

EBA Engineering Consultants Ltd.

Civil, Geotechnical and Materials Engineers

GOVERNMENT OF CANADA
INDIAN AND NORTHERN AFFAIRS
MACKENZIE VALLEY DATABASE
FINAL REPORT



D001535

**MACKENZIE VALLEY DATABASE
FINAL REPORT**

0101-10123

April, 1990

**MACKENZIE VALLEY DATABASE
PHASE I**

FINAL REPORT

Submitted to:

**GOVERNMENT OF CANADA
INDIAN AND NORTHERN AFFAIRS
DSS Contract No:
3GST.A7134-9-0024**

prepared by:

**EBA ENGINEERING CONSULTANTS LTD.
EDMONTON, ALBERTA**

0101-10123

April, 1990

TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	1
2.0 METHODOLOGY	2
3.0 DESCRIPTION	3
4.0 USE OF DATABASE	4
5.0 RELIABILITY CHECKS	5
6.0 CONCLUSIONS AND LIMITATIONS	9

LIST OF REFERENCES

APPENDICES

Appendix A	Excerpts from GSC Open File 350
Appendix B	Borehole Distribution Maps
Appendix C	Typical Borehole Logs and Reliability Test Results
Appendix D	Interface with AutoCad
Appendix E	Borehole Logs Added to the Mackenzie Valley Database
Appendix F	Database Disks and Installation Procedure

1.0 INTRODUCTION

This report summarizes a project to assemble geotechnical borehole data for the Mackenzie Valley region. The purpose was to revitalize available data for terrain evaluation of future transportation facilities in this region.

Phase I consisted of translation of an existing computer listing of geotechnical data from the Mackenzie Valley. This previous project, completed in 1976, provided a coded listing on magnetic tape of data from more than 11,000 boreholes. These data represented a substantial portion of the pipeline and highway related field drilling programs conducted between 1970 and 1975. However, the data tape was prepared before the widespread use of personal computers. The objective of Phase I was to translate the data tape into a PC-based data handling program that would allow effective searching and analysis of the data. The commercially available geotechnical data program, ESElog/base, was adopted for this purpose.

Phase II of the project included identification and addition of non-proprietary data from the region that was not previously in the database. Six hundred and ninety-five new boreholes were prepared in the ESElog form and added to the database during Phase II of the project. The new data includes some of the site investigations undertaken for the construction of the Norman Wells Pipeline Project and the Mackenzie Highway. Details on the origin of these borehole logs are provided in Appendix E.

This report describes the methodology for translation and some comments on reliability and use of the new ESE Mackenzie Valley database.

2.0 METHODOLOGY

A data tape developed by Proudfoot and Lawrence and originally published as Geological Survey of Canada Open File Report No. 350 (1976), Mackenzie Valley Geotechnical Data Bank was provided by the Geological Survey of Canada. The GSC data tape contains geotechnical information from 11,600 boreholes extracted from public but unpublished reports of engineering investigations for the Mackenzie Highway, Mackenzie Valley Pipeline proposals and various smaller projects. All data are derived from reports dating before 1976, the year the GSC data tape was prepared. For each borehole log, up to forty geological hydrological, morphological, climatic and engineering test parameters are recorded on the tape in a prescribed format as discussed in Proudfoot and Lawrence (1976). An excerpt from this original report, identifying the parameters recorded is attached as Appendix A. In order to translate the data on the tape to a format that could be read by ESEbase/log, the ASCII file of the data tape was transferred to the hard drive of an IBM Personal Computer. All further data manipulation was carried out on an MS-DOS type Personal Computer.

Some of the data records provided on the data tape were not available in the commercial version of ESEbase/log. The ESE program was modified to include fields such as genetic description and morphological description of the landform. A program was written to read the GSC data tape and place it in the appropriate fields for ESEbase/log. This procedure was tested and debugged using a small segment of the database. Subsequently the entire GSC data tape was translated to the ESEbase/log format, and the resulting database was tested.

Initial tests indicated that certain boreholes were listed twice in the database, thus obvious duplicates were eliminated. The fields "Client" and "Consultant" were reversed for a number of boreholes and these were corrected. A few records were considered so incomplete that they were of no value so those were eliminated. These early corrections resulted in a translated database with 11,449 boreholes.

The distribution of boreholes is shown in a series of 10 maps included in Appendix B. The maps show the distribution of all data, as well as separate distribution for the work of various consultants. Finally, a more detailed reliability check was undertaken to establish a measure of confidence in the data retrieved from the data tape. Thirty-four borehole logs from four reports, prepared by two different consultants were compared with the borehole logs obtained from the database. The results of the reliability checks are described in Section 5.0.

3.0 DESCRIPTION OF DATABASE

The translated Mackenzie Valley Database contains 11,449 boreholes located within the Mackenzie Valley extending from the arctic coast to Northwestern Alberta. Most of the data was derived from past projects such as pipeline studies and the northern extension of the Mackenzie Highway. A general overview of all borehole locations is shown in Figure B1. The boreholes are more or less evenly distributed along the Mackenzie Valley Corridor, with the exception of the very southern region where information is sparse or missing altogether.

Borehole logs include the location and elevation of the borehole, name of consultant and client (or owner), drilling method, landform (genetic description), thaw depth, Unified Soil Classification for all soil strata, and permafrost (ice) description. Also included are the precision of location and elevation of the borehole, together with a GSC assigned "reliability rating". Other factors are the borehole location relative to regional slopes, the proximity of standing or flowing water, and possible forest fires or other terrain disturbances. Soil test data such as density and specific gravity are provided whenever they are recorded in the original borehole log. The names of the responsible Project Engineer and the person who compiled the borehole log, which are commonly recorded on borehole logs were not stored on the GSC data tape thus this information is not available. More importantly, also not stored on the original data tape is the field description of soil which usually accompanies the Unified Soil Classification.

There was no data lost during the translation to ESElog/base. The modified ESEbase/log allowed all data from the original data tape to be included in the database.

Database disks and the installation procedure are included as Appendix F.

4.0 USE OF DATABASE

The Mackenzie Valley Database has all the capabilities of the commercially available ESEbase/log. Borehole logs can be added, edited, printed, and removed with ease. The database can be searched for sets of borehole logs by location, consultant, client, genetic category, etc., and any combination of these. At the completion of a search the retrieved boreholes can be stored in a new database which can then be used independently. Summary graphs, such as an area plan, stratigraphic section, plasticity chart, moisture content vs. depth plots, can be prepared readily.

The average duration of a search of the complete database executed on an IBM Personal Computer (with an INTEL 80286 processor) is approximately fifteen minutes. Retrieving and viewing a specific borehole can be completed in three minutes, and preparing a summary plot for one hundred boreholes (such as a cross-section or a plasticity chart) takes about ten minutes. The ESEbase/log program was modified to facilitate handling a large size database. The database can now be divided into two entirely independant databases, which can be exported separately, using a search condition to define the division. It is thus possible, for example, to divide the Mackenzie Valley Database into several smaller databases according to geographic locations of the boreholes. This will allow faster manipulation of the database, and will remove some of the disk-storage problems encountered with the present database.

Another modification to the program allows a database from ESEbase/log version 2.0 to be restored and upgraded to version 3.0, which will lead to easier inclusion of previous ESE formatted data into the Mackenzie Valley Database.

A particularly useful feature of the new Mackenzie Valley Database is the relative ease of interface with CAD programs. This allows precision plotting of borehole locations on a prepared background map or plotting of borehole locations to precise scale on a transparent overlay for use with National Topographic Series (NTS) Maps. The distribution maps included in Appendix B were prepared by exporting the results of an ESEbase search to AutoCad Version 10. In this case, a background map showing the arctic coast, Mackenzie River and certain communities was prepared in AutoCad. The borehole locations were then imported and plotted using the UTM coordinate system. The location of the river and other landscape features is approximate, however, location of the boreholes relative to the grid is precise. The scale and precision of maps prepared in this manner can be configured to suit the specific need. A more complete description of the techniques developed at EBA for interfacing with AutoCad are described in Appendix D.

5.0 RELIABILITY CHECKS

A reliability check of the database created from the GSC data tape was conducted. A sampling of borehole logs in the Mackenzie Valley Database were compared with their originals in the consultants' reports. Borehole logs from four reports available from EBA's library were used for that purpose, two are reports by EBA Engineering Consultants Ltd. (EBA) (1973, 1974), two are by Ripley, Klohn and Leonoff International Ltd. (RKL) (1973, 1974). The nature of the data collected for the projects described in the four reports is quite different. The reports by RKL and one of the reports by EBA (E-666) present data from granular borrow source investigations. The boreholes are therefore somewhat limited in depth and detail. The other EBA project (E-517) was a detailed geotechnical investigation for the Mackenzie Highway. Thirty-four representative boreholes were selected from the four reports. Sixteen from the RKL reports, seven from EBA (Granular Materials) and eleven from EBA (Mackenzie Highway).

Borehole logs from the consultants' reports were compared with the corresponding borehole logs retrieved from the Mackenzie Valley database prior to any editing of the database. Appendix C contains two original borehole logs as presented in the consultants report and the corresponding logs as retrieved from the new ESE Mackenzie Valley database, along with the ESE spreadsheets that store ESElog data. The data retrieved from the database was then compared item by item to the original borehole logs. The information is categorized according to five criteria as follows:

- a) correct: an item is exactly the same in the database as in the original borehole log;
- b) wrong: an item is present in the database, but recorded incorrectly;
- c) missing: an item is provided in the original, but omitted in the database;
- d) not provided: an item is not described in the original borehole log;
- e) not available: an item is standard ESEbase/log input, but not provided on the GSC tape.

Table 1 summarizes the results of the comparison and Appendix C contains the detailed results. In general the location and elevation of a borehole, the depth of the soil strata, the GSC symbol, soil properties and permafrost description were all quite reliable. The GSC coding format restricted the material description to four characters. Soils were described with up to two unified soil classification symbols and rocks were described with a coded abbreviation. Where "soft" rocks were described on original logs using both descriptions, such as shale, ML (EBA, E-517, 676B3), only the rock description was recorded on the tape.

TABLE 1 SUMMARY OF RELIABILITY CHECK

	Correct	Wrong	Not Provided	Missing	Not Available
Project Name	-	1	-	-	33
Client	34	-	-	-	-
Consultant	27	-	-	7	-
Genetic Cate	30	3	1	-	-
Morphologica	-	-	34	-	-
Drilling Met	27	1	6	-	-
Drilling Pur	34	-	-	-	-
Project Engi	-	-	-	-	34
Compiled By	-	-	-	-	34
Drilling Dat	33	1	-	-	-
Thaw Depth	8	-	26	-	-
Water Level	-	-	34	-	-
Top of Hole	33	1	-	-	-
Soil Descrip	9(31)	2(25)	-	(1)	-
Depth	32(33)	1(1)	-	-	-
Completion D	34	-	-	-	-
USC Symbol	18(29)	2(4)	6	1(6)	-
Moisture Con	30	-	3	1	-
Grain Size	22	-	12	-	-
Plasticity	11	-	18	5	-
NTS Map No.	34	-	-	-	-
UTM Zone	34	-	-	-	-
UTM Northing	34	-	-	-	-
UTM Easting	30	4	-	-	-
Elevation	33	1	-	-	-
Permafrost D	24(30)	1(4)	2	(5)	-
Ice Content	3	-	28	3	-

The numbers in brackets indicate cases that are partially correct or partially wrong.

Correct: an item is exactly the same in the database as in the original

Wrong: an item is present in the database, but recorded incorrectly

Missing: an item is provided in the original, but omitted in the database

Not Provided an item is not described in the original borehole log

Not Availabl an item is standard ESEbase/log input, but not provided on the tape

Grain size distributions in the database are determined from the actual grain size plots. The definition of the soil components (gravel, sand, silt and clay) in the database does not necessarily coincide with what was stated in the original report (EBA E-517). The ice content estimates provided in the database are averages of the ranges given in the original report.

A significant limitation of the GSC data tape is that it did not provide the normal soil description text recorded in the field by the logging technician. Therefore the soil description reproduced on the logs is simply a statement of the unified soil classification symbol.

The genetic category was stated as incorrect in a significant number of cases. The genetic category shown for a borehole in the GSC Mackenzie Valley Database was assigned based on the (preliminary) surficial geology maps. During compilation of the GSC Database no checking was carried out to determine whether the category taken off the map agreed with the information stored in the borehole log (personal communication with Mr D.E. Lawrence). Here the genetic category was indicated as wrong when it obviously contradicted the soil description in the consultants report (ie. when a soil described as till in the original consultants report was given the genetic category glaciofluvial it was indicated as wrong). There has been no attempt in this project to relate the borehole data to terrain interpreted from airphotos.

The assigned borehole locations appear to be reasonably correct. Some obvious errors that showed up during plotting of the data were corrected during database compilation. The location data also appears reasonable based on past knowledge of projects conducted in the Mackenzie Valley (ie: Highway and Pipeline boreholes fall on known routes). The rudimentary testing used in this project cannot verify the precision with which the borehole coordinates were chosen.

A location precision code is provided on the data tape. It is assumed that many borehole locations were scaled from 1:250,000 NTS map sheets in which case the UTM coordinates would be expected to be within 100-200 m. It is anticipated that few if any, of the boreholes included in the database are located with survey precision.

Subsequent detailed plotting of certain boreholes drilled along the Mackenzie Highway have shown that boreholes drilled in close proximity to each other for borrow pit evaluation, were assigned the same coordinates, thus they fall on top of one another. In this particular case, it is anticipated that the location precision is not better than 100 m.

6.0 CONCLUSIONS AND LIMITATIONS

The Mackenzie Valley database provides a rapid and useful retrieval method for some 12,000 boreholes drilled in the Mackenzie Valley. Any prospective users should be aware of how it evolved and thus, the limitations inherent in its use. The limited testing completed as part of this project, provides some confidence on interpretation of data provided in original reports. The question of reliability of data collected by many consultants for a wide variety of uses has not been addressed. The database will be an effective tool for general terrain assessment. Where the information is required for design purposes, the user is advised to consult the original project reports.

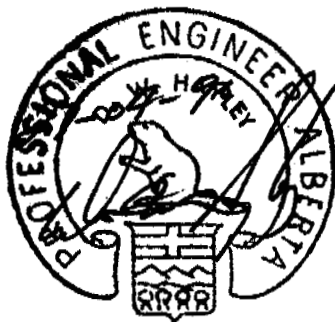
Respectfully submitted,

EBA Engineering Consultants Ltd.

W. Van Gassen

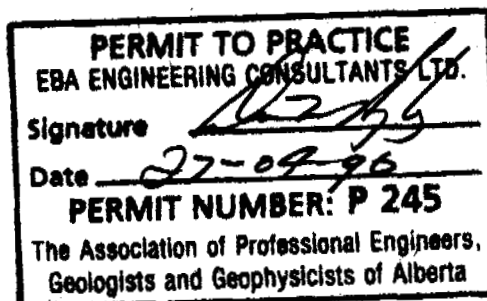
W. Van Gassen

Reviewed by,



D.W. Hayley, P. Eng.
Project Director

WVG:tr



LIST OF REFERENCES

- EBA Engineering Consultants Ltd. 1973. Mackenzie Highway, Geotechnical Evaluation (E-517). Prepared for Department of Public Works of Canada.
- EBA Engineering Consultants Ltd., 1974. Granular Materials Inventory, Stage III (E-666). Prepared for Department of Indian and Northern Affairs.
- Klohn Leonoff Consultants Ltd., 1974. Granular Materials Inventory, Parsons Lake, N.W.T. Prepared for Gulf Canada Ltd.
- Proudfoot, D.A., and Lawrence, D.E., 1976. Mackenzie Valley Geotechnical Data Bank, Tape Description Manual, Department of Energy, Mines and Resources, Geological Survey of Canada. Open File Report 350.
- Ripley, Klohn, and Leonoff, International, 1973. Granular Materials Inventory. Prepared for Department of Indian Affairs and Northern Development.

APPENDIX A
EXCERPTS FROM GSC OPEN FILE 350

CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES

GEOLOGICAL SURVEY OF CANADA



MACKENZIE VALLEY GEOTECHNICAL DATA BANK
TAPE DESCRIPTION MANUAL

by

D.A. Proudfoot and D.E. Lawrence

OPEN FILE 350

Price: \$50.00

OTTAWA 1976

CONTENTS

	Page
Introduction	1
Tape specifications	2
Tape structure	2
Record structure	2
Record description	4
Header-Record	5
Comment-Record	16
Horizon-Record	16
 Table 1. Sources of information	26
2. Terrain maps, Mackenzie Valley	29
3.. Modified unified soil classification system	32

INTRODUCTION

Environmental assessment and geotechnical investigation have been widespread in Mackenzie Valley in the past few years especially with regard to investigation for possible routes for the Mackenzie Highway and for gas and oil pipelines through the valley. Since construction problems and control of environmental and engineering concerns are most difficult in permafrost terrain, a project was undertaken to assess the presently available data in order to establish the engineering characteristics of materials and to correlate the controlling geological, engineering, and hydrological factors that influence the occurrence of ground ice and permafrost.

The principal source of geotechnical data was borehole logs from unpublished reports of engineering investigations for the proposed highway and pipelines as shown in Table 1. Geological data were available in the form of 1:125 000 scale surficial geology maps produced by the Geological Survey of Canada (Table 2).

Because of the large amount of information, more than 11 600 boreholes with up to 40 different geological, hydrological, morphological, climatic, and engineering test parameters recorded for each, it was decided at the inception of the project to establish a data bank to permanently store all the information so that it would be available for future analysis.

The primary purpose of the project was to establish the properties and their ranges for various natural materials under various conditions within the Mackenzie Valley and Delta and to establish the permafrost conditions and ground ice content so that engineering design and construction could be carried out with minimum environmental impact. Another objective was to assess the various methods of drilling and recovery of samples in permafrost terrain and to assess the relative merits of the various field and laboratory tests carried out on the samples. Should current practice not prove fruitful, alternate procedures would be suggested. Thirdly, in areas of little information the knowledge gained from the above would be used to predict the occurrence of ground ice and thus anticipate some of the engineering-environmental problems before they are encountered and remedial measures are required.

The data bank is based on drillhole records contained in the unpublished reports of various geotechnical consultants. Information is coded along with data on various site characteristics. Each record contains a five-digit identifying number; a header line of 78 characters which includes 27 variables specifying location, topography, and technical aspects of the drilling site; 18 lines of 71 characters in which up to 30 geotechnical and geological characteristics of each soil horizon can be recorded, with the last recorded horizon being the bottom of the hole; and a 74 character line in which other pertinent or explanatory data can be recorded. Data records were verified and amended prior to being incorporated into the data bank.

The completeness and accuracy of the data stored for any drillhole is dependent on the quality of the original record. In general, the capacity of the data bank is far in excess of the amount of information currently available. Actual values are used for most variables, with only limited use being made of coding or grouping so that the accuracy of the information in the data bank depends almost entirely on the quality of the input data.

Since the number of data bank records is large, as is the data bank itself, COBOL programming language was used to create, validate, and assess the data bank. FORTRAN language would not have been suitable for making retrievals from or queries of Data Bank; however, its present file structure can be handled in the COBOL programming language or one of the many file management systems supported by the various computer centres where subsets of pertinent information can be generated and analyzed by existing programs written in any language. The borehole records within each NTS map-area are arranged in order of ascending UTM zone descending UTM northing, ascending UTM easting, and ascending DATA-NO of the borehole record. This method of sorting orders the records from the upper left hand corner to the lower right hand corner of a map-sheet.

TAPE SPECIFICATIONS

The tape was created on a CDC CYBER 70 MODEL 74 computer operating under the SCOPE 3.4 Operating Systems, with RECORD MANAGER. The tape is a 9-track unlabelled Stranger tape, recorded at 1600 bpi. The coded data on the tape are recorded in EBCDIC.

TAPE STRUCTURE

The complete file description for this tape is:

File Organization (FO)	- Sequential
Block Type (BT)	- K (a fixed number of whole records per block)
Record Type (RT)	- F (fixed length records)
Field (records) Length (FL)	- 1430 characters
Number of Records per Block (RB)	- 3 records per block
Maximum Block Length (MBL)	- 4290 characters

RECORD STRUCTURE

The Mackenzie Valley Geotechnical Data Bank presently contains information from approximately 11 600 boreholes (data records). These data records each contain 1430 characters, of which 78 characters make up a HEADER-RECORD, 74 characters are included in a COMMENT-RECORD, and 1278 characters are broken up into 18 HORIZON-RECORDS each containing 71 characters.

The processing of this Data Bank has been accomplished using custom COBOL programming as the file size is moderately large and the retrieval requests unique. The following COBOL file description is the record duplication used for the Mackenzie Valley Data Bank.

FD DATA-FILE
TABLE RECORD IS OMITTED DATA RECORD IS DATA-REC.
01 DATA-REC.

03 HEADER-RECORD

05 DATA-NO PIC 9(5).
05 NTS-MAP.
07 MAP-NO PIC 9(3).
07 MAP-LETTER PIC X(1).
07 MAP-NO-2 PIC 9(2).
07 MAP-LETTER-2 PIC X(1).
05 UTM.
07 ZONE PIC 9(2).
07 EAST PIC 9(6).
07 NORTH PIC 9(7).
05 REFERENCE PIC X(9).
05 MONTH PIC 9(2).
05 YEAR PIC 9(2).
05 METHOD PIC 9(2).
05 PURPOSE PIC 9(2).
05 RELIABILITY PIC 9(1).
05 LOC-PREC PIC 9(1).
05 ELEVATION PIC X(4).
05 ELEV-PREC PIC 9(1).
05 TEXT-MOD PIC X(1).
05 GENETIC PIC X(1).
05 MORPH PIC X(1).
05 ANGLE PIC 9(1).
05 LENGTH-A PIC 9(1).
05 LENGTH-B PIC 9(1).
05 ORIENTATION PIC 9(2).
05 NEAR-WATER PIC 9(1).
05 LAND-ZONE PIC X(2).
05 BURN PIC X(2).
05 CLEAR PIC X(2).
05 TEMP-ZONE PIC X(1).
05 THAW-DEPTH PIC X(3).
05 LEVEL-NO PIC 9(2).
03 COMMENT-RECORD PIC X(74).

JUSTIFIED RIGHT.

OCCURS 4 TIMES.

OCCURS 4 TIMES.

JUSTIFIED RIGHT.

03 HORIZON-RECORD OCCURS 18 TIMES.

05 S-D PIC X(4).
05 -SAMP-DEPTH PIC 9(3)V9
05 H-D PIC X(4).
05 HORIZ-DEPTH PIC 9(3)V9
05 MATERIAL PIC X(4).
05 GRAIN-SIZE.
07 GRAVEL PIC X(2).
07 SAND-TOTAL PIC X(2).
07 SILT PIC X(2).
07 CLAY PIC X(2).
07 ORGANIC PIC X(2).
05 SAND.
07 MAX-SIZE PIC X(2).
07 NO-4 PIC X(2).
07 NO-10 PIC X(2).
07 NO-40 PIC X(2).

JUSTIFIED RIGHT.

REDEFINES S-D.

JUSTIFIED RIGHT.

REDEFINES H-D.

- 4 -

07	NO-200	PIC X(2).	
05	MOISTURE-CONT	PIC X(3).	
05	LIQUID-LIMIT	PIC X(3).	
05	PLASTIC-LIMIT	PIC X(3).	
05	INDEX-OF-PLAS	PIC X(2).	
05	SATURATION	PIC X(2).	
05	DENSITY.		
07	NATURAL	PIC 9(3).	
07	DRY	PIC 9(3).	
07	FROZEN	PIC 9(3).	
05	SPECIFIC-GRAV	PIC 9(1)V9(2).	
05	PROCTOR-COMPACTION.		
07	MAX-DENSITY	PIC 9(3).	
07	OPT-MOISTURE	PIC 9(2).	
05	PENETRATION	PIC 9(2).	
05	PERMAFROST	PIC X(3).	
05	PERCENT-ICE	PIC X(2)	JUSTIFIED RIGHT.
05	EXCESS-MOISTURE	PIC X(2)	JUSTIFIED RIGHT.
05	SAMPLE-METHOD	PIC 9(1).	

Table 1
Sources of Information

Consultant/Agency	Area of Geotechnical Expertise	Purpose	Year of Publication
Dept. of Public Works	Fort Simpson to Mackenzie Crossing (Miles 295 - 343.6)	Mackenzie Highway geotech investigation	1972, 1973
Acres Consulting Services (for DPW)	Mackenzie Crossing to Mt. Gaudet (Miles 346 - 450)	Mackenzie Highway geotech investigation	1973
Underwood McClellan Assoc. (for DPW)	Mt. Gaudet to Big Smith Creek (Miles 450 - 545)	Mackenzie Highway geotech investigation	1973
R.M. Hardy & Associates (for DPW)	Big Smith Creek to Bosworth Creek (Miles 545 - 632)	Mackenzie Highway geotech investigation	1973
Brooker & Associates (for DPW)	Bosworth Creek to Hare Indian River (Miles 632 - 724)	Mackenzie Highway geotech investigation	1973
Pemcan "72" (for DIAND)	Fort Simpson to Fort Good Hope (up to 10 miles away from prop. highway alignment)	Granular Resources Inventory	1973
Ripley Klohn & Leonoff (for DIAND)	Tuktoyaktuk Peninsula, Richards Island Mackenzie River Delta, south to Fort McPherson and Arctic Red River	Granular Resources Inventory	1973
Geological Survey of Canada	Norman Wells area	Permafrost regression study	1973
Ripley Klohn & Leonoff (for Canadian) (1969)	Mackenzie Valley Pipeline Route (Prudhoe Bay to Alta border) (both routes)	Pipeline investigation (terrain conditions)	1970
Ripley Klohn & Leonoff (for Mackenzie Valley Pipeline Research Ltd.) (1970)	Mackenzie Valley Pipeline route (Prudhoe Bay to Alta border) (both routes)	Pipeline investigation ((terrain conditions)	1971
Northwest Project Study Group (done by Hardy and Assoc.)	Canol Road, Norman Wells	Permafrost regression study	1971, 1972

Area of Geotechnical
Expertise

Consultant/Agency

Purpose

Year of
Publication

Gas Arctic System Study Group	Northern Canada Power Commission route Inuvik to Parsons Lake, N.W.T.	Terrain and permafrost investigation. Holes drilled for a power line.	1972
DPW	Dempster Highway, Mile 330 - 365	Soil survey	1972
DPW	Mackenzie Highway, Mile 931 - 964	Soil survey	1972
Blackwell and Watson (for Mackenzie Valley Pipeline Research)	Hanna River to Tuktoyaktuk	Regional reconnaissance- level subsurface information for a warm-oil pipeline feasibility study	1972
Alberta Gas Trunk Lines (by Templeton Engineering)	Norman Wells, Fort Simpson, N.W.T.	Permafrost regression	1970

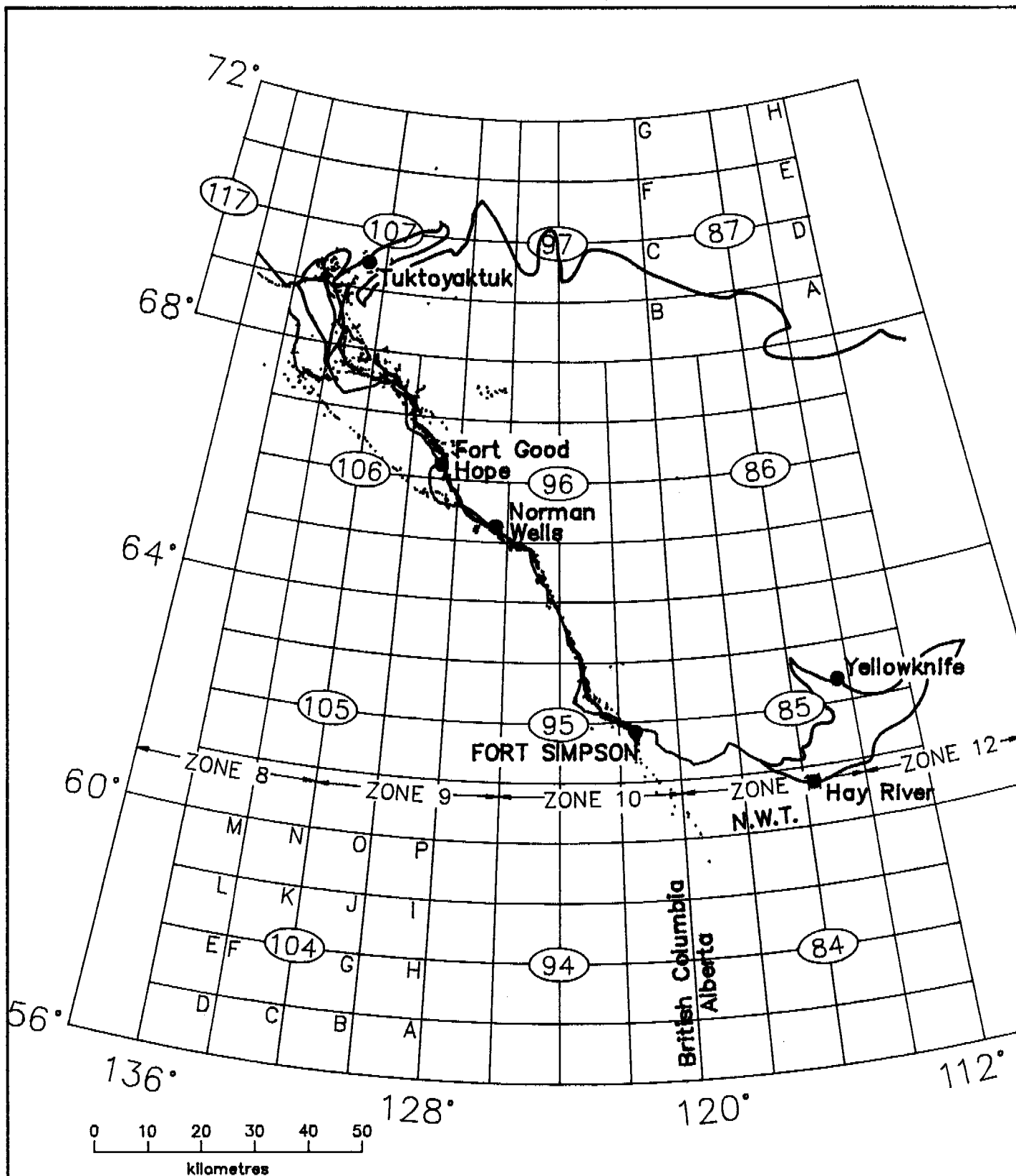
DATA BANK UP-DATA 1975

Consultant/Agency	Area of Geotechnical Expertise	Purpose	Year of Publication
DPW	Fort Good Hope to Dempster and Mackenzie Highway junction (925 - 936)	Mackenzie Highway geotechnical investigation	1975
GSC (Kurfurst and Heginbottom)	Various sites	Ground ice variability	1975
CAGSL by NESCL and Hardy	Fort Simpson	Frost effects	1975
CAGSL by NESCL and Hardy	Major River crossings along pipeline route	Geotechnical	
Gulf	Parsons Lake	Granular materials	1975
DPW	Major River crossings Mackenzie Highway, Mile 725 - 936	Geotechnical	1975
DPW	Mackenzie Highway, Mile 902 - 936	Geotechnical	1975
CAGSL (by NESCL)	Travaillant Lake	Geotechnical, for route and compressor sites	1975
CAGSL by NESCL and Hardy	Mackenzie Delta	Geotechnical, crossing Delta alteration	1975
Sunoco (for Arctic Geotechnical Group)	Beaufort Sea	Geotechnical	1975
CAGSL (by NESCL)		Frost effects	1975

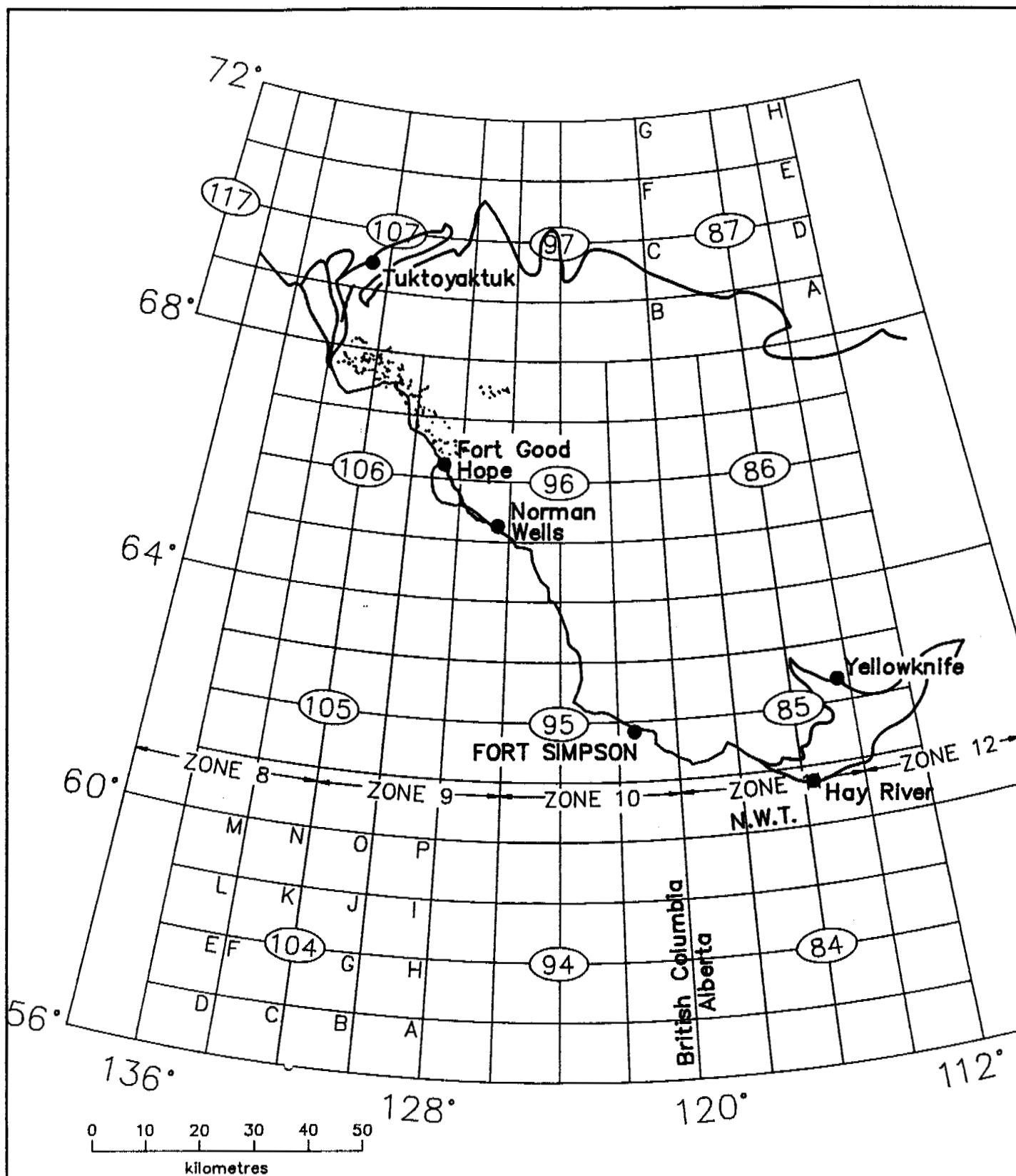
CAGSL: Canadian Arctic Gas Studies Ltd.

NESCL: Northern Engineering Services Company Ltd.

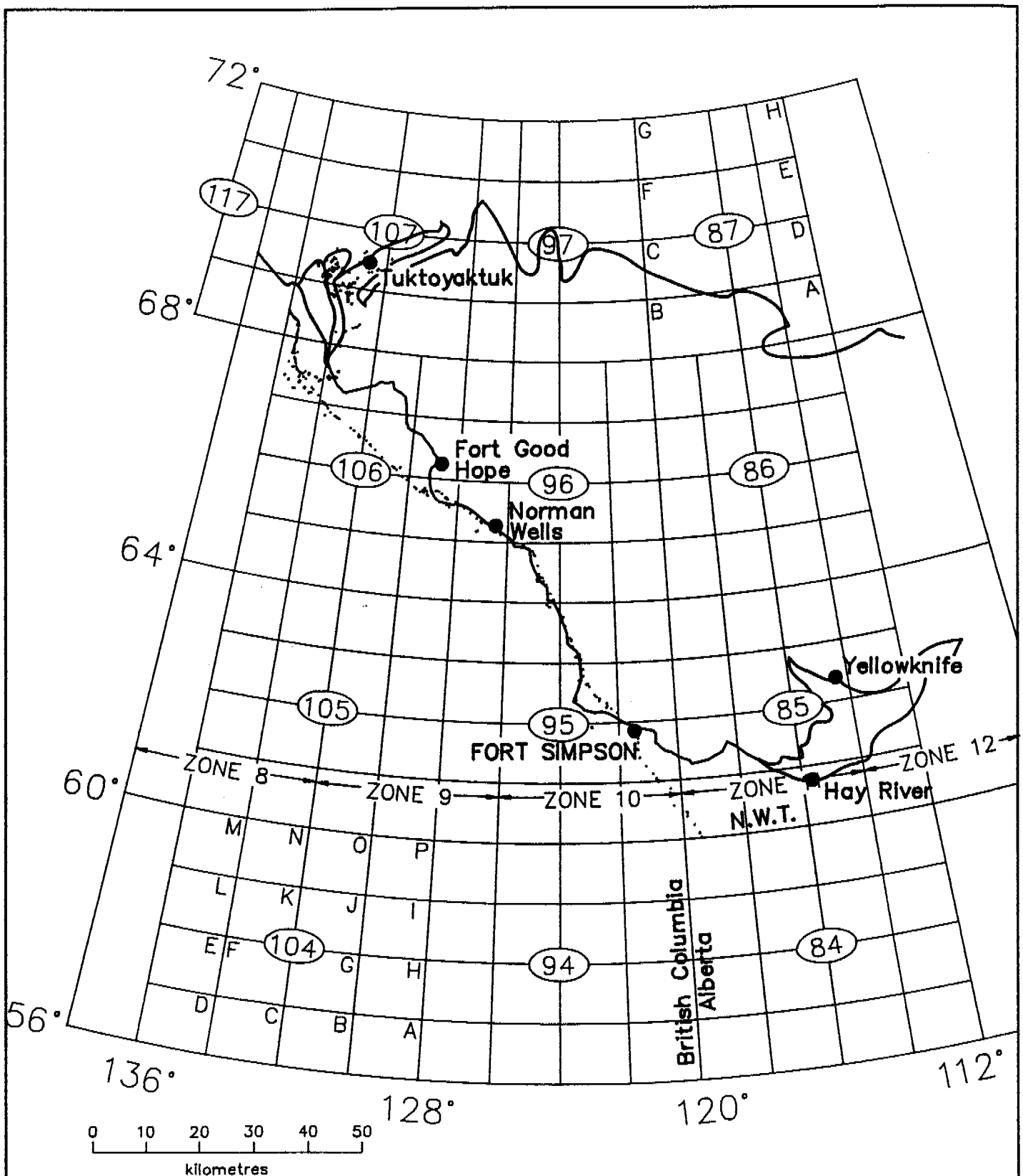
APPENDIX B
BOREHOLE DISTRIBUTION MAPS



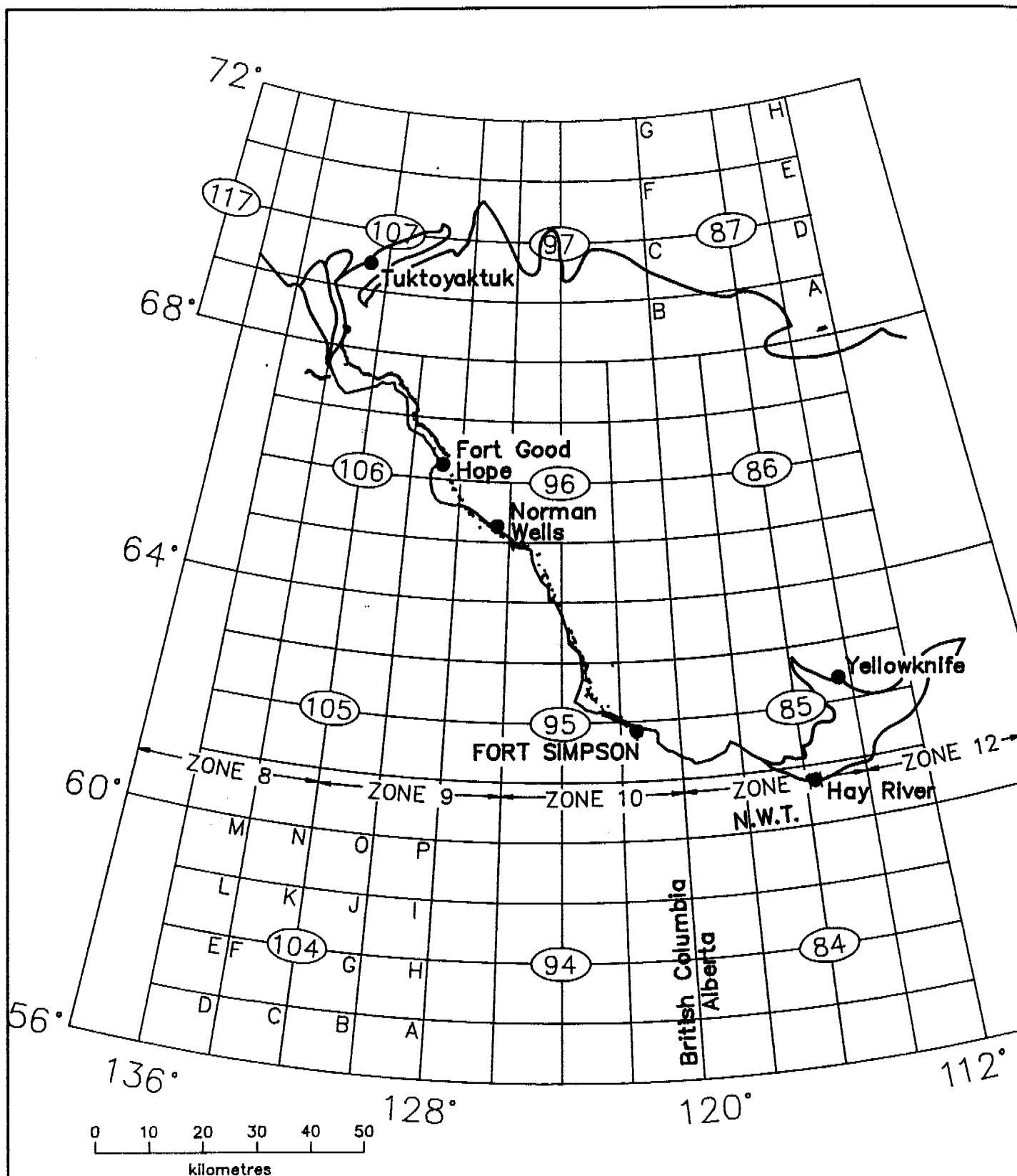
EBA Engineering Consultants Ltd.				PROJECT MACKENZIE VALLEY DATABASE		
CLIENT FOOTHILLS PIPELINE				TITLE BOREHOLES IN GSC DATABASE		
DATE	89-09-29	DWN.	CGE	CHKD.	DWH	FILE NO.
						10123ALL
						FIGURE 1



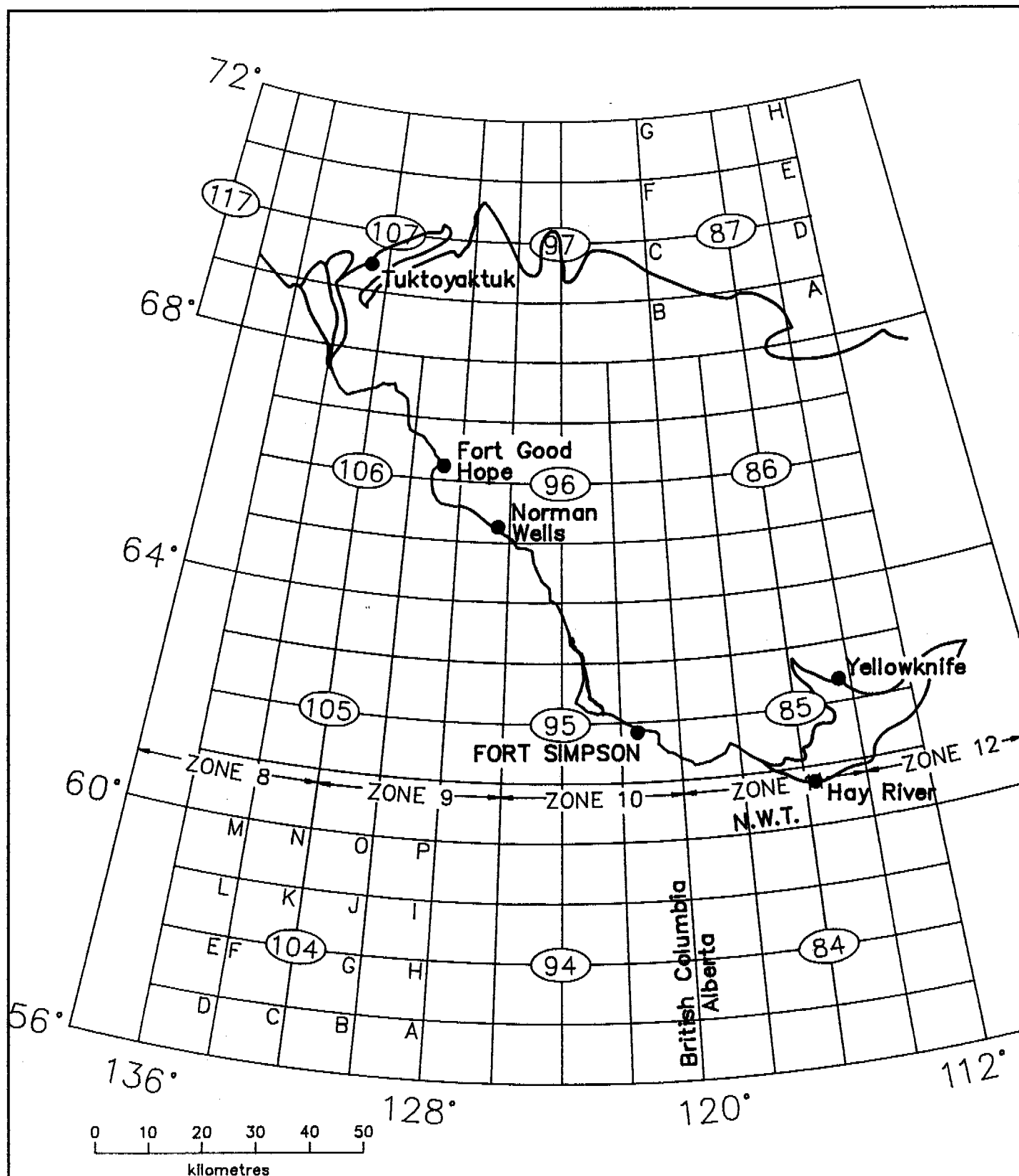
EBA Engineering Consultants Ltd.					PROJECT MACKENZIE VALLEY DATABASE			
CLIENT FOOTHILLS PIPELINE					TITLE BOREHOLE DRILLED BY EBA ENGINEERING CONSULTANTS LTD. IN GSC DATABASE			
DATE	89-09-29	DWN.	CGE	CHKD.	DWH	FILE NO.	10123EBA	FIGURE 2



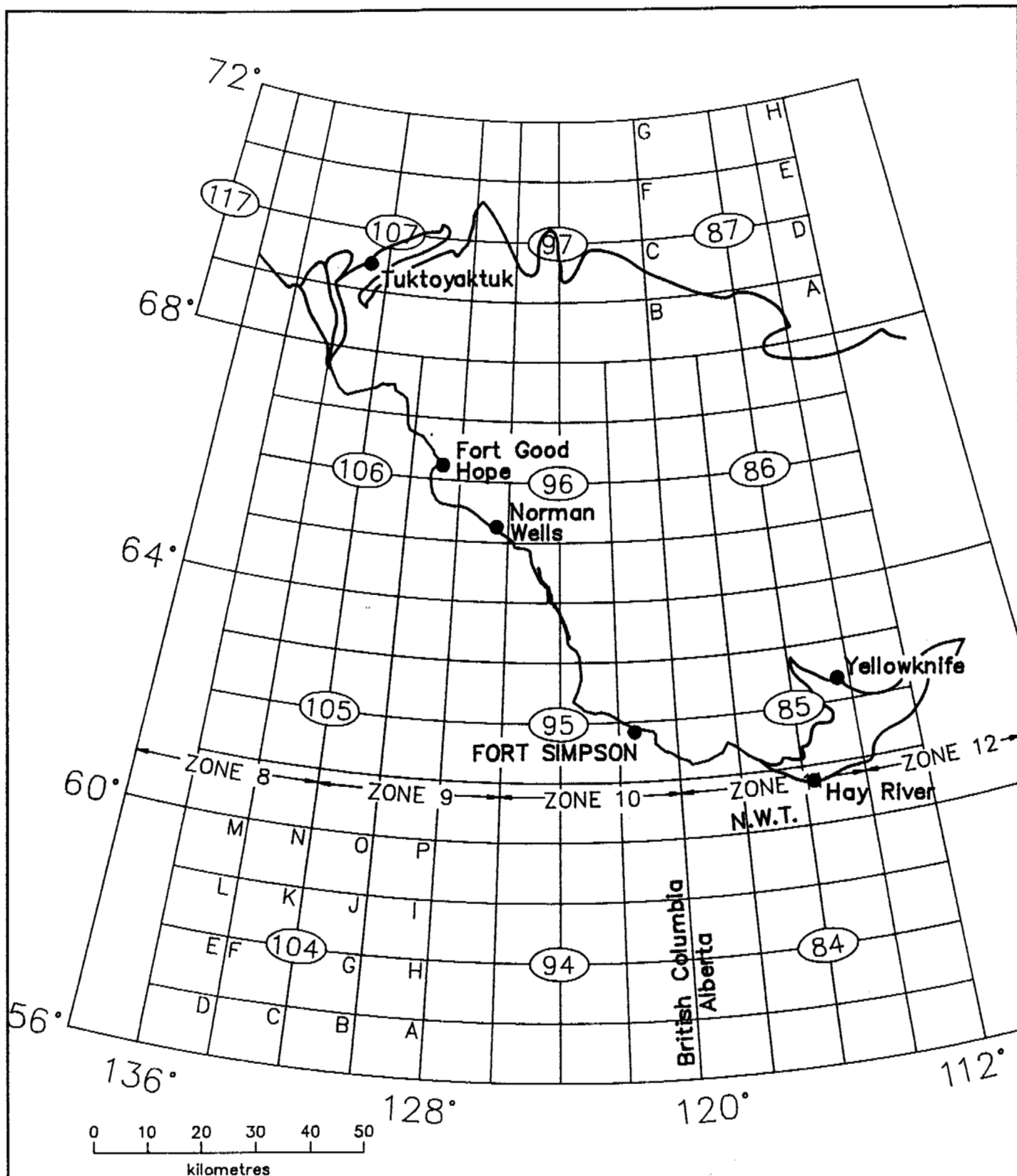
EBA Engineering Consultants Ltd.				PROJECT MACKENZIE VALLEY DATABASE		
CLIENT FOOTHILLS PIPELINE				TITLE BOREHOLES DRILLED BY RIPLEY, KLOHN, & LEONOFF IN GSC DATABASE		
DATE 89-09-29	DWN. CGE	CHKD. DWH	FILE NO. 10123RKL	FIGURE 3		



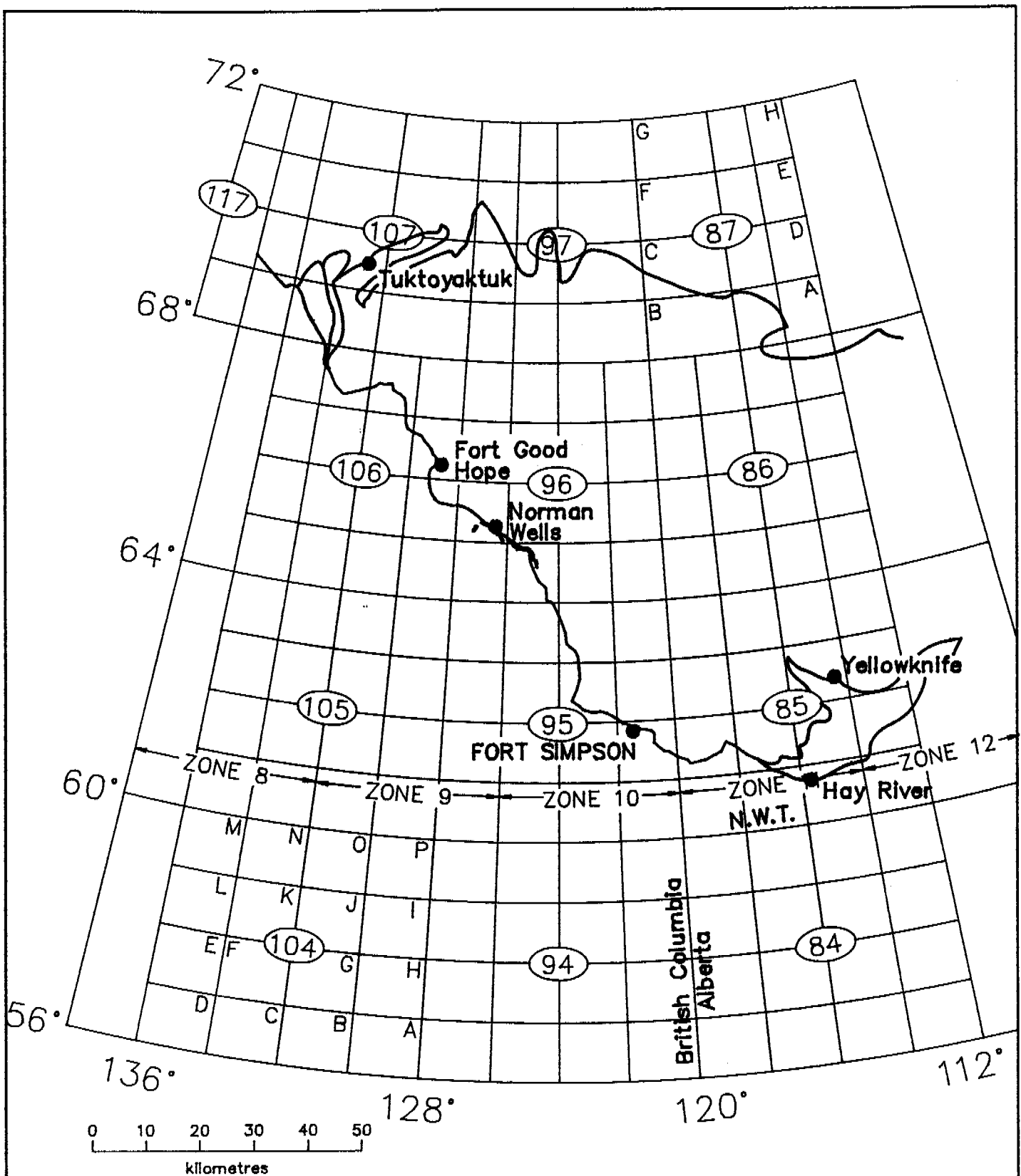
EBA Engineering Consultants Ltd.				PROJECT MACKENZIE VALLEY DATABASE		
CLIENT FOOTHILLS PIPELINE				TITLE BOREHOLES DRILLED BY DEPARTMENT OF PUBLIC WORKS IN GSC DATABASE		
DATE	89-09-29	DWN.	CGE	CHKD.	DWH	FILE NO.
				10123DPW		FIGURE 4



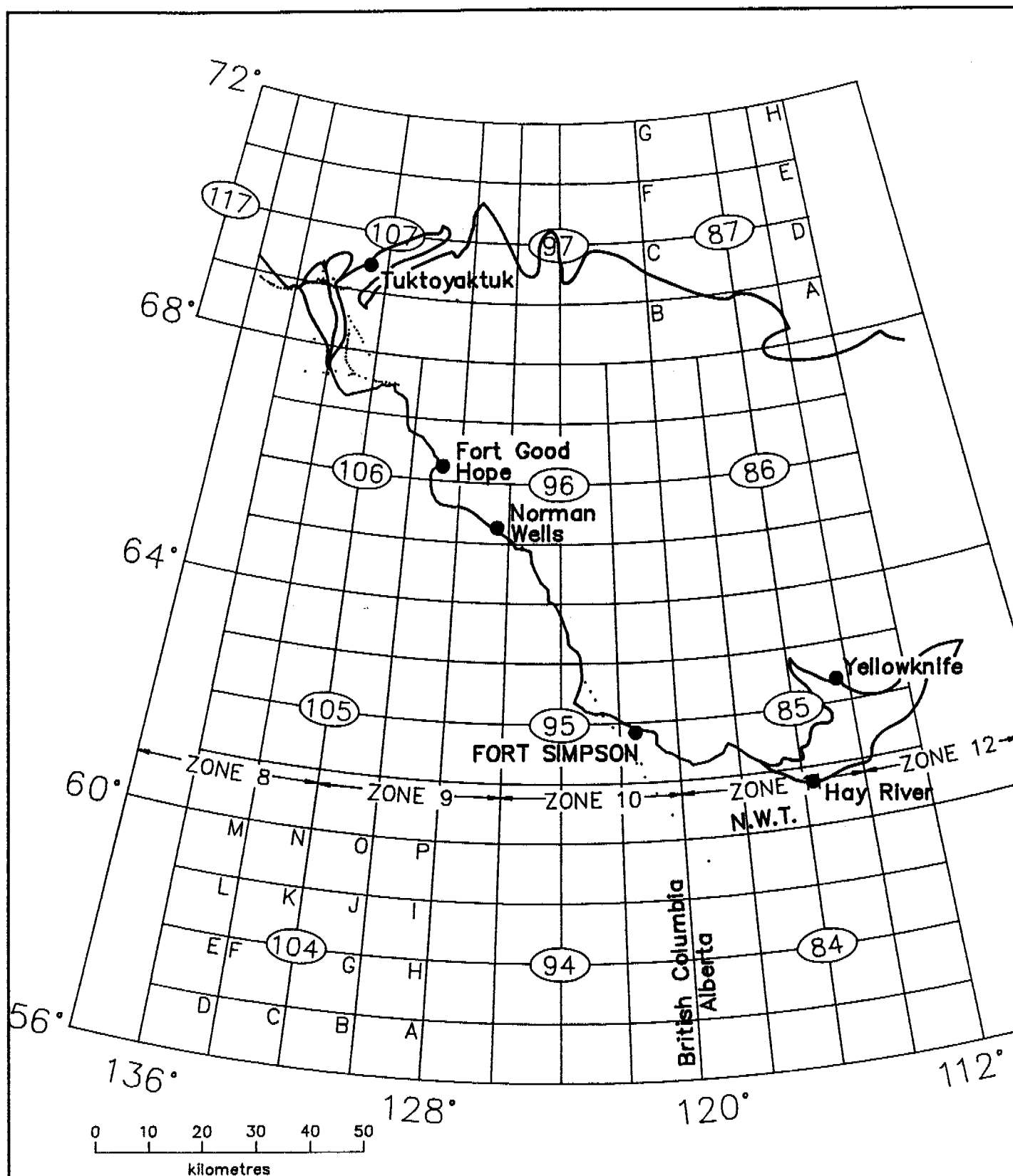
EBA Engineering Consultants Ltd.				PROJECT		MACKENZIE VALLEY DATABASE	
CLIENT				TITLE		BOREHOLES DRILLED BY ACRES CONSULTING SERVICES IN GSC DATABASE	
DATE	89-09-29	DWN.	CGE	CHKD.	DWH	FILE NO.	10123ACS
						FIGURE 5	



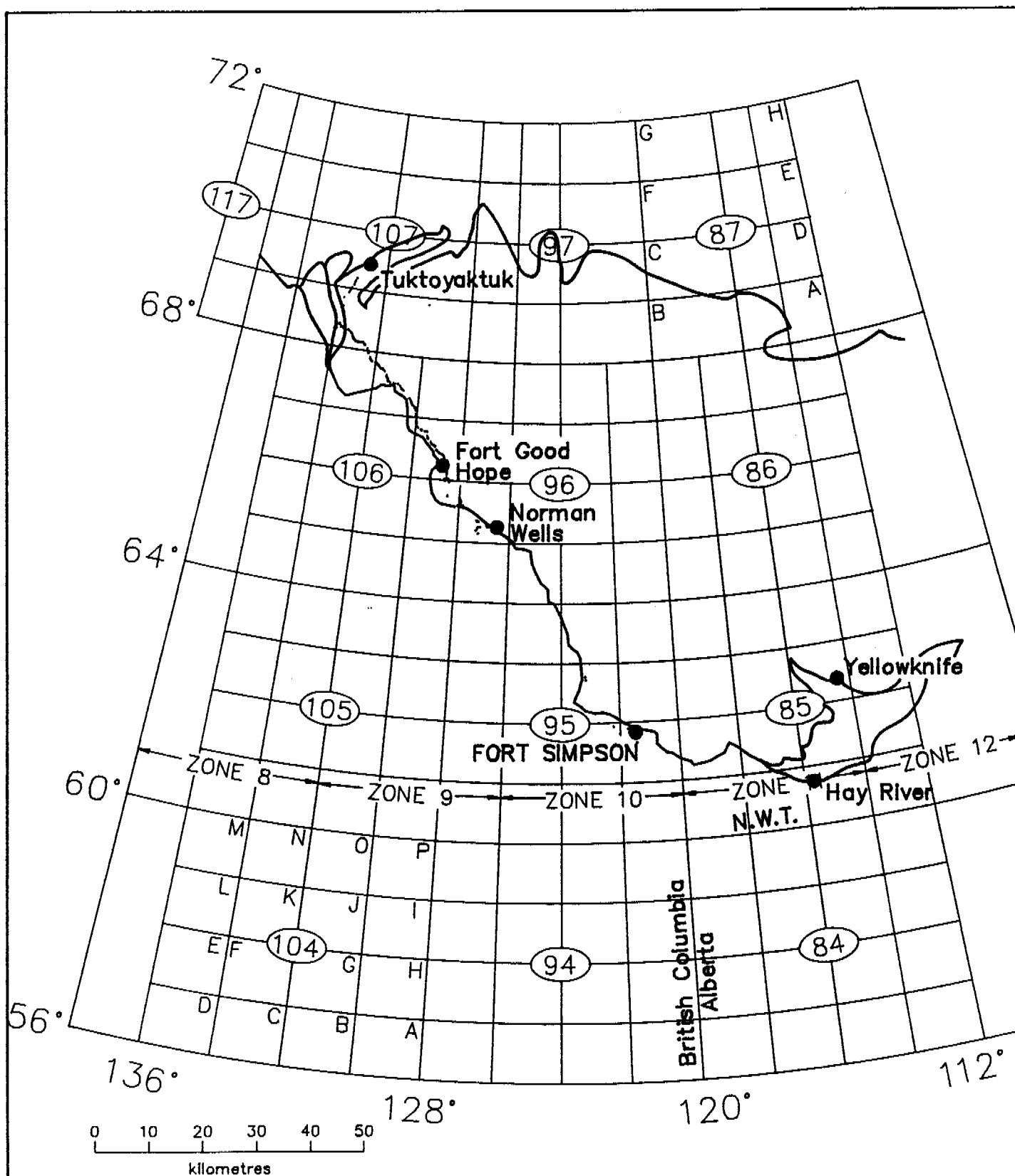
EBA Engineering Consultants Ltd.				PROJECT MACKENZIE VALLEY DATABASE	
CLIENT FOOTHILLS PIPELINE				TITLE BOREHOLES DRILLED BY UMA IN GSC DATABASE	
DATE 89-09-29	DWN. CGE	CHKD. DWH	FILE NO. 10123UMA	FIGURE 6	



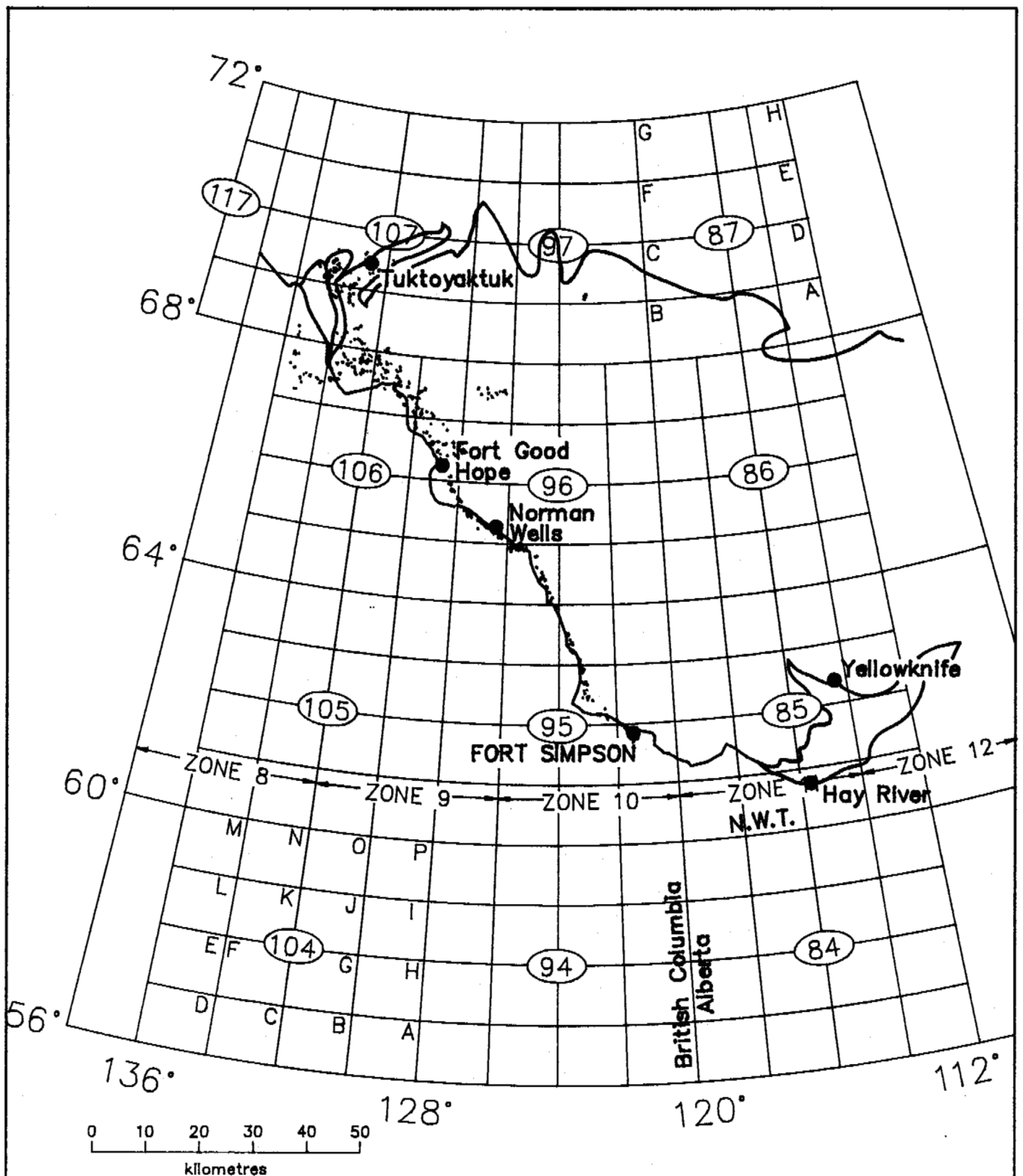
EBA Engineering Consultants Ltd.					PROJECT MACKENZIE VALLEY DATABASE	
CLIENT FOOTHILLS PIPELINE					TITLE BOREHOLES DRILLED BY R.M. HARDY & ASSOCIATES IN GSC DATABASE	
DATE 89-09-29	DWN.	CGE	CHKD.	DWH	FILE NO. 10123RMH	FIGURE 7



EBA Engineering Consultants Ltd.				PROJECT		MACKENZIE VALLEY DATABASE	
CLIENT				TITLE		BOREHOLES DRILLED BY NORTHERN ENGINEERING SERVICES CO. LTD. IN GSC DATABASE	
FOOTHILLS PIPELINE				FILE NO.		10123NES	FIGURE 8
DATE 89-09-29	DWN.	CGE	CHKD.	DWH			



EBA Engineering Consultants Ltd.				PROJECT		MACKENZIE VALLEY DATABASE	
CLIENT				TITLE		BOREHOLES DRILLED BY OTHER CONSULTANTS IN GSC DATABASE	
FOOTHILLS PIPELINE				FILE NO.		101230TH	FIGURE 9
DATE	89-09-29	DWN.	CGE	CHKD.	DWH		



EBA Engineering Consultants Ltd.				PROJECT MACKENZIE VALLEY DATABASE	
CLIENT FOOTHILLS PIPELINE				TITLE BOREHOLES DRILLED FOR DEPARTMENT OF INDIAN AND NORTHERN AFFAIRS IN GSC DATABASE	
DATE 89-09-29	DWN.	CGE	CHKD.	DWH	FILE NO. 101231NA
					FIGURE 10

APPENDIX C
TYPICAL BOREHOLE LOGS
AND RELIABILITY TEST RESULTS

Table C.1, EBA Engineering Report E-517, Mackenzie Highway Geotechnical Investigation

	632B1	638C2	648C1	659S2	664B5	676B3	683C3	695B8	705C3	718B9	722C8
Project Name	na	na	na	na	na	na	na	na	na	na	na
Client	c	c	c	c	c	c	c	c	c	c	c
Consultant	c	c	c	c	c	c	c	c	c	c	c
Genetic Category	c	w	c	c	w	np	c	w	c	c	c
Morphological Modi	np	np	np	np	np	np	np	np	np	np	np
Drilling Method	c	c	c	c	c	c	c	c	w	c	c
Drilling Purpose	c	c	c	c	c	c	c	c	c	c	c
Project Engineer	na	na	na	na	na	na	na	na	na	na	na
Compiled By ...	na	na	na	na	na	na	na	na	na	na	na
Drilling Date	c	c	c	c	c	c	c	c	c	c	w
Thaw Depth	np	np	np	np	np	np	np	np	np	np	np
Water Level	np	np	np	np	np	np	np	np	np	np	np
Top of Hole	c	c	c	c	c	c	c	c	c	c	c
Soil Description	c	c/w	c	c/w	w	w	c/w	c/w	c/w	c/w	c/w
Depth	c	c	c	c	c	c	c	c/w	c	c	c
Completion Depth	c	c	c	c	c	c	c	c	c	c	c
USC Symbol	c	c	c	c	c	c/w	c/w	c	c	c	w
Moisture Content	c	c	c	c	c	m	c	c	c	c	c
Grain Size	c	c	c	c	c	c	np	c	np	np	np
Plasticity	np	m	np	c	c	c	c	c	c	c	c
NTS Map No.	c	c	c	c	c	c	c	c	c	c	c
UTM Zone	c	c	c	c	c	c	c	c	c	c	c
UTM Northing	c	c	c	c	c	c	c	c	c	c	c
UTM Easting	c	c	c	c	c	w	c	c	c	c	c
Elevation	c	c	c	c	c	c	c	c	c	c	c
Permafrost Descrip	c	c	c	c/w	c/w	c	c	c	c	c	c
Ice Content	np	np	np	np	np	c	c	c	np	np	np

Legend: c: Correct, np: Not Provided, w: Wrong, m: Missing, na: Not Available

Table C.2, Ripley, Klohn and Leonoff, Granular Materials Inventory

	1-28	2-126	3-187	4-67	7-130	8-225
Project Name	na	na	na	na	na	na
Client	c	c	c	c	c	c
Consultant	c	c	c	c	c	c
Genetic Category	c	c	c	c	c	c
Morphological Modi	np	np	np	np	np	np
Drilling Method	np	np	np	np	np	np
Drilling Purpose	c	c	c	c	c	c
Project Engineer	na	na	na	na	na	na
Compiled By ...	na	na	na	na	na	na
Drilling Date	c	c	c	c	c	c
Thaw Depth	c	c	c	c	c	c
Water Level	np	np	np	np	np	np
Top of Hole	c	c	c	c	c	c
Soil Description	c/w	c/w	w/m	c/w	c/w	c/w
Depth	c	c	w	c	c	c
Completion Depth	c	c	c	c	c	c
USC Symbol	np	np	np	np	np	np
Moisture Content	c	c	np	c	c	c
Grain Size	np	c	np	c	c	c
Plasticity	np	np	m	m	np	np
NTS Map No.	c	c	c	c	c	c
UTM Zone	c	c	c	c	c	c
UTM Northing	c	c	c	c	c	c
UTM Easting	c	c	c	c	c	c
Elevation	c	c	c	c	c	w
Permafrost Descrip	c	c/m	w/m	c/m	c/m	c/m
Ice Content	m	m	m	np	np	np

Legend: c: Correct, np: Not Provided, w: Wrong, m: Missing, na: Not Available

Table C.3, Ripley, Klohn and Leonoff, Granular Materials Inventory

	T-115-	206-4	211-1	222-1	301-3	309-3	319-6	452-A	554-6	650-2
Project Name	na	na	na	na	na	na	na	na	na	w
Client	c	c	c	c	c	c	c	c	c	c
Consultant	c	c	c	c	c	c	c	c	c	c
Genetic Category	c	c	c	c	c	c	c	c	c	c
Morphological Modi	np	np	np	np	np	np	np	np	np	np
Drilling Method	c	c	c	c	c	c	c	c	c	c
Drilling Purpose	c	c	c	c	c	c	c	c	c	c
Project Engineer	na	na	na	na	na	na	na	na	na	na
Compiled By ...	na	na	na	na	na	na	na	na	na	na
Drilling Date	c	c	c	c	c	c	c	c	c	c
Thaw Depth	np	np	np	np	np	np	np	np	np	np
Water Level	np	np	np	np	np	np	np	np	np	np
Top of Hole	c	c	c	w	c	c	c	c	c	c
Soil Description	c	c/w	c	c/w	c/w	c	c/w	c	c/w	c
Depth	c	c	c	c	c	c	c	c	c	c
Completion Depth	c	c	c	c	c	c	c	c	c	c
USC Symbol	c/m	c/m	c	c	c	c/m	c/m	c/m	m	c
Moisture Content	np	c	c	c	c	c	c	c	np	c
Grain Size	c	c	c	c	c	c	c	c	np	c
Plasticity	np	np	np	c	np	c	m	np	np	np
NTS Map No.	c	c	c	c	c	c	c	c	c	c
UTM Zone	c	c	c	c	c	c	c	c	c	c
UTM Northing	c	c	c	c	c	c	c	c	c	c
UTM Easting	c	c	c	c	c	c	w	c	c	w
Elevation	c	c	c	c	c	c	c	c	c	c
Permafrost Descrip	c	c	c	c	c	c	c	c	c	c
Ice Content	np	np	np	np	np	np	np	np	np	np

Legend: c: Correct, np: Not Provided, w: Wrong, m: Missing, na: Not Available

Table C.4, EBA Engineering Report E-666, Granular Materials Inventory


	1035-1	1041-2	1089-4	1112-1	1115-1	1117-9	1152-2
Project Name	na	na	na	na	na	na	na
Client	c	c	c	c	c	c	c
Consultant	m	m	m	m	m	m	m
Genetic Category	c	c	c	c	c	c	c
Morphological Modi	np	np	np	np	np	np	np
Drilling Method	c	c	c	c	c	c	c
Drilling Purpose	c	c	c	c	c	c	c
Project Engineer	na	na	na	na	na	na	na
Compiled By ...	na	na	na	na	na	na	na
Drilling Date	c	c	c	c	c	c	c
Thaw Depth	np	c	np	np	np	np	c
Water Level	np	np	np	np	np	np	np
Top of Hole	c	c	c	c	c	c	c
Soil Description	c/w	c/w	c/w	c	c/w	c/w	c
Depth	c	c	c	c	c	c	c
Completion Depth	c	c	c	c	c	c	c
USC Symbol	c	w	c	c	c	c	c
Moisture Content	c	c	c	c	c	c	c
Grain Size	c	np	np	np	np	np	c
Plasticity	np	c	np	m	np	np	np
NTS Map No.	c	c	c	c	c	c	c
UTM Zone	c	c	c	c	c	c	c
UTM Northing	c	c	c	c	c	c	c
UTM Easting	w	c	c	c	c	c	c
Elevation	c	c	c	c	c	c	c
Permafrost Descrip	c	c	np	np	c	w	c
Ice Content	np	np	np	np	np	np	np

Legend: c: Correct, np: Not Provided, w: Wrong, m: Missing, na: Not Available


GRANULAR MATERIALS INVENTORY - STAGE III

SITE NO. 1089		HOLE NO. 4		PAGE 1 OF 2	
DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT %	DEPTH (feet)
				10 20 30 40	
1	PT	ORGANIC MATERIAL			1
2					2
3					3
4	ML	CLAY-SILT -wet on thawing			4
5					5
6					6
7					7
8		ICE			8
9					9
10					10
11	ML	SILT -sandy clay -very wet zones on thawing			11
12					12
13					13
14					14
15					15
16					16
17					17

DATE DRILLED: June /73	LOGGED BY: DPW 46	COMPLETION DEPTH: 30'
DRILLING METHOD: HELI		THAW DEPTH: N/A

GOVERNMENT OF CANADA DEPARTMENT OF INDIAN AND NORTHERN AFFAIRS	 EBA Engineering Consultants Ltd.
--	--

GRANULAR MATERIALS INVENTORY - STAGE III

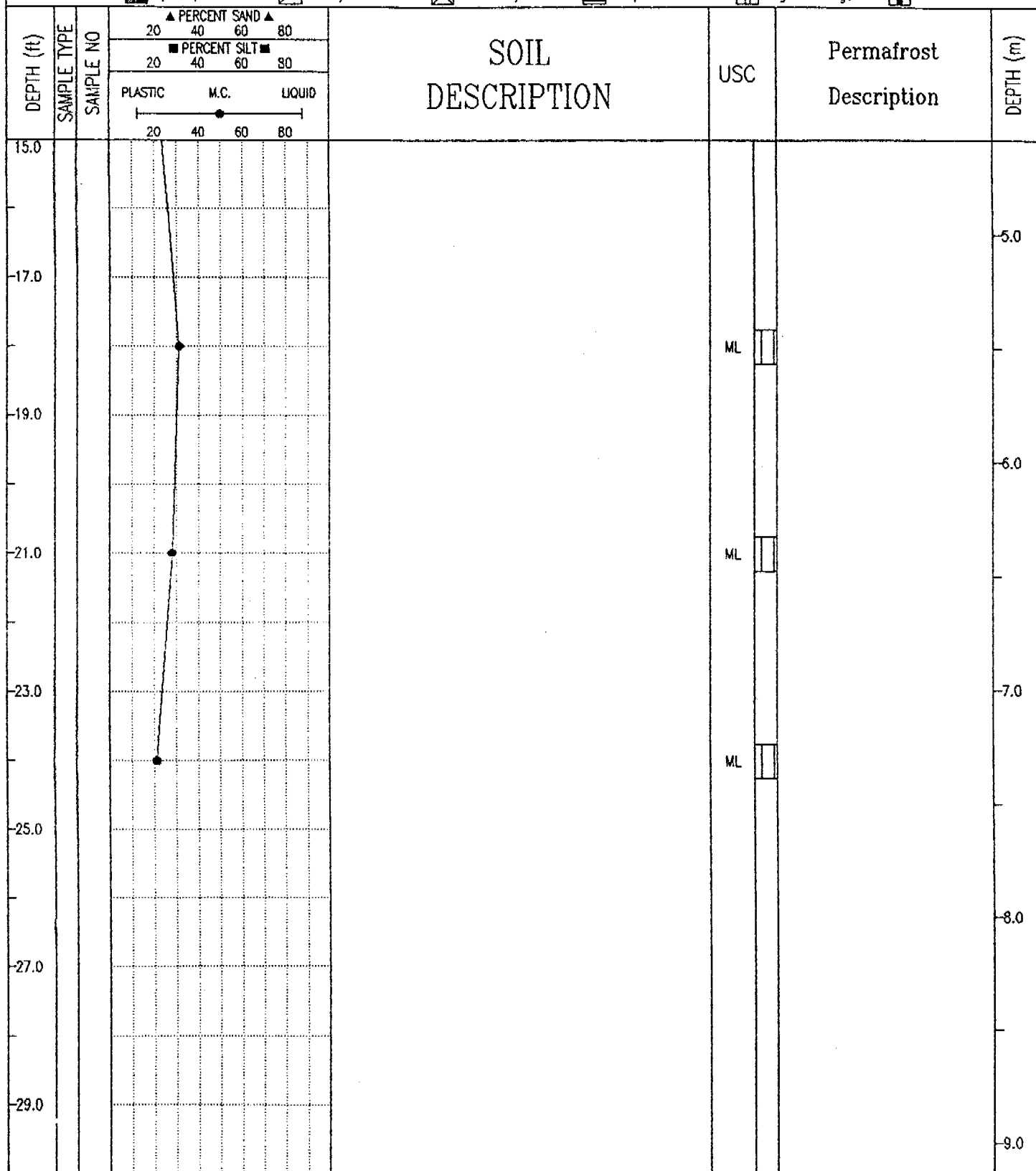
SITE NO. 1089		HOLE NO. 4		PAGE 2 OF 2					
DEPTH (feet)	UNIFIED GROUP SYMBOL	SOIL DESCRIPTION	GROUND ICE DESCRIPTION	MOISTURE CONTENT %				DEPTH (feet)	
				10	20	30	40		
18		SILT -sandy clay -very wet zones on thawing				○		18	
19									19
20									20
21							○		21
22									22
23									23
24							○		24
25									25
26									26
27									27
28									28
29									29
30									30
31									31
32									32
33									33
34									34
DATE DRILLED: June /73		LOGGED BY: DPW 46		COMPLETION DEPTH: 30'					
DRILLING METHOD: HELI				THAW DEPTH: N/A					
GOVERNMENT OF CANADA DEPARTMENT OF INDIAN AND NORTHERN AFFAIRS				 EBA Engineering Consultants Ltd.					

Dept of Indian Affairs and North. Dev.		NTS MAP NO 106 0 10		BOREHOLE No. 1089-4	
EBA Engineering Consultants Ltd.		UTM ZONE: 9 N7494090.00 E423550.00		Project No: 07797	
GENETIC: Glaciofluvial		METHOD: Air Drill		ELEVATION 375.00 (ft)	
SAMPLE TYPE <input checked="" type="checkbox"/> Split Spoon <input checked="" type="checkbox"/> Shelby Tube <input checked="" type="checkbox"/> RockCore/Barrel <input type="checkbox"/> Unspecified <input type="checkbox"/> Auger cuttings <input type="checkbox"/>					

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	<div style="text-align: center;"> ▲ PERCENT SAND ▲ 20 40 60 80 ■ PERCENT SILT ■ 20 40 60 80 PLASTIC M.C. LIQUID 20 40 60 80 </div>	SOIL DESCRIPTION	USC	Permafrost Description	DEPTH (m)
0.0				Peat ; highly organic soils			0.0
				Inorganic Silts, Very fine sands			
-2.0							
					ML		1.0
-4.0							
-6.0					ML		2.0
-8.0				Ice	ICEE	Ice	
				Inorganic Silts, Very fine sands			
-10.0							3.0
-12.0					ML		4.0
-14.0					ML		

Mackenzie Valley Geotechnical Data Bank		COMPLETION DEPTH 30.0 ft	COMPLETE 0673
LOGGED BY	DWG NO.	Page 1 of 2	

Dept of Indian Affairs and North. Dev.		NTS MAP NO 106 0 10	BOREHOLE No. 1089-4
EBA Engineering Consultants Ltd.		UTM ZONE: 9 N7494090.00 E423550.00	Project No: 07797
GENETIC: Glaciofluvial		METHOD: Air Drill	ELEVATION 375.00 (ft)
SAMPLE TYPE <input checked="" type="checkbox"/> Split Spoon <input checked="" type="checkbox"/> Shelby Tube <input checked="" type="checkbox"/> RockCore/Barrel <input type="checkbox"/> Unspecified <input type="checkbox"/> Auger cuttings <input type="checkbox"/>			



Mackenzie Valley
Geotechnical Data Bank

COMPLETION DEPTH 30.0 ft

COMPLETE 0673

LOGGED BY

DWG NO.

Page 2 of 2

Mackenzie Valley

89.11.24 09:33:21 am ESE1100

Current database: FOOTHILL(I)

BOREHOLE NUMBER: 1089-4 INDEX DATA

Project Number: 07797

NAME:

Proj Engr:

CLIENT:

Compiled By:

Dept of Indian Affairs and North. Dev.

CONSULTANT:

SEBA Engineering Consultants Ltd.

TEXTURE:

GENETIC CATEGORY:

Glaciofluvial

MORPHOLOGICAL MODIFIER

Drilling Comments:

METHOD: Air Drill

PURPOSE: Engineering testing

DRILLING DATE: 0673

Thaw Depth :

Water Level:

Termin. Depth: 30.00

Temperature ZONE: E

Top of Hole: 375.000

Datum:

Drawing No:

TM COORDS : UTM ZONE: 9 Easting:423550 Northing: 7494090

NTS MAP SHEET NO 106 Letter:0 No2: 10 Letter2:

PRESS PgDn -to Edit Index for another borehole Esc - Return to Data Entry Menu

Current database: FOOTHILL(I)

CURRENT BOREHOLE: 1089-4

SAMPLE SUMMARY

Total records= 8

TOP	BOTTOM	NO	USC	DIA	TYPE	SAMPLE COMMENTS
(m)	(m)			(m)		
2.75	3.25		BML		30	
5.75	6.25		BML		30	
7.75	8.25		SICEE		30	
10.75	11.25		BML		30	
13.75	14.25		BML		30	
17.75	18.25		BML		30	
20.75	21.25		BML		30	
23.75	24.25		BML		30	

Home-->1st Page ^End -->Last Page

Press Ins - To add record(F10) Del - Delete the record ; Esc - Quit

F1 SAMPLE	F3 STRENGTH	F5 SCIENCE	F7 SOIL	F9 CHANGE BOREHOLE
F2 BASIC	F4 CONSOLID	F6 CUSTOM	F8 COMMENTS	F10 INPUT NEW DATA

Current database: FOOTHILL(I)

CURRENT BOREHOLE: 1089-4

BASIC TEST DATA

Total records= 8

TOP	NO	GR	SA	SI	CL	OR	MaxSz	N4	N10	N40	200	m.c	LIQ	pla	pla	Sat
(m)		%	%	%	%	%	in	%	%	%	%	%	%	lim	Ind	%
2.75												21				
5.75												33				
7.75												39				
10.75												32				
13.75												21				
17.75												31				
20.75												28				
23.75												21				

Home-->1st Page ^End -->Last Page

Press Del - Delete the field ; Esc - Quit

F1 SAMPLE	F3 STRENGTH	F5 SCIENCE	F7 SOIL	F9 CHANGE BOREHOLE
F2 BASIC	F4 CONSOLID	F6 CUSTOM	F8 COMMENTS(c)	1988 ESE Software Ltd.

Mackenzie Valley

89.11.24 09:36:58 am ESE1800

Current database: FOOTHILL(1)

CURRENT BOREHOLE: 1089-4

SOIL DESCRIPTION

Total records= 5

DEPTH	BN	LN	Soil
(m)			Description
0.00	--		Peat ; highly organic soils
1.00	--		Inorganic Silts,Very fine sands
8.00	--		Ice
9.00	--		Inorganic Silts,Very fine sands
30.00	xx		Bottom

Home-->1st Page ^End -->Last Page

Press Ins - To add record(F10) Del - Delete the record ; Esc - Quit

F1 SAMPLE F3 STRENGTH F5 SCIENCE F7 SOIL F9 CHANGE BOREHOLE

F2 BASIC F4 CONSOLID F6 CUSTOM F8 COMMENTS F10 INPUT NEW DATA

Mackenzie Valley

89.11.24 09:37:41 am ESE1900

Current database: FOOTHILL(I)

CURRENT BOREHOLE: 1089-4

DEPTH COMMENTS

Total records= 1

DEPTH
\$ (m) \$
\$ 8.00 \$ Ice

ADDITIONAL
COMMENTS

\$
\$

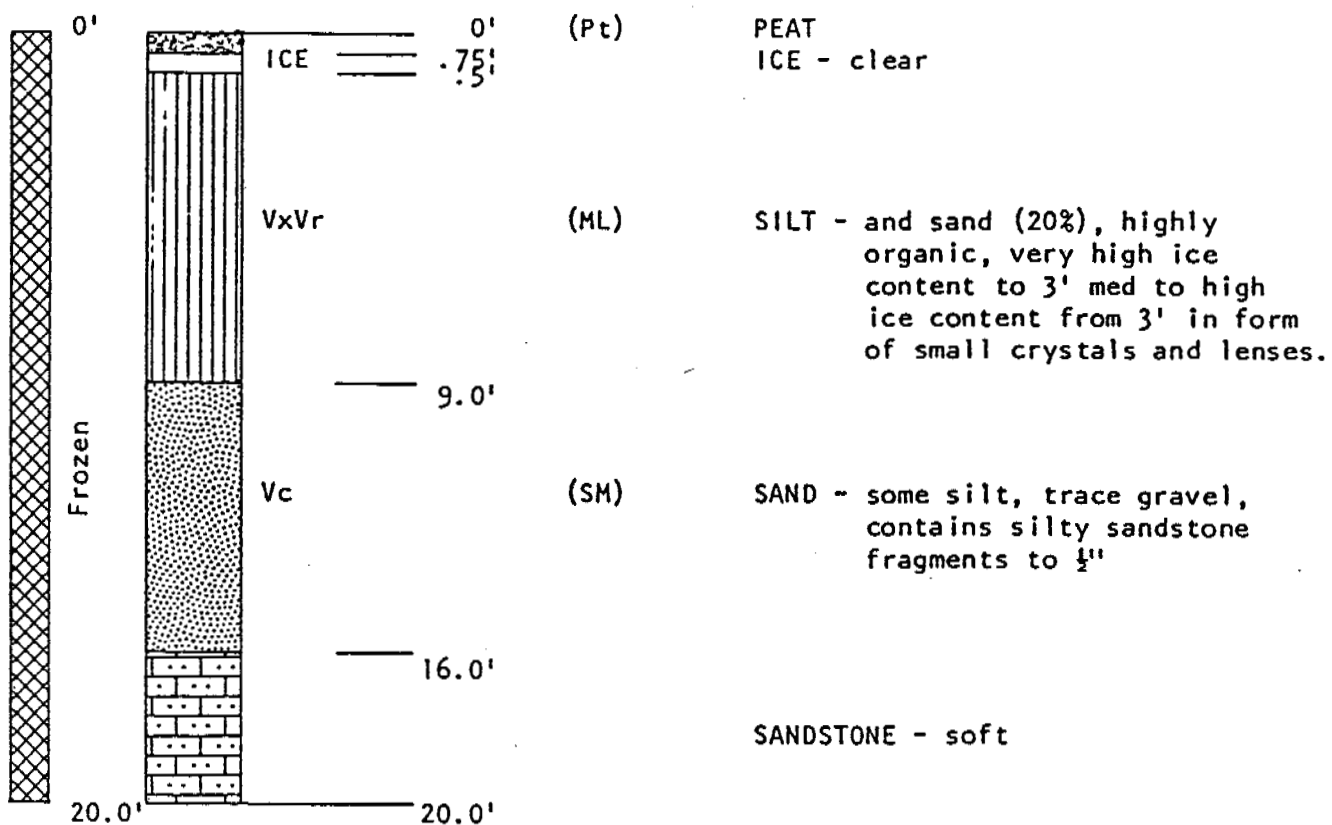
Home-->1st Page ^End -->Last Page

Press Ins - To add record(F10) Del - Delete the record ; Esc - Quit
F1 SAMPLE F3 STRENGTH F5 SCIENCE F7 SOIL F9 CHANGE BOREHOLE
F2 BASIC F4 CONSOLID F6 CUSTOM F8 COMMENTS F10 INPUT NEW DATA

TEST HOLE LOGS

SOURCE No. 554

554 - 6



Dept of Indian Affairs and North. Dev.		NTS MAP NO 106 M 11		BOREHOLE No. 554-6	
Ripley, Kohn, and Leonoff		UTM ZONE: 8 N7511740.00 E484260.00		Project No: 07585	
GENETIC: Glaciofluvial		METHOD: Air Percussion		ELEVATION 41.00 (ft)	
SAMPLE TYPE: <input checked="" type="checkbox"/> Split Spoon <input checked="" type="checkbox"/> Shelby Tube <input checked="" type="checkbox"/> RockCore/Barrel <input type="checkbox"/> Unspecified <input type="checkbox"/>					

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	<div style="display: flex; justify-content: space-between;"> <div>▲ PERCENT SAND ▲</div> <div>■ PERCENT SILT ■</div> </div> <div style="display: flex; justify-content: space-between;"> <div>20 40 60 80</div> <div>20 40 60 80</div> </div> <div style="display: flex; justify-content: space-between;"> <div>PLASTIC</div> <div>M.C.</div> <div>LIQUID</div> </div> <div style="display: flex; justify-content: space-between;"> <div>20 40 60 80</div> <div></div> </div>			SOIL/ROCK DESCRIPTION	USC	Permafrost Description	DEPTH (m)
0.0					Peat ; highly organic soils		Frozen- Type Unknown	0.0	
					Ice		Ice		
					Inorganic Silts, Very fine sands		Visible ice - indiv. crystals		
-2.0									
-4.0									
-6.0									
-8.0									
-10.0					Silty Sands		Visible ice - coating on particles	3.0	
-12.0									
-14.0								4.0	

Mackenzie Valley Geotechnical Data Bank		COMPLETION DEPTH 20.0 ft		COMPLETE 0373	
		LOGGED BY	DWG NO.	Page 1 of 2	

Dept of Indian Affairs and North. Dev.		NTS MAP NO 106 M 11		BOREHOLE No. 554-6					
Ripley, Klohn, and Leonoff		UTM ZONE: 8 N7511740.00 E484260.00		Project No: 07585					
GENETIC: Glaciofluvial		METHOD: Air Percussion		ELEVATION 41.00 (ft)					
SAMPLE TYPE <input checked="" type="checkbox"/> Split Spoon <input type="checkbox"/> Shelby Tube <input checked="" type="checkbox"/> RockCore/Barrel <input type="checkbox"/> Unspecified <input type="checkbox"/>									
DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	▲ PERCENT SAND ▲		SOIL/ROCK DESCRIPTION	USC	Permafrost Description	DEPTH (m)	
			20	40					
			■ PERCENT SILT ■						
			20	40					
			PLASTIC	M.C.	LIQUID				
			20	40	60	80			
15.0							Frozen- Type Unknown		
					Sandstone			5.0	
17.0									
19.0									
					Bottom			6.0	
21.0									
23.0								7.0	
25.0								8.0	
27.0									
29.0								9.0	

Mackenzie Valley Geotechnical Data Bank		COMPLETION DEPTH 20.0 ft		COMPLETE 0373	
		LOGGED BY	DWG NO.	Page 2 of 2	

Current database: FOOTHILL(I)

BOREHOLE NUMBER: 554-6 INDEX DATA

Project Number: 07585

NAME:	Proj Engr:
CLIENT:	Compiled By:
Dept of Indian Affairs and North. Dev.	
CONSULTANT:	
Ripley, Klohn, and Leonoff	

TEXTURE:

GENETIC CATEGORY:

Glaciofluvial

MORPHOLOGICAL MODIFIER

Drilling Comments:

METHOD: Air Percussion

PURPOSE: Engineering testing

DRILLING DATE:	0373
Thaw Depth :	.
Water Level:	.
Termin. Depth:	20.00
Temperature ZONE:	E
Top of Hole:	50.000
Datum:	.
Drawing No:	

UTM COORDS : UTM ZONE: 8 Easting:484260 Northing: 7511740

NTS MAP SHEET NO 106 Letter:M No2: 11 Letter2:

PRESS PgDn -to Edit Index for another borehole Esc - Return to Data Entry Menu

CURRENT BOREHOLE: 554-6

SOIL DESCRIPTION

Total records= 6

DEPTH	BN	UN	Soil	Description
(m)				
0.00			Peat	highly organic soils
0.50			Ice	
0.80			Inorganic Silts	Very fine sands
9.00			Silty Sands	
16.00			Sandstone	
20.00	xxx		Bottom	

Home-->1st Page ^End -->Last Page

Press Ins - To add record(F10) Del - Delete the record ; Esc - Quit

F1 SAMPLE F3 STRENGTH F5 SCIENCE F7 SOIL F9 CHANGE BOREHOLE

F2 BASIC F4 CONSOLID F6 CUSTOM F8 COMMENTS F10 INPUT NEW DATA

Mackenzie Valley

89.11.21 10:48:35 am ESE1900

Current database: FOOTHILL(I)

CURRENT BOREHOLE: 554-6

DEPTH COMMENTS

Total records= 5

DEPTH	ADDITIONAL
(m)	COMMENTS
0.00	Frozen- Type Unknown
0.50	Ice
0.80	Visible ice - indiv. crystals
9.00	Visible ice - coating on part
16.00	Frozen- Type Unknown

Home-->1st Page ^End -->Last Page

Press Ins - To add record(F10) Del - Delete the record ; Esc - Quit

F1 SAMPLE	F3 STRENGTH	F5 SCIENCE	F7 SOIL	F9 CHANGE BOREHOLE
F2 BASIC	F4 CONSOLID	F6 CUSTOM	F8 COMMENTS	F10 INPUT NEW DATA

APPENDIX D
INTERFACE WITH AUTOCARD

APPENDIX D

INTERFACE WITH AUTOCAD

Interface Between ESEBase and Autocad

1.0 ESEBase

A search is made in ESEBase for the desired boreholes. A file is exported specifying Easting then Northing. ESEBase exported files always have the Borehole Name as the first record so, in fact, the exported file will be Borehole Name, X, Y.

2.0 UTILITY

ESE2ACAD is a rather primitive program written at EBA for the purpose of moving ESEBase exported files to AutoCad. Because of its relative user hostility, it has not been released by ESE Software.

ESE2ACAD reads the BH, X, Y file from ESEBase and translates it to the Script format which can be interpreted by AutoCad. ESE2CAD provides several options including Circle or Dot, Symbol Layer (user specified), Diameter, and Text size, angle, Text Layer (user specified).

AUTOCAD

In AutoCad, the SCRIPT file may be invoked in a new or in an existing drawing. Overlays for NTS maps can be prepared by first running Script in a new drawing, then adding the grid lines and labels. The small maps included in this report were created by running Script into an existing sketch.

APPENDIX E
BOREHOLE LOGS ADDED TO THE MACKENZIE VALLEY DATABASE

APPENDIX E

BOREHOLE LOGS ADDED TO THE MACKENZIE VALLEY DATABASE

Six hundred and ninety-five new borehole logs were added to the Mackenzie Valley Database. These logs were extracted from site investigation reports prepared by various engineering consultants and Public Works Canada. The requirements for inclusion in the Mackenzie Valley Database were that the information contained in the reports is in the public domain and that the boreholes are located along the Mackenzie Valley. All borehole logs from the following reports were included in the database.

Hardy Associates (1978) Ltd., 1982. Norman Wells pipeline project 1982 drilling program data report. Report prepared for Interprovincial Pipe Line (NW) Ltd.

Hardy Associates (1978) Ltd., 1982. Norman Wells pipeline project. Report on investigations for evaluation of slopes. Report prepared for Interprovincial Pipe Line (NW) Ltd. (224 borehole logs from the two reports)

Templeton Consultants Limited, 1971. Data report on preliminary soils and terrain investigation program Mile 100 to Mile 520 of proposed pipeline route (Appendices I to VI). Report prepared for the Alberta Gas Trunk Line Company Ltd. Gas Arctic Project. (249 borehole logs)

EBA Engineering Ltd., 1972. Terrain Investigations proposed Arctic Gas pipeline routes. Richards Island Laterals and Lower Mackenzie Alternatives. Vol II-IV. Prepared for Gas Arctic/Northwest Project Study Group. (95 borehole logs)

Only boreholes related to granular borrow source investigations were included from the following report.

Public Works Canada, Western Region, 1981. Report geotechnical investigation
Mile 970 (km 0) to Mile 1058 (km 143) Inuvik to Tuktoyaktuk, Mackenzie Highway
Combined data 1976 to 1980.

Vol I: all boreholes from appendix D

Vol II: boreholes from 1-1 to 18-3 in Appendix D
(127 borehole logs)

APPENDIX F
DATABASE DISKS AND INSTALLATION PROCEDURE

APPENDIX F

DATABASE DISKS AND INSTALLATION PROCEDURE

Mount Install Diskette in Drive A: (then type)

A: (enter)

A:FB (enter)

The Fastback main menu will appear on the screen. Press the right arrow key to get to the restore option.

The default settings are to restore to Drive C:. If another drive is required highlight the Hard Disk sub-option (Cursor keys and Enter) and enter the appropriate Drive letter (e.g. D or F or G etc). You will need at least 25 Mbytes on your destination drive.

From the restore option highlight "START RESTORE" and press Enter. The restore submenu will now appear on the screen.

Mount the first backup disk in Drive A: and use the right arrow key to get to the start restore option (on the restore submenu). Press Enter and the restore process will begin.

The box on the bottom left corner will request subsequent diskettes as required.

When done Press "esc" to get out of restore menu and use the exit option of the main menu.

ESEBase can be run from the directory/esebase on your hard disk.

e.g. C:

CD/esebase

esebase