

BEAUFORT SEA



GRANULAR MATERIALS INVENTORY

ZONE III

RICHARDS ISLAND

CARIBOU HILLS

INUVIK

AKLAVIK

DEPARTMENT OF INDIAN AFFAIRS
AND
NORTHERN DEVELOPMENT

FORT McPHERSON

ARCTIC RED RIVER

MACKENZIE RIVER

RIPLEY, KLOHN & LEONOFF INTERNATIONAL LTD.

Consulting Geotechnical Engineers

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1. INTRODUCTION

1.1 Assignment

The Department of Indian Affairs and Northern Development commissioned Ripley, Klohn & Leonoff International Ltd. to undertake Stage #2 of a granular material inventory, which includes all unconsolidated material and bedrock suitable for engineering construction. The search area included the Tuktoyaktuk Peninsula, Richards Island, and the Mackenzie River Delta, south to Fort McPherson and Arctic Red River.

This report presents the results of the investigation and testing of granular materials in Zone III, as shown on the Zone Location Plan. The work was conducted in accordance with the requirements of the Stage #2 Terms of Reference provided by the Department which requested recommendations for usage, development and restoration of all sources that could be identified.

Authorization to proceed with the work was received September 5, 1972 under Contract No. OTT-72-141 and Authority Reference T.B. No. 714562.

1.2 Procedure

The investigation procedure entailed a study and compilation of existing geological data from the work of the Geological Survey of Canada, pipeline route studies, and other previous work conducted within the designated area by Ripley, Klohn & Leonoff International Ltd. Airphoto interpretation was carried out prior to the field reconnaissance and drilling program. This work was done in co-operation with J.D. Mollard and Associates of Regina. The field reconnaissance to groundcheck potential sources was done by means of surface sampling and hand dug test pits. At the same time, the field staff observed access roads, drainage conditions, biotic environmental concerns and source development considerations.

The reconnaissance program indicated that 29 sources are within Zone III, plus one source, I-407, that is reported in the Community Inventory for Inuvik.

1.3 Data Presented

Information for the granular material sources is presented in the following sections:

Section Entitled "Zone III" - is the text of the report which provides a general appreciation of the surficial geology and environment in the area and recommendations with respect to use of materials, management, development and restoration of the source areas.

Section Entitled "Maps and Tables" - provides topographic maps showing the Zone and the locations of the sources within it. A summary table giving the pertinent information relative to each source is provided in this section together with an explanation of the symbols and terms used in this report.

Sections Entitled "Source No. _____" - provide all details for each source including test pit and test hole logs, results of laboratory analyses and details of the development and restoration of each source.

2. ZONE III

2.1 Surficial Geology

Zone III consists of 4 components. The extreme southwestern corner covers the area where the Richardson Mountains merge into the Arctic coastal plain. The western half of the Zone is dominated by the Mackenzie Delta. The Caribou Hills form the eastern boundary of the Delta and fall away on the eastern slope to merge with the Pleistocene Coastal Plain.

The southwestern corner is not significant in this report, and the Delta consists of recent silt deposits, with no significant deposits of sand and gravel.

Shale and sandstone of Upper Cretaceous Age is exposed along the west flank of the Caribou Hills, and much of this area is covered by thick deposits of Tertiary unconsolidated sand and gravel. The central portion and eastern slope of these hills contains isolated glacial features and outwash terraces.

The Pleistocene coastal plain was formed from ancient sand deposits in the pre-glacial Mackenzie River Delta, and later was covered by glaciofluvial sand and gravel deposited during two major periods of glaciation. As the last glacier receded, the area was covered again by post-glacial lacustrine deposits consisting of silt, sand, and gravel. In general, granular material is found on this plain in isolated glacial features. The topography of the plain is hummocky with little range of elevation and the drainage pattern is poorly developed. Ground ice is prevalent, as indicated by polygonal ground, thermo-karstic topography, and many ponds and lakes.

2.2 Environment

The vegetation within Zone III varies from upland tundra in the Caribou Hills, primarily moss, lichens, grass, and upland dwarf shrubs, to the tundra of the plains, where moss and lichens blend with shrubs and spruce in the protected gullies.

The Mackenzie Delta, as far north as Reindeer Channel, and the eastern shore against the Caribou Hills is a critical wildlife area, important for sustained and intensive trapping of muskrat, mink, and beaver, and also the summer home of great flocks of waterfowl.

A large area around Eskimo Lakes is the permanent fawning ground of the Mackenzie Reindeer Herd. This critical area contains 11 of the sources studied, as has been noted in the discussion of each source, and a serious conflict may have to be reconciled. Most of the sources can be reached only during winter. At this time of year, the calving season is approaching, and the Herd will become sensitive to disturbance. The Herd is, however, largely domesticated, and its movement is under human control, so perhaps in this way the conflict in designated areas can be avoided.

The whole area east of the Delta is the Mackenzie Reindeer Grazing Reserve, an important, but not critical wildlife area.

The International Biological Programme has proposed two reserves in Zone III. One, the middle Mackenzie Delta, is removed from possible granular deposits and presents no problem. The other, the Caribou Hills reserve, follows the western slope of the Hills for a distance of 18 miles and is about 3/4 mile wide. No drilling or vehicular traffic is permitted within this area and two sources, Numbers 323A and 324A, are discarded because of the reserve. In the correspondence related to drilling in the general area, the Company were told that the International Biological Programme is also interested in a larger area east of this reserve, but placed no restrictions on drilling or travel. The sources contained within this expanded area are 300, 301, 316, 317, 322, 326, and a source included in the Inuvik Community Report, I-407. No reference to this potential limitation is written into the discussions of these sources.

The channels of the Mackenzie Delta are important fishing grounds of the native population, and must be protected. The Eskimo Lakes are also an important fishery, both for domestic fishing and because of their potential for sport-fishing.

2.3 Sources and Materials

Twenty-nine sources were identified and investigated in Zone III, in addition to Source I-407 that is reserved for use by the Community of Inuvik. Five of the 29 have been discarded as unworthy of further attention or for reasons of land-use. Sources 300A, 310A, and 328A contain very poor material and much ice. Sources 323A and 324A are located within the proposed Caribou Hills Reserve of the International Biological Programme. These last two sources could not be investigated thoroughly because of existing land-use regulations, but appear to contain large volumes of good material, and will deserve further study if the reserve is lifted in the future.

Of the remaining 24 sources, 7 are located on or near the Delta, 12 are located on or near Eskimo Lakes, and 5 are located in the interior region west of Parsons Lake. The three groups of sources will be discussed in this order.

Sources 301, 302, and 303 are terrace remnants located at or near Delta level and adjacent to the east channel of the Mackenzie River. Source 326 is the remnant of a delta plain about 1 mile from the River. Sources 316, 317, and 322 are glacial features located in the valley containing Peter Lake, accessible to the Delta by a winter road running around the north end of the proposed Caribou Hills Reserve.

All sources are suitable for the supply of general fill, and the volume available from the 4 sources at Delta level alone are about 26,000,000 cubic yards. Source 302 contains sound, well-graded sand and gravel, and is suitable for the supply

of aggregates for concrete and asphalt construction. Source 326 contains excellent sand and about 30% gravel. Sources 316, 317, and 322 appear to be erratic, and are not recommended as sources of aggregate.

Only Source 316 has been developed, and that only for a small volume of fill required for oil exploration nearby.

In the area about Eskimo Lakes, Sources 304 to 309 inclusive are glacial features, mostly kames or kame terraces. Sources 311 and 313 are small deposits of sand that have sloughed to the edge of the Lake from the bank above. Sources 312 and 314 are fluvial terraces of post-glacial age, and Sources 325 and 327 are glaciofluvial terraces.

All sources are suitable for the supply of general fill and road material, although some are rated low priority for various reasons. Sources 309 and 312 contain large deposits of material that could be used for any purpose, including concrete construction. Sources 304, 305, and 306 also contain material suitable for aggregate production, but do not lend themselves to large-scale development.

In this area, only Source 309 is developed. Oil companies are now operating a pit and hauling fill over winter roads as far as Tuktoyaktuk.

In the interior, west of Parsons Lake, Sources 315, 318, and 321 are outwash areas. Sources 319 and 320 are kame fields. All are remote from current developments and probably will not be exploited until a project is planned nearby.

All sources contain material that is suitable for general fill or road construction. Sources 315 and 319 can produce sand and gravel suitable for concrete and asphalt construction, and both are large enough to support a substantial operation.

None of these sources has been developed.

2.4 Management

The development of the many sources in Zone III will depend on two major considerations. The first is environmental.

Sources 301 and 326 lie within the critical Mackenzie Delta wildlife area, and all the sources around Eskimo Lakes, with the exception of Source 304, are within the critical fawning ground of the Mackenzie Reindeer Herd.

The second consideration is the location, nature, and size of projects. At present, the route of the Dempster Highway is not public knowledge, but undoubtedly a number of the interior sources will be developed on a large scale for this work.

Many sources lend themselves to small-scale development, but only a few are large enough and are uniform enough for a large aggregate operation.

Probably Source 326 should be developed as a major source of fill and fine aggregate, provided the environmental problems can be solved. The terrain favours this site, and it can be isolated from the Delta below to a considerable extent.

Source 302 is the only deposit of good concrete aggregate in the area, aside from Source 1-407, which is reserved for the use of Inuvik. This source will probably be developed as the demand for aggregate develops, and should be reserved for this class of product.

Source 309, already developed to a limited degree, will undoubtedly take a large place in the supply of granular material in the central area, with probable assistance from the very large deposit at Source 315.

Many sources of general fill are adjacent to Eskimo Lakes, but only Source 312 offers the potential for large-scale development of all types of granular product. A large area can be served, summer and winter, from this source.

Over the whole Zone the indiscriminate development of sources for small volumes must be discouraged, in order to minimize environmental problems, and in all cases restoration must follow close behind development.

2.5 Development

2.5.1 General

Of the 24 sources under consideration, only two have been developed. The choice of which should be developed next will depend on the approval of environmental studies related to each source, as well as on the location, nature, and size of new projects.

2.5.2 Access

The sources near the Delta and near Eskimo Lakes have a strong advantage in access in that winter haulage over the ice is easier than over tundra and also because summer haulage by barge is possible. This advantage will undoubtedly affect the choice of sources for development, and favours Sources 301, 302, 303, and 326 above the Delta, and Sources 311, 312, 313, 314, 325, and 327 on Eskimo Lakes.

The interior sources, which include all those not listed above, are accessible only by winter road built over tundra, and some will be difficult access roads. Probably this condition will limit their application to local projects unless they lie near a project such as the Dempster Highway.

2.5.3 Material Uses and Handling

All 24 sources can provide a good to satisfactory grade of general fill. Sources 302, 309, 312, and 315 can also support aggregate operations on a substantial scale. Other sources, smaller or less uniform, can supply small volumes of aggregate.

Most sources contain enough moisture to necessitate ripping, stockpiling, thawing, and draining before shipping. The

notable exceptions are Sources 309 and 326.

The equipment required to develop most of these sources is a dozer with ripper attachment, a front-end loader, and trucks. Sources 311 and 313 would require only a loader to load trucks or barges. The sources producing aggregate for concrete or asphalt construction would require at least a screen to remove oversize rock, and for large-scale production would require a crushing and screening plant with a conveyor system.

2.5.4 Stripping and Restoration

The main consideration in restoring these sources will be the prevalent ground ice. If left exposed on a slope or near a stream, the thawing of this ice can make a substantial area unstable, causing serious sloughing of slopes and possibly siltation in streams. For this reason, any sensitive area of ground ice should be left covered or covered immediately, and then prepared for revegetation if possible.

Another problem that will be encountered on many sources is the stockpiling of frozen topsoil, granular material, ice, and ice-rich silt. These stockpiles must always be placed so that, on thawing, the water and silt cannot flow directly into nearby streams or lakes.

On some sources the planning and construction of access roads across ice-rich silt will require particular care, especially if the source contains many individual kames that each contain some gravel.

The drainage from a disturbed area, and especially from a processing plant, cannot be permitted to enter either the Mackenzie River or one of the streams flowing to a large lake.

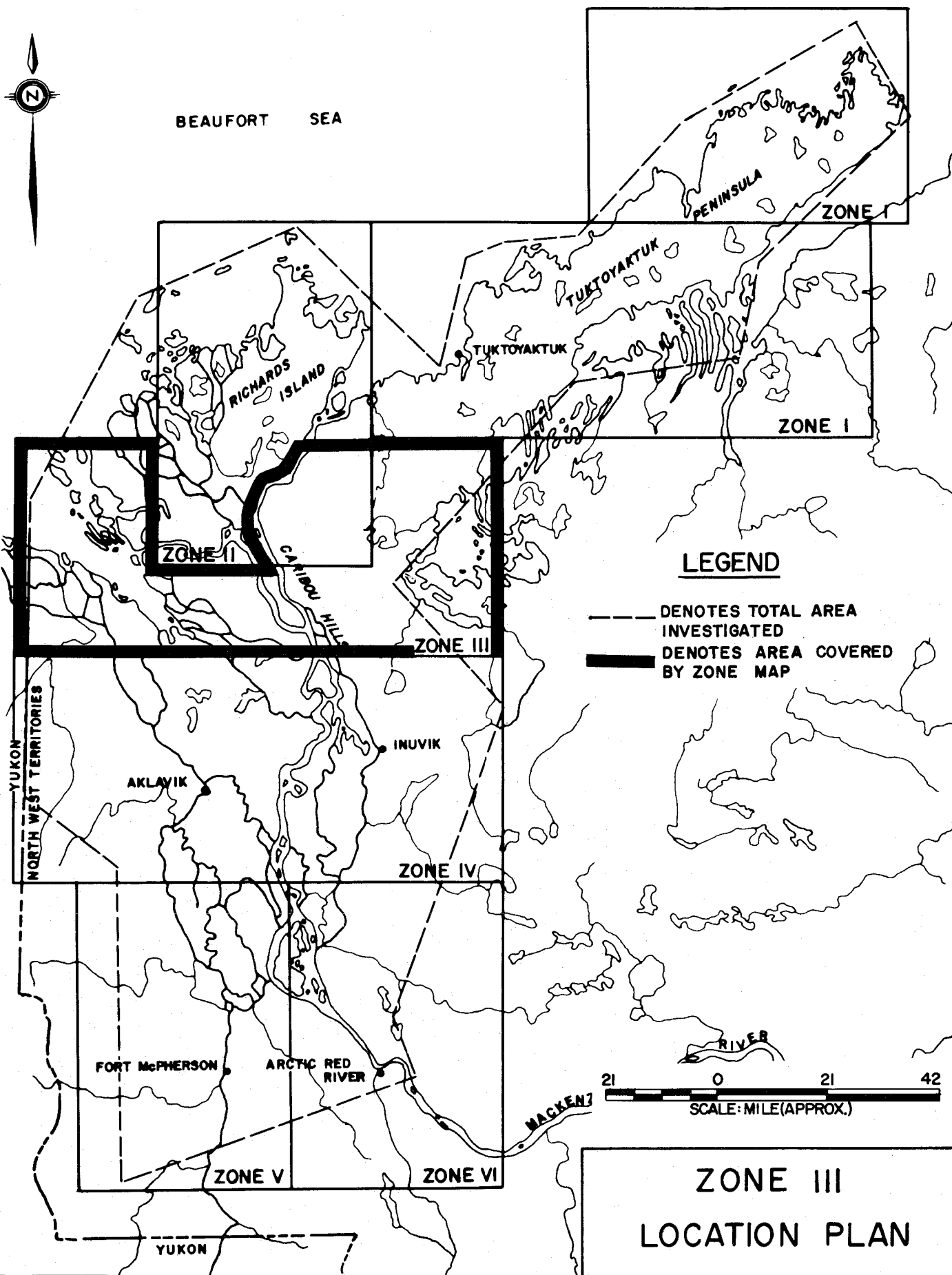
In general, the surface soils and organic cover must be stockpiled for replacement over a depleted area. Banks must be graded to a stable slope, and depleted areas must be graded to a smooth contour, before the topsoil is replaced.

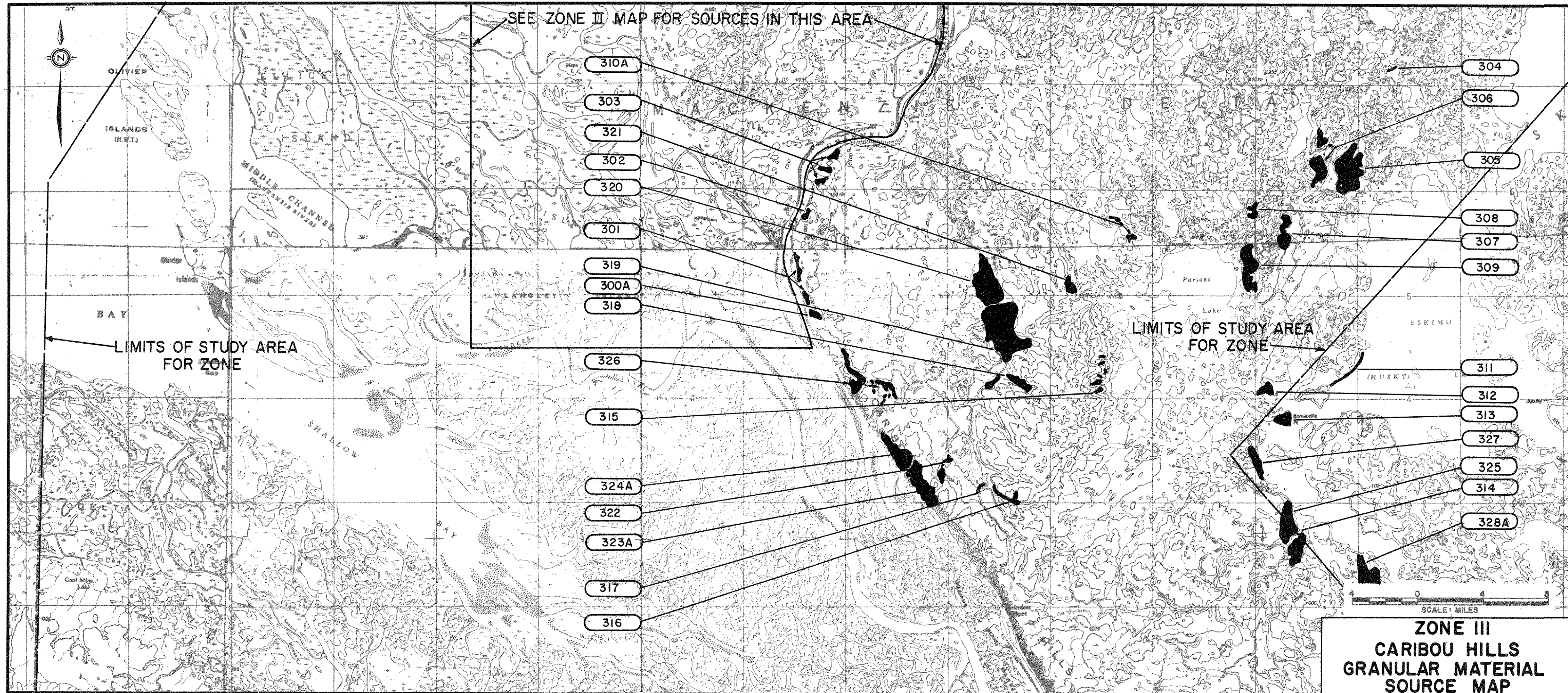
Where possible, restored areas should be seeded for speedy revegetation, using a selection of plants and methods of preparation recommended by a specialist in Arctic horticulture. Details of this nature are not considered to be within the terms of reference of this report.

More specific comments concerning the stripping and restoration of the sources investigated in Zone III are provided in the discussions of each source.



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SOURCE No.	DISTANCE FROM COMMUNITY MILES	MATERIAL TYPE (UNIFIED GROUP SYMBOL)	VOLUME ESTIMATES CUBIC YARDS	ENVIRONMENTAL CONCERNS	CONCLUSIONS	SOURCE DEVELOPMENT DATA									
						DRAINAGE	STRIPPING			GRD. ICE	REC. DEPTH (FT.)	TYPE OF EXCAVATION	MATERIAL USEAGE	EQUIPMENT REQUIRED	STATE OF DEVELOPMENT OF SOURCE
							MATERIAL	DEPTH (FT)	DISPOSAL						
304	22 south of Tuk- toyak- tuk	GRAVEL - and sand (GW)	60,000	Summer range of the Reindeer Herd	Low priority for development as larger sources are nearby	Good	Topsoil and silt	0 to 2	Stockpile adjacent to pit for later re- grading	Low	10	Rip, doze into piles, thaw and drain, load in trucks	General fill Fine and coarse aggregate	Dozer-Ripper, Loader, Trucks Screen plant for limited aggregate production	Undeveloped
SEE SECTION 304 FOR SOURCE DETAILS															
305	26 south of Tuk- toyak- tuk	SAND - and gravel, trace silt (SW) GRAVEL - and sand trace silt (GW)	300,000	Fawning ground of the Reindeer Herd	Suitable for development on limited and regulated scale. Schedule important	Good	Moss and silt	0 to 2	Stockpile adjacent to pit for later regrading	Low to High	up to 30	Rip and doze into piles, thaw, drain and load in trucks	Fine and coarse aggre- gate for con- crete and asphalt General fill	Dozer-Ripper, Loader, Trucks Screen plant for aggregate production	Undeveloped
SEE SECTION 305 FOR SOURCE DETAILS															
306	26 south of Tuk- toyak- tuk, 4 west of Eski- mo Lakes	GRAVEL - and sand (GP)	150,000	Fawning ground of the Reindeer Herd	Suitable for development on limited and reg- ulated scale. Schedule important	Good	Moss and silt	0 to 4	Stockpile adjacent to pit area for later regrading	Low	up to 10	Rip and doze into piles, thaw and load in trucks	Fine and coarse aggregate General fill	Dozer-Ripper, Loader, Trucks Screen plant for aggregate production	Undeveloped
SEE SECTION 306 FOR SOURCE DETAILS															
307	34 south of Tuk- toyak- tuk 5 west of Eski- mo Lakes	GRAVEL - and sand trace silt (GW-GM) SAND - little gravel some silt (SM)	150,000	Fawning ground of the Reindeer Herd	Suitable for development on limited and regulated scale. Schedule important	Good	Moss and silt	0 to 4	Stockpile adjacent to pit for later regrading	Low to High	up to 10	Rip and doze into piles, thaw, and load in trucks	General fill	Dozer-Ripper, Loader, Trucks	Undeveloped
SEE SECTION 307 FOR SOURCE DETAILS															

SOURCE No.	DISTANCE FROM COMMUNITY MILES	MATERIAL TYPE (UNIFIED GROUP SYMBOL)	VOLUME ESTIMATES CUBIC YARDS	ENVIRONMENTAL CONCERNS	CONCLUSIONS	SOURCE DEVELOPMENT DATA									
						DRAINAGE	STRIPPING			GRD. ICE	REC. DEPTH (FT.)	TYPE OF EXCAVATION	MATERIAL USEAGE	EQUIPMENT REQUIRED	STATE OF DEVELOPMENT OF SOURCE
							MATERIAL	DEPTH (FT)	DISPOSAL						
300A	5 south east Tunu-nuk Point	SILT - some gravel trace sand (ML)	-	Source is within the Mackenzie Delta critical wildlife region	Not recommended for development due to high silt content	Good	Peat and silt	1 to 4		Med-ium to high			Medium to poor quality general fill		Undeveloped
SEE SECTION 300A FOR SOURCE DETAILS															
301	2 south east Tunu-nuk Point	SAND - and gravel little silt (SM) GRAVEL - and sand little silt (GW-GM)	4,000,000	Source is within the Mackenzie Delta critical wildlife region	Deposit is highly variable but suitable for development	Good	Peat and silt	1 to 4	Stockpile adjacent to pit for later re-grading	Low to high	10	Rip and doze into piles, thaw and drain load into trucks or on barges	General fill	Dozer - Ripper, Loader, Trucks maybe Barges	Undeveloped
SEE SECTION 301 FOR SOURCE DETAILS															
302	3 north east Tunu-nuk Point	GRAVEL - and sand (GW-GM) SAND - and gravel (SW)	1,500,000	Source is in an important water-fowl staging and breeding area	Suitable for development	Good	Moss and silt	0 to 0.5	Stockpile adjacent to pit for later re-grading	Low in gravel	10	Rip and doze into piles, drain, load in trucks or on barges	Fine and coarse aggregate for concrete and asphalt General fill	Dozer - Ripper, Loader, Trucks, Barges Screen plant maybe Crusher	Undeveloped
SEE SECTION 302 FOR SOURCE DETAILS															
303	6 north east of Tunu-nuk Point	SAND - and gravel trace silt (SW) GRAVEL - and sand trace silt (GP)	6,000,000	Source is in an important water-fowl staging and breeding area	Deposit is highly variable but suitable for development	Good	Moss and silt	0 to 1	Stockpile adjacent to pit for later re-grading	Low to Med-ium	1 to 20	Rip and doze into piles, thaw and drain, load in trucks	Primarily general fill	Dozer - Ripper, Loader, Trucks, Barges	Undeveloped
SEE SECTION 303 FOR SOURCE DETAILS															

SOURCE No.	DISTANCE FROM COMMUNITY MILES	MATERIAL TYPE (UNIFIED GROUP SYMBOL)	VOLUME ESTIMATES CUBIC YARDS	ENVIRONMENTAL CONCERNS	CONCLUSIONS	SOURCE DEVELOPMENT DATA									
						DRAINAGE	STRIPPING			GRD. ICE	REC. DEPTH (FT.)	TYPE OF EXCAVATION	MATERIAL USEAGE	EQUIPMENT REQUIRED	STATE OF DEVELOPMENT OF SOURCE
							MATERIAL	DEPTH (FT)	DISPOSAL						
308	32 south of Tuk-toyak-ktuk 7 west of Eskimo Lakes	SAND - some sand (GW) GRAVEL-little sand (GP)	20,000	Fawning ground of Reindeer Herd	Suitable for development on limited scale	Good	Moss and silt	0 to 2	Stockpile adjacent to pit for later regrading	Low to Med	10	Rip and doze into piles, load in trucks	General fill and small quantities of fine and coarse aggregates	Dozer-Ripper, Loader, Trucks Screen plant for production of fine and coarse aggregate	Undeveloped
SEE SECTION 308 FOR SOURCE DETAILS															
309	North east corner of Parsons Lake 35 south of Tuk-toyak-ktuk	GRAVEL - and sand (GW) SAND - and gravel (SW-SM)	2,000,000	Fawning ground of the Reindeer Herd	Suitable for large scale development, but would require environmental study for approval	Good	Moss and silt	0 to 2	Stockpile adjacent to pit for later regrading	Low in sand and gravel	10 to 25	Rip and doze into piles, load in trucks	Fine and coarse aggregate for concrete and asphalt General fill, road material	Dozer-Ripper, Loader, Trucks Screen plant for production of fine and coarse aggregate	Partially developed by oil exploration companies in the area
SEE SECTION 309 FOR SOURCE DETAILS															
310A	36 south west of Tuk-toyak-ktuk	SAND - and silt, trace gravel (SP)		No major concern	Not recommended for development due to poor quality and high ice content	Good	Peat and silt	1 to 3		High			Poor quality general fill		Undeveloped
SEE SECTION 310A FOR SOURCE DETAILS															
311	Adjacent to Eskimo Lakes 4 miles north west Bonnaville Point	SAND - trace silt (SP)	400,000	Fawning ground of the Reindeer Herd	Suitable for limited scale development	Good	N/A	Nil	N/A	Nil to Low	5	Load in trucks or barge	General fill	Loader, Trucks or Barge	Undeveloped
SEE SECTION 311 FOR SOURCE DETAILS															

SOURCE No.	DISTANCE FROM COMMUNITY MILES	MATERIAL TYPE (UNIFIED GROUP SYMBOL)	VOLUME ESTIMATES CUBIC YARDS	ENVIRONMENTAL CONCERNS	CONCLUSIONS	SOURCE DEVELOPMENT DATA									
						DRAINAGE	STRIPPING			GRD. ICE	REC. DEPTH (FT.)	TYPE OF EXCAVATION	MATERIAL USEAGE	EQUIPMENT REQUIRED	STATE OF DEVELOPMENT OF SOURCE
							MATERIAL	DEPTH (FT)	DISPOSAL						
312	2 north west Bonnieville Point west of Eskimo Lakes	GRAVEL - and sand (GW) SAND - little gravel, trace silt (SP-SM)	6,000,000	Fawning ground of Reindeer Herd	Suitable for development, but will require environmental study	Good	Peat and silt	1 to 2	Stockpile adjacent to pit for later regrading	Low	5 to 15	Rip and doze into piles, thaw and drain, load in trucks	Coarse and fine aggregate for concrete and asphalt General fill	Dozer-Ripper, Loader, Trucks Screen plant for aggregate production	Undeveloped
SEE SECTION 312 FOR SOURCE DETAILS															
313	Bonnieville Point west side of Eskimo Lakes	SAND - trace silt (SP-SM)	50,000	Fawning ground of Reindeer Herd Siltation in lake	Low priority for a limited scale development. Require environmental study	Good	N/A	Nil	N/A	Nil to Low	5	Load in trucks or Barge	General fill	Loader, Trucks or Barge	Undeveloped
SEE SECTION 313 FOR SOURCE DETAILS															
314	Adjacent to small stream 1 west of Eskimo Lakes	SAND - and gravel (SW)	3,000,000	Fawning ground of Reindeer Herd Contamination of adjacent stream	Suitable for development following environmental impact study	Good	Moss and silt	0 to 1½	Stockpile away from stream for later regrading in pit	Low	15	Rip and doze into piles, thaw and drain, load in trucks	General fill	Dozer-Ripper Loader, Trucks	Undeveloped
SEE SECTION 314 FOR SOURCE DETAILS															
315	4 south west Parsons Lake 37 north of Inuvik	SAND - and gravel, trace silt (SW) GRAVEL - and sand, trace silt (GW-GM)	6,000,000	Contamination of adjacent streams	Suitable for development with care taken to prevent contamination of adjacent streams	Good	Moss and silt	0 to 1½	Stockpile away from streams for later regrading in pit	Low to Med.	15	Rip and doze into piles, thaw and drain, load in trucks	Coarse and fine aggregate for concrete and asphalt General fill	Dozer-Ripper, Loader, Trucks Screen plant for aggregate production	Undeveloped
SEE SECTION 315 FOR SOURCE DETAILS															

SOURCE No.	DISTANCE FROM COMMUNITY MILES	MATERIAL TYPE (UNIFIED GROUP SYMBOL)	VOLUME ESTIMATES CUBIC YARDS	ENVIRONMENTAL CONCERNS	CONCLUSIONS	SOURCE DEVELOPMENT DATA									
						DRAINAGE	STRIPPING			GRD. ICE	REC. DEPTH (FT.)	TYPE OF EXCAVATION	MATERIAL USEAGE	EQUIPMENT REQUIRED	STATE OF DEVELOPMENT OF SOURCE
							MATERIAL	DEPTH (FT)	DISPOSAL						
316	Adj- acent to east side Peter Lake 5 from Mac- ken- zie River	SAND - and gravel (SW-SM)	1,000,000	No major concern	Source is suitable for development for local projects	Good	Moss and silt	0 to 1	Stockpile away from stream for later regrading on deplet- ed flat surfaces	Nil to Low	5 to 30	Rip and doze into piles. Load in trucks	Primarily general fill	Dozer-Ripper, Loader, Trucks	Slightly developed by nearby oil exploration
SEE SECTION 316 FOR SOURCE DETAILS															
317	North end of Peter Lake 31 north west of Inu- vik	SAND - and gravel (SP)	500,000 from outwash	No major concern	Source is suitable for development for local projects Recommend only development of outwash area.	Good	Moss and silt	0 to 5½	Stockpile away from stream for later regrading	Nil to Low	5 to 10	Rip and doze into piles. Thaw and drain if necessary. Load in trucks	General fill	Dozer-Ripper, Loader, Trucks	Undeveloped
SEE SECTION 317 FOR SOURCE DETAILS															
318	Along east side Wol- ver- ine Lakes 38 north of Inu- vik	SAND - and gravel, trace silt (SP-SM) GRAVEL - and sand (GW-GM)	2,000,000	No major concern	Source is low priority for development due to heavy ice lensing and the unsound nature of aggregate	Good	Moss and silt	0 to 1	Stockpile away from drainage courses for later regrading	Low to High	10	Rip and doze into piles, thaw and drain, load in trucks	General fill	Dozer-Ripper, Loader, Trucks	Undeveloped
SEE SECTION 318 FOR SOURCE DETAILS															
319	North of Wol- ver- ine Lakes 40 north of Inu- vik	SAND - and gravel, trace silt (SP) GRAVEL - and sand (GW)	500,000 to 1,500,000	No major concern	Source is suitable for development for local projects	Good	Moss and silt	0 to 2	Stockpile away from drainage courses for later regrading	Low	10	Rip and doze into piles, thaw and drain, load in trucks	Fine and coarse aggregate for concrete and asphalt General fill	Dozer-Ripper, Loader, Trucks Screen plant for produc- tion of aggregates	Undeveloped
SEE SECTION 319 FOR SOURCE DETAILS															


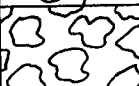
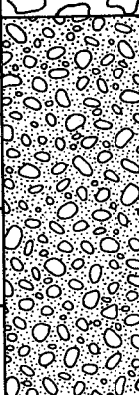
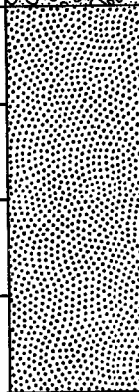
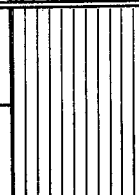
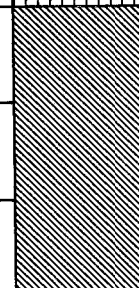


SOURCE No.	DISTANCE FROM COMMUNITY MILES	MATERIAL TYPE (UNIFIED GROUP SYMBOL)	VOLUME ESTIMATES CUBIC YARDS	ENVIRONMENTAL CONCERNS	CONCLUSIONS	SOURCE DEVELOPMENT DATA									
						DRAINAGE	STRIPPING			GRD. ICE	REC. DEPTH (FT.)	TYPE OF EXCAVATION	MATERIAL USEAGE	EQUIPMENT REQUIRED	STATE OF DEVELOPMENT OF SOURCE
							MATERIAL	DEPTH (FT)	DISPOSAL						
320	4 north of Wol-ver-ine Lakes 44 north of Inu-vik	SAND - little gravel, some silt (SM) SAND - some gravel, trace silt (SP)	500,000 to 1,500,000	No major concern	Low priority for development due to high ice and silt contents	Good	Moss, and silty sand	0 to 5	Stockpile away from drainage courses for later regrading	Low to High	15	Rip and doze into piles, thaw and drain, load in trucks	General fill	Dozer-Ripper, Loader, Trucks	Undeveloped
SEE SECTION 320 FOR SOURCE DETAILS															
321	15 from Mac-ken-zie River 43 north of Inu-vik	SAND - some gravel, trace silt (SP)	1,000,000	No major concern	Suitable for development	Good	Moss and silt	0 to 2	Stockpile away from drainage courses for later regrading	Low	5 to 10	Rip and doze into piles, probably thaw and drain, load in trucks	General fill	Dozer-Ripper, Loader, Trucks	Undeveloped
SEE SECTION 321 FOR SOURCE DETAILS															
322	3 north west Peter Lake 34 north west of Inu-vik	SAND - some gravel, some silt (SM)	1,000,000	No major concern	Low priority for development due to high silt content and erratic deposi-tion	Good	Moss and silt	0 to 2	Stockpile away from drainage paths for later regrading	Low to High	10	Rip and doze into piles, thaw and drain, load in trucks	Low quality general fill	Dozer-Ripper, Loader, Trucks	Undeveloped
SEE SECTION 322 FOR SOURCE DETAILS															
323A	Adj-acent to east chan-nel Mac-ken-zie 34 north west Inuvik	GRAVEL - and sand, trace silt (GW-GM) SAND - and gravel (SW)	15,000,000	Source is within proposed Caribou Hills reserve of International Biological Programme	Not recommended for development as source is within proposed Caribou Hills Reserve	Good	Moss and silt	0 to 5		Low	40		General fill, fine and coarse aggre-gate for con-crete and asphalt		Undeveloped
SEE SECTION 323A FOR SOURCE DETAILS															

SOURCE No.	DISTANCE FROM COMMUNITY MILES	MATERIAL TYPE (UNIFIED GROUP SYMBOL)	VOLUME ESTIMATES CUBIC YARDS	ENVIRONMENTAL CONCERNS	CONCLUSIONS	SOURCE DEVELOPMENT DATA									
						DRAINAGE	STRIPPING			GRD. ICE	REC. DEPTH (FT.)	TYPE OF EXCAVATION	MATERIAL USEAGE	EQUIPMENT REQUIRED	STATE OF DEVELOPMENT OF SOURCE
							MATERIAL	DEPTH (FT)	DISPOSAL						
324A	Adj-acent east chan-nel Mac-ken-zie River 38 north Inu-vik	GRAVEL - and sand trace silt (GW-GM) SAND - and gravel (SW)	10,000,000	Source is within proposed Caribou Hills reserve of International Biological Programme	Not recommended for development as source is within proposed Caribou Hills Reserve	Good	Moss and silt	0 to 5		Low	40		General fill, fine and coarse aggregate for concrete and asphalt		Undeveloped
SEE SECTION 324A FOR SOURCE DETAILS															
325	South west shore of Esk-imo Lakes 30 north of Inu-vik	GRAVEL - and sand, trace silt (GW)	500,000 to 1,000,000	Fawning ground of Reindeer Herd	Low priority for development due to variability of deposit. Environmental study required	Fair	Peat, top-soil, and silt	1 to 4½	Stockpile away from drainage courses for later regrading	Low to High	5 to 10	Rip and doze into piles, thaw and drain, load in trucks	General fill	Dozer-Ripper, Loader, Trucks	Undeveloped
SEE SECTION 325 FOR SOURCE DETAILS															
326	North end of Caribou Hills 17 north west Reindeer Station	SAND - and gravel, trace silt (SW)	20,000,000	Source is within critical Mackenzie Delta Wildlife region	Suitable for development pending environmental study	Good	Moss and silt	½ to 2	Stockpile away from slopes for later regrading in pit	Low to Med	15 to 20	Rip and doze into piles, thaw and drain, load in trucks	Fine and coarse aggregate for concrete and asphalt General fill	Dozer-Ripper, Loader, Trucks Screen plant for production of aggregate	Undeveloped
SEE SECTION 326 FOR SOURCE DETAILS															
327	South west shore Esk-imo Lakes 32 north of Inu-vik	GRAVEL - some sand trace silt (GW-GM)	1,000,000	Fawning ground of Reindeer Herd	Low priority for development due to variability of material quality and ice content. Environmental study required	Good	Moss and silt	1 to 5	Stockpile away from drainage courses for later regrading in pit	Low to High	5 to 10	Rip and doze into piles, thaw and drain, load in trucks	General fill	Dozer-Ripper, Loader, Trucks	Undeveloped
SEE SECTION 327 FOR SOURCE DETAILS															

SOURCE No.	DISTANCE FROM COMMUNITY MILES	MATERIAL TYPE (UNIFIED GROUP SYMBOL)	VOLUME ESTIMATES CUBIC YARDS	ENVIRONMENTAL CONCERNS	CONCLUSIONS	SOURCE DEVELOPMENT DATA									
						DRAINAGE	STRIPPING			GRD. ICE	REC. DEPTH (FT.)	TYPE OF EXCAVATION	MATERIAL USEAGE	EQUIPMENT REQUIRED	STATE OF DEVELOPMENT OF SOURCE
							MATERIAL	DEPTH (FT)	DISPOSAL						
328A	South west shore Esk-imo Lakes 28 north east Inu-vik	SILT - trace sand, trace, clay (ML)		Fawning ground of Reindeer Herd	Not recommended for development due to high ice content and poor quality	Fair	Moss and silt			High			Not suitable for general fill		Undeveloped
SEE SECTION 328A FOR SOURCE DETAILS															

SEE SECTION 328A FOR SOURCE DETAILS

EXPLANATION OF SYMBOLS AND TERMS USED IN THIS REPORT

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

SUPPLEMENTARY TERMS IDENTIFYING THE COMPOSITION OF GRANULAR SOILS

Component	Identification	Terms Identifying Proportions	Defining Range Percentage by Weight
Principal Component.....{	GRAVEL SAND SILT	50 or more
Minor Component.....{	Gravel Sand Silt	and some little trace	35 to 50 20 to 35 10 to 20 1 to 10

CLASSIFICATION SYSTEM FOR ICE

Non Visible Ice	Nf Nbn Nbe	Poorly bonded Well bonded Excess Ice
Visible Ice Less than 1 inch thick	Vx Vc Vr Vs	Individual ice crystals or inclusions Ice coatings or particles Random or irregularly oriented ice formation Stratified or distinctly oriented ice formations
Visible Ice Greater Than 1 inch thick	ICE+ ICE	Ice with soil inclusions Ice without soil inclusions

GROUND ICE CONTENT - % BY VOLUME

Low - <10% Med - 10% to 20% High - >20%

DESCRIPTIVE SOIL TERMS

Well graded having wide range of grain sizes and substantial amounts of all intermediate sizes.

Poorly graded .. predominantly of one grain size.

Coarse Aggregate .. Gravel retained on $\frac{1}{4}$ inch screen.

Fine Aggregate . Sand passing $\frac{1}{4}$ inch screen.

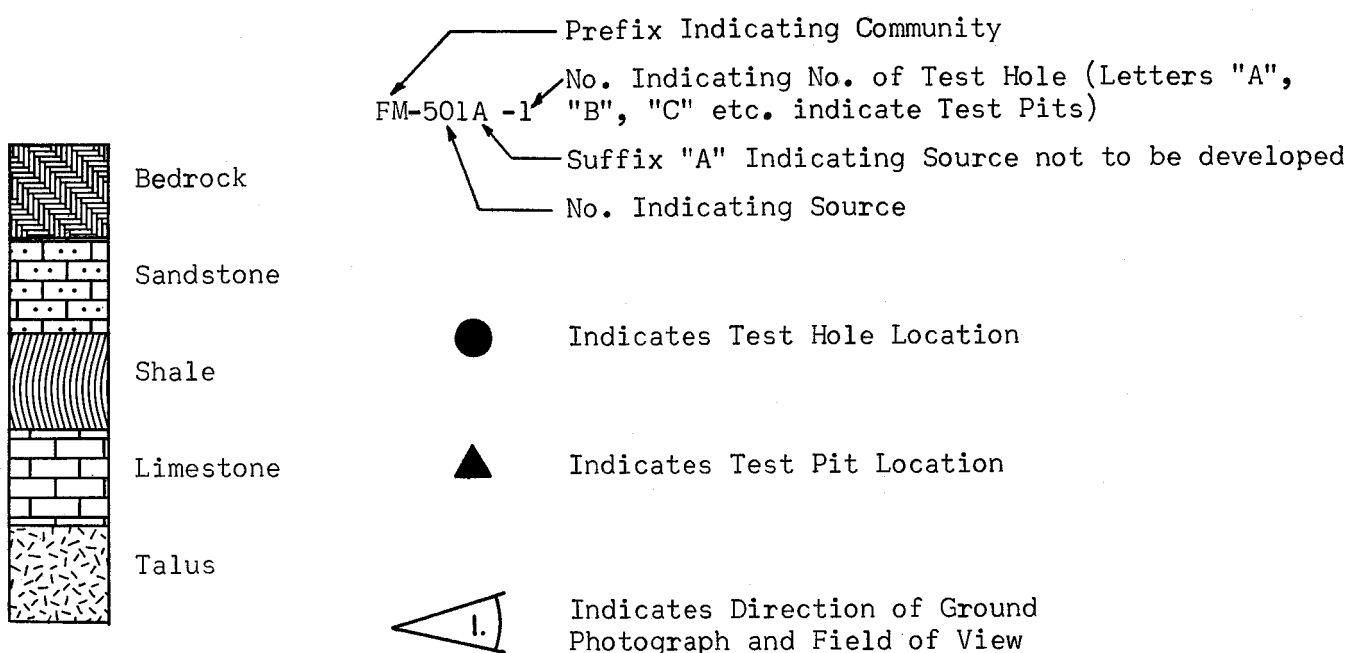
Interbedded composed of alternate layers of different soil or rock types.

Calcareous containing appreciable quantities of calcium carbonate.

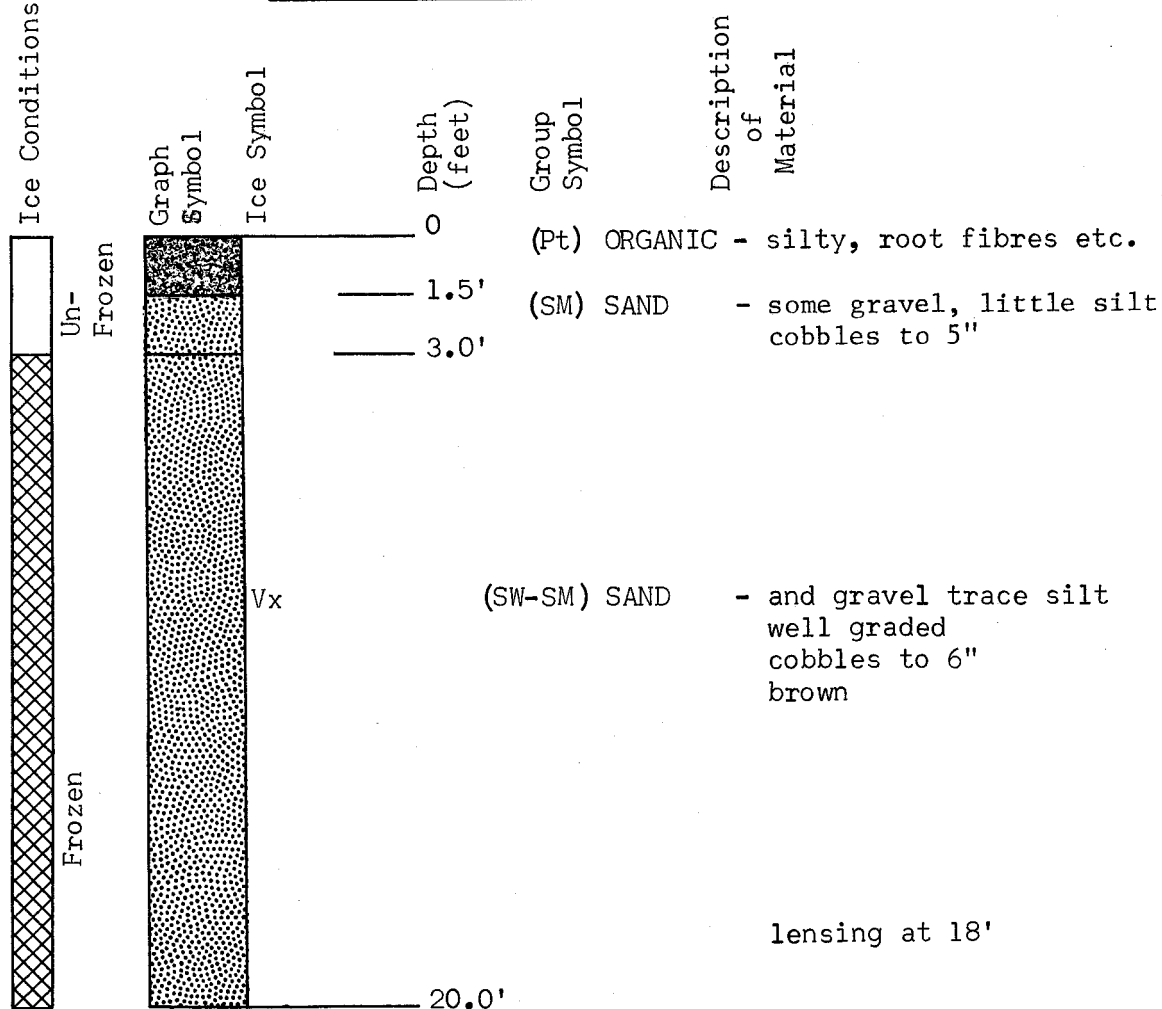
Organic containing organic matter; may be decomposed or fibrous.

Peat a fibrous mass of organic matter in various stages of decomposition. Generally dark brown to black in colour and of spongy consistency.

SUPPLEMENTARY SYMBOLS AND NOTATIONS



EXAMPLE OF SOIL LOG



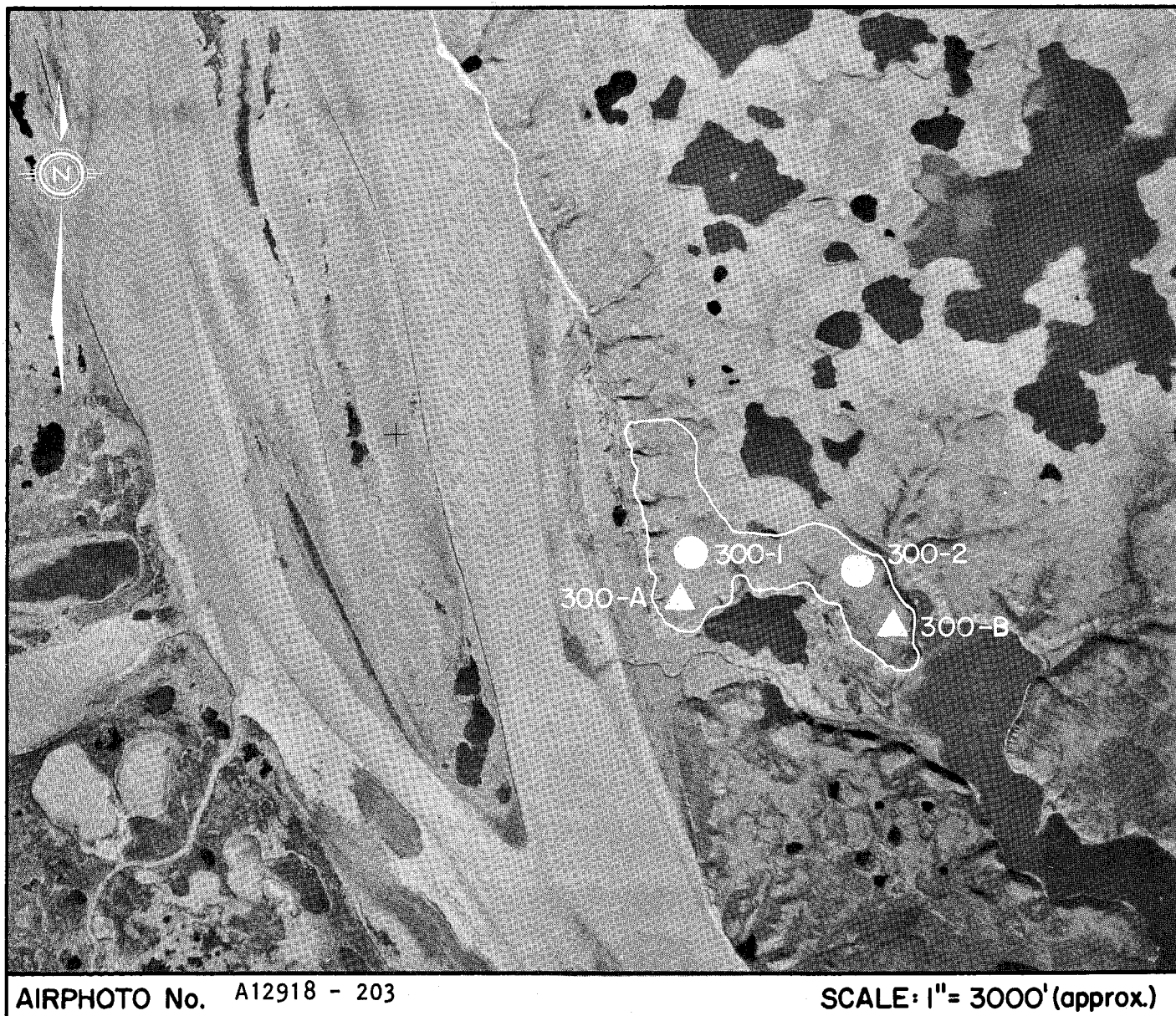
ZONE III
SOURCE No 300A

LANDFORM AND LOCATION: Terrace remnant adjacent to east channel of Mackenzie River about 5 miles southeast of Tununuk Point.

MATERIAL: SILT - some gravel, trace sand

VOLUME: ---

CONCLUSION: Not recommended for development because of high silt content and medium to high ice content.



AIRPHOTO No. A12918 - 203

SCALE: 1" = 3000' (approx.)

300A ENVIRONMENT

Physical

The source is a terrace remnant located in the Pleistocene coastal plain, adjacent to the east channel of the Mackenzie River 5 miles southeast of Tununuk. The base of the deposit is about 200 feet above river level, and the deposit is about 6,000 feet long and from 1,000 to 3,000 feet wide.

Drainage of the source is good because of topography, although a number of small lakes are directly adjacent and the surrounding area displays the polygonal pattern indicative of ground ice.

This source has not been developed.

Biotic

Vegetative cover is very sparse, primarily a light cover of upland dwarf shrub blending with sphagnum bogs. The organic ground cover varies from 1 to 4 feet in thickness.

The source is located just within the northern boundary of the Mackenzie Delta critical wildlife region, an area intensively trapped for muskrat, beaver, and mink and also important for the summer population of waterfowl.

The area also lies within the Mackenzie Reindeer Grazing Reserve.

The channels of the Mackenzie River are important to the native population for fishing, especially during certain seasons when fish are migrating to and from their spawning grounds.

300A MATERIALS AND QUANTITIES

The material in this source is primarily silt, with a trace of gravel and sand. Strata of ice were observed during the drilling and test pitting from a depth of 1½ feet to 14 feet. The moisture content at depth ranged from 11% to 34%.

300A DEVELOPMENT

General

This source is not recommended for development because of the high silt content and the medium to high ice content.

Access

The source is readily accessible to points on the Delta. A road about 1½ miles long would connect the source to the riverbank, accessible by barge in summer or by truck in winter.

Material Use and Handling

Due to the high silt content the material would provide a medium to poor grade of general fill if it were ripped, stockpiled, thawed, and drained. As a fill it would be susceptible to frost and liable to heave in winter.

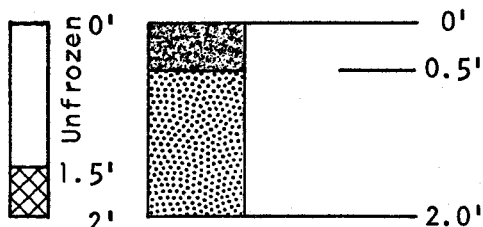
Stripping and Restoration

If the source were developed, and organic ground cover and topsoil stripped, the slopes in the area could be unstable because of thermal erosion, thus necessitating costly restoration. For this reason as well as those mentioned above, development of this source is not recommended.

TEST PIT LOGS

SOURCE No. 300A

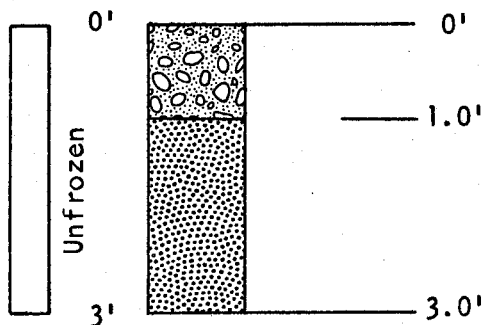
300A-A



(OL) SILT - organic, black

(SM) SAND - little gravel, some silt,
maximum 3/4" well graded

300A-B

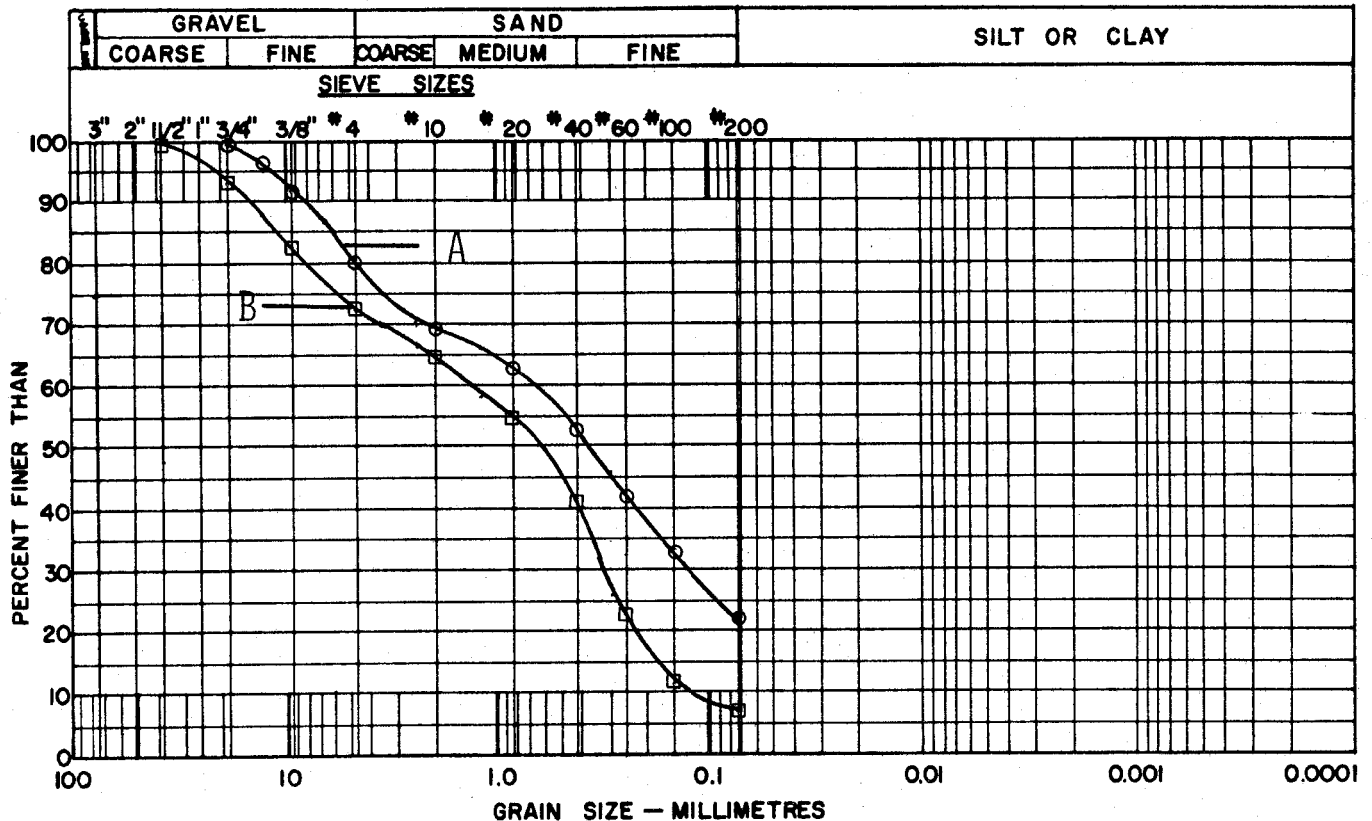


(GP) GRAVEL - and sand

(SW-SM) SAND - some gravel, trace silt,
maximum 1 1/2" rounded to
subangular, well graded

LABORATORY TEST DATA SOURCE No. 300A

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A depth 1.5 - 2' 13.2%
Pit B depth 1 - 3' 2.9%

ORGANIC CONTENT

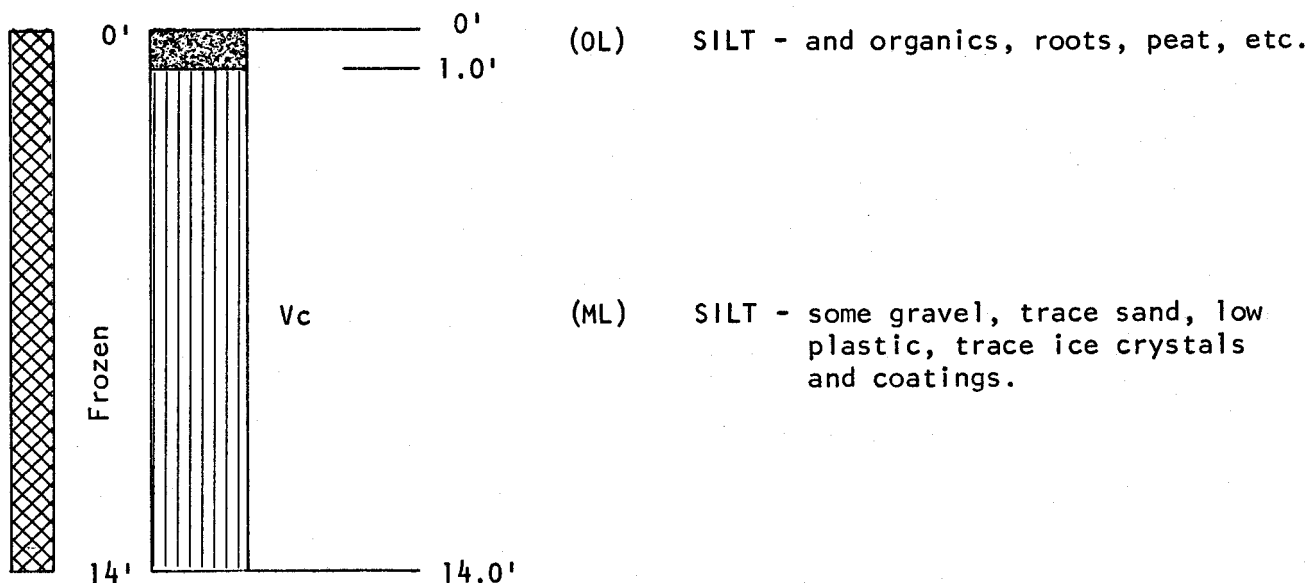
HARDNESS TEST

PETROGRAPHIC ANALYSIS

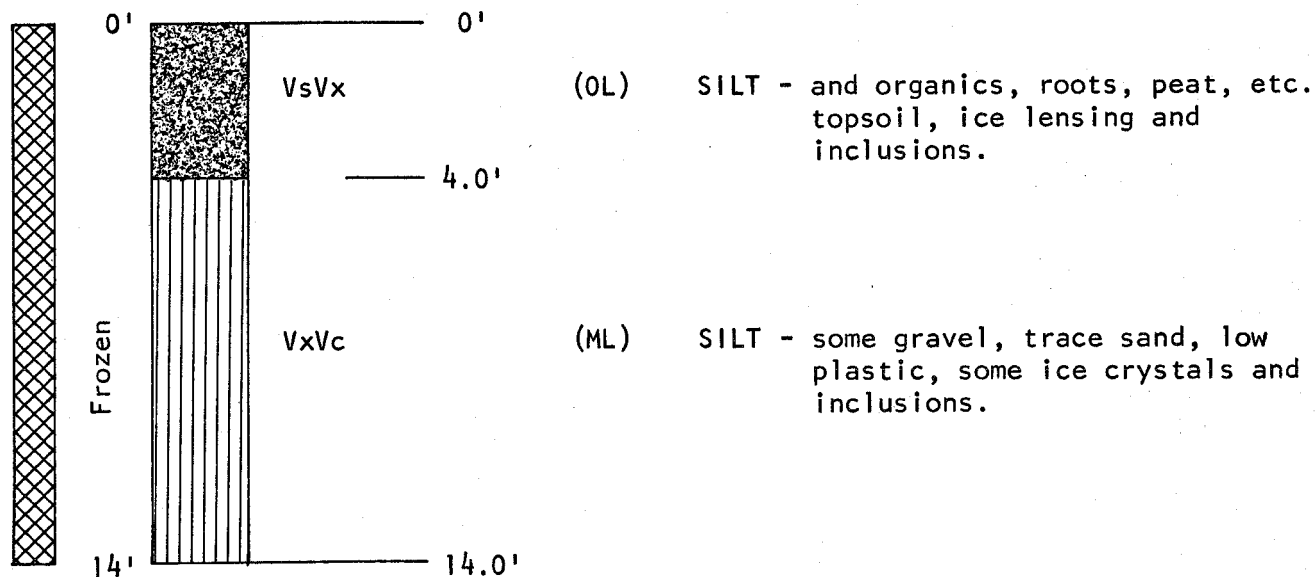
TEST HOLE LOGS

SOURCE No. 300A

300A-1



300A-2

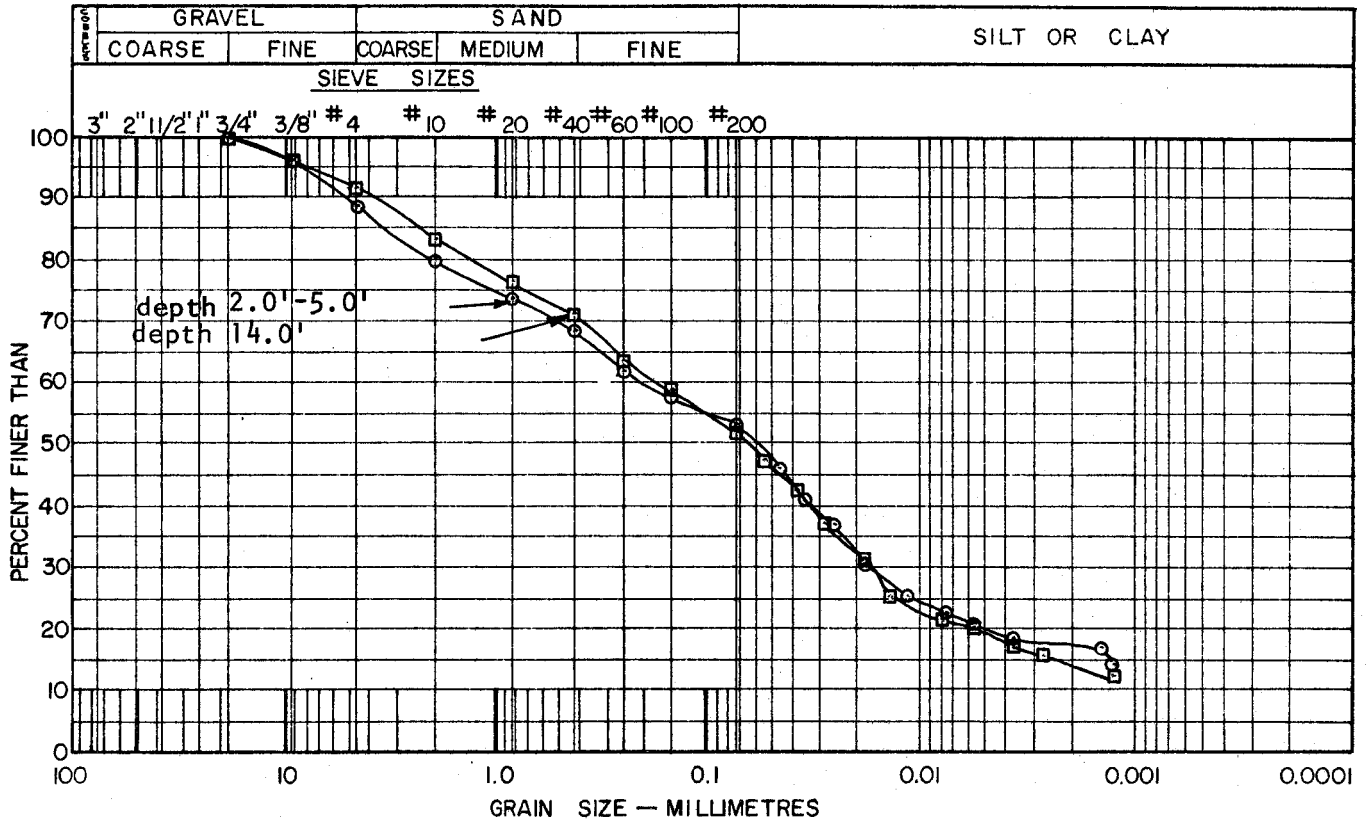


Moisture Content

Sample 1	depth 5'	24.2%
Sample 2	depth 10'	19.5%
Sample 3	depth 14'	11.2%

LABORATORY TEST DATA TEST HOLE-SOURCE No. 300-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	22.6%
Sample 2	depth 5'	17.2%
Sample 3	depth 10'	14.2%
Sample 4	depth 14'	34.0%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

ZONE III
SOURCE No. 301

LANDFORM AND LOCATION: Terrace remnant located adjacent to eastern channel of Mackenzie River about 2 miles southeast of Tununuk Point.

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

VOLUME: 4,000,000 cu. yds.

CONCLUSION: Source is suitable for development but due to its high variability it will require additional drilling to delineate the areas of low ice content sand and gravels. Environmental Study required.



301 ENVIRONMENT

Physical

The source is a terrace remnant located in the glaciofluvial plain adjacent to the eastern boundary of the Mackenzie Delta, about 2 miles southeast of Tununuk Point. The base of this feature is about 100 feet above river level, and the deposit is about 4 miles long and 200 to 1,000 feet wide. The source consists of a series of hillocks about 25 to 30 feet high, many of them separated by a series of small streams in incised valleys draining to the Delta.

The drainage of the source is good because of topography, although polygonal ground, indicative of massive ground ice, can be seen within and east of the source. Many small lakes lie east of the source as well.

The source has not been developed.

Biotic

Vegetative cover is very sparse, primarily a light cover of upland dwarf shrub blending with sphagnum bogs. The organic ground cover varies from 1 to 4 feet in thickness.

The source is located just within the northern boundary of the Mackenzie Delta critical wildlife region, an area intensively trapped for muskrat, beaver, and mink, and also important for the summer population of waterfowl.

The area also lies within the Mackenzie Reindeer Grazing Reserve.

The channels of the Mackenzie River are important to the native population for fishing, especially during certain seasons when fish are migrating to and from their spawning grounds.

301 MATERIALS AND QUANTITIES

The materials in this source are variable, ranging from medium to fine sand as in Test Pit A (98% passing #20 mesh, and only 8% passing #200 mesh), to the samples from the test holes, one of them containing 50% gravel and another 50% silt. The moisture content

varies almost as much as the grading, with Test Hole #3 reporting 84% at a depth of 2 feet and Test Hole #2 reporting 10% at a depth of 20 feet.

The estimated volume of material, assuming a recoverable depth of 10 feet, is 4,000,000 cubic yards.

301 DEVELOPMENT

General

Because of its size and location this source is considered to be suitable for development for general fill. The erratic nature of the deposit, and especially the high silt content, both limit its value as a source of specification materials. Further investigation may, however, establish an area that is suitable for this purpose.

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

Access

This source is well located to serve the Delta, being located adjacent to the east channel of the Mackenzie River. Material could be loaded directly to a barge in summer or trucks in winter for transportation to its destination. The distance to Inuvik is about 45 miles by either means of transport.

Material Use and Handling

Before a large-scale development proceeds on this source, a program of drilling should be undertaken to delineate the areas of low ice content sand and gravel. Some areas must be avoided because of massive ground ice at the surface. Lacking more qualitative information, it is sufficient for the present to classify the source suitable for general fill or road material, but with potential for the supply of concrete and asphalt aggregates.

The surface layer of parts of the deposit is unfrozen in summer,

and can be excavated to a depth of about 4 feet with no difficulty. Some areas of silty material contain a great deal of ice, and must be stripped and left to thaw. Below the 4 foot level, all material is frozen, and must be ripped, stockpiled and thawed before shipping for use.

The equipment required to develop this source is the conventional assembly of dozer with ripper attachment, front-end loader, and probably a conveyor system to stockpile and load material. For small volumes of production, a truck would be adequate for this purpose.

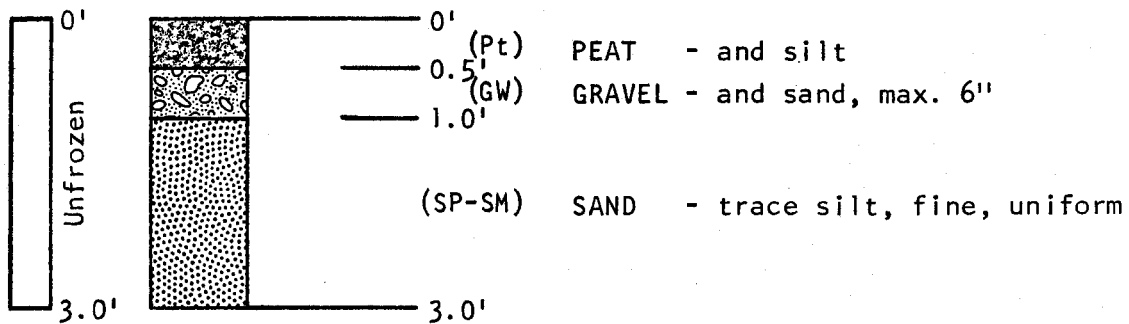
Stripping and Restoration

Before an area can be developed for production, all organic ground cover and topsoil must be stripped and stockpiled for replacement after the granular material has been removed. All banks must be graded to a stable slope. Large areas of ground ice must not be exposed on slopes because of sloughing and difficult restoration. The area must finally be seeded for speedy re-vegetation, using a selection of plants and methods of preparation recommended by a scientist experienced in Arctic horticulture.

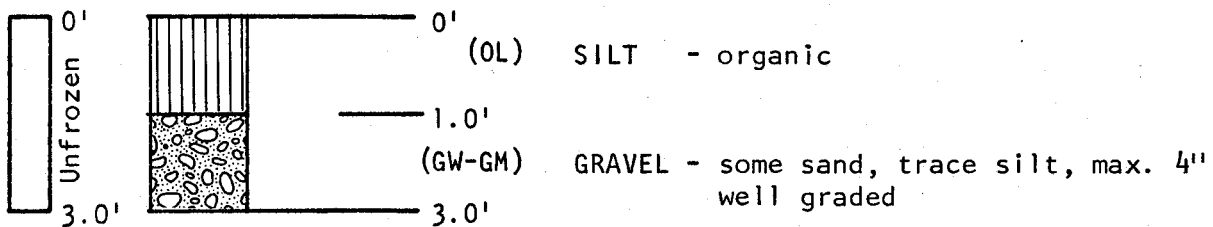
TEST PIT LOGS

SOURCE No. 301

301-A

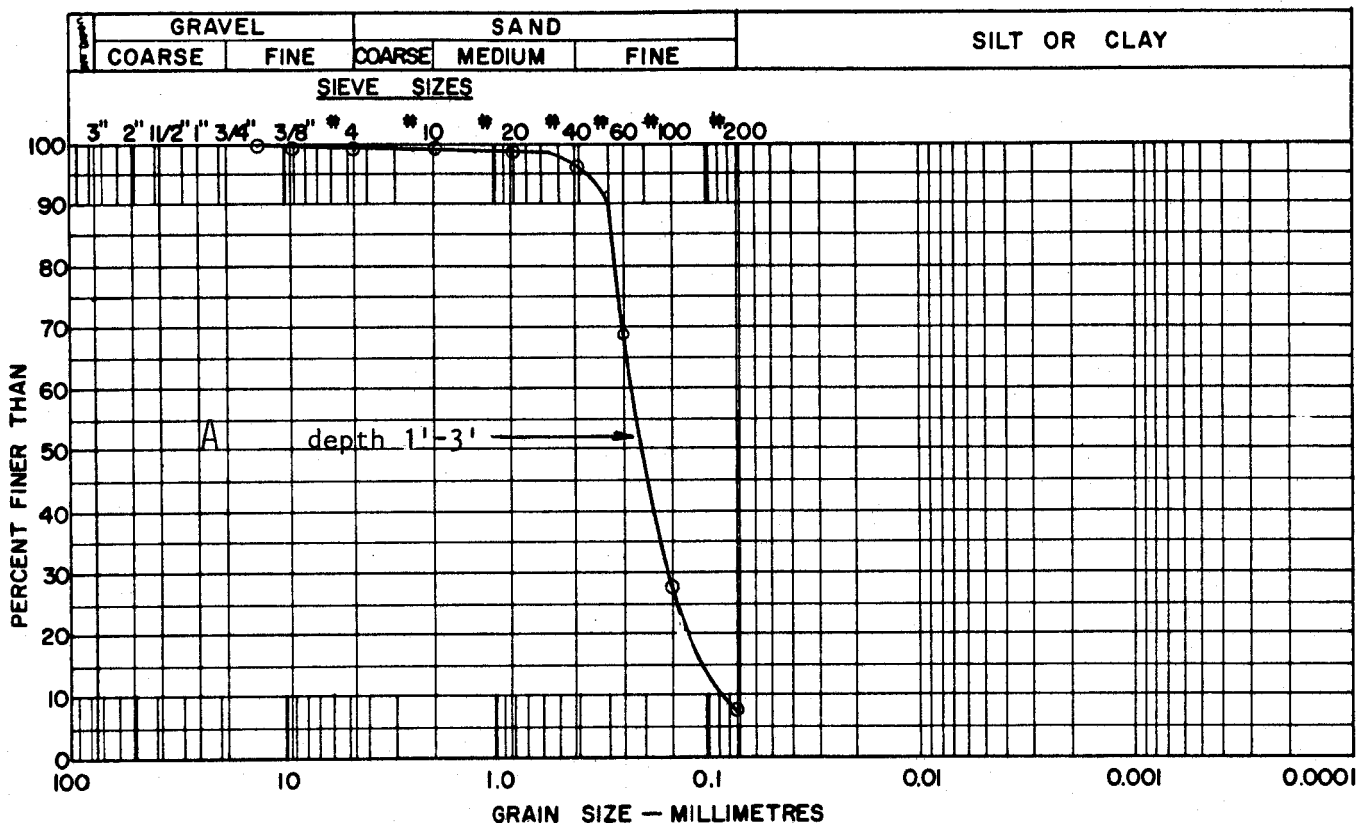


301-B



LABORATORY TEST DATA SOURCE No. 301

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A depth 1 - 3' 5.6%

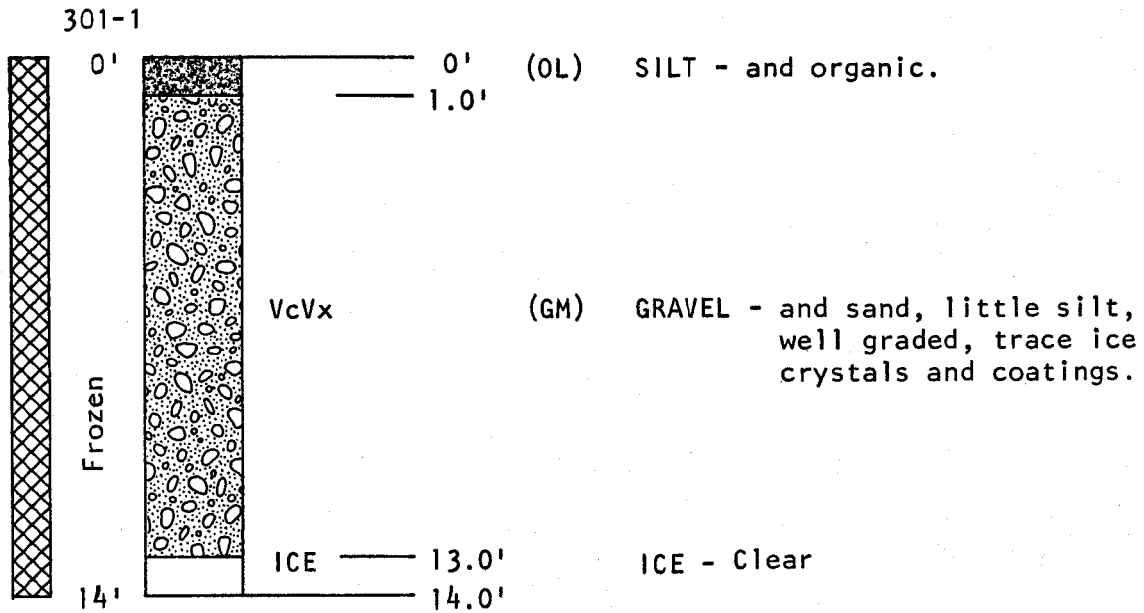
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

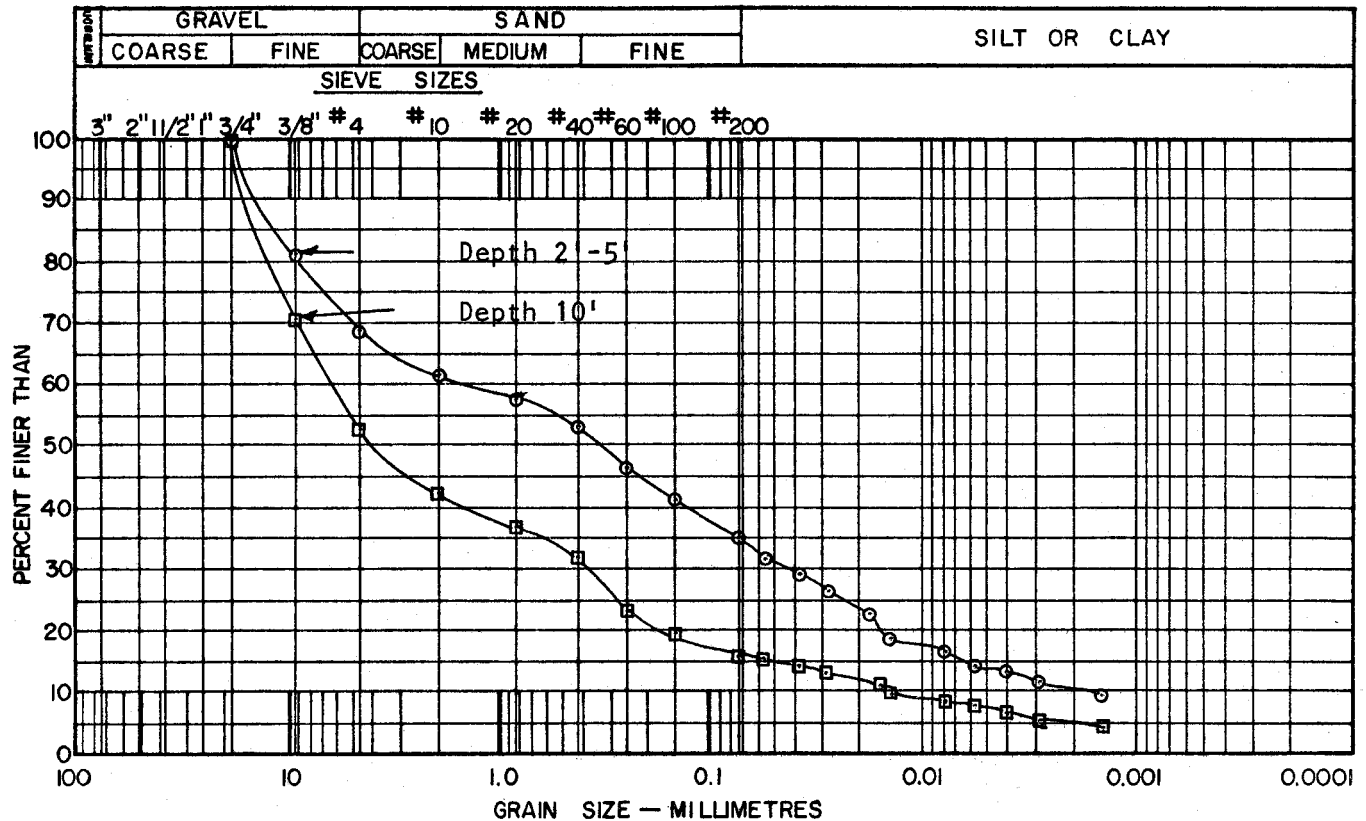
SOURCE No. 301



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 301-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2' 21.0%
 Sample 2 depth 5' 16.8%
 Sample 3 depth 10' 9.7%

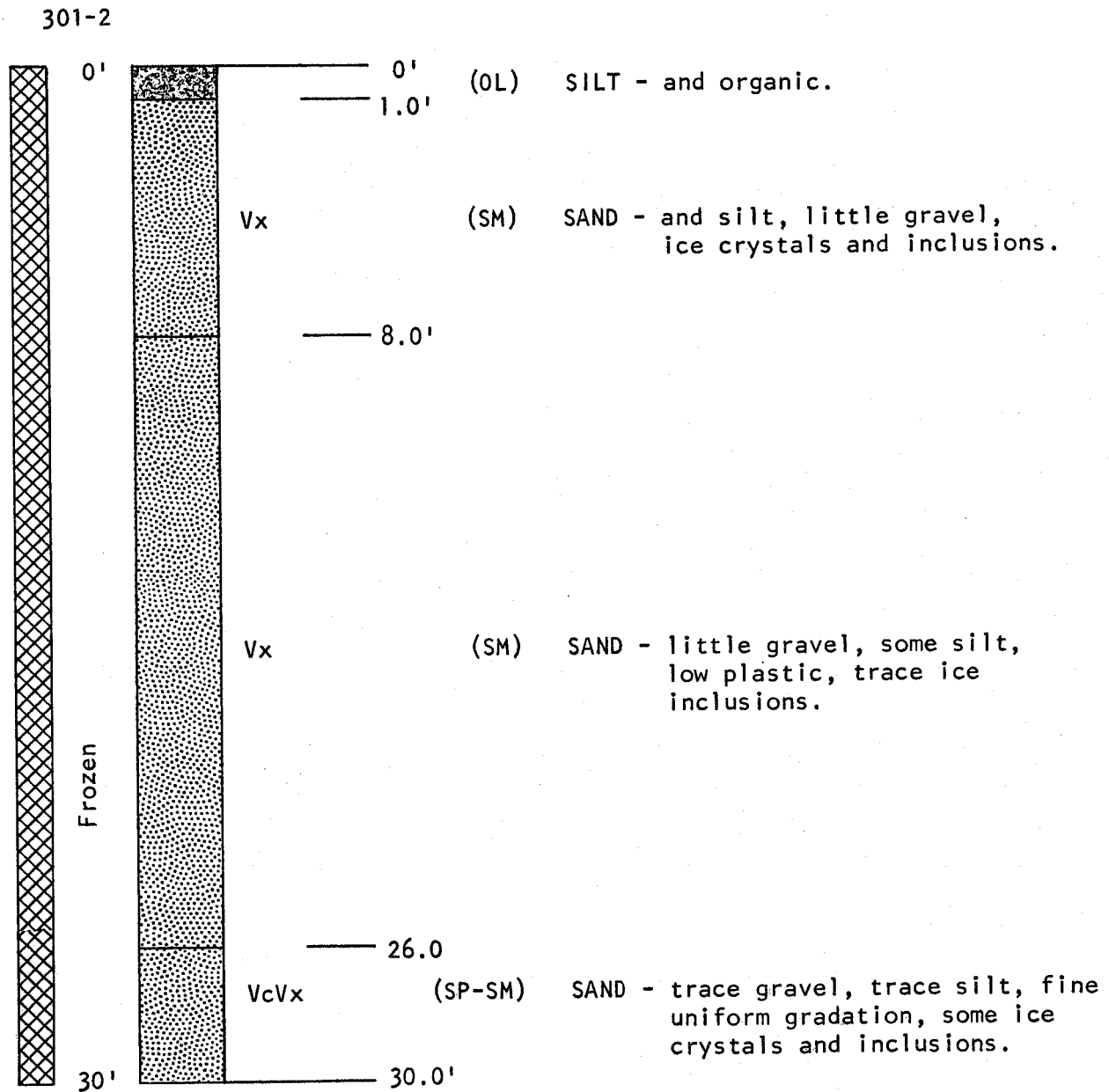
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

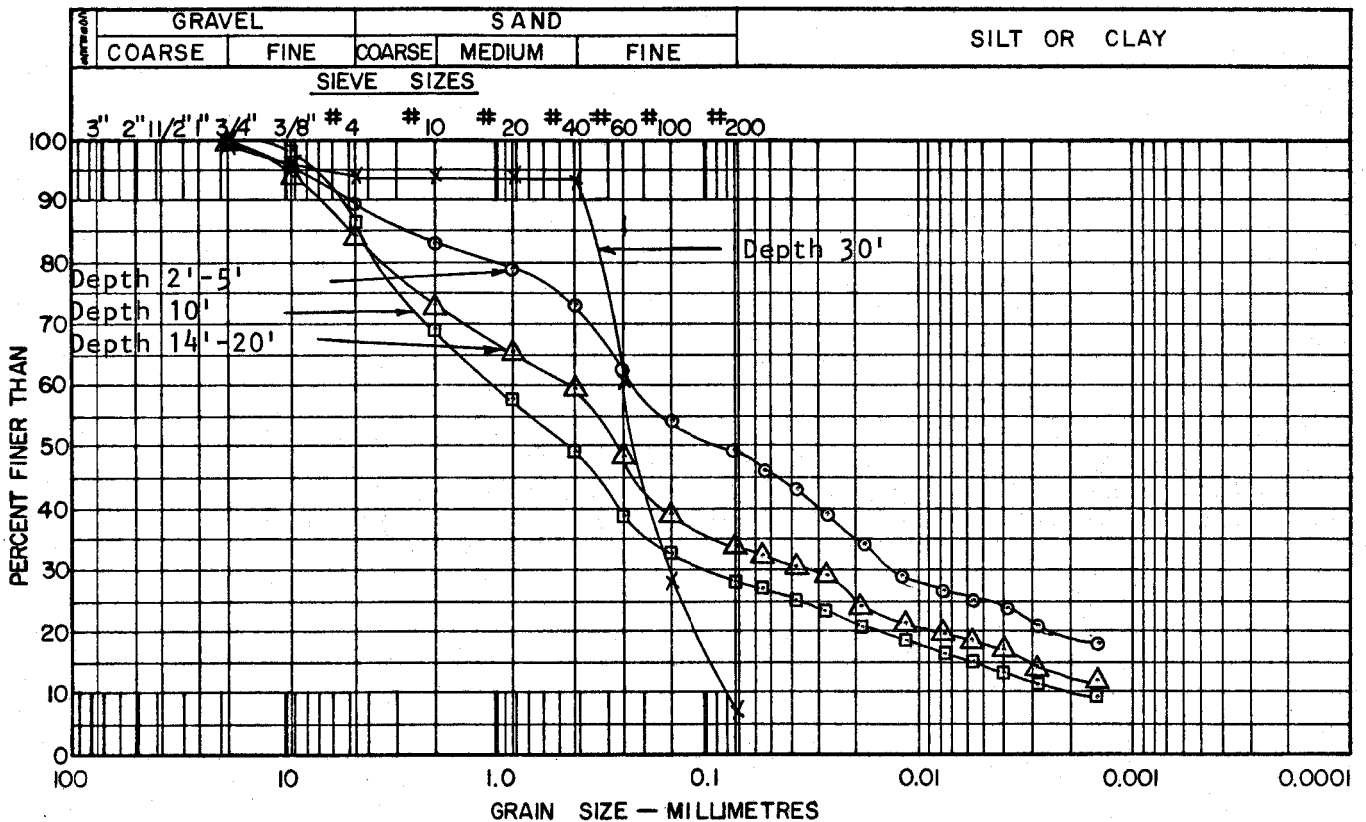
TEST HOLE LOGS

SOURCE No. 301



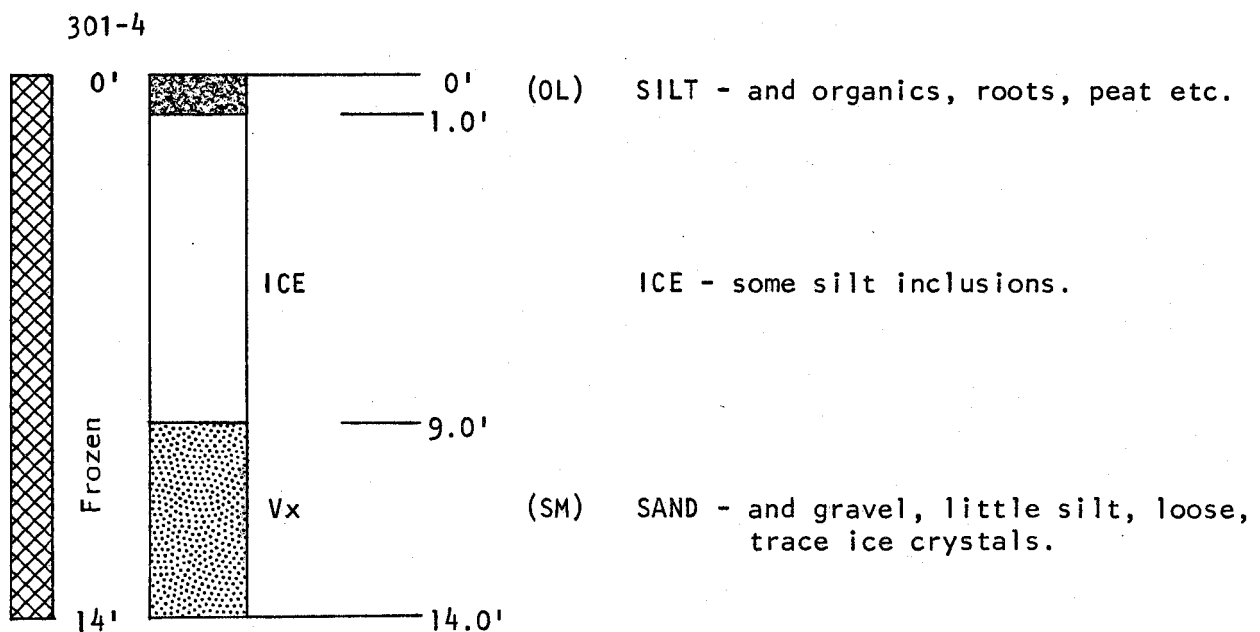
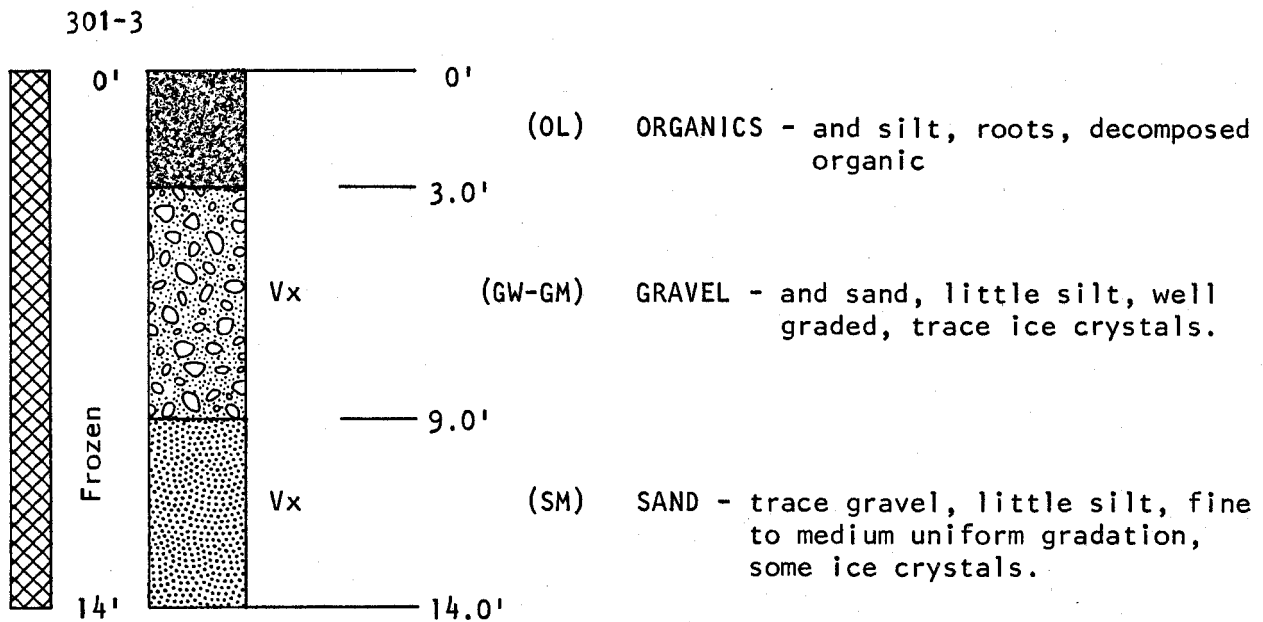
LABORATORY TEST DATA TEST HOLE-SOURCE No. 301-2

GRAIN SIZE DISTRIBUTION



TEST HOLE LOGS

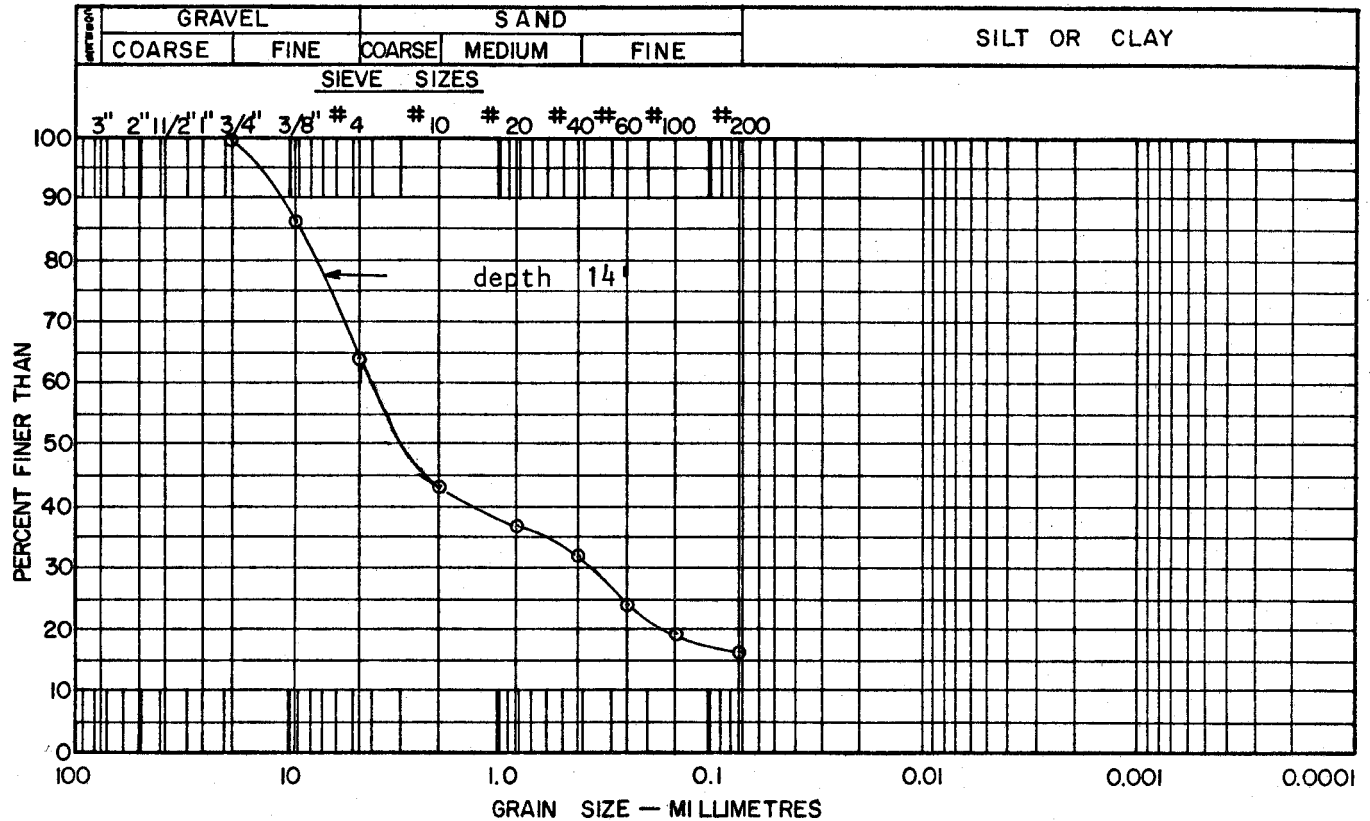
SOURCE No. 301



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 301-4

GRAIN SIZE DISTRIBUTION



ZONE III

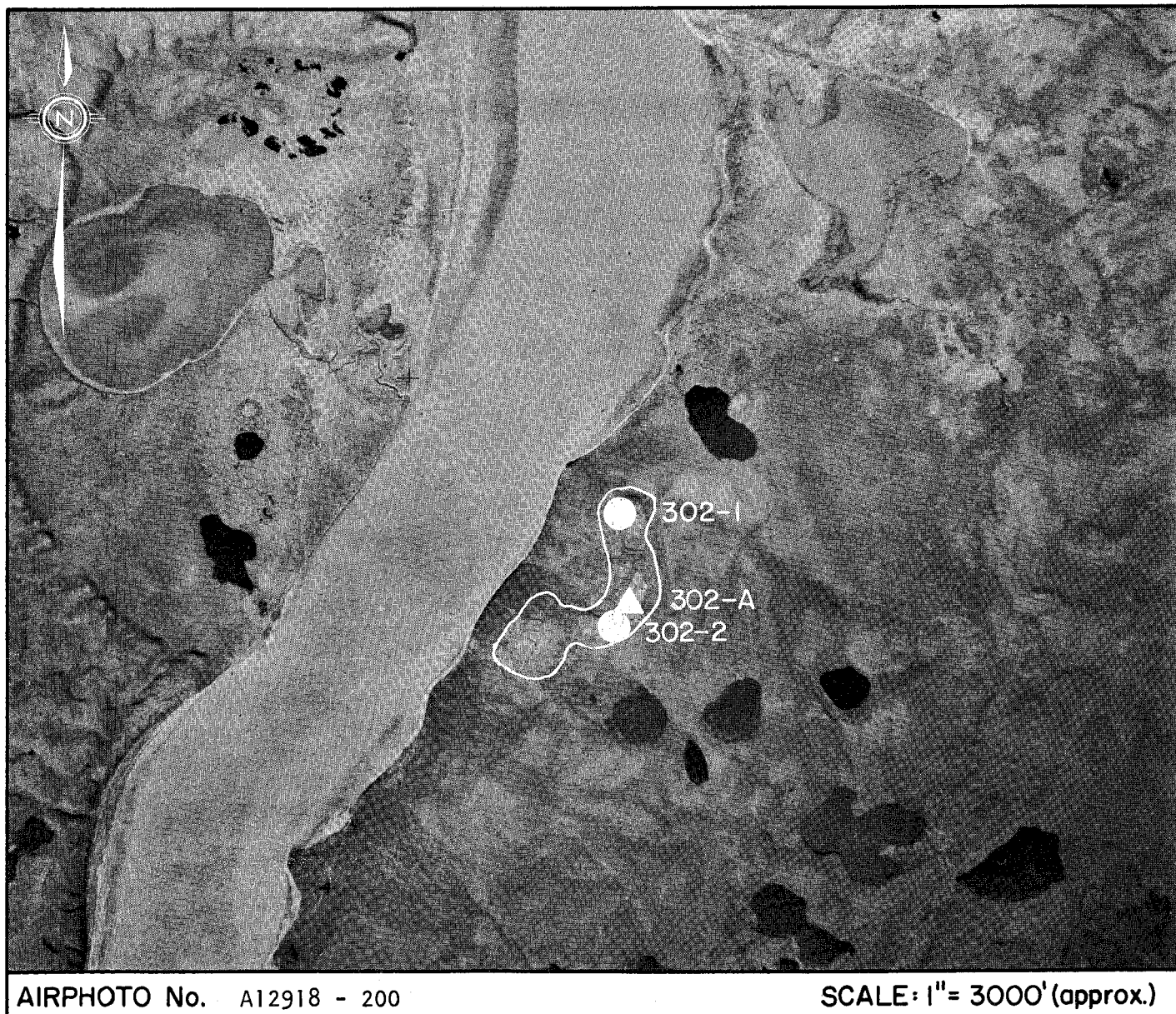
SOURCE No. 302

LANDFORM AND LOCATION: Glaciofluvial terrace adjacent to east channel of Mackenzie River approximately 3 miles northeast of Tununuk Point.

MATERIAL: GRAVEL - and sand.
SAND - and gravel.

VOLUME: 1,500,000 cu. yds.

CONCLUSION: Source is suitable for development but will probably require a study to determine method of development which will minimize wildlife disturbance. Also, care must be taken to prevent exposure of the underlying massive ground ice.



302 ENVIRONMENT

Physical

The source is a glaciofluvial terrace remnant located on the Pleistocene coastal plain adjacent to the eastern boundary of the Mackenzie Delta. The base of this deposit is about 50 feet above river level, and the deposit is about 5000 feet long and between 500 and 1000 feet wide. It is located 3 miles northeast of Tununuk Point.

The source is well drained because of topography, and no ground ice was encountered to a depth of 3 feet in September.

No development has taken place at this source.

Biotic

Vegetative cover in this area is very sparse, mostly moss in the poorly drained areas and grass with some dwarf shrubs up to 2 feet high on the slopes.

The source lies within an important waterfowl staging, breeding, and molting area, the northern part of the Mackenzie Delta. It also lies at the western limit of the Mackenzie Reindeer Grazing Reserve.

The channels of the Mackenzie River are very important to the native population for fishing, especially at certain seasons when fish are migrating to and from their spawning grounds.

An archaeological site has been identified about 1/2 mile to the southwest of the source.

302 MATERIALS AND QUANTITIES

The materials from this source are well-graded gravel and sand, with a trace of silt. The ice content in the sand and gravel is generally low, but the drilling encountered massive ground ice below the gravel.

Test Hole #1 contained about 45% coarser than #4 mesh, 50% well-graded sand, and 5% silt. The test pit indicated the maximum

particle size is about 1 inch.

A petrographic analysis of the sample from the test pit shows the main constituents to be quartzite (58%), sandstone (23%), metamorphosed siltstone (11%), and chert (6%), with granite and quartz making up the remaining 2%. The material is substantially all sound.

The estimated volume of recoverable material in this source is 1,500,000 cubic yards.

302 DEVELOPMENT

General

This source is recommended for development for specification aggregates. The quality of material is good, and the location is excellent for distribution over the Delta area.

An environmental study is necessary before development proceeds, in order to determine whether and how gravel can be produced at this source without excessive disturbance to wildlife.

Access

The source is located adjacent to the east channel of the Mackenzie River, and aggregate could be loaded directly to barge or truck for transport to its destination. The distance to Inuvik is 50 miles, and to Swimming Point is 8 miles.

Material Use and Handling

The material can be used for concrete and asphalt construction, and should be reserved for this use. For small volumes of material, screening to remove oversize will be sufficient treatment, although large-scale development will require the installation of a crushing and screening plant.

The surface of the deposit contains little or no ice, so materials to a depth of about 4 feet can be removed with no difficulty. From 4 feet to about 12 feet the material must be ripped, stockpiled, and thawed before it can be shipped for use.

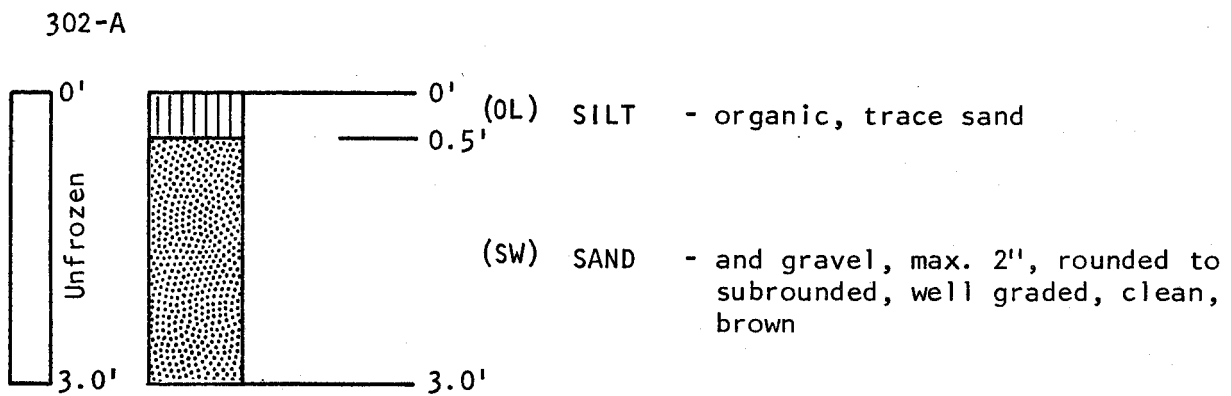
The equipment required to develop this source is a dozer with ripper attachment, front-end loader, and probably a conveyor system to stockpile and load aggregate. For small volumes, a truck could be used instead of the conveyor system. An aggregate plant will be necessary for the production of substantial volumes of specification material.

Stripping and Restoration

Probably the volume of organic ground cover and topsoil will be inadequate to provide a cultural layer for restoration, but any material that can be saved should be stockpiled and used to best advantage. All banks must be graded to a stable slope, and depleted areas graded to a smooth contour before restoration. Large areas of ground ice should not be exposed on sloping surfaces because of sloughing and difficult restoration.

TEST PIT LOGS

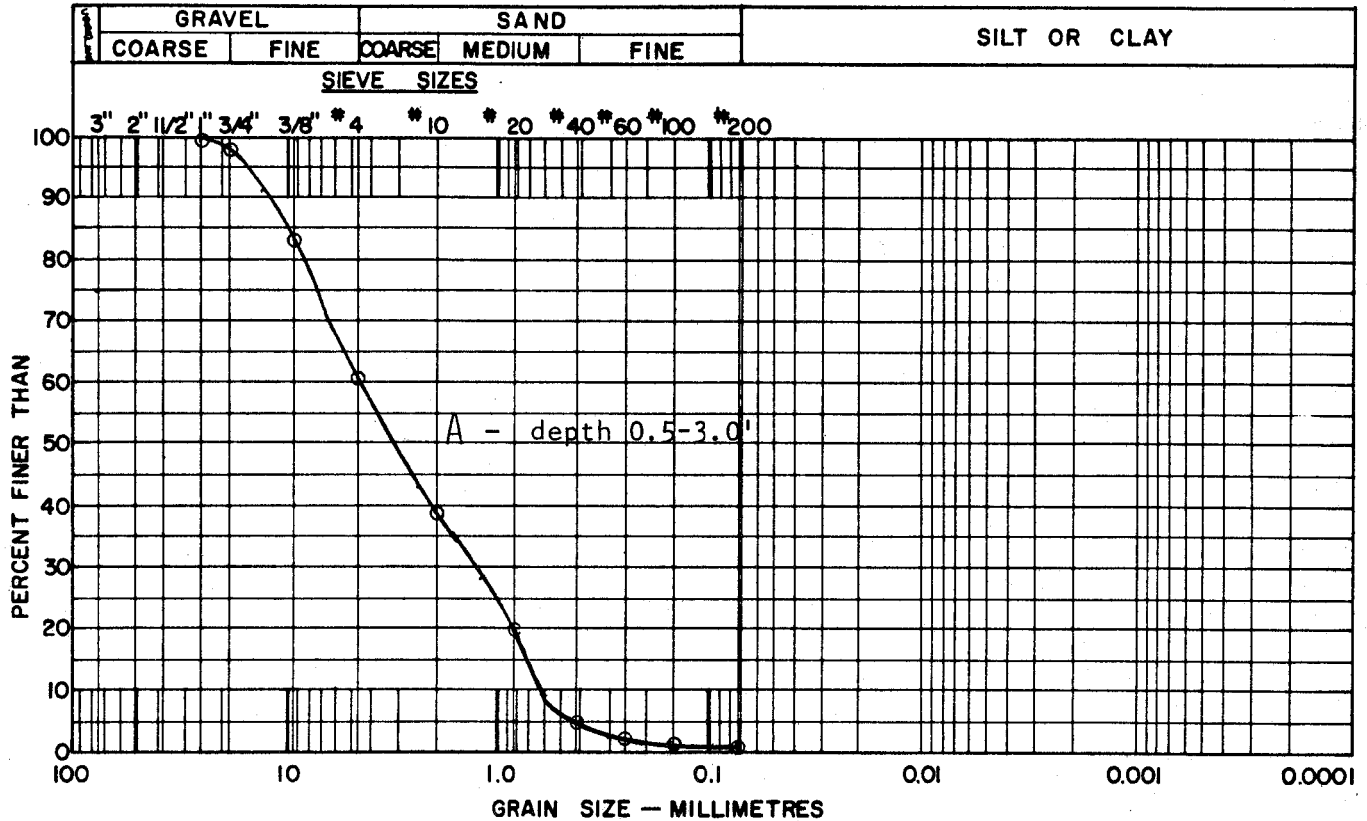
SOURCE No. 302



LABORATORY TEST DATA

SOURCE No. 302-A

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A depth 0.5 - 3.0' 3.4%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

Depth 0.5' - 3'

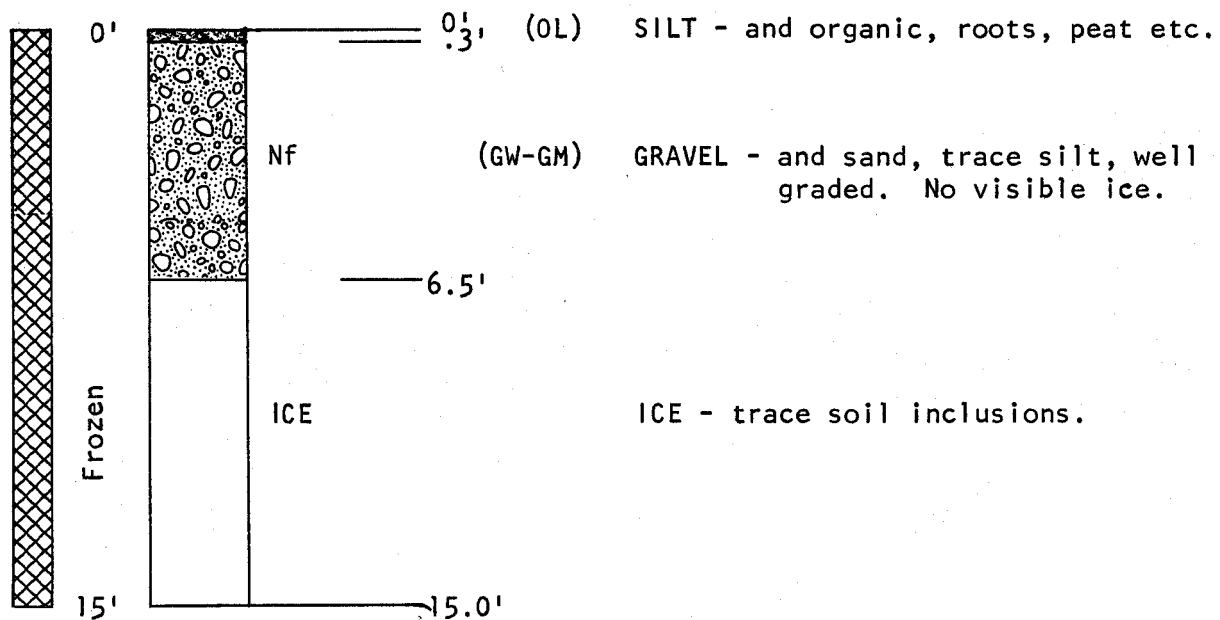
Quartzite	-58%
Sandstone	-23%
Siltstone	-11%
(metamorphic)	
Chert	- 6%
Granite	- 1%
Quartz	- 1%

Total 100%

TEST HOLE LOGS

SOURCE No. 302

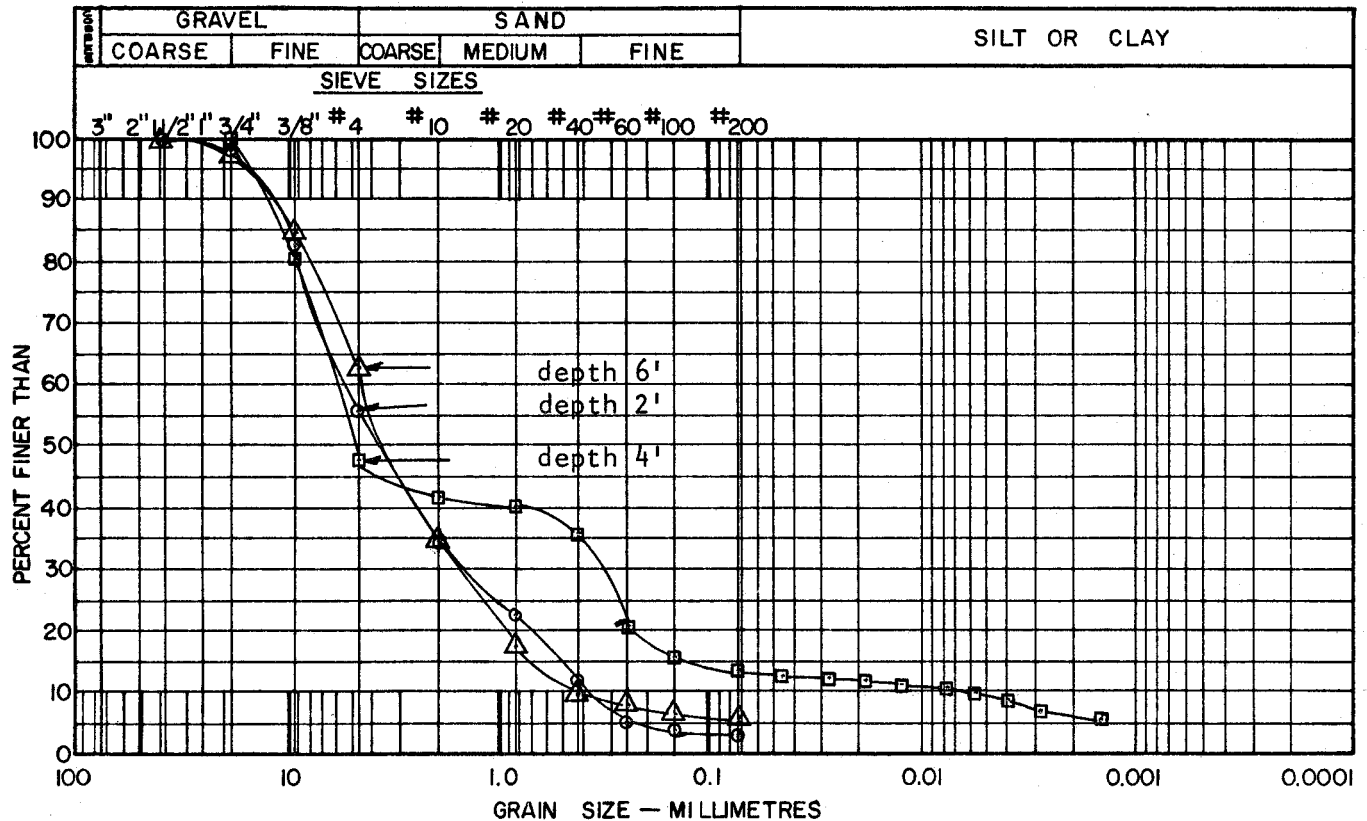
302-1



LABORATORY TEST DATA

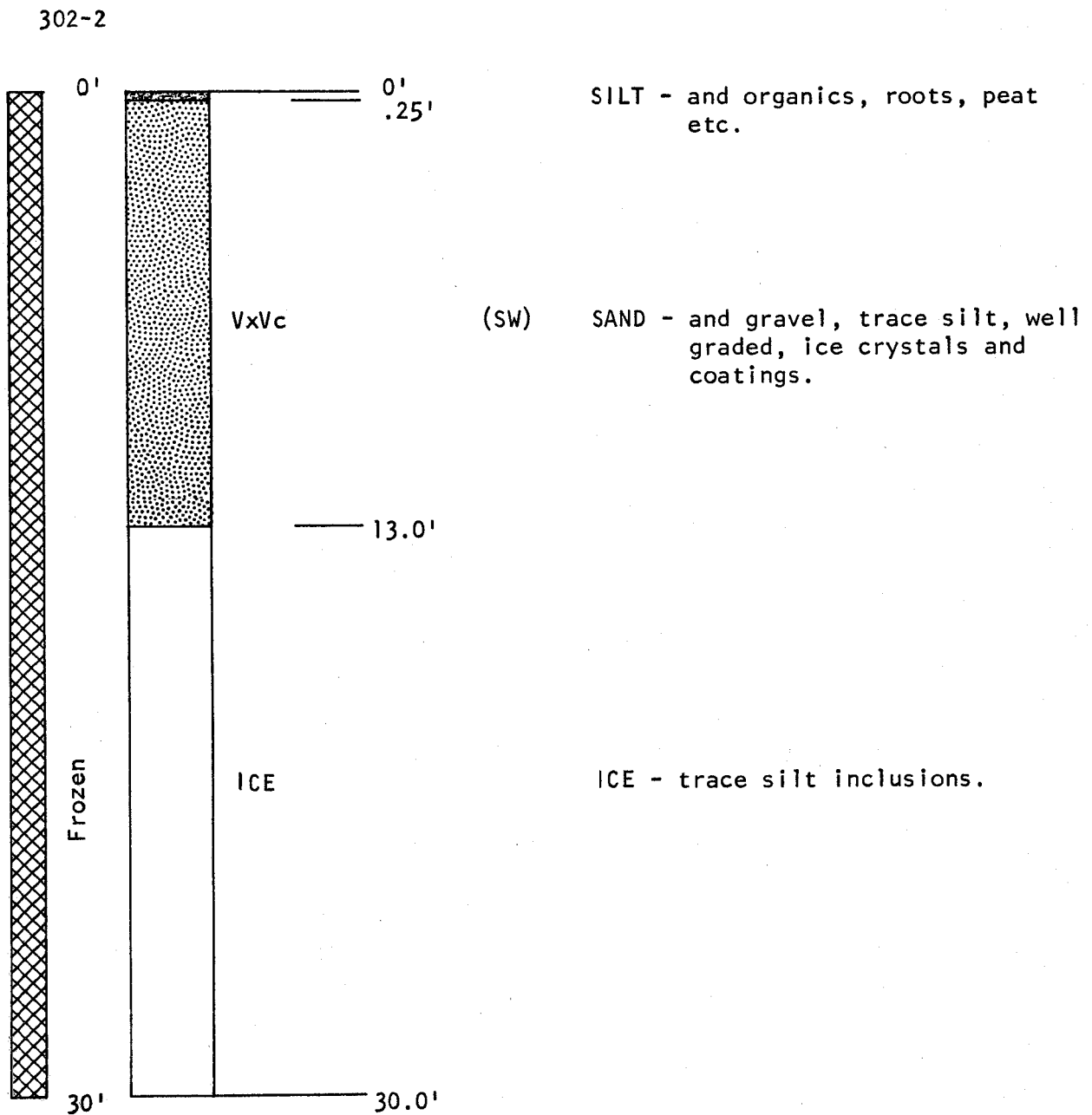
TEST HOLE-SOURCE No. 302-1

GRAIN SIZE DISTRIBUTION



TEST HOLE LOGS

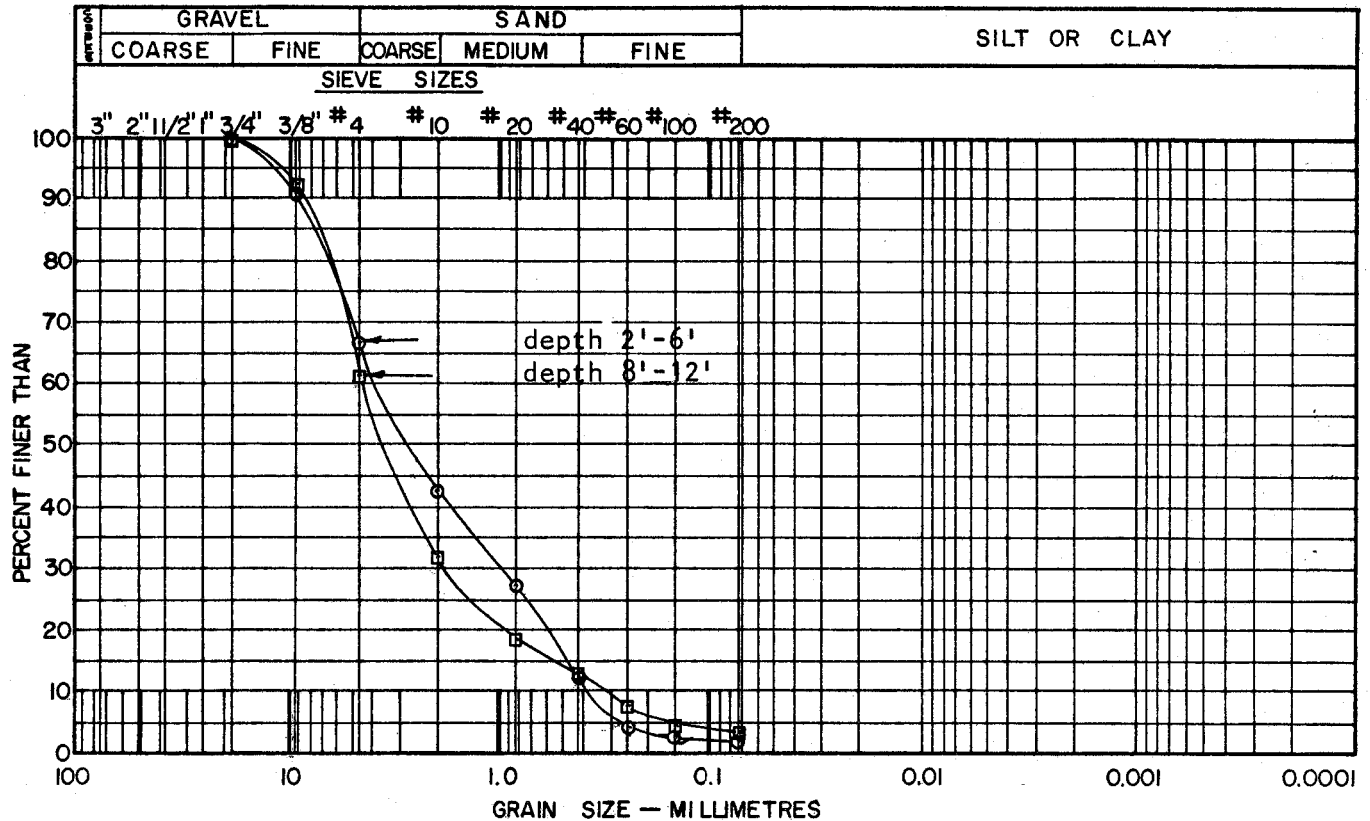
SOURCE No. 302



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 302-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2' 2.8%
 Sample 2 depth 4' 6.1%
 Sample 3 depth 6' 7.2%
 Sample 4 depth 8' 6.1%
 Sample 5 depth 10' 7.7%

Sample 6 depth 12' 8.8%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

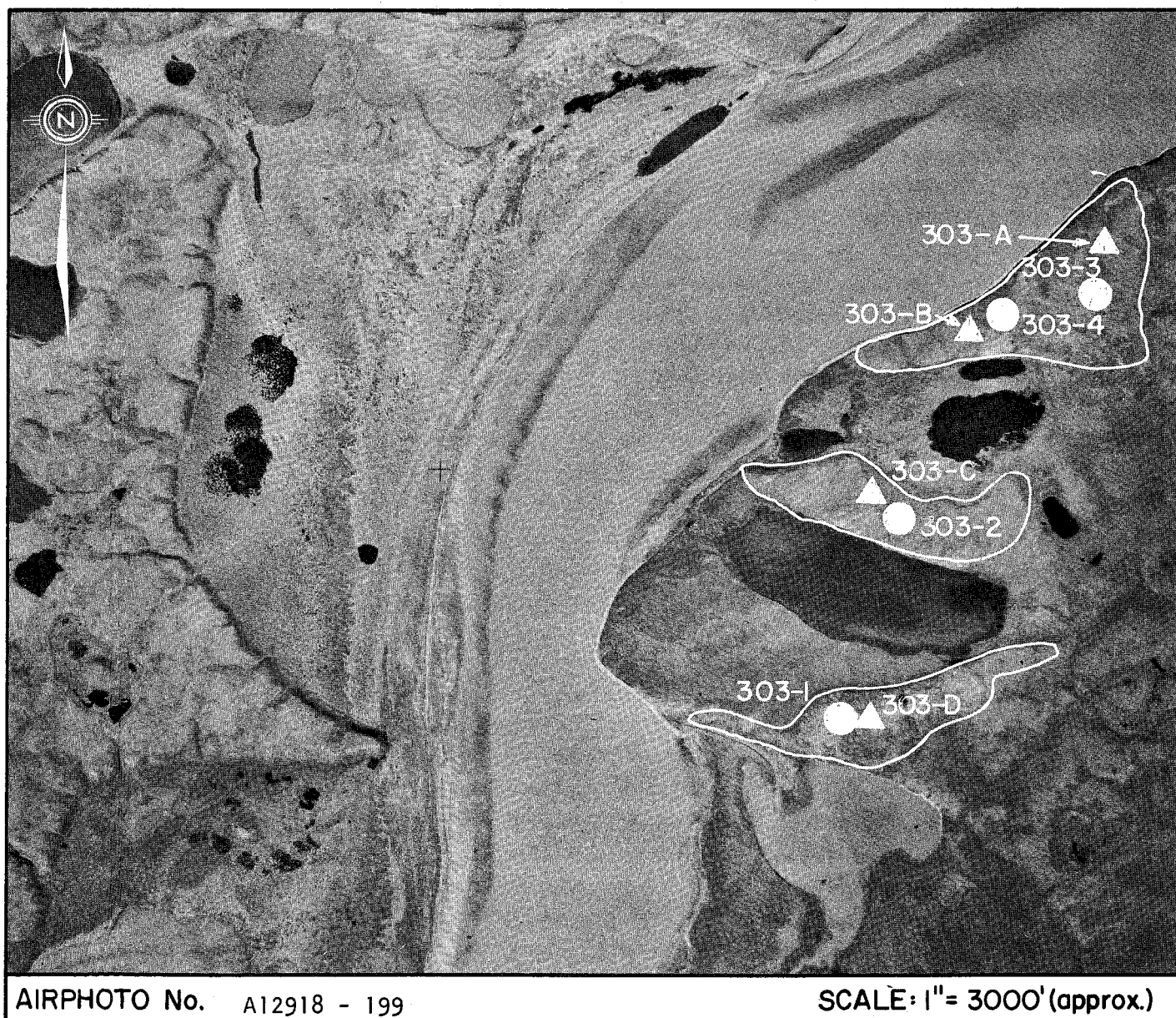
ZONE III
SOURCE No. 303

LANDFORM AND LOCATION: Three terrace remnants on the east bank of the east channel of the Mackenzie River about 6 miles northeast of Tununuk Point.

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

VOLUME: 6,000,000 cu. yds.

CONCLUSION: Source is suitable for development for general fill and road material.



303 ENVIRONMENT

Physical

The source consists of 3 terrace remnants located on the east bank of the east channel of the Mackenzie River, and lies 6 miles north-east of Tununuk Point. All three terraces are based at river level, but the southerly one rises about 50 feet above river level and the other two about 25 feet above river level. The southerly terrace is about 7000 feet long and 100 to 1000 feet wide. The middle terrace is about 6000 feet long and 200 to 700 feet wide. The northerly terrace is 7000 feet long, roughly triangular, and about 3500 feet wide at the eastern end.

The surface of the southerly terrace is distorted by depressions and cracks that usually indicate frost wedges and ground ice at depth. Several lakes can be seen among the three terraces.

The drainage of these features is good, with no ground ice detected to a depth of 2½ feet in September. The source has not been developed.

Biotic

Vegetative cover is sparse, with a thin ground cover of moss and grass and some dwarf shrubs from 1 to 3 feet high.

The source lies within an important waterfowl staging, breeding, and molting area, the northern part of the Mackenzie Delta. It also lies at the western limit of the Mackenzie Reindeer Grazing Reserve.

The channels of the Mackenzie River are very important to the native population for fishing, especially at certain seasons when fish are migrating to and from their spawning grounds.

303 MATERIALS AND QUANTITIES

The materials in this source are variable, consisting of gravel, sand, and silt in varying combinations. Some samples contain as

much as 47% silt, others are remarkably clean. Some of the grading of sand and gravel is good, other curves indicate significant gaps.

The petrographic analysis of gravel from Test Hole #1 indicates a marginal aggregate, consisting mainly of quartzite (77%), a soft sandstone (9%), and quartz (8%), with granite, limestone, ironstone, and vesicular andesite (4%) making up the remaining 7%. About 13½% of the total is unsound.

The ice content is variable as well as the grading. Test Hole #2 averages a moisture content of almost 20%, whereas Test Hole #1 ranges from 4% to 15% in 20 feet. In general, the 15 feet or so above the massive ground ice is medium to low ice content.

The estimated volume of recoverable material is 6,000,000 cubic yards.

303 DEVELOPMENT

General

Because of the size, location and material in this large source, it is considered suitable for development. However a program of drilling is required to define the best sections of granular material.

Access

The source is well located for distribution over the Delta, being on the east channel of the Mackenzie River. Swimming Point is 6 miles to the northeast, Tununuk Point 6 miles to the southwest, and Inuvik 56 miles south, all located on the same east channel. Transportation during summer will be by barge, during winter by trucks hauling over the ice.

Material Use and Handling

The material from this source can be used primarily for general fill and for road construction. It is very unlikely that, after further investigation, an operation can be set up to produce a

large volume of specification aggregates because of the variability of the source.

Material below the top, or active permafrost layer, and above the massive ground ice can be excavated by ripping, and then must be stockpiled and thawed before shipping. The production of specification aggregate will probably require the installation of a crushing and screening plant.

Development of the source will require a dozer with ripper attachment, a front-end loader, and probably a conveyor system for stockpiling and loading, although a truck could handle this function in a relatively small operation.

Stripping and Restoration

Before development begins the area must be stripped of all organic cover and topsoil, this material being stockpiled for replacement after the granular material has been removed. It is recommended that, wherever possible, the granular material should be removed to the full depth of usable material in one operation, in order to minimize the area disturbed at one time and to simplify restoration.

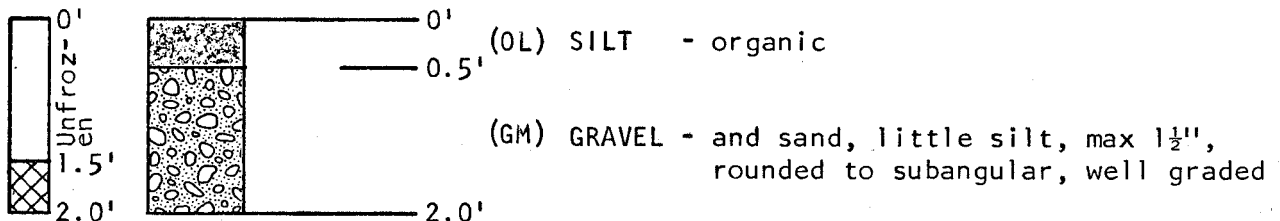
Banks in the depleted area must be graded to stable slopes before covering with topsoil, and large areas of ground ice should not be exposed on slopes.

Drainage to the Mackenzie River must not be permitted to carry silt from stockpiles of granular material or topsoil. If siltation becomes a problem, the drainage channels must be led through clarification ponds before release into the River.

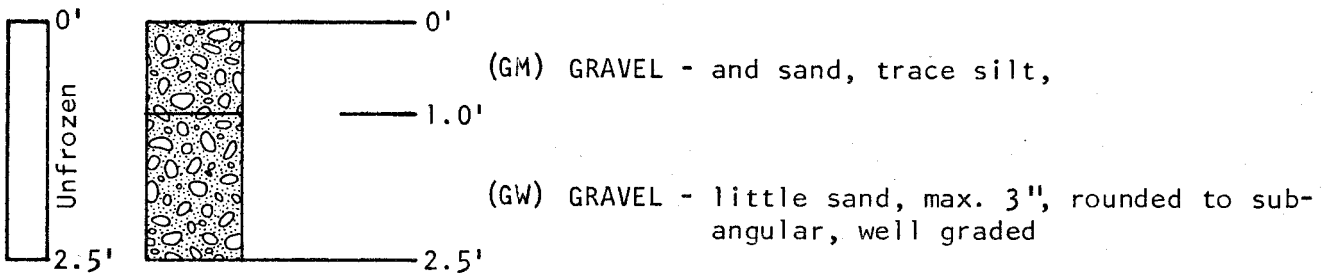
TEST PIT LOGS

SOURCE No. 303

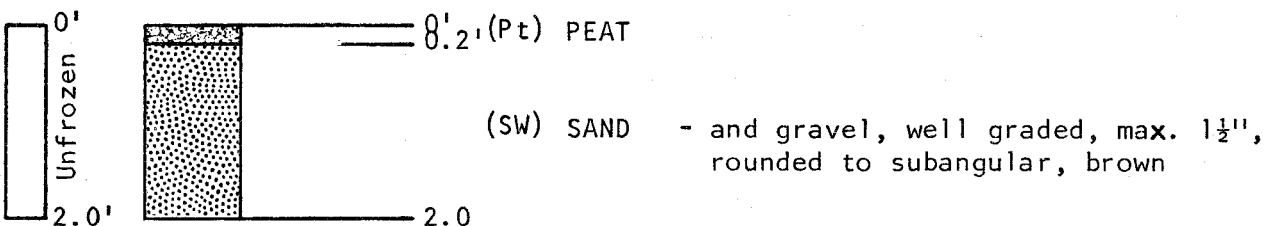
303-A



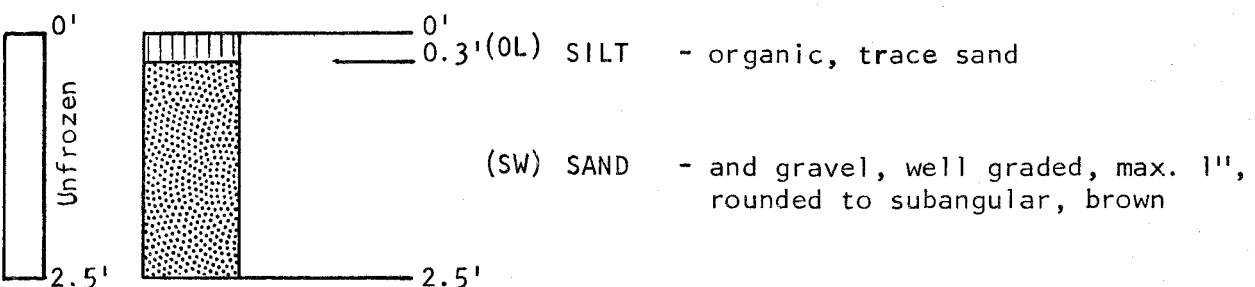
303-B



303-C

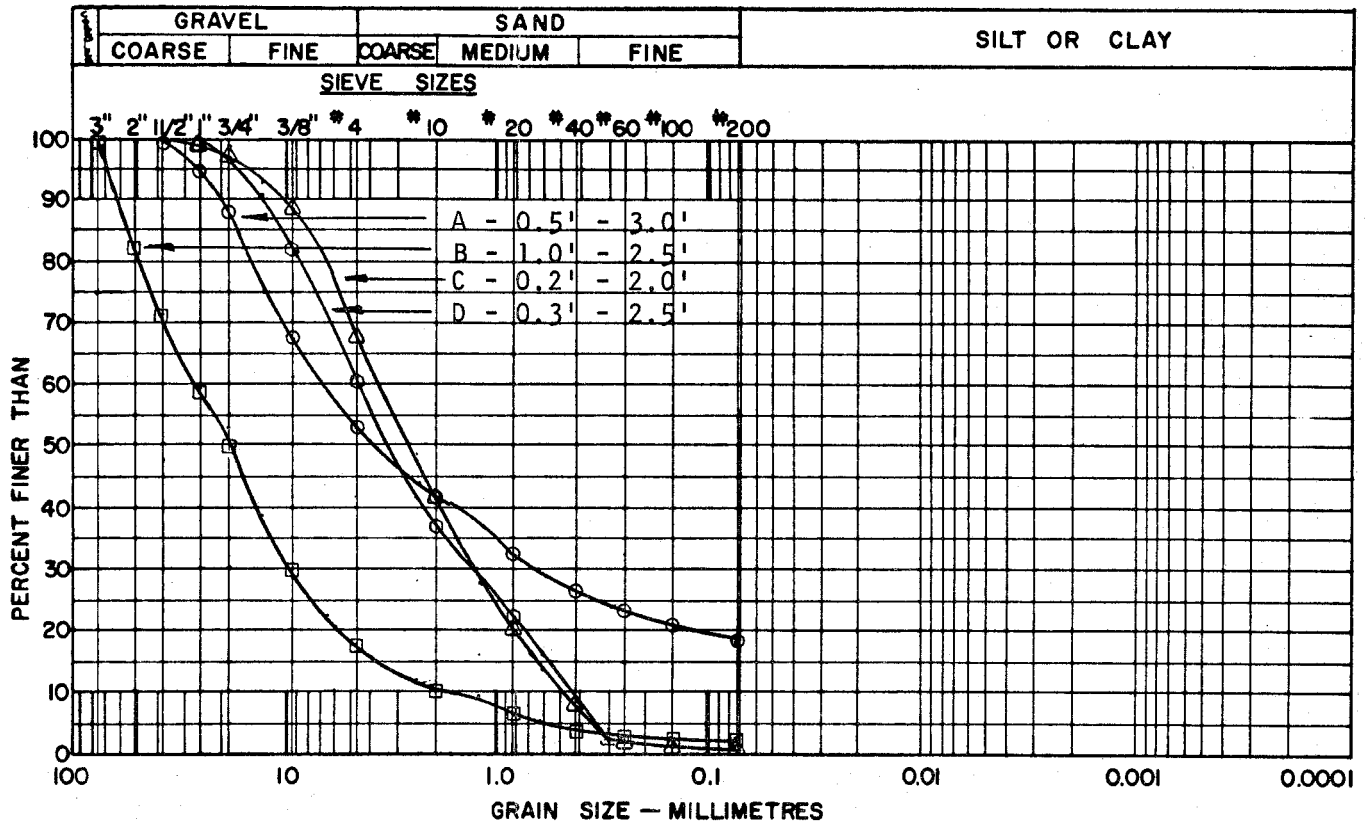


303-D



LABORATORY TEST DATA SOURCE No. 303

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample A depth (0.5' - 3.0') - 13.6%
 Sample B depth (1.0' - 2.5') - 1.9%
 Sample C depth (0.2' - 2.0') - 3.1%
 Sample D depth (0.3' - 2.5') - 3.1%

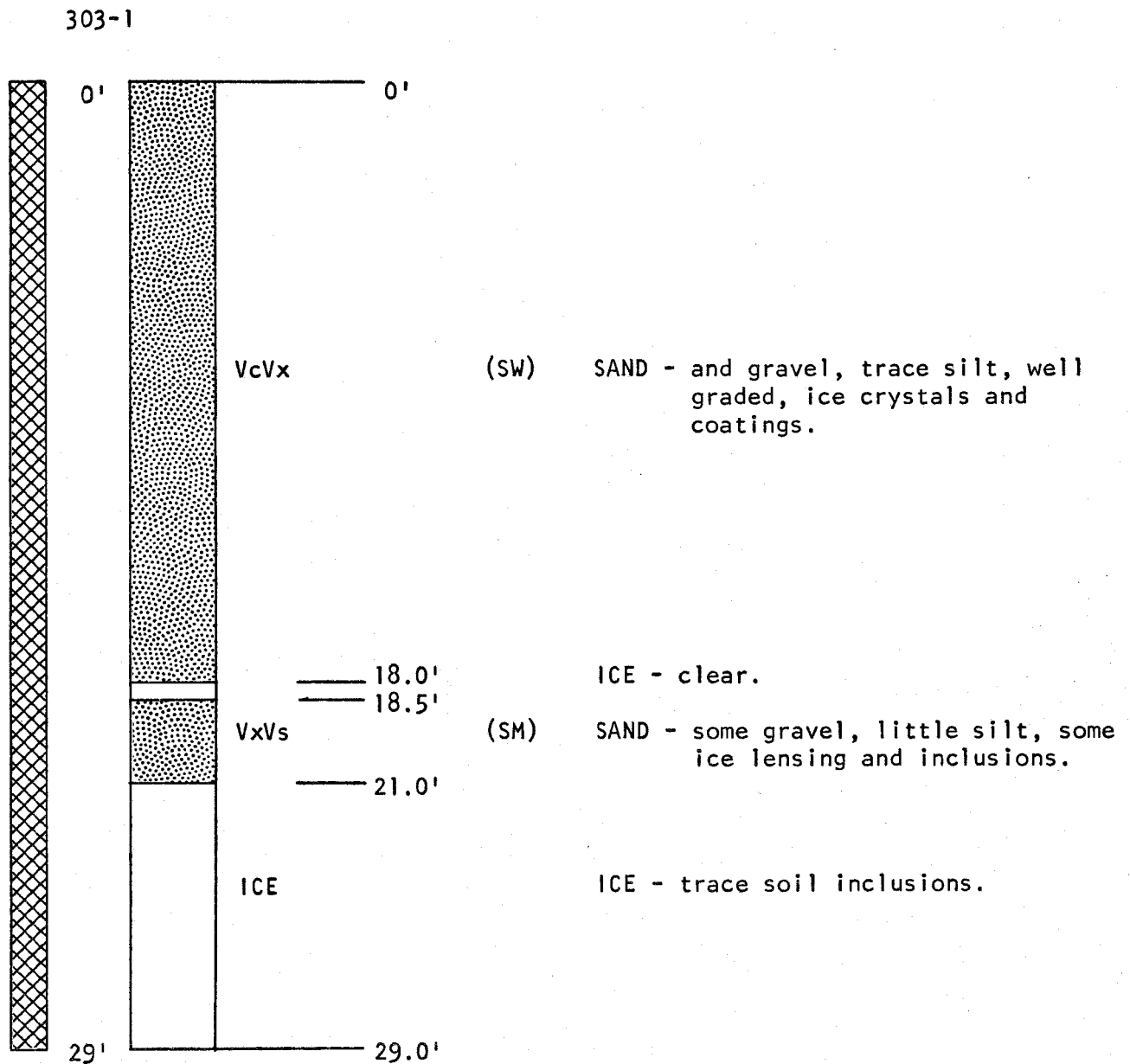
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

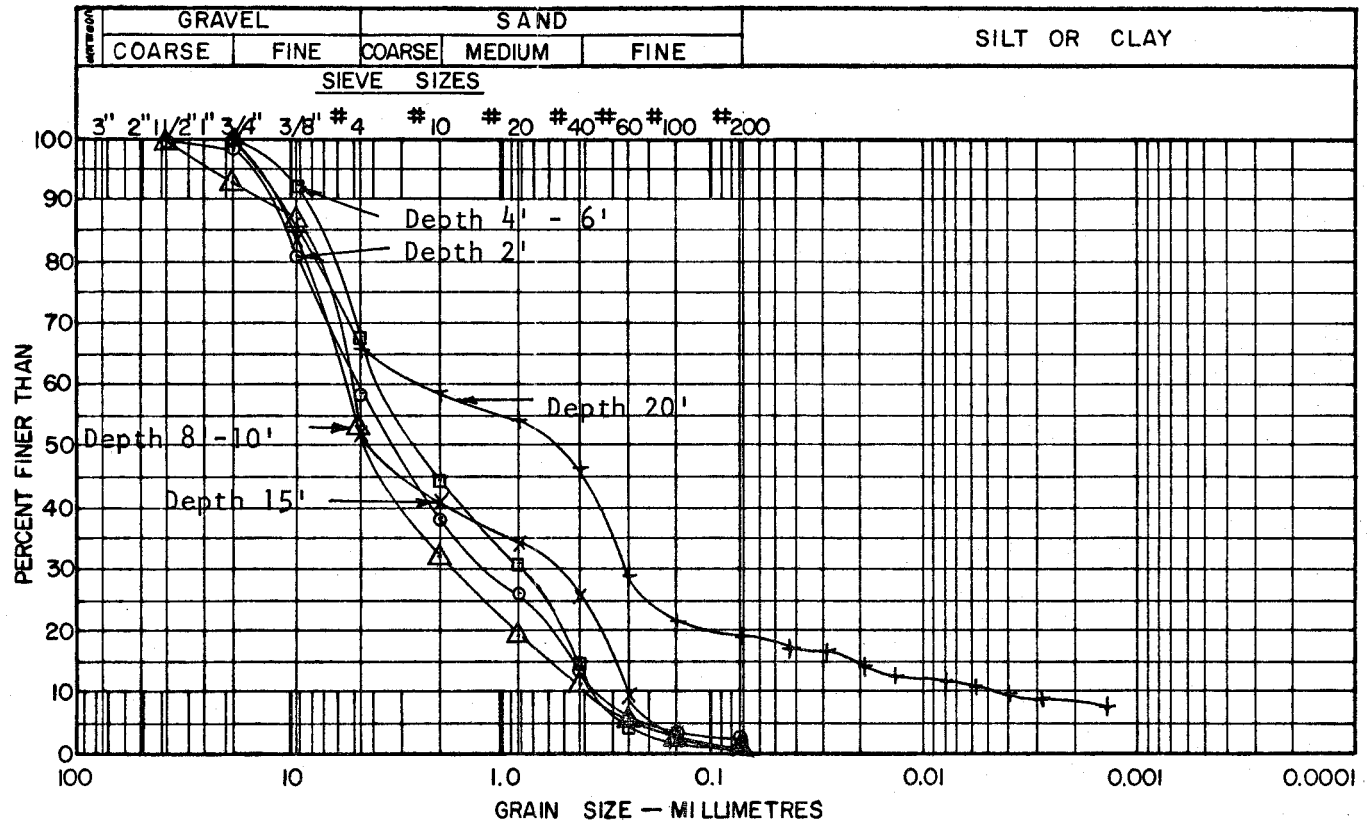
SOURCE No. 303



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 303-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2' 3.9%
 Sample 2 depth 4' 5.3%
 Sample 3 depth 6' 7.7%
 Sample 4 depth 8' 7.2%
 Sample 5 depth 10' 8.0%

Sample 6 depth 15' 11.3%
 Sample 7 depth 20' 15.1%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

Depth 2' - 15' Samples 1 to 6

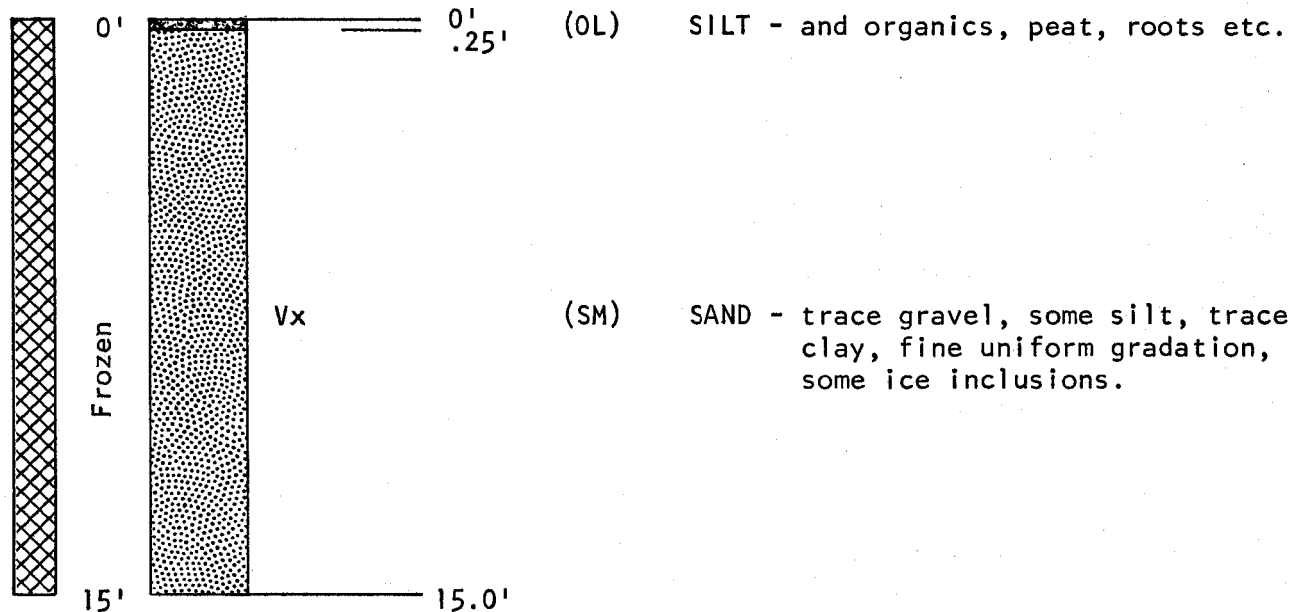
Quartzite	- 77%
Sandstone	- 9%
Quartz	- 8%
Andesite	- 4%
Granite	- 1%
Limestone	- 1%
Ironstone	- neg

Total 100%

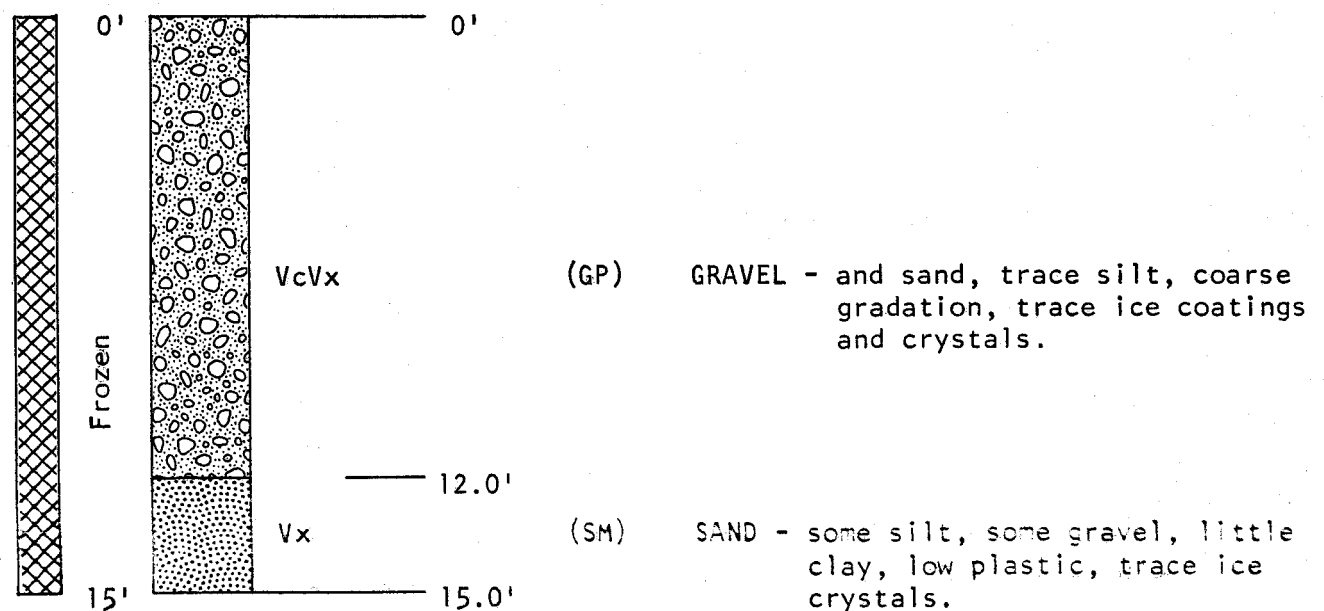
TEST HOLE LOGS

SOURCE No. 303

303-2

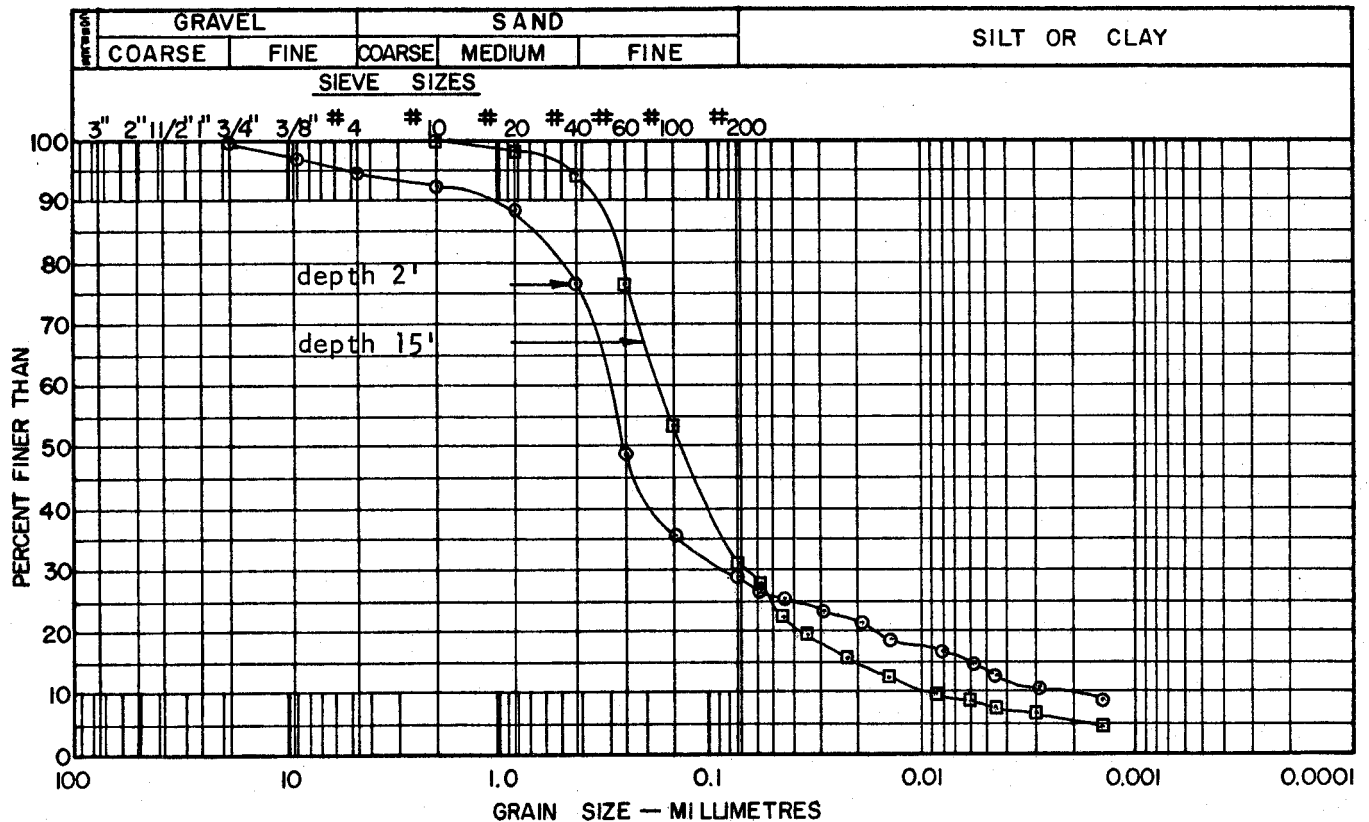


303-3



LABORATORY TEST DATA TEST HOLE-SOURCE No. 303-2

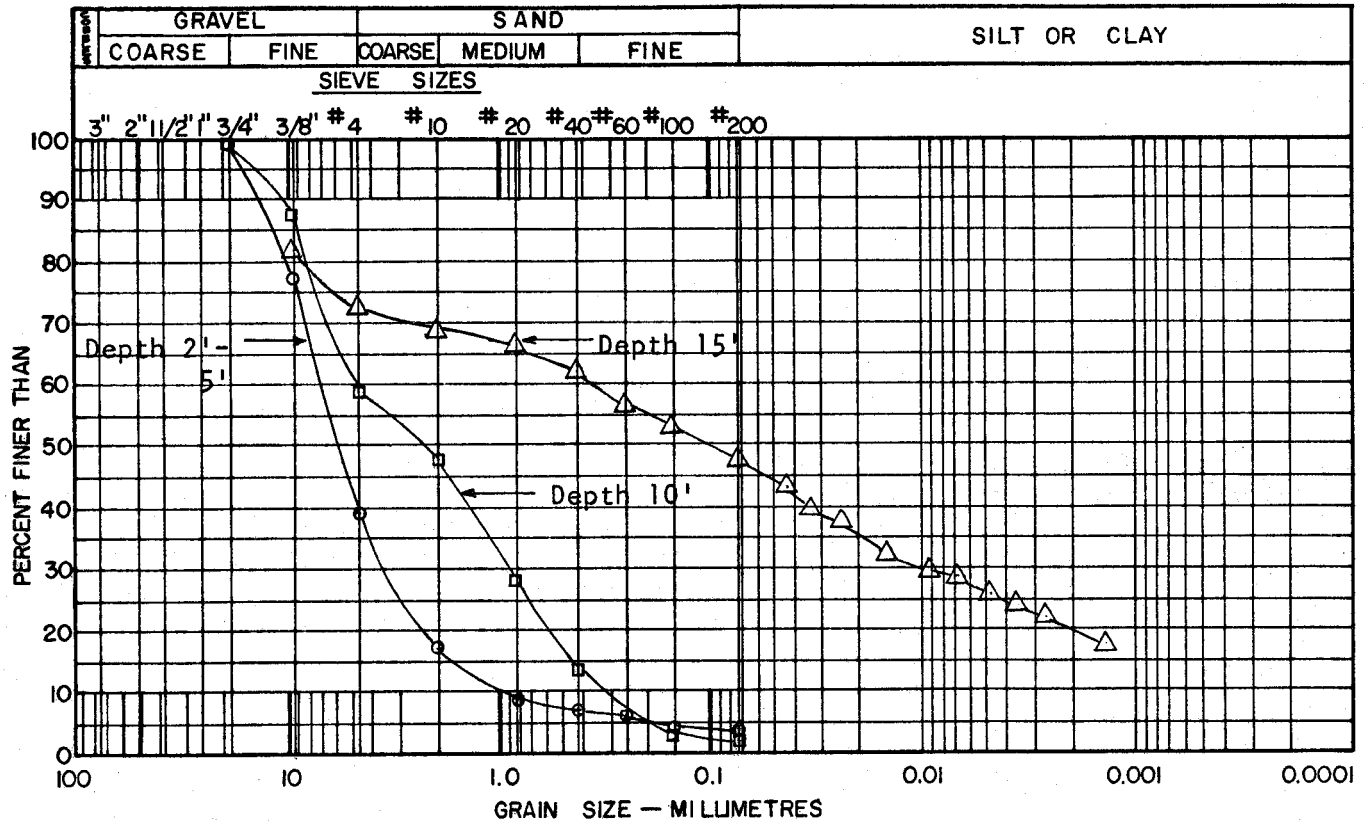
GRAIN SIZE DISTRIBUTION



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 303-3

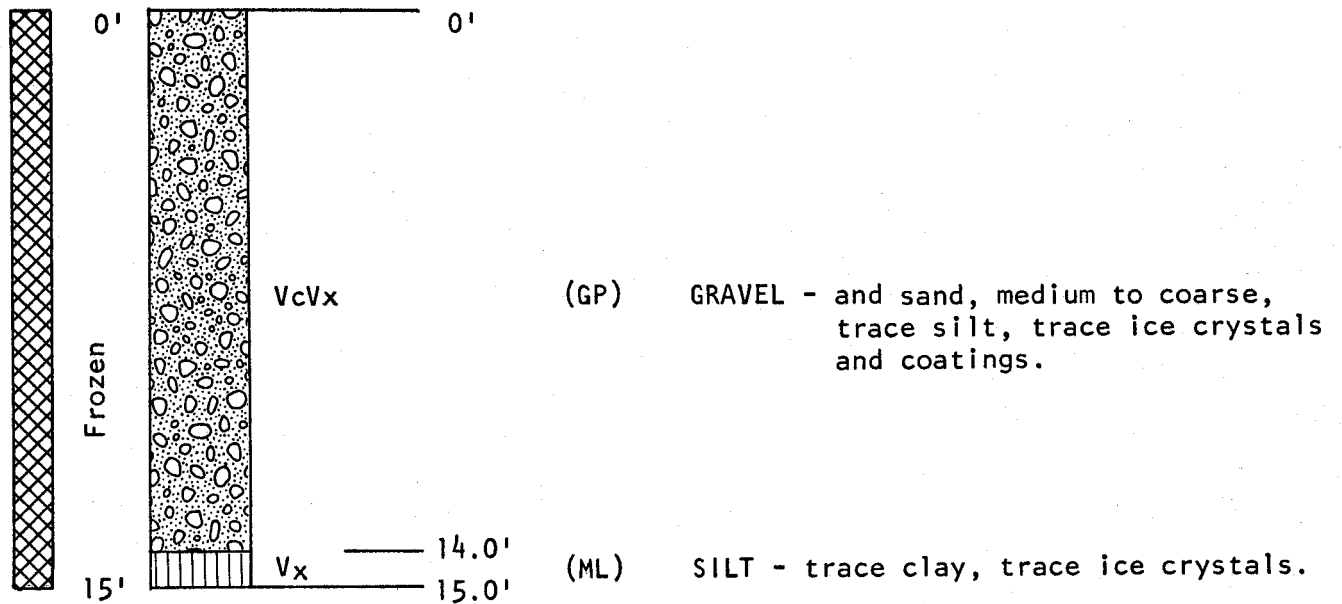
GRAIN SIZE DISTRIBUTION



TEST HOLE LOGS

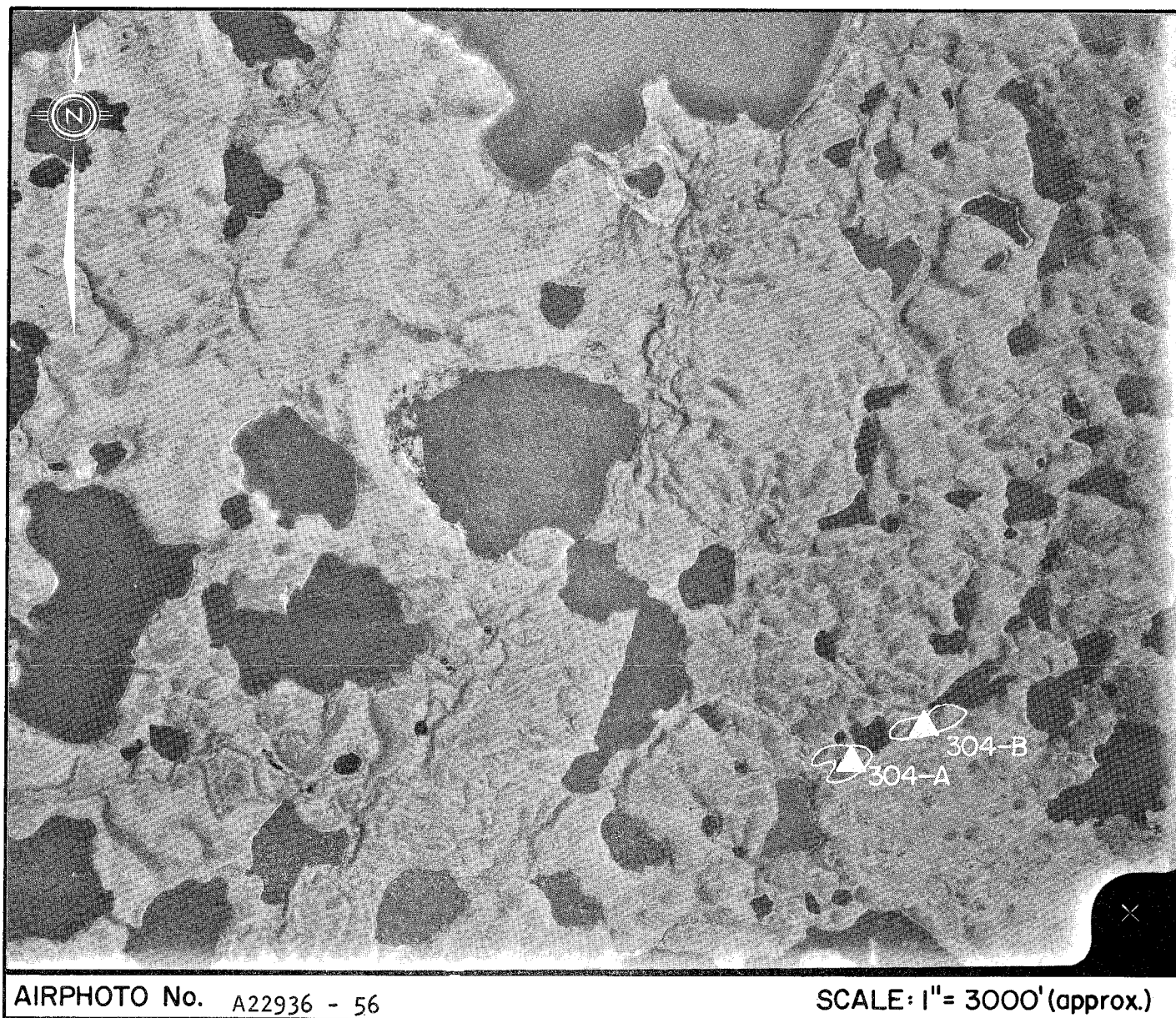
SOURCE No. 303

303-4



ZONE III
SOURCE No. 304

LANDFORM AND LOCATION: Small esker remnants about 1000 feet long
located 22 miles south of Tuktoyaktuk.
MATERIAL: GRAVEL - and sand.
VOLUME: 60,000 cu. yds.
CONCLUSION: Low priority for development. Suitable
for projects near by.



304 ENVIRONMENT

Physical

This source is a small esker, probably a remnant, located on the glaciofluvial plain 22 miles south of Tuktoyaktuk and 4 miles east of the power transmission line. The source is about 1000 feet long and from 100 to 200 feet wide, rising from 15 to 20 feet above the plain.

The surrounding area is thermokarstic, with many isolated ponds and hillocks indicating the subsidence and erosion associated with melting ground ice and sediments. Eskimo Lakes are 6 miles to the east and south.

Drainage of the source is good, with no ground ice observed in the top 4 feet of the deposit during September. The source has not been developed.

Biotic

Vegetative cover is limited to a ground cover of moss and grass, and some dwarf shrubs from 1 to 4 feet high, the higher growth located beside ponds or in gullies.

The source lies within an important wildlife area, the summer range of the Reindeer Herd and of barren-ground caribou. Moose are hunted during the winter, and the larger lakes of the area support winter fishing.

304 MATERIALS AND QUANTITIES

The source contains well-graded gravel and some sand. Only two Test Pits were sampled on this source, but a surficial examination indicates a fairly uniform deposit. The top 2½ feet sampled is gravel (65%), sand (33%) and silt (2%), fairly well graded to 3 inches maximum size. The sand below is clean, well-graded, and contains a trace of gravel.

Assuming a recoverable depth of 10 feet, the estimated volume of

material is about 60,000 cubic yards.

304 DEVELOPMENT

General

This small source is located only a few miles from several large sources, and therefore is low priority, suitable only for projects that may be built at close hand.

Access

Transportation is feasible only during the winter, when winter roads are often in common use over this area. During the winter of 1972 - 73 the main winter road passed several miles to the west.

Material Use and Handling

The material is suitable for general fill or road material, and has a potential for use in concrete and asphalt construction.

The material below the active permafrost layer must be ripped, stockpiled, and thawed before use, although the top layer can be excavated at any time.

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

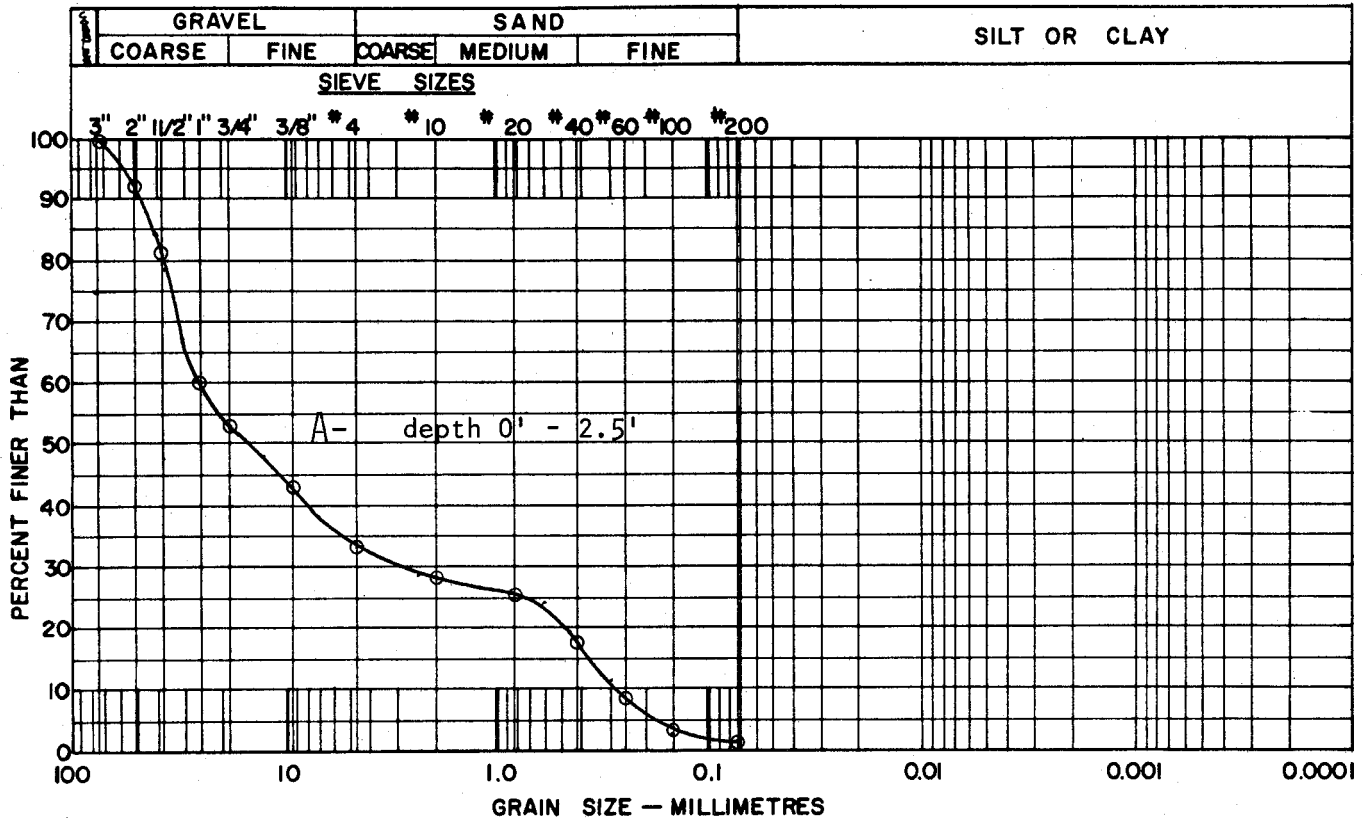
Stripping and Restoration

Before development can proceed all organic cover and topsoil must be stripped and stockpiled for replacement after the granular material has been removed. It is recommended that the full depth of usable material should be removed at one time, in order to permit rapid restoration and to limit the disturbance to as small an area as possible. All banks must be graded to a stable slope, and the depleted area graded to smooth contours before covering with topsoil. The area should then be seeded for rapid revegetation, using a selection of plants and methods of preparation approved by a specialist in Arctic horticulture.

LABORATORY TEST DATA

SOURCE No. 304-A

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A depth 0 - 2.5' 0.6%

ORGANIC CONTENT

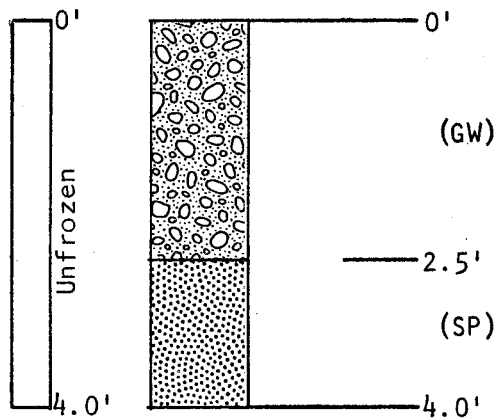
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST PIT LOGS

SOURCE No. 304

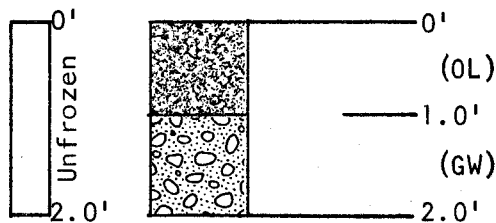
304-A



(GW) GRAVEL - some sand, well graded, max. 3", rounded to subangular, clean.

(SP) SAND - trace gravel, max. 2", clean, fine. uniform,

304-B



(OL) SILT - organic, and peaty

(GW) GRAVEL - and sand, max. 2", well graded

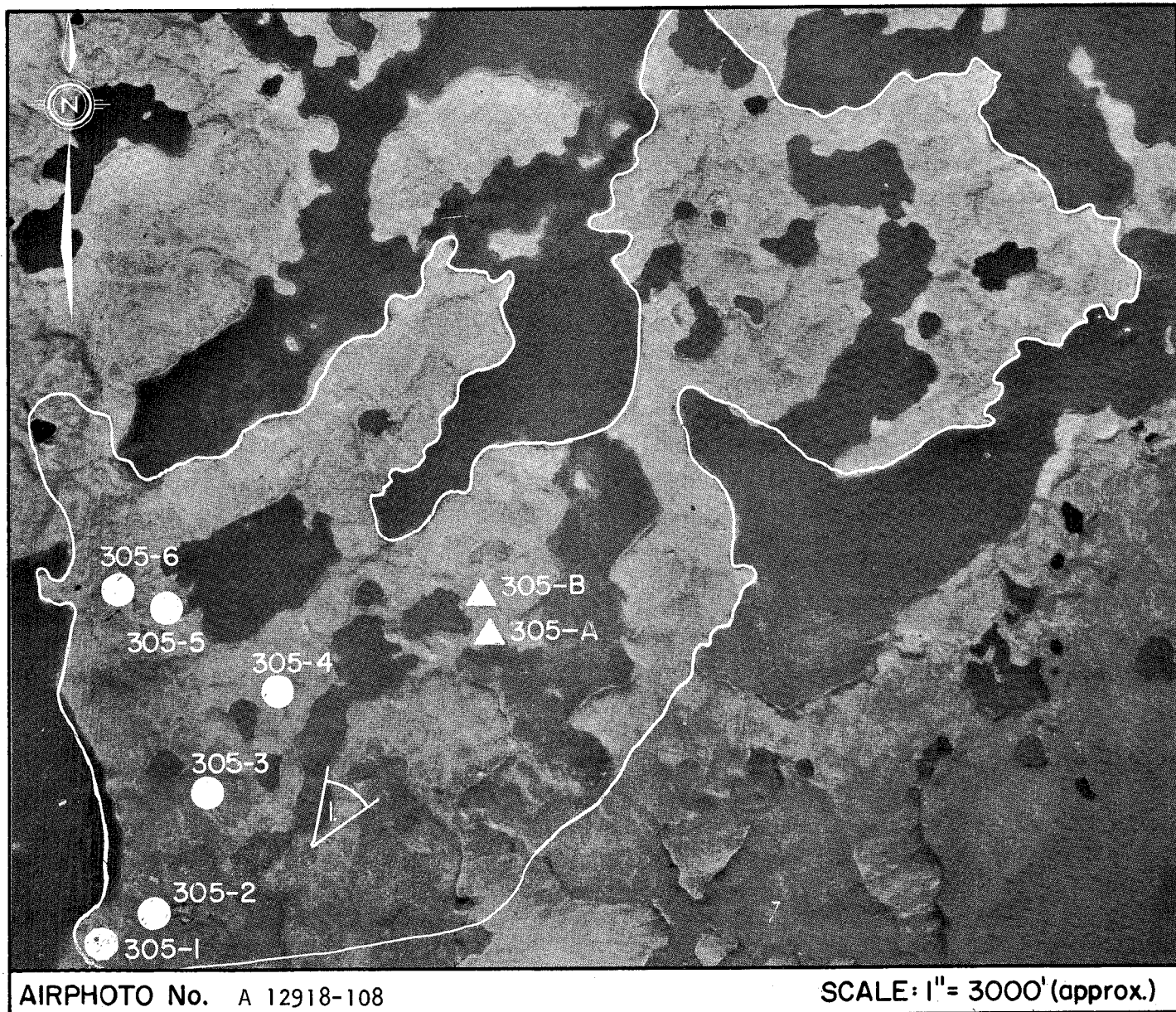
ZONE III
SOURCE No. 305

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.



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.

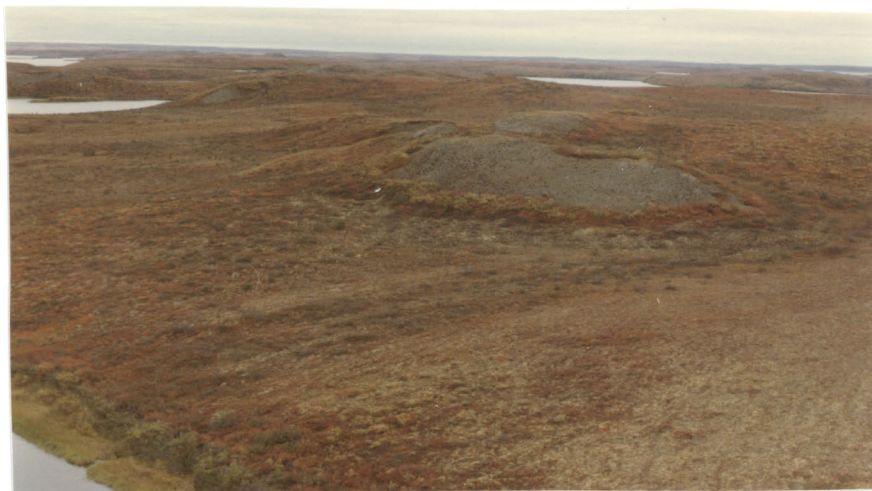


Photo No. 1 Source 305 - looking north-east at kame field.

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

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 steep-sided 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

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.

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.

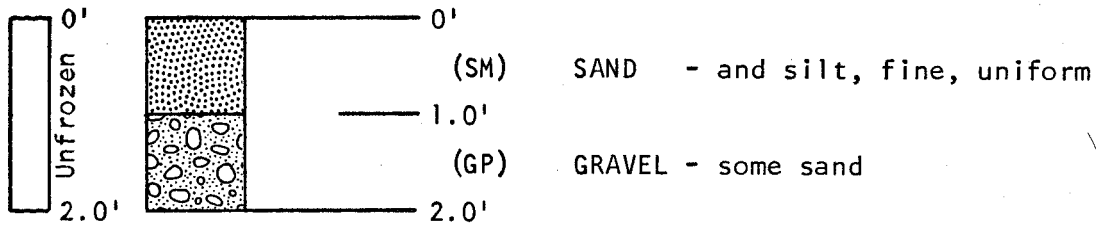
Stripping Restoration

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.

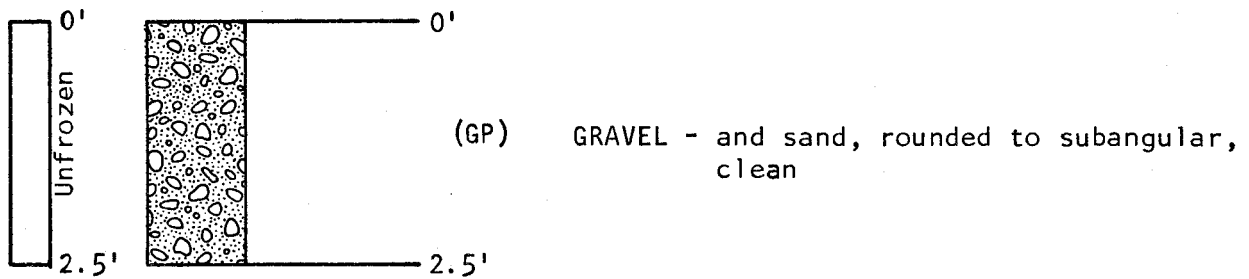
TEST PIT LOGS

SOURCE No. 305

305-A



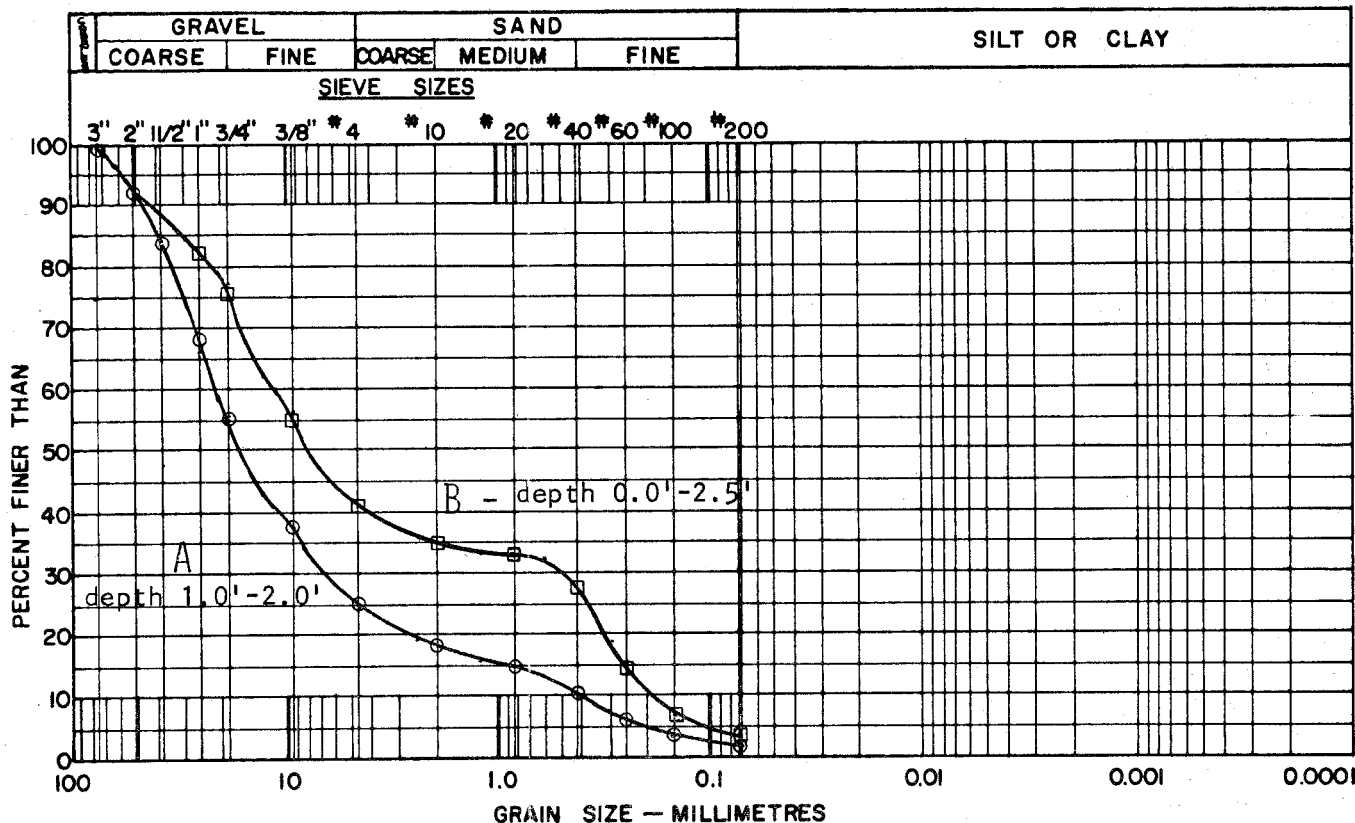
305-B



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

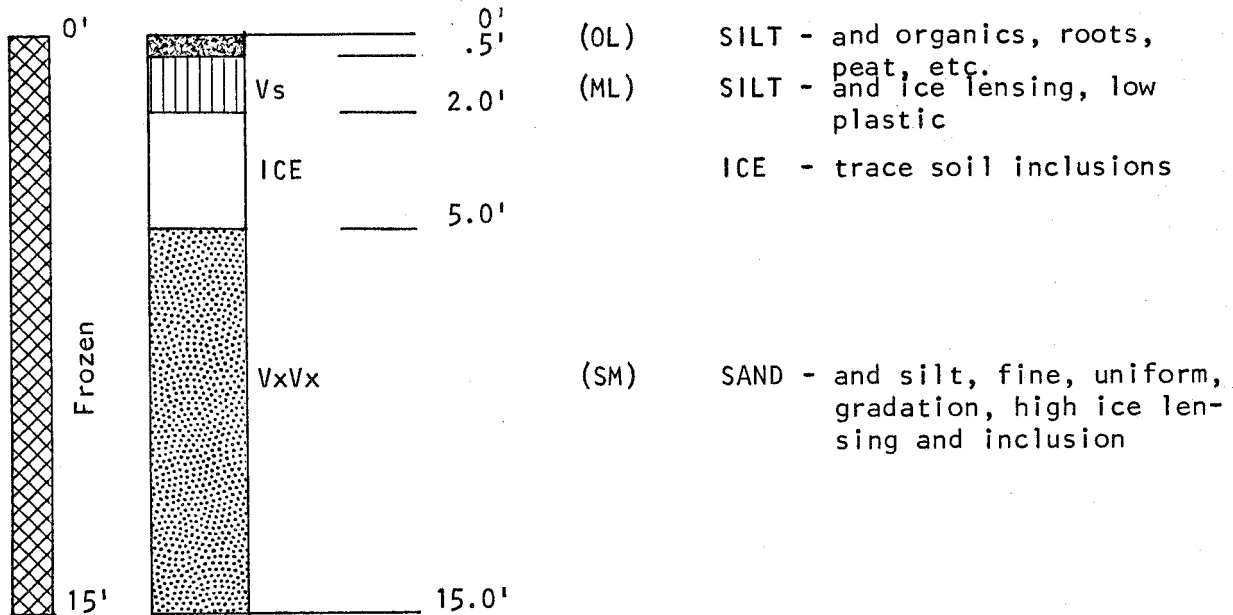
Pit B depth 0-2.5'

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

TEST HOLE LOGS

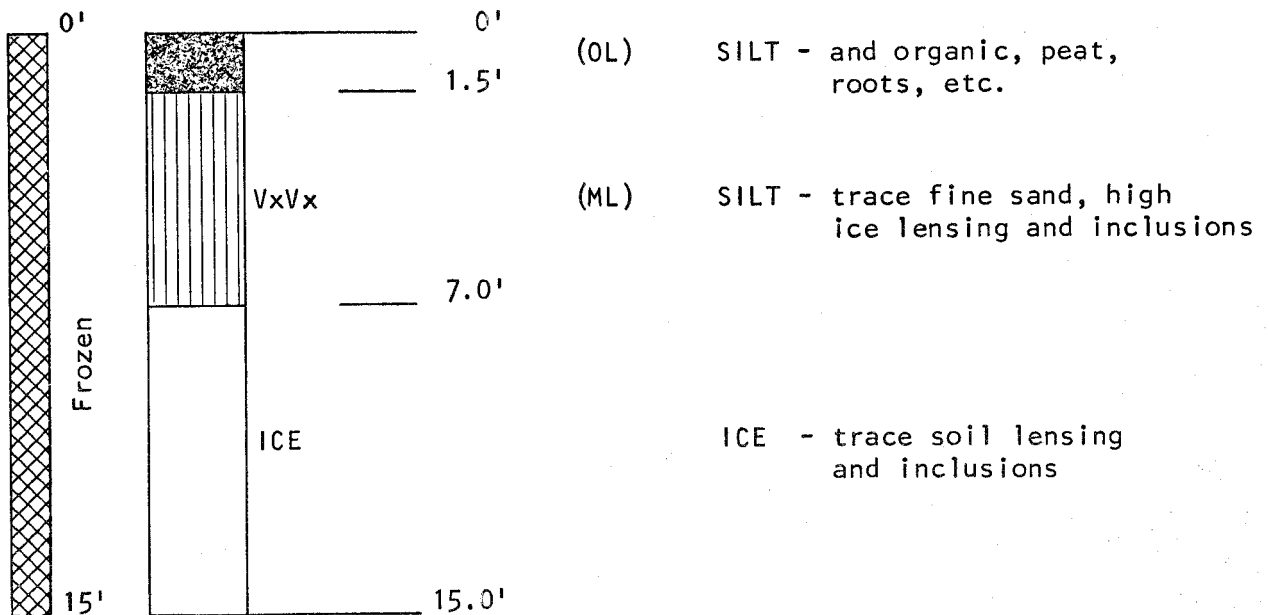
SOURCE No. 305

305-1



Moisture Content
Sample 1 depth 12.0' 18.2%

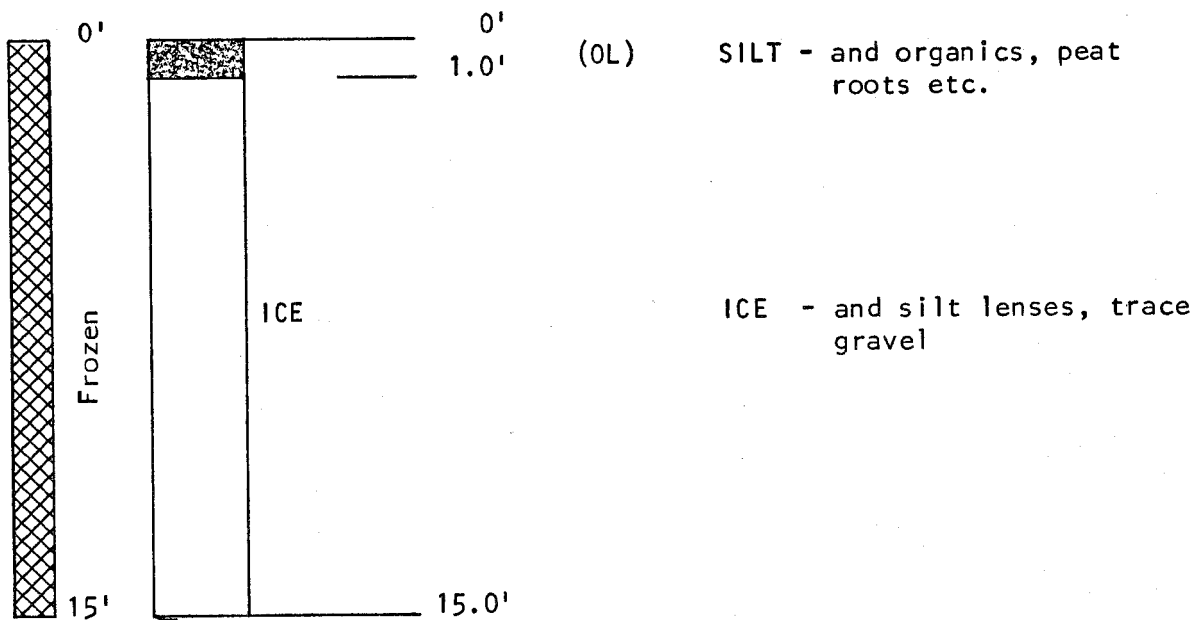
305-2



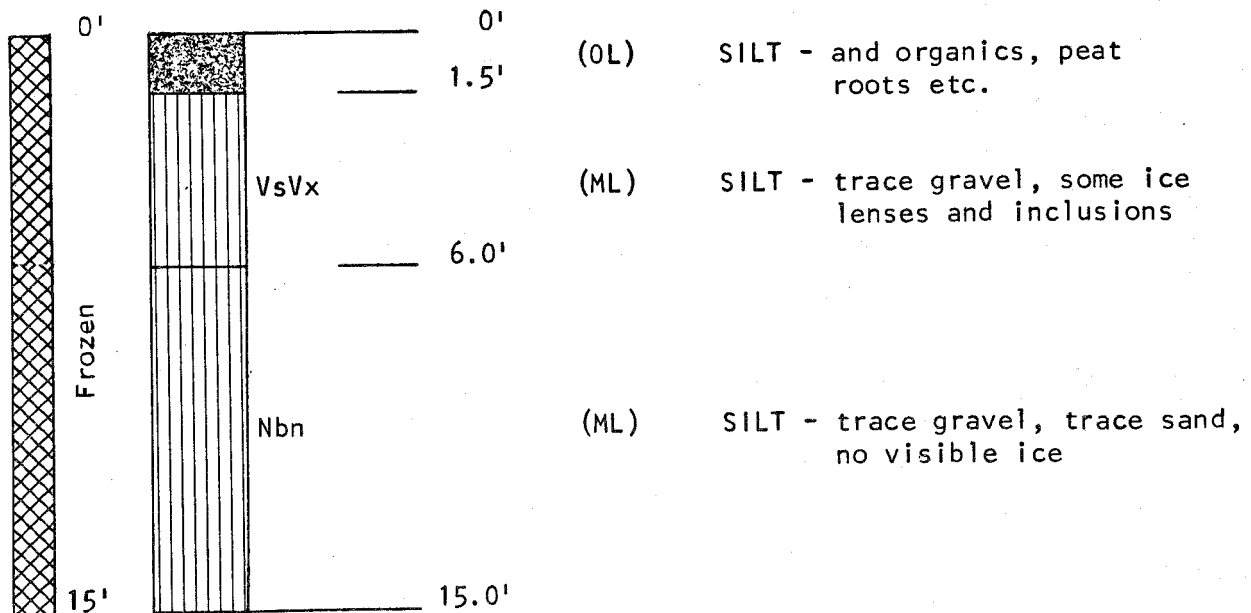
TEST HOLE LOGS

SOURCE No. 305

305-3



305-4



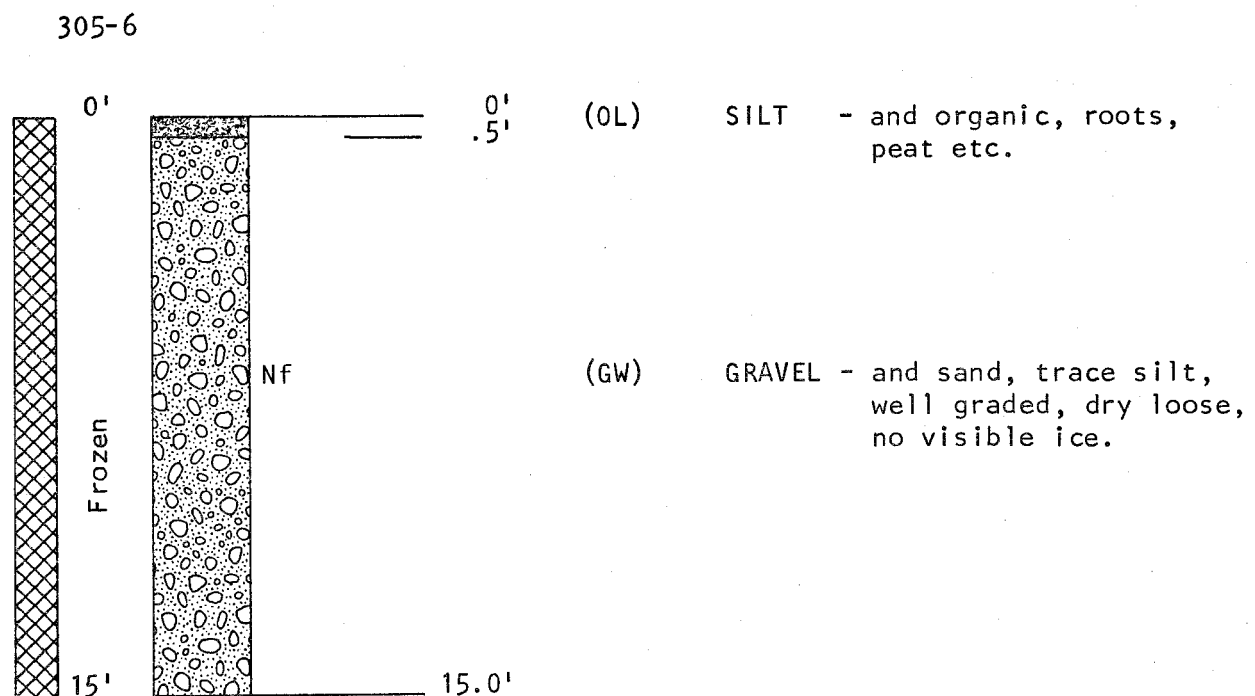
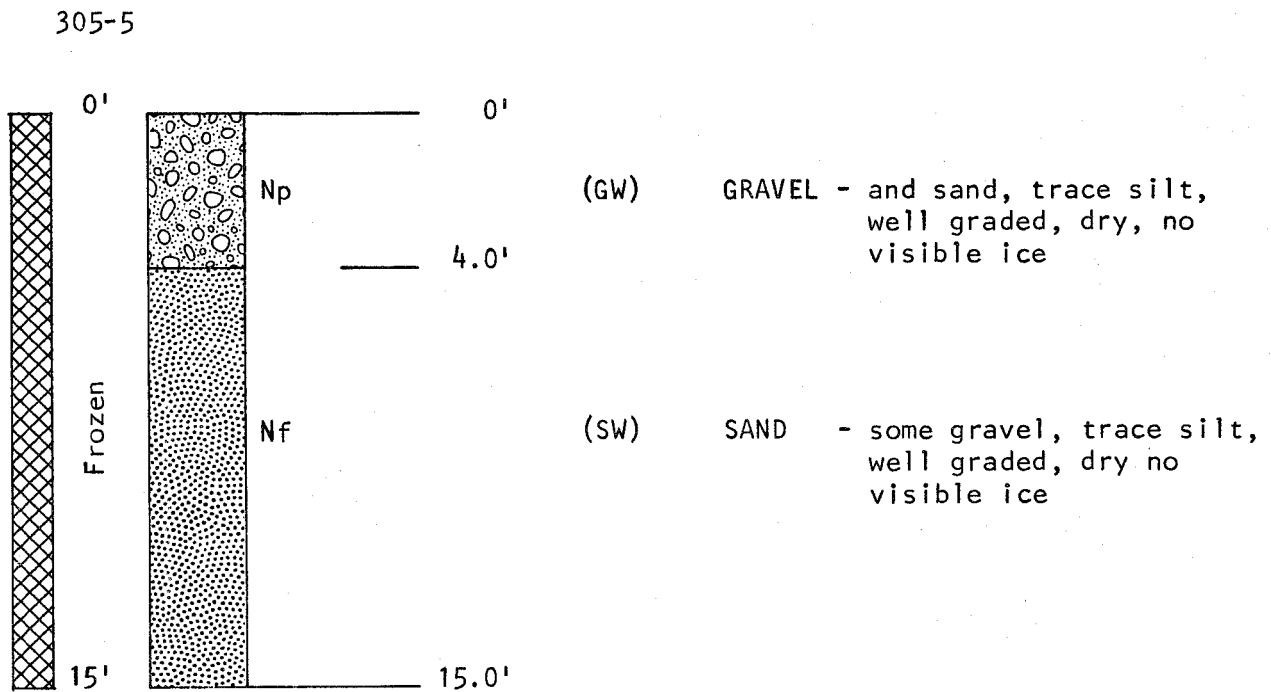
Moisture Content

Sample 1 depth 6.0'-8.0'

11.1%

TEST HOLE LOGS

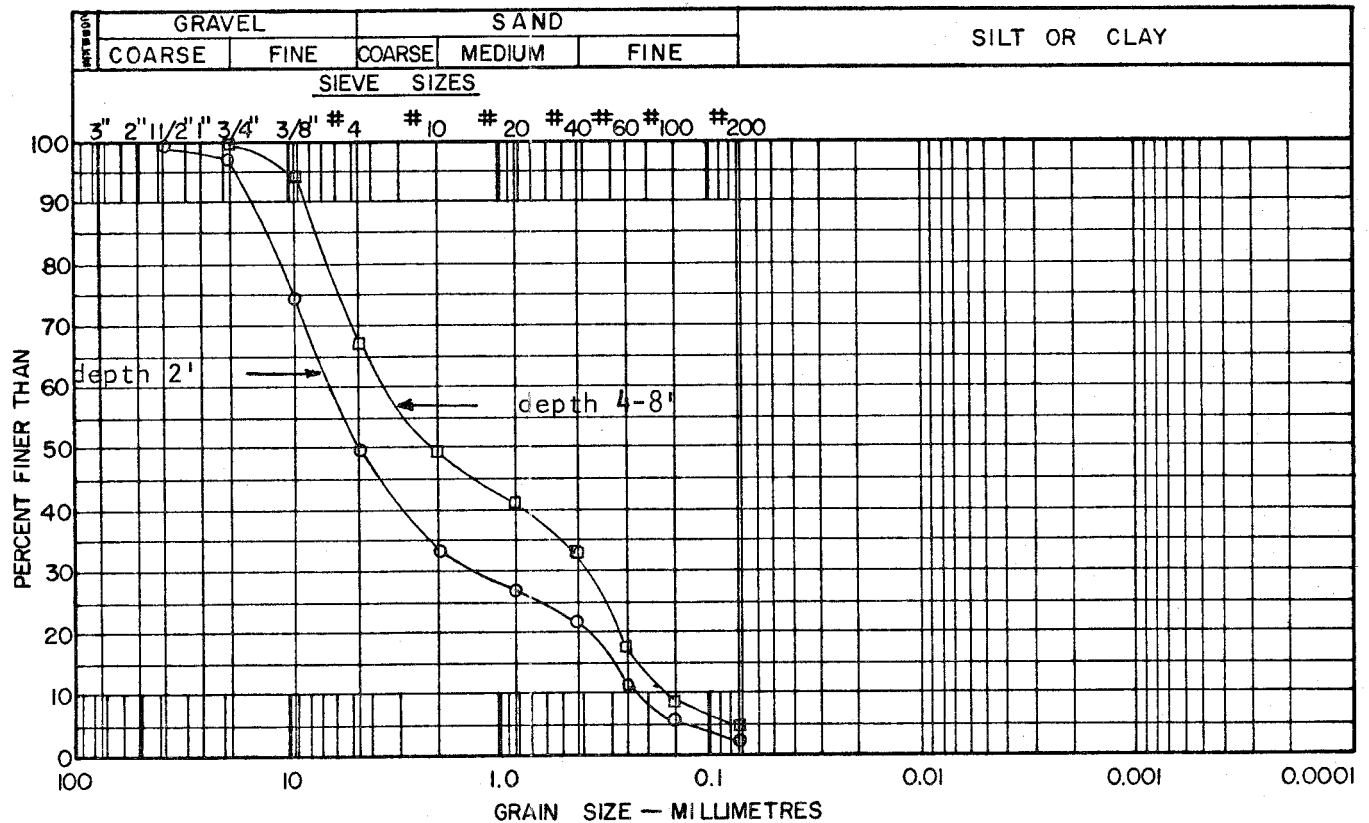
SOURCE No. 305



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

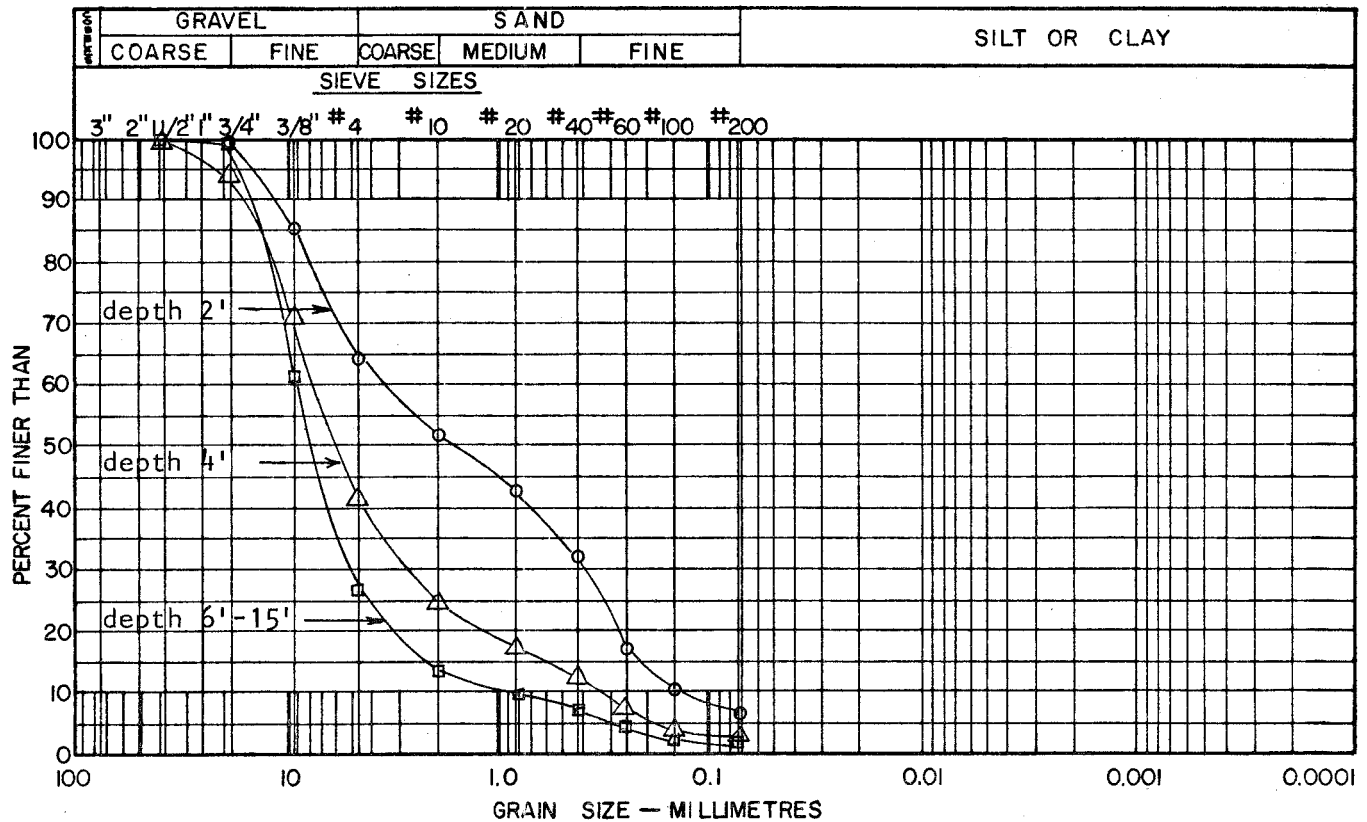
HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY TEST DATA

TEST HOLE-SOURCE No. 306-6

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	3.6%	Sample 6	depth 15'	2.4%
Sample 2	depth 4'	3.5%			
Sample 3	depth 6'	7.9%			
Sample 4	depth 8'	3.8%			
Sample 5	depth 10'	2.6%			

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

Samples 1 to 6 depth 2' - 15'

Quartzite - 86%
 Sandstone - 9%
 Granite - 3%
 Quartz - 2%
 Siltstone - neg.

Total 100%

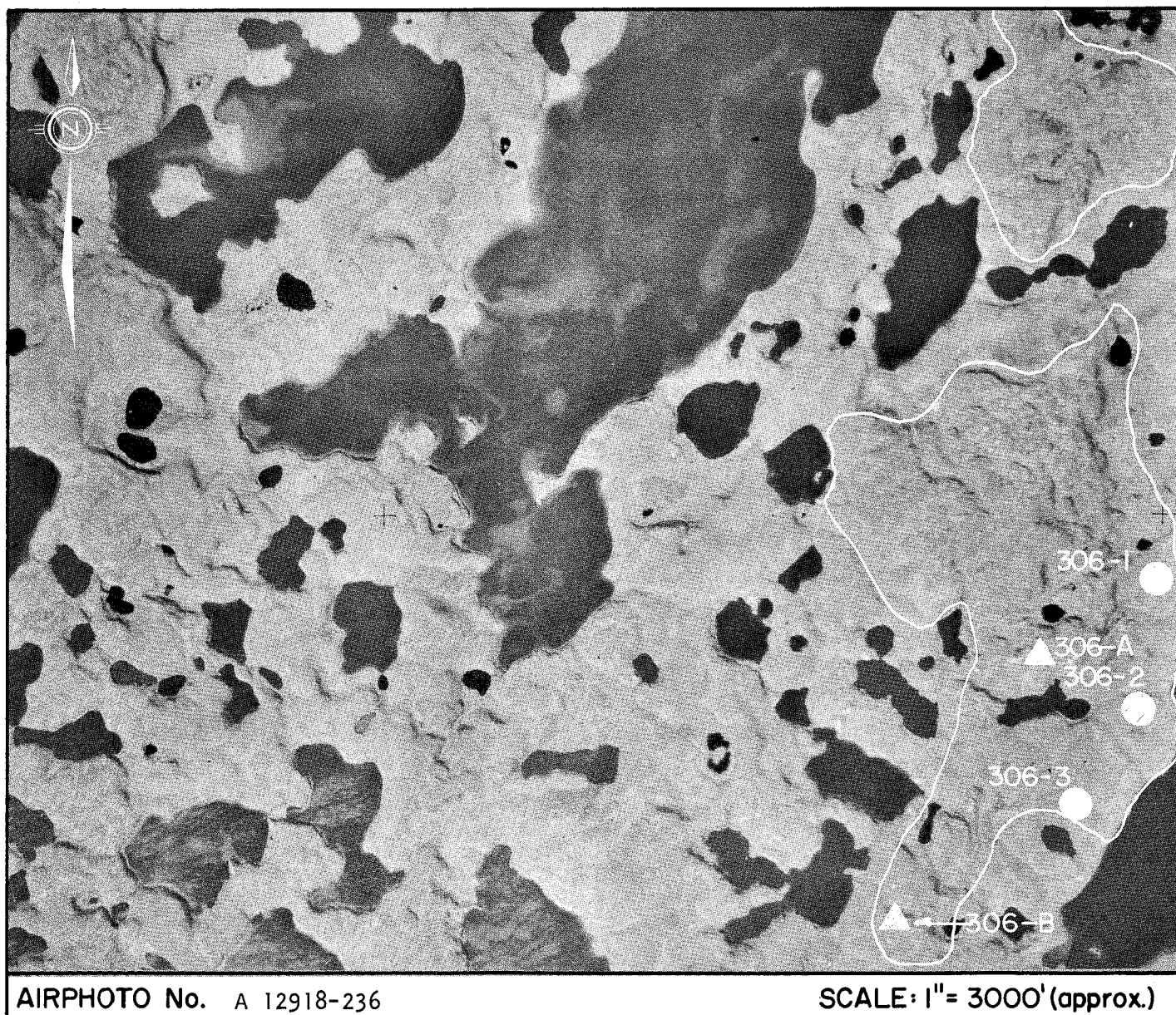
ZONE III
SOURCE No. 306

LANDFORM AND LOCATION: Many small kames in an outwash plain located about 4 miles west of Eskimo Lakes and 26 miles south of Tuktoyaktuk.

MATERIAL: GRAVEL - and sand

VOLUME: 150,000 cubic yards

CONCLUSION: Source is suitable for development on limited scale as the sand and gravel appears to be primarily the top 5 to 10 feet of the kames. Any development must be approved by the Canadian Wildlife Service.



Physical

This source is a kame field located in the glaciofluvial outwash plain about 4 miles west of Eskimo Lakes and 28 miles south of Tuktoyaktuk. The area is large, about 3 miles long and from 1,000 feet to 1½ miles wide.

This source and the vicinity contain many small ponds and irregular topography, evidently thermokarstic.

The numerous kames are from 10 to 50 feet high, and as much as 300 feet across the base.

Drainage in this source is good, with no ground ice encountered to a depth of 3 feet in September. The surrounding low-lying areas display the polygonal pattern usually associated with massive ground ice.

This source has not been developed.

Biotic

The tops of these kames are bare of vegetation, although the lower slopes and flat ground below is covered with light moss and some dwarf shrubs as much as 3 feet high.

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.

306 MATERIALS AND QUANTITIES

The material ranges from clean, well-graded sand and gravel to silt containing a trace of sand and gravel. The better granular material is usually located on the tops of the kames, and may be from 5 to 10 feet thick, so the volume of material available in each hillock may be quite small.

Test Hole #3 contained 60% gravel, 35% sand, and less than 5% silt, all quite well graded. The test pits indicate a maximum particle size of 2 to 3 inches.

The petrographic analysis of gravel from Test Hole #1 indicates the main constituents are quartzite (89%), soft sandstone (6%), and granite (3%), with quartz, chert, limestone, siltstone, and vesicular andesite making up the remaining 2%. The total deleterious content is 7%.

The moisture content varies from 4% to 9% in the gravel and sand deposits, and up to 17% in the silt. In Test Hole #3, the gravel and sand overlies clear ice.

The estimated volume of recoverable sand and gravel is about 150,000 cubic yards.

306 DEVELOPMENT

General

This source should be considered as a group of small high-grade sources. They would not be suitable for large-scale development, but may be valuable for smaller projects located nearby.

The area can be reached only during late winter, approaching the critical calving period of the Reindeer Herd, and any work done here must observe a schedule approved by the Canadian Wildlife Service.

Each small source should be excavated completely before another source of similar material is opened up.

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 materials from this source could be used for any purpose, from general fill to aggregate for concrete and asphalt construction.

Because of the nature of the deposit, its use in concrete and asphalt would be limited to small-scale work.

The sand and gravel could be excavated by ripper, then should be stockpiled to thaw and drain before use. If required for concrete or asphalt, the material should be passed over a screen to remove the oversize, and then would be suitable for use. A blending sand may be required to adjust the proportion of coarse and fine aggregates.

In addition to the equipment noted above, a front-end loader and trucks will be required for this development.

Stripping and Restoration

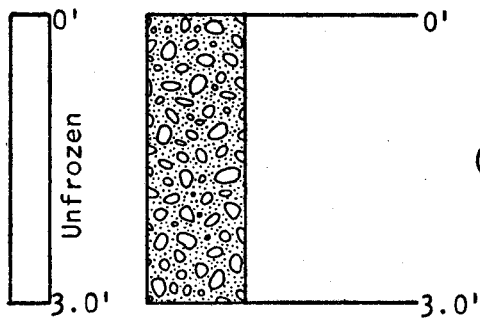
The amount of organic ground cover is very limited, but all that is removed should be stockpiled for replacement over depleted areas.

The area exposed at one time should 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 any source is abandoned, and before ground cover is replaced over the source.

TEST PIT LOGS

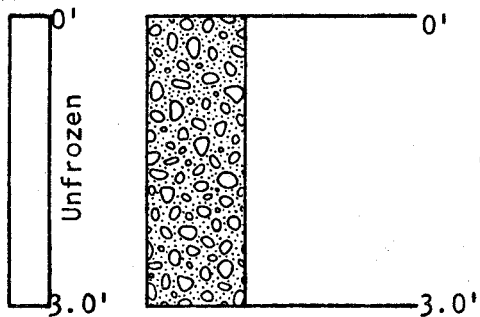
SOURCE No. 306

306-A



(GP) GRAVEL - some sand, well graded, max. 2",
rounded to subrounded, clean

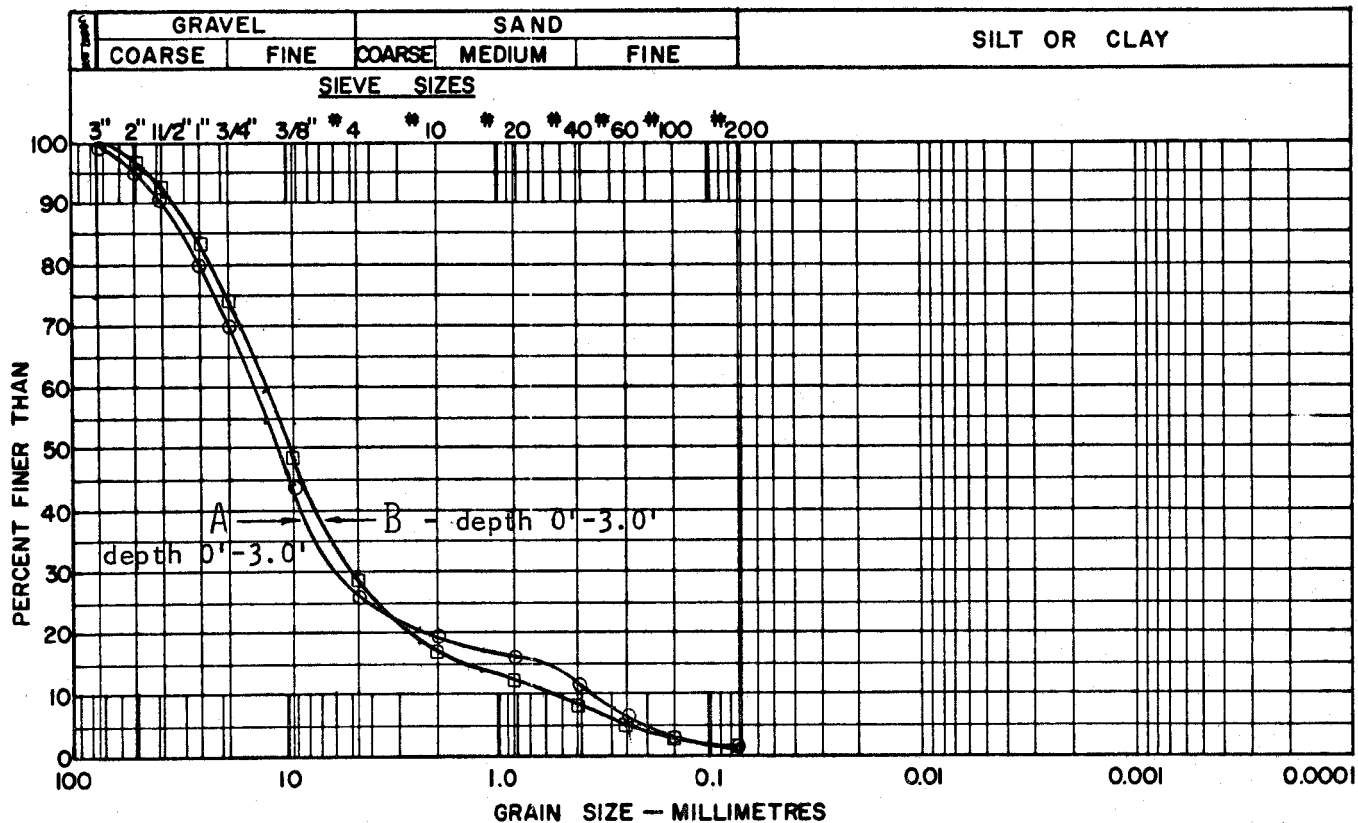
306-B



(GP) GRAVEL - some sand, well graded, max. 3",
rounded to subangular, clean

LABORATORY TEST DATA SOURCE No. 306

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A depth 0 - 3.0' 0.8%
Pit B depth 0 - 3.0' 0.7%

ORGANIC CONTENT

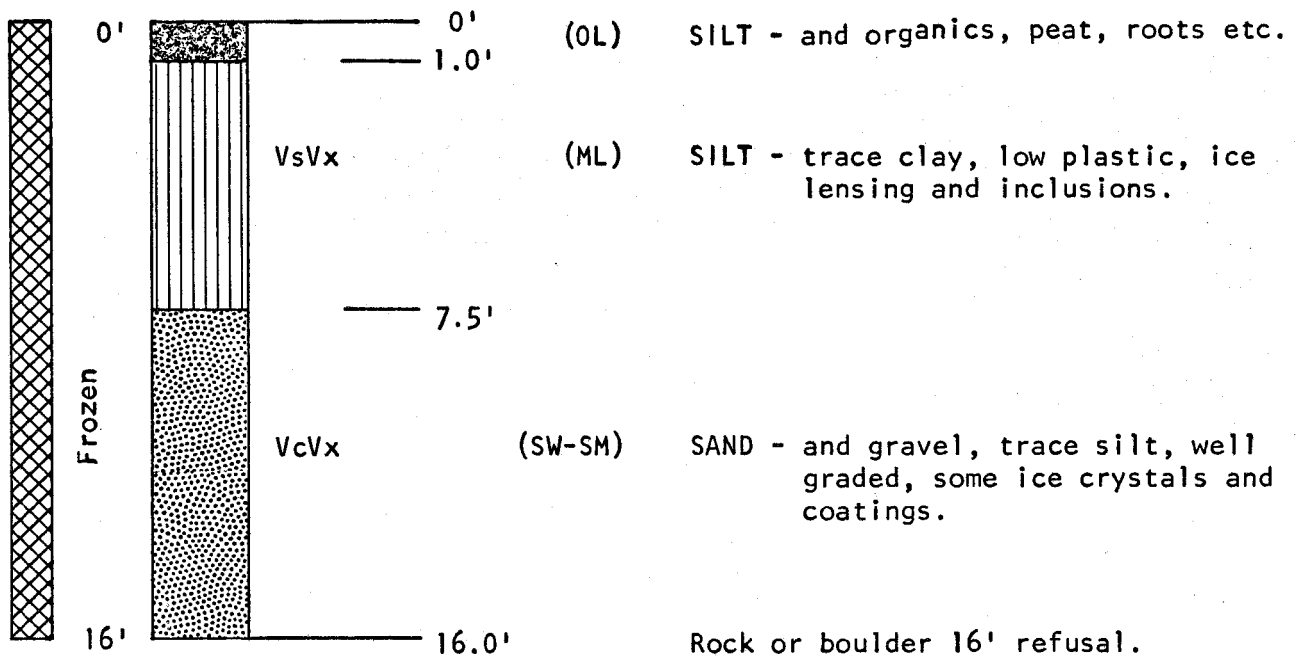
HARDNESS TEST

PETROGRAPHIC ANALYSIS

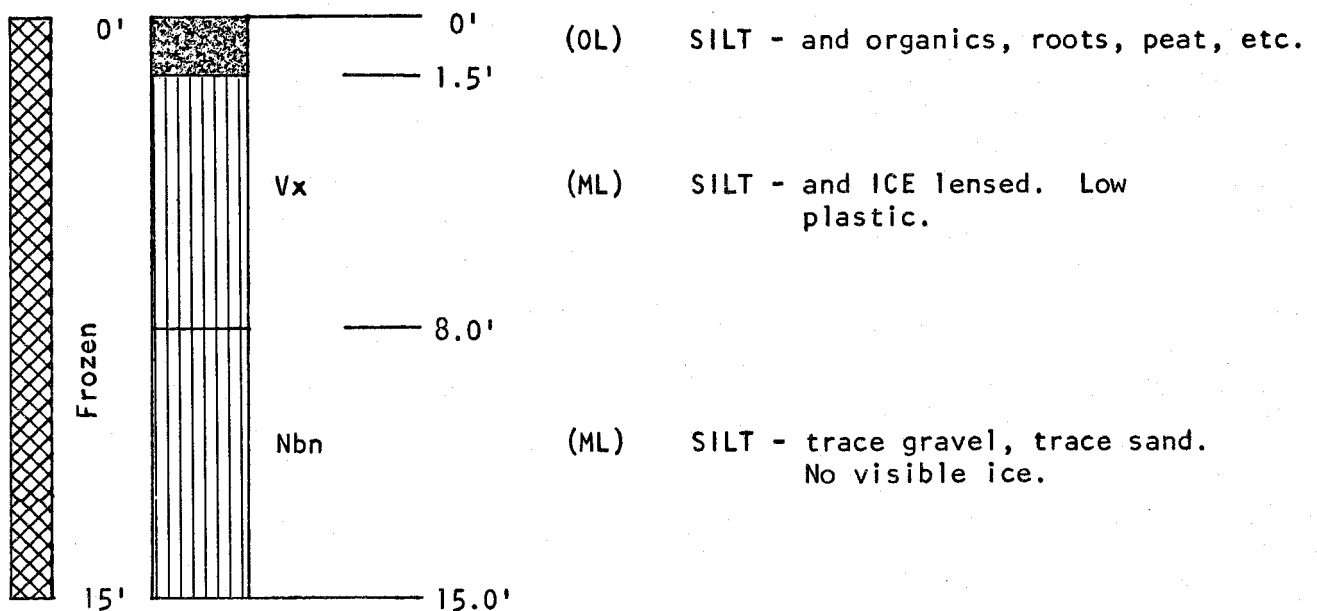
TEST HOLE LOGS

SOURCE No. 306

306-1



306-2

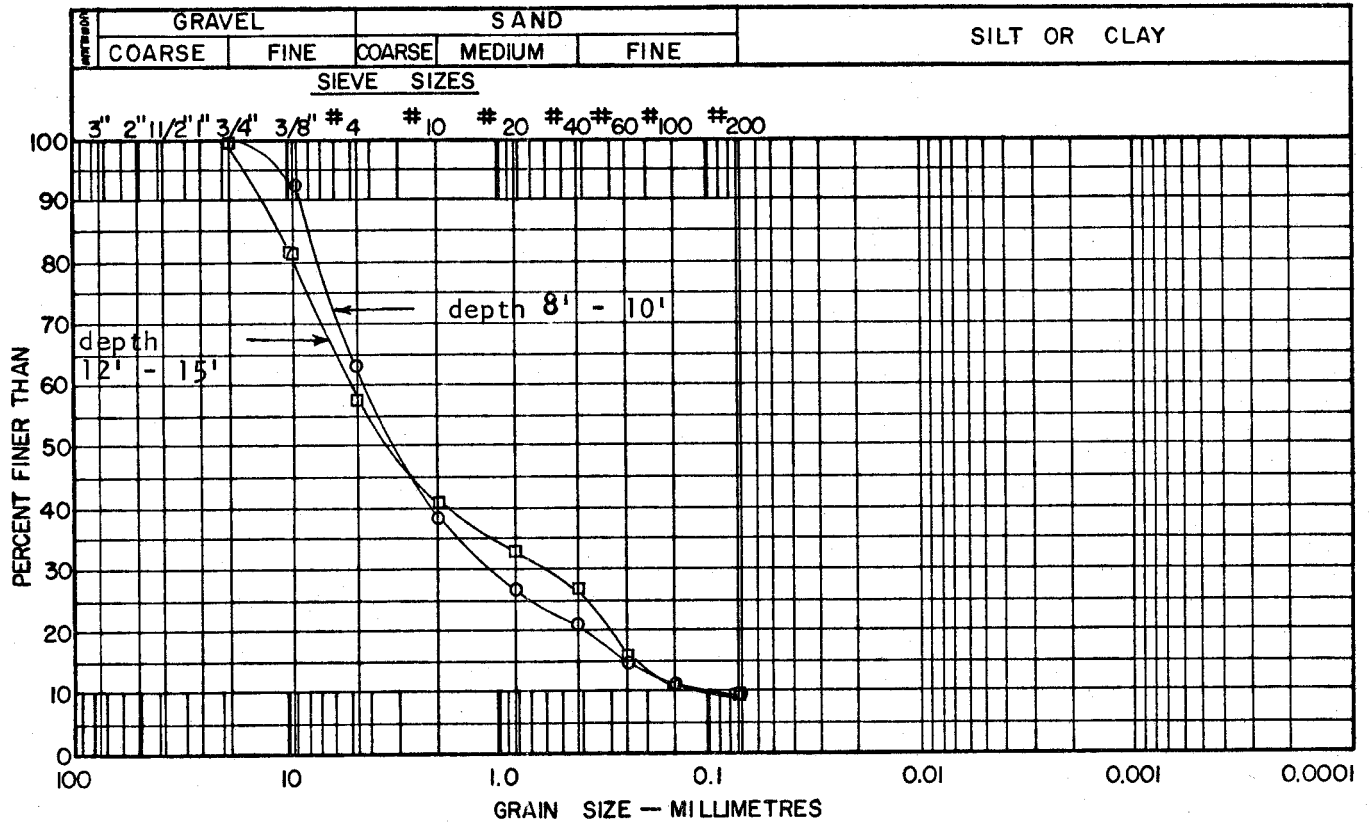


Moisture Content

Sample 1 depth 2' 16.6%

LABORATORY TEST DATA TEST HOLE-SOURCE No. 306-1

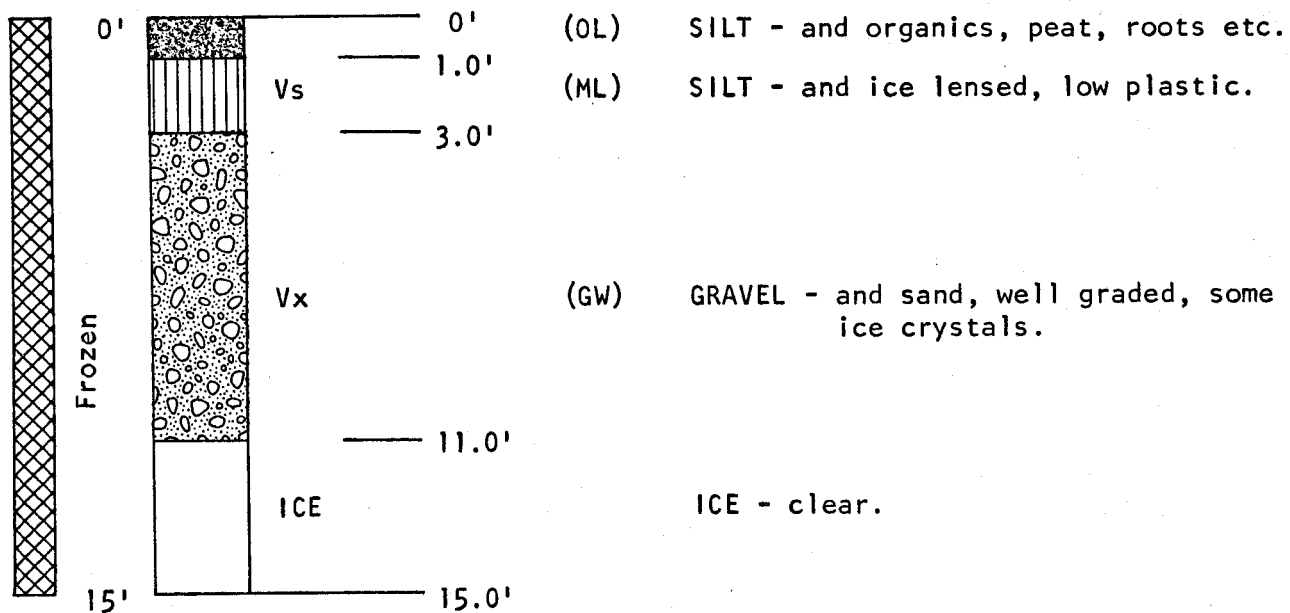
GRAIN SIZE DISTRIBUTION



TEST HOLE LOGS

SOURCE No. 306

306-3



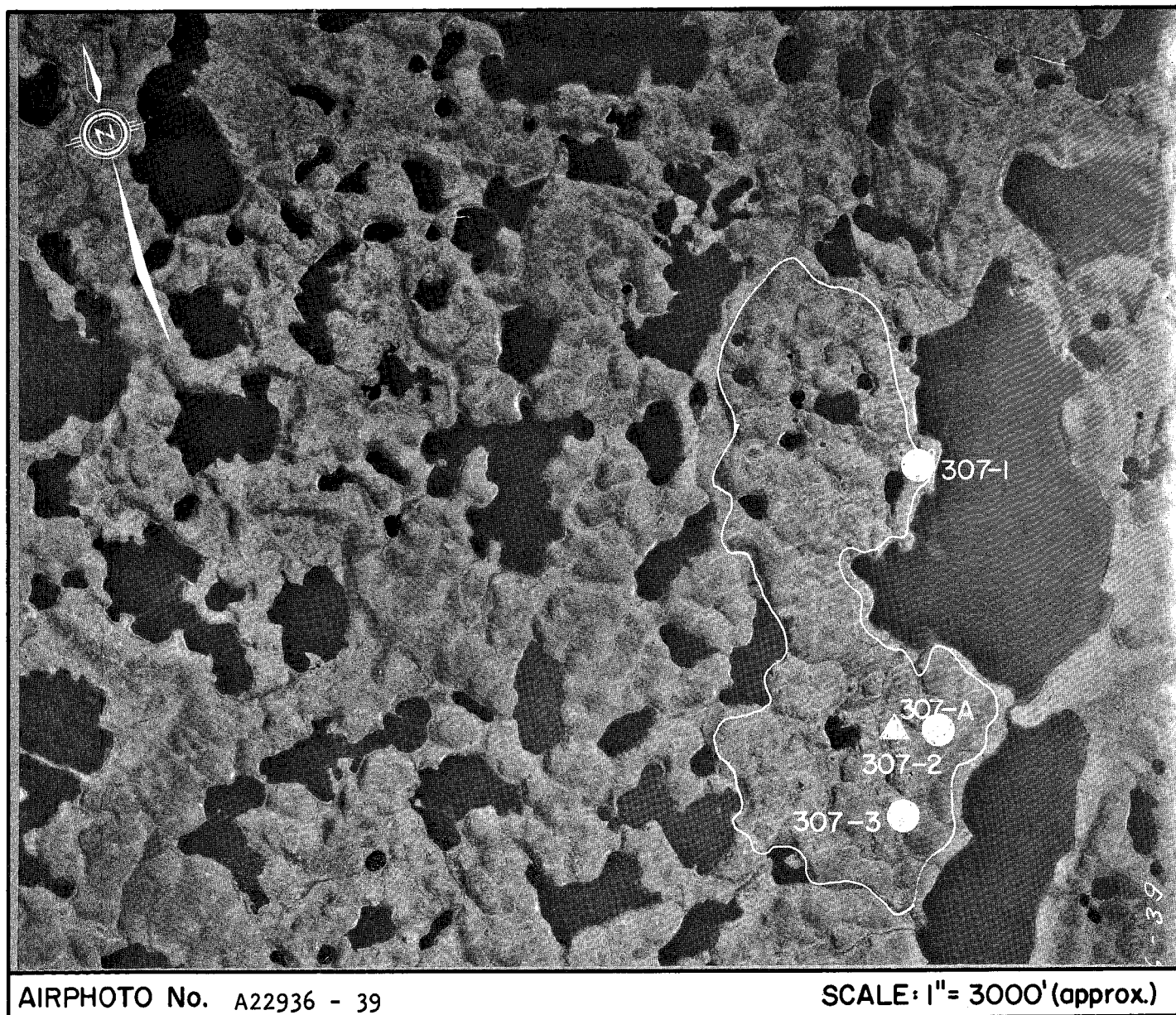
ZONE III
SOURCE No. 307

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.



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

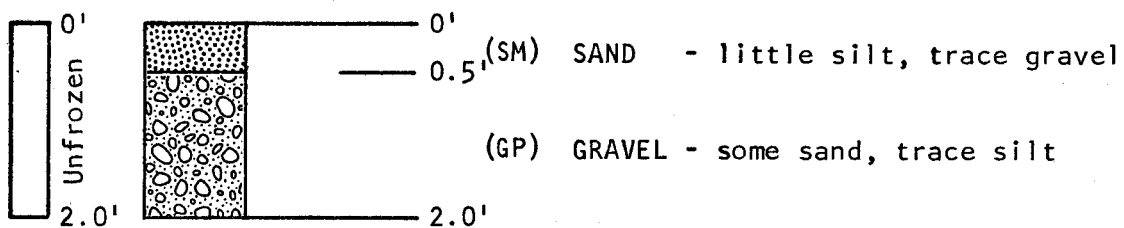
Very little organic ground cover and topsoil can be recovered on the kames, but any material that is stripped should be stockpiled for replacement after the granular material has been removed.

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

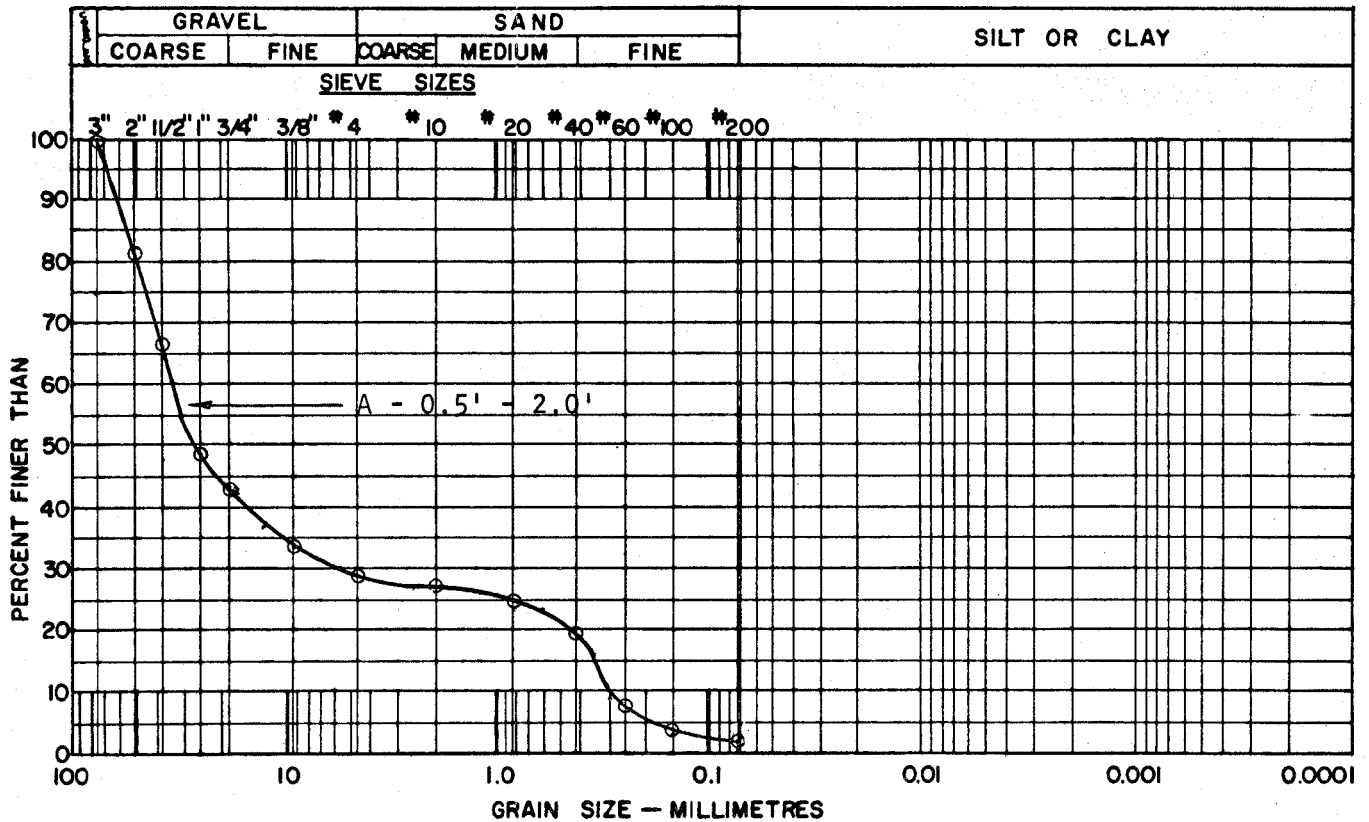
SOURCE No. 307

307-A



**LABORATORY
TEST DATA**
SOURCE No. 307

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample A 0.5' - 2.0' 0.6%

ORGANIC CONTENT

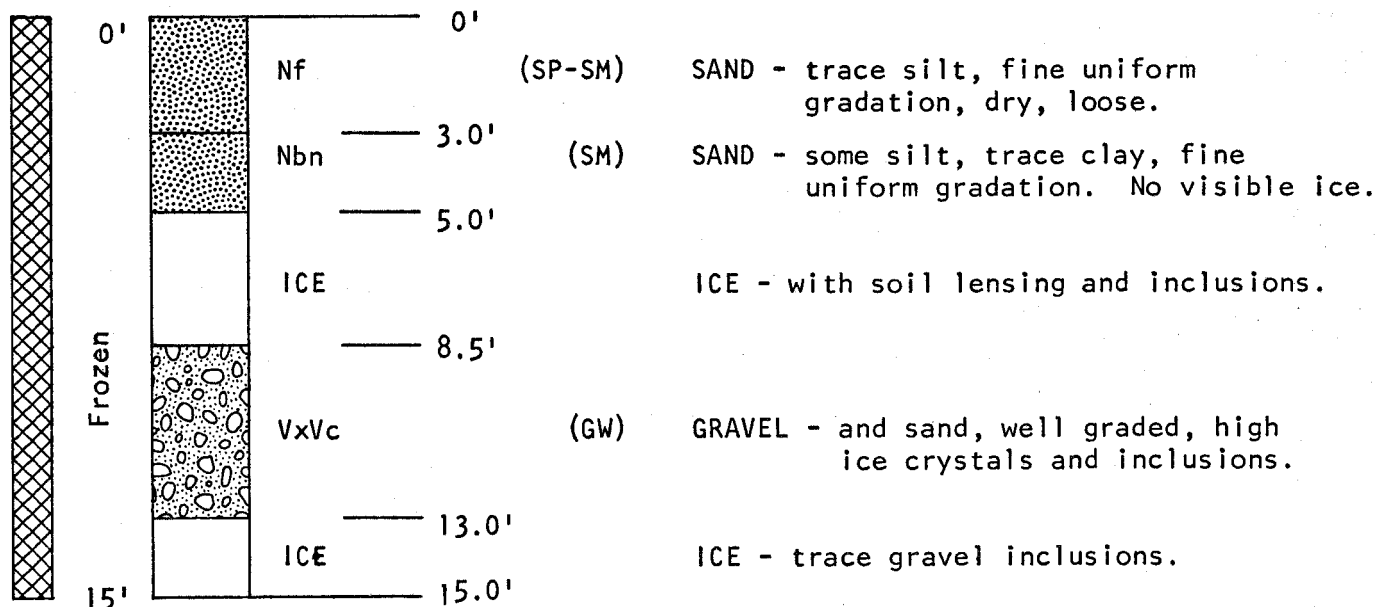
HARDNESS TEST

PETROGRAPHIC ANALYSIS

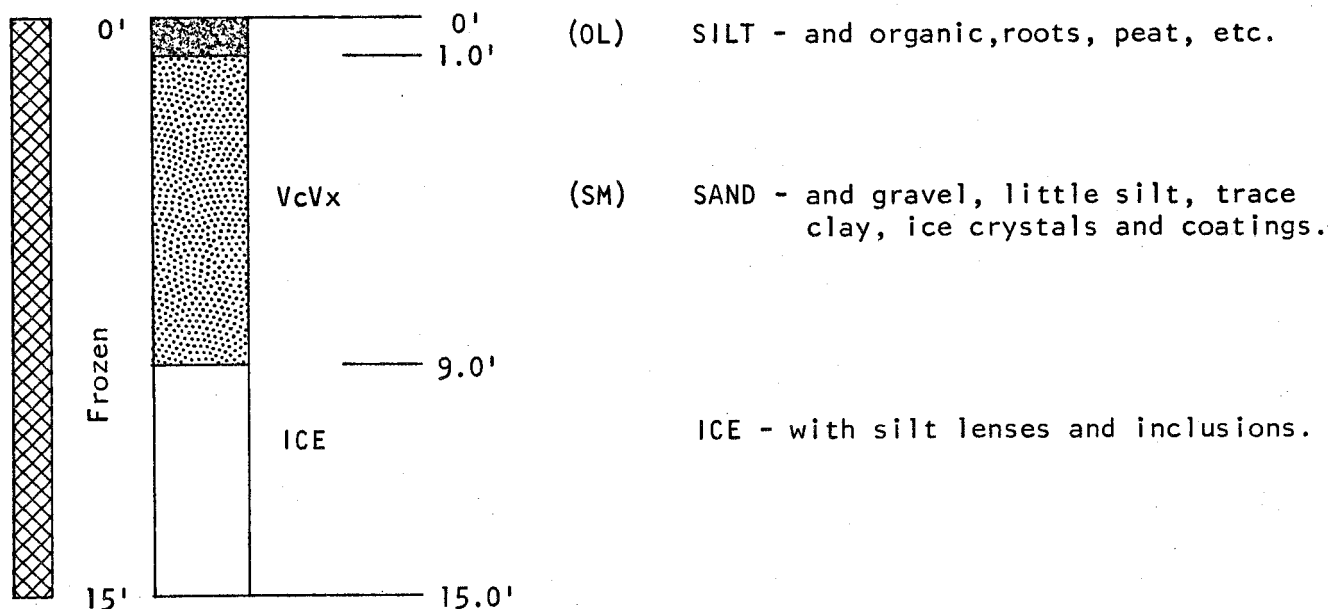
TEST HOLE LOGS

SOURCE No. 307

307-1



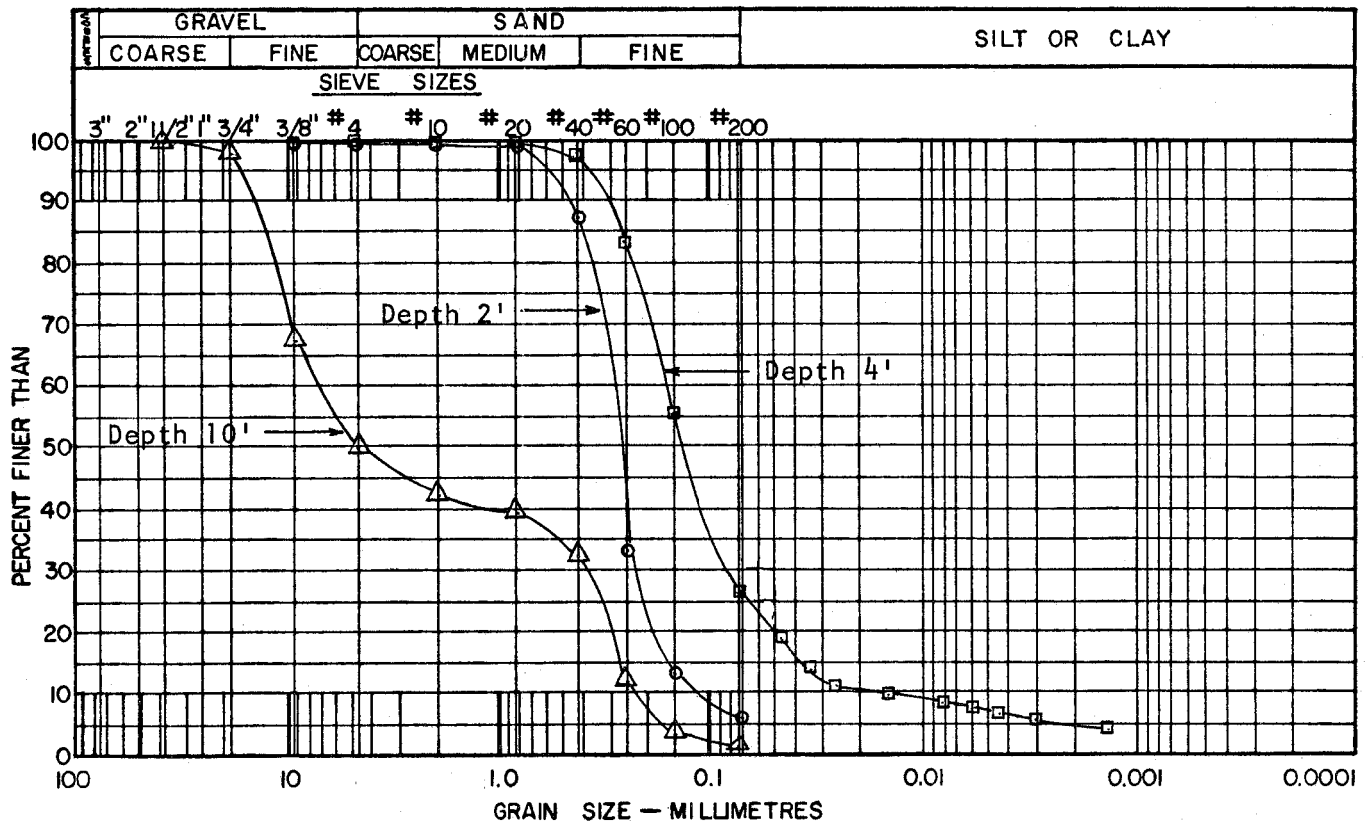
307-2



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

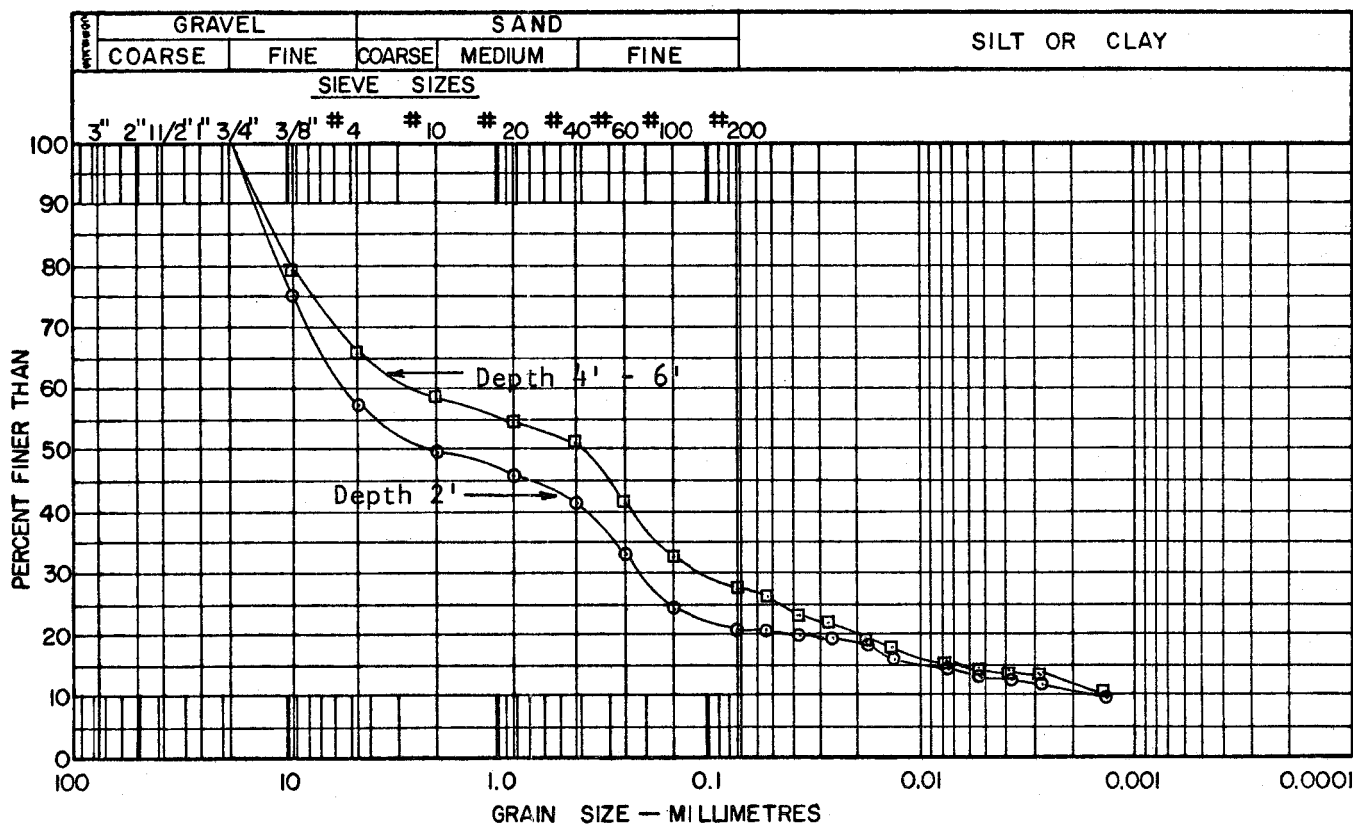
HARDNESS TEST

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%

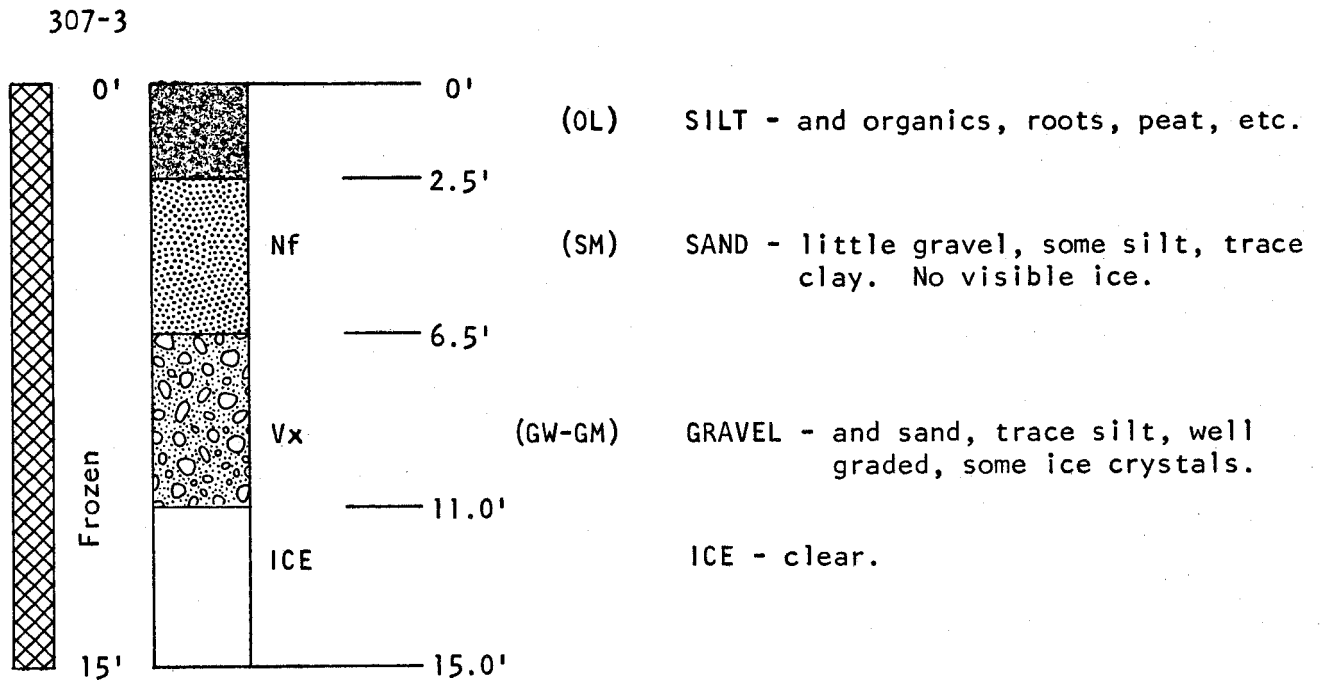
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

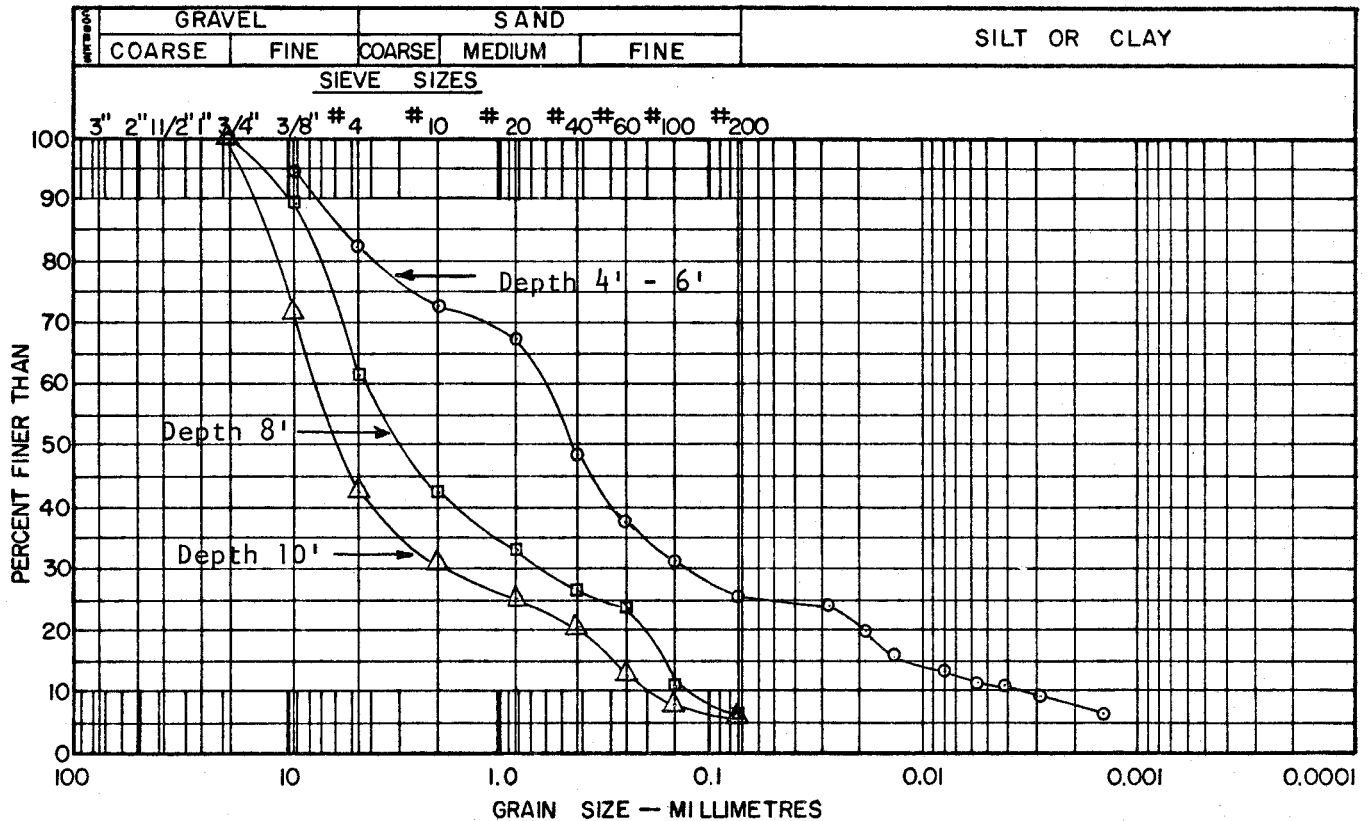
SOURCE No. 307



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

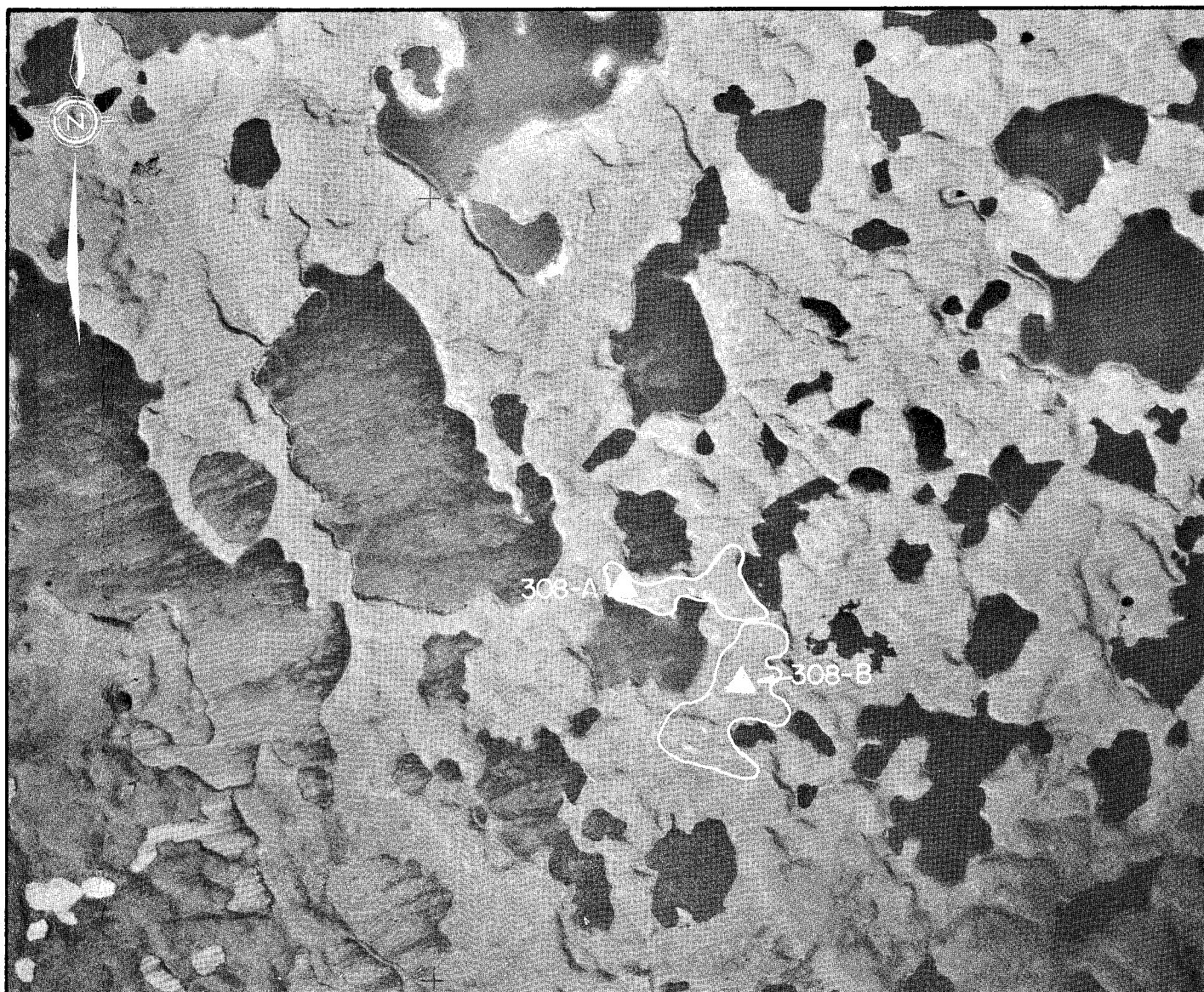
ZONE III
SOURCE No. 308

LANDFORM AND LOCATION: Terrace remnants and kames, 7 miles west
of Eskimo Lakes and 32 miles south of Tuktoyaktuk

MATERIAL: GRAVEL - little sand
SAND - and gravel

VOLUME: 20,000 cu. yds. at least

CONCLUSION: Not recommended for large-scale development, but
may assist in small local projects. Marginal
to critical wildlife habitat.



AIRPHOTO No. A12918 - 264

SCALE: 1" = 3000' (approx.)

308 ENVIRONMENT

Physical

This source is a group of terrace remnants and kames located in the glaciofluvial outwash plain 7 miles west of Eskimo Lakes and 32 miles south of Tuktoyaktuk. The area is about 3,000 feet long and from 200 to 2,000 feet wide. The source rises from 40 to 50 feet above the adjacent small lakes.

Drainage over the area is good, with no ground ice encountered in the top 3 feet during the reconnaissance in September.

The source has not been developed.

Biotic

Vegetative cover is very thin, with some areas of gravel completely exposed. Elsewhere the ground cover consists of moss and grass, with some dwarf shrubs up to 3 feet high.

This source lies on the boundary of the critical fawning ground of the Reindeer Herd, and lies within the Mackenzie Reindeer Grazing Reserve.

308 MATERIALS AND QUANTITIES

This source was investigated during the reconnaissance of September, 1972, but time would not permit drilling during the following winter, so the information concerning the material within the source is limited. Gravel and sand were exposed to a depth of 3 feet in 2 test pits. Although these materials are clean, the surficial examination of the source indicates that silt and massive ground ice are probably located beneath these shallow deposits.

The material exposed in test pit A is coarse gravel (70%), sand (28%), and a trace of silt (2%). The petrographic analysis indicates a very sound gravel, with only 4% soft and porous.

Test pit B contained similar materials but finer and with an irregular grading curve. The petrographic analysis is substantially the same.

The estimated volume of recoverable material in this source is about 20,000 cubic yards, although more detailed examination may increase this estimate.

308 DEVELOPMENT

General

This source is small, probably erratic, and far from current developments. It is marginal with respect to critical wildlife habitat.

The source should be rated low priority, valuable only for the supply of general fill to small local projects. Further investigation may reveal some small volume of aggregate suitable for concrete or asphalt construction.

Access

The area is accessible only during winter, hauling on snow roads. During recent years the Parsons Lake area has been penetrated by winter roads from Tuktoyaktuk and from Swimming Point, the former road passing close to this source. The power transmission line to Tuktoyaktuk lies 2 miles to the east.

Material Use and Handling

The materials in this source are suitable for general fill and road-building, and have a potential for use in concrete and asphalt.

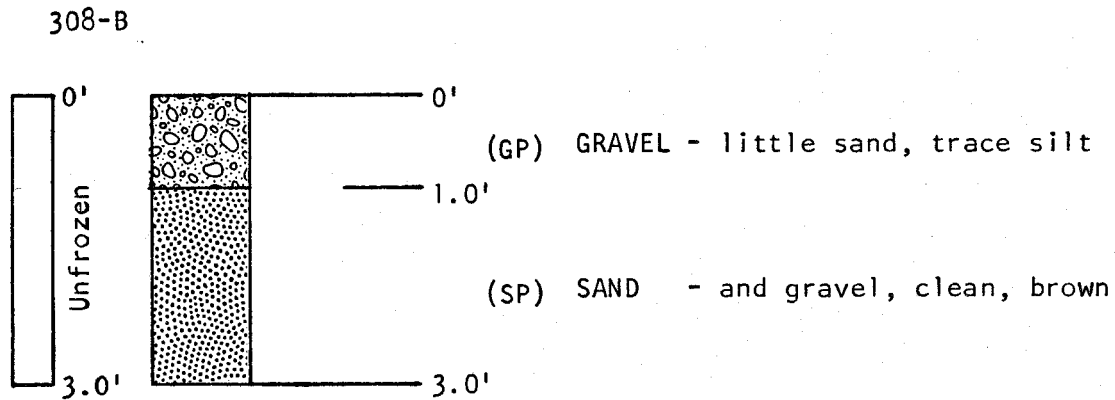
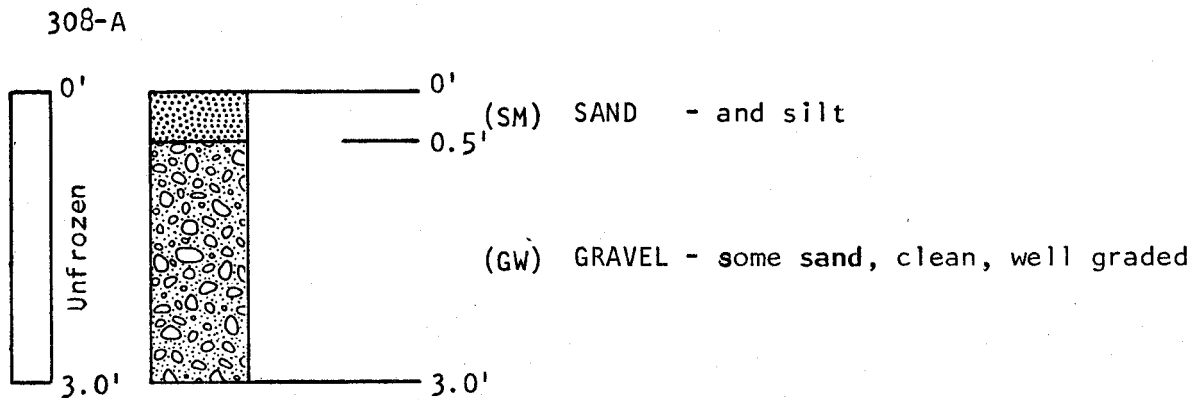
The equipment required for this development is the usual assembly of dozer with ripper attachment, front-end loader, and trucks.

Stripping and Restoration

This source is similar to many other glacial features in the area, and the same measures would be recommended for restoring the area for further use.

TEST PIT LOGS

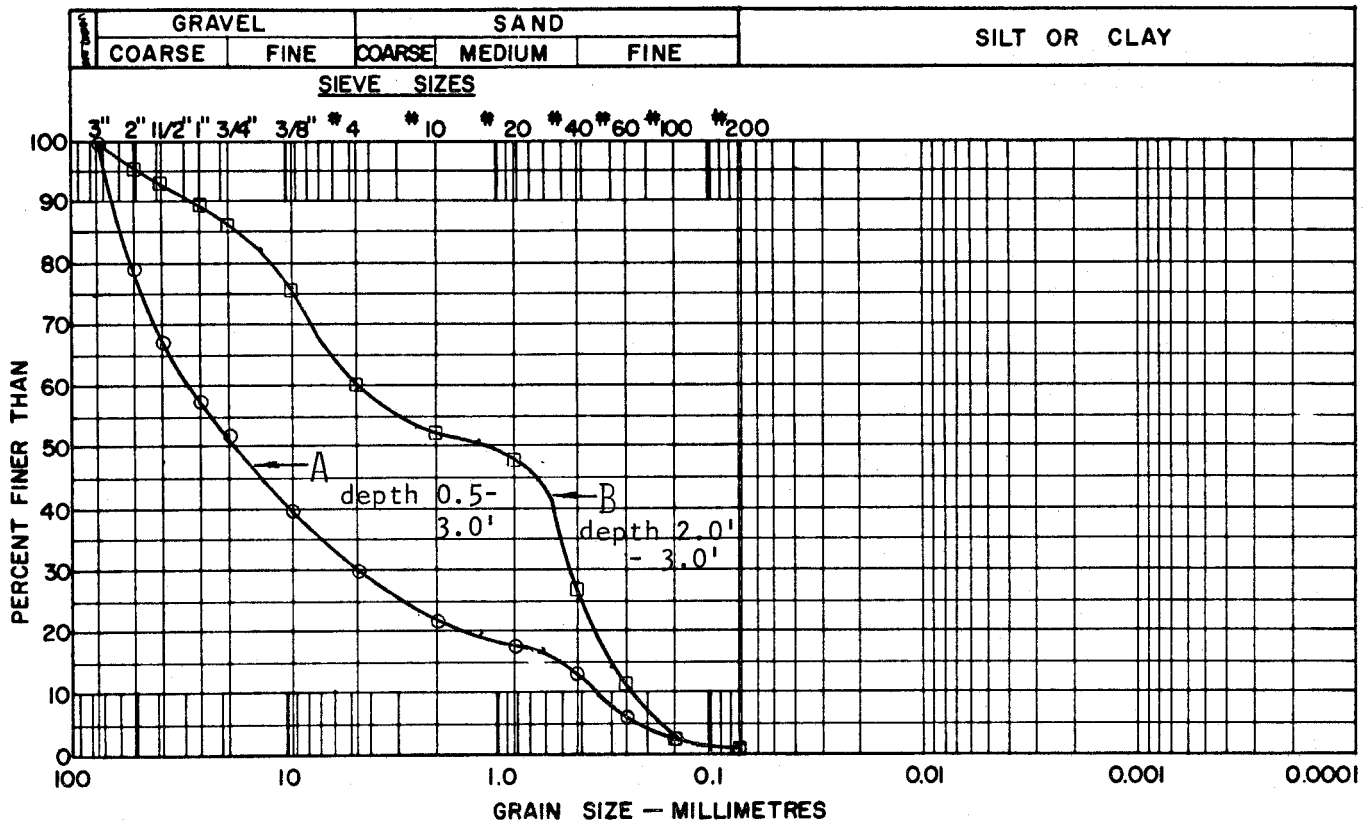
SOURCE No. 308



LABORATORY TEST DATA

SOURCE No. 308

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A depth 0.5 - 3.0' 0.5%
Pit B depth 2.0 - 3.0' 1.5%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

Pit A depth 0.5 - 3.0'

Quartzite - 73%
Granite - 16%
Chert - 5%
Sandstone, soft - 3%
Limestone, soft - 2%
Quartz - 1%

Total 100%

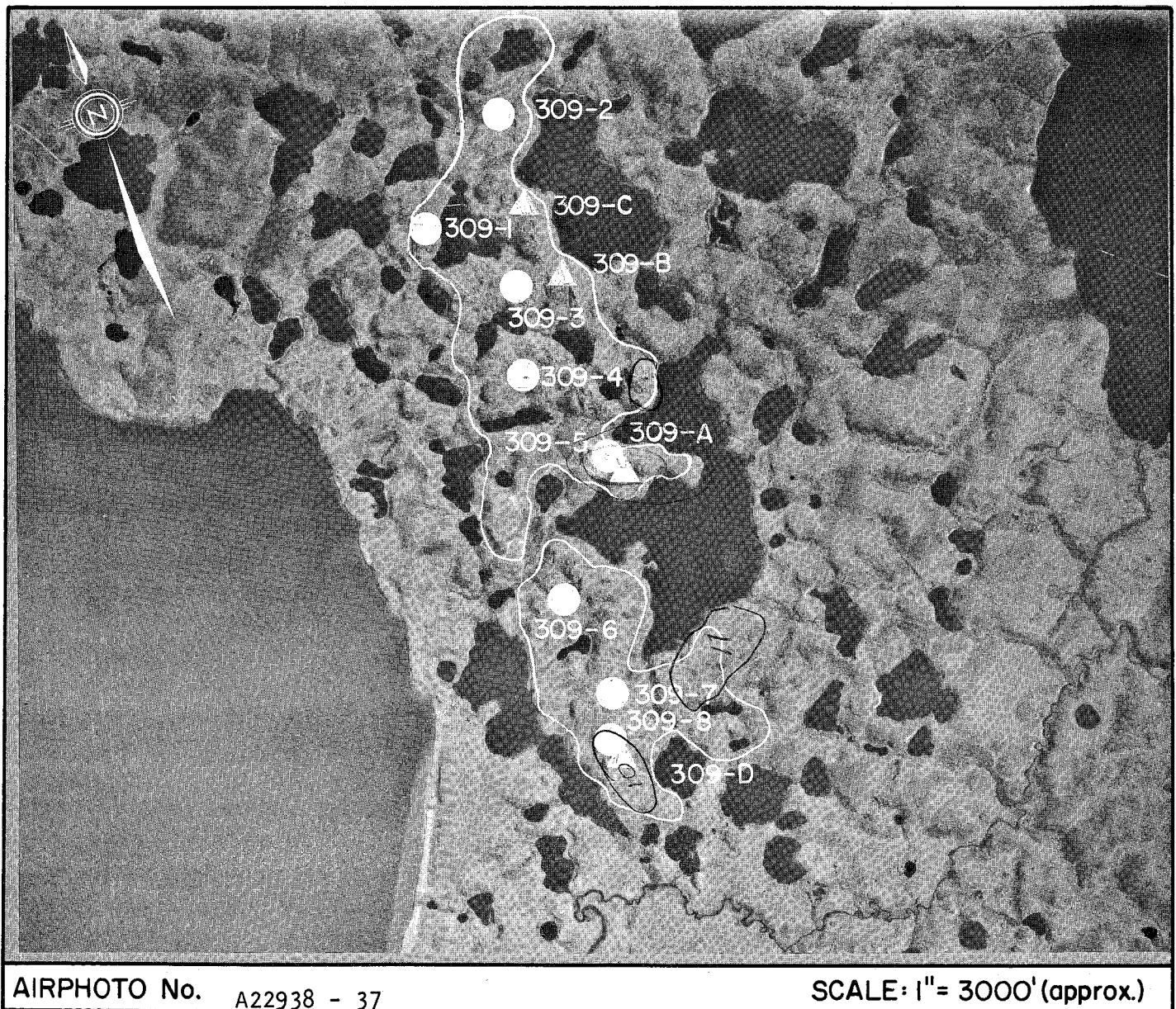
ZONE III
SOURCE No. 309

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.



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.

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.

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.

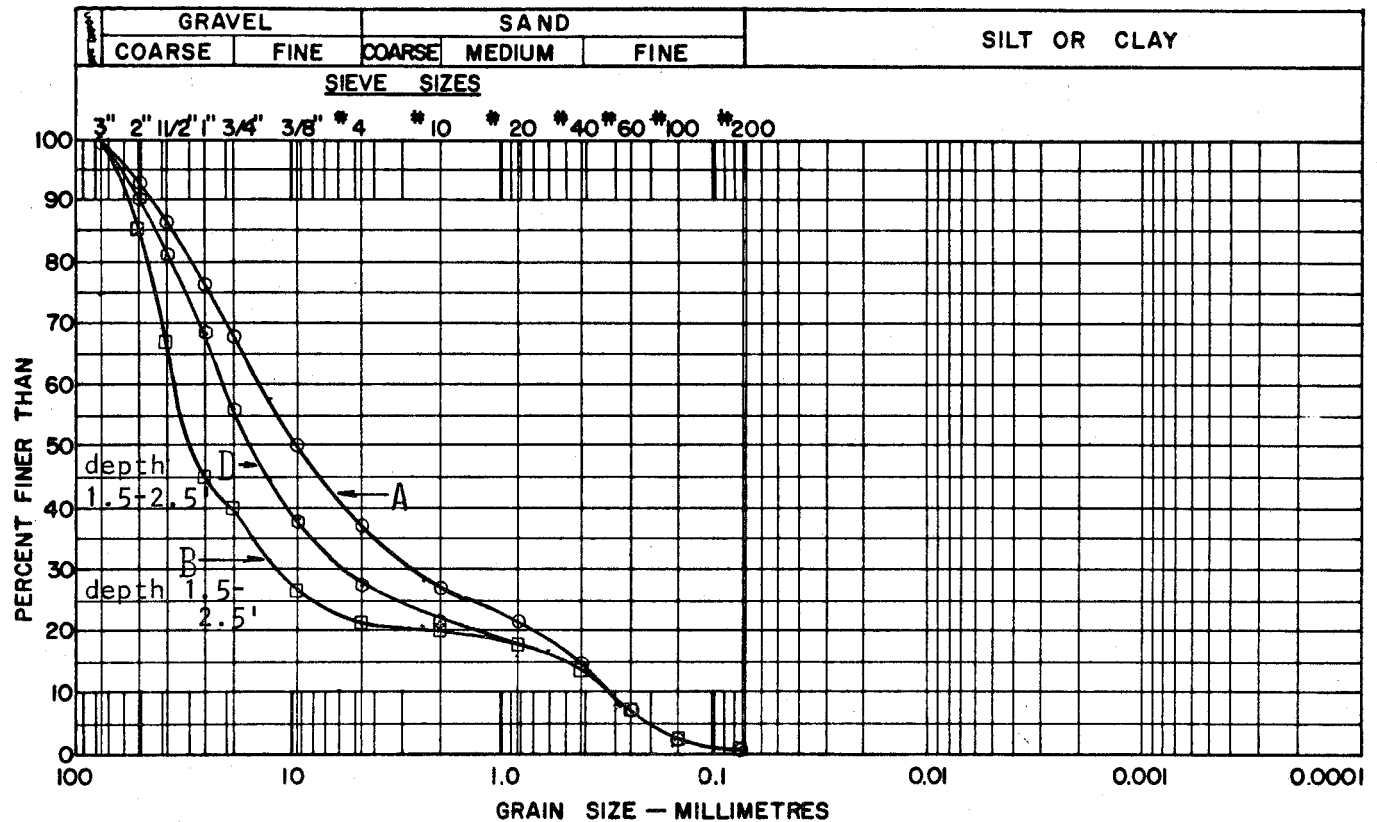
All banks must be graded to a stable slope before recovering with topsoil, and the depleted areas must be graded to a smooth contour.

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

LABORATORY TEST DATA

SOURCE No. 309

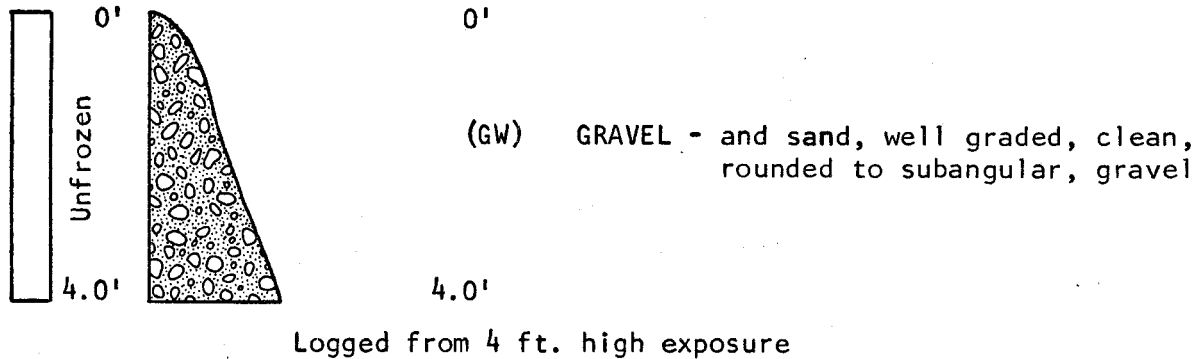
GRAIN SIZE DISTRIBUTION



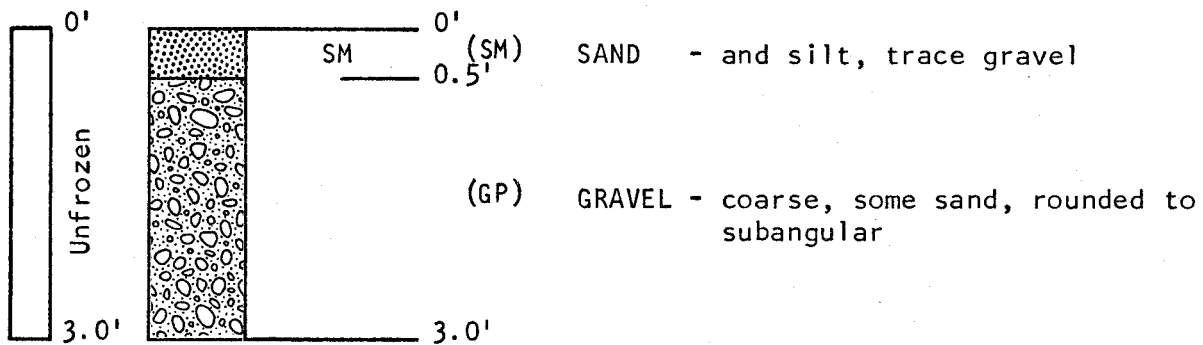
TEST PIT LOGS

SOURCE No. 309

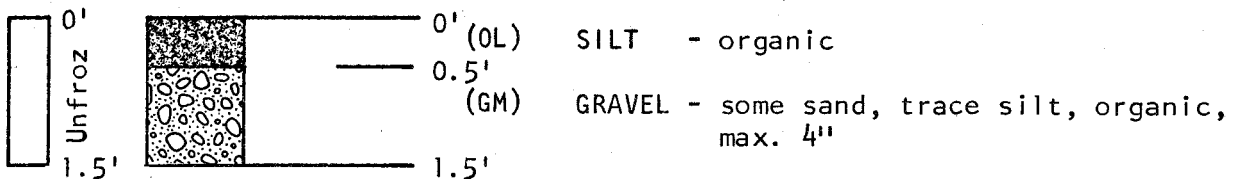
309-A



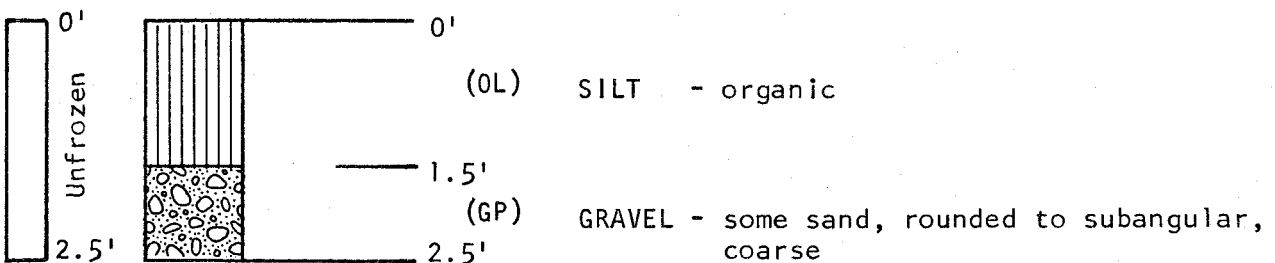
309-B



309-C



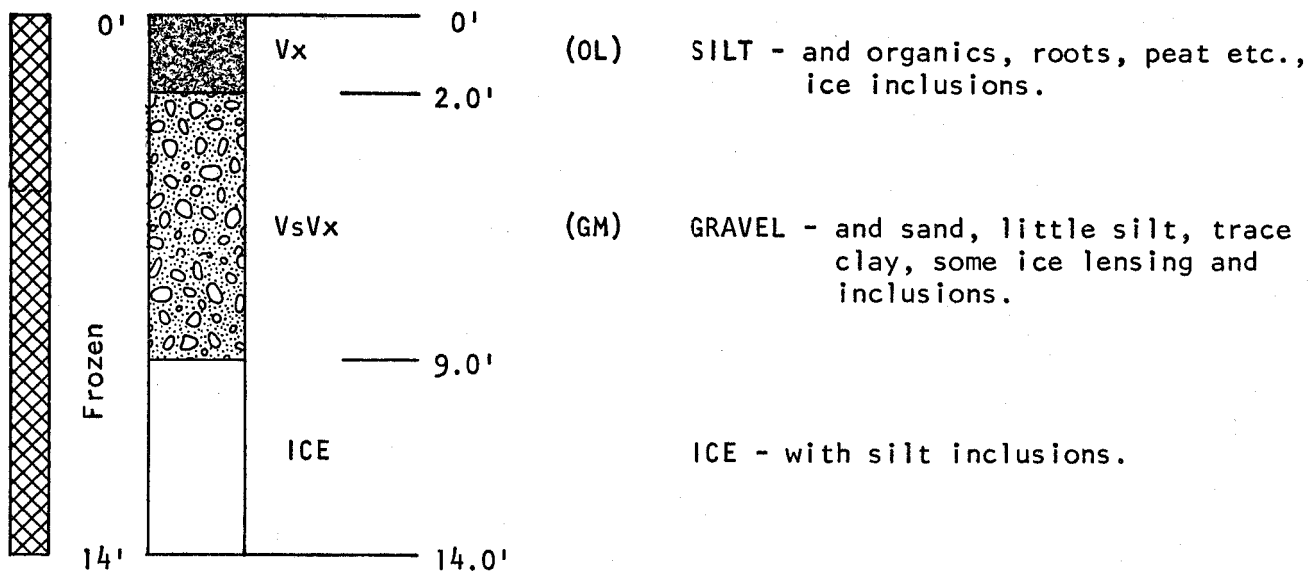
309-D



TEST HOLE LOGS

SOURCE No. 309

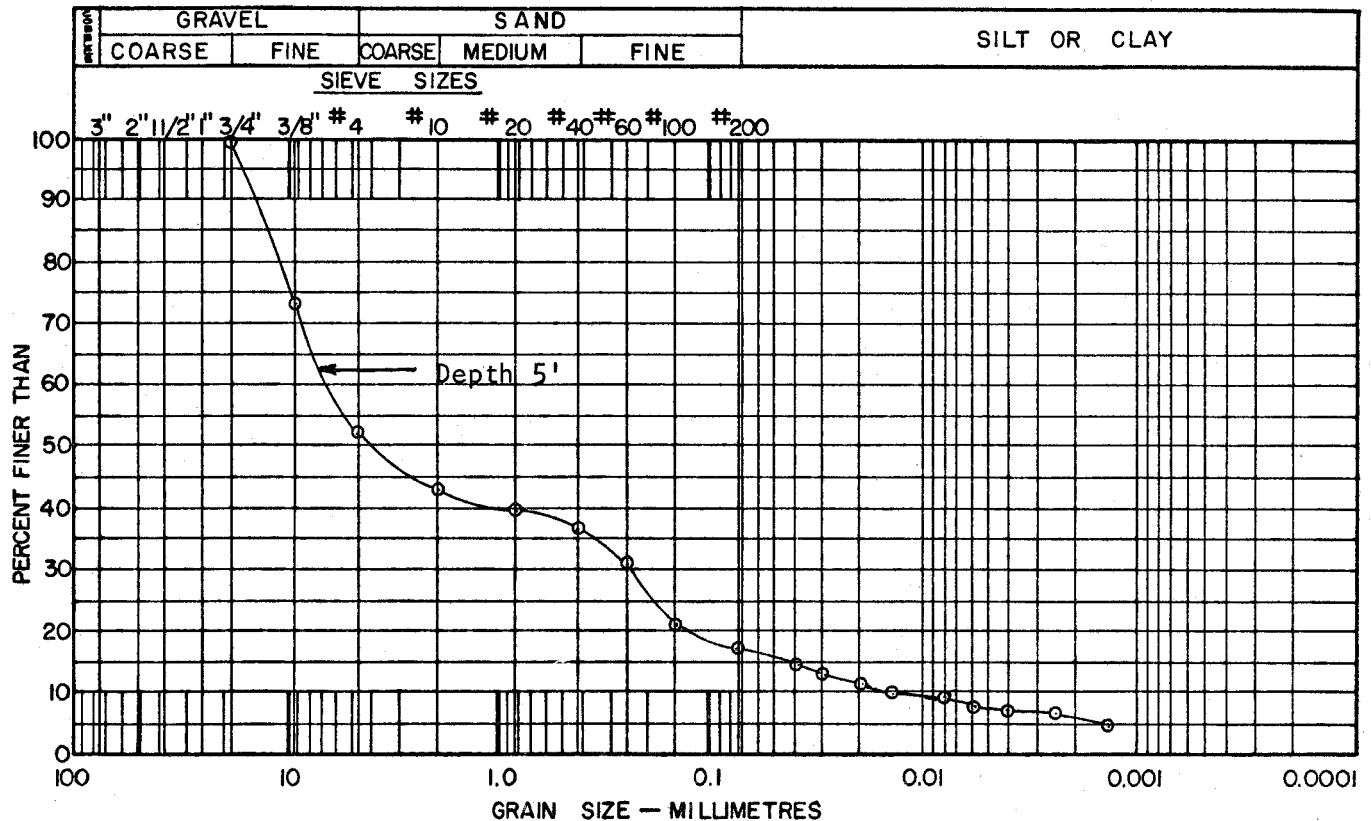
309-1



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 309-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 2 5' 10.0%

ORGANIC CONTENT

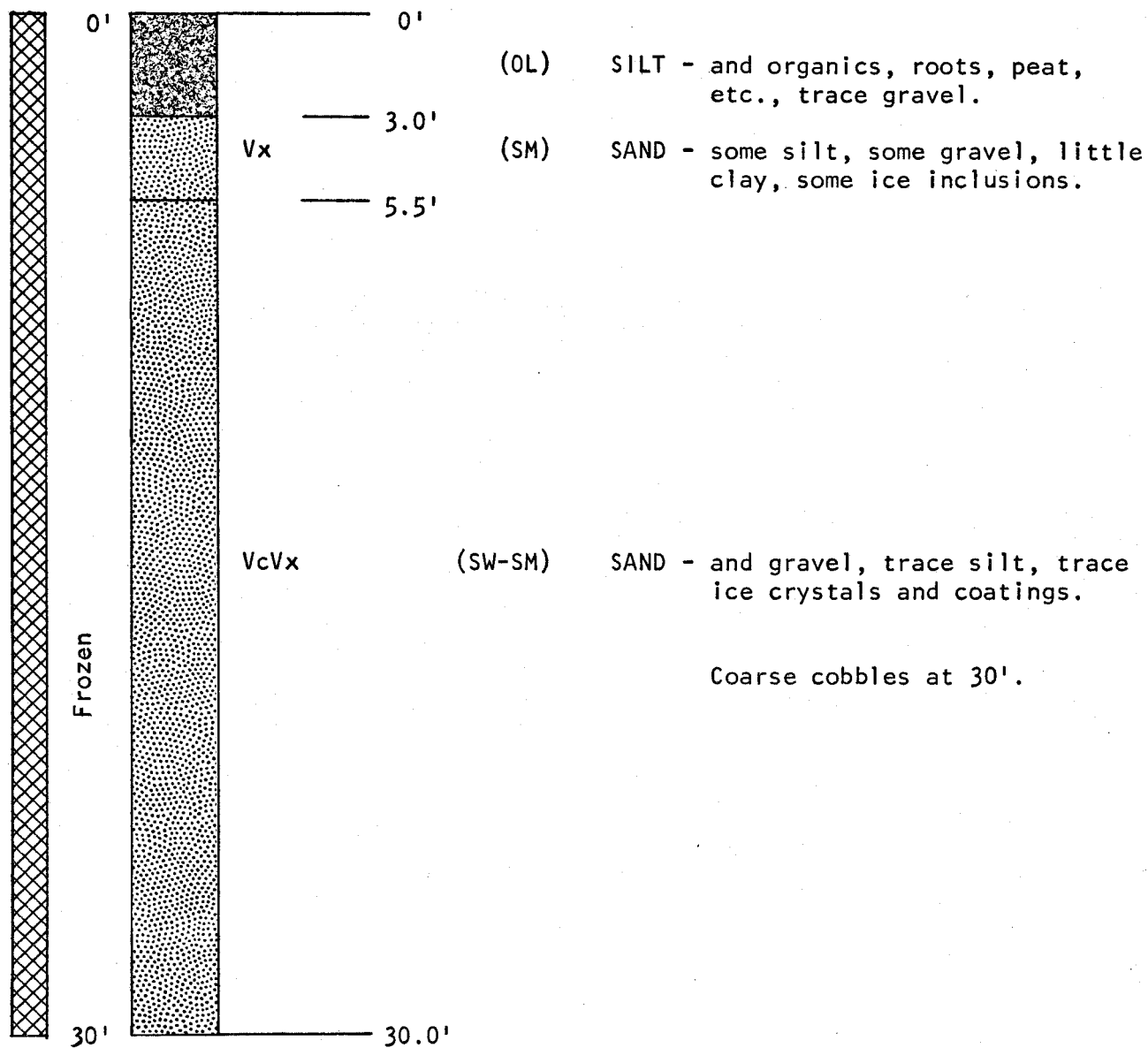
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 309

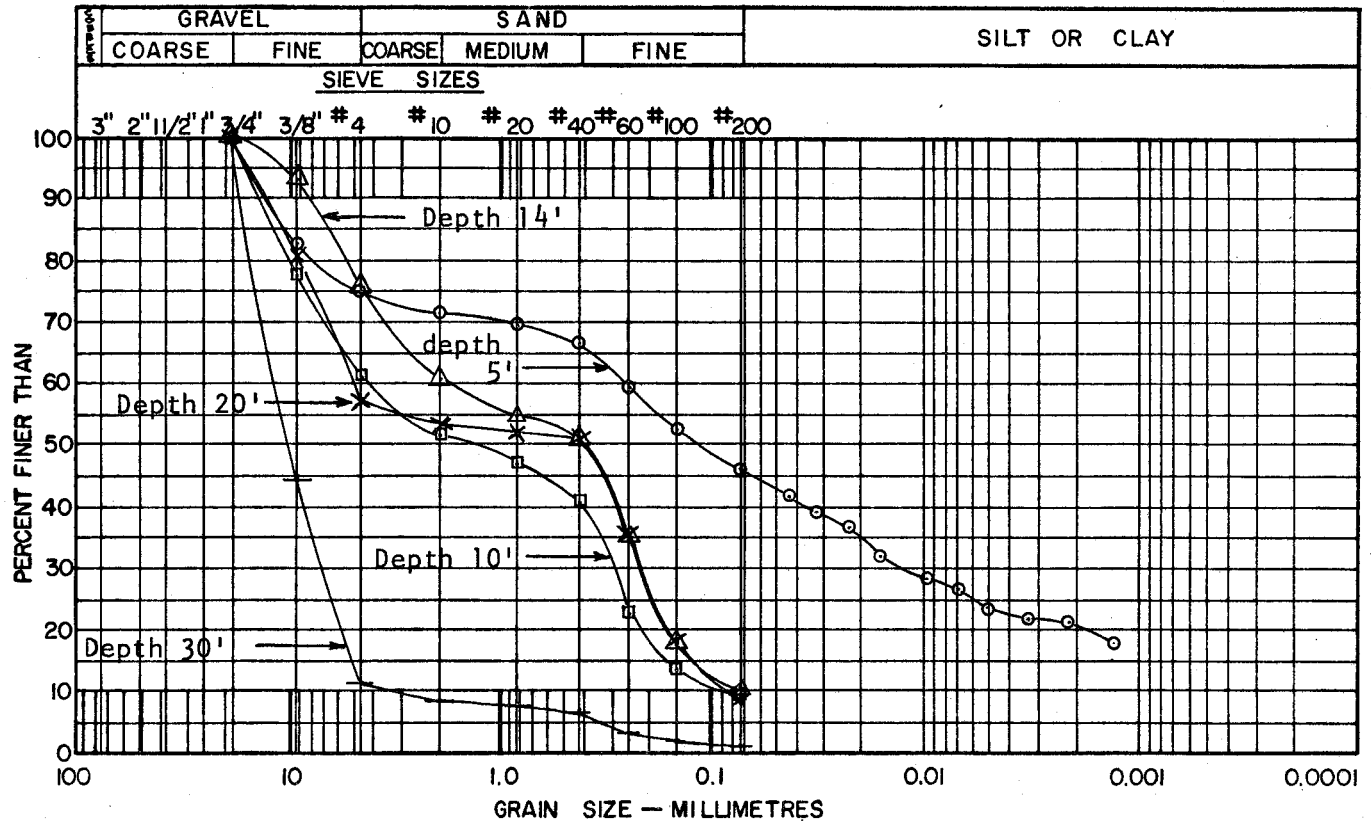
309-2



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

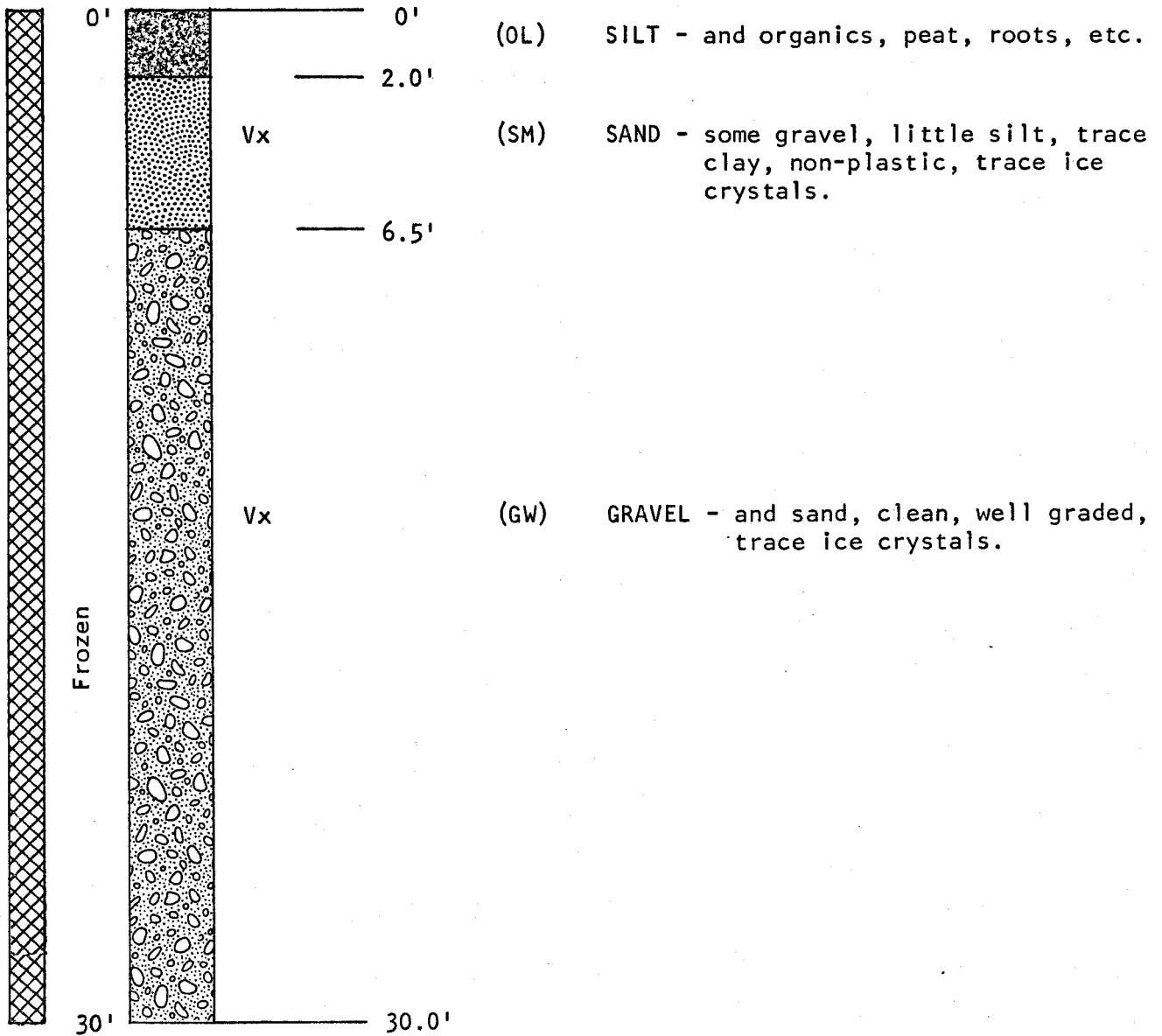
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 309

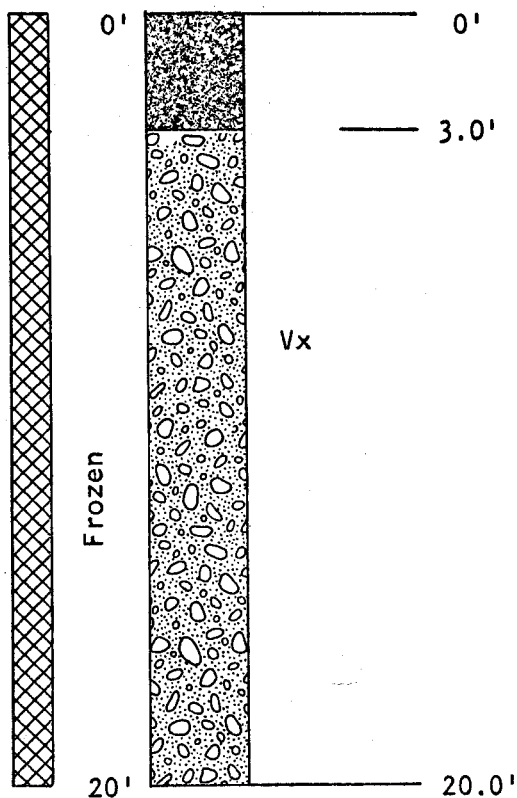
309-3



TEST HOLE LOGS

SOURCE No. 309

309-4

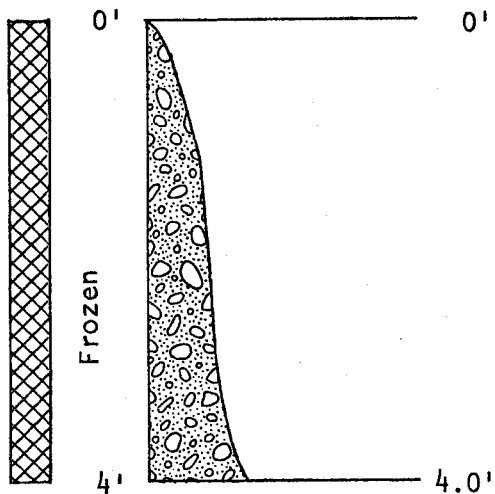


(OL) SILT - and organics, roots, peat, etc.

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

Rock or boulder at 20'.

309-5



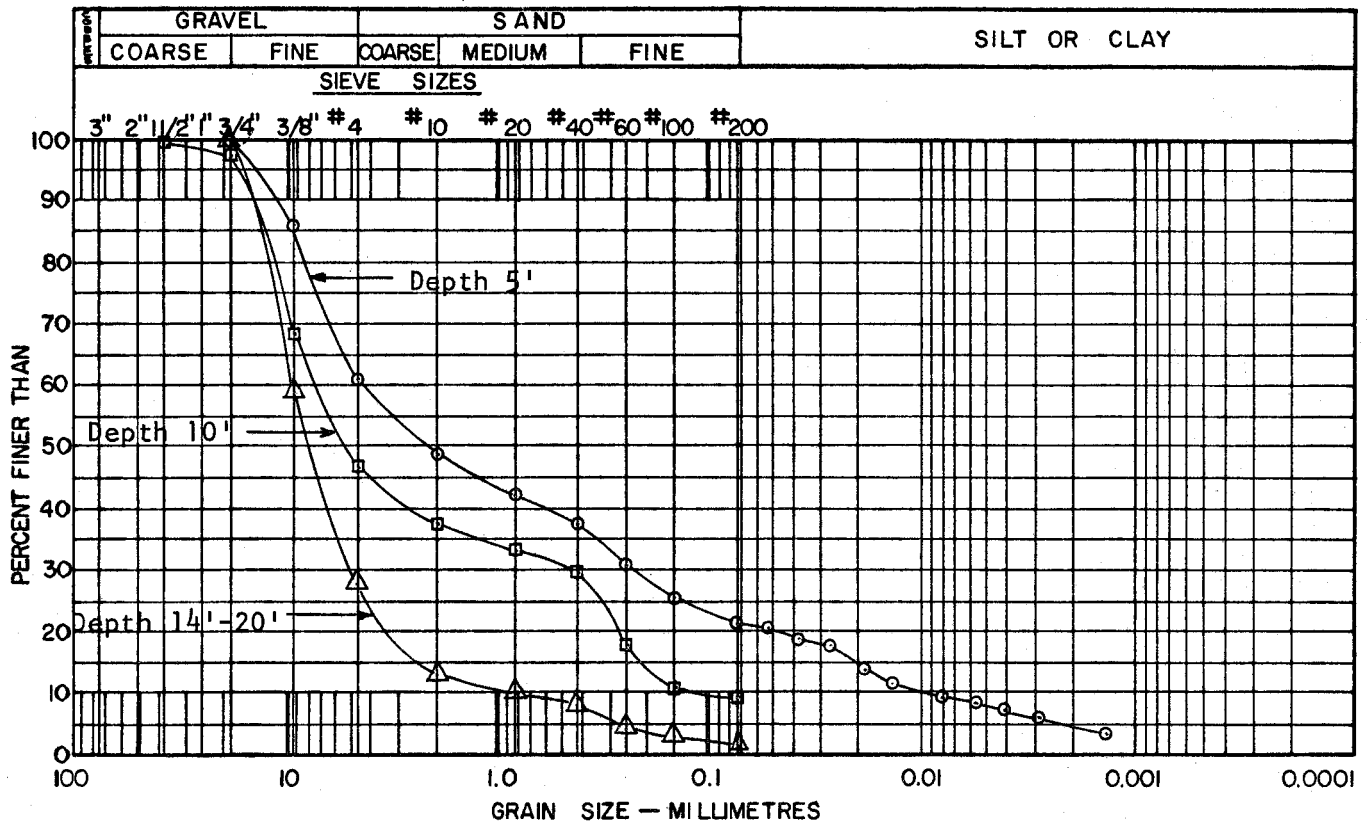
GULF PIT

(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

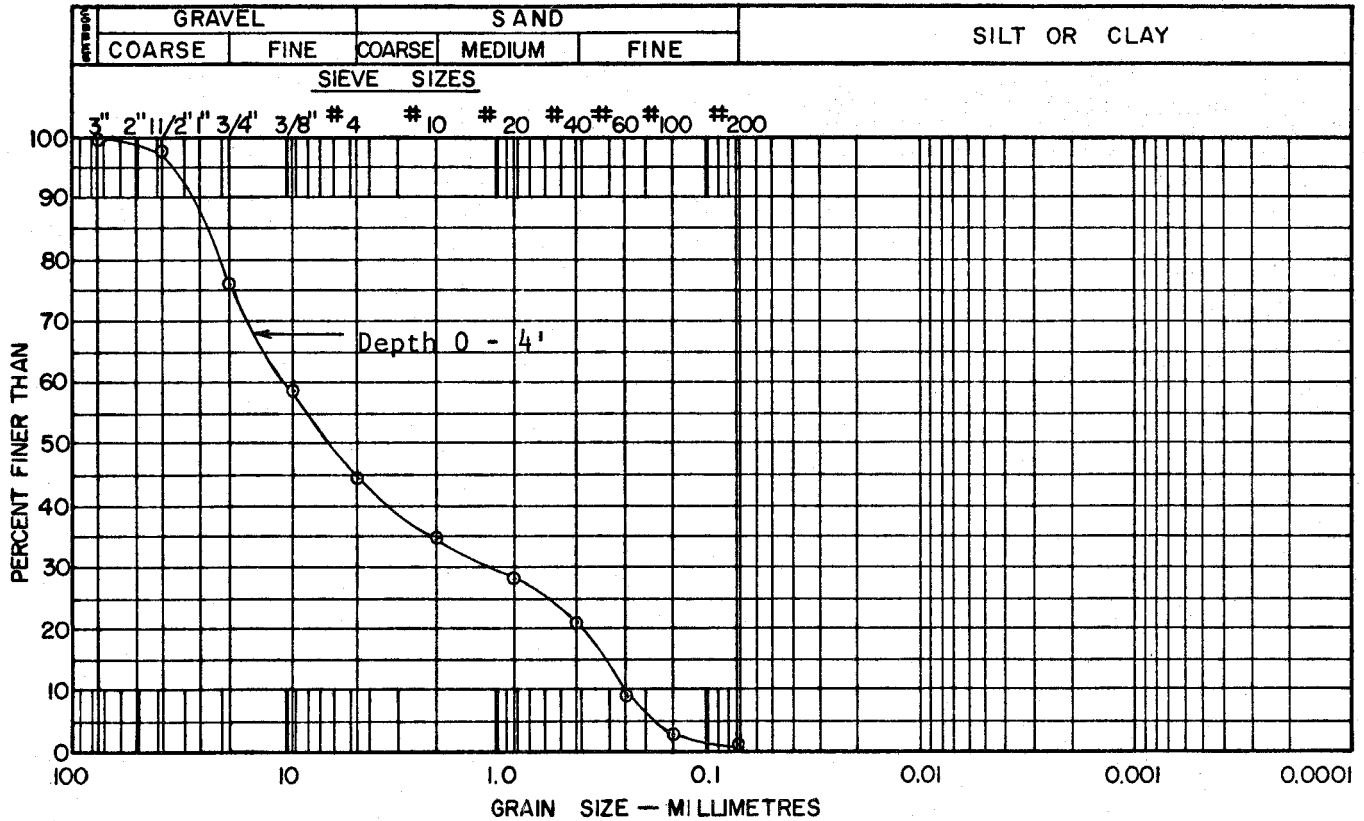
HARDNESS TEST

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'

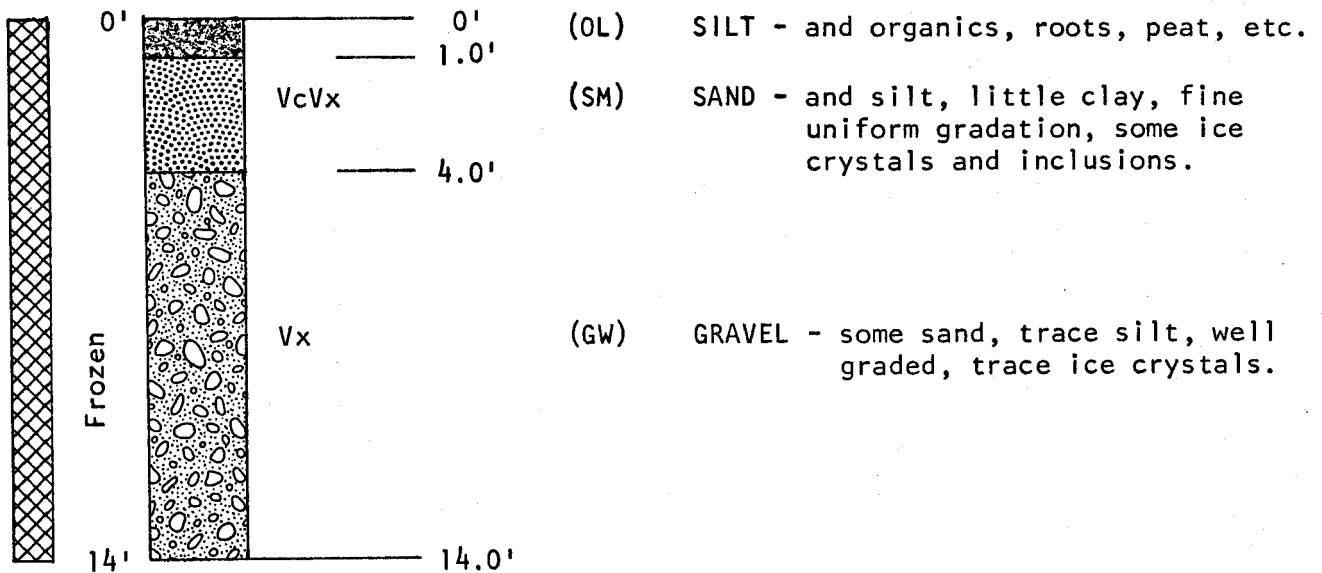
Quartzite	88%
Sandstone-	7%
soft	
Granite	2%
Ironstone	1%
Quartz	1%
Limestone-	1%
soft	

Chert	neg
Total	100%

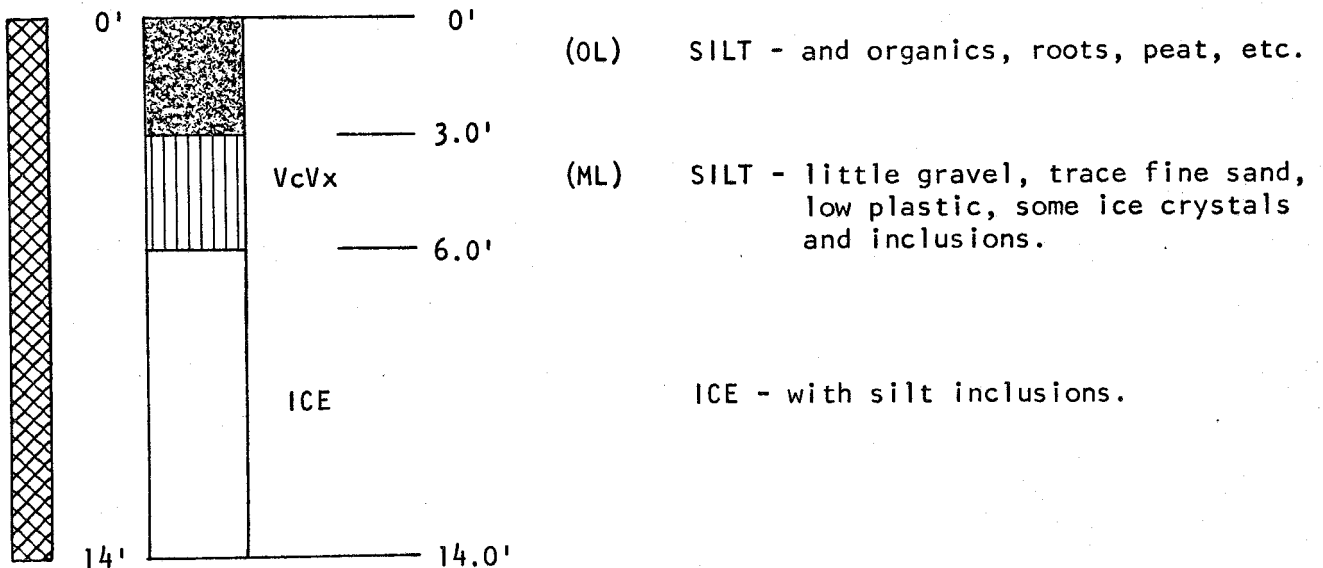
TEST HOLE LOGS

SOURCE No. 309

309-6



309-7



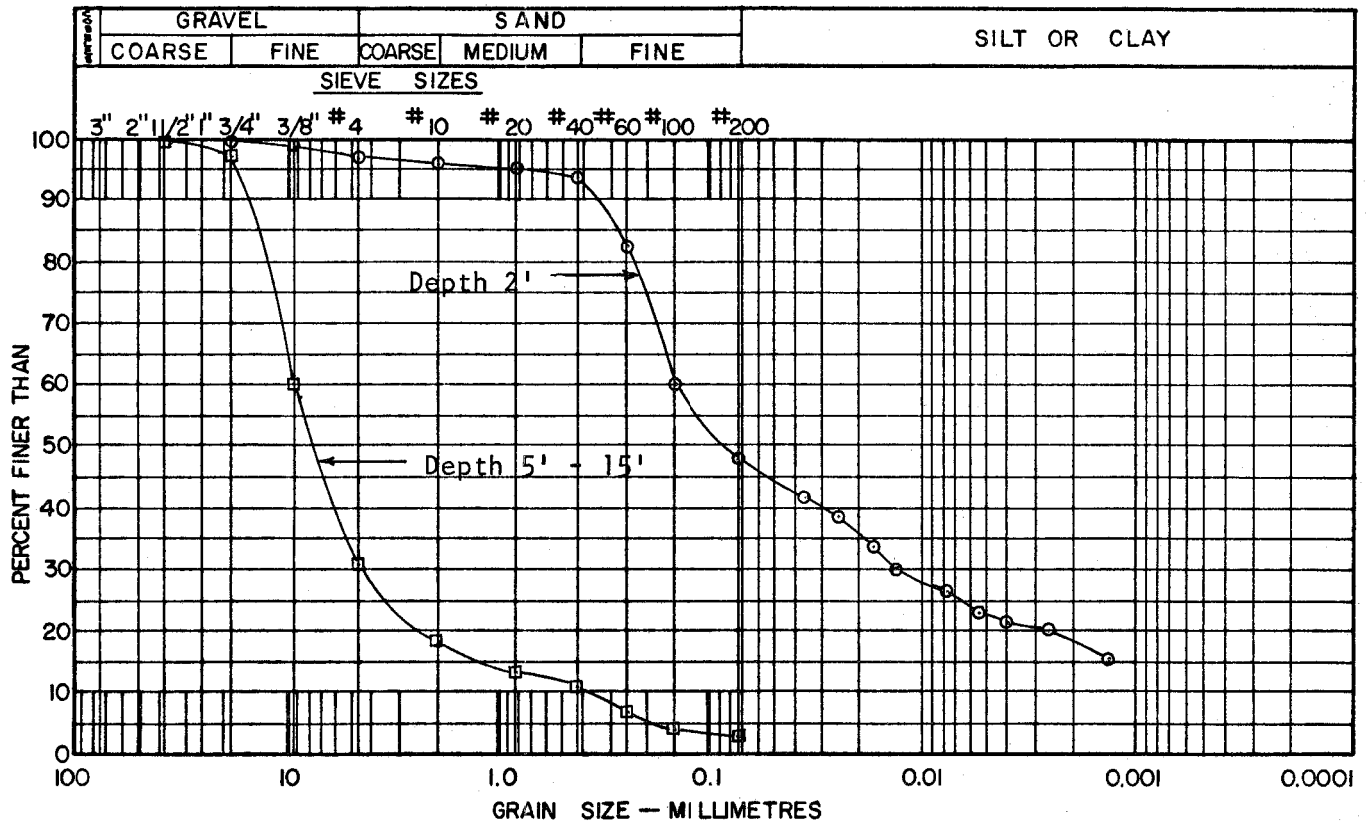
Moisture Content

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%

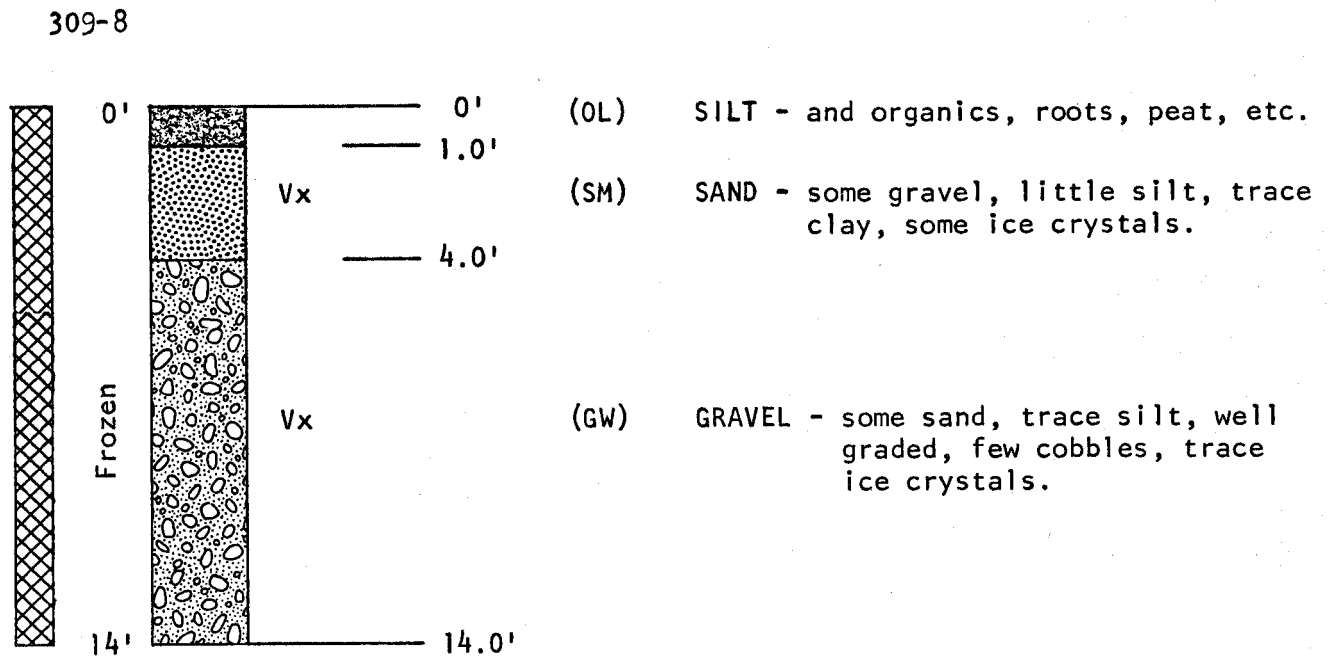
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

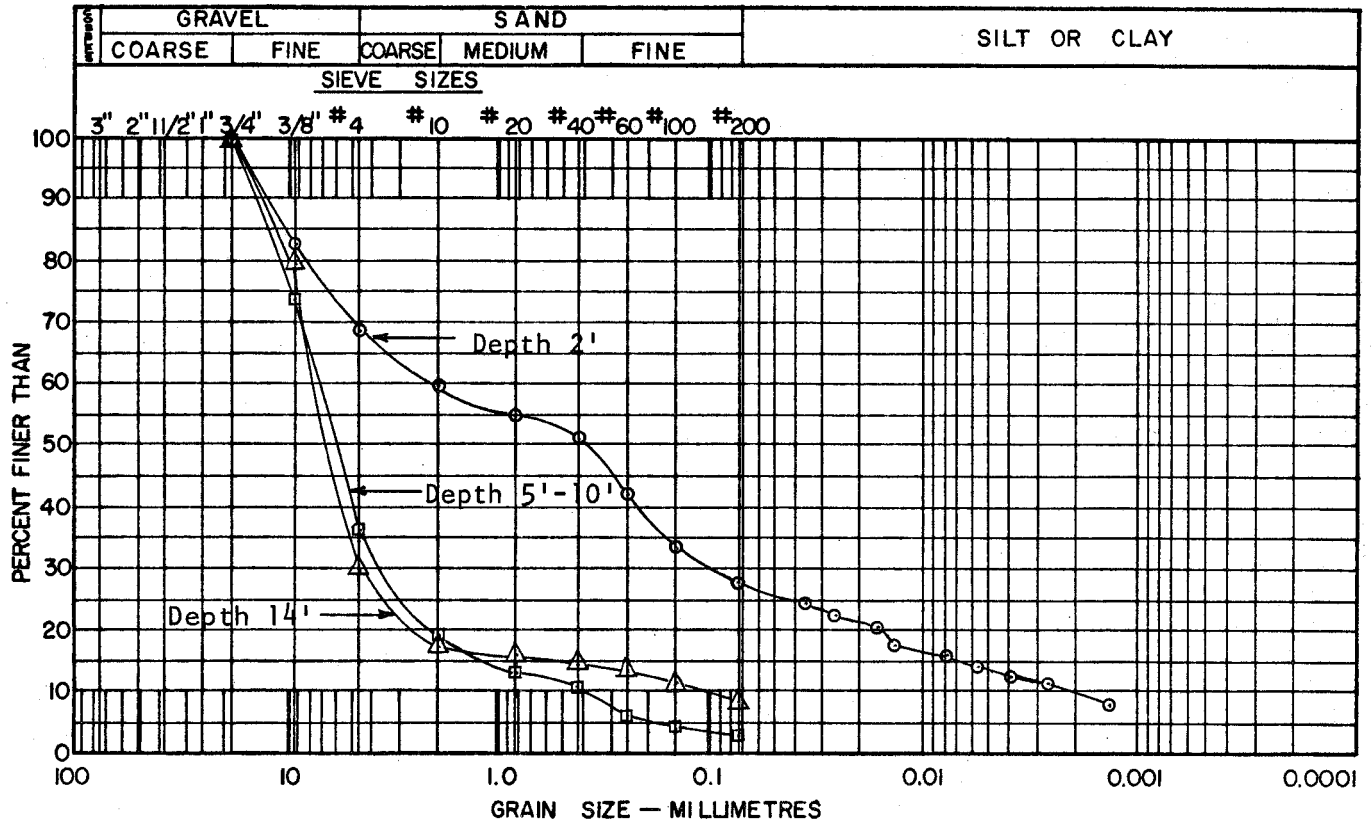
SOURCE No. 309



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

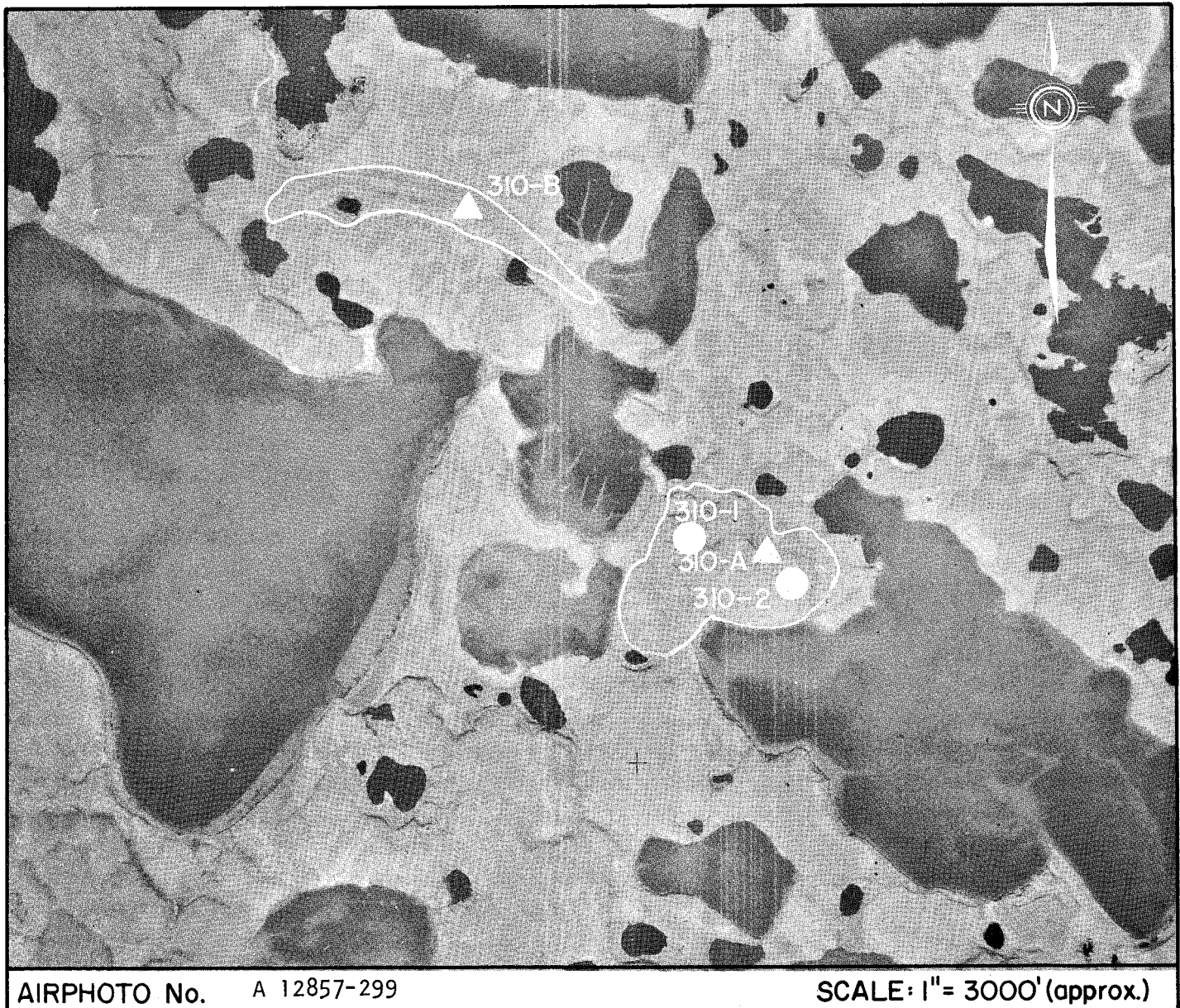
ZONE III
SOURCE No. 310A

LANDFORM AND LOCATION: Several kames and an esker located about 3 miles northwest of Parsons Lake and 36 miles southwest of Tuktoyaktuk.

MATERIAL: SAND - and silt, trace gravel

VOLUME: ---

CONCLUSION: Not recommended for development due to poor quality material and the high ice content.



AIRPHOTO No. A 12857-299

SCALE: 1" = 3000' (approx.)

310A ENVIRONMENT

Physical

The source is a complex of kames and an esker ridge located about 3 miles northwest of Parsons Lake and 36 miles southwest of Tuktoyaktuk. The glacial feature is superimposed on a glaciolacustrine plain in an area of many lakes and ponds and stands about 50 feet above the surrounding level.

The southerly part of the source is a kame field about 3,500 feet in maximum dimension each way, and the northern part is an esker ridge-kame complex about 5,000 feet long and 500 feet maximum in width.

Drainage of the source is good, with no ground ice observed in the top 4 feet in September. The surrounding area, however, because of the occurrence of ponds and polygonal patterns, is believed to contain massive ground ice, and in fact the test holes encountered ice at fairly shallow depth.

The source has not been developed.

Biotic

Vegetative cover over the source area is a thin growth of moss and grass, with some dwarf shrubs up to 2 feet high.

This source lies within the Mackenzie Reindeer Grazing Reserve, but not within any critical wildlife area.

310A MATERIALS AND QUANTITIES

The materials in this source are primarily sand and silt, with a trace of gravel.

The moisture content of the surficial sand layer is from 3% to 6%. The underlying silt contains a high ice content, some of it in the form of clear lenses.

310A DEVELOPMENT

General

This source is not recommended for development. The granular material is a thin veneer over silt with a high ice content. Removal of the veneer of sand would start thermal erosion that would be difficult or impossible to control.

The source lies within 8 miles of a large deposit of superior material.

Access

The only access to the area at this time is by winter road. A winter road from Swimming Point, in use through recent years, passes close to the source.

Material Use and Handling

The material from this source could be used only for a poor quality general fill.

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

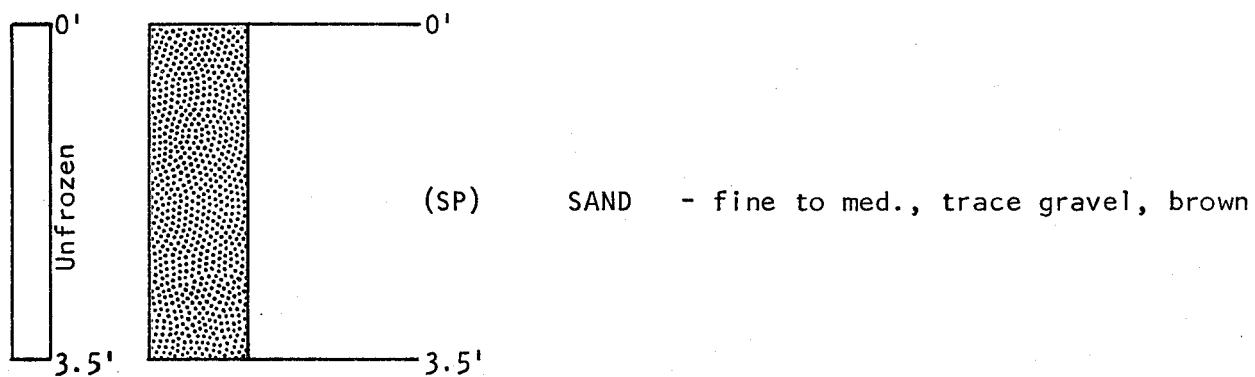
Stripping and Restoration

This source is typical of many glacial features in the barren grounds, and would require the same measures for restoration that have been recommended for the others, except that exposure of the massive ground ice could necessitate extensive restoration to the area for a very limited volume of usable material.

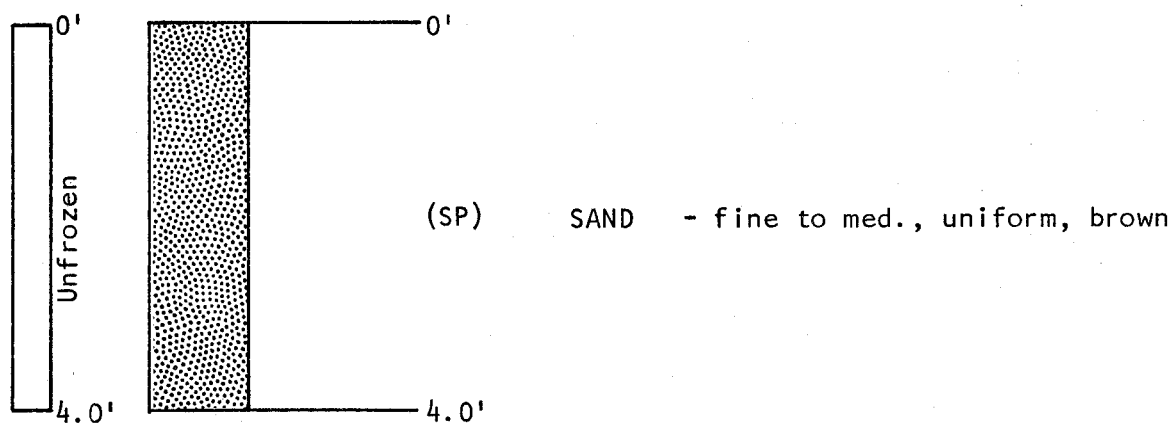
TEST PIT LOGS

SOURCE No. 310A

310A-A

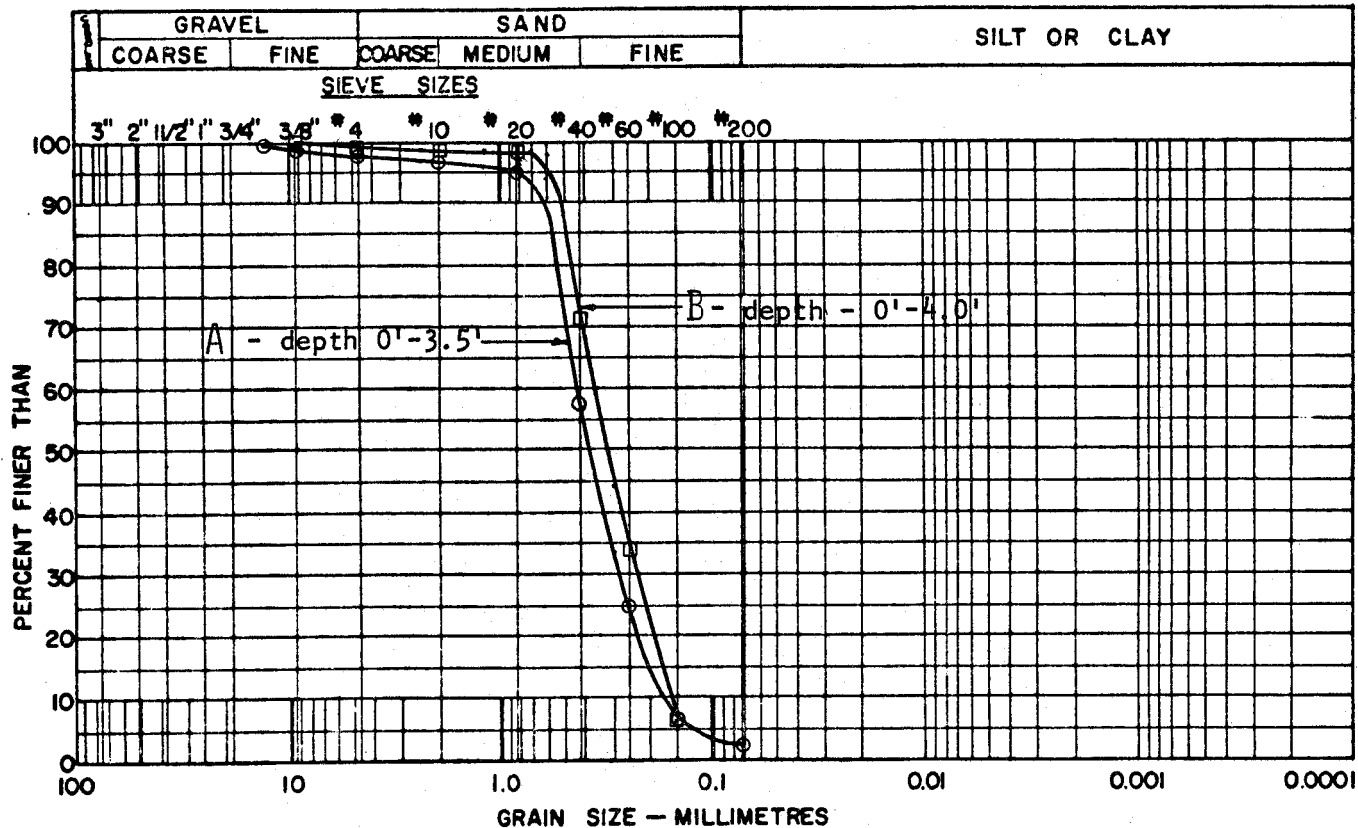


310A-B



SOURCE No. 310A

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A	depth 0'-3.5'	2.6%
Pit B	depth 0'-4.0'	5.9%

ORGANIC CONTENT

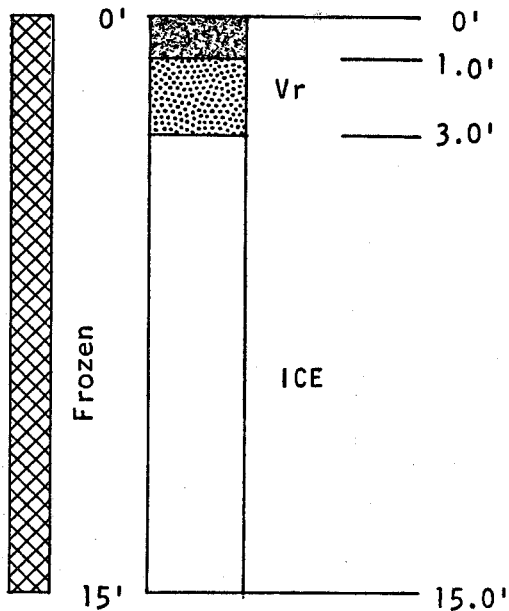
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 310A

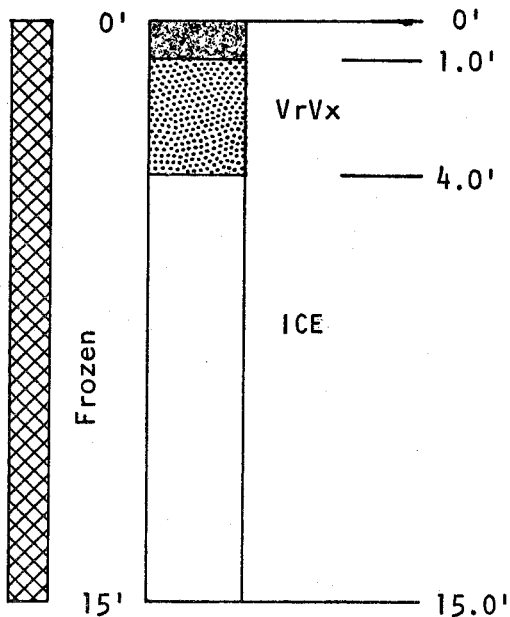
310A-1



(OL) SILT - and organics, root, peat, etc.
(SM) SAND - and silt, trace of fine gravel.

ICE - with silt inclusions.

310A-2



(OL) SILT - and organics, roots, peat, etc.
(SM) SAND - and silt, trace of fine gravel.

ICE - with silt inclusions.

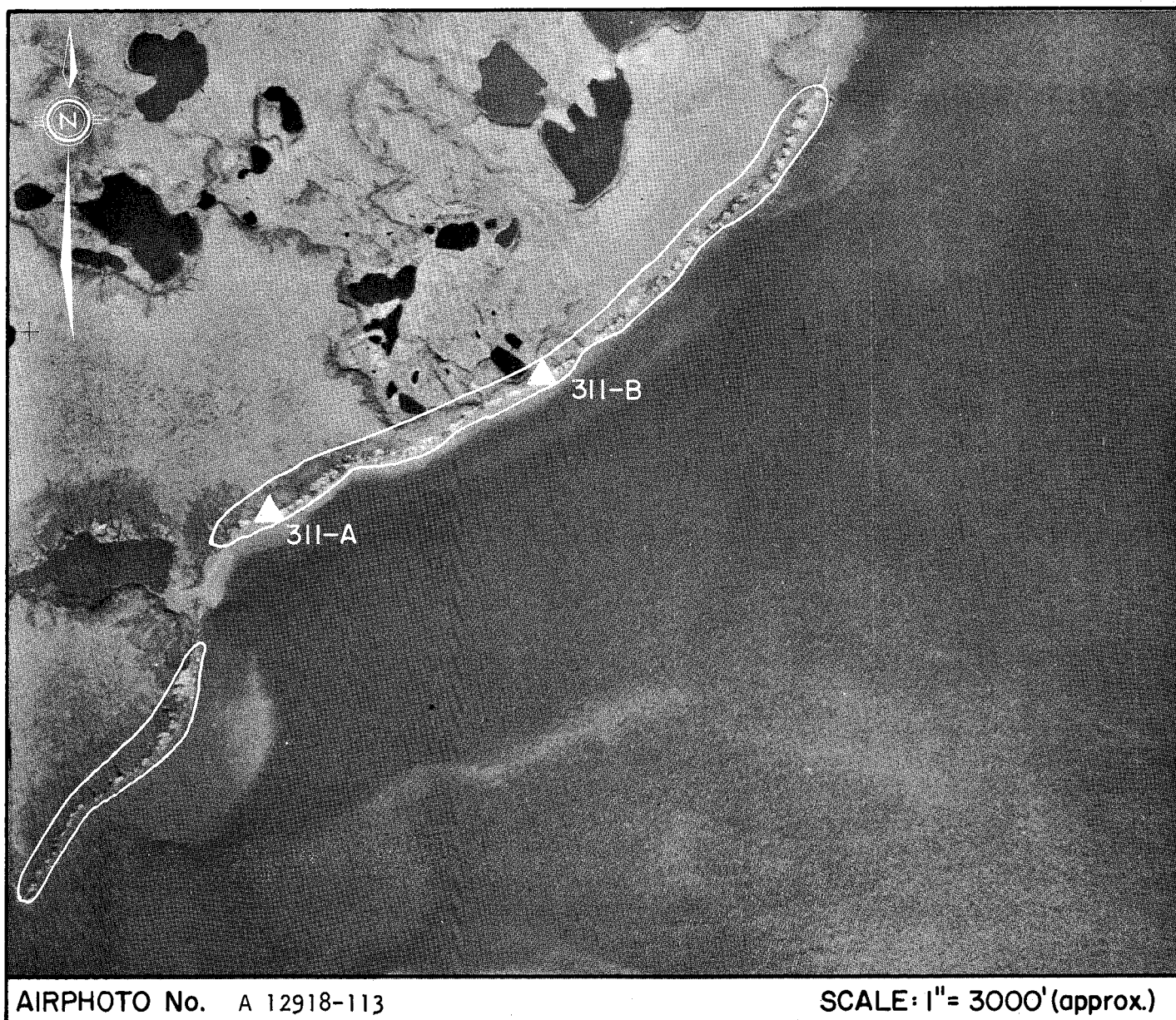
ZONE III
SOURCE No. 311

LANDFORM AND LOCATION: Bank adjacent to Eskimo Lakes about 4 miles northwest of Bonnieville Point and 38 miles southeast of Inuvik.

MATERIAL: SAND - trace silt

VOLUME: 400,000 cubic yards

CONCLUSION: Source is suitable for limited development removing only a portion of the unfrozen material at the toe of the bank. Care must be taken to prevent siltation of the lake by the operation.



Physical

This source is a bank of sand about 50 feet high and $4\frac{1}{2}$ miles long, adjacent to Eskimo Lakes 4 miles northwest of Bonnieville Point and about 38 miles northeast of Inuvik.

The plain above the source is relatively flat and covered with peat to a depth of from 2 to 5 feet. Polygonal patterns indicate the ground ice which can be observed in the exposed banks. Beneath the peat is sand of unknown thickness, in part containing little ice but undoubtedly frozen at depth. The bank of sand that has sloughed to the bottom of the slope at lake level is largely free of ice.

This source has not been developed.

Biotic

The vegetative cover on the flat ground above the source is thick moss, with some dwarf shrubs from 4 to 5 feet high growing on part of the slope leading to the lake. The sand banks along 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.

311 MATERIALS AND QUANTITIES

The material in this source is fine to medium sand with a trace of silt and gravel. Only the bank of frost-free sand adjacent to the lake is considered recoverable, and even this cannot be removed in large volume without starting another cycle of sloughing and thawing that would affect the quality of water in the lake.

It is estimated that about 400,000 cubic yards can be removed from this source without doing any damage to the lake.

311 DEVELOPMENT

General

This source is recommended for development on a very limited scale for local projects, removing only the unfrozen material along the base of the slope.

Any development would have to be preceded by an environmental study, describing the method of development and the schedule of operation. The operation would require close surveillance to ensure that the lake was not being fouled.

Access

This area is accessible by truck only during winter, hauling over winter roads or on the ice of the Eskimo Lakes.

During the summer months, barges could be used to transport material along the Eskimo Lakes.

Material Use and Handling

The material in this source can be used as general fill.

Development would be extremely simple, excavating from the toe of the bank with a front-end loader to load trucks or a barge.

Stripping and Restoration

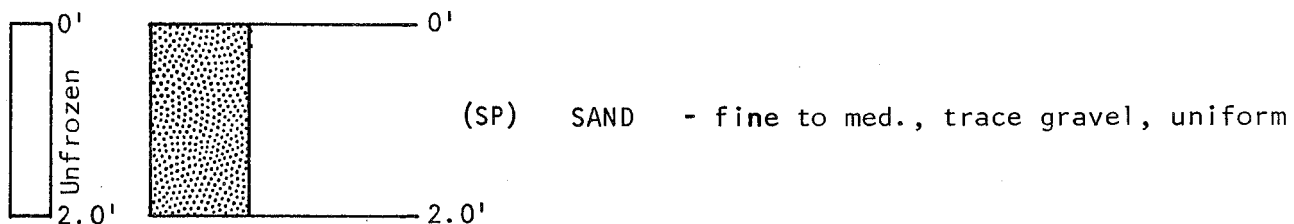
Because the sandbank is free of vegetation, no stripping is required. Very little grading can be done after excavation, because the slope above is at the angle of repose of the material.

The environmental study may recommend some special measures to prevent pollution of the lake.

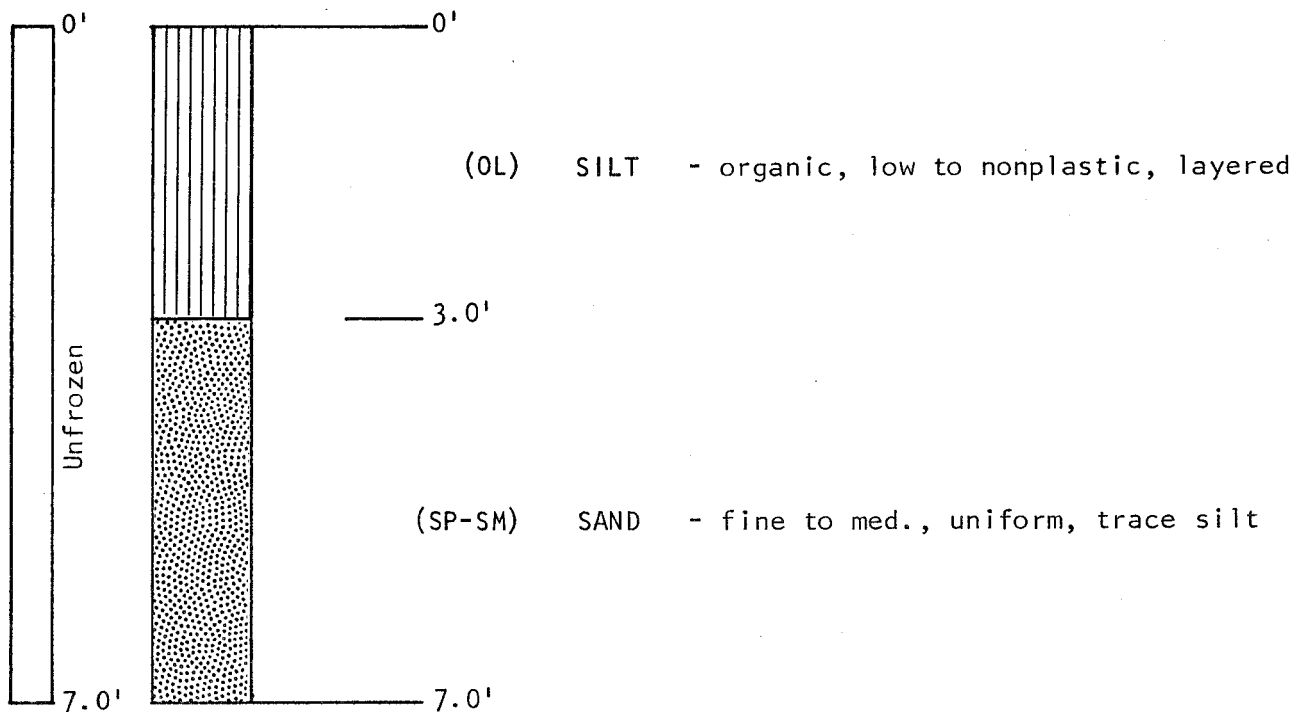
TEST PIT LOGS

SOURCE No. 311

311-A

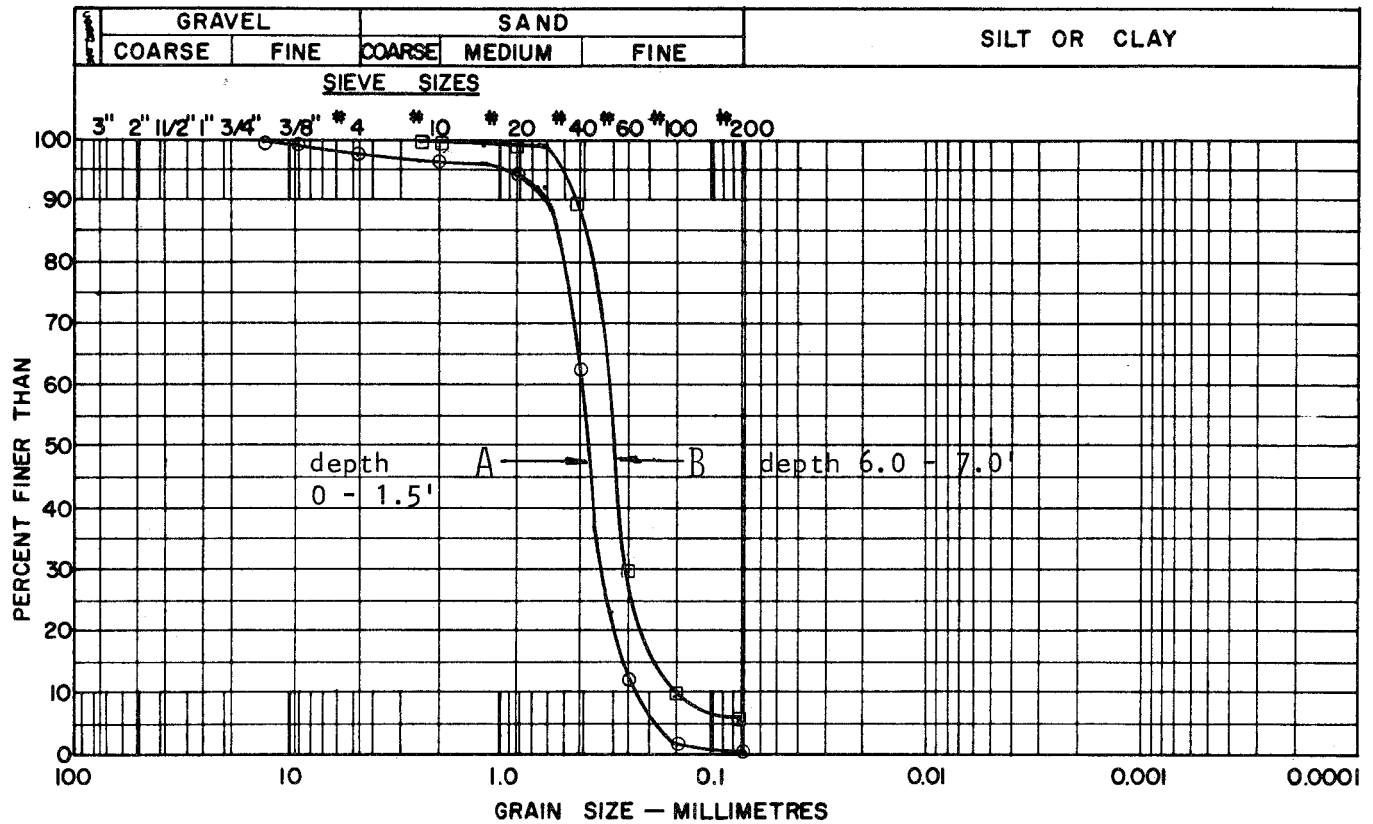


311-B



LABORATORY TEST DATA SOURCE No. 311

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A depth 0 - 1.5' 16.6%

Pit B depth 6.0 - 7.0' 5.9%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

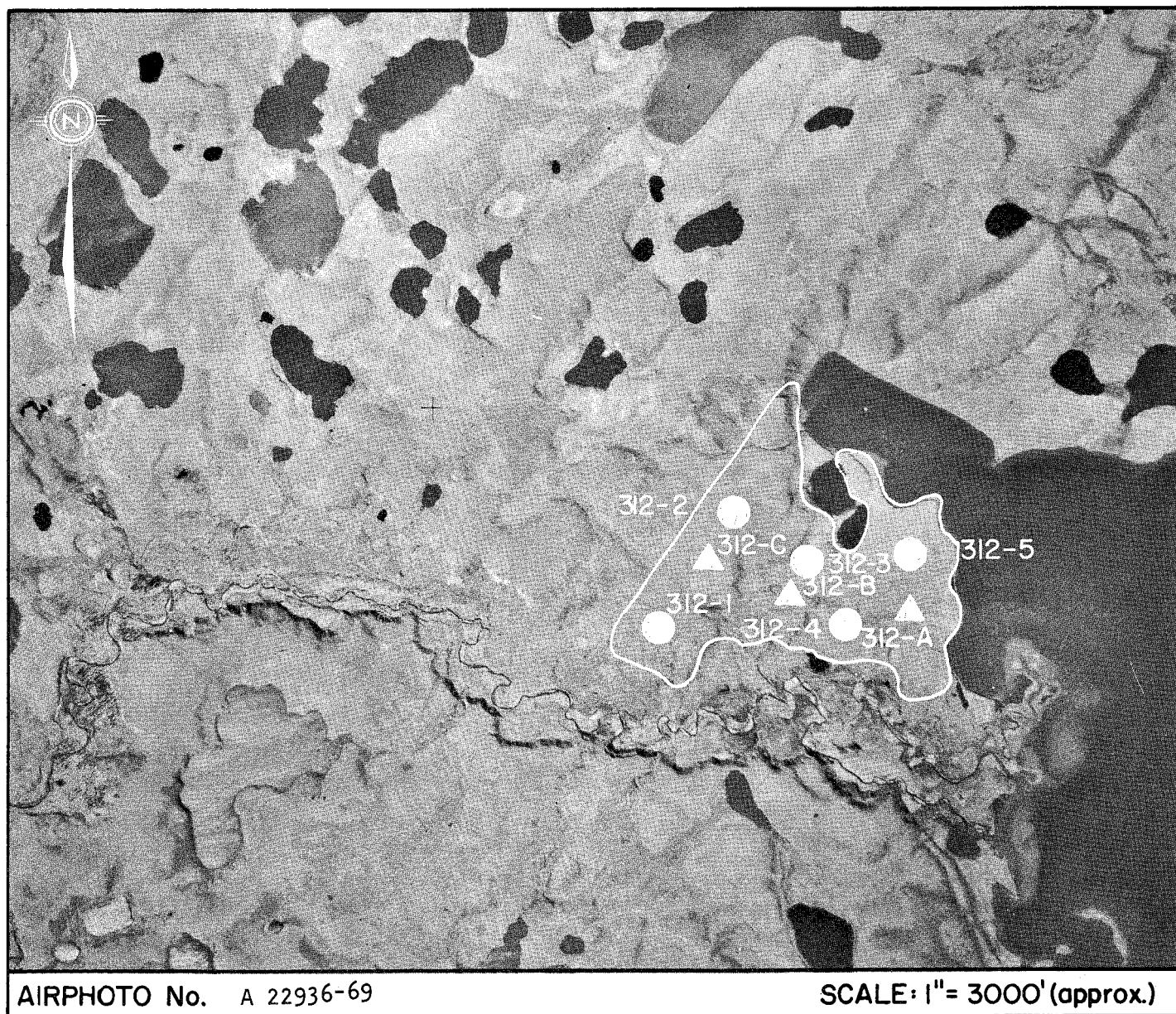
ZONE III
SOURCE No. 312

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.)

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 triangular, and 6,000 feet along each side.

The source is 2 miles northwest of Bonnierville 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

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

hailed 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.

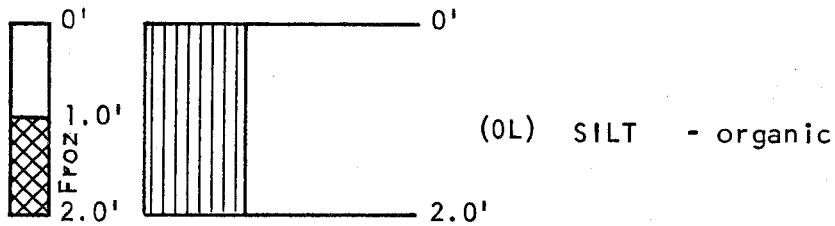
Large areas of ground ice should not be exposed on slopes, in order to minimize sloughing and restoration.

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.

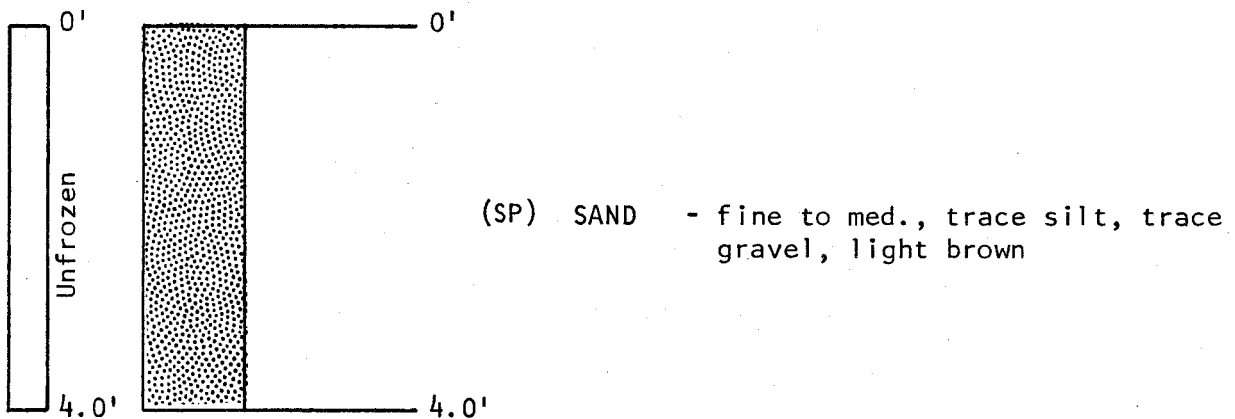
TEST PIT LOGS

SOURCE No. 312

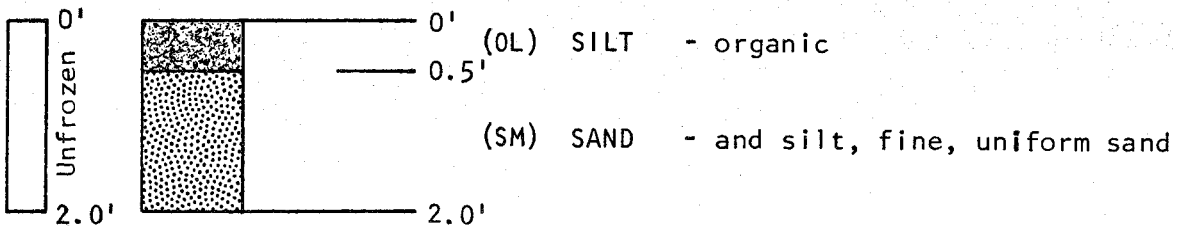
312-A



312-B



312-C



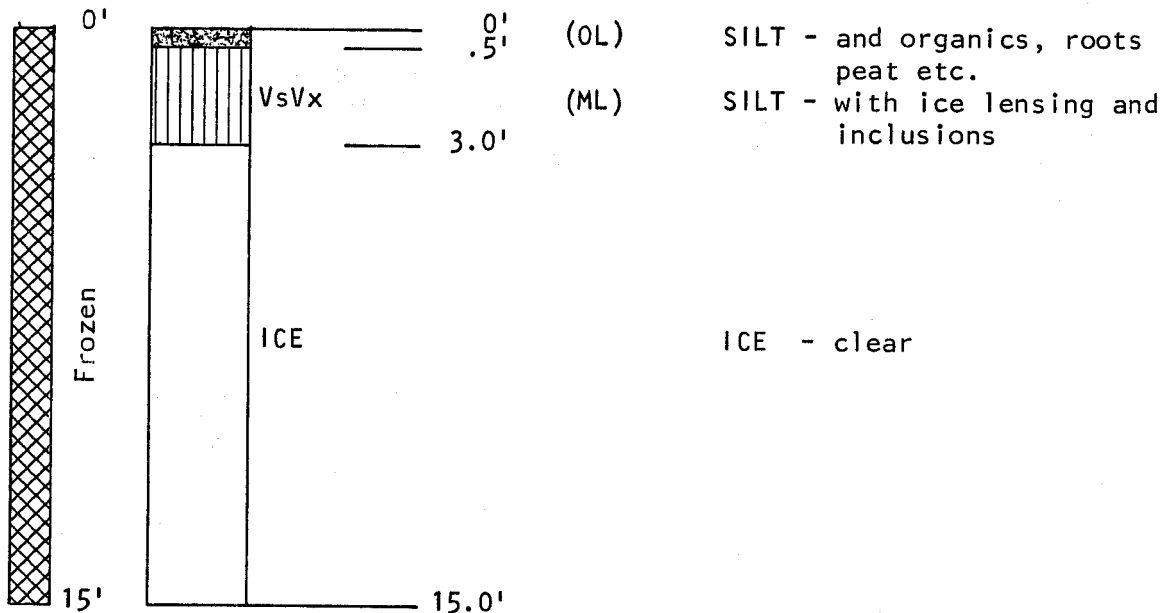
Moisture Content

Sample 2 depth 0' - 4.0' 11.9%

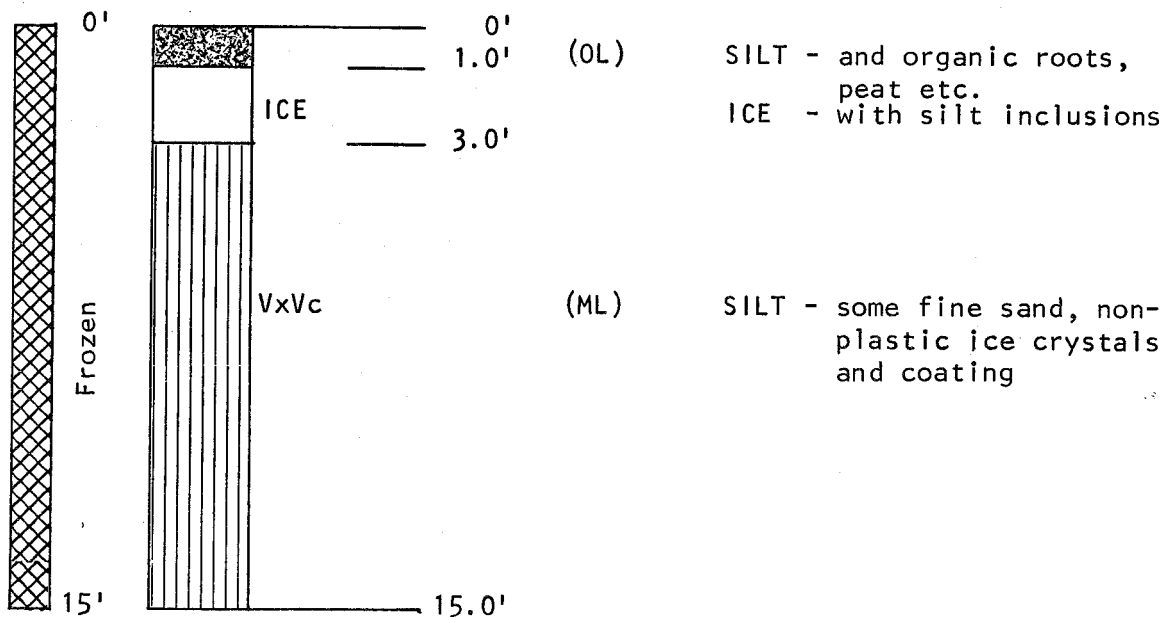
TEST HOLE LOGS

SOURCE No. 312

312-1



312-2

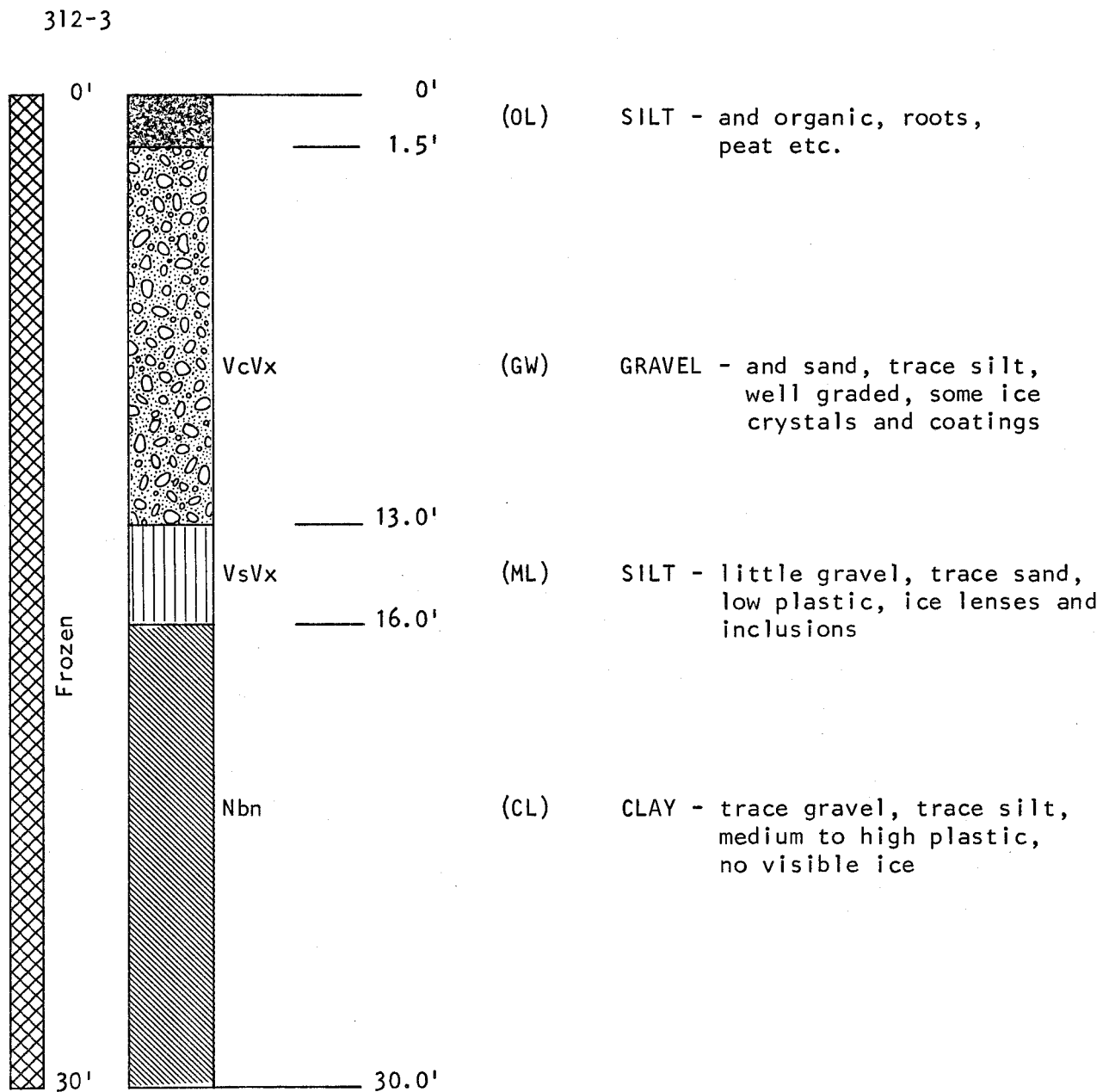


Moisture Content

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

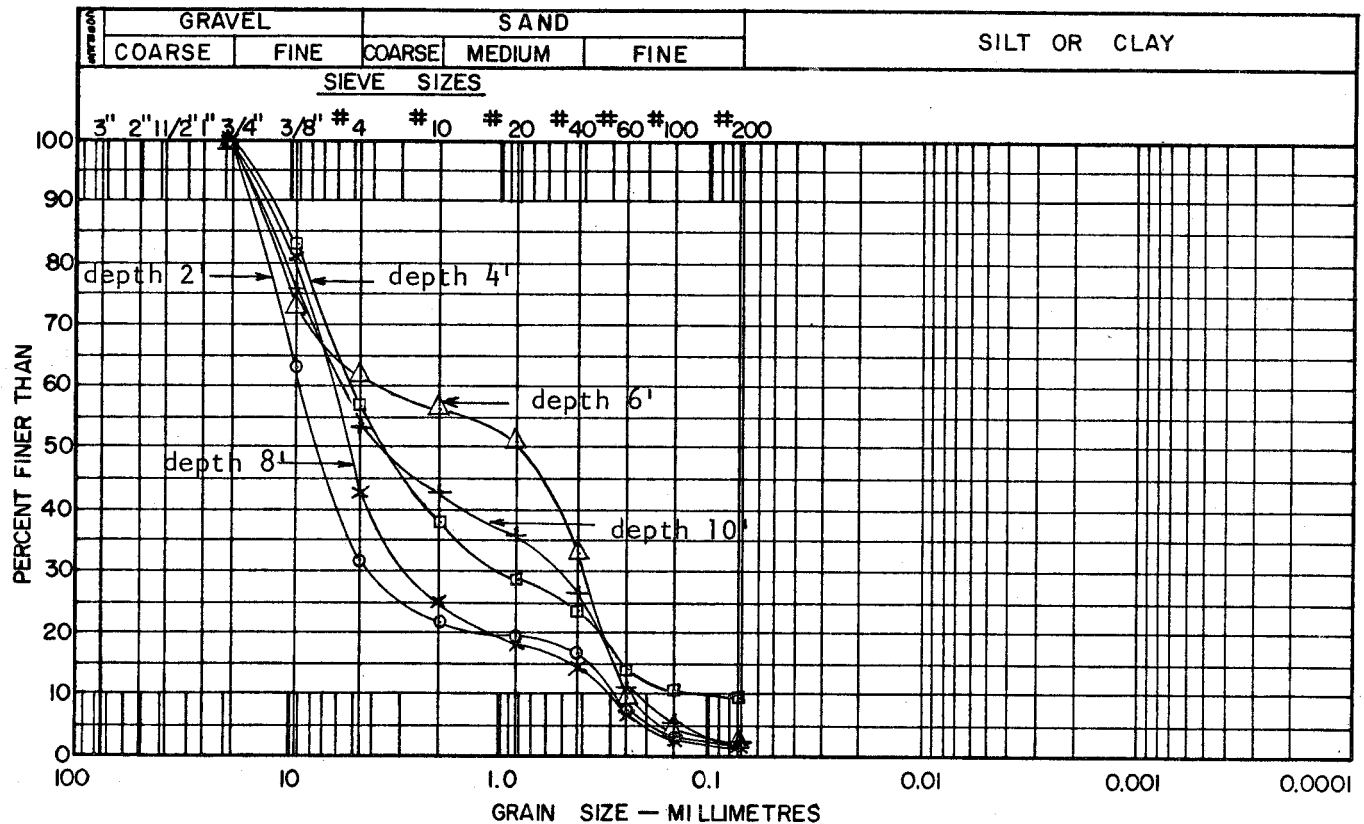
TEST HOLE LOGS

SOURCE No. 312



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

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	6.6%
Sample 2	depth 4'	8.8%
Sample 3	depth 6'	14.2%
Sample 4	depth 8'	7.1%
Sample 5	depth 10'	10.6%

Sample 6	depth 15'	15.3%
Sample 7	depth 20'	17.3%

ORGANIC CONTENT

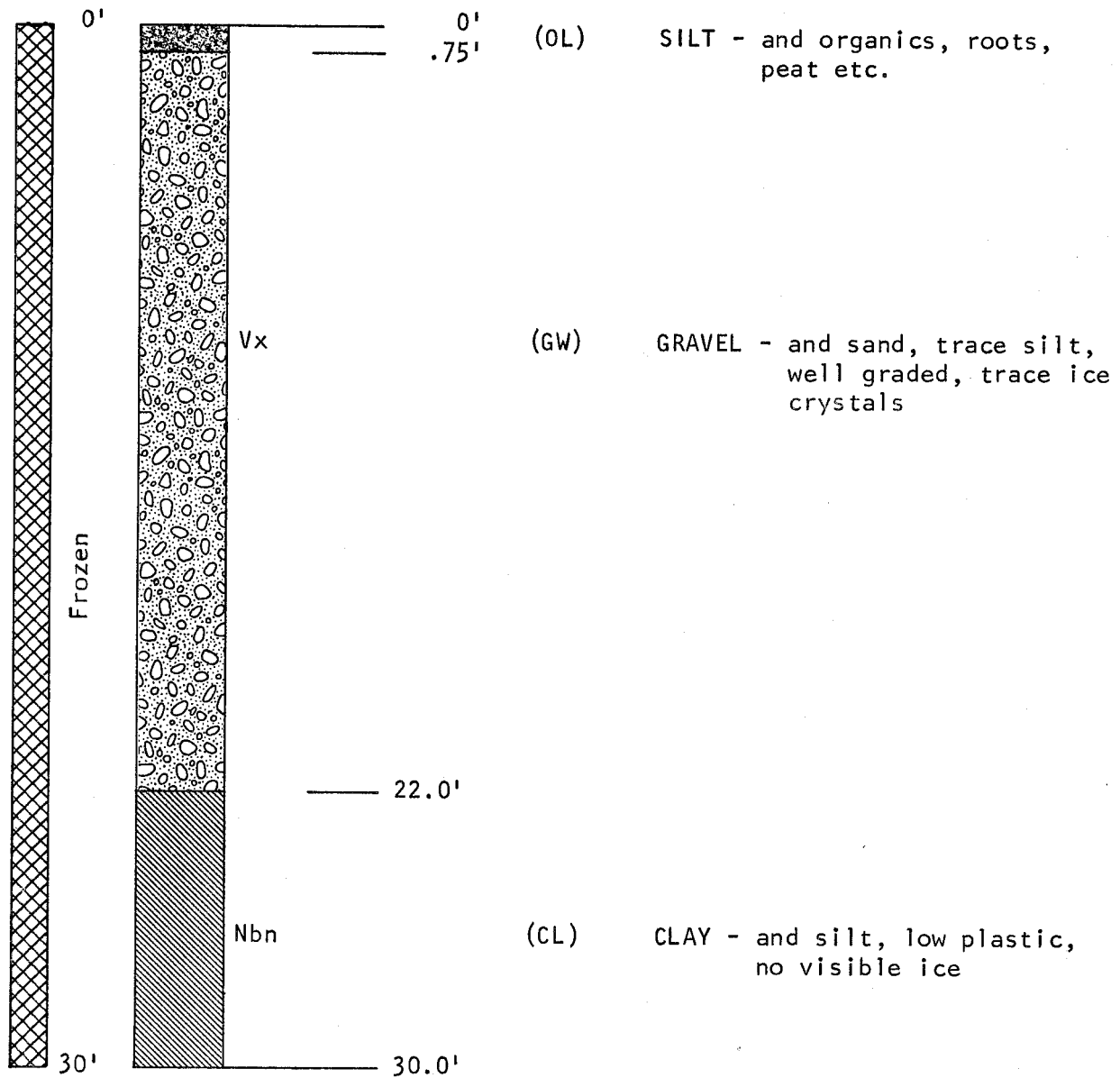
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 312

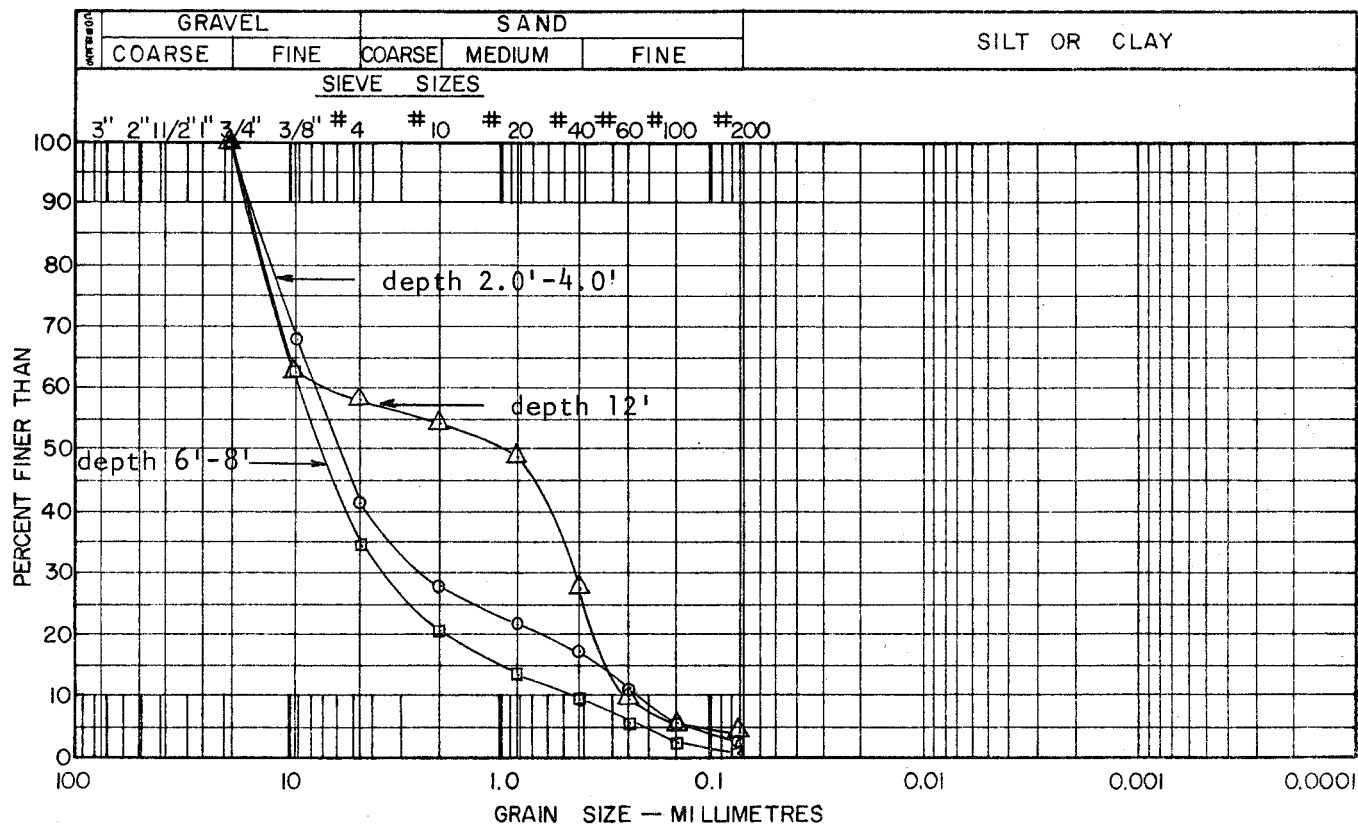
312-4



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

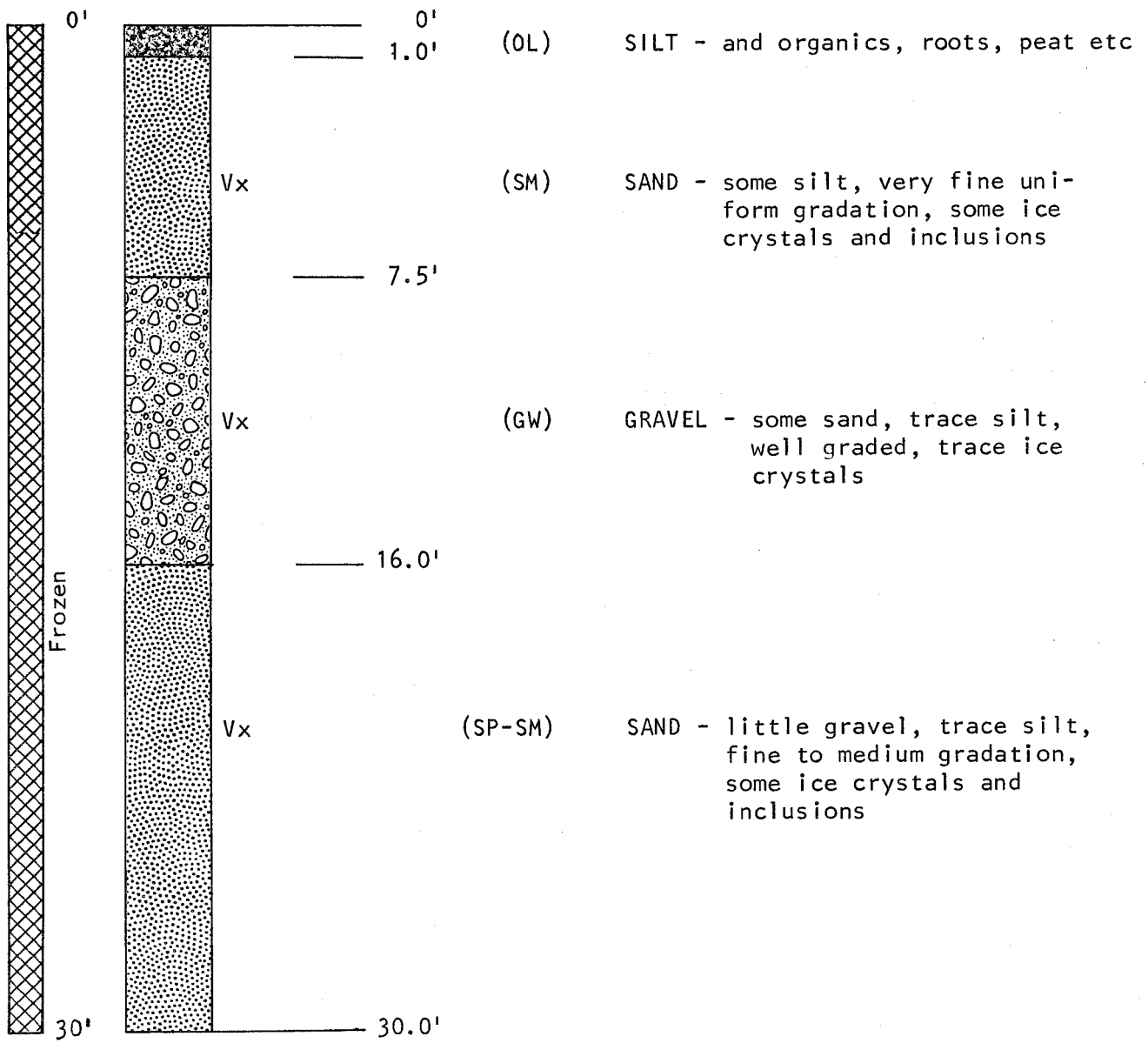
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 312

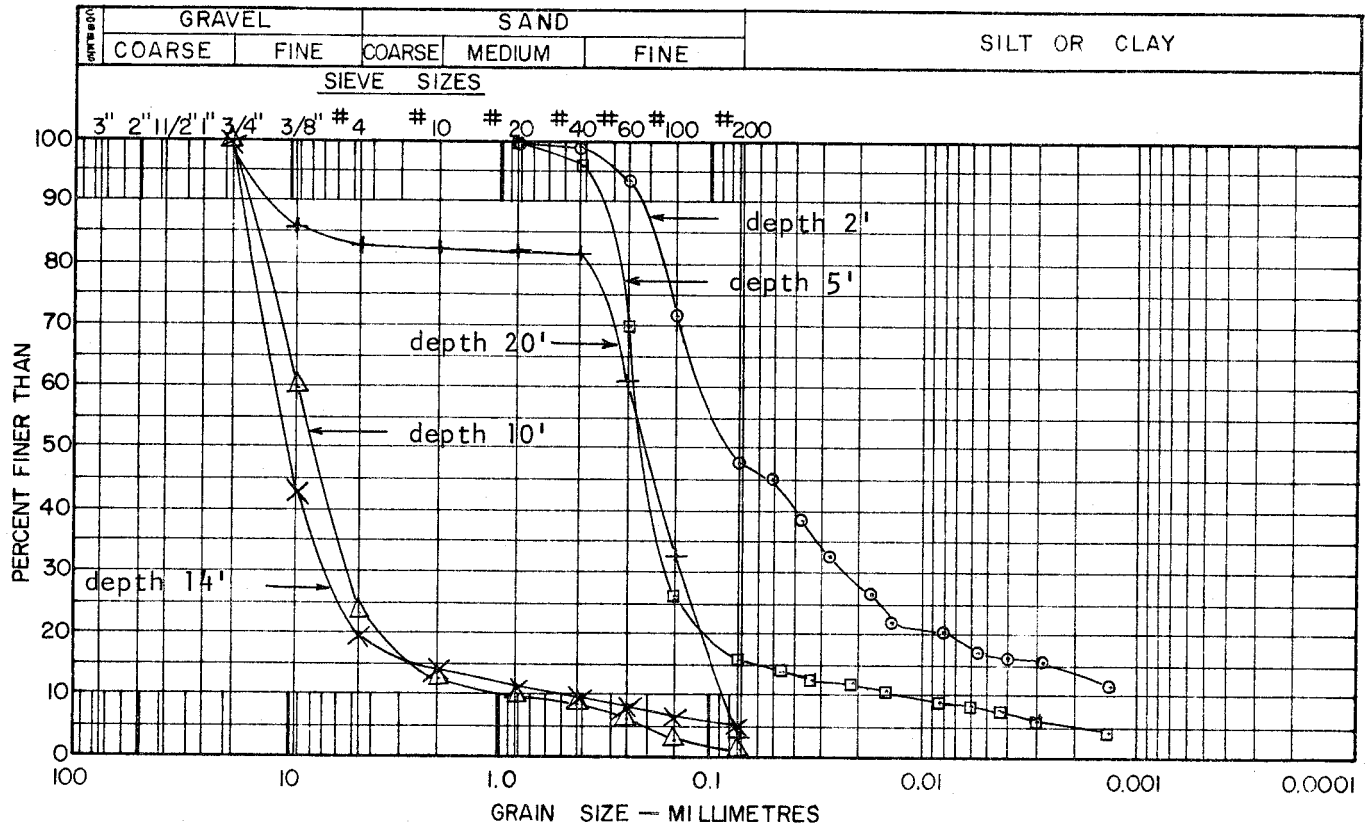
312-5



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%

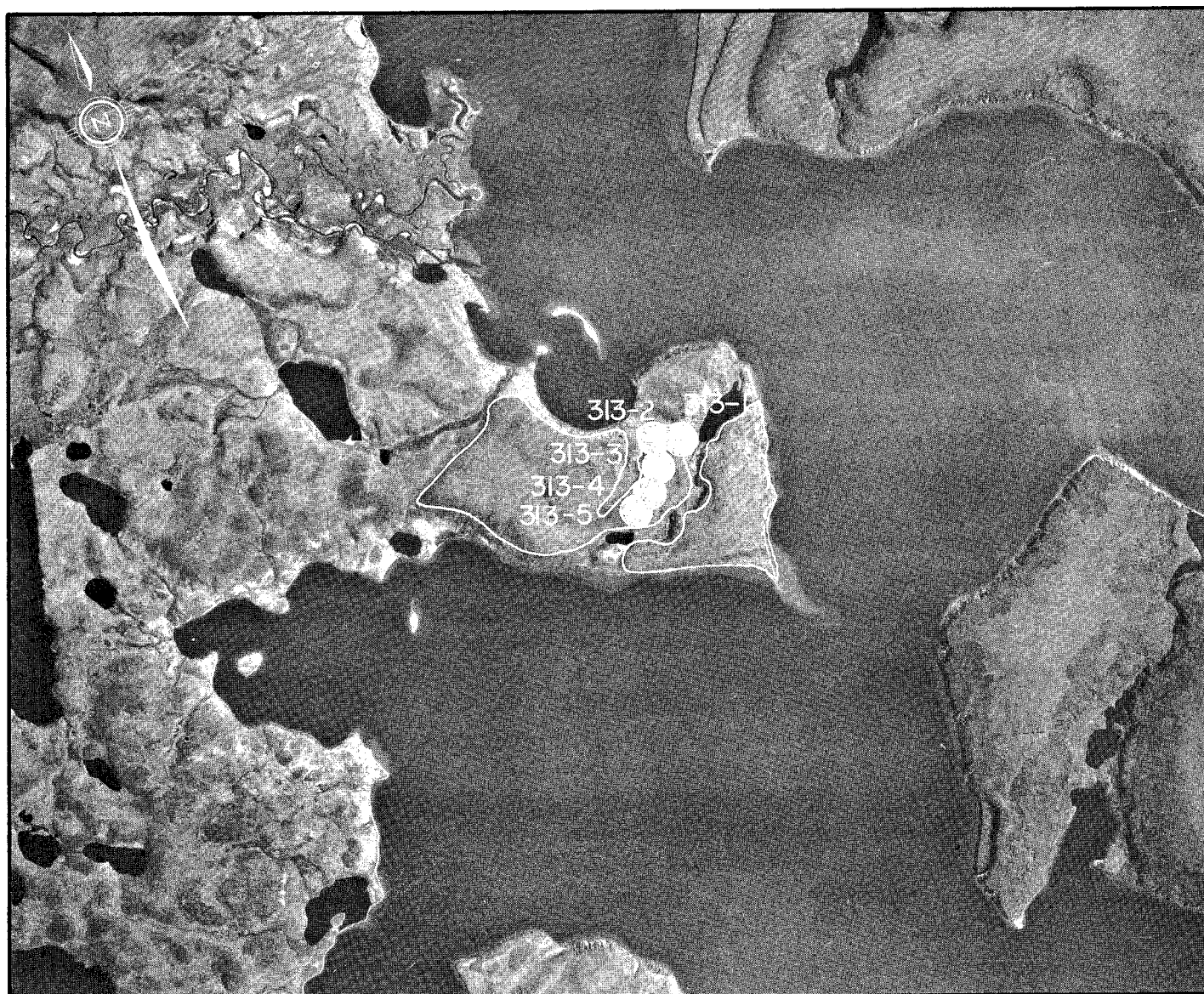
ZONE III
SOURCE No. 313

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

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

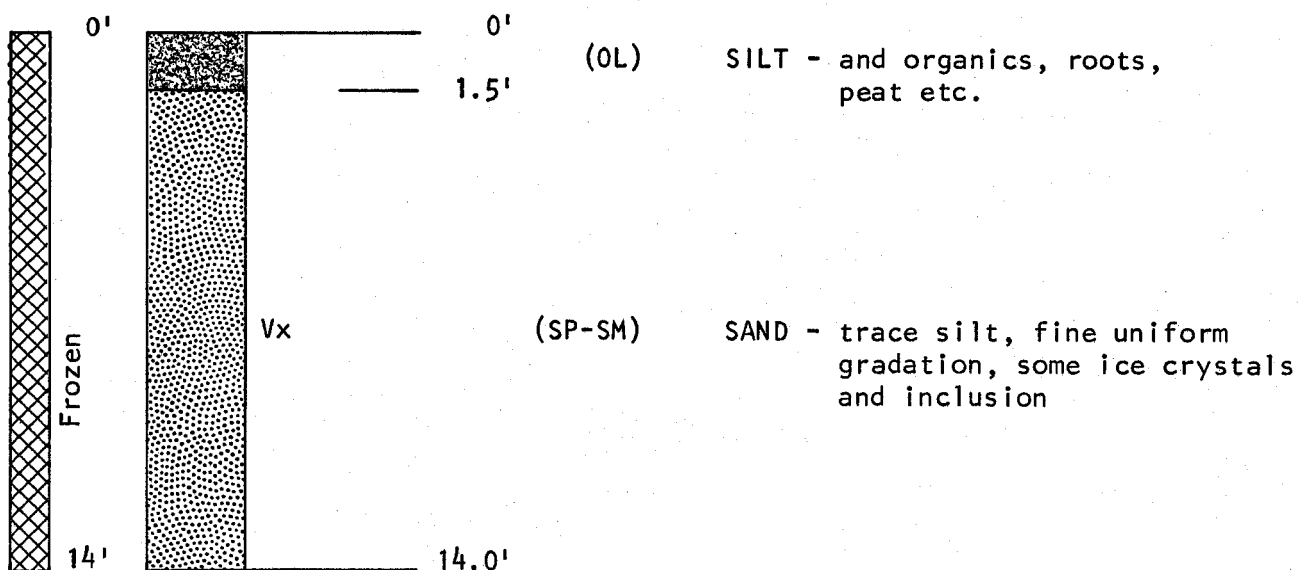
The only recommended areas of excavation are the banks adjacent to the lake, and these are bare. Very little could be done to improve the grading of a depleted area.

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.

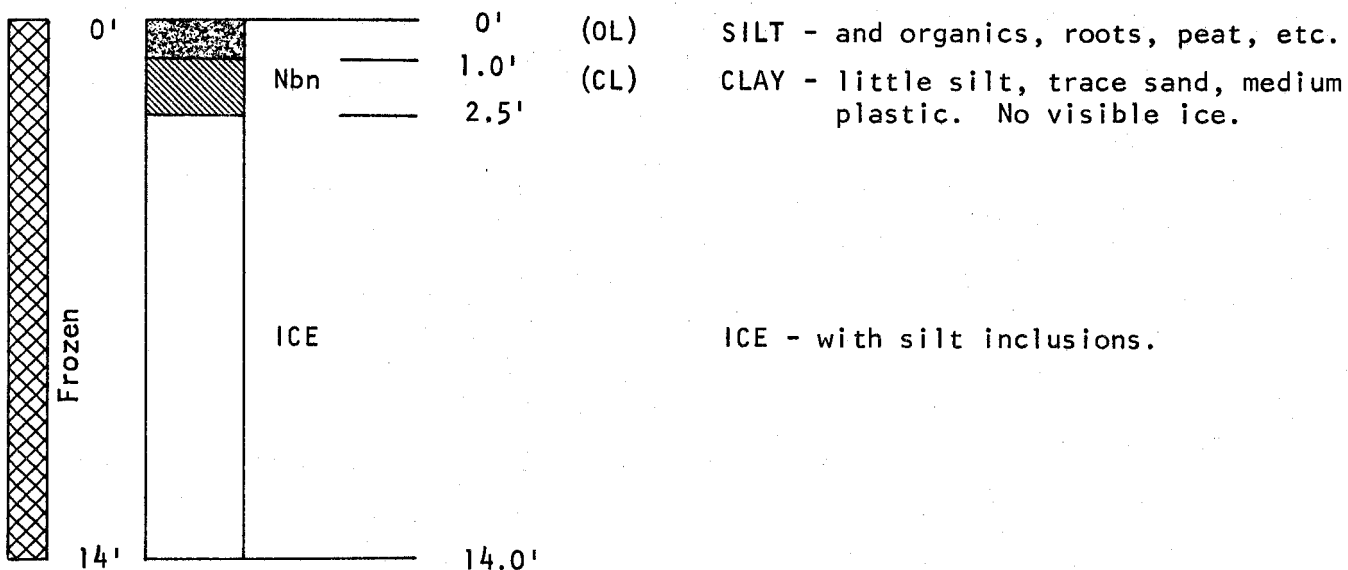
TEST HOLE LOGS

SOURCE No. 313

313-1



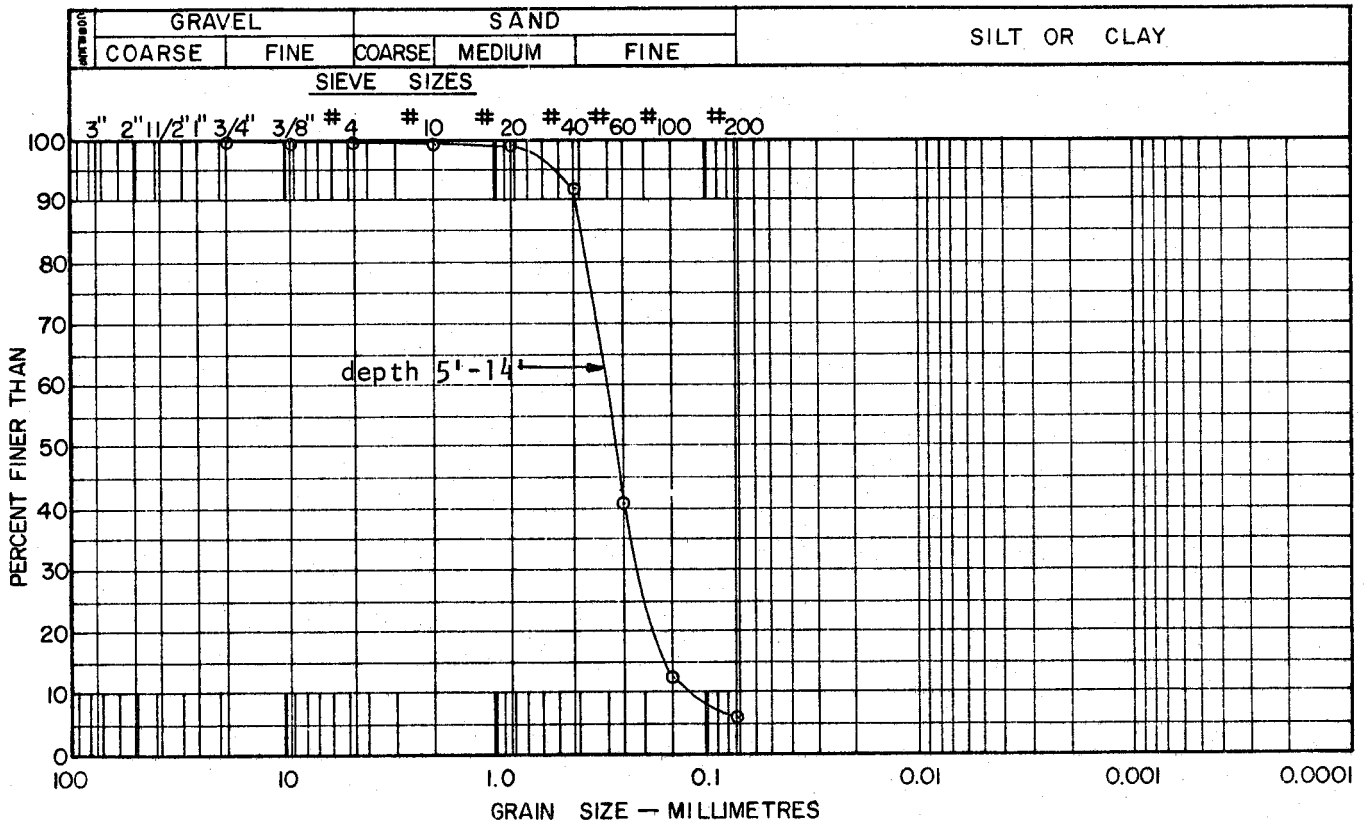
313-2



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

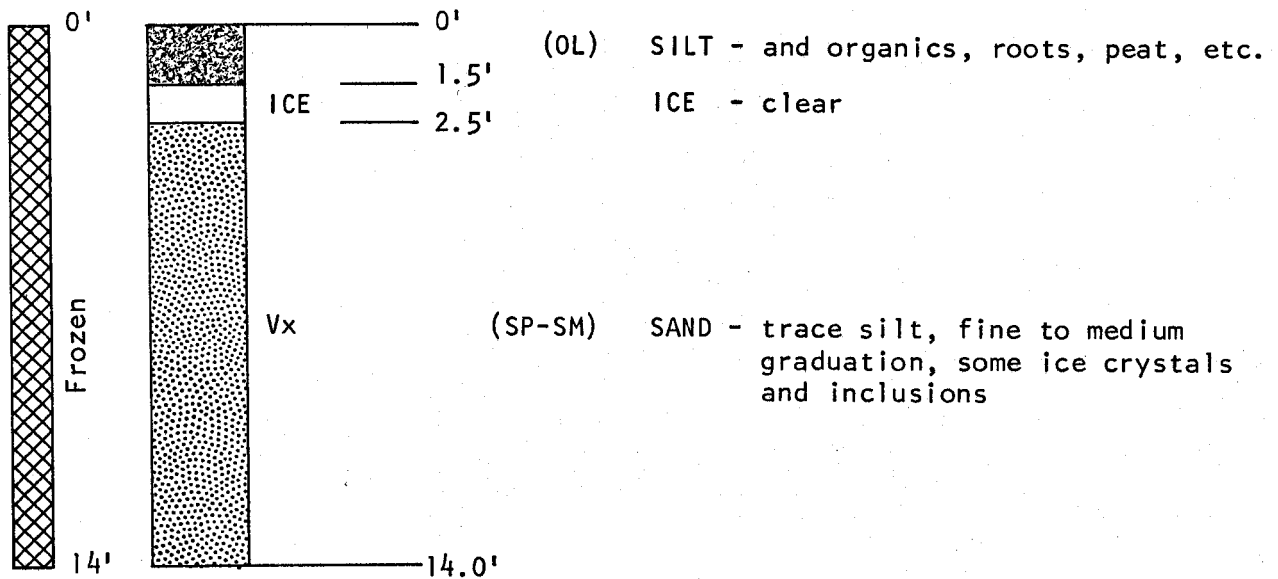
HARDNESS TEST

PETROGRAPHIC ANALYSIS

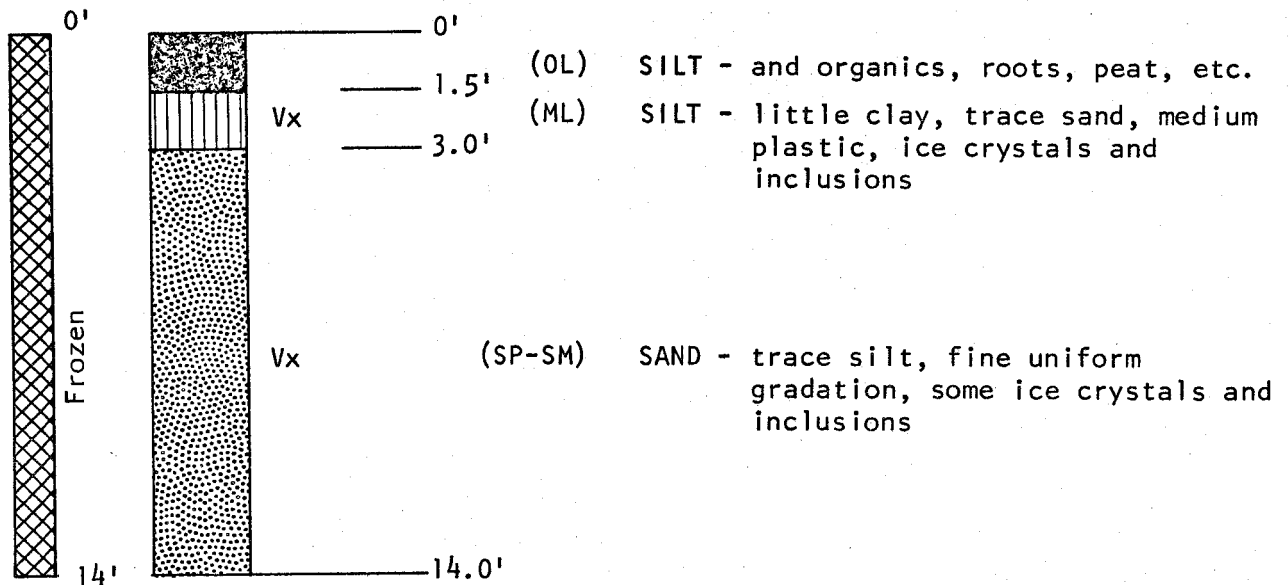
TEST HOLE LOGS

SOURCE No. 313

313-3



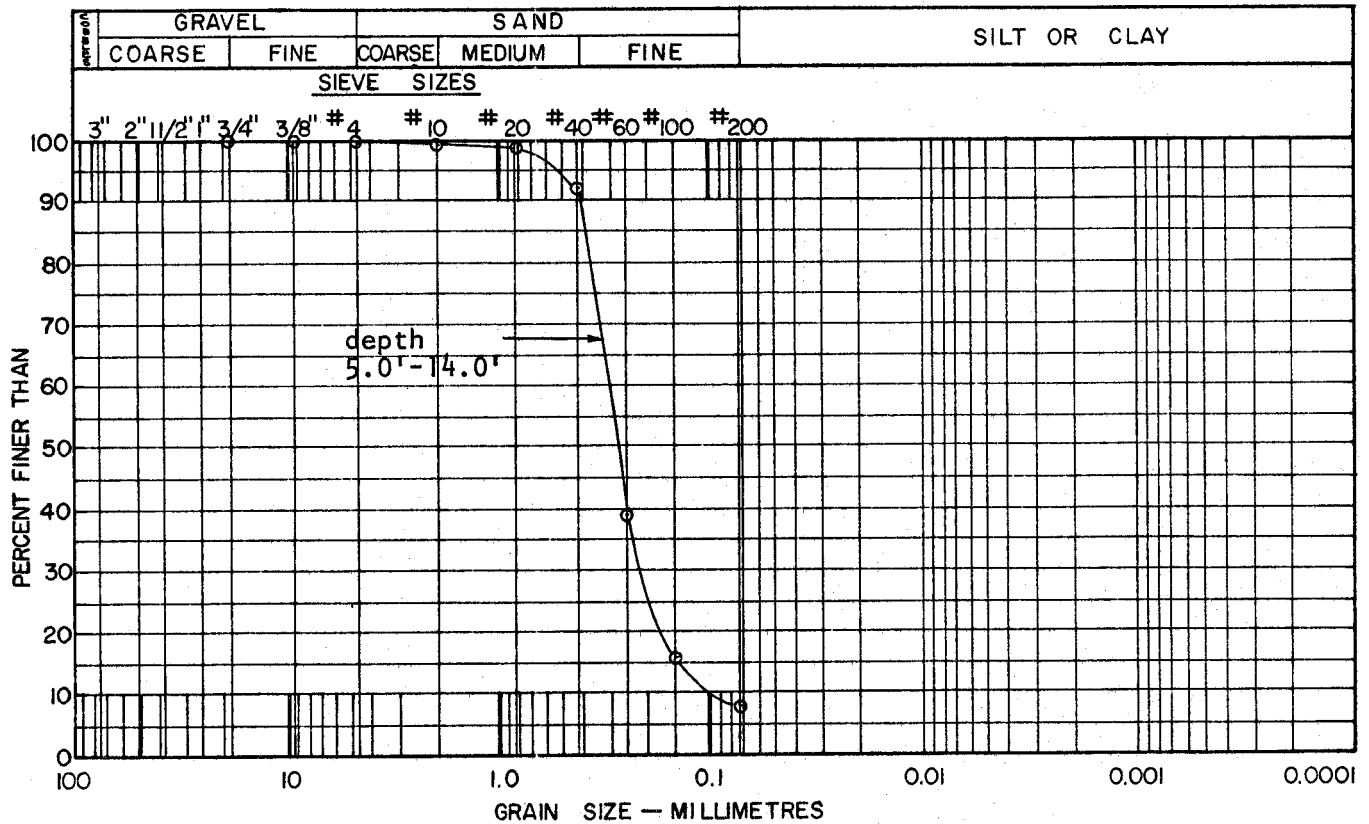
313-4



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

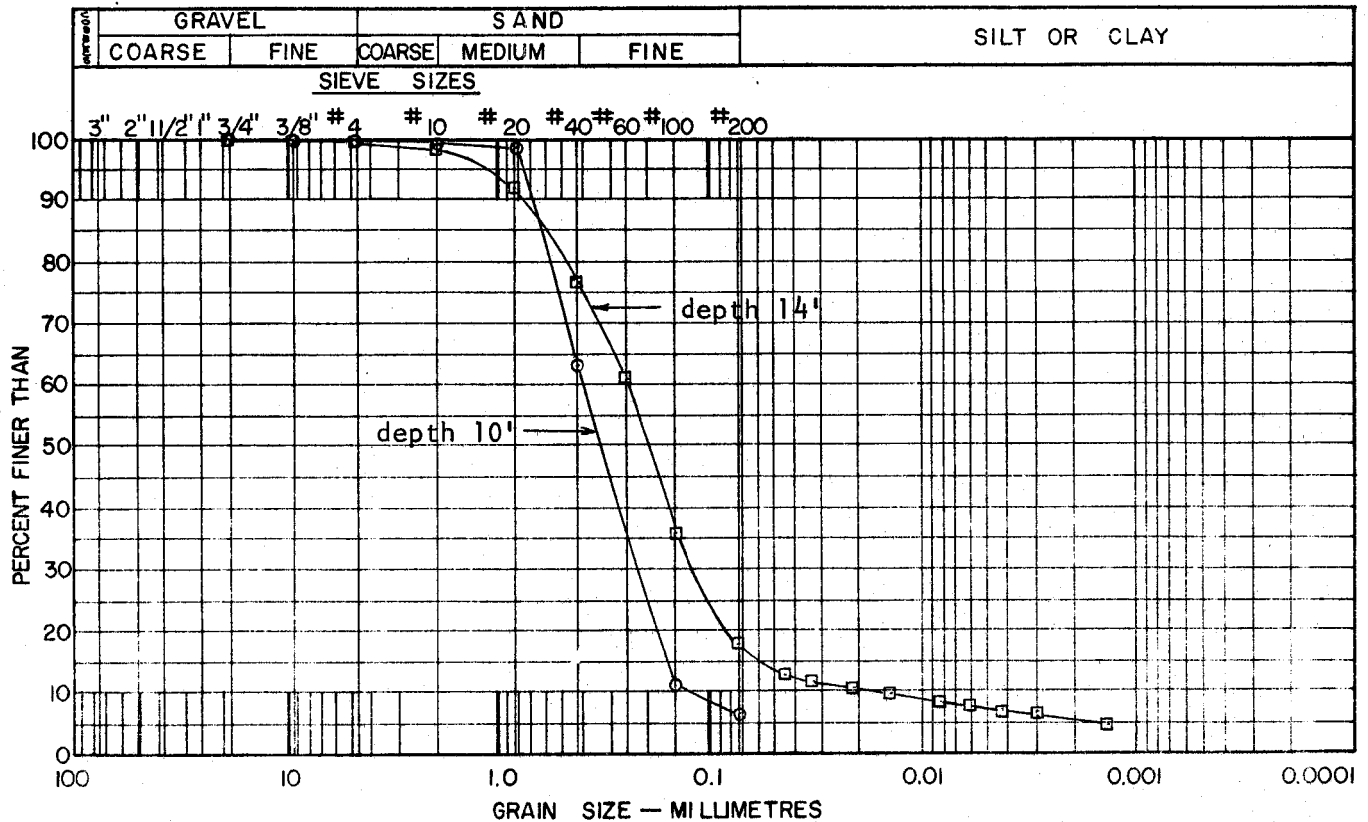
HARDNESS TEST

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

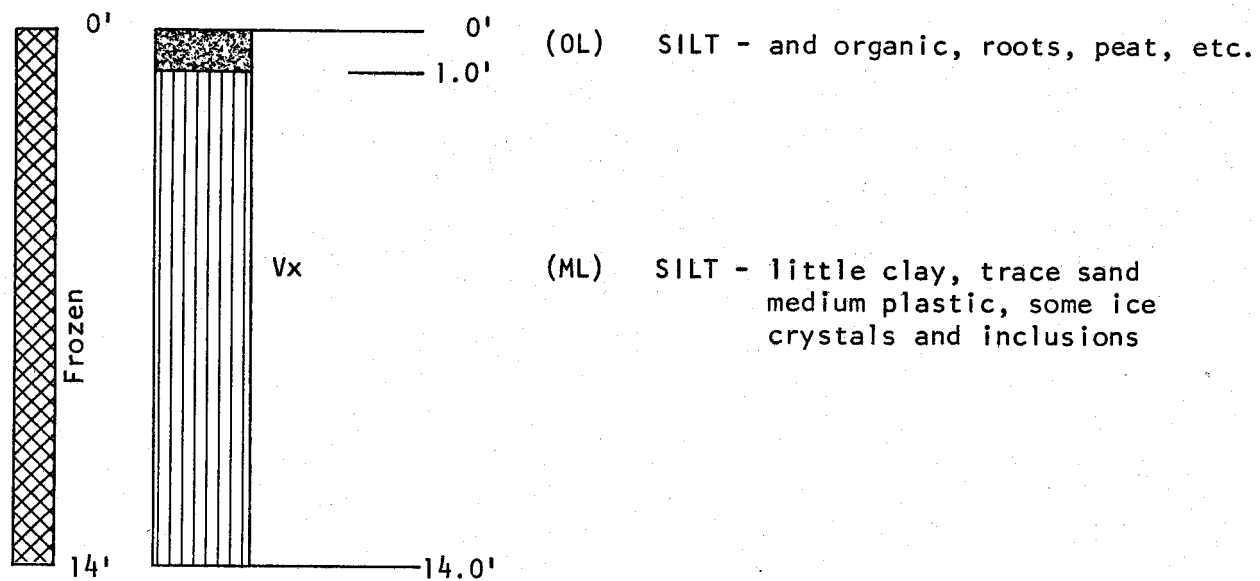
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 313

313-5



Moisture Content

Sample 1 depth 2' 37.7%

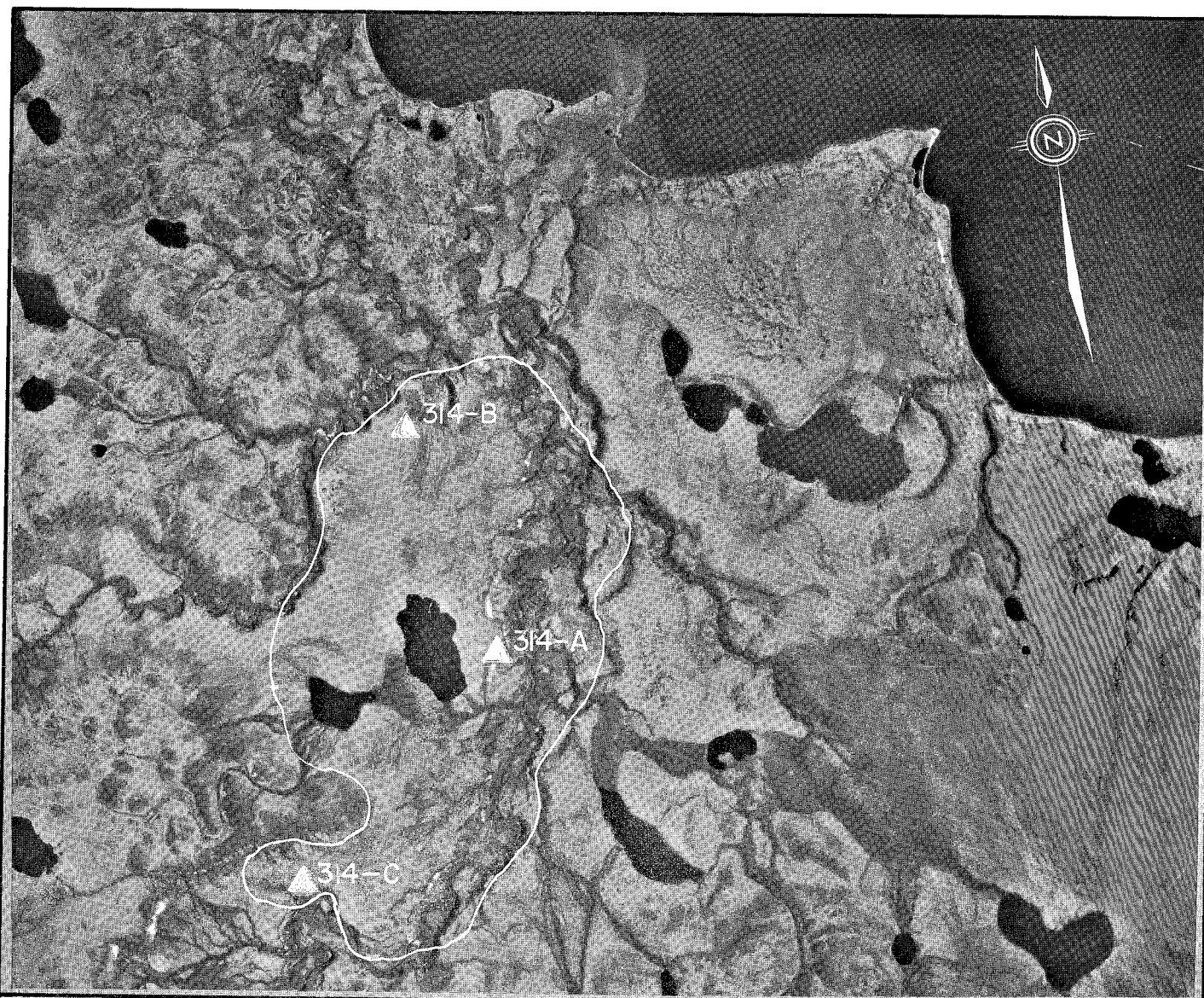
ZONE III
SOURCE No. 314

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.)

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.

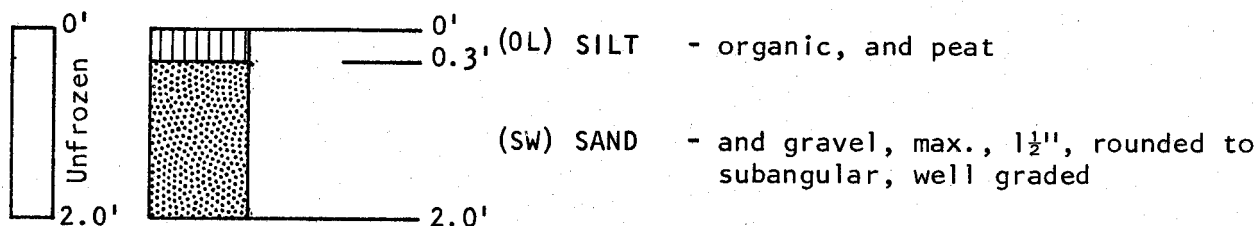
No large area of ground ice should be exposed on slopes, because of sloughing and difficult restoration. If exposed, such an area must be recovered with granular material at once.

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.

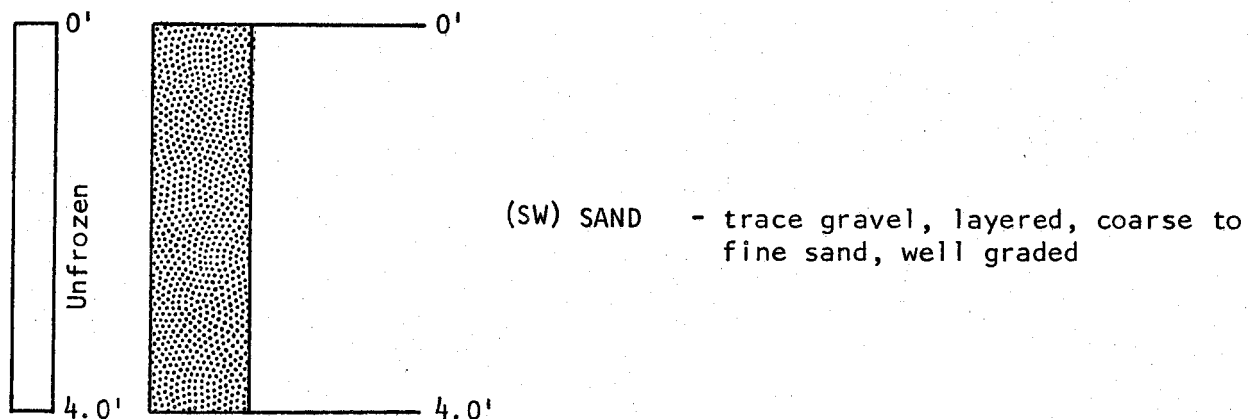
TEST PIT LOGS

SOURCE No. 314

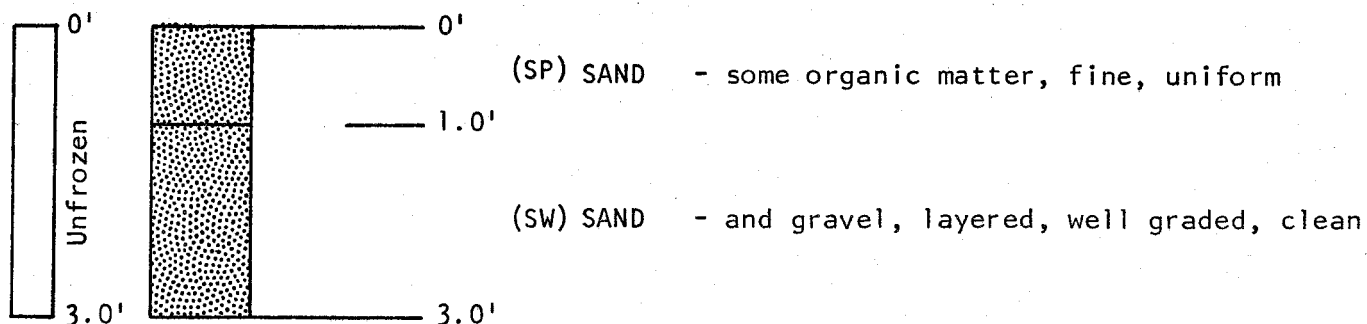
314-A



314-B

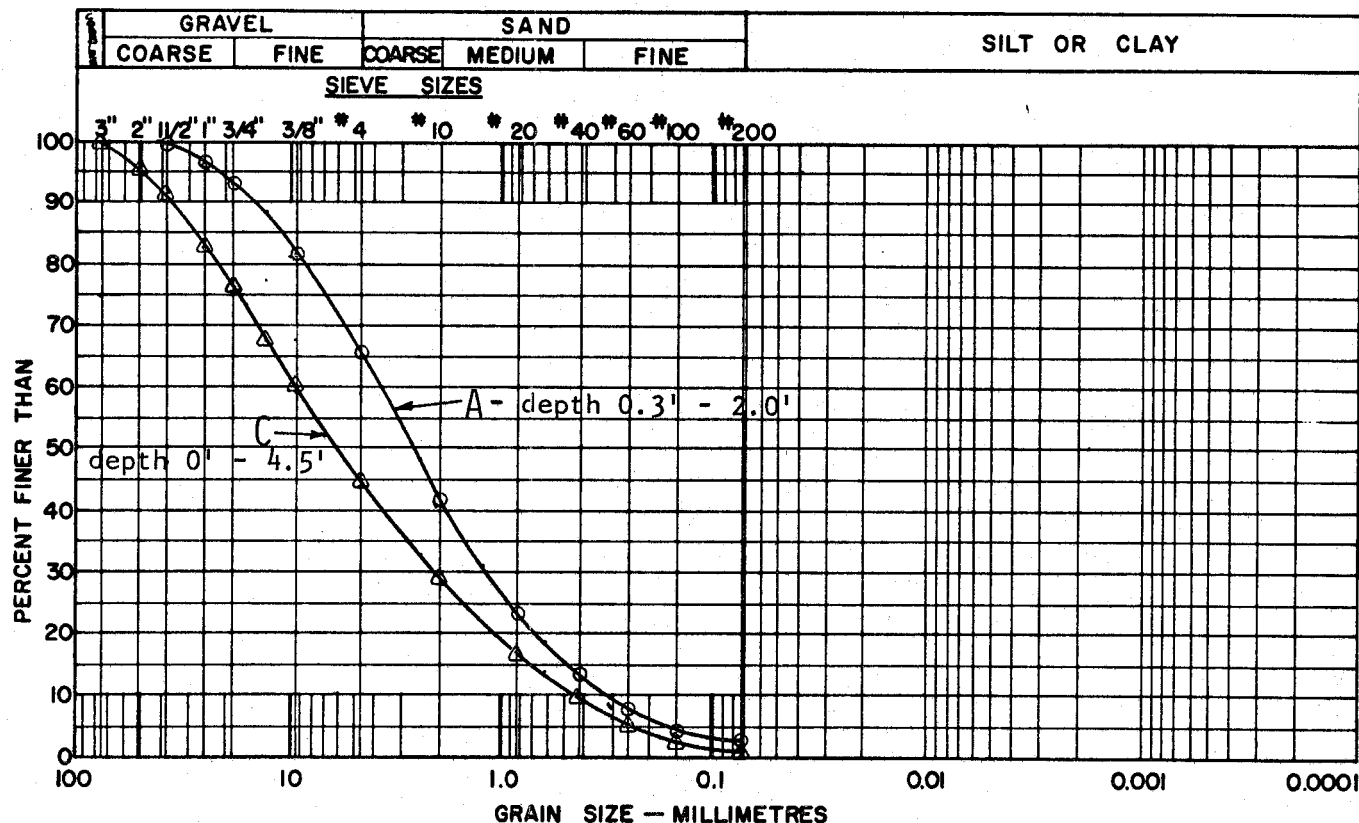


314-C



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%

ZONE III
SOURCE No. 315

LANDFORM AND LOCATION:

Stream bisected outwash located about 4 miles southwest of Parsons Lake and 37 miles north of Inuvik.

MATERIAL:

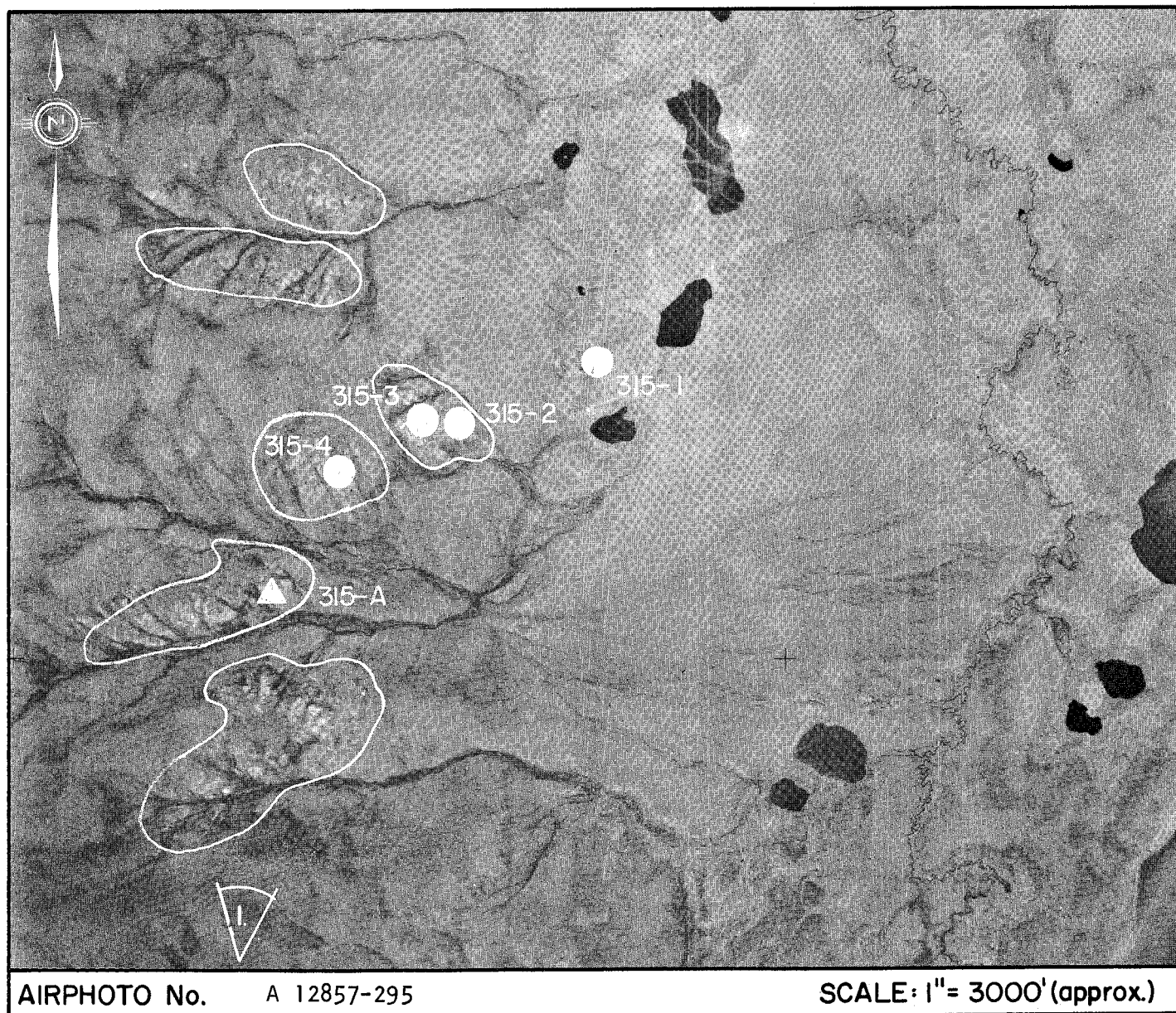
SAND - and gravel, trace silt
GRAVEL - and sand, trace silt

VOLUME:

6,000,000 cubic yards at least

CONCLUSION:

Source is suitable for development for general fill and aggregates. However, care must be taken to prevent contamination of adjacent streams.



AIRPHOTO No. A 12857-295

SCALE: 1" = 3000' (approx.)

Physical

This source is probably the remnants of a Tertiary outwash area, and is probably a secondary deposit. The individual deposits have been bisected by the action of numerous small streams flowing to the east, and occupy the ridges and slopes between these streams.



Photo No. 1, Source 315 - Looking north across source area.

The source area is on the east slope of the Caribou Hills, about half-way up from the level plain below, and is 4 miles southwest of Parsons Lake and 37 miles north of Inuvik. The source is $2\frac{1}{2}$ miles long, along the contour, and 1 mile wide.

Drainage on the different deposits is good, and the source has not been developed.

Biotic

Much of the sand and gravel deposit is bare of vegetation. Elsewhere the ground cover is thin moss and lichen, with occasional dwarf shrubs.

The source is located within the Mackenzie Reindeer Grazing Reserve, however the area is not critical to any form of wildlife or to fishing.

The streams passing through the source drain to Parsons Lake.

315 MATERIAL AND QUANTITIES

The material in this source is primarily gravel and sand, with a trace of silt. The proportions of gravel and sand vary from one area to another, and also with depth, but in general the grading is good. Test Hole #3 encountered sandstone bedrock at 27 feet. As sampled in the one test pit, the maximum particle size is 3 inches.

Test Hole #2 reported sand and gravel to 30 feet. The lower 24 feet of the hole averaged 45% gravel, 45% sand, and 10% silt. Here, as elsewhere in the source, no visible ice was observed in the sand and gravel.

The petrographic analysis of the lower 24 feet of Test Hole #2 indicates the main constituents are a quartzite (75%) and a marginal sandstone (20%), with some quartz (4%) and a trace of chert. The gravel should receive further attention if it is to be used in high-quality concrete, because of the marginal quality of the sandstone.

Test Hole #1 was located near the source on a small esker ridge that contains high-quality sand and gravel. The esker is, however, not extensive enough to warrant development.

The moisture content of samples varied from one hole to another. Test Holes #1 and #2 averaged 8% to 10% at depth. Test Hole #3 reported up to 12%, whereas Test Hole #4 was from 2½% to 5% in 15 feet depth. Some strata of ice-rich silt were identified.

The volume of recoverable granular material is estimated at 6,000,000 cubic yards at least.

315 DEVELOPMENT

General

This source is recommended for development for any project within economic hauling distance.

The source is really several deposits that should be excavated one

at a time.

A substantial berm or dyke should be left between a stream and an area of excavation, to ensure the stability of the stream-bed. No work should be done within any stream-bed, because such activity could start a cycle of stream erosion or thermal erosion that would lead to severe siltation.

Particular care in the operation is required to avoid siltation of the streams that pass through the area, and thus of the lakes downstream.

Access

At present, the only access to this area is by winter road. Eventually, the Mackenzie Highway will be constructed at some distance to the east, probably less than 10 miles. Barge transportation along the east channel of the Mackenzie River could be used if a road approximately 15 miles in length was built westward from the source.

Material Use and Handling

The material from this source can be used for general fill, road construction, and as aggregate for concrete and asphalt construction, with the qualification that the gravel requires further testing before use in high-quality concrete.

Because of the generally low moisture content in the sand and gravel, it is considered probable that the deposits can be excavated by dozer, or at least by a dozer with ripper attachment. Some of this material would have to be stockpiled, thawed, and drained before shipment for use. Strata of ice-rich silt should be ripped and disposed of in areas where their thawing could not lead to siltation of the streams.

The equipment required for this development are the usual assembly of dozer with ripper attachment, front-end loader, and trucks. Production of aggregate on a small scale would require a screen to remove oversize, whereas production on a large scale would require

a crushing and screening plant.

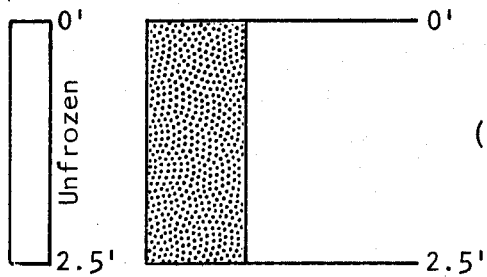
Stripping and Restoration

Much of the surface of the deposits is bare, and no stripping is required. Elsewhere the surface organic cover, topsoil, and shallow layers of ice-rich silt should be stripped and stockpiled in an area away from the natural drainage channels. Later this material should be replaced on the depleted areas to encourage revegetation.

TEST PIT LOGS

SOURCE No. 315

315-A

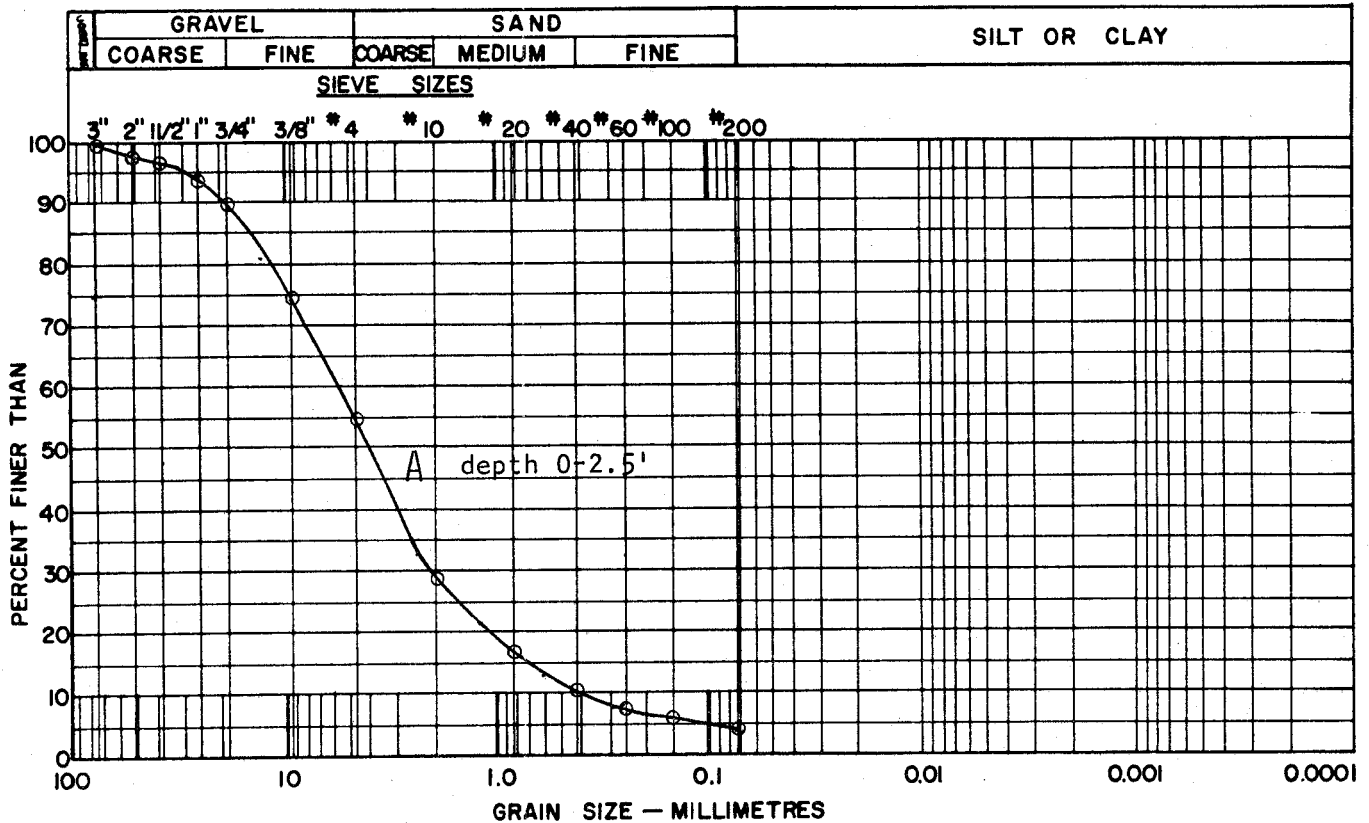


(SW) SAND - and gravel, max. $1\frac{1}{2}$ ", rounded to subangular, well graded

LABORATORY TEST DATA

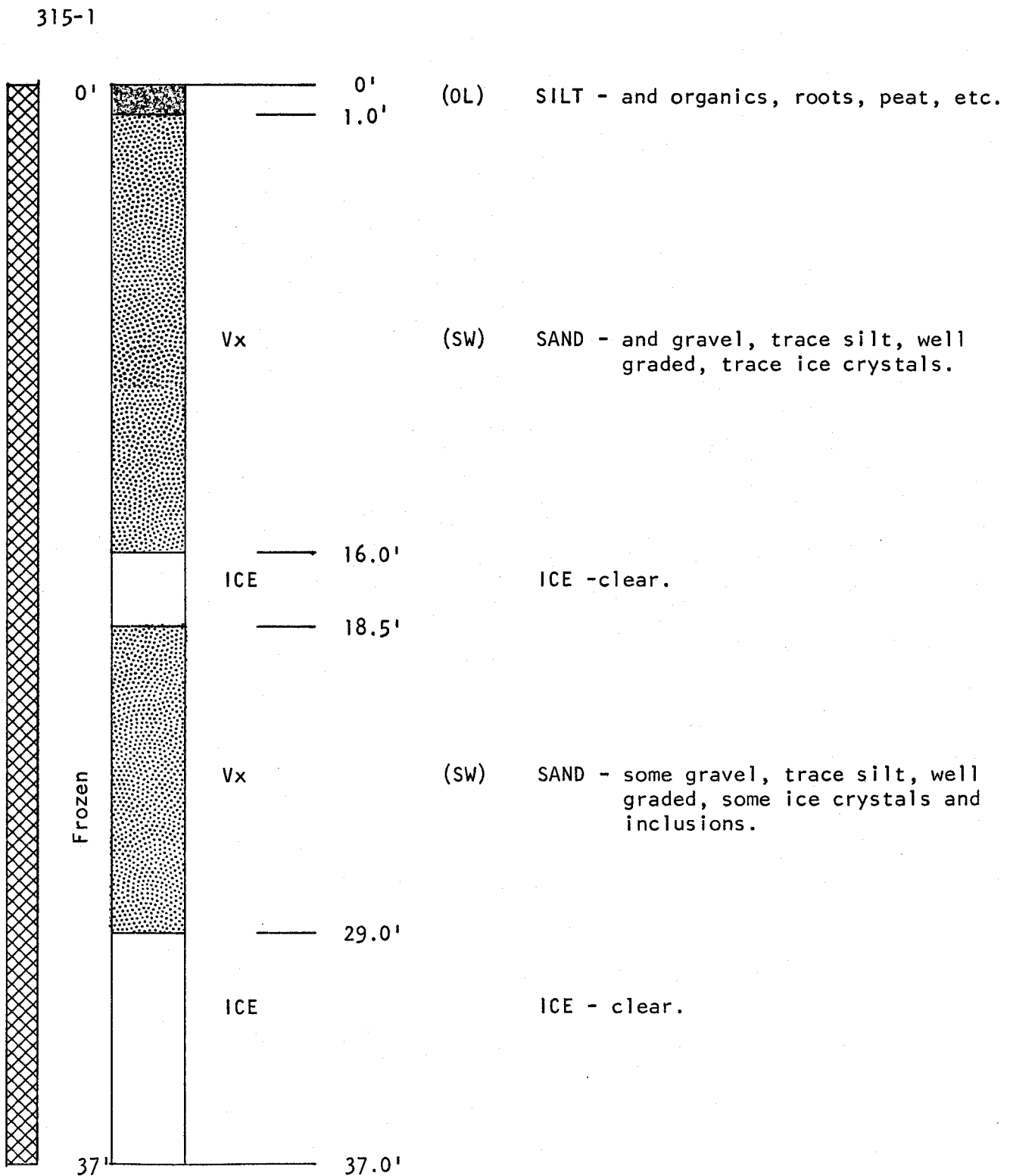
SOURCE No. 315

GRAIN SIZE DISTRIBUTION



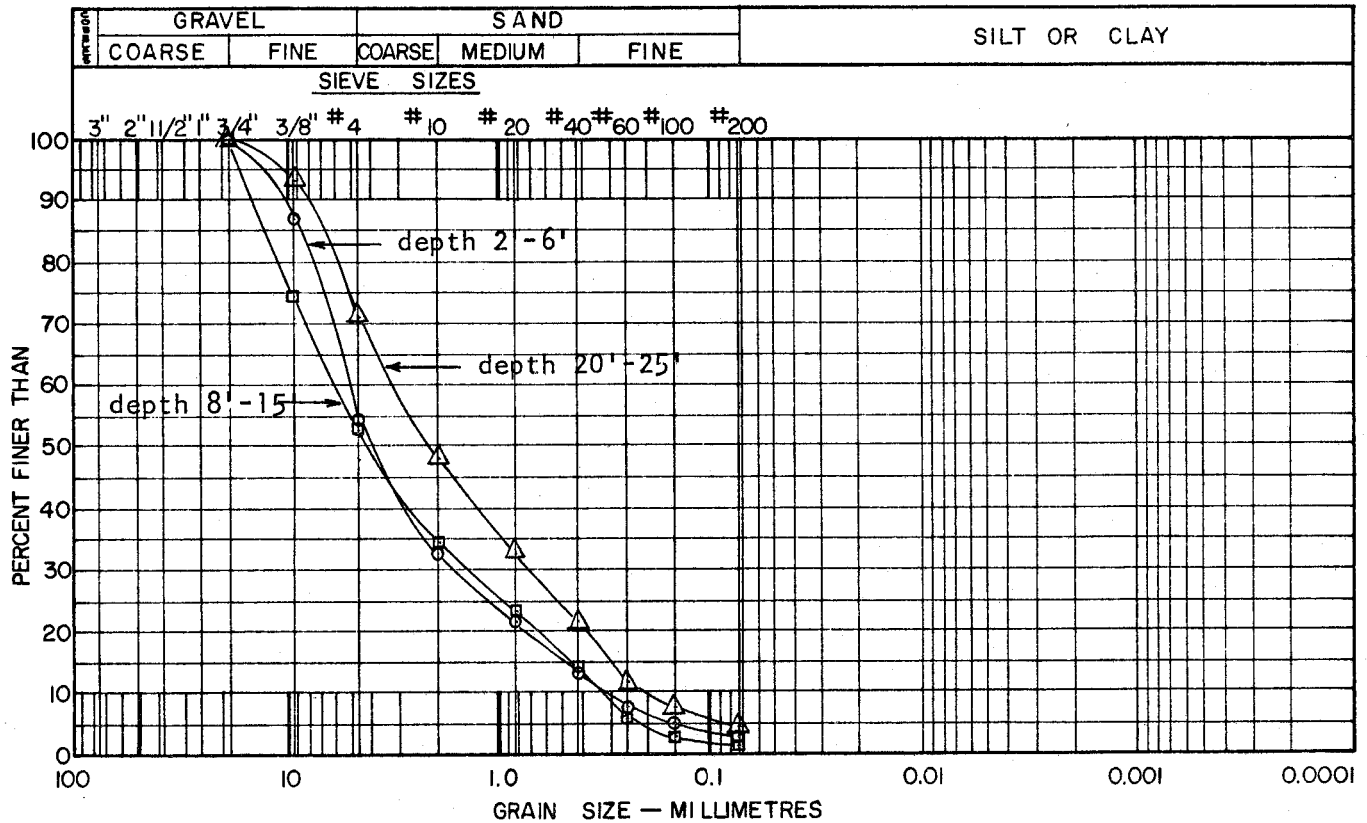
TEST HOLE LOGS

SOURCE No. 315



LABORATORY TEST DATA TEST HOLE-SOURCE No. 315-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	7.8%
Sample 2	depth 4'	6.6%
Sample 3	depth 6'	8.4%
Sample 4	depth 8'	6.8%
Sample 5	depth 10'	8.2%

Sample 6	depth 15'	7.7%
Sample 7	depth 20'	9.4%
Sample 8	depth 25'	9.7%

ORGANIC CONTENT

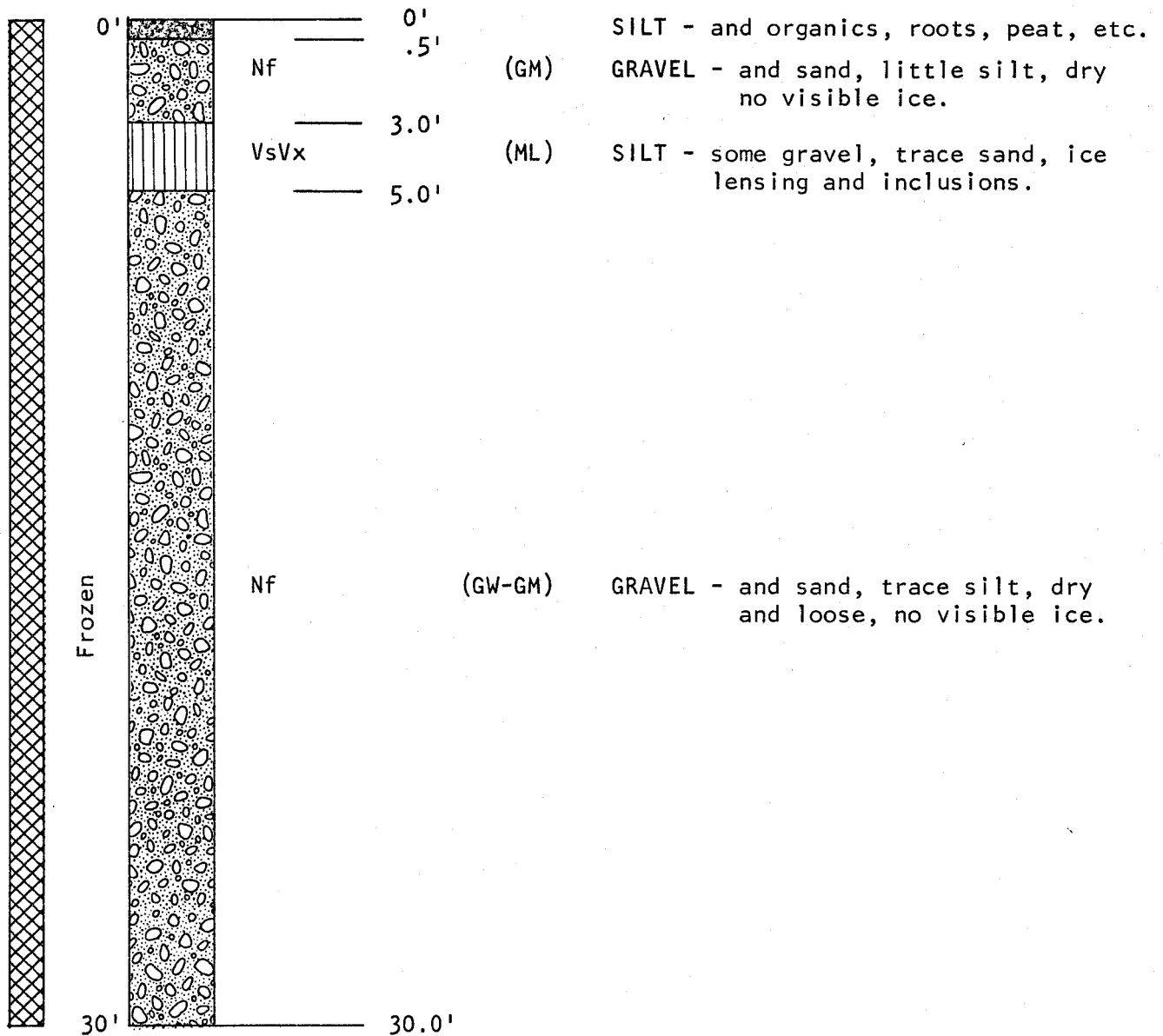
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

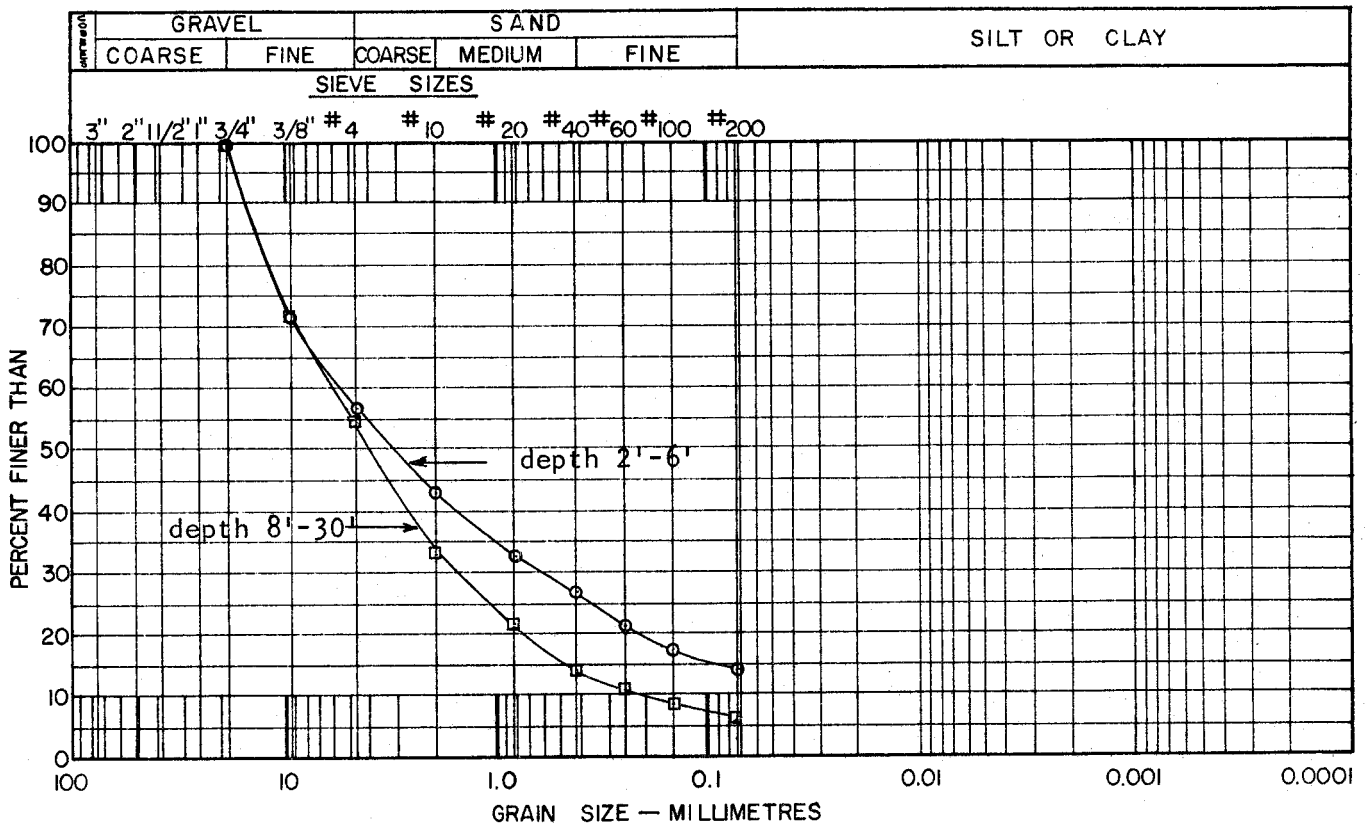
SOURCE No. 315

315-2



LABORATORY TEST DATA TEST HOLE-SOURCE No. 315-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	14.7%	Sample 6	depth 15'	9.5%
Sample 2	depth 4'	8.1%	Sample 7	depth 20'	9.4%
Sample 3	depth 6'	9.5%	Sample 8	depth 25'	8.4%
Sample 4	depth 8'	11.4%	Sample 9	depth 30'	8.0%
Sample 5	depth 10'	10.9%			

ORGANIC CONTENT

HARDNESS TEST

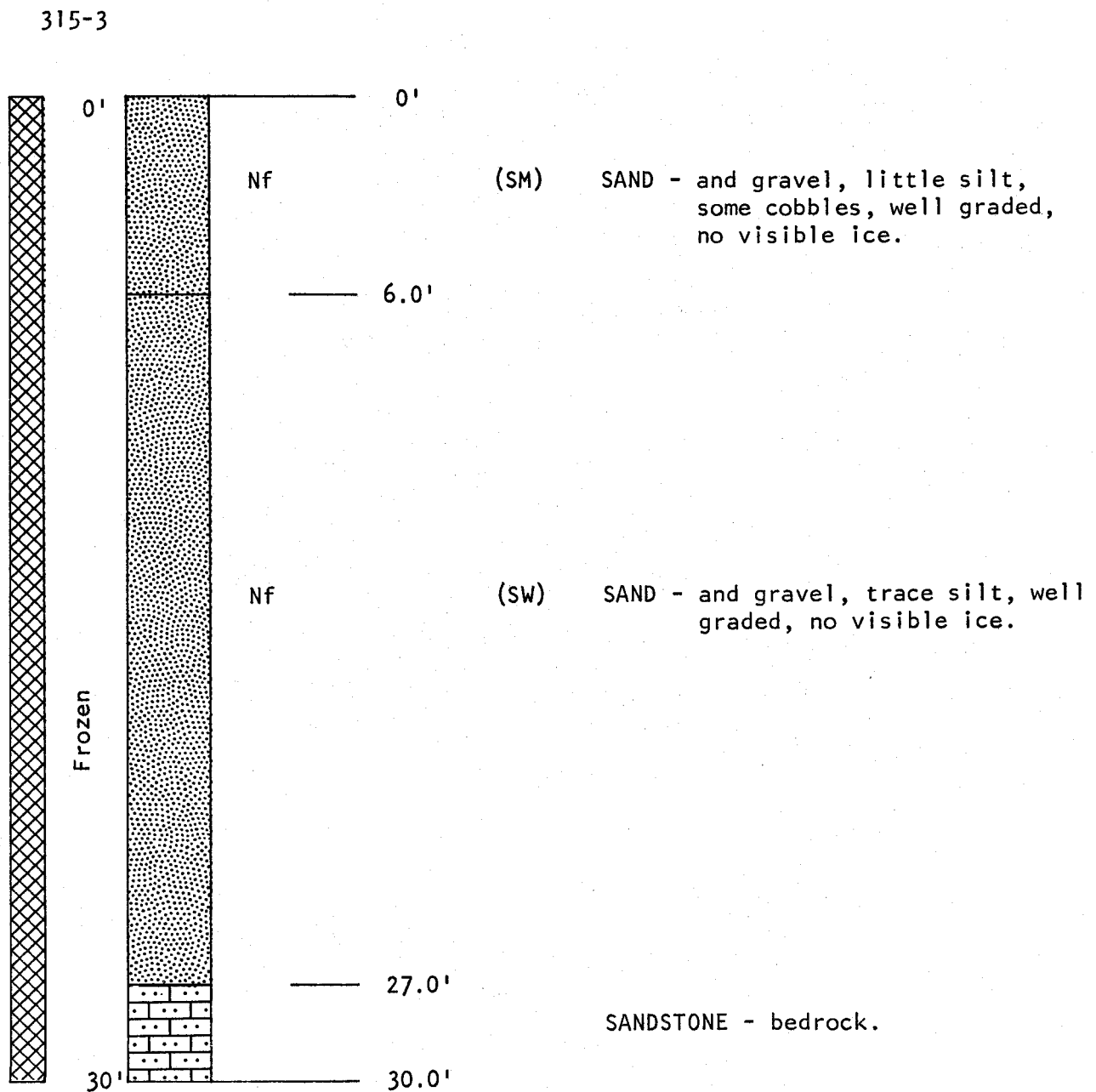
PETROGRAPHIC ANALYSIS

Samples 4 to 9 depth 8' - 30'

Quartzite	-75%
Sandstone	-20%
Quartz	- 4%
Chert	- 1%
Total	100%

TEST HOLE LOGS

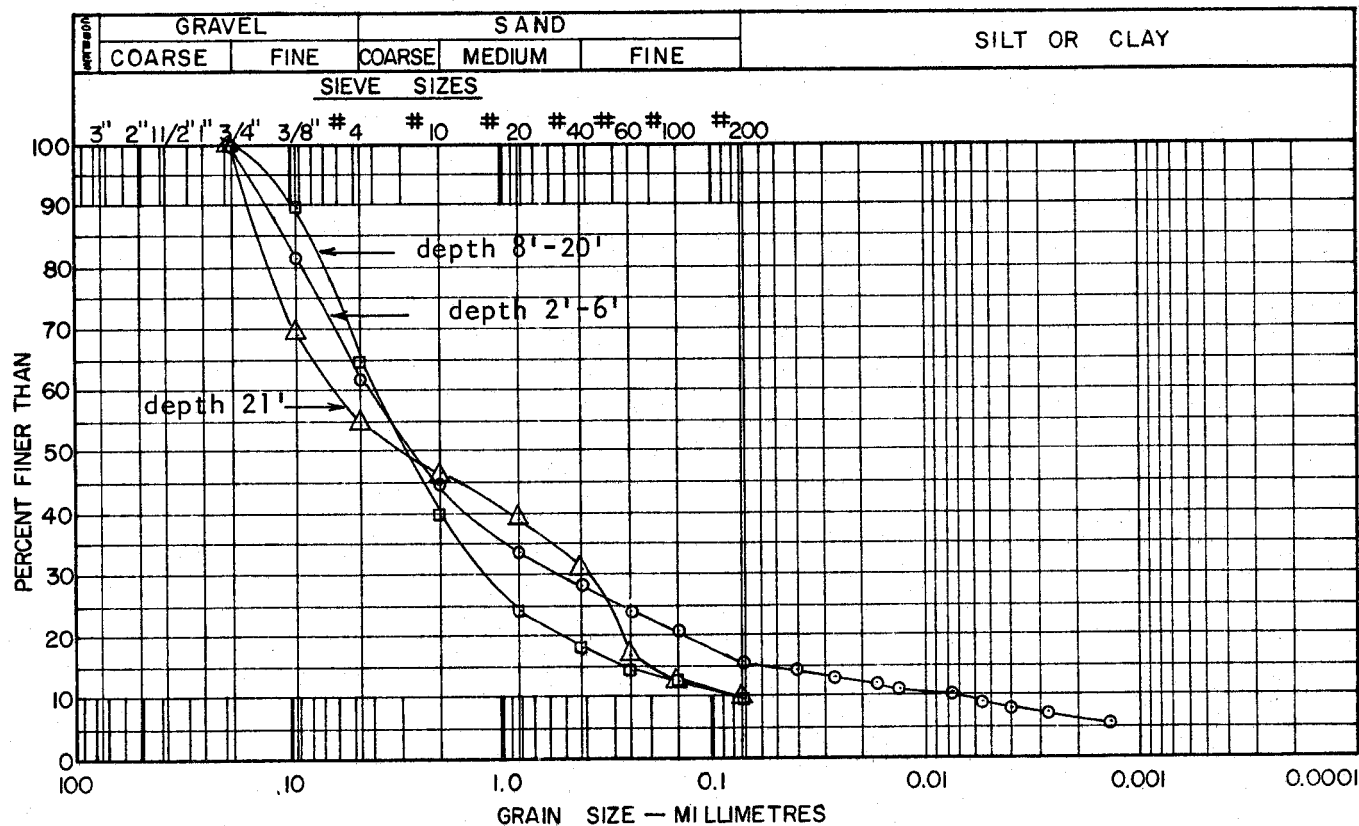
SOURCE No. 315



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 315-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	7.8%
Sample 2	depth 4'	11.2%
Sample 3	depth 6'	10.0%
Sample 4	depth 8'	10.2%
Sample 5	depth 10'	11.7%

Sample 6	depth 15'	8.2%
Sample 7	depth 20'	10.1%
Sample 8	depth 25'	11.1%
Sample 9	depth 30'	18.8%

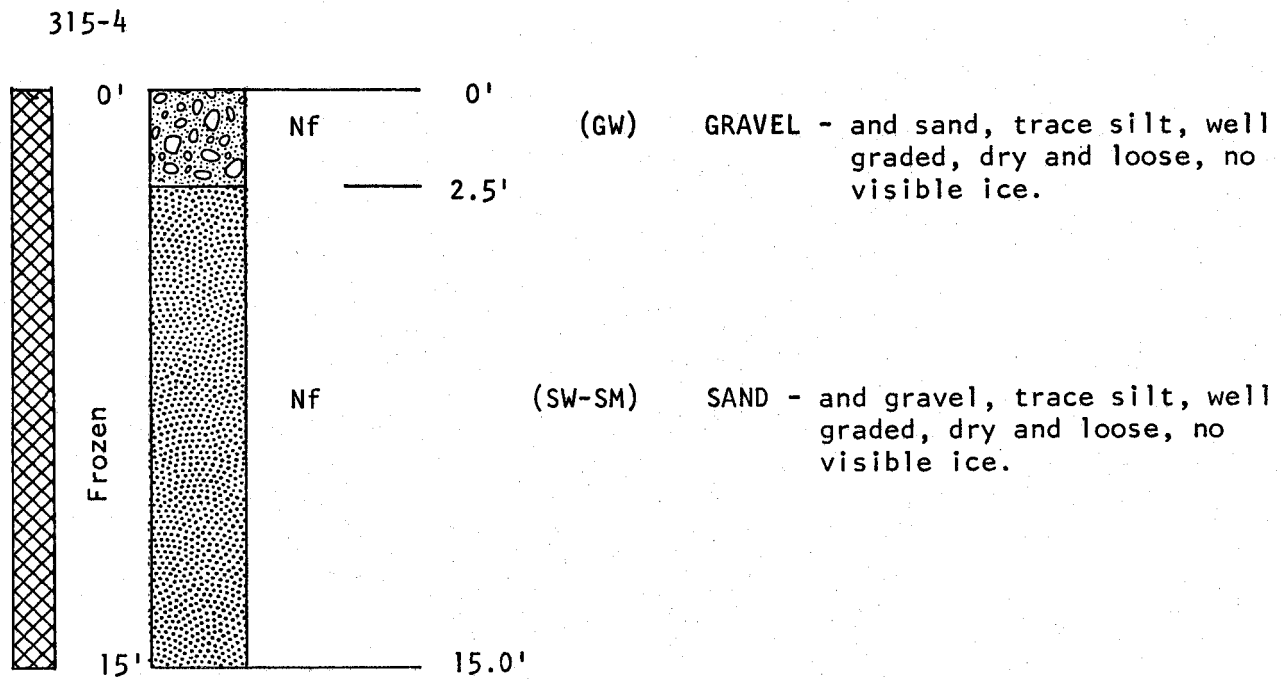
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

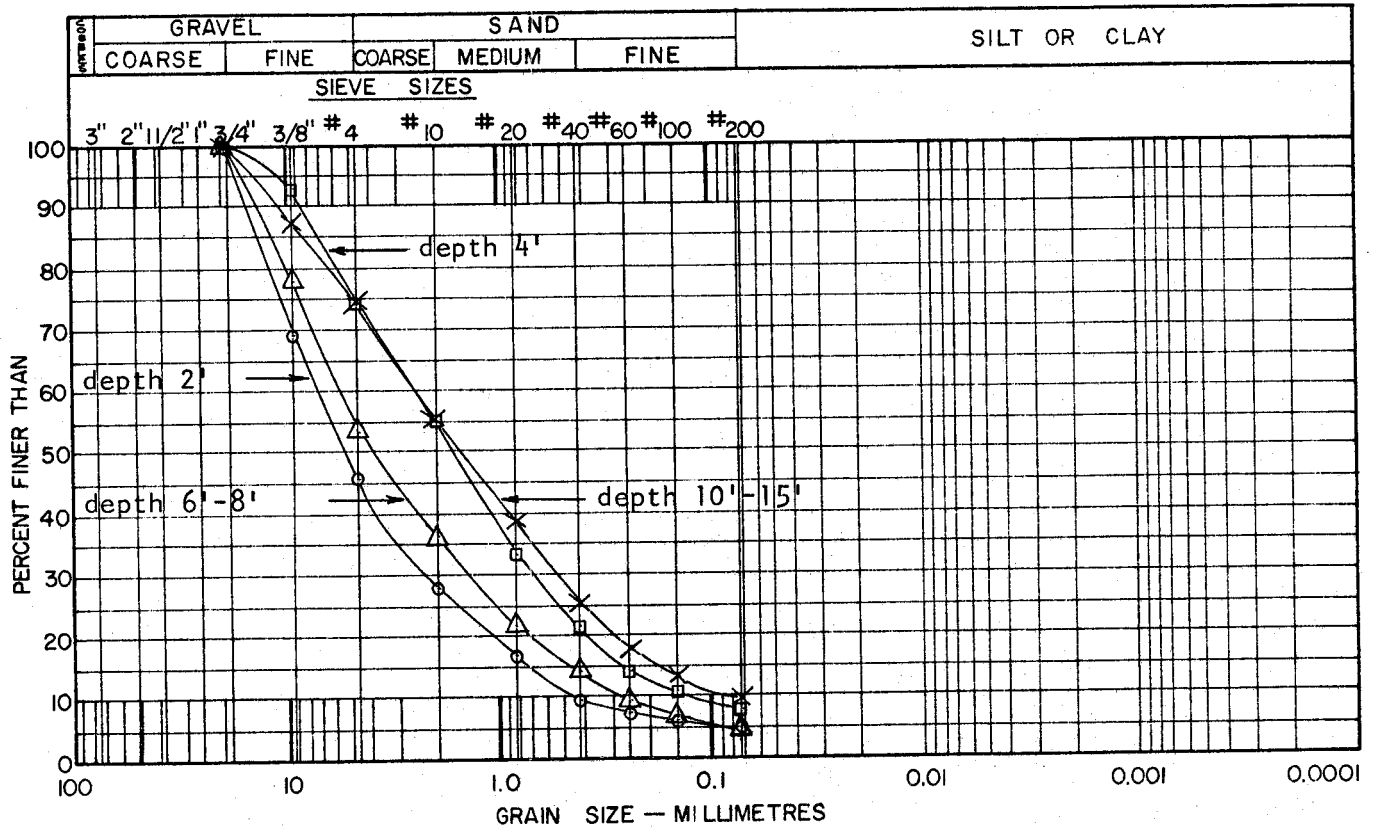
SOURCE No. 315



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 315-4

GRAIN SIZE DISTRIBUTION



ZONE III
SOURCE No. 316

LANDFORM AND LOCATION:

Glaciofluvial outwash remnant east of Peter Lake, 31 miles northwest of Inuvik.

MATERIAL:

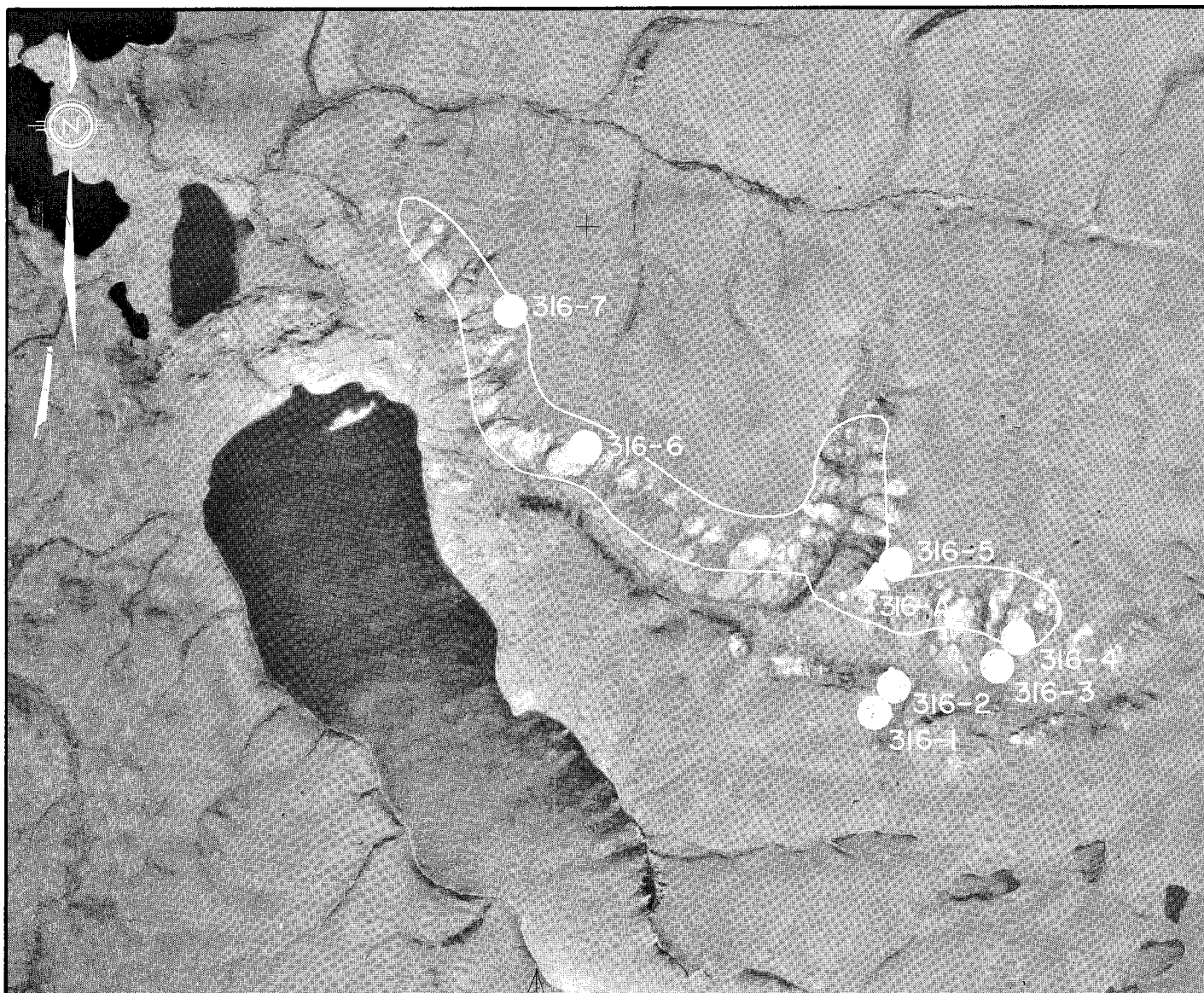
SAND - and gravel, trace of silt

VOLUME:

1,000,000 cubic yards

CONCLUSION:

Suitable for development for local projects for general fill and road material.



AIRPHOTO No. A12918-154

SCALE: 1" = 3000' (approx.)

316 ENVIRONMENT

Physical

This source is a glaciofluvial outwash area exposed on the upper slopes of an abandoned glacial spillway channel located just east of Peter Lake and 31 miles northwest of Inuvik. The exposure of granular material can be traced around the steep edges of this spillway, in places 150 feet high, for a distance of 12,000 feet.

A small volume of material has been removed from this source in connection with nearby oil exploration.

The source is well drained.

Biotic

Vegetative cover in this area is very thin, consisting primarily of moss and scattered upland dwarf shrubs.

The source lies within the Mackenzie Reindeer Grazing Reserve, but is not critical to any form of wildlife or fish. Peter Lake may contain fish, and is also the site of a bathymetric experiment by the Department of the Environment.

316 MATERIALS AND QUANTITIES

The materials in this source are sand and gravel well graded to a maximum particle size of 3 inches, usually with a trace of silt, but often covered by up to 2 feet of silty sand.

Test Hole #6 cut through 4 feet of silty sand, then 4 feet of gravel, then 24 feet of sand and gravel grading 35% to 50% gravel, 45% to 50% of well-graded sand, and from 7% to 13% passing the #200 sieve.

The moisture content of the sand and gravel is about 8½% to 12%, and no visible ice was detected in these deposits at depth.

The petrographic analysis of this gravel shows the main constituents to be quartzite (59%), soft sandstone (25%), hard sandstone (6%), and siltstone (6%), with some chert (3%) and quartz. The only unsound component is the soft sandstone, a poorly cemented and friable material

that would limit the quality of concrete made with this gravel. Generally the depth of granular material exposed on the slopes of this channel is believed to be more than 30 feet. A number of test holes were drilled back from the top of the slope to determine the lateral extent of the deposit, but these holes all penetrated silt and ice at a shallow depth, as did all holes on the south side of the gully.

The estimated volume of recoverable granular material is about 1,000,000 cubic yards.

316 DEVELOPMENT

General

This source is suitable for development for local projects. The material is satisfactory for general fill and road construction, but the unsound component in the gravel makes it unsuitable for use in concrete or asphalt construction.

Particular care must be taken to prevent the siltation of Peter Lake.

Access

At present this area is accessible only during winter, hauling over the tundra on snow roads.

Projects along the Mackenzie River can be served from this source by a winter road running northwest around the north end of the proposed Caribou Hills Reserve of the International Biological Programme, a distance of 10 miles. This route passes Source I-407, a very large deposit of excellent material reserved for the use of Inuvik, so the feasibility of hauling material from Source 316 to Inuvik is dubious.

Material Use and Handling

The material from this source can be used for general fill and road construction. Probably the full depth of this deposit can be excavated by a dozer, or at least by a dozer with ripper attachment. The silty material near the surface contains more ice, and would have to be ripped.

The depth of unfrozen sand and gravel on the exposed slopes may be as much as 10 feet, which could be loaded and shipped at once. The deeper material would have to be stockpiled, thawed, and drained before shipping.

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

Stripping and Restoration

Much of the deposit is bare of vegetation and, in general, the source will not require stripping if the material is to be used for general fill.

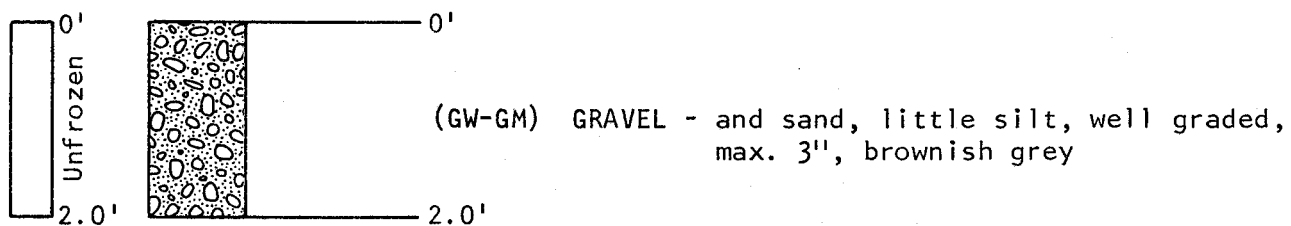
If stripping is required locally, the material will be mainly silty sand with very little organic content. This must be placed so that the silty material, in thawing, cannot drain directly into the stream below.

An operator must leave a depleted area clean and graded to a smooth contour.

TEST PIT LOGS

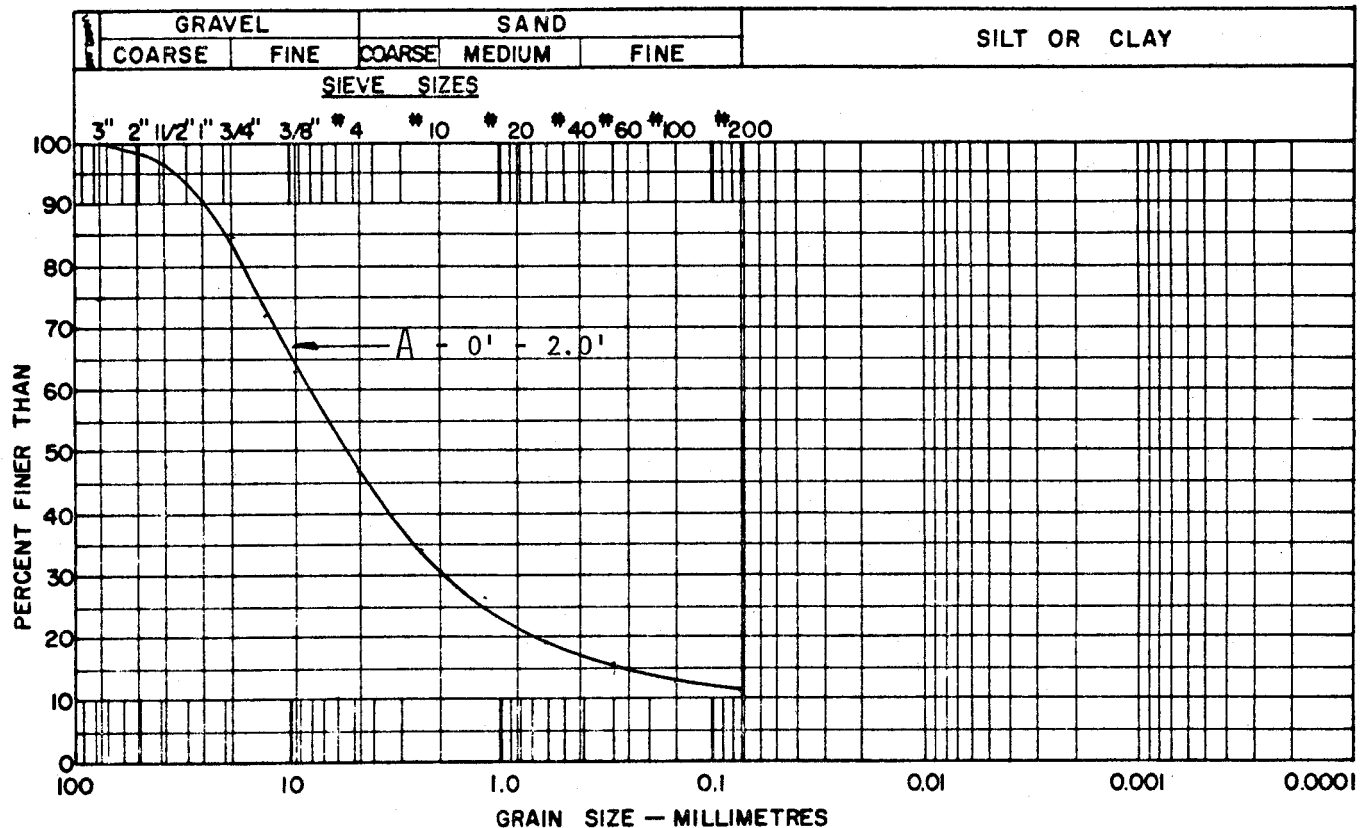
SOURCE No. 316

316-A



LABORATORY
TEST DATA
SOURCE No. 316

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A depth 0' - 2.0' 2.6%

ORGANIC CONTENT

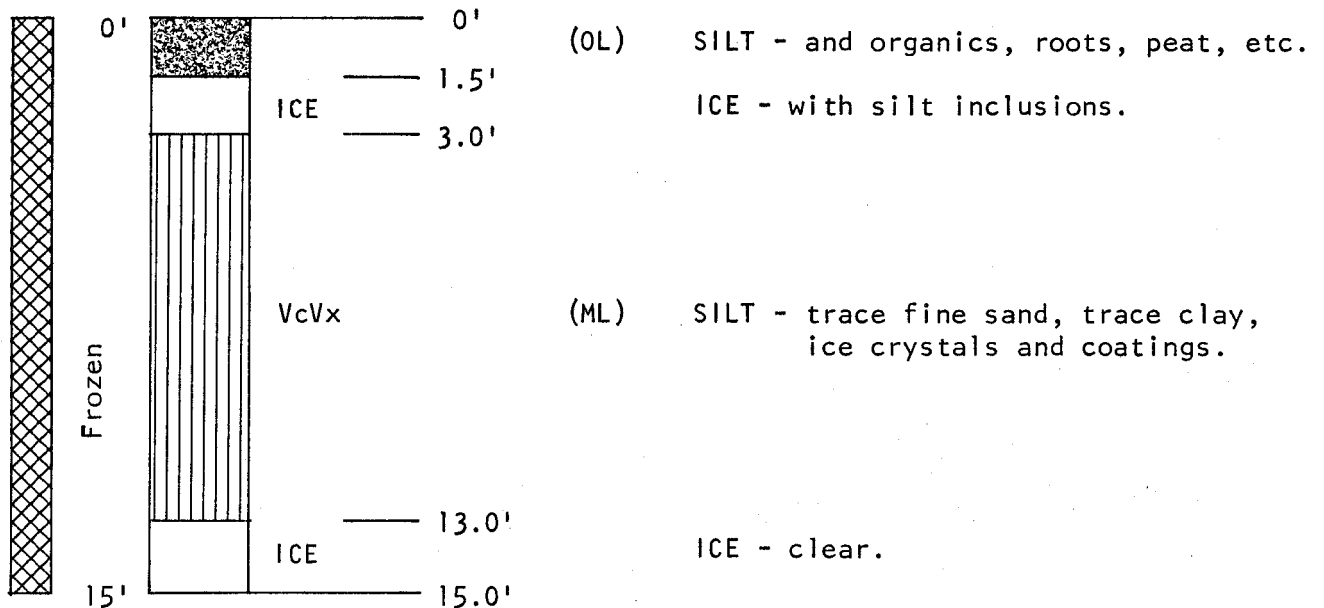
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

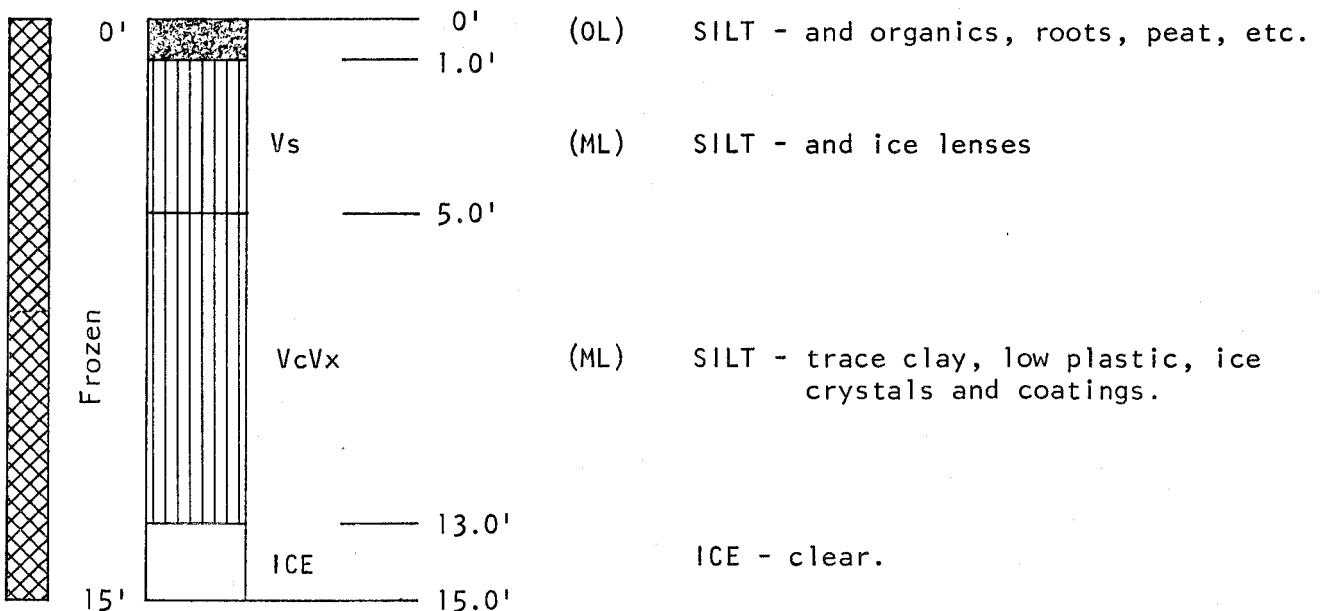
SOURCE No. 316

316-1



Moisture Content		
Sample 3	depth 6'	18.1%
Sample 4	depth 8'	25.4%

316-2

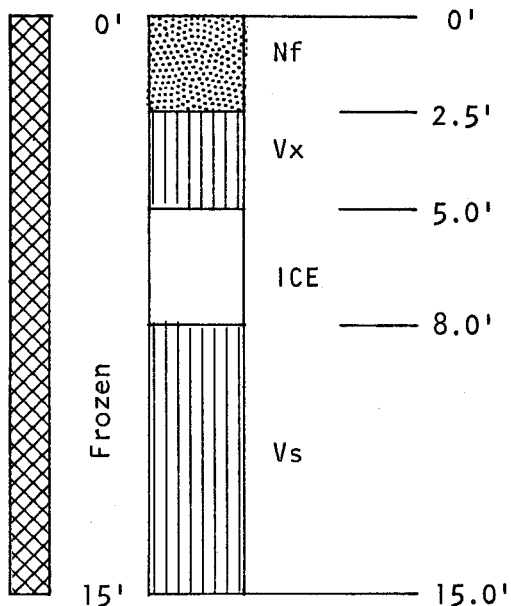


Moisture Content		
Sample 1	depth 2'	30.4%
Sample 2	depth 10'	34.4%

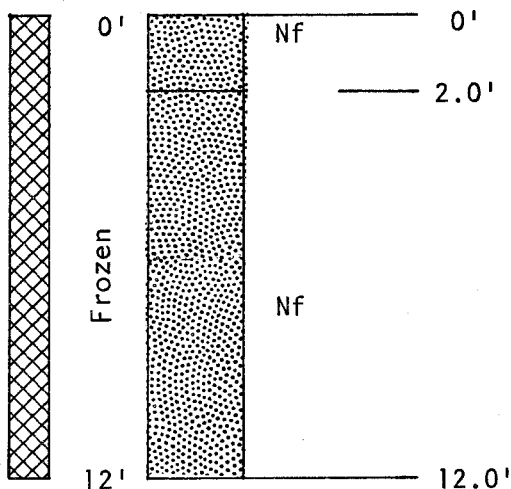
TEST HOLE LOGS

SOURCE No. 316

316-3



316-4



GRAIN SIZE DISTRIBUTION



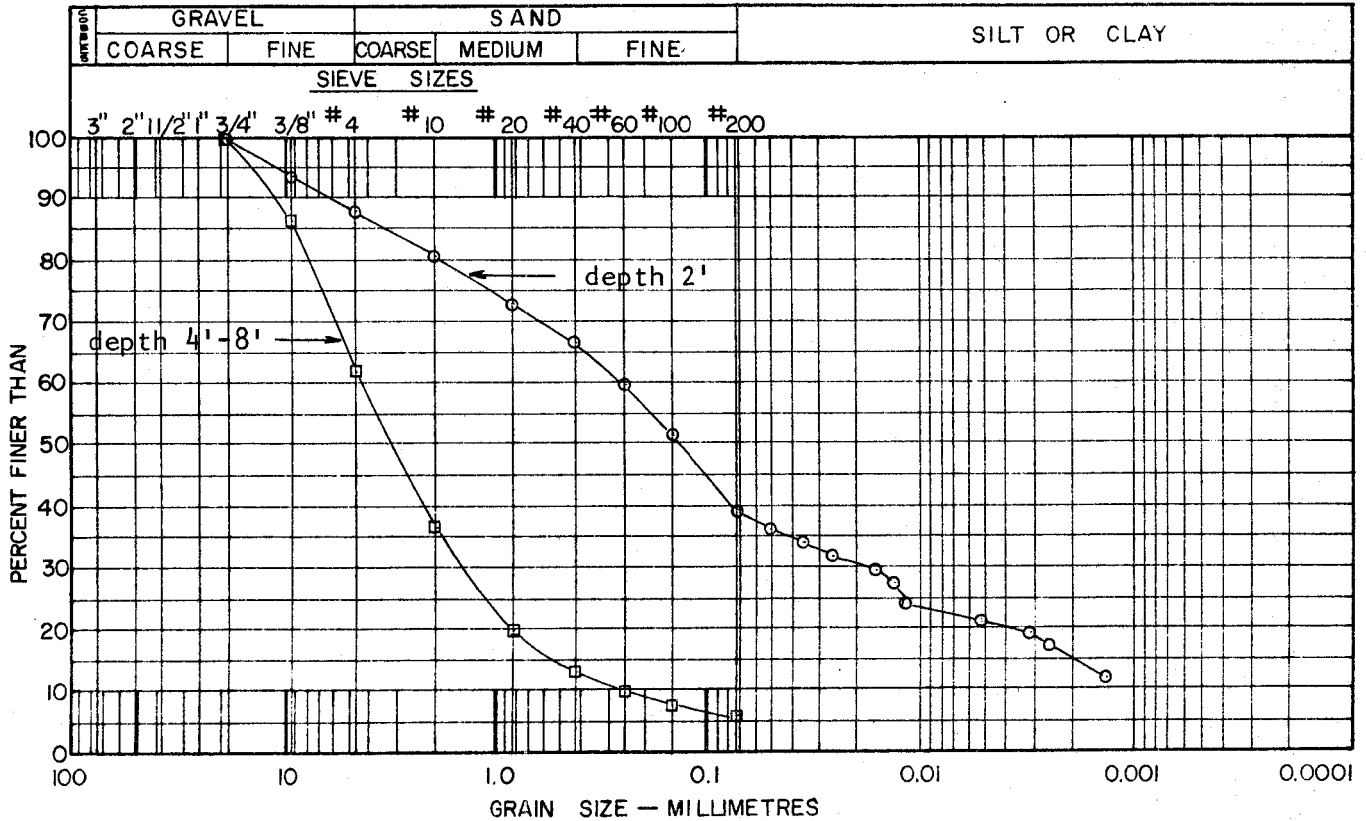
ORGANIC CONTENT

PETROGRAPHIC ANALYSIS

LABORATORY TEST DATA

TEST HOLE-SOURCE No. 316-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	11.9%
Sample 2	depth 4'	4.1%
Sample 3	depth 6'	3.0%
Sample 4	depth 8'	2.6%

ORGANIC CONTENT

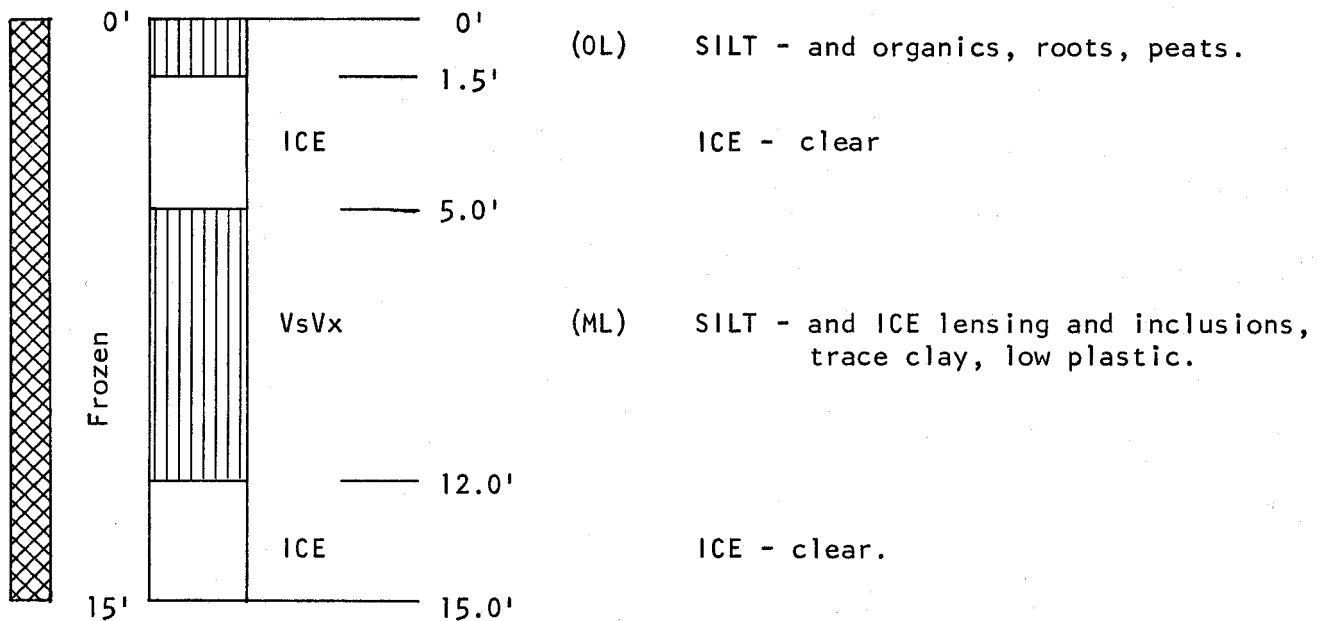
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 316

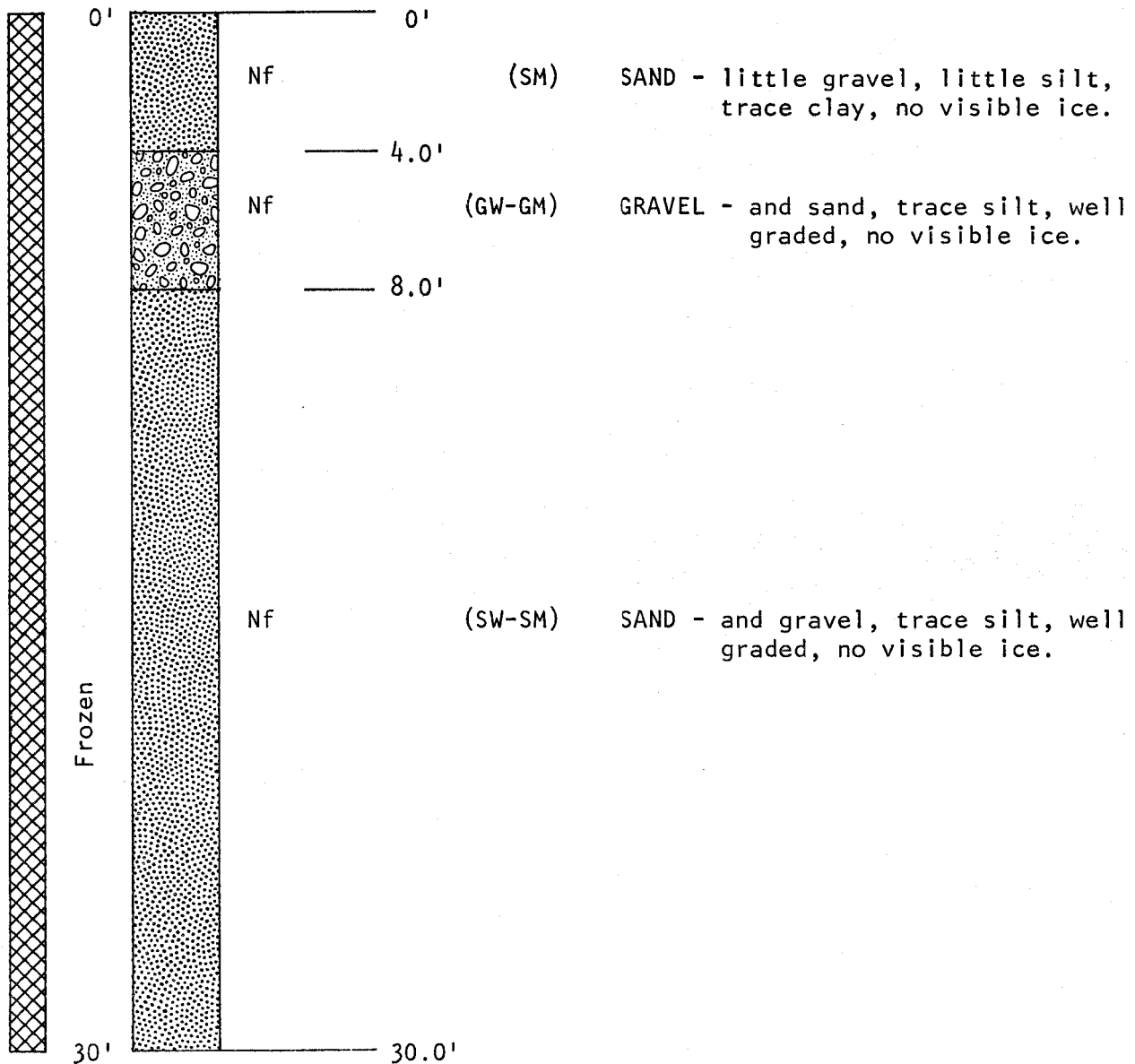
316-5



TEST HOLE LOGS

SOURCE No. 316

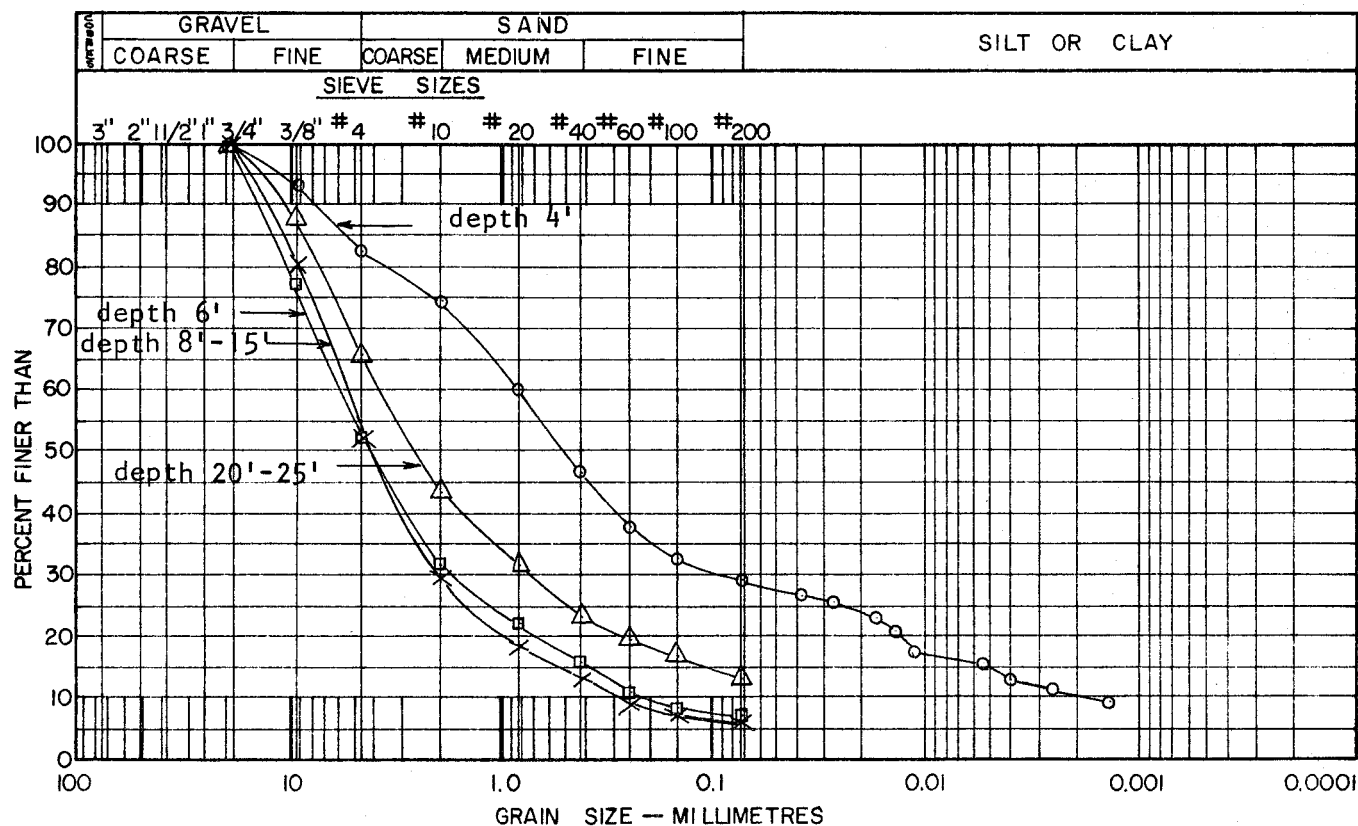
316-6



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 316-6

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	13.9%	Sample 5	depth 10'	10.9%
Sample 2	depth 4'	14.3%	Sample 6	depth 15'	11.7%
Sample 3	depth 6'	10.6%	Sample 7	depth 20'	8.8%
Sample 4	depth 8'	9.2%	Sample 8	depth 25'	10.0%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

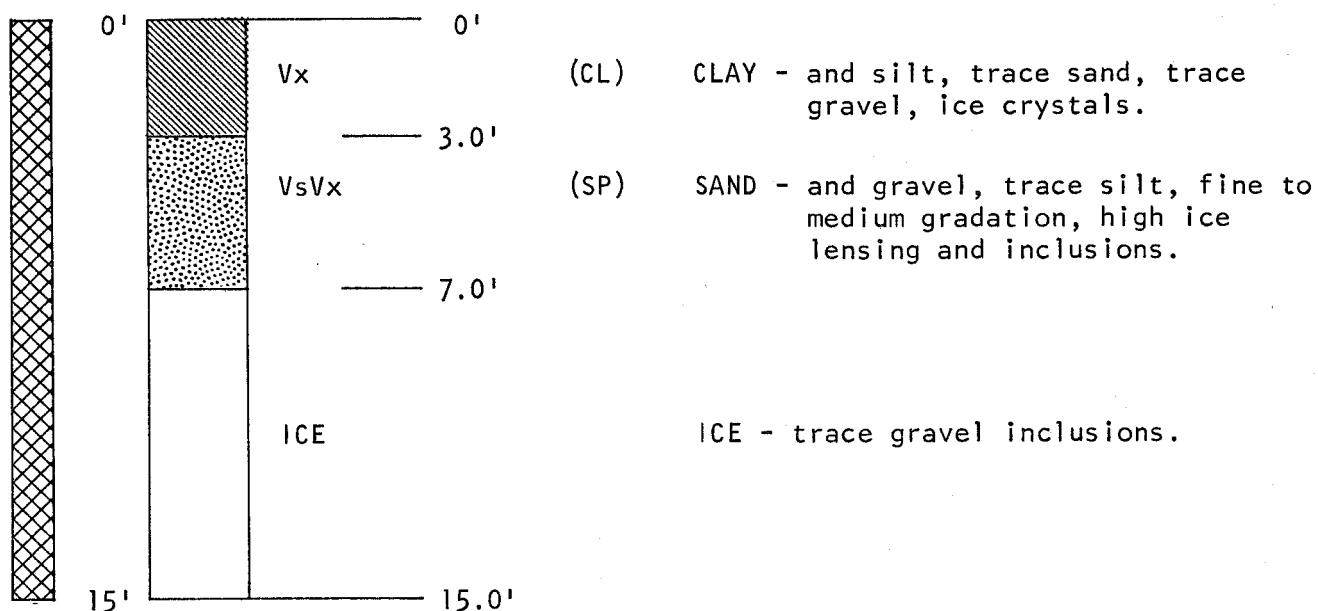
Sample 4 to 10 depth 8' - 25'

Quartzite	-59%	Chert	- 3%
Sandstone-soft	-25%	Quartz	- 1%
Sandstone-hard	- 6%		
Siltstone	- 6%	Total	100%

TEST HOLE LOGS

SOURCE No. 316

316-7



Moisture Content

Sample 1	depth	2'	10.7%
Sample 2	depth	4'	13.7%
Sample 3	depth	6'	11.6%

ZONE III
SOURCE No. 317

LANDFORM AND LOCATION:

A kame field and secondary outwash area at Peter Lake, 31 miles northwest of Inuvik.

MATERIAL:

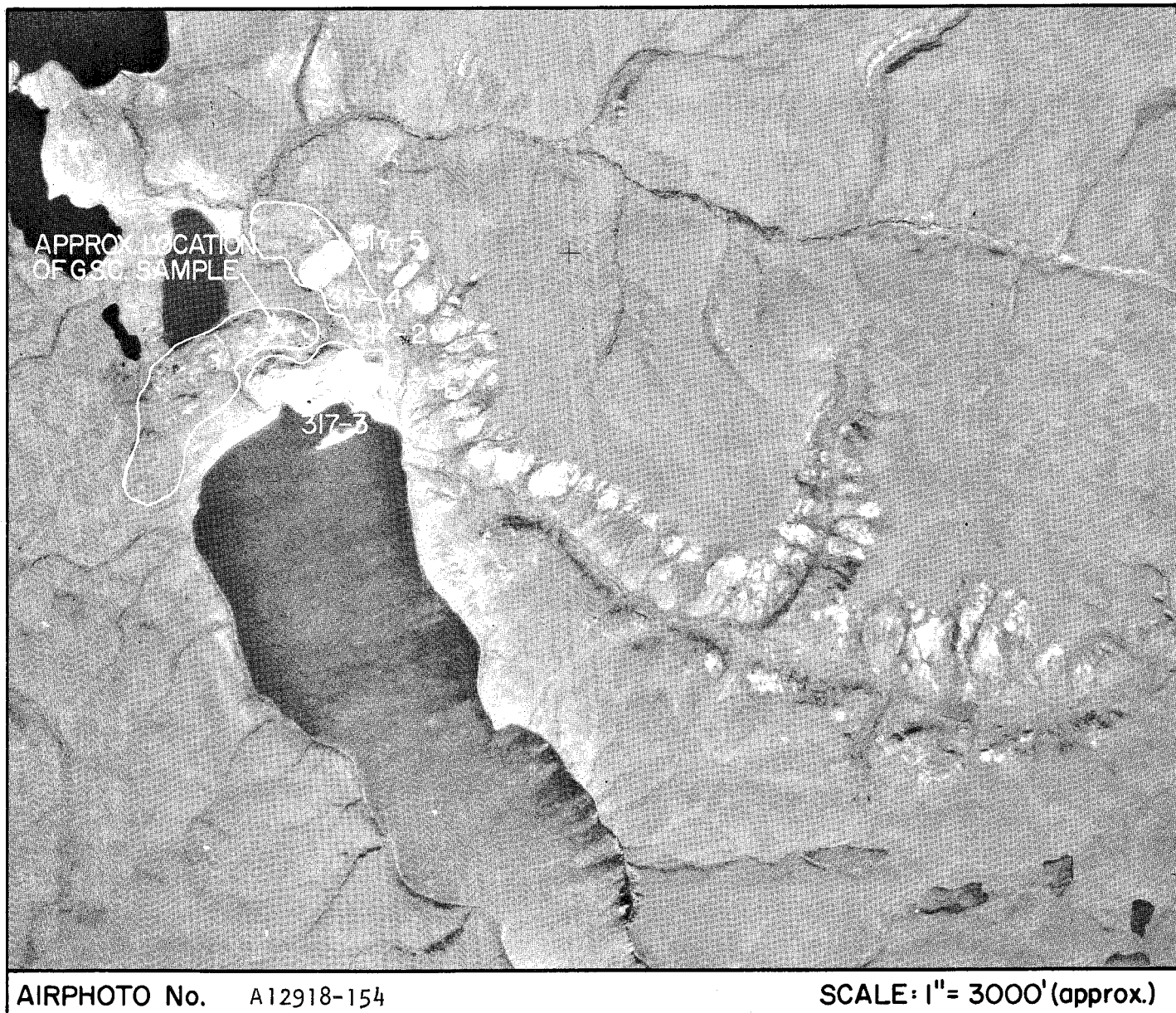
GRAVEL - and sand, trace of silt

VOLUME:

500,000 cubic yards

CONCLUSION:

The outwash deposit is suitable for development for local projects. Care is required.



317 ENVIRONMENT

Physical

This source is a kame field at the north end of Peter Lake and an associated secondary outwash deposit to the north of the kames. The kame field which is bisected by a stream draining the lake is about 5,000 feet long and 1,500 feet wide. The outwash extends about 2,000 feet further downstream along the eastern bank of the stream. The source is 31 miles northwest of Inuvik.

A bathymetry study is now being conducted at Peter Lake by the Department of the Environment.

The drainage of the source is good because of topography, although ground ice is close to the surface. The source has not been developed.

Biotic

Vegetative cover is thin to nonexistent over this area. Some parts of the deposit are covered by moss and scattered dwarf upland shrubs.

The source lies within the Mackenzie Reindeer Grazing Reserve, but is not critical to any wildlife or fish.

Peter Lake may contain fish.

317 MATERIALS AND QUANTITIES

The materials in this source vary within wide limits. The kame deposits are typically erratic, with a high ice content fairly common. The outwash area to the north is more consistent, and contains some clean gravel and sand.

Test Hole #5 indicates sand and gravel near the surface, increasingly coarse with depth. From 8 feet to 15 feet the grading ranges from 50% to 75% gravel, 22% to 47% sand, and about 3% silt.

The petrographic analysis of Test Hole #5 shows a gravel consisting primarily of quartzite (71%), a soft sandstone (25%), and quartz (3%), with granite, chert, and ironstone ($\frac{1}{2}\%$) making up the remaining 4%.

As noted earlier, ice appears to be near the surface. Test Hole #4

penetrated 2½ feet of ice only 1 foot below the surface, and Test Holes #4 and #5 both struck massive ground ice at 17 feet. The moisture content at depth varied from 6% to 22% in sand and gravel.

The Geological Survey of Canada sampled the material at Peter Lake, their sample being numbered LV77-72 and the station number 87. Their curve is comparable with that of Test Hole #5.

The volume of granular material available in the kame field of this source may be as much as 1,000,000 cubic yards. The outwash area to the north probably contains another 500,000 cubic yards.

317 DEVELOPMENT

General

The kame field is not recommended for development. The deposit is erratic and contains massive ground ice that could be difficult to stabilize if exposed. In addition, the disposal of ice-rich silt from the area would probably lead to the siltation of Peter Lake.

The outwash area north of the kames could be developed for local projects if controlled carefully. The material is suitable for general fill and road construction.

Access

At present this area is accessible only during winter, hauling over the tundra on snow roads.

Projects along the Mackenzie River can be served from this source by a winter road running northwest around the north end of the Proposed Caribou Hills Reserve of the International Biological Programme, a distance of 10 miles. This route passes Source I-407, a very large deposit of excellent material reserved for the use of Inuvik, so the feasibility of hauling material from Source 317 to Inuvik is dubious.

Material Use and Handling

The material from this source can be used for general fill or road construction with no processing other than ripping, stockpiling, thawing, and draining. The high percentage of soft sandstone makes

this gravel unsuitable for use in concrete or asphalt construction.

The excavation of this source should not be carried to the massive ground ice, but a blanket of granular material about 2 feet thick should be left in place over it.

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

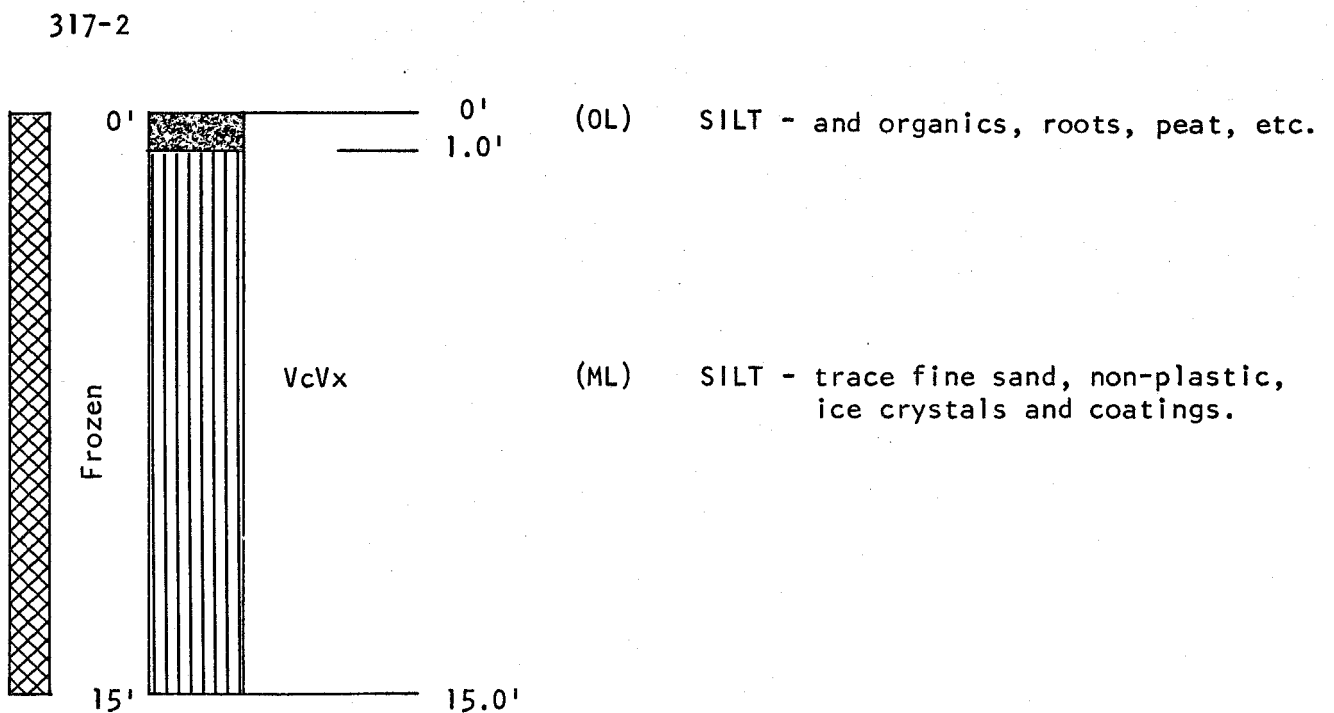
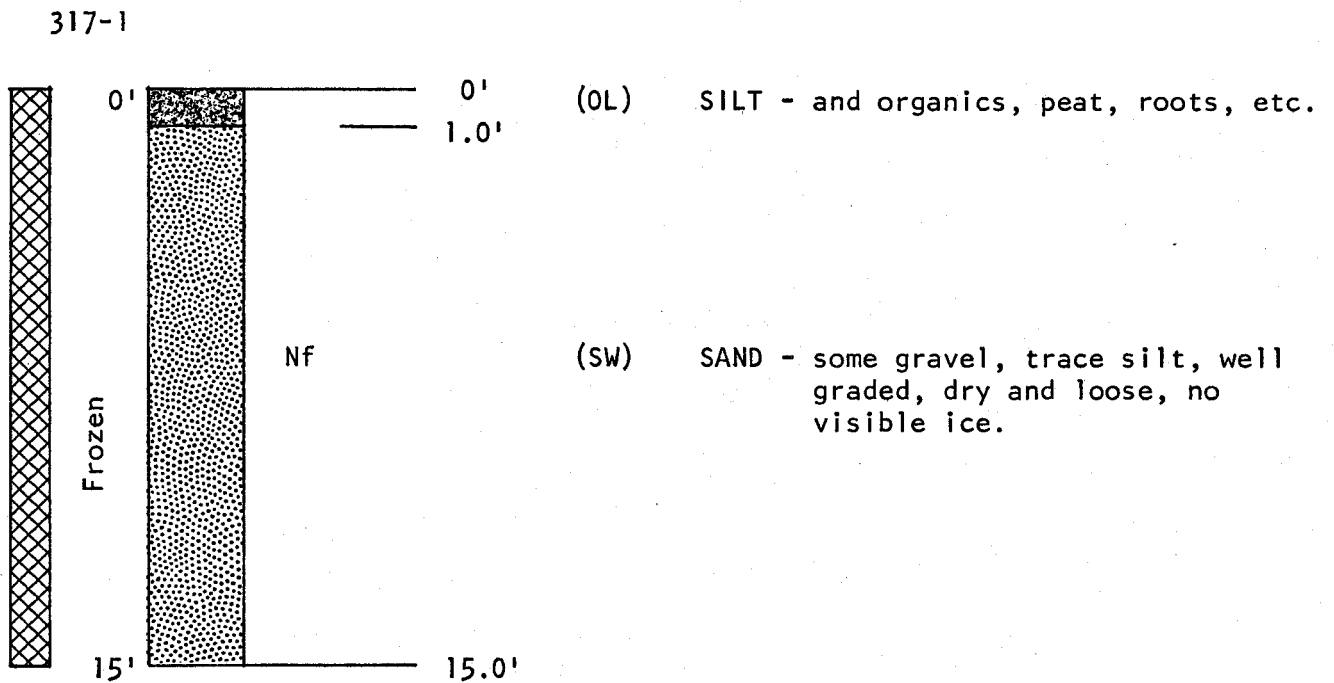
Stripping and Restoration

The stripping of the outwash area will be mostly silty sand, with very little organic material, and this stripping may be over 5½ feet thick in places. The stripped material should be placed away from the natural drainage system so that, in thawing, it will not enter the streams. Later this stripped material should be replaced over the floor and graded banks of the excavation to insulate the frozen ground below.

In order to limit the downhill movement of sloughed material, it is recommended that a substantial berm or dyke of frozen ground be left at the downhill side of all excavations.

TEST HOLE LOGS

SOURCE No. 317



Moisture Content

Sample 1	depth 2'	24.8%
Sample 2	depth 10'	26.4%

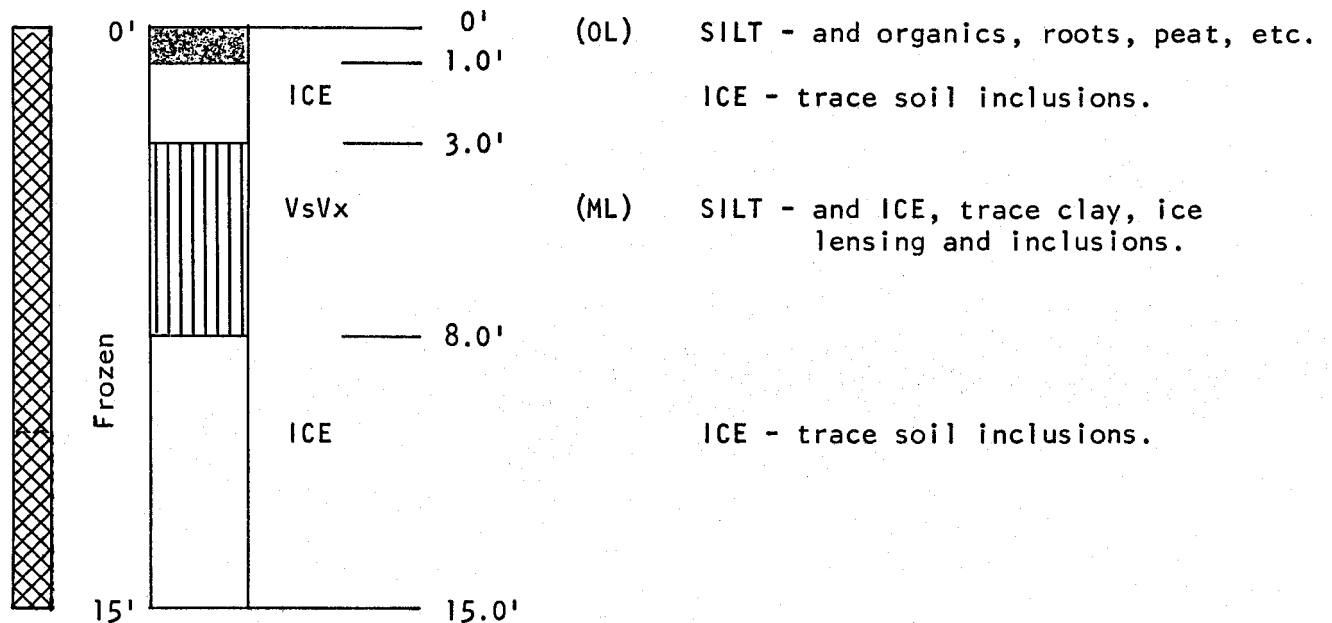
GRAIN SIZE DISTRIBUTION



TEST HOLE LOGS

SOURCE No. 317

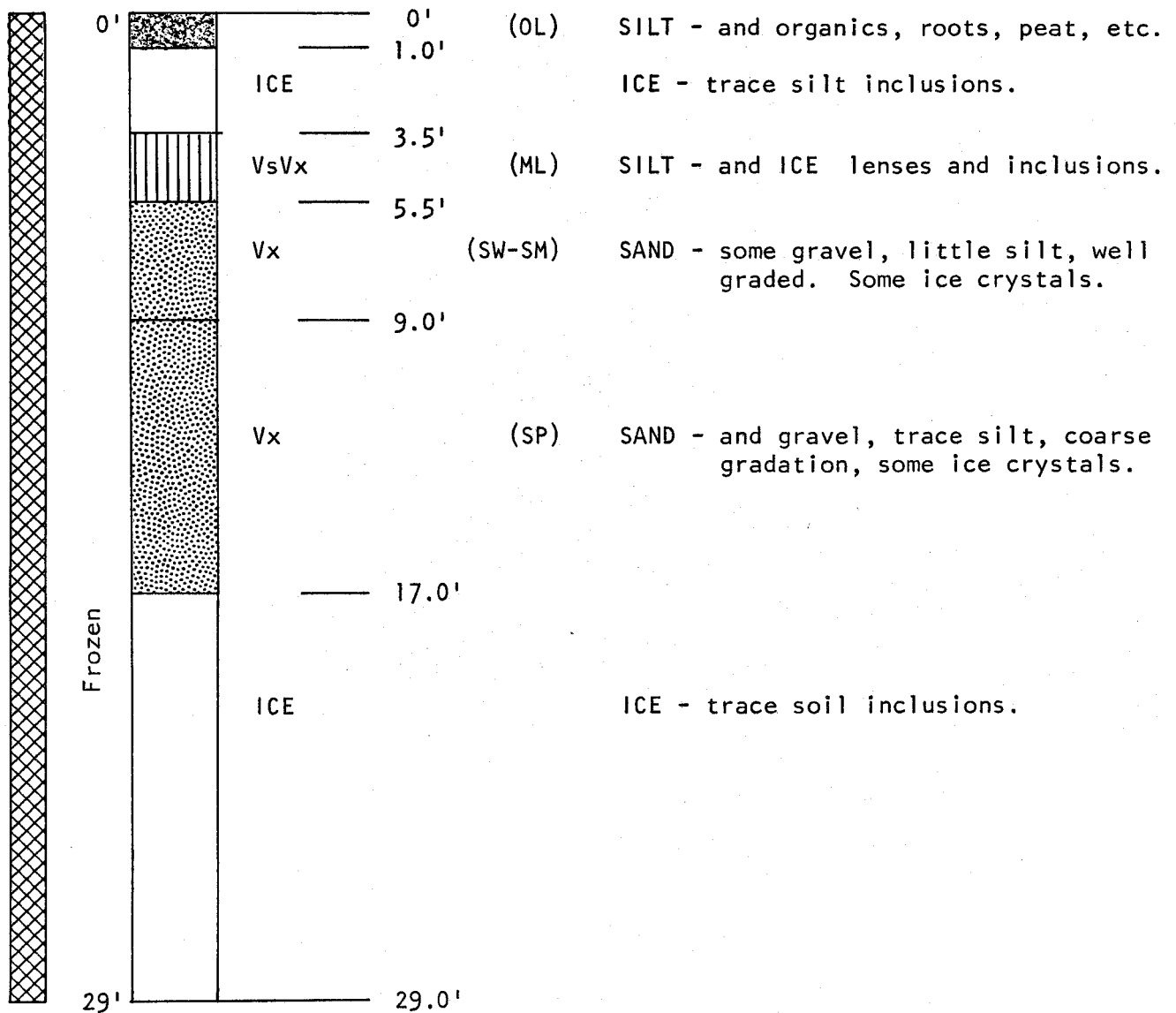
317-3



TEST HOLE LOGS

SOURCE No. 317

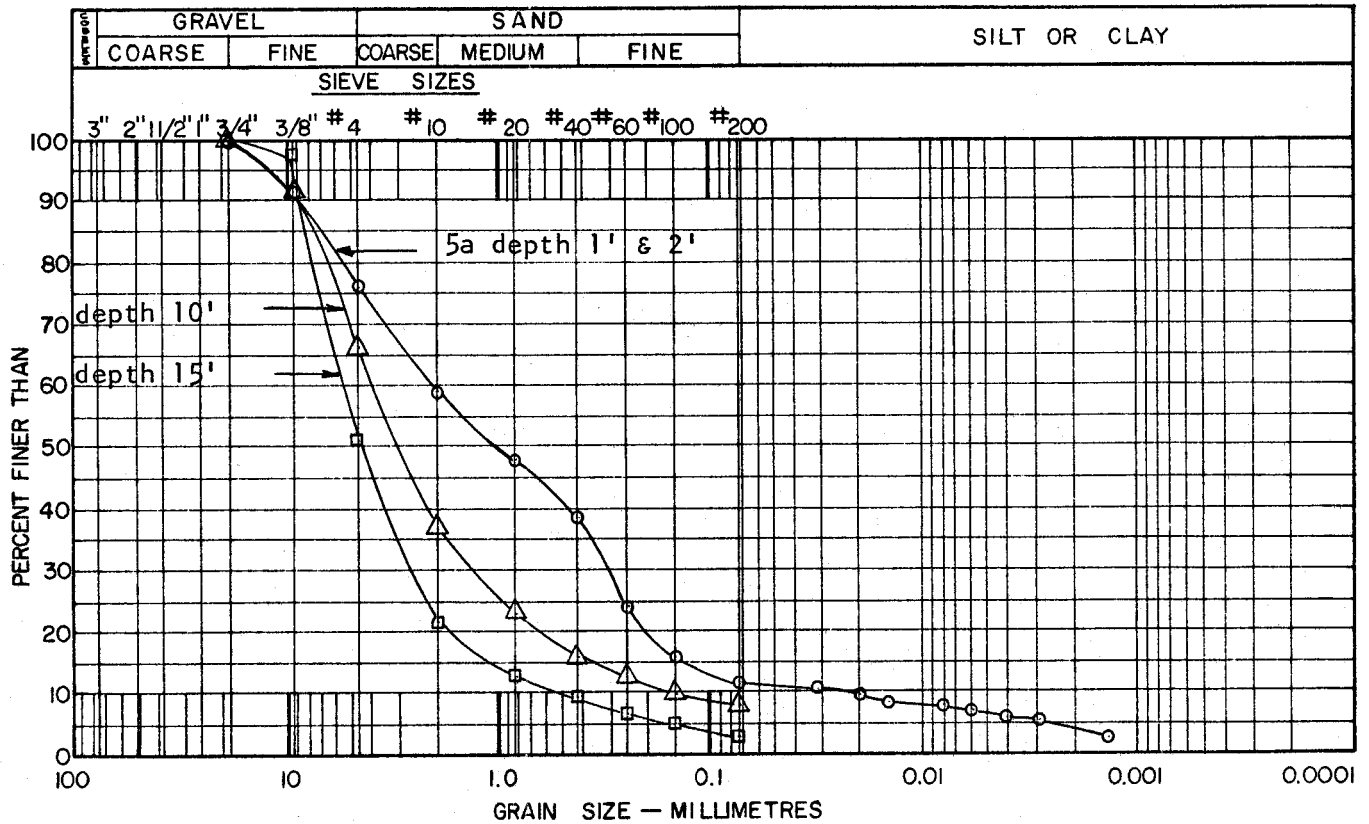
317-4



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 317-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 6'	15.5%
Sample 2	depth 8'	11.6%
Sample 3	depth 10'	5.2%
Sample 4	depth 15'	17.5%

ORGANIC CONTENT

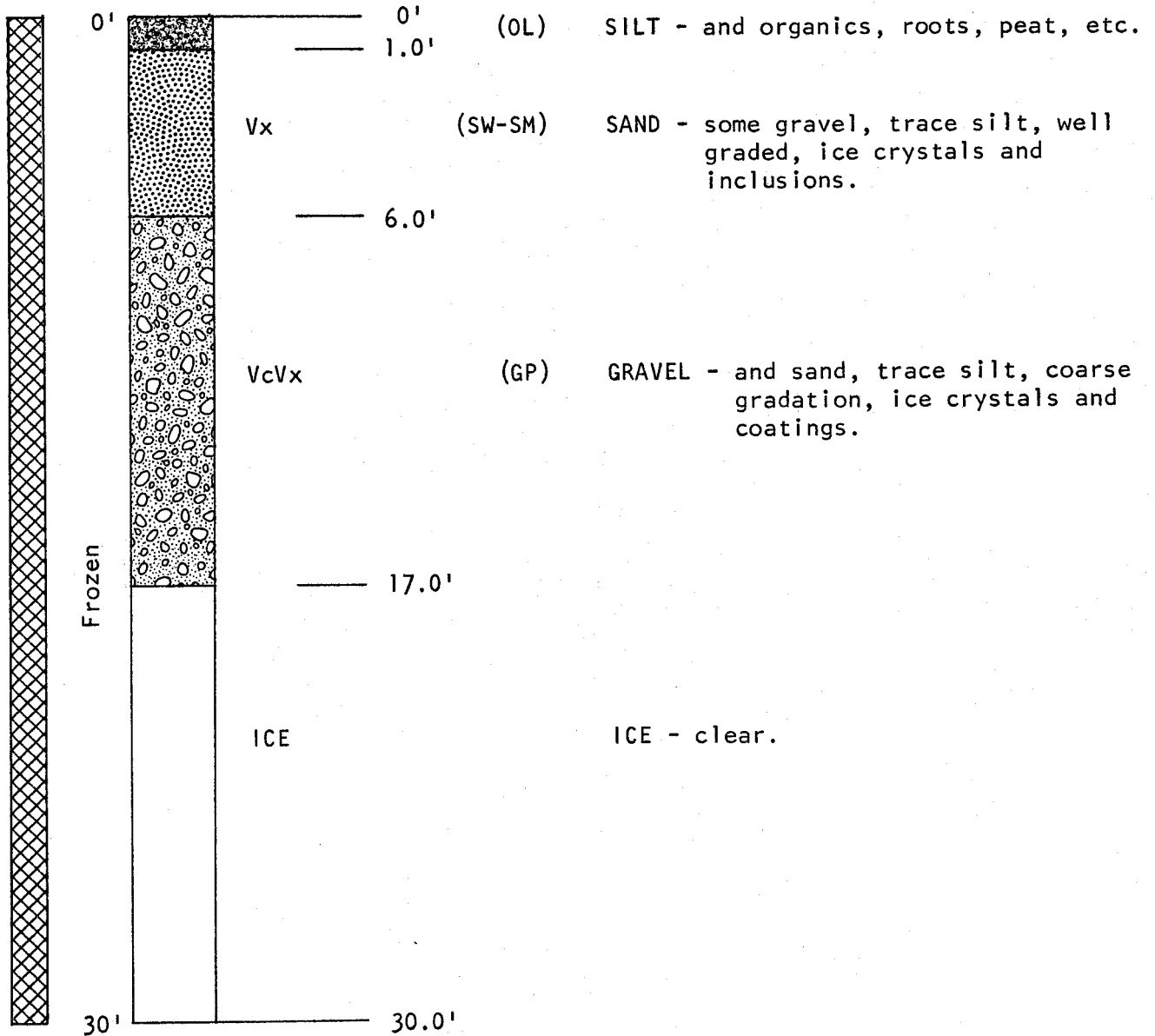
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

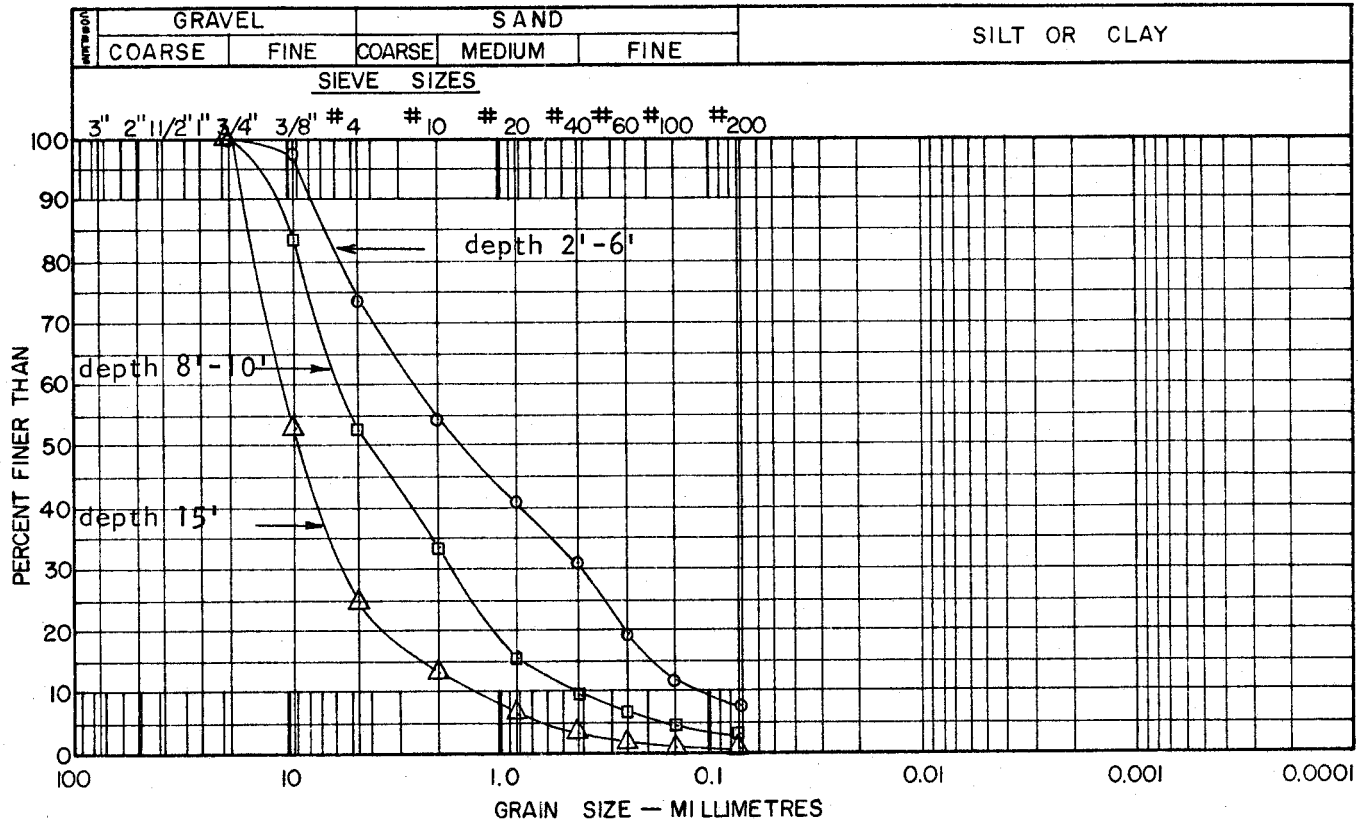
SOURCE No. 317

317-5



LABORATORY TEST DATA TEST HOLE-SOURCE No. 317-5

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	6.6%
Sample 2	depth 4'	17.7%
Sample 3	depth 6'	11.0%
Sample 4	depth 8'	21.9%
Sample 5	depth 10'	7.5%

Sample 6 depth 15' 6.0%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

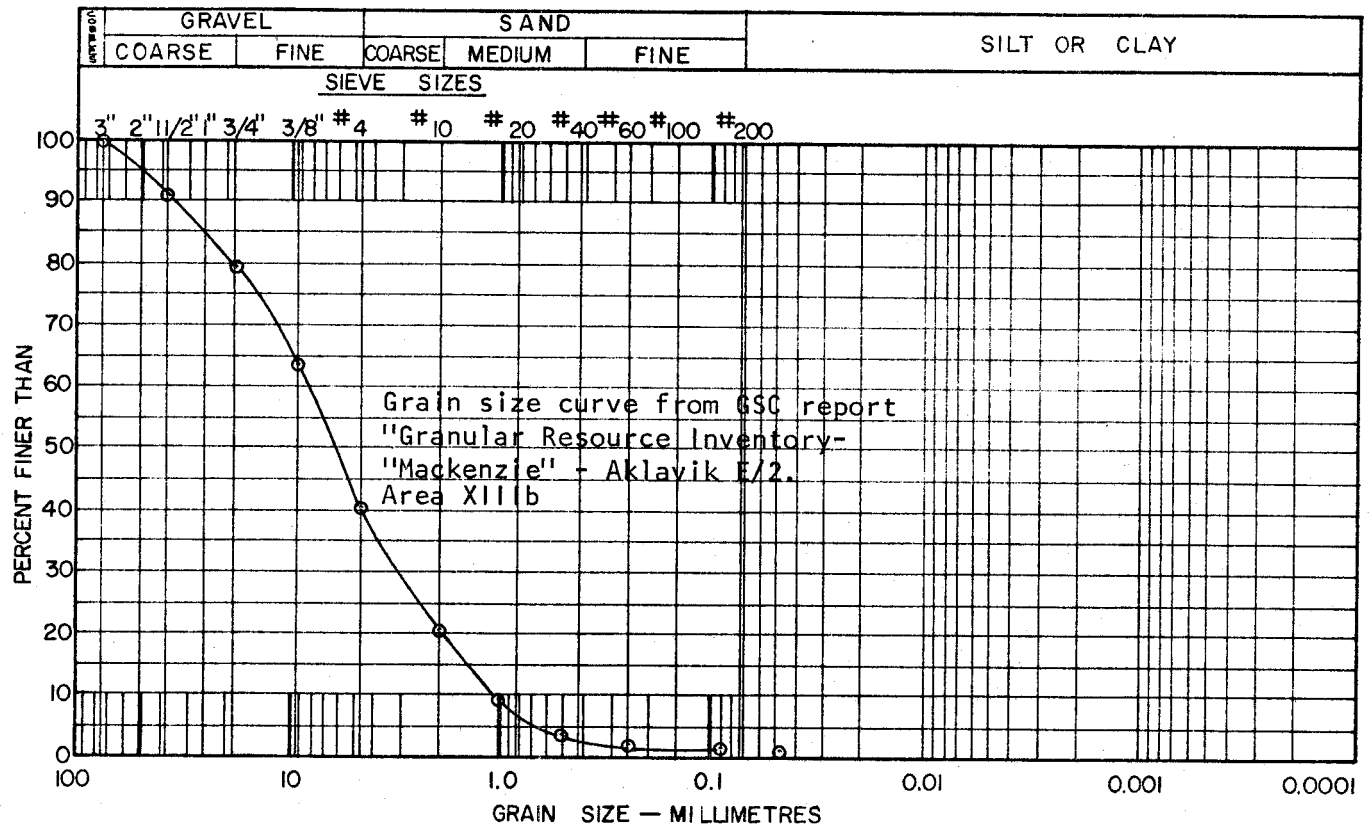
Samples 4 to 6 depth 8'-15'

Quartzite	-71%
Sandstone-soft	-25%
Quartz	-3%
Granite	-1%
Ironstone	- neg.
Chert	- neg.
Total	100%

LABORATORY TEST DATA

TEST PIT-SOURCE No. 317-GSC

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

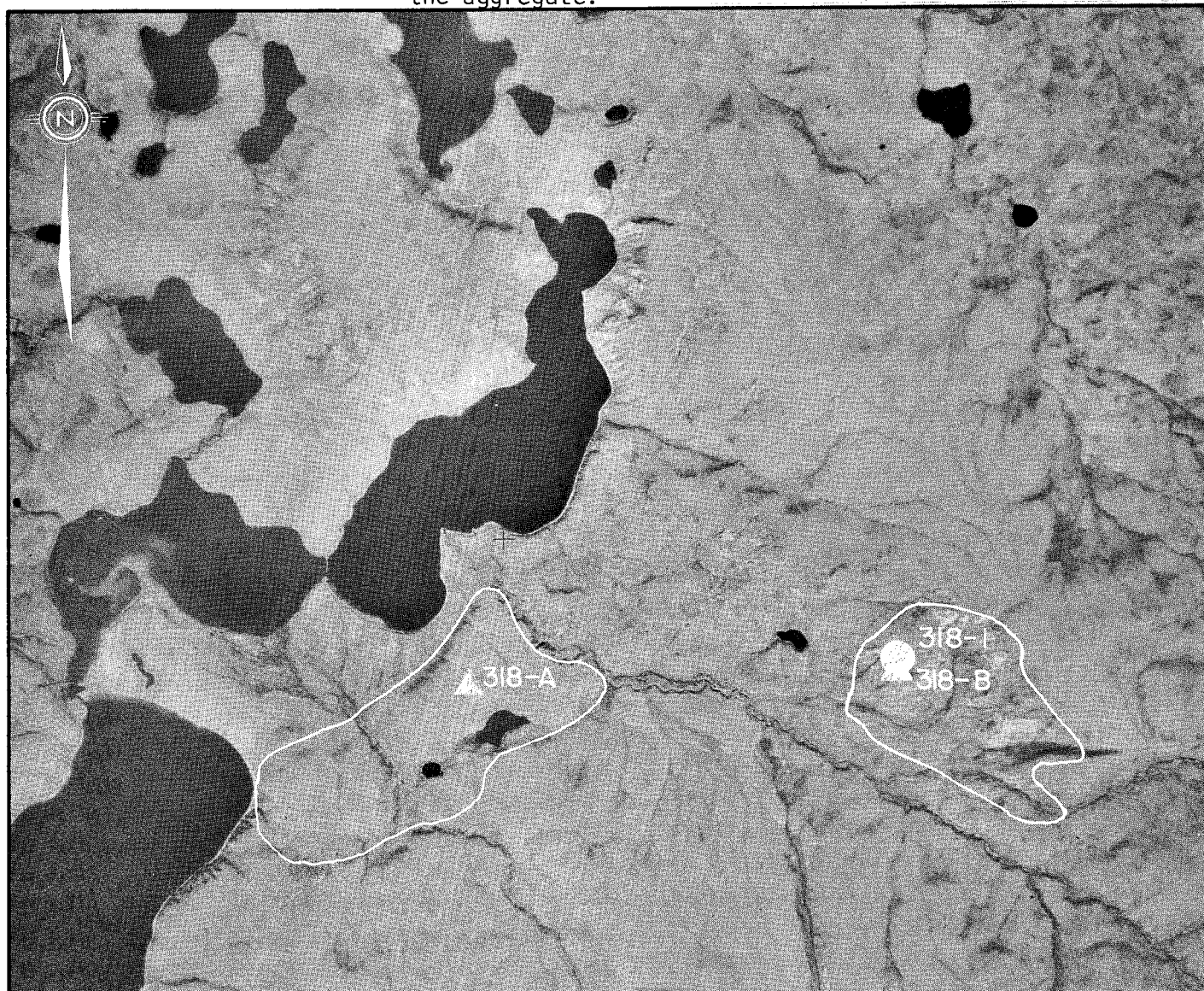
ZONE III
SOURCE No. 318

LANDFORM AND LOCATION: An outwash area and a redeposited alluvial fan located adjacent to the Wolverine Lakes about 38 miles north of Inuvik.

MATERIAL: SAND - and gravel
GRAVEL - and sand

VOLUME: Up to 2,000,000 cubic yards in alluvial fan, depending on ice occurrences.

CONCLUSION: Low priority for development because of ice lensing in the deposit and inferior quality of the aggregate.



AIRPHOTO No. A12918 - 157

SCALE: 1" = 3000' (approx.)

318 ENVIRONMENT

Physical

The western area of the source is probably an outwash while the eastern area is probably a redeposited alluvial fan. Both areas are located on the hills above and east of the Wolverine Lakes, 38 miles north of Inuvik. The areas are divided by a deep gully draining to the lake. The fan area, to the northeast, is about 3,500 feet long and 3,000 feet wide; the outwash area about 6,000 feet by 2,000 feet.

Drainage of the source is good because of topography, although several small ponds are located within them. The source has not been developed.

Biotic

Vegetative cover is thin to non-existent, with the upper portions of many gravel deposits bare. Where it occurs, ground cover consists of moss, lichens, and a few upland dwarf shrubs.

The source lies within the Mackenzie Reindeer Grazing Reserve, but is not critical to wildlife or fish.

Wolverine Lakes, located adjacent to the source, may contain fish and must receive consideration in any development that is planned.

318 MATERIALS AND QUANTITIES

The material in the westerly or outwash deposit appears to be consistently poor, primarily silty fine sand.

The material in the northeasterly or fan deposit is a reasonably good general fill, about 50% gravel, 43% sand, and 7% silt, with the gravel grading to a maximum particle size of 2½ inches.

Ice appears to be prevalent in this source. Although the moisture content in the gravel and sand of Test Hole #1 is only 6% to 8%, ice could be seen as a coating or as inclusions. Two strata of clear ice were penetrated at depths of 9½ and 17 feet, one 1½ feet thick and the other 2 feet thick.

The volume of recoverable material in the fan deposit will depend on the rippability of the frozen sand and gravel and on the amount of heavy ice encountered, but could be as much as 2,000,000 cubic yards.

318 DEVELOPMENT

General

The development of the fan deposit of this source is recommended for local projects. The material can be used as general fill or for road construction.

The outwash section of the source is not suitable for development because of inferior quality.

Access

At present this area is accessible only during winter, hauling over the tundra on snow roads.

Projects along the Mackenzie River can be served from this source by a winter road running southwest around the north end of the proposed Caribou Hills Reserve of the International Biological Programme, a distance of 10 miles. This route passes Source I-407, a very large deposit of excellent material reserved for the use of Inuvik, so the feasibility of hauling material from Source 318 to Inuvik is dubious.

The access road from the source to the Wolverine Lakes must negotiate some difficult grades.

Material Use and Handling

All material excavated from this source will probably require ripping, stockpiling, thawing, and draining before shipping for use. Probably substantial strata of clear ice will have to be removed as well.

Although the grading reported from Test Hole #1 is very good, the quality of stone is unsatisfactory for concrete or asphalt aggregate.

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

Stripping and Restoration

The depth of stripping will vary from nothing to about 1 foot, and this material must be stockpiled for replacement after the granular material has been removed. The stockpiles of topsoil, frozen granular material, and ice or ice-rich silt must be located so they will not drain directly into the natural drainage system, in order to avoid siltation of the streams and lakes.

Large areas of ground ice must not be exposed on sloping ground, to prevent sloughing and problems in restoration.

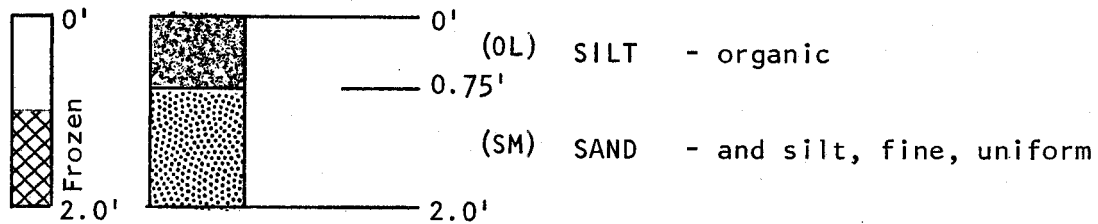
The area exposed at one time must be minimized in order to limit the thermal disturbance to ground ice at depth.

After an area has been covered with topsoil it should be seeded for speedy revegetation, using a selection of plants and methods of preparation recommended by an expert in Arctic horticulture.

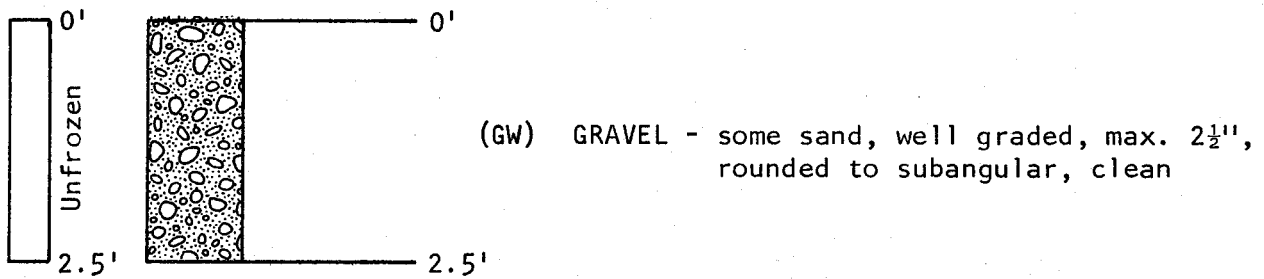
TEST PIT LOGS

SOURCE No. 318

318-A



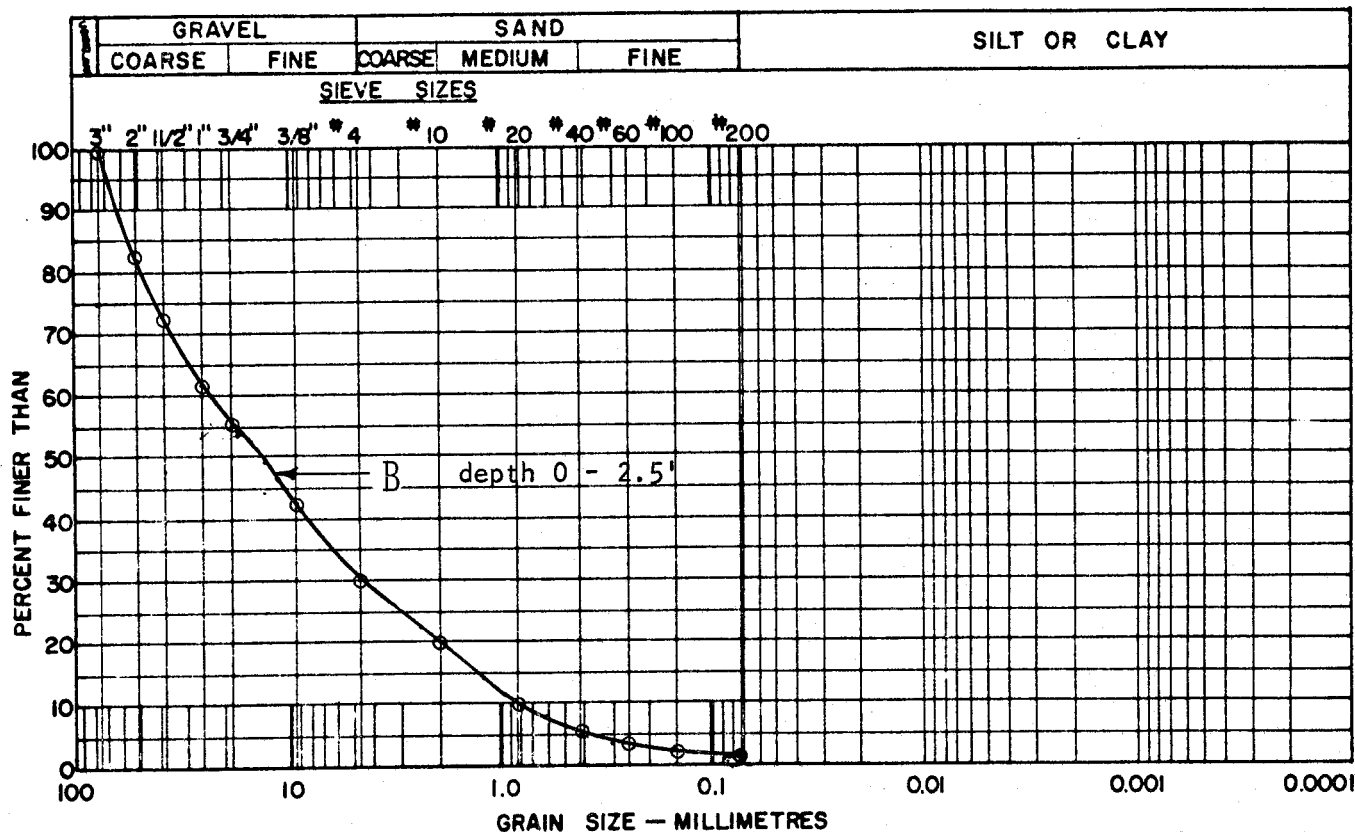
318-B



LABORATORY TEST DATA

SOURCE No. 318

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A depth 0 - 2.5' 3.1%

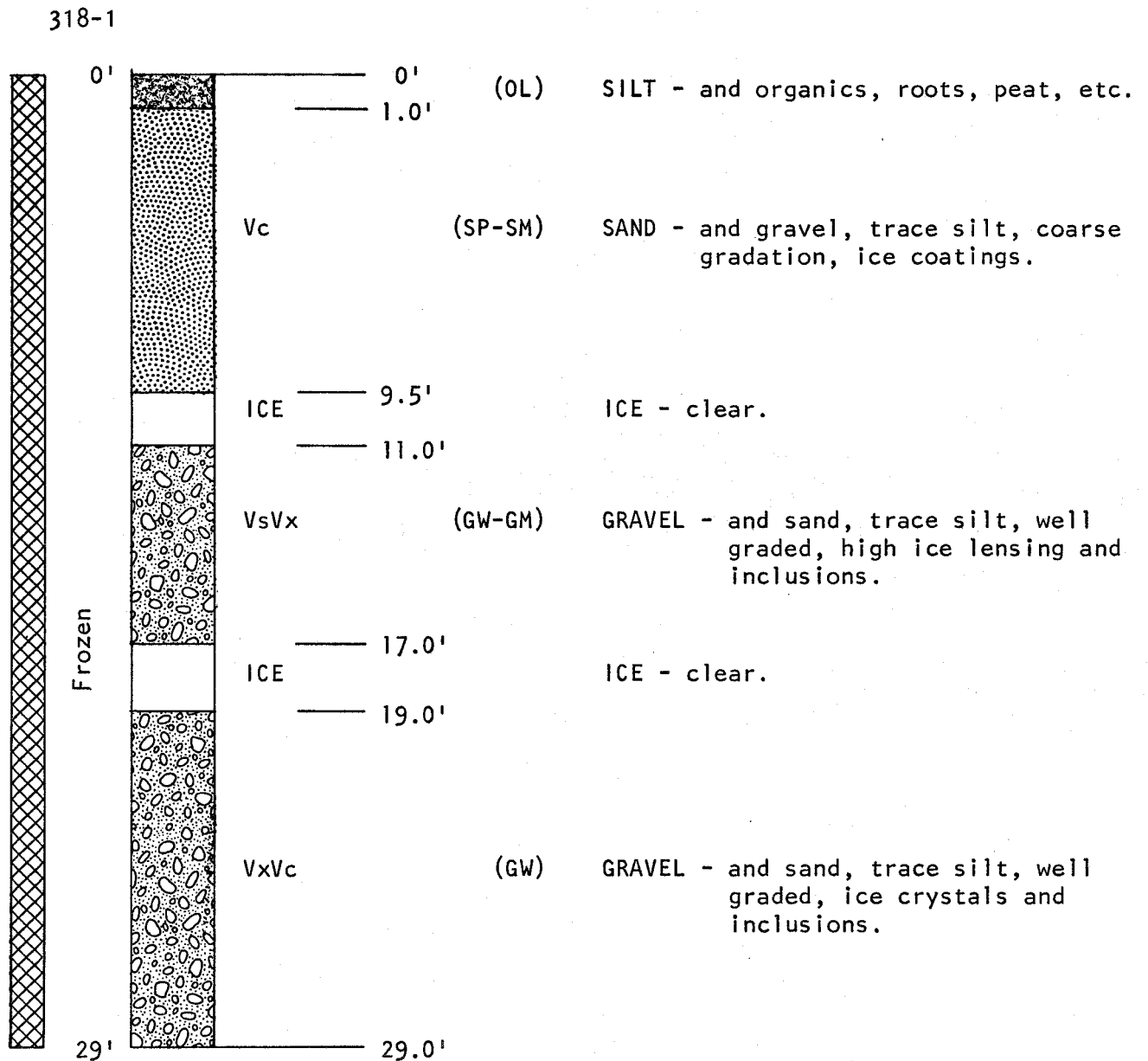
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

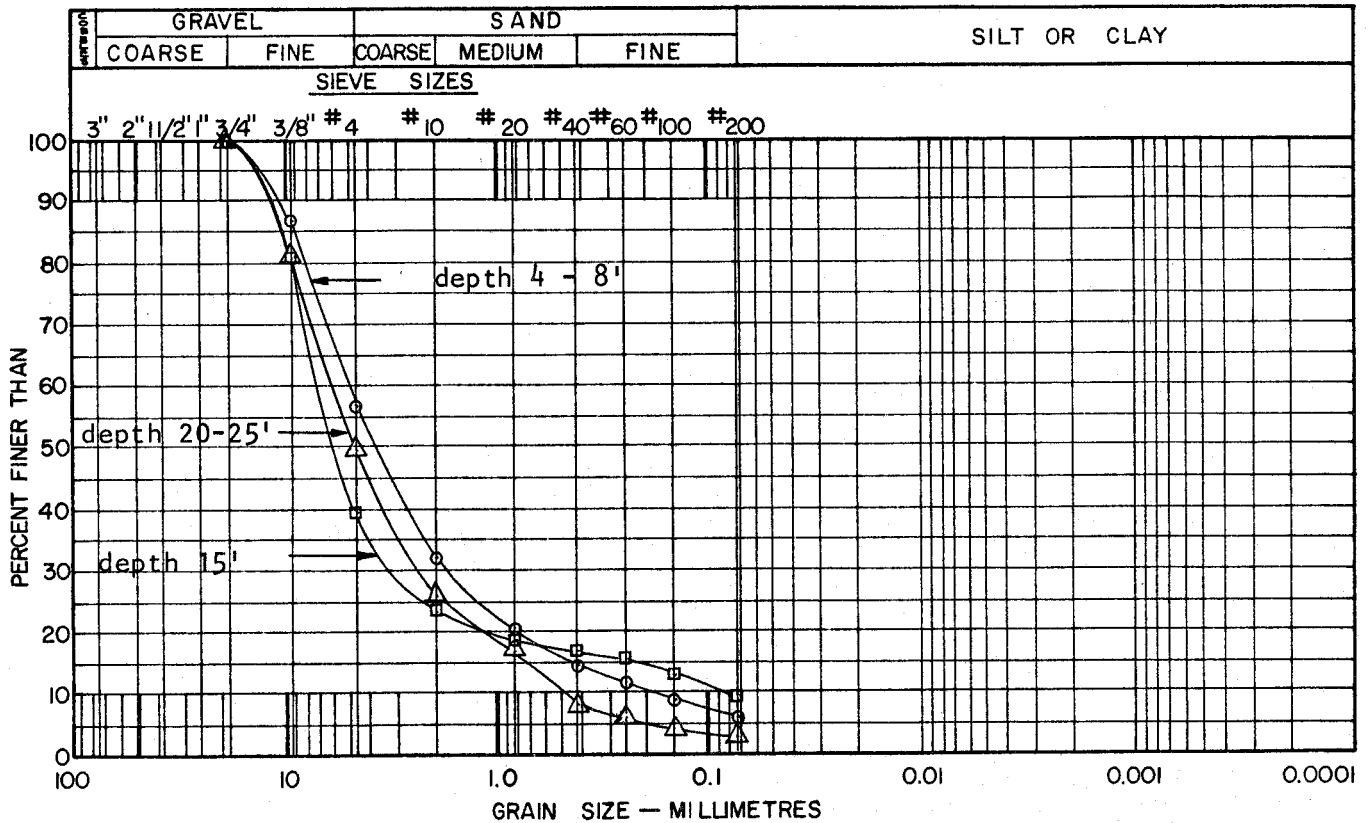
SOURCE No. 318



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 318-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	24.7%	Sample 7	depth 20'	5.9%
Sample 2	depth 4'	6.7%	Sample 8	depth 25'	6.9%
Sample 3	depth 6'	6.8%			
Sample 4	depth 8'	7.3%			
Sample 6	depth 15'	8.8%			

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

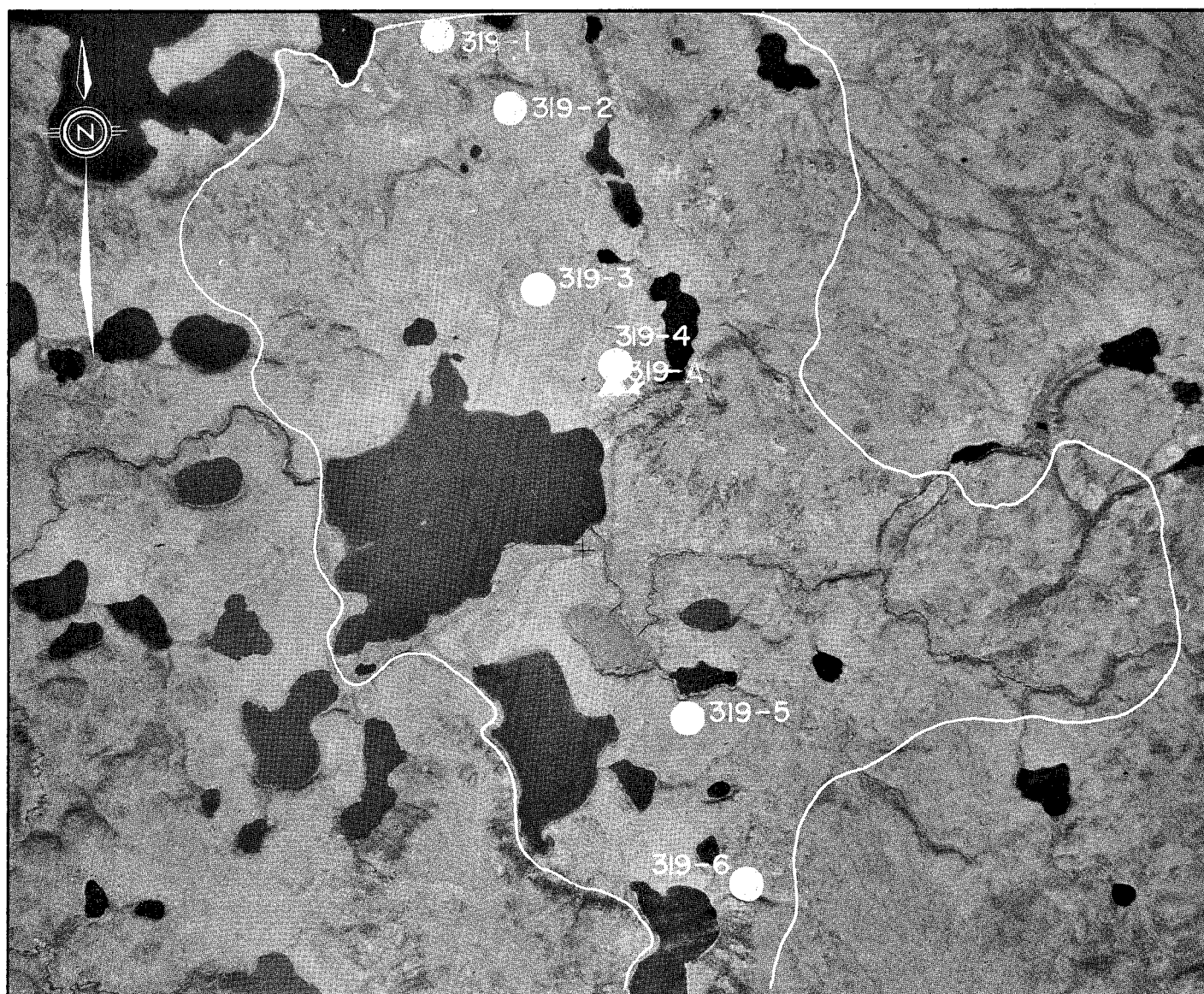
ZONE III
SOURCE No. 319

LANDFORM AND LOCATION: A large kame field north of Wolverine Lakes, 40 miles north of Inuvik.

MATERIAL: SAND - and gravel, trace of silt
GRAVEL - and sand

VOLUME: 500,000 to 1,500,000 cubic yards

CONCLUSION: Suitable for development, probably for local projects because of remote location.
General fill, road material, aggregates.



AIRPHOTO No. A12918-158

SCALE: 1" = 3000' (approx.)

Physical

This source is a very large kame field located at the north end of the Wolverine Lakes, 40 miles north of Inuvik. The area is about 4 miles long and 2 miles wide, very irregular topography, and contains many gullies, ponds, and lakes.

The drainage of the individual kames is good because of topography, and the source has not been developed.

Biotic

Vegetative cover is thin to non-existent, with the upper portions of many gravel deposits bare. Where it occurs, ground cover consists of moss, lichens, and a few upland dwarf shrubs.

The source lies within the Mackenzie Reindeer Grazing Reserve, but is not critical to wildlife or fish.

Wolverine Lakes, located adjacent to the source, may contain fish and must receive consideration in any development that is planned.

319 MATERIAL AND QUANTITIES

As can be expected in an area so large and in a deposit so erratic by nature, the quality of materials varies within wide limits.

A surface mantle of medium to coarse gravel was observed on many of the kame hillocks in this source, but drilling showed that surface showings of good material are not necessarily indicative of good material at depth.

Many kames contain sand and gravel, well graded to a maximum size of 2½ inches, with some silt near the surface, but only a trace at depth.

Test Hole #4 contained material with a classical grain-size curve, with 45% gravel, 53% sand and 2% silt at depth.

The petrographic analysis of the gravel samples from the lower 24 feet of this test hole indicate a sound material, primarily quartzite (81%), and a marginal sandstone (11%), with quartz (5%),

chert, and a trace of ironstone making up the remaining 8%. The total unsound component is less than 10%.

Ice is prevalent in the source. Four test holes encountered heavy to massive ice at depths less than 10 feet, and ice was generally reported in the sand and gravel as coating and inclusions.

The moisture content reported in Test Holes #2 and #4 are reasonably low, ranging from 3% to 8% at depth. The other holes reported higher values.

An accurate estimate of the volume of recoverable material in this type of source would require the drilling of each kame, a requirement that is obviously impractical. The total is expected to lie between 500,000 cubic yards and 1,500,000 cubic yards.

319 DEVELOPMENT

General

This source is satisfactory for development, although its location probably limits its application to local projects only.

A program of more detailed investigation is required, to identify the kames that contain a substantial volume of satisfactory material. The skimming of shallow deposits must be avoided because of the large area of ground ice exposed in so doing.

Special measures are required to avoid the siltation of local streams and lakes.

Access

At present this area is accessible only during winter, hauling over the tundra on snow roads.

Projects along the Mackenzie River can be served from this source by a winter road running southwest around the north end of the proposed Caribou Hills Reserve of the International Biological Programme, a distance of 10 miles. This route passes Source I-407, a very large deposit of excellent material reserved for the use of Inuvik, so the feasibility of hauling material from Source 319 to Inuvik is dubious.

Material Use and Handling

The material from selected kames in this source can be used for general fill, road construction, and as aggregate for concrete and asphalt construction.

Probably most of the material, if not all, must be ripped, stockpiled, thawed, and drained before shipping.

Small volumes of material for concrete construction can be produced by selection within a pit and screening to remove oversize. Larger volumes will require crushing and screening plants.

The equipment required for the development of this source is the usual assembly of dozer with ripper attachment, front-end loader, and trucks, with the addition of screening plant for aggregate production.

Stripping and Restoration

The material stripped from the surface will be mostly silty sand and gravel, and very little organic material. All of it must be stockpiled for replacement after the granular material has been removed. Stockpiles of topsoil, frozen granular material, and ice or ice-rich silt must be located so they will not drain directly into the natural drainage system, in order to avoid the siltation of streams and lakes.

Large areas of ground ice must not be exposed on sloping ground, to prevent sloughing and problems in restoration.

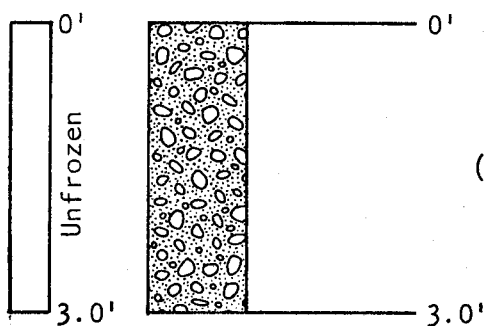
The area exposed at one time must be minimized in order to limit the thermal disturbance to ground ice at depth.

After an area has been covered with topsoil, it should be seeded for speedy revegetation, using a selection of plants and methods of preparation recommended by an expert in Arctic horticulture.

TEST PIT LOGS

SOURCE No. 319

319-A

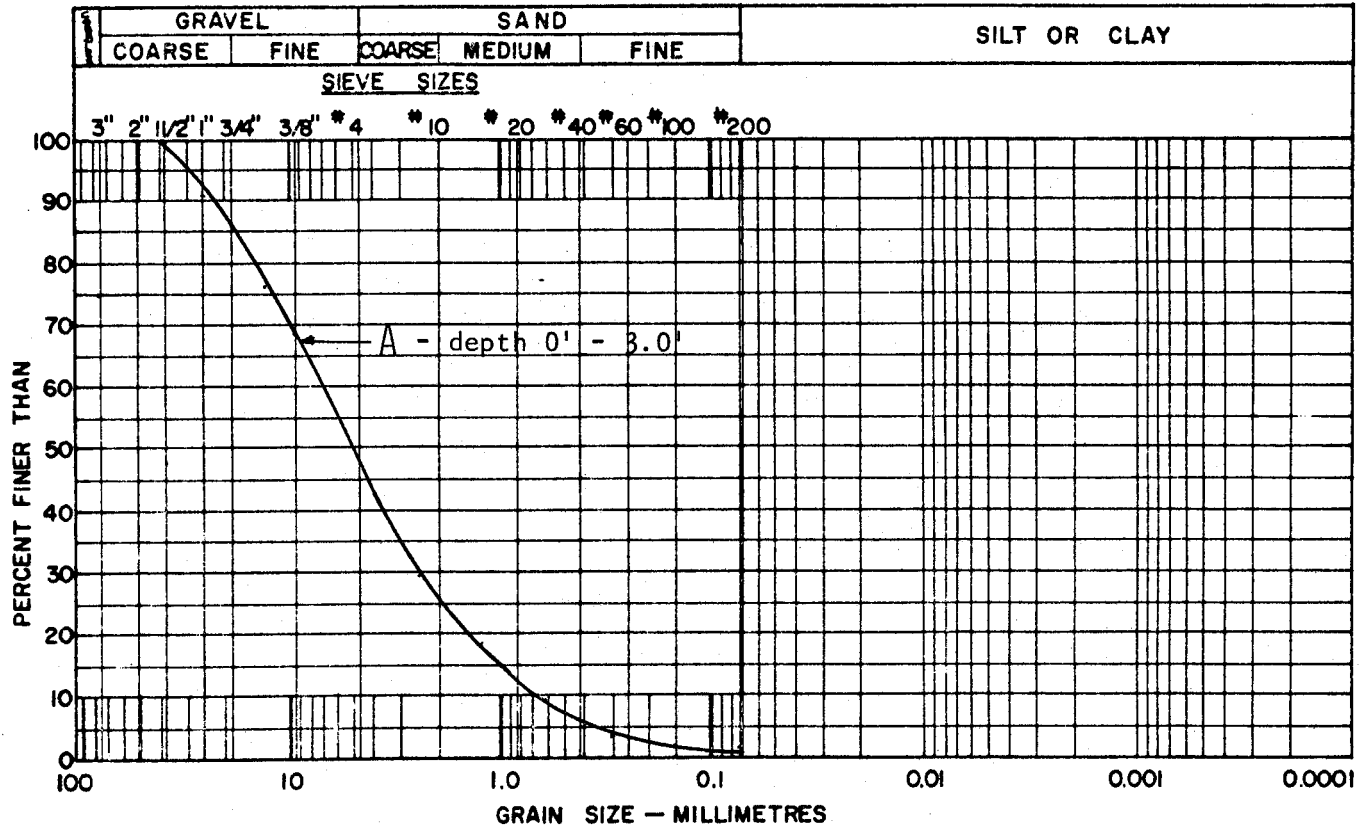


(GW) GRAVEL - and sand, well graded, rounded to subangular, max. 2 1/2", clean

LABORATORY TEST DATA

SOURCE No. 319

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A depth 0' - 3.0' 3.1%

ORGANIC CONTENT

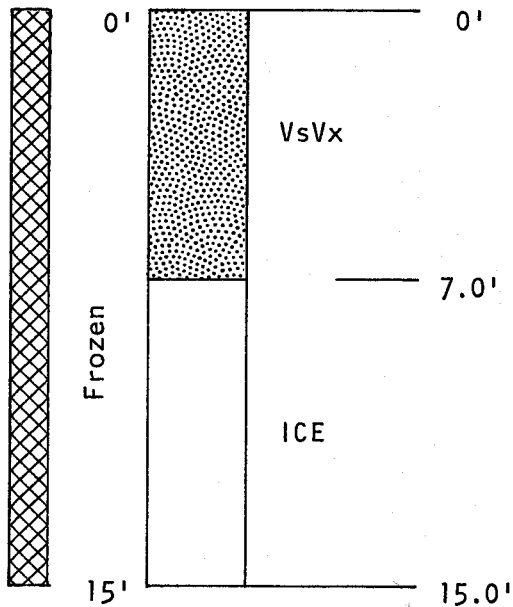
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 319

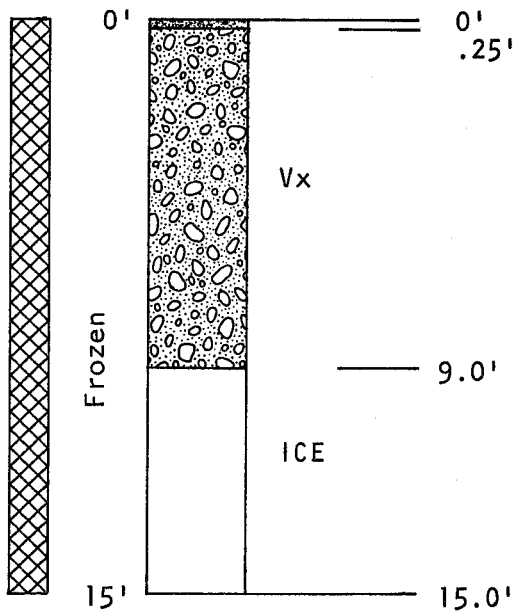
319-1



(SM) SAND - some gravel, some silt, trace clay, well graded, ice lenses and inclusions.

ICE - clear.

319-2



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

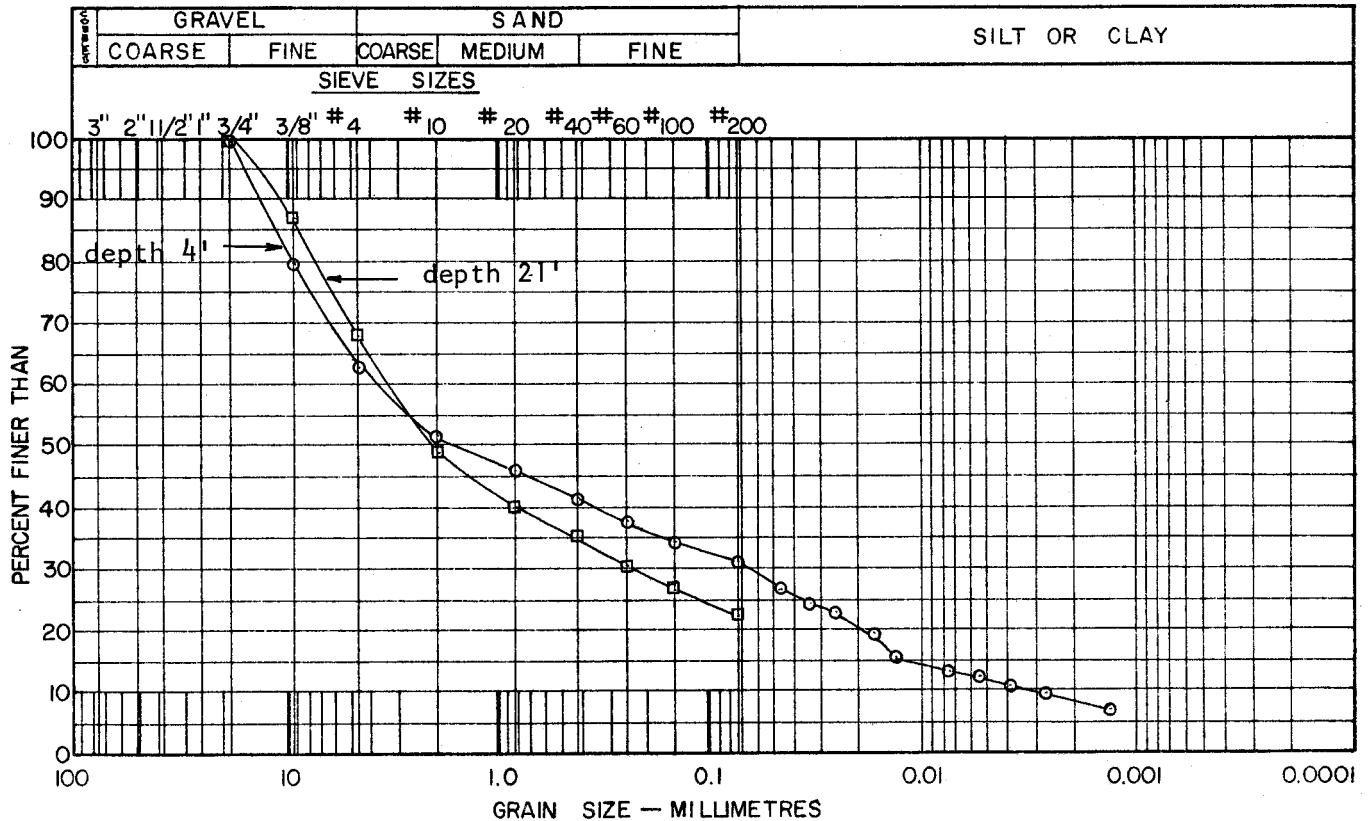
(GW) GRAVEL - and sand, trace silt, well graded, ice crystals and inclusions.

ICE - trace gravel.

LABORATORY TEST DATA

TEST HOLE-SOURCE No. 319-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	5.8%
Sample 2	depth 4'	11.2%
Sample 3	depth 6'	10.3%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

GRAIN SIZE DISTRIBUTION



ORGANIC CONTENT

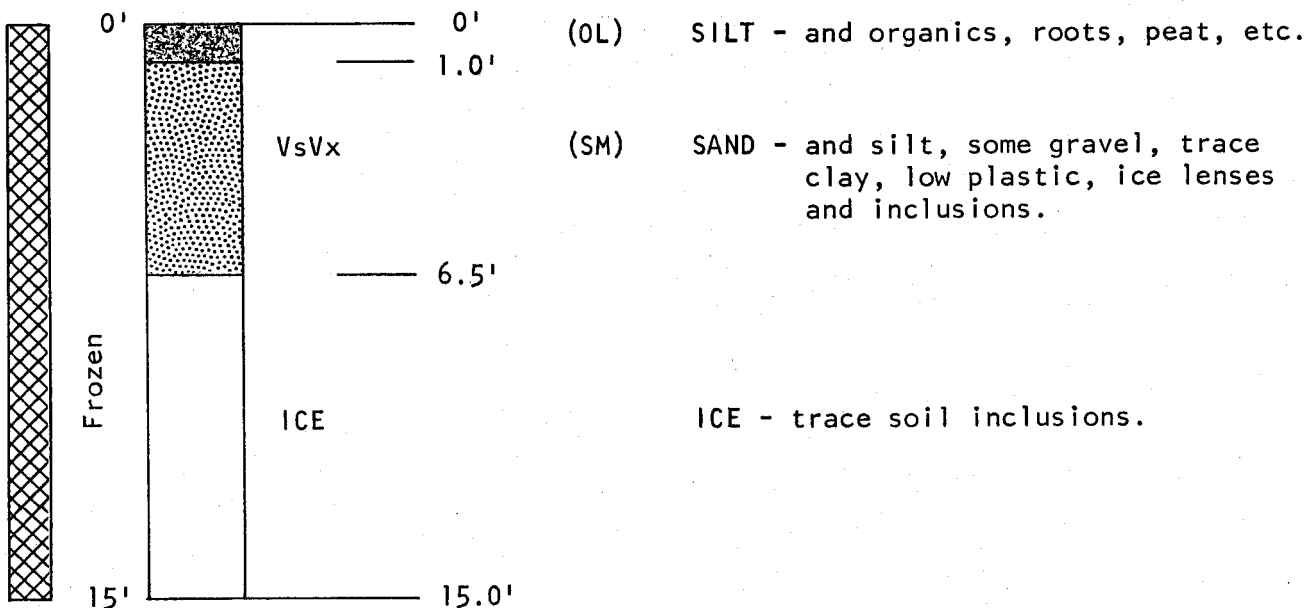
HARDNESS TEST

Ripley, Klohn & Leonoff International Ltd.

TEST HOLE LOGS

SOURCE No. 319

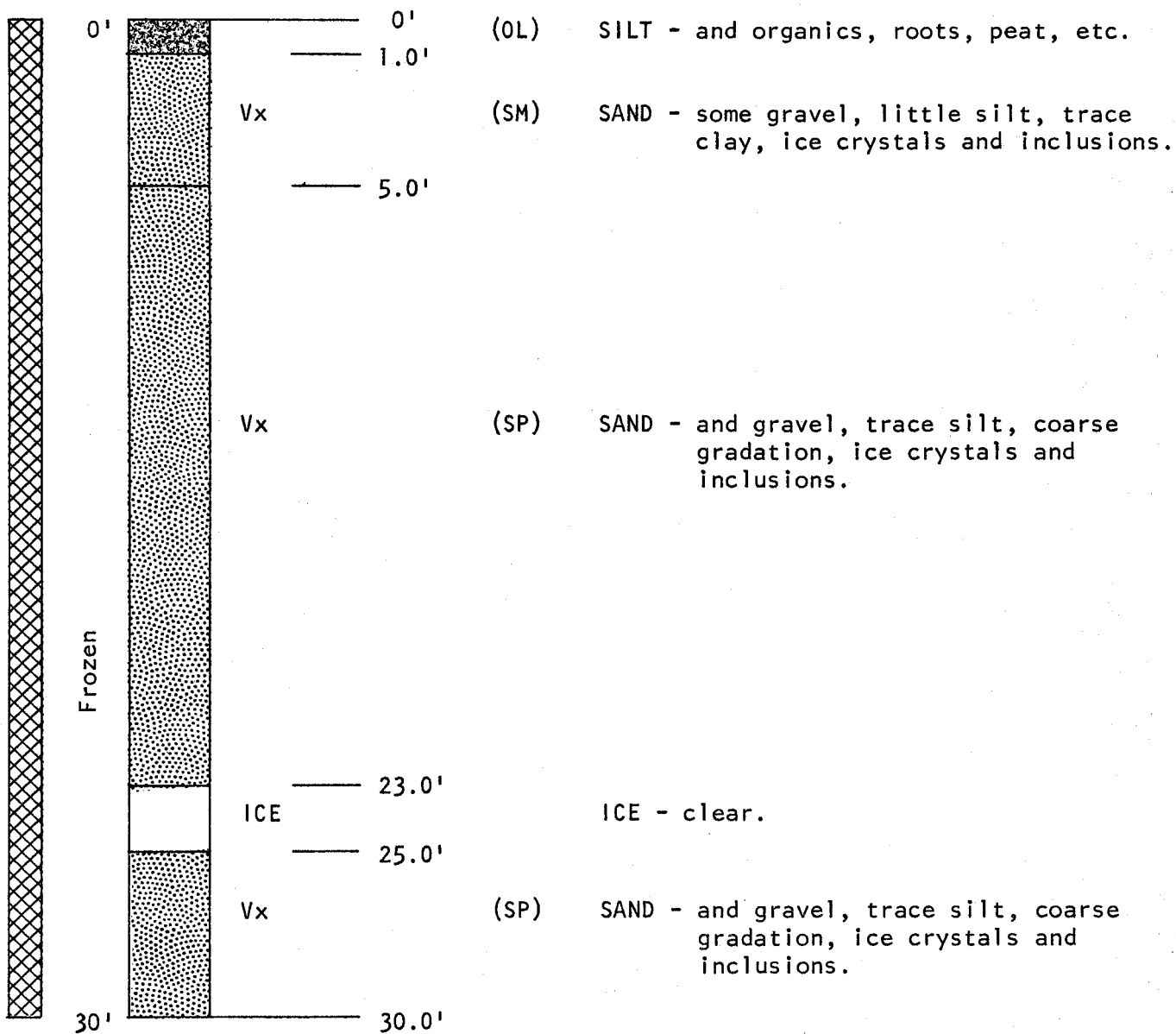
319-3



TEST HOLE LOGS

SOURCE No. 319

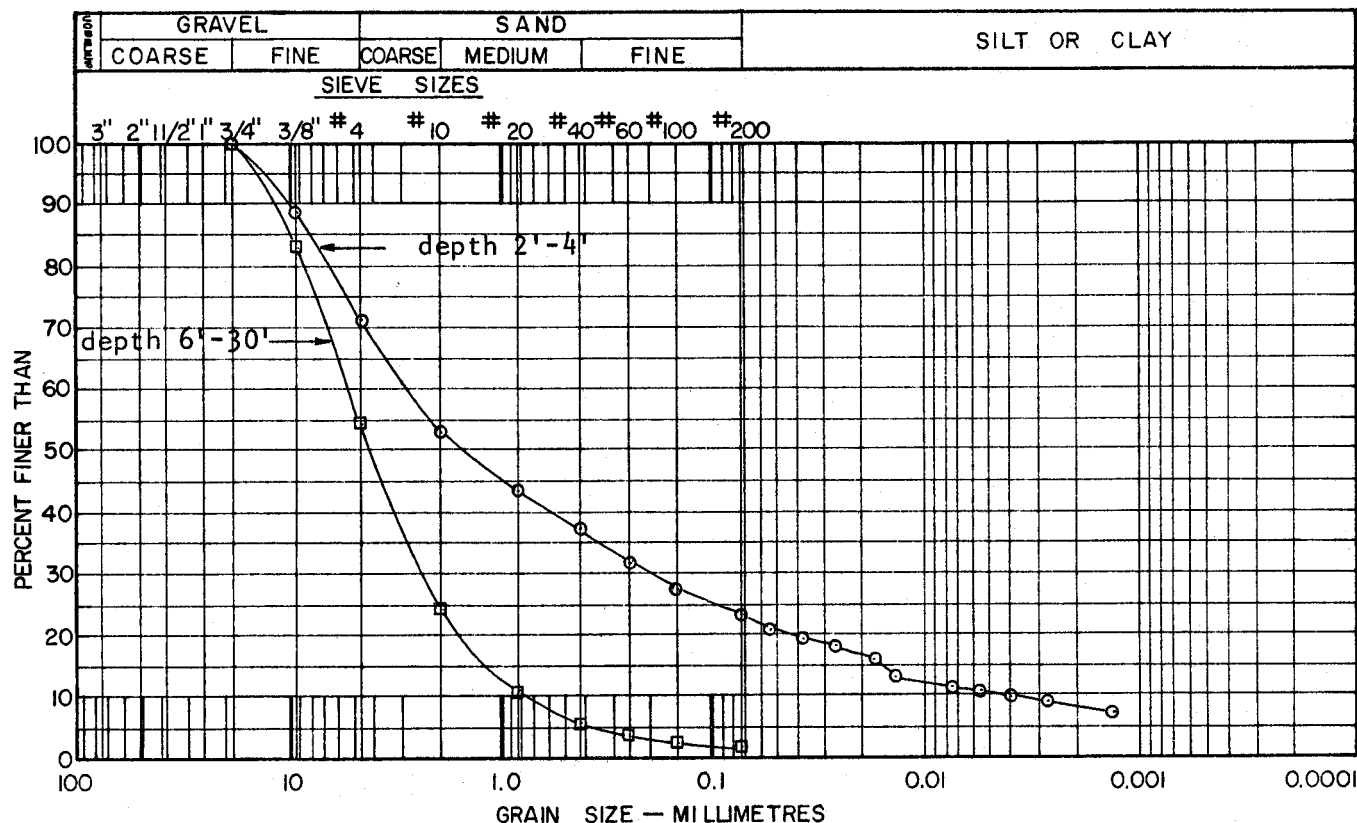
319-4



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 319-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	13.1%	Sample 5	depth 10'	5.9%
Sample 2	depth 4'	8.3%	Sample 6	depth 15'	7.8%
Sample 3	depth 6'	7.8%	Sample 7	depth 20'	4.2%
Sample 4	depth 8'	6.4%	Sample 8	depth 30'	5.6%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

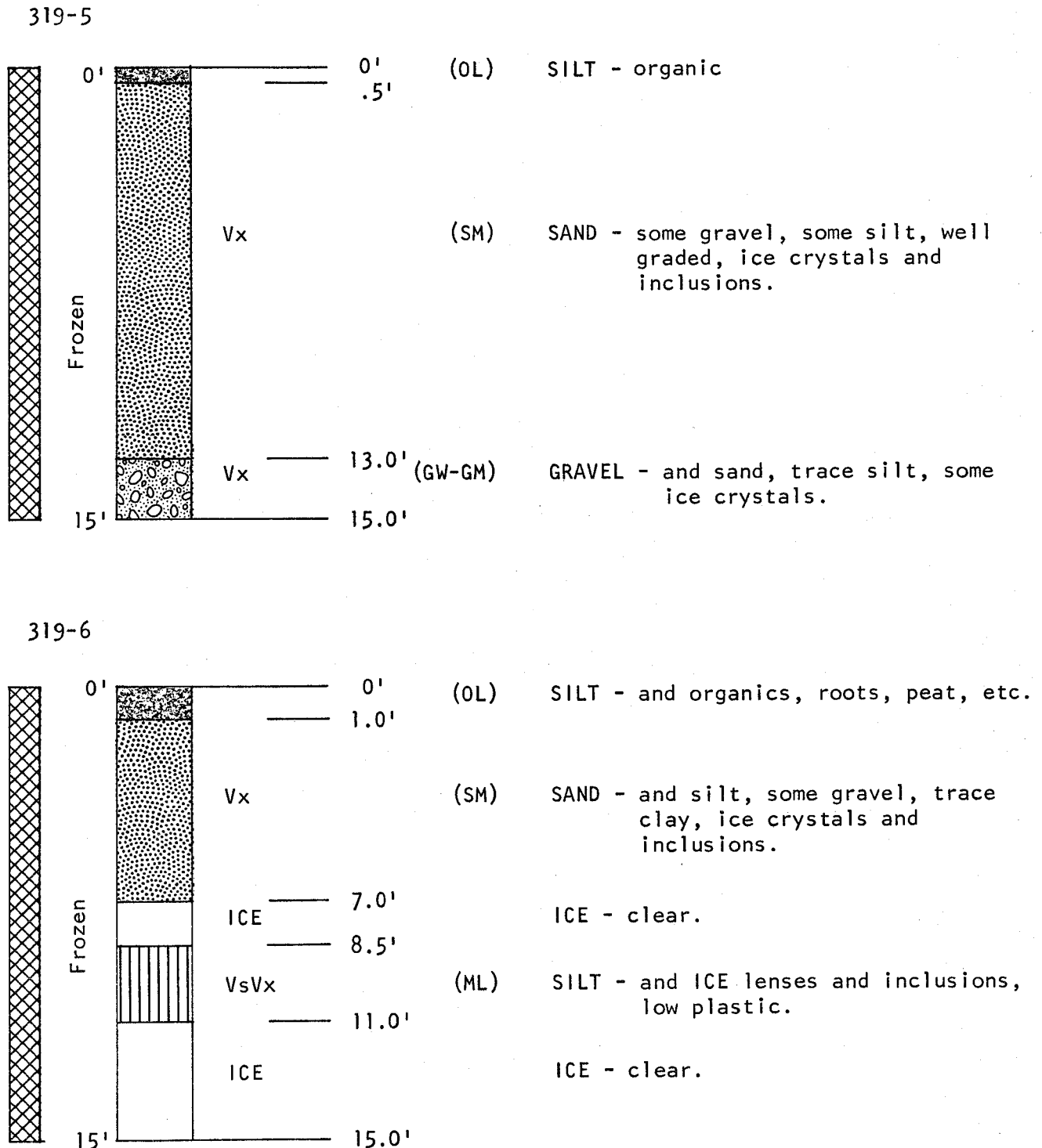
Samples 3 to 8 depth 6' - 30'

Quartzite	-81%
Sandstone-soft	-11%
Quartz	- 5%
Chert	- 3%
Ironstone	- neg.

Total 100%

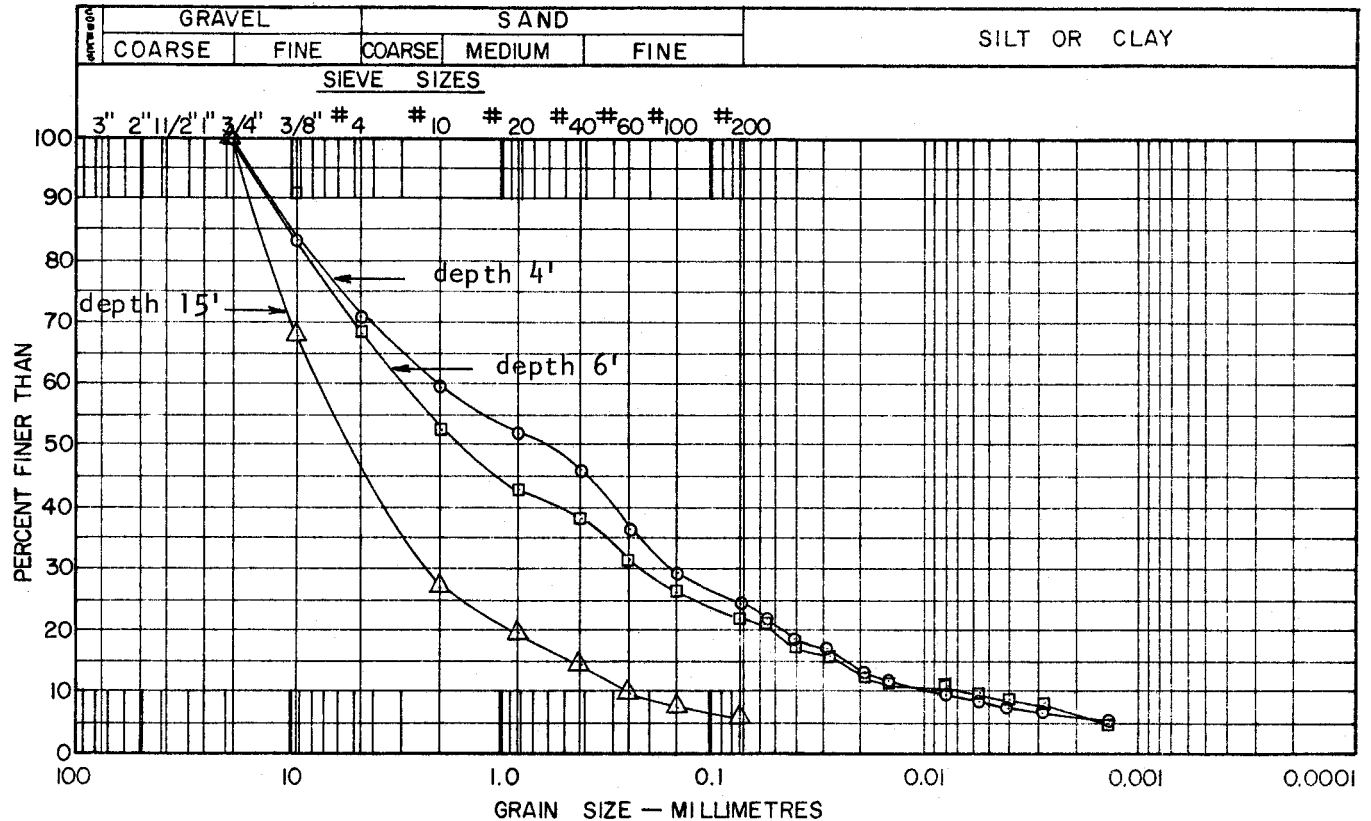
TEST HOLE LOGS

SOURCE No. 319



LABORATORY TEST DATA TEST HOLE-SOURCE No. 319-5

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	28.8%
Sample 2	depth 4'	11.0%
Sample 3	depth 6'	12.7%
Sample 4	depth 15'	6.8%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

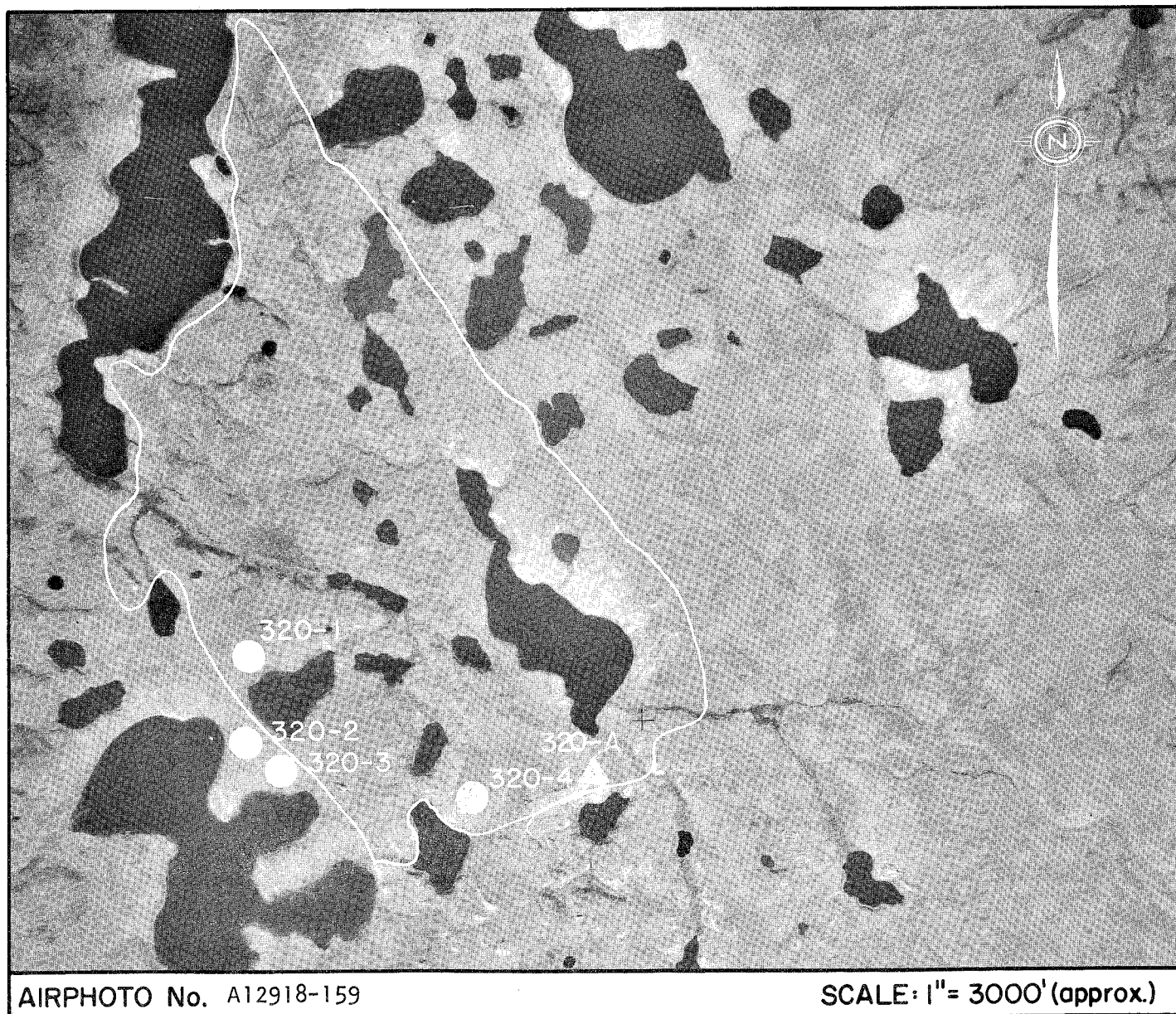
ZONE III
SOURCE No. 320

LANDFORM AND LOCATION: Kame field 4 miles north of Wolverine Lakes, 44 miles north of Inuvik.

MATERIAL: SAND - trace gravel, little silt
SAND - some gravel, trace silt

VOLUME: 500,000 to 1,500,000 cubic yards

CONCLUSION: Low priority for development due to high ice and silt contents. Possible use in local projects for general fill.



Physical

This source is a large kame field located 4 miles north of Wolverine Lakes and 44 miles north of Inuvik. The area is 3 miles long and 1½ miles wide, very irregular in relief, and contains a number of isolated kame hillocks and ridges separated by flat areas, gullies, and ponds.

Drainage is good because of the topography, and the source has not been developed.

Biotic

On many of the kames, the sand and gravel are exposed, with no vegetative cover; elsewhere the cover consists of moss and lichen, with some dwarf shrubs.

The source lies within the Mackenzie Reindeer Grazing Reserve, but is not critical to wildlife or fish.

320 MATERIAL AND QUANTITIES

The source is a group of relatively small individual sources, and each must be evaluated and developed separately. In some, a substantial depth of granular material is exposed at the surface, in others, a layer of silt or silty sand covers the gravel to a depth of 5 to 7 feet. In all test holes, the silt content varies erratically with depth, up to a maximum of about 30%.

Ice is prevalent at this source. Two holes penetrated massive ice, one at 7 feet and the other at 27 feet. All test holes report ice coating and inclusions in the sand and gravel.

The moisture content in the sand and gravel at depth varied from 6% to 14%. Some of the silty sand overlying the gravel is ice-rich and would be difficult to excavate.

A reasonably accurate estimate of the volume of recoverable material in this source would require the drilling of each kame, a requirement that is obviously impractical at this time. The total is expected to

lie between 500,000 and 1,500,000 cubic yards.

320 DEVELOPMENT

General

The material in this source contains too much silt to be suitable for anything but general fill, and for this use some selectivity in choosing which kames to develop will be required. It is recommended that development should be preceded by a program of drilling and investigation.

The source is low priority, but could be developed for local projects for the supply of general fill.

Access

At present this area is accessible only during winter, hauling over the tundra on snow roads.

Projects along the Mackenzie River can be served from this source by a winter road running southwest around the north end of the proposed Caribou Hills Reserve of the International Biological Programme, a distance of 10 miles. This route passes Source I-407, a very large deposit of excellent material reserved for the use of Inuvik, so the feasibility of hauling material from Source 320 to Inuvik is dubious.

Material Use and Handling

The problems to be faced in developing this source are twofold--silt and ice. The average silt content in the better deposits will permit the use of the material in general fill. The ice could present problems in getting to the sand and gravel, and also will require that all excavated material be ripped, stockpiled, thawed, and drained before shipping. The ice will also present problems in restoration.

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

Stripping and Restoration

The depth of stripping will vary from nothing to several feet, and the stripped material will be mostly silty sand with very little organic cover. This material must be stockpiled for replacement after the granular material has been removed. The stockpiles of topsoil, frozen granular material, and ice or ice-rich silt must be located so they will not drain directly into the natural drainage system, in order to avoid siltation of the streams and lakes.

Large areas of ground ice must not be exposed on sloping ground, to prevent sloughing and problems in restoration.

The area exposed at one time must be minimized in order to limit the thermal disturbance to ground ice at depth.

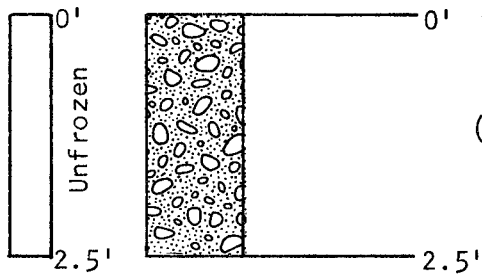
After an area has been covered with topsoil, it should be seeded for speedy revegetation, using a selection of plants and methods of preparation recommended by an expert in Arctic horticulture.

Access roads through the rough topography of this source must be planned carefully, to avoid the deterioration of streambeds and the resultant siltation of the streams.

TEST PIT LOGS

SOURCE No. 320

320-A

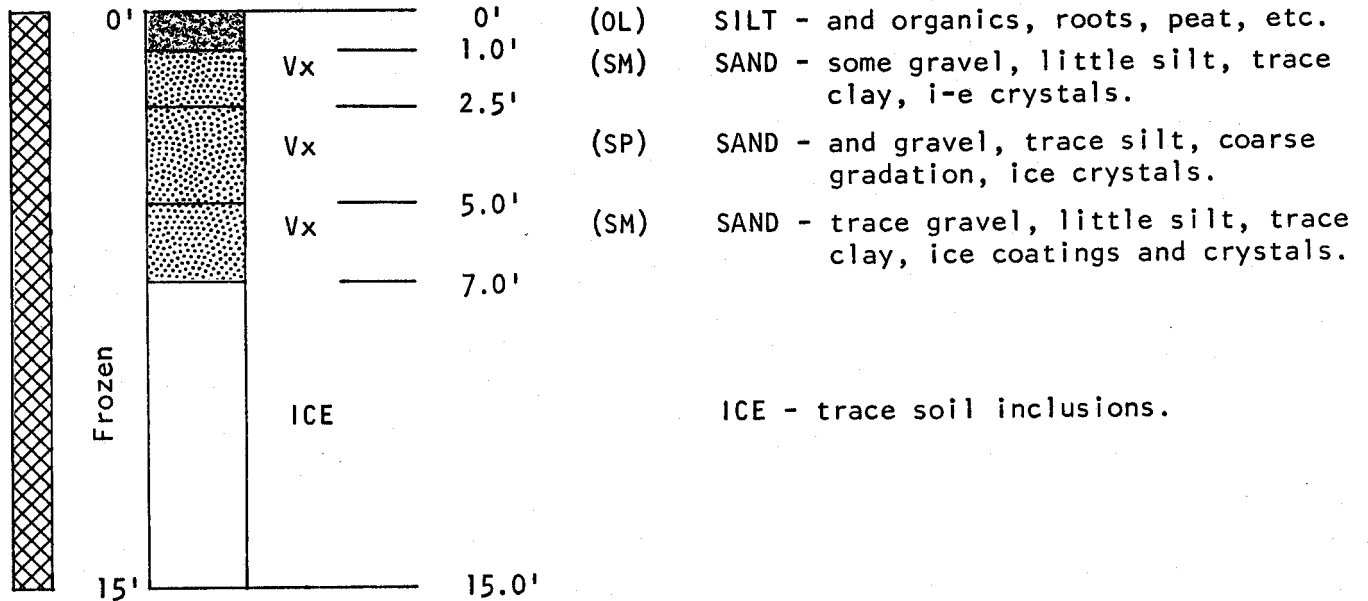


(GW) GRAVEL - and sand, well graded, rounded to subangular, max. $2\frac{1}{2}$ "

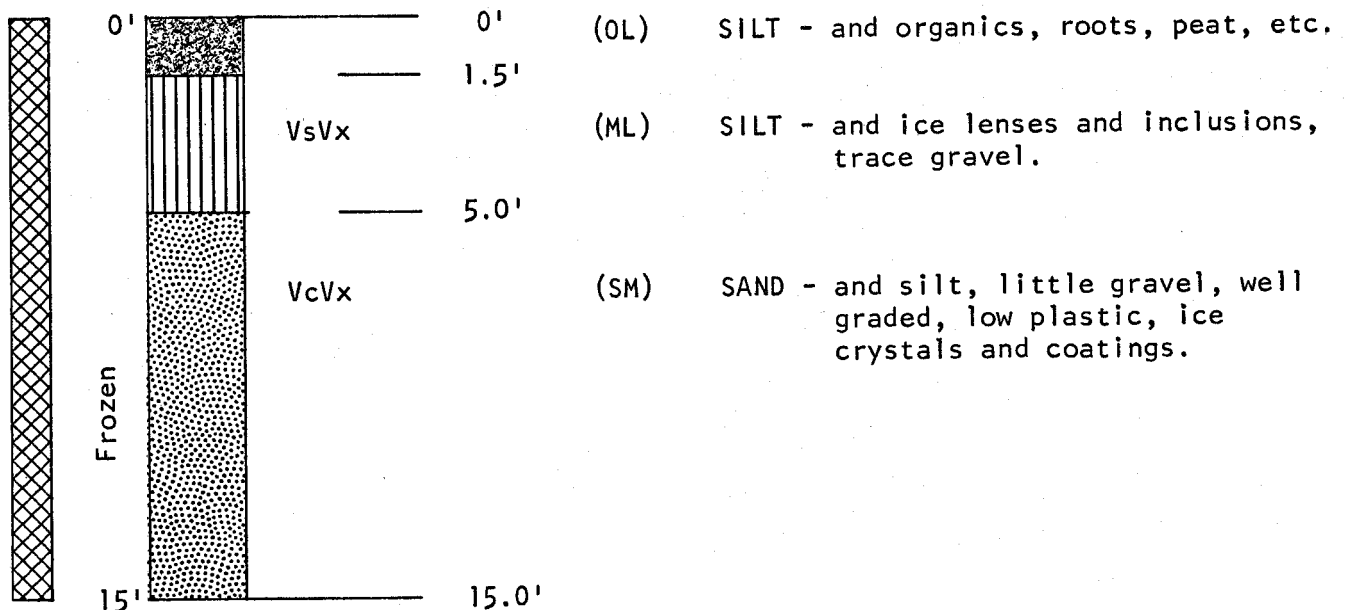
TEST HOLE LOGS

SOURCE No. 320

320-1

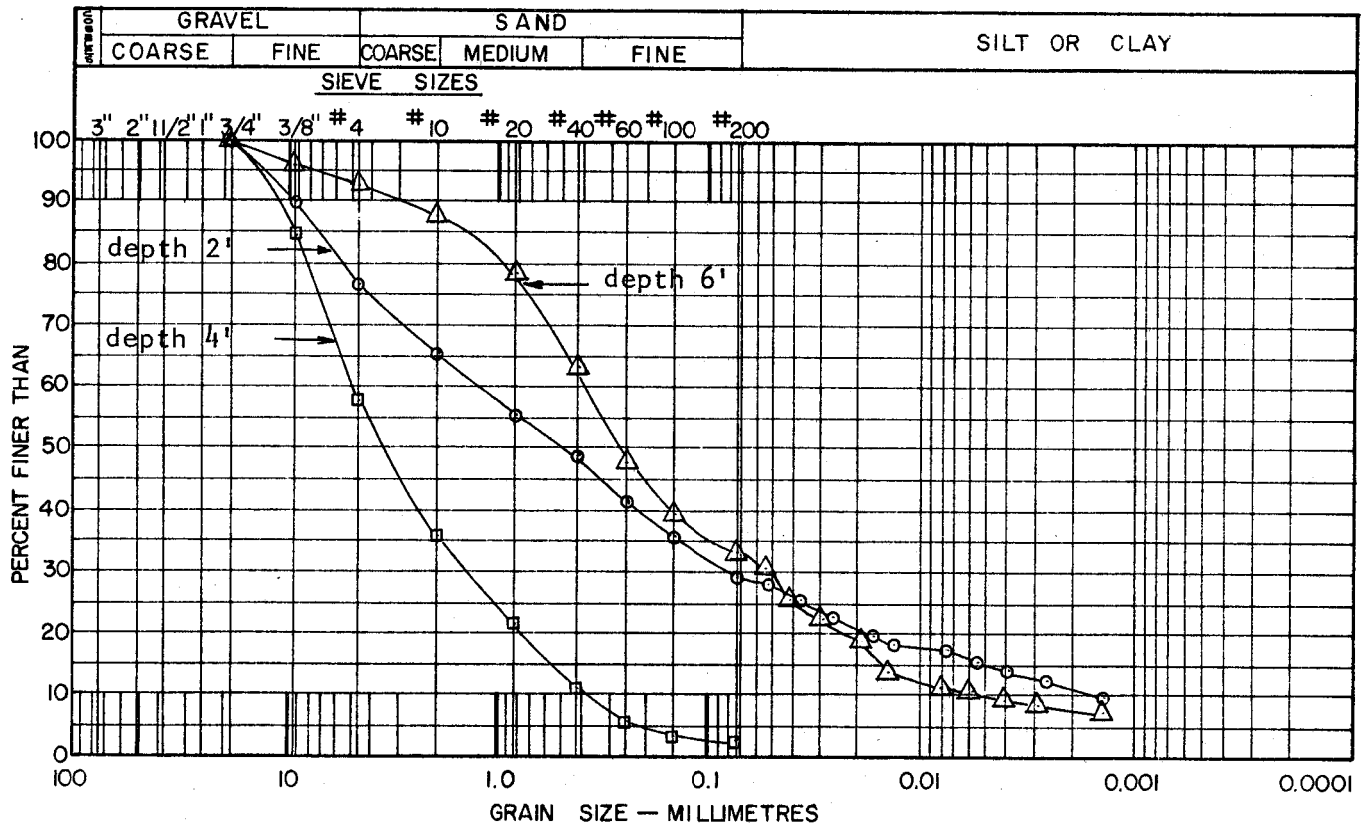


320-2



LABORATORY TEST DATA TEST HOLE-SOURCE No. 320-1

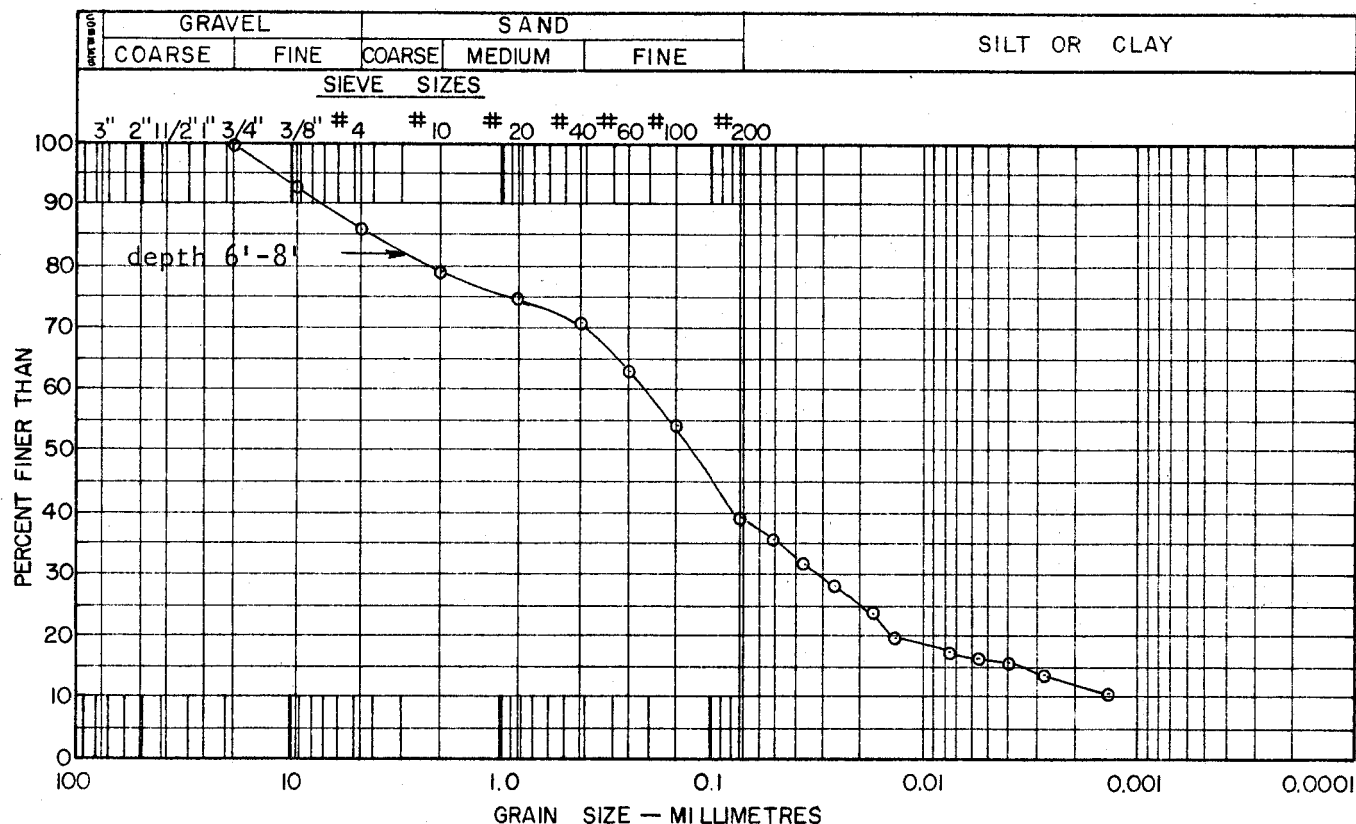
GRAIN SIZE DISTRIBUTION



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 320-2

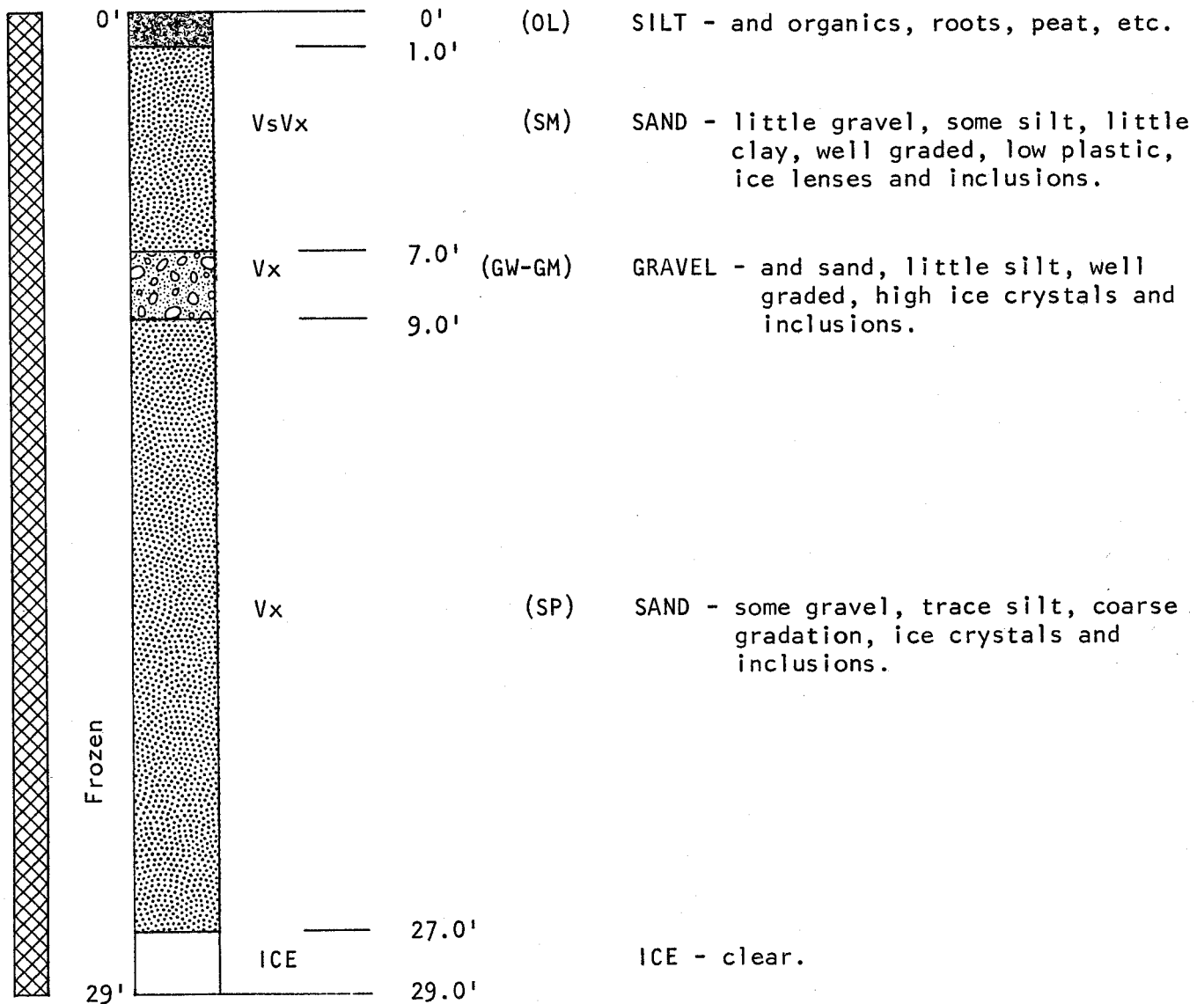
GRAIN SIZE DISTRIBUTION



TEST HOLE LOGS

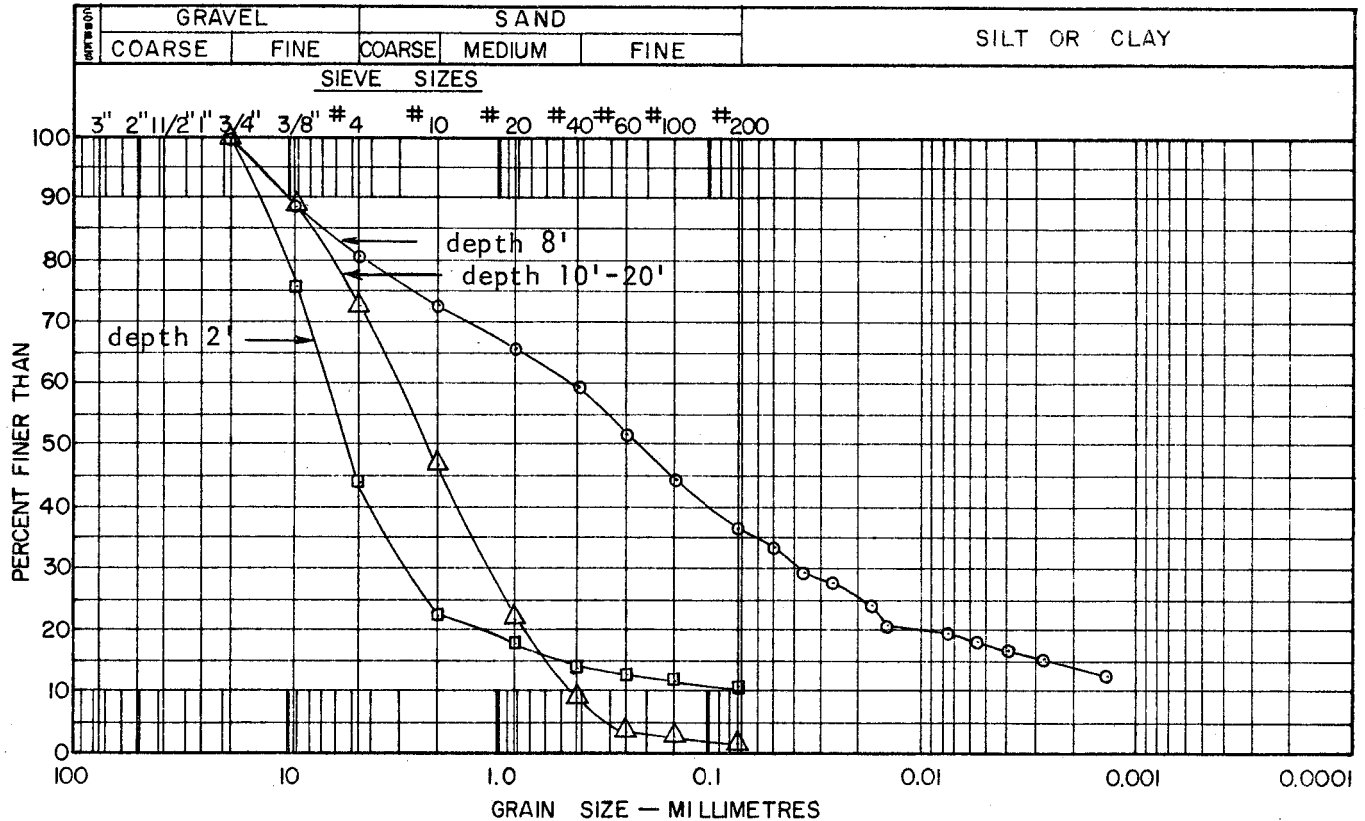
SOURCE No. 320

320-3



LABORATORY TEST DATA TEST HOLE-SOURCE No. 320-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	8.3%
Sample 2	depth 4'	16.7%
Sample 3	depth 8'	7.1%
Sample 4	depth 10'	9.9%
Sample 5	depth 15'	10.3%

Sample 6 depth 20' 13.6%

ORGANIC CONTENT

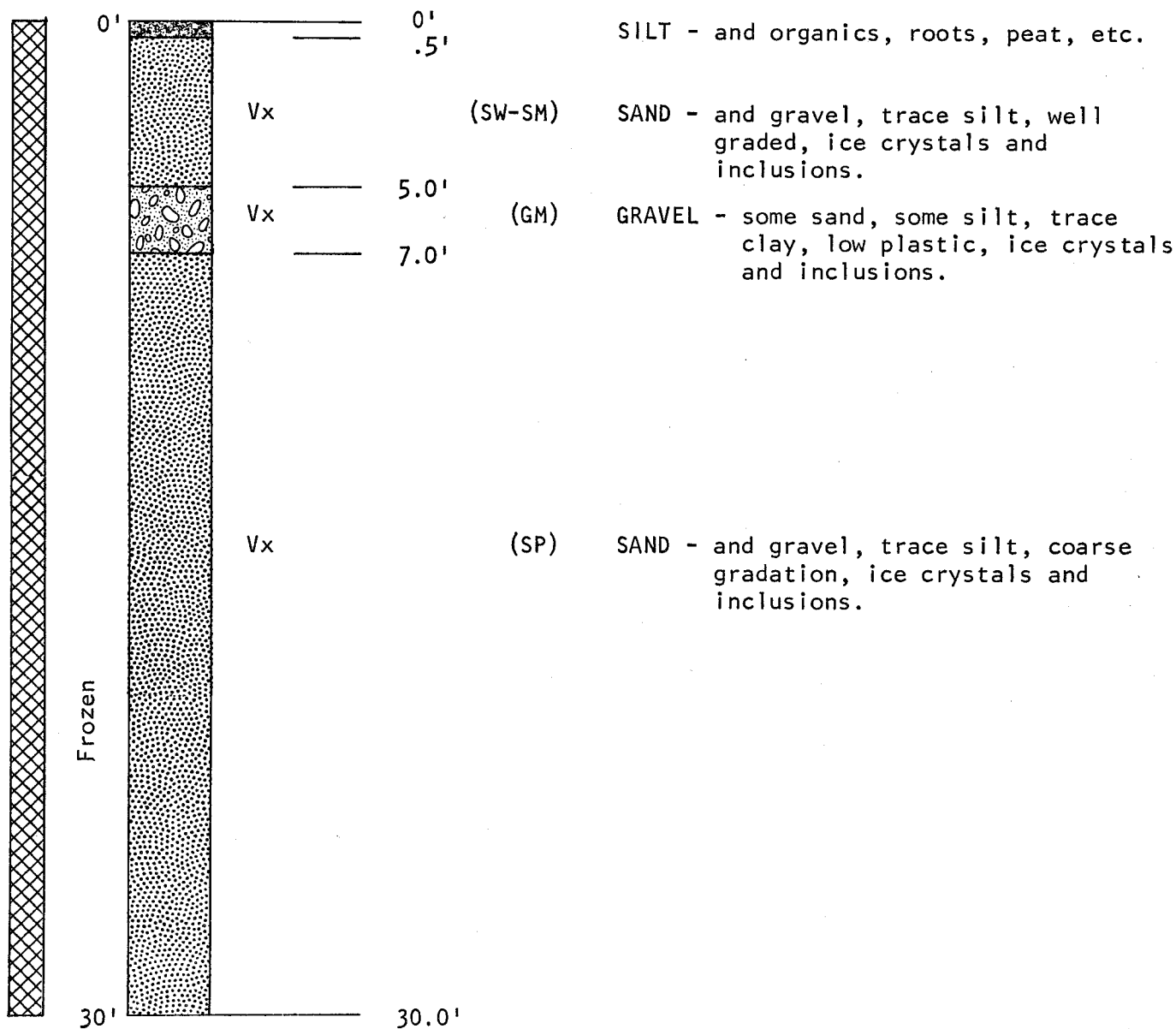
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 320

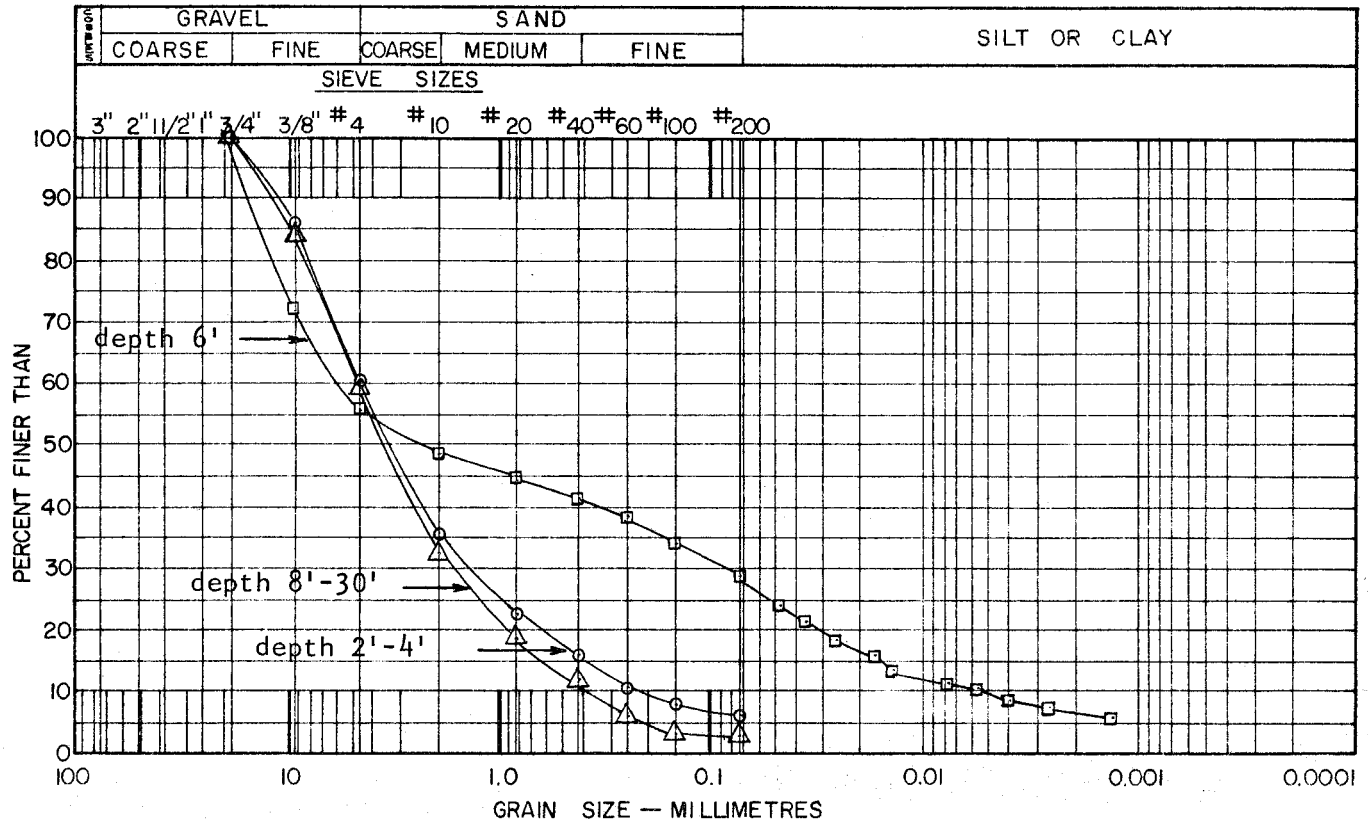
320-4



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 320-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	3.7%	Sample 6	depth 15'	9.0%
Sample 2	depth 4'	8.3%	Sample 7	depth 20'	7.7%
Sample 3	depth 6'	12.2%	Sample 8	depth 30'	5.7%
Sample 4	depth 8'	11.4%			
Sample 5	depth 10'	12.0%			

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

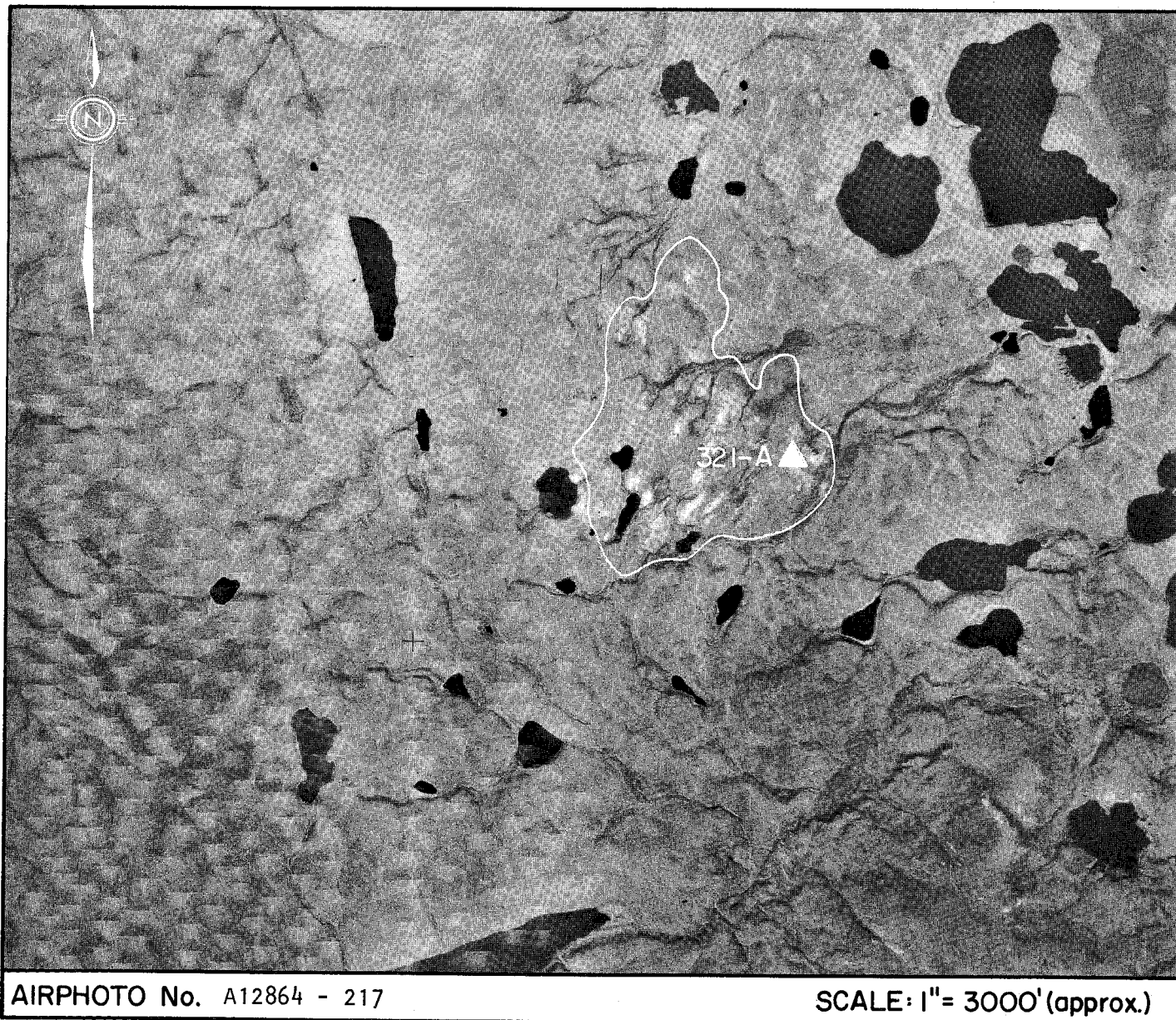
ZONE III
SOURCE No. 321

LANDFORM AND LOCATION: Outwash area on east slope of Caribou Hills
west of Parsons Lake, 43 miles north of Inuvik.

MATERIAL: SAND - some gravel, trace of silt

VOLUME: 1,000,000 cu. yds., at least

CONCLUSION: Suitable for development for local projects
for general fill.



AIRPHOTO No. A12864 - 217

SCALE: 1" = 3000' (approx.)

321 ENVIRONMENT

Physical

This source is probably the remnant of a post-glacial outwash area located on the eastern slope of the Caribou Hills just west of the plain surrounding Parsons Lake, and 43 miles north of Inuvik. Several gullies divide the source into separate deposits, and lead to the three ponds contained within it. The area is about 1 mile square.

Drainage of this source is good, and the source has not been developed.

Biotic

The gravel ridges are generally bare of vegetation, although the lower slopes and gullies are covered by moss and lichens, with a few patches of dwarf upland shrub.

The source lies within the Mackenzie Reindeer Grazing Reserve, but is not critical to any wildlife or fish.

321 MATERIAL AND QUANTITIES

This source was examined during the reconnaissance of September, 1972, but time would not permit drilling during the following winter. The detailed information is limited to a test pit and surface inspection.

The material observed in the test pit and over the area is a clean, well-graded sand with some fine gravel and a trace of silt. The maximum particle size is 1 inch.

The recoverable depth of material is estimated to be 10 feet, probably containing little or no free ice.

The volume of recoverable material in the several deposits of this source is estimated to be 1,000,000 cubic yards at least.

321 DEVELOPMENT

General

This source could be developed for general fill, road material, and fine aggregate. The remote location will probably limit its applica-

tion to local projects.

Access

At present this area is accessible only during winter, hauling over the tundra on snow roads.

Projects along the Mackenzie River can be served from this source by a winter road running southwest around the north end of the proposed Caribou Hills Reserve of the International Biological Programme, a distance of 15 miles. This route passes Source I-407, a very large deposit of excellent material reserved for the use of Inuvik, so the feasibility of hauling material from Source 321 to Inuvik is dubious.

Material Use and Handling

This material is suitable for general fill and road construction. The low percentage of gravel reported in the surficial examination makes the material unsuitable for concrete aggregate, although further investigation may locate a coarser deposit. The quality and grading of the material is otherwise good.

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

At this time the ice content of sand in the deposits is unknown, as is the need for stockpiling and thawing.

Stripping and Restoration

Stripping is minimal over this source, with clean sand exposed over the area of the deposits.

In order to avoid disturbance of the natural drainage system, development must not encroach on the stream-beds, but a substantial berm should be left between the excavation and all streams.

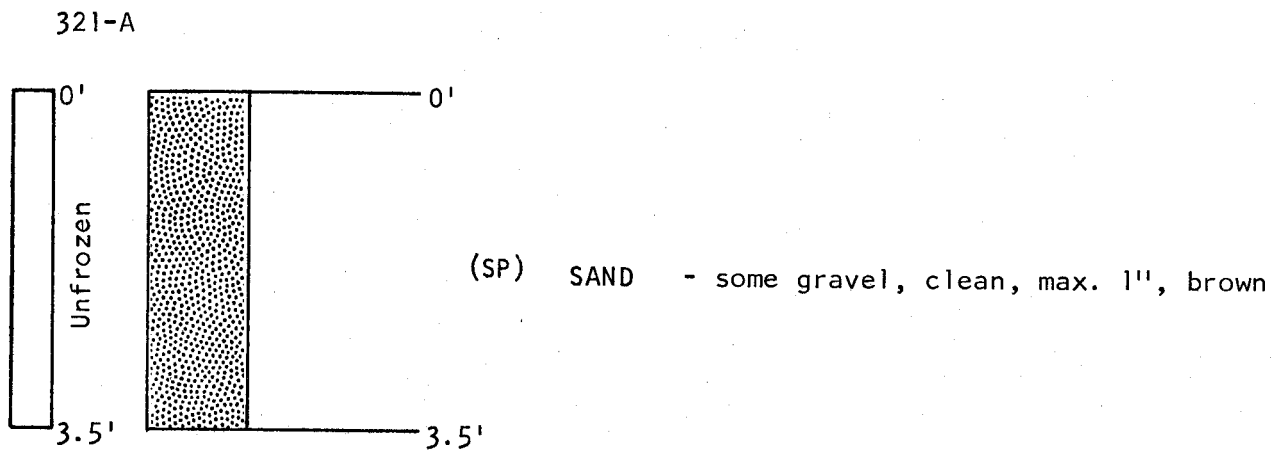
If a heavy ice lense or massive ground ice is uncovered in the excavation, it should be covered at once with a blanket of granular material, in order to avoid thawing. On such slopes the thawing of

ground ice could lead to the instability of the drainage system and the resultant siltation of streams and lakes.

Access roads must be planned carefully to avoid disturbance of the streams.

TEST PIT LOGS

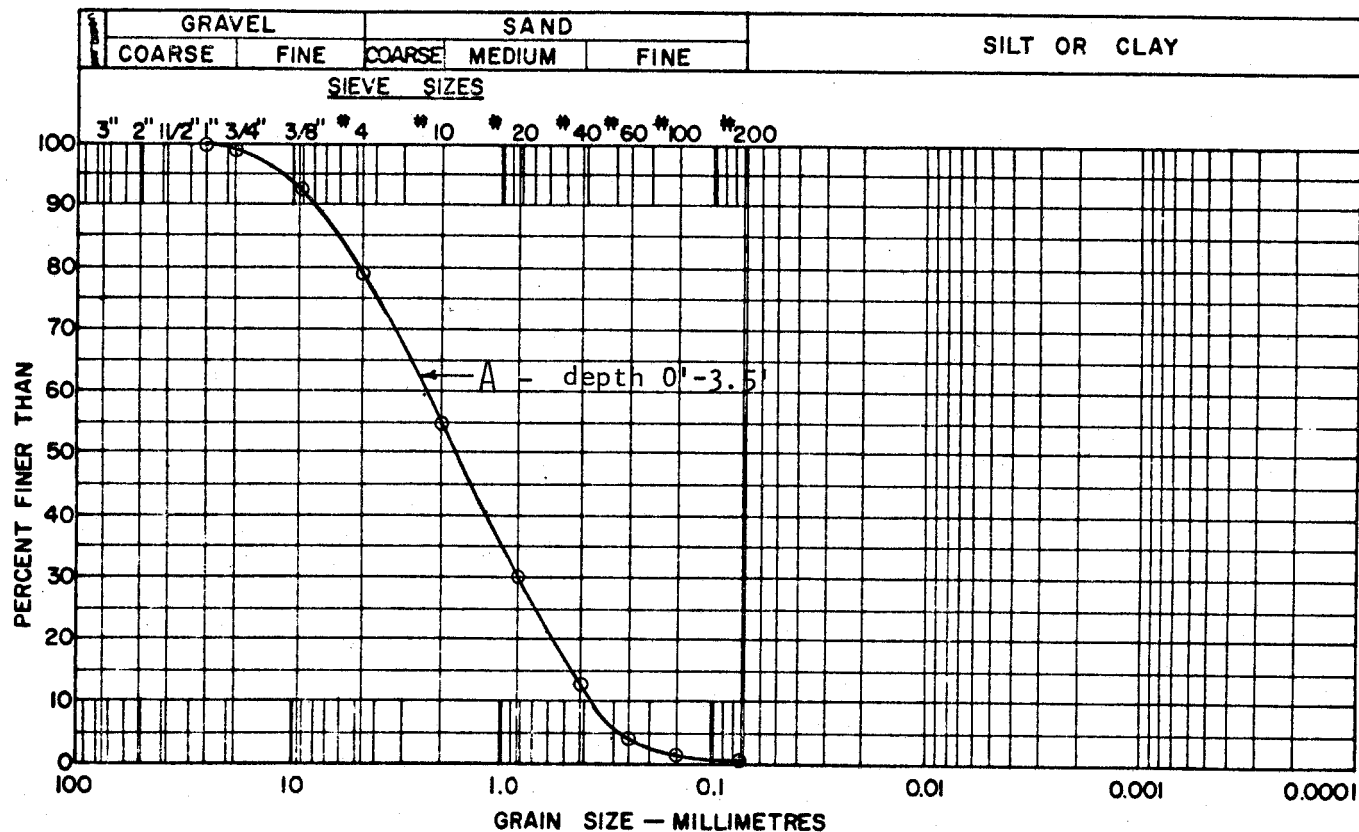
SOURCE No. 321



LABORATORY TEST DATA

SOURCE No. 321

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A depth 0' - 3.5' 4.0%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

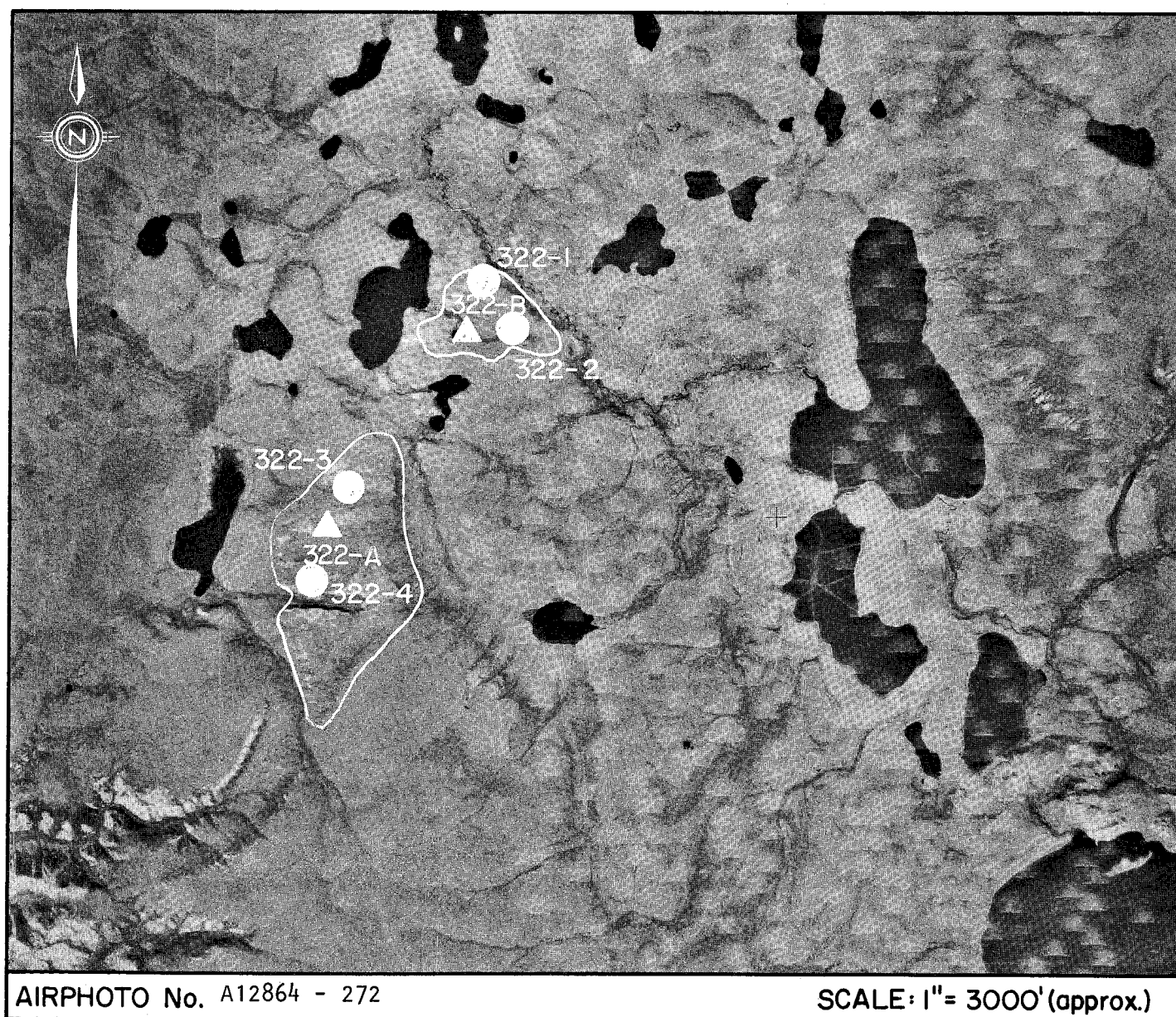
ZONE III
SOURCE No. 322

LANDFORM AND LOCATION: Two terraces on the Caribou Hills west of the valley between Peter and Wolverine Lakes, 34 miles northwest of Inuvik.

MATERIAL: SAND - some gravel, some silt

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

CONCLUSION: Northern terrace could be developed on low priority basis to supply general fill to local projects.



322 ENVIRONMENT

Physical

This source is two glaciofluvial terraces on the eastern slope of Caribou Hills looking over the valley between Peter Lake and Wolverine Lakes, and is located 34 miles northwest of Inuvik. The two terraces are separated by a valley. The northern terrace is about 2,000 feet across and the southern one 5,000 feet long by 3,000 feet wide.

Drainage is good over the source, and it has not been developed.

Biotic

Vegetative cover in this area is thin to nonexistent, with much of the gravel exposed at the surface. Where it exists the ground cover is moss and lichen, with scattered upland dwarf shrub.

The source is located within the Mackenzie Reindeer Grazing Reserve, but is not critical for wildlife or fish.

The eastern boundary of the proposed Caribou Hills Reserve of the International Biological Programme runs only 1 mile southwest of the southern terrace of this source. The area is valued for a combination of geographical factors and for its collection of plant life.

322 MATERIALS AND QUANTITIES

The two terraces should be considered separately because they appear to be quite different. The southern terrace contains some suitable general fill, but it appears to be covered by ice lenses or massive ice; in Test Hole #3 the ice over the sand is 7 feet thick.

In the northern terrace the sand and gravel is erratic in quality but contains little or no visible ice. By selective excavation material suitable for general fill could be developed.

The moisture content in Test Hole #2 at a depth of 5 feet was only 4½%, whereas that in Test Hole #1 varied from 12% to 16%, evidently related to a higher silt content.

The estimated volume of granular fill in the northern terrace is about 1,000,000 cubic yards.

322 DEVELOPMENT

General

The southern terrace is not recommended for development because of the high ice content.

The northern terrace rates low priority for the supply of general fill to local projects. The material is marginal in quality and the source is erratic in nature, probably difficult to develop and to restore.

Access

At present this area is accessible only during winter, hauling over the tundra on snow roads.

Projects along the Mackenzie River can be served from this source by a winter road running northwest around the north end of the proposed Caribou Hills Reserve of the International Biological Programme, a distance of 5 miles. This route passes Source I-407, a very large deposit of excellent material reserved for the use of Inuvik, so the feasibility of hauling material from Source 322 to Inuvik is dubious.

Material Use and Handling

The material in the northern terrace could be used as general fill, provided the more silty areas of the deposit were avoided. Probably some strata of silty material within a pit would have to be wasted.

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

Stripping and Restoration

The material stripped from the surface will be mostly silty sand and gravel, and very little organic material. All of it must be stock-piled for replacement after the granular material has been removed. Stockpiles of topsoil, frozen granular material, and ice or ice-rich silt must be located so they will not drain directly into the natural drainage system, in order to avoid the siltation of streams and lakes.

Large areas of ground ice must not be exposed on sloping ground, to prevent sloughing and problems in restoration.

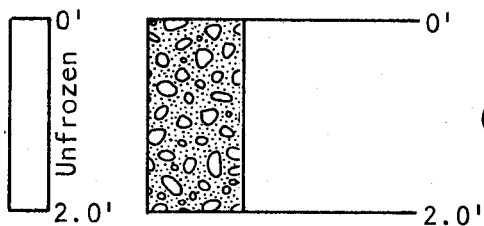
The area exposed at one time must be minimized in order to limit the thermal disturbance to ground ice at depth.

After an area has been covered with topsoil, it should be seeded for speedy revegetation, using a selection of plants and methods of preparation recommended by an expert in Arctic horticulture.

TEST PIT LOGS

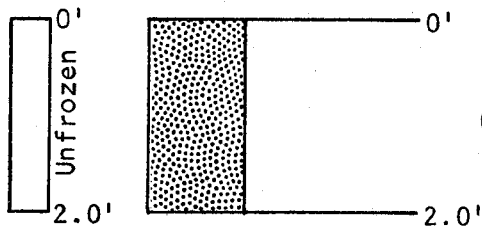
SOURCE No. 322

322-A



(GP) GRAVEL - some sand, well graded, rounded to subangular, brown

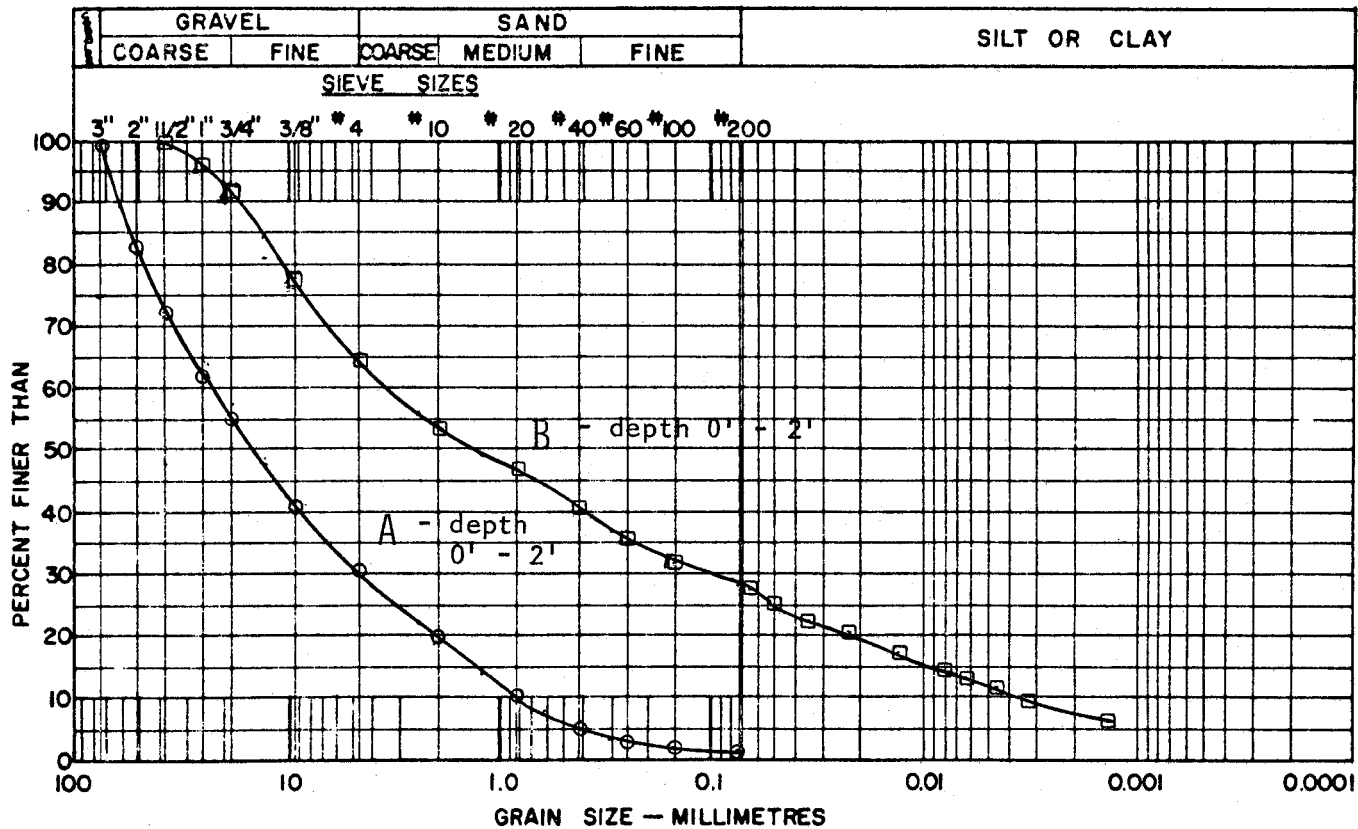
322-B



(SM) SAND - some gravel, some silt, trace clay

SOURCE No. 322

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A	depth 0' - 2'	3.0%
Pit B	depth 0' - 2'	6.6%

ORGANIC CONTENT

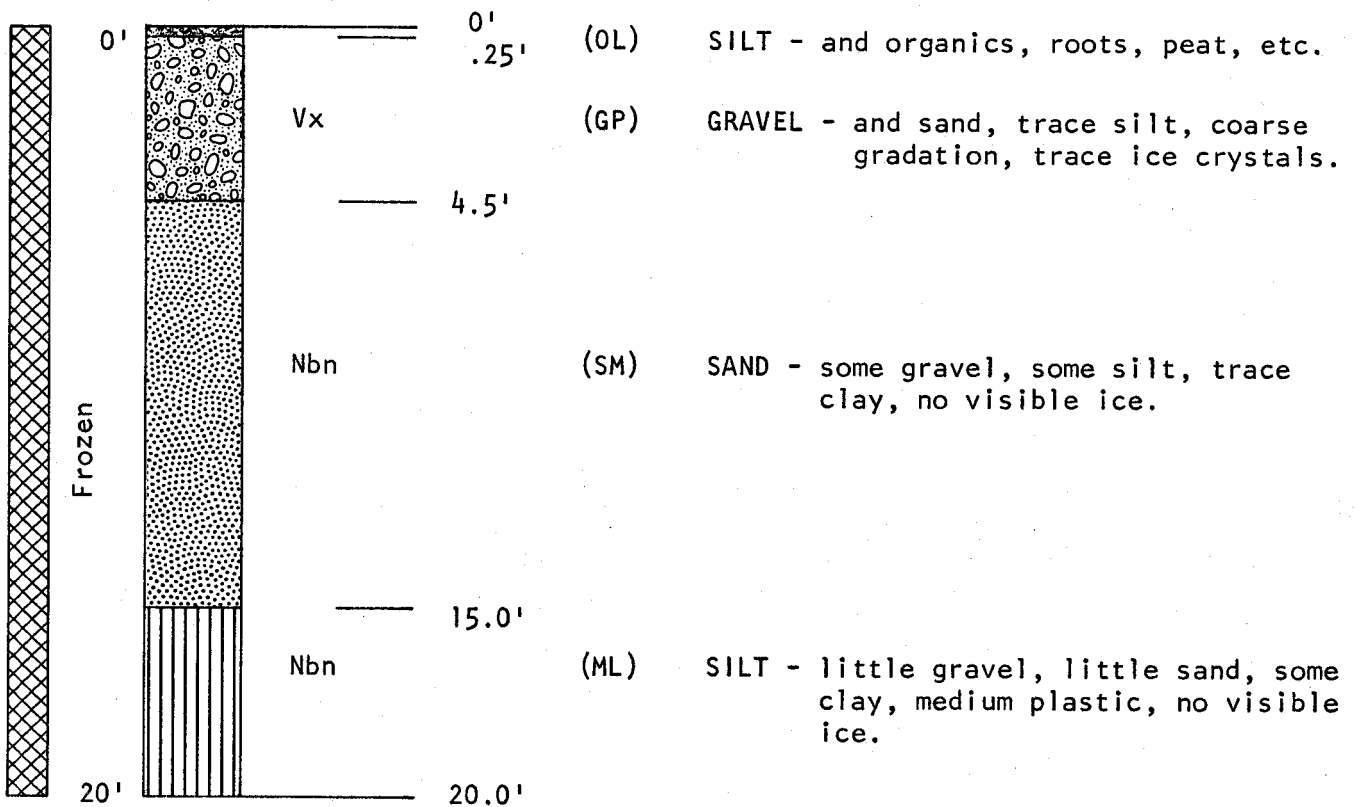
HARDNESS TEST

PETROGRAPHIC ANALYSIS

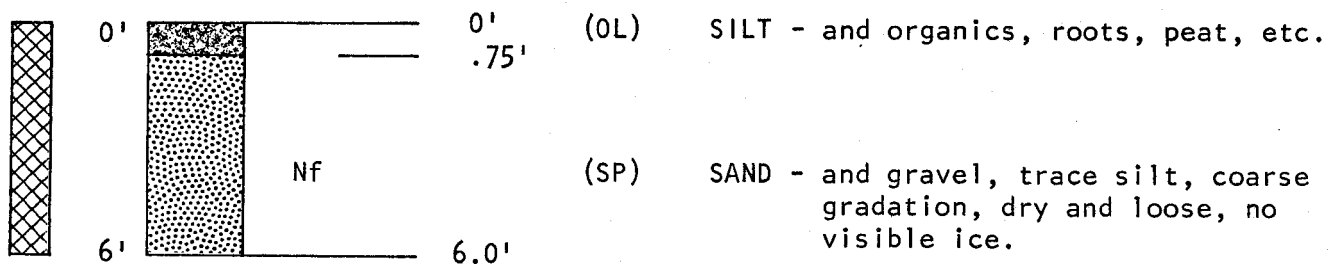
TEST HOLE LOGS

SOURCE No. 322

322-1

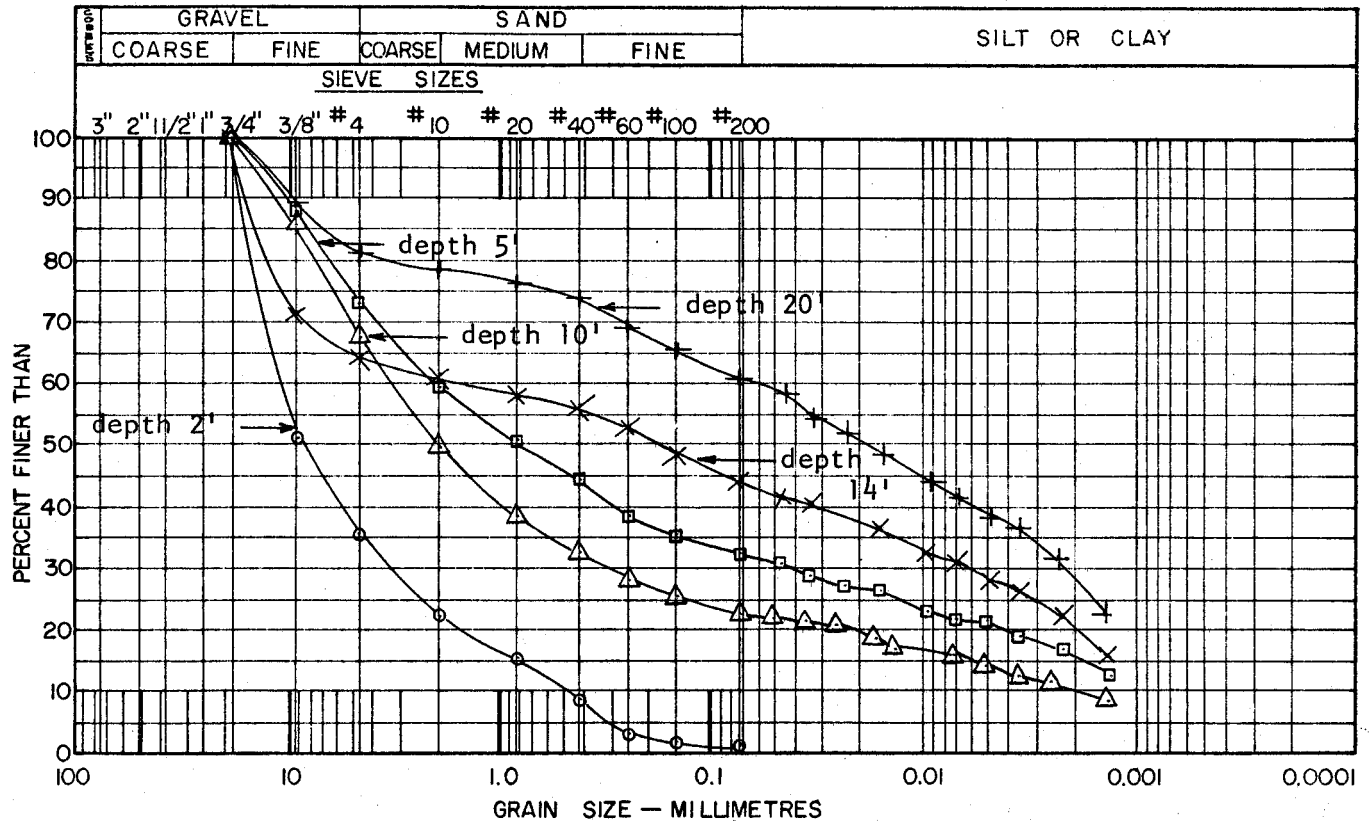


322-2



LABORATORY TEST DATA TEST HOLE-SOURCE No. 322-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	2.7%
Sample 2	depth 5'	12.1%
Sample 3	depth 10'	15.8%
Sample 4	depth 14'	12.1%
Sample 5	depth 20'	14.1%

ORGANIC CONTENT

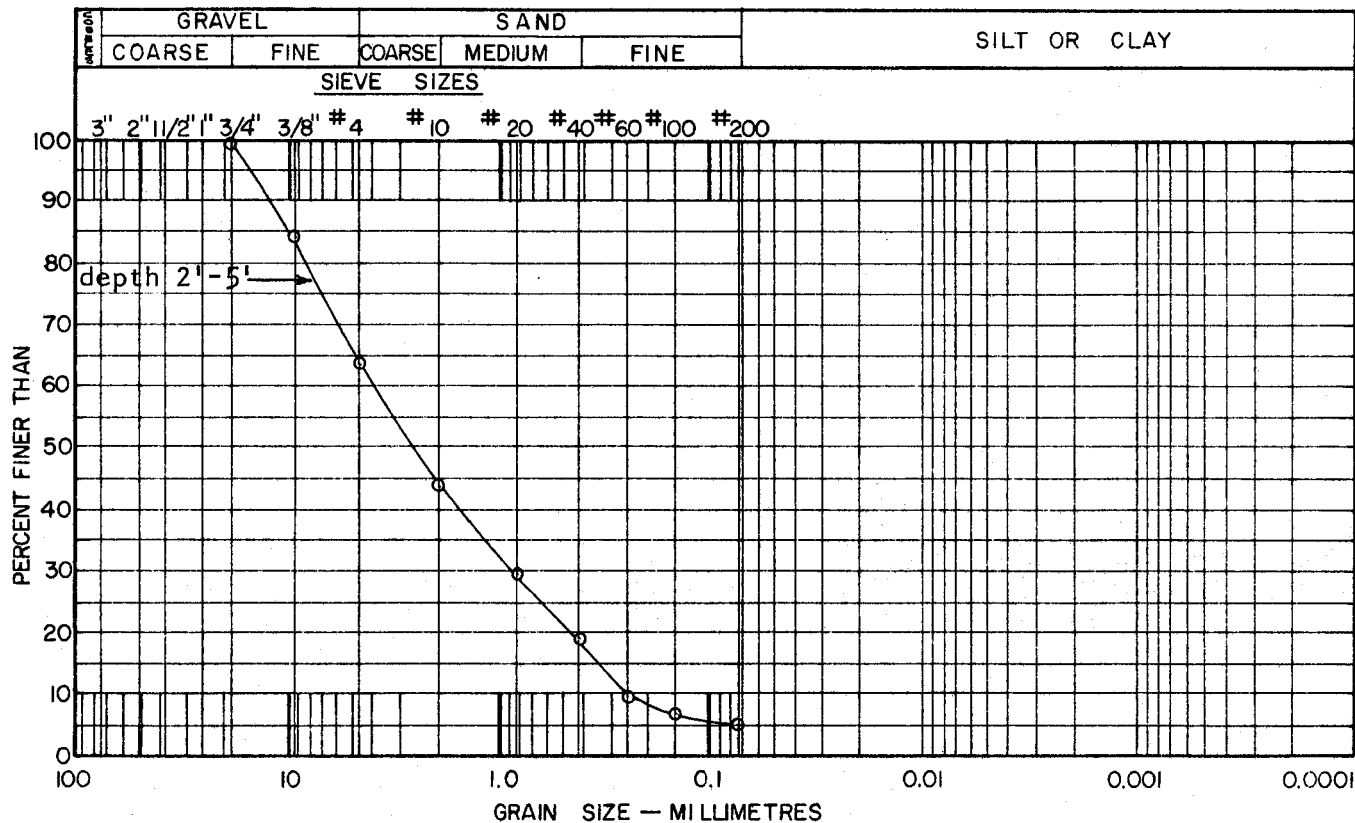
HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY TEST DATA

TEST HOLE-SOURCE No. 322-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2' 4.1%
Sample 2 depth 5' 4.5%

ORGANIC CONTENT

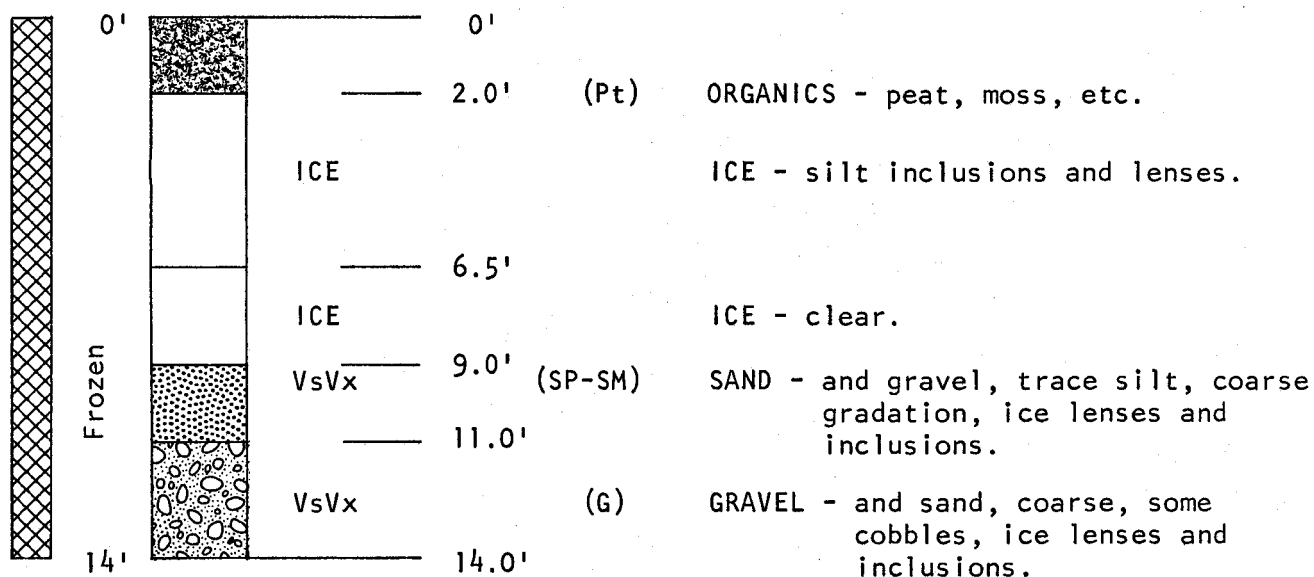
HARDNESS TEST

PETROGRAPHIC ANALYSIS

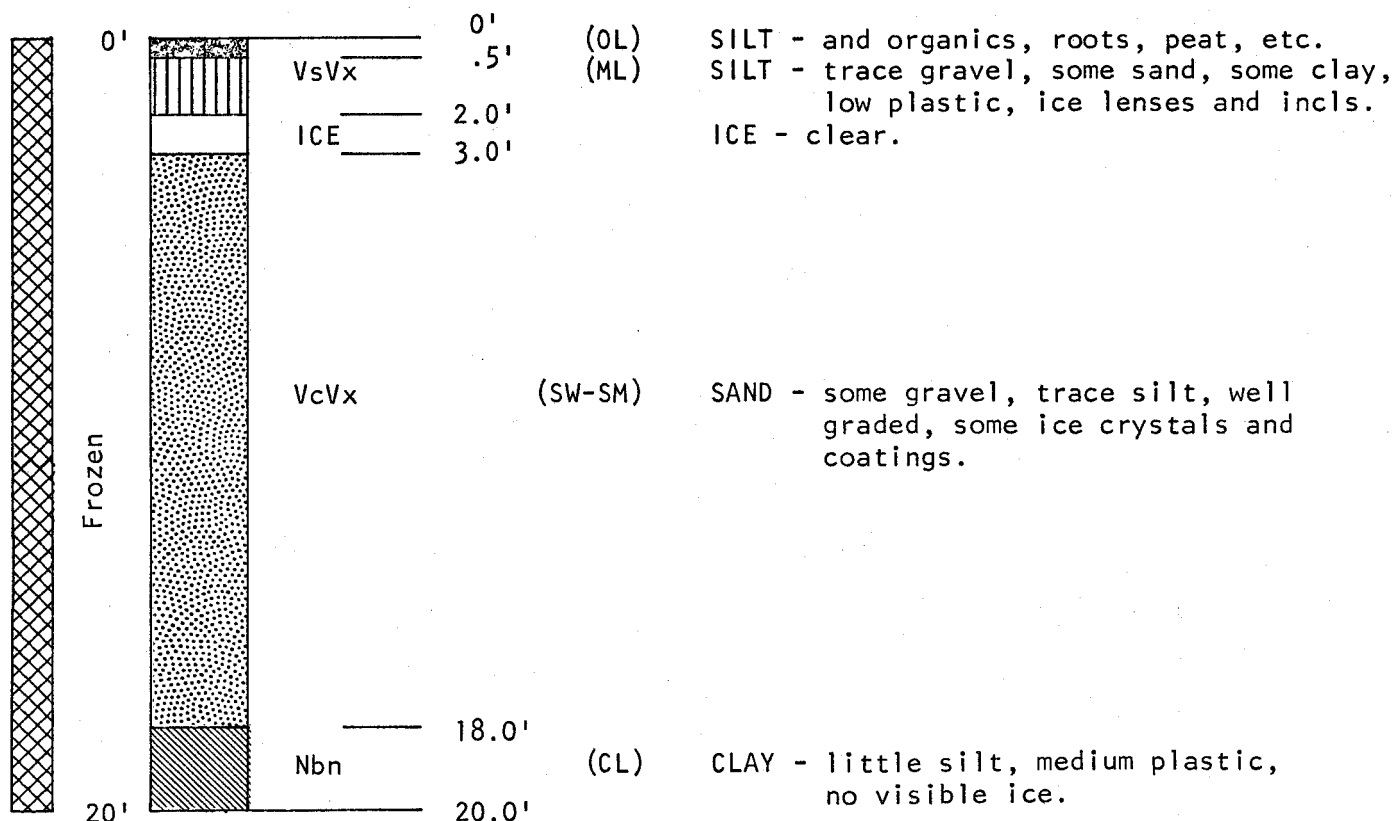
TEST HOLE LOGS

SOURCE No. 322

322-3



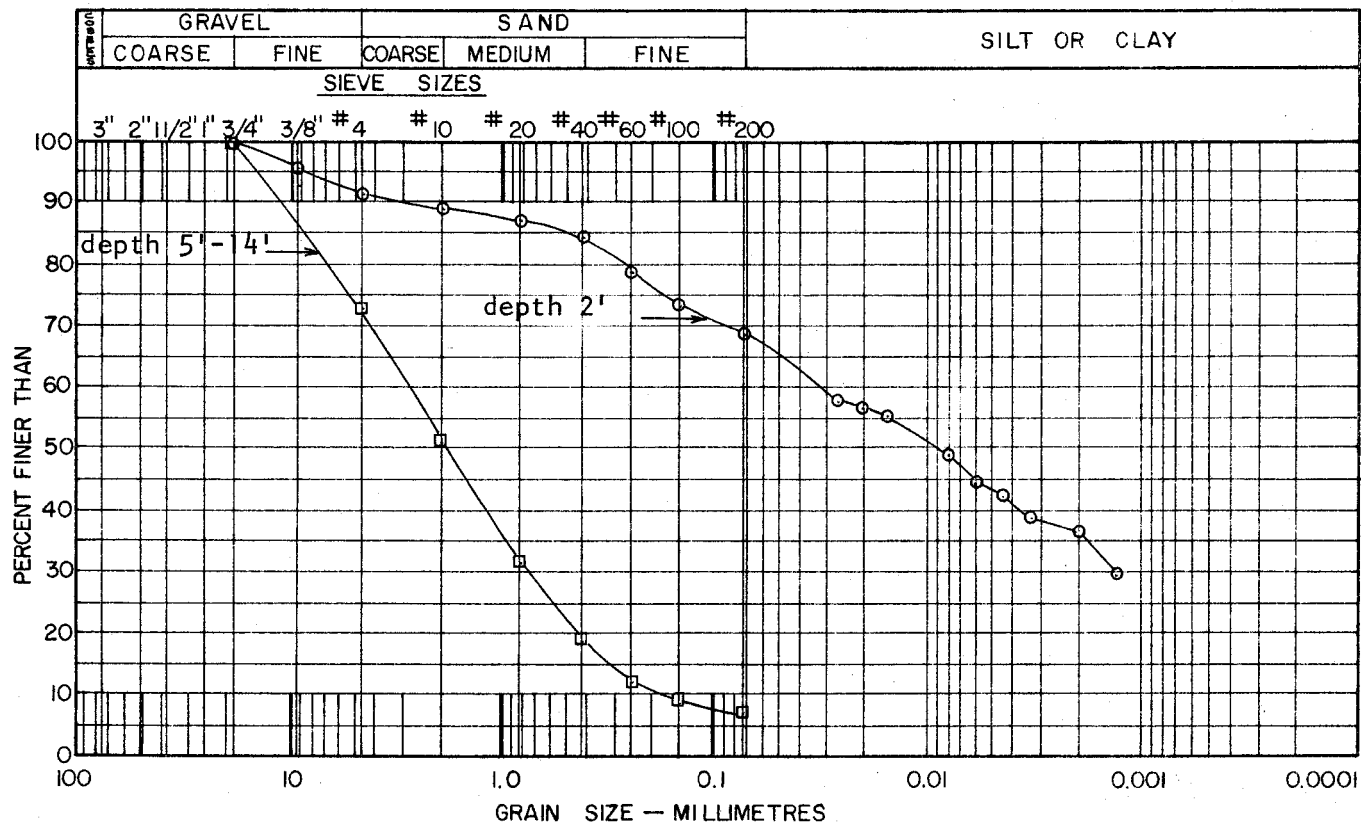
322-4



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 322-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	15.1%
Sample 2	depth 5'	8.5%
Sample 3	depth 10'	11.5%
Sample 4	depth 14'	8.3%
Sample 5	depth 20'	19.0%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

ZONE III
SOURCE No. 323A

LANDFORM AND LOCATION:

Probably Tertiary delta deposit on west slope of Caribou Hills looking over Mackenzie Delta, 34 miles northwest of Inuvik. Located in proposed Caribou Hills reserve of International Biological Programme, also in critical wildlife area of Mackenzie Delta.

MATERIAL:

GRAVEL - and sand, trace silt.

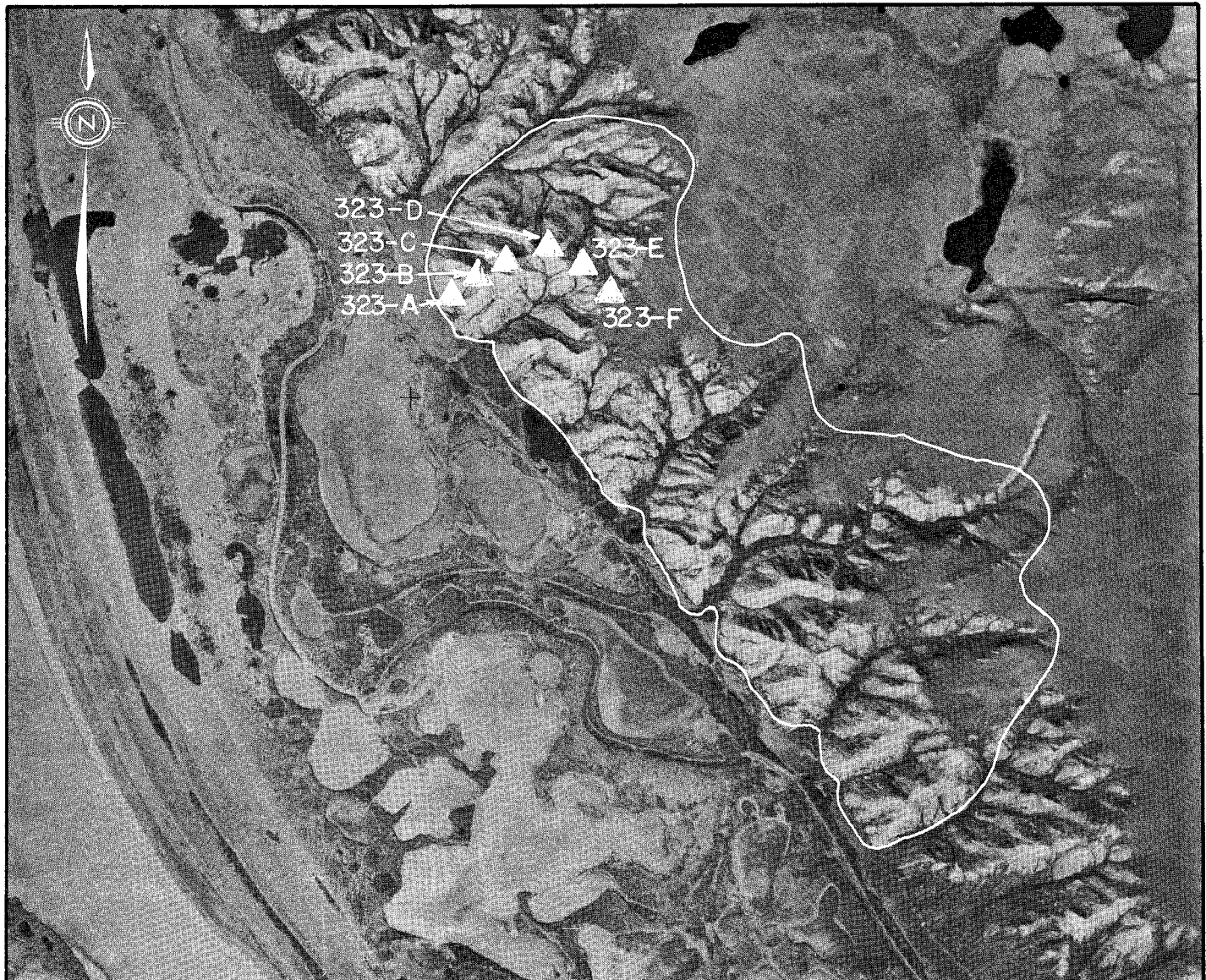
SAND - and gravel, trace silt.

VOLUME:

15,000,000 cu. yds. at least.

CONCLUSION:

This source cannot be developed because of its location within the proposed Caribou Hills reserve. If the reserve is lifted, the source deserves further study.



AIRPHOTO No. A12857 - 353

SCALE: 1" = 3000' (approx.)

323A ENVIRONMENT

Physical

This source is located near the northern end of the Caribou Hills on the eastern boundary of the Mackenzie Delta, 34 miles northwest of Inuvik. The outer slopes of the Caribou Hills, probably Tertiary deltaic deposits, display gravel for a distance of about 3 miles along the Delta and extend inland for about 1 mile. The source material is exposed in a series of gullies carrying small streams to the Mackenzie River.

The drainage of this source is good, and no development has been reported.

Biotic

The only trees discovered in this area are stunted white spruce and black spruce located in gullies where they are protected from wind. The exposed slopes of the Caribou Hills are partly bare, partly covered by moss and dwarf upland shrub. The upland is largely grass, with some dwarf shrub.

The source lies within the eastern boundary of the critical Mackenzie Delta wildlife region, intensively trapped for muskrat, mink, and beaver. Waterfowl are abundant as well through summer months. The source is also contained within the Mackenzie Reindeer Grazing Reserve, although near its western boundary.

This source lies within the proposed Caribou Hills reserve of the International Biological Programme, an area valued for a combination of geographical factors. Development of this source cannot be permitted unless the reserve is lifted.

323A MATERIALS AND QUANTITIES

Because of the reserve placed on the area the investigation of this source was limited to a series of 6 test pits and an extensive surficial examination. The findings of this investigation can, however, be related to the more extensive study of a similar source, No. 1-407, located just 5 miles to the northwest.

Test Pits A, B, C, and D all exposed gravel grading to about 1 inch to 3 inches maximum particle size. The silt content in all pits was below 6%. Test Pits E and F exposed sand with a silt content of 9% to 17%.

Petrographic analyses of gravel from Test Pits A and C are similar and very good. The major components are quartzite, quartz, chert, and granite, totalling over 98%, and the only possibly unsound material is 1% to 2% of soft sandstone.

The volume of recoverable material in this source is difficult to estimate on the basis of existing information, but probably exceeds 15,000,000 cubic yards.

323A DEVELOPMENT

General

This source cannot be developed because of its location within the proposed Caribou Hills reserve of the International Biological Programme. If the reserve is lifted in the future, this source should be studied thoroughly because of its potential for very large volume and high quality.

Access

If the source could be developed, distribution throughout the Delta would be relatively easy by barge along the east channel of the Mackenzie River.

Material Use and Handling

The material from this source could be used for any purpose, from general fill to concrete aggregate.

For a small-scale operation the only equipment required would be a front-end loader and barges or trucks. A large-scale operation would require much additional equipment, including dozers with ripper attachments, conveyors, a processing plant, and stockpiling and reclamation equipment. Probably a large-scale operation would draw from benches at intermediate levels on a slope, and would use

conveyors to feed material to a central processing and distribution plant.

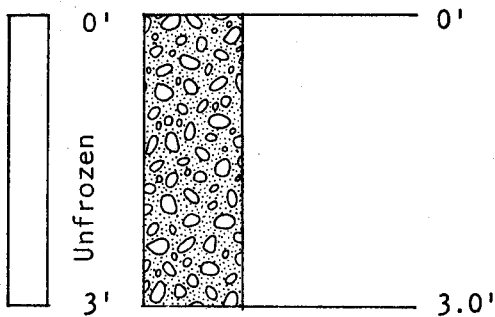
Stripping and Restoration

Little or no stripping is required on the slopes of the Caribou Hills, but any surface cover stripped would have to be stockpiled for later distribution over depleted areas.

TEST PIT LOGS

SOURCE No. 323A

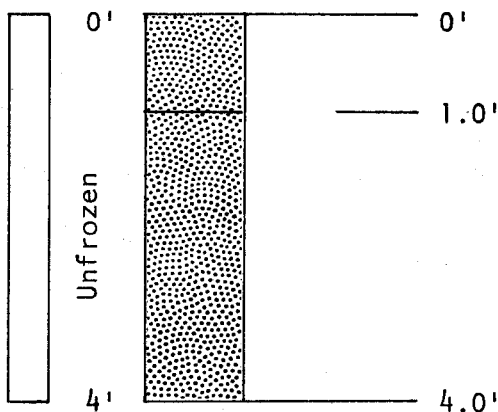
323A-A



(GW-GM)

GRAVEL - and sand, trace silt, maximum $2\frac{1}{2}$ " rounded to subangular, well graded.

323A-B



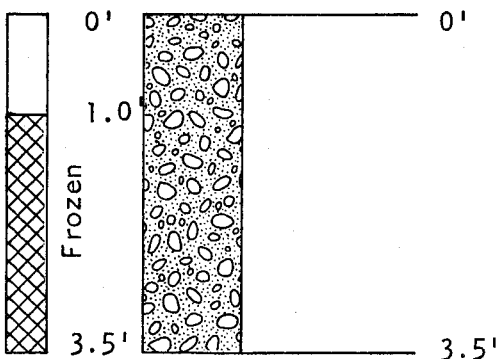
(SP)

SAND - trace root fibres, fine gradation.

(SW)

SAND - and gravel, maximum 1" layered structure to 3', well graded.

323A-C

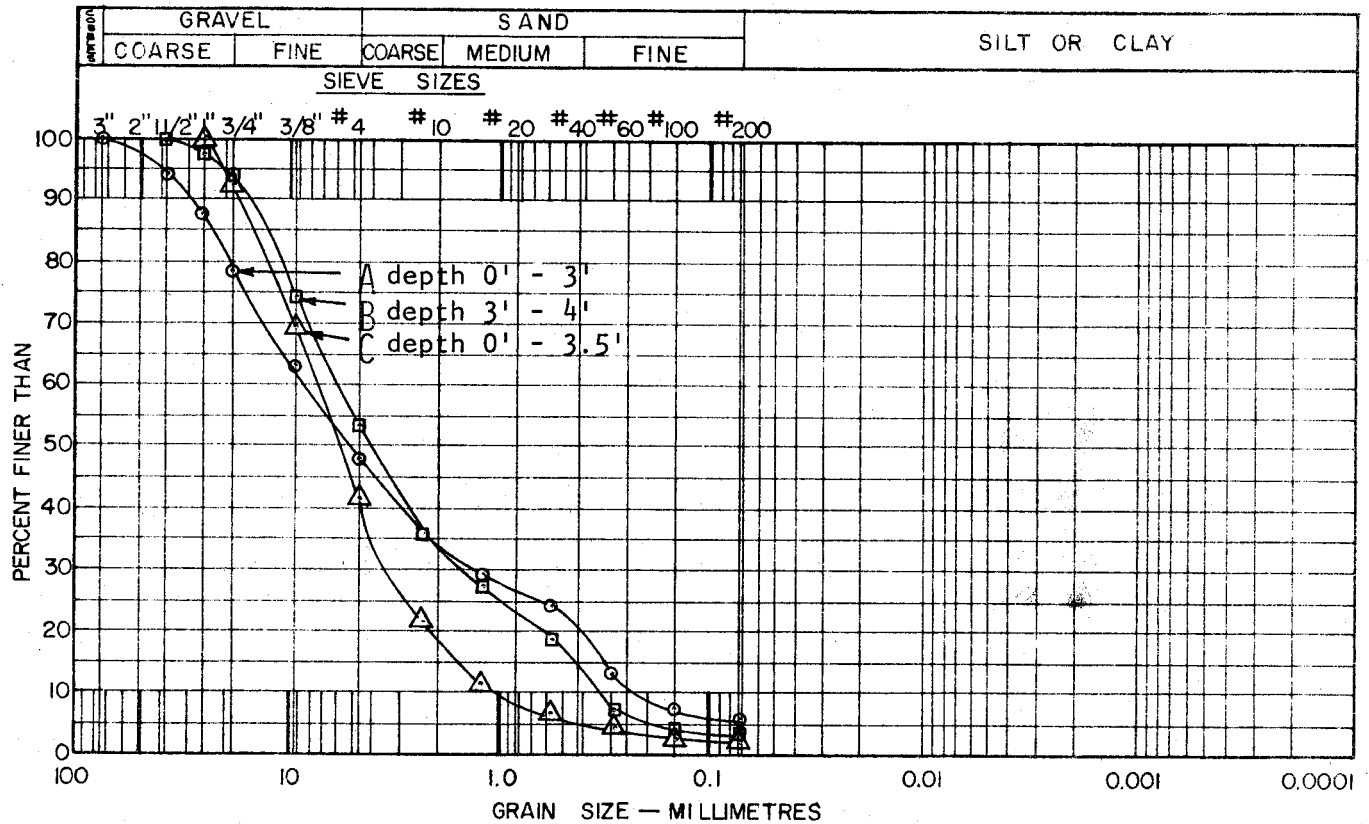


(GW)

GRAVEL - and sand, well graded, rounded to subangular, maximum 1" yellow.

LABORATORY TEST DATA TEST PIT-SOURCE No. 323A

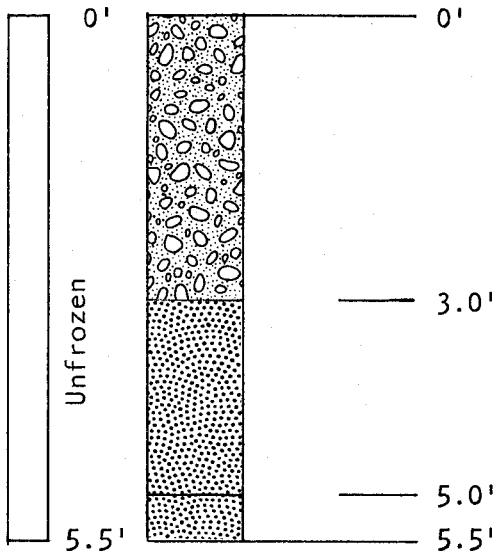
GRAIN SIZE DISTRIBUTION



TEST PIT LOGS

SOURCE No. 323A

323A-D

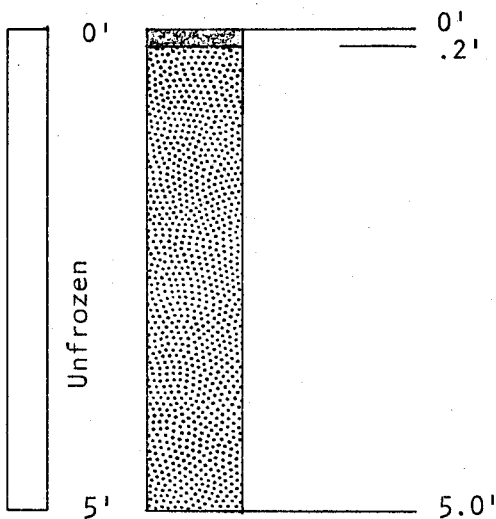


(GW) GRAVEL - some sand, trace clay, maximum 3/4" rounded to subangular, well graded.

(SM) SAND - little clay, trace gravel, well graded.

(SP) SAND - fine uniform gradation.

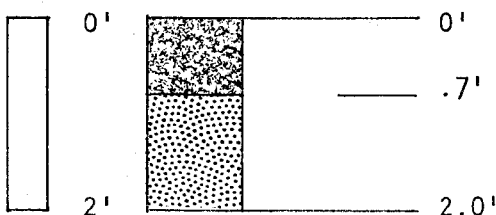
323A-E



(OL) SILT - organic, roots, peat.

(SM) SAND - trace silt, uniform, fine to medium gradation.

323A-F



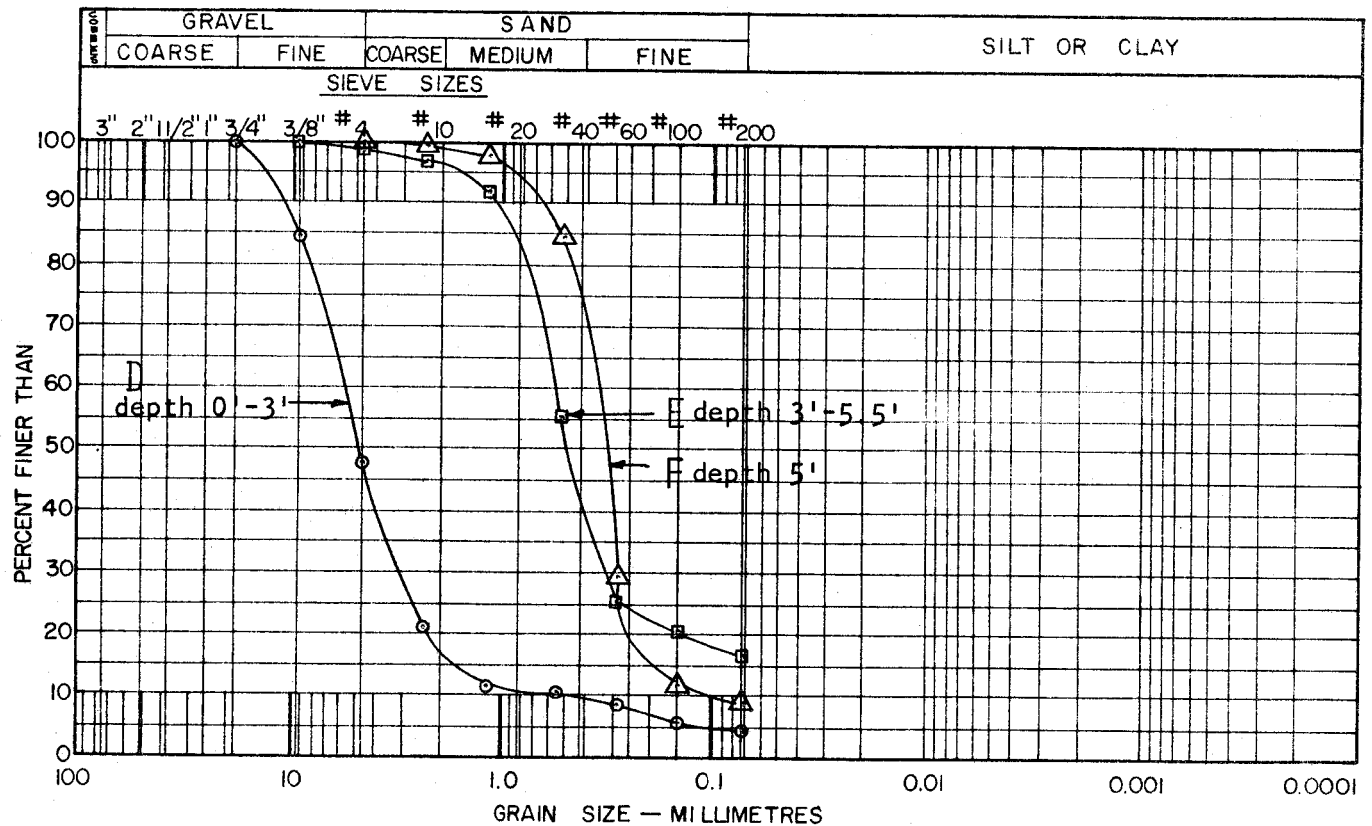
(OL) SILT - organic, little sand, roots etc.

(SM) SAND - trace silt, uniform, fine to medium gradation.

LABORATORY TEST DATA

TEST PIT-SOURCE No. 323A

GRAIN SIZE DISTRIBUTION



ZONE III
SOURCE No. 324A

LANDFORM AND LOCATION:

Probably Tertiary delta deposit on west slope of Caribou Hills looking over Mackenzie Delta, 38 miles northwest of Inuvik. Located in proposed Caribou Hills reserve of International Biological Programme, also in critical wildlife area of Mackenzie Delta.

MATERIAL:

GRAVEL - and sand, trace silt.

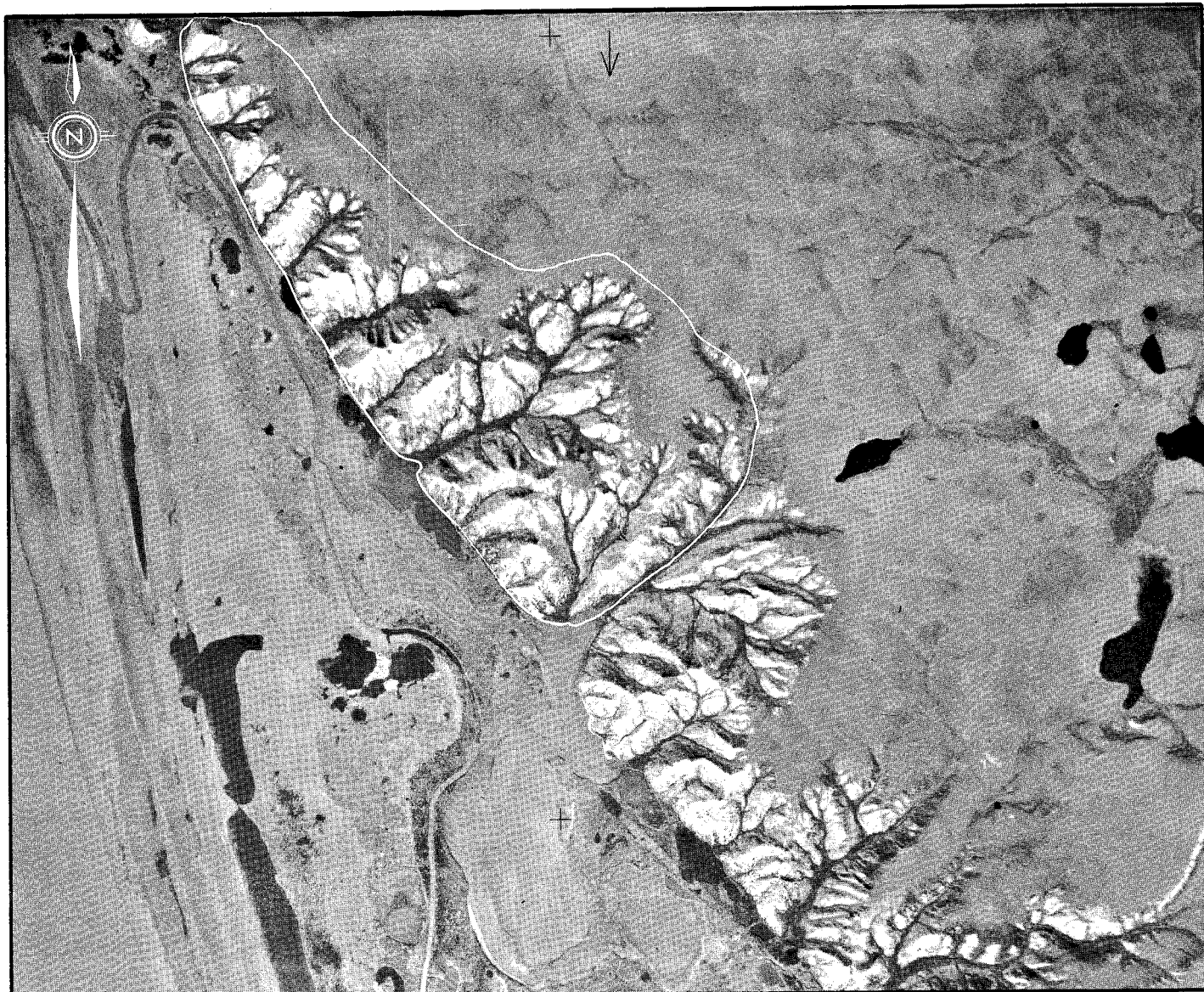
SAND - and gravel, trace silt.

VOLUME:

10,000,000 cu. yds.

CONCLUSION:

Source is a continuation of 323A but still cannot be developed because of its location within the Caribou Hills reserve. See Source 323A for descriptive details.



AIRPHOTO No. A12857 - 353

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:

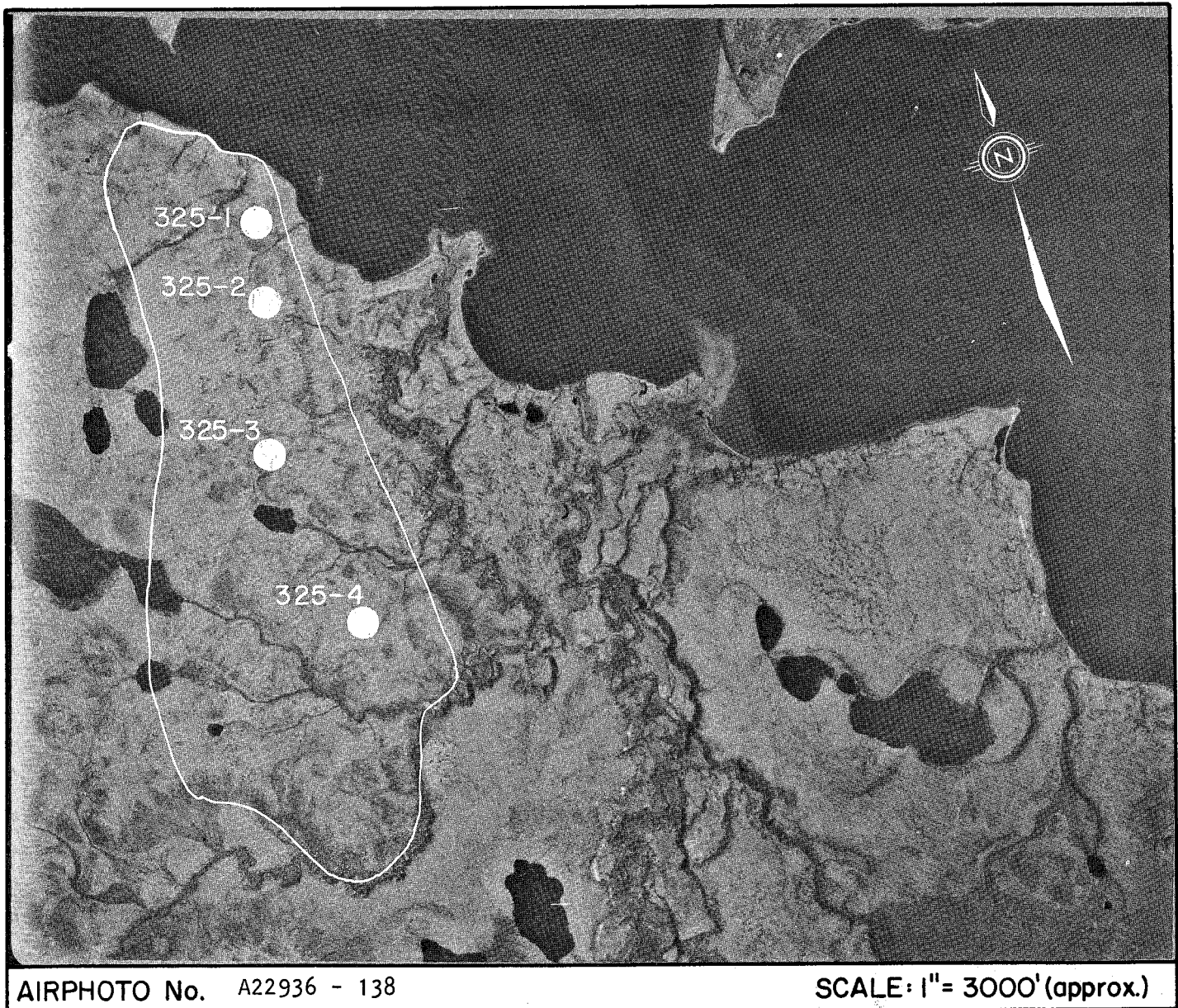
GRAVEL - and sand, trace silt.

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



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 $3\frac{1}{2}$ feet of silt and ice.

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

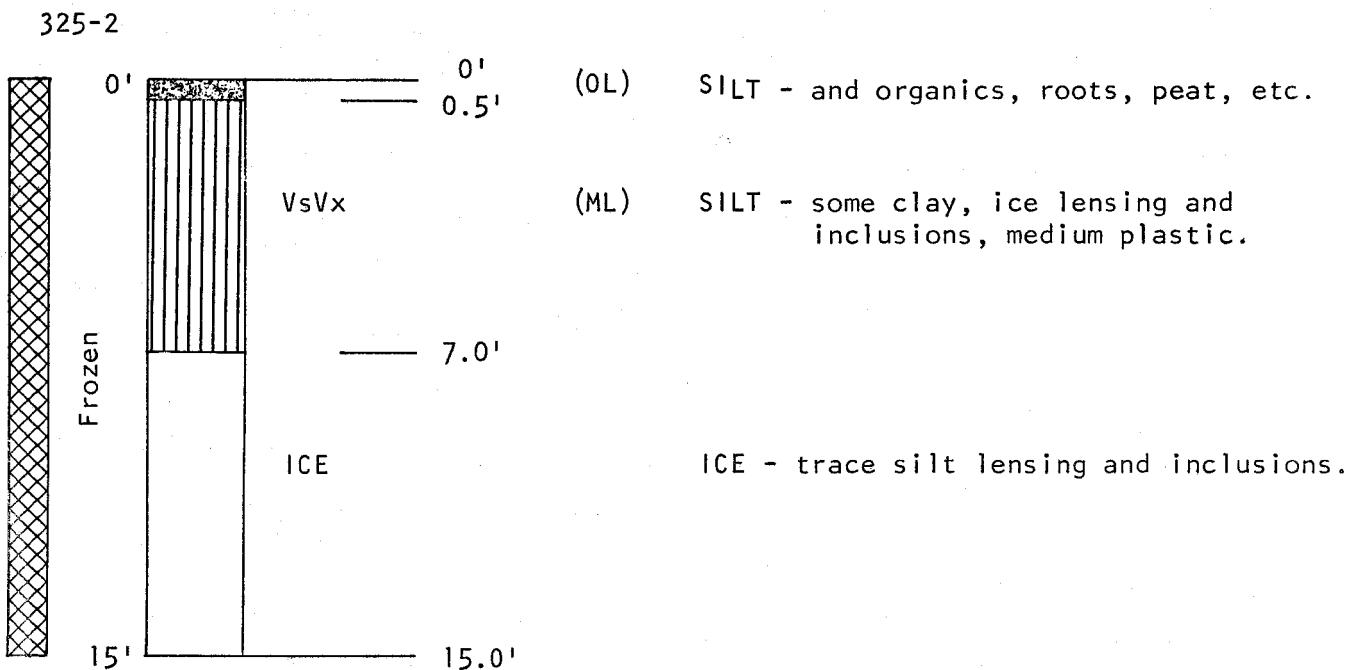
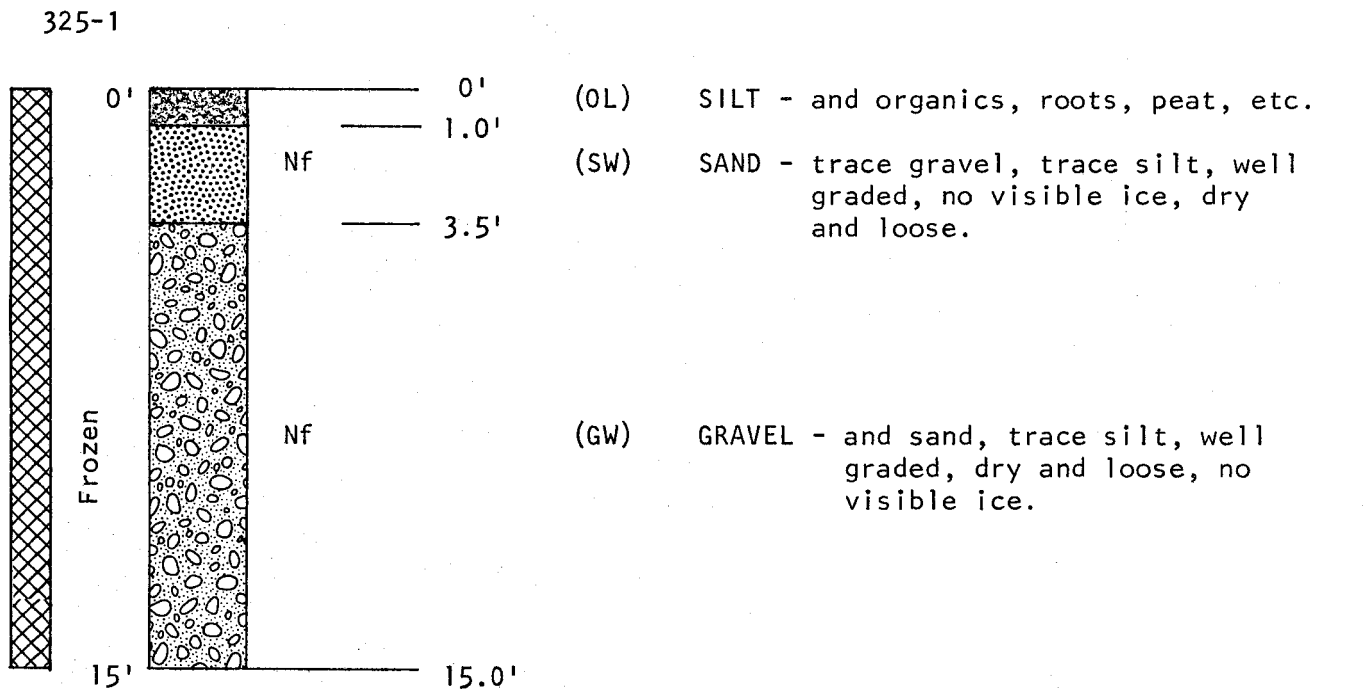
After the areas containing suitable granular material have been identified it will be necessary to strip the silty layer from the surface, the stripping varying from 1 foot to over $4\frac{1}{2}$ feet. This material, plus the organic cover with it, must be stockpiled for replacement after the granular 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

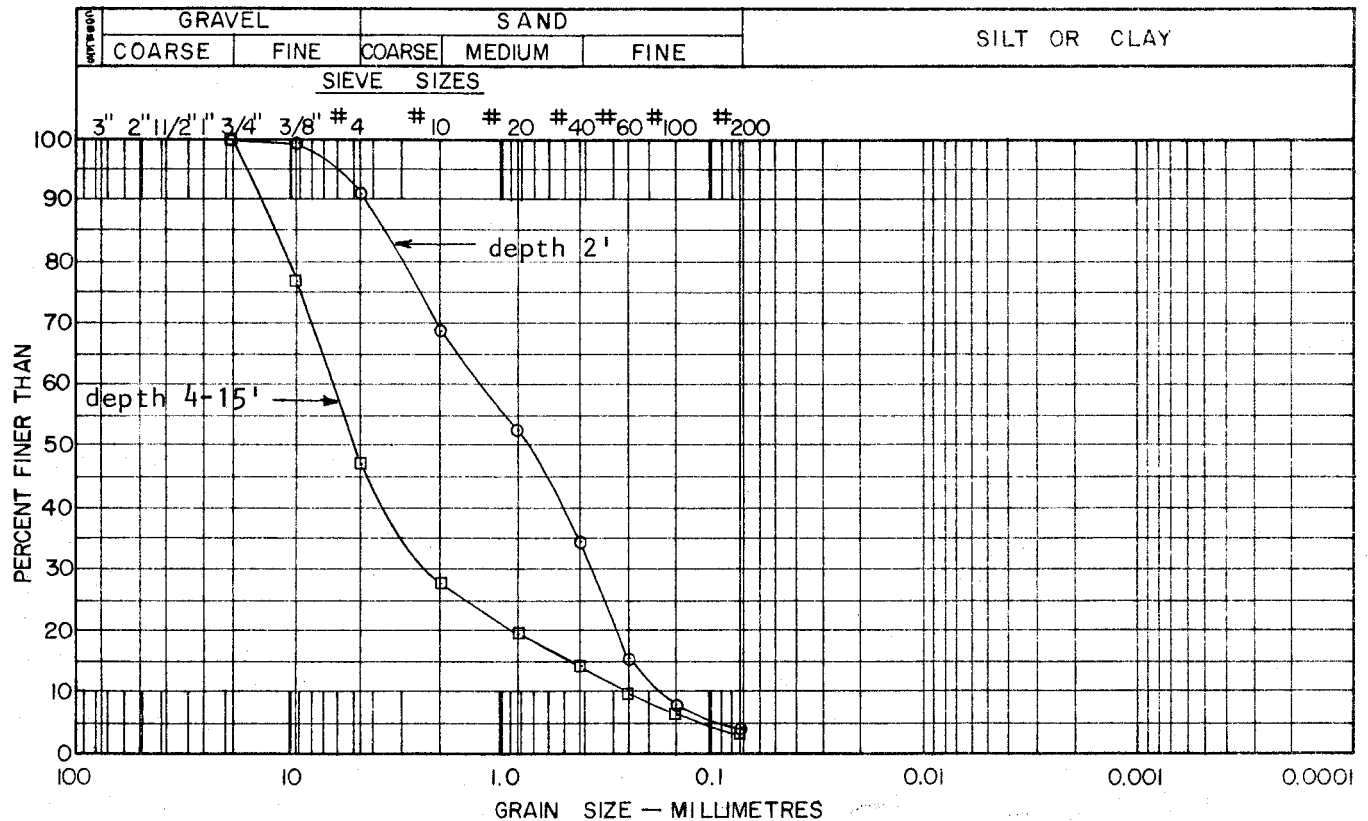
SOURCE No. 325



Moisture Content
Sample 1 depth 5' 25.7%

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

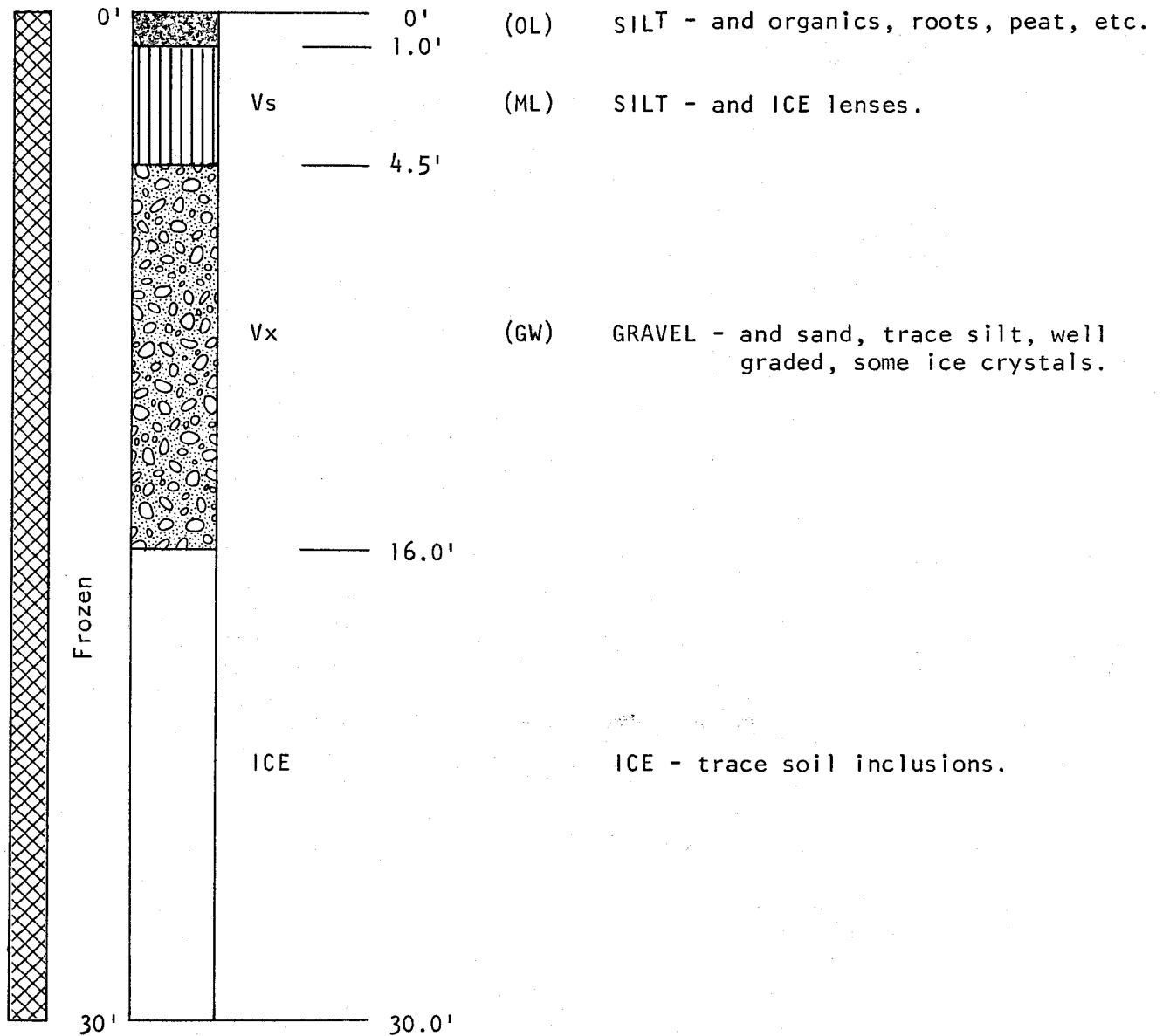
GRAIN SIZE DISTRIBUTION



TEST HOLE LOGS

SOURCE No. 325

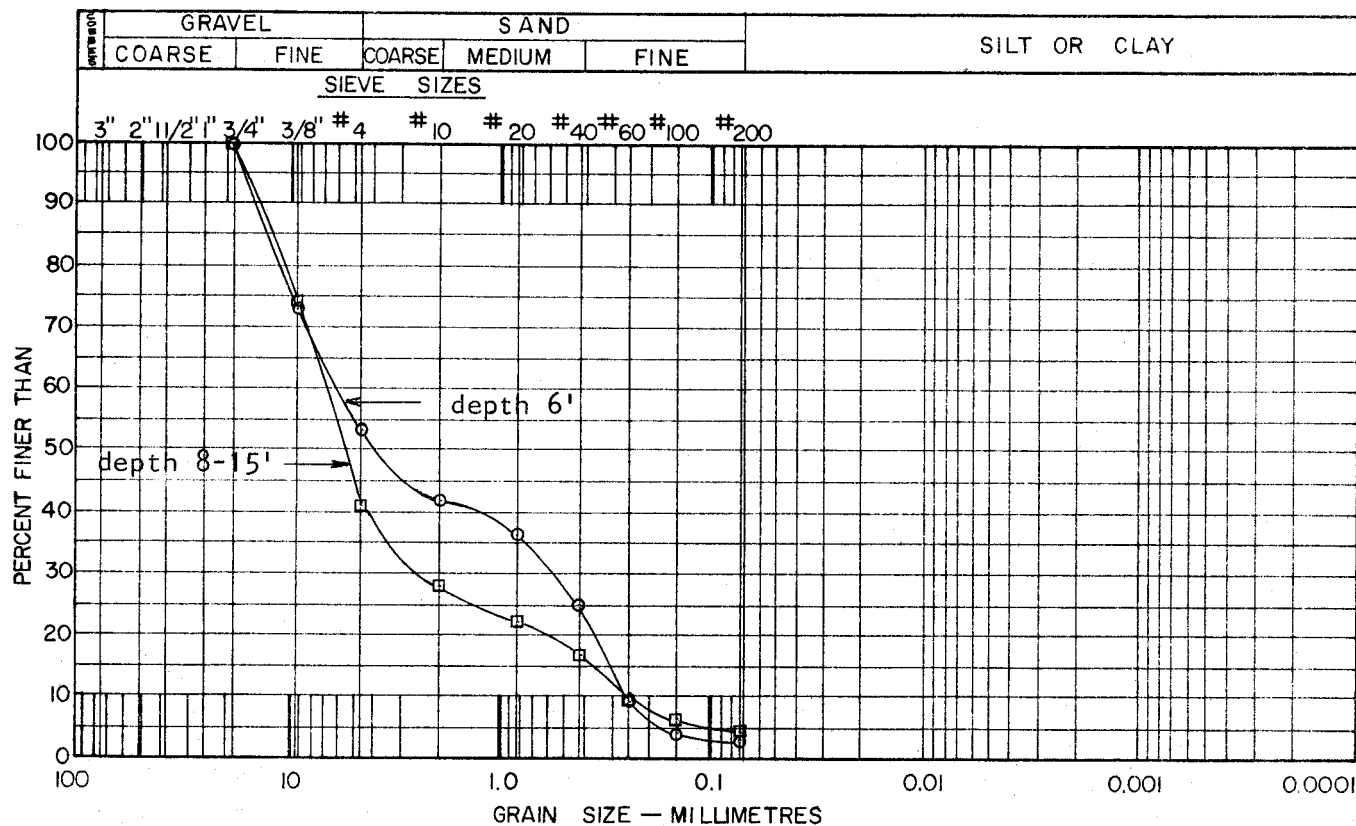
325-3



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%

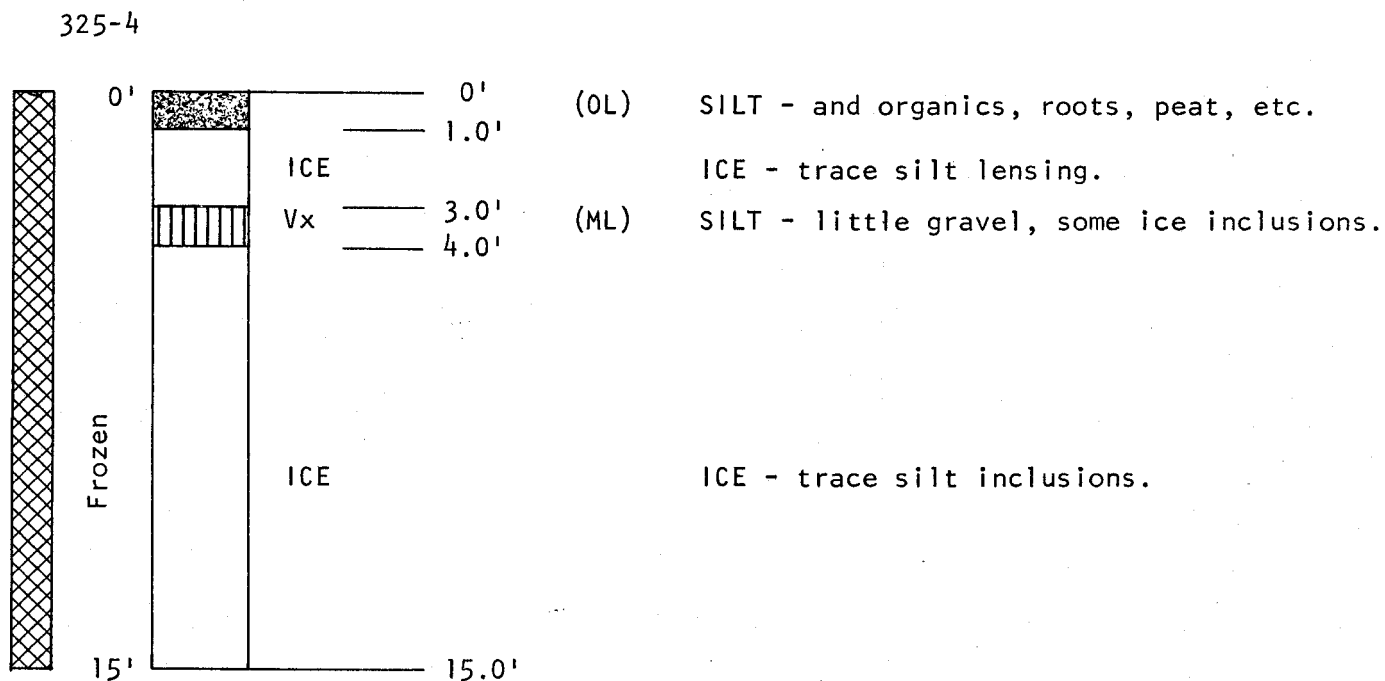
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 325



ZONE III
SOURCE No. 326

LANDFORM AND LOCATION:

Elevated remnant of a delta plain 1 mile east of Mackenzie Delta and 17 miles northwest of Reindeer Station. Located in the critical wildlife area of the Mackenzie Delta.

MATERIAL:

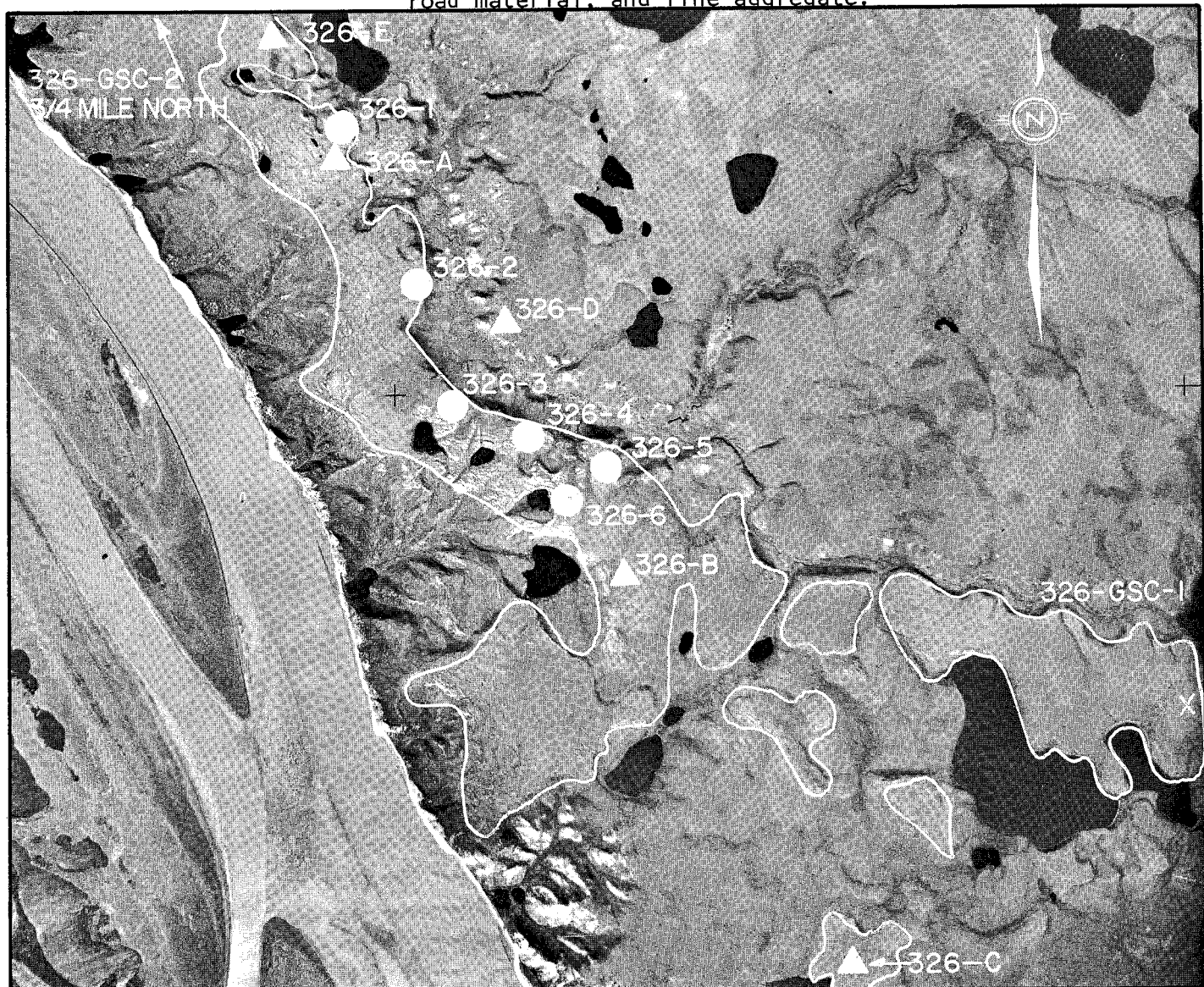
SAND - and gravel, trace of silt.

VOLUME:

20,000,000 cu. yds.

CONCLUSION:

Suitable for development, contingent on favourable environmental study. General fill, road material, and fine aggregate.



AIRPHOTO No. A12854 - 350

SCALE: 1" = 3000' (approx.)

326 ENVIRONMENT

Physical

This source is at the northern end of the Caribou Hills, 17 miles northwest of Reindeer Station and 1 mile inland from the east channel of the Mackenzie River at an elevation of 70 to 100 feet. The source appears to be an elevated remnant of a delta plain bounded by the River on the west and by a deep meltwater channel on the east. It is very large, about 4 miles long and typically about 2,000 feet wide.

The surface of the source contains several small ponds, and much of the area displays polygonal ground pattern. The source has not been developed.

Biotic

Vegetative cover is thin to non-existent, with some scattered moss and lichens on the exposed surface and dwarf shrub growth near the ponds. Some spruce trees can be found in the deeper valleys, below the level of the deposit.

The source lies within the eastern boundary of the critical Mackenzie Delta wildlife region, intensively trapped for muskrat, mink, and beaver. Waterfowl are abundant as well through summer months. The source is also contained within the Mackenzie Reindeer Grazing Reserve, although near its western boundary. The northern boundary of the proposed Caribou Hills reserve of the International Biological Programme is about 5 miles to the southeast of this source.

326 MATERIAL AND QUANTITIES

This source is relatively consistent in the depth and nature of the deposit. Typically the material is sand and gravel with a trace of silt. The gravel exposed in the test pits is graded to a maximum particle size of $2\frac{1}{2}$ inches. The overall grading of the source is approximately 30 - 40% gravel, 55 - 65% sand, and 5% silt.

A sample of gravel from Test Pit C was subjected to petrographic analysis, and the main constituents are shown to be quartzite (52%)

and chert (33%), with some quartz, soft sandstone (5%), and granite. Only the sandstone is unsound, the remainder being good to excellent quality.

The depth of granular material encountered in the drill holes varied from 16 feet to 28 feet, with 4 of the 6 holes penetrating sand and gravel in thickness greater than 22 feet.

The moisture content of the sand is medium to high, generally ranging from 8% to 16%. The moisture is observed in the material as ice crystals and coatings on the particles of granular material. Generally the sand and gravel overlies massive ground ice. Only Test Hole #1 penetrated a substantial lense of ice at shallow depth.

The Geological Survey of Canada has taken samples in this area, and the grain-size curves are attached.

Sample LV79-72 was taken north of the source and Sample LV78-72 was taken southeast of the source. Both of these samples show good quality granular material, the one to the north being a well-graded sand and fine gravel and the one to the south being a uniform fine sand with a trace of silt.

The volume of sand and gravel available in this source is estimated to be 20,000,000 cubic yards.

326 DEVELOPMENT

General

This source is recommended for development for the supply of general fill, road material, and fine aggregate, contingent on the presentation of a favourable environmental study.

Access

This source is within 1 mile of the bank of the east channel of the Mackenzie River. If developed, a road should be built up the slope to provide all-weather access and shipping, by barge in summer and by truck in winter. With the construction of this short road the

source will be well situated to serve the Delta, being 44 miles by the east channel from Inuvik and about 10 miles from Tununuk Point.

Material Use and Handling

The material from this source is a good general fill and road material, and can also be used as fine aggregate in concrete and asphalt construction. For the production of aggregate the oversize rock must be screened out but would not justify the installation of a crushing plant.

The moisture content of the material at depth is high enough to require ripping, stockpiling, thawing and draining.

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

Stripping and Restoration

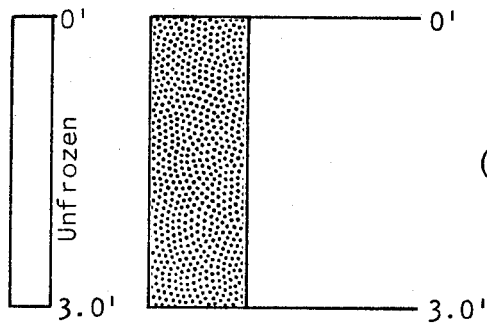
The depth of stripped material will vary from nothing to about 1 foot, and this material must be stockpiled for replacement after the granular material has been removed.

The development should be located on the top surface of the deposit, leaving the outer margin intact in order to avoid thermal erosion of the surrounding slopes. The deposit appears to be sufficiently uniform that a pit could be extended without interruption, the full depth of usable material being removed in a single operation. A blanket of several feet of sand should be left intact over the ground ice in order to minimize the thermal effect on this ice. Topsoil should then be spread over the floor of the pit to provide for revegetation. The ultimate walls of the pit should be graded to a stable slope, and then these slopes too should be covered with topsoil.

TEST PIT LOGS

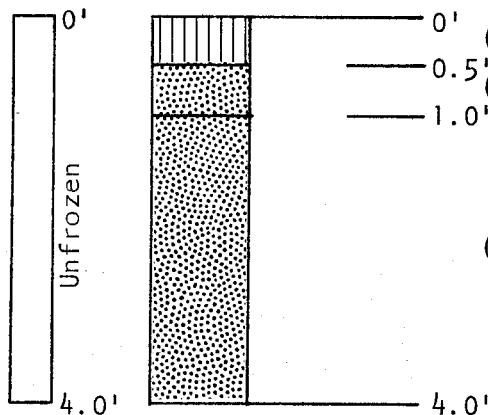
SOURCE No. 326

326-A



(SP) SAND - trace gravel, trace silt, coarse to fine, uniform, brown

326-B

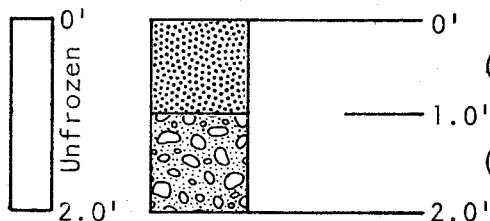


(OL) SILT - organic

(SP) SAND - fine, uniform

(SW) SAND - and gravel, clean, max. 2", rounded to subangular, well graded

326-C



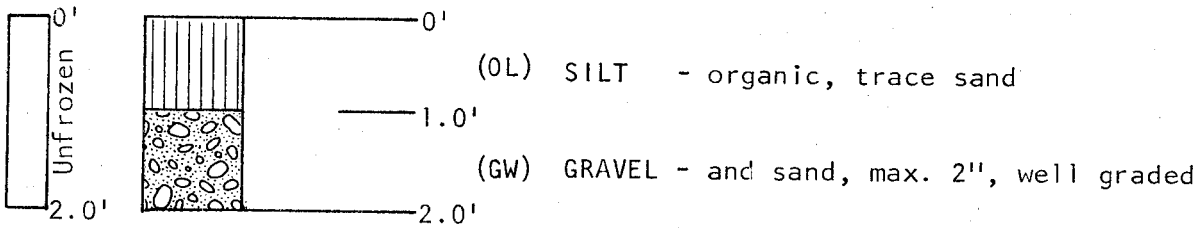
(SM) SAND - some silt, trace organic

(GW) GRAVEL - and sand, well graded, max. 2½", rounded to subangular

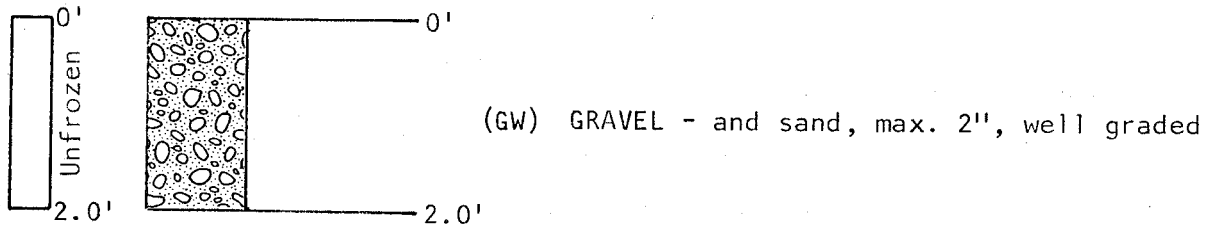
TEST PIT LOGS

SOURCE No. 326

326-D



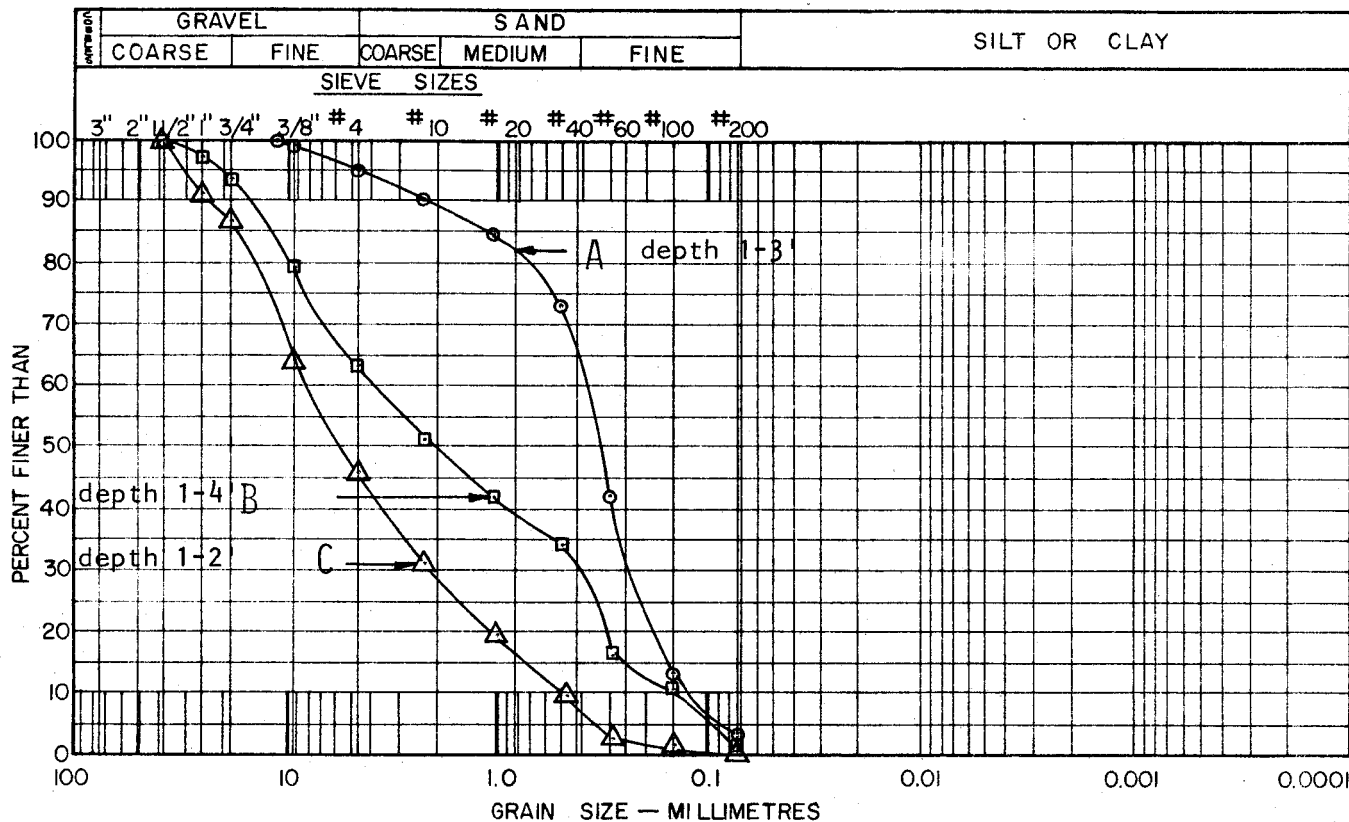
325-E



LABORATORY TEST DATA

TEST PIT-SOURCE No. 326

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Pit A depth 1-3' 13.4%
 Pit B depth 1-4' 2.4%
 Pit C depth 1-2' 3.1%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

Test pit C depth 1-2'

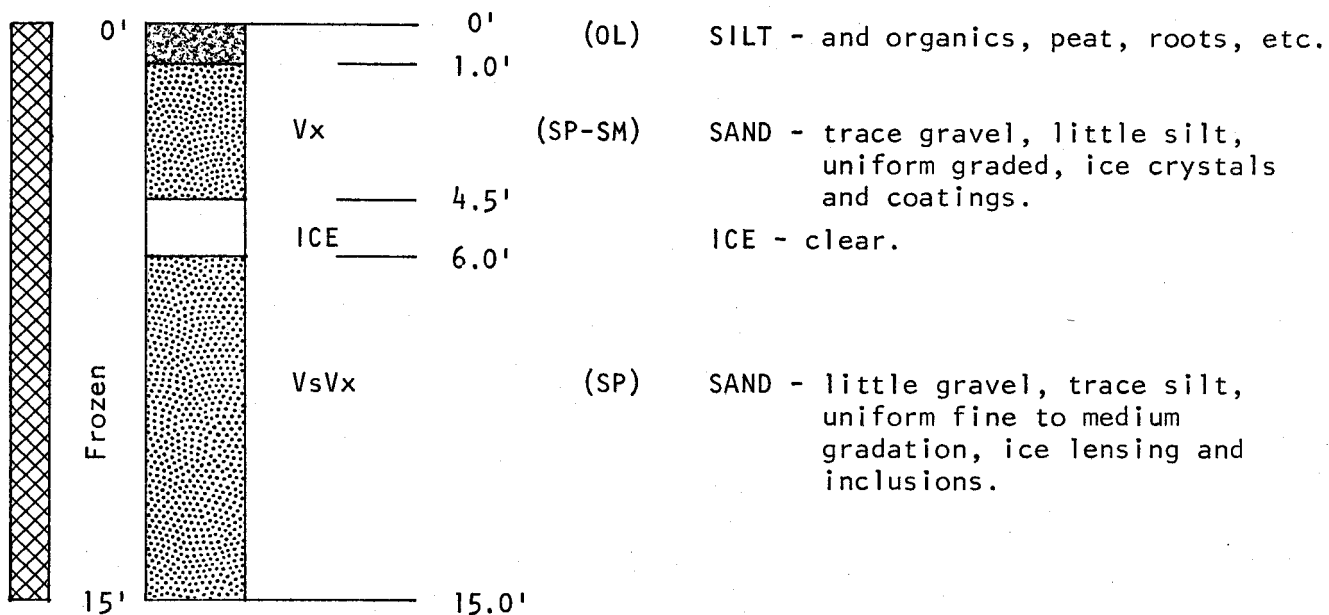
Quartzite - 52%
 Chert - 33%
 Quartz - 7%
 Sandstone, soft - 5%
 Granite - 3%

Total 100%

TEST HOLE LOGS

SOURCE No. 326

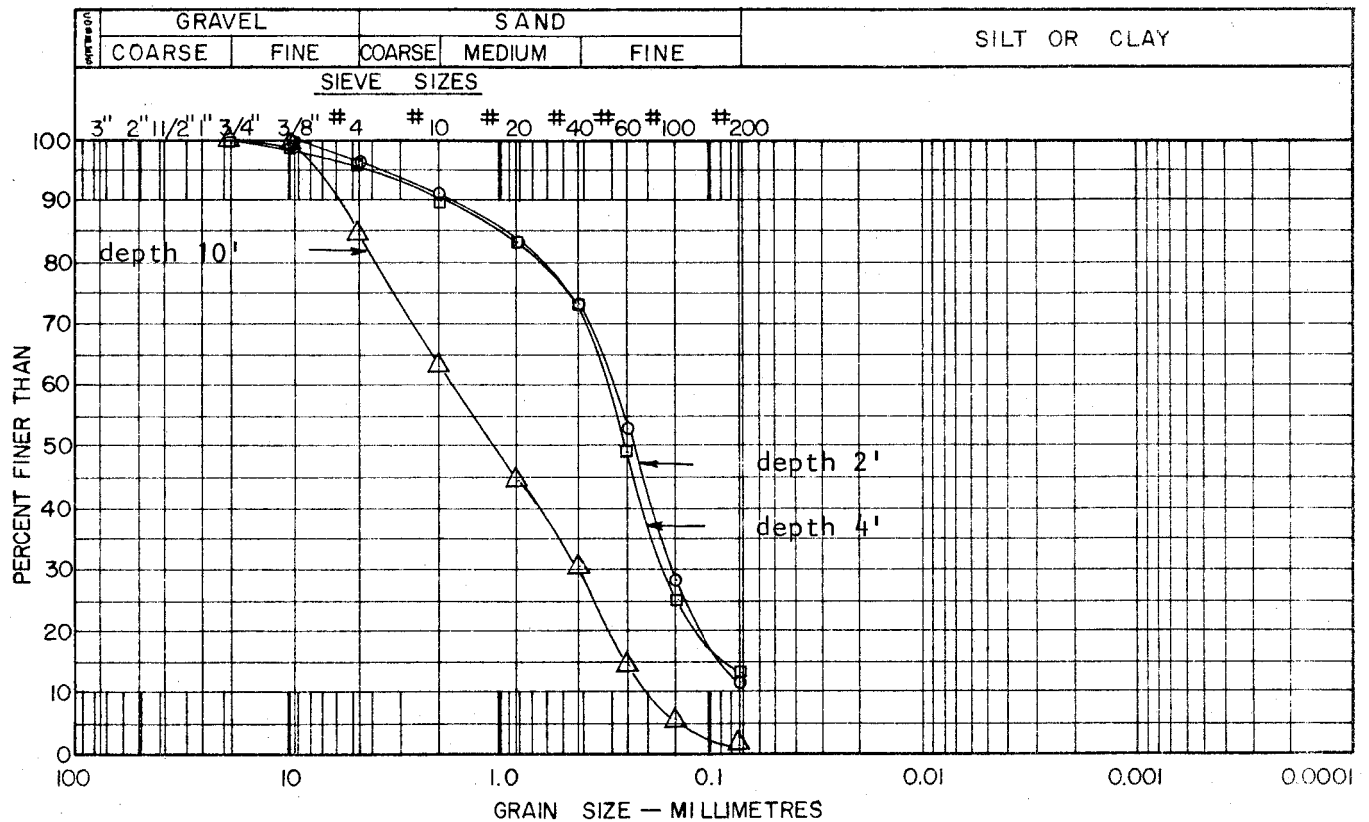
326-1



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 326-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	12.2%
Sample 2	depth 4'	18.4%
Sample 3	depth 10'	15.5%

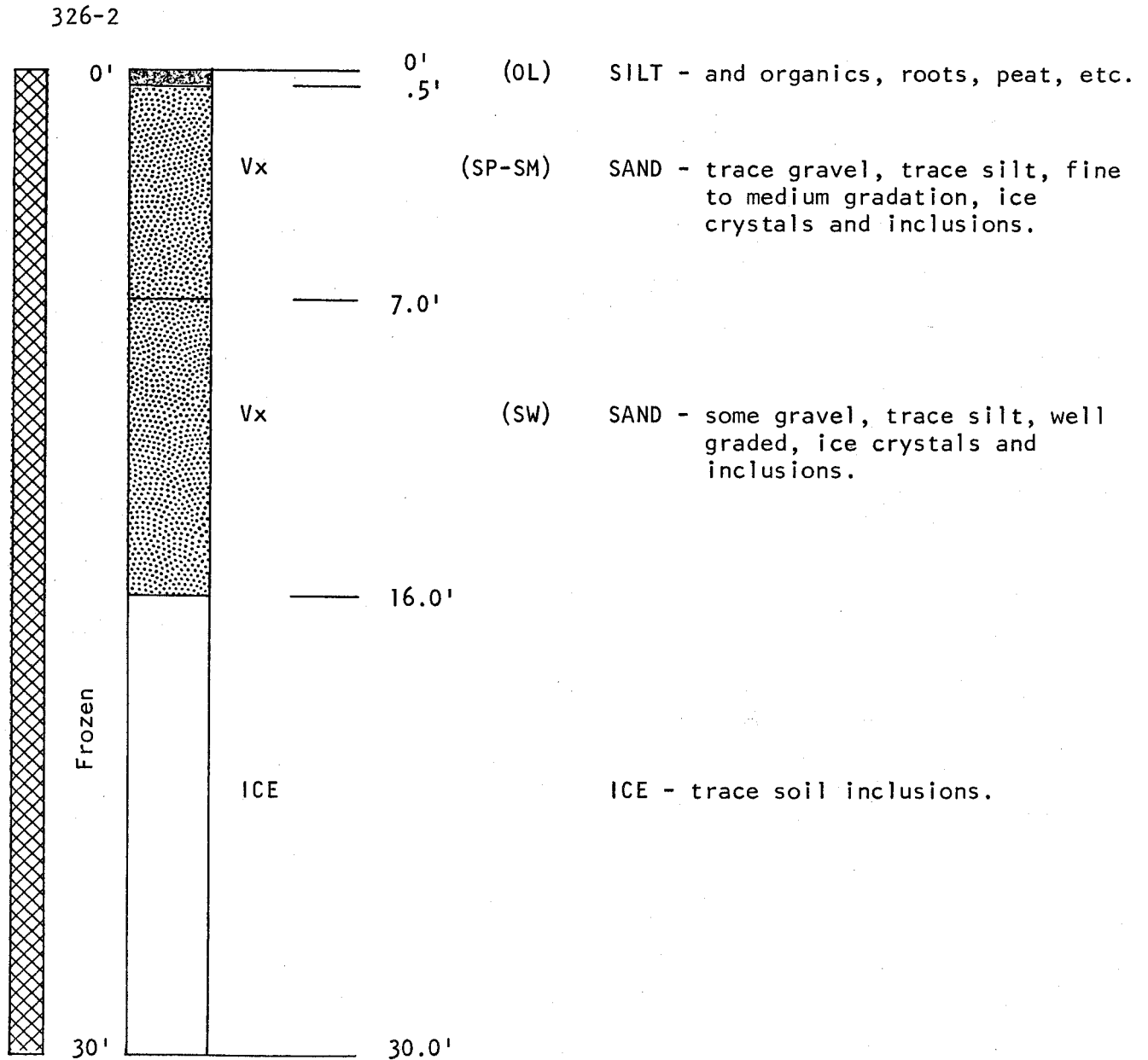
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

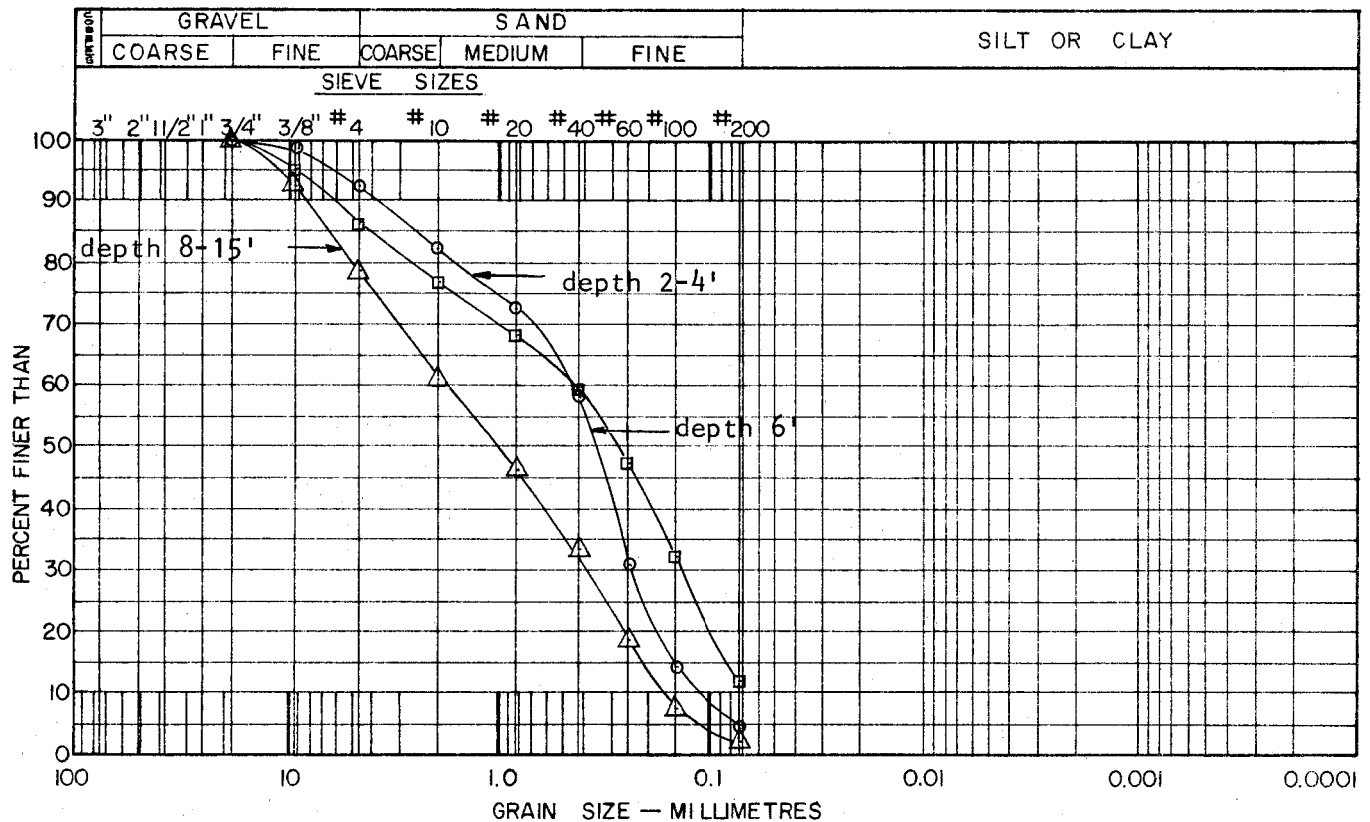
SOURCE No. 326



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 326-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	14.0%	Sample 6	depth 15'	13.2%
Sample 2	depth 4'	18.8%			
Sample 3	depth 6'	16.7%			
Sample 4	depth 8'	14.2%			
Sample 5	depth 10'	16.3%			

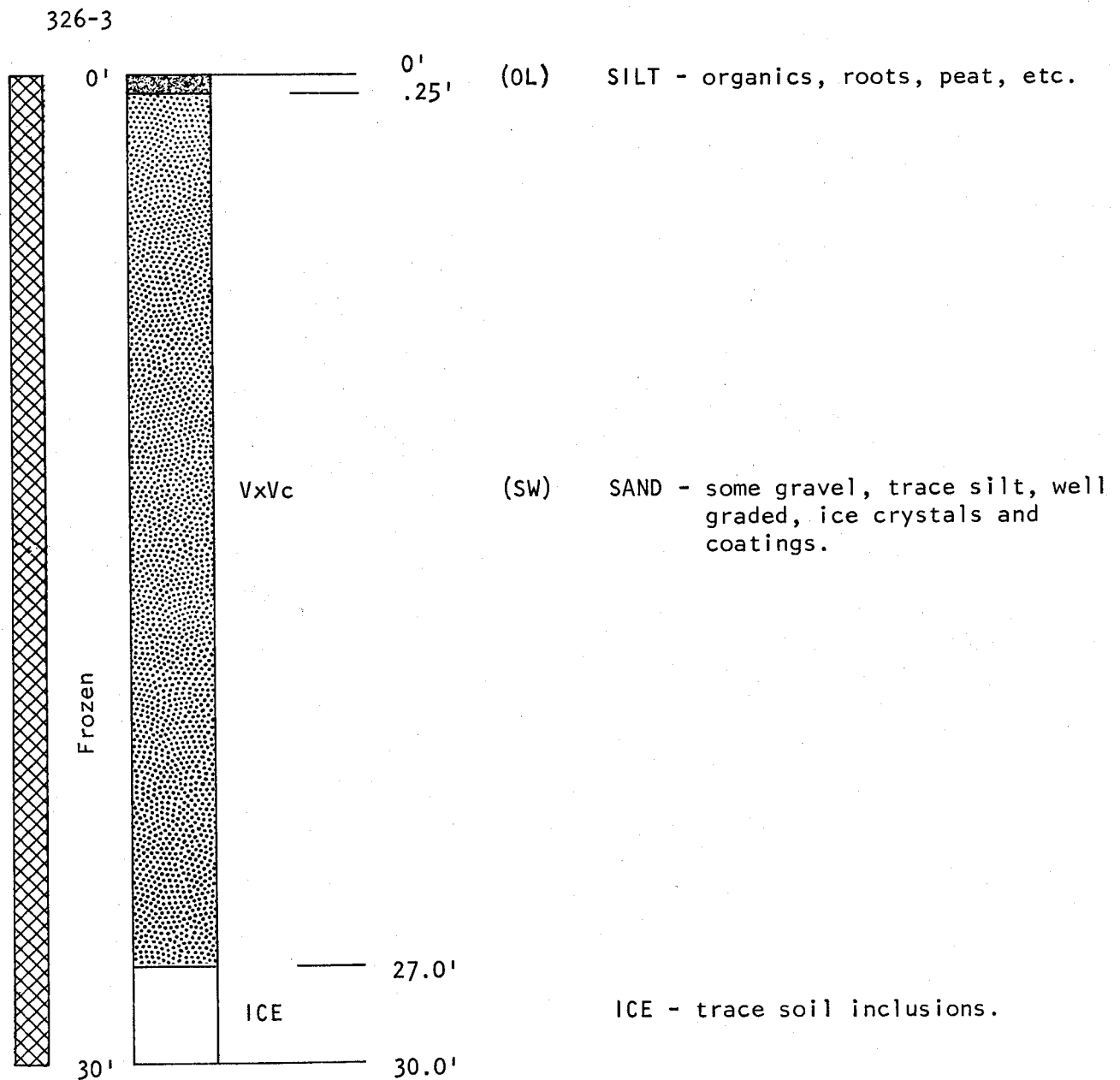
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

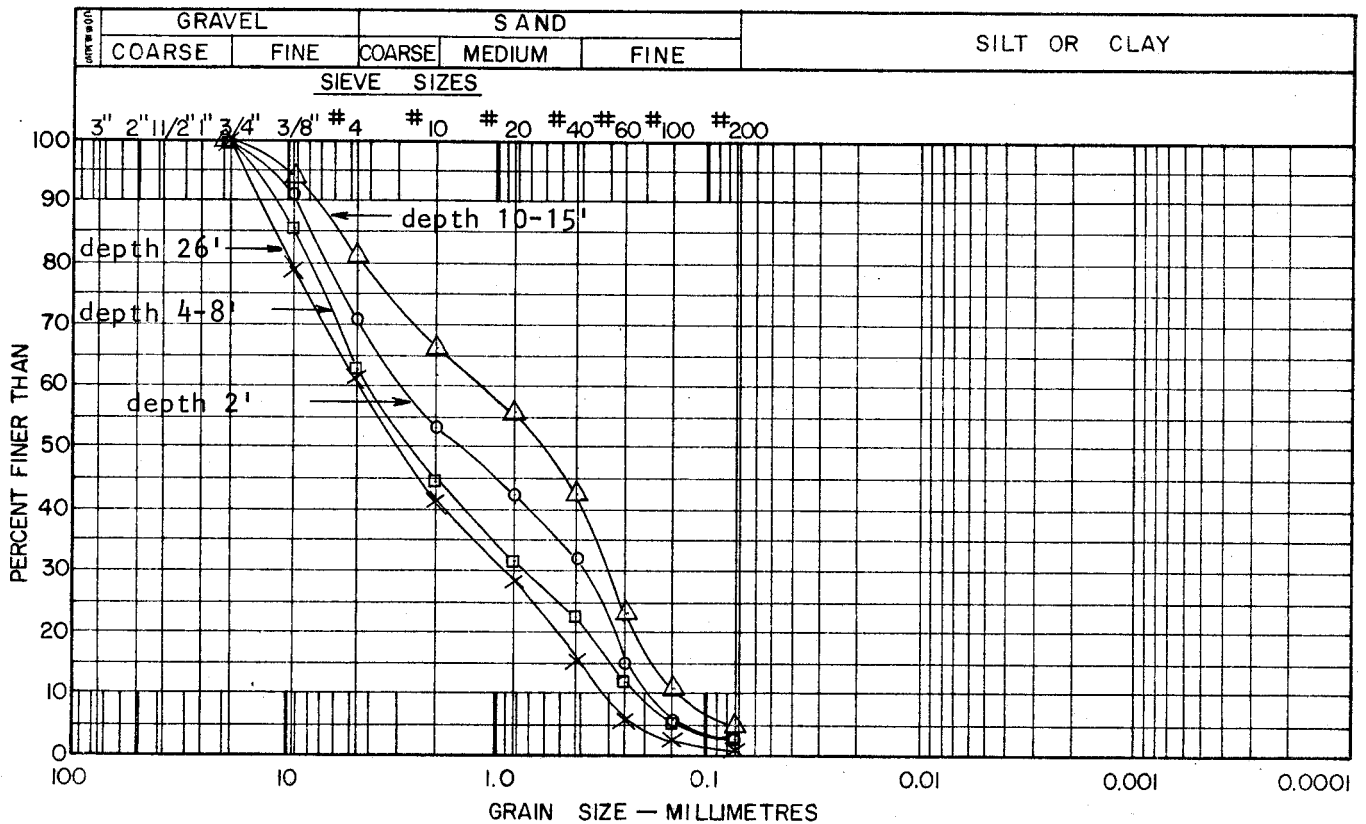
TEST HOLE LOGS

SOURCE No. 326



LABORATORY TEST DATA TEST HOLE-SOURCE No. 326-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	11.4%	Sample 6	depth 15'	17.0%
Sample 2	depth 4'	8.9%	Sample 7	depth 20'	10.9%
Sample 3	depth 6'	8.5%	Sample 8	depth 25'	27.0%
Sample 4	depth 8'	12.1%			
Sample 5	depth 10'	15.9%			

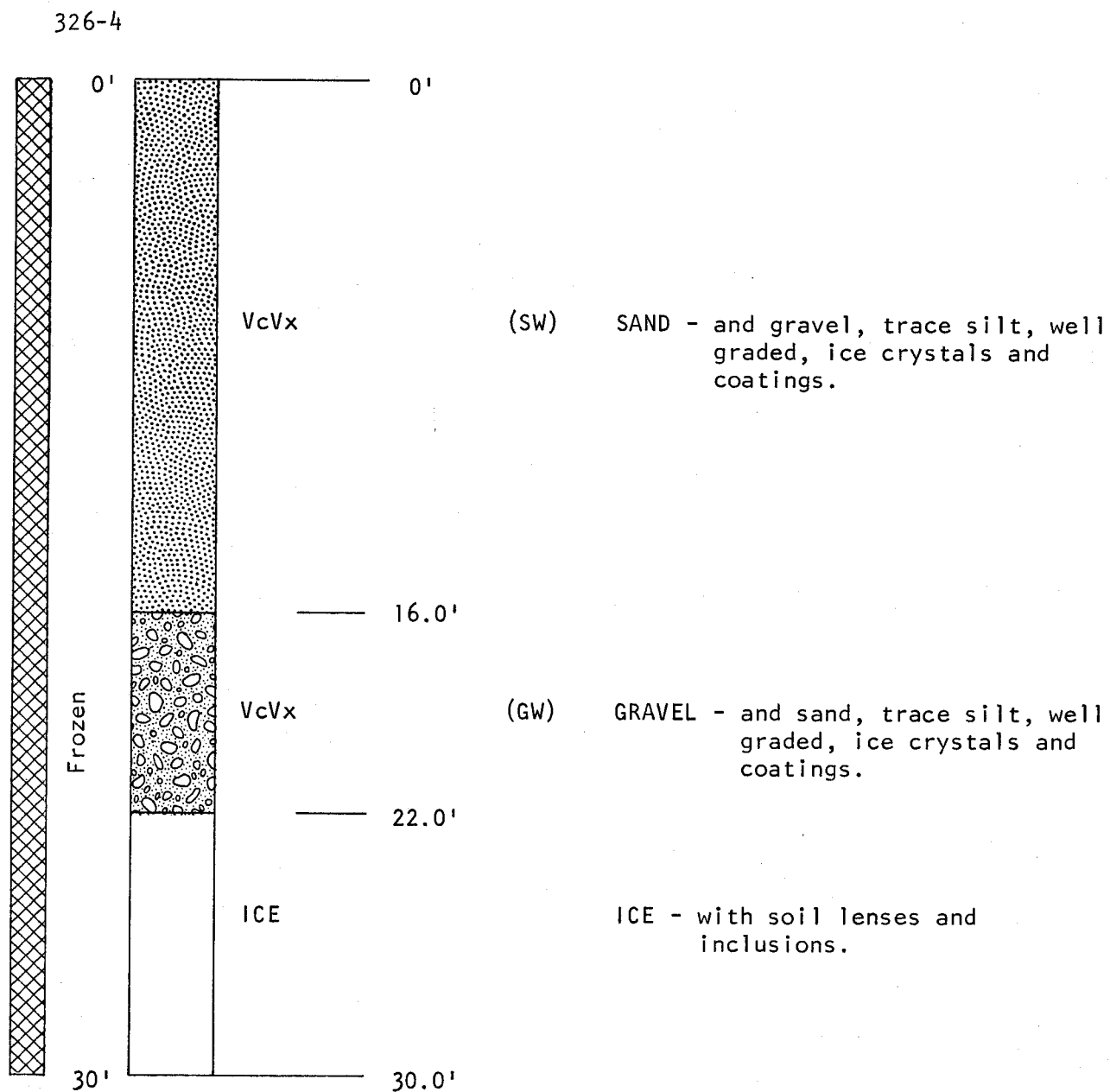
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

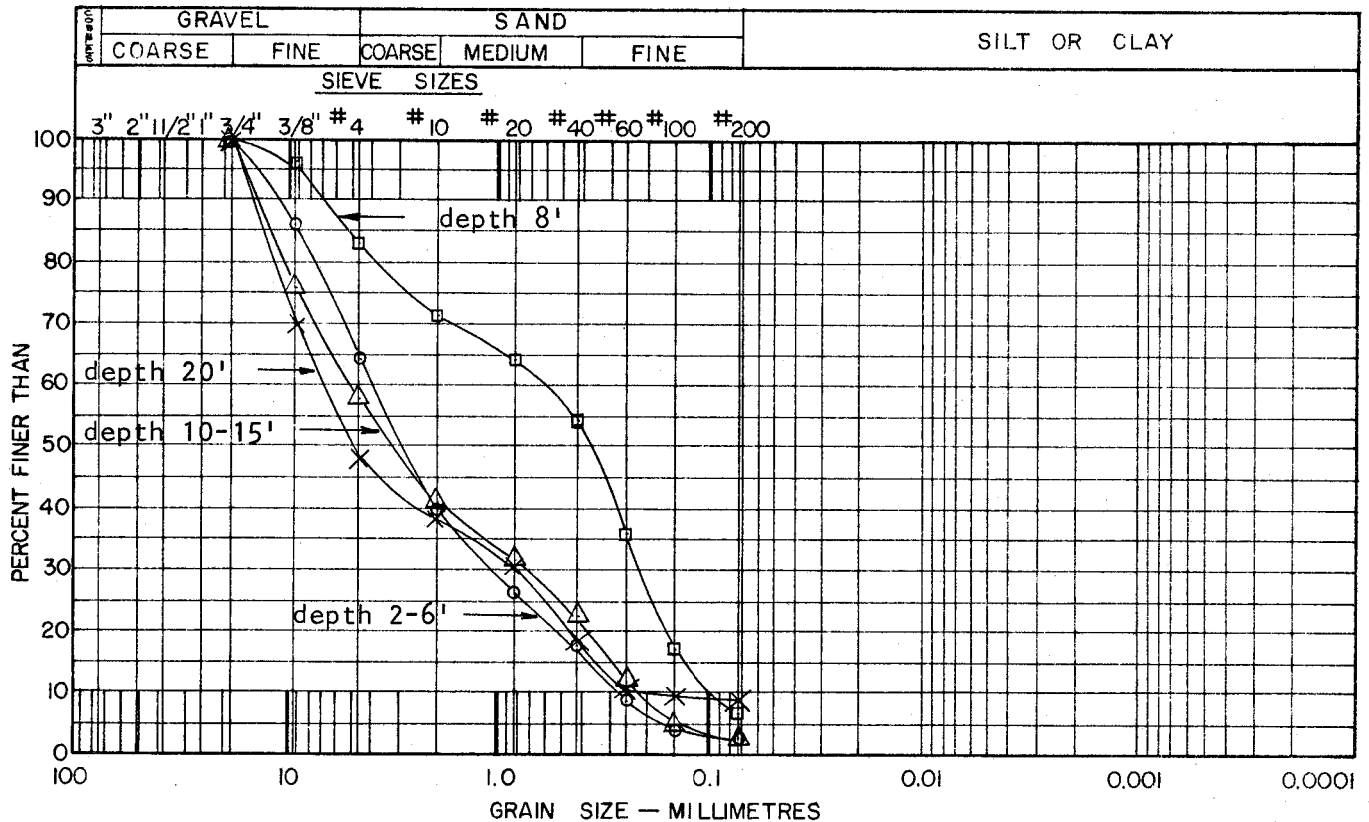
SOURCE No. 326



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 326-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	8.5%
Sample 2	depth 4'	3.1%
Sample 3	depth 6'	10.2%
Sample 4	depth 8'	25.5%
Sample 5	depth 10'	15.9%
Sample 6	depth 15'	9.8%

Sample 7 depth 20' 9.5%

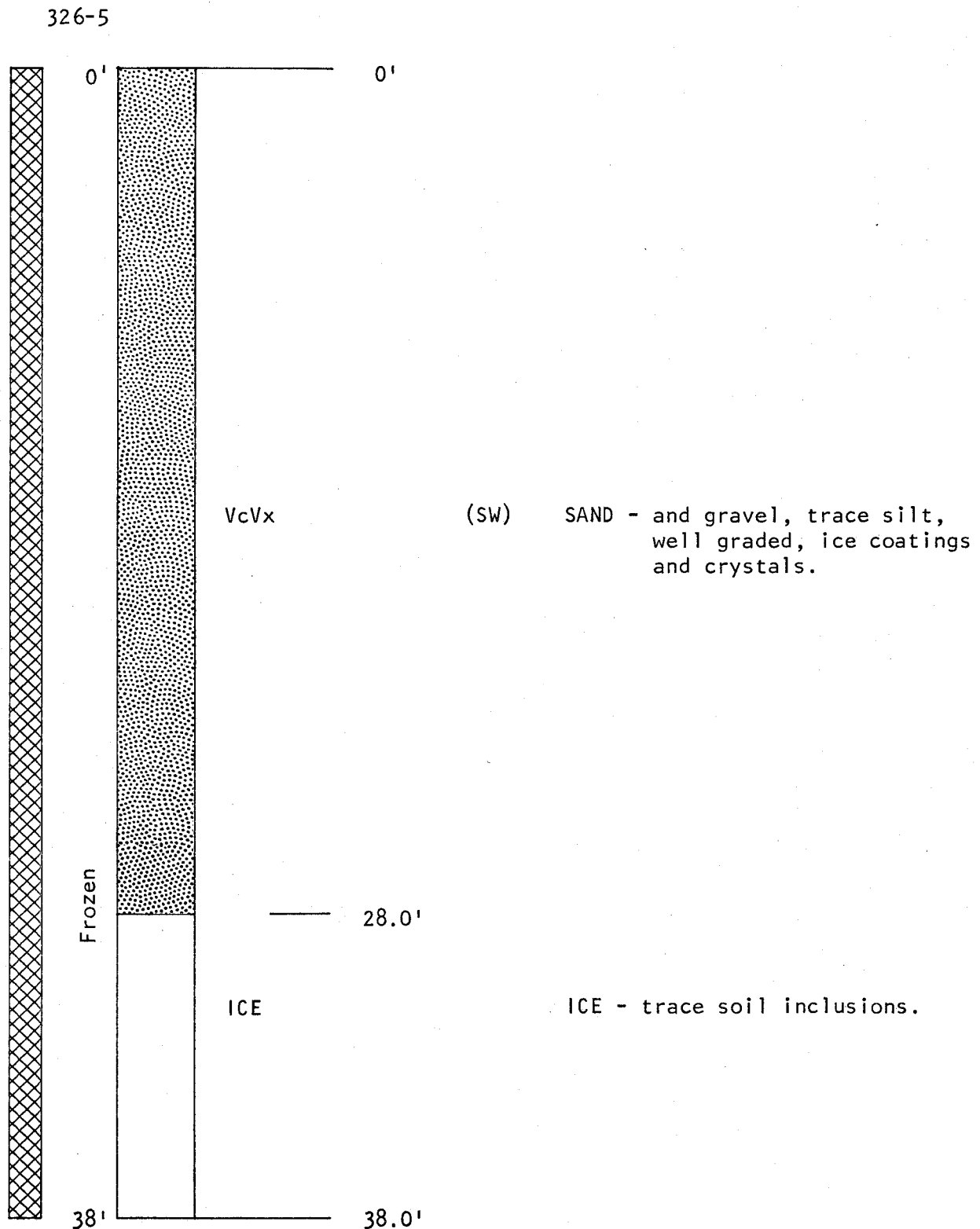
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. 326



GRAIN SIZE DISTRIBUTION



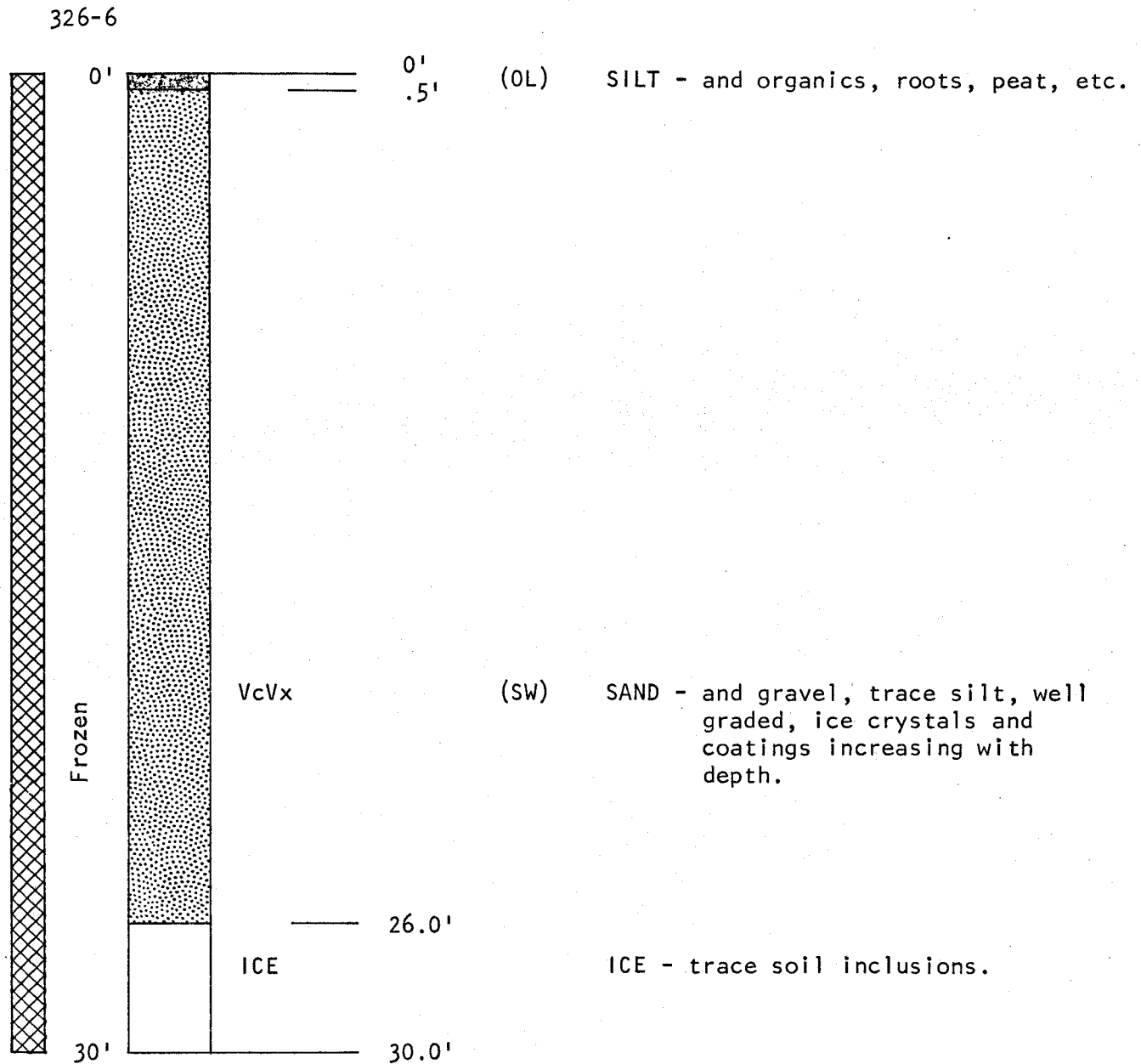
ORGANIC CONTENT

HARDNESS TEST

Ripley, Klohn & Leonoff International Ltd.

TEST HOLE LOGS

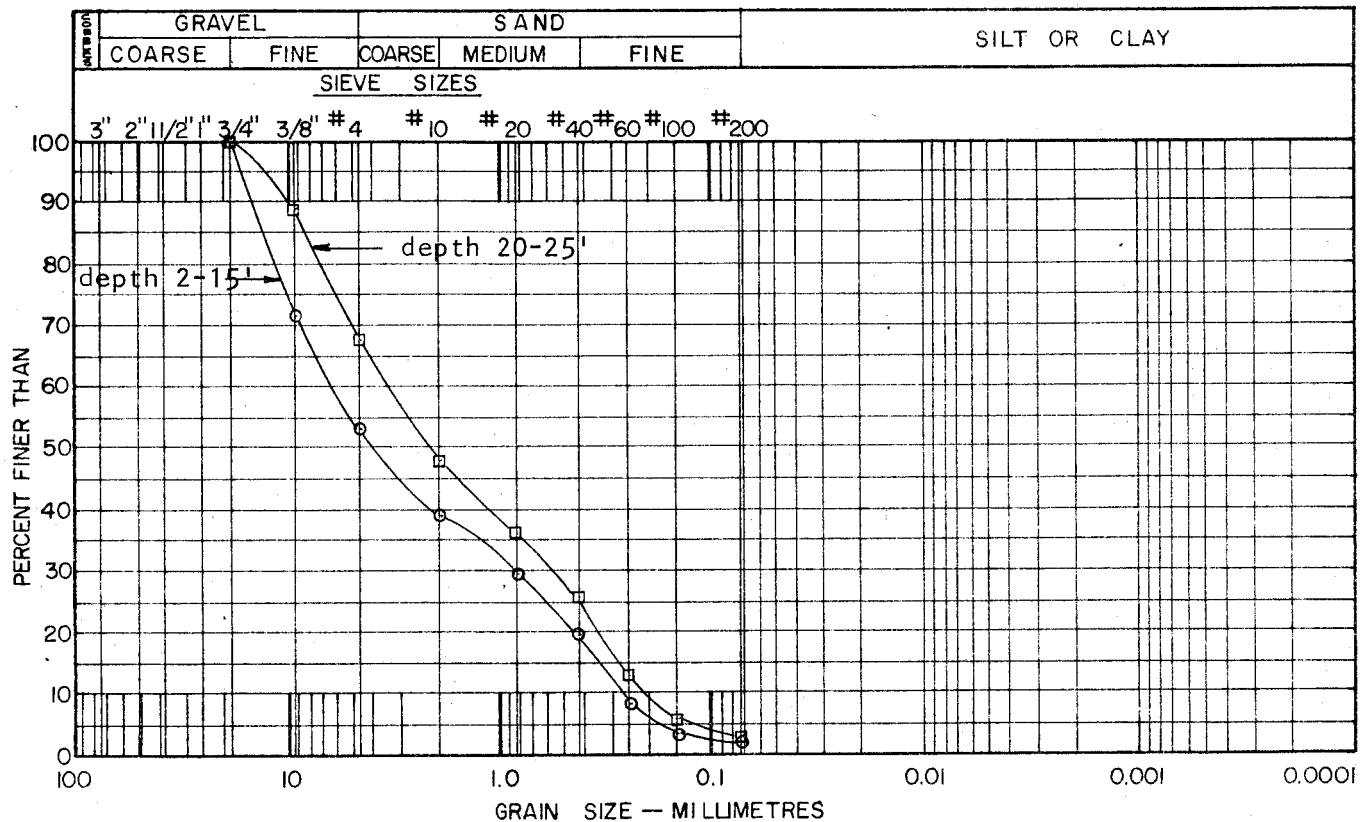
SOURCE No. 326



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 326-6

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	3.1%
Sample 2	depth 4'	3.9%
Sample 3	depth 6'	8.1%
Sample 4	depth 8'	8.8%
Sample 5	depth 10'	9.3%

Sample 6	depth 15'	9.9%
Sample 7	depth 20'	7.8%
Sample 8	depth 25'	13.9%

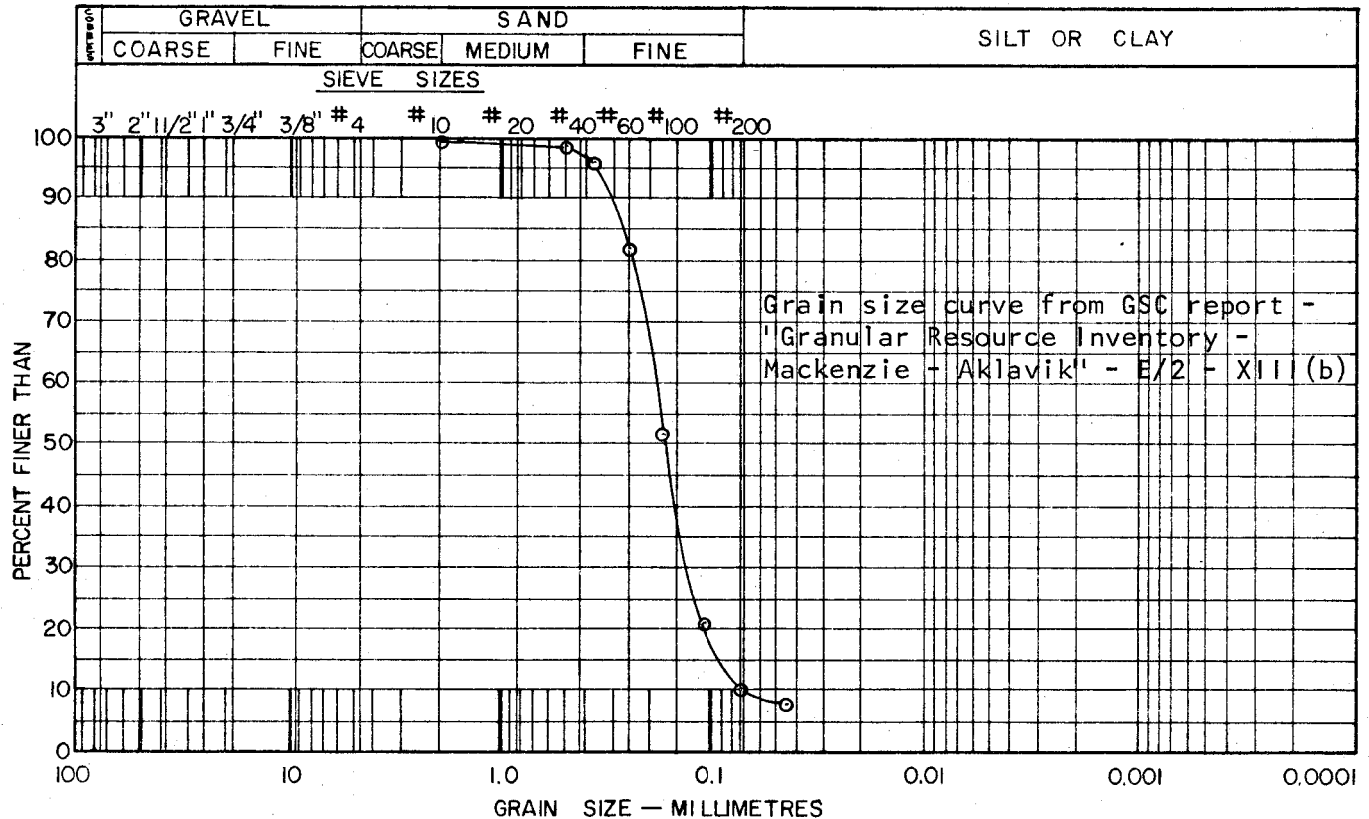
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST PIT-SOURCE No. 326-GSC-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

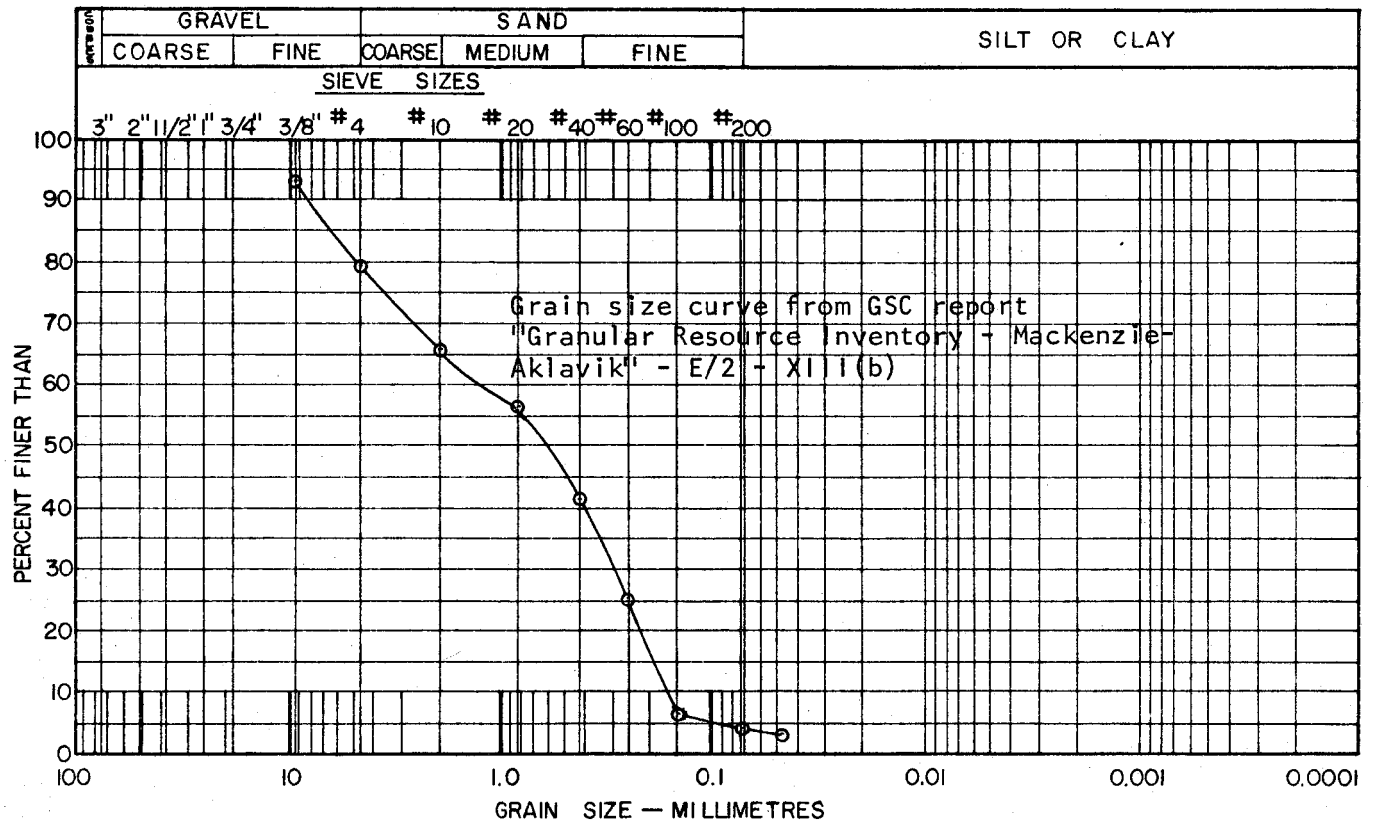
HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY TEST DATA

TEST PIT-SOURCE No. 326-GSC-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

ZONE III
SOURCE No. 327

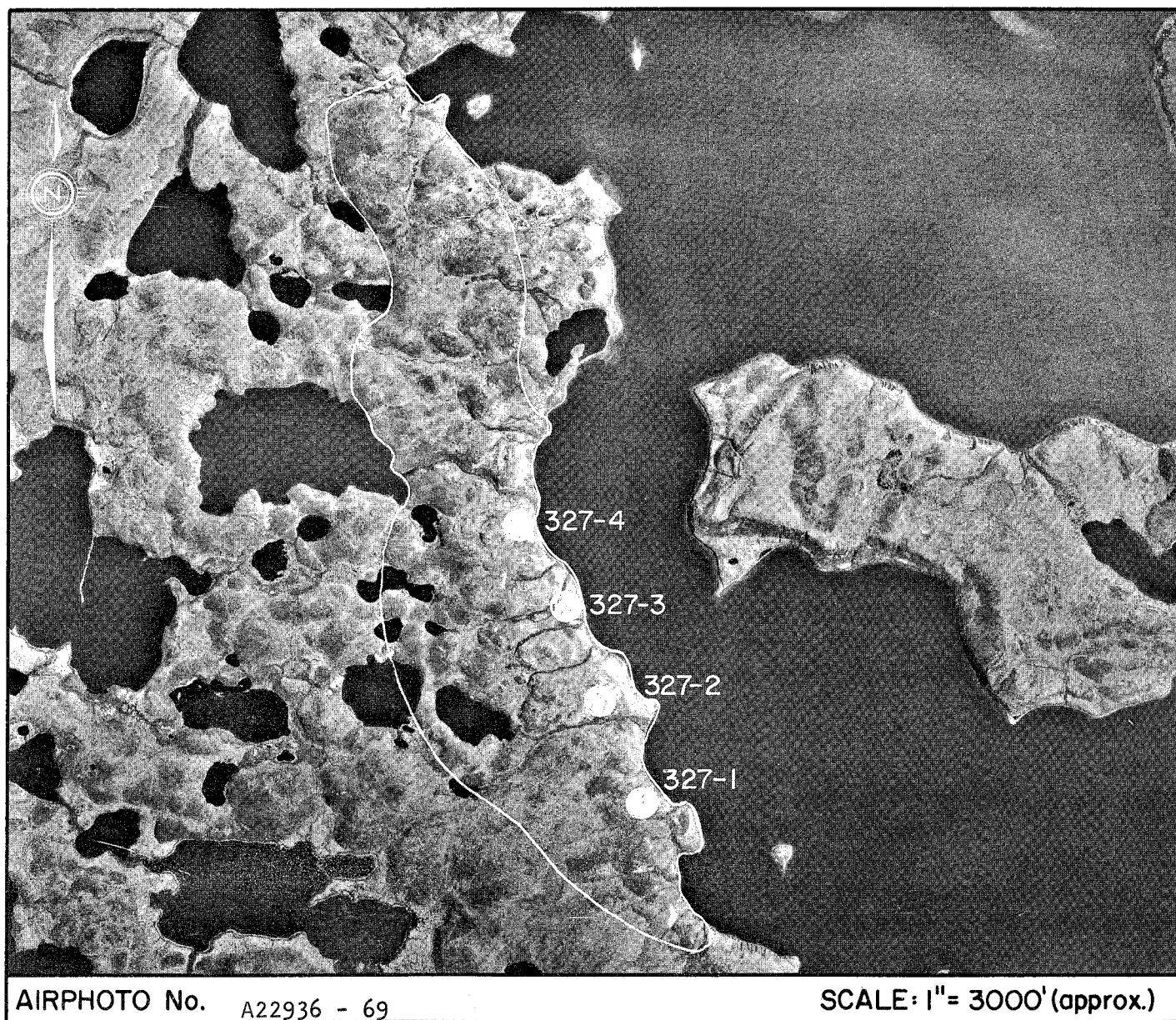
LANDFORM AND LOCATION: Glaciofluvial complex on southwest shore of Eskimo Lakes, 32 miles north of Inuvik.

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.



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

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.

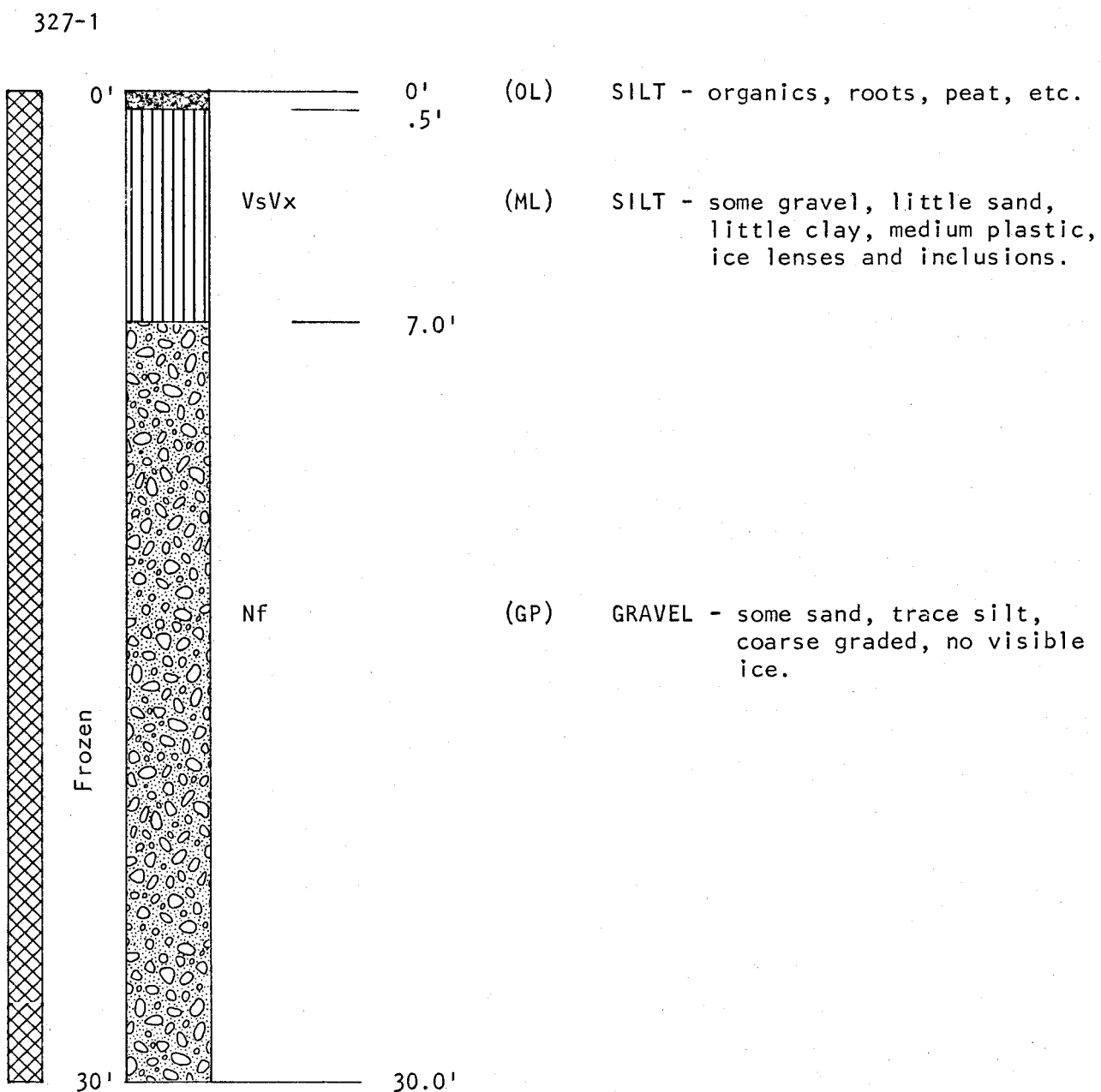
The equipment required for this development is the usual assembly of dozer with ripper attachment, front-end loader, and trucks.

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

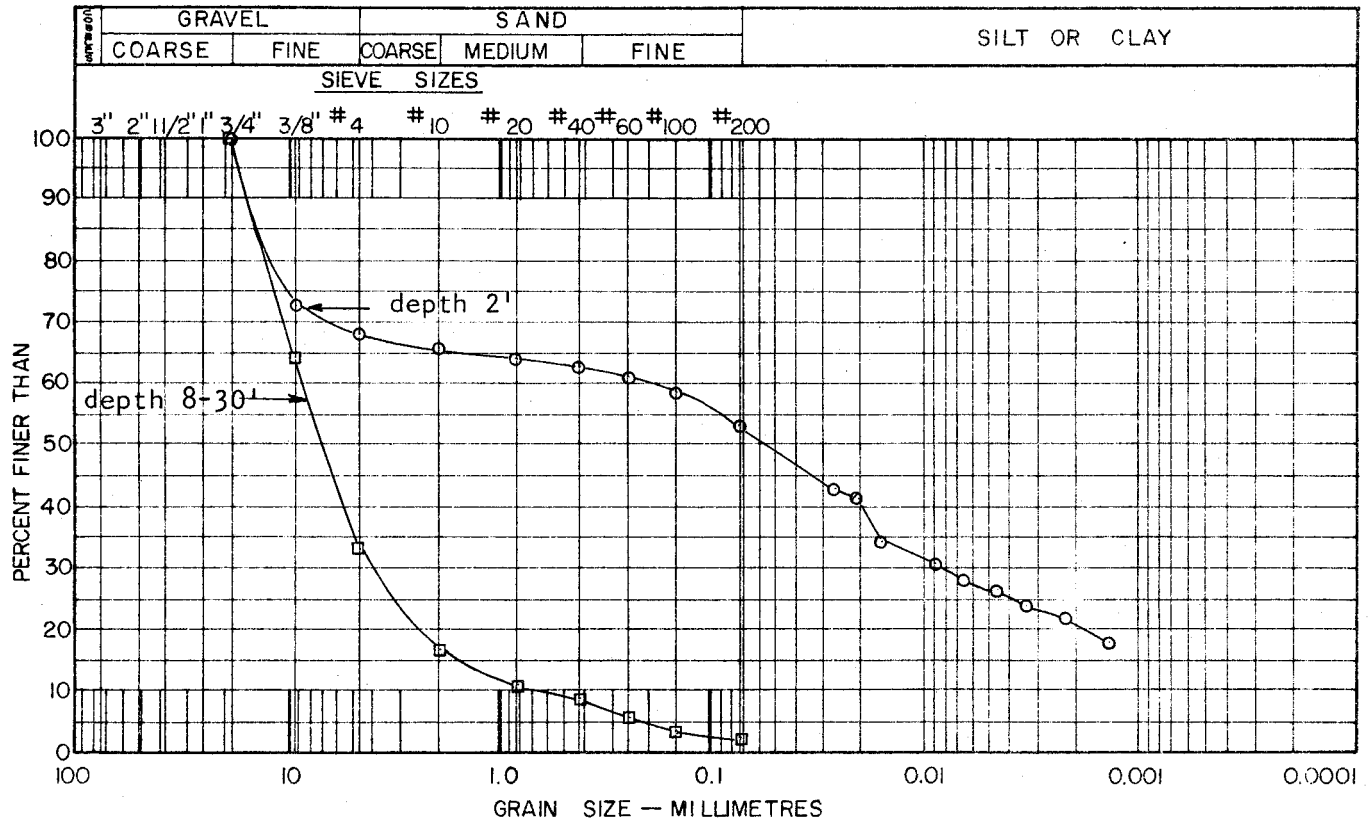
SOURCE No. 327



LABORATORY TEST DATA

TEST HOLE-SOURCE No. 327-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'	19.1%
Sample 2	depth 8'	5.7%
Sample 3	depth 10'	5.2%
Sample 4	depth 15'	5.0%
Sample 5	depth 20'	4.4%

Sample 6	depth 25'	4.3%
Sample 7	depth 30'	4.7%

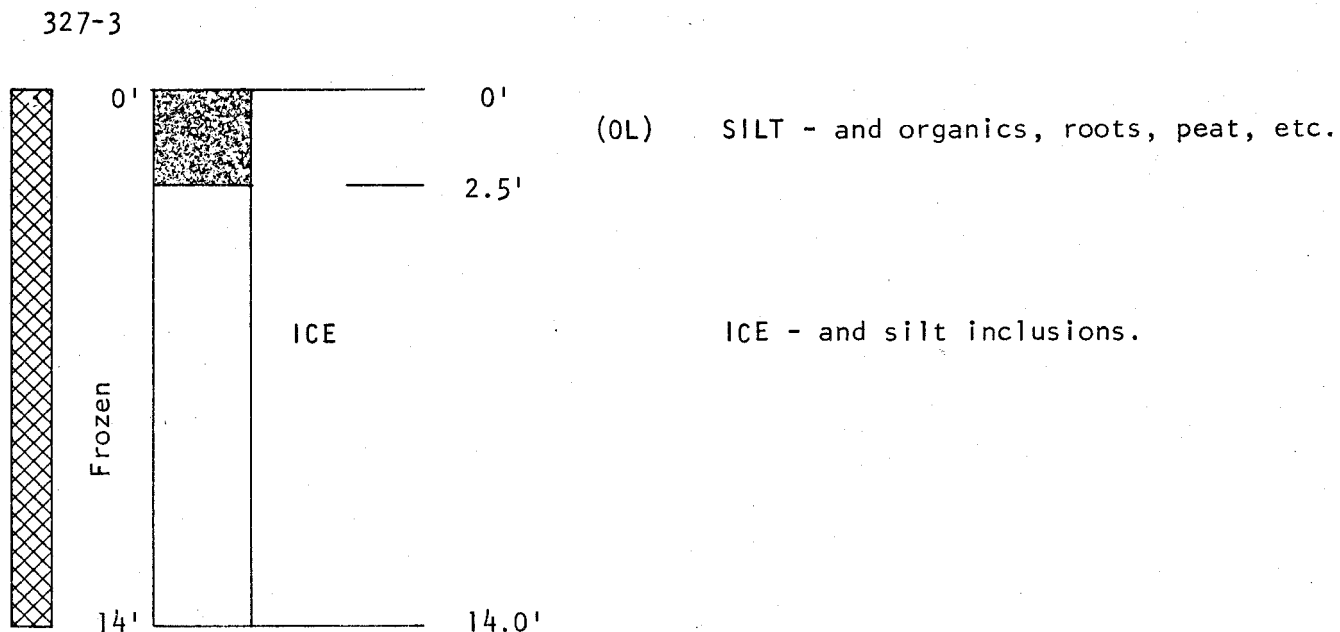
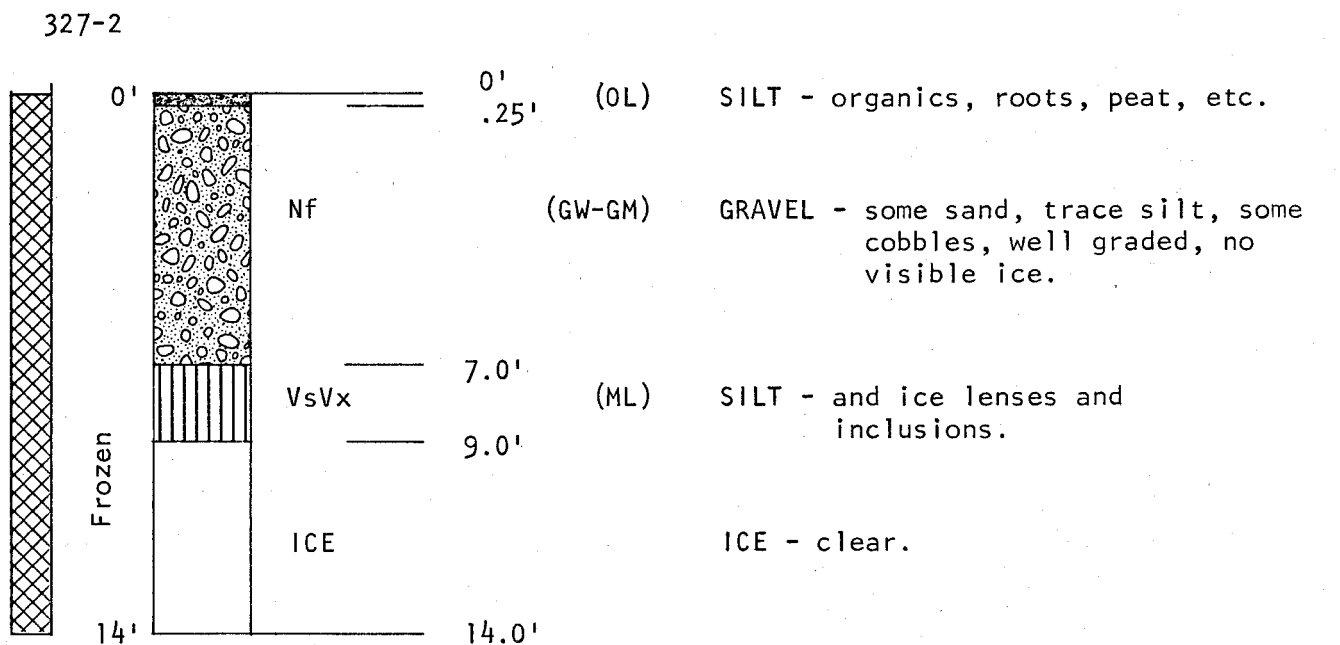
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

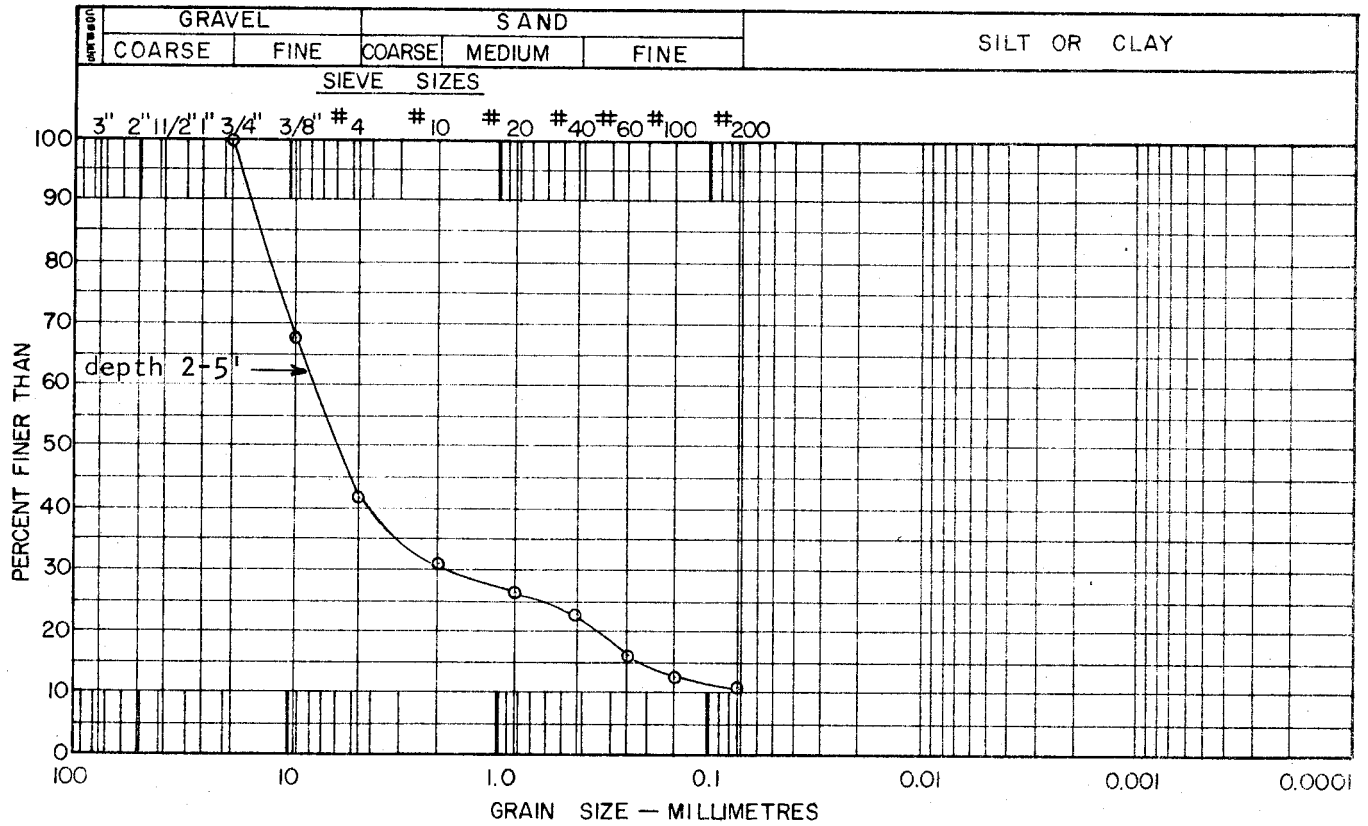
SOURCE No. 327



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%

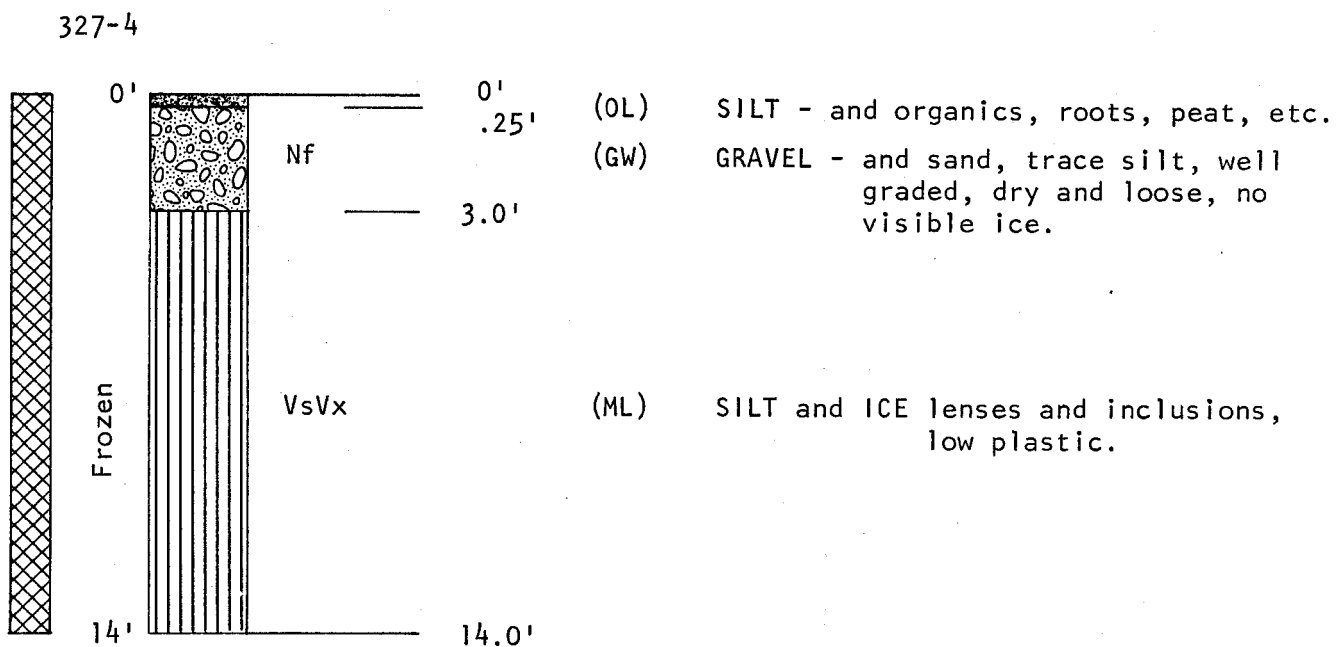
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

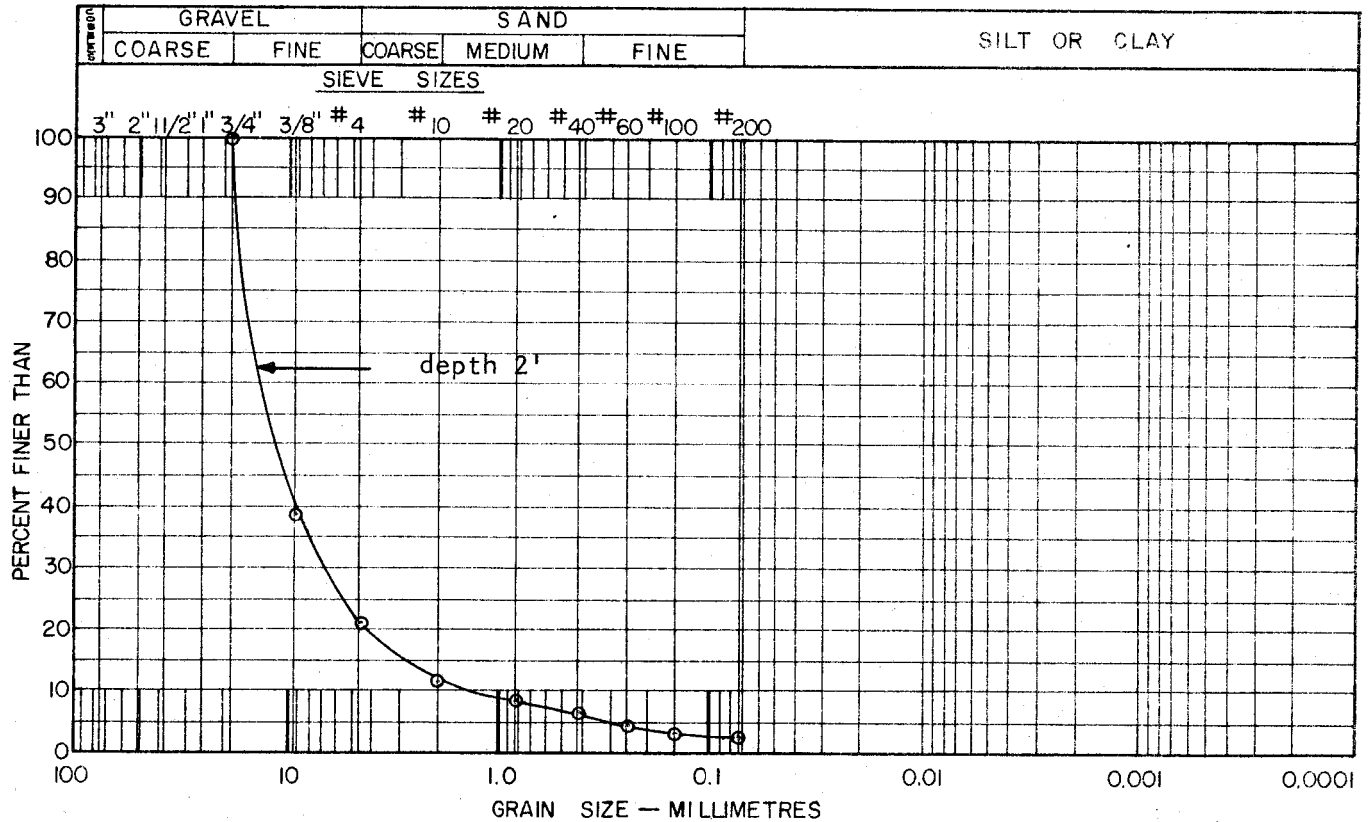
TEST HOLE LOGS

SOURCE No. 327



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

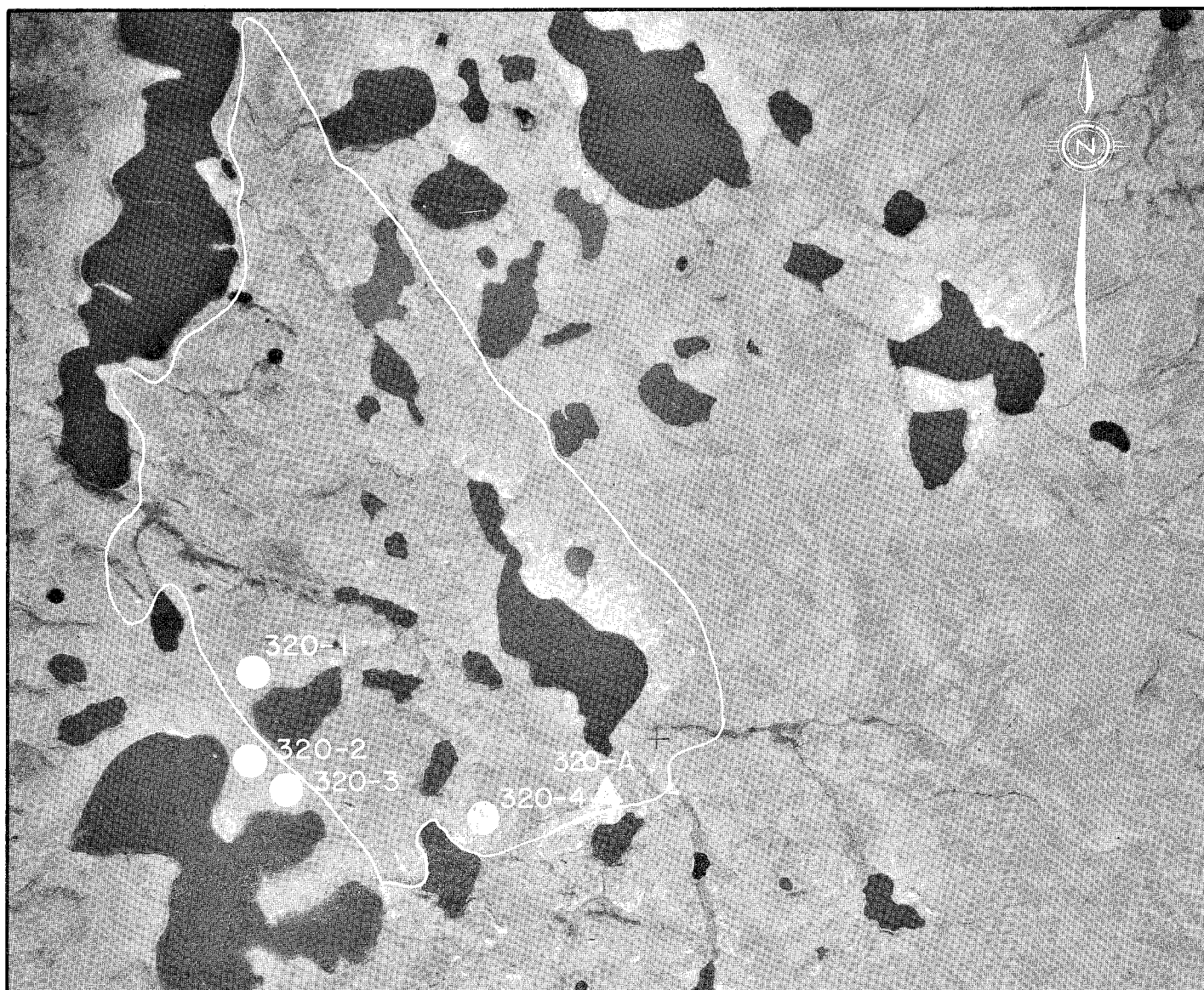
ZONE III
SOURCE No. 320

LANDFORM AND LOCATION: Kame field 4 miles north of Wolverine Lakes, 44 miles north of Inuvik.

MATERIAL: SAND - trace gravel, little silt
SAND - some gravel, trace silt

VOLUME: 500,000 to 1,500,000 cubic yards

CONCLUSION: Low priority for development due to high ice and silt contents. Possible use in local projects for general fill.



AIRPHOTO No. A12918-159

SCALE: 1" = 3000' (approx.)

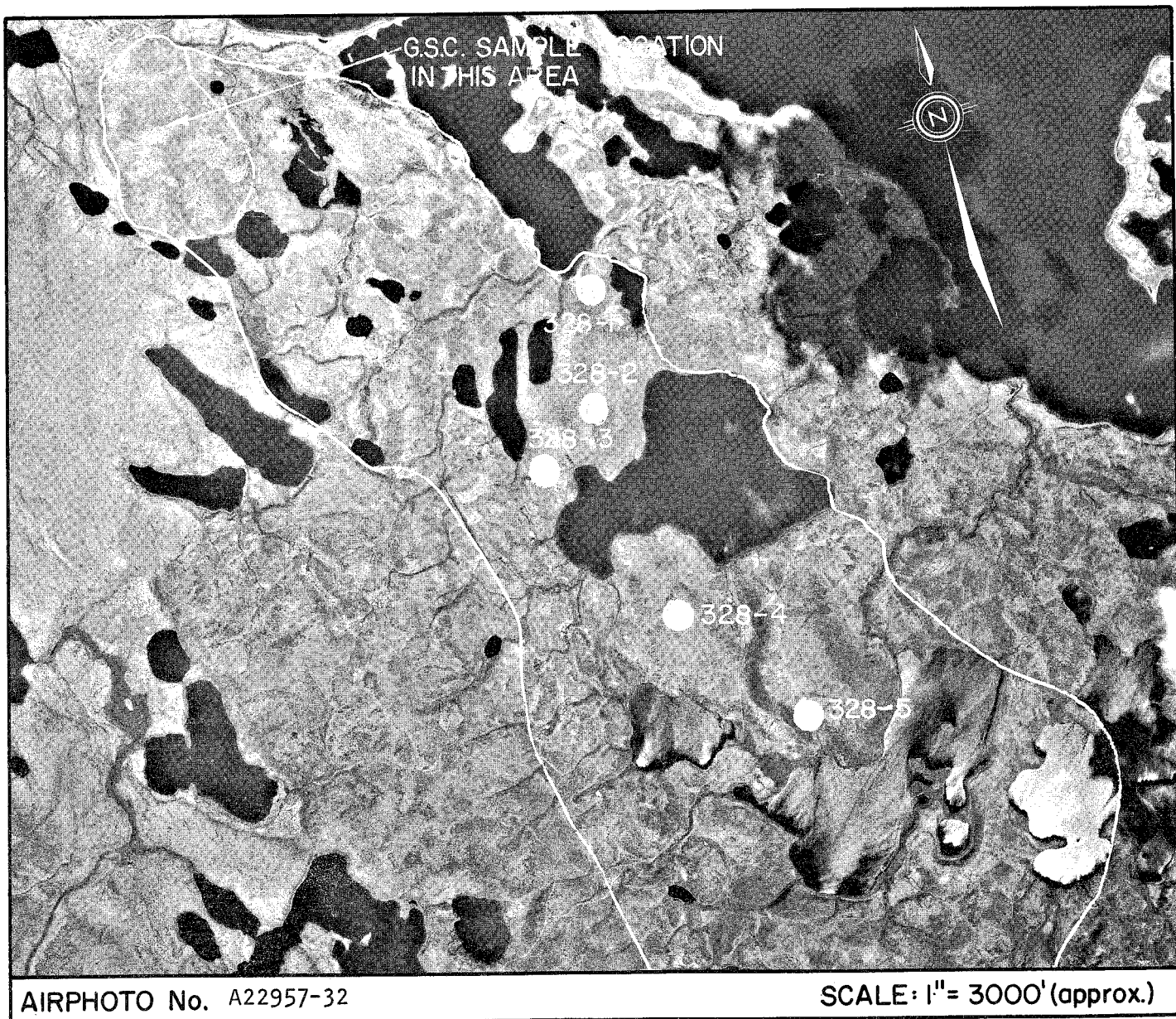
ZONE III
SOURCE No. 328A

LANDFORM AND LOCATION: A glaciofluvial and morainal deposit located on the southwest shore of Eskimo Lakes 28 miles northeast of Inuvik.

MATERIAL: SILT - trace sand, trace clay

VOLUME: --

CONCLUSION: Not recommended for development due to high ice and silt contents.



328A ENVIRONMENT

Physical

This source is located on the southwest shore of Eskimo Lakes, 28 miles northeast of Inuvik. It is an area of irregular terrain studded with lakes. The surficial geology map shows the area to be gravel with no other description, and an adjoining area to the north to be a morainal deposit overlying glaciofluvial material.

Polygonal ground is evident over the lower parts of the source area. 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.

328A MATERIALS AND QUANTITIES

The 5 holes drilled on this source uncovered no granular material.

The Geological Survey of Canada report Sample LV85-72 taken from the adjoining morainal deposit was gravel and sand with 13% silt. The area of the morainal deposit is about 2,000 by 2,000 feet. The quality and volume of material in this small feature are both likely to be low.

328A DEVELOPMENT

General

This source is not recommended for development. If, however, a local project should need general fill, the small morainal deposit should be investigated further.

Any development of this area should be preceded by an environmental study.

Access

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

Material Use and Handling

If developed, the material from the small moraine would be a poor grade of general fill.

The equipment required for deposits of this type are a dozer with ripper attachment, a front-end loader, and trucks.

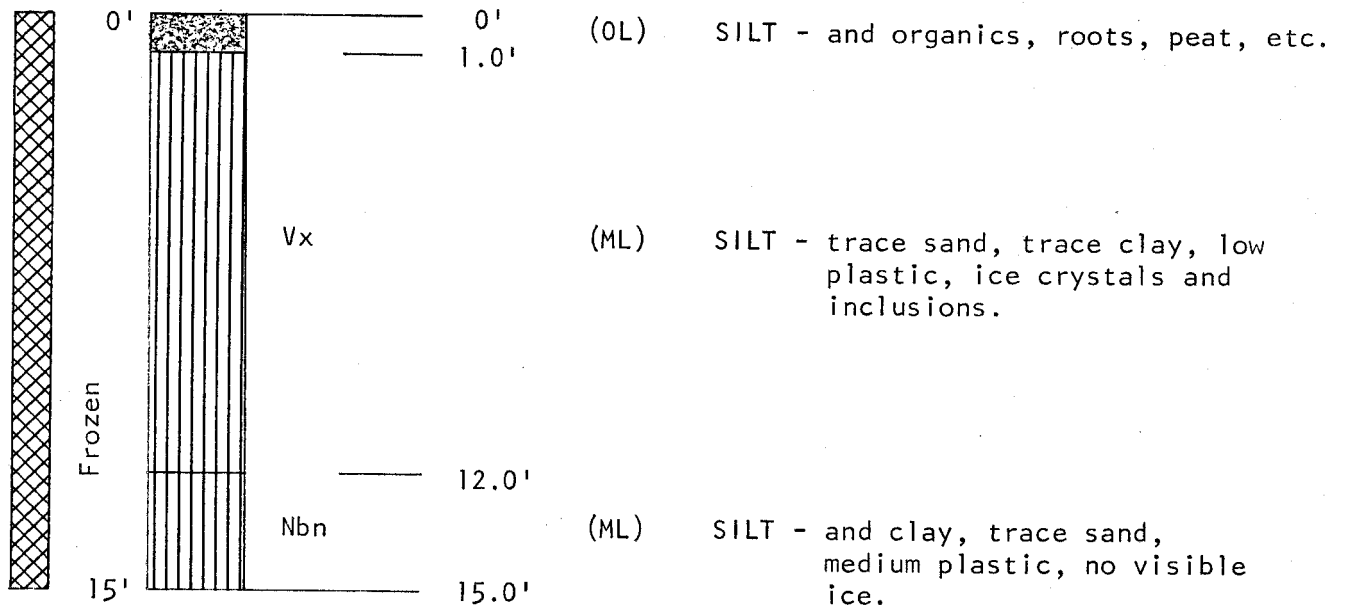
Stripping and Restoration

This source is similar in many respects to other glacial features in the area, and would require the same measures to strip and restore the area for further use.

TEST HOLE LOGS

SOURCE No. 328A

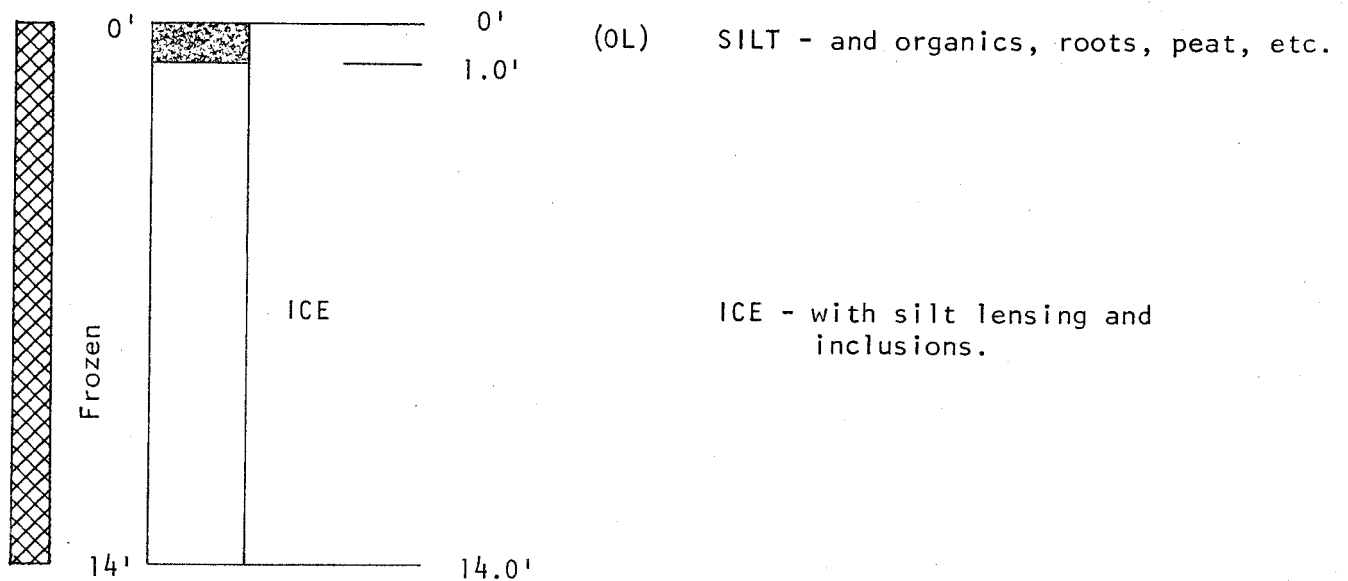
328A-1



Moisture Content

Sample 1 depth 2' 36.5%
 Sample 2 depth 15' 21.0%

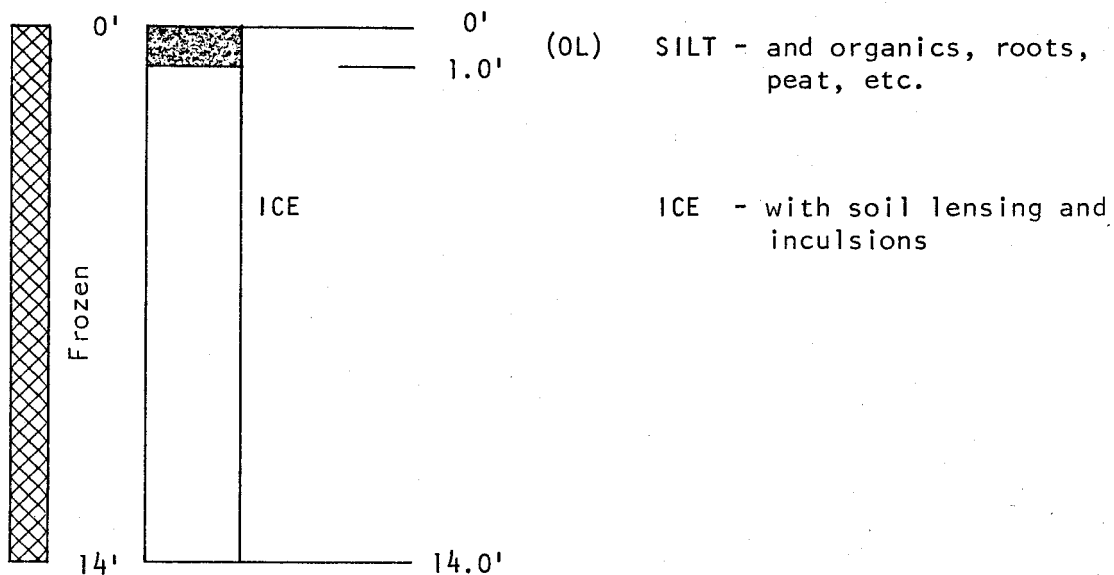
328A-2



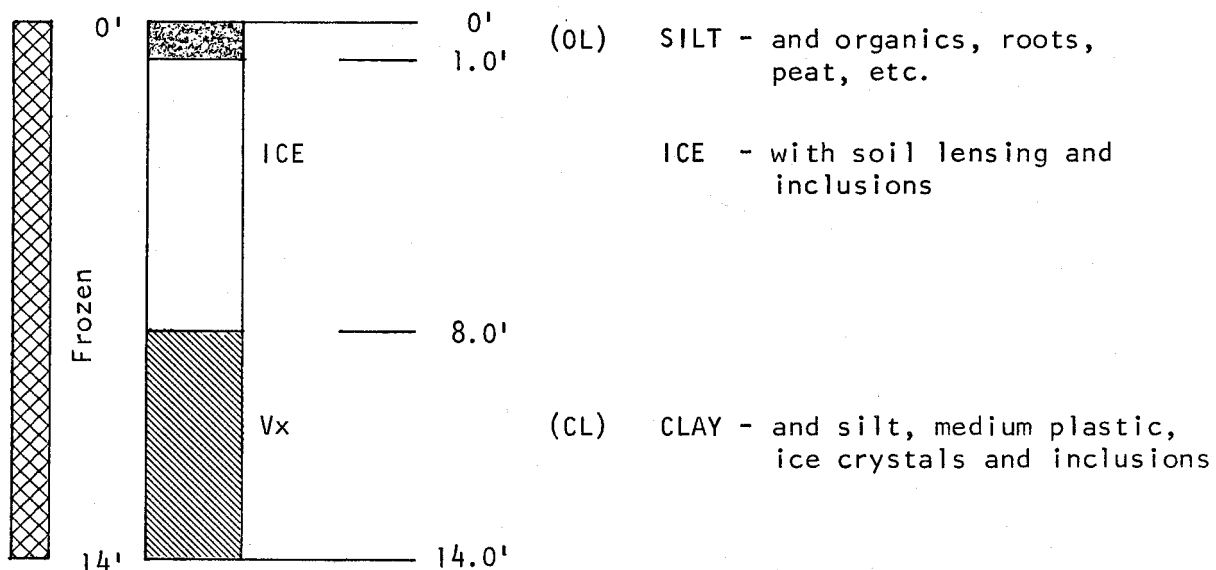
TEST HOLE LOGS

SOURCE No. 328A

328A-3



328A-4



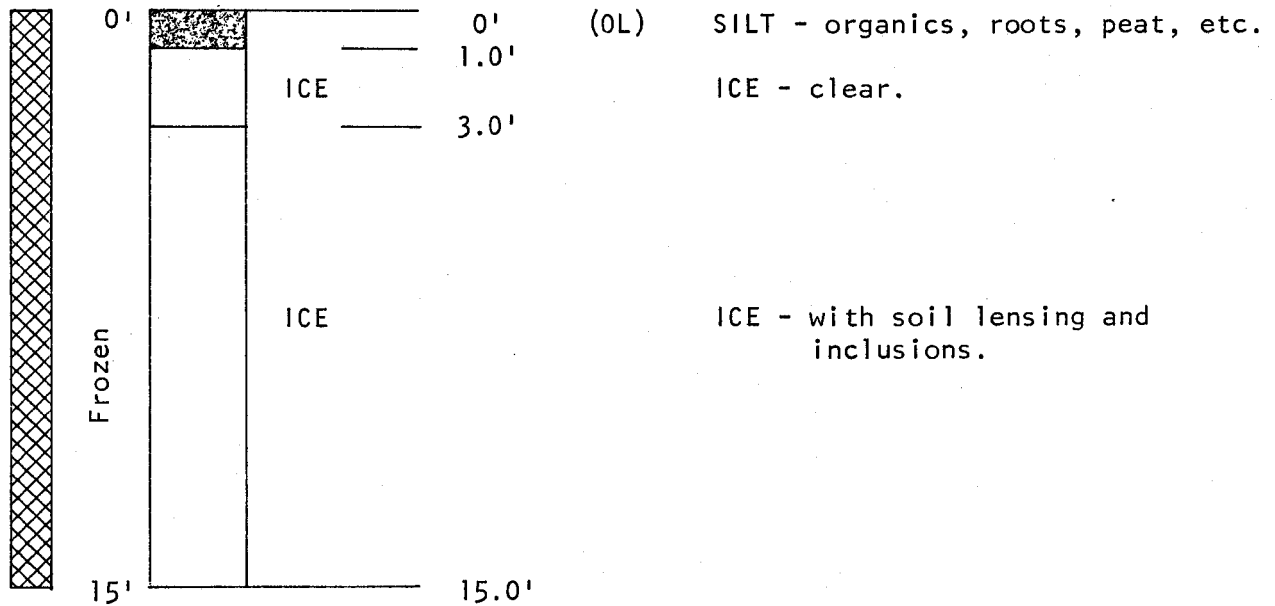
Moisture Content

Sample 1 depth 12' 21.9%

TEST HOLE LOGS

SOURCE No. 328A

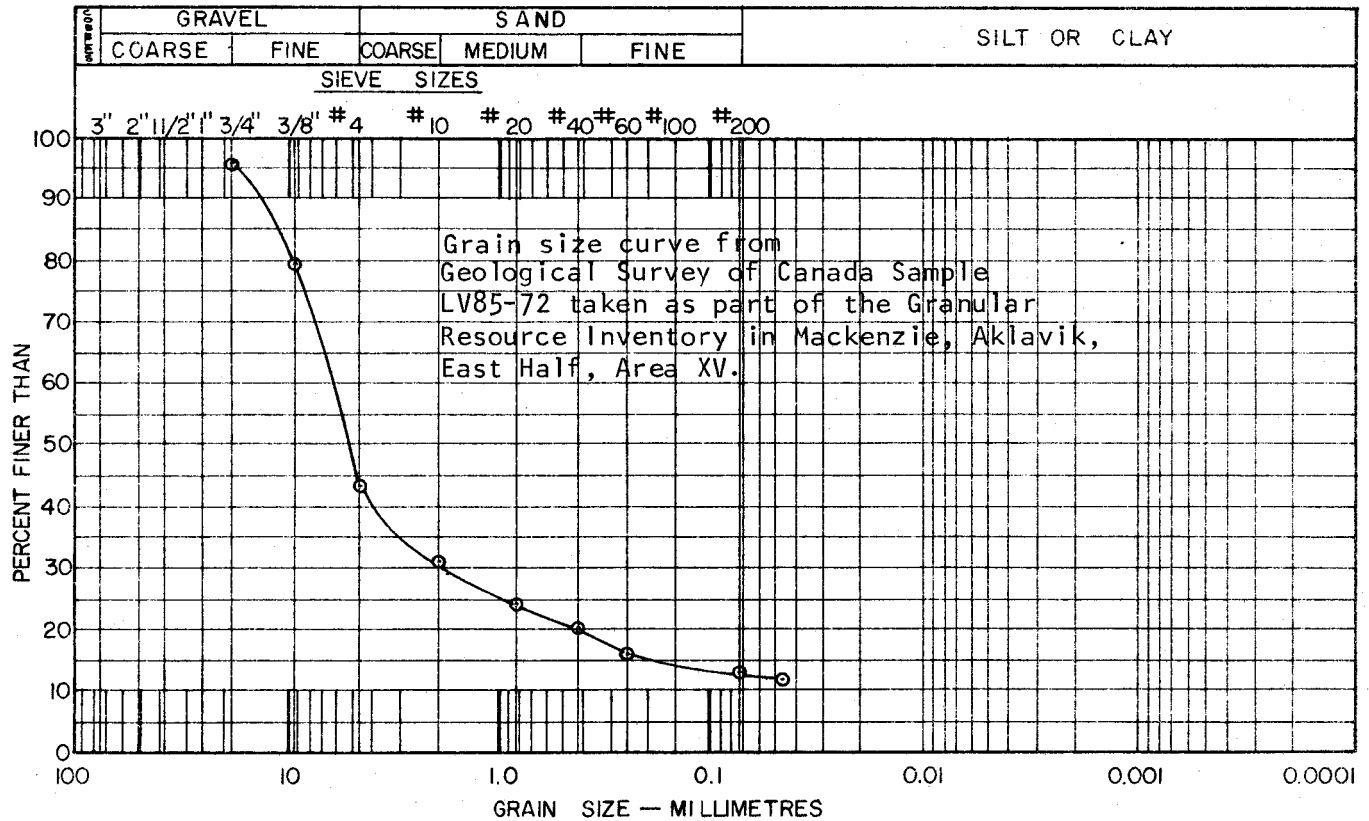
328A-5



LABORATORY TEST DATA

TEST PIT-SOURCE No. 328A

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS