



Public Works
Canada

Western Region

Travaux Publics
Canada

Region de l'Ouest



D003513

GEOTECHNICAL INVESTIGATION

Mile 970 (Inuvik) To Mile 1059 (Tuk)

MACKENZIE HIGHWAY



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J. Inglis

PUBLIC WORKS CANADA

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REPORT ON
GEOTECHNICAL INVESTIGATION
MILE 970 (INUVIK) TO MILE 1059 (TUKTOYAKTUK)
MACKENZIE HIGHWAY

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October 15, 1976

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1. INTRODUCTION

1.1 General

This report presents the results of a field investigation and assessment of potential borrow sources along the Mackenzie Highway between Inuvik and Tuktoyaktuk, N.W.T. The objective of the investigation was to locate and evaluate all unconsolidated material and bedrock suitable for embankment construction within a haul distance of approximately four miles of the highway location.

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1.2 Procedure

The investigation procedure initially entailed a study of existing geological data available from the Geological Survey of Canada, and from two reports by Klohn Leonoff Consultants Ltd. namely:

- (1) Granular Materials Inventory - Zones I and III - 1972
(prepared for Department of Indian Affairs and Northern Development).
- (2) Granular Materials Inventory - Parsons Lake, N.W.T. - 1974
(prepared for Gulf Oil Canada Ltd.).

Airphoto interpretation was used to identify those land forms in which gravel and sand were most likely to be present, and Mr. Vern Rampton, Ph.D. of Terrain Analysis and Mapping Services Ltd. was retained to identify potential areas of shallow bedrock along the route. A field reconnaissance was carried out in August, 1975 to ground check potential sources and plan a drilling program.

An extensive test borings program was carried out in March and early April of 1976. Work began at Inuvik (Mile 970) and was

terminated at Mile 1043, some 15 miles south of the settlement of Tuktoyaktuk. A total of 43 surface features and land forms were investigated and roughly 300 test holes were drilled and sampled. Field work and subsequent laboratory testing was carried out by staff of the Special Services section, Design and Construction Branch, P.W.C., Western Region.

1.3 Data Presentation

A 1:250,000 route map included overleaf outlines the route and identifies 13 'Search Sectors', plus the features or land forms investigated in each sector. Land forms which were drilled are designated as 'Test Areas' and are numbered consecutively beginning at Inuvik and proceeding northward toward Tuktoyaktuk.

The 13 Search Sectors are summarized in Section 2 with respect to the quantity and quality of material available in each.

Appendix A contains 13 pages outlining the terms and symbols used in the report, the classification system used for permafrost soils, and a brief description of the drilling, sampling, and laboratory testing programmes.

Appendix B contains a more detailed description of each Search Sector identified on the 1:250,000 route map. Each Sector is identified by a tab which shows the Sector Number and includes a 1" = 3,000' airphoto mosaic outlining the Test Areas investigated; a 1" = 1,000' airphoto mosaic showing borehole locations in each Test Area; plus a description of the feature or land forms, materials encountered, volumes, stripping and

recommendations for development. Test hole logs are also included.

Occasional test holes were drilled at random on the route centre-line. These holes are shown on the 1" = 1,000' airphoto mosaics in each Sector and test hole logs are included.

2. SUMMARY OF RESULTS

2.1 General Geology

Between Inuvik (Mile 971) and approximately Mile 1005, the Mackenzie Highway alignment crosses the eastern edge of the Caribou Hills. Much of the relief through this section is a direct reflection of underlying Tertiary strata that forms the core of these hills, although the entire area is overlain by erratic unconsolidated sediments. The surfical sediments consist of varying thicknesses of morainal, glacio-fluvial, lacustrine and organic deposits. They contain abundant ice including massive icy beds. The hummocky nature of parts of the area is probably due to a combination of glacial depositional features and thermokarst activity.

North of Mile 1005 the highway alignment crosses the boundary between the Caribou Hills and the Pleistocene Coastal Plain. The terrain north of this line is underlain by unconsolidated sediments well over 100 feet in thickness and containing abundant ground ice. It consists of a complex of interbedded glaciofluvial, morainic, fluvial, lacustrine, organic and thermokarst sediments. Bedrock in this area is nowhere within 100 feet of the surface.

2.2 Potential Borrow Sources

Thirteen general sectors of potential borrow sources were identified for field investigation within three to four miles of the alignment between Mile 971 and Mile 1043. To Mile 1005 the search areas were concentrated where shallow bedrock was expected. North of Mile 1005, search areas consisted of fluvial or glacio-fluvial depositional features which were considered potential source of granular deposits.

2.3 Borrow Sources

Only seven (7) areas proved to contain materials of sufficient quality or quantity for development as viable sources of embankment borrow. These sources are as follows:

<u>Sector No.</u>	<u>Mileage</u>	<u>Material</u>	<u>Volumes (Cu. Yds.)</u>
1	972	shale	1,000,000+
6	1000	shale, siltstone sandstone	750,000
7	1006	sand, gravel	500,000
8	1009	sand, gravel	1,800,000
11	1030	sand, gravel	200,000
12	1034	sand, gravel	1,000,000+
13	1041	sand, gravel	300,000

All sectors are summarized in more detail in Table I at the end of this section and are fully described in Appendix B.

The unconsolidated sediments above bedrock between Inuvik and Mile 1005 are more extensive and erratic than expected, and only two sources of usable bedrock borrow were encountered within this

section, resulting in a gap of some 28 miles between proven borrow sources. There are very few glacio-fluvial features which could possibly be a source of granular borrow here, and there are considered to be very few, if any, untested potential sources of bedrock borrow that are within three to four miles of the right-of-way. Additional areas that could be field checked would include: (1) a northern extension of the bedrock controlled escarpment along the edge of the Mackenzie River delta from Inuvik to Douglas Creek (west of the alignment); (2) the glacial spillway and surrounding area west of Mile 995 toward Bonnet Plume Lake; and (3) possible granular deposits east of Mile 990 and south and east of Jimmy Lake. It is expected that if any usable bedrock borrow is found on the west side of the present alignment it will be too distant for economic use and an alignment shift may have to be considered.

Additional drilling will be required in both proven bedrock sources to define stripping and outline the preferred area(s) for development of pits.

The unconsolidated sediments north of Mile 1005 are extremely erratic and variable and contain extensive ground ice. Terrain is very irregular where there are glacio-fluvial deposits and, as a result, the alignment has been located on more level ground near Eskimo Lakes and away from many of the glacio-fluvial deposits. This has resulted in a second large gap in proven borrow sources along the alignment - Mile 1009 to Mile 1030. There are granular borrow sources west of the alignment within this section, many in the form of small kames that could be developed. However they are

too far from the present alignment for economic use, and because of the abundant lakes and hummocks within the glacio-fluvial deposits, highway relocation into these areas would appear impractical at first glance. Further field investigation along the present alignment between Mile 1009 and 1030 would be fruitless.

With the exception of the Sector 8 deposit (Hans Creek), the granular borrow sources north of Mile 1005 are in kames and granular ridges that tend to be small, shallow, and contain layers and blocks of clear ice. The drilling to date in the areas designated as borrow sources has been sufficient to determine that there is usable borrow and to outline the general areas for development. However these glacio-fluvial deposits are extremely variable and erratic, and intermixed with random massive ice layers and blocks, and detailed drilling grids will be required to define the limits of the deposits and the preferred areas for borrow pits. The granular deposits are themselves relatively free of excess ice (moisture contents on thawing are usually between 5 - 10%), but large clear ice layers randomly sandwiched between layers of usable material are common and can only be outlined by detailed drilling patterns. It is considered unlikely that any of the glacio-fluvial features could be developed for quantities in excess of 100,000 cu. yds. without encountering some clear ice blocks.

TABLE I - SUMMARY OF FIELD INVESTIGATION

Sector	Test Areas	Location	Material	Volume Estimate (Cu. Yds.)	Ground Ice	Stripping	Conclusions
1	#1, #2 #3	Adjacent to Alignment near Mile 972 Haul distance less than 1/2 Mile	Soft Shale	1,000,000+	Random very minor ice lenses in shale. Much excess ice and some massive ice above shale	Variable from 5' to 10'	Excellent borrow source. Recommended for development. Can be ripped or shot. More drilling required
2	#4, #5 #6, #7 #8, #9 #9A	Within 4,000' of alignment between Miles 977 and 981	Fissile Shale, Siltstone and Sandstone acceptable plus some stripping Gravel in small isolated knobs	Possible total of 100,000 from four features with some massive ice on flanks of knobs	Nil excess ice in core of knobs. Much excess ice and high points of knobs - rapidly increasing on not recommended for flanks to 20'+	Variable - little or no stripping on flanks to 20'+	Areas are highly visible and massive stripping would be required to develop any significant volumes - increasing on not recommended for development
3	#10, #11	2,000' west of alignment Mile 983-985	Minor sand and gravel 25,000 - silty	Possibly massive ice around small granular ridges	Excess ice and some massive ice around small granular ridges	Little or no stripping on gravel ridges	Features are very small and shallow - insufficient volumes to warrant development
4	#12	3 miles west of 987	Clay and silts Shale at depths of probably 80'+	—	Much excess ice	—	Not suitable for development

Sector	Test Areas	Location	Material	Volume Estimate (Cu. Yds.)	Ground Ice	Stripping	Conclusions
5	#13, #14 #15, #16	Adjacent to, and one to two miles on either side of Alignment Mile 996 - 997	Very poorly consolidated Sandstone - breaks down to fine wet silty sand on thawing	Unlimited	Excess ice above sand - Little excess ice in sand	5 - 6' in selected areas	Sand material would likely be subject to wind erosion in place. Better borrow available at Mile 999 - not recommended for development
6	#17, #18	Adjacent to Alignment at Mile 999	Poorly consolidated shales, siltstones and sandstones	750,000 with limited stripping	Little excess ice in bedrock - Excess ice in stripping on flanks of ridges	Variable from Good borrow source - 0 - 5' on tops of ridges to possibly 15'+ - More drilling on lower ridges	
7	#19, #19A	Area #19 is 1/2 to 1 1/2 - Trace Silt Area #19 in miles east of Alignment Mile 1003 to 1006.	Sandy Gravel Unlimited in numerous small kames and ridges. Area #19A contains probably 500,000 Cu. Yds.	In ice in granular layers - massive ice blocks between granular layers	Little excess ice in 0 to 7-8' to the Alignment	Development of Area #19A adjacent to the Alignment is recommended - more drilling required	
8	Drilled by others	Hans Creek Mile 1009	Sandy Gravel 2,000,000+ - trace silt	Little excess ice in granular deposits - little or no massive ice	Variable from Excellent borrow source. 0 to 10'	Extensively drilled by Gulf Oil Canada who plan usage of much material for gas plant site.	

Sector	Areas	Locations	Material	Volume Estimate (Cu. Yds.)	Ground Ice	Stripping	Conclusions
9	#20, #20A #21, #22 #23E, #23F	Small features within 1 mile of R.O.W. Miles 1012 to 1016	Silts clays minor gravel	--	Much excess ice and some massive ice	--	Unsuitable for borrow
10	#23, #23A #23B, #23C, #23D, #24B	Kames on west side of R.O.W. Mile 1024 to 1026 - up to 3 miles west of Alignment	Sands and Gravel - Trace silt yds. in many small features - trace silt yds. in many small features	Total of 500,000+ cu. - some massive ice in granular deposits	Much excess ice in stripping - some massive ice in granular deposits	Variable from 0 to 20', R.O.W.	Not recommended for borrow - either too far from alignment over rough terrain, or excess stripping of sources near R.O.W.
11	#24, #24A	Kames and gravel ridges west of R.O.W. Miles 1029 to 1033 - 1/2 to 1 1/2 Miles from Alignment	Sands and Gravels - trace silt yds. in many small features - trace silt yds. in many small features	Total of 500,000+ cu. - excess ice in stripping	Some massive ice in granular deposits - excess ice in stripping	Variable from 0 to 5', R.O.W.	Recommend development of several small features in Area #24A within roughly 1/2 mile of R.O.W. - Possibly 200,000 cu. yds. available here
12	#25	Concentration of Kames Gravels adjacent to R.O.W. at Mile 1034	Sands and - trace silt features	1,000,000+ in several features	Some massive ice in granular deposits - Excess ice in stripping	Variable from 0 - 7'	Good source of embankment borrow. Several features will have to be developed. More drilling required.

Sector	Areas	Locations	Material	Volume Estimate (Cu. Yds.)	Ground Ice	Stripping	Conclusions
13	#26, #26A Small #26B, #27 features #27A, #27B within #27C, #28 3,000' of R.O.W.	Small Features Trace Silt Miles 1036 to 1042	Sands and Gravels Trace Silt	Total of 300,000+ cu. yds. in three to four features	Little or no Excess ice or massive ice	- zero to two feet on most features	Good embankment borrow source - several small features can be developed

Appendix A

APPENDIX A

1. Drilling and Sampling

A Failing 1250 rotary drilling rig was used throughout the field programme. This rig advances a hole by high speed rotation of tungsten-carbide insert bits, and soil cuttings are brought to the surface by a continuous flow of pressurized air. Samples are taken by collecting cuttings at the ground surface. Although the samples are disturbed, a specific depth can be sampled as cuttings are instantaneously brought to the surface by the flow of air.

Holes were generally drilled to a depth of 30 feet with samples taken at depths of 2', 5', 8', 11', 15', 20', 25 and 30'. Where much excess or massive ice was encountered, sampling was discontinued..

All samples were returned to the Departmental laboratory in Edmonton, and were visually identified, assessed as to relative thawed moisture content, and tested for natural moisture content. Additional testing was carried out on selected samples from areas that had potential as borrow sources - usually both grain size analyses and Atterberg Limits were performed. Final borehole logs were then prepared with both field and laboratory data included, for evaluation and reporting.

2. Soils Classification

Soils were classified according to the Unified Classification System which is outlined at the rear of this Appendix.

Soil samples were also categorized in the laboratory using a series of terms to indicate the relative moisture content of the soil in the thawed state. The terms and their approximate relationship to the Atterberg Limits are summarized below:

<u>Relative Moisture Content</u>	<u>Atterberg Limits</u>
'dry'	
'humid'	
'damp'	plastic limit
'moist'	
'wet'	liquid limit
'saturated'	
'free water'	

The above information is included on the borehole log sheets for all samples.

3 Ice Description

The ice classification system used is a modification of that outlined in the National Research Council Technical Memorandum No. 73 "A Guide to a Field Description of Permafrost." A brief outline of the N.R.C. system is included at the end of this Appendix.

The N.R.C. system requires relatively large undisturbed samples in order to establish if the ground ice is stratified, random, in individual crystals, or occurs as coating on larger soil particles. With the air circulation rig used on this project, the sample cutting sizes returned to the surface ranged from chips of 3/4" maximum dimension, to powder. Large ice lenses (1/2" or more)

could be detected by close observation of drill cuttings, and ice crystals or ice coatings could be determined from the soil chips, however accurate classification of the intervening excess ice formations was impossible. During past testing programmes in the N.W.T., technicians have had the opportunity to compare drill cuttings with drill cores and have developed a 'feel' for ground ice through visual observation of disturbed cuttings. Therefore, the classification of the ground ice that is recorded on the bore-hole logs, using the N.R.C. symbols, is at least partially inferred or estimated.

In addition to the N.R.C. classification system, the logging technicians also used a series of relative terms to indicate the amount of visual ground ice. These terms and the approximate relationship to ground ice are outlined below.

<u>Relative Term</u>	<u>Visual Ground Ice</u>
'nil'	- frozen, but little or no ice in any form - usually confined to dry surface gravels or bedrock.
'low'	- ice coatings, ice crystals and, possibly, occasional very small lenses.
'moderate'	- numerous small ice lenses.
'high'	- continuous small ice lenses with a significant amount of large (1/2"+) ice lenses.

Relative Term

'very high'

'ice'

Visual Ground Ice

- continuous large ice lenses.

- ice with some soil, or clear
ice.

GLOSSARY OF TERMS

Active Layer	The layer of soil above the permafrost table (in the area of this study, the active layer usually freezes completely during the winter.)
Alluvium	Stream deposits of comparatively recent time, does not include subaqueous deposits of seas and lakes.
Anhydrite	A mineral, anhydrous calcium sulfate, CaSO ₄ . Orthorhombic, commonly massive in evaporite beds.
Annuals	A plant that lives only one year or season.
Autoclave Expansion	Laboratory test procedure as designated by ASTM-C151-63 for determination of expansive qualities for all types of Portland Cement and aggregate reactions.
Berm	A horizontal portion of an earth embankment to ensure greater stability of a long slope.
Biotic	Of or pertaining to life or mode of living.
Boreal	Pertaining to the North.
Boulder	A rock fragment larger than 8" in diameter.
Cartographic	Pertaining to a map. In geology a cartographic unit is a rock or group of rocks that is shown on a geologic map by a single color or pattern.
Clay	Soil particles smaller than 0.002 mm. in diameter.
Cobble	A rock fragment between 3" and 8" in diameter.
Colluvium	A general term applied to loose and incoherent deposits, usually at the foot of a slope or cliff and brought there chiefly by gravity.

Conglomerate	Rounded water-worn fragments of rocks or pebbles, cemented together by another mineral substance which may be of a siliceous or argillaceous nature.
Continuous Zone	That zone where permafrost occurs everywhere beneath the ground surface including large lakes and rivers.
Cretaceous	The third and latest of the periods included in the Mesozoic era; also the system of strata deposited in the Cretaceous period.
Crystalline	Of or pertaining to the nature of a crystal; having regular molecular structure.
Delta Deposits	An alluvial deposit, usually triangular, at the mouth of a river.
Devonian	In the ordinarily accepted classification, the fourth in order of age of periods, comprised in the Paleozoic era, following the Silurian and succeeded by the Mississippian. Also the system of strata deposited at that time.
Discontinuous Zone	That zone where permafrost occurs everywhere beneath the ground surface except beneath large lakes or wide rivers.
Dolomite	A mineral, $\text{CaMg}(\text{CO}_3)_2$, commonly with some iron replacing magnesium; a common rock-forming mineral.
Drunken Forest	An area characterized by the appearance of many trees leaning in differing directions without any apparent pattern to the direction of inclination. This phenomenon is caused by differential thawing of ground ice.
Ecology	The study of the mutual relationships between organisms and their environments.
Eolian	Deposits which are due to the transporting action of the wind.
Escarpment	The steep face of a ridge of high land.

Esker	A narrow ridge of gravelly or sandy drift, deposited by a stream in association with glacier ice.
Excess Ice	Ice in excess of the fraction that would be retained as water in the soil voids upon thawing.
Fauna	The animals collectively of any given age or region.
Flood Plain	That portion of a river valley, adjacent to the river channel, which is built of sediments during the present regime of the stream and which is covered with water when the river overflows its banks at flood stages.
Flora	The plants collectively of any given formation, age or region.
Fossiliferous	Containing organic remains.
Geomorphology	The study of landscape and of the geologic forces that produce it. It is the dynamic geology of the face of the earth. It concerns that branch of physical geography dealing with the origin and development of the earth's surface; features (landforms) and the history of geologic changes through the interpretation of topographic forms.
Geothermal Gradient	Change in temperature of the earth with depth, either in degrees per unit depth or in units of depth per degree.
Glacial Till	Non sorted, non stratified sediment carried or deposited by a glacier.
Glaciofluvial	Fluvioglacial. Pertaining to streams flowing from glaciers or to the deposits made by such streams.
Glaciolacustrine	Pertaining to glacial-lake conditions, as in glaciolacustrine deposits.
Gravel	Soil particles smaller than 3" in diameter and larger than 2.0 mm in diameter.

Ground Ice	Bodies of more or less clear ice in permanently frozen ground.
Ground Moraine	A moraine with low relief, devoid of transverse linear elements.
Gypsum	Alabaster. Selenite. Satin Spar. A mineral, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. Monoclinic. A common mineral of evaporites.
Heterogeneous	Differing in kind; having unlike qualities; possessed of different characteristics; opposed to homogeneous.
Hummock	A mound or knoll.
Icing	Mass of surface ice formed during winter by successive freezing of sheets of water seeping from the ground, a river or spring.
Kames	A mound composed chiefly of gravel or sand, whose form is the result of original deposition modified by settling during the melting of glacier ice against or upon which the sediment is accumulated.
Karst	A limestone plateau marked by sinkholes and underlain by cavernous carbonate rocks having subterranean drainage channelways that largely follow solution-widened joints, faults, and bedding planes.
Lacustrine	Produced or belonging to lakes.
Lichen	Any of a group of low growing plant formations composed of a certain fungi growing close together with certain algae.
Massif	A French term adopted in geology and physical geography for a mountainous mass or group of connected heights, whether isolated or forming a part of a larger mountain system.

Meandering	Condition of river that follows a winding path owing to natural physical causes not imposed by external restraint. Characterized by alternating shoals and bank erosion.
Moraine	Drift, deposited chiefly by direct glacial action and having constructional topography independent of control by the surface on which the drift lies
Morphological	The scientific study of form. Used in various connections, e.g. landforms (geomorphology).
Muskeg	The term designating organic terrain, the physical condition of which is governed by the structure of peat it contains and its related mineral sub-layers considered in relation to topographic features and the ground vegetation with which the peat co-exists.
Ordovician	The second of the periods comprised in the Paleozoic era, in the geological classification now generally used. Also, the system of strata deposited during that period.
Organic Soil	Soil material which contains a significant proportion of organic material. Where the organic nature of the soil is the dominant characteristic, the soil is referred to as a peat.
Perennial	Lasting through the year.
Permafrost	The thermal condition under which earth materials are at a temperature below 32° F continuously for a number of years.
Permafrost Degradation	The lowering of the permafrost table due to thawing.
Permafrost Table	A more or less irregular surface which represents the upper limit of permafrost.
Petrography	The branch of science treating of the systematic description and classification of rocks.
Proglacial	Pertaining to features of glacial origin beyond the limits of the glacier itself, as...streams,...deposits,...sand.

Sand	Soil particles smaller than 2.0mm. in diameter and larger than 0.06mm. in diameter.
Screes	A heap of rock waste at the base of a cliff or a sheet of coarse debris mantling a mountain slope.
Seasonal Frost	Freezing of the ground during the winter. The term implies that the frost so formed will thaw during the following spring or summer.
Silurian	The third in order of age of the geologic periods comprised in the Paleozoic era, in the nomenclature in general use. Also the system of strata deposited during that period.
Sinuous	Winding or curving in and out.
Slope Wash	Soil and rock material that is being or has moved down a slope predominantly by the action of gravity assisted by running water that is not concentrated into channels.
Sporadic Zone	That zone where permafrost occurs only in isolated patches (usually beneath peat bogs)
Subgrade	The original ground upon which an embankment is placed.
Surface Degradation	The lowering of the ground surface due to thawing of underlying ground ice.
Taiga	A Russian word applied to the old, swampy, forested region of the north...that region between the Tundra in the north and the Boreal in the south.
Talus	Coarse angular fragments of rock and subordinate soil material dislodged by weathering (temperature and moisture changes) and collected at the foot of cliffs and other steep slopes and moved downslope primarily by the pull of gravity.

Terrace	A relatively flat elongate stairstepped surface bounded by a steeper ascending slope on one side and a steep descending slope on the other.
Tertiary	The earlier of the two geologic periods comprised in the Cenozoic era, in the classification generally used. Also the system of strata deposited during that period.
Thaw Settlement	Settlement of a soil mass due to thawing of ground ice.
Thermal Conductivity	The amount of heat passing through a unit cross-section in unit time under the influence of unit heat gradient.
Thermal Erosion	Erosion due to the melting of ground ice rather than the removal of soil
Thermal Regime	The temperature conditions in the ground at a given point in time.
Thermal Regression	The thawing of frozen ground due to surface disturbance, increasing temperature, etc.
Thermokarst	Uneven land subsidence caused by the melting of ground ice. The resulting ground surface resembles the karst topography found in limestone areas.
Thermokarst Lake	(Cave-in Lake), lakes which occupy depressions resulting from subsidence caused by thawing of ground ice.
Tundra	Any of the vast, nearly level, treeless plains of the Arctic Regions.
Turbid	Having the sediment stirred up hence muddy, impure.

**EXPLANATION OF
SYMBOLS AND TERMS USED IN THIS REPORT**

GENERAL CLASSIFICATION SYSTEM FOR SOILS					
MAJOR DIVISION		Group SYMBOL	Graph SYMBOL	TYPICAL DESCRIPTION	
COARSE-GRAINED SOILS (more than half by weight larger than 200 sieve)		BOULDERS	N/A	LARGER THAN 8 INCHES DIAMETER	
		COBBLES	N/A	3 TO 8 INCHES DIAMETER	
GRAVELS more than half coarse grains larger than No. 4 sieve & 100% smaller than 3 inches diameter	CLEAN GRAVELS (little or no fines)	G W	WELL GRADED GRAVELS, LITTLE OR NO FINES		
	DIRTY GRAVELS (with some fines)	G P	POORLY GRADED GRAVELS, AND GRAVEL-SAND MIXTURES, LITTLE OR NO FINES		
SANDS more than half fine grains smaller than No. 4 sieve.	G M		SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES		
	G C		CLAYEY GRAVELS, GRAVEL-SAND CLAY MIXTURES		
CLEAN SANDS (little or no fines)	S W		WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES		
	S P		POORLY GRADED SANDS, LITTLE OR NO FINES		
DIRTY SANDS (with some fines)	S M		SILTY SANDS, SAND-SILT MIXTURES		
	S C		CLAYEY SANDS, SAND-CLAY MIXTURES		
	FINE-GRAINED SOILS (more than half by weight passes 200 sieve)		SILTS below "A" line on plasticity chart	W_L 50%	M L
			CLAYS above "A" line on plasticity chart	W_L 50%	M H
			ORGANIC SILTS & CLAYS below "A" line on chart	W_L 30%	C L
				30% W_L 50%	C I
				W_L 50%	C H
				W_L 50%	O L
				W_L 50%	O H
			HIGHLY ORGANIC SOILS	P t	PEAT AND OTHER HIGHLY ORGANIC SOILS

NATIONAL RESEARCH COUNCIL PERMAFROST

CLASSIFICATION SYSTEM

Permafrost ground ice occurs in three basic conditions including non-visible, visible (less than one inch in thickness) and clear ice.

A. Non-visible - N

N_f - poorly bonded or friable frozen soil

N_{bn} - well bonded soil, no excess ice

N_{be} - well bonded soil, excess ice

B. Visible - V (less than 1" thick)

V_x - individual ice crystals or inclusions

V_c - ice coatings on particles

V_r - random or irregularly oriented ice formations

V_s - stratified or oriented ice formations

C. Visible Ice - (greater than 1" thick)

Ice - ice with soil inclusions

Ice + soil - ice without soil inclusions

A more complete description of this system is included in NRC publication TM 79.

Sector 1

SEARCH SECTOR NO. 1

Landform and Location: A bedrock controlled escarpment located one to two miles east and north of Inuvik, and at approximately Mile 972 of the Mackenzie Highway.

Designated Test Drilling Areas: Areas #1, #2 and #3.

Material: Shale - soft to medium hard.

Stripping: Probably nine to ten feet.

Volume: Unlimited.

Conclusion: Excellent source of embankment borrow.
Suitable for large scale development.
Area #2 considered the best area for a large borrow pit.

No. 1 - Sector Topography

This search area is a portion of a bedrock controlled escarpment that begins immediately east of Inuvik and continues toward the north. The escarpment is a line of demarkation between uplands to the east, associated with the Caribou Hills, and the modern Mackenzie Delta and adjacent terraces to the west. The uplands are covered by variable thicknesses of glacial till and isolated patches of glacial outwash, most of which contain an abundance of ice, in many cases massive ice. There are three narrow, but relatively deep erosion channels or canyons cut perpendicular to the escarpment within the areas test drilled. Retrogressive - thaw flow slides have developed in the surficial ice - rich sediments along the

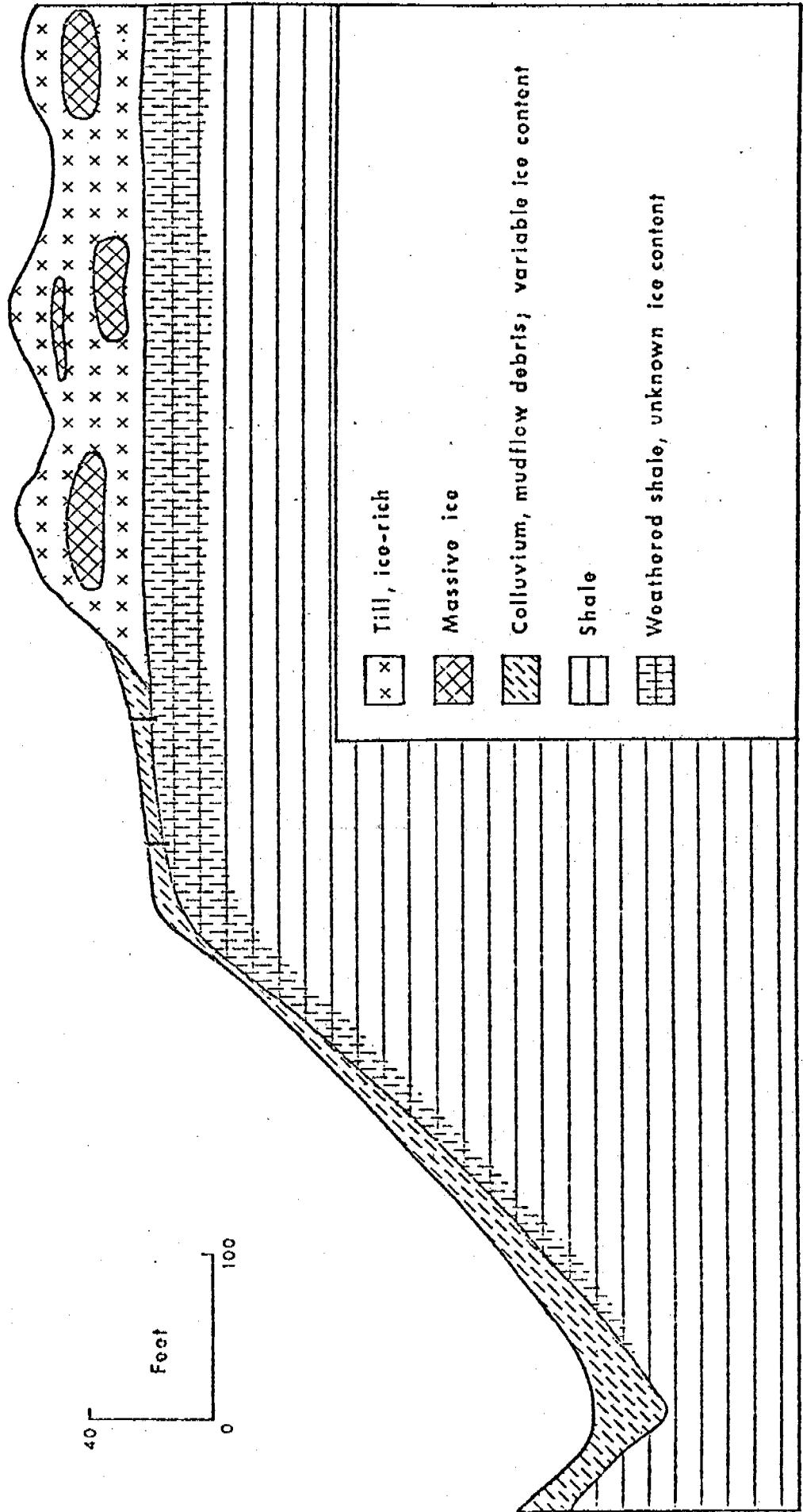
rims of the canyons, and the faces of these slumps have retreated some distance back from the rims and from the escarpment. As a result, overburden soils over bedrock are thinnest and relatively free of massive ice near the edge of the escarpment. Mud flow debris from the upland slumps have been deposited in the bottom of the erosion channels and on benches adjacent to the rims.

At present a large number of shallow failures confined to the active layer are present along the canyons. These are a result of a recent fire (four to five years), which caused the active layer to thicken and shallow ice-rich sediments to melt. A schematic cross-section across the rim of an erosion canyon through the escarpment is included overleaf.

No. 1 - Materials and Quantities

A total of 31 test holes were drilled along the escarpment. There is shale at depth throughout the areas drilled, although the overburden soils are widely variable in terms of both depth and ice content. In general, overburden is least along the edges of the erosion canyons through the escarpment, however the lateral extent of the shallow bedrock along the canyons is limited. The minimum overburden encountered was in the order of nine to 10 feet, most of which was ice-rich silty clay which is unsuitable for construction use and will have to be wasted. The maximum depth drilled was 110' into shale in hole #11 in Area #2. The shale is described as soft to medium hard throughout and is similar to the shale used for construction from Mile 964 to Mile 971 (Airport to Inuvik). Using that as a basis, the shale can either be drilled and shot, or ripped successfully with heavy equipment.

It is estimated that in excess of 1,000,000 cu. yds. will be required from

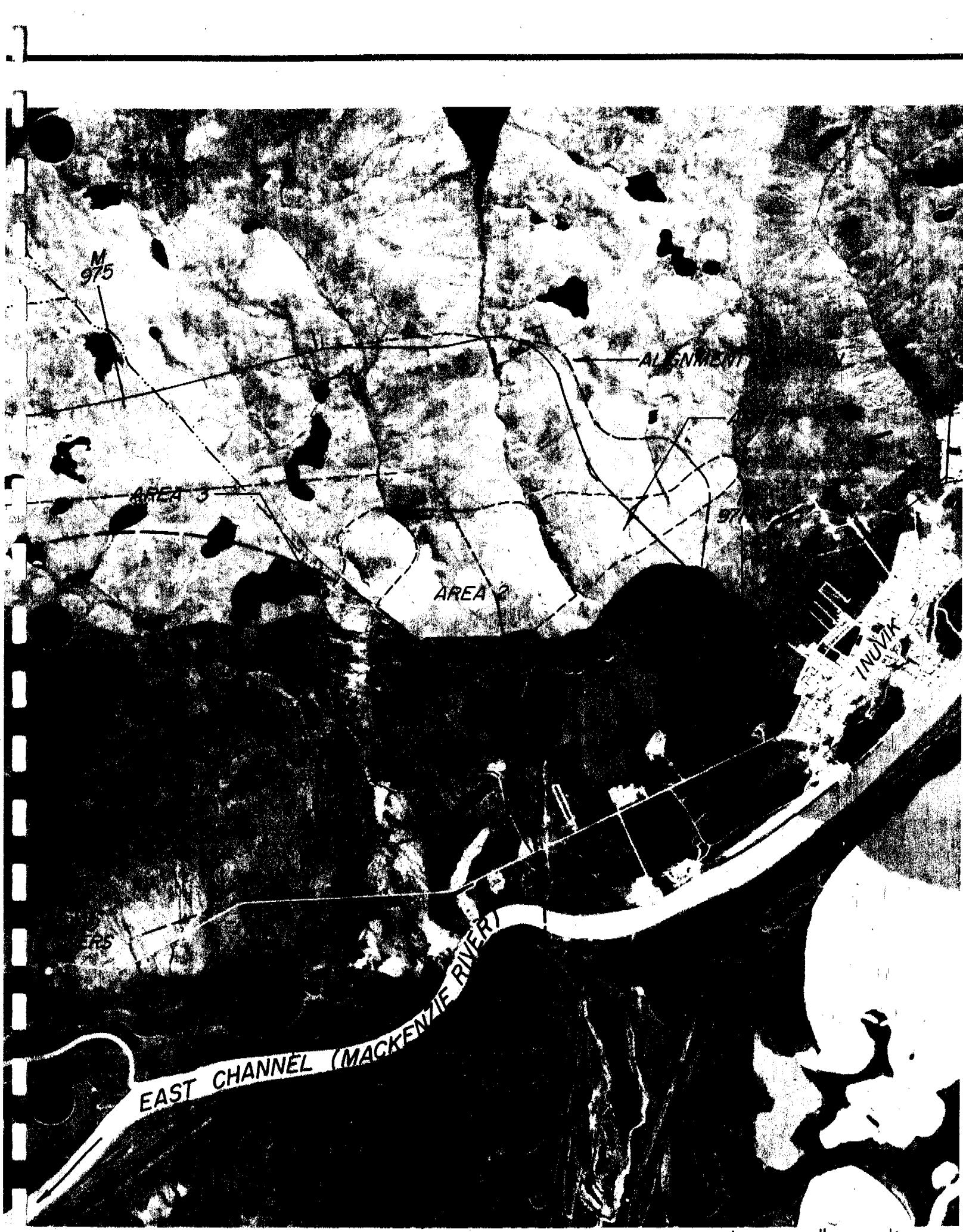


Schematic cross-section across canyon rim east of Inuvik.

this escarpment hence a large pit will have to be developed. The most promising zones are near holes #1 and #2 in Area #1, hole #5 in Area #1, hole #1 in Area #2, and holes #8, #10, #11, #12 and #15 in Area #2. Further drilling is recommended to isolate the preferred borrow pit when the final route location up the escarpment is selected. Some consideration is being given to a route up the canyon between Areas #1 and #2 on the photo-mosaic, and if this location is selected, it may be possible to develop the required yardage by 'daylighting' a borrow area along one edge of the canyon where the overburden is shallow.

The shale is frozen throughout and occasional thin ice lenses were noted in some holes, however generally the shale is relatively dry with a moisture content near 10%.

All borehole logs from Areas #1, #2 and #3 are included on the following pages for easy reference.



SCALE 1:36,000 (APPROX 1"=3,000')



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Bottom of Hole - 30'

Bottom of Hole - 20'

Bottom of Hole - 30

DRILL HOLE REPORT										DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY									
FIELD ENG	DATE DRILLED	AIRPHOTO NO.	CHAINAGE	TEST VANE	VEGETATION	OFFSET	ELEV.	TEST	HOLE	MILE	B.C.S	NUMBER							
C.D.	TECH	PRONYCH	RIG. #12	SURFACE DRAINAGE															
										972 + 2 - 6									
										REMARKS									
										DRY DENSITY (PCF)									
										WET DENSITY (PCF)									
										GRAVEL									
										SILT									
										SAND									
										CLAY									
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DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

FIELD ENG. DATE DRILLED 7/24/44 AIRPHOTO NO: 4001
 CKD TECH TROMYCH RIG AIR

SOIL DESCRIPTION
 1. CLAY - SAND
 2. SILTY
 3. GRAVEL - SAND - CLAY
 4. MIXTURE
 5. CLAY - SILTY
 6. SANDY
 7. PEBBLES
 8. MED. PLASTIC

TEST HOLE	ELEV.	VEGETATION:	ICE DESCRIPTION	SOIL DESCRIPTION	LIMITS OF FROZEN GROUND	DEPTH (FEET)	O : WATER CONTENT (% OF DRY WEIGHT) △ : ICE CONTENT (% OF SAMPLE VOLUME)	GRAIN-SIZE ANALYSIS	TEST	MILE	B.C.S	NUMBER
Q72-2-5	49-4328	Wet	Clay - Sand - Clay	1. CLAY - SAND 2. SILTY 3. GRAVEL - SAND - CLAY 4. MIXTURE	2' - 6'	20	O: 20% △: 2%	CLAY	Q72-2-5	2	2	5
Q5-50	49-483	Moist	Clay - Silty	5. CLAY - SILTY	6' - 16'	40	O: 40% △: 4%	SILT	Q5-50	4	3	3
Q3-43	49-4328	Moist	Sandy Pebbles	6. SANDY 7. PEBBLES	16' - 20'	80	O: 40% △: 4%	SAND	Q3-43	10	3	3
Q1-21	49-31	Damp	Med. Plastic	8. MED. PLASTIC	20' - 24'	100+	O: 50% △: 5%	GRAVEL	Q1-21	16	1	1
Q9-10	49-1030	Wet	Shale Fragment's	9. SHALE	24' - 28'	100+	O: 50% △: 5%	CLAY	Q9-10	24	1	1

Bottom of Hole: 30'

Damp

ΣΑ

Bottom of Hole - 30'

2

282

40E

2 of 4

ENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

304

4 OF 4

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DRILL HOLE REPORT										DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY									
FIELD ENG. CWD	TECH PROSPECT	DATE DRILLED 22/3/76	AIRPHOTO NO. A18	SURFACE DRAINAGE:	CHAINAGE:	VEGETATION:	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER						
1	CLAY - TURK	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
2	FIELD ENG. CWD	DATE DRILLED 22/3/76	AIRPHOTO NO. A18	SURFACE DRAINAGE:	CHAINAGE:	VEGETATION:	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER					
3	SOIL DESCRIPTION	ICE DESCRIPTION	ICE DESCRIPTION	ICE DESCRIPTION	ICE DESCRIPTION	ICE DESCRIPTION	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER					
4	PEAT	CLAY - SILTY	CLAY - V.R.	V.C - V.R.	V.S	MED. PLASTIC	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	
5	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL	UNIFORM SYMBOL
6	% RECOGNIZED	PENETRATION RESISTANCE	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER	TEST HOLE MILE B.C.S. NUMBER								
7	TYPE	SAMPLE NUMBER	SAMPLE NUMBER	SAMPLE NUMBER	SAMPLE NUMBER	SAMPLE NUMBER	SAMPLE NUMBER	SAMPLE NUMBER	SAMPLE NUMBER	SAMPLE NUMBER	SAMPLE NUMBER	SAMPLE NUMBER	SAMPLE NUMBER	SAMPLE NUMBER	SAMPLE NUMBER	SAMPLE NUMBER	SAMPLE NUMBER	SAMPLE NUMBER	
8	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	
9	SHALE FRAGMENTS	SHALE FRAGMENTS	SHALE FRAGMENTS	SHALE FRAGMENTS	SHALE FRAGMENTS	SHALE FRAGMENTS	SHALE FRAGMENTS	SHALE FRAGMENTS	SHALE FRAGMENTS	SHALE FRAGMENTS	SHALE FRAGMENTS	SHALE FRAGMENTS	SHALE FRAGMENTS	SHALE FRAGMENTS	SHALE FRAGMENTS	SHALE FRAGMENTS	SHALE FRAGMENTS	SHALE FRAGMENTS	
10	\$ SILTY CLAY	\$ SILTY CLAY	\$ SILTY CLAY	\$ SILTY CLAY	\$ SILTY CLAY	\$ SILTY CLAY	\$ SILTY CLAY	\$ SILTY CLAY	\$ SILTY CLAY	\$ SILTY CLAY	\$ SILTY CLAY	\$ SILTY CLAY	\$ SILTY CLAY	\$ SILTY CLAY	\$ SILTY CLAY	\$ SILTY CLAY	\$ SILTY CLAY	\$ SILTY CLAY	
11	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	POSSIBLE GROUND DOWN	
12	SHALE	SHALE	SHALE	SHALE	SHALE	SHALE	SHALE	SHALE	SHALE	SHALE	SHALE	SHALE	SHALE	SHALE	SHALE	SHALE	SHALE	SHALE	
13	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
14	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	
15	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	
16	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	
17	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	
18	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
19	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	
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24	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	

CHALE - SOFT

Bottom of Hole - 30

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

FIELD ENG. DATE DRILLED 7-21-76 AIRPHOTO NO:

RIG AIR

SURFACE DRAINAGE:

CHAINAGE:

LIMITS OF
FROZEN GROUND

SOIL DESCRIPTION

ICE DESCRIPTION

DEPTH (FEET)

DEPTH (METERS)

O = WATER CONTENT (% OF DRY WEIGHT)

△ = ICE CONTENT (% OF SAMPLE VOLUME)

LIQUID LIMIT

PLASTIC LIMIT

CLAY

SILT

SAND

GRAVEL

REMARKS

MILE

B.C.S.

NUMBER

QH2-2-1A

CLAY - SILTY
SANDY
TO
LOW PLASTIC
CL

SHALE - SOFT
LOOSE

VS

Vx

Bottom of Hole - 30'

Damo

Bottom of Hole - 30'

DRILL HOLE REPORT		DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY	
FIELD ENG. C.D.	DATE DRILLED TECHRONYCH	AIRPHOTO NO: RIG AIR	CHAINAGE:
SAMPLE NUMBER	DEPTH (FEET)	SAMPLE TYPE	SAMPLE NUMBER
1	2	CLAY - SILTY	1
2	4	MED. PLASTIC	2
3	6		3
4	8		4
5	10		5
6	12		6
7	14		7
8	16		8
9	18		9
10	20		10
11	22		11
12	24		12

VEGETATION:

ICE	DESCRIPTION	ICE DEPTH (FEET)	LIMITS OF FROZEN GROUND	WATER CONTENT (% OF DRY WEIGHT)	GRAIN-SIZE ANALYSIS	TEST HOLE
CLAY	SOIL DESCRIPTION	DEPTH (FEET)	PLASTIC LIMIT	LIQUID LIMIT	CLAY SILT SAND	972 - 3 + 1
△	○ = ICE CONTENT (% OF SAMPLE VOLUME)		40	60	% % %	REMARKS
4	○ = ICE CONTENT (% OF DRY WEIGHT)		60	100	%	
4	△ = ICE DEPTH (% OF SAMPLE VOLUME)		80	100+	%	
4	WATER CONTENT (% OF DRY WEIGHT)		100		%	

ELEV.

VS

ICE

Bottom of Hole - 30'

ICE

ICE

QA-6 off water

QA-6 off water

ICE

-96-4-0 West

Bottom of Hole - 30'

DEPARTMENT OF PUBLIC WORKS, CANADA

MACKENZIE HIGHWAY

DRILL HOLE REPORT

FIELD ENG. TURK.

DATE DRILLED 23/7/54

AIRPHOTO NO. AIR

TECH. FROHNCYH

RIG AIR

IN N	DEPTH (FEET)	SOIL DESCRIPTION	ICE DESCRIPTION	LIMITS OF FROZEN GROUND	VEGETATION	ELEV.	TEST HOLE		
							TEST	HOLE	NUMBER
2	CL CLAY - SANDY SILTY Loamy Plastic	4"	0	20	63-316 WET	63	Q12	3	5
4	SC SAND - CLAYEY 5.5	1	20	60	38-511 WET	38			
6	GRAVEL LENSE 6.5	1	20	60	23-725 SAT.	23			
8	SC SAND - SILTY Pebbly	1	20	60	23-6017 Freshwater	23			
10	CLAYEY	1	20	60	7-4746SAT.	7			
12	Gravely 11.5	1	20	60					
14	GRAVEL - SANDY	1	20	60					
16	CL	1	20	60					
17	CLAY - SILTY SANDY PEBBLES	1	20	60					
18	CL	1	20	60					
20	CL	1	20	60					
22									
24									

O = WATER CONTENT (% OF DRY WEIGHT)

△ = ICE CONTENT (% OF SAMPLE VOLUME)

PLASTIC LIMIT : 60

LIQUID LIMIT : 60

100+ %

100 %

%

WET DENSITY
(PCF)DRY DENSITY
(PCF)GROUT
REMARKS

-05-A-1 Moist

Bottom of Hole - 30'

PAPER REVISION

DRILL HOLE REPORT							DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY																																		
T A B E R - T U K		FIELD DRILLED		AIRPHOTO NO:		CHAINAGE:		TEST HOLE																																	
D.W.	FIELD ENG	DATE DRILLED	TECH (PROXY) C.F.	RIG AIR	SURFACE DRAINAGE:	VEGETATION:	OFFSET	ELEV.	MILE	B.C.S	NUMBER																														
C.K.O.									21																																
<p>SOIL DESCRIPTION</p> <p>CLAY - SILTY</p> <p>MAID. PLASTIC</p> <p>CL</p> <p>SHALE - SOFT</p> <p>q'</p> <p>Vc-VR</p> <p>Bottom of Hole. 15'</p>							<table border="1"> <caption>Approximate data points from the graph</caption> <thead> <tr> <th>Depth (ft)</th> <th>Water Content (%)</th> <th>Ice Content (%)</th> </tr> </thead> <tbody> <tr><td>2</td><td>20</td><td>0</td></tr> <tr><td>4</td><td>40</td><td>10</td></tr> <tr><td>5.5</td><td>50</td><td>20</td></tr> <tr><td>6</td><td>40</td><td>10</td></tr> <tr><td>8</td><td>20</td><td>0</td></tr> <tr><td>10</td><td>40</td><td>10</td></tr> <tr><td>12</td><td>50</td><td>20</td></tr> <tr><td>14</td><td>40</td><td>10</td></tr> <tr><td>15</td><td>20</td><td>0</td></tr> </tbody> </table>					Depth (ft)	Water Content (%)	Ice Content (%)	2	20	0	4	40	10	5.5	50	20	6	40	10	8	20	0	10	40	10	12	50	20	14	40	10	15	20	0
Depth (ft)	Water Content (%)	Ice Content (%)																																							
2	20	0																																							
4	40	10																																							
5.5	50	20																																							
6	40	10																																							
8	20	0																																							
10	40	10																																							
12	50	20																																							
14	40	10																																							
15	20	0																																							
<p>LIMITS OF FROZEN GROUND</p> <p>SOIL RESISTANCE UNITS</p> <p>SOIL SYMBOL</p> <p>PENETRATION RESISTANCE</p> <p>% RECOVERY</p> <p>SAMPLE NUMBER</p> <p>TYPE</p>																																									
<p>24 PALE</p> <p>A</p>																																									
<p>24</p>																																									

PAPER Revision

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DRILL HOLE REPORT

1

3

PAPER REVISION

Sector 2

SEARCH SECTOR NO. 2

Landform and Location: Hilly terrain south of Noell Lake near Miles 979 - 980 of the Mackenzie Highway - roughly seven miles north of Inuvik.

Designated Test Drilling Areas: Areas #4, #5, #6, #7, #8, #9 and #9A.

Material: Variable: - fissile decomposed bedrock - shale, siltstone, sandstone plus some sandy gravel.

Stripping: Variable - no stripping on the top of hillcocks - rapidly increasing on flanks of slopes to 20'+.

Volume: Volume on top of each hillcock where stripping would be minimal is in the order of 20 - 25,000 cu. yds. - thus could possibly obtain a total of 100,000 cu. yds. in Areas #6 and #9 combined (two hills in each Area). Further borrow would require extensive stripping.

Conclusions: Areas are highly visible and pit development would leave obvious scars. Because of stripping required to develop substantial volumes here, this source is not recommended.

No. 2 - Sector Topography

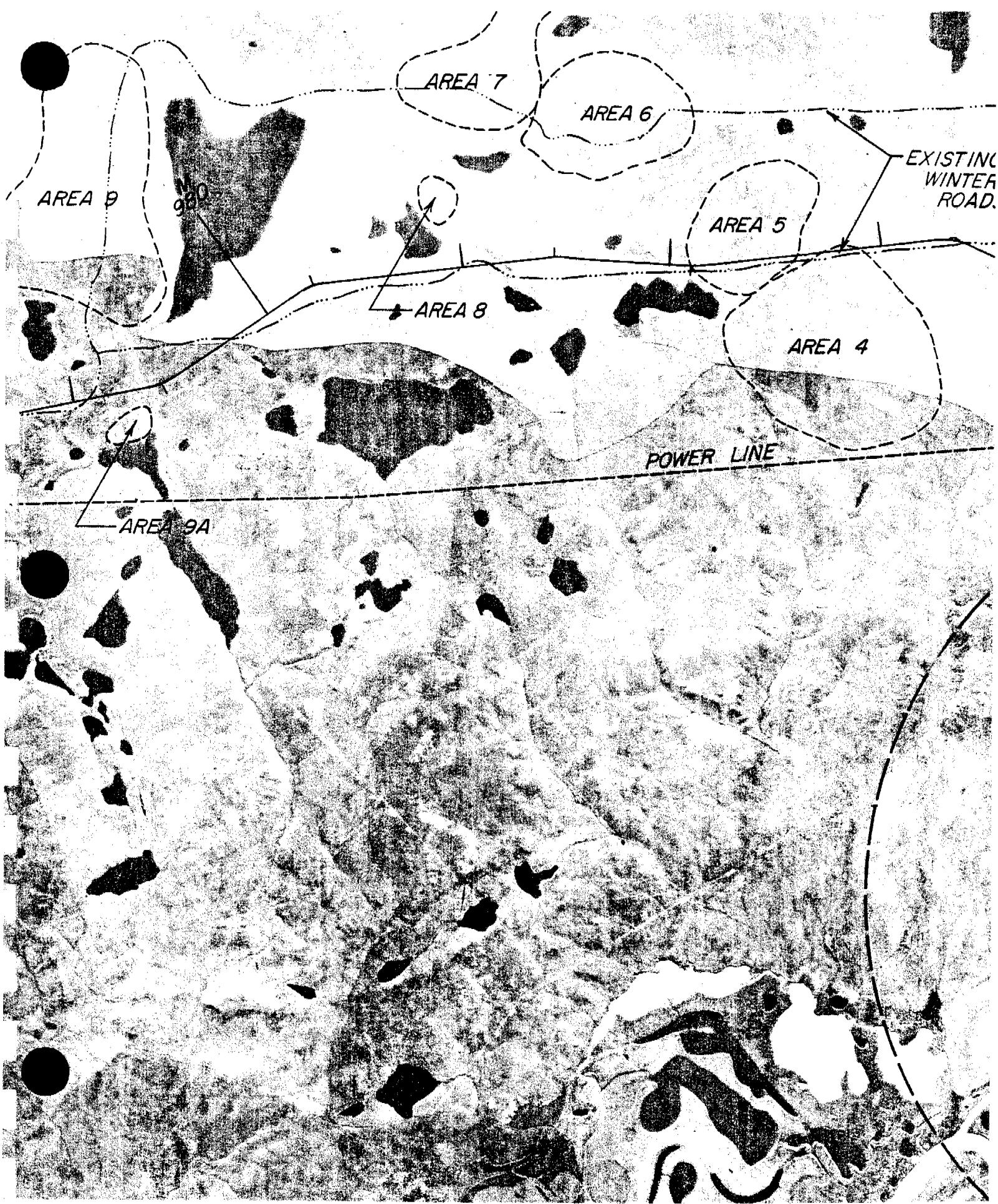
This search area is in an area of hummocky terrain immediately south of Noell Lake at approximately Mile 978 of the Mackenzie Highway. For the most part the hummocks are attributed to either the glacial origin of the surficial deposits, or a combination of ground ice and thermokarst, however some of the higher hills have bedrock cores. The tops of the high hills are relatively bare of glacial till, whereas the flanks are covered with either till or colluvium. There are isolated high points in Areas #6 and #9 which have weathered decomposed shale, siltstone and sandstone chips on the surface.

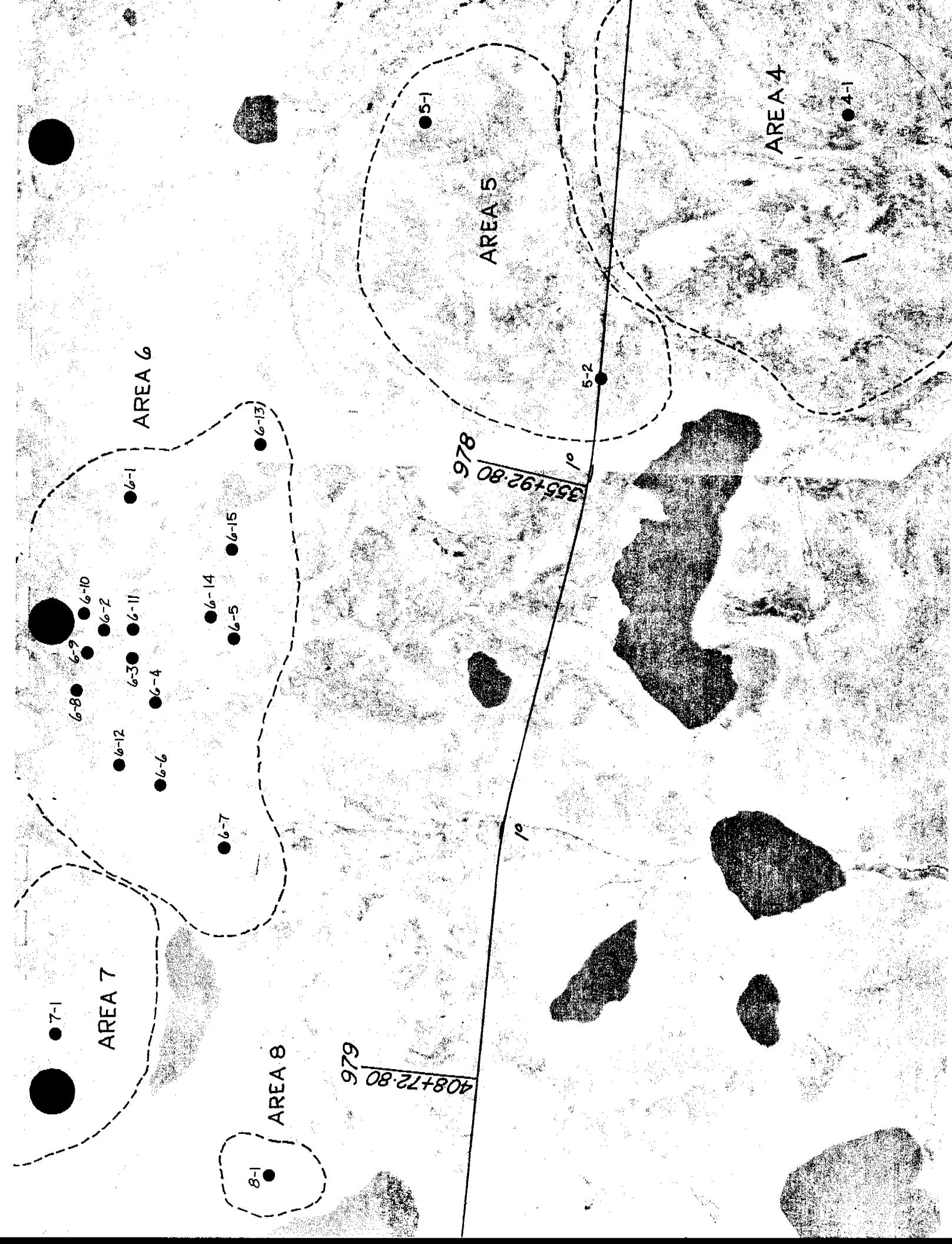
No. 2 - Materials and Quantities

A total of 31 test holes were drilled here in Areas #4 to #9A inclusive. The hill which comprises Area #6 is the highest feature for many miles and contains two points that have bedrock partings at the surface. Test holes on these exposures e.g. holes #6-2 and #6-12, revealed good borrow consisting of fissile shale, siltstone, sandstone and bentonite beginning at the surface, however adjacent test holes off the exposures but within 200 feet, encountered extensive ice-rich till and/or colluvium above the bedrock. Thus the bedrock cores here have very limited areal extent, and, while there is some good borrow material available, the stripping required on the flanks would make development of a borrow pit impractical.

Area #9 has similar cores of good borrow material with very limited areal extent - e.g. holes #9-4 encountered 30' of excellent rock borrow, and hole #9-8 encountered 15' of sandy gravel, but adjacent test holes revealed much ice rich material. Thus development of a borrow pit for the limited material available would be impractical.

Areas #4, #5, #7, #8 and #9A contain no usable material.







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MACKENZIE HIGHWAY

DRILL HOLE REPORT

AIRPHOTO NO:

DATE DRILLED:

RIG #:

FIELD ENG:

TECH:

TEST HOLE:

OFFSET:

CHAINAGE:

SURFACE DRAINAGE:

VEGETATION:

ICE:

DESCRIPTION:

FROZEN GROUND

LIMITS

DEPTH

(FEET)

SOIL SAMPLE

SOIL TEST

INUKUK - TUK.

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

FIELD ENG. DATE DRILLED 2/23/34 AIRPHOTO NO: 1/2

TECH. DRAWS BY RIG □ 1/2

SURFACE DRAINAGE:

CHAINAGE:

(PERCENT)	SAMPLE NUMBER	SAMPLE TYPE	SOIL GRADE	PENETRATION RESISTANCE	UNIFORMITY	SOIL SYMBOL	SOIL SAMPLE	DEPTH (FEET)	DEPTH (METERS)	SOIL DESCRIPTION	FROZEN GROUND LIMITS OF DEPTH (FEET)	WATER CONTENT (% OF DRY WEIGHT)	CLAY	SILT	SAND	GRAVEL	WET DENSITY (PCF)	DRY DENSITY (PCF)	TEST CORES	TEST HOLE
0	1	1	C	4	1	1	1	2	0.6	CLAY - SILTY / M.D. PLASTIC	40 - 60	0 - 100	0	0	0	0	0	0	0	0

ICE & SHALE

PACINGS

C

ICE

1

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

DATE DRILLED 13-5-56 AIRPHOTO NO: 100

FIELD ENG TECH DRILLING RIG: FIR

SOIL DESCRIPTION

SURFACE DRAINAGE:

VEGETATION:

TEST HOLE

DEPTH (FEET)	% ROCKWREN	SAMPLE NUMBER	TYPE	SANDS	SILT	CLAY	GRAVEL	SAND	SILT	CLAY	GRAVEL	REMARKS
2												
4												
6												
8												
10												
12												
14												
16												
18												
20												
22												
24												

DEPTH (FEET)	PENETRATION RESISTANCE	SOIL STRENGTH	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	ICE DEPTH (FEET)	O : WATER CONTENT (% OF DRY WEIGHT)	△ : ICE CONTENT (% OF SAMPLE VOLUME)	GRAIN-SIZE ANALYSIS	ELEV	TEST HOLE
2										
4										
6										
8										
10										
12										
14										
16										
18										
20										
22										
24										

2' CLAY - SILT / -PEBBLES
 2' PEAT
 5' GRAVEL - CLAY / GLEY
 2' COBBLES
 GLEY Possible Boulders

VS

F

Bottom of Hole - 30'

2 OF 2

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DRILL HOLE REPORT				TEST HOLE			
FIELD NO.	DATE DRILLED	AIRPHOTO NO.	CHAINAGE:	OFFSET	ELEV.	MILE	B.C.S.
HD	TECH	RIG	SURFACE DRAINAGE:	VEGETATION:		NUMBER	REMARKS
SOIL DESCRIPTION ICE DESCRIPTION SURFACE DRAINAGE VEGETATION: CLAY-SANDY ROCKS SHAPE SOFT MIXTURE				 O = WATER CONTENT (% OF DRY WEIGHT) △ = ICE CONTENT (% OF SAMPLE VOLUME) DEPTH (FEET) PLASTIC LIMIT LIQUID LIMIT 20 30 40 50 60 70 80 90 100 100+ 30 32 34 36 38 40 42 44 46			
PENETRATION RESISTANCE % RECOVERY SAMPLE NUMBER SAMPLE TYPE SOIL SYMBOL				44 High Plastic VX Bottom of Hole 45' 83-43 Wet 45-51.4 Damp -48-47.5 Damp 13-27.0 Moist			
FROZEN GROUND LIMITS OF							
TEST HOLE AREA - 6-12							

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

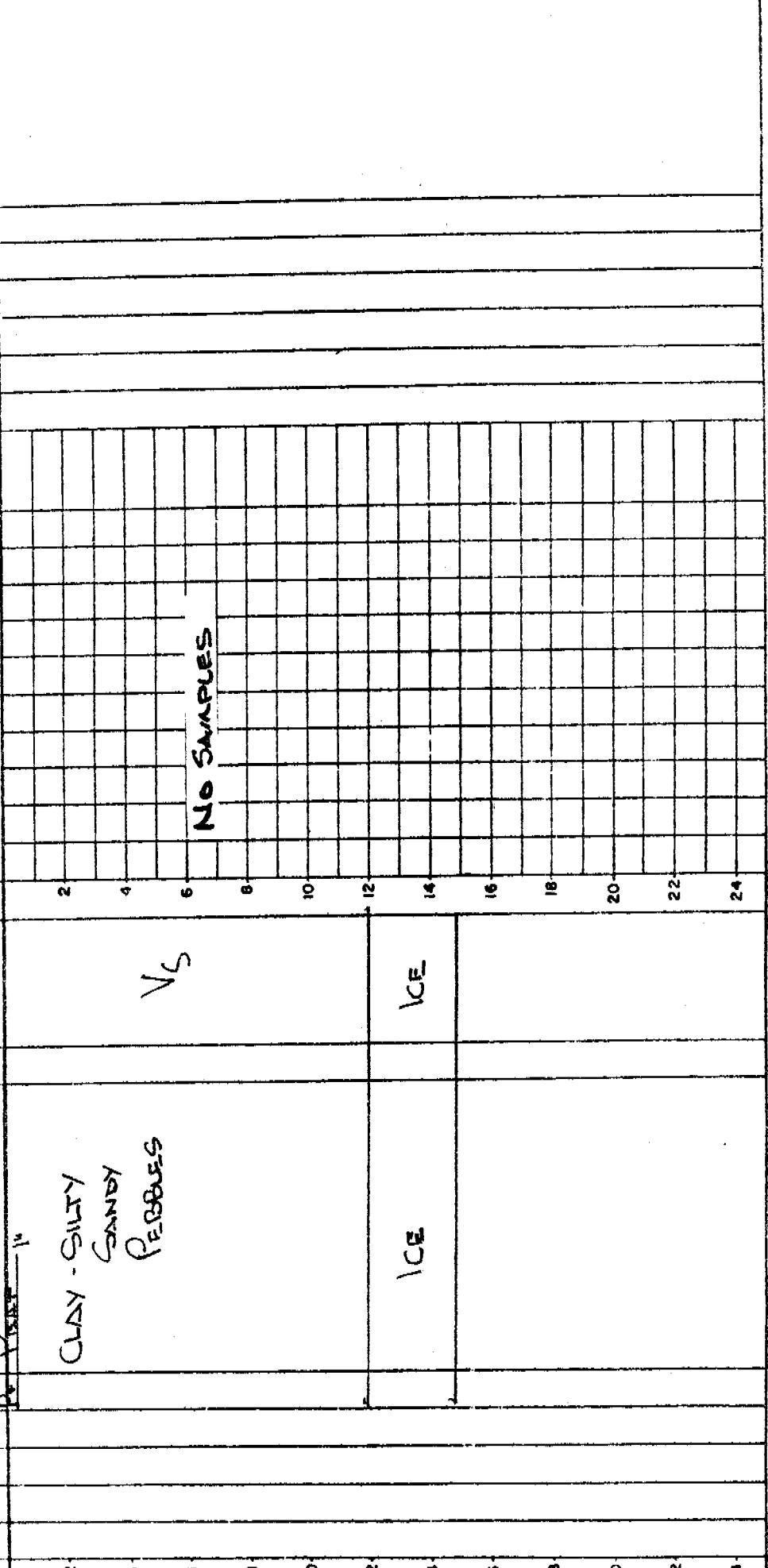
TUK - Tuk

FIELD NO: 14 AIRPHOTO NO: 14

DATE DRILLED: 14 TECH: DROUCH RIG: 12

SOIL DESCRIPTION: CLAY - SILTY
GUNNY
PEBBLES

AN	FIELD ENG	TECH	DROUCH	RIG	12	SURFACE DRAINAGE	VEGETATION	CHAINAGE	TEST	MILE	B.C.S	NUMBER
10									ARROW - 6 + 14			



DANVÍK-TUK.

DRILL HOLE REPORT

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

FIELD ENG. NO. DATE DRILLED AIRPHOTO NO:

TECHNICAL CHIEF RIG NO. SURFACE DRAINAGE:

DEPTN (PFS) SAMPLE NUMBER

% RECOVERY

PERCENT RESISTANCE

SOURCE OF SWAB

LIMITS OF FROZEN GROUND

SOIL DESCRIPTION

ICE DESCRIPTION

DEPTH (FEET)

TEST HOLE NUMBER

WATER CONTENT (% OF DRY WEIGHT)

ICE CONTENT (% OF SAMPLE VOLUME)

O = ICE

△ = ICE

PLASTIC LIMIT

LIMIT

LIQUID LIMIT

SOIL

SILT

CLAY

GRAVEL

SAND

REMARKS

TEST HOLE NUMBER

MILE

B.C.S.

NUMBER

AREA - Q-3

INUVIK - Tuk

DATE DRILLED 2/21/68

RIG AIR

SOIL NUMBER

TYPE

SAMPLE NUMBER

TEST HOLE NUMBER

PERCENT RECOVERY

PERCENT RESISTANCE

SOURCE OF SWAB

LIMITS OF FROZEN GROUND

SOIL DESCRIPTION

ICE DESCRIPTION

DEPTH (FEET)

TEST HOLE NUMBER

WATER CONTENT (% OF DRY WEIGHT)

ICE CONTENT (% OF SAMPLE VOLUME)

O = ICE

△ = ICE

PLASTIC LIMIT

LIMIT

LIQUID LIMIT

SOIL

SILT

CLAY

GRAVEL

SAND

REMARKS

TEST HOLE NUMBER

MILE

B.C.S.

NUMBER

AREA - Q-3

REMARKS

TEST HOLE NUMBER

MILE

B.C.S.

NUMBER

AREA - Q-3

REMARKS

TEST HOLE NUMBER

MILE

B.C.S.

NUMBER

AREA - Q-3

REMARKS

TEST HOLE NUMBER

MILE

B.C.S.

NUMBER

AREA - Q-3

REMARKS

TEST HOLE NUMBER

MILE

B.C.S.

NUMBER

AREA - Q-3

REMARKS

V_s

CLAY - SILTY
- PEBBLES

15'

ICE

16'

GRANULAR - SANDY

18'

LAYERS OF
CLAY-SILT & ICE

20'

V_s

CLAY - SALTY
- PEBBLES

26'

Bottom of Hole - 30'

Inuvik - Tuk

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA

MACKENZIE HIGHWAY

FIELD ENG. DATE DRILLED 1973 NO: 16

TECH PROXYCH RIG 12 AIRPHOTO NO:

SURFACE DRAINAGE: CHANAGE:

VEGETATION:

OFFSET:

ELEV:

TEST HOLE:

NUMBER:

AREA-Q-1

REMARKS:

</p

INFLAVIK = TUK.
FIELDENG.

四

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

TEST HOLE	TEST HOLE NUMBER	MILE	B.C.S.	REMARKS	TEST HOLE		ELEV.	GRAIN-SIZE ANALYSIS	WET DENSITY (PCF)	DRY DENSITY (PCF)
					TEST	SET				
1	1	0.0	0.0	AREA - O-Q						
2	2	0.0	0.0							
3	3	0.0	0.0							
4	4	0.0	0.0							
5	5	0.0	0.0							
6	6	0.0	0.0							
7	7	0.0	0.0							
8	8	0.0	0.0							
9	9	0.0	0.0							
10	10	0.0	0.0							
11	11	0.0	0.0							
12	12	0.0	0.0							
13	13	0.0	0.0							
14	14	0.0	0.0							
15	15	0.0	0.0							
16	16	0.0	0.0							
17	17	0.0	0.0							
18	18	0.0	0.0							
19	19	0.0	0.0							
20	20	0.0	0.0							
21	21	0.0	0.0							
22	22	0.0	0.0							
23	23	0.0	0.0							
24	24	0.0	0.0							

Bottom of Hole : 30'

INUVIK - Tuk. DRILL HOLE REPORT

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DRILL HOLE REPORT

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

Bottom of Hole - 30'

Sector 3

SEARCH SECTOR NO. 3

Landform and Location: A series of small glacio-fluvial deposits
- possible kames and/or crevasse fillings
- west of Noell Lake at approximately
Mile 984 of the Mackenzie Highway.

Designated Test Drilling Areas: Areas #10 and #11.

Material: Minor sand and gravel.

Volume: Very limited - less than 25,000 cu. yds.
total in several small features.

Conclusion: Unsuitable for development. Features are
very small and shallow.

NOELL LAKE

M
985

AREA II

ARE

983
6/9+92.80

2°

POWER LINE

AREA 10

● 10-1

● 10-2

● 10-3

● 10-7

● 10-6

● 10-8

● 10-4

● 10-5

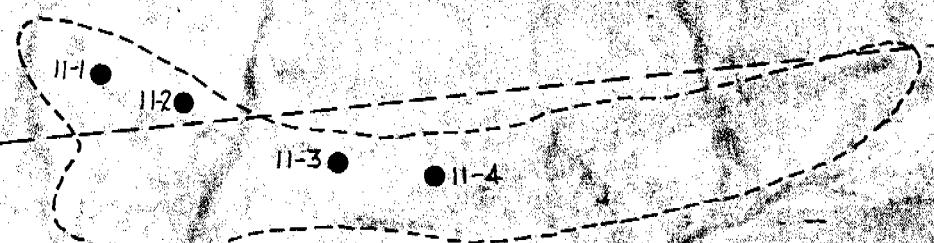
NOELL LAKE

985
725+52.80

2°

WINTER ROAD

984
672+72.80
2°30'



AREA II

● 987-1

● 985-1

986
778+32.80

837+12.80
987

NUVIK - TUK

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

FIELD ENG DATE DRILLED 25/3/71 AIRPHOTO NO:

TECHNODRILL RIG △ ID

SURFACE DRAINAGE:

VEGETATION:

% EDDY CUP

PENETRATION RESISTANCE

SOIL NUMBER

SOIL SYMBOL

SOIL DESCRIPTION

ICE DESCRIPTION

FEET (METERS)

O = WATER CONTENT (% OF DRY WEIGHT)
△ = ICE CONTENT (% OF SAMPLE VOLUME)

PLASTIC LIMIT

LIQUID LIMIT

SOIL TEST

80

60

TEST

60

40

TEST

40

20

TEST

20

20

TEST

INUVIK - TURK

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

NO:

AIRPHOTO NO:

CHAMAGE

DATE DRILLED

1976

RIG

AIR

SURFACE DRAINAGE:

FIELD ENG
TECH DRAUGHTY
SAMPLE NUMBER
TESTING UNIT
DEPTH
% RECOVERY
SAMPLE NUMBER
TESTING UNIT
DEPTH

SOIL COVERED
PENETRATION RESISTANCE
SOIL SYMBOL
SOIL TEST SYMBOL
% RESISTANCE
TEST TYPE

LIMITS OF FROZEN GROUND
ICE DESCRIPTION
DEPTH (FEET)

O = WATER CONTENT (% OF DRY WEIGHT)
△ = ICE CONTENT (% OF SAMPLE VOLUME)
PLASTIC LIMIT → LIQUID LIMIT →
20 40 60 80 100 100+

DRY DENSITY (PCF)
WET DENSITY (PCF)
GRAVEL
SAND
SILT
CLAY

AREA - 10-A

REMARKS

TEST HOLE

ELEV

VEGETATION

OFFSET

MILE

B.C.S

NUMBER

TEST HOLE

ELEV

TEST HOLE

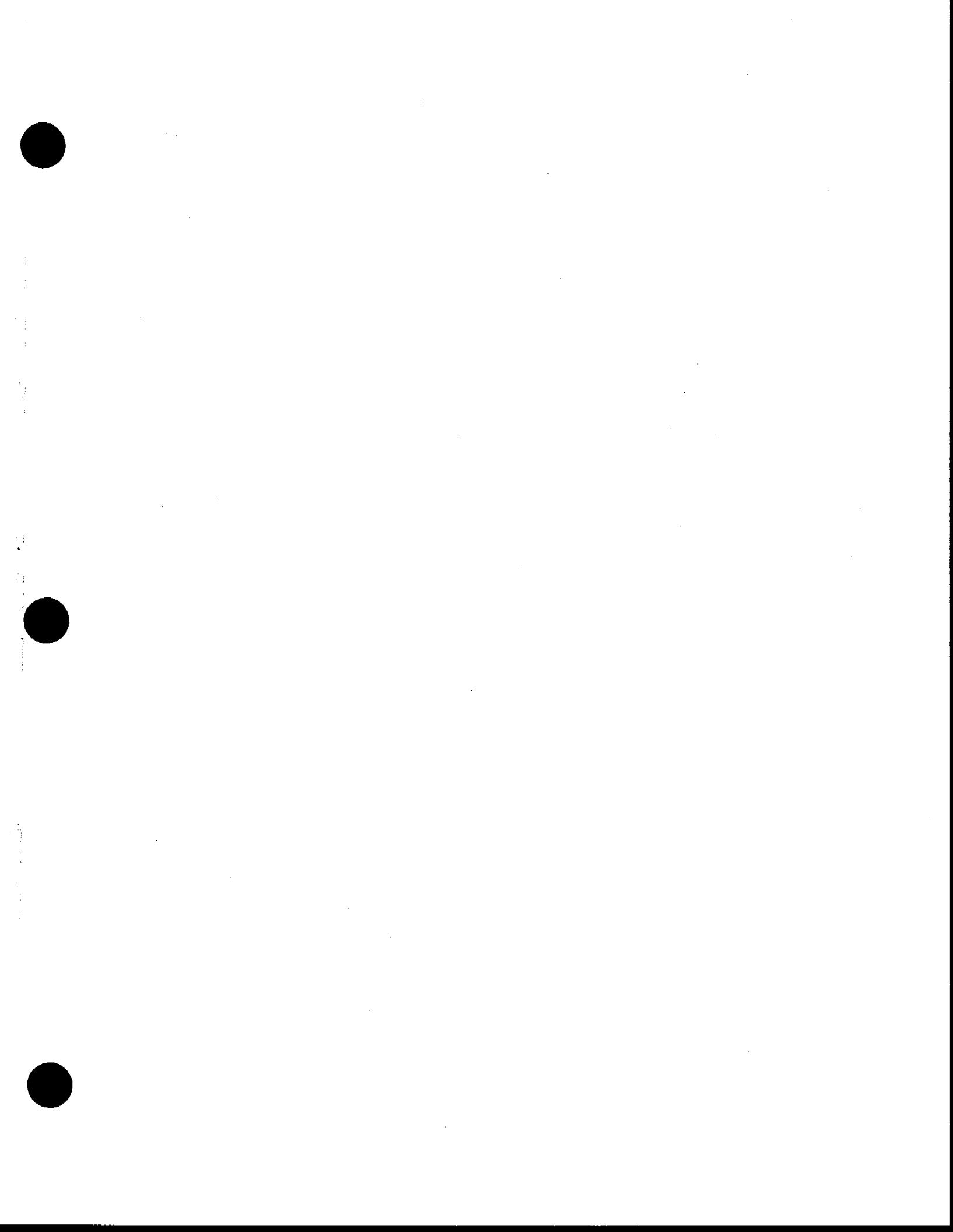
MILE

B.C.S

NUMBER

TEST HOLE

ELEV



INVÍK - TUK.

1

DRILL HOLE REPORT

60

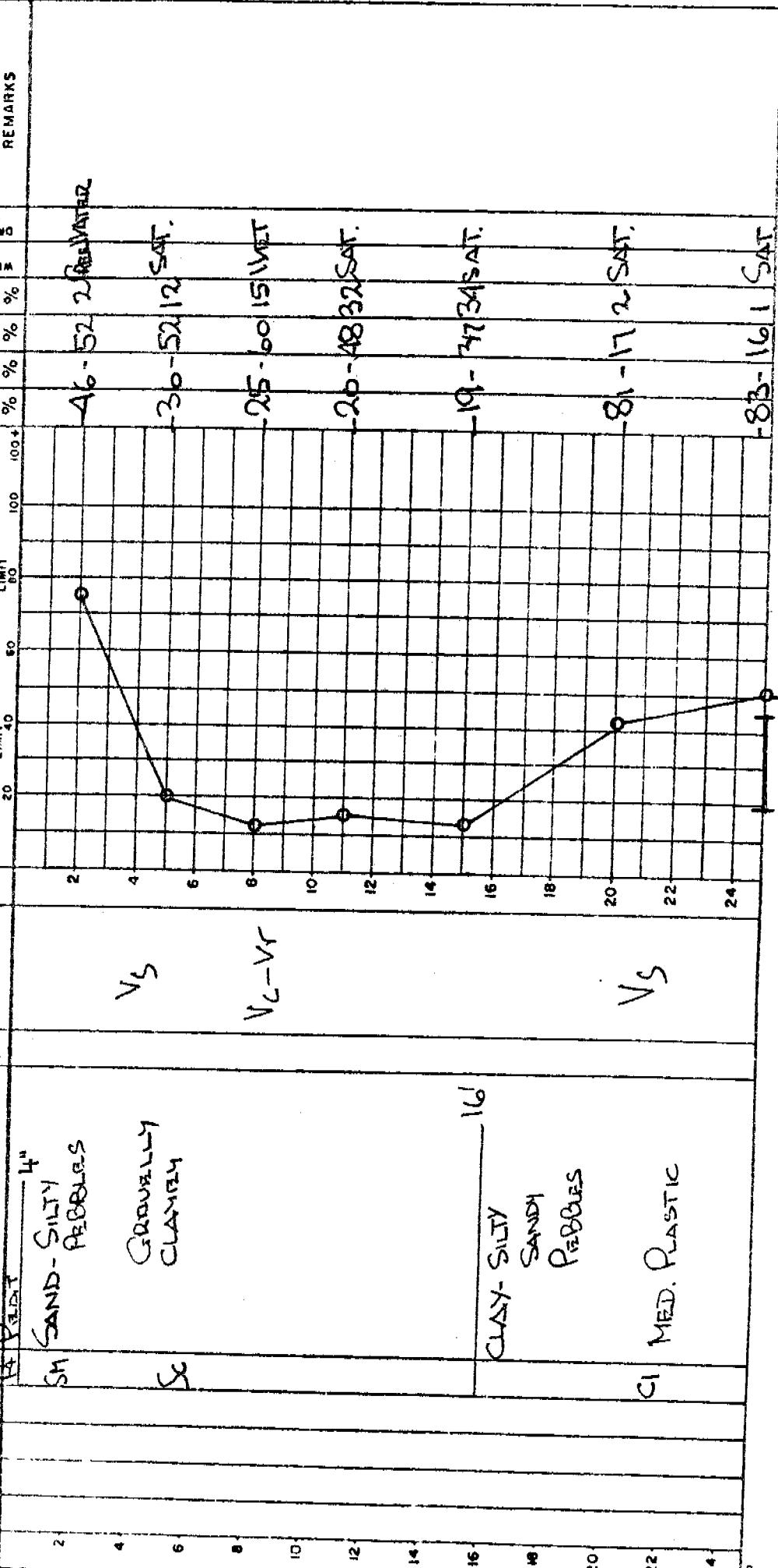
DEPARTMENT OF PUBLIC WORKS, CANADA

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INUVIK - TUK DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

OWN	FIELD ENG	DATE DRILLED	AIRPHOTO NO:	CHAINAGE
CKD	TECH	RIG	RIG	SURFACE DRAINAGE
		13/4/61		



Bottom of Hole. 30'

-16-23-11 Sat.

Sector 4

SEARCH SECTOR NO. 4

Landform and Location: The narrow canyon of Douglas Creek which has been incised to underlying shale bedrock through a morainic plain - three to four miles west of the Mackenzie Highway near Mile 985.

Designated Test Drilling Area: Area #12.

Material: Ice-rich lacustrine silts and clays and glacial till over shale bedrock.

Stripping: Probably 20 - 25' to usable till. Shale exposed at the bottom of the canyon probably 80 - 100' below the plain.

Volume: Unlimited.

Conclusion: Unsuitable as a borrow source because of excess stripping.

NOELL

EXISTING WATER ROAD

M
985

AREA 12

SCALE 1:36,000 (APPROX 1"=3,000')

AREA 12

12-3

12-2

12-1

12-5

12-6

WYK - Tuk

DRILL HOLE REPORT

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

Bottom of Hole - 30'

Sector 5

SEARCH SECTOR NO. 5

Landform and Location: An eastern extension of the Caribou Hills that has been dissected by melt-water channels. Located some 25 miles north of Inuvik at Mile 996 - 97 of the Mackenzie Highway.

Designated Test Drilling Areas: Areas #13, #14, #15 and #16.

Material: Poorly indurated sandstone which reduces to fine wet sand or silty sand upon thawing.

Stripping: Probably five to six feet in selected areas.

Volume: Unlimited.

Conclusion: Not recommended for development. The fine sandy material is wet or saturated upon thawing and would be subject to severe wind erosion in an embankment on the open tundra. In addition there is better borrow roughly three miles to the north (Search Sector No. 6).

No. 5 - Sector Topography

This search area is part of a broad ridge some 200' above the surrounding terrain that is an eastern extension of the Caribou Hills. The alignment crosses the ridge between roughly Mile 995 and Mile 1005.

The high ground has been glaciated and meltwater has cut large spillways that dissect the uplands. There is a variable thickness of glacial till on the high ground which forms a flat to gently rolling morainic plain. The till commonly contains excess ice in the form of ice lenses, wedges and massive ice. In some cases where icy materials have been exposed and ice slumps (retrogressive - thaw flow slides) have developed, terraces have formed along the spillways or surface depressions have occurred. The spillways have been partially filled with alluvium from tributary streams and colluvium from erosion of the bordering escarpments.

The most common "bedrock" type in the area adjacent to the highway is unconsolidated or weakly consolidated sandstone. There are also interbedded clayey seams and some shale and siltstone strata. Continuity of beds is limited hence there are variations in bedding sequences from locality to locality. The degree of induration and consolidation also varies even within unique stratigraphic units. There is well indurated sandstone exposed along the creek in the bottom of the meltwater spillway west of Area #16 (see 1" = 1,000' photo), however this more highly consolidated strata was not encountered at a higher elevation. The amount of ground ice that is present within the sand depends in part on the porosity of the strata, which is inversely related to the degree of induration and consolidation. Thus the majority of the higher level strata, which were test drilled in Areas #13 to #16 and which are not well

indurated, contain sufficient excess ice that the sandy material is wet or saturated upon thawing.

No. 5 - Materials and Quantities

A total of 19 test holes were drilled in Areas #13 to #16, the majority along the edges of meltwater channels where overburden above the sandstone strata is minimal. All areas were permanently frozen and all contained excess ice, some with massive ice inclusions. Areas #13 and #16 are the better of the four areas drilled, however there is sufficient ice in even these areas that the fine grained sand and silty sand is wet or saturated upon thawing. The sandstone is very poorly indurated and is 'bedrock' only in geologic terms. The material upon thawing has no inherent strength or structure and reduces readily to fine sand or silty sand. Moisture contents generally range around 20%. Overburden material consisting of very ice-rich sandy silts or clays is usually not less than five feet to six feet in thickness.

Quantities of the sandy material are unlimited however this source is not recommended for development. There is borrow available some three miles to the north (Search Sector No. 6) where stripping is less, the material is drier and is a better embankment material. If the sand were placed in an embankment in a frozen state it would probably thaw and drain without flowing, however the fine grained material would be subject to severe wind erosion on the open tundra.

Borehole logs for Areas #13 to #16 inclusive are included herein.

STANLEY GREEK

AREA 13

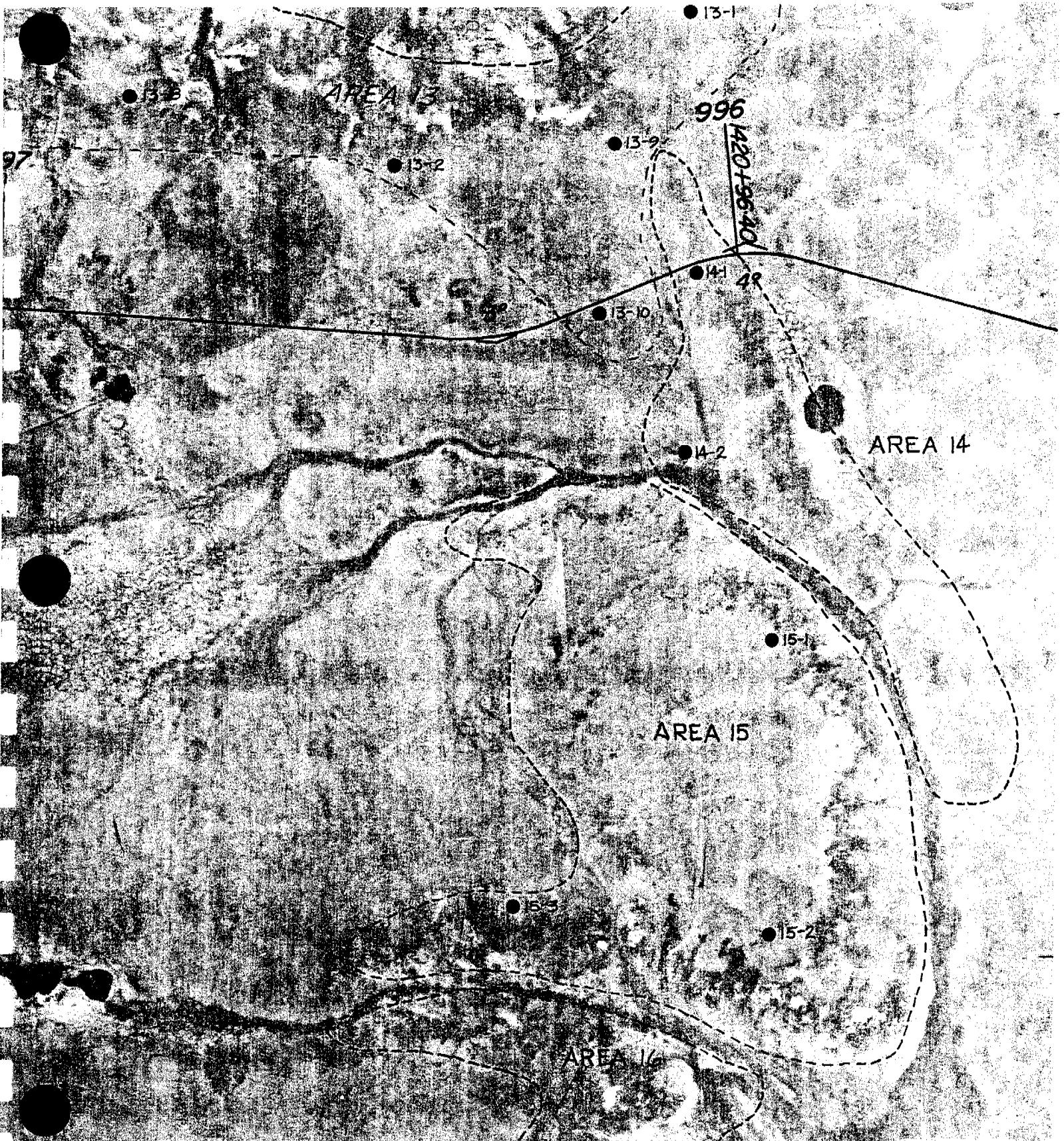
M
995

AREA 14

AREA 15

AREA 16





AREA 16

16-4

16-2

WELL INDURATED
SANDSTONE EXPOSED
HERE ALONG CREEK

- 58 - (2) - 0 Damp

Bottom of Hole. 30'

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DEPARTMENT OF PUBLIC WORKS, CANADA

MACKENZIE HIGHWAY

DRILL HOLE REPORT

OWN FIELD ENG DATE DRILLED 1974-11
CKD TECH DRILLING RIG: AIR

AIRPHOTO NO: SURFACE DRAINAGE:

CHAINAGE:

SOIL DESCRIPTION
SOIL SYMBOL
UNIFORMITY CLASSIFICATION
% COHESION
% MECH. COHESION
SAMPLE TYPE
SAMPLE NUMBER

ICE
ICE + CLAY
SAND - SILTY
FINE

DEPTH (FEET)
LIMITS OF FROZEN GROUND
DESCRIPTION
ICE
SOIL DESCRIPTION
SOIL SYMBOL
UNIFORMITY CLASSIFICATION
% COHESION
% MECH. COHESION
SAMPLE TYPE
SAMPLE NUMBER

O = WATER CONTENT (% OF DRY WEIGHT)
△ = ICE CONTENT (% OF SAMPLE VOLUME)
DEPTH (FEET)
PLASTIC LIMIT 20 40 60 80
LIQUID LIMIT 100 100+
CLAY SILT SAND

TEST HOLE NUMBER
AREA 139
REMARKS

ELEV

GRAIN-SIZE ANALYSIS

GRAVEL
SILT
SAND

CLAY
SILT
SAND

TEST HOLE NUMBER
AREA 139
REMARKS

ELEV

GRAIN-SIZE ANALYSIS

GRAVEL
SILT
SAND

CLAY
SILT
SAND

TEST HOLE NUMBER
AREA 139
REMARKS

ELEV

GRAIN-SIZE ANALYSIS

GRAVEL
SILT
SAND

CLAY
SILT
SAND

TEST HOLE NUMBER
AREA 139
REMARKS

ELEV

GRAIN-SIZE ANALYSIS

GRAVEL
SILT
SAND

CLAY
SILT
SAND

TEST HOLE NUMBER
AREA 139
REMARKS

ELEV

GRAIN-SIZE ANALYSIS

GRAVEL
SILT
SAND

CLAY
SILT
SAND

TEST HOLE NUMBER
AREA 139
REMARKS

ELEV

GRAIN-SIZE ANALYSIS

GRAVEL
SILT
SAND

CLAY
SILT
SAND

TEST HOLE NUMBER
AREA 139
REMARKS

ELEV

GRAIN-SIZE ANALYSIS

GRAVEL
SILT
SAND

CLAY
SILT
SAND

TEST HOLE NUMBER
AREA 139
REMARKS

ELEV

GRAIN-SIZE ANALYSIS

GRAVEL
SILT
SAND

CLAY
SILT
SAND

TEST HOLE NUMBER
AREA 139
REMARKS

ELEV

GRAIN-SIZE ANALYSIS

GRAVEL
SILT
SAND

CLAY
SILT
SAND

TEST HOLE NUMBER
AREA 139
REMARKS

ELEV

GRAIN-SIZE ANALYSIS

GRAVEL
SILT
SAND

CLAY
SILT
SAND

TEST HOLE NUMBER
AREA 139
REMARKS

ELEV

GRAIN-SIZE ANALYSIS

GRAVEL
SILT
SAND

CLAY
SILT
SAND

TEST HOLE NUMBER
AREA 139
REMARKS

ELEV

GRAIN-SIZE ANALYSIS

GRAVEL
SILT
SAND

CLAY
SILT

10

DRILL HOLE REPORT

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DRILL HOLE REPORT DEPARTMENT OF PUBLIC WORKS, CANADA

MACKENZIE HIGHWAY, CANADA

DATE DRILLED 12/16 AIRPHOTO NO:

SURFACE DRAINAGE:

AIR

TECH DRAUGHTS

FIELD DRAUGHTS

CROSS HOLES

SAMPLE NUMBER	DEPTH (FET)	SAMPLE TYPE	% RECOVERY	PERMEABILITY	RESISTANCE	UNIFACED SYMBOL	SOIL SYMBOL
1	2						
2	4						
3	6						
4	8						
5	10						
6	12						
7	14						
8	16						
9	18						
10	20						
11	22						
12	24						

TEST HOLE

REMARKS

WATER

CLAY

SILT

SAND

GRAVEL

DRY DENSITY

WET DENSITY

1 PCF

INUVIK - Tuk

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

D.W.N.	FIELD ENG.	TECH. RIG	DATE DRILLED	AIRPHOTO NO.	CHAINAGE:	VEGETATION:	OFFSET	TEST	H.C.L.E.
SOIL DESCRIPTION	ICE DESCRIPTION	DEPTH (FEET)	O = WATER CONTENT (% OF DRY WEIGHT)	△ = ICE CONTENT (% OF SAMPLE VOLUME)	GRAIN-SIZE ANALYSIS	MILE	B.C.S	NUMBER	
SOIL SAMPLE	FROZEN GROUND	LIMITS OF	CLAY	SILT	SAND				
% PEAT	PEAT	2	320.0	37-62	1				
CLAY - SANDY	SILTY - SANDY	4							
8"	8"	6							
MED. PLASTIC		8							
SAND - SALTY		10.5							
10.5		12							
		14							
		16							
		18							
		20							
		22							
		24							
		26							

Bottom of Hole - 30'

- 18-82-0
" " " "

Bottom of Hole. 30'

22-78-0 west

DRILL HOLE REPORT		DEPARTMENT OF PUBLIC WORKS, CANADA		MACKENZIE HIGHWAY	
FIELD ENG CKD	DATE DRILLED RIG	AIRPHOTO NO. A.D.	CHAINAGE:	SURFACE DRAINAGE:	
WILKINS - TUK					
SOIL SAMPLE	DEPTH (FEET)	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	O = WATER CONTENT (% OF DRY WEIGHT) Q = ICE CONTENT (% OF SAMPLE VOLUME)	
% RESISTANCE	DEPTH (FEET)	DEPTN (FEET)	SOIL DESCRIPTION	PLASTIC LIMIT LIQUID LIMIT 80 60 40	ELEV
% RECOV'AB	2	2	1. PEAT	100 100+ 100	TEST HOLE
SOIL SAMPLE	4	4	P-4 PEAT	100 100+ 100	REMARKS
UNIFID RESISTANCE	6	6	CLAY - SILTY SANDY	100 100+ 100	AREA - 15-3
RESISTANCE	8	8	C-1 MBD. PLASTIC	100 100+ 100	MILE B.C.S NUMBER
PERCENT PENETRATION	10	10	SILT - CLAYEY 9'	100 100+ 100	
TYPE	12	12	SANDY	100 100+ 100	
SAMPLE NUMBER	14	14	ML	100 100+ 100	
DEPTH (FEET)	16	16		100 100+ 100	
SAMPLE NUMBER	18	18		100 100+ 100	
TYPE	20	20		100 100+ 100	
SAMPLE NUMBER	22	22		100 100+ 100	
DEPTH (FEET)	24	24		100 100+ 100	
VEGETATION					

Vx

Bottom of Hole - 30'

- 73-27.0 Damp

Bottom of hole - 30'

Bottom of Hole - 30'

2 0 2 2

CLAY GUTTY SANDY
M. WILLY SCOTT SWAN

Bottom or Hole - 60'

- 56-44-0101ST

Sector 6

SEARCH SECTOR NO. 6

Landform and Location: An escarpment and benches along a glacial meltwater channel incised in a bedrock controlled ridge that is an extension of the Caribou Hills. Located some 28 miles north of Inuvik at Mile 1000 on the Mackenzie Highway.

Designated Test Drilling Areas: Areas #17 and #18.

Material: Poorly indurated and consolidated shales, siltstones and sandstones. Will revert rapidly to clays, silts and sands in an embankment.

Stripping: Variable from 0-5' on the tops of ridges to possibly 15'+ on the lower flanks of the ridges.

Volume: Approximately 750,000 cu. yds. with minimum stripping.

Conclusion: Good borrow source. Area #18A is the primary source. Area #18B can be developed as a secondary source if necessary. Area #18C is not recommended due to excess overburden.

No. 6-Sector Topography

This borrow area is part of the eastern extension of the Caribou Hills described previously (Sector No. 5). The areas test drilled here (#17 and #18) consist of the escarpments and benches adjacent to an ancient glacial meltwater channel which dissects the uplands. There is ice rich glacial till on the surface of the uplands, however along the exposed, south-facing, northern escarpment and upon benches on the north side of the spillway (Area #18), the icy overburden soils have been reduced largely by thermokarst activity. The sides and bottom of the spillway and the flanks of the benches on the north have variable thicknesses of colluvium and alluvium, all of which contain variable amounts of ground ice. These sediments increase in thickness toward the bottom of the spillway. On the southern side of the spillway (Area #17) there is an abundance of massive ice along the edge of the escarpment that is a complete contrast to the extensive thermokarst activity that has occurred on the exposed northern side.

There is a small creek flowing in the spillway at present which has incised the bottom and developed some small granular terraces.

No. 6-Materials and Quantities

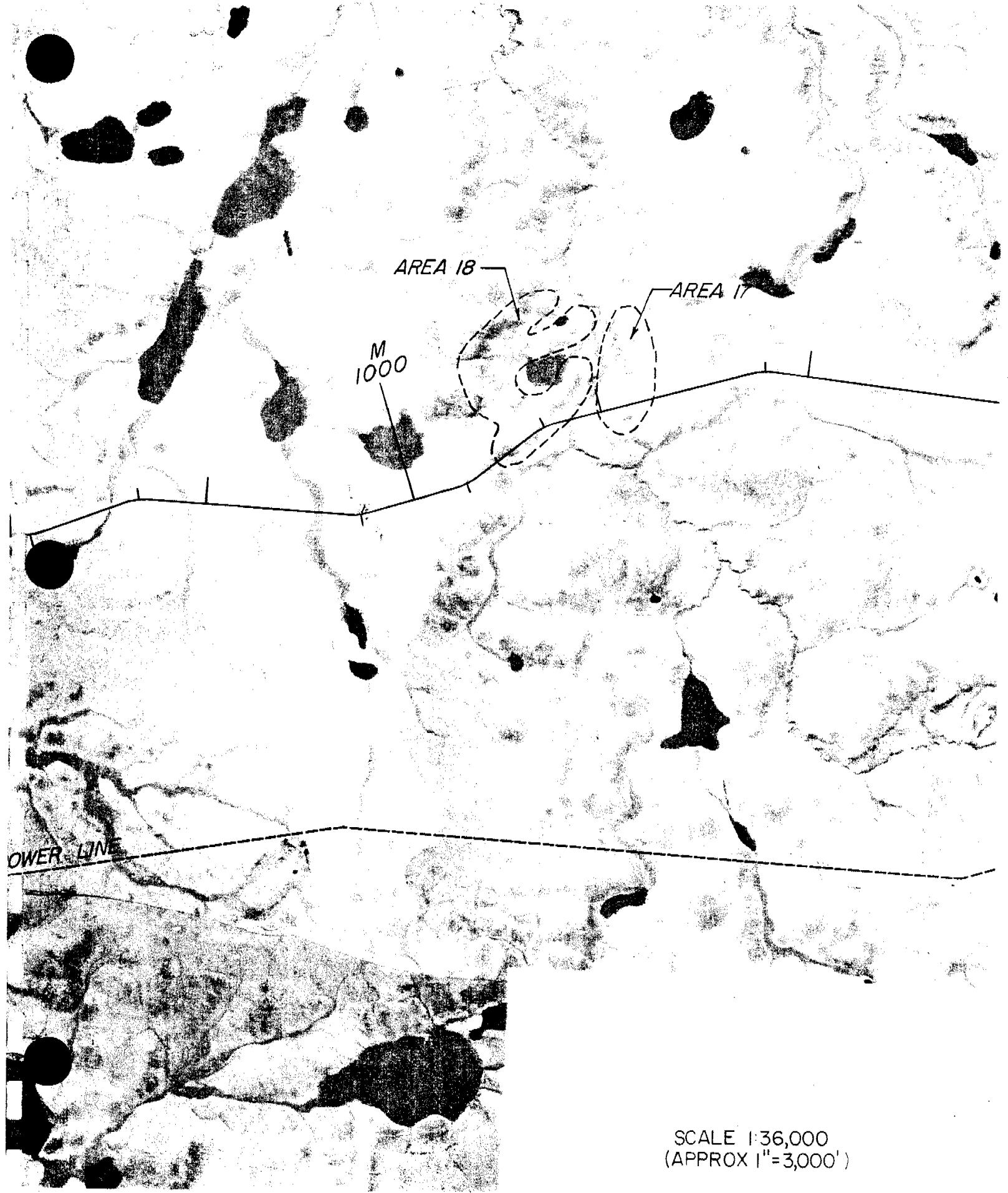
The bedrock here is slightly more indurated and consolidated than the sandstone in Sector No. 5, however it also has very little inherent strength when thawed. It consists of interbedded shales, siltstone and sandstone. A total of 21 test holes were drilled in Area #18 and there are three features that contain usable borrow: i.e. #18A - a portion of the spillway escarpment which is partially free of overburden (test holes #6, #12, #13 and #14); and two lower benches - #18B (test holes #1,

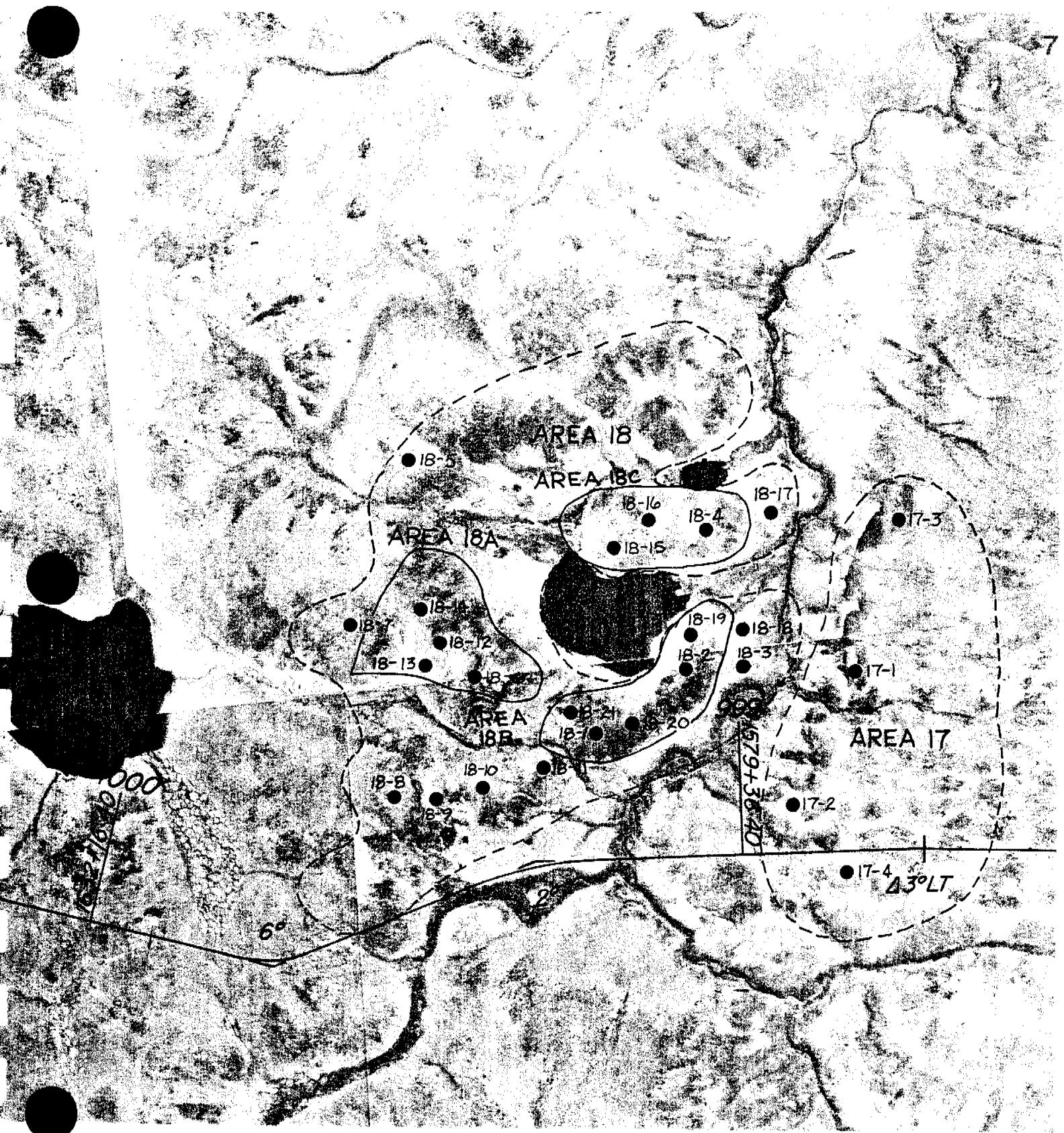
#2, #19, #20 and #21) and #18C (test holes #4, #15 and #16). These features are denoted on the 1" = 1,000' air photo included herein. Area #18A is the prime borrow source. It consists of a ridge with usable decomposed shale at the surface on the apex of the ridge, but with overburden soils on the flanks of the ridge. The material at depth is variable between soft shale and sandstone with moisture (ice) contents generally between 15 and 20%. Some of the sandy material tends to be wet on thawing, however the shale is categorized as damp or moist in the thawed state, and with some mixing of the two materials in the grade, very little if any of the wetter material will have to be wasted.

Maximum drilling depth here was 60 feet. This feature can be "day-lighted" to the east and south and stripping on the flanks will increase with depth of development. Further drilling should be carried out to accurately assess the overburden, however it is estimated at least 500,000 cu. yds. can be obtained from this feature with acceptable stripping costs.

Area #18B is a ridge similar to #18A but lower. Drilling was limited to near the apex of the ridge where stripping is minimal and it is again expected the depth of stripping will increase on the flanks. There is some sand and gravel on the surface of this ridge which, although wet, should drain readily in an embankment. The core of the ridge is interbedded, soft shales, siltstone, and very weak sandstone which reverts to fine sand or silty sand when thawed. Maximum depth of drilling here was 30' and it is estimated roughly 250,000 cu. yds. can be developed with an average stripping of five to six feet. Again further drilling should be carried out to assess the limits of the usable surface gravels and depth of stripping on the flanks of the ridge.

Area #18C is a low bench similar to #18B but wider and less sharply defined. The core of this ridge is similar soft shale, siltstone and weak sandstone, however stripping is variable from eight to 15' and this feature is not recommended for development.





DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

FIELD ENG DATE DRILLED 8/3/14 AIRPHOTO NO: 142
TECH DRONYCH RIG A12 SURFACE DRAINAGE:

TEST HOLE NUMBER	TEST HOLE NUMBER	MILE	B.C.S.	NUMBER	GRAIN-SIZE ANALYSIS			
					CLAY	SILT	SAND	GRAVEL
AREA - 17-1	REMARKS							
83-15-2 SAT.								
6A-21-15 FROZEN WATER								
59-31-4 FROZEN WATER								
1051-67-330 NYATRE								
124-64-333 FROZEN WATER								
202-65-332 FROZEN WATER								
24	24	24	24	24	24	24	24	24
26	26	26	26	26	26	26	26	26
CLAY - SILTY								
SAND								
PEBBLES								
MED. PLASTIC								
C1								
CLAY - SILTY SANDY								
PEBBLES								
Mostly WATER								
V _s								
ICE								
Bottom of Hole - 30'								

O = WATER CONTENT (% OF DRY WEIGHT)
Q = ICE CONTENT (% OF SAMPLE VOLUME)

DEPTH (FEET)

PLASTIC LIMIT

LIMITS OF FROZEN GROUND

LIQUID LIMIT

TEST

WATER

SOIL SYMBOL

UNITS USED

PENETRATION RESISTANCE

% RECOVERY

SOIL DESCRIPTION

FROZEN GROUND

TEST

WATER

SOIL SYMBOL

UNITS USED

PENETRATION RESISTANCE

% RECOVERY

SOIL DESCRIPTION

FROZEN GROUND

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% RECOVERY

SOIL DESCRIPTION

FROZEN GROUND

TEST

WATER

SOIL SYMBOL

UNITS USED

PENETRATION RESISTANCE

% RECOVERY

SOIL DESCRIPTION

FROZEN GROUND

TEST

DRILL HOLE REPORT DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

Bottom of Hole - 30'

INNUVIK - TUK

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAYFIELD ENG DATE DRILLED 28 JUN AIRPHOTO NO: 1012
CKD TECH RIG NO: 1012 SURFACE DRAINAGE:

DRILL HOLE REPORT CHAINAGE:

TEST HOLE
OFFSET ELEV

TEST HOLE OFFSET	ELEV	GRAIN-SIZE ANALYSIS		REMARKS
		MILE	B.C.S.	
10 - 3153	53	CLAY	100	Moist
15 - 3649	49	SILT	100	WET
20 - 3959	59	SAND	100	SAT
25 - 4500	50	SILTY SAND	100	WET
46 - 5131	31	3 Moist	100	
57 - 4300	0	DAMP	100	HUMID

○ = WATER CONTENT (% OF DRY WEIGHT)
 △ = ICE CONTENT (% OF SAMPLE VOLUME)

DEPTH (ft)	PLASTIC LIMIT (%)	LIMIT (%)
2	2	2
4	4	4
6	6	6
8	8	8
10	10	10
12	12	12
14	14	14
16	16	16
18	18	18
20	20	20

GRANULARITY

0+ PEAT

1 GRANULE

2+ GRAVEL - SILTY
SANDY

3 SAND - SILTY
PEBBLES

4 GM

5+ CLAY - SILTY
CLAY

6+ CLAY - SILTY
CLAY

7+ CLAY - SILTY
CLAY

8+ CLAY - SILTY
CLAY

9+ CLAY - SILTY
CLAY

10+ CLAY - SILTY
CLAY

11+ CLAY - SILTY
CLAY

12+ CLAY - SILTY
CLAY

13+ CLAY - SILTY
CLAY

14+ CLAY - SILTY
CLAY

15+ CLAY - SILTY
CLAY

16+ CLAY - SILTY
CLAY

17+ CLAY - SILTY
CLAY

18+ CLAY - SILTY
CLAY

19+ CLAY - SILTY
CLAY

20+ CLAY - SILTY
CLAY

21+ SHALE - SOFT
SHALE

22+ POSSIBLE SANDSTONE
POSSIBLE SANDSTONE

23+ POSSIBLE SANDSTONE
POSSIBLE SANDSTONE

24+ POSSIBLE SANDSTONE
POSSIBLE SANDSTONE

V_L-VR

V_X

Next Page

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

DATE DRILLED AIRPHOTO NO:

CHAINAGE

TEST HOLE

OFFSET

VEGETATION

ELEV.

MILE

B.C.S

NUMBER

REMARKS

CKD	FIELD ENG	TECH	RIG	SOIL DESCRIPTION	ICE DESCRIPTION	LIMITS OF FROZEN GROUND	TEST DEPTH (FEET)	TEST DEPTH (METERS)	WATER CONTENT (% OF DRY WEIGHT)	ICE CONTENT (% OF SAMPLE VOLUME)	GRAIN-SIZE ANALYSIS			TEST HOLE
											CLAY	SILT	SAND	
43				SOFT	SHALE - SOFT		30	9.14	20	0	%	%	%	43-41
							32							10 Dams
							34							
							36							
							38							
							40							
							42							
							44							
							45							
							46							
							48							
							50							
							52							
							54							

VX

44
45
46
47
48
49
50
51
52
53
54
Bottom of Hole - 45

CLEAN - SAND - FINE
Bottom of Hole - 45

DEPARTMENT OF PUBLIC WORKS, CANADA

MACKENZIE HIGHWAY

DRILL HOLE REPORT

No:

376

AIRPHOTO NO:

DATE DRILLED 28/3/64

FIELD ENG:

C.R.O.

TECH RONYCH

RIG #18

SURFACE DRAINAGE:

CLAY

SOIL DESCRIPTION

ICE DESCRIPTION

FROZEN GROUND

LIMITS OF

DEPTH (FEET)

O = WATER CONTENT (% OF DRY WEIGHT)

Δ = ICE CONTENT (% OF SAMPLE VOLUME)

PLASTIC LIMIT

LIQUID LIMIT

100+

100

100-

100

100+

100

100-

100

100+

100

100-

100

100+

100

100-

100

100+

100

100-

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100+

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100

100+

100

100-

100

100+

100

VEGETATION:

VS

X

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X

V

X

V

X

V

X

V

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DEPARTMENT OF PUBLIC WORKS, CANADA

DRILL HOLE REPORT

FIELD ENG. DATE DRILLED 28/3/76 AIRPHOTO NO:

TECH. RONYCH RIG A12

SURFACE DRAINAGE:

CHANAGE

VEGETATION:

O = WATER CONTENT (% OF DRY WEIGHT)
△ = ICE CONTENT (% OF SAMPLE VOLUME)

DEPTHS (FEET)

LIMITS OF FROZEN GROUND

FROZEN GROUND

ICE

DESCRIPTION

CLAY - SILTY
SANDY
Pebbly

4"

SOIL

DESCRIPTION

CLAY

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

FIELD ENG DATE DRILLED 1976 AIRPHOTO NO:
C.E.O. TECH DRONYCH RIG#10

SURFACE DRAINAGE:

CHANGING

OFFSET

TEST HOLE

DEPTH (FEET)	SAMPLE NUMBER	SOIL DESCRIPTION	% MELOCABANE	SAMPLE SIZE	TYPE	SAMPLE NUMBER	SOIL RESISTANCE	TEST	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	GRAIN-SIZE ANALYSIS			WATER DENSITY (PCF)	DRY DENSITY (PCF)	GRAVEL %	SILT %	CLAY %	SAND %	TEST	ELEV.	REMARKS	TEST HOLE NUMBER			
											MILE	B.C.S.	NUMBER													
2	1	CLAY - SALTY SANDY	0	14"	SOFT	1	100	PLASTIC LIMIT	10	20	2	2	0	71-290	Damp											
4	2	CL Low Plastic	0	14"	SOFT	2	100	LIQUID LIMIT	40	60	4	4	100	67-330	Water											
6	3		0	14"	SOFT	3	100	LOOSENESS TEST	100+	100+	6	6	0	71-230	0	Damp										
8	4		0	14"	SOFT	4	100	DEPTH (FEET)	100+	100+	8	8	0	71-160	0	Moist										
10	5		0	14"	SOFT	5	100	DEPTH (FEET)	100+	100+	10	10	0	71-120	0	Damp										
12	6		0	14"	SOFT	6	100	DEPTH (FEET)	100+	100+	12	12	0	71-120	0	Damp										
14	7		0	14"	SOFT	7	100	DEPTH (FEET)	100+	100+	14	14	0	71-120	0	Damp										
16	8		0	14"	SOFT	8	100	DEPTH (FEET)	100+	100+	16	16	0	71-120	0	Damp										
18	9		0	14"	SOFT	9	100	DEPTH (FEET)	100+	100+	18	18	0	71-120	0	Damp										
20	10		0	14"	SOFT	10	100	DEPTH (FEET)	100+	100+	20	20	0	71-120	0	Damp										
22	11		0	14"	SOFT	11	100	DEPTH (FEET)	100+	100+	22	22	0	71-120	0	Damp										
24	12		0	14"	SOFT	12	100	DEPTH (FEET)	100+	100+	24	24	0	71-120	0	Damp										

VX

C1 MUD. Plastic
SHAPE - SOFT
SANDSTONE

Next Page

23

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

MANN - 658-1C -

9

Bottom or hole - 60'

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

SM M. SAND - SILTY-SANDY
Bottom of Hole - 30'

2 of 2

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

AIRPHOTO NO:

CHAINAGE:

VEGETATION:

DRAINAGE:

SURFACE:

ICE:

DESCRIPTION:

ICE

DEPTH (FEET)

LIMITS OF FROZEN GROUND

SOIL DESCRIPTION:

SOIL RESISTANCE:

SOIL SWELL:

% MECHANICAL RESISTANCE:

SAMPLE TYPE:

SAMPLE NUMBER:

DEPTH (FEET):

SAMPLE NUMBER:

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

SILT %

CLAY %

SAND %

TEST HOLE:

MILE:

B.C.S. NUMBER:

REMARKS:

AREN. (8-12)

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRAIN-SIZE ANALYSIS:

ELEV:

ELEV:

GRAVEL %

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

OWN FIELD ENG DATE DRILLED 11/14/16 AIRPHOTO NO:

C#D TECH RIG A/R CHAINAGE TEST HOLE

DEPTH (FEET)	SAMPLE NUMBER	SOIL TYPE	SAMPLE QUANTITY	TEST	HOLE	TEST	HOLE	MILE	B.C.S.	NUMBER
0'	1	SAND - SILTY	3.0	Vs	2	○ = WATER CONTENT (% OF DRY WEIGHT)				
2'	2	ICE	4.0	ICE	4	△ = ICE CONTENT (% OF SAMPLE VOLUME)				
4'	3	SM SAND - SILT MIX	7'	Vs	6	LIMITS OF FROZEN GROUND				
6'	4				8'	DEPTH (FEET)				
8'	5	SAND - SILTY	8'		10	PLASTIC LIMIT	20			
10'	6				12	LIMIT	10			
12'	7				14	50				
14'	8				16					
16'	9				18					
18'	10				20					
20'	11				22					
22'	12				24					
24'										
Bottom of Hole - 15'										

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

DATE DRAINED 14 JULY 1963

AIRPHOTO NO. 112

TEST HOLE

FIELD ENG.

CHAINAGE:

OFFSET

TECH. PROBONYCH RIG

TEST HOLE E

DRILLING

SAMPLED

TESTS

SOIL

ICE

DESCRIPTION

GRAIN-SIZE ANALYSIS

WET DENSITY (%)

DRY DENSITY (%)

GRANULARITY

CLAY

SILT

SAND

NUMBER

O = WATER CONTENT (% OF DRY WEIGHT)
 △ = ICE CONTENT (% OF SAMPLE VOLUME)

PLASTIC LIMIT
 LIQUID LIMIT
 DEPTH (FEET)

LIMITS OF FROZEN GROUND

ICE RESISTANCE TEST

SOIL SYMBOL

UNIFED SOIL SYMBOL

PERCENTAGE OF RESISTANCE

% AGGREGATE

TESTS SAMPLED

Bottom of Hole 30'

GRANULE - SAND

MIX.

STONY

SHALE - SOFT

8 1/2

Vc-Vr

VX

Bottom of Hole 30'

AB-1-1 Drift

AB-1-1 Drift

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

TUK

DATE DRILLED

AIRPHOTO NO:

A102

CHAMAGE

SURFACE DRAINAGE:

SOIL DESCRIPTION

ICE

Sector 7

SEARCH SECTOR NO. 7

Landform and Location: Glacio-fluvial complex on the southwest shore of Eskimo Lakes, 32 miles north of Inuvik - near mile 1004 to 1006 Mackenzie Highway.

Designated Test Drilling Areas: Areas #19 and #19A.

Material: Sandy gravel.

Volume: Unlimited but in many small mounds and hillcocks.

Stripping: Variable from zero to six or eight feet. Most features contain massive clear ice at some depth.

Conclusion: Development of Area #19A adjacent to the alignment at Mile 1006 is recommended. Pit development costs will be high because of five to eight feet of surface stripping plus massive ice layers at depth, however pit would be strategically located and would have substantially reduced haul costs over alternate sources.

No. 7-Sector Topography

This source is part of a glacio-fluvial complex located along the south-

west shore of Eskimo Lakes. The major deposit Area (#19) is along the lakeshore and is roughly two miles long and some 3,000 feet in width. This area is located one half to one mile from the highway right-of-way. A smaller deposit Area (#19A) is situated on, and adjacent to, the right-of-way near mile 1006.

The ground surface throughout the complex is very irregular with many hillcocks, lakes, and small gullies draining to Eskimo Lake from the smaller inland lakes. Some areas show a polygonal ground pattern.

Area #19 was test drilled previously by Ripley, Klohn and Leonoff, Consultants and four test holes from that investigation have been included herein.

No. 7 - Materials and Quantities

A - Area #19

This source is very erratic. Test hole #19-1 penetrated roughly 30 feet of sandy gravel with no massive ice inclusions, whereas hole #19-2, within 300 feet, encountered two massive ice layers totalling nine feet in thickness in 17 feet of drilling. Most test holes in this area encountered some clear ice with three holes, #19-6, #19-7 and #19-10, penetrating in excess of 20 feet of ice in a 30 foot hole. Many of the small hillcocks contain gravel, however, as a general rule, it appears that where there are small exposed gravel faces on the surface, the deposit is shallow and underlain by ice.

Where gravel does exist it is practically free of ice with thawed moisture contents near 5%.

The volume of recoverable material here is impossible to estimate

accurately but it is probably in excess of 1,000,000 cu. yds. consisting of many small areas each with volumes in the order of 50,000 to 100,000 cu. yds. The drilling to date has been sufficient only to verify that there is usable material and, because of the variability in deposits, extensive drilling patterns will be required to select the most favorable features for development. It is expected that most features will contain some massive ice layers which will affect the method and extent of development. This area is probably not a viable source of embankment borrow because of the small volumes in any one feature and the pit development and haul costs. However there is good quality gravel here which may have use as surfacing material, and which could be developed by annual stripping and stockpiling of thawed material from the many small features.

B - Area #19A

This deposit straddles the alignment at Mile 1006 and like Area #19 is very erratic. There are clear ice lenses randomly throughout the sandy gravel, however this feature is considered to be a viable embankment borrow source. The portion of the feature west of the alignment (test holes #19-5 to #19-9) is recommended for development. Stripping here to the gravel will vary between probably five to eight feet and some massive ice lenses will have to be removed within the deposit at depth. The gravel itself is at a relatively low moisture content (approximately 5%). It is estimated that at least 500,000 cu. yds. of material is available here and a detailed drilling pattern is recommended to define the preferred pit area. The feature is on the edge of a relatively large lake which may impose some environmental restrictions on pit development.

ESKIMO LAKES

BONNIEVILLE PT.

AREA 19

*TM
005*

AREA 19A



AREA 19

1005
1896+1640
4°

006

19A-2

19A-1

19A-3

3°

19A-4

AREA 19A

19A-8

19A-5

19A-9

19A-7

19A-6

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

FIELD ENG. DATE DRILLED 24/3/46 AIRPHOTO NO: 100
TECHN. ONYCH RIG D 123 SURFACE DRAINAGE

TEST NUMBER	SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY	PERMEABILITY	RESISTANCE	UNITS TESTED	SOIL SYMBOL	LIMITS OF FROZEN GROUND	DESCRIPTION	ICE	O : WATER CONTENT (% OF DRY WEIGHT) △ : ICE CONTENT (% OF SAMPLE VOLUME)	GRAIN-SIZE ANALYSIS	TEST HOLE	
1	1	CLAY - STONY SANDY	2	20	PLASTIC LIMIT	14	CLAY	77-17	GRAVEL	△	0	100+	100%	10-2852 WEST
2	2	CLAY - STONY SANDY	4	20	LIQUID LIMIT	80	SILT	13-5234 WEST	GRAVEL	△	0	100+	100%	6-5143 WEST
3	3	GRAVEL - SANDY	6	20	PLASTIC LIMIT	16	SAND	8-5735 WEST	GRAVEL	O	0	100+	100%	7-2657 WEST
4	4	GRAVEL - SANDY	8	20	LIQUID LIMIT	80	SILT	4-21175 WEST	GRAVEL	O	0	100+	100%	4-21175 WEST
5	5	GRAVEL - SANDY	10	20	PLASTIC LIMIT	16	SAND		GRAVEL	O	0	100+	100%	
6	6	GRAVEL - SANDY	12	20	LIQUID LIMIT	80	SILT		GRAVEL	O	0	100+	100%	
7	7	GRAVEL - SANDY	14	20	PLASTIC LIMIT	16	SAND		GRAVEL	O	0	100+	100%	
8	8	GRAVEL - SANDY	16	20	LIQUID LIMIT	80	SILT		GRAVEL	O	0	100+	100%	
9	9	GRAVEL - SANDY	18	20	PLASTIC LIMIT	16	SAND		GRAVEL	O	0	100+	100%	
10	10	GRAVEL - SANDY	20	20	LIQUID LIMIT	80	SILT		GRAVEL	O	0	100+	100%	
11	11	GRAVEL - SANDY	22	20	PLASTIC LIMIT	16	SAND		GRAVEL	O	0	100+	100%	
12	12	GRAVEL - SANDY	24	20	LIQUID LIMIT	80	SILT		GRAVEL	O	0	100+	100%	

Bottom of Hole - 30'

-6- 25-18' west

DEPARTMENT OF PUBLIC WORKS, CANADA

MACKENZIE HIGHWAY

DRILL HOLE REPORT

AIRPHOTO NO:

21316

DATE DRILLED

29/3/64

RIG

A.R

FIELD ENG

C.D.

TECH PRODUCED

TEST HOLE

NUMBER

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% SAND	% SILET	% CLAY	GRAVEL	WET DENSITY (PCF)	DRY DENSITY (PCF)	TEST HOLE NUMBER
2	C1	GRANULAR	0	0	100	0	100.0	99.0	1-12
4	ICE		0	0	100	0	100.0	99.0	1-12
6			0	0	100	0	100.0	99.0	1-12
8	C1	CLAY - SILTY SANDY PEBBLES	0	0	100	0	100.0	99.0	1-12
10			0	0	100	0	100.0	99.0	1-12
12	Vs		0	0	100	0	100.0	99.0	1-12
14			0	0	100	0	100.0	99.0	1-12
16			0	0	100	0	100.0	99.0	1-12
18			0	0	100	0	100.0	99.0	1-12
20			0	0	100	0	100.0	99.0	1-12
22			0	0	100	0	100.0	99.0	1-12
24			0	0	100	0	100.0	99.0	1-12
26			0	0	100	0	100.0	99.0	1-12
28			0	0	100	0	100.0	99.0	1-12
30			0	0	100	0	100.0	99.0	1-12
32			0	0	100	0	100.0	99.0	1-12
34			0	0	100	0	100.0	99.0	1-12
36			0	0	100	0	100.0	99.0	1-12
38			0	0	100	0	100.0	99.0	1-12
40			0	0	100	0	100.0	99.0	1-12
42			0	0	100	0	100.0	99.0	1-12
44			0	0	100	0	100.0	99.0	1-12
46			0	0	100	0	100.0	99.0	1-12
48			0	0	100	0	100.0	99.0	1-12
50			0	0	100	0	100.0	99.0	1-12
52			0	0	100	0	100.0	99.0	1-12
54			0	0	100	0	100.0	99.0	1-12
56			0	0	100	0	100.0	99.0	1-12
58			0	0	100	0	100.0	99.0	1-12
60			0	0	100	0	100.0	99.0	1-12
62			0	0	100	0	100.0	99.0	1-12
64			0	0	100	0	100.0	99.0	1-12
66			0	0	100	0	100.0	99.0	1-12
68			0	0	100	0	100.0	99.0	1-12
70			0	0	100	0	100.0	99.0	1-12
72			0	0	100	0	100.0	99.0	1-12
74			0	0	100	0	100.0	99.0	1-12
76			0	0	100	0	100.0	99.0	1-12
78			0	0	100	0	100.0	99.0	1-12
80			0	0	100	0	100.0	99.0	1-12
82			0	0	100	0	100.0	99.0	1-12
84			0	0	100	0	100.0	99.0	1-12
86			0	0	100	0	100.0	99.0	1-12
88			0	0	100	0	100.0	99.0	1-12
90			0	0	100	0	100.0	99.0	1-12
92			0	0	100	0	100.0	99.0	1-12
94			0	0	100	0	100.0	99.0	1-12
96			0	0	100	0	100.0	99.0	1-12
98			0	0	100	0	100.0	99.0	1-12
100			0	0	100	0	100.0	99.0	1-12
102			0	0	100	0	100.0	99.0	1-12
104			0	0	100	0	100.0	99.0	1-12
106			0	0	100	0	100.0	99.0	1-12
108			0	0	100	0	100.0	99.0	1-12
110			0	0	100	0	100.0	99.0	1-12
112			0	0	100	0	100.0	99.0	1-12
114			0	0	100	0	100.0	99.0	1-12
116			0	0	100	0	100.0	99.0	1-12
118			0	0	100	0	100.0	99.0	1-12
120			0	0	100	0	100.0	99.0	1-12
122			0	0	100	0	100.0	99.0	1-12
124			0	0	100	0	100.0	99.0	1-12
126			0	0	100	0	100.0	99.0	1-12
128			0	0	100	0	100.0	99.0	1-12
130			0	0	100	0	100.0	99.0	1-12
132			0	0	100	0	100.0	99.0	1-12
134			0	0	100	0	100.0	99.0	1-12
136			0	0	100	0	100.0	99.0	1-12
138			0	0	100	0	100.0	99.0	1-12
140			0	0	100	0	100.0	99.0	1-12
142			0	0	100	0	100.0	99.0	1-12
144			0	0	100	0	100.0	99.0	1-12
146			0	0	100	0	100.0	99.0	1-12
148			0	0	100	0	100.0	99.0	1-12
150			0	0	100	0	100.0	99.0	1-12
152			0	0	100	0	100.0	99.0	1-12
154			0	0	100	0	100.0	99.0	1-12
156			0	0	100	0	100.0	99.0	1-12
158			0	0	100	0	100.0	99.0	1-12
160			0	0	100	0	100.0	99.0	1-12
162			0	0	100	0	100.0	99.0	1-12
164			0	0	100	0	100.0	99.0	1-12
166			0	0	100	0	100.0	99.0	1-12
168			0	0	100	0	100.0	99.0	1-12
170			0	0	100	0	100.0	99.0	1-12
172			0	0	100	0	100.0	99.0	1-12
174			0	0	100	0	100.0	99.0	1-12
176			0	0	100	0	100.0	99.0	1-12
178			0	0	100	0	100.0	99.0	1-12
180			0	0	100	0	100.0	99.0	1-12
182			0	0	100	0	100.0	99.0	1-12
184			0	0	100	0	100.0	99.0	1-12
186			0	0	100	0	100.0	99.0	1-12
188			0	0	100	0	100.0	99.0	1-12
190			0	0	100	0	100.0	99.0	1-12
192			0	0	100	0	100.0	99.0	1-12
194			0	0	100	0	100.0	99.0	1-12
196			0	0	100	0	100.0	99.0	1-12
198			0	0	100	0	100.0	99.0	1-12
200			0	0	100	0	100.0	99.0	1-12
202			0	0	100	0	100.0	99.0	1-12
204			0	0	100	0	100.0	99.0	1-12
206			0	0	100	0	100.0	99.0	1-12
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214			0	0	100	0	100.0	99.0	1-12
216			0	0	100	0	100.0	99.0	1-12
218			0	0	100	0	100.0	99.0	1-12
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224			0	0	100	0	100.0	99.0	1-12
226			0	0	100	0	100.0	99.0	1-12
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232			0	0	100	0	100.0	99.0	1-12
234			0	0	100	0	100.0	99.0	1-12
236			0	0	100	0	100.0	99.0	1-12
238			0	0	100	0	100.0	99.0	1-12
240			0	0	100	0	100.0	99.0	1-12
242			0	0	100	0	100.0	99.0	1-12
244			0	0	100	0	100.0	99.0	1-12
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270			0	0	100	0	100.0	99.0	1-12
272			0	0	100	0	100.0	99.0	1-12
274			0	0	100	0	100.0	99.0	1-12
276			0	0	100	0	100.0	99.0	1-12
278			0	0	100	0	100.0	99.0	1-12
280			0	0	100	0	100.0	99.0	1-12
282			0	0	100	0	100.0	99.0	1-12
284			0	0	100				

Inuvik - Tuk

DRILL HOLE REPORT

**DEPARTMENT OF PUBLIC WORKS. CANADA
MACKENZIE HIGHWAY**

MACKENZIE HIGHWAY

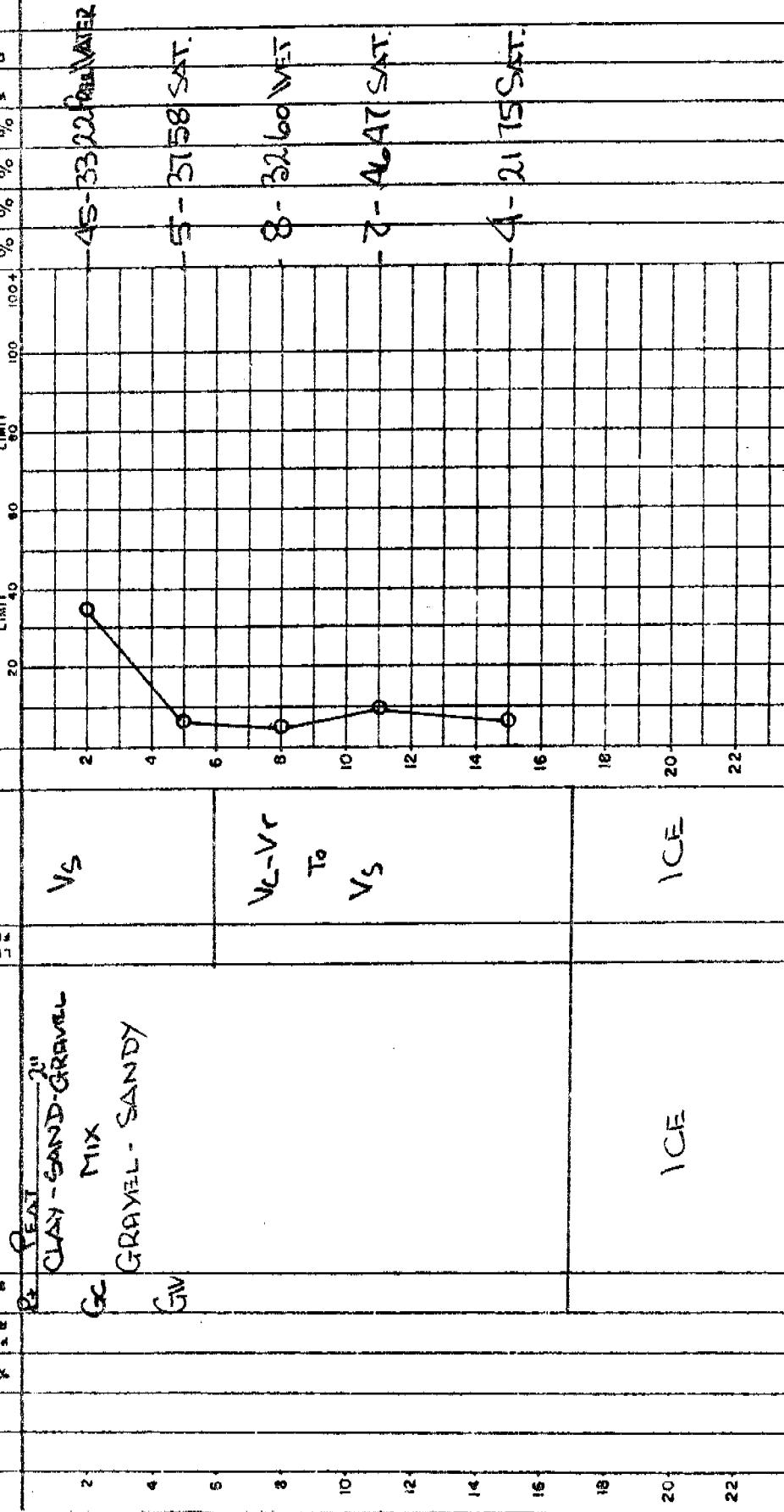
MACKENZIE HIGHWAY

- A-39-57 607

Bottom of Hole - 30'

DRILL HOLE REPORT				DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY			
CKD	FIELD ENG	DATE DRILLED	AIRPHOTO NO:	CHAINAGE:	VEGETATION	TEST HOLE	
DWY	RIG	DATE DRILLED	AIRPHOTO NO:	SURFACE DRAINAGE:			
1	TECH PRONYCH	29/3/76	16				
SOIL DESCRIPTION	FROZEN GROUND LIMITS OF SOIL	ICE DESCRIPTION	ICE DEPTH (FEET)	O = WATER CONTENT (% OF DRY WEIGHT) △ = ICE CONTENT (% OF SAMPLE VOLUME)	GRAIN-SIZE ANALYSIS	TEST HOLE	
CLAY - SAND GRANULAR MIX	V _s	V _s	2	PLASTIC LIMIT	MILE	B.C.S	NUMBER
GRANULAR MIX	T ₀	T ₀	4	LIQUID LIMIT	AREA - V0-9		
GRANULAR	V _s	V _s	6	100	REMARKS		
			8	100+			
			10	%			
			12	%			
			14	%			
			16	%			
			18	%			
			20	%			
			22	%			
			24	%			
DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE					
DWY							
TEST HOLE							

Bottom of Hole. 30'



INUVIK - TUK.

DRILL HOLE REPORT

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

INNUK - TUK

DEPARTMENT OF PUBLIC WORKS, CANADA

MACKENZIE HIGHWAY

DRILL HOLE REPORT

FIELD ENG DATE DRILLED 8/16 AIRPHOTO NO.

TECH DRILLING RIG AIR

SOIL DESCRIPTION

TEST HOLE NUMBER

SOIL SAMPLE

PENETRATION RESISTANCE

% RECOVERY

SAMPLE TYPE

SAMPLE NUMBER

SAMPLE DEPTH (FEET)

TEST HOLE DEPTH (FEET)

TEST HOLE NUMBER

TEST HOLE AREA

TEST HOLE ELEV.

TEST HOLE CHAINAGE

TEST HOLE SURFACE DRAINAGE

TEST HOLE VEGETATION

TEST HOLE OFFSET

TEST HOLE ELEV.

TEST HOLE MILE

TEST HOLE B.C.S

TEST HOLE NUMBER

O = WATER CONTENT (% OF DRY WEIGHT)
 △ = ICE CONTENT (% OF SAMPLE VOLUME)

PLASTIC LIMIT

LIQUID LIMIT

FROZEN GROUND

LIMITS OF

DEPTH (FEET)

ICE DESCRIPTION

SOIL SAMPLE

TEST HOLE NUMBER

GRAIN-SIZE ANALYSIS

GRANULAR

SILT

SAND

CLAY

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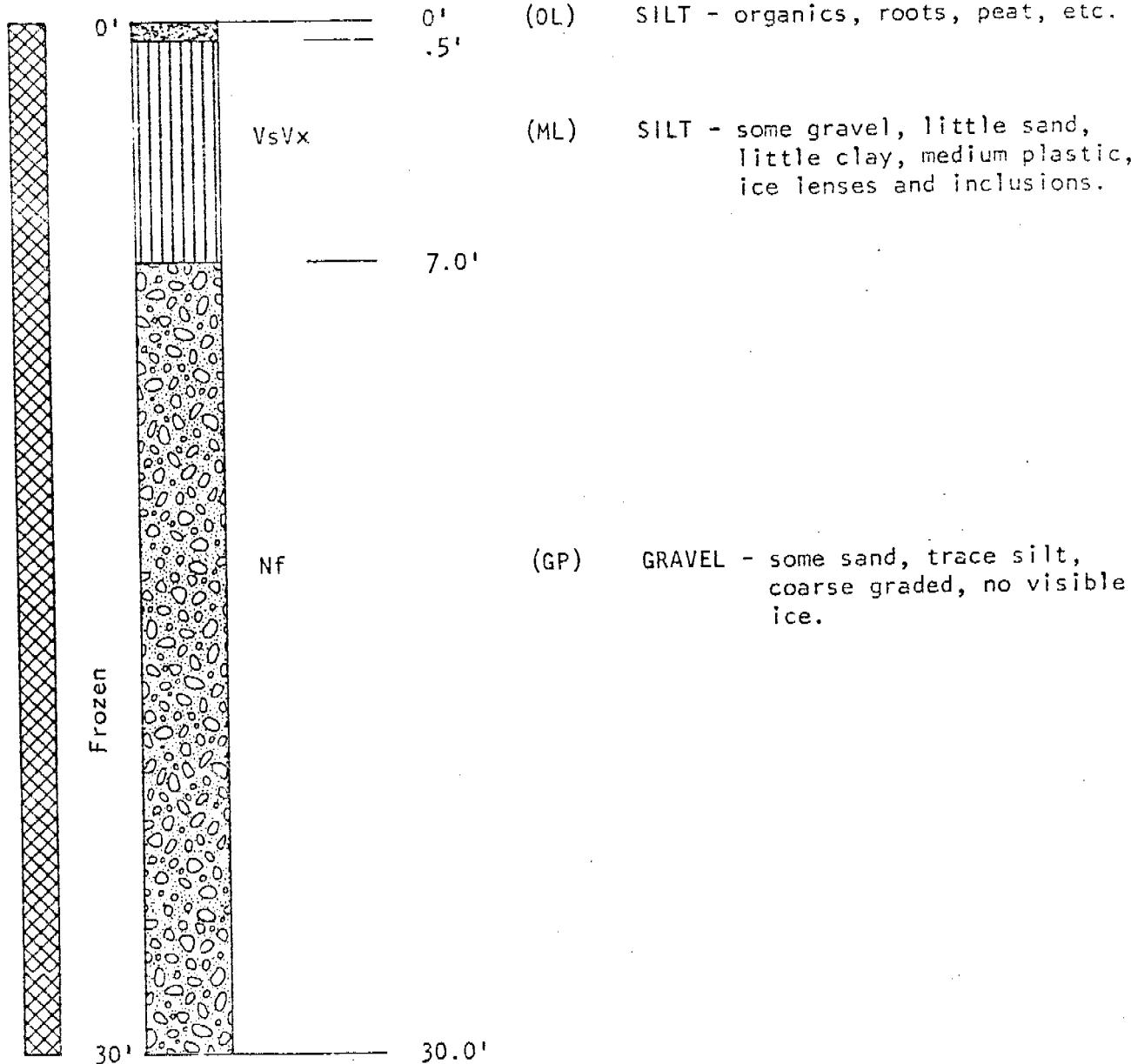
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TEST HOLE LOGS

SOURCE No. 327

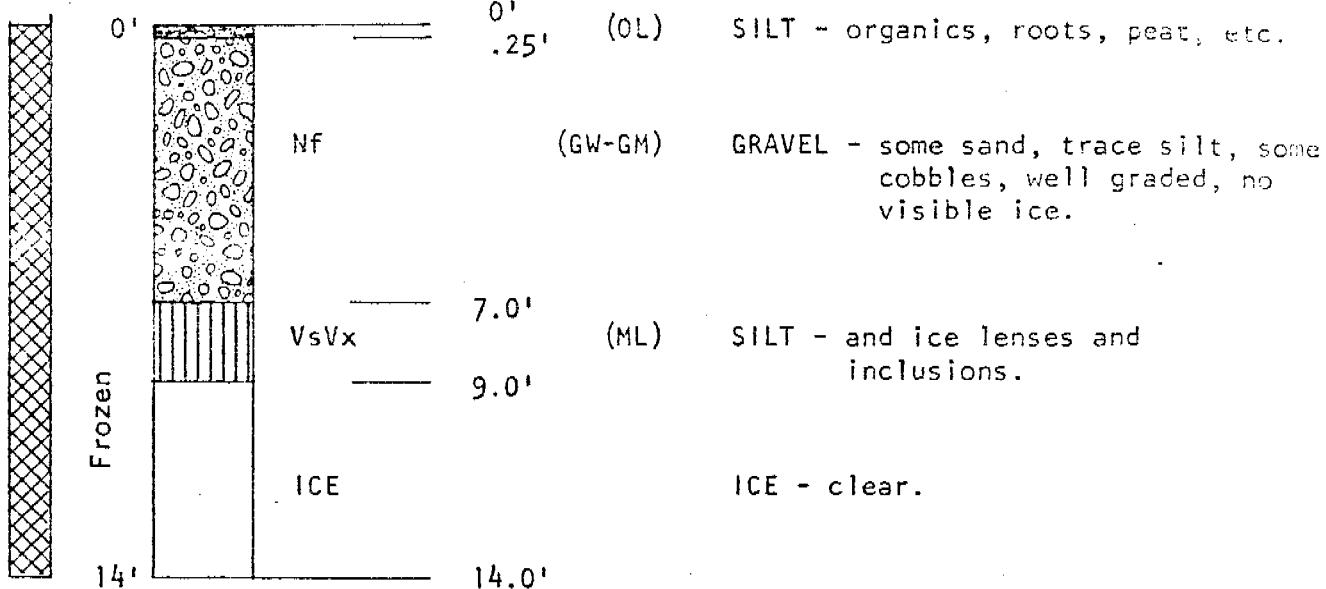
327-1



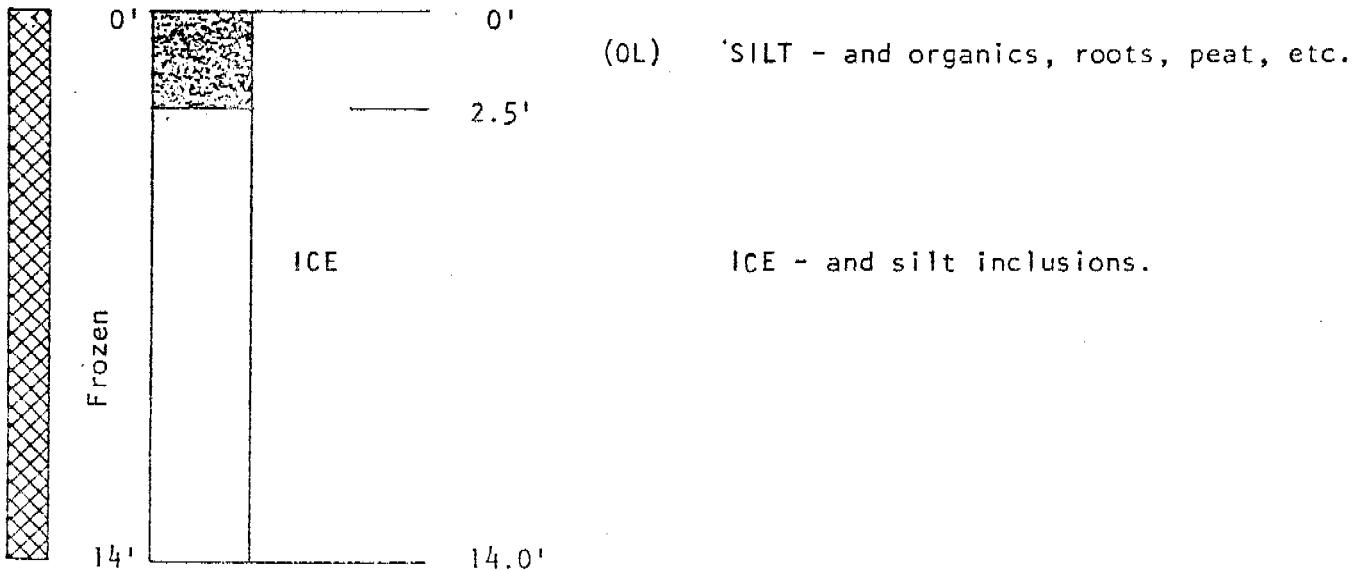
TEST HOLE LOGS

SOURCE No. 327

327-2



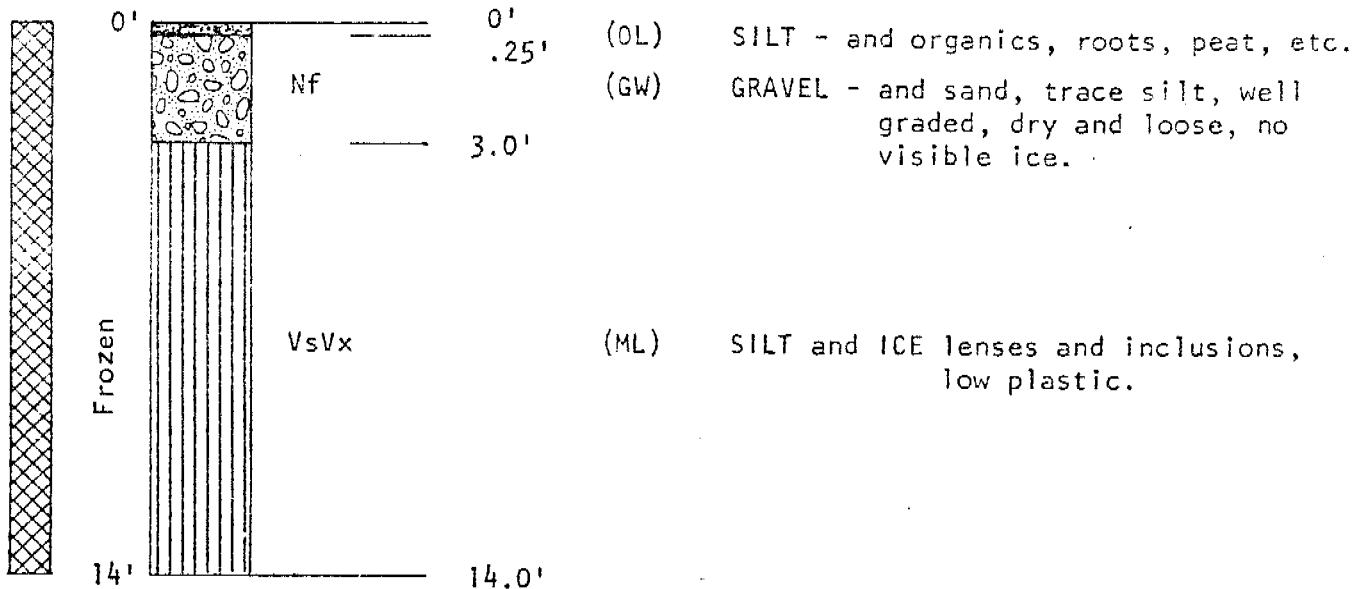
327-3



TEST HOLE LOGS

SOURCE No. 327

327-4



DRILL HOLE REPORT

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

TEST		HOLE 19A-1	
OFFSET	ELEV.	MILE	B.C.S
0000	GRAIN-SIZE ANALYSIS	NUMBER	
0000	GRAVEL	DENSITY	
0000	CLAY	C.F.	
0005		DENSITY	19A-1

SAND - GAVELLY

Bottom of Hole - 30.

-5-57-38 W3T

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

FIELD ENG. DOW

DATE DRILLED 7/4/61

AIRPHOTO NO:

TEST HOLE 19A-4

OFFSET

ELEV.

MILE B.C.S. NUMBER

1005 19A - 4

REMARKS

DRY DENSITY (PCF)

WET DENSITY (PCF)

GRAVEL %

SAND %

SILT %

CLAY %

ANALYSIS

CLAY

SILT

SAND

GRAVEL

REMARKS

Tuk - Tuk

RIG AIR

SOIL DESCRIPTION

ICE DESCRIPTION

LIMITS OF FROZEN GROUND

DEPTH (FEET)

DEPTHS (FEET)

ICE

SOIL SAMPLE

RESISTANCE

PENETRATION

% RECOVERY

TYPE

SAMPLE NUMBER

DEPTH (FEET)

TEST HOLE

CL CLAY - GRANULAR

Silty

Sandy

6' 1/2

C1 LOW-MED. PLASTIC

Gr

6' 1/2

GRANUL. SANDY

Gr

6' 1/2

SILTY

Gr

6' 1/2

ICE

Gr

6' 1/2</p

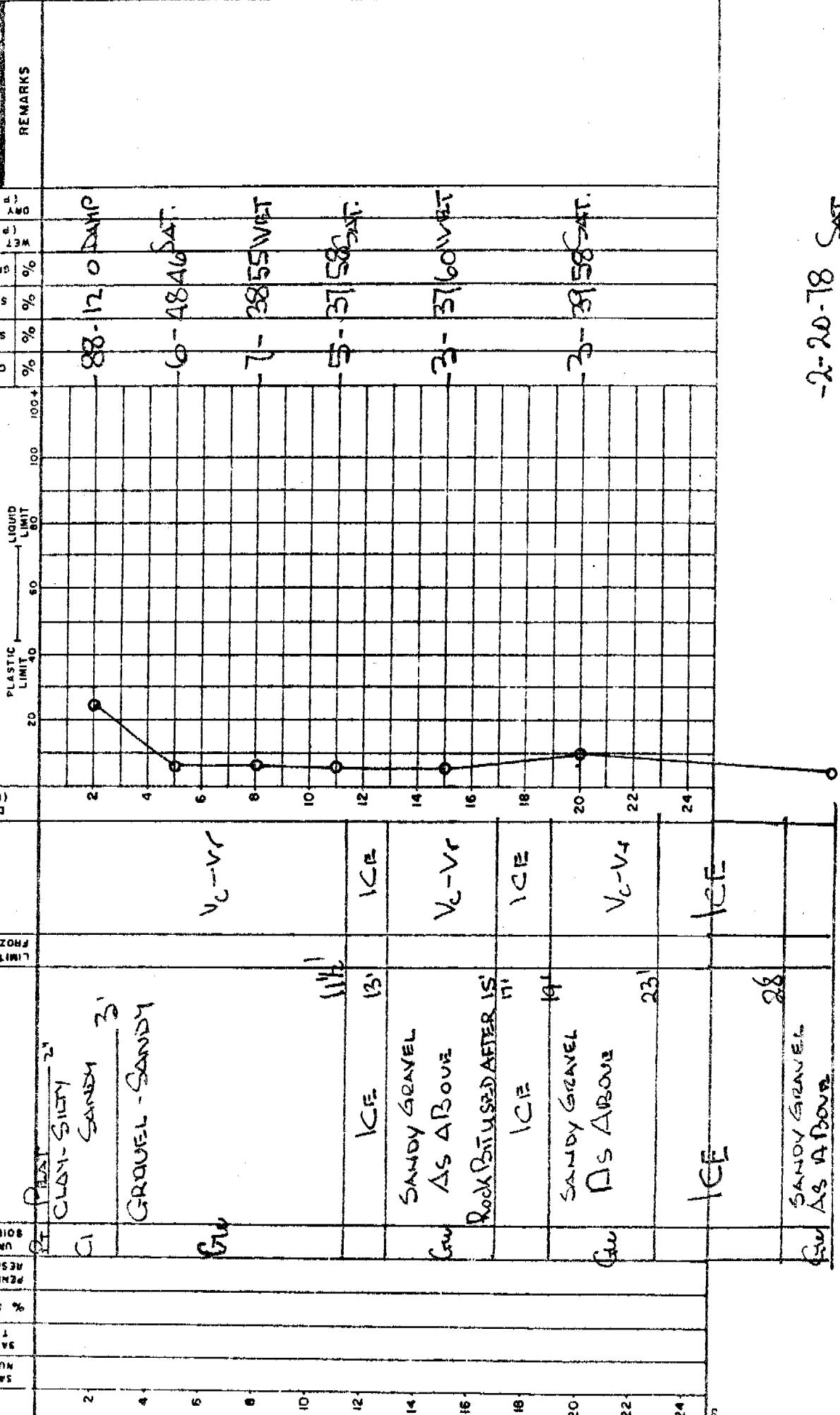
DEPARTMENT OF PUBLIC WORKS, CANADA

MACKENZIE HIGHWAY

DRILL HOLE REPORT

FIELD ENG. DATE DRILLED 10/4/78 AIRPHOTO NO:

CSD	TECH PK	MACHINIST	RIG	DIL.	SURFACE DRAINAGE:	VEGETATION:	OFFSET	TEST HOLE 9A-8	
								1005	10A-8



$\Delta \text{work} = \text{Tax}$

Page
21

Sector 8

SEARCH SECTOR NO. 8

This source is along Hans Creek near Mile 1009 of the Mackenzie Highway, and has been extensively test-drilled by Gulf Oil Canada Limited (Report entitled "granular Materials Inventory - Parsons Lake, N.W.T." - October, 1974 by Klohn Leonoff Consultants Ltd.). Volumes of sandy gravel totalling in the order of at least 2,000,000 cu. yds. have been estimated here, much of which is immediately adjacent to the highway alignment.

The above report is available within the Highways Library, Western Region. No further drilling was carried out at this source by Public Works.

Sector 9

SEARCH SECTOR NO. 9

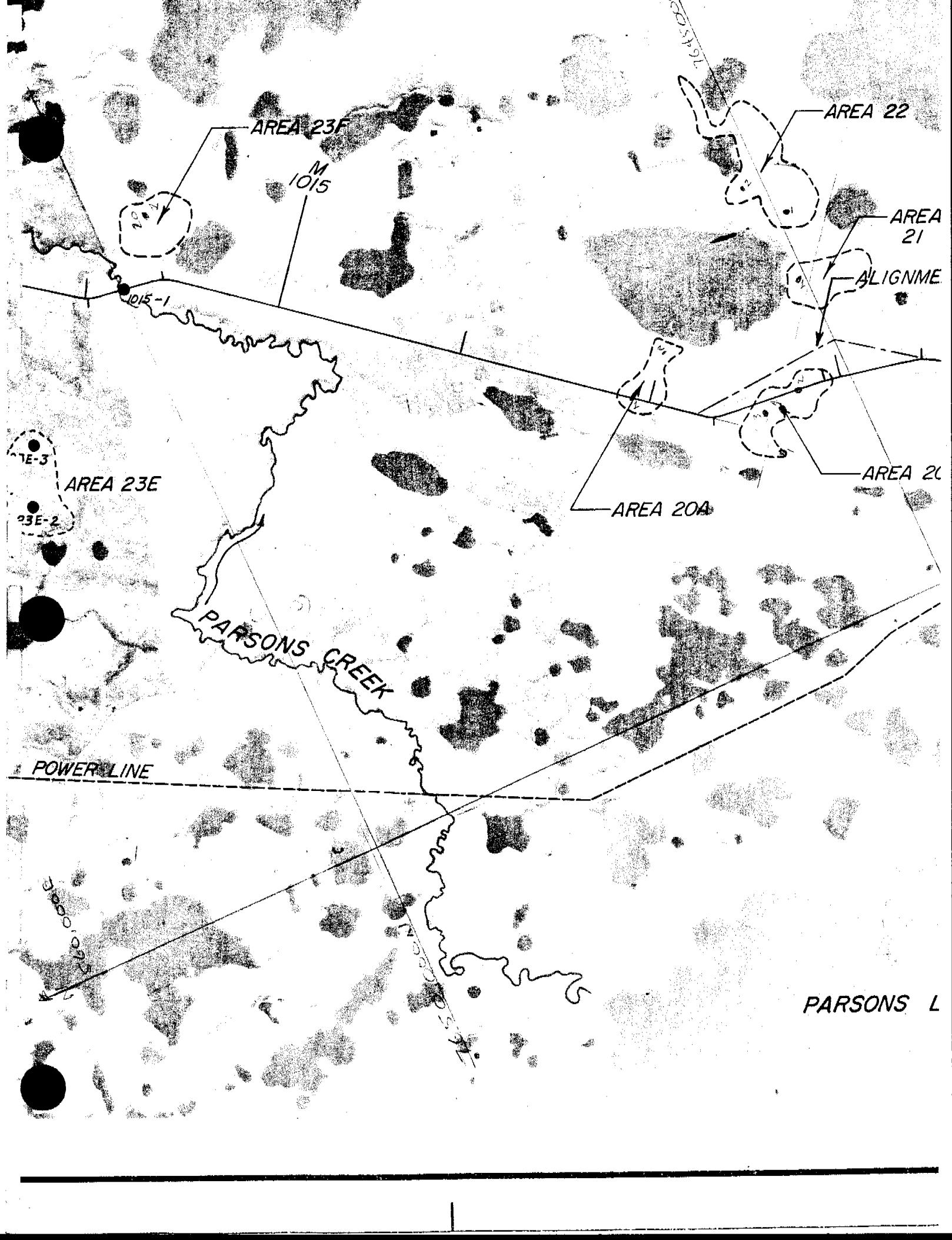
Landform and Location: Various small features near the Mackenzie Highway alignment between Mile 1012 and Mile 1016, which show some surface evidence of glacio-fluvial deposits over either glacial till or lacustrine sediments.

Designated Test Drilling Areas: Areas #20, #20A, #21, #22, #23E and #23F.

Material: Minor sand and gravel with much excess ice.

Volume: Very limited.

Conclusion: All areas are unsuitable for embankment borrow.



AREA 23F

23F-20

2476196.40
1016
3°

2°

1016
2423196.40
100.

DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY									
DRILL HOLE REPORT					TEST HOLE				
FIELD ENG	DATE DRILLED	AIRPHOTO NO.	CHAINAGE:	VEGETATION:	TEST	HOLE	MILE	B.C.S	NUMBER
CXD	TECH PRONYCH	RIG:	AIR	SURFACE DRAINAGE:	OFFSET	ELEV			
					TEST HOLE				
					GRAIN-SIZE ANALYSIS	GRANULE	SLATE	SAND	%
					WET DENSITY (PCF)	DRY DENSITY (PCF)	LIMITS OF FROZEN GROUND	LIMITS OF FROZEN GROUND	%
					TEST	TEST	TEST	TEST	TEST
100	100+	100+	100+	100+	100+	100+	100+	100+	100+
20	40	60	80	100	120	140	160	180	200
40	60	80	100	120	140	160	180	200	220
60	80	100	120	140	160	180	200	220	240
80	100	120	140	160	180	200	220	240	260
100	120	140	160	180	200	220	240	260	280
120	140	160	180	200	220	240	260	280	300
140	160	180	200	220	240	260	280	300	320
160	180	200	220	240	260	280	300	320	340
180	200	220	240	260	280	300	320	340	360
200	220	240	260	280	300	320	340	360	380
220	240	260	280	300	320	340	360	380	400
240	260	280	300	320	340	360	380	400	420
260	280	300	320	340	360	380	400	420	440
280	300	320	340	360	380	400	420	440	460
300	320	340	360	380	400	420	440	460	480
320	340	360	380	400	420	440	460	480	500
340	360	380	400	420	440	460	480	500	520
360	380	400	420	440	460	480	500	520	540
380	400	420	440	460	480	500	520	540	560
400	420	440	460	480	500	520	540	560	580
420	440	460	480	500	520	540	560	580	600
440	460	480	500	520	540	560	580	600	620
460	480	500	520	540	560	580	600	620	640
480	500	520	540	560	580	600	620	640	660
500	520	540	560	580	600	620	640	660	680
520	540	560	580	600	620	640	660	680	700
540	560	580	600	620	640	660	680	700	720
560	580	600	620	640	660	680	700	720	740
580	600	620	640	660	680	700	720	740	760
600	620	640	660	680	700	720	740	760	780
620	640	660	680	700	720	740	760	780	800
640	660	680	700	720	740	760	780	800	820
660	680	700	720	740	760	780	800	820	840
680	700	720	740	760	780	800	820	840	860
700	720	740	760	780	800	820	840	860	880
720	740	760	780	800	820	840	860	880	900
740	760	780	800	820	840	860	880	900	920
760	780	800	820	840	860	880	900	920	940
780	800	820	840	860	880	900	920	940	960
800	820	840	860	880	900	920	940	960	980
820	840	860	880	900	920	940	960	980	1000
840	860	880	900	920	940	960	980	1000	1020
860	880	900	920	940	960	980	1000	1020	1040
880	900	920	940	960	980	1000	1020	1040	1060
900	920	940	960	980	1000	1020	1040	1060	1080
920	940	960	980	1000	1020	1040	1060	1080	1100
940	960	980	1000	1020	1040	1060	1080	1100	1120
960	980	1000	1020	1040	1060	1080	1100	1120	1140
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1040	1060	1080	1100	1120	1140	1160	1180	1200	1220
1060	1080	1100	1120	1140	1160	1180	1200	1220	1240
1080	1100	1120	1140	1160	1180	1200	1220	1240	1260
1100	1120	1140	1160	1180	1200	1220	1240	1260	1280
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1180	1200	1220	1240	1260	1280	1300	1320	1340	1360
1200	1220	1240	1260	1280	1300	1320	1340	1360	1380
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DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

FIELD NO. DATE DRILLED AIRPHOTO NO:

TECH. RIG NO. RIG AREA:

CHANAGE:

SOIL DESCRIPTION

TEST HOLE

MILE

B.C.S

NUMBER

AREA - 20-A

REMARKS

GRAIN-SIZE ANALYSIS

ELEV.

TEST HOLE

WET DENSITY (PCF)

DRY DENSITY (PCF)

GRANULARITY (%)

SAND (%)

SILT (%)

CLAY (%)

TEST HOLE

MILE

B.C.S

NUMBER

TEST HOLE

INUYASHI -TUK

DRILL HOLE REPORT

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

INNUVIK - TUK

DRILL HOLE REPORT

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

FIELD ENG. C.W.	DATE DRILLED 13/10/68	AIRPHOTO NO. RIG AIR	CHAINAGE SURFACE DRAINAGE	VEGETATION	OFFSET	MILE	B.C.S.	NUMBER	TEST HOLE
TECH RON YUCH									
SOIL DESCRIPTION									
SOIL SYMBOL									
UNITS OF RESISTANCE									
PENETRATION DISTANCE									
% RECOVERY									
TYPE									
SAMPLE NUMBER									
DEPTH (FEET)									
LIMITS OF FROZEN GROUND									
ICE DESCRIPTION									
ICE CONTENT (% OF DRY WEIGHT)									
ICE CONTENT (% OF SAMPLE VOLUME)									
PLASTIC LIMIT									
LIQUID LIMIT									
CLAY									
SILT									
SAND									
GRAVEL									
WET DENSITY (PCF)									
DRY DENSITY (PCF)									
REMARKS									
TEST A - 20 - 1									
NO SAMPLES									
CLAY - SILTY VS BOTTOM OF HOLE - 15'									
2 4 6 8 10 12 14 16 18 20 22 24									

INUVIK - TUK

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

FIELD ENG CSD	TECH CRONYCH	DATE DRILLED 3/16	AIRPHOTO NO: RIG A-12	SURFACE DRAINAGE:	CHANGE:	TEST HOLE NUMBER: A85-22-2	MILE B.C.S.	TEST HOLE NUMBER: A85-22-2
OPERATION (FEET)	SAMPLE NUMBER	TYPE	SAMPLE SIZE	% RECOVERY	PERMEABILITY	RESISTANCE	SOIL SYMBOL	LIMITS OF GROUND
10	11	12	13	14	15	16	17	18
12	13	14	15	16	17	18	19	20
14	15	16	17	18	19	20	21	22
16	17	18	19	20	21	22	23	24
18	19	20	21	22	23	24	25	26
20	21	22	23	24	25	26	27	28
22	23	24	25	26	27	28	29	30
24	25	26	27	28	29	30	31	32
26	27	28	29	30	31	32	33	34
28	29	30	31	32	33	34	35	36
30	31	32	33	34	35	36	37	38
32	33	34	35	36	37	38	39	40
34	35	36	37	38	39	40	41	42
36	37	38	39	40	41	42	43	44
38	39	40	41	42	43	44	45	46
40	41	42	43	44	45	46	47	48
42	43	44	45	46	47	48	49	50
44	45	46	47	48	49	50	51	52
46	47	48	49	50	51	52	53	54
48	49	50	51	52	53	54	55	56
50	51	52	53	54	55	56	57	58
52	53	54	55	56	57	58	59	60
54	55	56	57	58	59	60	61	62
56	57	58	59	60	61	62	63	64
58	59	60	61	62	63	64	65	66
60	61	62	63	64	65	66	67	68
62	63	64	65	66	67	68	69	70
64	65	66	67	68	69	70	71	72
66	67	68	69	70	71	72	73	74
68	69	70	71	72	73	74	75	76
70	71	72	73	74	75	76	77	78
72	73	74	75	76	77	78	79	80
74	75	76	77	78	79	80	81	82
76	77	78	79	80	81	82	83	84
78	79	80	81	82	83	84	85	86
80	81	82	83	84	85	86	87	88
82	83	84	85	86	87	88	89	90
84	85	86	87	88	89	90	91	92
86	87	88	89	90	91	92	93	94
88	89	90	91	92	93	94	95	96
90	91	92	93	94	95	96	97	98
92	93	94	95	96	97	98	99	100
94	95	96	97	98	99	100	101	102
96	97	98	99	100	101	102	103	104
98	99	100	101	102	103	104	105	106
100	101	102	103	104	105	106	107	108
102	103	104	105	106	107	108	109	110
104	105	106	107	108	109	110	111	112
106	107	108	109	110	111	112	113	114
108	109	110	111	112	113	114	115	116
110	111	112	113	114	115	116	117	118
112	113	114	115	116	117	118	119	120
114	115	116	117	118	119	120	121	122
116	117	118	119	120	121	122	123	124
118	119	120	121	122	123	124	125	126
120	121	122	123	124	125	126	127	128
122	123	124	125	126	127	128	129	130
124	125	126	127	128	129	130	131	132
126	127	128	129	130	131	132	133	134
128	129	130	131	132	133	134	135	136
130	131	132	133	134	135	136	137	138
132	133	134	135	136	137	138	139	140
134	135	136	137	138	139	140	141	142
136	137	138	139	140	141	142	143	144
138	139	140	141	142	143	144	145	146
140	141	142	143	144	145	146	147	148
142	143	144	145	146	147	148	149	150
144	145	146	147	148	149	150	151	152
146	147	148	149	150	151	152	153	154
148	149	150	151	152	153	154	155	156
150	151	152	153	154	155	156	157	158
152	153	154	155	156	157	158	159	160
154	155	156	157	158	159	160	161	162
156	157	158	159	160	161	162	163	164
158	159	160	161	162	163	164	165	166
160	161	162	163	164	165	166	167	168
162	163	164	165	166	167	168	169	170
164	165	166	167	168	169	170	171	172
166	167	168	169	170	171	172	173	174
168	169	170	171	172	173	174	175	176
170	171	172	173	174	175	176	177	178
172	173	174	175	176	177	178	179	180
174	175	176	177	178	179	180	181	182
176	177	178	179	180	181	182	183	184
178	179	180	181	182	183	184	185	186
180	181	182	183	184	185	186	187	188
182	183	184	185	186	187	188	189	190
184	185	186	187	188	189	190	191	192
186	187	188	189	190	191	192	193	194
188	189	190	191	192	193	194	195	196
190	191	192	193	194	195	196	197	198
192	193	194	195	196	197	198	199	200
194	195	196	197	198	199	200	201	202
196	197	198	199	200	201	202	203	204
198	199	200	201	202	203	204	205	206
200	201	202	203	204	205	206	207	208
202	203	204	205	206	207	208	209	210
204	205	206	207	208	209	210	211	212
206	207	208	209	210	211	212	213	214
208	209	210	211	212	213	214	215	216
210	211	212	213	214	215	216	217	218
212	213	214	215	216	217	218	219	220
214	215	216	217	218	219	220	221	222
216	217	218	219	220	221	222	223	224
218	219	220	221	222	223	224	225	226
220	221	222	223	224	225	226	227	228
222	223	224	225	226	227	228	229	230
224	225	226	227	228	229	230	231	232
226	227	228	229	230	231	232	233	234
228	229	230	231	232	233	234	235	236
230	231	232	233	234	235	236	237	238
232	233	234	235	236	237	238	239	240
234	235	236	237	238	239	240	241	242
236	237	238	239	240	241	242	243	244
238	239	240	241	242	243	244	245	246
240	241	242	243	244	245	246	247	248
242	243	244	245	246	247	248	249	250
244	245	246	247	248	249	250	251	252
246	247	248	249	250	251	252	253	254
248	249	250	251	252	253	254	255	256
250	251	252	253	254	255	256	257	258
252	253	254	255	256	257	258	259	260
254	255	256	257	258	259	260	261	262
256	257	258	259	260	261	262	263	264
258	259	260	261	262	263	264	265	266
260	261	262	263	264	265	266	267	268
262	263	264	265	266	267	268	269	270
264	265	266	267	268	269	270	271	272
266	267	268	269	270	271	272	273	274
268	269	270	271	272	273	274	275	276
270	271	272	273	274	275	276	277	278
272	273	274	275	276	277	278	279	280
274	275	276	277	278	279	280	281	282
276	277	278	279	280	281	282	283	284
278	279	280	281	282	283	284	285	286
280	281	282	283	284	285	286	287	288
282	283	284	285	286	287	288	289	290
284	285	286	287	288	289	290	291	292
286	287	288	289	290	291	292	293	294
288	289	290	291	292	293	294	295	296
290	291	292	293	294	295	296	297	298
292	293	294	295	296	297	298	299	300
294	295	296	297					

Nuvik-Tuk.

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

Bottom or Hole: 30'

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DRILL HOLE REPORT

N N FIELD E&G DATE FILMED 15 AIRPHOTO NO:
U U TECH FROM YC4 MIG. A-12 SURFACE DRAIN

STATE DRILLED ON	75	AIRPHOTO NO:	
REG. AIR		SURFACE DRAIN	

9

SCU DESCRIPTION

LIMITS	RIDGEZEN
11	11
10	10
9	9
8	8
7	7
6	6
5	5
4	4
3	3
2	2
1	1
0	0

卷之三

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Yc-
Vc

卷之三

CHARTER

CLAY - Suite 16

Sandy
Pebbles
and O

Digitized by Google

Bottom of Hole - 30'

19-10-01-DWMP

NUVIK - TUK.

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

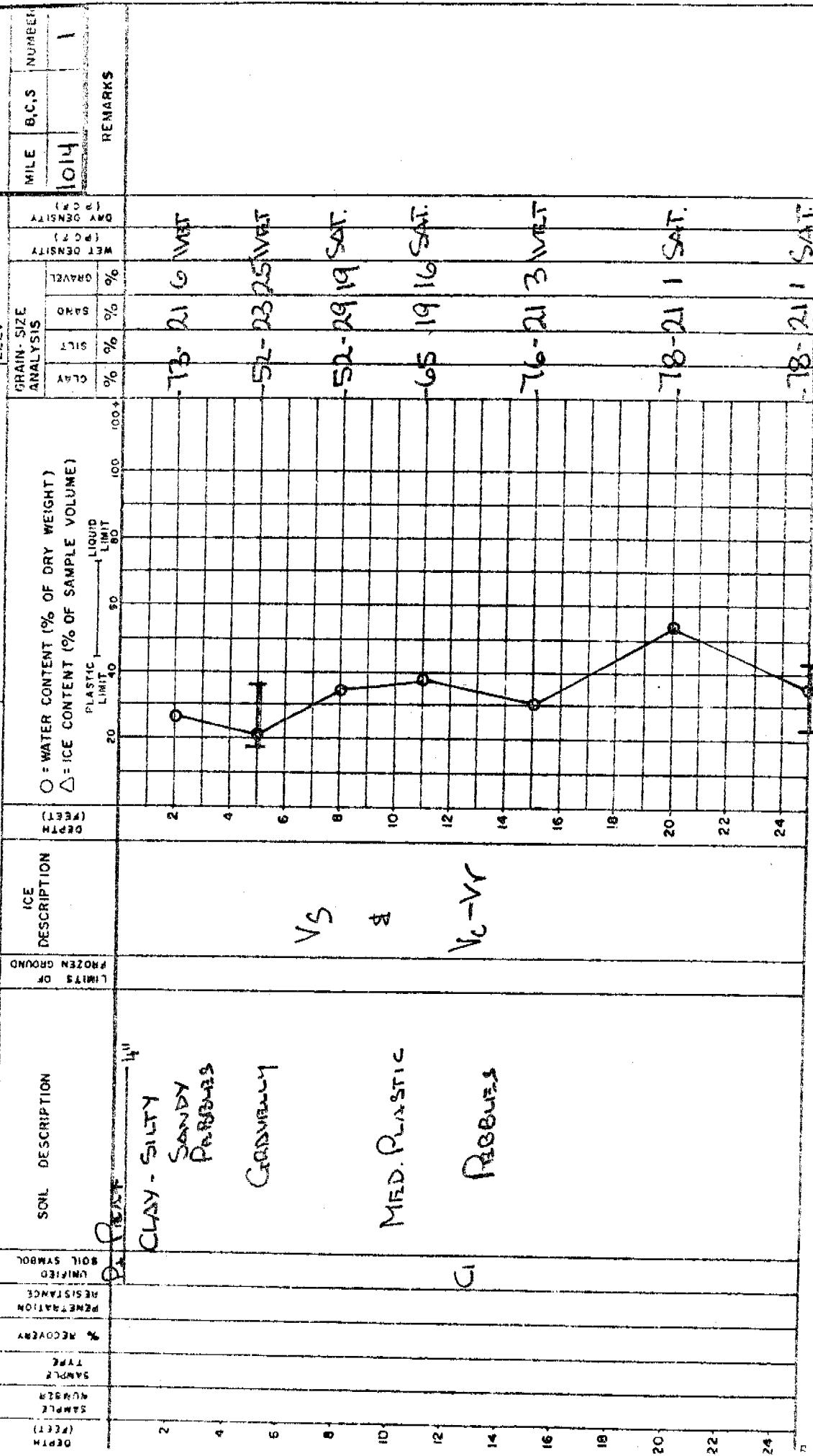
FIELD ENG	DATE DRILLED	AIRPHOTO NO.
CD	TECH	1947
DRILLING CH	DRILLING HIS	18

CHAINAGE

SAMPLE NUMBER	SOIL DESCRIPTION
1	CLAY - SALTY
2	SANDY
3	GRASSLAND

TEST HOLE

REMARKS



DODGE BANK

PARSON CREEK

DEPARTMENT OF PUBLIC WORKS, CANADA

MACKENZIE HIGHWAY

DRILL HOLE REPORT

FIELDING NO. 1476 DATE DRILLED 14.7.64

AIRPHOTO NO.

CHAINAGE

SURFACE DRAINAGE:

CSD	FIELDING TECH	DRILLING RIG	DATE DRILLED	AIRPHOTO NO.	CHAINAGE	VEGETATION	TEST HOLE	GRAIN-SIZE ANALYSIS											
								DEPTH (FEET)	DEPTH (METERS)	SOIL DESCRIPTION	ICE DESCRIPTION	WATER CONTENT (% OF DRY WEIGHT)	ICE CONTENT (% OF SAMPLE VOLUME)	GRAVEL	SILT	CLAY	GROSS DENSITY (PCF)	DRY DENSITY (PCF)	NUMBER
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24

○ = WATER CONTENT (% OF DRY WEIGHT)
 △ = ICE CONTENT (% OF SAMPLE VOLUME)

PLASTIC LIMIT

LIQUID LIMIT

20 40 60 80

10 12 14 16 18 20 22 24

100+ 100 100- 90- 80- 70- 60- 50- 40- 30- 20- 10- 0

100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

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100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

Bottom of Hole - 30

100 0.0 Water

Sector 10

SEARCH SECTOR NO. 10

Landforms and Location: A large number of kames on an outwash plain located roughly 26 miles south of Tuktoyaktuk and west of Mile 1025 on the Mackenzie Highway.

Designated Test Drilling Areas: #23, #23A, #23B, #23C, #23D, #24B.

Material: Sand and gravel-trace silt.

Volume: Probably in excess of 500,000 cu. yds. but randomly located in small features.

Conclusion: Not recommended for development due either to haul distances (three miles +) over very rough terrain to alignment, or extensive stripping (15 - 20 feet) of sources closer to the alignment.

No. 10 - Sector Topography

This source is a kame field located in a glacio-fluvial outwash plain about four miles west of Eskimo Lakes and 26 miles south of Tuktoyaktuk. The kame field is very large - about four miles long and from 500 feet to two miles in width. Previous work was carried out in this field by Ripley Klohn Leonoff and borehole logs from that work are included herein. Features test drilled extend from near the highway right-of-way to in excess of three miles away.

This source and the vicinity contain many ponds and hummocks; about 30 - 40% of the area is covered by water.

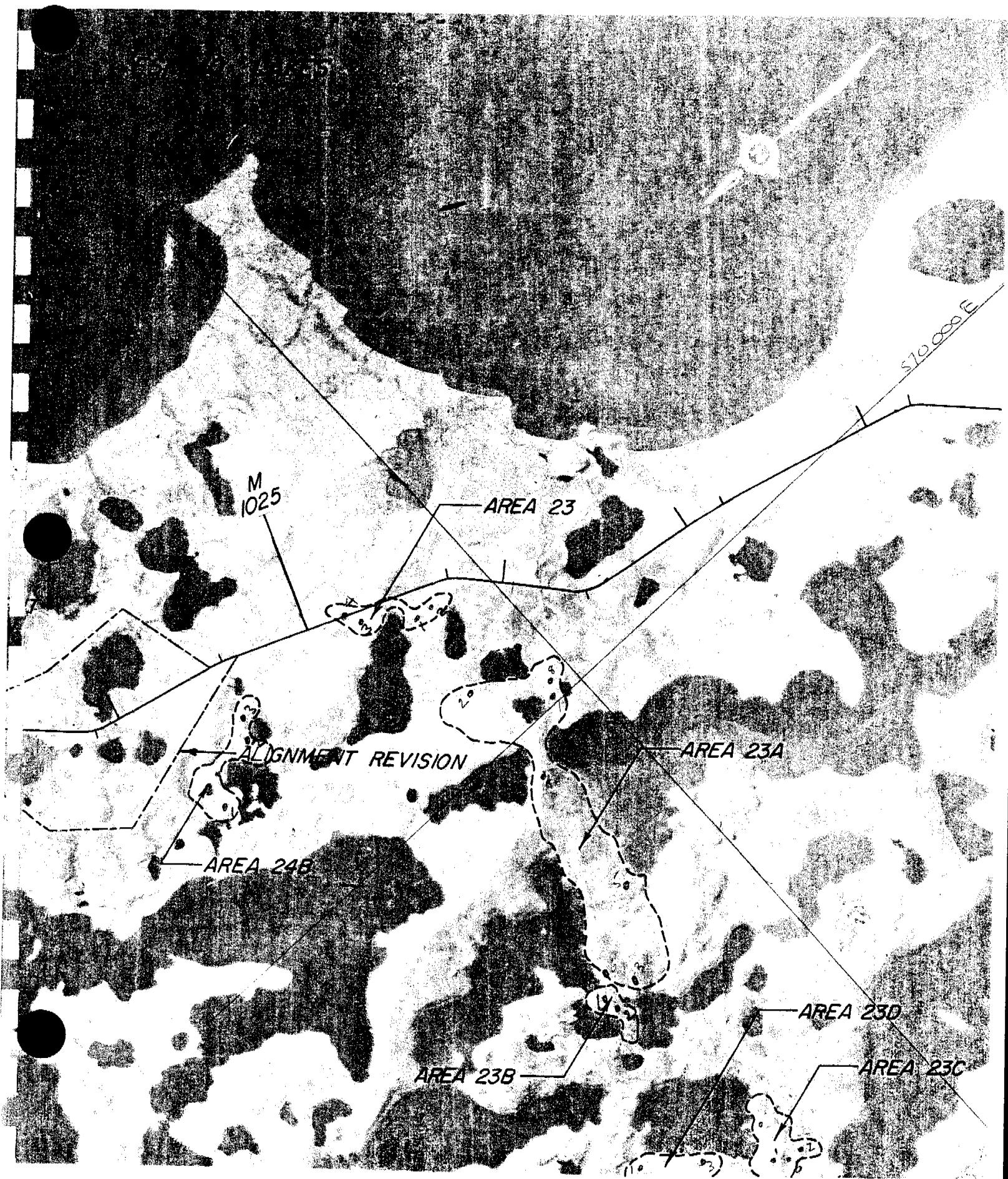
The numerous kames in this source rise from 20 to 100 feet above the

surrounding plain, and at their bases measure from 200 to 1,000 feet across. The surrounding area shows the polygonal pattern characteristic of massive ground ice, and ice was encountered in many of the test holes.

No. 10 - Materials and Quantities

The materials in the kames are variable from clean sands and gravels with little or no visible ice, to silts with minor sand and gravel and high ice contents. There are numerous gravel exposures throughout the kame field, however these gravel ridges invariably are narrow and shallow and underlain by massive ground ice. Very few features contain sufficient volume of usable material adequate for development as an embankment source. The larger granular features are located roughly three miles from the right-of-way in the vicinity of Areas #23B, #23C and #23D. There is probably in excess of 500,000 cu. yds. here, however because of the very rough terrain and the distance from the present alignment, development of these features would not appear to be viable. Sufficient drilling has been carried out only to identify that there are significant quantities of good material in these granular kames and more detailed programmes will be required to define the preferred areas.

A significant quantity of sandy gravel was encountered in Area #23 immediately adjacent to the right-of-way at Mile 1024.5, however this granular material is under 15 to 20 feet of ice-rich silty clay overburden. Because of the extensive stripping this area is not considered suitable for development.



173
231

305-A

AREA 23A

AREA 23B

305-B

23B-1
23B-2

305-4

23D-1

23D-2

AREA 23D

23D-3

305-5

AREA 23C

23C-1

305-6

23C-2

23A-1

23A-2

23A-8
23A-1

23A-4

AREA 23A

23A-6

3



MENT REVISION

102B

300

2030

102-1

0P30

24B-4

PEA 24B

24B-1

INUVIK - TUK.

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

FIELD ENG. DATE DRILLED 14 JULY AIRPHOTO NO:

C.R.D.

TECH RIGONYCH RIG A12

CHAINAGE:

100'

SURFACE DRAINAGE:

SOIL DESCRIPTION

TEST HOLE

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY	RESISTANCE	UNIFERI	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	DESCRIPTION	SOIL DESCRIPTION	TEST HOLE
2	2	CLAY - SILTY SANDY	2"	2"	2"	2"	ICE	ICE	ICE	ICE
4	4	ICE & TILL	4"	4"	4"	4"	TILL			
6	6									
8	8									
10	10									
12	12									
14	14									
16	16									
18	18									
20	20									
22	22									
24	24									

TEST HOLE	MILE	B.C.S.	NUMBER
AREA - 22-2			

O = WATER CONTENT (% OF DRY WEIGHT)
 △ = ICE CONTENT (% OF SAMPLE VOLUME)

DEPTH (FEET)

PLASTIC LIMIT

LIQUID LIMIT

80

60

40

20

0

100+

100

80

60

40

20

0

100+

100

80

60

40

20

0

100+

100

80

60

40

20

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2 of 2

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DRILL HOLE REPORT

AIRPHOTO NO:

DATE DRILLED:

CHAINAGE:

OFFSET:

RIG:

TECH:

TEST HOLE

SURFACE DRAINAGE:

VEGETATION:

NUMBER

TEST	HOLE	REMARKS
A25A	- 23-3	

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

VEGETATION CHAINAGE CHAINAGE

AIRPHOTO NO: SURFACE DRAIN

Bottom or Hole: - 27.

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

DATE DRILLED 14/4/74

AIRPHOTO NO: 14

CHAINAGE:

RIG AIR

SURFACE DRAINAGE:

VEGETATION:

AREA - 2002

REMARKS

TEST HOLE	MILE	B.C.S	NUMBERS
AREA - 2002			

GRAIN-SIZE ANALYSIS	ELEV.
GRANULE	
SAND	
SILT	
CLAY	
%	%
%	%
%	%

O = WATER CONTENT (% OF DRY WEIGHT)

△ = ICE CONTENT (% OF SAMPLE VOLUME)

DEPTH (FEET)

DEPTH (METERS)

PLASTIC LIMIT

LIMIT

LIQUID LIMIT

LIQUID LIMIT

80

60

40

20

0

100+

100+

100+

100+

100+

100+

100+

100+

100+

100+

100+

100+

100+

100+

100+

100+

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INUVIK - TUK.

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

OWN FIELD ENG DATE DRILLED 9-17 AIRPHOTO NO:

TECH PROYNGD RIG AIR

TEST HOLE

C.D.	SOIL	DESCRIPTION	ICE	ICE CONTENT (% OF DRY WEIGHT)	O = WATER CONTENT (% OF SAMPLE VOLUME)	GRAIN-SIZE ANALYSIS	TEST	HOLE				
										MILE	B.C.S	NUMBER
2	ICE & ORGANIC	ICE + O.H.								Δ 230-8		
4		ICE + CL										
6												
8												
10												
12												
14												
16												
18												
20												
22												
24												

O = WATER CONTENT (% OF DRY WEIGHT)
 Δ = ICE CONTENT (% OF SAMPLE VOLUME)

REMARKS

DRY DENSITY

WET DENSITY

LIQUID LIMIT

PLASTIC LIMIT

SOIL SAMPLING

UNIFORMITY

PENETRATION

RESISTANCE

% RECOVERY

SAMPLE TYPE

SAMPLE NUMBER

DEPTH (FEET)

DEPTH (METERS)

TEST

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

DATE DRILLED: 14 JUN 1968
FIELD ENG: T. A. TAK
PHOTO NO.: 1412
TECH: R. D. ONYCH

DRILLING SURFACE DRAINAGE:

OFFSET

TEST

HOLE

ELEV.

NUMBER

ANALYSIS

MILE

B.C.S

GRANULAR

SILT

CLAY

GRAVEL

SAND

REMARKS

DRY DENSITY
(PCF)

WET DENSITY
(PCF)

DRY DEPTH
(FEET)

WATER CONTENT (% OF DRY WEIGHT)

ICE CONTENT (% OF SAMPLE VOLUME)

PLASTIC LIMIT

LIMIT

LIQUID LIMIT

SOIL TEST

VEGETATION

ICE DESCRIPTION

FROZEN GROUND

LIMITS OF

PLASTIC

LIQUID

LIMIT

SOIL TEST

NUVIK - TAK

SOIL TEST

V_C-V_r

Bottom of Hole S

15

4- 30/60 WET

2- 27/71 WET

3- 29/68 WET

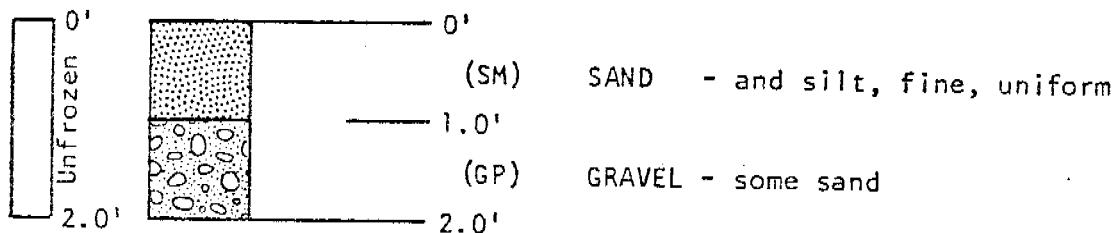
5- 32/63 SAT

9- 33/58 SAT

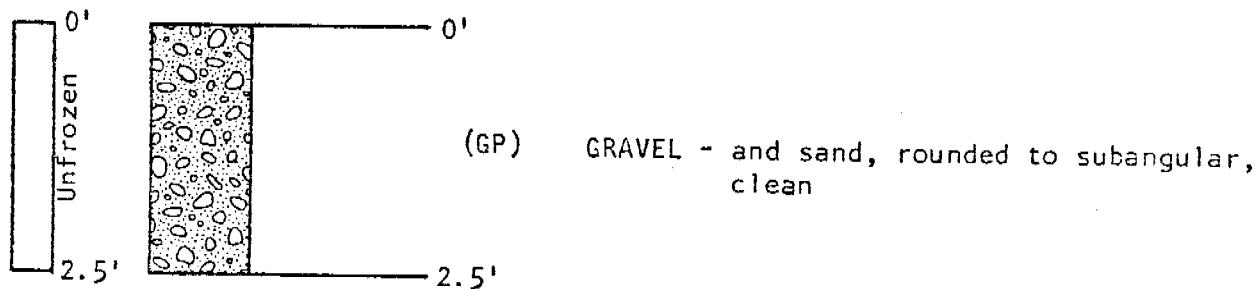
TEST PIT LOGS

SOURCE No. 305

305-A



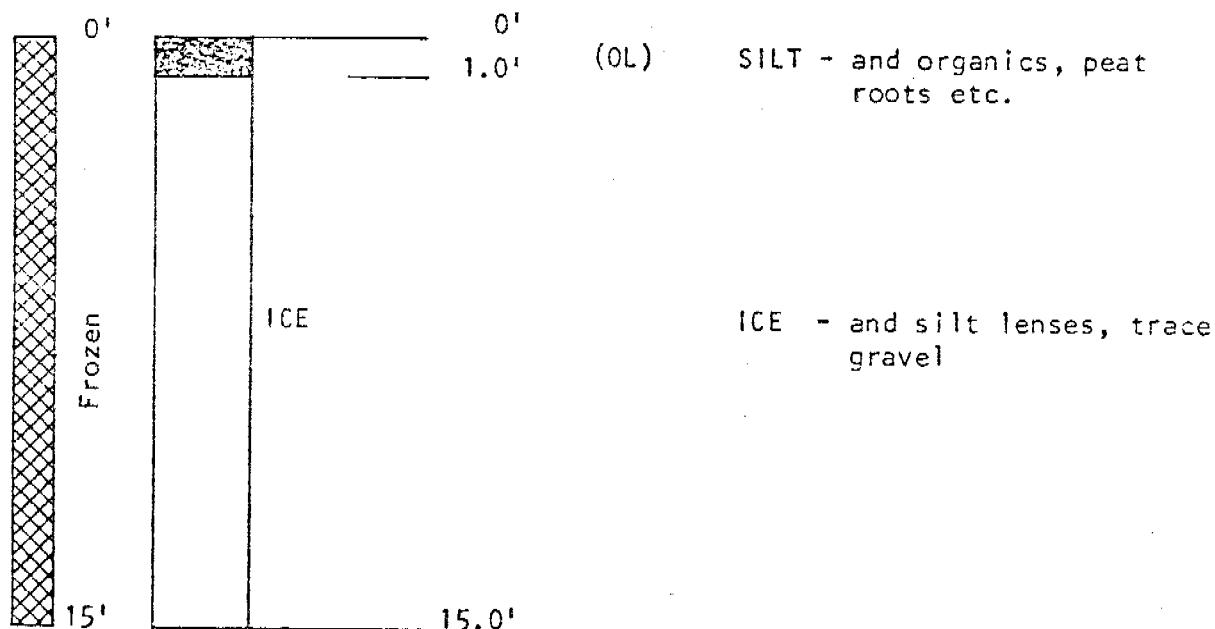
305-B



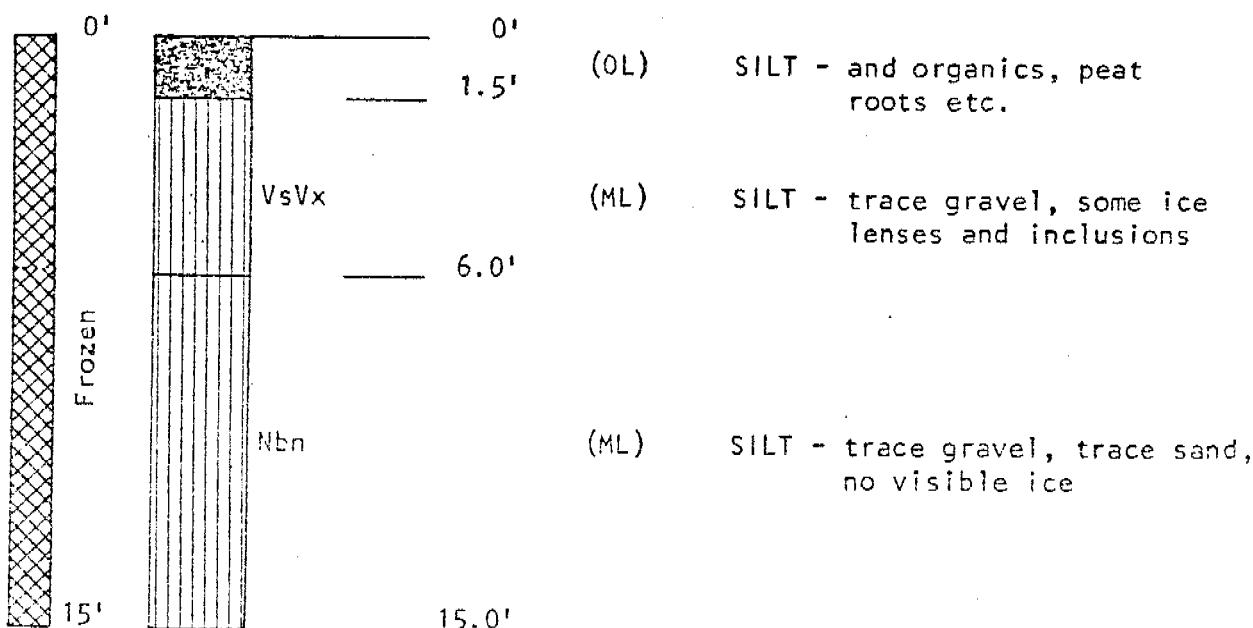
TEST HOLE LOGS

SOURCE No. 305

305-3



305-4



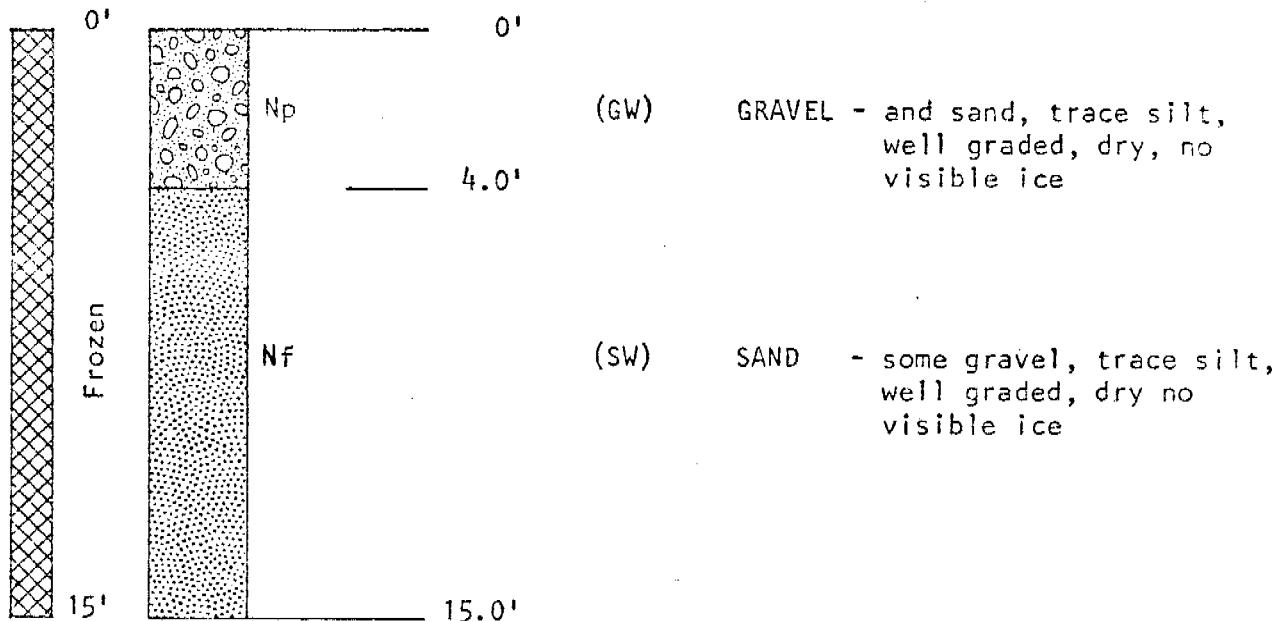
Moisture Content

Sample 1 depth 6.0'-8.0' 11.1%

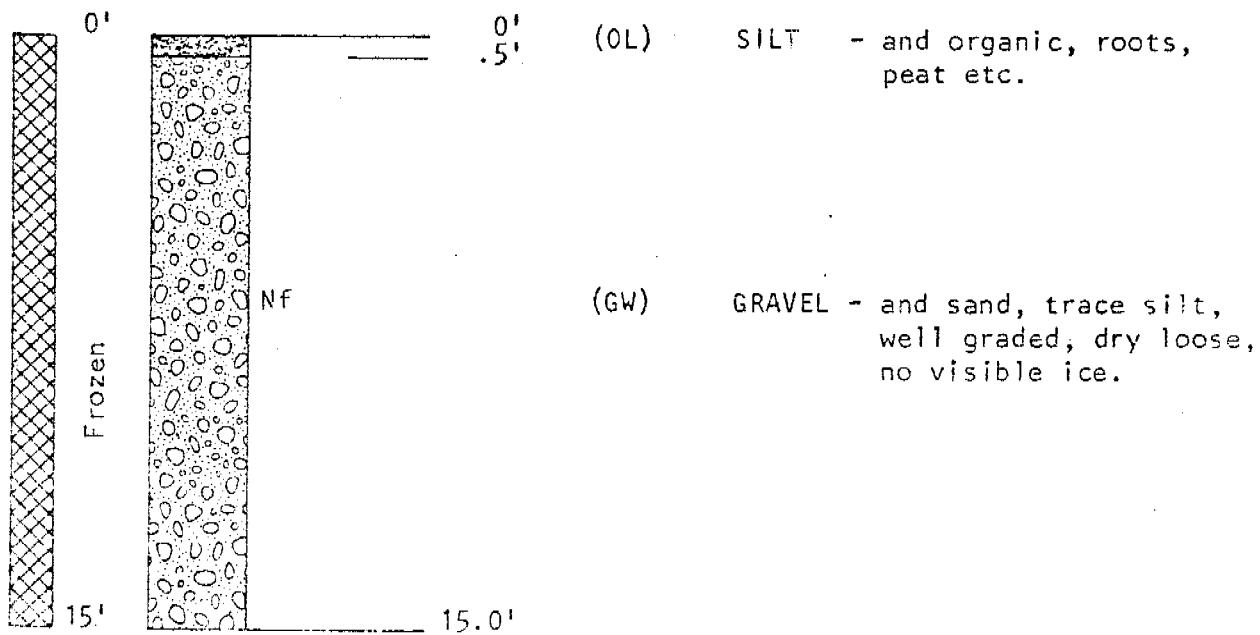
TEST HOLE LOGS

SOURCE No. 305

305-5



305-6



Sector 11

SERACH SECTOR NO. 11

Landforms and Location: A large number of kames on an outwash plain located roughly 23 miles south of Tuktoyaktuk, and north and west of the Mackenzie Highway between Mile 1030 and 1032.

Designated Test Drilling Areas: Area #24 and #24A.

Material: Sand and gravel, trace silt.

Volume: Probably in excess of 500,000 cu. yds. but randomly located in small features.

Conclusion: Recommend development of several small kames and granular ridges in Area #24A. Development will likely be viable because of the general lack of borrow along this portion of the route.

No. 11 - Sector Topography

This source is a kame field located in a glacio-fluvial outwash plain about 23 miles south of Tuktoyaktuk. The kame field is very large, about three miles long and from 500 feet to one and one half miles in width. Features test drilled vary from roughly one half mile to one and one half miles from the alignment.

The terrain here is very similar to Source #7 - it is very rough and contains many ponds and hummocks. Kames may vary from 20 to 100 feet above the surrounding terrain and some are in excess of 1,000 feet at their base. Much of the terrain adjacent to the kames shows the polygonal

pattern characteristic of massive ground ice, and ice was encountered in many of the test holes.

No. 11—Materials and Quantities

There are numerous gravel exposures on the surface of kames however these gravel exposures invariably prove to be narrow, shallow and underlain by massive ground ice. Very few features contain sufficient volume of usable material for development as an embankment source. The larger granular features are located roughly one to one and one half miles from the alignment in Area #24 and are considered to be too far from the highway for development.

There is usable granular borrow in Area #24A roughly one half mile from the alignment near Mile 1029.5. The volume of material here is estimated at probably 150,000 to 200,000 cu. yds. in several small kames and granular ridges. Some of the features will have little or no stripping and further drilling is recommended to define the limits of usable material. Development of these features is considered practical because of the relatively close proximity to the highway and the general lack of embankment borrow through the area. There will be some random massive clear ice layers within the gravels.



SCALE 1:36

1032
33247640

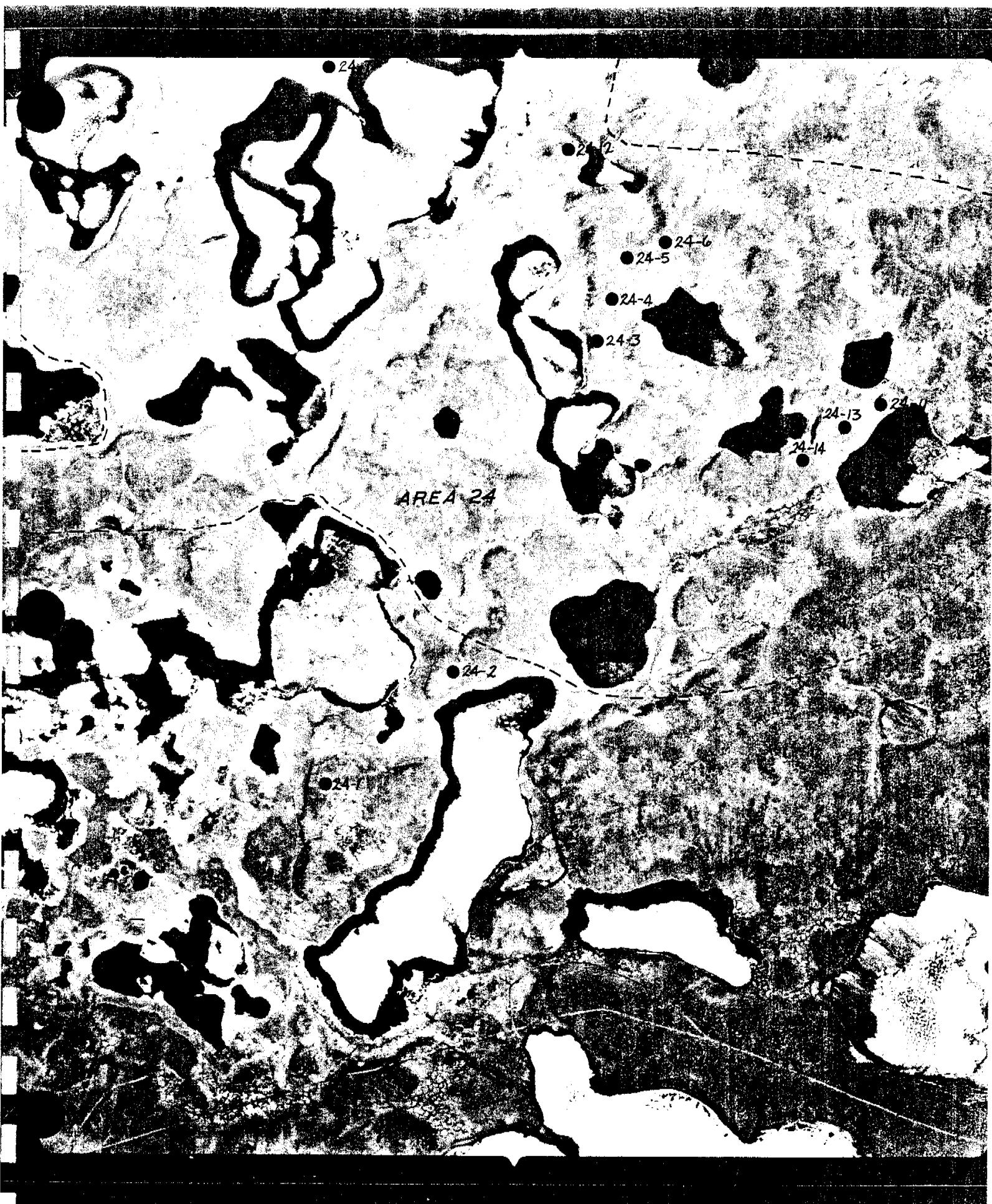
10

AREA 24

● 24-8 24-10 ● 24-9

● 24-7

● 24-12





AREA 24A

24A-4

24A-2

24A

24A-3

24A-5

24A-6

24A-7

SAND-SITY - Parcours

Bottom of hole - 301

1958-8-29-8-1

Bottom of Hole - 30'

Tuk - Tuk

DRILL HOLE REPORT

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

Bottom of Hole = 301

$$= 1 - \sqrt{3} - 2\sqrt{2} - 6\sqrt{3}.$$

INUVIK - Tuk

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

FIELD ENG DATE DRILLED 1976 AIRPHOTO NO:
CND TECH DRILLING RIG #12

SURFACE DRAINAGE:

CHAINAGE:

VEGETATION:

TEST	HOLE	MILE	B.C.S	NUMBER	GRAIN-SIZE ANALYSIS		WET DENSITY (PCF)	DRY DENSITY (PCF)	WATER CONTENT (% OF DRY WEIGHT)	ICE DESCRIPTION	DEPTH (FEET)	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	DEPTH (FEET)	LIMIT	LIMIT	LIMIT	
					TEST	OFFSET	ELEV.	VEGETATION	REMARKS	CLAY	SAND	SILT	%	%	%	%	%	%
AREA - 241 - 4																		
56-41 3	DAMP																	
9-89 2	SAT.																	
10-241	DAMP																	
5-5639	FROZEN																	
4-95 1	Moist																	
1-95 4	DAMP																	
4-89 7	DAMP																	

O = WATER CONTENT (% OF DRY WEIGHT)
Δ = ICE CONTENT (% OF SAMPLE VOLUME)

PLASTIC LIMIT — LIQUID LIMIT — 100+

20 40 60 80

10 12 14 16 18 20 22 24

100+ 100 100 100 100 100 100 100

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Bottom of Hole - 30'

-302.5 Damp

LITERATUR

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

NEXT Page

1 OF 2

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

16

DATE DRILLED

24

AIRPHOTO NO:

AIR

RIG:

TECH

BONYCH

FIELD ENG

C.D.

TEST HOLE NUMBER	TEST HOLE	ELEV.	MILE	B.C.S.	REMARKS	AREAS - 24-6	DENSITY (PCF)	WET DENSITY (PCF)	DRY DENSITY (PCF)
							GRAIN-SIZE ANALYSIS	SAND	SILT
TEST HOLE 1	1	108.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 2	2	111.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 3	3	112.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 4	4	113.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 5	5	114.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 6	6	115.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 7	7	116.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 8	8	117.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 9	9	118.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 10	10	119.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 11	11	120.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 12	12	121.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 13	13	122.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 14	14	123.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 15	15	124.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 16	16	125.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 17	17	126.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 18	18	127.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 19	19	128.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 20	20	129.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 21	21	130.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 22	22	131.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 23	23	132.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 24	24	133.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 25	25	134.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 26	26	135.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 27	27	136.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 28	28	137.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 29	29	138.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 30	30	139.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 31	31	140.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 32	32	141.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 33	33	142.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 34	34	143.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 35	35	144.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 36	36	145.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 37	37	146.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 38	38	147.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 39	39	148.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 40	40	149.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 41	41	150.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 42	42	151.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 43	43	152.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 44	44	153.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 45	45	154.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 46	46	155.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 47	47	156.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 48	48	157.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 49	49	158.0	74-26	O	0	0	GRANULAR	%	%
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TEST HOLE 51	51	160.0	74-26	O	0	0	GRANULAR	%	%
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TEST HOLE 54	54	163.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 55	55	164.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 56	56	165.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 57	57	166.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 58	58	167.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 59	59	168.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 60	60	169.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 61	61	170.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 62	62	171.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 63	63	172.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 64	64	173.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 65	65	174.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 66	66	175.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 67	67	176.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 68	68	177.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 69	69	178.0	74-26	O	0	0	GRANULAR	%	%
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TEST HOLE 72	72	181.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 73	73	182.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 74	74	183.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 75	75	184.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 76	76	185.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 77	77	186.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 78	78	187.0	74-26	O	0	0	GRANULAR	%	%
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TEST HOLE 80	80	189.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 81	81	190.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 82	82	191.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 83	83	192.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 84	84	193.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 85	85	194.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 86	86	195.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 87	87	196.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 88	88	197.0	74-26	O	0	0	GRANULAR	%	%
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TEST HOLE 104	104	213.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 105	105	214.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 106	106	215.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 107	107	216.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 108	108	217.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 109	109	218.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 110	110	219.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 111	111	220.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 112	112	221.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 113	113	222.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 114	114	223.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 115	115	224.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 116	116	225.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 117	117	226.0	74-26	O	0	0	GRANULAR	%	%
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TEST HOLE 123	123	232.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 124	124	233.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 125	125	234.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 126	126	235.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 127	127	236.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 128	128	237.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 129	129	238.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 130	130	239.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 131	131	240.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE 132	132	241.0	74-26	O	0	0	GRANULAR	%	%
TEST HOLE									

INUVIK - Tuk.

DRILL HOLE REPORT **DEPARTMENT OF PUBLIC WORKS, CANADA**
MACKENZIE HIGHWAY

DRILL HOLE REPORT				DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY			
FIELD ENG CO	TECH BRONYCH	DATE DRILLED 14/16	AIRPHOTO NO: AIR	CHAINAGE:	VEGETATION:	TEST HOLE	
SOIL DESCRIPTION	ICE DESCRIPTION	ICE FRACTURE (FPELT)	DEPTH (FEET)	O = WATER CONTENT (% OF DRY WEIGHT)	△ = ICE CONTENT (% OF SAMPLE VOLUME)	ELEV.	REMARKS
C1 CLAY - SILTY SANDY PEBBLES	V _S T _D	VS - VR	20	PLASTIC LIMIT	LIMITS OF FROZEN GROUND	43 - 34 23 SAT.	
J GRAVEL - SANDY	3 SILTY	GR	40	60	LIQUID LIMIT	14 - 38 48 WET	
G1 CLAY - SILTY SANDY	7	GR	60	80	100+	61 - 39 0 SAT.	
P1 RIBBONS			100+	100+	100+	65 - 28 7 WET	
MED. PLASTIC						62 - 34 4 MORN.	
BOTTOM OF HOLE - 15'							

Inuvik - Tuk.

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

FIELD ENG. C.R.D.	DATE DRILLED TECH PROBACH	AIRPHOTO NO: RIG A12	CHAINAGE:	SURFACE DRAINAGE:	VEGETATION:	TEST HOLE OFFSET:	ELEV.	TEST HOLE
DEPTN. IN FEET	DEPTN. IN FEET	DEPTN. IN FEET	DEPTN. IN FEET	DEPTN. IN FEET	DEPTN. IN FEET	DEPTN. IN FEET	DEPTN. IN FEET	DEPTN. IN FEET
5	5	5	5	5	5	5	5	5
10	10	10	10	10	10	10	10	10
15	15	15	15	15	15	15	15	15
20	20	20	20	20	20	20	20	20
25	25	25	25	25	25	25	25	25
30	30	30	30	30	30	30	30	30
35	35	35	35	35	35	35	35	35
40	40	40	40	40	40	40	40	40
45	45	45	45	45	45	45	45	45
50	50	50	50	50	50	50	50	50
55	55	55	55	55	55	55	55	55
60	60	60	60	60	60	60	60	60
65	65	65	65	65	65	65	65	65
70	70	70	70	70	70	70	70	70
75	75	75	75	75	75	75	75	75
80	80	80	80	80	80	80	80	80
85	85	85	85	85	85	85	85	85
90	90	90	90	90	90	90	90	90
95	95	95	95	95	95	95	95	95
100	100	100	100	100	100	100	100	100
105	105	105	105	105	105	105	105	105
110	110	110	110	110	110	110	110	110
115	115	115	115	115	115	115	115	115
120	120	120	120	120	120	120	120	120
125	125	125	125	125	125	125	125	125
130	130	130	130	130	130	130	130	130
135	135	135	135	135	135	135	135	135
140	140	140	140	140	140	140	140	140
145	145	145	145	145	145	145	145	145
150	150	150	150	150	150	150	150	150
155	155	155	155	155	155	155	155	155
160	160	160	160	160	160	160	160	160
165	165	165	165	165	165	165	165	165
170	170	170	170	170	170	170	170	170
175	175	175	175	175	175	175	175	175
180	180	180	180	180	180	180	180	180
185	185	185	185	185	185	185	185	185
190	190	190	190	190	190	190	190	190
195	195	195	195	195	195	195	195	195
200	200	200	200	200	200	200	200	200
205	205	205	205	205	205	205	205	205
210	210	210	210	210	210	210	210	210
215	215	215	215	215	215	215	215	215
220	220	220	220	220	220	220	220	220
225	225	225	225	225	225	225	225	225
230	230	230	230	230	230	230	230	230
235	235	235	235	235	235	235	235	235
240	240	240	240	240	240	240	240	240

CLAY - Silty
SANDY
PEBBLES

No Sampled

ICE

Bottom of Hole

IS

Invik-Tuk

DRILL HOLE REPORT

OWN	FIELD ENG	DATE DRILLED	AIRPHOTO NO.
CXD	TECH PRONYCHI RIG: AIR	7-16	SURFACE DRAW

DOW	FIELD ENG	CSD	FIELD NO.		AIRPHOTO NO.	DATE DRILLED	TEST HOLE	TEST HOLE		TEST	MILE	B.C.S	NUMBER
			DRILLING	RIG				DESCRIPTION	TEST				
16	DRILLING	16	16	AIR	16	16	16	SAND - Silty	16	16	16	16	16
17	DRILLING	17	17	AIR	17	17	17	No Coatings	17	17	17	17	17
18	DRILLING	18	18	AIR	18	18	18	Vc - Vr	18	18	18	18	18
19	DRILLING	19	19	AIR	19	19	19	Bottom of Hole	19	19	19	19	19
20	DRILLING	20	20	AIR	20	20	20		20	20	20	20	20
21	DRILLING	21	21	AIR	21	21	21		21	21	21	21	21
22	DRILLING	22	22	AIR	22	22	22		22	22	22	22	22
23	DRILLING	23	23	AIR	23	23	23		23	23	23	23	23
24	DRILLING	24	24	AIR	24	24	24		24	24	24	24	24

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DRILL HOLE REPORT

FIRL ENG	TECH	PROV/CH	DATE DRILLED	H	AIR	RIG	AIR	SURFACE	DRA	AIRPHOTO NO:
----------	------	---------	--------------	---	-----	-----	-----	---------	-----	--------------

ON THE
NATURAL
HABITS OF
THE
BROWN
TURTLE
IN
INDIA

SOIL DESCRIPTION
GROUP 8
NAME: GARDEN
ACREAGE: 20
SOIL TYPE: LOAM
SOIL COLOR: BROWN
SOIL P H: 6.5
SOIL THERM: 70
SOIL MOISTURE: DRY
SOIL DRAINAGE: GOOD

SAHARA AUSTRALIA SABARIS SAMOANIAN TAYPAN SABARIS RESISTI SORRY SUEDE UNIFORMS RESISTI SORRY SUEDE UNIFORMS SAMOANIAN TAYPAN SABARIS

ENT

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ICSE ORGANICS

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LINE SAND

51

卷之三

Gravel - Sandy

SIXTY-FIVE

Bottom of Hole- 15

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Sector 12

SEARCH SECTOR NO. 12

Landform and Location:

A concentration of kames on an outwash plain located roughly 20 miles south of Tuktoyaktuk and adjacent to the Mackenzie Highway at Mile 1034.

Designated Test Drilling Areas: Area #25.

Material:

Sands and gravels trace silt.

Stripping:

Variable from 0 to 6-7 feet.

Volume:

Probably 1,000,000 cu. yds. in several features.

Conclusion:

A good source of embankment borrow immediately adjacent to the highway. Materials will be wet on thawing but will drain in place. Some massive ground ice can be expected. Several features may have to be developed. Further drilling required.

No. 12-Sector Topography

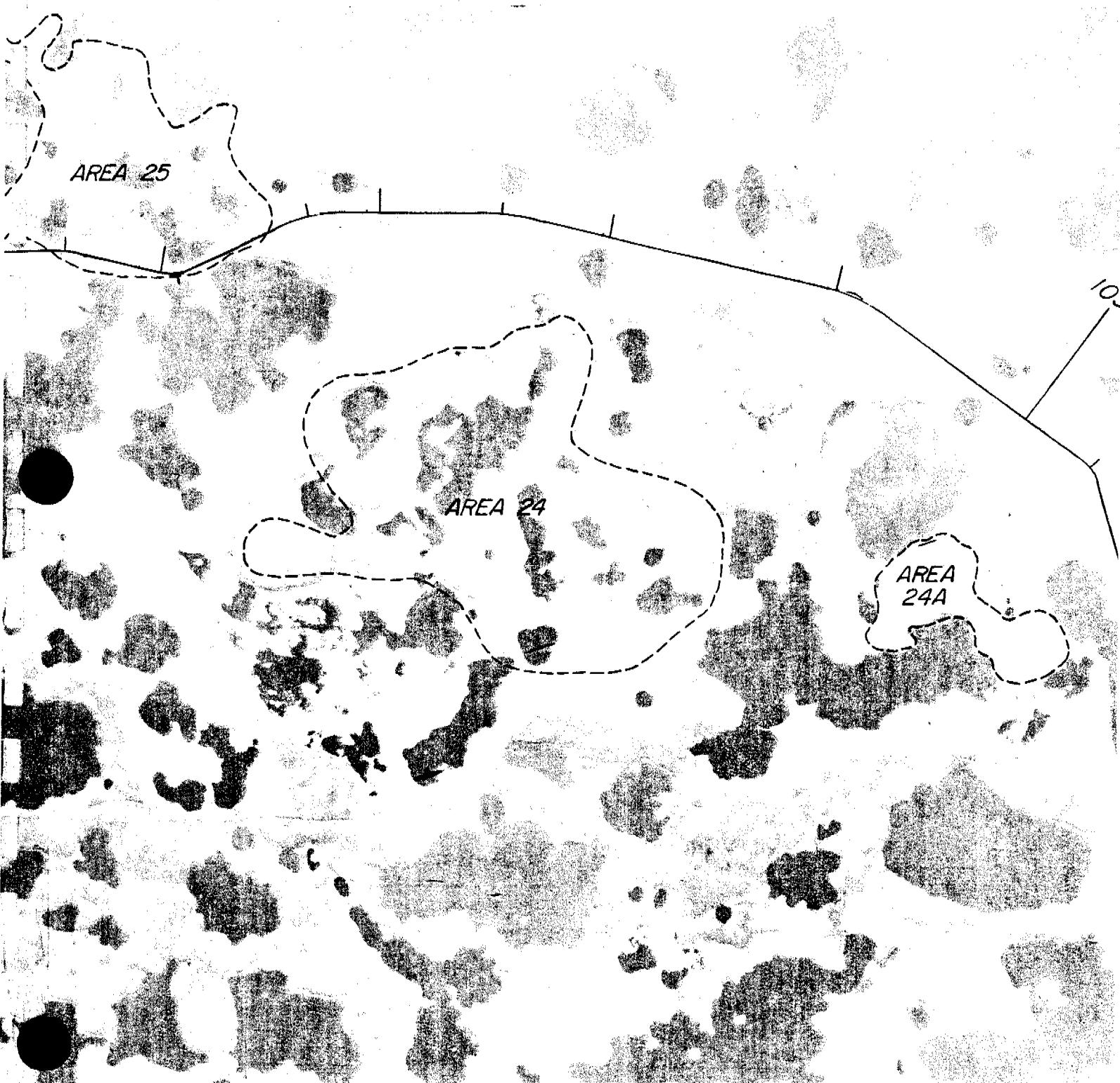
This source is a concentration of kames located on a glacio-fluvial outwash plain about 20 miles south of Tuktoyaktuk. The kame field is large, roughly one mile square and is adjacent to the highway between Mile 1033.5 and 1034.5.

The terrain is very irregular and contains many ponds and hummocks. Individual kames may vary up to 100 feet above the surrounding terrain,

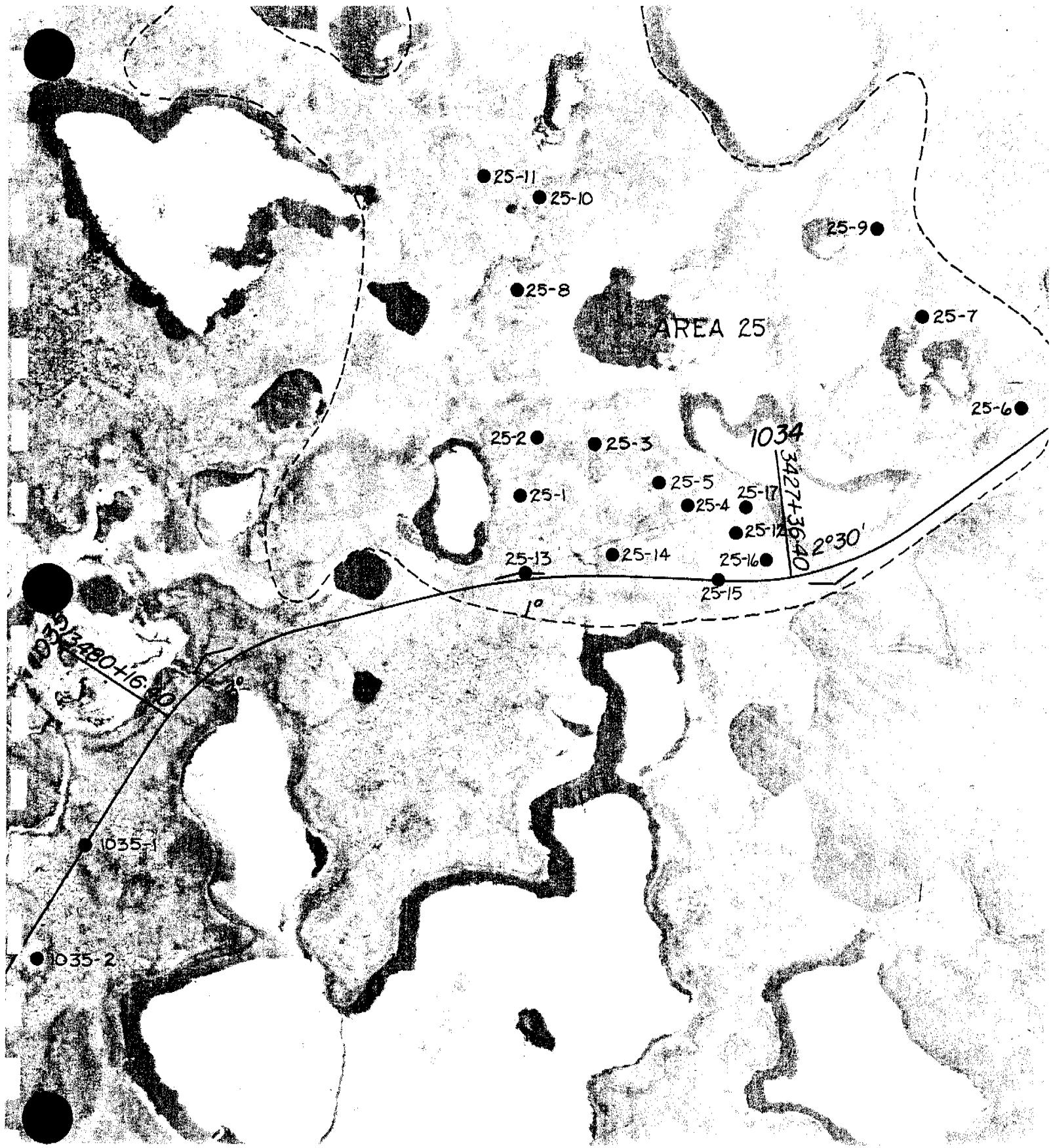
and most are steep-sided, elongate features which may vary up to 400 feet in width and in excess of 1,000 feet in length. Much of the terrain adjacent to the kames shows the polygonal pattern characteristic of massive ground ice and ice was encountered in many test holes.

No. 12-Materials and Quantities

As with all kame deposits these features are very erratic. There are numerous gravel exposures on the surface and faces of the kames, however these exposures in many instances tend to be discontinuous, narrow, and shallow, and underlain by massive ground ice. There is, however, significant volumes of usable material here, partially in the form of large gravel ridges and gravel exposures on the kames, and partially in the form of gravel beds on the flats adjacent to the kames (i.e. holes #12, #15 and #16). The sands and gravels contain some ice but moisture contents on thawing are generally less than 10 - 15% - these materials will drain readily. Again sufficient drilling has been carried out only to verify that there are significant quantities of granular materials here and, because of the extreme variability, drilling patterns will be required to define the preferred areas. It is considered unlikely that any large borrow pit can be developed without encountering some massive ground ice within the sands and gravels. Volumes here are estimated in excess of 1,000,000 cu. yds. with development of several pit areas required.



SCALE 1:3



1042

2 OF 2

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DRILL HOLE REPORT

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

DATE DRILLED 34/76 AIRPHOTO NO: 16

FIELD ENG C.R.D.

TECH

PONONYCH RIG AIR

SURFACE DRAINAGE:

CHANAGE:

VEGETATION:

ICE DESCRIPTION
SOIL DESCRIPTION
LIMITS OF FROZEN GROUND
TEST HOLE NO:

WET DESIERTY
(P.C.F.)
DRY DESIERTY
(P.C.F.)

GRANULARITY
AREA - 25-7

REMARKS

TEST HOLE

OFFSET

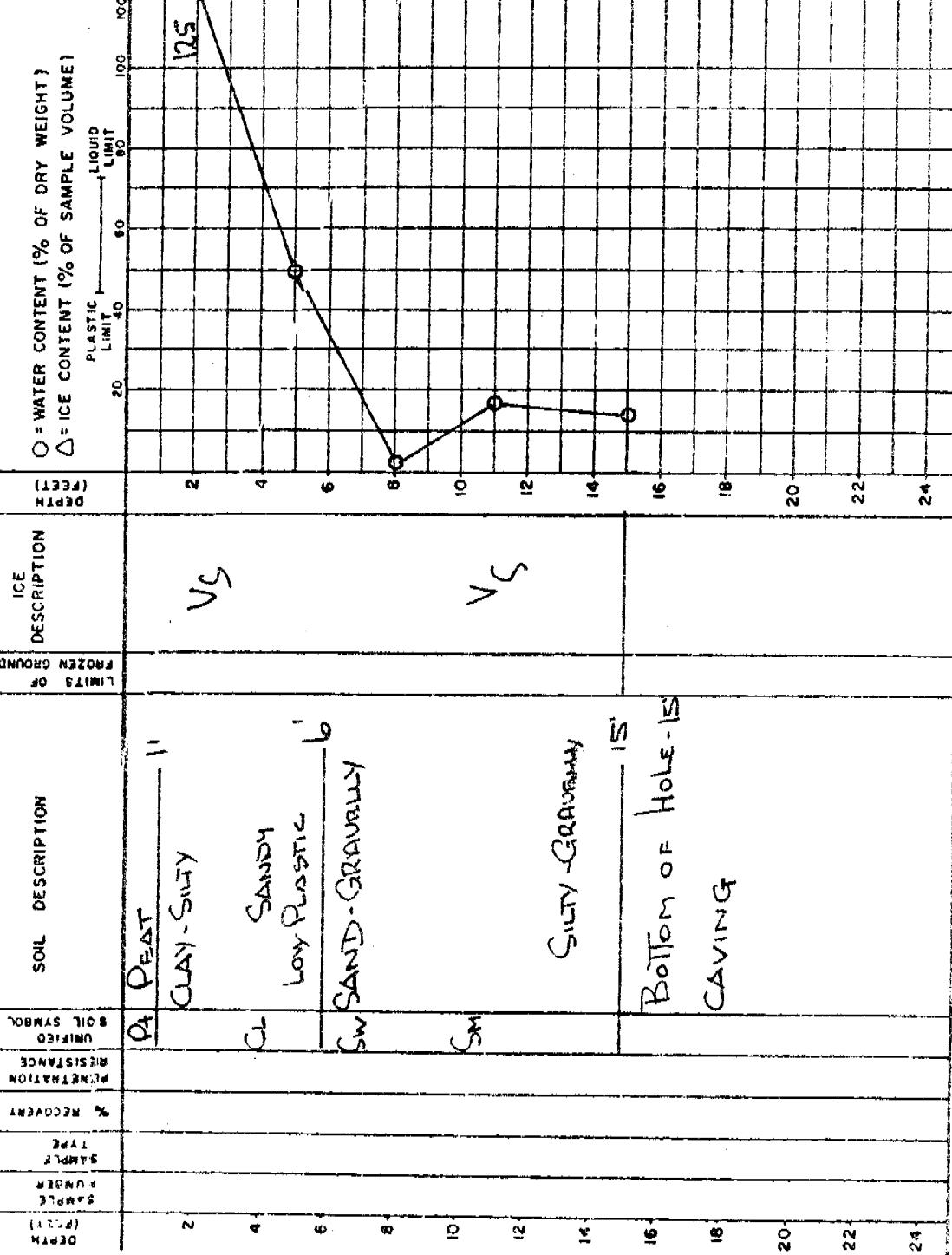
ELEV.

TEST HOLE

MILE

B.C.S

NUMBER



DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

AIRPHOTO NO:

DATE DRILLED 3/4/76

FIELD ENG. RIG AND CHAINAGE

C.D. TEST HOLE NUMBER

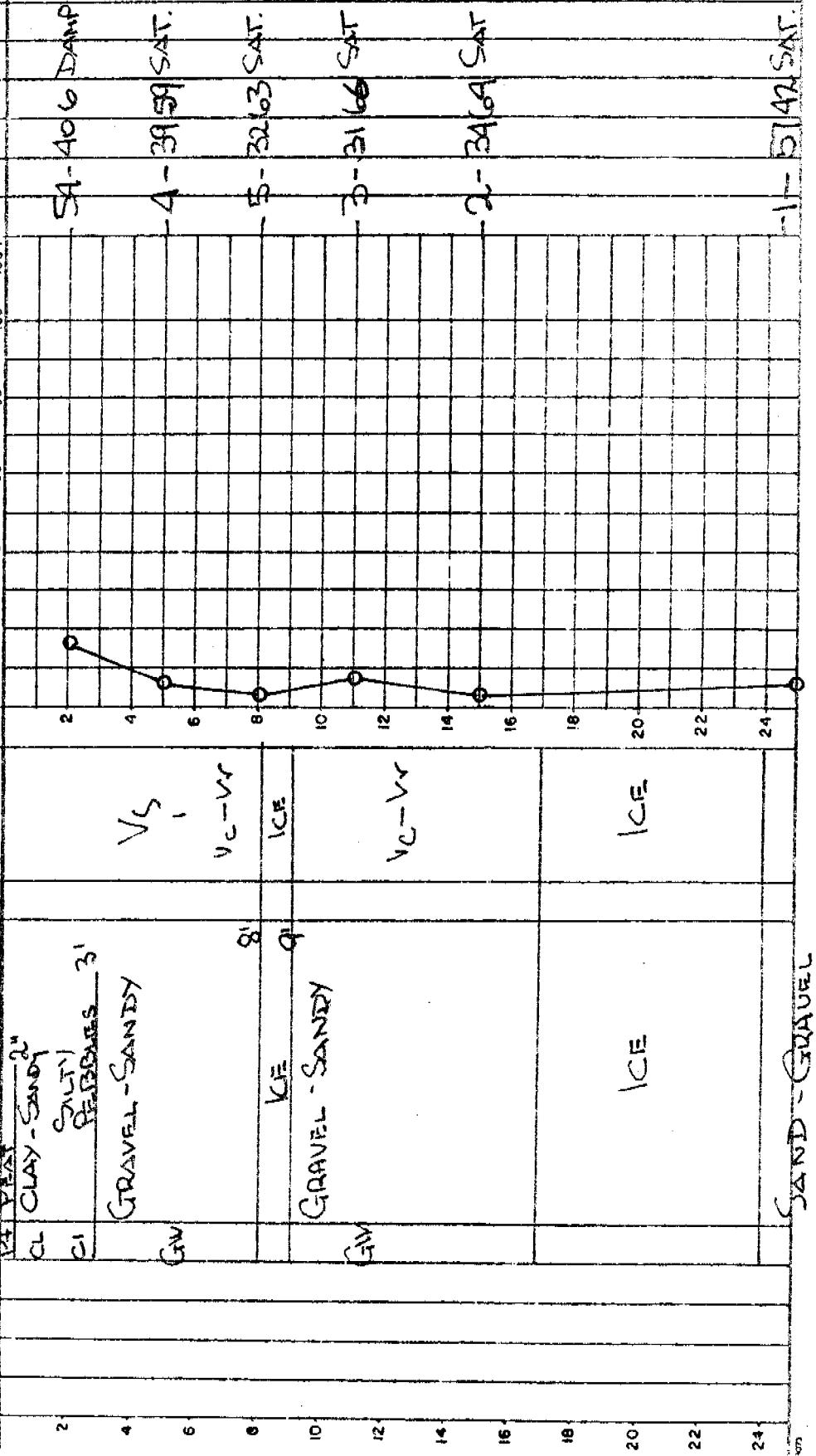
TEST HOLE NUMBER

MILE B.C.S. NUMBER

AREA - 25-11

REMARKS

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% ROCKS	PERCENTATION	RESISTANCE	UNIFED SOIL SYMBOL	SOIL SAMPLE	SOIL DESCRIPTION	ICE DESCRIPTION	ICE	VEGETATION	DRAINAGE	SURFACE	ICE	DESCRIPTION	ICE	VEGETATION	DRAINAGE	CHAINAGE	AIRPHOTO NO:	DATE DRILLED 3/4/76	FIELD ENG. RIG AND CHAINAGE	C.D. TEST HOLE NUMBER	MILE B.C.S. NUMBER	AREA - 25-11
0	1	VS	0	0	0	0	0	CLAY - SANDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2	VS	0	0	0	0	0	CLAY - SANDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	4	VS	0	0	0	0	0	CLAY - SANDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	6	VS	0	0	0	0	0	CLAY - SANDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	8	VS	0	0	0	0	0	CLAY - SANDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	10	VS	0	0	0	0	0	CLAY - SANDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	12	VS	0	0	0	0	0	CLAY - SANDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	14	VS	0	0	0	0	0	CLAY - SANDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	16	VS	0	0	0	0	0	CLAY - SANDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	18	VS	0	0	0	0	0	CLAY - SANDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	20	ICE	0	0	0	0	0	CLAY - SANDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	22	ICE	0	0	0	0	0	CLAY - SANDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	24	ICE	0	0	0	0	0	CLAY - SANDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



C.P. Mix.

Bottom of Hole 30'

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

DATE DRILLED 6/17/76 AIRPHOTO NO: 12

FIELD ENG. TECH RONNYCH RIG A-2 SURFACE DRAINAGE: CHAINAGE:

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% RESISTANCE	PENETRATION RESISTANCE	SOIL SYMBOL	UNIFORM SOIL SYMBOL	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	ICE CONTENT (% OF DRY WEIGHT)	GRAIN-SIZE ANALYSIS	WATER DENSITY (PCF)	DRY DENSITY (PCF)	WET DENSITY (PCF)	GRANULARITY	MILE	B.C.S.	NUMBER	TEST HOLE
2	C	CLAY - SILTY / SAND REBBLES	4	4	CL	CL	4	CLAY - SILTY / SAND REBBLES	4	CLAY	100	100	100+	WET	55-41	4	WET	
4	C	SAND - SILTY	3	3	CS	CS	6	SAND - SILTY	3	SILT	80	80	80	WET	31-41	25	WET	
6							8								55-41	4	SAT.	
8							10								68-78	4	SAT.	
10							12											
12							14											
14							16											
16							18											
18							20											
20							22											
22							24											

O = WATER CONTENT (% OF DRY WEIGHT)

△ = ICE CONTENT (% OF SAMPLE VOLUME)

◆ = PLASTIC LIMIT (%)

◆ = LIQUID LIMIT (%)

◆ = UNPLASTIC (%)

◆ = UNLIQUID (%)

◆ = UNPLASTIC + UNLIQUID (%)

◆ = UNLIQUID + UNPLASTIC (%)

◆ = UNLIQUID + UNPLASTIC + UNLIQUID (%)

VS

Ground

Clay - Sandy

Silty

Rebbles

Low Plastic

Bottom of Hole - 15'

1 OF 2

DRILL HOLE REPORT										DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY													
C.D.	FIELD ENG. TECH	DRILLED ON CH. RIG	DATE DRILLED 4/12	AIRPHOTO NO: 1476	CHAINAGE:	SURFACE DRAINAGE:	VEGETATION:	TEST HOLE	MILE	B.C.S.	NUMBER	REMARKS											
DEPTH (FEET)		WATER CONTENT (% OF DRY WEIGHT)		△ = ICE CONTENT (% OF SAMPLE VOLUME)		LIQUID LIMIT		PLASTIC LIMIT		100		100+		100		DAV DENSITY (PC.F.)		WET DENSITY (PC.F.)		DRAGEL	SILTY	CLAY	SAND
2																							
4																							
6																							
8																							
10																							
12																							
14																							
16																							
18																							
20																							
22																							
24																							
26																							
28																							
30																							

Next Page

30

2- 24-74 Sat

INNUK - Tuk.

	DRILL HOLE REPORT	
		DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY

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MACKENZIE HIGHWAY

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

TEST HOLE

OF SET.

VEGETATION:

CHANAGE

AIRPHOTO NO:

SURFACE DRAINAGE:

TEST HOLE

MILE B.C.S NUMBER

1035-2

REMARKS

ELEV

GRAIN-SIZE ANALYSIS

WET DENSITY (PCF)

DRY DENSITY (PCF)

TEST HOLE

CLAY

SILT

SAND

%

%

%

%

%

%

%

%

%

%

%

%

%

%

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%

%

%

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%

%

%

%

%

%

%

%

%

O = WATER CONTENT (% OF DRY WEIGHT)
 △ = ICE CONTENT (% OF SAMPLE VOLUME)

PLASTIC LIMIT

LIQUID LIMIT

SOIL SYMBOL

TEST HOLE

DEPTH

ICE DESCRIPTION

FROZEN GROUND

LIMITS OF

ICE

4

OH

6

8

10

12

14

16

18

20

22

24

SOIL DESCRIPTION

UNSPECIFIED

SOIL SYMBOL

TEST HOLE

PERCENTAGE

PERCENTAGE

% UNCOATED

% COATED

SAMPLE TYPE

SAMPLE NUMBER

DEPTH (FEET)

TEST HOLE NUMBER

TEST HOLE TYPE

TEST HOLE NUMBER

TEST HOLE TYPE</p

Sector 13

SEARCH SECTOR NO. 13

Landforms and Locations: Glacio-fluvial outwash features located roughly 15 miles south of Tuktoyaktuk and at Mile 1041 of the Mackenzie Highway.

Designated Test Drilling Areas: Areas #26, #26A, #26B, #27, #27A, #27B, #27C and #28.

Material: Sands and gravels - trace silt-wet on thawing.

Stripping: Little or no stripping on most features.

Conclusion: Good embankment borrow source. Limited stripping and haul, although features are small. Materials are wet on thawing but should drain in place. Pits probably cannot be reworked after one summer season.

No. 13-Sector Topography

This source is a series of small glacio-fluvial outwash features on a flat plain roughly 15 miles south of Tuktoyaktuk and between Mile 1041 and 1042 of the Mackenzie Highway. The features have very little surface relief and are only slightly above the surrounding terrain.

Terrain adjacent to the deposits is marked by numerous areas of polygonal ground indicative of massive ground ice, and some test holes near the edges of the outwash features encountered extensive ice.

Several features near the highway were test drilled and there are

numerous comparable features further east of those checked in the vicinity of Mile 1040, which may contain additional usable material.

No. 13-Materials and Quantities

Only features #27, #27A and #27B contain sufficient quantities of usable material to warrant development. The material in these features is a sandy gravel or gravelly sand which is at moisture contents usually less than 15% on thawing. Little or no massive ground ice was encountered within the granular deposits, however there is extensive ground ice in the adjacent terrain. As the features have little surface relief, pit development will be below the general terrain and because of the extensive ground ice nearby, significant sloughing and inflow into the pits could occur during the summer season. Area #27A is the major source with usable material in two features - holes #27A - 1, 2 and 6; and holes #27A - 7 and 8. The material is layered sandy gravel and gravelly sand with some silty sand at depth and, although wet on thawing, should drain in place. Volumes here are estimated at 250,000 cu. yds. with little or no stripping.

Area #27B is a small granular deposit on the highway alignment at Mile 1041. The material is very coarse granular on the surface and sloughed badly into drill holes limiting the drilling depth. Although unproven at depth this feature may contain in excess of 50,000 cu. yds. with no stripping.

Area #27 contains some usable material near holes 27-4, 27-6 and 27-7, but caving granular deposits limited drilling. There are similar features further to the east which also consist of granular material at

the surface, and although small, have little or no stripping. Many of these features could yield in the order of 40,000 to 50,000 cu. yds. with little development costs.

Areas #26, #26A, #26B, #27C and #28 all contain some very minor granular deposits but quantities are too small and erratic to warrant development.

AREA 2CA

000-17640

AREA 5

263

3

40

8

AREA

27-2
27-3
27-8
27-6
27-4
27-5
(27-9)

AREA 27A

27-1
27-2
27-3
27-4
27-5
27-6
27-7
27-8
27-9

1041

106.90 + 96.70

AREA 27B

27-1
27-2

AREA 28

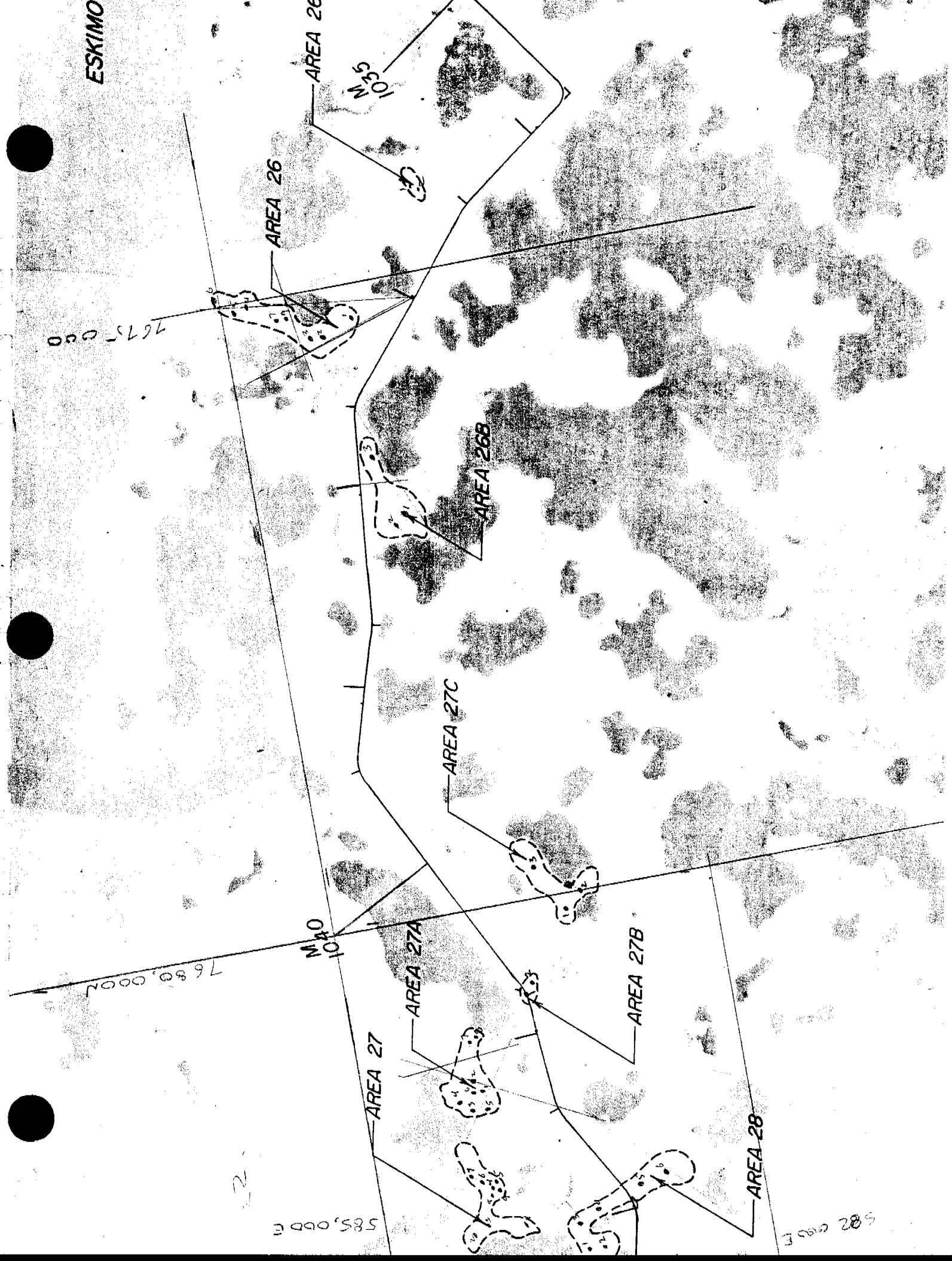
28-1
28-2
28-3
28-4
1042
38.90 + 76.40

C-3

AREA 27C

27C-1
27C-2

ESKIMO



Bottom of Hole - 30'

Wuvin - Tuk

DRILL HOLE REPORT

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

Bottom of Hole.

INUVIK - TUK.		DRILL HOLE REPORT		DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY	
DWY	FIELD ENG.	DATE DRILLED	AIRPHOTO NO:	CHAINAGE:	TEST HOLE
CSD	TECH	DRILLING RIG:	DRILLING RIG:	SURFACE DRAINAGE:	VEGETATION:
8	14	11/14/1974	11/14/1974		
10	12				
12	13				
14	14				
16	15				
18	16				
20	17				
22	18				
24	19				
26	20				
28	21				
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34	24				
36	25				
38	26				
40	27				
42	28				
44	29				
46	30				
48	31				
50	32				
52	33				
54	34				
56	35				
58	36				
60	37				
62	38				
64	39				
66	40				
68	41				
70	42				
72	43				
74	44				
76	45				
78	46				
80	47				
82	48				
84	49				
86	50				
88	51				
90	52				
92	53				
94	54				
96	55				
98	56				
100	57				
102	58				
104	59				
106	60				
108	61				
110	62				
112	63				
114	64				
116	65				
118	66				
120	67				
122	68				
124	69				
126	70				
128	71				
130	72				
132	73				
134	74				
136	75				
138	76				
140	77				
142	78				
144	79				
146	80				
148	81				
150	82				
152	83				
154	84				
156	85				
158	86				
160	87				
162	88				
164	89				
166	90				
168	91				
170	92				
172	93				
174	94				
176	95				
178	96				
180	97				
182	98				
184	99				
186	100				
188	101				
190	102				
192	103				
194	104				
196	105				
198	106				
200	107				
202	108				
204	109				
206	110				
208	111				
210	112				
212	113				
214	114				
216	115				
218	116				
220	117				
222	118				
224	119				
226	120				
228	121				
230	122				
232	123				
234	124				
236	125				
238	126				
240	127				
242	128				
244	129				
246	130				
248	131				
250	132				
252	133				
254	134				
256	135				
258	136				
260	137				
262	138				
264	139				
266	140				
268	141				
270	142				
272	143				
274	144				
276	145				
278	146				
280	147				
282	148				
284	149				
286	150				
288	151				
290	152				
292	153				
294	154				
296	155				
298	156				
300	157				
302	158				
304	159				
306	160				
308	161				
310	162				
312	163				
314	164				
316	165				
318	166				
320	167				
322	168				
324	169				
326	170				
328	171				
330	172				
332	173				
334	174				
336	175				
338	176				
340	177				
342	178				
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608	311				
61					

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

OWN FIELD ENG DATE DRILLED' AIRPHOTO NO: CHAINAGE:

RIG A10 RIG C10

SOIL SAMPLE NUMBER:

DEPTH (FEET)

SAMPLE TYPE:

NUMBER:

% RECOVERY:

PENETRATION RESISTANCE:

UNIFED SOIL SYMBOL:

LIMITS OF FROZEN GROUND:

ICE DESCRIPTION:

DEPTH (FEET)

○ = WATER CONTENT (% OF DRY WEIGHT)
 △ = ICE CONTENT (% OF SAMPLE VOLUME)

TEST HOLE

AREA - 2(B-1)

REMARKS

MILE B.C.S. NUMBER:

DRY DENSITY (PCF)

WET DENSITY (PCF)

GRAVEL SAND SILT CLAY

% % % %

ELEV.

OFFSET.

VEGETATION:

SURFACE DRAINAGE:

AIRPHOTO NO:

CHAINAGE:

RIG A10

DATE DRILLED'

FIELD ENG OWN

TECH OR ON YCH

RIG A10

DATE DRILLED'

FIELD ENG OWN

TECH OR ON YCH

RIG A10

DATE DRILLED'

FIELD ENG OWN

TECH OR ON YCH

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DATE DRILLED'

DRILL HOLE REPORT		DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY	
FIELD ENG. OHO	TECH PQONYCH	DATE DRILLED 5/4/76	AIRPHOTO NO: RIG A-2
CHAINAGE:	VEGETATION:	OFFSET:	ELEV.
SOL. DESCRIPTION	ICE DESCRIPTION	O = WATER CONTENT (% OF DRY WEIGHT) △ = ICE CONTENT (% OF SAMPLE VOLUME)	GRAIN-SIZE ANALYSIS
FROZEN GROUND	DEPTH (FEET)	(PLASTIC LIMIT → LIQUID LIMIT → 80)	CLAY % SILT % SAND % GRAVEL %
LIMITS OF FROZEN GROUND	40	60	100+
SPECIMEN NUMBER			MILE B.C.S. NUMBER
PENETRATION RESISTANCE			TEST HOLE
% RECOVERY			
SAMPLE TYPE			
SAMPLE NUMBER			
DEPTH (FEET)			
1	PEAT		
2	ICE & CLAY	ICE 4' C1	
4	ICE & ORGANIC	ICE & OIL	
6	CLAY - SILTY	V _S	
8	ICE & ORGANIC	ICE & OIL	
10	CLAY - SILTY		
12	FEW PEBBLES	V _S	
14			
16			
18			
20			
22			
24			
		Bottom of Hole 15'	

Nyvikk - Tuk:

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

Sy Sand-Silt
Bottom of Hole 301

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

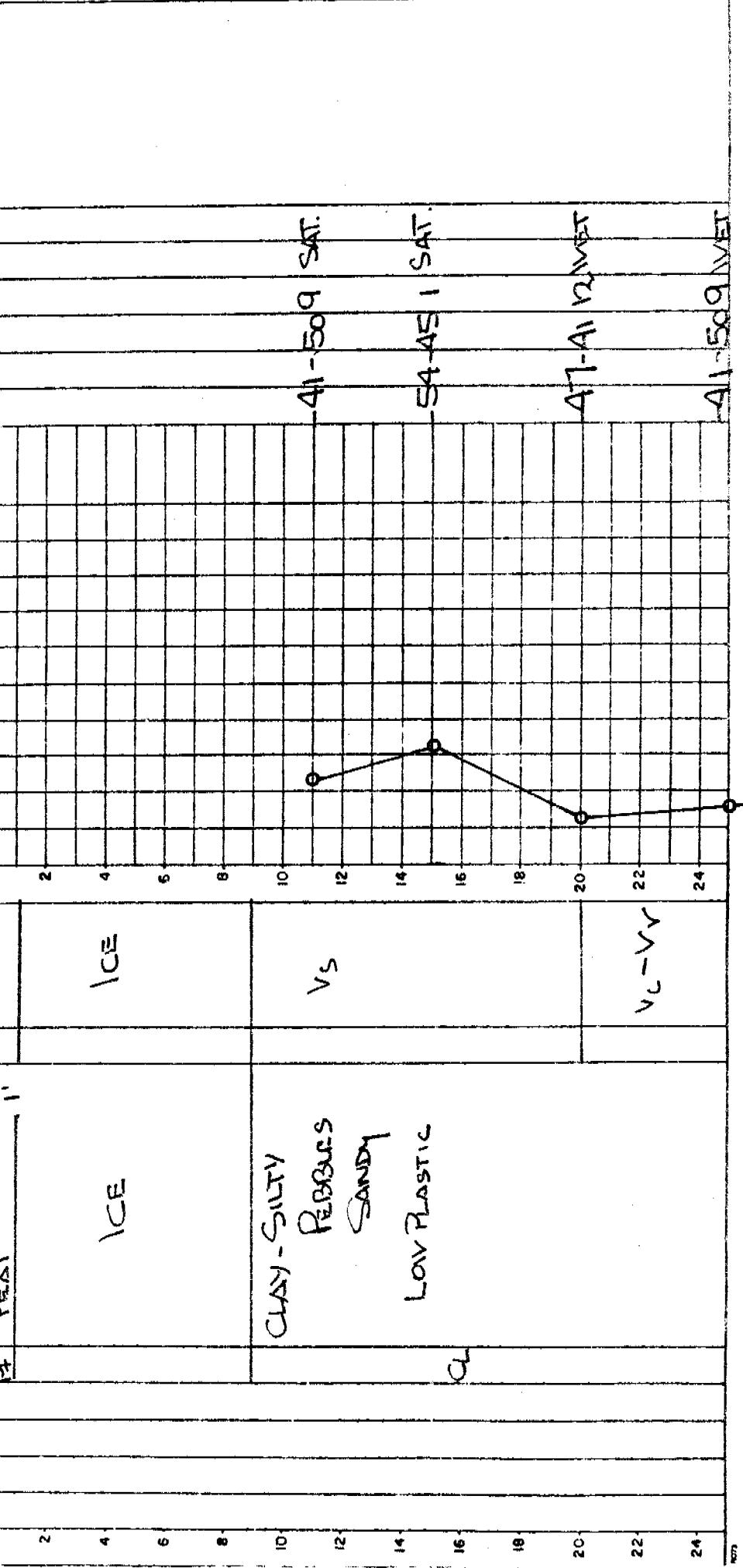
DRILL HOLE REPORT

DATE DRILLED 1976 AIRPHOTO NO:

CHAINAGE:

FIELD ENG	TECH AROMYCH	RIG AIR	SURFACE DRAINAGE:	VEGETATION:	TEST HOLE
CSD					OFFSET

DEPTH (FEET)	SOIL DESCRIPTION	ICE DESCRIPTION	ICE	○ = WATER CONTENT (% OF DRY WEIGHT)	△ = ICE CONTENT (% OF SAMPLE VOLUME)	GRAIN-SIZE ANALYSIS	MILE	B.C.S	NUMBER
0	FROZEN GROUND					GRANULAR			
2						SAND			
4						SILT			
6						CLAY			
8									
10									
12									
14									
16									
18									
20									
22									
24									



57-37-6 Moist

Bottom of Hole - 30'

2 OF 2

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DRILL HOLE REPORT				TEST HOLE			
FIELD ENG. CKD.	DATE DRILLED RIG.	AIRPHOTO NO:	CHAINAGE:	OFFSET	ELEV.	TEST HOLE	
SOIL DESCRIPTION ICE DESCRIPTION PROZEN GROUND LIMITS OF RESISTANCE				GRAIN-SIZE ANALYSIS TEST HOLE AREA - 27-3 REMARKS			
SURFACE DRAINAGE CHAINAGE				ELEV. MILE B.C.S. NUMBER			
% RECOVERY SOIL TYPE SAMPLE NUMBER				DRY DENSITY (PCF) WET DENSITY (PCF)			
DEPTH (FEET)				LIQUID LIMIT PLASTIC LIMIT			
30 32 34 36 38 40 42 44 46 48 50 52 54				30 40 50 60 70 80 90 100 100+			
○ = WATER CONTENT (% OF DRY WEIGHT) △ = ICE CONTENT (% OF SAMPLE VOLUME)				CLAY SILT SAND GRAVEL			
SP GRANULAR SAND - FINE				3-39 38 SAT. 10-81 3 P.M. WATER 1-93 0 FeawateR			
SP GRANULAR SAND - FINE				VS			
SP GRANULAR SAND - FINE				Pebbles Silt			
SP Bottom of Hole. 45'				Bottom of Hole. 45'			

Linux - Tuk -

DRILL HOLE REPORT

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

OF 2

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

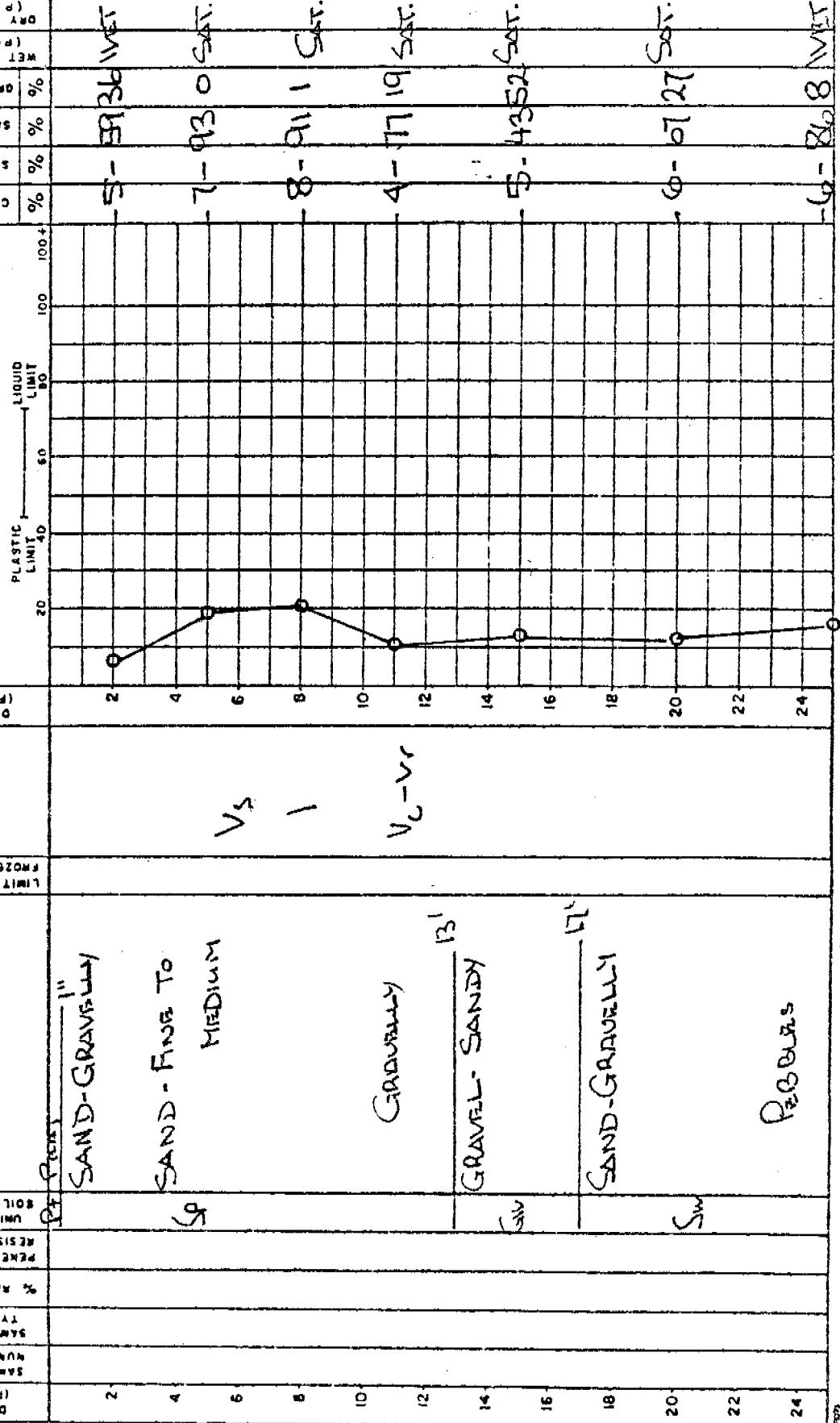
DRILL HOLE REPORT

D.W. FIELD ENG. DATE DRILLED 4/16 AIRPHOTO NO:

C.D. TECH PROVYCH HIG. DIST. SURFACE DRAINAGE:

CHARGE:

OFFSET:

TEST HOLE
AREA - 27A-2

NEXT PAGE

2 OF 2

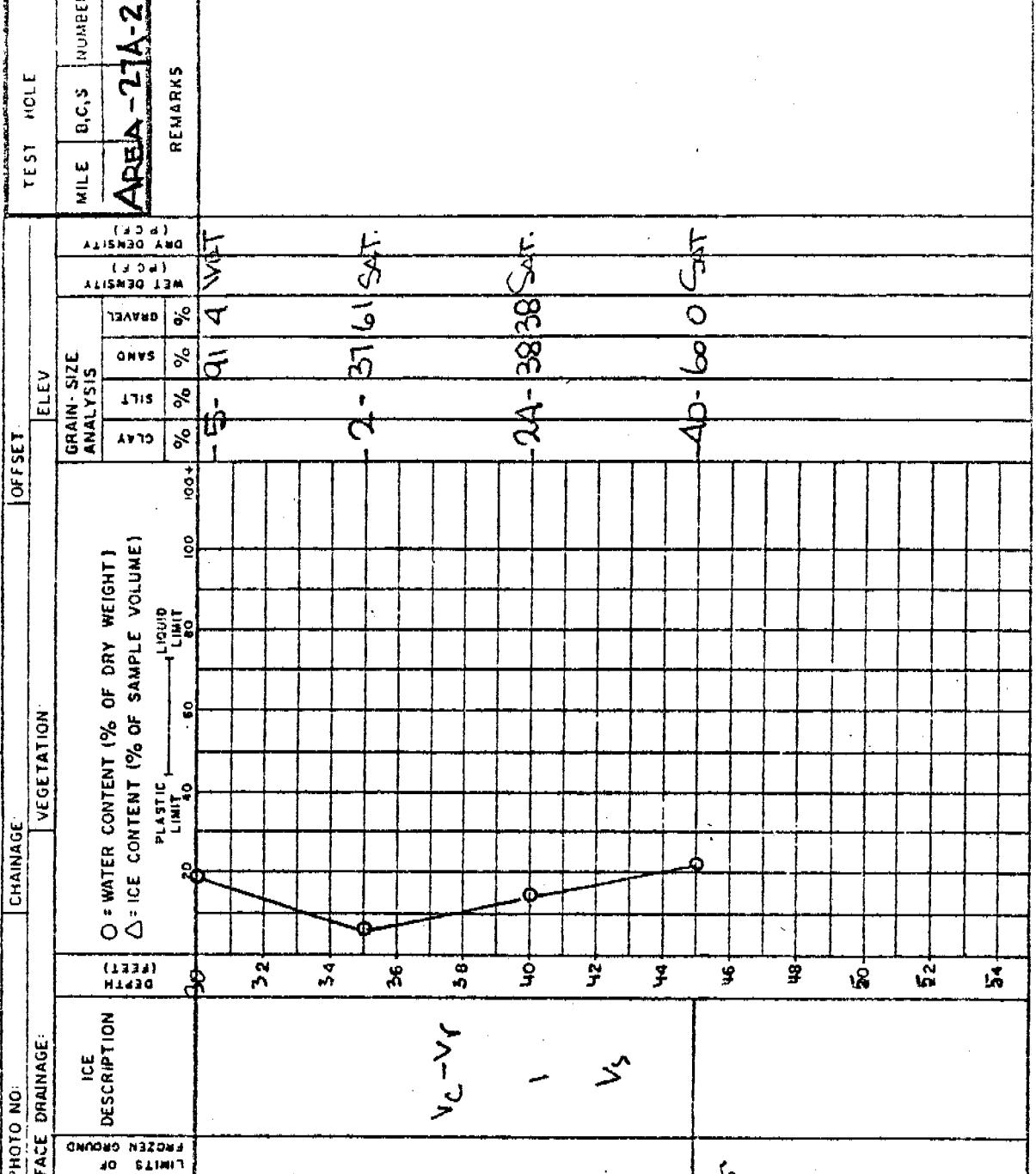
**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DRILL HOLE REPORT

TEST HOLE

FIELD ENG	DATE DRILLED	AIRPHOTO NO:	CHAINAGE:	TEST HOLE
C.D.	TECH	RIG	SURFACE DRAINAGE:	TEST HOLE
				TEST HOLE

TEST HOLE



**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DRILL HOLE REPORT

NAME	FIELD ENG	DATE DRILLED	AIRPHOTO NO:
CXO	TECH PROYONCH	MIG A12	SURFACE DRAIN

INUVIK - Tuk K.

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

AIRPHOTO NO: DATE DRILLED: 4/11 RIG: AIR

CSD	FIELD ENG	TECH PROYUCH	SOIL DESCRIPTION	ICE DESCRIPTION	LIMITS OF FROZEN GROUND (FEET)	TEST HOLE	ELEV	TEST HOLE	GRAIN-SIZE ANALYSIS					
									CLAY	SILT	SAND	GRANULE	GRANULE	GRANULE
DOWN									%	%	%	%	%	%
UP														
0														
2														
4														
6														
8														
10														
12														
14														
16														
18														
20														
22														
24														

O = WATER CONTENT (% OF DRY WEIGHT)

△ = ICE CONTENT (% OF SAMPLE VOLUME)

PLASTIC LIMIT 40 60 80

LIMITS OF FROZEN GROUND (FEET)

LIQUID LIMIT 80 100 100+

DEPTH (FEET)

0 2 4 6 8 10 12 14 16 18 20 22 24

CLAY - SALTY
- SANDY
- DEBBLES

V_c-V_r

No Samples

Bottom of Hole - 15'

DRILL HOLE REPORT

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

**DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DEPARTMENT OF PUBLIC WORKS, CANADA
HIGHWAY MACKENZIE

DRILL HOLE REPORT

FIELD ENG DATE DRILLED AIRPHOTO NO:

TECH PROTRACTOR RIG AREA

DEPTH (FEET)

TYPE

TEST HOLE

SAMPLE NUMBER

SOIL

NUMBER

PERCENTAGE

RECOVERY

RESISTANCE

PERCENTAGE

UNIFORMITY

SOIL RESISTANCE

SOIL DESCRIPTION

SOIL SYMBOL

SOIL TEST

ICE DESCRIPTION

ICE SYMBOL

ICE TEST

DEPTH (FEET)

TEST

TEST

LIMITS OF FROZEN GROUND

TEST

TEST

VEGETATION

TEST

TEST

SOIL DRAINAGE

TEST

TEST

WATER CONTENT (% OF DRY WEIGHT)

TEST

TEST

ICE CONTENT (% OF SAMPLE VOLUME)

TEST

TEST

PLASTIC LIMIT

TEST

TEST

Liquid Limit

TEST

TEST

100% LIQUID LIMIT

TEST

TEST

GRAIN-SIZE ANALYSIS

TEST

TEST

SILT %

TEST

TEST

SAND %

TEST

TEST

CLAY %

TEST

TEST

GRANULARITY

TEST

TEST

WET DENSITY (PCF)

TEST

TEST

DRY DENSITY (PCF)

TEST

TEST

REMARKS

TEST

TEST

MILE

TEST

TEST

B.C.S

TEST

TEST

NUMBER

TEST

TEST

AREA

TEST

**DRILL HOLE REPORT
INNUVIK - TUK.
DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY**

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

-9-
Grosby

Cotton or Holes 30'

INUVIK - TUK

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA

MACKENZIE HIGHWAY

FIELD ENG	DATE DRILLED	AIRPHOTO NO:	CHAINAGE	VEGETATION	TEST	HOLE
CKD	TECHRONYX RIG AIR		SURFACE DRAINAGE			
DEPTH (FEET)	SOIL DESCRIPTION	ICE DESCRIPTION	O : WATER CONTENT (% OF DRY WEIGHT) △ : ICE CONTENT (% OF SAMPLE VOLUME)	GRAIN-SIZE ANALYSIS	MILE	B.C.S NUMBER
DEPTH (FEET)	LIMITS OF FROZEN GROUND	DEPTH (FEET)	PLASTIC LIMIT	GRAVEL	TEST	REMARKS
DEPTH (FEET)	UNIFACED RESISTANCE	UNIFACED RESISTANCE	LIQUID LIMIT	SAND		
DEPTH (FEET)	PENETRATION RESISTANCE	PENETRATION RESISTANCE	60	SILT		
DEPTH (FEET)	% RECOVERY	% RECOVERY	40	CLAY		
DEPTH (FEET)	SAMPLE NUMBER	SAMPLE NUMBER	80			
DEPTH (FEET)	TYPE	TYPE	100			
2	Gravel	2	100+			
4		4				
6		6				
8		8				
10		10				
12		12				
14		14				
16		16				
18		18				
20		20				
22		22				
24		24				

Bottom of Hole. 12
Caving

4- BA 62 Wet.
6- 49 45 Sat.
7- 42 51 Sat.
8- 44 48 Sat.

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

FIELD ENG DATE DRILLED 5/16 AIRPHOTO NO:

CHD TECH V. RONYCH RIG: AIR

CHANGE:

TEST HOLE

AREA - 27C

REMARKS

MILE

B.C.S

NUM:

INUVIK - TUK.

DRILL HOLE REPORT

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DN	FIELD ENG	DATE DRILLED	AIRPHOTO NO:
CKD	TECH	RONYCH	RIG

CHAINAGE:

OFFSET
ELEV

SURFACE DRAINAGE:

VEGETATION:

SOIL DESCRIPTION

ICE DESCRIPTION

PROZEN GROUND

LIMITS OF

DEPTH (FEET)

UNIFACED SYMBOL

RECISITATION

PENETRATIION

RECISITANCE

RECISITANCE

RECISITANCE

RECISITANCE

RECISITANCE

RECISITANCE

RECISITANCE

RECISITANCE

% RECOVERY

SAMPLE

NUMBER

TEST HOLE

TEST

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

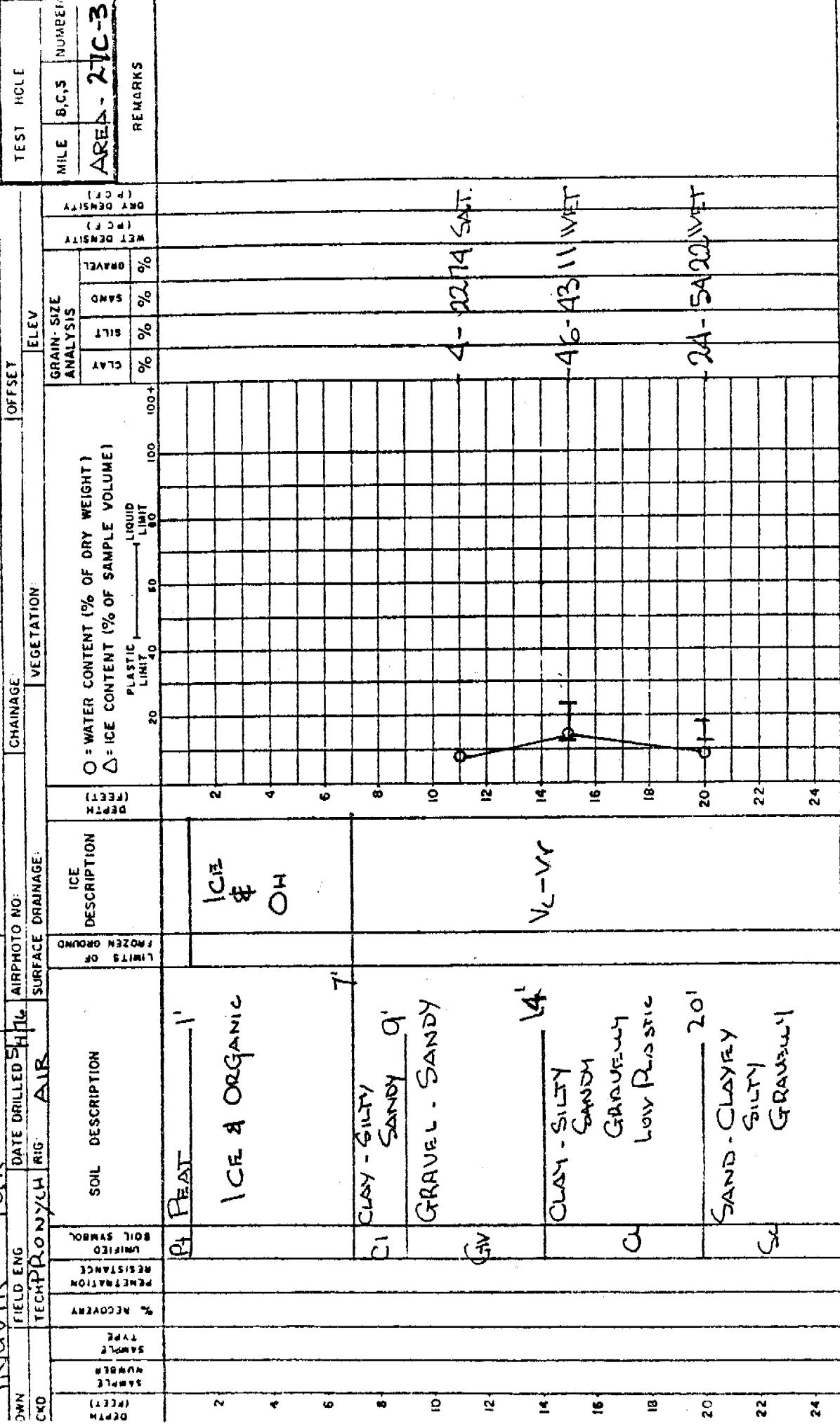
DRILL HOLE REPORT

FIELD ENG NO: CKO TECH PRONY CH
DATE DRILLED: 5/14 AIRPHOTO NO: AIR
SURFACE DRAINAGE:

CHAINAGE:
VEGETATION:

DEPTH (FEET)	SAMPLE NUMBER	SOIL DESCRIPTION	ICE CONTENT (%)	DESCRIPTION	ICE FROZEN ORROUND	LIMITS OF SAMPLE	TEST	HOLE NUMBER			
							CLAY	SILT	SAND	GRAVEL	DRY DENSITY (PCF)
0	P-1	ICE & ORGANIC	4	ICE	0	20 - 40	0	0	100+	0	100
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											

11 UVIK - TUK



26'

Bottom of Hole - 26'

INNUVIK - Tuk.		DEPARTMENT OF PUBLIC WORKS, CANADA	
DRILL HOLE REPORT		MACKENZIE HIGHWAY	
FIELD NO.	DATE DRILLED	DRILLER NO.	CHAMBER NO.
ENG 1	1951	PHOTO NO.	

DRILL HOLE REPORT

DATE DATED: 10/05/2011

INDIUVK - TUK. DRILL HOLE REPORT DEPARTMENT OF PUBLIC WORKS, CANADA
FIELD ENG. DATE DRILLED 5/4/74 AIRPHOTO NO: CHANAGE MACKENZIE HIGHWAY

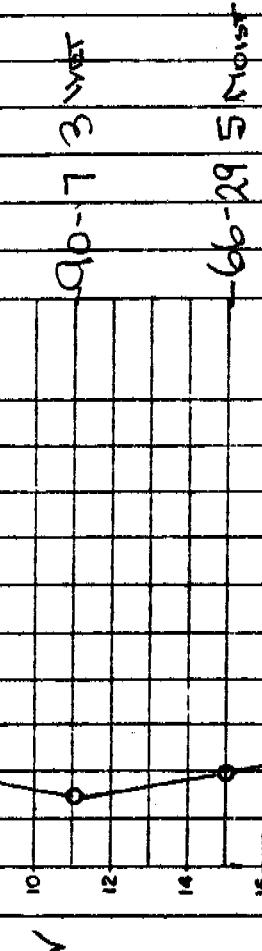
CKD	TECH. (RONYCH RIG A12)	FIELD ENG.	DATE DRILLED 5/4/74	AIRPHOTO NO:	CHANAGE	SURFACE DRAINAGE:	VEGETATION	TEST HOLE	MILE	B.C.S.	NUMBER
									OFFSET	ELEV.	GRAIN-SIZE ANALYSIS
											WET DENSITY (PCF)
											DRY DENSITY (PCF)
											REMARKS
2											
4											
6											
8											
10											
12											
14											
16											
18											
20											
22											
24											

27-3631 WET

MIX

Sy SAND-SILT Gravelly
Bottom of Hole - 30'

-30-60-10 WET



V_c-V_r

Pebbles

Low Plastic

C

Gravelly

SAND

CLAY-SILT
SAND

V_s

○ = WATER CONTENT (% OF DRY WEIGHT)
△ = ICE CONTENT (% OF SAMPLE VOLUME)

DEPTHE (FEET)

LIMITS OF FROZEN GROUND (DEPTHE IN FEET)

PLASTIC LIMIT

LIMIT

LIQUID LIMIT

SOIL SAMPLE NUMBER

UNIFRIED SOIL SAMPLE

RESISTANCE

PENETRATION

% RECOVERY

TEST

TYPE

SAMPLE NUMBER

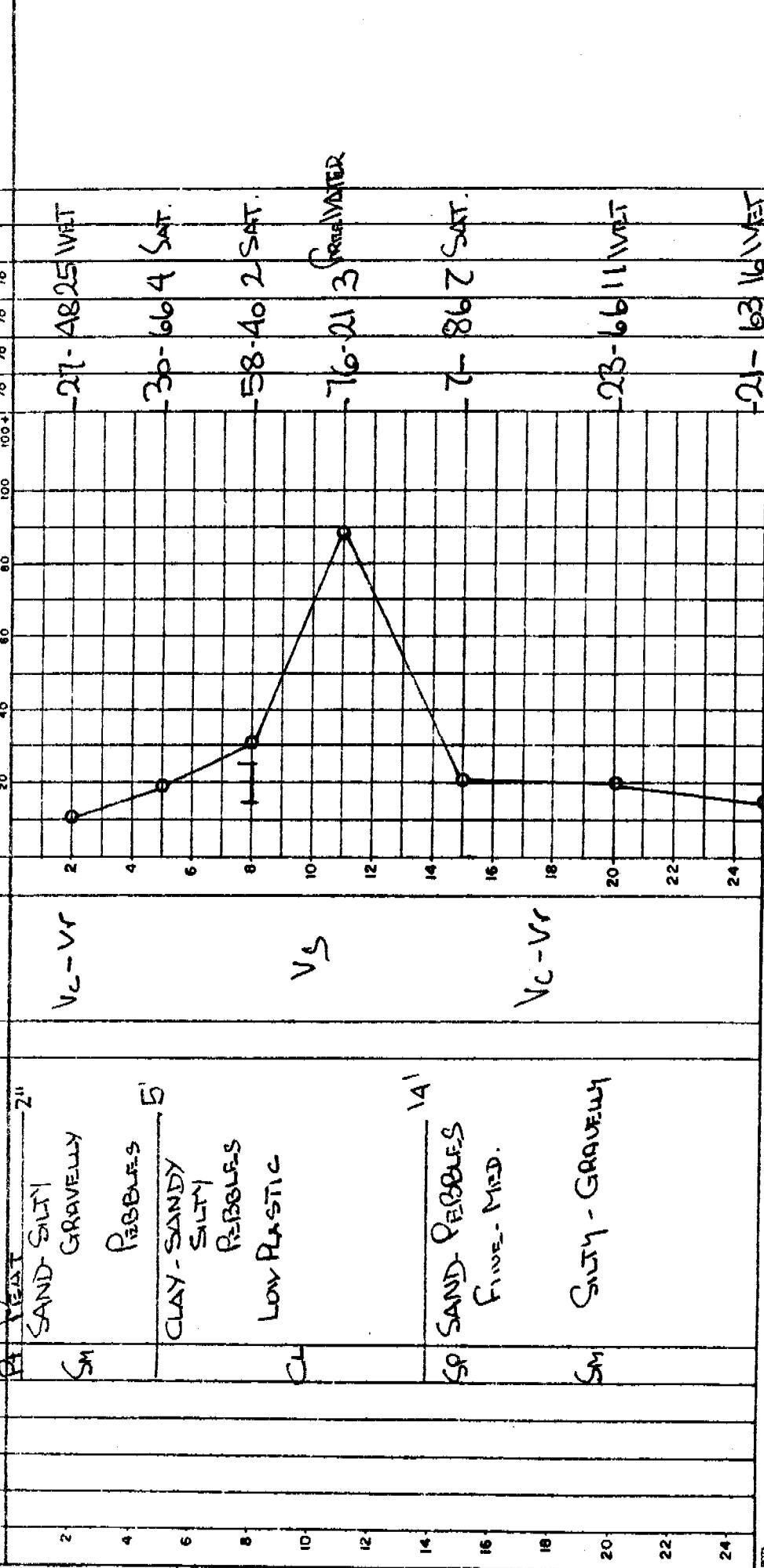
TEST

SOIL SYMBOL

DRILL HOLE REPORT DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

OWN CKD	FIELD ENG TECH	DRILLING RIG	DATE DRILLED	AIRPHOTO NO:	CHAINAGE	TEST HOLE
					OFFSET	ELEV.

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% ROCKDEBRIS	PENETRATION RESISTANCE	UNIFORM SOIL SYMBOL	SOIL DESCRIPTION	ICE DESCRIPTION	DEPTH (FEET)	VEGETATION	WATER CONTENT (% OF DRY WEIGHT)	ICE CONTENT (% OF SAMPLE VOLUME)	GRAIN SIZE ANALYSIS	MILE	B.C.S	NUMBER	REMARKS
0'-2'	Sm	SAND - SILTY	2"	5	Vc - Vr	GRANULAR PEBBLES	GRANULAR PEBBLES	2'	21-48-25 WEST	20	100+	CLAY SILT SAND GRANULE	21-48-25 WEST			AREA - 28-3



CLAY - SILTY SAND 27
C PEBBLES
Bottom of Hole - 30'

-55-42-3 WEST

DRILL HOLE REPORT
DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

OWN CKD	FIELD ENG TECH	DATE DRILLED	AIRPHOTO NO.	CHANAGE	VEGETATION	OFFSET	TEST HOLE	GRAIN SIZE ANALYSIS											
								DEPTH (FEET)	ICE DESCRIPTION	SOIL DESCRIPTION	SOIL SYMBOL	DRY DENSITY (PCF)	WET DENSITY (PCF)	DRY DEPTH (IN.)	WET DEPTH (IN.)	GRAVEL %	SAND %	CLAY %	TEST %
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
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42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61
44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
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52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
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62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81
64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83
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68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87
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72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91
74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
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80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101
84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103
86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107
90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109
92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113
96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115
98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117
100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119
102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121
104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123
106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129
112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131
114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133
116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137
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122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141
124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145
128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147
130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149
132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151
134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153
136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155
138	139	140	141	142</td															

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

DOWN FIELD END DATE DRILLED SURFACE AIRPHOTO NO:

UP FIELD END DATE DRILLED SURFACE AIRPHOTO NO:

CHAINAGE:

TEST HOLE

CKD	TECHNICONICA	RIG #	DEPTH (FEET)	SOIL DESCRIPTION	ICE DESCRIPTION	LIMITS OF GROUND FROZEN (DEGREES FAHRENHEIT)	TEST HOLE NUMBER	VEGETATION	ELEV.	TEST HOLE NUMBER	MILE	B.C.S
2	PEAT	4"	CLAY - GUTT	SANDY	VS	2						
4	P.B.B.	4"	Clay - GUTT	SANDY		4						
6			BUBBLES			6						
8						8						
10						10						
12						12						
14						14						
16						16						
18						18						
20						20						
22						22						
24						24						

○ = WATER CONTENT (% OF DRY WEIGHT)
 △ = ICE CONTENT (% OF SAMPLE VOLUME)

PLASTIC LIMIT 40 LIQUID LIMIT 80

ICE -
Occasional
SAND LENSE

Some Gravel
After 28'

Bottom of Hole. 30'