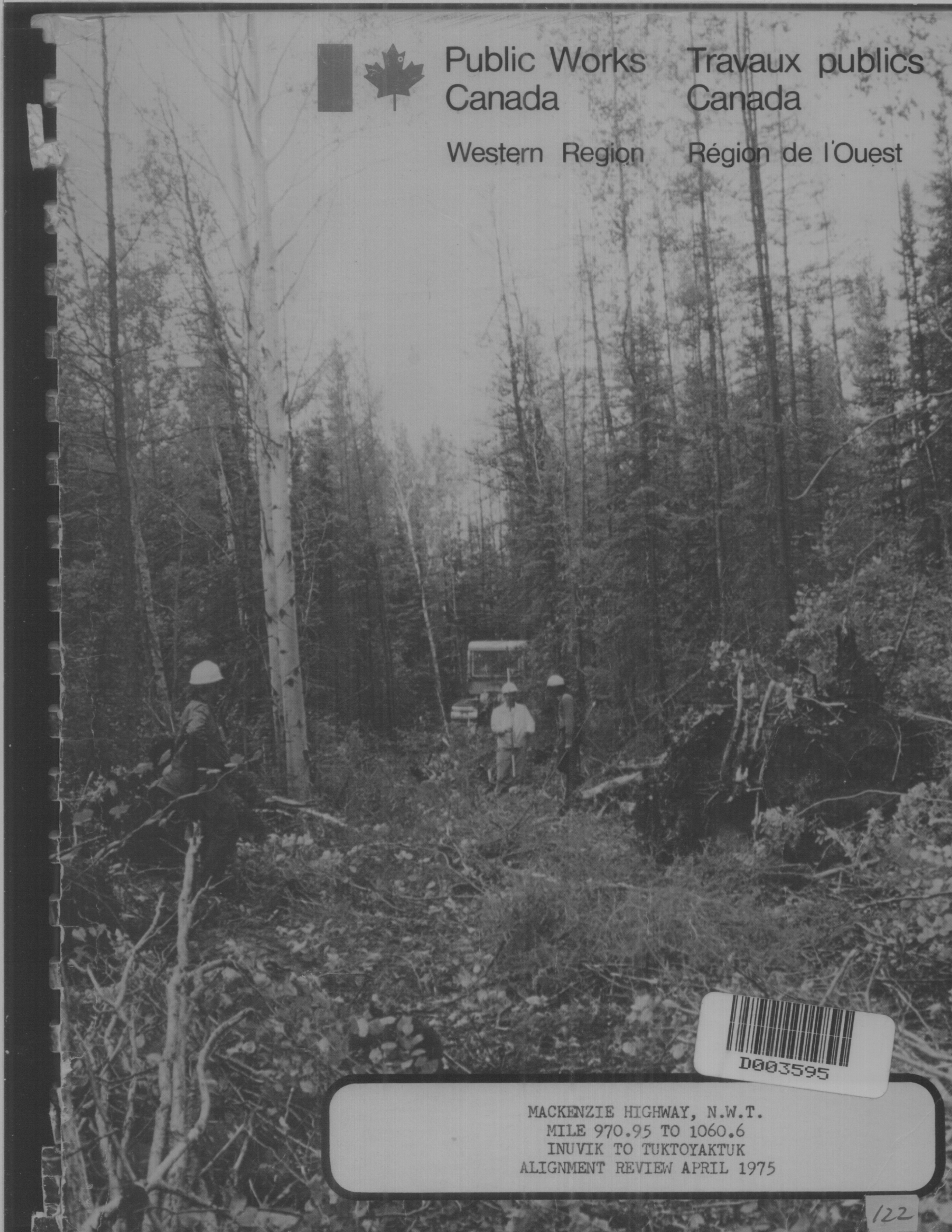

Public Works Canada
Travaux publics Canada

Western Region
Région de l'Ouest

MACKENZIE HIGHWAY, N.W.T.
MILE 970.95 TO 1060.6
INUVIK TO TUKTOYAKTUK
ALIGNMENT REVIEW APRIL 1975

MACKENZIE HIGHWAY, N.W.T.

MILE 970.95 TO 1060.6

INUVIK TO TUKTOYAKTUK

ALIGNMENT REVIEW

PUBLIC WORKS CANADA

WESTERN REGION

EDMONTON, ALBERTA

APRIL, 1975

TABLE OF CONTENTS

1 INTRODUCTION

1.1 GENERAL

The objective of this Report is to briefly review the guidelines and studies that have applied and surveys that have been undertaken on the section of the Mackenzie Highway location from Inuvik to Tuktoyaktuk, Mile 971 to 1060.6, Northwest Territories, to facilitate planning and client review.

1.2 SUMMARY

The selected highway location has been established on the basis of airphoto interpretation, field surveys from Mile 971 to 1009 and compilation of existing geological data. The Mackenzie Highway mileage for this section has been lengthened by approximately 10 miles to that previously established in the 1968 Reconnaisance, because of a major relocation to the east from Mile 1009 to 1055 and using a different route mileage. The revised Mackenzie Highway mileage for its termination at Tuktoyaktuk will now be approximately Mile 1060.6, instead of Mile 1049.

The projected highway alignment is to be considered as a preliminary engineering study subject to changes after the field reconnaisance, surveys and geotechnical investigations scheduled for 1975-76 are complete. It is apparent at this preliminary stage there is a scarcity of suitable road construction materials.

2.0 HIGHWAY BACKGROUND

The Department of Public Works commenced highway route studies in 1968 from Inuvik to Tuktoyaktuk as an area development road that was to comprise part of the Mackenzie Delta community road network. However, with the commencement of the Mackenzie Highway route studies north from Fort Simpson in 1972, the road became a section of that highway. The following pre-engineering for the road has been undertaken, or scheduled for 1975/76:

- 1968 Route Reconnaisance
- 1969 Aerial Photography, Scale 1" = 1000'
  Mapping Corridor, Scale 1" = 200' With 5 Contours — this not part of DPW planning until 1974
- 1971/72 Field Surveys, Mile 971 to 1009.5
- 1972 Aerial Photography, Scales 1" = 1000' and 1" = 3000'
- 1975:
  - Additional Aerial Photography, Scale 1" = 1000' and 1" = 3000'
  - Review Surveyed Alignment From Mile 971 to 1009
  - Field Reconnaisance and Surveys, Mile 1009 to 1060.

No serious field work until 1975 according to DPW in field

3.0 ROUTE LOCATION

3.1 LINE IMPROVEMENT

Alignment changes have been considered in this report for the previously surveyed highway section from Mile 970.65 to 1009 and the preliminary field plans indicate a number of minor revisions that will be required for the alignment to correspond to Mackenzie

Highway geometrics. A complete re-alignment review for this section will be required this summer to ensure the alignment conforms to the design and environmental controls established for other sections of the Mackenzie Highway.

Check with Lands for details of lease 9-3-1355-8

In addition to the surveyed route north from Inuvik, three alternative routes have been projected. Routes No. 1 and No. 2 must receive the approval of the Department of National Defence, which holds a two-mile radius protection reserve in the area. The Department of National Defence have been reluctant in the past to consider a highway through this reserve; however it is planned to re-submit the alternative routes to them for consideration.

The merits of the alternative routes are as follows, with the selected route dependent on D.N.D. approval, whose property and restricted reserve boundaries are shown on the 1" = 1000' airphote mosaic of Inuvik in the Appendix.

Surveyed Route:- Requires restrictive 10 percent grades with fills of up to 80' high to cross the deep creek valleys in the area. This route is to be considered as abandoned from 970.65 to 978.1 for economic and geometric reasons.

Alternate Route No. 1:-

Minimum fills are required since it follows a narrow flat lying section of the Mackenzie Delta Plain.

- The Route incorporates 0.7 miles of the Inuvik marine access road and is 0.6 miles shorter than the existing surveyed route.
- The alignment through the D.N.D. Reserve will pass 1900' east of the operations building and cross one antenna line.

This is the preferred highway route from Mile 970.95 to 977.5.

Alternate Route No. 2:-

Will reduce the grade over the Mackenzie Delta escarpment to approximately 8%.

- Avoids a number of deep creek crossings
- The route incorporates 0.7 miles of the Inuvik marine access road.
- The alignment through the D.N.D. Reserve will pass 6000' east of the operations building and clear the nearest antenna line by 1200'.

This route follows a height of land overlooking Noell Lake from Mile 970.9 to rejoin the existing survey at Mile 992.1.

Alternate Route No. 3:- Has been selected as an alternative to the present location to avoid one major creek and reduce the fill height required on the other creeks in the area. The route incorporates 0.3 miles of the Inuvik marine access road and commencing from Mile 970.9 will intersect alternate route No. 2 at Mile 976.5. The route is shorter than alternative No. 2 by approximately 0.4 miles.

3.2 NEW ALIGNMENT

From Mile 1009 to 1052 the 1968 Reconnaisance Alignment was selected to follow a more direct route along what is commonly called the "Imperial Oil Seismic Ditch". This alignment section has now been relocated to follow the Eskimo Lakes coastal plain. From Mile 1052 to 1060.6, the alignment remains along the previously projected location.

The re-alignment follows a broad, flat lying plain adjacent to the western shores of the Eskimo Lakes, avoiding the rolling topography along the original projection. The revised alignment will be more economical as a more uniform grade can be maintained, thereby keeping the design embankment quantities to a minimum and reducing or eliminating centre line cuts in the ice rich terrain. The rolling topography could not be completely avoided however, and is encountered in the section Mile 1044 to 1050.

An alternate projection is shown on the maps and airphoto mosaics from Mile 1015.5 to 1018.9 where the selected route will be dependent on the Parsons Creek crossing. The eastern route is preferred because of the well-drained terrain, whereas the westerly route follows a parallel slope with a large number of drainage crossings.

3.3 INUVIK ACCESS

The Marine Access Road around the east side of Inuvik will be completed in late 1975 as part of a contract for upgrading the Inuvik Airport Road (which is a section of the Mackenzie Highway from Mile 964 to 970.95).

The intersection of the Mackenzie Highway and Marine Access Road at Mile 970.95 will require design review for possible re-location since the alignment north towards Tuktoyaktuk was established prior to the Marine Access Road.

3.4 TUKTOYAKTUK ACCESS

From Mile 1056 to 1060.6 at Tuktoyaktuk, the highway location is in what is essentially a narrow peninsula, restricting the location to following around the shorelines of the many lakes and bays in this section.

The Ministry of Transport is now in the process of taking over, from the U.S. Air Force, the Tuktoyaktuk airstrip to the proposed boundary lines shown on the 1" = 1000' airphoto mosaics. In order to comply

with the M.O.T. Airport Control Zoning Regulations the highway approach to Tuktoyaktuk has been located to the east of Tareoknitok Lagoon as their future planning for the airport development would include using the present Polar Continental Shelf Camp as a building and aircraft parking area therefore restricing the use of the existing road to Tuktoyaktuk. The Hamlet water supply road would come under the same regulations since its present location does not allow sufficient clearance for runway extension to the east.

Location for the termination of the Mackenzie Highway with the Tuktoyaktuk streets will have to be determined through consultation with the Northwest Territories Government and local agencies before it can be finalized.

4.0 BORROW MATERIALS

It is apparent from existing geotechnical investigations undertaken by the Geological Survey of Canada, the Department of Indian Affairs and Northern Development (Mackenzie Valley Granular Inventory) and oil companies, that there is a limited source of suitable highway construction materials between Inuvik and Tuktoyaktuk. The granular deposits investigated by D.I.A.& N.D. and the oil companies are outlined on the airphoto mosaics and designated with their site numbers and the corresponding evaluation reports included in the Appendix. The evaluation reports of the small granular deposits in the Tuktoyaktuk area have been excluded in the Appendix, since they are of limited quantity and in highly sensitive areas.

The Geological Survey or Canada, Surficial Geology and Landform Maps, open file 119 and 96, 1972, have mapped a number of other granular areas that are also shown on the mosaics.

The following is a brief summary of the surficial geology for this section of the Mackenzie Highway as determined by the G.S.C.

Mile 971 to 1004 - Rolling morainal veneer over bedrock

- A mile west of Mile 1001,5, seismic logs show shale between 0 to 60 feet

Mile 1004 to 1039 - Glaciofluuial sands and gravels

Mile 1039 to 1060 - Varies from glaciolacustrine soils along Eskimo Lakes to morainal sands or colluvial veneer over fluvial sands at Tuktoyaktuk.

Until there is a more detailed geotechnical investigation, the presently known available sources of road construction materials are confined to the following mileages:

Mile 965.8 - shale(borrow pit used for construction of the Inuvik airport and Marine road)

Mile 1000 #314 - sands and gravels (2 mile deadhaul)

Mile 1005 #327 - sands and gravels (2 mile deadhaul)

Mile 1010 #312 & 1 to 4, #7 to 9 - sands and gravels

Mile 1025 #305 - sands and gravels (2 mile deadhaul)

Mile 1036 G.S.C. - sands and gravels (limited quantity)

No substantial amount of road construction material has been located in the Tuktoyaktuk area with the road to the Hamlet water supply lake built out of small sandy clay deposits.

5.0 DRAINAGE STRUCTURES

The following stream crossings are presently indicated as requiring short bridges or large culverts:

Mile 1009.6 - Hans Creek

Mile 1016.8 - Parsons Creek

Mile 1055.2 - Creek

and some dwarf shrubs as much as 4 feet high, the higher shrubs being found adjacent to ponds and in the gullies.

The source is located in a critical wildlife area, the permanent fawning ground of the Reindeer Herd. During the calving period this area is particularly important, because calving must be complete before the herd begins its migration to the summer range, but the area is occupied from December 1 to about May 15 of each year.

Fishing for lake trout, grayling and whitefish in the Eskimo Lakes is important to the native population, particularly because the relatively high water temperatures promote rapid growth and high productivity.

305 MATERIALS AND QUANTITIES

As must be expected in a glacial feature of this size, the materials are variable within wide limits. Some samples are clean sand and gravel with no visible ice and a moisture content about 3%, others are silt containing traces of sand and gravel with a high ice content.

Gravel and sand is usually related to the steepsided kames, whereas the silt is more commonly found in the rounded hillocks and on the flat ground between hillocks.

Test hole #6 contains an excellent gravel with 70% coarser than #4 mesh, 25% sand, and less than 5% silt. Other samples are clean sand with some gravel and a trace of silt.

Samples taken from the test pits indicate the maximum particle size is about 3 inches.

The petrographic analysis of gravel from test hole #6 indicates a sound material, mainly quartzite (86%) and a soft sandstone (9%), with granite, quartz, and siltstone making up the remaining 5%. Sandstone is the only unsound component. Analyses of other samples indicate a lower unsound gravel content.

The volume of gravel and sand contained in the kames of this source

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The volume of gravel and sand contained in the kames of this source

is estimated to be 300,000 cubic yards.

305 DEVELOPMENT

General

This source should be considered an assembly of many sources, some of them quite small, and containing a variety of materials.

The area is accessible only during the later winter, approaching the critical calving period of the Reindeer Herd.

The source is recommended for development only on a limited scale for local projects, and on a schedule approved by the Canadian Wildlife Service.

Development of one of the kames must be preceded by a detailed investigation, so that a contractor can begin the excavation with the confidence that he knows what material, and how much, he can remove. In order to minimize the disruption of the area, all usable material should be removed from a kame before another containing similar material is opened.

Access

The area can be reached only by winter road. During recent years the activity near Parsons Lake has caused winter roads to be built from Tuktoyaktuk and from Swimming Point, but these are no more than winter snow roads.

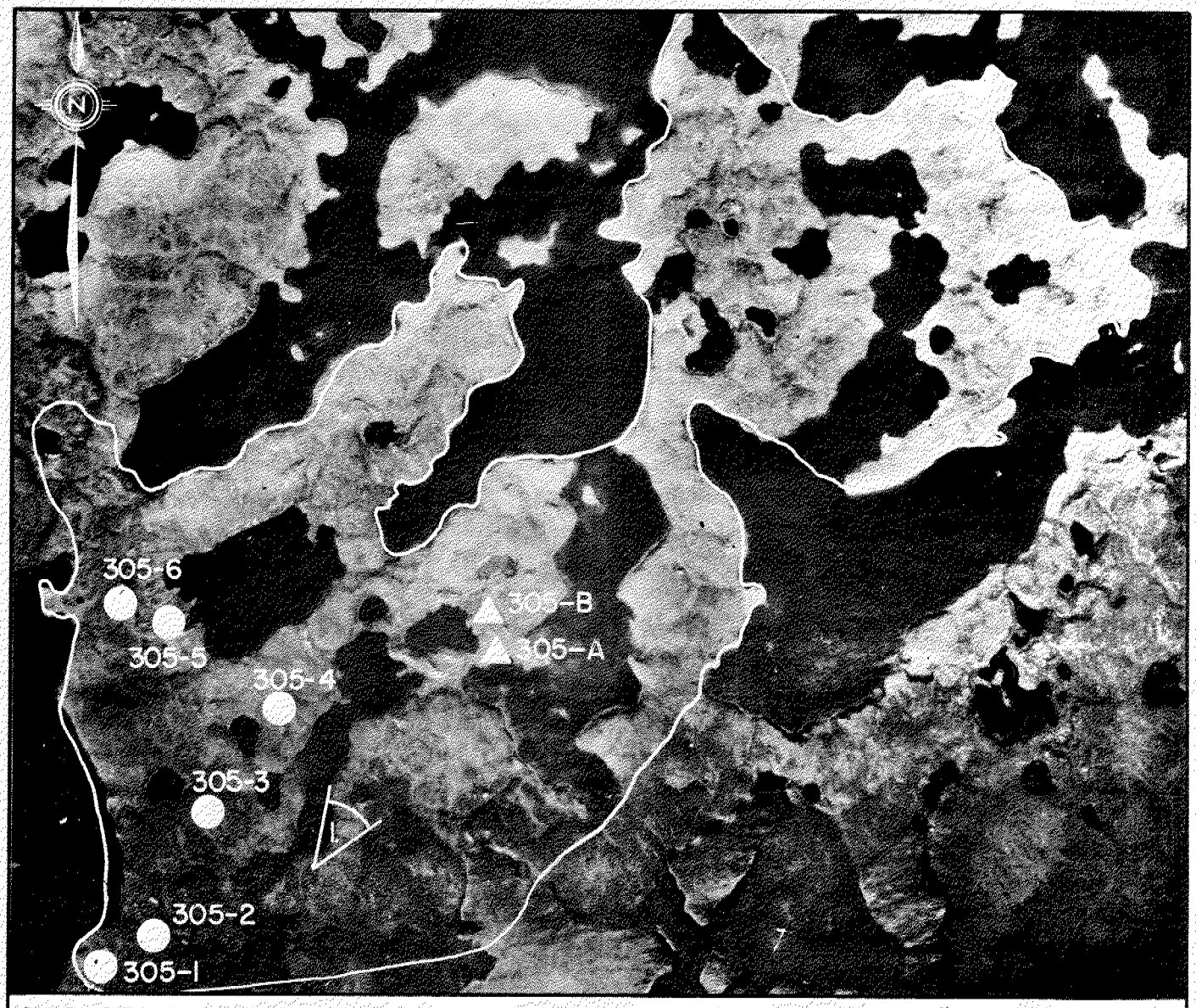
The power transmission line leading to Tuktoyaktuk runs three miles to the west of the source area.

Material Use and Handling

The materials from this source could be used for any purpose, from general fill to aggregate for concrete construction. For limited quantities, the material could be used for concrete or asphalt aggregate with nothing more than screening to remove oversize, and possibly with blending to adjust the proportion of coarse and fine aggregates. For large volumes a proper aggregate plant would provide a more consistent product.

ZONE III
SOURCE No. 305

LANDFORM AND LOCATION:	A large number of kames on an outwash plain located 26 miles south of Tuktoyaktuk.
MATERIAL:	SAND - and gravel, trace silt GRAVEL - and sand, trace silt
VOLUME:	300,000 cu. yds.
CONCLUSION:	Suitable for development on a limited scale. The source is within the fawning ground of the reindeer herd, and plans for development must be approved by the Canadian Wildlife Service.



AIRPHOTO No. A 12918-108 SCALE: 1"= 3000' (approx.)

305 ENVIRONMENT

Physical

This source is a kame field located in a glaciofluvial outwash plain about 4 miles west of Eskimo Lakes and 26 miles south of Tuktoyaktuk. This feature is very large, about 4 miles long and from 500 feet to 2 miles wide.

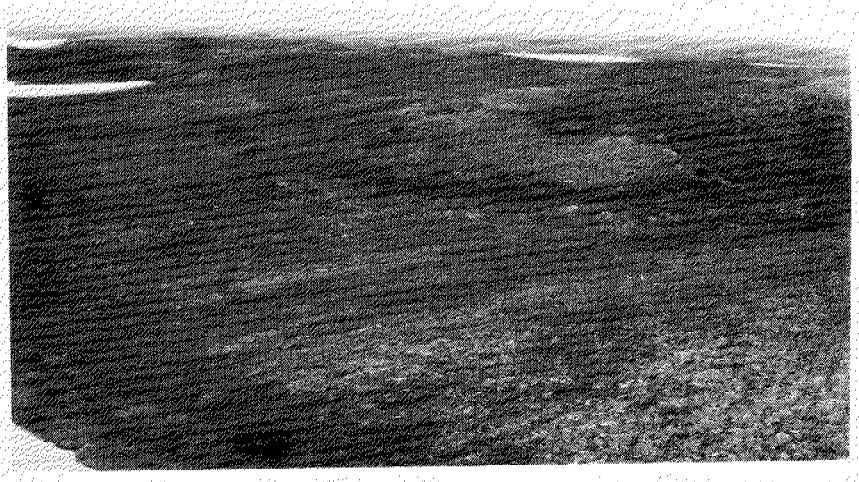


Photo No. 1 Source 305 - looking north-east at kame field.

This source and the vicinity contain many ponds and hummocks. About 20% to 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.

Drainage on the source is good, except for ponds in the lower levels. Test pits dug to depths of about 2½ feet in September encountered no ground ice. The surrounding area show the polygonal pattern characteristic of massive ground ice, and ice was encountered in many of the test holes.

This source has not been developed.

Biotic

Vegetative cover is light, with a ground cover of grass and moss

Selected deposits of gravel and sand could be removed at any season without ripping.

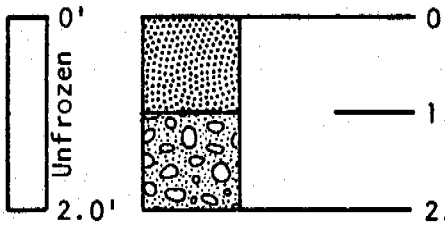
The equipment required for this development is the usual assembly of dozer with ripper attachment, front-end loader, and trucks. The production of concrete or asphalt aggregate will require the installation of a screen, and possibly of a complete aggregate plant if the volume warrants.

Stripping Restoration

This source is a typical glacial feature in tundra, and all organic cover and topsoil must be stripped and stockpiled for replacement after the granular material has been removed. The area exposed at one time must be kept to a minimum in order to limit the disturbance of the thermal regime at depth. All banks must be graded to a stable slope before the ground cover is replaced.

TEST PIT LOGS
SOURCE No. 305

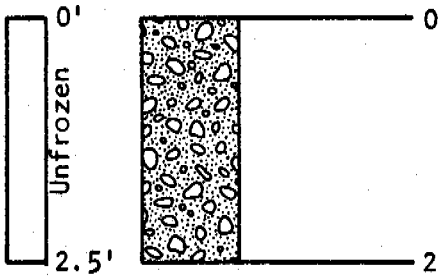
305-A



(SM) SAND - and silt, fine, uniform

(GP) GRAVEL - some sand

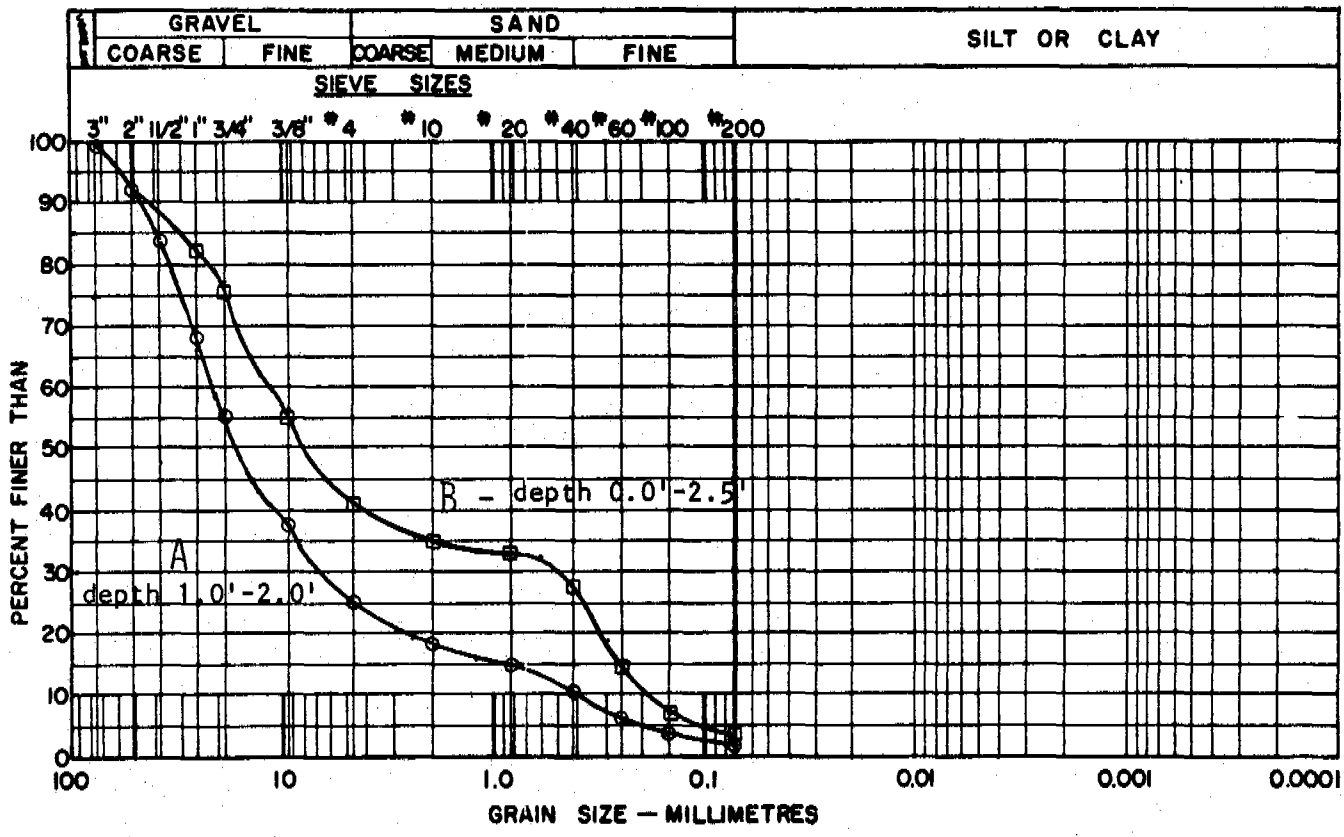
305-B



(GP) GRAVEL - and sand, rounded to subangular, clean

LABORATORY
TEST DATA
SOURCE No. 305

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A depth 1.0-2.0' 0.4%
Pit B depth 0.0-2.5' 2.2%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

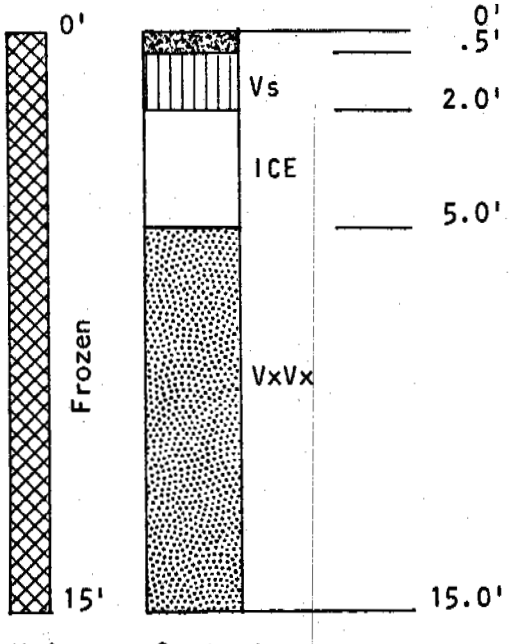
Pit B depth 0-2.5'

Quartzite	- 73%	Limestone, soft	- 3%
Chert	- 17%	Quartz	- 2%
Granite	- 4%	Sandstone, soft	- 1%
		Total	100%

TEST HOLE LOGS

SOURCE No. 305

305-1



(OL) SILT - and organics, roots, peat, etc.

(ML) SILT - and ice lensing, low plastic

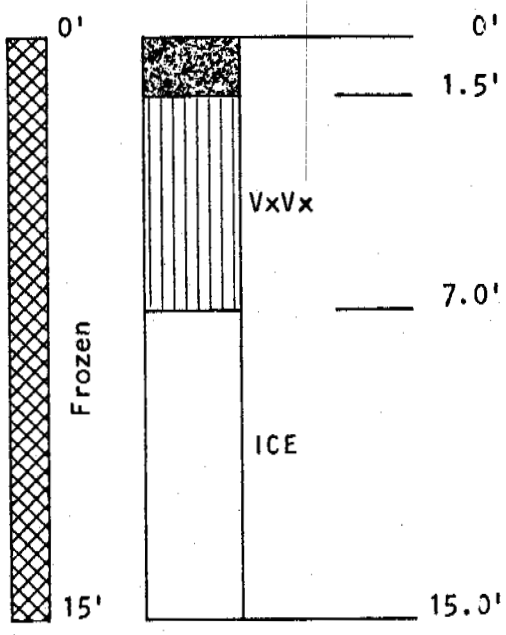
ICE - trace soil inclusions

(SM) SAND - and silt, fine, uniform, gradation, high ice lensing and inclusion

Moisture Content

Sample 1 depth 12.0' 18.2%

305-2



(OL) SILT - and organic, peat, roots, etc.

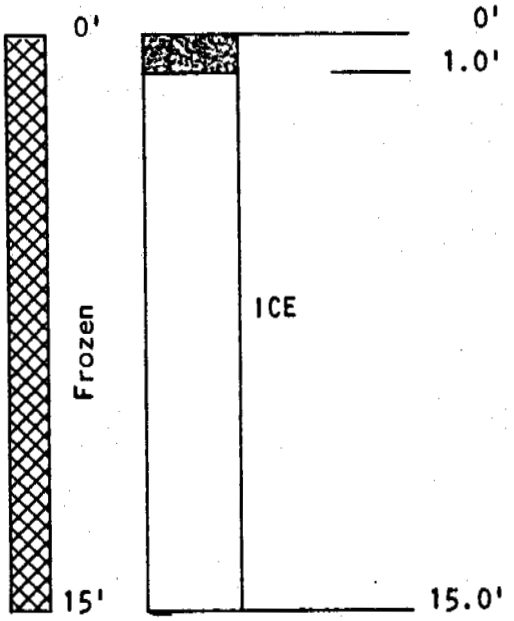
(ML) SILT - trace fine sand, high ice lensing and inclusions

ICE - trace soil lensing and inclusions

TEST HOLE LOGS

SOURCE No. 305

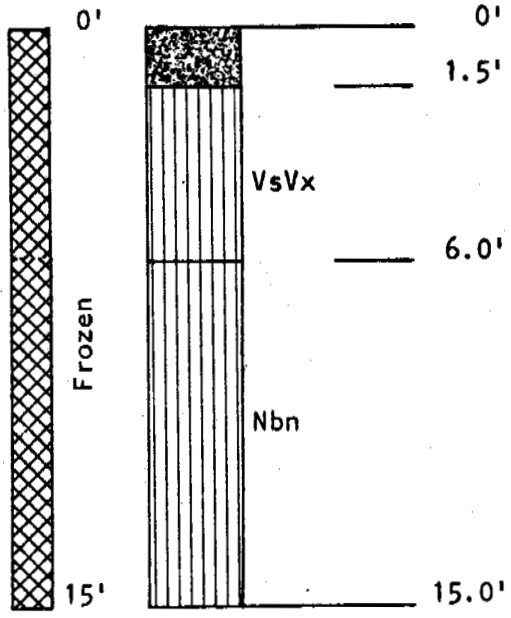
305-3



(OL) SILT - and organics, peat roots etc.

ICE - and silt lenses, trace gravel

305-4



(OL) SILT - and organics, peat roots etc.

(ML) SILT - trace gravel, some ice lenses and inclusions

(ML) SILT - trace gravel, trace sand, no visible ice

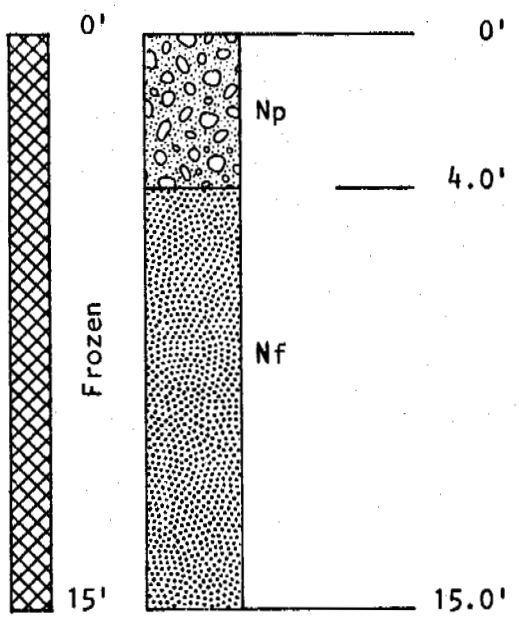
Moisture Content

Sample 1 depth 6.0'-8.0' 11.1%

TEST HOLE LOGS

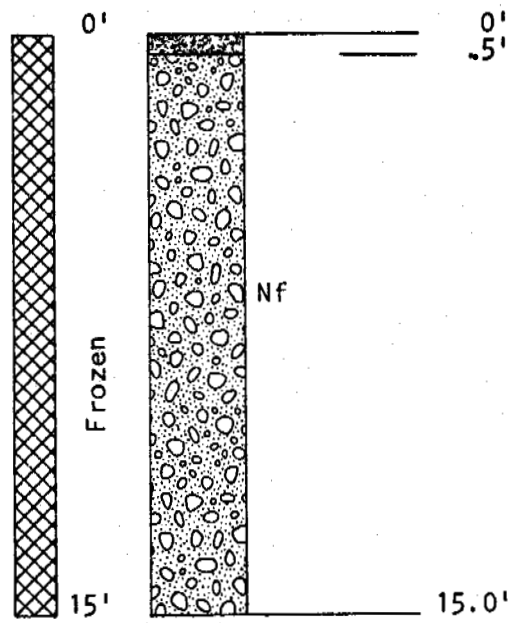
SOURCE No. 305

305-5



0' – 4.0'	(GW)	GRAVEL -	and sand, trace silt, well graded, dry, no visible ice
4.0' – 15.0'	(SW)	SAND -	some gravel, trace silt, well graded, dry no visible ice

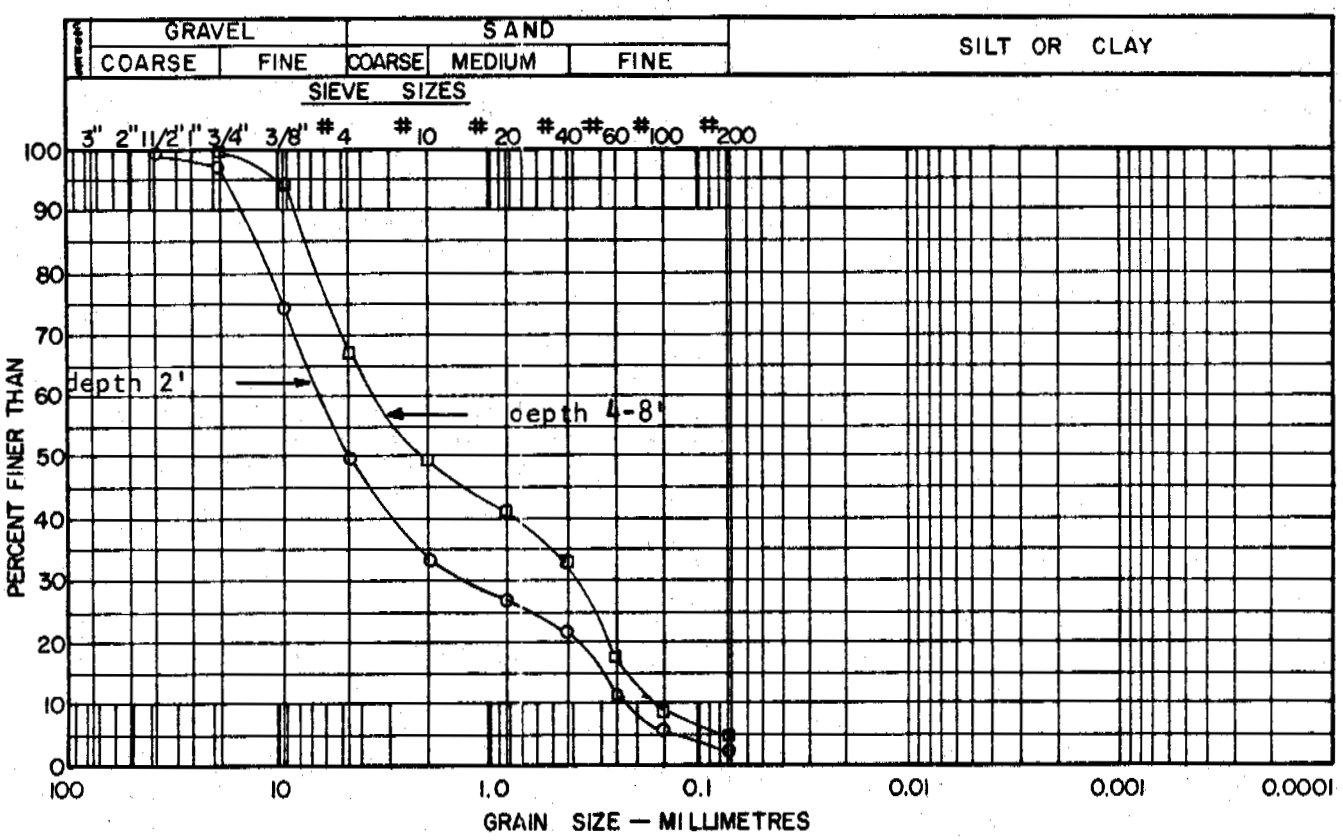
305-6



0' – .5'	(OL)	SILT -	and organic, roots, peat etc.
.5' – 15.0'	(GW)	GRAVEL -	and sand, trace silt, well graded, dry loose, no visible ice.

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 305-5

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2' 2.2%
Sample 2 depth 4' 1.9%
Sample 3 depth 6' 1.5%
Sample 4 depth 8' 2.6%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

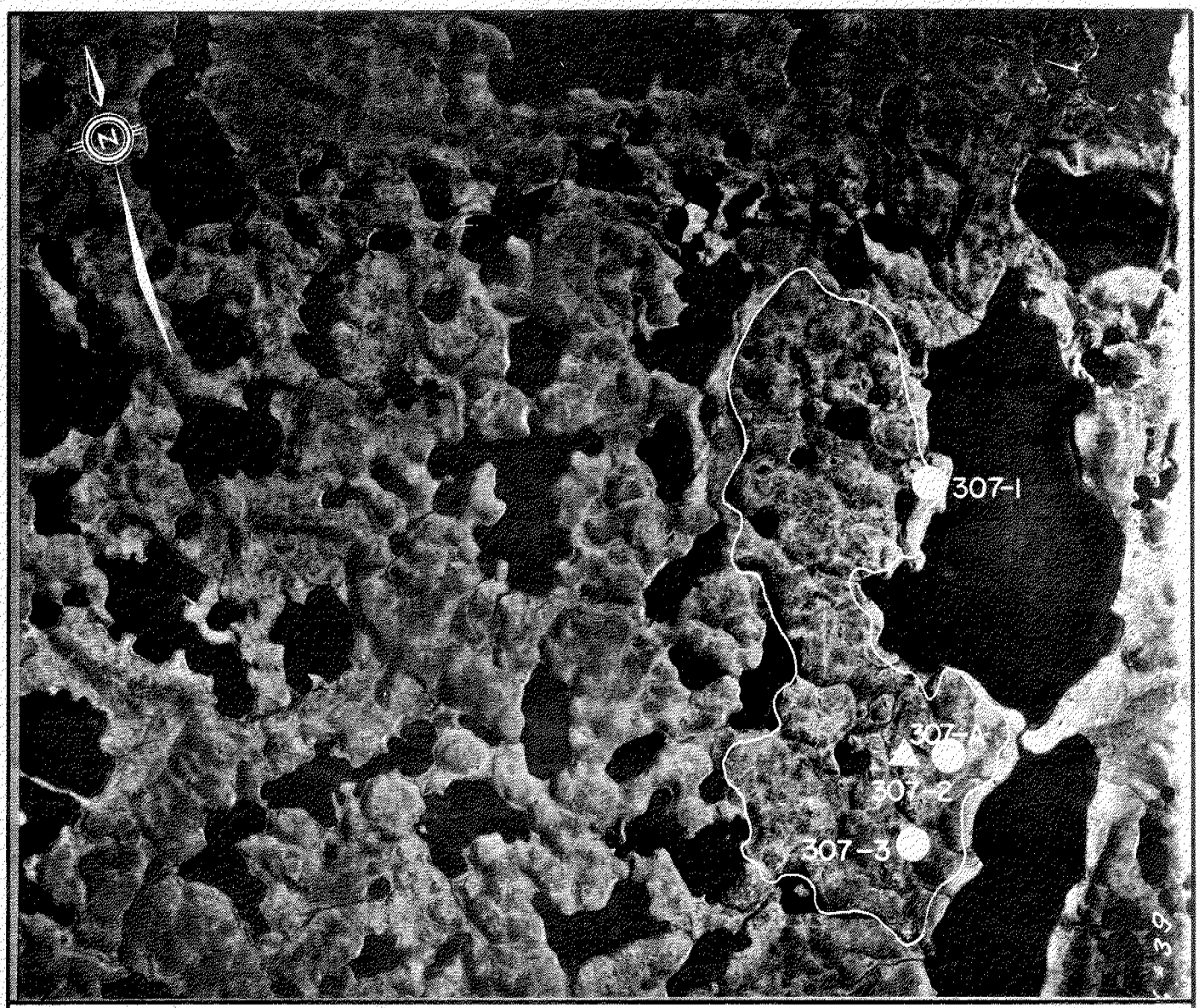
ZONE III
SOURCE No. 307

LANDFORM AND LOCATION: Many small kames in an outwash plain about 5 miles east of Eskimo Lakes and 34 miles south of Tuktoyaktuk.

MATERIAL: GRAVEL - and sand, trace silt.
SAND - little gravel, some silt.

VOLUME: 150,000 cu. yds.

CONCLUSION: Source is suitable for development on a limited scale due to the limited size of each kame deposit, the variability of the material, and the sensitivity of the area with respect to wildlife disturbance.



AIRPHOTO No. A22936 - 39 SCALE: 1"= 3000'(approx.)

307 ENVIRONMENT

Physical

This source is a kame field located in the glaciofluvial outwash plain 5 miles west of Eskimo Lakes and 34 miles south of Tuktoyaktuk.

The source is about 2½ miles long and from 1,500 to 4,000 feet wide, and contains many small kames up to 50 feet high and from 100 to 300 feet across at the base.

Drainage is good on the individual hillocks, with no ground ice encountered in the top 2 feet during the reconnaissance in September. The area contains many small ponds and is surrounded by large and small lakes. The flat land adjoining the lakes displays the polygonal marking indicative of massive ground ice.

This source has not been developed.

Biotic

Most of the kames in this source are bare of vegetation, although the lower slopes and flat ground below are covered with light moss, grass, and dwarf shrubs.

The source is within a critical wildlife area, the fawning ground of the Reindeer Herd. During the calving period this area is particularly important, because calving must be complete before the herd begins its migration to the summer range, but the area is occupied from December 1 to about May 15 of each year.

Fishing for lake trout, grayling and whitefish in the Eskimo Lakes is important to the native population, particularly because the relatively high water temperatures promote rapid growth and high productivity.

307 MATERIALS AND QUANTITIES

The kames in this source contain sand and gravel, gravel and sand, or silt with a trace of coarser material. Generally the top 5 to 10 feet of the kame hillocks contain little ice, and the lower portions

contain either massive ice or thick ice lenses. In general, low ice content is associated with coarse sand and gravel, whereas high ice content is associated with silt.

Test Hole #3 encountered sand to a depth of 6½ feet, then clean gravel to 11 feet, at which depth the hole ended in clear ice. The sand is gap-graded, with 15% gravel, 60% sand, and 25% fines passing the #200 mesh. The gravel contained 56% coarser than #4 mesh, 43% sand, and only 7% silt.

The moisture content of sand and gravel varied from 8% to 12% at depth.

The volume of recoverable sand and gravel in this source is estimated to be about 150,000 cubic yards.

307 DEVELOPMENT

General

This source is a group of small sources, variable in material quality and in size.

The source is accessible only during late winter, approaching the critical calving season of the Reindeer Herd.

This source, because of its nature and location, is not suitable for large-scale development. It may be valuable for the supply of general fill or road material to local projects of limited scope, provided the impact on wildlife is not excessive.

It is important that the area exposed at one time be as small as possible, and that a contractor should remove all the usable material from a kame or hillock before another is stripped for excavation.

Care must be taken to prevent the exposure of the underlying massive ground ice.

Access

The area is accessible by winter road. During recent years, some light access roads have been built to Parsons Lake from Tuktoyaktuk

and from Swimming Point.

The power transmission line leading to Tuktoyaktuk passes through this source.

Material Use and Handling

The source contains material that is suitable for general fill and road-building. Because of the erratic pattern that developed during the examination of the source, it is not likely that a substantial volume of good concrete or asphalt aggregate can be produced.

The equipment required for the development of this source is a dozer with ripper attachment, front-end loader, and trucks. The production of aggregates would require the addition of a screen to remove over-size rock.

Stripping and Restoration

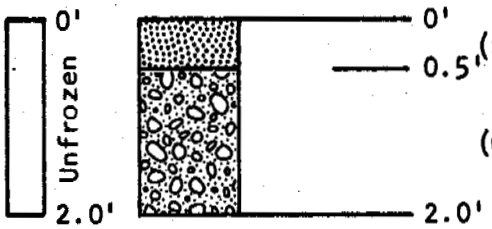
Very little organic ground cover and topsoil can be recovered on the kames, but any material that is stripped should be stockpiled for replacement after the granular material has been removed.

Banks should be graded to a stable slope before the topsoil is replaced. The area exposed at any one time should be minimal, in order to limit the disruption of the thermal regime at depth.

TEST PIT LOGS

SOURCE No. 307

307-A

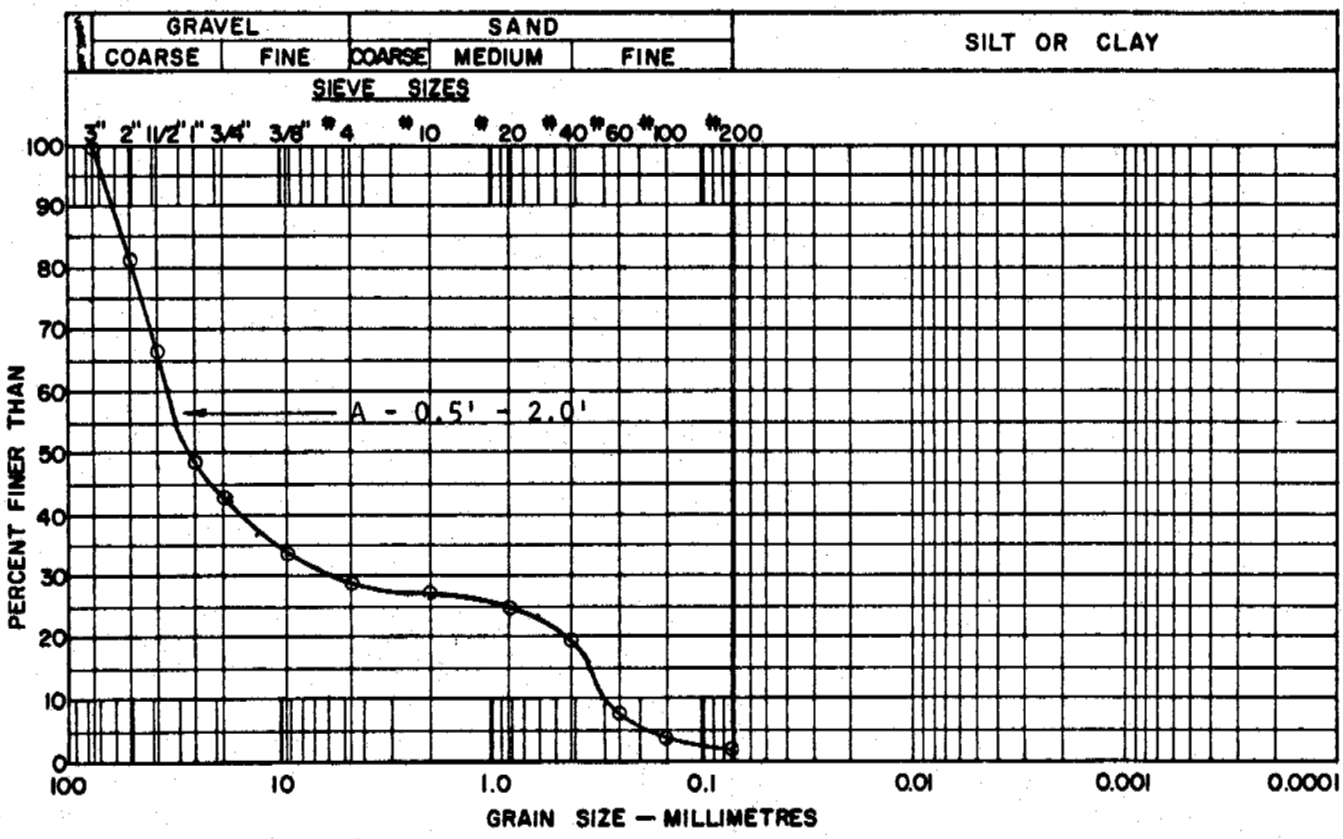


(SM) SAND - little silt, trace gravel

(GP) GRAVEL - some sand, trace silt

LABORATORY
TEST DATA
SOURCE No. 307

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample A 0.5' - 2.0' 0.6%

ORGANIC CONTENT

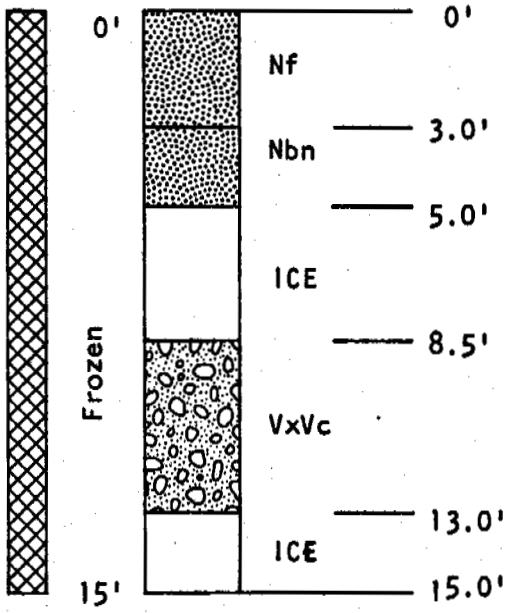
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 307

307-1



SAND - trace silt, fine uniform gradation, dry, loose.

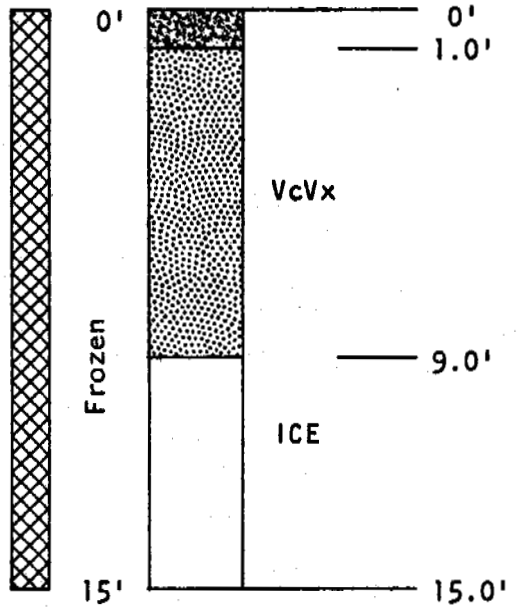
SAND - some silt, trace clay, fine uniform gradation. No visible ice.

ICE - with soil lensing and inclusions.

GRAVEL - and sand, well graded, high ice crystals and inclusions.

ICE - trace gravel inclusions.

307-2



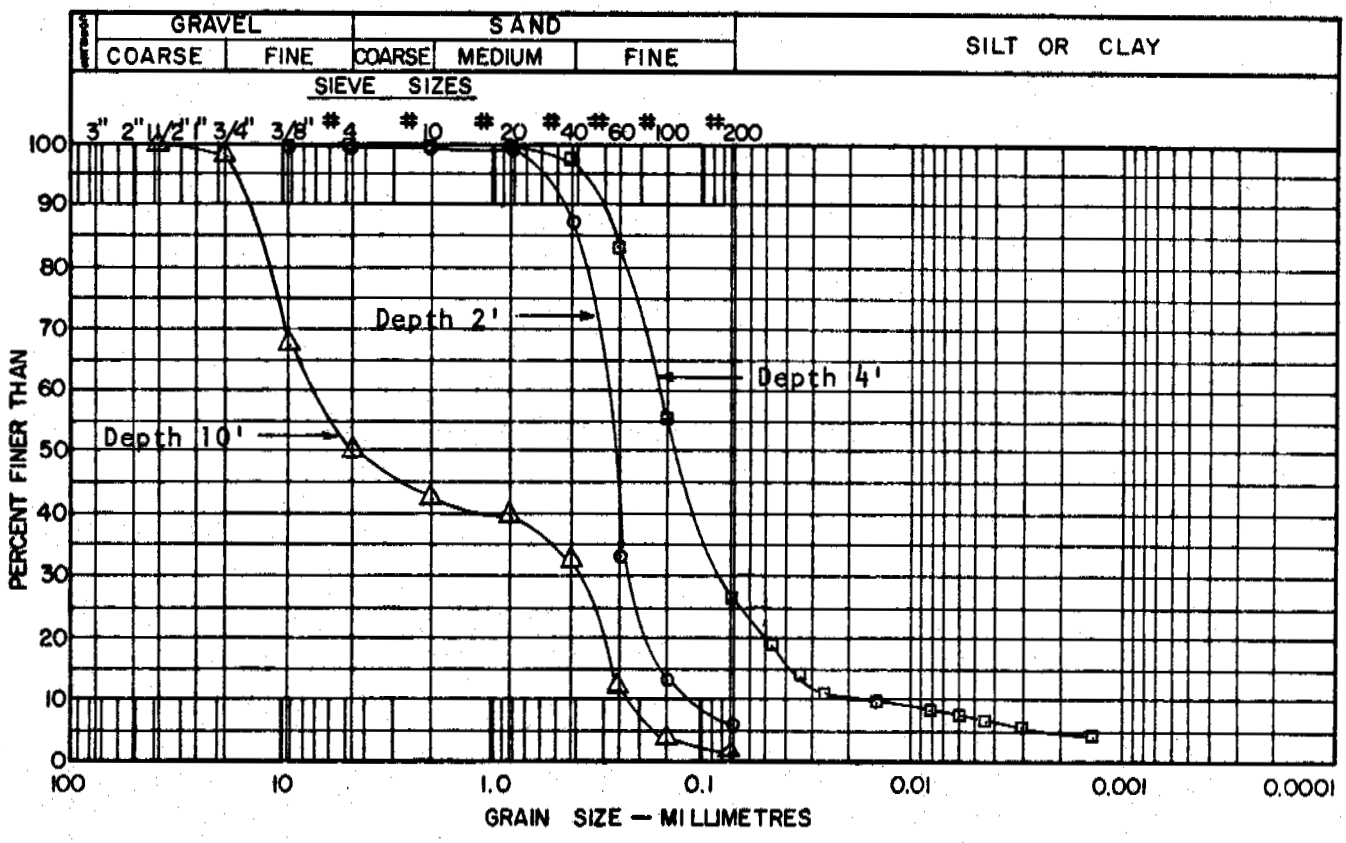
SILT - and organic, roots, peat, etc.

SAND - and gravel, little silt, trace clay, ice crystals and coatings.

ICE - with silt lenses and inclusions.

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 307-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	2'	7.2%
Sample 2	4'	22.8%
Sample 3	10'	9.9%

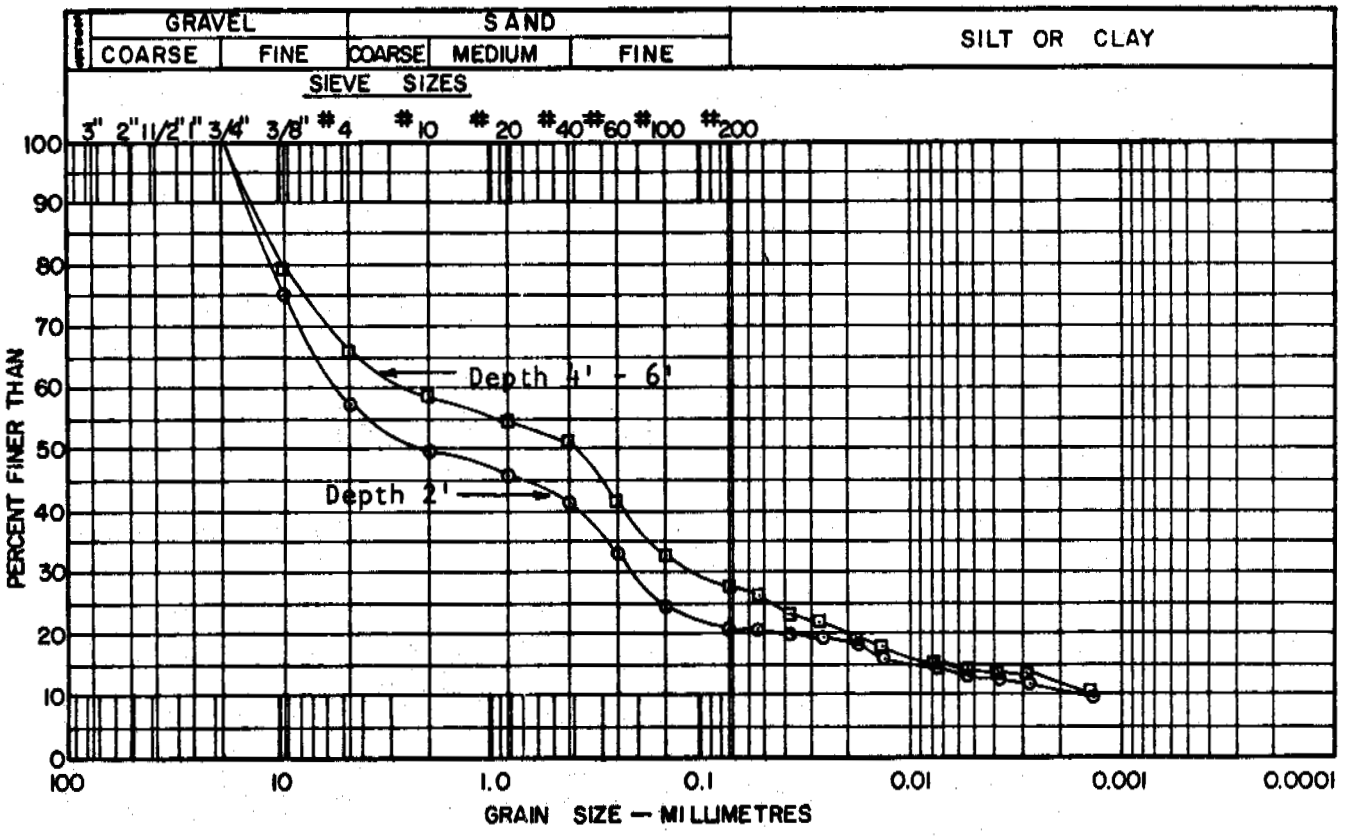
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 307-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	2'	8.5%
Sample 2	4'	10.0%
Sample 3	6'	12.2%

ORGANIC CONTENT

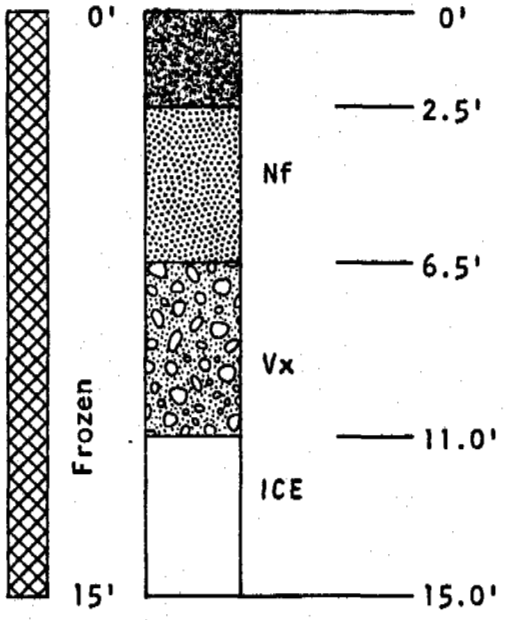
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 307

307-3



(OL) SILT - and organics, roots, peat, etc.

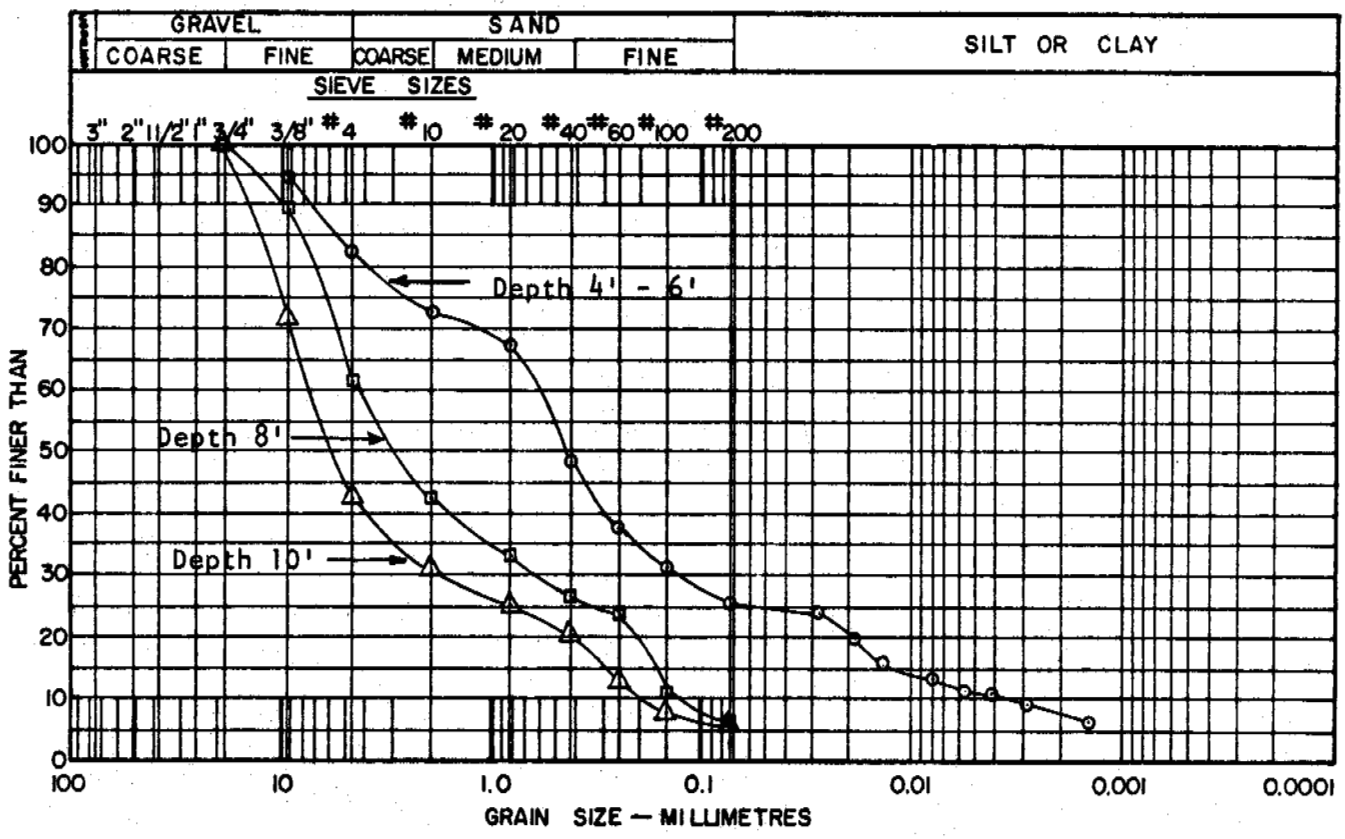
(SM) SAND - little gravel, some silt, trace clay. No visible ice.

(GW-GM) GRAVEL - and sand, trace silt, well graded, some ice crystals.

ICE - clear.

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 307-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	2'	190.6%
Sample 2	4'	17.5%
Sample 3	6'	14.0%
Sample 4	8'	8.7%
Sample 5	10'	7.7%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

309 MATERIALS AND QUANTITIES

The materials in this source are gravel and sand with only a trace of silt. The coarser materials are found in the steep-sided kames, and finer silt is located in the gently rounded hillocks and level areas.

Test Holes #2 and #3 penetrated sand and gravel to a depth of 30 feet, and then were stopped by sloughing in one hole and by cobbles in the other.

Through 20 feet depth of Test Hole #3 the material averaged 60% coarser than #4 mesh, 39% sand, fairly coarse, and only 1% silt.

The petrographic analysis of gravel from Test Pit A shows that the main constituents are quartzite (39%), fine-grained sandstone (25%), and chert (16%), with limestone (8%), limestone with iron cemented coating (4%), granite (5%), and quartz (2%) making up the remainder. The only unsound component is the limestone coated with iron cementation, 4% of the total.

The moisture content at depth in Test Hole #3 ranged from 5% to 8%. Comparable readings in the sand of Test Hole #2 averaged about 12%, although the reading at the cobble stratum was less than 3%. Test Hole #7 reported 15% moisture in silt, then graded to clear ice with silt inclusions.

The volume of recoverable material in this source is estimated to exceed 2,000,000 cubic yards. This estimate is based on the development of only the larger and steeper sided kames, and there recovering only the superficial deposits.

309 DEVELOPMENT

General

This source is recommended for development on a large scale, for the supply of general fill, road material, and aggregate for concrete and asphalt construction.

The recommendation is conditioned on the approval of an environmental study, showing the plan of large-scale development and a schedule of operation.

The development of the source should be controlled, to prevent the operation of a number of pits over the area, thus multiplying the problems of restoration and disturbance of wildlife.

Access

At present the only access to the area is by winter road. During recent years two winter roads have been in service, one from Tuktoyaktuk and the other from Swimming Point. The power transmission line to Tuktoyaktuk passes within two miles to the east of the source.

The location of the proposed highway from Inuvik to Tuktoyaktuk has not yet been established but will probably be close to this source, which would then be tied by all-weather access to Inuvik, about 50 miles away by road, and to Tuktoyaktuk, about 40 miles away.

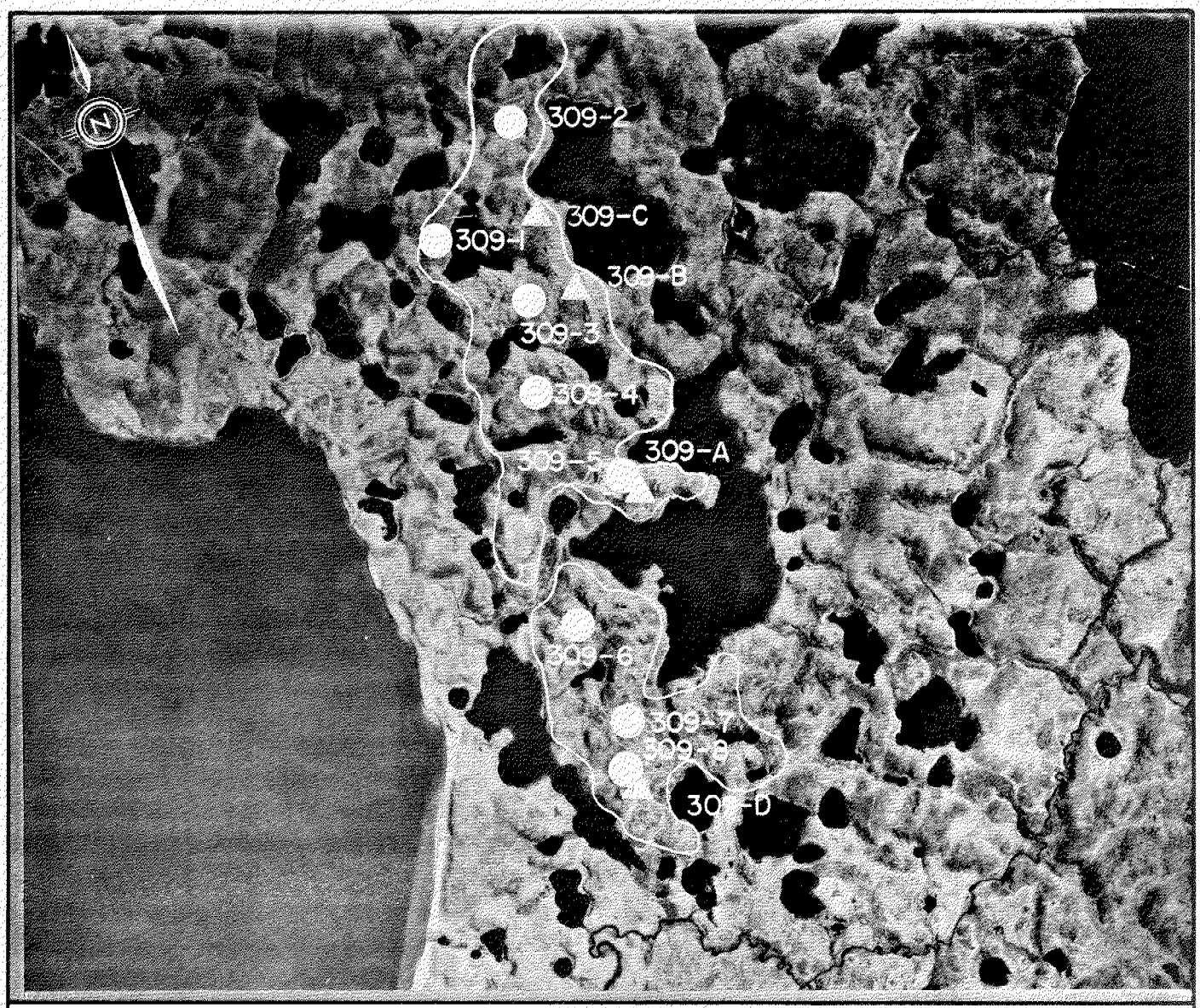
Material Use and Handling

The material in this source is suitable for any purpose, from general fill to aggregates for concrete and asphalt construction. Until the volume of production of aggregates builds up to warrant the installation of a proper aggregate plant, material can be produced for concrete and asphalt by screening out the oversize, and no more.

The equipment required to develop this source is the usual assembly of dozer with ripper attachment, front-end loader, and trucks. A small screening plant should be installed when concrete aggregate is required, and ultimately a complete aggregate plant with crusher, screens, classifiers, and conveyor system for stockpiling and loading.

ZONE III
SOURCE No. 309

LANDFORM AND LOCATION:	Kame field at northeast corner of Parsons Lake, 35 miles south of Tuktoyaktuk.
MATERIAL:	GRAVEL - and sand.
	SAND - and gravel, trace silt.
VOLUME:	2,000,000 cubic yards at least.
CONCLUSION:	Recommended for development on a large scale, conditioned on approval of an environmental study. Scale of development would probably depend also on development of all-weather access roads.



AIRPHOTO No. A22938 - 37 SCALE: 1"= 3000' (approx.)

Physical

This source is a kame field located in the glaciofluvial outwash plain at the northeast corner of Parsons Lake, 44 miles north of Inuvik, and 35 miles south of Tuktoyaktuk. The area is very large, about 3 miles long and 1 mile wide. The kames are as much as 100 to 150 feet in height.

Drainage over the kames is good, with no ground ice observed to a depth of 3 feet during September. The surrounding low lying areas contain many ponds and polygonal ground pattern, evidence of massive ground ice, and so the recoverable depth of material must be limited on this account. The clean sand and gravel tested at several points contained no visible ice crystals.

This source has been developed to a very limited extent for the oil exploration in the area and as far away as Tuktoyaktuk.

Biotic

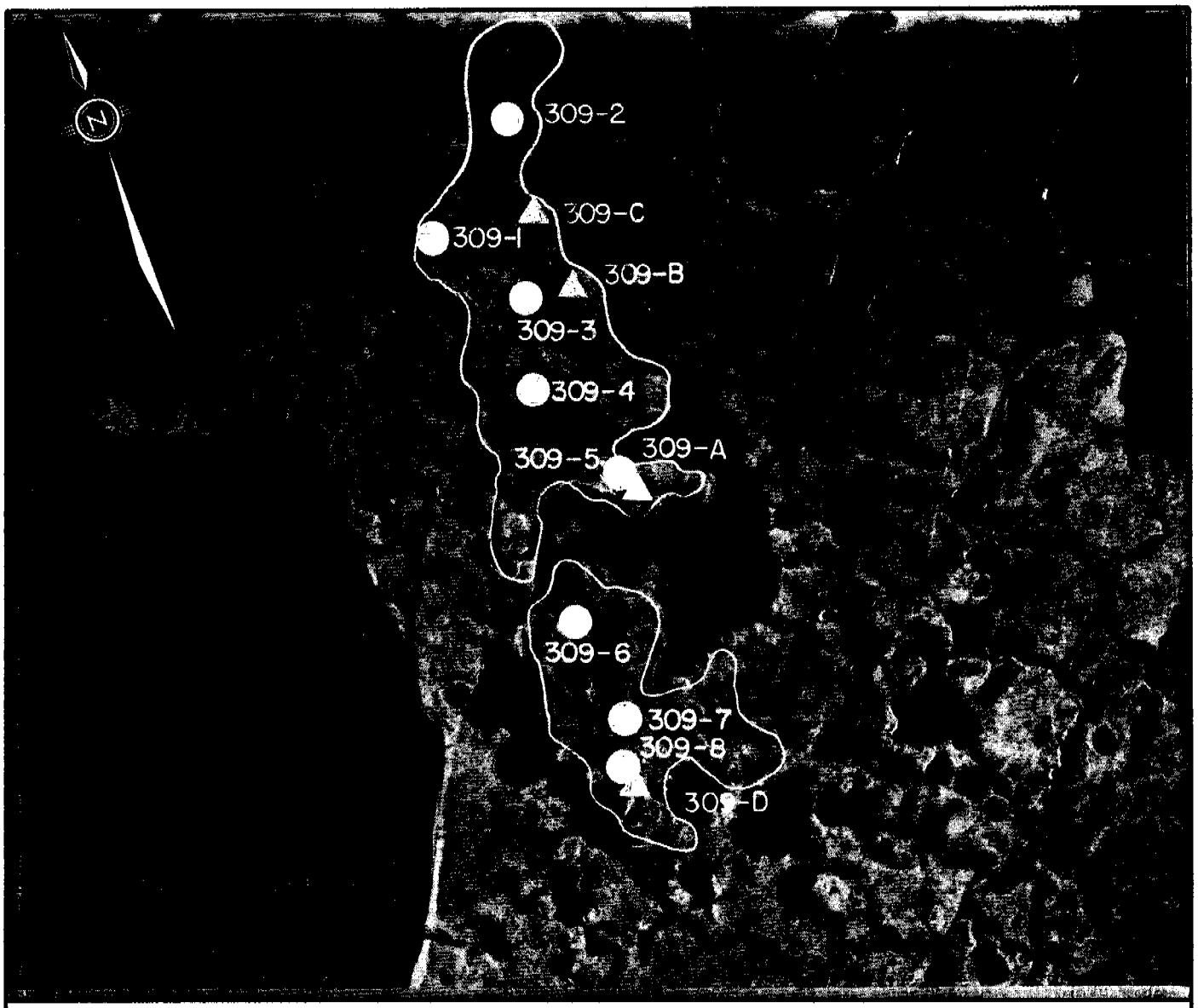
Vegetative cover is variable, with none on the tops of the kame hillocks and a thin cover of moss and grass over the lower slopes and level areas, in places blending with dwarf shrubs up to 2 feet high.

This source lies within a critical wildlife area, the fawning ground of the Reindeer Herd, and also within the Mackenzie Reindeer Grazing Reserve. The critical area is especially important to the Reindeer Herd during the calving period, which must be completed before the Herd begins its migration to summer range, although the Herd occupy the area from December 1 to May 15 of most years.

Probably Parsons Lake should be included among the lakes important for their lake trout, grayling and whitefish. The relatively high water temperatures in these lakes encourage rapid growth and high productivity.

ZONE III
SOURCE No. 309

LANDFORM AND LOCATION:	Kame field at northeast corner of Parsons Lake, 35 miles south of Tuktoyaktuk.
MATERIAL:	GRAVEL - and sand. SAND - and gravel, trace silt.
VOLUME:	2,000,000 cubic yards at least.
CONCLUSION:	Recommended for development on a large scale, conditioned on approval of an environmental study. Scale of development would probably depend also on development of all-weather access roads.



AIRPHOTO No. A22938 - 37 SCALE: 1"= 3000' (approx.)

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Probably Parsons Lake should be included among the lakes important for their lake trout, grayling and whitefish. The relatively high water temperatures in these lakes encourage rapid growth and high productivity.

Stripping and Restoration

The tops of the hillocks require little or no stripping, but the lower slopes are covered with organic material that must be removed and stockpiled for replacement after the granular material has been removed.

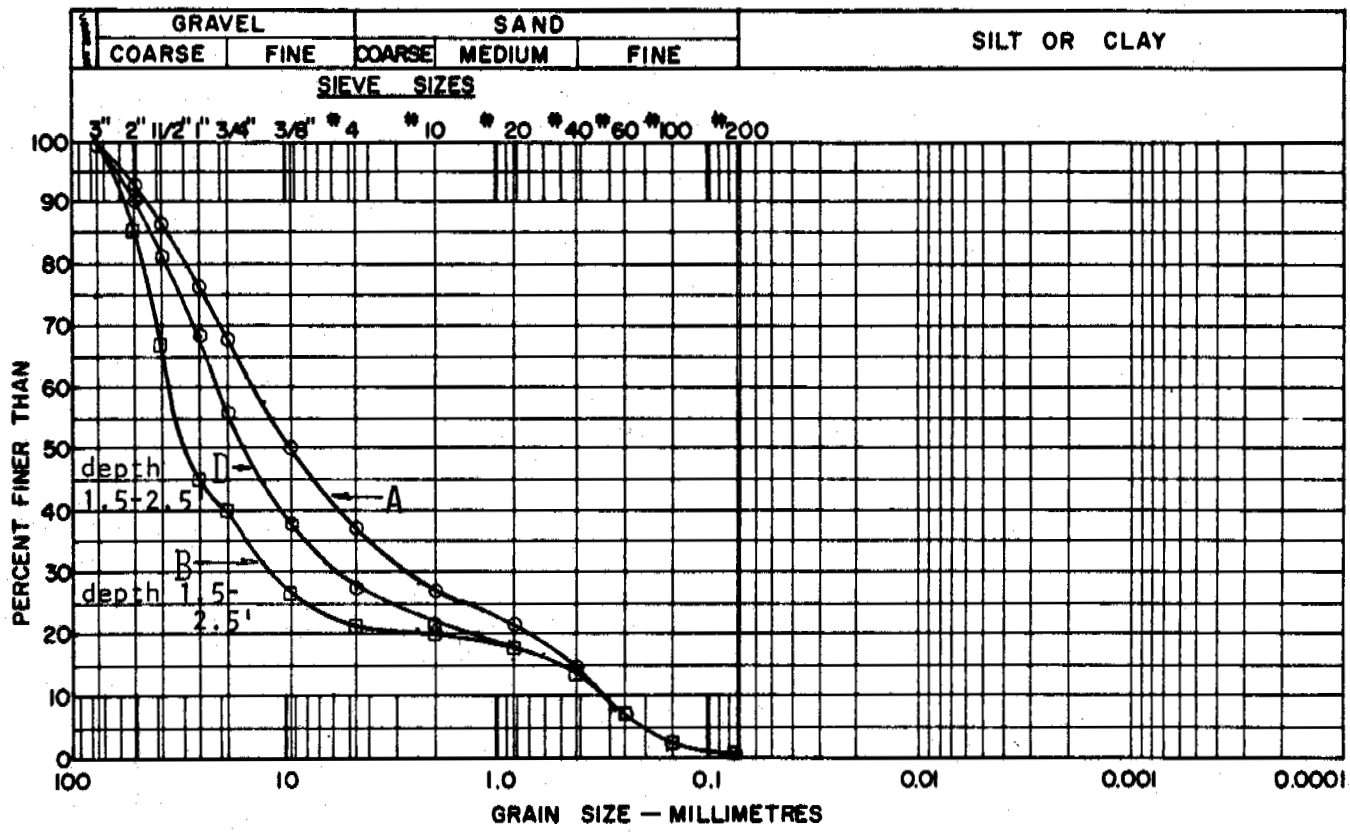
The area exposed at any time must be kept to a minimum, in order to limit the disturbance of the thermal regime at depth and to simplify the problems of restoration.

All banks must be graded to a stable slope before recovering with topsoil, and the depleted areas must be graded to a smooth contour.

Probably the environmental study that is recommended to precede large-scale production will specify other restoration measures.

LABORATORY
TEST DATA
SOURCE No. 309

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A depth 0.0 - 4.0' 0.9%
Pit B depth 0.5 - 3.0' 0.2%
Pit D depth 1.5 - 2.5' 0.3%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

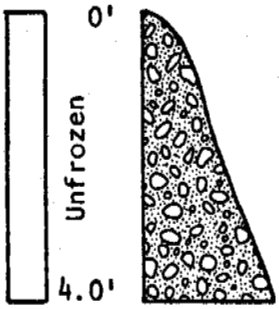
Pit A depth 0-4'

Quartzite	- 39%
Sandstone	- 26%
Chert	- 16%
Limestone	- 8%
Granite	- 5%
Limestone, with iron coating	- 4%
Quartz	- 2%
Total	100%

TEST PIT LOGS

SOURCE No. 309

309-A



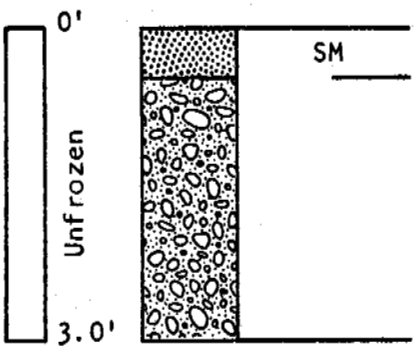
0'

(GW) GRAVEL - and sand, well graded, clean, rounded to subangular, gravel

4.0'

Logged from 4 ft. high exposure

309-B



0'

(SM) SAND - and silt, trace gravel

0.5'

(GP) GRAVEL - coarse, some sand, rounded to subangular

3.0'

309-C

0'

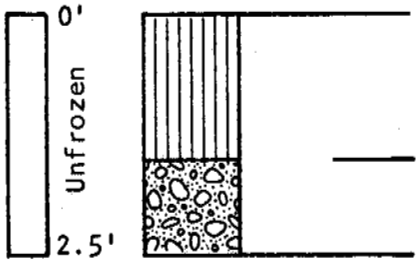
(OL) SILT - organic

0.5'

(GM) GRAVEL - some sand, trace silt, organic, max. 4"

1.5'

309-D



0'

(OL) SILT - organic

1.5'

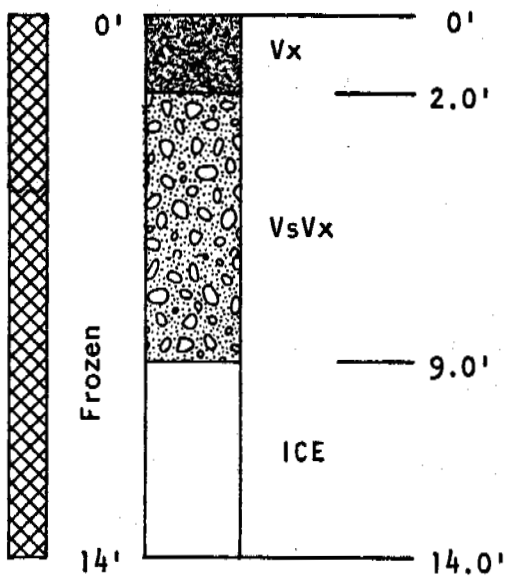
(GP) GRAVEL - some sand, rounded to subangular, coarse

2.5'

TEST HOLE LOGS

SOURCE No. 309

309-1



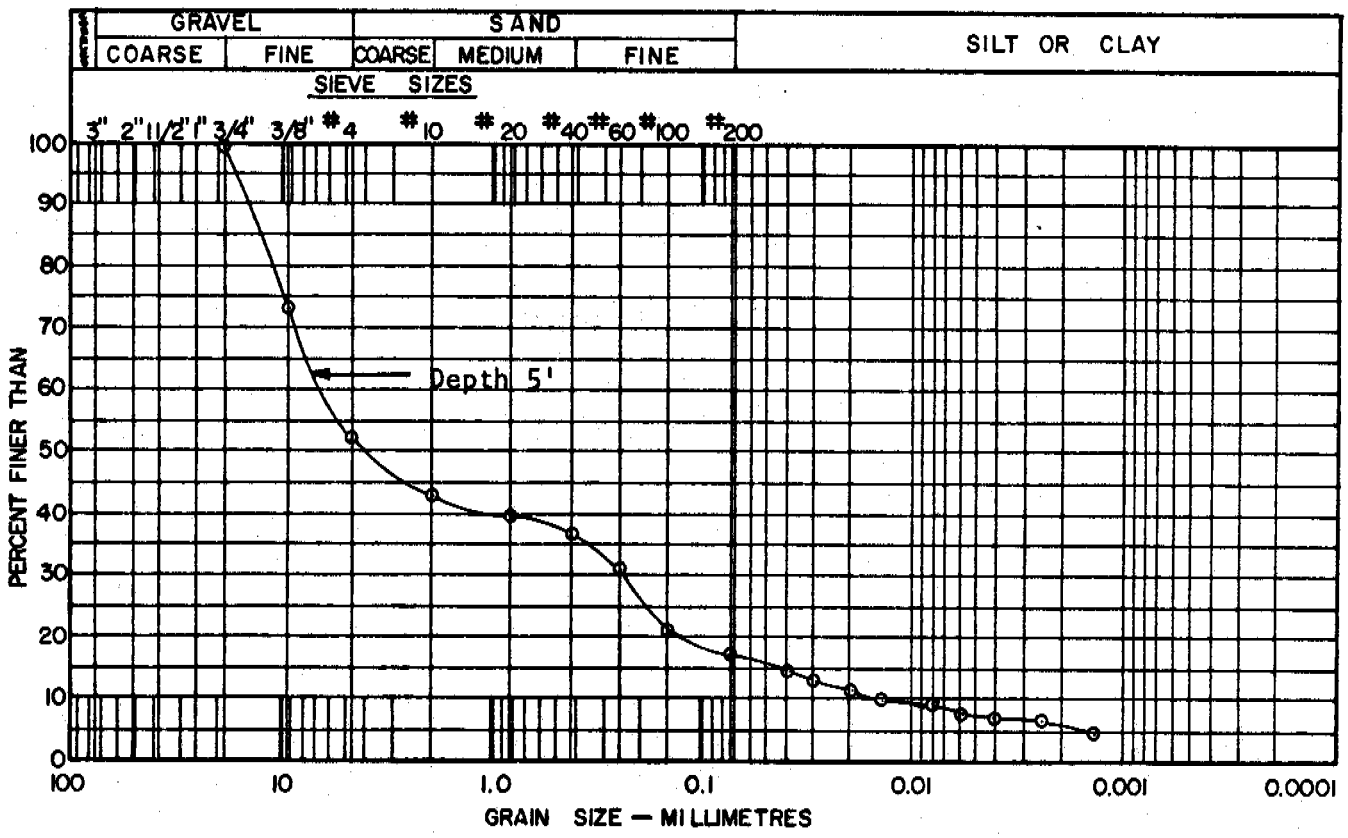
(OL) SILT - and organics, roots, peat etc., ice inclusions.

(GM) GRAVEL - and sand, little silt, trace clay, some ice lensing and inclusions.

ICE - with silt inclusions.

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 309-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 2 5' 10.0%

ORGANIC CONTENT

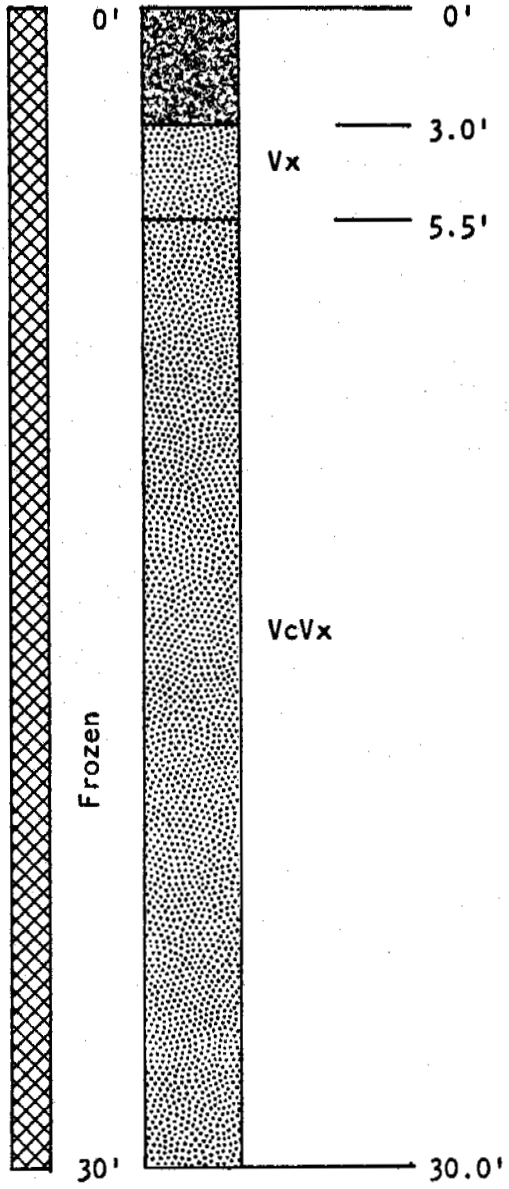
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 309

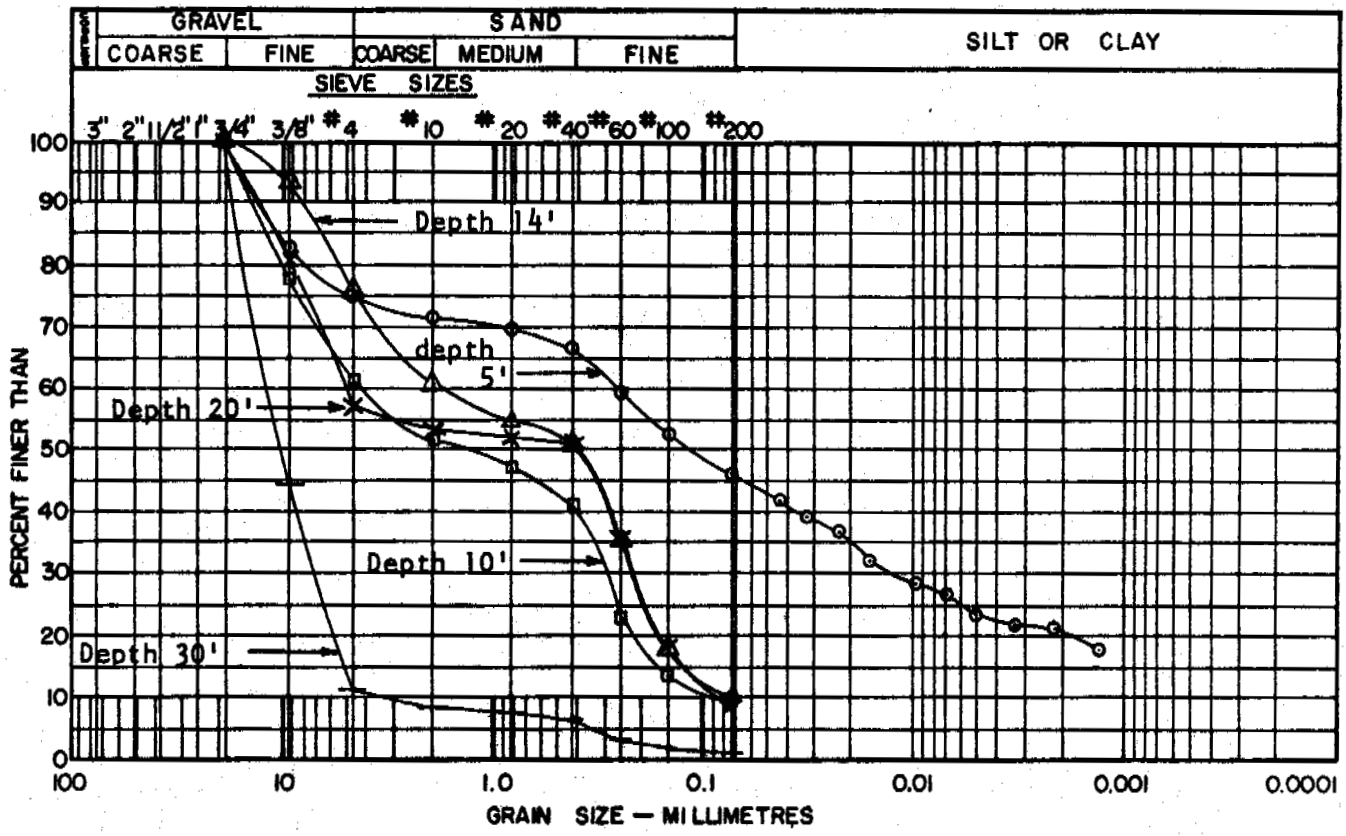
309-2



0'			
		(OL)	SILT - and organics, roots, peat, etc., trace gravel.
3.0'			
	Vx	(SM)	SAND - some silt, some gravel, little clay, some ice inclusions.
5.5'			
	VcVx	(SW-SM)	SAND - and gravel, trace silt, trace ice crystals and coatings.
			Coarse cobbles at 30'.
30.0'			

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 309-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 2	5'	16.9%
Sample 3	10'	7.8%
Sample 4	14'	13.7%
Sample 5	20'	12.0%
Sample 6	30'	2.8%

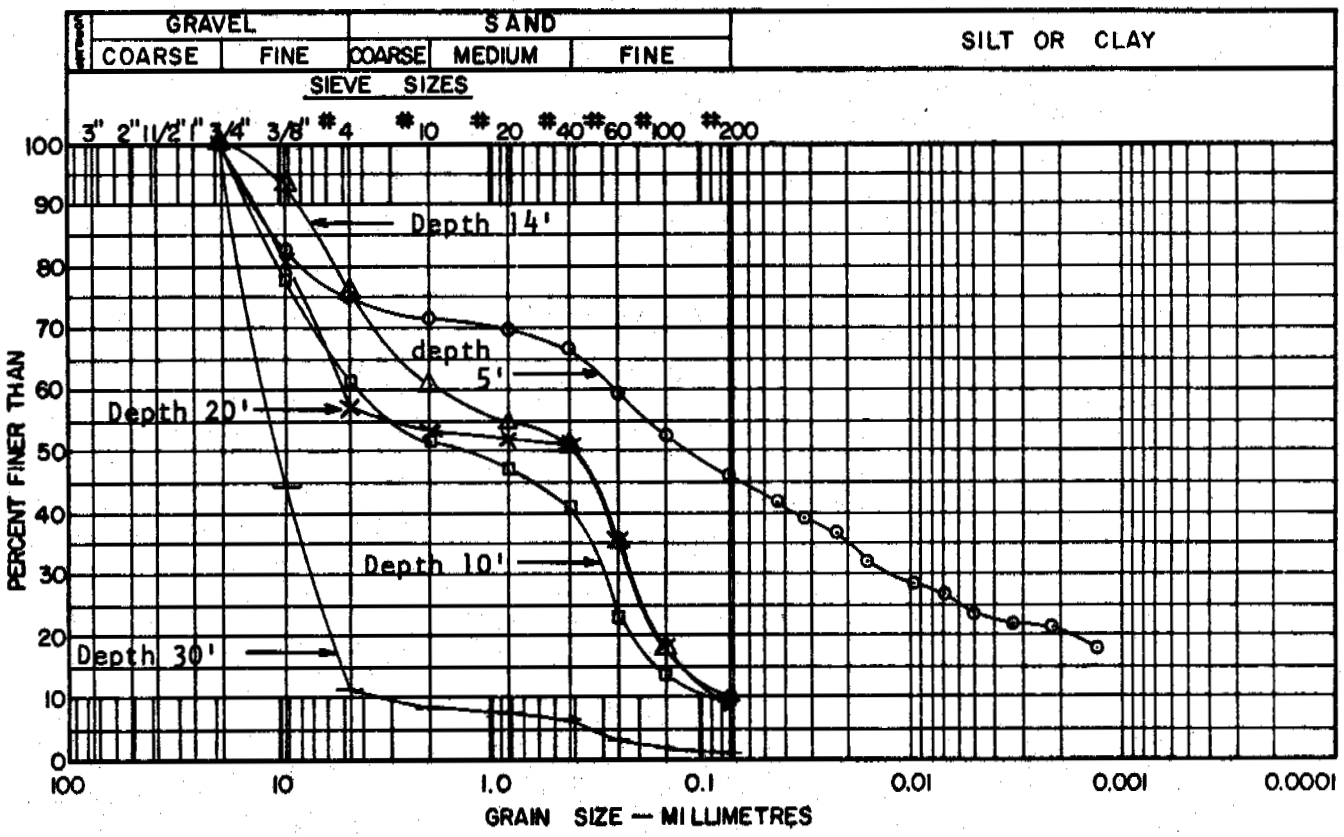
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 309-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 2	5'	16.9%
Sample 3	10'	7.8%
Sample 4	14'	13.7%
Sample 5	20'	12.0%
Sample 6	30'	2.8%

ORGANIC CONTENT

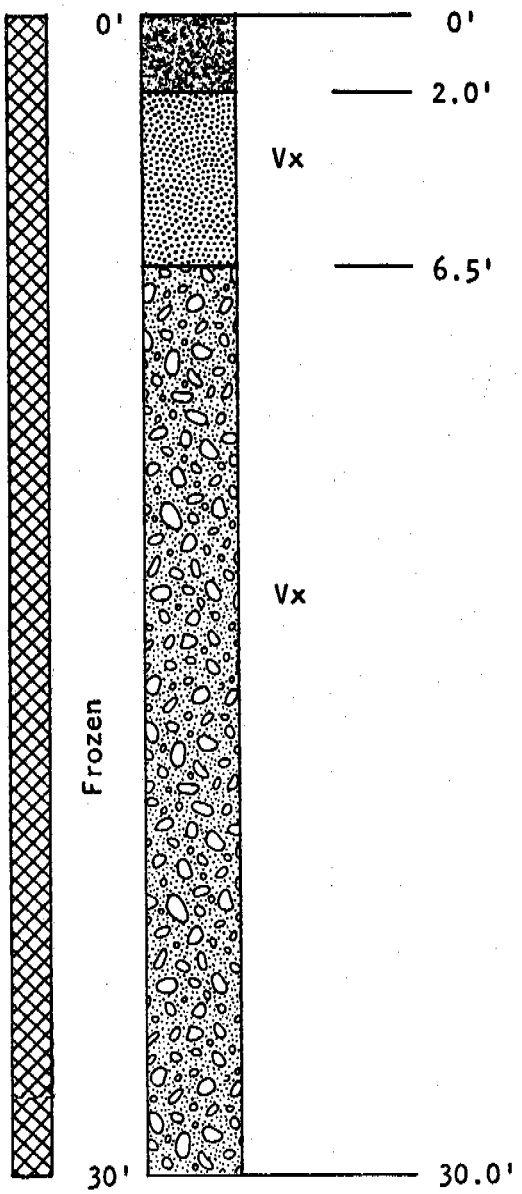
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 309

309-3



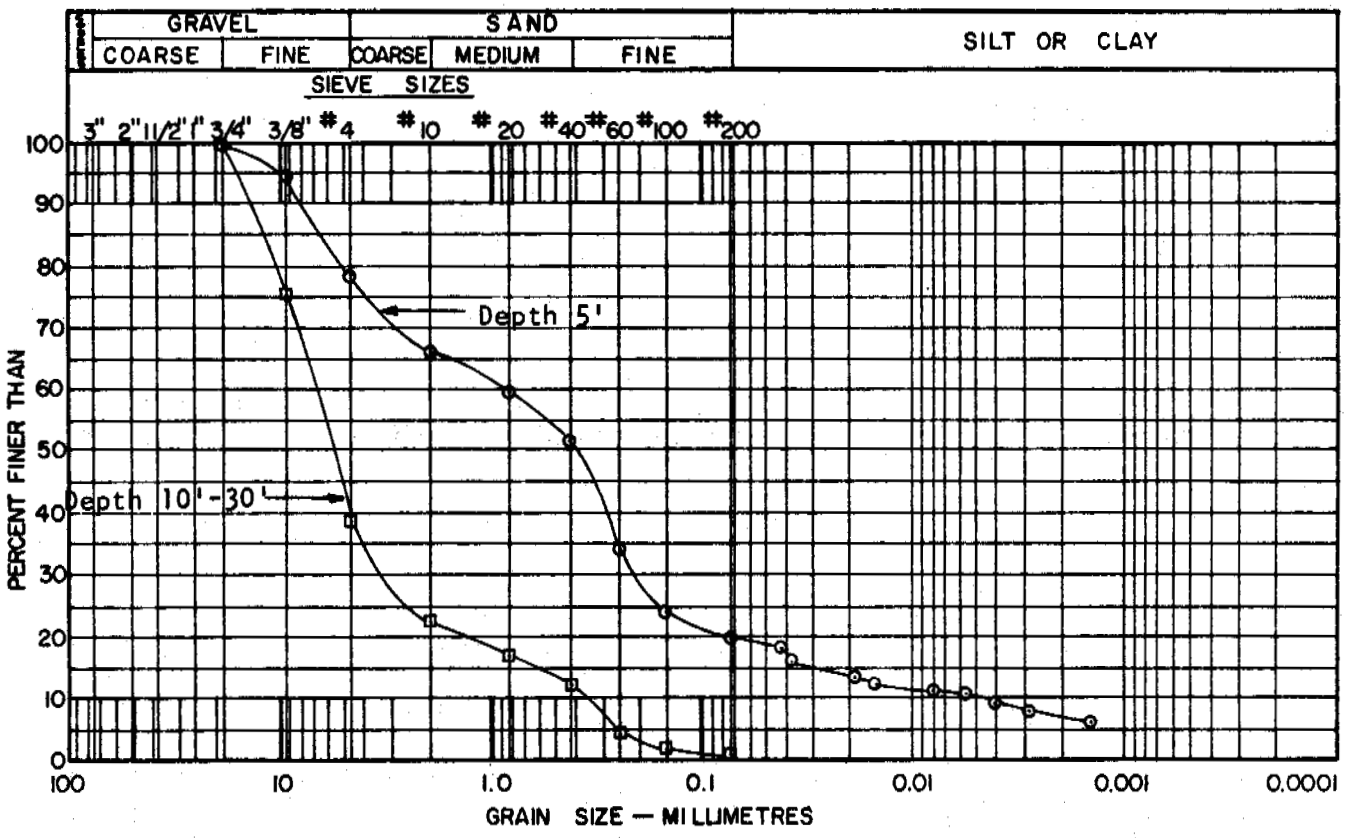
(OL) SILT - and organics, peat, roots, etc.

(SM) SAND - some gravel, little silt, trace clay, non-plastic, trace ice crystals.

(GW) GRAVEL - and sand, clean, well graded, trace ice crystals.

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 309-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	5'	11.1%
Sample 2	10'	8.0%
Sample 3	14'	7.4%
Sample 4	20'	5.6%
Sample 5	30'	4.7%

ORGANIC CONTENT

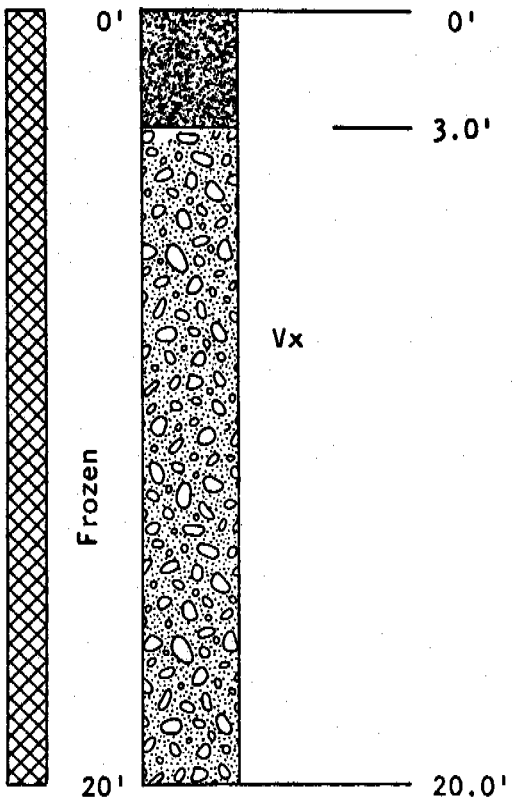
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 309

309-4

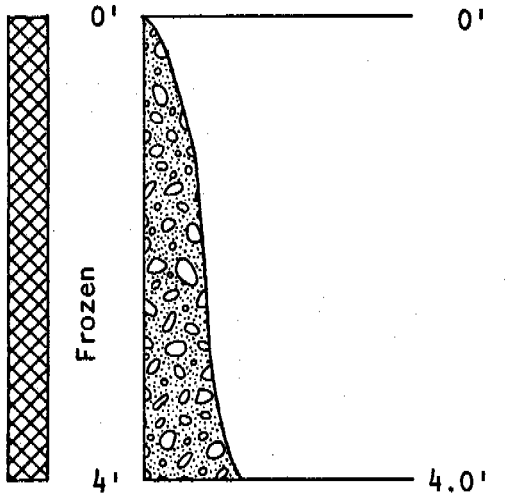


(OL) SILT - and organics, roots, peat, etc.

(GM) GRAVEL - and sand, little silt, well graded, trace ice crystals.

Rock or boulder at 20'.

309-5

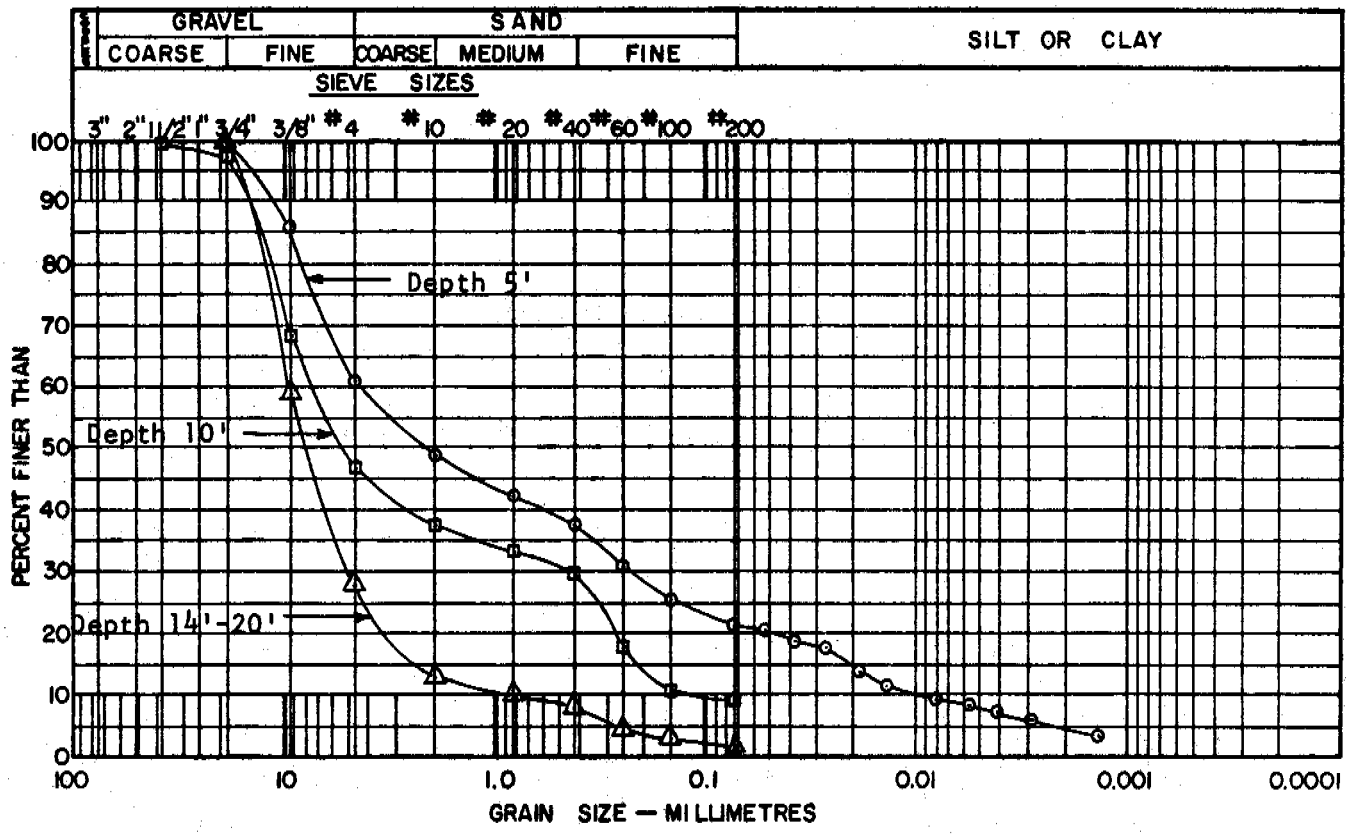


GULF PIT

(GW) GRAVEL - and sand, well graded, clean, cobbles to 9".

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 309-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	5'	24.6%
Sample 2	10'	7.8%
Sample 3	14'	5.3%
Sample 4	20'	5.5%

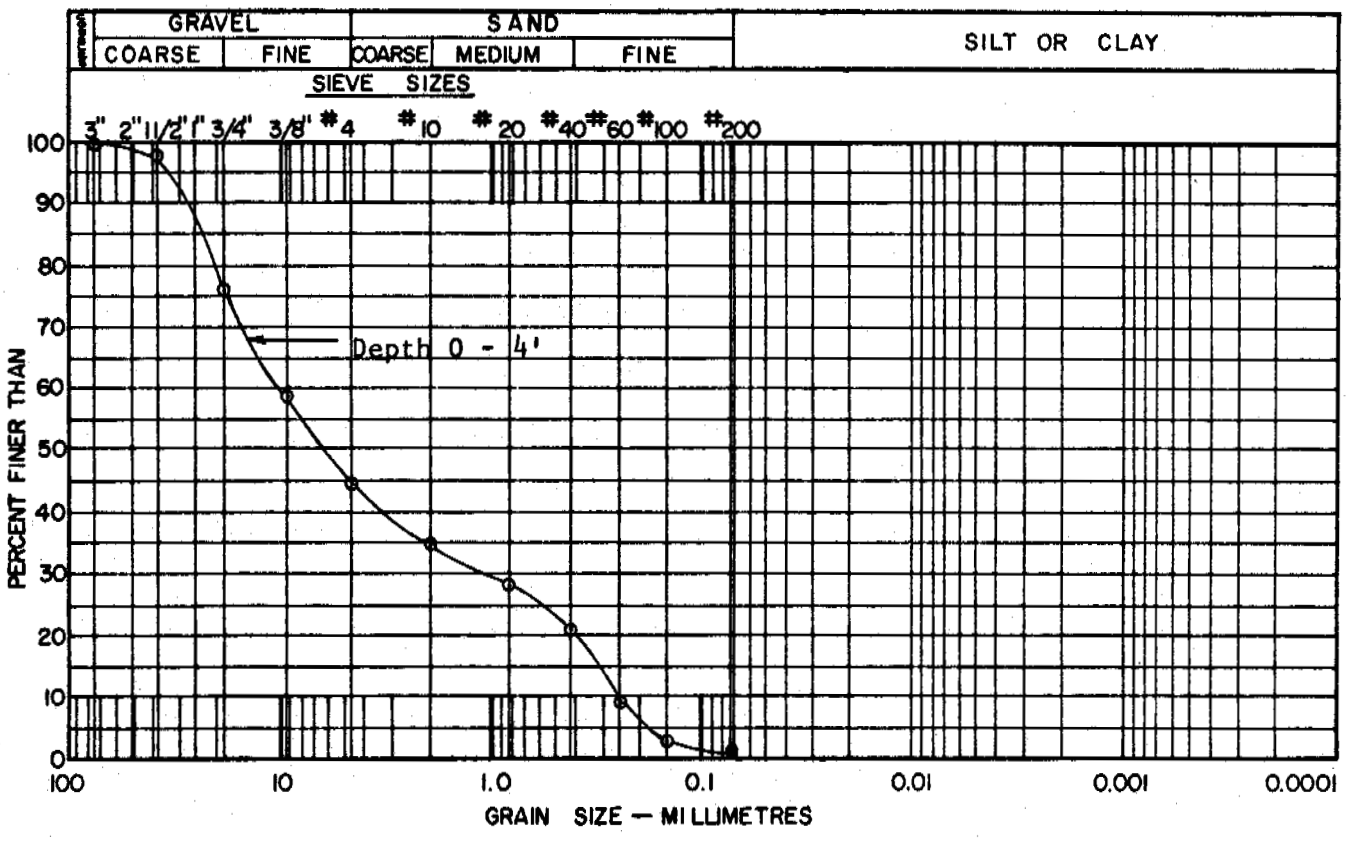
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 309-5

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 0' - 4' 2.8%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

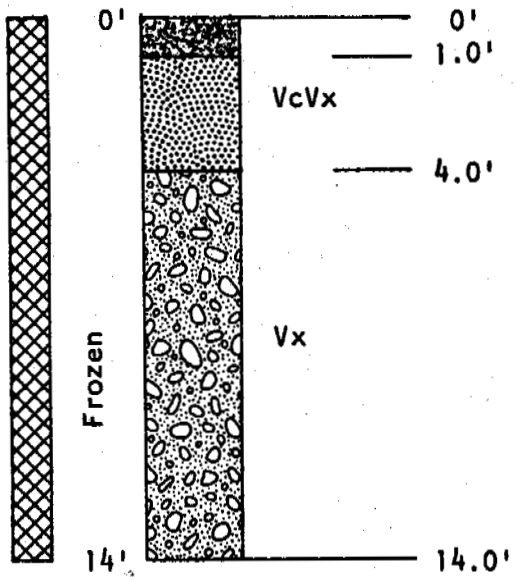
Depth 0' - 4'

Quartzite	88%
Sandstone-soft	7%
Granite	2%
Ironstone	1%
Quartze	1%
Limestone-soft	1%
Chert	neg
Total	100%

TEST HOLE LOGS

SOURCE No. 309

309-6

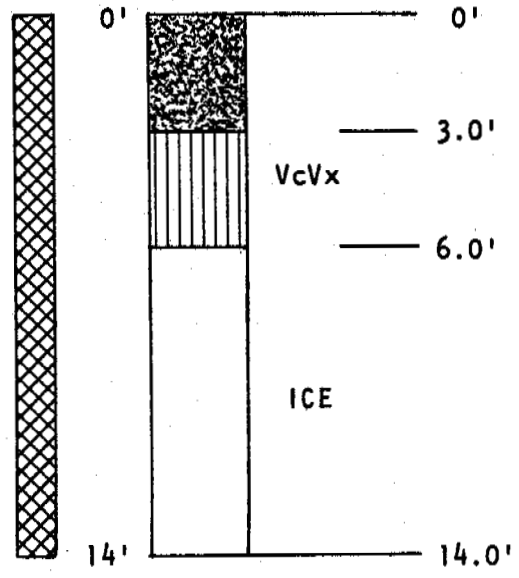


(OL) SILT - and organics, roots, peat, etc.

(SM) SAND - and silt, little clay, fine uniform gradation, some ice crystals and inclusions.

(GW) GRAVEL - some sand, trace silt, well graded, trace ice crystals.

309-7



(OL) SILT - and organics, roots, peat, etc.

(ML) SILT - little gravel, trace fine sand, low plastic, some ice crystals and inclusions.

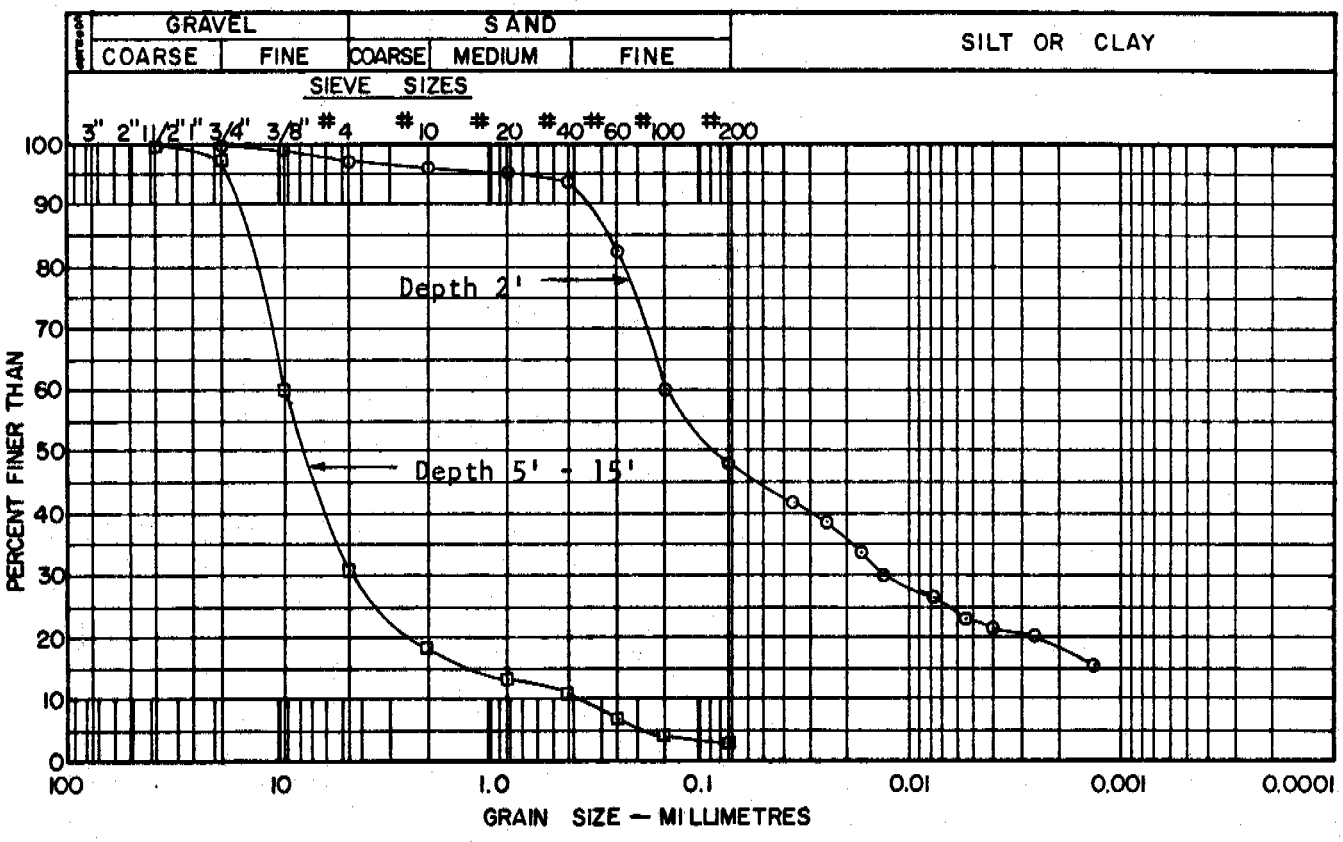
ICE - with silt inclusions.

Moisture Content

Sample 1 depth 5' 15.0%

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 309-6

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	2'	17.1%
Sample 2	5'	6.8%
Sample 3	10'	7.5'
Sample 4	15'	3.0%

ORGANIC CONTENT

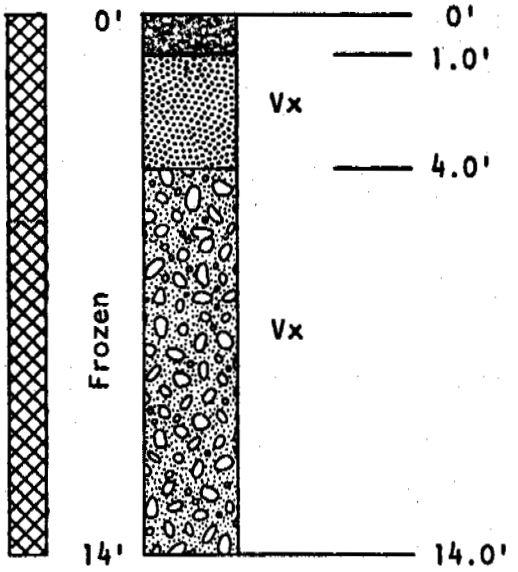
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 309

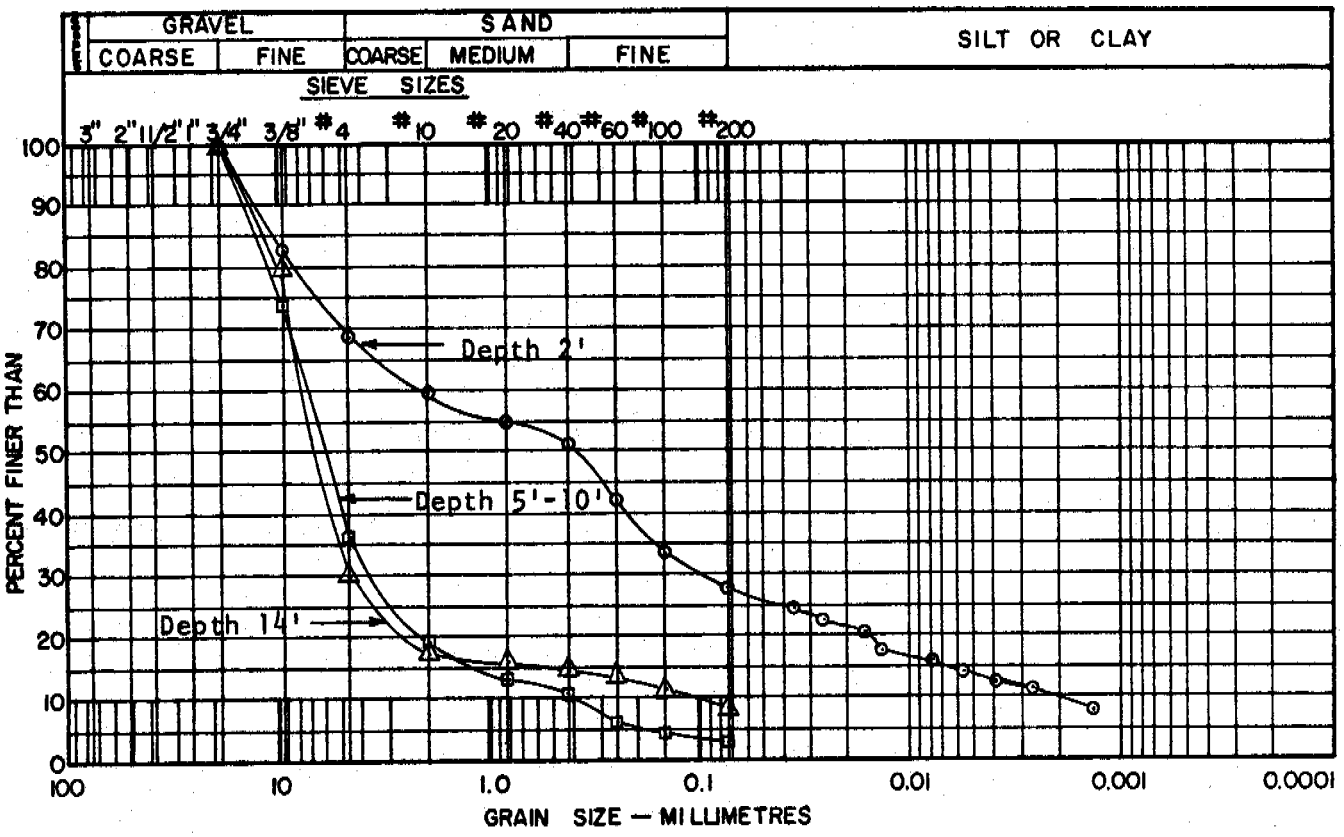
309-8



0' – 1.0'	(OL)	SILT - and organics, roots, peat, etc.
1.0' – 4.0'	(SM)	SAND - some gravel, little silt, trace clay, some ice crystals.
4.0' – 14.0'	(GW)	GRAVEL - some sand, trace silt, well graded, few cobbles, trace ice crystals.

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 309-8

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	2'	72.7%
Sample 2	5'	5.6%
Sample 3	10'	5.5%
Sample 4	19'	12.6%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

ZONE III
SOURCE No. 312

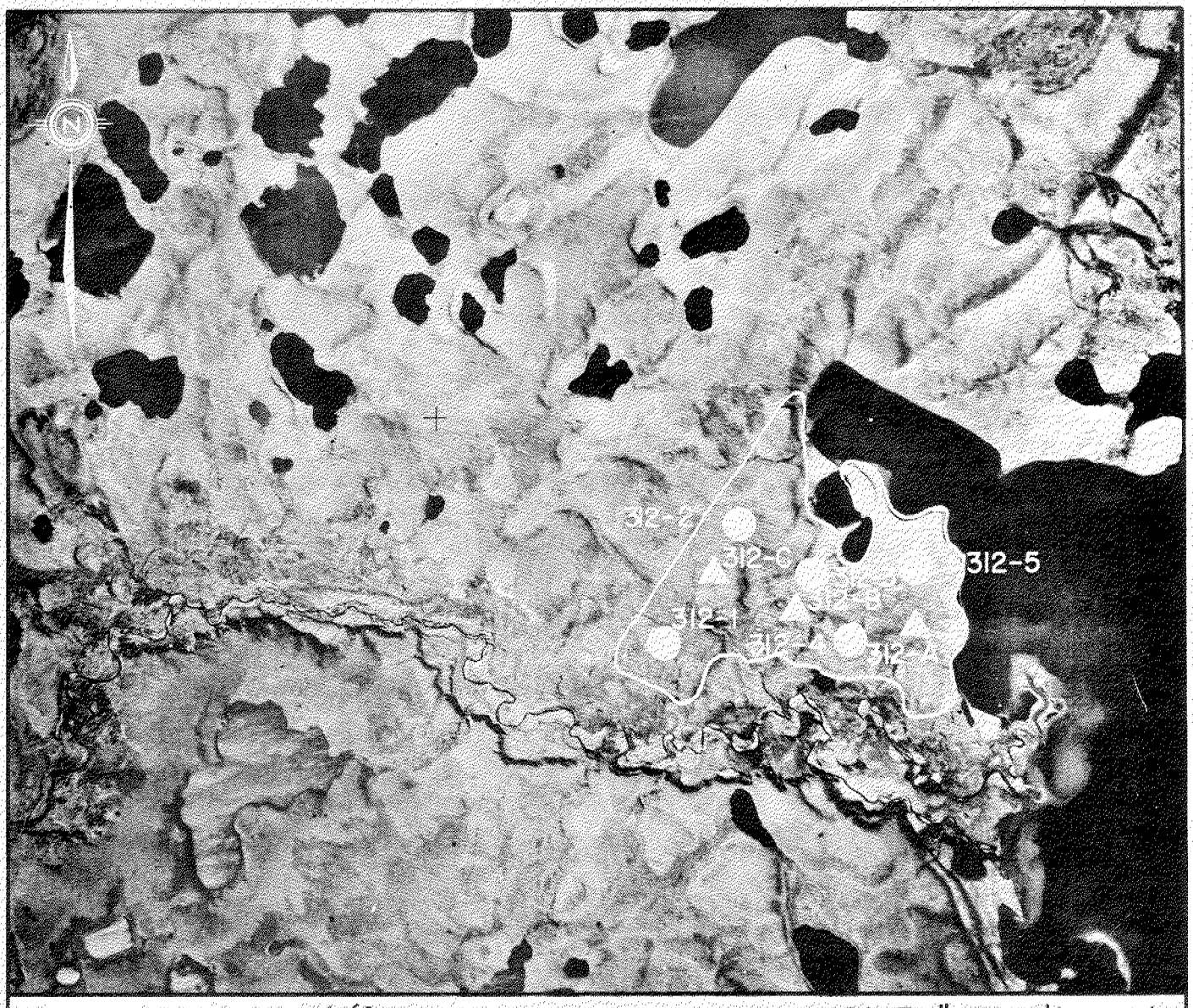
LANDFORM AND LOCATION: Several terraces located northwest of Bonnieville Point about 36 miles north of Inuvik.

MATERIAL: GRAVEL - and sand, trace silt

SAND - little gravel, trace silt

VOLUME: 6,000,000 cubic yards

CONCLUSION: Source is suitable for development for all types of aggregate and fill, but due to its location on Eskimo Lakes and near wildlife an environmental study will probably be necessary to determine the best procedure for development.



AIRPHOTO No. A 22936-69 SCALE: 1"= 3000' (approx.)

312 ENVIRONMENT

Physical

This source is complex. The lowest and middle of three terraces lie to the east and are fluvial. The third terrace steps upward to the west, and is glaciofluvial. Probably the fluvial terraces are post-glacial, related to the small stream that flows into Eskimo Lakes just south of the source. The lowest lies 15 feet above lake level. The other terraces rise to a height of 50 feet. The source is roughly trianglular, and 6,000 feet along each side.

The source is 2 miles northwest of Bonnieville Point, and 36 miles north of Inuvik.

Drainage of the source is good, with no ground ice encountered to depths from 2 feet to 4 feet during September. Some of the terrace areas display polygonal patterns.

The source has not been developed.

Biotic

Vegetative cover is light, consisting primarily of a thin ground cover of moss and grass and isolated shrubs about 3 feet high.

The source lies within a critical wildlife area, the permanent fawning ground of the Reindeer Herd. The area is especially important during the calving period, which must be complete before the herd begins its migration to summer range, although the Herd occupy this area from December 1 to May 15 of most years. This is also part of the Mackenzie Reindeer Grazing Reserve.

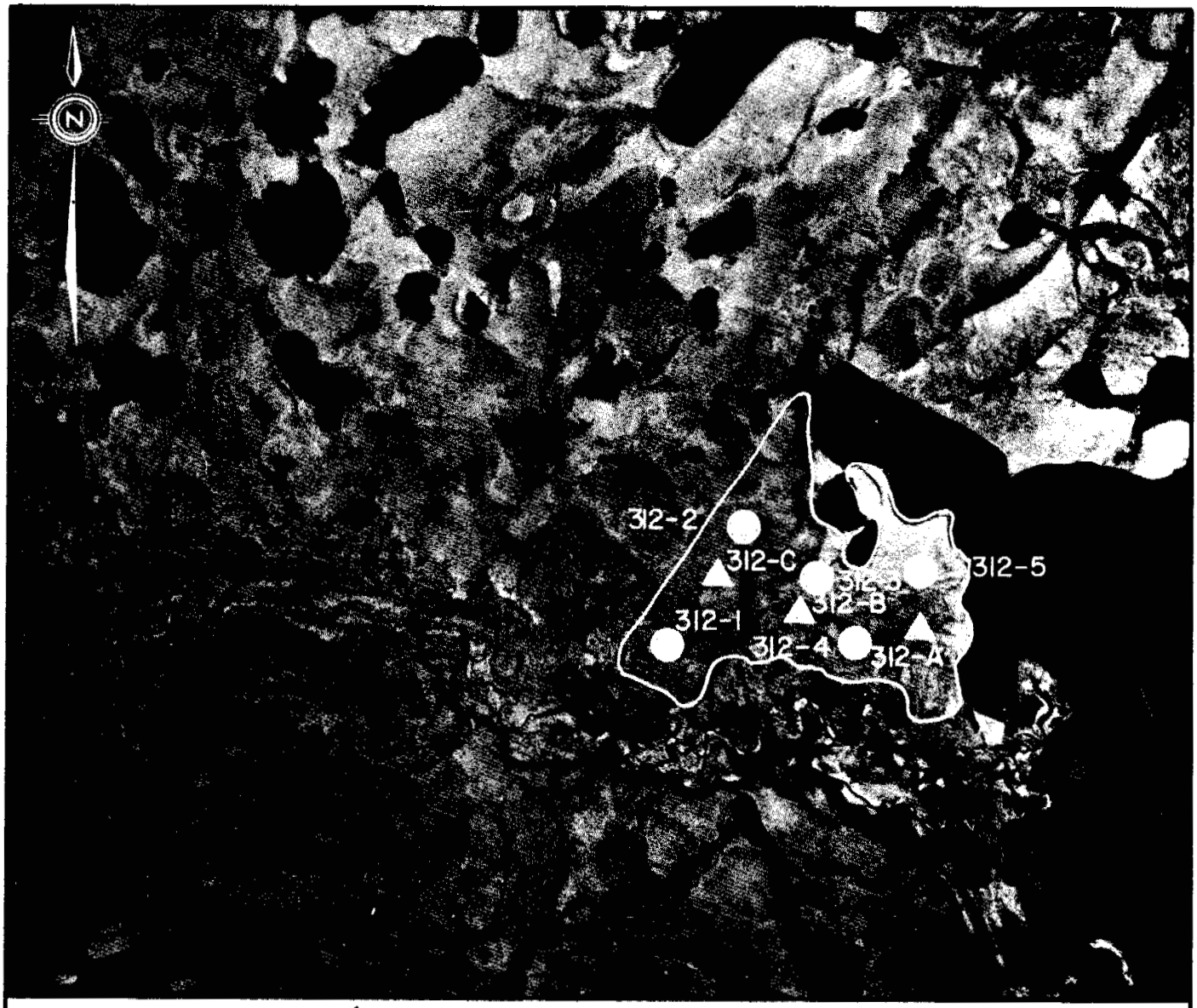
The Eskimo Lakes are an important fishery for lake trout, grayling, and whitefish, both as a source of food for the native population and as a potential sport-fishing area. Local inhabitants and tourists fly into the area frequently during the summer.

312 MATERIALS AND QUANTITIES

The materials in this source vary within wide limits. Test holes drilled in the highest terrace penetrated high ice content silts and

ZONE III
SOURCE No. 312

LANDFORM AND LOCATION:	Several terraces located northwest of Bonnieville Point about 36 miles north of Inuvik.
MATERIAL:	GRAVEL - and sand, trace silt SAND - little gravel, trace silt
VOLUME:	6,000,000 cubic yards
CONCLUSION:	Source is suitable for development for all types of aggregate and fill, but due to its location on Eskimo Lakes and near wildlife an environmental study will probably be necessary to determine the best procedure for development.



AIRPHOTO No. A 22936-69 SCALE: 1"= 3000' (approx.)

312 ENVIRONMENT

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The source has not been developed.

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312 MATERIALS AND QUANTITIES

The materials in this source vary within wide limits. Test holes drilled in the highest terrace penetrated high ice content silts and

massive ground ice. The two lower terraces contain gravel and sand, with a trace of silt, generally overlying clay.

The gravel in Test Hole #4 contains 60% coarser than #4 mesh, 35% well-graded sand, and less than 5% silt. Other samples are similar.

The petrographic analysis of gravel from Test Hole #5 indicates a sound material, with the main constituents being quartzite (65%), hard sandstone (about 21%), soft sandstone (about 7%), and quartz (3%), with chert (1%), granite (2%) and a trace of ironstone making up the balance. The unsound constituents are less than 8% of the total.

The moisture content is likewise variable. Test Holes #1 and #2 reported values up to 30%, whereas Test Holes #3, #4, and #5 reported values ranging from 4% to 15% in gravel, and from 20% to 36% in sand. The underlying clay contained 21% moisture.

The estimated volume of recoverable material in this source is about 6,000,000 cubic yards.

312 DEVELOPMENT

General

This source is the only deposit of gravel and coarse material known to exist adjacent to Eskimo Lakes. For this reason, as well as for reasons of quality and size, the source is recommended for development to serve the area around Eskimo Lakes.

Development of this source must be preceded by an environmental study to determine whether and how the operation can be conducted without excessive disturbance of wildlife.

The operation must be guided by the need to prevent siltation of the stream and lake. Drainage from the source may have to be directed through a series of sedimentation ponds.

Access

The area is accessible by truck only during the winter months, either following winter roads on the tundra or on the Eskimo Lakes. During the summer months, the material from this source could be

hauled by barge to any point around the lakes.

Material Use and Handling

The material from this source can be used for any purpose, from general fill to aggregate for concrete and asphalt construction. The samples that were tested for grain-size distribution were all taken from drilled holes and many of the gravel particles were fractured in drilling, so the maximum particle size is not known. Probably a screen and crusher will be required to remove oversize gravel from concrete or asphalt aggregate. Most of the gravel appears to be deficient in sand, so a blending sand will be required for use in high quality concrete.

The development of this source will require the usual assembly of equipment, dozer with ripper attachment, front-end loader, and trucks or barge.

For producing concrete aggregate on a small scale, only a screen will be required in addition to the assembly of heavy equipment. Large-scale production will require a complete aggregate plant, with screens, crusher, and a system of conveyors for stockpiling and loading. Large-scale operation of this source will also require that the granular material be ripped, stockpiled, thawed, and drained.

Stripping and Restoration

About 1½ feet of organic cover and topsoil must be removed from this source before excavation can begin. This material must be stockpiled for replacement after the granular material has been removed.

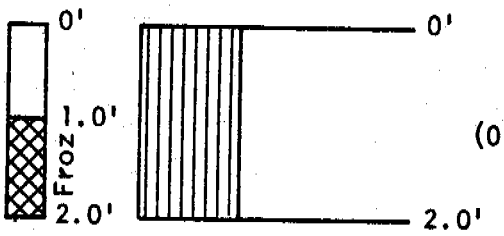
Banks must be graded to a stable slope before topsoil is replaced, and the depleted area must be graded to a smooth contour.

Large areas of ground ice should not be exposed on slopes, in order to minimize sloughing and restoration.

Finally, the area should be seeded for speedy revegetation, using a selection of plants and methods of preparation recommended by a specialist in Arctic horticulture.

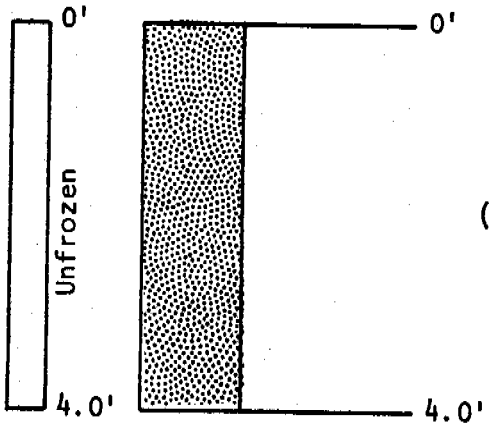
TEST PIT LOGS
SOURCE No. 312

312-A



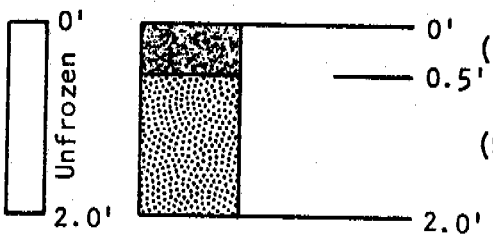
(OL) SILT - organic

312-B



(SP) SAND - fine to med., trace silt, trace gravel, light brown

312-C



(OL) SILT - organic

(SM) SAND - and silt, fine, uniform sand

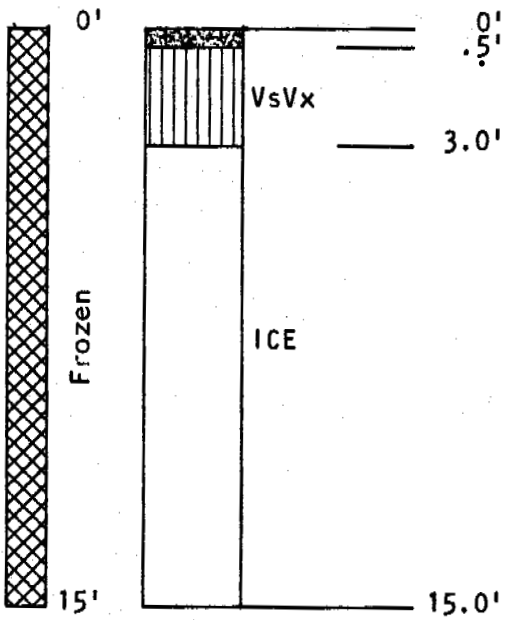
Moisture Content

Sample 2 depth 0' - 4.0' 11.9%

TEST HOLE LOGS

SOURCE No. 312

312-1

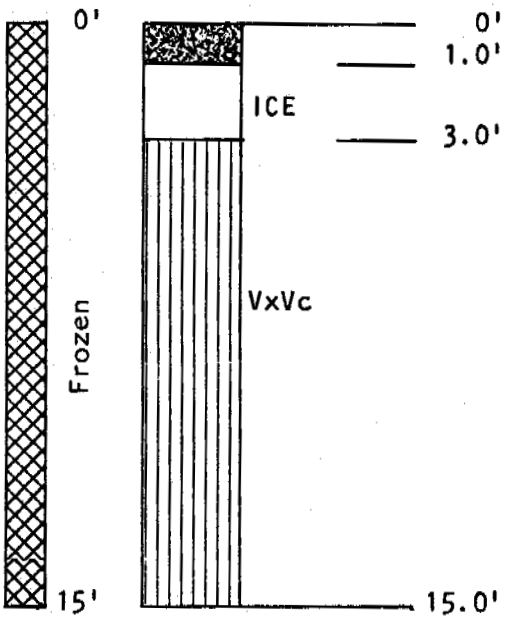


(OL) SILT - and organics, roots peat etc.

(ML) SILT - with ice lensing and inclusions

ICE - clear

312-2



(OL) SILT - and organic roots, peat etc.

ICE - with silt inclusions

(ML) SILT - some fine sand, non-plastic ice crystals and coating

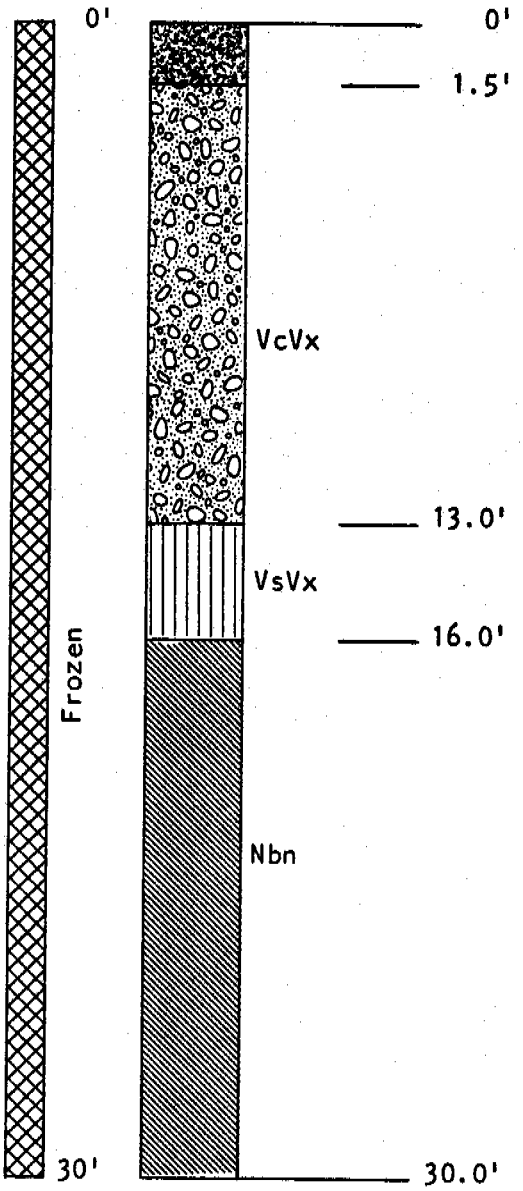
Moisture Content

Sample	1	depth 6'	25.5%
Sample	2	depth 15'	29.1%

TEST HOLE LOGS

SOURCE No. 312

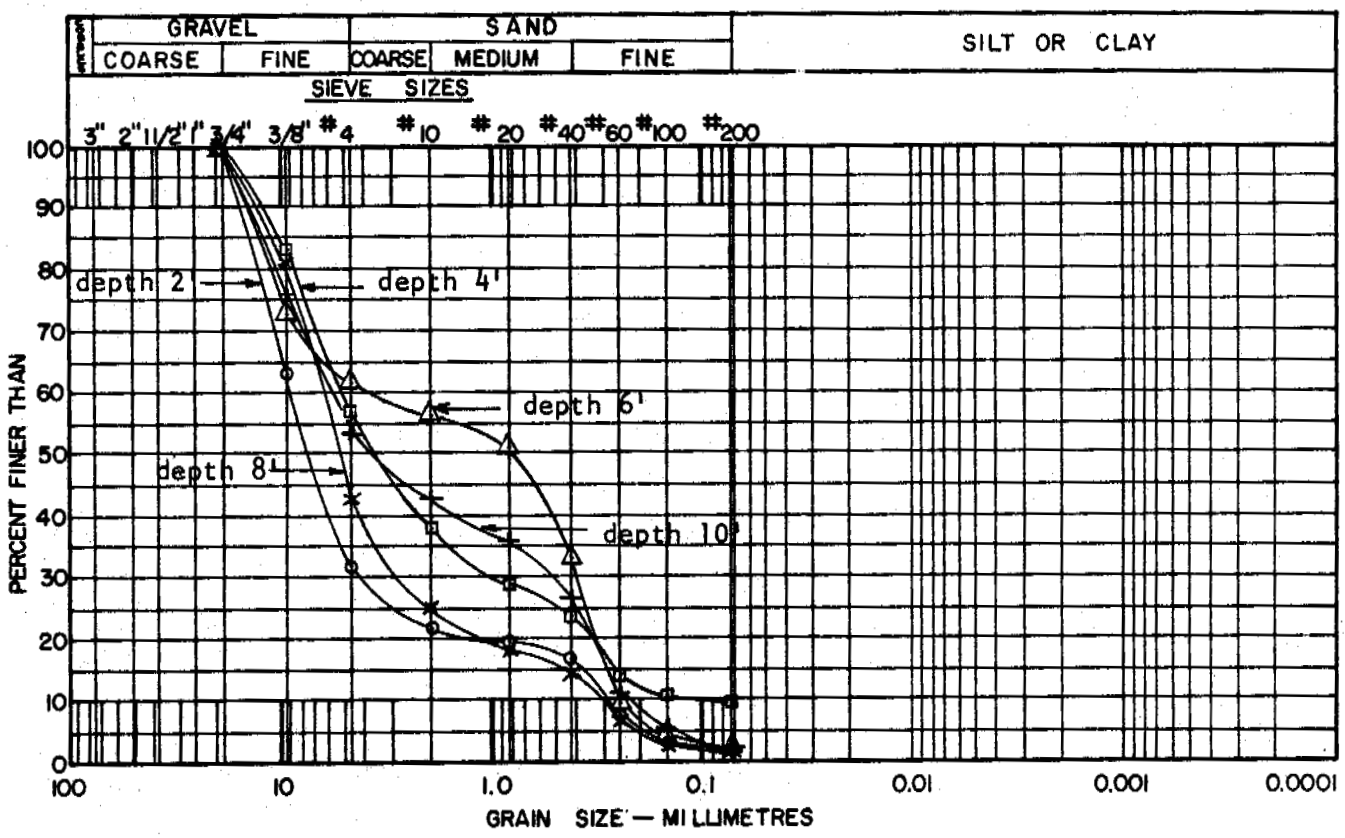
312-3



	(OL)	SILT - and organic, roots, peat etc.
VcVx	(GW)	GRAVEL - and sand, trace silt, well graded, some ice crystals and coatings
VsVx	(ML)	SILT - little gravel, trace sand, low plastic, ice lenses and inclusions
Nbn	(CL)	CLAY - trace gravel, trace silt, medium to high plastic, no visible ice

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 312-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	6.6%	Sample 6	depth 15'	15.3%
Sample 2	depth 4'	8.8%	Sample 7	depth 20'	17.3%
Sample 3	depth 6'	14.2%			
Sample 4	depth 8'	7.1%			
Sample 5	depth 10'	10.6%			

ORGANIC CONTENT

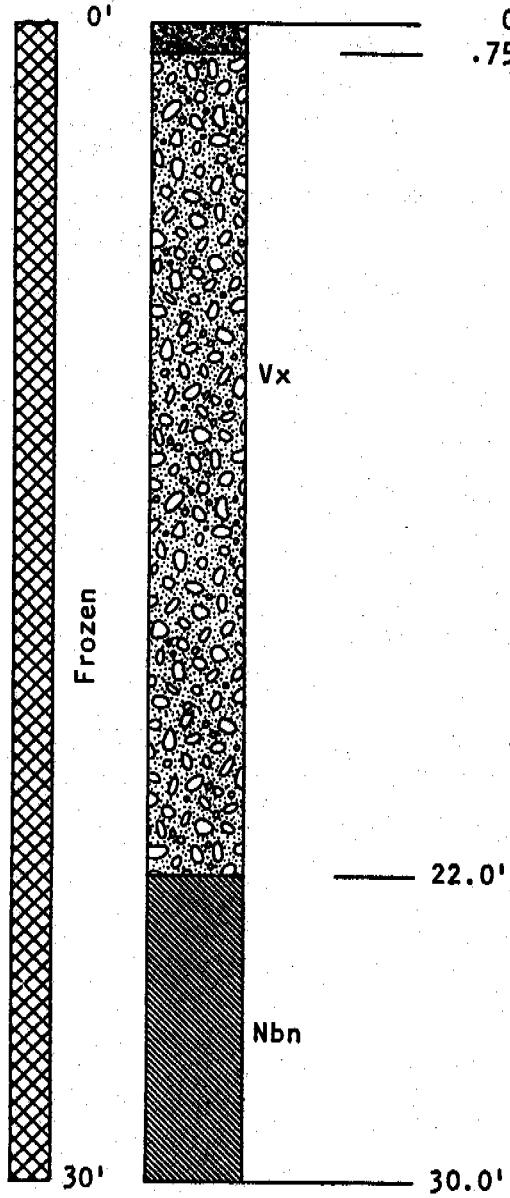
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 312

312-4



0' .75' (OL) SILT - and organics, roots, peat etc.

Vx (GW) GRAVEL - and sand, trace silt, well graded, trace ice crystals

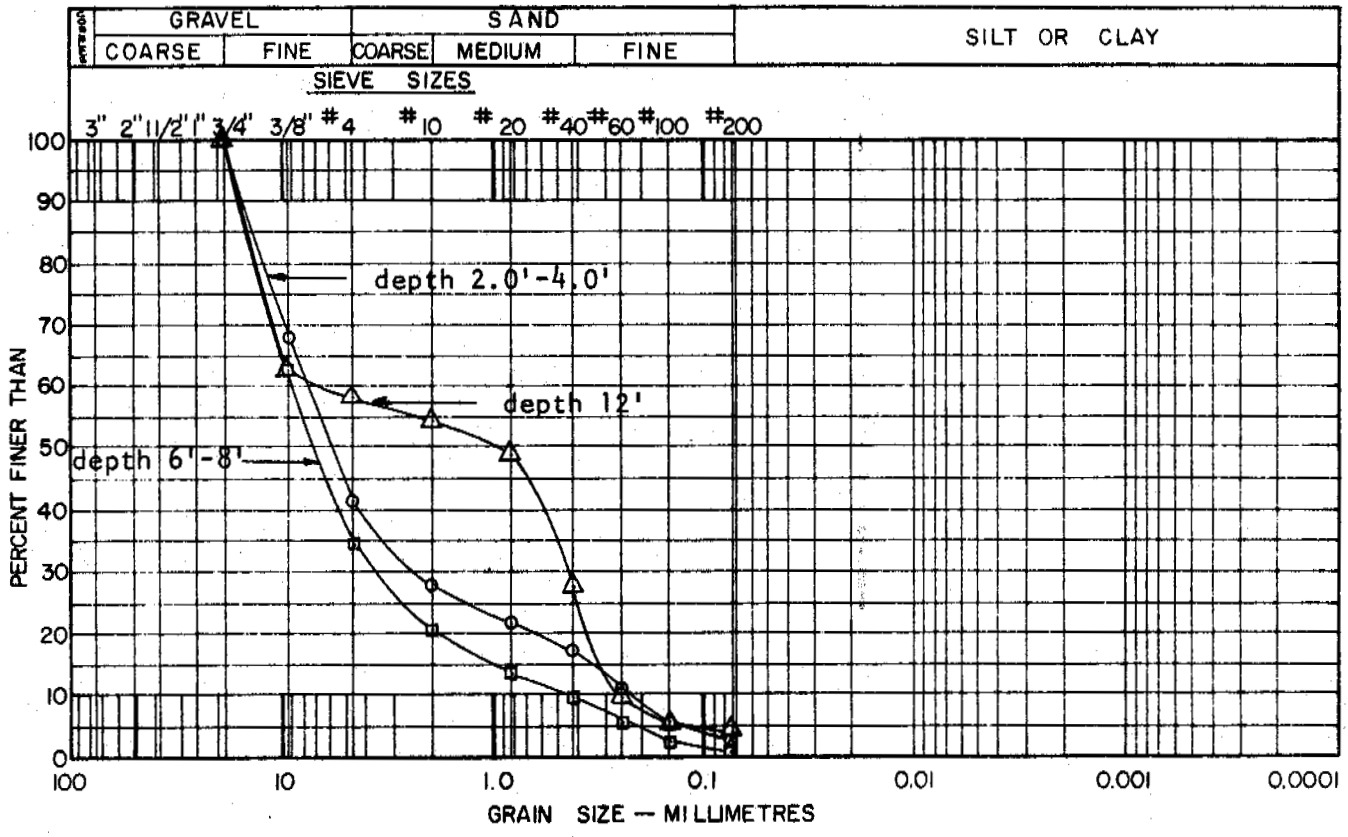
22.0'

Nbn (CL) CLAY - and silt, low plastic, no visible ice

30.0'

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 312-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	7.5%
Sample 2	depth 4'	6.8%
Sample 3	depth 6'	4.6%
Sample 4	depth 8'	7.6%
Sample 5	depth 12'	14.7%

ORGANIC CONTENT

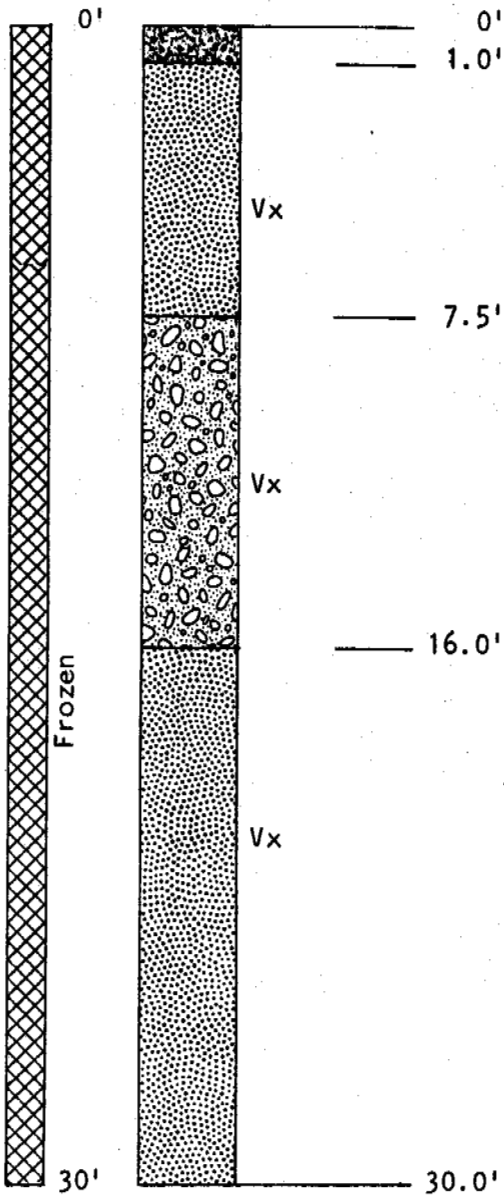
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 312

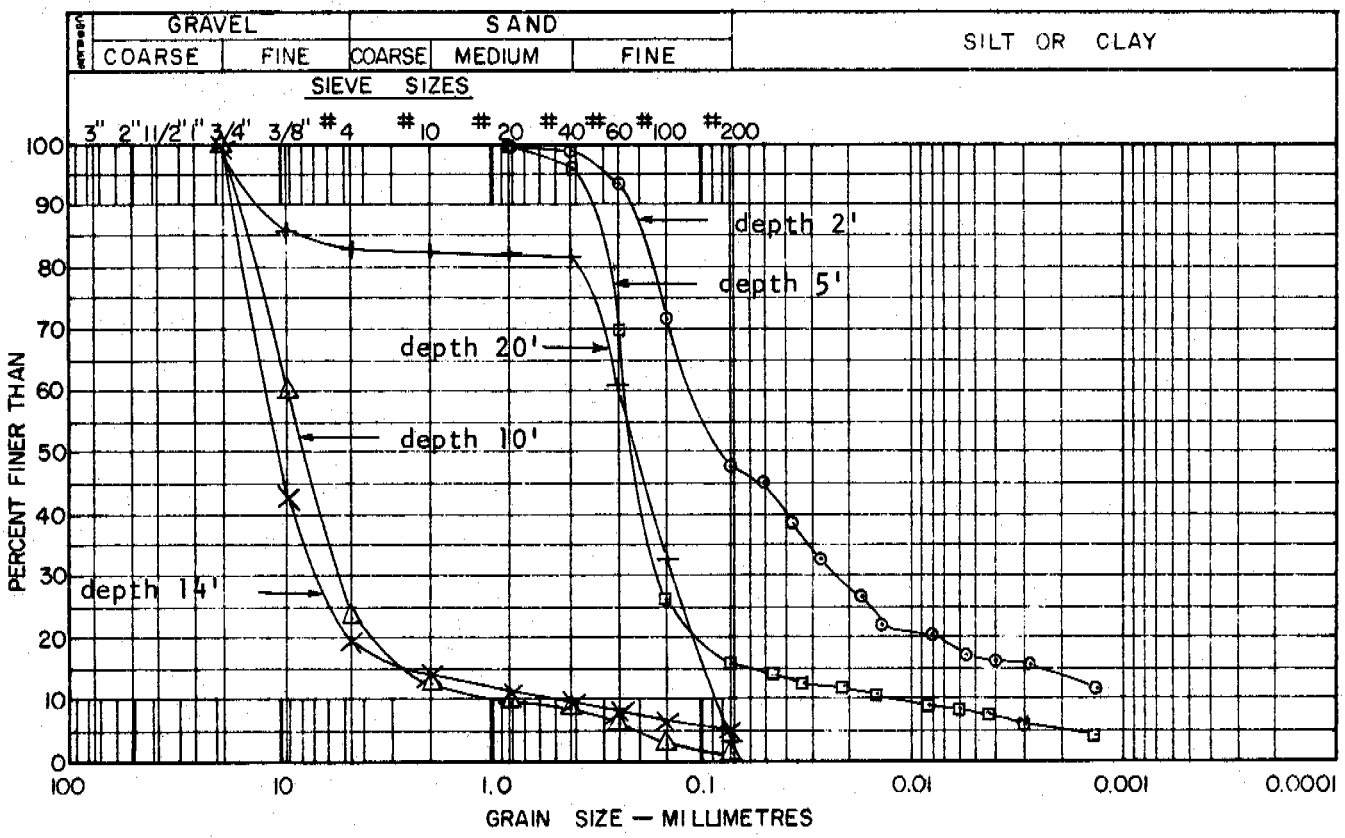
312-5



0'			
1.0'	(OL)	SILT -	and organics, roots, peat etc
	(SM)	SAND -	some silt, very fine uniform gradation, some ice crystals and inclusions
7.5'			
	(GW)	GRAVEL -	some sand, trace silt, well graded, trace ice crystals
16.0'			
	(SP-SM)	SAND -	little gravel, trace silt, fine to medium gradation, some ice crystals and inclusions
30.0'			

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 312-5

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	28.8%
Sample 2	depth 5'	36.0%
Sample 3	depth 10'	4.0%
Sample 4	depth 14'	6.4%
Sample 5	depth 20'	20.8%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

Quartzite	-65%
Sandstone (hard)	-22%
Sandstone (soft)	- 7%
Quartz	- 3%
Chert	- 1%
Ironstone	- neg.
Total	100%

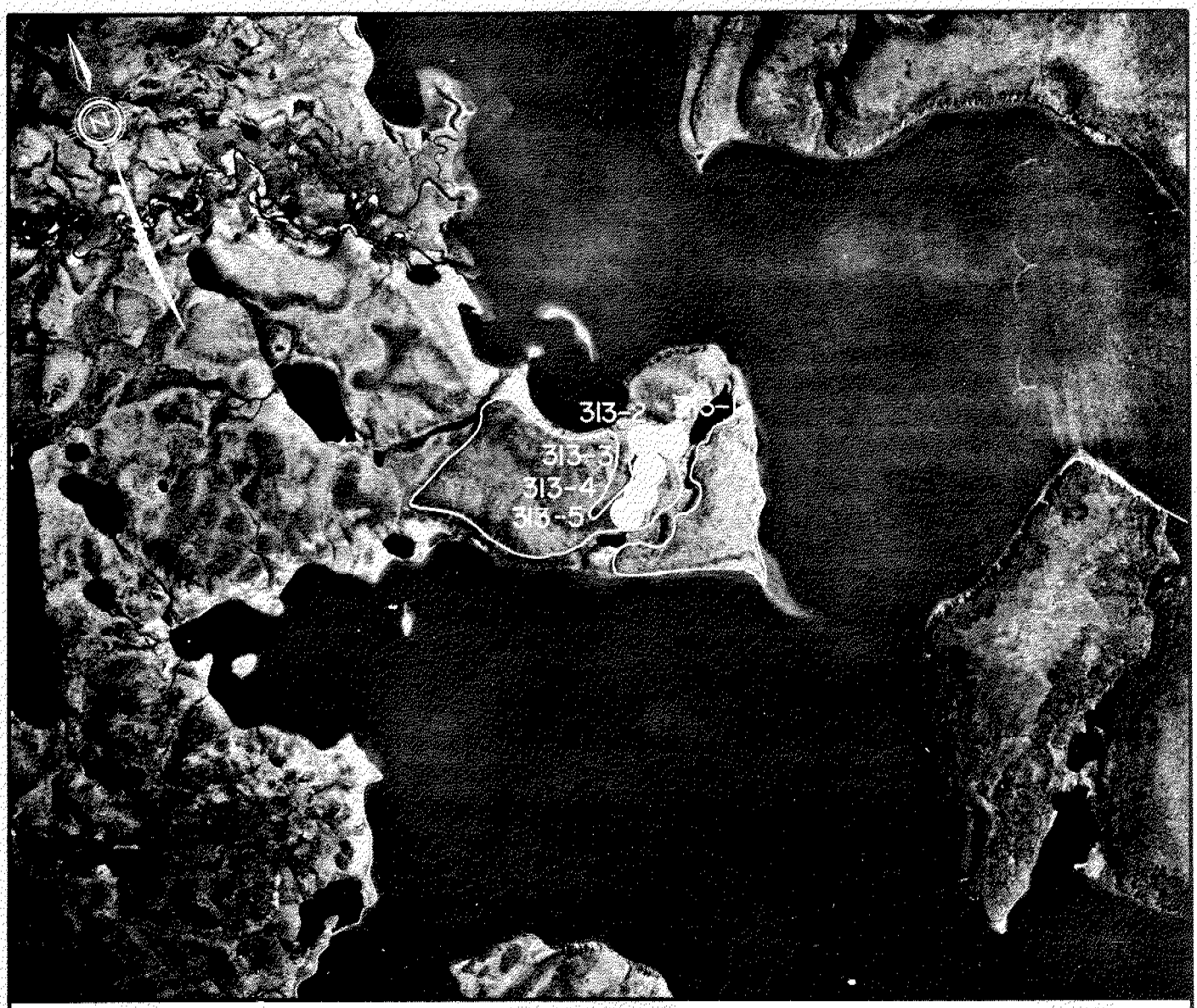
ZONE III
SOURCE No. 313

LANDFORM AND LOCATION: Glaciofluvial outwash at Bonnieville Point on the west side of Eskimo Lakes.

MATERIAL: SAND - trace silt

VOLUME: 50,000 cubic yards

CONCLUSION: Source is low priority for a limited development, removing only a portion of the unfrozen material at the toe of the banks. Environmental study is required.



AIRPHOTO No. A 22936-68 SCALE: 1"= 3000' (approx.)

313 ENVIRONMENT

Physical

The source is a glaciofluvial outwash area superimposed on the coastal plain at Bonnieville Point, on the west side of Eskimo Lakes 35 miles north of Inuvik. The source area is relatively flat, about 7,000 feet wide, and rises from 15 to 20 feet above the lake level.

Drainage of the source is good. Part of the source surface is polygonal ground, indicative of ground ice.

The source has not been developed.

Biotic

Vegetative cover in the area consists of moss and grass, with some dwarf shrubs about 1 foot high. Overburden of peat and topsoil up to 2½ feet thick overlies the granular material. The banks of material falling to the lake are bare.

The source is located in a critical wildlife area, the permanent fawning ground of the Reindeer Herd. The area is especially important during the calving period, which must be complete before the herd begins its migration to summer range, although the Herd occupy this area from December 1 to May 15 of most years. This is also part of the Mackenzie Reindeer Grazing Reserve.

The Eskimo Lakes are an important fishery for lake trout, grayling, and whitefish, both as a source of food for the native population and as a potential sport-fishing area. Local inhabitants and tourists fly into the area frequently during the summer.

313 MATERIALS AND QUANTITIES

The source contains sand with a trace of silt, and silt with a trace of sand. Ice is located near the surface; in Test Hole #2, the ice at 2½ feet depth is massive.

The only recoverable material in the source is that exposed in banks adjacent to the lake. Here material that has sloughed from

ZONE III
SOURCE No. 313

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MATERIAL:	SAND - trace silt
VOLUME:	50,000 cubic yards
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The only recoverable material in the source is that exposed in banks adjacent to the lake. Here material that has sloughed from

the deposit lies at the angle of repose and is unfrozen, at least near the surface.

The volume of material that can be removed from this source is about 50,000 cubic yards.

313 DEVELOPMENT

General

This source rates very low priority. The top surface should not be disturbed because of the high ice content and the possibility of severe thermal erosion on this prominent point. Much better material is available about 2 miles away at Source 312.

Very limited volumes may be removed from the bank of the lake, provided the operation could be approved by the Canadian Wildlife Service and the Fisheries Branch. Special measures would be necessary to prevent siltation of the lake.

Access

This area is accessible by truck only during the winter months, travelling across the tundra on winter roads or across Eskimo Lakes on the ice. During the summer, material can be hauled from the source by barge to any point adjacent to the Lakes.

Material Use and Handling

This material is suitable for general fill.

The only equipment required for development is a front-end loader, and trucks in winter or a barge in summer.

Stripping and Restoration

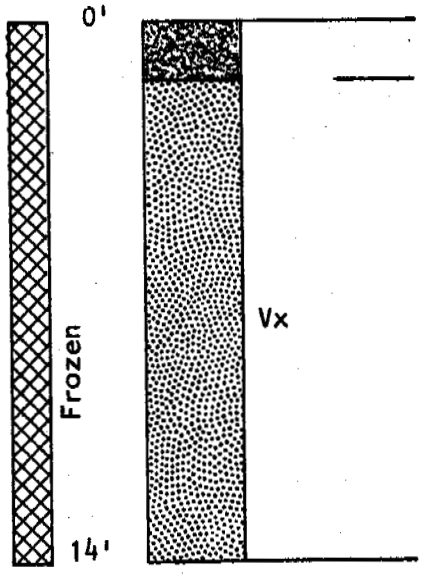
The only recommended areas of excavation are the banks adjacent to the lake, and these are bare. Very little could be done to improve the grading of a depleted area.

Special care must be taken to prevent the siltation of the lake, whether from excavation of the unfrozen material or from thawing and sloughing of the bank after exposure in the excavation.

TEST HOLE LOGS

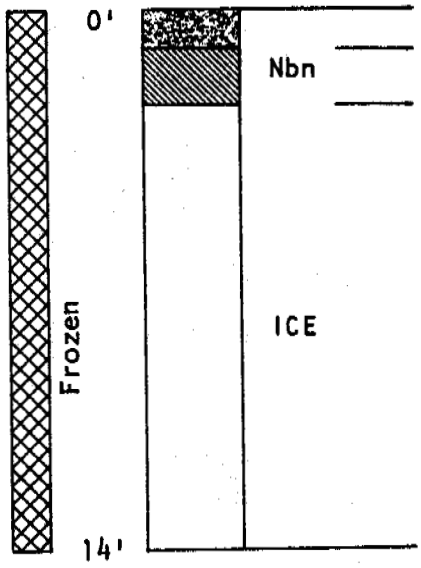
SOURCE No. 313

313-1



(OL)	SILT -	and organics, roots, peat etc.
(SP-SM)	SAND -	trace silt, fine uniform gradation, some ice crystals and inclusion

313-2



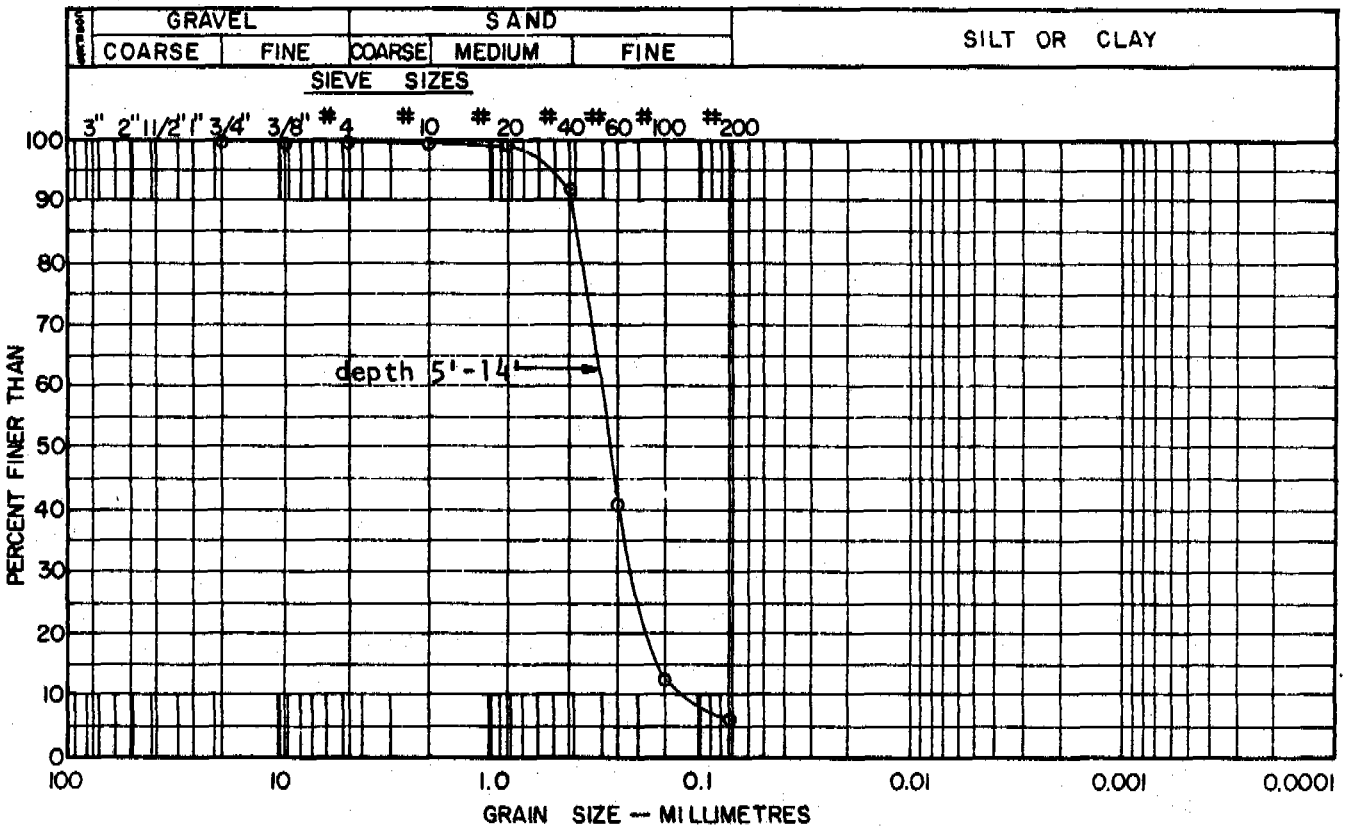
(OL)	SILT -	and organics, roots, peat, etc.
(CL)	CLAY -	little silt, trace sand, medium plastic. No visible ice.
	ICE -	with silt inclusions.

Moisture Content

Sample 1 depth 2' 25.4%

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 313-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	24.8%
Sample 2	depth 5'	27.0%
Sample 3	depth 10'	26.9%
Sample 4	depth 14'	14.4%

ORGANIC CONTENT

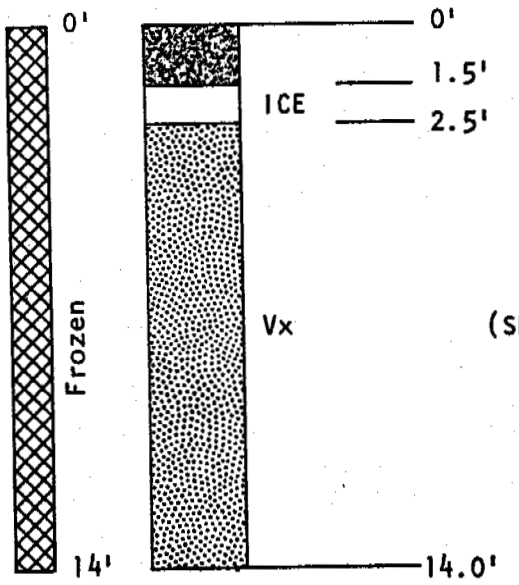
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 313

313-3

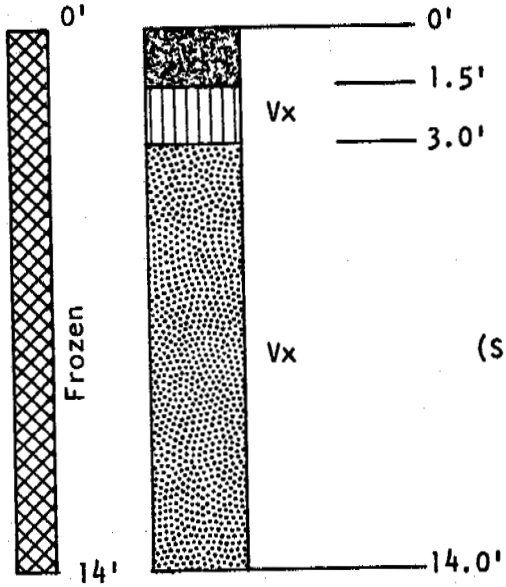


(OL) SILT - and organics, roots, peat, etc.

ICE - clear

(SP-SM) SAND - trace silt, fine to medium graduation, some ice crystals and inclusions

313-4



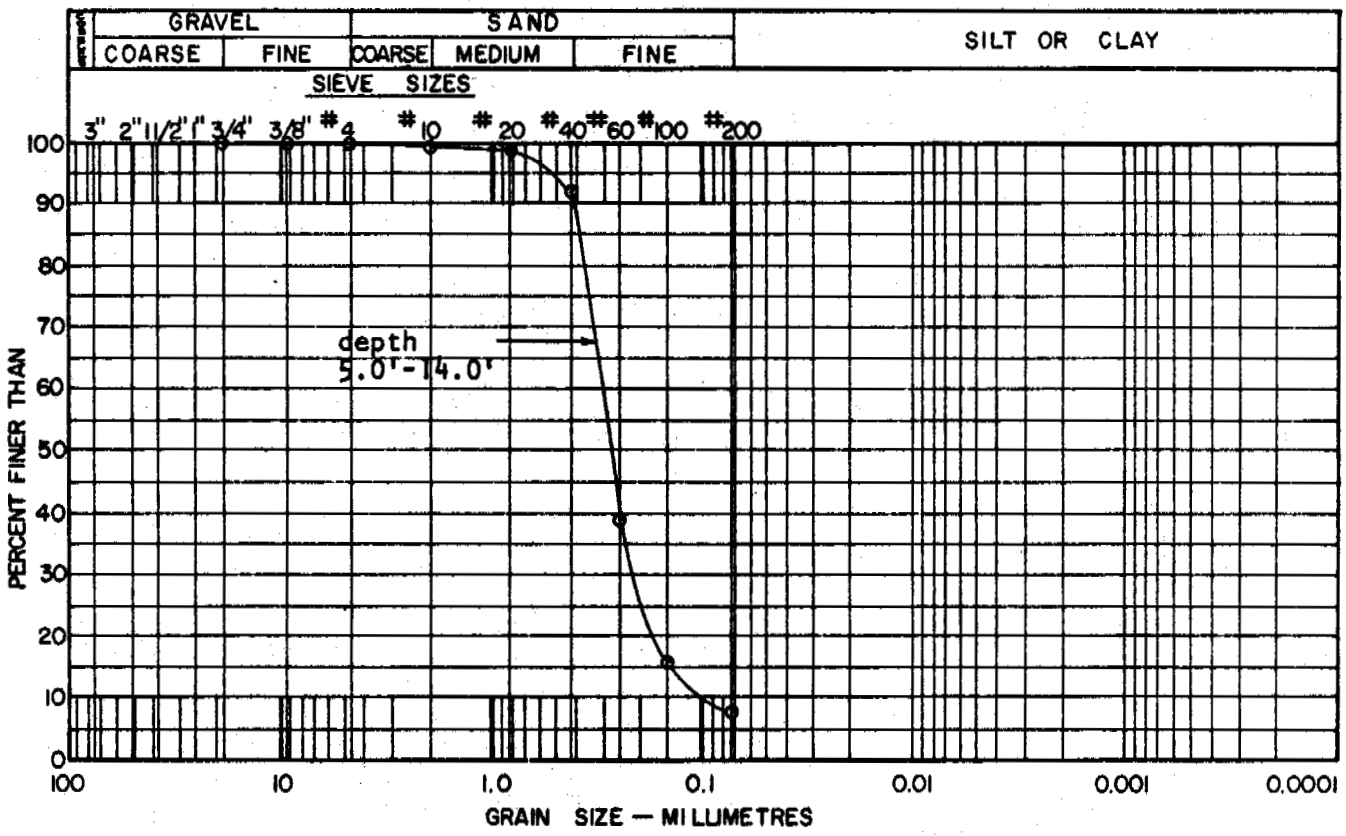
(OL) SILT - and organics, roots, peat, etc.

(ML) SILT - little clay, trace sand, medium plastic, ice crystals and inclusions

(SP-SM) SAND - trace silt, fine uniform gradation, some ice crystals and inclusions

LABORATORY
TEST DATA
TEST HOLE-SOURCE · No. 313-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	29.4%
Sample 2	depth 5'	25.0%
Sample 3	depth 10'	24.9%
Sample 4	depth 14'	23.0%

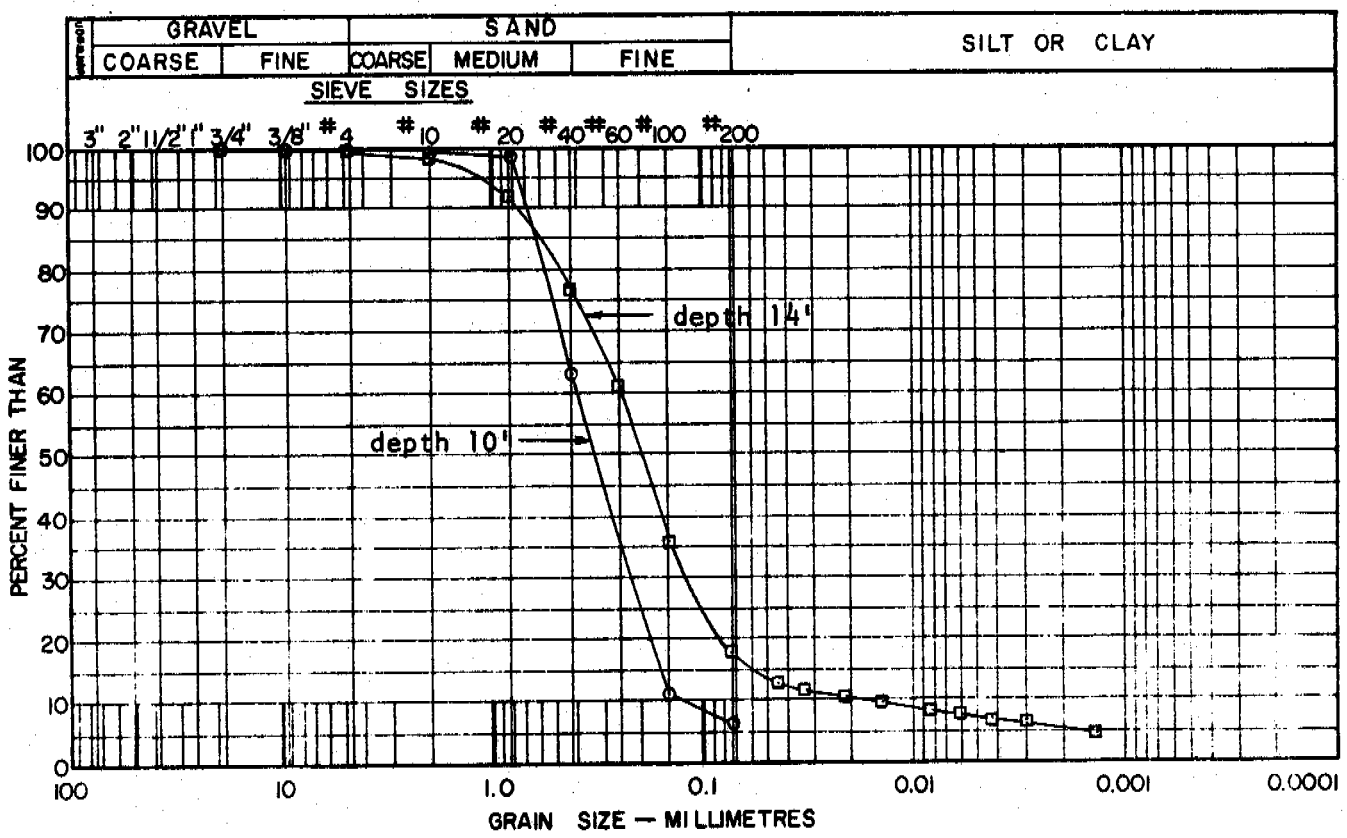
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 313-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 5'	30.2%
Sample 2	depth 10'	20.6%
Sample 3	depth 14'	21.7%

ORGANIC CONTENT

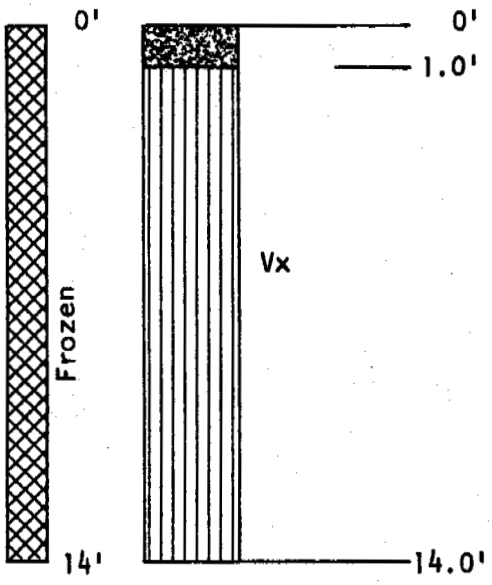
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 313

313-5



(OL) SILT - and organic, roots, peat, etc.

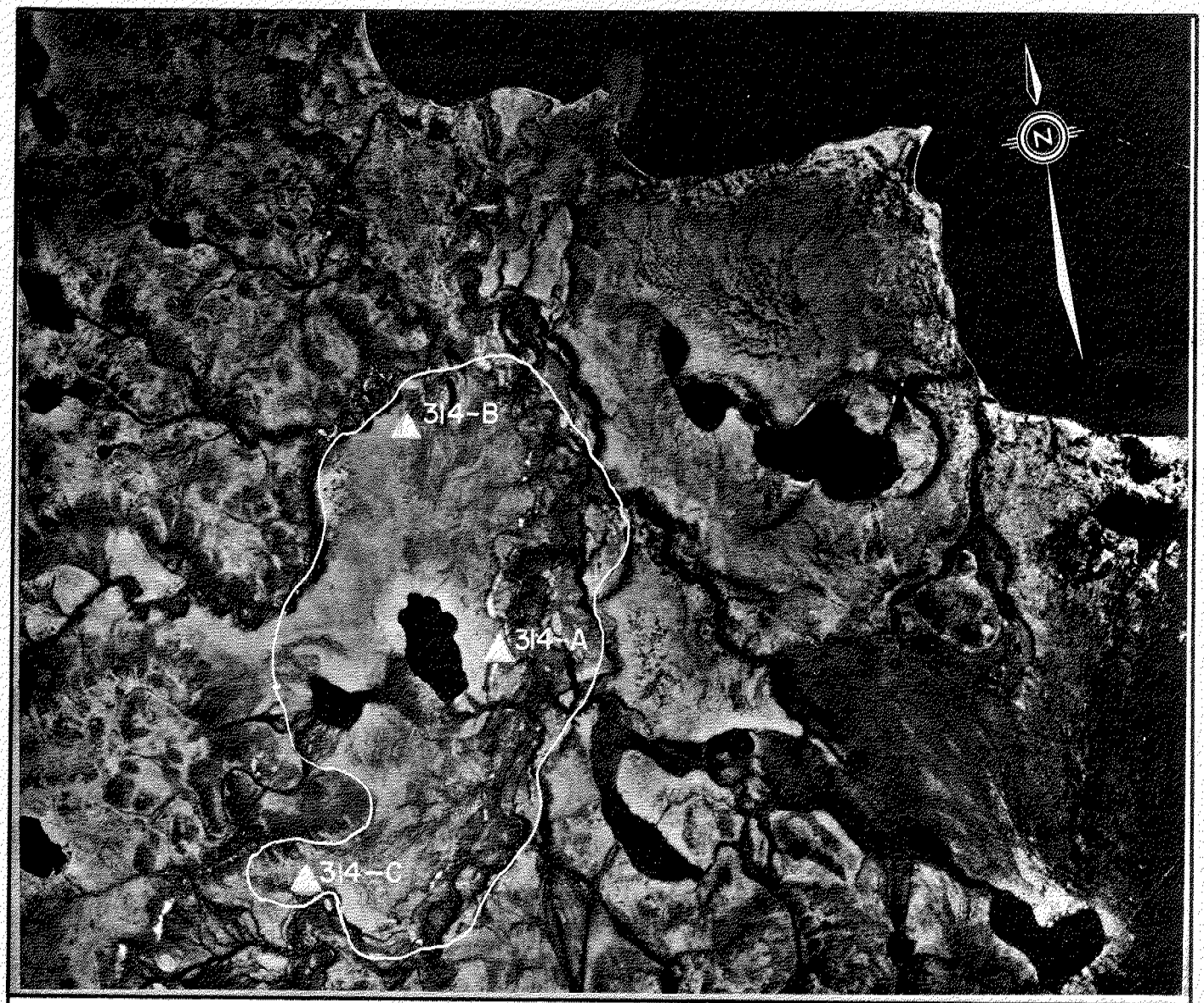
(ML) SILT - little clay, trace sand medium plastic, some ice crystals and inclusions

Moisture Content

Sample 1 depth 2' 37.7%

ZONE III
SOURCE No. 314

LANDFORM AND LOCATION:	Post-glacial fluvial terraces about 1 mile west of Eskimo Lakes.
MATERIAL:	SAND - and gravel.
VOLUME:	3,000,000 cu. yds. at least.
CONCLUSION:	Source is suitable for development for general fill but care must be taken to prevent contamination of the adjacent stream. An environmental study will probably be required to determine the method of development least disturbing to wildlife.



AIRPHOTO No. A22936 - 137 SCALE: 1" = 3000' (approx.)

314 ENVIRONMENT

Physical

This source is a group of post-glacial fluvial terraces adjacent to a small stream discharging to Eskimo Lakes at a point 28 miles north of Inuvik. The major terrace is about 4,000 feet by 3,000 feet located 1 mile upstream from the Lakes.

Drainage of the source is good, with no ground ice encountered within the top 3 to 4 feet during the reconnaissance in September. The pond adjacent to the large terrace, and the polygonal ground pattern upstream, indicate the prevalence of ground ice.

The source has not been developed.

Biotic

Vegetative cover over the source area is mostly moss and lichens with a few scattered dwarf shrubs. Spruce trees up to 40 feet high occur in the gullies and valleys.

This source lies in a critical wildlife area, the permanent fawning ground of the Reindeer Herd. The area is especially important during the calving period, which must be complete before the Herd begins its migration to summer range, although the Herd occupy this area from December 1 to May 15 of most years. This is also part of the Mackenzie Reindeer Grazing Reserve.

The Eskimo Lakes are an important fishery for lake trout, grayling, and whitefish, both as a source of food for the native population and as a potential sport-fishing area. Local inhabitants and tourists fly into the area frequently during the summer.

The small stream adjacent to this source is about 20 feet across and fast-flowing, and may be important to the fishery in Eskimo Lakes. In any case the development of the source must be conducted so that the stream is not fouled with silt and other debris.

ZONE III
SOURCE No. 314

LANDFORM AND LOCATION:	Post-glacial fluvial terraces about 1 mile west of Eskimo Lakes.
MATERIAL:	SAND - and gravel.
VOLUME:	3,000,000 cu. yds. at least.
CONCLUSION:	Source is suitable for development for general fill but care must be taken to prevent contamination of the adjacent stream. An environmental study will probably be required to determine the method of development least disturbing to wildlife.

AIRPHOTO No. A22936 - 137 SCALE: 1"= 3000' (approx.)

314 ENVIRONMENT

Physical

This source is a group of post-glacial fluvial terraces adjacent to a small stream discharging to Eskimo Lakes at a point 28 miles north of Inuvik. The major terrace is about 4,000 feet by 3,000 feet located 1 mile upstream from the Lakes.

Drainage of the source is good, with no ground ice encountered within the top 3 to 4 feet during the reconnaissance in September. The pond adjacent to the large terrace, and the polygonal ground pattern upstream, indicate the prevalence of ground ice.

The source has not been developed.

Biotic

Vegetative cover over the source area is mostly moss and lichens with a few scattered dwarf shrubs. Spruce trees up to 40 feet high occur in the gullies and valleys.

This source lies in a critical wildlife area, the permanent fawning ground of the Reindeer Herd. The area is especially important during the calving period, which must be complete before the Herd begins its migration to summer range, although the Herd occupy this area from December 1 to May 15 of most years. This is also part of the Mackenzie Reindeer Grazing Reserve.

The Eskimo Lakes are an important fishery for lake trout, grayling, and whitefish, both as a source of food for the native population and as a potential sport-fishing area. Local inhabitants and tourists fly into the area frequently during the summer.

The small stream adjacent to this source is about 20 feet across and fast-flowing, and may be important to the fishery in Eskimo Lakes. In any case the development of the source must be conducted so that the stream is not fouled with silt and other debris.

314 MATERIALS AND QUANTITIES

This source was examined during the reconnaissance of September, 1972. The time available for drilling during the following winter did not permit further examination, so the evaluation of this source is based on three test pits and the surficial examination of banks eroded by the stream. Exposures of undisturbed granular fluvial materials ranging from fine sand to medium gravel were noted on the slope to 60 feet below the terrace surface.

The sand and gravel exposed in the test pits extends to some depth in the deposit, however it has been assumed that only 15 feet can be removed from the top of the terrace without danger to the bank stability and purity of the adjacent streams.

The material ranges from coarse gravel to fine sand, with a trace of silt.

The petrographic analysis of gravel from Test Pit C indicates the material to be about 60% hard sound stone, mostly quartzite with some sandstone, granite, quartz and chert. The unsound or soft rock is 40% of the total, and consists of soft sandstone, soft limestone, ironstone, and shale.

The recoverable volume of material in the one terrace recommended for development is at least 3,000,000 cubic yards. An additional volume may be developed in smaller terraces, some of them upstream from the source area, but these are probably spotty in material quality and more difficult to develop.

314 DEVELOPMENT

General

The large terrace north of the small pond in this source is suitable for development for general fill.

When excavating this terrace it will be necessary to leave the banks of streams intact, by leaving a berm or dyke between the stream and the excavation.

Development must be preceded by an environmental study to determine whether or how the operation could be conducted without excessive disruption of wildlife.

Access

The source is accessible by truck only in winter time, hauling over the tundra on winter roads or over the Eskimo Lakes on the ice. During the summer, it will be feasible to haul by truck to load barges on the lakeshore, thus making the source available to any point around the lakes. It should be pointed out, however, that this short road will cross difficult ground and will be expensive to build.

Material Use and Handling

The materials in this source are recommended for general fill and road construction, but are not suitable for aggregate or for base course in roads because of the high proportion of unsound rock.

Equipment required for this development is the usual assembly of dozer with ripper attachment, front-end loader, and trucks, with the possible addition of a barge for summer transportation.

Stripping and Restoration

The terrace is well above the flood stages of adjacent streams, so it should be recovered for vegetation.

Before an area of this source is developed, the organic ground cover and topsoil, generally less than 1 foot thick, must be stripped and stockpiled on the slopes away from the streams, to be replaced over the depleted areas after excavation. The area exposed at anytime should be kept to a minimum, in order to limit the disturbance of the thermal regime at depth.

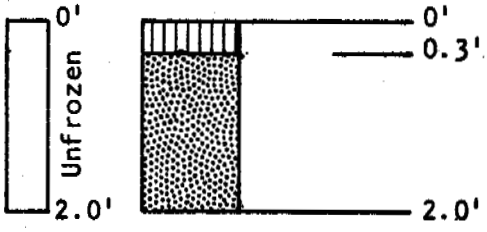
No large area of ground ice should be exposed on slopes, because of sloughing and difficult restoration. If exposed, such an area must be recovered with granular meterial at once.

Particular care must be exercised in restoring this source, because instability in the ground ice contained within the banks could lead to siltation in the streams, and so in the Eskimo Lakes.

TEST PIT LOGS

SOURCE No. 314

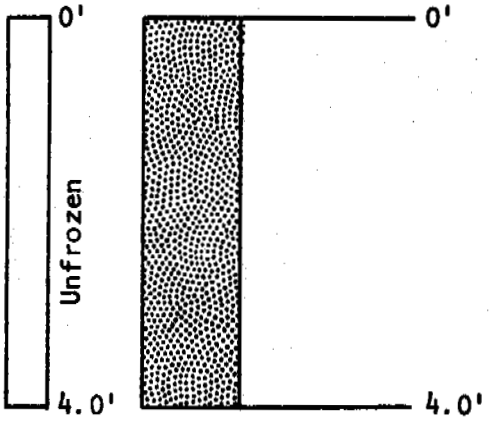
314-A



(OL) SILT - organic, and peat

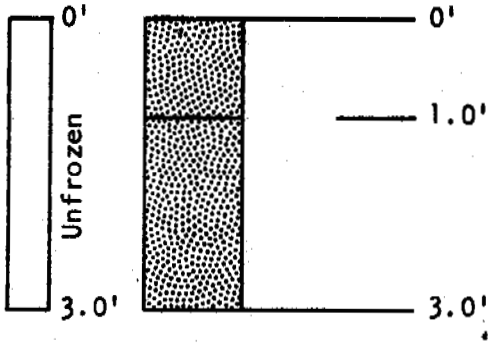
(SW) SAND - and gravel, max., 1½", rounded to subangular, well graded

314-B



(SW) SAND - trace gravel, layered, coarse to fine sand, well graded

314-C

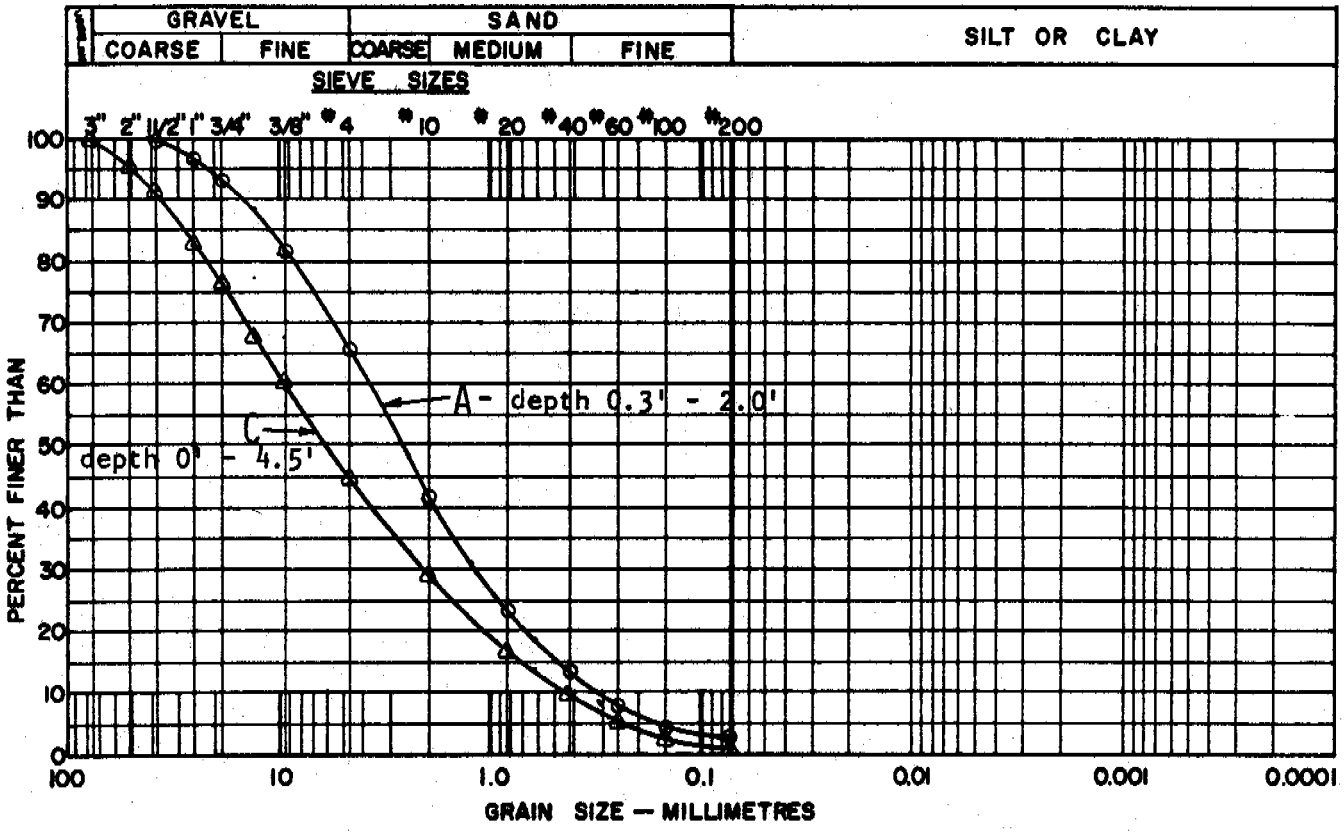


(SP) SAND - some organic matter, fine, uniform

(SW) SAND - and gravel, layered, well graded, clean

LABORATORY
TEST DATA
SOURCE No. 314

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A depth 0.3' - 2.0' 5.6%
Pit C depth 0' - 4.5' 2.9%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

Sample C depth 1' - 3'

Quartzite	-27%	Granite	- 5%
Sandstone-soft	-19%	Chert	- 4%
Limestone-soft	-17%	Quartz	- 4%
Limestone-hard	- 9%	Ironstone	- 3%
Sandstone-hard	- 9%	Shale	- 3%
		Total	100%

The moisture content within Test Hole #1 ranged from 5% to 7½%, with no visible ice reported. Test Hole #3 contained a similar percentage of moisture, and ice crystals were observed.

The volume of recoverable material in this source is difficult to estimate, depending as it does on the occurrence of ice and silt in the top stratum, but is expected to be between 500,000 and 1,000,000 cubic yards.

325 DEVELOPMENT

General

This source is rated low priority for development, although it may be used to supply small volumes to local projects. The source is very erratic in nature, some of the gravel and sand is covered by ice-rich silt, and a superior source is located only 2 miles to the north.

Any development of this source would be preceded by an environmental study because of the critical wildlife area in which it occurs.

Access

This area is accessible by truck only during the winter months, travelling across the tundra on winter roads or across Eskimo Lakes on the ice. During the summer, material can be hauled from the source by barge to any point adjacent to the Lakes.

Material Use and Handling

The material from this source can be used for general fill and road construction. The erratic nature of the deposit would make a specification aggregate operation very difficult to establish and maintain.

The equipment required for this development would be the usual assembly of dozer with ripper attachment, front-end loader, and trucks. Summer haulage would require the addition of a barge on the Lakes.

The operation would require careful planning. To begin with, the low-lying ground between hillocks is ice-rich silt, and would de-

grade rapidly if disturbed. Roads would have to avoid the worst of these areas or cross them on an embankment. Secondly, the operation could not be permitted to pollute the lake or small stream, and for this purpose a substantial berm of frozen ground must be left between the excavation and the natural drainage channels.

Stripping and Restoration

After the areas containing suitable granular material have been identified it will be necessary to strip the silty layer from the surface, the stripping varying from 1 foot to over 4½ feet. This material, plus the organic cover with it, must be stockpiled for replacement after the granular material has been removed. All banks must be graded to a stable slope, and the depleted areas graded to a smooth contour, before the topsoil is replaced.

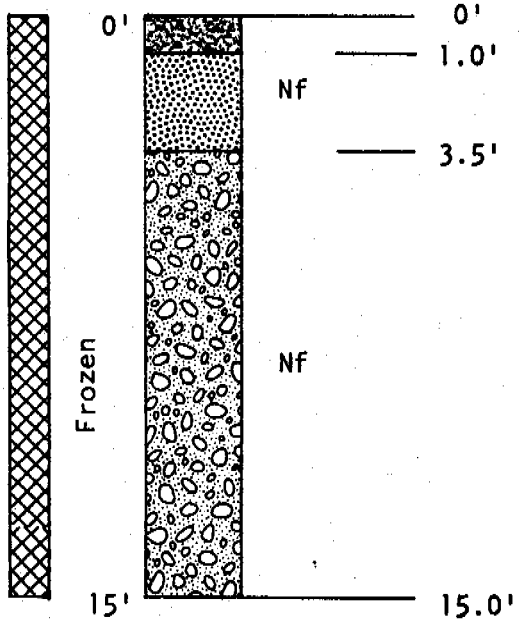
Stockpiles of topsoil, granular material, and ice must be located so they will not drain into the natural drainage system, in order to avoid siltation of the stream and lake.

The environmental study that precedes any development may recommend additional restorative measures.

TEST HOLE LOGS

SOURCE No. 325

325-1

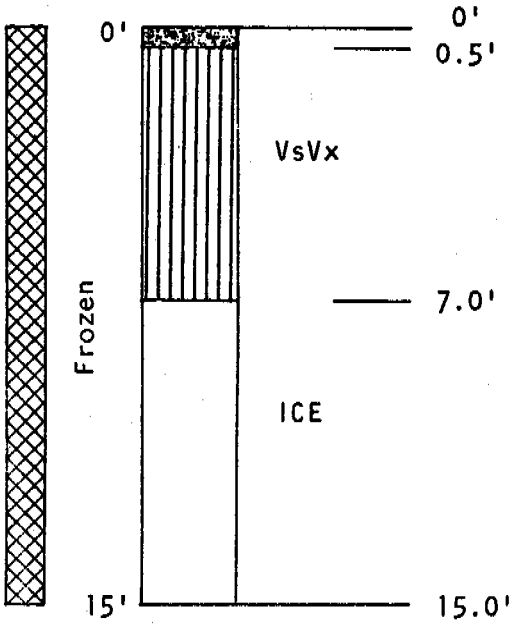


(OL) SILT - and organics, roots, peat, etc.

(SW) SAND - trace gravel, trace silt, well graded, no visible ice, dry and loose.

(GW) GRAVEL - and sand, trace silt, well graded, dry and loose, no visible ice.

325-2



(OL) SILT - and organics, roots, peat, etc.

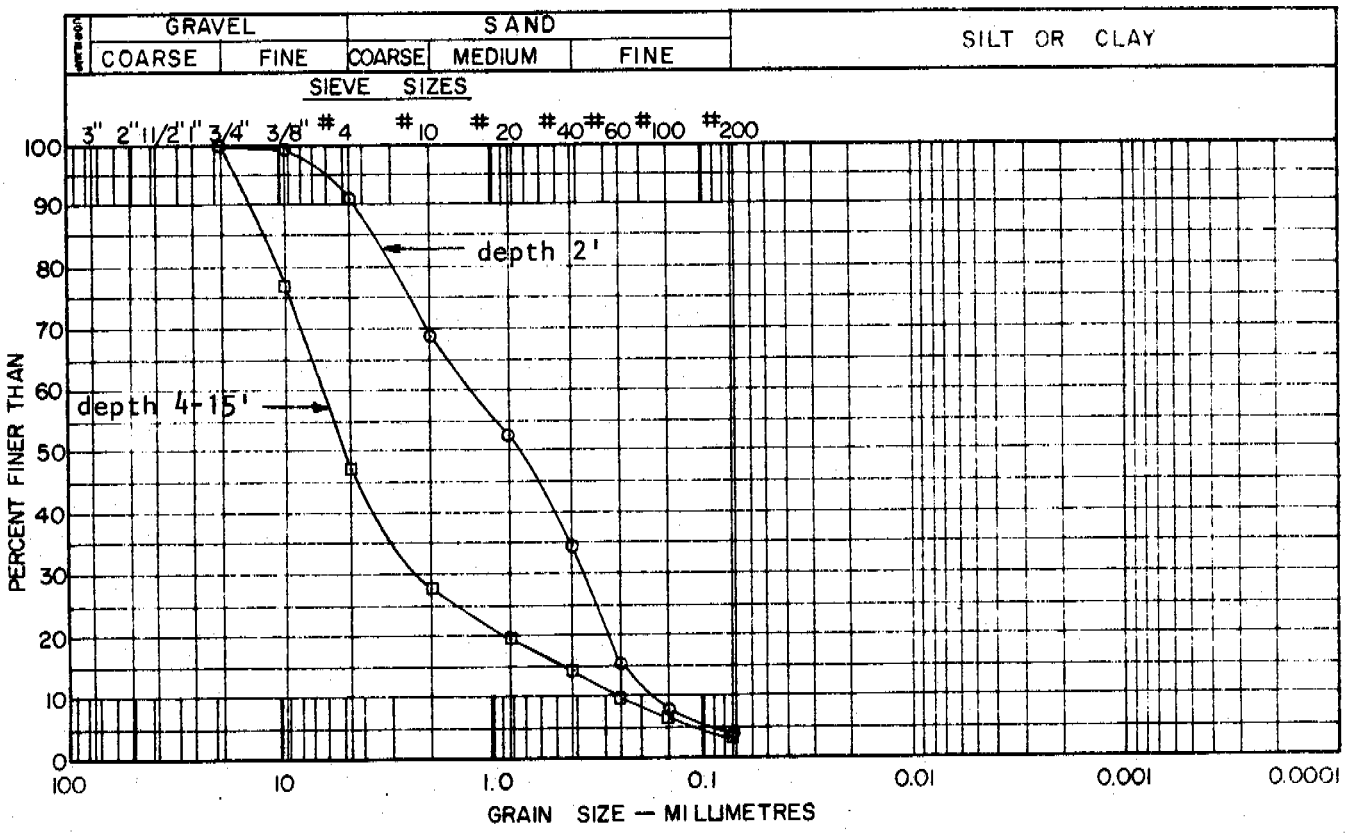
(ML) SILT - some clay, ice lensing and inclusions, medium plastic.

ICE - trace silt lensing and inclusions.

Moisture Content
Sample 1 depth 5' 25.7%

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 325-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth	2'	7.2%
Sample 2	depth	4'	4.6%
Sample 3	depth	6'	4.9%
Sample 4	depth	8'	6.8%
Sample 5	depth	10'	7.3%
Sample 6	depth	15'	4.9%

ORGANIC CONTENT

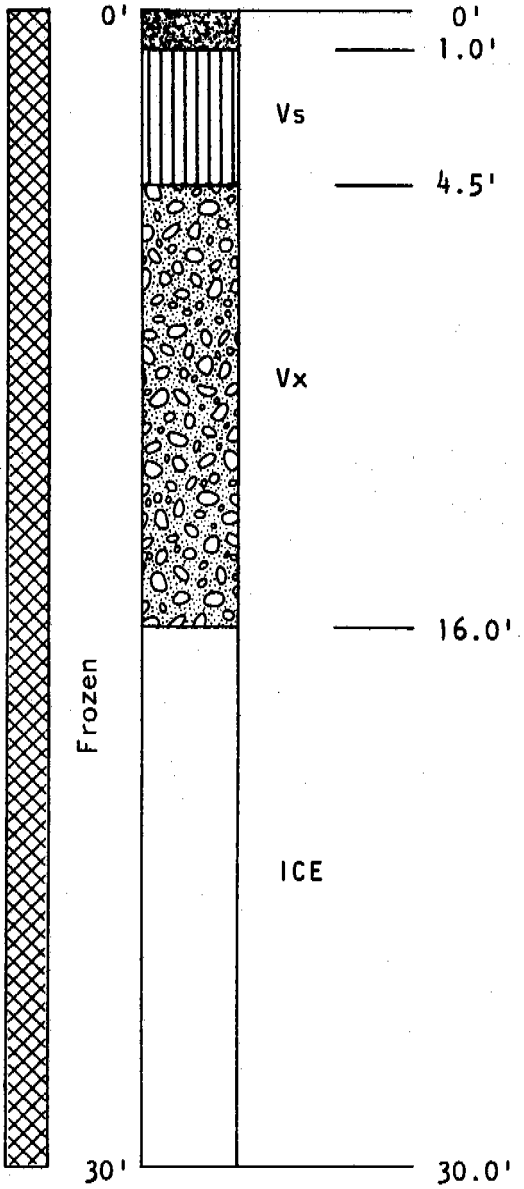
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 325

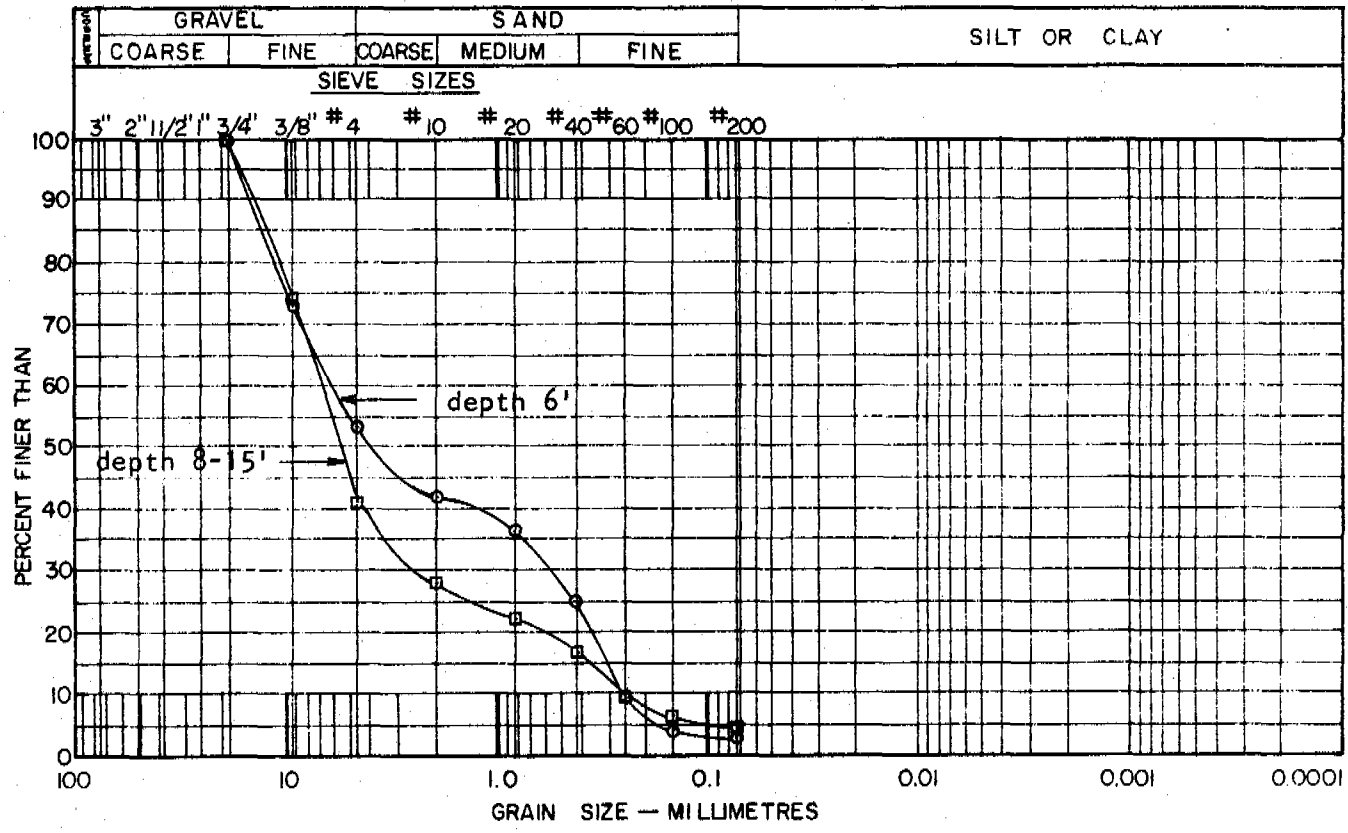
325-3



0' – 1.0'	(OL)	SILT - and organics, roots, peat, etc.
Vs	(ML)	SILT - and ICE lenses.
Vx	(GW)	GRAVEL - and sand, trace silt, well graded, some ice crystals.
ICE		ICE - trace soil inclusions.

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 325-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 6'	9.0%
Sample 2	depth 8'	4.7%
Sample 3	depth 10'	7.3%
Sample 4	depth 15'	4.7%

ORGANIC CONTENT

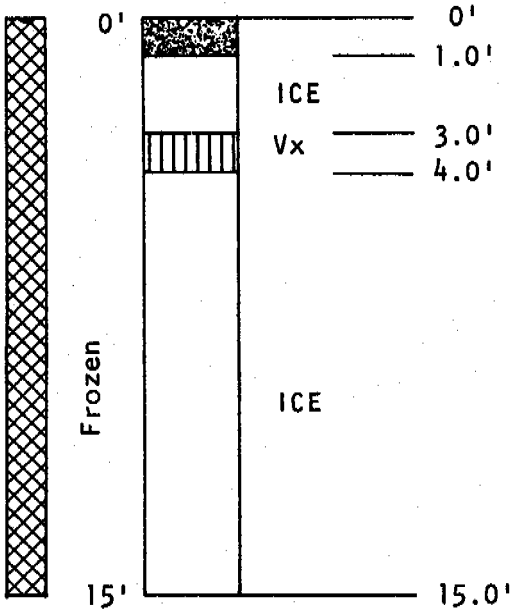
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 325

325-4



0' – 1.0'	(OL)	SILT - and organics, roots, peat, etc.
1.0' – 3.0'		ICE - trace silt lensing.
3.0' – 4.0'	(ML)	SILT - little gravel, some ice inclusions.
4.0' – 15.0'		ICE - trace silt inclusions.

seam. Other readings are comparable.

The volume of recoverable material depends on the occurrence of ice and ice-rich silt, and is impossible to estimate accurately, but is probably about 1,000,000 cubic yards.

327 DEVELOPMENT

General

Because of the nature of this deposit it is not recommended for large-scale development. It may, however, be valuable to local projects for the supply of general fill.

An environmental study will be required before development can proceed. Special measures will be required to prevent contamination of Eskimo Lakes.

Access

This area is accessible by truck only during the winter months, travelling across the tundra on winter roads or across Eskimo Lakes on the ice. During the summer, material can be hauled from the source by barge to any point adjacent to the Lakes.

Material Use and Handling

Some of the gravel tested on this source is well graded and apparently a high quality material. Because of the erratic nature of the deposit, however, it is likely that only a small operation can be based on the source, and that only general fill can be produced successfully.

The ice-rich silt overlying much of the gravel must be ripped before excavation. Because the thickness of this material may be substantial the disposal may be a serious problem.

The gravel can probably be excavated and hauled at once at any time of the year.

The equipment required for this development is the usual assembly of dozer with ripper attachment, front-end loader, and trucks.

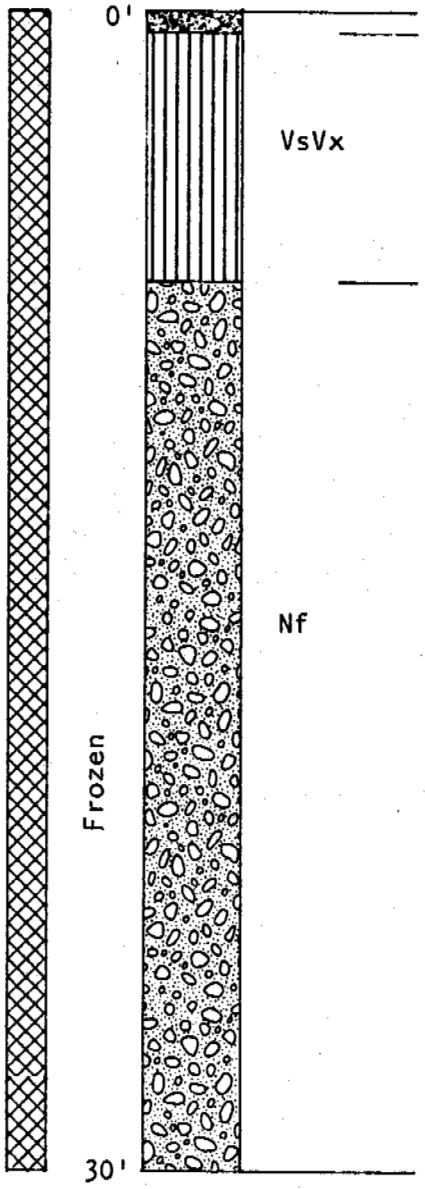
Stripping and Restoration

The stockpiles of ice-rich silt and topsoil must be located so that, when thawing, they do not drain directly into one of the small gullies leading to the Eskimo Lakes. After this material has thawed and drained it should be replaced over areas that have been depleted and graded smooth. All banks must be graded to a stable slope, then covered with topsoil or silt.

TEST HOLE LOGS

SOURCE No. 327

327-1

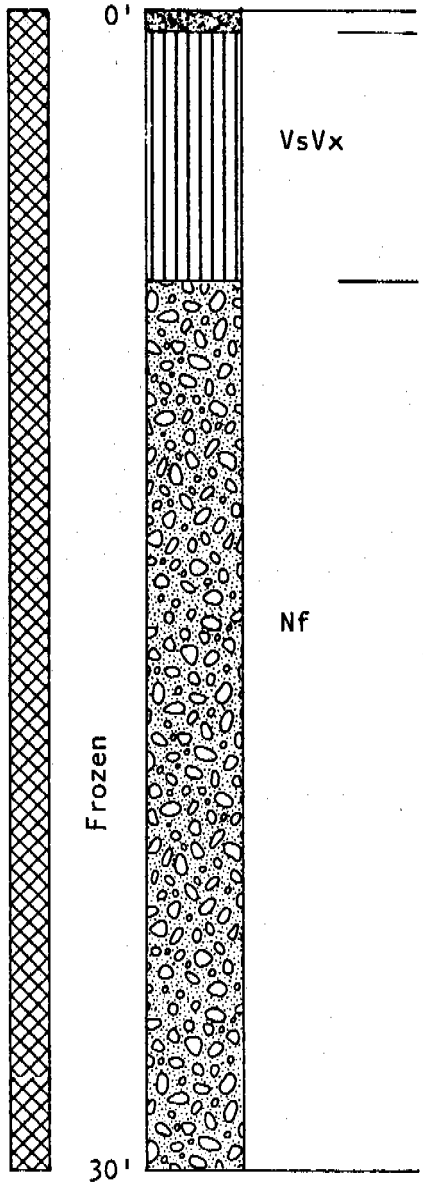


0'	(OL)	SILT - organics, roots, peat, etc.
.5'		
VsVx	(ML)	SILT - some gravel, little sand, little clay, medium plastic, ice lenses and inclusions.
7.0'		
Nf	(GP)	GRAVEL - some sand, trace silt, coarse graded, no visible ice.
30.0'		

TEST HOLE LOGS

SOURCE No. 327

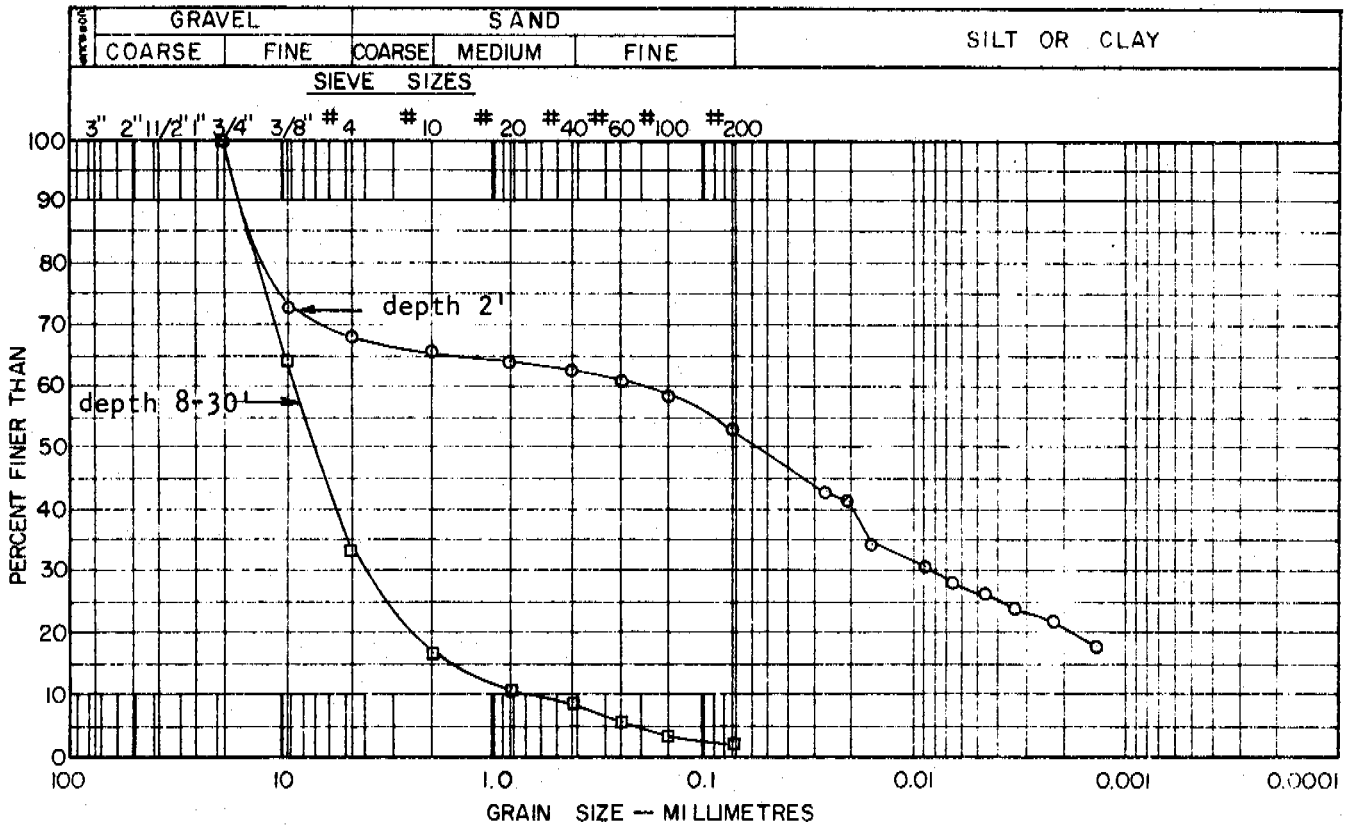
327-1



0'		(OL)	SILT - organics, roots, peat, etc.
.5'			
	VsVx	(ML)	SILT - some gravel, little sand, little clay, medium plastic, ice lenses and inclusions.
7.0'			
	Nf	(GP)	GRAVEL - some sand, trace silt, coarse graded, no visible ice.
30.0'			

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 327-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	19.1%	Sample 6	depth 25'	4.3%
Sample 2	depth 8'	5.7%	Sample 7	depth 30'	4.7%
Sample 3	depth 10'	5.2%			
Sample 4	depth 15'	5.0%			
Sample 5	depth 20'	4.4%			

ORGANIC CONTENT

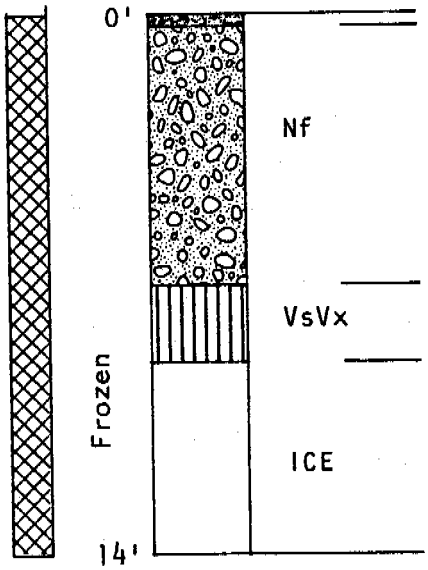
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

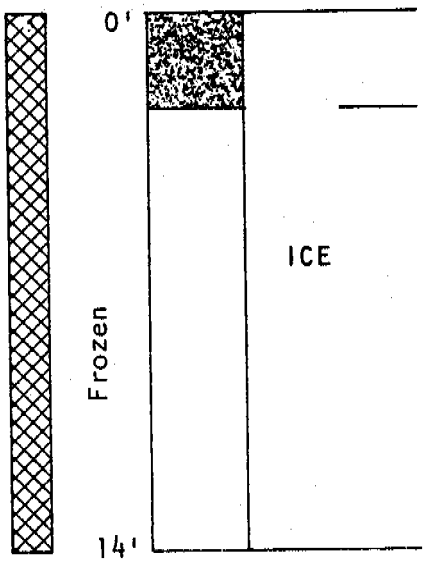
SOURCE No. 327

327-2



0'			
.25'	(OL)		SILT - organics, roots, peat, etc.
	(GW-GM)		GRAVEL - some sand, trace silt, some cobbles, well graded, no visible ice.
7.0'			
	(ML)		SILT - and ice lenses and inclusions.
9.0'			
			ICE - clear.
14.0'			

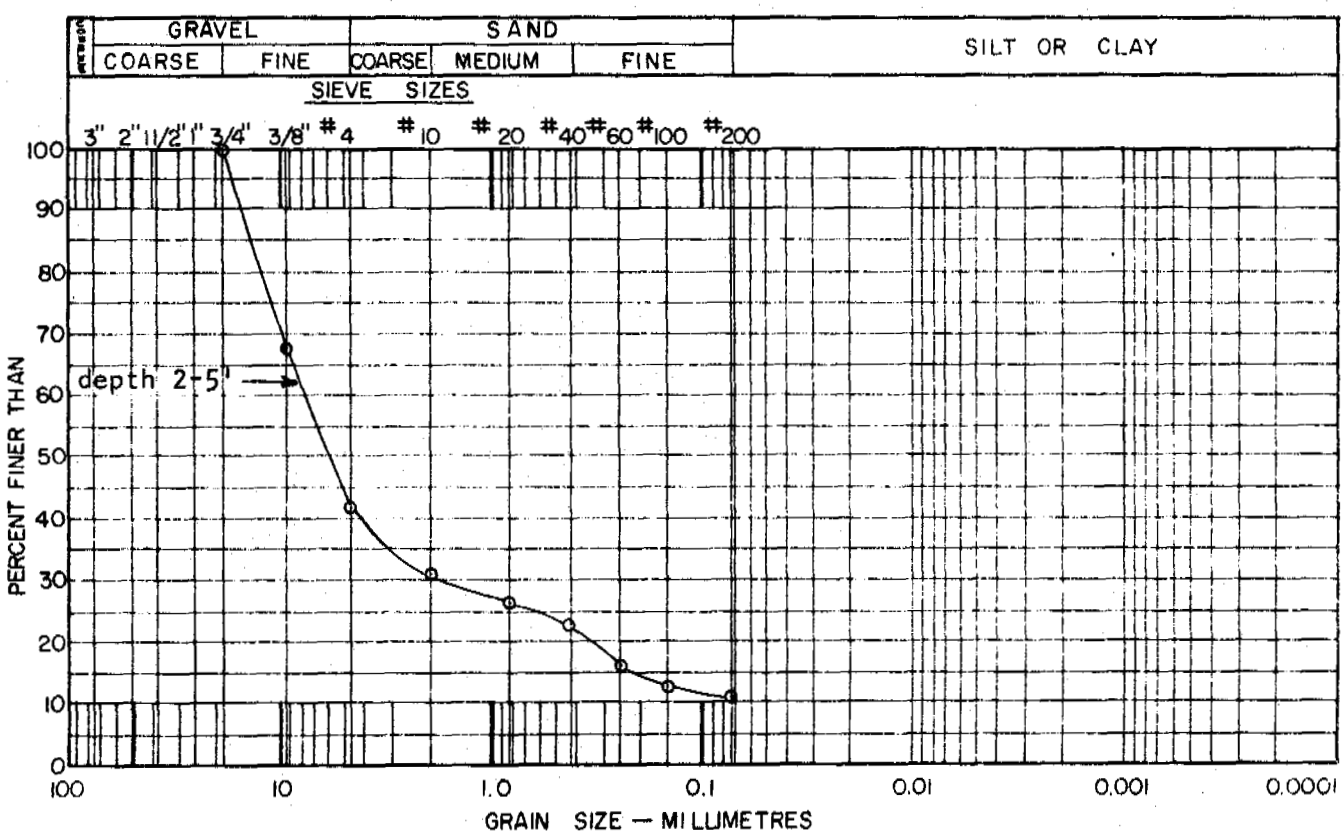
327-3



0'			
	(OL)		SILT - and organics, roots, peat, etc.
2.5'			
			ICE - and silt inclusions.
14.0'			

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 327-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2' 7.0%
Sample 2 depth 5' 6.1%

ORGANIC CONTENT

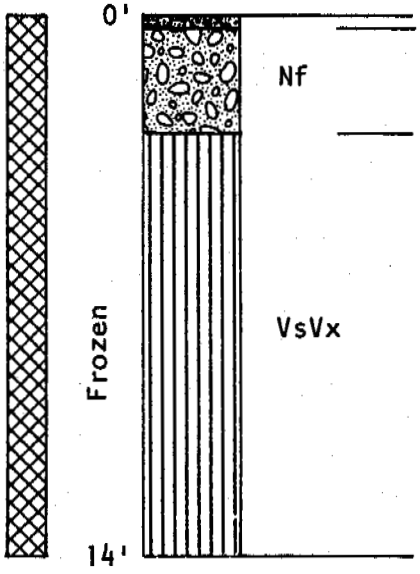
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 327

327-4



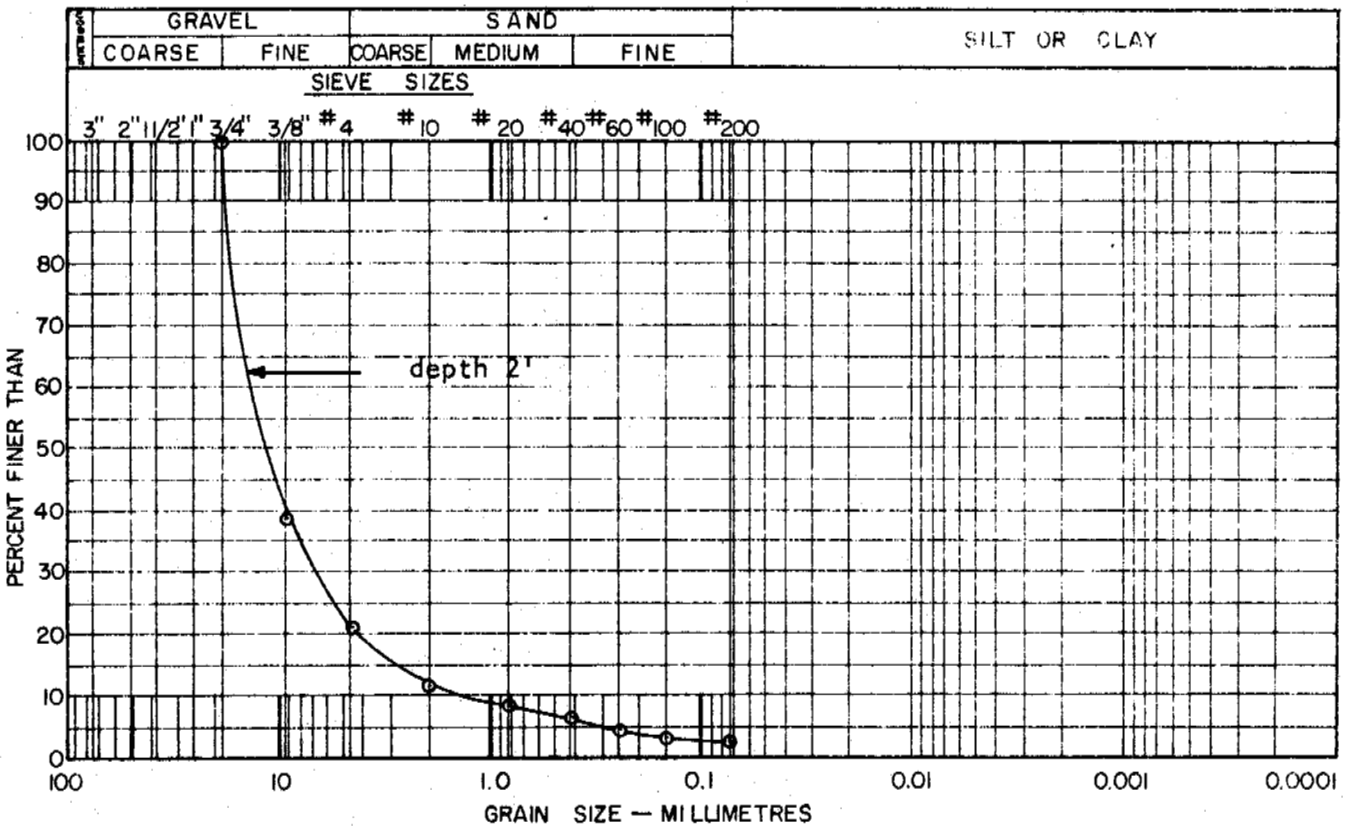
0' – .25' (OL) SILT - and organics, roots, peat, etc.

3.0' – (GW) GRAVEL - and sand, trace silt, well graded, dry and loose, no visible ice.

14.0' – (ML) SILT and ICE lenses and inclusions, low plastic.

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. 327-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2' 4.0%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

ZONE III
SOURCE No. 327

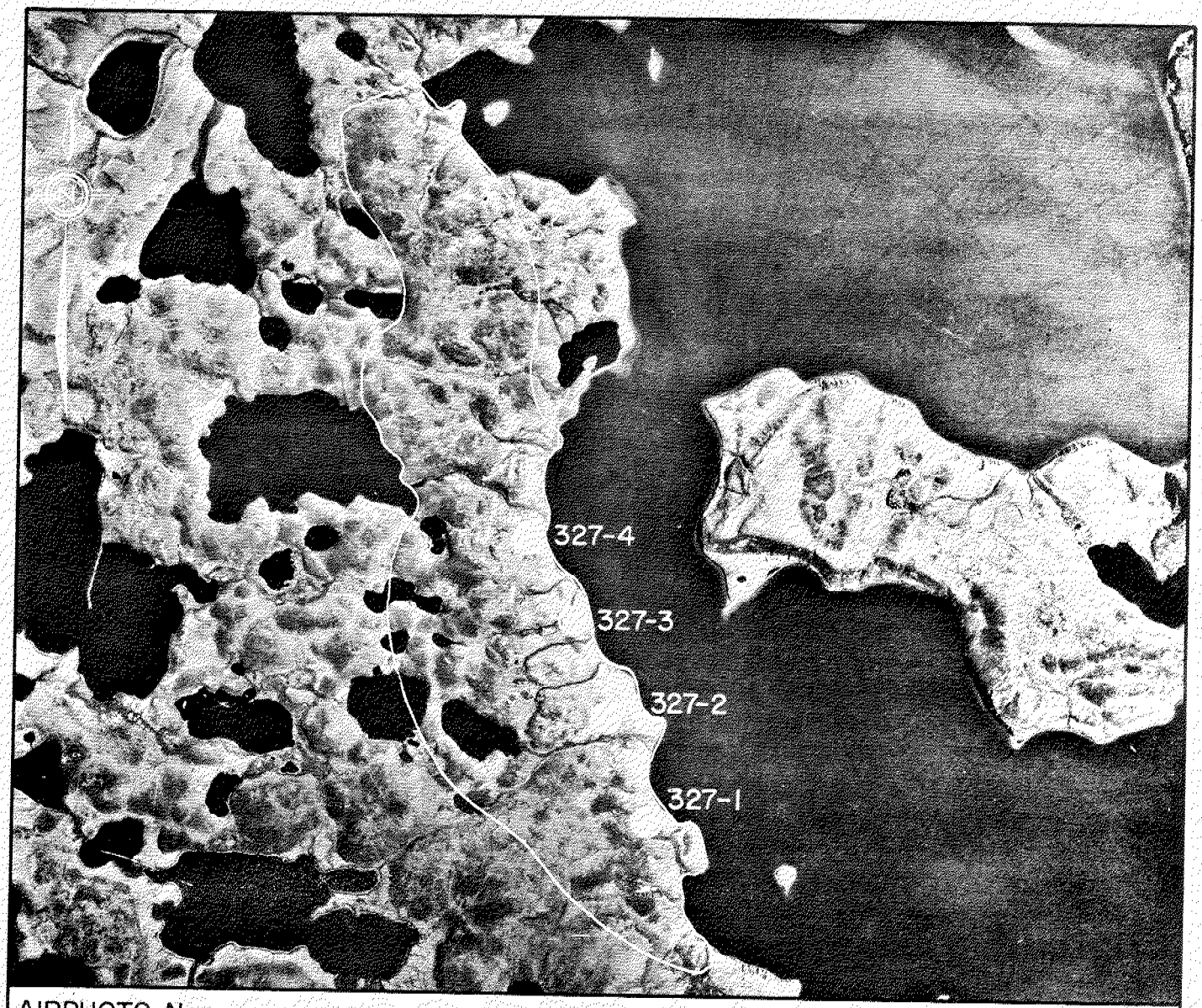
LANDFORM AND LOCATION: Glaciofluvial complex on southwest shore of Eskimo Lakes, 32 miles north of Inuvik.

MATERIAL: GRAVEL - some sand, trace of silt.

VOLUME: 1,000,000 cu. yds. approximately.

CONCLUSION: Low priority for local projects. General fill, road material.

Environmental study required.

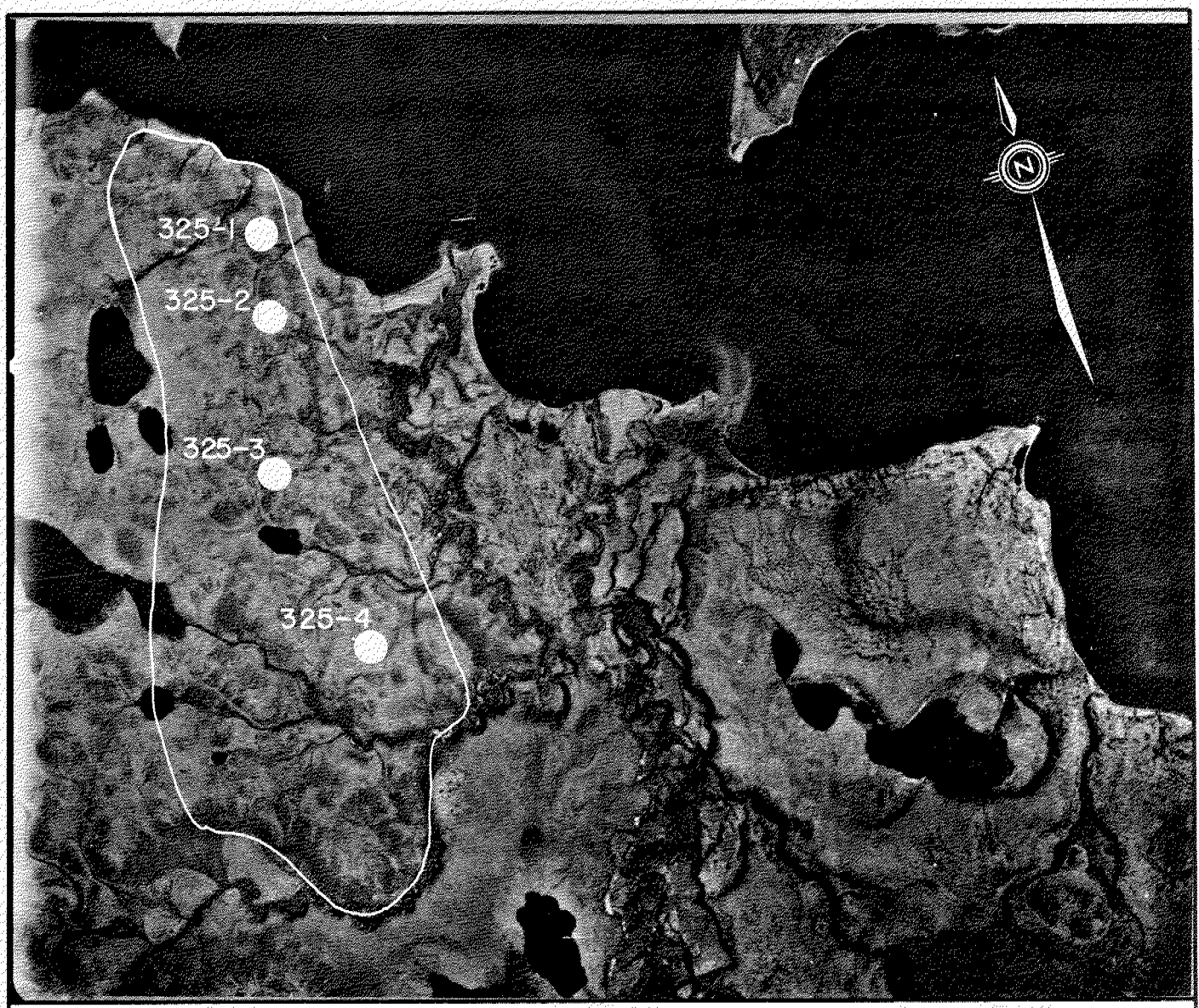


AIRPHOTO No. A22936 - 69

SCALE: 1"= 3000' (approx.)

ZONE III
SOURCE No. 325

LANDFORM AND LOCATION:	A glaciofluvial terrace on the southwest shore of Eskimo Lakes, 30 miles north of Inuvik.
MATERIAL:	GRAVEL - and sand, trace silt.
VOLUME:	500,000 to 1,000,000 cu. yds.
CONCLUSION:	Low priority for development, due to erratic quality of deposit. Environmental study required before development



AIRPHOTO No. A22936 - 138 SCALE: 1"= 3000' (approx.)

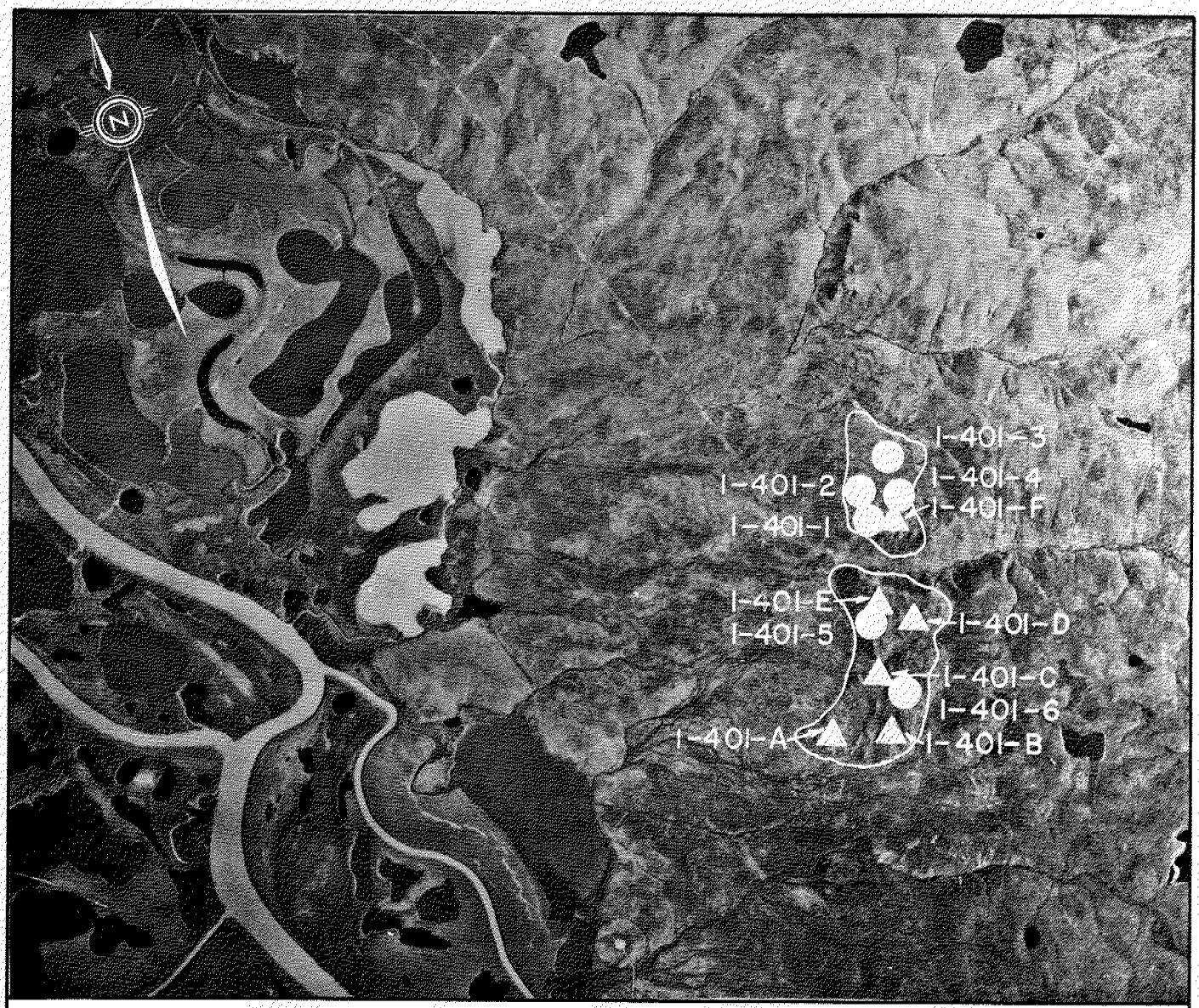
INUVIK
SOURCE No. I-401A

LANDFORM AND LOCATION: A group of small kames in morainal terrain, about 6 miles north of Inuvik.

MATERIAL: SILT -some gravel, some sand.
SAND -some gravel, some silt.

VOLUME: ---

CONCLUSION: This source is not recommended for development because of poor quality and the problems of restoring a large sloping area containing massive ground ice.



AIRPHOTO No. A22936 - 83 SCALE: 1" = 3000' (approx.)

I-401A ENVIRONMENT

Physical

This source is a group of small kames located in rolling morainal terrain about 6 miles north of Inuvik, near the southern end of Caribou Hills. The kames are a series of hillocks 10 to 15 feet high, distributed over an area about 6,000 feet by 2,000 feet that is bisected by a small stream flowing in a deeply incised valley. Flow slides were observed in the upper reaches of this same valley, indicative of the prevalent ground ice. The source slopes toward the Mackenzie Delta, and the surface is well drained.

This source has not been developed.

Biotic

The vegetation in this area is a dense ground cover of moss and some dwarf shrubs. The trees that grew here have been destroyed by forest fires, leaving only the charred stumps.

This source lies within the western boundary of the Mackenzie Reindeer Grazing Reserve, and is 1 mile outside the critical Mackenzie Delta trapping area. It lies on the border of the Inuvik Development Control Zone.

The source is not located in any critical wildlife zone.

I-401A MATERIALS AND QUANTITIES

The material in this source is mainly silt with some sand and some gravel. Some gravel lies on the surface, probably a false indication of the percentage of gravel to be found beneath the surface.

Ice is prevalent, with lensing near the surface and massive ground ice at depth.

325 ENVIRONMENT

Physical

This source is a glaciofluvial terrace on the southwest shore of the Eskimo Lakes about 30 miles north of Inuvik. The terrain is irregular and cut by several gullies. The southern and eastern boundaries of the source are formed by a small stream flowing to the Lakes.

The source is about 3 miles long by 1 mile wide. Drainage is generally good, although small areas of polygonal patterned ground indicate ground ice. The source has not been developed.

Biotic

Vegetative cover in the area consists of moss and grass, with some dwarf shrubs about 1 foot high. Spruce trees as much as 40 feet high can be found in the gullies.

The source is located in a critical wildlife area, the permanent fawning ground of the Reindeer Herd. The area is especially important during the calving period, which must be complete before the herd begins its migration to summer range, although the Herd occupy this area from December 1 to May 15 of most years. This is also part of the Mackenzie Reindeer Grazing Reserve.

The Eskimo Lakes are an important fishery for lake trout, grayling, and whitefish, both as a source of food for the native population and as a potential sport-fishing area. Local inhabitants and tourists fly into the area frequently during the summer.

325 MATERIAL AND QUANTITIES

The material in this source is very erratic. Test Holes #2 and #4 encountered massive ice at shallow depths without encountering any granular material. The other two holes indicated substantial depths of gravel. The grading reported for Test Hole #1 is 53% gravel, 44% sand, and 3% silt. Test Hole #3 indicated similar material, but here the granular material is covered by 3½ feet of silt and ice.

327 ENVIRONMENT

Physical

This source is a glaciofluvial deposit located on the southwest shore of Eskimo Lakes, 32 miles north of Inuvik. The source is about 2 miles long and 3,000 feet wide.

The surface of the source is irregular, with many hillocks and small gullies draining to the Lake from the numerous small lakes located on the western side. Some areas show a polygonal ground pattern.

The drainage of the granular material is good, and the source has not been developed.

Biotic

Vegetative cover in this area consists of moss and lichens, with scattered dwarf shrubs.

The source is located in a critical wildlife area, the permanent fawning ground of the Reindeer Herd. The area is especially important during the calving period, which must be complete before the Herd begins its migration to summer range, although the Herd occupy this area from December 1 to May 15 of most years. This is also part of the Mackenzie Reindeer Grazing Reserve.

The Eskimo Lakes are an important fishery for lake trout, grayling, and whitefish, both as a source of food for the native population and as a potential sport-fishing area. Local inhabitants and tourists fly into the area frequently during the summer.

327 MATERIALS AND QUANTITIES

This source is very erratic. Test Hole #1 penetrated 23 feet of well-graded gravel and sand, but above the gravel is 7 feet of frozen silt. All four holes penetrated ice-rich silt or clear ice. Wherever gravel was exposed near the surface it was found to be a shallow deposit.

Where gravel was encountered it was practically free of ice. The moisture contents in Test Hole #1 varied from 4½% to 5½% in the gravel

I-401A DEVELOPMENT

General

Because of the poor quality of material and the massive ground ice discovered in some test-holes, this source is not recommended for development. The area slopes toward the Delta, and disturbance of the insulating cover over the ground ice would lead to sloughing that would be difficult to stabilize.

Access

Access to this area can be accomplished by winter road, following the east channel for about 6 miles from Inuvik and then going up the hill about 2 miles to the source. A summer access road could be extended about 3 miles from the Canadian Forces Establishment, to complete a road of 8 miles terminating in Inuvik.

Material Use and Handling

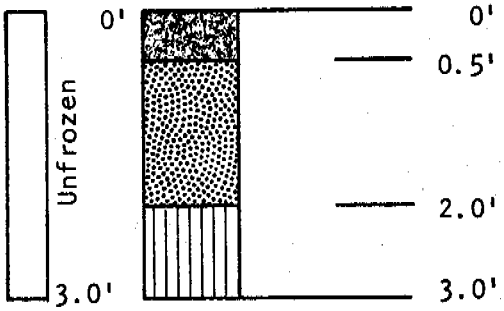
The material in this source is a poor grade of general fill. If excavated this material would have to be thawed, drained and dried before it could be used.

Stripping and Restoration

If stripping of this source were attempted and the underlying massive ground ice exposed, thermal erosion of slopes could be a very serious problem requiring extensive restoration of the area. Therefore development of the source is not recommended.

TEST PIT LOGS
SOURCE No. I-401A

I-401A-A

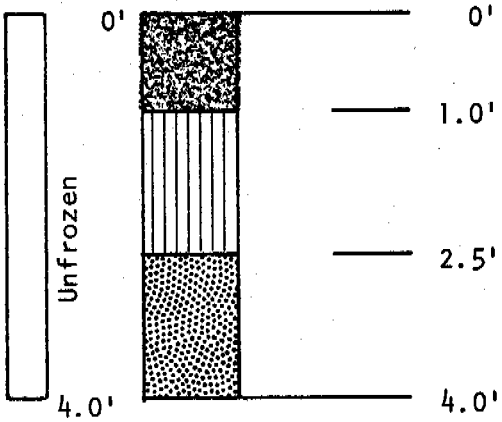


(OL) SILT - organic, trace sand

(SM) SAND - and gravel, little silt, well graded, max 3/4" gravel, non-plastic fines, brown

(ML) SILT - and sand, fine, uniform, non-plastic, brown

I-401A-B

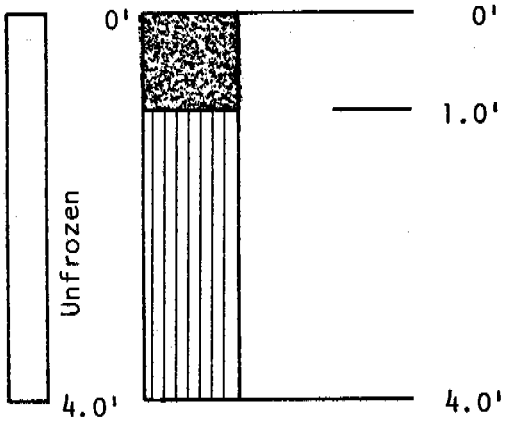


(OL) SILT - organic

(ML) SILT - trace clay, low plastic, brown

(SW-SM) SAND - some gravel, trace silt, well graded, brown

I-401A-C



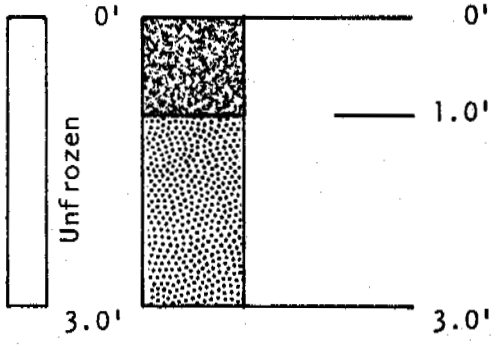
(OL) SILT - organic, and peat

(ML) SILT - and sand, trace gravel, low plastic, grayish brown

TEST PIT LOGS

SOURCE No. I-401A

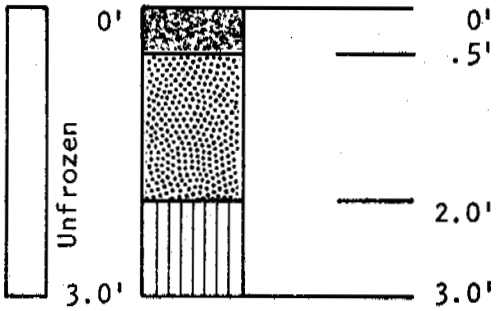
I-401A-D



(OL) SILT - organic, moss, trace sand

(SM) SAND - some gravel, some silt, well graded, low plastic. greyish brown

I-401A-E

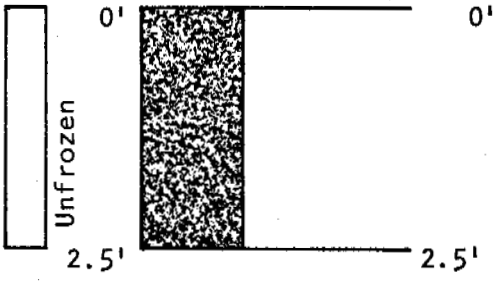


(OL) SILT - organic, moss

(SW-SM) SAND - and gravel, trace silt, well graded, max 3/4", gravel, brown

(ML) SILT - and sand, fine, uniform, saturated, nonplastic

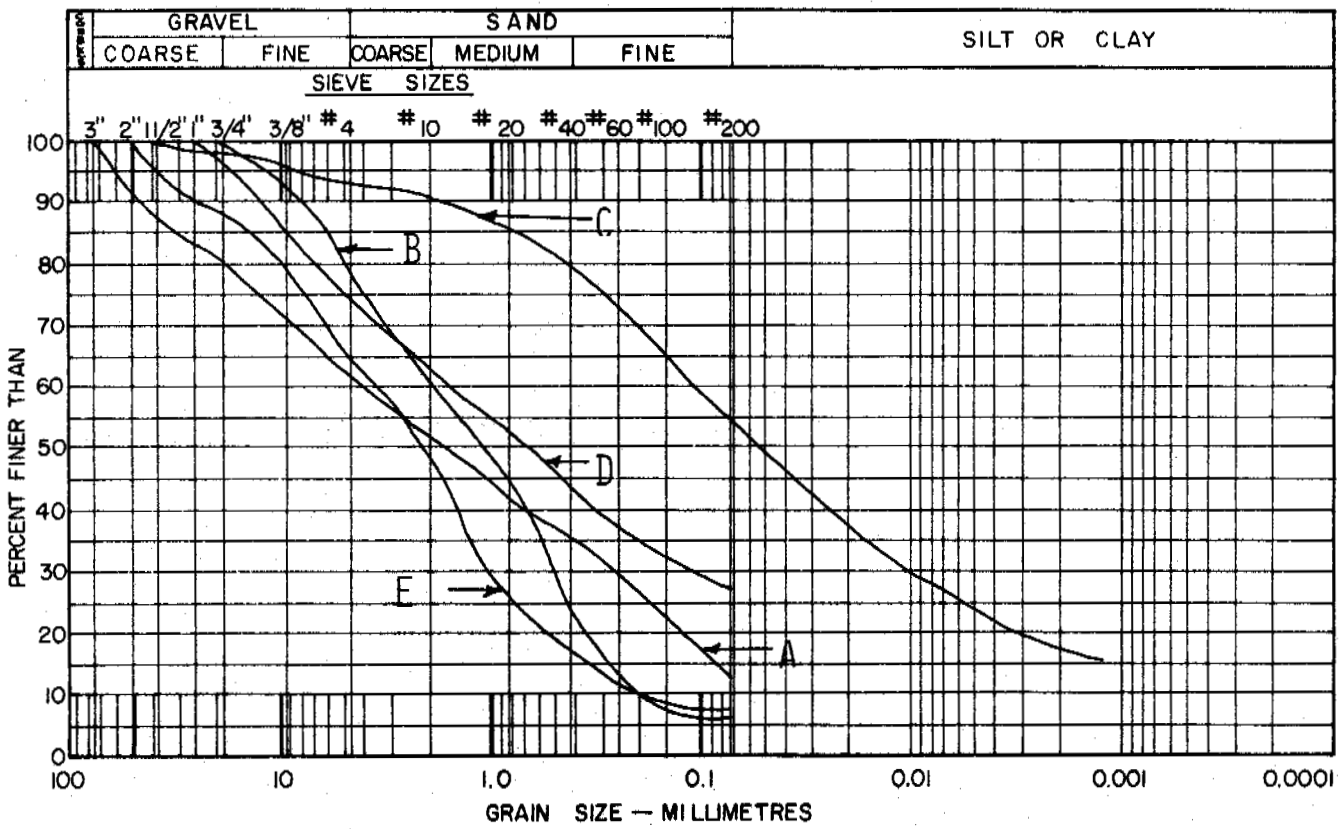
I-401A-F



(OL) SILT - organic, little sand, trace fine gravel

LABORATORY
TEST DATA
TEST PIT - SOURCE No. I-401A

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Test Pit A	Depth 0.5' - 2'	7.4%	
Test Pit A	Depth 2' - 3'	12.8%	
Test Pit B	Depth 1' - 2.5'	16.0%	
Test Pit B	Depth 2.5' - 4'	5.6%	
Test Pit C	Depth 1' - 4'	16.0%	
Test Pit D	Depth 1' - 3'	9.9%	
Test Pit E	Depth 0.5' - 2'	6.0%	

ORGANIC CONTENT

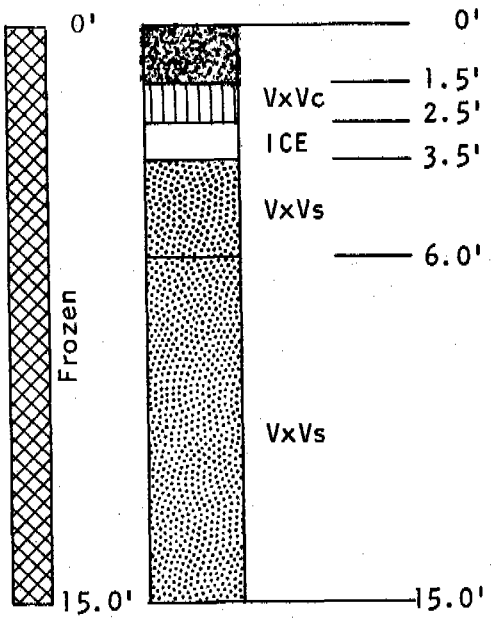
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. I-401A

I-401A-1



(OL) SILT - organic, peat, roots.

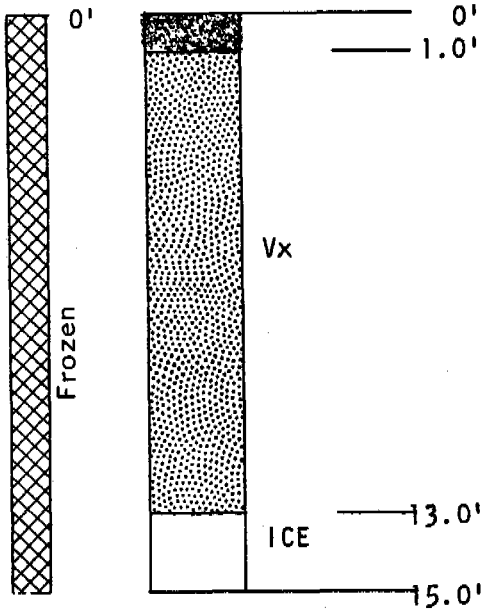
(ML) SILT - trace gravel, trace sand, ice crystals

ICE - clear

(SM) SAND - little gravel, some silt, low plastic, ice lensing & inclusions

(SM) SAND - and gravel, little silt, ice lensing & inclusions

I-401A-2



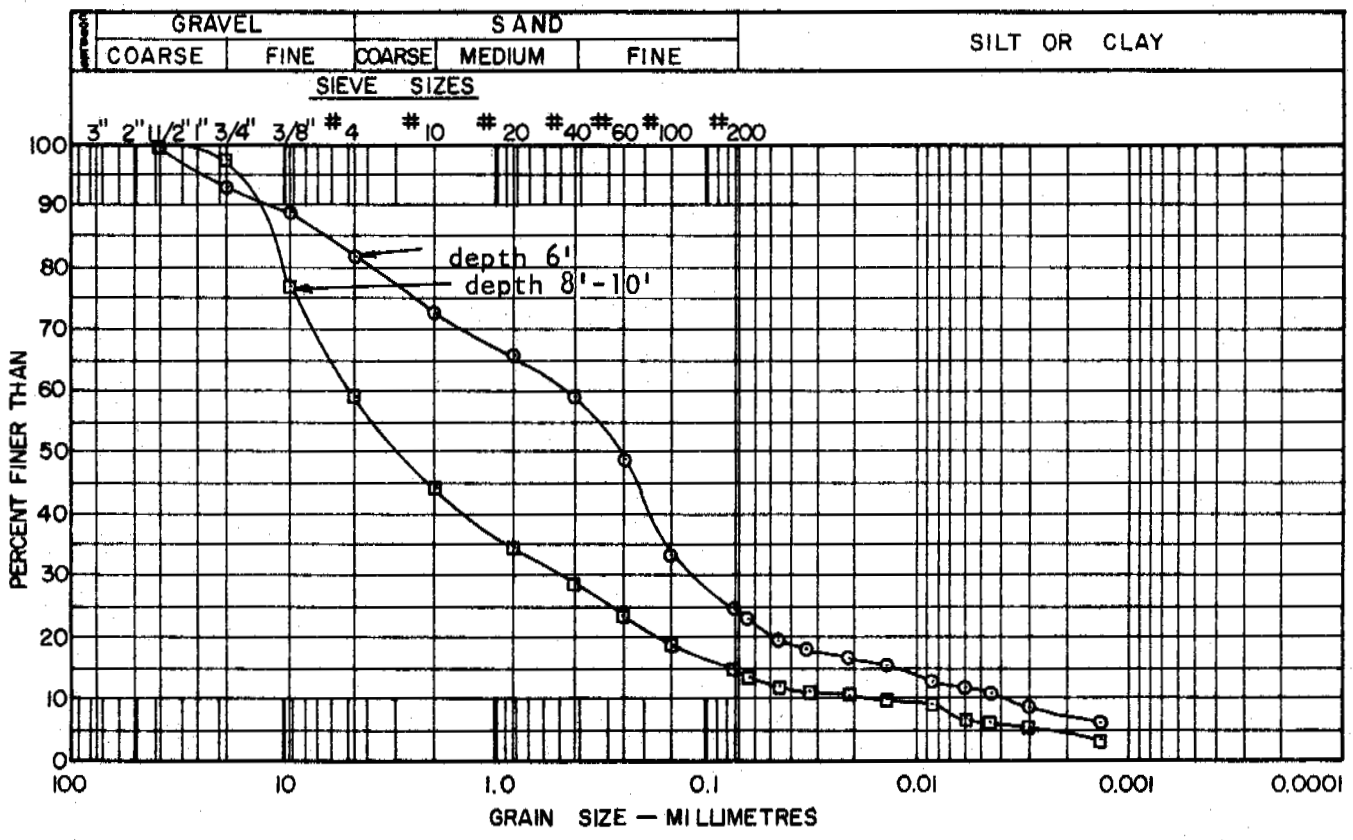
(OL) SILT - organic, peat, roots etc.

(SM) SAND - little gravel, some silt, non-plastic, ice lenses to 3"

ICE - trace soil inclusions

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. I-401A-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth	2'	21.8%
Sample 2 depth	4'	33.6%
Sample 3 depth	6'	14.2%
Sample 4 depth	8'	11.1%
Sample 5 depth	10'	14.1%

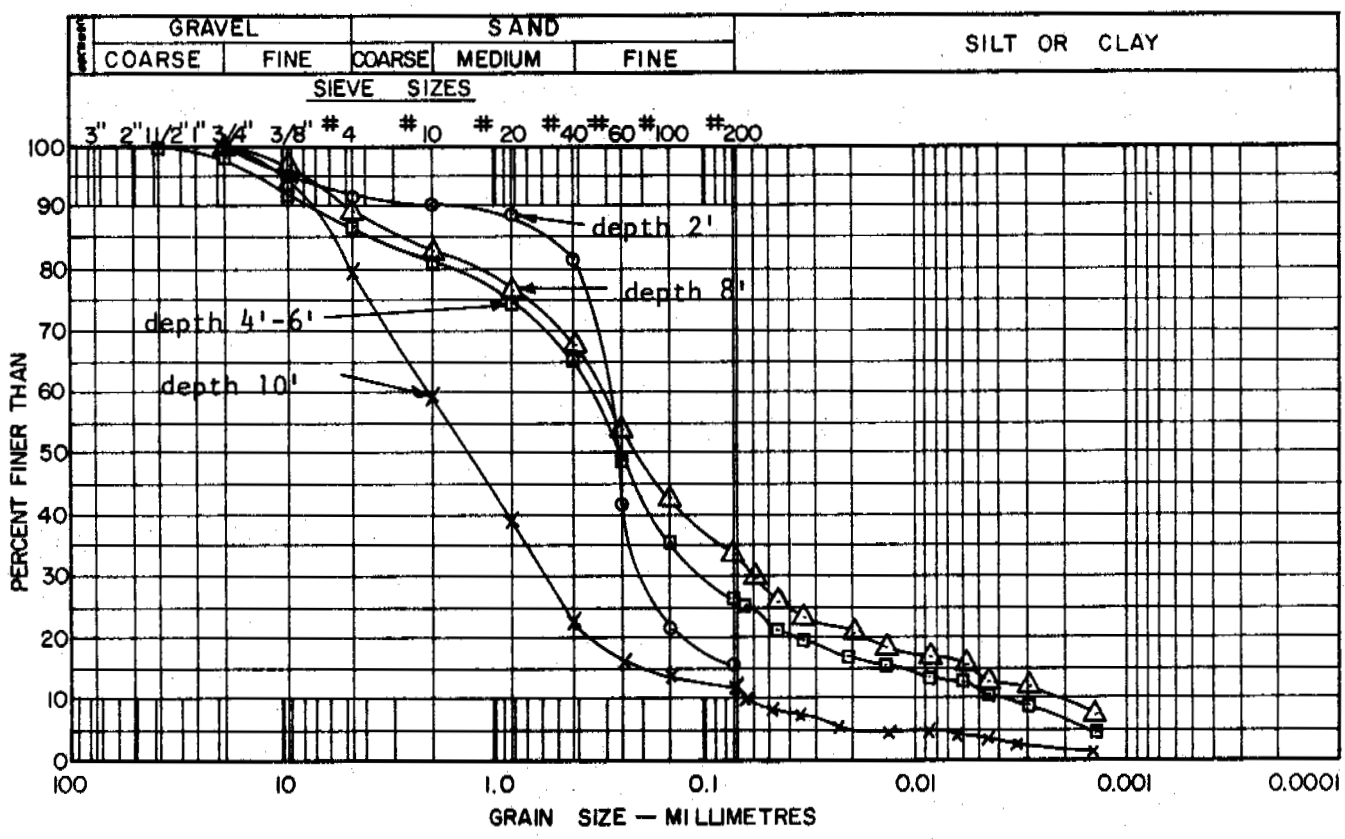
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. I-401A-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	8.3%
Sample 2	depth 4'	11.2%
Sample 3	depth 6'	19.1%
Sample 4	depth 8'	19.4%
Sample 5	depth 10'	15.2%

ORGANIC CONTENT

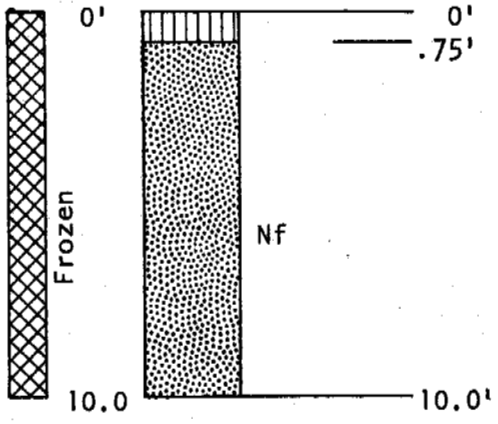
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. I-401A

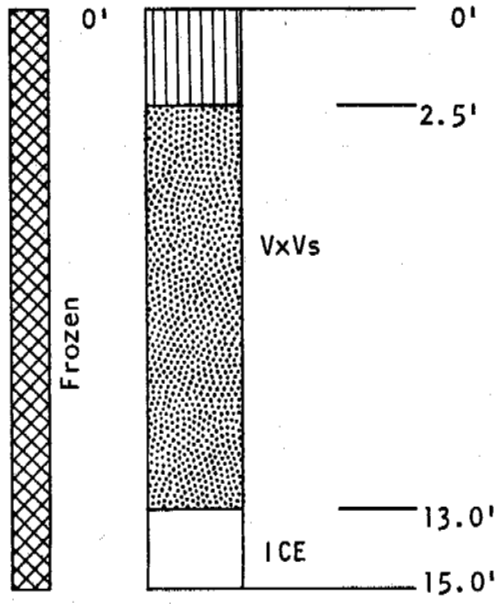
I-401A-3



(OL) SILT - organic, roots, peat

(SW-SM) SAND - some gravel trace silt, well graded, dry and loose, no visible ice

I-401A-4



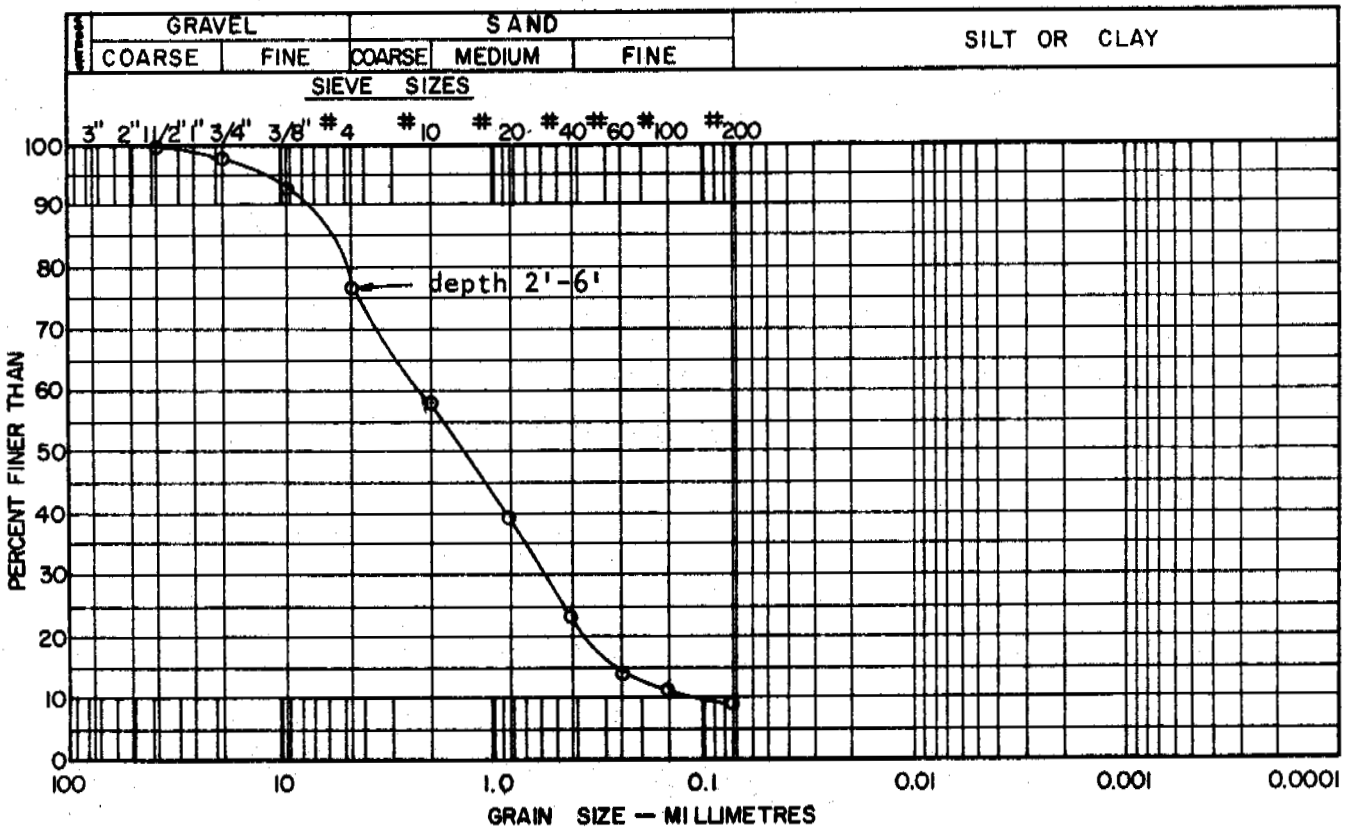
(OL) SILT - organic, roots, peat

(SM) SAND - some gravel, some silt, nonplastic, ice lenses & inclusions

ICE - trace soil inclusions

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. I-401A-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth	2'	5.3%
Sample 2 depth	4'	5.7%
Sample 3 depth	6'	5.0%

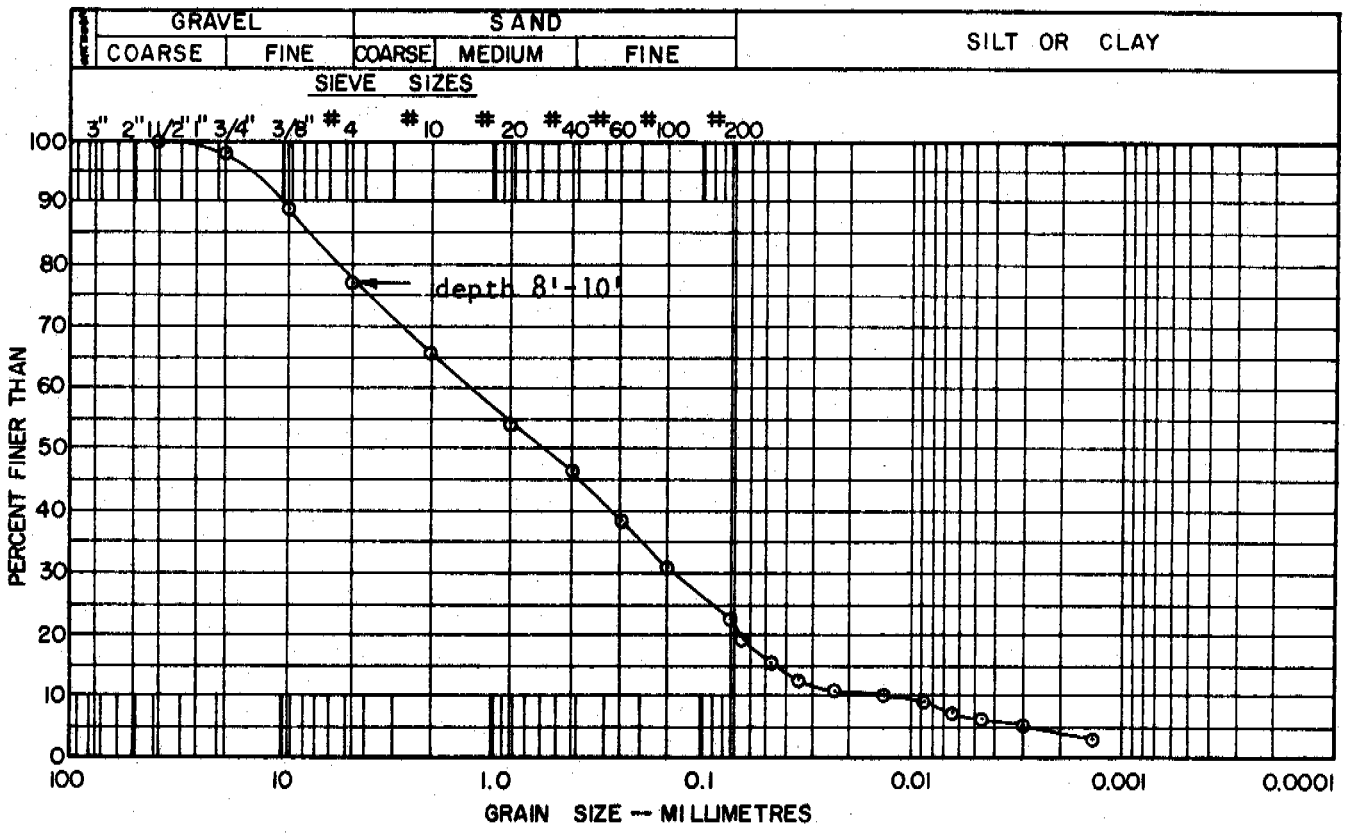
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. I-401A-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth	2'	130.7%
Sample 2 depth	4'*	27.5%
Sample 3 depth	6'*	19.9%
Sample 4 depth	8'	18.8%
Sample 5 depth	10'	15.3%

*Bag leaked

ORGANIC CONTENT

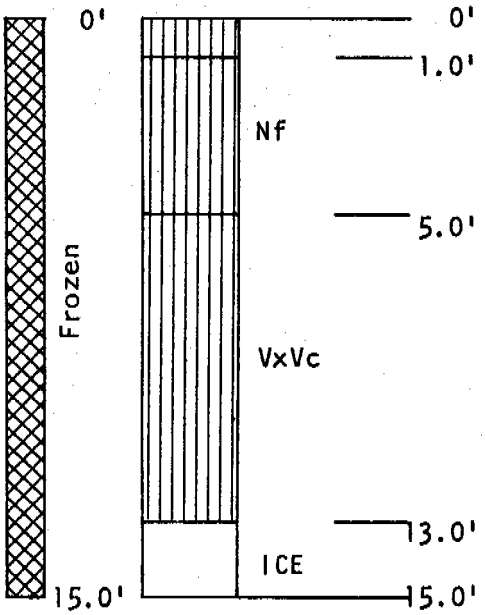
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. I-401A

I-401A-5



(OL) SILT - organic, roots, peat

(ML) SILT - some fine gravel, some sand low to med plastic, dry, no visible ice

(ML) SILT - some fine gravel, some sand low plastic, ice

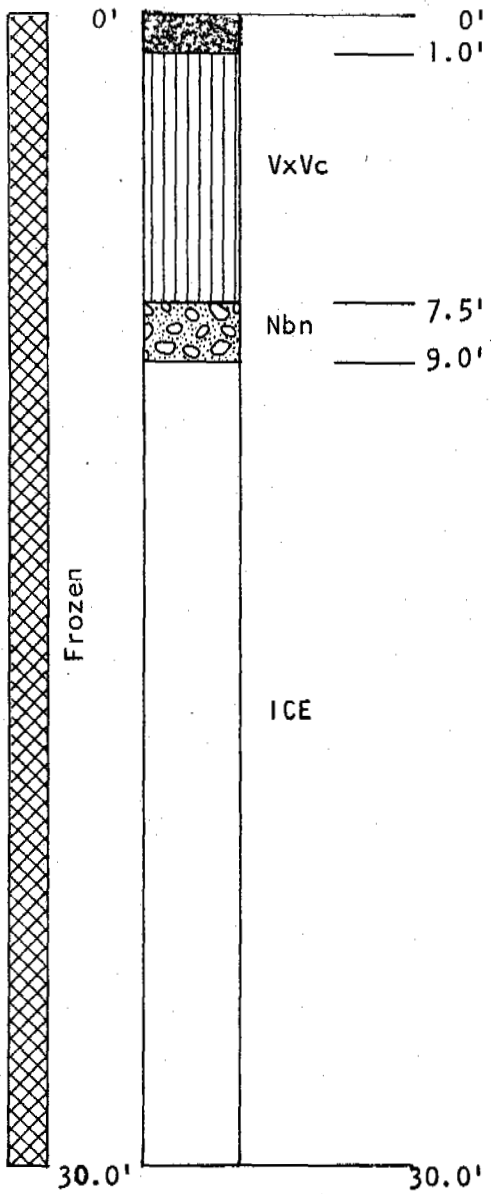
ICE - trace soil inclusions

Sample 1	depth 2'	12.8%
Sample 2	depth 4'	13.1%
Sample 3	depth 6'	23.9%
Sample 4	depth 8'	18.7%

TEST HOLE LOGS

SOURCE No. I-401A

I-401A-6



0' – 1.0'	(OL)	SILT - organic roots, peat
VxVc	(ML)	SILT - trace gravel, trace sand, med plastic, ice crystals and coatings
Nbn 7.5' – 9.0'	(GM)	GRAVEL - some sand, some silt, well graded, no visible ice
ICE		ICE - some silt lenses to 1½" thick

Sample 1 depth 2' 15.8%
Sample 2 depth 4' 20.3%
Sample 3 depth 6' 18.2%
Sample 4 depth 8' 9.1%

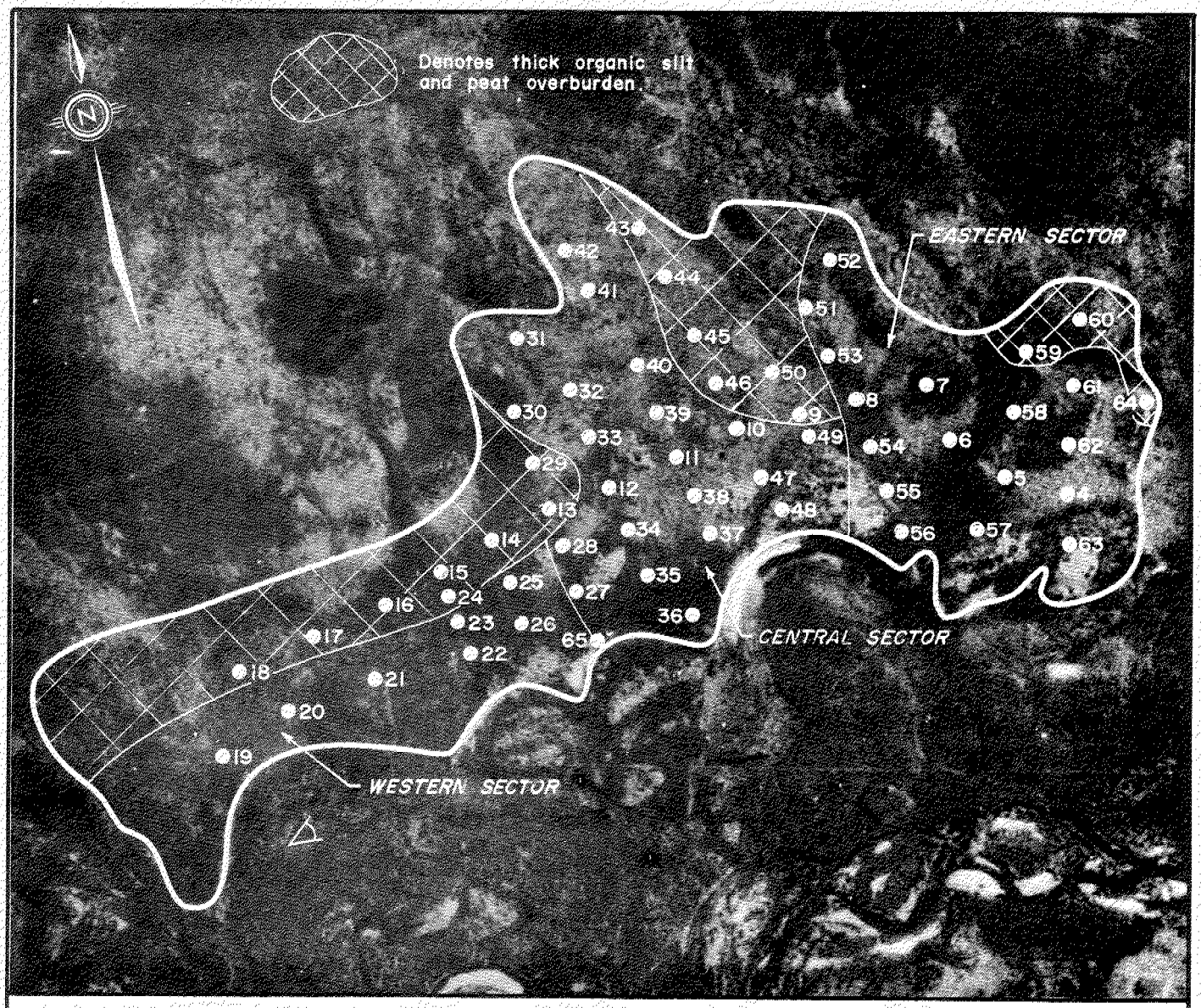
PARSONS LAKE
SOURCE No. 1

LANDFORM AND LOCATION: River terrace located 3 miles southeast of Parsons Lake and 5 miles west of Eskimo Lakes.

MATERIAL: GRAVEL - and sand, trace silt, trace cobbles, variable.

VOLUME: 1,000,000 cubic yards.

CONCLUSION: Largest source of granular material proven up during the investigation. Suitable for large scale development. Materials and ice conditions vary within wide limits.



AIRPHOTO No. A22936-34 SCALE : 1" = 500' (approx.)

Klohn Leonoff Consultants Ltd.

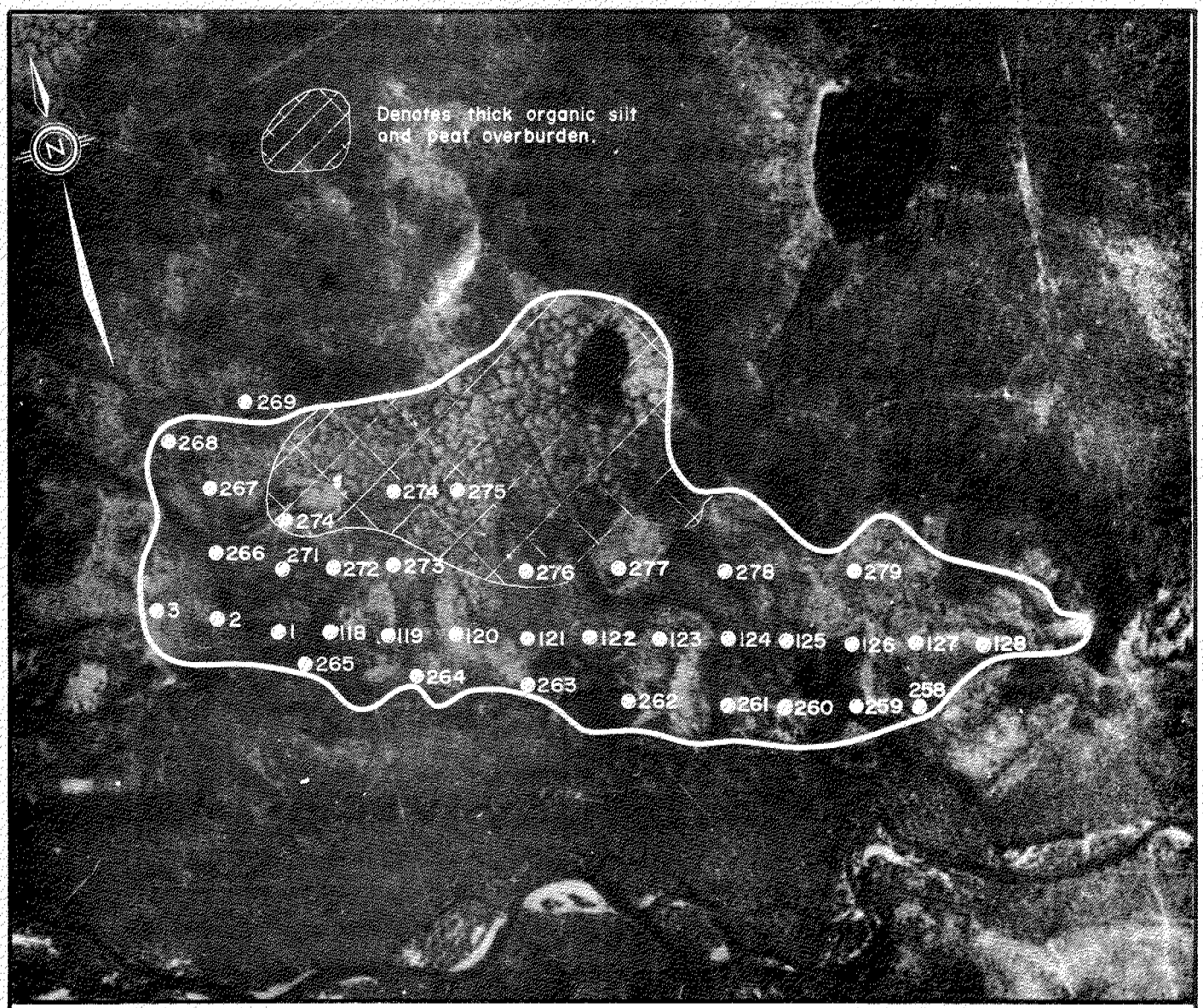
PARSONS LAKE
SOURCE No. 2

LANDFORM AND LOCATION: River terrace located 3 miles southeast of Parsons Lake and 5 miles west of Eskimo Lakes.

MATERIAL: GRAVEL - some sand, trace silt, trace cobbles.

VOLUME: 250,000 cubic yards.

CONCLUSION: Material is generally clean and fairly well graded with a low ice content. The average thickness of the gravel stratum is only 8 feet. This source should be considered for development upon depletion of Source 1 to confine the gravel operation to this general locality.



AIRPHOTO No. A22936-34 SCALE : 1" = 500' (approx.)

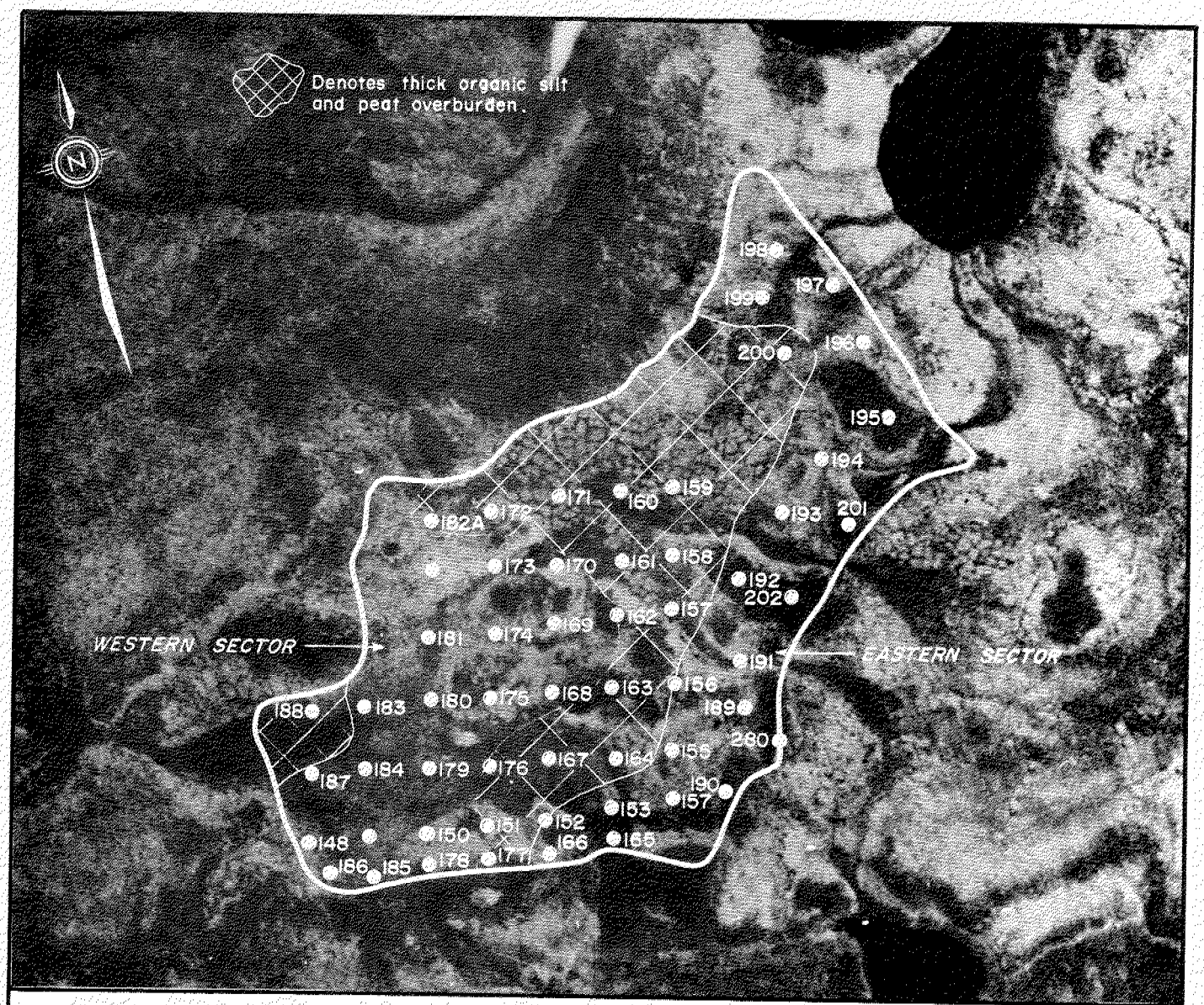
PARSONS LAKE
SOURCE No. 3

LANDFORM AND LOCATION: River terrace located 5 miles southeast of Parsons Lake and 1 mile west of Eskimo Lakes.

MATERIAL: GRAVEL - and sand, trace silt.

VOLUME: 370,000 cubic yards.

CONCLUSION: This is the third source of gravel and sand proven up during the investigation and should be considered for development upon depletion of Sources 1 and 2.



AIRPHOTO No. A22936-68 SCALE : 1" = 500' (approx.)

Klohn Leonoff Consultants Ltd.

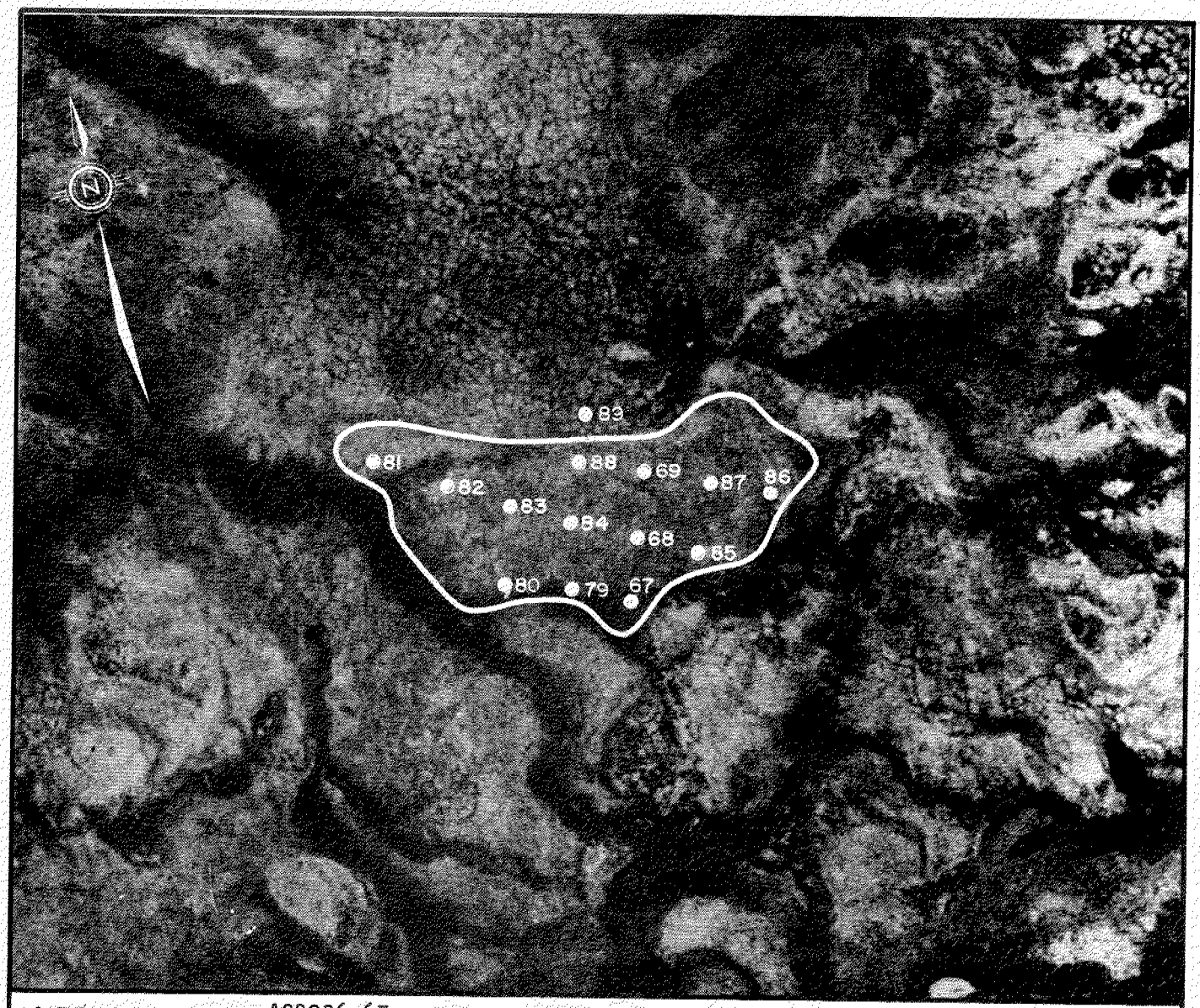
PARSONS LAKE
SOURCE No. 4

LANDFORM AND LOCATION: A high terrace located 5 miles southeast of Parsons Lake and 2 miles west of Eskimo Lakes.

MATERIAL: GRAVEL AND SAND - trace silt.

VOLUME: 200,000 cubic yards.

CONCLUSION: Source is recommended as a low priority development because of thickness of overburden and limited volume of usable material.



AIRPHOTO No. A22936-67 SCALE : 1" = 500' (approx.)

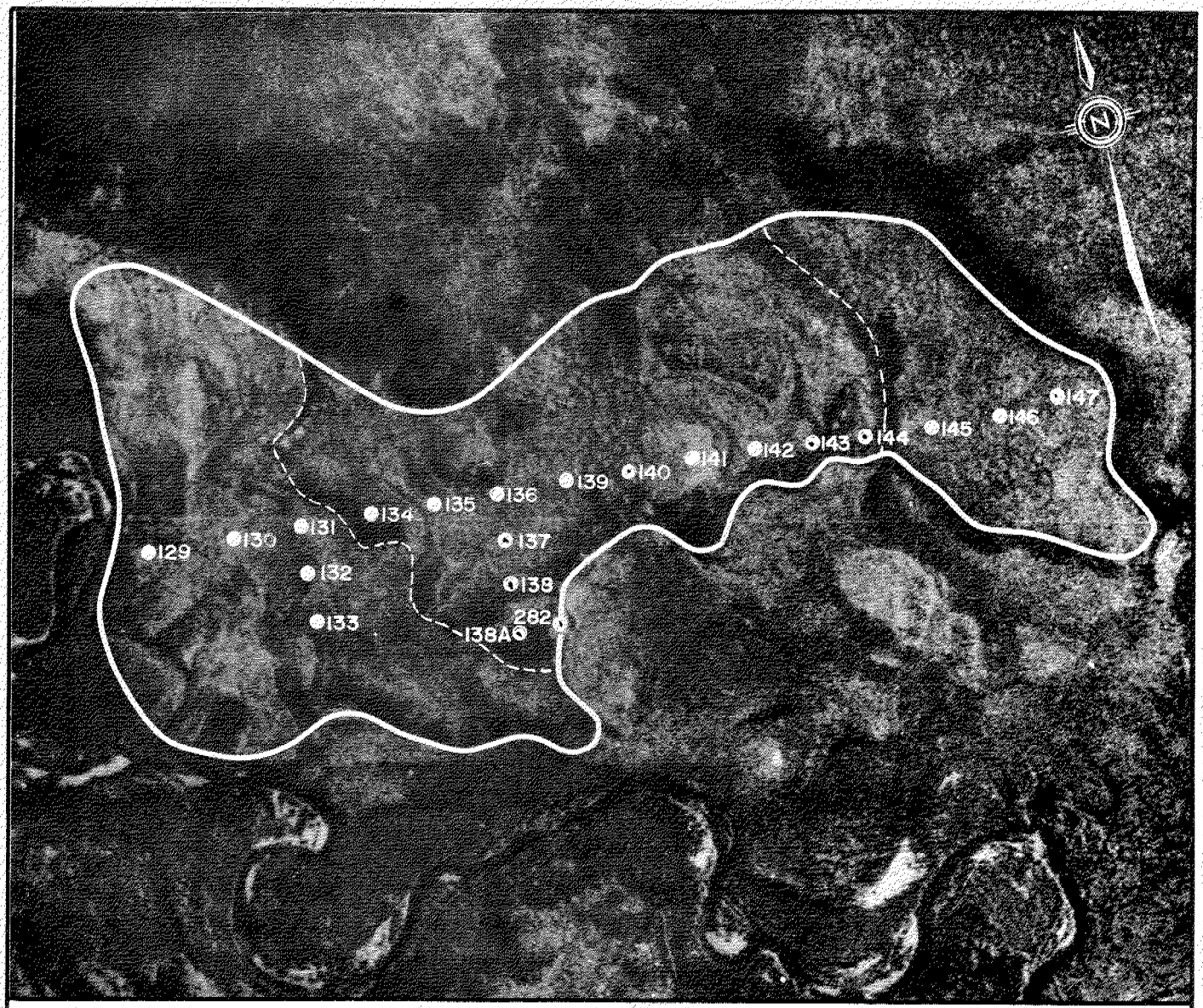
PARSONS LAKE
SOURCE No. 7

LOCATION AND LANDFORM: River terrace located 5 miles southeast of Parsons Lake and 3 miles west of Eskimo Lakes.

MATERIAL: GRAVEL - and sand, trace cobbles, trace silt.

VOLUME: Not established.

CONCLUSION: Additional test hole drilling necessary to determine the quantity of granular materials in source.



AIRPHOTO No. A22936-34 SCALE : 1" = 500' (approx.)

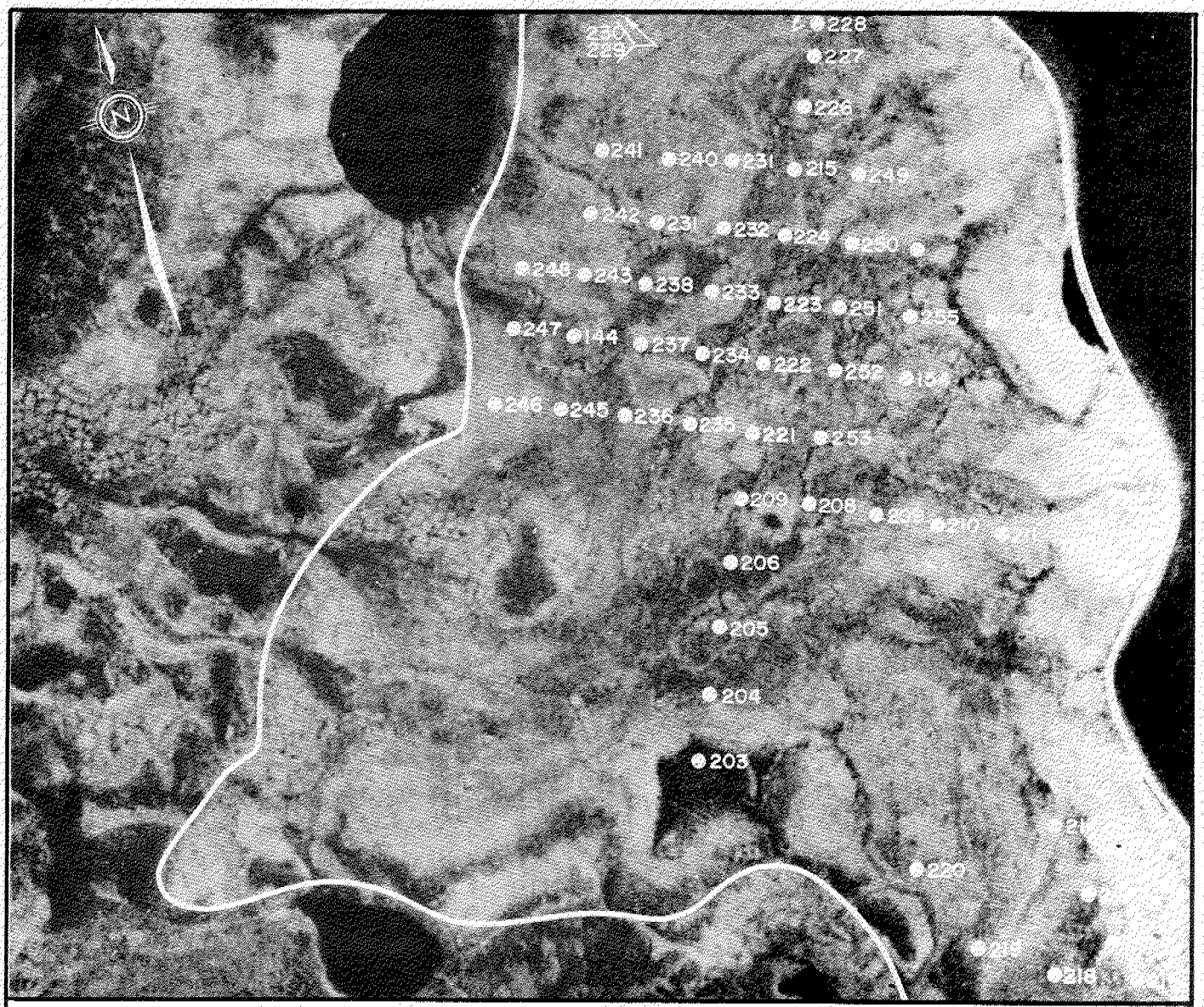
PARSONS LAKE
SOURCE No. 8

LOCATION AND LANDFORM: River terrace located adjacent to the western shores of Eskimo Lakes, 5 miles southeast of Parsons Lake.

MATERIAL: GRAVEL - and sand, trace silt, variable.

VOLUME: 100,000 cubic yards.

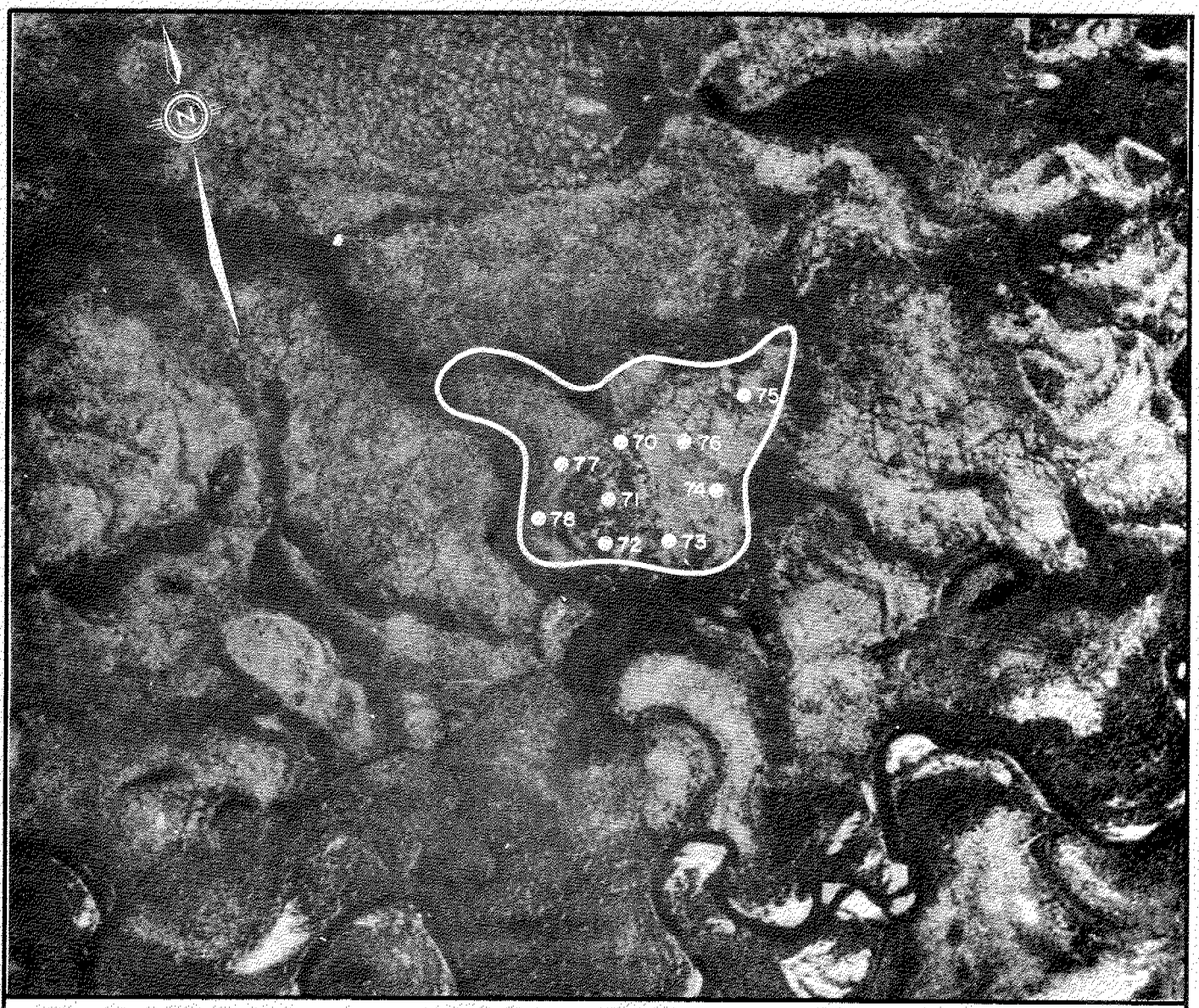
CONCLUSION: The underlying fluvial soils are highly variable. The source is not recommended for development.



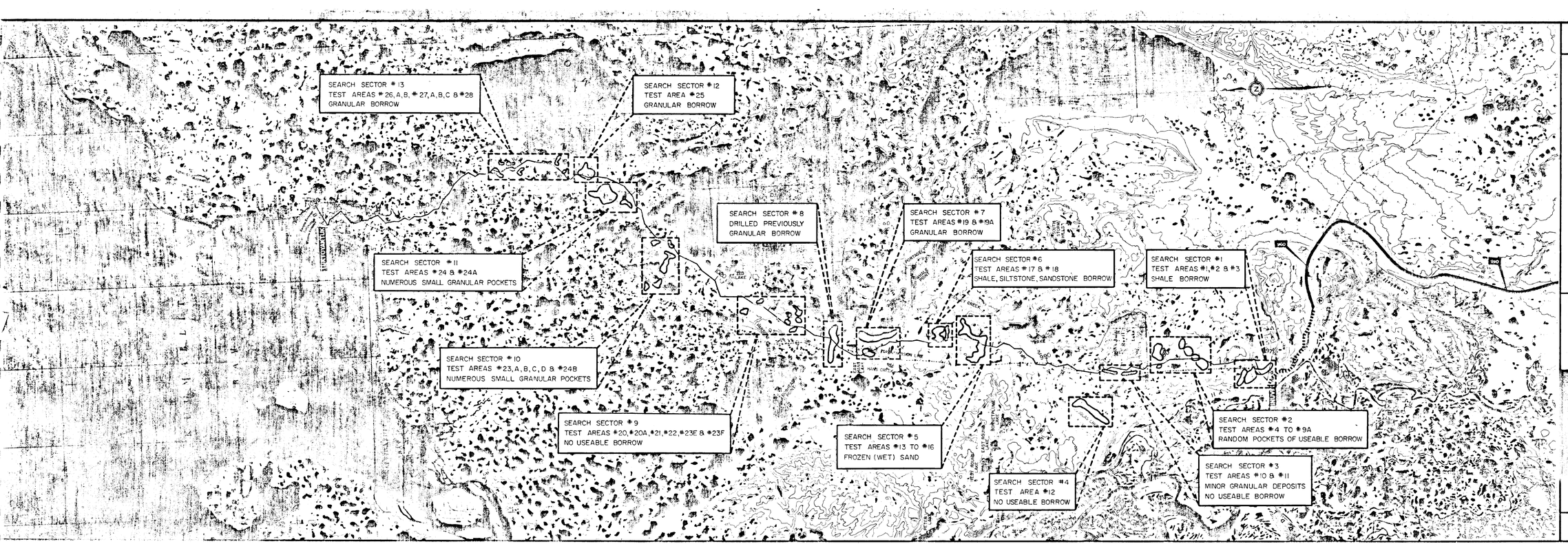
AIRPHOTO No. A22936-68 SCALE : 1" = 500' (approx.)

PARSONS LAKE
SOURCE No. 9

LOCATION AND LANDFORM:	A high river terrace located 5 miles southeast of Parsons Lake and 2 miles west of Eskimo Lakes.
MATERIAL:	GRAVEL - and sand, trace silt, variable.
VOLUME:	50,000 cubic yards.
CONCLUSION:	Development is not recommended due to the variable overburden materials, and the relatively thin underlying gravel stratum.



AIRPHOTO No. A22936-67 SCALE : 1" = 500' (approx.)



PUBLIC WORKS CANADA
WESTERN REGION

Legend

- Highway (constructed)
- Highway (under construction)
- Highway (proposed)
- Highway mile post
- Power transmission line
- Parsons Lake Gas Field

Revision /date

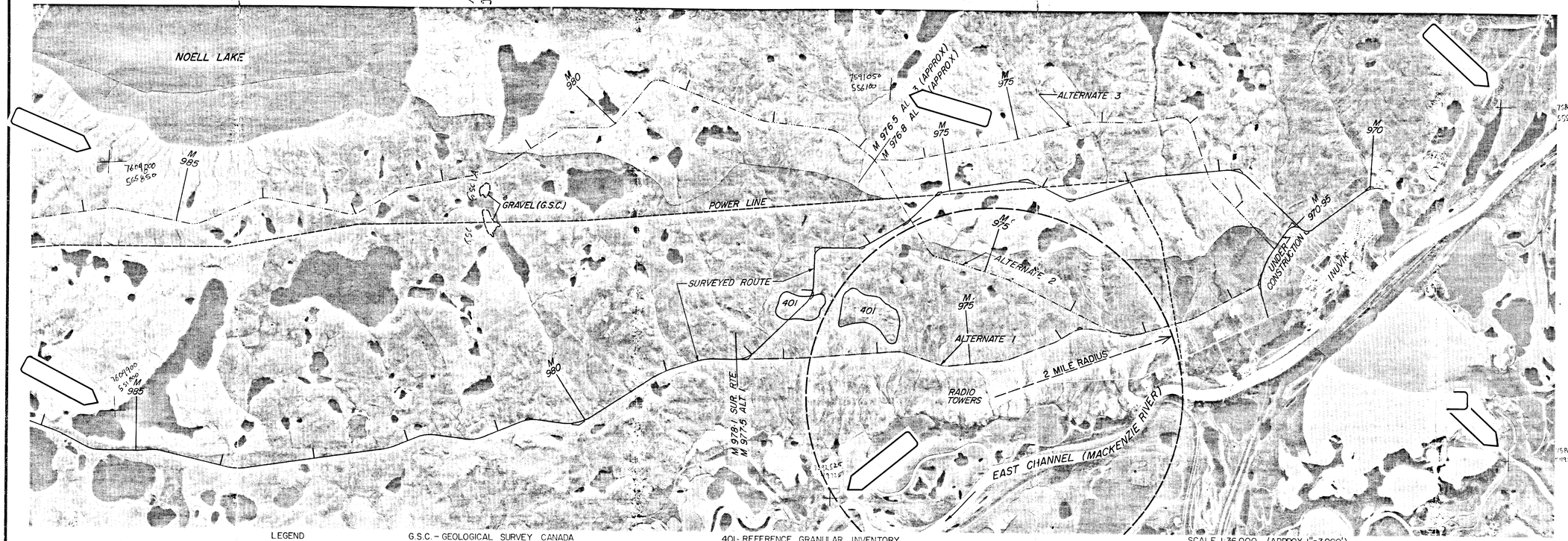
REVISED DATE DEC. 18, 1975

Scale 1:250,000

Miles 0 5 Miles

Kilometres 0 5 Kilometres

DATE APRIL 1975



LEGEND

G.S.C. – GEOLOGICAL SURVEY CANADA

401 – REFERENCE GRANULAR INVENTORY

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

Public Works Canada / Travaux publics Canada

WESTERN REGION

A detail no. / détail no.

B location drawing no. / sur dessin no.

C drawing no. / dessin no.

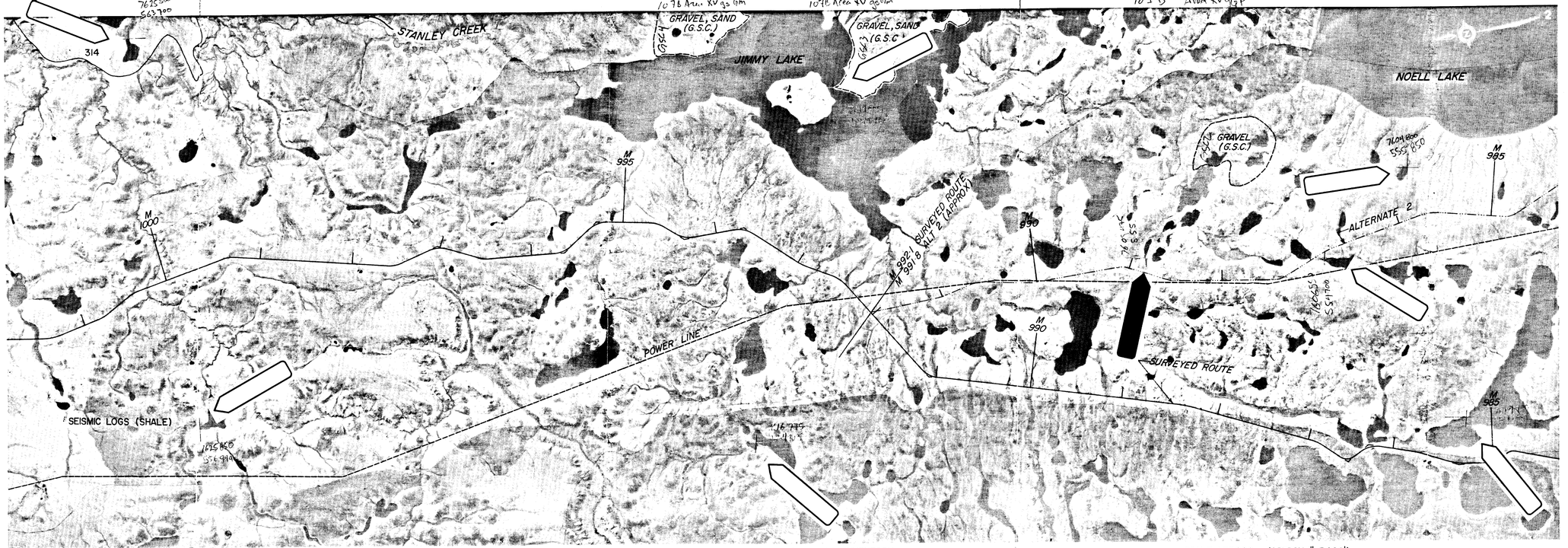
revisions / date

LEGEND

G.S.C. – GEOLOGICAL SURVEY CANADA

LEGEND G.S.C. - GEOLOGICAL SURVEY CANADA

401 - REFERENCE GRANULAR INVENTORY



LEGEND G.S.C. - GEOLOGICAL SURVEY CANADA

401 - REFERENCE GRANULAR INVENTORY

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

401 - REFERENCE GRANULAR INVENTORY

project title / titre du projet

mackenzie highway

drawing title / titre du dessin

UNCONTROLLED MOSAICS

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

designed by / conçu par

date

drawn by E.E. PETERS / dessiné par

date

reviewed by / examiné par

date

approved by / approuvé par

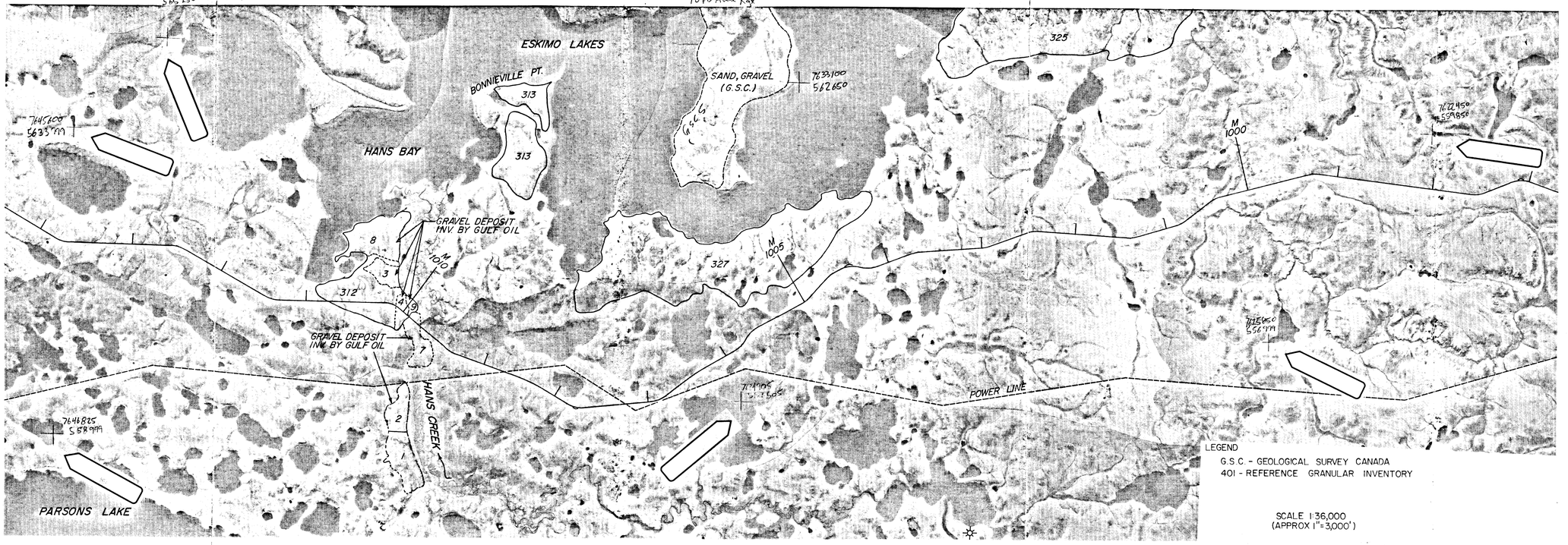
date

Tender / Soumission

D.P.W. Project Manager / Administrateur de projets M.T.P.

project number / no. du projet

drawing no. / dessin no.



LEGEND

G.S.C. - GEOLOGICAL SURVEY CANADA

401 - REFERENCE GRANULAR INVENTORY

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

Public Works Canada / Travaux publics Canada

WESTERN REGION

A detail no. / détail no.

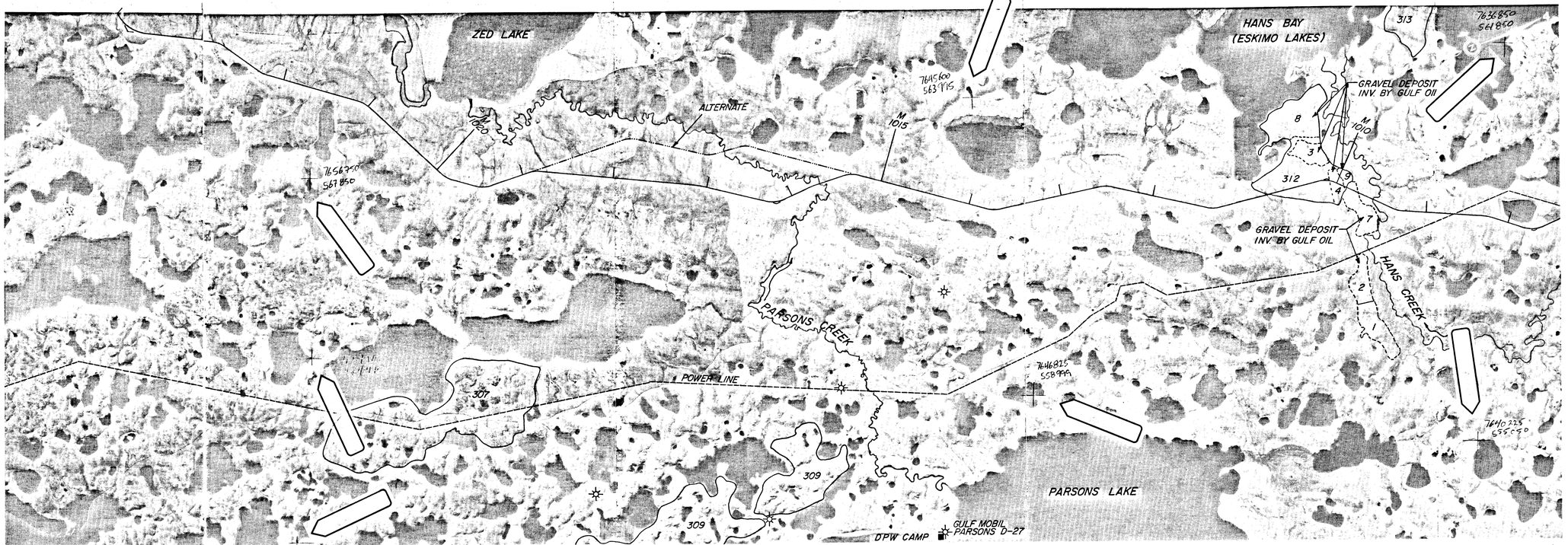
B location drawing no. / sur dessin no.

C drawing no. / dessin no.

revisions / date

LEGEND

G.S.C.- GEOLOGICAL SURVEY CANADA



LEGEND 765720 561650 G.S.C. – GEOLOGICAL SURVEY CANADA

401 – REFERENCE GRANULAR INVENTORY

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

401 – REFERENCE GRANULAR INVENTORY

project title / titre du projet

mackenzie highway

drawing title / titre du dessin

UNCONTROLLED MOSAICS

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

designed by / conçu par

date

drawn by E.E. PETERS / dessiné par

date

reviewed by / examiné par

date

approved by / approuvé par

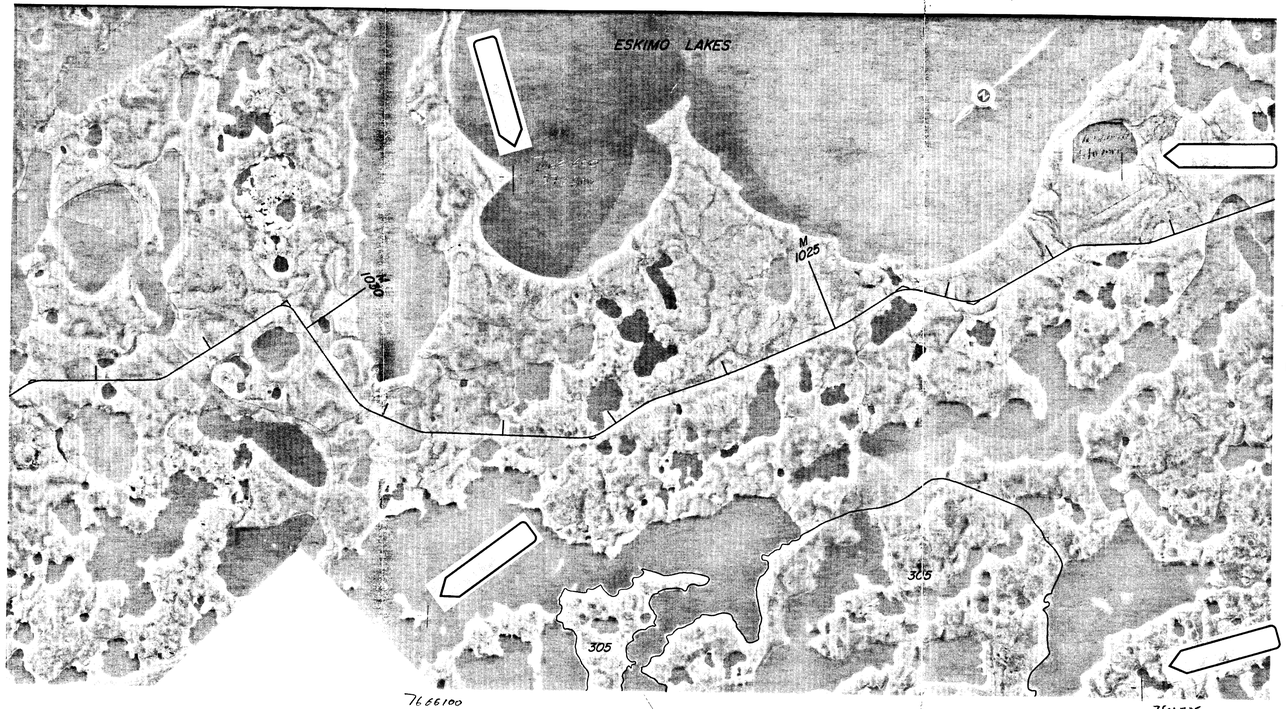
date

Tender / Soumission

D.P.W. Project Manager / Administrateur de projets M.T.P.

project number / no. du projet

drawing no. / dessin no.



LEGEND

G.S.C. – GEOLOGICAL SURVEY CANADA

401 – REFERENCE GRANULAR INVENTORY

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

Public Works Canada / Travaux publics Canada

WESTERN REGION

A detail no. / détail no.

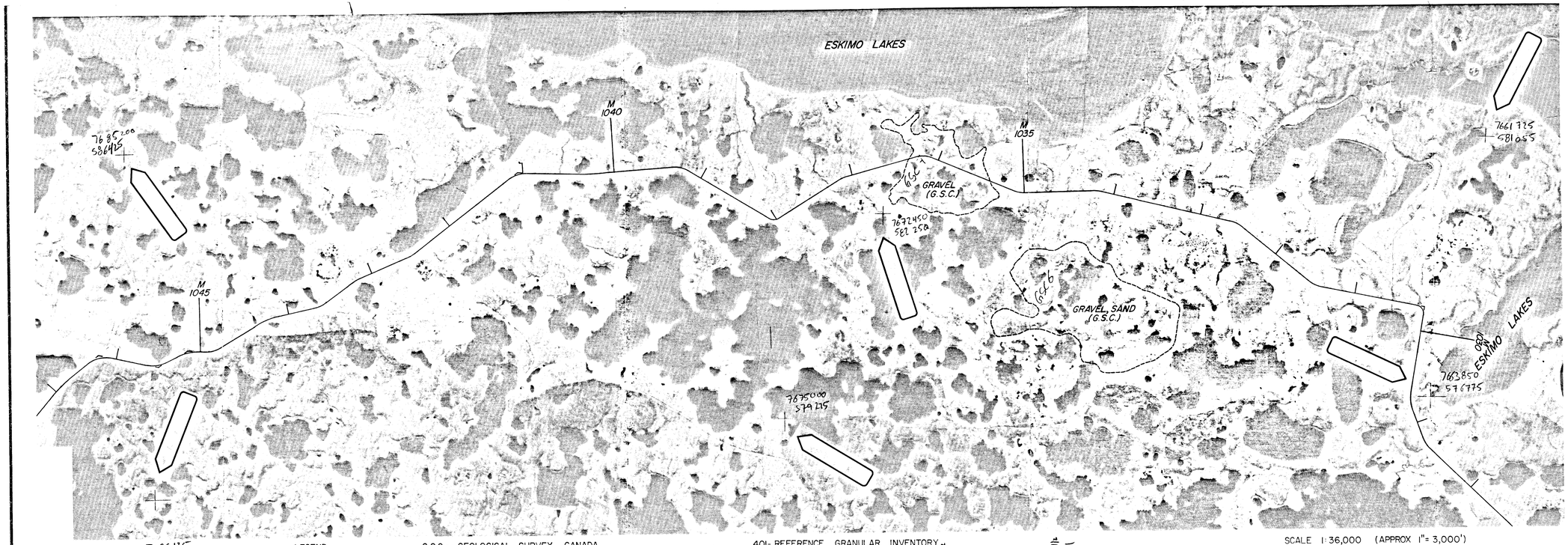
B location drawing no. / sur dessin no.

C drawing no. / dessin no.

revisions / date

LEGEND

G.S.C.– GEOLOGICAL SURVEY CANADA



LEGEND

G.S.C.— GEOLOGICAL SURVEY CANADA

401- REFERENCE GRANULAR INVENTORY

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

401 - REFERENCE GRANULAR INVENTORY

project title — titre du projet

mackenzie highway

drawing title — titre du dessin

UNCONTROLLED MOSAICS

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

designed by — conçu par

date

drawn by E.E. PETERS — dessiné par

date

reviewed by — examiné par

date

approved by — approuvé par

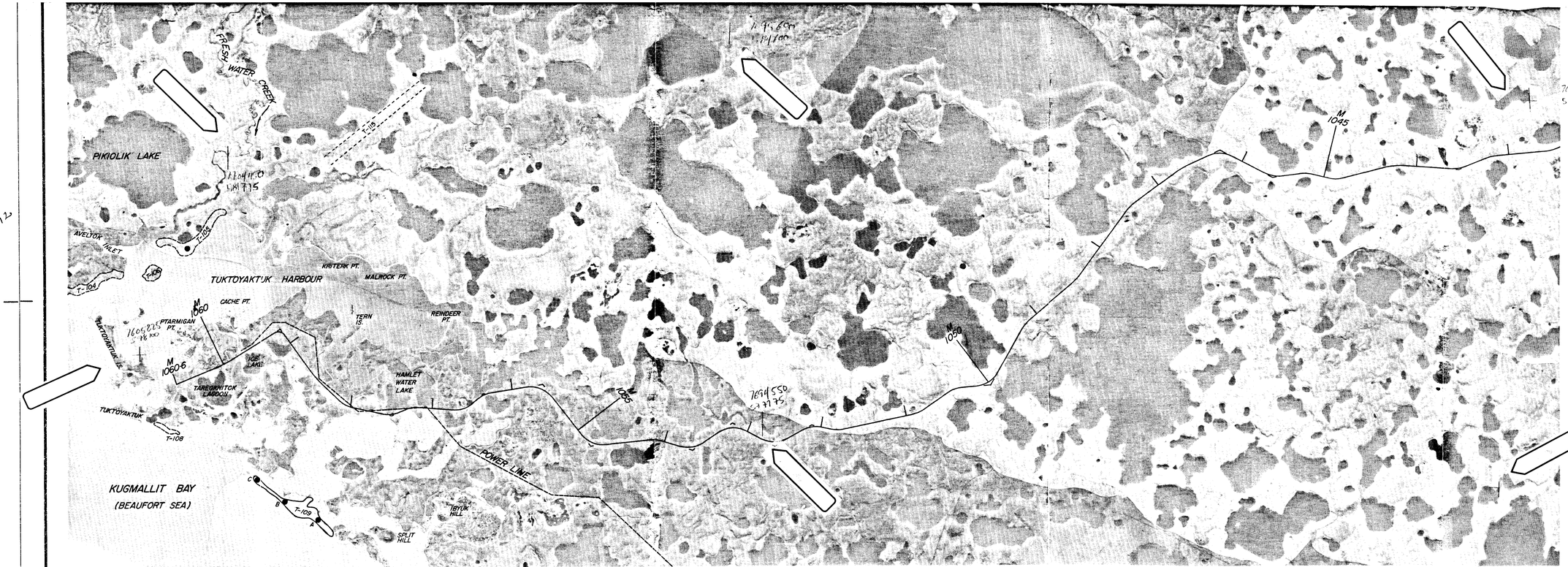
date

Tender — Soumission

D.P.W. Project Manager — Administrateur du projets M.T.P.

project number — no. du projet

drawing no. — dessin no.



LEGEND G.S.C.- GEOLOGICAL SURVEY CANADA 401- REFERENCE GRANULAR INVENTORY

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

A detail no. détail no.

B location drawing no. sur dessin no.

C drawing no. dessin no.

revisions date

LEGEND

G.S.C.- GEOLOGICAL SURVEY CANADA

401- REFERENCE GRANULAR INVENTORY

project title titre du projet

mackenzie highway

drawing title titre du dessin

UNCONTROLLED MOSAICS

DRAWING NO. | SHEET NO. | TOTAL SHEETS

SCALE 1"=1000'

PLAN	SURVEYED	DATE	PLOTTED	DATE	CHECKED	DATE
ALIGNMENT						
TOPOGR. NOTES						
DRAINAGE						
BORROW AREAS						
STRUCTURES NOTED						

	BY	DATE
...TATION		
...ED IN FIELD		

Public Works Canada / Travaux publics Canada

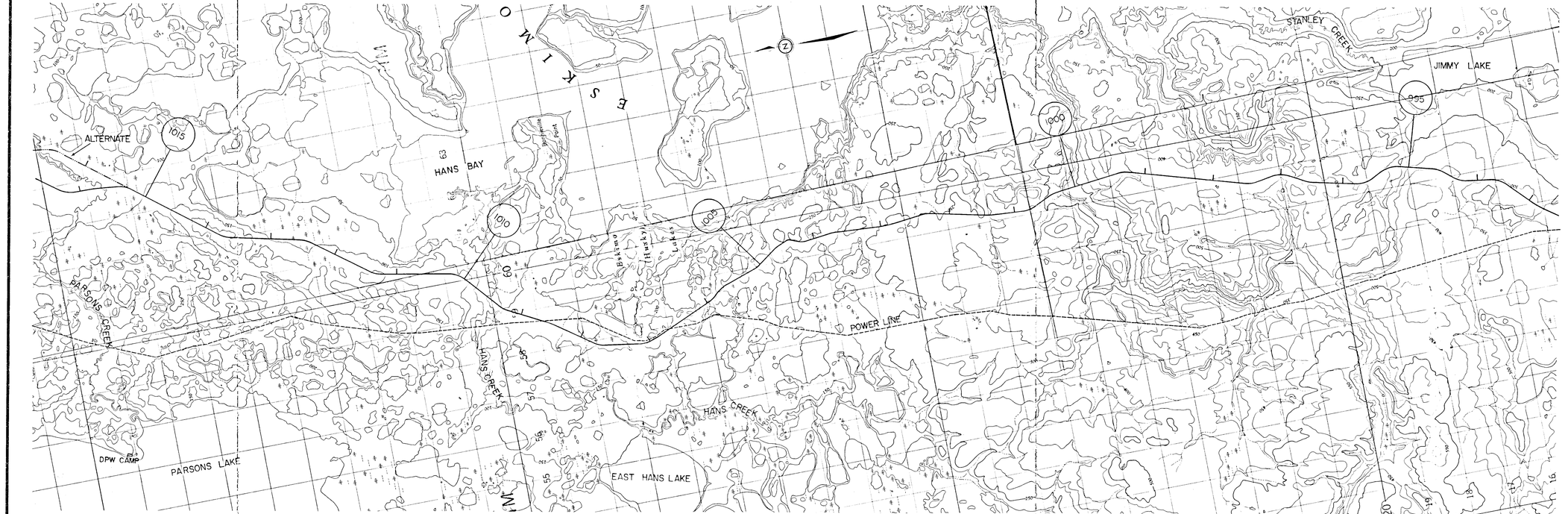
WESTERN REGION

A detail no. / détail no.

B location drawing no. / sur dessin no.

C drawing no. / dessin no.

revisions / date



project title — titre du projet

mackenzie highway

drawing title — titre du dessin

INUVIK–TUK
TOPOGRAPHICAL MAPS
1:50,000

designed by — conçu par	
date	
drawn by E.E. PETERS — dessiné par	
date	
reviewed by — examiné par	
date	
approved by — approuvé par	
date	
Tender	Soumission
D.P.W. Project Manager	Administrateur de projets M.T.P.
project number	no. du projet
drawing no.	dessin no.

DPW 700 D

Public Works Canada / Travaux publics Canada

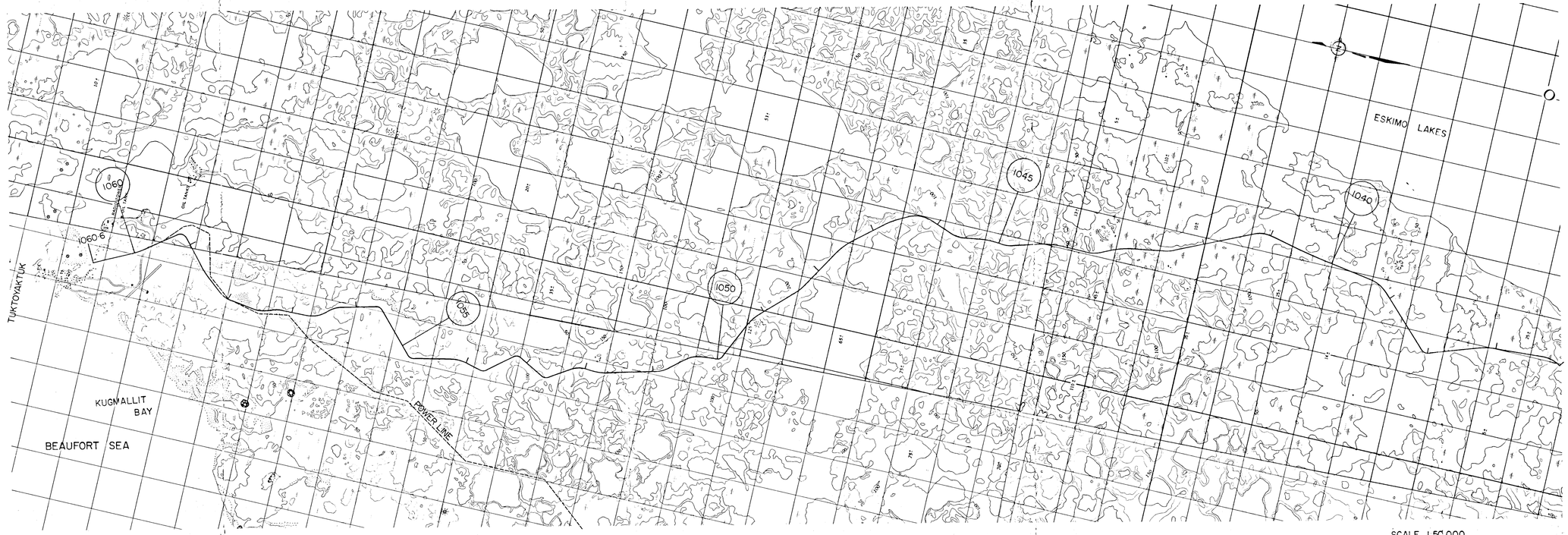
WESTERN REGION

A detail no. / détail no.

B location drawing no. / sur dessin no.

C drawing no. / dessin no.

revisions / date



project title / titre du projet

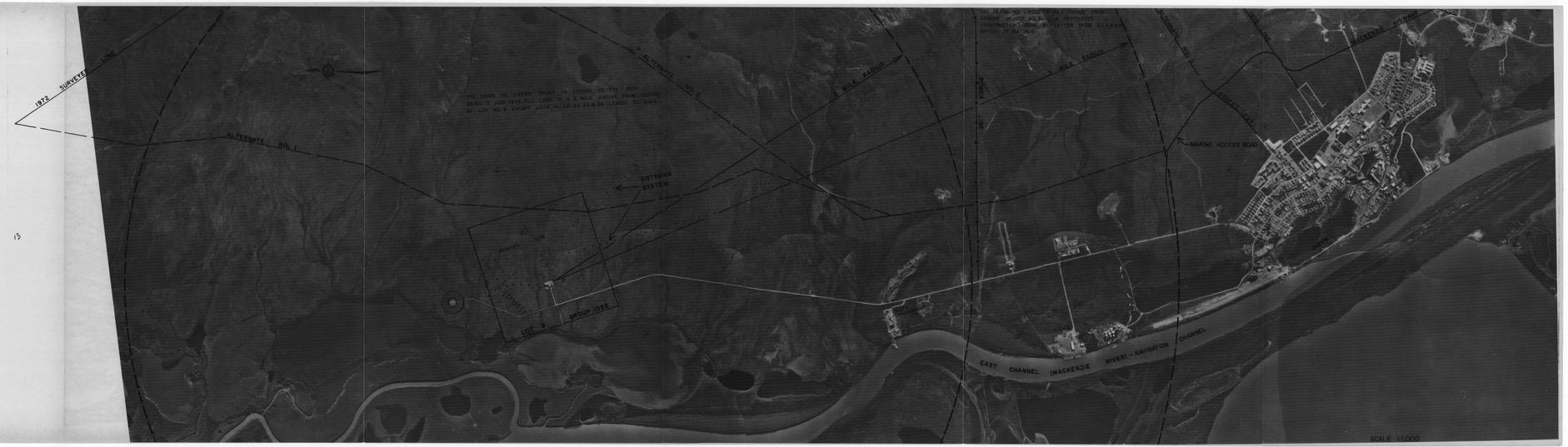
mackenzie highway

drawing title / titre du dessin

INUVIK–TUK TOPOGRAPHICAL MAPS

1:50,000

designed by	conçu par
date	
drawn by E.E. PETERS	dessiné par
date	
reviewed by	examiné par
date	
approved by	approuvé par
date	
Tender	Soumission
D.P.W. Project Manager	Administrateur de projets M.T.P.
project number	no. du projet
drawing no.	dessin no.


1972 SURVEYED LINE
ALTERNATE NO. 1
ALTERNATE NO. 2
ANTENNA SYSTEM
LOT 8
GROUP 1356
3 MILE RADIUS
3 MILE RADIUS
MARINE ACCESS ROAD
EAST CHANNEL (MACKENZIE RIVER) - NAVIGATION CHANNEL
MACKENZIE HIGHWAY
SCALE 1:1,000