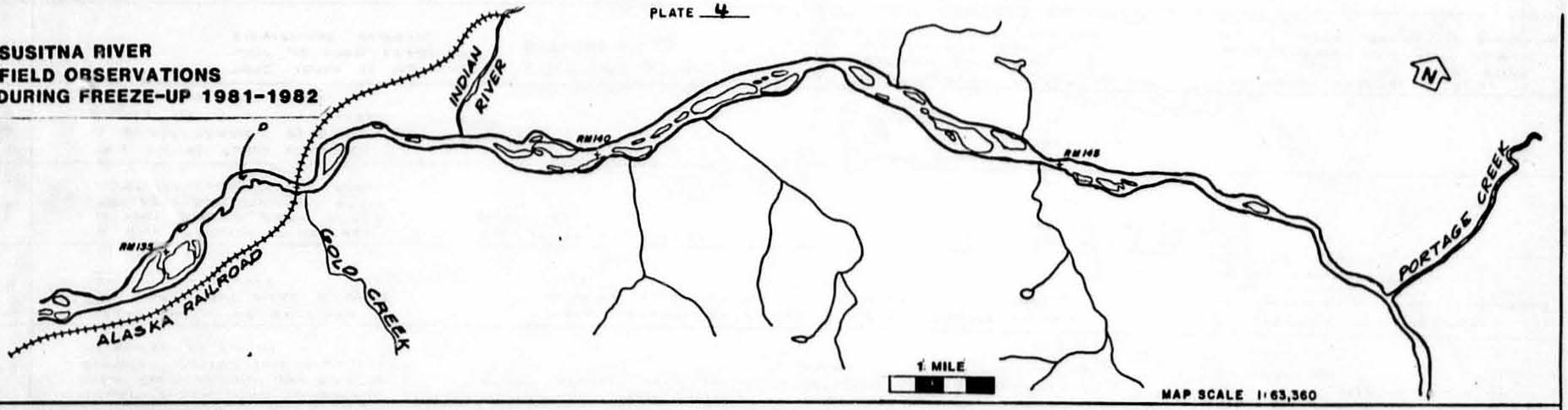
PLATE 3



OCT. 2	DENSE FRAZIL FLOW EMERGING FROM RIGHT CHANNEL AND SLOUGHS BETWEEN ISLANDS JUST DOWNSTREAM OF CURRY AT RM 119	HEAVY FRAZIL FLOW OPPOSITE CURRY AGAINST ROCK WALL.	MOUTH OF CREEK AT RM 124.5 HAS SOLID ICE COVER BANK TO BANK.	EXTENSIVE SHORE ICE BUILDUP IN BETWEEN ISLANDS UPSTREAM OF SHERMAN.
NOV. 2	LESS FRAZIL ICE OBSERVED AT CURRY BUT MORE ICE PANS 2'-3' IN DIAMETER.	MAIN CHANNEL AT RM 125 REMAINS THICK WITH ICE FLOES.	SOME SLOUGHS IN THIS AREA ARE ICE FREE.	AT SHERMAN THE ICE PANS ARE SMALLER BUT MORE CONCENTRATED. FLOES OF SLUSH ICE ARE LARGE AT BENDS AND UPSTREAM OF GRADIENT BREAKS.
NOV. 6	A HIGH DENSITY OF ICE PANS IS STILL FLOWING BELOW CURRY. THIS AREA ALSO CONTAINS LARGE SHEET OF CONSOLIDATED PANS.	ICE BRIDGE HAS FORMED AT RM 123	ICE BRIDGE HAS FORMED AT RM 131 (SHERMAN)	
NOV. 18	THIS ENTIRE REACH OF RIVER IS CHARACTERIZED BY HEAVY ANCHOR ICE FORMATIONS, CLEAR WATER AND LITTLE FRAZIL.		HEAVY FRAZIL ICE FLOES OBSERVED NEAR SHERMAN.	
DEC. 14	THIS REACH IS ICE COVERED WITH NO OPEN LEADS OF SIGNIFICANT LENGTH.		THE LEADING EDGE OF ICE WAS OBSERVED AT RM 127. ONLY ONE CHANNEL SEEMS TO CONTAIN FLOWING WATER, THE SIDE CHANNELS AND SLOUGHS REMAIN FROZEN.	THE OPEN CHANNEL WIDENS TO 40'-50' AND CONTAINING 70% FRAZIL COVERAGE. ANCHOR ICE IS WIDE SPREAD IN EXTENSIVE PATCHES.
JAN. 4-JAN. 7	OPEN WATER LEADS WITH FRAZIL WERE OBSERVED AT VARIOUS INTERVALS BETWEEN CURRY AND SHERMAN.		PARTICULARLY SIGNIFICANT LEADS WERE LOCATED AT RM 127 TO 128 AND ANOTHER JUST UPSTREAM OF SHERMAN SIDING.	
FEB. 3			THE SAME OPEN LEADS PERSISTED IN THE ABOVE LOCATIONS.	

PLATE 4

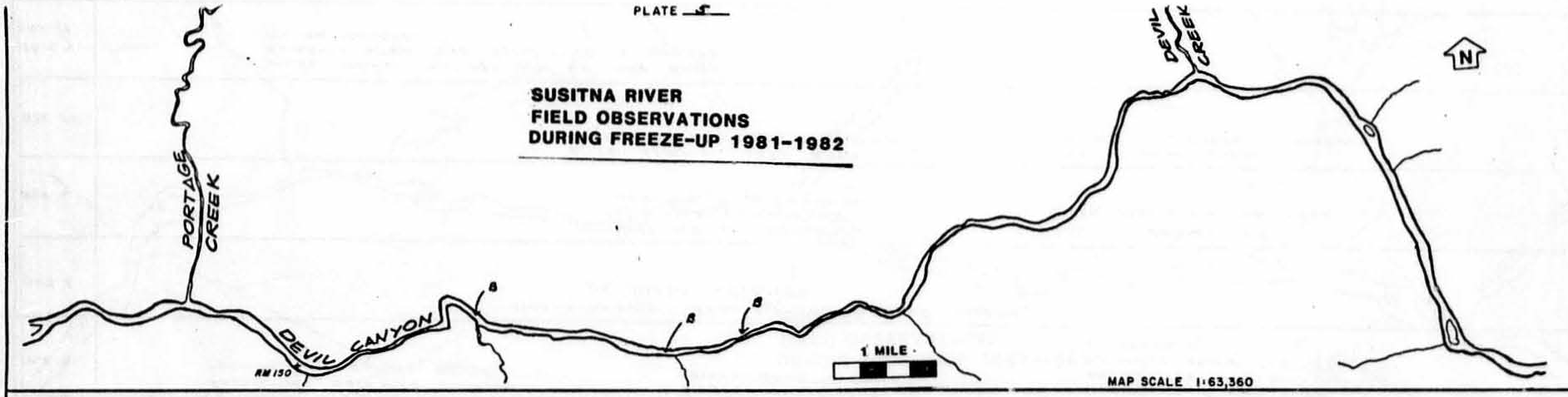
SUSITNA RIVER
FIELD OBSERVATIONS
DURING FREEZE-UP 1981-1982



OCT. 2	FRAZIL ICE IS PRESENT THROUGH ENTIRE REACH WITH OCCASSIONAL CONCENTRATED ACCUMULATIONS ON THE OUTSIDE OF RIVER BENDS.	ICE FLOES AT RM 140 ARE MOSTLY PANS 2"-3" IN DIAMETER.	DENSE FRAZIL FLOES WITH PAN ICE NEARLY BANK TO BANK BEGINNING 2 MILES BELOW PORTAGE CR. AND EXTENDING THROUGH DEVIL CANYON.	
OCT. 6	NO WATER IN SLOUGHS BETWEEN ISLANDS AT RM 140. NO FLOW TO THE LEFT OF ISLANDS.	NO FRAZIL OBSERVED BELOW PORTAGE.		
NOV. 2	GOLD CREEK STREAM GAGE READS 5.78 WHICH INDICATES A DISCHARGE OF 4100 CFS.			
NOV. 6	ICE PANS AND SLUSH ICE HAS BRIDGED THE RIVER AT 'D'.	ALL FLOWING ICE THROUGH THIS SECTION IS COMPOSED OF 1'-2' PANS.	ICE HAS FORMED A BRIDGE AT THE RIVER CONSTRICTION JUST BELOW RM 145	ANOTHER ICE BRIDGE OCCURS AT RM 144 JUST ABOVE PORTAGE CR. CONFLUENCE.
NOV. 18	ICE BRIDGE AT LOCATION 'D' REMAINS STABLE AND SEEMS TO BE ENLARGED.			
DEC. 14	ICE BRIDGE AT 'D' REMAINS STABLE.	RIVER REMAINS OPEN THROUGH THIS ENTIRE REACH WITH THE EXCEATION OF SEVERAL ICE BRIDGES.	AT GOLD CREEK BRIDGE THE CHANNEL IS 60'-70' WIDE AND SHOWING NO FRAZIL.	
JAN. 4-JAN. 7	THE RIVER IN THIS REACH HAS STILL NOT FROZEN. OVERFLOWING HAS OCCURED AT THE ICE BRIDGE LOCATED AT 'D'.	LARGE ICE FLOES HAVE JAMMED AT RM 138.	ICE BRIDGE AT Am 145	

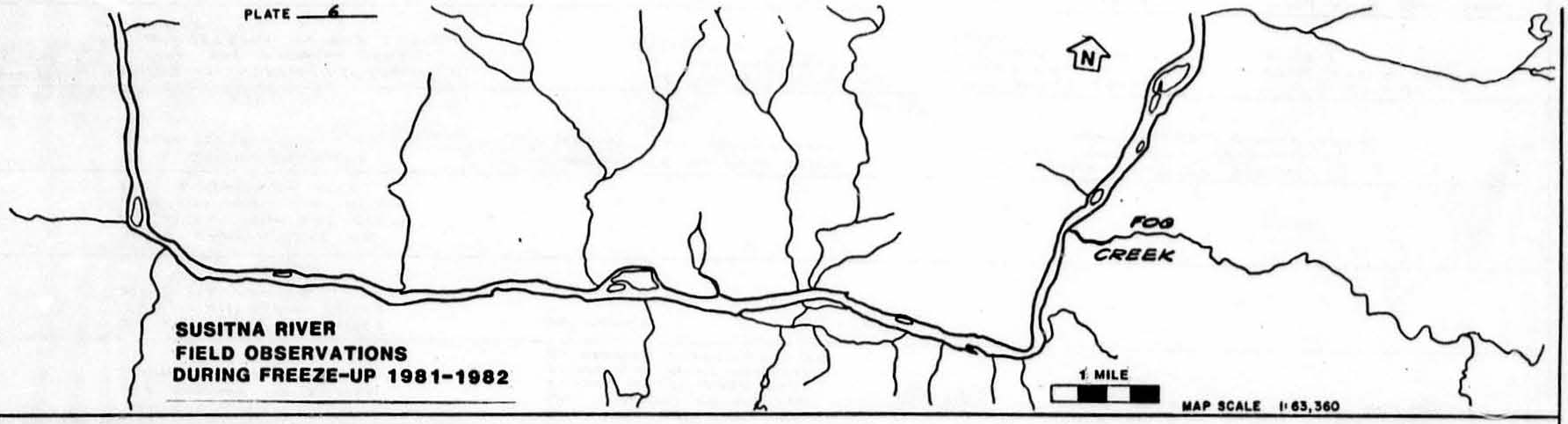
PLATE 5

SUSITNA RIVER FIELD OBSERVATIONS DURING FREEZE-UP 1981-1982



OCT. 2		DENSE CONCENTRATIONS OF ICE THROUGH THE ENTIRE DEVIL CANYON REACH.	THE REACH OF RIVER IN THE VICINITY OF THE DEVIL CANYON CREST GAGE HAS DENSE ICE FLOES INDICATED BY VARYING SHADES OF GREEN.	PAN ICE AND FRAZIL FLOWS THICKLY BANK TO BANK WITHOUT INTERRUPTION.	
OCT. 6		AS OPPOSED TO THE LAST ENTRY THIS REACH SHOWS LITTLE ICE FLOWING.	NO FRAZIL NO PANS		
NOV. 2		DEVIL CANYON HAS AN ICE COVER FROM THE STAFF GAGE TO ABOUT 300' BELOW THE "ELBOW", RM 151.5.			
NOV. 6		DEVIL CANYON REMAINS FROZEN OVER.	SEVERAL ICE BRIDGES WERE OBSERVED THROUGH THIS REACH	A SOLID ICE COVER EXTENDS FROM THE DEVIL CREEK MOUTH TO ABOUT 2 MILES DOWNSTREAM.	
NOV. 18	FRAZIL ICE BELOW PORTAGE	ICE COVER REMAINS STABLE FROM THE PROPOSED DAMSITE DOWNSTREAM TO THE STAFF GAGE.	ICE BRIDGES REMAIN AT SAME LOCATIONS AS PREVIOUS ENTRY	VERY DENSE FRAZIL CONCENTRATIONS THROUGH THE DEVIL CANYON REACH	ICE COVER BELOW DEVIL CREEK REMAINS STABLE.
DEC. 14		AN OPEN LEAD HAS DEVELOPED THROUGH THE CANYON. ICE COVER NOW EXTENDS 1/2 MILE ON EITHER SIDE OF RM 150	ICE BRIDGES REMAIN STABLE.	THE ICE COVER BELOW DEVIL CREEK HAS DEVELOPED A NARROW OPEN LEAD, ABOUT 1 MILE LONG.	THE RIVER ABOVE DEVIL CREEK IS OPEN WITH A CONTINUOUS LEAD OF VARIABLE WIDTH.
JAN. 4 - JAN. 7		ICE COVER AT RM 150 REMAINS STABLE AS NOTED ABOVE	ICE BRIDGES REMAIN STABLE.	A CONTINUOUS OPEN LEAD EXTENDS THROUGH THIS REACH BROKEN OCCASSIONALLY BY ICE BRIDGES.	
MAR. 10		DEVIL CANYON REMAINS OPEN DUE TO GRADIENT AND VELOCITY. ICE SHELVES EXTEND FROM THE CANYON WALLS CONSTRICTING THE OPEN LEAD. THESE		A TWO MILE REACH BELOW DEVIL CREEK REMAINS OPEN	THE REST OF THE RIVER HAS A CONTINUOUS ICE COVER WITH SEVERAL OPEN LEADS AND OVERFLOWS

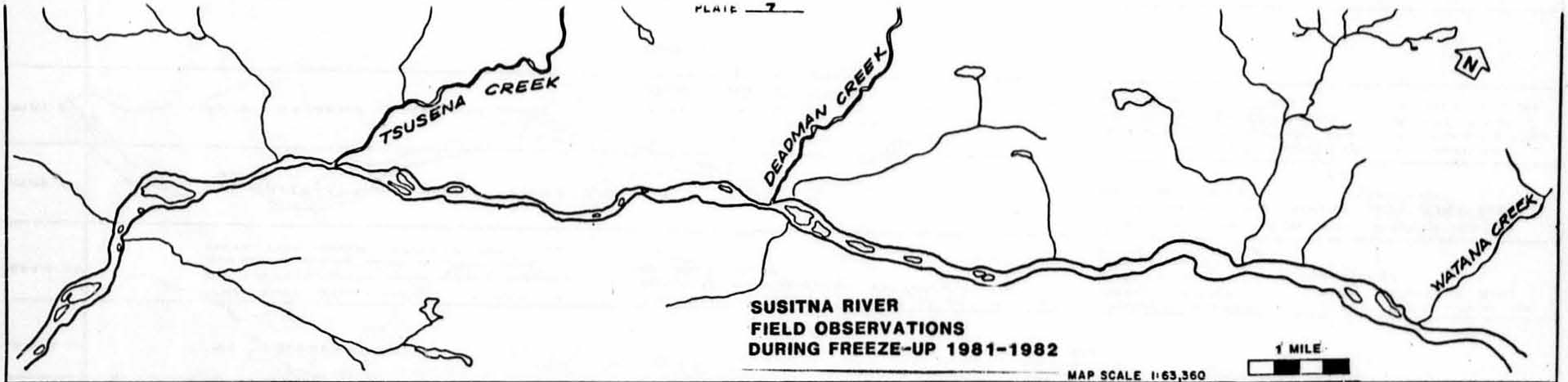
PLATE 6



SUSITNA RIVER
FIELD OBSERVATIONS
DURING FREEZE-UP 1981-1982

OCT. 2	FRAZIL ICE OBSERVED FLOWING THROUGH THIS ENTIRE REACH.	SIDE CHANNELS ARE FROZEN BANK TO BANK.	HEAVY ICE ACCUMULATION ON OUTSIDE OF ELBOW 1.5 MILES BELOW FOG CREEK CONFLUENCE.
OCT. 6	SIDE CHANNELS AND SLOUGHS REMAIN FROZEN. NO FRAZIL OBSERVED.		
NOV. 6		SHORE ICE HAS EXTENDED FROM ISLAND CLUSTERS INTO THE MAIN CHANNEL.	ICE HAS BRIDGED THE RIVER JUST BELOW FOG CREEK.
DEC. 14		RIVER REMAINS OPEN WITH EXTENSIVE SHORE ICE FORMATIONS.	ICE IS NOW JAMMING AT THE FOG CREEK CONFLUENCE.
JAN. 4 - JAN. 7	MORE THAN 70 PERCENT OF THE RIVER REMAINS OPEN. THE REMAINING IS COVERED BY ICE BRIDGES.		

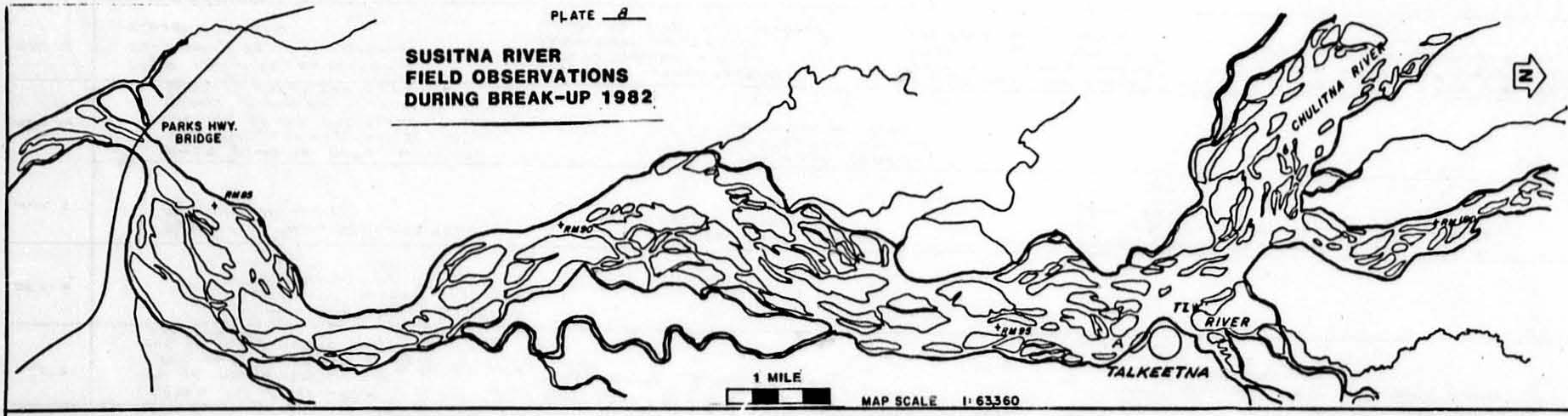
PLATE 7



OCT 2	LARGE ICE FLOES SEEM TO BE STRANDED IN THE LEFT CHANNEL SOUTH OF THE ISLAND OPPOSITE THE BOAT LANDING	DISCHARGE AT THE WATANA STREAMGAGE IS 5900 CFS		UPSTREAM FROM WATANA THE RIVER REMAINS THICK WITH ICE PANS ABOUT 1'-2' IN DIAMETER.
OCT. 6	SHORE ICE IS DEVELOPING AND THE WATER LEVEL IS DROPPING.			
NOV. 6	SLOUGHS AND SIDE CHANNELS ARE FROZEN OVER.	ICE BRIDGES HAVE FORMED IN SEVERAL LOCATIONS		SHORE ICE IS CONTINUING TO EXPAND OUT INTO THE CHANNEL AS THE WATER LEVEL DROPS.
NOV. 18	RIVER REMAINS OPEN WITH AN ICE FREE CHANNEL OF 50'-60'. AN ICE BRIDGE HAS FORMED ABOUT 1/4 MILE UPSTREAM OF THE ISLAND LOCATED WHERE THE RIVER TURNS SOUTH.	THE OPEN CHANNEL HAS APPROX. FRAZIL COVERAGE OF 70%.		
DEC. 2	OPEN CHANNEL CONTINUOUS TO ABOUT 1/2 MILE BELOW TSUSENA CREEK.	AN OPEN LEAD PROBABLY DUE TO GROUND WATER INTRUSION ON THE LEFT BANK AT THE W.Q. MONITOR SITE.	CONTINUOUS ICE COVER EXTENDS APPROX. 1 MILE UP AND DOWNSTREAM OF PROPOSED DAMSITE.	A LONG OPEN LEAD EXTENDS FROM MOUTH OF WATANA CREEK FOR 2 MILES DOWNSTREAM.
DEC. 14	ALL OPEN CHANNEL	ICE BRIDGES REMAIN STABLE.	ICE COVER BEGINS ABOUT 1/2 MILE ABOVE W.Q. MONITOR SITE.	AREA OF OVERFLOW BEGINS JUST ABOVE PROPOSED DAM SITE.

PLATE 8

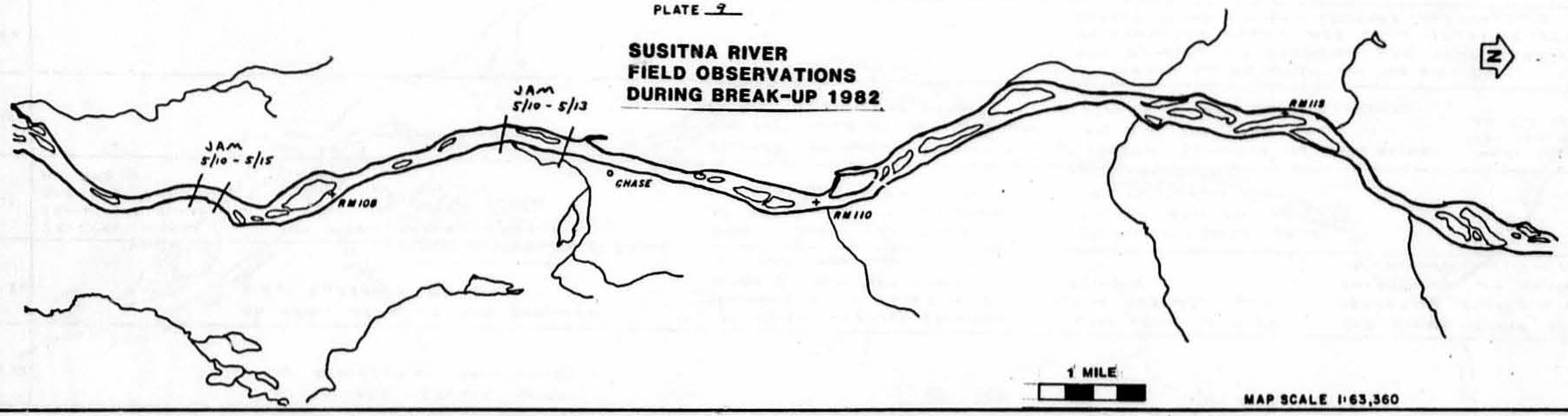
SUSITNA RIVER FIELD OBSERVATIONS DURING BREAK-UP 1982



APRIL 12	NO OBSERVATIONS				
APRIL 26	THE RIVER BELOW TALKEETNA REMAINS ICE COVERED WITH MANY AREAS SHOWING OVERFLOW. ALONG WITH A LIGHT SNOW COVER THIS COULD INDICATE THICK ICE.	THE RIVER IS OPEN SOUTH OF BELL ISLANDS TO COOK INLET	ICE IS BREAKING UP IN BIRCH CREEK.	MANY OPEN LEADS FROM TALKEETNA BOAT LANDING TO THE TALKEETNA RIVER CONFLUENCE.	MANY OPEN LEADS IN SIDE CHANNELS AND SLOUGHS.
MAY 10	NO OBSERVATIONS BELOW TALKEETNA			THE CHULITNA RIVER HAS BROKEN UP. MANY LARGE ICE BLOCKS ARE STRANDED ON SAND BARS.	
MAY 27	POST BREAKUP RECONNAISANCE	NO ICE REMAINING ON BARS OR RIVER BANKS. SEVERE EROSION OBSERVED AT CUTBANKS ON OUTSIDE OF RIVER BENDS.		BELOW TOWN OF TALKEETNA IN AREA 'A', THE RIVER BANK HAS BEEN ERODED ABOUT 10-15 FT.	AT SUSITNA CONFLUENCE THE BANKS HAVE ERODED 2-3 FT.

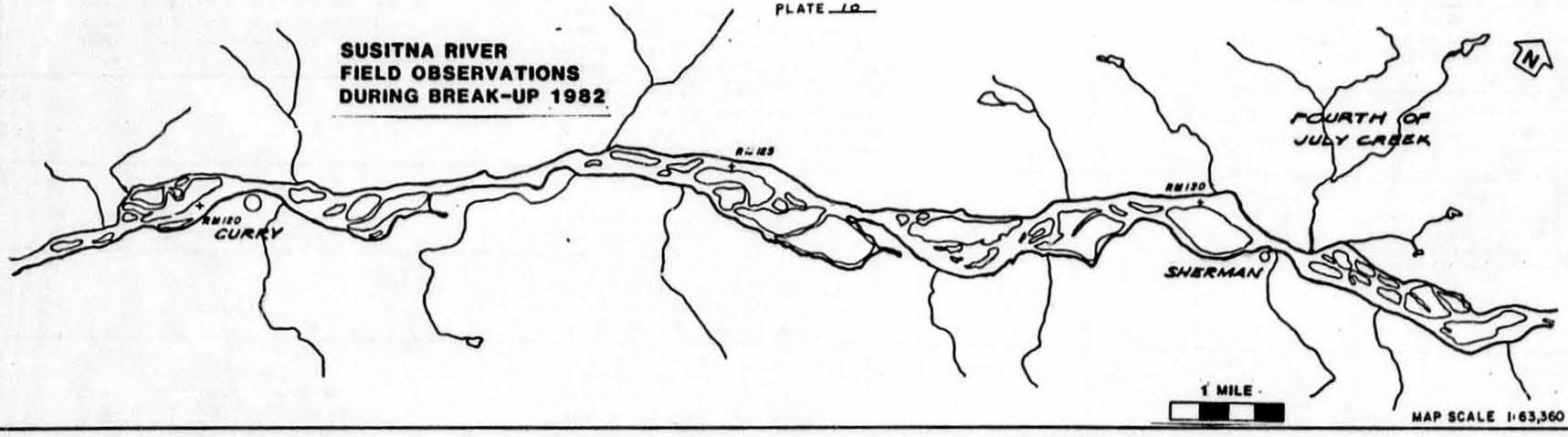
PLATE 9

SUSITNA RIVER FIELD OBSERVATIONS DURING BREAK-UP 1982



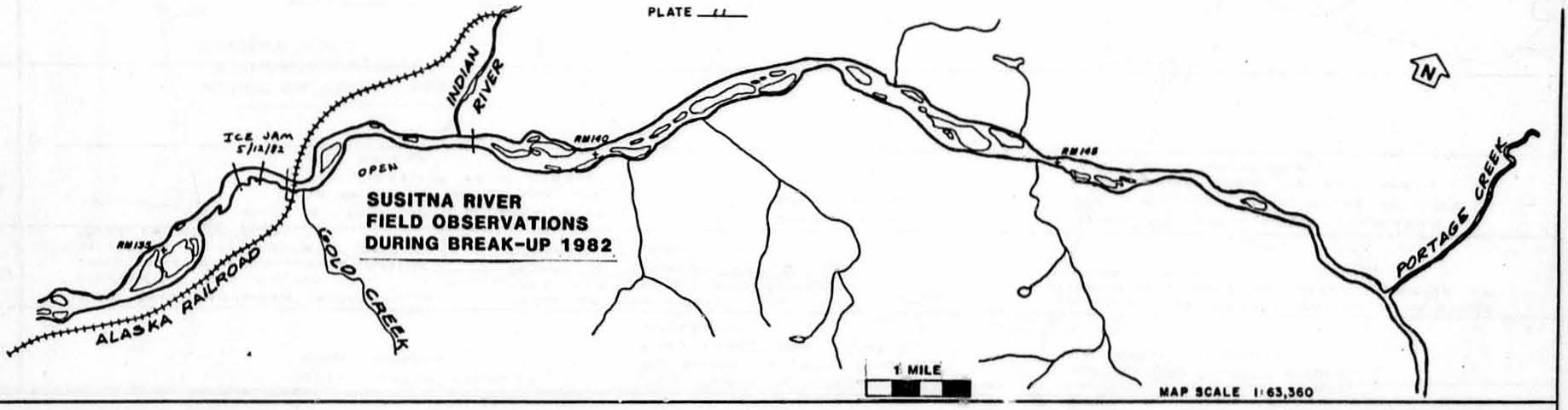
APRIL 12	ICE IS SNOW COVERED AND APPEARS STABLE.	MANY AREAS OF OVERFLOW AND NARROW LEADS.			
APRIL 26		ICE COVER REMAINS STABLE WITH EVIDENCE OF HEAVY OVERFLOWS NEAR CHASE.			
MAY 10	ICE IS JAMMING AT RIVER MILE 103.5	SLOUGHS AND SIDE CHANNELS ARE OPEN	SMALL ICE JAM AT Rm 106	AT RIVER MILE 107 RIVER IS ENTIRELY FROZEN OVER AT THE SAND BAR.	A CONTINUOUS OPEN LEAD EXTENDS FROM CHASE TO LANE CREEK CONFLUENCE.
MAY 12 - 15		SEVERE ICE JAMMING OCCURED AT Rm 107 AND EXTENDED FOR ABOUT 1 MILE UPSTREAM. THE WATER LEVEL ROSE ABOUT 10-15 FT.	SEVERAL RAILROAD TIES NEAR Rm 109 WERE WASHED OUT AS THE SUSITNA SPILLED OVER THE BANK.		FURTHER JAMMING AND RAILROAD DAMAGE WAS OBSERVED BETWEEN Rm 117 AND 118.
MAY 27	NEAR RIVER MILES 99 AND 100, LARGE ACCUMULATIONS OF STRANDED ICE BLOCK WERE OBSERVED. SOME MEASURING 20-30'	THE UPSTREAM ENDS OF ISLANDS HAVE BEEN SCOURED BY ICE. SOME ARE NOW DEVOID OF VEGETATION FOR 100 FT OR MORE FROM THE BANK.	AREAS DAMAGED BY ICE CONSISTED MOSTLY OF MATURE 15-20" COTTONWOODS AND BIRCH.		AT Rm 116 TO 117.5 THE RAILROAD HAS ADDED MUCH RIPRAP TO THE RR BED.
MAY 27 - CONT.		MORE ICE BLOCKS WERE FOUND STRANDED NEAR LRX-9. THE RIVER BANK AT Rm 102 HAS ERODED 4-5 FT.	LARGE RIPRAP HAS BEEN EXTENSIVELY ADDED TO RAILROAD BED BETWEEN Rm 104 TO 105 AND 108 TO 111		RAILROAD PERSONNEL REPORTED W.S. RISING 10 - 15 FT IN LESS THAN 1 HOUR.

PLATE 10



APRIL 12		ICE APPEARS STABLE WITH MANY REACHES OF THIN LEADS			
APRIL 26		AN OPEN LEAD ON THE THALWEG WAS OBSERVED AT Rm 121.	AT RIVER MILE 127, BETWEEN SLOUGHS 8 & 9 THERE IS A WIDE (10-20') OPEN LEAD ON THE THALWEG.	OPEN LEADS IN MOST SIDE CHANNELS AND SLOUGHS.	ICE COVER REMAINS GENERALLY STABLE WITH EXCEPTIONS AT REACHES OF HIGHER VELOCITIES.
MAY 10 "	SEVERAL SMALL JAMS ARE OCURRING BETWEEN RIVER MILE 115 AND 117.	THE RIVER THALWEG HAS A STABLE ICE COVER FROM Rm 118 TO Rm 120	ABOVE CURRY THE RIVER IS OPEN WITH THE EXCEPTION OF THE NOTED JAM SITES.	BELOW SHERMAN NEAR Rm 129 AND Rm 130 SEVERAL JAMS ARE OCCURRING.	
MAY 15			SEVERE JAMMING NEAR Rm 125, CAUSING THE SUSITNA TO BE REDIRECTED INTO SLOUGH 8.	SEVERE JAMMING IS OCCURRING AT Rm 129, THE BERM AT SLOUGH 9 HAS BEEN BREACHED.	MORE DAMAGE TO THE RR AT Rm 132.5.
MAY 27				AT SLOUGH 9, BETWEEN Rm 128 AND 129, THE EFFECTS OF BREAKUP ARE PARTICULARLY EVIDENT. THE BERMS ARE VERY UNSTABLE. THE FOREST FLOOR ON THE ISLANDS ARE COVERED	
				BY 3-4" OF RECENTLY DEPOSITED SILT. LARGE ICE BLOCKS WERE OBSERVED WITHIN THE FOREST.	

PLATE 11

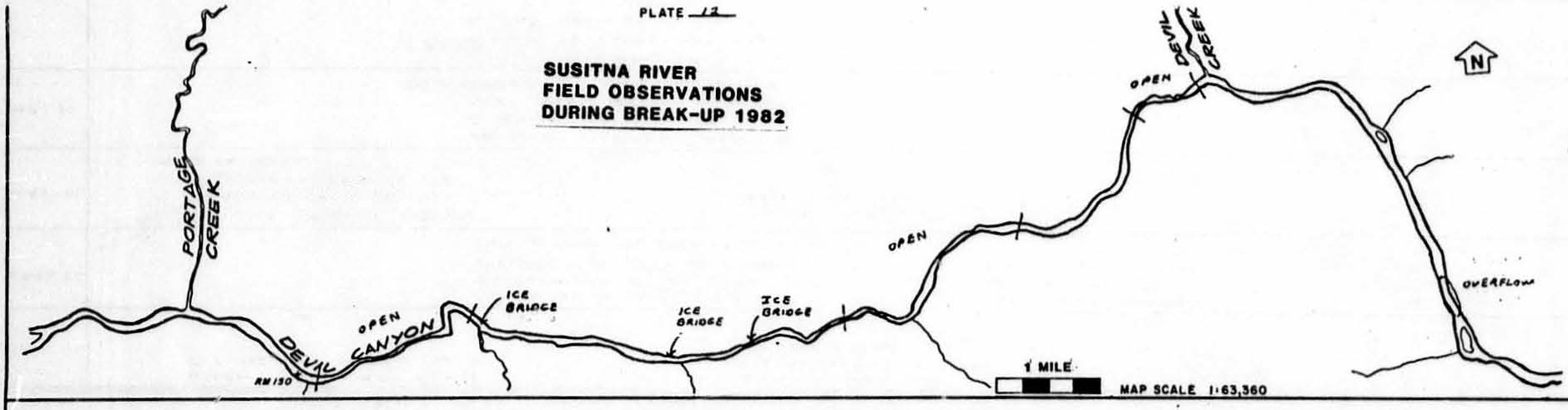


SUSITNA RIVER FIELD OBSERVATIONS DURING BREAK-UP 1982

APRIL 12	BELOW GOLD CREEK BRIDGE THE ICE COVER REMAINS SOLID.	NARROW OPEN LEADS ARE DEVELOPING UPSTREAM OF GOLD CREEK.	
APRIL 26	INDIAN RIVER IS BEGINNING TO BREAKUP. SUSITNA RIVER THALWEG HAS OPEN LEAD FROM INDIAN RIVER TO GOLD CREEK BRIDGE.	MOST SIDE CHANNELS AND SLOUGHS ARE SHOWING OPEN WATER.	
MAY 10	A STABLE ICE COVER EXTENDS FROM GOLD CREEK BRIDGE DOWNSTREAM THROUGH THE RIVER BEND.	MOSTLY OPEN WATER ABOVE GOLD CREEK.	
MAY 12	RAILROAD PERSONNEL REPORTED A MAJOR ICE JAM AT THE RIVER BEND BELOW GOLD CREEK BRIDGE. THIS JAM CAUSED THE WATER TO BACKUP AND RISE ENOUGH TO CREST THE BERM AT THE HEAD OF SLOUGH 11.		

PLATE 12

SUSITNA RIVER FIELD OBSERVATIONS DURING BREAK-UP 1982



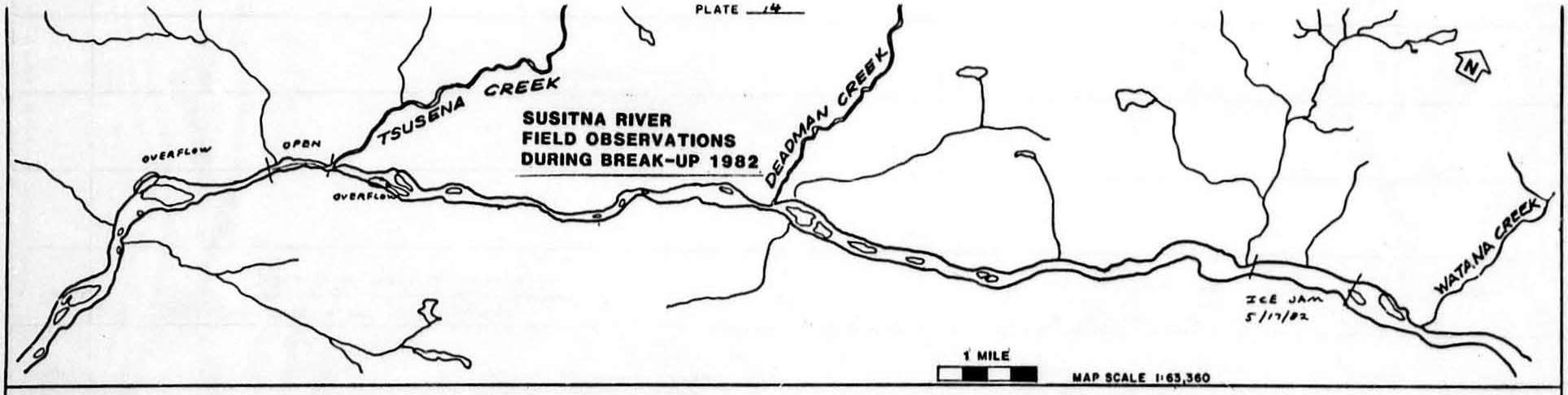
APRIL 12	OPEN WATER THROUGH DEVIL CANYON.	THIS REACH IS CHARACTERIZED BY NUMEROUS ICE BRIDGES, OPEN LEADS AND AREAS OF OVERFLOW.	UPSTREAM OF DEVIL CREEK CONFLUENCE THE ICE COVER IS AGAIN CONTINUOUS.
APRIL 26	THE REACH BETWEEN PORTAGE CONFLUENCE AND RM 150 IS STILL FROZEN. OPEN WATER BEGINS AT MOUTH OF CANYON AND EXTENDS THROUGH THE "FLOW".	AREAS OF HIGH VELOCITY ARE OPEN. ICE BRIDGES AND OVERFLOWS OCCUR IN SLOWER VELOCITY REACHES.	SEVERAL ICE BRIDGES BELOW DEVIL CREEK CONFLUENCE HAVE ICE FLOES STACKING UP AGAINST THEM.
MAY 10	A LARGE JAM IS CONTINUING TO BUILD AT RIVER MILE 153, THE LOCATION OF A STABLE ICE BRIDGE.	MOSTLY OPEN TO DEVIL CREEK.	ABOVE THE DEVIL CREEK CONFLUENCE THE RIVER HAS MANY AREAS OF OPEN LEADS WHICH SEEM TO GET WIDER AND MORE NUMEROUS.

PLATE 12



APRIL 12	FEW OPEN WATER LEADS BUT MANY OVERFLOW AREAS.
APRIL 26	THOSE AREAS WHICH WERE PREVIOUSLY MARKED BY OVERFLOWS HAVE NOW BECOME OPEN LEADS. OPEN LEADS ARE LESS PREVALENT ABOVE FOG CREEK CONFLUENCE, AREAS OF OVERFLOW ARE NUMEROUS.

PLATE 14



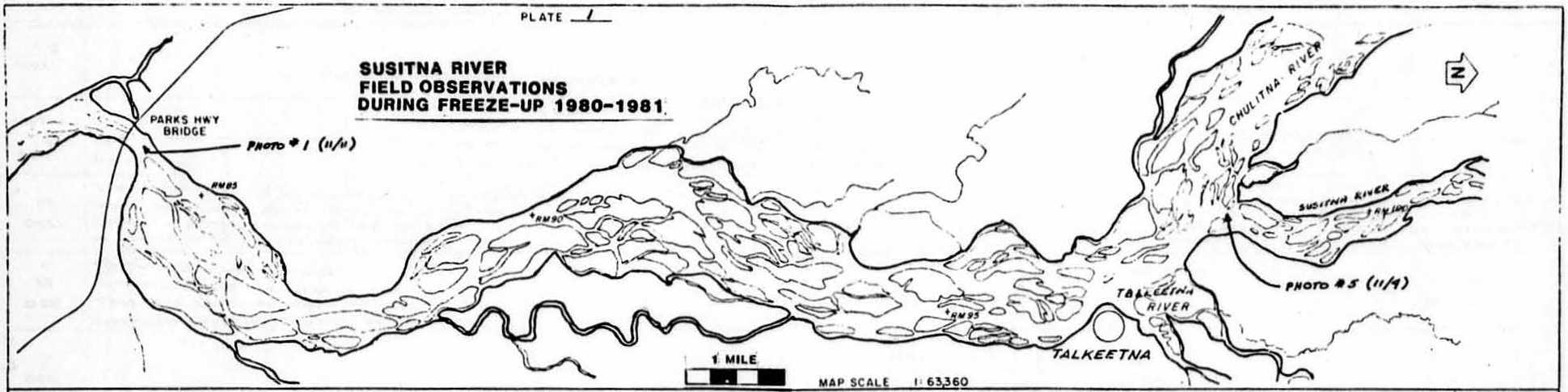
APRIL 12	MANY AREAS OF OVERFLOW	
APRIL 26	NO OBSERVATIONS	
MAY 17	REACH ABOVE FOG CREEK CONFLUENCE IS ENTIRELY OPEN.	A LARGE JAM EXTENDING ABOUT 1 MILE WAS OBSERVED FROM THE CONFLUENCE OF DEADHORSE CREEK AND PROCEEDING UPSTREAM.

ATTACHMENT F

FIELD NOTES OF FREEZEUP AND BREAKUP OBSERVATIONS WINTER 1980-81

PLATE 1

SUSITNA RIVER FIELD OBSERVATIONS DURING FREEZE-UP 1980-1981

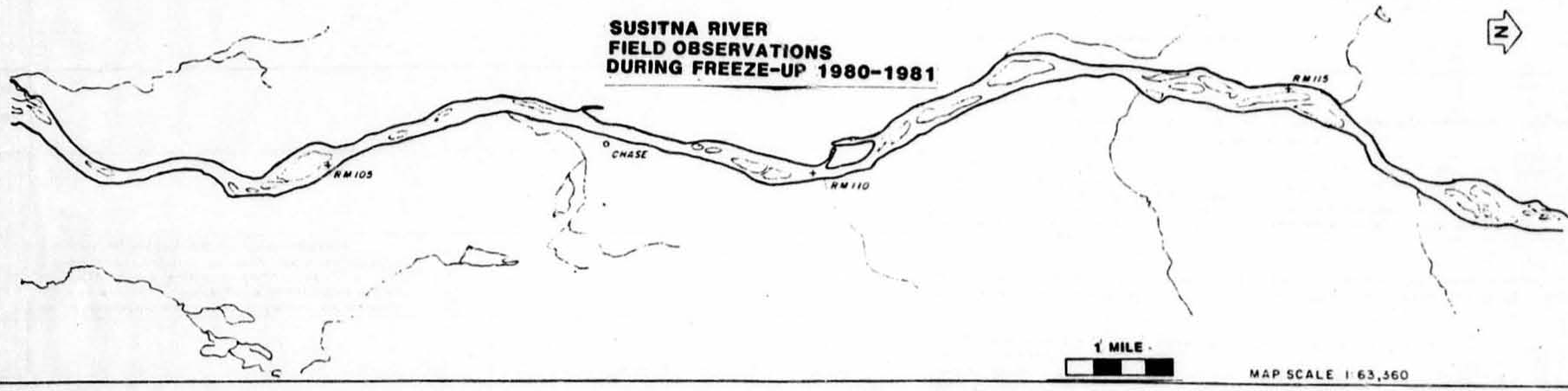


1980

OCT. 11			BY LATE EVENING, FRAZIL ICE OBSERVED IN THE SUSITNA RIVER AT TALKEETNA. AREAL COVERAGE 5-10%, CONCENTRATED IN THE EAST CHANNEL AT TALKEETNA. NO ICE FLOWING IN THE TALKEETNA OR CHULITNA RIVERS.
OCT. 12	BY LATE AFTERNOON, LEADING FRONT OF FRAZIL ICE AT RM 66.0, APPROX. 5 MILES UPSTREAM OF KASHWITNA RIVER CONFLUENCE. FRAZIL ICE FLOWING IN THE VENTNA RIVER. NO FRAZIL OBSERVED IN THE DESHKA.		ALL FRAZIL ICE FLOWING IN CHANNELS ON THE EAST SIDE OF THE SUSITNA RIVER FLOODPLAIN AT TALKEETNA. AREAL COVERAGE 20% OR LESS.
OCT. 13			FIRST FRAZIL ICE OBSERVED IN THE TALKEETNA RIVER. AREAL COVERAGE ~20% IN THE SUSITNA RIVER @ TALKEETNA, FRAZIL ICE COVERAGE 40%. STILL NO SIGN OF ICE FLOWING IN THE CHULITNA RIVER. ABOVE THE CHULITNA-SUSITNA CONFLUENCE, ICE FLOES ARE MORE CONCENTRATED. THE MAIN CHANNEL HAS ~80% FRAZIL ICE COVERAGE.
OCT. 31-NOV. 1			FRAZIL ICE FLOWING IN ALL THREE RIVERS. SHORE ICE IS GROWING OUT INTO THE CHANNELS RESTRICTING FLOW, BUT NO ICE BRIDGES HAVE FORMED.
NOV. 3			LITTLE CHANGE SINCE OCTOBER 31.
NOV. 11	~50% FRAZIL ICE COVERAGE AT THE BRIDGE. ICE FLOES STATIONARY ALONG THE RIGHT SIDE, BUT DO NOT APPEAR TO HAVE FROZEN INTO AN ICE COVER.	IN MORE TURBULENT SECTIONS, FLOES ARE BROKEN INTO SMALL FRAZIL PARTICLES INDICATING LOW STRENGTH TO THE FLOES.	TALKEETNA RIVER: 30% FRAZIL COVERAGE, NORTH CHANNEL WITH MAJORITY OF FLOW. CHULITNA RIVER: 10-20% FRAZIL COVERAGE, LITTLE SHORE ICE EXCEPT IN BACKWATER AREAS SUSITNA ABOVE TLK: 50-60% FRAZIL COVERAGE, UP TO 80% IN CONSTRICTED REACHES.
NOV. 13	ICE CONDITIONS AT THE BRIDGE SHOW LITTLE CHANGE.		

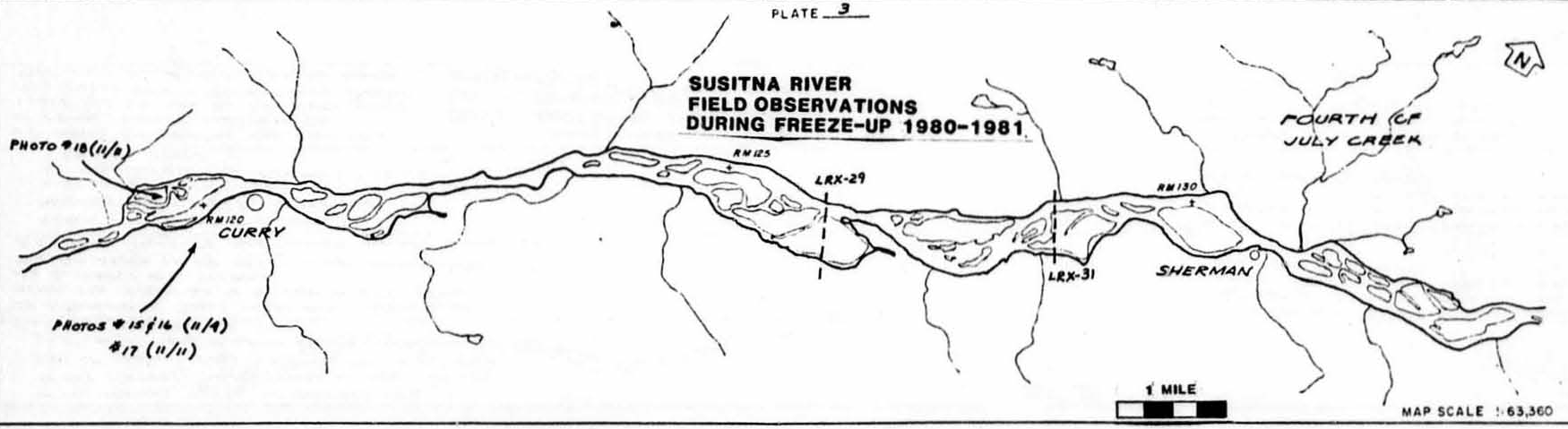
PLATE 2

SUSITNA RIVER FIELD OBSERVATIONS DURING FREEZE-UP 1980-1981



1980		
OCT. 11		FIRST FRAZIL ICE APPEARED IN THE AFTERNOON. SMALL ACCUMULATIONS OF FRAZIL PARTICLES COVER ~5% OF THE MAIN CHANNEL
OCT. 12	APPROXIMATELY 30% COVERAGE OF ICE FLOES. FLOES TEND TO ACCUMULATE IN LOW VELOCITY AREAS. IN PLACES, ICE IS BUILDING OUT FROM SHORE.	
OCT. 13	IN CONFINED OR CONSTRICTED REACHES, AREAL COVERAGE OF FRAZIL ICE IS 80%. FLOES ARE SMALL, UP TO 10 FEET IN DIAMETER. FRAZIL APPEARS TO BE MAINLY ON THE SURFACE.	ALONG THE MAIN CHANNEL RIM THERE ARE SIGNS OF SHEAR LINES (BUTTERING) FORMING FROM ACCUMULATION OF FRAZIL SLUSH EXTENDING 2 TO 5 FT. FROM SHORE.
OCT. 31 - NOV. 1	70-80% FRAZIL ICE COVERAGE THROUGH THIS REACH. NO ICE BRIDGES FORMED THOUGH SHORE ICE IS BEGINNING TO CONSTRICT THE CHANNEL IN SEVERAL LOCATIONS.	
NOV. 3	LITTLE CHANGE SINCE OCTOBER 31.	
NOV. 11	IN CHANNEL CONSTRICTIONS THROUGH THIS REACH, ICE IS BEING COMPACTED INTO 100% COVERAGE. HOWEVER, FRAZIL ICE APPEARS TO LACK COHESIVE STRENGTH TO FORM ICE BRIDGES. WATER LEVEL APPEARS TO BE DROPPING, EVIDENCED BY INCREASING NUMBER OF EXPOSED BOULDERS IN THE CHANNEL AND DECREASED FLOW IN SIDE CHANNELS.	
NOV. 13		

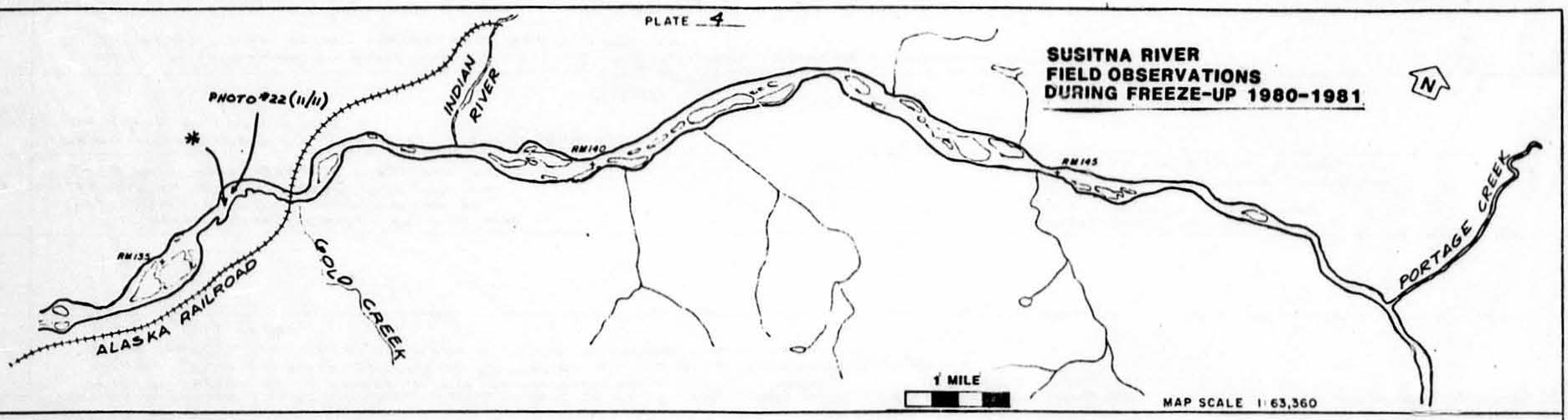
PLATE 3



1980

OCT. 11	FRAZIL ICE BEGINNING TO APPEAR IN THE AFTERNOON THROUGH THIS REACH. GREATEST CONCENTRATION OF FRAZIL PARTICLES IN THE MAIN CHANNEL THALWEG. CONCENTRATION AND SIZE OF FRAZIL FLOES INCREASES UPSTREAM TOWARD GOLD CREEK.		
OCT. 12			
OCT. 13	JUST BELOW CURRY, ICE FLOES FORMING INTO SHEETS APPROX. 20 FEET WIDE AND UP TO 100 FEET LONG. ICE SHEETS ARE BROKEN UP AS THEY MOVE THROUGH TURBULENT REACHES.		CHANNEL ABOVE SHERMAN IS BEING CONSTRICTED BY SHORE ICE GROWTH. WATER VELOCITY INHIBITS FORMATION OF LARGER FRAZIL ICE FLOES.
OCT. 31 - NOV. 1	FRAZIL ICE ACCUMULATING MORE IN CONSTRICTED REACHES OR AREAS OF SLOW WATER.		
NOV. 3	SHORE ICE CONTINUING TO BUILD OUT CONSTRICTING THE CHANNEL, ESPECIALLY UPSTREAM OF CURRY, AT LRX-29, JUST BELOW LRX-31 AND ABOVE SHERMAN.		
NOV. 11	SHORE ICE CONSTRICTING CHANNEL AT CURRY. SHORE ICE APPEARS TO BE COMPOSED OF SLUSH ICE FLOES BUTTERING THE FROZEN ICE, AS WELL AS CLEAR ICE GROWTH BETWEEN FLOES.	FRAZIL ICE THICKNESS DOWNSTREAM TO CURRY IS BETWEEN 0.5 AND 1.0 FOOT. FLOE VELOCITY IS APPROX. 2 FEET PER SECOND	FOURTH OF JULY CREEK IS FROZEN OVER. SOME AUFEIS IS DEVELOPING ON THE CREEK. SHORE ICE AT SHERMAN IS 75 FEET WIDE AND UP TO 2 FEET THICK. HINGE CRACKS FORMING IN THE SHORE ICE ALONG THE BANKS AS WATER LEVEL LOWERS. SLUSH ICE 0.5' THICK OR LESS. DENSITY DISLOCATION APPROX. 70 %.

PLATE 4



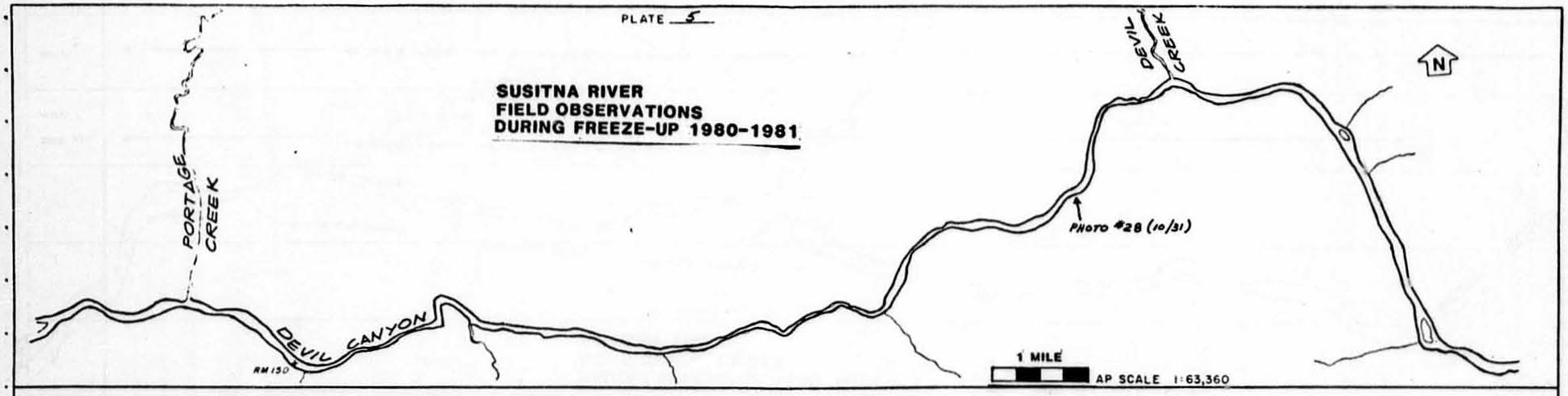
1980

OCT. 11	IN THE MORNING, FRAZIL ICE COVERED 40% OF THE SURFACE, CONCENTRATED IN THE THALWEG. SIZE OF FRAZIL FLOES: 3-6" THICK, 6-12" WIDE, 2-5 LONG. AMOUNT OF FRAZIL ICE INCREASED IN THE AFTERNOON.		
OCT. 12	ICE ACCUMULATING ABOVE SHARP RIGHT HAND BEND ALONG THE RIGHT BANK AT LRX-46 (VT. FRAZIL ICE COVERAGE 40% OVERALL. INDIAN RIVER IS ICE FREE. FLOES IN THE SUSITNA R. AT THE CONFLUENCE ARE FORCED TOWARD STEEP LEFT BANK.		ICE FLOES PUSHED TOWARD LEFT BANK AT THE PORTAGE CREEK CONFLUENCE. SIZE OF FRAZIL ICE FLOES GENERALLY LARGER THROUGH THIS REACH.
OCT. 13	FRAZIL ICE COVERAGE 70-80% THROUGH THE BRIDGE. SHORE ICE ONLY A FEW FEET WIDE. NO SIGNIFICANT ICE FLOWING FROM INDIAN RIVER.		FRAZIL ICE FLOES VARY FROM A FEW FEET IN DIAMETER TO 20 FEET WIDE AND 50 FEET LONG. NO SIGNIFICANT ICE FLOWING FROM PORTAGE CREEK.
OCT. 31- NOV. 1	* MARKS SITE WHERE THE CHANNEL IS BEING SEVERLY CONSTRICTED BY SHORE ICE GROWTH ON THE LEFT BANK, AND FLOES ARE ACCUMULATING ABOVE THE ROCK POINT ON THE RIGHT BANK.	70-80% FRAZIL ICE COVERAGE THROUGH MOST OF THE REACH. ICE FLOES ARE ACCUMULATING IN QUIET AREAS AND AT CHANNEL CONSTRICTIONS.	ICE FLOES BELOW PORTAGE CREEK CONFLUENCE ARE SMALL AND RELATIVELY SPARCE (ONLY 30% COVERAGE).
NOV. 3			
NOV. 11	SHORE ICE CONSTRICTING THE CHANNEL, BUT FRAZIL BEING CARRIED UNDERNEATH, AND REAPPEARING. ICE FLOE COVERAGE AT THE BRIDGE = 60%. THICKNESS ~ 0.5'. WIDTH OF SHORE ICE AT GOLD CREEK = 30 FT.	SHORE ICE FORMED BY TRAPPING AND SOLIDIFICATION OF SLUSH ICE FLOES.	

F-6

PLATE 5

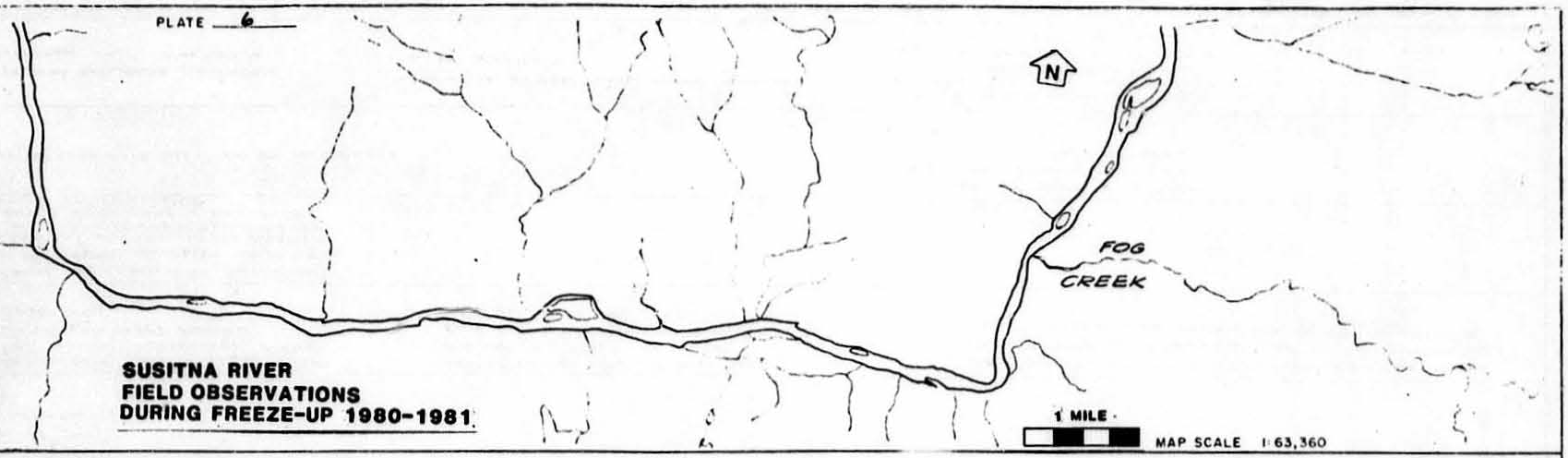
SUSITNA RIVER
FIELD OBSERVATIONS
DURING FREEZE-UP 1980-1981



1980

OCT. 11	ICE FLOES CONCENTRATED IN THE THALWEG BELOW DEVIL CANYON. FRAZIL COVERAGE 50%		
OCT. 12	FRAZIL BEING GENERATED THROUGH THE CANYON. TURBULENCE BREAKS UP LARGER FLOES FORMED UPSTREAM	DEEPER, LARGER LAKES IN THIS AREA HAVE NO ICE COVER. SMALLER, SHALLOWER LAKES HAVE A THIN, DISCONTINUOUS ICE COVER.	ICE FLOES ACCUMULATING AT CONSTRICTIONS OR ALONG THE OUTSIDE, DOWNSTREAM SIDE OF CHANNEL BENDS. ABOVE DEVIL CREEK, FRAZIL ICE COVERAGE 30-40 %.
OCT. 13	ICE EMERGING FROM THE CANYON IS COLLECTING IN SLOWER VELOCITY AREAS UPSTREAM OF PORTAGE CREEK. CONSIDERABLE SHORE ICE IS FORMING ON BOTH SIDES OF THE CHANNEL BELOW RAPIDS. THROUGH THE CANYON THERE ARE A FEW SHORT REACHES OF SHORE ICE DEVELOPING.		
OCT. 31 - NOV. 1	INDICATES APPROXIMATE LOCATIONS OF ICE BRIDGES		ICE BRIDGE FORMED THROUGH THIS REACH, BUILDING UPSTREAM TOWARD THE MOUTH OF DEVIL CREEK.
NOV. 3	ICE BRIDGE HAS EXTENDED UPSTREAM AND DOWNSTREAM SINCE NOVEMBER 1.	OTHER ICE BRIDGES SHOW LITTLE CHANGE SINCE NOVEMBER 1.	ICE BRIDGE BELOW DEVIL CREEK EXTENDED UPSTREAM AND DOWNSTREAM. PRESSURE CRACKS AND SIGNS OF HEAVING IN THE CENTER OF THE ICE COVER ARE APPARENT.
NOV. 11	ICE FLOES WITH SUFFICIENT DENSITY ARE CARRIED UNDERNEATH ICE BRIDGES THROUGH DEVIL CANYON. CRACKS PARALLEL TO BANKS INDICATE THE ICE COVER HAS SETTLED AS WATER LEVEL DROPPED.	SIMILAR PROCESSES OCCURRING AS NOTED THROUGH THE LOWER PART OF DEVIL CANYON. WATER LEVEL HAS RISEN THROUGH THE RAPIDS JUST DOWNSTREAM OF DEVIL CREEK.	
NOV. 13	EVIDENCE OF STAGING THROUGHOUT THE LOWER CANYON. TERRACE LEVELS OBSERVED AS WATER LEVEL DROPPED DUE TO FAILURE OF ICE JAMS DOWNSTREAM. ICE COVER APPEARS STABLE.		

PLATE 6

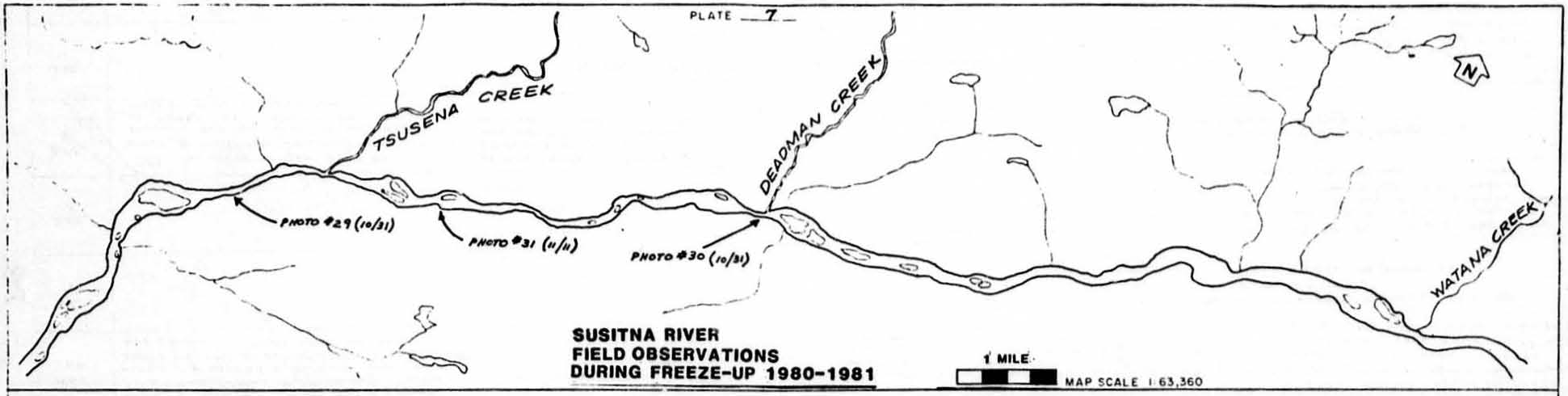


SUSITNA RIVER
FIELD OBSERVATIONS
DURING FREEZE-UP 1980-1981

1980

OCT. 31 - NOV. 1	← 60-80% FRAZIL ICE COVERAGE THROUGH THIS REACH →
NOV. 3	← 50-60% FRAZIL ICE COVERAGE, INCREASED IN CONSTRICTED REACHES →
NOV. 11	← FRAZIL ICE COVERAGE ONLY 10-20%, FLOES DECREASED IN SIZE OVER THE PAST WEEK. →

PLATE 7



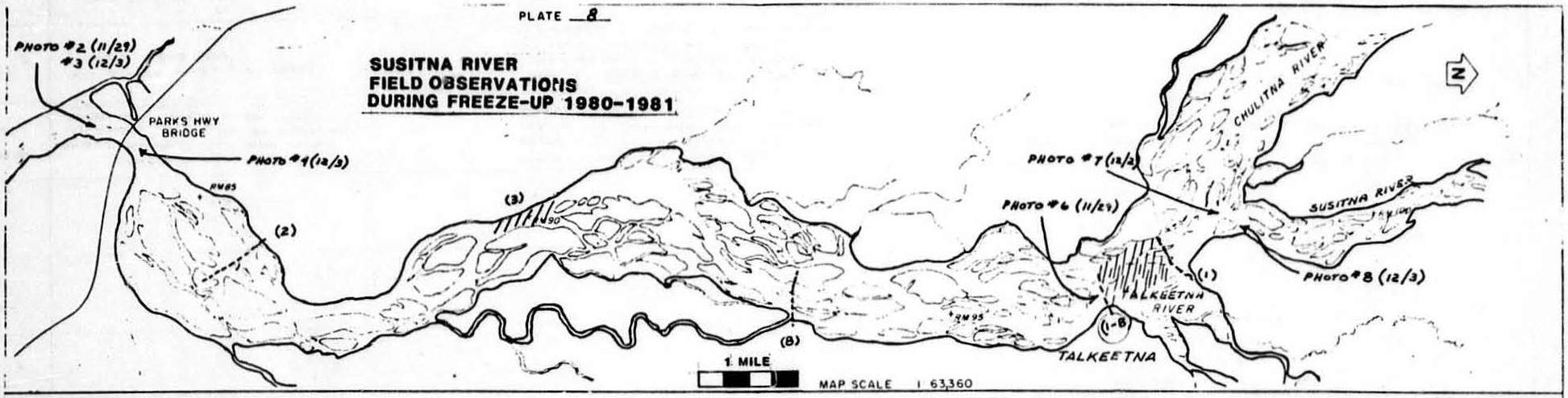
SUSITNA RIVER
FIELD OBSERVATIONS
DURING FREEZE-UP 1980-1981

1980

OCT. 31 - NOV. 1	INDICATES WHERE NEW ICE BRIDGE FORMED. UPSTREAM FROM ICE BRIDGE TO MOUTH OF TSUSENA CREEK ARE AREAS WITH 100% FRAZIL COVERAGE	CHANNEL SEVERELY CONSTRICTED BY SHORE ICE GROWTH AROUND THE MOUTH OF DEADMAN CREEK. NO ICE BRIDGES FORMED, FRAZIL ICE FLOES STILL MOVING.	SEVERAL AREAS WITH 100% FRAZIL ICE COVERAGE, BUT ICE HAS NOT CONSOLIDATED TO FORM BRIDGES.
NOV. 3	ICE BRIDGE HOLDING IN PLACE, LENGTH ~ 200 FEET	SMALL ICE BRIDGE FORMED JUST DOWNSTREAM OF DEADMAN CREEK. NO OTHER ICE BRIDGES FORMED, BUT FRAZIL COVERAGE 90-100% IN PLACES.	
NOV. 11	LITTLE CHANGE SINCE NOVEMBER 3.	MAXIMUM FRAZIL ACCUMULATION 40% IN CONSTRICTIONS. FRAZIL APPEARS VERY SOFT. ANCHOR ICE FORMING BUT NOT CONTINUOUS.	SMALL BRIDGE BELOW MOUTH OF WATANA CREEK, FRAZIL ICE FLOWING UNDERNEATH ICE BRIDGE. ABOVE WATANA CREEK THE CHANNEL IS BRIDGED. ICE COVER EXTENDS 6 MILES UPSTREAM WITH SOME OPEN WATER LEADS IN THE ICE COVER.
NOV. 13	FRAZIL ICE COVERAGE ONLY 5-10%. WATANA STREAM GAGE CHART SHOWS RAPID RISE AND FALL IN WATER LEVEL DURING THE DAY.		NO FRAZIL FLOWING FROM UNDER THE ICE COVER BELOW WATANA CREEK. FRAZIL ICE ACCUMULATING AT THE UPSTREAM EDGE OF THE ICE COVER 6 MILES ABOVE WATANA CREEK. WATER VELOCITY APPEARS TOO SLOW TO DRAG FLOES UNDER THE ICE COVER.

PLATE 8

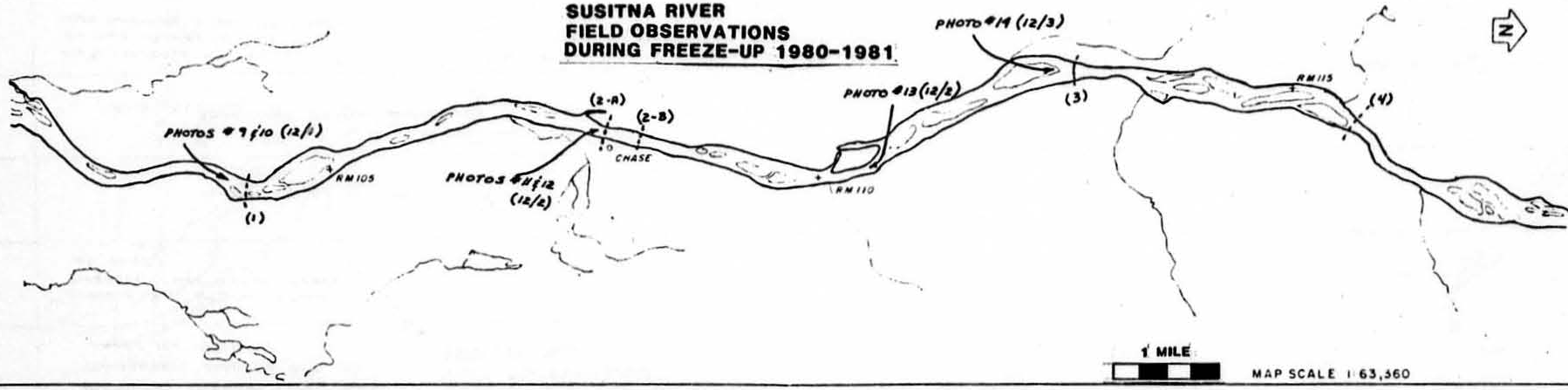
SUSITNA RIVER FIELD OBSERVATIONS DURING FREEZE-UP 1980-1981



1980			
NOV. 29	LEADING EDGE OF ICE COVER ~ 8.4 MILES BELOW THE BRIDGE @ RM 75.4 @ 1PM. FRAZIL ICE COVERAGE 70-80 % UPSTREAM. SHORE ICE GROWTH CONSTRICTING MAIN CHANNEL. SIDE CHANNELS BAY OR ICE COVERED.	ICE BRIDGE FORMED ACROSS THE MAIN CHANNEL @ TALKEETNA. (1) INDICATES LEADING EDGE OF ICE BRIDGE AS OF 1:30 P.M. NO SIGNS OF STAGING. WEST CHANNEL CARRYING MOST OF THE FLOW AND ICE. (1-B) INDICATES DOWNSTREAM EXTENT OF ICE BRIDGE.	TLK. RIVER: 40-50 % FRAZIL COVERAGE SUSITNA R. ABOVE CHULITNA CONFLUENCE SHOWS 80-90 % FRAZIL COVERAGE. CHULITNA RIVER: 40 % FRAZIL COVERAGE, NO ICE COVER FOR AT LEAST 5 MILES U/S
DEC. 1		CHULITNA-SUSITNA CONFLUENCE BRIDGED, ICE COVER EXTENDS UPSTREAM ~ 6 MILES. CHULITNA RIVER: 70% FRAZIL ICE COVERAGE.	
DEC. 2		EVIDENCE OF STAGING @ CHULITNA-SUSITNA CONFLUENCE, ICE CAKES LEFT 3-4 FEET ABOVE PRESENT WATER LEVEL. NO FRAZIL EMERGING FROM UNDER THE ICE COVER IN THE SUSITNA RIVER ABOVE THE CONFLUENCE. CHULITNA RIVER HAS AN OPEN CHANNEL FLOWING AT THE CONFLUENCE, SHIFTING TO THE WEST SIDE OF THE FLOOD PLAIN AT TALKEETNA. ICE COVER FORMED ON THE TALKEETNA RIVER, OPEN LEADS NEAR SUSITNA CONFLUENCE.	
DEC 3	(2) INDICATES LEADING EDGE OF ICE COVER @ 9 AM. NO SIGNS OF UNUSUAL STAGING BUT WATER LEVEL IS RISING. NO FRAZIL ICE EMERGING IN OPEN WATER LEADS DOWNSTREAM.	(3) INDICATES LOCATION OF ICE BRIDGE FORMING @ 9 AM THROUGH THE CONSTRICTED REACH IN THE VICINITY OF RIVER MILE 90.0	THREE RIVERS CONFLUENCE AREA SHOWS LITTLE CHANGE SINCE DECEMBER 2. OPEN CHANNEL SHIFTS FROM WEST TO EAST SIDES OF THE SUSITNA FLOODPLAIN BELOW TALKEETNA
DEC 4			CONFLUENCE AREA APPEARS UNCHANGED. CHULITNA RIVER HAS 40-50% FRAZIL ICE COVERAGE IN OPEN CHANNEL. TALKEETNA RIVER HAS FORMED AN ICE COVER. SUSITNA RIVER ALSO ICE COVERED FROM THE CHULITNA CONFLUENCE UPSTREAM.
DEC. 5			UNCHANGED THROUGH THIS REACH.
DEC. 8	(B) INDICATES LEADING EDGE OF THE ICE COVER BELOW TALKEETNA AT 9 AM.		STILL AN OPEN CHANNEL FLOWING FROM THE CHULITNA RIVER. LONG OPEN WATER LEAD EXTENDS UPSTREAM ALONG THE LEFT BANK IN THE SUSITNA RIVER ABOVE THE SUSITNA-CHULITNA CONFLUENCE.
DEC.			CHANNEL STILL OPEN IN THE CHULITNA RIVER.

PLATE 9

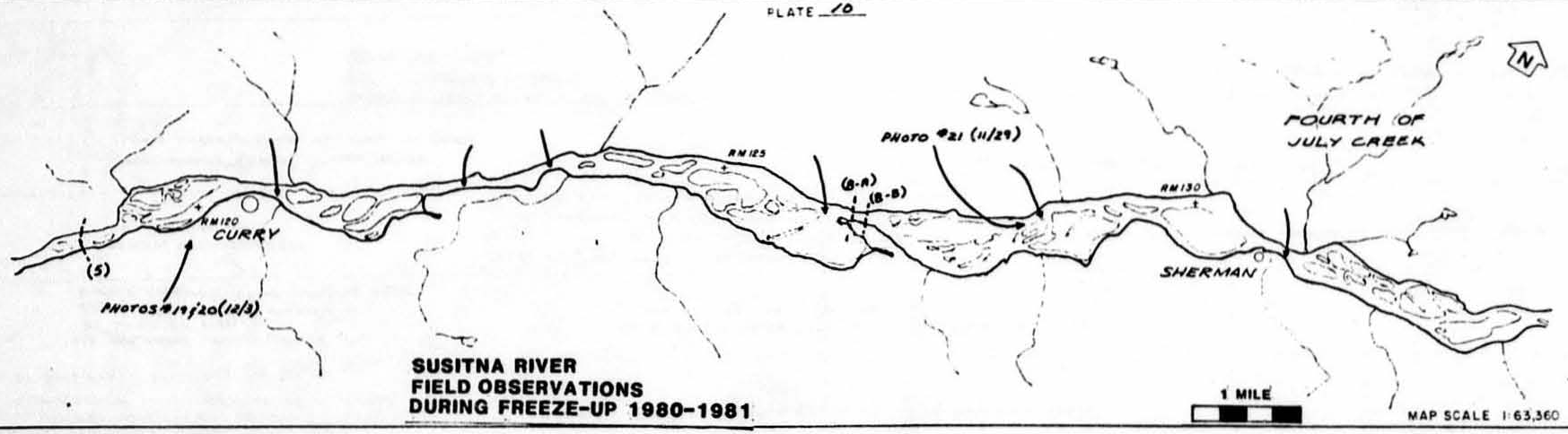
SUSITNA RIVER FIELD OBSERVATIONS DURING FREEZE-UP 1980-1981



1980

NOV. 29	LARGE ICE FLOES BREAK INTO FRAZIL SLUSH THROUGH HIGH VELOCITY REACHES, BUT REFORM IN SLOWER VELOCITY AREAS. 80-90% FRAZIL COVERAGE AT LRX-9	FRAZIL ICE CONCENTRATION UP TO 100% IN CONSTRICTED REACHES	
DEC. 1	(1) INDICATES LEADING EDGE OF ICE COVER AT 2:30 PM HEAVY FRAZIL ACCUMULATION IN SINGLE CHANNEL ABOVE LEADING EDGE	100% FRAZIL ACCUMULATION IN SEVERAL LOCATIONS BUT NO ICE BRIDGES FORMED.	
DEC. 2	SEVERAL VELOCITY LEADS IN THE ICE COVER	(2-A) LEADING EDGE AT 12:30 PM (RM 107.8) (2-B) " " AT 1:40 PM (RM 108.25) FRAZIL ICE NOT CARRIED UNDER LEADING EDGE, 80-100% FRAZIL COVERAGE UPSTREAM	EXTENSIVE ANCHOR ICE VISIBLE IN THE MAIN CHANNEL.
DEC. 3	OPEN WATER LEADS IN THIS REACH SHOW LITTLE FRAZIL FLOWING IN THEM.		(3) LEADING EDGE AT 11 AM (RM 112.9)
DEC 4			(4) LEADING EDGE AT 10AM (RM 115.9)
DEC 5			
DEC. 8			
DEC. 12			OVERFLOW ON TOP OF ICE SUGGEST THE WATER LEVEL RISING THROUGH THIS REACH.

PLATE 10



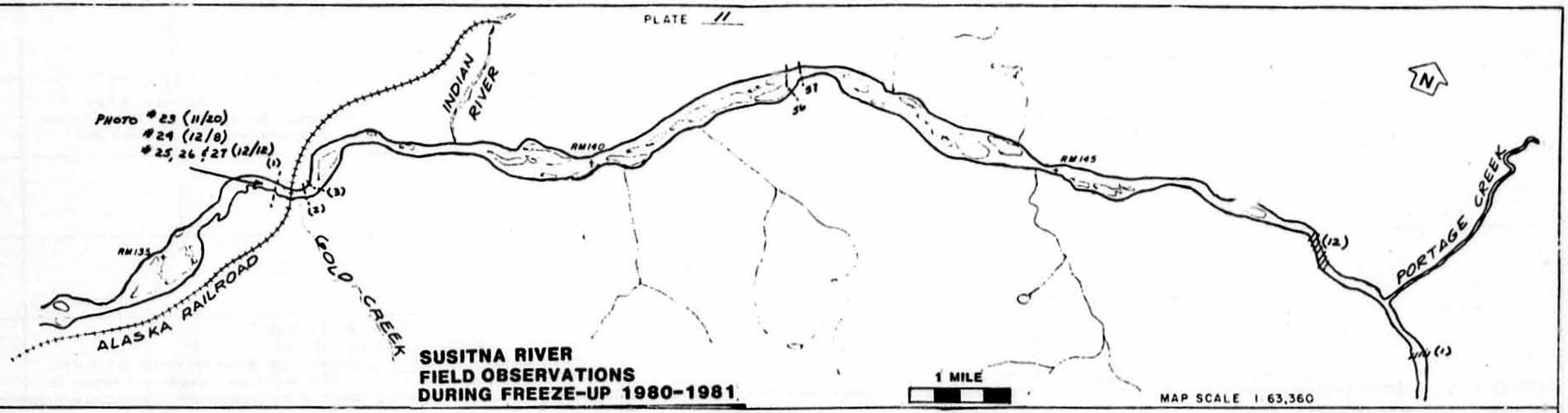
SUSITNA RIVER
FIELD OBSERVATIONS
DURING FREEZE-UP 1980-1981

1980

NOV. 29	RIGHT SIDE CHANNEL BELOW CURRY COMPLETELY BLOCKED OFF BY SHORE ICE GROWTH.		
DEC. 1	100% FRAZIL ACCUMULATION THROUGH CONSTRICTED REACH AT CURRY.		
DEC. 2	CONDITIONS APPEAR UNCHANGED		
DEC. 3	CONDITIONS APPEAR UNCHANGED		
DEC. 4	100% COVERAGE OF FRAZIL ON THE UPSTREAM SIDE OF THE CHANNEL BEND AT CURRY	AREAS OF HEAVIEST FRAZIL ACCUMULATION INDICATED BY ARROWS ON THE MAP ABOVE.	
DEC. 5	(5) LEADING EDGE OF ICE COVER AT 10 AM (RM 118.8) NO CHANGE IN POSITION OF LEADING EDGE AT 2:45 PM	COVERAGE OF FRAZIL ICE APPEARS UNCHANGED	WATER LEVEL RISING UPSTREAM OF SHERMAN
DEC. 8		(B-A) LEADING EDGE AT 10 AM (RM 126.85) (B-B) " " " 1 PM (RM 126.5) DISTINCT SHEAR LINES ALONG LEFT BANK. WATER LEVEL RISING IN CHANNEL UPSTREAM.	FRAZIL COVERAGE ~80% UPSTREAM OF ICE COVER.
	OVERFLOW AND SIGNS OF RISE IN WATER LE[illegible] IN T[illegible] OF C[illegible] LS BE[illegible] CURR[illegible]	[illegible] OF THE CHANNEL HAS A GOOD ICE COVER. E A[illegible] OME WA[illegible] LEAD[illegible]	

F-11

PLATE 11



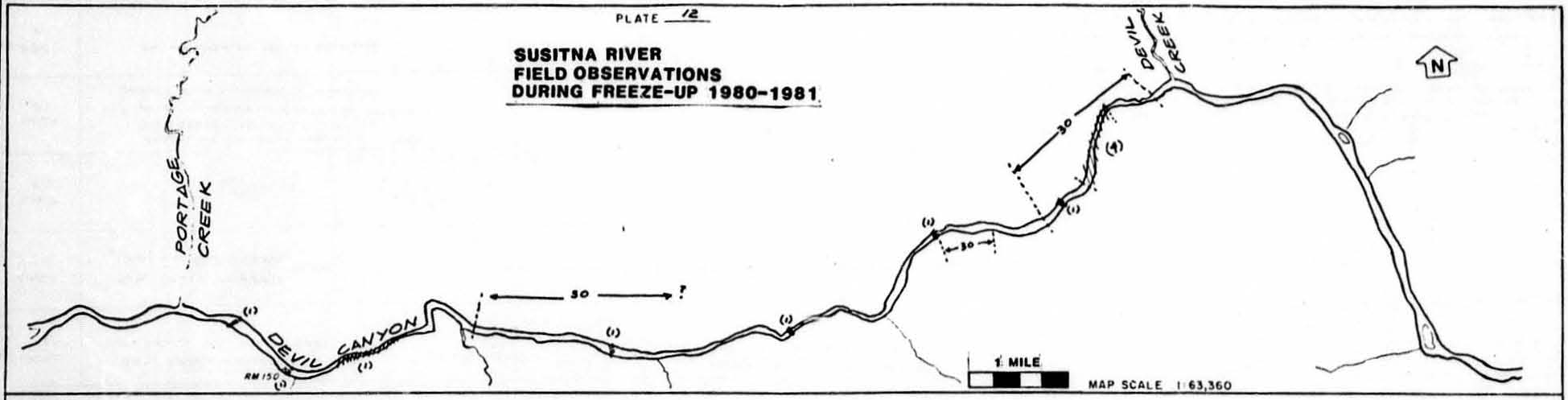
SUSITNA RIVER FIELD OBSERVATIONS DURING FREEZE-UP 1980-1981

1980

NOV. 29	80% FRAZIL COVERAGE IN THE CHANNEL AT GOLD CREEK.	INDIAN RIVER STILL FLOWING.	HEAVY ANCHOR ICE THROUGH THE BEND AT LRX-56 AND 57.	(1) INDICATES LOCATION OF ICE BRIDGE FRAZIL COVERAGE 90% BELOW MOUTH OF PORTAGE CREEK. PORTAGE CREEK STILL FLOWING.
DEC. 1	30% FRAZIL COVERAGE THROUGH THIS REACH.	← SIGNIFICANT ANCHOR ICE THROUGH THIS REACH →		
DEC 2				
DEC 3	FRAZIL ICE COVERAGE 60-70% FROM GOLD CREEK TO INDIAN RIVER. ICE FLOE VELOCITY – 3 FEET PER SECOND AVERAGE FLOE THICKNESS = 4 INCHES			FRAZIL ICE COVERAGE – 50%. FLOE VELOCITY 4 FEET PER SECOND. DEPTH OF WATER AT THE EDGE OF ICE ABOVE PORTAGE CREEK IS 2.7 FEET. THICK OVERFLOW ICE BUILDING AT THE PORTAGE CREEK CONFLUENCE. PORTAGE CREEK PERCHED ABOVE NORMAL RIVER BED.
DEC 4	NO CHANGE IN ICE CONDITIONS			80% FRAZIL ICE COVERAGE BELOW MOUTH OF PORTAGE CREEK. NO CHANGE IN ICE BRIDGE ABOVE THE CONFLUENCE MARKED ON NOVEMBER 29TH.
DEC. 5	ICE FLOES CONSOLIDATED AT THE BEND BELOW THE BRIDGE AT LRX-43 50-60% FRAZIL COVERAGE AT THE BRIDGE			
DEC. 8				
DEC. 12	(1) LEADING EDGE AT 11 AM (RM 136.4) (2) " " AT 1 PM (RM 136.8) (3) " " AT 2 PM (RM 136.9)			(12) NEW ICE BRIDGE FORMED DOWNSTREAM FROM MOUTH OF PORTAGE CREEK.

PLATE 12

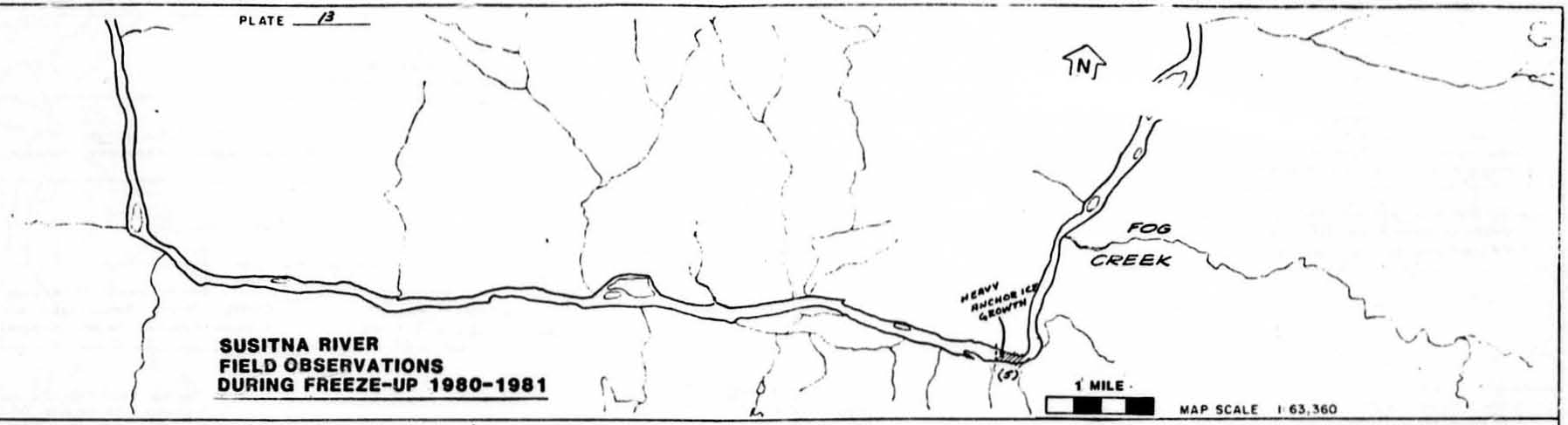
SUSITNA RIVER FIELD OBSERVATIONS DURING FREEZE-UP 1980-1981



1980

NOV. 29	(1) INDICATES LOCATION OF ICE BRIDGE ICE FLOES BEING CARRIED UNDERNEATH	APPEARS SIMILAR TO NOV. 13 TRIP, STAGING HAS NOT MOVED UP THROUGH THE HEAD OF THE RAPIDS.
DEC. 1		(4) NEW ICE BRIDGE THROUGH THIS REACH. POSITION AND EXTENT OF OTHER BRIDGES APPEARS UNCHANGED SINCE NOV. 29
DEC. 2		
DEC. 3	ICE CONDITIONS SHOW LITTLE CHANGE. MOST FRAZIL ICE IS BEING TRAPPED IN DEVIL CANYON.	CONDITIONS UNCHANGED THROUGH THIS REACH SINCE DEC. 1. ABOVE DEVIL CREEK, FRAZIL ICE COVERAGE 40-50%. ICE FLOE VELOCITY ~ 6 FPS.
DEC 4		TWO SMALL BRIDGES FORMED BETWEEN DEVIL CREEK AND THE UPSTREAM EDGE OF LARGER BRIDGE INDICATED BY (4) ON DEC. 1 TRIP.
DEC 5	DEVIL CANYON AREA APPEARS UNCHANGED	(5) NEW ICE BRIDGE ABOVE THE MOUTH OF DEVIL CREEK. OTHER ICE BRIDGES UNCHANGED.
DEC 8		
	EXTENT OF ICE COVER AS OF DEC. 30'14 INDICATED BY [illegible]	

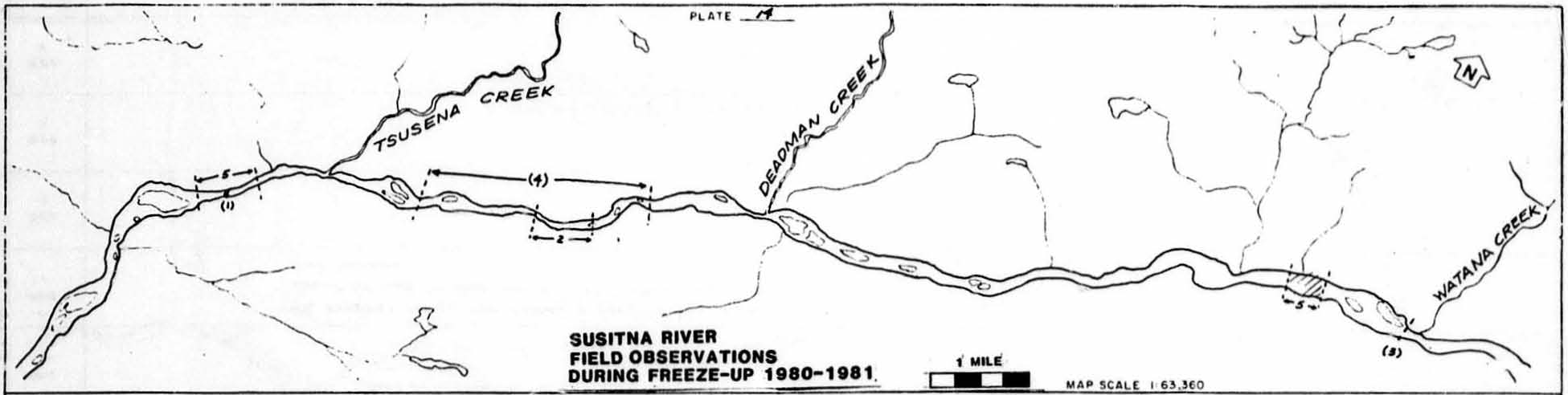
PLATE 13



SUSITNA RIVER
FIELD OBSERVATIONS
DURING FREEZE-UP 1980-1981

1980		
NOV. 29	EXTENSIVE ANCHOR ICE THROUGH THIS REACH.	
DEC 1	60% AVERAGE FRAZIL ICE COVERAGE THROUGH THIS REACH. SHORE ICE AND ANCHOR ICE GROWTH CONSTRICTING THE CHANNEL	HEAVY ANCHOR ICE ACCUMULATION IN THE CHANNEL DOWNSTREAM OF THE SHARP RIGHT-HAND BEND
DEC 2		
DEC 3		
DEC 4		
DEC. 5	70-80 % FRAZIL ICE COVERAGE THROUGH MOST OF THE CHANNEL. NO ICE BRIDGES FORMED.	(5) HEAVY FRAZIL ACCUMULATION. ICE BRIDGE FORMING AS FRAZIL MOVEMENT THROUGH THIS REACH STOPS.

PLATE A



SUSITNA RIVER
FIELD OBSERVATIONS
DURING FREEZE-UP 1980-1981.

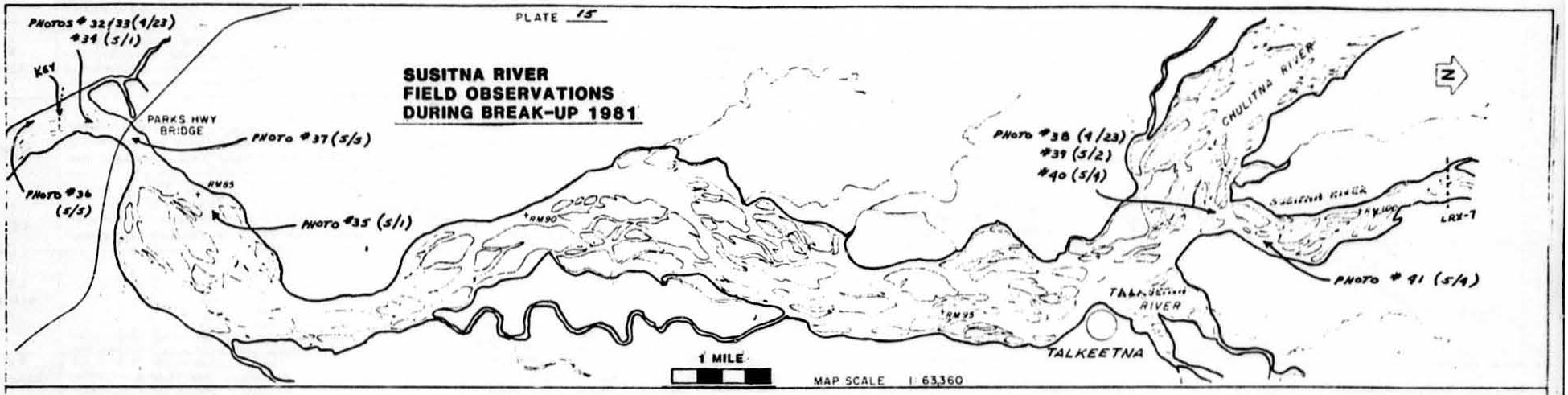
MAP SCALE 1:63,360

1980

NOV. 29	(1) ICE BRIDGE FORMED, NO STAGING APPARENT		FRAZIL ICE COVERAGE 50-60%	(3) MARKS DOWNSTREAM EXTENT OF ICE COVER EXTENDING UPSTREAM TO ISLAND BELOW MOUTH OF KOSINA CREEK
DEC 1	COMBINATION OF SHORE & ANCHOR ICE RESTRICTING FLOW, CAUSING INCREASED TURBULENCE.	(2) ICE BRIDGE FORMED. WATER LEVEL RISING UPSTREAM		
DEC. 2			HEAVY ANCHOR ICE AND SHORE ICE CONSTRICTING CHANNEL UPSTREAM OF DEADMAN CREEK.	ICE COVER APPEARS UNCHANGED. FRAZIL ICE OBSERVED FLOWING OUT FROM UNDER THE ICE COVER.
DEC. 3	CHANNEL SEVERELY CONSTRICTED BY SHORE AND ANCHOR ICE.			DOWNSTREAM EDGE OF ICE COVER IS IN THE SAME LOCATION. ICE COVER NOW EXTENDS APPROX. 3 MILES ABOVE KOSINA CREEK CONFLUENCE
DEC. 4		(4) INDICATES EXTENT OF ICE COVER THROUGH THIS REACH. LEADING EDGE HAS ADVANCED APPROX. 20 YARDS SINCE YESTERDAY		
DEC. 5	(6) MARKS EXTENT OF ICECOVER. SEVERAL SMALLER BRIDGES GREW TOGETHER TO FORM THIS ICE BRIDGE			(5) ICE BRIDGE FORMED SINCE DECEMBER 3. LEADING EDGE OF ICE COVER NOW 9 MILES ABOVE THE MOUTH OF KOSINA CREEK.

F-15

PLATE 15



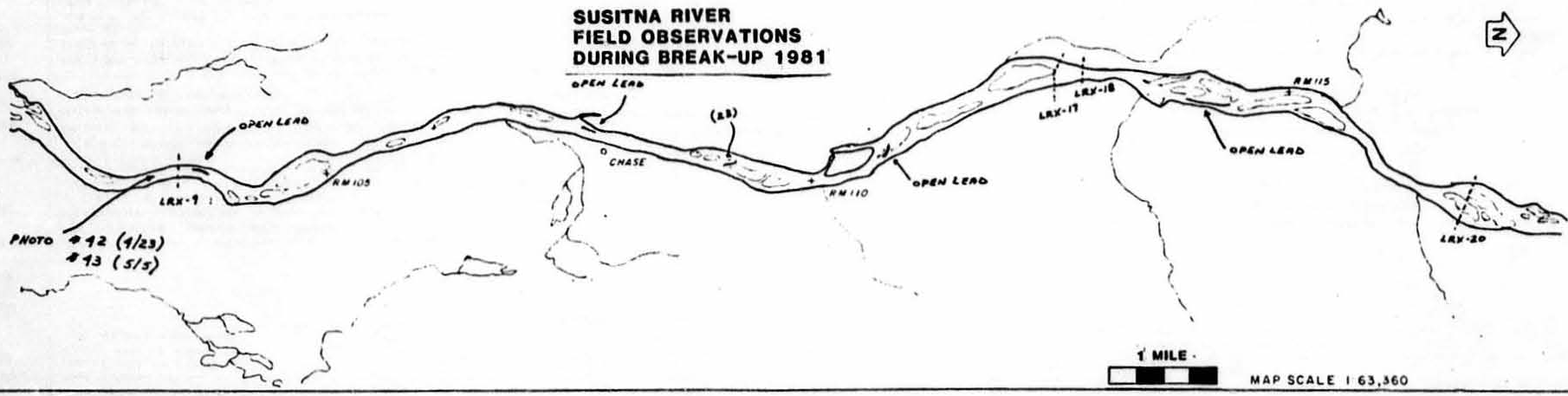
SUSITNA RIVER FIELD OBSERVATIONS DURING BREAK-UP 1981

1981

APRIL 23	FEW OPEN LEADS THROUGH THIS REACH. SIGNS OF MINOR ICE MOVEMENT. STILL PATCHY SNOW ON ICE, GRAVEL AND LAND.		OPEN LEADS IN THE TALKEETNA RIVER EXTENDING SEVERAL MILES UPSTREAM. NO SIGNS OF ICE MOVEMENT IN THE SUSITNA RIVER AT TALKEETNA OR IN THE CHULITNA RIVER. GOOD ICE COVER AT THE SUSITNA - CHULITNA CONFLUENCE.
APRIL 29			
MAY 1	ICE COVER HAS UNDERGONE FIRST MOVEMENT UPSTREAM OF THE BRIDGE. WATER LEVEL IS RISING. INCREASED OVERFLOW AND OPEN LEADS. SMALL ICE ACCUMULATION ABOVE THE BRIDGE.		OPEN LEAD IN THE CHULITNA RIVER AT THE CONFLUENCE. CAN SEE THAT SUSITNA WATER IS MUCH CLEARER THAN CHULITNA WATER. ICE COVER SHOWS LITTLE CHANGE. OPEN LEADS GROWING.
MAY 2	ICE JAM BACKED UP THROUGH THE BRIDGE. KEY INDICATED ON THE MAP ABOVE. FLOOD RELIEF THROUGH LEFT OVERBANK AREA BELOW THE BRIDGE.	CHANNELS ALONG EAST AND WEST OF THE FLOODPLAIN CARRYING THE MAJORITY OF FLOW.	WATER LEVEL RISING. INCREASED OVERFLOW. SIGNS OF ICE MOVEMENT IN THE SUSITNA AT THE CHULITNA - SUSITNA CONFLUENCE.
MAY 3	ICE JAM HOLDING IN THE MAIN CHANNEL. OVERFLOW THROUGH SIDE CHANNELS BELOW THE BRIDGE. LARGE ICE SHEET STUCK AT THE BEND JUST ABOVE KEY OF JAM.		LARGE SECTIONS OF ICE IN THE SUSITNA RIVER ARE BREAKING AWAY AND MOVING INTO THE OPEN LEAD IN THE CHULITNA. WATER LEVEL RISING. NO ICE ACCUMULATIONS ABOVE THE CONFLUENCE TO LRX-7.
MAY 4			
MAY 5	ICE JAM AT THE BRIDGE RELEASED. NEW JAM FORMED 0.75 MILE DOWNSTREAM. ICE COVER BELOW THE JAM STILL IN PLACE.	CHANNELS OPEN. NO MAJOR JAMS OR ACCUMULATIONS	CONFLUENCE STILL BLOCKED, BUT ICE COVER UPSTREAM DETERIORATING. INCREASED ICE MOVEMENT IN LEADS. WATER LEVEL STILL RISING.
MAY 6	CHANNEL THROUGH THE BRIDGE IS CLEAR. ICE JAM HOLDING DOWNSTREAM. JAM RELEASED PRIOR TO MAY 8 RECONNAISSANCE TRIP		LARGE JAM DEVELOPED FROM SUSITNA - CHULITNA CONFLUENCE UPSTREAM TO LRX-7 AS ICE JAMS UPSTREAM RELEASED OVERNIGHT. ICE PUSHED UP INTO VEGETATION ALONG THE BANKS. FLOODING IN THE RIGHT AND LEFT OVERBANK. JAM HOLDING ON MAY 8. RELEASED BY MORNING OF MAY 9.

PLATE 16

SUSITNA RIVER FIELD OBSERVATIONS DURING BREAK-UP 1981

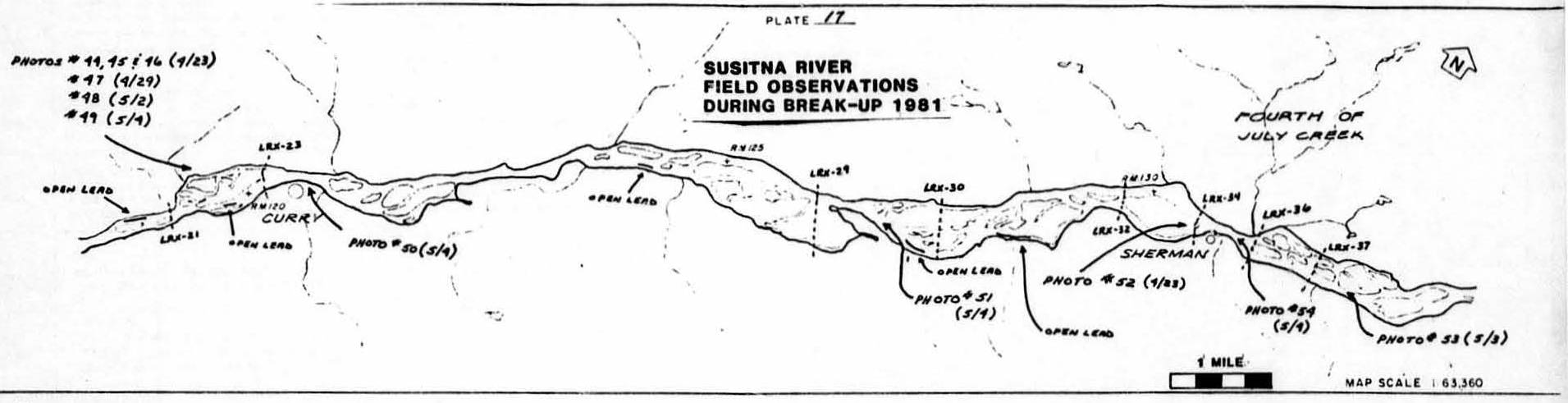


1981

APRIL 23	SNOW ON ICE. A FEW OVERFLOW POCKETS BUT LITTLE EVIDENCE OF A RISE IN WATER LEVEL. ICE CALVING OFF SIDES OF OPEN LEAD AND FLOATING TO HEAD OF LEAD.	GOOD ICE COVER AT CHASE. HISTORICALLY, THE LAST SECTION OF THE RIVER TO BREAKUP. (23) OPEN LEAD PERSISTED ALL WINTER	FRAZIL ICE FLOWING FROM UNDER THE ICE COVER IN OPEN WATER LEADS ALONG THE LEFT BANK.	
APRIL 29				
MAY 1	SIGNS OF FRACTURE AND ICE MOVEMENT. INCREASED OVERFLOW ON ICE COVER.	INCREASED OVERFLOW ON ICE. SMALL LEADS OPENING IN THE ICE COVER.	ICE ACCUMULATING JUST ABOVE LRX-18 WHERE ICE COVER IS BREAKING UP.	ICE ACCUMULATION FORMING APPROX. 1/4 MILE ABOVE RM 115.
MAY 2	ICE DETERIORATING ALONG SHORES. CANDLED ICE CAKES BREAKING FROM EDGES OF LEADS.	← LITTLE CHANGE SINCE MAY 1 →		
MAY 3	ICE COVER MORE BROKEN. MINOR ICE ACCUMULATION UPSTREAM FROM LRX-9. WATER LEVEL RISING.	SMALL ICE ACCUMULATION FORMED WHERE CHANNELS JOIN ABOVE LRX-13	ICE PIECES AT LRX-18 HAVE CONSOLIDATED. NO SIGN IN RISE OF WATER LEVEL.	
MAY 4	INCREASED SIGNS OF MOVEMENT AT LRX-9. HEAVY OVERFLOW ALONG BOTH SHORES BELOW LRX-9		ICE ACCUMULATION HAS INCREASED IN SIZE. HEAVY OVERFLOW UPSTREAM. ICE FLOES SHOW SIGNS OF COMPRESSION.	INCREASED SIZE OF ICE ACCUMULATION DUE TO RELEASE OF SMALL ICE JAM AT LRX-19 DURING THE NIGHT. WATER BEGINNING TO FLOW IN CHANNEL BETWEEN ISLANDS ABOVE RM 115.
MAY 5	JAM DEVELOPED THROUGH THIS REACH. WATER LEVEL UP INTO VEGETATION ON LEFT BANK AT LRX-9. ICE FLOES BEING ADDED AT THE UPSTREAM END OF THE JAM. ICE COVER DOWNSTREAM STILL IN PLACE.		TRUE JAM FORMED. KEY AT LRX-17. MORE FLOES ADDING TO THE JAM. UPSTREAM END OF JAM AT MOUTH OF LANE CREEK. WATER LEVEL RISING IN OVERFLOW CHANNELS	SOME ICE RELEASED IN THE EARLY AFTERNOON. ICE FLOES ADDED TO THE JAM AT LRX 17 & 18.
[illegible]	ICE RELEASED MAIN CHANNEL [illegible]			

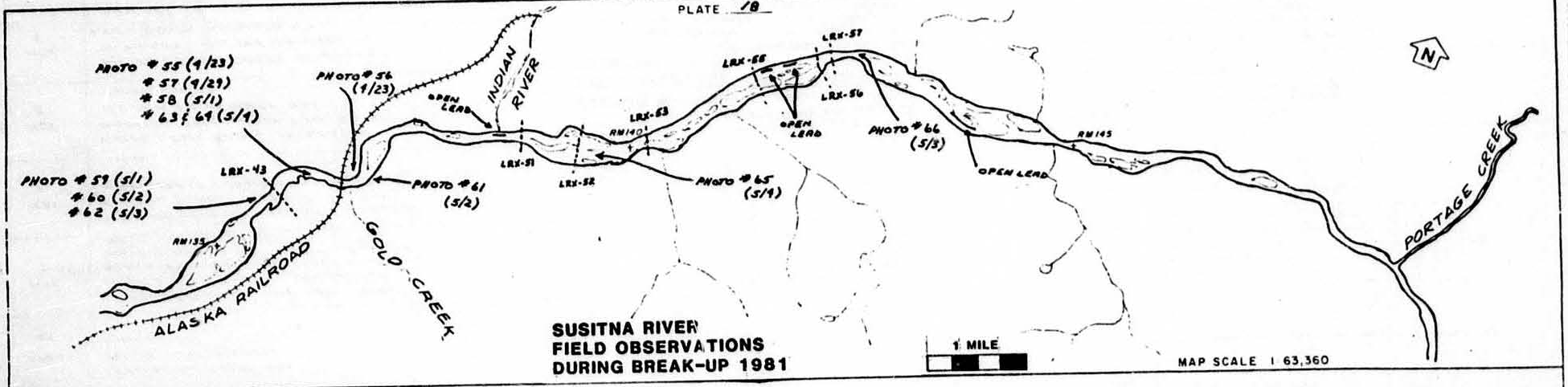
PLATE 17

SUSITNA RIVER FIELD OBSERVATIONS DURING BREAK-UP 1981



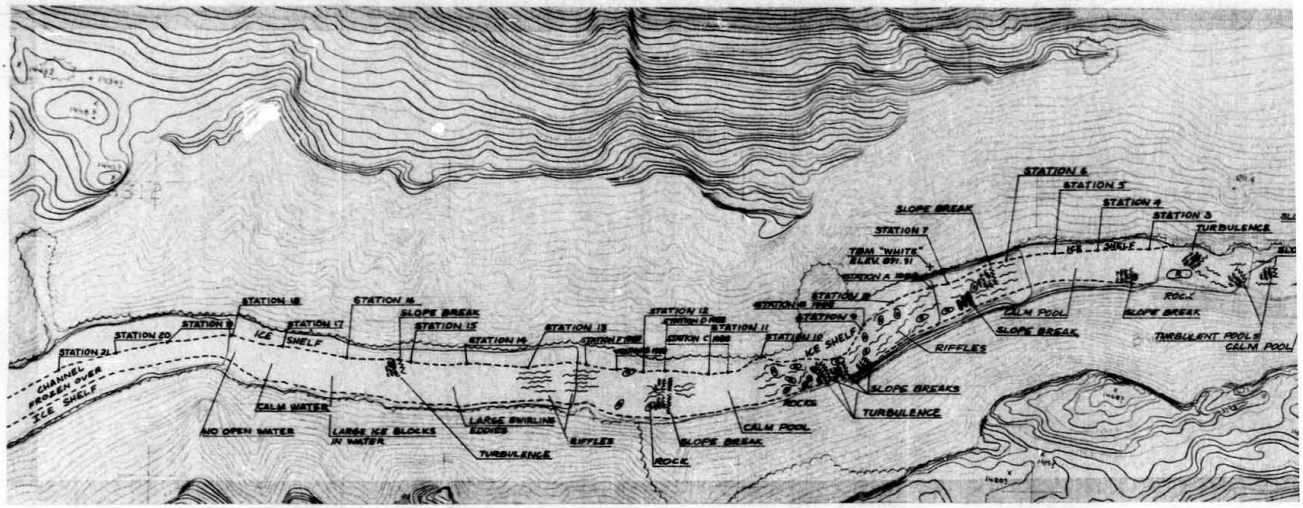
1981				
APRIL 23	OPEN LEAD BELOW CURRY. ICE MOVEMENT IN THE LEAD AND EVIDENCE OF ICE FLOES MOVING UNDER THE ICE COVER	ICE COVER APPEARS STABLE. SOME ICE FLOE MOVEMENT IN OPEN LEADS ALONG THE RIGHT BANK BETWEEN LRX-29 & 30.	OPEN LEAD ALONG RIGHT BANK AT SHERMAN, AND IN LEFT CHANNEL DOWNSTREAM. NO FLOW IN FOURTH OF JULY CREEK.	CONSIDERABLE ICE MOVEMENT IN LEADS THROUGH THIS REACH. WATER LEVEL RISING.
APRIL 29	LEAD BELOW CURRY HAS GROWN, WATER LEVEL RISING.		CONDITIONS RELATIVELY UNCHANGED SINCE APRIL 23	
MAY 1	ICE JAM DEVELOPING JUST ABOVE CURRY. NO OPEN LEADS THROUGH CONSTRICTED REACH AT CURRY. INCREASED OVERFLOW. ICE APPEARS TO BE THINNING, ESPECIALLY NEAR SHORELINES.	LEADS HAVE OPENED UP. SMALL ICE ACCUMULATION DEVELOPING ALONG THE RIGHT BANK ABOVE LRX-29	SMALL ICE ACCUMULATIONS JUST ABOVE SHERMAN IN THE AREA BETWEEN LRX 36 AND 37. HEAVY OVERFLOW IN RIGHT OVERBANK. STILL NO FLOW IN 4TH OF JULY CREEK.	
MAY 2	MINOR JAM FORMED UPSTREAM OF CURRY. SEVERAL SMALL ICE ACCUMULATIONS HAVE FORMED DOWNSTREAM OF CURRY.		ICE ACCUMULATIONS ABOVE SHERMAN HAVE CONSOLIDATED AND THICKENED.	
MAY 3	WATER LEVEL RISING. INCREASED OVERFLOW THROUGHOUT THIS REACH. ICE JAM ABOVE CURRY HAS CONSOLIDATED.	ICE ACCUMULATION/JAM HAS MOVED DOWN TO CONSTRICTED REACH AT LRX-29. SIGNS OF RISING WATER LEVEL, WATER FLOWING IN FAR RIGHT CHANNEL.	ICE JAM/ACCUMULATIONS STILL IN PLACE. WATER LEVEL UP NOTICEABLY. ICE FLOES BEING PUSHED UP ON LEFT BANK BY INCREASING ON THE ICE.	
MAY 4	ICE JAM ABOVE CURRY RELEASED OVERNIGHT. ALL ICE JAMMED IN THE REACH BETWEEN LRX-21 AND LRX-23.	JAM DEVELOPED THROUGH THIS REACH. KEY MARKED ON MAP ABOVE. HEAVY OVERFLOW IN SIDE CHANNELS ICE FLOES ADDING UPSTREAM.	ICE JAMS RELEASED OVERNIGHT. NEW ICE JAM FORMED IN MAIN CHANNEL FROM LRX-32 TO 34. FLOOD RELIEF FROM FLOW IN LEFT CHANNEL. HEAVY OVERFLOW IN 4TH OF JULY CREEK.	
MAY 5	ICE JAM HOLDING. PRESSURE RIDGES FORMING BETWEEN FLOES. STRONG FLOW THROUGH AND AROUND THE JAM. NO APPARENT RISE IN WATER LEVEL.	JAM HOLDING. NO SIGNS OF SIGNIFICANT CHANGE	NO CHANGE IN CONDITIONS AT THE JAM OR UPSTREAM	
MAY 6	ICE JAM RELEASED OVERNIGHT.	JAM HAS GROWN UPSTREAM. OBVIOUS RISE IN WATER LEVEL. JUST ABOVE LRX-30 WATER LEVEL 4-6 FEET BELOW R.R. TRACKS. JAM RELEASED BETWEEN MAY 7 AND 8.	JAM RELEASED SOMETIME BETWEEN MAY 6 AND MAY 8 A.M.	

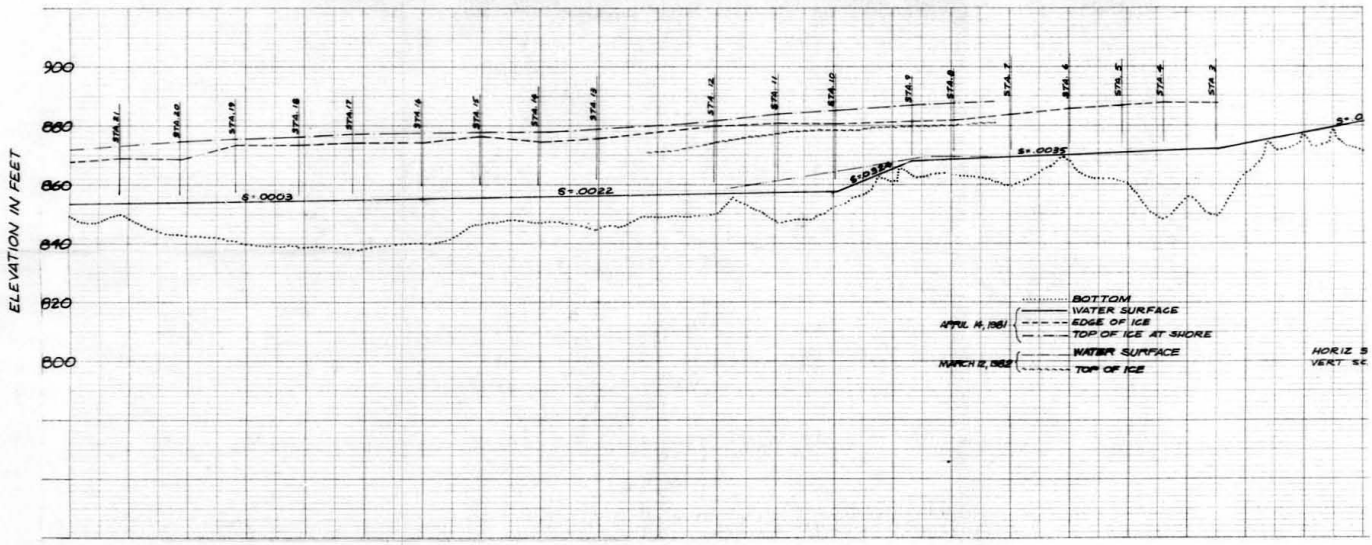
PLATE 18



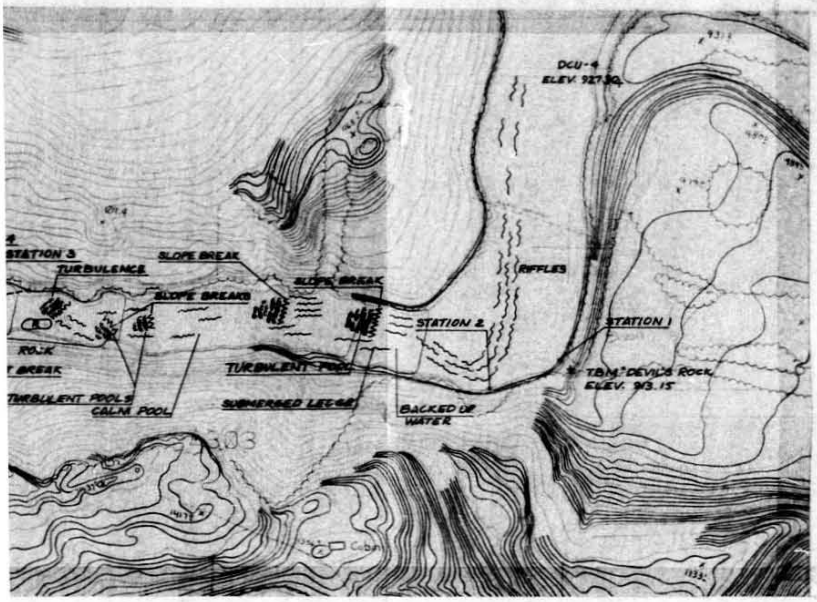
SUSITNA RIVER FIELD OBSERVATIONS DURING BREAK-UP 1981

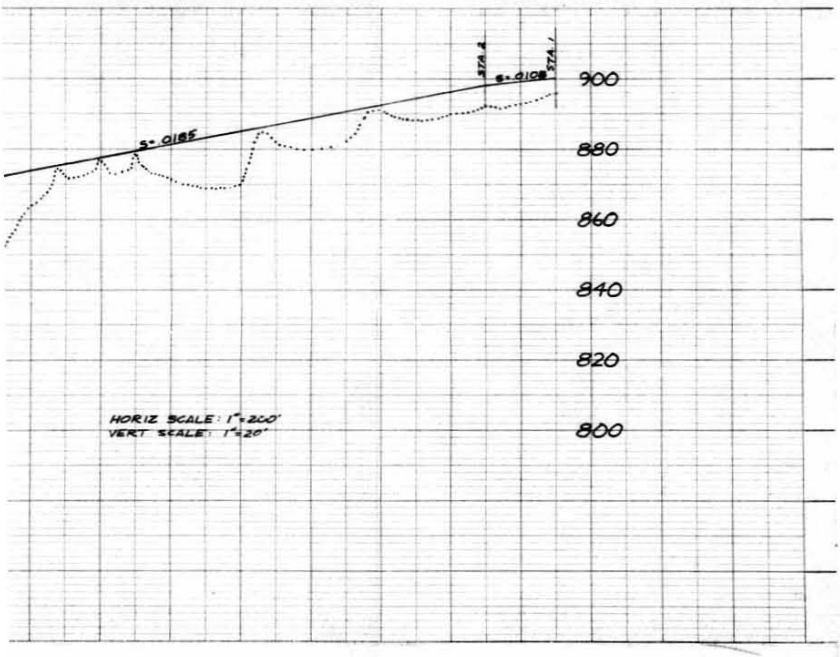
1981			
APRIL 23	OPEN WATER LEAD ALONG THE LEFT BANK AT THE BRIDGE. ICE COVER ATTACHED ON RIGHT BANK, APPEARS TO BE FLOATING. CAN HEAR ICE FLOES MOVING UNDER ICE COVER.		
APRIL 29	OPEN LEADS ALONG LEFT AND RIGHT BANKS. ICE ACCUMULATION DEVELOPING UPSTREAM OF THE BRIDGE.		
MAY 1	ICE JAM DEVELOPING AT BEND IN CHANNEL BELOW THE BRIDGE.	SMALL ICE ACCUMULATION BETWEEN SPLIT CHANNELS AT THE MOUTH OF INDIAN RIVER. OVERFLOW ON INDIAN RIVER. SMALL ICE JAM AT LRX-52 IN THE MAIN CHANNEL. ANOTHER ACCUMULATION JUST ABOVE LRX-53.	
MAY 2	ICE JAM HOLDING DOWNSTREAM OF THE BRIDGE. KEY OF JAM AT ROCK POINT ON RIGHT BANK AT LRX-43	JAM GROWING AT LRX-52. OVERFLOW IN RIGHT CHANNEL. ICE ACCUMULATION ABOVE LRX-53 APPEARS UNCHANGED. OPEN WATER IN INDIAN RIVER.	ICE JAM DEVELOPING FROM LRX-55 TO 57 CAUSING OVERFLOW INTO SIDE CHANNELS.
MAY 3	SIGNS OF INCREASED COMPRESSION THROUGH THE JAM. WATER LEVEL RISING. HEAVY OVERFLOW IN LEFT OVERBANK BELOW THE BRIDGE.	LITTLE CHANGE IN THIS REACH SINCE MAY 2.	ICE BEING ADDED TO ICE JAM. FLOES NOT BEING CARRIED UNDER THE UPSTREAM END OF THE JAM. NO SIGN OF SIGNIFICANT CHANGE IN WATER LEVEL UPSTREAM.
MAY 4	ICE JAM RELEASED OVERNIGHT. MAIN CHANNEL ICE-FREE. PIECES OF ICE STACK 6 FEET HIGH ALONG THE SHORE	ICE IN MAIN CHANNEL AT LRX-52 APPEARS TO HAVE SAGGED, POSSIBLY DUE TO DROP IN WATER LEVEL AFTER JAM AT GOLD CREEK RELEASED.	ICE JAM RELEASED OVERNIGHT. MAIN CHANNEL ICE-FREE. LEFT SIDE CHANNELS PACKED STRANDED ICE.
MAY 5	APPEARS UNCHANGED SINCE MAY 4.	NO NEW ICE ACCUMULATIONS OR SIGNIFICANT CHANGE IN WATER LEVEL THROUGH THIS REACH.	
MAY		ICE JAM HOLDING ON THE MORNING OF MAY 6TH. USGS STREAMFLOW [illegible] AT GOLD CREEK [illegible] RECORDED. [illegible] EVEN	





DATE	NO.	
7-82		ADD





DATE	NO.	REVISIONS	CH.	APP.	APP.
7-82	1	ADD STATIONS A-F	CS	SB	

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

MAP & PROFILE FOR THE SUSITNA RIVER AT DEVIL CANYON

R&M CONSULTANTS, INC.

DATE 4-21-81

DEPARTMENT

PROJECT 062207

SCALE

DRAWING NO.

REV. 1

SHEET OF

APPLIED MECHANICS | ARCHITECTURAL | CIVIL | CONSTRUCTION | ELECTRICAL | GEOTECHNICAL | HYDRAULIC | MECHANICAL | DESIGNED | DRAWN | CHECKED