

ALASKA POWER AUTHORITY

**SUSITNA HYDROELECTRIC
PROJECT**

FIELD DATA INDEX

UNIVERSITY OF ALASKA
NORTH CAMPUS
AND DATA CENTER
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JULY, 1980

PREPARED

BY

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R&M Consultants, Inc.

for

Acres American, Incorporated

FOREWORD

The field data acquisition requirements for the study described in the Plan of Study, Susitna Hydroelectric Project, are substantial. The objective of this index is to keep the study team and all other parties concerned with the project fully updated on the status of available hydrologic and climatologic data.

This Field Data Index has been prepared by R&M Consultants, Inc., for Acres American Incorporated, and it will be updated at six monthly intervals.

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Introduction

The objective of the Field Data Index and Distribution System is to establish a formal system of conveying information concerning hydrologic and climatology data availability to each member of the study team. Contained in this report is a listing of historical data related to the Susitna Project, and which is available at the offices of R&M Consultants. Anyone knowing of additional data that has been collected within or adjacent to the Susitna River Basin is asked to notify R&M Consultants.

All new data collected by R&M Consultants or other organizations will be added to the data index system. An update will be prepared and distributed to personnel listed in Appendix A.

Hard copy of the data required by the project staff will be stored in the R&M Consultants and Acres American offices. The data will be made available to project team members and other concerned parties.

Water Resources Data Presently Available

A number of government agencies have collected data within and adjacent to the Susitna River Basin. The water discharge, water temperature, suspended sediment and water quality data presented herein come entirely from those collected by the Water Resources Branch of the U.S. Geological Survey. The snow survey data presented herein come from those collected by the U.S. Soil Conservation Service. The climatic data come from those collected by the National Oceanic and Atmospheric Administration and supplied by Mr. Jim Wise of the Arctic Environmental Information and Data Center.

Other sources of water resources information concerning the Susitna River Basin include the following two reports.

Riis, J.S. 1977. Pre-authorization assessment of the proposed Susitna River hydroelectric projects: preliminary investigations of water quality and aquatic species composition. Sport Fish Division, Alaska Department of Fish and Game, Anchorage. 72 pp.

U.S. Army, Corps of Engineers. 1975. Southcentral railbelt area Alaska Upper Susitna River Basin, interim feasibility report, Appendix 1, part 1. Alaska District, Corps of Engineers, Anchorage. 430 pp.

The addresses for the agencies mentioned above are presented in Appendix B.

Water Discharge

Mean daily discharge and/or the annual maximum flood peak discharge data have been collected by the U.S. Geological Survey at a number of locations within the Susitna River Basin. The locations for which this information is available and the period of record at each location are as follows:

Station 15290000 - Little Susitna River near Palmer.

Mean Daily Discharge Records: July 1948 - September 1978.

Station 15291000 - Susitna River near Denali.

Mean Daily Discharge Records: May 1957 - September 1966, July 1968 -
September 1978.

Annual Maximum Discharge Records: 1957 - 1978.

Station 15291100 - Raft Creek near Denali.

Annual Maximum Discharge Records: 1963 - 1978.

Station 15291200 - Maclaren River near Paxson.

Mean Daily Discharge Records: June 1958 - September 1978.

Annual Maximum Discharge Records: 1958 - 1978.

Station 15291500 - Susitna River near Cantwell.

Mean Daily Discharge Records: May 1961 - September 1972.

Annual Maximum Discharge Records: 1961 - 1972.

Station 15292000 - Susitna River at Gold Creek.

Mean Daily Discharge Records: August 1949 - September 1978.

Annual Maximum Discharge Records: 1950 - 1978.

Station 15292400 - Chulitna River near Talkeetna.

Mean Daily Discharge Records: February 1958 - September 1972.

Annual Maximum Discharge Records: 1958 - 1977.

Station 15292700 - Talkeetna River near Talkeetna.

Mean Daily Discharge Records: June 1964 - September 1978.

Annual Maximum Discharge Records: 1964 - 1978.

Station 15292780 - Susitna River at Sunshine.

Partial Discharge Records: June 1965, May - August 1971, 1977.

- Susitna River at Curry.

Partial Discharge Records: August - September 1948 (2 dates only)

- Talkeetna River near Talkeetna.

(Alternate location from above)

Partial Discharge Records: August - September 1949 (2 dates only)

Station 15292800 - Montana Creek near Montana.

Partial Discharge Records: June 1963 - January 1973

Station 15292900 - Goose Creek near Montana

Partial Discharge Records: June 1963 - September 1971

Station 15293000 - Caswell Creek near Caswell.

Partial Discharge Records: June 1963 - May 1975

Station 15294005 - Willow Creek near Willow.

Mean Daily Discharge Records: June 1978 - September 1978.

Annual Maximum Discharge Records: 1960 - 1978.

Station 15294010 - Deception Creek near Willow.

Mean Daily Discharge Records: May 1978 - September 1978.

Station 15294025 - Moose Creek near Talkeetna.

Annual Maximum Discharge Records: 1972 - 1978.

Station 15294300 - Skwentna River near Skwentna.

Mean Daily Discharge Records: October 1959 - September 1978.

Station 15294350 - Susitna River at Susitna Station.

Mean Daily Discharge Records: October 1974 - September 1978

Annual Maximum Discharge Records: 1975 - 1978.

Note that the 1979 water discharge records are available at the U.S. Geological Survey for the stations operating in 1979, but that the records have not yet been published.

Water Temperature

Daily maximum and minimum water temperature data have been collected by the U.S. Geological Survey at a number of locations within the Susitna River Basin. The locations for which this information is available and the period of record at each location are given below. It should be noted that selected instantaneous temperature measurements are also available and may be found in the water quality records.

Station 15291000 - Susitna River near Denali.

Period of Record:	1974	August	-	September
	1975	May	-	September
	1976	May	-	December
	1977	June	-	November
	1978	May	-	September

Station 15292000 - Susitna River at Gold Creek.

Period of Record:	1974	July	-	November
	1975	May, August	-	September
	1976	May	-	September
	1977	May	-	July
	1978	June	-	September

Station 15294350 - Susitna River at Susitna Station.

Period of Record:	1975	May	-	December
	1976	April	-	October
	1977	May	-	October
	1978	May	-	September

Sediment

Suspended sediment concentration (mg/l) and suspended sediment discharge (tons/day) and/or suspended sediment particle size analysis data have been collected by the U.S. Geological Survey at a number of locations within the Susitna River Basin. The locations for which this information is available and the period of record at each location are given below. Since the measurements are only taken periodically, and the number and timing of the measurements are subject to both budget and manpower constraints, the annual number and timing of the measurements varies from year to year at any given station.

Station 15291000 - Susitna River near Denali.

Sediment Concentration and Sediment Discharge.

Period of Record: 1958 - 1979.

Particle Size Analysis.

Period of Record: 1958 - 1977.

Station 15291200 - Maclaren River near Paxson.

Sediment Concentration and Sediment Discharge.

Period of Record: 1958 - 1968, 1974 - 1975.

Particle Size Analysis.

Period of Record: 1958 - 1967, 1974 - 1975.

Station 15291500 - Susitna River near Cantwell.

Sediment Concentration and Sediment Discharge.

Period of Record: 1962 - 1972

Particle Size Analysis.

Period of Record: 1962 - 1972.

Station 15292000 - Susitna River near Gold Creek.

Sediment Concentration and Sediment Discharge.

Period of Record: 1952 - 1957, 1962, 1967, 1974 - 1979.

Particle Size Analysis.

Period of Record: 1953, 1955 - 1957, 1962, 1974 - 1978.

Station 15292400 - Chulitna River near Talkeetna.

Sediment Concentration and Sediment Discharge.

Period of Record: 1967 - 1972.

Particle Size Analysis.

Period of Record: 1967 - 1972.

Station 15292700 - Talkeetna River near Talkeetna.

Sediment Concentration and Sediment Discharge.

Period of Record: 1966 - 1979.

Particle Size Analysis.

Period of Record: 1966 - 1977.

Station 15292780 - Susitna River at Sunshine.

Sediment Concentration and Sediment Discharge.

Period of Record: 1971, 1977.

Particle Size Analysis.

Period of Record: 1971, 1977.

Station 15294350 - Susitna River at Susitna Station.

Sediment Concentration and Sediment Discharge.

Period of Record: 1975 - 1973.

Particle Size Analysis.

Period of Record: 1975 - 1978.

Station 624941149221500 - Susitna River above Portage Creek near Gold Creek.

Sediment Concentration and Sediment Discharge.

Period of Record: 1977.

Particle Size Analysis.

Period of Record: 1977.

Water Quality

Water quality data have been collected by the U.S. Geological Survey at a number of locations within the Susitna River Basin. The locations for which this information is available and the period of record at each location are given below. Since the measurements are only taken periodically, the number of measurements, timing and specific parameters measured vary from year to year at any given station. A list of the water quality parameters that have been measured in the basin is presented in Appendix C.

Station 15291000 - Susitna River near Denali.

Period of Record: 1957 - 1966, 1968, 1974 - 1979.

Station 15291100 - Raft Creek near Denali.

Period of Record: 1972.

Station 15291200 - Maclaren River near Paxson.

Period of Record: 1958 - 1975.

Station 15291500 - Susitna River near Cantwell.

Period of Record: 1962 - 1972.

Station 15292000 - Susitna River near Gold Creek.

Period of Record: 1949 - 1958, 1962, 1967 - 1968, 1971, 1974 - 1979.

Station 15292400 - Chulitna River near Talkeetna.

Period of Record: 1958 - 1959, 1967 - 1972.

Station 15292700 - Talkeetna River near Talkeetna.

Period of Record: 1954, 1966 - 1979.

Station 15292780 - Susitna River at Sunshine.

Period of Record: 1971, 1975, 1977.

Station 15294350 - Susitna River at Susitna Station.

Period of Record: 1975 - 1978.

Station 624606149412500 - Gold Creek at Gold Creek.

Period of Record: 1977.

Station 624941149221500 - Susitna River above Portage Creek near Gold Creek.

Period of Record: 1977.

Snow Survey

Snow depth and water equivalent data have been collected by the U.S. Soil Conservation Service at a number of locations within and surrounding the Susitna River Basin. The locations for which this information is available and the period of record at each location are given below. Usually, one measurement a month has been taken at each site during the months of February, March, April and May.

Station 50MM1A - Alexander Lake.

Period of Record: 1964 - 1980.

Station 49NN1A - Bald Mountain Lake.

Period of Record: 1964 - 1980

Station 49MM14A - Capitol Site.

Period of Record: 1978 - 1979

Station 51NN1a - Chelatna Lake.

Period of Record: 1964 - 1980

Station 49NN6a - Chuniilna Creek.

Period of Record: 1979 - 1980

Station 46NN1A - Clearwater Lake.

Period of Record: 1964 - 1980

Station 49MM16A - Deception Creek.

Period of Record: 1979

Station 49NN2a - Devil's Canyon.

Period of Record: 1977 - 1980

Station 48NN1A - Fog Lakes (1)

Period of Record: 1964 - 1973

Station 48NN2A - Fog Lakes (2)

Period of Record: 1970 -1980

Station 45NN1A - Haggard Creek *

Period of Record: 1964 - 1980

Station 49MM10 - Independence Mine

Period of Record: 1964 - 1980

Station 49MM13a - Kashwitna River Cirque

Period of Record: 1979

Station 46NN2A - Lake Louise

Period of Record: 1964 - 1980

Station 47NN2A - Little Nelchina *

Period of Record: 1968 - 1980

Station 48NN4a - Middle Fork Iron Creek

Period of Record: 1979

Station 47001APST - Monahan Flats

Period of Record: 1964 - 1980

Station 49MM15A - Mount Bullion

Period of Record: 1978 - 1979

Station 47NN1A - Oshetna Lake (Square Lake)

Period of Record: 1964 - 1980

Station 50NN1A - Peters Hills

Period of Record: 1968 - 1980

Station 49NN5a - Rainbow Lake

Period of Record: 1978 -1979

Station 46MM1A - St. Anne Lake *

Period of Record: 1964 - 1980

Station 49NN4a - Sheep River

Period of Record: 1979 - 1980

Station 51MM1A - Skwentna

Period of Record: 1967 - 1980

Station 50NN2 - Talkeetna

Period of Record: 1967 - 1980

Station 48NN5a - Talkeetna River

Period of Record: 1979 - 1980

Station 48NN3a - Talkeetna River Pass

Period of Record: 1979 - 1980

Station 48MM1a - Upper Kashwitna River

Period of Record: 1979 - 1980

Station 50MM2 - Willow Airstrip

Period of Record: 1964 - 1980

* Copper River Drainage

Climate

Climatic data have been collected by the National Oceanic and Atmospheric Administration and others at a number of locations within and adjacent to the Susitna River Basin. The locations for which this information is available and the period of record at each location are given below.

Climatic Data collected by NOAA appear, in R&M's files, in one of two types of reports. The first, entitled "Local Climatological Data, Annual Summary with Comparative Data" is generally the most comprehensive, and a list of the parameters included in this report is presented in Appendix D. The second, entitled "Annual Climatologic Summary" contains fewer parameters than the first, and a list of the parameters included in this report is presented in Appendix E. It should be noted that all of the parameters listed in the appendices for a particular report may not have actually been measured at any given station.

Although not available at R&M's offices, NOAA also publishes reports entitled "Local Climatological Data, Monthly Summaries". These reports are available for any station publishing an "annual summary with comparative data", and present most of the parameters contained in the annual summary on a daily basis, with selected parameters also presented on a 3-hour or hourly basis.

The miscellaneous wind data were supplied by Mr. Jim Wise of the Arctic Environmental Information and Data Center, and were taken from a soon to be published manuscript entitled the "Wind Power Atlas". The data are listed by parameter collected.

Station: Big Delta.

NOAA Report Available: Local Climatological Data, Annual Summary
with Comparative Data.

Period of Record Covered In Report: January 1969 - December 1969
with Comparative Data for 1943 - 1969.

Miscellaneous Wind Data. Period Summary by Combined Velocity Groups
(1 to 3 Obs. Daily) covering 1935 - 1941.

Station: Chulitna Highway Camp.

NOAA Report Available: Annual Climatological Summary.

Period of Record Covered in Report: One year per report. Reports
available for the years 1974 - 1978.

Station: Chulitna River Lodge.

NOAA Report Available: Annual Climatological Summary.

Period of Record covered in Report: One year per report. Reports
available for the years 1974, 1975, 1977 and 1978.

Station: Gracious House.

NOAA Report Available: Annual Climatological Summary.

Period of Record covered in Report: One year per report. Reports
available for the years 1974 - 1978.

Station: Gulkana.

NOAA Report Available: Local Climatological Data, Annual Summary with Comparative Data.

Period of Record Covered in Report: January 1978 - December 1978 with Comparative Data for 1943 - 1978.

Miscellaneous Wind Data: Percentage Frequency of Occurrence, Directions by Speed Groups - a summary of the data between January 1945 and November 1958.

Station: Healy Power Plant I.

Miscellaneous Wind Data: Figure showing wind speed duration. Table containing wind speed percent frequency and cumulative frequency at one meter per second increments. Table containing wind direction frequency in percent. Table containing wind speed and joint frequency.

Station: Healy Power Plant II.

Miscellaneous Wind Data: Figure showing wind speed duration. Table containing wind speed percent frequency and cumulative frequency at one meter per second increments. Table containing wind direction frequency in percent. Table containing wind speed and joint frequency.

Station: Healy National Weather Service Site.

Miscellaneous Wind Data: Table containing wind speed percent frequency and cumulative frequency at one meter per second increments. Table containing wind direction frequency in percent. Table containing wind speed and joint frequency.

Station: Rapids.

Miscellaneous Wind Data: Period Summary by Combined Velocity Groups (1 to 12 Obs. Daily) covering 1935 - 1941.

Station: Summit.

NOAA Report available: Local Climatological Data, Annual summary with Comparative Data.

Period of Record Covered in Report: January 1976 - December 1976 with Comparative Data for 1941 - 1976.

Miscellaneous Wind Data: Periodic Summary by Combined Velocity Groups (16 obs. Daily) covering 1940 - 1941.

Station: Talkeetna.

NOAA Report Available: Local Climatological Data, Annual Summary with Comparative Data.

Period of Record Covered in Report: January 1977 - December 1977.

Miscellaneous Wind Data: Period Summary by Combined velocity Groups (16 Obs. Daily) covering 1940 - 1941.

FIELD DATA INDEX

DISTRIBUTION LIST
APPENDIX A

Acres American The Clark Building, Suite 329 Columbia, Maryland 21044 Attention: Charles Debelius	Alaska Power Authority 333 West 4th Avenue, Suite 31 Anchorage, Alaska 99501 Attention: Nancy Blunck
Acres American The Liberty Bank Building Main at Court Buffalo, New York 14202 Attention: G. Krishnan (2 copies)	Cook Inlet Region, Inc./Holmes & Narver 3201 C Street, Suite 201 (Calais I) Anchorage, Alaska 99502 Attention: Jim Pederson
Acres American 2207 Spenard Road Anchorage, Alaska 99503 Attention: Jim Gill	Department of Environmental Conservation Pouch O Juneau, Alaska 99811 Attention: Dave Sturdevant
AEIDC 707 A Street Anchorage, Alaska 99501 Attention: Jim Wise	Geophysical Institute University of Alaska Fairbanks, Alaska 99701 Attention: Dr. Tom Osterkamp
Alaska Dept. of Fish and Game 333 Raspberry Road Anchorage, Alaska 99502 Attention: Tom Trent	Institute of Water Resources University of Alaska Fairbanks, Alaska 99701 Attention: Dr. R.F. Carlson
Alaska Dept. of Natural Resources 323 East 4th Avenue Anchorage, Alaska 99501 Attention: Brent Petrie	L.A. Peterson & Associates 118 Slater Drive Fairbanks, Alaska 99701 Attention: Larry Peterson
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(APPENDIX A CONTINUED)

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R.D.I. Box 388
Phoenix, New York 13135

Attention: Dr. Vincent Lucid

U.S. Fish and Wildlife Service
733 West 4th Avenue, Suite 101
Anchorage, Alaska 99501

Attention: Don Mackay

Woodward-Clyde Consultants
4791 Business Park Blvd.
Anchorage, Alaska 99503

Attention: Dr. Richard Firth

Soil Conservation Service
2221 E. Northern Lights Blvd., Rm. 129
Anchorage, Alaska 99504

Attention: George Clagett

U.S. Army Corps of Engineers
Alaska District
Post Office Box 7002
Anchorage, Alaska 99510

Attention: Vern Thompson

U.S. Geological Survey/Water Resources
218 E Street
Anchorage, Alaska 99501

Attention: Harry Hulsing

APPENDIX B

GOVERNMENT AGENCIES THAT HAVE COLLECTED OR ANALYZED WATER RESOURCES DATA FOR THE SUSITNA RIVER BASIN

Alaska Department of Fish & Game
333 Raspberry Road
Anchorage, Alaska 99502
Attn: Sport Fish Division

Includes: Water Quality Data in
Conjunction with Fisheries Studies

Alaska District, Corp of Engineers
Hydrology Section
Post Office Box 7002
Anchorage, Alaska 99510

Includes: Data Analysis

Arctic Environmental Information
and Data Center
707 A Street
Anchorage, Alaska 99501

Includes: Data Analysis

National Climatic Center
National Oceanic & Atmospheric
Administration
Asheville, North Carolina 28810

Includes: Climatic Data

Soil Conservation Service
2221 E. Northern Lights Blvd.
Room 129
Anchorage, Alaska 99501

Includes: Snow Surveys

U.S. Geological Survey
281 E Street
Anchorage, Alaska 99501
Water Resources Branch

Includes: Water Discharge
Sediment
Water Quality
Water Temperature

APPENDIX C

WATER QUALITY PARAMETERS THAT HAVE BEEN SAMPLED BY THE USGS WITHIN THE SUSITNA RIVER BASIN

Site Parameters

Available for each sample

Date

Time

Instantaneous Stream Flow (cfs)

Occasionally available for sample

Sampling Depth (ft)

Stream Width (ft)

Percent of Total Depth

Sample Location in Cross Section (ft from left bank)

Physical Parameters

Color (Platinum - Cobalt Units)

Hardness (mg/l as CaCO_3)

Hardness, Noncarbonate (mg/l as CaCO_3)
Methylene Blue Active Substance
pH
Solids, Dissolved (tons/day, tons/ac-ft)
Solids, Dissolved Residue at 105°C (mg/l)
Solids, Dissolved Residue at 180°C (mg/l)
Solids, Suspended Residue at 180°C (mg/l)
Specific Conductance (Micromhos/centimeter)
Temperature, Instantaneous (°C)
Turbidity (Jackson Turbidity Units)

Inorganic Parameters

Alkalinity (mg/l as CaCO_3)
Aluminum, Total Recoverable (ug/l as Al)
Arsenic, Dissolved (ug/l as As)
Arsenic, Total (ug/l as As)
Arsenic, Total Suspended (ug/l as As)
Barium, Dissolved (ug/l as Ba)
Barium, Total Recoverable (ug/l as Ba)
Beryllium, Dissolved (ug/l as Be)
Bicarbonate (mg/l as HCO_3)
Boron, Dissolved (ug/l as B)
Cadmium, Dissolved (ug/l as Cd)
Cadmium, Total Recoverable (ug/l as Cd)
Calcium, Dissolved (mg/l as Ca)
Carbon Dioxide, Dissolved (mg/l as CO_2)

Carbonate (mg/l as CO₃)
Chloride, Dissolved (mg/l as Cl)
Chromium, Dissolved (ug/l as Cr)
Chromium, Dissolved Hexavalent (ug/l as Cr)
Chromium, Suspended Recoverable (ug/l as Cr)
Chromium, Total Recoverable (ug/l as Cr)
Cobalt, Dissolved (ug/l as Co)
Copper, Dissolved (ug/l as Cu)
Copper, Total Recoverable (ug/l as Cu)
Cyanide, Total (mg/l as Cn)
Fluoride, Dissolved (mg/l as F)
Iron (ug/l as Fe)
Iron, Dissolved (ug/l as Fe)
Iron, Total Recoverable (ug/l as Fe)
Lead, Dissolved (ug/l as Pb)
Lead, Total Recoverable (ug/l as Pb)
Lithium, Dissolved (ug/l as Li)
Magnesium, Dissolved (mg/l as Mg)
Manganese (ug/l as Mn)
Manganese, Dissolved (ug/l as Mn)
Manganese, Total Recoverable (ug/l as Mn)
Mercury, Dissolved (ug/l as Hg)
Mercury, Total Recoverable (ug/l as Hg)
Molybdenum, Dissolved (ug/l as Mo)

Molybdenum, Total Recoverable (ug/l as Mo)

Nickel, Dissolved (ug/l as Ni)

Nickel, Total Recoverable (ug/l as Ni)

Nitrogen, Dissolved Ammonia (mg/l as N, mg/l as NH_4)

Nitrogen, Dissolved Nitrate (mg/l as N, mg/l as NO_3)

Nitrogen, Dissolved Nitrate + Nitrite (mg/l as N)

Nitrogen, Total (mg/l as NO_3)

Nitrogen, Total Ammonia (mg/l as N)

Nitrogen, Total Ammonia + Organic (mg/l as N)

Nitrogen, Total Nitrate (mg/l as N, mg/l as NO_3)

Nitrogen, Total Nitrate + Nitrite (mg/l as N)

Nitrogen, Total Nitrite (mg/l as N)

Nitrogen, Total Organic (mg/l as N)

Oxygen, Dissolved (mg/l, percent saturation)

Phosphate, Dissolved Ortho (mg/l as PO_4)

Phosphate, Total (mg/l as PO_4)

Phosphorus, Total (mg/l as P)

Phosphorus, Dissolved (mg/l as P)

Phosphorus, Dissolved Ortho (mg/l as P)

Potassium, Dissolved (mg/l as K)

Selenium, Dissolved (ug/l as Se)

Selenium, Total (ug/l as Se)

Silica, Dissolved (mg/l as SiO_2)

Silver, Dissolved (ug/l as Ag)

Silver, suspended recoverable (ug/l as Ag)
Silver, total recoverable (ug/l as Ag)
Sodium Adsorption Ratio
Sodium, Dissolved (mg/l as Na)
Sodium, Percent
Sodium + Potassium, Dissolved (mg/l as Na)
Strontium, Dissolved (ug/l as Sr)
Sulfate, Dissolved (mg/l as SO₄)
Uranium, Dissolved - Extraction (ug/l)
Uranium, Dissolved - Direct Fluorimetric (pci/l)
Zinc, Dissolved (ug/l as Zn)
Zinc, Total Recoverable (ug/l as Zn)

Organic Parameters

Aldrin, Total (ug/l)
Aldrin, Total in Bottom Material (ug/kg)
Biochemical Oxygen Demand, Five Day (mg/l)
Chlordane, Total (ug/l)
Chlordane, Total in Bottom Material (ug/kg)
2,4-D, Total (ug/l)
2,4-D, Total in Bottom Material (ug/kg)
DDD, Total (ug/l)
DDD, Total in Bottom Material (ug/kg)

DDE, Total (ug/l)
DDE, Total in Bottom Material (ug/kg)
DDT, Total (ug/l)
DDT, Total in Bottom Material (ug/kg)
Diazinon, Total (ug/l)
Dieldrin, Total (ug/l)
Dieldrin, Total in Bottom Material (ug/kg)
Endosulfan, Total (ug/l)
Endosulfan, Total in Bottom Material (ug/kg)
Endrin, Total (ug/l)
Endrin, Total in Bottom Material (ug/kg)
Ethion, Total (ug/l)
Ethion, Total in Bottom Material (ug/kg)
Heptachlor., Total (ug/l)
Heptachlor., Total in Bottom Material (ug/kg)
Heptachlor., Total Epoxide (ug/l)
Heptachlor., Total Epoxide in Bottom Material (ug/kg)
Lindane, Total (ug/l)
Lindane, Total in Bottom Material (ug/kg)
Malathion, Total (ug/l)
Malathion, Total in Bottom Material (ug/kg)
Mirex, Total (ug/l)
Naphthalenes, Total Polychlor (ug/l)
Parathion, Total (ug/l)

Parathion, Total in Bottom Material (ug/kg)
Parathion, Total Methyl (ug/l)
Parathion, Total Methyl in Bottom Material (ug/kg)
PCB, Total (ug/l)
PCB, Total in Bottom Material (ug/kg)
PCN, Total in Bottom Material (ug/kg)
Perthane, Total (ug/l)
Phenols (ug/l)
Silvex, Total (ug/l)
Silvex, Total in Bottom Material (ug/kg)
2, 4, 5 - T, Total (ug/l)
2, 4, 5 - T, Total in Bottom Material (ug/kg)
Toxaphene, Total (ug/l)
Toxaphene, Total in Bottom Material (ug/kg)
Trithion, Total (ug/l)
Trithion, Total in Bottom Material (ug/kg)
Trithion, Total Methyl (ug/l)
Trithion, Total Methyl in Bottom Material (ug/kg)
Vanadium, Dissolved (ug/l as V)

Radioactive Parameters

Alpha, Dissolved Gross (pci/l as U-NAT, ug/l as U-NAT)
Alpha, Total Suspended Gross (pci/l as U-NAT, pci/g as U-NAT,
ug/l as U-NAT)

Beta, Dissolved Gross (pci/l as Cs-137, pci/l as Sr/Yt - 90)

Beta, Total Suspended Gross (pci/l as Cs-137, pci/g as Sr/Yt - 90,
pci/g as Cs-137)

Radium 226, Dissolved - Random Method (pci/l)

Coliform Bacteria

Coliform, Fecal - 0.45 UM-MF (Cols./100ml.)

Coliform, Fecal - 0.7 UM-MF (Cols./100ml.)

Coliform, Streptococci Fecal (Cols./100ml.)

Coliform, Streptococci Fecal - KF Agar (Cols./100ml.)

Coliform, Total - Delayed (Cols./100ml.)

Coliform, Total - Immediate (Cols./100 ml.)

APPENDIX D
CLIMATOLOGICAL PARAMETERS WHICH
APPEAR IN THE NOAA REPORTS ENTITLED
"LOCAL CLIMATOLOGICAL DATA, ANNUAL SUMMARY
WITH COMPARATIVE DATA"

1. Meteorological Data For The Current Year

Temperature (°F)

Average Daily Maximum, for each month.
Average Daily Maximum, for the year.
Average Daily Minimum, for each month.
Average Daily Minimum, for the year.
Average, for each month.
Average, for the year.
Highest, and Date of Occurrence, for each month.
Highest, and Date of Occurrence, for the year.
Lowest, and Date of Occurrence, for each month.
Lowest, and Date of Occurrence, for the year.

Degree Days (Base 65°F)

Number of Heating, for each month.
Number of Heating, for the year.
Number of Cooling, for each month.
Number of Cooling, for the year.

Precipitation (Inches)

Total Inches of Water Equivalent, for each month.

Total Inches of Water Equivalent, for the year.

Greatest Amount of Water Equivalent in 24 hours and the Date of Occurrence, for each month.

Greatest Amount of Water Equivalent in 24 hours and the Date of Occurrence, for the year.

Total Inches of Snow and/or Ice Pellets, for each month.

Total Inches of Snow and/or Ice Pellets, for the year.

Greatest Amount of Snow and/or Ice Pellets in 24 hours and the Date of Occurrence, for each month.

Greatest Amount of Snow and/or Ice Pellets in 24 hours and the Date of Occurrence, for the year.

Relative Humidity (Percent)

Average Relative Humidity at hour 0200, for each month.

Average Relative Humidity at hour 0200, for the year.

Average Relative Humidity at hour 0800, for each month.

Average Relative Humidity at hour 0800, for the year.

Average Relative Humidity at hour 1400, for each month.

Average Relative Humidity at hour 1400, for the year.

Average Relative Humidity at hour 2000, for each month.

Average Relative Humidity at hour 2000, for the year.

Wind

Resultant Direction, for each month.

Resultant Direction, for the year.

Resultant Speed (m.p.h.), for each month.

Resultant Speed (m.p.h.), for the year.

Average Speed (m.p.h.), for each month.

Average Speed (m.p.h.), for the year.

Speed of the Fastest Mile (m.p.h.), for each month.

Speed of the Fastest Mile, (m.p.h.) for the year.

Direction and Date of Occurrence of the Fastest Mile, for each month.

Direction and Date of Occurrence of the Fastest Mile, for the year.

Miscellaneous

Percent of Possible Sunshine, for each month.

Percent of Possible Sunshine, for the year.

Average Sky Cover, tenths, sunrise to sunset, for each month.

Average Sky Cover, tenths, sunrise to sunset, for the year.

Number of Clear Days, sunrise to sunset, for each month.

Number of Clear Days, sunrise to sunset, for the year.

Number of Partly Cloudy Days, sunrise to sunset, for each month.

Number of Partly Cloudy Days, sunrise to sunset, for the year.

Number of Cloudy Days, sunrise to sunset, for each month.

Number of Cloudy Days, sunrise to sunset, for the year.

Number of Days with 0.01 inch or more of Precipitation, for each month.

Number of Days with 0.01 inch or more of Precipitation, for the year.

Number of Days with 1.0 inch or more of Snow and/or Ice Pellets,
for each month.

Number of Days with 1.0 inch or more of Snow and/or Ice Pellets,
for the year.

Number of Days with Thunderstorms, for each month.

Number of Days with Thunderstorms, for each year.

Number of Days with Heavy Fog, visibility 1/4 mile or less for each
month.

Number of Days with Heavy Fog, visibility 1/4 mile or less for the
year.

Number of Days when the Maximum Temperature was 90°F and above,
for each month.

Number of Days when the Maximum Temperature was 90°F and above,
for the year.

Number of Days when the Maximum Temperature was 32°F and below,
for the year.

Number of Days when the Maximum Temperature was 32°F and below,
for the year.

Number of Days when the Minimum Temperature was 32°F and below,
for each month.

Number of days when the Minimum Temperature was 32°F and Below,
for the year.

Number of Days when the Minimum Temperature was 0°F and below,
for each month.

Number of Days when the Minimum Temperature was 0°F and below, for
the year.

Average Station Pressure (mb), for each month.

Average Station Pressure (mb), for the year.

2. Normals*, Means, and Extremes

Temperature (°F)

Normal Daily Maximum, for each month.

Normal Daily Maximum, for a year.

Normal Daily Minimum, for each month.

Normal Daily Minimum, for a year.

Normal Monthly, for each month.

Normal Yearly.

Record High and Year of Occurrence, for each month.

Record High and Date of Occurrence.

Record Low and Year of Occurrence, for each month.

Record Low and Date of Occurrence.

Degree Days (Base 65°F)

Normal Number of Heating, for each month.

Normal Number of Heating, for a year.

Normal Number of Cooling, for each month.

Normal Number of Cooling, for a year.

*Normals are based on the previous 30 years of record.

Precipitation (Inches)

Normal Total Inches of Water Equivalent, for each month.

Normal Yearly Total Inches of Water Equivalent.

Maximum Monthly Total Inches of Water Equivalent and Year of
Occurrence, for each month.

Maximum Monthly Total Inches of Water Equivalent and Date of
occurrence.

Minimum Monthly Total Inches of Water Equivalent and Date of
Occurrence, for each month.

Minimum Monthly Total Inches of Water Equivalent and Date of
Occurrence.

Maximum Total Inches of Water Equivalent in 24 hours and Date
of Occurrence, for each month.

Maximum Total Inches of Water Equivalent in 24 hours and Date
of Occurrence.

Maximum Monthly Total Inches of Snow and/or Ice Pellets and Date
of Occurrence, for each month.

Maximum Monthly Total Inches of Snow and/or Ice Pellets and Date
of Occurrence.

Maximum Inches of Snow and/or Ice Pellets in 24 hours and Date
of Occurrence, for each month.

Maximum Inches of Snow and/or Ice Pellets in 24 hours and Date
of Occurrence.

Relative Humidity (Percent)

Normal Relative Humidity at hour 0200, for each month.

Normal Yearly Relative Humidity at hour 0200.

Normal Relative Humidity at hour 0800, for each month.

Normal Yearly Relative Humidity at hour 0800.

Normal Relative Humidity at hour 1400, for each month.

Normal Yearly Relative Humidity at hour 1400.

Normal Relative Humidity at hour 2000, for each month.

Normal Yearly Relative Humidity at hour 2000.

Wind

Mean Monthly Speed (m.p.h.), for each month.

Mean Yearly Speed (m.p.h.).

Prevailing Direction, for each month.

Yearly Prevailing Direction.

Maximum Speed, Direction, and Date of Occurrence of the
Fastest Mile, for each month.

Maximum Speed, Direction, and Date of Occurrence of the Fastest
Mile.

Miscellaneous

Mean Percent of Possible Sunshine, for each month.

Mean Yearly Percent of Possible Sunshine.

Mean Sky Cover, tenths, sunrise to sunset, for each month.

Mean Yearly Sky Cover, tenths, sunrise to sunset.

Mean Number of Clear Days, sunrise to sunset, for each month.

Mean Yearly Number of Clear Days, sunrise to sunset.

Mean Number of Partly Cloudy Days, sunrise to sunset, for each month.

Mean Yearly Number of Partly Cloudy Days, sunrise to sunset.

Mean Number of Cloudy Days, sunrise to sunset, for each month.

Mean Yearly Number of Cloudy Days, sunrise to sunset.

Mean Number of Days with 0.01 inch or more of Precipitation, for each month.

Mean Yearly Number of Days with 0.01 inch or more of Precipitation.

Mean Number of Days with 1.0 inch or more of Snow and/or Ice Pellets, for each month.

Mean Yearly Number of Days with 1.0 inch or more of Snow and/or Ice Pellets.

Mean Number of Days with Thunderstorms, for each month.

Mean Yearly Number of Days with Thunderstorms.

Mean Number of Days with Heavy Fog, visibility 1/4 mile or less, for each month.

Mean Yearly Number of Days with Heavy Fog, visibility 1/4 mile or less.

Mean Number of Days when the Maximum Daily Temperature is 90°F and above, for each month.

Mean Yearly Number of Days when the Maximum Daily Temperature is 90°F and above.

Mean Number of Days when the Maximum Daily Temperature is 32°F and below, for each month.

Mean Yearly Number of Days when the Maximum Daily Temperature is 32°F and below.

Mean Number of Days when the Minimum Daily Temperature is 32°F and below, for each month.

Mean Yearly Number of Days when the Minimum Daily Temperature is 32°F and below.

Mean Number of Days when the Minimum Daily Temperature is 0°F and below, for each month.

Mean Yearly Number of Days when the Minimum Daily Temperature is 0°F and below.

Average Station Pressure (mb), for each month.

Average Yearly Station Pressure (mb).

3. Average Temperature

Both the monthly and the annual average air temperatures are given for the period of record.

4. Precipitation

Both the monthly and the annual amounts of precipitation (in inches) are given for the period of record.

5. Heating Degree Days

Both the monthly and the annual number of heating degree days are given for the period of record.

6. Cooling Degree Days

Both the monthly and the annual number of cooling degree days are given for the period of record.

7. Snowfall

Both the monthly and the annual amounts of snowfall are given for the period of record.

APPENDIX E

CLIMATOLOGICAL PARAMETERS WHICH APPEAR IN THE NOAA REPORTS ENTITLED "ANNUAL CLIMATOLOGICAL SUMMARY"

Temperature (°F)

Mean Maximum Temperature, for each month.

Mean Maximum Temperature, for the year.

Mean Minimum Temperature for each month.

Mean Minimum Temperature for the year.

Mean Temperature for each month.

Mean Temperature for the year.

Total Degree Days, for each month.

Total Degree Days, for the year.

Highest Temperature and Date of Occurrence, for each month.

Highest Temperature and Date of Occurrence, for the year.

Lowest Temperature and Date of Occurrence, for each month.

Lowest Temperature and Date of Occurrence, for the year.

Number of Days when the Maximum Temperature was 90°F and above,
for each month.

Number of Days when the Maximum Temperature was 90°F and above,
for the year.

Number of Days when the Maximum Temperature was 32°F and below,
for each month.

Number of Days when the Maximum Temperature was 32°F and below,
for the year.

Number of Days when the Minimum Temperature was 32°F and below,
for each month.

Number of Days when the Minimum Temperature was 32°F and below,
for the year.

Number of Days when the Minimum Temperature was 0°F and below,
for each month.

Number of Days when the Minimum Temperature was 0°F and below,
for the year.

Precipitation (Inches)

Total Amount of Precipitation, for each month.

Total Amount of Precipitation, for the year.

Greatest Amount of Precipitation in 24 hours and Date of Occurrence,
for each month.

Greatest Amount of Precipitation in 24 hours and Date of Occurrence,
for the year.

Total Amount of Snow and/or Sleet, for each month.

Total Amount of Snow and/or Sleet, for the year.

Greatest Depth of Snow and/or Sleet and Date of Occurrence, for each
month.

Greatest Depth of Snow and/or Sleet and Date of Occurrence, for the
year.

Number of Days with 0.10 inch or more of Precipitation, for each month.

Number of Days with 0.10 inch or more of Precipitation, for the year.

Number of Days with 0.50 inch or more of Precipitation, for the year.

Number of Days with 0.50 inch or more of Precipitation, for each month.

Number of Days with 1.0 inch or more of Precipitation, for each month.

Number of Days with 1.0 inch or more of Precipitation, for the year.

APPENDIX F:

PROPOSED DATA COLLECTION PROGRAM FOR SUSITNA HYDROELECTRIC PROJECT

STATION/LOCATION	MEASUREMENTS	R&M	U.S.G.S.	S.C.S.	COMMENTS
Susitna River near Denali	Streamflow Gaging Sediment Discharge Climate In-cloud Icing Freezing Rain	 X X X	X X 		Proposed. See attached list of parameters to be measured. Proposed Proposed
MacLaren River near Paxson	Streamflow Gaging		X		
Susitna River near Cantwell	Streamflow Gaging Sediment Discharge Water Quality Water Temperature	 X X	X X		See attached list of parameters to be measured.
Susitna River at Watana Damsite	Streamflow Gaging Water Quality Crest Stage Climate In-cloud Icing Freezing Rain	X X X X X X			To include continuous water quality. Monitoring at locations: above, at and below proposed damsite.
Susitna River at Devil's Canyon Damsite	Crest Stage Climate Snow Creep	X X X			3 locations: above, at and below proposed damsite. Proposed

APPENDIX F (Continued)

PROPOSED DATA COLLECTION PROGRAM FOR SUSITNA HYDROELECTRIC PROJECT

STATION/LOCATION	MEASUREMENTS	R&M	U.S.G.S.	S.C.S.	COMMENTS
Susitna River at Gold Creek	Streamflow Gaging Sediment Discharge Water Quality	X X	X X X		
Chulitna River near Talkeetna	Streamflow Gaging Sediment Discharge Water Temperature		X X X		
Talkeetna River near Talkeetna	Streamflow Gaging Sediment Discharge Water Quality		X X X		
Susitna River near Sunshine	Streamflow Gaging Sediment Discharge Water Quality		X X X		All data collection delayed until 1981.
Yentna River near the mouth	Streamflow Gaging Water Temperature Sediment Discharge		X X X		
Susitna River near Susitna	Streamflow Gaging Sediment Discharge Water Quality		X X X		
Susitna River:					
in Devil's Canyon	Crest Stage	X			
at Portage Creek confluence	Crest Stage	X			

APPENDIX F (Continued)

PROPOSED DATA COLLECTION PROGRAM FOR SUSITNA HYDROELECTRIC PROJECT

STATION/LOCATION	MEASUREMENTS	R&M	U.S.G.S.	S.C.S.	COMMENTS
near Sherman	Crest Stage	X			
appr. 5 miles below Sherman	Crest Stage	X			
near Curry	Crest Stage	X			
near Chulitna River confluence	Crest Stage	X			
Alexander Lake	Snow Survey	X		X	
Bald Mountain Lake	Snow Survey	X		X	
Capitol Site	Snow Survey	X		X	
Chelatna Lake	Snow Survey	X		X	
Chunilna River	Snow Survey	X		X	
Clearwater Lake	Snow Survey	X		X	
Deception Creek	Snow Survey	X		X	
Devil's Canyon	Snow Survey	X		X	
Fog Lakes (1) & (2)	Snow Survey	X		X	
Haggard Creek	Snow Survey	X		X	Copper River Drainage
Independence Mine	Snow Survey	X		X	

APPENDIX F (Continued)

PROPOSED DATA COLLECTION PROGRAM FOR SUSITNA HYDROELECTRIC PROJECT

STATION/LOCATION	MEASUREMENTS	R&M	U.S.G.S.	S.C.S.	COMMENTS
Kashwitna River Cirque	Snow Survey	X		X	
Lake Louise	Snow Survey	X		X	
Little Nelchina	Snow Survey	X		X	Copper River Drainage
Middle Fork Iron Creek	Snow Survey	X		X	
Monahan Flats	Snow Survey	X		X	
Mount Bullion	Snow Survey	X		X	
Oshetna Lake (Square Lake)	Snow Survey	X		X	
Peters Hills	Snow Survey	X		X	
Rainbow Lake	Snow Survey	X		X	
St. Anne Lake	Snow Survey	X		X	Copper River Drainage
Sheep River	Snow Survey	X		X	
Skwentna	Snow Survey	X		X	
Talkeetna	Snow Survey	X		X	
Talkeetna River	Snow Survey	X		X	
Talkeetna River Pass	Snow Survey	X		X	

APPENDIX F (Continued)

PROPOSED DATA COLLECTION PROGRAM FOR SUSITNA HYDROELECTRIC PROJECT

STATION/LOCATION	MEASUREMENTS	R&M	U.S.G.S.	S.C.S.	COMMENTS
Upper Kashwitna River	Snow Survey	X		X	
Willow Airstrip	Snow Survey	X		X	
West Fork Glacier	Snow Survey	X		X	Proposed
Susitna Glacier	Snow Survey	X		X	Proposed
East Fork Glacier	Snow Survey	X		X	Proposed
Susitna Glacier	Climate	X			
Denali	Climate	X			
Tyone River	Climate	X			
Kosina Creek	Climate	X			
Healy	Climate	X			Proposed for 1981
	In-cloud Icing	X			Proposed
	Freezing Rain	X			Proposed
	Snow Creep	X			Proposed

APPENDIX F (Continued)

Climate Parameters to be Measured

Wind Direction
Wind Speed
Temperature
Relative Humidity
Solar Radiation
Precipitation

Water Quality Parameters to Be Measured

Field:

Dissolved Oxygen
pH
Conductivity
Temperature
Carbon Dioxide
Alkalinity
Settleable Solids

Laboratory:

Turbidity
Total Dissolved Solids
Total Suspended Solids
Total Phosphate
Kjeldahl Nitrogen
Total Nitrogen
Nitrate Nitrogen
Ammonia Nitrogen
Chemical Oxygen Demand
Hardness
Chloride
Color
Sulfate
ICAP Scan (1)
Uranium
Radioactivity, Gross Alpha
Organic Chemicals
Total Organic Carbon
Total Inorganic Carbon

(1) ICAP Scan includes:

Silver
Aluminum
Arsenic
Gold
Boron
Barium
Bismuth
Calcium
Cadmium
Cobalt
Chromium
Copper
Iron
Mercury
Potassium
Magnesium
Molybdenum
Sodium
Nickel
Manganese
Phosphorous
Lead
Platinum
Antimony
Selenium
Tin
Strontium
Titanium
Vanadium
Tungsten
Zinc
Zirconium