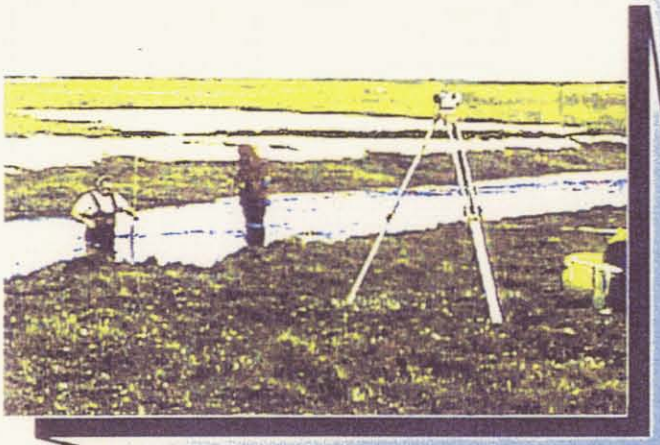
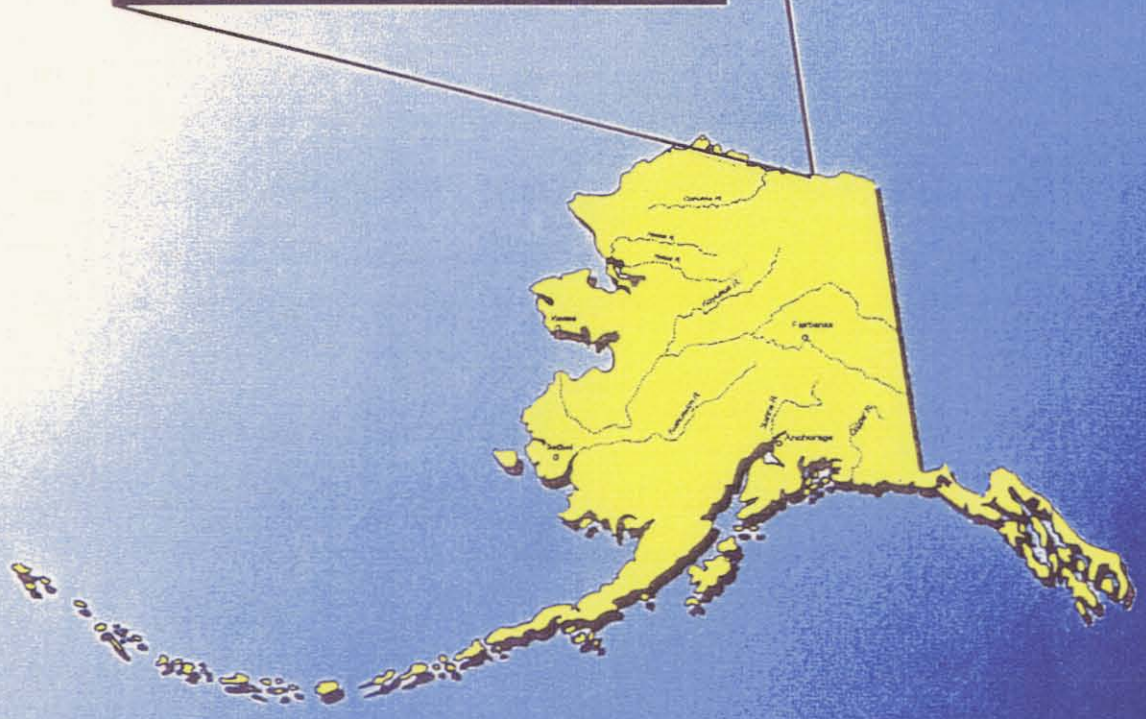
1998 SPRING BREAKUP AND HYDROLOGIC ASSESSMENT

SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA





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1.0 INTRODUCTION

This data report summarizes the observations and measurements made during the 1998 spring breakup at streams along the proposed pipeline route (Figure B-1, Appendix B). The purpose of the project was to collect baseline hydrologic and hydraulic data that could be used for pipeline design and environmental assessment. The field work was conducted between 21 May and 12 June 1998.

As shown on the Location Map (Figure B-1, Appendix B), the project is located east of Deadhorse, between the Staines River and Badami Camp, on the North Slope of Alaska. At the beginning of the field effort, the project was still in the conceptual stages of design. At that time, the project was expected to consist of an export pipeline between approximately the Point Thompson West site and Badami Camp. Infield pipelines and a road were expected to connect the Sourdough #3 site, the North Staines River #1 site and the Point Thompson Unit #3 site with the Point Thompson West site.

Prior to the field work, a review was made of the available maps and aerial photographs in order to identify streams crossing the proposed pipelines. Once the field crew arrived on site, the streams were assessed as to their significance with regard to pipeline design, and placed into one of two categories. Category I streams are minor streams having poorly defined channels and drainage areas, while Category II streams have definable channels and drainage areas. The information collected differed between the two categories of streams. At Category I streams the information collected generally included visual estimates of the:

(1) width of the flow at the 1998 peak water surface elevation,
(2) maximum depth of water at the 1998 peak water surface elevation, and
(3) mid channel velocity at the 1998 peak water surface elevation.

At Category II streams the information collected generally included the information for Category I streams plus:

(1) the peak water surface elevation during the 1998 spring breakup at the proposed pipeline crossing and at one other cross section located either upstream or downstream from the proposed pipeline crossing;
(2) a discharge measurement made as close to the flood peak as possible, including water surface elevation measurements at both cross sections at the time of the discharge measurement;
(3) a survey of the two cross sections described in item 1 above, and the length of the thalweg between the two cross sections, based on (a) a three dimensional coordinate system and (b) a primary temporary bench mark (TBM) having an assumed elevation of 100.00 feet, an assumed Northing of 5,000 feet and an assumed Easting of 5,000 feet; and
(4) notes regarding the width of gravel in the stream bed at each cross section.

At selected Category II streams, bed material samples were collected and the gradation measured.

Proposed pipeline crossings of Category I streams include: PLX 05, PLX 13, PLX 14, PLX 18, PLX 19, PLX 20, PLX 20A, PLX 20B, PLX 21, and PLX 25. Proposed pipeline crossings of Category II streams include: PLX 01 (West Badami Creek), PLX 02 (Middle Badami Creek), PLX 03 (East Badami Creek), PLX 04, PLX 06, PLX 07, PLX 08, PLX 09, PLX 10, PLX 11, PLX 12, PLX 15, PLX 16, PLX 22, PLX 23, PLX 24, PLX 26, PLX 27, PLX 28, and PLX 29. The stream associated with proposed pipeline crossing PLX 17 was not identifiable in the field and was dropped from further consideration.

It should be noted that a survey of the proposed pipeline route had not been undertaken prior to the field work. Thus, the proposed pipeline crossings were located based on a

hand held global positioning system (GPS) and coordinates taken from the mapping available at the start of the project.

2.0 HYDROLOGIC OBSERVATIONS

2.1 General Hydrologic Observations

Watersheds within the project area range in size from approximately 1 to 90 square miles (Table 1). Several of the watersheds are without clearly defined boundaries or drainage channels, while other watersheds contain well-established stream channels. Typically, the watersheds over 10 square miles in size are long and narrow.

Stream channel characteristics range from shallow grass lined swales to incised channels with gravel beds. The maximum size of the gravel was generally less than 3 inches. Many of the streambeds are composed of a combination of grass and gravel.

2.2 1998 Spring Breakup

The 1998 spring snowmelt progressed from south to north during the early stages (Photo C-1), and then combined with a general melt 5 to 10 miles from the coast. The narrowness of many of the watersheds resulted in a short time of concentration and a rapid rise and recession in the water surface elevation.

The first observed indication of runoff occurred on the afternoon of 25 May 1998. Approximately 25 miles southeast of Badami, water was flowing over snow-filled channels in East Badami Creek (PLX 03), and the ponds were beginning to collect water. North of this area the ground was more than 90 percent snow covered with little evidence of saturation.

By mid-afternoon on 26 May 1998, the leading edge of the flow had moved 3 to 4 miles downstream. Within the next 24 hours most of the streams between Badami Camp and 12 miles east were flowing. From about 12 miles east at PLX 12 to 23 miles east of Badami Camp no flow was observed.

Streams west of PLX 12 were flowing mostly out of banks with channels 50 to 80 percent snow filled on the afternoon of 28 May 1998. East of PLX 12 similar conditions did not develop until 29 May.

Throughout the project area, the peak water surface elevation occurred between 29 and 31 May 1998. In general the streams with the larger watersheds crested earlier than those draining smaller areas. Dense snowdrifts located within the channels affected most of the crest elevations. Snow blockage was estimated to range from 10 to 80 percent.

As snowmelt progressed, and the rate of flow increased, the snow within the channels was rapidly cleared. In most cases the peak discharge probably occurred at a slightly lower stage (0 to 1 foot, about 0.4 feet on average) and shortly after the peak water surface elevation (usually within hours).

Snowmelt in the general vicinity of the project occurred rapidly. On 28 May it was estimated that the ground was 60 to 80 percent snow covered. On 29 May only an estimated 20 percent of the snow cover existed. By 1 June all of the streams were in recession. However, areas of indefinite channels and ponded or sheet flow had not started to recede by 1 June.

Although slush and snow floes were observed in the streams, no solid ice floes were observed.

1998 EVENT WAS PROBABLY ABOUT 2 YR EVENT.

Based on the 3 streams monitored by the USGS in the vicinity of Deadhorse and Pump Station 3, it appears that the 1998 spring breakup flood peak generally had a reoccurrence interval of 2 to 5 years. It is likely that the streams monitored for this project experienced floods with similar recurrence intervals.

EAST CR (DA = 43sm) 1998 Q_p = 530 cfs R.P. = 1.6 yrs
KUPARUK R (DA 3130 sm) 1998 Q_p = 3130 cfs R.P. = 2.3 yrs
NUNAVAIK CR (DA 2.8) 1998 Q_p = 25 cfs R.P. = 1.3 yrs
SAG R. TRIB (DA 12) 1998 Q_p = 85 cfs R.P. = 2.4 yrs

2.3 Pipeline Crossing Data

A summary of the data collected at each stream is presented in Table A-1 (Appendix A), and includes:

(1) the spring peak water surface elevation, velocity, width, depth, water surface slope, and date of occurrence;
(2) a preliminary estimate of the bankfull elevation, width, and depth;
(3) the width of the gravel bottom; a summary of the discharge measurement, where one was made; and
(4) a summary of other miscellaneous measurements, where such were made.

A summary of the locations and elevations of the temporary bench marks used in the survey is presented in Table A-2 (Appendix A).

A photograph showing the typical size of the gravel exposed in many of the channel bottoms is presented in Photo C-2 (Appendix C). Photographs of the typical vegetal conditions within the channels and along the floodplain are presented in Photos C-3 through C-5 (Appendix C).

Additional information concerning specific pipeline crossings is presented in the appendices. For Category I streams, photographs of the streams are presented. For Category II streams, plan and profiles of the survey data, bed material gradations where available, photographs, discharge measurements where available, and a summary of the survey data are presented. Discharge measurements were made on all Category II streams except PLX 01, PLX 02, PLX 23, PLX 26 and PLX 29. Bed material gradations are provided for streams PLX 03, PLX 06, PLX 09, PLX 15, PLX 16, PLX 24, and PLX 28. A description of the water surface elevations measured at times other than the peak water surface elevation or the discharge measurement, and the portion of the channel covered with gravel, are presented on the cross section plots.

The requirement for valve locations for the crude oil transmission pipeline is governed by the Code of Federal Regulations Part 195 (CFR 195), "Transportation of Hazardous Liquids by Pipeline". The regulations would cover the crossings labeled PLX01 through PLX22, based on the preliminary alignment used for this study. CFR 195.260 states :

195.260 Valves:location.
"A valve must be installed at each of the following locations: ...
(e) On each side of a water crossing that is more than 100 feet wide from high-water mark to high-water mark unless the Administrator finds in a particular case that valves are not justified."

The "high water mark" referenced in the above regulations is interpreted as being the "Bankfull" condition reported in this initial study. From Table A-1, it is clear that East Badami Creek is well over 100 feet at the preliminary crossing location and would require consideration of valving.

Four other crossings exceed a bankfull width of 100 feet directly at the proposed crossings – PLX07, PLX09, PLX16 and PLX22. However, all of these streams show a width of less than 100 feet at the "Other" cross sections reported in Table A-1. The data show that the bankfull width is variable for these streams, and pipeline reroutes can reduce the estimates of bankfull width to less than 100 feet at all of these crossings if required to show agreement with the stipulated language. In addition PLX22 is located close to the facility and the valve at facility discharge should suffice for this crossing in any case.

On the other hand, intermediate valves and/or other leak control measures along the alignment are prudent in any case. For planning purposes, valves or other leak control measures (e.g. vertical loops) are recommended to be included for design consideration at PLX09 and PLX16, which are roughly the one-third points of the 22 mile pipeline from the planned CPF to the Badami facilities. These crossings are in addition to the East Badami Creek crossing. From photo PLX 07-1 as well as from the data in Table A-1, a minor reroute upstream will satisfy the stipulations at this location and should be included in further preliminary route descriptions.

2.4 Staines/Canning River Reconnaissance

A very brief reconnaissance of the Staines/Canning Rivers was made on 2 June 1998. The purpose of the reconnaissance was to look for signs that the west bank had been overtopped by floodwaters.

Between 19 and 16 miles upstream from the Sourdough #3 site, visual estimates of the bank height suggest that it ranges from approximately 50 to 8 feet. Within this reach the Canning River is confined to nearly a single channel with high banks.

Between 11 and 6 miles upstream from the Sourdough # 3 site, visual estimates suggest that the bank height ranges from approximately 12 to 3 feet. Within this reach, flood debris was estimated to lie 6 to 4 feet below the top of the bank.

Approximately 1 mile upstream from the Sourdough #3 site, visual estimates of the bank height suggest that it is about 5 feet high. Visual estimates also suggest that the ground rises approximately 5 feet between the top of the bank and the Sourdough # 3 site.

Throughout the reach of the Staines/Canning Rivers investigated, no flood debris was observed at the top of the west bank. However, it is rare to find evidence of a flood that is more than about 25 years old on the North Slope. Another complicating factor is the large areas of aufeis that form in the Staines/Canning Rivers. Therefore, in order to estimate the likelihood of a large flood (on the order of a 100- to 200-year flood) overtopping the west bank and contributing to flooding within the project area, it will probably be necessary to perform at least preliminary hydraulic computations. Ideally, data describing the extent and thickness of the icings would also be available at the time of the computations.

3.0 PIPELINE ALIGNMENT CONSIDERATIONS

The proposed pipeline crossings discussed in this report were selected prior to the field program, based on an office reconnaissance of the available maps and aerial photographs. While in the field, a brief assessment of the desirability of the proposed crossing locations was made. In considering the desirability of the proposed crossing locations, it was assumed that shifts of less than 100 feet would be better addressed during the pipeline route survey. Additionally, it was assumed that the pipeline would generally not be moved a great distance from the original location due to other alignment considerations. Based on these criteria, two of the proposed pipeline crossings were identified as candidates for a possible shift in location.

3.1 Pipeline Crossing PLX 01

The proposed crossing at PLX 01 is located about 1200 feet upstream from the road that connects the Badami airstrip with the Badami Camp. At the peak water surface elevation of the 1998 spring breakup flood, the water surface was 460 feet wide at the proposed crossing. The right bank is relatively low. It was about 2 feet under water at the peak of the 1998 spring breakup flood. The right floodplain also contains a pond that is 240 feet wide, in the direction of the crossing.

Approximately 400 feet upstream from the proposed pipeline crossing the channel has higher banks and the flow area is more uniformly distributed. Thus, consideration should probably be given to moving the pipeline crossing upstream.

3.2 Pipeline Crossing PLX 28

At the proposed PLX 28 crossing, the channel is wide and shallow. At the peak of the 1998 spring breakup flood the water surface width was 284 feet. A 66-foot wide flat bench forms part of the left floodplain, while the main channel has a width of 115 feet.

Upstream from the proposed pipeline crossing, approximately 200 to 500 feet, the banks are higher and the water surface width at the peak of the 1998 spring breakup flood was

narrower. Thus, consideration should probably be given to moving the pipeline crossing to this reach of the river.

Another possibility is to eliminate the PLX 28 crossing. If the pipeline coming into the PLX 28 crossing were routed to the PLX 29 crossing and joined to the pipeline at PLX 29, approximately 2200 feet of pipeline would be eliminated. Alternatively, the pipeline coming into PLX 29 could be routed to a location 200 to 500 feet upstream from the present PLX 28 pipeline and joined to the PLX 28 pipeline at that location. This option would also eliminate approximately 2200 feet of pipeline.

APPENDIX A: SUMMARY TABLES

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Table A-1: Summary Of Selected Hydrologic Parameters

Stream Crossing Designation	West Badami Cr. PLX 01	Middle Badami Cr. PLX 02	East Badami Cr. PLX 03	PLX 04	PLX 05	PLX 06
Drainage Area (sm)	40.3	31.5	88.7	7.49		23.8
1998 Spring Peak Stage						
At Proposed Crossing						
Date	5/29/98	5/29/98	5/29/98	5/29/98	5/29/98	5/29/98
Water Surface Elev. (ft) (25)	97.78	101.87	99.59	99.35		98.61
Velocity (fps)	< 2.0	< 2.0	≥ 5.0	< 2.5	< 2.0	
Surface Width (ft)	459	358	276	200	12	335
Max Depth (ft)	8.6	10.9	6.0	4.0	2.5	5.8
Water Surface Slope (ft/ft)	0.0009	0.0005	0.0009	0.0017		0.0023
See Notes	1, 7, 23	2, 23, 31	3	5		4
Approximate Bankfull Conditions						
At Proposed Crossing						
Elevation (ft) (25)	94.0	94.5	98.8	97.2		96.5
Surface Width (ft)	58	45	220	58	12	56
Max Depth (ft)	4.8	3.6	5.2	1.8	2.5	3.7
Gravel Bed Width (ft)	30	4	143	36	0	12
See Notes						
At Other X-Sec						
Location	2002 u/s	1132 d/s	1387 u/s	337 u/s		897 u/s
Elevation (ft) (25)	97.4	82.2	99.0	98.2		98.0
Surface Width (ft)	91	56	330	41		66
Max Depth (ft)	3.6	4.2	3.0	3.4		3.2
Gravel Bed Width (ft)	56	13	301	14		24
See Notes		31				
Discharge Measurement						
Date			6/1/98	5/30/98		6/1/98
Water Surface Elev. (ft) (25)			96.71	98.28		96.50
Discharge (cfs)			596	225		207
Average Velocity (fps)			1.94	1.63		2.47
Max Mean Velocity In Any Vertical			2.87	3.31		3.31
Surface Width (ft)			143	132		56.0
Max Depth (ft)			3.2	2.7		3.4
Water Surface Slope (ft/ft)			0.0007	0.0028		0.0023
See Notes			19			19
Miscellaneous Observations At Proposed Crossing						
Date	5/30/98	5/30/98	6/1/98			
Water Surface Elev. (ft) (25)	97.16	100.14	96.71			
Water Surface Slope (ft/ft)	0.0007	0.0009	0.0011			
Water Depth (ft) max			3.2			
Velocity (fps)			1.94			
See Notes	19	19	19			

Table A-1: Summary Of Selected Hydrologic Parameters (continued)

Stream Crossing Designation	PLX 07	PLX 08	PLX 09	PLX 10	PLX 11	PLX 12
Drainage Area (sm)	3.46	1.35	41.4	11.3	4.87	13.2
1998 Spring Peak Stage						
At Proposed Crossing						
Date	5/29/98	5/29/98	5/29/98	5/29/98	5/29/98	5/29/98
Water Surface Elev. (ft) (25)	99.04	99.06	99.34	98.84	98.59	99.13
Velocity (fps)			>5	> 3	> 1	> 3
Surface Width (ft)	168	80	290	~440	~304	202
Max Depth (ft)	5.2	1.6	5.3	5.2	4.2	5.9
Water Surface Slope (ft/ft)	0.0004	0.0033	0.0003	0.0021	0.0022	0.0018
See Notes	5	5	4	6	5, 22, 23	4
Approximate Bankfull Conditions						
At Proposed Crossing						
Elevation (ft) (25)	98.2	98.7	98.0	97.0	97.1	96.3
Surface Width (ft)	107	74	145	89	57	66
Max Depth (ft)	4.3	1.4	4.0	3.4	2.7	3.1
Gravel Bed Width (ft)	5 & 28	0	16	5	13	53
See Notes	21					
At Other X-Sec						
Location	747 u/s	391 u/s	1027 u/s	800 u/s	507 u/s	560 d/s
Elevation (ft) (25)	98.1	99.8	99.0	98.8	98.2	95.2
Surface Width (ft)	93	40	85	54	35	66
Max Depth (ft)	3.6	1.5	4.7	2.2	4.5	2.8
Gravel Bed Width (ft)	4	0	18	10	11	45
See Notes						
Discharge Measurement						
Date	6/1/98	6/1/98	5/30/98	6/1/98	6/1/98	6/1/98
Water Surface Elev. (ft) (25)	95.62	98.24	96.85	97.03	97.56	97.00
Discharge (cfs)	82.3	13.0	~600	176	65.2	245
Average Velocity (fps)	2.00	0.93	~3.9	2.30	0.98	1.73
Max Mean Velocity In Any Vertical	3.28	1.06	~5.5	4.28	2.22	2.25
Surface Width (ft)	52.0	23	~97	73	64.0	93.0
Max Depth (ft)	1.3	0.90	2.3	2.2	3.0	3.0
Water Surface Slope (ft/ft)	0.0026	0.0047	0.0018	0.0023	0.0027	0.0015
See Notes		29	20,22,26	19	19	19
Miscellaneous Observations At Proposed Crossing						
Date	6/1/98					
Water Surface Elev. (ft) (25)	95.59					
Water Surface Slope (ft/ft)	0.0027					
Water Depth (ft) max						
Velocity (fps)						
See Notes	19					

Table A-1: Summary Of Selected Hydrologic Parameters (continued)

	I	I	II	II		I
Stream Crossing Designation	PLX 13	PLX 14	PLX 15	PLX 16	PLX 17	PLX 18
Drainage Area (sm)	6.82		5.41	32.1		1.75
1998 Spring Peak Stage						
At Proposed Crossing						
Date	5/30,31	5/30,31	5/29/98	5/29/98		5/30,31
Water Surface Elev. (ft) (25)			98.96	97.53		
Velocity (fps)	≤1.5	≤ 1.0	> 3.5	> 5.0		
Surface Width (ft)	≤ 800	≤30	243	101		≤ 90
Max Depth (ft)	≤1.5	≤1.5	6.6	3.2		≤1.1
Water Surface Slope (ft/ft)			0.0022	0.0014		≤1.0
See Notes		13	4, 22	9	14	15
Approximate Bankfull Conditions						
At Proposed Crossing						
Elevation (ft) (25)			97.6	98.4		
Surface Width (ft)			51	111		
Max Depth (ft)			5.2	4.1		
Gravel Bed Width (ft)			13	18		
See Notes						
At Other X-Sec						
Location			403 d/s	1211 u/s		
Elevation (ft) (25)			98.0	97.1		
Surface Width (ft)			56.0	93		
Max Depth (ft)			2.4	4.1		
Gravel Bed Width (ft)			16	19		
See Notes						
Discharge Measurement						
Date			6/3/98	5/30/98		
Water Surface Elev. (ft) (25)			95.92	96.64		
Discharge (cfs)			48.8	~254		
Average Velocity (fps)			1.07	~4.1		
Max Mean Velocity In Any Vertical			1.34	~5		
Surface Width (ft)			27.0	38.0		
Max Depth (ft)			3.5	~2.6		
Water Surface Slope (ft/ft)			0.0016	0.0019		
See Notes				3, 20		
Miscellaneous Observations At Proposed Crossing						
Date			6/1/98			6/3/98
Water Surface Elev. (ft) (25)			96.69			
Water Surface Slope (ft/ft)			0.0021			
Water Depth (ft) max						1.1
Velocity (fps)						0.7 (s)
See Notes						24

Table A-1: Summary Of Selected Hydrologic Parameters (continued)

Stream Crossing Designation	I PLX 19	I PLX 20	I PLX 20A	I PLX 20B	I PLX 21	II PLX 22
Drainage Area (sm)		3.29			8.24	3.00
1998 Spring Peak Stage						
At Proposed Crossing						
Date		5/30,31	5/30,31	5/30,31	5/30,31	5/29/98
Water Surface Elev. (ft) (25)						97.87
Velocity (fps)	≤ 2.5	≤ 2.0	≤ 1.5	< 1.0	≤ 1.5	< 2.5
Surface Width (ft)	≤ 200	~200	~800	≤ 30	≤ 30	~204
Max Depth (ft)	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.0	≤ 1.5	5.5
Water Surface Slope (ft/ft)						0.0017
See Notes	16	17	17	18	18	10, 22
Approximate Bankfull Conditions						
At Proposed Crossing						
Elevation (ft) (25)						96.0
Surface Width (ft)				6	≤ 30	104
Max Depth (ft)				0.5	≤ 1.0	3.6
Gravel Bed Width (ft)				0	0	13
See Notes						
At Other X-Sec						
Location						736 d/s
Elevation (ft) (25)						96.0
Surface Width (ft)						46
Max Depth (ft)						2.5
Gravel Bed Width (ft)						11
See Notes						
Discharge Measurement						
Date						5/31/98
Water Surface Elev. (ft) (25)						96.64
Discharge (cfs)						117
Average Velocity (fps)						1.36
Max Mean Velocity In Any Vertical						2.2
Surface Width (ft)						78.0
Max Depth (ft)						2.7
Water Surface Slope (ft/ft)						0.0016
See Notes						19
Miscellaneous Observations At Proposed Crossing						
Date	6/3/98	6/3/98	6/3/98	6/3/98		
Water Surface Elev. (ft) (25)						
Water Surface Slope (ft/ft)						
Water Depth (ft) max	0.7	0.5	0.7	0.5	0.8	
Velocity (fps)	2.2 (s)	1.38 (s)	1.3 (s)	0.35 (s)	1.03 (s)	
See Notes	24	24	24	24	24	

Table A-1: Summary Of Selected Hydrologic Parameters (continued)

Stream Crossing Designation	II PLX 23	II PLX 24	I PLX 25	II PLX 26	II PLX 27	II PLX 28
Drainage Area (sm)		12.9			1.61	18.0
1998 Spring Peak Stage						
At Proposed Crossing						
Date	5/29,30	5/29/98	5/29/,5/30	5/29/98	5/30/98	5/29/98
Water Surface Elev. (ft) (25)	96.07	95.96		97.36	93.08	97.00
Velocity (fps)	< 2.5	< 3.0	≤ 1.5	< 2	< 3	3.5
Surface Width (ft)	60	202	~250	260	101	284
Max Depth (ft)	2.0	7.8	≤ 1.5	3.9	2.8	5.5
Water Surface Slope (ft/ft)	0.0025	0.0009		0.0027	0.0043	0.0008
See Notes	10	6, 23	13,14,22	6	7	12, 23
Approximate Bankfull Conditions						
At Proposed Crossing						
Elevation (ft) (25)	96.1	94.7		96.4	92.3	94.6
Surface Width (ft)	60	101		68	79	125
Max Depth (ft)	2.0	6.5		2.9	2.0	3.1
Gravel Bed Width (ft)	6	60		0	64	114
See Notes				18		
At Other X-Sec						
Location	583 u/s	334 u/s		717 u/s	984 u/s	512 u/s
Elevation (ft) (25)	97.6	94.8		98.2	92.3	96.0
Surface Width (ft)	39	109		46	41	70
Max Depth (ft)	2.0	5.7		4.4	3.2	5.6
Gravel Bed Width (ft)	0	18		26	18	27
See Notes						
Discharge Measurement						
Date		5/31/98			5/31/98	5/31/98
Water Surface Elev. (ft) (25)		91.35			92.88	96.31
Discharge (cfs)		271			80.6	391
Average Velocity (fps)		2.86			1.71	3.31
Max Mean Velocity In Any Vertical		3.89			2.44	5.08
Surface Width (ft)		74.0			37	74.4
Max Depth (ft)		2.7			2.4	2.4
Water Surface Slope (ft/ft)		0.0021			0.0011	0.0015
See Notes		8			19,30	27, 32
Miscellaneous Observations At Proposed Crossing						
Date	5/31/98		6/4/98	5/31/98		
Water Surface Elev. (ft) (25)	95.78			95.06		
Water Surface Slope (ft/ft)	0.0024			0.0020		
Water Depth (ft) max			0.5			
Velocity (fps)	< 2.5			< 2.0		
See Notes				19		

Table A-1: Summary Of Selected Hydrologic Parameters (continued)

Stream Crossing Designation	PLX 29
Drainage Area (sm)	17.7
1998 Spring Peak Stage	
At Proposed Crossing	
Date	5/29/98
Water Surface Elev. (ft) (25)	96.93
Velocity (fps)	
Surface Width (ft)	210
Max Depth (ft)	9.5
Water Surface Slope (ft/ft)	0.0014
See Notes	11, 23
Approximate Bankfull Conditions	
At Proposed Crossing	
Elevation (ft) (25)	93.6
Surface Width (ft)	49
Max Depth (ft)	6.2
Gravel Bed Width (ft)	25
See Notes	
At Other X-Sec	
Location	
Elevation (ft) (25)	
Surface Width (ft)	
Max Depth (ft)	
Gravel Bed Width (ft)	
See Notes	
Discharge Measurement	
Date	
Water Surface Elev. (ft) (25)	
Discharge (cfs)	
Average Velocity (fps)	
Max Mean Velocity In Any Vertical	
Surface Width (ft)	
Max Depth (ft)	
Water Surface Slope (ft/ft)	
See Notes	
Miscellaneous Observations At Proposed Crossing	
Date	6/3/98
Water Surface Elev. (ft) (25)	90.00
Water Surface Slope (ft/ft)	0.0020
Water Depth (ft) max	
Velocity (fps)	
See Notes	

Table A-1: Summary Of Selected Hydrologic Parameters (continued)

Notes:

1. The downstream culvert was 80 percent plugged by snow.
2. Channel was approximately 30 percent blocked by snow at the time of the event.
3. Channel was approximately 10 percent blocked by snow at the time of the event.
4. Channel was approximately 10 - 20 percent blocked by snow at the time of the event.
5. Channel was approximately 20 - 30 percent blocked by snow at the time of the event.
6. Channel was approximately 10 - 30 percent blocked by snow at the time of the event.
7. Channel was approximately 30 - 50 percent blocked by snow at the time of the event.
8. Channel was less than 10 percent blocked by snow at the time of the event.
9. Channel was approximately 20 percent blocked by snow at the time of the event.
10. Channel was less than 20 percent blocked by snow at the time of the event.
11. Channel was approximately 30 percent blocked by snow at the time of the event.
12. Channel was approximately 50 percent blocked by snow at the time of the event.
13. There were numerous small channels at this location.
14. There was no definable drainage at this location.
15. There was a broad area of sheet flow at this location.
16. The water at this site was flowing in numerous small polygon troughs.
17. This stream channel was broad and flat.
18. This channel was grass lined.
19. The channel was clear of snow at the time of this event.
20. Discharge was partially measured and partially estimated.
21. There are two gravel channels at this location.
22. Width was partially measured and partially estimated.
23. The water was flowing on the top of the snow, and the water depth represents the depth of the water and the depth of the snow to the bottom of the channel.
24. An "(s)" next to the velocity means the velocity is a surface velocity.
25. Elevation is based on an arbitrary elevation at a single temporary bench mark established at each crossing.
26. Velocity was partially measured and partially estimated.
27. There was snow in the channel at the time the discharge measurement was made.
28. The values presented in this table are preliminary and subject to revision at the time the 1998 spring breakup report is prepared.
29. This discharge made 60 feet upstream from pipeline crossing.
30. This discharge measurement made at upstream cross section.
31. Water surface elevations, widths and depths are provisional and subject to verification of the survey data.
32. This discharge measurement was made 500 feet upstream from the upstream cross section.

file: table1a.xls

Table A-2: TEMPORARY BENCH MARK LOCATIONS

Stream	Latitude	Longitude	Elevation (ft)	Description	Survey Point Number
PLX 01	N 70° 08' 02.4"	W 147° 03' 29.7"	100.00	Primary Temporary Bench Mark for PLX 01 and PLX 02 (TBM1A)	1
			100.36	Temporary Bench Mark (TBM1B)	2
			97.30	Temporary Bench Mark (TBM 1C)	178
PLX 02	N 70° 08' 02.4"	W 147° 03' 29.7"	100.00	Primary Temporary Bench Mark for PLX 01 and PLX 02 (TBM1A)	1
	N 70° 07' 57.7"	W 147° 02' 29.8"	98.76	Temporary Bench Mark (TBM2A)	53
			95.61	Temporary Bench Mark (TBM2B)	222
PLX 03	N 70° 08' 22.2"	W 146° 59' 58.9"	100.00	Primary Temporary Bench Mark (TBM3A)	1
	N 70° 08' 10.6"	W 146° 59' 59.5"	105.59	Temporary Bench Mark (TBM3B)	2
PLX 04	N 70° 08' 24.7"	W 146° 56' 39.4"	100.00	Primary Temporary Bench Mark (TBM4A)	1
	N 70° 08' 23.0"	W 146 ° 56' 26.8"	99.26	Temporary Bench Mark (TBM4B)	18
	N 70° 08' 25.9"	W 146 ° 56' 38.7"	99.53	Temporary Bench Mark (TBM4C)	2
PLX 06	N 70° 08' 53.7"	W 146° 52' 05.1"	100.00	Primary Temporary Bench Mark (TBM6A)	1
	N 70° 08' 47.9"	W 146° 51' 56.1"	101.45	Temporary Bench Mark (TBM6B)	2
PLX 07	N 70° 08' 57.2"	W 146° 50' 13.0"	100.00	Primary Temporary Bench Mark (TBM7A)	1
	N 70° 08' 55.0"	W 146° 50' 11.4"	99.10	Temporary Bench Mark (TBM7B)	2
	N 70° 09' 01.7"	W 146° 50' 08.4"	98.52	Temporary Bench Mark (TBM7C)	17
PLX 08	N 70° 09' 15.4"	W 146° 47' 48.6"	100.00	Primary Temporary Bench Mark (TBM8A)	1
	N 70° 09' 14.7"	W 146° 47' 45.5"	99.86	Temporary Bench Mark (TBM8B)	2
	N 70° 09' 15.4"	W 146° 47' 54.9"	99.85	Temporary Bench Mark (TBM8C)	13
PLX 09	N 70° 09' 17.5"	W 146° 45' 45.1"	100.00	Primary Temporary Bench Mark (TBM9A)	1
	N 70° 09' 16.2"	W 146° 45' 47.6"	98.10	Temporary Bench Mark (TBM9B)	80
	N 70° 09' 10.7"	W 146° 45' 23.7"	102.09	Temporary Bench Mark (TBM9C)	2
PLX 10	N 70° 09' 35.5"	W 146°41' 12.5"	100.00	Primary Temporary Bench Mark (TBM10A)	1
	N 70° 09' 32.9"	W 146° 41' 11.6"	99.54	Temporary Bench Mark (TBM10B)	18
	N 70° 09' 39.4"	W 146° 41' 13.8"	98.92	Temporary Bench Mark (TBM10C)	2

Table A-2: TEMPORARY BENCH MARK LOCATIONS (continued)

Stream	Latitude	Longitude	Elevation (ft)	Description	Survey Point Number
PLX 11	N 70° 09' 46.8"	W 146° 37' 51.0"	100.00	Primary Temporary Bench Mark (TBM11A)	1
	N 70° 09' 48.6"	W 146° 37' 47.1"	99.15	Temporary Bench Mark (TBM11B)	2
	N 70° 09' 44.4"	W 146° 37' 42.5"	99.20	Temporary Bench Mark (TBM11C)	76
PLX 12	N 70° 10' 10.1"	W 146° 35' 10.1"	100.00	Primary Temporary Bench Mark (TBM12A)	1
	N 70° 10' 09.3"	W 146° 35' 14.0"	94.64	Temporary Bench Mark (TBM12B)	2
	N 70° 10' 13.6"	W 146° 35' 09.0"	97.59	Temporary Bench Mark (TBM12C)	90
PLX 15	N 70° 10' 35.1"	W 146° 29' 54.8"	100.00	Primary Temporary Bench Mark (TBM15A)	1
	N 70° 10' 31.7"	W 146° 30" 00.0"	98.35	Temporary Bench Mark (TBM15B)	29
	N 70° 10' 36.1"	W 146° 29' 58.4"	98.58	Temporary Bench Mark (TBM15C)	2
PLX 16	N 70° 10' 25.7"	W 146° 26' 52.7"	100.00	Primary Temporary Bench Mark (TBM16A)	1
	N 70° 10' 20.4"	W 146° 26' 48.8"	101.08	Temporary Bench Mark (TBM16B)	2
PLX 22	N 70° 10' 06.2"	W 146° 17' 19.3"	100.00	Primary Temporary Bench Mark (TBM22A)	1
	N 70° 10' 09.9"	W 146° 17" 15.6"	98.25	Temporary Bench Mark (TBM22B)	2
	N 70° 10' 04.3'	W 146° 17' 19.0"	96.91	Temporary Bench Mark (TBM22C)	162
PLX 23	N 70° 09' 41.4"	W 146° 14' 50.4"	100.00	Primary Temporary Bench Mark for PLX 23 and PLX 24 (TBM24A)	1
	N 70° 09' 45.1"	W 146° 15' 20.5"	96.92	Temporary Bench Mark (TBM23A)	101
	N 70° 09' 46.9"	W 146° 15' 04.3"	95.53	Temporary Bench Mark (TBM23B)	175
PLX 24	N 70° 09' 41.4"	W 146° 14' 50.4"	100.00	Primary Temporary Bench Mark for PLX 23 and PLX 24 (TBM24A)	1
	N 70° 09' 40.2"	W 146° 14' 47.8"	95.56	Temporary Bench Mark (TBM24B)	78
	N 70° 09' 42.9"	W 146° 14' 43.2"	96.21	Temporary Bench Mark (TBM24C)	2
PLX 26	N 70° 09' 25.2"	W 146° 12' 26.1"	100.00	Primary Temporary Bench Mark (TBM26A)	1
	N 70° 09' 21.8"	W 146° 12' 21.5"	98.68	Temporary Bench Mark (TBM26B)	40
	N 70° 09' 27.8"	W 146° 12' 23.9"	97.82	Temporary Bench Mark (TBM26C)	2

(continued on next page)

Table A-2: TEMPORARY BENCH MARK LOCATIONS (continued)

Stream	Latitude	Longitude	Elevation (ft)	Description	Survey Point Number
PLX 27	N 70° 09' 02.9"	W 146° 09' 25.8"	100.00	Primary Temporary Bench Mark (TBM27A)	1
	N 70° 09' 06.2"	W 146° 09' 24.4"	100.23	Temporary Bench Mark (TBM27B)	36
	N 70° 08' 58.6"	W 146° 09' 38.9"	93.38	Temporary Bench Mark (TBM27C)	2
PLX 28	N 70° 08' 37.8"	W 146° 06' 46.3"	100.00	Primary Temporary Bench Mark (TBM28A)	1
	N 70° 08' 38.8"	W 146° 06' 39.4"	95.70	Temporary Bench Mark (TBM28B)	2
PLX 29	N 70° 08' 15.5"	W 146° 06' 57.3"	100.00	Primary Temporary Bench Mark (TBM29A)	1
	N 70° 08' 06.3"	W 146° 07' 10.7"	100.33	Temporary Bench Mark (TBM29B)	2

Note:

1. The primary temporary bench mark was assumed to have (1) an elevation of 100.00 feet, (2) a Northing of 5,000 feet, and (3) an Easting of 5,000 feet. The primary temporary bench mark at each stream provided the vertical and horizontal control for that stream.
2. The latitude and longitude are based on North American Datum 1927.
3. Temporary bench marks consist of a 0.5 inch diameter rebar driven into the ground.
4. The latitude and longitude were estimated with a Garmin II Plus hand held Global Positioning System.

file: tableA2.xls

APPENDIX B: LOCATION MAP

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N

APPROXIMATE SCALE (FEET)

0 10,000 20,000

Baker

MAGUIRE ISLANDS

CHALLENGE ENTRANCE

ALASKA ISLAND

CHALLENGE ISLAND

BUCKLES ISLAND

NORTH STAR ISLAND

MARY SACHS ENTRANCE

MIKKELSEN BAY

POINT THOMSON WEST

POINT THOMSON UNIT #2

PLX01 PLX02 PLX03 PLX04 PLX05 PLX06 PLX07 PLX08 PLX09 PLX10 PLX11 PLX12 PLX13 PLX14 PLX15 PLX16 PLX17 PLX18 PLX19 PLX20 PLX21 PLX22 PLX23 PLX24 PLX25 PLX26 PLX27 PLX28 PLX29

WEST BADAMI

MIDDLE BADAMI

EAST BADAMI

WEST STAINES STATE #2

NORTH STAINES RIVER STATE #1

STAINES RIVER STATE #1

SOURDOUGH 3

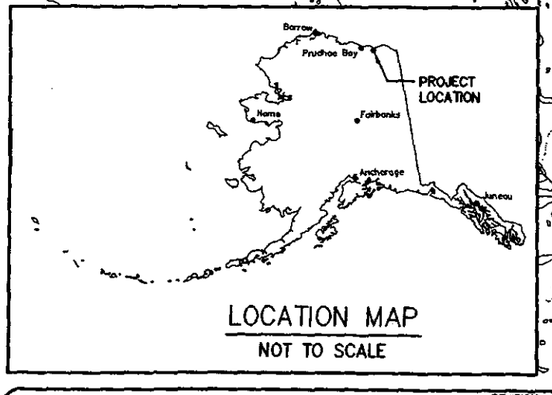
SOURDOUGH 2

STAINES RIVER

PT. THOMSON UNIT

YUKON GOLD 1

CANNING RIVER



LOCATION MAP

NOT TO SCALE

REVISION

NO.:	DATE:		BY:

PLAN VIEW

SOURDOUGH DEVELOPMENT PROJECT AREA
NORTH SLOPE, ALASKA

Baker Michael Baker Jr., Inc.

DATE:	7/29/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADPloc.dwg
CHECKED:	JWA	SCALE:	1"= 10,000'

FIGURE:

B-1

APPENDIX C: GENERAL PHOTOGRAPHS

TABLE OF CONTENTS

Photo C-1: The leading edge of the snowmelt run-off.

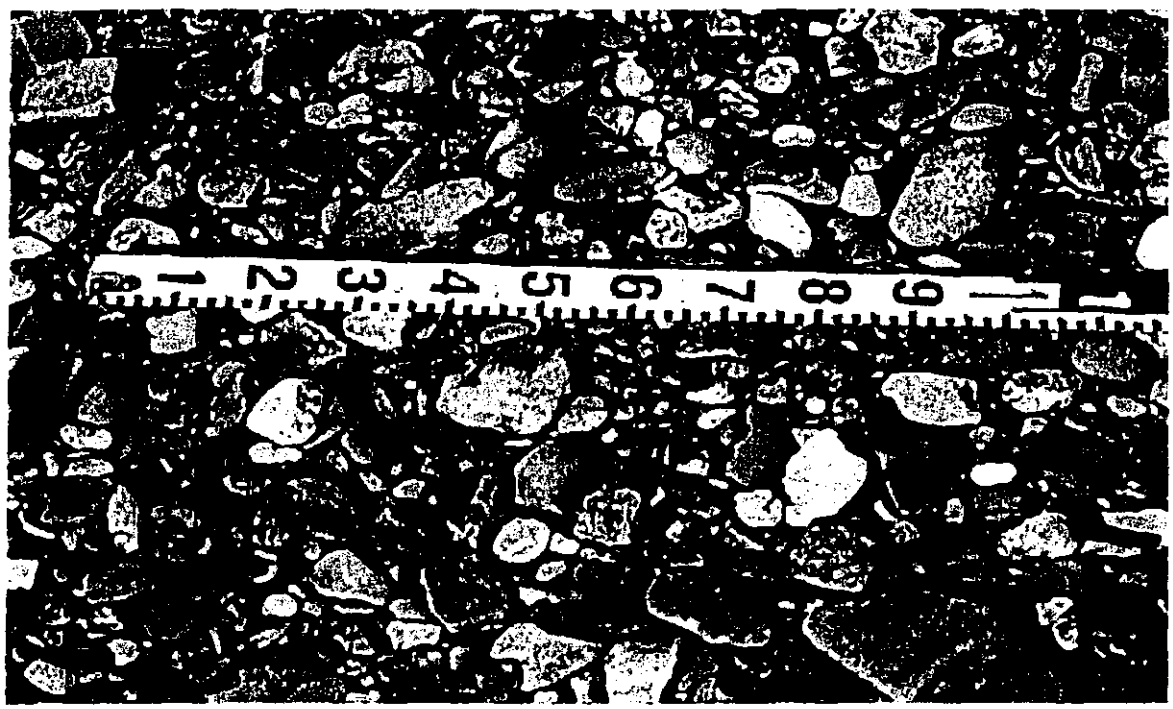


Photo C-2: Typical bed material within the gravel bed streams of this area.

APPENDIX C - TYPICAL PHOTOGRAPHS SOURDOUGH AREA DEVELOPMENT PROJECT NORTH SLOPE, ALASKA	Michael Baker Jr., Inc. Date: 6/7/98 | Project: 23247 Drawn: JDA | File: Appendix C Checked: JWA | Scale:	Photo Number: C-1

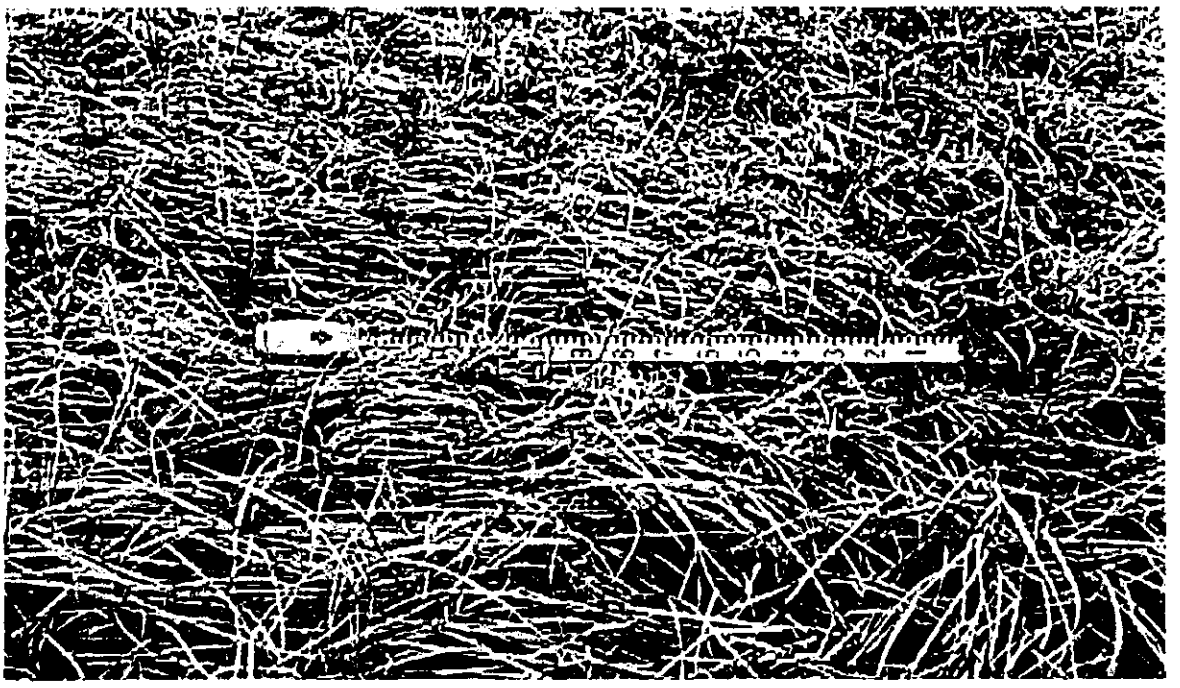


Photo C-3: Typical tundra vegetation.

Photo C-4: Typical vegetation in grass covered channel with low flow. Note that the grass is not laid down by the flow.

APPENDIX C - TYPICAL PHOTOGRAPHS SOURDOUGH AREA DEVELOPMENT PROJECT NORTH SLOPE, ALASKA	Michael Baker Jr., Inc.		Photo Number: C-2
	Date: 6/7/98	Project: 23247	
	Drawn: JDA	File: Appendix C	
	Checked: JWA	Scale:	

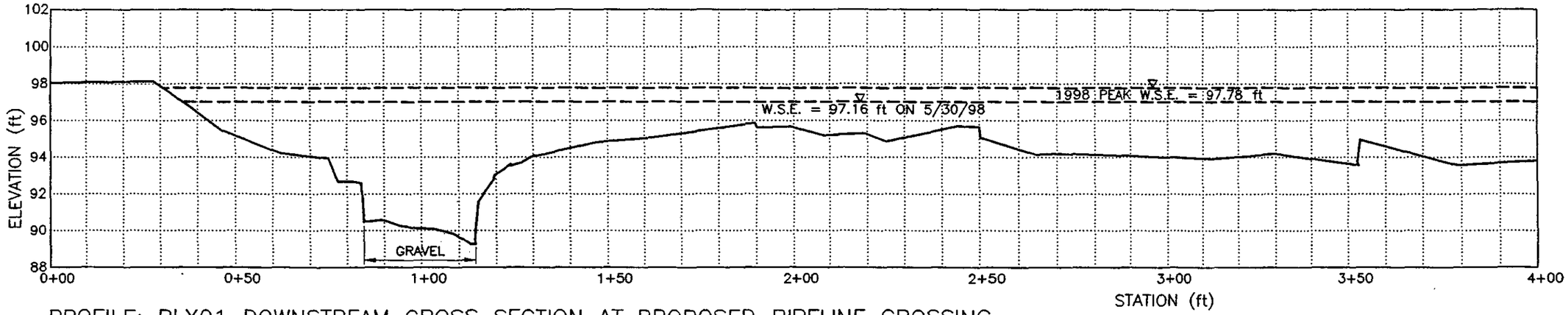
Photo C-5: Typical grass and gravel channel with medium flow. Note how the grass is laid down by the higher flow.

APPENDIX C - TYPICAL PHOTOGRAPHS SOURDOUGH AREA DEVELOPMENT PROJECT NORTH SLOPE, ALASKA	Michael Baker Jr., Inc.		Photo Number: C-3
	Date: 6/7/98	Project: 23247	
	Drawn: JDA	File: Appendix C	
	Checked: JWA	Scale:	

APPENDIX D: PLX 01

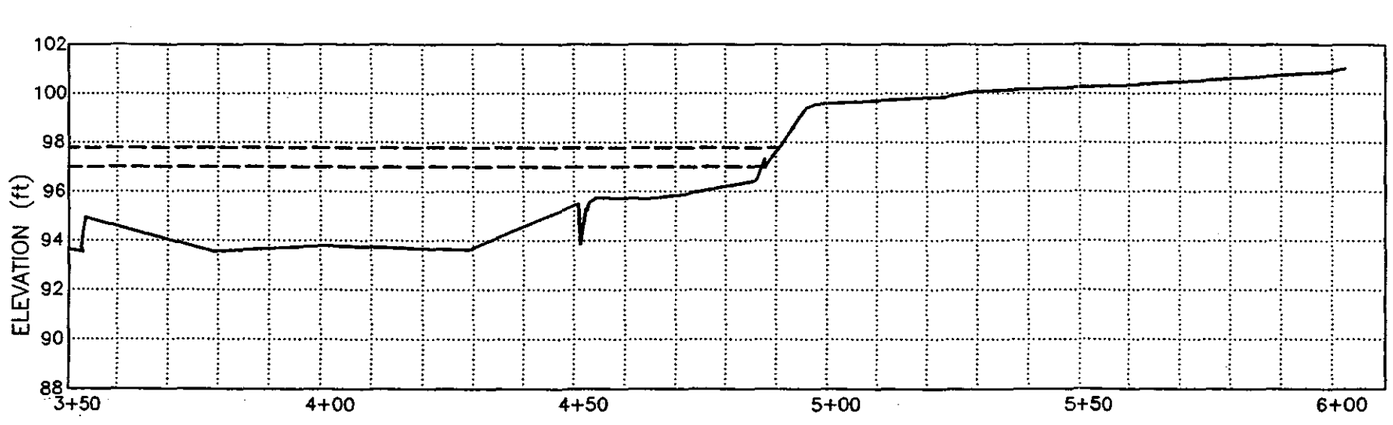
TABLE OF CONTENTS

Notes:
1. THE SURVEY DATA FOR PLX 02 CONTAINED IN TABLES PLX 01-1 AND PLX 01-3 ARE PROVISIONAL, SUBJECT TO VERIFICATION.



PROFILE: PLX01 DOWNSTREAM CROSS SECTION AT PROPOSED PIPELINE CROSSING
STATION 0+00 TO STATION 4+00

SCALE: H 1"= 30'
V 1"= 6'



PROFILE: PLX01 DOWNSTREAM CROSS SECTION AT PROPOSED PIPELINE CROSSING
STATION 3+50 TO STATION 6+10

SCALE: H 1"= 30'
V 1"= 6'

NOTES:
1. THE ELEVATIONS SHOWN ARE BASED ON AN ASSUMED ELEVATION OF 100.00 AT TBM1A.
2. W.S.E.= WATER SURFACE ELEVATION

REVISION			
NO.:	DATE:		BY:

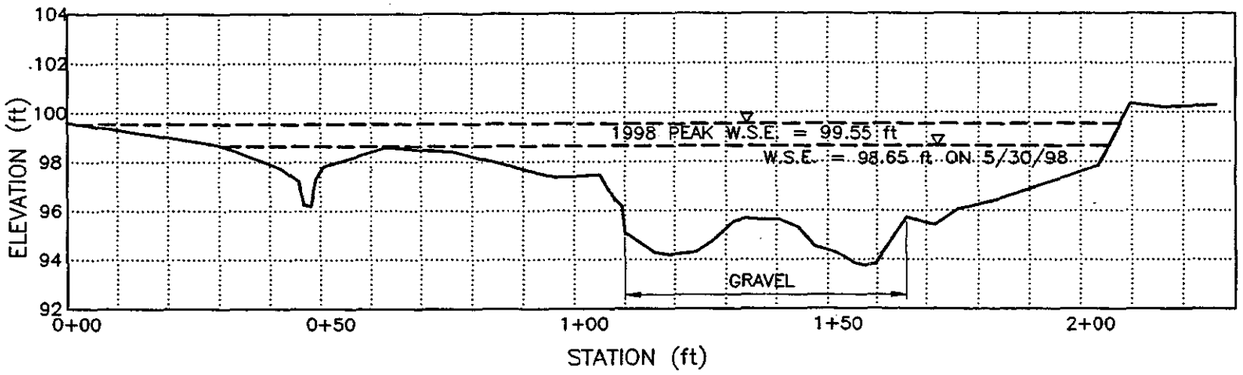
STREAM PLX01 – WEST BADAMI CREEK
PROFILE

SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

Baker Michael Baker Jr., Inc.

DATE:	8/3/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADP-X1
CHECKED:	JWA	SCALE:	VARIES

FIGURE: PLX 01-3



PROFILE: PLX01 UPSTREAM CROSS SECTION

SCALE: H 1"= 30'
V 1"= 6'

NOTES:
1. THE ELEVATIONS SHOWN ARE BASED ON AN ASSUMED ELEVATION OF 100.00 AT TBM1A.
2. W.S.E.= WATER SURFACE ELEVATION

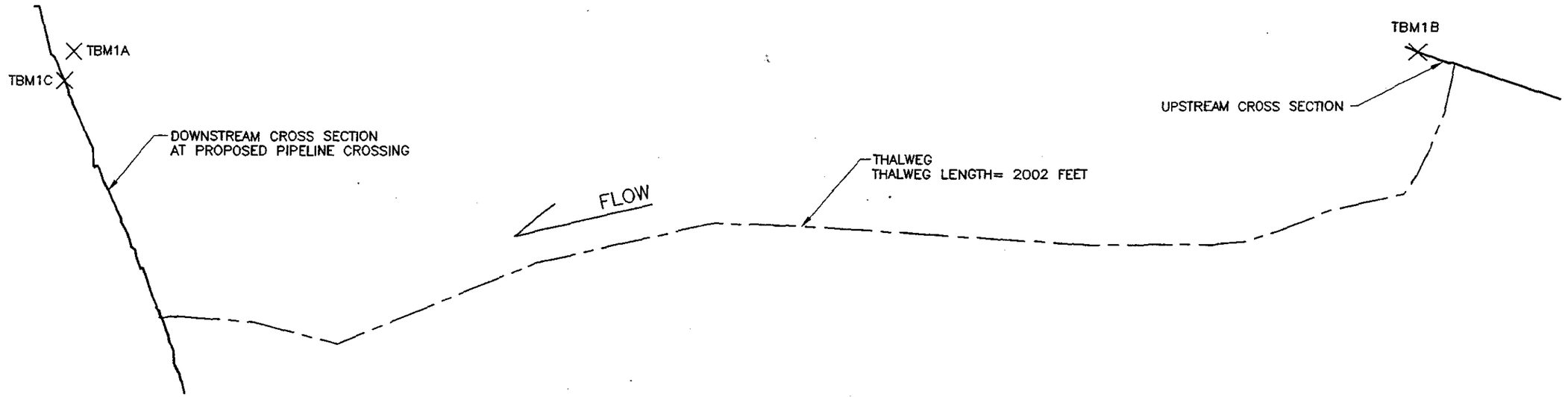
REVISION			
NO.:	DATE:		BY:

STREAM PLX01 – WEST BADAMI CREEK
PROFILE
SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

Baker Michael Baker Jr., Inc.

DATE:	8/3/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADP-X1
CHECKED:	JWA	SCALE:	VARIES

FIGURE: PLX 01-2



NOTES:
1. THE PRIMARY TEMPORARY BENCH MARK WAS ASSUMED TO HAVE: (1) AN ELEVATION OF 100.00 FEET, (2) A NORTHING OF 5000 FEET, AND (3) AN EASTING OF 5000 FEET. THE PRIMARY TEMPORARY BENCH MARK AT EACH STREAM PROVIDED THE VERTICAL AND HORIZONTAL CONTROL.
2. THE PRIMARY TEMPORARY BENCH MARK ON THIS STREAM IS TBM1A.

REVISION			
NO.:	DATE:		BY:

STREAM PLX01 – WEST BADAMI CREEK
PLAN

SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA.

Baker Michael Baker Jr., Inc.

DATE:	8/3/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADP-X1
CHECKED:	JWA	SCALE:	1"= 160'

FIGURE: PLX 01-1

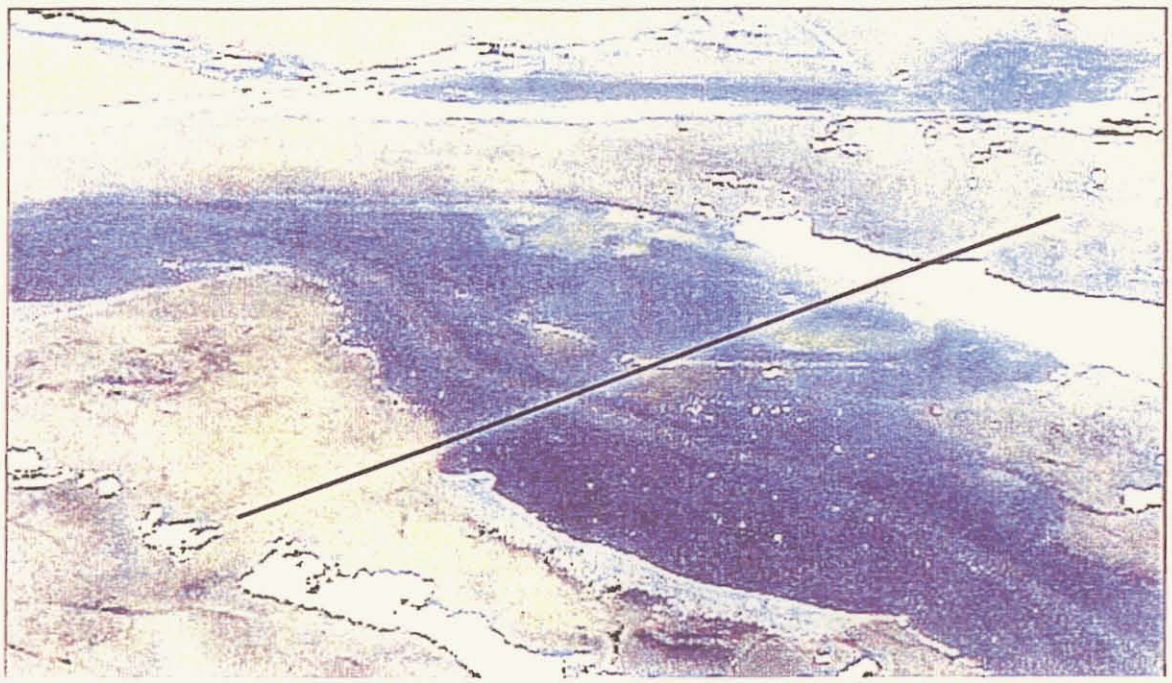


Photo PLX 01-1: Looking northeast at the proposed pipeline crossing (5/30/98).

Photo PLX 01-2: Looking downstream at the main channel of the proposed pipeline crossing (6/6/98).

STREAM PLX 01 PHOTOGRAPHS	
SOURDOUGH AREA DEVELOPMENT PROJECT NORTH SLOPE, ALASKA	
Baker Michael Baker Jr., Inc.	
Date: 6/7/98	Project: 23247
Drawn: JDA	File: photo01
Checked: JWA	Scale:
Photo Number:	PLX 01-1

Table PLX 01-1: Survey Data For PLX 01 And PLX 02

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
1	5000	5000	100	TBMP-01 (TBM1A)
2	5000	3095.01	100.36	CG-UPSTR (TBM1B)
50	5300.232984	5195.474763	99.38	P01-P02-TRAV
51	3899.835966	5299.795892	99.38	PK-CULVERT
52	4890.640407	5661.193955	98.76	PK-LITTLE-CULV.
53	6263.448502	5711.026862	98.76	CG-PO2-UPSTR (TBM2A)
100	5006.713798	3110.113077	100.283	T
101	5002.983794	3101.108912	100.201	T/SH
102	4997.473998	3089.423831	97.85	GB
103	4989.575679	3070.32216	96.405	REW
104	4986.855769	3064.094153	96.07	G
105	4985.733331	3059.97293	95.428	G
106	4983.662495	3054.143215	95.719	G/C
107	4984.122043	3047.540494	93.828	C
108	4982.435737	3043.234365	93.873	C
109	4981.020191	3039.90599	94.3	C
110	4980.093594	3036.072063	94.548	C
111	4978.400333	3033.321445	95.323	C
112	4977.10004	3029.607813	95.634	C
113	4976.020588	3026.236406	95.643	C
114	4974.921322	3023.268337	95.688	C
115	4973.7132	3021.233367	95.543	C
116	4972.675683	3017.286121	94.721	C
117	4971.690997	3014.485188	94.327	C
118	4970.991873	3011.975816	94.248	C
119	4970.178109	3009.266131	94.207	C
120	4969.166908	3006.358727	94.302	C
121	4968.310022	3003.895007	94.657	C
122	4967.322372	3000.834643	95.102	C/G
123	4967.238817	3000.118748	96.184	G
124	4966.836964	2998.954801	96.434	LEW
125	4965.829707	2996.24692	97.463	T
126	4962.944427	2987.907535	97.361	T
127	4956.243421	2969.181468	98.407	T
128	4951.753336	2956.269562	98.59	T
129	4947.779865	2944.843258	97.83	REW
130	4947.235933	2943.279101	97.287	G
131	4946.73462	2942.398183	96.213	G
132	4946.243338	2940.9906	96.256	G
133	4945.989042	2940.262011	97.202	G
134	4944.766729	2936.759935	97.745	LEW
135	4940.929881	2925.184924	98.688	T
136	4936.166431	2911.490125	99.145	T/HW
137	4931.099406	2896.92256	99.604	T
138	5025.951276	3035.235038	93.764	TH
139	4982.877492	3045.466065	93.925	TH

Table PLX 01-1: Survey Data For PLX 01 And PLX 02 (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
140	4953.929527	3050.932792	93.874	TH
141	4912.853444	3059.463398	93.837	TH
142	4858.830204	3080.314296	93.759	TH
143	4819.538686	3096.466742	94.172	TH
144	4791.832923	3113.588417	92.76	TH
145	4768.723912	3211.77967	92.829	TH
146	4737.889491	3289.483202	93.423	TH
147	4723.379248	3335.355051	92.619	TH
148	4718.046541	3388.401301	92.397	TH
149	4717.729952	3570.459449	91.287	TH
150	4732.717025	3742.284341	92.069	SB
151	4744.931049	3968.850216	89.148	TH
152	4748.405933	4098.707201	90.5	TH
153	4690.540218	4347.626322	90.359	TH
154	4573.74379	4629.406704	89.929	TH
155	4605.327681	4748.740818	88.489	TH
156	4613.248371	4864.89821	89.264	TH
157	4593.089585	4954.267791	89.426	TH
158	4611.260889	4879.138302	89.245	C/G
159	4616.204285	4880.113853	92.756	G
160	4620.566126	4881.779147	93.589	G
161	4623.456302	4882.519405	93.691	G
162	4626.479624	4884.038695	94.087	REW
163	4642.403111	4889.799028	94.817	T
164	4683.152032	4901.851833	95.85	TWET
165	4710.455651	4913.698365	95.286	TWET
166	4733.338758	4923.543115	95.701	TWET
167	4738.496784	4926.063664	95.658	LEW
168	4738.890486	4926.174978	95.045	G
169	4756.599283	4933.102251	94.19	M
170	4811.639333	4958.188748	94.196	M
171	4831.348939	4970.818379	93.74	M
172	4831.863525	4971.515726	94.939	ICE
173	4924.110369	5003.064626	95.51	ICE
174	4925.937548	5003.035797	95.243	M/G
175	4926.308443	5003.185228	95.545	G
176	4936.773334	5008.185217	95.707	REW
177	4957.42392	5014.202161	96.417	T/TOE
178	4959.1925	5014.791132	97.305	CREST.GA. (TBM1C)
179	4968.416994	5019.052087	99.567	SH
180	4992.521746	5028.237528	99.864	T
181	5065.562887	5057.255753	101.032	T
200	6245.658959	5664.886223	99.438	T
201	6261.131706	5705.026038	97.304	T
202	6275.141597	5738.291372	95.413	T

Table PLX 01-1: Survey Data For PLX 01 And PLX 02 (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
203	6279.073329	5751.40701	94.602	LEW
204	6280.617912	5755.398766	94.209	G
205	6282.585511	5760.182562	94.2	G
206	6283.602469	5762.794743	93.713	G
207	6284.605445	5765.371005	93.367	G
208	6285.575892	5767.729506	93.122	G
209	6286.519205	5770.346266	92.967	G
210	6287.298707	5773.043713	92.436	G
211	6288.435238	5774.093273	92.255	G
212	6289.381801	5776.468495	91.046	TH
213	6087.357761	5827.496541	90.123	TH
214	6022.326142	5816.967	90.508	TH
215	5847.733274	5627.650619	87.59	TH
216	5769.302631	5518.651647	90.212	TH
217	5688.440937	5484.067956	89.279	TH
218	5631.228723	5490.548408	88.878	TH
219	5508.792711	5551.376814	89.895	TH
220	5325.01729	5562.43127	88.362	TH/CS
221	5257.279931	5574.157918	87.616	TH
222	5319.443741	5527.283934	95.611	CGDS (TBM2B)
223	6322.375358	5864.585523	97.847	T
224	6308.639173	5828.790128	97.787	T
225	6298.225281	5801.737811	96.359	SH
226	6296.770449	5797.943062	95.451	T
227	6295.504677	5795.037232	94.648	REW
228	6294.862937	5793.355409	94.123	G
229	6293.680492	5790.256548	93.965	G
230	6292.114511	5786.152544	94.262	G
231	6290.508844	5781.944535	94.076	G
232	6289.614034	5779.599485	93.513	G
233	6289.163409	5778.418523	92.774	G
234	6288.660659	5777.502194	90.927	C
235	6288.78954	5777.598548	92.446	G/C
236	6346.210713	6237.443113	86.895	T
237	6340.681613	6211.442143	86.285	T
238	6334.786682	6180.262066	86.474	T/GB
239	6332.24634	6169.837834	84.85	T
240	6326.390834	6144.462389	83.99	T
241	6320.894826	6119.200192	83.546	T
242	6318.304234	6108.611855	82.561	T
243	6317.243315	6103.239523	82.333	T
244	6316.580207	6099.734617	82.197	REW
245	6315.971448	6096.814153	81.703	REW
246	6315.298771	6093.398708	81.144	G
247	6314.473663	6090.560863	80.538	G
248	6314.157597	6088.071484	79.148	G/C
249	6314.339761	6087.285385	78.406	TH/C

Table PLX 01-1: Survey Data For PLX 01 And PLX 02 (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
250	6311.714234	6075.452902	77.99	C/G
251	6310.774409	6073.485857	80.037	G
252	6310.394155	6072.004832	80.268	G
253	6310.27856	6070.70693	81.89	G
254	6309.940649	6068.043993	78.469	LEW
255	6308.726925	6062.582934	79.289	T
256	6307.758754	6059.330011	79.625	T
257	6307.239142	6057.121802	80.304	T
258	6305.731338	6049.086738	79.661	T
259	6304.240423	6041.063758	80.847	T/CG
260	6304.23058	6040.984121	84.542	T/CG
261	6302.432558	6031.346915	86.008	T
262	6298.219479	6011.030394	87.368	T
263	6291.859552	5985.885988	88.307	T

Legend:

G = grass	TH = thalweg	US = upstream
T = tundra	CG = crest gage	TWET = wet tundra
C = cobbles	GB = ground break	M = mud
LEW = left edge of water	SH = shoulder	SB = sand bags
REW = right edge of water	DS = downstream	PK = "pk" nail
CL = center line		

file:plx1&2.xls

Table PLX 01-2: Additional Survey Data For PLX 01

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
1	5000	5000	100	P01TBMCL
2	5000	3095	99.64	PO1TBMUS
11	4501.89656	4844.977258	98.042	T
12	4529.211699	4852.062736	98.128	T
13	4533.217381	4853.445769	97.564	T/HWM
14	4546.152667	4859.124905	95.455	T
15	4562.689989	4859.805568	94.208	T
16	4574.490327	4864.827362	93.934	T
17	4576.209056	4865.531673	92.994	LEW/G
18	4577.13166	4865.564867	92.672	G
19	4580.753102	4866.469948	92.67	G
20	4583.404379	4866.702355	92.589	G
21	4584.042791	4866.906627	90.46	C
22	4588.930951	4868.294908	90.577	C
23	4593.320508	4870.483522	90.244	C
24	4597.544911	4871.828881	90.118	C
25	4601.794321	4872.990804	90.086	C
26	4606.757875	4874.563446	89.824	C
27	4610.790202	4876.514611	89.246	C/TH
28	4611.873879	4877.158674	89.363	C
29	4612.732651	4877.430474	91.542	G
30	4616.950891	4878.724678	93.003	REW
31	4621.153094	4880.33797	93.539	T
32	4627.238641	4882.816402	94.052	T
33	4657.146903	4894.761106	95.072	T
34	4682.437171	4905.254965	95.617	T
35	4690.532254	4908.274355	95.667	T/POND/LEW
36	4699.304711	4911.761877	95.172	M
37	4714.930837	4918.96025	94.856	M
38	4751.463419	4932.752212	94.137	M
39	4770.103328	4939.36002	94.11	M
40	4797.553637	4950.31603	93.913	M
41	4833.887397	4965.192195	93.548	M
42	4858.93131	4973.018821	93.546	M
43	4878.230118	4981.713846	93.792	M
44	4904.765446	4993.192065	93.626	M
45	4924.77534	5002.674373	93.873	M
46	4925.716808	5002.907774	95.302	G
47	4927.672905	5003.407345	95.736	REW
48	4944.103424	5008.807318	95.859	T
49	4957.982766	5014.15964	96.52	T

Table PLX 01-2: Additional Survey Data For PLX 01 (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
50	4959.299999	5014.789013	96.975	CG.C/L. See note 1.
51	4966.649531	5018.523473	99.407	T.C/L. See note 1.
52	4996.776056	5033.825687	100.08	T.C/L. See note 1.
53	5027.493948	5041.257927	100.338	T.C/L. See note 1.
54	5065.143074	5050.151828	100.893	T

Legend:

G = grass	TH = thalweg	US = upstream
T = tundra	CG = crest gage	TWET = wet tundra
C = cobbles	GB = ground break	M = mud
LEW = left edge of water	SH = shoulder	SB = sand bags
REW = right edge of water	DS = downstream	PK = "pk" nail
CL = center line		

Notes:

1. These point numbers were also used as control in Table PLX 01-1 (P-01.txt) and are not the same points. Point No. 50 in this table is the same point as No. 178 in Table PLX 01 (P-01.txt).

file:plx01-2.xls

Table PLX 01-3: Culvert Data For PLX 01 And PLX 02

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
1	4890.64	5661.19	105.4	PK/L.CULV.
2	3899.84	5299.8	104.63	PK/B.CULV.
101	4827.733907	5648.36582	104.818	GSH
102	4844.302932	5657.304352	105.047	GSH
103	4867.384937	5669.520818	105.249	GSH
104	4878.887623	5675.544168	105.237	GSH
105	4888.54205	5680.242788	105.161	GSH
106	4906.053357	5689.904426	104.745	GSH
107	4926.664201	5700.294125	104.464	GSH
108	4947.974525	5710.324977	104.364	GSH
109	4967.61046	5719.838279	104.279	GSH
110	4985.438666	5685.873976	104.605	GSH
111	4965.663366	5675.758419	104.689	GSH
112	4944.301039	5665.256504	104.777	GSH
113	4925.852841	5655.314272	104.733	GSH
114	4915.486644	5650.160915	104.713	GSH
115	4905.241428	5644.587603	104.776	GSH
116	4894.325655	5638.233995	104.897	GSH
117	4874.456423	5628.641427	104.811	GSH
118	4856.586081	5618.992294	104.693	GSH
119	4833.823798	5608.371976	104.643	GSH
120	4840.429744	5599.212413	98.805	GTO
121	4867.323976	5608.115731	97.724	GTO
122	4907.372003	5614.20194	92.507	SB
123	4897.799864	5616.849096	94.385	SB
124	4877.953879	5608.290662	97.014	SB
125	4877.821448	5622.38851	100.977	SB
126	4934.702227	5653.928726	101.913	SB
127	4957.410851	5645.225183	93.316	SB
128	4936.431703	5631.991306	91.817	SB
129	4928.463425	5640.310634	98.077	SB
130	4923.152696	5640.464096	100	SB
131	4920.536197	5636.187037	97.414	SB
132	4925.896507	5628.902602	91.51	SB
133	4920.451823	5632.227713	95.284	SB
134	4915.871946	5631.42031	97.525	SB
135	4913.222248	5627.568649	95.483	SB
136	4917.225592	5623.198793	92.284	SB
137	4914.850575	5621.486121	92.372	SB
138	4910.068834	5626.432604	95.409	SB
139	4903.332621	5628.158676	99.225	SB
140	4903.767467	5621.994787	95.031	SB
141	4909.067642	5615.846789	92.154	SB
142	4911.823072	5618.868499	91.813	CI

Table PLX 01-3: Culvert Data For PLX 01 And PLX 02 (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
143	4911.410803	5619.123021	99.661	CT
144	4850.215699	5691.068697	99.122	CT
145	4849.935297	5691.517706	91.529	CI
146	4856.964706	5700.552501	89.671	CI
147	4857.398291	5699.958093	98.474	CT
148	4924.73674	5621.305528	98.517	CT
149	4925.436204	5620.453358	89.657	CI
150	4932.089514	5629.466388	91.757	CI
151	4931.8194	5630.045071	100.529	CT
152	4870.794958	5701.596478	100.319	CT
153	4870.258173	5702.131141	91.755	CI
154	4895.892077	5691.988913	101.484	SB
155	4845.22525	5666.268208	101.63	SB
156	4831.773502	5683.955135	91.52	SB
157	4847.091802	5688.869133	90.871	SB
158	4852.600136	5681.760176	96.389	SB
159	4858.333946	5680.500064	98.759	SB
160	4859.531255	5686.329915	95.178	SB
161	4862.283508	5689.121807	95.799	SB
162	4866.486511	5689.251423	97.373	SB
163	4867.72134	5695.446607	93.395	SB
164	4864.298989	5698.703788	91.915	SB
165	4866.983764	5699.211273	92.258	SB
166	4879.895316	5691.394139	100.147	SB
167	4880.397788	5697.539061	96.211	SB
168	4873.737326	5705.107618	91.467	SB
169	4896.188448	5704.604611	96.714	SB
170	4884.155969	5742.141242	96.961	T
171	4869.557921	5733.950875	94.821	T
172	4865.10601	5731.194919	92.99	REW
173	4863.668709	5730.237981	92.332	G
174	4858.230689	5727.768983	92.123	G
175	4856.352135	5726.332765	88.556	C
176	4828.481045	5709.615155	88.976	M
177	4823.416403	5705.288797	90.413	M
178	4818.963658	5702.006159	91.709	M/G
179	4817.581523	5701.236148	92.997	LEW
180	4814.804652	5699.545105	93.718	T
181	4790.731484	5684.755622	96.015	T
182	4933.463616	5566.823805	98.243	T
183	4951.607411	5587.092533	96.921	T
184	4960.217507	5600.268294	93.597	LEW
185	4961.131798	5601.371112	92.757	C
186	4966.097131	5606.788728	92.469	C

Table PLX 01-3: Culvert Data For PLX 01 And PLX 02 (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
187	4971.682232	5614.665054	91.72	C/G
188	4971.607175	5614.898446	91.718	C/G
189	4975.407088	5618.069491	90.655	C
190	4981.954088	5621.580851	90.416	C
191	4982.157177	5623.155551	90.64	C
192	4982.242786	5623.707155	91.889	G
193	4984.338328	5628.1406	92.728	G
194	4991.276513	5639.733358	93.631	REW
195	4997.92915	5649.156225	93.857	T
196	4999.590867	5650.950368	94.918	T
197	5016.965314	5666.749171	97.206	T
201	3792.533545	5328.312382	104.302	GSH
202	3836.713353	5325.226107	104.28	GSH
203	3857.079319	5323.272477	104.365	GSH
204	3873.447275	5322.959112	104.508	GSH
205	3884.366741	5321.942354	104.453	GSH
206	3894.880123	5321.134322	104.405	GSH
207	3905.853412	5320.504369	104.17	GSH
208	3917.693206	5319.478067	104.09	GSH
209	3930.67259	5318.85317	103.962	GSH
210	3946.812453	5318.191544	103.936	GSH
211	3988.978773	5318.055321	103.68	GSH
212	4031.539713	5320.028824	103.671	GSH
213	4026.278368	5279.611475	104.065	GSH
214	3984.272416	5278.226649	104.223	GSH
215	3947.948558	5277.740656	104.217	GSH
216	3938.480352	5277.953473	103.777	GSH
217	3930.892371	5277.873806	103.766	GSH
218	3918.030931	5277.582982	103.917	GSH
219	3906.463333	5278.790345	104.346	GSH
220	3895.247747	5279.495468	104.461	GSH
221	3883.776061	5280.737306	104.392	GSH
222	3872.788145	5281.923762	104.264	GSH
223	3856.304159	5283.64971	104.041	GSH
224	3816.549511	5288.196719	104.295	GSH
225	3773.519186	5292.389681	104.845	GSH
226	3769.282352	5278.932717	97.619	GTO
227	3794.16473	5275.53447	97.071	GTO
228	3832.213777	5267.56962	95.806	GTO
229	3869.085417	5257.378673	93.801	SB
230	3864.455965	5258.006307	93.728	SB
231	3853.602832	5260.256896	95.459	SB
232	3859.563934	5268.931927	97.544	SB

Table PLX 01-3: Culvert Data For PLX 01 And PLX 02 (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
233	3865.826435	5276.776809	101.783	SB
234	3884.79429	5275.678604	102.514	SB
235	3938.0707	5271.592777	101.378	SB
236	3947.199148	5253.39604	93.89	SB
237	3951.261643	5247.910644	93.549	SB
238	3941.733699	5245.014233	90.561	SB
239	3940.40995	5238.006297	89.735	SB
240	3934.086122	5239.424766	90.826	SB
241	3929.611108	5243.516878	95.912	SB
242	3923.400841	5240.965013	89.923	SB
243	3917.298876	5244.60597	95.983	SB
244	3911.244114	5244.087452	90.238	SB
245	3909.275251	5259.463717	94.927	SB
246	3905.588961	5262.831381	97.65	SB
247	3901.040847	5258.537822	93.956	SB
248	3899.53684	5250.125488	90.723	SB
249	3899.151042	5259.70357	93.569	SB
250	3894.891387	5265.088111	98.611	SB
251	3890.735518	5261.872082	95.196	SB
252	3889.055917	5253.523014	92.404	SB
253	3888.127467	5261.857976	95.061	SB
254	3884.111009	5269.399375	100.124	SB
255	3879.484252	5265.9219	96.963	SB
256	3878.379997	5257.960462	93.674	SB
257	3877.26056	5264.695881	95.937	SB
258	3873.50651	5271.100835	100.518	SB
259	3869.41114	5265.917492	96.994	SB
260	3870.813837	5257.151061	93.189	SB
261	4070.219915	5269.617893	97.645	GTO
262	4024.099217	5264.521817	96.838	GTO
263	3973.210656	5259.682134	95.808	GTO
264	4104.887355	5340.515357	97.977	GTO
265	4058.452657	5335.477198	97.34	GTO
266	3957.458142	5334.676158	95.318	GTO
267	3849.292339	5346.158448	95.084	GTO
268	3822.23501	5346.788352	95.896	GTO
269	3782.794244	5346.029354	97.049	GTO
270	3729.653644	5348.201976	98.59	GTO
271	3854.413581	5346.691802	94.621	SB
272	3870.053927	5346.815309	93.47	SB
273	3870.213551	5338.58633	96.689	SB
274	3874.01493	5331.843108	100.628	SB
275	3878.042832	5339.67932	95.729	SB
276	3878.181138	5346.961276	93.407	SB

Table PLX 01-3: Culvert Data For PLX 01 And PLX 02 (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
277	3880.834338	5347.423848	92.839	SB
278	3880.768434	5339.664337	95.69	SB
279	3884.671702	5331.979103	100.337	SB
280	3889.290629	5338.442079	95.447	SB
281	3889.013367	5347.117734	92.463	SB
282	3890.985828	5347.186559	92.375	SB
283	3891.72968	5340.613455	94.621	SB
284	3895.512841	5333.720716	98.687	SB
285	3900.443006	5340.129982	93.652	SB
286	3900.290258	5346.851092	90.944	SB
287	3902.09559	5348.183998	90.645	SB
288	3902.016905	5341.284709	93.566	SB
289	3906.397272	5335.037984	97.409	SB
290	3911.28951	5339.832596	93.352	SB
291	3911.117898	5346.676896	90.141	SB
292	3912.869156	5345.815279	90.571	SB
293	3913.0896	5343.13839	91.656	SB
294	3917.902773	5337.462982	95.014	SB
295	3922.509975	5341.411445	92.144	SB
296	3922.706418	5343.581392	90.817	SB
297	3924.793137	5344.208539	90.411	SB
298	3924.68601	5342.253243	92.219	SB
299	3930.179131	5338.431638	95.282	SB
300	3934.611154	5342.546162	91.859	SB
301	3934.494849	5348.80835	89.063	SB
302	3937.351573	5346.224643	90.325	SB
303	3946.239017	5334.845776	95.508	SB
304	3943.290436	5331.085019	97.02	SB
305	3928.810539	5332.259126	96.782	SB
306	3917.540854	5332.247394	97.058	SB
307	3906.211361	5332.234476	98.119	SB
308	3895.445503	5331.305389	99.313	SB
309	3881.244174	5329.713835	100.828	SB
310	3873.421052	5329.751424	101.175	SB
311	3863.023962	5330.839768	100.557	SB
312	3857.58153	5340.784612	96.348	SB
313	3874.304279	5354.031225	93.515	CI
314	3874.237366	5353.69461	101.051	CT
315	3884.925728	5345.474362	92.548	CI
316	3884.626543	5345.219782	100.494	CT
317	3895.979107	5347.364639	91.046	CI
318	3896.109672	5347.004622	99.117	CT
319	3906.698553	5348.63756	89.869	CI
320	3906.544283	5348.108626	97.943	CT

Table PLX 01-3: Culvert Data For PLX 01 And PLX 02 (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
322	3918.066383	5354.234498	96.139	CT
323	3929.698372	5353.678987	88.03	CI
324	3929.635481	5353.375424	96.115	CT
325	3929.477388	5238.768876	87.329	CI
326	3929.664802	5239.370184	96.069	CT
327	3917.325206	5239.995786	87.601	CI
328	3918.053926	5240.585717	96.222	CT
329	3905.308274	5248.327904	89.86	CI
330	3905.248959	5248.909712	97.888	CT
331	3895.301354	5252.311572	90.887	CI
332	3895.279906	5252.690119	99.056	CT
333	3883.667794	5255.609893	92.53	CI
334	3883.900041	5255.808869	100.477	CT
335	3873.356509	5258.820862	93.267	CI
336	3873.334261	5259.454752	100.857	CT
337	3836.926243	5194.410875	95.59	T
338	3861.985242	5194.939661	94.436	T
339	3885.988453	5194.503436	93.417	T
340	3900.350887	5195.071891	92.228	LEW
341	3907.159485	5195.208086	91.352	G
342	3912.047337	5195.100718	91.164	G
343	3912.593925	5195.283389	89.286	C
344	3923.534719	5189.901171	89.492	C
345	3930.295773	5190.599499	89.486	C
346	3935.669539	5190.432969	90.035	C
347	3941.012313	5190.490097	90.302	C
348	3946.273343	5191.746865	90.876	C
349	3947.623494	5191.611213	92.232	REW
350	3948.736925	5191.52099	92.996	T
351	3957.994186	5191.533541	94.593	T
352	3999.951581	5194.592029	96.345	T
353	4049.619507	5204.656556	97.664	T
354	4067.192938	5391.693413	97.19	T
355	4052.021236	5394.254652	94.788	T
356	4009.696643	5398.533436	95.132	T
357	3964.577456	5403.419692	95.247	T
358	3947.597955	5404.866738	93.921	T
359	3939.280715	5405.20516	92.105	REW
360	3936.117775	5405.551547	91.339	G
361	3934.268609	5405.361788	88.485	C
362	3900.21331	5410.783199	88.719	C
363	3898.022905	5410.63918	90.818	G
364	3892.216249	5410.43404	92.151	LEW
365	3883.68042	5410.980423	93.87	T

Table PLX 01-3: Culvert Data For PLX 01 And PLX 02 (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
366	3831.7445	5409.133585	95.238	T
367	3797.431222	5404.888647	97.228	T

Legend:

G = grass	CL = center line	DS = downstream
T = tundra	TH = thalweg	US = upstream
C = cobbles	CG = crest gage	M = mud
LEW = left edge of water	GB = ground break	SB = sand bags
REW = right edge of water	SH = shoulder	PK = "pk" nail
CI = Culvert Invert	CT = Culvert Top	

file:culverts.xls

APPENDIX E: PLX 02

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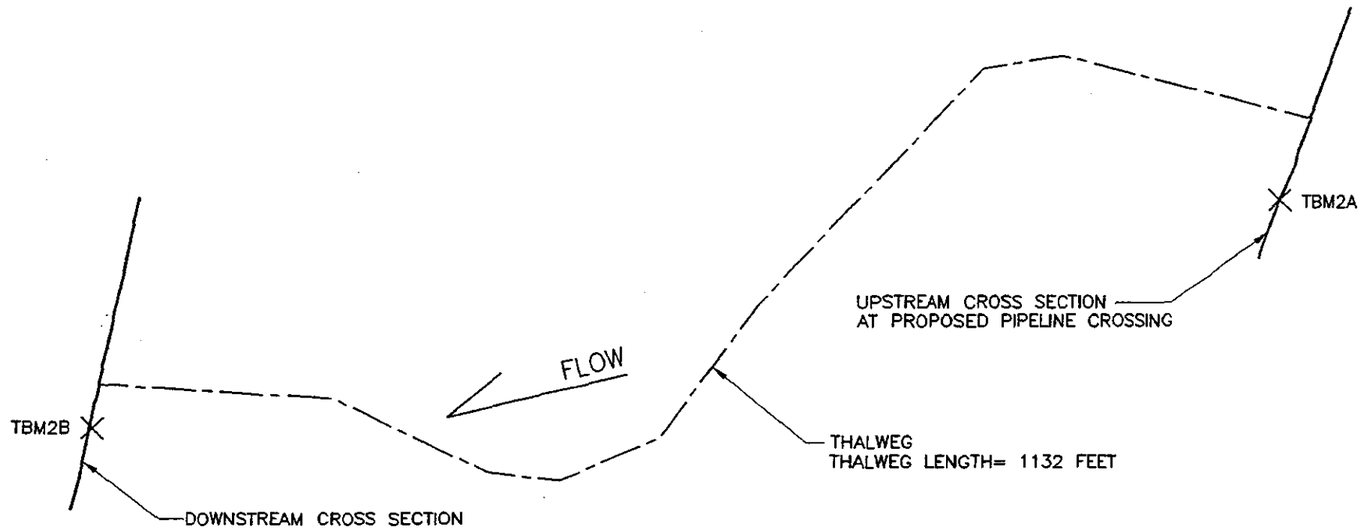
Notes:

1. THE PLAN AND PROFILE FOR PLX 02, AND THE DATA CONTAINED THEREIN, ARE PROVISIONAL, SUBJECT TO VERIFICATION OF THE SURVEY DATA CONTAINED IN TABLES PLX 01-1 AND PLX 01-3.

2. The survey and culvert data associated with PLX 02 were collected in combination with the data collected for PLX 01 and are presented in Tables PLX 01-1 and PLX 01-3.



TBM1A

NOTES:

1. THE PRIMARY TEMPORARY BENCH MARK WAS ASSUMED TO HAVE: (1) AN ELEVATION OF 100.00 FEET, (2) A NORTHING OF 5000 FEET, AND (3) AN EASTING OF 5000 FEET. THE PRIMARY TEMPORARY BENCH MARK AT EACH STREAM PROVIDED THE VERTICAL AND HORIZONTAL CONTROL.
2. THE PRIMARY TEMPORARY BENCH MARK ON THIS STREAM IS TBM1A. THIS IS THE SAME TBM USED FOR THE PLX01 SURVEY.

PROVISIONAL
SUBJECT TO CHANGE
UPON FURTHER REVIEW
OF SURVEY DATA

REVISION			
NO.:	DATE:		BY:

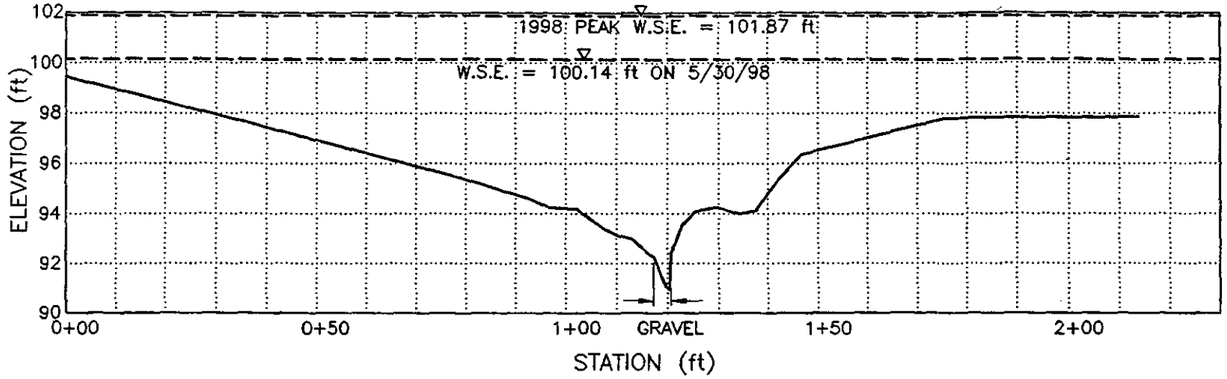
STREAM PLX02 – MIDDLE BADIMI CREEK
PLAN

SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

Baker Michael Baker Jr., Inc.

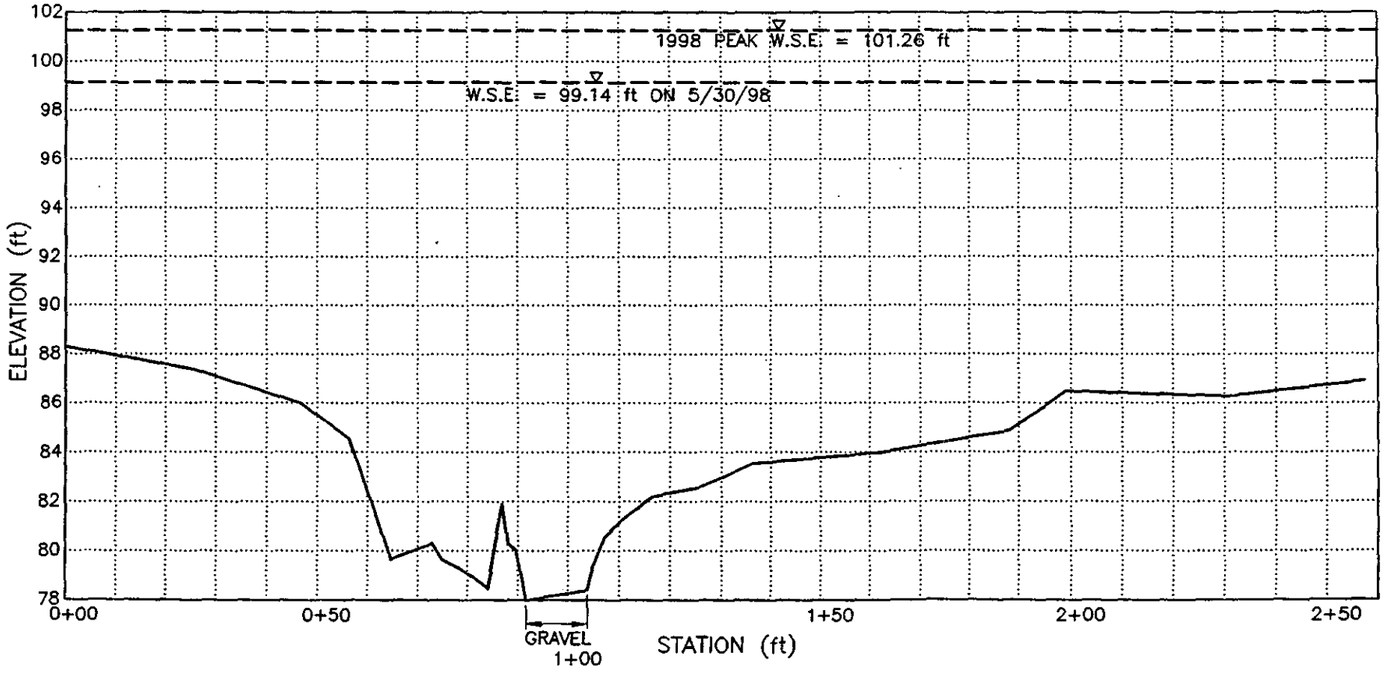
DATE:	8/3/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADP-X2
CHECKED:	JWA	SCALE:	1"= 120'

FIGURE: PLX 02-1



PROFILE: PLX02 UPSTREAM CROSS SECTION AT PROPOSED PIPELINE CROSSING

SCALE: H 1"= 30'
V 1"= 6'



PROFILE: PLX02 DOWNSTREAM CROSS SECTION

SCALE: H 1"= 30'
V 1"= 6'

PROVISIONAL
SUBJECT TO CHANGE
UPON FURTHER REVIEW
OF SURVEY DATA

NOTES:
1. THE ELEVATIONS SHOWN ARE BASED ON AN ASSUMED ELEVATION OF 100.00 AT TBM1A.
2. W.S.E.= WATER SURFACE ELEVATION

REVISION			
NO.:	DATE:		BY:

STREAM PLX02 – MIDDLE BADIMI CREEK
PROFILES

SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

Baker Michael Baker Jr., Inc.

DATE:	8/3/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADP-X2
CHECKED:	JWA	SCALE:	VARIES

FIGURE: PLX 02-2

Photo PLX 02-1: Looking east at stream (5/30/98).

Photo PLX 02-2: Looking north, the proposed pipeline crossing is at the upper portion of the riffle in the straight reach before the bend to the left (6/2/98).

STREAM PLX 02 PHOTOGRAPHS	Baker Michael Baker Jr., Inc.		Photo Number:
SOURDOUGH AREA DEVELOPMENT PROJECT NORTH SLOPE, ALASKA	Date: 6/7/98	Project: 23247	PLX 02-1
	Drawn: JDA	File: photo02	
	Checked: JWA	Scale:	

Photo PLX 02-3: Looking north, the person in the photo is indicating the peak water surface elevation at the crossing (6/6/98).

STREAM PLX 02 PHOTOGRAPHS SOURDOUGH AREA DEVELOPMENT PROJECT NORTH SLOPE, ALASKA	Baker Michael Baker Jr., Inc. Date: 6/7/98 Project: 23247 Drawn: JDA File: photo02 Checked: JWA Scale:	Photo Number. PLX 02-2

APPENDIX F: PLX 03

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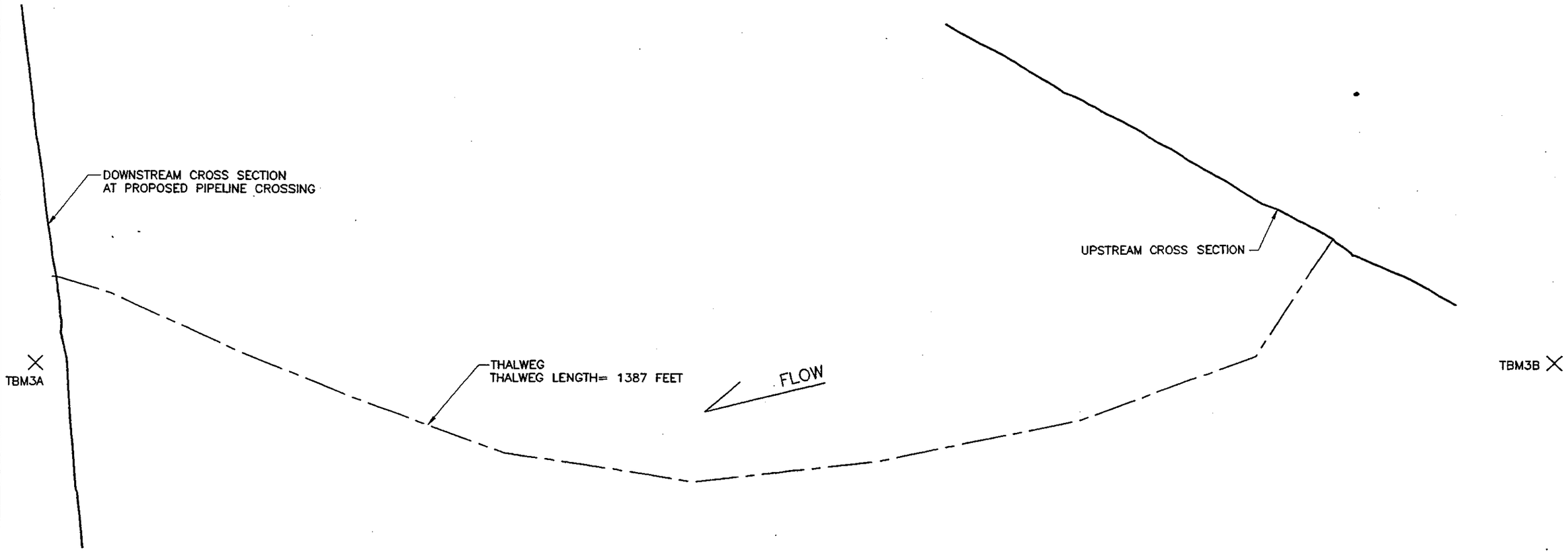


NOTES:

1. THE PRIMARY TEMPORARY BENCH MARK WAS ASSUMED TO HAVE: (1) AN ELEVATION OF 100.00 FEET, (2) A NORTHING OF 5000 FEET, AND (3) AN EASTING OF 5000 FEET. THE PRIMARY TEMPORARY BENCH MARK AT EACH STREAM PROVIDED THE VERTICAL AND HORIZONTAL CONTROL.
2. THE PRIMARY TEMPORARY BENCH MARK ON THIS STREAM IS TBM3A.

REVISION NO.:	DATE:		BY:

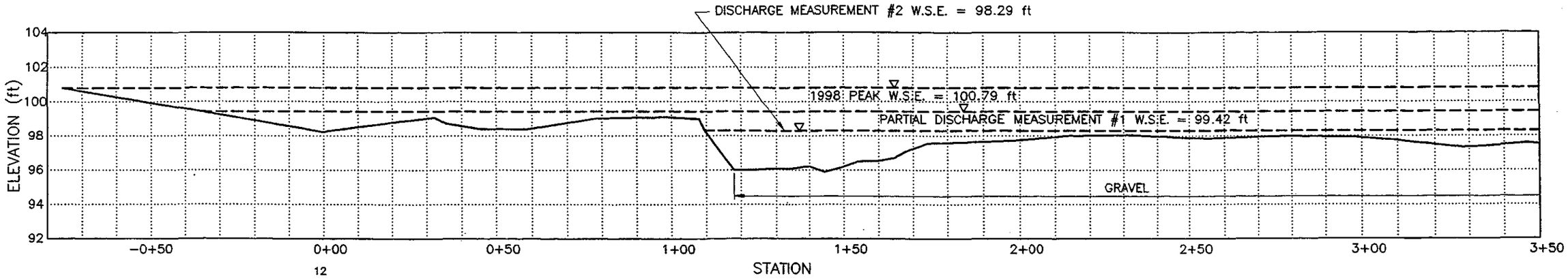
STREAM PLX03 – EAST BADAMI CREEK
PLAN

SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

Baker Michael Baker Jr., Inc.

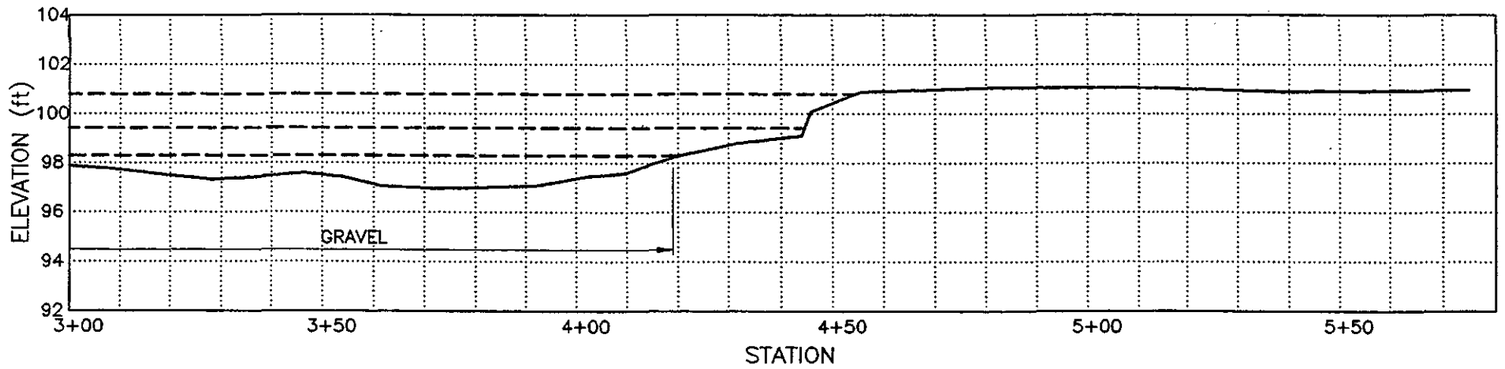
DATE:	8/3/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADP-X3
CHECKED:	JWA	SCALE:	1" = 100'

FIGURE: PLX 03-1



PROFILE: PLX03 UPSTREAM CROSS SECTION – STATION -0+80 TO STATION 3+50

SCALE: H 1"= 30'
V 1"= 6'



PROFILE: PLX03 UPSTREAM CROSS SECTION – STATION 3+00 TO STATION 5+80

SCALE: H 1"= 30'
V 1"= 6'

NOTES:
1. THE ELEVATIONS SHOWN ARE BASED ON AN ASSUMED ELEVATION OF 100.00 AT TBM3A.
2. W.S.E.= WATER SURFACE ELEVATION
3. THE DIFFERENCE IN THE SURVEY AND DISCHARGE MEASUREMENT CROSS SECTIONS IS DUE TO A SLIGHT DIFFERENCE IN WHERE THE MEASUREMENTS WERE MADE.

REVISION			
NO.:	DATE:		BY:

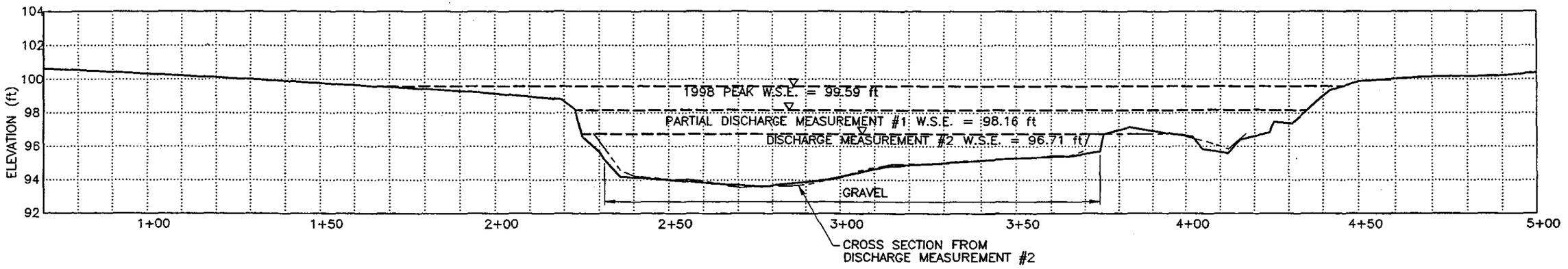
STREAM PLX03 – EAST BADAMI CREEK
PROFILE

SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

Baker Michael Baker Jr., Inc.

DATE:	8/3/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADP-X3
CHECKED:	JWA	SCALE:	VARIES

FIGURE:
PLX
03-2



PROFILE: PLX03 DOWNSTREAM CROSS SECTION AT PROPOSED PIPELINE CROSSING

SCALE: H 1"= 30'
V 1"= 6'

NOTES:
1. THE ELEVATIONS SHOWN ARE BASED ON AN ASSUMED ELEVATION OF 100.00 AT TBM3A.
2. W.S.E.= WATER SURFACE ELEVATION
3. THE DIFFERENCE IN THE SURVEY AND DISCHARGE MEASUREMENT CROSS SECTIONS IS DUE TO A SLIGHT DIFFERENCE IN WHERE THE MEASUREMENTS WERE MADE.

REVISION			
NO.:	DATE:		BY:

STREAM PLX03 – EAST BADAMI CREEK
PROFILE

SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

Baker Michael Baker Jr., Inc.

DATE:	8/3/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADP-X3
CHECKED:	JWA	SCALE:	VARIES

FIGURE: PLX 03-3

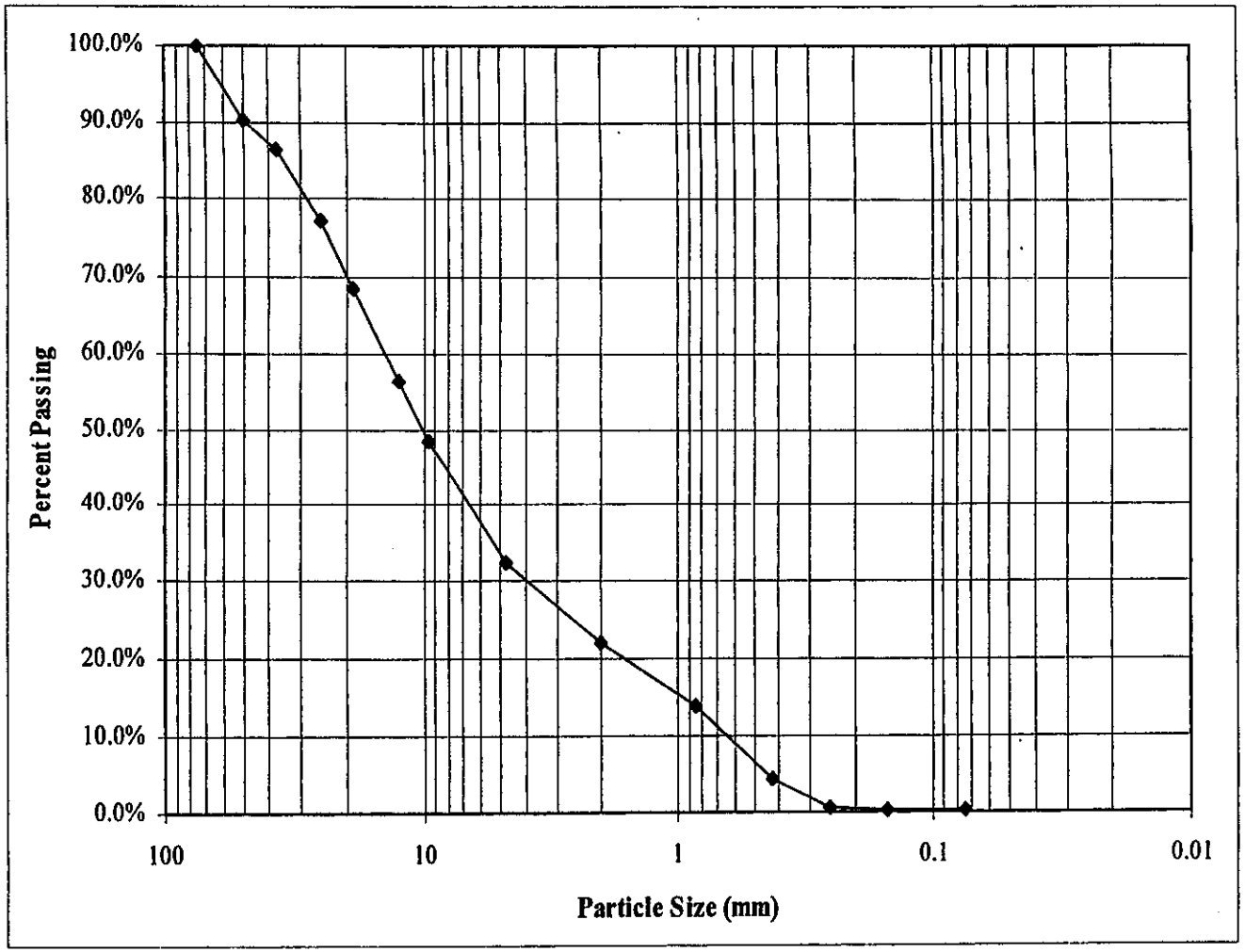


Figure Number: PLX 03-4

Baker	Michael Baker Jr., Inc.	
Date: 8/6/98		Project: 23247
Drawn: JDA		File: gradations.ppt
Checked: JWA		Scale: N/A

STREAM PLX 03
BED MATERIAL GRADATION
SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

REVISION:			
NO:	DATE:		BY:

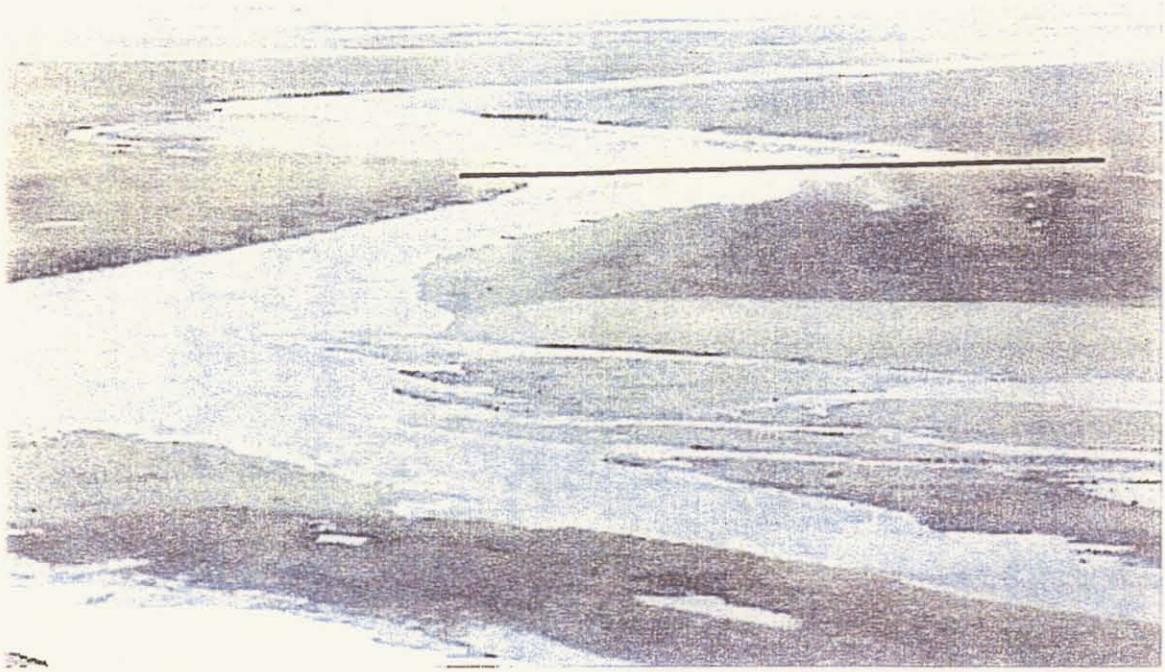


Photo PLX 03-1: Looking north at the proposed pipeline crossing (6/8/98).

Photo PLX 03-2: Looking north at the proposed pipeline crossing (6/11/98).

STREAM PLX 03 PHOTOGRAPHS	Baker Michael Baker Jr., Inc.		Photo Number:
SOURDOUGH AREA DEVELOPMENT PROJECT NORTH SLOPE, ALASKA	Date: 6/7/98	Project: 23247	PLX 03-1
	Drawn: JDA	File: photo03	
	Checked: JWA	Scale:	

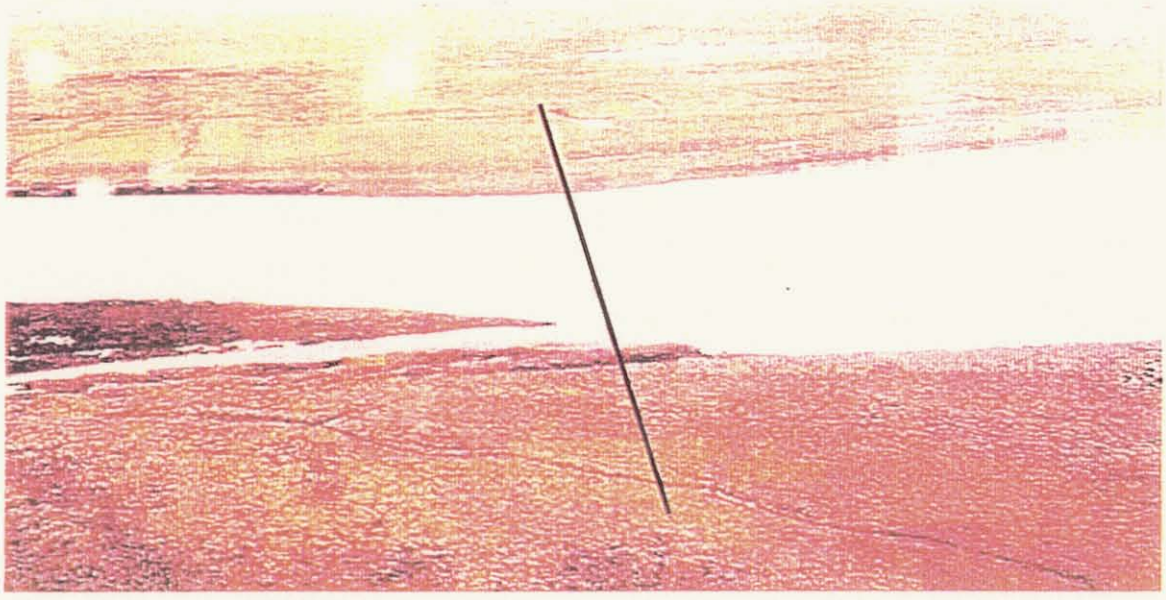


Photo PLX 03-3: Looking west at the proposed pipeline crossing (6/2/98).

STREAM PLX 03 PHOTOGRAPHS SOURDOUGH AREA DEVELOPMENT PROJECT NORTH SLOPE, ALASKA	Baker Michael Baker Jr., Inc. Date: 6/7/98 Project: 23247 Drawn: JDA File: photo03 Checked: JWA Scale:	Photo Number: PLX 03-2

DISCHARGE MEASUREMENT NOTES

LOCATION: PLX 03 East Badami Creek - Discharge Measurement Number 1 (Partial Measurement)

Date: 5/30 ,1998 **Party:** J. Meckel, P. McGranahan

Width: 197 **Area:** **Vel:** **G.H.:** **Disch.:** cfs

No Secs. **G.H. change:** **in.:** **hrs.:** **Susp.:** Rod

Method coef.: 1 **Hor. Angle coef.** 1 **Sus. Coef.:** 1 **Meter No.** **std 1**

Gage Readings

Time	Recorder	Inside	Outside
	upstream x-sec	WSE=	99.41
	downstream x-sec	WSE=	98.16
Weighted M.G.H.			
G.H. corrections			
Correct M.G.H.			

Type of meter: Price A

Date rated: Std No 1

Meter: **ft. above bottom of weight.**

Spin before meas. ok **after** ok

Method: Wading at proposed pipeline crossing.

Levels obtained this time

Measurement rated: Incomplete

Cross section: Fairly uniform - ice on bottom 20%.

Flow:

Weather: clear -wind **Air °F@:**

Gage: Upstream ok, downstream bent, w.s. refered for levels. **Water °F@:**

Other:

Record Removed: **Intake flushed:**

Observer

Control Channel

Section was free of ice in the area of the most discharge.

Remarks Estimed that the maximum velocity was about 130 percent of that at sta 52.

Estimated that maximum depth was 4-5 feet.

G.H. of zero flow: ft.

DISCHARGE MEASUREMENT NOTES (PLX 03 Measurement 1 Continued)

Angle coef.	Dist. From Initial point (ft)	Width (ft)	Depth (ft)	Observ. depth	Revo-lutions	Time In seconds	VELOCITY		Area (s.f.)	Discharge (cfs)	Description
							At Point (fps)	Mean in-vertical (fps)			
	242.0	8.5	0.0						0.0	0.0	Right Edge Water (1030 hr)
	225.0	21.0	1.6	0.6	30	43	1.54	1.54	33.6	51.7	
	200.0	25.0	0.9					0.00	22.5	0.0	Snow/slush
	175.0	17.5	2.0	0.6	40	41		3.21	35.0	112	Bottom ice
	52.0	5.0	2.3	0.6	100	42	5.20	5.20	11.5	59.8	
				s	100	41	5.32		0.0	0.0	
	50.0	3.5	1.2	0.6	80	42		4.16	4.2	17.5	
	45.0	2.5									Left Edge Water (1110 hr)
	197.0										

DISCHARGE MEASUREMENT NOTES

LOCATION: PLX 03 East Badami Creek - Discharge Measurement Number 2

Date: 6/1 ,1998 **Party:** J. Meckel, P. McGranahan

Width: 143 **Area:** 307 **Vel:** 1.94 **G.H.:** **Disch.:** 596 **cfs**

No Secs. 32 **G.H. change:** **in.:** **hrs.:** **Susp.:** Rod

Method coef.: 1 **Hor. Angle coef.** 1 **Sus. Coef.:** 1 **Meter No.**

Type of meter: Price AA

Date rated: Std No 1

Meter: **ft. above bottom of weight.**

Spin before meas. ok **after** ok

Method: Wading at proposed pipeline crossing, downstream cross section.

Levels obtained this time

Gage Readings			
Time	**Recorder**	**Inside**	**Outside**
	upstream x-sec	WSE=	98.29
	downstream x-sec	WSE=	96.71
Weighted M.G.H.			
G.H. corrections			
Correct M.G.H.			

Measurement rated: good (5%) **based on following conditions:**

Cross section: Very uniform, smooth cobble

Flow: evenly distributed **Weather:** **Air °F@:**

Gage: **Water °F@:**

Other:

Record Removed: **Intake flushed:**

Observer

Control Broad riffle 300-500 ft. downstream clear - streambed smooth cobble ≤ 3".

Remarks Sand, gravel, mostly firm - light short grass on right side.

Note that there was no flow between station 3 and 49, therefore width of section is 189 ft, width of flow is 143 ft.

G.H. of zero flow: **ft.**

DISCHARGE MEASUREMENT NOTES (PLX 03 Discharge Measurement 2 Continued)

Angle coef.	Dist. From Initial point (ft)	Width (ft)	Depth (ft)	Observ. depth	Revo-lutions	Time In seconds	VELOCITY		Area (s.f.)	Discharge (cfs)	Description
							At Point (fps)	Mean in-vertical (fps)			
	3.0	2.5	0.0								Right Edge Water (1630)
	8.0	6.0	1.1		0		grass bar				Dead water
	15.0	7.5	0.4		0						" "
	23.0	17.0	0.0								Left Edge Water
	49.0	14.0	0.0								Right Edge Water
	51.0	3.0	1.0	0.6	10	45		0.50	3.0	1.5	Edge grass
	55.0	4.5	1.3	0.6	15	53		0.64	5.9	3.7	Small cobble
	60.0	5.0	1.3	0.6	15	42		0.80	6.5	5.2	" "
	65.0	7.5	1.4	0.6	15	48		0.70	10.5	7.4	" "
	75.0	10.0	1.5	0.6	15	46		0.73	15.0	11.0	" "
	85.0	10.0	1.6	0.6	20	44		1.01	16.0	16.2	" "
	95.0	7.5	1.8	0.6	25	48		1.16	13.5	15.7	" "
	100.0	5.0	1.8	0.6	25	44		1.26	9.0	11.3	" "
	105.0	5.0	1.8	0.6	25	40		1.38	9.0	12.4	" "
	110.0	5.0	2.0	0.6	30	40		1.65	10.0	16.5	" "
	115.0	5.0	2.2	0.6	40	42		2.10	11.0	23.1	" "
	120.0	5.0	2.6	0.8	40	45	1.96	2.18	13.0	28.3	" "
				0.2	50	46	2.39				" "
	125.0	5.0	2.8	0.2	50	43	2.55	2.35	14.0	32.9	" "
				0.8	40	41	2.15				" "
	130.0	5.0	3.0	0.8	40	42	2.15	2.44	15.0	36.6	" "
				0.2	50	40	2.74				" "
	135.0	5.0	3.1	0.2	60	45	2.92	2.51	15.5	38.9	" "
				0.8	40	42	2.10				" "
	140.0	5.0	3.1	0.8	50	43	2.55	2.77	15.5	42.9	" "
				0.2	60	44	2.99				" "
	145.0	5.0	3.1	0.2	60	42	3.13	2.87	15.5	44.5	" "
				0.8	50	42	2.61				" "
	150.0	5.0	3.2	0.8	50	41	2.68	2.80	16.0	44.8	" "
				0.2	60	45	2.92				" "

DISCHARGE MEASUREMENT NOTES (PLX 03 Discharge Measurement 2 Continued)

Angle coef.	Dist. From Initial point (ft)	Width (ft)	Depth (ft)	Observ. depth	Revo-lutions	Time In seconds	VELOCITY		Area (s.f.)	Discharge (cfs)	Description
							At Point (fps)	Mean in-vertical (fps)			
	155.0	5.0	3.0	0.2	60	43	3.06	2.78	15.0	41.7	Small cobble
				0.8	50	44	2.50				" "
	160.0	5.0	2.8	0.8	50	43	2.55	2.80	14.0	39.2	" "
				0.2	60	43	3.06				" "
	165.0	5.0	2.7	0.2	60	42	3.13	2.78	13.5	37.5	" "
				0.8	50	45	2.44				" "
	170.0	5.0	2.7	0.8	40	41	2.15	2.44	13.5	32.9	" "
				0.2	60	48	2.74				" "
	175.0	5.0	2.6	0.2	50	48	2.29	2.02	13.0	26.3	" "
				0.8	40	50	1.76				" "
	180.0	4.5	2.5	0.6	30	45		1.47	11.3	16.5	" "
	184.0	4.5	2.2	0.6	15	41		0.82	9.9	8.1	" "
	189.0	4.0	0.8	0.6	5	43		0.27	3.2	0.9	Edge grass
	192.0	1.5	0.0					0.73			Left Edge Water (1730)
	189	189.0							307.2	596.0	

Table PLX 03-1: Survey Data

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
1	5000	5000	100	P03TBMCL (TBM3A)
2	5000	3501.836227	105.593	P03TBMUS (TBM3B)
11	5110.531359	3695.474296	98.239	SGUS
12	5059.781144	3598.034043	98.212	T
13	5060.130409	3599.415217	98.28	T
14	5069.165774	3614.710612	98.754	T
15	5076.542073	3625.564726	99.054	THW
16	5077.704449	3628.644704	98.72	T
17	5082.587656	3637.235257	98.388	T
18	5088.809647	3649.040967	98.39	T
19	5097.596794	3667.003108	99.009	T
20	5106.396374	3685.589229	99.068	T
21	5110.246724	3693.563509	98.97	T
22	5113.13038	3697.092813	97.447	T
23	5113.937505	3698.051851	97.131	LEW
24	5116.499594	3701.402866	95.997	C
25	5120.218806	3706.467086	96.006	C
26	5123.614733	3711.629113	96.079	C
27	5127.065571	3714.672978	96.084	CTH
28	5129.777072	3719.280696	96.217	C
29	5132.071602	3723.180354	95.882	C
30	5134.684192	3727.173377	96.138	C
31	5136.9869	3731.280771	96.486	C
32	5140.004486	3736.348873	96.524	C
33	5142.209647	3740.715786	96.715	C
34	5143.817629	3743.685958	97.087	REW
35	5146.301928	3749.358687	97.552	C
36	5157.591257	3769.334392	97.688	C
37	5163.5235	3785.231935	97.996	C
38	5172.568926	3800.601116	98.033	C
39	5185.039393	3820.607782	97.839	C
40	5196.277801	3841.073652	97.965	C
41	5206.640463	3857.263269	97.916	LEW
42	5213.279822	3866.882836	97.726	C
43	5217.875763	3874.61197	97.509	C
44	5222.208229	3883.166778	97.323	C
45	5226.324934	3891.703497	97.414	C
46	5230.800253	3899.354011	97.584	C
47	5235.210597	3905.688238	97.426	C
48	5238.77963	3912.081947	97.054	C
49	5243.681408	3921.625956	96.958	C
50	5248.189158	3929.474583	96.995	C
51	5252.711107	3939.001637	97.06	C
52	5257.542357	3948.063515	97.439	C
53	5261.691622	3954.73099	97.575	C
54	5263.618871	3958.825165	97.917	REW
55	5266.409586	3963.654777	98.283	CT
56	5271.893501	3974.046703	98.8	T
57	5276.3385	3985.626994	99.104	T
58	5277.265221	3987.067905	100.071	T

Table PLX 03-1: Survey Data (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
59	5282.795799	3995.230981	100.872	T
60	5296.365444	4017.529634	101.058	T
61	5312.920042	4043.719032	101.059	T
62	5324.963782	4066.83113	100.896	T
63	5343.402008	4097.898675	100.96	T
64	5276.459277	3706.148663	96.022	THFL
65	5007.585728	3791.777563	94.022	TH
66	4943.406482	3968.459955	95.865	TH
67	4900.406238	4170.086527	95.196	TH
68	4880.422044	4350.422204	95.45	TH
69	4909.597908	4535.762746	93.372	TH
70	4966.513059	4686.654802	94.347	TH
71	5010.83169	4793.987905	93.745	TH
72	5071.728858	4925.751413	93.636	TH
73	5089.558839	5075.000928	93.684	THFL
74	5361.431877	5013.639139	100.68	T
75	5341.965775	5011.352472	100.619	T
76	5320.274198	5008.946068	100.562	T
77	5298.411333	5006.438987	100.205	T
78	5277.898662	5004.23082	100.136	T
79	5260.252574	5002.208098	99.882	TRB
80	5251.781641	5001.916492	99.352	T
81	5241.110317	5000.824103	97.363	T
82	5235.787113	5000.045725	97.454	T
83	5234.323077	5000.045441	96.819	T
84	5225.890354	4998.69676	96.402	T
85	5222.353201	4997.779249	95.585	T
86	5215.254033	4996.853379	95.838	T
87	5212.375994	4996.468051	96.596	T
88	5203.67438	4995.155687	96.812	T
89	5193.69788	4993.729493	97.14	T
90	5186.007765	4992.840756	96.738	T
91	5184.920788	4992.774848	95.695	REW
92	5176.001071	4991.614481	95.408	C
93	5160.927436	4990.192496	95.309	C
94	5141.556049	4987.41488	95.019	C
95	5124.855536	4984.841683	94.811	C
96	5107.528694	4982.562752	94.031	C
97	5088.473624	4979.217019	93.607	CTH
98	5073.971345	4977.284656	93.808	C
99	5062.587053	4975.821773	93.982	C
100	5047.831168	4975.000375	94.213	C
101	5043.298382	4973.932254	95.207	C
102	5041.812143	4973.884147	95.69	LEW
103	5037.015703	4974.177488	96.554	T
104	5034.787023	4974.439899	98.18	T
105	5030.70673	4974.617237	98.814	P3CLCG
106	5003.91943	4968.625952	99.289	NWS
107	4943.83383	4965.414428	99.998	T
108	4912.512938	4962.640986	100.32	T

Table PLX 03-1: Survey Data (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
109	4873.686066	4959.630719	100.742	T
110	4812.758036	4952.088895	102.055	T
111	4866.931111	4957.638902	101.799	TBM

Legend:

G = grass	TH = thalweg	US = upstream
T = tundra	CG = crest gage	TWET = wet tundra
C = cobbles	GB = ground break	M = mud
LEW = left edge of water	SH = shoulder	SB = sand bags
REW = right edge of water	DS = downstream	PK = "pk" nail
CL = center line		

file:plx3.xls

APPENDIX G: PLX 04

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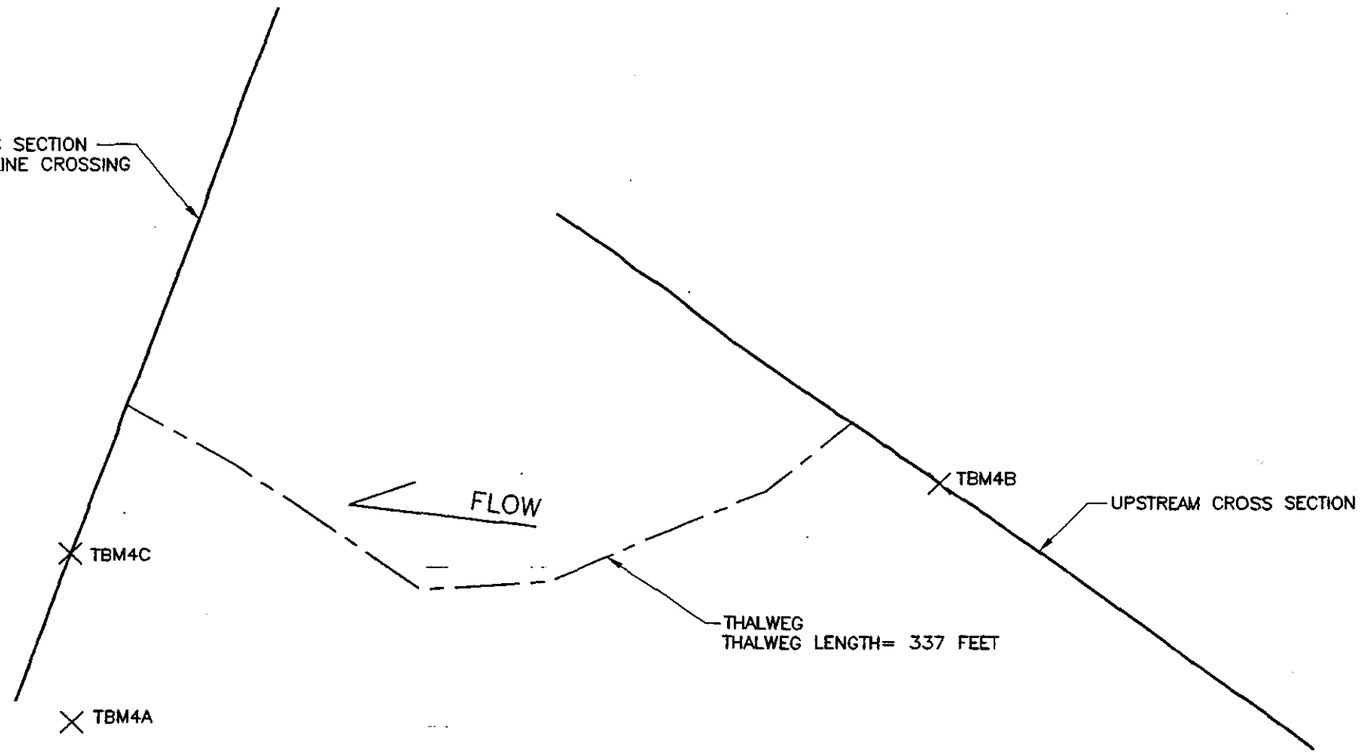


NOTES:

1. THE PRIMARY TEMPORARY BENCH MARK WAS ASSUMED TO HAVE: (1) AN ELEVATION OF 100.00 FEET, (2) A NORTHING OF 5000 FEET, AND (3) AN EASTING OF 5000 FEET. THE PRIMARY TEMPORARY BENCH MARK AT EACH STREAM PROVIDED THE VERTICAL AND HORIZONTAL CONTROL.
2. THE PRIMARY TEMPORARY BENCH MARK ON THIS STREAM IS TBM4A.

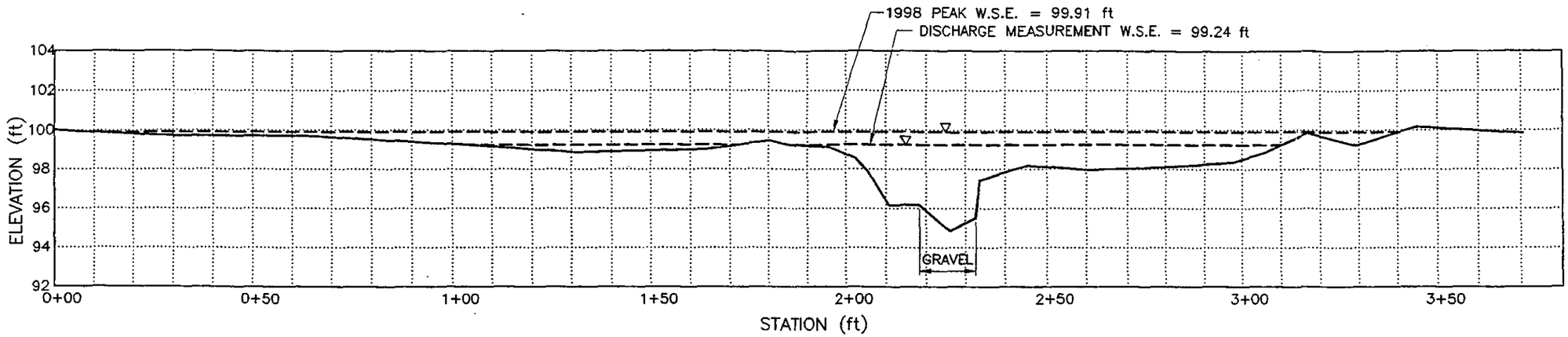
REVISION NO.	DATE:		BY:

STREAM PLX04
PLAN
SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

Baker Michael Baker Jr., Inc.

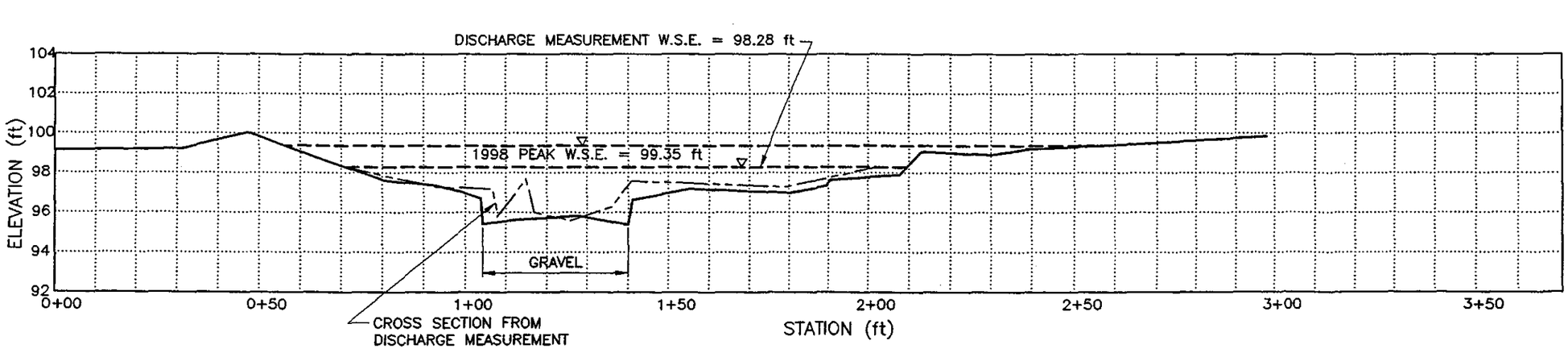
DATE:	8/3/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADP-X4
CHECKED:	JWA	SCALE:	1"= 60'

FIGURE: PLX 04-1



PROFILE: PLX04 UPSTREAM CROSS SECTION

SCALE: H 1"= 30'
V 1"= 6'



PROFILE: PLX04 DOWNSTREAM CROSS SECTION AT PROPOSED PIPELINE CROSSING

SCALE: H 1"= 30'
V 1"= 6'

NOTES:
1. THE ELEVATIONS SHOWN ARE BASED ON AN ASSUMED ELEVATION OF 100.00 AT TBM4A.
2. W.S.E.= WATER SURFACE ELEVATION
3. THE DIFFERENCE IN THE SURVEY AND DISCHARGE MEASUREMENT CROSS SECTIONS IS DUE TO A SLIGHT DIFFERENCE IN WHERE THE MEASUREMENTS WERE MADE.

REVISION NO.:	DATE:		BY:

STREAM PLX04
PROFILES
SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

Baker Michael Baker Jr., Inc.

DATE:	8/3/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADP-X4
CHECKED:	JWA	SCALE:	VARIES

FIGURE: PLX 04-2

Photo PLX 04-1: Looking north at the proposed pipeline crossing (6/11/98).

Photo PLX 04-2: Looking north at the proposed pipeline crossing (6/6/98).

STREAM PLX 04 PHOTOGRAPHS SOURDOUGH AREA DEVELOPMENT PROJECT	Baker **Michael Baker Jr., Inc.** Date: 6/7/98 | Project: 23247 Drawn: JDA | File: photo04	Photo Number: PLX

Photo PLX 04-1: Looking north at the proposed pipeline crossing (6/11/98).

Photo PLX 04-2: Looking north at the proposed pipeline crossing (6/6/98).

STREAM PLX 04 PHOTOGRAPHS	Baker Michael Baker Jr., Inc.
SOURDOUGH AREA DEVELOPMENT PROJECT NORTH SLOPE, ALASKA	Date: 6/7/98 | Project: 23247 Drawn: JDA | File: photo04 Checked: JWA | Scale:

Photo Number: PLX 04-1

DISCHARGE MEASUREMENT NOTES

LOCATION: PLX 04 at downstream cross section

Date: 5/30 ,1998 **Party:** J. Meckel, P.McGranahan

Width: 132 **Area:** 138 **Vel:** 1.63 **G.H.:** **Disch.:** 225 cfs

No Secs. 11 **G.H. change:** **in.:** **hrs.:** **Susp.:** Rod

Method coef.: 1 **Hor. Angle coef.** 1 **Sus. Coef.:** 1 **Meter No.**

Type of meter: Price AA

Date rated: Std No 1

Meter: **ft. above bottom of weight.**

Spin before meas. ok **after** ok

Method: Wading at downstream cross section

Gage Readings

Time	Recorder	Inside	Outside
	upstream x-sec	WSE=	99.24
	downstream x-sec	WSE=	98.28
Weighted M.G.H.			
G.H. corrections			
Correct M.G.H.			

Levels obtained this date

Measurement rated: fair 8% **based on following conditions:**

Cross section: Non-uniform, grass, cobbles, ice & snow.

Flow: **Weather:** **Air °F@:**

Gage: **Water °F@:**

Other:

Record Removed: **Intake flushed:**

Observer

Control Riffle 100' downstream - ice snow.

Remarks

G.H. of zero flow: **ft.**

DISCHARGE MEASUREMENT NOTES (PLX 04 Continued)

Angle coef.	Dist. From Initial point (ft)	Width (ft)	Depth (ft)	Observ. depth	Revo-lutions	Time In seconds	VELOCITY		Area (s.f.)	Discharge (cfs)	Description
							At Point (fps)	Mean in-vertical (fps)			
	0.0	11.2	0.0				4	18	0	0.0	Left Edge Water (18:00 crest)
	22.4	18.0	1.0	5	25	41	1.35	1.22	18	21.9	
	36.0	7.3	1.1	0.6	40	46		1.92	8.03	15.4	
	37.0	4.0	2.5	0.6	20	46		0.97	10	9.7	
	44.0	4.5	0.6	0.6	60	41		3.21	2.7	8.7	
	46.0	5.5	2.3	0.6	80	53		3.31	12.6	41.7	
	55.0	9.5	2.7	0.2	50	41	2.68	2.44	25.6	62.5	
				0.8	40	40	2.20		0.0	0.0	
	65.0	7.5	2.0	0.6	25	43		1.29	15.0	19.4	
	70.0	21.5	0.7	0.6	15	42		0.82	15.1	12.3	
	108.0	30.8	1.0	0.6	20	42		1.08	30.8	33.3	E of ice on bottom REW
	131.5	11.8	0.0								Right EdgeWater (1830 crest)
	131.5	131.5							137.7	224.8	

Table PLX 04-1: Survey Data

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
1	5000	5000	100	P04PCL (TBM4A)
2	5000	5068.715984	99.533	P04.P.C/L (TBM4C)
11	5491.703607	4989.139814	99.994	T/HWM
12	5467.021879	5007.925412	99.696	T
13	5440.696358	5026.192908	99.7	T
14	5410.312059	5048.382101	99.281	T
15	5385.544595	5066.248678	98.866	T
16	5358.884218	5085.636193	98.996	T
17	5345.529066	5094.994359	99.468	T
18	5342.512488	5097.20829	99.265	CG/US (TBM4B)
19	5333.344149	5104.197563	99.12	T
20	5327.782505	5107.963139	98.564	LEW
21	5325.28577	5110.147103	97.816	G
22	5323.687665	5111.56871	97.122	G
23	5321.180911	5113.061899	96.165	C
24	5315.192246	5117.610479	96.188	C
25	5308.817049	5121.957688	94.846	C/TH
26	5302.958829	5125.49826	95.507	C
27	5302.337089	5126.117428	97.416	G
28	5292.778449	5132.65619	98.19	G
29	5280.075572	5141.817382	97.961	G
30	5263.242178	5153.732162	98.118	G
31	5250.281959	5163.684627	98.37	REW
32	5243.688268	5169.18385	98.883	T
33	5235.436139	5175.479812	99.843	T
34	5224.996377	5182.505718	99.211	T
35	5212.700503	5191.665823	100.15	T
36	5191.236284	5205.884809	99.853	T
37	5329.922813	5166.686121	96.765	TH/FL
38	5275.2387	5094.056408	96.484	TH
39	5247.756655	5099.402253	96.311	TH
40	5236.092823	5077.839047	95.927	TH
41	5187.537658	5057.132268	94.935	TH
42	5136.892241	5053.800661	95.359	TH
43	5063.539277	5105.001963	95.466	TH
44	5012.133165	5142.624031	94.976	TH/FL
45	5080.99992	5288.300523	99.843	T
46	5069.630272	5258.909505	99.472	T
47	5060.393167	5232.917361	99.181	T
48	5057.430681	5225.104342	98.897	T
49	5051.697624	5208.748504	99.056	T
50	5049.802824	5203.826929	97.9	T
51	5043.795433	5187.74605	97.622	T
52	5043.506721	5186.876912	97.334	REW
53	5040.152497	5178.352102	96.977	G

Table PLX 04-1: Survey Data (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
54	5031.474844	5154.646236	97.176	G
55	5026.72545	5141.196541	96.616	G
56	5026.369344	5140.282618	95.388	C
57	5021.976498	5129.114255	95.815	C/TH
58	5017.334034	5115.620434	95.641	C
59	5013.982942	5106.851411	95.424	C
60	5013.824244	5106.339866	96.702	G
61	5011.702055	5100.945013	97.105	G
62	5009.937342	5096.252943	97.368	LEW
63	5005.812935	5084.692355	97.596	T
64	4999.668889	5068.639201	98.798	CG.C/L
65	4994.005713	5053.405215	100.036	T
66	4988.788459	5038.337029	99.21	T
67	4978.002697	5008.908583	99.116	T

Legend:

G = grass	TH = thalweg	US = upstream
T = tundra	CG = crest gage	TWET = wet tundra
C = cobbles	GB = ground break	M = mud
LEW = left edge of water	SH = shoulder	SB = sand bags
REW = right edge of water	DS = downstream	PK = "pk" nail
CL = center line		

file:plx4.xls

APPENDIX H: PLX 05

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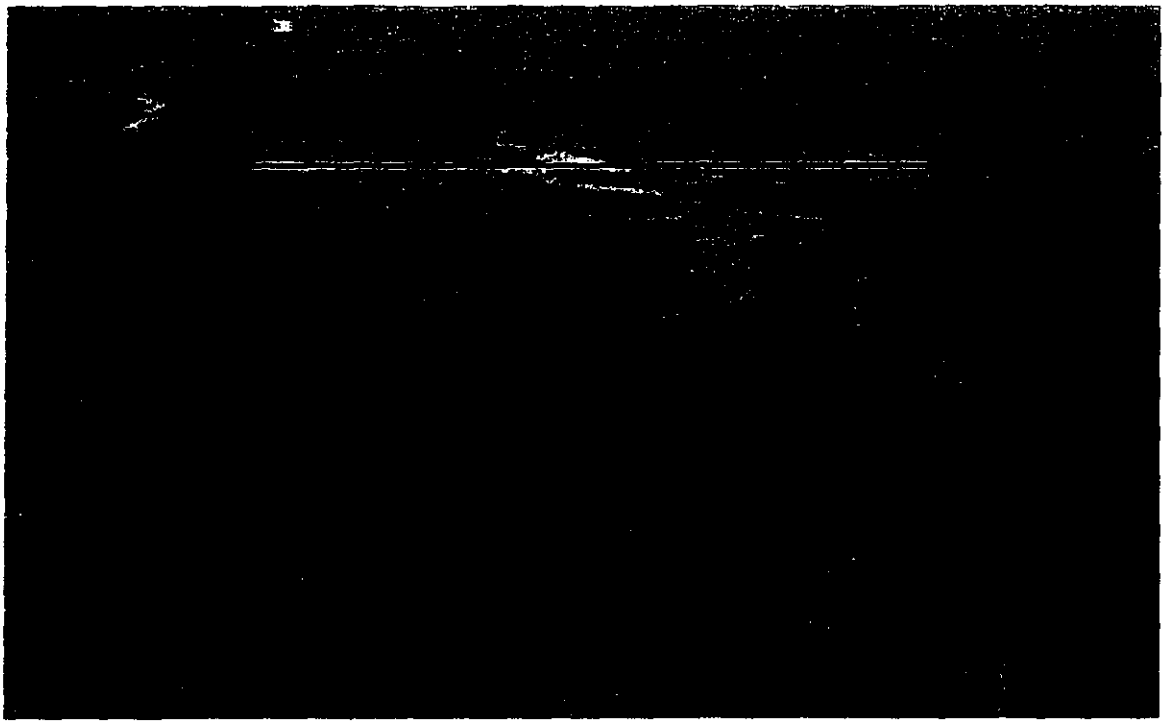

Photo PLX 05-1: Looking north at the proposed pipeline crossing (6/8/98).

STREAM PLX 05 PHOTOGRAPHS SOURDOUGH AREA DEVELOPMENT PROJECT NORTH SLOPE, ALASKA	Baker Michael Baker Jr., Inc.		Photo Number: PLX 05-1
	Date: 6/7/98	Project: 23247	
	Drawn: JDA	File: photo05	
	Checked: JWA	Scale:	

APPENDIX I: PLX 06

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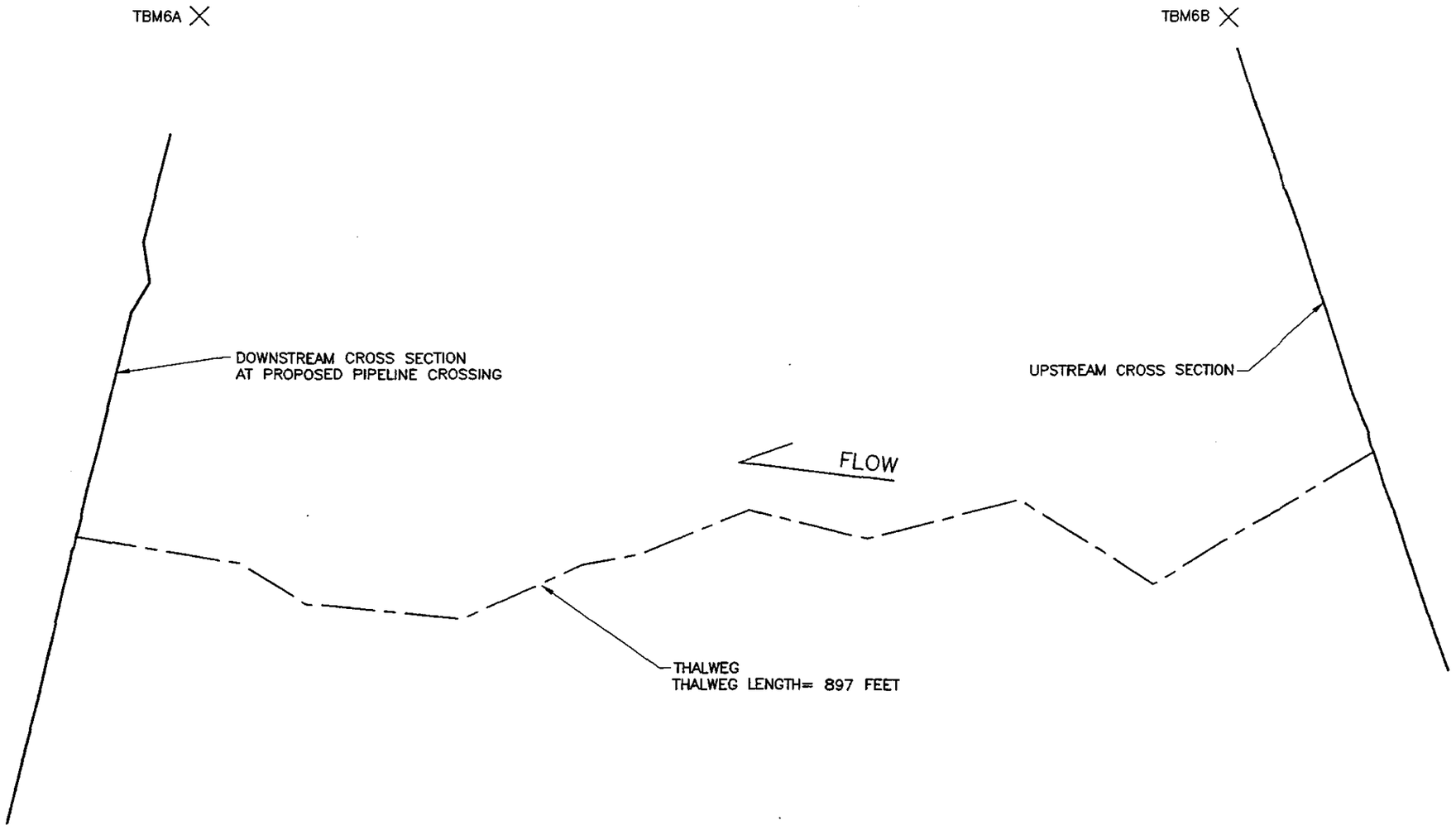


NOTES:

1. THE PRIMARY TEMPORARY BENCH MARK WAS ASSUMED TO HAVE: (1) AN ELEVATION OF 100.00 FEET, (2) A NORTHING OF 5000 FEET, AND (3) AN EASTING OF 5000 FEET. THE PRIMARY TEMPORARY BENCH MARK AT EACH STREAM PROVIDED THE VERTICAL AND HORIZONTAL CONTROL.
2. THE PRIMARY TEMPORARY BENCH MARK ON THIS STREAM IS TBM6A.

REVISION			
NO.:	DATE:		BY:

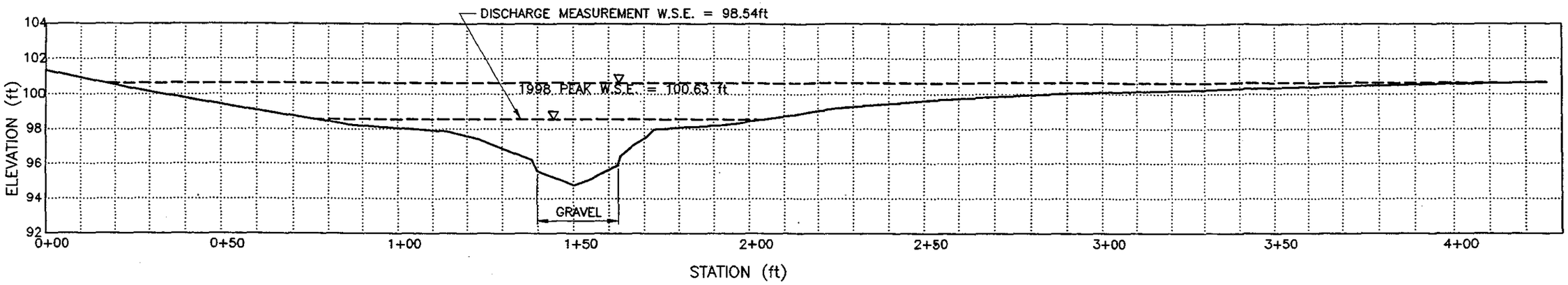
STREAM PLX06
PLAN

SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

Baker — Michael Baker Jr., Inc.

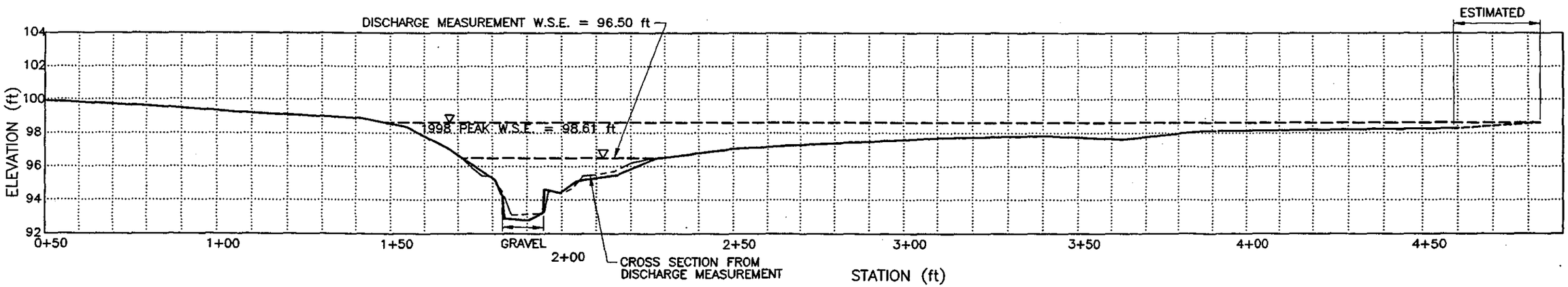
DATE:	8/3/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADP-X6
CHECKED:	JWA	SCALE:	1"= 80'

FIGURE: PLX 06-1



PROFILE: PLX06 UPSTREAM CROSS SECTION

SCALE: H 1"= 30'
V 1"= 6'



PROFILE: PLX06 DOWNSTREAM CROSS SECTION AT PROPOSED PIPELINE CROSSING

SCALE: H 1"= 30'
V 1"= 6'

NOTES:
1. THE ELEVATIONS SHOWN ARE BASED ON AN ASSUMED ELEVATION OF 100.00 AT TBM6A.
2. W.S.E.= WATER SURFACE ELEVATION
3. THE DIFFERENCE IN THE SURVEY AND DISCHARGE MEASUREMENT CROSS SECTIONS IS DUE TO A SLIGHT DIFFERENCE IN WHERE THE MEASUREMENTS WERE MADE.

REVISION		
NO.:	DATE:	BY:

STREAM PLX06
PROFILES
SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

Baker — Michael Baker Jr., Inc.

DATE:	8/3/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADP-X6
CHECKED:	JWA	SCALE:	VARIES

FIGURE: PLX 06-2

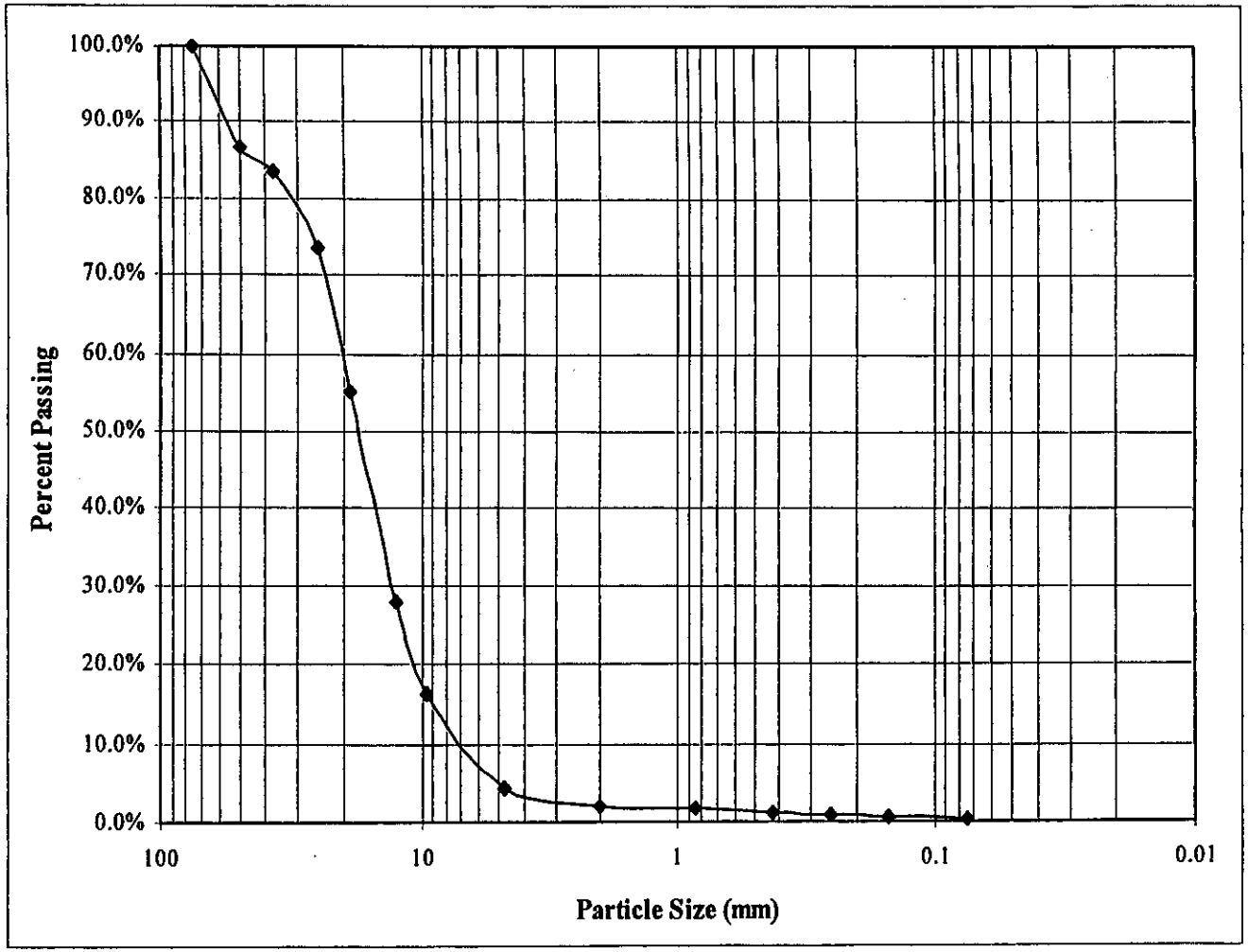


Figure Number: PLX 06-3

Baker	Michael Baker Jr., Inc.	
Date: 8/6/98		Project: 23247
Drawn: JDA		File: gradations.ppt
Checked: JWA		Scale: N/A

STREAM PLX 06
BED MATERIAL GRADATION

SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

REVISION:			
NO:	DATE:		BY:

Photo PLX 06-1: Looking north at the proposed pipeline crossing (6/11/98).

Photo PLX 06-2: Looking north at the upstream cross section (6/11/98).

STREAM PLX 06 PHOTOGRAPHS SOURDOUGH AREA DEVELOPMENT PROJECT NORTH SLOPE, ALASKA	Baker Michael Baker Jr., Inc.		Photo Number: PLX 06-1
	Date: 6/7/98	Project: 23247	
	Drawn: JDA	File: photo06	
	Checked: JWA	Scale:	

Photo PLX 06-3: Looking north at the upstream cross section (6/8/98).

Photo PLX 06-4: Looking north at the proposed pipeline crossing (6/1/98).

STREAM PLX 06 PHOTOGRAPHS SOURDOUGH AREA DEVELOPMENT PROJECT NORTH SLOPE, ALASKA	Baker **Michael Baker Jr., Inc.**		Photo Number: PLX 06-2
	Date: 6/7/98	Project: 23247	
	Drawn: JDA	File: photo06	
	Checked: JWA	Scale:	

DISCHARGE MEASUREMENT NOTES

LOCATION: PLX 06 at proposed pipeline crossing

Date: 6/1 ,1998 **Party:** J. Meckel, P McGranahan

Width: 56 **Area:** 83.7 **Vel:** 2.47 **G.H.:** **Disch.:** 207 cfs

No Secs. 16 **G.H. change:** **in.:** **hrs.:** **Susp.:**

Method coef.: 1 **Hor. Angle coef.** 1 **Sus. Coef.:** 1 **Meter No.**

Type of meter: Price AA

Date rated: Std No 1

Meter: **ft. above bottom of weight.**

Spin before meas. **ok** **after** ok

Method: Wading at proposed pipeline crossing, downstream cross section.

Gage Readings

Time	Recorder	Inside	Outside
	upstream x-sec	WSE=	9854
	downstream x-sec	WSE=	96.5
Weighted M.G.H.			
G.H. corrections			
Correct M.G.H.			

Levels obtained

Measurement rated: Poor over 8% **based on following conditions:**

Cross section: Partly uniform - grass, cobble smooth, no snow or ice.

Flow: **Weather:** **Air °F@:**

Gage: **Water °F@:**

Other:

Record Removed: **Intake flushed:**

Observer

Control Riffles throughout - channel at high stage.

Remarks Channel has grass up to 8-10". Short section smooth cobbles < 3" - sand.

G.H. of zero flow: **ft.**

DISCHARGE MEASUREMENT NOTES (PLX 06 Continued)

Angle coef.	Dist. From Initial point (ft)	Width (ft)	Depth (ft)	Observ. depth	Revo-lutions	Time In seconds	VELOCITY		Area (s.f.)	Discharge (cfs)	Description
							At Point (fps)	Mean in-vertical (fps)			
	21.0	1.5	0.0						0	0.0	Left edge water (0900)
	24.0	3.0	0.6	s	20	46	0.968	0.87	1.8	1.6	
	27.0	3.0	1.1	0.6	40	52		1.7	3.3	5.6	
	30.0	3.0	1.1	0.6	40	44		2	3.3	6.6	
	33.0	2.8	2.1	0.6	50	47		2.34	5.8	13.5	Edge grass
	35.5	5.5	3.4	0.8	40	41	2.15	2.94	18.7	55.0	Small cobble
				0.2	80	47	3.72				
	44.0	4.8	3.3	0.2	80	45	4.07	3.31	15.7	51.9	Small cobble
	45.0	1.0	3.2	0.6	30	46	1.44	2.64	3.2	8.4	Edge grass
				s	80	41	4.26				
	46.0	2.5	2.0	0.6	60	40		3.28	5.0	16.4	
	50.0	3.5	2.1	0.6	60	46		2.86	7.4	21.0	
	53.0	3.0	1.8	0.6	30	41		1.62	5.4	8.7	
	56.0	3.5	1.1	0.6	40	49		1.8	3.9	6.9	
	60.0	4.5	1.0	0.6	20	46		0.97	4.5	4.4	
	65.0	5.0	0.8	0.6	25	40		1.38	4.0	5.5	
	70.0	6.0	0.3	s	15	44	0.763	0.69	1.8	1.2	
	77.0	3.5	0.0					0	0.0	0.0	Right edge water (0945)
	56.0	56.0							83.7	206.8	

Table PLX 06-1: Survey Data

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
1	5000	5000	100	P06.TBM.C/L (TBM6A)
2	5000	4344.343096	101.448	P16.TBM.US (TBM6B)
11	4979.746546	4338.674674	100.66	T
12	4927.982426	4321.444807	100.456	T
13	4854.035847	4295.509772	100.056	SG/US
14	4816.355942	4283.816739	99.678	T
15	4789.591238	4274.849823	99.178	T
16	4759.127951	4265.102675	98.227	T
17	4739.995608	4258.408545	97.961	T
18	4737.936055	4257.49552	97.503	REW
19	4734.053898	4255.478932	96.963	G
20	4731.25489	4254.439164	96.442	G
21	4730.37703	4254.949058	95.904	C
22	4723.371355	4253.177224	95.159	C
23	4718.507601	4251.156727	94.757	C/TH
24	4708.654497	4247.78499	95.57	C
25	4707.426631	4247.540837	96.213	G
26	4697.643153	4244.69122	97.007	G
27	4692.022526	4242.386036	97.476	LEW
28	4684.348747	4239.619287	97.851	T
29	4658.056028	4231.429788	98.231	T
30	4630.131132	4222.614837	99.15	T
31	4602.224976	4213.818284	100.219	T
32	4575.803864	4204.391173	101.337	T
33	4748.382504	4172.045777	96.638	TH/FL
34	4632.176826	4394.409007	92.711	TH
35	4687.662896	4480.01247	94.19	TH
36	4661.796202	4575.390284	92.479	TH
37	4680.524956	4650.963681	94.531	TH
38	4652.468766	4718.058278	94.447	TH
39	4644.282661	4757.901634	92.818	TH
40	4609.455917	4832.657415	92.443	TH
41	4619.048048	4933.065908	93.577	TH
42	4645.396847	4975.531949	94.545	TH
43	4701.989746	5145.698229	92.424	TH/FL
44	4476.138306	5120.555172	100.666	T
45	4503.039882	5114.529282	100.057	T
46	4527.887209	5109.176656	99.893	T
47	4556.162824	5102.071331	99.581	T
48	4584.136111	5096.14779	99.163	T
49	4614.660876	5089.336499	98.871	T
50	4627.041946	5086.466088	98.357	T/HWM
51	4639.151275	5083.631026	97.041	T
52	4652.479224	5080.808458	95.171	LEW

Table PLX 06-1: Survey Data (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
53	4654.550242	5080.115075	94.244	G
54	4655.048582	5079.72639	92.86	C
55	4661.885138	5078.146301	92.797	TH
56	4665.896065	5076.920736	93.245	C
57	4666.045204	5076.8864	94.61	G
58	4670.595933	5075.737794	94.413	G
59	4675.178639	5074.791901	95.111	REW
60	4686.664587	5072.29918	95.462	T
61	4697.511117	5070.120885	96.429	NAIL
62	4719.874956	5064.200081	97.041	T
63	4748.014404	5057.750979	97.369	T
64	4779.023142	5050.232877	97.696	T
65	4808.467212	5043.56401	97.804	T
66	4828.3698	5031.732323	97.602	SG.C/L
67	4854.567397	5035.949779	98.103	T
68	4923.675936	5018.588161	98.264	T

Legend:

G = grass	TH = thalweg	US = upstream
T = tundra	CG = crest gage	TWET = wet tundra
C = cobbles	GB = ground break	M = mud
LEW = left edge of water	SH = shoulder	SB = sand bags
REW = right edge of water	DS = downstream	PK = "pk" nail
CL = center line		

file:plx6.xls

APPENDIX J: PLX 07

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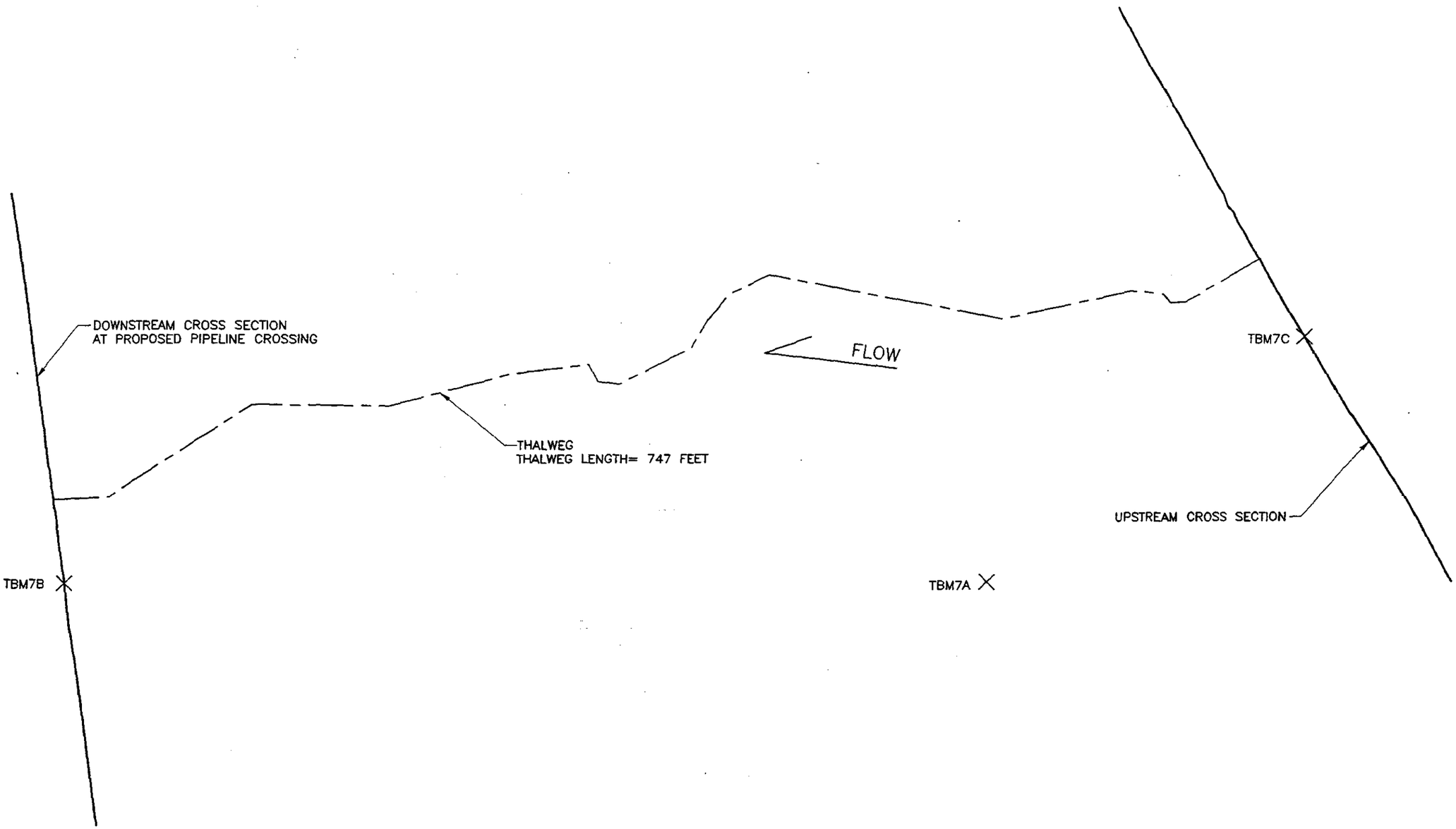


NOTES:
1. THE PRIMARY TEMPORARY BENCH MARK WAS ASSUMED TO HAVE: (1) AN ELEVATION OF 100.00 FEET, (2) A NORTHING OF 5000 FEET, AND (3) AN EASTING OF 5000 FEET. THE PRIMARY TEMPORARY BENCH MARK AT EACH STREAM PROVIDED THE VERTICAL AND HORIZONTAL CONTROL.
2. THE PRIMARY TEMPORARY BENCH MARK ON THIS STREAM IS TBM7A.

REVISION			
NO.:	DATE:		BY:

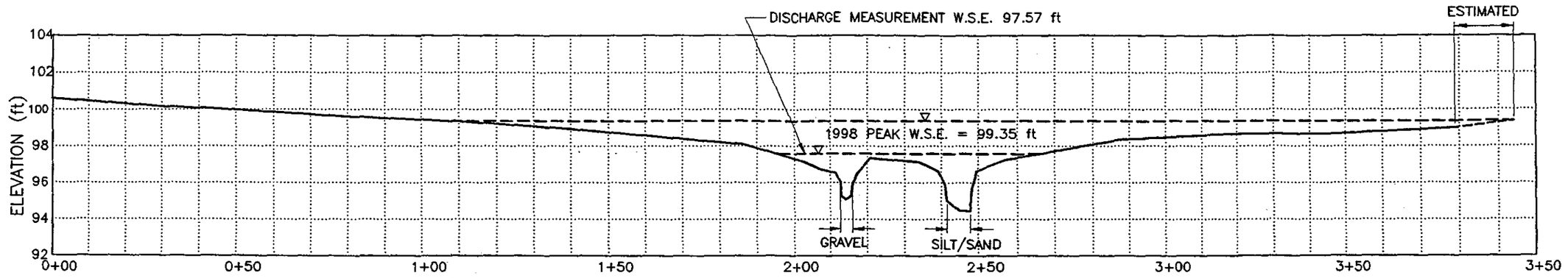
STREAM PLX07
PLAN

SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

Baker Michael Baker Jr., Inc.

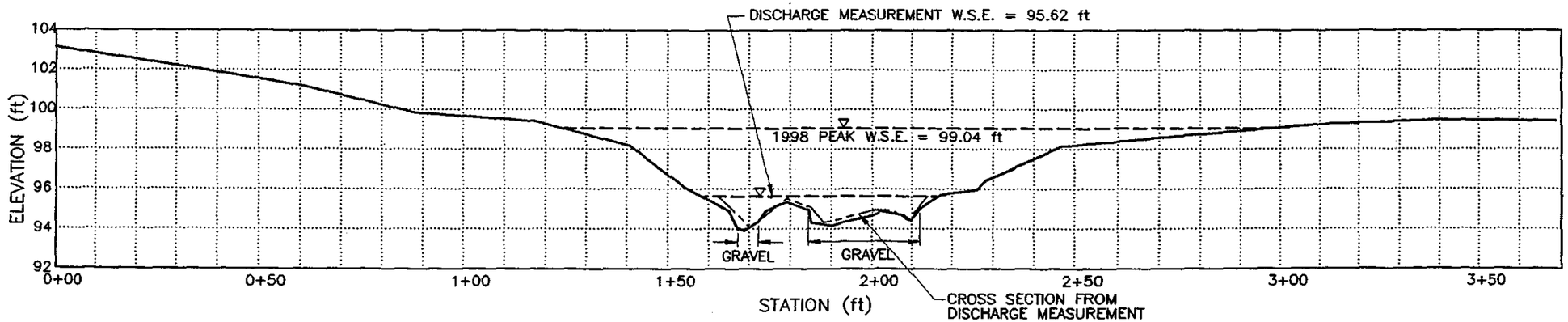
DATE:	8/3/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADP-X7
CHECKED:	JWA	SCALE:	1"= 60'

FIGURE:
PLX
07-1



PROFILE: PLX07 UPSTREAM CROSS SECTION

SCALE: H 1"= 30'
V 1"= 6'



PROFILE: PLX07 DOWNSTREAM CROSS SECTION AT PROPOSED PIPELINE CROSSING

SCALE: H 1"= 30'
V 1"= 6'

NOTES:
1. THE ELEVATIONS SHOWN ARE BASED ON AN ASSUMED ELEVATION OF 100.00 AT TBM7A.
2. W.S.E.= WATER SURFACE ELEVATION
3. THE DIFFERENCE IN THE SURVEY AND DISCHARGE MEASUREMENT CROSS SECTIONS IS DUE TO A SLIGHT DIFFERENCE IN WHERE THE MEASUREMENTS WERE MADE.

REVISION		
NO.:	DATE:	BY:

STREAM PLX07
PROFILES

SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

Baker Michael Baker Jr., Inc.

DATE:	8/3/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADP-X7
CHECKED:	JWA	SCALE:	VARIES

FIGURE:
PLX
07-2

Photo: PLX 07-1: Looking north at the proposed pipeline crossing (6/11/98).

Photo: PLX 07-2: Looking north at the discharge measurement cross section, located 60 feet upstream from the proposed pipeline crossing (6/1/98).

STREAM PLX 07 PHOTOGRAPHS	Baker Michael Baker Jr., Inc.		Photo Number:
SOURDOUGH AREA DEVELOPMENT PROJECT NORTH SLOPE, ALASKA	Date: 6/7/98	Project: 23247	PLX 07-1
	Drawn: JDA	File: photo07	
	Checked: JWA	Scale:	

DISCHARGE MEASUREMENT NOTES

LOCATION: PLX 07 at proposed pipeline crossing

Date: 6/1 ,1998 **Party:** J. Meckel, P. McGranahan

Width: 52 **Area:** 41.2 **Vel:** 2.00 **G.H.:** **Disch.:** 82.3 **cfs**

No Secs. 11 **G.H. change:** **in.:** **hrs.:** **Susp.:** Rod

Method coef.: 1 **Hor. Angle coef.** Noted **Sus. Coef.:** 1 **Meter No.**

Type of meter: Price AA

Date rated: Std No 1

Meter: **ft. above bottom of weight.**

Spin before meas. **ok** **after** ok

Method: Wading at proposed pipeline crossing, downstream cross section.

Gage Readings

Time	Recorder	Inside	Outside
	upstream x-sec	WSE=	97.57
	downstream x-sec	WSE=	95.62
Weighted M.G.H.			
G.H. corrections			
Correct M.G.H.			

Levels obtained

Measurement rated: **based on following conditions:**

Cross section: Irregular - grass, cobbles.

Flow: Not evenly distributed. **Weather:** **Air °F@:**

Gage: **Water °F@:**

Other:

Record Removed: **Intake flushed:**

Observer

Control Riffle 100-150 downstream clear.

Remarks Channel composed of firm grass < 8", cobbles = < 3", sand.

G.H. of zero flow: **ft.**

DISCHARGE MEASUREMENT NOTES (PLX 07 Continued)

Angle coef.	Dist. From Initial point (ft)	Width (ft)	Depth (ft)	Observ. depth	Revo-lutions	Time In seconds	VELOCITY		Area (s.f.)	Discharge (cfs)	Description
							At Point (fps)	Mean in-vertical (fps)			
	71.0	2.0	0.0								Left edge water (1030)
0.9	67.0	4.0	0.7	0.6	30	45	1.47	1.32	2.8	3.7	
0.94	63.0	6.5	1.6	0.6	30	46	1.44	1.35	10.4	14.0	
	54.0	7.5	0.1				0.20	0.20	0.8	0.2	
	48.0	4.5	0.6	0.6	60	40		3.28	2.7	8.9	
	45.0	4.0	1.3	0.6	60	42		3.13	5.2	16.3	Edge grass/cobble
	40.0	6.0	1.1	0.6	60	41		3.21	6.6	21.2	small cobble
0.98	33.0	6.0	0.7	0.6	50	45	2.44	2.39	4.2	10.0	" " "
0.97	28.0	4.5	0.7	0.6	20	45	0.99	0.96	3.2	3.0	" " "
	24.0	4.5	1.2	0.6	20	48		0.93	5.4	5.0	Edge grass/cobble
	19.0	2.5	0.0						0.0	0.0	Right edge water (1100)
	52.0	52.0							41.2	82.3	

Table PLX 07-1: Survey Data

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
1	5000	5000	100	P07.TBM (TBM7A)
2	5000	5519.894587	99.095	P07.P.C/L (TBM7B)
3	4999.924379	5519.934927	98.175	CG.C/L
11	4998.991317	4738.29578	100.591	T
12	5024.951223	4751.907536	100.169	T
13	5042.252794	4760.711702	99.983	T/HWM
14	5068.254338	4775.953955	99.615	T
15	5093.825312	4790.332706	99.348	T
16	5120.072867	4805.057362	98.956	T
17	5142.016449	4817.014268	98.524	CG/US (TBM7C)
18	5162.401449	4828.481951	98.079	T/HWM
19	5176.442808	4835.887721	97.161	T
20	5180.623785	4837.888121	96.728	T
21	5184.644539	4839.969685	96.539	LEW
22	5185.794509	4840.567255	96.036	G
23	5185.942442	4840.737481	95.288	C
24	5186.998854	4841.140483	95.073	TH
25	5187.940652	4842.423244	95.253	C
26	5188.24877	4842.63836	95.96	G
27	5189.558884	4843.337987	96.556	REW
28	5192.36185	4844.922087	97.332	G
29	5204.01914	4851.006886	97.142	G
30	5208.475423	4854.099237	96.596	LEW
31	5210.078886	4854.707701	95.87	G
32	5210.522445	4854.935932	95.044	M
33	5213.503043	4856.306426	94.485	M
34	5215.884766	4858.310044	94.446	M
35	5216.236536	4858.626009	95.678	G
36	5217.329368	4859.4108	96.608	REW
37	5224.157863	4862.074691	97.228	T
38	5250.623614	4876.828783	98.338	T
39	5277.137585	4891.8015	98.649	T
40	5302.026119	4906.138119	98.655	T
41	5330.653591	4921.845266	98.984	T
42	5211.392215	4790.037739	94.93	TH/FL
43	5162.274703	4884.807569	95.512	TH
44	5161.680933	4893.913256	95.219	TH
45	5166.963107	4897.434186	94.739	TH
46	5168.880116	4915.523284	94.81	TH
47	5153.255932	4990.768157	93.6	TH
48	5161.955667	5033.044297	94.268	TH
49	5178.683198	5120.290305	94.069	TH
50	5167.578118	5143.603635	93.78	TH
51	5152.51232	5156.201832	95.101	TH

Table PLX 07-1: Survey Data (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
52	5136.941383	5165.150234	94.06	TH
53	5115.856607	5206.794541	94.509	TH
54	5117.53841	5218.49549	93.405	TH
55	5127.347023	5223.867948	93.851	TH
56	5121.955773	5267.178323	94.702	TH
57	5103.379254	5336.329591	94.175	TH
58	5104.54735	5412.620289	94.22	TH
59	5050.389306	5494.285771	93.719	TH
60	5055.116251	5560.300872	94.359	TH/FL
61	5226.039613	5549.88817	99.42	T
62	5197.1792	5545.527739	99.466	T
63	5166.978521	5541.650708	99.209	T
64	5135.68495	5537.756247	98.695	T
65	5105.476213	5533.712243	98.137	T
66	5086.847418	5531.152886	96.405	T
67	5084.779843	5530.781146	95.964	T
68	5076.088444	5530.019301	95.701	T
69	5070.878708	5529.253799	94.984	REW
70	5068.572612	5528.983796	94.419	G
71	5066.380255	5528.544686	94.682	G
72	5060.918669	5527.849449	94.885	G
73	5060.256642	5527.501469	94.708	C
74	5054.244811	5526.914818	94.408	C
75	5049.009672	5526.089678	94.149	C/TH
76	5044.1978	5525.573612	94.297	C
77	5043.413949	5525.402693	94.926	LEW
78	5038.270091	5524.446326	95.33	G
79	5033.268432	5524.123374	94.914	REW
80	5031.388971	5524.044888	94.355	G/C
81	5027.989759	5523.632608	93.877	C/G
82	5026.379373	5523.246718	94.008	G
83	5024.128179	5523.226818	94.872	LEW
84	5013.355394	5521.618578	96.049	T
85	4976.909216	5517.354055	99.407	T
86	4947.867363	5512.865274	99.84	T

(continued on next page)

Table PLX 07-1: Survey Data (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
87	4920.366054	5509.016092	101.188	T
88	4893.196829	5505.420631	102.109	T
89	4860.572455	5501.155183	103.118	T

Legend:

G = grass	TH = thalweg	US = upstream	CL = center line
T = tundra	CG = crest gage	TWET = wet tundra	
C = cobbles	GB = ground break	M = mud	
LEW = left edge of water	SH = shoulder	SB = sand bags	
REW = right edge of water	DS = downstream	PK = "pk" nail	

file:plx7.xls

APPENDIX K: PLX 08

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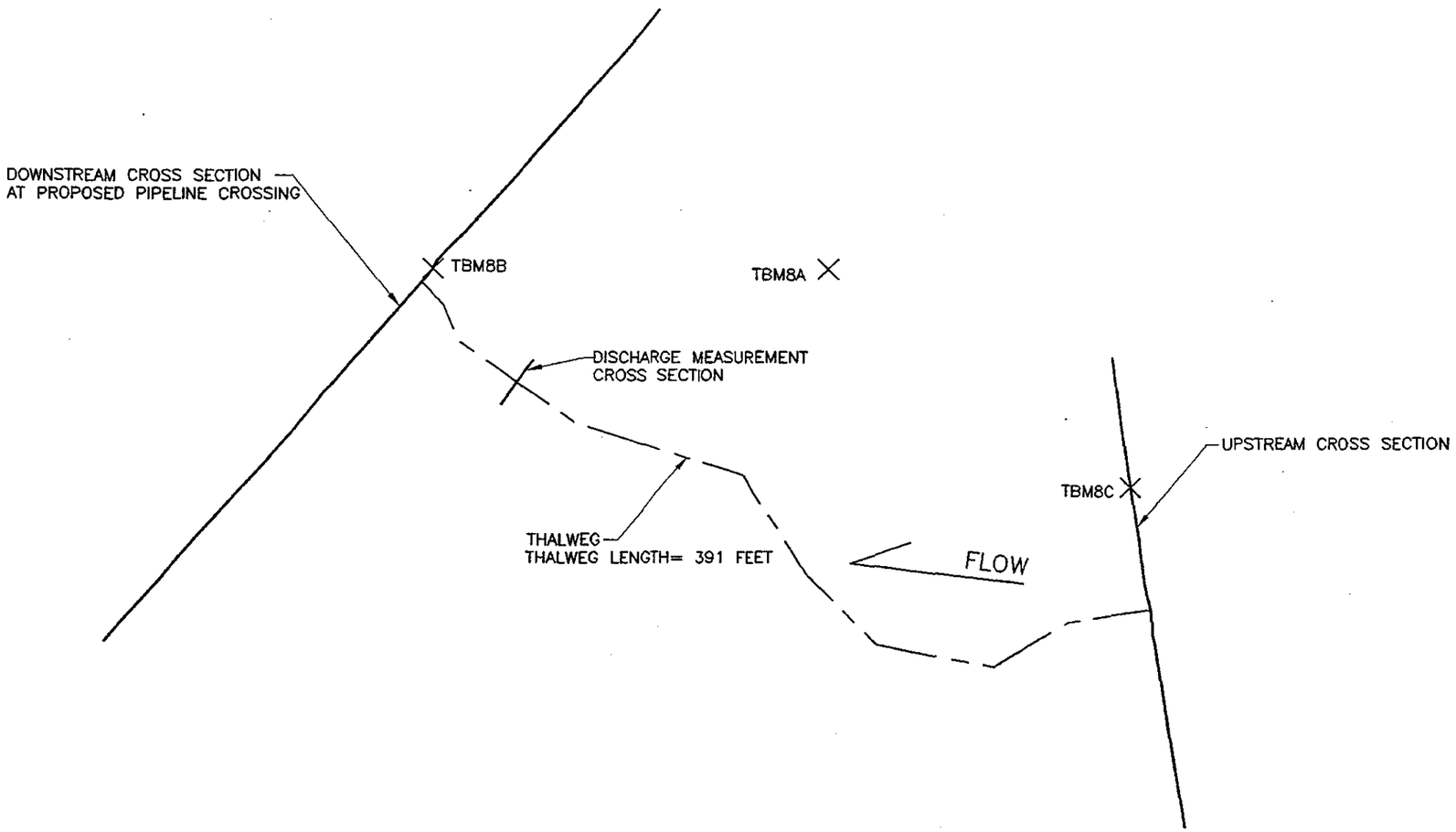


NOTES:

1. THE PRIMARY TEMPORARY BENCH MARK WAS ASSUMED TO HAVE: (1) AN ELEVATION OF 100.00 FEET, (2) A NORTHING OF 5000 FEET, AND (3) AN EASTING OF 5000 FEET. THE PRIMARY TEMPORARY BENCH MARK AT EACH STREAM PROVIDED THE VERTICAL AND HORIZONTAL CONTROL.
2. THE PRIMARY TEMPORARY BENCH MARK ON THIS STREAM IS TBM8A.

REVISION			
NO.:	DATE:		BY:

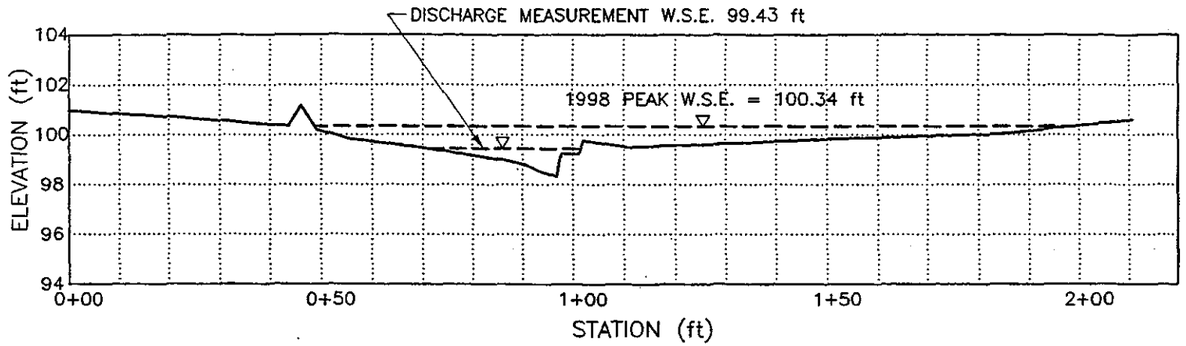
STREAM PLX08
PLAN

SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

Baker — Michael Baker Jr., Inc.

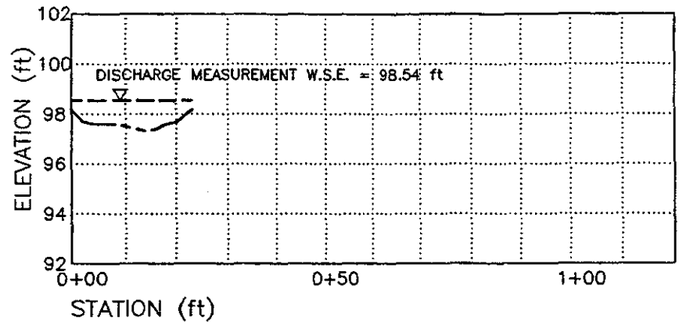
DATE:	8/3/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADP-X8
CHECKED:	JWA	SCALE:	1"= 60'

FIGURE: PLX 08-1



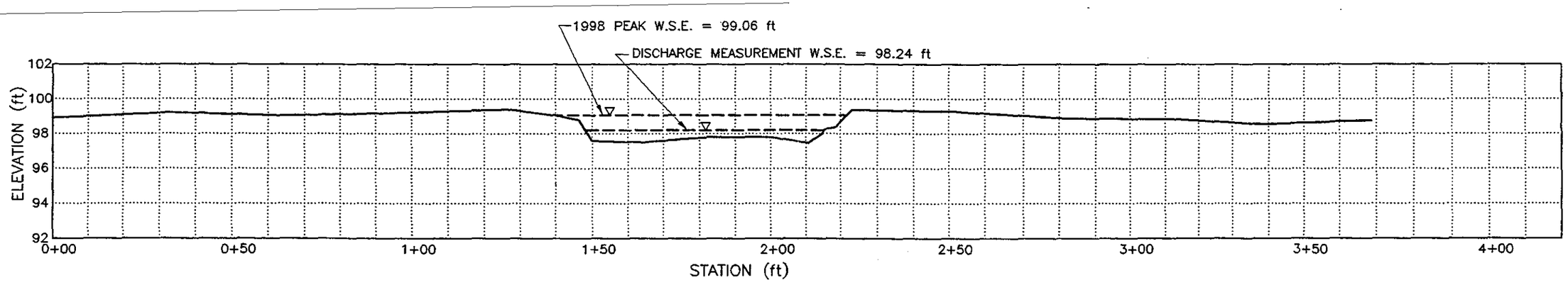
PROFILE: PLX08 UPSTREAM CROSS SECTION

SCALE: H 1"= 30'
V 1"= 6'



PROFILE: PLX08 DISCHARGE MEASUREMENT CROSS SECTION

SCALE: H 1"= 30'
V 1"= 6'



PROFILE: PLX08 DOWNSTREAM CROSS SECTION AT PROPOSED PIPELINE CROSSING

SCALE: H 1"= 30'
V 1"= 6'

NOTES:
1. THE ELEVATIONS SHOWN ARE BASED ON AN ASSUMED ELEVATION OF 100.00 AT TBM3A.
2. W.S.E.= WATER SURFACE ELEVATION
3. THE DISCHARGE MEASUREMENT CROSS SECTION IS LOCATED 60 FEET UPSTREAM FROM THE DOWNSTREAM CROSS SECTION.

REVISION			
NO.:	DATE:		BY:

STREAM PLX08
PROFILES

SOURDOUGH AREA DEVELOPMENT PROJECT
NORTH SLOPE, ALASKA

Baker Michael Baker Jr., Inc.

DATE:	8/3/98	PROJECT:	SADP
DRAWN:	BC	FILE:	SADP-X8
CHECKED:	JWA	SCALE:	VARIES

FIGURE: PLX 08-2

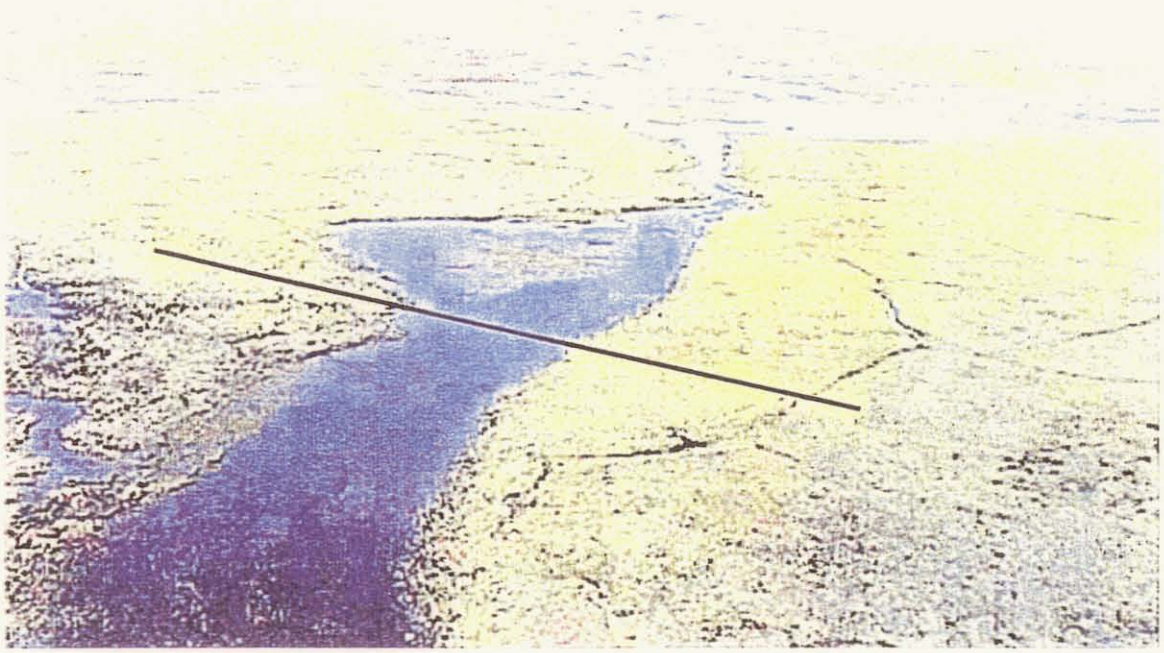


Photo: PLX 08-1: Looking north at the proposed pipeline crossing (6/11/98).

Photo PLX 08-2: Looking north at the proposed pipeline crossing (6/6/98).

STREAM PLX 08 PHOTOGRAPHS SOURDOUGH AREA DEVELOPMENT PROJECT NORTH SLOPE, ALASKA	Baker Michael Baker Jr., Inc.		Photo Number PLX 08-1
	Date: 6/7/98	Project: 23247	
	Drawn: JDA	File: photo08	
	Checked: JWA	Scale.	

DISCHARGE MEASUREMENT NOTES

LOCATION: PLX 08, 60 feet upstream from the proposed pipeline crossing

Date: 6/1 ,1998 **Party:** J. Meckel, P. McGranahan

Width: 23 **Area:** 14.0 **Vel:** 0.921 **G.H.:** **Disch.:** 12.9 **cfs**

No Secs. 12 **G.H. change:** **in.:** **hrs.:** **Susp.:** Rod

Method coef.: 1 **Hor. Angle coef.** 1 **Sus. Coef.:** 1 **Meter No.**

Type of meter: Price AA

Date rated: Std No 1

Meter: **ft. above bottom of weight.**

Spin before meas. ok **after** ok

Method: Wading 60' upstream from pipeline crossing.
Proposed pipeline crossing is at the
downstream cross section.

Gage Readings

Time	Recorder	Inside	Outside
	upstream x-sec	WSE=	99.43
	downstream x-sec	WSE=	98.24
Weighted M.G.H.			
G.H. corrections			
Correct M.G.H.			

Levels obtained

Measurement rated: Fair **based on following conditions:**

Cross section: Uniform grass.

Flow: Evenly distributed. **Weather:** **Air °F@:**

Gage: **Water °F@:**

Other:

Record Removed: **Intake flushed:**

Observer

Control Narrow channel & riffle 180' downstream clear.

Remarks slope = 1.23/260 ft. = .00473 in reach of 260 ft at measurement

G.H. of zero flow: **ft.**

DISCHARGE MEASUREMENT NOTES (PLX 08 Continued)

Angle coef.	Dist. From Initial point (ft)	Width (ft)	Depth (ft)	Observ. depth	Revo-lutions	Time In seconds	VELOCITY		Area (s.f.)	Discharge (cfs)	Description
							At Point (fps)	Mean in-vertical (fps)			
	32.0	1.5	0.0						0.0	0.0	Right edge water (1115)
	29.0	2.5	0.6	S	15	52	0.80	0.72	1.4	1.0	
	27.0	2.0	0.7	S	20	42	1.06	0.95	1.3	1.2	
	25.0	2.0	0.8	S	25	48	1.16	1.04	1.6	1.7	
	23.0	2.0	0.9	S	25	48	1.16	1.04	1.8	1.9	
	21.0	2.0	0.8	S	25	47	1.18	1.06	1.6	1.7	
	19.0	2.0	0.7	S	20	46	0.97	0.87	1.4	1.2	
	17.0	2.0	0.7	S	20	46	0.97	0.87	1.3	1.1	
	15.0	2.0	0.7	S	20	41	1.08	0.97	1.3	1.3	
	13.0	2.0	0.7	S	20	50	0.89	0.80	1.3	1.0	
	11.0	2.0	0.5	S	20	49	0.91	0.82	1.0	0.8	
	9.0	1.0	0.0								Left edge water (1200)
	23.0	23.0							14.0	12.9	

Table PLX 08-1: Survey Data

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
1	5000	5000	100	P08.TBM. (TBM8A)
2	5000	5172.17623	99.859	P08.PC/L (TBM8B)
3	5000.283708	5172.114383	98.357	CG.C/L
11	4960.544301	4878.667929	100.601	T
12	4934.306032	4874.974541	100.014	T
13	4902.933202	4870.536246	99.846	CGUS (TBM8C)
14	4878.361672	4866.516362	99.609	T
15	4861.688785	4864.529377	99.504	T
16	4853.22665	4862.691964	99.753	T
17	4852.092483	4862.402101	99.215	T
18	4848.991317	4861.774116	99.231	T
19	4848.494388	4861.716966	99.063	REW
20	4847.951853	4861.377095	98.306	G/TH
21	4844.975753	4861.135157	98.488	G
22	4841.856093	4860.951673	98.781	G
23	4837.481966	4860.951026	98.974	G
24	4832.664494	4859.878909	99.112	LEW
25	4820.14139	4857.772078	99.487	T
26	4806.851929	4855.827829	99.842	T
27	4800.822782	4854.883162	100.207	T
28	4797.686301	4854.496401	101.167	T
29	4795.380336	4853.986334	100.365	T
30	4774.3744	4850.559402	100.695	T
31	4752.188895	4846.907246	100.965	T
32	4856.301352	4801.579255	98.803	TH/FL
33	4842.733656	4898.63257	97.273	TH
34	4823.025695	4929.364573	98.535	TH
35	4832.926501	4979.559948	98.198	TH
36	4864.322205	5009.675919	96.53	TH
37	4908.166516	5036.839271	97.957	TH
38	4916.16756	5062.575334	97.855	TH
39	4932.536614	5102.931411	97.592	TH
40	4967.250989	5160.846782	97.701	TH
41	4984.387414	5167.812052	97.674	TH
42	5013.728359	5206.690374	97.399	TH/FL
43	4834.595189	5314.586377	98.91	T
44	4859.135107	5293.168336	99.193	T
45	4883.380928	5272.896179	99.037	T
46	4906.319156	5252.330716	99.183	T
47	4930.085393	5231.690131	99.406	T
48	4940.399085	5223.473411	99.062	T
49	4945.677819	5219.209496	98.775	T
50	4946.930208	5218.022565	97.926	LEW
51	4948.355495	5216.68774	97.586	G
52	4959.140096	5207.598658	97.504	G

Table PLX 08-1: Survey Data (continued)

Survey Point Number	Easting (ft)	Northing (ft)	Elevation (ft)	Description
53	4973.115992	5195.447566	97.802	G
54	4986.196228	5184.241338	97.802	G
55	4992.035466	5178.933997	97.548	G
56	4994.404923	5177.217257	97.465	G/TH
57	4997.201233	5174.655896	97.954	REW
58	4997.879765	5174.226434	98.238	T
59	5004.523525	5169.758559	99.354	T
60	5025.319535	5150.742332	99.287	T
61	5048.94387	5129.611704	98.864	T
62	5070.786564	5111.059173	98.832	T
63	5090.897828	5093.245898	98.531	T
64	5113.712237	5073.59503	98.753	T

Legend:

G = grass	TH = thalweg	US = upstream	CL = center line
T = tundra	CG = crest gage	TWET = wet tundra	
C = cobbles	GB = ground break	M = mud	
LEW = left edge of water	SH = shoulder	SB = sand bags	
REW = right edge of water	DS = downstream	PK = "pk" nail	

file:plx8.xls