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HYDROLOGIC AND GEOLOGIC CONDITIONS AND HAZARDS AT THE PUT 23 PIT SITE, BEECHEY POINT B-3 SW QUADRANGLE, ALASKA

By

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HYDROLOGIC AND GEOLOGIC CONDITIONS AND HAZARDS AT THE PUT 23 PIT SITE, BEECHEY POINT B-3 SW QUADRANGLE, ALASKA

By

William A. Petrik[1] and Richard D. Reger[2]

INTRODUCTION

At the request of Rick Smith, Northern Regional Manager, Division of Land and Water Management (DLWM), Department of Natural Resources (DNR), we began researching published and unpublished information on hydrologic and geologic conditions at the PUT 23 pit site in August 1990. Petrik briefly visited the site on 9-10-90, and Reger conducted a short field reconnaissance on 10-11-90. The results of these efforts and subsequent analyses are presented and discussed in this report.

SETTING

PUT 23 pit is located in Section 23, T. 11 N., R. 14 E., Umiat Meridian, in the Beechey Point B-3 SW Quadrangle, Alaska, near the east bank of the Putuligayuk River 1.3 to 2.5 mi upstream from the river mouth at Prudhoe Bay (fig. 1). A landfill and a solid-oily-waste-disposal facility are developed in the southeastern corner of the large gravel pit there (fig. 2). This part of the Arctic Coastal Plain slopes gently northward toward Prudhoe Bay. Natural relief on the order of a few feet is provided by isolated pingos and by low scarps along streams and around thaw lakes.

The climate of this area is classified as arctic modified by coastal maritime influences (Walker, 1985). Winters are long, dark, and cold, and summers are short, sunlit, and cool. Summer fogs frequently move into the area from Beaufort Sea. Mean annual temperature is about 9° F and the warmest month, July, averages about 25° F. Total yearly precipitation ranges from about 10 to 20 in. of water equivalent, up to about half of which is summer rain (Rawlinson, 1990). Snowfall is generally light, and thickness of the spring (April) snow cover on the ground is a windpacked 12 to 16 in., with up to 8 in. of loose depth hoar at the base. Winds blow frequently, primarily from the eastnortheast, and mean yearly wind velocity is about 12 mi/hr.

Permafrost, or perennially frozen ground, is continuous in this area (Ferrians, 1965) and is more than 1,800 ft thick inland of Prudhoe Bay (Collett and others, 1989). Maximum depth of seasonal thawing is about 3.3 ft. Mean temperature of the ground surface is about 14° F (Lachenbruch and others, 1982). Ground temperature at the depth of no annual temperature change is close to 14° F (Péwé, 1974). Ground ice is generally concentrated in the upper several feet of permafrost (Sellmann and others, 1975), where it occupies up to 85 percent of the ground volume (Brown, 1967). In this interval, small segregated lenses, seams, and veins represent 75 percent of the ice present and massive wedge ice represents 25 percent.

HYDROLOGIC CONDITIONS

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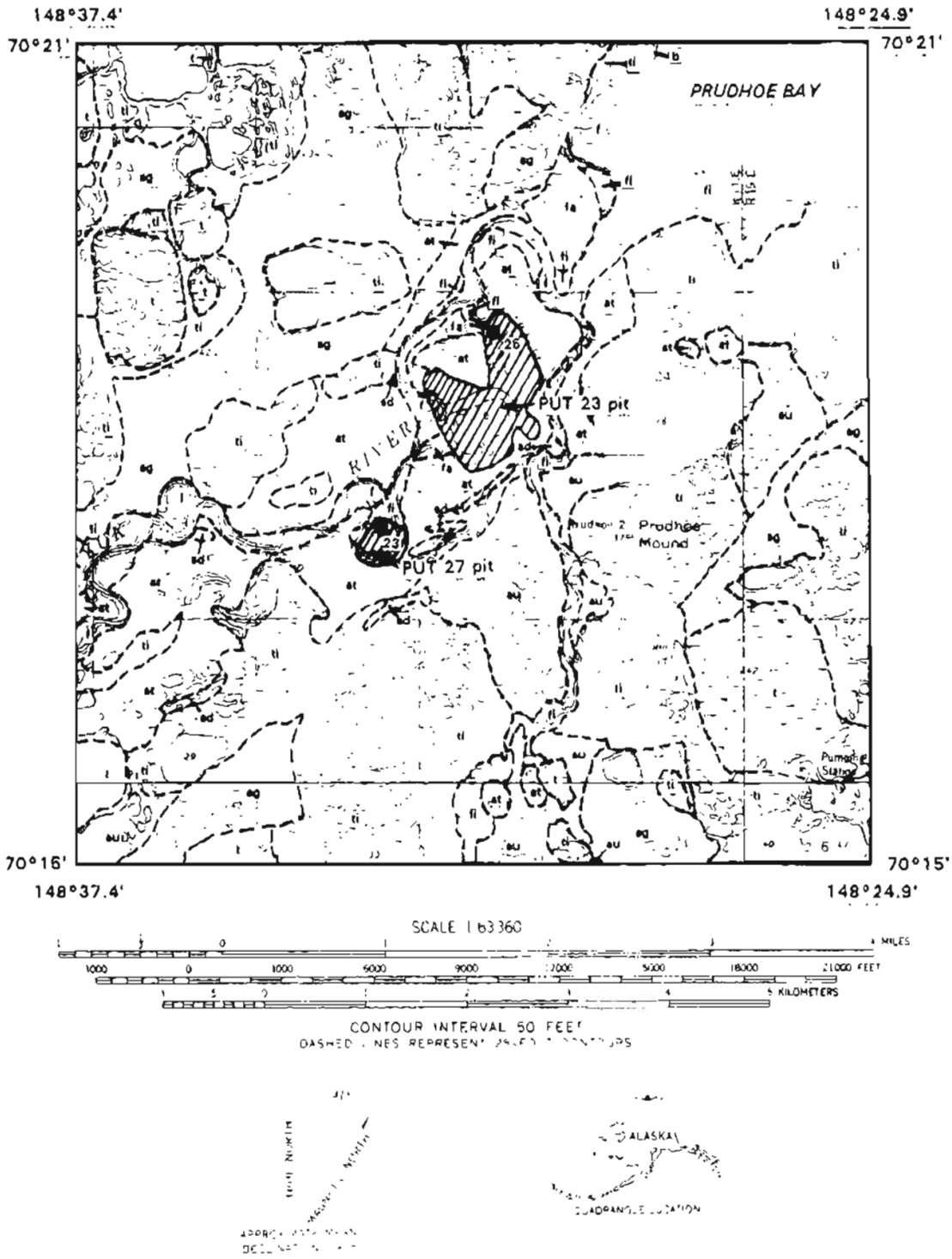

Figure 1. Geologic map of lower Putuligayuk River area (from Rawlinson, 1990, sheet 3). Base is U.S. Geological Survey Beechey Point B-3 Quadrangle, Alaska (1955, revised 1975). Map symbols defined in table 1.

Table 1. *Descriptions of symbols used on geologic map of PUT 23 pit area (fig. 1)(Rawlinson, 1990).*

MAP SYMBOL	DESCRIPTION
at	ALLUVIAL TERRACE DEPOSITS–3 to 10 ft of peat and pebbly silt or fine-to-medium sand, or mixtures or interbeds of all three, deposited in floodplain overbank environments by river, wind, and lake processes, and up to 50 ft of underlying sand, sandy gravel, or gravel, or interbeds of all three, deposited in channels by river processes; sandy gravel is the dominant sediment of the coarser lower unit. Continuously frozen but thaw seasonally to depths up to 0.6 m; fine-grained facies frequently contain segregated ice and massive wedge ice.
au	UNDIFFERENTIATED ALLUVIUM–Up to 17 ft of peat and silt or fine sand, or mixtures or interbeds of all three deposited in channels of floodplains by river processes; sandy gravel is the dominant sediment of the coarser lower unit. Continuously frozen but thaws seasonally to depths up to 0.6 m; fine-grained facies frequently contain segregated ice and massive wedge ice.
b	BEACH DEPOSITS–Gravelly sand and fine-to-medium sand deposited along the coast and nearshore islands by mass-wasting and marine processes. Along the coast and on tundra-covered islands these deposits include detrital peat. Continuously frozen but thaw seasonally to depths up to 3.5 ft.
f	ALLUVIUM OF ACTIVE FLOODPLAINS–Fine-to-medium sand or sandy gravel, or both, deposited in channels of modern floodplains by river processes; sandy gravel is the dominant sediment. Continuously frozen but seasonally thaws to depths up to 3.5 ft. Surfaces flood seasonally.
fa	ALLLUVIUM OF ABANDONED FLOODPLAINS–Peat and pebbly silt or fine-to-medium sand, or mixtures or interbeds of all three, deposited in floodplain overbank environments by river, wind, and lake processes, and underlying sand, sandy gravel, or gravel, or interbeds of all three, deposited in channels by river processes; sandy gravel is the dominant sediment of the lower, coarser unit. Continuously frozen but thaws seasonally to depths up to 0.6 m. Fine-grained facies generally contain segregated ice and massive wedge ice. Surfaces flood infrequently, although low areas may flood annually.
fi	ALLUVIUM OF INACTIVE FLOODPLAINS–Peat and pebbly silt or fine-to-medium sand, or mixtures or interbeds of all three, deposited in floodplain overbank environments by river, wind, and lake processes, and underlying sand, sandy gravel, or gravel, or interbeds of all three, deposited in channels by river processes; sandy gravel is the dominant sediment of the lower, coarser unit. Continuously frozen. Floods seasonally.

Table 1—*Continued*

sd	SAND DUNE DEPOSITS—Up to 20 ft of fine and medium sand derived from barren floodplains, delta, and beach deposits and laid down in dune forms by wind processes. Continuously frozen where dunes vegetated but thaw seasonally to depths up to 3.5 ft; contain pore ice.
sd	DEPOSITS OF ALLUVIAL PLAINS—Pebbly fine sand deposited by wind, and underlying interbedded pebbly fine-to-medium sand and gravel, and sandy gravel deposited by braided streams to form an alluvial plain. The topmost 1 to 4 ft often consist of peat with a 0.3- to 1.5-ft-thick interbed of pebbly silt sand and occasionally an underlying thaw-lake deposit. Continuously frozen but seasonally thaws to depths up to 2 ft; segregated ice lenses and massive ice wedges concentrated in upper 10 ft.
t	THAW-LAKE DEPOSITS—6 to 24 ft of peat and pebbly silt or fine sand, or mixtures or interbeds of all three, deposited in basins of thaw lakes by lake and wind processes. Continuously frozen but seasonally thaw to maximum depth of 2 ft; contain some segregated ice lenses and indistinct wedges of massive ice.
ti	ICE-RICH DEPOSITS OF THAW LAKES—6 to 24 ft of peat and pebbly silt or fine sand, or mixtures or interbeds of all three, deposited in basins of thaw lakes by lake and wind processes. Continuously frozen but thaws seasonally as deep as 2 ft; contain abundant segregated ice lenses and massive ice wedges.
● 23	Location of stratigraphic section.
— — —	Approximate geologic boundary.

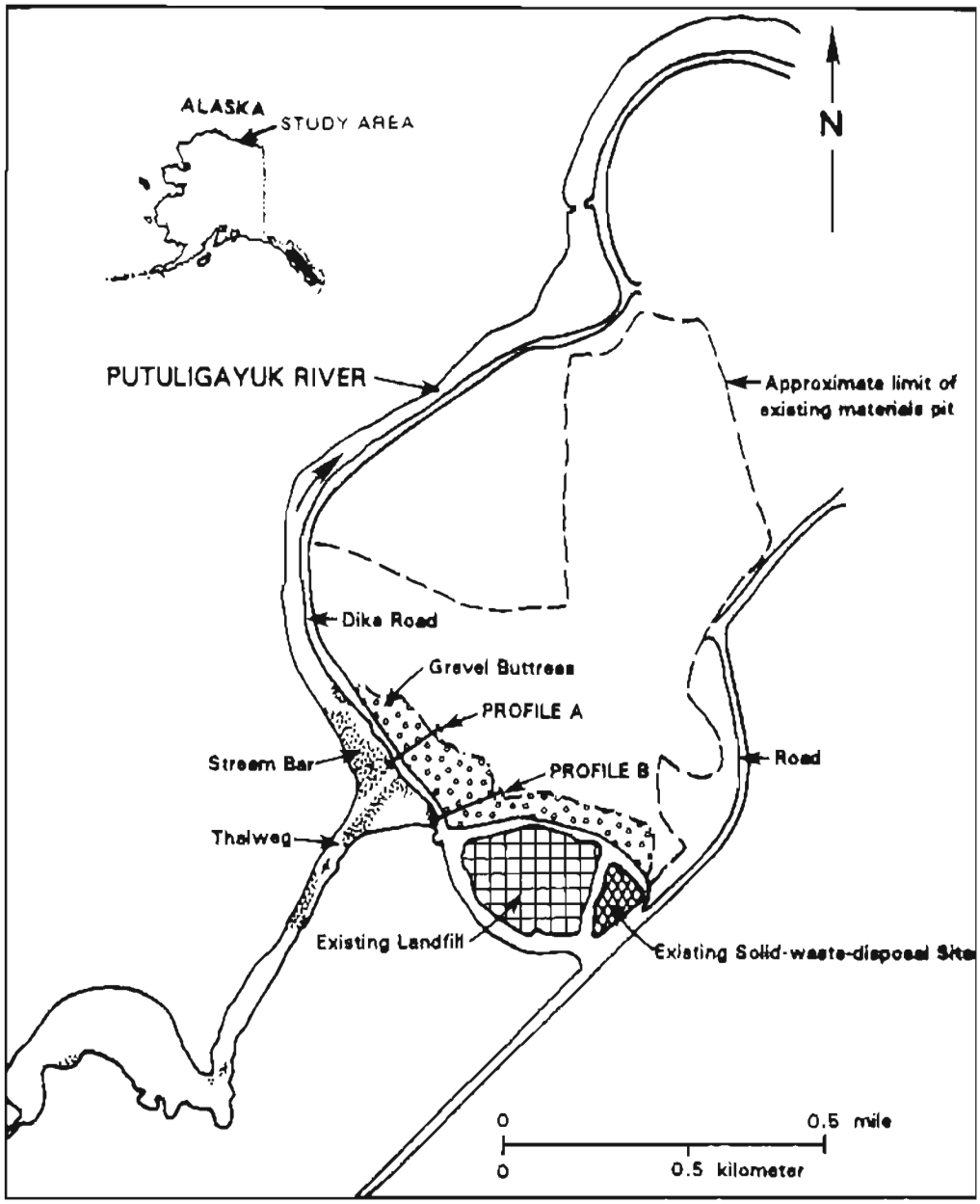

Figure 2. Map showing features in vicinity of PUT 23 pit and locations of two topographic profiles measured on 10-11-90. Updated from color aerial photograph PUO-UN-6, negative 10, taken 7-4-83.

Putuligayuk River drains 176 mi^2 of the central Arctic Coastal Plain and empties into Beaufort Sea at Prudhoe Bay. Lower Putuligayuk River is channelized and has a low gradient (fig. 3); Its flow is characterized by minimal flow during freeze-up and rapid attainment of peak flows in mid-June during annual breakup, which is typical of most small streams on the North Slope. Putuligayuk River is extremely responsive to precipitation and snowmelt events (flashy) because its drainage basin is underlain almost entirely by permafrost. Ice jamming occurs randomly along Putuligayuk River, often causing local flooding.

In the vicinity of PUT 23 pit, lower Putuligayuk River is tidally influenced. Mean-diurnal tidal range along the Beaufort Sea coast at Flaxman Island 60 mi east of Prudhoe Bay averages about 0.5 ft. (U.S. Department of Commerce NOAA-NOS, 1990). However, higher water levels occur during storm surges when strong northern winds coincide with low atmospheric pressures and high tides. During storm-surge events, ocean levels on the order of one magnitude higher than atmospheric tidal values are expected (Michael Crane, oral commun., 1991).

No stream-gage data are presently available for Putuligayuk River in the immediate vicinity of PUT 23 pit. However, since 1970 the United States Geological Survey (USGS) has maintained a stream-gaging station (#15896700) on lower Putuligayuk River 7.3 mi from the mouth at Prudhoe Bay (fig. 3). This location is about 3.75 river miles above the PUT 23 pit. At the gaging station, the water-stage recorder is located 200 ft upstream from the Spine Road crossing in the northeastern corner of Section 32, T. 11 N., R. 14 E, Umiat Meridian. Gage datum is the National Geodetic Vertical Datum of 1929. Prior to 6-4-72, this station was located at the same datum but on the right bank of Putuligayuk River 150 ft downstream from the present location (U.S. Geological Survey, 1978). Although both the gaging station and the PUT 23 pit area are close to the same elevation and both are below 25-ft elevation, the difference in their elevations is unknown.

At the present time, only stage-discharge data are available for Putuligayuk River. USGS records are continuous for water years 1970 through 1979 and 1982 through 1986, and these records are partial for water years 1987 through 1989 (U.S. Geological Survey, 1970-79, 1982-88; appendix A). For the period of continuous record, average discharge of Putuligayuk River was 42.3 cfs. For the entire period of record, a maximum discharge of 5,440 cfs occurred at a gage height of 21.84 ft on 6-17-86, when river width was 212 ft and cross-sectional area was 1,156 ft^2 (R.L. Burrows, written commun., 1990)(fig. 4, appendix B). Maximum gage height for the entire period of record (24 ft) was achieved on 6-5-73 at a discharge of only 10 cfs, when river runoff and snow meltwater ponded behind a local dam of snow and ice. Outside the period of record, the flood of 6-12-80 had a stage height of 22.6 ft and a discharge of 5,800 cfs.

To determine flood frequencies and discharges for Putuligayuk River during hydrologic years 1970 through 1989, an Annual Peak Flow Frequency Analysis was performed (R.D. Lemke, written commun., 1990). This analysis supplied the 1980 peak discharge that was missing from the USGS data set. According to the analysis (appendix C), the maximum discharge of 5,800 cfs is about equal to the 10-yr flood event. The 50-yr flood event is estimated to be 8,041 cfs, and the 100-yr flood event is estimated to be 9,195 cfs. Peak 50- and 100-yr flows represent 39 and 58 percent increases over the 10-yr flood event, respectively.

Strandlines of high-water levels of recent but unknown age occur within 6 ft of the top of the dike at the sharp bend in the Putuligayuk River southwest of PUT 23 pit (fig. 5). The highest strandline is about 10 ft above the level of Putuligayuk River on 9-10-90 when river discharge was estimated at 10 to 15 cfs.

PUT 23 pit is situated close to the channel of Putuligayuk River at the northeast end of a 0.6-mi-long reach, where the river diverts sharply 80° westward to flow around the west side of the pit (fig. 2). A large sandy gravel buttress was built along the pit side of the river dike in this area during gravel-mining operations. In the immediate vicinity of the river diversion, the stream bank is composed of sandy gravel. Observations made 9-10-90 indicate that the stream banks slope very steeply, probably due to

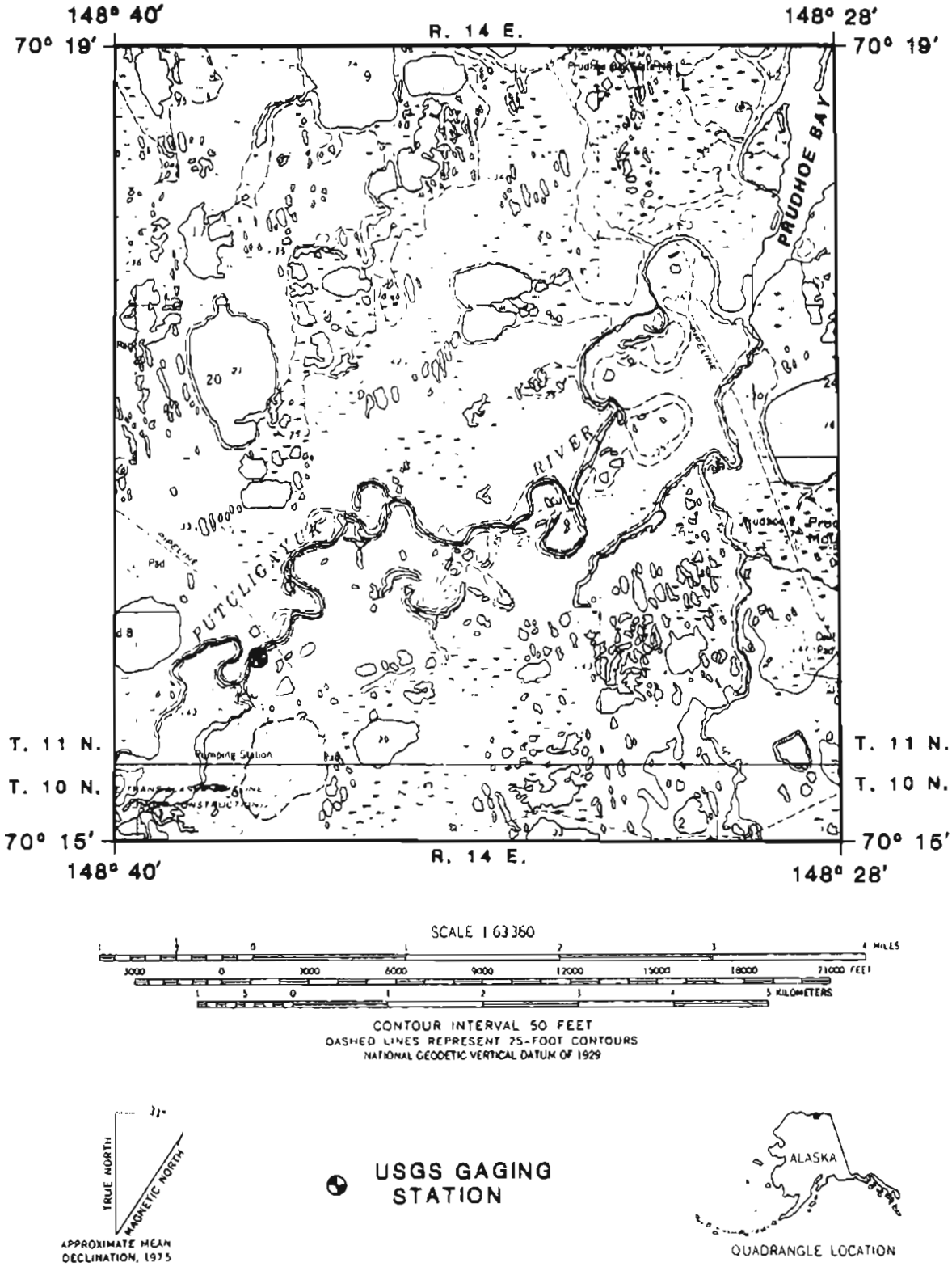

Figure 3. Location of U.S. Geological Survey gaging station on lower Putuligayuk River. Base is U.S. Geological Survey Beechey Point B-3 Quadrangle, Alaska (1955, revised 1975).

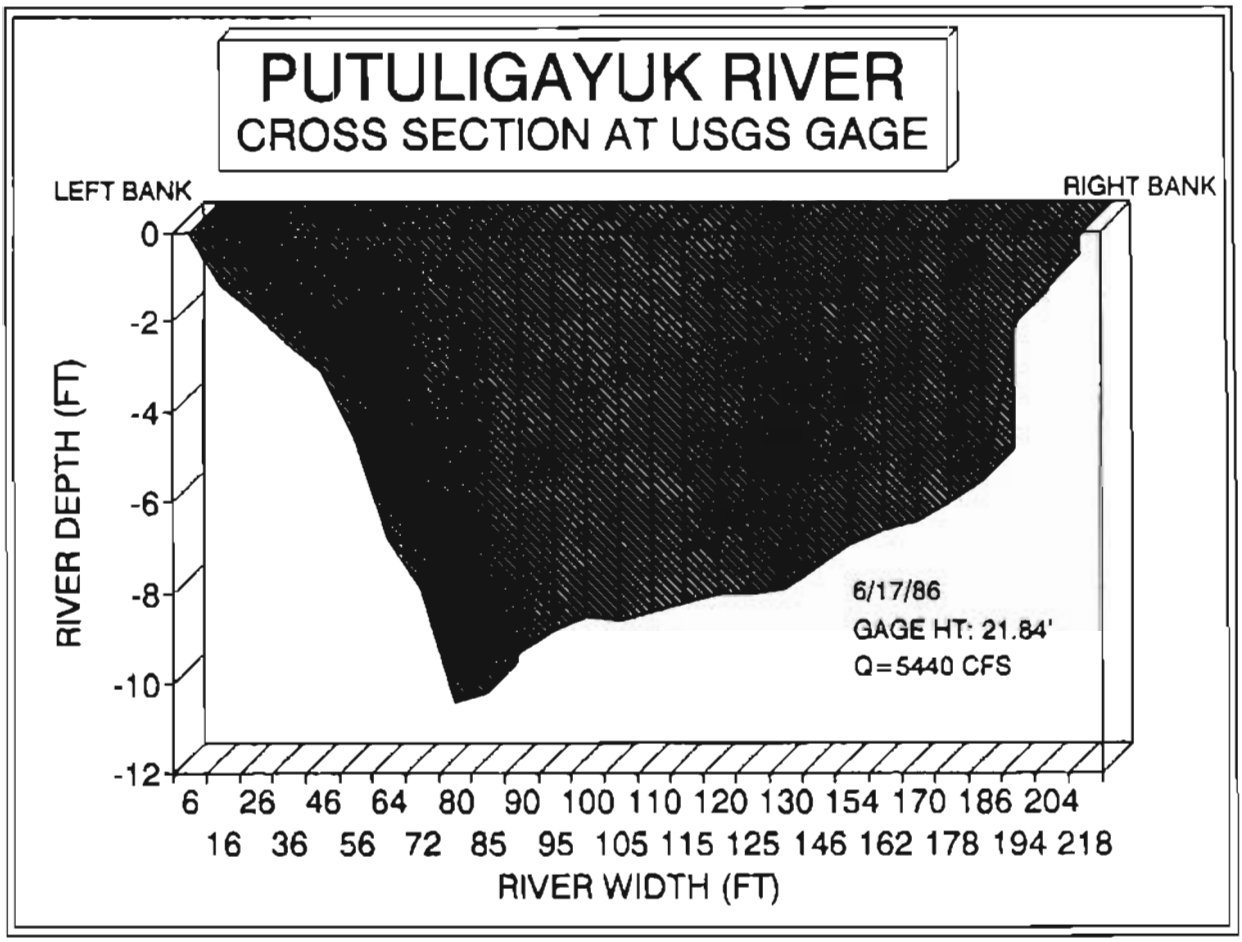

Figure 4. Cross section of Putuligayuk River at U.S. Geological Survey gaging station during peak flow on 6-17-86. Constructed from notes made by field personnel during discharge measurements (appendix B).

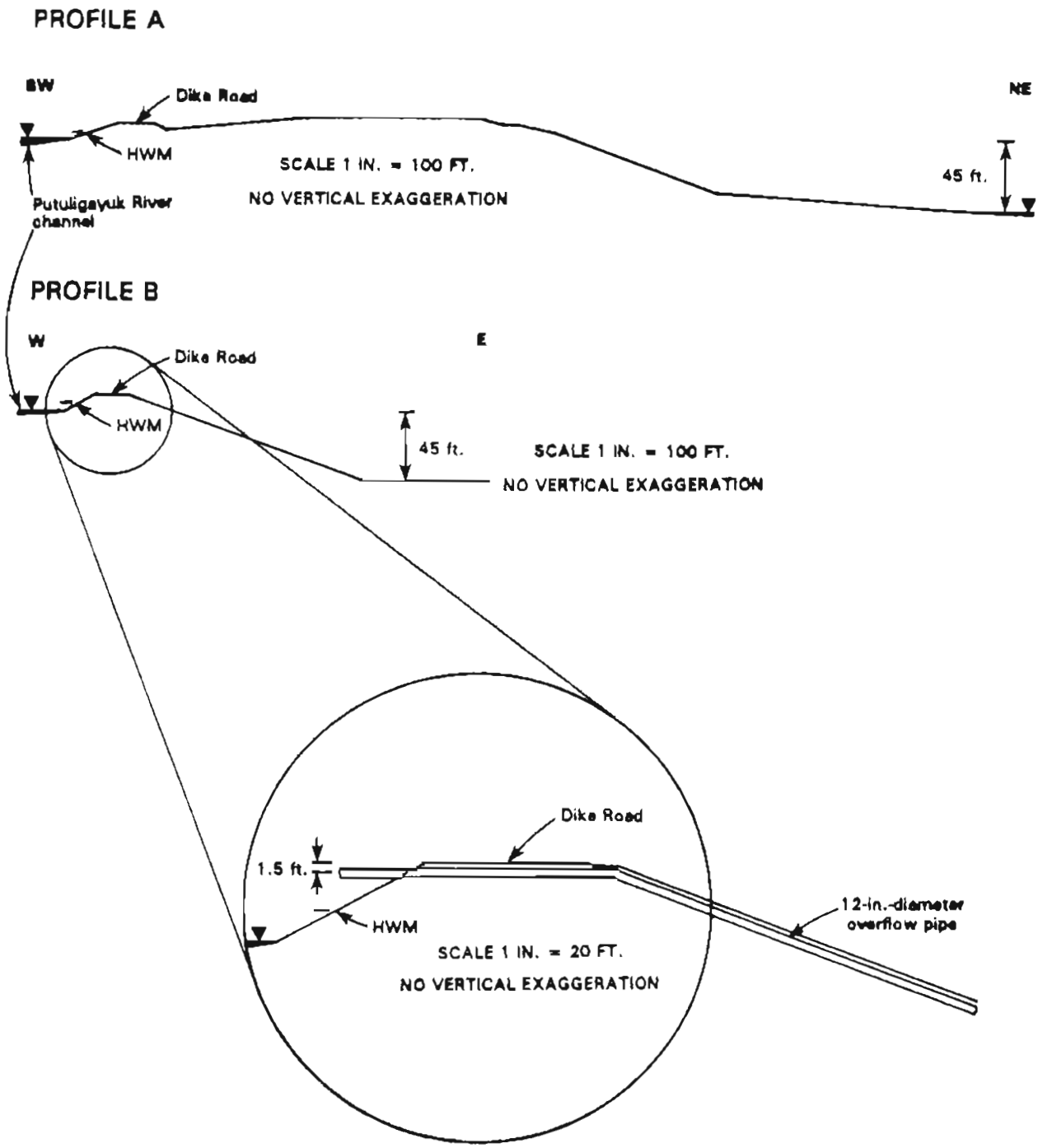

Figure 5. Two topographic profiles measured on 10-11-90 by brunton-compass-and-pace method across dike road adjacent to Putuligayuk River along southern margin of PUT 23 pit. Locations of profiles shown on figure 2. Water depths not reliable. HWM = high-water mark of recent but unknown age.

scouring by flood waters and drifting river ice. Evidence of erosion was visible for about 300 ft on each side of the point of impingement by the stream against the dike-buttress.

Near a low section in the dike about 100 ft southeast of the west end of profile B (fig. 2), one 12-in.-diameter pipe and two 4- to 6-in.-diameter pipes emerge out of the dike and extend toward the river 8 to 10 ft (fig. 5). All three pipes are located within about 30 ft of each other and a second 12-in.-diameter pipe is located about 300 ft downstream from this group. These pipes could be placed in these locations as a flood-control mechanism to protect the dike. Lengthy extensions of these pipes out of the dike are probably intended to prevent plugging of the pipes during June high-water stages when much drifting ice could pile against the levee. However, we have not been able to verify this design intent.

GEOLOGIC CONDITIONS

The PUT 23 pit is excavated into gravel-rich alluvium of a low terrace of Pututigayuk River (fig. 1, table 1). Two long stratigraphic sections measured in walls of the PUT 23 and PUT 27 pits (figs. 1 and 6) and observations of aerial photographs and existing pit walls demonstrate that more than 50 ft of fluvial sands and gravels underlie 3 to 10 ft of silty peat and sandy silt in the terrace alluvium. The dominant sediment type in the upper 50 ft of the terrace deposits is sandy gravel. DLWM personnel believe that about 8 million yd^3 of this material was mined to produce PUT 23 pit (Rick Smith, oral commun., 1990).

The presence of widespread low-center contraction-crack polygons in thawing materials visible on 1:18,000-scale color aerial photographs (mission PUO-UN 6, negative 11 dated 8-7-82 and mission PUO UN 6, negatives 10 and 11 dated 7-4-83) demonstrates that massive, polygonal, foliated-ice wedges were common in the 8- to 10-ft-thick, upper fine-grained terrace deposits when the pit was mined. However, these same aerial photographs and our 1990 observations of the pit walls indicate that most of the coarse, granular materials composing the majority of the pit walls has low ice content, probably in the form of pore fillings. No cavities, depressions, or deposits formed by melting of massive ice bodies are visible on the photographs, nor did we observe them during our field inspections. This conclusion is also supported by two topographic profiles measured between the channel of Putuligayuk River and the bottom of PUT 23 pit (fig. 5). These profiles demonstrate that the surface of water in the bottom of the pit is 45 ft below river level. Lack of subsurface connection between the river and the deeper pit indicates that an impermeable barrier exists between the two. Thus, the granular walls of the pit are undoubtedly perennially frozen and well bonded by intergranular ice. We saw no evidence of significant slope instability in pit walls, although local, minor gullying and surface ravelling has occurred, except where thawing ice-rich spoil materials were dumped on the gravel buttress in the vicinity of profile A just northeast of the sharp bend in Putuligayuk River (fig. 2).

SITE RISKS

1. Based on data presently available to us, we cannot accurately predict the flood hazard at the PUT 23 pit site. Local channel-cross-section and stream-discharge data are essential to accurate local flood analysis. Moreover, ice jams can randomly cause local flooding during breakup.

2. The extent of tidal influence on the flow of Putuligayuk River is unknown because of the possibility of storm surges in the lower river. Combinations of high tides, strong north and northeast winds, and ice jamming could produce excessive flooding during peak 50- and 100-yr flows.

3. Unabated bank erosion in the southwestern corner of PUT 23 pit could breach the dike-levee there, causing flooding of the large pit.

4. Thawed granular materials composing the walls of PUT 23 pit appear to be stable. However, pit or dike-levee expansion will encounter ice-rich, fine-grained, near-surface soils that are not thaw stable and must be accomodated.

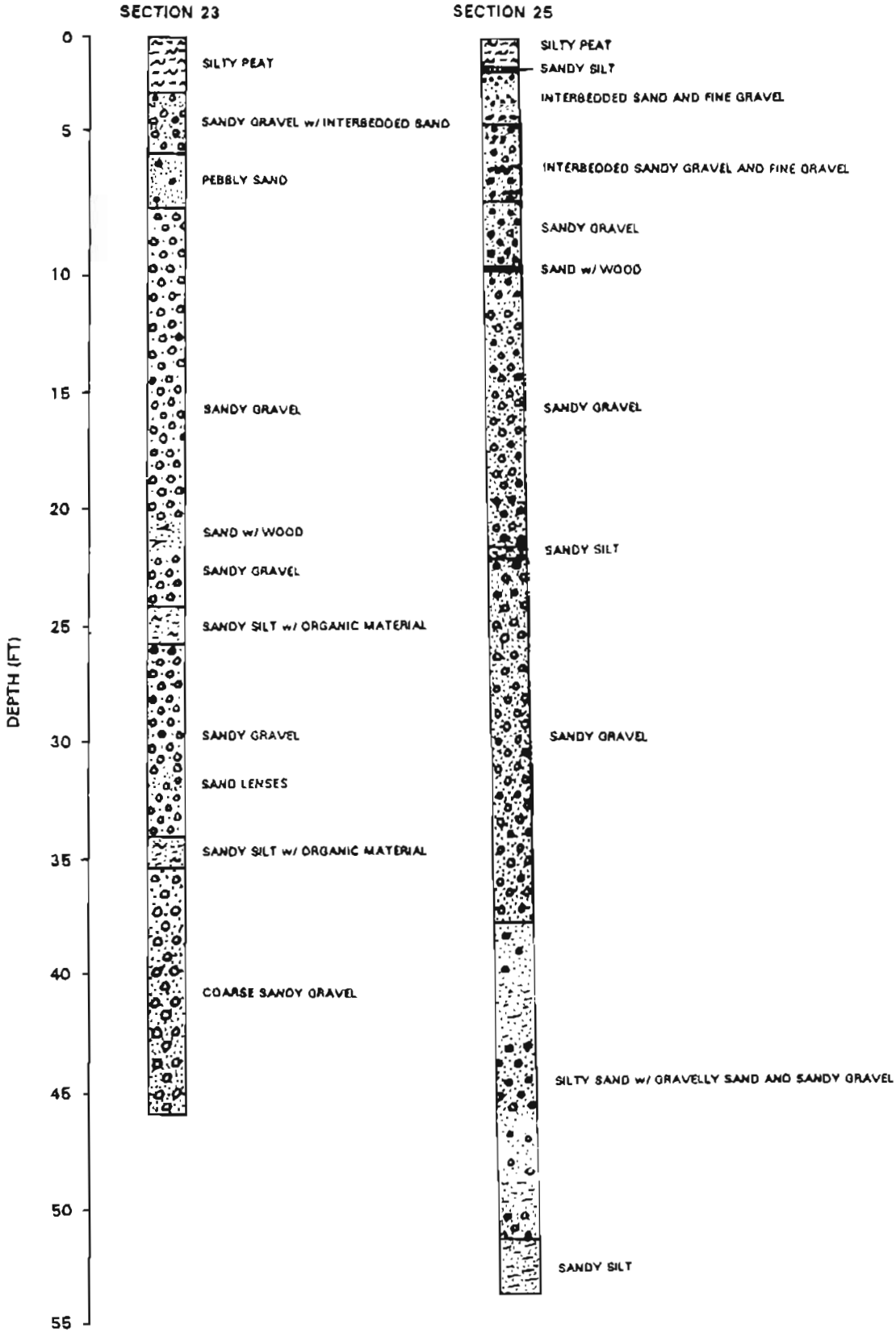

Figure 6. Geologic sections measured in PUT 27 pit (Section 23) and PUT 23 pit (Section 25)(Rawlinson, 1990, fig. 4.10).

5. Granular terrace deposits in the vicinity of PUT 23 pit and composing the pit walls are susceptible to surface hydraulic erosion where unprotected.

ACKNOWLEDGMENTS

We appreciate the logistical support provided by Rick Smith, Chris Milles, and Bill Newman of DLWM. Robert L. Burrows, USGS Water Resources Branch (Fairbanks) kindly provided copies of discharge-measurement notes and related data for lower Putuligayuk River, and Robert D. Lamke, USGS Water Resources Branch (Anchorage), graciously conducted the flood-frequency analysis used in this report. Special thanks to Mark Inghram (DGGS), who prepared the cross section at the USGS gaging station on lower Putuligayuk River (fig. 4) using computer techniques. Stuart E. Rawlinson provided a copy of his massive dissertation and freely offered verbal information that has been very useful during the present study.

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APPENDIX A

Discharge record of U.S. Geological Survey gaging station (#15896700) on lower Putuligayuk River

ALASKA WEST OF LONGITUDE 141°

15896700 Putuligayuk River near Deadhorse

LOCATION.--Lat 70°16'08", long 148°37'11", in NE¼ sec.32, T.11 N., R.14 E., on right upstream wingwall of culvert causeway, 0.4 mile downstream from unnamed tributary, 7.1 miles from mouth on Prudhoe Bay, and 7 miles west of Prudhoe Bay landing field.

DRAINAGE AREA.--176 sq mi, approximately.

PERIOD OF RECORD.--May to September 1970.

GAGE.--Water-stage recorder. Datum of gage is mean sea level (levels by private engineering firm).

REMARKS.--Current year: Maximum discharge, 1,900 cfs June 7 (gage height, 21.25 ft); no flow May 1-28.

REMARKS.--Records poor.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1								0	30	8.4	14	1.0
2								0	78	7.0	10	.90
3								0	140	6.2	6.6	.80
4								0	84	5.6	5.4	.70
5								0	120	5.0	5.0	.60
6								0	180	4.7	10	.60
7								0	1,200	4.5	7.4	.50
8								0	1,300	4.2	5.2	.50
9								0	1,700	4.0	3.5	.40
10								0	1,000	3.8	2.7	.40
11								0	1,000	3.6	2.3	.40
12								0	766	3.5	2.0	.40
13								0	620	4.5	1.8	.30
14								0	425	6.0	1.6	.30
15								0	405	4.5	1.4	.30
16								0	460	3.6	1.3	.30
17								0	425	3.0	1.2	.30
18								0	250	2.8	1.1	.30
19								0	150	2.6	1.0	.30
20								0	80	2.5	1.1	.20
21								0	45	2.3	3.0	.20
22								0	25	2.2	2.6	.20
23								0	20	2.1	2.7	.20
24								0	15	2.1	2.0	.20
25								0	10	2.0	2.5	.20
26								0	11	2.0	3.5	.20
27								0	14	1.9	2.5	.20
28								0	16	1.8	2.0	.20
29				------				0.50	12	3.7	1.6	.10
30				------				1.0	10	5.4	1.4	.10
31		------		------			------	10	------	10	1.2	------
TOTAL								11.50	10,091	125.5	109.2	11.50
MEAN								.37	336	4.05	3.52	.38
MAX								10	1,300	10	14	1.0
MIN								0	10	1.8	1.0	.10
CFSM								.002	1.91	.023	.020	.002
IN.								.002	2.13	.03	.02	.002
AC-FT								23	20,020	249	217	22

NOTE.--No gage-height record June 18 to Sept. 30.

ALASKA WEST OF LONGITUDE 141°

15896700 Putuliqayuk River near Deadhorse

LOCATION.--Lat 70°16'08", long 148°37'11", in NE¼ sec.32, T.11 N., R.14 E., on right upstream wingwall of culvert causeway, 0.4 mile downstream from unnamed tributary, 7.3 miles from mouth on Prudhoe Bay, and 6.2 miles northwest of Deadhorse.

DRAINAGE AREA.--176 sq mi, approximately.

PERIOD OF RECORD.--May 1970 to current year.

GAGE.--Water-stage recorder. Datum of gage is at mean sea level (levels by private engineering firm).

EXTREMES.--Current year: Maximum discharge, 4,980 cfs June 6 (gage height, 24.50 ft); no flow Oct. 1 to May 26.
Period of record: Maximum discharge, 4,980 cfs June 6, 1971 (gage height, 24.50 ft); no flow during winter periods each year.

REMARKS.--Records poor. Records of chemical analyses and suspended-sediment loads for the current year are published in Part 2 of this report.

COOPERATION.--Logistical support provided by British Petroleum of Alaska, Inc.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1								0	10	20	2.5	1.5
2								0	20	18	2.0	1.5
3								0	60	16	2.0	1.5
4								0	300	14	2.0	1.5
5								0	1,520	14	2.0	1.5
6								0	4,320	12	2.0	1.5
7								0	2,200	10	2.0	1.5
8								0	1,500	10	2.0	1.5
9								0	1,000	9.0	2.0	1.5
10								0	700	8.0	2.0	1.5
11								0	500	7.5	2.0	1.5
12								0	300	7.0	2.0	1.5
13								0	200	6.5	2.0	1.5
14								0	150	6.0	2.0	1.5
15								0	130	5.5	1.5	1.5
16								0	110	5.0	1.5	1.5
17								0	100	5.0	1.5	1.5
18								0	90	5.0	1.5	1.5
19								0	80	4.5	1.5	1.5
20								0	70	4.0	1.5	1.5
21								0	60	4.0	1.5	1.5
22								0	55	3.5	1.5	1.5
23								0	53	3.5	1.5	1.0
24								0	50	3.5	1.5	1.0
25								0	40	3.0	1.5	1.0
26								0	35	3.0	1.5	1.0
27								1.0	30	3.0	1.5	1.0
28								1.5	28	3.0	1.5	1.0
29					------			2.0	24	2.5	1.5	1.0
30					------			3.0	22	2.5	1.5	1.0
31		------			------		------	6.0	------	2.5	1.5	------
TOTAL	0	0	0	0	0	0	0	11.5	13,757	221.0	54.0	41.0
MEAN	0	0	0	0	0	0	0	.44	459	7.13	1.74	1.37
MAX	0	0	0	0	0	0	0	6.0	4,320	20	2.5	1.5
MIN	0	0	0	0	0	0	0	0	10	2.5	1.5	1.0
AC-FT	0	0	0	0	0	0	0	27	27,290	438	107	81

WTR YR 1971 TOTAL 14,086.5 MEAN 38.6 MAX 4,320 MIN 0 AC-FT 27,940

NOTE.--No gage-height record Oct. 1 to June 4, June 9 to Sept. 30.

ALASKA WEST OF LONGITUDE 141°

15896700 Putuligayuk River near Deadhorse

LOCATION(revised).--Lat 70°16'03", long 148°37'41", in NE¼ sec.32, T.11 N., R.14 E., at midchannel 200 ft upstream from culvert causeway, 0.2 mile downstream from unnamed tributary, 7.3 miles from mouth on Prudhoe Bay, and 6.2 miles northwest of Deadhorse.

DRAINAGE AREA.--176 sq mi, approximately.

PERIOD OF RECORD.--May 1970 to current year.

GAGE.--Water-stage recorder. Datum of gage is at mean sea level (levels by private engineering firm). Prior to June 4, 1972 on right bank 150 ft downstream at same datum.

EXTREMES.--Current year: Maximum discharge, about 4,500 cfs June 13 (gage height, 22.25 ft, flow over ice); no flow Oct. 1 to June 8.
Period of record: Maximum discharge, 4,980 cfs June 6, 1971 (gage height, 24.50 ft at site then in use); no flow during winter periods each year.

REMARKS.--Records poor. *Records of chemical analyses and suspended-sediment loads for the current year are published in Part 2 of this report.*

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1									0	90	11	93
2									0	70	8.0	95
3									0	60	11	103
4									0	45	14	100
5									0	35	17	98
6									0	30	16	91
7									0	26	14	91
8									0	23	12	72
9									10	21	10	65
10									20	20	8.4	63
11									100	20	11	61
12									2,100	19	11	54
13									4,000	18	11	51
14									2,940	17	11	50
15									1,380	17	11	45
16									762	16	12	40
17									560	16	12	35
18									430	16	14	30
19									342	16	13	25
20									286	15	11	20
21									254	15	9.0	15
22									224	15	7.0	10
23									200	15	6.0	8.0
24									165	18	5.0	6.3
25									147	30	4.0	5.0
26									133	70	10	4.0
27									120	50	39	3.3
28									110	40	50	2.0
29									110	30	63	1.0
30					------				100	21	72	.50
31		------			------		------		------	15	91	------
TOTAL	0	0	0	0	0	0	0	0	14,493	909	594.4	1,336.50
MEAN	0	0	0	0	0	0	0	0	483	29.3	19.2	44.6
MAX	0	0	0	0	0	0	0	0	4,000	90	91	103
MIN	0	0	0	0	0	0	0	0	0	15	4.0	.50
CFSM	0	0	0	0	0	0	0	0	2.74	.17	.11	.25
IN.	0	0	0	0	0	0	0	0	3.06	.19	.13	.28
AC-FT	0	0	0	0	0	0	0	0	28,750	1,800	1,180	2,650

CAL YR 1971 TOTAL 14,086.00 MEAN 38.6 MAX 4,320 MIN 0 CFSM .22 IN 2.98 AC-FT 27,940
WTR YR 1972 TOTAL 17,332.90 MEAN 47.4 MAX 4,000 MIN 0 CFSM .27 IN 3.66 AC-FT 34,380

NOTE.--No gage-height record Oct. 1 to June 4, June 27 to Aug. 9 except occasional days.

ARCTIC SLOPE ALASKA

15896700 Putuligayuk River near Deadhorse

LOCATION.--Lat 70°16'03", long 148°37'41", in NE¼ sec.32, T.11 N., R.14 E., North Slope Borough, at midchannel 200 ft (61 m) upstream from culvert causeway, 0.2 mi (0.3 km) downstream from unnamed tributary, 7.3 mi (11.7 km) from mouth on Prudhoe Bay, and 6.2 mi (10.0 km) northwest of Deadhorse.

DRAINAGE AREA.--176 mi² (456 km²), approximately.

PERIOD OF RECORD.--May 1970 to current year.

GAGE.--Water-stage recorder. Datum of gage is at mean sea level (levels by private engineering firm). Prior to June 4, 1972 on right bank 150 ft (46 m) downstream at same datum.

EXTREMES.--Current year: Maximum discharge, about 4,000 ft³/s (110 m³/s) June 9, gage height, not determined; maximum gage height observed, 24.0 ft (7.32 m) June 5, backwater from snow and ice; no flow Oct. 1 to May 29.
Period of record: Maximum discharge, 4,980 ft³/s (141 m³/s) June 6, 1971, gage height, 24.50 ft (7.468 m), at site then in use; no flow during winter periods each year.

REMARKS.--Records estimated.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1								0	10	17	7.0	17
2								0	10	15	6.0	17
3								0	10	13	5.0	15
4								0	10	11	6.0	13
5								0	10	10	6.0	11
6								0	50	9.0	5.0	10
7								0	500	8.0	5.0	9.0
8								0	2,000	8.0	5.0	8.0
9								0	2,000	8.0	5.0	8.0
10								0	2,000	9.0	6.0	7.0
11								0	1,000	9.0	7.0	7.0
12								0	700	8.0	9.0	7.0
13								0	500	7.0	15	6.0
14								0	300	7.0	20	6.0
15								0	200	7.0	20	6.0
16								0	150	7.0	17	6.0
17								0	100	8.0	18	15
18								0	70	8.0	15	30
19								0	50	8.0	17	50
20								0	40	7.0	20	60
21								0	30	7.0	23	40
22								0	35	10	25	20
23								0	40	15	25	15
24								0	50	30	25	10
25								0	60	25	20	5.0
26								0	70	20	18	4.0
27								0	60	15	16	3.0
28								0	30	13	15	2.0
29					------			0	25	10	14	1.6
30					------			5.0	20	9.0	13	.50
31		------			------		------	10	------	8.0	12	------
TOTAL	0	0	0	0	0	0	0	15.0	12,110	346.0	422.0	410.50
MEAN	0	0	0	0	0	0	0	.48	404	11.2	13.6	13.7
MAX	0	0	0	0	0	0	0	10	4,000	30	25	60
MIN	0	0	0	0	0	0	0	0	10	7.0	5.0	.50
CFSM	0	0	0	0	0	0	0	.003	2.30	.06	.08	.08
IN.	0	0	0	0	0	0	0	.003	2.56	.07	.09	.08
AC-FT	0	0	0	0	0	0	0	30	24,020	686	837	814

CAL YR 1972	TOTAL 17,332.90	MEAN 47.4	MAX 4,000	MIN 0	CFSM .27	IN 3.66	AC-FT 34,380			
WTR YR 1973	TOTAL 13,303.50	MEAN 36.4	MAX 4,000	MIN 0	CFSM .21	IN 2.81	AC-FT 26,390			

NOTE.--No gage-height record except occasional days.

ARCTIC SLOPE ALASKA

15896700 Putuligayuk River near Deadhorse

LOCATION.--Lat 70°16'03", long 148°37'41", in NE¼ sec.32, T.11 N., R.14 E., North Slope Borough, at midchannel 200 ft (61 m) upstream from culvert causeway, 0.2 mi (0.3 km) downstream from unnamed tributary, 6.2 mi (10.0 km) northwest of Deadhorse, and 7.3 mi (11.7 km) from mouth on Prudhoe Bay.

DRAINAGE AREA.--176 mi^2 (456 km^2), approximately.

PERIOD OF RECORD.--May 1970 to current year.

GAGE.--Water-stage recorder. Datum of gage is at mean sea level (levels by private engineering firm). Prior to June 4, 1972 on right bank 150 ft (46 m) downstream at same datum.

EXTREMES.--Current year: Maximum daily discharge, 2,000 ft^3/s (57 m^3/s) June 10, gage height, not determined; maximum gage height observed, 22.13 ft (6.745 m) June 5, backwater from snow and ice; no flow Oct. 6 to May 28. Period of record: Maximum discharge, 4,980 ft^3/s (141 m^3/s) June 6, 1971, gage height, 24.50 ft (7.468 m), at site then in use; no flow during winter periods each year.

REMARKS.--Records estimated prior to July 18, poor thereafter. Records of chemical analyses and suspended-sediment loads are published in Part 2 of this report.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.40							0	2.7	58	3.0	1.8
2	.30							0	2.7	45	2.8	1.9
3	.20							0	3.5	40	2.6	1.9
4	.10							0	5.0	37	2.6	1.6
5	.10							0	10	33	2.4	1.6
6	0							0	20	30	1.8	1.3
7	0							0	78	27	.70	1.3
8	0							0	200	25	.70	1.3
9	0							0	500	22	.70	1.3
10	0							0	2,000	20	.70	1.2
11	0							0	1,500	19	.60	1.2
12	0							0	1,000	17	.60	1.2
13	0							0	700	16	.60	1.2
14	0							0	500	15	.60	1.2
15	0							0	450	14	.60	1.0
16	0							0	400	13	.60	1.0
17	0							0	300	12	.60	1.0
18	0							0	250	11	.70	.90
19	0							0	200	11	.70	.90
20	0							0	170	10	.70	.90
21	0							0	150	10	.60	.80
22	0							0	130	9.7	.60	.80
23	0							0	120	8.1	.70	.70
24	0							0	100	6.7	.70	.70
25	0							0	90	6.4	.70	.60
26	0							0	80	5.5	.60	.60
27	0							0	70	5.2	.80	.50
28	0							0	65	4.3	1.3	.50
29	0				------			1.0	60	4.3	1.4	.40
30	0				------			6.0	55	4.0	1.6	.40
31	0	------			------		------	9.0	------	3.2	1.8	------
TOTAL	1.10	0	0	0	0	0	0	18.0	9,203.9	534.4	35.10	31.70
MEAN	.036	0	0	0	0	0	0	.58	307	17.2	1.13	1.06
MAX	.40	0	0	0	0	0	0	9.0	2,000	58	3.0	1.9
MIN	0	0	0	0	0	0	0	0	2.7	3.2	.60	.40
CFSM	.0002	0	0	0	0	0	0	.003	1.74	.10	.006	.006
IN.	0	0	0	0	0	0	0	.003	1.95	.11	.007	.006
AC-FT	2.2	0	0	0	0	0	0	36	18,260	1,060	70	63

CAL YR 1973 TOTAL 13,304.68 MEAN 36.5 MAX 4,000 MIN 0 CFSM .21 IN 2.81 AC-FT 26,390
WTR YR 1974 TOTAL 9,824.20 MEAN 26.9 MAX 2,000 MIN 0 CFSM .15 IN 2.08 AC-FT 19,490

NOTE.--No gage-height record Oct. 1 to July 17 except occasional days.

ARCTIC SLOPE ALASKA

15896700 Putuligayuk River near Deadhorse

LOCATION.--Lat 70°16'04", long 148°37'36", in NE¼ sec.32, T.11 N., R.14 E., North Slope Borough, at midchannel 200 ft (61 m) upstream from culvert causeway, 0.2 mi (0.3 km) downstream from unnamed tributary, 6.2 mi (10.0 km) northwest of Deadhorse, and 7.3 mi (11.7 km) upstream from mouth on Prudhoe Bay.

DRAINAGE AREA.--176 mi^2 (456 km^2), approximately.

PERIOD OF RECORD.--May 1970 to current year.

GAGE.--Water-stage recorder. Datum of gage is at mean sea level (levels by private engineering firm). Prior to June 4, 1972 on right bank 150 ft (46 m) downstream at same datum.

AVERAGE DISCHARGE.--5 years, 36.6 ft^3/s (1.04 m^3/s), 2.82 in/yr (72 mm/yr), 26,500 acre-ft/yr (32.7 hm^3/yr).

EXTREMES.--Current year: Maximum discharge, 2,000 ft^3/s (57 m^3/s) June 14, gage height, 20.55 ft (6.264 m), backwater from snow and ice; no flow Oct. 7 to June 6.
Period of record: Maximum discharge, 4,980 ft^3/s (141 m^3/s) June 6, 1971, gage height, 24.50 ft (7.468 m), at site then in use; no flow during winter periods each year.

REMARKS.--Records estimated prior to June 8, poor thereafter. Records of chemical analyses and suspended-sediment loads are published in Section 2 of this report.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.30								0	102	2.2	10
2	.30								0	96	2.2	10
3	.20								0	78	1.8	10
4	.20								0	66	1.4	10
5	.10								0	56	1.4	10
6	.10								0	48	1.4	9.0
7	0								1.0	38	1.5	8.0
8	0								10	30	1.5	7.5
9	0								50	27	1.5	7.0
10	0								100	25	1.8	6.5
11	0								400	23	1.5	6.0
12	0								450	21	1.5	5.0
13	0								1100	19	1.5	4.5
14	0								1600	16	1.5	4.0
15	0								1500	16	1.4	3.5
16	0								1080	14	1.3	3.0
17	0								896	14	1.2	2.5
18	0								728	11	1.3	2.0
19	0								602	11	1.2	4.0
20	0								500	9.9	1.3	6.0
21	0								420	9.6	1.5	5.5
22	0								345	7.8	1.5	5.0
23	0								305	5.4	1.5	4.5
24	0								260	4.7	1.4	4.0
25	0								224	4.0	1.4	3.5
26	0								188	3.2	2.6	3.0
27	0								168	3.2	5.0	2.5
28	0								141	3.2	4.0	2.0
29	0				---				120	2.6	5.0	1.5
30	0				---				112	2.6	6.8	1.0
31	0	---			---		---		---	2.2	9.6	---
TOTAL	1.20	0	0	0	0	0	0	0	11300.0	767.4	70.7	161.0
MEAN	.039	0	0	0	0	0	0	0	377	24.8	2.28	5.37
MAX	.30	0	0	0	0	0	0	0	1600	102	9.6	10
MIN	0	0	0	0	0	0	0	0	0	2.2	1.2	1.0
CFSM	.0002	0	0	0	0	0	0	0	2.14	.14	.01	.03
IN.	.0003	0	0	0	0	0	0	0	2.39	.16	.01	.03
AC-FT	2.4	0	0	0	0	0	0	0	22410	1520	140	319

CAL YR 1974 TOTAL 9824.30 MEAN 26.9 MAX 2000 MIN 0 CFSM .15 IN 2.08 AC-FT 19490
WTR YR 1975 TOTAL 12300.30 MEAN 33.7 MAX 1600 MIN 0 CFSM .19 IN 2.60 AC-FT 24400

NOTE.--No gage-height record Oct. 1 to June 7.

ARCTIC SLOPE ALASKA

15896700 PUTULIGAYUK RIVER NEAR DEADHORSE

LOCATION.--Lat 70°16'04", long 148°37'36", in NE¼ sec.32, T.11 N., R.14 E., North Slope Borough, Hydrologic Unit 19010001, at midchannel 200 ft (61 m) upstream from culvert causeway, 0.2 mi (0.3 km) downstream from unnamed tributary, 6.2 mi (10.0 km) northwest of Deadhorse, and 7.3 mi (11.7 km) upstream from mouth on Prudhoe Bay.

DRAINAGE AREA.--176 mi² (456 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1970 to current year.

GAGE.--Water-stage recorder. Datum of gage is at mean sea level (levels by private engineering firm). Prior to June 4, 1972 on right bank 150 ft (46 m) downstream at same datum.

REMARKS.--Water-discharge records estimated for period of no gage-height record prior to June 6 and fair thereafter.

AVERAGE DISCHARGE.--6 years, 10.0 ft³/s (1.133 m³/s), 3.09 in/yr (78 mm/yr), 28,980 acre-ft/yr (35.7 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,980 ft³/s (141 m³/s) June 6, 1971, gage height, 24.50 ft (7.468 m), at site then in use; no flow during winter periods each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,130 ft³/s (88.6 m³/s) June 17, gage height, 19.85 ft (6.050 m), no flow Oct. 11 to June 5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.80								0	247	5.6	1.9
2	.60								0	215	4.6	1.9
3	.50								0	184	4.2	2.1
4	.40								0	154	3.5	2.3
5	.30								0	139	3.3	2.5
6	.30								7.0	120	3.3	2.3
7	.20								8.0	108	3.1	2.5
8	.10								9.0	93	2.7	2.1
9	.10								10	82	2.5	2.5
10	.10								15	74	2.5	2.7
11	0								35	68	2.5	2.5
12	0								100	61	2.3	2.9
13	0								300	54	2.3	2.5
14	0								600	48	2.3	2.3
15	0								1100	42	2.5	2.3
16	0								1500	36	2.7	2.5
17	0								2500	34	2.7	2.5
18	0								2670	30	2.9	2.3
19	0								2070	26	2.9	1.9
20	0								1640	24	2.7	2.3
21	0								1290	21	2.9	2.1
22	0								989	20	2.9	2.1
23	0								792	18	2.7	1.7
24	0								630	15	2.5	1.7
25	0								500	13	2.5	1.7
26	0								440	11	2.3	1.5
27	0								400	10	2.1	1.5
28	0								385	7.5	2.1	1.9
29	0								342	6.6	2.1	1.5
30	0				---				245	7.0	1.9	1.0
31	0	---			---		---		---	6.6	1.9	---
TOTAL	3.40	0	0	0	0	0	0	0	18627.0	1974.7	87.0	63.5
MEAN	.11	0	0	0	0	0	0	0	621	63.7	2.81	2.12
MAX	.80	0	0	0	0	0	0	0	2670	247	5.6	2.9
MIN	0	0	0	0	0	0	0	0	0	6.6	1.9	1.0
CFSM	0	0	0	0	0	0	0	0	3.53	.36	.02	.01
IN.	.0007	0	0	0	0	0	0	0	3.94	.42	.02	.01
AC-FT	6.7	0	0	0	0	0	0	0	36950	3920	173	126

CAL YR 1975	TOTAL	12302.50	MEAN 33.7	MAX 1600	MIN 0	CFSM .19	IN 2.60	AC-FT	24400	
WTR YR 1976	TOTAL	20755.60	MEAN 56.7	MAX 2670	MIN 0	CFSM .32	IN 4.39	AC-FT	41170	

ARCTIC SLOPE ALASKA

15896700 PUTULIGAYUK RIVER NEAR DEADHORSE

LOCATION.--Lat 70°16'04", long 148°37'36", in NE¼ sec.32, T.11 N., R.14 E., North Slope Borough, Hydrologic Unit 19010001, at midchannel 200 ft (61 m) upstream from culvert causeway, 0.2 mi (0.3 km) downstream from unnamed tributary, 6.2 mi (10.0 km) northwest of Deadhorse, and 7.3 mi (11.7 km) upstream from mouth on Prudhoe Bay.

DRAINAGE AREA.--176 mi² (456 km²), approximately.

PERIOD OF RECORD.--May 1970 to current year.

GAGE.--Water-stage recorder. Datum of gage is at mean sea level (levels by private engineering firm). Prior to June 4, 1972 on right bank 150 ft (46 m) downstream at same datum.

REMARKS.--Records estimated and poor for period of no gage-height record prior to June 11 and good thereafter. Several observations of water temperature were made this year.

AVERAGE DISCHARGE.--7 years, 39.5 ft³/s (1.119 m³/s), 3.05 in/yr (77 mm/yr), 28,620 acre-ft/yr (35.3 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,980 ft³/s (141 m³/s) June 6, 1971, gage height, 24.50 ft (7.468 m), at site then in use; no flow during winter periods each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,800 ft³/s (51.0 m³/s) June 10, gage height, unknown; maximum gage height, 22.36 ft (6.815 m) sometime during June 5-10, from floodmarks, backwater from ice; no flow Oct. 10 to June 5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.90	.00	.00	.00	.00	.00	.00	.00	.00	176	1.4	1.7
2	.80	.00	.00	.00	.00	.00	.00	.00	.00	152	1.2	1.4
3	.70	.00	.00	.00	.00	.00	.00	.00	.00	128	1.2	1.4
4	.60	.00	.00	.00	.00	.00	.00	.00	.00	110	1.0	1.2
5	.50	.00	.00	.00	.00	.00	.00	.00	.00	105	.90	1.2
6	.40	.00	.00	.00	.00	.00	.00	.00	100	98	.80	1.2
7	.30	.00	.00	.00	.00	.00	.00	.00	250	90	.60	1.4
8	.20	.00	.00	.00	.00	.00	.00	.00	500	80	.60	2.0
9	.10	.00	.00	.00	.00	.00	.00	.00	1000	70	.50	2.4
10	.00	.00	.00	.00	.00	.00	.00	.00	1750	61	.40	2.2
11	.00	.00	.00	.00	.00	.00	.00	.00	1340	53	.40	2.0
12	.00	.00	.00	.00	.00	.00	.00	.00	970	43	.40	2.4
13	.00	.00	.00	.00	.00	.00	.00	.00	739	35	.40	3.7
14	.00	.00	.00	.00	.00	.00	.00	.00	564	29	.40	3.7
15	.00	.00	.00	.00	.00	.00	.00	.00	450	23	.50	4.5
16	.00	.00	.00	.00	.00	.00	.00	.00	360	19	.80	5.1
17	.00	.00	.00	.00	.00	.00	.00	.00	301	16	.60	5.7
18	.00	.00	.00	.00	.00	.00	.00	.00	257	14	.50	5.7
19	.00	.00	.00	.00	.00	.00	.00	.00	211	11	.50	6.3
20	.00	.00	.00	.00	.00	.00	.00	.00	218	10	.50	6.9
21	.00	.00	.00	.00	.00	.00	.00	.00	214	8.6	.50	7.0
22	.00	.00	.00	.00	.00	.00	.00	.00	204	7.6	.50	8.0
23	.00	.00	.00	.00	.00	.00	.00	.00	249	6.3	.50	8.5
24	.00	.00	.00	.00	.00	.00	.00	.00	318	5.4	.50	9.0
25	.00	.00	.00	.00	.00	.00	.00	.00	370	4.2	.60	9.3
26	.00	.00	.00	.00	.00	.00	.00	.00	370	3.4	.90	10
27	.00	.00	.00	.00	.00	.00	.00	.00	332	2.7	.90	14
28	.00	.00	.00	.00	.00	.00	.00	.00	285	3.0	.90	17
29	.00	.00	.00	.00	---	.00	.00	.00	245	2.4	.90	17
30	.00	.00	.00	.00	---	.00	.00	.00	208	2.0	.90	20
31	.00	---	.00	.00	---	.00	---	.00	---	1.7	2.0	---
TOTAL	4.50	.00	.00	.00	.00	.00	.00	.00	11805.00	1370.3	22.70	181.9
MEAN	.15	.000	.000	.000	.000	.000	.000	.000	394	44.2	.73	6.06
MAX	.90	.00	.00	.00	.00	.00	.00	.00	1750	176	2.0	20
MIN	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.7	.40	1.2
CFSM	.001	.000	.000	.000	.000	.000	.000	.000	2.24	.25	.004	.03
IN.	.00	.00	.00	.00	.00	.00	.00	.00	2.50	.29	.00	.04
AC-FT	8.9	.00	.00	.00	.00	.00	.00	.00	23420	2720	45	361

CAL YR 1976 TOTAL 20756.70 MEAN 56.7 MAX 2670 MIN .00 CFSM .32 IN 4.39 AC-FT 41170
WTR YR 1977 TOTAL 13384.40 MEAN 36.7 MAX 1750 MIN .00 CFSM .21 IN 2.83 AC-FT 26550

ARCTIC SLOPE ALASKA

15896700 PUTULIGAYUK RIVER NEAR DEADHORSE

LOCATION.--Lat 70°16'04", long 148°37'36", in NE¼ sec.32, T.11 N., R.14 E., North Slope Borough, Hydrologic Unit 19010001, at midchannel 200 ft (61 m) upstream from culvert causeway, 0.2 mi (0.3 km) downstream from unnamed tributary, 6.2 mi (10.0 km) northwest of Deadhorse, and 7.3 mi (11.7 km) upstream from mouth on Prudhoe Bay.

DRAINAGE AREA.--176 mi^2 (456 km^2), approximately.

PERIOD OF RECORD.--May 1970 to September 1978 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by private engineering firm). Prior to June 4, 1972, on right bank 150 ft (46 m) downstream at same datum.

REMARKS.--Records estimated and poor for period of no gage-height record prior to June 11 and fair thereafter. Several observations of water temperature or specific conductance were made this year.

AVERAGE DISCHARGE.--8 years, 41.8 ft^3/s (1.184 m^3/s), 3.23 in/yr (82 mm/yr), 30,280 acre-ft/yr (37.3 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,980 ft^3/s (141 m^3/s) June 6, 1971, gage height, 24.50 ft (7.468 m), at site then in use; no flow during winter periods each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,630 ft^3/s (131 m^3/s) June 11, gage height, 21.43 ft (6.532 m); no flow Nov. 1 to June 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	.00	.00	.00	.00	.00	.00	.00	.00	74	1.4	1.6
2	30	.00	.00	.00	.00	.00	.00	.00	.00	61	1.4	1.6
3	40	.00	.00	.00	.00	.00	.00	.00	.00	51	1.4	1.5
4	50	.00	.00	.00	.00	.00	.00	.00	10	43	1.1	1.5
5	45	.00	.00	.00	.00	.00	.00	.00	30	37	1.0	1.5
6	40	.00	.00	.00	.00	.00	.00	.00	68	31	1.0	1.8
7	35	.00	.00	.00	.00	.00	.00	.00	180	26	1.0	2.4
8	30	.00	.00	.00	.00	.00	.00	.00	600	20	.88	2.6
9	25	.00	.00	.00	.00	.00	.00	.00	900	16	.78	3.0
10	20	.00	.00	.00	.00	.00	.00	.00	1800	14	.68	3.2
11	18	.00	.00	.00	.00	.00	.00	.00	4230	11	.60	3.2
12	16	.00	.00	.00	.00	.00	.00	.00	2900	9.7	.60	3.4
13	14	.00	.00	.00	.00	.00	.00	.00	2070	8.6	.60	3.7
14	12	.00	.00	.00	.00	.00	.00	.00	1510	7.6	.68	4.2
15	10	.00	.00	.00	.00	.00	.00	.00	1100	6.6	.60	4.0
16	9.0	.00	.00	.00	.00	.00	.00	.00	816	6.0	.60	4.0
17	8.0	.00	.00	.00	.00	.00	.00	.00	678	4.8	.68	3.7
18	7.0	.00	.00	.00	.00	.00	.00	.00	558	4.0	.78	3.7
19	6.0	.00	.00	.00	.00	.00	.00	.00	462	3.4	.88	3.4
20	5.0	.00	.00	.00	.00	.00	.00	.00	380	3.2	.88	3.7
21	4.0	.00	.00	.00	.00	.00	.00	.00	310	3.0	1.0	4.5
22	3.0	.00	.00	.00	.00	.00	.00	.00	257	2.8	1.4	4.0
23	3.0	.00	.00	.00	.00	.00	.00	.00	225	3.0	1.6	4.0
24	2.0	.00	.00	.00	.00	.00	.00	.00	190	2.8	1.5	4.5
25	2.0	.00	.00	.00	.00	.00	.00	.00	162	2.6	1.4	5.0
26	2.0	.00	.00	.00	.00	.00	.00	.00	149	2.2	1.5	5.0
27	2.0	.00	.00	.00	.00	.00	.00	.00	125	1.8	1.6	4.5
28	1.0	.00	.00	.00	.00	.00	.00	.00	105	1.6	1.8	4.0
29	1.0	.00	.00	.00	---	.00	.00	.00	92	1.5	2.0	3.5
30	1.0	.00	.00	.00	---	.00	.00	.00	80	1.5	1.8	3.0
31	1.0	---	.00	.00	---	.00	---	.00	---	1.4	1.5	---
TOTAL	487.0	.00	.00	.00	.00	.00	.00	.00	19987.00	462.1	34.64	99.7
MEAN	15.1	.000	.000	.000	.000	.000	.000	.000	666	14.9	1.12	3.32
MAX	50	.00	.00	.00	.00	.00	.00	.00	4230	74	2.0	5.0
MIN	1.0	.00	.00	.00	.00	.00	.00	.00	.00	1.4	.60	1.5
CFSM	.09	.000	.000	.000	.000	.000	.000	.000	3.78	.09	.006	.02
IN.	.10	.00	.00	.00	.00	.00	.00	.00	4.22	.10	.01	.02
AC-FT	926	.00	.00	.00	.00	.00	.00	.00	39640	917	69	198

CAL YR 1977 TOTAL 13846.90 MEAN 37.9 MAX 1750 MIN .00 CFSM .22 IN 2.93 AC-FT 27470
WTR YR 1978 TOTAL 21050.44 MEAN 57.7 MAX 4230 MIN .00 CFSM .33 IN 4.45 AC-FT 41750

ARCTIC SLOPE ALASKA

15896700 PUTULIGAYUK RIVER NEAR DEADHORSE

LOCATION.--Lat 70°16'03", long 148°37'41", in NE¼ sec. 32, T. 11 N., R. 14 E., North Slope Borough, Hydrologic Unit 19010001, at midchannel 200 ft (61 m) upstream from culvert causeway, 0.2 mi (0.3 km) downstream from unnamed tributary, 6.2 mi (10.0 km) northwest of Deadhorse, and 7.3 mi (11.7 km) upstream from mouth on Prudhoe Bay.

DRAINAGE AREA.--176 mi^2 (456 km^2), approximately.

PERIOD OF RECORD.--May 1970 to current year.

GAGE.--Water-stage recorder. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by private engineering firm). Prior to June 4, 1972, on right bank 150 ft (46 m) downstream at same datum.

REMARKS.--Records poor. Several observations of water temperature were made this year.

AVERAGE DISCHARGE.--9 years, 39.7 ft^3/s (1.124 m^3/s), 3.06 in/yr (78 mm/yr), 28,760 acre-ft/yr (35.5 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,980 ft^3/s (141 m^3/s) June 6, 1971, gage height, 24.50 ft (7.468 m), at site then in use; no flow during winter periods each year.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1,100 ft^3/s (31.2 m^3/s) May 31; maximum gage height, 18.61 ft (5.672 m), May 31, backwater from snow; no flow Oct. 10 to May 14, 24-26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.0	.00	.00	.00	.00	.00	.00	.00	800	11	.44	72
2	2.0	.00	.00	.00	.00	.00	.00	.00	700	10	.36	74
3	2.0	.00	.00	.00	.00	.00	.00	.00	500	9.0	.52	70
4	2.0	.00	.00	.00	.00	.00	.00	.00	400	7.6	.60	72
5	1.0	.00	.00	.00	.00	.00	.00	.00	300	7.6	.52	70
6	1.0	.00	.00	.00	.00	.00	.00	.00	240	7.2	.52	72
7	1.0	.00	.00	.00	.00	.00	.00	.00	220	6.6	.44	74
8	.50	.00	.00	.00	.00	.00	.00	.00	200	6.3	.44	70
9	.50	.00	.00	.00	.00	.00	.00	.00	180	5.1	.60	69
10	.00	.00	.00	.00	.00	.00	.00	.00	170	4.8	.60	65
11	.00	.00	.00	.00	.00	.00	.00	.00	160	4.5	.52	61
12	.00	.00	.00	.00	.00	.00	.00	.00	150	3.7	.52	59
13	.00	.00	.00	.00	.00	.00	.00	.00	131	3.0	.52	55
14	.00	.00	.00	.00	.00	.00	.00	.00	118	2.6	.52	46
15	.00	.00	.00	.00	.00	.00	.00	5.0	102	2.4	.60	50
16	.00	.00	.00	.00	.00	.00	.00	10	84	1.6	.68	44
17	.00	.00	.00	.00	.00	.00	.00	8.0	74	1.1	.60	36
18	.00	.00	.00	.00	.00	.00	.00	6.0	61	1.1	.68	34
19	.00	.00	.00	.00	.00	.00	.00	4.0	51	.78	.78	40
20	.00	.00	.00	.00	.00	.00	.00	2.0	44	.60	1.1	32
21	.00	.00	.00	.00	.00	.00	.00	2.0	38	.52	1.4	28
22	.00	.00	.00	.00	.00	.00	.00	1.0	29	.52	2.4	25
23	.00	.00	.00	.00	.00	.00	.00	1.0	23	.44	3.2	23
24	.00	.00	.00	.00	.00	.00	.00	.00	20	.36	7.2	22
25	.00	.00	.00	.00	.00	.00	.00	.00	20	.30	11	21
26	.00	.00	.00	.00	.00	.00	.00	.00	21	.36	13	23
27	.00	.00	.00	.00	.00	.00	.00	50	19	.44	34	23
28	.00	.00	.00	.00	.00	.00	.00	200	17	.60	53	22
29	.00	.00	.00	.00	---	.00	.00	150	15	.68	56	21
30	.00	.00	.00	.00	---	.00	.00	120	12	.60	58	20
31	.00	---	.00	.00	---	.00	---	1100	---	.52	67	---
TOTAL	13.00	.00	.00	.00	.00	.00	.00	1659.00	4899	101.92	317.76	1393
MEAN	.42	.000	.000	.000	.000	.000	.000	53.5	163	3.29	10.3	46.4
MAX	3.0	.00	.00	.00	.00	.00	.00	1100	800	11	67	74
MIN	.00	.00	.00	.00	.00	.00	.00	.00	12	.30	.36	20
CFSM	.002	.000	.000	.000	.000	.000	.000	.30	.93	.02	.06	.26
IN.	.00	.00	.00	.00	.00	.00	.00	.35	1.04	.02	.07	.29
AC-FT	26	.00	.00	.00	.00	.00	.00	3290	9720	202	630	2760

CAL YR 1978 TOTAL 20596.44 MEAN 56.4 MAX 4230 MIN .00 CFSM .32 IN 4.35 AC-FT 40850
WTR YR 1979 TOTAL 8383.68 MEAN 23.0 MAX 1100 MIN .00 CFSM .13 IN 1.77 AC-FT 16630

NOTE.--No gage-height record prior to May 26.

ARCTIC SLOPE ALASKA

15896700 PUTULIGAYUK RIVER NEAR DEADHORSE

LOCATION.--Lat 70°16'03", long 148°37'41", in NE¼ sec. 32, T. 11 N., R. 14 E., North Slope Borough, Hydrologic Unit 19010001, at midchannel 200 ft (61 m) upstream from culvert causeway, 0.2 mi (0.3 km) downstream from unnamed tributary, 6.2 mi (10.0 km) northwest of Deadhorse, and 7.3 mi (11.7 km) upstream from mouth on Prudhoe Bay.

DRAINAGE AREA.--176 mi² (456 km²), approximately.

PERIOD OF RECORD.--May 1970 to September 1979 and October 1981 to September 1982.

GAGE.--Water-stage recorder. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by private engineering firm). Prior to June 4, 1972, on right bank 150 ft (46 m) downstream at same datum.

REMARKS.--Records fair except those for periods of no gage-height record prior to June 13 and Sept. 15-30, which are estimated and poor.

AVERAGE DISCHARGE.--10 years (water years 1970-79, 1982), 41.6 ft³/s (1.178 m³/s), 3.21 in/yr (82 mm/yr), 30,140 acre-ft/yr (37.2 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,980 ft³/s (141 m³/s) June 6, 1971, gage height, 24.50 ft (7.468 m), at site then in use; no flow during winter periods each year.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 12, 1980 had a stage of 22.6 ft (6.89 m) and discharge of 5,800 ft³/s (164 m³/s), from information by private engineering firm.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,290 ft³/s (64.9 m³/s) June 14, gage height, 18.82 ft (5.736 m); no flow Oct. 12 to May 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	.00	.00	.00	.00	.00	.00	.00	1.0	102	12	15
2	7.0	.00	.00	.00	.00	.00	.00	.00	2.0	92	16	15
3	5.0	.00	.00	.00	.00	.00	.00	.00	2.0	80	17	15
4	4.0	.00	.00	.00	.00	.00	.00	.00	3.0	71	18	14
5	3.0	.00	.00	.00	.00	.00	.00	.00	5.0	64	19	14
6	2.0	.00	.00	.00	.00	.00	.00	.00	9.0	56	19	14
7	2.0	.00	.00	.00	.00	.00	.00	.00	17	48	19	14
8	2.0	.00	.00	.00	.00	.00	.00	.00	35	42	19	14
9	2.0	.00	.00	.00	.00	.00	.00	.00	70	36	19	14
10	1.0	.00	.00	.00	.00	.00	.00	.00	170	34	19	15
11	1.0	.00	.00	.00	.00	.00	.00	.00	600	32	18	16
12	.00	.00	.00	.00	.00	.00	.00	.00	1600	28	17	16
13	.00	.00	.00	.00	.00	.00	.00	.00	2000	25	16	16
14	.00	.00	.00	.00	.00	.00	.00	.00	2220	24	16	16
15	.00	.00	.00	.00	.00	.00	.00	.00	2090	21	14	16
16	.00	.00	.00	.00	.00	.00	.00	.00	1770	19	13	15
17	.00	.00	.00	.00	.00	.00	.00	.00	1480	16	12	15
18	.00	.00	.00	.00	.00	.00	.00	.00	1320	16	12	15
19	.00	.00	.00	.00	.00	.00	.00	.00	1140	14	13	14
20	.00	.00	.00	.00	.00	.00	.00	.00	973	14	15	14
21	.00	.00	.00	.00	.00	.00	.00	.00	819	11	16	14
22	.00	.00	.00	.00	.00	.00	.00	.00	735	11	15	13
23	.00	.00	.00	.00	.00	.00	.00	.00	637	10	14	13
24	.00	.00	.00	.00	.00	.00	.00	.00	528	9.6	14	12
25	.00	.00	.00	.00	.00	.00	.00	.00	425	9.3	13	12
26	.00	.00	.00	.00	.00	.00	.00	.00	314	9.3	14	11
27	.00	.00	.00	.00	.00	.00	.00	.00	245	9.6	14	11
28	.00	.00	.00	.00	.00	.00	.00	.00	194	10	14	10
29	.00	.00	.00	.00	---	.00	.00	.00	158	9.6	14	10
30	.00	.00	.00	.00	---	.00	.00	.00	122	9.3	14	10
31	.00	---	.00	.00	---	.00	---	1.0	---	9.6	15	---
TOTAL	39.00	.00	.00	.00	.00	.00	.00	1.00	19684.0	942.3	480	413
MEAN	1.26	.000	.000	.000	.000	.000	.000	.032	656	30.4	15.5	13.8
MAX	10	.00	.00	.00	.00	.00	.00	1.0	2220	102	19	16
MIN	.00	.00	.00	.00	.00	.00	.00	.00	1.0	9.3	12	10
CFSM	.007	.000	.000	.000	.000	.000	.000	.000	3.73	.17	.09	.08
IN.	.01	.00	.00	.00	.00	.00	.00	.00	4.16	.20	.10	.09
AC-FT	77	.00	.00	.00	.00	.00	.00	2.0	39040	1870	952	819

WTR YR 1982 TOTAL 21559.30 MEAN 59.1 MAX 2220 MIN .00 CFSM .34 IN 4.56 AC-FT 42760

ARCTIC SLOPE ALASKA

15896700 PUTULIGAYUK RIVER NEAR DEADHORSE

LOCATION.--Lat 70°16'03", long 148°37'41", in NE¼ sec. 32, T. 11 N., R. 14 E., North Slope Borough, Hydrologic Unit 19010001, at midchannel 200 ft upstream from culvert causeway, 0.2 mi downstream from unnamed tributary, 6.2 mi northwest of Deadhorse, and 7.3 mi upstream from mouth on Prudhoe Bay.

DRAINAGE AREA.--176 mi², approximately.

PERIOD OF RECORD.--May 1970 to September 1979 and October 1981 to current year.

GAGE.--Water-stage recorder. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by private engineering firm). Prior to June 4, 1972, on right bank 150 ft downstream at same datum.

REMARKS.--Records fair except those for periods of no gage-height record prior to June 6 and Sept. 20-30, which are estimated and poor.

AVERAGE DISCHARGE.--11 years (water years 1970-79, 1982-83), 42.2 ft³/s, 3.26 in/yr, 30,570 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,980 ft³/s June 6, 1971, gage height, 24.50 ft, at site then in use; no flow during winter periods each year.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 12, 1980 had a stage of 22.6 ft and discharge of 5,800 ft³/s, from information by private engineering firm.

EXTREMES FOR CURRENT YEAR.--Maximum observed discharge, 3,130 ft³/s June 5, gage height, 19.85 ft; maximum gage-height, 20.35 ft June 5, backwater from ice; no flow Oct. 12 to May 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	.00	.00	.00	.00	.00	.00	.00	100	37	.93	.55
2	7.0	.00	.00	.00	.00	.00	.00	.00	240	35	.93	.50
3	5.0	.00	.00	.00	.00	.00	.00	.00	600	31	.93	.50
4	4.0	.00	.00	.00	.00	.00	.00	.00	2000	28	.82	.40
5	3.0	.00	.00	.00	.00	.00	.00	.00	2800	25	.82	.40
6	2.0	.00	.00	.00	.00	.00	.00	.00	2200	22	1.0	.50
7	2.0	.00	.00	.00	.00	.00	.00	.00	1650	20	.82	.60
8	2.0	.00	.00	.00	.00	.00	.00	.00	1350	18	.82	.70
9	1.0	.00	.00	.00	.00	.00	.00	.00	1070	15	.71	.80
10	1.0	.00	.00	.00	.00	.00	.00	.00	858	14	.60	1.0
11	1.0	.00	.00	.00	.00	.00	.00	.00	696	12	.60	1.0
12	.00	.00	.00	.00	.00	.00	.00	.00	552	10	.55	1.0
13	.00	.00	.00	.00	.00	.00	.00	.00	455	9.0	.50	1.0
14	.00	.00	.00	.00	.00	.00	.00	.00	351	7.5	.45	1.0
15	.00	.00	.00	.00	.00	.00	.00	.00	287	6.6	.45	.90
16	.00	.00	.00	.00	.00	.00	.00	.00	227	5.6	.45	.90
17	.00	.00	.00	.00	.00	.00	.00	.00	195	5.2	.45	.80
18	.00	.00	.00	.00	.00	.00	.00	.00	181	5.2	.40	.80
19	.00	.00	.00	.00	.00	.00	.00	.00	160	4.6	.40	.80
20	.00	.00	.00	.00	.00	.00	.00	.00	139	4.6	.45	.70
21	.00	.00	.00	.00	.00	.00	.00	.00	128	3.5	.55	.60
22	.00	.00	.00	.00	.00	.00	.00	.00	112	3.1	.55	.60
23	.00	.00	.00	.00	.00	.00	.00	.00	95	3.0	.60	.50
24	.00	.00	.00	.00	.00	.00	.00	.00	87	2.4	.60	.50
25	.00	.00	.00	.00	.00	.00	.00	1.0	79	2.4	.60	.40
26	.00	.00	.00	.00	.00	.00	.00	2.0	70	2.1	.50	.40
27	.00	.00	.00	.00	.00	.00	.00	3.0	62	1.7	.50	.40
28	.00	.00	.00	.00	.00	.00	.00	5.0	55	1.5	.50	.30
29	.00	.00	.00	.00	---	.00	.00	10	50	1.2	.55	.30
30	.00	.00	.00	.00	---	.00	.00	20	44	1.0	.55	.30
31	.00	---	.00	.00	---	.00	---	50	---	1.0	.55	---
TOTAL	38.00	.00	.00	.00	.00	.00	.00	91.00	16893	338.2	19.13	19.15
MEAN	1.23	.000	.000	.000	.000	.000	.000	2.94	563	10.9	.62	.64
MAX	10	.00	.00	.00	.00	.00	.00	50	2800	37	1.0	1.0
MIN	.00	.00	.00	.00	.00	.00	.00	.00	44	1.0	.40	.30
CFSM	.007	.000	.000	.000	.000	.000	.000	.02	3.20	.06	.004	.004
IN.	.01	.00	.00	.00	.00	.00	.00	.02	3.57	.07	.00	.00
AC-FT	75	.00	.00	.00	.00	.00	.00	180	33510	671	38	38

CAL YR 1982	TOTAL	21558.30	MEAN 59.1	MAX 2220	MIN .00	CFSM .34	IN 4.56	AC-FT 42760			
WTR YR 1983	TOTAL	17398.48	MEAN 47.7	MAX 2800	MIN .00	CFSM .27	IN 3.68	AC-FT 34510			

ARCTIC SLOPE ALASKA

15896700 PUTULIGAYUK RIVER NEAR DEADHORSE

LOCATION.--Lat 70°16'03", long 148°37'41", in NE¼ sec.32, T.11 N., R.14 E., North Slope Borough, Hydrologic Unit 19010001, at midchannel 200 ft upstream from culvert causeway, 0.2 mi downstream from unnamed tributary, 6.2 mi northwest of Deadhorse, and 7.3 mi upstream from mouth on Prudhoe Bay.

DRAINAGE AREA.--176 mi^2, approximately.

PERIOD OF RECORD.--May 1970 to September 1979 and October 1981 to current year.

GAGE.--Water-stage recorder. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by private engineering firm). Prior to June 4, 1972, on right bank 150 ft downstream at same datum.

REMARKS.--Records estimated and poor for period of no gage-height record prior to June 5, fair thereafter.

AVERAGE DISCHARGE.--12 years (water years 1971-79, 1982-84), 41.5 ft^3/s, 3.20 in/yr, 30,070 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,980 ft^3/s June 6, 1971, gage height, 24.50 ft, at site then in use; no flow during winter periods each year.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 12, 1980 had a stage of 22.6 ft and discharge of 5,800 ft^3/s, from information by private engineering firm.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,640 ft^3/s June 10, gage height, 18.20 ft; maximum gage-height, 18.38 ft June 10, backwater from ice; no flow Oct. 6 to May 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.20	.00	.00	.00	.00	.00	.00	.00	1.0	39	4.6	119
2	.20	.00	.00	.00	.00	.00	.00	.00	2.0	34	4.6	114
3	.10	.00	.00	.00	.00	.00	.00	.00	2.0	30	4.6	108
4	.10	.00	.00	.00	.00	.00	.00	.00	4.0	27	5.3	102
5	.10	.00	.00	.00	.00	.00	.00	.00	6.6	24	5.3	98
6	.00	.00	.00	.00	.00	.00	.00	.00	11	22	5.3	91
7	.00	.00	.00	.00	.00	.00	.00	.00	26	20	5.8	83
8	.00	.00	.00	.00	.00	.00	.00	.00	200	20	5.8	79
9	.00	.00	.00	.00	.00	.00	.00	.00	600	16	7.6	77
10	.00	.00	.00	.00	.00	.00	.00	.00	1300	13	9.5	73
11	.00	.00	.00	.00	.00	.00	.00	.00	1060	12	16	69
12	.00	.00	.00	.00	.00	.00	.00	.00	970	10	18	65
13	.00	.00	.00	.00	.00	.00	.00	.00	830	9.1	18	62
14	.00	.00	.00	.00	.00	.00	.00	.00	680	8.1	20	59
15	.00	.00	.00	.00	.00	.00	.00	.00	558	7.6	22	56
16	.00	.00	.00	.00	.00	.00	.00	.00	446	7.2	25	54
17	.00	.00	.00	.00	.00	.00	.00	.00	365	6.7	31	51
18	.00	.00	.00	.00	.00	.00	.00	.00	296	7.2	36	49
19	.00	.00	.00	.00	.00	.00	.00	.00	243	6.7	38	47
20	.00	.00	.00	.00	.00	.00	.00	.00	193	6.7	43	44
21	.00	.00	.00	.00	.00	.00	.00	.00	153	6.2	45	43
22	.00	.00	.00	.00	.00	.00	.00	.00	131	5.8	48	41
23	.00	.00	.00	.00	.00	.00	.00	.00	114	5.3	69	39
24	.00	.00	.00	.00	.00	.00	.00	.00	98	5.0	106	37
25	.00	.00	.00	.00	.00	.00	.00	.00	85	5.0	123	36
26	.00	.00	.00	.00	.00	.00	.00	.10	75	5.3	133	35
27	.00	.00	.00	.00	.00	.00	.00	.20	62	5.0	139	33
28	.00	.00	.00	.00	.00	.00	.00	.40	53	5.0	139	32
29	.00	.00	.00	.00	.00	.00	.00	.60	49	5.0	136	31
30	.00	.00	.00	.00	---	.00	.00	.80	44	4.6	130	30
31	.00	---	.00	.00	---	.00	---	1.0	---	4.6	123	---
TOTAL	.70	.00	.00	.00	.00	.00	.00	3.10	8857.6	383.1	1516.4	1857
MEAN	.023	.000	.000	.000	.000	.000	.000	.10	295	12.4	48.9	61.9
MAX	.20	.00	.00	.00	.00	.00	.00	1.0	1500	39	139	119
MIN	.00	.00	.00	.00	.00	.00	.00	.00	1.0	4.6	4.6	30
CFSM	.000	.000	.000	.000	.000	.000	.000	.001	1.68	.07	.28	.35
IN.	.00	.00	.00	.00	.00	.00	.00	.00	1.87	.08	.32	.39
AC-FT	1.4	.00	.00	.00	.00	.00	.00	6.1	17570	760	3010	3680

CAL YR 1983	TOTAL	17361.18	MEAN 47.6	MAX 2800	MIN .00	CFSM .27	IN 3.67	AC-FT 34440				
WTR YR 1984	TOTAL	12617.90	MEAN 34.5	MAX 1500	MIN .00	CFSM .20	IN 2.67	AC-FT 25030				

ARCTIC SLOPE ALASKA

15896700 PUTULIGAYUK RIVER NEAR DEADHORSE

LOCATION.--Lat 70°16'03", long 148°37'41", in NE¼ sec.32, T.11 N., R.14 E., North Slope Borough, Hydrologic Unit 19010001, at midchannel 200 ft upstream from culvert causeway, 0.2 mi downstream from unnamed tributary, 6.2 mi northwest of Deadhorse, and 7.3 mi upstream from mouth on Prudhoe Bay.

DRAINAGE AREA.--176 mi², approximately.

PERIOD OF RECORD.--May 1970 to September 1979 and October 1981 to current year.

GAGE.--Water-stage recorder. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by private engineering firm). Prior to June 4, 1972, on right bank 150 ft downstream at same datum.

REMARKS.--Estimated daily discharges: Oct. 1 to June 2, July 8-24, and Sept. 15-28, 30. Records fair except for the periods of ice effect, June 1-2 and Sept. 15-17, 21-28 and periods of no gage-height record, Oct. 1 to May 31, July 8-24, and Sept. 18-20, 30.

AVERAGE DISCHARGE.--13 years (water years 1970-79, 1982-85), 40.7 ft³/s, 3.14 in/yr, 29,490 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,980 ft³/s, June 6, 1971, gage height, 24.50 ft, at site then in use; no flow during winter periods each year.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 12, 1980 had a stage of 22.6 ft and discharge of 5,800 ft³/s, from information by private engineering firm.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,880 ft³/s, June 2, gage height, 19.60 ft; maximum gage-height, 22.21 ft, June 2, backwater from ice; no flow, Oct. 22 to May 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1984 TO SEPTEMBER 1985
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	.00	.00	.00	.00	.00	.00	.00	200	26	.54	.04
2	26	.00	.00	.00	.00	.00	.00	.00	900	26	.54	.07
3	23	.00	.00	.00	.00	.00	.00	.00	2310	24	.38	.15
4	20	.00	.00	.00	.00	.00	.00	.00	1540	20	.32	.11
5	17	.00	.00	.00	.00	.00	.00	.00	1060	18	.26	.11
6	13	.00	.00	.00	.00	.00	.00	.00	820	17	.26	.11
7	8.0	.00	.00	.00	.00	.00	.00	.00	603	14	.26	.15
8	4.0	.00	.00	.00	.00	.00	.00	.00	446	12	.20	.73
9	3.0	.00	.00	.00	.00	.00	.00	.00	401	11	.20	3.0
10	2.0	.00	.00	.00	.00	.00	.00	.00	338	10	.15	7.2
11	2.0	.00	.00	.00	.00	.00	.00	.00	288	9.0	.15	9.5
12	2.0	.00	.00	.00	.00	.00	.00	.00	250	8.0	.11	13
13	1.0	.00	.00	.00	.00	.00	.00	.00	212	7.0	.11	22
14	1.0	.00	.00	.00	.00	.00	.00	.00	173	7.0	.07	40
15	1.0	.00	.00	.00	.00	.00	.00	.00	150	6.0	.07	35
16	1.0	.00	.00	.00	.00	.00	.00	.00	133	5.0	.07	30
17	1.0	.00	.00	.00	.00	.00	.00	.00	109	5.0	.07	25
18	1.0	.00	.00	.00	.00	.00	.00	.00	89	4.0	.04	20
19	1.0	.00	.00	.00	.00	.00	.00	.00	77	4.0	.04	16
20	.50	.00	.00	.00	.00	.00	.00	.00	67	3.0	.04	13
21	.50	.00	.00	.00	.00	.00	.00	1.0	65	2.0	.02	11
22	.00	.00	.00	.00	.00	.00	.00	3.0	59	1.0	.02	10
23	.00	.00	.00	.00	.00	.00	.00	5.0	56	.90	.02	9.0
24	.00	.00	.00	.00	.00	.00	.00	3.0	50	.80	.02	8.0
25	.00	.00	.00	.00	.00	.00	.00	2.0	46	.84	.01	7.0
26	.00	.00	.00	.00	.00	.00	.00	2.0	43	1.2	.01	6.0
27	.00	.00	.00	.00	.00	.00	.00	2.0	37	1.2	.01	5.0
28	.00	.00	.00	.00	.00	.00	.00	2.0	34	1.0	.02	5.0
29	.00	.00	.00	.00	---	.00	.00	5.0	32	1.0	.02	4.5
30	.00	.00	.00	.00	---	.00	.00	10	27	.73	.02	5.0
31	.00	---	.00	.00	---	.00	---	50	---	.63	.02	---
TOTAL	156.00	.00	.00	.00	.00	.00	.00	85.00	10615	247.30	4.07	305.67
MEAN	5.03	.000	.000	.000	.000	.000	.000	2.74	354	7.98	.13	10.2
MAX	28	.00	.00	.00	.00	.00	.00	50	2310	26	.54	40
MIN	.00	.00	.00	.00	.00	.00	.00	.00	27	.63	.01	.04
CFSM	.03	.000	.000	.000	.000	.000	.000	.02	2.01	.05	.001	.06
IN.	.03	.00	.00	.00	.00	.00	.00	.02	2.24	.05	.00	.06
AC-FT	309	.00	.00	.00	.00	.00	.00	169	21050	491	8.1	606

CAL YR 1984 TOTAL 12773.20 MEAN 34.9 MAX 1500 MIN .00 CFSM .20 IN 2.70 AC-FT 25340
WTR YR 1985 TOTAL 11413.04 MEAN 31.3 MAX 2310 MIN .00 CFSM .18 IN 2.41 AC-FT 22640

ARCTIC SLOPE ALASKA

15896700 PUTULIGAYUK RIVER NEAR DEADHORSE

LOCATION.--Lat 70°16'03", long 148°37'41", in NE¼ sec.32, T.11 N., R.14 E., North Slope Borough, Hydrologic Unit 19010001, at midchannel 200 ft upstream from culvert causeway, 0.2 mi downstream from unnamed tributary, 6.2 mi northwest of Deadhorse, and 7.3 mi upstream from mouth on Prudhoe Bay.

DRAINAGE AREA.--176 mi², approximately.

PERIOD OF RECORD.--May 1970 to September 1979 and October 1981 to September 1986 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by private engineering firm). Prior to June 4, 1972, on right bank 150 ft downstream at same datum.

REMARKS.--Estimated daily discharges: Oct. 5 to June 16, July 12 to Aug. 20, and Sept. 23-30. Records fair except for the period of ice effect, June 12-15, and periods of no gage-height record, Oct. 5 to June 11 and

AVERAGE DISCHARGE.--14 years (water years 1970-79, 1982-86), 42.3 ft³/s, 3.26 in/yr, 30,650 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,440 ft³/s, June 17, 1986, gage height, 21.84 ft; maximum gage height, 24.0 ft, June 5, 1973, backwater from snow and ice; no flow during winter periods each year.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 12, 1980 had a stage of 22.6 ft and discharge of 5,800 ft³/s, from information by private engineering firm.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,440 ft³/s, June 17, gage height, 21.84 ft; maximum gage-height, 21.99 ft, June 16, backwater from snow and ice; no flow, Oct. 17 to May 29.

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

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.0	.00	.00	.00	.00	.00	.00	.00	10	121	16	20
2	5.0	.00	.00	.00	.00	.00	.00	.00	15	98	16	18
3	5.0	.00	.00	.00	.00	.00	.00	.00	10	81	15	18
4	5.0	.00	.00	.00	.00	.00	.00	.00	8.0	69	15	18
5	4.5	.00	.00	.00	.00	.00	.00	.00	6.0	59	18	19
6	4.0	.00	.00	.00	.00	.00	.00	.00	5.0	51	20	19
7	3.5	.00	.00	.00	.00	.00	.00	.00	5.0	45	22	19
8	3.0	.00	.00	.00	.00	.00	.00	.00	4.0	38	20	18
9	2.5	.00	.00	.00	.00	.00	.00	.00	4.0	33	19	17
10	2.0	.00	.00	.00	.00	.00	.00	.00	5.0	29	18	17
11	2.0	.00	.00	.00	.00	.00	.00	.00	10	26	17	18
12	1.5	.00	.00	.00	.00	.00	.00	.00	20	23	17	17
13	1.0	.00	.00	.00	.00	.00	.00	.00	100	20	19	15
14	1.0	.00	.00	.00	.00	.00	.00	.00	250	18	20	16
15	.50	.00	.00	.00	.00	.00	.00	.00	300	16	19	16
16	.50	.00	.00	.00	.00	.00	.00	.00	3500	14	18	15
17	.00	.00	.00	.00	.00	.00	.00	.00	4490	13	17	15
18	.00	.00	.00	.00	.00	.00	.00	.00	2620	12	17	14
19	.00	.00	.00	.00	.00	.00	.00	.00	2160	11	18	14
20	.00	.00	.00	.00	.00	.00	.00	.00	1850	10	19	13
21	.00	.00	.00	.00	.00	.00	.00	.00	1390	11	20	14
22	.00	.00	.00	.00	.00	.00	.00	.00	970	12	20	13
23	.00	.00	.00	.00	.00	.00	.00	.00	730	12	23	14
24	.00	.00	.00	.00	.00	.00	.00	.00	580	11	25	13
25	.00	.00	.00	.00	.00	.00	.00	.00	477	11	24	13
26	.00	.00	.00	.00	.00	.00	.00	.00	389	11	22	12
27	.00	.00	.00	.00	.00	.00	.00	.00	329	10	19	12
28	.00	.00	.00	.00	.00	.00	.00	.00	250	10	19	11
29	.00	.00	.00	.00	---	.00	.00	.00	193	10	20	11
30	.00	.00	.00	.00	---	.00	.00	2.0	147	12	21	10
31	.00	---	.00	.00	---	.00	---	5.0	---	14	20	---
TOTAL	46.00	.00	.00	.00	.00	.00	.00	7.00	20827.0	911	593	459
MEAN	1.48	.000	.000	.000	.000	.000	.000	.23	694	29.4	19.1	15.3
MAX	5.0	.00	.00	.00	.00	.00	.00	5.0	4490	121	25	20
MIN	.00	.00	.00	.00	.00	.00	.00	.00	4.0	10	15	10
CFSM	.008	.000	.000	.000	.000	.000	.000	.001	3.94	.17	.11	.09
IN.	.01	.00	.00	.00	.00	.00	.00	.00	4.40	.19	.13	.10
AC-FT	91	.00	.00	.00	.00	.00	.00	14	41310	1810	1180	910

CAL YR 1985 TOTAL 11303.04 MEAN 31.0 MAX 2310 MIN .00 CFSM .18 IN 2.39 AC-FT 22420
WTR YR 1986 TOTAL 22843.00 MEAN 62.6 MAX 4490 MIN .00 CFSM .36 IN 4.83 AC-FT 45310

Annual maximum discharge at crest-stage gage partial-record stations during water year 1988--Continued

Station No.	Station Name	Location	Drainage area (mi^2)	Period of record	Annual maximum Date	Gage height (ft)	Discharge (ft^3/s)
		Arctic Slope Alaska					
15896700	Putuligayuk River near Deadhorse	Lat 70°16'03", long 148°37'41", in NE¼ sec.32, T.11 N., R.14 E., North Slope Borough, at midchannel 200 ft upstream from culvert causeway, 0.2 mi downstream from unnamed tributary, 6.2 mi northwest of Deadhorse, and 7.3 mi upstream from mouth.	a176	‡1970-79, 1980, ‡1982-85, 1987-88	6-13-87 6-14-88	19.84 20.66	g3,120 3,990
15904900	Atigun River tributary near Pump Station 4	Lat 68°22'25", long 149°18'48", in NE¼SE¼ sec.28, T.12 S., R.12 E., North Slope Borough, on right bank 0.2 mi upstream from culvert at mi 191 on Dalton Highway, 0.9 mi upstream from mouth, and 4 mi south of Pump Station 4.	32.6	1976, ‡1977-86, 1987-88	6-19-88	12.78	350
15910200	Happy Creek at Happy Valley Camp near Sagwon	Lat 69°08'50", long 148°49'50", in SE¼ sec.30, T.3 S., R.14 E., North Slope Borough, on right bank at former Happy Valley Camp 1 mi upstream from mouth and 17.5 mi south of Sagwon.	34.5	1972-88	6- 3-88	16.08	480
15916200	Sagavanirktok River tributary near Deadhorse	Lat 69°57'14", long 148°43'48", in NW¼NE¼ sec.19, T.1 N., R.14 E., on right bank 6 ft upstream from culvert at mi 386.2 on Dalton Highway, 0.4 mi upstream from mouth, and 23 mi south of Deadhorse.	a12	1985, 1988	6- -86 8- -88	7.01 7.14	g6.8 11

‡ Operated as a continuous-record station.
a Approximately.
g Not previously published.

Annual maximum discharge at crest-stage gage partial-record stations during water year 1989--Continued

Station No.	Station Name	Location	Drainage area (mi^2)	Period of record	Annual maximum Date	Gage height (ft)	Discharge (ft^3/s)
		Yukon Alaska--Continued					
15564887	Bonanza Creek tributary near Prospect Camp	Lat 66°36'52", long 150°41'24", in SE¼ sec.25, T.21 N., R.15 W., on right bank 0.3 mi downstream from culverts on the Dalton Highway, 3.4 mi upstream from mouth, and 13.5 mi south of Pump Station 5.	11.7	1975-89	6- 1-89	19.17	208
		Northwest Alaska					
15585000	Goldengate Creek near Nome	Lat 64°26'03", long 165°02'48", in SW¼ sec.15, T.12 S., R.32 W., on right bank 500 ft upstream from culvert on Nome-Council Road and 11 mi southeast of Nome.	1.55	1965, 1977-84, 1986-89	6-14-89 8-12-89	11.78 11.03	S/53 R/13
15619000	Dexter Creek near Nome	Lat 64°35'11", long 165°16'39", in NE¼ sec.33, T.10 S., R.33 W., on left bank 800 ft upstream from culvert on Nome-Taylor Road 0.2 mi upstream from mouth and 7 mi northeast of Nome.	2.99	1978, 1981-89	6-14-89 8-12-89	f14.12 11.50	S/135 R/68
15624998	Arctic Creek above tributary near Nome	Lat 64°38'16", long 165°42'42", in NE¼ sec.8, T.10 S., R.35 W., on right bank 300 ft upstream from culvert on Nome-Teller Road 2 mi upstream from mouth and 13 mi northwest of Nome.	1.13	1975, 1979-89	8-13-89	17.99	26
15633000	Washington Creek near Nome	Lat 64°42'52", long 165°49'13", in NW¼ sec.14, T.9 S., R.35 W., 400 ft upstream from culvert on Nome-Teller Road and 19 mi northwest of Nome.	6.34	1964-89	6-15-89 8-12-89	f21.78 19.91	S/a150 R/40
15637000	Gold Run Creek near Teller	Lat 65°02'30", long 168°10'05", in SE¼ NE¼ sec.21, T.5 S., R.37 W., on left bank, 30 ft downstream from bridge at mi 52.7 of Nome-Teller Road, 18 mi southeast of Teller, and 55 mi northwest of Nome.	24.2	ǂ1986-88, 1989	6-16-18-89 8-12-89	4.97 4.52	S/920 R/640
15668100	Star Creek near Nome	Lat 64°55'40", long 164°57'39", in NW¼ sec.33, T.6 S., R.31 W., on right bank upstream from culvert at mi 40.5 Nome-Taylor Road 0.9 mi upstream from mouth and 32 mi northeast of Nome.	3.78	1964-65, 1967-89	6- -89	10.04	60
15668200	Crater Creek near Nome	Lat 64°55'48", long 164°52'12", in NW¼ NW¼ sec.36, T.6 S., R.31 W., on right bank 25 ft upstream from bridge at mi 43 on Nome-Taylor Road, 1.1 mi upstream from mouth, and 34 mi northeast of Nome.	21.9	1964-65, 1967-75, ǂ1976-85, 1986-89	6-10-88 6- -89	8.06 9.04	r560 1,090
		Arctic Slope Alaska					
15896700	Putuligayuk River near Deadhorse	Lat 70°16'03", long 148°37'41", in NE¼ sec.32, T.11 N., R.14 E., North Slope Borough, at midchannel 200 ft upstream from culvert causeway, 0.2 mi downstream from unnamed tributary, 6.2 mi northwest of Deadhorse, and 7.3 mi upstream from mouth.	a176	ǂ1970-79, 1980, ǂ1982-86, 1987-89	6-11-89	21.49	4,950
15904900	Atigun River tributary near Pump Station 4	Lat 68°22'25", long 149°18'48", in NE¼SE¼ sec.28, T.12 S., R.12 E., North Slope Borough, on right bank 0.2 mi upstream from culvert at mi 191 on Dalton Highway, 0.9 mi upstream from mouth, and 4 mi south of Pump Station 4.	32.6	1976, ǂ1977-86, 1987-89	6-22-89	13.59	580

ǂ Operated as a continuous-record station.
a Approximately.
f Ice effect.
r Revised.
R/ Rainfall.
S/ Snowmelt.

APPENDIX B

Notes made during stream-discharge measurements at U.S. Geological Survey gaging station (#15896700) on Putuligayuk River

9-375-F-WP (May 1960)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Meas. No. 107
Comp. by ALB
Checked by SGS

DISCHARGE MEASUREMENT NOTES

Sta. No. 15896700
PUTULIGAYUK RIVER NR DEADHORSE, AK
Date JUNE 17, 1986 Party ZENONE BURROWS
Width 212.' Area 1,160 Vel. 4.66' G. H. 21.78 Disch. 5400
Method 2-8/6 No. secs. 29 G. H. change -.03 in 1.0 hrs. Susp. SOC
Method coef. — Hor. angle coef. 1.0 Susp. coef. — Meter No. _____

GAGE READINGS TG				
Time		Recorder	Inside	Outside
0810		20.32	20.32	
			±.08	
UPPER	05 24	32 -3.0	±.2 =	21.32
0900	S	20.28		
1000	F	20.25		
1100		20.10		
Weighted M. G. H.		20.16		21.32
G. H. correction		+1.52		+.67
Correct M. G. H.		21.78		21.99

Date rated SR # 1 Used rating
for rod _____ susp. Meter _____ ft.
above bottom of wt. Tags checked _____.
Spin before meas. OK after OK
Meas. plots ± 1.1 % diff. from 12 rating
Wading, cable, ice, [boat], upstr., downstr., side
bridge 100 [feet], mile, [above], below
[gage], and _____
Check-bar, chain found _____
changed to _____ at _____
Correct _____
Levels obtained YES

Measurement rated excellent (2%), [good (5%)], fair (8%), poor (over 8%), based on following conditions: Cross section UNIFORM - GRAVEL
Flow STEADY Weather OVRCST = COOL
Other _____ Air _____ °F@ _____
Gage OPERATING OK Water _____ °F@ _____
_____ Record removed NO Intake flushed U _____
Observer _____

Control CULVERTS - ALL 6 WIDE OPEN

Remarks HUGE SURGE AROUND GAGE - PILE UP ON ICE BUMPER - THEN DRAWN DOWN - THEN PILE UP ON GAGE.

G. H. of zero flow _____ ft.

.0 .10 .20 .30 .40 .50 .60 .70 .75

River at—

Angle coefficient	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	VELOCITY: At point	VELOCITY: Mean in vertical	Adjusted for hor. angle or	Area	Discharge	
	6	5	LEW @			0855						.50
	16	10	1.2	.6	40	51	1.73			12.0	21	.55
	26	10	1.8	.6	50	50	2.20			18.0	40	
	36	10	2.5	.6	50	45	2.44			25.0	61	
	46	10	3.1	.2	80	48	3.65	3.13		31.0	97	.90
				.8	50	42	2.61					.92
	56	9	4.6		80	42	4.16	3.54		41.4	147	
					60	45	2.92					.94
	64	8	6.8		100	48	4.55	3.74		54.4	203	.96
					60	45	2.92					.97
	72	8	7.9		100	43	5.08	3.71		63.2	234	.98
					50	47	2.34					.95
	80	6.5	10.4		100	42	5.20	4.10		67.6	277	
					60	44	2.99					
⊙	85	5	10.2		100	41	5.32	4.34		51.0	221	1.00
					60	39	3.35					
	90	5	9.3		100	42	5.20	4.64		46.5	216	
					80	43	4.07					.99
	95	5	8.8		100	40	5.45	4.86		44	214	.98
					80	41	4.26					.97
	100	5	8.5		150	59	5.55	5.15		42.5	219	.96
					100	46	4.75					
	105	5	8.6		150	56	5.84	5.10		43	220	.94
					80	40	4.37					.92
	110	5	8.4		150	56	5.84	5.05		42	212	.90
					80	41	4.26					
	115	5	8.2		150	54	6.06	5.35		41	220	
					100	47	4.65					.88
	120	5	8.0		150	52	6.29	5.68		40	227	
					100	43	5.08					
	125	5	8.0		150	52	6.29	5.52		40	220	.80
					100	46	4.75					

.0 .10 .20 .30 .40 .50 .60 .70 .75

	130	6.5	7.9		150	53	6.17	5.56		51.4'	286'
					100	44	4.96'				333'
	138	8	7.6		150	54	6.06'	5.57		60.8'	339'
					100	43	5.08'				366'
	146	8	7.4		150	50	6.54'	5.64'		59'	333'
					100	46	4.75'				397'
	154	8	6.9		150	50	6.54'	5.81'		55'	320'
					100	43	5.08'				317'
	162	8	6.6		150	55	5.95'	5.45'		53'	289'
					100	44	4.96'				460'
	170	8	6.4		150	55	5.95'	5.40'		51'	275'
					100	45	4.85'				375'
	178	8	6.0		150	57	5.74'	5.29'		48'	254'
					100	45	4.85'				512'
	186	8	5.5	.2	100	47	4.65'	4.11'		44'	180'
				.8	80	49	3.57'				531'
	194	9	2.0	.6	60	46	2.86'			18'	51'
⊙	204	12	1.2		40	49	1.80'			14'	25'
	218	7		2E	W @	100	5 HRS				
	212	212								1156	5401'

APPENDIX C

Flood frequency analysis for Putuligayuk River

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PSM J407 VER 3.7                              U. S. GEOLOGICAL SURVEY
(REV  11/5/81)                          ANNUAL  PEAK  FLOW  FREQUENCY  ANALYSIS
                                         FOLLOWING WRC GUIDELINES BULL. 17-B.


EXECUTION BEGINNING AT DATE, TIME =    9/11/90   1731

INPUT FORMAT =   1  WATSTORE PEAK FILE RETRIEVAL


 EXPLANATION OF PEAK DISCHARGE QUALIFICATION CODES

 J407   FILE   MEANING

   D      3    DAM FAILURE, NON-RECURRENT FLOW ANOMALY
   G      3    DISCHARGE GREATER THAN STATED VALUE
   X     3+8   BOTH OF THE ABOVE
   L      4    DISCHARGE LESS THAN STATED VALUE
   K   6 OR C  KNOWN EFFECT OF REGULATION OR URBANIZATION
   H      7    HISTORIC PEAK


REPORT TROUBLE TO WATSTORE USER ASSISTANCE.



        J407 -- REVISED FOR USE WITH W.R.C. BULLETIN 17-B.   8/1/81

     PEAK FLOW FILE RETRIEVAL VERSION

     PRINCIPAL CHANGES INCLUDE --
     -- HIGH OUTLIER TEST
     -- MORE SENSITIVE LOW OUTLIER TEST
     -- STATION SKEW ADJUSTMENT FOR LOW OUTLIERS AND ZERO FLOWS
     -- WEIGHTED AVERAGING OF STATION AND GENERALIZED SKEWS IN
          INVERSE PROPORTION TO ESTIMATED MEAN SQUARE ERRORS.

     FOR DETAILS, SEE WATSTORE USER'S GUIDE, VOL.4, CH.I (1981
     REVISION), SEC.C.

     NO CHANGES IN JOB INPUT PREPARATION ARE REQUIRED IN RETRIEVAL MODE
     MINOR CHANGES MAY BE REQUIRED IN STANDALONE (CARD INPUT) MODE.

  NOTE -- IN STANDALONE MODE (CARD INPUT), A NEW FORMAT IS USED FOR
     HISTORIC AND OUTLIER INFORMATION.  SEE WATSTORE USER'S GUIDE,
     VOL.4, CH.I, SEC.C.2.K (1981 REVISION).  NO CHANGE IS NEEDED
     FOR STATIONS HAVING NO HISTORIC/OUTLIER INFORMATION.

  NOTE -- IN STANDALONE MODE, USE REGION=140K ON THE EXEC CARD.


  NOTE --  SUMMARY OUTPUT IS PRODUCED BY DEFAULT, UNLESS SUPPRESSED BY
     THE  NOSC  OPTION.  (SCPU IS THE DEFAULT OPTION.)  SCPU OUTPUT
```

ORDINARILY GOES TO A TEMPORARY DATA SET NAMED &&BCCARDS, WHICH IS AVAILABLE TO LATER STEPS OF THE JOB IN WHICH IT WAS CREATED, BUT IS DELETED AT THE END OF THE JOB. TO GET A PERMANENT ONLINE DATA SET, TYPE BCU=ONLINE,BCDS='USERID.DATA.SET.NAME' ON THE EXEC CARD FOR PGMBCA. TO GET ACTUAL PUNCHED CARDS, TYPE BCOUT=SYSOUT INSTEAD. SEE WATSTORE USER'S GUIDE VOL.4, CH.1, SEC. C.2.G & H.

NOTE -- OLD J407 PROGRAM IS STILL AVAILABLE FOR TESTS AND COMPARISONS TO USE IT, TYPE PROG=J407A ON THE EXEC CARD.

```
WATSTORE PEAK FLOW FILE RETRIEVAL PGM, J96D - RUN DATE : 11 SEP 90  17.31.54
PROGRAM LAST REVISED :  3 OCT 83 19.25.23


*** EXPLANATION OF PEAK DATA CODES *****

    DISCHARGE QUALIFICATION CODES:

      1...DISCHARGE IS A MAXIMUM DAILY AVERAGE
      2...DISCHARGE IS AN ESTIMATE
      3...DISCHARGE AFFECTED BY DAM FAILURE
      4...DISCHARGE LESS THAN INDICATED VALUE, WHICH IS MINIMUM RECORDABLE DISCHARGE AT THIS SITE
      5...DISCHARGE AFFECTED TO UNKNOWN DEGREE BY REGULATION OR DIVERSION
      6...DISCHARGE AFFECTED BY REGULATION OR DIVERSION
      7...DISCHARGE IS AN HISTORIC PEAK
      8...DISCHARGE ACTUALLY GREATER THAN INDICATED VALUE
      9...DISCHARGE DUE TO SNOWMELT, HURRICANE, ICE-JAM OR DEBRIS DAM BREAKUP
      A...YEAR OF OCCURRENCE IS UNKNOWN OR NOT EXACT
      B...MONTH OR DAY OF OCCURRENCE IS UNKNOWN OR NOT EXACT
      C...ALL OR PART OF THE RECORD AFFECTED BY URBANIZATION, MINING, AGRICULTURAL CHANGES, CHANNELIZATION, OR OTHER
      D...BASE DISCHARGE CHANGED DURING THIS YEAR
      E...ONLY ANNUAL MAXIMUM PEAK AVAILABLE FOR THIS YEAR

    GAGE HEIGHT QUALIFICATION CODES:

      1...GAGE HEIGHT AFFECTED BY BACKWATER
      2...GAGE HEIGHT NOT THE MAXIMUM FOR THE YEAR
      3...GAGE HEIGHT AT DIFFERENT SITE AND/OR DATUM
      4...GAGE HEIGHT BELOW MINIMUM RECORDABLE ELEVATION
      5...GAGE HEIGHT IS AN ESTIMATE
      6...GAGE DATUM CHANGED DURING THIS YEAR


*** NOTES *****

BASE DISCHARGE (IF REPORTED) MAY NOT BE EFFECTIVE FOR ENTIRE PERIOD OF RECORD; CURRENT VALUE USED.

GAGE DATUM (IF REPORTED) MAY NOT BE EFFECTIVE FOR ENTIRE PERIOD OF RECORD; CURRENT VALUE USED.



RETRIEVAL SPECIFICATIONS FOR REQUEST NUMBER 01 ARE AS FOLLOWS:
M CARD:  M                                  L                                   01
PEAK FLOW RETRIEVAL NUMBER 01 IS FOR ALL WATER YEARS
THE FOLLOWING HAVE BEEN REQUESTED:
.....LONG FORMAT PRINTOUT
.....STANDARD RECORD FORMAT

.....VECTOR FORMAT(FROM X CARD) --XJ607   SJ08      BILL TETRIK
     NOTE -- RECORD FOR STATION  15996730       WY = 1974 REJECTED DURING RETRIEVAL.
     NOTE -- RECORD FOR STATION  15696730       WY = 1979 REJECTED DURING RETRIEVAL.

NUMBER OF SITES RETRIEVED:     1
NUMBER OF RECORDS RETRIEVED:     17



END OF RETRIEVAL PROCESSING
```

PGM J407 VER 5.7
(REV 11/5/81)

U. S. GEOLOGICAL SURVEY
ANNUAL PEAK FLOW FREQUENCY ANALYSIS
FOLLOWING WRC GUIDELINES BULL. 17-B.

BILL PETRIK
RUN-DATE 9/11/93 AT 1751 SEQ 1.0001

STATION - 15896700 /USGS PUTULIGAYUK R NR DEADHORSE AK 1970-1989 15896709 /USGS

********* NOTICE -- PRELIMINARY MACHINE COMPUTATIONS. *********
********* USER RESPONSIBLE FOR ASSESSMENT AND INTERPRETATION. *********

INPUT DATA LISTING

WATER YEAR	DISCHARGE	CODES
1970	1900.0	
1971	4980.0	
1972	4500.0	
1973	4000.0	
1975	2000.0	
1976	3130.0	
1977	1800.0	
1978	4630.0	
1980	5800.0	
1982	2290.0	
1983	3130.0	
1984	1640.0	
1985	2880.0	
1986	5440.0	
1987	3120.0	
1988	3990.0	
1989	4950.0	

EMPIRICAL FREQUENCY CURVES -- WEIBULL PLOTTING POSITIONS

WATER YEAR	RANKED DISCHARGE	SYSTEMATIC RECORD	W R C ESTIMATE
1980	5800.0	0.0556	0.0556
1986	5440.0	0.1111	0.1111
1971	4980.0	0.1667	0.1667
1989	4950.0	0.2222	0.2222
1978	4630.0	0.2778	0.2778
1972	4500.0	0.3333	0.3333
1973	4000.0	0.3889	0.3889
1988	3990.0	0.4444	0.4444
1976	3130.0	0.5000	0.5000
1983	3130.0	0.5556	0.5556
1987	3120.0	0.6111	0.6111
1985	2880.0	0.6667	0.6667
1982	2290.0	0.7222	0.7222
1975	2000.0	0.7778	0.7778
1970	1900.0	0.8333	0.8333
1977	1800.0	0.8889	0.8889
1984	1640.0	0.9444	0.9444

PGM J407 VER 3.7
(REV 11/5/81)

U. S. GEOLOGICAL SURVEY
ANNUAL PEAK FLOW FREQUENCY ANALYSIS
FOLLOWING WRC GUIDELINES BULL. 17-B.

BILL PETRIK
RUN-DATE 9/11/90 AT 1731 SEQ 1.0001

OPTIONS IN EFFECT -- PLOT RCRD LOPT NSKB PPOS NORS EXPR CLIM

STATION - 15896700 /USGS PUTULIGAYUK R NR DEADHORSE AK 1970-1989 15896700 /USGS

I N P U T D A T A S U M M A R Y

-- YEARS OF RECORD -- SYSTEMATIC	HISTORIC	HISTORIC PEAKS	GENERALIZED SKEW	STD. ERROR OF GENERAL. SKEW	SKEW OPTION	GAGE BASE DISCHARGE	USER-SET OUTLIER CRITERIA HIGH OUTLIER	LOW OUTLIER
17	0	0	0.530	0.440	WRC WEIGHTED	0.0	--	--

********* NOTICE -- PRELIMINARY MACHINE COMPUTATIONS. *********
********* USER RESPONSIBLE FOR ASSESSMENT AND INTERPRETATION. *********

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 1257.2
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HMBASE. 8550.8

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE DISCHARGE	FLOOD BASE EXCEEDANCE PROBABILITY	LOGARITHMIC MEAN	LOGARITHMIC STANDARD DEVIATION	LOGARITHMIC SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.5157	0.1803	-0.330
W R C ESTIMATE	0.0	1.0000	3.5157	0.1803	0.203

ANNUAL FREQUENCY CURVE ORDINATES -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

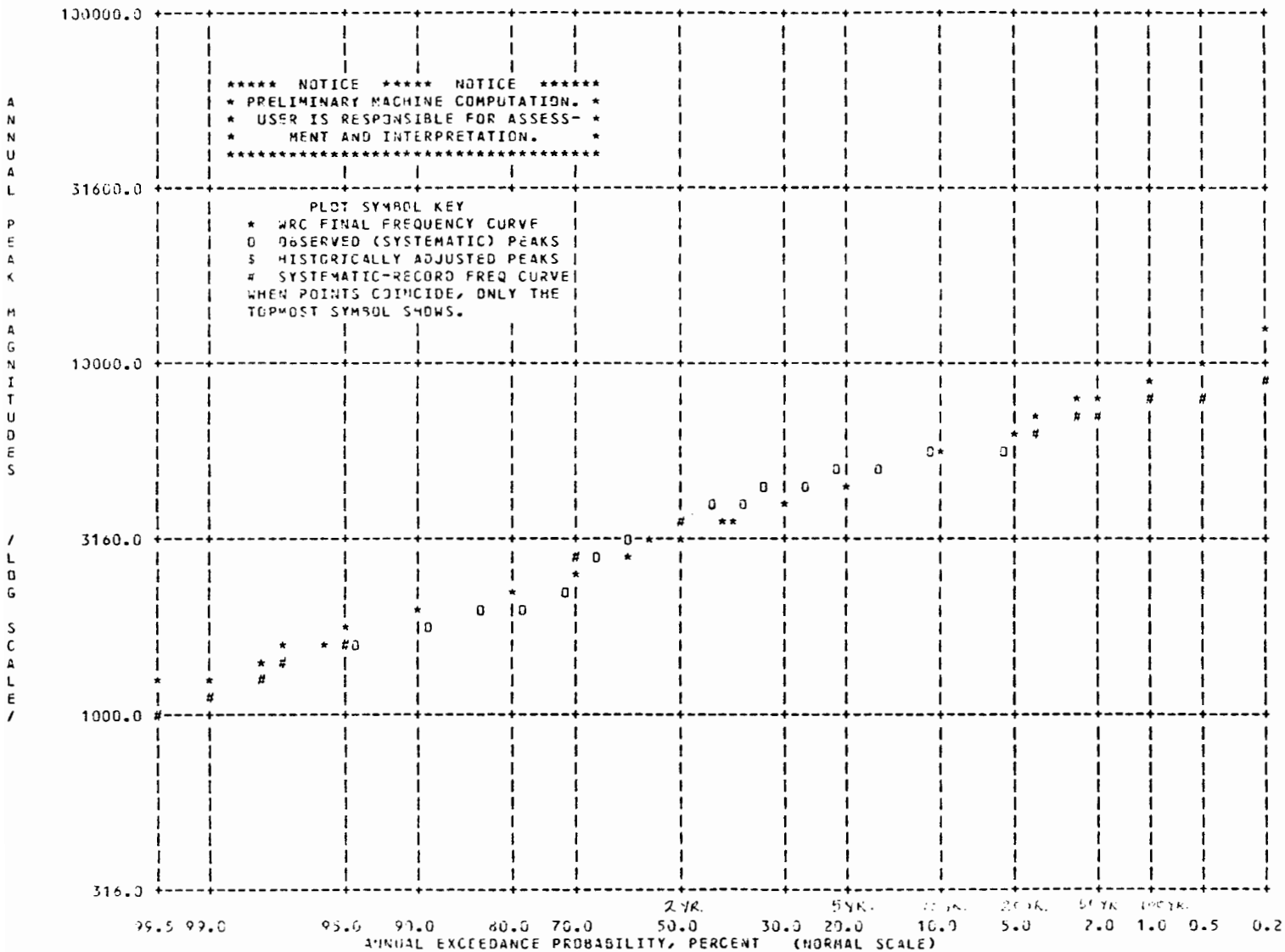
ANNUAL EXCEEDANCE PROBABILITY	W R C ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR W R C ESTIMATES LOWER	UPPER
0.9950	1218.2	990.1	1047.6	776.3	1571.9
0.9900	1328.6	1130.1	1173.8	874.1	1708.8
0.9500	1697.9	1596.7	1601.8	1217.9	2096.1
0.9000	1945.0	1902.0	1864.6	1459.3	2355.7
0.8000	2303.9	2331.2	2253.2	1814.4	2740.8
0.5000	3233.1	3356.4	3233.1	2715.4	3839.5
0.2000	4628.0	4673.1	4748.5	3892.8	5864.0
0.1000	5627.7	5488.5	5925.2	4635.8	7548.9
0.0400	6975.7	6455.8	7584.2	5564.3	10054.3
0.0200	8041.2	7134.3	9075.5	6256.8	12194.1
0.0100	9159.0	7779.9	10908.8	6960.2	14572.2
0.0050	10337.8	8399.5	12896.0	7675.8	17214.3
0.0020	12001.1	9186.0	16741.5	8651.6	21157.8

PGM J407 VER 3.7
(REV 11/5/81)

U. S. GEOLOGICAL SURVEY
ANNUAL PEAK FLOW FREQUENCY ANALYSIS
FOLLOWING WRC GUIDELINES BULL. 17-B.

BILL PETRIK
RUN-DATE 9/11/90 AT 1731 SEQ 1.0001

STATION - 15896700 /USGS PUTULIGAYUK R NR DEADHORSE AK 1970-1989 15896700 /USGS



STATION 15596700 PUTULIGAYUK R NR DEADHORSE AK

AGENCY: USGS
STATE: 02
COUNTY: 040
DISTRICT: 02

STATION LOCATOR
LAT. LONG.
701605 1483741

DRAINAGE AREA: 176.00 SQ MI
CONTRIBUTING
DRAINAGE AREA: SQ MI
GAGE DATUM:
BASE DISCHARGE:

WATER YEAR	DATE	PEAK DISCHARGE (CFS)	DISCHARGE CODES	GAGE HEIGHT (FT)	GAGE HT CODES	HIGHEST SINCE	MAX GAGE HEIGHT (FT)	DATE	GAGE HT CODES	NUMBER OF PARTIAL PEAKS
1970	06/07/70	1900.20		21.25	3					0
1971	06/06/71	4930.00		24.50	3					0
1972	06/13/72	4501.00	2	22.25	1					0
1973	06/09/73	4000.00	2				24.00	06/05/73	1	0
1975	06/14/75	2080.00		20.55	1					0
1976	06/17/76	3130.00		19.85						0
1977	06/10/77	1900.00					22.36	06/05/77	1	0
1978	06/11/78	4430.00		21.43						0
1980	06/12/80	5800.00		22.60						0
1982	06/14/82	2290.00		15.82						0
1983	06/05/83	3130.00		19.85	2		20.35	06/05/83	1	0
1984	06/10/84	1640.00		18.20						0
1985	06/02/85	2360.00		19.60	2		22.21	06/02/85	1	0
1986	06/17/86	5440.00		21.84	2		21.99	06/16/86	1	0
1987	06/13/87	3120.00		19.84						0
1988	06/14/88	3960.00		20.66						0
1989	06/11/89	4950.00		21.49						0

END OF PROGRAM J330.