COMMUNITY GRANULAR MATERIALS INVENTORY

HAY RIVER N.W.T

MARCH 1974

DEPARTMENT OF INDIAN AFFAIRS
AND
NORTHERN DEVELOPMENT

RIPLEY, KLOHN & LEONOFF INTERNATIONAL LTD.

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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 a granular material inventory in the vicinity of the Hay River community. The study was to determine the locations of unconsolidated materials and bedrock suitable for engineering construction.

This report presents the results of the field investigation and laboratory testing of the materials. The work was conducted in accordance with the requirements of the Terms of Reference provided by the Department which requested recommendations for the usage, development and restoration of each source. The approximate quantities of granular materials required for the Hay River community were as follows:

Fine grained aggregate (sand)	240,000 cu. yds.
Coarse grained aggregate (gravel)	360,000 cu. yds.
Material suitable for building pads, roads, airstrips, etc.	6,000,000 cu. yds.

Authorization to proceed with the work was received August 27th, 1973 under Contract No. 161-73 from the Department of Indian Affairs and Northern Development, Ottawa.

1.2 Procedure

The investigation procedure entailed a study and compilation of existing geological data from the work of the Geological Survey of Canada and previous work conducted near the designated area by Ripley, Klohn & Leonoff International Ltd. Airphoto interpretation was carried out prior to the field reconnaissance and drilling program. The work was done in co-operation with J. C. Sproule & Associates Ltd. of Calgary. The field reconnaissance to ground - check potential sources was done by observing surface exposures and sampling from shallow hand dug test pits. At the same time the field staff observed access roads, drainage conditions, biotic environmental concerns, and source development considera-

tions. The reconnaissance program indicated that 8 sources are within a 10 mile radius of the community and an additional 15 sources are within 25 miles of the community.

1.3 Data Presented

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

Section entitled "Hay River" 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 a topographic map showing the location of the community and the locations of the sources near the community. 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. HAY RIVER COMMUNITY

2.1 Surficial Geology

The community is located on the southern shores of Great Slave Lake. The area surrounding Hay River to the south is part of the Inland Plain physiographic region which ascends slowly towards the Cameron Hills in the southwest. The topography of the study area is characterized by flat lying to gently rolling terrain which varies between an elevation of about 513 feet at Great Slave Lake to about 700 feet in the south end of the study area.

The whole area is underlain at depth by Upper Devonian shale, limestone and sandstone bedrock and covered by a mantle of glacial till. The till is overlain by scattered glaciofluvial, glaciolacustrine and fluvial deposits.

The glaciofluvial features are eskers and outwashes laid down during the period of the Laurentide Glaciation. Most of these landforms are orientated in a N.E. - S.W. or N.W. - S.E. direction and vary in size from a few hundred feet to many miles across. They contain variable sands, gravels. silts and clays, derived not only from local bedrocks (limestone, sandstone, and shale) but also from foreign crystalline material originating in the Canadian Shield.

The glaciolacustrine features are beach ridges formed during the retreat of the Laurentide ice sheet. As the ice sheet retreated to the northeast, the ice dammed Great Slave Lake and created a much larger lake than exists today. A series of parallel strand lines were formed as the lake slowly retreated to its present level. Subsequent reworking of the beach ridges by wind has resulted in the formation of sand dunes which mostly occur as indefinite, narrow ridges. The lake sediment material in the reworked beach ridges consists of fine uniform sand.

The fluvial features are relatively minor and occur adjacent to rivers, particulary the Hay River. These deposits were laid down in ancient meander channels which have been masked by past glacial activity and recent erosion.

Most of the surficial deposits contain no permafrost in their topstratum

layers. Few traces of permafrost were found in the sand deposits near Great Slave Lake and these were usually in the flat low lying areas where peat and muskeg were present. In the glaciofluvial features, permafrost was not encountered within the depth of holes drilled during the winter drilling program.

2.2 Environment

The higher ground in the vicinity of Hay River supports a dense growth of white spruce, poplar, and pine, with the swampy lowlands covered with grasses and muskeg.

The most important wildlife area occurs between Sandy River and Buffalo Lake along the old winter road to the southeast of Hay River. This region supports a population of small fur-bearing animals, such as lynx, marten, beaver and muskrat which are trapped by the men from the community during the winter. It also serves as a grazing area for small numbers of caribou. Six of the sources of granular material investigated for this study are located in this area (HR-107A to 112A inclusive). Permission to drill at these sources was denied by local authorities after consultation with the local Indian Band Council and Governmental Authorities.

The area to the southwest of the community is not regarded as an important wildlife habitat. There is no active trapping in this area although some moose are hunted during the fall.

The sand beach ridge areas to the west and east of the community are not considered critical wildlife areas. The areas are not actively trapped although some local trapping for lynx does take place during the winter. However, the beach ridge area and the lakeshore are aesthetically important. The beach ridges west of the community are used as a cross country ski course during the winter, and the beaches along Great Slave Lake are important recreation areas during the summer.

The Hay River and that part of Great Slave Lake adjacent to the study area also contain fishing areas important to the local population.

2.3 Sources and Materials

Twenty three sources were investigated in the vicinity of the community.

Six of the 23 sources (HR-107A to 112A inclusive) were not drilled at the request of the local Indian Band Council and Governmental Authorities. Sources HR-104A, 113A and 117A contain excessive amounts of silt and are not recommended for development. Source HR-106 is located on a local Indian Reserve and any future development would require permission from the local Indian Band Council.

Of the remaining 13 sources, 3 sources (HR-119, 121, and 122) are located near Mile 21 on N.W.T. Hwy. 5; 6 sources (HR-120, 114, 115, 116, 118 and 100) are located west of N.W.T. Hwy. 2 between Mile 14 and 23; and 4 sources (HR-101, 102, 103 and 105) are located west of the community just south of Great Slave Lake. The three groups of sources will be discussed in the following paragraphs.

Sources HR-119, 121, and 122 are part of a large esker and outwash complex. The sources are located adjacent to the C.N.R. Pine Point Sub-line and about 28 miles southeast of the community along N.W.T. Hwys. 2 and 5. Source HR-119 is primarily sand with little fine gravel and is suitable for good quality general fill. This source has not been developed in the past. Sources HR-121 and 122 contain highly variable sands and gravels with a trace of silt. Processing, screening and crushing would be required to make the most efficient use of the materials for the production of coarse and fine aggregates for concrete and asphalts. Both sources contain unsound rock (5-6%), thus aggregates produced should be considered as marginally suitable for high quality structural concrete. Both sources have been partially developed and lend themselves to future development on large scale.

Sources HR-114, 115, 116, and 120 are small, narrow, elongate eskers between 3 and 7 feet above the adjacent flat terrain. Materials are primarily clean, gap graded sand with some fine gravel. Petrographic analysis of material from these sources indicates that the percentage of unsound material (10%) is above that which is normally acceptable for the production of aggregates. The material is suitable for high quality general fill. Sources HR-100 and 118 consist of a very shallow outwash deposit of sand and gravel overlying glacial till and bedrock and are suitable for general fill. Sources HR-100, 116, and 120 were partially

developed for road and railway construction.

Sources HR-101, 102, 103, and 105 are a series of long parallel beach and reworked wind deposits between 2 and 7 feet above the adjacent flat terrain. The water table in the deposits which limits the depth of excavation is usually level with the adjacent flat terrain. The material consists of fine, uniform sand, with organic laminations. About 80% grades between the #40 and the #100 mesh sieve, with about 5 to 10% passing the #200 mesh sieve. The material is suitable only for low quality general fill. Because of the erodable nature and frost susceptibility of the material, the materials should not be placed in water within the depth of frost penetration. The sources are suitable for development.

2.4 Management

Hay River is unfortunate in not having any sources of good quality granular material close to the community. Sources HR-121 and 122 contain the largest volumes of granular material available to the community and should be reserved for the exclusive use of the community for production of coarse and fine aggregates. The chief disadvantage to these sources is their location 28 miles by road or rail from the community. In addition, as already discussed under 2.3 Sources and Materials, these materials are variable in gradation, contain unsound particles, and will require processing to make the most efficient use of the deposit. The sources have been partially developed for previous highway, railway construction and for local projects. Future development of the source should be strictly reserved for the production of coarse and fine aggregates with any reject material being used as general fill.

Sources HR-100, 114, 115, 116, 118, 119 and 120 are suitable for general fill and should be developed first to provide an adequate supply of material for future community needs. The estimated volume of general fill available from these sources is estimated to be in excess of 3,000,000 cu. yds. The remaining materials to make up the required 6,000,000 cu. yds. will come from reject material from Sources HR-121 and 122 and from the eventual development of the beach ridge sources. These sources are discussed in order of priority for development.

Sources HR-114, 115 and 116 are small narrow eskers suitable for good quality general fill. The haphazard development of these sources to remove small volumes of material should not be allowed because of the high percentage of waste in this type of operation. All development should be strictly controlled with immediate restoration of the area after materials have been removed. Source HR-119 is a large source adjacent to Source HR-122 and suitable for development to produce general fill. The silt content in this source increases with depth and generally only the upper 5 feet of the deposit is suitable for development.

Source HR-100 has been extensively developed by a local contractor. The remaining volume is limited in depth and probably highly variable in grain size distribution. The source can be developed as a source of general fill for local projects.

Source HR-120 consists of a series of narrow, parallel eskers consisting of fine uniform sand. A low priority for development is given to this source because of the fine gradation, and their long narrow configuration.

Sources HR-101, 102, 103, 105 and 106 are beach ridge deposits located near the community. The deposits are closest to the community, but their fine uniform gradation and organic content restricts their use for low quality general fill. These sources should have lowest priority for development. The removal of material from these sources should be carefully considered in view of the present day recreational use of the area by the community and possible damage to the environment caused by siltation of Great Slave Lake. The sources should only be developed for specific large projects in the community with immediate restoration occurring after the source has been depleted.

The best beach ridge sources for development are Sources HR-101 and 105. The materials are clean and the depth of materials which can be removed above the water table are a maximum. The development of Sources HR-102 and 106 must be strictly controlled to prevent undue disruption of the lakeshore as well as siltation into Great Slave Lake. Source HR-103 contains poor material, the recoverable depth above the water table is shallow and should be developed last.

2.5 Development

2.5.1 General

Twenty three sources were investigated as potential sources. Of these, only 14 sources were recommended for development to provide the volumes of general fill, coarse and fine aggregates required for future expansion. The order in which the sources should be developed depends on the location, nature and size of new projects.

2.5.2 Access

All sources, with the exception of the beach ridge sources, are conveniently located relatively close to the 2 major highways, N.W.T. Hwys. 2 and 5, the Canadian National and Great Slave Lake Railways. Year round access to these sources from the highway or the railway can be provided by construction of short all-weather roads along existing cleared trails. These roads will generally be less than 2 miles in length and will require the installation of temporary railway crossings or railway sidings.

The beach ridge sources are presently accessible only during winter along seismic lines and cleared trails. Development of sources west of the community would likely be preceded by construction of a 3 mile long all-weather road along the existing seismic line which runs northwest from the community. The new road would cross a small creek where a small bridge or culvert must be constructed. The development of Source HR-106 east of the community is accessible by a 2 mile winter road which crosses the ice on Hay River. Summer access is possible using the all-weather road to the Indian Village for a total distance of about 14 miles from the community.

2.5.3 Material Uses and Handling

The materials required for future development can be obtained from the 14 sources are recommended in this report. Of these sources, only Sources HR-121 and 122 contain natural gravels and sands in sufficient quantity for production of coarse and fine aggregates. The remaining 12 sources can be developed to provide the general fill requirements.

The equipment required to develop the sources is bulldozers, front-end loaders and trucks. For production of aggregates, screening, crushing and other processing equipment will be required.

2.5.4 Stripping and Restoration

All sources in the study area will require the removal of trees and the stripping of organic cover. In all cases it is recommended that trees and heavy roots be burned, and that organic cover and surficial soils be stockpiled for later restoration of the source. Banks of pits or other excavations must be graded to a stable slope before restoration.

The drainage from a disturbed area, and especially from a processing plant, cannot be permitted to enter either the Hay River or one of the streams flowing into Great Slave Lake. Special care must be taken during any development of the beach ridge sources, to prevent ponding of water. Any development along the lakeshore sources will require that a sufficient width of land be left between the lakeshore and the operation to prevent breaching and subsequent movements of the shoreline inland. Where possible, restored areas should be seeded for speedy revegetation.

More specific comments concerning the stripping and restoration of the sources, as well as details of other items summarized in this introduction, are provided in the individual discussion of each source.

HR-102
HR-103
HR-104A
HR-113A
HR-117A
HR-120
HR-114
HR-115
HR-116
HR-118
HR-100
HR-106
HR-101
HR-105
HR-107A
HR-111A
HR-108A
HR-122
HR-119
HR-121
HR-110A
HR-112A
HR-109A

Pointe de Roche
Vale Island
Vale Point
Hay River Point
Hay River
False Point
Fish Point
High Point
Breynat Point
Breynat Bight
Buffalo River
Mellor Rapids
Cut Lake
Winter
GREAT
SLAVE
LAKE
RIVER
HAY RIVER
Sandy
Twin
Falls
Creek
Escarpment Lake
Enterprise
Alexandra Falls
Louise Falls
NATIONAL
Highway
Road
Tp 132
Tp 131
R 14
R 13
R 12
R 10
R 9
R 7
R 6
R 5
Cabin
SCALE : MILES
5 0 5 10

HAY RIVER GRANULAR MATERIAL SOURCE MAP

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						
100	24 south along N.W.T Hwy.2	GRAVEL - and sand, trace silt (GW)	100,000	No major environmental concern	Suitable for continued development. Remaining material possibly variable gradation	Good	Topsoil	0 to 1	Stockpile adjacent to pit for later regrading	Nil	3	Doze into piles, load in trucks	General fill Limited use for aggregate production	Dozer, loader, trucks	Most of source developed by local contractor
						SEE SECTION 100 FOR SOURCE DETAILS									
101	2 west	SAND - fine, uniform trace silt (SP)	500,000	Contamination of adjacent creeks. Aesthetically important because of closeness to community. Cross country ski run through source is used during winter months	Low priority for development with use of ridges only. Maybe desirable to develop for recreational use	Good	Moss and silt on ridges, peat in depressions	0 to 1 on ridges	Stockpile away from creeks for later regrading	Nil	5 above water table	Doze into piles, load in trucks	Restricted use as low quality general fill	Dozer, loader, trucks	Undeveloped
						SEE SECTION 101 FOR SOURCE DETAILS									
102	3 west	SAND - fine, uniform trace silt, organic specks (SP)	1,000,000	Contamination of lake and adjacent creeks. Aesthetically important as a lakeshore recreational area	Very low priority for limited development. Development should be limited above water table and would require strip of land left between lakeshore and operation	Fair	Peat, moss and silt	0 to 3	Stockpile away from drainage courses for later regrading	Nil to low	3 to 4	Doze into piles, load in trucks	Restricted use as very low quality general fill	Dozer, loader, trucks	Undeveloped
						SEE SECTION 102 FOR SOURCE DETAILS									
103	4 west	SAND - fine, uniform little silt, organic laminations (SP-SM)	400,000	Contamination of adjacent streams	Very low priority due to variable silt content and presence of organic laminations	Fair	Peat, moss and silt	0.5 to 3.5	Due to high water table stripped material would have to be disposed elsewhere	Nil to low	2 to 3 above water table	Doze into piles, load in trucks	Restricted use as very low quality general fill	Dozer, loader, trucks	Undeveloped
						SEE SECTION 103 FOR SOURCE DETAILS									

SOURCE No.	DISTANCE FROM COMMUNITY MILES	MATERIAL TYPE (UNIFIED GROUP SYMBOL)	VOLUME ESTIMATES CUBIC YARDS	ENVIRONMENTAL CONCERNS	CONCLUSIONS
104A	4 west	SAND - fine, uniform some silt (SP-SM)	300,000	Contamination of adjacent stream	Not recommended for development due to poor quality
105	3 west	SAND - fine, uniform trace silt (SP)	1,000,000	Contamination of adjacent creeks. Aesthetically important because of closeness to community. Cross country ski run through source is used during winter months	Low priority. Should be developed in conjunction with source HR-101 only after depletion of more suitable sources
106	2 east. 14 by present access road	SAND - fine, uniform trace silt (SP)	1,500,000	Contamination of lake and adjacent creeks. Aesthically important as a lake shore recreational area	Located on Indian Reserve. Any development will require permission from the local Indian Band Council. Development should be limited above water table and would require strip of land left between lake and operation
107A	20 south east along N.W.T Hwys. 2 & 5	SAND - and gravel, trace silt (SW) GRAVEL - and sand (GW)	600,000	Trapping area and grazing area for small caribou herd	Permission to continue development of this source may be difficult to obtain. No drilling was permitted in this source

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						
Fair to Poor	N/A	N/A	N/A	Nil to low	2	N/A	Very poor quality general fill	N/A	Undeveloped
						SEE SECTION 104A FOR SOURCE DETAILS			
Fair	Moss and silt	1/2	Stockpile away from creeks for later regrading in pits	Nil	5	Doze into piles along ridges, load in trucks	Low quality general fill	Dozer, loader, trucks	Undeveloped
						SEE SECTION 105 FOR SOURCE DETAILS			
Fair	Peat, silt	0 to 1	Stockpile away from drainage courses for later regrading	Nil	6	Doze and load trucks	Low quality general fill	Dozer, loader, trucks	Undeveloped
						SEE SECTION 106 FOR SOURCE DETAILS			
Good	Topsoil, moss	1/2	Stockpile for later regrading	Nil	10	Doze into piles, load in trucks	General fill, road surfacing, and fine and coarse aggregate	Dozer, loader, trucks, possibly screen plant	Partially developed by local contractors
						SEE SECTION 107A 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						
108A	20 south-east along N.W.T. Hwys. 2 & 5, and 4 south along old Ft Smith road	SAND - and gravel (SW) SAND - some silt (SM)	500,000	Important trapping area	Can not be considered for development because the local Indian Band Council and governmental authorities denied permission to drill the source	Good	Topsoil, moss	1	Stockpile for later regrading	Nil	5	Doze, load trucks	General fill, limited fine and coarse aggregate	Dozer, loader, trucks	Undeveloped
						SEE SECTION 108A FOR SOURCE DETAILS									
109A	20 south-east along N.W.T. Hwys. 2 & 5, & 4.5 south along old Ft Smith road	SAND - some gravel, trace silt (SP) GRAVEL - and sand (GP)	500,000 at least	Important trapping area	Can not be considered for development because the local Indian Band Council and governmental authorities denied permission to drill the source	Good	Topsoil, moss	1	Stockpile for later regrading	Nil	7	Doze, load trucks	General fill and fine and coarse aggregate for concrete and asphalt	Dozer, loader, trucks, maybe crusher and screen plant	Partially developed before as a winter operation
						SEE SECTION 109A FOR SOURCE DETAILS									
110A	20 south-east along N.W.T. Hwys. 2 & 5, and 5 south along old Ft Smith road	SAND - some gravel (SW)	200,000 at least	Important trapping area	Can not be considered for development because the local Indian Bank Council and governmental authorities denied permission to drill the source	Good	Topsoil, moss	1	Stockpile for later regrading	Nil	10	Doze, load trucks	General fill, and fine and coarse aggregate for concrete and asphalt	Dozer, loader, trucks, maybe crusher and screen plant	Undeveloped
						SEE SECTION 110A FOR SOURCE DETAILS									
111A	20 south-east along N.W.T Hwys. 2 & 5 and 5 south along old Ft Smith road	SAND - little gravel, trace silt (SP)	500,000	Important trapping area	Can not be considered for development because the local Indian Band Council and governmental authorities denied permission to drill the source	Good	Topsoil, moss	1	Stockpile for later regrading	Nil	12	Doze, load trucks	General fill, and aggregates	Dozer, loader maybe screener	Undeveloped
						SEE SECTION 111A FOR SOURCE DETAILS									

SOURCE No.	DISTANCE FROM COMMUNITY MILES	MATERIAL TYPE (UNIFIED GROUP SYMBOL)	VOLUME ESTIMATES CUBIC YARDS	ENVIRONMENTAL CONCERNS	CONCLUSIONS
112A	20 south-east along N.W.T. Hwys. 2 & 5 and 4 south along old Ft Smith road	GRAVEL - some sand, trace silt (GP)	500,000	Important trapping area	Cannot be considered for development because the local Indian Bank Council and governmental authorities denied permission to drill the source
113A	8 south along N.W.T. Hwy.2 and 1 west	SILT - and clay, little sand, trace gravel (till) (ML)	300,000	No major environmental concern	Not suitable for development due to poor quality
114	20 south along N.W.T. Hwy.2 & 1.5 west along cleared trail	SAND - some gravel, trace silt (SW) GRAVEL - and sand (GW)	250,000	No major environmental concern	Suitable for development
115	20 south along N.W.T. Hwy.2 & 2 west along cleared trail	SAND - some gravel, trace silt (SW)	200,000	No major environmental concern	Suitable for development

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						
Good	Topsoil	1/2	Stockpile for later regrading	Nil	15	Doze, load trucks	General fill, possibly low quality fine and coarse aggregate for concrete and asphalt	Dozer, loader, trucks	Undeveloped
						SEE SECTION 112A FOR SOURCE DETAILS			
Good	Topsoil and silt	1	N/A	Nil	3		Poor quality general fill		Undeveloped
						SEE SECTION 113A FOR SOURCE DETAILS			
Good	Topsoil	1/2	Stockpile for later regrading	Nil	5	Doze, load into trucks or railway cars	General fill. Possibly low quality fine and coarse aggregate for concrete and asphalt	Dozer, loader, trucks, sceen plant	Undeveloped
						SEE SECTION 114 FOR SOURCE DETAILS			
Good	Topsoil	1/2	Stockpile for later regrading	Nil	6	Doze into piles, load into trucks or railway cars	General fill. Possibly low quality fine and coarse aggregate for concrete and asphalt	Dozer, loader, trucks, screen plant	Undeveloped
						SEE SECTION 115 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						
116	21 south along N.W.T. Hwy.2 and 1.5 west along cleared trail	SAND - little gravel, trace silt (SP)	200,000	No major environmental concerns	Suitable for additional development	Good	Topsoil, moss	1/2	Stockpile for later regrading	Nil	7	Doze into piles, load into trucks on alternately railway cars	General fill and possibly fine aggregate	Dozer, loader, trucks, screen plant	Partially developed by C.N.R. during construction of railway
						SEE SECTION 116 FOR SOURCE DETAILS									
117A	10 south along N.W.T. Hwy.2	SILT - and sand, trace gravel	100,000	Contamination of Hay River. Source is located on private property	Not recommended for development	Good	Topsoil, silt	1/2 to 1		Nil			Very poor quality general fill		Undeveloped
						SEE SECTION 117A FOR SOURCE DETAILS									
118	24 south along N.W.T. Hwy.2 and 2 west along gravel road	SAND - some gravel, little silt (SW-SM) SAND - and silt, trace gravel (SM)	800,000	No major environmental concerns	Suitable for development	Good	Topsoil, silt	1/2 to 1	Stockpile for later regrading	Nil	3	Doze into piles, load into trucks or railway cars	General fill	Dozer, loader, trucks	Undeveloped
						SEE SECTION 118 FOR SOURCE DETAILS									
119	29 south east along N.W.T. Hwys. 2 and 5 plus north	SAND - little silt, little fine gravel (SW-SM)	1,000,000	No major environmental concerns	Deposit is fine, with a medium silt content but suitable for development	Good	Topsoil, silt	1/2	Stockpile for later regrading	Nil	5	Doze into piles, load in trucks or railway cars	General fill. Limited quantities of gravel and sand available for concrete	Dozer, loader, trucks	Undeveloped
						SEE SECTION 119 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						
120	14 south along N.W.T Hwy.2 and 2 west	SAND - trace gravel, - trace silt (SP)	300,000	No major environmental concerns	Low priority for development because of low quality material and long narrow shape of eskers	Good	Topsoil	1	Stockpile for later regrading	Nil	3	Doze into piles, load into trucks	Low quality general fill	Dozer, loader, trucks	Partially developed during construction of railway and highway
						SEE SECTION 120 FOR SOURCE DETAILS									
121	28 south east along N.W.T Hwys. 2 and 5	GRAVEL - and sand, trace silt (GW) SAND - some gravel, trace silt (SW)	600,000	No major environmental concerns. Contamination of Birch Creek if source is developed to the west	Source is variable but should be reserved for controlled development to process coarse and fine aggregates	Good	Topsoil, silt	1	Stockpile for later regrading	Trace	5	Doze into piles, load in trucks or rail cars	Coarse and fine aggregates. General fill	Dozer, loader, trucks, crushing and screening equipment	Southern portion of source is extensively developed
						SEE SECTION 121 FOR SOURCE DETAILS									
122	28 south east along N.W.T Hwys. 2 and 5	SAND - and gravel, trace silt (SW)	1,000,000	No major environmental concerns	Source is highly variable but should be reserved for controlled development to produce coarse and fine aggregates with waste materials suitable for general fill.	Good	Topsoil, silt	1/2	Stockpile for later regrading	Trace	6	Doze into piles, load in trucks or rail cars	Coarse and fine aggregates after processing. General fill	Dozer, loader, trucks, crushing and screening equipment	G.S.L. railway holds a 700' x 2640' lease on land in the eastern portion of the source. The area was partially developed during railway construction
						SEE SECTION 122 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	...	50 or more
	SAND	...	
	SILT	...	
Minor Component.....	Gravel	and	35 to 50
	Sand	some	20 to 35
	Silt	little	10 to 20
		trace	1 to 10

CLASSIFICATION SYSTEM FOR ICE

Non Visible Ice	Nf	Poorly bonded
	Nbn	Well bonded
	Nbe	Excess Ice
Visible Ice Less than 1 inch thick	Vx	Individual ice crystals or inclusions
	Vc	Ice coatings or particles
	Vr	Random or irregularly oriented ice formation
	Vs	Stratified or distinctly oriented ice formations
Visible Ice Greater Than 1 inch thick	ICE+	Ice with soil inclusions
	ICE	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.

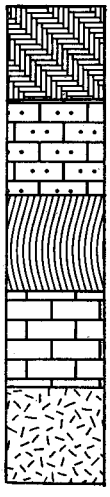
Interbedded .... composed of alternate layers of different soil or rock types.

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



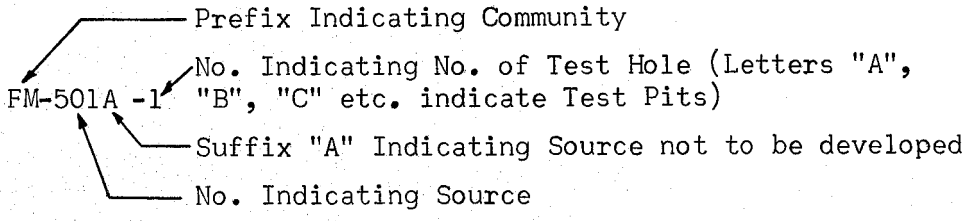
Bedrock

Sandstone

Shale

Limestone

Talus

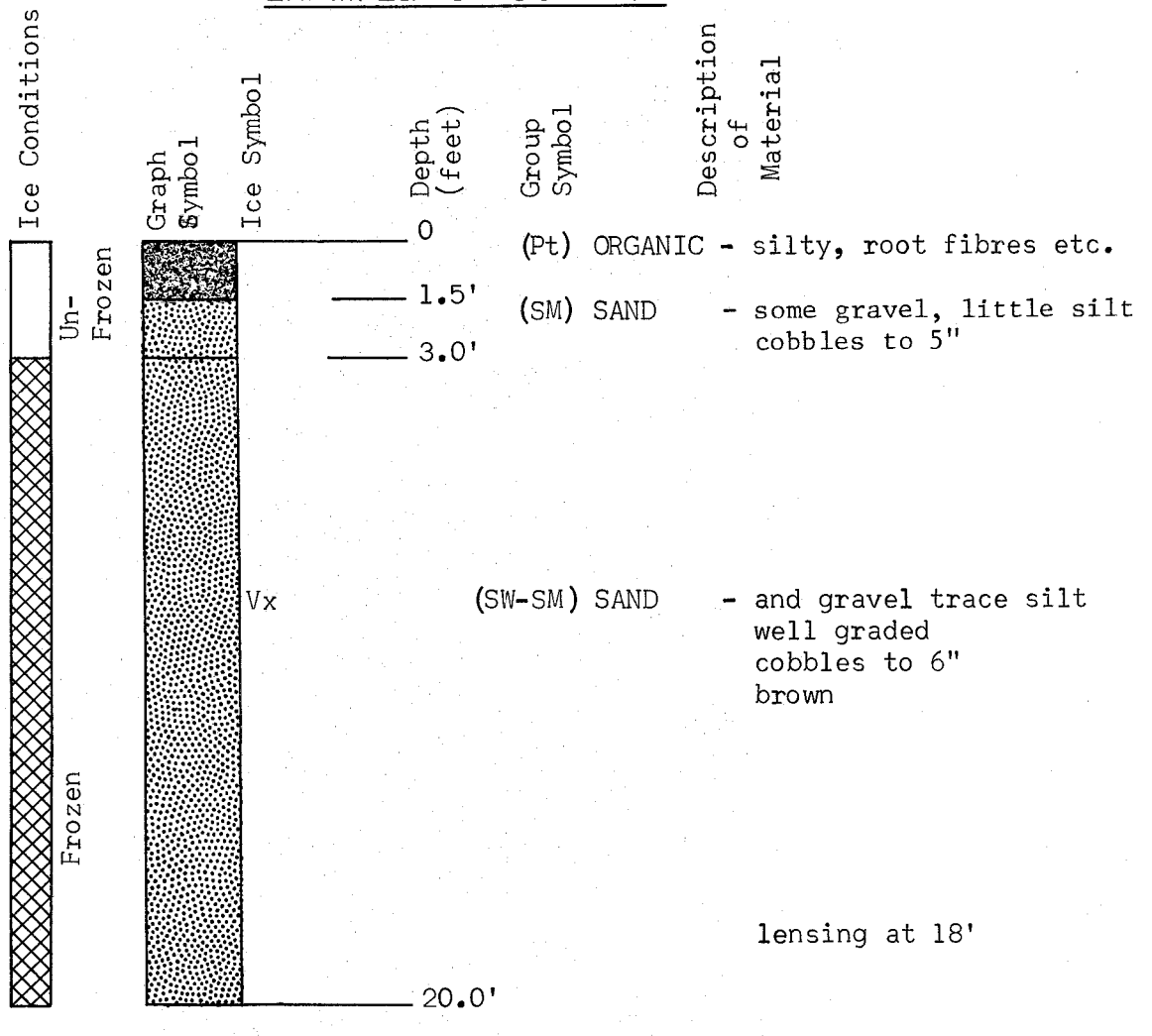


Indicates Test Hole Location

Indicates Test Pit Location

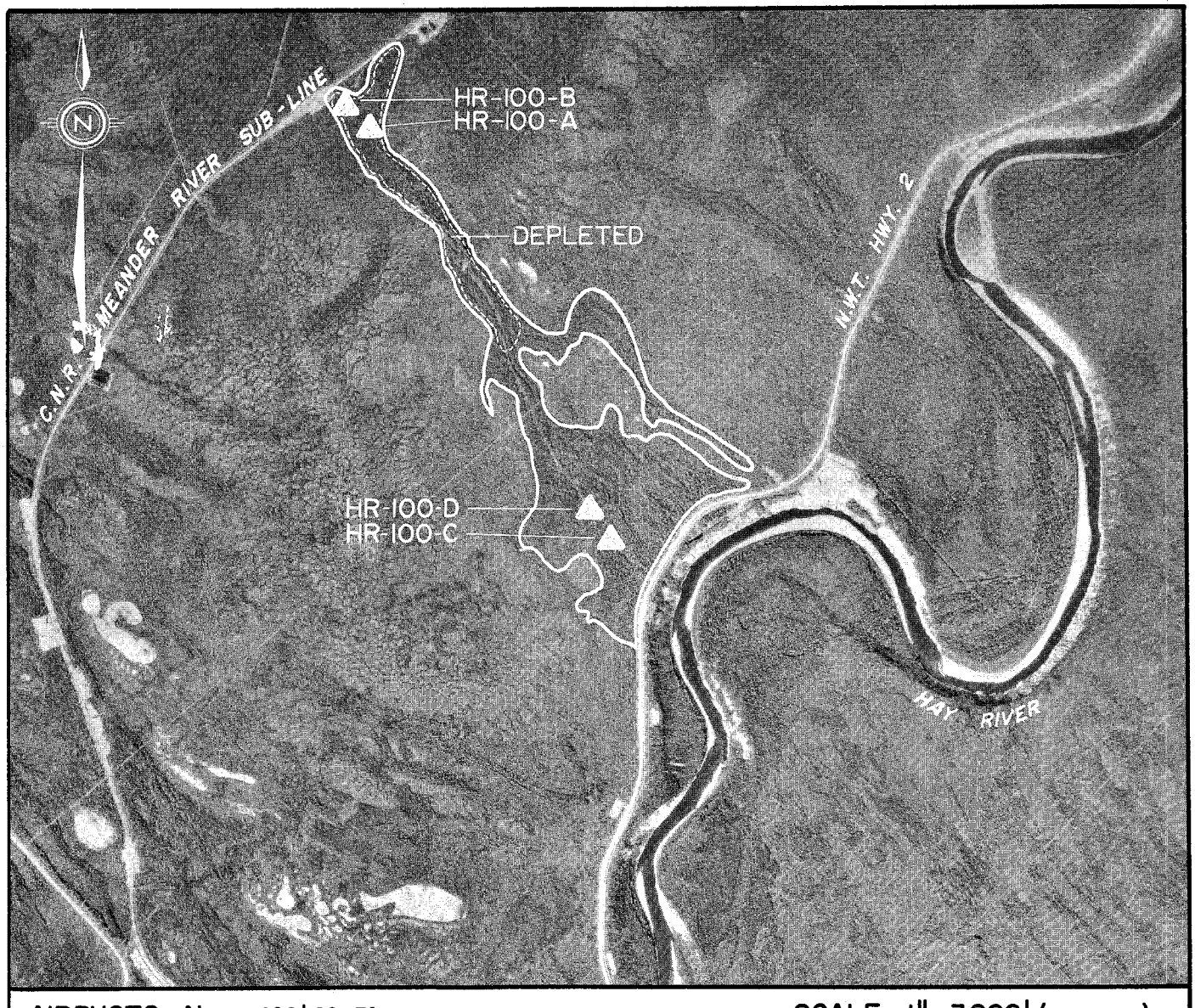
Indicates Direction of Ground Photograph and Field of View

EXAMPLE OF SOIL LOG



HAY RIVER
SOURCE No. HR-100

LANDFORM AND LOCATION:	Shallow outwash located 24 miles south of the community adjacent to N.W.T. Hwy. 2.
MATERIAL:	GRAVEL and SAND - trace of silt, poorly graded.
VOLUME:	Approximately 100,000 cu. yds. remaining in the deposit.
CONCLUSION:	Source is currently used by a local contractor. Remaining volume is limited in depth and probably highly variable in grain size distribution.



AIRPHOTO No. A22432-71 SCALE : 1"= 3000' (approx.)

HR-100 ENVIRONMENT

Physical

The source is a long, relatively narrow glaciofluvial outwash overlying till and bedrock. It is about 3,900 yards long and varies in width between 100 and 1,000 yards and in depth from 1 to 2 yards. The outwash trends northwesterly from the N.W.T. Hwy. 2 to the C.N.R. Meander River Sub-line. Drainage of the outwash is good although surrounding drainage of the lowlands is poor. The source is extensively developed.

Biotic

The tree cover is primarily spruce and poplar up to 40 feet high, with a canopy density of 40 to 60%. The area is not in an important or critical wild life area. Moose and wolf have been observed near the present development.

HR-100 MATERIALS AND QUANTITIES

General

The area lies within the Territorial Development Control Zone. The source has been extensively developed by a local contractor whose existing lease on the deposit expires on June 19th, 1974. Many test pits have been opened up to locate and exploit the areas of coarser material.

Access

The source is easily accessible during all seasons from Hay River and Enterprise via N.W.T. Hwy. 2 then west along a gravel road.

Material Use and Handling

The remaining portions of the source can be used as a local supply of general fill and limited fine and coarse aggregate for concrete or asphalt construction. However, its use for aggregate production would require careful selection in the pit and screening, blending and washing to produce acceptable products.

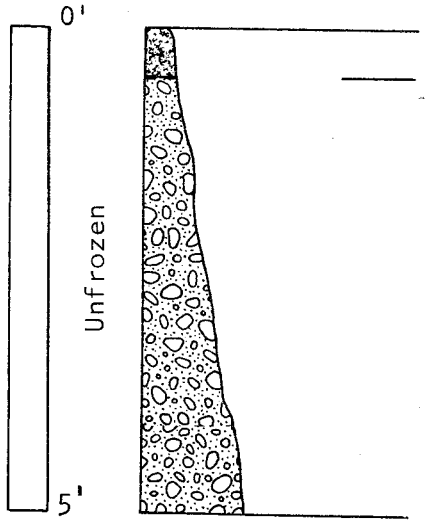
Operation of the pit requires pushing the granular material into stockpiles before loading in trucks. The development would require the usual assembly of dozer, front-end loader, and trucks.

Stripping and Restoration

All trees and roots must be burned on the area already developed. After an area has been worked out it should be levelled and the overburden that has been stock-piled regraded over the site. All banks must be graded and drainage provided to prevent ponding of water in the depleted area. The area may then be seeded for speedy re-vegetation.

TEST PIT LOGS
SOURCE No. HR-100

HR-100-A

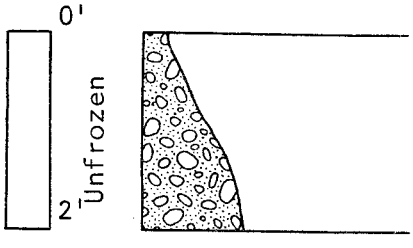


(OL) SILT - topsoil, roots

(GP) GRAVEL - little sand, trace silt, max. 3"

Soil profile as logged from pit face exposure

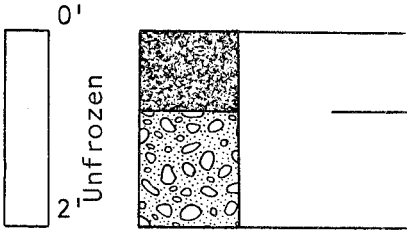
HR-100-B



(GW) GRAVEL - some sand, little silt, max. 3"

Sample from stockpile

HR-100-C



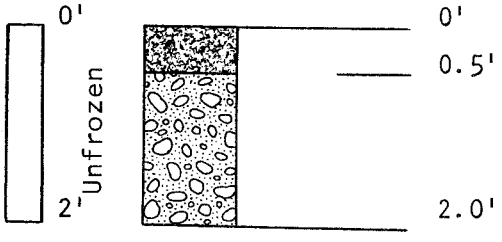
(OL) SILT - topsoil, roots

(GW) GRAVEL - and sand, trace silt, sand is poorly graded

TEST PIT LOGS

SOURCE No. HR-100

HR-100-D

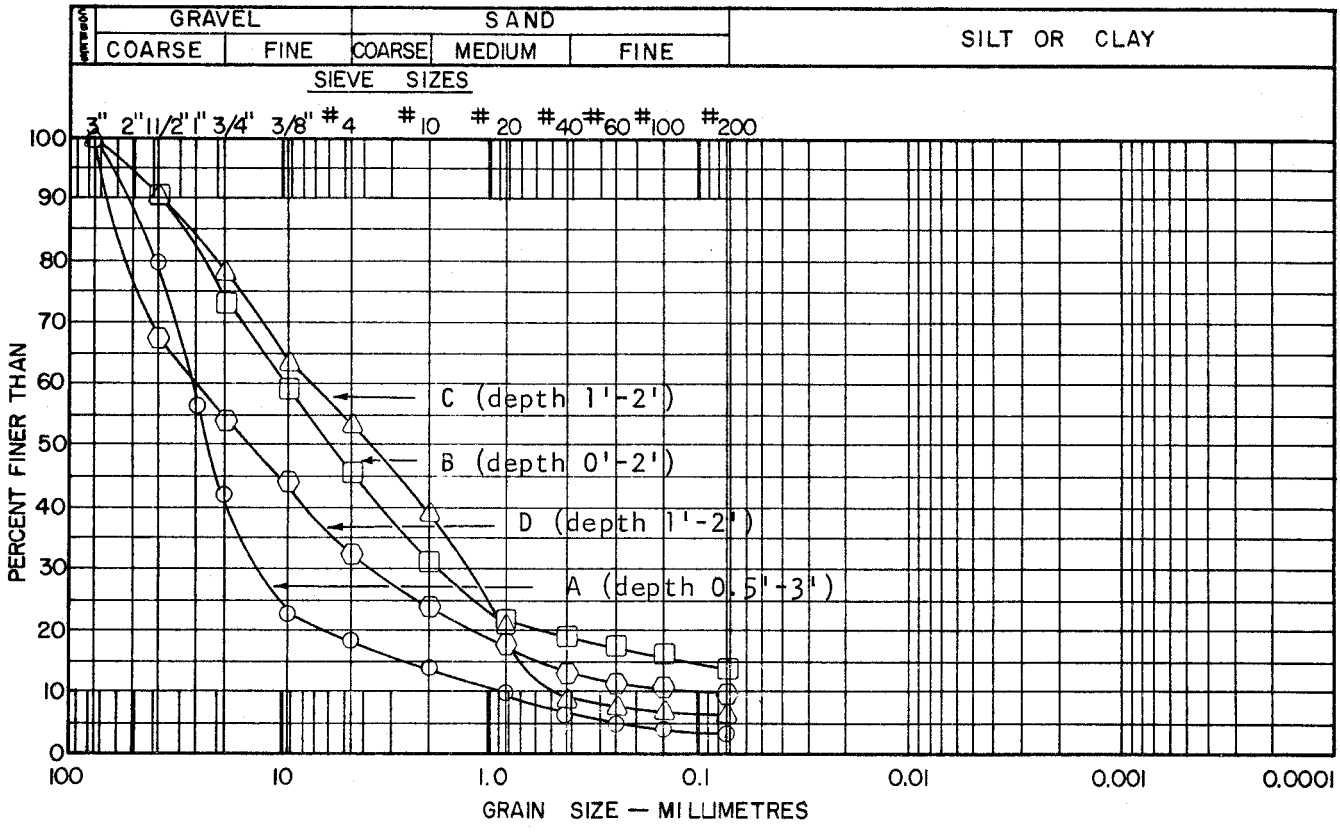


(OL) SILT - topsoil, roots

(GW) GRAVEL - some sand, little silt, max. 3"

LABORATORY
TEST DATA
SOURCE No. HR-100

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

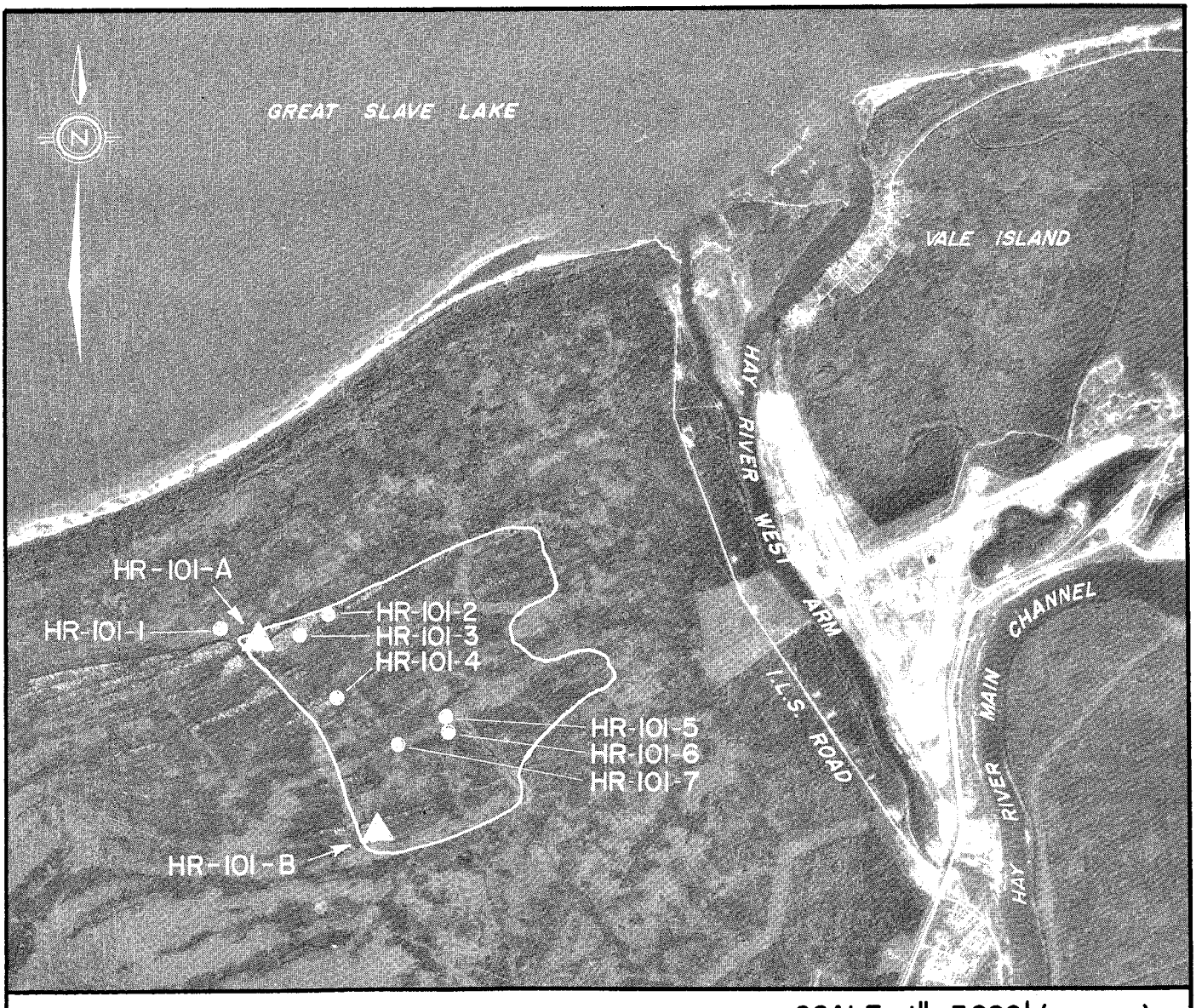
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

HAY RIVER
SOURCE No. HR-101

LANDFORM AND LOCATION:	Raised beach ridges modified by wind action approximately 3/4 by 1 mile in area. Source is 2 miles west of the community.
MATERIAL:	SAND - fine, uniform, trace silt, organic laminations.
VOLUME:	Approximately 500,000 cu. yds. above the water table.
CONCLUSION:	Low priority for development as a source of low quality general fill.



AIRPHOTO No. A21530-172 SCALE : 1"= 3000' (approx.)

HR-101 ENVIRONMENT

Physical

The source is a series of beach ridges located about 1 mile west of the west arm of Hay River and 1 mile south of the Great Slave Lake shoreline. The northwestern part of the source is a series of low, elongated ridges, up to 3,000 feet long and 300 feet wide, rising to a height of 4 to 7 feet above the surrounding marshland. A shallow meandering creek flows through the low lying eastern sector of the source. The western edge of the source is bounded by a poorly drained muskeg filled depression.

Although drainage of the ridge surfaces is good, drainage of the lowlands between the ridges is very poor, with the water table within 0 to 3 feet of the ground surface.

Biotic

The tree cover on the ridges is pine up to 50 feet high, with a canopy density less than 20%. The undergrowth is lichen and moss with wild rose and berry bushes.

The tree cover in the depressions between the ridges ranges from spruce to 40 feet high, with a canopy density of 20% to 40%, to brush and willow to 10 feet high.

The immediate area is not a critical wildlife habitat, but is aesthetically important because of its closeness to the community.

HR-101 MATERIALS AND QUANTITIES

The ridge material is a uniform fine sand, about 80% grading between the 40 and 100 mesh, with less than 5% fines passing the 200 mesh. The recoverable depth above the water table is shallow, generally less than 6 feet.

The depressions adjacent to the ridges consist of about 2 feet of peat overlying sand which is generally silty. The water table in the depressions is usually within 2 feet of the ground surface.

The estimated volume of recoverable material above the water table is 500,000 cu. yds.

HR-101 DEVELOPMENT

General

This source has not been developed up to the present time. The source is the closest available to the community, but being a poorly graded fine sand, is suitable only for restricted use as general fill. The source covers a large area and any development must be strictly controlled to prevent undue disruption of the environment. The area should be developed in a strip fashion, by excavations only along the raised ridges. The low lying depressions between the ridges are not suitable for development because of low quality material, a thick peat overburden, and a high water table.

Since the area is close to the community it may be desirable to develop the ridges for other uses than a source of granular fill.

Access

The existing all weather road to the I.L.S. (Instrument Landing Station) passes within 1 mile of the eastern limit of the source. A 1½ mile long road from the I.L.S. road to the source would have to be constructed for year round access. This new road would cross a small creek where a small bridge or culvert must be constructed.

Material Use and Handling

The fine uniform sand in this source is suitable for restricted use as low quality general fill. The material will be frost susceptible. Therefore any fills constructed with this material must be designed to avoid free access to water to prevent frost heaving of the fill. An adequate drain of coarse granular material should be used between any fill and the water table. The sand is also easily water and wind erodable. A covering of coarse granular material or vegetation should be provided on the fills.

Development of the source is recommended only above the water table requiring the usual assembly of dozer, front end loader and trucks.

Stripping and Restoration

All trees will have to be cut and disposed of by burning. Any development of the low lying area would require the topstratum of peat by stripped and stockpiled

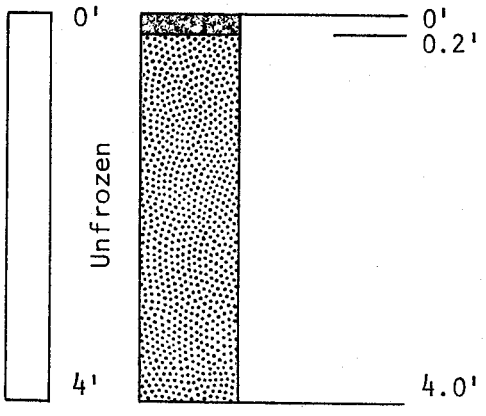
for later regrading of the site. A major concern during any operation will be to avoid siltation of the small creeks flowing through the source. All stripped material should be stockpiled away from the drainage paths.

Restoration of the area should include revegetation.

TEST PIT LOGS

SOURCE No. HR-101

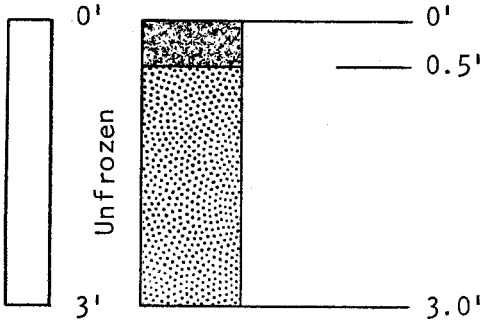
HR-101-A



(OL) SILT - topsoil, moss

(SP) SAND - trace silt, organic specks, fine uniform gradation, brown

HR-101-B

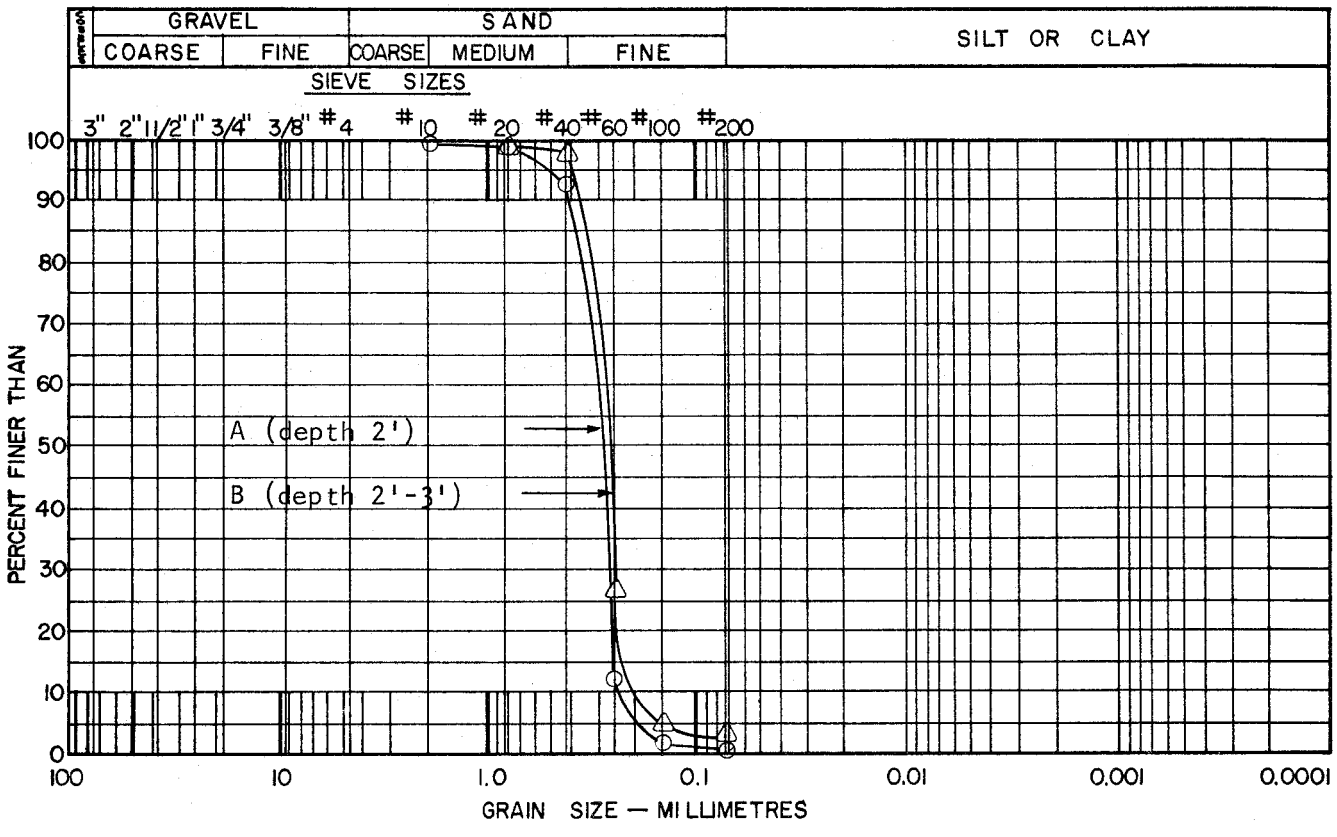


(OL) SILT - and sand, moss

(SP) SAND - trace silt, organic specks, fine uniform gradation, brown

LABORATORY
TEST DATA
SOURCE No. HR-101

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

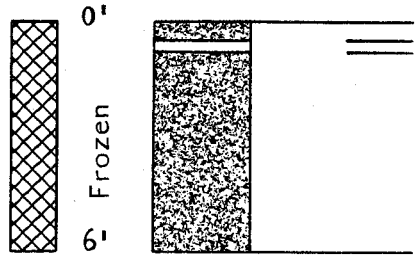
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-101

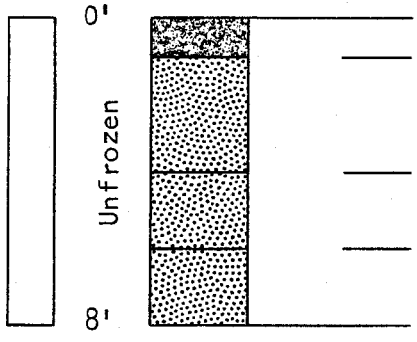
HR-101-1



(Pt)	PEAT - muskeg
	ICE
(Pt)	PEAT - organic

Water at top of hole on completion

HR-101-2



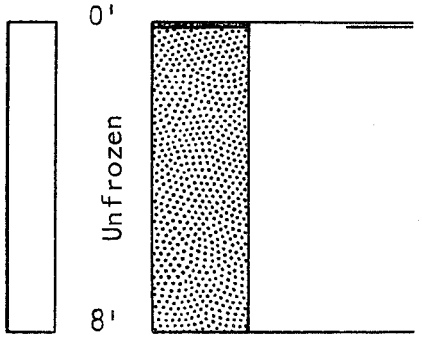
(OL)	SILT - topsoil, moss
(SP)	SAND - fine uniform gradation, roots, brown
(SP)	SAND - trace fine gravel, trace silt, fine to medium
(SP)	SAND - trace silt, organic laminations, fine, grey

Water at 7' on completion

Moisture Content:

Sample 1	depth 2'-3'	3.1%
Sample 2	depth 4'-5'	15.6%
Sample 3	depth 6'-7'	31.3%

HR-101-3

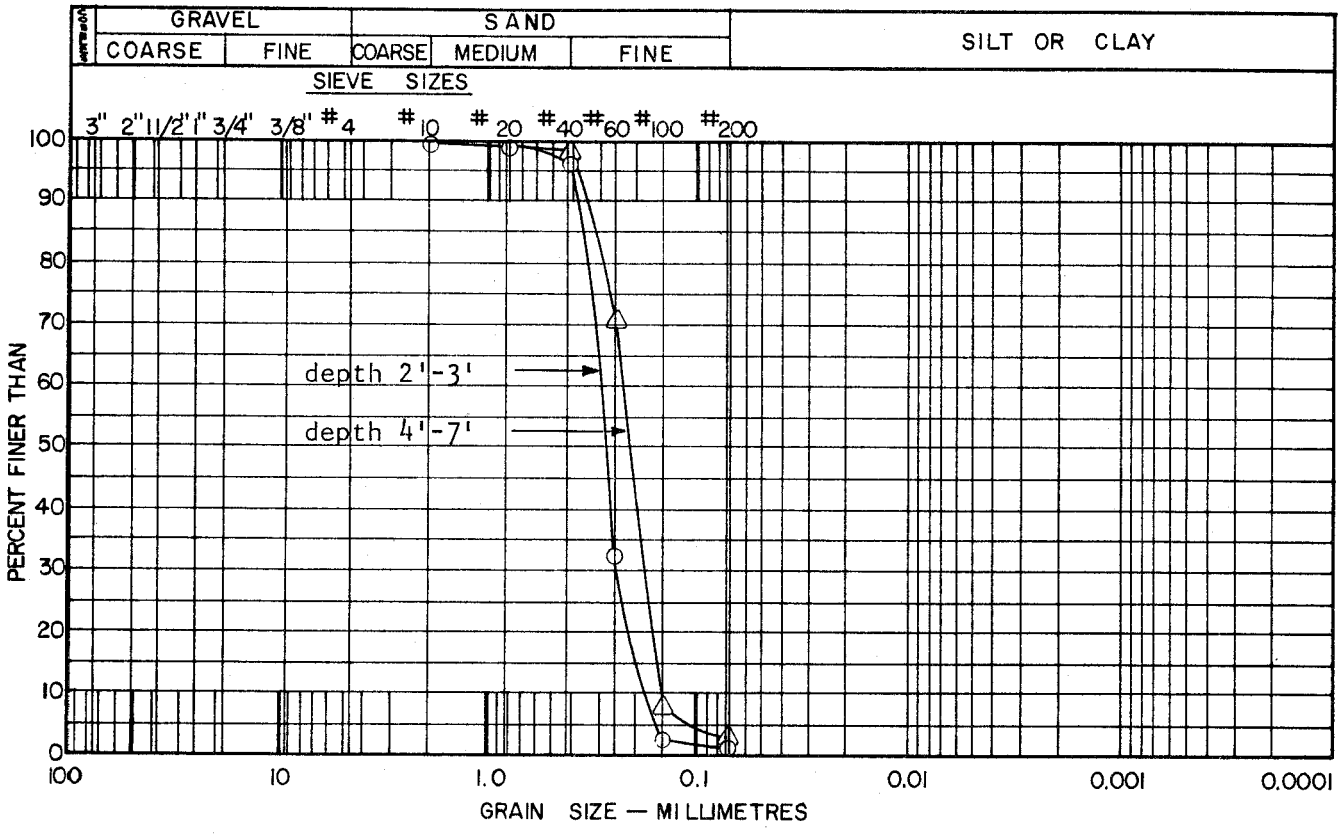


(OL)	SILT - topsoil, moss
(SP)	SAND - fine uniform gradation, clean, light brown

Water at 6' on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-101-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.3%
Sample 2	depth 4'-5'	15.2%
Sample 3	depth 6'-7'	25.7%

ORGANIC CONTENT

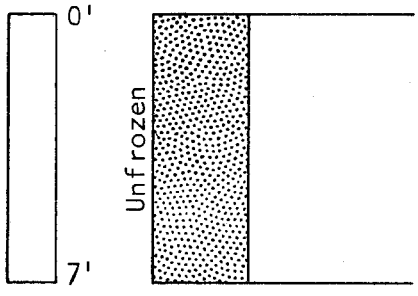
Loss on ignition test
- Sample 1 depth 2'-3' 0.43%
- Sample 2 depth 4'-7' 0.20%

Color test - Sample 1 depth 2'-3' Rdg. 2
- Sample 2 depth 4'-7' Rdg. 1

HARDNESS TEST

TEST HOLE LOGS
SOURCE No. HR-101

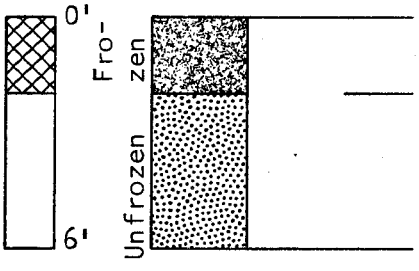
HR-101-4



(SP) SAND - fine uniform gradation, clean, light brown

Water at 4' on completion

HR-101-5

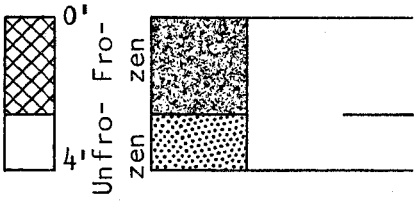


(Pt) PEAT - roots, etc., black

(SP-SM) SAND - some silt, fine uniform gradation, grey

Water at 3.5' on completion

HR-101-6



(Pt) PEAT - roots, etc. black

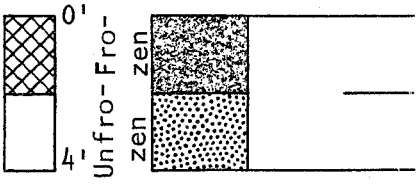
(SP-SM) SAND - little silt, organic laminations, uniform, grey

Water at 1' on completion

Moisture Content:

Sample 1 depth 2'-3' 23.0%

HR-101-7

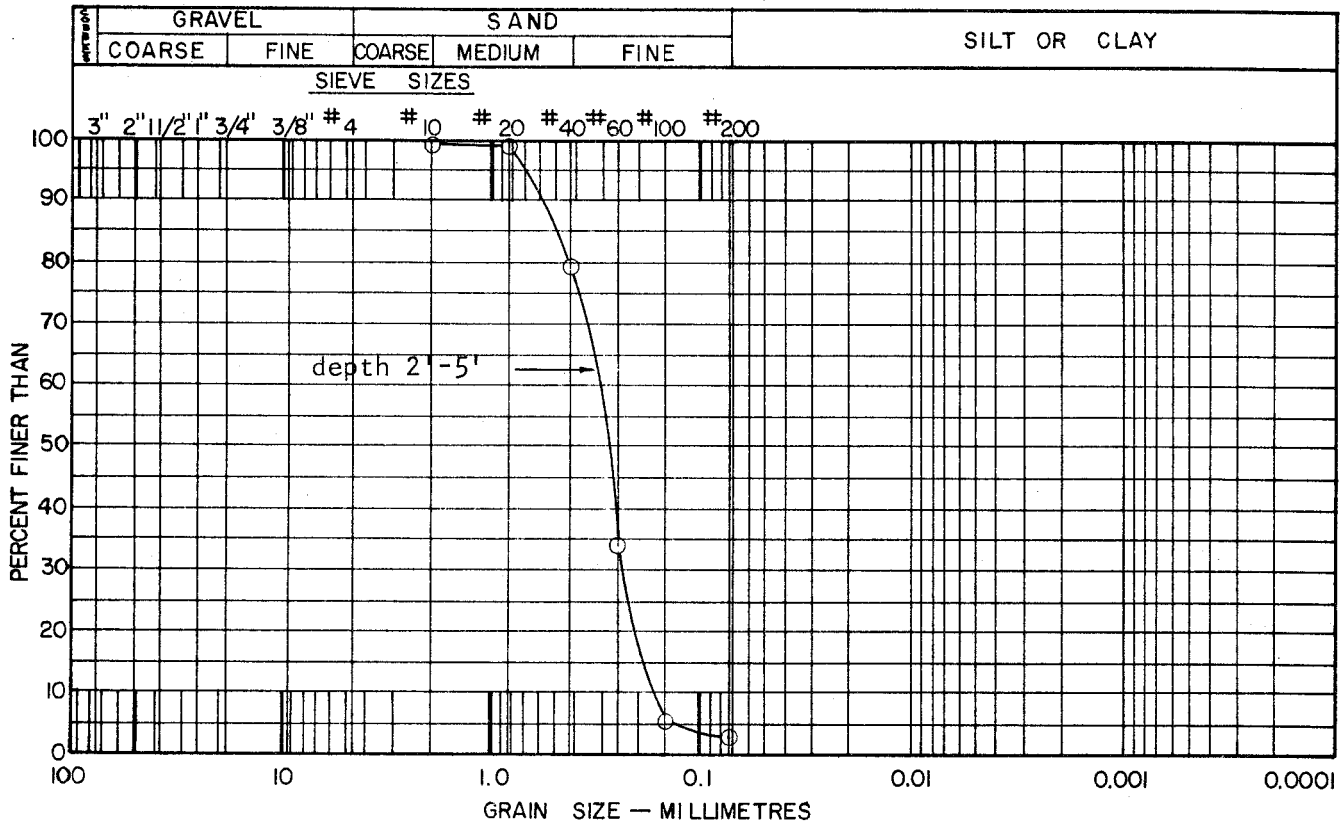


(Pt) PEAT - roots, etc., black

(SP) SAND - little silt, fine uniform gradation

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-101-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	7.7%
Sample 2	depth 4'-5'	22.0%

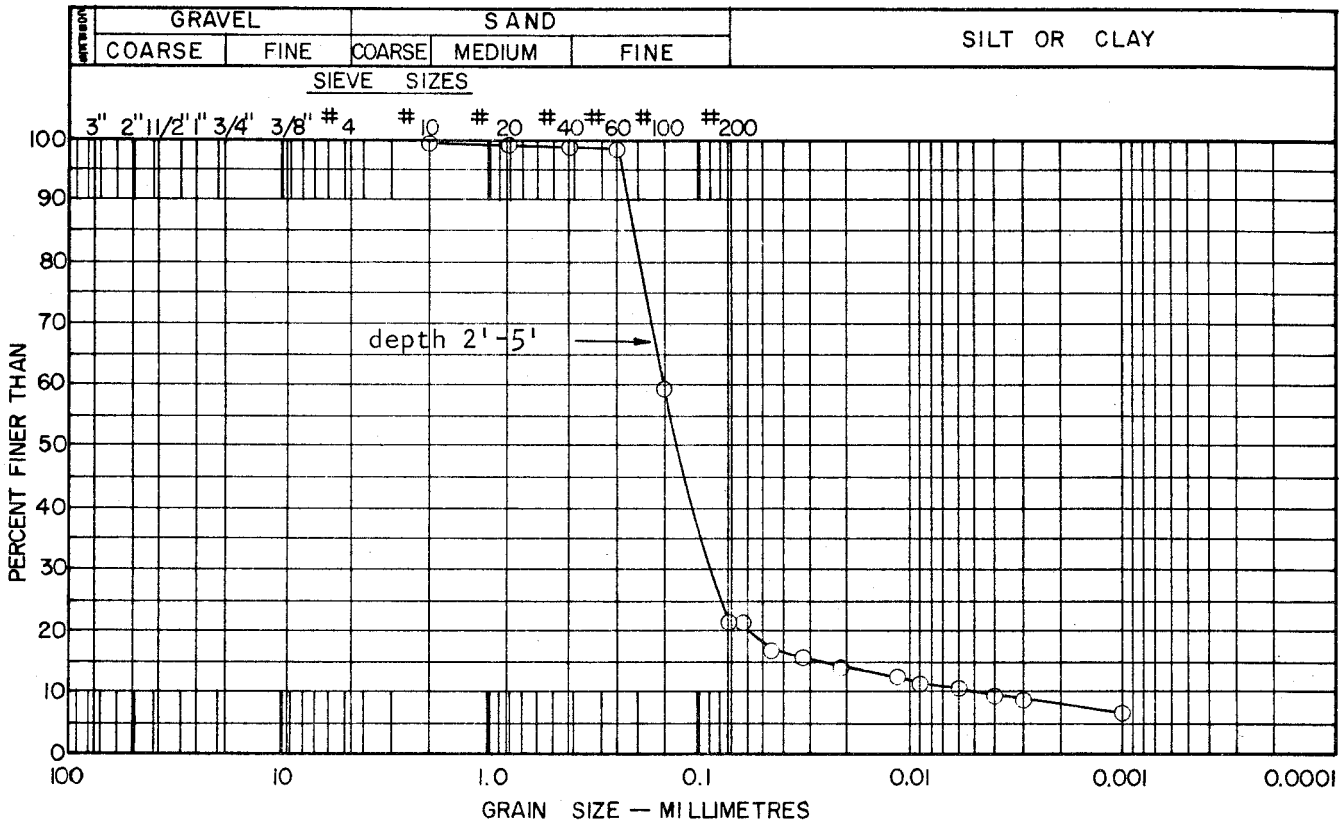
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-101-5

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2'-3' 21.7%
Sample 2 depth 4'-5' 21.1%

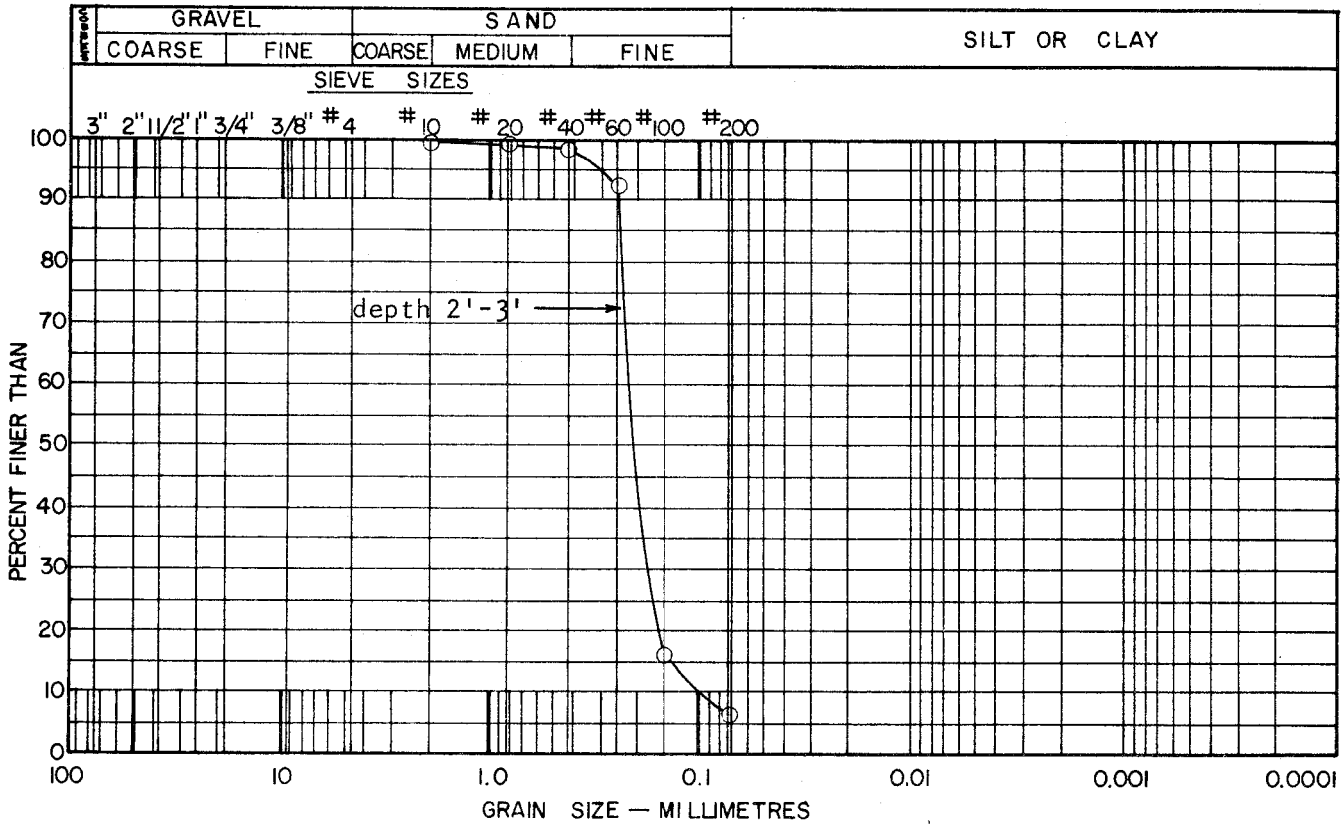
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-101-7

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2'-3' 26.7%

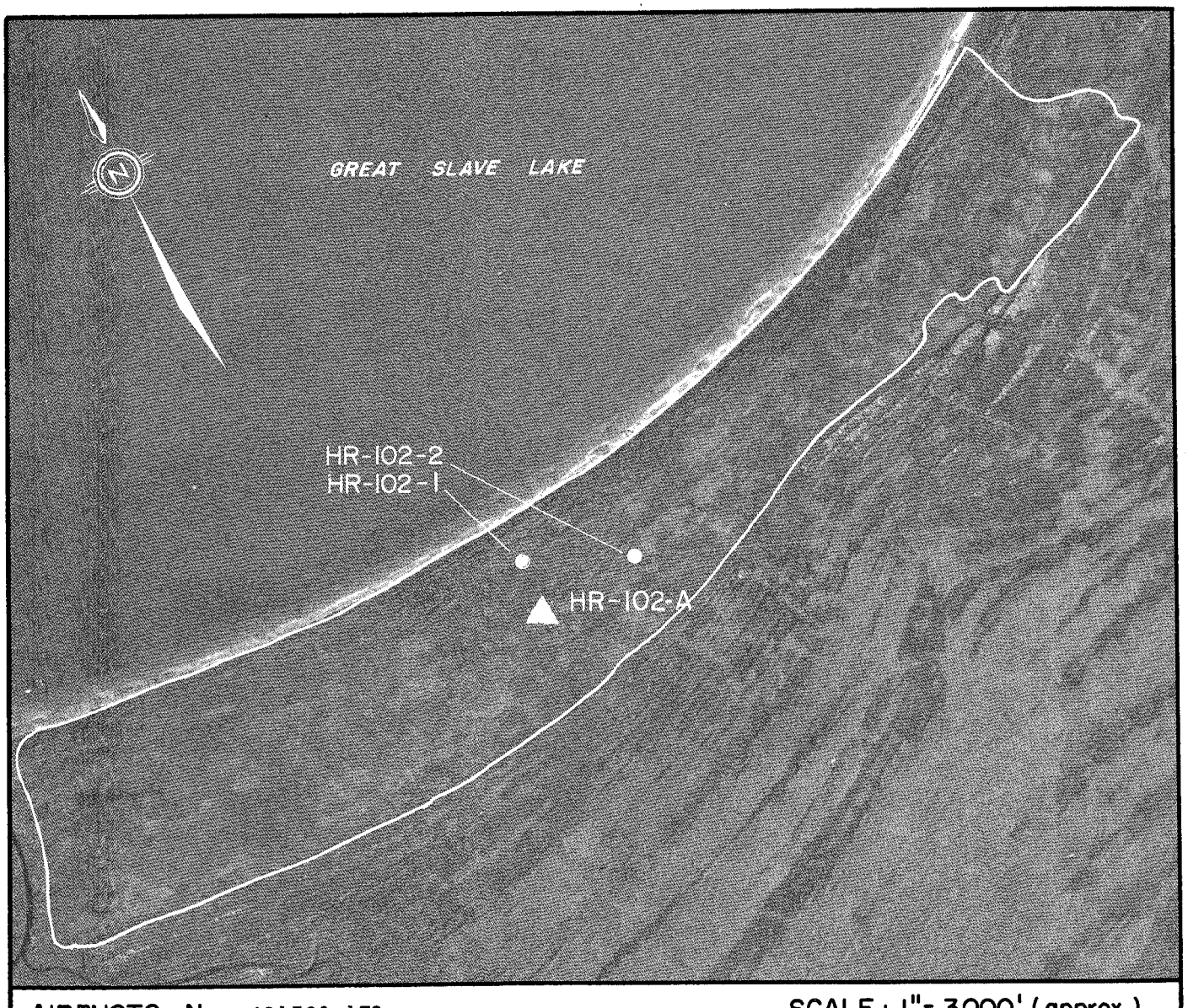
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

HAY RIVER
SOURCE No. HR-102

LANDFORM AND LOCATION:	Low, poorly defined beach ridges along Great Slave Lake extending from 3 to 7.5 miles west of Hay River in a band up to 1/2 mile wide.
MATERIAL:	SAND - fine, uniform, trace silt.
VOLUME:	Approximately 1,000,000 cu. yds. above the water table.
CONCLUSION:	Very low priority for development as the deposit is adjacent to the lake; is shallow in depth above the water table, and contains an excess of organic material.



AIRPHOTO No. A21530-172

SCALE : 1"= 3000' (approx.)

HR-102 ENVIRONMENT

Physical

This source is located immediately north of sources HR-101, 103 and 105 and lies adjacent to the Great Slave Lake shoreline. The source area is a series of low, poorly defined, parallel beach ridges, about 4 miles long and 1/2 mile wide. The low ridges are about 1 to 2 feet higher than the adjacent lowlands.

Drainage of the ridges is fair. The lowlands adjacent to the ridges are poorly drained with the water table generally within 0 to 3 feet of the ground surface.

Biotic

The tree cover on the ridges is primarily spruce to 40 feet high, with a canopy density of 20 to 40%. The marshes and lowlands support a slight tree growth and many small bushes. Peat deposits generally overlie the sands in the wet hollows adjacent to the ridges.

The area supports ptarmigan and the usual population of small fur bearing animals and rodents, but very small in numbers.

HR-102 MATERIALS AND QUANTITIES

The material of the ridges is a uniform fine sand, about 80% grading between 40 and 100 mesh, with less than 10% passing 200 mesh. The deposit, adjacent to Great Slave Lake, is very shallow above the water table, varying up to 6 feet, but averaging less than 3 feet in depth.

The sand in this source contains numerous organic specks, likely the result of decayed driftwood and organic material which were reworked by wave action during ancient beach stands.

The estimated volume of recoverable material above the water table is 1,000,000 cu. yds.

HR-102 DEVELOPMENT

General

This source has not been developed to the present time. The fine sand is organic, and would only be suitable as a low quality fill. It is considered very low

priority for development due to its proximity to the lake, its organic content, and its large surface area versus shallow recovery depth.

Access

This source is located along a seismic line, about 4 miles northwest of the community. For winter operation, a winter road can be used along the seismic line. For a summer operation, an all-weather road would have to be constructed along the seismic line.

As an alternative route, a 1 mile long road could be constructed from the I.L.S. road to the source for year round access. This new road would branch from the existing I.L.S. road about $2\frac{1}{2}$ miles north of the junction between the I.L.S. road and N.W.T. Hwy. 2. Both routes cross a small creek, where a small bridge or culvert will have to be constructed.

Material Use and Handling

The fine uniform sand is only suitable for low quality general fills which are protected from frost action and erosion.

The development of this source would require the same equipment as required for development of similar beach ridge deposits in the area.

Stripping and Restoration

Any development would require that a strip of land, a few hundred feet wide, be left between the lakeshore and the operation. Any excavations should stop at least 1 foot above the water table to prevent ponding of water in depleted areas.

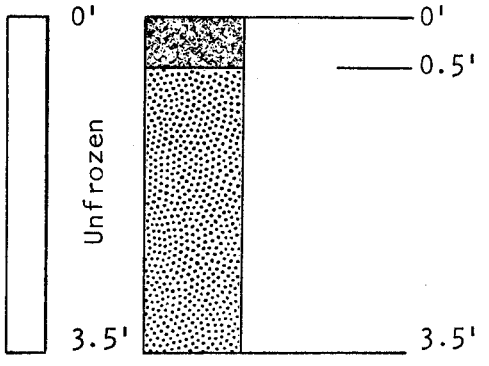
All trees will have to be cut and disposed of by burning. The depth of stripping in the source varies between 0 to 0.5 feet on the ridges, and 1 to 3 feet in the depressions. These materials can be stockpiled away from the lakeshore, adjacent to that area of the source being developed.

After depletion of the area, the stripped material can be used to cover the slopes and bottom of the pit area, then possibly reseeded for speedy revegetation.

TEST PIT LOGS

SOURCE No. HR-102

HR-102-A



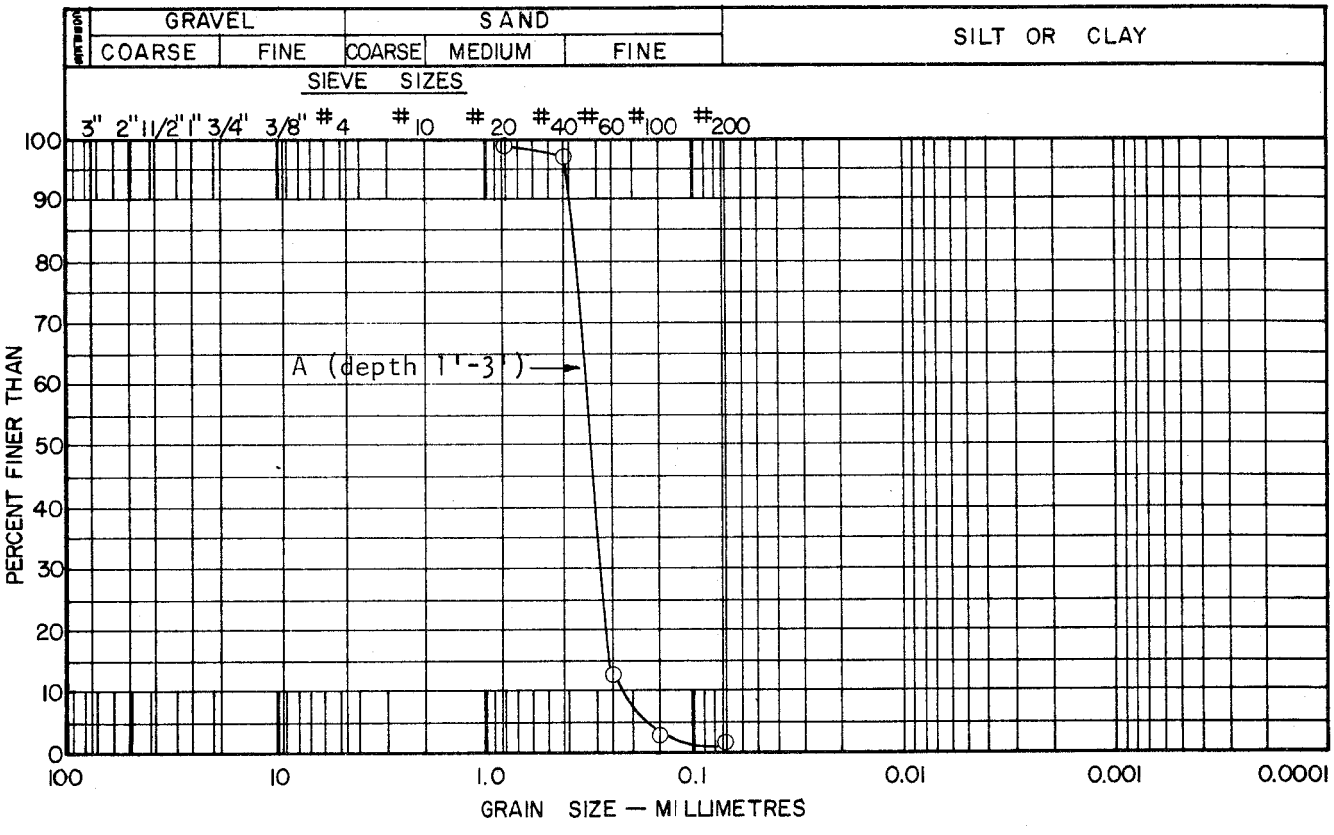
(OL) SILT - topsoil, moss

(SP) SAND - trace silt, organic laminations, fine uniform gradation, brown

Water at 3' on completion

LABORATORY
TEST DATA
SOURCE No. HR-102

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

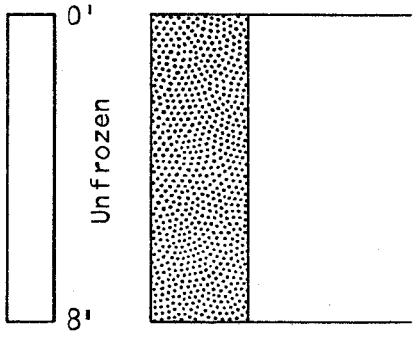
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS
SOURCE No. HR-102

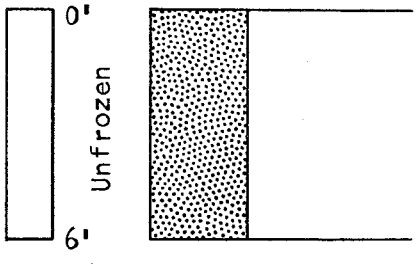
HR-102-1



(SP-SM) SAND - trace silt, organic specks, fine uniform gradation

Water at 6' on completion

HR-102-2



(SP) SAND - trace silt, organic specks, fine uniform gradation

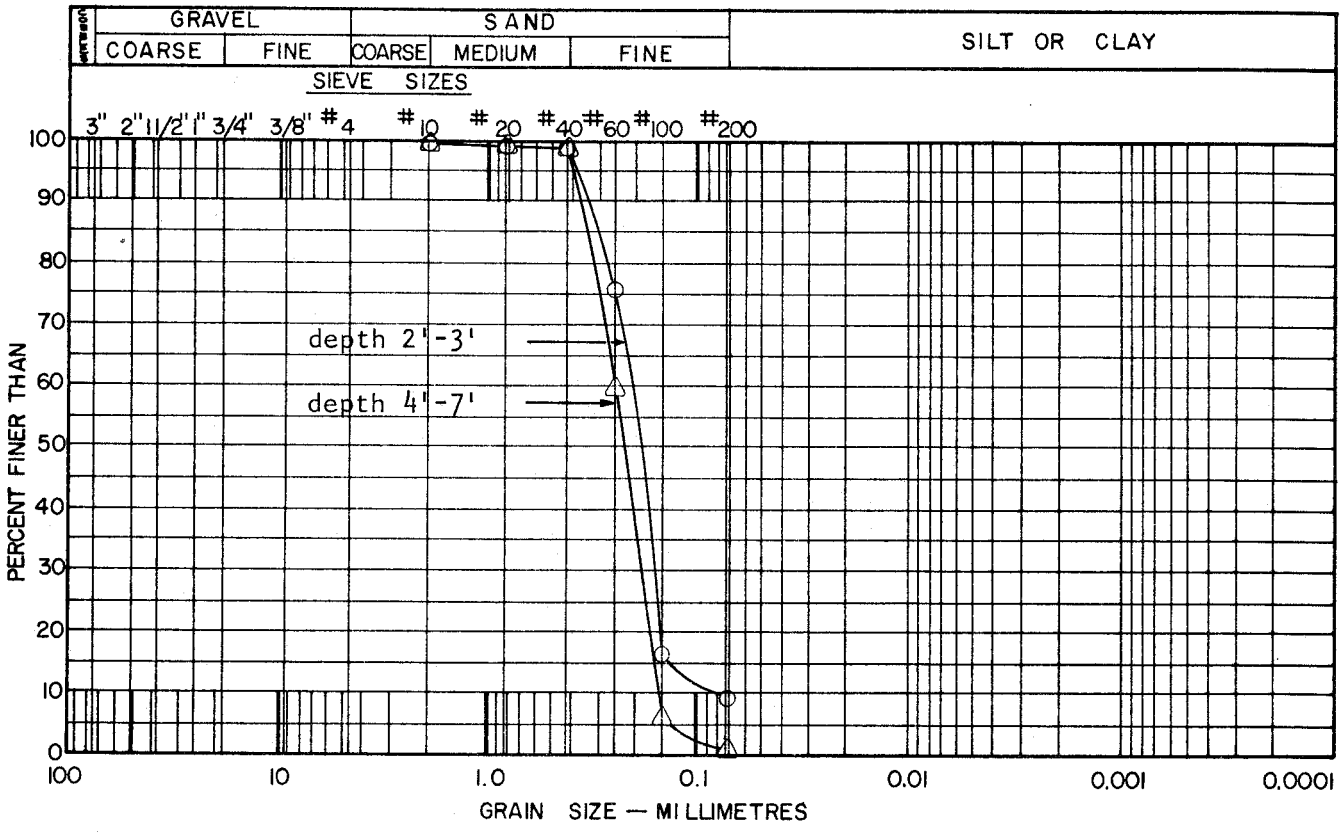
Water at 4' on completion

Moisture Content:

Sample 1	depth 2'-3'	25.6%
Sample 2	depth 4'-5'	24.8%

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-102-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	20.2%
Sample 2	depth 4'-5'	21.3%
Sample 3	depth 6'-7'	23.3%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

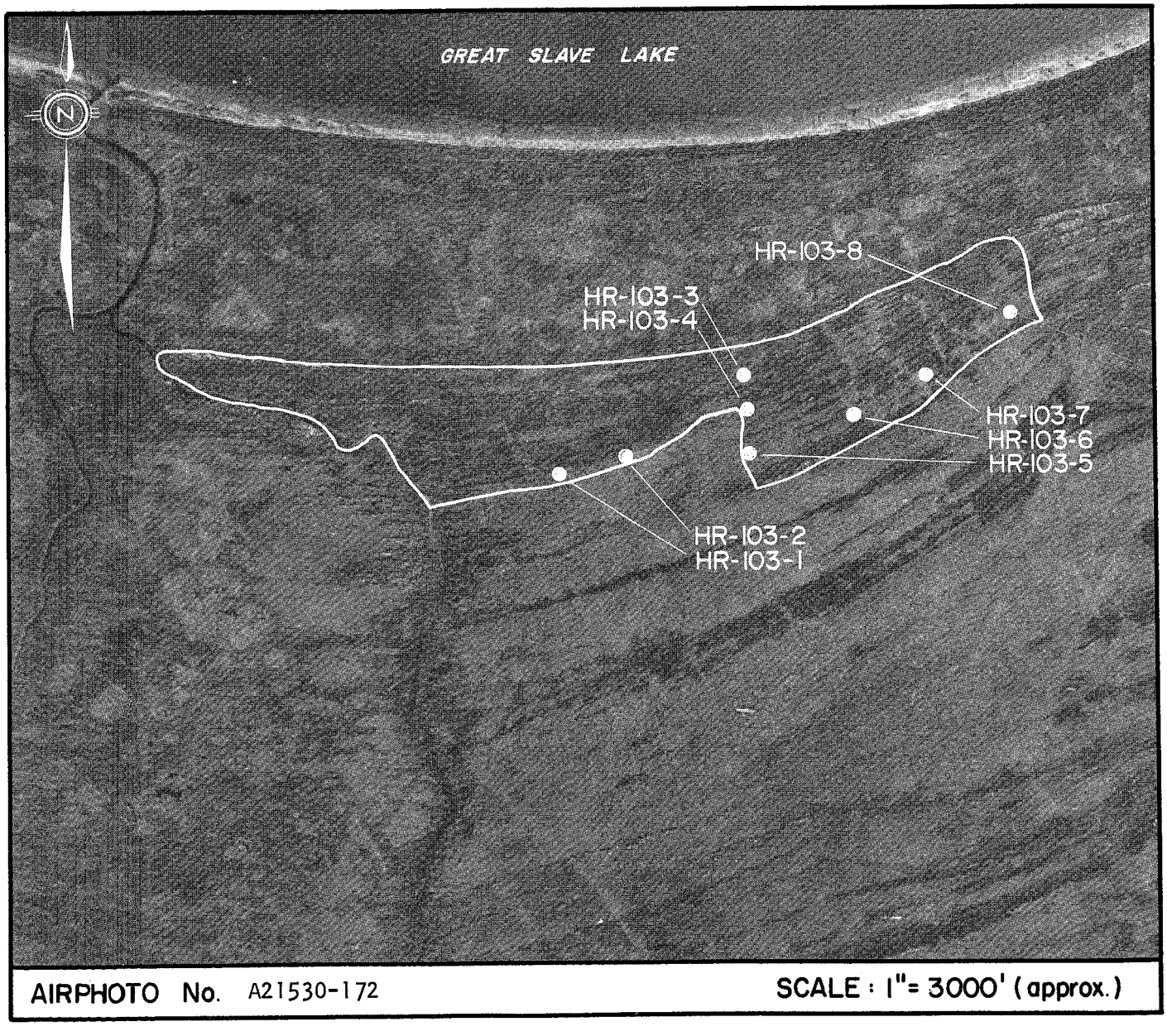
HAY RIVER
SOURCE No. HR-103

LANDFORM AND LOCATION: Series of parallel beach ridges extending from 4 to 7 miles west of the community in an area up to 1/2 mile wide.

MATERIAL: SAND - fine, uniform, little silt, trace organics.

VOLUME: Approximately 400,000 cu. yds. above the water table.

CONCLUSION: Very low priority for development. This deposit should only be used as a last resort after sources HR-101 and 105 are depleted.



AIRPHOTO No. A21530-172 SCALE : 1"= 3000' (approx.)

HR-103 ENVIRONMENT

Physical

The source is a series of low parallel ridges located along a seismic line about 4 miles northeast of the community. The area is bounded by source HR-105 to the east and by a creek to the west.

The individual ridges are up to 3 miles long and 100 feet wide, rising to a height of 1 to 2 feet above the surrounding marshland.

Although drainage of the ridges is fair, drainage of the lowlands is very poor, with the water table generally within 0 to 3 feet of the ground surface.

Biotic

The tree cover on the ridges is pine and spruce up to 40 feet high. The low lying marshland areas are covered with sparse scrub brush and willows to 10 feet in height.

The area supports the usual population of small fur-bearing animals and rodents, but very small in number.

HR-103 MATERIALS AND QUANTITIES

The source material in the north is generally a fine uniform sand, about 80% grading between 40 and 100 mesh, with less than 10% passing the 200 mesh. The deposit is very shallow above the water table, generally less than 4 feet in depth.

The depressions adjacent to the ridges generally consist of about 2 to 3 feet of peat overlying a silty sand.

Based upon development of the ridges, the estimated volume of recoverable material is 400,000 cu. yds.

HR-103 DEVELOPMENT

General

This source has not been developed to date. Only the ridges are considered suitable for development. The low lying depressions between the ridges are not suitable for development because of a high percentage of silt in the sand,

a thick peat overburden, and a high water table.

Access

Access would be along a seismic line which runs 4 miles northwest from the community to the southeastern corner of the source. In its present state the route could only be used for a winter operation. For year round development an all-weather road would have to be constructed along the seismic line.

As an alternate route, a $2\frac{1}{2}$ mile long road could be constructed from the I.L.S. road to the source for year round access. The new road would branch from the existing I.L.S. road about $1\frac{1}{2}$ miles north of the junction between the I.L.S. road and N.W.T. Hwy. 2. Both routes cross a small creek, where a small bridge or culvert will have to be constructed.

Material Use and Handling

The fine uniform sand in this source is suitable for restricted use as low quality general fill. Any fills constructed with this material must be designed to avoid access to water. The sand must not be used below the water table since it is highly frost susceptible. A coarse granular blanket can be used between the fill and water table to prevent frost action. The sand is also easily erodable by wind and water. An adequate covering of either granular material or vegetation must be provided to protect the fill.

Development of the source is recommended only above the water table. It requires the usual assembly of dozer, front end loader and trucks.

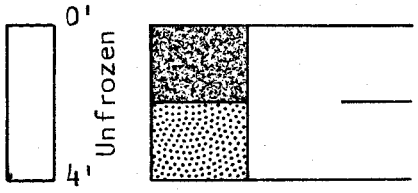
Stripping and Restoration

All trees will have to be cut and disposed of by burning. Any development of the low lying areas would require the topstratum of peat be stripped and stockpiled for later regrading of the site. Restoration of the area should include revegetation.

TEST HOLE LOGS

SOURCE No. HR-103

HR-103-1



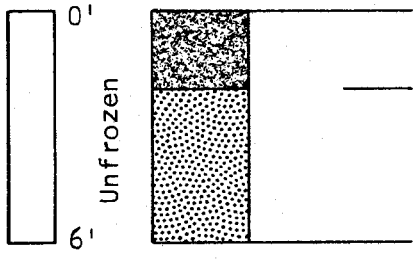
0'			
	(Pt)	PEAT - black	
2.0'			
	(SP-SM)	SAND - little silt, organic laminations, fine uniform gradation	
4.0'			

Water at 1' on completion

Moisture Content:

Sample 1 depth 2'-3' 9.0%

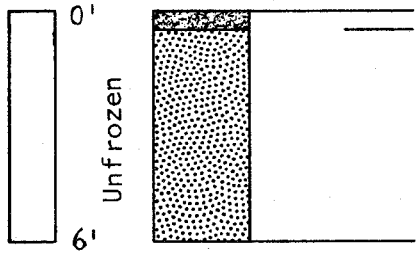
HR-103-2



0'			
	(Pt)	PEAT - roots, etc.	
2.0'			
	(SP)	SAND - trace silt, organic laminations, fine uniform gradation	
6.0'			

Water at 4' on completion

HR-103-3



0'			
0.5'	(Pt)	PEAT - roots, etc.	
	(SP)	SAND - trace silt, organic laminations, fine uniform gradation	
6.0'			

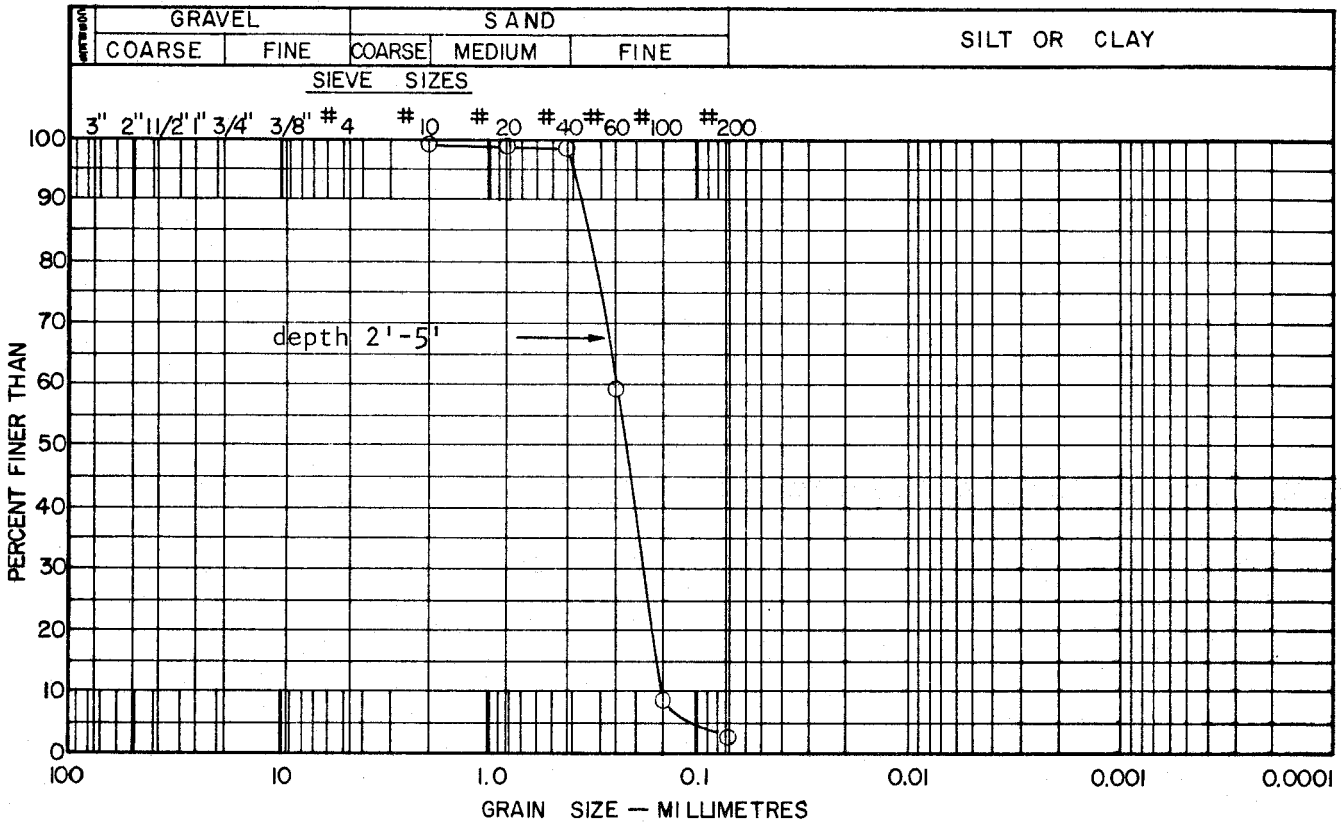
Water at 2' on completion

Moisture Content:

Sample 1 depth 2'-3' 25.4%
Sample 1 depth 4'-5' 22.7%

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-103-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	23.2%
Sample 2	depth 4'-5'	23.7%

ORGANIC CONTENT

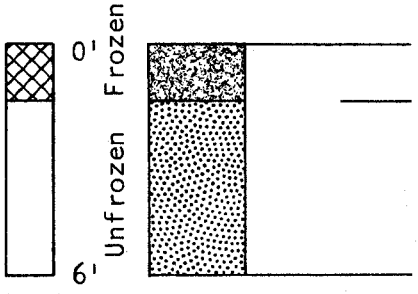
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-103

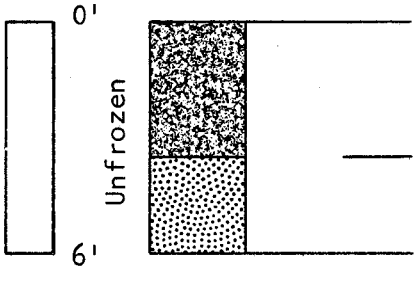
HR-103-4



0'			
	(Pt)	PEAT -	roots, etc.
1.5'			
	(SP)	SAND -	trace silt, organic laminations, fine uniform gradation, grey
6.0'			

Water at 3.5' on completion

HR-103-5



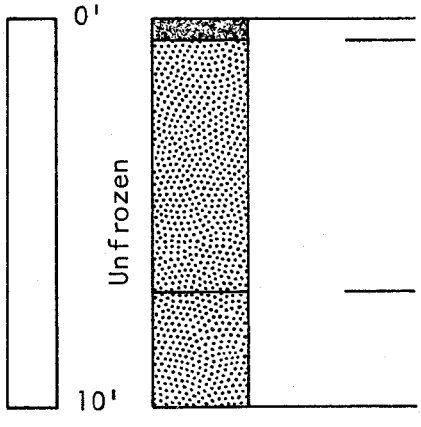
0'			
	(Pt)	PEAT -	roots, etc.
3.5'			
	(SP-SM)	SAND -	little silt, organic laminations, fine uniform gradation, grey
6.0'			

Water at 4' on completion

Moisture Content:

Sample 1	depth 2'-3'	121.0%
Sample 2	depth 4'-5'	24.5%

HR-103-6



0'			
0.5'	(Pt)	PEAT -	roots, etc.
	(SM)	SAND -	some silt, organic laminations, fine uniform gradation, brown
7.5'			
	(ML)	SILT -	some clay, trace sand, medium plastic, coal specks, grey, (till)
10.0'			

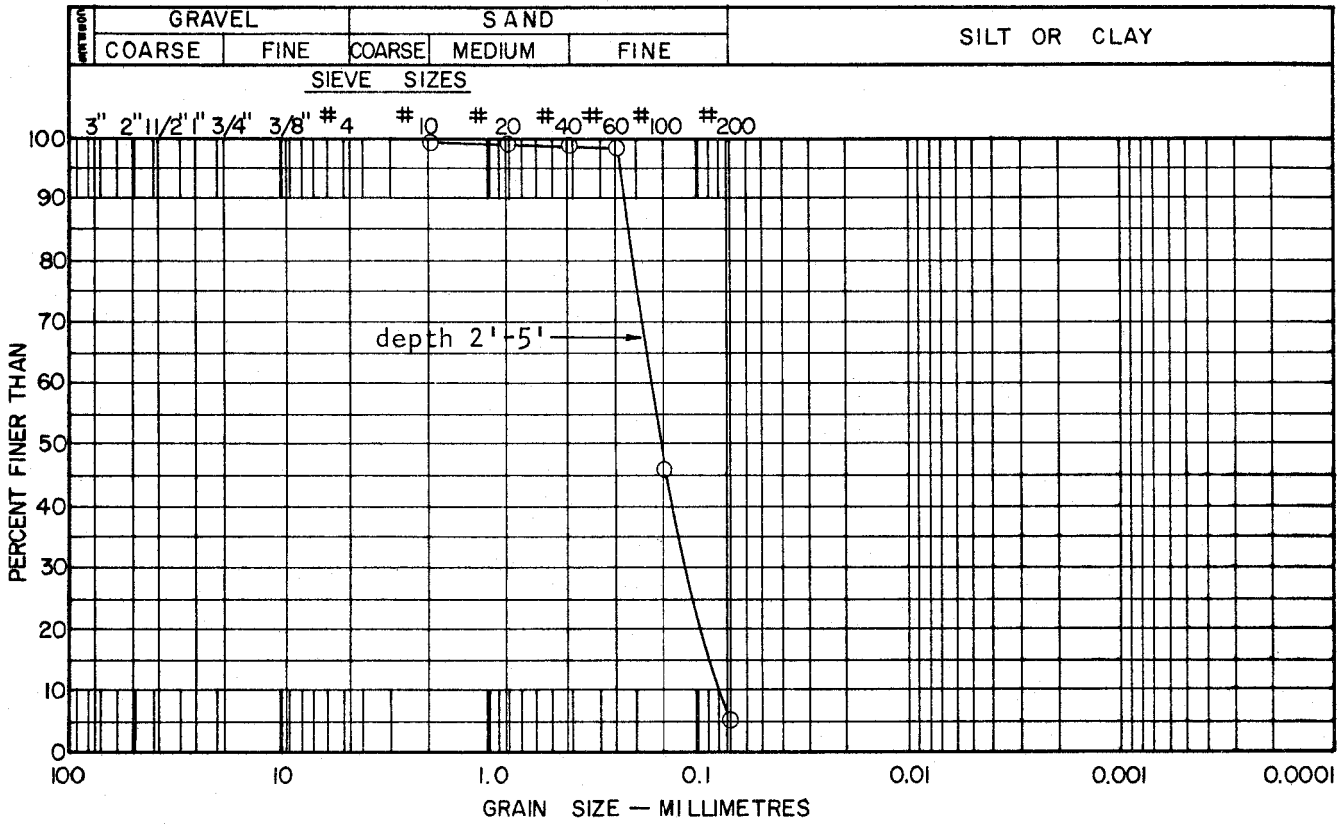
Hole dry on completion

Moisture Content:

Sample 1	depth 2'-3'	28.3%
Sample 2	depth 4'-5'	19.3%
Sample 3	depth 6'-9'	23.9%

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-103-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	25.4%
Sample 2	depth 4'-5'	23.5%

ORGANIC CONTENT

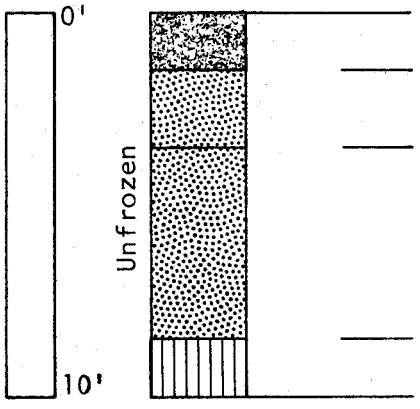
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-103

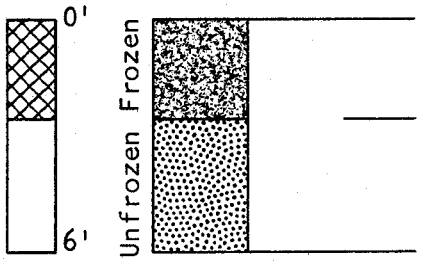
HR-103-7



(Pt)	PEAT -	roots, etc.
(SM)	SAND -	some silt, organic laminations, fine, brown
(SM)	SAND -	little silt, organic laminations, fine, grey
(ML)	SILT -	some clay, little gravel to 3/4", little sand, medium plastic, grey, (till)

Water at 7' on completion

HR-103-8



(Pt)	PEAT -	roots, etc.
(SP-SM)	SAND -	little silt, organic laminations, fine uniform gradation, grey

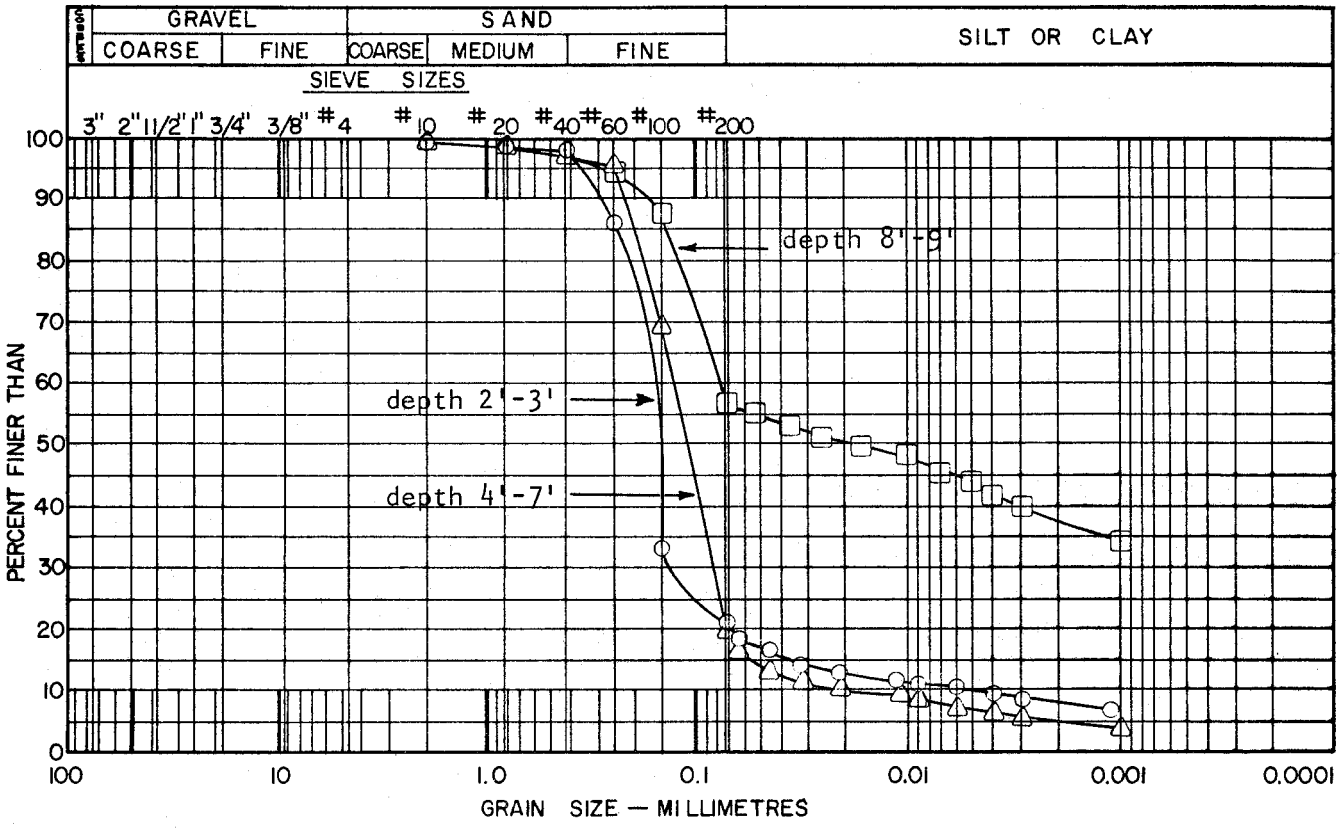
Water at 3' on completion

Moisture Content:

Sample 1	depth 2'-3'	52.9%
Sample 2	depth 4'-5'	24.0%

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-103-7

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	46.1%
Sample 2	depth 4'-5'	21.8%
Sample 3	depth 6'-7'	22.6%
Sample 4	depth 8'-9'	21.7%

ORGANIC CONTENT

Loss on ignition test

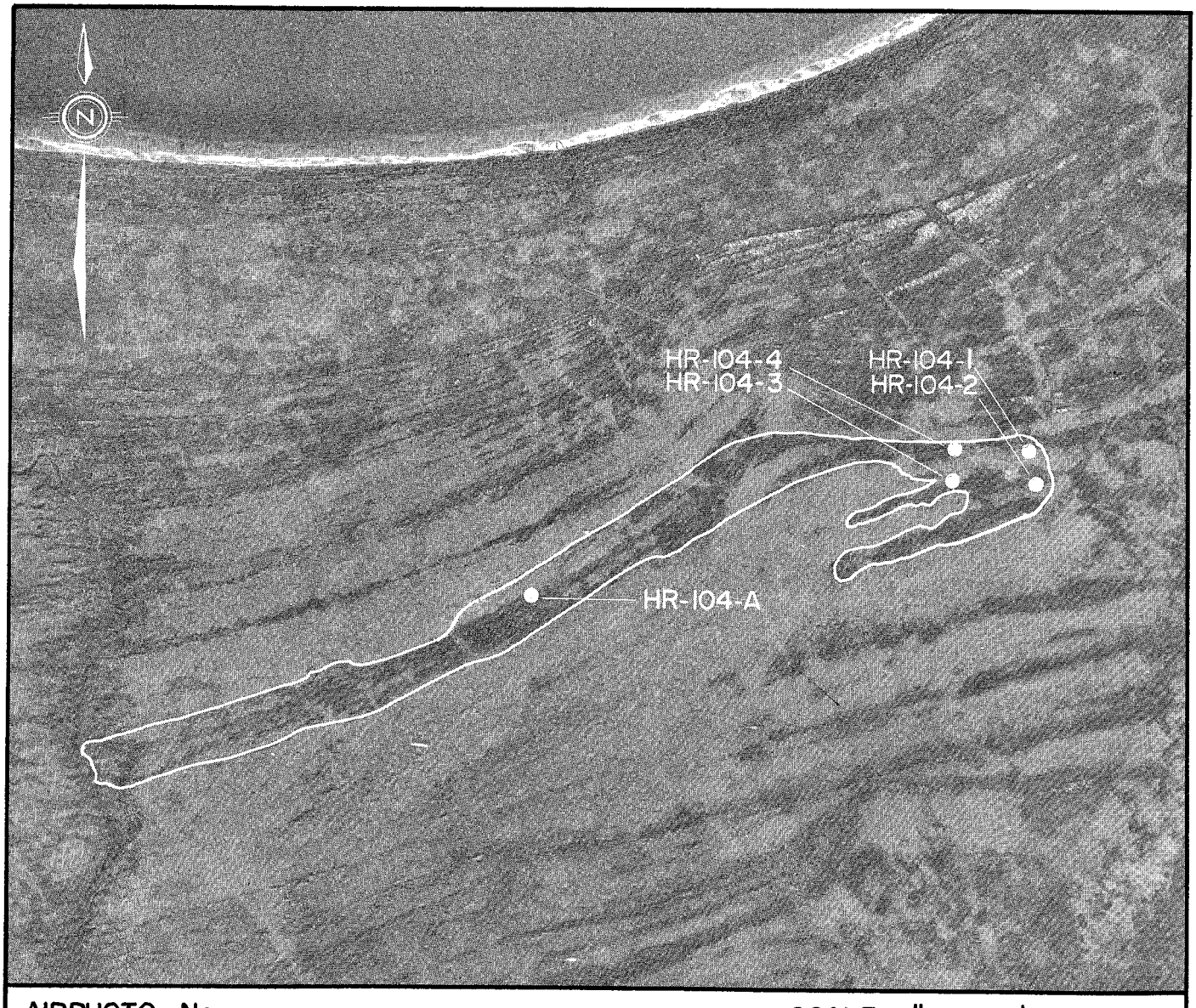
Sample 1	depth 2'-3'	9.2%
Sample 2	depth 4'-7'	2.0%

HARDNESS TEST

Color test - unwashed	Sample 1	depth 2'-3' - Rdg. + 5 (black)
- washed	Sample 1	depth 2'-3' - Rdg. 4
	Sample 2	depth 4'-7' - Rdg. 5

HAY RIVER
SOURCE No. HR-104A

LANDFORM AND LOCATION:	A series of long, narrow, parallel beach ridges in an area extending from 2 to 5.5 miles west of the community.
MATERIAL:	SAND - fine, uniform, some silt.
VOLUME:	Approximately 300,000 cu. yds. above the water table.
CONCLUSION:	Not recommended for development because of the high silt content, and the shallow depth of material above the water table.



AIRPHOTO No. A21530-172 SCALE : 1"= 3000' (approx.)

HR-104A ENVIRONMENT

Physical

The source is a series of long, narrow beach ridges about 6,000 yards long and 300 yards wide. The average height of the source above the surrounding marshland is less than 1 foot. Drainage of the marshland area is poor with the water table in the ridges at 1 to 4 feet below ground surface.

The source has not been developed to date.

Biotic

The tree cover on the source consists of spruce and pine to a height of 25 feet. The marshland and low lying areas adjacent to the small ridges support a sparse tree growth with many small bushes. Depressions in the area are infilled with peat to a depth of 4 feet.

The area is not within an important wildlife area, supporting only a limited population of small animals and rodents.

HR-104A MATERIALS AND QUANTITIES

The material in this source is primarily a fine, uniform, organic sand, with a silt content up to 40%. The ridges are generally overlain by a minimum 1 foot thick organic cover.

The estimated volume of material above the water table is approximately 300,000 cu. yds.

HR-104A DEVELOPMENT

General

This source is not recommended for development because of the high silt and organic content. Other beach ridge sources in the area provide better quality material.

Access

Access would be along a seismic line which runs 4 miles northwest from the community to the eastern corner of the source. In its present state the route could

only be used for a winter operation. Year-round access to the source would require the construction of an all-weather road along the seismic line.

As an alternate route, a 2 mile long road could be constructed from the I.L.S. road to the source for year-round access. The new road would branch from the existing I.L.S. road about 1 mile north of the junction between the I.L.S. road and N.W.T. Hwy. 2. Both routes cross a small creek, where a small bridge or culvert would have to be constructed.

Material Use and Handling

Due to the high silt and organic content the material would provide a very poor grade of general fill. As a fill it would be highly susceptible to frost heave in the winter and loss of strength in spring thaw.

Handling of this material would require the usual assembly of equipment, including bulldozer, front-end loader and trucks.

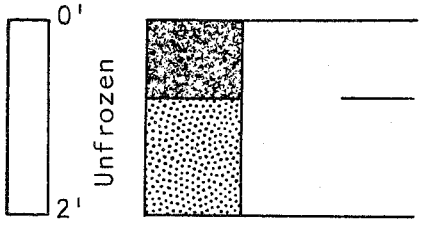
Stripping and Restoration

The process of stripping and restoration would be the same as for similar landforms in the area. Due to the limited depth of material available above the water table, a large area of the source would be disturbed in order to develop any volume of material.

TEST PIT LOGS

SOURCE No. HR-104A

HR-104A-A



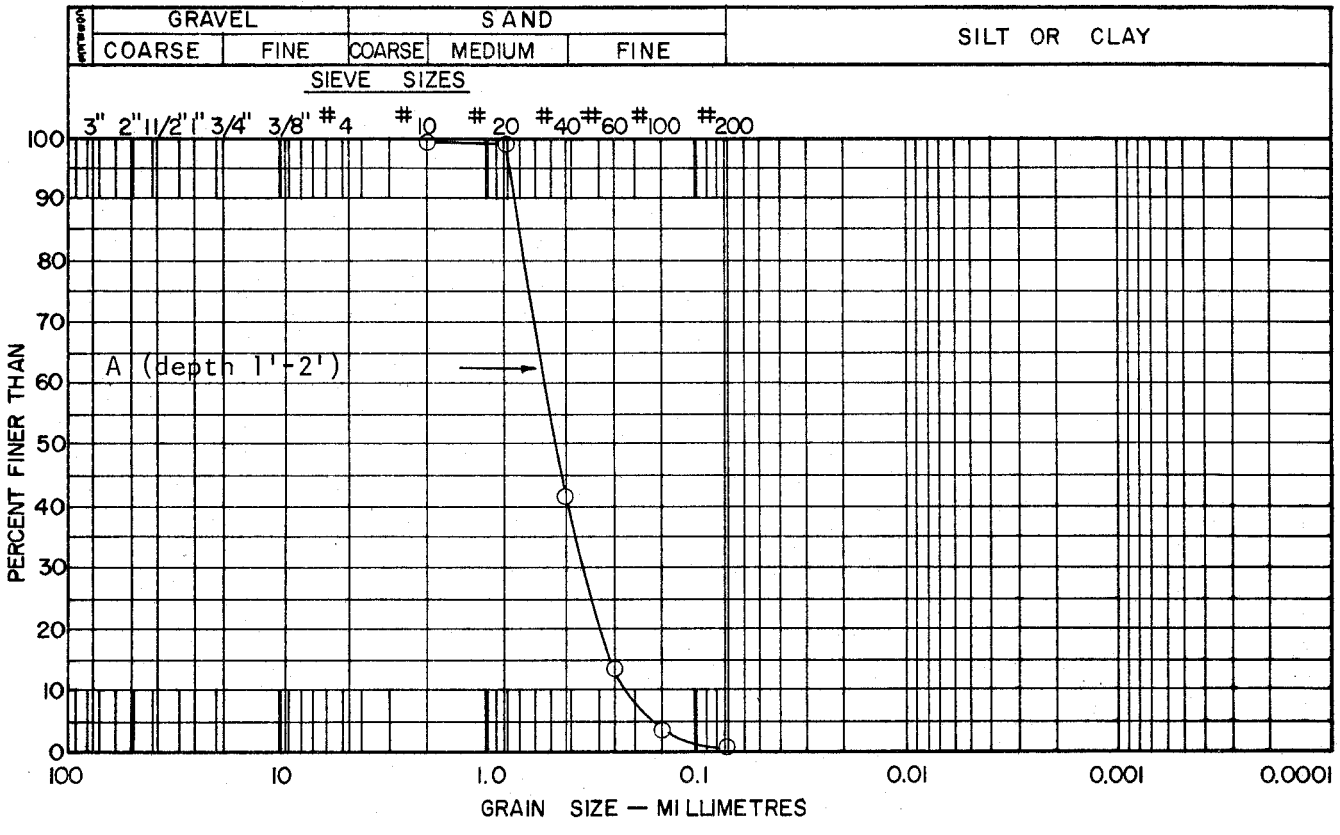
(OL) SILT - roots, black

(SP) SAND - trace silt, organic laminations, fine uniform gradation

Water at 1' on completion

LABORATORY
TEST DATA
SOURCE No. HR-104A

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

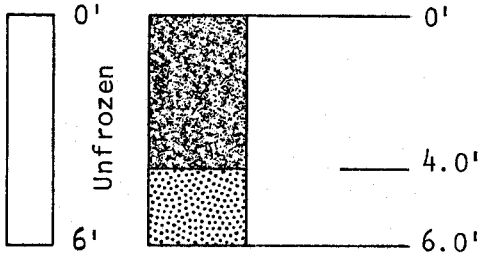
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-104A

HR-104A-1

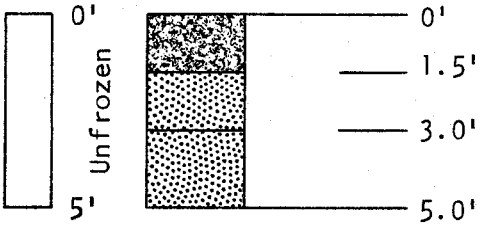


(Pt) PEAT - roots, etc.

(SP-SM) SAND - little silt, fine uniform gradation

Water at 0.5' on completion

HR-104A-2



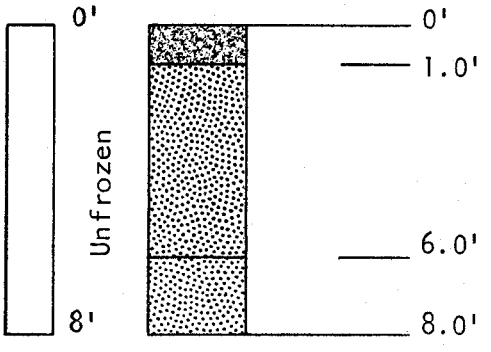
(Pt) PEAT - roots, etc.

(SP-SM) SAND - and silt, organic laminations, trace clay

(SP) SAND - trace silt, fine uniform gradation

Water at 4' on completion

HR-104A-3



(Pt) PEAT - roots, etc.

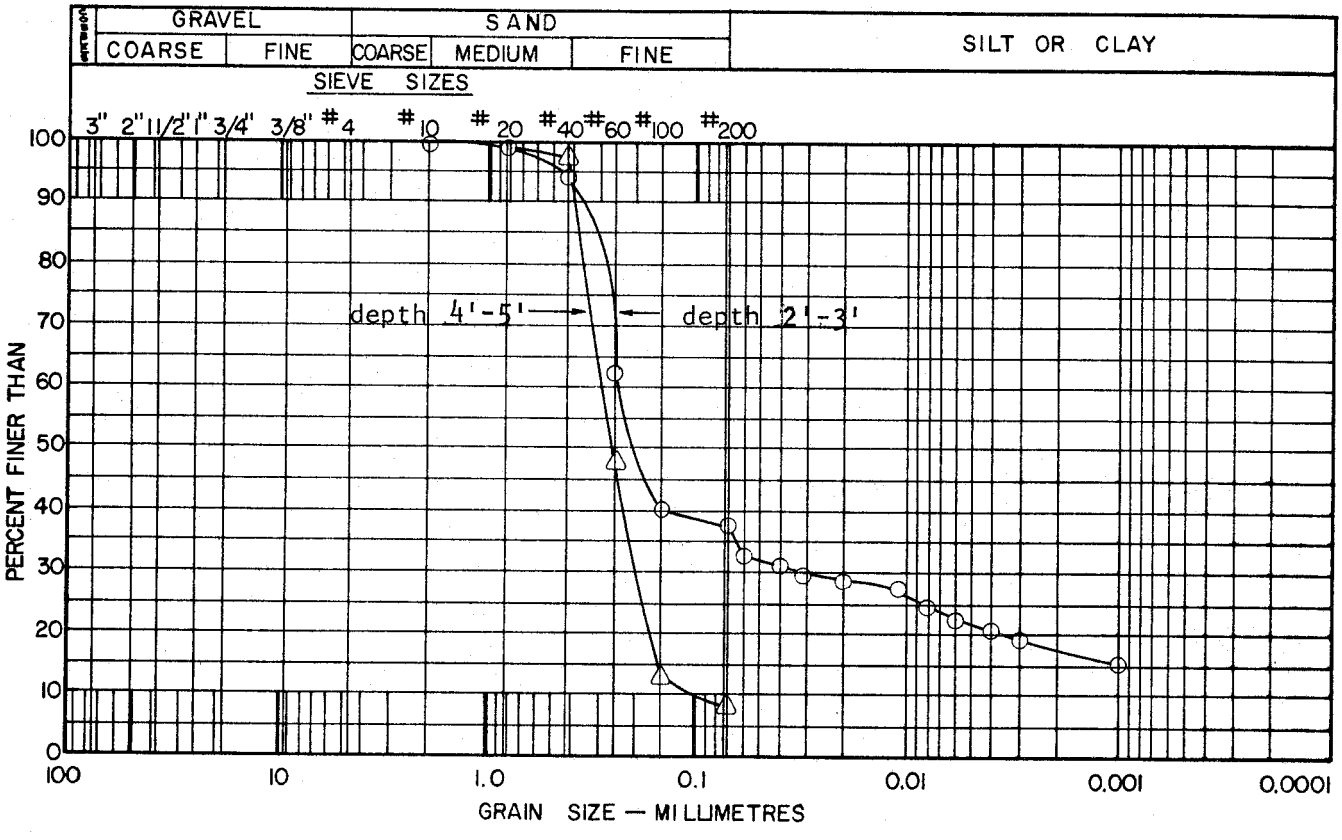
(SP-SM) SAND - some silt, organic laminations, fine, brown

(SP-SM) SAND - and silt, fine uniform gradation, grey

Water at 4' on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-104A-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	22.2%
Sample 2	depth 4'-5'	18.4%

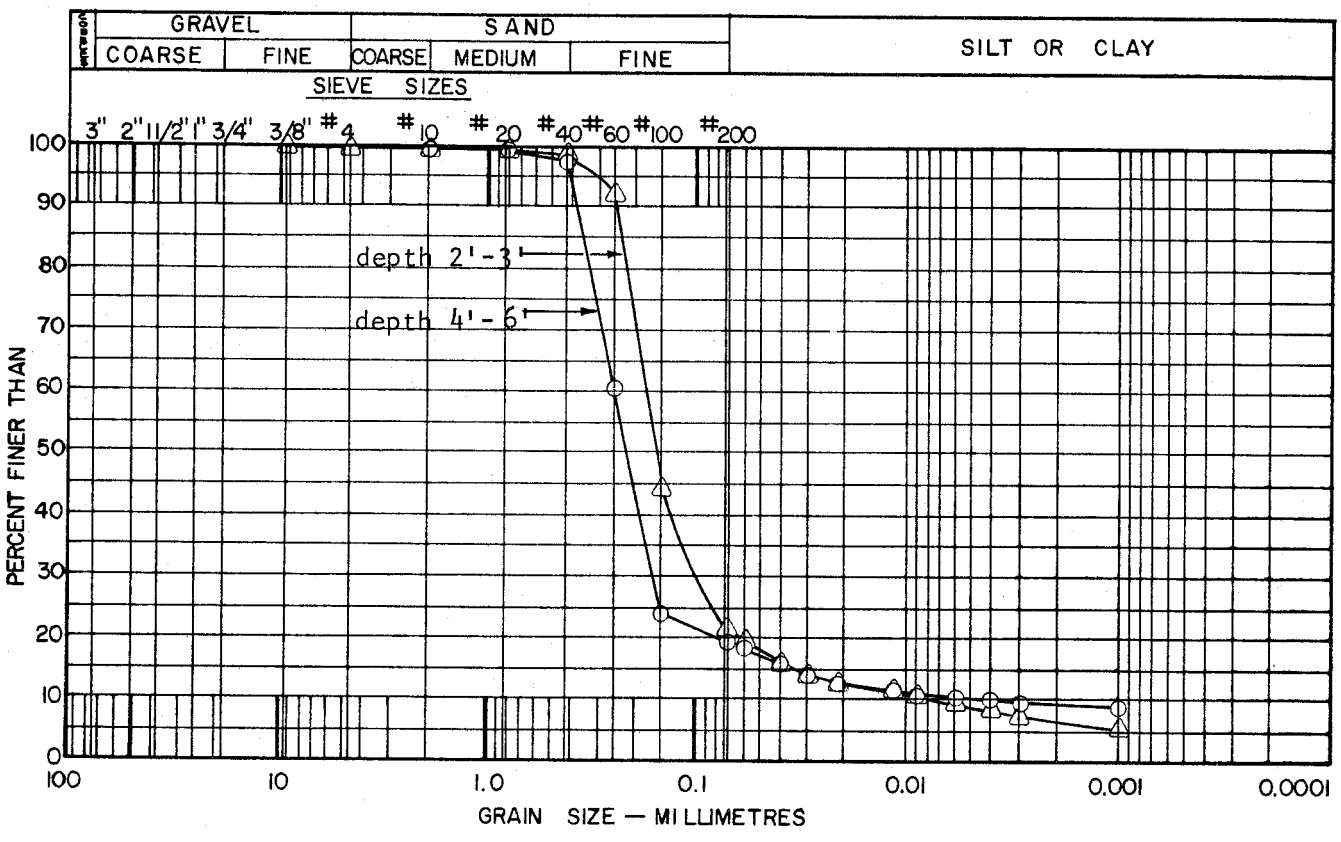
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-104A-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	18.4%
Sample 2	depth 4'-5'	16.8%
Sample 3	depth 6'-7'	18.9%

ORGANIC CONTENT

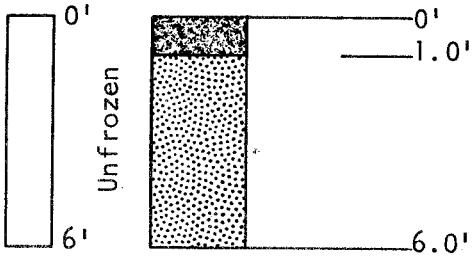
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-104A

HR-104A-4



(Pt) PEAT - roots, etc.

(SP-SM) SAND - little silt, organic laminations, fine uniform gradation

Water at 4' on completion

Moisture Content:

Sample 1	depth 2'-3'	11.6%
Sample 2	depth 4'-5'	18.9%

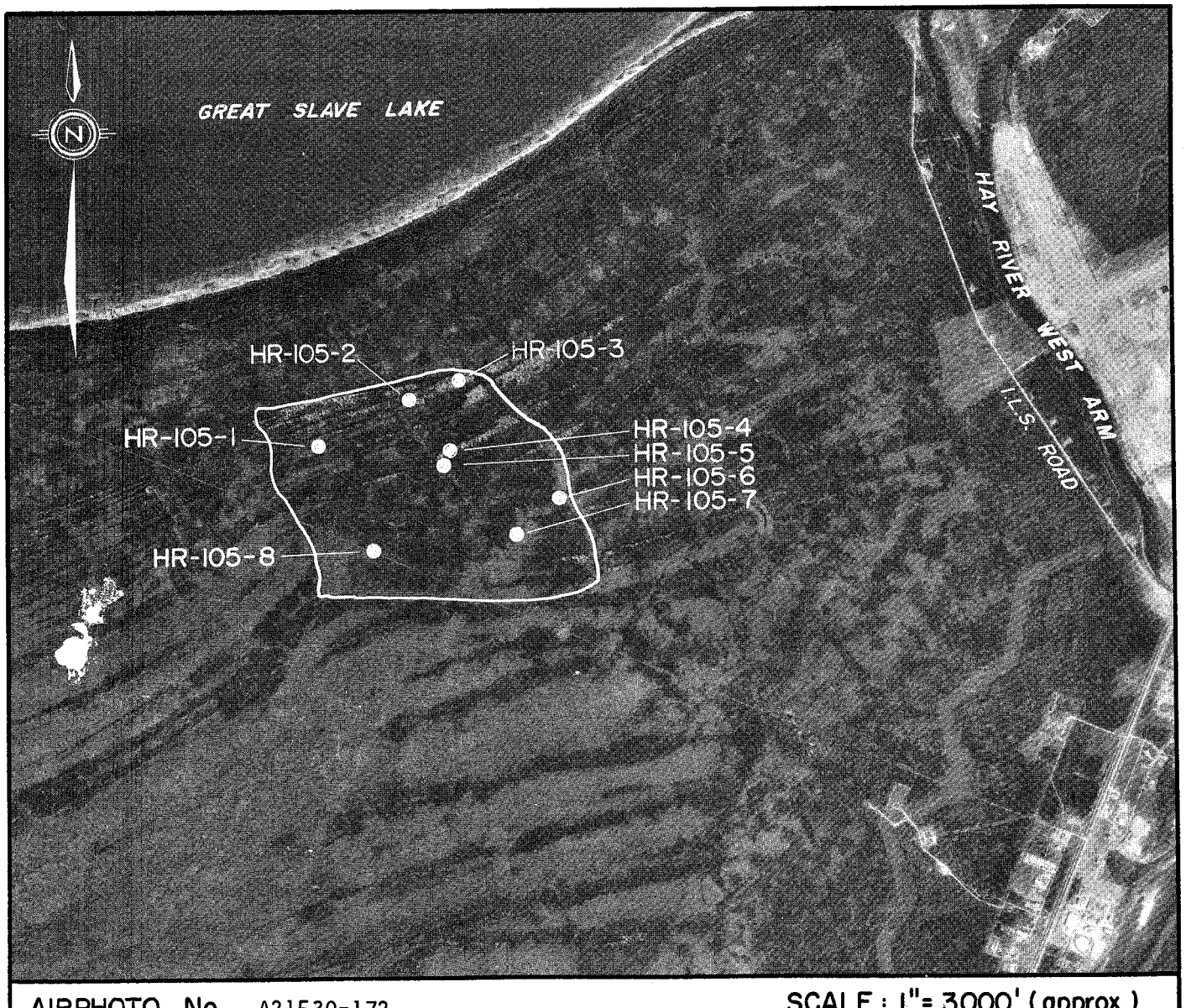
HAY RIVER
SOURCE No. HR-105

LANDFORM AND LOCATION: Parallel beach ridges in an area approximately 4000 feet square, located about 3 miles west of the community adjacent to Source HR-101.

MATERIAL: SAND - fine, uniform, trace of silt.

VOLUME: Approximately 1,000,000 cu. yds. above the water table.

CONCLUSION: Deposit is suitable for development as a source of low quality general fill.



AIRPHOTO No. A21530-172 SCALE : 1"= 3000' (approx.)

HR-105 ENVIRONMENT

Physical

The source is located 2 miles west of the west arm of Hay River, and 1 mile south of the Great Slave Lake shoreline. It is flanked by Source HR-101 to the east and Source HR-103 to the west.

The northern part of the source is a series of low, parallel beach ridges. The elongated ridges are up to 4,000 feet long and 300 feet wide, rising to a height of 4 to 7 feet above the surrounding marshland. The ridges in the southern part of the source are lower and narrower, about 50 to 100 feet wide and 2 to 3 feet high.

Although drainage of the ridges is good, drainage of the lowlands is very poor, with the water table within 1½ to 3 feet of the ground surface. The eastern edge of the source is bounded by a poorly drained muskeg filled depression.

The source has not been developed to data.

Biotic

The tree cover on the ridges is pine up to 50 feet high, with a canopy density less than 20%. The vegetative undergrowth is primarily lichen and moss generally less than 6 inches, overlain by sparse deadfall.

The tree cover in the depressions between the ridges ranges from spruce to 40 feet high, with a canopy density of 20 to 40%, to brush and willow to 10 feet high.

The area supports ptarmigan and the usual population of small fur-bearing animals and rodents, but very small in number. Although the immediate area is not a critical wildlife habitat, it is aesthetically important because of its closeness to the community.

HR-105 MATERIALS AND QUANTITIES

The ridge material is a uniform, fine sand, about 80% grading between the 40 and the 100 mesh, with less than 5% fines passing the 200 mesh. The deposit is shallow above the water table, varying up to 10 feet but averaging less than 6 feet in depth. The depressions adjacent to the ridges generally consist of

about 2 feet of peat overlying the fine sand.

The estimated volume of recoverable material above the water table is 1,000,000 cu. yds.

HR-105 DEVELOPMENT

General

This source has not been developed to the present time. The fine sand is suitable only for restricted use as general fill. The source covers a large area and any development must be orderly and strictly controlled. Since the area is relatively close to the community, it may be desirable to develop the ridges for other uses than a source of granular fill.

Access

This source is located along a seismic line about 3 miles northwest of the community. For winter operation a winter road can be used along the seismic line. For summer operation an all-weather road will have to be constructed along the seismic line.

As an alternate route a 2 mile long road could be constructed from the I.L.S. road through Source HR-101 to this source for year-round access. This new road would branch from the existing I.L.S. road about 1½ miles north of the junction between the I.L.S. road and N.W.T. Hwy. 2. Both routes cross a small creek where a small bridge or culvert will have to be constructed.

Material Use and Handling

The fine uniform sand in this source is suitable for use as low quality general fill. The erodable and frost susceptible nature of the sand will require careful preventative construction techniques.

Any fills constructed with this material must be designed to avoid access to water. The sand must not be used below the water table since it is highly frost susceptible. A coarse granular blanket can be used between the fill and the water table to prevent frost action. The sand is also easily erodable by wind and water. An adequate covering of either granular material or vegetation must be provided to protect the fills.

Development of the source is recommended only above the water table and would require the usual assembly of dozer, front-end loader and trucks. The source should be developed in a strip fashion, by excavations only along the raised ridges. The depressions between the ridges are not suitable for development above the water table because of the thick peat overburden and high water table.

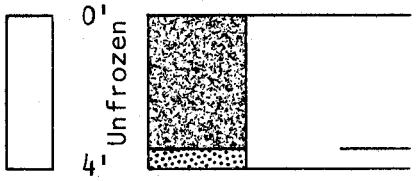
Stripping and Restoration

All trees will have to be cut and disposed of by burning. Any development of the low lying areas would require the topstratum of peat be stripped and stock-piled for later regarding of the site. Restoration of the area should include revegetation.

TEST HOLE LOGS

SOURCE No. HR-105

HR-105-1



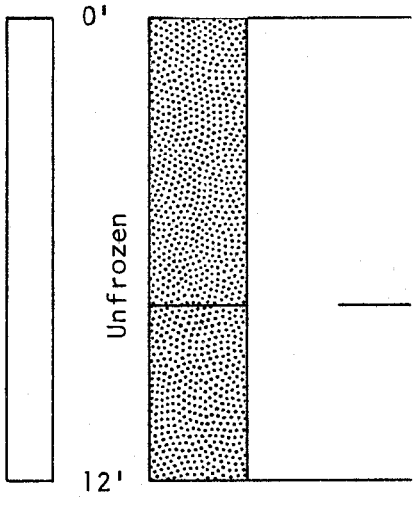
0'			
	(Pt)	PEAT -	trace sand, roots
3.5'	(SP-SM)	SAND -	some silt, organic laminations, fine uniform gradation
4.0'			

Water at 1.5' on completion

Moisture Content:

Sample 1 depth 2'-3' 192.2%

HR-105-2



0'			
	(SP)	SAND -	trace silt, organic laminations, fine uniform gradation, brown
7.5'			
	(SP)	SAND -	trace silt, fine uniform gradation, grey
12.0'			

Water at 10.5' on completion

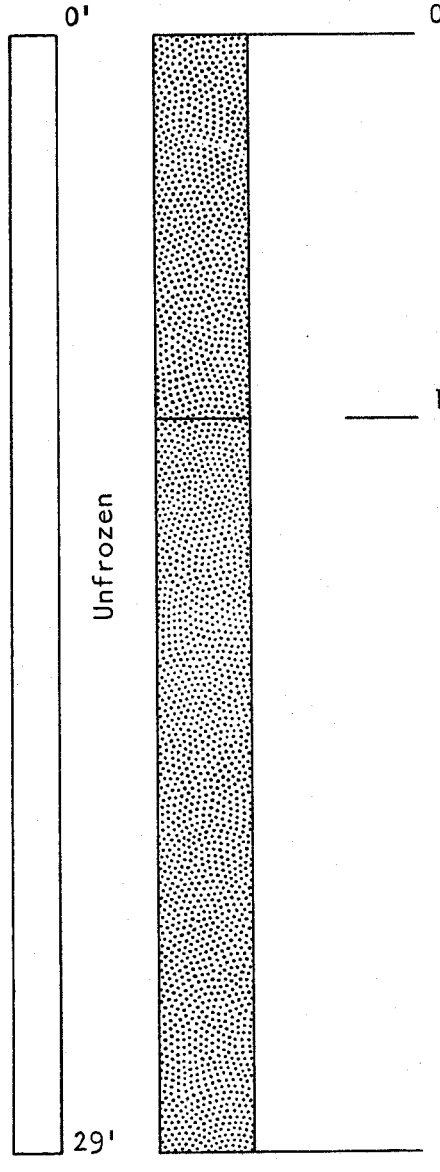
Moisture Content:

Sample 1	depth 2'-3'	3.0%
Sample 2	depth 4'-5'	3.0%
Sample 3	depth 6'-7'	7.5%
Sample 4	depth 8'-9'	20.0%
Sample 5	depth 10'-11'	24.8%

TEST HOLE LOGS

SOURCE No. HR-105

HR-105-3



0'

(SP) SAND - trace silt, fine uniform gradation, light brown, clean

10.0'

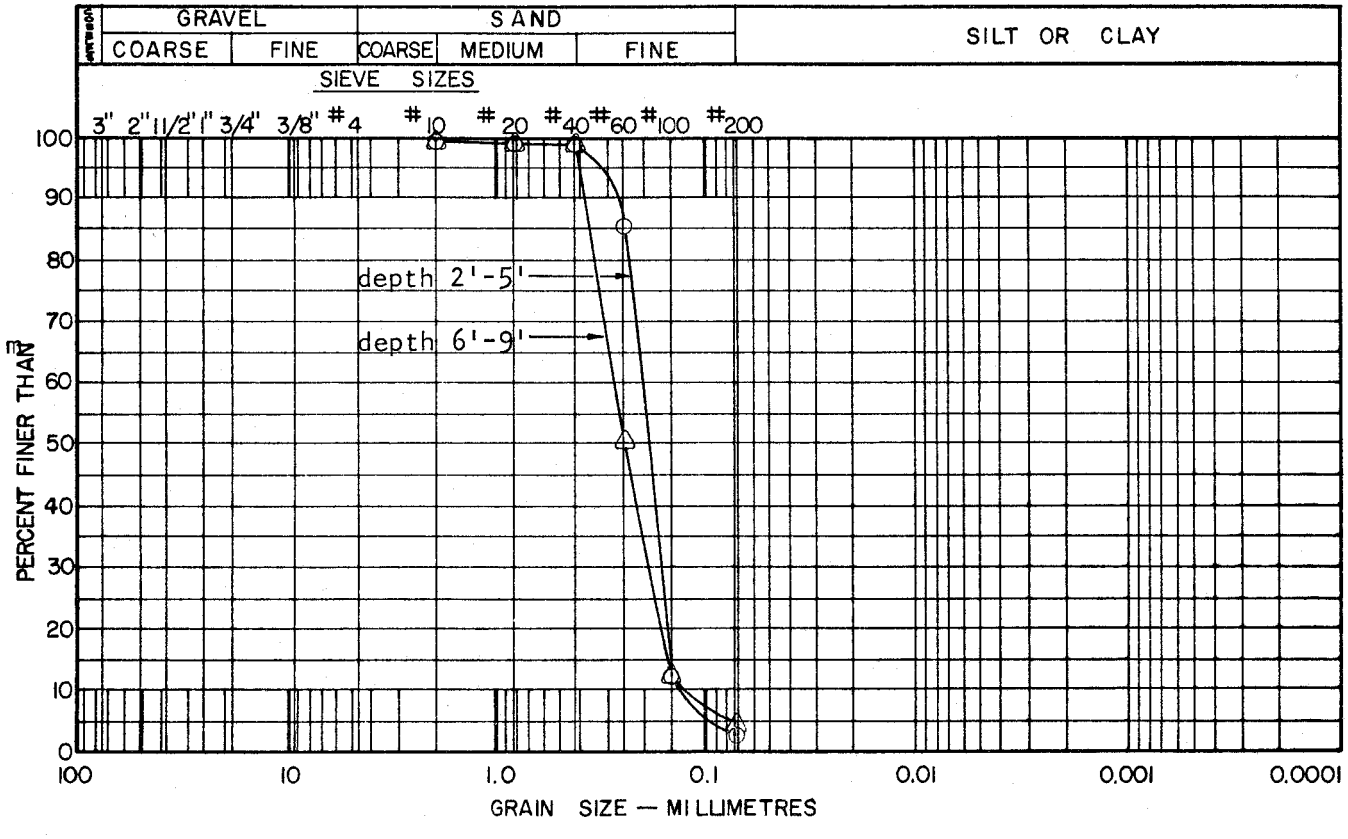
(SP-SM) SAND - some silt, fine uniform gradation, grey

29.0'

Water at 8' on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-105-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.8%
Sample 2	depth 4'-5'	12.6%
Sample 3	depth 6'-7'	22.1%
Sample 4	depth 8'-9'	24.4%

ORGANIC CONTENT

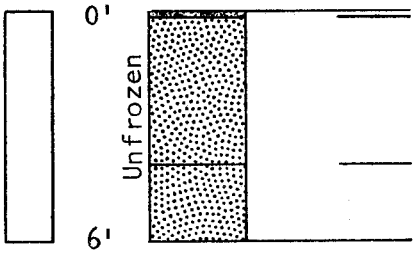
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-105

HR-105-4



0'
0.2' (OL) SILT - topsoil, moss

(SP) SAND - trace silt, fine uniform gradation, brown

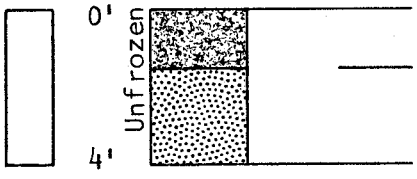
4.0'

(SP) SAND - trace silt, trace sea shells to 1/8", organic laminations, grey

6.0'

Water at 4.5' on completion

HR-105-5



0'
(Pt) PEAT - roots, etc.

1.5'

(SP-SM) SAND - some silt, organic laminations, fine uniform gradation

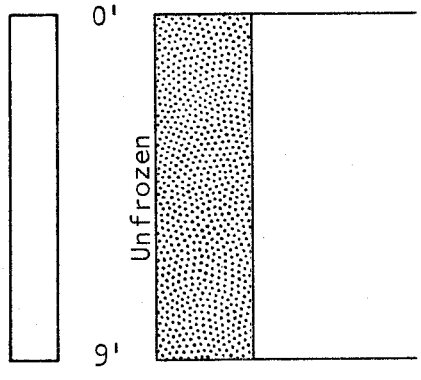
4.0'

Water at 2' on completion

Moisture Content:

Sample 1 depth 2'-3' 33.1%

HR-105-6



0'

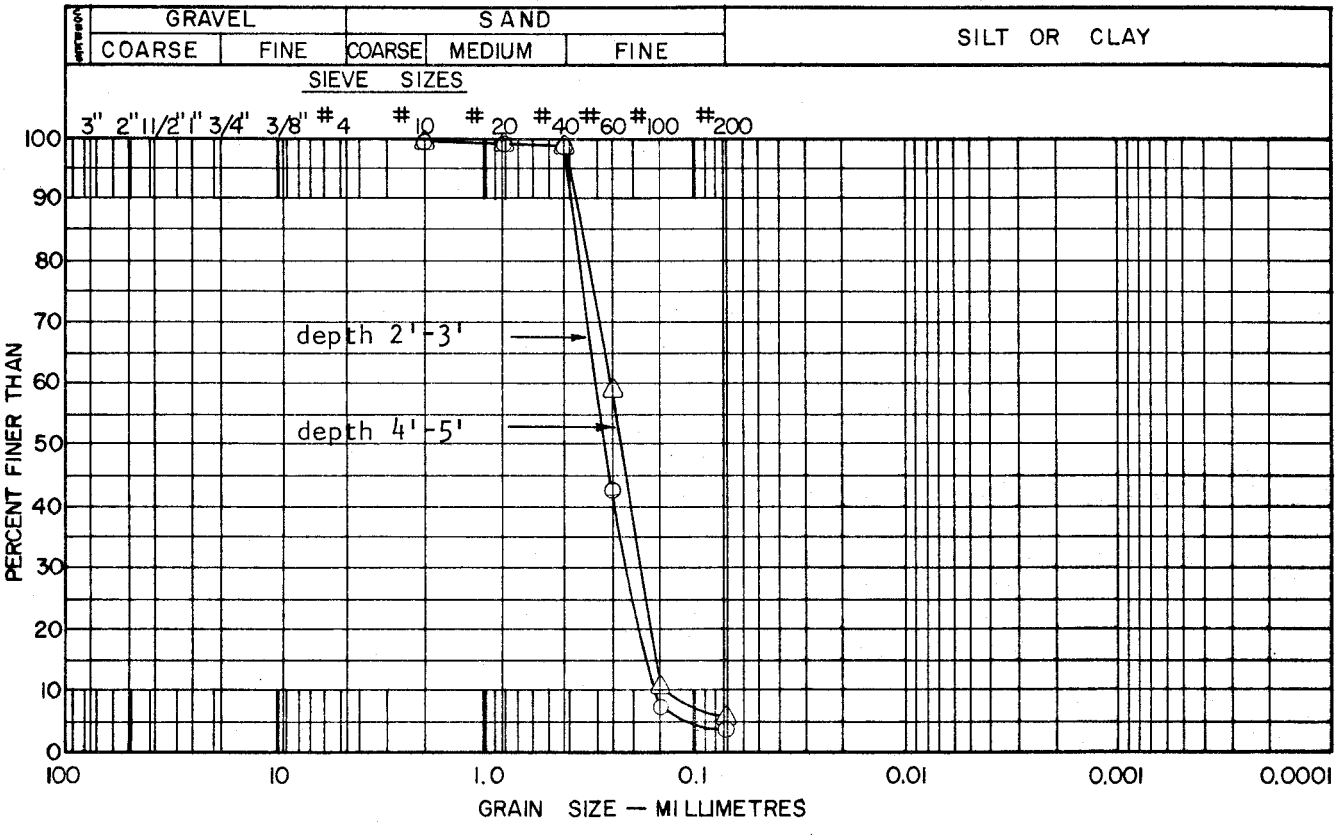
(SP) SAND - trace silt, fine uniform gradation, brown

9.0'

Water at 5.5' on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-105-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	7.7%
Sample 2	depth 4'-5'	22.6%

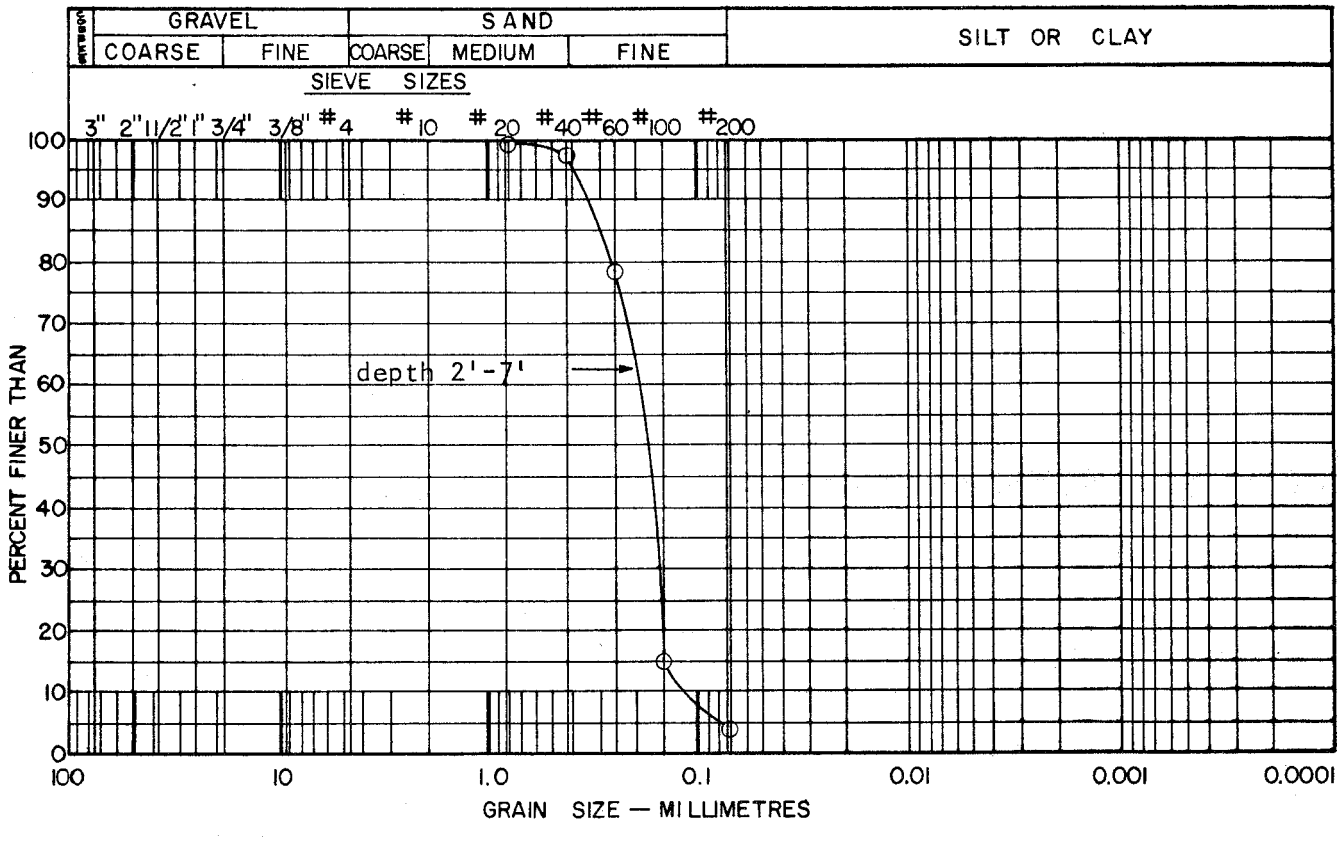
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-105-6

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	3.9%
Sample 2	depth 4'-5'	20.2%
Sample 3	depth 6'-7'	21.0%

ORGANIC CONTENT

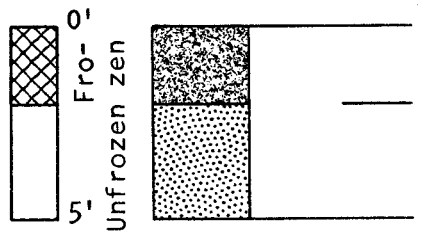
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-105

HR-105-7

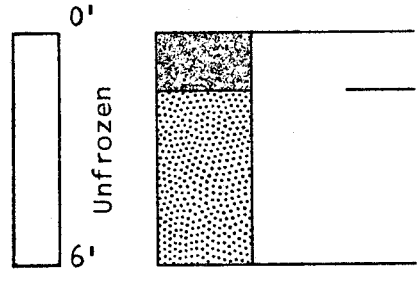


(Pt) PEAT - roots, etc.

(SP-SM) SAND - little silt, organic laminations, fine uniform gradation, brown to grey

Water at 3' on completion

HR-105-8



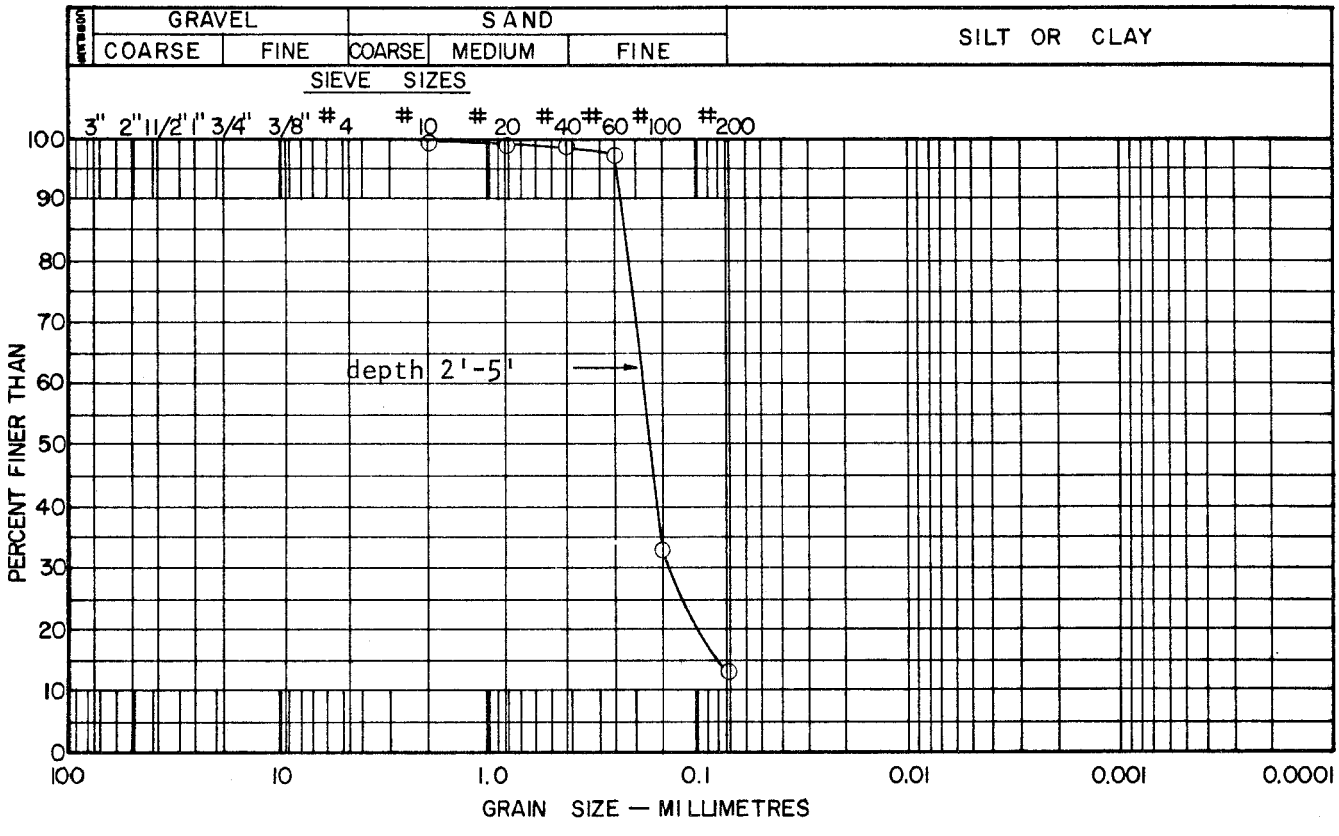
(Pt) PEAT - roots, etc.

(SP-SM) SAND - little silt, organic laminations, fine uniform gradation, grey

Water at 1.5' on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-105-7

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2'-3' 29.9%
Sample 2 depth 4'-5' 24.0%

ORGANIC CONTENT

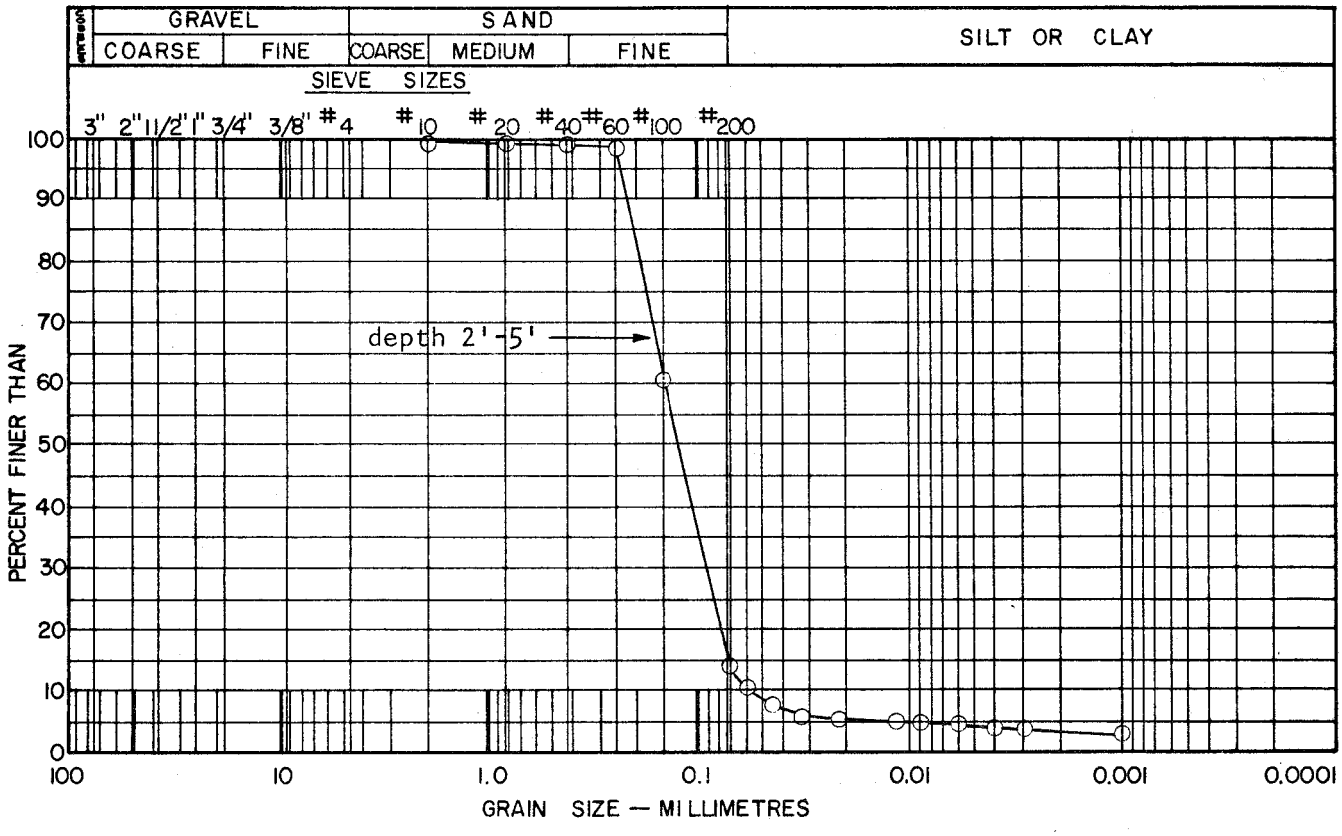
Loss on ignition test
Samples 1 and 2 depth 2'-5' 4.1%
Color test - Samples 1 and 2 depth 2'-5' - Rdg. 5

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-105-8

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2'-3' 21.7%
Sample 2 depth 4'-5' 37.7%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

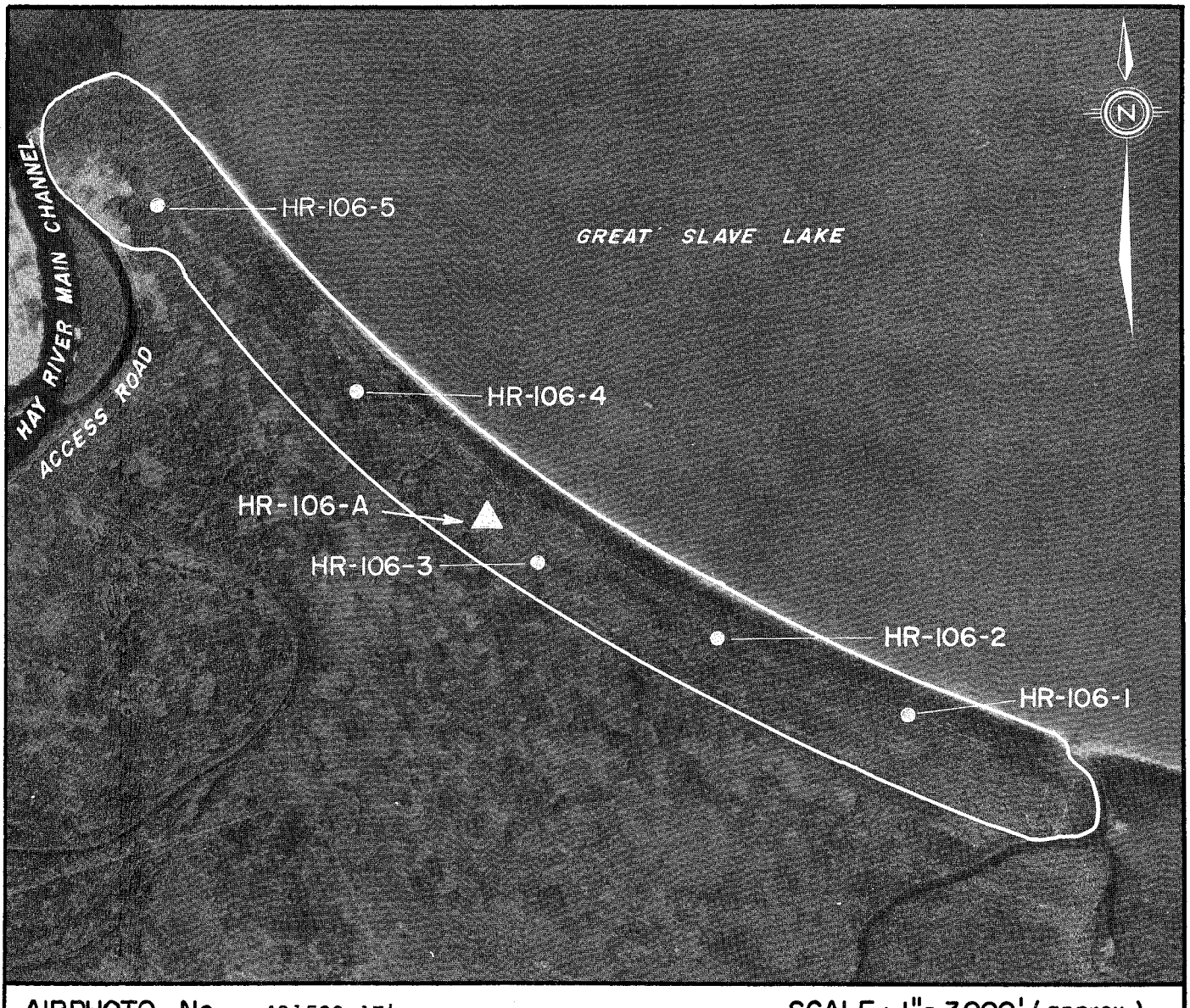
HAY RIVER
SOURCE No. HR-106

LANDFORM AND LOCATION: Sand ridges and beach up to 2,000 feet wide along Great Slave Lake extending 4.2 miles east from the Hay River main channel to Sandy River. The western edge of the source is approximately 2 miles by winter road from the community and 14 miles by an all-weather access route.

MATERIAL: SAND - trace silt, organic specks, fine uniform gradation.

VOLUME: Approximately 1,500,000 cu. yds. above the water table.

CONCLUSION: Deposit is suitable for development as a source of low quality general fill. The source is located within the local Indian Reserve and permission must be obtained from the local Indian Band Council before development commences.



AIRPHOTO No. A21530-174 SCALE : 1"= 3000' (approx.)

HR-106 ENVIRONMENT

Physical

The source is located along the Great Slave Lake shoreline about 2 miles northeast of the community. The source is a series of low, parallel, elongated beach ridges about 4 miles long and 2,000 feet wide.

Drainage of the ridges is good. The lowlands to the south are poorly drained with the water table generally within 1 to 3 feet of the ground surface.

Biotic

The tree cover in the area is primarily spruce and scattered poplar and pine to 40 feet in height. The canopy density is 20 to 40%. The low lying areas of the source support a sparse tree growth, and many small bushes.

The area supports ptarmigan and the usual population of small fur-bearing animals and rodents, but very small in number. The source area is not a critical wildlife habitat, but it is most important aesthetically because of its position on the local Indian Reserve as well as its closeness to the community.

HR-106 MATERIALS AND QUANTITIES

The material in the source is a uniform fine sand, about 80% grading between the 40 and the 100 mesh, with about 10% fines passing the 200 mesh. The reworked beach sands contain visible amounts of organic specks and thin laminations of decomposed organic material. The water level was encountered at depths varying from 4.5 to 7 feet during the winter drilling program.

The estimated volume of recoverable material above the water table is 1,500,000 cu. yds.

HR-106 DEVELOPMENT

General

This source has not been developed to date. The source is located close to the community, but being a poorly graded fine sand, is suitable only for restricted use as general fill. The source covers a large area along the lakeshore and any development must be strictly controlled to prevent undue disruption of the

environment.

Access

An all-weather road exists to the western end of the source. However, the route is very indirect and although the community is near the source, the distance by road is about 14 miles. During the winter, a 2 mile long winter road crosses Hay River near the community and provides direct access to the western end of the source.

Material Use and Handling

The fine, uniform sand is only suitable for low quality general fills which are protected from frost action and erosion. Development of the source will require the usual assembly of dozer, front-end loader and trucks.

Stripping and Restoration

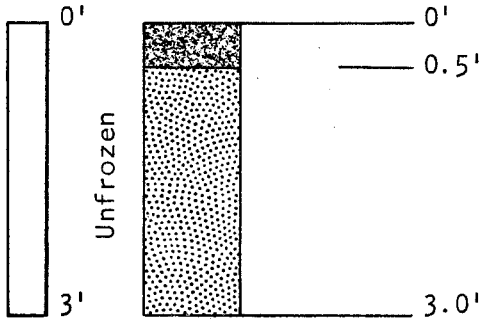
Any development would require that a sufficient width of land be left between the lakeshore and the operation to prevent breaching and subsequent migration of the shoreline inland. Any excavations should stop at least 1 foot above the water table to prevent ponding of water in depleted areas.

All trees will have to be cut and disposed of by burning. The depth of stripping in the source varies up to about 1 foot. The stripped materials should be stockpiled away from the lakeshore, adjacent to that area of the source being developed.

After depletion of the area, the stripped material can be used to cover the slopes and bottom of the pit area, then possibly reseeded for speedy revegetation.

TEST PIT LOGS
SOURCE No. HR-106

HR-106-A

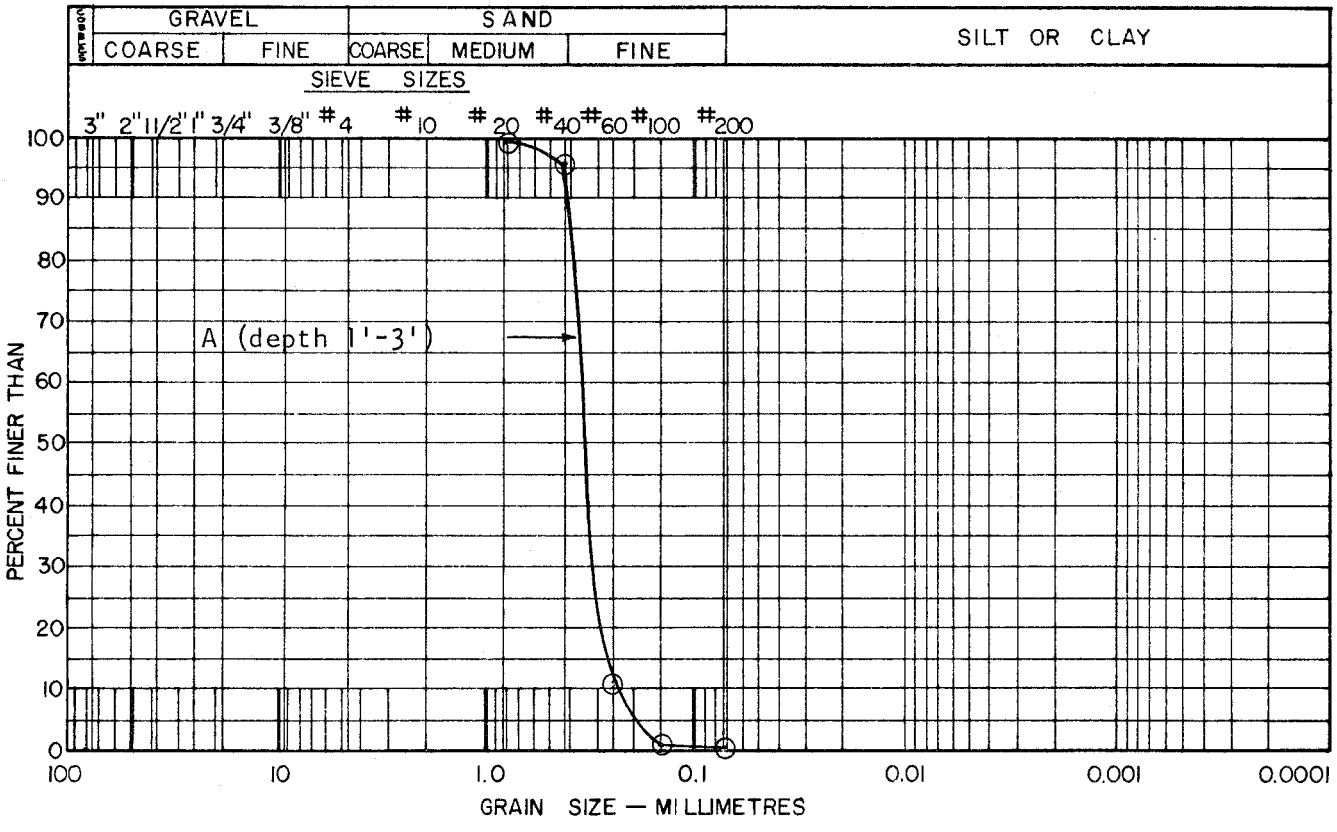


(OL) SILT - roots

(SP) SAND - trace silt, fine uniform gradation, organic specks and laminations

LABORATORY
TEST DATA
TEST PIT-SOURCE No. HR-106-A

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

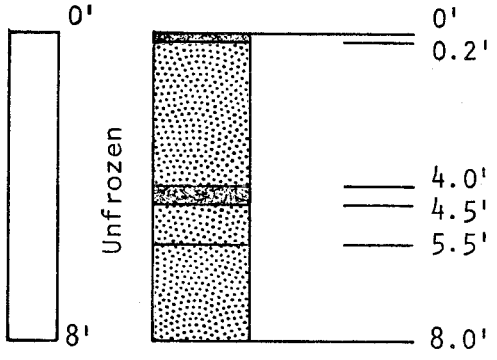
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-106

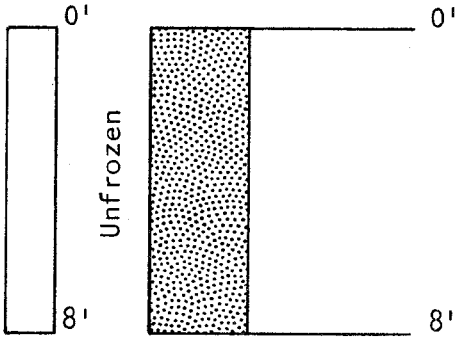
HR-106-1



(OL)	SILT - topsoil, roots
(SP)	SAND - trace silt, organic specks, fine uniform gradation
(OL)	SILT - organic laminations, black
(SP)	SAND - trace silt, organic specks, fine uniform gradation, brown
(SP-SM)	SAND - little silt, organic specks, fine uniform gradation, grey

Water at 6' on completion

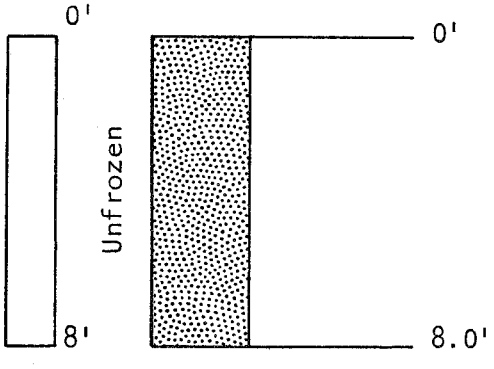
HR-106-2



(SP)	SAND - trace silt, organic specks, fine uniform gradation, brown

Water at 7' on completion

HR-106-3

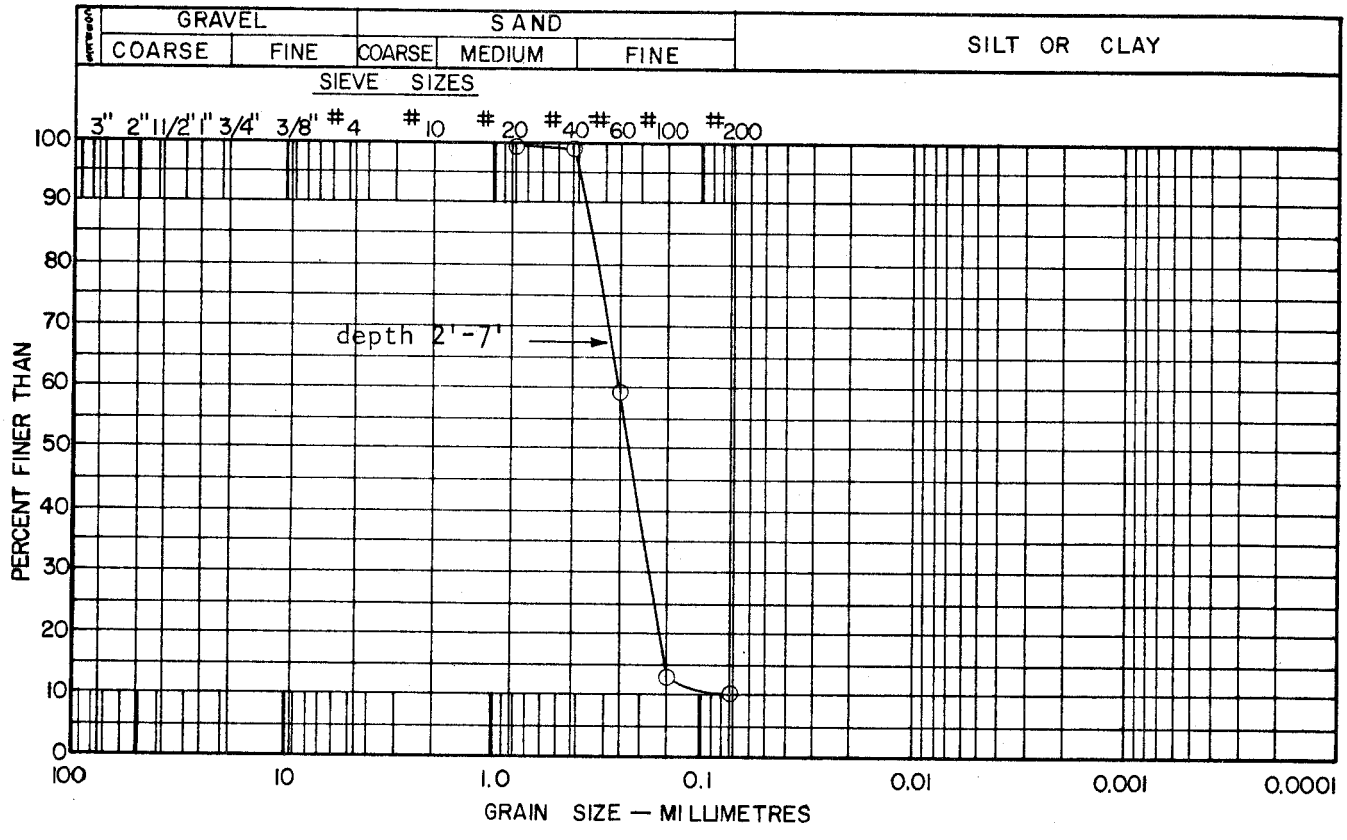


(SP)	SAND - trace silt, organic specks, fine uniform gradation

Water at 5.5' on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-106-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	6.8%
Sample 2	depth 4'-5'	24.0%
Sample 3	depth 6'-7'	26.6%

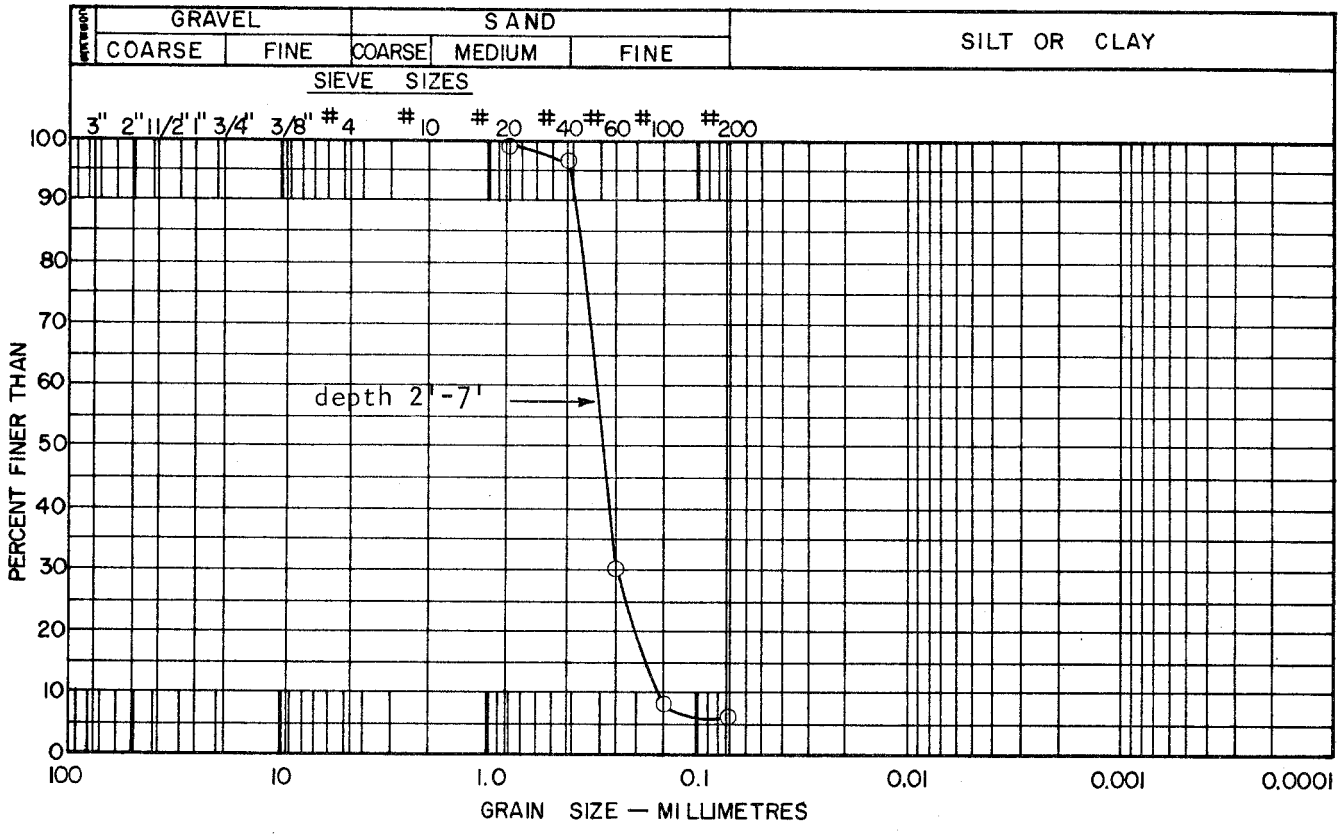
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-106-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	3.8%
Sample 2	depth 4'-5'	13.7%
Sample 3	depth 6'-7'	20.2%

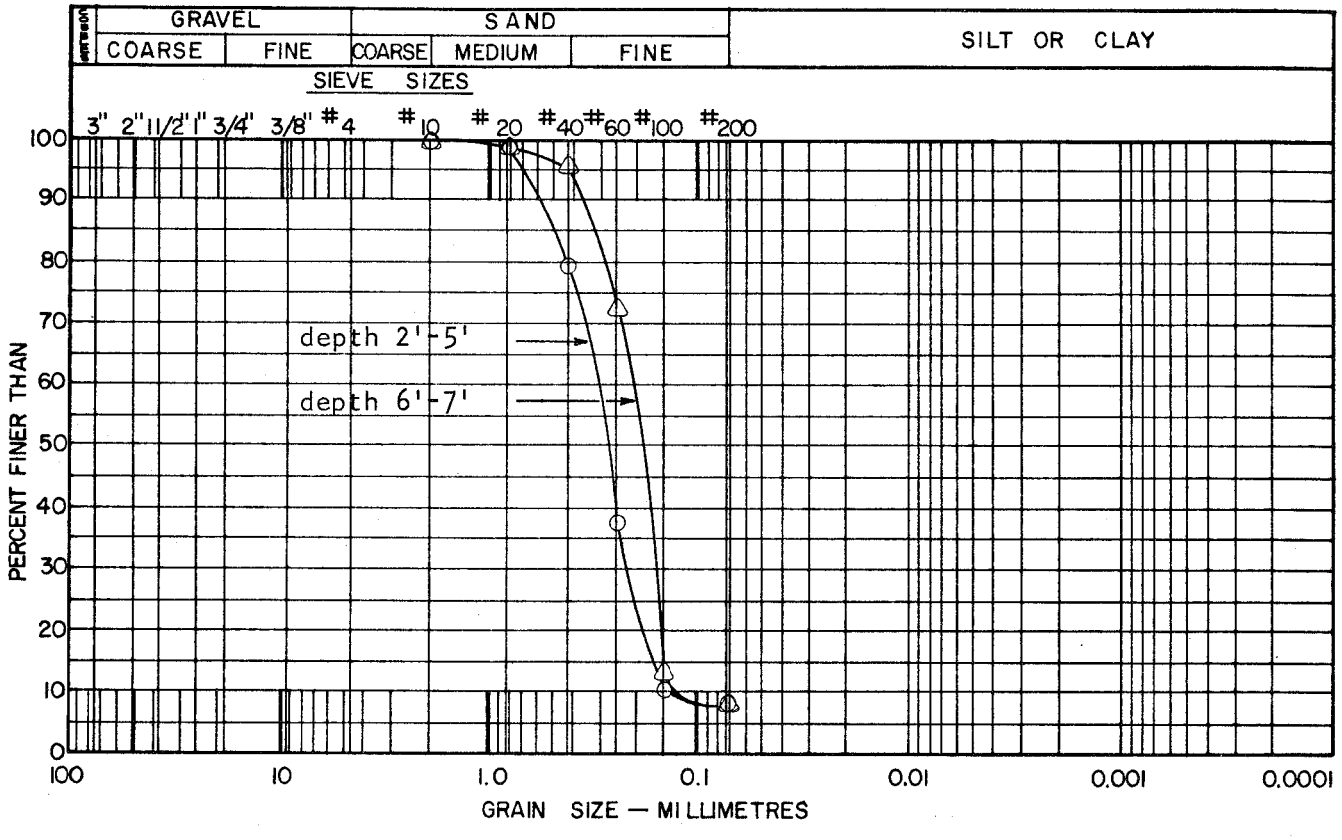
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-106-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.4%
Sample 2	depth 4'-5'	14.4%
Sample 3	depth 6'-7'	23.1%

ORGANIC CONTENT

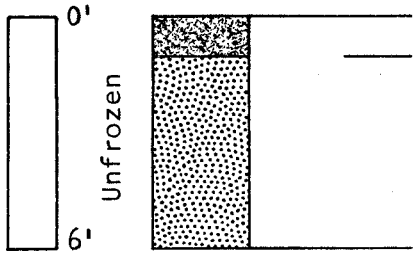
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-106

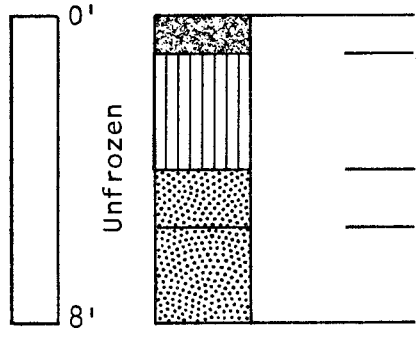
HR-106-4



(OL)	SILT -	topsoil, roots
(SP)	SAND -	trace silt, organic specks, fine uniform gradation

Water at 4.5' on completion

HR-106-5

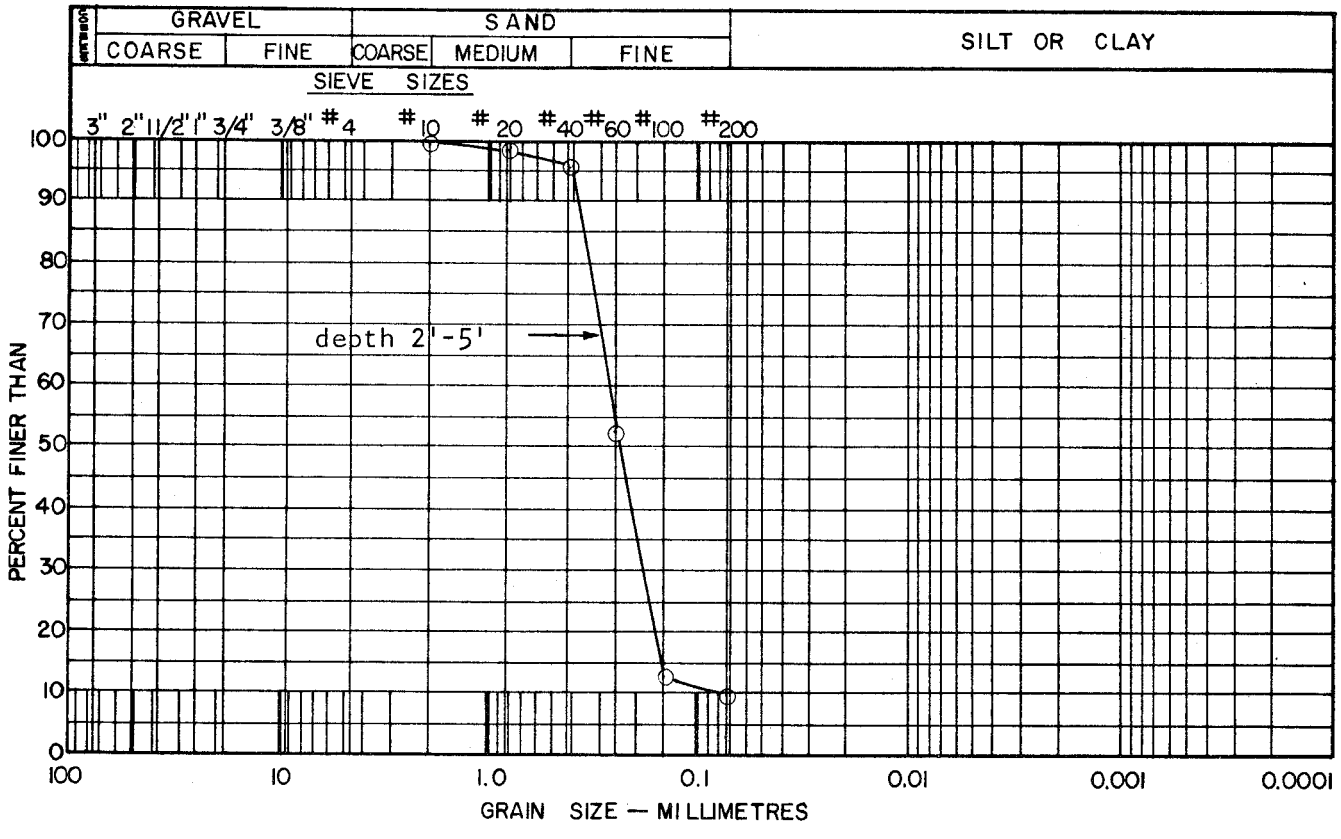


(OL)	SILT -	topsoil, roots
(ML)	SILT -	little clay, trace sand, roots, organic specks
(SP-SM)	SAND -	little silt, organic laminations, brown
(SP-SM)	SAND -	little silt, organic laminations, grey

Water at 5.5' on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-106-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2'-3' 19.2%

Sample 2 depth 4'-5' 25.0%

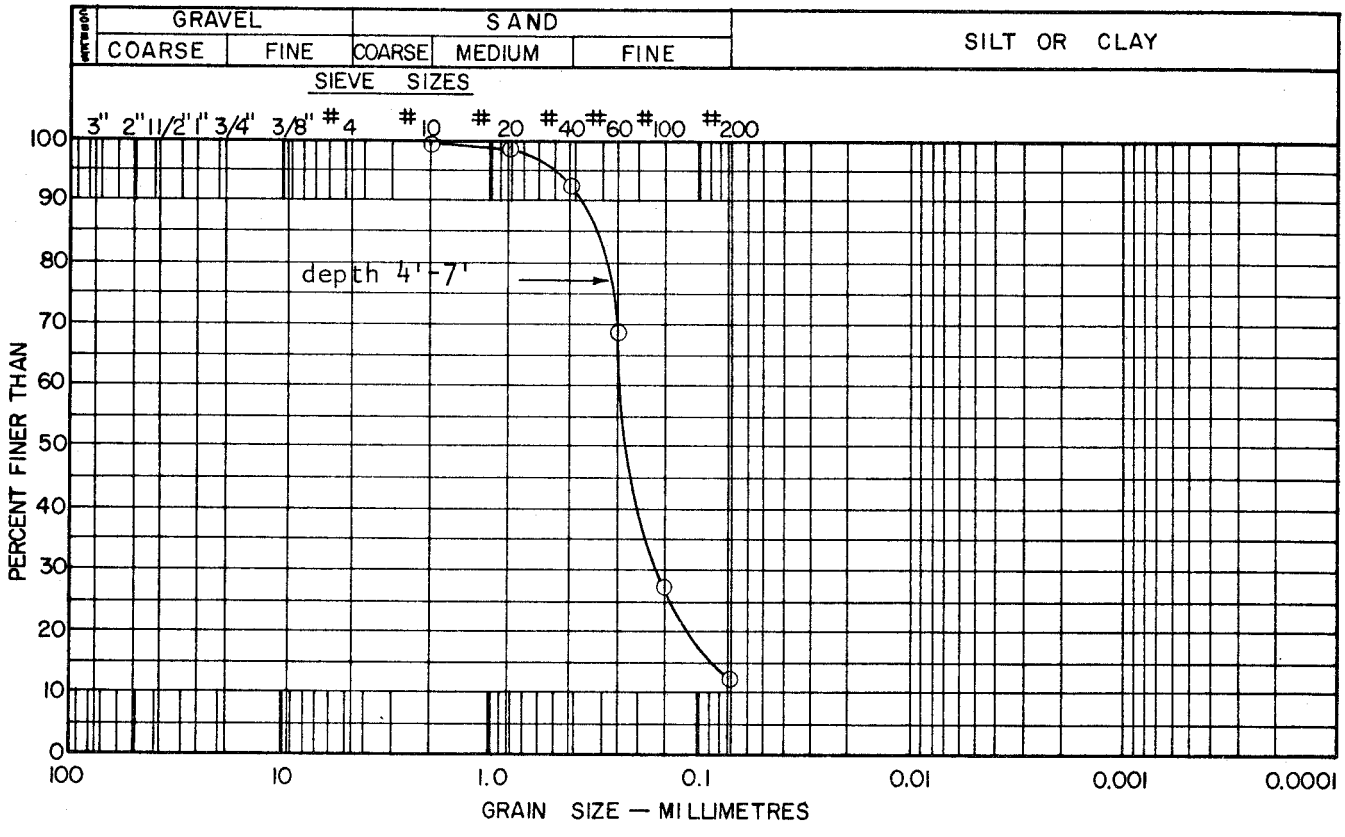
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-106-5

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	23.8%
Sample 2	depth 4'-5'	11.9%
Sample 3	depth 6'-7'	25.8%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

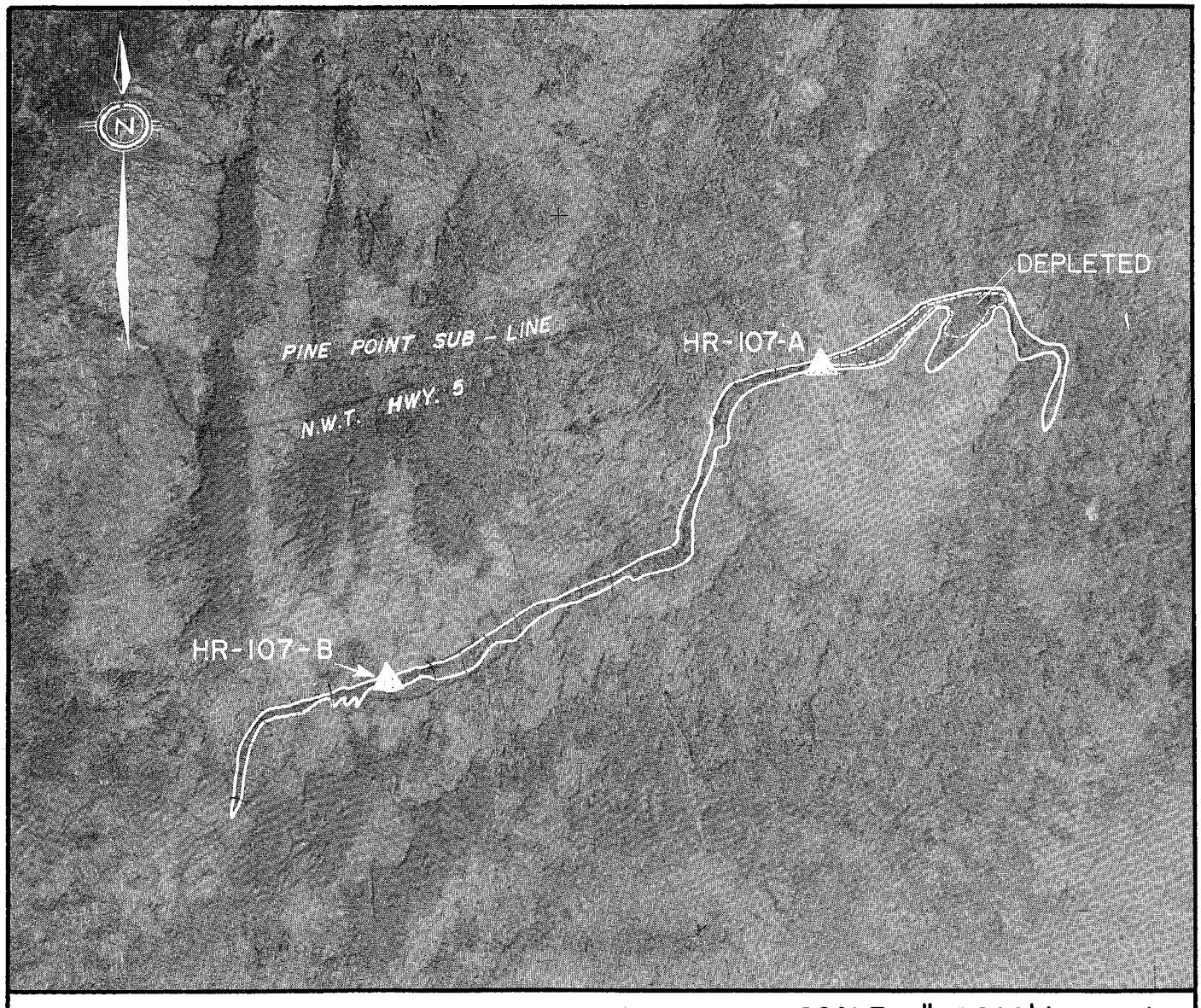
HAY RIVER
SOURCE No. HR-107A

LANDFORM AND LOCATION: Esker ridge located 20 miles from the community by road along N.W.T. Hwys. 2 and 5, and immediately south of the Great Slave Lake railroad.

MATERIAL: SAND - some gravel to 2½", trace of silt, well graded.

VOLUME: 600,000 cu. yds. above the water table.

CONCLUSION: Part of this deposit is developed. However, due to present land-use requirements, permission to continue development of this source may be difficult to obtain. The deposit is suitable for road surfacing material, general fill and fine and coarse aggregate.



AIRPHOTO No. A11128-18 SCALE : 1"= 3000' (approx.)

HR-107A ENVIRONMENT

Physical

The source consists of a long esker located about 20 miles by road southeast of Hay River. The esker is narrow and sinuous in shape, approximately 3.6 miles long, 50 to 150 yards wide, and 1 to 5 yards high.

Drainage of the esker is very good, while drainage in the surrounding muskeg area is poor with the water table close to the ground surface.

The source has been developed in the northeast corner, adjacent to the N.W.T. Hwy. 5.

Biotic

The tree cover on the esker is primarily poplar and pine up to 40 feet high, with a canopy density of 40 to 60%. The vegetative undergrowth is grass with a few ferns and berry bushes.

Wildlife within the area is limited to lynx, small fur-bearing animals including marten, beaver and muskrat as well as squirrels and other small rodents. A few caribou graze in the area.

The area is important to local trappers and the Indian Band Council feel that any disturbance to the environment may reduce or alter the wildlife.

HR-107A MATERIALS AND QUANTITIES

No drilling was permitted in any of the granular sources in this vicinity. The data presented is based upon a reconnaissance of the area.

The material is a well graded sand, with some gravel to $2\frac{1}{2}$ inches and a trace of silt. A petrographic analysis of material obtained from samples in 2 test pits shows the main constituent is hard limestone and dolomite (56%). The other rocks identified are granite (26%), feldspar porphyry (10%), soft porous limestone (7%) and quartzite (1%) with a trace of quartz. The only unsound constituent is the soft porous limestone (7%) although some of the porphyritic material is quite crumbly. The source is estimated to contain at least 600,000 cu. yds. of usable material above the water table.

HR-107A DEVELOPMENT

General

Because of its position in a sensitive environmental area, it is considered improbable that permission will be granted to continue development of this source. In addition, it is probable that any future development would require an impact study to determine its effects on the biotic environment. If, however, continued development was permitted, this source could supply general fill and likely aggregate to nearby projects.

Access

The N.W.T. Hwy. 5 passes immediately north of the esker and provides all-weather access. A short gravel road links the source with the highway. The source is located about 20 miles from the community by road.

Material Use and Handling

The material in this source can be used for general fill and is expected to be suitable for concrete or asphalt aggregate with some washing and screening. However, further qualitative data should be acquired to confirm its suitability for aggregate.

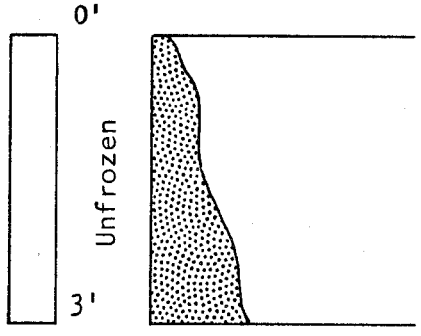
Equipment required for continued development would be the usual assembly of dozer, front-end loader and trucks.

Stripping and Restoration

All trees will have to be cut and disposed of by burning. The depth of stripping in the area investigated averages about 6 inches, and this material can be stockpiled in the depleted portion of the source. Excavations during development should be stopped about 1 foot above the water table to prevent ponding of water. After depletion of the esker, the area should be levelled and resurfaced with the stockpiled topsoil, then reseeded for speedy revegetation.

TEST PIT LOGS
SOURCE No. HR-107A

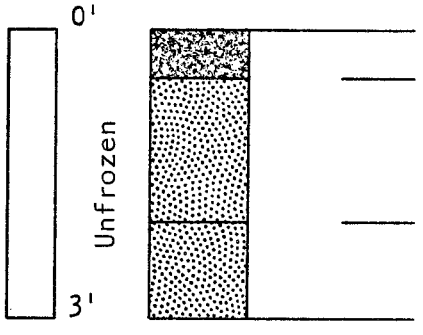
HR-107A-A



(SW) SAND - and gravel to 2½", trace silt, well graded

Sample from stockpile

HR-107A-B



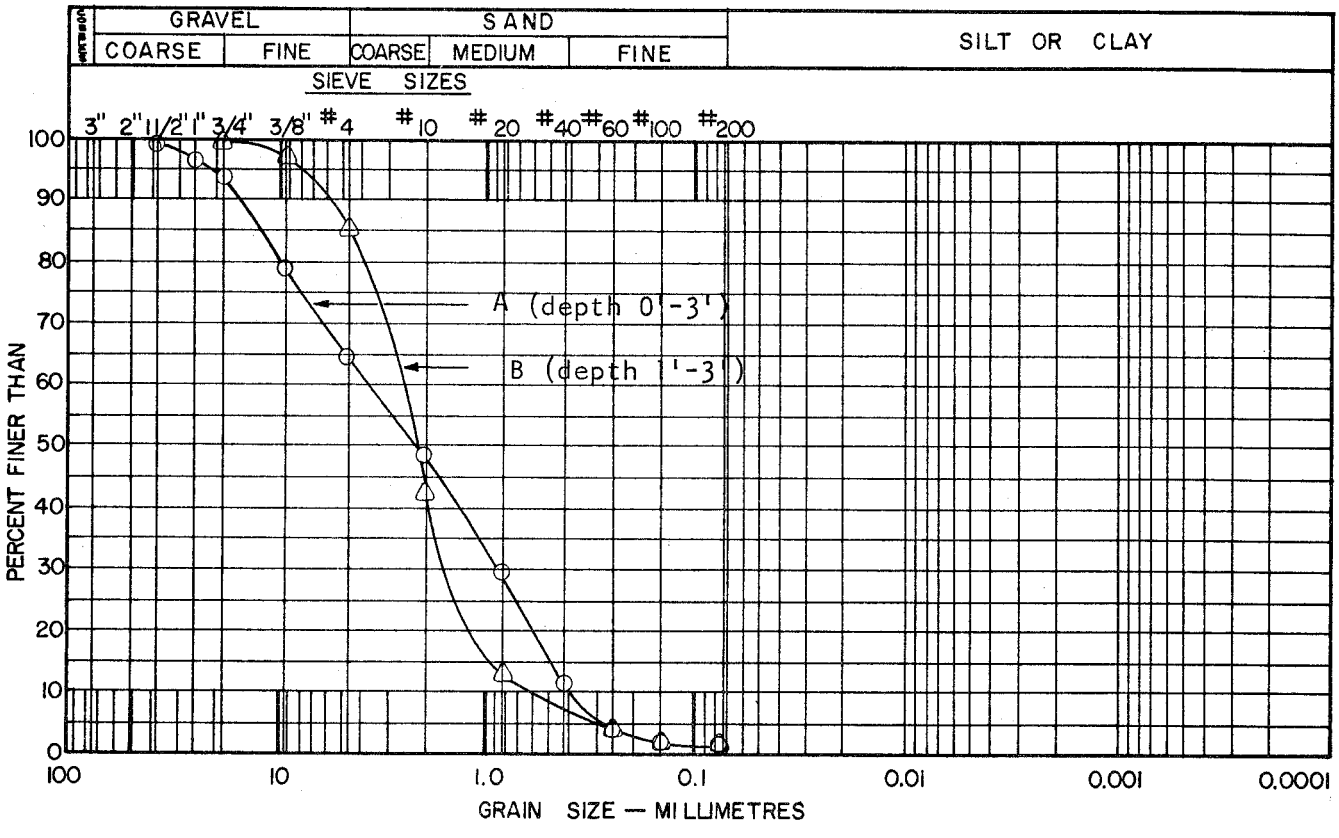
(OL) SILT - topsoil, roots

(SW) SAND - some gravel to 2½", trace silt, clean, interlayered

(SP) SAND - little gravel to 1", trace silt

LABORATORY
TEST DATA
SOURCE No. HR-107A

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

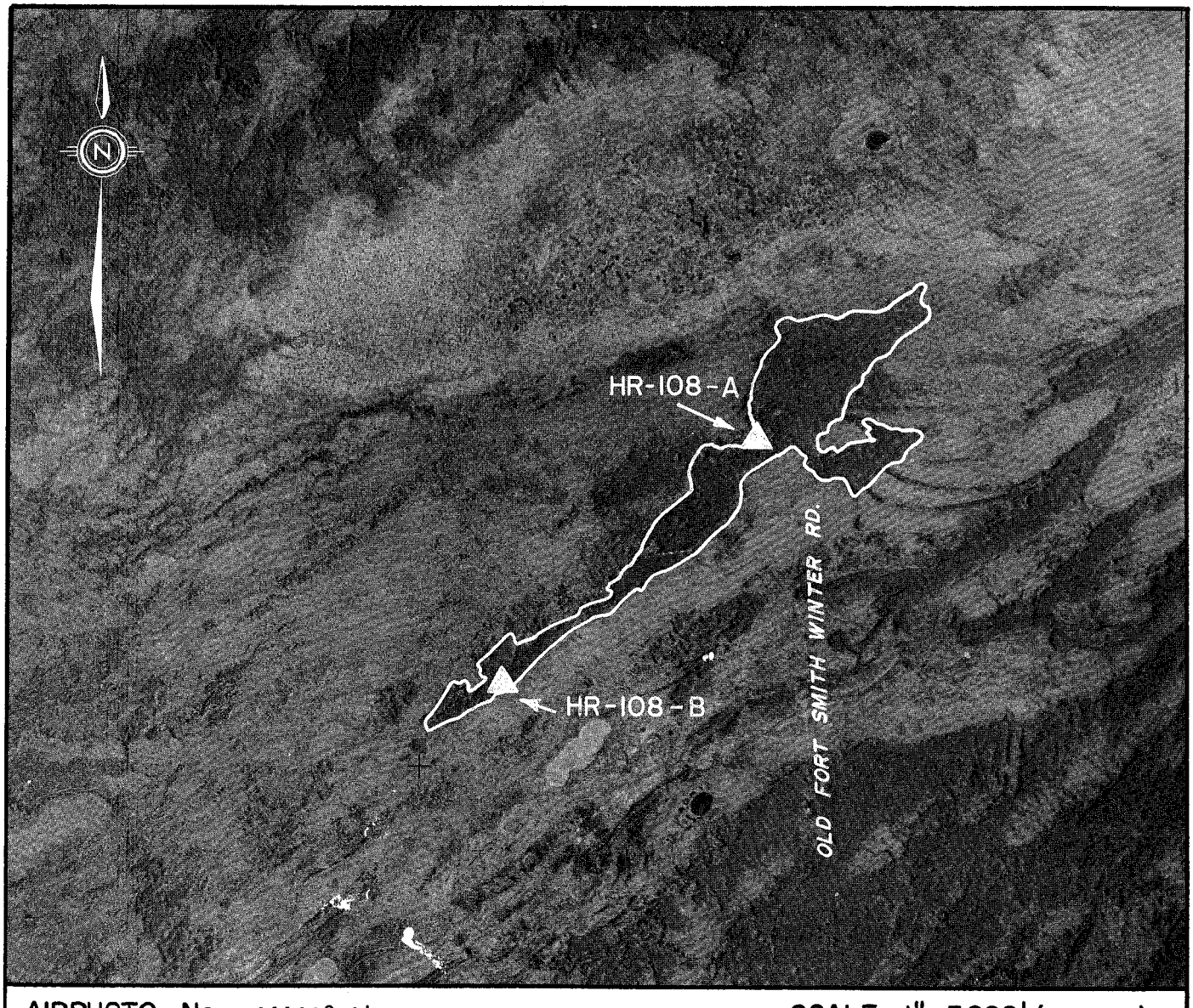
HARDNESS TEST

PETROGRAPHIC ANALYSIS

Hard Limestone and Dolomite	56%
Granites	26%
Feldspar Porphyry	10%
Soft Porous Limestone	7%
Quartzite	1%
Quartz	trace
TOTAL	100%

HAY RIVER
SOURCE No. HR-108A

LANDFORM AND LOCATION:	Esker 20 miles from Hay River by road along N.W.T. Hwys. 2 and 5, plus an additional 4 miles south along the old Fort Smith winter road.
MATERIAL:	SAND - and gravel. SAND - some silt.
VOLUME:	Approximately 500,000 cu. yds.
CONCLUSION:	Due to present land-use requirements, this source cannot be developed. No test drilling was permitted.



AIRPHOTO No. A11338-142 SCALE : 1"= 3000' (approx.)

HR-108A ENVIRONMENT

Physical

This source is a low lying, irregularly shaped esker about 24 miles by road south-east of Hay River. The esker is approximately 2.5 miles long, 100 to 1,000 yards wide, and 1 to 2 yards high above the surrounding marshland. Drainage of the source is good because of a gentle slope to the northwest. However, the water table in the surrounding area is generally within a few feet of the ground surface.

This source has not been developed to date.

Biotic

The tree cover on the source is primarily spruce and pine up to 40 feet in height, with a canopy density of 40 to 60%. The undergrowth consists of grass, moss and some peat, with sparse juniper and other bushes.

Wildlife within the area is limited to lynx, small fur bearing animals including marten, beaver, and muskrat as well as squirrels and other small rodents. A small herd of caribou graze in the area.

HR-108A MATERIALS AND QUANTITIES

Because the source lies in a sensitive area, no test drilling was permitted in this vicinity. Only a preliminary reconnaissance was made.

The material exposed in 1 test pit is 55% coarse gravel, 40% well graded sand, with many large cobbles and boulders, and traces of silt and clay. In another test pit the material is mainly sand with some silt, a little gravel, with traces of clay and cobbles. Thus, the source appears to be highly variable.

The volume of material in this source is estimated to be 500,000 cu. yds.

HR-108A DEVELOPMENT

General

Because of its position in a sensitive environmental area, it is considered improbable that permission will be granted to develop this source. In addition, it is probable that any development allowed would require an impact study to determine its effects on the biotic environment.

Access

Access is presently possible only during the winter. The access route would follow N.W.T. Hwy. 2 for 9 miles, then along N.W.T. Hwy. 5 for 11 miles, and finally south along the old Fort Smith winter road for about 4 miles. Year round access would require that 4 miles of the old Fort Smith winter road be converted to an all-weather road.

Material Use and Handling

If development of the source were permitted in the future, the material would be suitable primarily for general fill. Further qualitative data is required to ascertain the suitability of the material for aggregate. However, the variability and limited area of the source would limit the use of the source materials for fine and coarse aggregates.

Handling of this material would require an assembly of equipment including dozer, front-end loader, and trucks.

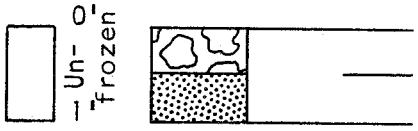
Stripping and Restoration

The process of stripping and restoration would be the same as for similar land-forms in the area.

TEST PIT LOGS

SOURCE No. HR-108A

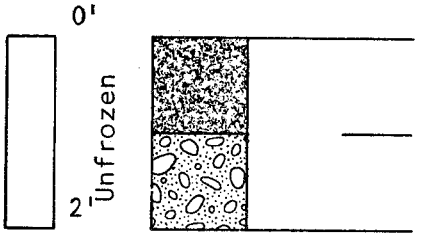
HR-108A-A



0'		
0.5'		COBBLES & BOULDERS - some sand
1.0'	(SM)	SAND - some silt, little gravel, trace clay, trace cobbles

Water at 1' on completion

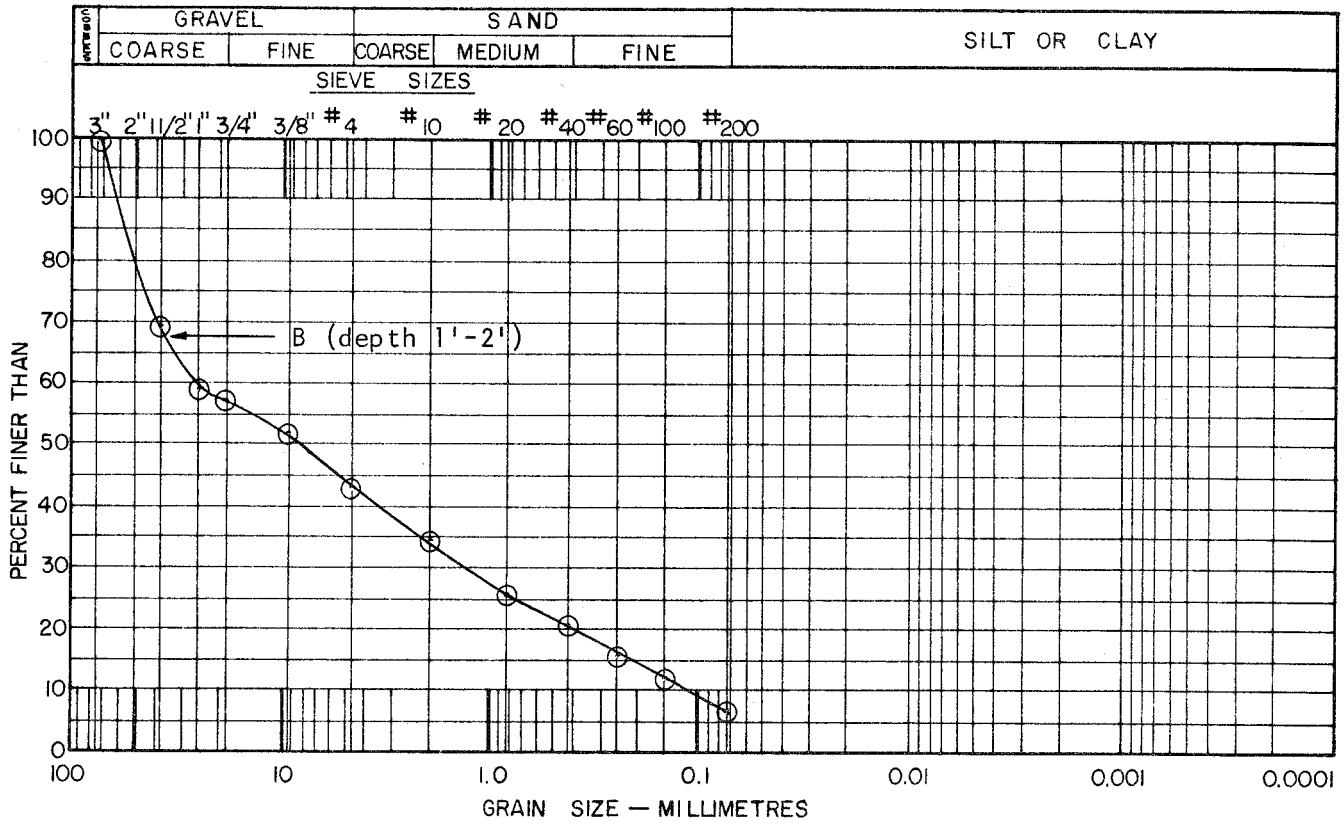
HR-108A-B



0'		
1.0'	(OL)	SILT - trace cobbles, topsoil, roots
2.0'	(GW)	GRAVEL - and sand, trace silt

LABORATORY
TEST DATA
TEST PIT - SOURCE No. HR-108A

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

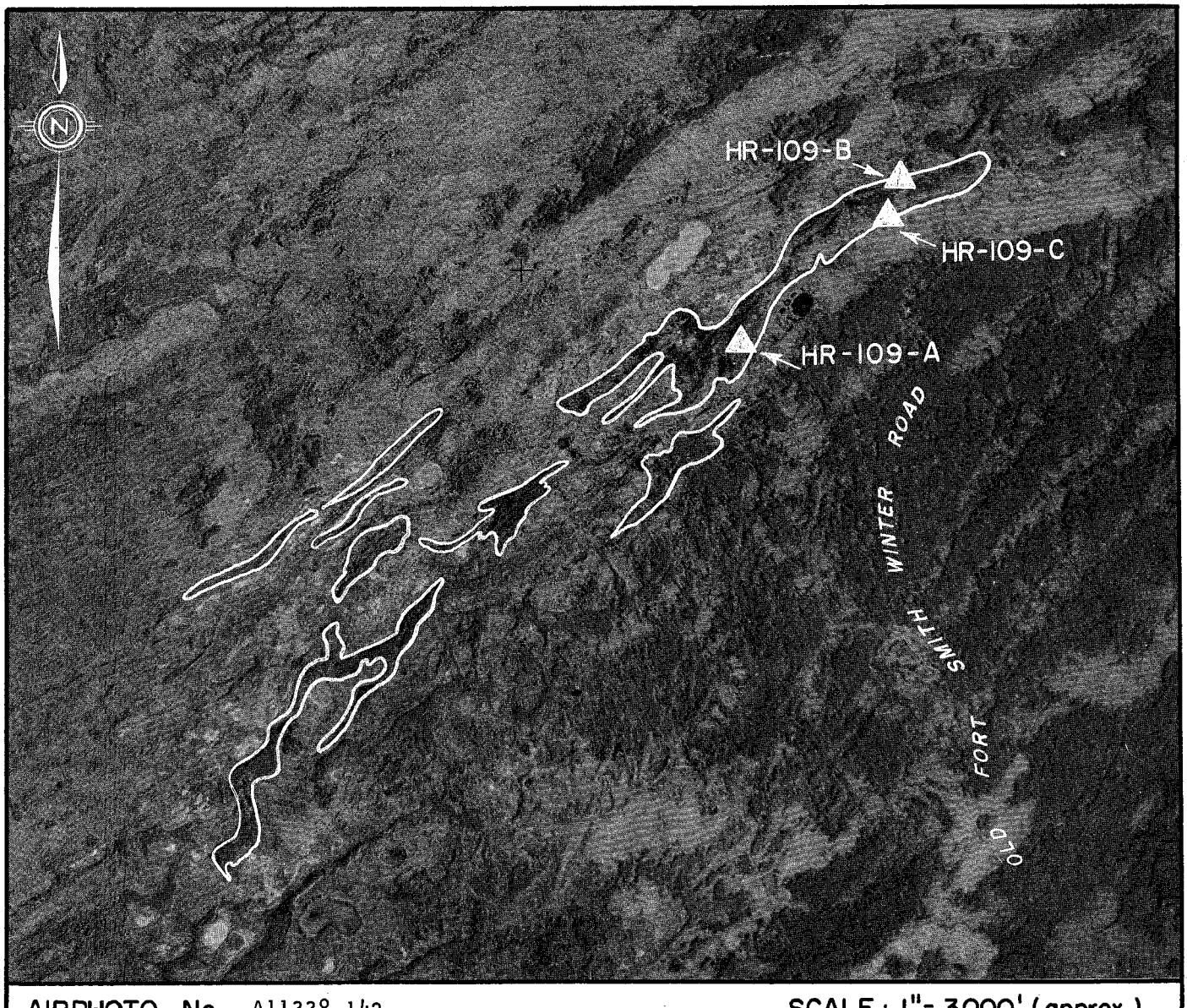
HAY RIVER
SOURCE No. HR-109A

LANDFORM AND LOCATION: Large esker and several small eskers located about 20 miles from the community by road along N.W.T. Hwys. 2 and 5, plus an additional 4.5 miles south along the old Fort Smith winter road.

MATERIAL: SAND - some gravel, GRAVEL - and sand

VOLUME: Approximately 500,000 cu. yds.

CONCLUSION: Part of the deposit has been developed in the past. However, due to present land-use requirements, this source cannot be further developed. No test drilling was permitted. Based on limited reconnaissance data, the deposit would be suitable for general fill and fine and coarse aggregate.



AIRPHOTO No. A11338-142 SCALE : 1"= 3000' (approx.)

HR-109A ENVIRONMENT

Physical

The source is a large esker and several small eskers trending in a northeasterly direction. The main esker is about 2 miles long, 50 to 200 yards wide and 2 to 7 yards in height above the surrounding marshland. Drainage of the eskers is good although the surrounding drainage in the marshland is very poor.

This source has been partially developed as a winter operation and approximately 200,000 cu. yds. have been removed.

Biotic

The tree cover on the source is primarily spruce to 45 feet in height with a canopy density of 40 to 60%. The undergrowth consists of grass and moss with sparse ferns and bushes.

Wildlife within the area is limited to lynx, small fur-bearing animals including marten, beaver and muskrat, as well as squirrels and small rodents. A few caribou graze in the area.

HR-109A MATERIALS AND QUANTITIES

Because the source lies within a sensitive environmental area, no test drilling was permitted.

Sampling during the field reconnaissance was confined to the large esker. The material exposed in 3 shallow test pits is coarse to medium sand, with gravel varying from 15 to 50% of the sample. The smaller eskers to the southwest are part of the same esker complex and likely contain material similar to that found in the large esker.

The volume of material remaining in this source is estimated to be 500,000 cu. yds. This estimate is very approximate since drill data are not available to confirm depths of the granular material.

HR-109A DEVELOPMENT

General

Because of its position in a sensitive environmental area, it is considered

improbable that permission will be granted to renew development of this source. In addition, it is probable that any future development would require an impact study to determine its effects on the biotic environment. If, however, continued development was permitted, this source could supply general fill and aggregate to nearby projects.

Access

Access is presently possible only during the winter, and is about 24.5 miles by road from Hay River. The route would follow N.W.T. Hwy. 2 for 9 miles, then along N.W.T. Hwy. 5 for 11 miles, and finally along the old Fort Smith winter road for about 4.5 miles. For year-round access, 4.5 miles of the old Fort Smith winter road would have to be converted to an all-weather road.

Material Use and Handling

The material in this source is similar to that in HR-107A. It can be used for general fill, road surfacing, and is expected to be suitable for concrete or asphalt aggregate with washing and screening. However, since drilling was not permitted in this vicinity, further qualitative data must be acquired to confirm its suitability for aggregate.

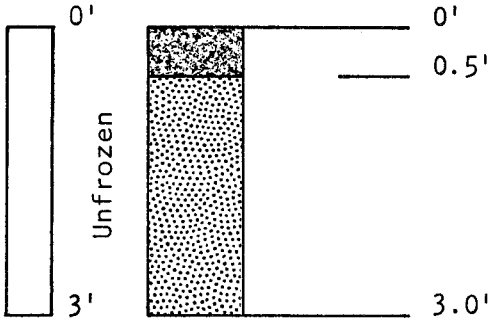
Equipment required for renewed development would be the usual assembly of dozer, front-end loader and trucks.

Stripping and Restoration

All trees will have to be cut and disposed of by burning. The depth of stripping in the area investigated varies from a few inches to 1 foot, and this material can be stockpiled for later regrading of the site. After depletion of the source, the area should be levelled and resurfaced with the stockpiled topsoil, then reseeded for speedy revegetation.

TEST PIT LOGS
SOURCE No. HR-109A

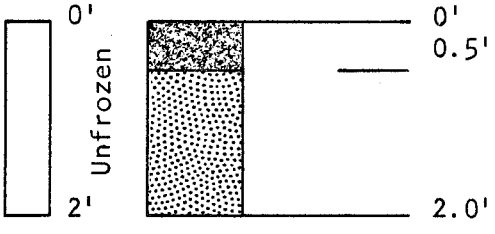
HR-109A-A



(OL) SILT - and sand, roots

(SP) SAND - some gravel to 3", trace silt, mostly medium-to-coarse

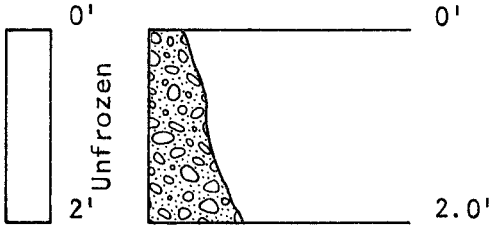
HR-109A-B



(OL) SILT - roots, moss

(SP) SAND - little gravel to 3", trace silt, mostly medium to coarse

HR-109A-C

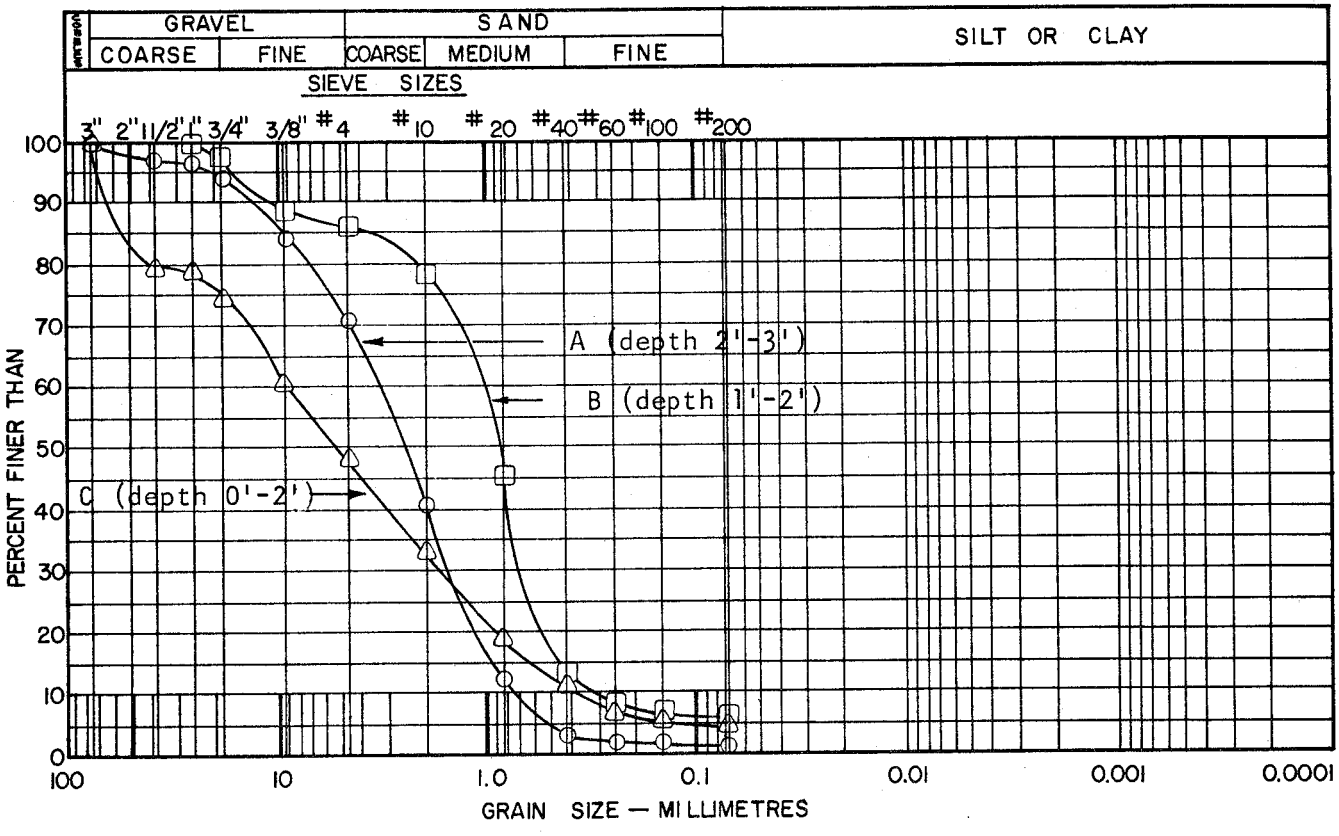


(GW) GRAVEL - and sand, trace silt, max. 3"

Soil profile as logged from open cut

LABORATORY
TEST DATA
SOURCE No. HR-109A

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

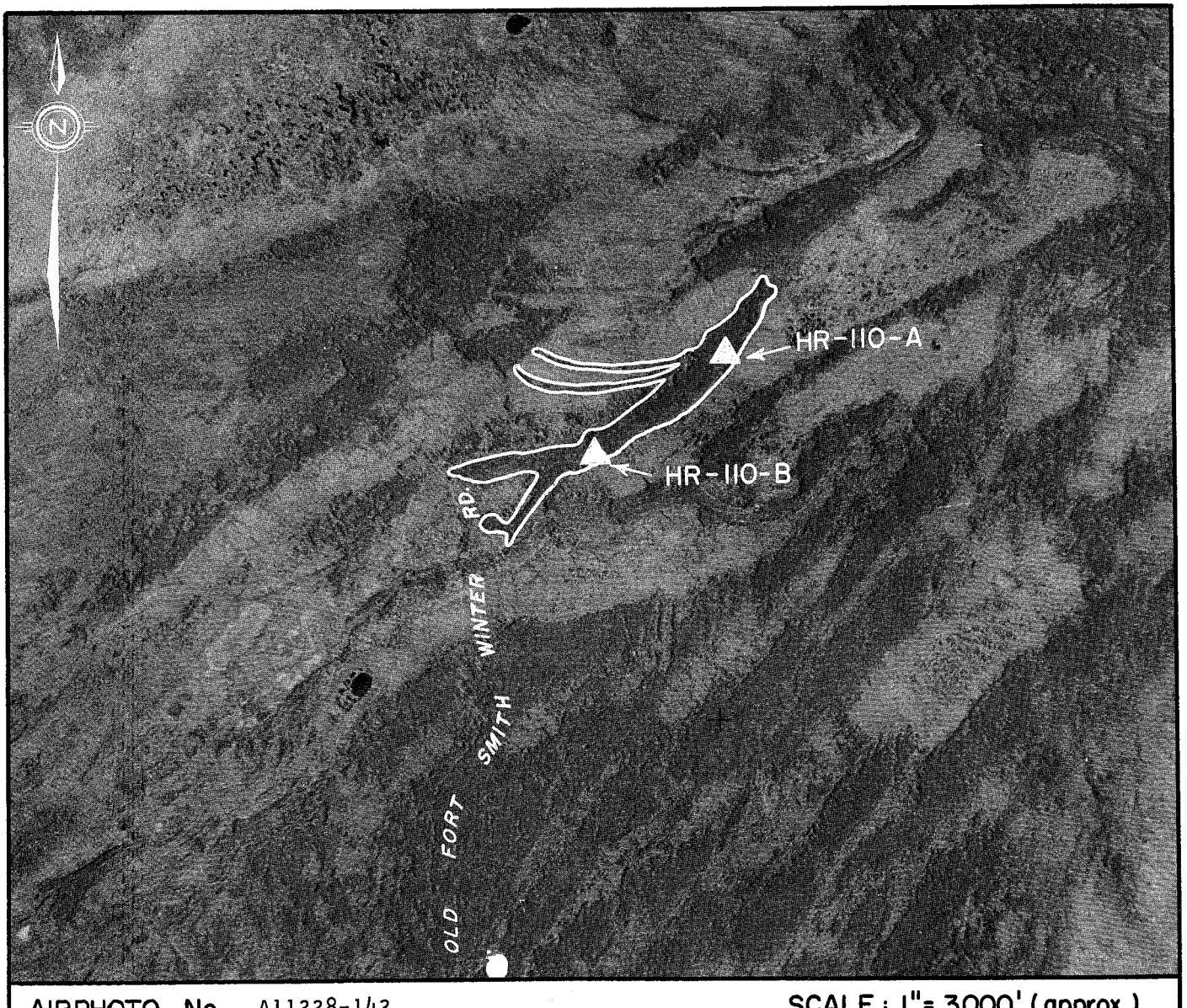
HAY RIVER
SOURCE No. HR-110A

LANDFORM AND LOCATION: Esker 7,000 feet long and 150 to 500 feet wide located 20 miles from the community along N.W.T. Hwys. 2 and 5, plus 4 miles south along the old winter road to Fort Smith.

MATERIAL: SAND - some gravel to 2".

VOLUME: Approximately 200,000 cu. yds.

CONCLUSION: Due to present land-use requirements, this source cannot be developed. No drilling was permitted. Based on limited reconnaissance data, the deposit is suitable for general fill, and potentially suitable for aggregate production.



AIRPHOTO No. A11338-143 SCALE : 1"= 3000' (approx.)

HR-110A ENVIRONMENT

Physical

This source is an irregular shaped esker linked with Source HR-109 on the south-western end. The esker is approximately 1.4 miles long, 50 to 170 yards wide, and 2 to 5 yards high above the surrounding marshland. The landform is about 24.5 miles by road southeast of Hay River. Drainage of the esker itself is very good although the surrounding drainage in the marshland is poor.

This source has not been developed.

Biotic

The tree cover on the source is primarily spruce and pine up to 40 feet in height, with a canopy density of 40 to 60%. The undergrowth is grass and moss with a few ferns and bushes.

Wildlife within the area is limited to lynx, small fur bearing animals including marten, beaver and muskrat as well as squirrels and small rodents. A few caribou graze in the area.

HR-110A MATERIALS AND QUANTITIES

Because the source lies in a sensitive environmental area, no drilling was permitted. Only a preliminary field reconnaissance of the area was made.

The material exposed in 2 test pits is sand with some fine gravel to 2 inches, and a trace of silt, cobbles and boulders to 12".

The volume of material in this source is estimated to be at least 200,000 cu. yds. This estimate is very approximate since drill data are not available to confirm the depth of the granular material.

HR-110A DEVELOPMENT

General

Because of its position in a sensitive environmental area, it is considered improbable that permission will be granted to develop this source. In addition, it is probable that any development would require an impact study to determine its effects on the biotic environment.

If however, development were permitted, this source could supply general fill and fine and coarse aggregate to nearby projects.

Access

Access is presently possible only during the winter, and is about 24.5 miles by road from Hay River. The route would follow N.W.T. Hwy. 2 for 9 miles, then along N.W.T. Hwy. 5 for 11 miles, and finally along the old Fort Smith winter road for about 4.5 miles. Year round access would require that 4.5 miles of the old Fort Smith winter road be converted to an all-weather road.

Material Use and Handling

The material in this source is similar to that in HR-107A. It can be used for general fill, road surfacing, and is expected to be suitable for concrete or asphalt aggregate with some washing and screening. However, since drilling was not permitted in this vicinity, further qualitative data must be acquired to confirm its suitability for aggregates.

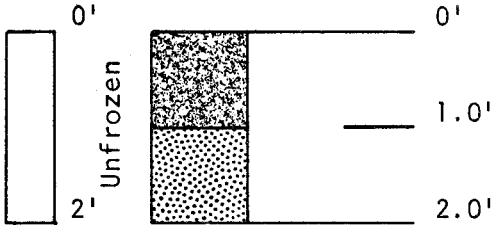
Equipment required for development would be the usual assembly of dozer, front-end loader and trucks.

Stripping and Restoration

All trees will have to be cut and disposed of by burning. The depth of stripping in the area investigated varies from a few inches to 1 foot, and this material can be stockpiled for later regrading of the site. After depletion of the source, the area should be levelled and resurfaced with the stockpiled topsoil, then reseeded for speedy re-vegetation.

TEST PIT LOGS
SOURCE No. HR-110A

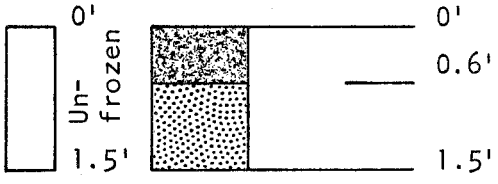
HR-110A-A



(OL) SILT - some sand, topsoil, roots, etc.

(SP-SM) SAND - little fine gravel to 2", little silt, trace cobbles, trace boulders to 12"

HR-110A-B



(OL) SILT - topsoil, roots

(SP) SAND - some fine gravel to 1½", trace silt, trace boulders to 12"

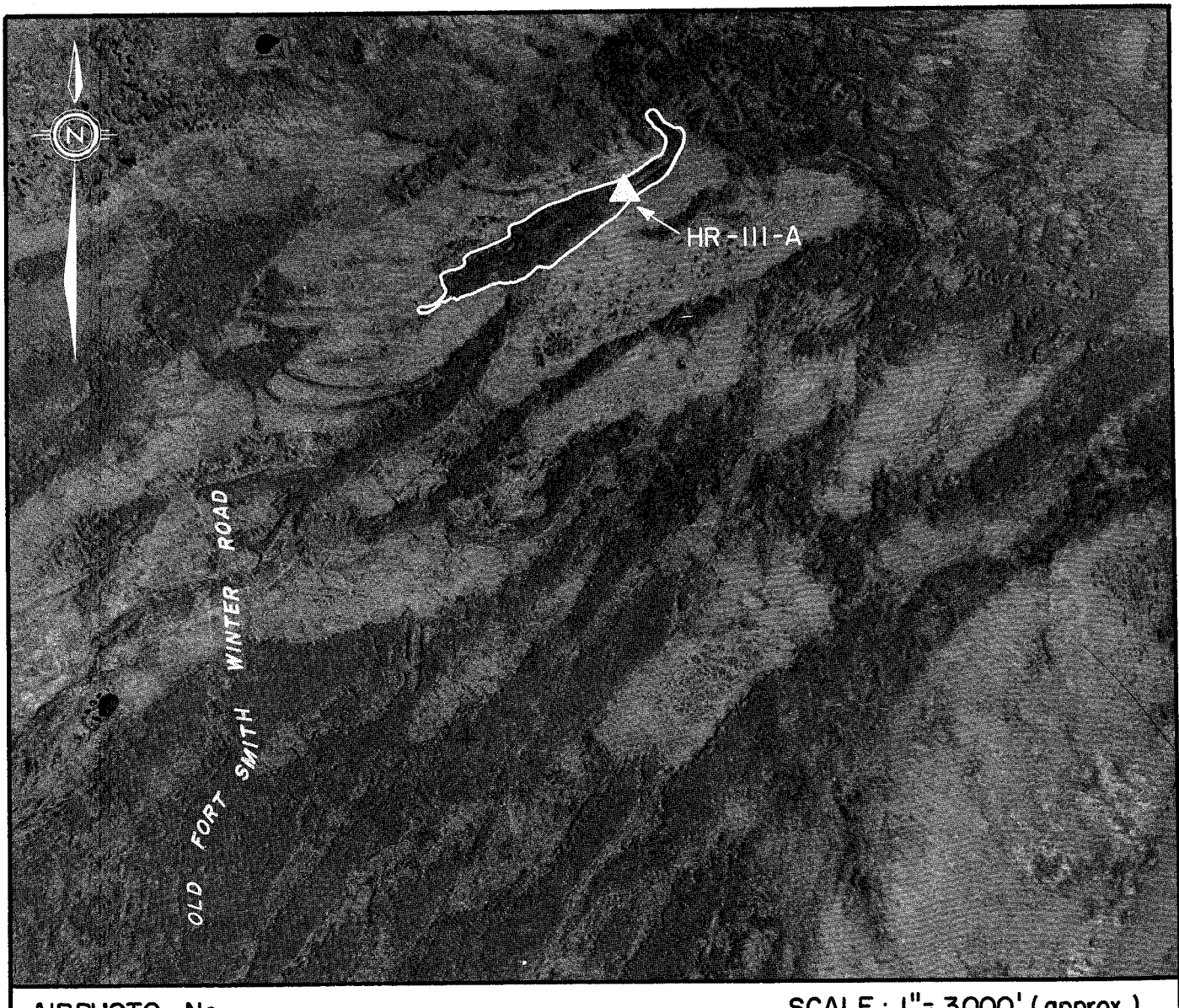
HAY RIVER
SOURCE No. HR-111A

LANDFORM AND LOCATION: Esker 1 mile long by 50 to 200 yards wide located 20 miles from the community by road along N.W.T. Hwys. 2 and 5, plus 5 miles south along the old Fort Smith winter road.

MATERIAL: SAND - little gravel, trace silt.

VOLUME: Approximately 500,000 cu. yds.

CONCLUSION: Due to land-use requirements, this source cannot be developed. No drilling was permitted. Based on limited reconnaissance data, the deposit is suitable for general fill and potentially suitable for aggregate and road surfacing material with screening and blending.



AIRPHOTO No. A11338-143

SCALE : 1"= 3000' (approx.)

HR-111A ENVIRONMENT

Physical

This source is an esker located directly northeast of HR-110A. The esker is approximately 1 mile long, 50 to 200 yards wide and 1 to 6 yards in height above the surrounding marshland. Drainage of the esker is good although the surrounding marshland drainage is very poor. The water table is generally within a few feet of the ground surface on the flanks of the source.

The source has not been developed.

Biotic

The tree cover on the source is primarily spruce up to 40 feet high, with a canopy density of 40 to 60%. The undergrowth consists of grass and moss with a few ferns and bushes.

Wildlife in the area is limited to lynx, small fur-bearing animals including marten, beaver and muskrat as well as squirrels and small rodents. A few caribou graze in the area.

HR-111A MATERIALS AND QUANTITIES

Because the source lies in a sensitive environmental area, no drilling was permitted in this vicinity. The comments made on quality and quantity are based upon limited reconnaissance data.

The material exposed in a single test pit is 80% well graded coarse to medium sand with little gravel and traces of silt and boulders.

The volume of material in this source is estimated at 500,000 cu. yds. above the water table. This estimate is very approximate since drill data are not available. Drilling at various points on the source is necessary to confirm the depth of the granular material.

HR-111A DEVELOPMENT

General

Because of its position in a sensitive environmental area, it is considered improbable that permission will be granted to develop this source. In addition,

it is probable that any development would require an impact study to determine its effects on the biotic environment. If however, development was permitted, this source could supply general fill and aggregate to nearby projects.

Access

Access is presently possible only during the winter, and is about 25 miles by road from Hay River. The route would follow N.W.T. Hwy. 2 for 9 miles, along N.W.T. Hwy. 5 for 11 miles, along the old Fort Smith winter road for 4 miles, and finally east for 1 mile on a new road to be constructed. Year-round access would require 4 miles of the old Fort Smith winter road, and the 1 mile road to the site, to be constructed to all-weather road specifications.

Material Use and Handling

The material in this source is similar to that in HR-107A. It can be used for general fill or road surfacing, and is expected to be suitable for concrete or asphalt aggregate with some washing and screening. However, since drilling was not permitted in this vicinity, further qualitative data must be acquired to confirm its suitability for aggregate.

Equipment required for development would be the usual assembly of dozer, front-end loader and trucks.

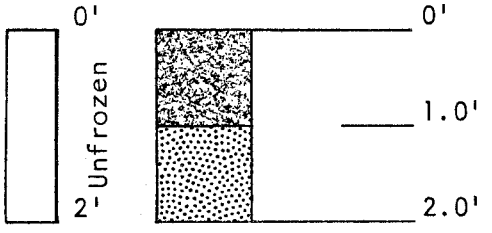
Stripping and Restoration

All trees will have to be cut and disposed of by burning. The depth of stripping in the area investigated varies from a few inches to 1 foot, and this material can be stockpiled for later regrading of the site. After depletion of the source, the area should be levelled and resurfaced with the stockpiled topsoil, then re-seeded for speedy revegetation.

TEST PIT LOGS

SOURCE No. HR-111A

HR-111A-A



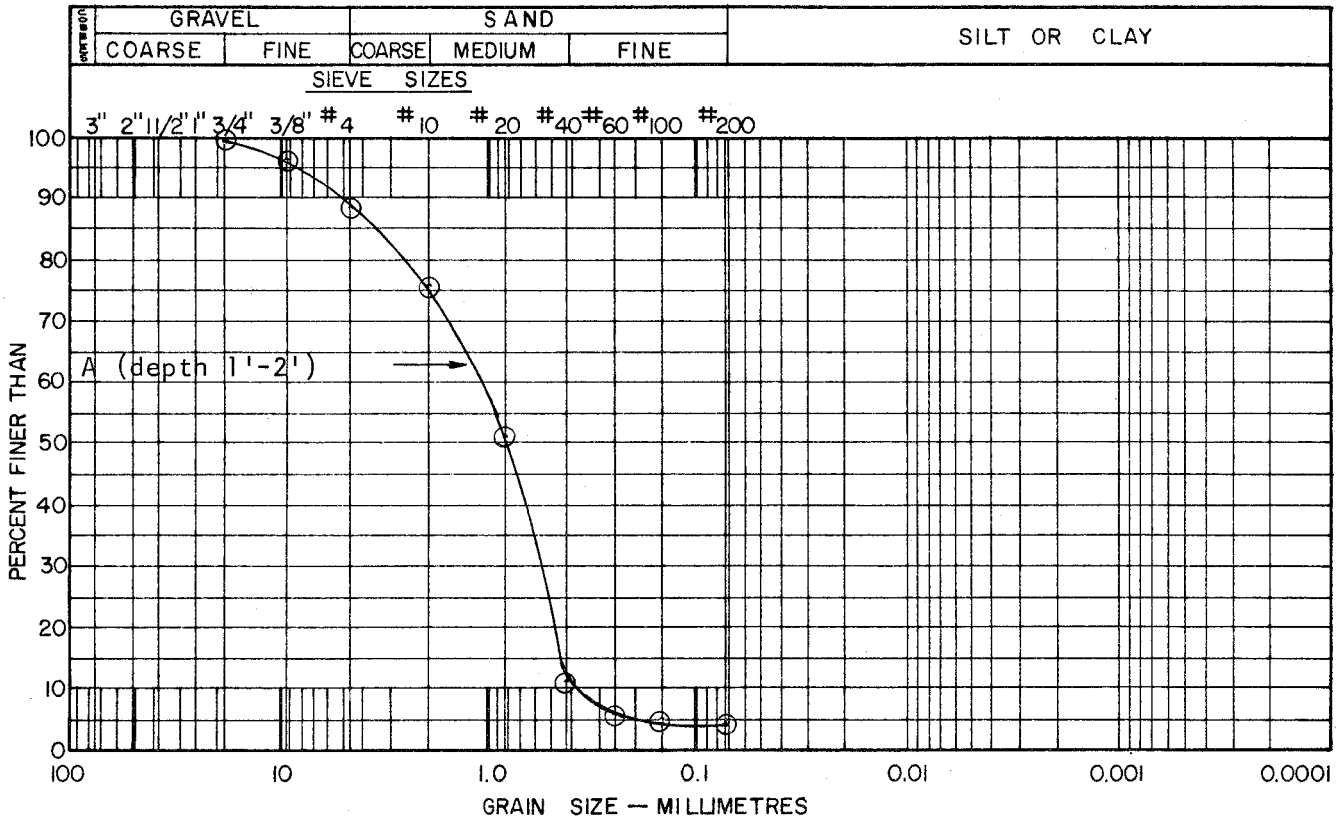
(OL) SILT - topsoil, roots

(SP) SAND - little gravel to 3/4", trace silt, mostly medium-to-coarse

Water at 1' on completion

LABORATORY
TEST DATA
TEST PIT-SOURCE No. HR-IIIA-A

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

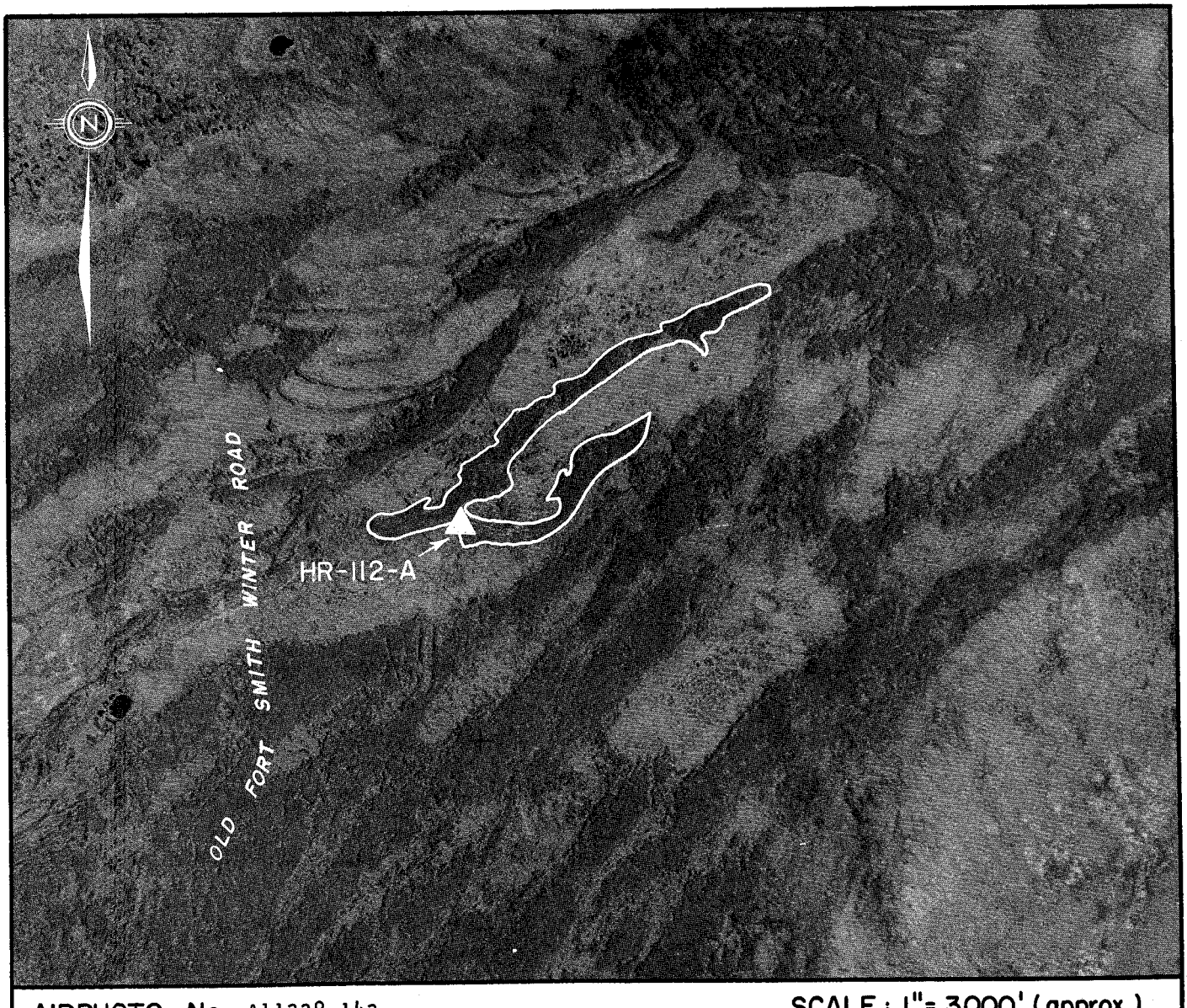
HAY RIVER
SOURCE No. HR-112A

LANDFORM AND LOCATION: Two connected eskers 5,000 feet and 9,000 feet long respectively and each up to 200 yards wide located 20 miles southeast of the community along N.W.T. Hwys. 2 and 5, plus 4 miles south along the old winter road to Fort Smith.

MATERIAL: GRAVEL - to 3", some sand, trace silt.

VOLUME: Approximately 500,000 cu. yds.

CONCLUSION: Due to present land-use requirements, this source cannot be developed. No drilling was permitted. The deposit is suitable as a source of general fill and low quality concrete or asphalt aggregate as was indicated by limited petrographic data.



AIRPHOTO No. A11338-143 SCALE : 1"= 3000' (approx.)

HR-112A ENVIRONMENT

Physical

This source consists of two parallel eskers, connected at the southwest end. The eskers are 1 and 1.8 miles long respectively, about 50 to 200 yards wide, and 2 to 5 yards in height above the surrounding marshland.

Drainage of the feature is good, although the surrounding marshland drainage is poor. This source has not been developed. The source is about 26 miles from the community by road.

Biotic

The tree cover on the source is primarily spruce and pine up to 40 feet in height, with a canopy density of 40 to 60%. The undergrowth is grass and moss with a few ferns and bushes.

Wildlife within the area is limited to lynx, small fur bearing animals including marten, beaver and muskrat as well as squirrels and small rodents. A few caribou graze in the area.

HR-112A MATERIALS AND QUANTITIES

Because the source lies in an important environmental area, no drilling was permitted in this vicinity. The following comments are based upon limited reconnaissance data.

The material as based on data from a single test pit is primarily gravel (70%) with well graded medium to coarse sand and a trace of fine sand and silt. The petrographic analysis of material obtained from a single test pit shows the main constituents are granite (35%) and hard limestone (31%), with unsound porous limestone comprising 11%.

The material is suited to use as general fill and road material. However, the high proportion of unsound material as shown by the one petrographic analysis suggests the aggregate would produce a low quality concrete or asphalt product.

The volume of material in this source is estimated at 500,000 cu. yds. This estimate is very approximate since drill data are not available. Drilling at various points on the source is necessary to confirm the depth of granular material.

HR-112A DEVELOPMENT

General

Because of its position in a sensitive environmental area, it is considered improbable that permission will be granted to develop this source. In addition, it is probable that any future development would require an impact study to determine its effects on the biotic environment.

If however, development were permitted, this source could supply general fill to nearby projects.

Access

Access is presently only possible during the winter, and is about 26 miles by road from the community. The route would follow the all-weather N.W.T. Hwys. 2 and 5, then along the old Fort Smith winter road which passes about 1 mile west of the source. A new 1 mile road would have to be constructed from the old Fort Smith winter road or from Source HR-110A to the source. Year round access would require that 5 miles of the old Fort Smith winter road as well as the 1 mile road to the source be converted to all-weather roads.

Material Use and Handling

The deposit can be used for general fill but may produce a low quality concrete or asphalt aggregate.

Equipment required for development would be the usual assembly of dozer, front-end loaders and trucks.

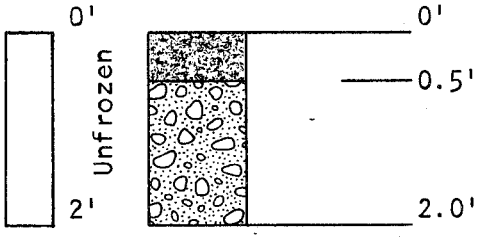
Stripping and Restoration

The process of stripping and restoration would be the same as for similar land-forms in the area.

TEST PIT LOGS

SOURCE No. HR-112A

HR-112A-A

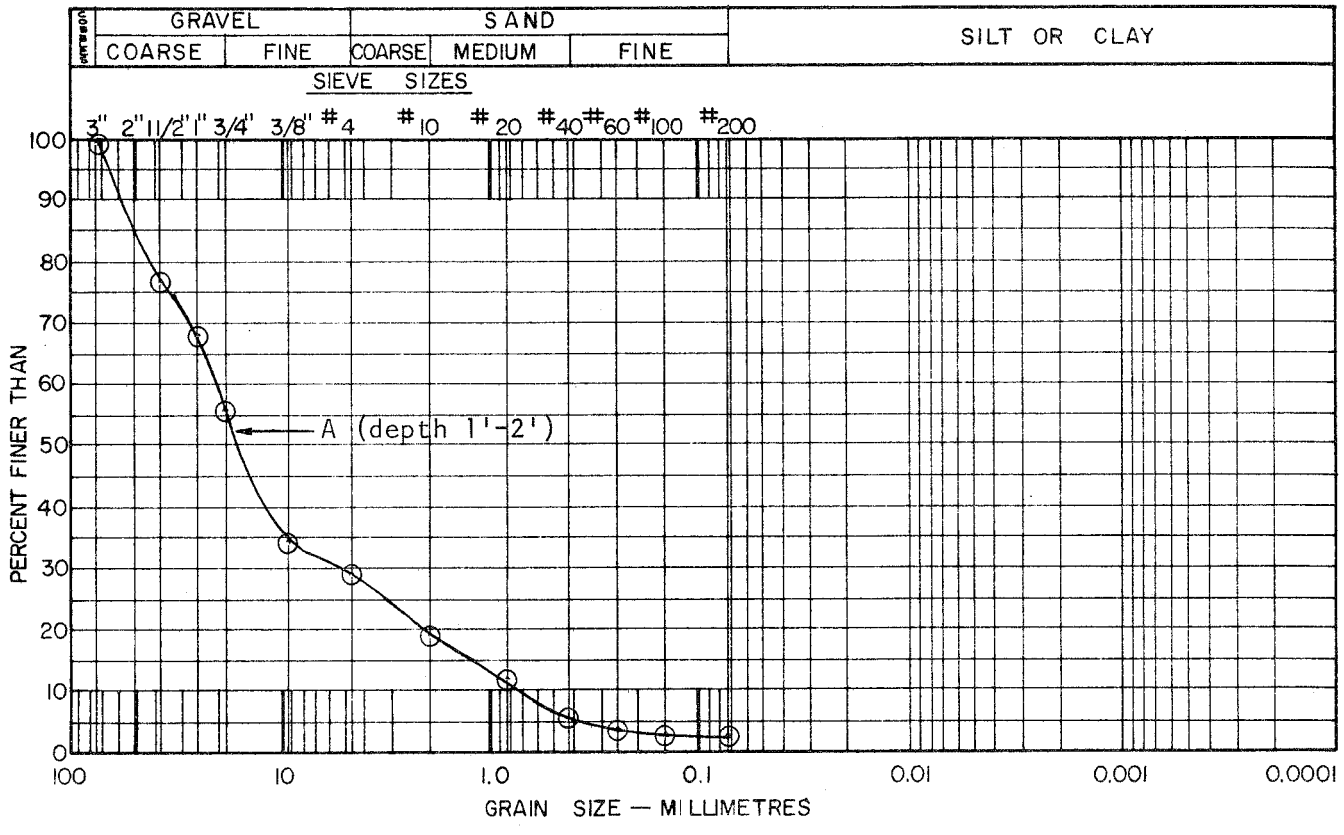


(OL) SILT - topsoil, roots, moss

(GP) GRAVEL - some sand, trace cobbles, trace silt

LABORATORY
TEST DATA
TEST PIT-SOURCE No. HR-112A

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

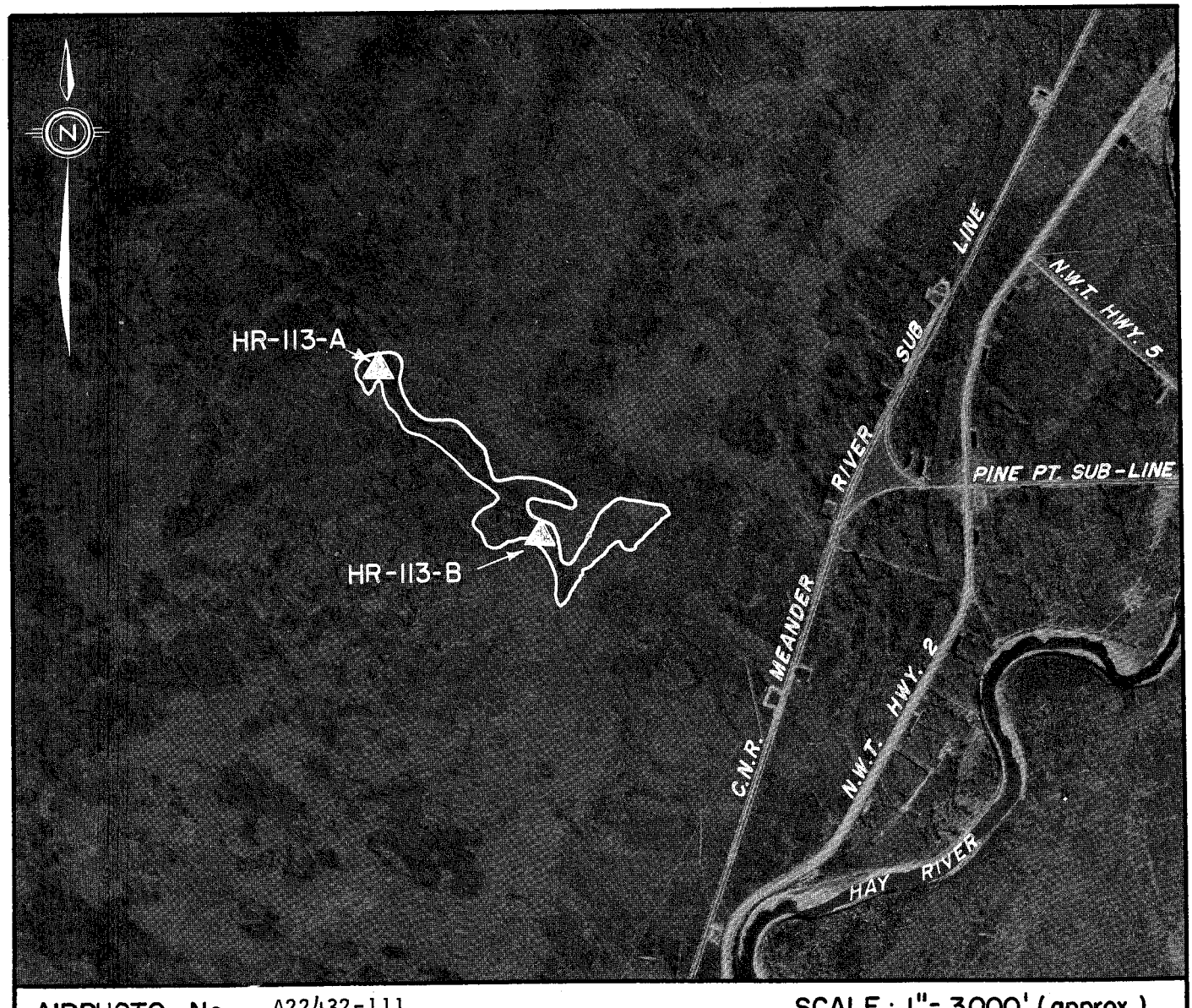
HARDNESS TEST

PETROGRAPHIC ANALYSIS

Granites	35%
Hard Limestone	31%
Soft Porous Limestone	11%
Quartzite	10%
Sandstone	8%
Schist	3%
Feldspar Porphyry	1%
Siltstone	1%
Quartz	trace
TOTAL	100%

HAY RIVER
SOURCE No. HR-113A

LANDFORM AND LOCATION:	Ground moraine 6,000 feet long between 400 and 1500 feet wide, located 8 miles southwest of the community along N.W.T. Hwy. 2, plus 1 mile west.
MATERIAL:	SILT and CLAY - little sand, trace gravel to 2", trace cobbles.
VOLUME:	Approximately 300,000 cu. yds.
CONCLUSION:	Deposit not recommended for development as the material quality is low.



AIRPHOTO No. A22432-111 SCALE : 1"= 3000' (approx.)

HR-113A ENVIRONMENT

Physical

This source is an irregular deposit of ground moraine about 1 mile long and varying in width from 400 feet to 1500 feet. The feature varies in relief from 3 to 6 feet above the surrounding marshland. Surface drainage of the deposit is relatively good because of the sloping topography, but the water table is generally 3 to 6 feet below the ground surface.

Biotic

The tree cover on the source is primarily spruce and pine up to 40 feet high, with a canopy density of 40 to 60%. The undergrowth consists of juniper and wildrose bushes as well as grass, moss and peat in low areas.

The source is not in an important wildlife area.

HR-113A MATERIALS AND QUANTITIES

The material in this source contains more than 70% silt and clay with little sand and a trace of gravel. The estimated volume of material is 300,000 cu. yds. above the water table.

HR-113A DEVELOPMENT

General

Since the test pit data indicates mainly silt and clay in the ridge, development of this source is not recommended.

Access

The source is located 9 miles south of Hay River along N.W.T. Hwy. 2 and 1 mile west across marshland.

Material Use and Handling

The material in this source is poor quality and is not recommended for use under most conditions. It would be highly frost susceptible showing excessive loss of strength when saturated during spring thaw.

Handling of this material would require the usual assembly of equipment including

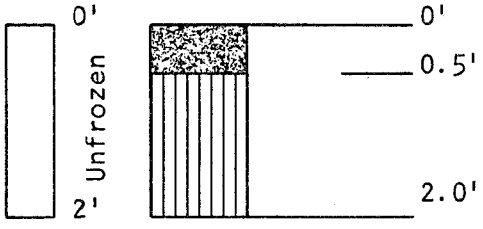
dozer, front-end loader, and trucks.

Stripping and Restoration

The process of stripping and restoration would be the same as for similar landforms in the area.

TEST PIT LOGS
SOURCE No. HR-113A

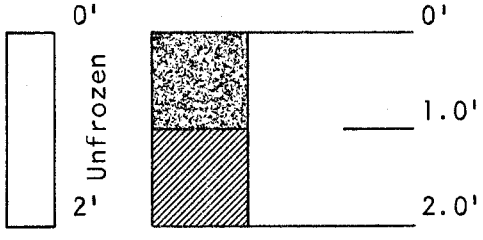
HR-113A-A



(OL) SILT - topsoil, roots

(ML) SILT - and clay, little sand, trace gravel to 2"

HR-113A-B

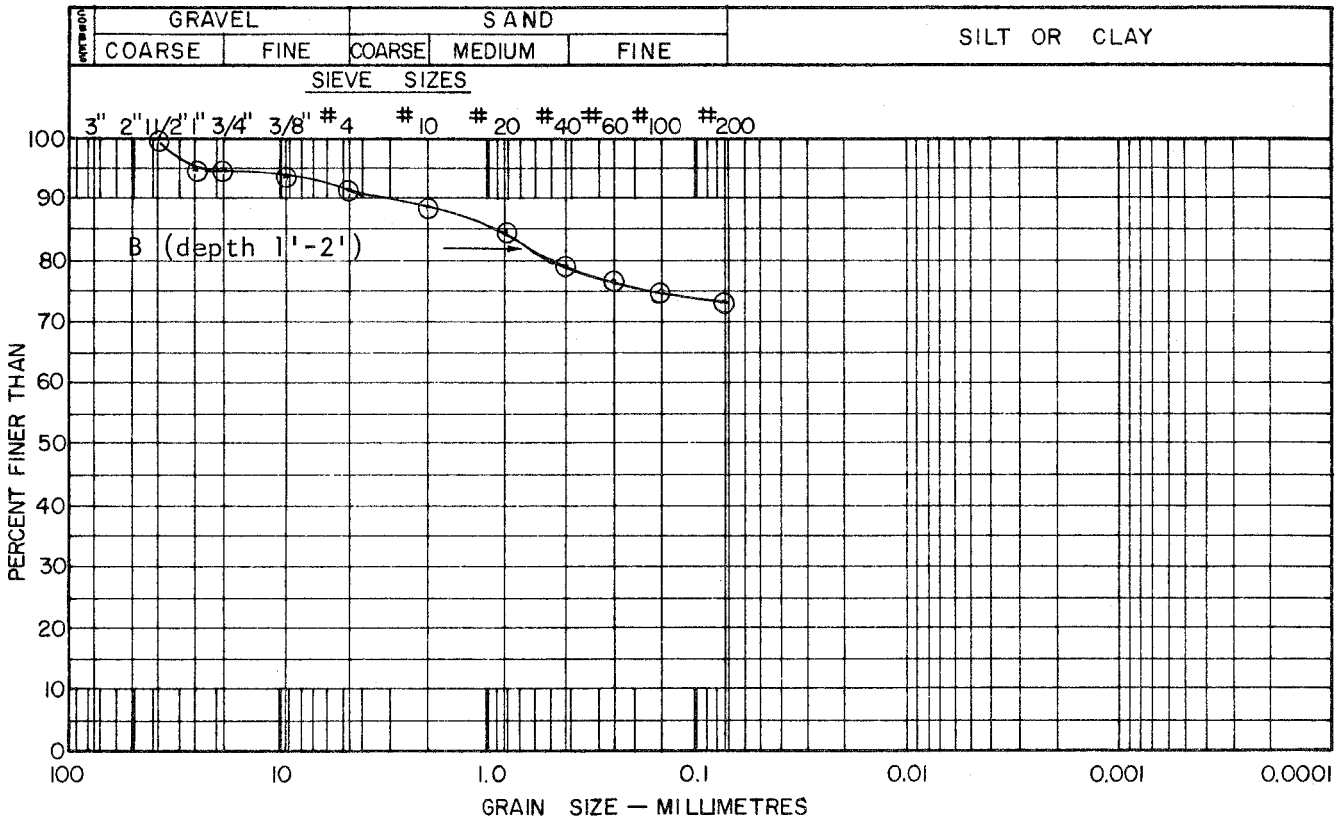


(OL) SILT - topsoil, roots

(CL) CLAY - some silt, little sand, trace gravel to 1½", trace cobbles

LABORATORY
TEST DATA
TEST PIT - SOURCE No. HR-113A

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

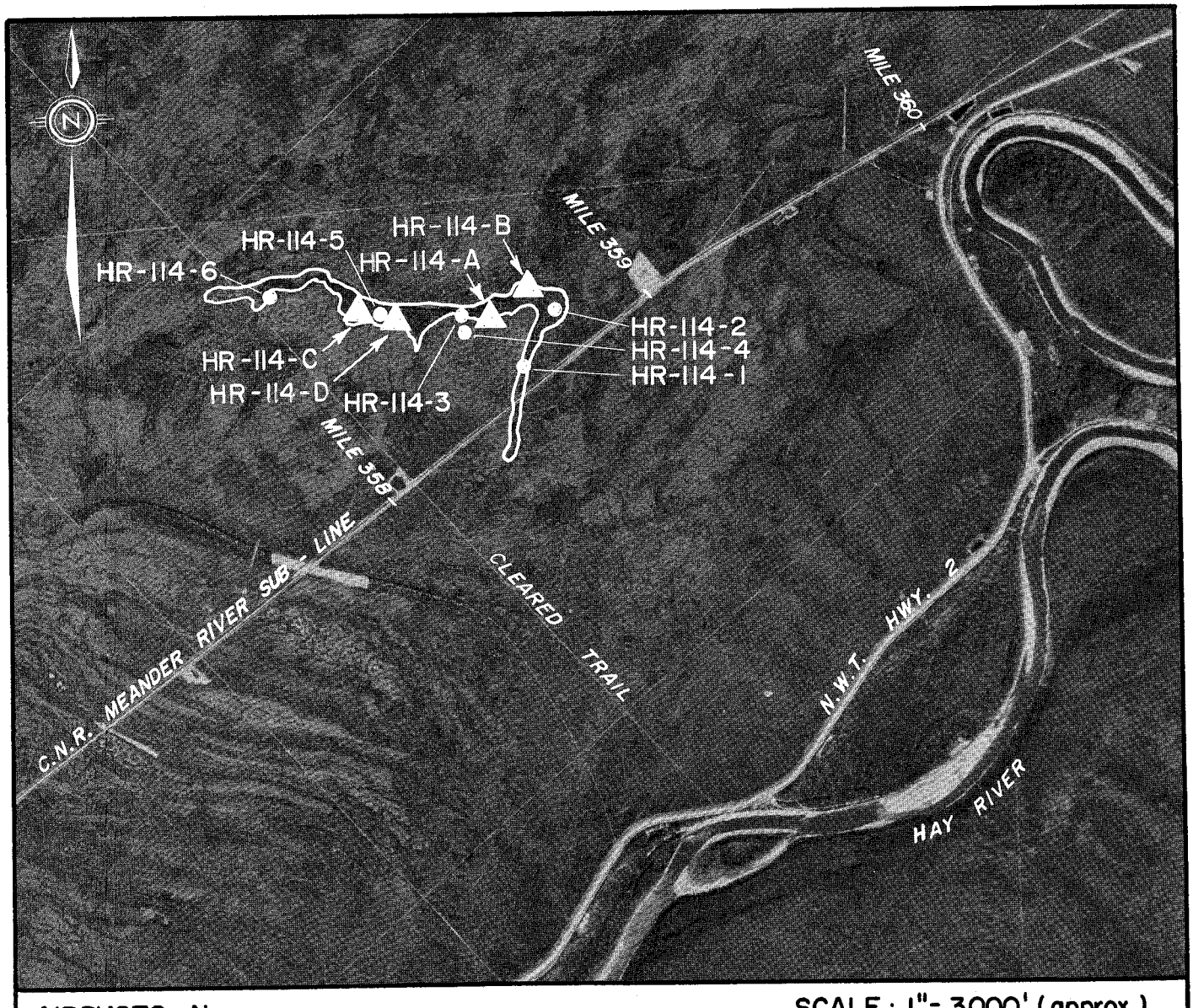
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

HAY RIVER
SOURCE No. HR-114

LANDFORM AND LOCATION:	Esker 9,000 feet long by 150 to 300 feet wide located 20 miles south of the community on N.W.T. Hwy. 2, then 1.5 miles west along an existing cleared trail.
MATERIAL:	SAND - some gravel, GRAVEL - and sand.
VOLUME:	Approximately 250,000 cu. yds.
CONCLUSION:	Deposit is suitable for general fill and low quality aggregates. Petrographic analysis indicates a percentage of unsound rock which restricts its use in high quality concrete or asphalt.



AIRPHOTO No. A22439-93

SCALE : 1"= 3000' (approx.)

HR-114 ENVIRONMENT

Physical

This source is a low, sinuous esker comprised of two smaller ridges about 1 to 3 feet higher than the surrounding marshland. The esker is about 9,000 feet long and between 150 and 300 feet wide. It is located adjacent to the railway, about 20 miles south of the community along N.W.T. Hwy. 2, then 1½ miles west along an existing cleared trail.

Drainage of the esker is good, however, the flat marshland adjoining the source is poorly drained.

The source has not been developed in the past.

Biotic

The esker is a conspicuous deposit because it is more heavily vegetated than the surrounding flat land. The southern and western parts of the source are covered by spindly spruce, with a canopy density of 10 to 20%. The central portion of the esker is more densely covered by pine and poplar to 30 feet in height, with a canopy density of 20 to 40%.

Wildlife in the area is scarce, being limited to small fur-bearing animals and other small rodents. The general area is not actively trapped.

HR-114 MATERIALS AND QUANTITIES

The material is a well graded sand, with some gravel to 1½ inches in diameter, a little silt, and a trace of cobbles. The petrographic analysis of material obtained from 4 test pit samples shows the main constituent is hard limestone and dolomite (47%). The other rocks identified are granite (28%), soft porous limestone (9%), quartz feldspar porphyry (7%), sandstone (4%), quartzite (4%), and chert (1%). The unsound rocks include the soft limestone as well as a portion of the quartz feldspar porphyry.

The granular materials in this source are underlain by a silty till at an average depth of about 5 feet. Based on removing the sand and gravel materials to the 5 foot depth, the source contains approximately 250,000 cu. yds. of material.

HR-114 DEVELOPMENT

General

The granular materials in the deposit are suitable for good quality general fill and with screening for use in low quality concrete.

Access

At present the only access to the source is along the railway right of way or by an existing cleared trail. Access along the existing trail is feasible only during the winter months.

For year-round access, a 2 mile long all-weather road would have to be constructed along the existing trail. Any development of the source will require the installation of a railway crossing near Mile 358 of the line.

Material Use and Handling

The pit run material in this source is primarily suitable for use as general fill. The presence of the unsound aggregates limits their use to low quality concrete. These materials should not be used in submerged concrete or in concrete exposed to freezing and thawing.

The development of this source will require the usual assembly of equipment including bulldozer, front-end loader and trucks. As an alternate, materials could also be hauled to the community by rail.

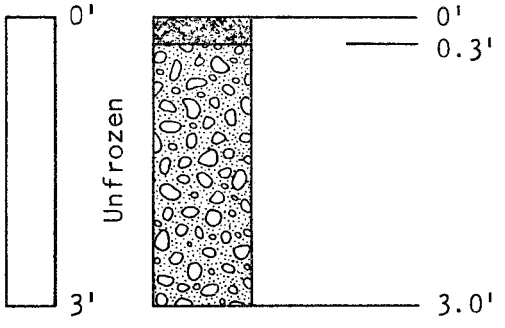
Stripping and Restoration

All trees will have to be cut and disposed of by burning. The depth of stripping on the esker is less than 6 inches. These materials can be stored adjacent to that area of the source being developed.

After depletion of the sand and gravel, the stripped material can be used to cover the slopes and the bottom of the pit area. Finally, the area should be seeded for speedy revegetation.

TEST PIT LOGS
SOURCE No. HR-114

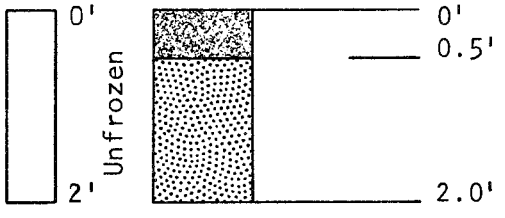
HR-114-A



(OL) SILT - topsoil, roots

(GW) GRAVEL - and sand, trace silt, max. 2"

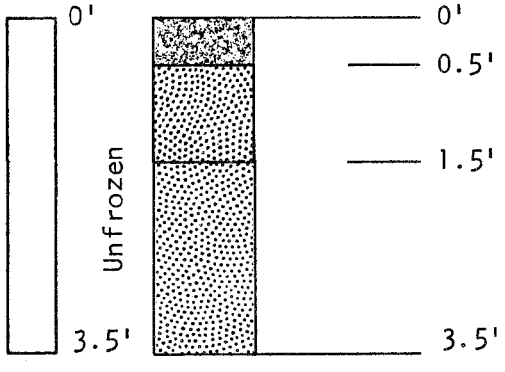
HR-114-B



(OL) SILT - topsoil, roots

(SW) SAND - and gravel, trace silt, max. 2"

HR-114-C



(OL) SILT - topsoil, roots

(SW) SAND - little gravel, trace silt

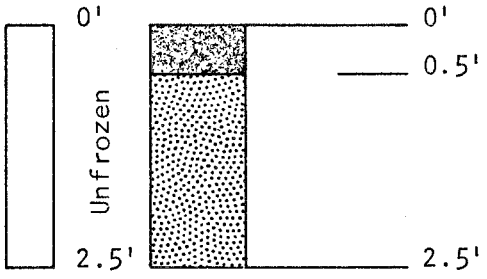
(SW) SAND - and gravel, trace silt, max. 1½"

Water at 3.5' on completion

TEST PIT LOGS

SOURCE No. HR-114

HR-114-D

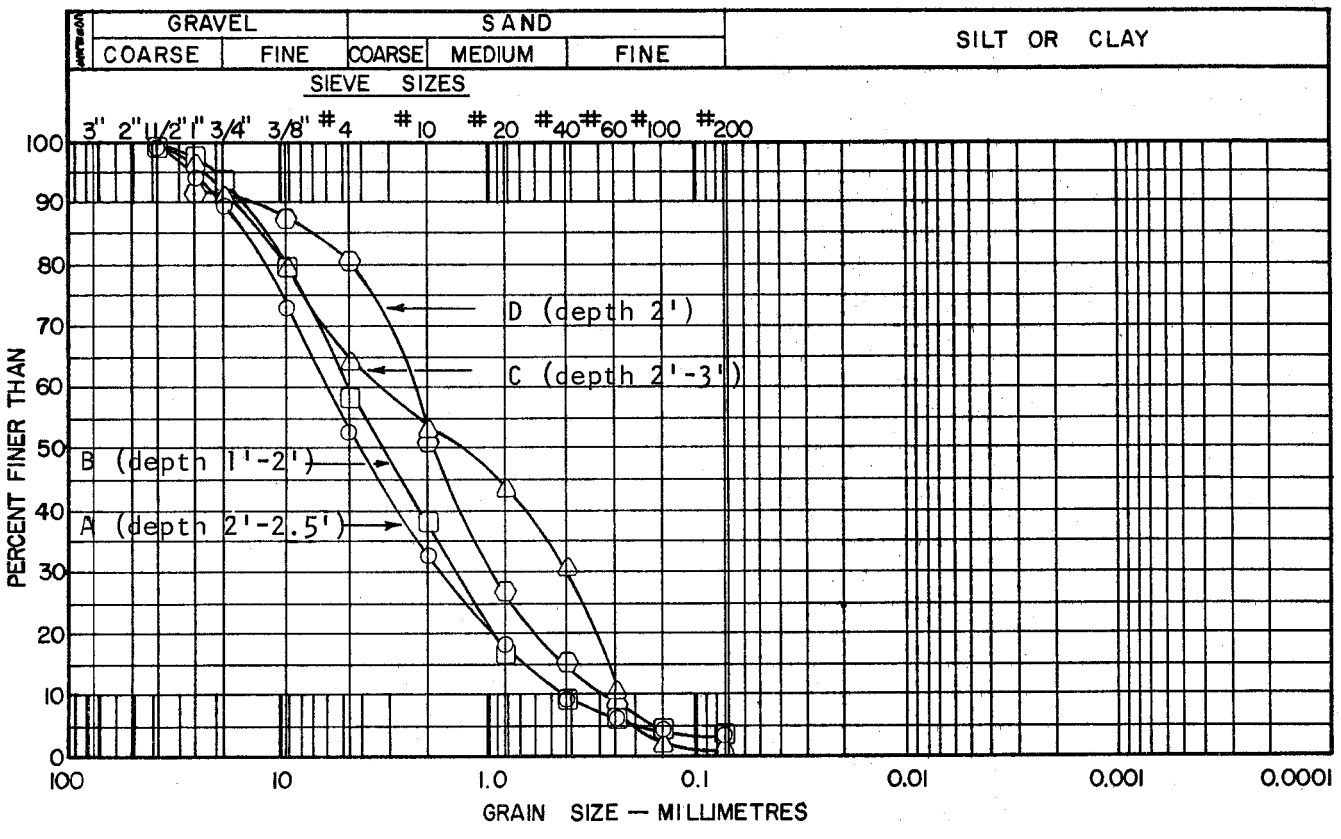


(OL) SILT - topsoil, roots

(SP) SAND - little gravel, trace silt, mostly medium-to-coarse

LABORATORY
TEST DATA
SOURCE No. HR-114

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

HARDNESS TEST

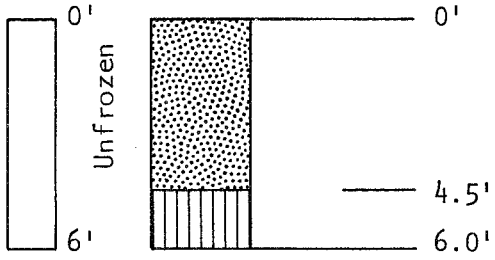
PETROGRAPHIC ANALYSIS

Hard limestone and dolomite	47%	Sandstone	4%
Granites	28%	Quartzite	4%
Soft porous limestone	9%	Chert	1%
Quartz feldspar porphyry	7%	Total	100%

TEST HOLE LOGS

SOURCE No. HR-114

HR-114-1

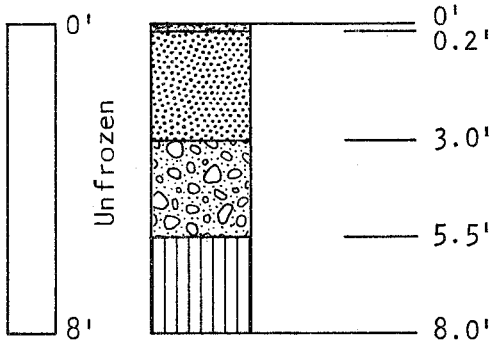


(SW-SM) SAND - some fine gravel to 1", little silt, brown

(ML) SILT - and sand, little clay, trace fine gravel

Hole dry on completion

HR-114-2



(OL) SILT - topsoil, roots, etc.

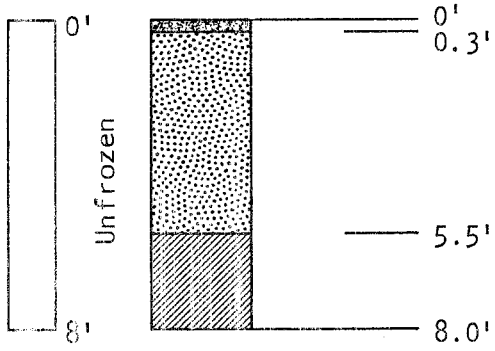
(SW) SAND - some fine gravel to 1½", little silt, well graded

(GW) GRAVEL - some sand, trace silt, trace cobbles

(ML) SILT - some clay, little fine gravel, trace sand, low plastic, (till)

Water at 6' on completion

HR-114-3



(OL) SILT - topsoil, roots, etc.

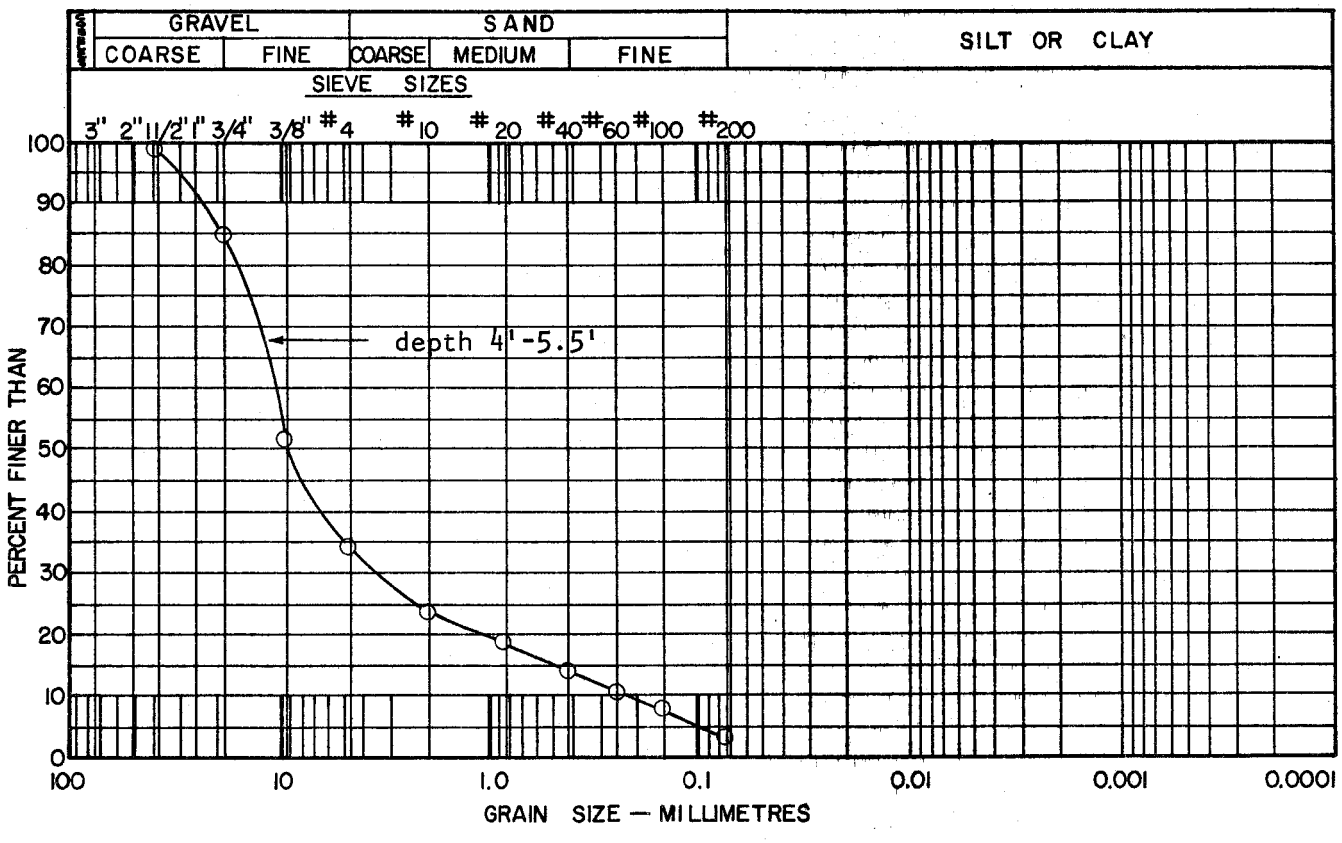
(SW) SAND - some gravel to 1½", little silt, well graded

(CL) CLAY - some silt, some gravel to ½", trace sand, medium plastic, grey, (till)

Hole dry on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-114-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 4'-5.5'	6.2%
Sample 2	depth 6'-7'	10.9%

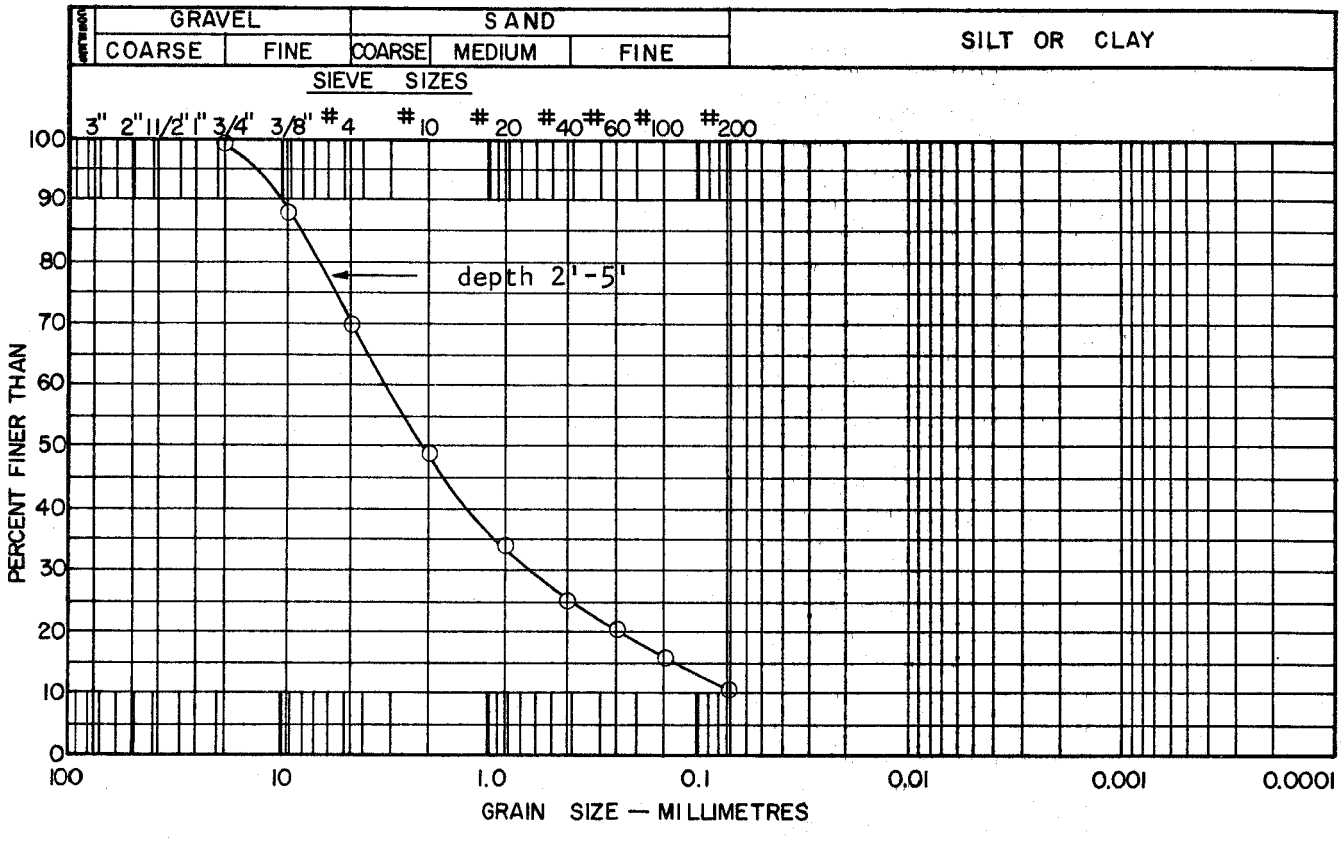
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-114-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	3.8%
Sample 2	depth 4'-5'	7.8%
Sample 3	depth 6'-7'	8.6%

ORGANIC CONTENT

Loss on ignition test
Sample land 2 depth 2'-5' - 1.4%
Color test - sample land 2 depth 2'-5' - Rdg. 2

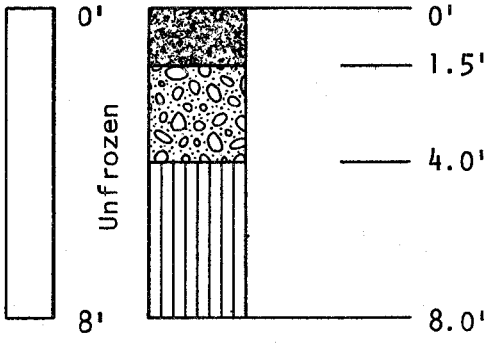
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-114

HR-114-4



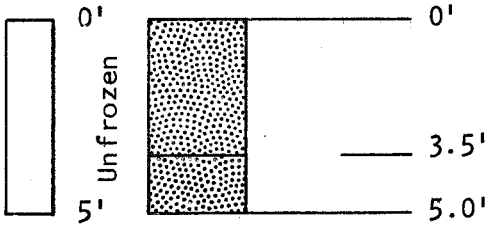
(Pt) PEAT - roots, etc.

(GW-GM) GRAVEL - some sand, little silt, trace clay, roots, well graded, max. 1½"

(ML) SILT - some clay, little sand, trace gravel, medium plastic, (till)

Water at 4' on completion

HR-114-5

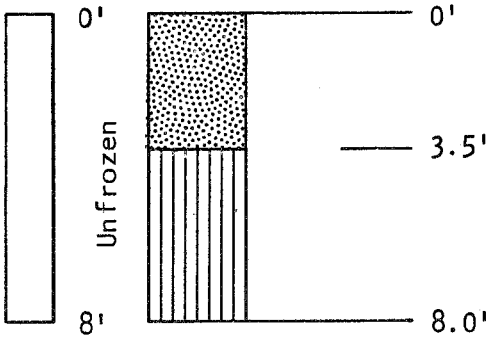


(SW) SAND - some gravel, trace silt, roots, well graded

(SP) SAND - and cobbles, little fine gravel, little silt

Unable to bypass cobbles at 5'

HR-114-6



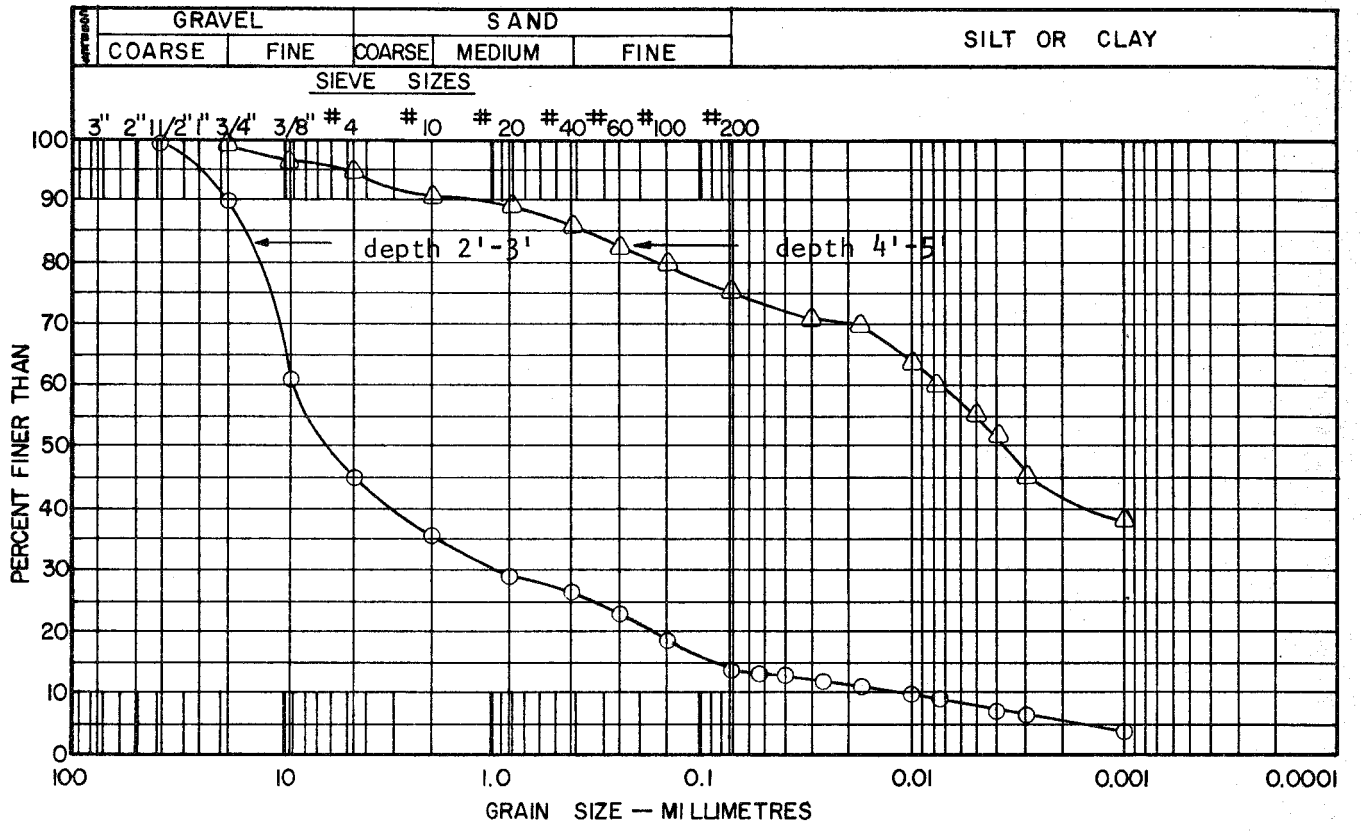
(SW-SM) SAND - and gravel, little silt, trace clay

(ML) SILT - some clay, some gravel to ½", trace sand, medium plastic, (till)

Hole dry on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-114-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	8.3%
Sample 2	depth 4'-5'	14.3%

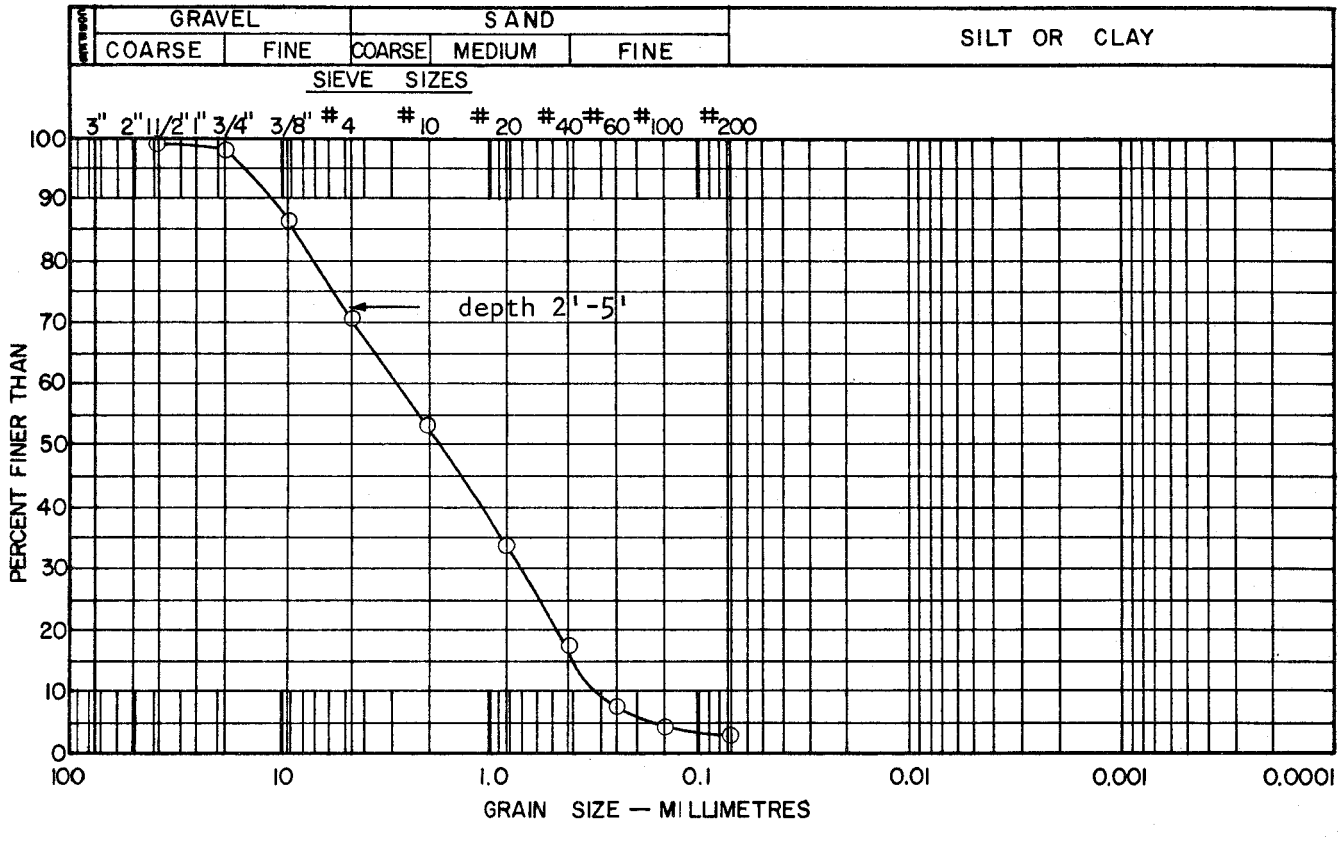
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-114-5

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2'-3' 2.9%
Sample 2 depth 4'-5' 3.1%

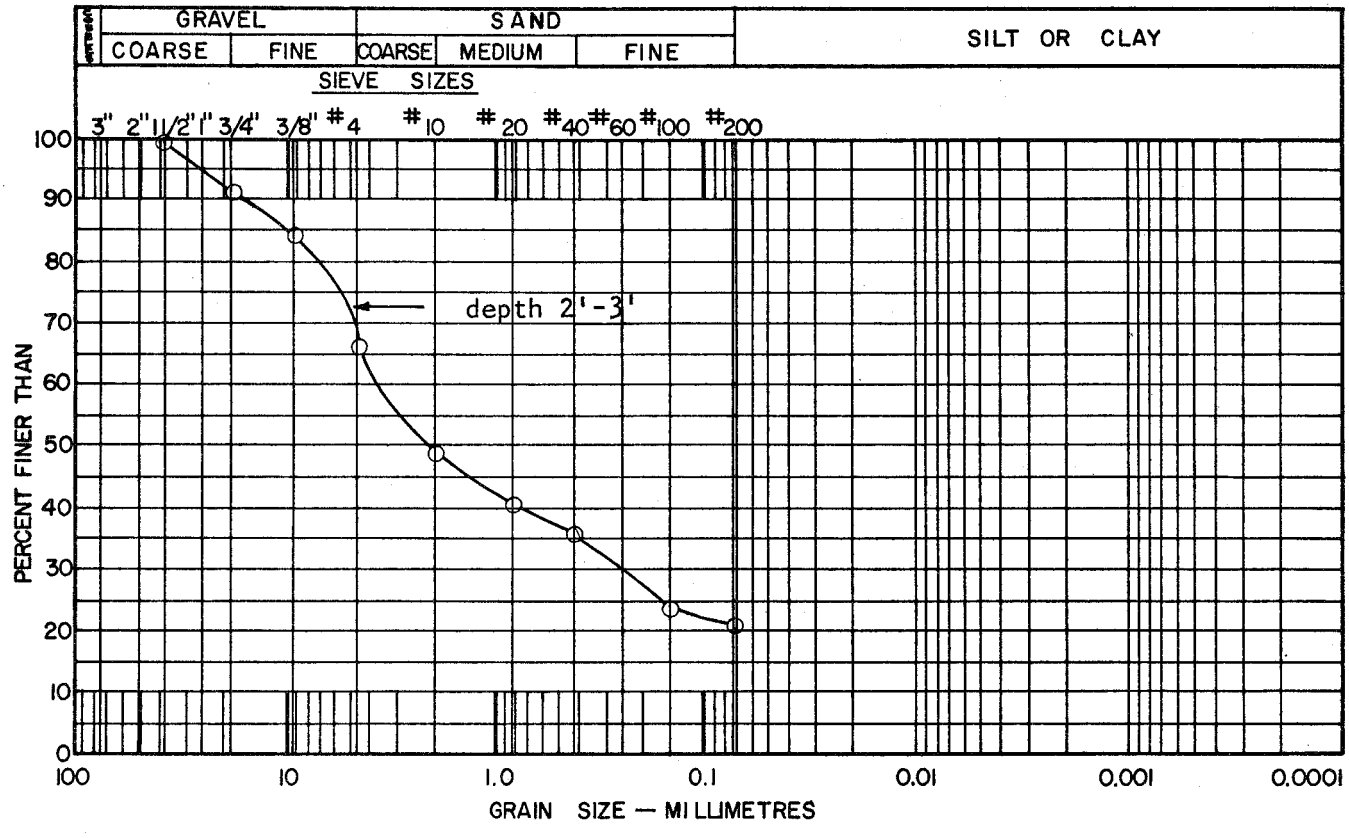
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-114-6

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2'-3' 7.0%
Sample 2 depth 4'-5' 7.9%

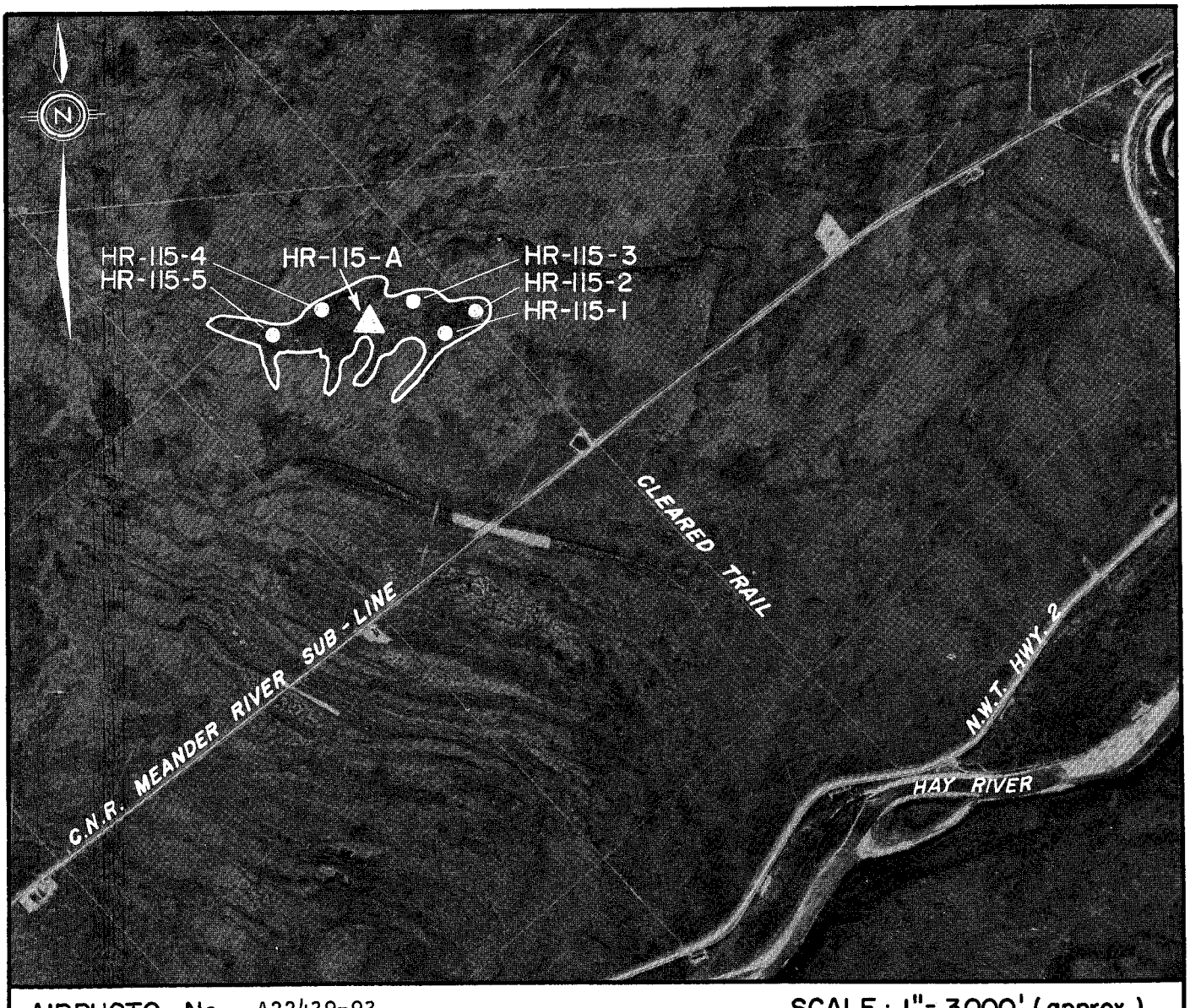
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

HAY RIVER
SOURCE No. HR-115

LANDFORM AND LOCATION:	Esker 5,000 feet long and up to 700 feet wide located 20 miles south of the town of Hay River on Hwy. 2, and 2 miles west along an existing cleared trail.
MATERIAL:	SAND - some gravel to 3", trace of silt.
VOLUME:	Approximately 200,000 cu. yds. above the water table and till.
CONCLUSION:	Deposit is suitable for general fill and for low quality aggregates. Petrographic analysis indicates a percentage of unsound rock which restricts use in high quality concrete or asphalt.



AIRPHOTO No. A22439-93 SCALE : 1"= 3000' (approx.)

HR-115 ENVIRONMENT

Physical

The source is an irregularly shaped esker complex comprised of a number of low, steep sided ridges up to 7 feet higher than the surrounding marshland.

Drainage of the esker is good, however surrounding marshland is poorly drained. Water was encountered at a depth of approximately 8 feet below the ground surface during the drilling of the test holes.

The source has not been developed in the past.

Biotic

The source is very conspicuous in the field, being more heavily wooded than the surrounding flat land. The tree cover on the source is primarily pine up to 50 feet high, with a variable canopy density of 20 to 60%. A portion of the tree cover has been burned by a recent forest fire. The undergrowth consists primarily of tall grasses and scattered bushes.

Wildlife in the area is scarce, being limited to small fur bearing animals and rodents. The area is not actively trapped.

HR-115 MATERIALS AND QUANTITIES

The material is a well graded sand and gravel to a maximum of 3" in diameter, with a trace of silt. The gravel is fine, and a large percentage ranges between the $\frac{1}{4}$ inch and $\frac{1}{2}$ inch size.

A petrographic analysis of gravel from Test Hole #5 indicates the material is primarily hard limestone (44.7%), granite (23.8%), quartzite (10.8%), and soft porous limestone (10.4%), with feldspar porphyry, siltstone, quartz, sandstone, ironstone, chert and mica schist making up the remaining 10.3%. The potentially unsound rocks are soft porous limestone (10.4%), crumbly feldspar porphyry (3.4%), soft sandstone (1.6%), and traces of ironstone, chert, and mica schist.

Organic tests on a selected sample indicates that the average colour code is about 1. A loss on ignition test on a similar sample gave a value of 0.4%.

The extraction of usable granular material from this source will be governed by

the depth to the underlying till and the water table. Assuming an average recovery depth of 2 yards, the volume of material in this source is estimated to be about 200,000 cu. yds.

HR-115 DEVELOPMENT

General

The pit run material is suitable for good quality general fill and with screening for use in low quality concrete.

Access

At present the only access to the source is along the railway right of way or the existing cleared trail which passes through the eastern end of the source. Access along the existing trail is feasible only during the winter months.

For year round access, a 2 mile long all weather road would have to be constructed along the existing cleared trail. Any development of the source will require the installation of a railway crossing near Mile 358 of the line.

Material Use and Handling

The pit run material in this source is suitable for use as general fill. The material not only has a high percentage of unsound rocks that limits use to low quality concrete but lacks the percentage of gravel sizes required for economical processing. These materials should not be used in submerged concrete or in concrete exposed to freezing and thawing.

Development of the source will require the usual assembly of bulldozer, loader and trucks. As an alternative, materials could also be hauled to the community by rail.

Stripping and Restoration

All trees will have to be cut and disposed of by burning. The depth of stripping on the esker is less than 6 inches. These materials can be stored adjacent to that area of the source being developed.

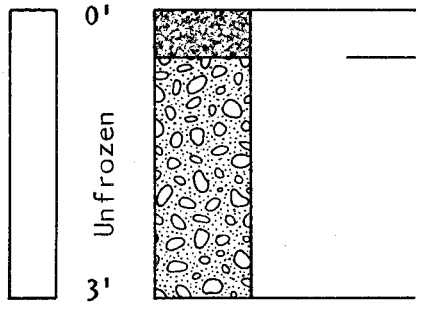
After depletion of the sand and gravel, the stripped material can be used to cover the slopes and the bottom of the pit area.

Finally, the area should be seeded for speedy re-vegetation.

TEST PIT LOGS

SOURCE No. HR-115

HR-115-A



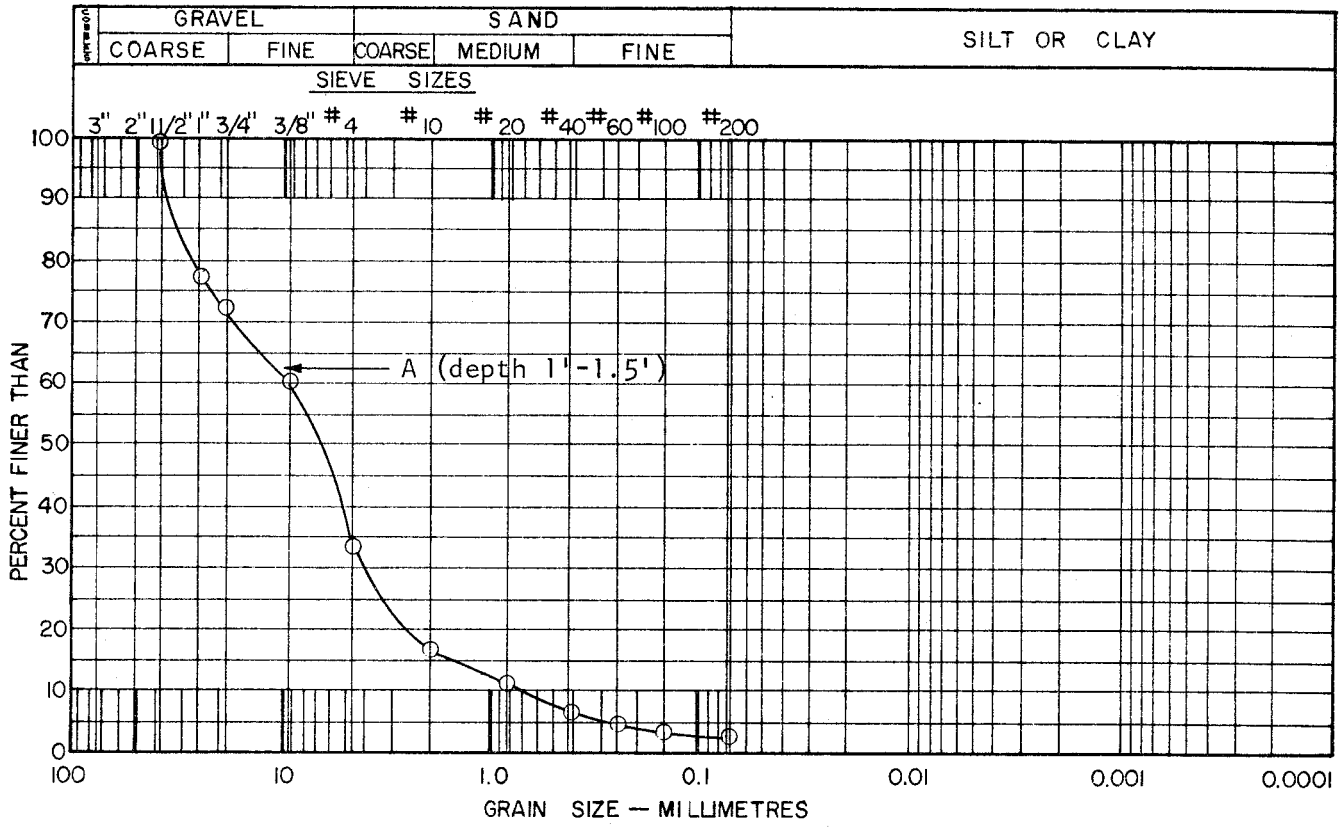
(OL) SILT - topsoil

(GP) GRAVEL - some medium-to-coarse sand, trace silt, max. 3"

Water at 3' on completion

LABORATORY
TEST DATA
TEST PIT - SOURCE No. HR - 115

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

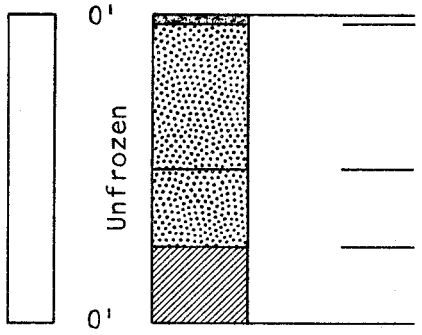
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-115

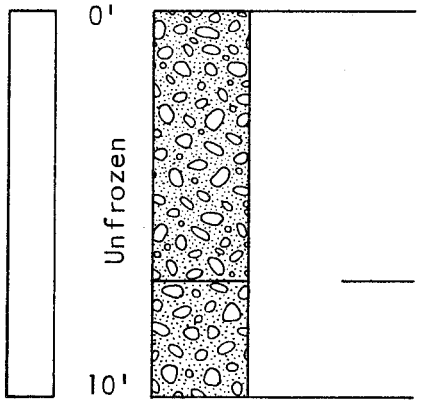
HR-115-1



(OL)	SILT -	trace cobbles to 4", topsoil, roots
(SW)	SAND -	and fine gravel, trace silt
(SW)	SAND -	some fine gravel, trace silt, well graded, brown
(CL)	CLAY -	some silt, some gravel, little sand, med. plastic, brown-grey, (till)

Hole dry on completion

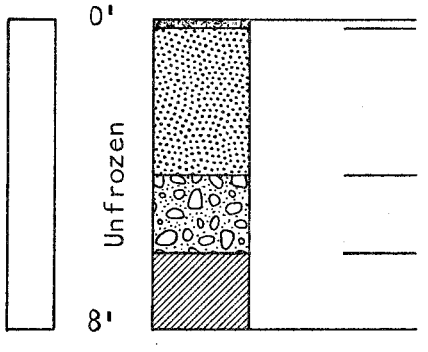
HR-115-2



(GW-SW)	GRAVEL and SAND -	trace silt, max. 1", well graded, clean
(GP)	GRAVEL -	little sand, little silt, little clay, grey

Water at 8' on completion

HR-115-3

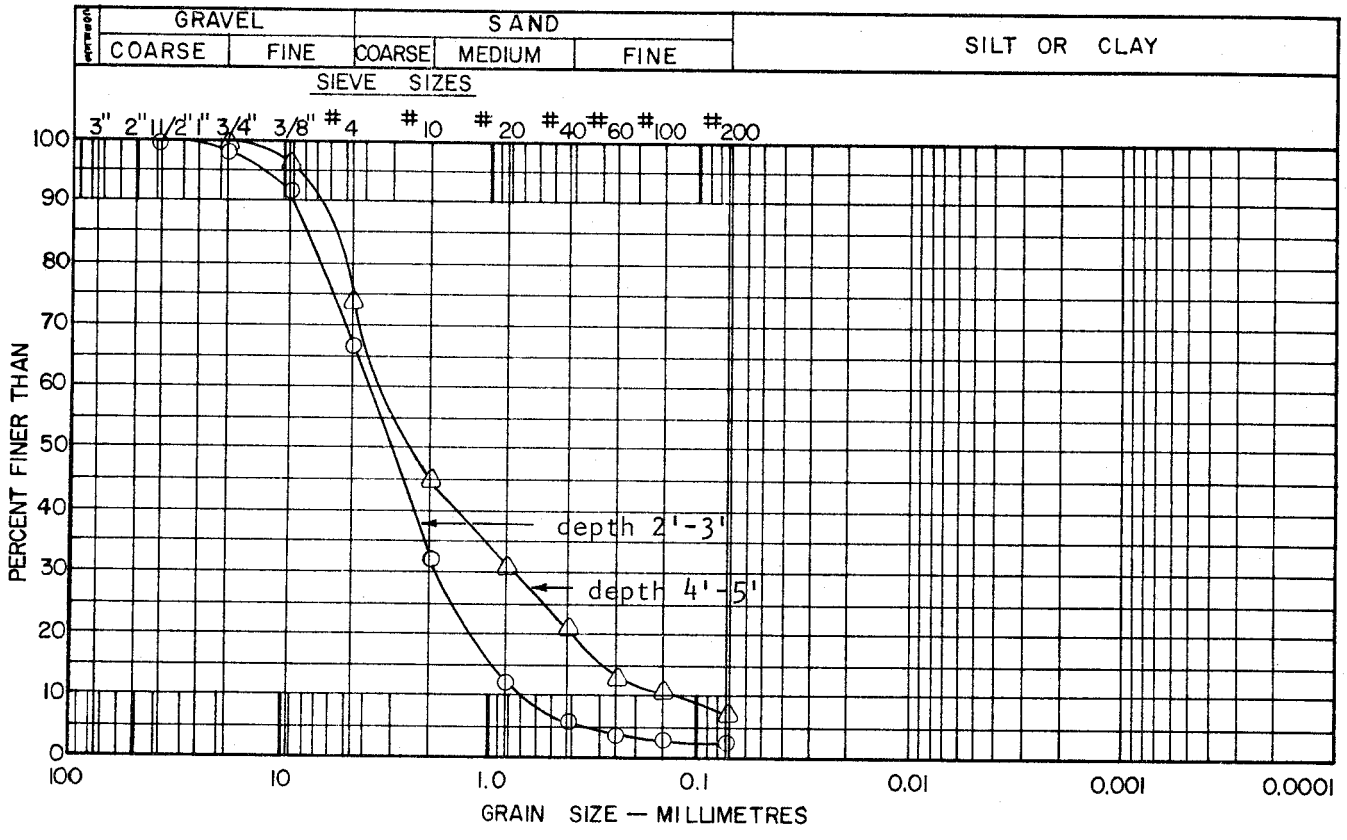


(OL)	SILT -	topsoil, roots
(SW)	SAND -	and gravel to 1", trace silt, clean
(GW)	GRAVEL -	and sand, trace silt, trace clay, well graded
(CL)	CLAY -	some gravel, little silt, trace sand, grey, (till)

Water at 7' on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-115-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.7%
Sample 2	depth 4'-5'	6.4%
Sample 3	depth 6'-7'	10.9%

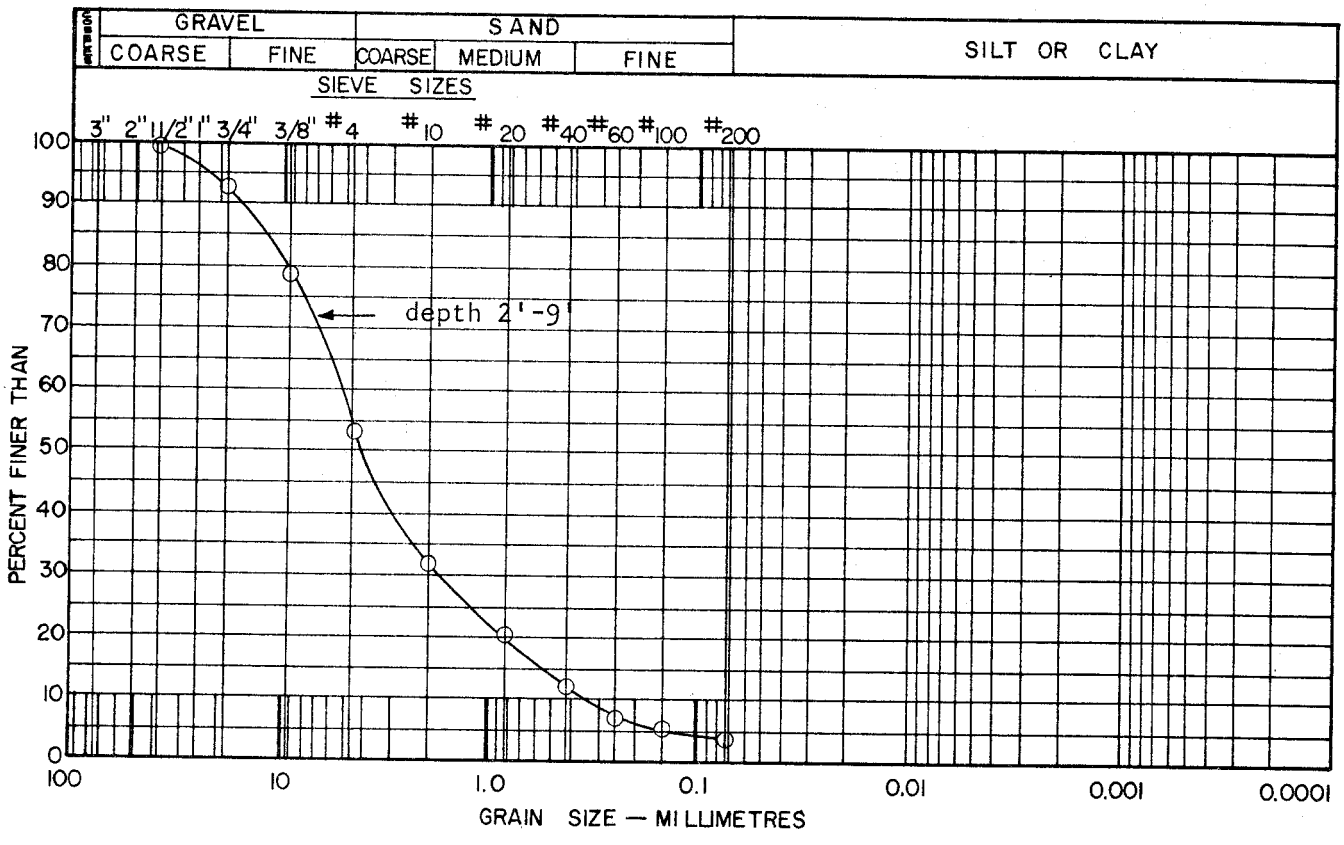
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-115-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.6%
Sample 2	depth 4'-5'	3.6%
Sample 3	depth 6'-7'	4.9%
Sample 4	depth 8'-9'	6.4%

ORGANIC CONTENT

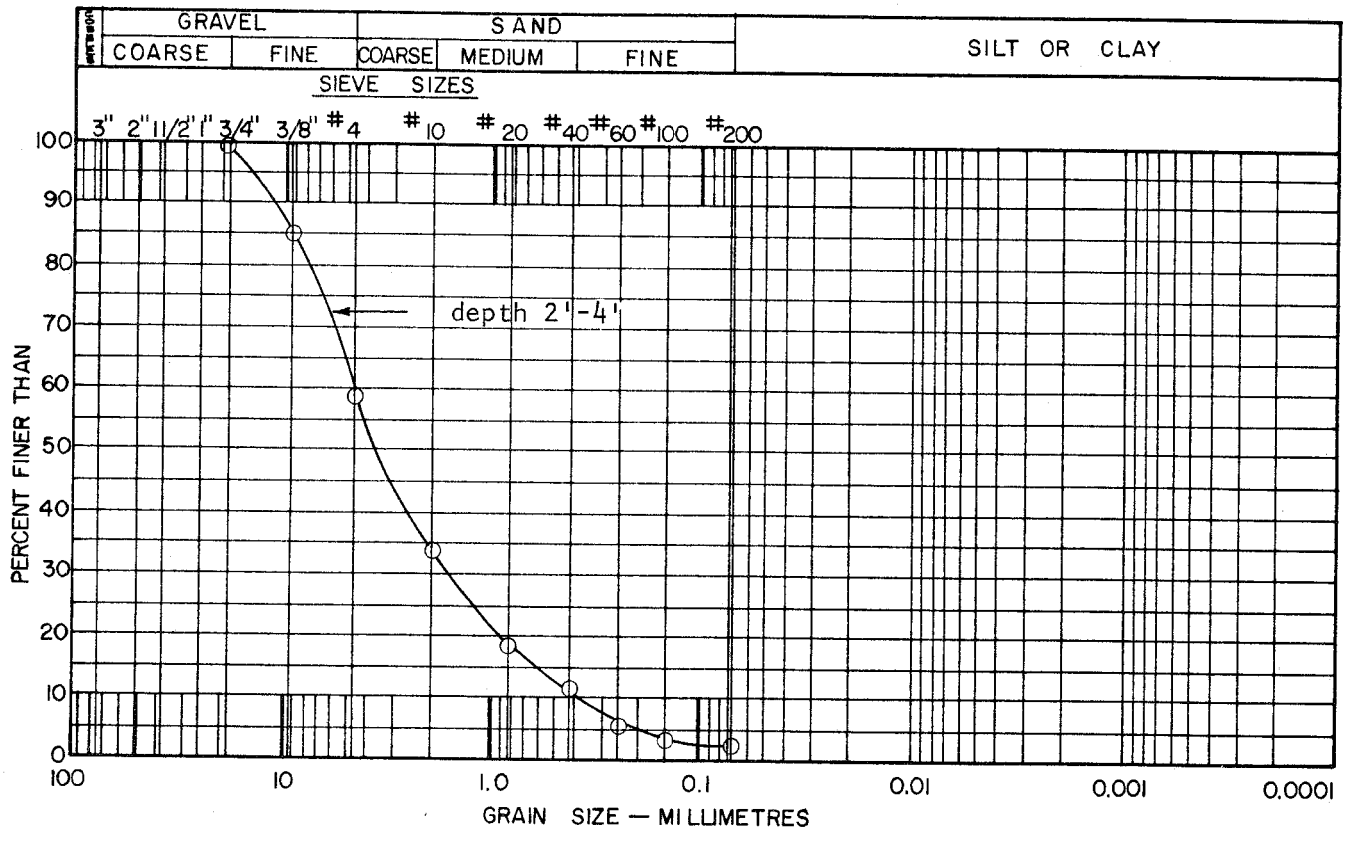
Loss on ignition test
Samples 1 to 4 depth 2'-9' - 0.4%
Color test - samples 1 to 4 depth 2'-9' - Rdg. 1

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-115-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	4.2%
Sample 2	depth 4'-5'	6.0%
Sample 3	depth 6'-7'	9.7%

ORGANIC CONTENT

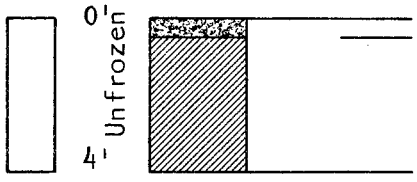
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-115

HR-115-4



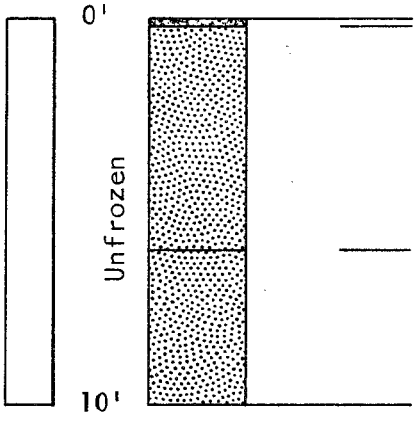
0'			
0.5'	(OL)	SILT -	topsoil, roots, etc.
	(CL)	CLAY -	some silt, some gravel, trace sand, medium plastic, grey, till
4.0'			

Hole dry on completion

Moisture Content:

Sample 1 depth 2'-3' 11.5%

HR-115-5

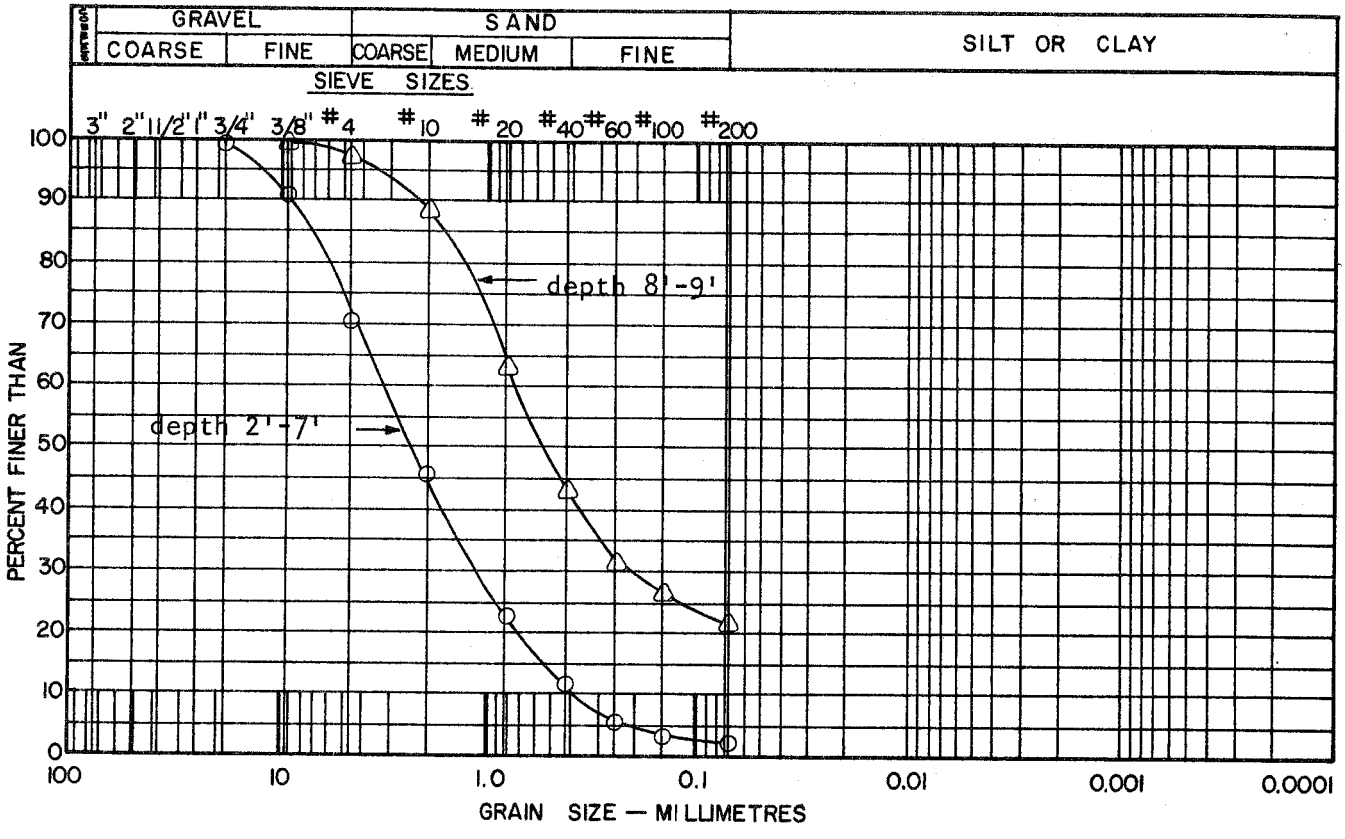


0'			
0.2'	(OL)	SILT -	topsoil, roots, moss
	(SW)	SAND -	little fine gravel, trace silt, well graded
6.0'			
	(SW-SM)	SAND -	some silt, trace fine gravel
10.0'			

Hole dry on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-115-5

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.4%
Sample 2	depth 4'-5'	2.9%
Sample 3	depth 6'-7'	4.3%
Sample 4	depth 8'-9'	5.8%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

Hard limestone	44.7%	Siltstone	2.5%
Granites	23.8%	Quartz	1.6%
Quartzite	10.8%	Sandstone	1.6%
Soft porous limestone	10.4%	Ironstone	0.5%
Feldspar Porphyry	3.4%	Chert	0.4%
		Mica Schist	0.3%
		Total	100%

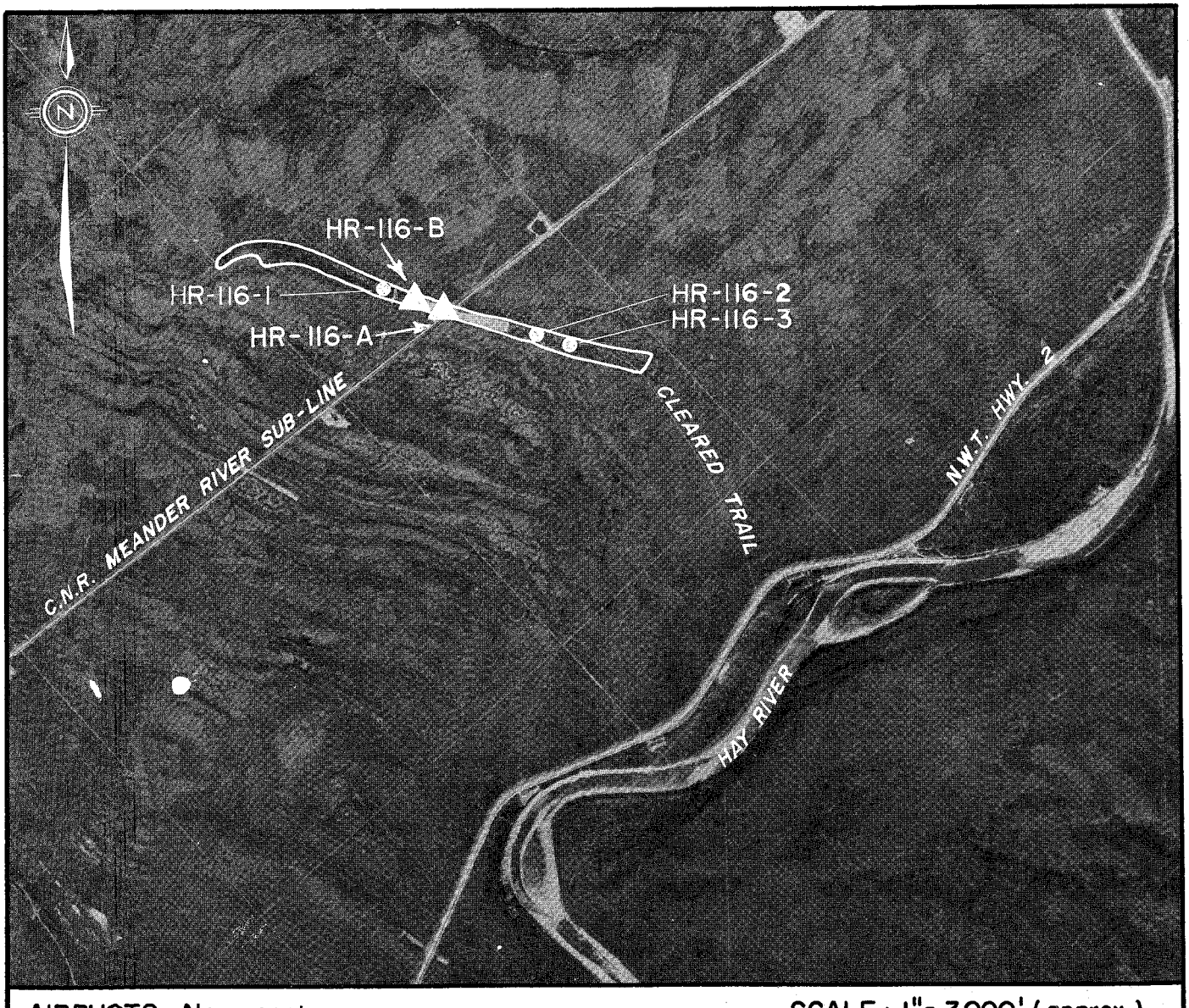
HAY RIVER
SOURCE No. HR-116

LANDFORM AND LOCATION: Esker 8,000 feet long by up to 200 feet wide straddles the C.N.R.-Railway and is located 21 miles south of the town of Hay River on Hwy. 2 plus 1.5 miles west along an existing cleared trail.

MATERIAL: SAND - gap graded, little gravel, trace silt.

VOLUME: Approximately 200,000 cu. yds. above the water table.

CONCLUSION: Pit run material is suitable for general fill and for low quality aggregates for use in small local projects.



AIRPHOTO No. A22439-93 SCALE : 1"= 3000' (approx.)

HR-116 ENVIRONMENT

Physical

The source is an esker about 8,000 feet long, 100 to 200 feet wide, and 5 to 10 feet high. The esker is well drained although the surrounding flat areas are poorly drained. The water table was encountered at about 7 feet in all test holes.

The source was partially developed by C.N.R. during construction of the railway line.

Biotic

The tree cover on the source is primarily pine to 40 feet in height, with sparse poplar and spruce growth. The undergrowth is tall grass with scattered bushes.

Wildlife in the area is scarce, being limited to small fur bearing animals or rodents. The general area is not actively trapped.

HR-116 MATERIALS AND QUANTITIES

The material in this source is a poorly graded clean sand, with a little fine gravel to 1½ inches in diameter, and a trace of silt. The material becomes slightly coarser with depth.

Based on an average recovery depth of 7 feet, the volume of material in this source is estimated to be about 200,000 cu. yds.

HR-116 DEVELOPMENT

General

The pit run material is suitable for good quality general fill and with processing could be used for production of fine aggregate. The source should be considered for development in conjunction with Sources HR-114 and 115.

Access

At present, year-round access to the source is provided by the C.N.R. railway line. Winter access is also provided by a cleared trail from N.W.T. Hwy. 2 to the eastern end of the source. For year-round access by road, a 1.5 mile long

all-weather road would have to be constructed along the existing cleared trail. The entrance to the source from the highway is 21 miles south of the community. Any development of the western part of the source will require the installation of a railway crossing near Mile 357.7 of the C.N.R. Meander River Sub-line.

Material Use and Handling

The pit run materials are suitable for general fill. They also have a potential, with processing, for use as fine aggregates. The processed fine aggregates will be coarse and blending sand will likely be required to meet specifications. The natural materials contain such a small percentage of coarse aggregate sizes that any processing of the materials would be uneconomical.

The development of the source will require the usual assembly of equipment including bulldozer, front-end loader and trucks. As an alternate, materials could also be hauled to the community by rail.

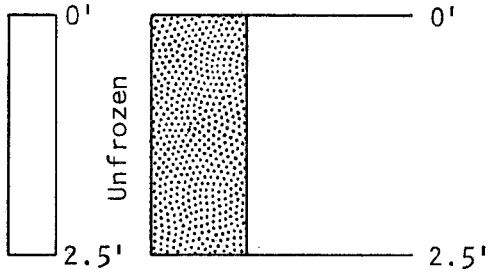
Stripping and Restoration

All trees will have to be cut and disposed of by burning. The depth of stripping on the esker is less than 6 inches. These materials can be stored adjacent to that area of the source being developed.

After depletion of the sand and gravel, the stripped material can be used to cover the slopes and the bottom of the pit area. Finally, the area should be seeded for speedy revegetation.

TEST PIT LOGS
SOURCE No. HR-116

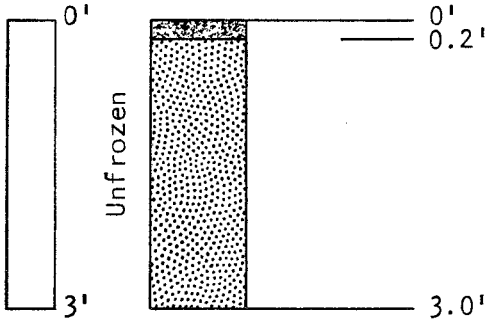
HR-116-A



(SP) SAND - trace gravel, fine, clean, gap graded

Soil profile as logged from pit face

HR-116-B



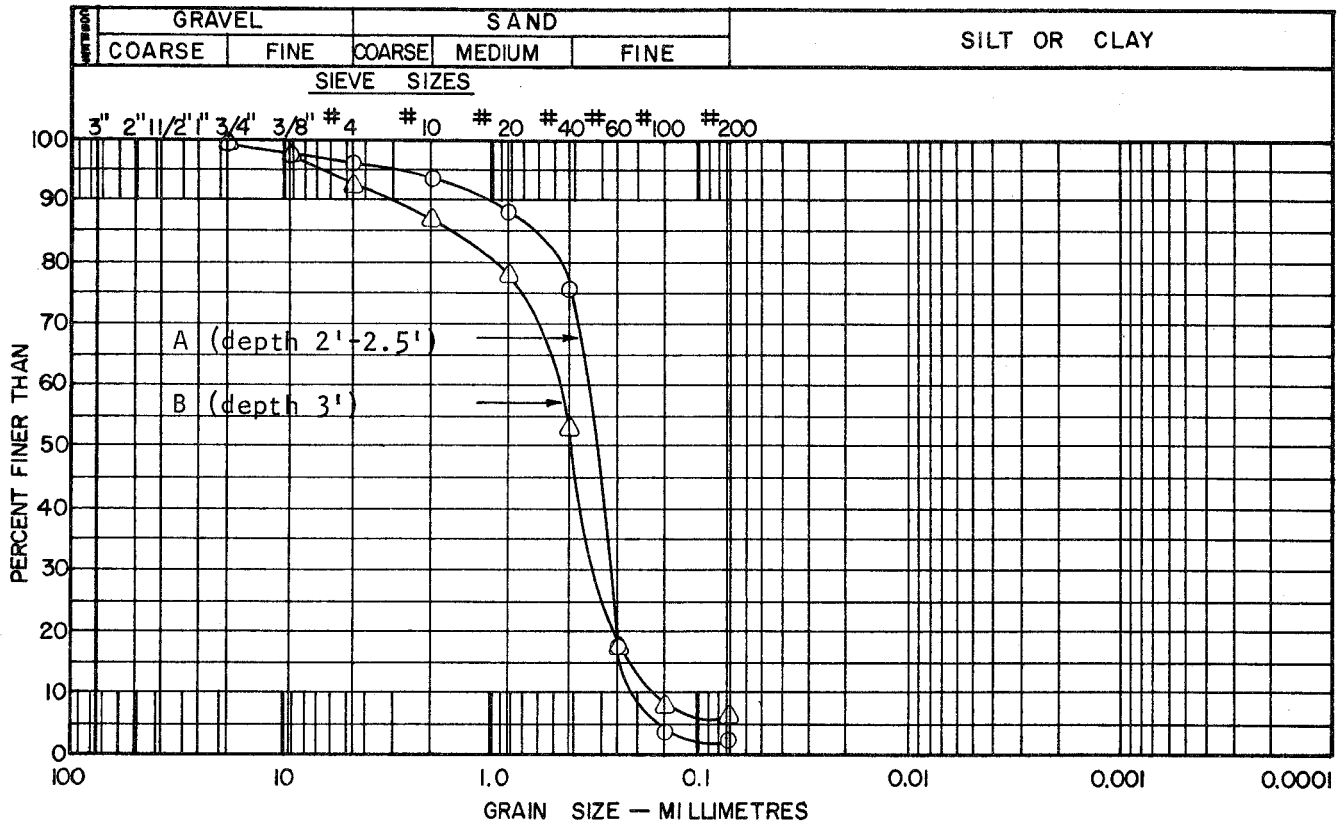
(OL) SILT - and sand

(SP) SAND - trace gravel to 1", fine uniform gradation

Test pit dug below bottom of existing pit

LABORATORY
TEST DATA
SOURCE No. HR-116

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

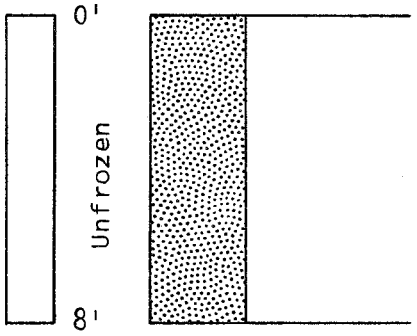
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-116

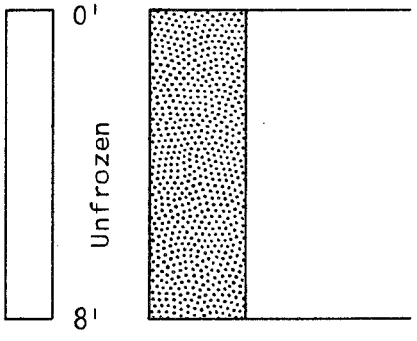
HR-116-1



(SW) SAND - little fine gravel to ½", trace silt, gap graded, clean, interbedded

Water at 7' on completion

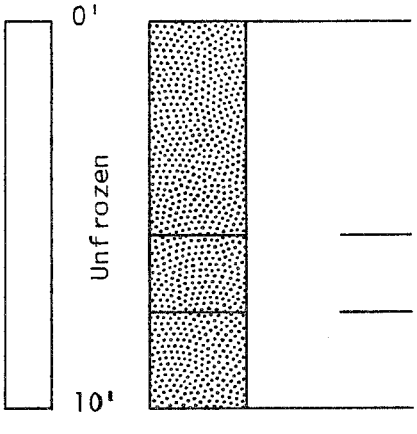
HR-116-2



(SW) SAND - little fine gravel to 1", trace silt, well graded, clean, interbedded

Water at 7' on completion

HR-116-3



(SW) SAND - little fine gravel, trace silt

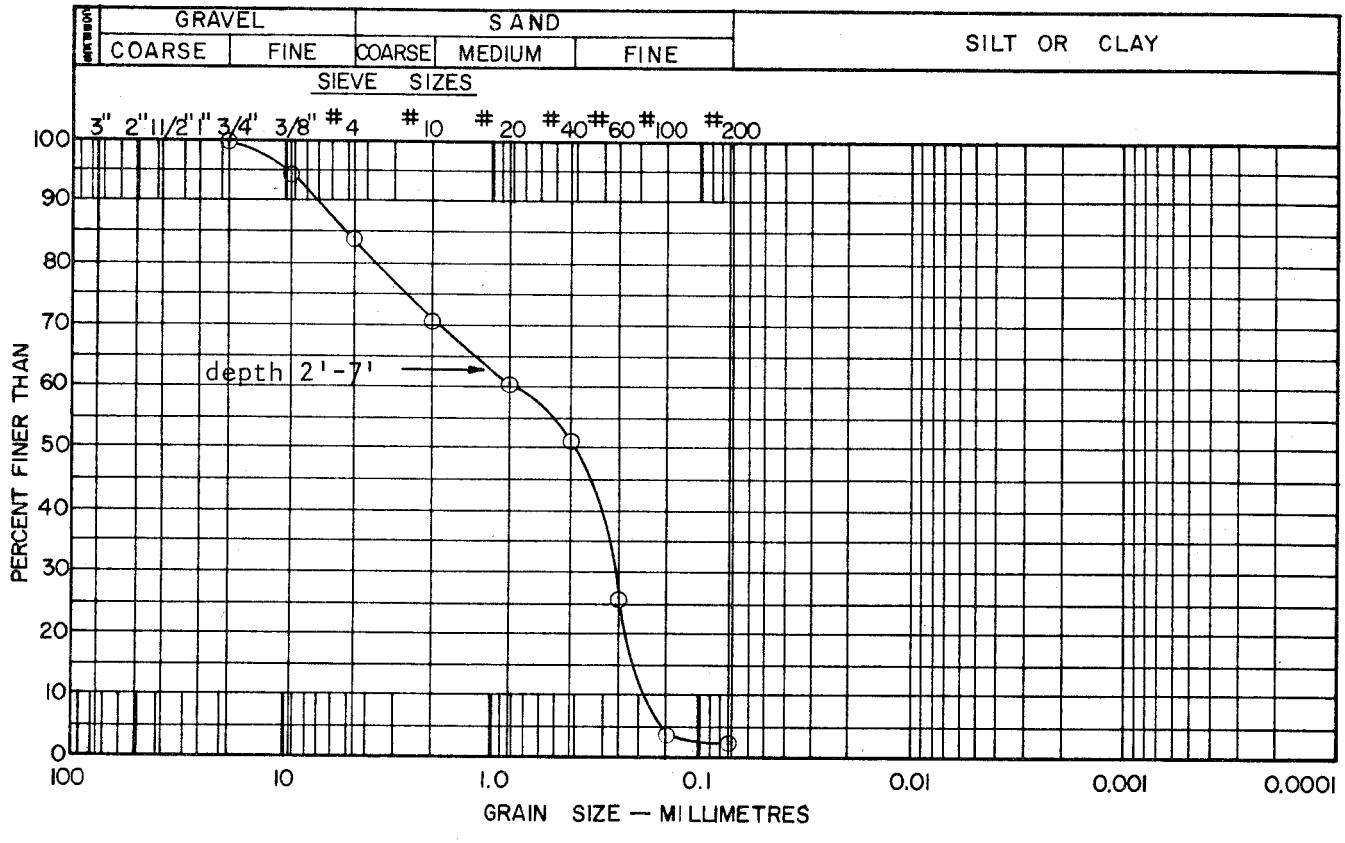
(SW) SAND - and gravel to 1½", trace silt, mostly fine

(SW) SAND - some fine gravel to ½", trace silt

Water at 7.5' on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-116-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.6%
Sample 2	depth 4'-5'	4.0%
Sample 3	depth 6'-7'	13.2%

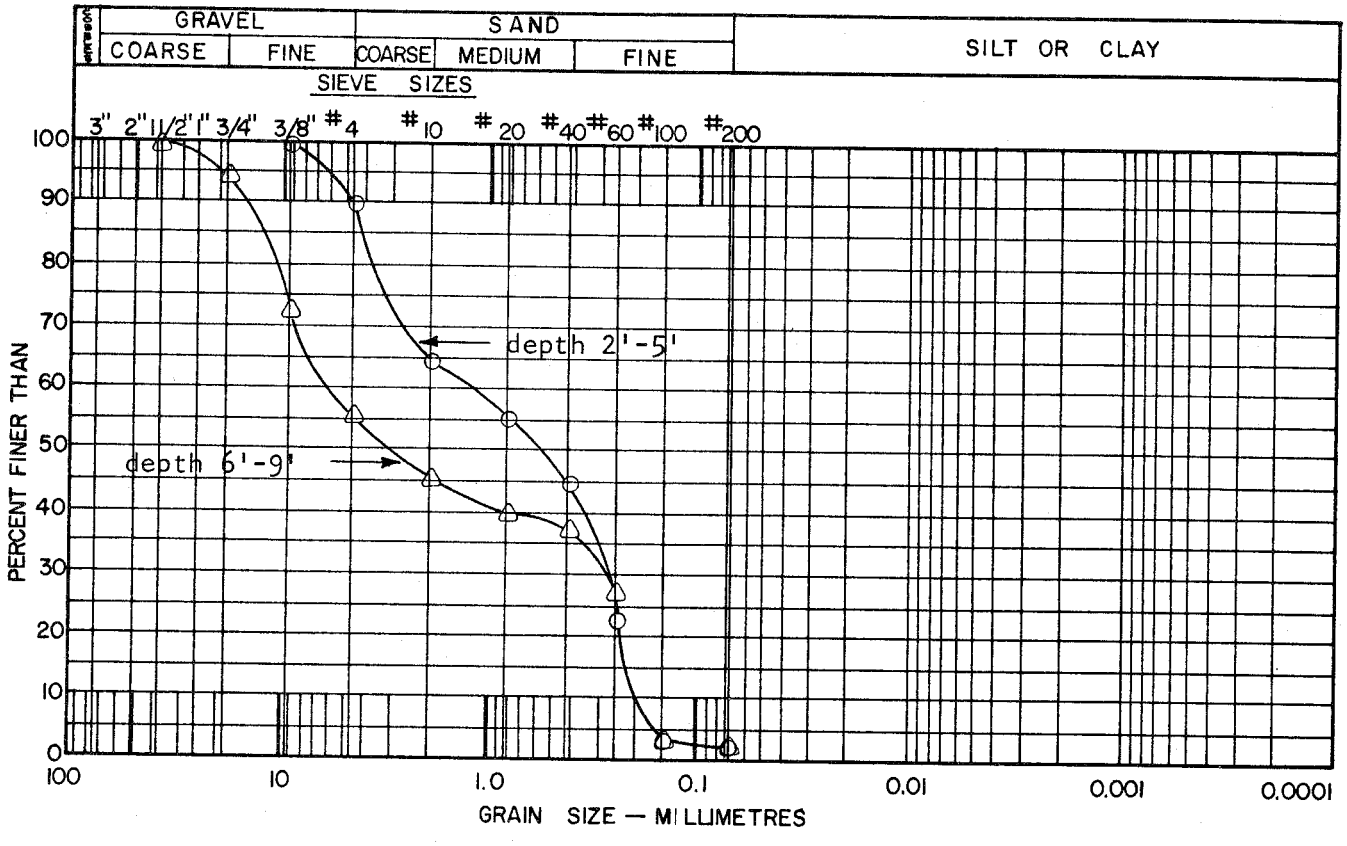
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-116-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.6%
Sample 2	depth 4'-5'	9.5%
Sample 3	depth 6'-7'	8.8%
Sample 4	depth 8'-9'	14.2%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

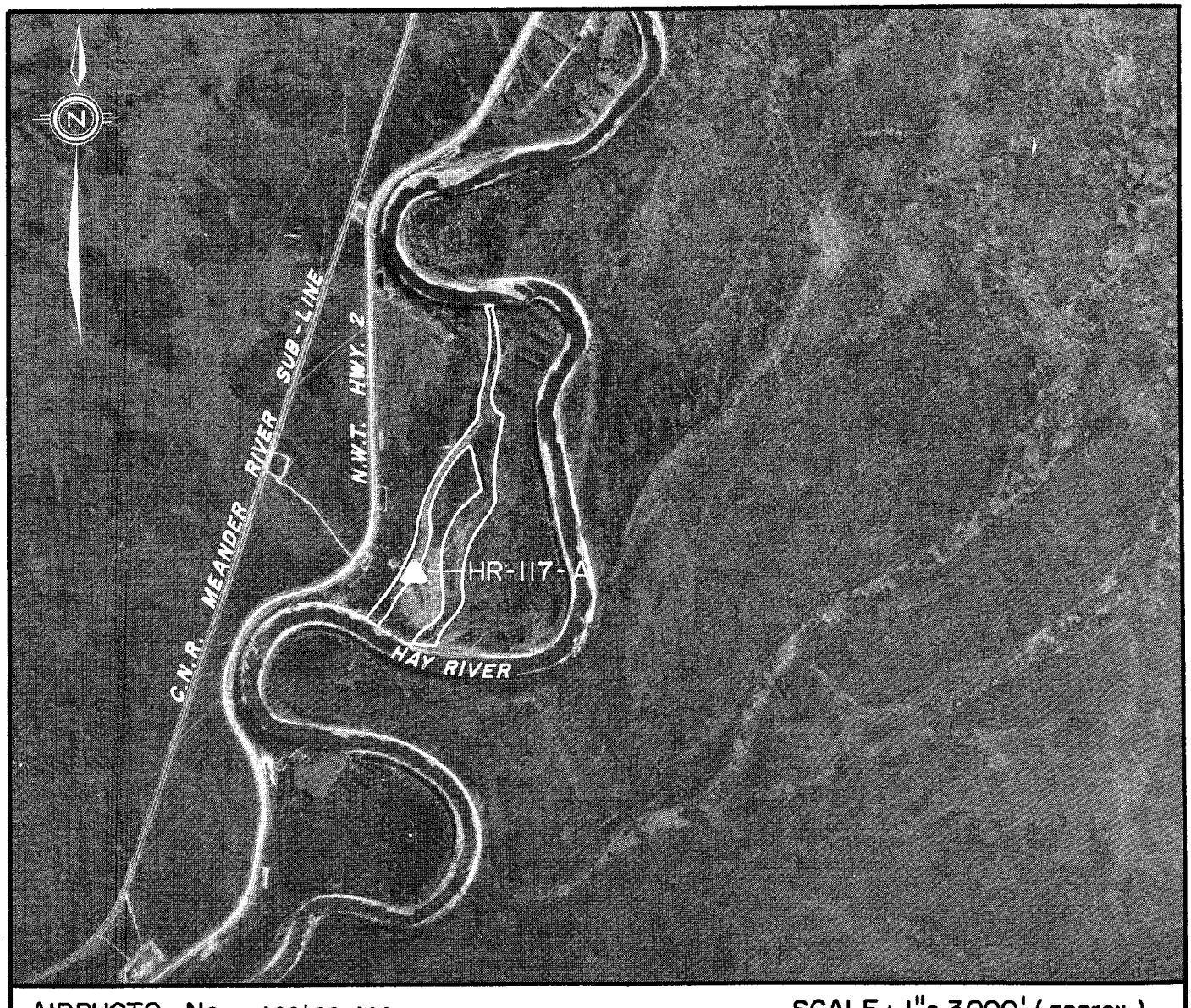
HAY RIVER
SOURCE No. HR-117A

LANDFORM AND LOCATION: Former flood plain of the Hay River located 10 miles south of the community close to N.W.T. Hwy. 2, plus ½ mile to the east.

MATERIAL: SILT - and sand, little clay, trace gravel.

VOLUME: 100,000 cu. yds. at least.

CONCLUSION: Deposit not recommended for development as the material has a high silt content. No drilling carried out because source is located on private property.



AIRPHOTO No. A22432-111 SCALE : 1"= 3000' (approx.)

HR-117A ENVIRONMENT

Physical

This deposit is located ½ mile east of N.W.T. Hwy. 2, about 10 miles south of the community. The source is wish-bone shaped, probably a former river channel, about 6,000 feet long, and 300 feet wide. Drainage is good.

The source has not been developed.

Biotic

Forest cover on the feature is largely poplar to 45 feet high, with undergrowth of grass and moss. The area contains no noteworthy wildlife although it is adjacent to Hay River which is an important fishing locality.

HR-117A MATERIALS AND QUANTITIES

No drilling was carried out at this source due to its location on private property. One shallow test pit dug during field reconnaissance shows 2 feet of silt and clay overlying silt and sand to 3½ feet. Drilling would be required to check the quality and quantity of materials and to determine whether coarse granular materials exist at depth below existing ground surface.

The volume of material is estimated to be at least 100,000 cu. yds.

HR-117A DEVELOPMENT

General

The shallow surface materials are low quality with a high proportion of silt. The source is not recommended for development due to the poor quality material and because of its location on private property.

Material Use and Handling

Due to the high silt content, the surface materials would provide only a very poor grade of general fill. As a fill it would be susceptible to frost and liable to heave in winter.

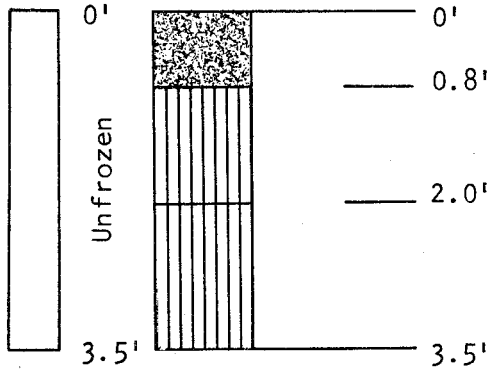
The equipment required to develop the source would be dozer, front-end loaders, and trucks.

Stripping and Restoration

If the source is developed, all trees and bushes should be cleared and burned. The organic cover and topsoil should be stripped and stockpiled for later restoration of the site. All stockpiles should be sited so as to prevent any siltation into the river.

TEST PIT LOGS
SOURCE No. HR-117A

HR-117A-A



(OL) SILT - and sand, topsoil, roots

(ML) SILT - some clay, little sand, trace gravel

(ML) SILT - and sand, little clay, trace gravel

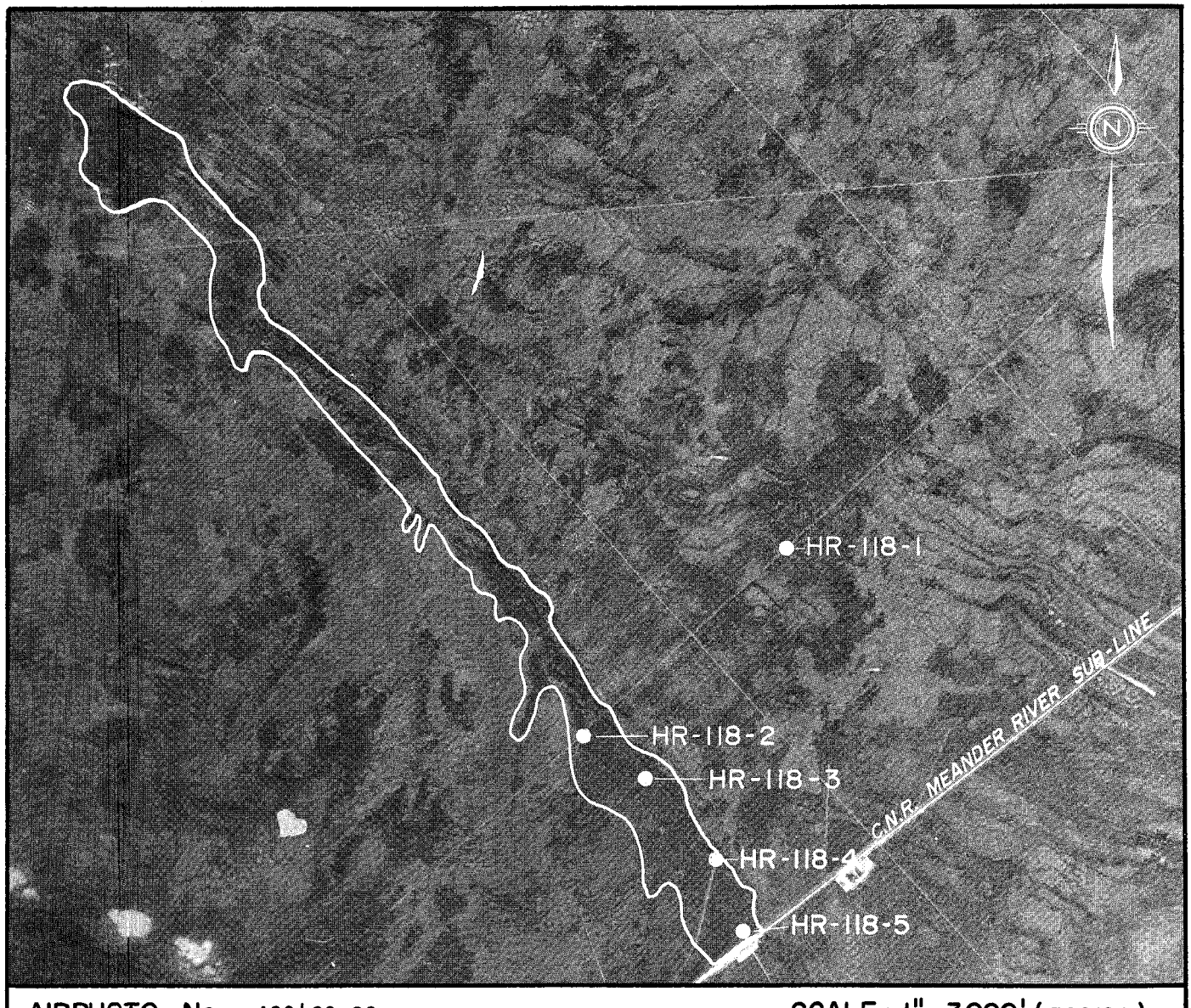
HAY RIVER
SOURCE No. HR-118

LANDFORM AND LOCATION: Shallow outwash deposit overlying glacial till and bedrock. Located 24 miles south of the community along N.W.T. Hwy. 2, then 2 miles west along an existing cleared trail.

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

VOLUME: Approximately 800,000 cu. yds. above the glacial till deposit.

CONCLUSION: Deposit is suitable for development as a source of general fill. Deposit consists of a shallow outwash veneer overlying a glacial till. Additional materials, suitable for general fill, can be obtained from the glacial till deposits.



AIRPHOTO No. A22439-93 SCALE : 1"= 3000' (approx.)

HR-118 ENVIRONMENT

Physical

The source is a long narrow outwash complex overlying glacial till and bedrock. The source is about 4 miles long, 500 to 1,000 feet wide, and 3 to 5 feet high.

The source has very good drainage and all test holes were dry on completion of drilling. It is flanked on both sides by low lying marshland.

The source lies adjacent to the C.N.R. railway line and immediately northwest of Source HR-100. It is undeveloped at the present time.

Biotic

Vegetation consists of moss and grasses with a relatively dense cover of spruce, poplar and sparse pine up to 40 feet high.

The source does not lie within any critical or important wildlife area, but supports a population of small fur-bearing animals and rodents.

HR-118 MATERIALS AND QUANTITIES

The material in this source appears to consist of a thin veneer of variable outwash materials overlying a glacial till. The glacial till is underlain at depth by bedrock.

The outwash materials generally consist of sand and gravel with a little silt, and has an average thickness of about 3 feet. The underlying glacial till has varying percentages of gravel, sand, clay or silt. The percentage of silt can be as high as 70%. The moisture content of the glacial till materials is low and ranges between 5 and 12%.

Based on an average recovery depth of 3 feet in the outwash veneer, the volume of material in this source is estimated to be about 800,000 cu. yds. Additional volumes could be obtained by excavating the glacial till materials.

HR-118 DEVELOPMENT

General

The source is suitable only for general fill because of the variation in silt

content and the shallow depth of recovery above the glacial till.

Access

The source is located about 24 miles south of the community along N.W.T. Hwy. 2, then 2 miles west along an existing trail through Source HR-100 to the railway track.

For all-weather access to the southeastern end of the source, the existing trail through Source HR-100 will have to be improved.

Any development of the source will require the installation of a temporary railway crossing near Mile 355½ of the C.N.R. Meander River Sub-line.

Material Use and Handling

The shallow surface materials and the underlying glacial till are suitable for general fill.

The development of this source will require the usual assembly of equipment including a bulldozer, a front-end loader and trucks. As an alternate to trucking, the materials could be hauled to the community by rail.

Stripping and Restoration

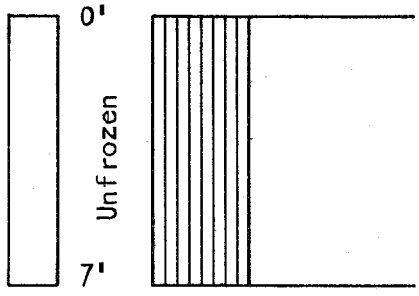
All trees will have to be cut and disposed of by burning. The depth of stripping on the source varies between a few inches and 1 foot. These materials can be stockpiled adjacent to that area of the source being developed.

After depletion of the sand and gravel, the stripped material can be used to cover the slopes and the bottom of the pit area. Finally, the area should be seeded for speedy revegetation.

TEST HOLE LOGS

SOURCE No. HR-118

HR-118-1



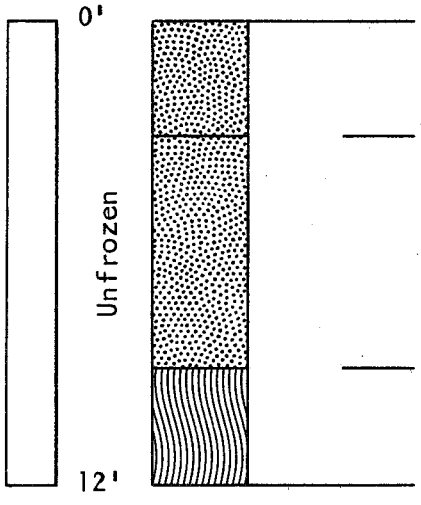
(ML) SILT - some clay, little gravel, little sand, low plastic, (till)

Hole dry on completion

Moisture Content:

Sample 1	depth 2'-3'	9.0%
Sample 2	depth 4'-5'	11.0%

HR-118-2



(SW-SM) SAND and GRAVEL - some silt, trace cobbles

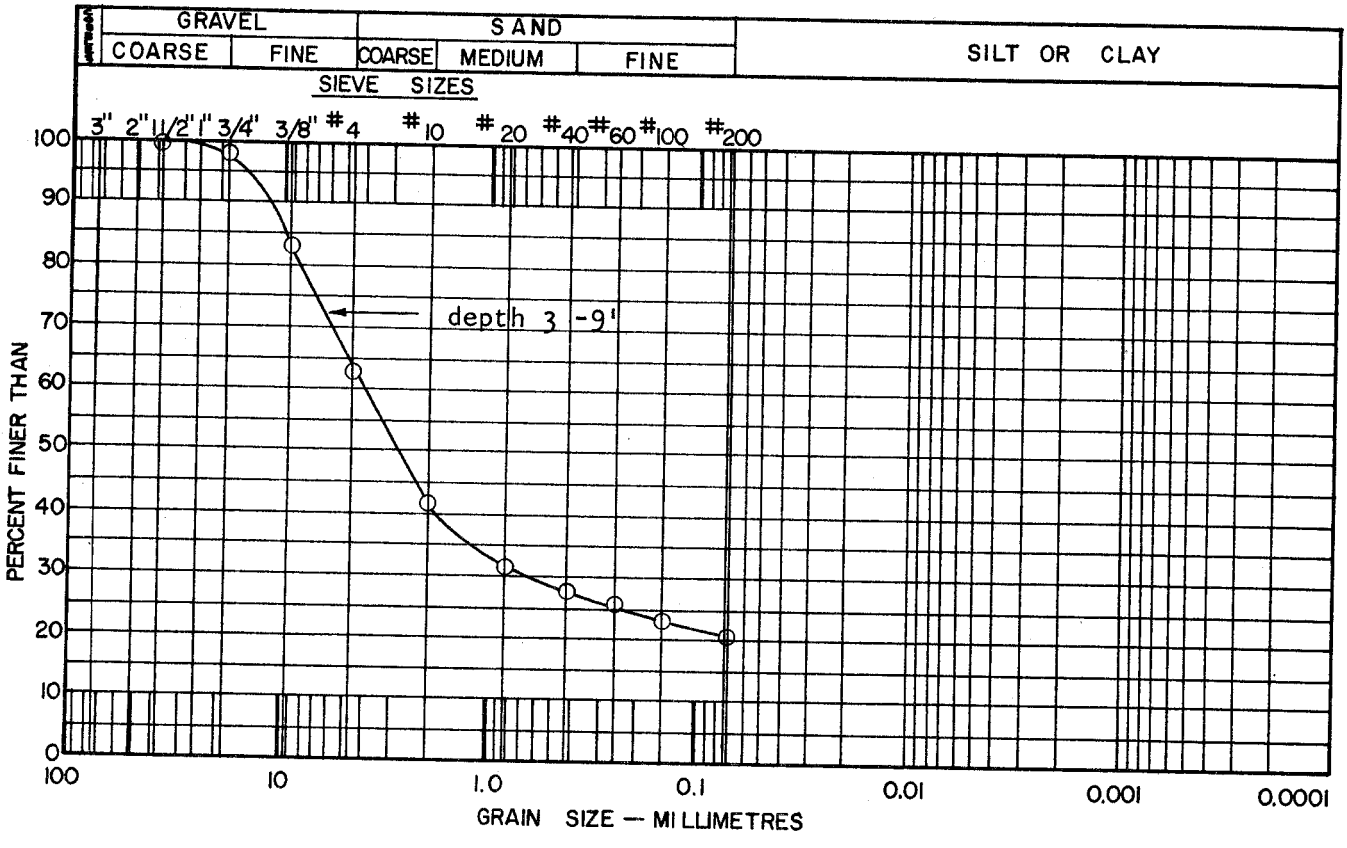
(SM) SAND - some fine gravel to 1", some silt, gravel ground up, low plastic,(till)

SHALE - light grey

Hole dry on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-118-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	4.8%
Sample 2	depth 4'-5'	6.0%
Sample 3	depth 6'-7'	7.9%
Sample 4	depth 8'-9'	5.9%
Sample 5	depth 10'-11'	6.1%

ORGANIC CONTENT

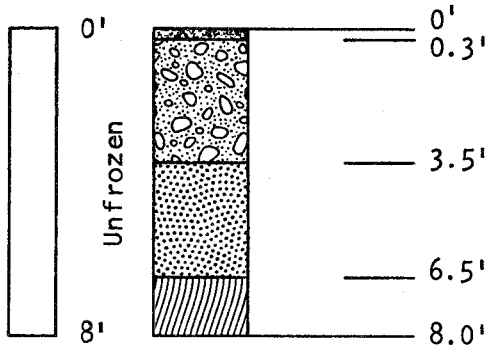
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-118

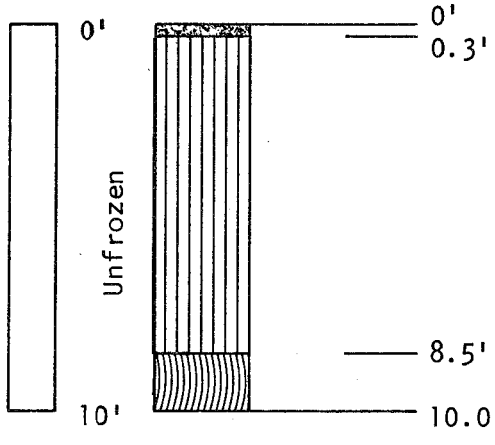
HR-118-3



(OL)	SILT - topsoil, roots
(GW-GM)	GRAVEL - some sand, some silt, roots, well graded, max. ½"
(SW-SM)	SAND - and gravel, some silt, low plastic, brown, (till)
	SHALE - low plastic, grey

Hole dry on completion

HR-118-4

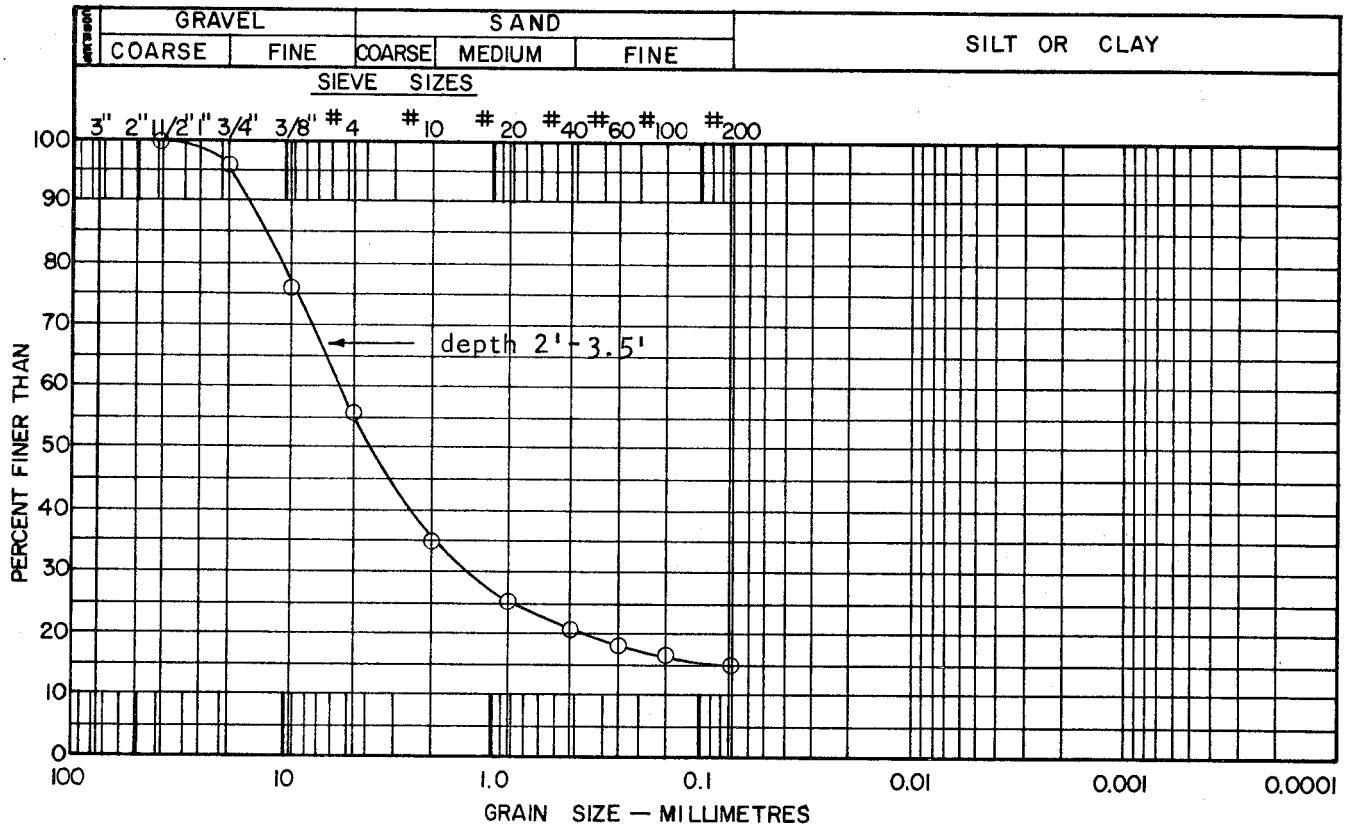


(OL)	SILT - topsoil
(ML)	SILT - little gravel, little sand, trace clay, low plastic, (till)
	SHALE - grey

Hole dry on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-118-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	4.5%
Sample 2	depth 4'-5'	5.7%
Sample 3	depth 6'-7'	3.8%

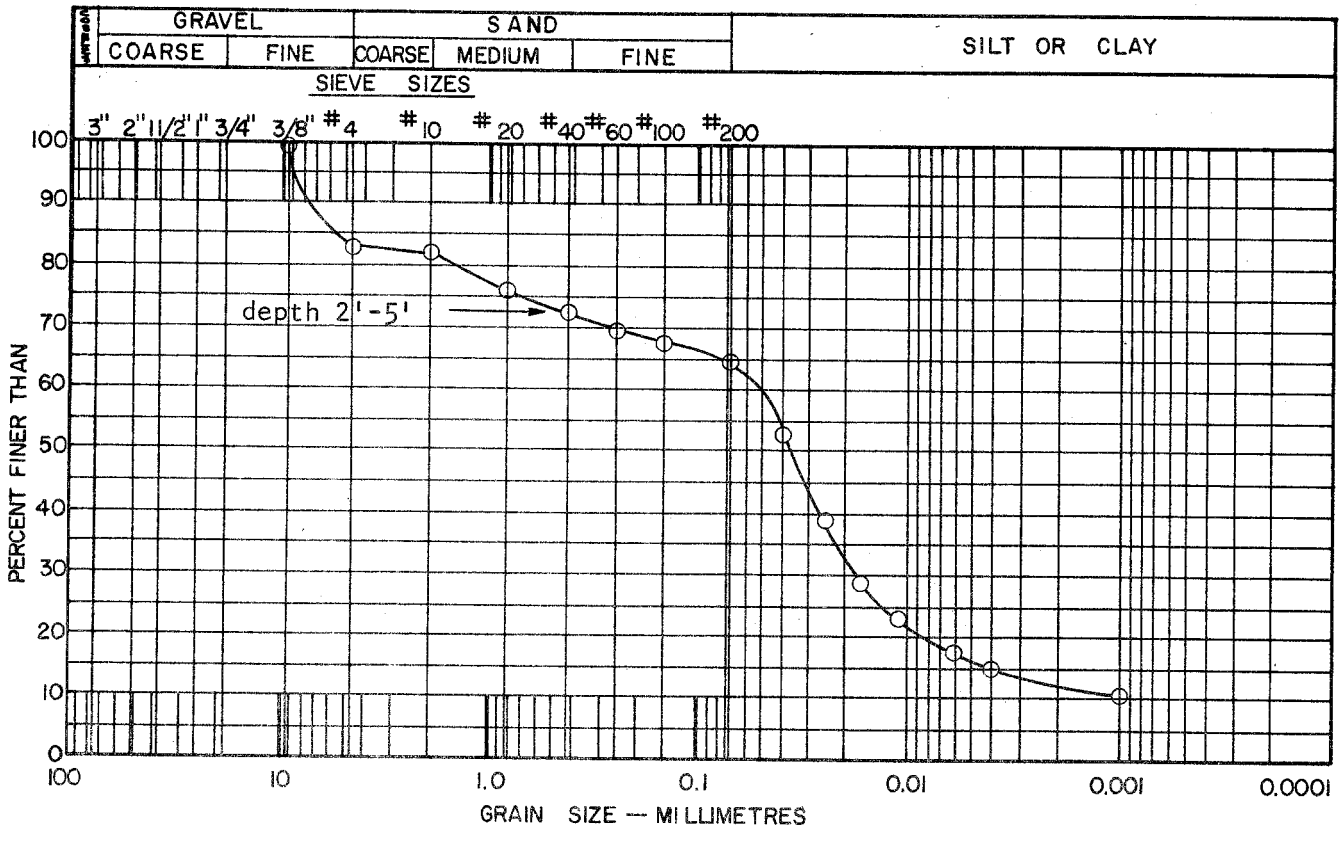
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-118-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	12.4%
Sample 2	depth 4'-5'	13.3%
Sample 3	depth 6'-7'	14.7%
Sample 4	depth 8'-9'	12.4%

ORGANIC CONTENT

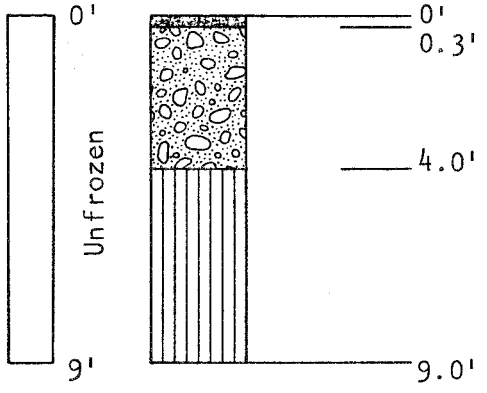
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-118

HR-118-5

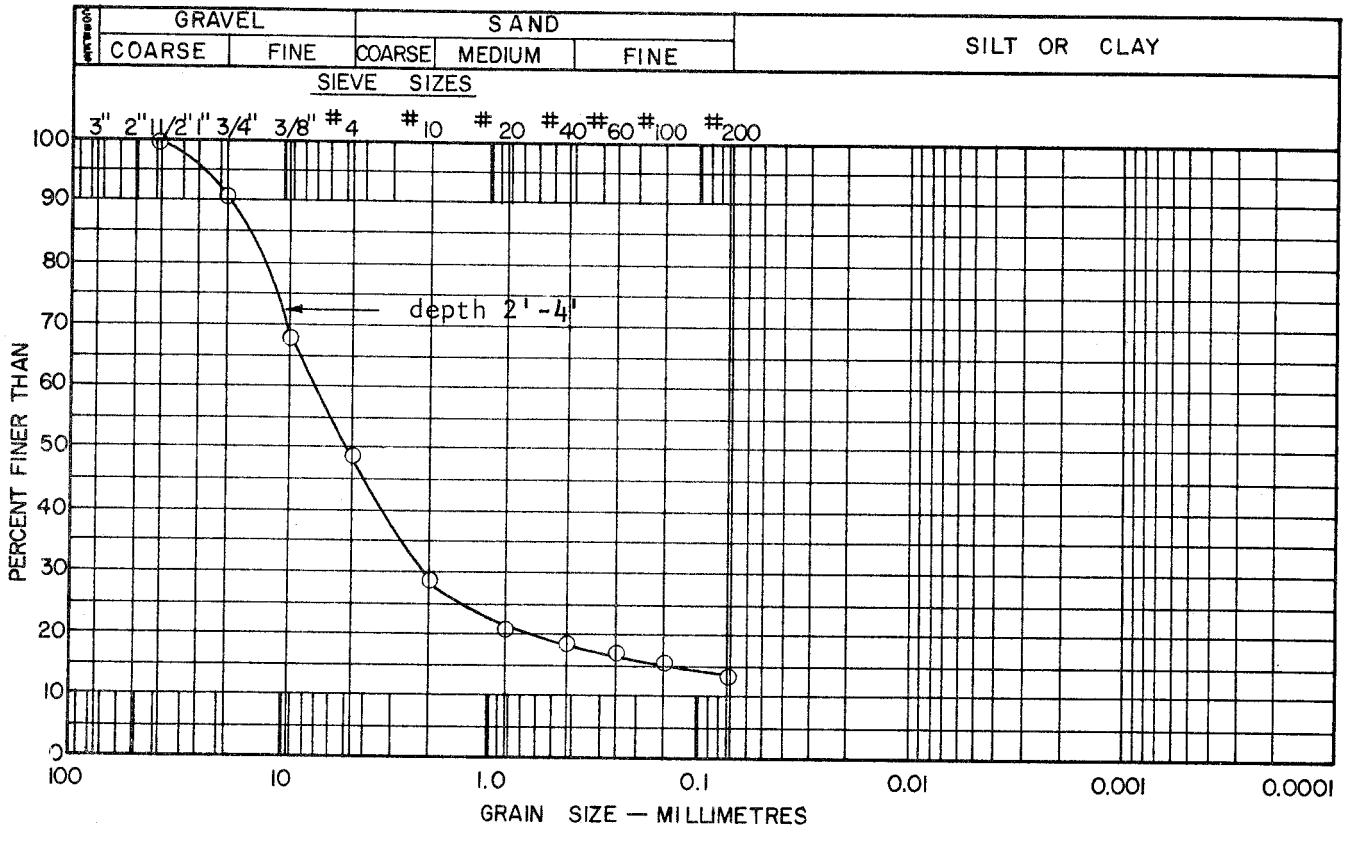


(OL)	SILT - topsoil, roots
(GW-GM)	GRAVEL - and sand, little silt, trace cobbles, well graded
(ML)	SILT - some gravel to 3/4", trace sand, trace clay, low plastic (till)

Hole dry on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-118-5

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	5.2%
Sample 2	depth 4'-5'	6.5%
Sample 3	depth 6'-7'	5.3%

ORGANIC CONTENT

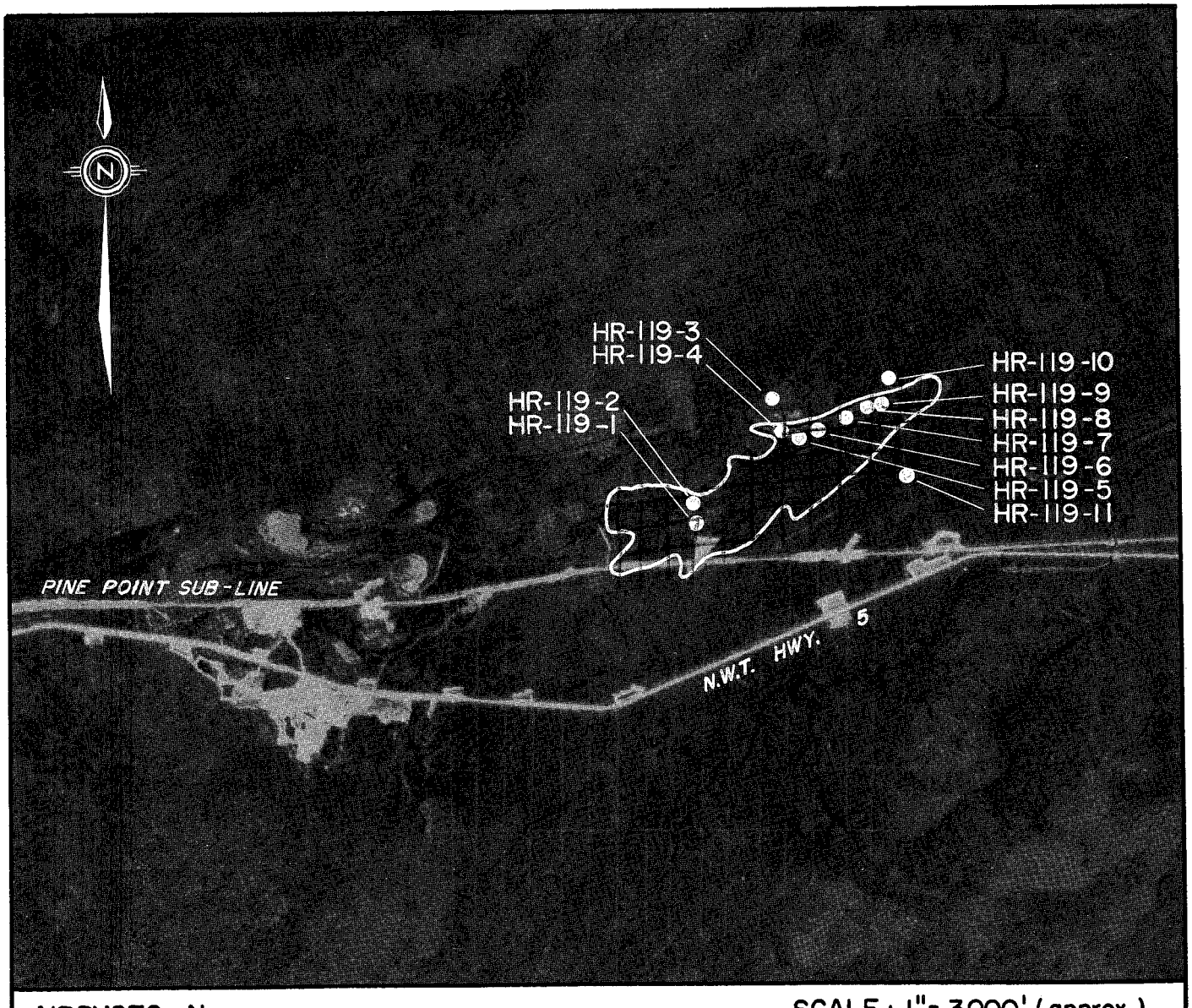
HARDNESS TEST

PETROGRAPHIC ANALYSIS

HAY RIVER
SOURCE No. HR-119

35

LANDFORM AND LOCATION:	Esker and outwash complex along N.W.T. Hwy. 5 and C.N.R. Pine Point Sub-line at a distance of 29 miles by road southeast of the community.
MATERIAL:	SAND - little fine gravel to 1", trace silt, trace cobbles.
VOLUME:	1,000,000 cu. yds.
CONCLUSION:	Suitable for development for general fill. With screening, small volumes of fine and coarse aggregates suitable for concrete could be produced.



AIRPHOTO No. A20026-75 SCALE : 1"= 3000' (approx.)

HR-119 ENVIRONMENT

Physical

The source is an esker and outwash complex about 6,000 feet long and 1,000 feet wide. It adjoins Source HR-122 to the west and is located about 29 miles by road southeast of the community.

Drainage of the source is very good and all drill holes on the source were dry on completion. The source has not been developed in the past.

No permafrost was detected in any of the test holes.

Biotic

The tree cover on this source is a dense growth of pine up to 45 feet high.

The area supports small populations of small fur-bearing animals and rodents. The source does not lie within any critical wildlife area.

HR-119 MATERIALS AND QUANTITIES

The material in this source consists of fairly well graded sand, with a little fine gravel, and a little silt overlying silt till. The depth of the silt till is variable over the site ranging between 1 and 10 feet below ground surface, although there are some exceptions. Some of the test holes showed sand materials to 26 foot depth.

Laboratory test data indicates that there is wide variation in gradation of the samples and percentages of gravel, sand and silt sizes. Some test holes show well graded sands and gravels which would be suitable for concrete aggregates. The data also indicates that the silt content in most test holes increases with depth.

Based on an average recovery depth of 5 feet, the volume of material in this source is estimated to be at least 1,000,000 cu. yds.

HR-119 DEVELOPMENT

General

This source should be developed primarily to provide general fill. The material

from this source is not suitable for production of large volumes of coarse and fine aggregates but small volumes only for local use could be produced.

Access

The source is located about 29 miles from the community by road. Access by road will require the installation of a railway crossing and construction of a ½ mile road from N.W.T. Hwy. 5. Alternatively, the access road which would be constructed to develop Source HR-122 could be continued to this source. The source is also accessible by the railway which is immediately adjacent to the source.

Material Use and Handling

The pit run material in this source is suitable for use as general fill. Laboratory data indicates that some areas of the pit could be developed to produce small quantities of coarse and fine aggregates for local use. For production of large volumes of fine aggregate, screening of the materials and addition of blending sands would be required. For this reason, in addition to the high silt content and the variation in gradation, the production of aggregates on a large scale does not appear to be feasible.

The equipment required for the operation will be an assembly of bulldozers, loaders and trucks.

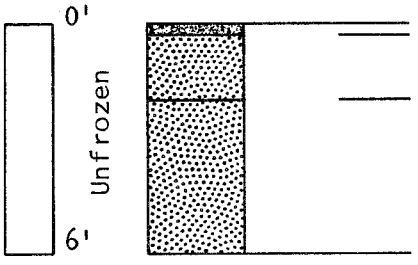
Stripping and Restoration

All trees will have to be cut and disposed of by burning. The depth of stripping in the area investigated averages about 6 inches. These materials can be stored adjacent to that area of the source being developed. After depletion of the sand and gravel, the stripped material can be used to cover the slopes and the bottom of the pit area.

TEST HOLE LOGS

SOURCE No. HR-119

HR-119-1



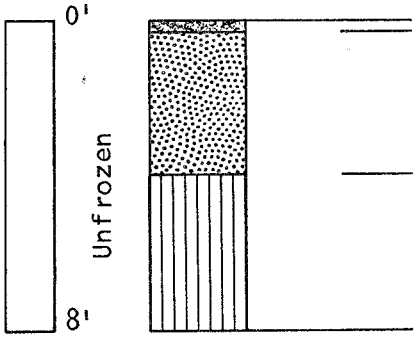
(OL) SILT - topsoil, roots

(SP-SM) SAND - some silt, fine, brown

(SM) SAND - some gravel to $\frac{1}{2}$", some silt, low plastic,(till)

Hole dry on completion

HR-119-2



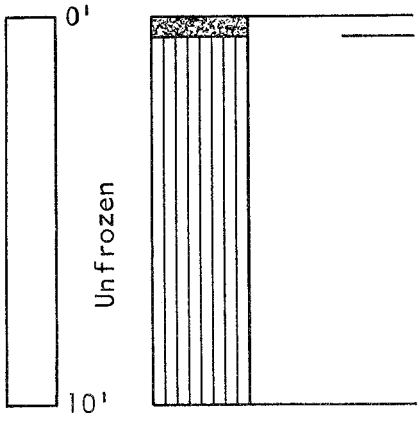
(OL) SILT - some fine gravel, some sand, roots, etc.

(SW-SM) SAND - and gravel, little silt, trace clay, well graded

(ML) SILT - some sand, little gravel, to 3/4", trace clay, low plastic, (till)

Hole dry on completion

HR-119-3



(OL) SILT - roots, etc., dark brown

(ML) SILT - some clay, little sand, fine gravel, low plastic, brown,(till)

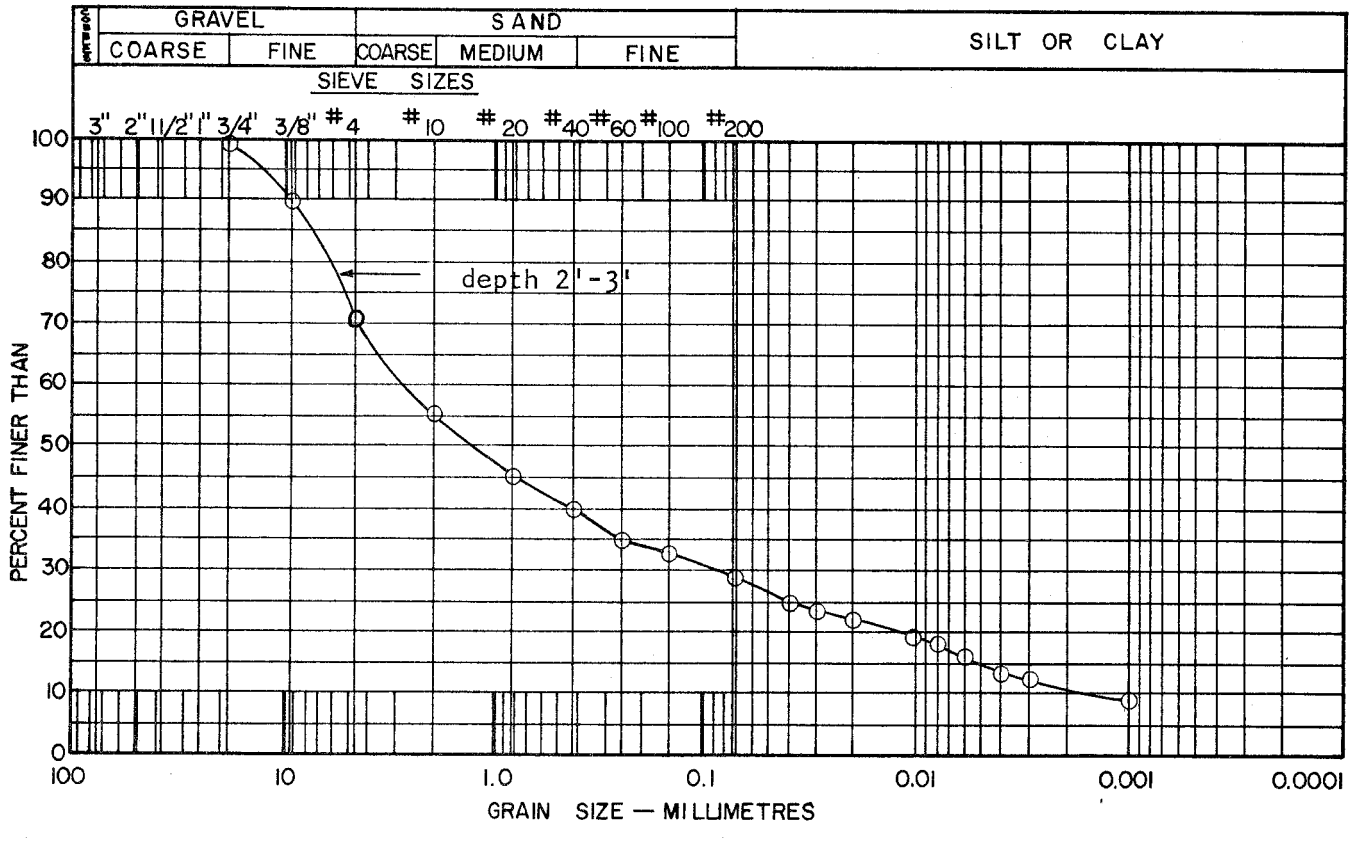
Hole dry on completion

Moisture Content:

Sample 1 depth 2'-3' 8.5%

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-119-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	6.3%
Sample 2	depth 4'-5'	4.4%

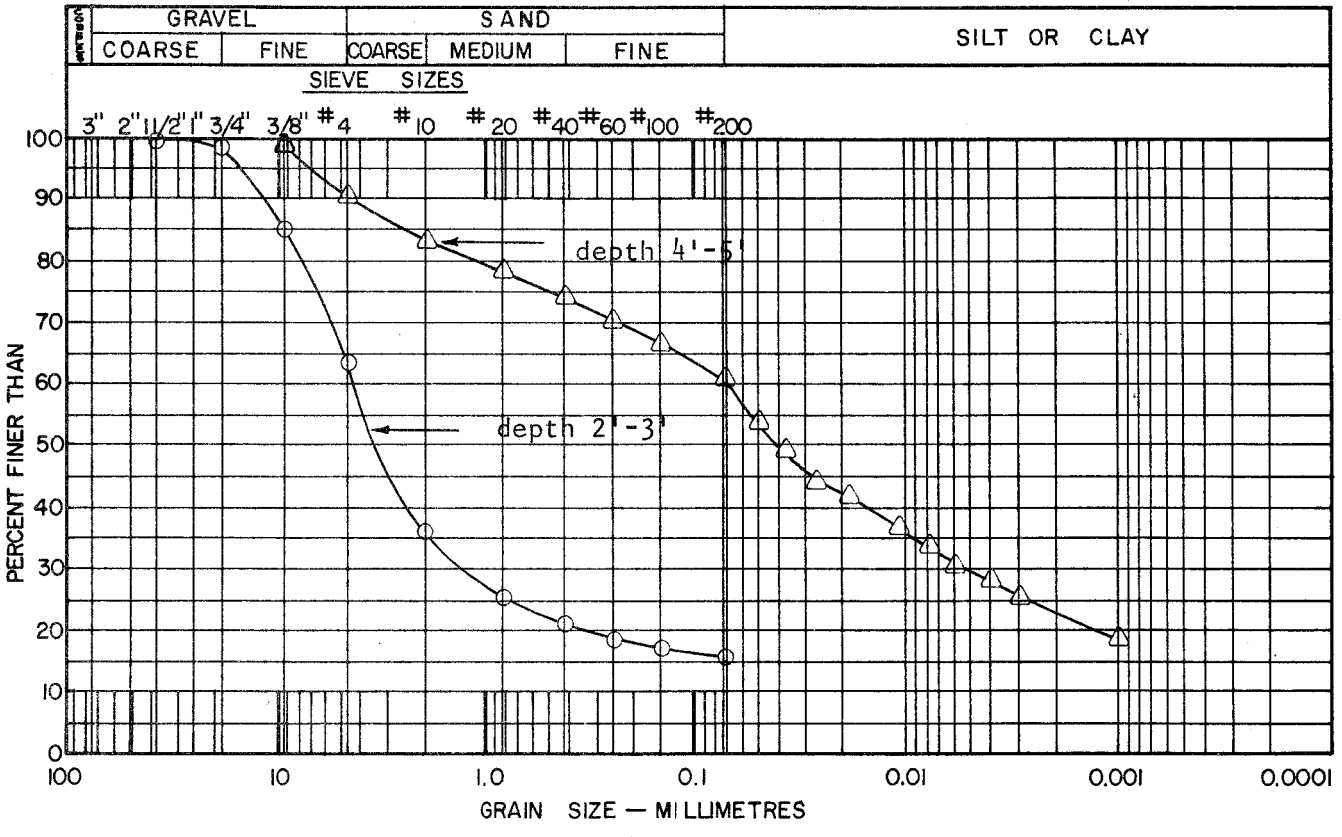
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-119-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	4.7%
Sample 2	depth 4'-5'	8.1%

ORGANIC CONTENT

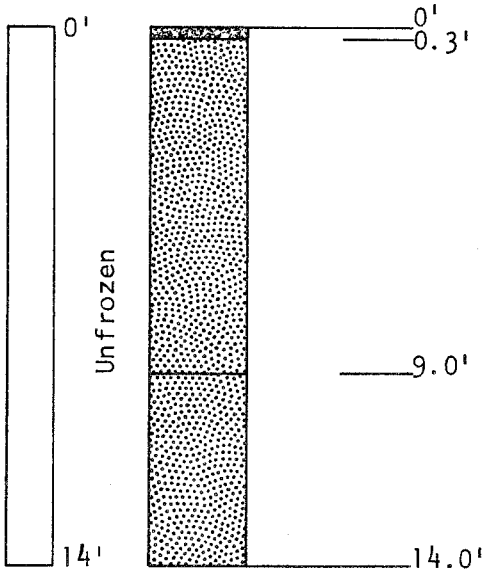
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-119

HR-119-4

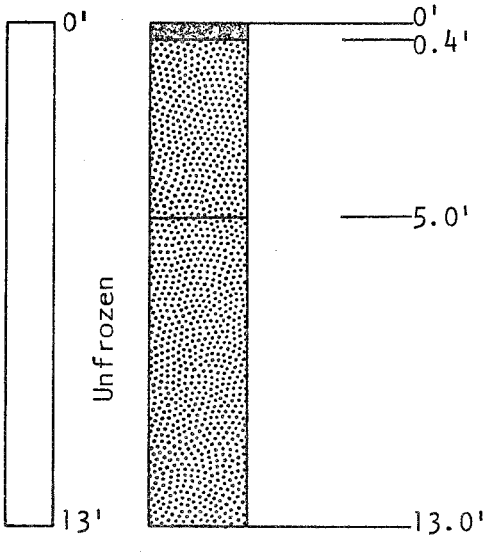


(OL) SILT - topsoil, roots

(SW) SAND - little gravel to 3/8", trace silt, siltier with depth, brown

(SW-SM) SAND - some fine gravel, trace cobbles to 8", trace silt, grey

HR-119-5



(OL) SILT - topsoil, roots

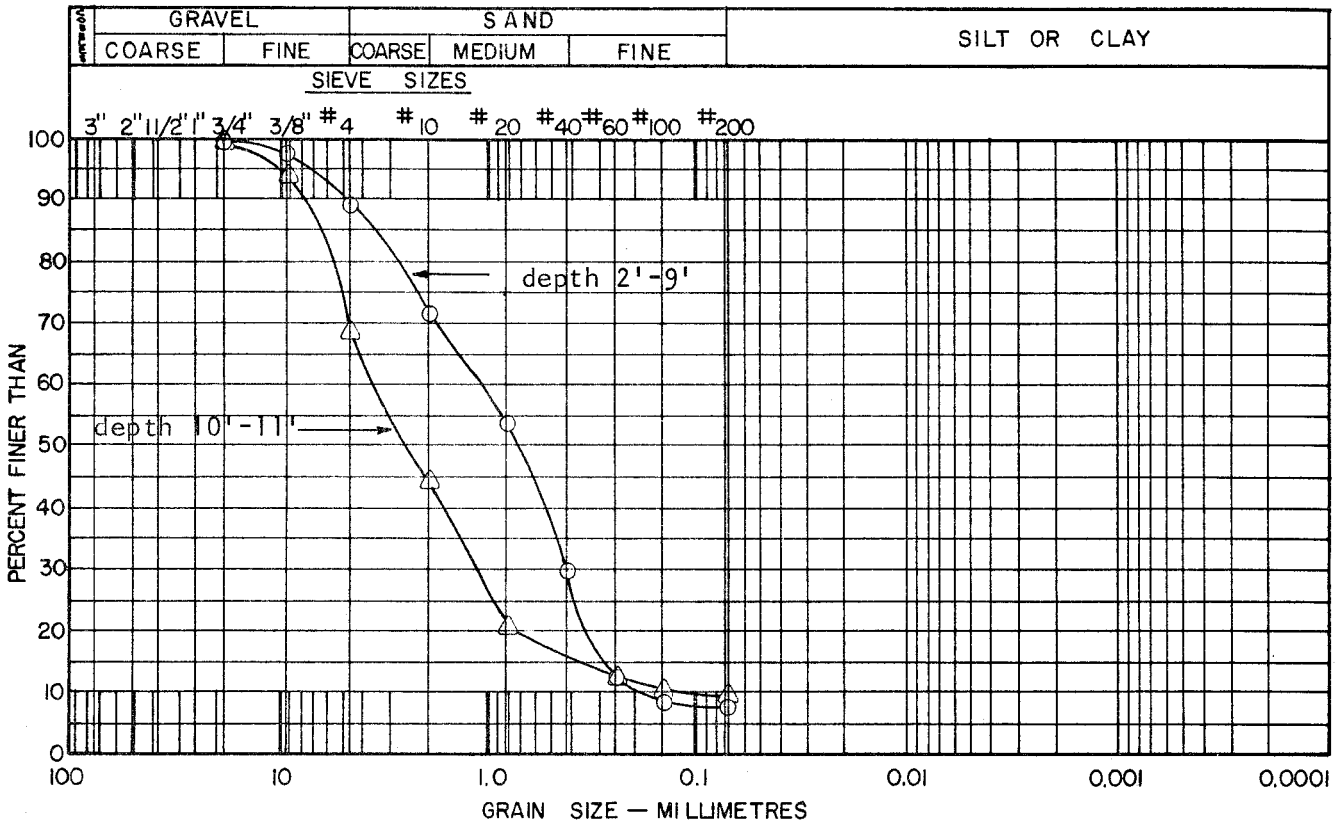
(SW) SAND - little gravel to 1", trace silt, well graded, brown

(SM) SAND - some silt, trace fine gravel to 3/4", trace cobbles to 6", grey

Hole collapsing at 12'
Hole dry on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-119-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	4.7%
Sample 2	depth 4'-5'	2.6%
Sample 3	depth 6'-7'	5.3%
Sample 4	depth 8'-9'	5.3%
Sample 5	depth 10'-11'	1.5%

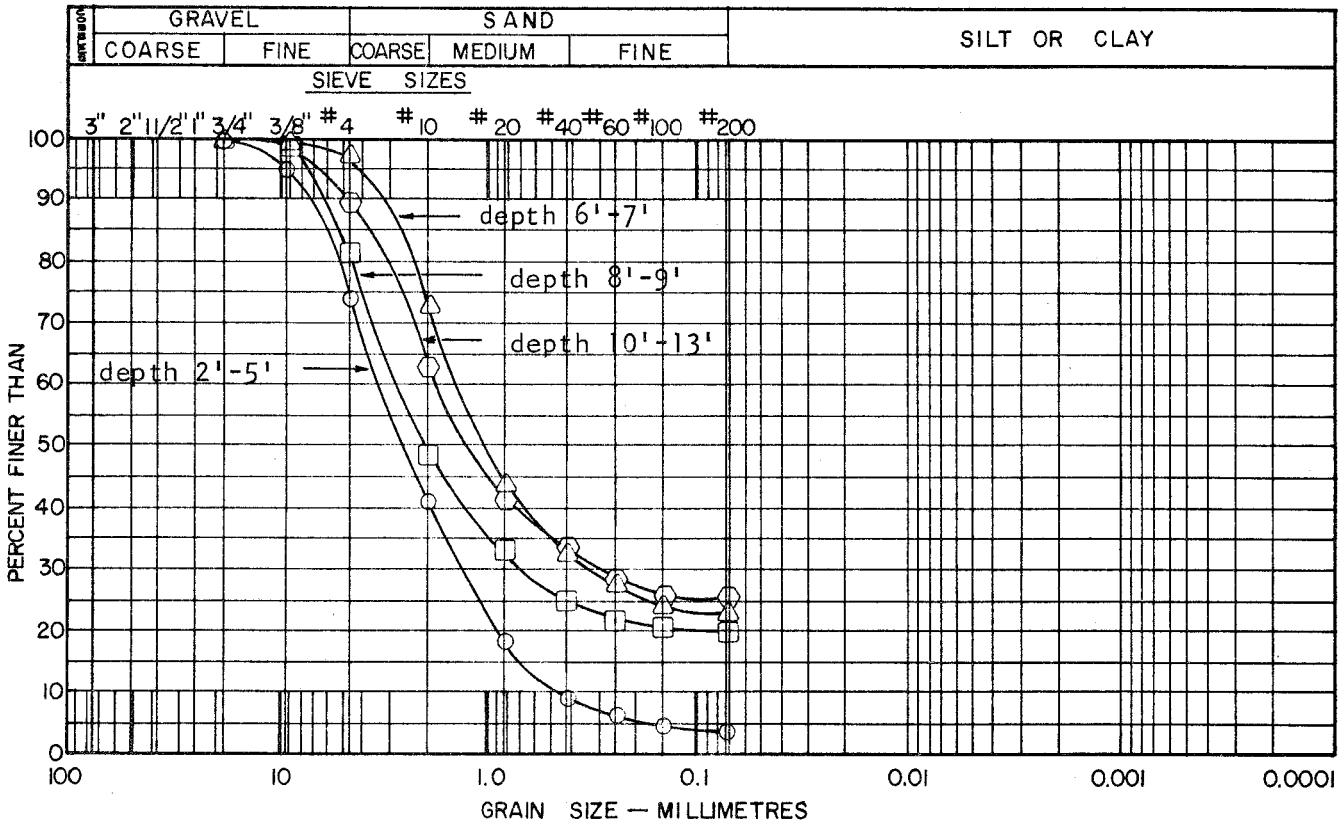
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-119-5

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	3.0%
Sample 2	depth 4'-5'	3.1%
Sample 3	depth 6'-7'	3.7%
Sample 4	depth 8'-9'	3.5%
Sample 5	depth 10'-11'	2.5%
Sample 6	depth 12'-13'	2.2%

ORGANIC CONTENT

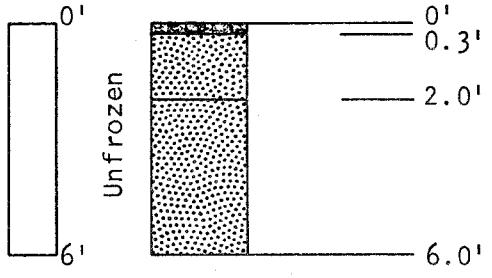
Loss of ignition test
Sample 2 and 3 depth 4'-7' - 2.1%
Color test - sample 2 depth 4'-5' - Rdg. 3
- sample 4 depth 8'-9' - Rdg. 2

HARDNESS TEST

TEST HOLE LOGS

SOURCE No. HR-119

HR-119-6



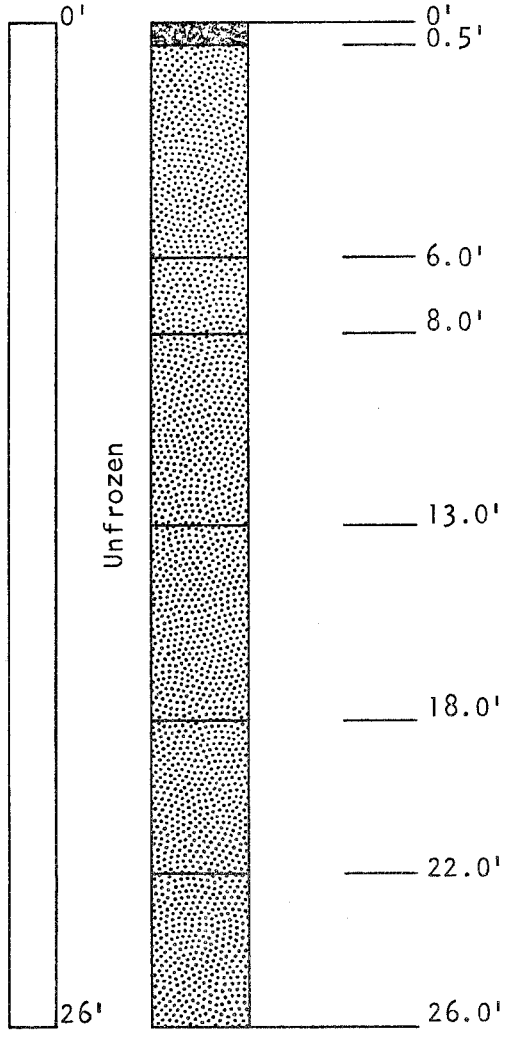
(OL) SILT - topsoil, roots

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

(SW-SM) SAND - some silt, little fine gravel

Hole dry on completion

HR-119-7



(OL) SILT - topsoil, roots

(SW) SAND - some fine gravel to 1", trace silt, well graded

(SW-SM) SAND - some fine gravel to 3/4", little silt

(SM) SAND - some silt, little fine gravel

(SM) SAND - and silt, trace, fine gravel to 3/8"

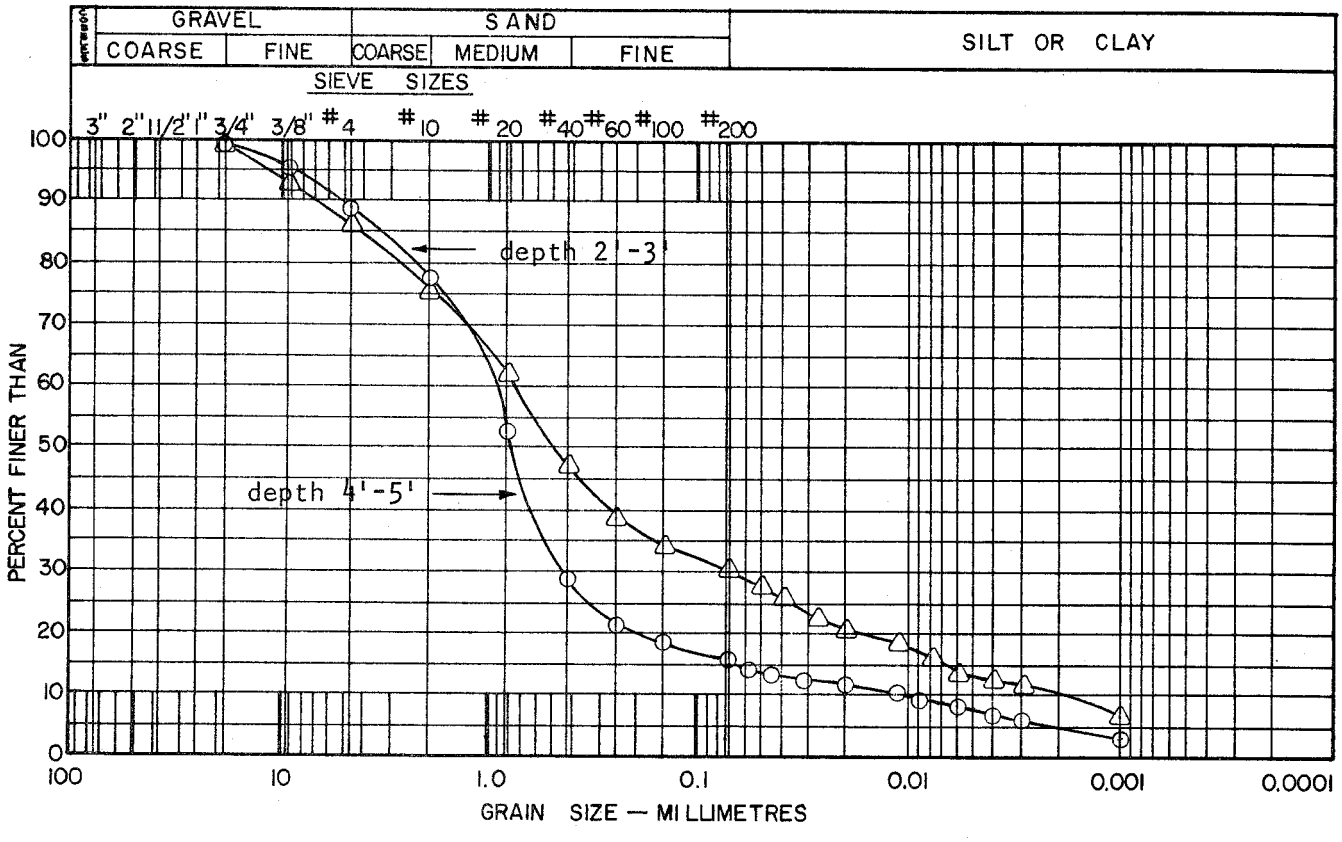
(SW-SM) SAND - and fine gravel to 3/4", little silt, well graded

(SM) SAND - some silt, little fine gravel to 1/2"

Hole collapsing between 20' - 26'
Hole dry on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-119-6

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.3%
Sample 2	depth 4'-5'	2.7%

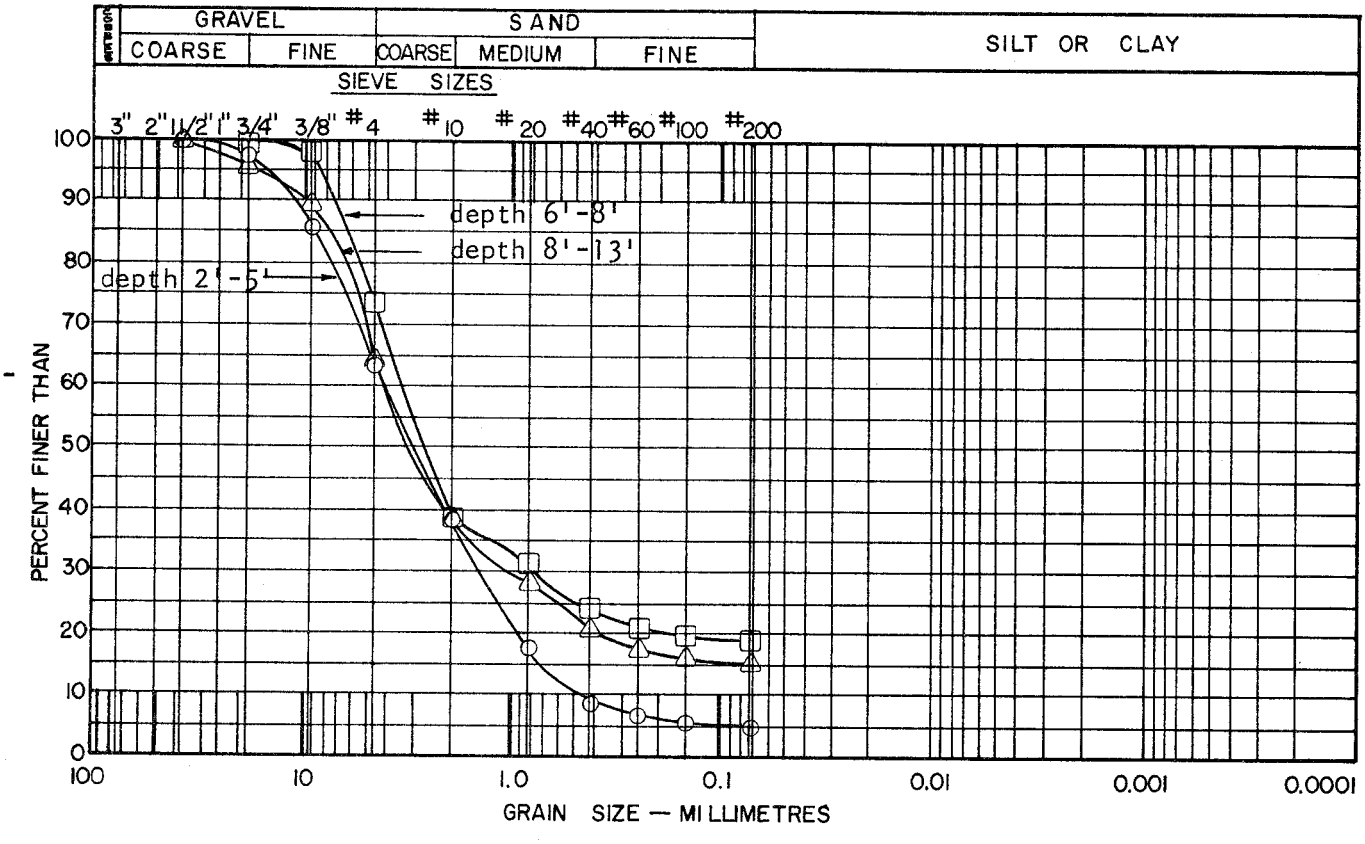
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-119-7

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.5%	Sample 4	depth 8'-9'	5.3%
Sample 2	depth 4'-5'	4.8%	Sample 5	depth 10'-11'	5.0%
Sample 3	depth 6'-7'	4.0%	Sample 6	depth 12'-13'	5.3%

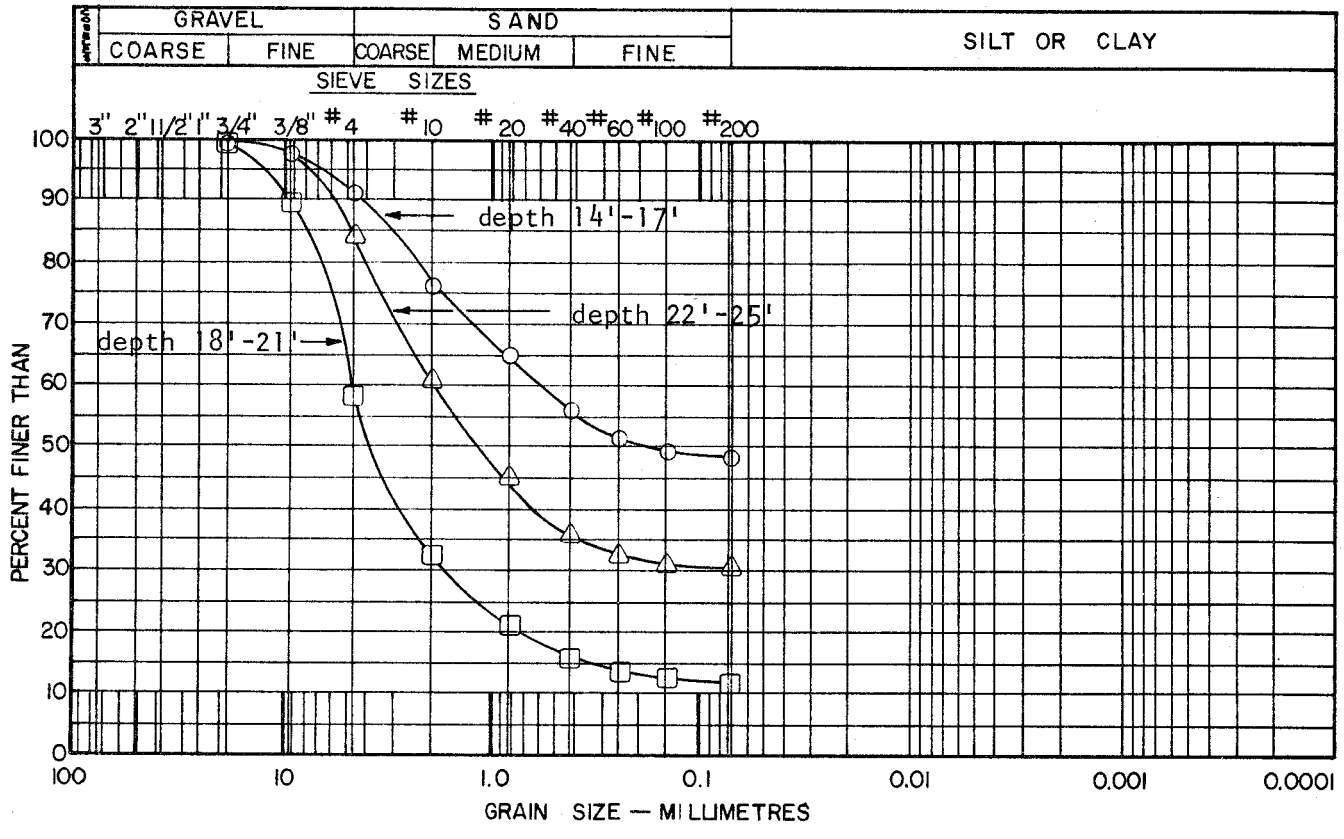
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-119-7

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 7	depth 14'-15'	4.3%	Sample 10	depth 20'-21'	3.4%
Sample 8	depth 16'-17'	4.6%	Sample 11	depth 22'-23'	4.4%
Sample 9	depth 18'-19'	3.4%	Sample 12	depth 24'-25'	3.4%

ORGANIC CONTENT

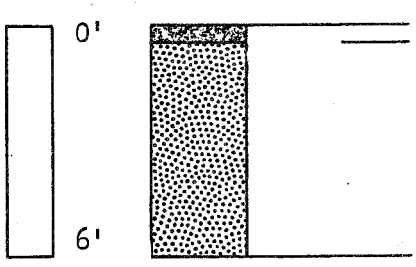
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-119

HR-119-8



(OL) SILT - topsoil, roots

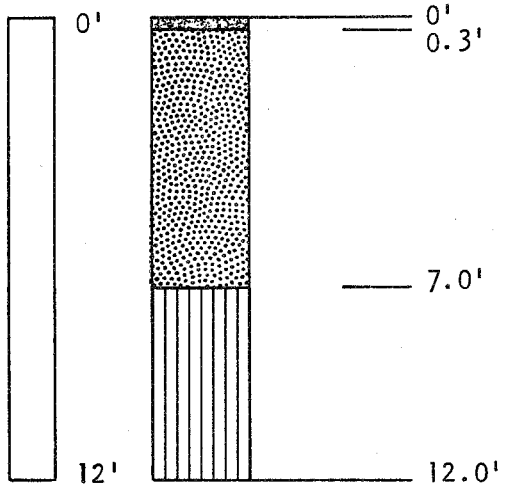
(SW-SM) SAND - some silt, little gravel, roots

Hole dry on completion
Unable to bypass cobbles at 6'

Moisture Content:

Sample 1	depth 2'-3'	3.3%
Sample 2	depth 4'-5'	3.4%

HR-119-9



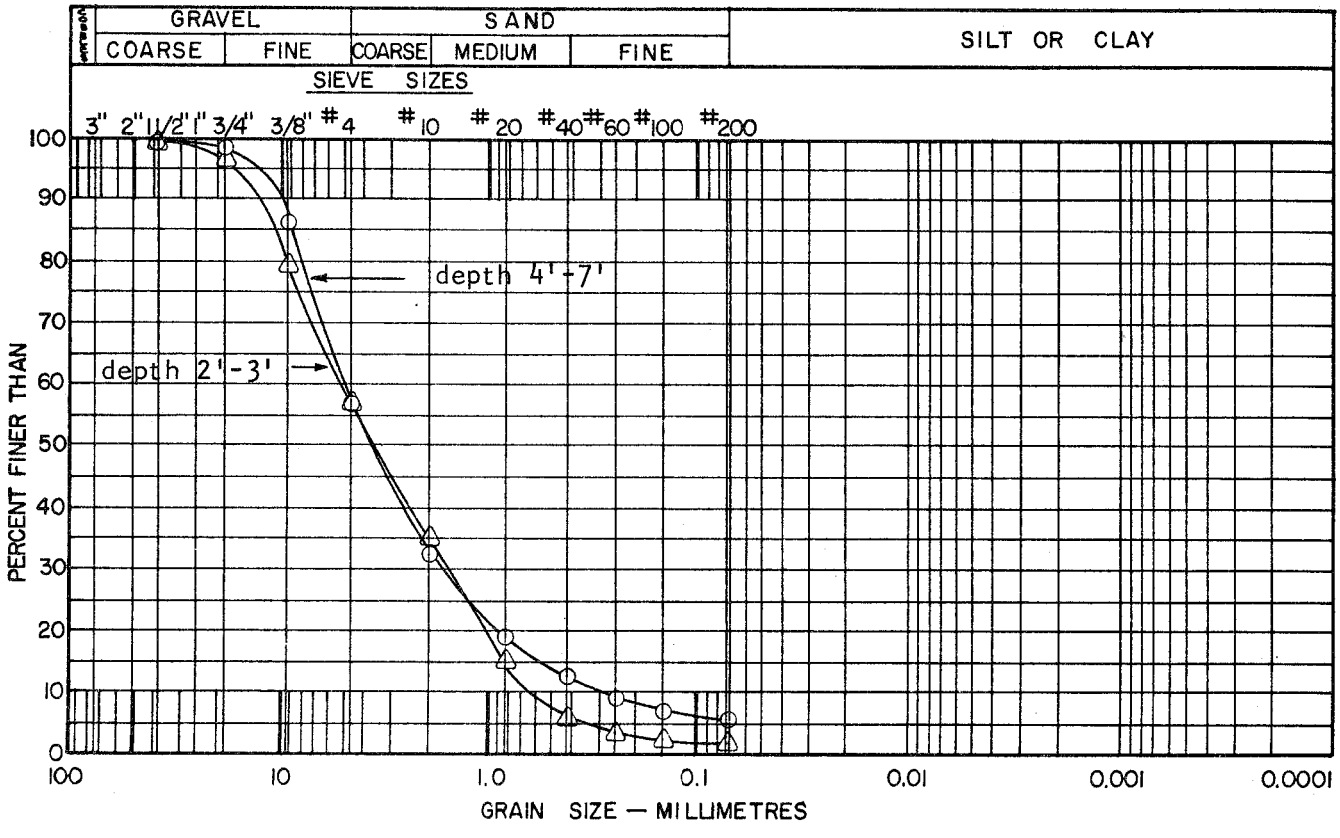
(OL) SILT - topsoil, roots

(SW) SAND - and gravel to 1", trace silt, clean, well graded

(ML) SILT - some gravel, little sand, trace clay, low plastic

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-119-9

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.2%
Sample 2	depth 4'-5'	3.5%
Sample 3	depth 6'-7'	5.1%
Sample 4	depth 8'-9'	6.5%
Sample 5	depth 10'-11'	6.4%

ORGANIC CONTENT

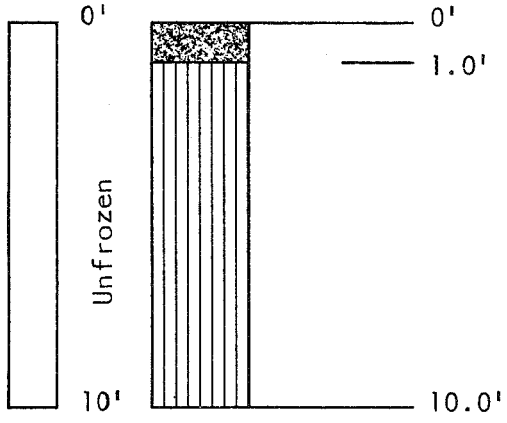
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-119

HR-119-10



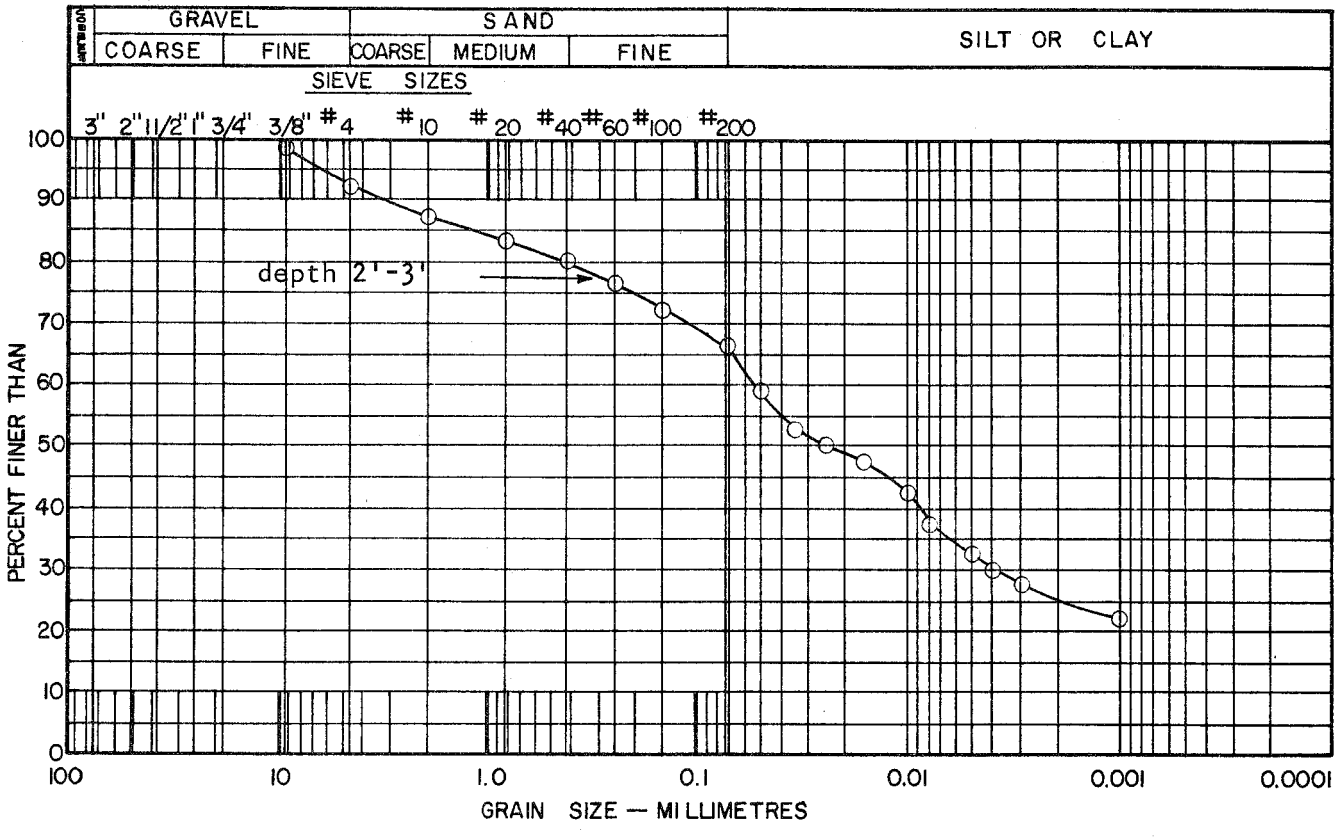
(OL) SILT - topsoil, roots

(ML) SILT - some clay, some sand, trace gravel, low plastic, (till)

Hole dry on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-119-10

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2'-3' 10.6%

ORGANIC CONTENT

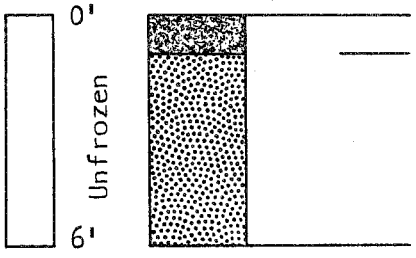
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-119

HR-119-11



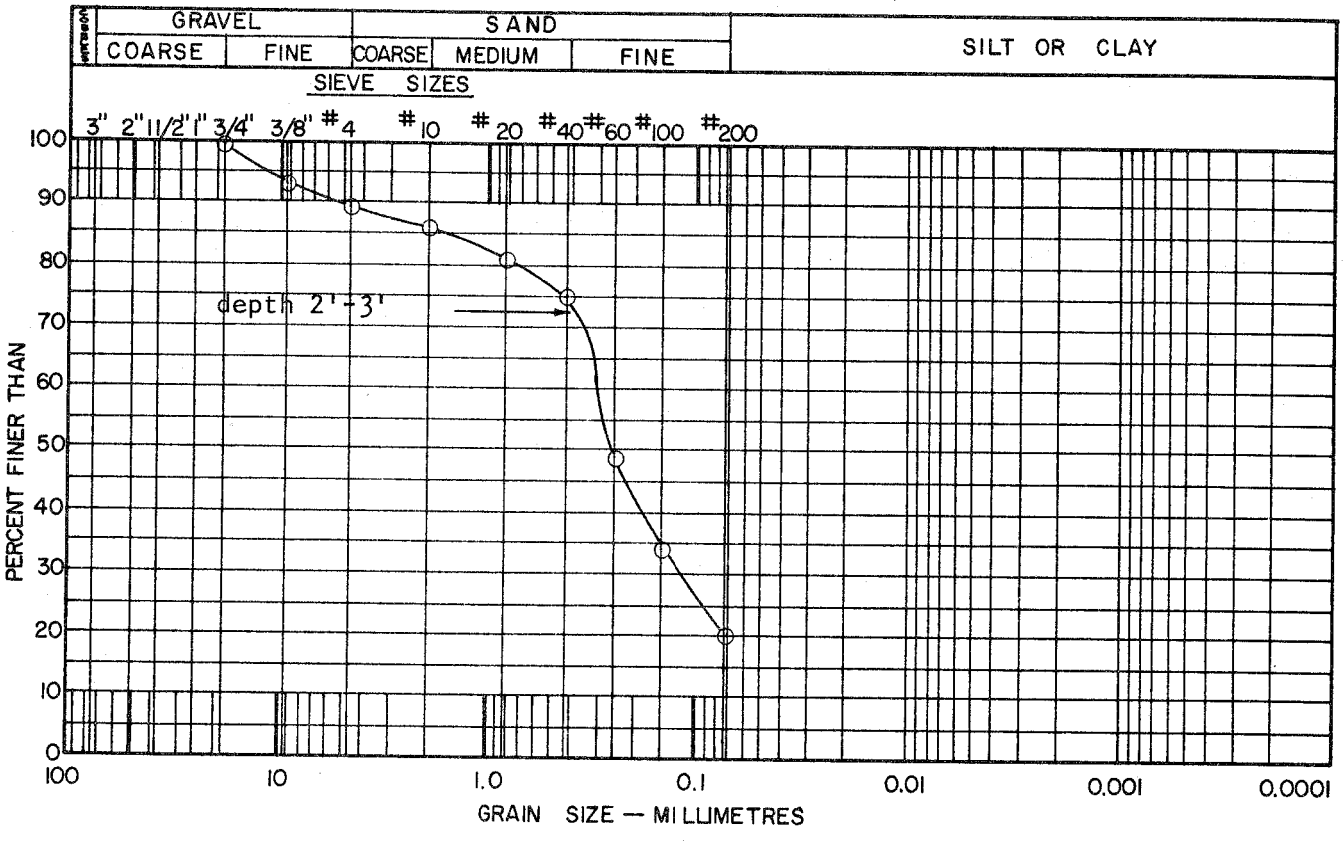
(OL) SILT - topsoil, roots

(SM) SAND - some silt, trace fine gravel, fine uniform gradation, non-plastic, mottled grey

Water at 3' on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-119-11

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2'-3' 12.7%

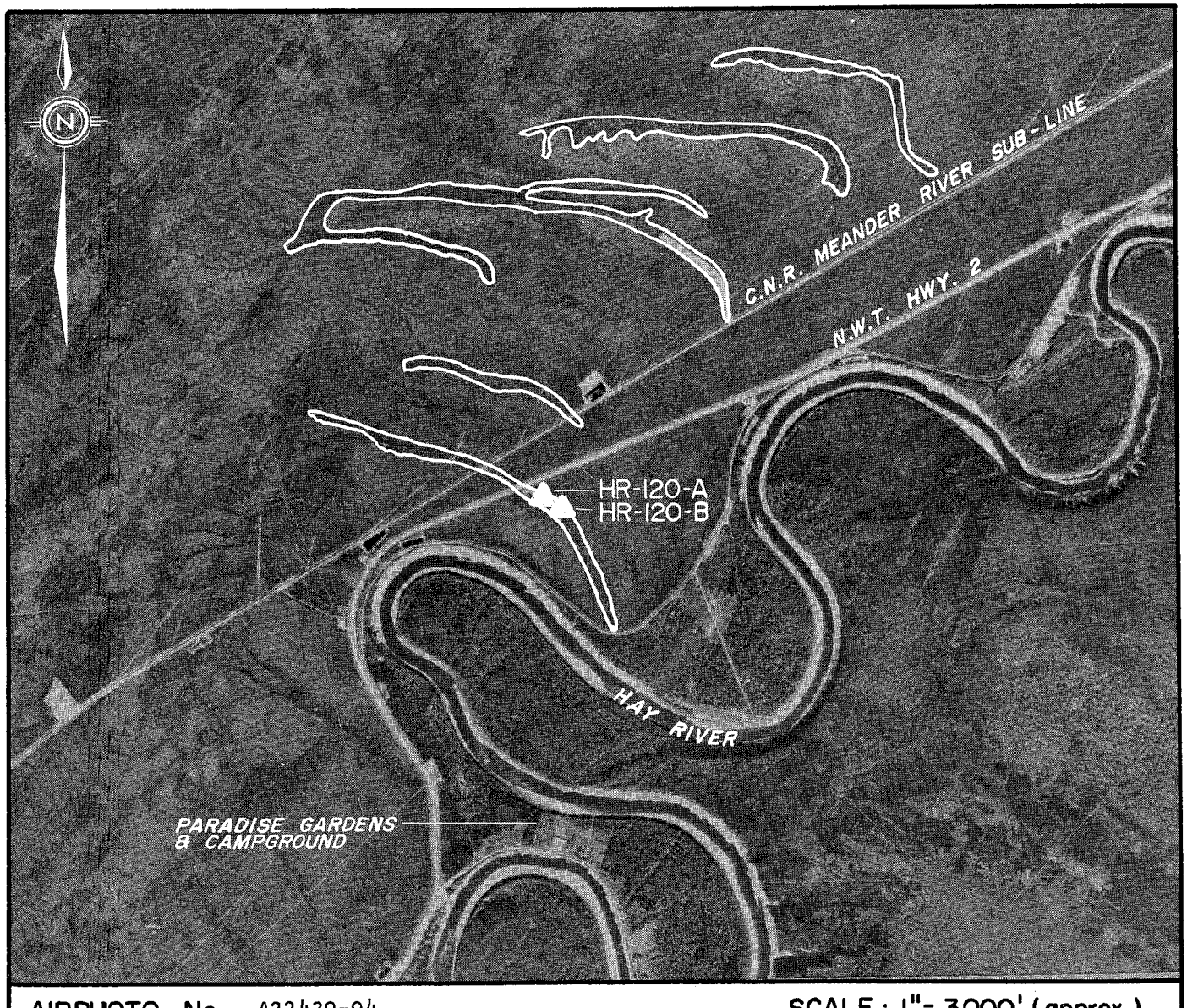
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

HAY RIVER
SOURCE No. HR-120

LANDFORM AND LOCATION:	Group of shallow, narrow eskers in an area 14 miles south of Hay River adjacent to N.W.T. Hwy. 2.
MATERIAL:	SAND - medium and fine, trace of gravel, trace of silt, poorly graded.
VOLUME:	Approximately 300,000 cu. yds.
CONCLUSION:	Material is suitable only for general fill. Development of source should have low priority because the cost of stripping and restoring would be high in relation to the volume of material removed.



AIRPHOTO No. A22439-94 SCALE : 1"= 3000' (approx.)

HR-120 ENVIRONMENT

Physical

The source consists of 6 long, narrow and shallow eskers, varying from 1,100 to 3,000 yards long, from 30 to 60 yards wide, and from 3 to 4 feet high. Drainage of the eskers is good although drainage in the surrounding marshland is very poor. The source was developed to a limited extent during the construction of the railway and highway.

Biotic

The tree cover on this source is primarily spruce and pine up to 40 feet in height, with a canopy cover of 20 to 40%. The undergrowth consists of grass with sparse ferns and bushes.

The source is not in an important wildlife area.

HR-120 MATERIALS AND QUANTITIES

The material exposed in 2 test pits about 2 feet deep is a gap-graded sand containing about 10% gravel, grading from 3/4 inches, and 60% fine sand between #40 and #60 mesh.

The volume of recoverable material is about 300,000 cu. yds. based on a recoverable depth of 3 feet.

HR-120 DEVELOPMENT

General

This source is about 14 miles from Hay River by road and contains a small volume of low quality material scattered over a large area. The source was not drilled because it was considered that the cost of developing and restoring these narrow eskers would be high in relation to the volume of sand available.

Development of this source should have low priority.

Access

Any access to this source, except by rail, requires the installation of a private crossing across the Meander River Sub-line. Winter access to the source is good,

being only 14 miles south of Hay River along N.W.T. Hwy. 2 and 2 miles west across marshland. Summer access would require construction of an all-weather road linking the highway to the source.

Material Use and Handling

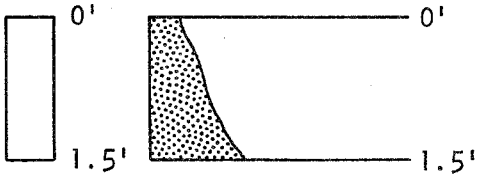
The material in this source is low quality and is suitable for use as general fill. The equipment required for the development of this source is the usual assembly of dozers, front-end loader, and trucks.

Stripping and Restoration

Because of the narrow, shallow shape of these eskers, a large area would have to be disturbed in order to obtain a small volume of material. If developed, all trees in the area should be cut and disposed of by burning. All organic topsoil to a depth of approximately 1 foot should be removed and stockpiled adjacent to the developed area. After depletion of the source, the stripped material should be used to cover the slopes and the pit area.

TEST PIT LOGS
SOURCE No. HR-120

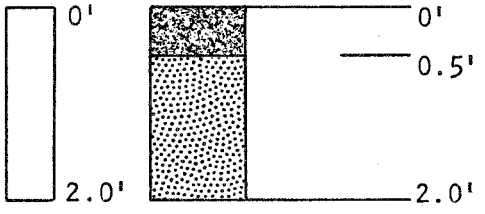
HR-120-A



(SP) SAND - little gravel, trace silt, fine uniform gradation

Soil profile logged from pit face exposure

HR-120-B

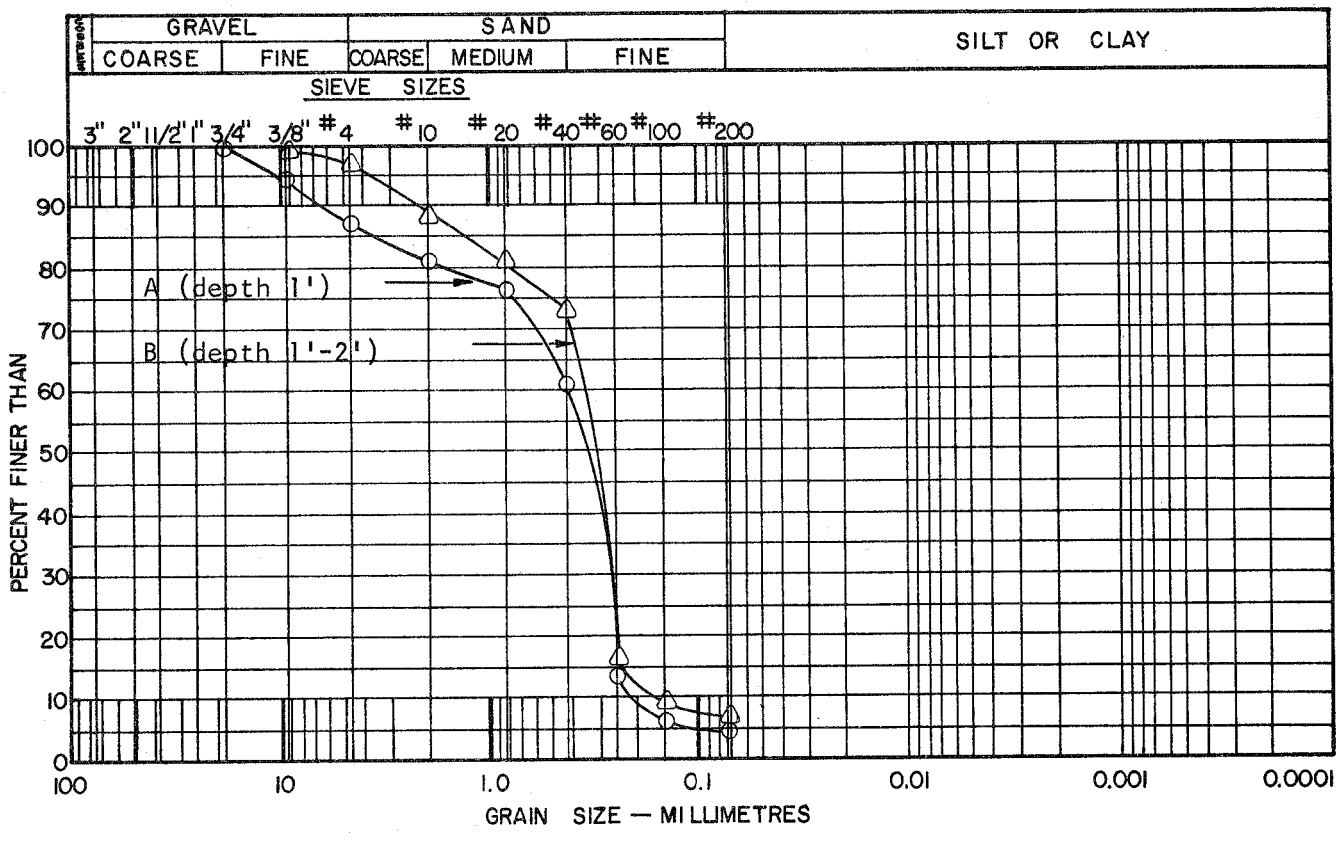


(OL) SILT - and sand

(SP) SAND - trace gravel to 1", trace silt, fine uniform gradation

LABORATORY
TEST DATA
SOURCE No. HR-120

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

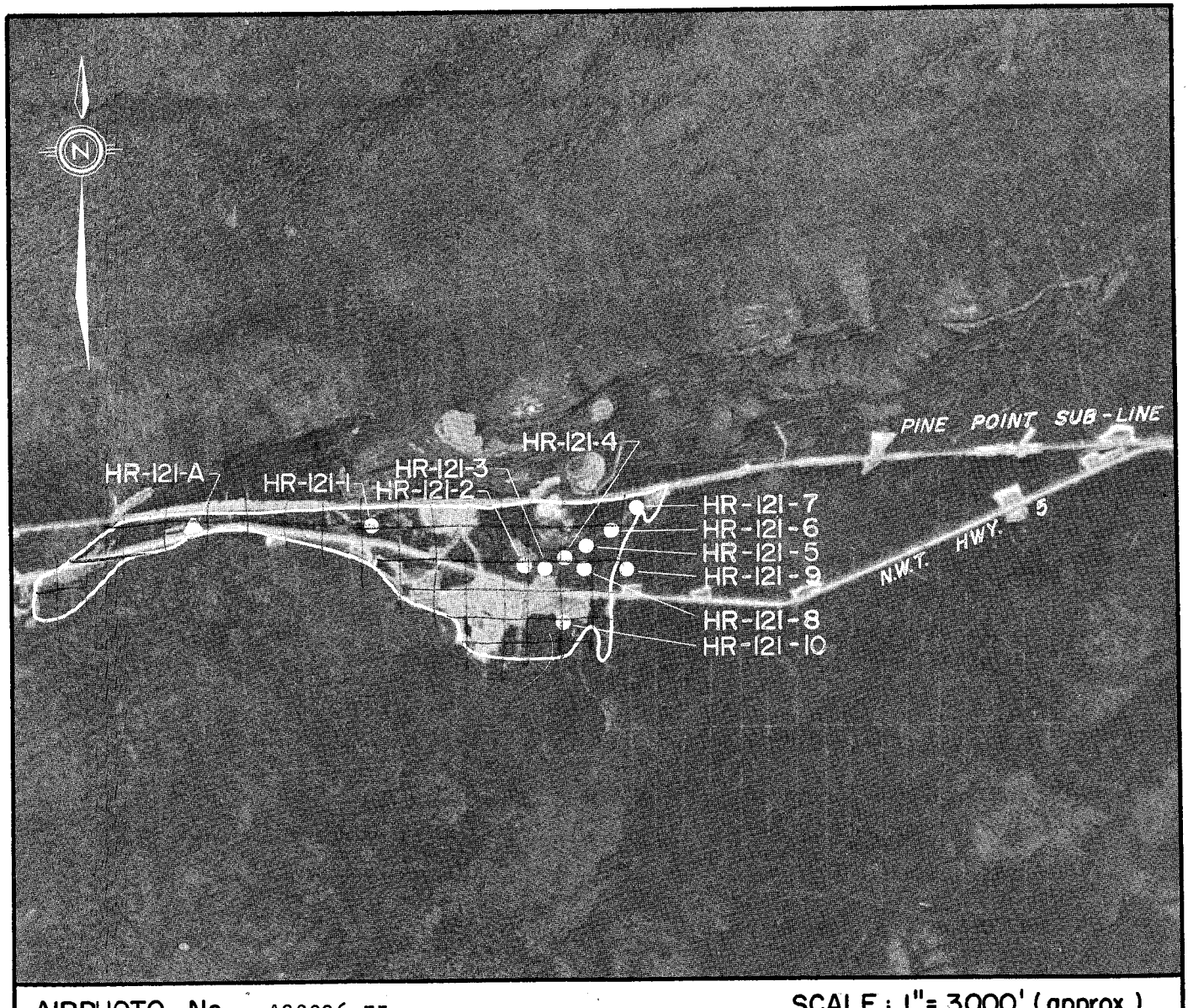
HAY RIVER
SOURCE No. HR-121

LANDFORM AND LOCATION: Esker and outwash complex along N.W.T. Hwy. 5 and C.N.R. Pine Point Sub-line at a distance of 28 miles by road southeast of the community.

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

VOLUME: 600,000 cu. yds.

CONCLUSION: Source was partially developed for construction of railroad and highway. Future development should be reserved to produce coarse and fine aggregates. The source is suitable for production of concrete, asphalt and construction aggregates, however, due to its high variability, the material will require screening and washing, as well as blending to produce coarse and fine aggregates.



AIRPHOTO No. A20026-75 SCALE : 1"= 3000' (approx.)

HR-121 ENVIRONMENT

Physical

The source is a glaciofluvial complex, located about 28 miles from the community. The area is gently rolling, about 2 miles long and 100 to 1,000 yards wide. Numerous small ponds at different elevations are present within the source area.

Drainage of the complex is very good. The position of the water table is variable and is generally related to the small ponds which are scattered over the source area. Permafrost is not expected to occur in the area, although isolated pockets of frozen ground were encountered to a depth of 3 feet during the winter drilling program.

The source was partially developed for construction of the railway and highway. The developed areas are generally south of the highway or adjacent to the railway. A number of local companies hold permits to remove material, however, no land leases are presently held on the source.

Biotic

The tree cover on this source is primarily pine up to 40 feet high, with smaller numbers of spruce and poplar.

The area supports small populations of small fur-bearing animals and rodents. Because of previous development in the area, and the closeness of the highway and railway the wildlife population near the source is expected to be low.

HR-121 MATERIALS AND QUANTITIES

The materials in this source consist of gravel and sand in varying combinations, with a trace of silt. The maximum size of cobbles encountered in the deposit is 12 inches in diameter. Some of the samples tested in the laboratory were well graded, whereas other samples were gap-graded with a lack of the coarse gravel sizes.

The petrographic analysis of gravel from Test Hole #4 indicates that the material is primarily hard limestone and dolomite (55%), siltstone (24%), and granite (15%) with soft limestone, soft siltstone, sandstone, quartzite and mica schist comprising the remaining 6%. About 5% of the total is considered unsound. A

conventional X-ray diffraction test was conducted on samples of limestone from Test Hole #4. The results indicate that the limestone is not likely to be reactive since the chemical constituents are primarily calcite (95%) with dolomite (3%) and only a trace of quartz (2%). Pending further investigation, however, it is recommended that concrete produced with this aggregate should be made with cement containing less than 0.6% alkali.

Additional tests carried out on the materials - bulk specific gravity, organic tests, loss on ignition, and the Los Angeles Abrasion Test - indicate the materials are marginally suitable for production of aggregates.

The extraction of material from this source will be governed primarily by the depth to the water table or to the underlying till, whichever occurs first. Based on an average recovery depth of 2 yards, the volume of material in this source is estimated to be more than 600,000 cu. yds. Due to the variable gradation of the material, it is estimated that about 250,000 cu. yds. of coarse aggregate and 350,000 cu. yds. of fine aggregate could be produced.

HR-121 DEVELOPMENT

General

The source has been partially developed to the present time. Along with Source HR-122, it is the only major developable source of granular material in the study area suitable for production of aggregate, and it should be reserved for this purpose. Since the source covers a large area, development also must be controlled to prevent wasteful use of material.

Access

Year-round access to the source is possible from N.W.T. Hwy. 5. The source is located about 28 miles from the community by road.

Material Use and Handling

The materials in this source could be used for any purpose, from production of fine and coarse aggregates for concrete or asphalt to general fill. For limited quantities of fine or coarse aggregates, screening could be used to remove oversize rock and the excess fine aggregates. For larger volumes, crushing equipment would be required for more efficient utilization of the available materials.

Regardless of the processing equipment used in this source to produce coarse or fine aggregates, there will always be an excess of fine aggregates over coarse aggregates. These excess materials can be used for general fill.

Sieve analysis of the pit run materials indicate the extreme variability of the deposit. Fine aggregates produced will be coarse and probably require blending sand to improve grading sufficiently for use in high quality concrete.

In addition to the screening, washing and crushing equipment for processing the materials, the usual assembly of bulldozers, loaders and trucks will also be required. For movement of large volumes of materials to the community, the use of rail transportation may be an economical alternative to trucking.

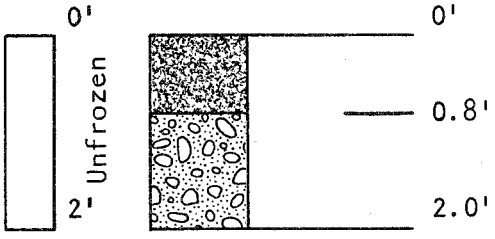
Stripping and Restoration

All trees will have to be cut and disposed of by burning. The depth of stripping in the area generally varies between a few inches and 1 foot. This surface material should be removed and stored adjacent to that area of the source being developed. After depletion of the sand and gravel, the side slopes and pit area must be graded before covering with stripped material. If any development takes place near the western boundary of the source, care must be taken to avoid siltation of Birch Creek.

TEST PIT LOGS

SOURCE No. HR-121

HR-121-A

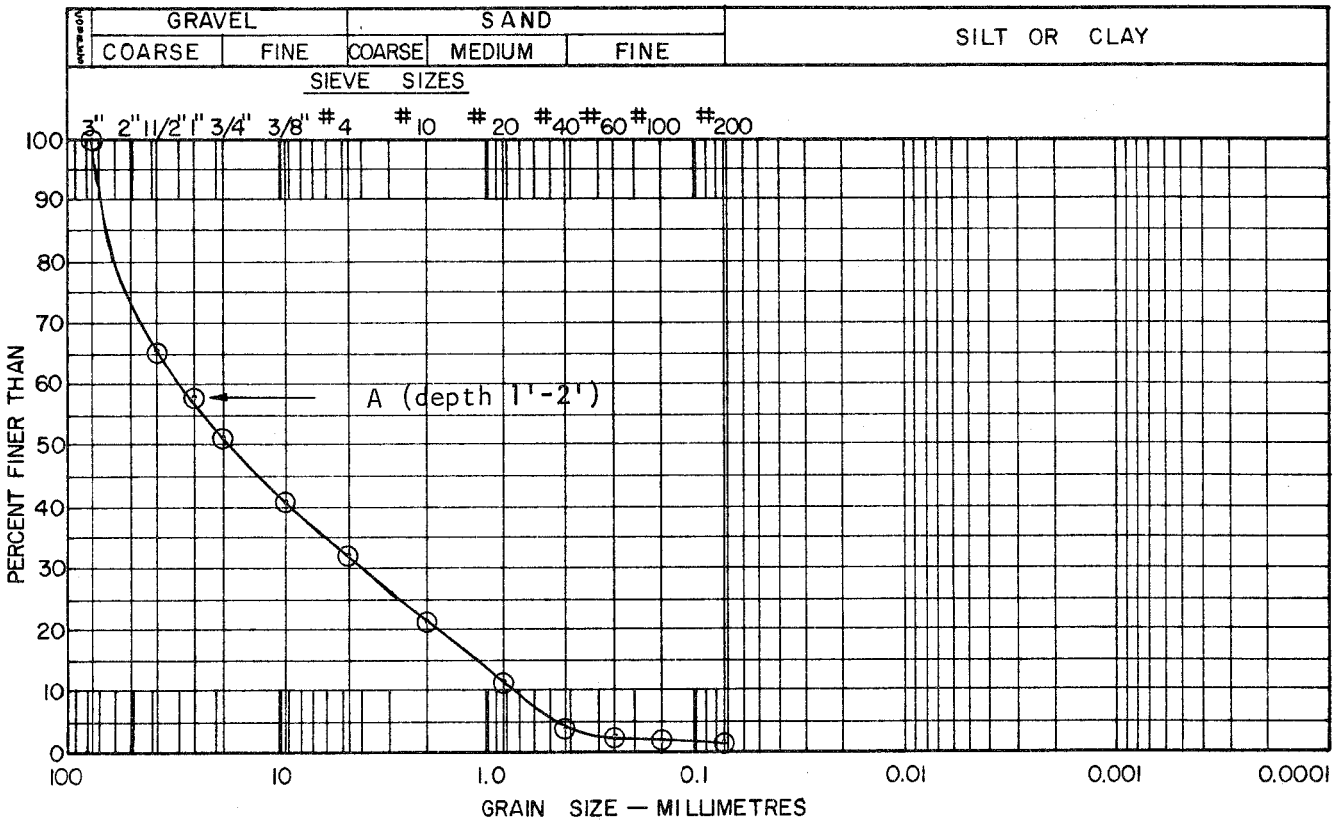


(OL) SILT - topsoil, roots

(GW) GRAVEL - some sand, trace silt, trace cobbles to 14"

LABORATORY
TEST DATA
TEST PIT - SOURCE No. HR-121

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

ORGANIC CONTENT

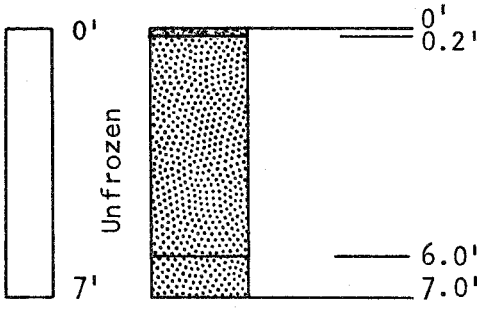
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-121

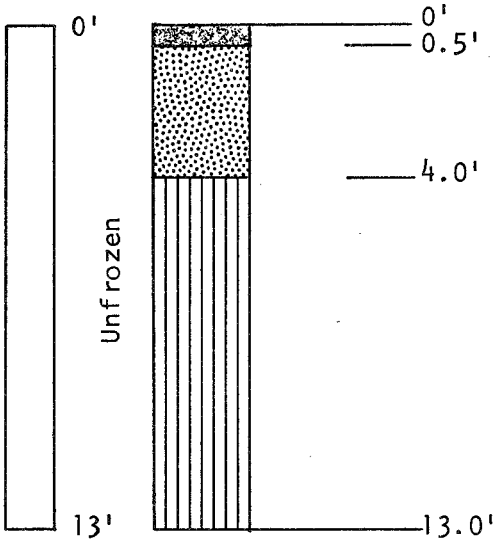
HR-121-1



(OL)	SILT -	topsoil, roots, etc.
(SW-SM)	SAND -	some gravel, little silt, few rootlets
(SW)	SAND -	and gravel to 3/4", trace silt

Water at 5.5' on completion

HR-121-2

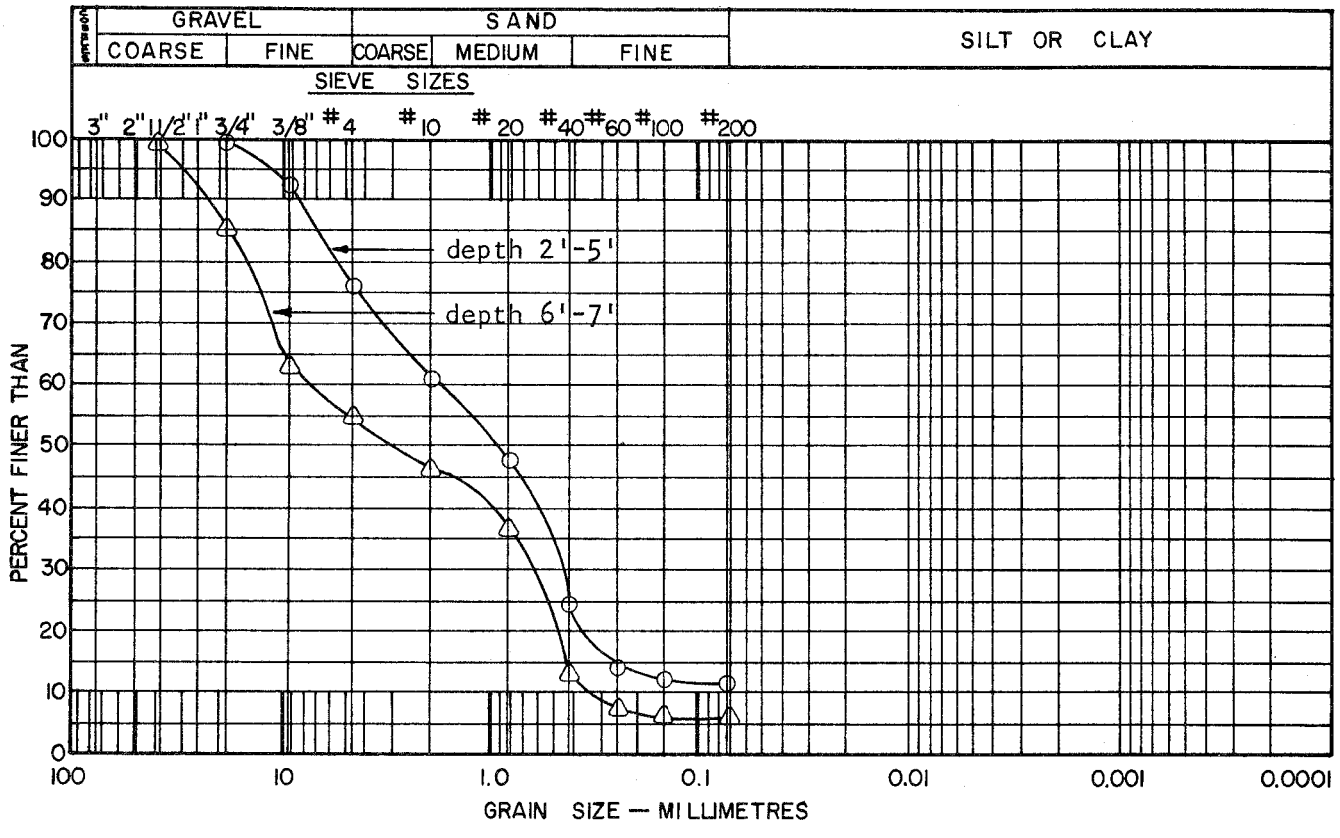


(OL)	SILT -	topsoil, roots, etc.
(SW)	SAND -	some gravel, max. 1½", trace silt, well graded, brown
(ML)	SILT -	some gravel, little sand, trace clay, low plastic, (till)

Hole dry on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-121-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	3.3%
Sample 2	depth 4'-5'	5.2%
Sample 3	depth 6'-7'	8.6%

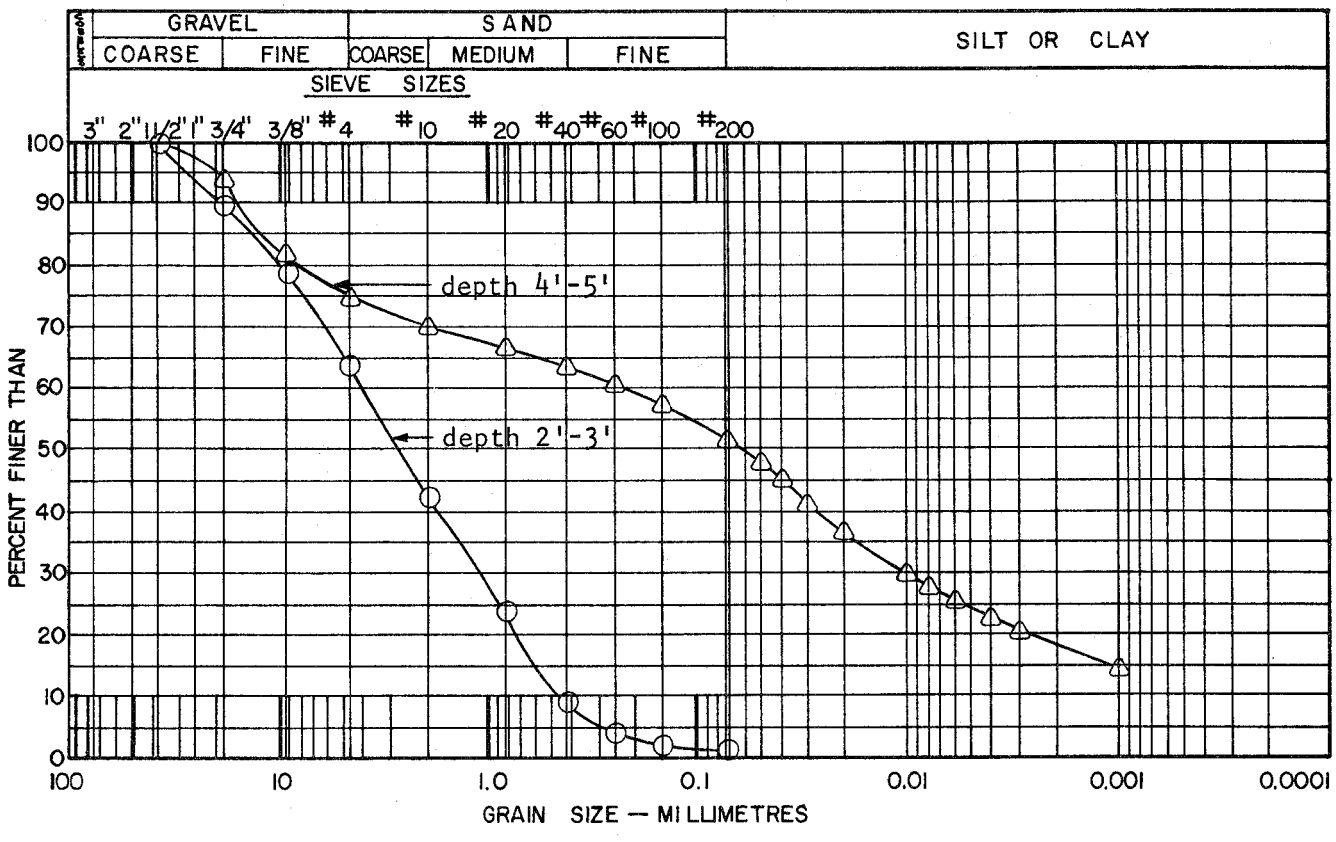
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-121-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	3.8%
Sample 2	depth 4'-5'	7.2%
Sample 3	depth 6'-7'	6.5%

ORGANIC CONTENT

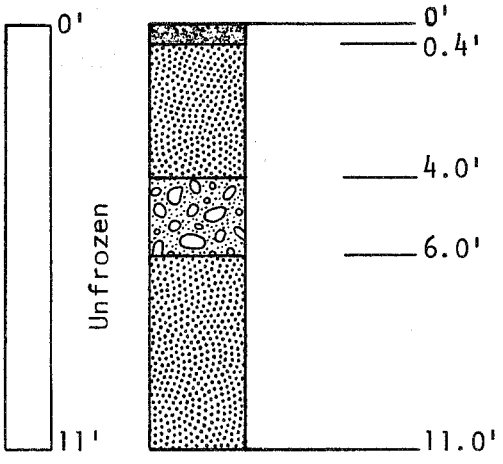
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-121

HR-121-3

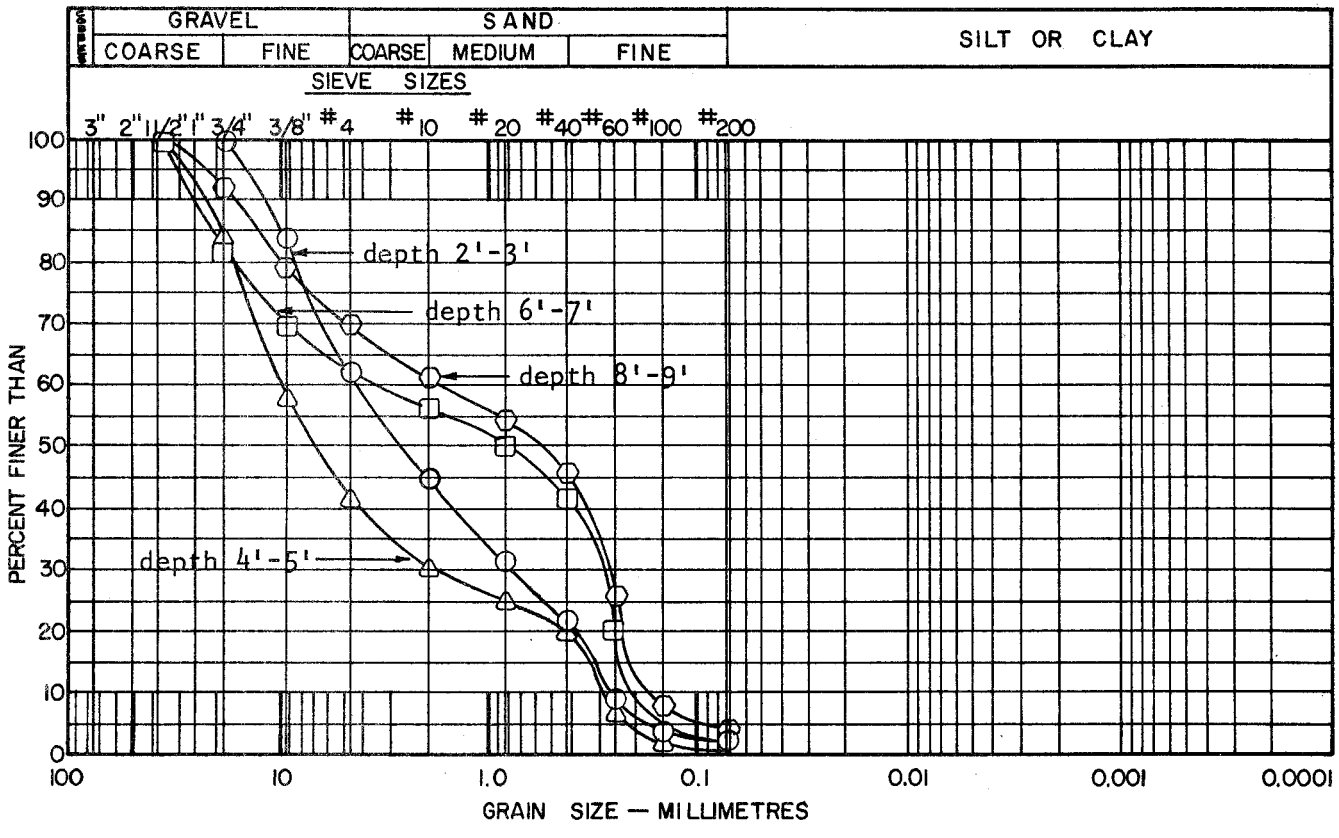


(OL)	SILT - topsoil, root fibres
(SW)	SAND - and gravel, trace silt, well graded, clean
(GW)	GRAVEL - and sand, trace silt, max. $1\frac{1}{2}$"
(SP)	SAND - some gravel to 1", trace silt, gap graded

Water at 3' on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-121-3

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	4.6%
Sample 2	depth 4'-5'	5.3%
Sample 3	depth 6'-7'	11.2%
Sample 4	depth 8'-9'	11.4%

ORGANIC CONTENT

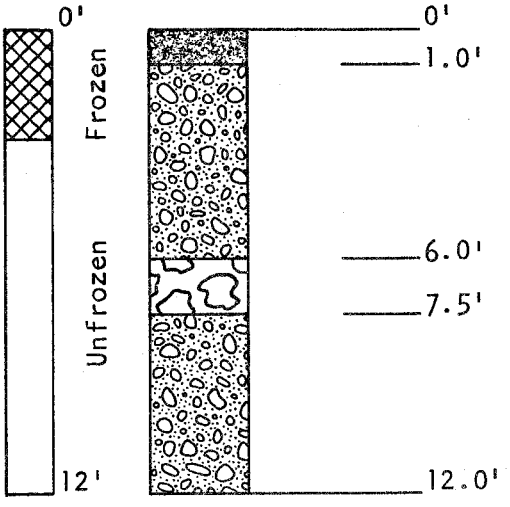
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-121

HR-121-4



(OL) SILT - and sand, topsoil, roots

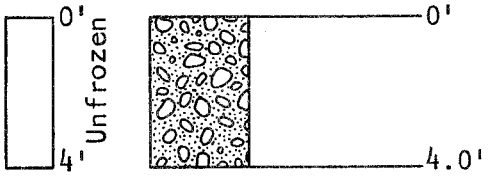
(GW) GRAVEL - some sand, cobbles to 4", well graded, rounded

COBBLES - little gravel, little sand, max. 10"

(GW) GRAVEL - and sand, trace silt, well graded, brown

Hole dry on completion

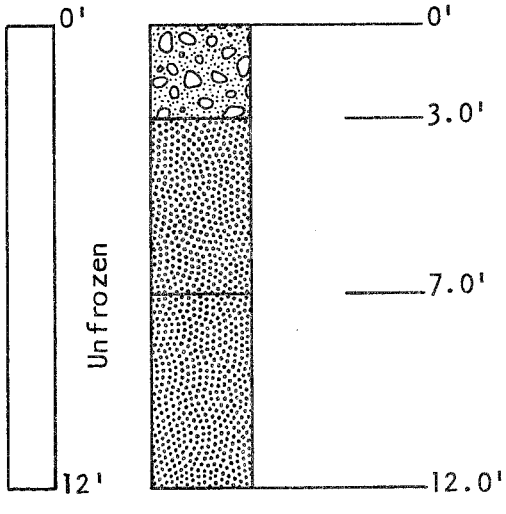
HR-121-5



(GW) GRAVEL - little sand, trace silt, well graded, grey, max. 1½"

Hole collapsing badly at 4'

HR-121-6



(GW) GRAVEL - and sand, trace silt, cobbles to 8", well graded

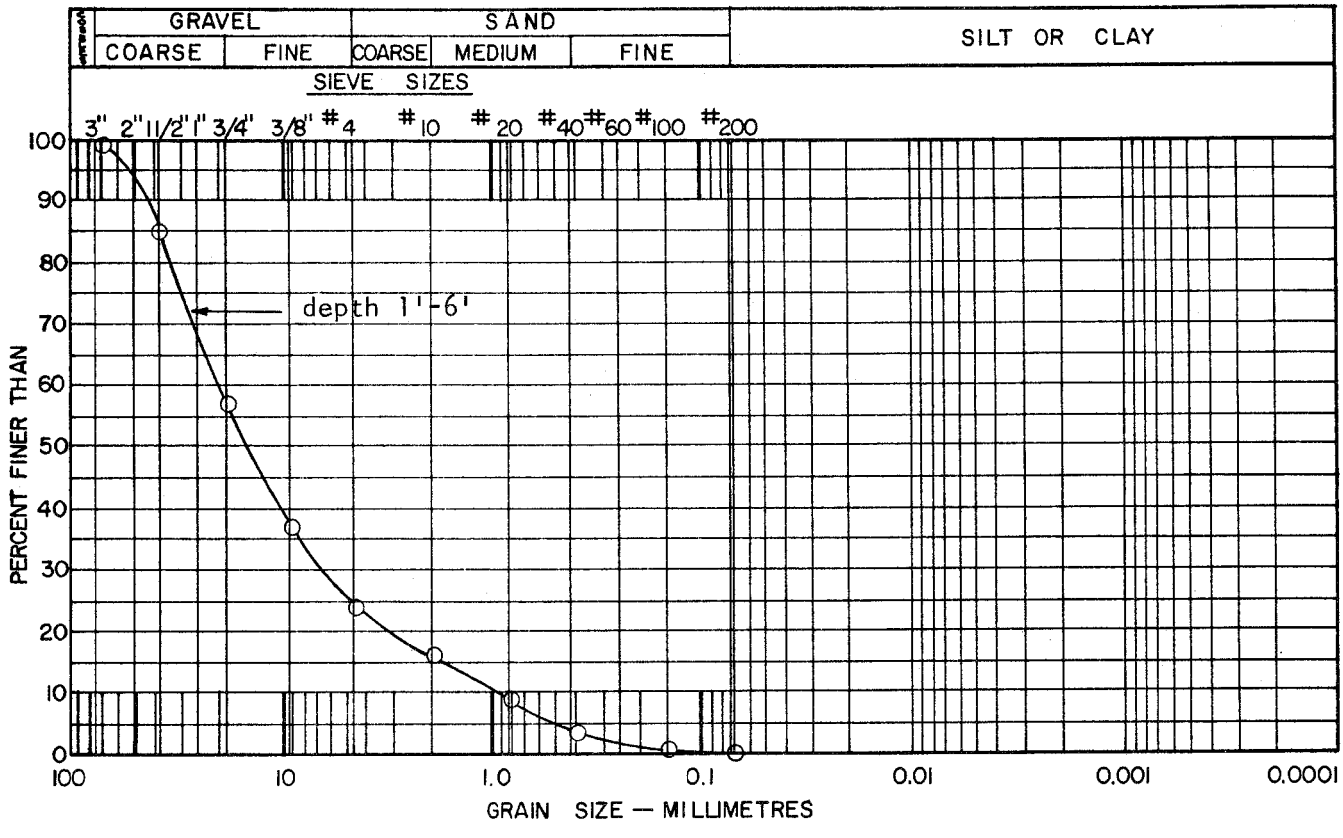
(SW) SAND - little gravel, trace silt, well graded, brown

(SM) SAND - some silt, little gravel, trace clay, trace cobbles, brown

Unable to bypass cobbles at 12'

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-121-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 1'-6' 2.2%

LOS ANGELES ABRASION TEST

Weight loss after 1,000 revolutions - 19.5%

ORGANIC CONTENT

Loss on ignition, depth 1'-6' - 0.5%
Color test - unwashed, Rdg. 3
(depth 1'-6')- washed, Rdg. 2

SPECIFIC GRAVITY & ABSORPTION TEST

Bulk specific gravity
+1½" hard limestone - 2.60
Absorption
+1½" hard limestone - 0.8%

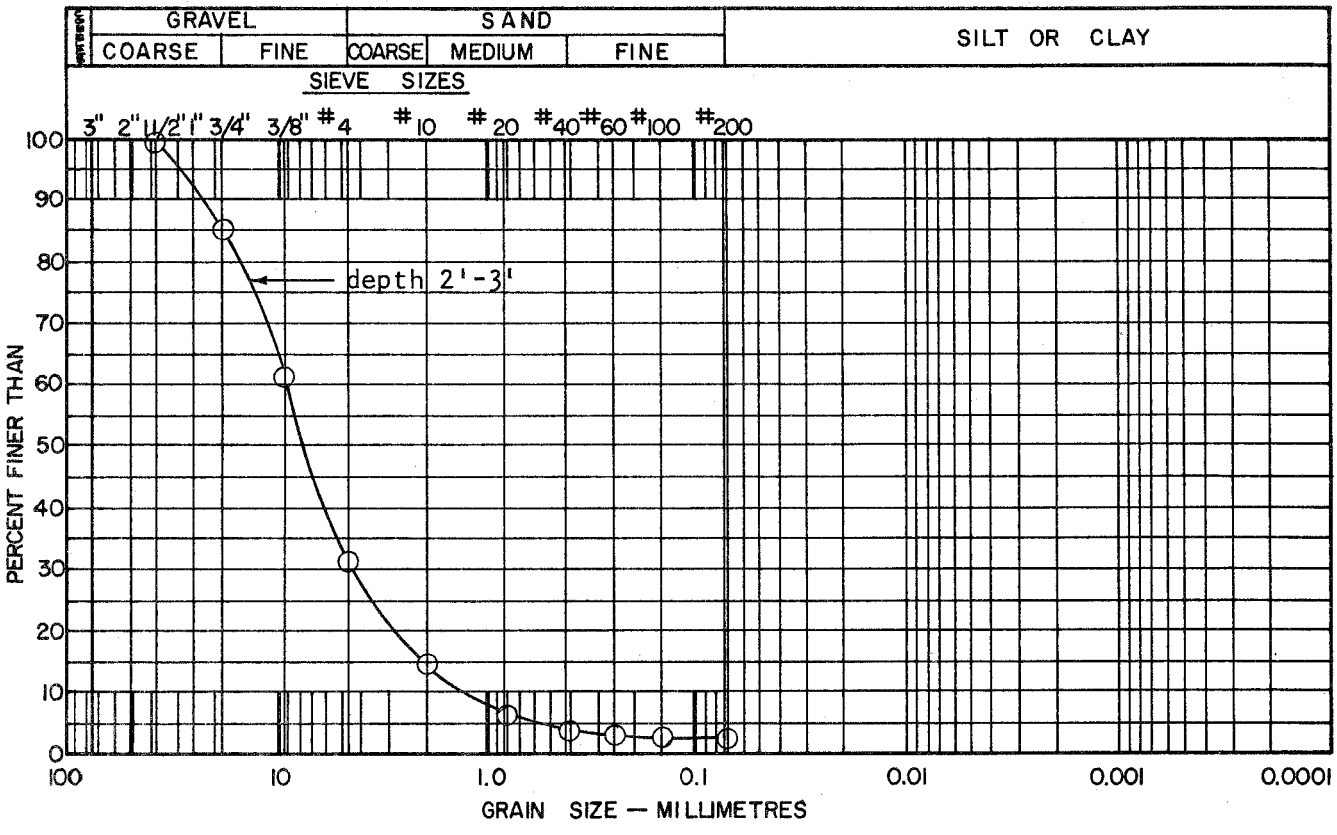
PETROGRAPHIC ANALYSIS

Depth 1'-6'

Hard limestone & dolomite	55%	Siltstone (soft)	1%
Granites	15%	Sandstone	1%
Siltstone (calcareous)	12%	Quartzite)	
Siltstone (hard)	12%	Mica Schist)	Trace
Limestone (soft & porous)	4%	Total	100%

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-121-5

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2'-3' 4.5%

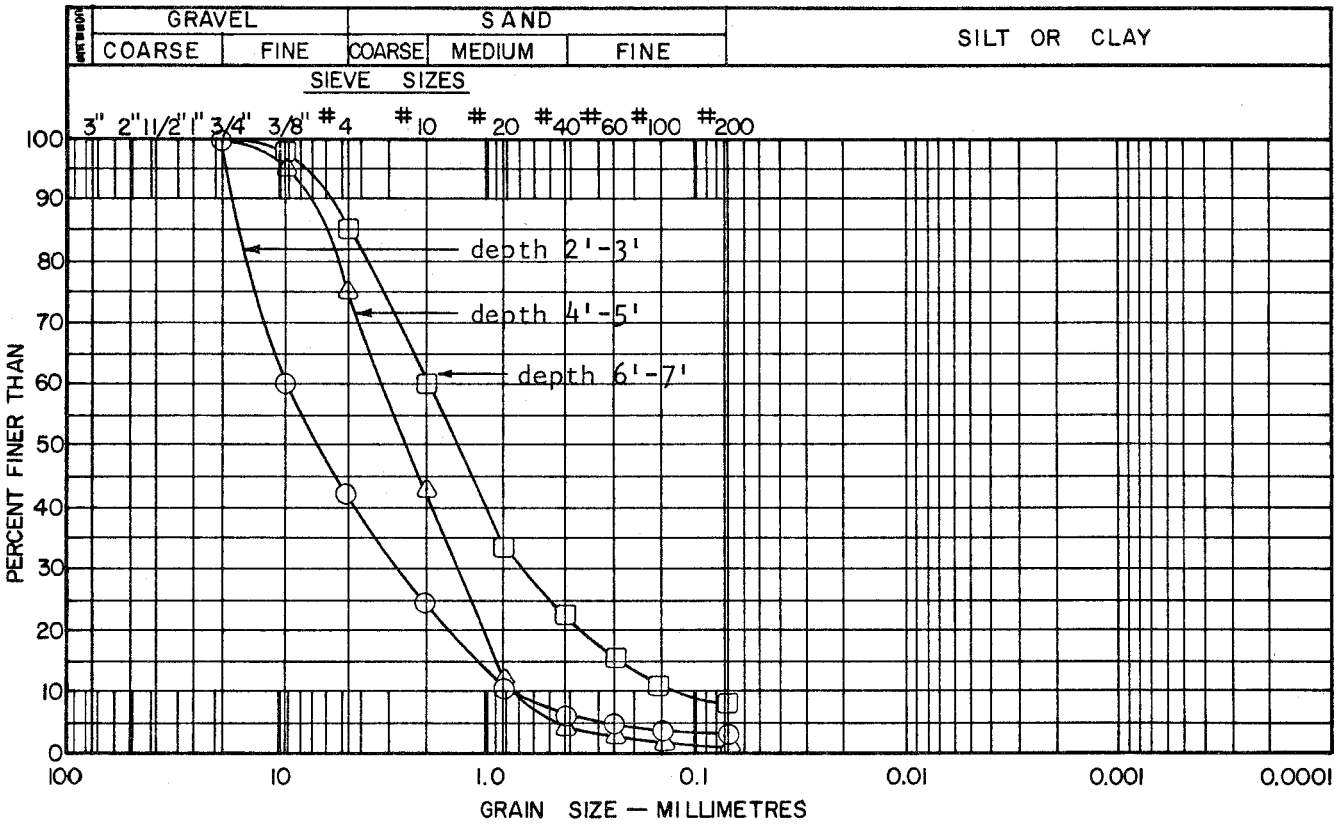
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-121-6

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.7%
Sample 2	depth 4'-5'	2.3%
Sample 3	depth 6'-7'	2.8%

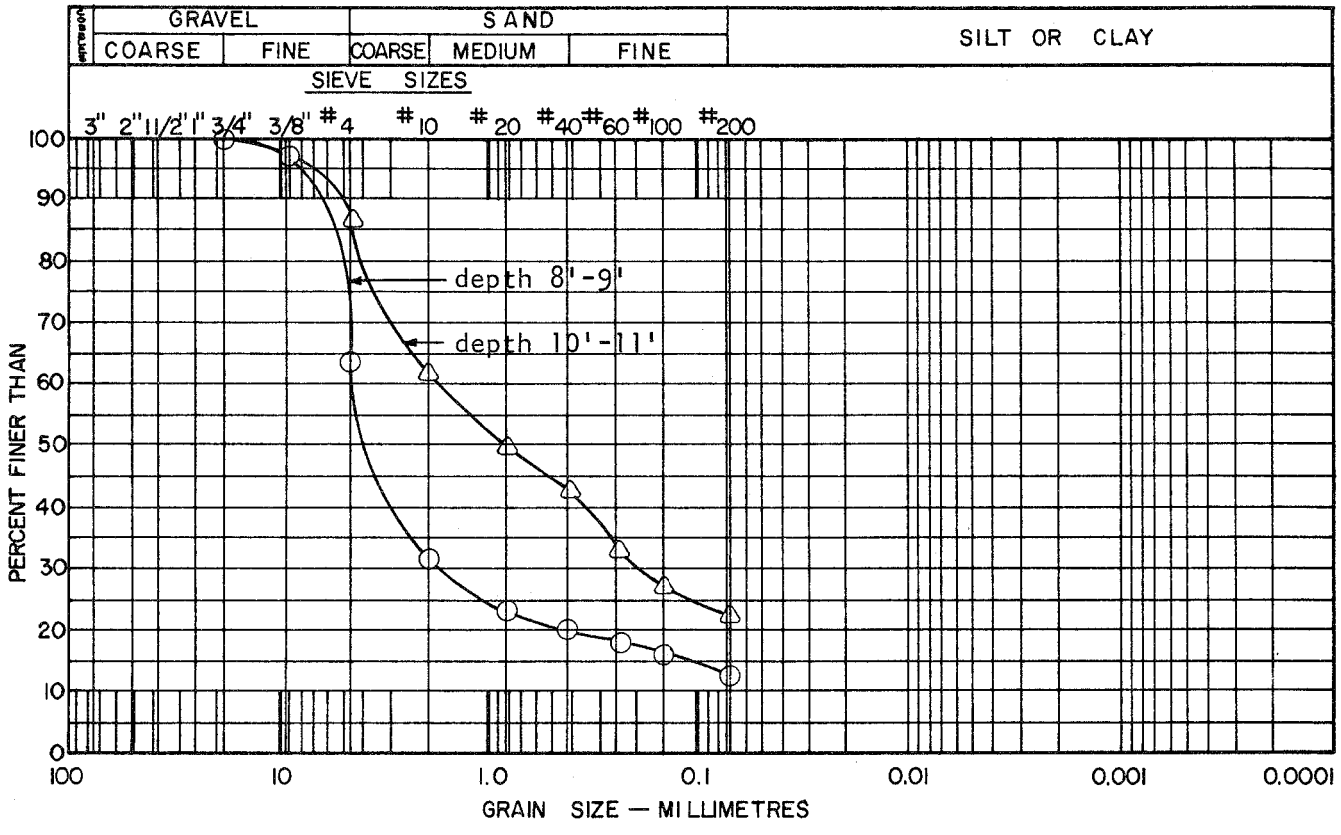
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-121-6

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 4 depth 8'-9' 3.9%
Sample 5 depth 10'-11' 7.2%

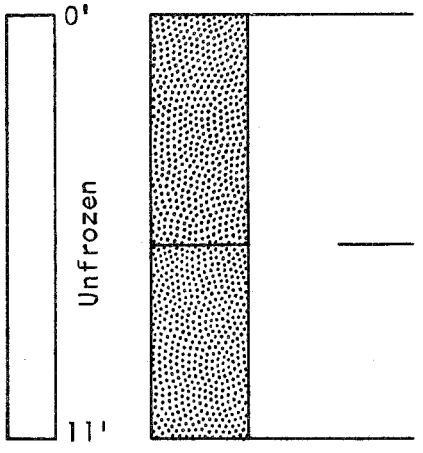
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS
SOURCE No. HR-121

HR-121-7

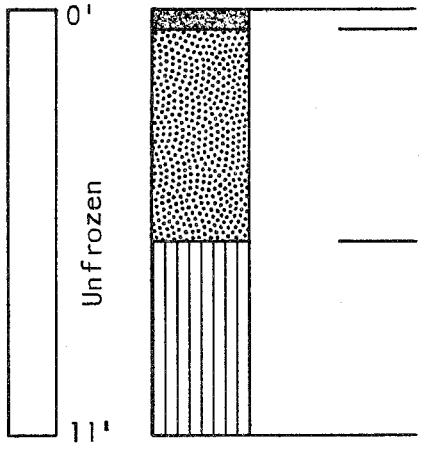


(SW) SAND - and gravel to 1½", trace silt, trace cobbles, well graded, brown

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

Hole collapsing at 11'
Hole dry on completion

HR-121-8



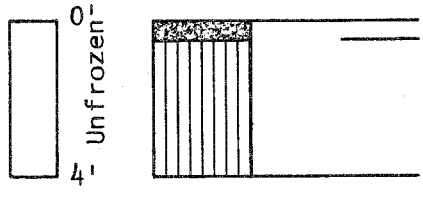
(OL) SILT - topsoil, root fibres, etc.

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

(ML) SILT - some gravel, little sand, trace clay, low plastic, (till)

Hole dry on completion

HR-121-9



(OL) SILT - few cobbles to 10", top-soil, root fibres, etc.

(ML) SILT - little gravel, little clay, trace sand, trace cobbles, low plastic, (till)

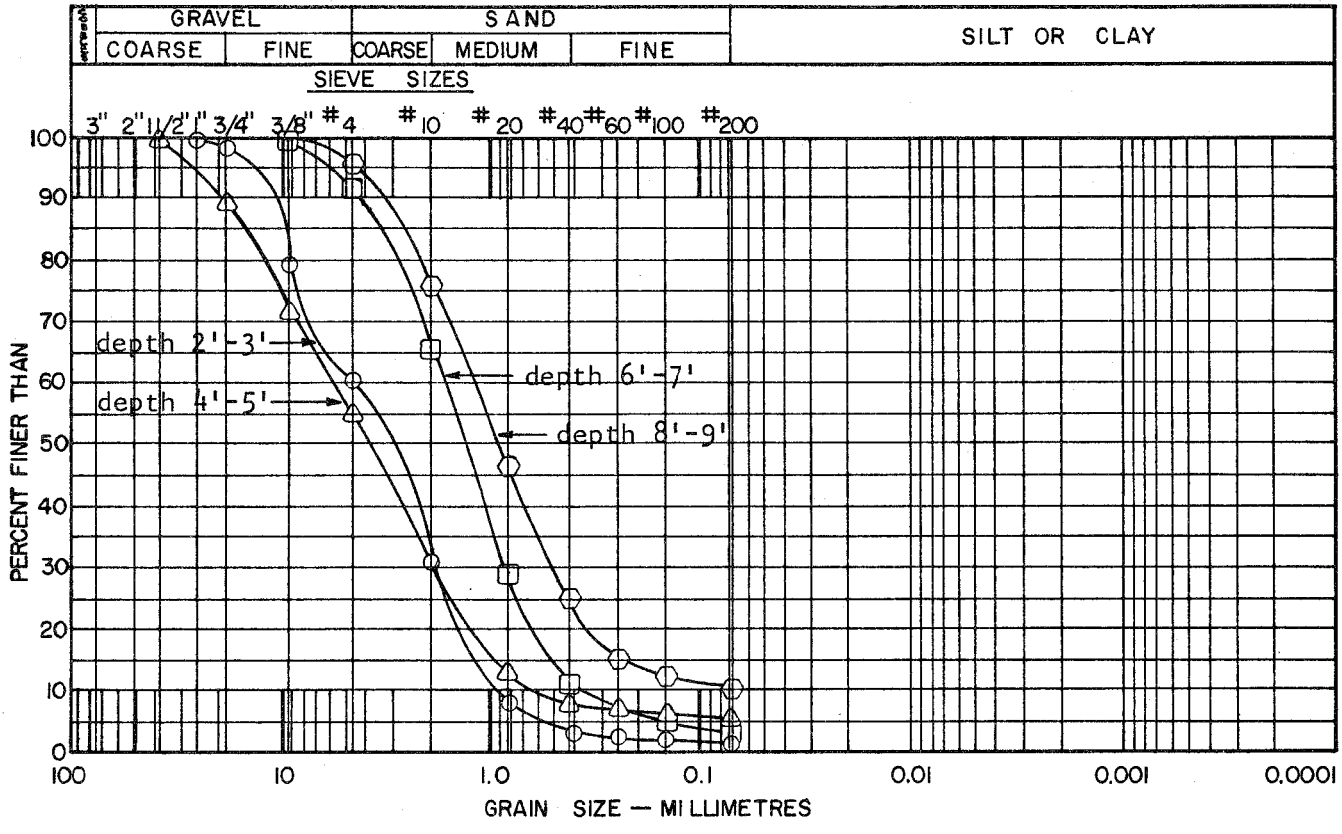
Hole dry on completion

Moisture Content:

Sample 1 depth 2'-3' 10.4%

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-121-7

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.4%
Sample 2	depth 4'-5'	2.7%
Sample 3	depth 6'-7'	4.1%
Sample 4	depth 8'-9'	6.1%

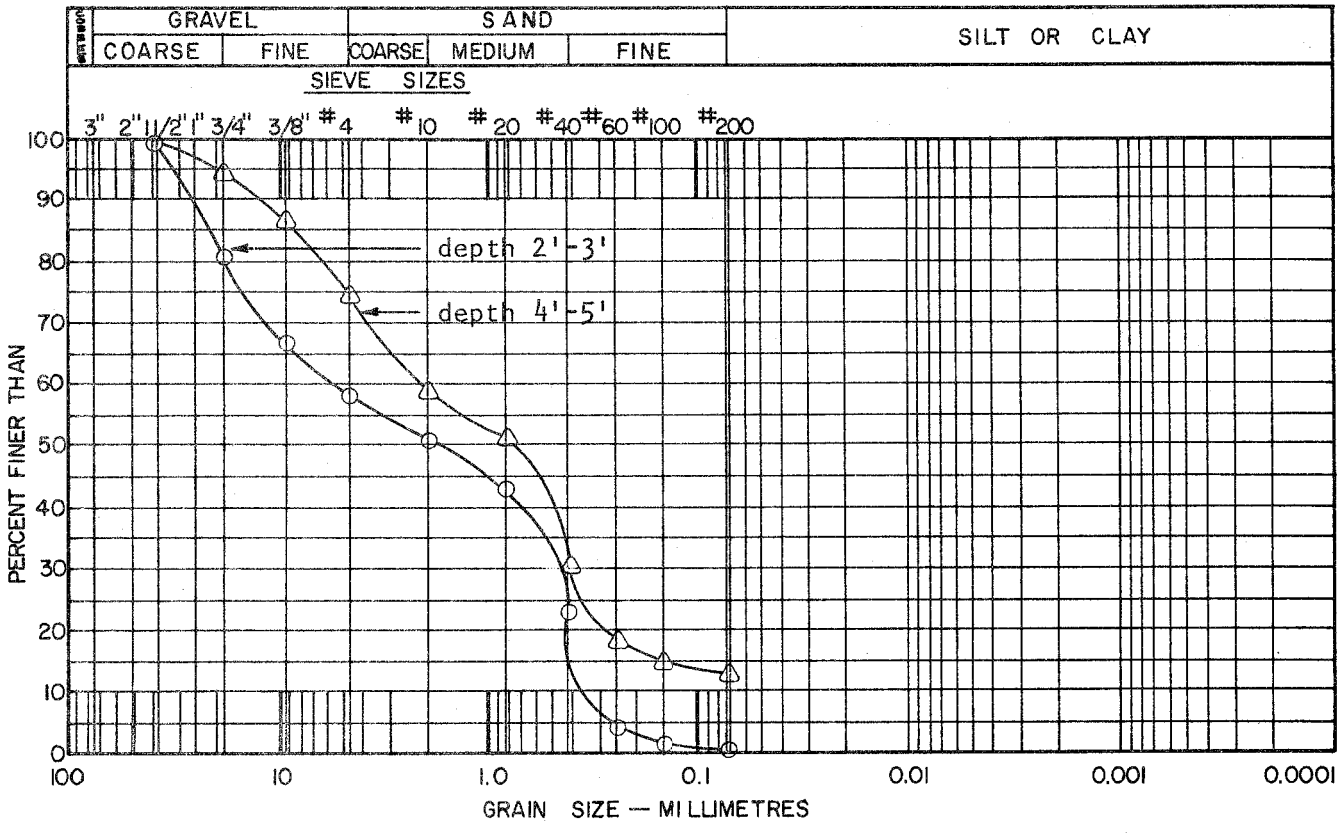
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-121-8

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	6.9%
Sample 2	depth 4'-5'	8.5%
Sample 3	depth 6'-7'	5.7%
Sample 4	depth 8'-9'	6.6%

ORGANIC CONTENT

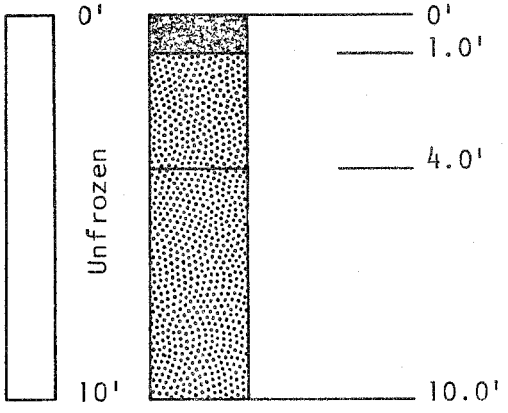
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-121

HR-121-10



(OL) SILT - trace cobbles, topsoil roots

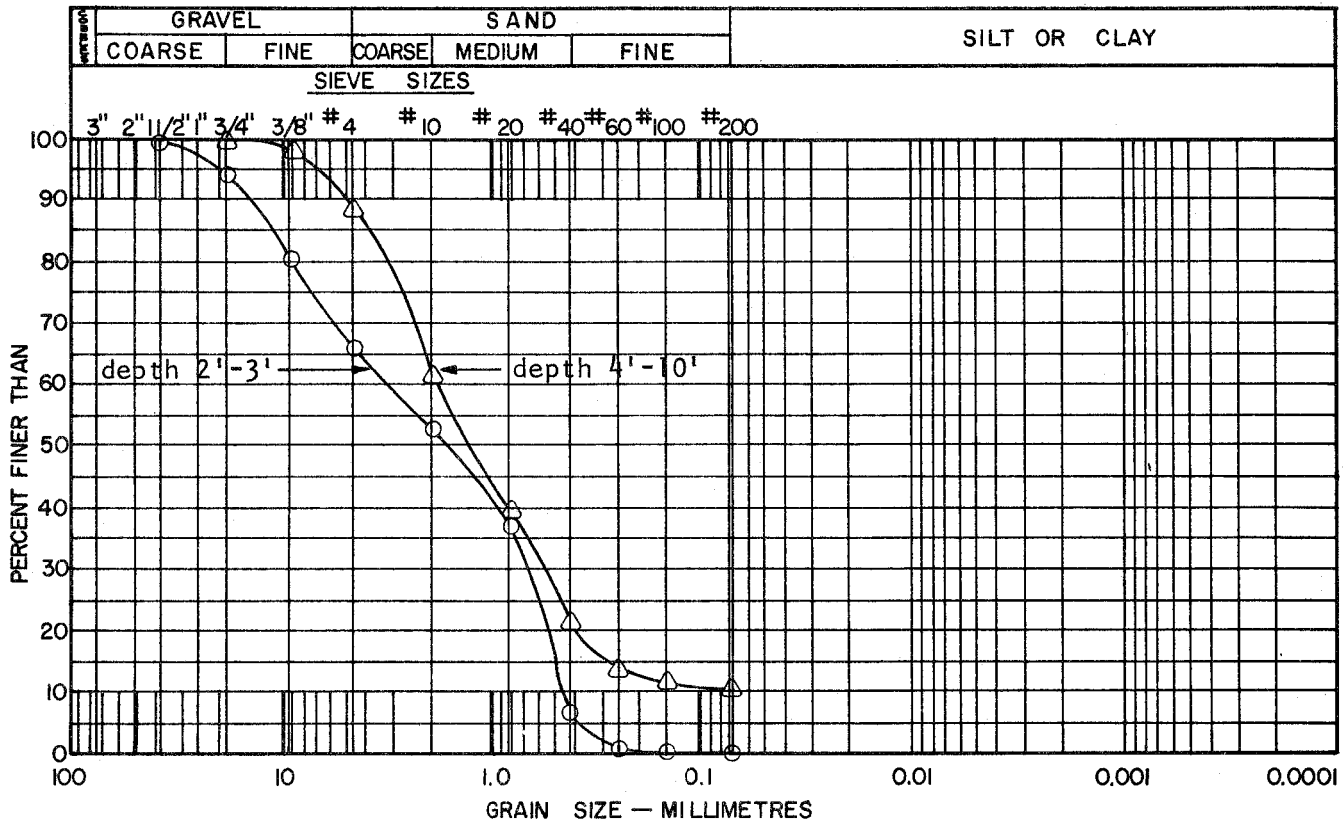
(SW) SAND - and gravel to 1½", trace silt, well graded, brown

(SW-SM) SAND - little gravel, little silt, well graded

Hole collapsing between 4'-10'

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-121-10

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2'-3' 2.2%
Sample 2 depth 4'-10' 2.8%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

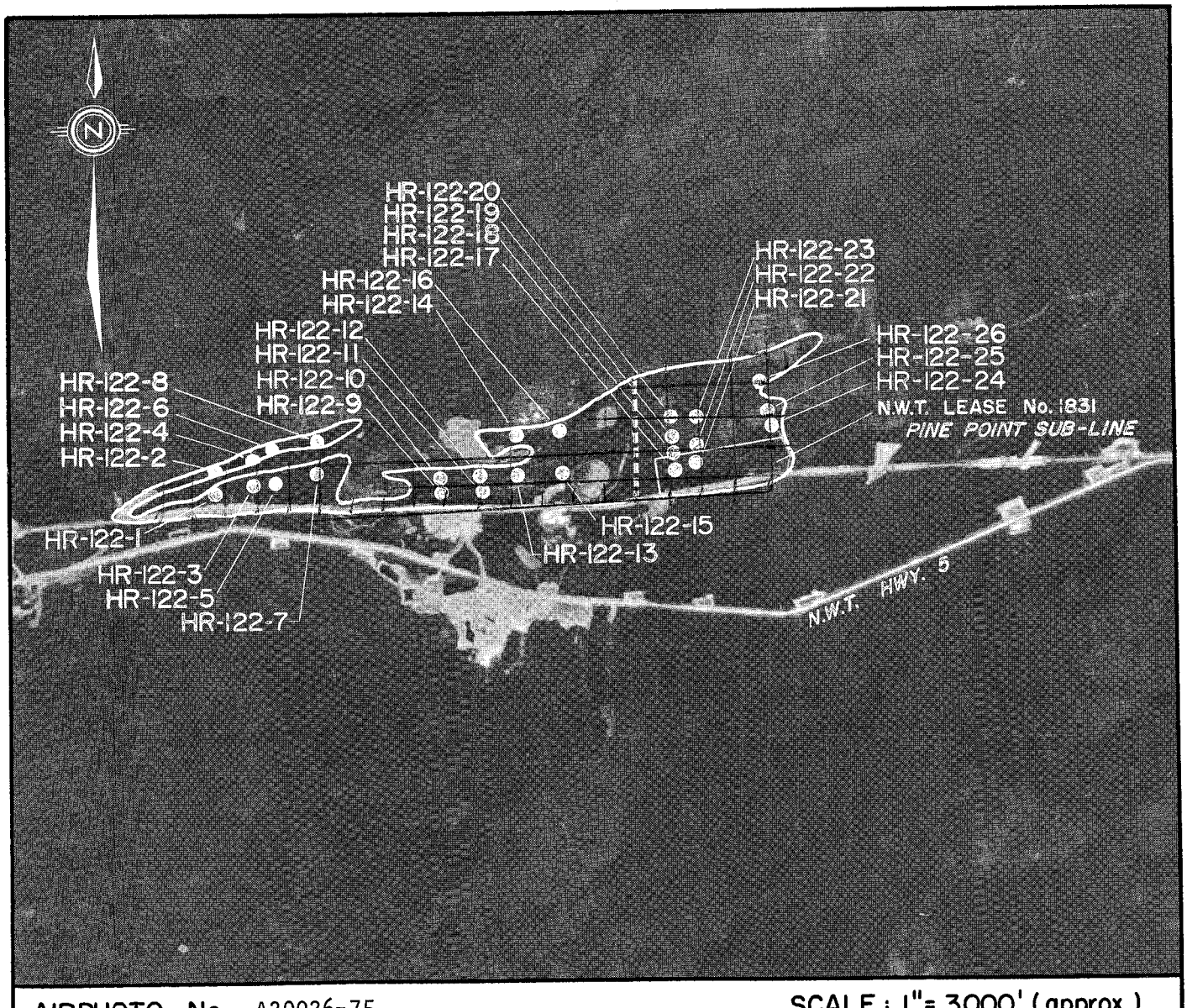
HAY RIVER
SOURCE No. HR-122

LANDFORM AND LOCATION: Esker and outwash complex along the C.N.R. Pine Point Sub-Line and adjoining Source HR-121 to the south. Located 28 miles southeast of Hay River.

MATERIAL: SAND and gravel, trace silt, trace cobbles, highly variable.

VOLUME: 1,000,000 cu. yds.

CONCLUSION: Source should be reserved for controlled development to produce coarse and fine aggregates using waste materials for general fill. Due to its high variability, processing will be required. Low priority for development should be given to the eastern portion of the source.



AIRPHOTO No. A20026-75 SCALE : 1"= 3000' (approx.)

HR-122 ENVIRONMENT

Physical

The source is a gently rolling glaciofluvial complex about 12,000 feet long and up to 2,000 feet wide. It adjoins Source HR-121 to the south and slopes gently northward from the railway line. A number of low parallel ridges, up to 4 feet high, trend east-west across the source.

Drainage of the ridges is good, although the water table is often within a few feet of the ground surface in low areas of the source, especially adjacent to the lakes. Permafrost is not expected to occur in the area, although pockets of frozen ground were encountered at the time of winter drilling. Where frost was encountered it was generally very shallow.

A small area at the east end of the source has been developed by the railway.

Biotic

The tree cover is primarily spruce and pine up to 40 feet high, with poplar growing along many of the ridges.

The area supports small populations of fur bearing animals and rodents. Because of the closeness of the railway, the highway and adjacent developments, the wildlife population in this vicinity is not considered an important factor.

HR-122 MATERIALS AND QUANTITIES

The materials in this source are variable, consisting of sand and gravel overlying silt till. Gradation curves indicate that materials are generally well graded but with large variations in the percentages of sand and gravel sizes. A large proportion of the samples tested indicate a lack of coarse gravel sizes in the deposits. The maximum size of cobbles encountered in the deposit is 10 inches in diameter. Generally, this source appears to have less gravel sizes than Source HR-121.

The petrographic analysis of gravel from 3 representative holes indicates that the material is primarily hard limestone and dolomite (45-59%), granite (13-24%), siltstone (6-23%), and quartzite (3-11%). The minor constituents include sandstone, schist, gneiss, basalt, chert, gossan and feldspar porphyry. The unsound

components comprise 2-6% of the total and include: soft and porous limestone, soft basalt, crumbly schist, and gossan. A conventional X-ray diffraction analysis on two samples of hard limestone and dolomite indicate they are not likely to be reactive. The chemical constituents are primarily calcite (75-95%), dolomite (2-25%) and a trace of quartz (0.5-2%). Pending further investigation, however, it is recommended that concrete produced with this aggregate should be made with cement containing less than 0.6% alkali.

Additional tests carried out on the materials include: bulk specific gravity, organic tests, loss of ignition, and absorption tests. These tests indicate the materials are marginally suitable for the production of aggregates.

The recovery of useable granular materials from the source will be governed by two main factors: depth to the water table, or depth to the underlying till. The basal till can be within a few feet of the ground surface as was encountered in the area east of the dotted line shown on the air photo. This part of the source should be given the lowest priority for development because of the shallow depth of granular materials overlying the till.

Based on an average recovery depth varying from 1 to 2 yards, the volume of material in this source is estimated to be at least 1,000,000 cu. yds. It is estimated that about 300,000 cu. yds. of coarse aggregate and 700,000 cu. yds. of fine aggregate could be produced from this source.

HR-122 DEVELOPMENT

General

The east end of the source has been partially developed at the present time. The Great Slave Lake Railway (C.N.R. Pine Point Sub-Line) has a 5 year lease on an area 700 feet wide by 2,640 feet long extending west from Mile 22 of the line. The expiry date of the lease is March 1st, 1975. See location on air photo.

This source and Source HR-121 are the only major sources in the study area containing materials which are suitable for the production of coarse and fine aggregates for concrete and asphalt. The area should be reserved for production of aggregates and development should be strictly controlled to prevent wastage

of material.

This source should not be further developed until the adjacent source HR-121 has been depleted.

Access

The source is located 28 miles from the community by road. Access to the source by road will require the installation of a railway crossing and improvement of the short 1,000 foot long road connecting the source to N.W.T. Hwy. 5. The railroad also provides direct access to the source from the community.

Material Use and Handling

The materials in this source could be used for any purpose, from production of fine and coarse aggregates for concrete or asphalt to general fill. For limited quantities of fine or coarse aggregates, screening could be used to remove oversize rock and the excess fine aggregates. For larger volumes, crushing equipment would be required for more efficient utilization of the available materials. Regardless of the processing equipment used in this source to produce coarse or fine aggregates, there will always be an excess of fine aggregates over coarse aggregates. These excess materials can be used for general fill.

Most of the sand appears to be coarse, so a fine blending sand will be required to improve grading sufficiently for use in high quality concrete.

For processing, the materials can be bulldozed into piles before screening and washing begins. In addition to the screening, washing and crushing machinery, other equipment that will be required for the operation is the usual assembly of bulldozers, loaders and trucks. For movement of large volumes of material to the community, the use of rail transportation may be an economical alternative to trucking.

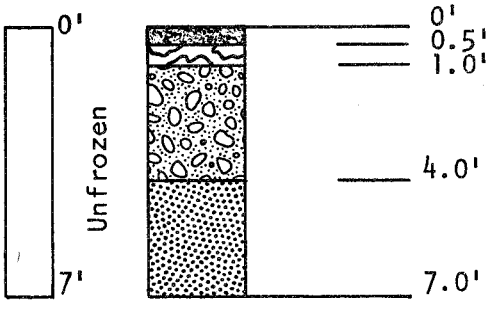
Stripping and Restoration

All trees will have to be cut and disposed of by burning. About 0.5 feet of organic cover and topsoil must then be removed from this source before excavation can begin. This material must be stockpiled for replacement after the granular material has been removed. After depletion of the sand and gravel, the side slopes and pit area should be graded and covered with stripped materials.

TEST HOLE LOGS

SOURCE No. HR-122

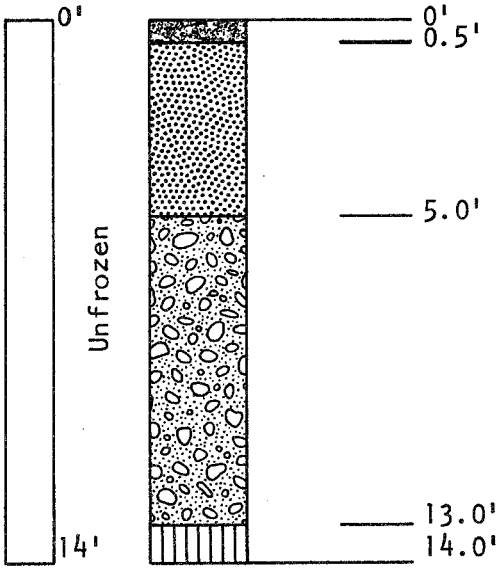
HR-122-1



(OL)	SILT - topsoil, root fibres, etc. COBBLES - some fine gravel, some sand
(GW)	GRAVEL - little sand, trace silt, well graded, 1½" max.
(SM)	SAND - some gravel, some silt, trace clay, low plastic, (till)

Hole dry on completion

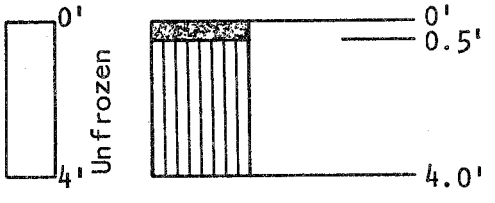
HR-122-2



(OL)	SILT - topsoil, roots
(SW)	SAND - and fine gravel to 1" interbedded layers
(GW)	GRAVEL - some sand, trace silt, cobbles to 4", rounded to sub-rounded, well graded
(ML)	SILT - some clay, some sand, trace fine gravel, cobbles to 12", grey-brown (till)

Hole dry on completion

HR-122-3



(OL)	SILT - topsoil, roots
(ML)	SILT - some gravel to 1", little sand, trace clay, low-plastic, (till)

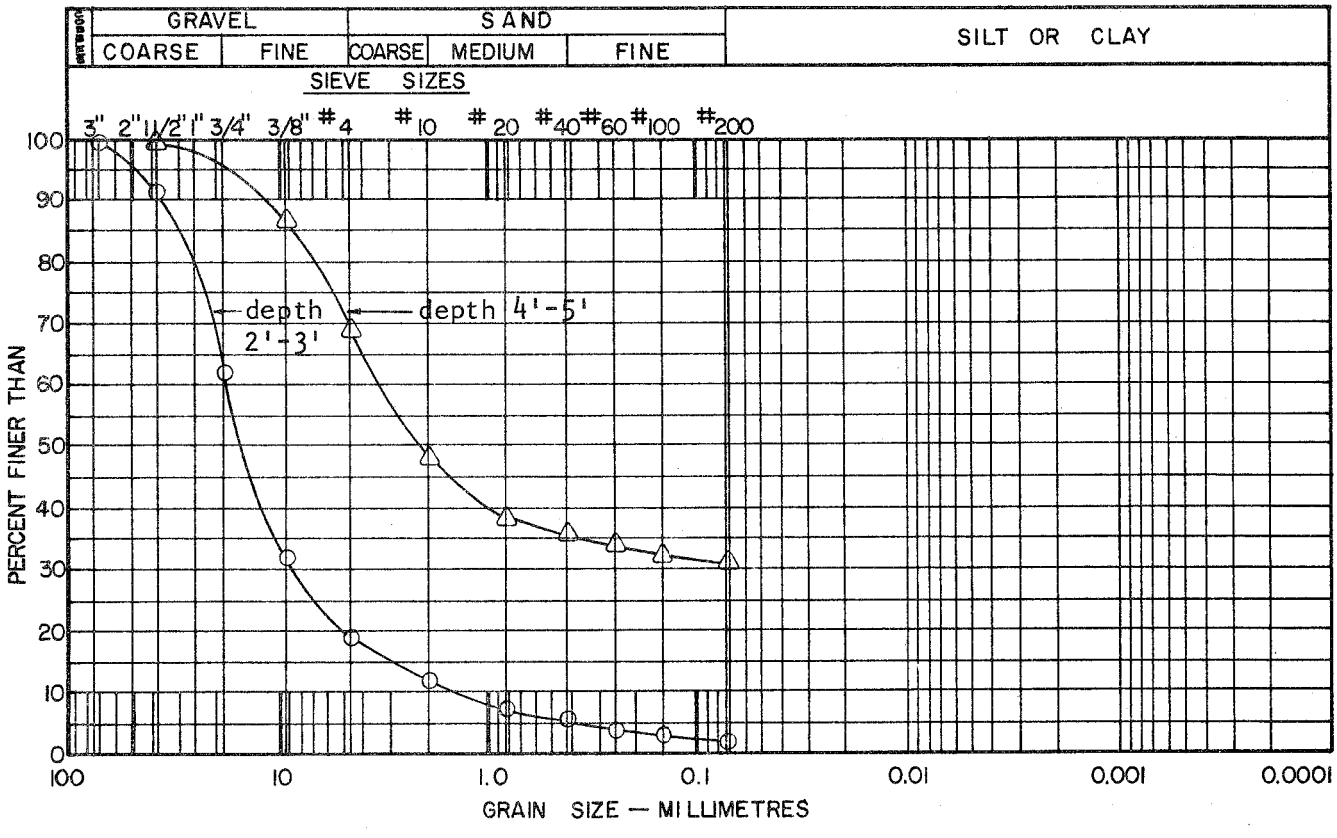
Hole dry on completion

Moisture Content

Sample 1 depth 2'-3' 9.4%

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-1

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.2%
Sample 2	depth 4'-5'	7.0%

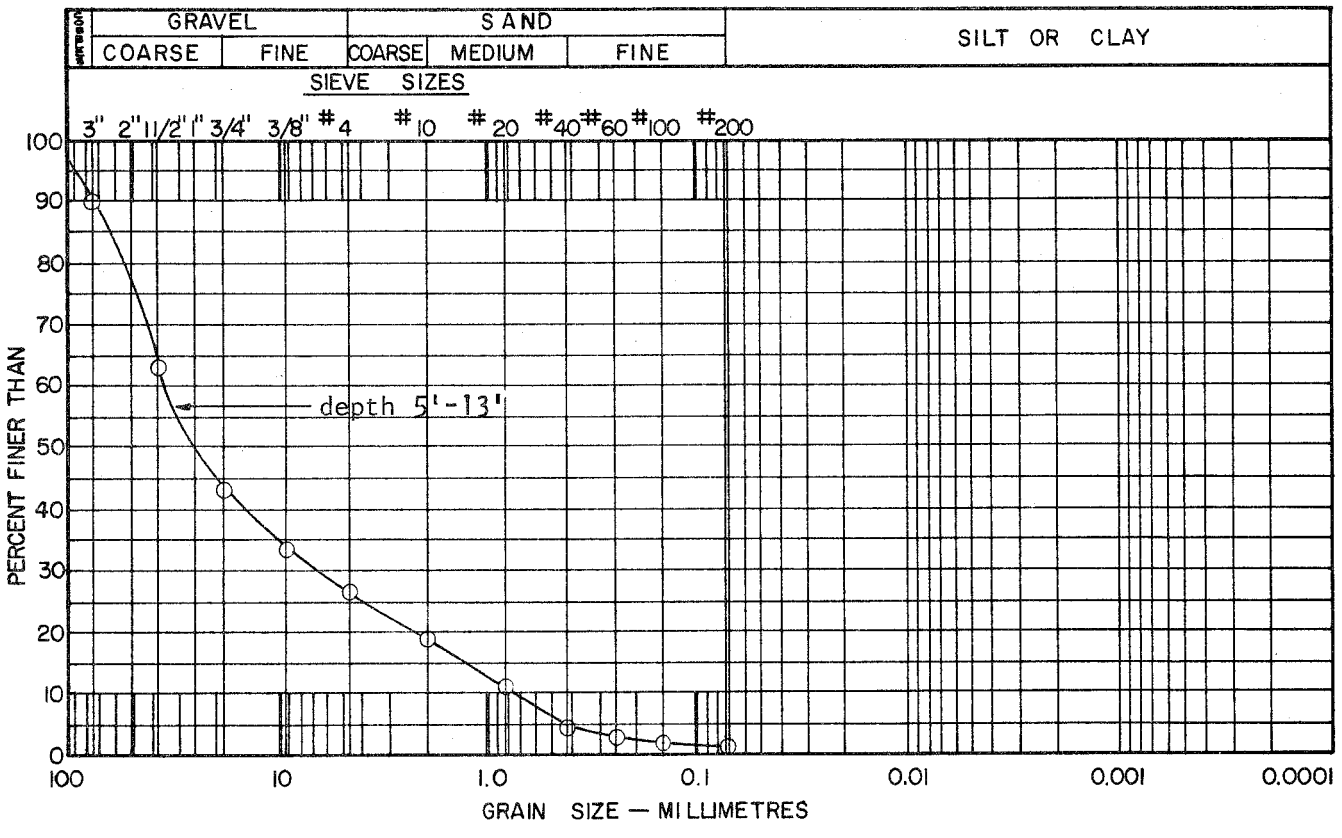
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-2

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 5'-14' 3.1%

ORGANIC CONTENT

HARDNESS TEST

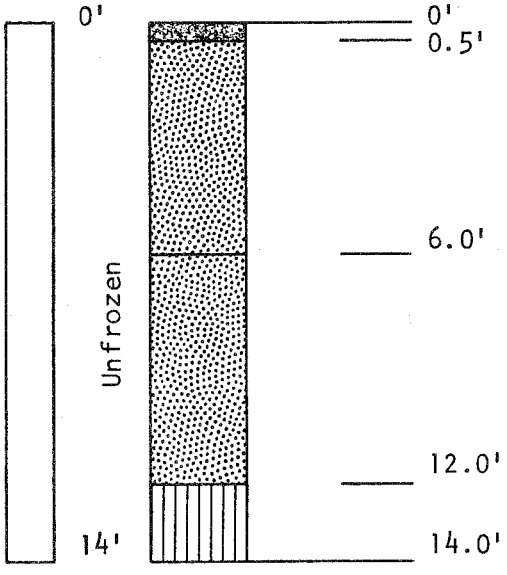
PETROGRAPHIC ANALYSIS

Hard limestone & dolomite	53%
Granites	22%
Quartzite	11%
Siltstone	7%
Gneiss	3%
Sandstone (coarse)	2%
Limestone (soft & porous)	2%
Basalt (soft))	
Schist (soft))	Trace
Total	100%

TEST HOLE LOGS

SOURCE No. HR-122

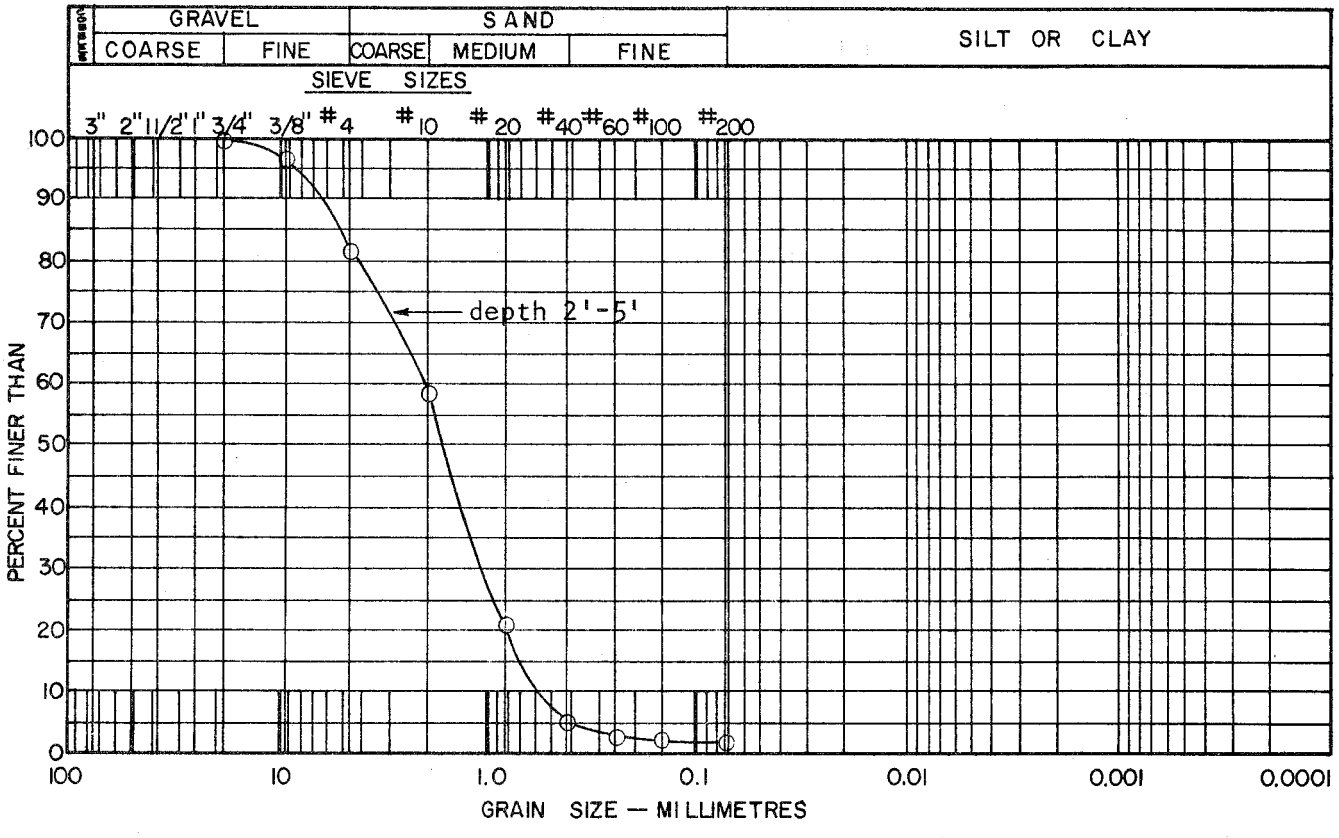
HR-122-4



(OL)	SILT - topsoil, roots
(SW)	SAND - little gravel to 1½", trace silt, brown
(SW)	SAND - trace silt, trace gravel, trace cobbles
(ML)	SILT - little gravel, little sand, trace clay, trace cobbles, (till)

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-4

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.1%
Sample 2	depth 4'-5'	2.9%

ORGANIC CONTENT

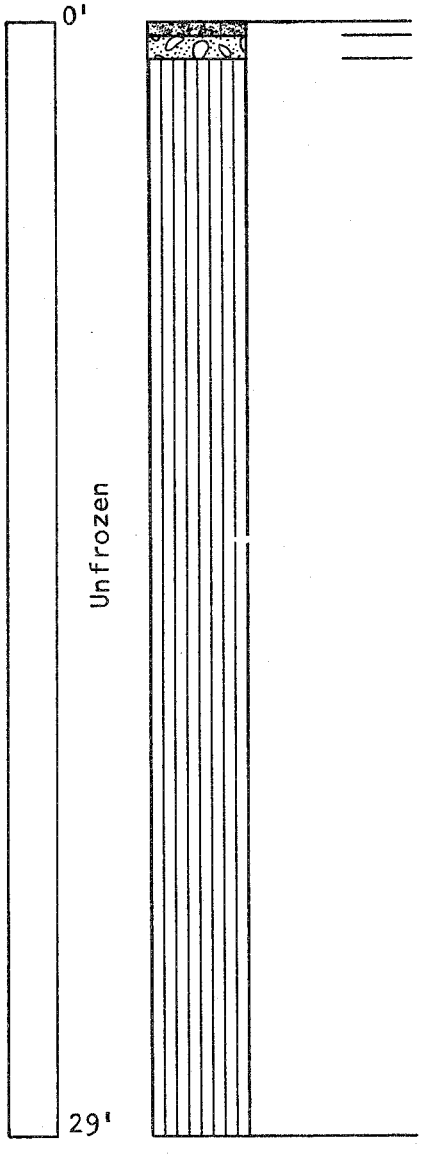
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-122

HR-122-5

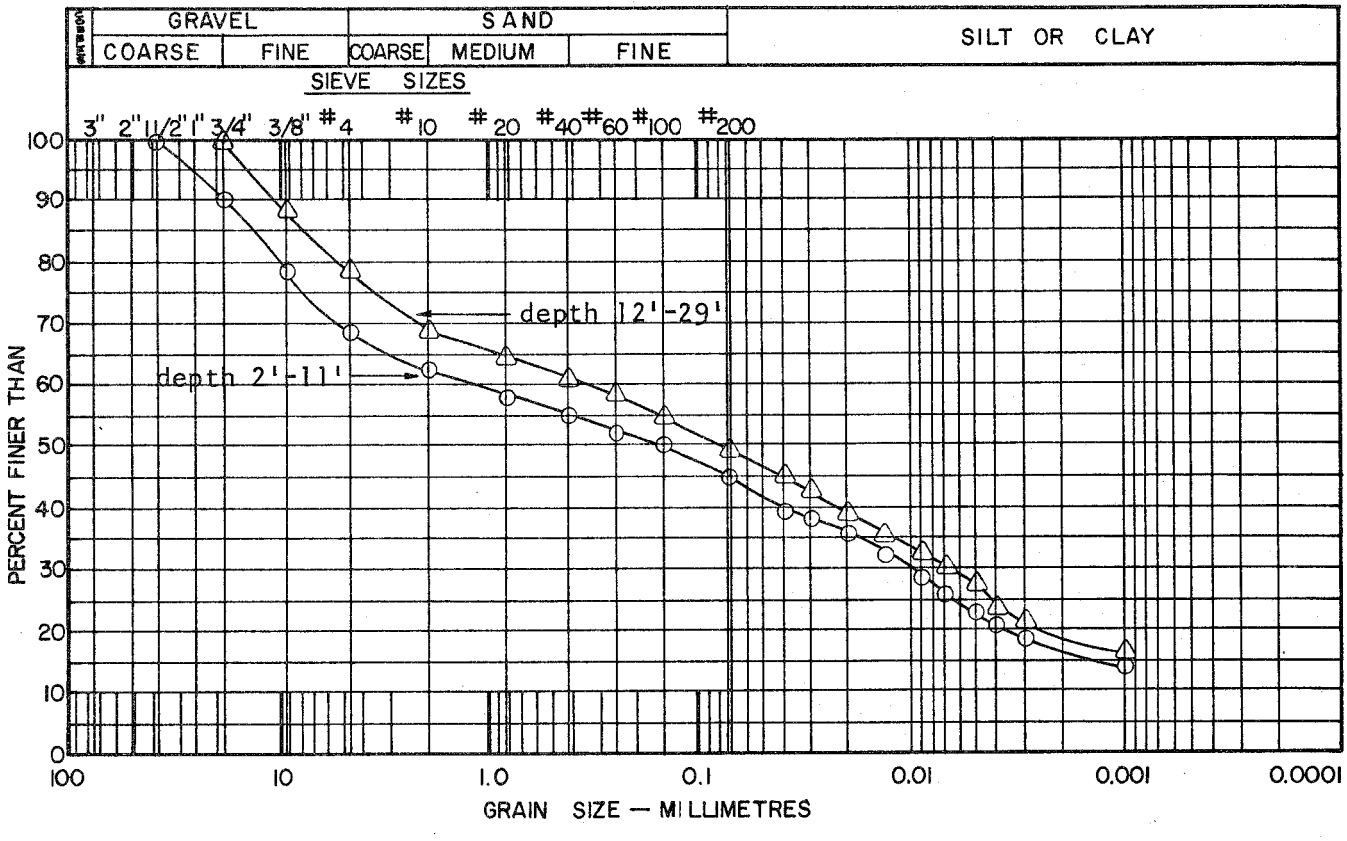


0'	(OL)	SILT - topsoil, roots
0.4'	(GW)	GRAVEL - some sand, trace silt, max. 3"
1.0'	(ML)	SILT - some gravel, some sand, trace clay, low plastic, grey, (till)
29.0'		

Hole dry on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-5

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	7%
Sample 2	depth 4'-5'	6.4%
Sample 3	depth 6'-7'	5.9%
Sample 4	depth 8'-9'	5.5%
Sample 5	depth 10'-11'	4.8%
Sample 6	depth 12'-13'	4.7%
Sample 7	depth 15'-16'	5.1%
Sample 8	depth 19'-20'	6.2%
Sample 9	depth 24'-25'	7.0%
Sample 10	depth 28'-29'	6.0%

ORGANIC CONTENT

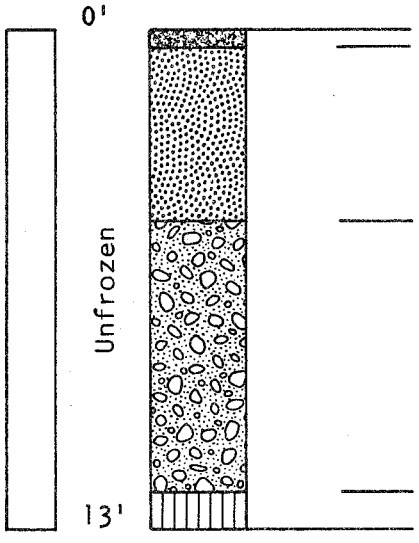
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-122

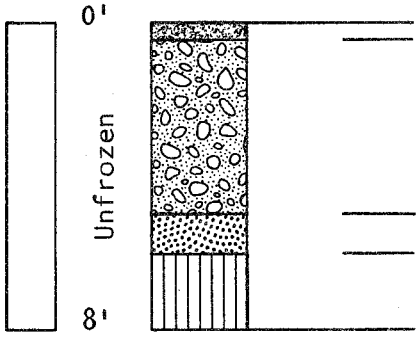
HR-122-6



0'			
0.5'	(OL)	SILT -	brown topsoil, roots
5.0'	(SW)	SAND -	some poorly graded gravel to 4", trace silt, few roots
12.0'	(GP)	GRAVEL -	and sand, trace silt, cobbles to 12", gap graded
13.0'	(ML)	SILT -	some sand, little clay, grey-brown (till)

Hole dry on completion

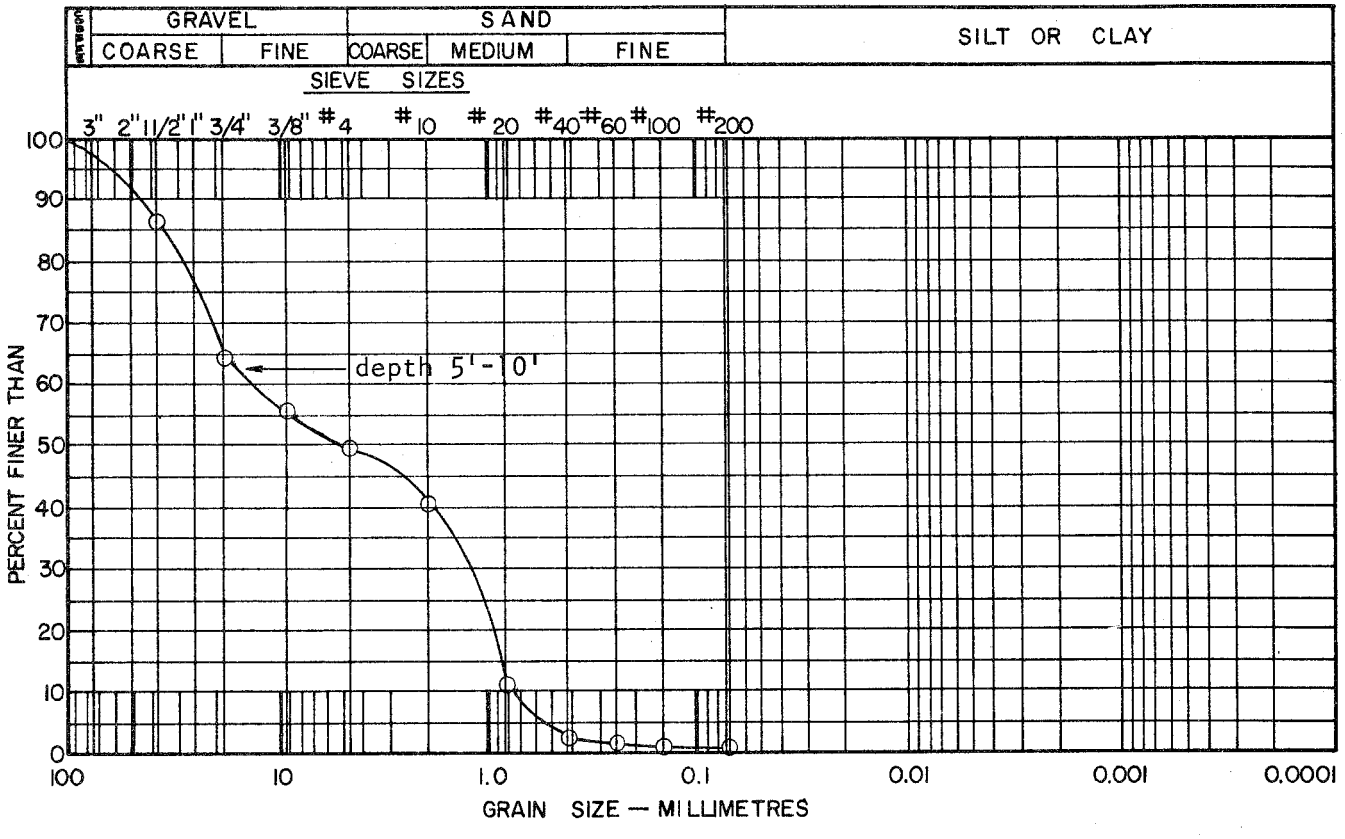
HR-122-7



0'			
0.5'	(OL)	SILT -	brown topsoil, roots
5.0'	(GW)	GRAVEL -	and sand, trace silt, well graded, max. 4"
6.0'	(SW)	SAND -	little gravel, trace silt, brown
8.0'	(ML)	SILT -	some sand, trace clay, brown, (till)

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-6

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 5'-10' 2.2%

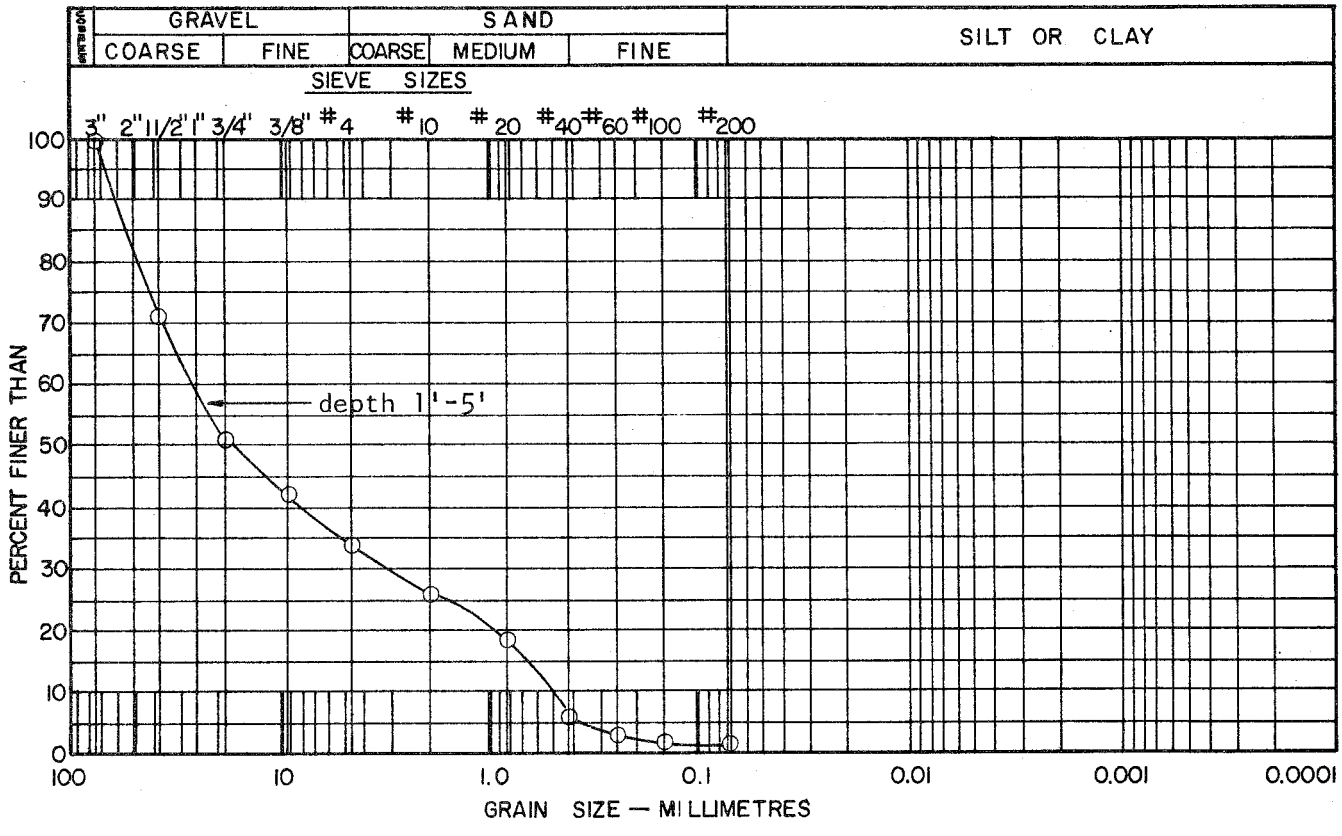
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-7

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 1'-5' 2.9%

SPECIFIC GRAVITY & ABSORPTION TEST

Bulk specific gravity test - +1½" hard limestone & dolomite - 2.68

Absorption test - +1½" hard limestone & dolomite - 1.0%

ORGANIC CONTENT

Loss on ignition test
Sample 1 depth 1'-5' 1.0%
Color test - Sample 1 depth 1'-5' Rdg. 3

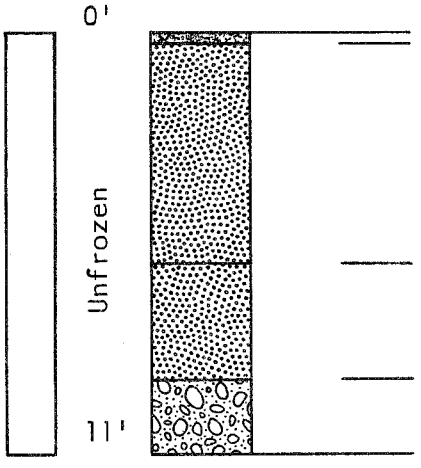
PETROGRAPHIC ANALYSIS

Hard limestone & dolomite	59%	Sandstone	2%
Granites	24%	Gneiss)	
Siltstone (calcareous)	6%	Chert)	
Limestone (soft & porous)	6%	Schist)	Trace
Quartzite	3%	Total	100%

TEST HOLE LOGS

SOURCE No. HR-122

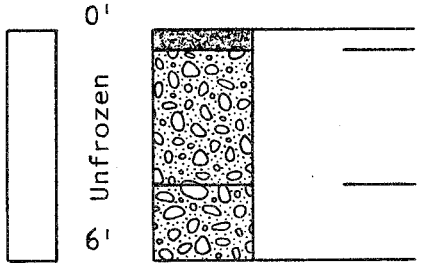
HR-122-8



(OL)	SILT - topsoil, roots	0' - 0.3'
(SW)	SAND - little gravel, trace silt, brown	0.3' - 6.0'
(SW)	SAND - some gravel, trace silt, trace cobbles	6.0' - 9.0'
(GW)	GRAVEL - and sand, trace silt	9.0' - 11.0'

Water at 9.5' on completion

HR-122-9

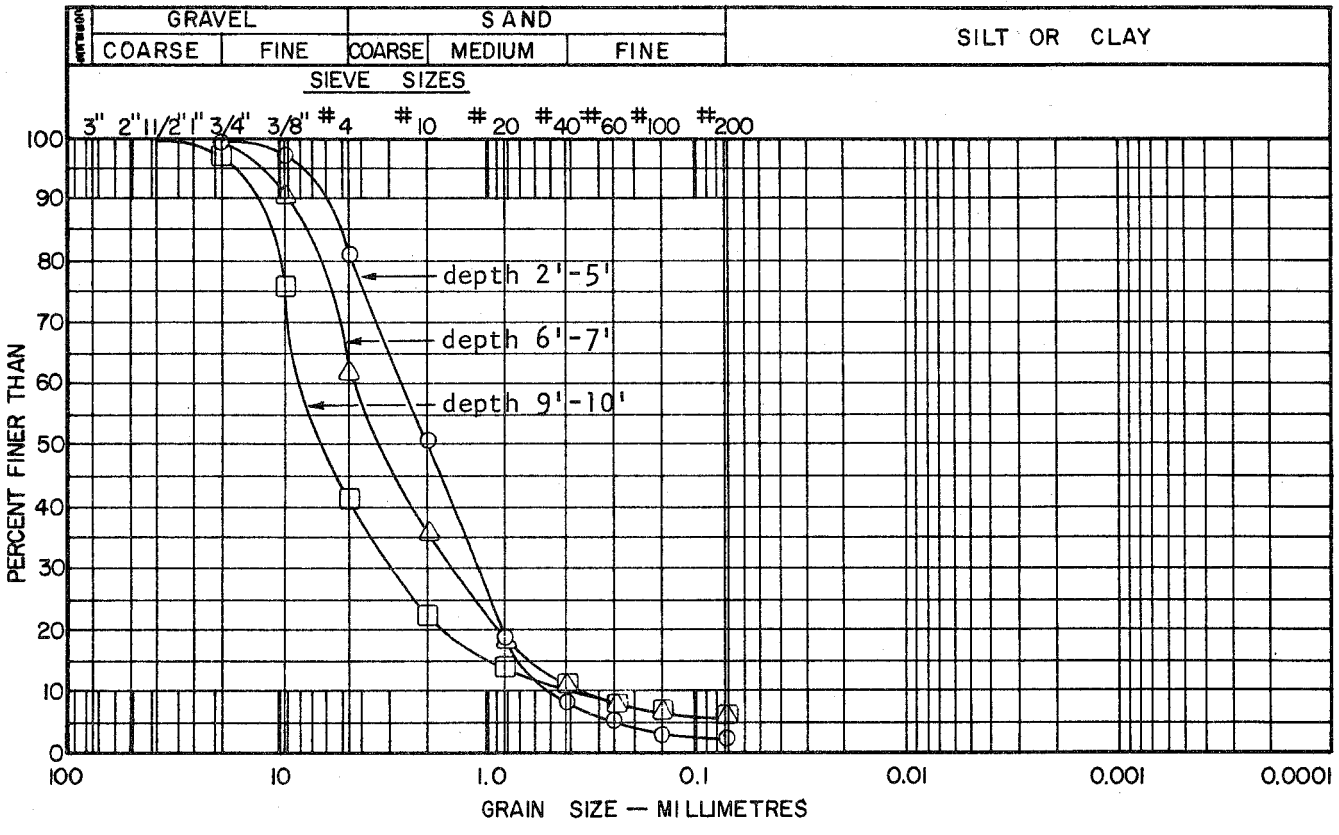


(OL)	SILT - topsoil, roots	0' - 0.5'
(GW)	GRAVEL - and sand, trace silt, max. 2"	0.5' - 4.0'
(GC)	GRAVEL - some sand, little silt, trace clay, low plastic, grey-brown	4.0' - 6.0'

Hole dry on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-8

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.1%
Sample 2	depth 4'-5'	1.5%
Sample 3	depth 6'-7'	3.3%
Sample 4	depth 9'-10'	4.6%

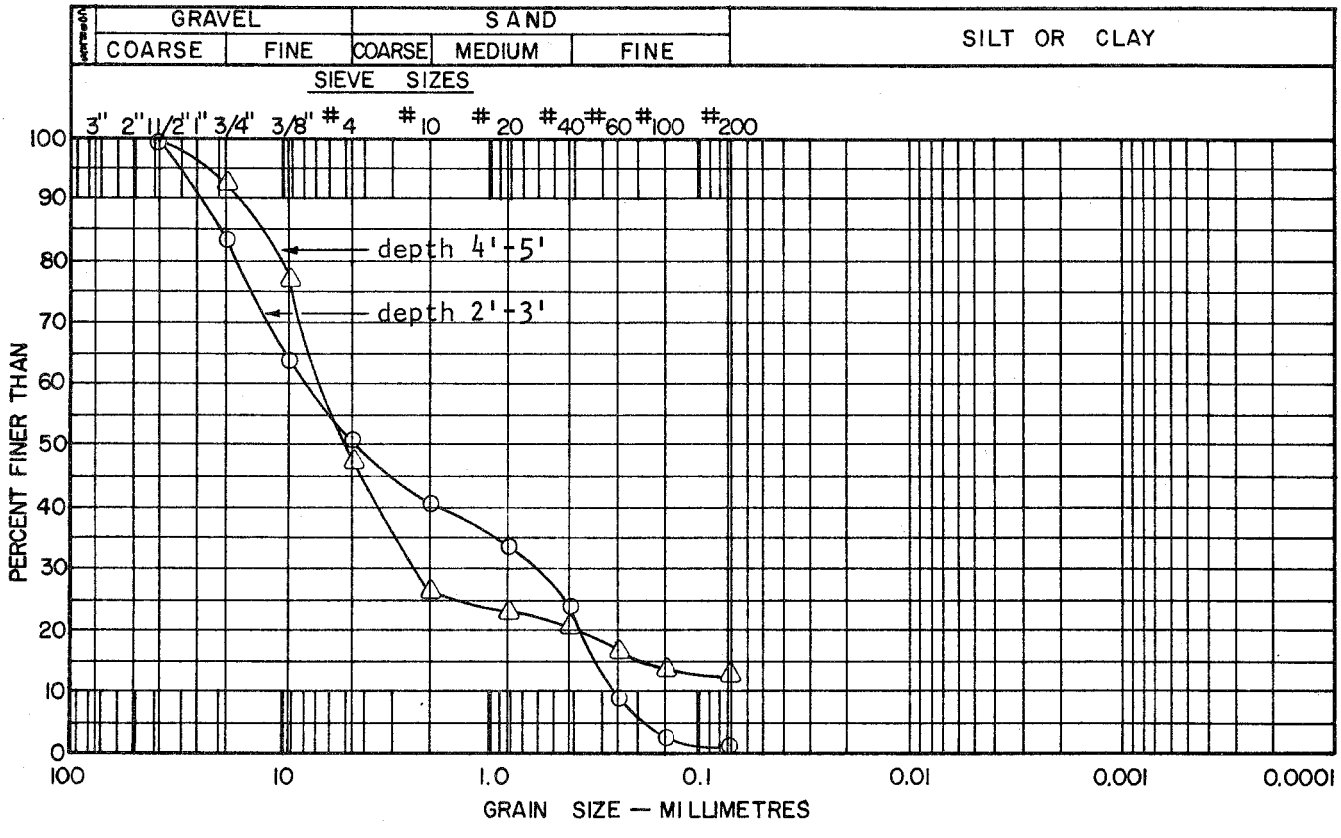
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-9

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.6%
Sample 2	depth 4'-5'	6.5%

ORGANIC CONTENT

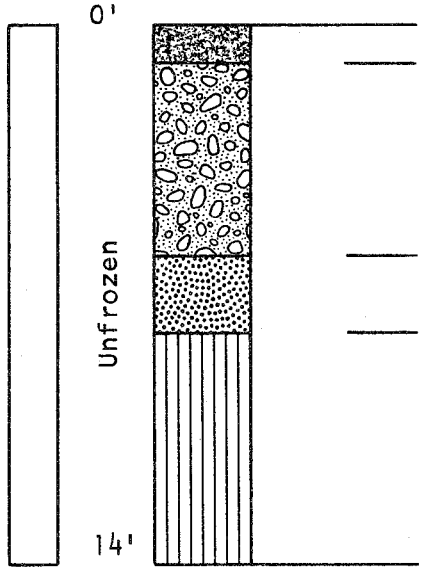
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-122

HR-122-10

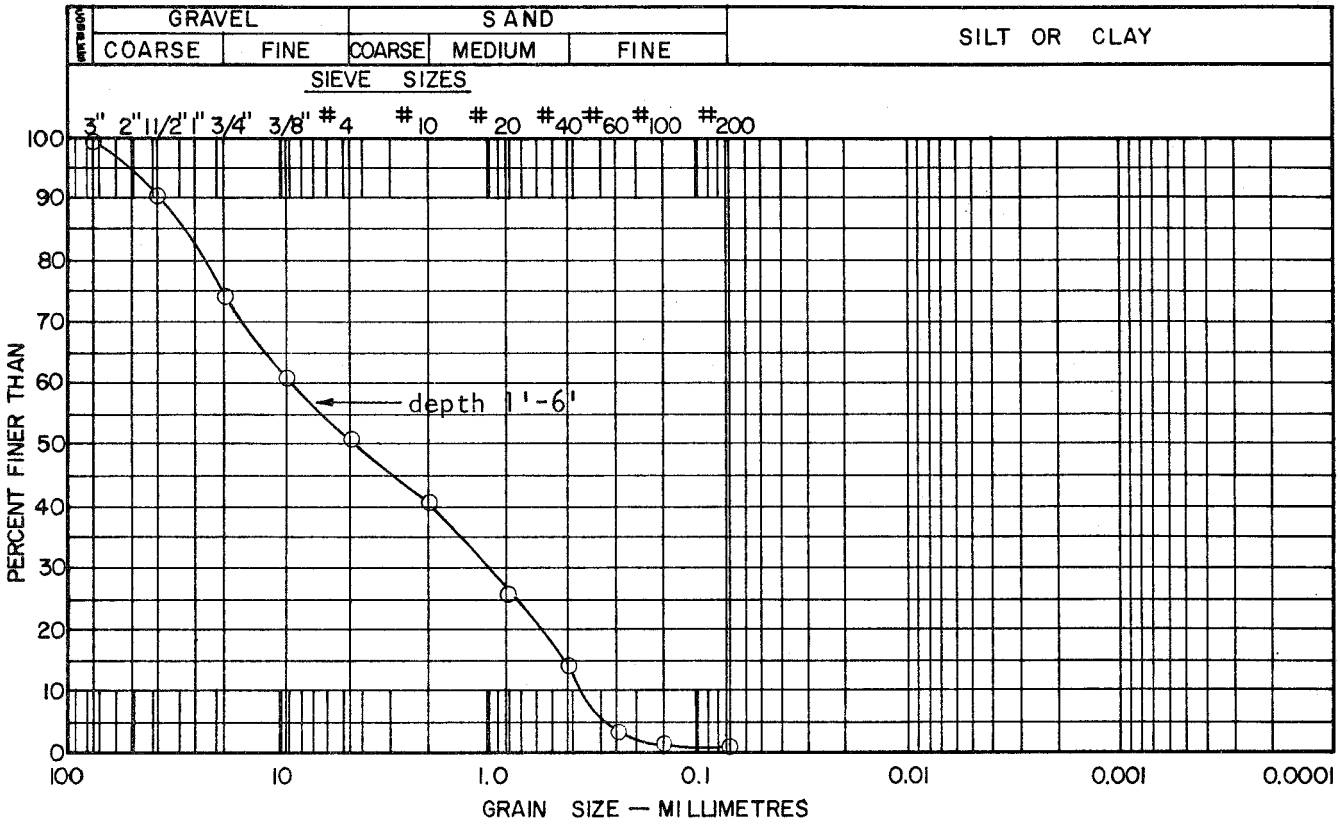


0'		
1.0'	(OL)	SILT - topsoil, roots
	(GW)	GRAVEL - and sand, trace silt, interbedded, well-graded, max. 3"
6.0'		
8.0'	(SW)	SAND - little silt, little gravel, cobbles to 10", brown
	(ML)	SILT - some sand, little gravel, trace clay, grey, (till)
14.0'		

SEEPAGE ZONE 6'-6.5'

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-10

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 1'-6' 3.0%

ORGANIC CONTENT

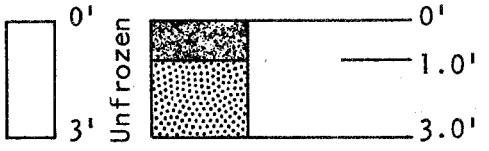
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

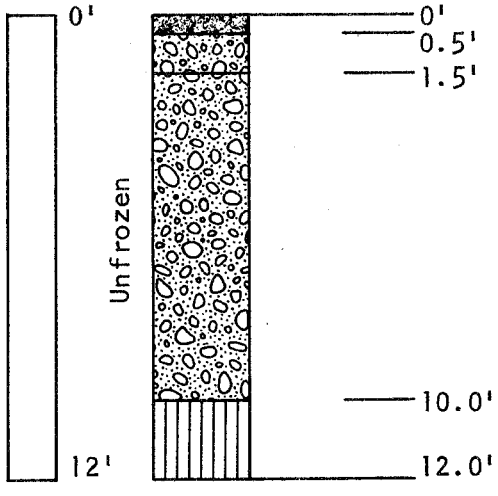
SOURCE No. HR-122

HR-122-11



(OL)	SILT -	some sand, roots
(SW)	SAND -	little fine gravel, trace silt, coarse, brown

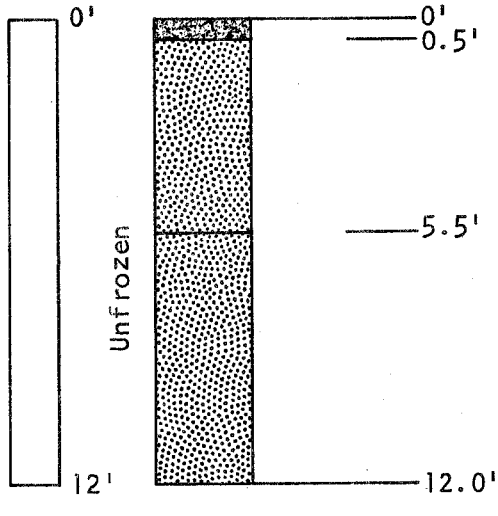
HR-122-12



(OL)	SILT -	topsoil, roots
(GW)	GRAVEL -	trace sand, trace silt, cobbles to 10", max. 3"
(GW)	GRAVEL -	some sand, trace silt, well graded, max. 3"
(ML)	SILT -	some sand, little fine gravel, trace clay, brown, (till)

Hole dry on completion

HR-122-13

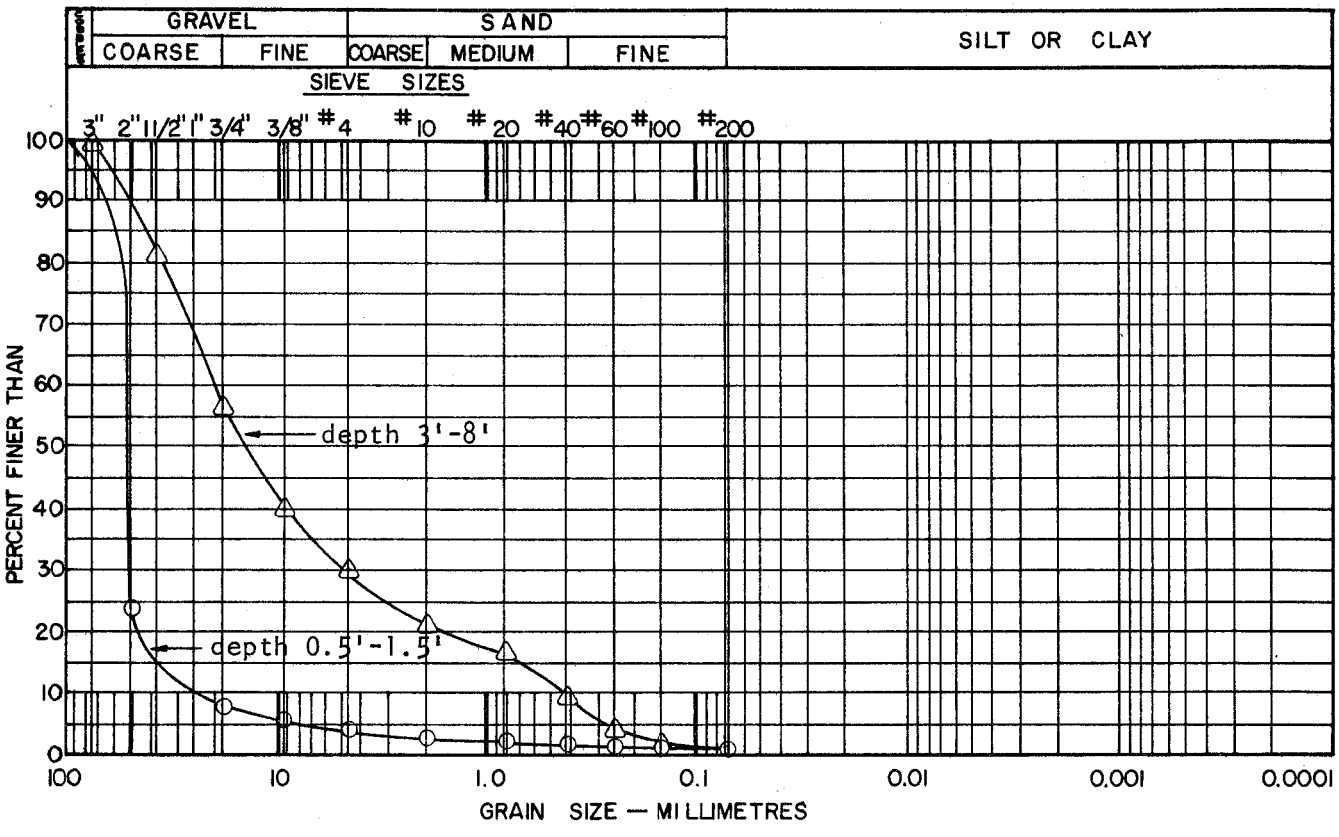


(OL)	SILT -	topsoil, roots
(SW)	SAND -	and gravel, trace silt, trace cobbles, well graded
(SM)	SAND -	and silt, trace gravel, trace clay, trace cobbles, low plastic, grey-brown, (till)

Unable to bypass cobbles at 12'
Hole dry on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-12

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 0.5'-1.5'	2.6%
Sample 2	depth 3'-8'	1.9%

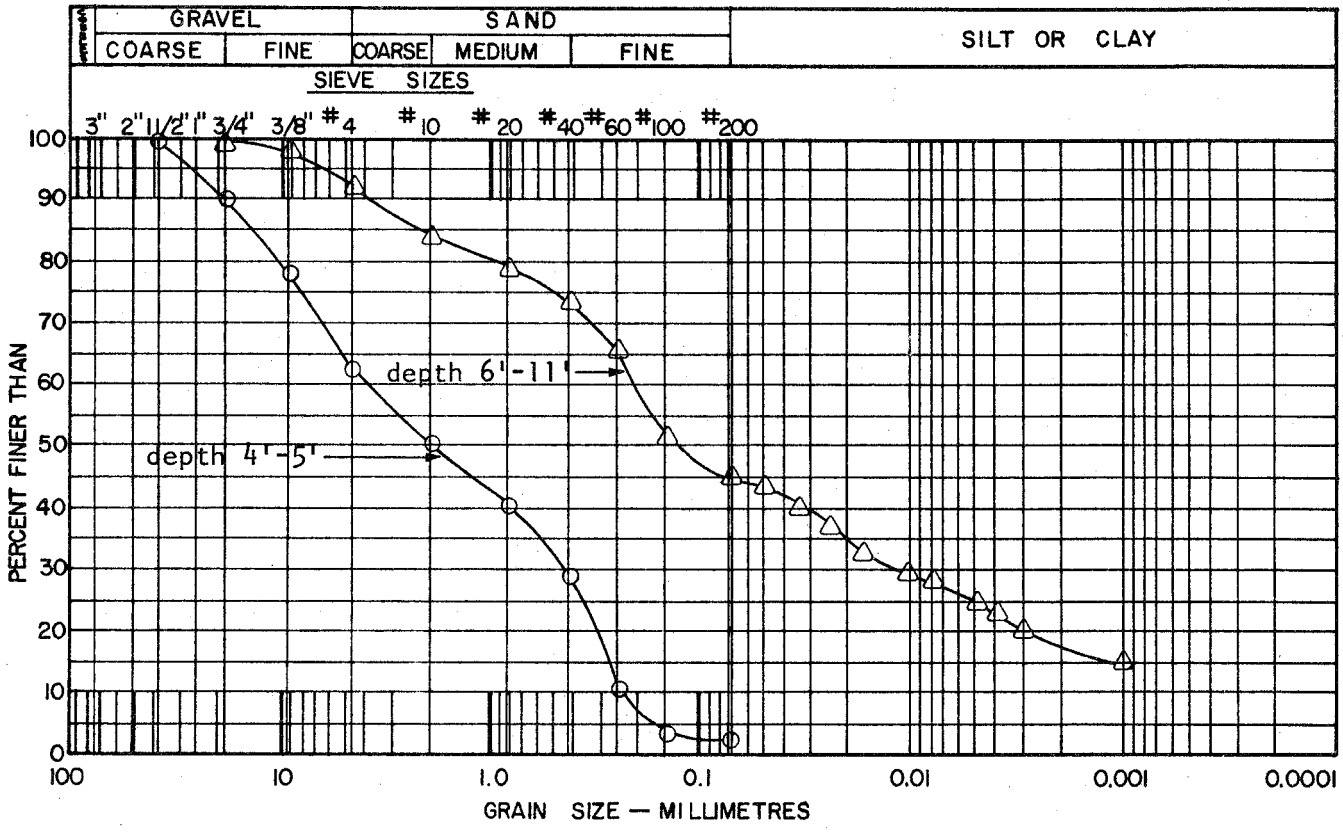
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-13

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	3.0%
Sample 2	depth 4'-5'	6.5%
Sample 3	depth 6'-7'	8.0%
Sample 4	depth 8'-9'	6.6%
Sample 5	depth 10'-11'	5.9%

ORGANIC CONTENT

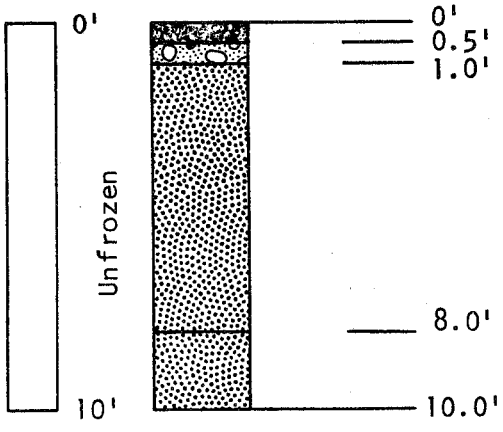
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-122

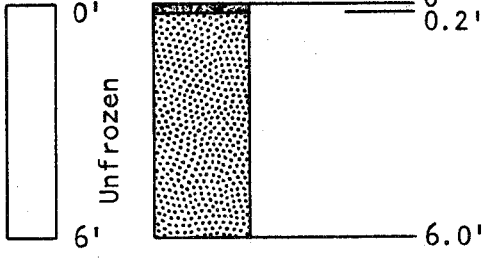
HR-122-14



(OL)	SILT - topsoil, brown
(GW)	GRAVEL - some sand, trace silt, max. ½"
(SW)	SAND - little fine gravel to 3/4", trace silt, inter-bedded layers, well graded
(SW)	SAND - trace gravel, trace silt, grey, fine

Hole dry on completion

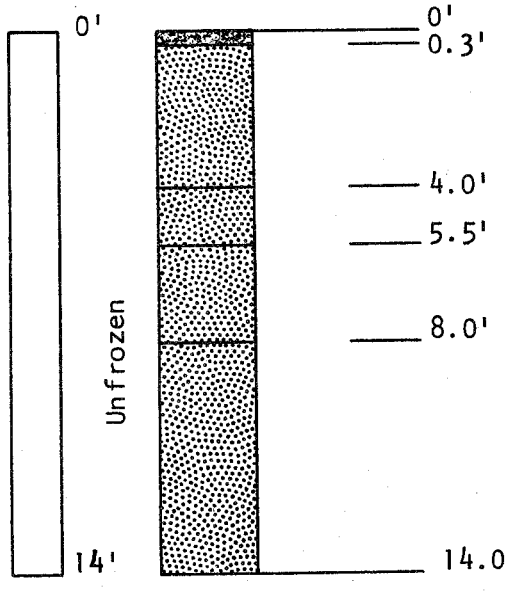
HR-122-15



(OL)	SILT - trace cobbles, topsoil, roots
(SW-SM)	SAND - and gravel to 2", little silt, trace clay, low plastic

Hole dry on completion

HR-122-16

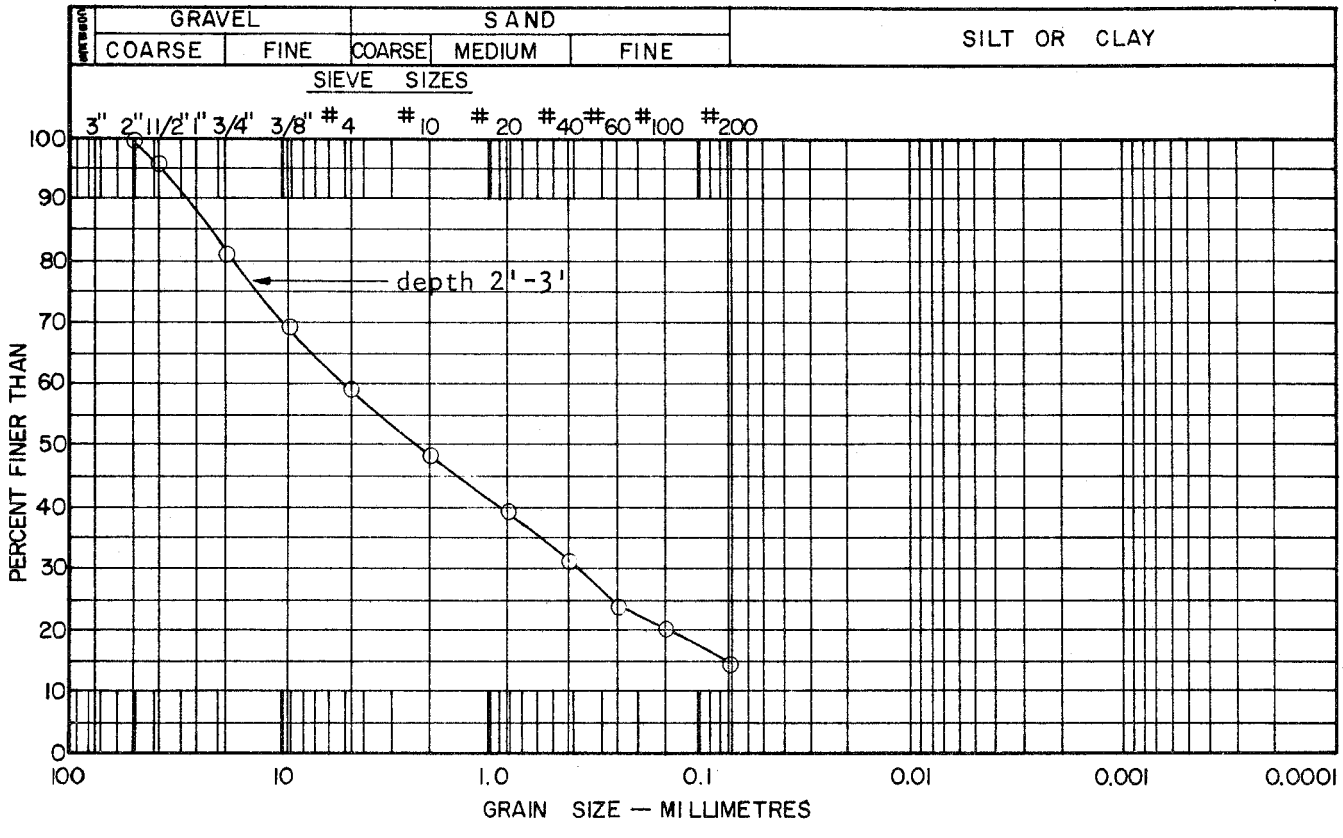


(OL)	SILT - topsoil, roots
(SW)	SAND - little gravel, trace silt, brown
(SW)	SAND - some gravel, trace silt, brown
(SP)	SAND - little gravel, trace silt, trace cobbles, uniform, brown
(SM)	SAND - some silt, trace gravel to 3/4", tracy clay, trace cobbles, low plastic, brown

Unable to bypass cobbles at 14" - hole dry on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-15

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2'-3' 5.0%
Sample 2 depth 4'-5' 7.4%

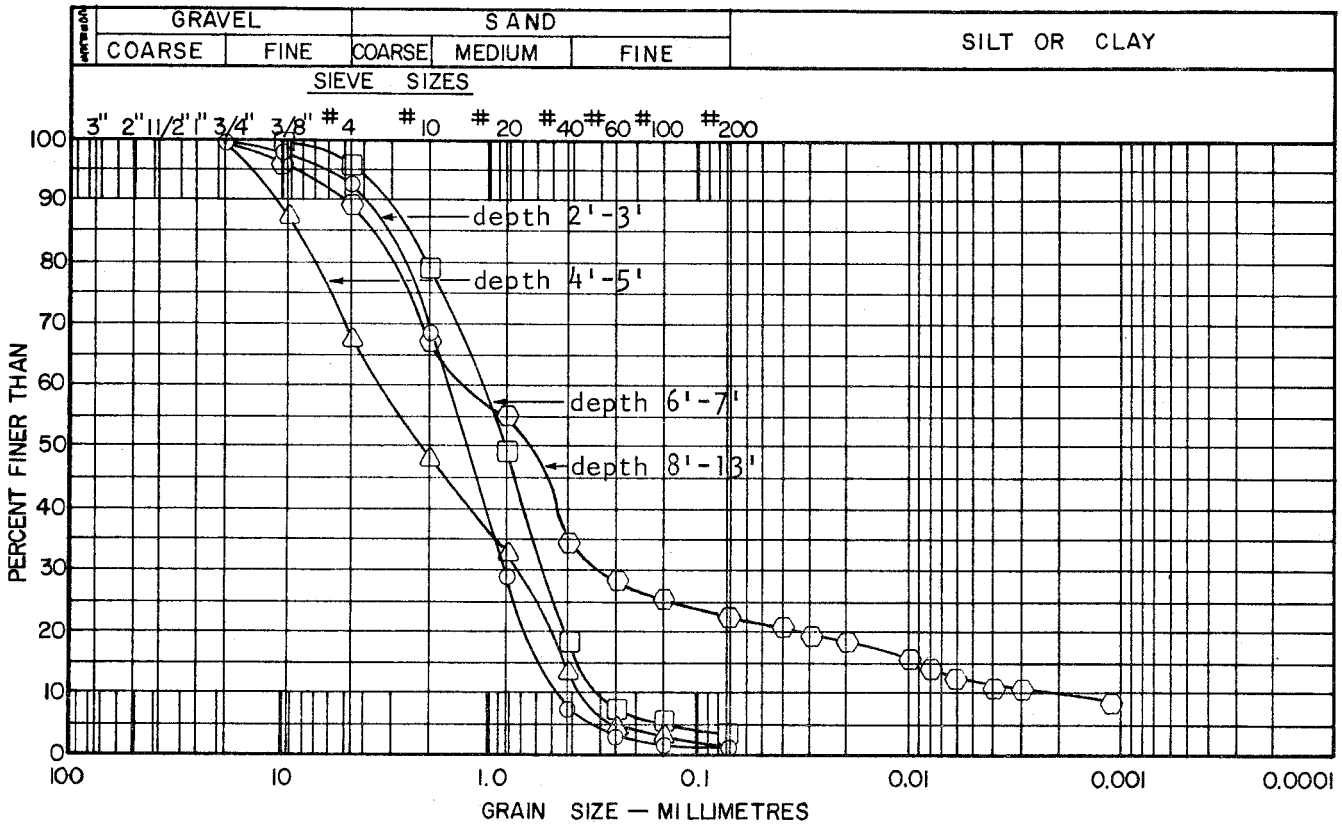
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-16

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	1.8%
Sample 2	depth 4'-5'	3.1%
Sample 3	depth 6'-7'	3.7%
Sample 4	depth 8'-9'	4.6%
Sample 5	depth 10'-11'	4.7%
Sample 6	depth 12'-13'	4.5%

ORGANIC CONTENT

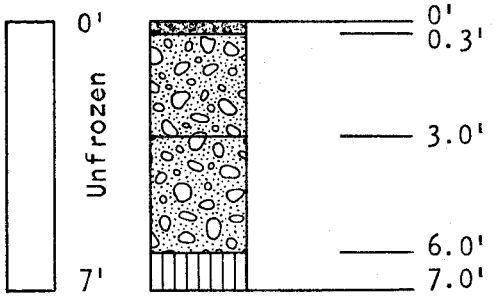
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-122

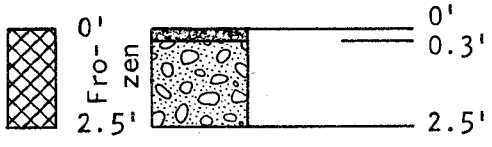
HR-122-17



(OL)	SILT - topsoil, roots	0' – 0.3'
(GP)	GRAVEL - little sand, trace silt, max. 1½"	0.3' – 3.0'
(GW)	GRAVEL - some sand, trace silt, cobbles to 12", coarse	3.0' – 6.0'
(ML)	SILT - some sand, trace clay, brown, (till)	6.0' – 7.0'

Hole dry on completion

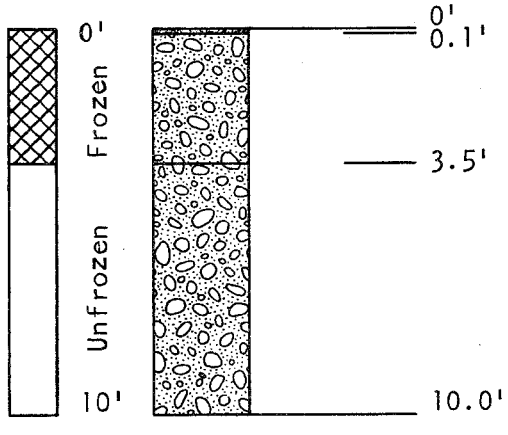
HR-122-18



(OL)	SILT - topsoil, roots	0' – 0.3'
(GW)	GRAVEL - and sand, trace silt, cobbles to 12"	0.3' – 2.5'

Unable to bypass cobbles at 2.5'
Hole dry on completion

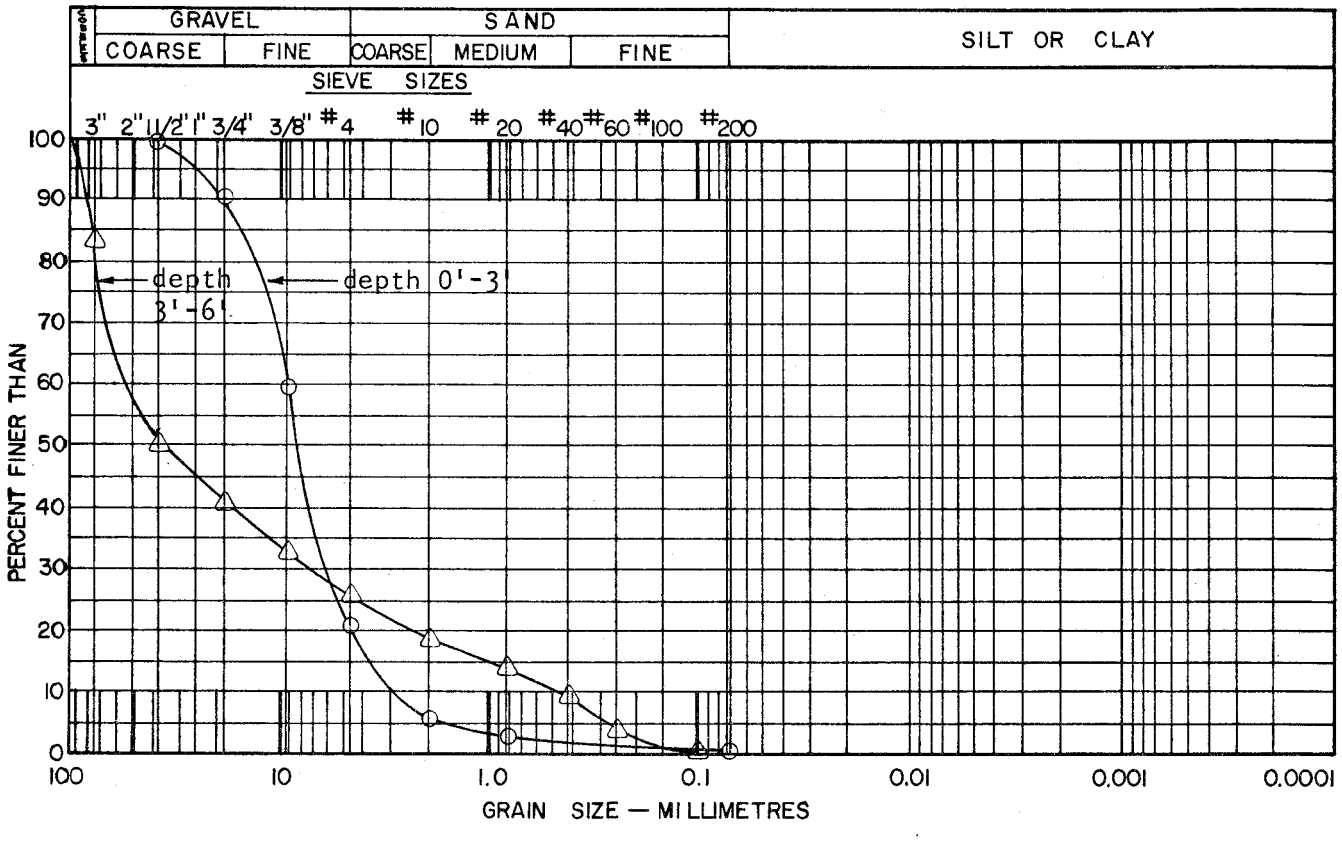
HR-122-19



(OL)	SILT - topsoil, roots	0' – 0.1'
(GW)	GRAVEL - and sand, trace silt, well graded, brown, max. 1"	0.1' – 3.5'
(GM)	GRAVEL - and silt, trace sand trace clay, low plastic, brown, (till)	3.5' – 10.0'

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-17

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 0'-3'	3.7%
Sample 2	depth 3'-6'	3.2%

SPECIFIC GRAVITY & ABSORPTION TEST

Bulk specific gravity test
- +1½" hard siltstone - 2.70
- +3" dolomite - 2.71

Absorption test
- +1½" hard siltstone - 1.4%
- +3" dolomite - 0.6%

ORGANIC CONTENT

Loss on ignition test
Sample 2 depth 3'-6' 0.6%

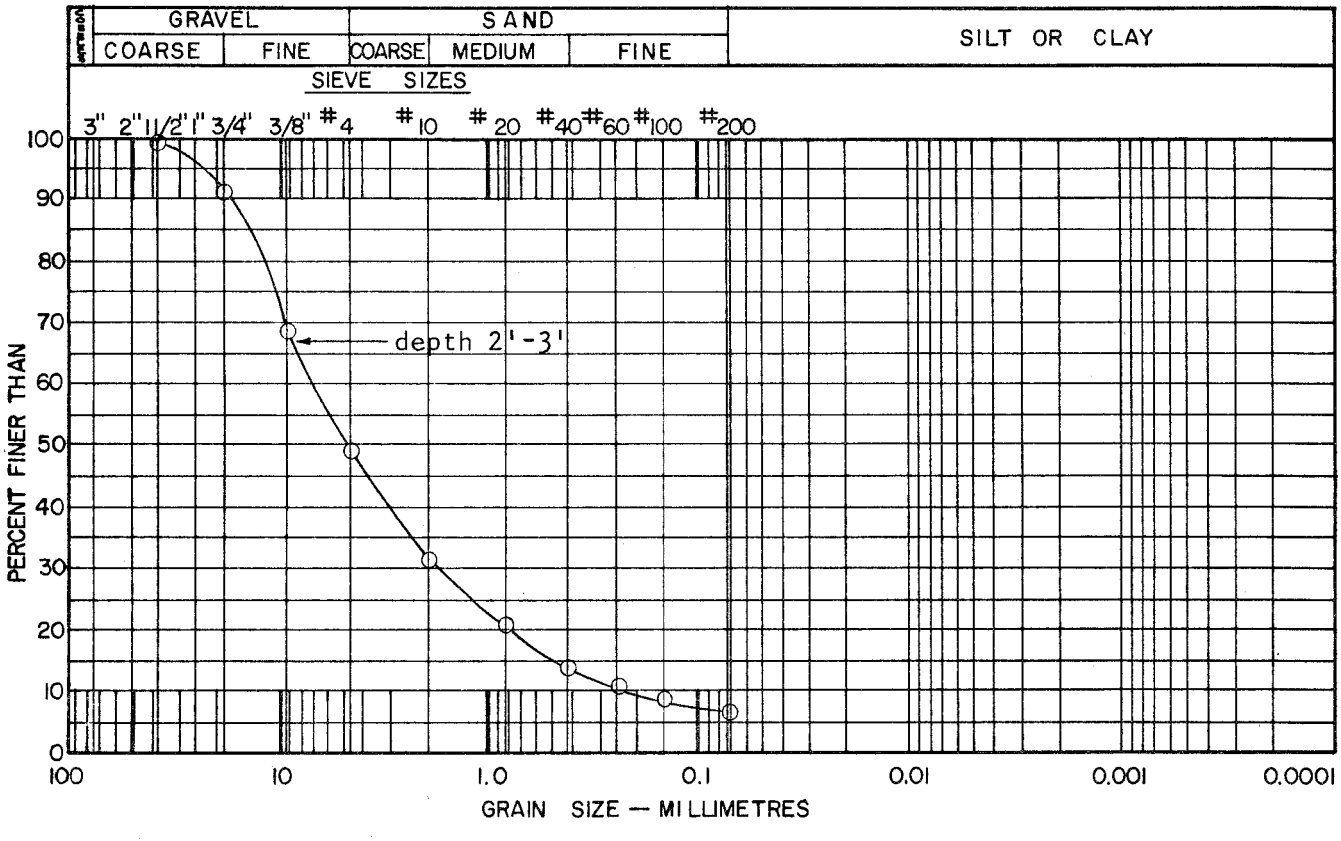
Color test - Sample 2 depth 3'-6' Rdg. 3

PETROGRAPHIC ANALYSIS

Hard limestone & dolomite	45%	Quartzite	3%
Silstone (hard, calcareous)	23%	Sandstone	1%
Granites	13%	Limestone (soft & porous)	1%
Feldspar porphyry	7%	Gossan	1%
Limestone (metamorphosed)	6%	Total	100%

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-19

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	3.3%
Sample 2	depth 4'-5'	4.9%
Sample 3	depth 6'-7'	6.3%

ORGANIC CONTENT

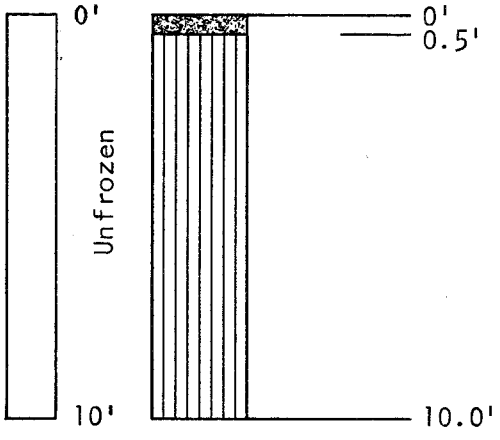
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-122

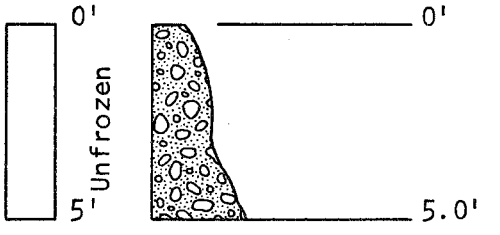
HR-122-20



(OL) SILT - topsoil, roots

(ML) SILT - some sand, little clay, little gravel, trace cobbles, low plastic, (till)

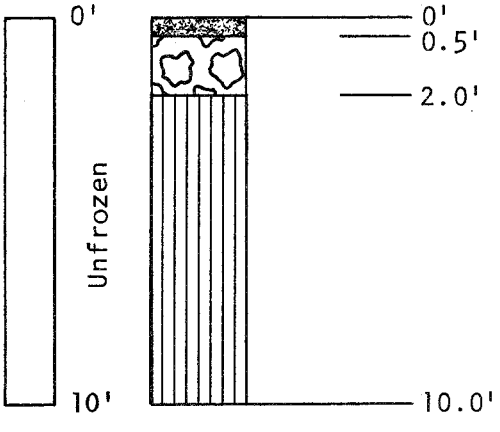
HR-122-21



(GW) GRAVEL - and sand, trace silt, well graded, max. 4"

Soil profile as logged from pit face

HR-122-22



(Pt) PEAT - roots

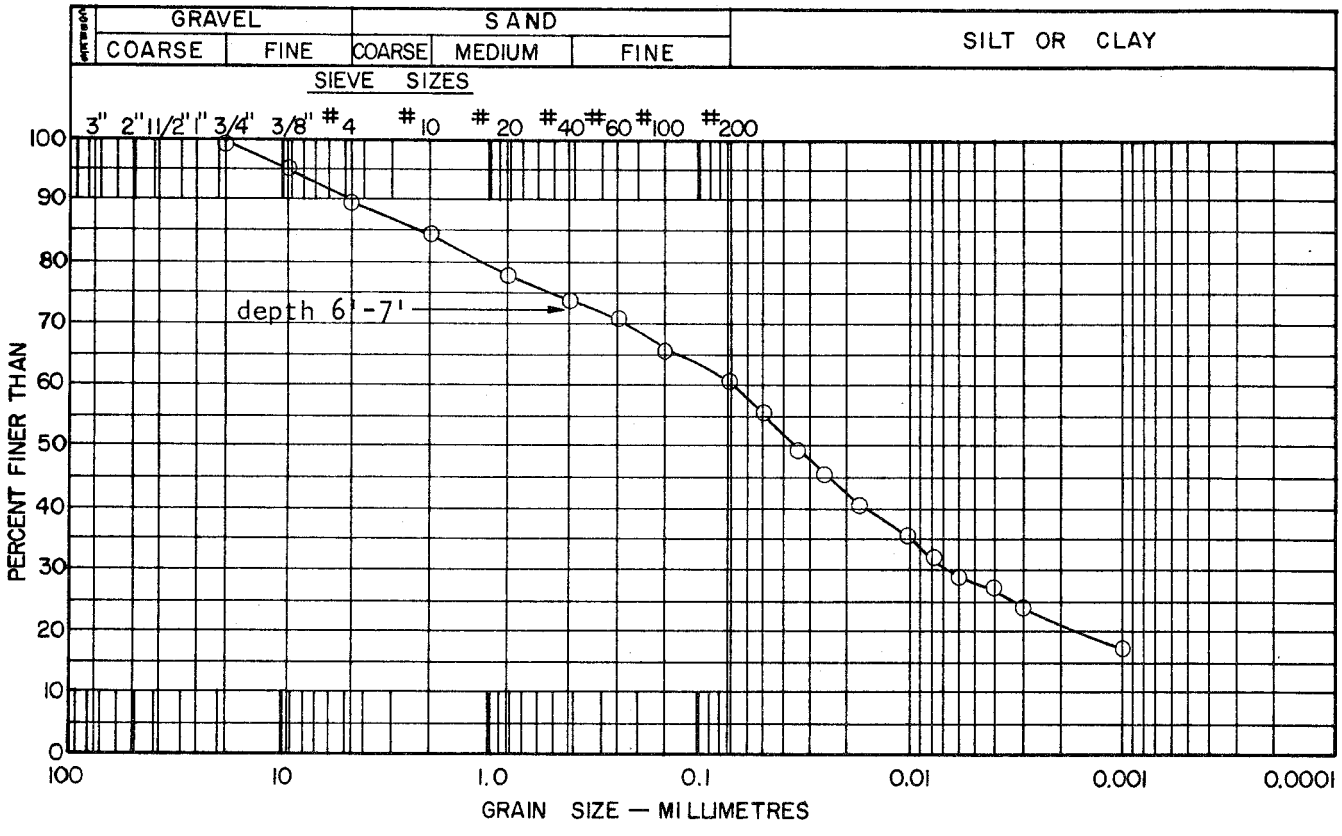
COBBLES - some peat, some sand, little silt

(ML) SILT - little gravel, little sand, trace clay, (till)

Hole dry on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-20

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	9.6%
Sample 2	depth 4'-5'	10.1%
Sample 3	depth 6'-7'	7.5%

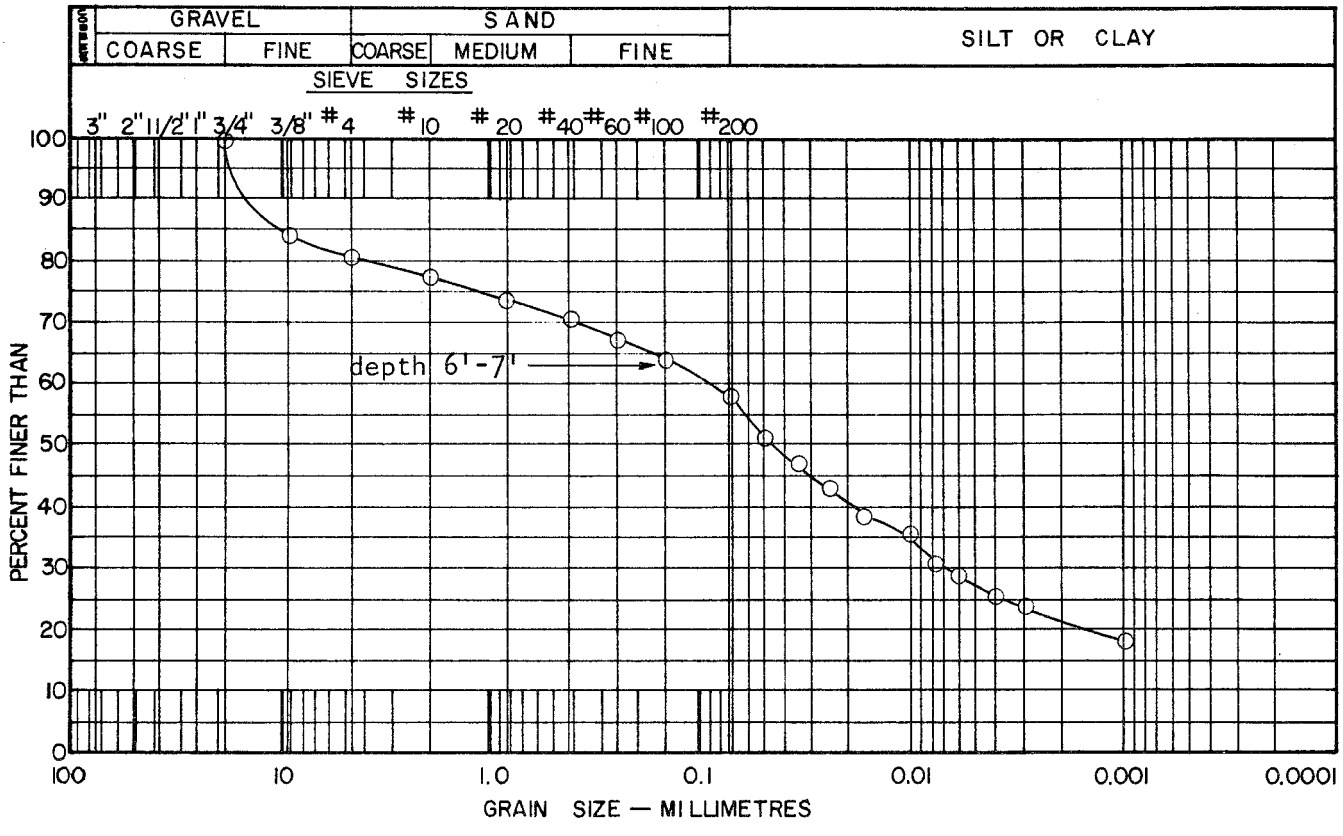
ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-22

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	11.9%
Sample 2	depth 4'-5'	7.8%
Sample 3	depth 6'-7'	8.0%

ORGANIC CONTENT

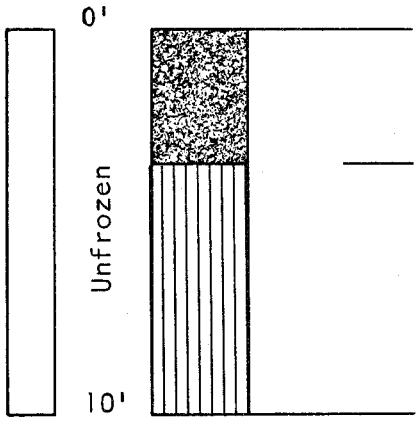
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-122

HR-122-23



0' — (Pt) PEAT - organic, roots, black

3.5' — (ML) SILT - little gravel, little sand, trace clay, (till)

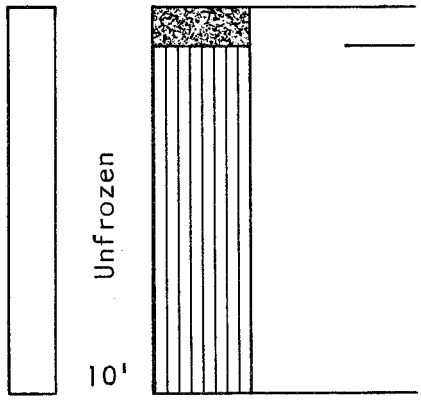
10.0'

Hole dry on completion

Moisture Content:

Sample 1 depth 2'-3' 177.8%
Sample 2 depth 4'-5' 11.3%

HR-122-24



0' — (OL) SILT - topsoil, roots, trace cobbles

1.0' — (ML) SILT - some sand, some gravel, trace clay, (till)

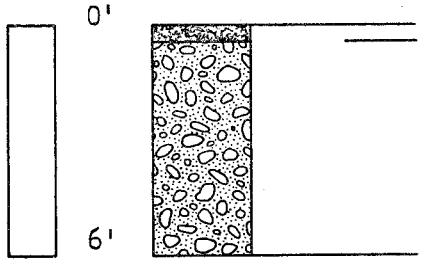
10.0'

Hole dry on completion

Moisture Content:

Sample 1 depth 2'-3' 21.3%

HR-122-25



0' — (OL) SILT - topsoil, roots, etc.

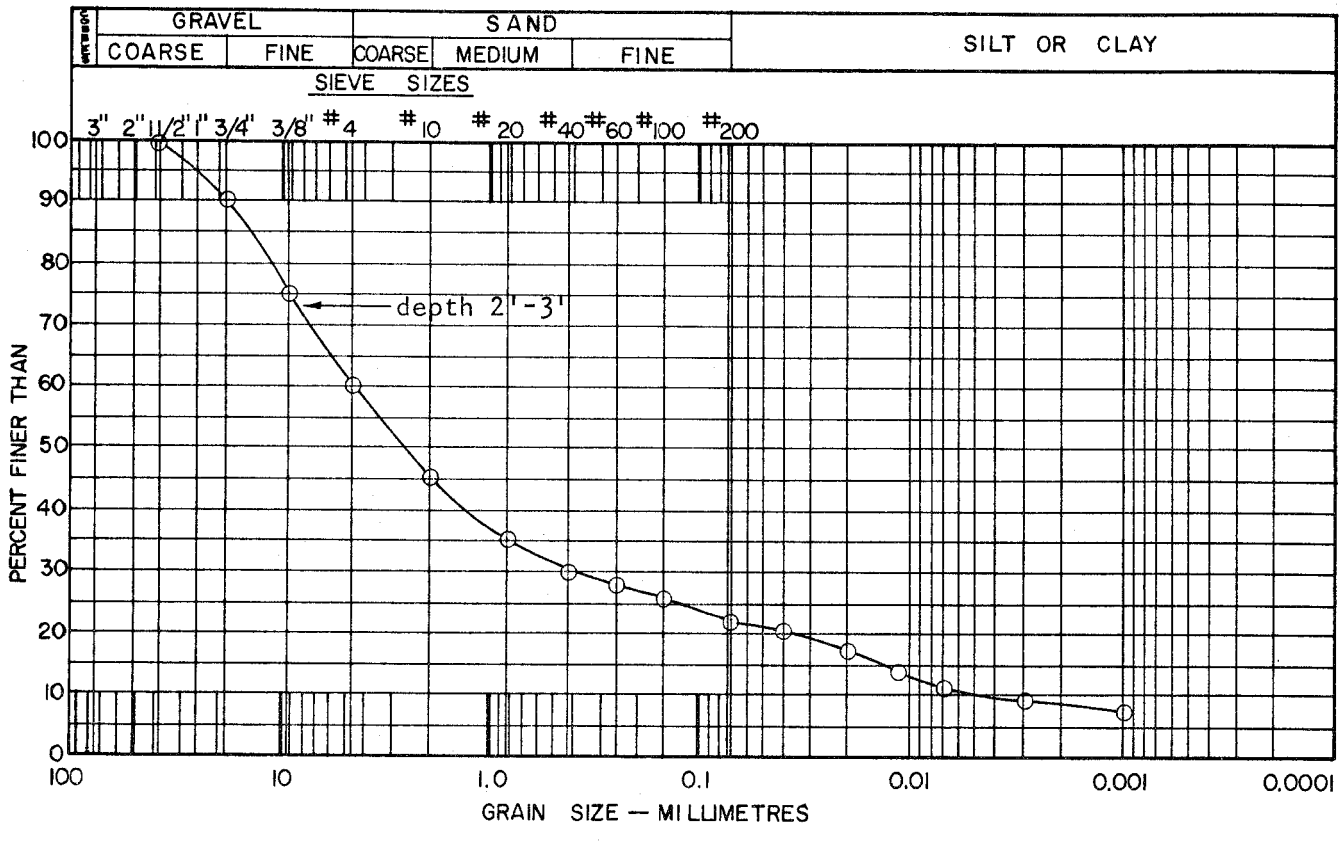
1.0' — (GW-GM) GRAVEL - and sand, some silt, trace clay, low plastic, (till)

10.0'

Water at 4' on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-25

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1 depth 2'-3' 5.7%
Sample 2 depth 4'-5' 17.3%

ORGANIC CONTENT

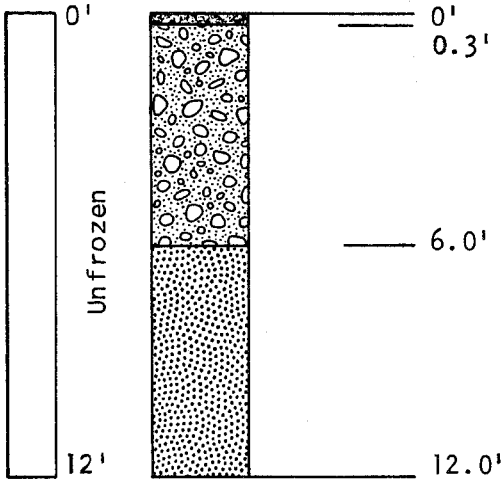
HARDNESS TEST

PETROGRAPHIC ANALYSIS

TEST HOLE LOGS

SOURCE No. HR-122

HR-122-26



(OL) SILT - some fine gravel, roots

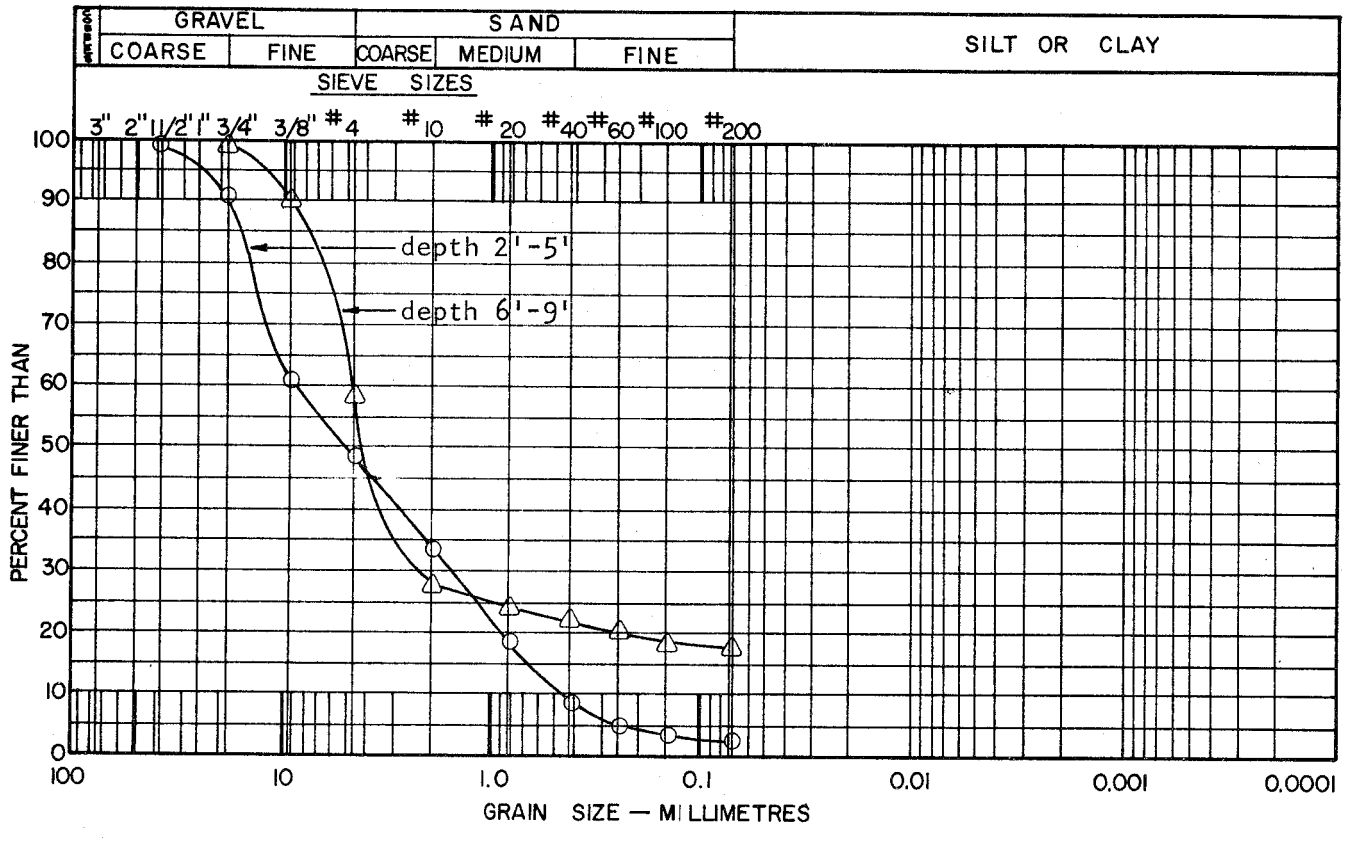
(GW) GRAVEL - and sand, trace silt, well graded, max. 1½"

(SM) SAND - some gravel, little silt, trace clay, medium plastic, brown, (till)

Hole dry on completion

LABORATORY
TEST DATA
TEST HOLE-SOURCE No. HR-122-26

GRAIN SIZE DISTRIBUTION



MOISTURE CONTENT

Sample 1	depth 2'-3'	2.7%
Sample 2	depth 4'-5'	4.8%
Sample 3	depth 6'-7'	7.2%
Sample 4	depth 8'-9'	6.5%

ORGANIC CONTENT

HARDNESS TEST

PETROGRAPHIC ANALYSIS