ALASKAN ARCTIC GAS PIPELINE COMPANY

ArcticGas

EXHIBIT F

(PORTION)

MAPS AND ALIGNMENT SHEETS

AND

EXHIBIT G

(PORTION)

FLOW DIAGRAMS

CONTINENTAL DELIVERY SYSTEM

ARCTIC GAS PIPELINE SYSTEMS

ALASKAN ARCTIC GAS PIPELINE COMPANY

CANADIAN ARCTIC GAS PIPELINE LIMITED

AND

CONNECTING SOUTHERN CANADIAN AND U.S. PIPELINE SYSTEMS

ALIGNMENT SHEETS

PIPELINE ROUTE IN ALASKA

For

ALASKAN ARCTIC GAS PIPELINE COMPANY

Prepared by

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

DESCRIPTION OF ALIGNMENT SHEETS AND OVERLAYS

This volume contains a group of photomosaic strip maps — called "Alignment Sheets" — which show the area proposed to be traversed by the proposed pipeline. The proposed location of the pipeline and related facilities are shown on each sheet, and the sheets contained in this volume show the complete route over the area covered by this volume, with the top sheet covering the most western or northern end of the area, with following sheets moving to the east or south.

The other data which appears on each Alignment Sheet, and the Environmental overleaf sheets which accompany Alignment Sheets, are described hereinafter.

ALIGNMENT SHEETS

The sheet following this sheet is a Master Index Map, (a small version of which is set forth on the lower right hand corner of each Alignment Sheet), and each Alignment Sheet may be located on such map. The numbering system on the Index Maps refers to the last parts of the nine digit drawing number which appears in the bottom right hand corner at each Alignment Sheet. For example, Alignment Sheet 3A-0220-1005 appears as sheet number 5 of Section 3A on the Master Index Map.

ACCURACY OF SCALE

The mosaic Sections of the Alignment Sheets are uncontrolled, which means that no corrections have been made for variations in flying altitude, airplane tilt, or distortion caused by mountinous terrain. As a result, the nominal horizontal scale 1" = 2000' shown on the Alignment Sheets is only approximate. The scale for each Alignment Sheet was checked against topographical maps, and the horizontal scale accuracy, expressed as a percentage, was calculated for each individual sheet. A weighted average was then calculated for the entire line section. The overall accuracy of Alignment Sheets 3A-0200-1001 to 3A-0200-1016 is -2.0%. It should be emphasized that this inaccuracy applies only to the mosaic sections of the Alignment Sheets and not to the pipeline mileages, which were scaled from government topographical maps and transferred to the mosaics.

AERIAL PHOTOGRAPHY

The aerial photography used to produce the mosaic has been obtained since 1970. All photography is at a nominal horizontal scale of 1" = 2000'.

ALIGNMENT SHEET DATA

The following information appears on the Alignment Sheets:

1. Pipeline and Facilities Location

The facilities referred to are pipeline compressor stations, meter stations, mainline block valves, airstrips, and associated access roads. Pipeline mileposts are also shown.

2. Terrain and Soils Information

Airphoto interpreted terrain typing has been mapped on the photomosaic portion of the Alignment Sheets. An abbreviated legend which appears on the sheets defines the symbols used. Drillhole locations, logs and legends are also shown on the Alignment Sheets. A description and analysis of the terrain typing and the confirming borehole data is presented in other Sections of the application.

3. Borrow Areas, Staging Areas, Access Roads

The borrow areas, staging areas, and associated permanent and temporary access roads planned by the Applicant have been shown in those situations in which they appear within the area covered by the mosaic.

4. Profile

An approximate pipeline profile is shown on each Alignment Sheet at a horizontal scale of 1" = 2000' and a vertical scale of 1" - 200'. This profile was plotted from Alaska Topographic Series Maps.

5. Erosion Control Categories

The category of erosion control measure applicable to the area shown on the mosaic is stated on each sheet. An explanation of the parameters that were used to select the categories of erosion control measures and a description of those categories, appears in other Sections of the application.

6. Areas of Potential Buoyancy

The buoyancy condition and design solution applicable to the area shown on the mosaic is stated on each sheet. A description of potential buoyancy conditions and design solutions relative thereto appears in other Sections of the application.

7. Revegetation Categories

Right-of-way revegetation technique code numbers appear on the Alignment Sheets. Those numbers related to categories of materials to be used, and techniques to be applied for purposes of revegetation. Such materials and techniques are described in other Sections of the application.

8. River Crossing Reference Drawings

Reference drawing numbers are shown on the Alignment Sheets for river and stream crossings. This typical reference drawing appears at the back of this Alignment Sheet volume.

Erosion control and buoyancy measures relative to the crossing are indicated or referred to on the river crossing drawing.

9. Depth of Cover

Minimum depth of cover over the pipeline is shown on the Alignment Sheets as a general note. The factors upon which depth of cover is dependent appear in other Sections of the application.

10. Mapping Co-ordinate System

The Universal Transverse Mercator Grid System is shown on all Alignment Sheets.

ENVIRONMENTAL DATA SHEETS

The second copy of the Alignment Sheets are Environmental Data Sheets which indicate environmental information relative to the area covered by the mosaic, including any specific environmental concerns and the related protective measure. Such information covers vegetation, birds, fish, mammals, archeology and current human land use.

Unless otherwise stated, the comments on the data sheets are applicable to a zone which is approximately 2,000 feet wide, on either side of the pipeline route, and which extends the full length of the sheet on which the comments appear. Vertical lines appearing in the comment space indicate a boundary for comment applicability when a comment covers less than the full length of the sheet. Absence of comment indicates an area of relatively low sensitivity.

PRINT REDUCTION AND SCALE

All Alignment Sheets contained in this volume have been photo-reduced from originals which were larger than these prints. The nominal scale on the original drawings is 1" = 2000'. The nominal scale on the prints in this volume is 1" = 2530'.

On each print, a bar scale appears in the lower right corner, above the title block. The bar scale is correct and may be used to scale distances in the photomosaic.

A. DRILL HOLE DATA

1. DATA PRESENTATION

A(B)*			C
D	E	F	G

A – Drill hole number.

B – Temperature probe installation number.

C – Date boring made.

D – Soil and bedrock description (see Section B, 'Soil Description')

E – Depth in feet of strata changes, and symbolic representation of soil and bedrock.

F – Permafrost Conditions:
column shaded – indicates frozen soil.
column unshaded – indicates unfrozen soil.
---- indicates interpreted depth of active layer.
Frozen soil described in accordance with NRC permafrost description system (see Section C).

G – Water or ice content expressed in percent of dry weight of soil solids.

* – Indicates boring made in area exhibiting surface disturbances (e.g. cleared areas, seismic lines, winter roads).

NOTES:
1. A double line at the bottom of the drill hole column indicates 'Refusal' (i.e. the drill could not penetrate further).
2. The drill hole data is not plotted to scale, but the water or ice content determinations are shown in their true relative position within a given stratum.

2. GRAPHIC SOIL SYMBOLS

See Section B for explanation of soil description terms and symbols.

BEDROCK · BOULDERS, COBBLES · CH, CH-CL · CL, CL-CH · CL-ML · GC · GM · GP, GW · ICE · MH, MH-ML · ML, ML-MH · OH · OL · PEAT, MOSS · SC · SM · SP, SW · TILL · WATER

3. SOURCES OF DRILL HOLE DATA

DRILL HOLE NUMBERS	DATE PERFORMED	TYPE OF DRILLING
2 – 282	Feb. – April, 1971	Rotary (air)
285-497	June – July, 1971	Auger
1000 series 2000 series 3000 series 4000 series	July – Aug. 1972	Auger
5000 series 6000 series 7000 series	Aug. – Sept. 1972	Rotary (air)
2A – 69B	Aug. – Nov. 1970	Auger
5NCPC – 373NCPC	Feb. – April, 1972	Auger
72C series	Feb. – April, 1972	Rotary (air)
A2-A114	June – July, 1971	Auger
B – series	Sept. – Nov 1969	Rotary (air)
H72 series	Aug. – Sept. 1972	Auger
N series	June – July, 1971	Auger
N73 series	May – June, 1973	Auger
P series PA series	Feb. – April, 1971	Rotary (air)
PBS series	October, 1970	Auger, Drive Sampling
R series	Feb. – April, 1971	Auger
ÄG series	July – Oct. 1973	Auger

NOTES:
1. Drill hole data is shown on the alignment sheets only for those drill holes which are within or near the mosaic area on the alignment sheets.
2. The drill hole numbers are shown above as they appear on the alignment sheets.

B. SOIL DESCRIPTION

1 SOIL IDENTIFICATION SYSTEM

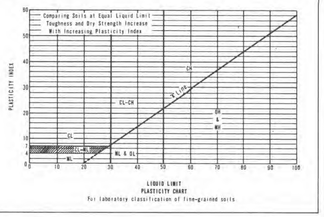
The soil descriptions obtained from the drilling programs described in section A.3 have been converted into abbreviated soil descriptions on the alignment sheets using the Unified Soil Classification (USC) system symbols (see section B.2). The soil descriptions appear in area D of the boring column (see Section A-1). The classification is given in bold type, and data which modifies or augments the basic USC symbol appears in lighter type. The terms which modify or augument the USC descriptions are based on a system of soil identification developed by D. Burmister. An abbreviated description of the Burmister system is presented in Section B-3. The abbreviation and terms used which are not covered by the two systems are listed in Section B-4.

2 UNIFIED SOIL CLASSIFICATION SYSTEM

A complete description of the USC system of soil classification will be found in Reference 1, described in Section B.5. below. Descriptions of this system will also be found in References 2 and 3.

UNIFIED SOIL CLASSIFICATION (Including Identification and Description)

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES	FIELD IDENTIFICATION PROCEDURES (excluding particles larger than 3 inches and basing fractions on estimated weights)	LABORATORY CLASSIFICATION CRITERIA
COARSE-GRAINED SOILS More than half of material is LARGER than No. 200 sieve size.	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size.	Clean gravels (little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate particle sizes	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between one and 3 Not meeting all gradation req'ts for GW
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines	Predominantly one size or a range of sizes with some intermediate sizes missing	
		Gravels with fines (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures	Nonplastic fines or fines with low plasticity (see ML below)	Atterberg limits below "A" line or PI less than 4 Atterberg limits above "A" line or PI greater than 7 Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures	Plastic fines (see CL below)	
	SANDS More than half of coarse fraction is smaller than No. 4 sieve size. (For visual classification, the ¼ in. size may be used as equivalent to the No. 4 sieve size)	Clean sands (little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	Wide range in grain size and substantial amounts of all intermediate particle sizes	$C_u = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between one and 3 Not meeting all gradation req'ts for SW
			SP	Poorly-graded sands, gravelly sands, little or no fines	Predominantly one size or a range of sizes with some intermediate sizes missing	
		Sands with fines (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures	Nonplastic fines or fines with low plasticity (see ML below)	Atterberg limits below "A" line or PI less than 4 Atterberg limits above "A" line or PI greater than 7 Limits plotting in hatched zone with PI between 4 and 7 are borderline cases req'g use of dual symbols
			SC	Clayey sands, sand-clay mixtures	Plastic fines (see CL below)	
FINE-GRAINED SOILS More than half of material is SMALLER than No. 200 sieve size. (For visual classification, the ¼ in. size may be used as equivalent to the No. 200 sieve size)	Silts and Clays Liquid limit less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity		
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
			OL	Organic silts and organic silty clays of low plasticity		
	Silts and Clays Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			CH	Inorganic clays of high plasticity, fat clays		
			OH	Organic clays of medium to high plasticity, organic silts		
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils		



NOTES:
1. The above chart has been adapted from Table I in Reference 1, below.
2. Soils possessing characteristics of two groups are designated by combinations of group symbols. For example, GW-GC, well-graded sand-gravel mixture with clay binder.
3. Clay soils of intermediate or medium plasticity (i.e., liquid limit between 30 and 50) are indicated by the compound symbol CL-CH. Clay soils with a liquid limit greater than 50 but less than 55 are indicated by the compound symbol CH-CL.
4. All sieve sizes on the above chart are U.S. standard.

3 BURMISTER SOIL IDENTIFICATION SYSTEM

The Burmister soil identification system has been used to augment or modify the USC symbols. These modifing terms appear in lighter type in the descriptions. The chart presented below summarizes the elements of the Burmister system which appear on the alignment sheets. A complete description of this system can be found in Reference 4, listed below.

Definitions of Terms Identifying The Composition of Granular Soils						Definitions of Terms Identifying The Gradation of Granular Components		
Component	Identification		Terms Identifying Proportions		Defining Range of Percentages by Weight	Gradation Designation for Identification		Defining Proportions
	Written	Symbol	Written	Symbol		As Written	Symbol	
Principal component	GRAVEL	G	—	—	50 or more	coarse to fine or coarse medium to fine	cf cmf	All fractions greater than 10 per cent of the component, but the medium components predominates
	SAND	S	—	—				
	SILT	Z	—	—				
Minor component	Gravel	G	and	a-	35 to 50	coarse to medium	cm	less than 10 per cent fine
	Sand	S	some	s-	20 to 35	medium to fine	mf	less than 10 per cent coarse
	Silt	Z	little	l-	10 to 20	medium	m	less than 10 per cent coarse and fine
			trace	t-	1 to 10	fine	f	less than 10 per cent coarse and medium

NOTES: (1) The chart has been adapted from Table II in Reference 4.

B. SOIL DESCRIPTION

4 ABBREVIATIONS USED FOR SOIL DESCRIPTIONS

BDRK.....Bedrock
bldr(s).....boulder(s)
cbl(s).....cobble(s)
cvr.....cover
fgmt(s).....fragment(s)
Gs.....Grass
wd.....wood
lnsd.....lensed
lyrd.....layered
Ms.....Moss
org.....organic
Pt.....Peat
rt(s).....root(s)
Wx.....Weathered (bedrock)
SHL.....Shale
sm(s).....seam(s)
SS.....Sandstone
Sts.....Siltstone
veg.....Vegetation
vvd.....varved

NOTE:
In those instances where the field personnel have identified a stratum as TILL on the boring logs, this term has been included in the stratum description on the alignment sheets. Where the stratum has been identified as 'TILL-like', it has been noted as 'TILL' on the alignment sheets. Till is a geological term describing soil deposited by glacial action which characteristically consists of a heterogeneous mixture of clay through gravel soil sizes, containing varying amounts of cobbles and boulders.

5 REFERENCES

(1) UNIFIED SOIL CLASSIFICATION SYSTEM, TECHNICAL No. 3-357; prepared for Office, Chief of Engineers by Waterways Experimental Station, Vicksburg Mississippi, Corp of Engineers, U.S.A. Army; Volume 1, March 1953
(2) Wagner, A.A., 'Classifying Soils by Unified Soil Classification System; in PROCEDURES FOR TESTING SOILS, published by American Society for Testing and Materials, Philadelphia, Pa; Fourth Edition (revised), 1963; Chapter 1.
(3) EARTH MANUAL: prepared by Bureau of Reclamation, U.S.A. Dept. of Interior, First Edition (revised), 1963; Chapter 1.
(4) Burmister, D.M.; Identification of Soils;; in PROCEDURES FOR TESTING SOILS, published by American Society for Testing and Materials, Philadelphia, Pa; Fourth Edition, December 1964, pp. 221-233.

C. PERMAFROST DESCRIPTIONS

1. GENERAL

The nature of the frozen soils encountered in the borings has been described in accordance with the N.R.C. system of permafrost description which can be found in Reference 1. This system is summarized in the tables, Section C.2 below. In some instances, these descriptions are given for frozen active layer soils; in other instances insufficient data was recorded on the boring logs to allow assignation of a permafrost category.

2. PERMAFROST DESCRIPTION SYSTEM

A. ICE NOT VISIBLE			
Group	Subgroup		
Symbol	Description		Symbol
N	Poorly bonded or friable		Nf
	No excess ice well-bonded Excess ice	Nb	Nbn
			Nbe

B. VISIBLE ICE LESS THAN 1 INCH THICK		
Group	Subgroup	
Symbol	Description	Symbol
V	Individual ice crystal or inclusions	Vx
	Ice coatings on particles	Vc
	Random or irregularly oriented ice formations	Vr
	Stratified or distinctly oriented ice formations	Vs

C. VISIBLE ICE GREATER THAN 1 INCH THICK		
Group	Subgroup	
Symbol	Description	Symbol
ICE	Ice with soil inclusions	ICE
	Ice without soil inclusions	ICE

NOTES: (1) The above charts have been adapted from Table I in Reference 1.

3 REFERENCES

(1) Phillarnen, J.A., and Johnston, G.H.; GUIDE TO A FIELD DESCRIPTION OF PERMAFROST FOR ENGINEERING PURPOSES: TECHNICAL MEMORANDUM 79 (NRC 7576); published by Associate Committee on Soil and Snow Mechanics, National Research Council of Canada, Ottawa, Ontario; October 1963.

D. TERRAIN MAPPING

1. GENERAL

The terrain mapping presented on the alignment sheets was done by J.D. Mollard and Associates, Regina, Saskatchewan. This mapping was done using airphoto interpretation techniques including stereoscopic examination of aerial photography, review and analysis of available published geological and geographical information, and analysis of field boring data obtained for this project.

The terrain mapping generally outlines landforms, but, where the scale of the photography permits, the landform is further subdivided into ''phases'' (distinctly different expressions of the same basic landform) and ''features'' (secondary landform elements within a basic landform, e.g., sand dunes). In some cases two or more landforms may be so intimately associated that they cannot be separated at the scale of the photography used. This type of map unit is termed a ''complex''.

The terrain map unit symbols were generally created from the initial letters of the phrase describing the landform they designate. For example, ''AFP'' represents ''Active Flood Plain''; ''GLB'' represents ''Glacial Lake Basin''. Other symbols are convenient abbreviations of the landform element, e.g., ''TK'' for the thermokarst features.

Each terrain map unit within a particular region (called a ''physiographic division'' –see below) is characterized by a data sheet which describes the nature of that unit in detail including; a description of the landform and its constituent materials, permafrost conditions, topography, vegetation, a stereoscopic pair of airphotos illustrating the terrain unit, the major diagnostic features used to identify the landform a list of the boreholes made in the terrain unit, and estimate of the engineering properties of the materials comprising the landform, and drainage characteristics within the map unit. A complete assemblage of such data sheets is called a ''terrain legend''. For convenience, an abbreviated ''Terrain Typing Legend'', providing a brief description of the terrain map units, is presented on the right hand side of each alignment sheet.

Considerable variation in the nature of the materials comprising a landform can occur depending on the climate, topography and geology of a given region (e.g., mountainous vs. plains areas; sedimentary vs. igneous bedrock). In order that such variations could be taken into account, the terrain mapping is presented in regional segments called ''physiographic divisions''. These physiographic divisions are designated by roman numerals appearing at the top of the abbreviated terrain legend on the alignment sheets, and the location of these segments is shown on the ''Master Index Map'' prefacing the alignment sheets.

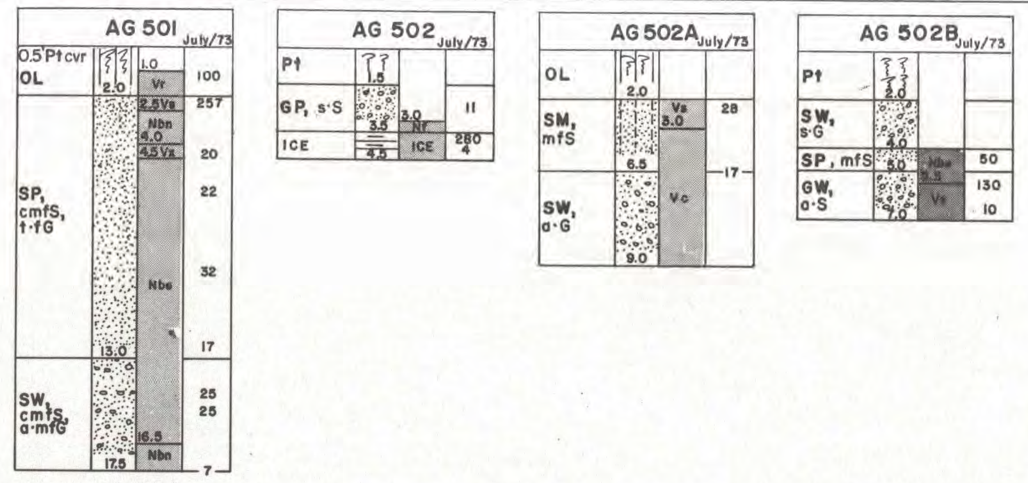
NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY ALBERTA
ENGINEERS FOR
CANADIAN ARCTIC GAS PIPELINE LIMITED

DRILL HOLE, SOIL DESCRIPTION
PERMAFROST DESCRIPTIONS
AND TERRAIN MAPPING

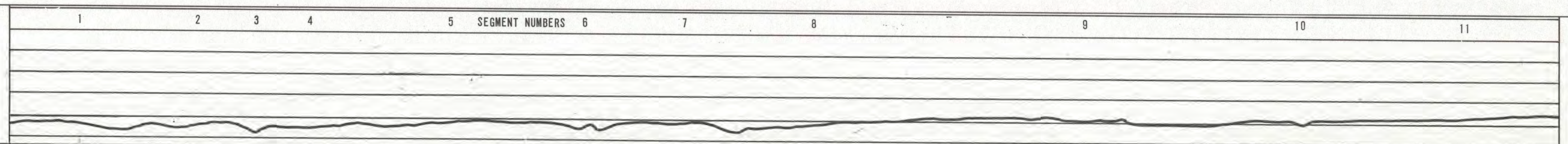

BEAUFORT SEA
AMUNDSEN GULF
ALASKA
YUKON TERRITORY
DISTRICT OF MACKENZIE
NORTHWEST TERRITORIES
BANKS ISLAND
VICTORIA ISLAND
PRINCE OF WALES ISLAND
M'CLINTOCK CHANNEL
PRINCE ALBERT PENINSULA
WOLLASTON PENINSULA
MELVILLE HILLS
RICHARDSON MOUNTAINS
BRITISH MTNS.
PHILIP SMITH MTNS.
DAVIDSON MTNS
OGILVIE MOUNTAINS
GREAT BEAR LAKE
CORONATION GULF
Prudhoe Bay
Demarcation Pt.
Inuvik
Aklavik
Tuktoyaktuk
Fort McPherson
Old Crow
Fort Yukon
Fairbanks
Dawson
Norman Wells
Fort Norman
Fort Good Hope
Fort Franklin
Coppermine
Port Radium
Sachs Harbour
Holman Island
Paulatuk
Cambridge Bay
Bathurst Inlet
Arctic Circle
Yukon River
Porcupine River
Peel River
Arctic Red River
3A
VIII
LEGEND
3A DRAWING SECTION NUMBER
3 LOCATION AND NUMBER OF ALIGNMENT SHEET
VIII PHYSIOGRAPHIC DIVISION NUMBER AND BOUNDARY
SCALE
miles
DESIGNED BY:
DRAWN BY:
CHECKED BY:
ENGINEERS APP.
PROJECT MANAGER:
NORTHERN Engineering Services Company Limited
NORTHERN ENGINEERING SERVICES COMPANY LIMITED
ENGINEERS FOR
ALASKAN ARCTIC GAS PIPELINE COMPANY
MASTER INDEX MAP
GAS PIPELINE ROUTE ALIGNMENT
AND TERRAIN DATA SHEETS
ALASKA
DATE: JAN. 16, 1974
PROJECT No.
DRAWING No 3-0214-1008 -C
REV.

OWNERSHIP

DRILL HOLE DATA



PROFILE



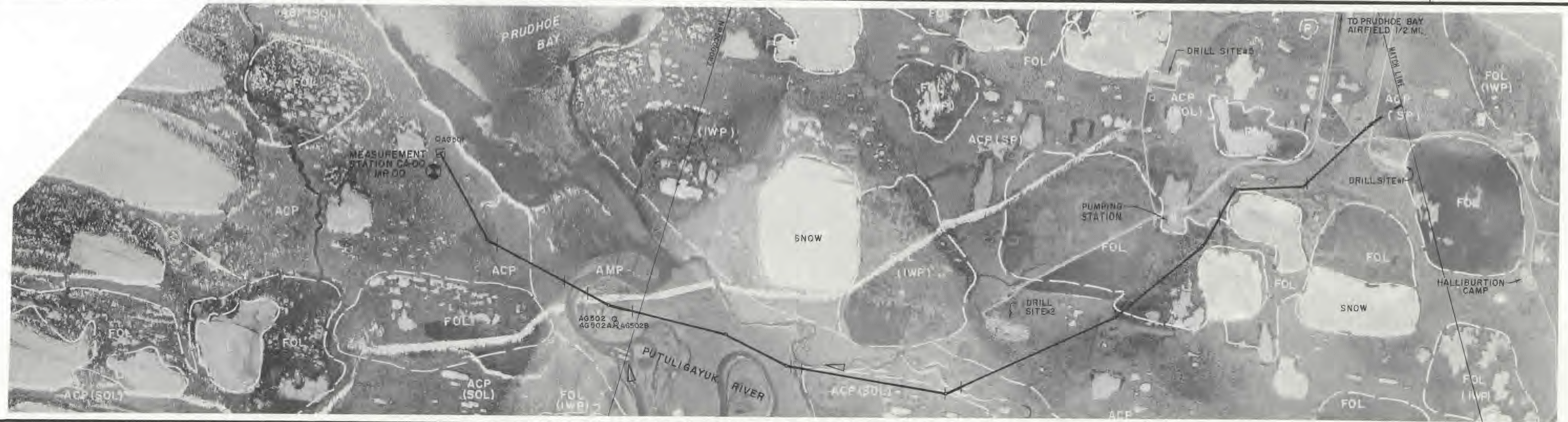
DRILL HOLE DATA LEGEND

A-Drill hole number
B-Temperature probe number
C-Date drill hole made
D-Soil/bedrock description
E-Depth of strata changes and graphical soil symbols
F-Permafrost conditions: Shaded-frozen; Unshaded-unfrozen
G-Water/ice content (% of dry weight)
*-Indicates drill hole in disturbed terrain

SOIL COMPONENT SYMBOLS & ABBREVIATIONS: G-Gravel, S-Sand, M-Silt, C-Clay, O-Organic, P-Peat, P-Poorly graded, W-Well graded, L-Low plasticity, H-High plasticity, cbl(s)-cobble(s), bldr(s)-boulder(s)

ABBREVIATIONS FOR MINOR SOIL COMPONENT PERCENTAGES: a-and 35 to 50%, s-some 20 to 35%, l-little 10 to 20%, t-trace 1 to 10%

MISCELLANEOUS ABBREVIATIONS: bdrk-bedrock, c-coarse, cvr-cover, f-fine, Gr-Grass, lnsd-lensed, lyrd-layered, m-medium, Ms-Moss, org-organic, veg-vegetation, vvd-varved



TERRAIN TYPING LEGEND

VIII -- ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary
TERRAIN TYPES

- ACP — Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata
- AFD — Alluvial fan deposits: thin silt-mantled broad low-gradient ($1/3^o$ to 2^o) alluvial fans underlain by deep silty to clean sand and gravel with generally lower excess ice contents
- AFP — Active flood plain: mainly exposed riverbed sand and gravel strata
- AMP — Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata
- BR — Bedrock: mainly folded and faulted Lower Cretaceous shale and sadnstone with patches of thin overburden
- FFP — Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata
- OW — Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents
- RSR — Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

- B — Bedrock-controlled relief
- LST — Lobate solifluction terraces on steep bedrock slopes
- P — Pingos and hydrolaccoliths
- ETB — Eroding thaw banks
- MF — Mudflow failures: thawed and failed ice-rich silt
- IWP — Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

- FOL — Former oriented lakes, now partly filled with peat and organic silt
- SOL — Small oriented lakes and ponds, frequently sub-rectanguiar in outline
- SP — Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil
- HD — Horsetail drainage on smoothly rounded highly ice-rich silt mantle
- BD — Beaded drainage
- AUF — Aufeis (flood icing) occurrences

Depth phases

- d — 5 to 10 ft of ice-rich silty topstratum

Discontinuous exposures of subdued and submasked moraine and outwash plains

- OM — Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt and fine sand
- OW — Old outwash (sand, gravel, cobbles) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt; silt mantle generally much thicker and more continuous from west of the Sadlerochit River to the Tamayariuk River, approximately

COMPLEXES

Areas within the following complexes of two terrain types are either too small or too complexly intermingled to separate readily at the scale of the aerial photographs:

AFP+FFP: OW+AFD; RSR+RSR(OW)(HD)

CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES: PRUDHOE BAY TERMINAL MILE POST 00.00; 4-0210-1099; 4-0210-1099; 4-0210-1099; MATCH LINE 7.00

CHAINAGE (miles): 00.00, 0.87, 1.16, 1.31, 1.61, 2.66, 2.73, 3.64, 3.74, 5.65, 6.27, 7.00

DESIGN DATA

SEGMENT Nº	1	2	3	4	5	6	7	8	9	10	11
SEGMENT LENGTH	0.87	0.49	0.15	0.38	1.05	0.07	0.91	0.10	1.91	0.62	0.73
EROSION CONTROL	EC-1D	EC-1D	N/A	EC-1C	EC-1C	N/A	EC-1D	N/A	EC-1D	EC-1D	EC-1D
BUOY.	B-1	B-0	N/A	B-1	B-0	N/A	B-1	N/A	B-1	B-0	B-1
REVEG.	I-V-8		I-V-5	I-V-8		I-V-5	I-V-8	I-V-5	I-V-8		

FOOTAGE THIS SHEET

SCALE: (miles) 0 0.5 1.0

U.T.M. GRID ZONE 6

PIPELINE LEGEND

- CARRIER PIPE (cover shown)
- CARRIER PIPE (berm cover)
- BERM BREAK
- SWAMP WEIGHT
- RIVER WEIGHT
- FROST ANCHOR
- SCREW ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
- ANCHOR BLOCK (concrete)
- BLOCK VALVE
- TEST LEAD & DIRECTION OF WIRES
- POINT OF INTERSECTION
- DRILL HOLE LOCATION
- WARNING SIGN
- MILEPOST SIGN - AIRCRAFT
- CHAINAGE EQUATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA	QUAN.
CARRIER - 48" O.D. x 0.800" W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL QUAN.	DESCRIPTION	REQ'N. Nº

BUOYANCY AND EROSION CONTROL LEGEND

- B-0 No buoyancy
- B-1 Potential buoyant conditions along segment
- B-2 Potential buoyant conditions along portions of the segment
- N/A Refer to river crossing drawing
- EC-1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
- EC-2 Average slope along segment greater than 3° Erodible soil Close spaced control measures required
- EC-3 Average slope along segment less than 3° Non-erodible soil. Minimal control measures required
- EC-4 Average slope along segment greater than 3° Non-erodible soil. Control measures required in low areas only
- EC-5 Unstable water course. Deeper burial required along segment
- EC-6 Control measures required on s eep sideslopes
- EC-7 Control measures required at steep scarps
- EC-8 Low-lying sensitive areas. Measures to preserve micro drainage

GENERAL NOTES:

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG. 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY ROLL Nº	PHOTO Nºs
C 711	10 - 12
C 711	42-45
C 711	74-76

OPERATING LICENCE Nº

CONSTRUCTION PERMIT Nº

MIN. TEST PRESSURE 1848 p.s.i.

MAX. OPERATING PRESSURE 1680 p.s.i.

Nº	DATE	REVISION	APPRD BY	APPRD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. 0 DOWNSTREAM M.P. 7

DRN. BY: DATE:

CHKD. BY: [signature] JAN 25/74

APPRD BY: [signature] FEB. 4/74

SCALE: 1" = 2000'

SHEET 1 OF 16

3A-0200-1001

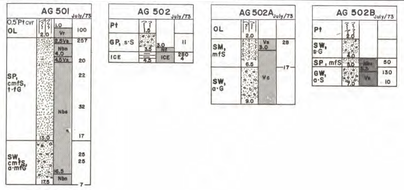
TERRAIN MAPPING BY:

J.D. MOLLARD & ASSOCIATES LIMITED

REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA



PROFILE

ENVIRONMENTAL DATA AND PROTECTION MEASURES

FISH

Small, shallow ponds, frozen in winter, although a few may be deep enough to support populations of sticklebacks

BIRDS

Lake and pothole area; limited habitat. Waterfowl and shorebirds; low risk to rare; Breeding, moulting and migration; May to August
Ground disturbance by ATV'S will be restricted. Low-level aircraft flights will be limited to right-of-way inspections

MAMMALS

Scattered caribou present year round; Approximately 3,000 caribou use this area as summer and calving range
Some concentration on coast in July and August.
Primarily Arctic fox with wolf, wolverine, red fox, short tailed weasel and ground squirrel.

Putuligayuk River – moderately productive habitat for upland furbearers and grizzly bear; suitable denning areas for foxes and ground squirrel; year round use for feeding by upland furbearers; possible denning area for polar bear.

VEGETATION

00.00									7.00
	Wet sedge meadow with some dwarf willow on frost ridges – heavy moss and numerous ponds	Gravelly substrata dwarf willow Dryas -sedge	Wet sedge – cottongrass meadow	Wet sedge meadow with cottongrass and infilled ponds of sedge	Wet sedge meadow – dwarf willow – cottongrass with some frost scarred relief	Wet sedge meadow with dwarf willow on hummocks of low centre polygons	Wet sedge meadow Pedicularis	Wet sedge meadow – cotton grass with in filled ponds	

LAND USE

OTHERS

Archaeology medium priority

Archaeology medium priority

Archaeology medium priority

3A-0200-1001

DRILL HOLE DATA LEGEND

TERRAIN TYPING LEGEND

VIII -- ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST

Prudhoe Bay East to Alaska/Yukon boundary

TERRAIN TYPES

ACP Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata

AFD Alluvial fan deposits: thin silt-mantled broad low-gradient (1/3° to 2°) alluvial fans underlain by deep silty to clean sand and gravel with generally lower excess ice contents

AFP Active flood plain: mainly exposed riverbed sand and gravel strata

AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata

BR Bedrock: mainly folded and faulted Lower Cretaceous shale and sandstone with patches of thin overburden

FPF Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata

GW Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents

RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 30 ft) interbedded aolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

B Bedrock-controlled relief
LST Lobate solifluction terraces on steep bedrock slopes
P Pingos and hydrolaccoliths
RTB Eroding thaw banks
MF Mudflow failures: thawed and failed ice-rich silt
TWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

FOL Former oriented lakes, now partly filled with peat and organic silt
SOL Small oriented lakes and ponds, frequently sub-rectangular in outline
SP Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil
HD Horsetail drainage on smoothly rounded highly ice-rich silt mantle
BD Beaded drainage
AUF Aufeis (flood icing) occurrences

Depth phases

4 5 to 10 ft of ice-rich silty topstratum

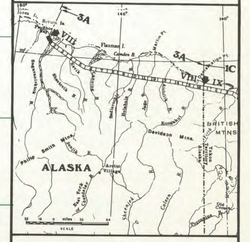
Discontinuous exposures of subdued and submasked moraine and outwash plains

OM Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich aolian and colluvial silt and organic silt and fine sand
OW Old outwash (sand, gravel, cobbles) suspected beneath a discontinuous, variable-thickness mantle of ice-rich aolian and colluvial silt and organic silt; silt mantle generally much thicker and more continuous from west of the Sadlerochit River to the Tamayariuk River, approximately

COMPLEXES

Areas within the following complexes of two terrain types are either too small or too complexly intermingled to separate readily at the scale of the aerial photographs:

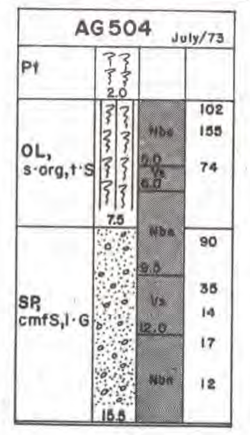
AFP+FPF: GW+AFD; RSR+RSR(GW)(HD)

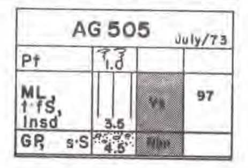


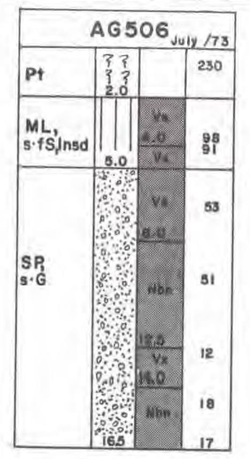
TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

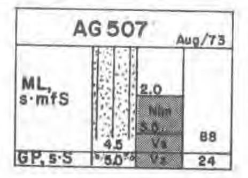
OWNERSHIP

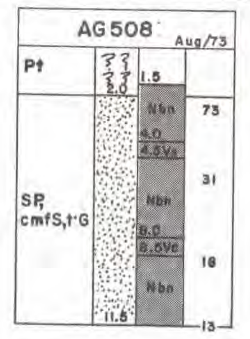
DRILL HOLE DATA

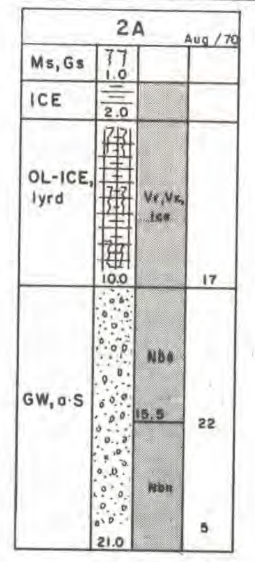




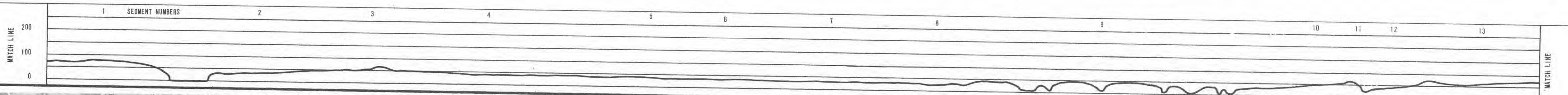








PROFILE



CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES: MATCH LINE 7.00 · 4-0210-1099 · 4-0210-1099 · 4-0210-1099 · 4-0210-1099 · MATCH LINE 18.22

CHAINAGE (miles): 00.00 · 0.85 · 2.23 · 2.55 · 4.09 · 4.88 · 5.20 · 6.51 · 6.79 · 9.17 · 9.82 · 9.87 · 10.33 · 11.22

DESIGN DATA

SEGMENT Nº	SEGMENT LENGTH	EROSION CONTROL	BUOY.	REVEG.
1	0.85	EC-1D	B-1	I-V-8
2	1.38	N/A	N/A	N/A
3	0.32	EC-1D	B-1	I-V-8
4	1.54	N/A	N/A	N/A
5	0.79	EC-1D	B-1	I-V-8
6	0.32	EC-1D	B-0	I-V-8
7	1.31	EC-1C	B-1	I-V-8
8	0.28	EC-1D	B-0	I-V-8
9	2.38	N/A	N/A	I-V-2
10	0.65	EC-1D	B-1	I-V-8
11	0.05	N/A	N/A	I-V-5
12	0.46	EC-1C	B-1	I-V-8
13	0.89	EC-1D	B-0	I-V-8

FOOTAGE THIS SHEET

SCALE: (miles) 0 0.5 1.0

U.T.M. GRID ZONE 6

DRILL HOLE DATA LEGEND

A(B)* C
D | E | F | G

A-Drill hole number
B-Temperature probe number
C-Date drill hole made
D-Soil bedrock description
E-Depth of strata changes and graphical soil symbols.
F-Permafrost conditions
Shaded-frozen; Unshaded-unfrozen
N-non-visible ice; V-visible ice
G-Water/ice content (% of dry weight)
*-indicates drill hole in disturbed terrain

SOIL COMPONENT (USCS) ABBREVIATIONS

G-Gravel · O-Organic · L-Low plasticity
S-Sand · Pt-Peat · H-High plasticity
M-Silt · P-Poorly graded · cbl(s)-cobble(s)
C-Clay · W-Well graded · bldr(s)-boulder(s)

ABBREVIATIONS FOR MINOR SOIL COMPONENT PERCENTAGES

a-and 35 to 50% · l-little 10 to 20%
s-some 20 to 35% · t-trace 1 to 10%

MISCELLANEOUS ABBREVIATIONS

bdrk-bedrock · Gs-Grass · Ms-Moss
c-coarse · lnsd-lensed · org-organic
cvr-cover · lyrd-layered · veg-vegetation
f-fine · m-medium · vrd-varved

TERRAIN TYPING LEGEND

VIII -- ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary
TERRAIN TYPES

ACP Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata

AFD Alluvial fan deposits: thin silt-mantled broad low-gradient (1/3° to 2°) alluvial fans underlain by deep silty to clean sand and gravel with generally lower excess ice contents

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AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata

BR Bedrock: mainly folded and faulted Lower Cretaceous shale and sadnstone with patches of thin overburden

FFP Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata

OW Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents

RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

B Bedrock-controlled relief
LST Lobate solifluction terraces on steep bedrock slopes
P Pingos and hydrolaccoliths
ETB Eroding thaw banks
MF Mudflow failures: thawed and failed ice-rich silt
IWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

FOL Former oriented lakes, now partly filled with peat and organic silt
SOL Small oriented lakes and ponds, frequently sub-rectangular in outline
SP Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil
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AUF Aufeis (flood icing) occurrences

Depth phases

d 5 to 10 ft of ice-rich silty topstratum

Discontinuous exposures of subdued and submasked moraine and outwash plains

OM Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt and fine sand

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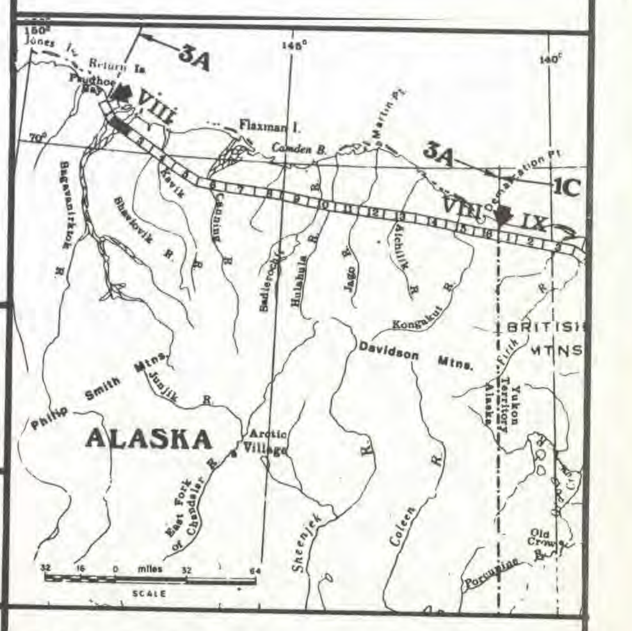

PIPELINE LEGEND

- CARRIER PIPE (cover shown)
- CARRIER PIPE (berm cover)
- BERM BREAK
- SWAMP WEIGHT
- RIVER WEIGHT
- FROST ANCHOR
- SCREW ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
- ANCHOR BLOCK (concrete)
- BLOCK VALVE
- TEST LEAD & DIRECTION OF WIRES
- POINT OF INTERSECTION
- DRILL HOLE LOCATION
- WARNING SIGN
- MILEPOST SIGN - AIRCRAFT
- CHAINAGE EQUATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA	QUAN.
CARRIER - 48" O.D. x 0.800" W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL		
QUAN.	DESCRIPTION	REQ'N. Nº

BUOYANCY AND EROSION CONTROL LEGEND

- B-0 No buoyancy
- B-1 Potential buoyant conditions along segment
- B-2 Potential buoyant conditions along portions of the segment
- N/A Refer to river crossing drawing
- EC-1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
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- EC-5 Unstable water course. Deeper burial required along segment
- EC-6 Control measures required on steep sideslopes
- EC-7 Control measures required at steep scarps
- EC-8 Low-lying sensitive areas. Measures to preserve micro drainage

GENERAL NOTES:

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2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG. 4-0200-J001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY	
ROLL Nº	PHOTO Nºs
C 711	77 - 84

OPERATING LICENCE Nº
CONSTRUCTION PERMIT Nº

MIN. TEST PRESSURE	1848 p.s.i.
MAX. OPERATING PRESSURE	1680 p.s.i.

Nº	DATE	REVISION	APPRD BY	APPRD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
ENGINEERS FOR
ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
ALASKA

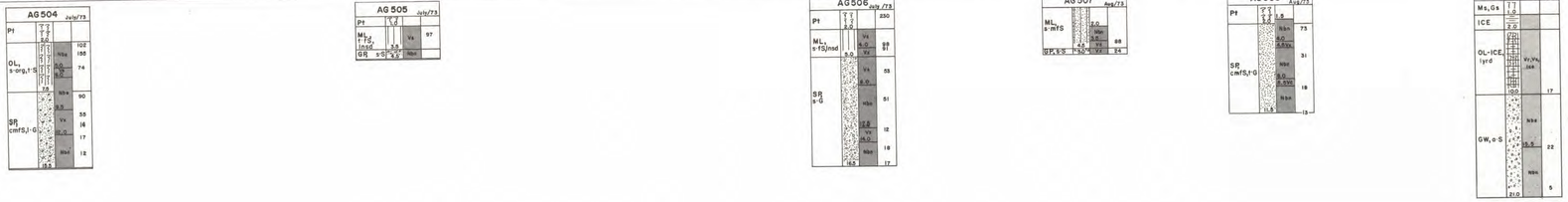
UPSTREAM M.P. 7 · DOWNSTREAM M.P. 18

DRN. BY: · DATE
CHKD. BY: [signature] · Jan 25/74
APPRD BY: [signature] · Feb 4/74
SCALE: 1" = 2000'
SHEET 2 OF 16
3A-0200-1002

TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA



PROFILE

DRILL HOLE DATA LEGEND

TERRAIN TYPING LEGEND

VIII — ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary

TERRAIN TYPES

ACP: Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata

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OW: Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents

RSH: Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eollan (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

b: Bedrock-controlled relief

LST: Lobate solifluction terraces on steep bedrock slopes

p: Pingos and hydrolaccoliths

ETB: Eroding thaw banks

MF: Mudflow failures: thawed and failed ice-rich silt

IWP: Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

FOL: Former oriented lakes, now partly filled with peat and organic silt

SOL: Small oriented lakes and ponds, frequently sub-rectangular in outline

SP: Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil

HD: Horsetail drainage on smoothly rounded highly ice-rich silt mantle

BD: Beaded drainage

ADF: Aufeis (flood icing) occurrences

Depth phases

d: 5 to 10 ft of ice-rich silty topstratum

Discontinuous exposures of subdued and submasked moraine and outwash plains

OM: Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eollan and colluvial silt and organic silt and fine sand

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COMPLEXES

Areas within the following complexes of two terrain types are either too small or too complexly intermingled to separate readily at the scale of the aerial photographs:

AFP+FFP: OM+AFD; RSH+RSE(OW)(HD)

ENVIRONMENTAL DATA AND PROTECTION MEASURES

FISH

Sagavanirktok River – Arctic char, grayling, round whitefish, slimy sculpin, burbot, ninespine stickleback, chum salmon.
Possible overwintering area for Arctic char and other species. Char were angled throughout the winter 2 miles upstream of this location. Area has been disturbed in the past (note gravel berms in photo)

1) Minor drainages – no winter flow
2) Shallow ponds frozen in winter

Sag River
See comments on W. channel

1) Small streams – no winter flow
2) Shallow ponds frozen in winter

BIRDS

Lake, pothole and braided river area; limited habitat. Waterfowl and shorebirds, low risk to rare. Breeding, moulting and migration, May to August; Ground disturbance by ATV'S will be restricted. Low level aircraft flights will be limited to right-of-way inspections.

In 1972 many snowy owls were observed nesting in the FFP terrain type east of the main channel of the Sagavanirktok River.

MAMMALS

Arctic fox – denning habitat on the Sagavanirktok River Delta and the Sagavanirktok River. Avoid marked den sites.

Important habitat for upland furbearers and bears

Arctic fox denning habitat. Avoid marked dens.

Arctic fox den (1972) at Mile Post 9.82. Avoid disturbance of marked den site.

Grizzly bear with polar bear denning activity suspected along the Sagavanirktok River during winter months.
Grizzly bears Sagavanirktok – good travel route and foraging area, bears active on north slope from mid-April–mid-October but most use would be in summer.
Caribou comments on sheet 3A-0200-1001 pertain

VEGETATION

7.00

Sedge meadow dwarf willow on h.c. polygons

Wet sedge meadow – dwarf willow – louse wort on h.c. polygons

Sedge – dwarf willow – Dryas and inclusions of Dryas – dwarf willow – Astragalus on raised areas

Sedge Dwarf willow, horsetail

Sedge – dwarf willow on h.c. polygons

Dryas open d.willow

Scattered veget on bars of dwarf willow – horsetail – Arctagrostis

Sedge meadows (scattered) dwarf willow

Sedge-Dryas-Astrag

Wet sedge meadow

Wet sedge meadow; w./cottongrass and dwarf willow on scattered mounds

Wet sedge meadow – lousewort – moss

Wet sedge meadow with some dwarf willow inclusions on hummocks

Sedge meadow

d. willow-Dryas

Sedge meadow dwarf willow

Scattered d. willow – Astragalus –

Carex – Dryas – dwarf willow of variable density

Scattered d. willow – Astragalus on bars

Dryas – Carex – d. willow

Carex tussock meadow with some h.c. polygons and d. willow

Carex tussock – Cassiope, d. willow & Dryas

Carex tussock meadow – cotton grass & d.willow

Wet sedge – cottongrass tussock

18.22

LAND USE

OTHERS

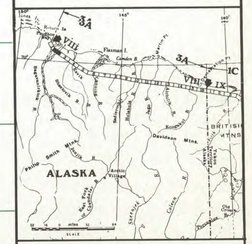
Archaeology medium priority

Archaeology medium priority

Archaeology medium priority

Archaeology medium – high priority along river banks.

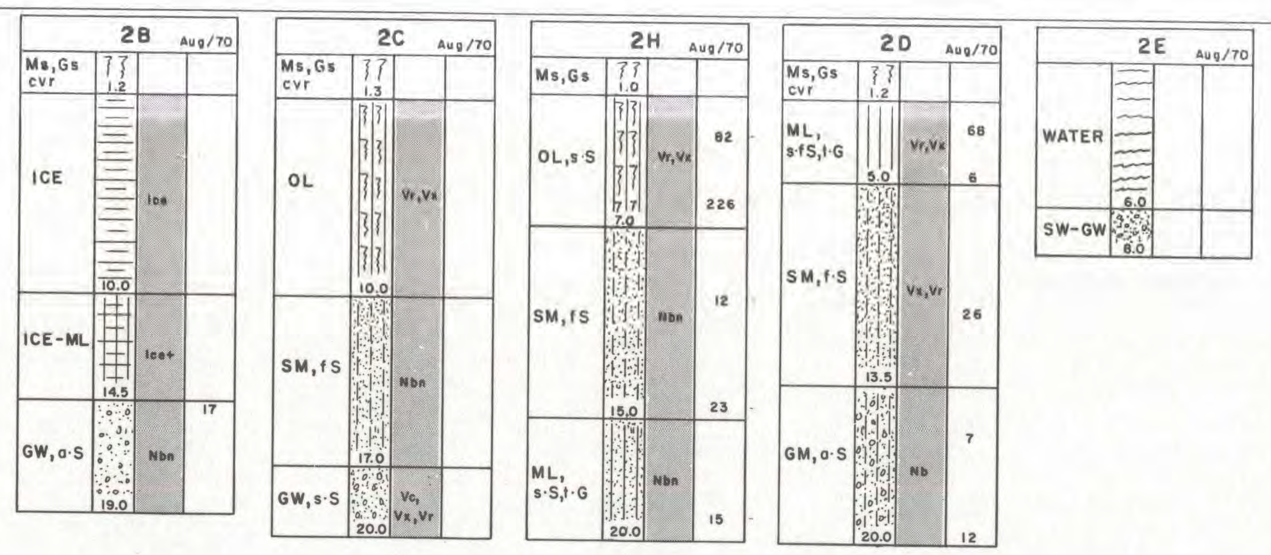
3A-0200-1002

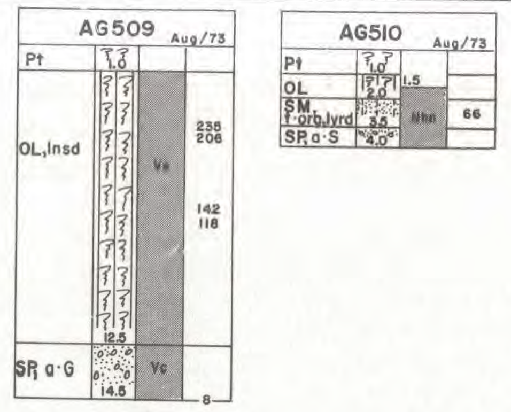


TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

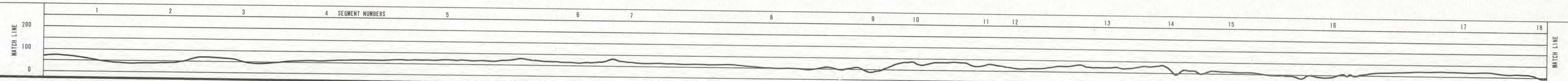
OWNERSHIP

DRILL HOLE DATA





PROFILE



DRILL HOLE DATA LEGEND

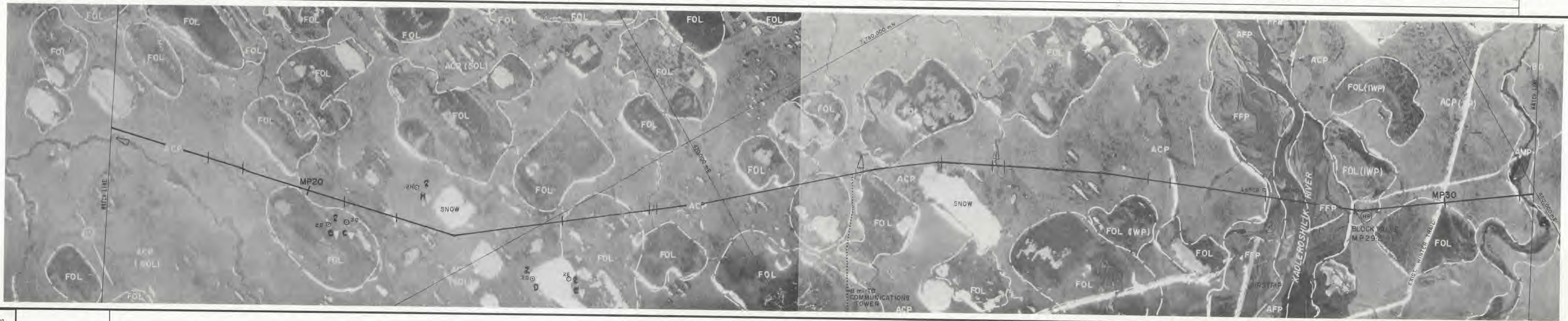
SOIL COMPONENT SYMBOLS & ABBREVIATIONS

A-Drill hole number; B-Temperature probe number; C-Site drill hole made; D-Soil/bedrock description; E-Depth of strata changes and graphical soil symbols; F-Permafrost conditions; G-Water/ice content (% of dry weight); *-Indicates drill hole in disturbed terrain

G-Gravel, S-Sand, M-Silt, C-Clay; O-Organic, Pt-Peat, P-Poorly graded, W-Well graded; L-Low plasticity, H-High plasticity, cbl(s)-cobble(s), bldr(s)-boulder(s)

ABBREVIATIONS FOR MINOR SOIL COMPONENT PERCENTAGES: a-and 35 to 50%; s-some 20 to 35%; l-little 10 to 20%; t-trace 1 to 10%

MISCELLANEOUS ABBREVIATIONS: bdrk-bedrock, c-coarse, cvr-cover, f-fine, Gs-Grass, lnsd-lensed, lyrd-layered, m-medium, Ms-Moss, org-organic, veg-vegetation, vrd-varved



TERRAIN TYPING LEGEND

VIII -- ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary

TERRAIN TYPES

- ACP Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata
- AFD Alluvial fan deposits: thin silt-mantled broad low-gradient (1/3° to 2°) alluvial fans underlain by deep silty to clean sand and gravel with generally lower excess ice contents
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- BR Bedrock: mainly folded and faulted Lower Cretaceous shale and sadnstone with patches of thin overburden
- FFP Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata
- OW Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents
- RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

- B Bedrock-controlled relief
- LST Lobate solifluction terraces on steep bedrock slopes
- P Pingos and hydrolaccoliths
- ETB Eroding thaw banks
- MF Mudflow failures: thawed and failed ice-rich silt
- IWP Ice-wedge polygons, well expressed

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- FOL Former oriented lakes, now partly filled with peat and organic silt
- SOL Small oriented lakes and ponds, frequently sub-rectangular in outline
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- BD Beaded drainage
- AUF Aufeis (flood icing) occurrences

Depth phases

- d 5 to 10 ft of ice-rich silty topstratum

Discontinuous exposures of subdued and submasked moraine and outwash plains

- OM Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt and fine sand
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Areas within the following complexes of two terrain types are either too small or too complexly intermingled to separate readily at the scale of the aerial photographs:

AFP+FFP: OW+AFD; RSR+RSR(OW)(HD)

CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES: MATCH LINE 18.22; 4-0210-1099; 4-0210-1099; 4-0210-1099; 4-0210-1099; 4-0210-1099 MATCH LINE 30.77

CHAINAGE (miles): 00.00, 0.87, 1.18, 2.10, 2.57, 4.03, 4.80, 4.87, 6.67, 6.74, 7.41, 7.85, 7.95, 9.20, 9.38, 10.22, 10.98, 12.42, 12.55

DESIGN DATA

SEGMENT Nº	SEGMENT LENGTH	EROSION CONTROL	BUOY.	REVEG.
1	0.87	EC-1D	B-0	I-V-8
2	0.31	EC-1D	B-1	I-V-8
3	0.92	EC-1C	B-0	I-V-8
4	0.47	EC-1D	B-1	I-V-8
5	1.46	EC-1B	B-0	I-V-8
6	0.77	EC-1C	B-1	I-V-3
7	0.07	N/A	N/A	I-V-5
8	1.80	EC-1C	B-1	I-V-8
9	0.07	N/A	N/A	I-V-5
10	0.67	EC-1D	B-1	I-V-8
11	0.44	EC-1D	B-0	I-V-8
12	0.18	N/A	N/A	I-V-5
13	1.25	EC-1D	B-2	I-V-8
14	0.18	EC-1D	B-0	I-V-8
15	0.84	EC-1D	B-2	I-V-8
16	0.76	N/A	N/A	I-V-2
17	1.44	EC-1D	B-1	I-V-8
18	0.13	N/A	N/A	I-V-5

FOOTAGE THIS SHEET

SCALE: (miles) 0 0.5 1.0

U.T.M.GRID ZONE 6

PIPELINE LEGEND

- CARRIER PIPE (cover shown)
- CARRIER PIPE (berm cover)
- BERM BREAK
- SWAMP WEIGHT
- RIVER WEIGHT
- FROST ANCHOR
- SCREW ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
- ANCHOR BLOCK (concrete)
- BLOCK VALVE
- TEST LEAD & DIRECTION OF WIRES
- POINT OF INTERSECTION
- DRILL HOLE LOCATION
- WARNING SIGN
- MILEPOST SIGN - AIRCRAFT
- CHAINAGE EQUATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGF OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA	QUAN.
CARRIER - 48" O.D. x 0.800 " W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL

QUAN.	DESCRIPTION	REQ'N. Nº

BUOYANCY AND EROSION CONTROL LEGEND

- B-0 No buoyancy
- B-1 Potential buoyant conditions along segment
- B-2 Potential buoyant conditions along portions of the segment
- N/A Refer to river crossing drawing
- EC-1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
- EC-2 Average slope along segment greater than 3° Erodible soil Close spaced control measures required
- EC-3 Average slope along segment less than 3° Non-erodible soil. Minimal control measures required
- EC-4 Average slope along segment greater than 3° Non-erodible soil. Control measures required in low areas only
- EC-5 Unstable water course. Deeper burial required along segment
- EC-6 Control measures required on steep sideslopes
- EC-7 Control measures required at steep scarps
- EC-8 Low-lying sensitive areas. Measures to preserve micro drainage

GENERAL NOTES:

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG.4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY

ROLL Nº C 711 — PHOTO Nºs 85-94

OPERATING LICENCE Nº

CONSTRUCTION PERMIT Nº.

MIN. TEST PRESSURE 1848 p.s.i.

MAX OPERATING PRESSURE 1680 p.s.i

Nº	DATE	REVISION	APPRD BY	APPRD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. 18 — DOWNSTREAM M.P. 31

DRN. BY: — DATE

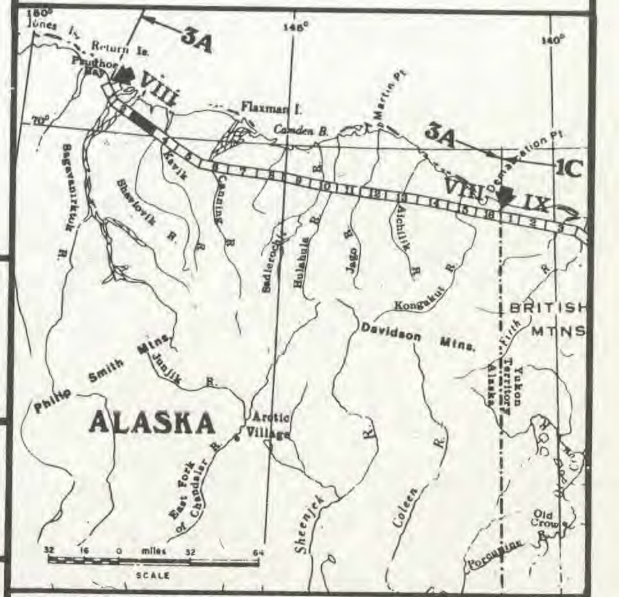
CHKD. BY: [signature] Jan 25/74

APPRD BY: [signature] Feb 4/74

SCALE: 1" = 2000'

SHEET 3 OF 16

3A-0200-1003



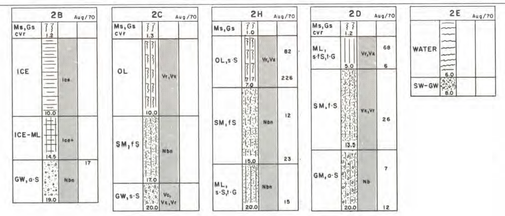
TERRAIN MAPPING BY:

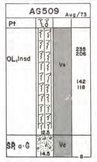
J.D. MOLLARD & ASSOCIATES LIMITED

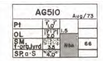
REGINA, SASK.

OWNERSHIP

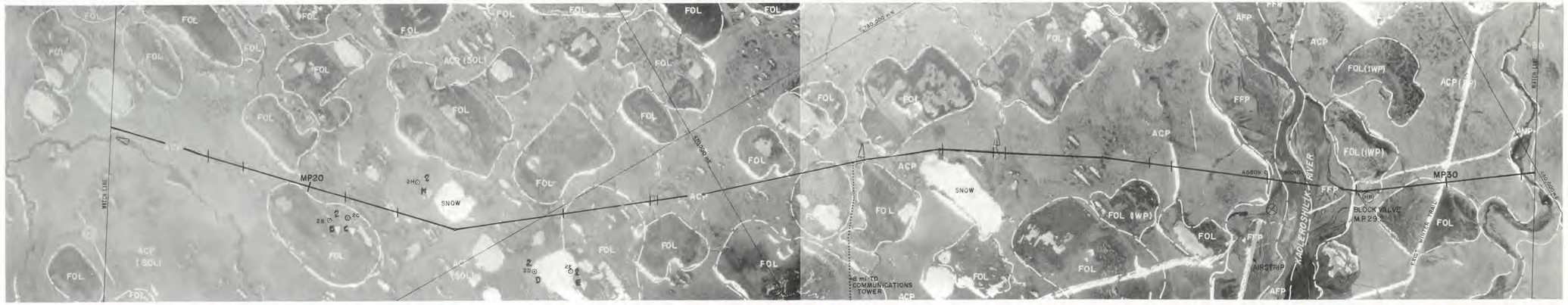
DRILL HOLE DATA







PROFILE



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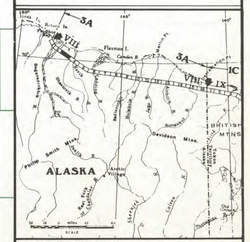


TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

ENVIRONMENTAL DATA AND PROTECTION MEASURES

FISH

The region between Prudhoe Bay and the Canning River is characterized by numerous shallow ponds, generally only a few feet deep. Most of these are too small to support permanent fish populations since they freeze to the bottom during the winter months. Some of these ponds and small lakes are used by sticklebacks and grayling as summer feeding areas, and a small number are deep enough to support overwintering populations of these species.
The small streams in this region also freeze solid in the winter. There is little fish utilization of many of these small streams during the summer; others contain some sticklebacks, slimy sculpin and grayling.

Kadleroshilak River grayling, ninespine stickleback. Very few fish have been caught in this river, and there are no known overwintering sites. River is frozen at this location in the winter.

Unnamed lake just off top of map contains stickleback.

Unnamed stream, No winter flow. Only sticklebacks have been taken in this stream.

BIRDS

Lake, pothole and braided river area; limited habitat. Waterfowl and shorebirds; low risk to rare. Breeding, moulting and migration, May to August. Ground disturbance by ATV'S will be restricted. Low level aircraft flights will be limited to right – of – way inspections.

MAMMALS

Scattered caribou present year round. Some calving. Approximately 3,000 caribou in summer range.
Arctic fox, wolf, wolverine, red fox, stoat – tailed weasel

Kadleroshilak River – pingoes are numerous in FOL soil type areas and are important den sites for Arctic fox and ground squirrels; grizzly bear and polar bear actively expected along this river. Wolf, wolverine, red fox active.

VEGETATION

18.22	Sedge meadow – moss	Wet Sedge meadow – some hummocks w d. willow	Sedge meadow – Dryas – d. willow	Wet sedge meadow – dwarf willow on frost ridges	Sedge tussocks	Hummocky sedge – wet sedge meadow moss	Sedge – cotton grass tussocks – moss	Wet sedge meadow – moss	Sedge meadow – heath (Vaccinium) Dryas	Sedge meadow – wet sedge meadow w hummocks of Dryas – dwarf willow	Hummocky sedge meadow – willow – cottongrass	Wet sedge meadow	Wet sedge meadow d. birch – lingonberry	Wet sedge meadow	Sedge meadow – moss	Sedge tussock dwarf willow lingonberry – moss	Wet sedge meadow – dwarf willow – d. birch on hummocks	Wet sedge meadow – willow	Wet Sedge meadow	D. birch – lingonberry – sedge – moss	d. willow – Carex	Scattered dwarf willow – horsetail and Astragalus communities on bars	Sedge – Dryas – dwarf willow	Sedge tussock dwarf willow d. birch	Sedge tussock d. willow – Dryas

LAND USE

OTHERS

Kadleroshilak Pingo
Archaeology – high priority

Archaeology high priority

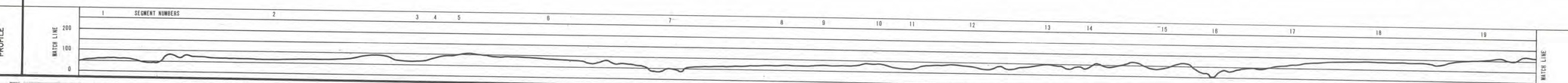
Archaeology
medium
priority

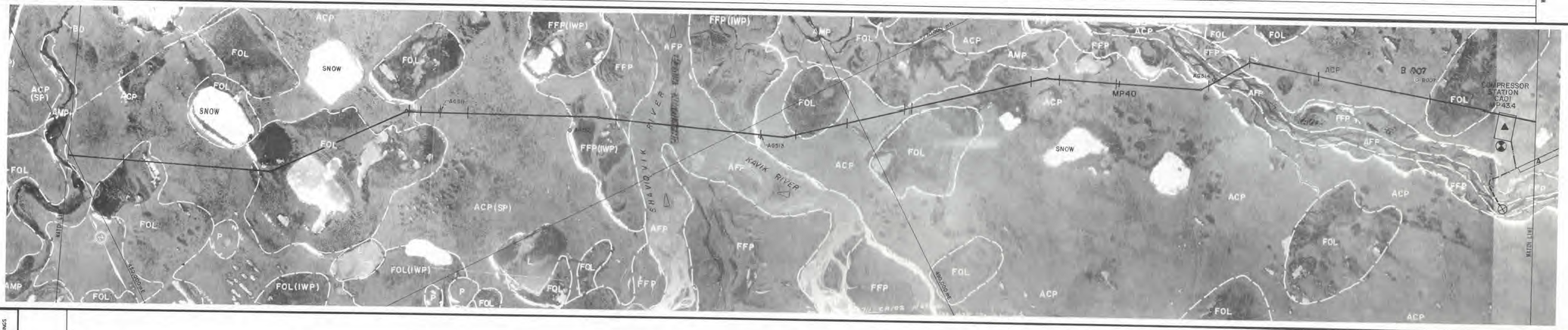
3A-0200-1003

OWNERSHIP

DRILL HOLE DATA

PROFILE





CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES

CHAINAGE (miles)

DESIGN DATA

MATCH LINE 30.77

4+210-1099

4+210-1098

4+210-1098

4+210-1098

MATCH LINE 43.71

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FOOTAGE THIS SHEET

DRILL HOLE DATA LEGEND

TERRAIN TYPING LEGEND

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OWNERSHIP

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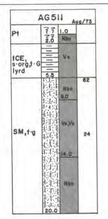
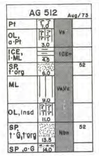
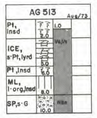
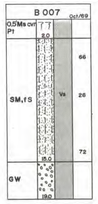
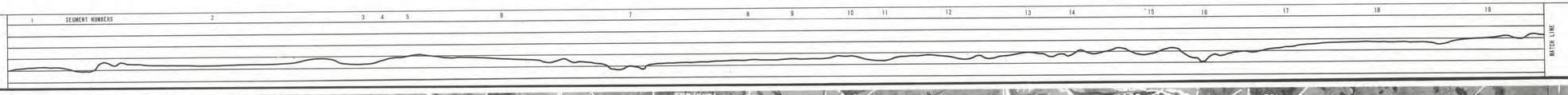


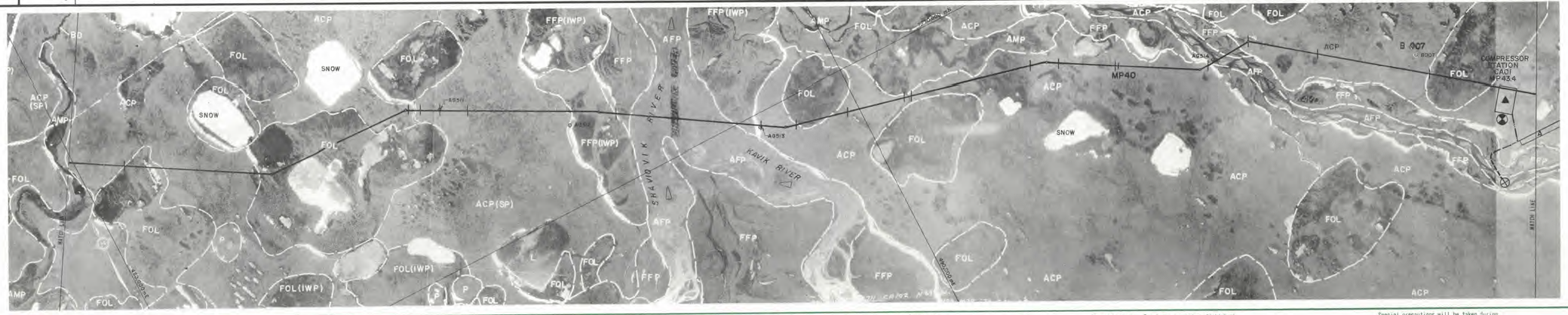






PROFILE





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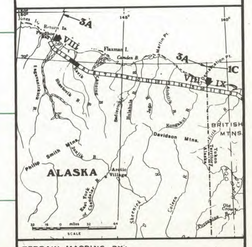

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ENVIRONMENTAL DATA AND PROTECTION MEASURES

FISH

Ponds in this region are very shallow and freeze solid in the winter.
Some populations of sticklebacks may be present.

Shavovik River — Arctic char, grayling, ninespine stickleback.
River is frozen at this location in the winter. The only known Arctic char spawning and overwintering site is located about 10 miles upstream of the pipeline crossing.

Kavik River — Arctic char, grayling, ninespine stickleback
No winter flow at this location. Char spawning and overwintering sites are well upstream (35 miles) of the pipeline crossing.
Sensitive during May 1 - Nov. 1

Unnamed stream — Grayling, ninespine stickleback
Summer feeding area for grayling. No flow in winter. Sensitive during May 1 - Nov. 1

Special precautions will be taken during borrow activities to prevent siltation.

BIRDS

Lake, pothole and braided river area; limited habitat. Waterfowl and shorebirds; low risk to rare. Breeding, moulting and migration: May to August. Ground disturbance by ATV'S will be restricted. Low level aircraft flights will be limited to right of way inspections

MAMMALS

Scattered caribou year round. Several hundred caribou move up from south from mid-May through June. Occasional calving,, groups of 100-1,000 occur in the area and northward to coast.
Muskox sightings in 1973
Occasional moose along Shavovik and Kavik river
Denning and year round use by Arctic fox, wolverine, red fox, weasel.
Avoid disturbance of marked den sites.

VEGETATION

30.77	Sedge cottongrass d. willow	Sedge – moss – d. birch & willow	Sedge – cottongrass; hummocks d. willow – d. birch	Sedge – d. willow – cottongrass moss	Sedge cottongrass – d. willow & birch	Sedge – cotton-grass Poly-ces of gonum	Sedge – cotton-grass d. willow	Willow – sedge	Sedge – d. willow – cottongrass	Sedge – cottongrass – moss	Sedge cottongrass d. willow	Willow Arctostaphylos sedge	Scattered willow with Arctostaphylos – Astragalus	Sedge – cotton-grass willow	Sedge cotton-grass tussock lingon-berry – Labrador tea	Wet Sedge meadow with cot-tongrass – hummocks of d.birch d. willow	Sedge – cotton-grass – tussock – lingonberry – Labrador tea	Carex – bistort	Tussocky & hummocky sedge cottongrass – d. willow	Wet sedge meadow – bistort, – d. willow	Sedge cottongrass tussock – Labrador tea moss	Wet sedge – cotton-grass meadow d.willow	Sedge – cotton-grass tussock lingonberry – Labrador tea	Sedge – willow – Dryas – alpine bistort	willow horse-tail moss	Dryas – lichen	Sedge – cotton-grass d.willow	Wet sedge meadow moss d. birch	Sedge – cottongrass tussocks w d., willow. Inclusions of wet sedge meadow	Sedge hummocks w cottongrass	Sedge – cottongrass tussock w dwarf willow	42.71

LAND USE

OTHERS

Archaeology high priority particularly point of land at confluence

Archaeology high priority

Archaeology high priority

3A-0200-1004

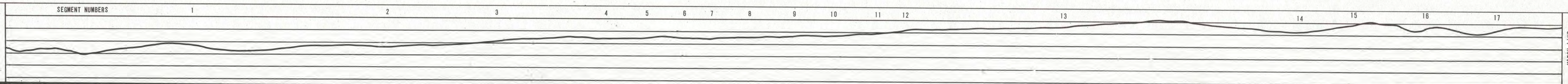
OWNERSHIP

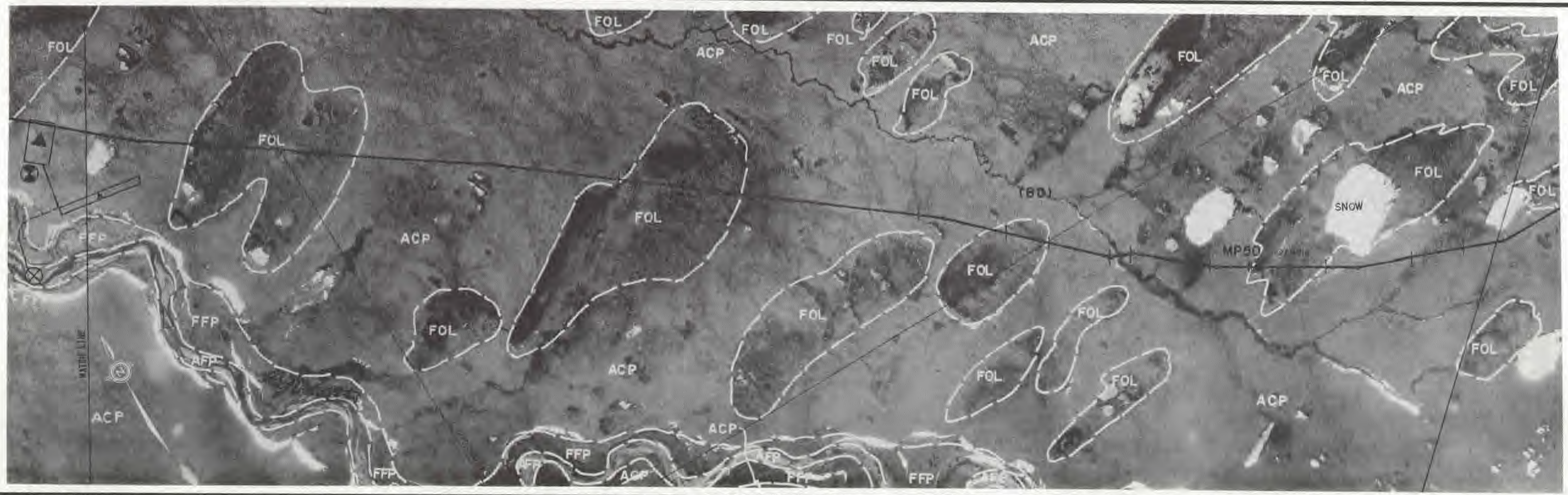
DRILL HOLE DATA

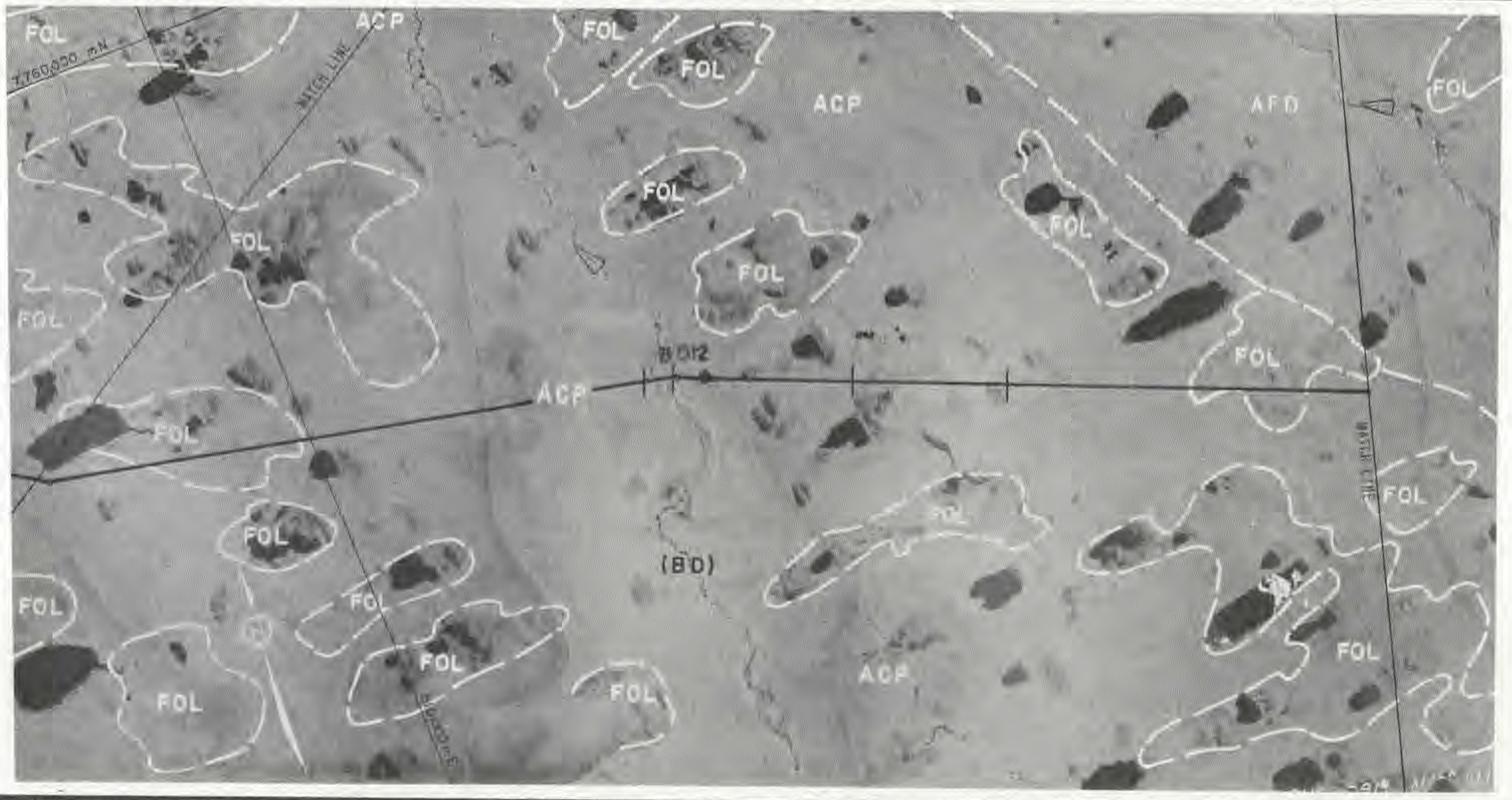
AG 515	Aug/73
0.5 Pt ML, t-S	3·0 Vs
SM, t-fG	Nbn 5.0 Vs 7.0 9·0
SP, a-G	Nbn 11.0

AG 516	Aug/73	
Pt	1·5	
OL, Insd	2.0 Vs 3·5	209
SM, t-fG	Nbn 8.0 8.5 Vs Nbn 12·5	102 23 126

PROFILE







DRILL HOLE DATA LEGEND

A-Drill hole number; B-Temperature probe number; C-Date drill hole made; D-Soil/bedrock description; E-Depth of strata changes and graphical soil symbols; F-Permafrost conditions: Shaded-frozen; Unshaded-unfrozen; N-non-visible ice; V-visible ice; G-Water/ice content (% of dry weight); *-Indicates drill hole in disturbed terrain

SOIL COMPONENT SYMBOLS & ABBREVIATIONS: G-Gravel, S-Sand, M-Silt, C-Clay; O-Organic, Pt-Peat, P-Poorly graded, W-Well graded; L-Low plasticity, H-High plasticity, cobl(s)-cobble(s), bldr(s)-boulder(s)

ABBREVIATIONS FOR MINOR SOIL COMPONENT PERCENTAGES: a-and 35 to 50%; s-some 20 to 35%; l-little 10 to 20%; t-trace 1 to 10%

MISCELLANEOUS ABBREVIATIONS: bdrk-bedrock, c-coarse, cvr-cover, f-fine; Gs-Grass, lnsd-lensed, lyrd-layered, m-medium; Ms-Moss, org-organic, veg-vegetation, vvd-varved

TERRAIN TYPING LEGEND

VIII -- ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary
TERRAIN TYPES

- ACP Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata
- AFD Alluvial fan deposits: thin silt-mantled broad low-gradient (1/3° to 2°) alluvial fans underlain by deep silty to clean sand and gravel with generally lower excess ice contents
- AFP Active flood plain: mainly exposed riverbed sand and gravel strata
- AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata
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- FFP Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata
- OW Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents
- RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features
- B Bedrock-controlled relief
- LST Lobate solifluction terraces on steep bedrock slopes
- P Pingos and hydrolaccoliths
- ETB Eroding thaw banks
- MF Mudflow failures: thawed and failed ice-rich silt
- IWP Ice-wedge polygons, well expressed

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- FOL Former oriented lakes, now partly filled with peat and organic silt
- SOL Small oriented lakes and ponds, frequently sub-rectangular in outline
- SP Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil
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- BD Beaded drainage
- AUF Aufeis (flood icing) occurrences

Depth phases
- d 5 to 10 ft of ice-rich silty topstratum

Discontinuous exposures of subdued and submasked moraine and outwash plains
- OM Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt and fine sand
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COMPLEXES

Areas within the following complexes of two terrain types are either too small or too complexly intermingled to separate readily at the scale of the aerial photographs:

AFP+FFP: OW+AFD; RSR+RSR(OW)(HD)

CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES: MATCH LINE 43.71; 4-0210-1099; MATCH LINE; MATCH LINE; 4-0210-1099; MATCH LINE 55.78

CHAINAGE (miles): 00.00, 2.88, 2.97, 4.51, 4.98, 5.22, 5.56, 5.68, 6.12, 6.33, 6.73, 7.21, 7.49, 7.67 | 7.67, 9.70, 9.80, 10.42, 10.94, 12.07

DESIGN DATA

SEGMENT Nº	1	2	3	4	5	6	7	8	9	10	11	12	13	13	14	15	16	17
SEGMENT LENGTH	2.88	0.09	1.54	0.47	0.24	0.34	0.12	0.44	0.21	0.40	0.48	0.28	0.18	2.03	0.10	0.62	0.52	1.13
EROSION CONTROL	EC-1C	EC-7	EC-1C	EC-1C	EC-1C	EC-1C	N/A	EC-1C	EC-1C	EC-1C	EC-1D	EC-1C	EC-1D	EC-1D	N/A	EC-1D	EC-1C	EC-1D
BUOY.	B-1	B-1	B-1	B-0	B-1	B-0	N/A	B-1	B-0	B-1	B-0	B-1	B-0	B-0	N/A	B-0	B-1	B-0
REVEG.	I-V-8						I-V-5	I-V-8						I-V-8	I-V-5	I-V-8		

FOOTAGE THIS SHEET

SCALE: (miles) 0 0.5 1.0

U.T.M. GRID ZONE 6

PIPELINE LEGEND

- CARRIER PIPE (cover shown)
- CARRIER PIPE (berm cover)
- BERM BREAK
- SWAMP WEIGHT
- RIVER WEIGHT
- FROST ANCHOR
- SCREW ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
- ANCHOR BLOCK (concrete)
- BLOCK VALVE
- TEST LEAD & DIRECTION OF WIRES
- POINT OF INTERSECTION
- DRILL HOLE LOCATION
- WARNING SIGN
- MILEPOST SIGN - AIRCRAFT
- CHAINAGE EQUATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA	QUAN.
CARRIER - 48" O.D. x 0.600" W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL

QUAN.	DESCRIPTION	REQ'N. Nº

BUOYANCY AND EROSION CONTROL LEGEND

- B-0 No buoyancy.
- B-1 Potential buoyant conditions along segment
- B-2 Potential buoyant conditions along portions of the segment
- N/A Refer to river crossing drawing
- EC-1 Average slope along segment less than 3° Erodible-soil. Control measures required in low areas only
- EC-2 Average slope along segment greater than 3° Erodible soil Close spaced control measures required
- EC-3 Average slope along segment less than 3° Non-erodible soil. Minimal control measures required
- EC-4 Average slope along segment greater than 3° Non-erodible soil. Control measures required in low areas only
- EC-5 Unstable water course. Deeper burial required along segment
- EC-6 Control measures required on steep sideslopes
- EC-7 Control measures required at steep scarps
- EC-8 Low-lying sensitive areas. Measures to preserve micro drainage

GENERAL NOTES:
1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG. 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.6 FEET

AERIAL PHOTOGRAPHY	
ROLL Nº	PHOTO Nºs
C 711	104-109
C 7115	66-71

OPERATING LICENCE Nº
CONSTRUCTION PERMIT Nº
MIN TEST PRESSURE 1848 p.s.i.
MAX OPERATING PRESSURE 1680 p.s.i

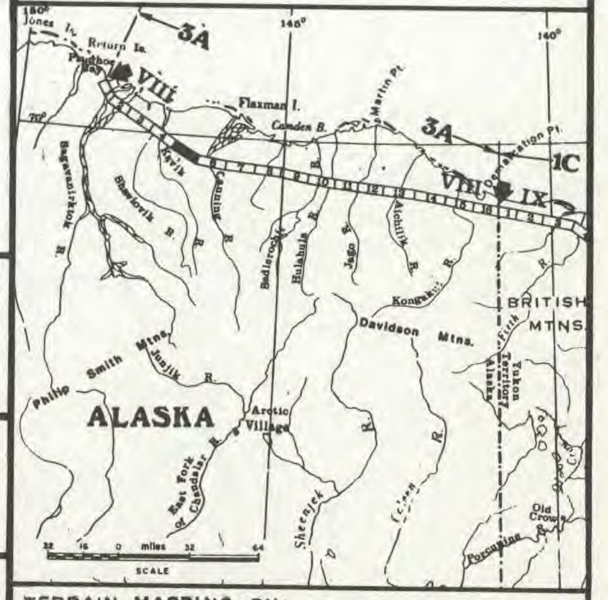
Nº	DATE	REVISION	APPRD BY	APPRD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
ENGINEERS FOR
ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
ALASKA

UPSTREAM M.P. 44 DOWNSTREAM M.P. 56

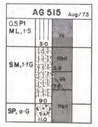
DRN. BY: | DATE
CHKD. BY: [signature] Jan 25/74
APPRD BY: [signature] Feb 4/74
SCALE: 1" = 2000'
SHEET 5 OF 16
3A-0200-1005

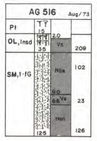


TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA





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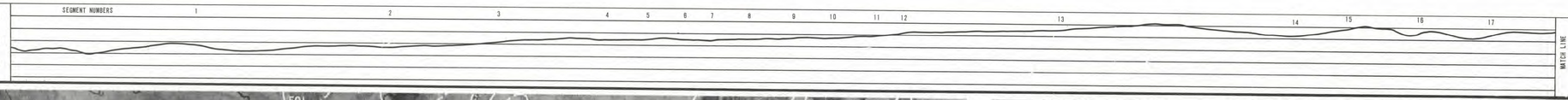
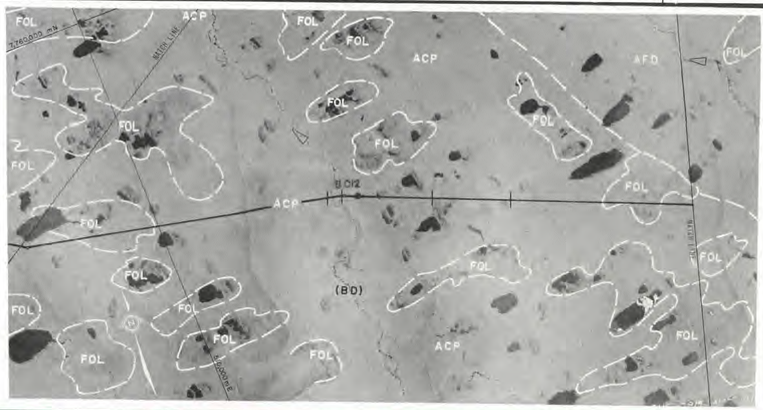


Unnamed stream
comments on previous page



1 - Small streams in this area - no winter flow
2 - Shallow ponds - frozen in winter

TERRAIN TYPING LEGEND

VIII -- ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary

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PHASES AND FEATURES

Topographic phases and features

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p Pingos and hydrolacoliths
RTB Eroding thaw banks
MF Mudflow failures; thawed and failed ice-rich silt
IWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

FOL Former oriented lakes, now partly filled with peat and organic silt
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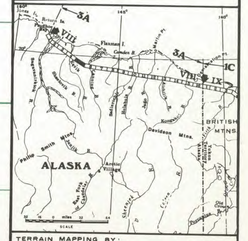


TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

ENVIRONMENTAL-DATA AND PROTECTION MEASURES

FISH

BIRDS

Lake, pothole and braided river area; limited habitat; waterfowl and shorebirds; low risk to rare; breeding, moulting and migration, May to August. Ground disturbance by ATV's will be restricted.
Low level aircraft flights will be limited to right-of-way inspections.

MAMMALS

Several hundred scattered caribou may parallel proposed alignment in easterly direction in mid-May through June. Several thousand caribou found during July and August.
Muskox sightings occurred during 1973.
Moose sighted occasionally along Shaviovik and Kavik Rivers.
Denning and year round use by Arctic fox - wolverine, wolf, red fox, short-tailed weasel.
Grizzly bear summer range and possibly winter use by polar bear, but unlikely to be a denning area.
Avoid disturbance of den sites.

VEGETATION

43 71 | Sedge - moss d. willow | Sedge - cotton-grass - lingonberry | Sedge - moss - hummocks d.willow | Sedge - moss d.willow - lingon-berry | Sedge - moss - d. willow - blue-berry | Sedge - d. willow lingonberry | Sedge - moss d. willow - lingon-berry | Sedge - cottongrass - moss, hummocks of lingonberry, d. willow | Sedge - cotton-grass - moss | Sedge - d. willow | Willow - Astragalus | Moss - sedge - d.willow | Sedge-lingon berry | Sedge cottongrass - d. willow | Sedge - lingonberry-moss | Sedge - cotton-grass Polygon-um | Sedge - lingonberry moss | Sedge - lingonberry - moss - Labrador tea | Sedge - cotton-grass - d.wil-low | Sedge - d. willow - moss Labrador tea | Willow - (scarce) - soft mountain | Sedge - d. willow - moss | d.willow lingon-berry - sedge | Sedge - d. willow d. birch. lingon-berry | Sedge - moss d. willow

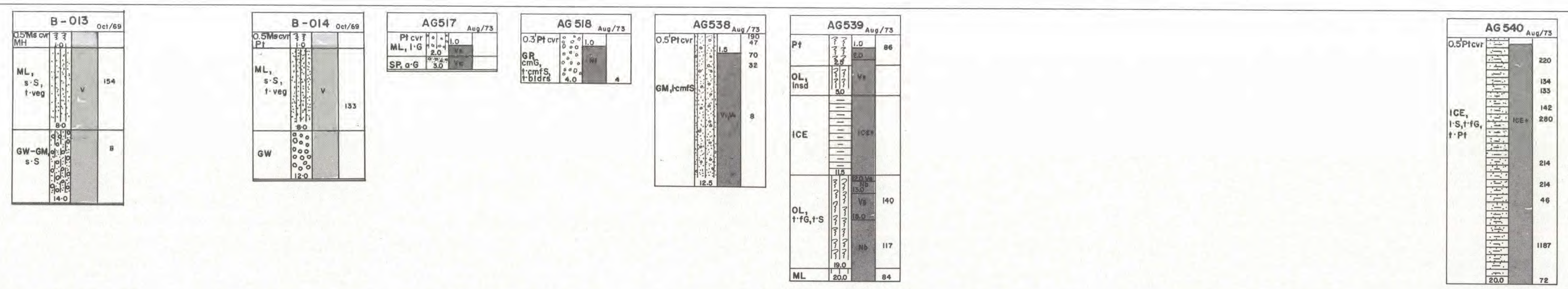
LAND USE

OTHERS

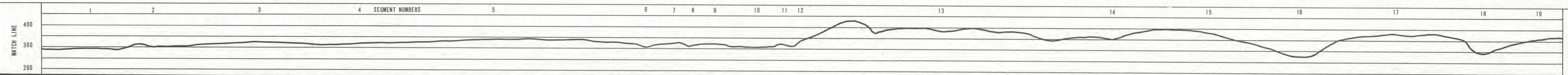
3A-0200-1005

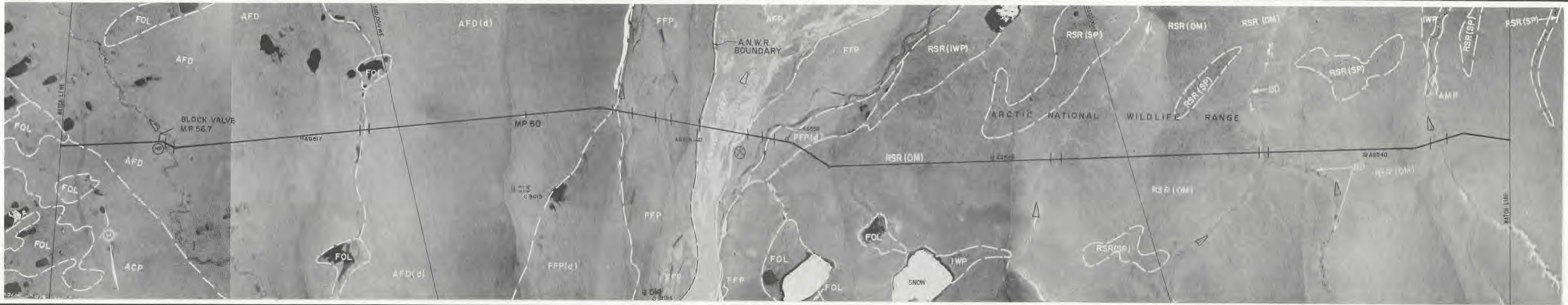
OWNERSHIP

DRILL HOLE DATA



PROFILE





CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES	CHAINAGE (miles)
MATCH LINE 55.78	00.00
4-0210-1099	0.92 / 1.01
4-0210-1099	2.65 / 2.73
4-0210-1099	4.88 / 5.07
	5.27 / 5.42 / 5.67
4-0210-1099	6.10
4-0210-1099	6.23 / 6.34
4-0210-1099	8.83 / 8.93
4-0210-1099	10.67 / 10.75
4-0210-1099	12.21 / 12.36
MATCH LINE 68.71	12.93

SEGMENT Nº	SEGMENT LENGTH	EROSION CONTROL	BUOY.	REVEG.
1	0.92	EC-1D	B-0	I-V-8
2	0.09	N/A	N/A	I-V-5
3	1.64	EC-1D	B-0	I-V-8
4	0.08	N/A	N/A	I-V-8
5	2.15	EC-1D	B-0	I-V-8
6	0.19	N/A	N/A	I-V-5
7	0.20	EC-1D	B-0	I-V-2
8	0.15	EC-1A	B-1	I-V-2
9	0.25	EC-1D	B-0	I-V-2
10	0.43	N/A	N/A	N/A
11	0.13	EC-1D	B-0	I-V-2
12	0.11	N/A	N/A	I-V-5
13	2.49	EC-1D	B-0	I-V-8
14	0.10	N/A	N/A	I-V-5
15	1.74	EC-1D	B-0	I-V-8
16	0.08	N/A	N/A	I-V-5
17	1.46	EC-1C	B-0	I-V-8
18	0.15	N/A	N/A	I-V-5
19	0.57	EC-1C	B-0	I-V-8

FOOTAGE THIS SHEET

SCALE (miles) 0 0.5 1.0

U.T.M. GRID ZONE 6

DRILL HOLE DATA LEGEND

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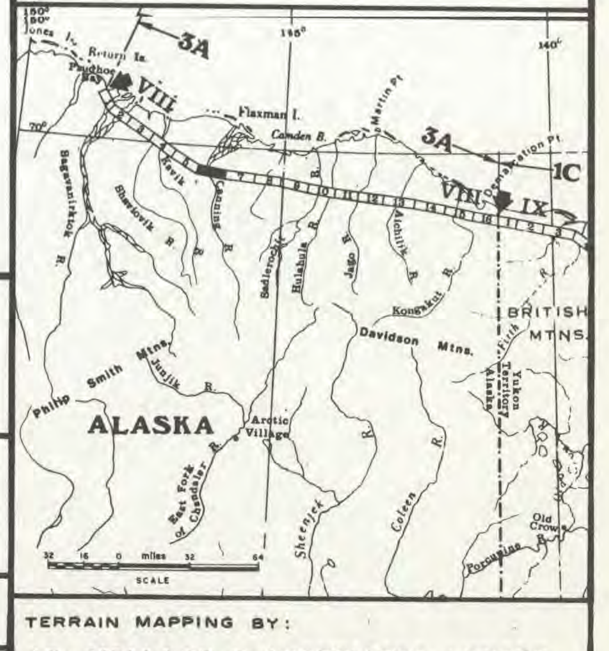
AFP+FFP; OW+AFD; RSR+RSR(OW)(HD)



TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

PIPELINE LEGEND

- CARRIER PIPE (cover shown)
- CARRIER PIPE (berm cover)
- BERM BREAK
- SWAMP WEIGHT
- RIVER WEIGHT
- FROST ANCHOR
- SCREW ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
- ANCHOR BLOCK (concrete)
- BLOCK VALVE
- TEST LEAD & DIRECTION OF WIRES
- POINT OF INTERSECTION
- DRILL HOLE LOCATION
- WARNING SIGN
- MILEPOST SIGN - AIRCRAFT
- CHAINAGE EQUATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA	QUAN.
CARRIER - 48" O.D. x 0.800" W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL QUAN.	DESCRIPTION	REQ'N. Nº

BUOYANCY AND EROSION CONTROL LEGEND

- B-0 No buoyancy
- B-1 Potential buoyant conditions along segment
- B-2 Potential buoyant conditions along portions of the segment
- N/A Refer to river crossing drawing
- EC-1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
- EC-2 Average slope along segment greater than 3° Erodible soil Close spaced control measures required
- EC-3 Average slope along segment less than 3° Non-erodible soil. Minimal control measures required
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- EC-5 Unstable water course. Deeper burial required along segment
- EC-6 Control measures required on steep sideslopes
- EC-7 Control measures required at steep scarps
- EC-8 Low-lying sensitive areas. Measures to preserve micro drainage

GENERAL NOTES:
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2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG. 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY
ROLL Nº C 7115
PHOTO Nºs 72 - 80

OPERATING LICENCE Nº
CONSTRUCTION PERMIT Nº
MIN TEST PRESSURE 1848 p.s.i.
MAX OPERATING PRESSURE 1680 p.s.i.

Nº	DATE	REVISION	APPRD BY	APPRD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
ENGINEERS FOR
ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
ALASKA

UPSTREAM M.P. 56 DOWNSTREAM M.P. 69

DRN BY: DATE
CHKD. BY: [signature] JAN 25/74
APPRD BY: [signature] Feb 4/74
SCALE: 1" = 2000'
SHEET 6 OF 16
3A-0200-1006

OWNERSHIP

DRILL HOLE DATA

B-013 Oct/68

B-014 Oct/68

AG517 Aug/73

AG518 Aug/73

AG538 Aug/73

AG539 Aug/73

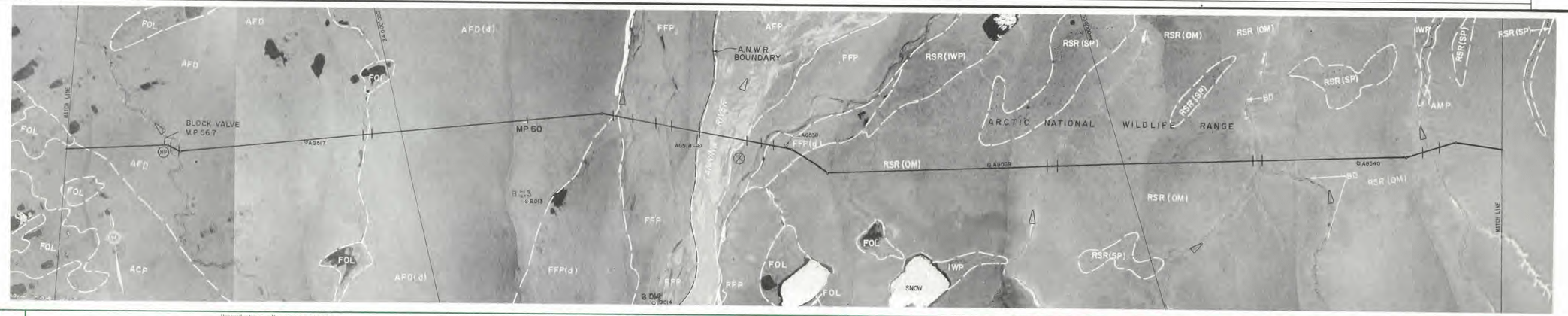
AG540 Aug/73

PROFILE

MATCH LINE 400 300 200

1 2 3 4 SEGMENT NUMBERS 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

MATCH LINE



ENVIRONMENTAL DATA AND PROTECTION MEASURES

FISH

Unnamed stream - Ninespine stickleback

Small ponds in this region freeze solid in winter.

Canning River - Arctic char, grayling, round whitefish, broad whitefish
NL winter flow at this location. Fry, juveniles and adults of several species are found in this area throughout the open water period. A spring source, located 1 mile downstream of the crossing, may be an overwintering site.
Sensitive during May 1 - Nov. 1.

Unnamed lake - Sticklebacks have been caught in this lake, although no free water was found under the ice in the winter.

Unnamed lake - grayling and sticklebacks have been caught here.

Minor drainages - no winter flow

BIRDS

Braided River area; limited habitat. Shorebirds; low risk to vulnerable. Breeding, May to July. Ground disturbance by ATV's will be restricted. Low level aircraft flights will be limited to right-of-way inspections.

Occasional use of gravel and dirt bars by rough-legged hawks.

MAMMALS

Winter range for a few hundred caribou; several hundred scattered caribou from mid-May through June. Groups of 100 to 1000 may parallel or cross line from south and north. September and October many thousand encounter pipe line route on south and west movements.
Area used by Canning River muskox group.
Furbearers denning and present year round; Arctic fox, red fox, wolf, wolverine, short-tailed weasel.

Canning River - Grizzly bears present along river from April to mid-October; potential polar bear winter denning area along river.

VEGETATION

SS-JB

Sedge - Dryas - moss - d. willow

D. willow - Dryas - moss

Sedge - cottongrass - Dryas - moss

D. willow-sedge Astragalus

Sedge - cottongrass - d. willow - Dryas

Sedge - d. willow Dryas

Dryas-d. willow Astragalus

Scattered willow - Arctostaphylos

D. willow - Astragalus - (Poa)

Dryas Sedge - lupine

Sedge - Dryas - d. willow Cassiope

Sedge - cottongrass - Dryas - moss

Sedge - lingonberry moss

Sedge - cottongrass - d. willow - moss

D.willow - sedge

Sedge - cottongrass - d. willow - lingonberry

Dryas - d willow lupine

Sedge - horse-tail - Cassiope

LAND USE

OTHERS

Archaeology high priority
Major trade route.

Archaeology
medium priority
winter trail

3A-0200-1006

DRILL HOLE DATA LEGEND

TERRAIN TYPING LEGEND

VIII — ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary

TERRAIN TYPES

ACP Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata

AFD Alluvial fan deposits: thin silt-mantled broad low-gradient (1/3° to 2°) alluvial fans underlain by deep silty to clean sand and gravel with generally lower excess ice contents

AFP Active flood plain: mainly exposed riverbed sand and gravel strata

AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata

BR Bedrock: mainly folded and faulted Lower Cretaceous shale and sadnstone with patches of thin overburden

FFP Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata

OW Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents

RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

R Bedrock-controlled relief
LST Lobate solifluction terraces on steep bedrock slopes
P Pingos and hydrolaccoliths
ETB Eroding thaw banks
MF Mudflow failures: thawed and failed ice-rich silt
IWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

FOL Former oriented lakes, now partly filled with peat and organic silt
SOL Small oriented lakes and ponds, frequently sub-rectangular in outline
ST Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil
RD Rectangular drainage on smoothly rounded highly ice-rich silt mantle
BD Beaded drainage
AUF Aufeis (flood icing) occurrences

Depth phases

d 5 to 10 ft of ice-rich silty topstratum

Discontinuous exposures of subdued and submasked moraine and outwash plains

OM Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt and fine sand

OW Old outwash (sand, gravel, cobbles) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt; silt mantle generally much thicker and more continuous from west of the Sadlerochit River to the Tamayariak River, approximately

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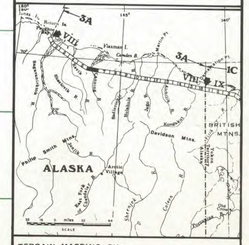
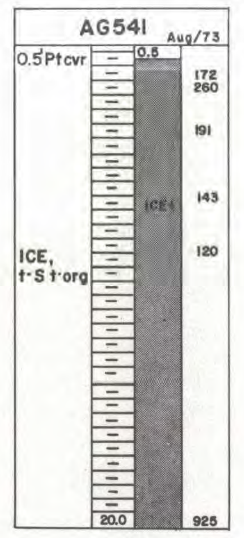


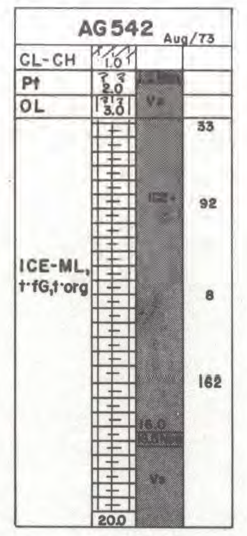
TERRAIN MAPPING BY:

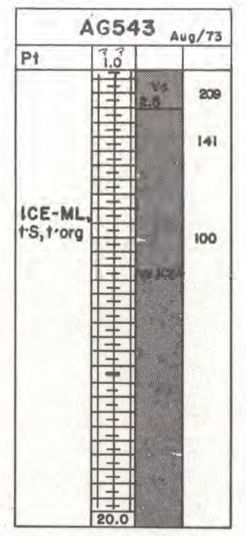
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

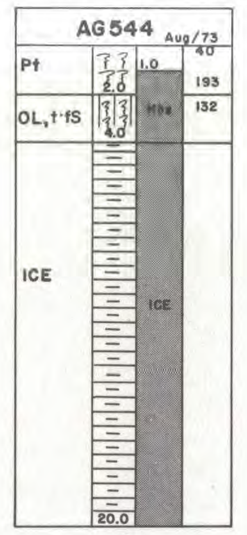
OWNERSHIP

DRILL HOLE DATA

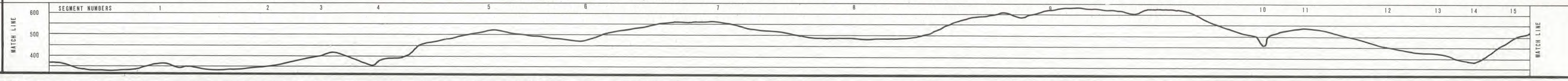








PROFILE



DRILL HOLE DATA LEGEND

A-Drill hole number
B-Temperature probe number
C-Date drill hole made
D-Soil/bedrock description
E-Depth of strata changes and graphical soil symbols
F-Permafrost conditions: Shaded-frozen; Unshaded-unfrozen; N-non-visible ice; V-visible ice
G-Water/ice content (% of dry weight)
*-indicates drill hole in disturbed terrain

SOIL COMPONENT SYMBOLS & ABBREVIATIONS

G-Gravel, S-Sand, M-Silt, C-Clay, O-Organic, Pt-Peat, P-Poorly graded, W-Well graded, L-Low plasticity, H-High plasticity, cbl(s)-cobble(s), bld(s)-boulder(s)

ABBREVIATIONS FOR MINOR SOIL COMPONENT PERCENTAGES

a-and 35 to 50%; s-some 20 to 35%; l-little 10 to 20%; t-trace 1 to 10%

MISCELLANEOUS ABBREVIATIONS

bdrk-bedrock, c-coarse, cvr-cover, f-fine, Gs-Gneiss, lnsd-lensed, lyrd-layered, m-medium, Ms-Moss, org-organic, veg-vegetation, vvd-varved

TERRAIN TYPING LEGEND

VIII -- ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary

TERRAIN TYPES

- ACP Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata
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- RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

- B Bedrock-controlled relief
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CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES: MATCH LINE 68.71; 4-0210-1099; 4-0210-1099; 4-0210-1099; 4-0210-1099; 4-0210-1099; 4-0210-1099; MATCH LINE 81.81

CHAINAGE (miles): 00.00; 1.93; 2.01; 2.84; 3.08; 4.76; 4.83; 7.11; 7.16; 10.69; 10.91; 11.52; 12.25; 12.47; 12.77; 13.10

DESIGN DATA

SEGMENT Nº	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
SEGMENT LENGTH	1.93	0.08	0.83	0.24	1.68	0.07	2.28	0.05	3.53	0.22	0.61	0.73	0.22	0.30	0.33
EROSION CONTROL	EC-1C	N/A	EC-1C	N/A	EC-1C	N/A	EC-1D	N/A	EC-1C	N/A	EC-1D	EC-1C	EC-1D	N/A	EC-1D
BUOY.	B-0	N/A	B-0	N/A	B-2	N/A	B-2	N/A	B-2	N/A	B-0	B-1	B-0	N/A	B-0
REVEG.	I-V-8	I-V-5	I-V-8	I-V-5	I-V-8	I-V-5	I-V-8	I-V-5	I-V-8	I-V-5	I-V-8			I-V-5	I-V-5

FOOTAGE THIS SHEET

SCALE: (miles) 0 0.5 1.0

U.T.M. GRID ZONE 6

PIPELINE LEGEND

- 30" cvr CARRIER PIPE (cover shown)
- CARRIER PIPE (berm cover)
- BERM BREAK
- SWAMP WEIGHT
- RIVER WEIGHT
- FROST ANCHOR
- SCREW ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
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AERIAL PHOTOGRAPHY	
ROLL Nº	PHOTO Nºs
C 7115	81 - 89

OPERATING LICENCE Nº

CONSTRUCTION PERMIT Nº.

MIN. TEST PRESSURE	1848 p.s.i.
MAX OPERATING PRESSURE	1680 p.s.i.

Nº	DATE	REVISION	APPRD BY	APPRD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

Northern Engineering Services Company Limited

ENGINEERS FOR

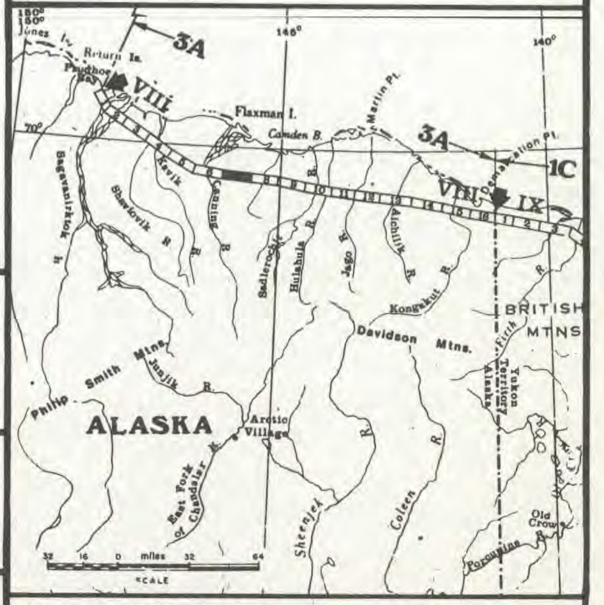
ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. 69 DOWNSTREAM M.P. 82

DRN BY:	DATE		
CHKD. BY:	Jan 25/74		
APPRD BY:	Feb 4/74	SCALE: 1" = 2000'	3A-0200-1007
		SHEET 7 OF 16	



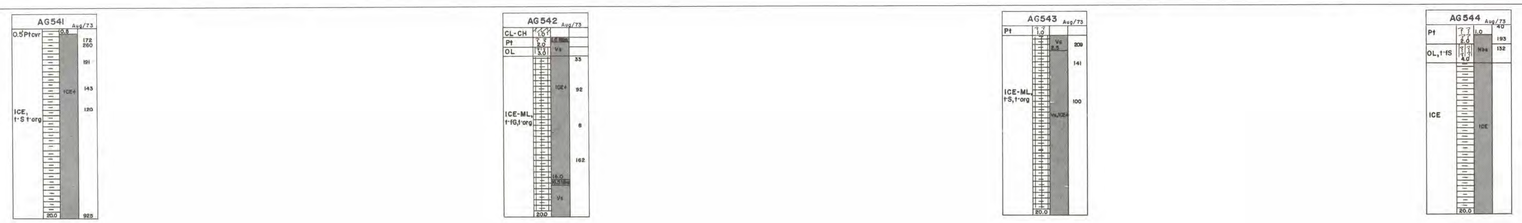
TERRAIN MAPPING BY:

J.D. MOLLARD & ASSOCIATES LIMITED

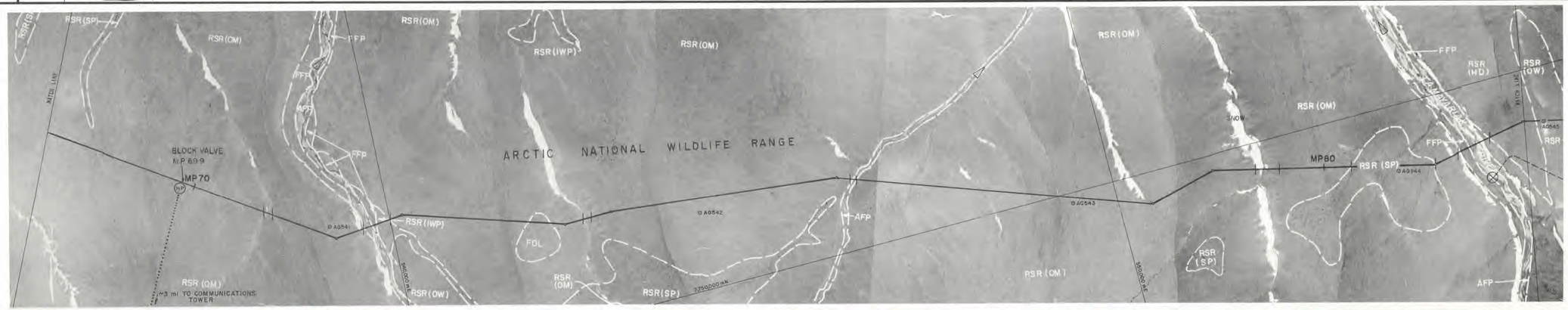
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA



PROFILE



TERRAIN TYPING LEGEND

VIII — ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary

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PHASES AND FEATURES

Topographic phases and features

- B — Bedrock-controlled relief
- LST — Lobate solifluction terraces on steep bedrock slopes
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- MF — Mudflow failures: thawed and failed ice-rich silt
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- BD — Beaded drainage
- AUF — Aufeis (flood icing) occurrences

Depth phases

- f — 5 to 10 ft of ice-rich silty topstratum

Discontinuous exposures of subdued and submasked moraine and outwash plains

- OM — Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt and fine sand
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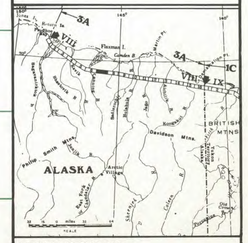


TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

ENVIRONMENTAL DATA AND PROTECTION MEASURES

FISH: Unnamed stream - no winter flow.

Small drainages - no winter flow.

Tamayariak River - Grayling
This stream is used by grayling as a spawning and summer feeding area.
There is no winter flow at this location, however,
Fish may overwinter approx. 12 miles downstream near the river mouth.
Sensitive during May 1 - Nov. 1.

BIRDS: Raptors use outcrops and river escarpments south of proposed line in Sadlerochit Mtns. Occasional nesting may occur 2 - 5 miles south of pipeline route along Tamayariak River.

MAMMALS: During June several hundred caribou present in vicinity of pipeline. Occasional calving may occur in this area. During July and August several thousand caribou found in post-calving aggregations and movements. Very important for Canning River muskox group, calving area, numerous crossings by muskox and may occur along proposed route from October through June.
Occasional moose summering along Tamayariak drainage to south of map sheet.
Arctic fox, red fox, wolf, wolverine, short-tailed weasel, ground squirrel.
Grizzly bear summer range, polar bear may be present during early November and may cross line to dens in south.

In 1973 some late fall and early winter caribou activity occurred along Tamayariak River, mainly 5 miles south of northern boundary of present of present alignment.
Tamayariak River - Arctic and red fox denning area, potential denning area for polar bear and wolves. Avoid disturbance to den sites.

VEGETATION:

Bg, Tl	Sedge - cottongrass - d. willow; willow - Equisetum - moss in drainage channels	D. willow - moss - Equisetum	Sedge - cottongrass - moss	D. willow sedge - moss	Sedge - moss cottongrass - horsetail	Sedge - cottongrass - Dryas - moss, d. willow - horsetail - lupine in drainages	Cmoss - Cassiope - Dryas	Sedge - d. willow - Dryas - moss	Sedge - cottongrass - moss	D. willow - sedge - Equisetum	Sedge - d. willow - moss Cassiope horsetail	Sedge - cottongrass - d. willow, with drainages of sedge, d. willow, moss, horsetail	D. willow sedge - Dryas -	Scattered willow - sedge - lupine	Sedge - cottongrass Dryas	Sedge - moss - cottongrass - d. willow	Sedge - Dryas - d. willow	Scattered willow - Dryas - Astragalus	Sedge - Dryas - Cassio

LAND USE:

OTHERS: Archeology high priority.

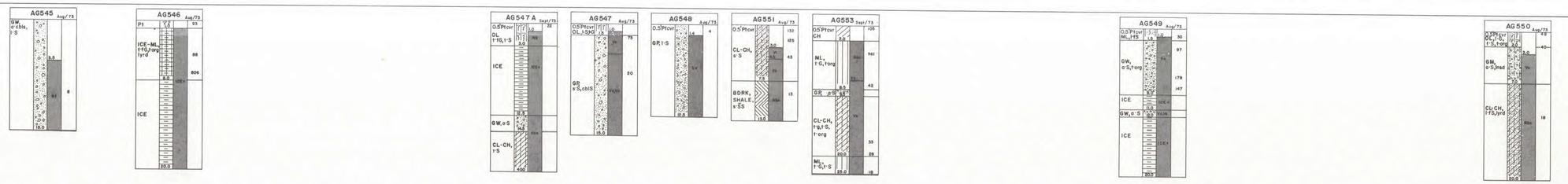
Archae-ology high priority.

Archaeology high priority

3A-0200-1007

OWNERSHIP

DRILL HOLE DATA



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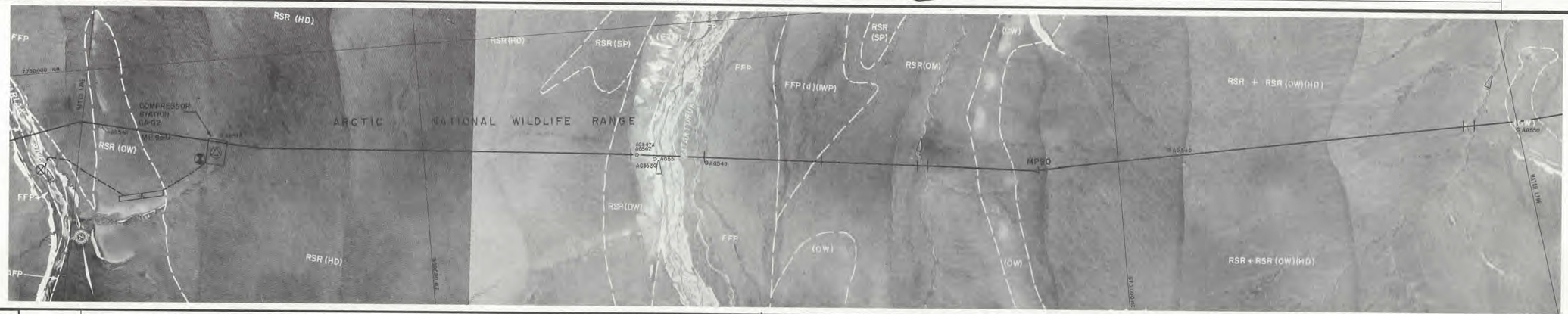


DRILL HOLE DATA LEGEND

TERRAIN TYPING LEGEND

VIII — ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary

TERRAIN TYPES

ACP Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata

AFD Alluvial fan deposits: thin silt-mantled broad low-gradient ($1/3^{0}$ to 2^{0}) alluvial fans underlain by deep silty to clean sand and gravel with generally lower excess ice contents

AFP Active flood plain: mainly supraval riverbed sand and gravel strata

AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata

BR Bedrock: mainly folded and faulted Lower Cretaceous shale and sandstone with patches of thin overburden

FPP Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata

OW Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents

RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

B Bedrock-controlled relief
LST Lobate solifluction terraces on steep bedrock slopes
F Pingos and hydrolaccoliths
RTB Eroding thaw banks
MF Mudflow failures: thawed and failed ice-rich silt
IWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

FOL Former oriented lakes, now partly filled with peat and organic silt
SOL Small oriented lakes and ponds, frequently sub-rectangular in outline
SP Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil
HD Horsetail drainage on smoothly rounded highly ice-rich silt mantle
BD Beaded drainage
AUF Aufeis (flood icing) occurrences

Depth phases

d 5 to 10 ft of ice-rich silty topstratum

Discontinuous exposures of subdued and submasked moraine and outwash plains

OM Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt and fine sand

OW Old outwash (sand, gravel, cobbles) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt; silt mantle generally much thicker and more continuous from west of the Sadlerochit River to the Tamayariak River, approximately

COMPLEXES

Areas within the following complexes of two terrain types are either too small or too complexly intermingled to separate readily at the scale of the aerial photographs:

AFP+FFP: OW+AFD; RSR+RSR(OW)(HD)

CONSTRUCTION DATA

REFERENCE DRAWINGS AND NOTES	MATCH LINE 81-181		4-0210-1089			4-0210-1089								MATCH LINE 84-18	
CHAINAGE (miles)	000.00		4.69	5.32	6.31	7.13	7.22						11.83	11.93	12.28
DESIGN DATA															
SEGMENT No.	1		2	3	4	5							6		
SEGMENT LENGTH	4.69		0.63	0.99	0.82	0.09							4.81		
EROSION CONTROL	EC-1C		N/A	EC-1B	EC-1B	N/A							EC-1C		
BUOY.	B-0		N/A	B-1	B-0	N/A							B-0		
REVEG.	I-V-8		I-V-5	I-V-8		I-V-5							I-V-8		

SEGMENT No.													7	8	
SEGMENT LENGTH													0.10	0.38	
EROSION CONTROL													N/A	EC-1B	
BUOY.													N/A	B-0	
REVEG.													I-V-5	I-V-8	

FOOTAGE THIS SHEET

SCALE (miles) 0 0.5 1.0

PIPELINE LEGEND

- CARRIER PIPE (cover shown)
- CARRIER PIPE (bare cover)
- BERM BREAK
- SWAMP WEIGHT
- RIVER WEIGHT
- FROST ANCHOR
- BORE'N ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
- ANCHOR BLOCK (concrete)
- BLOCK VALVE
- TEST LEAD & DIRECTION OF WIRES
- POINT OF INTERSECTION
- DRILL HOLE LOCATION
- WARNING SIGN
- MILEPOST SIGN -AIRCRAFT
- CHAINAGE EQUATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA	QUAN.
CARRIER - 48" O.D. x 0.800" W.T. GRADE 70	
HEAVY WALL - 48" O.D. x 1.034" W.T. GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL		
QUAN.	DESCRIPTION	REGTN. No.

BUOYANCY AND EROSION CONTROL LEGEND

- B-0 No buoyancy
- B-1 Potential buoyant conditions at river segment
- B-2 Potential buoyant conditions along portions of the segment
- N/A Refer to river crossing drawing
- EC-1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
- EC-2 Average slope along segment greater than 3° Erodible soil Slope upward control measures required
- EC-3 Average slope along segment less than 3° Non-erodible soil. Minimal control measures required
- EC-4 Average slope along segment greater than 3° Non-erodible soil. Control measures required in low areas only
- EC-5 Unstable water courses. Deeper burial required along segment
- EC-6 Control measures required on steep sidestopes
- EC-7 Control measures required at steep scarps
- EC-8 Low-lying sensitive areas. Measures to preserve micro drainage

GENERAL NOTES:

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG. 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 7.0 FEET

AERIAL PHOTOGRAPHY

ROLL No.	PHOTO No.
C7115	90 - 97

OPERATING LICENCE No.	
CONSTRUCTION PERMIT No.	
MIN. TEST PRESSURE	1848 p.s.i.
MAX. OPERATING PRESSURE	1680 p.s.i.

U.T.M. GRID ZONE 6

No.	DATE	REVISION	APPRD BY	APPRD DD

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

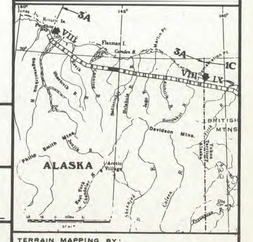
ALASKA

UPSTREAM M.P. 82 DOWNSTREAM M.P. 94

DRN. BY:	DATE
CHKD. BY:	Jan 24/75
APPRD BY:	Feb 4/75

SCALE - 1" = 2000' SHEET 8 OF 16

3A-0200-1008



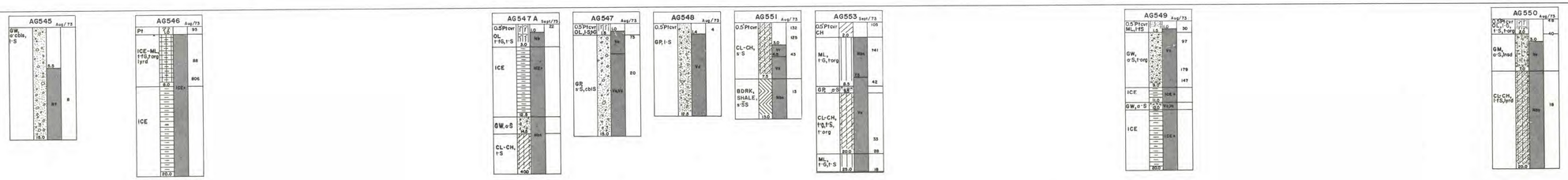
TERRAIN MAPPING BY:

J.D. MOLLARD & ASSOCIATES LIMITED

REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA



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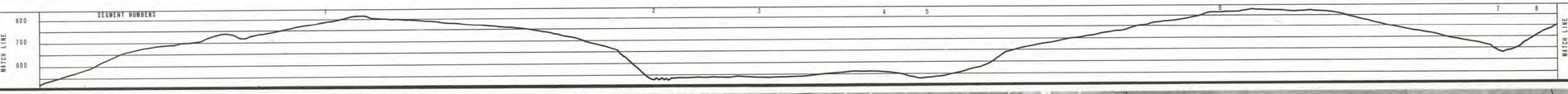
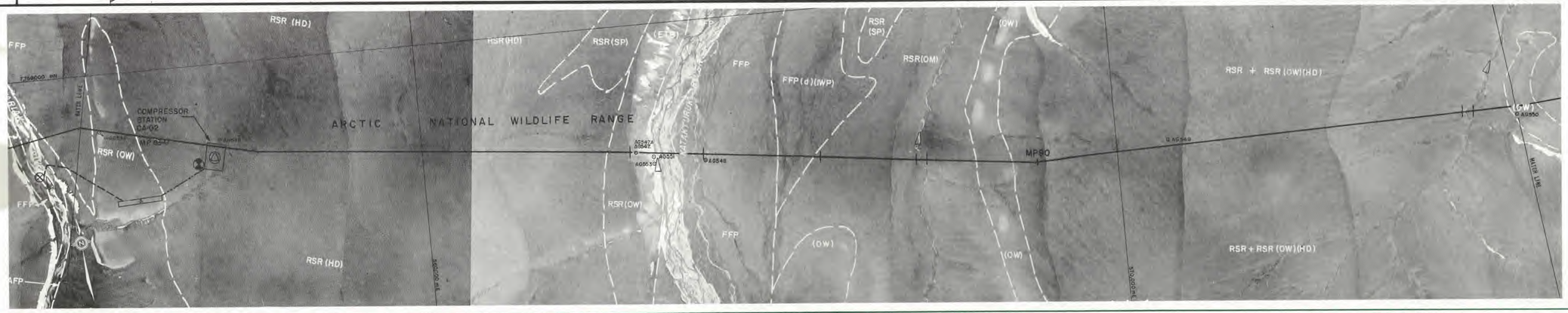




ENVIRONMENTAL DATA AND PROTECTION MEASURES

FISH

Special precautions will be taken during borrow activity to prevent siltation.

Katakturuk River - grayling
No winter flow at this location. River is summer feeding area for grayling. Although there are two spring sources 11 miles upstream, the Katakturuk does not appear to be used by Arctic char for spawning or overwintering.
Sensitive during May.1 - Nov. 1.

Minor drainages - no winter flow.

BIRDS

The western bluff of the Katakturuk River may occasionally support rough-legged hawks.

MAMMALS

Very little wintering area for caribou, during June several hundred caribou may occur in vicinity of pipeline; July and August many thousand caribou moving east-west, north-south and from post-calving aggregations from Camden Bay.
This area west of Katakturuk River lies within the general range of Canning River muskox group.

Potential denning area for fox and wolves.

Katakturuk River - important habitat for bears and upland fur-bearers; Arctic fox and numerous ground squirrel dens; red fox thought to den along river; potential wolf and polar bear, possible winter travel route for polar bear.

VEGETATION

BI-BI	Sedge - cottongrass - Cassiope - moss	Dryas - sedge - cotton grass	Sedge - cottongrass - d. willow - moss	Sedge Dryas - moss - lichen	Sedge - d. willow - moss	D. birch, d. willow - Dryas	Scattered d. willow - Astragalus	D. willow - Sedge - cotton-grass - moss	Sedge moss - d.willow	Sedge - d. willow - Dryas - moss	Sedge cotton-grass - d. willow	Willow - sedge	Sedge - d. birch, d. willow - cotton-grass	D. willow - sedge - Dryas Cassiope	Sedge - d. willow complex w cottongrass - Dryas moss, drainage channels	Sedge - d. willow	D. willow Astragalus Arctagrostis Arctostaphylos	D. willow - sedge - Dryas - Cassiope

LAND USE

OTHERS

Archaeology high priority

Archaeology High priority

Archaeology high priority

Archaeology medium priority

3A-0200-1008

DRILL HOLE DATA LEGEND

TERRAIN TYPING LEGEND

VIII — ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary

TERRAIN TYPES

- ACP Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata
- AFD Alluvial fan deposits: thin silt-mantled broad low-gradient ($1/3^{0}$ to 2^{0}) alluvial fans underlain by deep silty to clean sand and gravel with generally lower excess ice contents
- AFP Active flood plain: mainly exposed riverbed sand and gravel strata
- AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata
- BR Bedrock: mainly folded and faulted Lower Cretaceous shale and sandstone with patches of thin overburden
- FFP Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata
- OW Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents
- RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

- B Bedrock-controlled relief
- LST Lobate solifluction terraces on steep bedrock slopes
- P Pingos and hydrolaccoliths
- RTB Eroding thaw banks
- MF Mudflow failures: thawed and failed ice-rich silt
- IWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

- FOL Former oriented lakes, now partly filled with peat and organic silt
- SOL Small oriented lakes and ponds, frequently sub-rectangular in outline
- SP Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil
- HD Horsetail drainage on smoothly rounded highly ice-rich silt mantle
- BD Beaded drainage
- AUF Aufeis (flood icing) occurrences

Depth phases

- d 5 to 10 ft of ice-rich silty topstratum

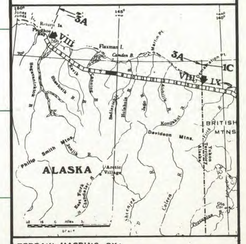
Discontinuous exposures of subdued and submasked moraine and outwash plains

- OM Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt and fine sand
- OW Old outwash (sand, gravel, cobbles) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt; silt mantle generally much thicker and more continuous from west of the Sadlerochit River to the Tamayariuk River, approximately

COMPLEXES

Areas within the following complexes of two terrain types are either too small or too complexly intermingled to separate readily at the scale of the aerial photographs:

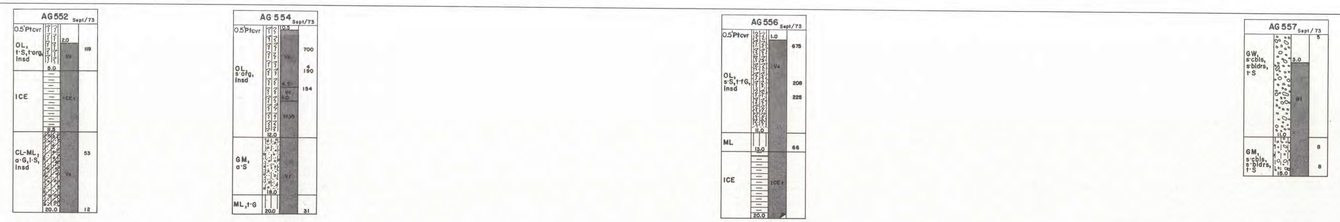
AFP+FFP: OW+AFD; RSR+RSR(OW)(HD)



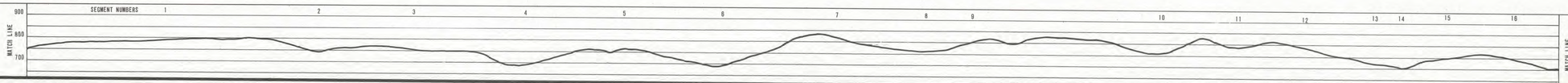
TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

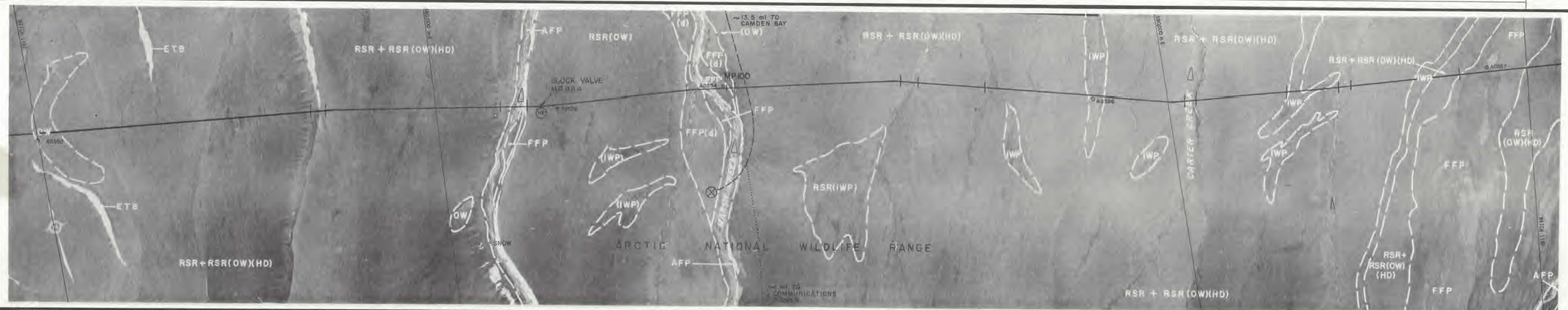
OWNERSHIP

DRILL HOLE DATA



PROFILE





CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES	MATCH LINE 94.18 · 4-0210-1099 · 4-0210-1099 · 4-0210-1099 · 4-0210-1099 · 4-0210-1099 · 4-0210-1099 · MATCH LINE 108.85
CHAINAGE (miles)	00.00 · 2.34 · 2.47 · 3.86 · 4.18 · 5.06 · 5.97 · 7.39 · 7.54 · 8.11 · 9.83 · 9.92 · 10.85 · 11.13 · 11.24 · 12.14 · 12.75
DESIGN DATA	
SEGMENT NR	1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9 · 10 · 11 · 12 · 13 · 14 · 15 · 16
SEGMENT LENGTH	2.34 · 0.13 · 1.49 · 0.23 · 1.33 · 0.41 · 1.42 · 0.15 · 0.57 · 1.72 · 0.08 · 0.73 · 0.48 · 0.11 · 0.90 · 0.61
EROSION CONTROL	EC-1C · N/A · EC-1C · N/A · EC-1D · N/A · EC-1C · N/A · EC-1B · EC-1C · N/A · EC-1D · EC-1C · N/A · EC-1C · EC-1C
BUOY.	B-0 · N/A · B-0 · N/A · B-0 · N/A · B-0 · N/A · B-0 · B-2 · N/A · B-0 · B-1 · N/A · B-0 · B-2
REVEG.	I-V-8 · I-V-5 · I-V-8 · I-V-5 · I-V-8 · I-V-2 · I-V-8 · I-V-5 · I-V-8 · I-V-5 · I-V-8 · I-V-5 · I-V-8

FOOTAGE THIS SHEET

U.T.M. GRID ZONE 6

SCALE: (miles) 0 0·5 1·0

TERRAIN TYPING LEGEND

VIII — ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary

TERRAIN TYPES

ACP Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata

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AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata

BR Bedrock: mainly folded and faulted Lower Cretaceous shale and sandstone with patches of thin overburden

FFP Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata

OW Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents

RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

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LST Lobate solifluction terraces on steep bedrock slopes
P Pingos and hydrolaccoliths
ETB Eroding thaw banks
MF Mudflow failures: thawed and failed ice-rich silt
IWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

FOL Former oriented lakes, now partly filled with peat and organic silt
SOL Small oriented lakes and ponds, frequently sub-rectangular in outline
SP Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil
RD Horizontal drainage on smoothly rounded highly ice-rich silt mantle
BD Beaded drainage
AIF Aufeis (flood icing) occurrences

Depth phases

d 5 to 10 ft of ice-rich silty topstratum

Discontinuous exposures of subdued and submasked moraine and outwash plains

ON Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt and fine sand
OW Old outwash (sand, gravel, cobbles) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt; silt mantle generally much thicker and more continuous from west of the Sadlerochit River to the Tamayariak River, approximately

COMPLEXES

Areas within the following complexes of two terrain types are either too small or too complexly interwingled to separate readily at the scale of the aerial photographs:

AFP+FFP: ON+AFD; RSR+RSR(OW)(HD)

DRILL HOLE DATA LEGEND

PIPELINE LEGEND

- CARRIER PIPE (cover shown)
- CARRIER PIPE (berm cover)
- BERM BREAK
- SWAMP WEIGHT
- RIVER WEIGHT
- FROST ANCHOR
- SCREW ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
- ANCHOR BLOCK (concrete)
- BLOCK VALVE
- TEST LEAD & DIRECTION OF WIRES
- POINT OF INTERSECTION
- DRILL HOLE LOCATION
- WARNING SIGN
- MILEPOST SIGN -AIRCRAFT
- CHAINAGE EQUATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA	QUAN.
CARRIER - 48" O.D. x 0.800" W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL		
QUAN.	DESCRIPTION	REQ'N. Nº

BUOYANCY AND EROSION CONTROL LEGEND

- B-0 No buoyancy
- B-1 Potential buoyant conditions along segment
- B-2 Potential buoyant conditions along portions of the segment
- N/A Refer to river crossing drawing
- EC-1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
- EC-2 Average slope along segment greater than 3° Erodible soil Steam spaced control measures required
- EC-3 Average slope along segment less than 3° Non-erodible soil. Minimal control measures required
- EC-4 Average slope along segment greater than 3° Non-erodible soil. Control measures required in low areas only
- EC-5 Unstable water courses. Ravine burial required along segment
- EC-6 Control measures required on steep sidesloopes
- EC-7 Control measures required at steep scarps
- EC-8 Low-lying sensitive areas. Measures to preserve micro drainage

GENERAL NOTES:

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG. 4-0200-0001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY	
ROLL Nº	PHOTO Nº
C7115	98 - 106

OPERATING LICENCE Nº.	
CONSTRUCTION PERMIT Nº.	
MIN. TEST PRESSURE	1848 p.s.i.
MAX. OPERATING PRESSURE	1680 p.s.i.

Nº	DATE	REVISION	APPRO BY	APPRO BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

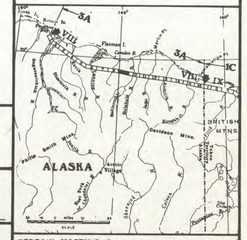
UPSTREAM M.P. 94 DOWNSTREAM M.P. 107

DRN. BY	DATE
CHKD. BY	
APPRD BY	Jan 22/74 Feb 4/74

SCALE: 1" = 2000'

SHEET 9 OF 16

3A-0200-1009



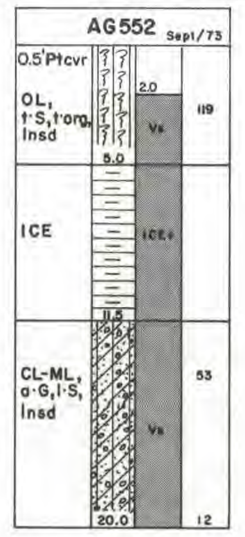
TERRAIN MAPPING BY:

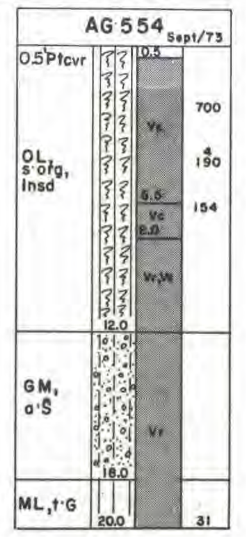
J.D. MOLLARD & ASSOCIATES LIMITED

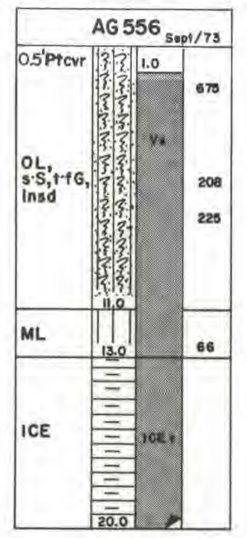
REGINA, SASK.

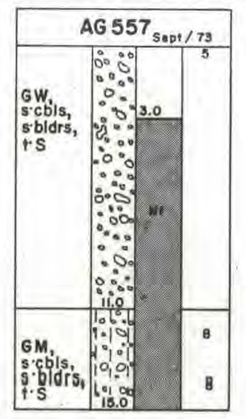
OWNERSHIP

DRILL HOLE DATA

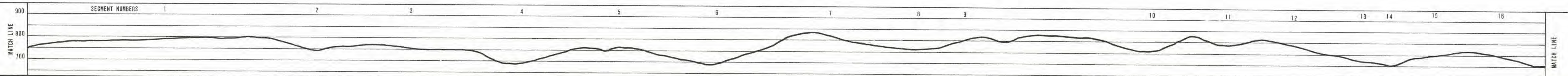


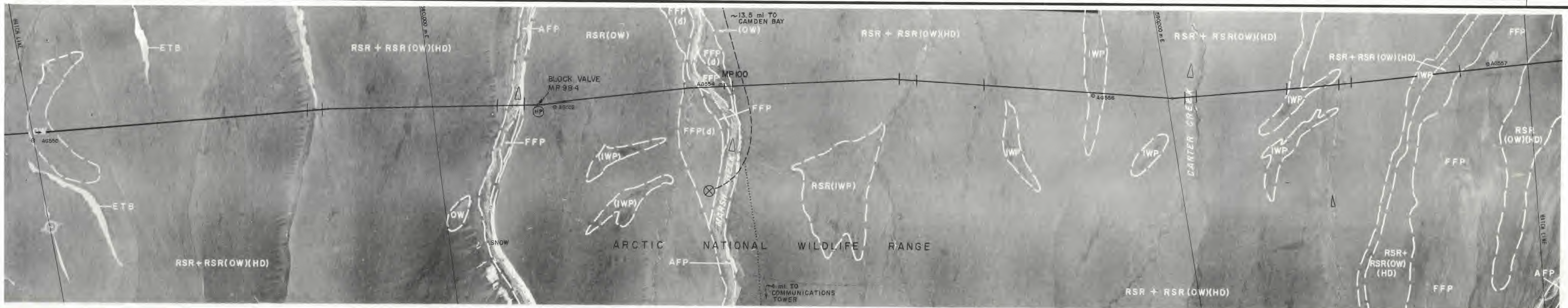






PROFILE





ENVIRONMENTAL DATTA AND PROTECTION MEASURES

FISH

No winter flow in these streams

BIRDS

Potential nesting of rough-legged hawks along Marsh Creek in the immediate vicinity of the proposed pipeline

MAMMALS

Very little caribou wintering activity; during June several hundred caribou may occur in vicinity of pipeline. Sadlerochit-Hulahula River muskox group occurs from mile 100 east; north-south movements can be expected on this sheet.
A few sheep summering along upper Marsh Creek.
Year round use and denning by Arctic fox, red fox, wolf, wolverine, short-tailed weasel and ground squirrel Avoid disturbance to den sites.
Possible presence of polar bear from early November to early April.
Grizzly bear present during summer months.

Critical muskox area.

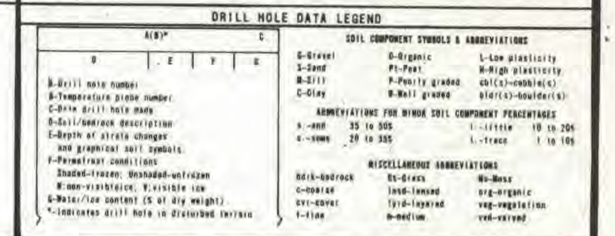
VEGETATION

- 94.10
- Sedge d. willow - moss
- Sedge - cottongrass - d. willow, drainage systems - Carex - moss - horsetail
- Sedge - moss, Equisetum, lingonberry
- Sedge Dryas d. willow
- Willow-horsetail
- Sedge - Dryas d. willow
- Sedge - moss
- Sedge - cottongrass - d.willow
- Sedge - cotton-grass - moss
- Willow-horsetail
- Sedge - d. willow - moss
- D. willow-sedge horsetail
- Dryas - cotton-grass - d. willow
- Willow - sedge Polygonum
- Sedge - d.willow
- D. willow - horsetail - Arctostaphylos
- Sedge - d. willow Cassiope - moss
- Sedge - Dryas cottongrass
- Sedge - d. willow - moss
- Sedge - moss
- Sedge - cottongrass d. willow
- Sedge - moss Cassiope
- Sedge - cottongrass - Dryas - d. willow
- Sedge moss
- Dryas - sedge Cassiope
- Sedge - moss Cassiope
- Sedge - cotton-grass - Dryas
- Sedge - moss - d.willow
- Sedge - cotton-grass - moss
- Sedge - moss - Polygonum
- Sedge - cottongrass - moss

LAND USE

OTHERS

Archaeology high priority



TERRAIN TYPING LEGEND

VIII -- ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary
TERRAIN TYPES

- ACP Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata
- AFD Alluvial fan deposits: thin silt-mantled broad low-gradient (1/3° to 2°) alluvial fans underlain by deep silty to clean sand and gravel with generally lower excess ice contents
- AFP Active flood plain: mainly exposed riverbed sand and gravel strata
- AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata
- BR Bedrock: mainly folded and faulted Lower Cretaceous shale and sadnstone with patches of thin overburden
- FFP Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata
- OW Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents
- RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

- B Bedrock-controlled relief
- LST Lobate solifluction terraces on steep bedrock slopes
- P Pingos and hydrolaccoliths
- ETB Eroding thaw banks
- MF Mudflow failures: thawed and failed ice-rich silt
- IWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

- FOL Former oriented lakes, now partly filled with peat and organic silt
- SOL Small oriented lakes and ponds, frequently sub-rectangular in outline
- SP Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil
- HD Horsetail drainage on smoothly rounded highly ice-rich silt mantle
- BD Beaded drainage
- AUF Aufeis (flood icing) occurrences

Depth phases

- d 5 to 10 ft of ice-rich silty topstratum

Discontinuous exposures of subdued and submasked moraine and outwash plains

- OM Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt and fine sand
- OW Old outwash (sand, gravel, cobbles) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt; silt mantle generally much thicker and more continuous from west of the Sadlerochit River to the Tamayariuk River, approximately

COMPLEXES

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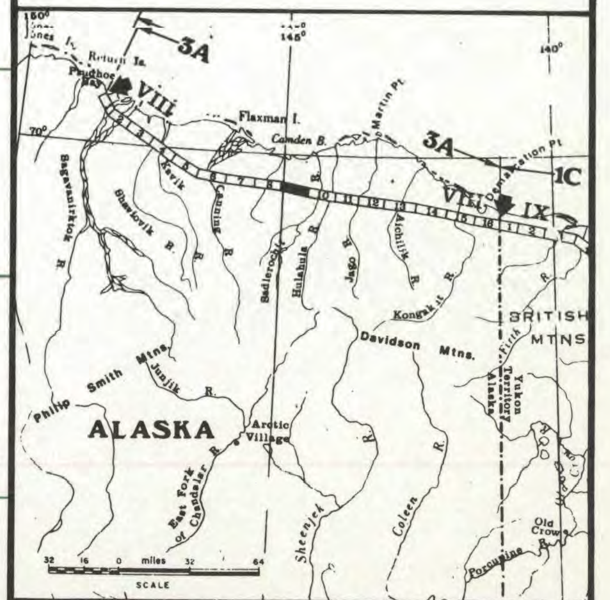
AFP+FFP: OW+AFD; RSR+RSR(OW)(HD)

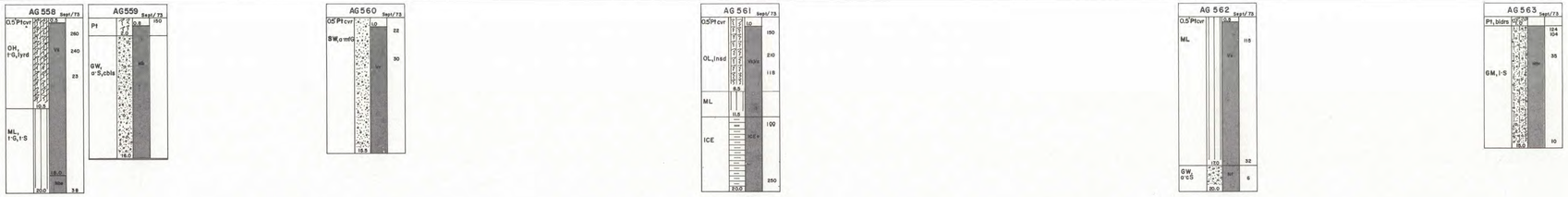


3A-0200-1009

TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA



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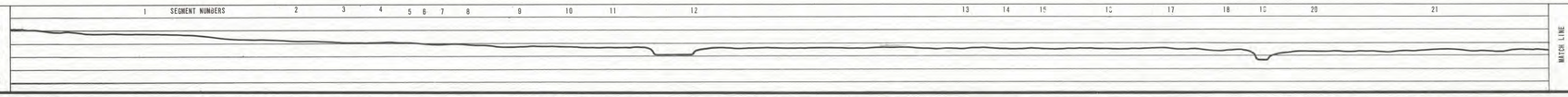

DRILL HOLE DATA LEGEND

TERRAIN TYPING LEGEND

VIII — ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary

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Areas within the following complexes of two terrain types are either too small or too complexly intermingled to separate readily at the scale of the aerial photographs:

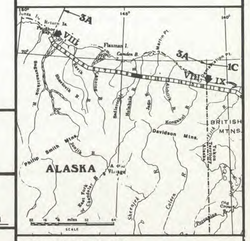
AFP+FFP: OM+AFD; RSR+RSR(OW)(HD)

CONSTRUCTION DATA

	MATCH LINE 105.85												MATCH LINE	MATCH LINE								MATCH LINE 110.00	
REFERENCE DRAWINGS & NOTES			4-0210-1099		4-0210-1099	4-0210-1099					4-0210-1099				4-0210-1099								
CHAINAGE (miles)	80.00	1.82	2.14	2.50	2.68	2.74	2.78	2.90	3.27	3.67	3.99	4.27	5.17	6.62	6.62	6.95	7.05	7.62	7.89	8.53	8.78	8.88	8.92	11.15	
DESIGN DATA																									FOOTAGE THIS SHEET
SEGMENT No.	1	2	3	4	5	6	7	8	9	10	11	12	13		13	14	15	16	17	18	19	20	21		
SEGMENT LENGTH	1.82	0.52	0.16	0.30	0.14	0.10	0.08	0.37	0.30	0.42	0.28	0.90	1.45		0.33	0.10	0.57	0.27	0.64	0.28	0.19	0.54	1.63		
EROSION CONTROL	EC-1C	EC-1B	N/A	EC-1C	N/A	EC-1D	N/A	EC-1B	EC-1C	EC-1B	EC-1C	N/A	EC-1D		EC-1D	N/A	EC-1D	EC-1D	EC-1C	EC-2B	N/A	EC-1D	EC-1C		
BUOY.	B-D	B-1	N/A	B-1	N/A	B-D	N/A	B-1	B-D	B-1	B-D	N/A	B-1		D-1	N/A	B-1	B-D	B-1	B-D	N/A	B-D	B-2		
REVEG.	I-V-8		N/A	I-V-8	I-V-5				I-V-8			I-V-2	I-V-8		I-V-8	I-V-5		I-V-8			I-V-5		I-V-8		

0 0·5 1·0 SCALE: (miles)

U.T.M. GRID ZONE 8



PIPELINE LEGEND

- CARRIER PIPE (over shown)
- CARRIER PIPE (bern cover)
- BERM BREAK
- SWAMP WEIGHT
- RIVER WEIGHT
- FROST ANCHOR
- SCREW ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
- ANCHOR BLOCK (concrete)
- BLOCK VALVE
- TEST LEAD & DIRECTION OF WIRES
- POINT OF INTERSECTION
- DRILL HOLE LOCATION
- WARNING SIGN
- MILEPOST SIGN - AIRCRAFT
- CHAINAGE EQUATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALLEY
- WINTER TRAIL

PIPE DATA	QUAN.
CARRIER - 48" O.D. x 0.800" W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE 65	
COATING DATA	

MISCELLANEOUS MATERIAL		
QUAN.	DESCRIPTION	REQ'N No.

BUOYANCY AND EROSION CONTROL LEGEND

- B-0 No buoyancy.
- B-1 Potential buoyant conditions along segment
- B-2 Potential buoyant conditions along portions of the segment
- N/A Refer to river crossing drawing
- EC-1 Average slope along segment less than 3° Erodible soil, Control measures required in low areas only
- EC-2 Average slope along segment greater than 3° Erodible soil Close spaced control measures required
- EC-3 Average slope along segment less than 3° Non-erodible soil, Minimal control measures required
- EC-4 Average slope along segment greater than 3° Non-erodible soil, Control measures required in low areas only
- EC-5 Erodable water courses, Deeper burial required along segment
- EC-6 Control measures required on steep sidesloges
- EC-7 Control measures required at steep sharps
- EC-8 Low-lying sensitive areas, Measures to preserve micro drainage

GENERAL NOTES:

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG. 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY	
ROLL No.	PHOTO Nos.
C7115	107 - 116
C7118	175 - 176

OPERATING LICENCE No.	
CONSTRUCTION PERMIT No.	
MIN. TEST PRESSURE	1848 p.s.i.
MAX. OPERATING PRESSURE	1680 p.s.i.

No.	DATE	REVISION	APPD. BY	APPD. BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
Engineering Services Company Limited
ENGINEERS FOR
ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
ALASKA

UPSTREAM M.P. 107 DOWNSTREAM M.P. 118

	DATE
DRN. BY:	
CHKD. BY:	Jan 20/74
APPRD BY:	Feb 4/74

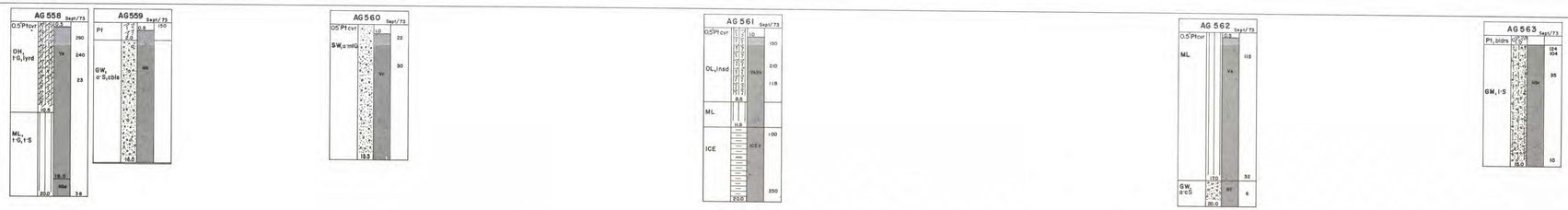
SCALE: 1" = 2000'
SHEET 10 OF 16

3A-0200-1010

TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA



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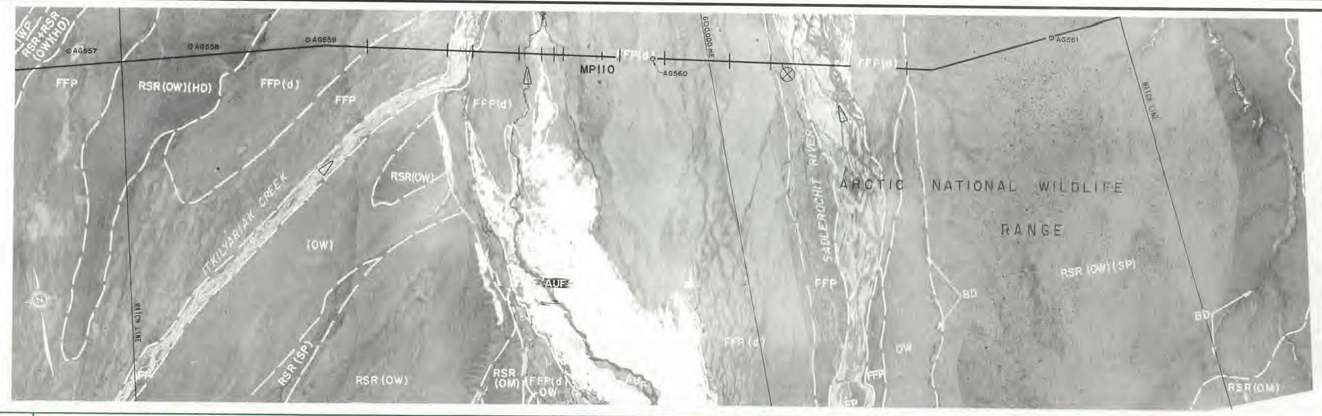

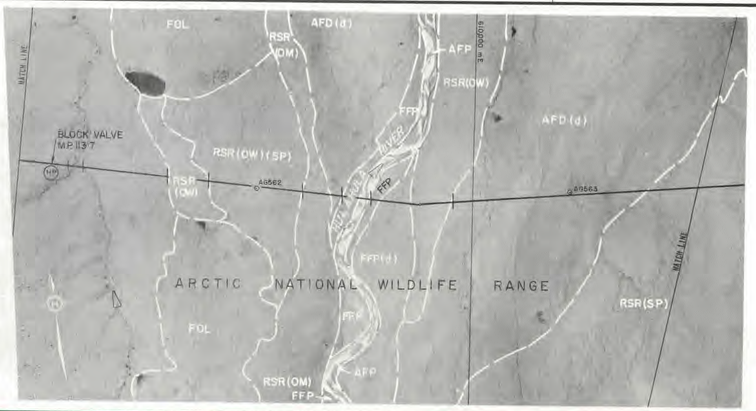

ENVIRONMENTAL DATA AND PROTECTION MEASURES

FISH

Small streams - no winter flow

Sadlerochit Springs - Arctic char, grayling.
Pipeline crosses bottom end of large field of aufeis formed at lower end of Sadlerochit Springs. This warm spring is an important summer feeding area for fish and an overwintering site for juvenile Arctic char. The spring habitat is sensitive at all times.

Sadlerochit River
River is frozen at this location. No known spawning or overwintering areas in this vicinity. Sensitive during May 1 - Nov. 1.

Minor drainage
no winter flow

Hulahula River - Arctic char.
River is frozen at this location in winter, but there is a char spawning and overwintering site approximately 1 mile downstream of the crossing which is sensitive throughout the winter months. The major spawning and overwintering sites on the Hulahula, located 20 miles upstream, are also sensitive.

BIRDS

North Slope area; limited habitat. Waterfowl (geese); vulnerable. Migration, August 15 to October1.Disturbance will be limited to winter construction and low level aircraft flights will be limited to right-of-way inspections.

MAMMALS

VEGETATION

Sedge - d. willow - moss

d. willow - cottongrass - sedge

d. willow - sedge - horsetail

willow - Arctostaphylos - horsetail

Sedge - d. willow - horsetail

Scattered d willow - Astragalus

Open sedge - willow - horsetail

willow - Arctostaphylos - horsetail

open sedge - willow

willow - Arctostaphylos - Astragalus

Scattered willow - sedge

Sedge - willow - horsetail

Sedge - d. willow - lingonberry

Sedge - d. willow - cottongrass - moss

Sedge - cottongrass - d. willow

willow - horsetail

Sedge - cottongrass - moss

Sedge - d. willow

Sedge - cottongrass - d. willow - moss

Sedge - d. willow - cottongrass - Polygonum - Sedge

Sedge - horsetail

Scattered sedge - willow - sedge

Sedge cottongrass - d. willow

Sedge - moss d willow

Sedge cottongrass - d. willow

Sedge - cottongrass - d willow - moss - horsetail

LAND USE

OTHERS

Archaeology high priority
Itkilyariak means Indian route

Archaeology high priority

Archaeology high priority. Major trade route

3A-0200-1010

DRILL HOLE DATA LEGEND

TERRAIN TYPING LEGEND

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ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary

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PHASES AND FEATURES

Topographic phases and features

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LST Lobate solifluction terraces on steep bedrock slopes

P Pingos and hydrolaccoliths

STR Stroding thaw basks

MF Mudflow failures: thawed and failed ice-rich silt

SW Ice-wedge polygons, well expressed

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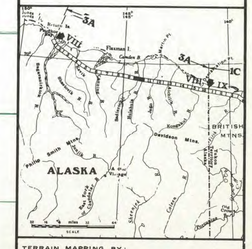
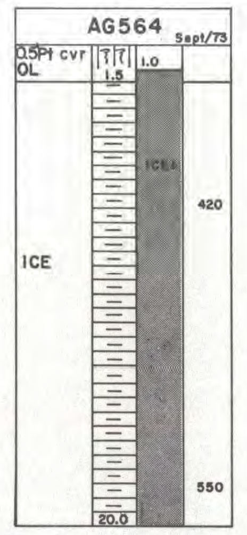
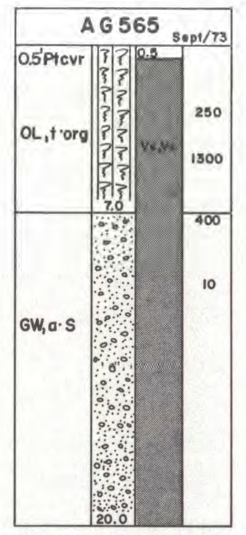


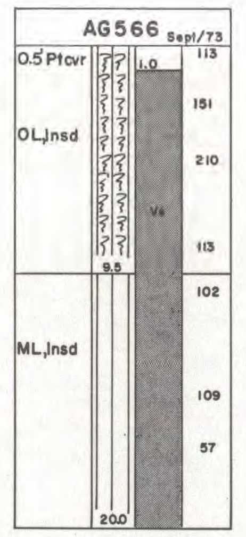
TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

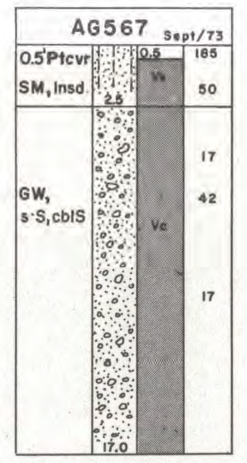
OWNERSHIP

DRILL HOLE DATA

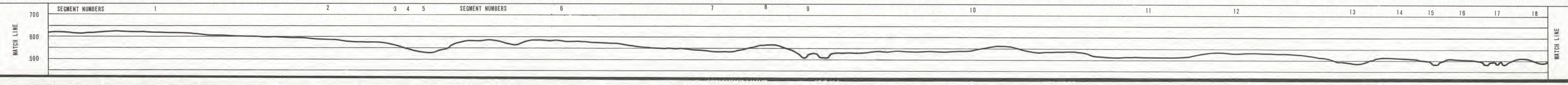


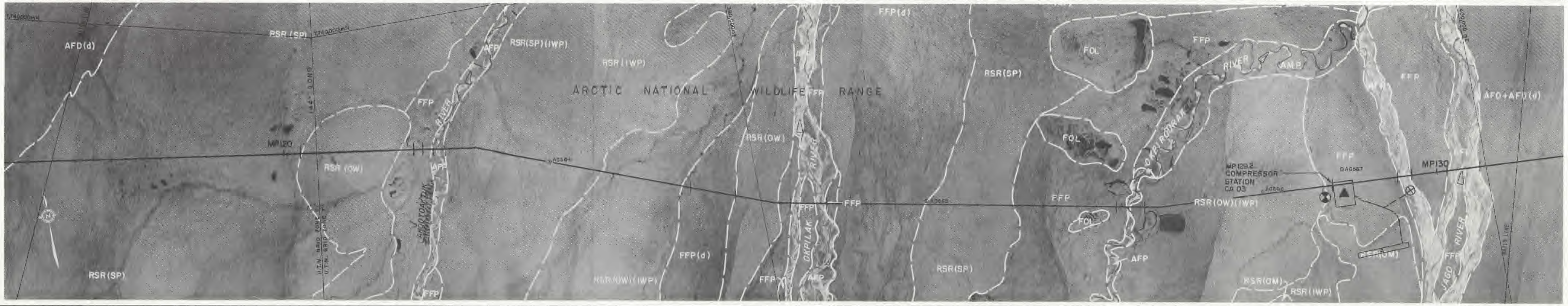






PROFILE





CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES: MATCH LINE 118.00; 4-0210-1099; 4-0210-1099; 4-0210-1099; 4-0210-1099; 4-0210-1099; 4-0210-1099; 4-0210-1099; MATCH LINE 130.70

CHAINAGE (miles): 00.00, 2.14, 3.12, 3.20, 3.30, 3.41, 5.53, 5.92, 6.41, 6.72, 9.22, 9.47, 11.02, 11.09, 11.66, 11.77, 12.09, 12.38, 12.70

DESIGN DATA

SEGMENT Nº	SEGMENT LENGTH	EROSION CONTROL	BUOY.	REVEG.
1	2.14	EC-1C	B-2	I-V-8
2	0.98	EC-1D	B-0	I-V-8
3	0.08	N/A	N/A	I-V-8
4	0.10	EC-1D	B-0	I-V-8
5	0.11	N/A	N/A	I-V-5
6	2.12	EC-1D	B-1	I-V-8
7	0.39	EC-1C	B-0	I-V-8
8	0.49	EC-1C	B-2	I-V-8
9	0.31	N/A	N/A	I-V-5
10	2.50	EC-1C	B-1	I-V-8
11	0.25	N/A	N/A	I-V-5
12	1.55	EC-1D	B-1	I-V-8
13	0.07	N/A	N/A	I-V-5
14 (C)	0.57	EC-1D	B-1	I-V-2
15	0.11	N/A	N/A	N/A
16	0.32	EC-1C	B-1	I-V-8
17	0.29	N/A	N/A	N/A
18	0.32	EC-1D	B-0	I-V-2

FOOTAGE THIS SHEET

SCALE: (miles) 0 0.5 1.0

U.T.M. GRID ZONE 6 & 7

PIPELINE LEGEND

- 30"cvr CARRIER PIPE (cover shown)
- CARRIER PIPE (berm cover)
- BERM BREAK
- SWAMP WEIGHT
- RIVER WEIGHT
- FROST ANCHOR
- SCREW ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
- ANCHOR BLOCK (concrete)
- BLOCK VALVE
- TEST LEAD & DIRECTION OF WIRES
- POINT OF INTERSECTION
- DRILL HOLE LOCATION
- WARNING SIGN
- MILEPOST SIGN - AIRCRAFT
- CHAINAGE EQUATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA	QUAN.
CARRIER - 48" O.D. x 0.800" W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL

QUAN.	DESCRIPTION	REQ'N. Nº

BUOYANCY AND EROSION CONTROL LEGEND

- B-0 No buoyancy
- B-1 Potential buoyant conditions along segment
- B-2 Potential buoyant conditions along portions of the segment
- N/A Refer to river crossing drawing
- EC-1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
- EC-2 Average slope along segment greater than 3° Erodible soil Close spaced control measures required
- EC-3 Average slope along segment less than 3° Non-erodible soil. Minimal control measures required
- EC-4 Average slope along segment greater than 3° Non-erodible soil. Control measures required in low areas only
- EC-5 Unstable water course. Deeper burial required along segment
- EC-6 Control measures required on steep sideslopes
- EC-7 Control measures required at steep scarps
- EC-8 Low-lying sensitive areas. Measures to preserve micro drainage

GENERAL NOTES:

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG. 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY	
ROLL Nº	PHOTO Nºs
C7118	177 - 186

OPERATING LICENCE Nº.

CONSTRUCTION PERMIT Nº.

MIN. TEST PRESSURE 1848 p.s.i.

MAX. OPERATING PRESSURE 1680 p.s.i.

Nº	DATE	REVISION	APPRD BY	APPRD BY

NORTHERN Engineering Services Company Limited

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. 118 DOWNSTREAM M.P. 131

DRN. BY: | DATE
CHKD. BY: [signature] Jan 25/74
APPRD BY: [signature] Feb 4/74
SCALE: 1" = 2000'
SHEET 11 OF 16
3A-0200-1011

DRILL HOLE DATA LEGEND

A-Drill hole number
B-Temperature probe number
C-Date drill hole made
D-Soil/bedrock description
E-Depth of strata changes and graphical soil symbols
F-Permafrost conditions: Shaded-frozen; Unshaded-unfrozen; N-non-visible ice; V-visible ice
G-Water/ice content (% of dry weight)
*-Indicated drill hole in disturbed terrain

SOIL COMPONENT SYMBOLS & ABBREVIATIONS: G-Gravel, S-Sand, M-Silt, C-Clay, O-Organic, Pt-Peat, P-Poorly graded, W-Well graded, L-Low plasticity, H-High plasticity, cbl(s)-cobble(s), bldr(s)-boulder(s)

ABBREVIATIONS FOR MINOR SOIL COMPONENT PERCENTAGES: a-and 35 to 50%, s-some 20 to 35%, l-little 10 to 20%, t-trace 1 to 10%

MISCELLANEOUS ABBREVIATIONS

TERRAIN TYPING LEGEND

VIII -- ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary
TERRAIN TYPES

- ACP Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata
- AFD Alluvial fan deposits: thin silt-mantled broad low-gradient (1/3° to 2°) alluvial fans underlain by deep silty to clean sand and gravel with generally lower excess ice contents
- AFP Active flood plain: mainly exposed riverbed sand and gravel strata
- AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata
- BR Bedrock: mainly folded and faulted Lower Cretaceous shale and sadnstone with patches of thin overburden
- FFP Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata
- OW Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents
- RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

- B Bedrock-controlled relief
- LST Lobate solifluction terraces on steep bedrock slopes
- P Pingos and hydrolaccoliths
- ETB Eroding thaw banks
- MF Mudflow failures: thawed and failed ice-rich silt
- IWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

- FOL Former oriented lakes, now partly filled with peat and organic silt
- SOL Small oriented lakes and ponds, frequently sub-rectangular in outline
- SP Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil
- HD Horsetail drainage on smoothly rounded highly ice-rich silt mantle
- BD Beaded drainage
- AUF Aufeis (flood icing) occurrences

Depth phases

- d 5 to 10 ft of ice-rich silty topstratum

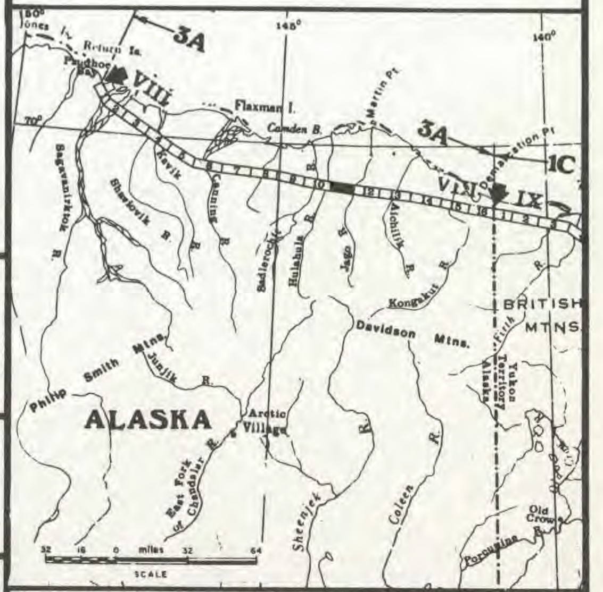
Discontinuous exposures of subdued and submasked moraine and outwash plains

- OM Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt and fine sand
- OW Old outwash (sand, gravel, cobbles) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt; silt mantle generally much thicker and more continuous from west of the Sadlerochit River to the Tamayariuk River, approximately

COMPLEXES

Areas within the following complexes of two terrain types are either too small or too complexly intermingled to separate readily at the scale of the aerial photographs:

AFP+FFP: OW+AFD; RSR+RSR(OW)(HD)



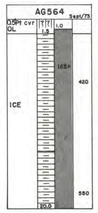
TERRAIN MAPPING BY:

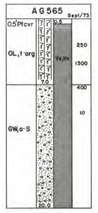
J.D. MOLLARD & ASSOCIATES LIMITED

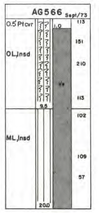
REGINA, SASK.

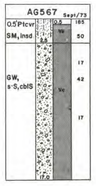
OWNERSHIP

DRILL HOLE DATA

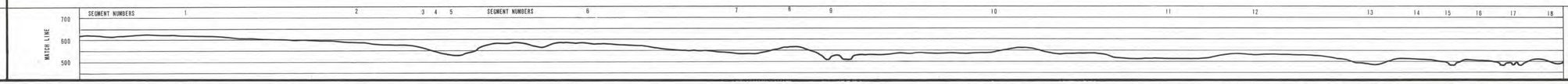


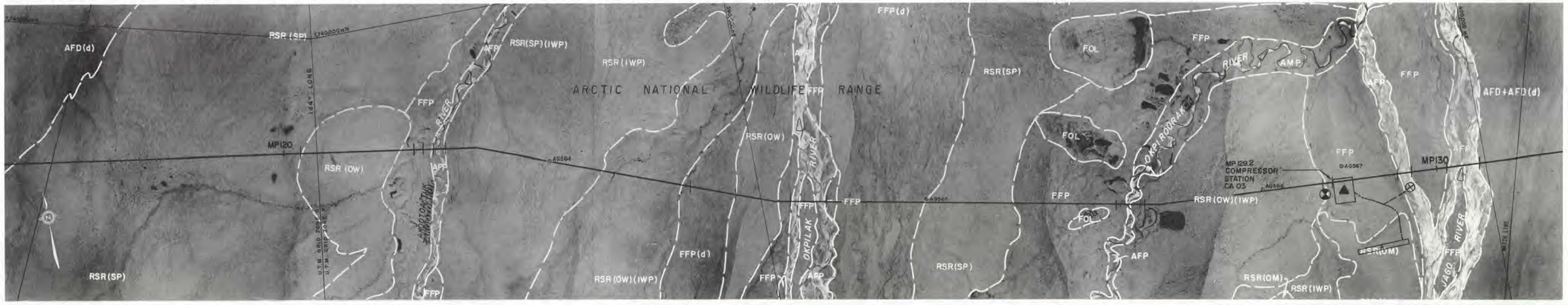






PROFILE





TERRAIN TYPING LEGEND

VIII — ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary
TERRAIN TYPES

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AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata

BR Bedrock: mainly folded and faulted lower Cretaceous shale and sandstone with patches of thin overburden

FFP Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata

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RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

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LST Lobate solifluction terraces on steep bedrock slopes
P Pingos and hydrolaccoliths
RTB Eroding thaw banks
MF Mudflow failures: thawed and failed ice-rich silt
IWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

FOL Former oriented lakes, now partly filled with peat and organic silt
SOL Small oriented lakes and ponds, frequently sub-rectangular in outline
SF Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil
WD Horsetail drainage on smoothly rounded highly ice-rich silt mantle
BD Beaded drainage
ASF Aufeis (flood icing) occurrences

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d 5 to 10 ft of ice-rich silty topstratum

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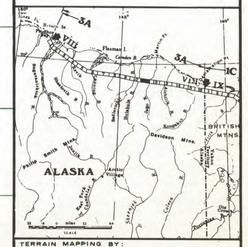


TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

ENVIRONMENTAL DATA AND PROTECTION MEASURES

FISH

Akoptoakuk River
No winter flow at this crossing.

Omilak River - Probably utilized by Arctic char and grayling, but no known spawning or overwintering areas in this vicinity. No winter flow at this crossing.

No winter flow at this crossing.

Jago River probably utilized by char and grayling, but no known spawning or overwintering sites in this vicinity. River is frozen at this location in winter. Sensitive during May 1 - Nov. 1. Special precautions will be taken during borrow activities to prevent siltation.

BIRDS

North slope area; limited habitat. Waterfowl (geese); vulnerable, migration, August 15 to October 1, disturbance will be limited to winter construction; low level aircraft flights will be limited to right-of-way inspections.

MAMMALS

Caribou wintering activity is apparently rare in this area. The northwest corner of this sheet is principal calving area for Porcupine herd entering mainly from east after mid-May. After calving in mid-June caribou cross this area from south and southeast. Intense activity to the north and west as late as first week in July; caribou stay in area from mid-June to July 1 - 3; some years intense activity until early Sept. travelling east and or south. Arctic and red fox, wolf, wolverine, short-tailed weasel and ground squirrel. Grizzly bear present during summer period.

Important habitat for upland furbearer and grizzly bear; red and Arctic fox and ground squirrel dens present.

Important habitat for upland furbearers and grizzly bear; red and Arctic fox and ground squirrel dens present.

VEGETATION

118.00

Sedge meadow complex w/cottongrass, d. willow, lingonberry - moss

D. willow - sedge moss

D. willow - sedge - cotton-grass

Scattered willow on Sedge - Dryas - moss

Sedge - Cottongrass - moss

Sedge - d. willow - moss - cotton-grass

Sedge - d. willow - horsetail

Sedge - willow - horsetail

Sedge - d. willow - horsetail

Sedge - Polygonum - moss - Dryas

Sedge - d. willow - Scattered willow

Scattered willow on Sedge - d. willow - horsetail

Scattered d. willow on Sedge - Dryas

Sedge - d. willow - cottongrass - moss

Sedge - d. willow lingon-berry - Dryas

Sedge - cottongrass d. willow strands of willow - horsetail

Sedge - moss lousewort

Open willow - horsetail - sedge

Sedge - cottongrass - moss - d. willow

Sedge - d. willow Cassiope moss

Willow - Horse-tail - Astragalus

Sedge - d. willow moss

Scattered willow - horsetail - Astragalus

Sedge - willow - horsetail

Scattered willow - horsetail sedge

Sedge Dryas moss

LAND USE

OTHERS

Archaeology medium priority

Archaeology high priority

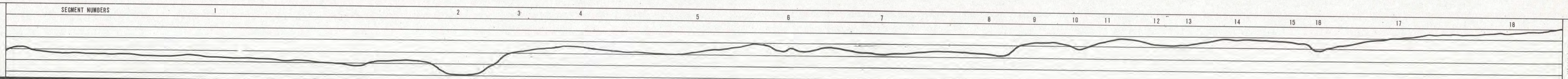
Archaeology high priority. River said to be taboo.

3A-0200-1011

OWNERSHIP

DRILL HOLE DATA

PROFILE



DRILL HOLE DATA LEGEND

A(B)*			C
D	E	F	G

A-Drill hole number
B-Temperature probe number
C-Date drill hole made
D-Soil/bedrock description
E-Depth of strata changes and graphical soil symbols
F-Permafrost conditions
Shaded-frozen; Unshaded-unfrozen
N:non-visible ice; V:visible ice
G-Water/ice content (% of dry weight)
*-Indicates drill hole in disturbed terrain

SOIL COMPONENT SYMBOLS & ABBREVIATIONS

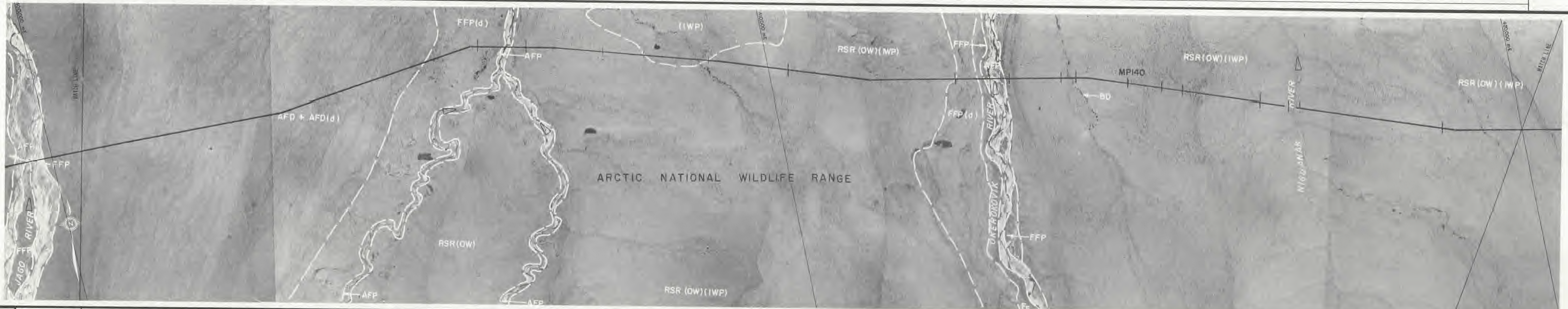
G-Gravel	O-Organic	L-Low plasticity
S-Sand	Pt-Peat	H-High plasticity
M-Silt	P-Poorly graded	cbl(s)-cobble(s)
C-Clay	W-Well graded	bldr(s)-boulder(s)

ABBREVIATIONS FOR MINOR SOIL COMPONENT PERCENTAGES

a.-and	35 to 50%	l.-little	10 to 20%
s.-some	20 to 35%	t.-trace	1 to 10%

MISCELLANEOUS ABBREVIATIONS

bdrk-bedrock	Gs-Grass	Ms-Moss
c-coarse	lnsd-lens(s)	org-organic
cvr-cover	lyrd-layered	veg-vegetation
f-fine	m-medium	vvd-varved



TERRAIN TYPING LEGEND

VIII -- ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary
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PHASES AND FEATURES

Topographic phases and features

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AFP+FFP; OW+AFD; RSR+RSR(OW)(HD)

CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES: MATCH LINE 130.70; 4-0210-1099; 4-0210-1099; 4-0210-1099; 4-0210-1099; MATCH LINE 143.46

CHAINAGE (miles): 00.00, 3.58, 3.98, 4.64, 5.04, 5.59, 6.36, 7.82, 8.29, 8.74, 8.87, 9.32, 9.62, 9.80, 10.48, 10.73, 10.83, 12.07, 12.76

DESIGN DATA

SEGMENT Nº	SEGMENT LENGTH	EROSION CONTROL	BUOY.	REVEG.
1	3.58	EC-1C	B-2	I-V-2
2	0.40	N/A	N/A	I-V-5
3	0.66	EC-1D	B-2	I-V-8
4	0.40	EC-1B	B-0	I-V-8
5	0.55	EC-1D	B-1	I-V-5
6	0.77	EC-1D	B-0	I-V-8
7	1.46	EC-1C	B-1	I-V-8
8	0.47	N/A	N/A	I-V-5
9	0.45	EC-1D	B-0	I-V-8
10	0.13	N/A	N/A	I-V-5
11	0.45	EC-1D	B-0	I-V-8
12	0.30	EC-1C	B-1	I-V-8
13	0.18	EC-1D	B-0	I-V-8
14	0.68	EC-1C	B-1	I-V-8
15	0.25	EC-1D	B-0	I-V-8
16	0.10	N/A	N/A	I-V-5
17	1.24	EC-1D	B-0	I-V-8
18	0.69	EC-1C	B-1	I-V-8

FOOTAGE THIS SHEET

SCALE: (miles) 0 0.5 1.0

U.T.M. GRID ZONE 7

PIPELINE LEGEND

CARRIER PIPE (cover shown)
CARRIER PIPE (berm cover)
BERM BREAK
SWAMP WEIGHT
RIVER WEIGHT
FROST ANCHOR
SCREW ANCHOR
HEAVY WALL PIPE
CASING PIPE
ANCHOR BLOCK (concrete)
BLOCK VALVE
TEST LEAD & DIRECTION OF WIRES
POINT OF INTERSECTION
DRILL HOLE LOCATION
WARNING SIGN
MILEPOST SIGN - AIRCRAFT
CHAINAGE EQUATION
COMPRESSOR STATION
AIR STRIP
STORAGE OR STAGING AREA
CAMP SITE
STAGING AREA & CAMP SITE
BORROW SITE
WHARF
PERMANENT ROAD
TEMPORARY ROAD
HELIPAD
MEASURING STATION
COMMUNICATIONS TOWER
SIDE VALVE
WINTER TRAIL

PIPE DATA	QUAN.
CARRIER - 48" O.D. x 0.800" W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE .65	

COATING DATA

MISCELLANEOUS MATERIAL

QUAN.	DESCRIPTION	REQ'N. Nº

BUOYANCY AND EROSION CONTROL LEGEND

B-0 No buoyancy
B-1 Potential buoyant conditions along segment
B-2 Potential buoyant conditions along portions of the segment
N/A Refer to river crossing drawing
EC-1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
EC-2 Average slope along segment greater than 3° Erodible soil Close spaced control measures required
EC-3 Average slope along segment less than 3° Non-erodible soil. Minimal control measures required
EC-4 Average slope along segment greater than 3° Non-erodible soil. Control measures required in low areas only
EC-5 Unstable water course. Deeper burial required along segment
EC-6 Control measures required on steep sideslopes
EC-7 Control measures required at steep scarps
EC-8 Low-lying sensitive areas. Measures to preserve micro drainage

GENERAL NOTES:

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG. 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY	
ROLL Nº C7118	PHOTO Nºs 187 - 195

OPERATING LICENCE Nº	
CONSTRUCTION PERMIT Nº	
MIN. TEST PRESSURE	1848 p.s.i.
MAX. OPERATING PRESSURE	1680 p.s.i

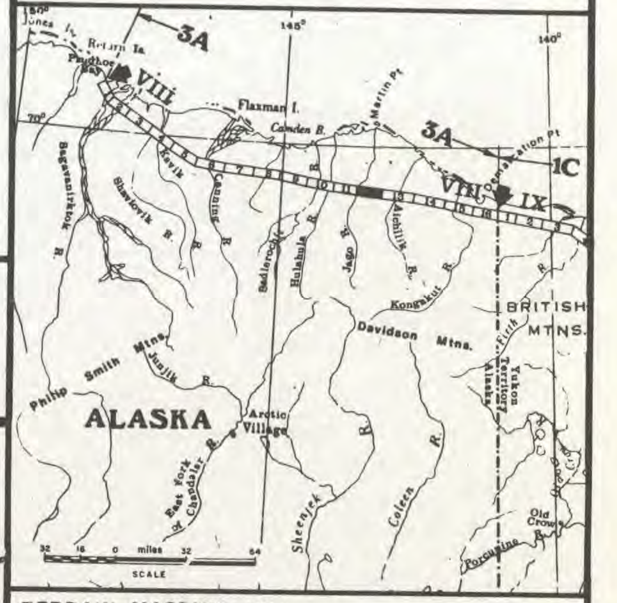
Nº	DATE	REVISION	APPR'D BY	APPR'D BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
Northern Engineering Services Company Limited
ENGINEERS FOR
ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
ALASKA

UPSTREAM M.P. 131   DOWNSTREAM M.P. 143

DRN. BY: | DATE
CHKD. BY: [signature] | Jan 25/74
APPR'D BY: [signature] | Feb. 4/74
SCALE: 1" = 2000'
SHEET 12 OF 16
3A-0200-1012



TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA

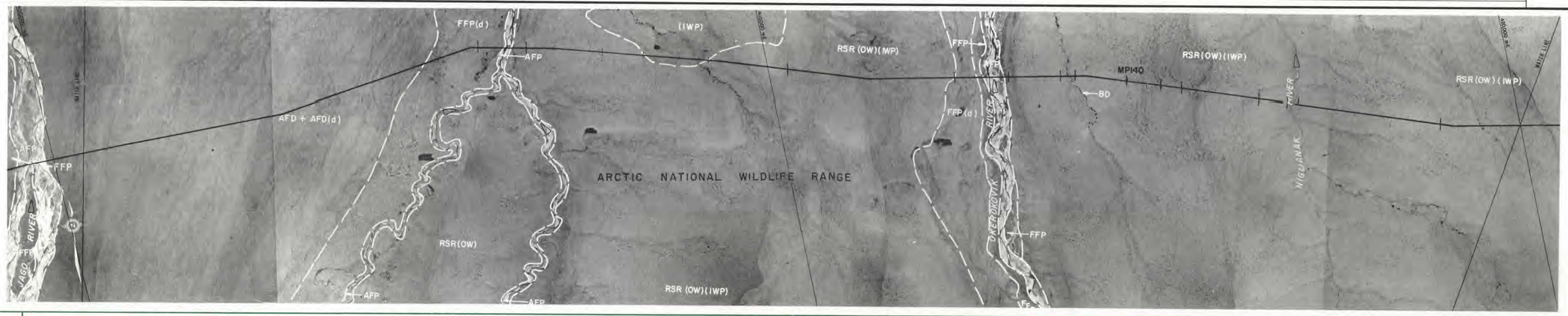
PROFILE

SEGMENT NUMBERS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

600
500
400

MATCH LINE

MATCH LINE



FISH

No winter flow at this stream crossing

Minor drainage - no winter flow

BIRDS

North slope area, limited habitat. Waterfowl (geese) vulnerable, migration August 15 to October 1; disturbance will be limited to winter construction, low level aircraft flights will be limited to right-of-way inspections.

MAMMALS

Caribou activity rare in this area, northern edge of this sheet is principal calving area of P cupine caribou herd, occurring from mid-May through mid-June. This sheet crosses general range of Jago-Angus River muskox

Year round use by Arctic and red fox, wolf, wolverine, short-tailed weasel and ground squirrel. Grizzly bear present during summer.

Area east of Okerokovik River receives use year round muskox use and calving probably occurs here; critical area; avoid low level flights and harassment.

Moderate value habitat to upland furbearers and grizzly bear; red fox, Arctic fox and ground squirrel denning area, year round use by upland furbearers and summer use by grizzly bear.

Okerokovik River - important habitat for furbearers and grizzly bear; Arctic and red fox and ground squirrel denning - potential polar bear or wolf denning

VEGETATION

130 70

Tussocky cottongrass - d. willow - Dryas - moss / inclusions of wet sedge meadow w/moss

Sedge - lousewort - moss - d.willow

Sedge - cotton-grass tussocks/ d. willow - moss

Willow - Arctost-aphylos rotundifolia - Dryas - willow - sedge

Sedge - cotton-grass - Dryas - lingonberry

Tussocky - sedge - cottongrass - d.willow - Polygonum

willow - sedge - horsetail - Polygonum

Sedge - moss

Sedge - d. willow - moss

Dryas - sedge - moss

Sedge - cotton-grass - d. willow - lingonberry

Hummocky and ridged sedge - d. willow - Dryas

Sedge - d. willow - cotton-grass

Willow - horse-tail - sedge

Scattered willow - sedge - moss

d. willow - sedge - lupine

Hummocky sedge - cottongrass - moss

willow-horsetail

Hummocky sedge - cot-tongrass - d. willow - moss

Hummocky and ridged sedge - moss - d. willow - cottongrass

Sedge - d. willow - moss

willow-horsetail

Sedge - cottongrass moss meadow

Hummocky and ridged sedge - cotton-grass w/d. willow - moss

LAND USE

OTHERS

Archaeology medium priority

Archaeology high priority

ENVIRONMENTAL DATA AND PROTECTION MEASURES

DRILL HOLE DATA LEGEND

TERRAIN TYPING LEGEND

VIII — ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary

TERRAIN TYPES

ACP Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata

AFD Alluvial fan deposits: thin silt-mantled broad low-gradient (1/2° to 2°) alluvial fans underlain by deep silty to clean sand and gravel with generally lower excess ice contents

AFP Active flood plain: mainly exposed riverbed sand and gravel strata

AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata

BR Bedrock: mainly folded and faulted Lower Cretaceous shale and sandstone with patches of thin overburden

FFP Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata

OW Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents

RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

S Bedrock-controlled relief

LST Lobate solifluction terraces on steep bedrock slopes

P Pingos and hydrolaccoliths

ETR Eroding thaw banks

MF Mudflow failures; thawed and failed ice-rich silt

IWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

FOL Former oriented lakes, now partly filled with peat and organic silt

SOL Small oriented lakes and ponds, frequently sub-rectangular in outline

SP Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil

HD Horsetail drainage on smoothly rounded highly ice-rich silt mantle

BD Beaded drainage

AUF Aufeis (flood icing) occurrences

Depth phases

d 5 to 10 ft of ice-rich silty topstratum

Discontinuous exposures of subdued and submasked moraine and outwash plains

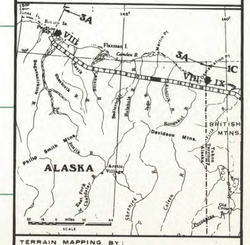
OM Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt and fine sand

OW Old outwash (sand, gravel, cobbles) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt; silt mantle generally much thicker and more continuous from west of the Sadlerochit River to the Tamayariak River, approximately

COMPLEXES

Areas within the following complexes of two terrain types are either too small or too complexly intermingled to separate readily at the scale of the aerial photographs

AFP+FFP; OW+AFD; RSR+RSR(OW)(BD)



TERRAIN MAPPING BY:

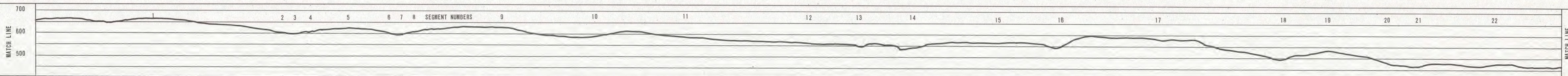
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

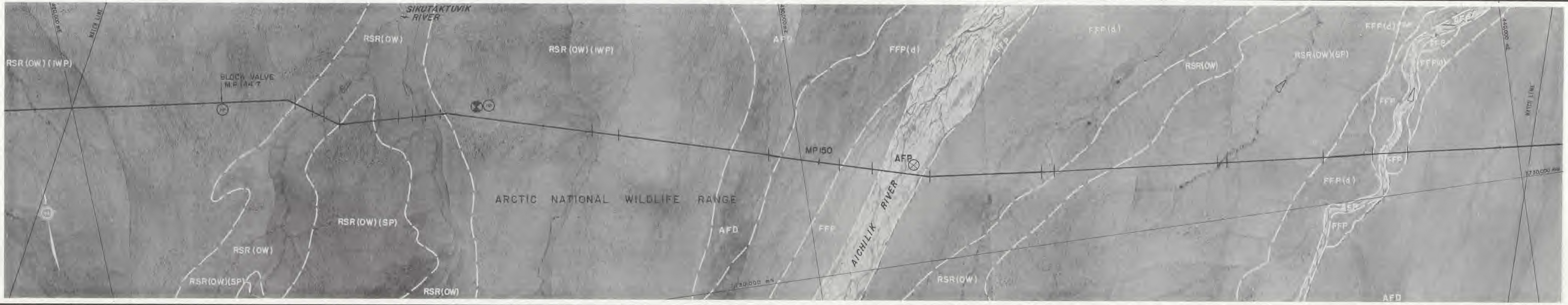
3A-0200-1012

OWNERSHIP

DRILL HOLE DATA

PROFILE





CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES	CHAINAGE (miles)
MATCH LINE 143.46	00.00
	1.93
4-0210-1099	2.09
	2.22
	2.36
	2.88
4-0210-1099	3.01
	3.12
	3.24
4-0210-1099	4.57
	4.80
	6.11
	6.72
4-0210-1099	7.02
	7.52
4-0210-1099	8.49
	8.60
4-0210-1099	10.11
	10.21
	11.08
	11.50
4-0210-1099	11.79
MATCH LINE 156.33	12.87

DESIGN DATA

SEGMENT Nº	SEGMENT LENGTH	EROSION CONTROL	BUOY.	REVEG.
1	1.93	EC-1C	B-1	I-V-8
2	0.16	EC-1C	B-0	
3	0.13	N/A	N/A	I-V-5
4	0.14	EC-1C	B-0	
5	0.52	EC-1C	B-1	I-V-8
6	0.13	EC-1C	B-0	
7	0.11	N/A	N/A	I-V-5
8	0.12	EC-1C	B-0	
9	1.33	EC-1C	B-2	I-V-8
10	0.23	N/A	N/A	I-V-5
11	1.31	EC-1C	B-2	I-V-8
12	0.61	EC-1C	B-0	I-V-2
13	0.30	EC-1B	B-1	
14	0.50	N/A	N/A	I-V-2
15	0.97	EC-1C	B-1	I-V-8
16	0.11	N/A	N/A	I-V-5
17	1.51	EC-1C	B-0	I-V-8
18	0.10	N/A	N/A	I-V-5
19	0.87	EC-1C	B-2	I-V-8
20	0.42	EC-1C	B-1	I-V-2
21	0.29	N/A	N/A	I-V-5
22	1.08	EC-1C	B-0	I-V-2

FOOTAGE THIS SHEET

0 0.5 1.0
SCALE: (miles)

U.T.M. GRID ZONE 7

DRILL HOLE DATA LEGEND

A(B)* C
D E F G

A-Drill hole number
B-Temperature probe number
C-Date drill hole made
D-Soil/bedrock description
E-Depth of strata changes and graphical soil symbols
F-Permafrost conditions
Shaded-frozen; Unshaded-unfrozen
N: non-visible ice, V: visible ice
G-Water/ice content (% of dry weight)
*-Indicates drill hole in disturbed terrain

SOIL COMPONENT SYMBOLS & ABBREVIATIONS

G-Gravel, S-Sand, M-Silt, C-Clay; O-Organic, Pt-Peat, P-Poorly graded, W-Well graded; L-Low plasticity, H-High plasticity, cbl(s)-cobble(s), bld(s)-boulder(s)

ABBREVIATIONS FOR MINOR SOIL COMPONENT PERCENTAGES

a.-and 35 to 50%; s.-some 20 to 35%; l.-little 10 to 20%; t.-trace 1 to 10%

MISCELLANEOUS ABBREVIATIONS

bdrk-bedrock, c-coarse, cvr-cover, f-fine; Gs-Grass, lnsd-lensed, lyrd-layered, m-medium; Ms-Moss, org-organic, veg-vegetation, vvd-varved

TERRAIN TYPING LEGEND

VIII -- ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary
TERRAIN TYPES

- ACP Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata
- AFD Alluvial fan deposits: thin silt-mantled broad low-gradient (1/3° to 2°) alluvial fans underlain by deep silty to clean sand and gravel with generally lower excess ice contents
- AFP Active flood plain: mainly exposed riverbed sand and gravel strata
- AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata
- BR Bedrock: mainly folded and faulted Lower Cretaceous shale and sadnstone with patches of thin overburden
- FFP Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata
- OW Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents
- RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

- B Bedrock-controlled relief
- LST Lobate solifluction terraces on steep bedrock slopes
- P Pingos and hydrolaccoliths
- ETB Eroding thaw banks
- MF Mudflow failures: thawed and failed ice-rich silt
- IWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

- FOL Former oriented lakes, now partly filled with peat and organic silt
- SOL Small oriented lakes and ponds, frequently sub-rectangular in outline
- SP Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil
- HD Horsetail drainage on smoothly rounded highly ice-rich silt mantle
- BD Beaded drainage
- AUF Aufeis (flood icing) occurrences

Depth phases

- d 5 to 10 ft of ice-rich silty topstratum

Discontinuous exposures of subdued and submasked moraine and outwash plains

- OM Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt and fine sand
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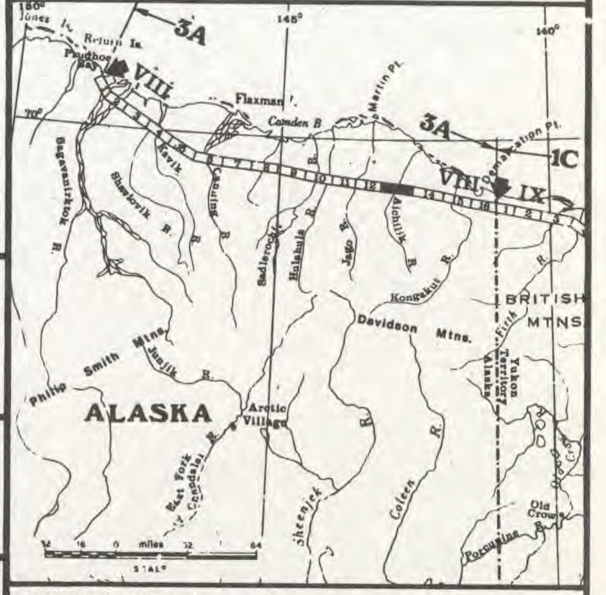
COMPLEXES

Areas within the following complexes of two terrain types are either too small or too complexly intermingled to separate readily at the scale of the aerial photographs:

AFP+FFP: OW+AFD; RSR+RSR(OW)(HD)



PIPELINE LEGEND

- CARRIER PIPE (cover shown)
- CARRIER PIPE (berm cover)
- BERM BREAK
- SWAMP WEIGHT
- RIVER WEIGHT
- FROST ANCHOR
- SCREW ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
- ANCHOR BLOCK (concrete)
- BLOCK VALVE
- TEST LEAD & DIRECTION OF WIRES
- POINT OF INTERSECTION
- DRILL HOLE LOCATION
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- MILEPOST SIGN - AIRCRAFT
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- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA	QUAN.
CARRIER - 48" O.D x 0.800" W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL

QUAN	DESCRIPTION	REQ'N. Nº

BUOYANCY AND EROSION CONTROL LEGEND

- B-0 No buoyancy
- B-1 Potential buoyant conditions along segment
- B-2 Potential buoyant conditions along portions of the segment
- N/A Refer to river crossing drawing
- EC-1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
- EC-2 Average slope along segment greater than 3° Erodible soil Close spaced control measures required
- EC-3 Average slope along segment less than 3° Non-erodible soil. Minimal control measures required
- EC-4 Average slope along segment greater than 3° Non-erodible soil. Control measures required in low areas only
- EC-5 Unstable water course. Deeper burial required along segment
- EC-6 Control measures required on steep sideslopes
- EC-7 Control measures required at steep scarps
- EC-8 Low-lying sensitive areas. Measures to preserve micro drainage

GENERAL NOTES:

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG. 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY

ROLL Nº	PHOTO Nºs
C7118	196 - 205

OPERATING LICENCE Nº
CONSTRUCTION PERMIT Nº

MIN TEST PRESSURE	1848 p.s.i.
MAX OPERATING PRESSURE	1680 p.s.i

Nº	DATE	REVISION	APPRD BY	APPRD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
ALASKA

UPSTREAM M.P. 143 DOWNSTREAM M.P. 156

DRN BY: DATE
CHKD. BY: [signature] Jan 26/74
APPRD BY: [signature] Feb 4/74

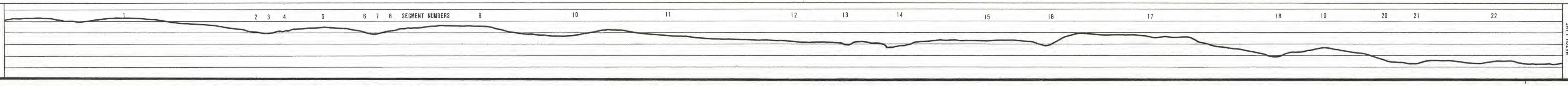
SCALE: 1" = 2000'
SHEET 13 OF 16

3A-0200-1013

TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP	
DRILL HOLE DATA	

PROFILE



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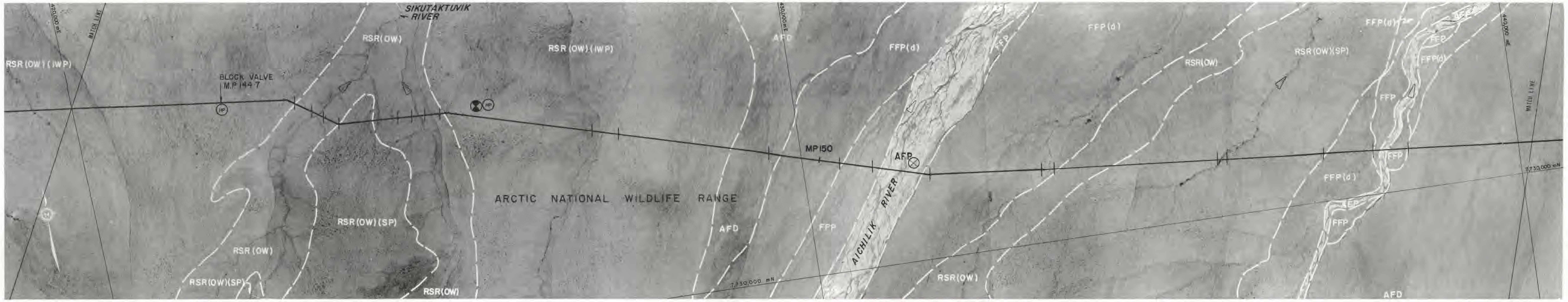

TERRAIN TYPING LEGEND

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AFP+FFP: OW+AFD; RSR+RSR(OW)(HD)

ENVIRONMENTAL DATA AND PROTECTION MEASURES

FISH

Minor drainages in this area - no winter flow

Aichilik River; Arctic char grayling River is frozen at this location in winter. An important Arctic char spawning and overwintering site is located 11 minutes upstream, river crossing sensitive during May 1 - Nov. 1.

Small drainages in this region - no winter flow

BIRDS

North slope; limited habitat; waterfowl (geese); vulnerable. Migration, Aug. 15 to Oct. 1. Disturbance will be limited to winter construction and low-level aircraft flights will be limited to right-of-way inspections.

MAMMALS

Caribou wintering activity is rare. Principal calving grounds of Porcupine caribou herd and intense activity from mid-May through mid-June. Many thousand caribou parallel or cross here from north.west between July 3 and 10. This area is critical muskox habitat for the Jago-AtigunRiver group. Year round use by Arctic and red fox, wolf, wolverine, short-tailed weasel and ground squirrel. Grizzly bear present during summer, polar bear present in frequently during winter.

** Sikutakluvik River - low - moderate value habitat for upland furbearer; possibility for limited denning by foxes and ground squirrels

Same as **

Aichilik River - important habitat for furbearers and grizzly bears; Arctic and red fox and ground squirrel denning area; potential wolf or polar bear denning area.

Same as **

Moderate value habitat for upland furbearer and grizzly bear; denning by fox and ground squirrel common but not concentrated.

VEGETATION

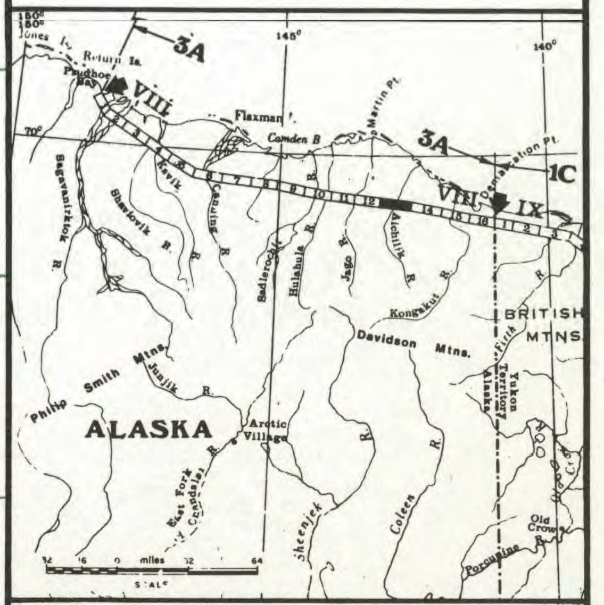
143.46	Sedge - cottongrass tussock w/ d. willow - moss - lingonberry includes wet sedge - moss meadow in strands and pockets	D. willow - sedge cottongrass - Astragalus	- Willow - sedge horsetail	Tussocky hummocky sedge - d.willow moss - cloud-berry	D. willow sedge - cottongrass hummocks - Wet sedge meadow in scattered pockets	D. willow - sedge - moss - lingonberry - cloudberry	D. willow - Dryas - sedge	Sedge - d. willow - Dryas - moss; inclusions of wet sedge - moss meadow type in drainages and small ponds	Sedge - d. willow - moss cottongrass	Sedge - cottongrass lingonberry - Dryas. Small drainage systems of d. willow - sedge	Sedge - d. willow cottongrass	D. willow - sedge - moss	Sedge - moss meadow	Scattered willow - horsetail - sedge	Scattered open willow sedge - horsetail	Sedge - d. willow - moss - cottongrass - lingonberry	Willow - sedge horsetail	Dryas - sedge lingonberry	D. willow - sedge - moss - cottongrass; Dryas sedge - d. willow inclusions on more exposed hilltops	Sedge - willow - horsetail	Sedge - cotton-grass - moss - Dryas	D. wil-low - sedge -	D. willow - sedge horsetail	Willow - Arctostaphylos - horsetail	Sedge - moss - cottongrass	Sedge - cottongrass - d. willow - lingonberry drainage systems of sedge - horsetail - moss

LAND USE

OTHERS

Archaeology medium priority

Archaeology high priority



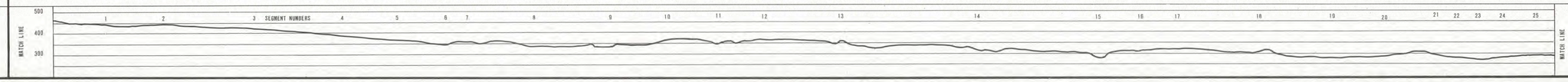
TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

3A-0200-1013

OWNERSHIP

DRILL HOLE DATA

PROFILE



CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES	MATCH LINE 156.93								4-0210-1099		4-0210-1099		4-0210-1099			4-0210-1099				4-0210-1099			4-0210-1099							MATCH LINE 169.45
CHAINAGE (miles)	00.00	0.87	1.09	2.40	2.65	3.32	3.65	3.78	4.97	5.11	5.65	5.78	6.77	7.35	8.76	9.28	9.63	9.88	10.84	11.26	11.86	12.17	12.36	12.44	12.70	13.12					
DESIGN DATA																															
SEGMENT No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25						
SEGMENT LENGTH	0.87	0.22	1.31	0.25	0.67	0.33	0.13	0.89	0.44	0.54	0.13	0.99	0.58	1.41	0.52	0.35	0.23	1.08	0.32	0.70	0.21	0.19	0.08	0.26	0.42						
EROSION CONTROL	EC-1C	EC-1B	EC-1C	EC-1B	EC-1C	EC-1B	EC-1C	EC-1C	N/A	EC-1C	N/A	EC-1C	N/A	EC-1C	N/A	EC-1D	EC-1C	EC-1C	N/A	EC-1C	EC-1B	EC-1C	N/A	EC-1 g	EC-1C						
BUOY.	B-0	B-1	B-0	B-1	B-0	B-1	B-0	B-1	N/A	B-2	N/A	B-2	N/A	B-2	N/A	B-0	B-1	B-0	N/A	B-1	B-0	B-1	N/A	B-0	B-1						
REVEG.	I-V-2								I-V-5	I-V-8	I-V-5	I-V-2	I-V-5	I-V-2	I-V-5	I-V-2			I-V-5	I-V-8			I-V-5	I-V-8							

FOOTAGE THIS SHEET

0 0·5 1·0
SCALE: (miles)

U.T.M. GRID ZONE 7

PIPELINE LEGEND

- CARRIER PIPE (cover shown)
- CARRIER PIPE (bare cover)
- BERM BREAK
- SWAMP WEIGHT
- RIVER WEIGHT
- FROST ANCHOR
- SCREW ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
- ANCHOR BLOCK (concrete)
- BLOCK VALVE
- TEST LEAD & DIRECTION OF WIRES
- POINT OF INTERSECTION
- DRILL HOLE LOCATION
- WARNING SIGN
- MILEPOST SIGN AIRCRAFT
- CHAINAGE EQUATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA	QUAN.
CARRIER - 48"O.D.x0.800"W.T. GRADE 70	
HEAVYWALL - 48"O.D.x1.034"W.T. GRADE 65	
COATING DATA	

MISCELLANEOUS MATERIAL		
QUAN.	DESCRIPTION	REQ'N. No

BUOYANCY AND EROSION CONTROL LEGEND

- B-0 No buoyancy
- B-1 Potential buoyant conditions along segment
- B-2 Potential buoyant conditions along portions of the segment
- N/A Refer to river crossing drawing
- EC-1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
- EC-2 Average slope along segment greater than 3° Erodible soil Close spaced control measures required
- EC-3 Average slope along segment less than 3° Non-erodible soil. Minimal control measures required
- EC-4 Average slope along segment greater than 3° Non-erodible soil. Control measures required in low areas only
- EC-5 Available water source. Deeper burial requ.red along segment
- EC-6 Control measures required on steep sidesloops
- EC-7 Control measures required on steep scarps
- EC-8 Low-lying sensitive areas. Measures to preserve micro drainage

GENERAL NOTES:
1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG. 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER - 2.5 FEET

AERIAL PHOTOGRAPHY	
ROLL No	PHOTO Nos
C7118	206 - 208
C7119	1 - 7

OPERATING LICENCE No	
CONSTRUCTION PERMIT No.	
MIN. TEST PRESSURE	1848 p.s.i.
MAX. OPERATING PRESSURE	1680 p.s.i.

No.	DATE	REVISION	APPRD BY	APPRD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
ENGINEERS FOR
ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA
ALASKA

UPSTREAM M.P. 139 DOWNSTREAM M.P. 169

	DATE
DRN. BY	
CHKD. BY	Jan 20/74
APPRD BY	Feb 4/74

SCALE: 1" = 2000'
SHEET 14 OF 16

3A-0200-1014

DRILL HOLE DATA LEGEND

TERRAIN TYPING LEGEND

VIII -- ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary

TERRAIN TYPES

- ACP Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata
- AFD Alluvial fan deposits: thin silt-mantled broad low-gradient (1/3° to 2°) alluvial fans underlain by deep silty to clean sand and gravel with generally lower excess ice contents
- AFP Active flood plain: mainly exposed riverbed sand and gravel strata
- AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata
- BR Bedrock: mainly folded and faulted lower Cretaceous shale and sandstone with patches of thin overburden
- FFP Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata
- OW Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents
- RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

- B Bedrock-controlled relief
- LST Lobate solifluction terraces on steep bedrock slopes
- P Pingos and hydrolaccoliths
- RTB Eroding thaw banks
- MF Mudflow failures: thawed and failed ice-rich silt
- IWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

- FOL Former oriented lakes, now partly filled with peat and organic silt
- SOL Small oriented lakes and ponds, frequently sub-rectangular in outline
- SP Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil
- HD Horsetail drainage on smoothly rounded highly ice-rich silt mantle
- BD Beaded drainage
- AUF Aufeis (flood icing) occurrences

Depth phases

- d 5 to 10 ft of ice-rich silty topstratum

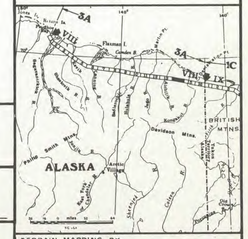
Discontinuous exposures of subdued and submasked moraine and outwash plains

- OM Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt and fine sand
- OW Old outwash (sand, gravel, cobbles) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt; silt mantle generally much thicker and more continuous from west of the Sadlerochit River to the Tamayariak River, approximately

COMPLEXES

Areas within the following complexes of two terrain types are either too small or too complexly intermingled to separate readily at the scale of the aerial photographs:

AFP+FFP: OW+AFD; RSR+RSR(OW)(RD)

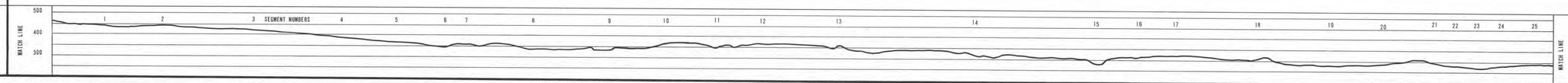


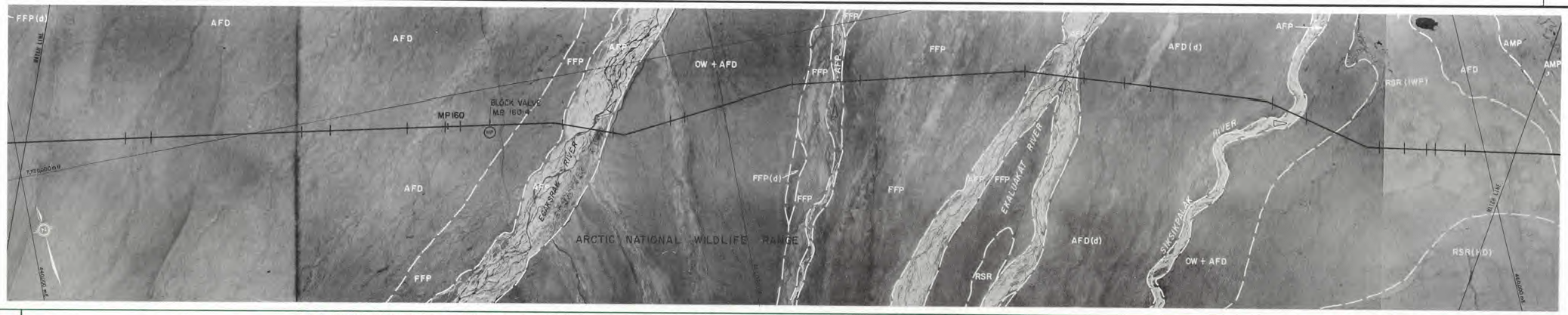
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA

PROFILE





ENVIRONMENTAL DATA AND PROTECTION MEASURES

FISH

Egakarak River: Arctic char*, grayling. River is probably frozen at this location in winter.

Small stream - no winter flow

Ekaluakat River: Arctic char. River is frozen at this location in the winter. An important Arctic char spawning and overwintering site, located 6 minutes upstream, is sensitive at all times. Sensitive during May 1 - Nov. 1.

Siksikpalak River: Arctic char. No winter flow at this location. Sensitive May 1 - Nov. 1. A char overwintering area, located 5 min. upstream is sensitive at all times.

Minor drainages - no winter flow

BIRDS

North slope; limited habitat. Waterfowl (geese); vulnerable. Migration, Aug. 15 to Oct. 1. Disturbance will be limited to winter construction and low level aircraft flights will be limited to right-of-way inspections.

MAMMALS

Caribou wintering activity is rare. Section of principal calving area of Porcupine. Caribou herd from mid-May to mid-June, caribou in some years summer here, caribou travelling east and/or south through this area until early September.
Year round use land denning by Arctic and red fox, wolf, wolverine, short-tailed weasel and grownd squirrel. Avoid disturbance to den sites.
Grizzly bear present from mid-April to mid-October, polar bear present from early Nov. early April. Polar bear movement cross route expected during Nov. March- and early April.

Siksikpaluk River - Important habitat for furbearers and bears denning by Arctic fox, red fox and ground squirrel; potential denning by wolves and polar bear along river bank.

VEGETATION 196.93

Sedge - cottongrass - d. willow - lingonberry

Sedge - d. willow - Cassiope

Sedge - d. willow - d. birch - moss; sedge - lingonberry - moss in drainage systems.

Sedge - d. willow - lingon-berry - moss.

Sedge - d. willow - d. birch.

Cassiope - blueberry - d. willow

Scattered willow - horsetail - lupine.

Dryas - Cassiope - d. willow

D. willow - Carex

D. willow - d. birch - sedge - blueberry

Scattered willow - sedge - lupine

Scattered, open willow - sedge

Sedge - d.willow - horsetail

D. willow - d. birch - sedge

Sedge - blueberry - d. willow

Sedge - lingon-berry - moss

Sedge d. willow - horsetail

Scattered, open willow - sedge - horsetail

D. willow - sedge - Cassiope - lingonberry

Dryas - lichen - sedge

D. willow - sedge - cottongrass - moss

Dryas - Cassiope - blueberry

Scattered willow - horsetail

Cassiope - Dryas - blueberry - moss

Sedge - cottongrass - d. willow - moss

Hummocky sedge - d. willow - d. Dryas - lingonberry

Sedge - d. willow - sedge - moss

Sedge moss - d. willow

D. willow - d. birch - sedge - horsetail

LAND USE

OTHERS

Archaeology high priority

Archaeology medium priority

Archaeology high priority

Archaeology high priority

DRILL HOLE DATA LEGEND

TERRAIN TYPING LEGEND

VIII — ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary

TERRAIN TYPES

ACP Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata

AFD Alluvial fan deposits: thin silt-mantled broad low-gradient ($1/2^{0}$ to 2^{0}) alluvial fans underlain by deep silty to clean sand and gravel with generally lower excess ice contents

AFP Active flood plain: mainly exposed riverbed sand and gravel strata

AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata

BR Bedrock: mainly folded and faulted Lower Cretaceous shale and sandstone with patches of thin overburden

FFP Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata

OW Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents

RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thivk excess ice

PHASES AND FEATURES

Topographic phases and features

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LST Lobate solifluction terraces on steep bedrock slopes
P Pingos and hydrolaccoliths
ETR Eroding thaw banks
MF Mudflow failures: thawed and failed ice-rich silt
IWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

FOL Former oriented lakes, now partly filled with peat and organic silt
SOL Small oriented lakes and ponds, frequently sub-rectangular in outline
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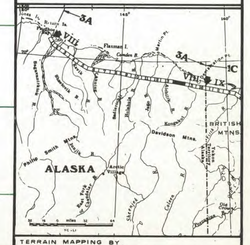
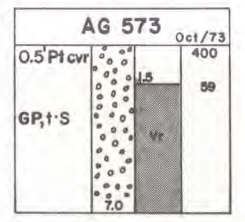


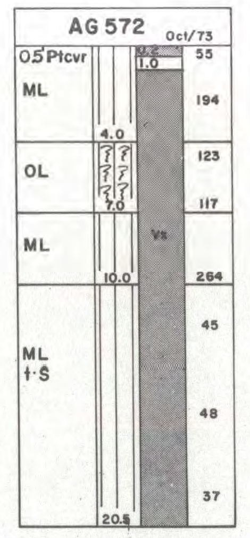
TERRAIN MAPPING BY
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

3A-0200-1014

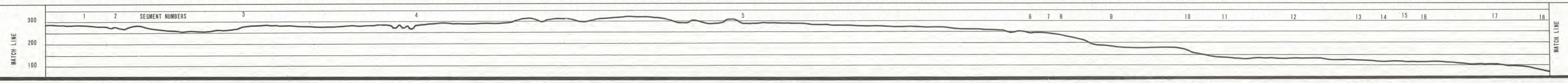
OWNERSHIP

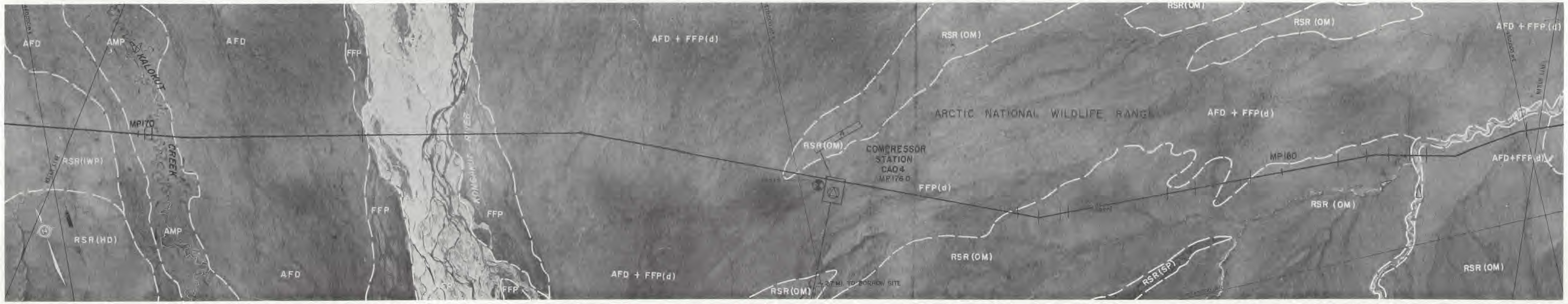
DRILL HOLE DATA





PROFILE





DRILL HOLE DATA LEGEND

A(B)* — C

D | E | F | G

- A-Drill hole number
- B-Temperature probe number
- C-Date drill hole made
- D-Soil bedrock description
- E-Depth of strata changes and graphical soil symbols
- F-Permafrost conditions: Shaded-frozen; Unshaded-unfrozen; N: non-visible ice; V: visible ice
- G-Water/ice content (% of dry weight)
- *-indicates drill hole in disturbed terrain

SOIL COMPONENT SYMBOLS & ABBREVIATIONS

G-Gravel	O-Organic	L-Low plasticity
S-Sand	Pt-Peat	H-High plasticity
M-Silt	P-Poorly graded	cbl(s)-cobble(s)
C-Clay	W-Well graded	bld(s)-boulder(s)

ABBREVIATIONS FOR MINOR SOIL COMPONENT PERCENTAGES

a -and	35 to 50%	l -little	10 to 20%
s -some	20 to 35%	t -trace	1 to 10%

MISCELLANEOUS ABBREVIATIONS

bdrk-bedrock	Gs-Grass	Ms-Moss
c-coarse	lnsd-lensed	org-organic
cvr-cover	lyrd-layered	veg-vegetation
f-fine	m-medium	vvd-varved

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CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES: MATCH LINE 169.45; 4-0210-1099; 4-0210-1099; 4-0210-1099; MATCH LINE 182.27

CHAINAGE (miles): 00.00, 0.60, 0.68, 2.49, 3.68, 8.22, 8.39, 8.56, 8.64, 9.52, 9.77, 10.26, 11.06, 11.32, 11.47, 11.66, 11.80, 12.71, 12.82

DESIGN DATA: [C]

SEGMENT Nº	SEGMENT LENGTH	EROSION CONTROL	BUOY.	REVEG.
1	0.60	EC-1C	B-1	I-V-8
2	0.08	N/A	N/A	I-V-5
3	1.81	EC-1C	B-2	I-V-2
4	1.19	N/A	N/A	I-V-5
5	4.54	EC-1C	B-2	I-V-2
6	0.17	EC-1D	B-0	I-V-2
7	0.17	EC-1C	B-1	I-V-2
8	0.08	EC-1D	B-0	I-V-2
9	0.88	EC-1C	B-1	I-V-2
10	0.25	EC-1D	B-0	I-V-2
11	0.49	EC-1C	B-1	I-V-2
12	0.80	EC-1D	B-0	I-V-2
13	0.25	EC-1D	B-1	I-V-2
14	0.16	EC-1D	B-0	I-V-2
15	0.19	EC-1D	B-1	I-V-2
16	0.14	N/A	N/A	I-V-5
17	0.91	EC-1C	B-0	I-V-8
18	0.11	EC-1C	B-1	I-V-8

FOOTAGE THIS SHEET

SCALE: (miles) 0 0.5 1.0

U.T.M. GRID ZONE 7

PIPELINE LEGEND

- 30"cw CARRIER PIPE (cover shown)
- CARRIER PIPE (berm cover)
- BERM BREAK
- SWAMP WEIGHT
- RIVER WEIGHT
- FROST ANCHOR
- SCREW ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
- ANCHOR BLOCK (concrete)
- BLOCK VALVE
- TEST LEAD & DIRECTION OF WIRES
- POINT OF INTERSECTION
- DRILL HOLE LOCATION
- WARNING SIGN
- MILEPOST SIGN AIRCRAFT
- CHAINAGE EQUATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA	QUAN.
CARRIER - 48" O.D. x 0.800" W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL		
QUAN.	DESCRIPTION	REQ'N. Nº

BUOYANCY AND EROSION CONTROL LEGEND

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- B-1 Potential buoyant conditions along segment
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- EC-4 Average slope along segment greater than 3° Non-erodible soil. Control measures required in low areas only
- EC-5 Unstable water course. Deeper burial required along segment
- EC-6 Control measures required on steep sideslopes
- EC-7 Control measures required at steep scarps
- EC-8 Low-lying sensitive areas. Measures to preserve micro drainage

GENERAL NOTES:

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
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3. SEE DWG. 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY	
ROLL Nº	PHOTO Nºs
C7119	8 - 16

OPERATING LICENCE Nº

CONSTRUCTION PERMIT Nº

MIN. TEST PRESSURE	1848 p.s.i.
MAX. OPERATING PRESSURE	1680 p.s.i

Nº	DATE	REVISION	APPRD BY	APPRD BY

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. 169 DOWNSTREAM M.P. 182

DRN. BY: DATE

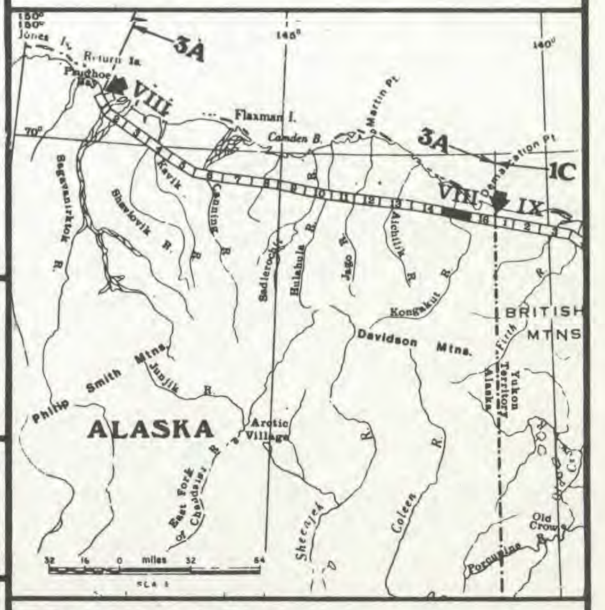
CHKD. BY: [signature] Jan 25/74

APPRD BY: [signature] Feb 4/74

SCALE: 1" = 2000'

SHEET 15 OF 16

3A-0200-1015



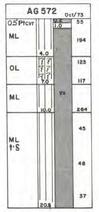
TERRAIN MAPPING BY:

J.D. MOLLARD & ASSOCIATES LIMITED

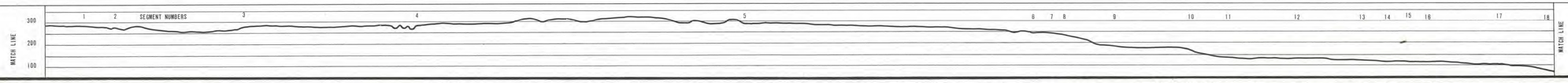
REGINA, SASK.

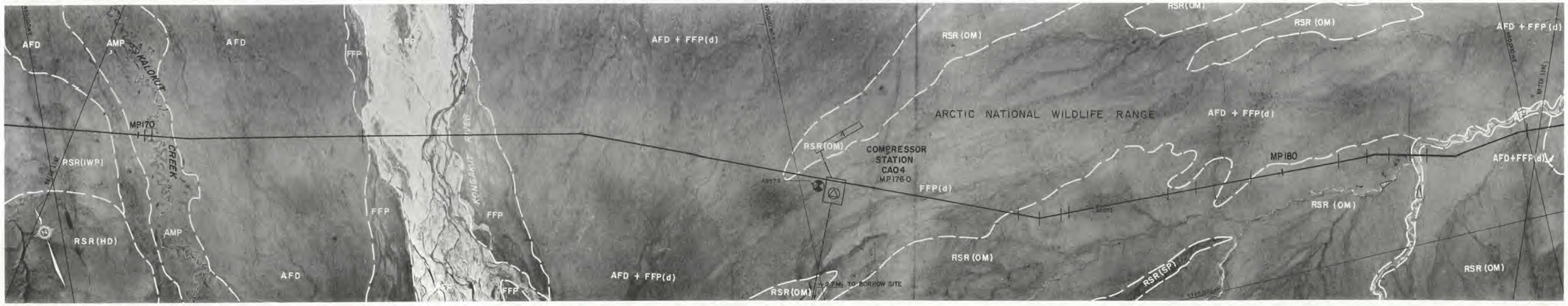
OWNERSHIP

DRILL HOLE DATA



PROFILE





ENVIRONMENTAL DATA AND PROTECTION MEASURES

FISH

Small drainage - no winter flow

Kongakut River: Arctic char*. River probably frozen at pipeline crossing. This large river is probably one of the more important char spawning and overwintering streams in this region. Major spawning areas are located 5 - 25 miles upstream of the pipeline crossing and the extensive spring-fed region downstream of the crossing supports large populations of overwintering fish, juvenile Arctic char. Potentially highly sensitive year round.

Small drainages - no winter flow

BIRDS

North slope; limited habitat; waterfowl (geese); vulnerable. Migration August 15 to Octobrt 1; raptors utilize areas throughout hills and along rivers south, within 4 miles

Noise from compressor station will be muffled

Disturbance will be limited to winter construction and low level aircraft flights will be limited to right-of-way inspections

Disturbance will be limited to winter construction and low level aircraft flights will be limited to right-of-way inspections.

MAMMALS

Caribou winter activity rare. Intense post calving (July) activity by caribou that have calved inYukon and bull-barren cow groups. Occasional heavy spring activity in this area and north.

Single muskox may occur where proposed line crossed Kongakut River. Year round use by Arctic and red fox, wolf, wolverine, short-tailed weasel and ground squirrel.

Kongakut River considered critical. Denning by Arctic fox, red fox, ground squirrels, possibly wolves and polar bear. Important concentration area travel route and feeding area for upland furbearers and bears. Intense grizzly bear activity observed along Kongakut River in 1972. Several sightings reported in 72 and 73. Potential polar bear movements and dennings during winter months

VEGETATION

160.45

Humocky d. willow - sedge - d. birch - lingonberry

Sedge - d. willow - Polygonal - moss hummocks

Sedge - d. willow - moss - horsetail

D. willow - d. birch - sedge - Dryas complex/drainage systems of sedge - horsetail - moss - d. willow

Scattered, open d. willow - Astragalus - Dryas - sedge

Scattered willow - sedge - Cassiope

D. willow - sedge - blueberry - moss

Sedge - cottongrass - d. willow - moss

D. willow - sedge - blueberry - moss/drainage channels with sedge - moss - horsetail

Sedge - cottongrass hummocks - d. birch - d. willow - moss

Sedge - d. willow - moss - d. birch; sedge - moss - horsetail drainage systems.

Sedge - Dryas - d. willow

Sedge - d. willow - blueberry - moss hummocks; pockets of wet sedge - moss

Sedge - d. willow - Dryas

Sedge - d. willow w/cottongrass - some small hummocks; lingonberry - blueberry - moss asso'd.

Wet sedge meadow - d. willow - moss

Willow - sedge/horsetail

Tussocky sedge - d. willow w/ cottongrass - moss; polygonal microrelief.

LAND USE

OTHERS

Archaeology high priority

Archaeology high priority

3A-0200-1015

DRILL HOLE DATA LEGEND

TERRAIN TYPING LEGEND

VIII — ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary

TERRAIN TYPES

ACP Arctic coastal plain: mainly thin to thick (up to 35 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata

AFD Alluvial fan deposits: thin silt-mantled broad low-gradient ($1/3^{0}$ to 2^{0}) alluvial fans underlain by deep silty to clean sand and gravel with generally lower excess ice contents

AFP Active flood plain: mainly exposed riverbed sand and gravel strata

AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata

BR Bedrock: mainly folded and faulted Lower Cretaceous shale and sandstone with patches of thin overburden

FFP Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata

OW Outwash: mainly small old moch-notified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents

RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

B Bedrock-controlled relief
LST Lobate solifluction terraces on steep bedrock slopes
P Pingos and hydrolacoliths
RTB Eroding thaw banks
MF Mudflow failures: thawed and failed ice-rich silt
IWP Ice-wedge polygons, well expressed

Permafrost-affected hydrographic phases and features

FOL Former oriented lakes, now partly filled with peat and organic silt
SOL Small oriented lakes and ponds, frequently sub-rectangular in outline
SP Speckled pattern of small ponds and patterned wet tundra in areas of poorly drained silty soil
HD Horizontal drainage on smoothly rounded highly ice-rich silt mantle
BD Beaded drainage
AUF Aufeis (flood icing) occurrences

Depth phases

d 5 to 10 ft of ice-rich silty topstratum

Discontinuous exposures of subdued and submasked moraine and outwash plains

OM Old moraine (stony till) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt and fine sand
OW Old outwash (sand, gravel, cobbles) suspected beneath a discontinuous, variable-thickness mantle of ice-rich eolian and colluvial silt and organic silt; silt mantle generally much thicker and more continuous from west of the Sadlerochit River to the Tamayariak River, approximately

COMPLEXES

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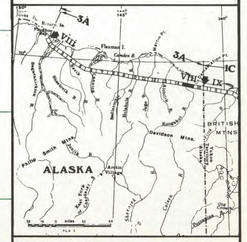
AFP+FFP: OW+AFD; RSR+RSR(OW)(HD)

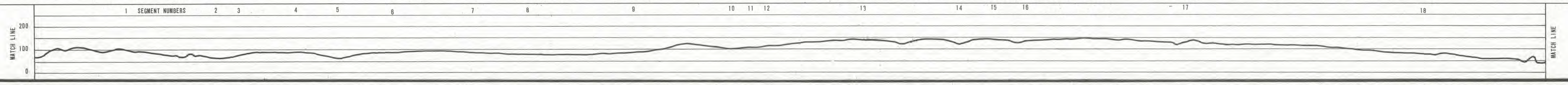


TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP

DRILL HOLE DATA

PROFILE



CONSTRUCTION DATA

REFERENCE DRAWINGS & NOTES: MATCH LINE 182.27; 4-0210-1099; 4-0210-1099; 4-0210-1099; 4-0210-1099; 4-0210-1099; MATCH LINE 194.80

CHAINAGE (miles): 00.00, 1.44, 1.52, 1.91, 2.45, 2.62, 3.30, 4.19, 4.32, 5.89, 5.94, 6.12, 6.28, 7.68, 7.85, 8.24, 8.36, 10.98, 12.53

DESIGN DATA

SEGMENT Nº	SEGMENT LENGTH	EROSION CONTROL	BUOY.	REVEG.
1	1.44	EC-1C	B-1	I-V-2
2	0.08	N/A	N/A	I-V-5
3	0.39	EC-1C	B-1	I-V-8
4	0.54	EC-1C	B-0	
5	0.17	N/A	N/A	I-V-5
6	0.68	EC-1D	B-0	I-V-2
7	0.89	EC-1C	B-2	
8	0.13	N/A	N/A	I-V-5
9	1.57	EC-1C	B-2	I-V-2
10	0.05	EC-8	B-1	I-V-4
11	0.18	EC-1D	B-0	I-V-2
12	0.16	N/A	N/A	I-V-5
13	1.40	EC-1C	B-2	I-V-2
14	0.17	EC-8	B-1	
15	0.39	EC-1C	B-2	
16	0.12	EC-8	B-1	
17	2.62	EC-1C	B-2	
18	1.55	N/A	N/A	

FOOTAGE THIS SHEET

SCALE: (miles) 0 0.5 1.0

U.T.M. GRID ZONE 7

DRILL HOLE DATA LEGEND

A(B)*			C
D	E	F	G

A-Drill hole number
B-Temperature probe number
C-Date drill hole made
D-Soil/bedrock description
E-Depth of strata changes and graphical soil symbols.
F-Permafrost conditions
Shaded-frozen; Unshaded-unfrozen
N: non-visible ice; V: visible ice
G-Water/ice content (% of dry weight)
*-Indicates drill hole in disturbed terrain

SOIL COMPONENT SYMBOLS & ABBREVIATIONS

G-Gravel, S-Sand, M-Silt, C-Clay; O-Organic, Pt-Peat, P-Poorly graded, W-Well graded; L-Low plasticity, H-High plasticity, cbl(s)-cobble(s), bldr(s)-boulder(s)

ABBREVIATIONS FOR MINOR SOIL COMPONENT PERCENTAGES

a.-and 35 to 50%; s.-some 20 to 35%; l.-little 10 to 20%; t.-trace 1 to 10%

MISCELLANEOUS ABBREVIATIONS

bdrk-bedrock, c-coarse, cvr-cover, f-fine; Gs-Grass, lnsd-lensed, lyrd-layered, m-medium; Ms-Moss, org-organic, veg-vegetation, svd-sieved

TERRAIN TYPING LEGEND

VIII -- ARCTIC NORTH SLOPE PHYSIOGRAPHIC DIVISION
ALONG BEAUFORT COAST
Prudhoe Bay East to Alaska/Yukon boundary
TERRAIN TYPES

ACP Arctic coastal plain: mainly thin to thick (up to 15 ft) ice-rich silty topstratum over stratified silty and clean sand and gravel strata
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AMP Alluvial meander plain: mainly thin ice-rich silty topstratum over alluvial sand and gravel strata
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FFP Fossil flood plain: mainly thin (less than 5 ft) ice-rich silty to fine sandy topstratum over silty to clean sand and gravel substrata
OW Outwash: mainly small old much-modified outwash sand and gravel remnants; low to high (buried ice?) excess ice contents
RSR Smoothly rounded silt-mantled sloping regions: mainly thick (up to 50 ft) interbedded eolian (silt) and associated colluvial (organic silt) deposits with numerous inclusions of thick excess ice

PHASES AND FEATURES

Topographic phases and features

B Bedrock-controlled relief
LST Lobate solifluction terraces on steep bedrock slopes
P Pingos and hydrolaccoliths
ETB Eroding thaw banks
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IWP Ice-wedge polygons, well expressed

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AUF Aufeis (flood icing) occurrences

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d 5 to 10 ft of ice-rich silty topstratum

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COMPLEXES

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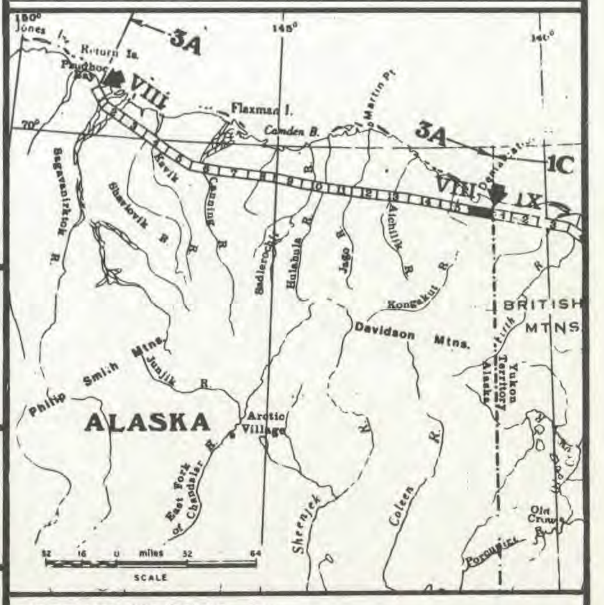
AFP+FFP: OW+AFD; RSR+RSR(OW)(HD)

Note: DFS - See Physio. Div. II



PIPELINE LEGEND

- CARRIER PIPE (cover shown)
- CARRIER PIPE (berm cover)
- BERM BREAK
- SWAMP WEIGHT
- RIVER WEIGHT
- FROST ANCHOR
- SCREW ANCHOR
- HEAVY WALL PIPE
- CASING PIPE
- ANCHOR BLOCK (concrete)
- BLOCK VALVE
- TEST LEAD & DIRECTION OF WIRES
- POINT OF INTERSECTION
- DRILL HOLE LOCATION
- WARNING SIGN
- MILEPOST SIGN - AIRCRAFT
- CHAINAGE EQUATION
- COMPRESSOR STATION
- AIR STRIP
- STORAGE OR STAGING AREA
- CAMP SITE
- STAGING AREA & CAMP SITE
- BORROW SITE
- WHARF
- PERMANENT ROAD
- TEMPORARY ROAD
- HELIPAD
- MEASURING STATION
- COMMUNICATIONS TOWER
- SIDE VALVE
- WINTER TRAIL

PIPE DATA	QUAN.
CARRIER - 48" O.D. x 0.800" W.T. GRADE 70	
HEAVYWALL - 48" O.D. x 1.034" W.T. GRADE 65	

COATING DATA

MISCELLANEOUS MATERIAL		
QUAN.	DESCRIPTION	REQ'N. Nº

BUOYANCY AND EROSION CONTROL LEGEND

B-0 No buoyancy
B-1 Potential buoyant conditions along segment
B-2 Potential buoyant conditions along portions of the segment
N/A Refer to river crossing drawing
EC-1 Average slope along segment less than 3° Erodible soil. Control measures required in low areas only
EC-2 Average slope along segment greater than 3° Erodible soil Close spaced control measures required
EC-3 Average slope along segment less than 3° Non-erodible soil. Minimal control measures required
EC-4 Average slope along segment greater than 3° Non-erodible soil. Control measures required in low areas only
EC-5 Unstable water course. Deeper burial required along segment
EC-6 Control measures required on steep sideslopes
EC-7 Control measures required at steep scarps
EC-8 Low-lying sensitive areas. Measures to preserve micro drainage

GENERAL NOTES:

1. THE TERRAIN AND SOILS INFORMATION ON THIS DRAWING IS BASED ON AIRPHOTO INTERPRETATION AND DRILL HOLE DATA AS INDICATED. IT IS THE CONTRACTORS RESPONSIBILITY TO ASSURE HIMSELF OF THIS INFORMATION.
2. SEGMENT MILEPOST EQUALS MATCH LINE MILEPOST PLUS CHAINAGE VALUE.
3. SEE DWG. 4-0200-1001 FOR NOMENCLATURE USED FOR SOIL DESCRIPTION ON DRILL HOLE LOGS.
4. MINIMUM DEPTH OF COVER = 2.5 FEET

AERIAL PHOTOGRAPHY	
ROLL Nº	PHOTO Nºs.
C7119	17 - 26

OPERATING LICENCE Nº.
CONSTRUCTION PERMIT Nº.

MIN. TEST PRESSURE	1848 p.s.i.
MAX. OPERATING PRESSURE	1680 p.s.i

Nº	DATE	REVISION	APPRD BY	APPRD BY

NORTHERN Engineering Services Company Limited

NORTHERN ENGINEERING SERVICES COMPANY LIMITED

ENGINEERS FOR

ALASKAN ARCTIC GAS PIPELINE COMPANY

GAS PIPELINE ROUTE ALIGNMENT AND TERRAIN DATA

ALASKA

UPSTREAM M.P. 182 DOWNSTREAM M.P. 195

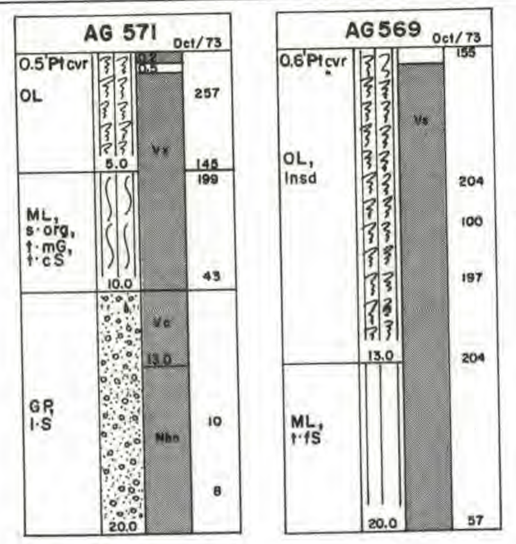
DRN. BY:	DATE	
CHKD. BY:	JAN 25/74	SCALE: 1" = 2000'
APPRD BY:	Feb 4/74	SHEET 16 OF 16

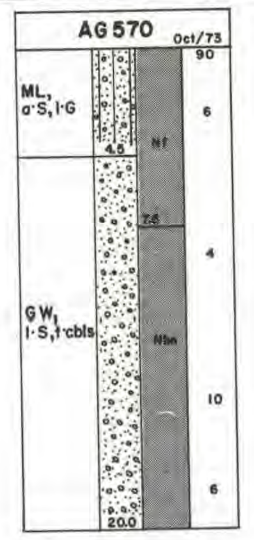
3A-0200-1016

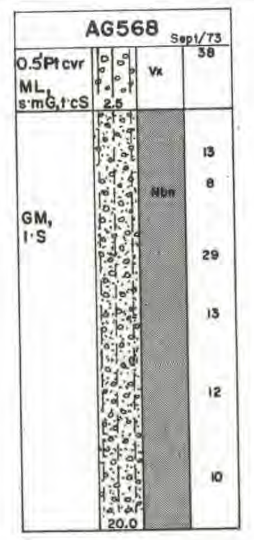
TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

OWNERSHIP	

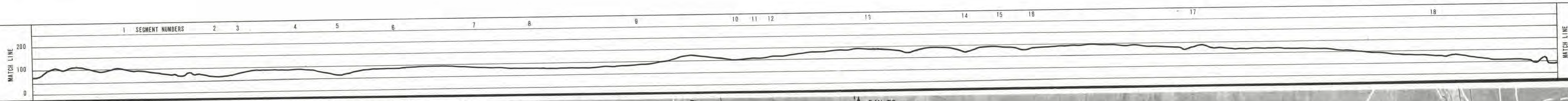
DRILL HOLE DATA

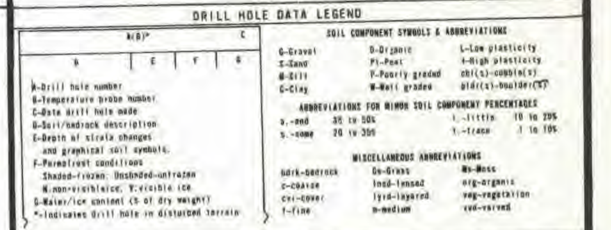


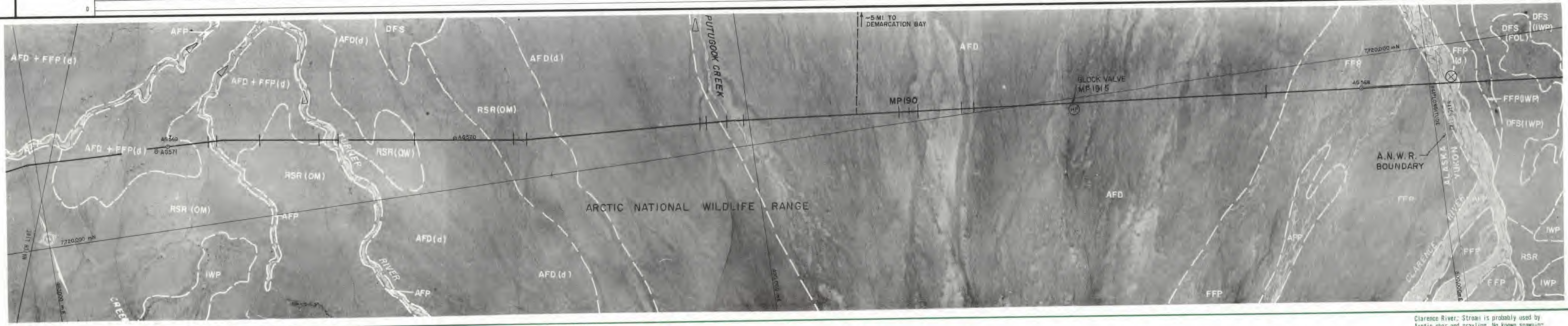




PROFILE







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Note: DFS - See Physio. Div. II

ENVIRONMENTAL DATA AND PROTECTION MEASURES

FISH

No winter flow in these streams

Clarence River: Stream is probably used by Arctic char and grayling. No known spawning or overwintering sites in this vicinity. Sensitive during May 1 - Nov. 1.

BIRDS

North slope; limited habitat; waterfowl (geese); vulnerable, migration, Aug. 15 to Oct. 1; disturbance will be limited to winter construction and low-level aircraft flights will be limited to right-of-way inspections.

MAMMALS

Caribou winter activity rare. Intense post-calving (July) activity by caribou that have calved in Yukon and bull/barren cow groups Occasional heavy spring activity in this area and north.
Occasionally many thousand caribou move east near proposed line (mainly July 5 - 15 but in some years through August).
An occasional single muskox may pass through area between Yukon and Alaska.
Moderate value to upland furbearers and bears; Some polar bear activity during March and early April denning by fox and ground squirrel common, summer feeding for grizzly bears.

Avoid marked den sites

Important habitat at crossing. Summer denning areas for Arctic fox, red fox, ground squirrels and possibly wolves. Potential winter denning area for polar bear, year round concentration area, travel route and feeding area for grizzly bear. Polar bear activity observed in the early spring of 1973 in this area.

VEGETATION

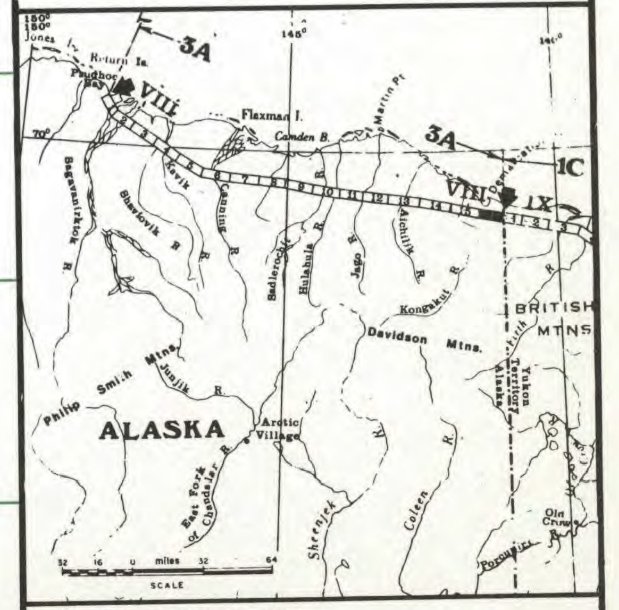
182 27 Tussocky sedge - d. willow - cottongrass	Sedge - d - willow - d - birch; Pockets and drainages with sedge - moss - Polygonum	sedge - d. willow	Willow - sedge	Hummocky sedge - Dryas cottongrass - moss	Sedge-d-willow - lingonberry - blueberry	Scattered willow sedge - Astragalus	Sedge-d-willow - lingonberry - blueberry	Sedge-d-willow - horsetail - moss - Polygonum	Sedge - cotton-grass - Dryas	Sedge - Dryas d-willow - cotton-grass	Sedge-d-willow - lingonberry - moss	d-willow - Dryas - sedge; /sedge - horsetail - d-willow in drainage systems	Dryas - lichen sedge	willow - sedge Cassiope	Sedge - d. willow - Dryas/hummocks; Sedge - cottongrass - moss	d. willow - sedge Dryas	sedge - d. willow cottongrass	Dryas - sedge - lingonberry - d. willow	Sedge - d. willow cottongrass	d.willows - sedge Dryas/Drainages of sedge - horsetail	sedge - cotton-grass - moss	sedge-d.willow - Moss - Dryas	d.willow - sedge - lingon-berry - Cassiope	sedge - d.willow - Dryas	d. willow - willow - sedge, closed but scattered	sedge d.willow - Dryas	d. willow willow - sedge; closed but scattered	Sedge - d.willow - Dryas

LAND USE

OTHERS

Archaeology high priority

Archaeology high priority



TERRAIN MAPPING BY:
J.D. MOLLARD & ASSOCIATES LIMITED
REGINA, SASK.

3A-0200-1016

FLOW DIAGRAMS - ALASKA

EXHIBIT G

THIS VOLUME CONTAINS FLOW DIAGRAMS

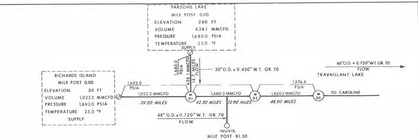
FOR APPLICANTS PROPOSED FACILITIES.

FLOW DIAGRAM DESCRIPTION

Flow diagrams are presented which show the maximum capacity of Applicant's proposed pipeline system for its first four years of operation, under average winter (October 19 to April 20) and average summer (April 20 to October 19) conditions. The formulae and assumptions used to generate the flow diagrams are given in Exhibit G-II, Flow Diagrams Data. The connecting facilities of Canadian Arctic Gas Pipeline Limited are shown as well as Applicant's facilities in order to demonstrate the capabilities of the combined facilities north of the Canada-United States border. Applicant's operation commences in Operating Year 2, whereas Canadian Arctic Gas' operation commences in Operating Year 1.

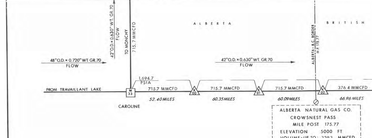
Applicant's proposed system includes a pipeline from Prudhoe Bay to the Alaska-Yukon border, which connects to the Canadian Arctic Gas system at that point. The Canadian Arctic Gas system includes two gas supply lines which join at the origin of the main line at Travaillant Lake, the main line from Travaillant Lake to Caroline, Alberta, and two gas delivery lines which begin at the terminus of the main line near Caroline, as shown in Exhibit F, Location of Facilities. The data shown on the flow diagrams for the two gas supply lines and the two gas delivery lines reflect the maximum capacity of the entire system. That is, the sum of the maximum delivery capacities of the two gas supply lines is equal to the maximum capacity of the main line at its inlet, and the sum of the maximum capacities of the two gas delivery lines at their inlets is equal to the maximum delivery capacity of the main line. Each gas supply and gas delivery line has a maximum capacity somewhat in excess of that shown, but these capacities cannot be used simultaneously because the total flow is restricted by the maximum capacity of the main line. The maximum capacity of the main line at its inlet is prorated to each gas supply line in proportion to the design gas volumes from each supply source. The maximum delivery capacity of the main line is divided equally between the two gas delivery lines.

DRAWINGS



RICHARDS ISLAND to TRAVAILLANT LAKE
GAS SUPPLY LINE

	STATION NUMBER	M-01	M-02	TOTALS
1	STATION NUMBER	39.20	94.40	
2	STATION ELEVATION(FEET)	470	350	
3	NUMBER OF GAS COMPRESSOR UNITS PROPOSED			
4	SIZE OF GAS COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)			
5	TOTAL GAS COMPRESSOR HORSEPOWER(ISO) PROPOSED			
6	TOTAL GAS COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED			
7	GAS VOLUME INTO STATION(MMCFD)			
8	STATION FUEL GAS (MMCFD)			
9	GAS VOLUME OUT OF STATION (MMCFD)			
10	GAS COMPRESSOR SUCTION PRESSURE (PSIA)			
11	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)			
12	GAS COMPRESSION RATIO			
13	GAS COMPRESSOR SUCTION TEMPERATURE (°F)			
14	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)			
15	GAS TEMPERATURE OUT GAS TEMPERATURE (°F)			
16	CHILLING/COOLING DUTY (TONS) REQUIRED			
17	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED			
18	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)			
19	TOTAL PROPANE COMPRESSOR HORSEPOWER(ISO) PROPOSED			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED			
21				



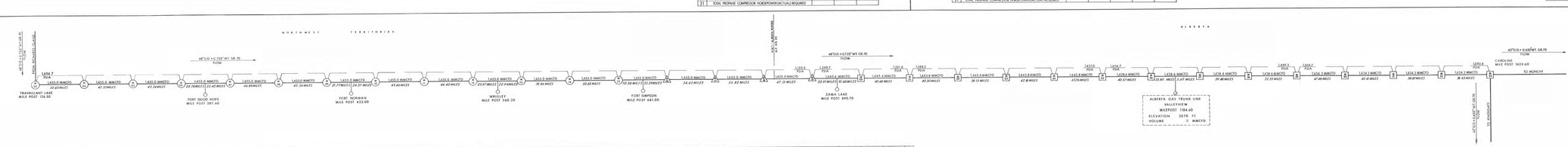
CAROLINE to KINGSGATE

GAS DELIVERY LINES

	STATION NUMBER	K-00	K-01	K-02	K-03	TOTALS
1	STATION NUMBER	59.40	119.75	194.86	248.80	
2	STATION ELEVATION (FEET)	4570	4600	4930	4730	
3	NUMBER OF GAS COMPRESSOR UNITS PROPOSED					
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)					
5	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED					
6	TOTAL GAS COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED					
7	GAS VOLUME INTO STATION (MMCFD)					
8	STATION FUEL GAS (MMCFD)					
9	GAS VOLUME OUT OF STATION (MMCFD)					
10	GAS COMPRESSOR SUCTION PRESSURE (PSIA)					
11	GAS COMPRESSOR DISCHARGE PRESSURE(PSIA)					
12	GAS COMPRESSION RATIO					
13	GAS COMPRESSOR SUCTION TEMPERATURE(°F)					
14	GAS COMPRESSOR DISCHARGE TEMPERATURE(°F)					
15	STATION OUTLET GAS TEMPERATURE (°F)					
16	CHILLING/COOLING DUTY(TONS) REQUIRED					
17	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED					
18	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)					
19	TOTAL PROPANE COMPRESSOR HORSEPOWER(ISO) PROPOSED					
20	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED					
21						

CAROLINE to MONCHY

	STATION NUMBER	E-00	E-01	E-02	E-03	E-04	E-05	TOTALS
1	STATION NUMBER	99.46	152.70	206.70	260.70	314.70	389.40	
2	STATION ELEVATION(FEET)	2970	2410	2690	2390	2270	2850	
3	NUMBER OF GAS COMPRESSOR UNITS PROPOSED							
4	SIZE OF GAS COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)							
5	TOTAL GAS COMPRESSOR HORSEPOWER(ISO) PROPOSED							
6	TOTAL GAS COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED							
7	GAS VOLUME INTO STATION(MMCFD)							
8	STATION FUEL GAS (MMCFD)							
9	GAS VOLUME OUT OF STATION(MMCFD)							
10	GAS COMPRESSOR SUCTION PRESSURE (PSIA)							
11	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)							
12	GAS COMPRESSION RATIO							
13	GAS COMPRESSOR SUCTION TEMPERATURE(°F)							
14	GAS COMPRESSOR DISCHARGE TEMPERATURE(°F)							
15	STATION OUTLET GAS TEMPERATURE (°F)							
16	CHILLING/COOLING DUTY(TONS) REQUIRED							
17	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED							
18	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)							
19	TOTAL PROPANE COMPRESSOR HORSEPOWER(ISO) PROPOSED							
20	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED							
21								



TRAVAILLANT LAKE to CAROLINE

MAINLINE

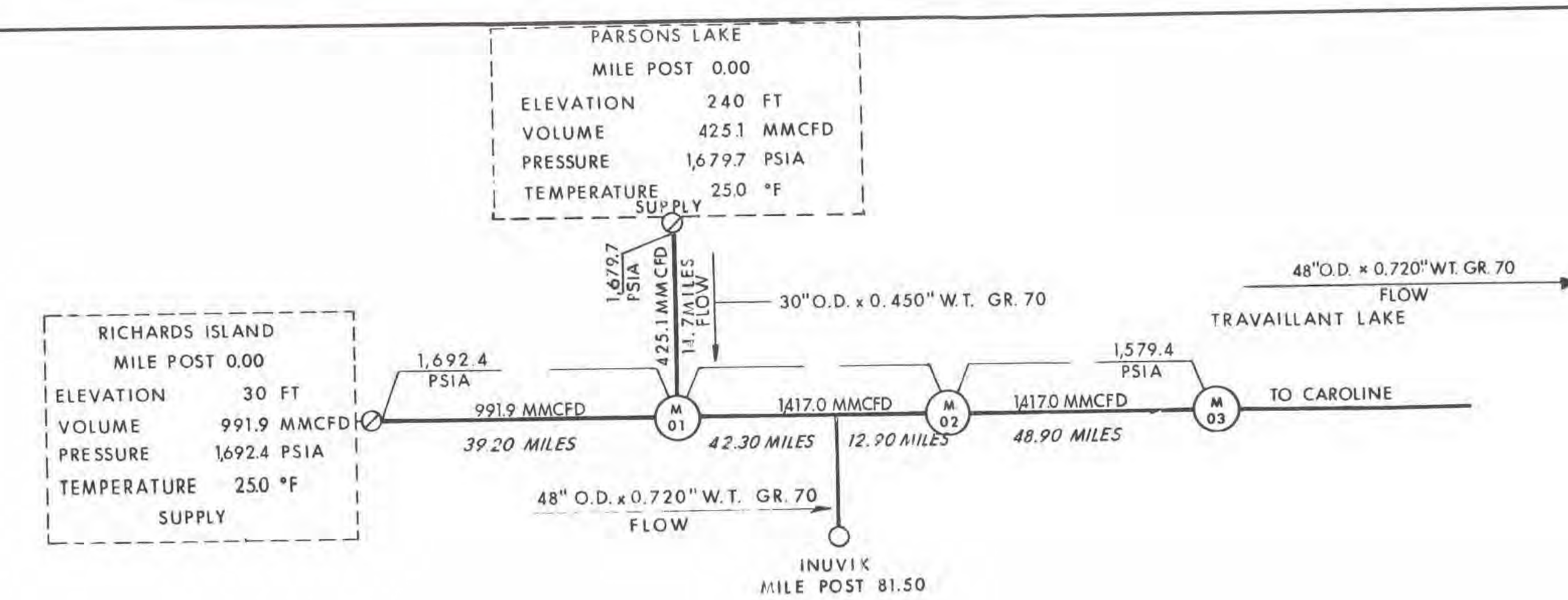
	STATION NUMBER	M-03	M-04	M-05	M-06	M-07	M-08	M-09	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18
1	STATION NUMBER	126.50	137.70	274.62	363.86	384.90	434.93	446.27	489.82	506.23	560.16	592.16	620.00	650.62	706.79	760.82	802.64
2	STATION ELEVATION(FEET)	810	440	530	490	470	510	596	490	390	890	320	1270	930	950	1480	2400
3	NUMBER OF GAS COMPRESSOR UNITS PROPOSED	1				1				1				1			
4	SIZE OF GAS COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)	30,000				30,000				30,000				30,000			
5	TOTAL GAS COMPRESSOR HORSEPOWER(ISO) PROPOSED	30,000				30,000				30,000				30,000			
6	TOTAL GAS COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED	30127				0				0				0			
7	GAS VOLUME INTO STATION (MMCFD)	1692.0															
8	STATION FUEL GAS (MMCFD)	53															
9	GAS VOLUME OUT OF STATION (MMCFD)	1692.0															
10	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1276.5															
11	GAS COMPRESSOR DISCHARGE PRESSURE(PSIA)	1692.0															
12	GAS COMPRESSION RATIO	1.326															
13	GAS COMPRESSOR SUCTION TEMPERATURE(°F)	109															
14	GAS COMPRESSOR DISCHARGE TEMPERATURE(°F)	229															
15	GAS TEMPERATURE OUT GAS TEMPERATURE (°F)	169															
16	CHILLING/COOLING DUTY (TONS) REQUIRED	3233															
17	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED																
18	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)	15000				15000				15000				15000			
19	TOTAL PROPANE COMPRESSOR HORSEPOWER(ISO) PROPOSED	17000				15000				15000				17,000			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED	17144				0				0				0			
21																	

	STATION NUMBER	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS
1	STATION NUMBER	854.79	905.30	944.84	987.90	1020.59	1060.47	1096.25	1168.80	1190.30	1239.68	1260.31	1280.69	1333.10	1389.12	1439.60	
2	STATION ELEVATION(FEET)	1400	1600	1050	1470	1960	2100	2370	2100	2160	2690	2400	2010	2490	2450	2840	
3	NUMBER OF GAS COMPRESSOR UNITS PROPOSED	1			1			1				1				1	4
4	SIZE OF GAS COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)	23500			23500			23500				23500				23500	
5	TOTAL GAS COMPRESSOR HORSEPOWER(ISO) PROPOSED	23500			23500			23500				23500				23500	94,000
6	TOTAL GAS COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED	21,262			21,267			14,698				14,684				14843	81,154
7	GAS VOLUME INTO STATION (MMCFD)	1692.0			1692.0			1692.0				1692.0				1692.0	
8	STATION FUEL GAS (MMCFD)	1.4			1.4			4.3				4.3				2.9	26.9
9	GAS VOLUME OUT OF STATION (MMCFD)	1,690.6			1,690.6			1,690.6				1,690.6				1,690.6	
10	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,669.6			1,350.8			1,430.0				1,690.6				1,690.6	
11	GAS COMPRESSOR DISCHARGE PRESSURE(PSIA)	1,690.6			1,690.6			1,690.6				1,690.6				1,690.6	
12	GAS COMPRESSION RATIO	1.013			1.252			1.182				1.000				1.000	
13	GAS COMPRESSOR SUCTION TEMPERATURE(°F)	109			109			109				109				109	
14	GAS COMPRESSOR DISCHARGE TEMPERATURE(°F)	109			109			109				109				109	
15	GAS TEMPERATURE OUT GAS TEMPERATURE (°F)	109			109			109				109				109	
16	CHILLING/COOLING DUTY (TONS) REQUIRED	71.5			1060			99.3				78.2				81.5	
17	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	0			0			0				0				0	0
18	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)	0			0			0				0				0	
19	TOTAL PROPANE COMPRESSOR HORSEPOWER(ISO) PROPOSED	0			0			0				0				0	0
20	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED	0			0			0				0				0	0
21																	

LEGEND

- PIPELINE
- STATION WITH (TENTATIVE)-GAS TURBINE GAS COMPRESSOR & CENTRIFUGAL- GAS TURBINE PROPANE COMPRESSOR FOR GAS CHILLING
- STATION WITH (TENTATIVE)-GAS TURBINE GAS COMPRESSOR & CENTRIFUGAL- GAS TURBINE GAS EXCHANGE FOR GAS COOLING
- STATION WITH (TENTATIVE)-GAS TURBINE GAS COMPRESSION
- GAS MEASUREMENT STATION
- PIPELINE PRESSURE
- 4557MMCFD GAS FLOWING VOLUME (14.73 PSIA & 60°F)
- SIDE VALVE FOR FUTURE DELIVERIES

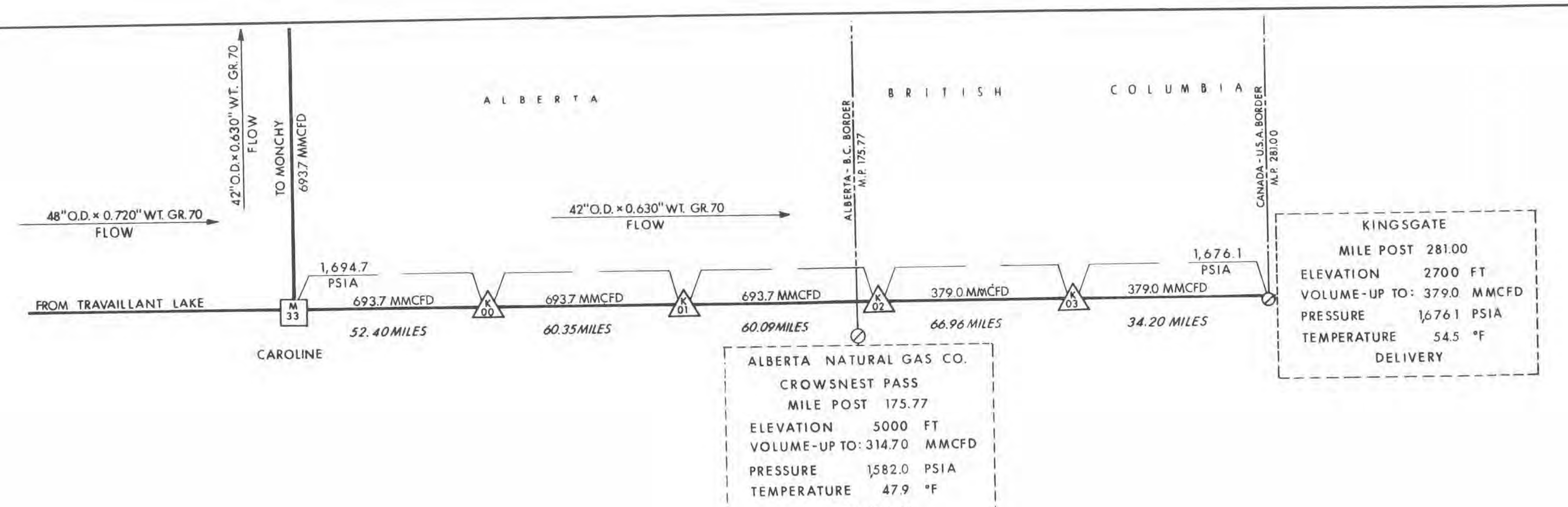
PREPARED BY	NORTHERN ENGINEERING SERVICES COMPANY LIMITED	
DRAWN BY	CALGARY, ALBERTA	
CHECKED BY	ALASKAN ARCTIC GAS PIPELINE COMPANY	
ENGINEERING APPROVAL	FLOW DIAGRAM	SCALE
PROJECT MANAGER	MAXIMUM CAPACITY	DATE
	AVERAGE WINTER CONDITIONS - OPERATING YEAR 1	PROJECT No.
		SECTION I-1
		REV.



		M-01	M-02	TOTALS
1	STATION NUMBER	M-01	M-02	TOTALS
2	STATION MILEPOST	39.20	94.40	
3	STATION ELEVATION (FEET)	470	320	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED			
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED			
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			
8	GAS VOLUME INTO STATION (MMCFD)			
9	STATION FUEL GAS (MMCFD)			
10	GAS VOLUME OUT OF STATION (MMCFD)			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)			
13	GAS COMPRESSION RATIO			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)			
16	STATION OUTLET GAS TEMPERATURE (°F)			
17	CHILLING/COOLING DUTY (TONS) REQUIRED			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			

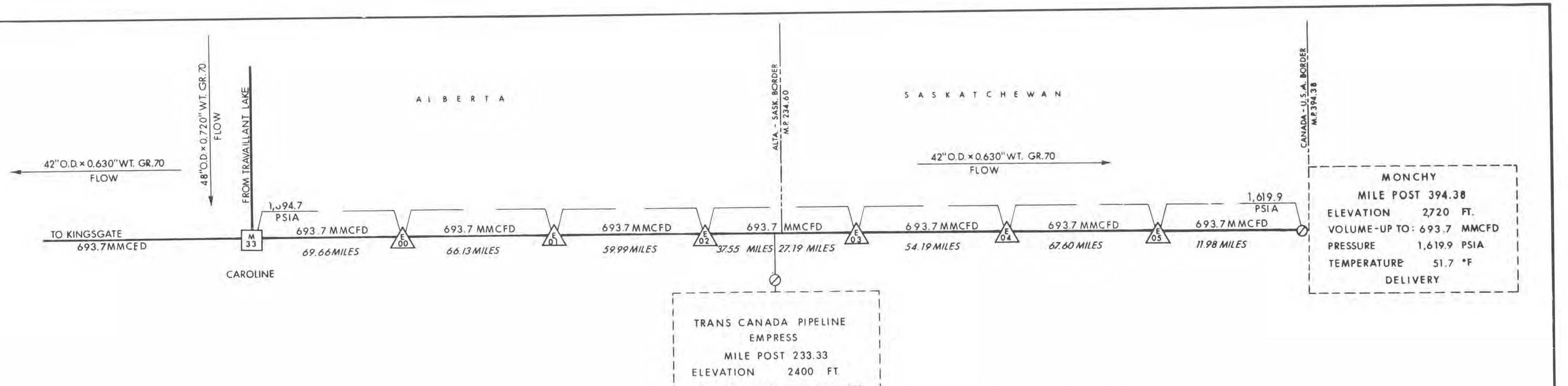
RICHARDS ISLAND to TRAVAILLANT LAKE

GAS SUPPLY LINE



		K-00	K-01	K-02	K-03	TOTALS
1	STATION NUMBER	K-00	K-01	K-02	K-03	TOTALS
2	STATION MILEPOST	59.40	119.75	179.84	246.80	
3	STATION ELEVATION (FEET)	4170	4400	4930	4230	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED					
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)					
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED					
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					
8	GAS VOLUME INTO STATION (MMCFD)					
9	STATION FUEL GAS (MMCFD)					
10	GAS VOLUME OUT OF STATION (MMCFD)					
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)					
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)					
13	GAS COMPRESSION RATIO					
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)					
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)					
16	STATION OUTLET GAS TEMPERATURE (°F)					
17	CHILLING/COOLING DUTY (TONS) REQUIRED					
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED					
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)					
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED					
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					

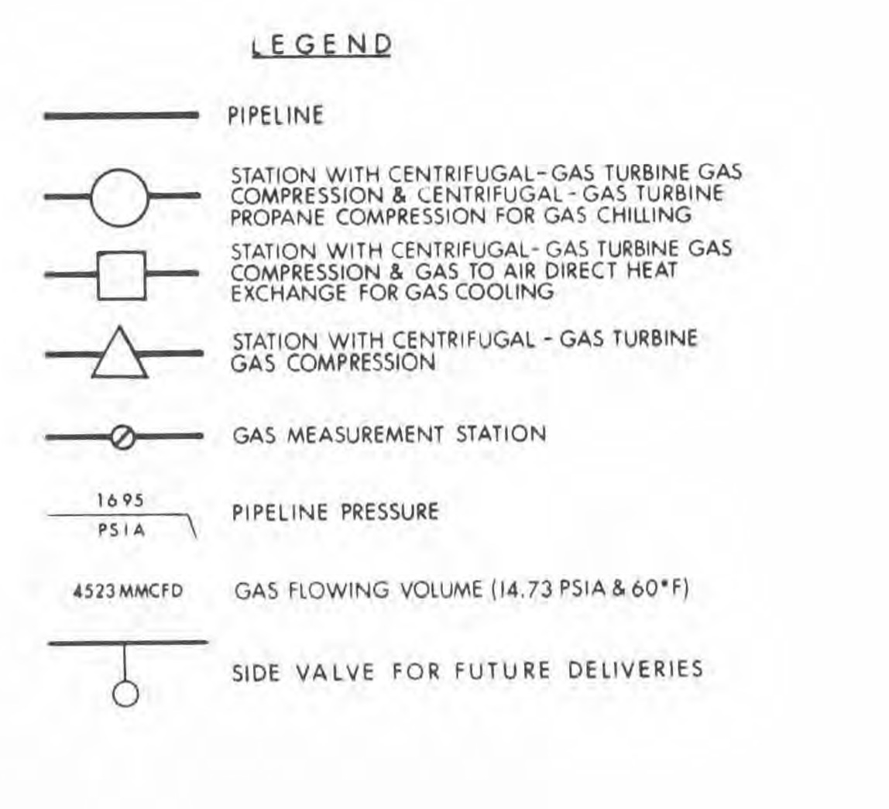
CAROLINE to KINGSGATE



CAROLINE to MONCHY

		E-00	E-01	E-02	E-03	E-04	E-05	TOTALS
1	STATION NUMBER	E-00	E-01	E-02	E-03	E-04	E-05	TOTALS
2	STATION MILEPOST	69.66	135.79	195.78	260.52	314.71	382.40	
3	STATION ELEVATION (FEET)	2970	2410	2650	2380	3310	2810	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED							
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)							
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED							
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED							
8	GAS VOLUME INTO STATION (MMCFD)							
9	STATION FUEL GAS (MMCFD)							
10	GAS VOLUME OUT OF STATION (MMCFD)							
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)							
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)							
13	GAS COMPRESSION RATIO							
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)							
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)							
16	STATION OUTLET GAS TEMPERATURE (°F)							
17	CHILLING/COOLING DUTY (TONS) REQUIRED							
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED							
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)							
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED							
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED							

GAS DELIVERY LINES



		M-03	M-04	M-05	M-06	M-07	M-08	M-09	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS
1	STATION NUMBER	M-03	M-04	M-05	M-06	M-07	M-08	M-09	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS
2	STATION MILEPOST	126.50	177.10	219.62	262.86	310.00	356.89	400.23	446.37	489.83	534.23	583.14	620.00	670.42	716.39	750.82	807.64	854.79	901.16	941.84	982.14	1020.29	1062.47	1108.23	1148.80	1190.20	1229.68	1263.21	1310.69	1353.10	1391.17	1429.60	
3	STATION ELEVATION (FEET)	810	440	530	690	470	310	520	450	700	810	520	1370	930	950	1480	1440	1810	1100	1470	1790	2540	2520	1860	2130	2140	2600	4000	3050	2850	3400	3880	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED	1				1				1				1				2		2				2				2				2	10
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	30,000				30,000				30,000				30,000				27,500		27,500				27,500				27,500				27,500	
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED	30,000				30,000				30,000				30,000				55,000		55,000				55,000				55,000				55,000	395,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	10,032				0				0				0				26,673		26,722				26,107				24,823				24,523	138,880
8	GAS VOLUME INTO STATION (MMCFD)	1,417.0																1,411.7		1,406.7				1,401.7				1,396.8				1,392.1	
9	STATION FUEL GAS (MMCFD)	5.3																5.0		5.0				4.9				4.7				4.7	29.6
10	GAS VOLUME OUT OF STATION (MMCFD)	1,411.7																1,406.7		1,401.7				1,396.8				1,392.1				1,387.4	
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,578.8																1,159.7		1,300.6				1,358.2				1,371.8				1,465.0	
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,695.6																1,370.1		1,514.4				1,576.8				1,587.9				1,694.7	
13	GAS COMPRESSION RATIO	1.070																1.182		1.165				1.162				1.158				1.158	
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	24.8																29.2		59.3				61.4				54.8				58.1	
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	41.1																75.6		105.5				106.4				97.5				100.1	
16	STATION OUTLET GAS TEMPERATURE (°F)	12.9																75.6		105.5				106.4				97.5				100.1	
17	CHILLING/COOLING DUTY (TONS) REQUIRED	4,924																0		0				0				0				0	4,924
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	1				1				1				1				0		0				0				0				0	4
19	[illegible]	17,000				17,000				17,000				17,000				0		0				0				0				0	
20	[illegible]	[illegible]				[illegible]				[illegible]				[illegible]				0		0				0				0				0	68,000
21	[illegible]	[illegible]				[illegible]				[illegible]				[illegible]				[illegible]		[illegible]				[illegible]				0				0	6,898

TRAVAILLANT LAKE to CAROLINE

MAINLINE

DESIGNED BY	NORTHERN ENGINEERING SERVICES COMPANY LIMITED
DRAWN BY	ENGINEERS FOR
CHECKED BY	ALASKAN ARCTIC GAS PIPELINE COMPANY
ENGINEERS APPROVAL	FLOW DIAGRAM MAXIMUM CAPACITY
PROJECT MANAGER	AVERAGE SUMMER CONDITIONS - OPERATING YEAR 1

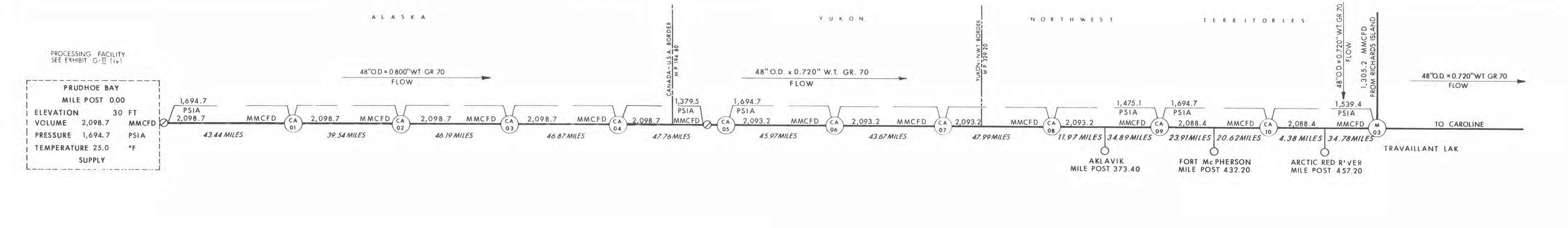
SCALE

DATE

PROJECT No

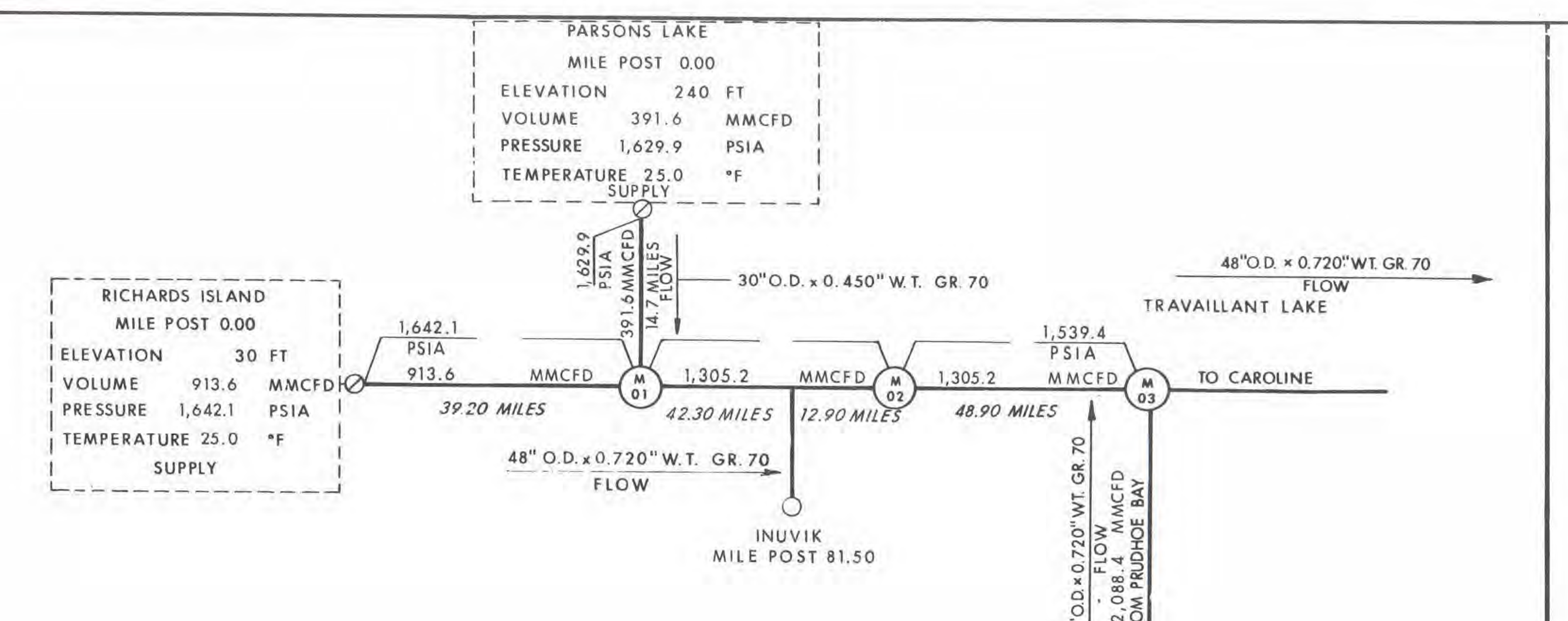
SECTION I-2

REV



PRUDHOE BAY to TRAVAILLANT LAKE (COASTAL ROUTE)

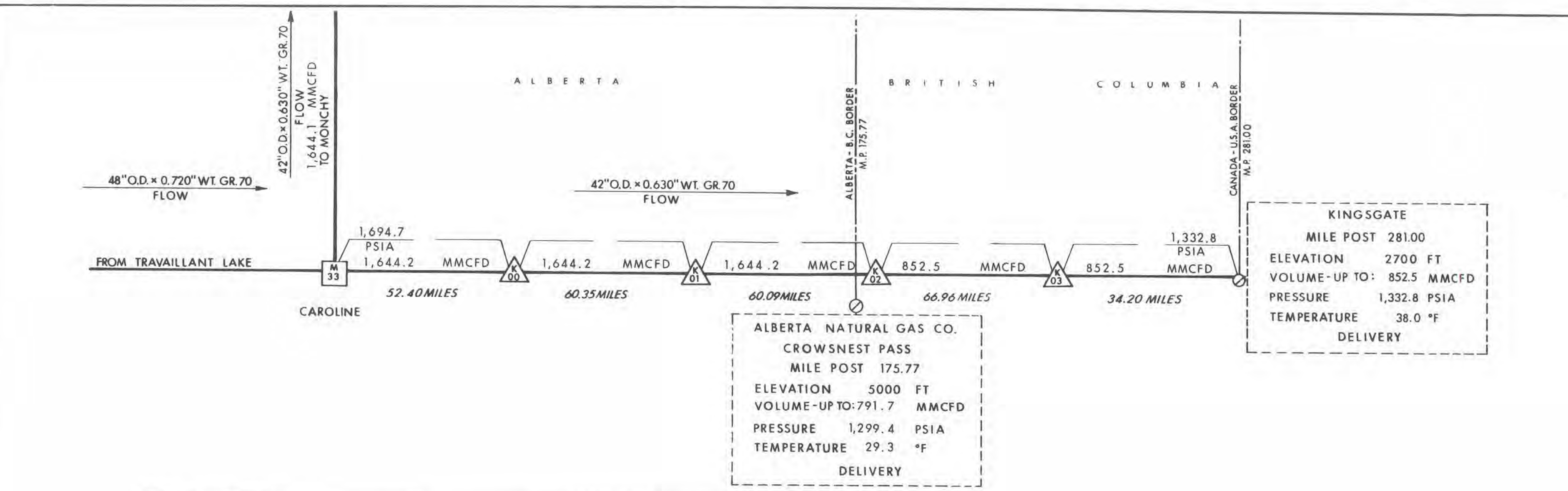
		CA-01	CA-02	CA-03	CA-04	CA-05	CA-06	CA-07	CA-08	CA-09	CA-10	TOTALS	
1	STATION NUMBER	CA-01	CA-02	CA-03	CA-04	CA-05	CA-06	CA-07	CA-08	CA-09	CA-10	TOTALS	1
2	STATION MILEPOST	43.44	82.98	129.17	176.04	223.80	269.77	313.44	361.43	408.29	452.82		2
3	STATION ELEVATION (FEET)	150	690	510	290	250	120	300	60	30	150		3
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED					1				1		2	4
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)					30,000				30,000			5
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED					30,000				30,000		60,000	6
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					14,440				9,595		24,035	7
8	GAS VOLUME INTO STATION (MMCFD)					2,098.7				2,093.2			8
9	STATION FUEL GAS (MMCFD)					5.5				4.8		10·3	9
10	GAS VOLUME OUT OF STATION (MMCFD)					2,093.2				2,088.4			10
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)					1,378.2				1,474.1			11
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)					1,696.8				1,696.7			12
13	GAS COMPRESSION RATIO					1·230				1·150			13
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)					11.7				14.9			14
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)					37.6				32.1			15
16	STATION OUTLET GAS TEMPERATURE (°F)					25.0				25.0			16
17	CHILLING / COOLING DUTY (TONS) REQUIRED					4,234				2,403		6,637	17
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED					1				1		2	18
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)					17,000				17,000			19
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED					17,000				17,000		34,000	20
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					8,311				8·311		16,622	21



RICHARDS ISLAND to TRAVAILLANT LAKE

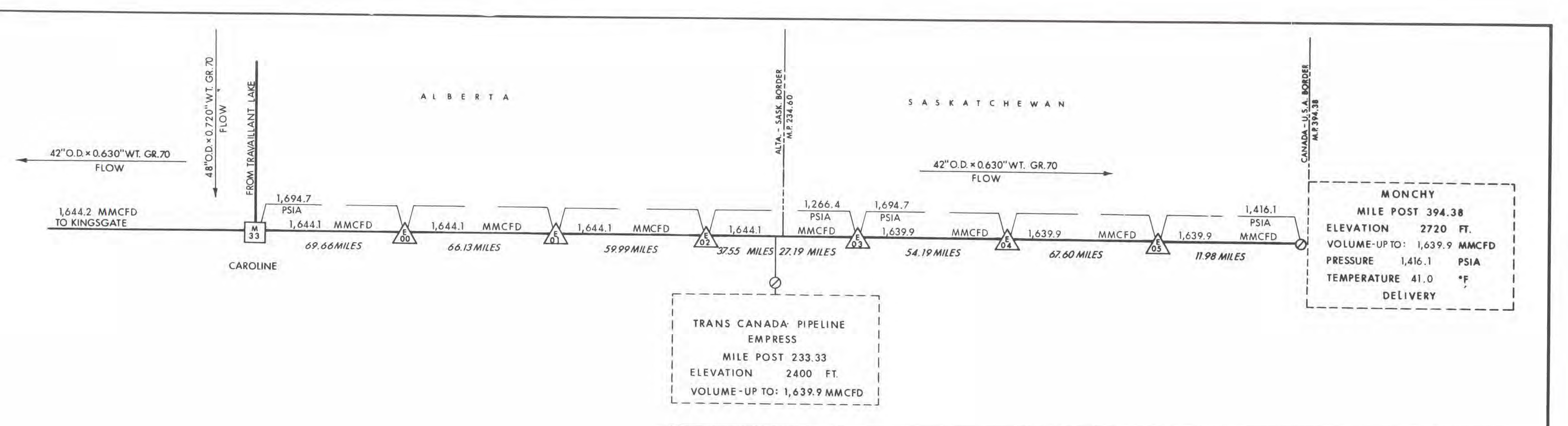
		M-01	M-02	TOTALS
1	STATION NUMBER	M-01	M-02	TOTALS
2	STATION MILEPOST	39.20	94.40	
3	STATION ELEVATION (FEET)	470	320	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED			
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED			
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			
8	GAS VOLUME INTO STATION (MMCFD)			
9	STATION FUEL GAS (MMCFD)			
10	GAS VOLUME OUT OF STATION (MMCFD)			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)			
13	GAS COMPRESSION RATIO			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)			
16	STATION OUTLET GAS TEMPERATURE (°F)			
17	CHILLING/COOLING DUTY (TONS) REQUIRED			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			

GAS SUPPLY LINES



CAROLINE to KINGSGATE

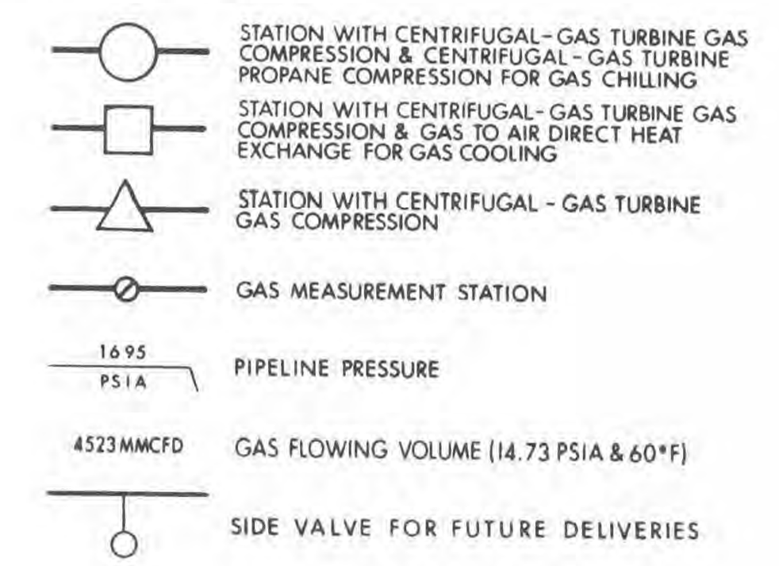
		K-00	K-01	K-02	K-03	TOTALS
1	STATION NUMBER	K-00	K-01	K-02	K-03	TOTALS
2	STATION MILEPOST	59.40	119.75	179.84	246.80	
3	STATION ELEVATION (FEET)	4170	4400	4930	4230	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED					
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)					
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED					
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					
8	GAS VOLUME INTO STATION (MMCFD)					
9	STATION FUEL GAS (MMCFD)					
10	GAS VOLUME OUT OF STATION (MMCFD)					
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)					
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)					
13	GAS COMPRESSION RATIO					
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)					
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)					
16	STATION OUTLET GAS TEMPERATURE (°F)					
17	CHILLING/COOLING DUTY (TONS) REQUIRED					
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED					
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)					
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED					
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					



CAROLINE to MONCHY

		E-00	E-01	E-02	E-03	E-04	E-05	TOTALS
1	STATION NUMBER	E-00	E-01	E-02	E-03	E-04	E-05	TOTALS
2	STATION MILEPOST	69.66	135.79	195.78	260.52	314.71	382.40	
3	STATION ELEVATION (FEET)	2970	2410	2650	2380	3310	2810	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED				1			
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)				30,000			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED				30,000			30,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED				19,653			19,653
8	GAS VOLUME INTO STATION (MMCFD)				1,644.1			
9	STATION FUEL GAS (MMCFD)				4.2			4.2
10	GAS VOLUME OUT OF STATION (MMCFD)				1,639.9			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)				1,264.5			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)				1,698.4			
13	GAS COMPRESSION RATIO				1·340			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)				28.3			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)				69.2			
16	STATION OUTLET GAS TEMPERATURE (°F)				69.1			
17	CHILLING/COOLING DUTY (TONS) REQUIRED				0			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED				0			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)				0			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED				0			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED				0			

GAS DELIVERY LINES



LEGEND

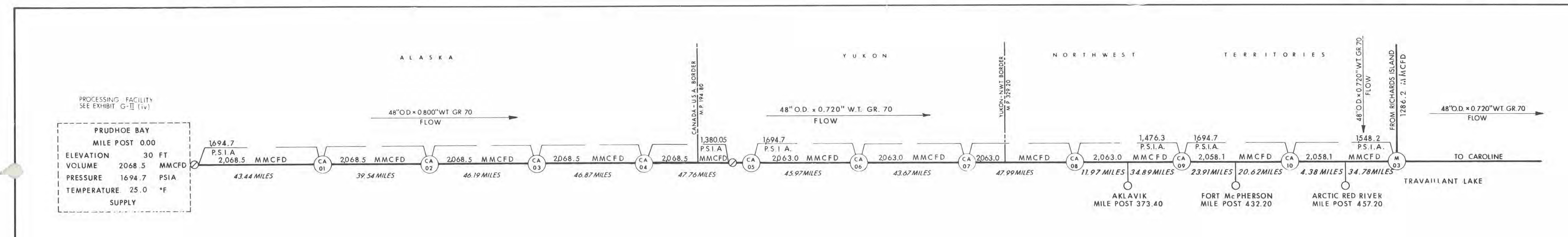
		M-03	M-04	M-05	M-06	M-07	M-08	M-09	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18
1	STATION NUMBER	M-03	M-04	M-05	M-06	M-07	M-08	M-09	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18
2	STATION MILEPOST	126.50	177.10	219.62	262.86	310.00	356.89	400.23	446.37	489.83	534.23	583.14	620.00	670.42	716.39	750.82	807.64
3	STATION ELEVATION (FEET)	810	440	530	690	470	310	520	450	700	810	520	1370	930	950	1480	1440
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED	1		1		1		1		1		1		1		1	
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	30,000		30,000		30,000		30,000		30,000		30,000		30,000		30,000	
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED	30,000		30,000		30,000		30,000		30,000		30,000		30,000		30,000	
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	11,318		20,896		21,621		21,900		22,373		21,864		23,198		24,310	
8	GAS VOLUME INTO STATION (MMCFD)	3,393.6		3,386.6		3,380.2		3,373.6		3,367.0		3,360.3		3,353.6		3,348.8	
9	STATION FUEL GAS (MMCFD)	7.0		6.4		6.6		6.6		6.7		6.7		4.8		4.8	
10	GAS VOLUME OUT OF STATION (MMCFD)	3,386.6		3,380.2		3,373.6		3,367.0		3,360.3		3,353.6		3,348.8		3,344.0	
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,543.0		1,411.5		1,402.3		1,399.0		1,393.5		1,401.1		1,383.5		1,385.9	
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,699.9		1,699.9		1,699.8		1,699.8		1,699.8		1,699.8		1,700.0		1,697.5	
13	GAS COMPRESSION RATIO	1·100		1·200		1·210		1·220		1·220		1·210		1·230		1·220	
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	16.4		3.3		3.0		3.2		3.4		4.8		3.1		13.4	
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	28.5		26.4		26.9		27.5		28.2		29.0		29.1		39.6	
16	STATION OUTLET GAS TEMPERATURE (°F)	14.9		15.3		14.6		14.8		15.1		15.7		28.9		39.5	
17	CHILLING/COOLING DUTY (TONS) REQUIRED	6,888		5,759		6,404		6,562		6,752		6,824		0		0	
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	2		1		1		1		1		1		1		0	
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	17,000		17,000		17,000		17,000		17,000		17,000		17,000		0	
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED	34,000		17,000		17,000		17,000		17,000		17,000		17,000		0	
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	12,840		6,620		6,775		6,914		7,114		7,195		0		0	

	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS	
1	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS	1
2	854.79	901.16	941.84	982.14	1020.29	1062.47	1108.33	1148.80	1190.20	1229.68	1263.21	1310.69	1353.10	1391.17	1429.60		2
3	1810	1100	1470	1790	2540	2520	1860	2130	2140	2600	4000	3050	2850	3400	3880		3
4	2		2		2		2		2		2		2		2	24	4
5	27,500		27,500		27,500		27,500		27,500		27,500		27,500		27,500		5
6	55,000		55,000		55,000		55,000		55,000		55,000		55,000		55,000	680,000	6
7	36,211		30,068		35,073		30,273		32,060		35,171		27,091		32,730	426,157	7
8	3,344.0		3,336.7		3,330.0		3,322.7		3,316.0		3,309.0		3,301.7		3,295.3		8
9	7.3		6.7		7.3		6.7		7.0		7.3		6.4		7.0	105.3	9
10	3,336.7		3,330.0		3,322.7		3,316.0		3,309.0		3,301.7		3,295.3		3,288.3		10
11	1,277.4		1,364.5		1,319.5		1,367.8		1,347.2		1,314.0		1,397.3		1,338.4		11
12	1,697.7		1,701.0		1,701.0		1,701.0		1,701.0		1,700.9		1,700.9		1,700.9		12
13	1·330		1·250		1·290		1·240		1·260		1·290		1·220		1·270		13
14	17.1		36.6		36.8		41.6		38.6		35.0		43.1		37.9		14
15	55.4		67.1		72.2		71.9		71.0		70.9		70.4		71.2		15
16	55.3		60.7		60.6		60.5		60.4		60.3		60.2		60.0		16
17	0		2,925		5,332		5,224		4,830		4,800		4,622		5,021	71,943	17
18	0		0		0		0		0		0		0		0	8	18
19	0		0		0		0		0		0		0		0		19
20	0		0		0		0		0		0		0		0	136,000	20
21	0		0		0		0		0		0		0		0	47,458	21

TRAVAILLANT LAKE to CAROLINE

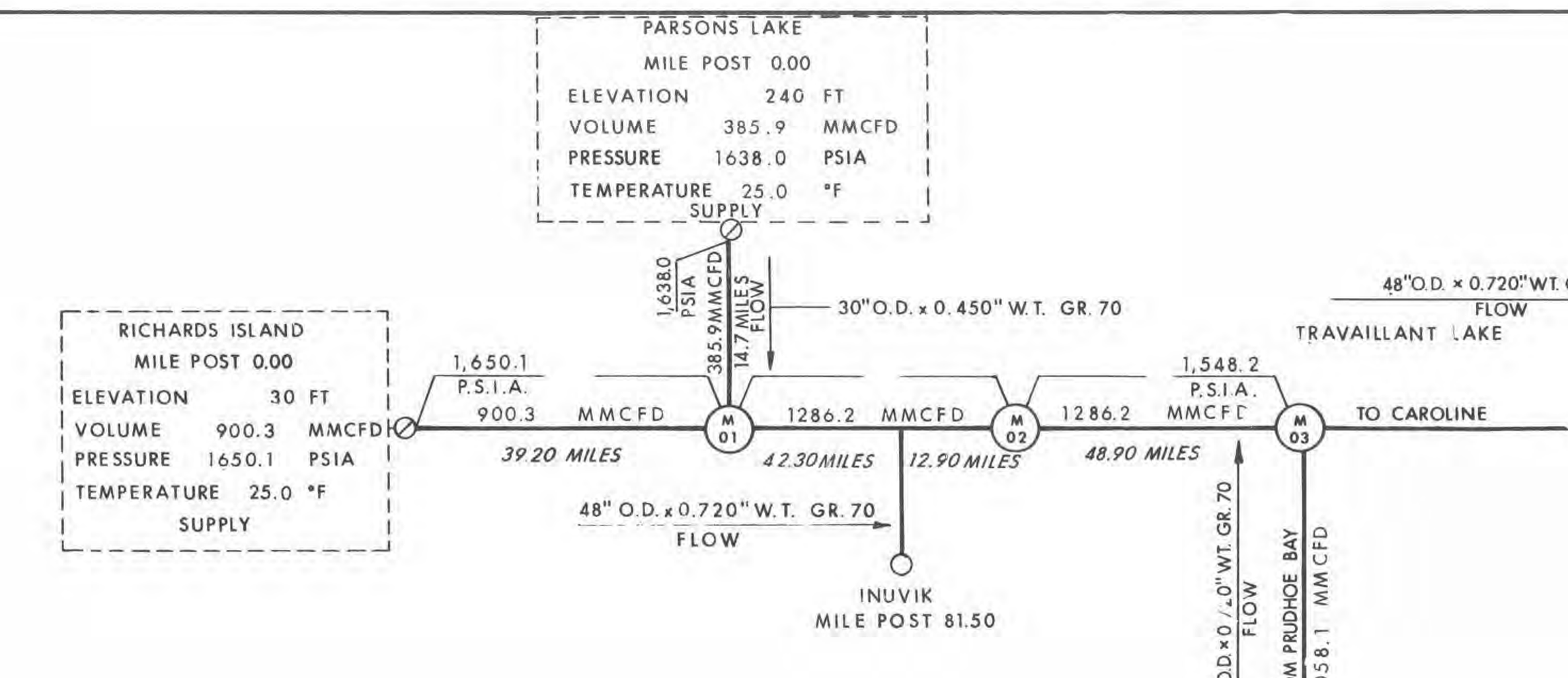
MAINLINE

DESIGNED BY	NORTHERN ENGINEERING SERVICES COMPANY LIMITED — ENGINEERS FOR — ALASKAN ARCTIC GAS PIPELINE COMPANY	
DRAWN BY		
CHECKED BY	FLOW DIAGRAM	SCALE
ENGINEERS APPROVAL	MAXIMUM CAPACITY	DATE
PROJECT MANAGER	AVERAGE WINTER CONDITIONS - OPERATING YEAR 2	PROJECT No
		SECTION I - 3 — REV.



PRUDHOE BAY to TRAVAILLANT LAKE (COASTAL ROUTE)

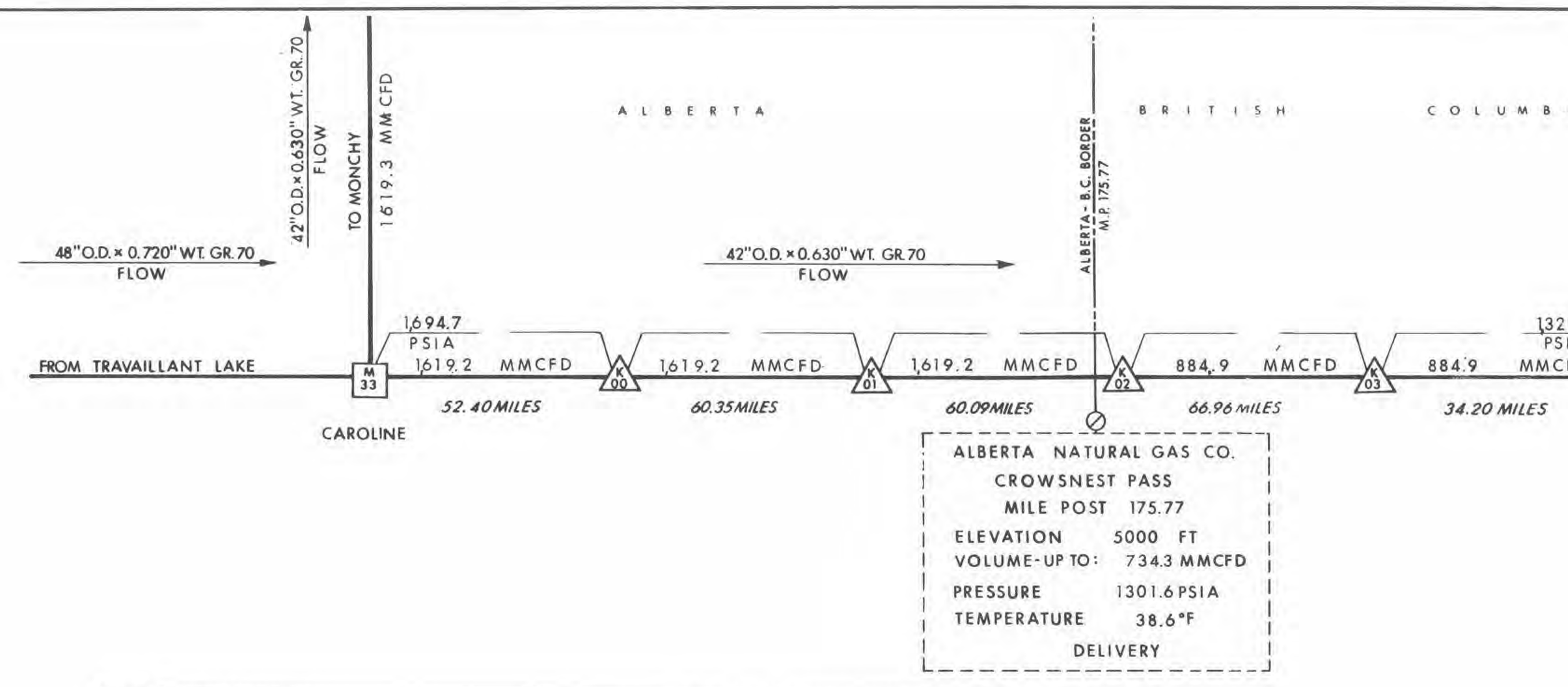
		CA-01	CA-02	CA-03	CA-04	CA-05	CA-06	CA-07	CA-08	CA-09	CA-10	TOTALS	
1	STATION NUMBER	CA-01	CA-02	CA-03	CA-04	CA-05	CA-06	CA-07	CA-08	CA-09	CA-10	TOTALS	1
2	STATION MILEPOST	43.44	82.98	129.17	176.04	223.80	269.77	313.44	361.43	408.29	452.82		2
3	STATION ELEVATION (FEET)	150	690	510	290	250	120	300	60	30	150		3
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED					1.				1.		2	4
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)					30,000.				30,000			5
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED					30,000				30,000		60,000	6
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					14,772				9,797		24,569	7
8	GAS VOLUME INTO STATION (MMCFD)					2,068.5				2,063.0			8
9	STATION FUEL GAS (MMCFD)					5.5				4.9		10.4	9
10	GAS VOLUME OUT OF STATION (MMCFD)					2063.0				2058.1			10
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)					1379.4				1475.3			11
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)					1696.8				1696.7			12
13	GAS COMPRESSION RATIO					1·230				1·150			13
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)					17.5				20.9			14
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)					43.9				38.4			15
16	STATION OUTLET GAS TEMPERATURE (°F)					25.0				25.0			16
17	CHILLING / COOLING DUTY (TONS) REQUIRED					6213				4418		10631	17
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED					1				1		2	18
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)					17,000				17,000			19
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED					17,000				17,000		34,000	20
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					8116				8311		16,427	21



RICHARDS ISLAND to TRAVAILLANT LAKE

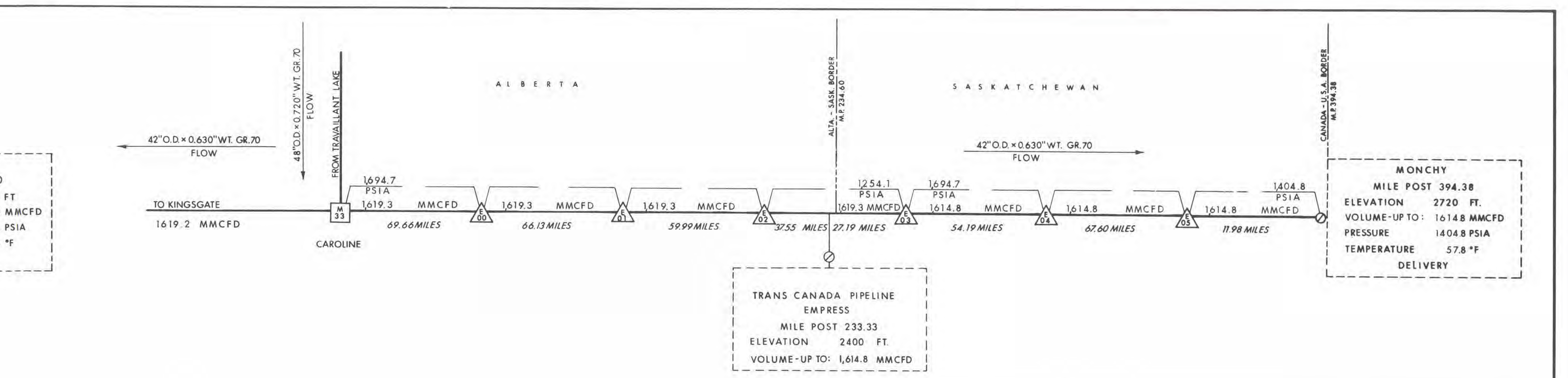
GAS SUPPLY LINES

1	STATION NUMBER	M-01	M-02	TOTALS
2	STATION MILEPOST	39.20	94.40	
3	STATION ELEVATION (FEET)	470	320	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED			
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED			
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			
8	GAS VOLUME INTO STATION (MMCFD)			
9	STATION FUEL GAS (MMCFD)			
10	GAS VOLUME OUT OF STATION (MMCFD)			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)			
13	GAS COMPRESSION RATIO			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)			
16	STATION OUTLET GAS TEMPERATURE (°F)			
17	CHILLING/COOLING DUTY (TONS) REQUIRED			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			



CAROLINE to KINGSGATE

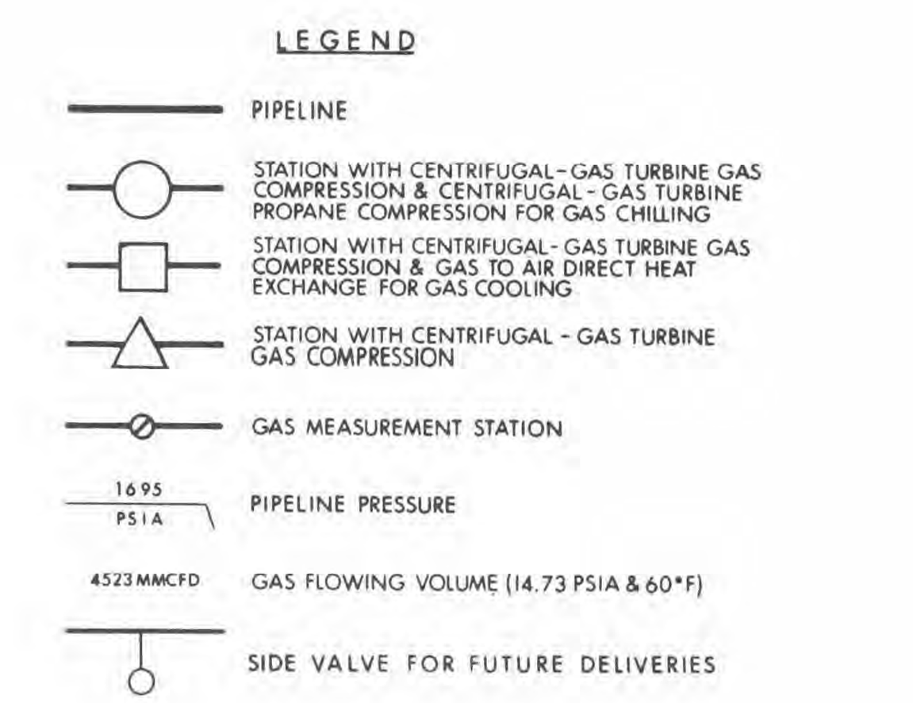
1	STATION NUMBER	K-00	K-01	K-02	K-03	TOTALS
2	STATION MILEPOST	59.40	119.75	179.84	246.80	
3	STATION ELEVATION (FEET)	4170	4400	4930	4230	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED					
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)					
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED					
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					
8	GAS VOLUME INTO STATION (MMCFD)					
9	STATION FUEL GAS (MMCFD)					
10	GAS VOLUME OUT OF STATION (MMCFD)					
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)					
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)					
13	GAS COMPRESSION RATIO					
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)					
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)					
16	STATION OUTLET GAS TEMPERATURE (°F)					
17	CHILLING/COOLING DUTY (TONS) REQUIRED					
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED					
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)					
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED					
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					



CAROLINE to MONCHY

GAS DELIVERY LINES

1	STATION NUMBER	E-00	E-01	E-02	E-03	E-04	E-05	TOTALS
2	STATION MILEPOST	69.66	135.79	195.78	260.52	314.71	382.40	
3	STATION ELEVATION (FEET)	2970	2410	2650	2380	3310	2810	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED				1			1
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)				30,000			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED				30,000			30,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED				21,449			21,449
8	GAS VOLUME INTO STATION (MMCFD)				1,619.3			
9	STATION FUEL GAS (MMCFD)				4.5			4.5
10	GAS VOLUME OUT OF STATION (MMCFD)				1,614.8			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)				1252.1			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)				1698.5			
13	GAS COMPRESSION RATIO				1·360			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)				42.7			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)				86.3			
16	STATION OUTLET GAS TEMPERATURE (°F)				86.2			
17	CHILLING/COOLING DUTY (TONS) REQUIRED				0			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED				0			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)				0			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED				0			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED				0			



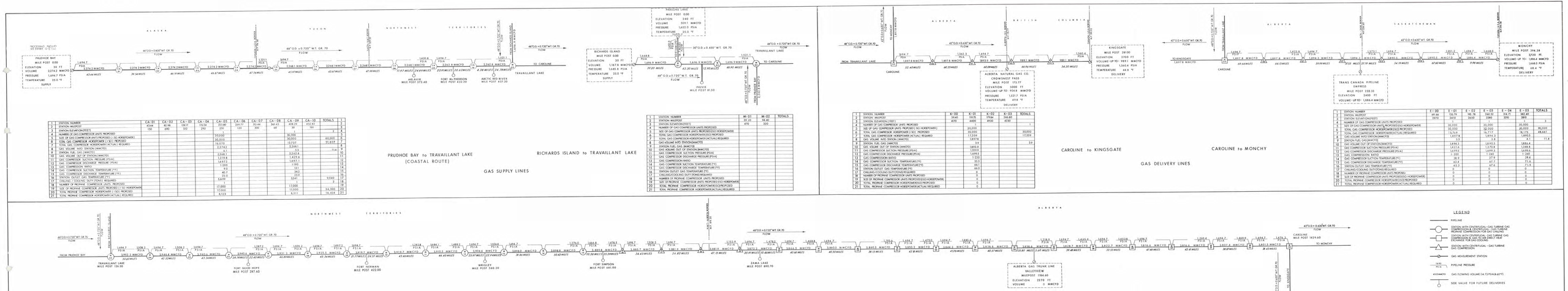
TRAVAILLANT LAKE to CAROLINE

MAINLINE

		M-03	M-04	M-05	M-06	M-07	M-08	M-09	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18
1	STATION NUMBER	M-03	M-04	M-05	M-06	M-07	M-08	M-09	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18
2	STATION MILEPOST	126.50	177.10	219.62	262.86	310.00	356.89	400.23	446.37	489.83	534.23	583.14	620.00	670.42	716.39	750.82	807.64
3	STATION ELEVATION (FEET)	810	440	530	690	470	310	520	450	700	810	520	1370	930	950	1480	1440
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED	1		1		1		1		1		1		1		1	
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	30,000		30,000		30,000		30,000		30,000		30,000		30,000		30,000	
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED	30,000		30,000		30,000		30,000		30,000		30,000		30,000		30,000	
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	11,196		19,906		20,492		20,838		21,365		20,712		22,005		23,698	
8	GAS VOLUME INTO STATION (MMCFD)	3,344.3		3,337.4		3,330.9		3,324.2		3,317.4		3,310.4		3,303.5		3,298.9	
9	STATION FUEL GAS (MMCFD)	6.9		6.5		6.7		6.8		7.0		6.9		4.6		4.8	
10	GAS VOLUME OUT OF STATION (MMCFD)	3,337.4		3,330.9		3,324.2		3,317.4		3,310.4		3,303.5		3,298.9		3,294.2	
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,545.7		1,422.1		1,413.4		1,409.7		1,403.9		1,412.8		1,394.5		1,392.8	
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,699.8		1,699.7		1,699.7		1,699.7		1,699.7		1,699.7		1,699.6		1,697.5	
13	GAS COMPRESSION RATIO	1·100		1·200		1·200		1·210		1·210		1·200		1·220		1·200	
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	21.9		5.1		4.2		4.7		5.1		6.3		4.2		16.2	
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	33.9		27.2		27.1		28.0		29.0		29.4		29.0		42.0	
16	STATION OUTLET GAS TEMPERATURE (°F)	12.9		12.7		12.2		12.2		12.4		12.8		28.8		41.9	
17	CHILLING/COOLING DUTY (TONS) REQUIRED	9,735		7,494		7,675		8,110		8,494		8,482		0		0	
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	2		1		1		1		1		1		1		0	
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	17,000		17,000		17,000		17,000		17,000		17,000		17,000		0	
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED	34,000		17,000		17,000		17,000		17,000		17,000		17,000		0	
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	11,269		7,885		8,328		9,004		9,695		9,822		0		0	

	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS	
1	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS	1
2	854.79	901.16	941.84	982.14	1020.29	1062.47	1108.23	1148.80	1190.20	1229.68	1263.21	1310.69	1353.10	1391.17	1429.60		2
3	1810	1100	1470	1790	2540	2520	1860	2130	2140	2600	4000	3050	2850	3400	3880		3
4	2		2		2		2		2		2		2		2	24	4
5	27,500		27,500		27,500		27,500		27,500		27,500		27,500		27,500		5
6	55,000		55,000		55,000		55,000		55,000		55,000		55,000		55,000	680,000	6
7	35,672		29,901		34,093		29,361		32,057		35,007		26,225		32,485	415,013	7
8	3,294.2		3,286.9		3,280.2		3,273.0		3,266.4		3,259.4		3,252.0		3,245.8		8
9	7.3		6.7		7.2		6.6		7.0		7.4		6.2		7.0	105.5	9
10	3,286.9		3,280.2		3,273.0		3,266.4		3,259.4		3,252.0		3,245.8		3,238.8		10
11	1,284.0		1,368.4		1,328.0		1,376.5		1,351.0		1,319.0		1,405.9		1,343.3		11
12	1,697.7		1,700.9		1,700.9		1,700.9		1,700.9		1,700.8		1,700.8		1,700.8		12
13	1·320		1·240		1·280		1·240		1·260		1·290		1·210		1·270		13
14	21.0		41.8		41.8		45.2		44.8		40.9		46.9		43.3		14
15	58.8		72.1		74.8		74.9		77.2		76.6		73.5		76.4		15
16	58.7		61.0		60.6		63.1		63.5		60.3		62.8		61.7		16
17	0		4,768		6,081		5,019		5,803		6,965		4,515		6,225	89,366	17
18	0		0		0		0		0		0		0		0	8	18
19	0		0		0		0		0		0		0		0		19
20	0		0		0		0		0		0		0		0	136,000	20
21	0		0		0		0		0		0		0		0	56,003	21

DESIGNED BY	NORTHERN ENGINEERING SERVICES COMPANY LIMITED ENGINEERS FOR ALASKAN ARCTIC GAS PIPELINE COMPANY	
DRAWN BY		
CHECKED BY	FLOW DIAGRAM MAXIMUM CAPACITY AVERAGE SUMMER CONDITIONS - OPERATING YEAR 2	SCALE
ENGINEERS APPROVAL		DATE
PROJECT MANAGER		PROJECT No
		SECTION I-4 — REV



	STATION NUMBER	CA-01	CA-02	CA-03	CA-04	CA-05	CA-06	CA-07	CA-08	CA-09	CA-10	TOTALS	
1	STATION NUMBER	43.44	82.98	128.07	176.04	211.89	269.70	311.46	360.43	408.29	455.97		1
2	STATION MILEPOST	150	285	440	605	730	930	1070	1240	1405	1570		2
3	STATION ELEVATION(FEET)						270	120	300	60	30		3
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED											2	4
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (-) HORSEPOWER						20,000			30,000			5
6	TOTAL GAS COMPRESSOR HORSEPOWER (-) HP PROPOSED						20,000			30,000		50,000	6
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED						19,070			12,737		31,807	7
8	GAS VOLUME INTO STATION (MMCFD)						1,870.2			1,870.2			8
9	STATION FUEL GAS (MMCFD)						1.5			1.5		114	9
10	GAS VOLUME OUT OF STATION (MMCFD)						1,868.1			2,262.8			10
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)						1,439.6			1,427.6			11
12	GAS COMPRESSOR SUCTION PRESSURE (PSIA)						1,427.6			1,697.1			12
13	GAS COMPRESSION RATIO						1.195			1.189			13
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)						40.0			40.0			14
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)						59.0			342			15
16	STATION OUTLET GAS TEMPERATURE (°F)						59.0			23.0			16
17	CHILLING/COOLING DUTY(TONS REQUIRED)						5,699			3,541		9,040	17
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED											2	18
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (-) HP/COMPRESSOR						17,000			17,000			19
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (-) HP PROPOSED						17,000			17,000		34,000	20
21	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED						6,113			4,311		10,424	21

	STATION NUMBER	M-01	M-02	TOTALS
1	STATION NUMBER	39.60	94.80	
2	STATION MILEPOST	470	520	
3	STATION ELEVATION(FEET)			
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED			
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED			
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			
8	GAS VOLUME INTO STATION(MMCFD)			
9	STATION FUEL GAS (MMCFD)			
10	GAS VOLUME OUT OF STATION (MMCFD)			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)			
13	GAS COMPRESSION RATIO			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)			
16	STATION OUTLET GAS TEMPERATURE (°F)			
17	CHILLING/COOLING DUTY(TONS REQUIRED)			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED			

	STATION NUMBER	K-00	K-01	K-02	K-03	TOTALS	
1	STATION NUMBER	0.00	52.42	97.23	172.27		1
2	STATION MILEPOST	3640	3975	4280	4680		2
3	STATION ELEVATION(FEET)	4100	4600	4900	4230		3
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED					1	4
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)		20,000				5
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED		20,000			20,000	6
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED		17,209			17,209	7
8	GAS VOLUME INTO STATION(MMCFD)		1,877.8				8
9	STATION FUEL GAS (MMCFD)		3.7			3.7	9
10	GAS VOLUME OUT OF STATION (MMCFD)		1,874.1				10
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)		1,359.8				11
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)		1,693.5				12
13	GAS COMPRESSION RATIO		1.245				13
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)		33.3				14
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)		88.1				15
16	STATION OUTLET GAS TEMPERATURE (°F)		66.0				16
17	CHILLING/COOLING DUTY(TONS REQUIRED)		0				17
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED		0				18
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)		0				19
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED		0				20
21	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED		0				21

CAROLINE to MONCHY

	STATION NUMBER	E - 00	E - 01	E - 02	E - 03	E - 04	E - 05	TOTALS
1	STATION NUMBER	00.00	53.79	98.76	160.52	214.75	282.40	
2	STATION ELEVATION(FEET)	3970	2410	3650	2080	3270	2810	
3	NUMBER OF GAS COMPRESSOR UNITS PROPOSED							3
4	SIZE OF GAS COMPRESSOR UNITS PROPOSED (HORSEPOWER)		20,000				20,000	
5	TOTAL GAS COMPRESSOR HORSEPOWER PROPOSED		20,000				20,000	40,000
6	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED		16,717				18,722	35,440
7	GAS VOLUME INTO STATION(MMCFD)		1,877.8				1,890.2	
8	STATION FUEL GAS (MMCFD)		3.5				4	11.4
9	GAS VOLUME OUT OF STATION (MMCFD)		1,874.3				1,886.4	
10	GAS COMPRESSOR SUCTION PRESSURE (PSIA)		1,412.6				1,388.6	
11	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)		1,693.5				1,693.5	
12	GAS COMPRESSION RATIO		1.199				1.219	
13	GAS COMPRESSOR SUCTION TEMPERATURE(°F)		28.5				27.9	
14	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)		63.4				67.7	
15	STATION OUTLET GAS TEMPERATURE (°F)		40.0				73.5	
16	CHILLING/COOLING DUTY(TONS REQUIRED)		0				0	
17	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED		0				0	
18	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (HORSEPOWER)		0				0	
19	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED		0				0	
20	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED		0				0	

	STATION NUMBER	M - 03	M - 04	M - 05	M - 06	M - 07	M - 08	M - 09	M - 10	M - 11	M - 12	M - 13	M - 14	M - 15	M - 16	M - 17	M - 18	TOTALS
1	STATION NUMBER	126.50	177.92	239.62	282.86	350.90	336.99	400.23	446.37	489.83	534.23	584.14	630.60	680.62	736.78	770.92	807.44	
2	STATION MILEPOST	810	1140	1535	1690	1970	2160	2565	2860	3140	3425	3745	4040	4360	4720	4940	5175	36
3	STATION ELEVATION(FEET)																	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED																	
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (HORSEPOWER)	20,000	20,000	20,000		20,000	20,000	20,000		20,000	20,000	20,000		20,000	30,000	30,000		340,000
6	SIZE OF GAS COMPRESSOR UNITS PROPOSED(ISO)	20,000	20,000	20,000		20,000	20,000	20,000		20,000	20,000	20,000		20,000	30,000	30,000		340,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	15,440	15,518	15,864		16,943	16,143	16,780		16,582	17,484	16,457		16,778	16,510	16,237		276,139
8	GAS VOLUME INTO STATION (MMCFD)	1,359.2	1,351.2	1,346.4		1,342.5	1,323.3	1,320.5		1,312.5	1,297.0	1,279.6		1,262.4	1,247.6	1,230.4		1642
9	STATION FUEL GAS (MMCFD)	7.5	3.8	3.8		9.3	3.8	3.8		9.0	3.6	3.6		8.8	3.5	3.5		
10	GAS VOLUME OUT OF STATION (MMCFD)	1,351.7	1,347.4	1,342.6		1,333.2	1,319.5	1,316.7		1,303.5	1,293.4	1,276.0		1,253.6	1,243.9	1,226.9		
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,517.6	1,498.5	1,505.6		1,504.6	1,505.8	1,501.5		1,672.5	1,698.2	1,698.2		1,698.2	1,698.2	1,698.2		
12	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,698.2	1,698.2	1,698.2		1,698.2	1,698.2	1,698.2		1,698.2	1,698.2	1,698.2		1,698.2	1,698.2	1,698.2		
13	GAS COMPRESSION RATIO	1.120	1.060	1.128		1.130	1.130	1.130		1.045	1.105	1.130		1.105	1.105	1.130		
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	15.2	6.9	6.6		4.7	7.1	6.5		2.6	6.7	7.9		2.6	6.8	14.8		
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	29.5	22.2	21.4		21.4	23.1	22.2		16.5	22.1	24.1		16.7	24.1	29.8		
16	STATION OUTLET GAS TEMPERATURE (°F)	14.9	15.0	15.3		14.6	15.2	14.8		14.6	15.2	14.8		14.7	15.1	15.2		
17	CHILLING/COOLING DUTY (TONS) REQUIRED	6,545	6,580	3,693		10,056	6,841	3,754		5,823	5,540	4,382		5,665	0	0		
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED																	
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)	17,000	17,000	17,000		17,000	17,000	17,000		17,000	17,000	17,000		17,000	0	0		
20	TOTAL PROPANE COMPRESSOR HORSEPOWER(ISO) PROPOSED	34,000	34,000	34,000		34,000	34,000	34,000		34,000	34,000	34,000		34,000	0	0		
21	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED	11,877	6,741	6,860		12,168	6,795	6,758		11,298	6,626	6,819		10,870	0	0		

	STATION NUMBER	M - 19	M - 20	M - 21	M - 22	M - 23	M - 24	M - 25	M - 26	M - 27	M - 28	M - 29	M - 30	M - 31	M - 32	M - 33	TOTALS
1	STATION NUMBER	654.79	705.96	749.82	785.14	1009.29	1062.87	1108.25	1148.80	1199.30	1239.64	1260.37	1283.87	1353.50	1384.70	1429.60	
2	STATION MILEPOST	1810	1950	2070	2170	2790	2940	3065	3180	3320	3430	3490	3555	3750	3840	3960	36
3	STATION ELEVATION(FEET)	1780	1660	1470	1790	2340	2320	1860	2130	2160	3490	4000	3050	2850	3490	3840	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED																
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (HORSEPOWER)	27,500	27,500	27,500		27,500	27,500	27,500		27,500	27,500	27,500		27,500	27,500	27,500	
6	SIZE OF GAS COMPRESSOR UNITS PROPOSED(ISO)	55,000	55,000	55,000		55,000	55,000	55,000		55,000	55,000	55,000		55,000	55,000	55,000	1,020,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	35,114	23,618	16,397		52,447	23,650	23,502		23,650	23,650	23,650		49,118	23,790	23,037	665,238
8	GAS VOLUME INTO STATION (MMCFD)	1,230.4	1,217.2	1,217.2		1,202.5	1,202.5	1,202.5		1,202.5	1,202.5	1,202.5		1,202.5	1,202.5	1,202.5	
9	STATION FUEL GAS (MMCFD)	3.5	3.4	3.4		3.4	3.4	3.4		3.4	3.4	3.4		3.4	3.4	3.4	
10	GAS VOLUME OUT OF STATION (MMCFD)	1,226.9	1,213.8	1,213.8		1,199.1	1,199.1	1,199.1		1,199.1	1,199.1	1,199.1		1,199.1	1,199.1	1,199.1	
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,698.2	1,698.2	1,698.2		1,672.2	1,846.5	1,860.5		1,850.5	1,844.2	1,838.6		1,828.7	1,822.7	1,816.5	
12	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,698.2	1,698.2	1,698.2		1,698.2	1,698.2	1,698.2		1,698.2	1,698.2	1,698.2		1,698.2	1,698.2	1,698.2	
13	GAS COMPRESSION RATIO	1.130	1.130	1.130		1.130	1.130	1.130		1.130	1.130	1.130		1.130	1.130	1.130	
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	15.2	6.9	6.6		4.7	7.1	6.5		2.6	6.7	7.9		2.6	6.8	14.8	
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	29.5	22.2	21.4		16.5	22.1	24.1		16.7	24.1	29.8		16.7	24.1	29.8	
16	STATION OUTLET GAS TEMPERATURE (°F)	14.9	15.0	15.3		14.6	15.2	14.8		14.7	15.1	15.2		14.8	15.1	15.2	132.130
17	CHILLING/COOLING DUTY (TONS) REQUIRED	6,545	6,580	3,693		5,823	5,540	4,382		5,665	0	0		5,926	5,873	3,710	15
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED																
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)	17,000	17,000	17,000		17,000	17,000	17,000		17,000	0	0		17,000	0	0	187,000
20	TOTAL PROPANE COMPRESSOR HORSEPOWER(ISO) PROPOSED	34,000	34,000	34,000		34,000	34,000	34,000		34,000	0	0		34,000	0	0	86,772
21	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED	11,877	6,741	6,860		12,168	6,795	6,758		11,298	6,626	6,819		10,870	0	0	

LEGEND

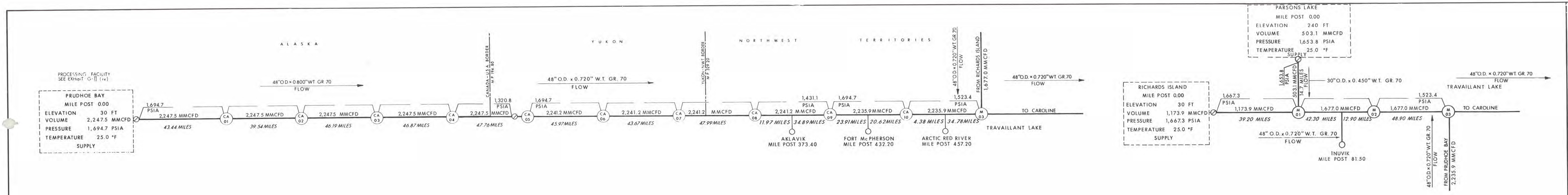
- PIPELINE
- STATION WITH CENTRIFUGAL-GAS TURBINE GAS COMPRESSION & CENTRIFUGAL-GAS TURBINE PROPANE COMPRESSION & DELIVERY FACILITIES
- STATION WITH CENTRIFUGAL-GAS TURBINE GAS COMPRESSION & GAS TO AN DIRECT HEAT EXCHANGE FOR GAS COOLING
- STATION WITH CENTRIFUGAL - GAS TURBINE GAS COMPRESSION
- GAS MEASUREMENT STATION
- 1695 PSIA — PIPELINE PRESSURE
- 450MMCFD — GAS FLOWING VOLUME (14.73 PSIA & 60°F)
- SIDE VALVE FOR FUTURE DELIVERIES

NORTHERN ENGINEERING SERVICES CONSULTANT LIMITED

ALASKAN ARCTIC GAS PIPELINE COMPANY

FLOW DIAGRAM
MAXIMUM CAPACITY
AVERAGE WINTER CONDITIONS - OPERATING YEAR 3

DESIGNED BY	
DRAWN BY	
CHECKED BY	
ENGINEERING APPROVAL	
PROJECT MANAGER	
SCALE	
DATE	
PROJECT No.	
DRAWING No.	REV.
SECTION: I-5 -D	



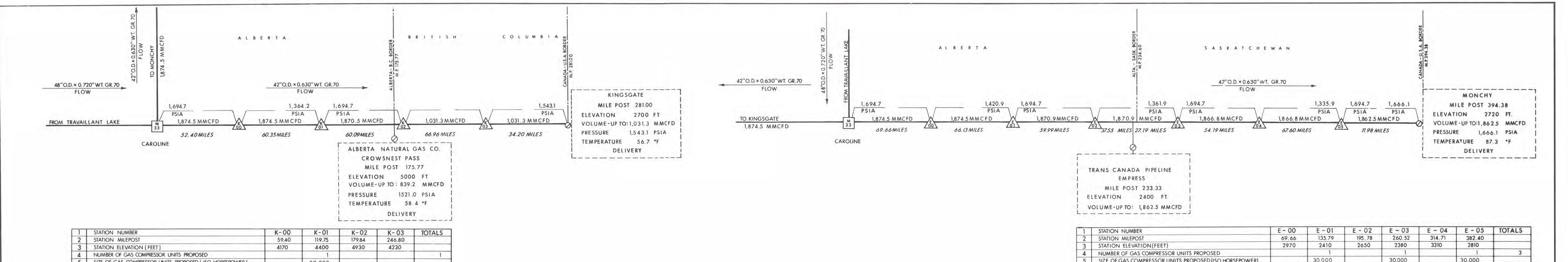
PRUDHOE BAY to TRAVAILLANT LAKE (COASTAL ROUTE)

#		CA-01	CA-02	CA-03	CA-04	CA-05	CA-06	CA-07	CA-08	CA-09	CA-10	TOTALS	#
1	STATION NUMBER	CA-01	CA-02	CA-03	CA-04	CA-05	CA-06	CA-07	CA-08	CA-09	CA-10	TOTALS	1
2	STATION MILEPOST	43.44	82.98	129.17	176.04	223.80	269.77	313.44	361.43	408.29	452.82		2
3	STATION ELEVATION (FEET)	150	690	510	290	250	120	300	60	30	150		3
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED					1				1		2	4
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)					30,000				30,000			5
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED					30,000				30,000		60,000	6
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					19,619				13,072		32,691	7
8	GAS VOLUME INTO STATION (MMCFD)					2,247.5				2,241.2			8
9	STATION FUEL GAS (MMCFD)					6.3				5.3		11.6	9
10	GAS VOLUME OUT OF STATION (MMCFD)					2,241.2				2,235.9			10
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)					1,319.5				1,429.9			11
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)					1,697.2				1,697.1			12
13	GAS COMPRESSION RATIO					1·290				1·190			13
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)					14.7				18.7			14
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)					47.0				40.2			15
16	STATION OUTLET GAS TEMPERATURE (°F)					25.0				25.0			16
17	CHILLING / COOLING DUTY (TONS) REQUIRED					7,803				5,437		13,240	17
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED					1				1		2	18
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)					17,000				17,000			19
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED					17,000				17,000		34,000	20
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					8,470				8,169		16,639	21

RICHARDS ISLAND to TRAVAILLANT LAKE

GAS SUPPLY LINES

#		M-01	M-02	TOTALS
1	STATION NUMBER	M-01	M-02	TOTALS
2	STATION MILEPOST	39.20	94.40	
3	STATION ELEVATION (FEET)	470	320	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED			
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED			
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			
8	GAS VOLUME INTO STATION (MMCFD)			
9	STATION FUEL GAS (MMCFD)			
10	GAS VOLUME OUT OF STATION (MMCFD)			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)			
13	GAS COMPRESSION RATIO			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)			
16	STATION OUTLET GAS TEMPERATURE (°F)			
17	CHILLING/COOLING DUTY (TONS) REQUIRED			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			



CAROLINE to KINGSGATE

#		K-00	K-01	K-02	K-03	TOTALS
1	STATION NUMBER	K-00	K-01	K-02	K-03	TOTALS
2	STATION MILEPOST	59.40	119.75	179.84	246.80	
3	STATION ELEVATION (FEET)	4170	4400	4930	4230	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED		1			1
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)		30,000			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED		30,000			30,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED		17,448			17,448
8	GAS VOLUME INTO STATION (MMCFD)		1,874.5			
9	STATION FUEL GAS (MMCFD)		4.0			4.0
10	GAS VOLUME OUT OF STATION (MMCFD)		1,870.5			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)		1,361.9			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)		1,699.5			
13	GAS COMPRESSION RATIO		1·250			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)		42.4			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)		73.4			
16	STATION OUTLET GAS TEMPERATURE (°F)		73.4			
17	CHILLING/COOLING DUTY (TONS) REQUIRED		0			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED		0			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)		0			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED		0			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED		0			

GAS DELIVERY LINES

CAROLINE to MONCHY

#		E-00	E-01	E-02	E-03	E-04	E-05	TOTALS
1	STATION NUMBER	E-00	E-01	E-02	E-03	E-04	E-05	TOTALS
2	STATION MILEPOST	69.66	135.79	195.78	260.52	314.71	382.40	
3	STATION ELEVATION (FEET)	2970	2410	2650	2380	3310	2810	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED		1		1		1	3
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)		30,000		30,000		30,000	
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED		30,000		30,000		30,000	90,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED		14,363		18,310		20,322	52,995
8	GAS VOLUME INTO STATION (MMCFD)		1,874.5		1,870.9		1,866.8	
9	STATION FUEL GAS (MMCFD)		3.6		4.1		4.3	12.0
10	GAS VOLUME OUT OF STATION (MMCFD)		1,870.9		1,866.8		1,862.5	
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)		1,418.7		1,359.5		1,333.4	
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)		1,699.5		1,699.7		1,699.8	
13	GAS COMPRESSION RATIO		1·200		1·250		1·270	
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)		47.9		51.7		55.6	
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)		73.3		83.7		90.8	
16	STATION OUTLET GAS TEMPERATURE (°F)		73.2		83.6		90.7	
17	CHILLING/COOLING DUTY (TONS) REQUIRED		0		0		0	
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED		0		0		0	
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)		0		0		0	
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED		0		0		0	
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED		0		0		0	

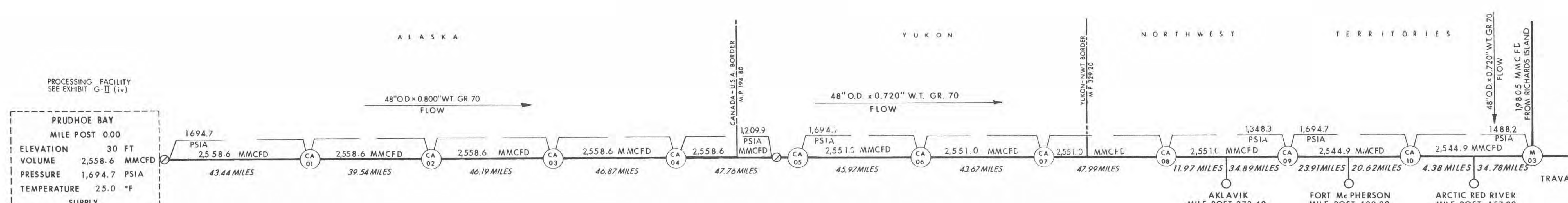
TRAVAILLANT LAKE to CAROLINE

MAINLINE

#		M-03	M-04	M-05	M-06	M-07	M-08	M-09	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18
1	STATION NUMBER	M-03	M-04	M-05	M-06	M-07	M-08	M-09	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18
2	STATION MILEPOST	126.50	177.10	219.62	262.86	310.00	356.89	400.23	446.37	489.83	534.23	583.14	620.00	670.42	716.39	750.82	807.64
3	STATION ELEVATION (FEET)	810	440	530	690	470	310	520	450	700	810	520	1370	930	950	1480	1440
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED	1	1	1		1	1	1		1	1	1		1	1	1	
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	30,000	30,000	30,000		30,000	30,000	30,000		30,000	30,000	30,000		30,000	30,000	30,000	
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED	30,000	30,000	30,000		30,000	30,000	30,000		30,000	30,000	30,000		30,000	30,000	30,000	
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	15,553	15,591	14,987		30,979	20,696	15,848		30,466	22,341	14,969		29,966	22,672	16,241	
8	GAS VOLUME INTO STATION (MMCFD)	3,912.9	3,905.2	3,899.5		3,893.9	3,885.6	3,878.9		3,873.1	3,864.8	3,857.7		3,852.1	3,843.9	3,839.3	
9	STATION FUEL GAS (MMCFD)	7.7	5.7	5.6		8.3	6.7	5.8		8.3	7.1	5.6		8.2	4.6	3.8	
10	GAS VOLUME OUT OF STATION (MMCFD)	3,905.2	3,899.5	3,893.9		3,885.6	3,878.9	3,873.1		3,864.8	3,857.7	3,852.1		3,843.9	3,839.3	3,835.5	
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,519.9	1,506.2	1,511.7		1,298.1	1,449.6	1,500.8		1,292.5	1,430.2	1,511.7		1,286.6	1,423.3	1,506.6	
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,701.7	1,701.4	1,701.4		1,650.9	1,701.4	1,701.3		1,636.5	1,701.4	1,701.2		1,626.1	1,698.1	1,698.3	
13	GAS COMPRESSION RATIO	1·120	1·130	1·130		1·270	1·170	1·130		1·270	1·190	1·130		1·260	1·190	1·130	
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	20.2	6.7	5.9		-3.1	5.8	5.7		-2.2	4.9	7.4		-2.9	4.9	18.2	
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	34.4	21.5	20.2		27.1	25.5	20.9		27.7	26.4	21.7		26.7	26.9	33.4	
16	STATION OUTLET GAS TEMPERATURE (°F)	12.9	12.6	12.7		12.2	12.6	12.2		12.4	12.1	12.8		11.9	26.8	33.3	
17	CHILLING/COOLING DUTY (TONS) REQUIRED	11,787	5,346	4,482		8,872	7,727	5,186		8,994	8,495	5,299		8,693	0	0	
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	2	1	1		1	1	1		1	1	1		1	0	0	
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	17,000	17,000	17,000		17,000	17,000	17,000		17,000	17,000	17,000		17,000	0	0	
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED	34,000	17,000	17,000		17,000	17,000	17,000		17,000	17,000	17,000		17,000	0	0	
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	12,299	6,338	6,497		10,234	8,496	6,330		10,685	9,772	6,386		10,550	0	0	

#	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS	#
1	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS	1
2	854.79	901.16	941.84	982.14	1020.29	1062.47	1108.23	1148.80	1190.20	1229.68	1263.21	1310.69	1353.10	1391.17	1429.60		2
3	1810	1100	1470	1790	2540	2520	1860	2130	2140	2600	4000	3050	2850	3400	3880		3
4	2	2	2		2	2	2		2	2	2		2	2	2	36	4
5	27,500	27,500	27,500		27,500	27,500	27,500		27,500	27,500	27,500		27,500	27,500	27,500		5
6	55,000	55,000	55,000		55,000	55,000	55,000		55,000	55,000	55,000		55,000	55,000	55,000	1,020,000	6
7	53,346	26,822	23,626		51,796	29,679	22,041		51,688	28,948	25,277		47,848	24,092	22,873	658,345	7
8	3,835.5	3,826.1	3,819.8		3,813.9	3,804.4	3,797.7		3,792.0	3,782.5	3,775.8		3,769.7	3,760.7	3,754.7		8
9	9.4	6.3	5.9		9.5	6.7	5.7		9.5	6.7	6.1		9.0	6.0	5.8	164.0	9
10	3,826.1	3,819.8	3,813.9		3,804.4	3,797.7	3,792.0		3,782.5	3,775.8	3,769.7		3,760.7	3,754.7	3,748.9		10
11	1,149.6	1,438.6	1,469.8		1,200.4	1,419.1	1,485.6		1,217.3	1,426.7	1,452.7		1,265.9	1,466.4	1,474.9		11
12	1,667.7	1,703.0	1,703.0		1,656.2	1,703.0	1,703.0		1,672.6	1,703.0	1,702.8		1,703.1	1,702.8	1,702.7		12
13	1·450	1·180	1·160		1·380	1·200	1·150		1·370	1·190	1·170		1·350	1·160	1·150		13
14	5.1	44.6	48.8		33.3	49.9	52.3		37.9	52.7	48.5		40.1	53.1	51.2		14
15	55.2	67.9	69.2		78.7	75.4	71.3		83.0	77.6	70.6		82.0	74.0	71.1		15
16	55.1	60.7	61.0		61.5	61.6	62.9		65.5	62.8	60.3		65.3	62.8	61.3		16
17	0	3,547	4,070		8,407	6,822	4,076		8,448	7,246	5,098		8,093	5,480	4,771	140,939	17
18	0	0	0		0	0	0		0	0	0		0	0	0	11	18
19	0	0	0		0	0	0		0	0	0		0	0	0		19
20	0	0	0		0	0	0		0	0	0		0	0	0	187,000	20
21	0	0	0		0	0	0		0	0	0		0	0	0	87,587	21

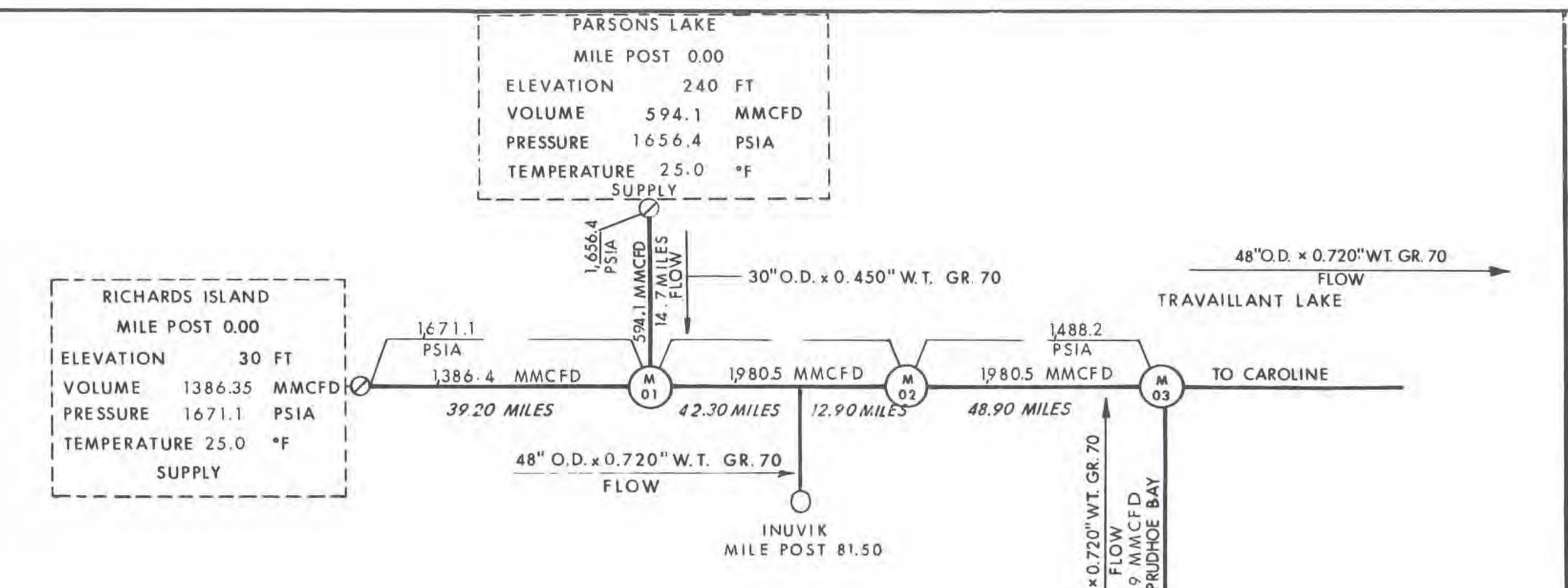
DESIGNED BY	NORTHERN ENGINEERING SERVICES COMPANY LIMITED		
DRAWN BY	ENGINEERS FOR		
CHECKED BY	ALASKAN ARCTIC GAS PIPELINE COMPANY		
ENGINEERS APPROVAL	FLOW DIAGRAM	SCALE	
PROJECT MANAGER	MAXIMUM CAPACITY	DATE	
	AVERAGE SUMMER CONDITIONS- OPERATING YEAR 3	PROJECT No	
		SECTION I-6	REV



PRUDHOE BAY to TRAVAILLANT LAKE
(COASTAL ROUTE)

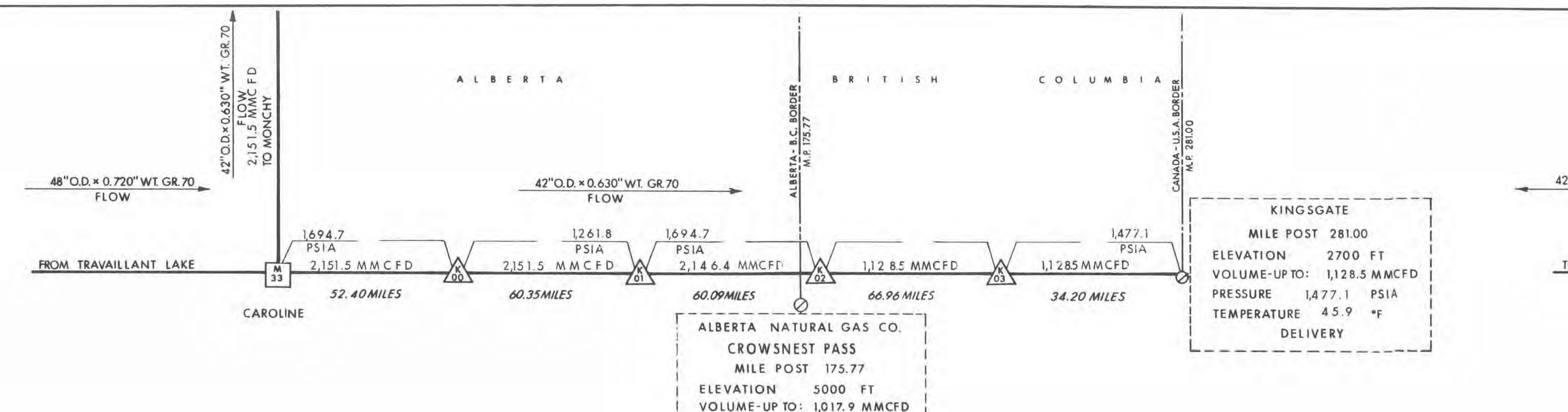
1	STATION NUMBER	CA-01	CA-02	CA-03	CA-04	CA-05	CA-06	CA-07	CA-08	CA-09	CA-10	TOTALS	1
2	STATION MILEPOST	43.44	82.98	129.17	176.04	223.80	269.77	313.44	361.43	408.29	452.82		2
3	STATION ELEVATION (FEET)	150	690	510	290	250	120	300	60	30	150		3
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED					1				1		2	4
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)					30,000				30,000			5
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED					30,000				30,000		60,000	6
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					29,458				19,483		48,941	7
8	GAS VOLUME INTO STATION (MMCFD)					2,558.6				2,551.0			8
9	STATION FUEL GAS (MMCFD)					7.6				6.1		13.7	9
10	GAS VOLUME OUT OF STATION (MMCFD)					2,551.0				2,544.9			10
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)					1,208.1				1,346.8			11
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)					1,697.9				1,697.8			12
13	GAS COMPRESSION RATIO					1.410				1.260			13
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)					3.4				9.1			14
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)					47.0				38.0			15
16	STATION OUTLET GAS TEMPERATURE (°F)					25.0				25.0			16
17	CHILLING / COOLING DUTY (TONS) REQUIRED					8,874				5,306		14,180	17
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED					1				1		2	18
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)					17,000				17,000			19
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED					17,000				17,000		34,000	20
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					9,551				8,114		17,665	21

GAS SUPPLY LINES



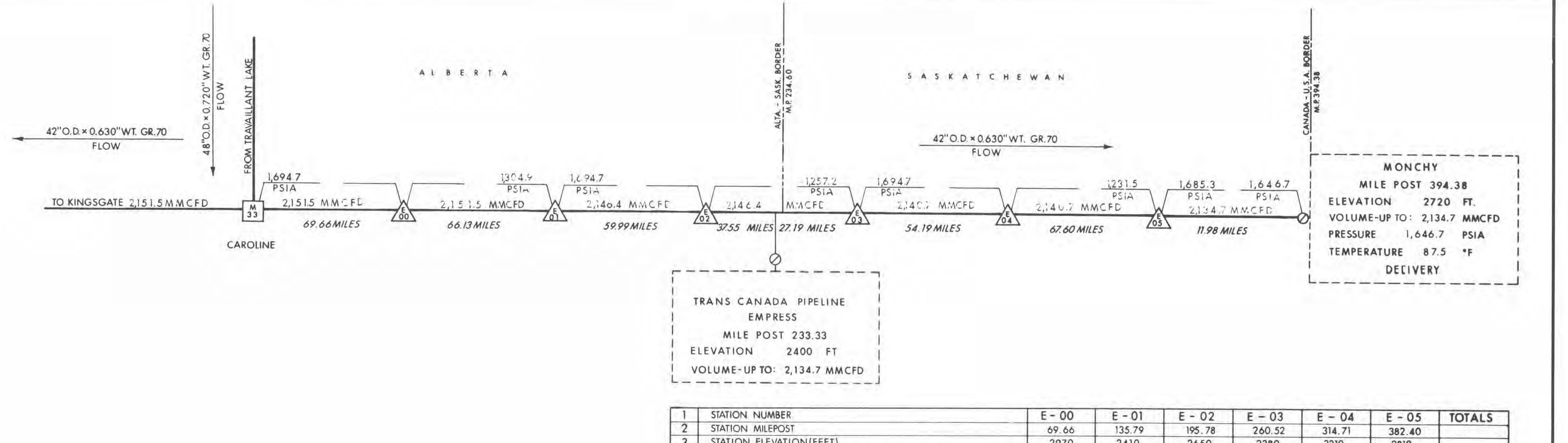
RICHARDS ISLAND to TRAVAILLANT LAKE

1	STATION NUMBER	M-01	M-02	TOTALS
2	STATION MILEPOST	39.20	94.40	
3	STATION ELEVATION (FEET)	470	320	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED			
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED			
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			
8	GAS VOLUME INTO STATION (MMCFD)			
9	STATION FUEL GAS (MMCFD)			
10	GAS VOLUME OUT OF STATION (MMCFD)			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)			
13	GAS COMPRESSION RATIO			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)			
16	STATION OUTLET GAS TEMPERATURE (°F)			
17	CHILLING/COOLING DUTY (TONS) REQUIRED			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			



CAROLINE to KINGSGATE

1	STATION NUMBER	K-00	K-01	K-02	K-03	TOTALS
2	STATION MILEPOST	59.40	119.75	179.84	246.80	
3	STATION ELEVATION (FEET)	4170	4400	4930	4230	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED		1			1
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)		30,000			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED		30,000			30,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED		26,702			26,702
8	GAS VOLUME INTO STATION (MMCFD)		2,151.5			
9	STATION FUEL GAS (MMCFD)		5.1			5.1
10	GAS VOLUME OUT OF STATION (MMCFD)		2,146.4			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)		1,258.5			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)		1,701.0			
13	GAS COMPRESSION RATIO		1.350			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)		31.2			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)		73.2			
16	STATION OUTLET GAS TEMPERATURE (°F)		73.1			
17	CHILLING/COOLING DUTY (TONS) REQUIRED		0			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED		0			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)		0			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED		0			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED		0			



CAROLINE to MONCHY

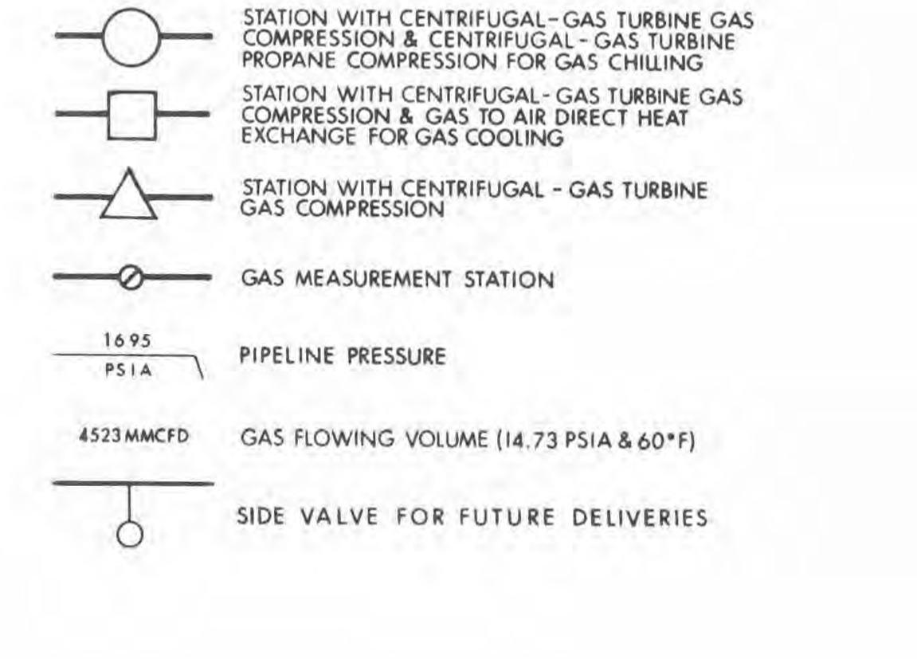
1	STATION NUMBER	E-00	E-01	E-02	E-03	E-04	E-05	TOTALS
2	STATION MILEPOST	69.66	135.79	195.78	260.52	314.71	382.40	
3	STATION ELEVATION (FEET)	2970	2410	2650	2380	3310	2810	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED		1		1		1	3
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)		30,000		30,000		30,000	
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED		30,000		30,000		30,000	90,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED		24,812		29,162		31,340	85,314
8	GAS VOLUME INTO STATION (MMCFD)		2,151.5		2,146.4		2,140.7	
9	STATION FUEL GAS (MMCFD)		5.1		5.7		6.0	16.8
10	GAS VOLUME OUT OF STATION (MMCFD)		2,146.4		2,140.7		2,134.7	
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)		1,301.8		1,253.9		1,228.1	
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)		1,700.9		1,701.2		1,691.9	
13	GAS COMPRESSION RATIO		1.310		1.360		1.380	
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)		35.1		39.6		44.6	
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)		73.5		84.3		92.3	
16	STATION OUTLET GAS TEMPERATURE (°F)		73.4		84.2		92.2	
17	CHILLING/COOLING DUTY (TONS) REQUIRED							
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED							
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)							
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED							
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED							

GAS DELIVERY LINES

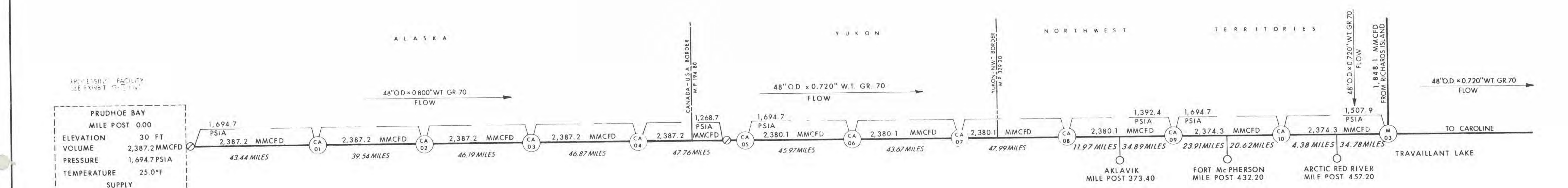
1	STATION NUMBER	M-03	M-04	M-05	M-06	M-07	M-08	M-09	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18	1
2	STATION MILEPOST	126.50	177.10	219.62	262.86	310.00	356.89	400.23	446.37	489.83	534.23	583.14	620.00	670.42	716.39	750.82	807.64	2
3	STATION ELEVATION (FEET)	810	440	530	690	470	310	520	450	700	810	520	1370	930	950	1480	1440	3
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	4
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	27,500	5
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	55,000	6
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	21,639	26,457	24,268	25,423	24,684	25,246	25,392	25,149	25,526	24,910	25,149	24,980	24,009	23,854	23,482	39,420	7
8	GAS VOLUME INTO STATION (MMCFD)	4,525.4	4,517.1	4,509.9	4,503.0	4,496.0	4,489.1	4,482.1	4,475.0	4,468.0	4,461.0	4,454.0	4,447.0	4,440.0	4,433.1	4,428.3	4,423.6	8
9	STATION FUEL GAS (MMCFD)	8.3	7.2	6.9	7.0	6.9	7.0	7.1	7.0	7.0	7.0	7.0	7.0	6.9	4.8	4.7	7.7	9
10	GAS VOLUME OUT OF STATION (MMCFD)	4,517.1	4,509.9	4,503.0	4,496.0	4,489.1	4,482.1	4,475.0	4,468.0	4,461.0	4,454.0	4,447.0	4,440.0	4,433.1	4,428.3	4,423.6	4,415.9	10
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,483.7	1,425.9	1,445.6	1,434.3	1,441.0	1,436.0	1,433.8	1,436.7	1,432.2	1,437.5	1,436.0	1,435.0	1,445.2	1,442.5	1,457.3	1,330.5	11
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,704.0	1,703.8	1,703.8	1,703.7	1,703.7	1,703.7	1,703.7	1,703.7	1,703.6	1,703.6	1,703.6	1,703.5	1,703.5	1,699.2	1,699.4	1,699.7	12
13	GAS COMPRESSION RATIO	1.150	1.190	1.180	1.190	1.180	1.190	1.190	1.190	1.190	1.120	1.190	1.190	1.180	1.180	1.170	1.280	13
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	13.7	2.9	3.4	3.0	3.3	3.5	3.2	3.8	3.3	3.5	4.1	2.8	3.9	3.7	11.7	12.8	14
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	31.0	24.7	23.4	24.0	23.7	24.4	24.3	24.7	24.6	24.3	25.1	23.7	24.0	23.7	31.0	44.7	15
16	STATION OUTLET GAS TEMPERATURE (°F)	14.9	15.0	15.3	14.7	14.6	15.2	14.8	15.4	15.1	14.8	15.7	14.1	14.7	23.6	30.8	44.6	16
17	CHILLING/COOLING DUTY (TONS) REQUIRED	10,814	6,627	5,488	6,328	6,195	6,236	6,413	6,285	6417	6406	6306	6517	6282	0	0	0	17
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	2	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	18
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	0	0	0	19
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED	34,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	0	0	0	20
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	11,188	6,958	6,562	6,679	6,565	6,629	6,753	6,676	6,768	6,748	6,707	6,820	6,642	0	0	0	21

1	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS	1
2	854.79	901.16	941.84	982.14	1020.29	1062.47	1108.23	1148.80	1190.20	1229.68	1263.21	1310.69	1353.10	1391.17	1429.60		2
3	1810	1100	1470	1790	2540	2520	1860	2130	2140	2600	4000	3050	2850	3400	3880		3
4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	47	4
5	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500		5
6	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	1,330,000	6
7	38,335	38,161	37,318	37,926	38,424	36,461	36,180	36,215	36,068	36,457	36,135	33,662	34,559	35,166	34,110	954,765	7
8	4,415.9	4,408.3	4,400.6	4,392.9	4,385.2	4,377.4	4,369.8	4,362.3	4,354.8	4,347.3	4,339.7	4,332.2	4,325.0	4,317.7	4,310.3		8
9	7.6	7.7	7.7	7.7	7.8	7.6	7.5	7.5	7.5	7.6	7.5	7.2	7.3	7.4	7.3	222.4	9
10	4,408.3	4,400.6	4,302.9	4,385.2	4,377.4	4,369.8	4,362.3	4,354.8	4,347.3	4,339.7	4,332.2	4,325.0	4,317.7	4,310.3	4,303.0		10
11	1,361.0	1,385.7	1,394.0	1,388.9	1,383.9	1,399.2	1,402.0	1,398.8	1,400.5	1,396.1	1,396.1	1,418.5	1,410.3	1,403.8	1,411.4		11
12	1,700.0	1,705.8	1,705.8	1,705.7	1,705.7	1,705.6	1,705.6	1,705.5	1,705.5	1,705.5	1,705.4	1,705.4	1,705.4	1,705.3	1,705.3		12
13	1.250	1.230	1.220	1.230	1.230	1.220	1.220	1.220	1.220	1.220	1.220	1.200	1.210	1.210	1.210		13
14	27.3	42.0	44.4	44.0	43.2	44.9	45.9	43.9	44.8	43.9	42.4	46.7	45.5	44.1	44.5		14
15	57.2	70.3	72.4	72.6	72.2	72.4	73.2	71.4	72.2	71.7	70.0	72.3	71.9	71.1	70.7		15
16	57.1	60.7	60.7	60.6	60.6	60.5	60.5	60.4	60.4	60.3	60.3	60.2	60.2	60.1	60.0		16
17	0	5,953	6,950	7,070	6,866	6,985	7,488	6,396	6,897	6,608	5,675	6,987	6,797	6,349	6,133	179,468	17
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	18
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		19
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	238,000	20
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91,695	21

TRAVAILLANT LAKE to CAROLINE
MAINLINE



DESIGNED BY	NORTHERN ENGINEERING SERVICES COMPANY LIMITED	
DRAWN BY	ENGINEERS FOR	
CHECKED BY	ALASKAN ARCTIC GAS PIPELINE COMPANY	
ENGINEERS APPROVAL	FLOW DIAGRAM	SCALE
	MAXIMUM CAPACITY	DATE
PROJECT MANAGER	AVERAGE WINTER CONDITIONS-OPERATING YEAR 4	PROJECT No
		SECTION I-7 REV

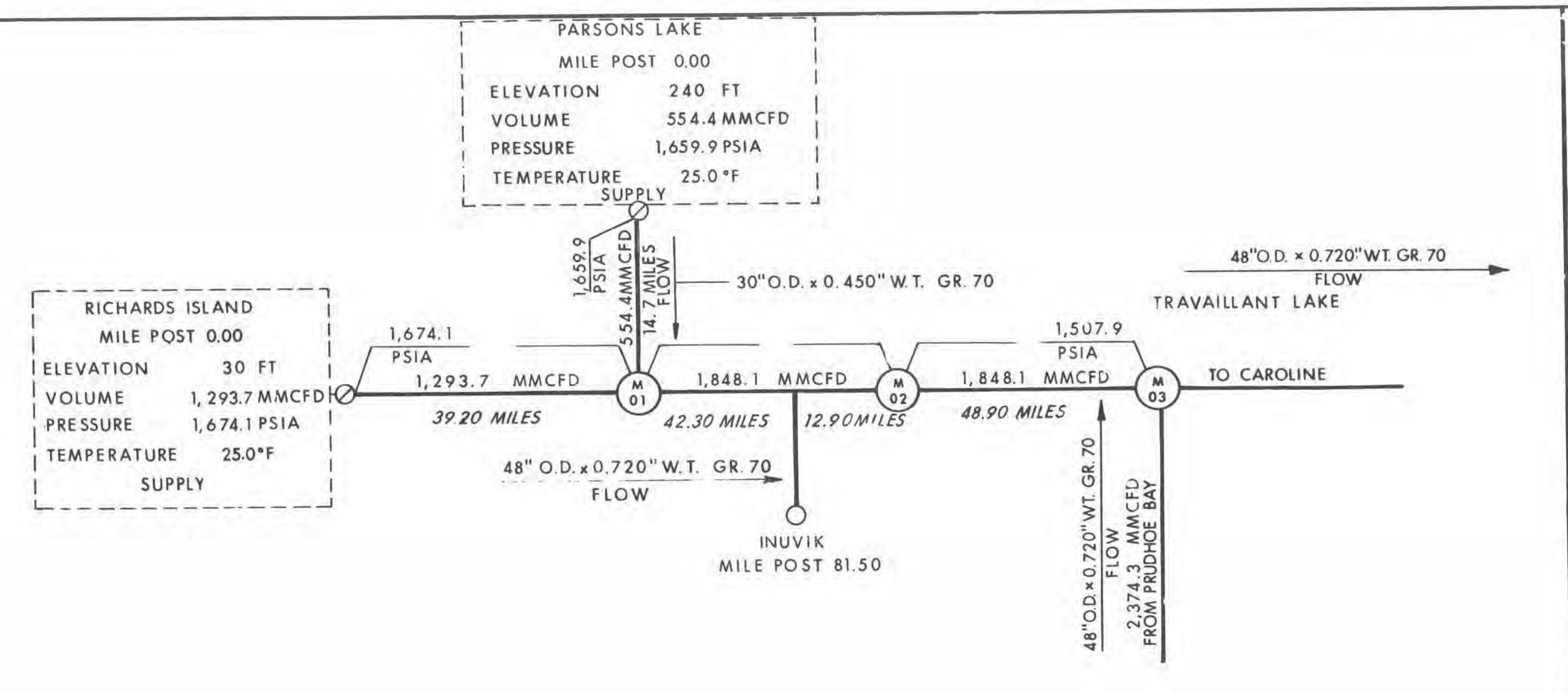


		CA-01	CA-02	CA-03	CA-04	CA-05	CA-06	CA-07	CA-08	CA-09	CA-10	TOTALS	
1	STATION NUMBER	CA-01	CA-02	CA-03	CA-04	CA-05	CA-06	CA-07	CA-08	CA-09	CA-10	TOTALS	1
2	STATION MILEPOST	43.44	82.98	129.17	176.04	223.80	269.77	313.44	361.43	408.29	452.82		2
3	STATION ELEVATION (FEET)	150	690	510	290	250	120	300	60	30	150		3
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED					1				1		2	4
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)					30,000				30,000			5
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED					30,000				30,000		60,000	6
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					24,341				16,168		40,509	7
8	GAS VOLUME INTO STATION (MMCFD)					2,387.2				2,380.1			8
9	STATION FUEL GAS (MMCFD)					7.1				5.8		12.9	9
10	GAS VOLUME OUT OF STATION (MMCFD)					2,380.1				2,374.3			10
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)					1,267.2				1,391.0			11
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)					1,697.5				1,697.4			12
13	GAS COMPRESSION RATIO					1.340				1.220			13
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)					12.0				16.7			14
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)					49.8				41.9			15
16	STATION OUTLET GAS TEMPERATURE (°F)					25.0				25.0			16
17	CHILLING / COOLING DUTY (TONS) REQUIRED					9,298				6,375		15,673	17
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED					1				1		2	18
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)					17,000				17,000			19
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED					17,000				17,000		34,000	20
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					10,005				7,994		17,999	21

PRUDHOE BAY to TRAVAILLANT LAKE

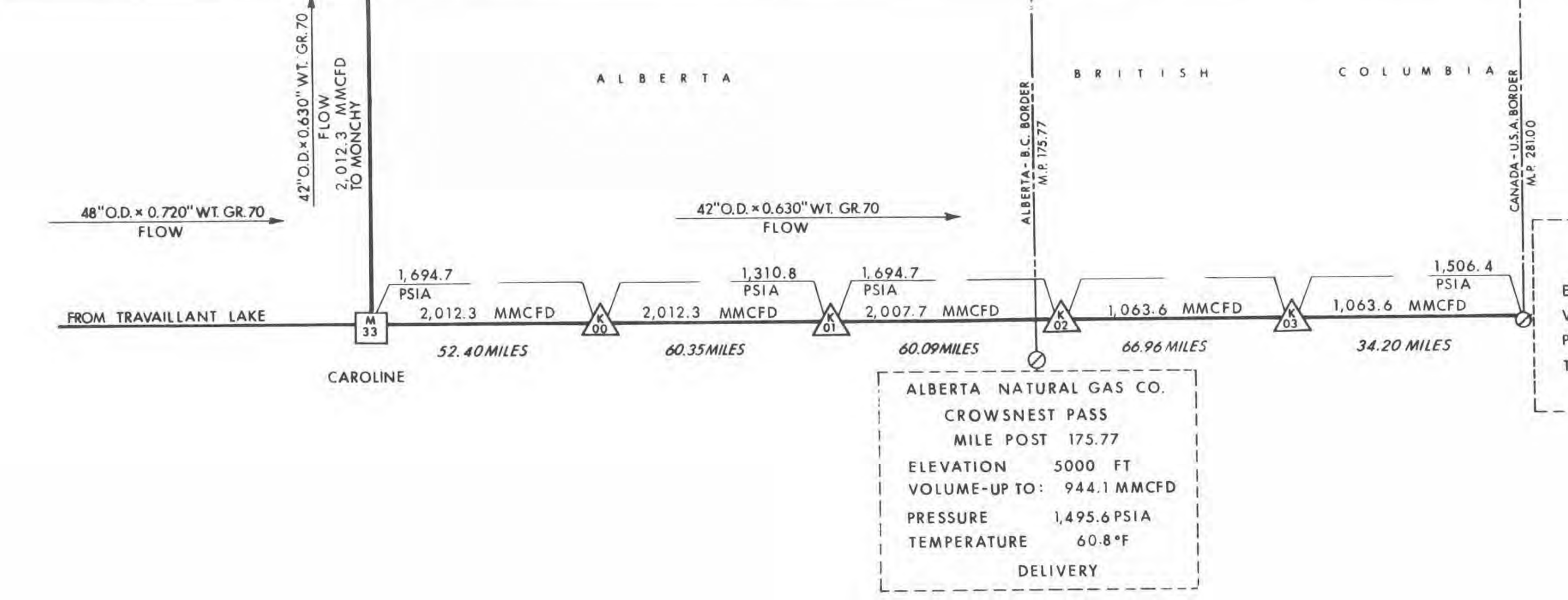
(COASTAL ROUTE)

GAS SUPPLY LINES



RICHARDS ISLAND to TRAVAILLANT LAKE

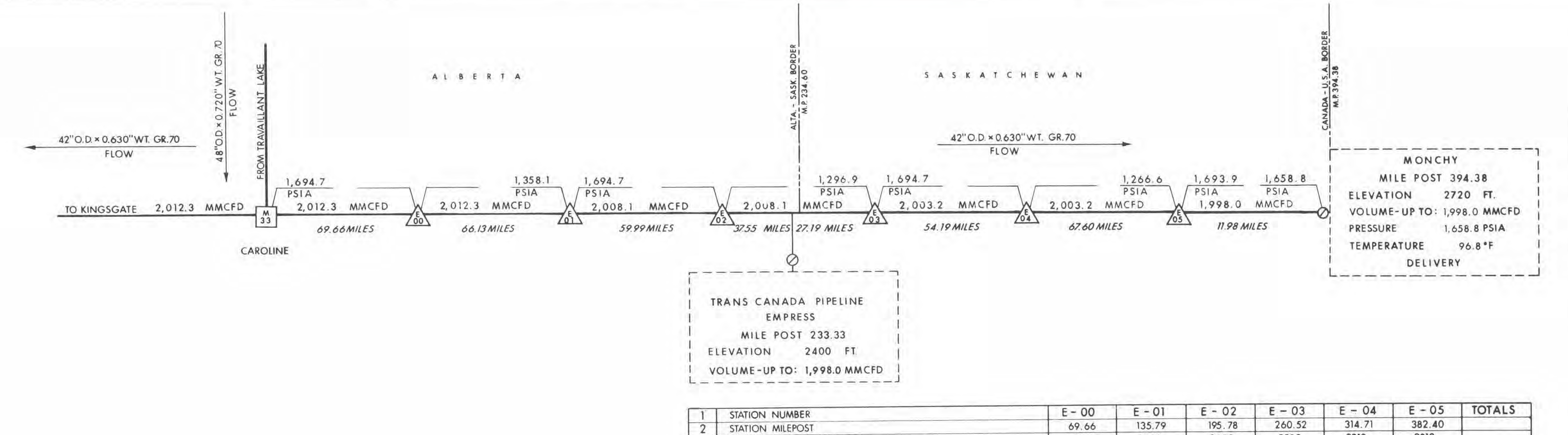
		M-01	M-02	TOTALS
1	STATION NUMBER	M-01	M-02	TOTALS
2	STATION MILEPOST	39.20	94.40	
3	STATION ELEVATION (FEET)	470	320	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED			
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED			
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			
8	GAS VOLUME INTO STATION (MMCFD)			
9	STATION FUEL GAS (MMCFD)			
10	GAS VOLUME OUT OF STATION (MMCFD)			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)			
13	GAS COMPRESSION RATIO			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)			
16	STATION OUTLET GAS TEMPERATURE (°F)			
17	CHILLING/COOLING DUTY (TONS) REQUIRED			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			



		K-00	K-01	K-02	K-03	TOTALS
1	STATION NUMBER	K-00	K-01	K-02	K-03	TOTALS
2	STATION MILEPOST	59.40	119.75	179.84	246.80	
3	STATION ELEVATION (FEET)	4170	4400	4930	4230	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED		1			1
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)		30,000			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED		30,000			30,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED		22,355			22,355
8	GAS VOLUME INTO STATION (MMCFD)		2,012.3			
9	STATION FUEL GAS (MMCFD)		4.6			4.6
10	GAS VOLUME OUT OF STATION (MMCFD)		2,007.7			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)		1,308.0			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)		1,700.4			
13	GAS COMPRESSION RATIO		1.300			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)		40.6			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)		77.5			
16	STATION OUTLET GAS TEMPERATURE (°F)		77.5			
17	CHILLING/COOLING DUTY (TONS) REQUIRED		0			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED		0			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)		0			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED		0			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED		0			

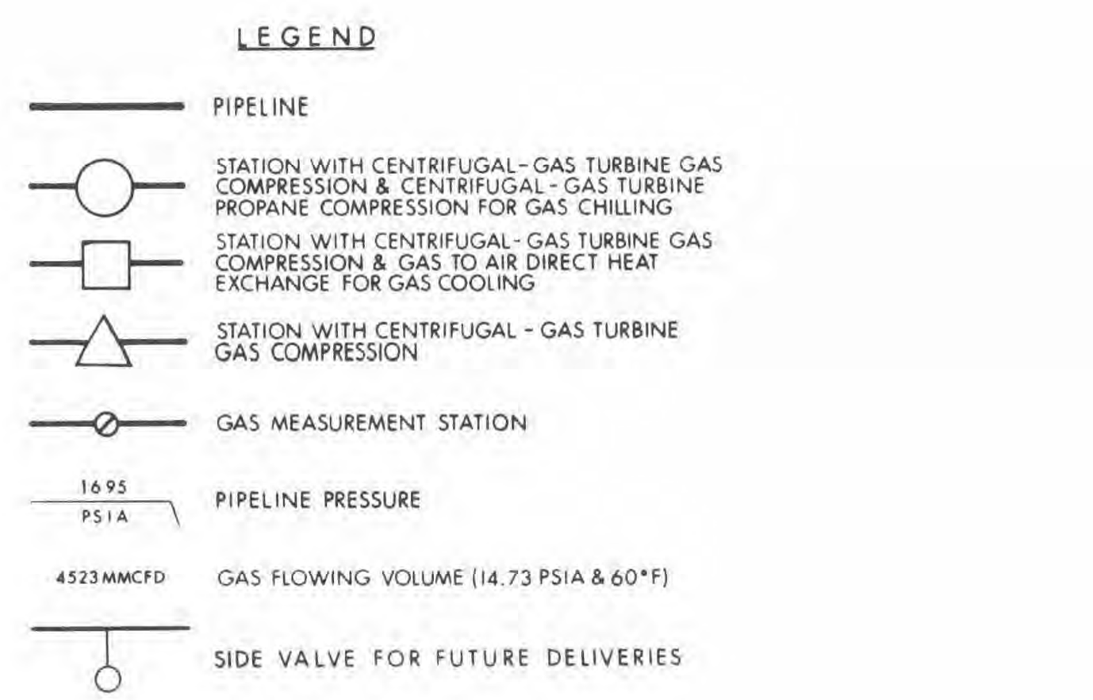
CAROLINE to KINGSGATE

GAS DELIVERY LINES



		E-00	E-01	E-02	E-03	E-04	E-05	TOTALS
1	STATION NUMBER	E-00	E-01	E-02	E-03	E-04	E-05	TOTALS
2	STATION MILEPOST	69.66	135.79	195.78	260.52	314.71	382.40	
3	STATION ELEVATION (FEET)	2970	2410	2650	2380	3310	2810	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED		1		1		1	3
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)		30,000		30,000		30,000	
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED		30,000		30,000		30,000	90,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED		19,523		24,495		27,345	71,363
8	GAS VOLUME INTO STATION (MMCFD)		2,012.3		2,008.1		2,003.2	
9	STATION FUEL GAS (MMCFD)		4.2		4.9		5.2	14.3
10	GAS VOLUME OUT OF STATION (MMCFD)		2,008.1		2,003.2		1,998.0	
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)		1,355.4		1,293.9		1,263.5	
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)		1,700.4		1,700.6		1,700.0	
13	GAS COMPRESSION RATIO		1.250		1.310		1.350	
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)		45.9		51.9		57.7	
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)		77.9		91.4		101.0	
16	STATION OUTLET GAS TEMPERATURE (°F)		77.9		91.3		100.9	
17	CHILLING/COOLING DUTY (TONS) REQUIRED							
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED							
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)							
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED							
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED							

CAROLINE to MONCHY



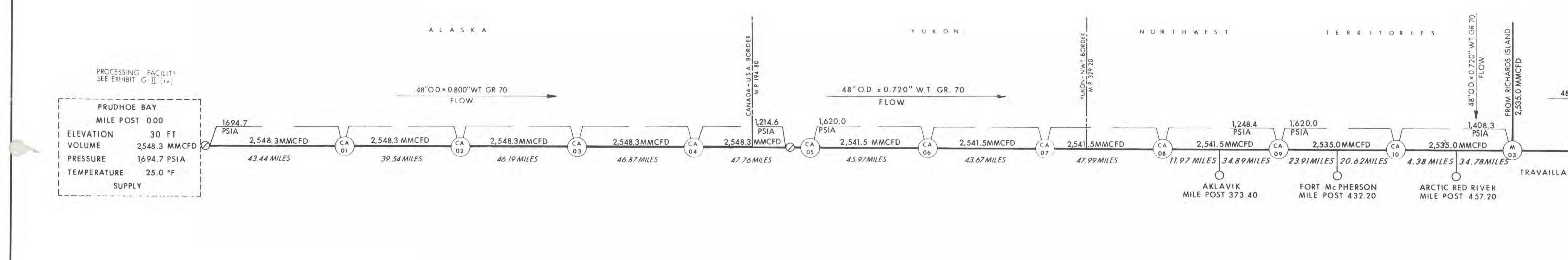
		M-03	M-04	M-05	M-06	M-07	M-08	M-09	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18
1	STATION NUMBER	M-03	M-04	M-05	M-06	M-07	M-08	M-09	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18
2	STATION MILEPOST	126.50	177.10	219.62	262.86	310.00	356.89	400.23	446.37	489.83	534.23	583.14	620.00	670.42	716.39	750.82	807.64
3	STATION ELEVATION (FEET)	810	440	530	690	470	310	520	450	700	810	520	1370	930	950	1480	1440
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	27,500
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	55,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	18,459	20,346	19,021	19,917	18,949	19,538	19,971	19,572	20,204	19,470	19,329	20,209	18,166	18,528	18,858	30,219
8	GAS VOLUME INTO STATION (MMCFD)	4,222.4	4,214.0	4,207.6	4,201.5	4,195.7	4,189.0	4,182.8	4,176.5	4,170.2	4,163.8	4,157.6	4,151.3	4,144.9	4,138.8	4,134.7	4,130.6
9	STATION FUEL GAS (MMCFD)	8.4	6.4	6.1	6.3	6.2	6.2	6.3	6.3	6.4	6.2	6.3	6.4	6.1	4.1	4.1	6.6
10	GAS VOLUME OUT OF STATION (MMCFD)	4,214.0	4,207.6	4,201.5	4,195.2	4,189.0	4,182.8	4,176.5	4,170.2	4,163.8	4,157.6	4,151.3	4,144.9	4,138.8	4,134.7	4,130.6	4,124.0
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,503.8	1,469.1	1,481.4	1,471.4	1,481.3	1,476.0	1,470.2	1,475.5	1,467.9	1,474.6	1,477.4	1,464.6	1,487.8	1,480.3	1,486.3	1,386.4
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,702.8	1,702.5	1,702.5	1,702.4	1,702.4	1,702.4	1,702.4	1,702.4	1,702.4	1,702.3	1,702.3	1,702.2	1,702.2	1,689.5	1,689.7	1,699.0
13	GAS COMPRESSION RATIO	1.130	1.160	1.150	1.160	1.150	1.150	1.160	1.150	1.160	1.150	1.150	1.160	1.140	1.150	1.140	1.230
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	19.2	4.6	4.2	3.7	4.1	4.7	3.9	5.1	4.4	4.2	5.4	2.8	4.8	4.4	11.7	14.3
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	34.9	22.6	21.1	21.4	20.9	22.1	21.7	22.5	22.4	21.6	22.6	21.0	21.1	21.1	28.3	40.6
16	STATION OUTLET GAS TEMPERATURE (°F)	12.9	12.6	12.7	12.0	12.2	12.6	12.2	13.0	12.4	12.1	12.8	11.1	11.9	21.0	28.2	40.5
17	CHILLING/COOLING DUTY (TONS) REQUIRED	13,026	6,453	5,375	6,047	5,625	6,071	6,109	6,074	6,395	6,074	6,277	6,337	5,855	0	0	0
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	2	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	0	0	0
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED	34,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	0	0	0
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	14,288	6,768	6,314	6,382	6,257	6,456	6,494	6,465	6,853	6,466	6,691	6,807	6,332	0	0	0

	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS	
1	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS	1
2	854.79	901.16	941.84	982.14	1020.29	1062.47	1108.23	1148.80	1190.20	1229.68	1263.21	1310.69	1353.10	1391.17	1429.60		2
3	1810	1100	1470	1790	2540	2520	1860	2130	2140	2600	4000	3050	2850	3400	3880		3
4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	47	4
5	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500		5
6	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	1,330,000	6
7	29,288	27,916	29,979	30,853	31,557	29,217	28,640	30,209	29,766	30,605	30,643	26,297	28,066	29,565	28,560	761,917	7
8	4,124.0	4,117.5	4,111.2	4,104.5	4,097.7	4,090.8	4,084.1	4,077.7	4,070.9	4,064.2	4,057.3	4,050.5	4,044.3	4,037.8	4,031.2		8
9	6.5	6.3	6.7	6.8	6.9	6.7	6.4	6.8	6.7	6.9	6.8	6.2	6.5	6.6	6.6	197.8	9
10	4,117.5	4,111.2	4,104.5	4,097.7	4,090.8	4,084.1	4,077.7	4,070.9	4,064.2	4,057.3	4,050.5	4,044.3	4,037.8	4,031.2	4,024.6		10
11	1,411.0	1,441.5	1,433.3	1,426.9	1,419.8	1,439.0	1,445.1	1,432.7	1,436.2	1,428.9	1,424.7	1,461.9	1,447.4	1,435.2	1,442.6		11
12	1,699.2	1,704.2	1,704.4	1,704.3	1,704.3	1,704.3	1,704.3	1,704.3	1,704.3	1,704.2	1,704.1	1,704.1	1,704.1	1,704.1	1,704.0		12
13	1.200	1.180	1.190	1.190	1.200	1.180	1.180	1.190	1.190	1.190	1.200	1.170	1.180	1.190	1.180		13
14	26.3	39.4	47.1	47.8	46.7	48.0	49.9	50.1	50.6	56.2	47.0	50.1	50.1	50.0	50.0		14
15	51.0	62.2	71.2	72.5	72.1	71.5	72.9	74.4	74.5	74.8	71.9	71.4	72.8	74.0	73.2		15
16	50.9	60.7	61.7	61.3	60.6	61.1	63.6	63.2	64.0	62.6	60.3	61.7	63.5	63.1	62.1		16
17	0	624	5,007	5,952	6,109	5,548	4,865	5,859	5,500	6,425	6,148	5,071	4,819	5,684	5,764	159,093	17
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	18
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		19
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	238,000	20
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92,573	21

TRAVAILLANT LAKE to CAROLINE

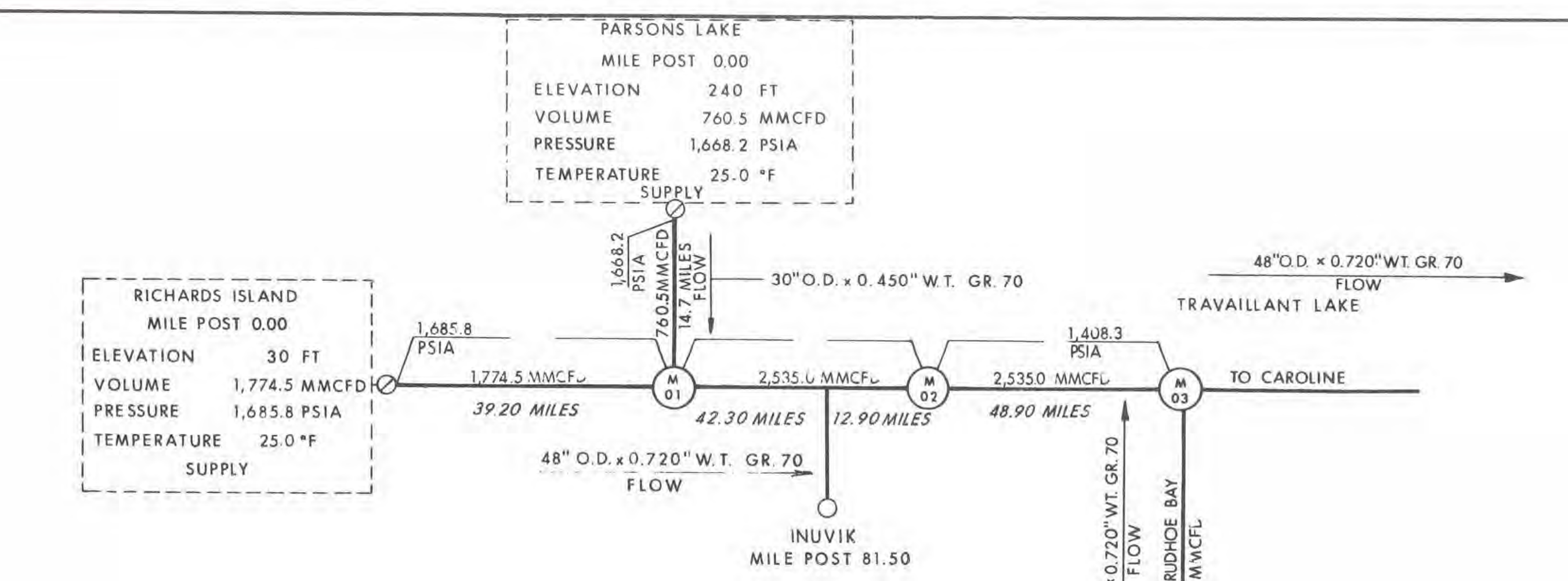
MAINLINE

DESIGNED BY	NORTHERN ENGINEERING SERVICES COMPANY LIMITED ENGINEERS FOR ALASKAN ARCTIC GAS PIPELINE COMPANY	
DRAWN BY		
CHECKED BY	FLOW DIAGRAM	SCALE
ENGINEERS APPROVAL	MAXIMUM CAPACITY	DATE PROJECT No
PROJECT MANAGER	AVERAGE SUMMER CONDITIONS - OPERATING YEAR 4	SECTION I-8 / REV



1	STATION NUMBER	CA-01	CA-02	CA-03	CA-04	CA-05	CA-06	CA-07	CA-08	CA-09	CA-10	TOTALS	1
2	STATION MILEPOST	43.44	82.98	129.17	176.04	223.80	269.77	313.44	[illegible] 43	408.29	452.82		2
3	STATION ELEVATION (FEET)	150	690	510	290	250	120	300	0	30	150		3
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED					1				1		2	4
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (I SO HORSEPOWER)					30,000				30,000			5
6	TOTAL GAS COMPRESSOR HORSEPOWER (I SO) PROPOSED					30,000				30,000		60,000	6
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					24,880				22,602		47,482	7
8	GAS VOLUME INTO STATION (MMCFD)					2,548.3				2,541.5			8
9	STATION FUEL GAS (MMCFD)					6.8				6.5		13.3	9
10	GAS VOLUME OUT OF STATION (MMCFD)					2,541.5				2,535.0			10
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)					1,212.9				1,246.7			11
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)					1,623.3				1,623.3			12
13	GAS COMPRESSION RATIO					1·340				1·300			13
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)					3·6				6·9			14
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)					41.1				40.8			15
16	STATION OUTLET GAS TEMPERATURE (°F)					25.0				25.0			16
17	CHILLING / COOLING DUTY (TONS) REQUIRED					6,451				6,314		12,765	17
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED					1				1		2	18
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (I SO HORSEPOWER)					17,000				17,000			19
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (I SO) PROPOSED					17,000				17,000		34,000	20
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED					7,943				7,966		15,909	21

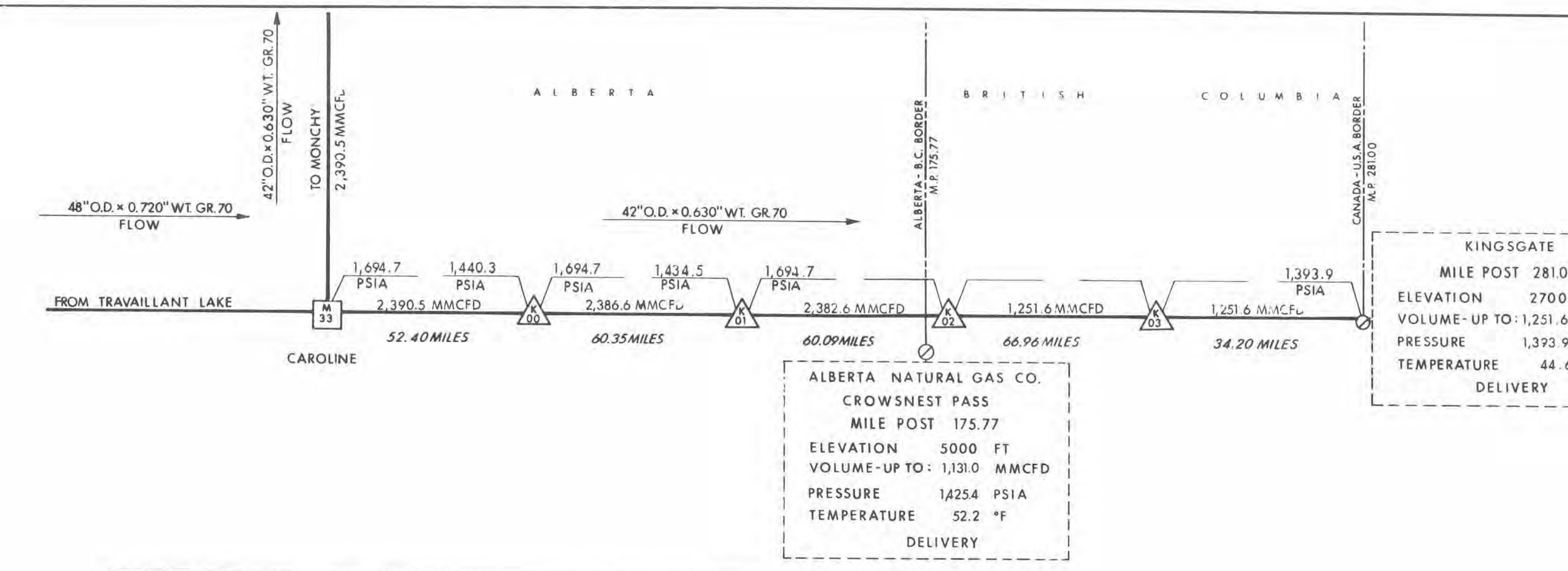
PRUDHOE BAY to TRAVAILLANT LAKE
(COASTAL ROUTE)



RICHARDS ISLAND to TRAVAILLANT LAKE

1	STATION NUMBER	M-01	M-02	TOTALS
2	STATION MILEPOST	39.20	94.40	
3	STATION ELEVATION (FEET)	470	320	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED			
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED			
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			
8	GAS VOLUME INTO STATION (MMCFD)			
9	STATION FUEL GAS (MMCFD)			
10	GAS VOLUME OUT OF STATION (MMCFD)			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)			
13	GAS COMPRESSION RATIO			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)			
16	STATION OUTLET GAS TEMPERATURE (°F)			
17	CHILLING/COOLING DUTY (TONS) REQUIRED			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED			

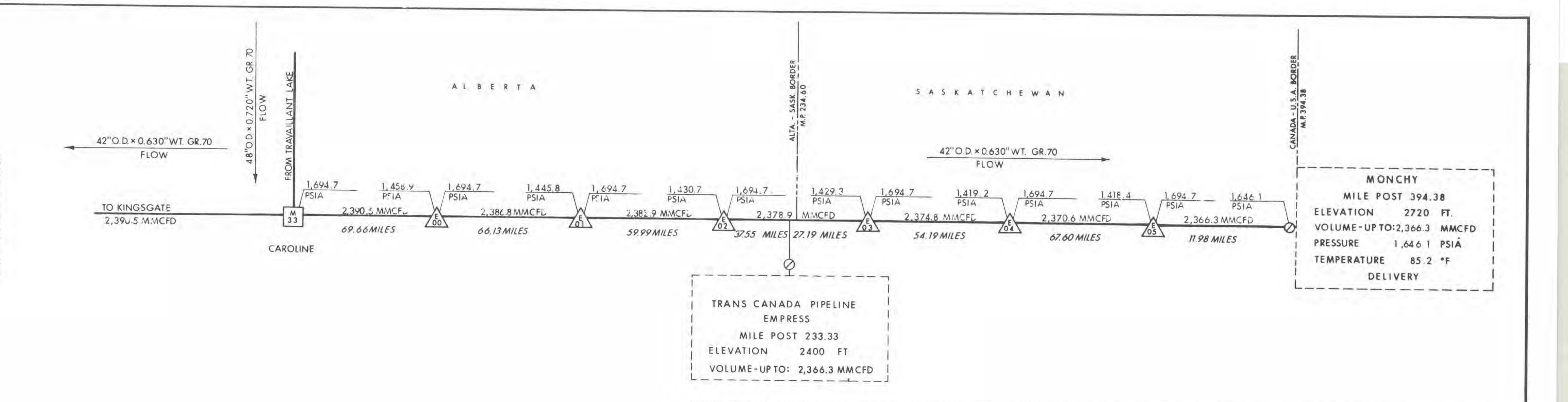
GAS SUPPLY LINES



1	STATION NUMBER	K-00	K-01	K-02	K-03	TOTALS
2	STATION MILEPOST	59.40	119.75	179.84	246.80	
3	STATION ELEVATION (FEET)	4170	4400	4930	4230	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED	1	1			2
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	30,000	30,000			
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED	30,000	30,000			60,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	16,772	17,609			34,381
8	GAS VOLUME INTO STATION (MMCFD)	2,390.5	2,386.6			
9	STATION FUEL GAS (MMCFD)	3.9	4.0			7.9
10	GAS VOLUME OUT OF STATION (MMCFD)	2,386.6	2,382.6			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,436.7	1,430.8			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,702.3	1,702.5			
13	GAS COMPRESSION RATIO	1·180	1·190			
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	43.5	48.7			
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	66.9	73.0			
16	STATION OUTLET GAS TEMPERATURE (°F)	66.8	72.9			
17	CHILLING/COOLING DUTY (TONS) REQUIRED	0	0			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	0	0			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	0	0			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED	0	0			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	0	0			

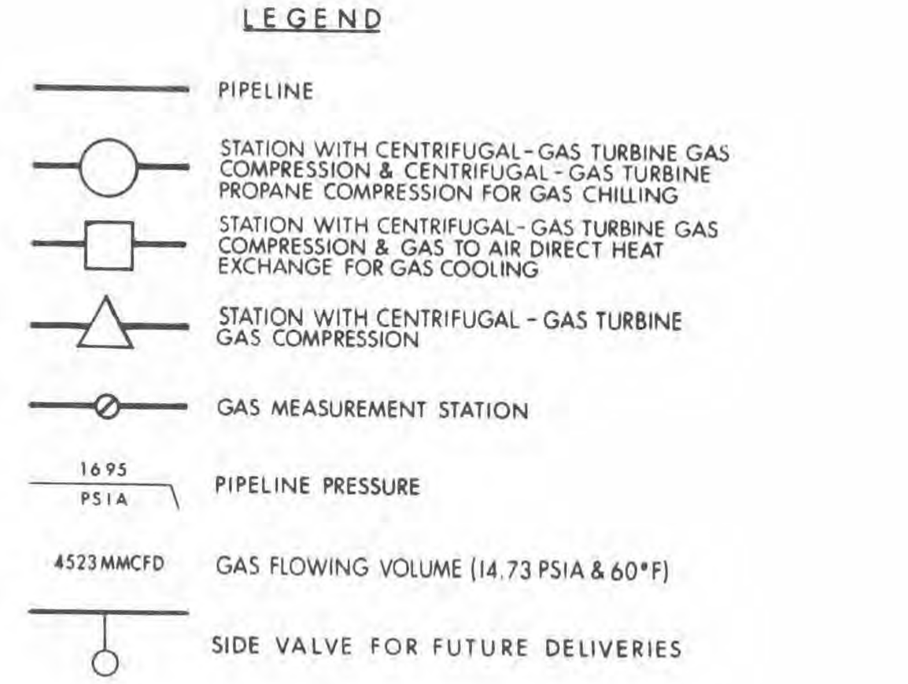
CAROLINE to KINGSGATE

GAS DELIVERY LINES



1	STATION NUMBER	E-00	E-01	E-02	E-03	E-04	E-05	TOTALS
2	STATION MILEPOST	69.66	135.79	195.78	260.52	314.71	382.40	
3	STATION ELEVATION (FEET)	2970	2410	2650	2380	3310	2810	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED	1	1	1	1	1	1	6
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	30,000	30,000	30,000	30,000	30,000	30,000	
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED	30,000	30,000	30,000	30,000	30,000	30,000	180,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	15,498	16,794	18,134	18,611	19,555	19,912	108,504
8	GAS VOLUME INTO STATION (MMCFD)	2,390.5	2,386.8	2,382.9	2,378.9	2,374.8	2,370.6	
9	STATION FUEL GAS (MMCFD)	3.7	3.9	4.0	4.1	4.2	4.3	24.2
10	GAS VOLUME OUT OF STATION (MMCFD)	2,386.8	2,382.9	2,378.9	2,374.8	2,370.6	2,366.3	
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,455.3	1,442.2	1,427.0	1,425.5	1,415.3	1,414.5	
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,702.3	1,702.5	1,702.6	1,702.8	1,702.8	1,702.9	
13	GAS COMPRESSION RATIO	1·170	1·180	1·190	1·190	1·200	1·200	
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	44.6	49.2	51.9	56.8	59.0	63.0	
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	66.2	72.3	76.8	82.1	85.4	89.8	
16	STATION OUTLET GAS TEMPERATURE (°F)	66.1	72.2	76.7	82.0	85.4	89.7	
17	CHILLING/COOLING DUTY (TONS) REQUIRED	0	0	0	0	0	0	
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	0	0	C	0	0	0	
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	0	0	0	0	0	0	
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED	0	0	0	0	0	0	
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	0	0	0	0	0	0	

CAROLINE to MONCHY



1	STATION NUMBER	M-03	M-04	M-05	M-06	M-07	M-08	M-09	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18
2	STATION MILEPOST	126.50	177.10	219.62	262.86	310.00	356.89	400.23	446.37	489.83	534.23	583.14	620.00	670.42	716.39	750.82	807.64
3	STATION ELEVATION (FEET)	810	440	530	690	470	310	520	450	700	810	520	1370	930	950	1480	1440
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	27,500
6	TOTAL GAS COMPRESSOR HORSEPOWER (ISO) PROPOSED	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	55,000
7	TOTAL GAS COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	35,193	37,807	37,543	37,305	37,520	37,418	36,931	36,781	36,582	35,954	36,739	35,136	35,778	34,619	33,567	62,643
8	GAS VOLUME INTO STATION (MMCFD)	5,070.0	5,058.7	5,049.7	5,040.7	5,031.7	5,022.6	5,013.6	5,004.7	4,995.8	4,987.0	4,978.2	4,969.4	4,960.7	4,951.9	4,945.8	4,939.8
9	STATION FUEL GAS (MMCFD)	11.3	9.0	9.0	9.0	9.1	9.0	8.9	8.9	8.8	8.8	8.8	8.7	8.8	6.1	6.0	10.6
10	GAS VOLUME OUT OF STATION (MMCFD)	5,058.7	5,049.7	5,040.7	5,031.7	5,022.6	5,013.6	5,004.7	4,995.8	4,987.0	4,978.2	4,969.4	4,960.7	4,951.9	4,945.8	4,939.8	4,929.2
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,402.2	1,343.8	1,355.2	1,356.0	1,357.5	1,358.4	1,363.5	1,365.0	1,365.5	1,369.9	1,360.3	1,374.9	1,369.7	1,374.3	1,400.7	1,212.4
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,706.6	1,687.5	1,698.6	1,698.7	1,703.4	1,703.5	1,706.0	1,706.0	1,705.9	1,705.9	1,701.1	1,705.7	1,705.6	1,700.4	1,700.7	1,701.3
13	GAS COMPRESSION RATIO	1·220	1·260	1·250	1·250	1·250	1.250	1·250	1·250	1·250	1·250	1·250	1·240	1·250	1·240	1·210	1·400
14	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	11.1	-1.9	-1.0	-1.3	-1.3	-.9	-.9	-.4	-.6	-.4	-.3	-.5	-.5	-.3	10.6	9.6
15	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	36.1	26.2	26.9	26.5	26.7	27.0	26.8	27.2	26.9	26.6	27.3	26.0	26.6	25.9	35.2	54.7
16	STATION OUTLET GAS TEMPERATURE (°F)	14.9	15.0	15.3	14.7	14.6	15.2	14.8	15.4	15.1	14.8	15.7	14.1	14.7	25.7	35.0	54.6
17	CHILLING/COOLING DUTY (TONS) REQUIRED	17,087	8,515	8,771	8,967	9,200	8,909	9,034	8,841	8,837	8,837	8,678	8,932	8,879			
18	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	2	1	1	1	1	1	1	1	1	1	1	1	1			
19	SIZE OF PROPANE COMPRESSOR UNITS PROPOSED (ISO HORSEPOWER)	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER (ISO) PROPOSED	34,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER (ACTUAL) REQUIRED	20,118	8,771	9,029	9,198	9,817	9,155	9,312	9,101	9,083	9,069	8,962	9,240	9,104			

	M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS	
2	854.79	901.16	941.84	982.14	1020.29	1062.47	1108.23	1148.80	1190.20	1229.68	1263.21	1310.69	1353.10	1391.17	1429.60		2
3	1810	1100	1470	1790	2540	2520	1860	2130	2140	2600	4000	3050	2850	3400	3880		3
4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	47	4
5	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500	27,500		5
6	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	1,330,000	6
7	62,523	63,874	62,733	58,323	54,562	53,309	54,444	52,175	52,539	51,983	49,363	50,967	50,522	49,665	48,184	1,422,682	7
8	4,929.2	4,918.6	4,907.2	4,896.2	4,885.8	4,875.9	4,866.1	4,856.2	4,846.6	4,837.0	4,827.4	4,818.2	4,808.7	4,799.3	4,790.1		8
9	10.6	11.4	11.0	10.4	9.9	9.8	9.9	9.6	9.6	9.6	9.2	9.5	9.4	9.2	9.1	289.0	9
10	4,918.6	4,907.2	4,896.2	4,885.8	4,875.9	4,866.1	4,856.2	4,846.6	4,837.0	4,827.4	4,818.2	4,808.7	4,799.3	4,790.1	4,781.0		10
11	1,248.6	1,247.3	1,255.2	1,290.0	1,310.3	1,319.0	1,312.7	1,323.3	1,321.5	1,323.2	1,337.0	1,331.0	1,332.0	1,335.2	1,344.2		11
12	1,698.1	1,664.9	1,693.6	1,708.6	1,708.4	1,708.4	1,708.4	1,708.2	1,708.2	1,708.1	1,708.0	1,708.1	1,708.0	1,707.9	1,707.8		12
13	1·360	1·330	1·350	1·320	1·300	1·300	1·300	1·290	1 290	1·290	1.280	1·280	1·280	1·280	1·270		13
14	31.1	51.6	39.1	39.7	39.5	40.9	41.5	40.2	40.9	40.3	39.4	42.4	41.7	40.7	41.2		14
15	73.7	93.3	81.3	79.0	76.5	77.0	78.4	75.8	76.8	75.8	73.4	77.3	76.4	75.0	74.5		15
16	73.5	60.7	60.7	60.6	60.6	60.5	60.5	60.4	60.4	60.3	60.3	60.2	60.2	60.1	60.0		16
17		20,818	13,403	12,001	10,372	10,726	11,610	9,926	10,540	9,985	8,451	10,925	10,341	9,488	9,188	281,262	17
18																14	18
19																	19
20																238,000	20
21																129,959	21

TRAVAILLANT LAKE to CAROLINE

MAINLINE

DESIGNED BY	NORTHERN ENGINEERING SERVICES COMPANY LIMITED ENGINEERS FOR ALASKAN ARCTIC GAS PIPELINE COMPANY	
DRAWN BY	FLOW DIAGRAM	SCALE
CHECKED BY	MAXIMUM CAPACITY	DATE
ENGINEERS APPROVAL	AVERAGE WINTER CONDITIONS - OPERATING YEAR 5	PROJECT No
PROJECT MANAGER		SECTION I-9 REV

		CA-01	CA-02	CA-03	CA-04	CA-05	CA-06	CA-07	CA-08	CA-09	CA-10	TOTALS	
1	STATION NUMBER	4344	4516	4688	4860	5032	5204	5376	5548	5720	5892		1
2	STATION MILEPOST	150	490	830	1240	1650	1930	2090	2250	2410	2570		2
3	STATION ELEVATION(FEET)					2100	1200	300	60	1	100		3
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED					1				1		2	4
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED(HORSEPOWER)					30,000				30,000			5
6	TOTAL GAS COMPRESSOR HORSEPOWER(ISO HORSEPOWER)					30,000				30,000		60,000	6
7	TOTAL GAS COMPRESSOR HORSEPOWER(ACTUAL REQUIRED)					29,486				29,486		58,972	7
8	GAS VOLUME INTO STATION(MMCFD)					2,439.0				2,424.3			8
9	STATION FUEL GAS (MMCFD)					73.0				73.0		73.0	9
10	GAS VOLUME OUT OF STATION(MMCFD)					2,439.0				2,424.3			10
11	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)					1,568.2				1,568.2			11
12	GAS COMPRESSOR SUCTION PRESSURE (PSIA)					1,496.2				1,496.2			12
13	GAS COMPRESSOR SUCTION TEMPERATURE (°F)					1.4				1.4			13
14	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)					14.5				14.5			14
15	STATION OUTLET GAS TEMPERATURE (°F)					45.9				44.8			15
16	CHILLING/COOLING DUTY(TONS) REQUIRED					17,000				17,000		34,000	16
17	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED					1				1		2	17
18	NUMBER OF PROPANE COMPRESSOR UNITS REQUIRED					1				1		2	18
19	SIZE OF PROPANE COMPRESSOR HORSEPOWER(ISO HORSEPOWER)					17,000				17,000		34,000	19
20	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL REQUIRED)					16,808				16,808		33,616	20
21	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL)REQUIRED					8,198				8,198		16,808	21

		M-01	M-02	TOTALS
1	STATION NUMBER			
2	STATION MILEPOST	39.10	98.40	
3	STATION ELEVATION(FEET)	470	330	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED			
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)			
6	TOTAL GAS COMPRESSOR HORSEPOWER(ISO HORSEPOWER)			
7	TOTAL GAS COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED			
8	GAS VOLUME INTO STATION(MMCFD)			
9	STATION FUEL GAS (MMCFD)			
10	GAS VOLUME OUT OF STATION(MMCFD)			
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)			
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)			
13	GAS COMPRESSOR SUCTION TEMPERATURE (°F)			
14	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)			
15	STATION OUTLET GAS TEMPERATURE (°F)			
16	CHILLING/COOLING DUTY(TONS) REQUIRED			
17	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED			
18	NUMBER OF PROPANE COMPRESSOR UNITS REQUIRED			
19	SIZE OF PROPANE COMPRESSOR HORSEPOWER(ISO HORSEPOWER)			
20	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL)REQUIRED			
21	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED			

		K-01	K-02	K-03	TOTALS
1	STATION NUMBER	5564	5736	5908	
2	STATION MILEPOST	394.40	449.80	497.20	
3	STATION ELEVATION(FEET)	4170	4600	4230	
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED				
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)				
6	TOTAL GAS COMPRESSOR HORSEPOWER(ISO HORSEPOWER)	30.0ch	30.0ch		60,000
7	TOTAL GAS COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED	30.0ch	30.0ch		60,000
8	GAS VOLUME INTO STATION(MMCFD)	2,398.7	2,388.6		37.813
9	STATION FUEL GAS (MMCFD)	73.0	73.0		73
10	GAS VOLUME OUT OF STATION (MMCFD)	2,398.7	2,388.6		
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,451.1	1,446.1		
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,767.0	1,767.0		
13	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	11%	11%		
14	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	57.1	57.1		
15	STATION OUTLET GAS TEMPERATURE (°F)	73.1	84.4		
16	CHILLING/COOLING DUTY(TONS) REQUIRED	80.4	80.4		
17	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	–	–		
18	NUMBER OF PROPANE COMPRESSOR UNITS REQUIRED	–	–		
19	SIZE OF PROPANE COMPRESSOR HORSEPOWER(ISO HORSEPOWER)	–	–		
20	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL)REQUIRED	–	–		
21	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED	–	–		

		E-01	E-02	E-03	E-04	E-05	TOTALS
1	STATION NUMBER	6948	7120	7292	7464	7636	
2	STATION MILEPOST	69.86	130.78	188.78	250.52	314.71	382.40
3	STATION ELEVATION(FEET)	3970	3410	3030	3280	3080	3410
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED	1	1	1	1	1	5
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)	30,000	30,000	30,000	30,000	30,000	30,000
6	TOTAL GAS COMPRESSOR HORSEPOWER(ISO HORSEPOWER)	30,000	30,000	30,000	30,000	30,000	150,000
7	TOTAL GAS COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED	29,589	29,589	29,589	29,589	29,589	147,944
8	GAS VOLUME INTO STATION(MMCFD)	2,280.2	2,280.2	2,280.2	2,277.3	2,277.3	2,280.2
9	STATION FUEL GAS (MMCFD)	9.3	11.8	9.5	9.7	9.7	22.8
10	GAS VOLUME OUT OF STATION (MMCFD)	2,280.2	2,268.4	2,270.7	2,267.6	2,267.6	
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,471.3	1,424.0	1,439.9	1,426.6	1,426.2	1,434.2
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,901.9	1,901.9	1,912.3	1,912.3	1,912.3	1,901.9
13	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	19°C	19°C	19°C	19°C	19°C	19°C
14	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	53.2	51.6	52.6	52.6	52.6	52.6
15	STATION OUTLET GAS TEMPERATURE (°F)	73.2	81.5	80.6	80.5	80.3	104.2
16	CHILLING/COOLING DUTY(TONS) REQUIRED	73.2	81.5	80.6	80.5	80.3	104.2
17	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	0	0	0	0	0	0
18	NUMBER OF PROPANE COMPRESSOR UNITS REQUIRED	0	0	0	0	0	0
19	SIZE OF PROPANE COMPRESSOR HORSEPOWER(ISO HORSEPOWER)	0	0	0	0	0	0
20	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL)REQUIRED	0	0	0	0	0	0
21	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED	0	0	0	0	0	0

		M-03	M-04	M-05	M-06	M-07	M-08	M-09	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18	TOTALS
1	STATION NUMBER	104.50	107.92	279.62	352.86	390.48	426.59	490.51	546.10	599.65	654.73	583.94	620.00	670.62	734.59	750.83	807.64	
2	STATION ELEVATION(FEET)	870	440	550	690	470	310	590	450	906	590	510	1,000	970	950	1,600	1,640	
3	NUMBER OF GAS COMPRESSOR UNITS PROPOSED																	
4	SIZE OF GAS COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	
5	TOTAL GAS COMPRESSOR HORSEPOWER(ISO HORSEPOWER)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	540,000
6	TOTAL GAS COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED	26,952	27,582	27,582	27,582	27,582	27,582	27,582	27,582	27,582	27,582	27,582	27,582	27,582	27,582	27,582	27,582	496,476
7	GAS VOLUME INTO STATION(MMCFD)	2,439.0	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	
8	STATION FUEL GAS (MMCFD)	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	
9	GAS VOLUME OUT OF STATION (MMCFD)	2,439.0	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	
10	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,427.3	1,393.7	1,362.8	1,398.2	1,397.4	1,397.4	1,397.4	1,397.4	1,397.4	1,398.2	1,398.2	1,395.8	1,396.2	1,396.2	1,396.2	1,396.2	
11	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,754.6	1,689.6	1,703.8	1,692.2	1,754.0	1,703.1	1,704.9	1,704.9	1,700.2	1,700.4	1,693.4	1,690.7	1,688.7	1,688.7	1,682.8	1,682.8	
12	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	56.5	54.3	54.2	54.6	59.1	57.1	57.7	57.5	57.1	57.3	57.1	57.0	57.0	57.0	57.0	57.0	
14	STATION OUTLET GAS TEMPERATURE (°F)	45.1	44.2	44.2	44.8	49.2	47.3	47.9	47.7	47.3	47.5	47.3	47.2	47.2	47.2	47.2	47.2	
15	CHILLING/COOLING DUTY (TONS) REQUIRED	16,506	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	
16	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
17	SIZE OF PROPANE COMPRESSOR HORSEPOWER(ISO HORSEPOWER)	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	
18	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL)REQUIRED	16,506	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	
19	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED	16,506	9,127	9,274	9,485	9,424	10,529	9,472	9,813	10,676	9,978	10,231	10,047	10,159	0	0	0	
20																		
21																		

		M-19	M-20	M-21	M-22	M-23	M-24	M-25	M-26	M-27	M-28	M-29	M-30	M-31	M-32	M-33	TOTALS
1	STATION NUMBER	854.79	905.16	964.86	982.14	1009.39	1042.47	1098.23	1149.80	1190.30	1216.66	1262.77	1292.60	1313.10	1342.40	1369.40	
2	STATION MILEPOST	1850	1550	1670	1760	2040	2320	2560	2720	2760	2820	2920	3000	3060	3120	3180	
3	STATION ELEVATION(FEET)																
4	NUMBER OF GAS COMPRESSOR UNITS PROPOSED																
5	SIZE OF GAS COMPRESSOR UNITS PROPOSED(ISO HORSEPOWER)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	
6	TOTAL GAS COMPRESSOR HORSEPOWER(ISO HORSEPOWER)	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	1,350,000
7	TOTAL GAS COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED	27,582	27,582	27,582	27,582	27,582	27,582	27,582	27,582	27,582	27,582	27,582	27,582	27,582	27,582	27,582	1,241,619
8	GAS VOLUME INTO STATION(MMCFD)	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	
9	STATION FUEL GAS (MMCFD)	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	
10	GAS VOLUME OUT OF STATION (MMCFD)	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	2,424.3	
11	GAS COMPRESSOR SUCTION PRESSURE (PSIA)	1,396.2	1,396.2	1,396.2	1,396.2	1,396.2	1,396.2	1,396.2	1,396.2	1,396.2	1,396.2	1,396.2	1,396.2	1,396.2	1,396.2	1,396.2	
12	GAS COMPRESSOR DISCHARGE PRESSURE (PSIA)	1,682.8	1,682.8	1,682.8	1,682.8	1,682.8	1,682.8	1,682.8	1,682.8	1,682.8	1,682.8	1,682.8	1,682.8	1,682.8	1,682.8	1,682.8	
13	GAS COMPRESSOR SUCTION TEMPERATURE (°F)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
14	GAS COMPRESSOR DISCHARGE TEMPERATURE (°F)	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	57.0	
15	STATION OUTLET GAS TEMPERATURE (°F)	47.2	47.2	47.2	47.2	47.2	47.2	47.2	47.2	47.2	47.2	47.2	47.2	47.2	47.2	47.2	
16	CHILLING/COOLING DUTY (TONS) REQUIRED	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	
17	NUMBER OF PROPANE COMPRESSOR UNITS PROPOSED	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
18	NUMBER OF PROPANE COMPRESSOR UNITS REQUIRED	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
19	SIZE OF PROPANE COMPRESSOR HORSEPOWER(ISO HORSEPOWER)	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	
20	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL)REQUIRED	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	15,481	
21	TOTAL PROPANE COMPRESSOR HORSEPOWER(ACTUAL) REQUIRED	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	238,002
22		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	164,127

DESIGNED BY	
DRAWN BY	
CHECKED BY	
ENGINEERING APPROVAL	
PROJECT MANAGER	

NORTHERN ENGINEERING SERVICES COMPANY LIMITED
CALGARY, ALBERTA

ALASKAN ARCTIC GAS PIPELINE COMPANY

FLOW DIAGRAM
MAXIMUM CAPACITY
AVERAGE SUMMER CONDITIONS-OPERATING YEAR 5

SCALE
DATE
PROJECT No.

SECTION I-10