Robert J. Bowan

Hardy BBT Limited
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

INTERIM REPORT - PHASE II
FIELD RECONNAISSANCE
COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, NWT
PROJECT NO. 86-9128A

Prepared For:

GOVERNMENT OF THE NORTHWEST TERRITORIES

DEPARTMENT OF PUBLIC WORKS, HIGHWAYS DIVISION

Yellowknife, NWT

Prepared By:

HARDY BBT LIMITED

Calgary, Alberta

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CG14096

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1.0 INTRODUCTION

The study to develop a community granular management plan for Tuktoyaktuk is being conducted in four phases, with interim reporting and reviews between each phase. In accordance with the terms of Contract No. 86.32. 1D41 (259) Hardy BBT Limited have undertaken Phase II of this study, and are pleased to present this interim report. The report details the results of the Phase II Field Reconnaissance and provides recommendations for Phase III. The Phase I interim report was submitted in July 1986.

1.1 SCOPE OF WORK

The terms of reference for Phase II, were as follows:

- undertake airphoto interpretation (as required) prior to any field work
- undertake a field reconnaisance in the late summer/early fall to spot check the surficial geology, land forms and most promising potential granular sources
- carry out a limited program of test pitting and sampling
- take spot elevations of selected features that are recognizable on the airphotos to facilitate future preparation of a topographic plan for the most promising granular sources
- take photographs and prepare detailed field notes of granular sources, giving a description of: stratigraphy

and geomorphic development together with comments on distribution, estimated volumes, expected quality, depth of overburden, potential ground ice, ease of access, possible development problems, drainage requirements, etc.

- photograph representative samples and run gradation tests, carry out limited petrographic analyses, moisture content, ice content, organic content, hardness, soundness, specific gravity and absorption tests on selected representative samples.

- update the annotated airphotos to reflect the results of the field checking

- prepare 10 copies of a brief interim report summarizing the results of the field reconnaissance and providing recommendations for Phase III.

During a review meeting in our office on October 30, 1986, it was decided that this report should outline in more detail than originally requested our present thoughts on the development of granular sources. This has been requested primarily because our field reconnaissance has identified numerous potential small and shallow granular deposits relatively close to Tuktoyaktuk. Because of their probable shallow nature a different method of investigation, other than drilling, should be considered. Also, if a number of relatively small granular deposits were to be considered for development close to Tuktoyaktuk, it was decided to introduce at this stage some preliminary discussion on planning a satisfactory restoration and revegetation of the sources.

2.0 METHODOLOGY

2.1 AIRPHOTO INTERPRETATION

Prior to organizing the field reconnaissance a detailed review of airphotographs was undertaken of selected areas and known deposits. Particular attention was placed on the area south and southeast of Tuktoyaktuk (south of line A-A', defined during Phase I) in an attempt to locate suitable granular material relatively close to Tuktoyaktuk. In addition, a review of Deposits 155 and 163 was undertaken with the objective to conduct some limited field reconnaissance of these deposits.

Black and white panchromatic air photographs at a scale of 1:20,000 were available for most of the area south and southeast of Tuktoyaktuk. Recent airphotographs (1985) for Deposits 155 and 163 were available only at a scale of 1:60,000.

The airphotographs were used to identify and delineate the distribution of glaciofluvial deposits in the areas of interest, and as an aid to planning the logistics for ground-truthing during the field reconnaissance.

The annotated airphotographs are retained in our files for reference during future phases. They will be made available with the final report at the end of Phase IV.

2.2 FIELD RECONNAISSANCE

The field reconnaissance was conducted in the period September 4-12, 1986 under the direction Mr. N. Mosley P. Geol., Senior Engineering Geologist with Hardy BBT Limited. A Bell Jet Ranger 206B helicopter (contracted from Sunrise Helicopters of Inuvik) was used to transport our geologist and two local labourers (plus equipment) to various locations for the purpose of documenting, test-pitting and sampling granular materials.

A total of 38 test pits were excavated in Deposits 181, 183, 184, 169, 155 and 163. The test pits were taken to a maximum depth of 1.7 m, but the average depth was about 0.8-0.9 m. Deposits 181, 183 and 184 were defined during this study (in the area south and southeast of Tuktoyaktuk) and are described in section 3.0. Parts of Deposit 169 are now included in Deposit 183. Logs of the test pits are presented in Appendix "B" to this report.

Throughout the field reconnaissance, as information became available, the airphoto interpretation was revised and new areas of interest were identified and field checked. In this manner a comprehensive delineation of glaciofluvial deposits in the area south/southeast of Tuktoyaktuk was achieved. Reconnaissance of Deposits 155 and 163 was of a less detailed nature, however, several new glaciofluvial deposits were identified in the area of 155, and the areal extent of 163 was increased.

2.3 LABORATORY TESTING

A large number of samples were returned to our Calgary laboratory for classification and aggregate quality testing. The laboratory testing program comprises 32 grain size analyses, 5 petrographic analyses, and 2 sets of aggregate tests comprising: Los Angeles abrasion, sulphate soundness, organic impurities, absorption and specific gravity. The results of this testing program are presented in Appendix "C".

3.0 GEOLOGIC EVALUATION OF DEPOSITS

3.1 GENERAL

Glaciofluvial deposits in the area between Tuktoyaktuk and the Eskimo Lakes are considered to be part of a pro-glacial outwash plain, deposited as outwash fans and valley trains. However, scattered groups of kames and esker ridges are known in the area.

Most of the outwash consists of fine to coarse sand, and to a minor extent gravel. Gravel often is found as a thin layer on the surface of the outwash, as irregular lenses and layers in sand deposits, and in some instances as channel fillings. The gravel is generally crudely stratified with variable grading and content of fines. Most of the glaciofluvial sand is fine to coarse-grained and crossbedded.

In the area around Deposit 155 the glaciofluvial materials are considered to be kame deposits with some terrace deposits adjacent to glacial meltwater channels. The kame deposits, consist of fine to coarse sand with a minor gravel content and

occasional cobbles and boulders; however the terrace deposits are significantly gravelly with cobbles and some boulders.

Deposit 163 is a large terraced glaciofluvial outwash plain with a flat to gently undulating surface. The outwash consists of fine to coarse sand with a variable gravel content such that some areas comprise sand with some gravel.

In general the glaciofluvial sands contain 5 to 20 percent excess ice by volume, although occassionally excess ice is absent. The gravels are generally free of excess ice, although some may contain up to 20 percent by volume. Isolated bodies of massive ice may be present in the glaciofluvial deposits. Ice wedges are more common where the sand and gravel is covered by silt or peat.

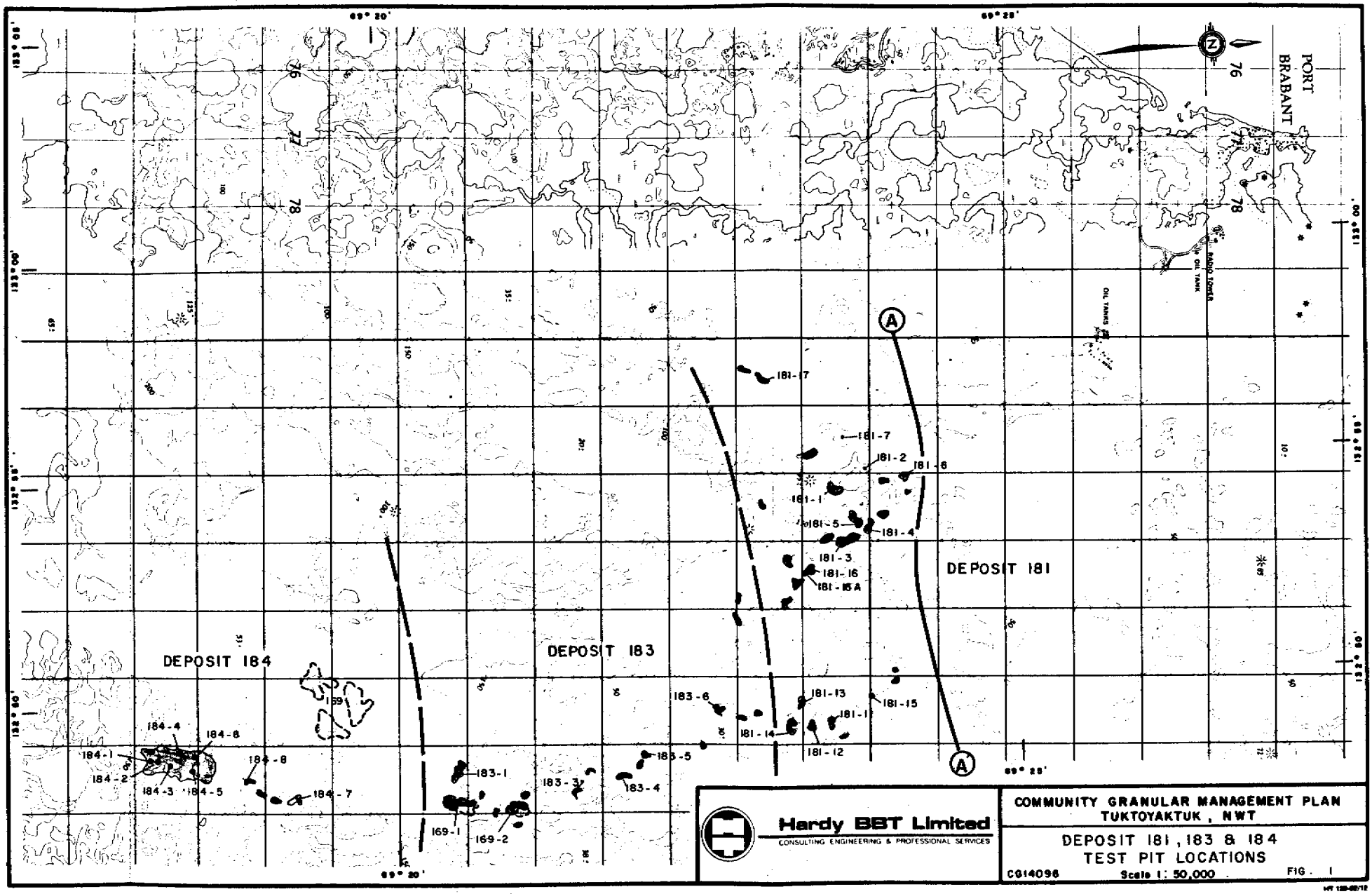
In the following sections a brief description is given of the deposits investigated during this study.

3.2 DEPOSITS 181, 183 AND 184

Setting

The distribution of these three deposits is illustrated on Figure 1, and they are described together due to their close proximity and probable common genesis. The distance of these deposits from Tuktoyaktuk is as follows:

Deposit 181	-	8 to 12 km
Deposit 183	-	12 to 17 km
Deposit 184	-	19 to 22 km



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COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, NWT

DEPOSIT 181, 183 & 184
TEST PIT LOCATIONS

C914098 Scale 1: 50,000 FIG. 1

Deposit 169, which was previously identified by Hardy Associates in 1977, forms part of Deposit 183. All of these deposits are south of the line A-A' (defined in Phase I) and north of which no development of granular materials is desired. Deposits 181, 183 and part of 184 all occur at relatively low elevation (less than 30 m above sea level) as numerous small and generally thin glaciofluvial accummulations. The remainder of Deposit 184 is a relatively large deposit which occurs on an upland plateau area (disected by small lakes) which is about 50-60 m above sea level.

Most of the deposits occur as localized accummulations of outwash on the flanks and tops of low hills, or as small kame-like features in low-lying areas. This gives the impression of either deposition in discreet areas, or erosion and disection of more extensive outwash deposits. The former explanation may be more likely because the occurrence of many deposits have the appearance of irregular terraces.

The large area of granular material in Deposit 184 occurs as disected outwash which has accummulated around two small lakes on the upland area. The two lakes appear to occupy parts of a glacial meltwater channel with lateral channels either side. The meltwater channels disect the deposit such that granular material occupies the higher ground and channel flanks, but is absent within the channels.

Materials

Based upon an inspection of all the gradations performed on samples from Deposits 181, 183 (169) and 184, it is apparent that they are all composed of similar proportions of granular

material. They all comprise mainly sand, fine to medium grained with a trace to some gravel, and a trace of fines. However, about forty percent of the material is sand and gravel, having about 30-60 percent gravel content, and a trace of fines. Occasional cobbles and boulders occur quite commonly in these coarser materials.

Some areas display clear evidence of stratification, such as thin gravel layers within sand, yet in other areas the test pits revealed no discernable bedding structure.

The active layer thickness generally varies from 0.7 m to 1.3 m but may be greater than 1.7 m locally, and the peat overburden is generally less than 0.1 m but locally may be up to 0.3 m in thickness. In a few locations permafrost was not encountered by 1.2 m and 1.7 m depth, where the test pit was terminated. But generally the sand and gravel is underlain by frozen, fine to medium grained sand or frozen sand and gravel. Where frozen fine to medium sand occurs it is always bonded into a hard solid mass with no visible ice i.e. well bonded, little excess ice. The sand is interpreted to be either glaciofluvial in origin or of pre-glacial deltaic origin. Where frozen sand and gravel is encountered, it is well bonded and often contains ice crystals or ice-coatings on particles i.e. some excess ice.

The granular material in these deposits is considered to vary from poor to good quality, with an overall "bulk" quality estimated to be fair. Qualitative explanations of these materials quality grades are included in Appendix "A". The material from these deposits would be useful for embankment fill.

Volume

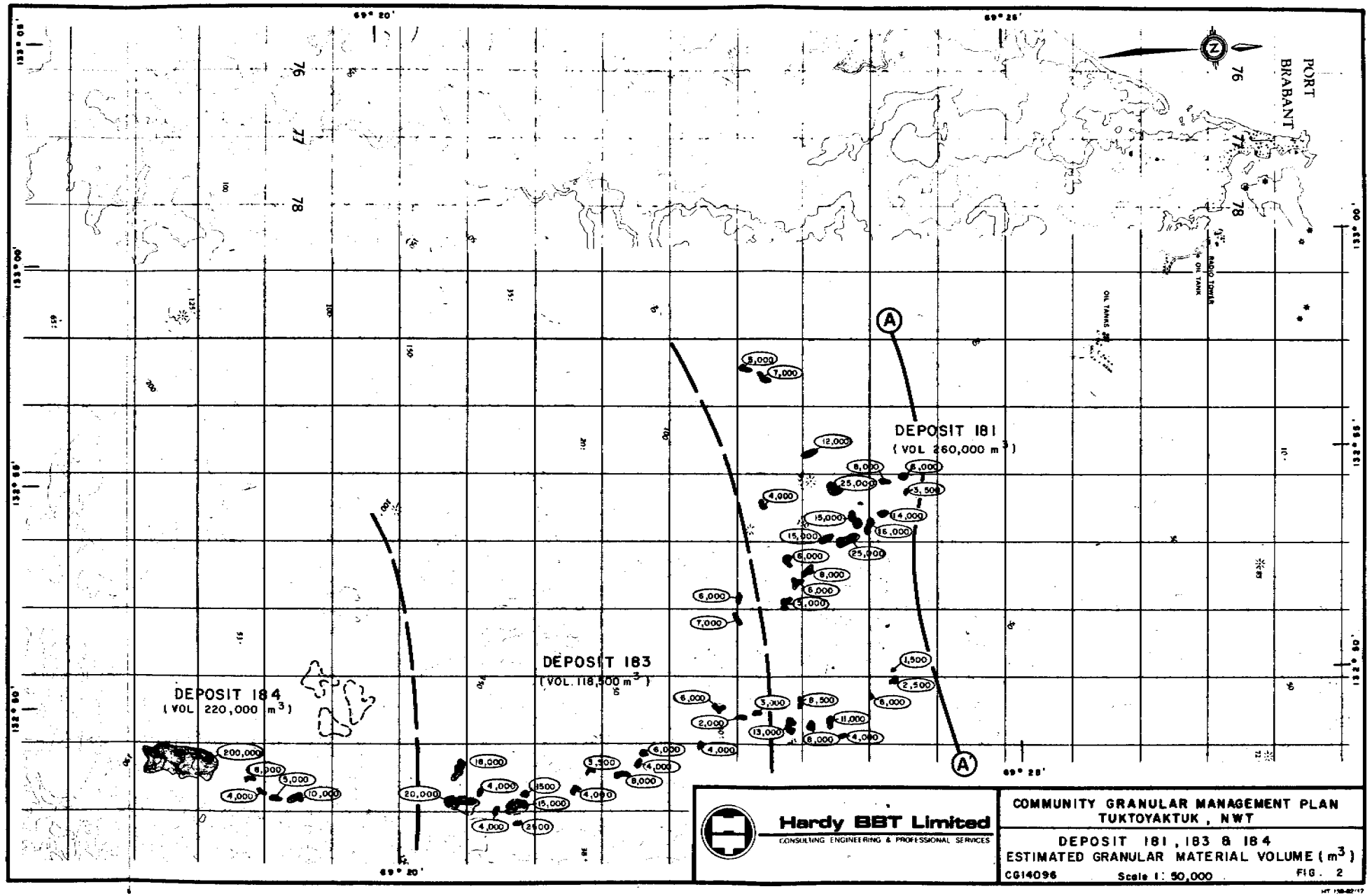
The volume of granular material available from these deposits is limited due to their relative thinness and small areal extent. However, if an average extraction depth of 1.0 m is assumed, the following volumes of fair quality granular material are estimated to be recoverable:

Deposit 181	-	260,000 m^3
Deposit 183	-	118,500 m^3
Deposit 184	-	220,000 m^3

These volumes are generated by estimating the surface areas of individual deposits, scaled from the airphotographs (1:20,000 scale). Estimated volumes of granular material in individual deposits are shown on Figure 2.

Additional Exploration

The majority of discrete deposits comprising Deposits 181, 183 and 184 are considered to be of only surficial thickness i.e. about one metre thick. Hence it is not considered cost effective to undertake an extensive drilling program to prove the deposits. However, at a few locations frozen sand and gravel was encountered and at others the permafrost table was not located within the test pit depth. At some of these locations additional testing would be warranted to prove the thickness. In addition the frozen sand encountered in numerous pits may be underlain by sand and gravel at depth, so this possibility could be investigated.



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TUKTOYAKTUK , NWT

DEPOSIT 181 , 183 & 184
ESTIMATED GRANULAR MATERIAL VOLUME (m^3)

CG14096 Scale 1: 50,000 FIG. 2

Access and Development

Access to Deposit 181 from the community of Tuktoyaktuk is relatively easy during winter operations (the preferred approach) due to the close proximity (8-12 km). The majority of the access route (55-70%) would be ice road, with the remainder being overland.

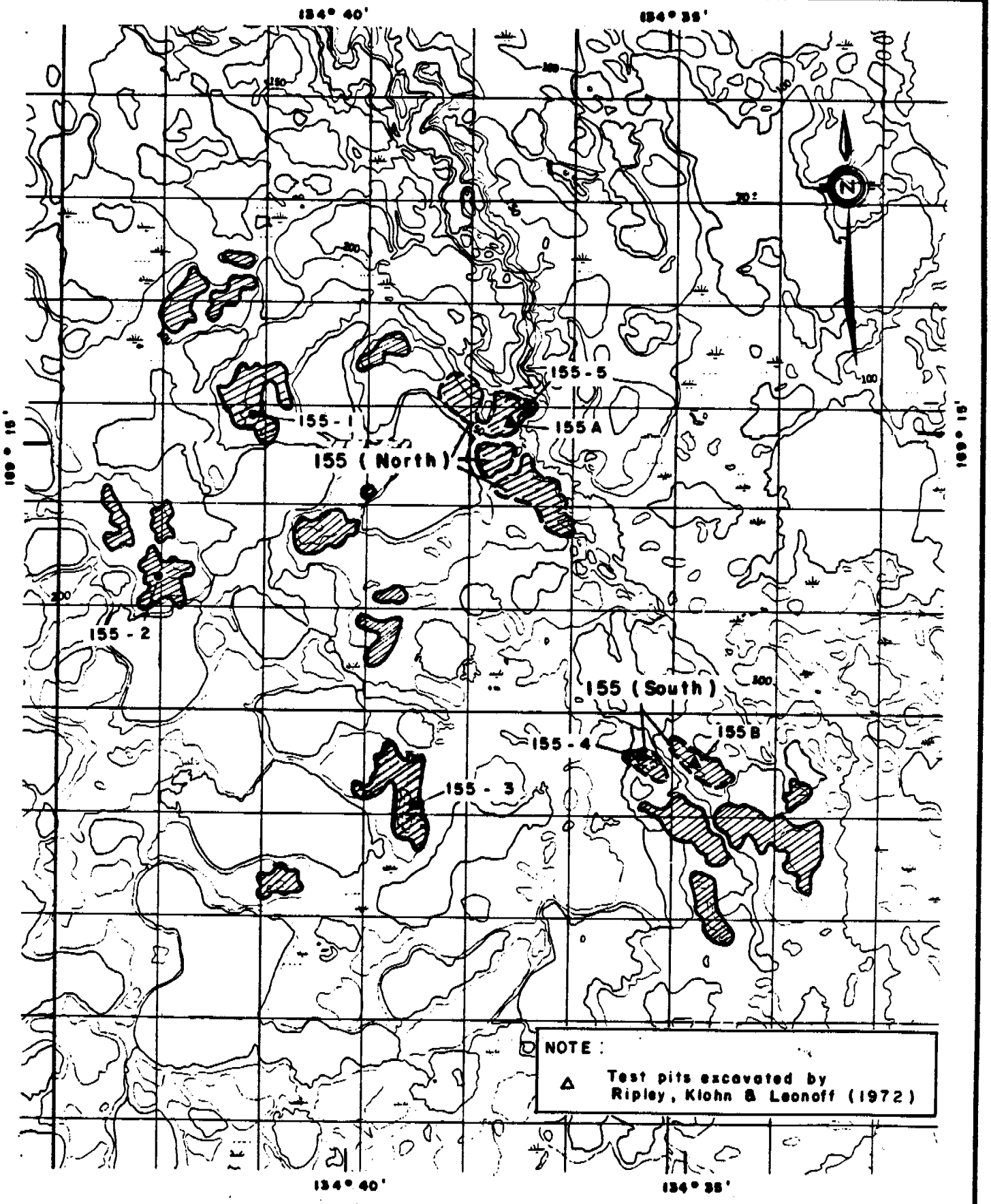
Access to Deposits 183 and 184 is more difficult due to increased distance from Tuktoyaktuk and proportionately more overland travel involved. However, it is possible to optimise routes across lakes to keep overland sections to an acceptable minimum. Access to the large portion of Deposit 184 involves a significant climb in elevation i.e. 30-45 m.

Drainage of most of the deposits is not anticipated to be of concern due to their location on the tops and flanks of low hills. However, some deposits are close to lakes, therefore careful borrow pit operation will be required to avoid siltation. Ice wedges (polygons) likely exist in some deposits, associated with the underlying fine to medium sand.

3.3 DEPOSIT 155

Setting

The extent of Deposit 155 is illustrated on Figure 3, which shows the original deposits (155 north and south) together with those located during the course of this study. Deposit 155 is located approximately 32 km radially to the west of Tuktoyaktuk, but access to it is relatively good by winter ice road. The surface distance is about 45 km, with about 40 km



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TUKTOYAKTUK, NWT

DEPOSIT 155 - TEST PIT LOCATIONS

CG14096 Scale 1:50,000 FIG. 3

being ice road (coast, Kittigazuit inlet and creek) and the remainder being overland.

The deposits originally identified at 155 (i.e 155 north and south) have the appearance of irregular glacifluvial terraces adjacent to meltwater channels which trend roughly NW-SE in this area. The newly identified deposits are at a higher elevation generally being draped over the tops of hills as irregular kame-like mounds and ridges.

Materials

The kames are composed predominantly of sand with a variable gravel content and some cobbles and boulders. A layer of sand and gravel typically occurs at the surface, and some occur within the sand bodies, however stratification is poorly developed. The glaciofluvial terraces comprise mainly silty sand and gravel with good stratification, particularly in the 155 (north) terrace. Structure is less well developed in the irregular 155 (south) terraces where units of sand are interbeded with sand and gravel.

The active layer thickness varies from 0.8 m to 1.3 m. The overburden of peat varies in thickness from less than 0.1 m to about 0.6 m (estimated), although in localized areas it may be thicker. The thawed granular materials within the active layer are underlain by frozen, well bonded fine to medium sand, or sand with some gravel, generally with no discernable excess ice.

The quality of material in these deposits is quite variable. The kame deposits are only of poor to fair quality and as such

would be useful only for general (embankment) fill. The irregular glaciofluvial terraces, in the 155 (south) area, are of variable quality between fair to good, but overall are probably only of fair quality in bulk, and thus would be useful for embankment fill. The 155 (north) terrace is considered to be of good quality and could provide a good source of base and surface course aggregates.

Volume

The total volume of granular material contained in these deposits is difficult to estimate without information on their stratigraphic thickness and lateral continuity. However, the following estimates have been made:

(a) kame deposits: assuming an average extraction depth of 1.0 m, approximately 1.1 x 10^6 m^3 of fair quality granular material is recoverable

(b) 155 (south) area: assuming an average extraction depth of 1.0 m, approximately 800,000 m^3 of fair quality granular material is recoverable

(c) 155 (north) area: assuming an average extraction depth of 1.5 m, approximately 700,000 m^3 of good quality granular material is recoverable

These volumes are generated by estimating the surface areas of individual deposits, scaled from the airphotographs (1:60,000

scale) and topographic maps (1:50,000 scale). Estimated volumes of granular material in individual deposits are shown on Figure 4.

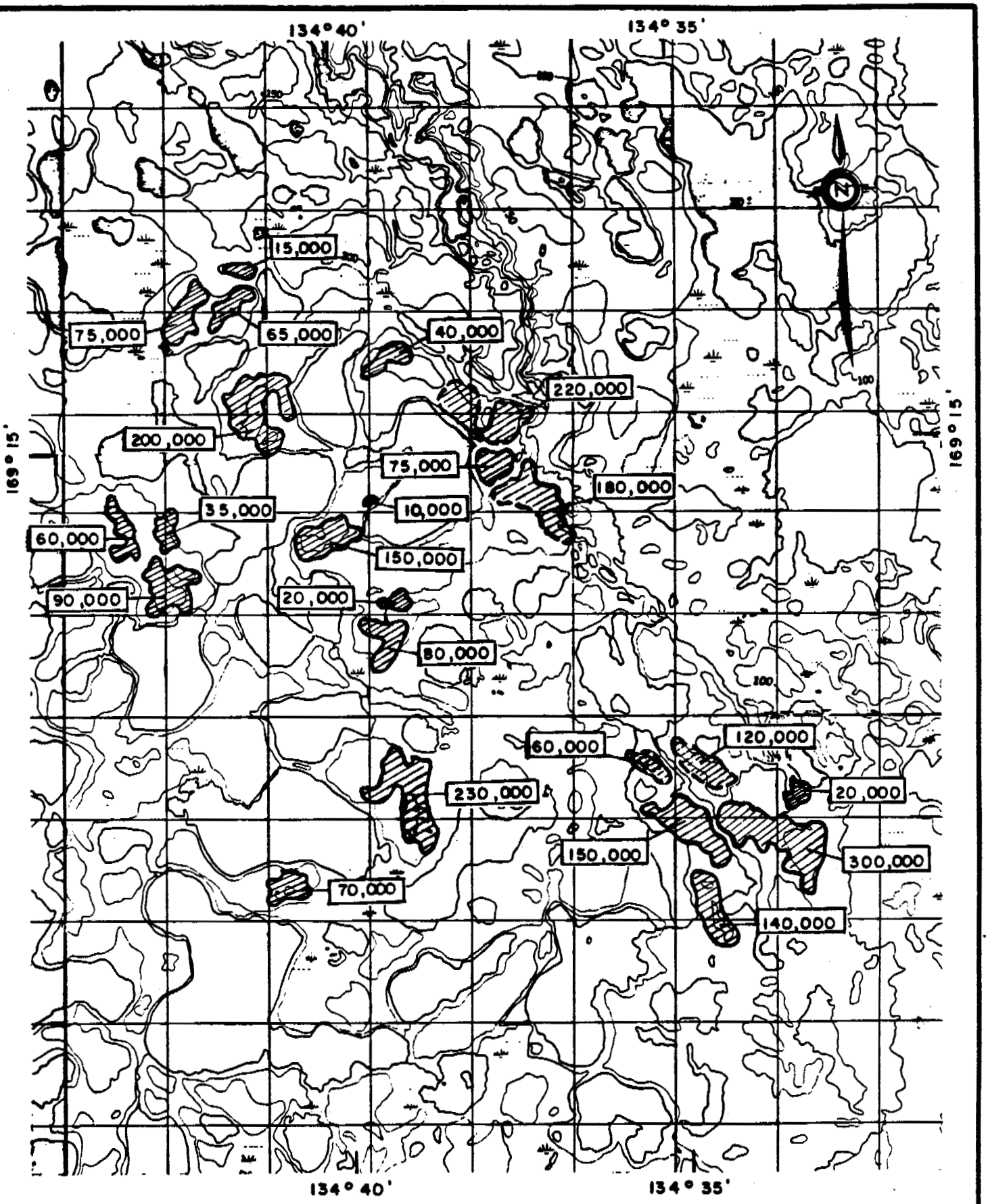
Additional Exploration

We consider that some additional exploration is warranted to determine: stratigraphic thickness, lateral and vertical variation, permafrost conditions (particularly the presence of massive ice). This work is required to prove up material quality and quantities which is particularly important in the 155 (north) deposit as it may be an important source of good quality material.

Access and Development

The access to Deposit 155 has already been discussed, except that the final 5 km of the route involves a significant climb in elevation of about 40-60 m. Surface drainage conditions for the majority of deposits are good, due to the rolling to hilly relief. Exceptions to this are 155 (north) and (south) which include extensive areas of level to undulating terrain which are potentially poorly drained. The 155 (north) area is presently well drained, however parts of 155 (south) are poorly drained and boggy. However, due to the close proximity of all deposits to lakes and or creeks (including the important Kittigazuit Creek) careful pit management will be required to avoid siltation.

Based on the present knowledge of these deposits, massive ice, in the form of ice wedges (polygons), likely exist in the level and poorly drained areas.



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TUKTOYAKTUK, NWT

DEPOSIT 155 - ESTIMATED GRANULAR MATERIAL VOLUMES (m^3)

CG 14096 Scale 1:50,000 FIG. 4

HT83-62/03

3.4 DEPOSIT 163

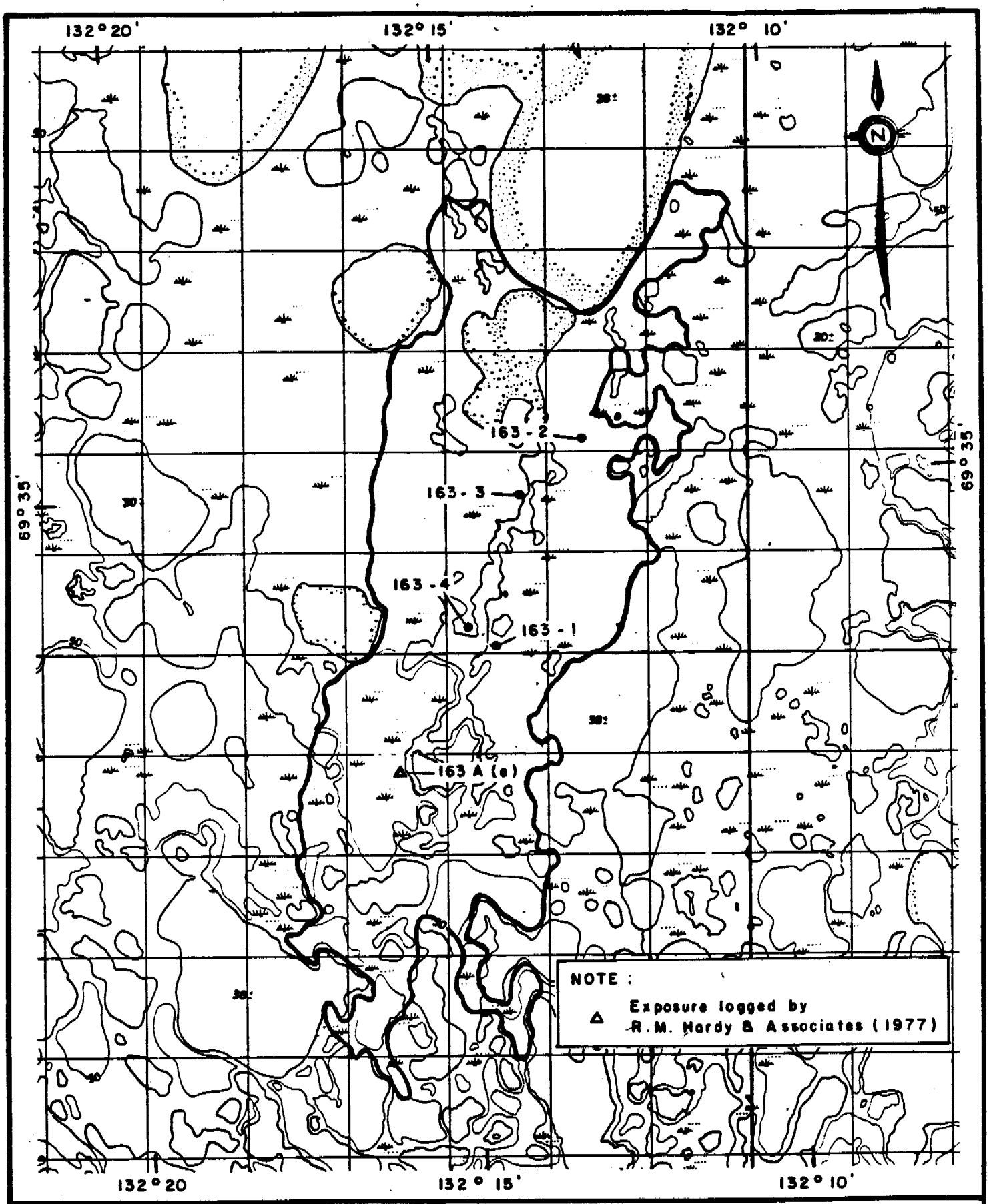
Setting

The location and extent of Deposit 163 is illustrated on Figure 5. Deposit 163 is located approximately 33 km (radial distance) to the east-northeast of Tuktoyaktuk. As a result of this study the deposit is considered to be more extensive than originally mapped. However, it is our interpretation that the granular materials likely have a finer gradation towards the periphery of the deposit.

Deposit 163 is a large glaciofluvial outwash plain which is bisected by a continuous line of interconnected thermokarst lakes. The surface is flat to undulating however the slopes to the internal thermokarst lakes are terraced, which is considered indicative of horizontal layering. The relief is up to about 15 m with two significant terraces, each about 7-8 m high.

Materials

The outwash plain is typically composed of fine to medium sand with a little gravel (fine to coarse), and a variable silt content (trace to silty). The overburden is of variable thickness, from almost none over large parts, to an unknown maximum thickness elsewhere. In TP 163-2 on the upper terrace at the north end of the deposit, silt overburden was determined to be 0.30 m thick. In TP 163-4 on the lower terrace, the granular materials were found to be underlain by silt of unknown thickness and extent. It is possible that layers of silt may be quite extensive and numerous, throughout



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DEPOSIT 163 - TEST PIT LOCATIONS

CG14096 Scale 1 : 50,000 FIG. 5

HT83-82/03

the stratigraphic sequence in Deposit 163, however this can only be determined by drilling. Despite the terraced form of the deposit, stratification is generally poorly developed and irregular, and is only evidenced by thin layers of gravelly sand.

The active layer thickness varies from 0.75 m to greater than 1.6 m in an area which has been stripped and worked. Frozen materials beneath the active layer consist of similar sands with a little gravel, and probably frozen silt in places. The frozen sands are well bonded, with some excess ice (visible ice crystals) being noted.

The overall quality of material in Deposit 163 is only fair, and is locally poor. As such it would be useful only for general fill (embankment).

Volume

The total volume of granular material in Deposit 163 is extremely large and is difficult to estimate without detailed stratigraphic information. It is possible that the whole sequence may be in excess of 15 m in thickness, which for the mapped area would suggest a total volume of about 150 x 10^6 m^3.

Additional Exploration

Due to the only fair quality of granular material in Deposit 163, and its distance from Tuktoyaktuk we do not consider it worthwhile to undertake a drilling program in this area. However, the relatively significant gravel content (up to 20%)

in some areas indicates that a considerable amount of gravel could be obtained from this deposit, albeit with extensive processing.

Access and Development

The preferred winter access to Deposit 163 is along a coastal ice-road for about 45 km, then inland for 10 km. The last 10 km includes a number of large lakes, such that only about 2-3 km comprises overland "portages".

Surface drainage conditions on the upper terrace are poor due to the level topography. However, drainage is good along the flanks of the thermokarst lakes, but careful pit management will be required to avoid siltation of the lakes. There is evidence of ice wedge polygons in these granular deposits, and the presence of massive ice bodies cannot be discounted.

4.0 DISCUSSION

The Phase II field reconnaissance has identified numerous small deposits quite close to Tuktoyaktuk, and has expanded information on previously known deposits, i.e. 155 and 163. In terms of the mandate for this study, these deposits will be considered, along with several others, as potential sources for the twenty year community supply.

Plate 1 illustrates the distribution of deposits which will be considered further in this study for the community supply. All other deposits have been eliminated at this stage due to excessive distance, inadequate volume or unsuitable material. The deposits still under consideration are as follows: 162,

160, 161, 158, 181, 183 (169), 184, 177, 168, 167, 155, 163, 211 and YaYa Lakes.

In the following sections we present some points for discussion concerning the development of certain deposits, relatively close to Tuktoyaktuk.

4.1 DEPOSITS 160 AND 161

The community concerns with respect to development of these sources was presented in our Phase I report. It is our proposal that rather than leaving the presently disturbed areas as they are, they should be restored and reclamined (revegetated). In the process of restoration it is proposed that some of the thawed and drained granular materials be taken for granular supply.

It is our opinion that a significant volume (with respect to the community requirements) of fair quality granular material (embankment) still remains in these deposits. There has been partial development to date, which was ceased due to community concerns for scaring of the landscape close to Tuktoyaktuk. In their present state the deposits are left as bare exposures of granular material which are undergoing progressive degradation of permafrost as the new thermal regime becomes established. Ground-ice is melting out to produce an irregular thermokarst topography with accummulating thaw ponds.

It is still possible to salvage some of the remaining granular material through early winter operations, then regrade the disturbed areas ready for reclamation. The reclamation would

be undertaken during summer months by replacing stripped organic material, scarifying the surface and seeding with adapted grasses. The scarified surface, with mixed-in organics, serves to provide moisture retention and local micro-climates which encourages the establishment of vegetation. A more detailed discussion of this approach is presented in Section 4.2, below.

We propose this approach, for government and community consideration because it serves three purposes: Firstly, the scarred land close to Tuktoyaktuk may be prevented from getting any worse, and by reclamation may be returned to its natural state in some years time. Secondly, it is possible to satisfy part of the community requirements for granular material from local deposits which will enable considerable cost savings. Thirdly, the partially exploited material may be fully worked out and utilized, rather than being ignored and wasted, as is the present case.

4.2 DEPOSITS 181, 183 and 184

During Phase II of this study numerous relatively small and thin granular deposits were identified in a region, 8-22 km from Tuktoyaktuk. While the quality of granular material varies from good to poor, and the volume contained in them ranges from 1500 m^3 to 200,000 m^3, it is our opinion that some of these should be seriously considered as sources for community supply (embankment material).

We accept that the smaller deposits are probably not worth exploiting, but it is felt that any with volumes greater than about 10,000 m^3 are worthy of consideration.

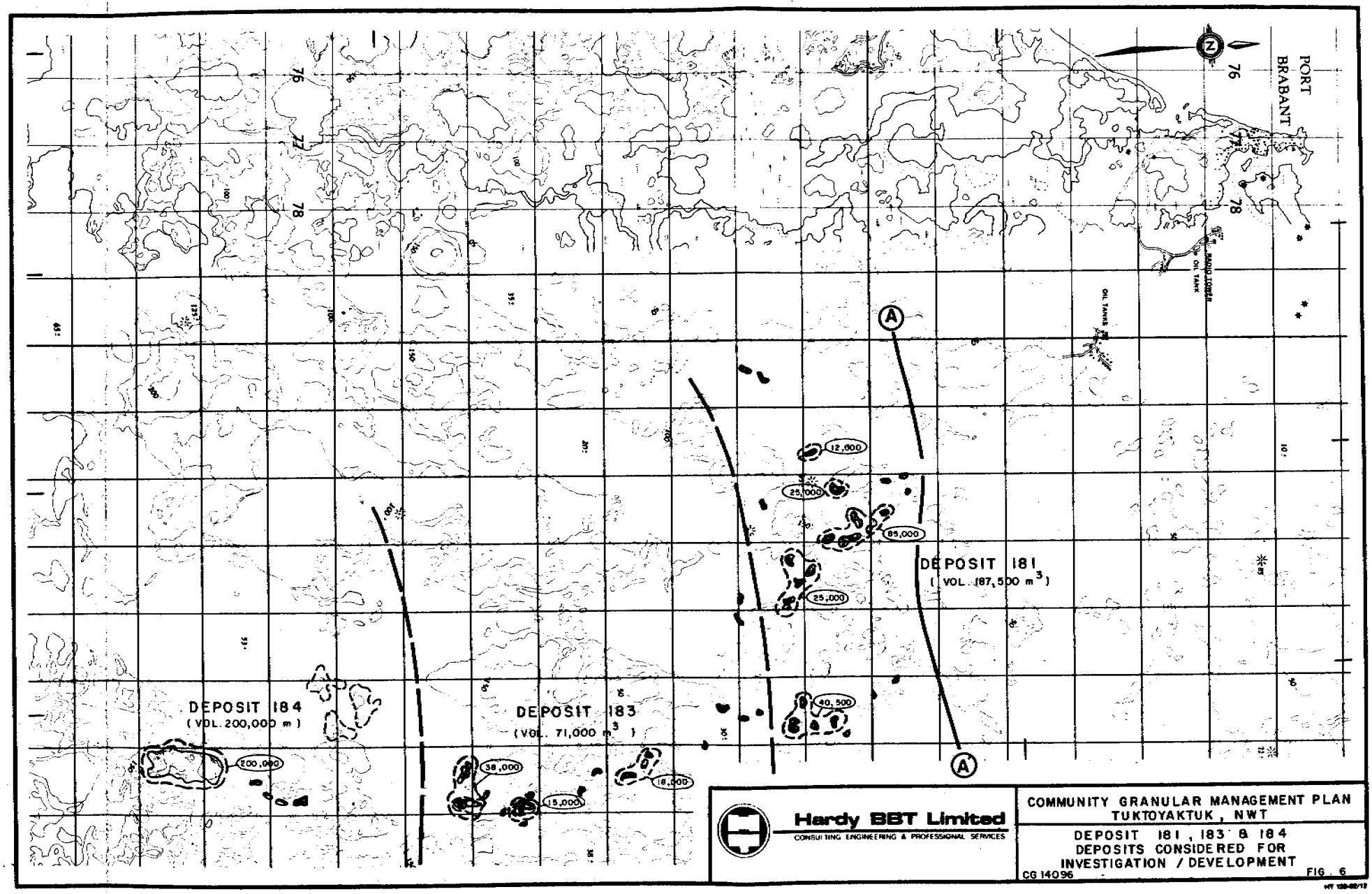
It is proposed that certain deposits could be designated (individually) as the deposit(s) to be worked in one particular season. As they are small areas with a thin surficial layer of useful material, they would be stripped and worked out completely in one season, or at the most two seasons. Then, they would be regraded and prepared for reclamation, which would ideally be completed the following summer. Some remedial re-vegetation would likely be required in subsequent years. In this manner scaring of the landscape would be minimized.

Some permafrost degradation is unavoidable and it is expected that small thermokarst ponds will form in places associated with the thawing of ice wedges. Since ponds and small lakes are very numerous in the region, it is assumed that thaw ponds resulting from pit development will be environmentally acceptable. Degradation will eventually cease and the disturbed area will continue to improve (esthetically) as vegetation becomes better established with time.

We estimate that about 187,000 m^3 of granular material could be obtained from Deposit 181, specifically from the deposits indicated on Figure 6. Similarly Deposits 183 and 184 could provide about 70,000 m^3 and 200,000 m^3 respectively (See Figure 6).

The development of these deposits would ideally be strictly controlled such that:

(i) a reclamation plan would be prepared prior to any issuing of permits for development.



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COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, NWT

DEPOSIT 181, 183 & 184
DEPOSITS CONSIDERED FOR
INVESTIGATION / DEVELOPMENT

CG 14096 FIG. 6

(ii) permits would be issued only for one, or a few, specific deposits each season and the deposits would be clearly staked.

(iii) inspections would be carried out periodically, to ensure that only permitted deposits were being worked, that they were being fully worked-out, and that they were being regraded for re-vegetation.

(iv) once re-vegetated, they would be monitored and assessed for possible remedial measures.

There need not be and should not be any reason to leave any granular source as a bare gravel surface following development. Reclamation of gravel pads in the Tuktoyaktuk region has been successfully achieved in the past by environmental personnel in our company.

5.0 RECOMMENDATIONS FOR PHASE III

In light of results from the Phase II field reconnaissance we consider that additional exploration work is warranted. However our recommendations for the Phase III detailed field program are somewhat different from the approach in our proposal of May, 1986.

The following deposits are recommended for detailed exploration:

(i) Deposits 181, 183 and 184: Due to their close proximity to Tuktoyaktuk and comprising of embankment quality material, these deposits warrant additional exploration

to prove out the quantity and quality. However, it is only worthwhile studying these deposits further, provided the Government and the Hamlet of Tuktoyaktuk are in agreement with developing small deposits in these areas. We have presented a development/reclamation approach to exploiting these deposits (Section 4.0), which could be adopted to mitigate the environmental impact and community concerns.

(ii) Deposit 155: The 155 (north) area of this deposit appears to have the potential to supply a significant volume of good quality granular material (i.e. base and/or surface course). In addition, there is apparently a large volume of fair quality (potential embankment) granular material available from the surrounding deposits.

We consider that 155 (north) certainly warrants detailed exploration, as a potential substitute for YaYa Lakes type material. Also, that certain of the surrounding deposits could be further explored and proved out as potential sources of embankment material. It is possible that all of the community requirement for embankment fill, base and surface course material may be available from Deposit 155.

5.1 DETAILED FIELD PROGRAM

We propose that two separate field programs (approaches) be undertaken. A test pitting program in Deposits 181, 183 and 184 and a drilling program in Deposit 155. Both programs will remain within the Phase III budget.

5.1.1 Deposits 181, 183 and 184

Due to the relatively thin distribution of suitable granular materials in these deposits, a drilling program is considered inappropriate (i.e not cost effective). The use of a dozer could provide much more detailed and useful information, at less cost. Therefore, we propose that the initial part of the field program be based out of Tuktoyaktuk (i.e. no mobile camp costs) and that about 30-40 test pits be excavated, logged and sampled in the deposits indicated in Figure 6.

We propose to employ a D8 Cat with ripper to push out small pits. We estimate the work can be completed in about 6-7 days (single shift) at a daily cost of about $3,000 for all men, equipment, accommodations etc. Hence this phase of the detailed field program will use about $20,000-$25,000 of the field budget.

5.1.2 Deposit 155

It is proposed to conduct a drilling program, in the manner outlined in our proposal, to prove out the potentially good quality material in the 155 (north) area. In addition, it is proposed to drill some of the surrounding deposits, to obtain more information on material quality and volumes.

We estimate that about 8 days of drilling time will be available in the remaining budget. Hence about 25-35 boreholes could be drilled in Deposit 155. We have allowed for about 15 boreholes to be drilled in the 155 (north) area.

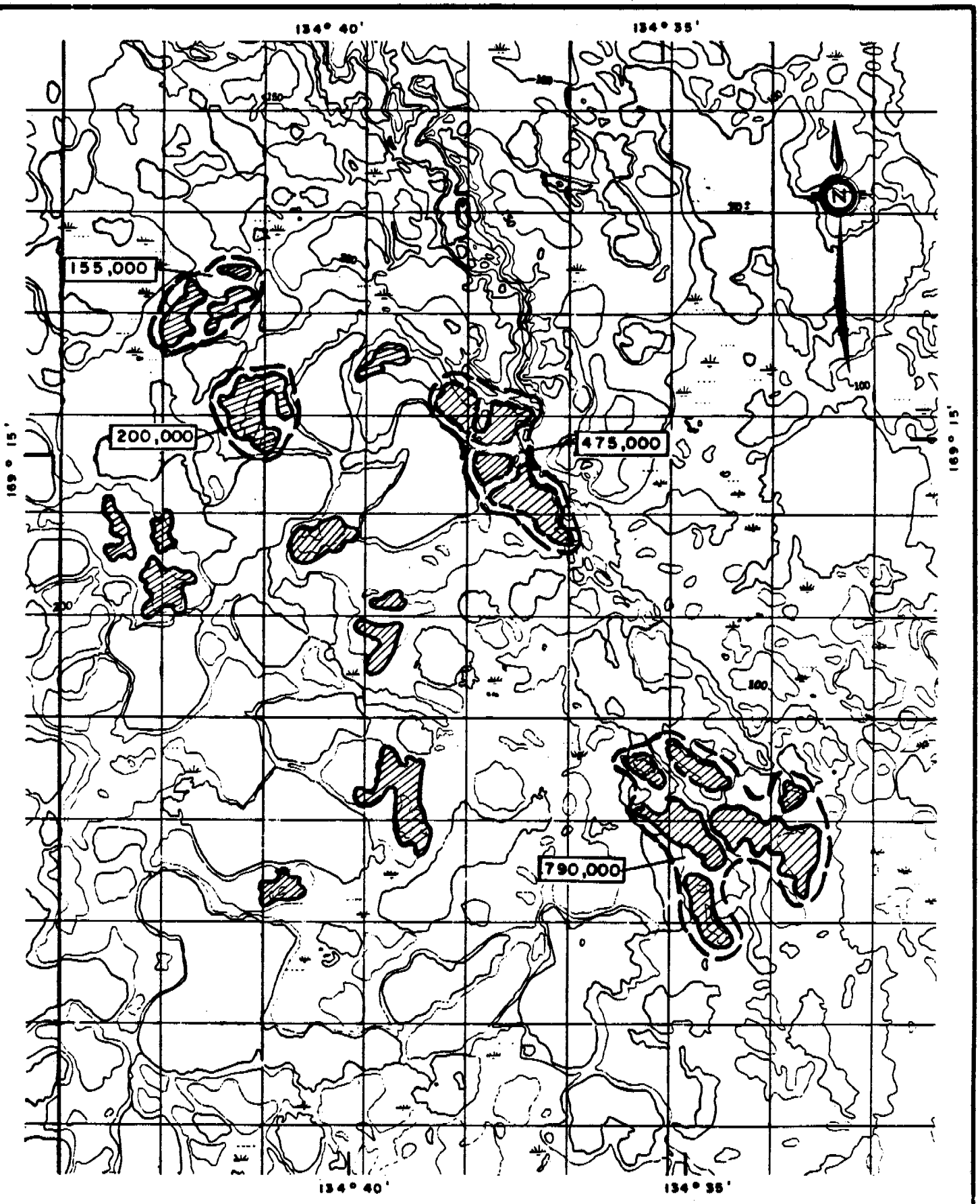
The remaining boreholes will be located in the deposits indicated in Figure 7.

Should it be decided that Deposits 181, 183 and 184 are not acceptable for additional investigation, then more emphasis will be placed on Deposit 155. More effort will be put into proving out a larger volume of embankment quality material.

6.0 CONCLUSION

This study has identified three new deposits 181, 183 (169) and 184 in the area south-southeast of Tuktoyaktuk. In addition, new deposits have been identified in the area of Deposit 155, and the extent of Deposit 163 has been increased.

Deposits 181, 183 and 184 occur between 8 and 22 km from Tuktoyaktuk and contain numerous small and thin deposits of poor to good quality granular material. One area of Deposit 155 may contain a significant volume of good quality granular material, however, the remaining deposits appear to comprise only poor to fair quality material. Deposit 163 contains a very large volume of only fair (and often poor) quality granular material, and is not considered for detailed investigation.



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COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, NWT

DEPOSIT 155 - DEPOSITS CONSIDERED FOR INVESTIGATION / DEVELOPMENT

CG 14096 Scale 1 : 50,000 FIG. 7

HT83-82(1)

It is recommended that Deposits 181, 183, 184 and 155 be investigated in detail during Phase III, as potential sources of community supply.

PERMIT TO PRACTICE
HARDY BBT LIMITED
Signature _____
Date _____
PERMIT NUMBER: P 4546
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

Respectfully Submitted

HARDY BBT LTD.

Per:

N.G. Mosley, M.Sc., P.Geol.

Per:

A.J. Hanna, M.A.Sc., P.Eng.

APPENDIX "A"

Explanation Sheets

EXPLANATION OF TERMS AND SYMBOLS

The terms and symbols used on the borehole logs to summarize the results of field investigation and subsequent laboratory testing are described in the following pages.

It should be noted that materials, boundaries, and conditions have been established only at the borehole locations, and are not necessarily representative of subsurface conditions elsewhere across the site.

TEST DATA

Data obtained from laboratory and field testing are shown on the grid at the appropriate depth interval.

The natural moisture (water) content of the soil at the time of drilling is plotted against depth, together with the plastic and liquid limits where determined.

Abbreviations, graphic symbols, and relevant test method designations are as follows:

⊙	w	natural moisture content (ASTM D 2216)
⊡	w_P	plastic limit (ASTM D 424)
△	w_L	liquid limit (ASTM D 423)
	NP	non plastic soil
——→		seepage
—▼—		observed water level

Other abbreviations and symbols are as shown on the borehole log sheet.

DEPTH

The depth of borehole below existing ground surface is shown. Corresponding elevations sometimes are shown with respect to the datum given.

SOIL CLASSIFICATION AND DESCRIPTION

Soils are classified and described according to their engineering properties and behaviour.

The soil of each stratum is described using the Unified Soil Classification System[1] modified slightly so that an inorganic clay of "medium plasticity" is recognized.

The use of modifying adjectives may be employed to define the actual or estimated percentage range by weight of minor components. This is similar to a system developed by D.M. Burmister.[2]

The soil classification system is shown in greater detail on page 3.

1. "Unified Soil Classification System", Technical Memorandum 3-357 prepared for Office, Chief of Engineering, by Waterways Experiment Station, Vicksburg, Mississippi, Corps. of Engineers, U.S. Army. Vol. 1, March 1953.

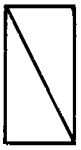
2. American Society for Testing and Materials. Procedures for Testing Soils, "Suggested Methods of Testing for Identification of Soils", 4th Ed; pp 221-233, Dec. 1964.

SOIL SAMPLES

CONDITION — This column graphically indicates the depth and condition of the sample:

 undisturbed

 disturbed

 not recovered

TYPE — The type of sample is indicated in this column as follows:

A auger sample
B block sample
C rock core, or frozen soil core
D drive sample
P Pitcher tube sample
U tube sample (usually thin-walled)
W wash or air return sample
O other (see report text)

PENETRATION RESISTANCE — Unless otherwise noted this column refers to the number of blows (N) of a 140 pound (63.5 kg) hammer freely dropping 30 inches (0.76 m) required to drive a 2 inch (50.8 mm) O.D. open-end sampler 0.5 feet (0.15 m) to 1.5 feet (0.45 m) into the soil, or until 100 blows have been applied, in which case, the penetration is stated. This is the standard penetration test referred to in ASTM D 1586.

OTHER TESTS

In this column are tabulated results of other laboratory tests as indicated by the following symbols:

*C	Consolidation test
Fines	Percentage by weight smaller than #200 sieve
D_R	Relative density (formerly specific gravity)
k	Permeability coefficient
*MA	Mechanical grain size analysis and hydrometer test (if appropriate)
pp	Pocket penetrometer strength
*q	Triaxial compression test
q_u	Unconfined compressive strength
*SB	Shearbox test
SO_4	Concentration of water-soluble sulphate
*ST	Swelling test
TV	Torvane shear strength
VS	Vane shear strength (undisturbed-remolded)
ε_f	Unit strain at failure
γ	Unit weight of soil or rock
γ_d	Dry unit weight of soil or rock
ρ	Density of soil or rock
ρ_d	Dry density of soil or rock

* The results of these tests usually are reported separately.

SOIL CLASSIFICATION SYSTEM (MODIFIED U.S.C.)

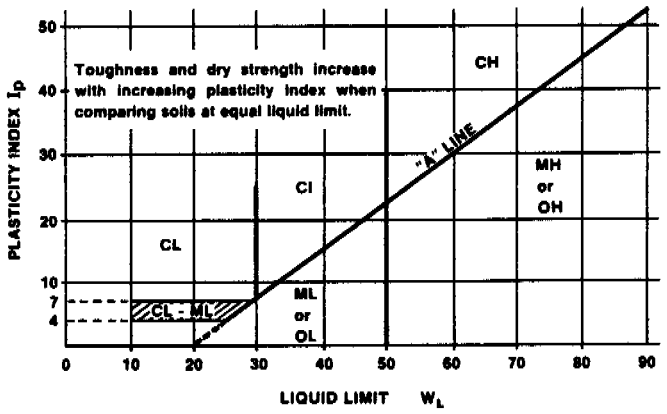
MAJOR DIVISION			GROUP SYMBOL	GRAPHIC SYMBOL	COLOR CODE	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA
HIGHLY ORGANIC SOILS			Pt		ORANGE	PEAT AND OTHER HIGHLY ORGANIC SOILS	STRONG COLOR OR ODOR, AND OFTEN FIBROUS TEXTURE
COARSE-GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN NO. 200 SIEVE SIZE)	GRAVELS MORE THAN HALF COARSE FRACTION LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS	GW		RED	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, < 5% FINES	$C_u = \frac{D_{60}}{D_{10}} > 4$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ = 1 to 3
			GP		RED	POORLY-GRADED GRAVELS, AND GRAVEL-SAND MIXTURES, < 5% FINES	NOT MEETING ALL ABOVE REQUIREMENTS
		DIRTY GRAVELS	GM		YELLOW	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES > 12% FINES	ATTERBERG LIMITS BELOW "A" LINE OR $I_p < 4$
			GC		YELLOW	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES > 12% FINES	ATTERBERG LIMITS ABOVE "A" LINE, $I_p > 7$
	SANDS MORE THAN HALF COARSE FRACTION SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS	SW		RED	WELL-GRADED SANDS, GRAVELLY SANDS, < 5% FINES	$C_u = \frac{D_{60}}{D_{10}} > 6$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ = 1 to 3
			SP		RED	POORLY-GRADED SANDS, OR GRAVELLY SANDS, < 5% FINES	NOT MEETING ALL ABOVE REQUIREMENTS
		DIRTY SANDS	SM		YELLOW	SILTY SANDS, SAND-SILT MIXTURES > 12% FINES	ATTERBERG LIMITS BELOW "A" LINE OR $I_p < 4$
			SC		YELLOW	CLAYEY SANDS, SAND-CLAY MIXTURES > 12% FINES	ATTERBERG LIMITS ABOVE "A" LINE OR $I_p > 7$
FINE-GRAINED SOILS (MORE THAN HALF BY WEIGHT PASSES NO. 200 SIEVE SIZE)	SILTS BELOW "A" LINE ON PLASTICITY CHART; NEGLIGIBLE ORGANIC CONTENT		ML		GREEN	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHT PLASTICITY	$W_L < 50$
			MH		BLUE	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS	$W_L > 50$
	CLAYS ABOVE "A" LINE ON PLASTICITY CHART; NEGLIGIBLE ORGANIC CONTENT		CL		GREEN	INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY, OR SILTY CLAYS, LEAN CLAYS	$W_L < 30$
			CI		GREEN-BLUE	INORGANIC CLAYS OF MEDIUM PLASTICITY SILTY CLAYS	$W_L > 30$, < 50
			CH		BLUE	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	$W_L > 50$
	ORGANIC SILTS & ORGANIC CLAYS BELOW "A" LINE ON PLASTICITY CHART		OL		GREEN	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	$W_L < 50$
			OH		BLUE	ORGANIC CLAYS OF HIGH PLASTICITY	$W_L > 50$

SEE CHART BELOW

1. All sieve sizes mentioned on this chart are U.S. Standard, ASTM E11.
2. Boundary classifications possessing characteristics of two groups are given combined group symbols eg GW-GC is a well-graded gravel-sand mixture with clay binder between 5% and 12%.
3. Soil fractions and limiting textural boundaries are in accordance with the Unified Soil Classification System, except that an inorganic clay of medium plasticity (CI) is recognized.
4. The following adjectives may be employed to define percentage ranges by weight of minor components:

and	50 - 36%
some	35 - 21%
little	20 - 11%
trace	10 - 1%

PLASTICITY CHART



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	Source Quality Description	General Description of Material	Minimum Technical Identification Parameters	Suggested Uses of Material
(1)	Excellent	Well graded sands and gravel suitable for use as aggregates with a minimum of processing	Petrographic Number - 160 max. Los Angles Abrasion Loss - 35% max. Soundness Loss (Magnesium Sulphate) - 12% max. and meeting other requirements of CSA A23.1 - 1973	Portland Cement Concrete, Asphaltic Concrete, Masonry Sand, Concrete Block, Surface Treatment and Roofing Aggregate.
(2)	Good	Graded sands and gravels with varying quantities of silt.	Petrographic Number - 200 max. Los Angeles Abrasion Loss - 60% max. Fines greater than 10% passing the 200 sieve can be removed with minimum of processing	Granular base and subbase. Winter sand backfill for trenches and slabs. Pads for structures.
(3)	Fair	Poorly graded sands and gravels with or without substantial silt content	Petrographic Number 250 max. Can be processed to meet local frost susceptibility criteria	Granular subbase General backfill material, pads for equipment.
(4)	Poor	Poorly graded granular soils of high silt content, possibly containing very weak particles and deleterious materials	Nil	General non-structural fill.

NOTE: Classification developed by DIAND.

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CLASSIFICATION OF GRANULAR MATERIALS

ORGANIC IMPURITIES
Fine Aggregate

Organic Color Number	Interpretation
1 to 1+	Sand suitable for use in high grade concrete.
2 to 2+	Sand which may be used in unimportant concrete work.
3 to 3+	Sand which should not be used in concrete without processing.
4 to 5+	Sand with high organic content that should not be used in concrete.

APPENDIX "B"

Test Pit Logs

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F. | CKD. N.M. | DATE OF INVEST. Sept. 6, 1986 | JOB NO. CG14096 | HOLE NO. TP181-1

DRILL TYPE: Hand Excavation

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △
10 20 30 40 50 60

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		DATUM SURFACE ELEVATION Not determined				
		PEAT, organic material, black, roots, dry				
		GRAVEL (fmc) and SAND (fmc), trace silt, compact, brown, occasional cobbles and boulders, root fibres to 0.6 m, dry (GP)				
0.5		becoming damp		A_1		MA (Plate C1)
1.0						
		End of Test Pit at 1.2 m No permafrost encountered				
1.5						
2.0						

Plate B1

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F.	CKD. N.M.	DATE OF INVEST. Sept 6, 1986	JOB NO. CG14096	HOLE NO. TP181-2

DRILL TYPE: Hand Excavation

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △

10 20 30 40 60 80

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		DATUM SURFACE ELEVATION Not determined				
		PEAT, organic material, black, roots, dry.				
		SILT, trace of clay, frozen with ice veins and fine ice lenses, low to non-plastic, brown, (permafrost). (ML)				
0.5		End of Test Pit at 0.40 m				
1.0						
1.5						
2.0						

Plate B2

HT11 - 79.05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./ D.F.	CKD. N.M.	DATE OF INVEST. Sept. 6, 1986	JOB NO. CG14096	HOLE NO. TP181-3

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △
10 20 30 40 50 60

DRILL TYPE: Hand Excavation

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		DATUM SURFACE ELEVATION Not determined				
		PEAT, organic material, dark brown, dry				
		SAND (fmc), little gravel, trace of silt, loose to compact, stratified - thin gravelly layers, rusty brown, dry				
		damp (SP)		A_1		
0.5		SAND (fmc) with some gravel, trace of silt, loose to compact stratified, grey-brown, damp (SP)				
				A_2		MA (Plate C2)
1.0		becoming wet and very silty				
		frozen silty fine sand, ice bonded, no visible ice, (permafrost)				
1.5		End of Test Pit at 1.3 m.				
2.0						

Plate B3

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F.	CKD. N.M.	DATE OF INVEST. Sept. 6, 1986	JOB NO. CG14096	HOLE NO. TP181-4

DRILL TYPE: Hand Excavation

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △ (10 20 30 40 60 80)

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		DATUM SURFACE ELEVATION Not determined				
		PEAT, organic material, brown, dry				
		SAND (fmc), little gravel, trace of silt, compact to loose stratified - layers of gravel, rusty brown to brown, occasional cobbles and boulders, dry (SP) damp		A_1		MA (Plate C3)
0.5		SAND, fine, trace of silt and gravel, compact, fine stratification/lamination, grey damp to wet (SP)		A_2		MA (Plate C4)
1.0		-- frozen fine sand, ice bonded, no visible ice, grey, (permafrost)				
		End of Test Pit at 0.95 m				
1.5						
2.0						

Plate B4

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F. | CKD. N.M. | DATE OF INVEST. Sept. 6, 1986 | JOB NO. CG14096 | HOLE NO. TP181-5

DRILL TYPE: Hand Excavation

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △
10 20 30 40 50 60

DEPTH m

SOIL SYMBOL

SOIL DESCRIPTION

DATUM

SURFACE ELEVATION Not determined

SOIL SAMPLE: CONDITION | TYPE | PENETRATION RESISTANCE

OTHER TESTS

DEPTH m	SOIL DESCRIPTION	SOIL SAMPLE TYPE	OTHER TESTS
	PEAT, organic material, roots, brown, dry		
	SAND (fmc), some gravel trace of silt, compact, stratified, layers/lenses of sand, very gravelly sands and sandy gravel, rust-brown to brown, some root fibres, dry (SP)		
0.5	-damp	A_1	MA (Plate C5)
1.0	-becoming damp to wet		
	-frozen sand with some gravel, (permafrost)		
	End of Test Pit at 1.2 m		
1.5			
2.0			

Plate B5

HT11 - 79 05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F.	CKD. N.M.	DATE OF INVEST. Sept. 6, 1986	JOB NO. CG14096	HOLE NO. TP181-6

CASING RESISTANCE blows/foot (0.3m)
WATER CONTENT% W_P-□ W-○ W_L-△ (10 20 30 40 50 60)

DATUM

SURFACE ELEVATION Not determined

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	DRILL TYPE: Hand Excavation / OTHER TESTS
		PEAT, organic material, roots, brown, dry				
		SAND(fmc) some gravel, silty, compact, brown, occasional cobbles, many root fibres, dry to damp (SP)				
0.5		GRAVEL(fmc) and SAND(fmc), trace to no silt, compact, no stratification, brown to grey-brown, rootlets, occasional cobbles and boulders, damp (SP)		A_1		MA(Plate C6)
1.0		--frozen gravel and sand, (permafrost)				
		End of Test Pit at 1.0 m				
1.5						
2.0						

Plate B6

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F.	CKD. N.M.	DATE OF INVEST. Sept., 1986	JOB NO. CG14096	HOLE NO. TP181-7

CASING RESISTANCE blows/foot (0.3m)
WATER CONTENT% Wp - □ W - ○ W_L - △
10 20 30 40 60 80

DATUM
SURFACE ELEVATION Not determined

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	DRILL TYPE: Hand Excavation / OTHER TESTS
		PEAT, organic material and organic soil, peaty, some clay and silt, dark brown, moist				
		CLAY (TILL), very sandy (fine), silty, some gravel, brown, moist (CL)				
0.5		SAND, fine grained, trace to some silt, loose to compact, grey brown, occasional gravel (fm), well rounded, moist (SP)		A_1		MA (Plate C7)
		becoming wet, free water				
1.0		frozen fine sand, ice bonded, no visible ice, (permafrost)				
		End of Test Pit at 0.9 m				
1.5						
2.0						

Plate B7

HT11 - 79-05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN.	N.M./ D.F.	CKD.	N.M.	DATE OF INVEST.	Sept. 7, 1986	JOB NO.	CG14096	HOLE NO.	TP181-11

CASING RESISTANCE blows/foot (0.3m)
WATER CONTENT% Wp - □ W - ○ W_L - △
10 20 30 40 60 80

DEPTH m | SOIL SYMBOL | SOIL DESCRIPTION | SOIL SAMPLE: CONDITION, TYPE, PENETRATION RESISTANCE | DRILL TYPE: Hand Excavation | OTHER TESTS

DATUM
SURFACE ELEVATION Not determined

PEAT and organic soil, silty/ clayey, dark brown, moist

SAND (fm), some gravel, trace of silt, compact, rusty brown to brown, root fibres in upper 0.30 m, damp to moist (SP)

0.5

A_1 — MA (Plate C8)

frozen sand (fm), grey

SAND (fm), no fines, frozen, ice bonded, no visible ice, grey (permafrost) (SP)

A_2

1.0

End of Test Pit at 1.0 m

1.5

2.0

Plate B8

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./ D.F. | CKD. N.M. | DATE OF INVEST. Sept. 7, 1986 | JOB NO. CG14096 | HOLE NO. TP181-12

DRILL TYPE: Hand Excavation

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △
10 20 30 40 60 80

DATUM

SURFACE ELEVATION Not determined

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		PEAT, organic material, brown, dry				
		SAND (fm), trace of gravel and silt, loose to compact, stratified, thin layers of gravel in sand, rusty brown to brown, root fibres in top 0.40 m, damp to moist (SP)		A_1		MA (Plate C10)
0.5						
		--frozen sand (fm), ice bonded, no visible ice, grey (permafrost)				
1.0						
		End of Test Pit at 0.85 m				
1.5						
2.0						

Plate B9

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F. | CKD. N.M. | DATE OF INVEST. Sept. 7, 1986 | JOB NO. CG14096 | HOLE NO. TP181-13

DRILL TYPE: Hand Excavation

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △
10 20 30 40 60 80

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		DATUM SURFACE ELEVATION Not determined				
		PEAT, organic material and organic soil				
		ORGANIC SOIL, silty clay, soft, dark brown, moist to wet				
0.5		SAND (fmc) and GRAVEL (fmc), trace to no silt, loose to compact, stratified thin layers of gravel in sand and gravel, dark brown to grey brown, occasional cobbles/boulders, moist (SP)		A_1		MA (Plate C11)
		--frozen sand (fm), little gravel, ice-bonded, no visible ice, grey, (permafrost)				
		End of Test Pit at 0.70 m				
1.0						
1.5						
2.0						

Plate B10

HT11 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./ D.F. | CKD. N.M. | DATE OF INVEST. Sept. 7, 1986 | JOB NO. CG14096 | HOLE NO. TP181-14

DRILL TYPE: Hand Excavation

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △
10 20 30 40 60 80

DATUM

SURFACE ELEVATION Not determined

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		PEAT, organic material, brown, dry				
0.5		SAND (fm), trace of silt and gravel, well rounded, loose, rusty brown to brown, damp to moist (SP)		A_1		MA (Plate C12)
1.0		--frozen sand (fm) with some gravel (fm), ice-bonded (permafrost)				
		End of Test Pit at 1.10 m				
1.5						
2.0						

Plate B11

HT11 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN.	CKD.	DATE OF INVEST.	JOB NO.	HOLE NO.
N.M./D.F.	N.M.	Sept. 7, 1986	CG14096	TP181-15

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △
10 20 30 40 60 80

DATUM

SURFACE ELEVATION Not determined

DEPTH m	SOIL DESCRIPTION	SOIL SAMPLE CONDITION	SOIL SAMPLE TYPE	SOIL SAMPLE PENETRATION RESISTANCE
	PEAT, fibrous, root-fibres, dark brown, dry to damp			
	GRAVEL (fmc) with silty CLAY (TILL), sandy, dense, low plastic matrix, dark grey, some cobbles and boulders, moist (GM-GC)			
0.5			A_1	
	-- frozen gravel with clay (till), visible ice veins and crystals, (permafrost)			
	End of Test Pit at 0.80 m			
1.0				
1.5				
2.0				

DRILL TYPE: Hand Excavation

OTHER TESTS

Plate B12

HT11 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F.	CKD. N.M.	DATE OF INVEST. Sept. 10, 1986	JOB NO. CG14096	HOLE NO. TP181-16

DRILL TYPE: Hand Excavation

WATER CONTENT — Wp - □ W - ○ W_L - △ — PERCENT % — 10 20 30 40 50 60

SURFACE ELEVATION: Not determined

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION (DATUM)	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		PEAT and organic soil, dark brown, moist				
		SAND (fmc) with some gravel (fmc), trace of silt, loose to compact, rusty brown to brown, root fibres, moist (SP)		A_1		
0.5		-- frozen sand (fm), ice bonded, no visible ice, grey (permafrost)				
		End of Test Pit at 0.70 m				
1.0						
1.5						
2.0						

Plate B13

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F. | CKD. N.M. | DATE OF INVEST. Sept. 10, 1986 | JOB NO. CG14096 | HOLE NO. TP181-16A

DRILL TYPE: Hand Excavation

WATER CONTENT — Wp - □ W - ○ W_L - △ — PERCENT % — 10 20 30 40 50 60

DATUM

SURFACE ELEVATION Not determined

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		PEAT and organic soil, dark brown, moist				
		SAND (fm), some gravel, trace of silt, loose, rusty brown, root fibres, moist (SP)		A_1		
0.5		GRAVEL (fmc) and SAND (fmc), trace of silt, compact, grey-brown, occasional cobbles and boulders, moist (SP)		A_2		MA (Plate C13) Petrographic
1.0						
		End of Test Pit at 1.20 m No permafrost encountered				
1.5						
2.0						

Plate B14

HT08 - 79 05

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PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F. | CKD. N.M. | DATE OF INVEST. Sept 8, 1986 | JOB NO. CG14096 | HOLE NO. TP183-1

DRILL TYPE: Hand Excavation

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp-□ W-○ W_L-△ (10 20 30 40 50 60)

DATUM

SURFACE ELEVATION Not determined

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		PEAT and organic soil, sandy, brown, damp				
		SAND (fmc), some gravel, well rounded, trace to no silt, compact, grey-brown, occasional cobbles, root fibres, damp to moist (SP)		A_1		
0.5		SAND (fmc) with little gravel, trace of silt, loose to compact, brown, damp to moist (SP)		A_2		MA (Plate C14)
1.0		-- frozen sand (fm) ice bonded, no visible ice crystals (permafrost).				
		End of Test Pit at 0.90 m.				
1.5						
2.0						

Plate B16

HT11 - 78/05

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PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F. | CKD. N.M. | DATE OF INVEST. Sept. 10, 1986 | JOB NO. CG14096 | HOLE NO. TP181-17

DRILL TYPE: Hand Excavation

WATER CONTENT
Wp - □ W - ○ W_L - △
PERCENT %
10 20 30 40 50 60

DEPTH m	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
	DATUM SURFACE ELEVATION Not determined				
	PEAT, organic material, dark brown, moist				
	SILT(TILL), clayey, sandy, firm, low plastic, dark grey, gravel and occasional cobbles/boulders, moist to wet (ML)				
0.5	-frozen silt till, some thin ice veins (permafrost)				
	End of Test Pit at 0.55 m				
1.0					
1.5					
2.0					

Plate B15

HT08 - 79/05

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PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F.	CKD. N.M.	DATE OF INVEST. Sept 8, 1986	JOB NO. CG14096	HOLE NO. TP183-2

CASING RESISTANCE (blows/foot (0.3m))

WATER CONTENT% Wp - □ W - ○ W_L - △ (10 20 30 40 50 60)

DRILL TYPE: Hand Excavation

OTHER TESTS

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		DATUM SURFACE ELEVATION Not determined				
		PEAT and organic soil, fibrous brown, moist				
0.5		SAND (fmc), some gravel (fmc), trace of silt, compact, brown, occasional cobbles, root fibres, moist (SP)		A_1		
		SAND (fm), no fines, loose, brown to grey-brown, occasional gravel, moist to wet (SP)		A_2		MA (Plate C15)
1.0		-- frozen sand, ice-bonded, no visible ice, grey-brown (permafrost)				
		End of Test Pit at 0.90 m				
1.5						
2.0						

Plate B17

HT11 - 78/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN.	N.M./ D.F.	CKD.	N.M.	DATE OF INVEST.	Sept 8, 1986	JOB NO.	CG14096	HOLE NO.	TP183-3

CASING RESISTANCE blows/foot (0.3m)
WATER CONTENT% Wp - □ W - ○ W_L - △
10 20 30 40 50 60

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE CONDITION	SOIL SAMPLE TYPE	SOIL SAMPLE PENETRATION RESISTANCE	DRILL TYPE / OTHER TESTS
		DATUM SURFACE ELEVATION Not determined				Hand Excavation
		PEAT and organic soil, brown, damp				
		SAND (fmc), some gravel (fmc) trace of silt, compact, brown, root fibres, occasional cobbles, moist. (SP)		A_1		
0.5						
		SAND (fm) trace to no silt, trace of gravel (fmc), loose, brown to grey brown, moist (SP)				
1.0		-- frozen sand (fm), ice-bonded, no visible ice, (permafrost)				
		End of Test Pit at 1.10 m				
1.5						
2.0						

Plate B18

HT11 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F.	CKD. N.M.	DATE OF INVEST. Sept 10, 1986	JOB NO. CG14096	HOLE NO. TP183-4

CASING RESISTANCE blows/foot (0.3m)
WATER CONTENT% Wp - □ W - ○ W_L - △
10 20 30 40 50 60

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE
		DATUM SURFACE ELEVATION Not determined			
		PEAT and organic soil, sandy, dark brown,			
		GRAVEL (fmc) and SAND (fmc), no fines, compact, rusty brown, root fibres, moist (GP-SP)		A_1	
0.5		SAND (fmc) with some gravel, no fines, loose to compact, grey-brown, moist (SP)		A_2	
1.0		-- frozen sand (fm), ice bonded, no visible ice, grey, (permafrost).			
		End of Test Pit at 1.20 m.			
1.5					
2.0					

DRILL TYPE: Hand Excavation
OTHER TESTS

Plate B19

HT11 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN.	CKD.	DATE OF INVEST.	JOB NO.	HOLE NO.
N.M./ D.F.	N.M.	Sept 10, 1986	CG14096	TP183-5

DRILL TYPE: Hand Excavation

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △ (10 20 30 40 50 60)

DATUM

SURFACE ELEVATION: Not determined

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		PEAT and organic soil, sandy, dark brown, moist				
		GRAVEL (fmc) and SAND (fm), trace of silt, compact, rusty brown, occasional cobbles and boulders, root fibres, moist (SP)		A_1		MA(Plate C16)
0.5		SAND (fmc) and some gravel (fmc), trace of silt, compact, gravelly layers, brown, occasional cobbles and boulders, moist (SP)		A_2		MA(Plate C17)
1.0		-- frozen sand (fm), ice bonded, no visible ice, grey, (permafrost).				
		End of Test Pit at 1.2 m.				
1.5						
2.0						

Plate B20

HT11 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN.	CKD.	DATE OF INVEST.	JOB NO.	HOLE NO.
N.M./D.F.	N.M.	Sept 10, 1986	CG14096	TP183-6

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △

10 20 30 40 50 60

DEPTH m

SOIL SYMBOL

SOIL DESCRIPTION

DATUM

SURFACE ELEVATION Not determined

SOIL SAMPLE

CONDITION | TYPE | PENETRATION RESISTANCE

DRILL TYPE: Hand Excavation

OTHER TESTS

DEPTH m	SOIL DESCRIPTION	SOIL SAMPLE TYPE	OTHER TESTS
	PEAT and organic soil, sandy, dark-brown, moist		
	SAND (fmc) little gravel, trace of silt, compact, brown, some root fibres (SP)		
0.5		A_1	MA (Plate C18)
	--frozen sand, little gravel, ice bonded, no visible ice, grey-brown, (permafrost).		
1.0	End of Test Pit at 0.90 m		
1.5			
2.0			

Plate B21

HT11 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F. | CKD. N.M. | DATE OF INVEST. Sept 8, 1986 | JOB NO. CG14096 | HOLE NO. TP169-1

DRILL TYPE: Hand Excavation

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △ (10 20 30 40 50 60)

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		DATUM SURFACE ELEVATION Not determined				
		PEAT and organic, soil, sandy, dark brown, dry to damp.				
		SAND (fmc), some gravel, trace of silt, loose, brown, root fibres, damp (SP)				
0.5		SAND (fm), some silt, loose, faint stratification, rusty brown to brown, occasional gravel, damp to moist (SP)				
		SAND (fmc), some gravel, trace of silt, some irregular stratification, brown to rusty brown and grey, moist. (SP)		A_1		MA (Plate C19) Petrographic
1.0						
1.5						
		End of Test Pit at 1.70 m Permafrost not encountered				
2.0						

Plate B22

HT11 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F. | CKD. N.M. | DATE OF INVEST. Sept 8, 1986 | JOB NO. CG14096 | HOLE NO. TP169-2

DRILL TYPE: Hand Excavation

CASING RESISTANCE (blows/foot (0.3m))

WATER CONTENT% Wp - □ W - ○ W_L - △

10 20 30 40 60 80

DATUM

SURFACE ELEVATION Not determined

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		PEAT and organic soil, sandy, dark brown, moist				
0.5		GRAVEL (fmc) and SAND (fmc), trace to no silt, compact, some irregualr layering, brown, occasional cobbles and boulders (near surface), root fibres to 0.80 m, moist (GP)		A_1		MA(Plate C20)
1.0		SAND (fm) with some gravel (fmc), trace to no silt, loose to compact, brown, moist. (SP)		A_2		
		-- frozen sand (fm), ice bonded, no visible ice (permafrost)				
		End of Test Pit at 1.20 m.				
1.5						
2.0						

Plate B23

HT11 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F. | CKD. N.M. | DATE OF INVEST. Sept. 7, 1986 | JOB NO. CG14096 | HOLE NO. TP184-1

DRILL TYPE: Hand Excavation

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △
10 20 30 40 50 60

DATUM

SURFACE ELEVATION Not determined

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		PEAT and organic soil, silty, dark brown, damp				
		SAND (fm), trace to no silt, trace of gravel (fm), compact to loose, brown, damp to moist (SP)		A_1		
0.5						
		frozen sand (fm), ice bonded, no visible ice, grey (permafrost)				
1.0		End of Test Pit at 0.90 m				
1.5						
2.0						

Plate B24

HT11 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./ D.F.	CKD. N.M.	DATE OF INVEST. Sept. 7, 1986	JOB NO. CG14096	HOLE NO. TP184-2

CASING RESISTANCE blows/foot (0.3m)
WATER CONTENT% Wp - □ W - ○ W_L - △
10 20 30 40 60 80

DRILL TYPE: Hand Excavation

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		DATUM SURFACE ELEVATION Not determined				
		SAND (fmc), with some gravel, little to no silt, loose, brown, many root fibres, damp (SP)		A_1		MA (Plate C21)
0.5						
		SAND (fm), no silt, uniform, loose, brown, occasional gravel particles (fine to medium), damp to moist (SP)		A_2		
1.0						
1.5		frozen sand (fm) grey, ice bonded, no visible ice (permafrost)				
		End of Test Pit at 1.45 m				
2.0						

Plate B25

HT11 - 79/05

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PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./ D.F. | CKD. N.M. | DATE OF INVEST. Sept. 7, 1986 | JOB NO. CG14096 | HOLE NO. TP184-3

DRILL TYPE: Hand Excavation

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △ (10 20 30 40 50 60)

DEPTH m

SOIL SYMBOL

SOIL DESCRIPTION

DATUM

SURFACE ELEVATION Not determined

SOIL SAMPLE: CONDITION | TYPE | PENETRATION RESISTANCE

OTHER TESTS

0.0 m — PEAT, organic material, brown, dry

SAND (fmc), some gravel, trace of silt, loose to compact, stratified - thin gravel layers in sand and gravel, rusty brown to dark brown, root fibres, damp (SP) — A_1 — MA (Plate C22)

0.5

SAND (fmc) with trace of gravel, trace to no silt, loose, brown, damp to moist (SP) — A_2

1.0

---frozen sand (fm), grey-brown, ice bonded, no visible ice, (permafrost)

End of Test Pit at 1.10 m

1.5

2.0

Plate B26

HT11 - 79/05

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PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F. | CKD. N.M. | DATE OF INVEST. Sept 07, 1986 | JOB NO. CG14096 | HOLE NO. TP184-4

DRILL TYPE: Hand Excavation

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △

10 20 30 40 50 60

DATUM

SURFACE ELEVATION Not determined

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		PEAT, organic soil, silty, dark brown, moist				
0.5		SAND (fm) silty and clayey, with some gravel (fmc), firm, low plastic, brown, root fibres, moist (SM)		A_1		
		SAND (fm) trace to no silt, trace of gravel (fmc), loose, brown, moist (SP)		A_2		
1.0		-- frozen sand (fm), ice bonded, no visible ice, (permafrost).				
		End of Test Pit at 1.0 m.				
1.5						
2.0						

Plate B27

HT11 - 79/05

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PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F.	CKD. N.M.	DATE OF INVEST. Sept 8, 1986	JOB NO. CG14096	HOLE NO. TP184-5

DRILL TYPE: Hand Excavation

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △ (10 20 30 40 60 80)

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		DATUM SURFACE ELEVATION Not determined				
		PEAT and organic soil, silty, dark brown, moist				
		SAND (fm), silty, trace of gravel, loose to compact, low to non-plastic, some irregular layering, rusty brown, damp to moist (SM)		A_1		MA (Plate C23)
0.5		SAND (fmc), some gravel, no fines, loose, thin gravel layers, grey, damp to moist (SP)		A_2		
1.0		-- frozen sand (fm), a little gravel, ice-bonded, no visible ice (permafrost).				
		End of Test Pit at 0.95 m.				
1.5						
2.0						

Plate B28

HT11 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN.	CKD.	DATE OF INVEST.	JOB NO.	HOLE NO.
N.M./D.F.	N.M.	Sept 8, 1986	CG14096	TP184-6

CASING RESISTANCE blows/foot (0.3m)
WATER CONTENT% Wp - □ W - ○ W_L - △
10 20 30 40 50 60

DRILL TYPE: Hand Excavation

DATUM

SURFACE ELEVATION: Not determined

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		PEAT and organic soil, silty, dark brown, moist				
		SAND (fmc) and GRAVEL (fmc), trace of silt, compact to dense, brown, occasional cobbles and boulders, occasional clay lumps, moist (GP-SP)				
0.5				A_1		MA (Plate C24) Petrographic Aggregate Tests
		---frozen sand (fm) with trace gravel (f)-ice bonded, no visible ice (permafrost).				
1.0		End of Test Pit at 0.90 m				
1.5						
2.0						

Plate B29

HT11 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F. | CKD. N.M. | DATE OF INVEST. Sept 10, 1986 | JOB NO. CG14096 | HOLE NO. TP184-7

DRILL TYPE: Hand Excavation

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT% Wp - □ W - ○ W_L - △
10 20 30 40 60 80

DEPTH m

SOIL SYMBOL

SOIL DESCRIPTION

DATUM

SURFACE ELEVATION Not determined

SOIL SAMPLE: CONDITION | TYPE | PENETRATION RESISTANCE

OTHER TESTS

DEPTH m	SOIL DESCRIPTION	SOIL SAMPLE TYPE	OTHER TESTS
	PEAT and organic soil, dark brown, moist		
	SAND (fm) and some gravel (fmc), silty, compact, brown, occasional cobbles, roots and root fibres, moist (SP)	A_1	
0.5	SAND (fmc) and GRAVEL (fmc), trace of silt, compact, brown, moist (SP)	A_2	MA (Plate C25)
1.0	---frozen sand (fm) some gravel, ice bonded, no visible ice (permafrost).		
	End of Test Pit at 1.05 m.		
1.5			
2.0			

Plate B3C

HT11 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F. | CKD. N.M. | DATE OF INVEST. Sept 10. 1986 | JOB NO. CG14096 | HOLE NO. TP184-8

DRILL TYPE: Hand Excavation

CASING RESISTANCE blows/foot (0.3m)
WATER CONTENT% Wp - □ W - ○ W_L - △
10 20 30 40 50 60

DATUM
SURFACE ELEVATION Not determined

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		PEAT and organic soil, dark brown, moist				
		SAND (fmc), trace of silt, some gravel (fmc), loose, some irregular layering and lamination, brown to grey brown, some root fibres, moist (SP)		A_1		
0.5						
1.0		SILT(TILL), sandy, frozen, ice bonded, no visible ice, some gravel particles (permafrost).		A_2		
		End of Test Pit at 1.10 m				
1.5						
2.0						

Plate B31

HT11 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F.	CKD. N.M.	DATE OF INVEST. Sept. 11, 1986	JOB NO. CG14096	HOLE NO. TP155-1

WATER CONTENT: W_p - □ W - ○ W_L - △ PERCENT % (10 20 30 40 60 80)

DATUM

SURFACE ELEVATION Not determined

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE
		PEAT, organic material and organic soil, brown, damp			
		SAND (f) with little gravel, silty, loose, rusty brown, root fibres, occasional cobbles and boulders, damp (SP)			
0.5		SAND, fine grained, some silt, non plastic, rusty brown to brown, occasional gravel particles, damp to moist (SP)		A_1	
1.0		frozen fine sand, ice bonded, (permafrost)			
		End of Test Pit at 1.3 m			
1.5					
2.0					

DRILL TYPE: Hand Excavation

OTHER TESTS

Plate B32

HT08 - 79/05

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./ D.F. | CKD. N.M. | DATE OF INVEST. Sept. 11, 1986 | JOB NO. CG14096 | HOLE NO. TP155-2

DRILL TYPE: Hand Excavation

WATER CONTENT — Wp - □ W - ○ W_L - △ — PERCENT % — 10 20 30 40 50 60

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		DATUM SURFACE ELEVATION Not determined				
		PEAT, organic material and organic soil, brown, damp				
		SAND (f), with some gravel silty, loose to compact, brown, occasional cobbles and boulders, damp to moist				
		SAND, fine grained, trace of gravel (fmc), silty, brown, moist (SM)		A_1		MA (Plate C26)
0.5		SAND (fmc), and GRAVEL (fmc), silty, compact, brown, moist to wet (SP)		A_2		MA (Plate C27)
1.0		frozen sand and gravel, silty, ice bonded, no visible ice, (permafrost)				
		End of Test Pit at 0.95 m				
1.5						
2.0						

Plate C33

HT08 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F. | CKD. N.M. | DATE OF INVEST. Sept. 11, 1986 | JOB NO. CG14096 | HOLE NO. TP155-4

DRILL TYPE: Hand Excavation

DATUM

SURFACE ELEVATION Not determined

WATER CONTENT — Wp - □ W - ○ W_L - △ — PERCENT % — 10 20 30 40 50 60

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		PEAT, organic material, brown damp				
		SAND (fmc), silty, clayey, with trace gravel (fmc), well rounded, firm/compact, low plastic, rusty brown, root fibres, moist (SM)		A_1		
0.5		SAND (fmc), some gravel, well rounded, trace to no silt, compact, brown, moist (SP)		A_2		MA (Plate C28)
		frozen sand, ice bonded (permafrost)				
		End of Test Pit at 0.80 m				
1.0						
1.5						
2.0						

Plate B34

HT08 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F.	CKD. N.M.	DATE OF INVEST. Sept. 10, 1986	JOB NO. CG14096	HOLE NO. TP155-5

WATER CONTENT
Wp - □ W - ○ W_L - △
PERCENT %
10 20 30 40 50 60

DEPTH m

SOIL SYMBOL

SOIL DESCRIPTION
DATUM
SURFACE ELEVATION Not determined

SOIL SAMPLE
CONDITION | TYPE | PENETRATION RESISTANCE

DRILL TYPE
Hand Excavation

OTHER TESTS

0.0

GRAVEL (fmc) and SAND (fmc), silty, compact, stratified with thin gravel layers, brown, some cobbles and boulders, dry to damp
(GP)

A_1

MA (Plate C29) Petrographic

Aggregate Tests

0.5

1.0

End of Test Pit at 1.2 m
No permafrost encountered

Note: test pit excavated in an area which had been stripped/worked the previous winter

1.5

2.0

Plate B35

HT08 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F. | CKD. N.M. | DATE OF INVEST. Sept. 11, 1986 | JOB NO. CG14096 | HOLE NO. TP163-1

DRILL TYPE: Hand Excavation

WATER CONTENT (Wp - □ W - ○ W_L - △, PERCENT %, 10 20 30 40 50 60)	DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
			DATUM SURFACE ELEVATION Not determined				
			SAND (fm) with some gravel (fmc), trace of silt, loose to compact, brown, occasional cobbles, damp to moist (SP)				
	0.5						
	1.0				A_1		MA (Plate C30) Petrographic
	1.5		becoming moist to wet				
			End of Test Pit at 1.60 m Permafrost not encountered Note: test pit excavated in an area which had been stripped/ worked the previous winter				
	2.0						

Plate B36

HT08 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F. | CKD. N.M. | DATE OF INVEST. Sept. 11, 1986 | JOB NO. CG14096 | HOLE NO. TP163-2

DRILL TYPE: Hand Excavation

WATER CONTENT
Wp - □ W - ○ W_L - △
PERCENT %
10 20 30 40 50 60

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION (DATUM / SURFACE ELEVATION Not determined)	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		PEAT and organic soil, some silt, dark brown, moist				
		SILT with organics (peat, organic silt), sandy, some clay, firm, low plastic, light brown, occasional gravel(fm), roots, moist (ML)				
0.5		SAND(fm), silty, trace of gravel (fmc), well rounded, loose to compact, brown, moist to wet (SM)		A_1		MA(Plate C31)
		-- frozen sand with trace gravel, ice bonded, some visible ice crystals (permafrost)				
1.0		End of Test Pit at 0.75 m				
1.5						
2.0						

Plate B37

HT08 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN.	CKD.	DATE OF INVEST.	JOB NO.	HOLE NO.
N.M./D.F.	N.M.	Sept. 11, 1986	CG14096	TP163-3

WATER CONTENT
Wp - □ W - ○ W_L - △
PERCENT %
10 20 30 40 60 80

DRILL TYPE: Hand Excavation

DATUM

SURFACE ELEVATION: Not determined

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		PEAT, organic material, roots, dry to damp				
		SAND (fm), trace of gravel (fmc) well rounded, trace to no silt, loose, some layering, rusty brown to brown, root fibres, moist (SP)				
0.5				A_1		MA (Plate C32)
		--thin gravel layer (0.10m)				
1.0		--frozen sand (fm), ice bonded, (permafrost)				
		End of Test Pit at 1.15 m				
1.5						
2.0						

Plate B38

HT08 - 79/05

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BOREHOLE LOG

PROJECT COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

LOGGED/DWN. N.M./D.F.	CKD. N.M.	DATE OF INVEST. Sept. 11, 1986	JOB NO. CG14096	HOLE NO. TP163-4

DRILL TYPE: Hand Excavation

WATER CONTENT — Wp - □ W - ○ W_L - △ — PERCENT % — 10 20 30 40 50 60

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	SOIL SAMPLE: TYPE	SOIL SAMPLE: PENETRATION RESISTANCE	OTHER TESTS
		DATUM SURFACE ELEVATION Not determined				
		SAND (fm) with some gravel (fmc), well rounded, trace to no silt, loose to compact, occasional cobbles, moist (SP)				
0.5						
1.0		--becoming wet				
		SILT, some fine sand, compact, non-plastic, grey, wet (ML) (ML)				
1.5		End of Test Pit at 1.60 m Permafrost not encountered Note: test pit excavated in an area which had been stripped/ worked the previous winter				
2.0						

Plate B39

HT08 - 79/05

APPENDIX "C"

Laboratory Test Results

Grain Size Curves

Petrographic Analyses

Aggregate Tests

HARDY ASSOCIATES (1978) LTD.
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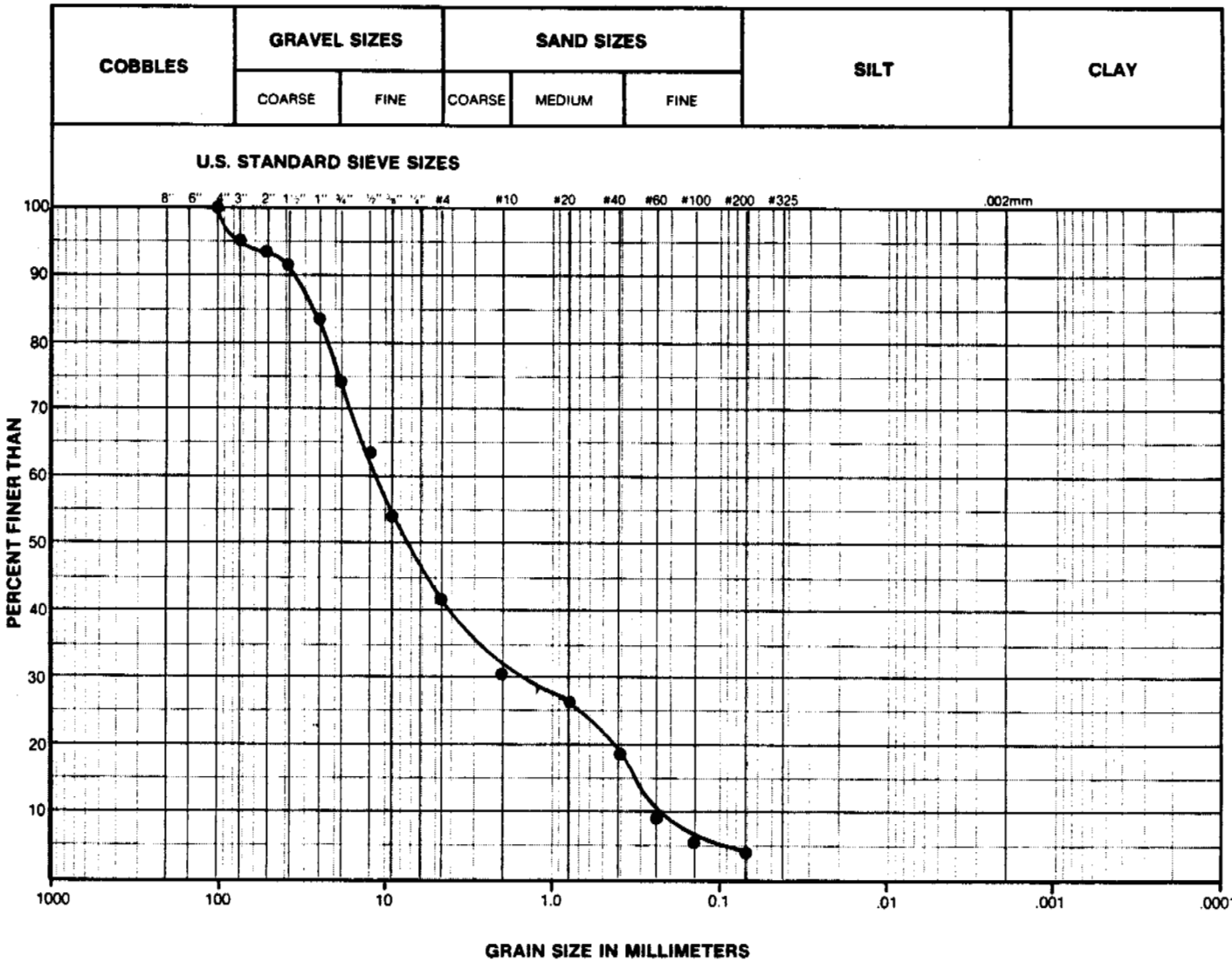
GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP181-1	SAMPLE: A1
DEPTH:	0.3 - 0.9 m
TECHNICIAN: L.R.	DATE: 01/10/86



REMARKS: GP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

D_{10} =	mm	GRAVEL 59	%
D_{30} =	mm	SAND 37	%
D_{60} =	mm	SILT 4	%
C_U =	mm	CLAY	%
C_C =	mm		

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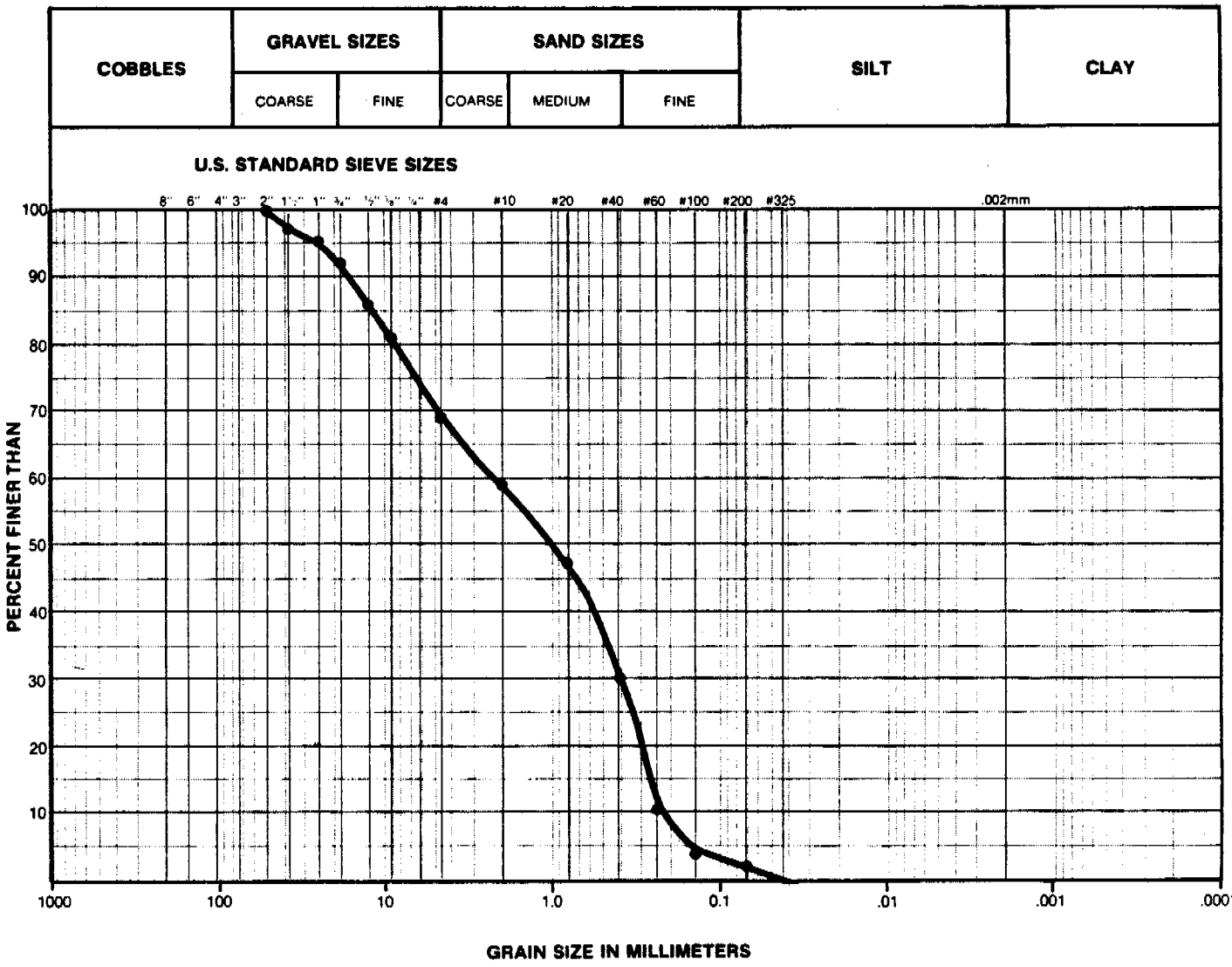
GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP181-3	SAMPLE: A2
DEPTH:	0.5 - 1.2 m
TECHNICIAN: L.R.	DATE: 03/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

D_{10} =	mm	GRAVEL	31 %
D_{30} =	mm	SAND	66 %
D_{60} =	mm	SILT	3 %
C_U =	mm	CLAY	%
C_C =	mm		

Plate C2

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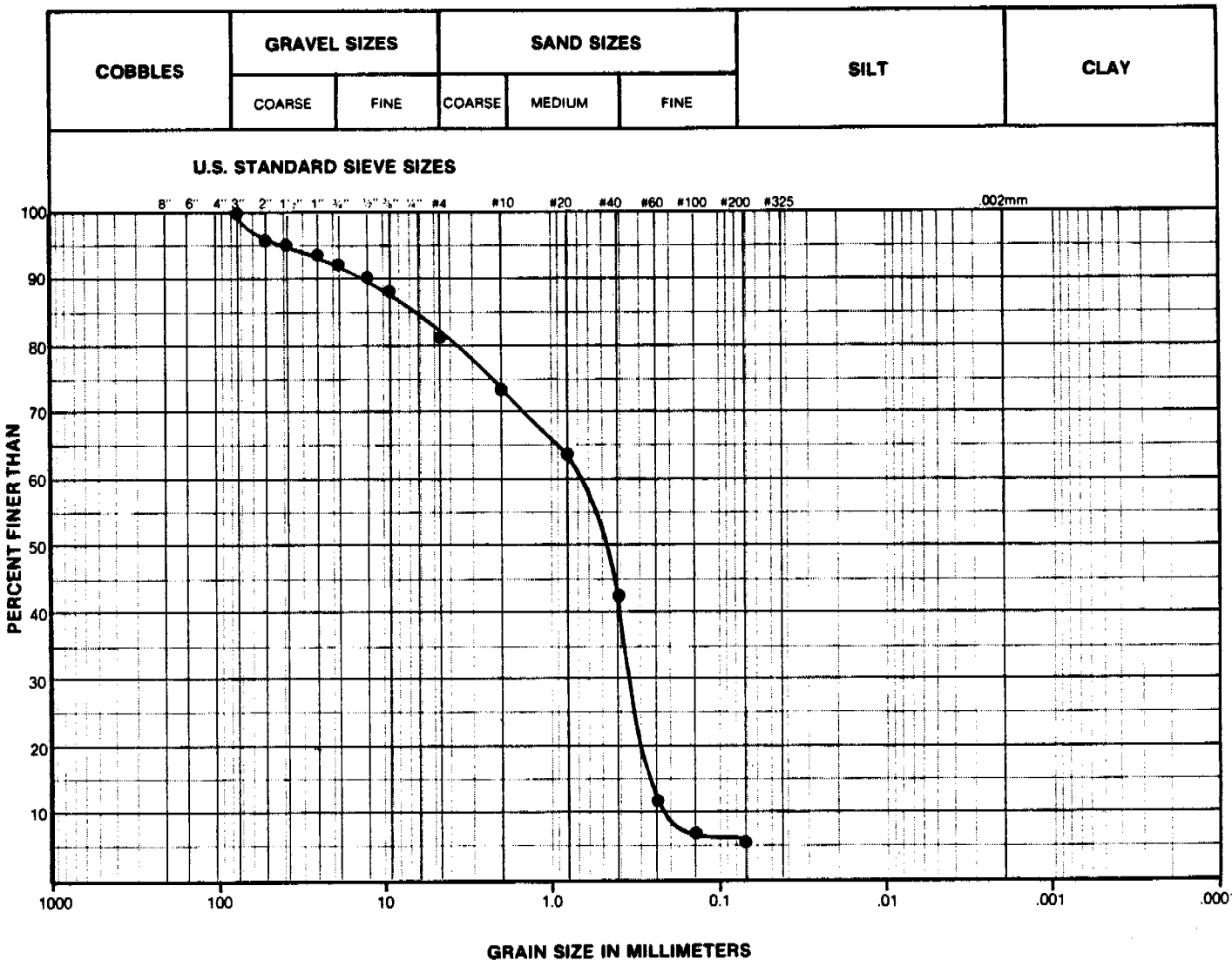
GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP181-4	SAMPLE: A1
DEPTH:	0.2 - 0.7 m
TECHNICIAN: L.R.	DATE: 01/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

D_{10} =	mm	GRAVEL 19	%
D_{30} =	mm	SAND 76	%
D_{60} =	mm	SILT 5	%
C_U =	mm	CLAY	%
C_C =	mm		

Plate C3

HARDY ASSOCIATES (1978) LTD.
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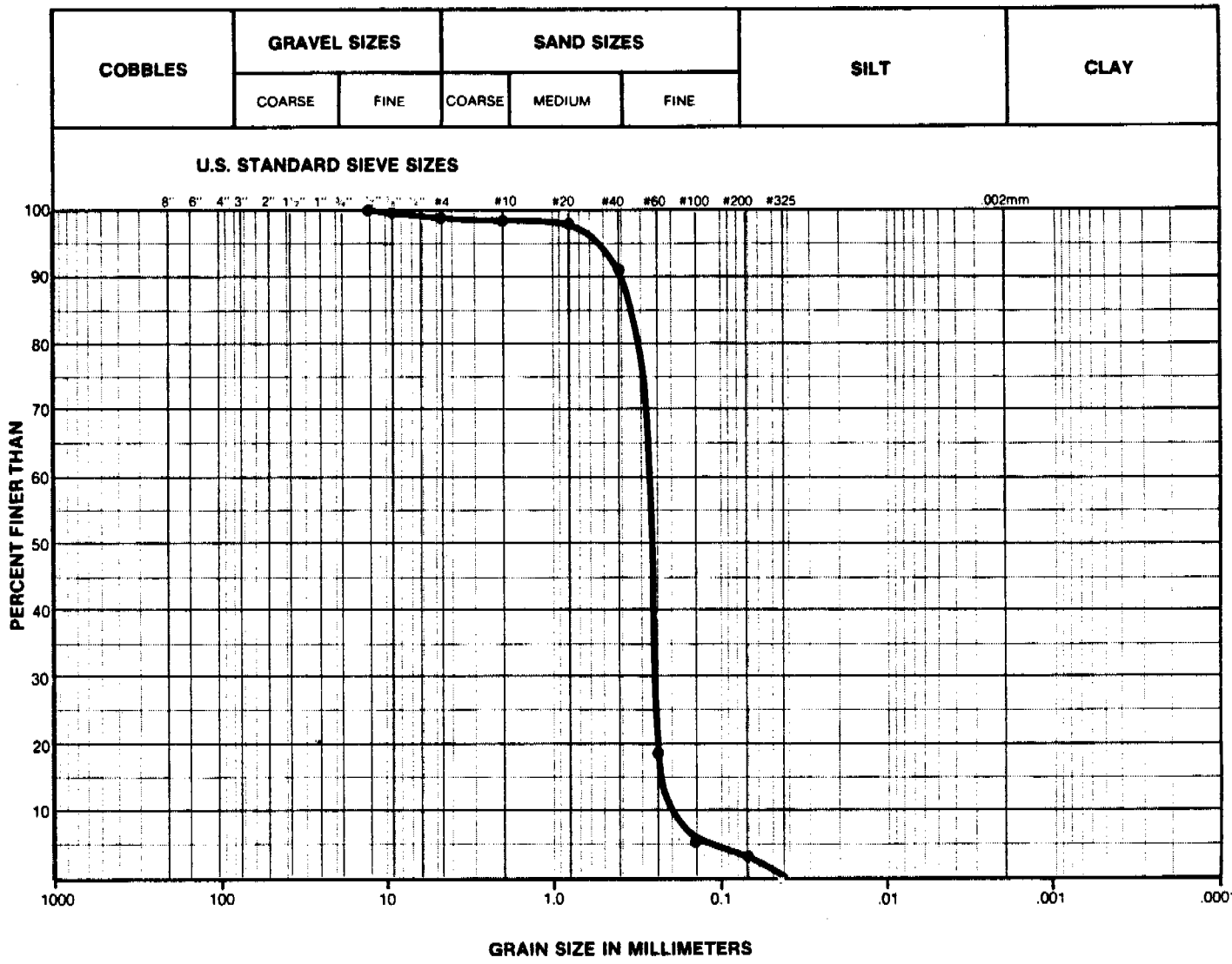
GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP181-4	SAMPLE: A2
DEPTH:	0.7 - 0.9 m
TECHNICIAN: L.R.	DATE: 02/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

D_{10} =	mm	GRAVEL	1 %
D_{30} =	mm	SAND	95 %
D_{60} =	mm	SILT	4 %
C_U =	mm	CLAY	%
C_C =	mm		

Plate C4

HARDY ASSOCIATES (1978) LTD.
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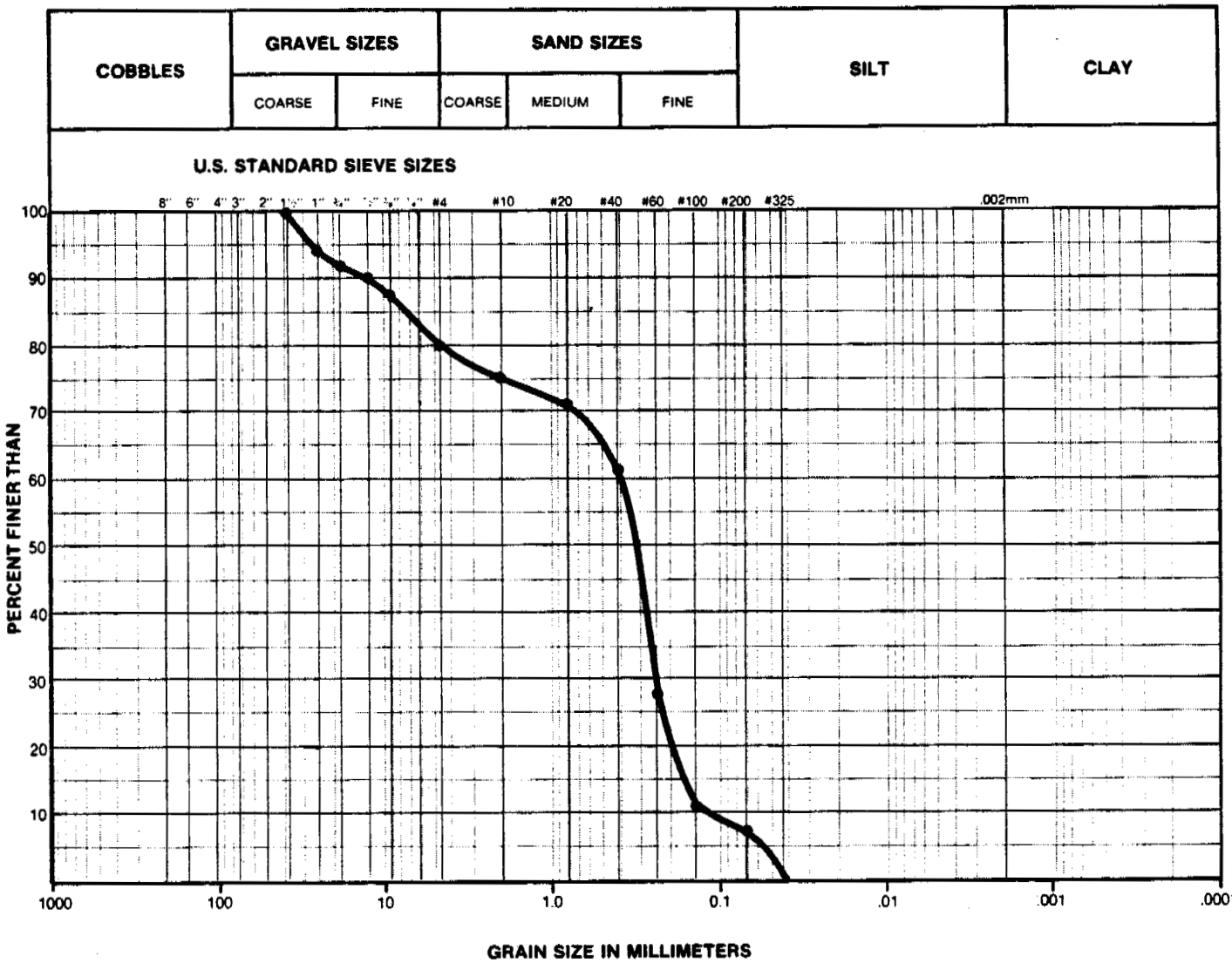
GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE:	TP181-5 SAMPLE: A1
DEPTH:	0.3 - 1.0 m
TECHNICIAN:	L.R. DATE: 01/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

D_{10} =	mm	GRAVEL	20 %
D_{30} =	mm	SAND	73 %
D_{60} =	mm	SILT	7 %
C_U =	mm	CLAY	%
C_C =	mm		

HARDY ASSOCIATES (1978) LTD.
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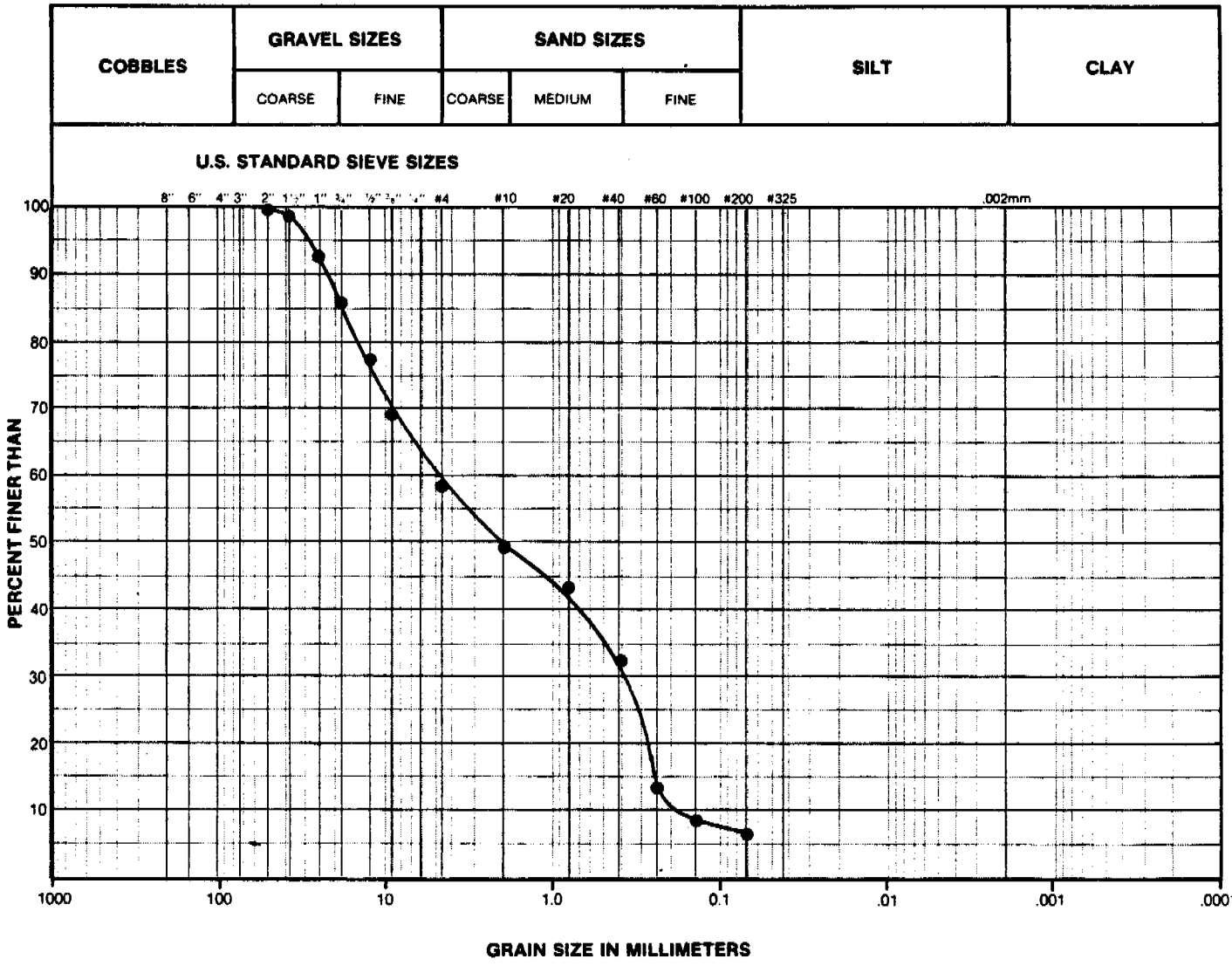
GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP181-6	SAMPLE: A1
DEPTH:	0.4 - 1.0 m
TECHNICIAN: L.R.	DATE: 01/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

D_{10} =	mm	GRAVEL	42 %
D_{30} =	mm	SAND	52 %
D_{60} =	mm	SILT	6 %
C_U =	mm	CLAY	%
C_C =	mm		

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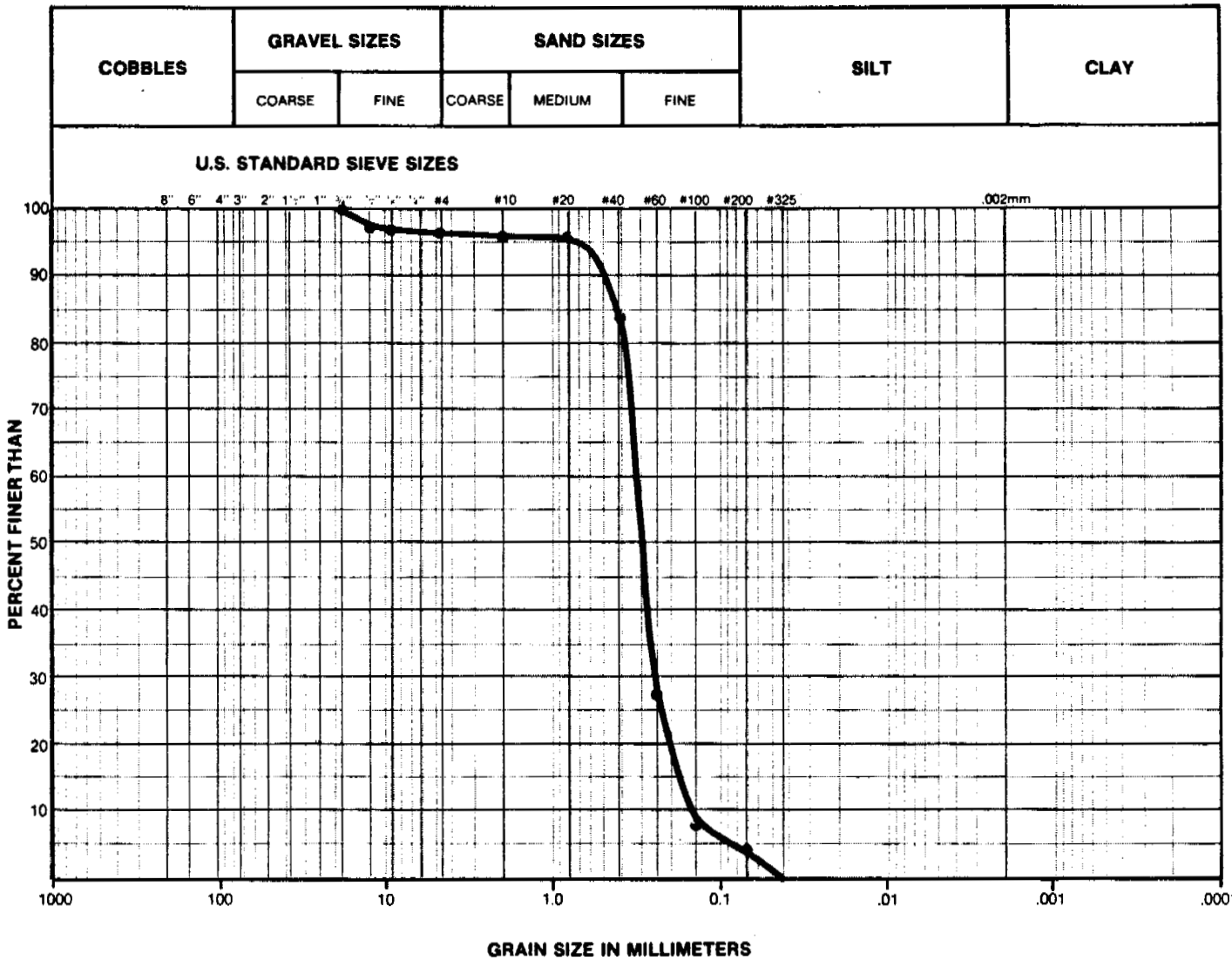
GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP181-7	SAMPLE: A1
DEPTH:	0.4 - 0.6 m
TECHNICIAN: L.R.	DATE: 03/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

D_{10} =	mm	GRAVEL	3 %
D_{30} =	mm	SAND	93 %
D_{60} =	mm	SILT	4 %
C_U =	mm	CLAY	%
C_C =	mm		

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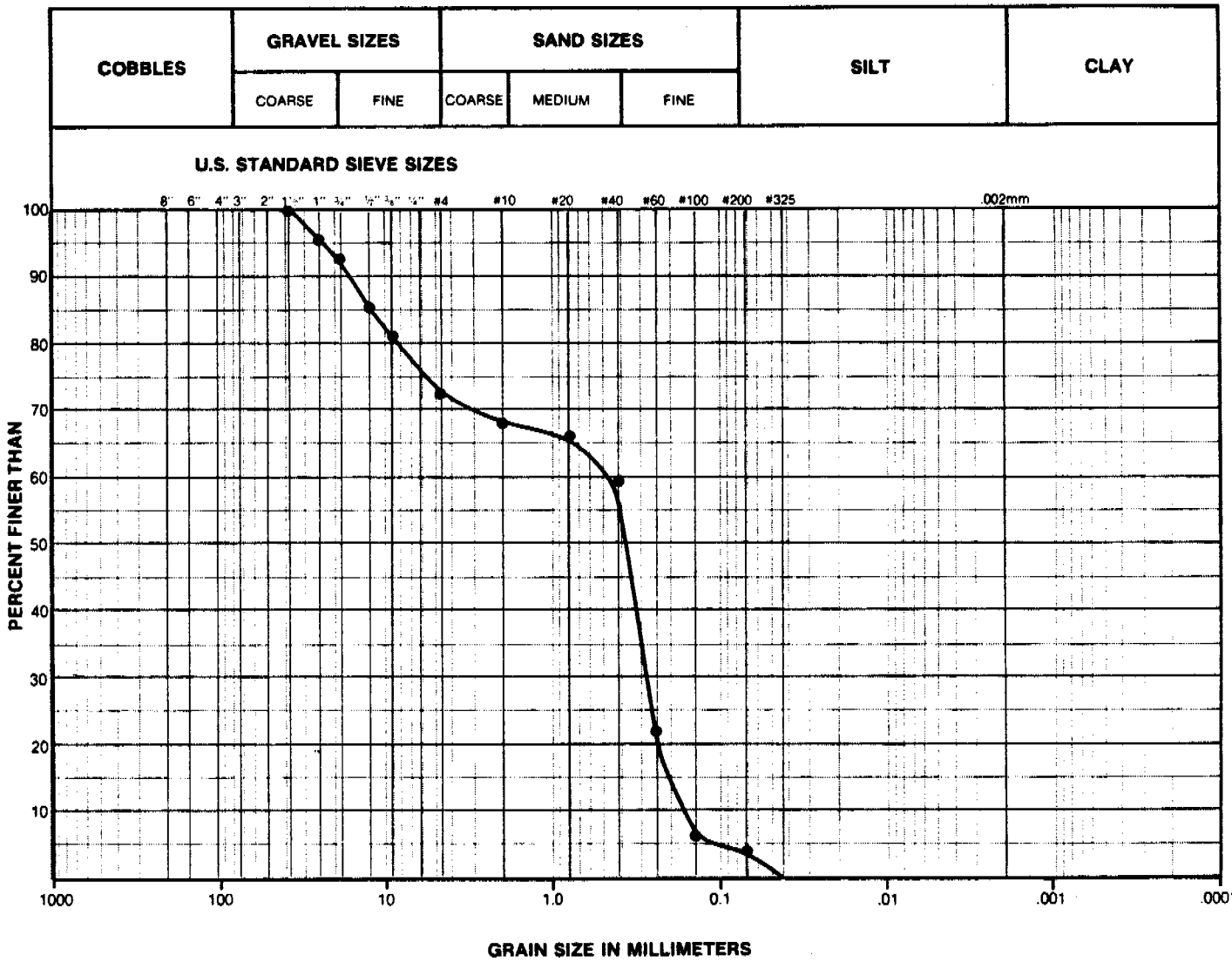
GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP181-11	SAMPLE: A1
DEPTH:	0.3 - 0.9 m
TECHNICIAN: L.R.	DATE: 15/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

D_{10} =	mm	GRAVEL 27	%
D_{30} =	mm	SAND 69	%
D_{60} =	mm	SILT 4	%
C_U =	mm	CLAY	%
C_C =	mm		

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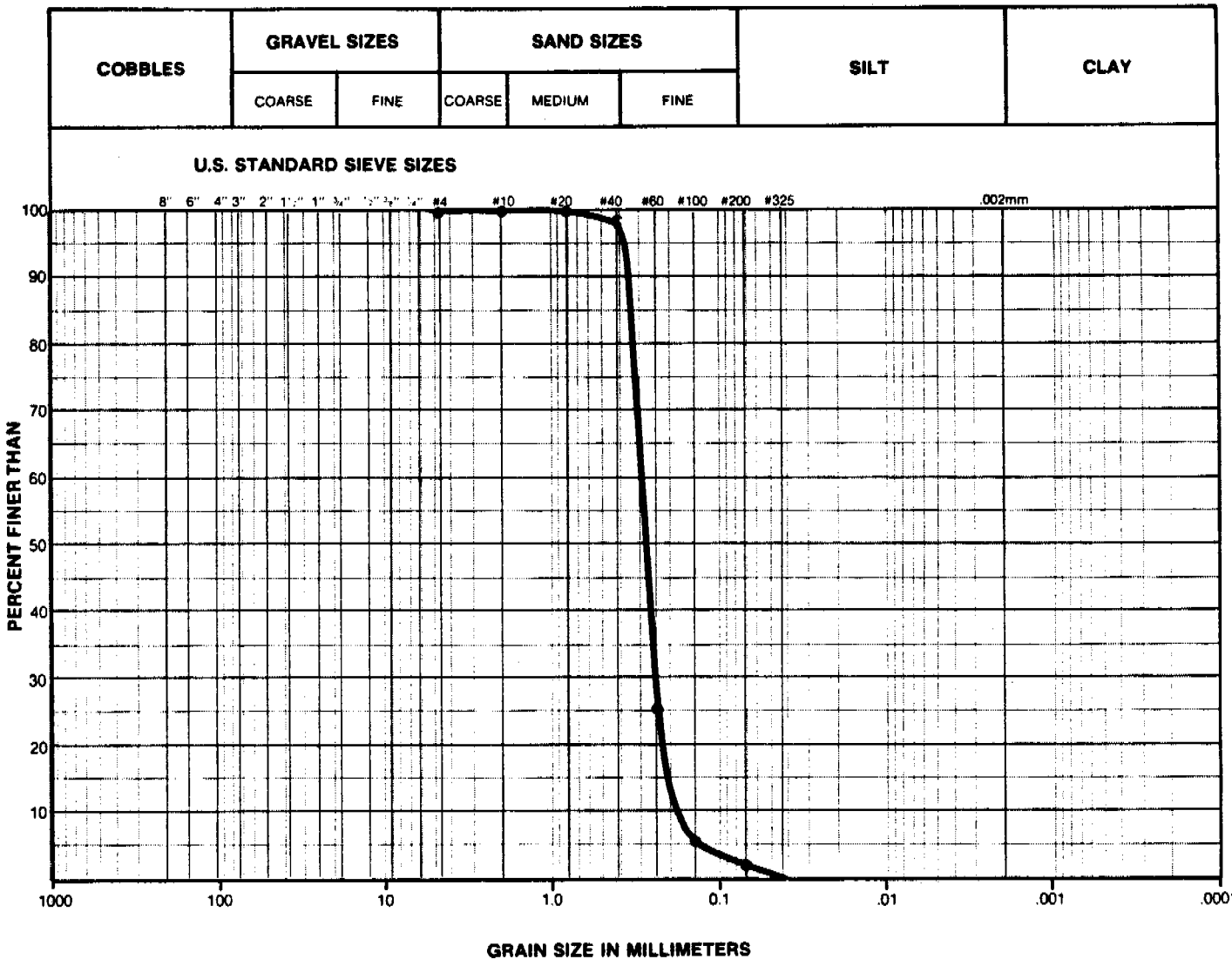
GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP181-11	SAMPLE: A2
DEPTH:	0.9 - 1.0 m
TECHNICIAN: L.R.	DATE: 03/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

D_{10} =	mm	GRAVEL	%
D_{30} =	mm	SAND 98	%
D_{60} =	mm	SILT 2	%
C_U =	mm	CLAY	%
C_C =	mm		

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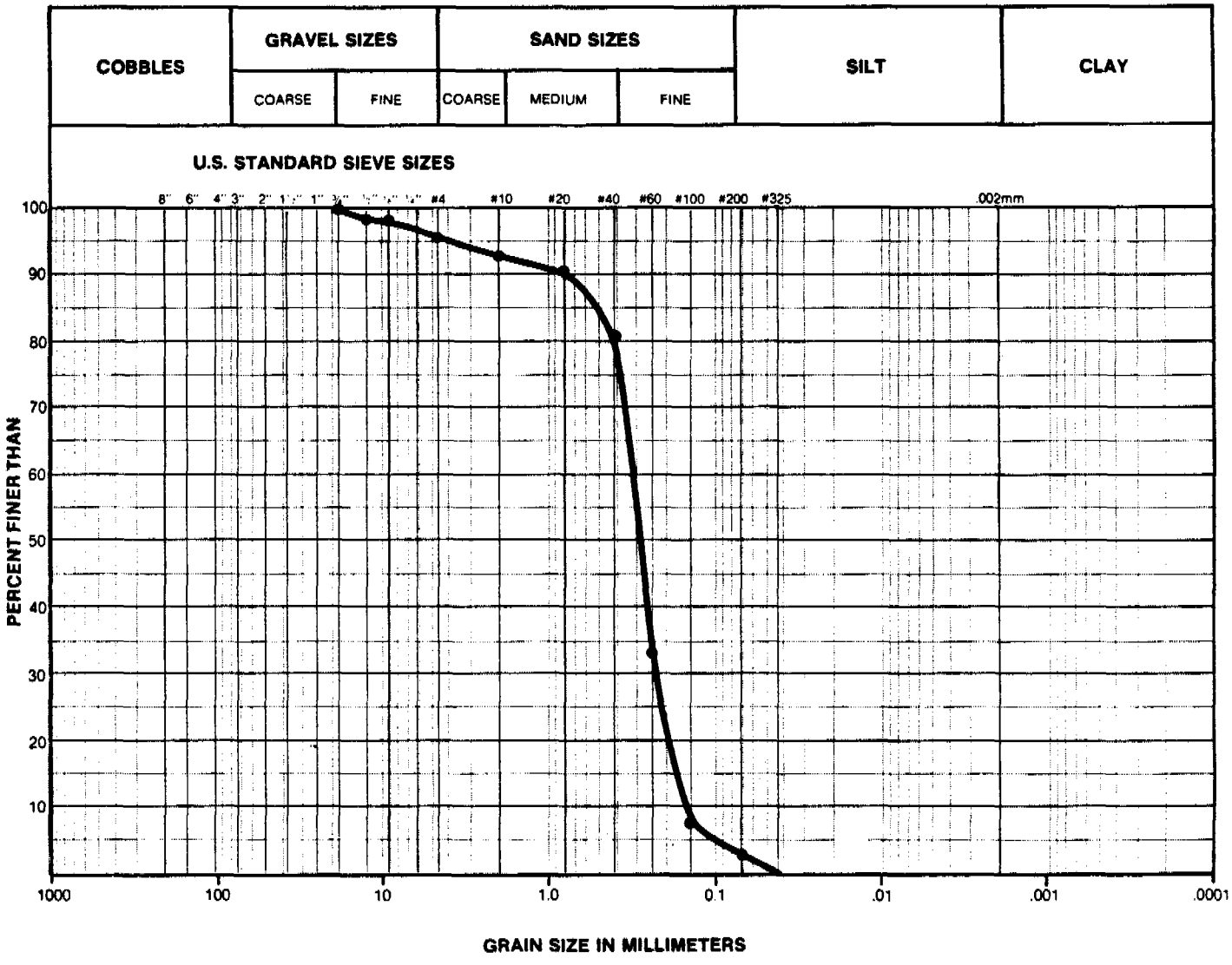
GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP181-12	SAMPLE: A1
DEPTH:	0.2 - 0.8 m
TECHNICIAN: L.R.	DATE: 02/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

D_{10} =	mm	GRAVEL 5	%
D_{30} =	mm	SAND 92	%
D_{60} =	mm	SILT 3	%
C_U =	mm	CLAY	%
C_C =	mm		

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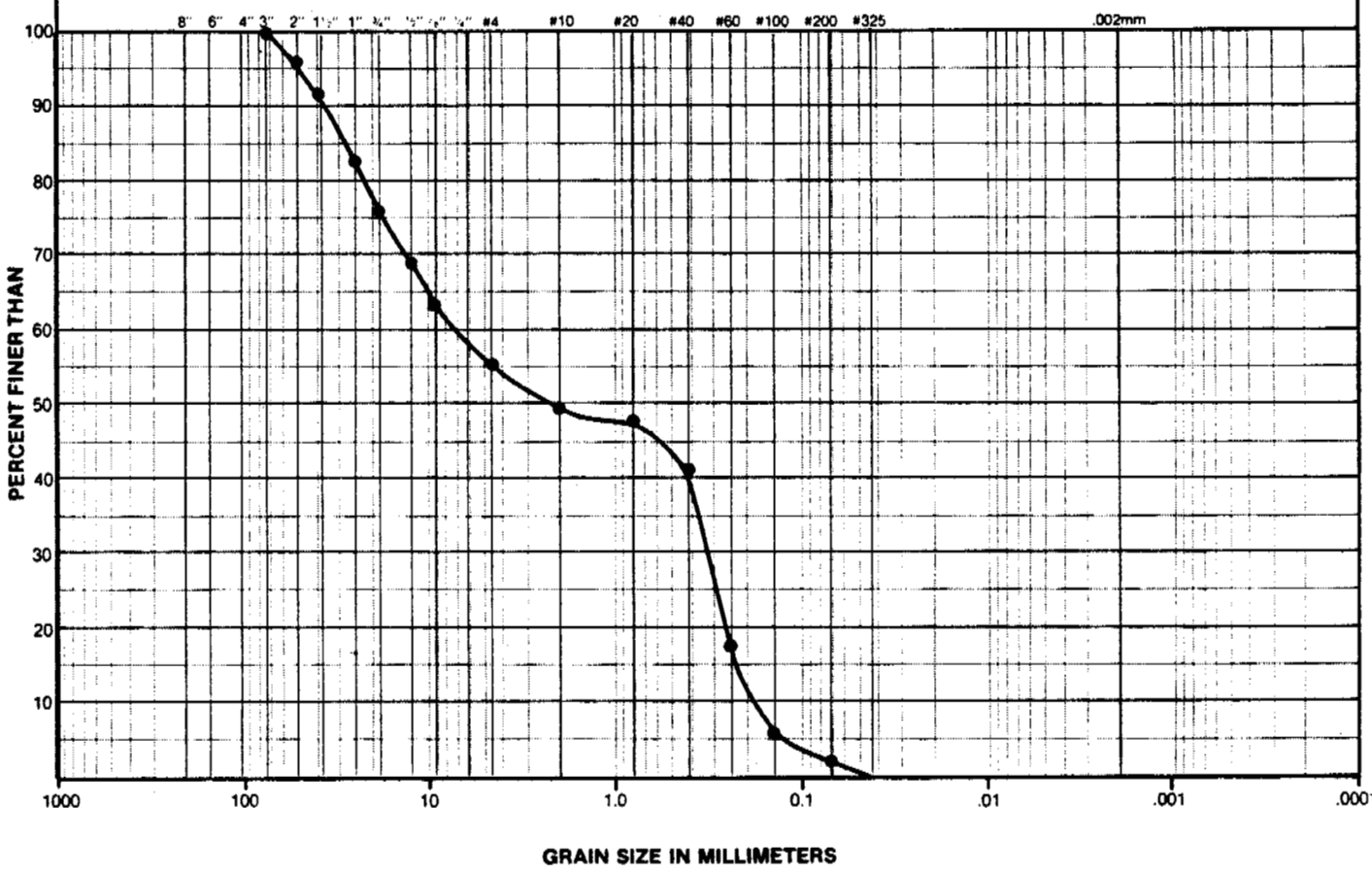
GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE:	TP181-13 SAMPLE: A1
DEPTH:	0.3 - 0.7 m
TECHNICIAN:	L.R. DATE: 09/10/86

COBBLES	GRAVEL SIZES		SAND SIZES			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

D_{10} =	mm	GRAVEL	45 %
D_{30} =	mm	SAND	52 %
D_{60} =	mm	SILT	3 %
C_U =	mm	CLAY	%
C_C =	mm		

Plate C11

HARDY ASSOCIATES (1978) LTD.
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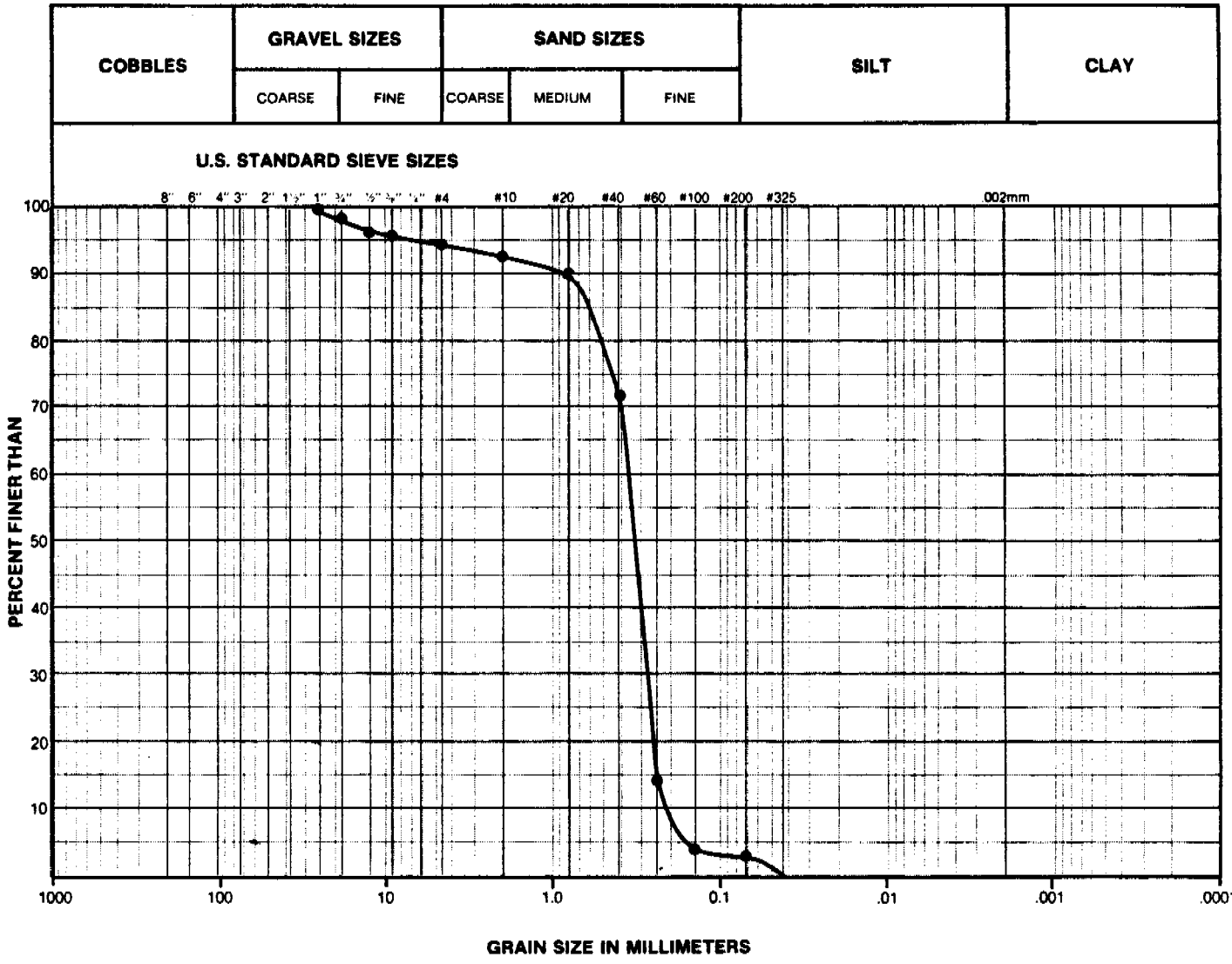
GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP181-14	SAMPLE: A1
DEPTH:	0.3 - 1.0 m
TECHNICIAN: L.R.	DATE: 02/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

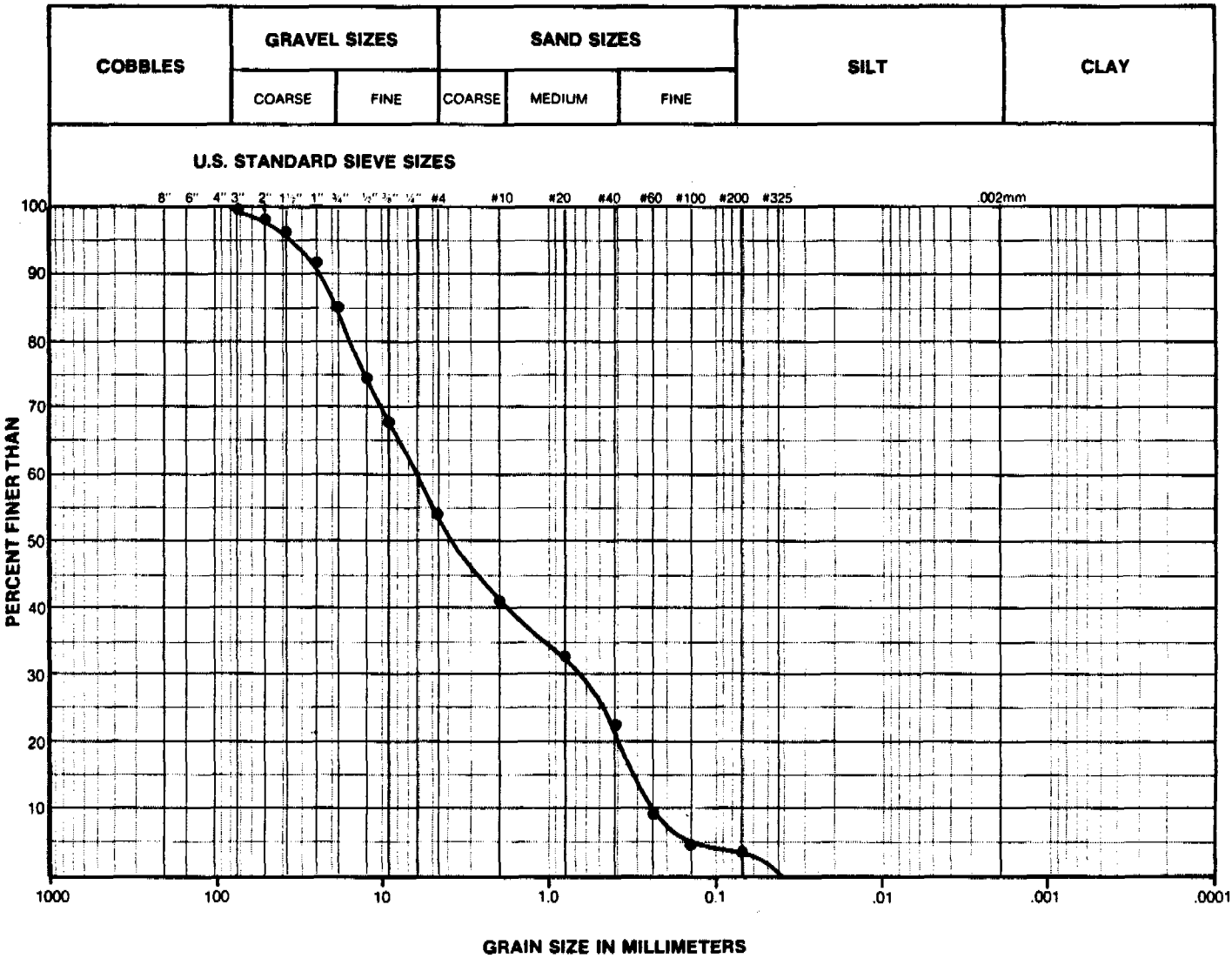
D_{10} =	mm	GRAVEL 5	%
D_{30} =	mm	SAND 92	%
D_{60} =	mm	SILT 3	%
C_U =	mm	CLAY	%
C_C =	mm		

Plate C12

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP181-16A	SAMPLE: A2
DEPTH:	0.5 - 0.1 m
TECHNICIAN: L.R.	DATE: 15/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

D_{10} =	mm	GRAVEL 46	%
D_{30} =	mm	SAND 50	%
D_{60} =	mm	SILT 4	%
C_U =	mm	CLAY	%
C_C =	mm		

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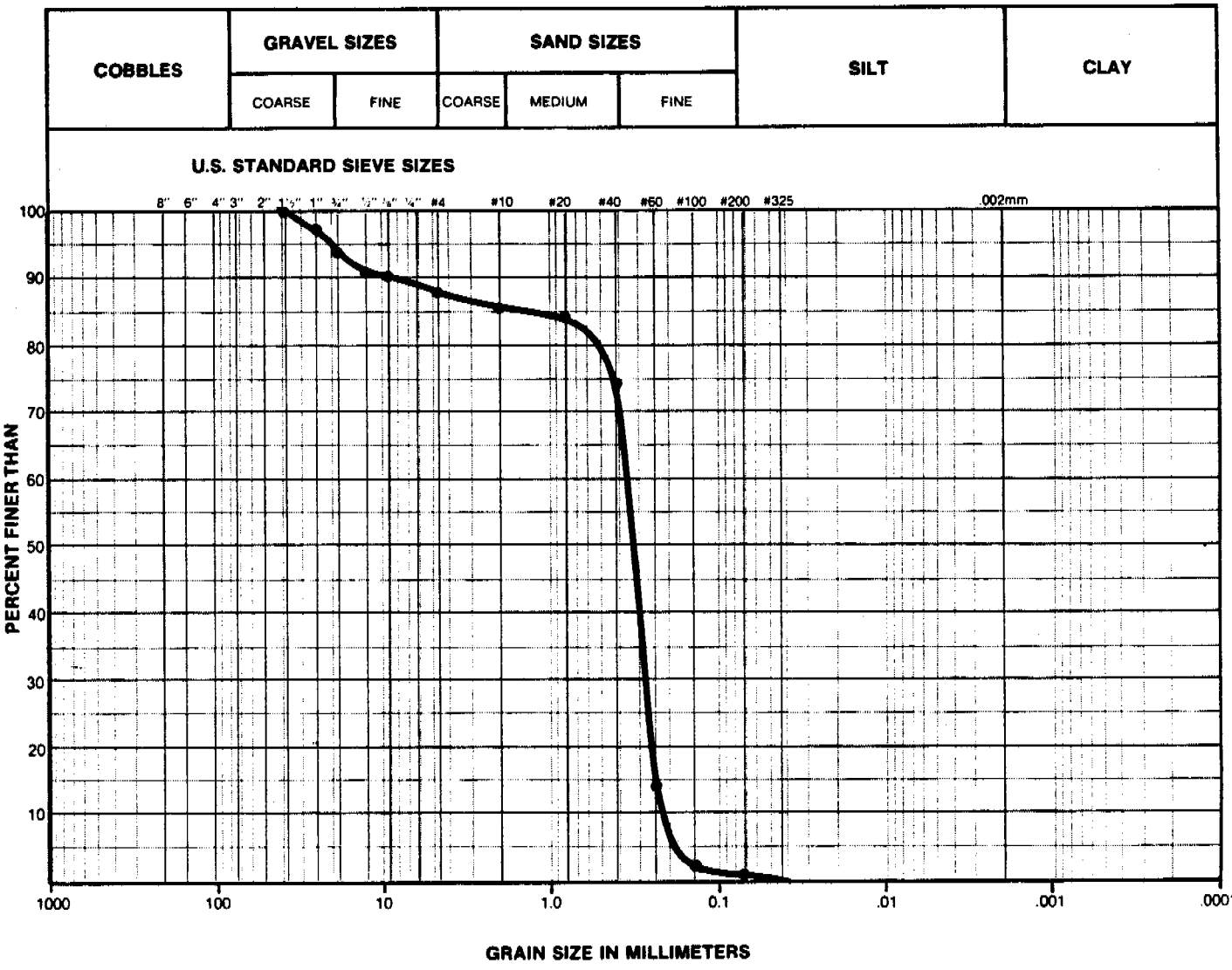
GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP183-1	SAMPLE: A2
DEPTH:	0.5 - 0.8 m
TECHNICIAN: L.R.	DATE: 03/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

D_{10} =	mm	GRAVEL 12	%
D_{30} =	mm	SAND 87	%
D_{60} =	mm	SILT 1	%
C_U =	mm	CLAY	%
C_C =	mm		

Plate C14

HARDY ASSOCIATES (1978) LTD.
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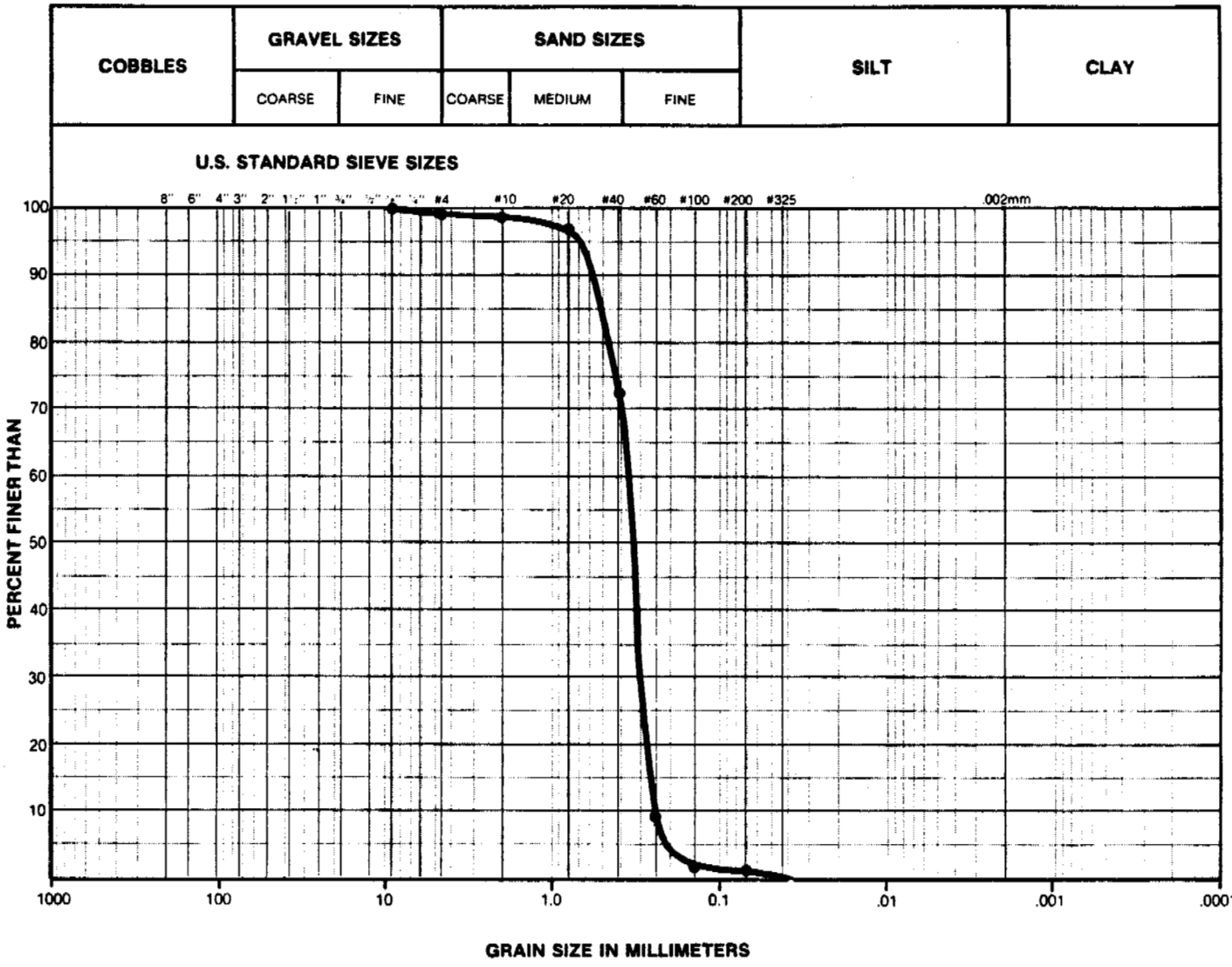
GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP183-2	SAMPLE: A2
DEPTH:	0.7 - 0.9 m
TECHNICIAN: L.R.	DATE: 03/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

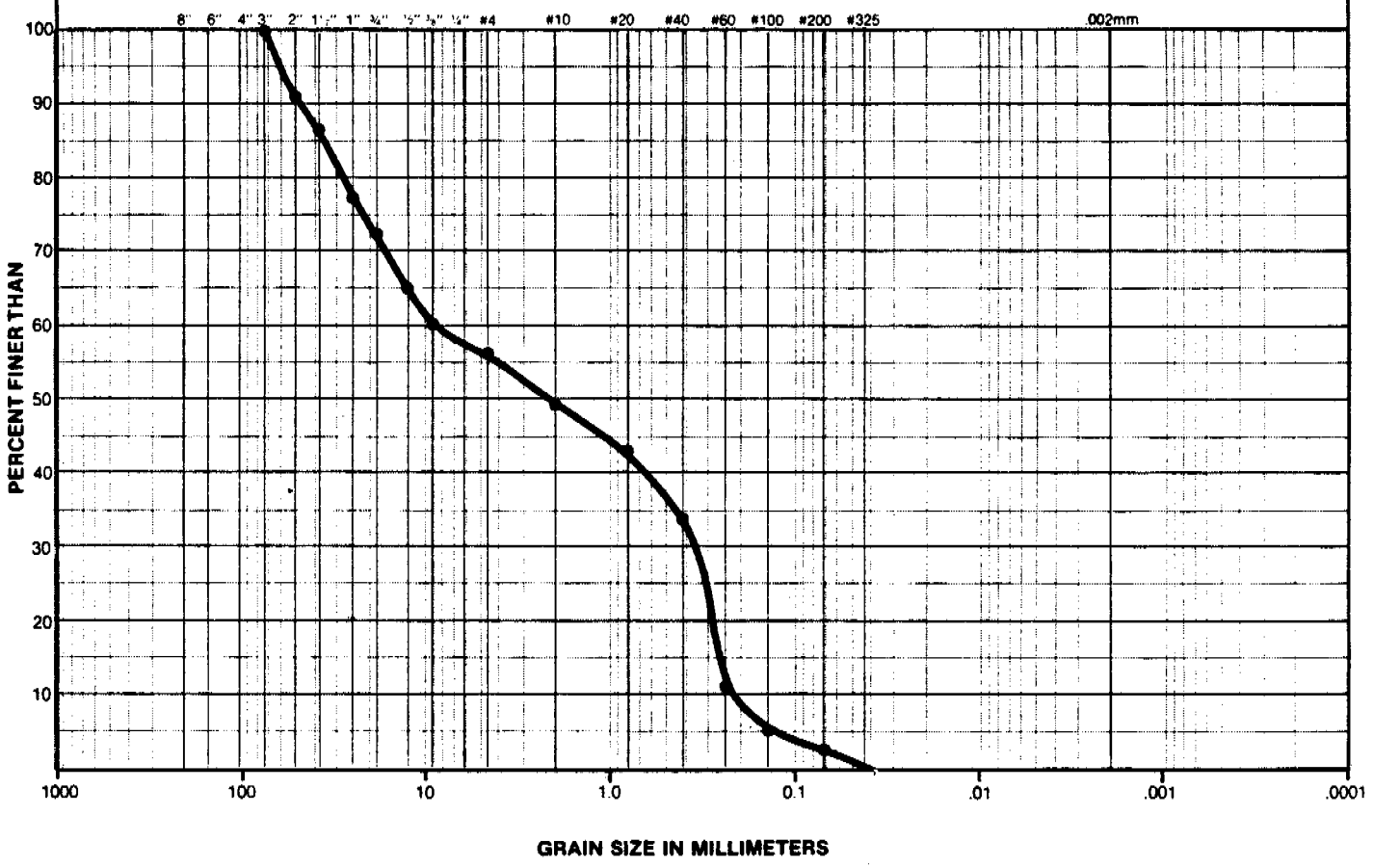
D_{10} =	mm	GRAVEL	1 %
D_{30} =	mm	SAND	97 %
D_{60} =	mm	SILT	2 %
C_U =	mm	CLAY	%
C_C =	mm		

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE:	TP183-5 SAMPLE: A1
DEPTH:	0.1 - 0.5 m
TECHNICIAN:	L.R. DATE: 01/10/86

COBBLES	GRAVEL SIZES		SAND SIZES			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

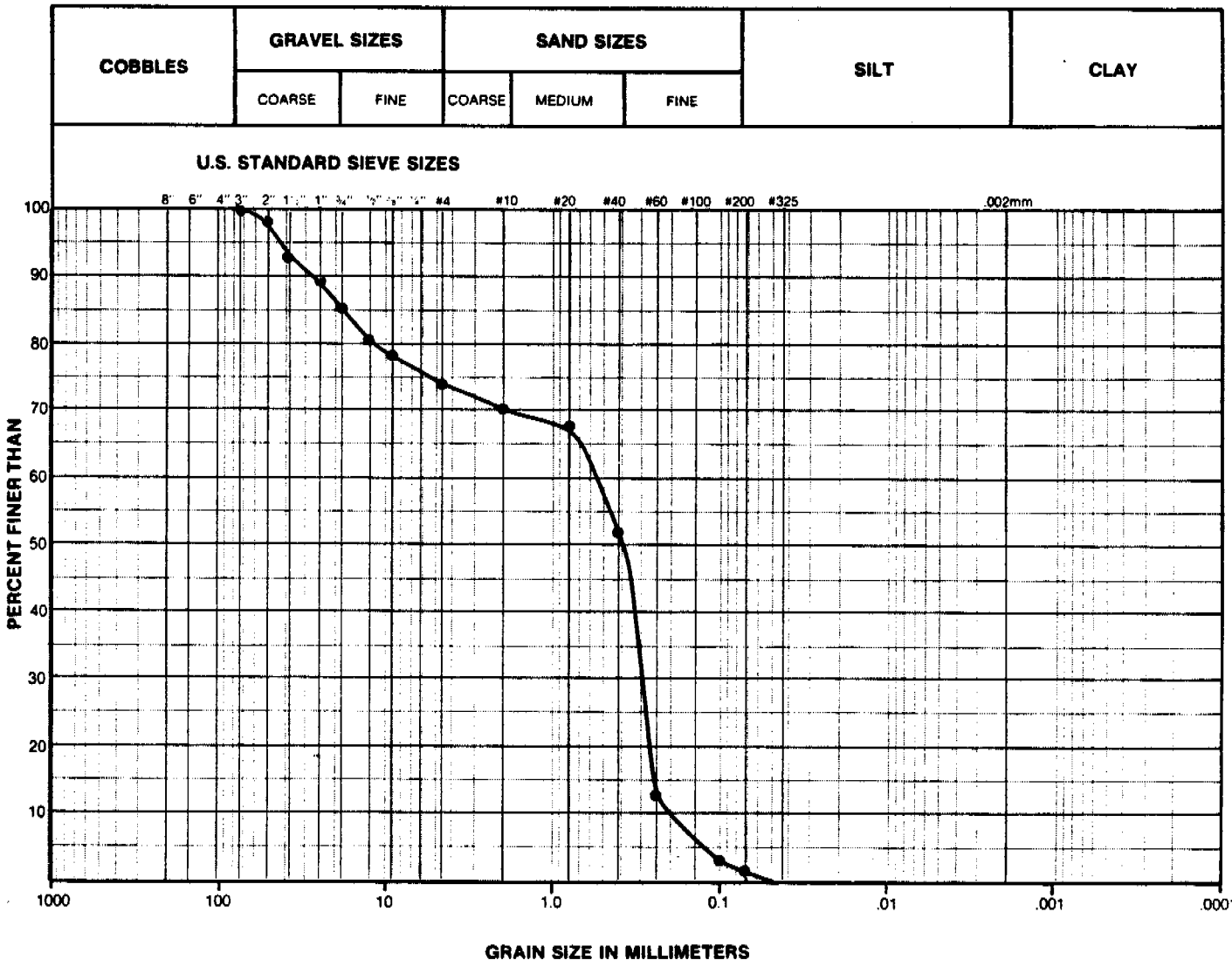
D_{10} =	mm	GRAVEL	43 %
D_{30} =	mm	SAND	53 %
D_{60} =	mm	SILT	4 %
C_U =	mm	CLAY	%
C_C =	mm		

Plate C16

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP183-5	SAMPLE: A2
DEPTH:	0.7 - 1.1 m
TECHNICIAN: L.R.	DATE: 09/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

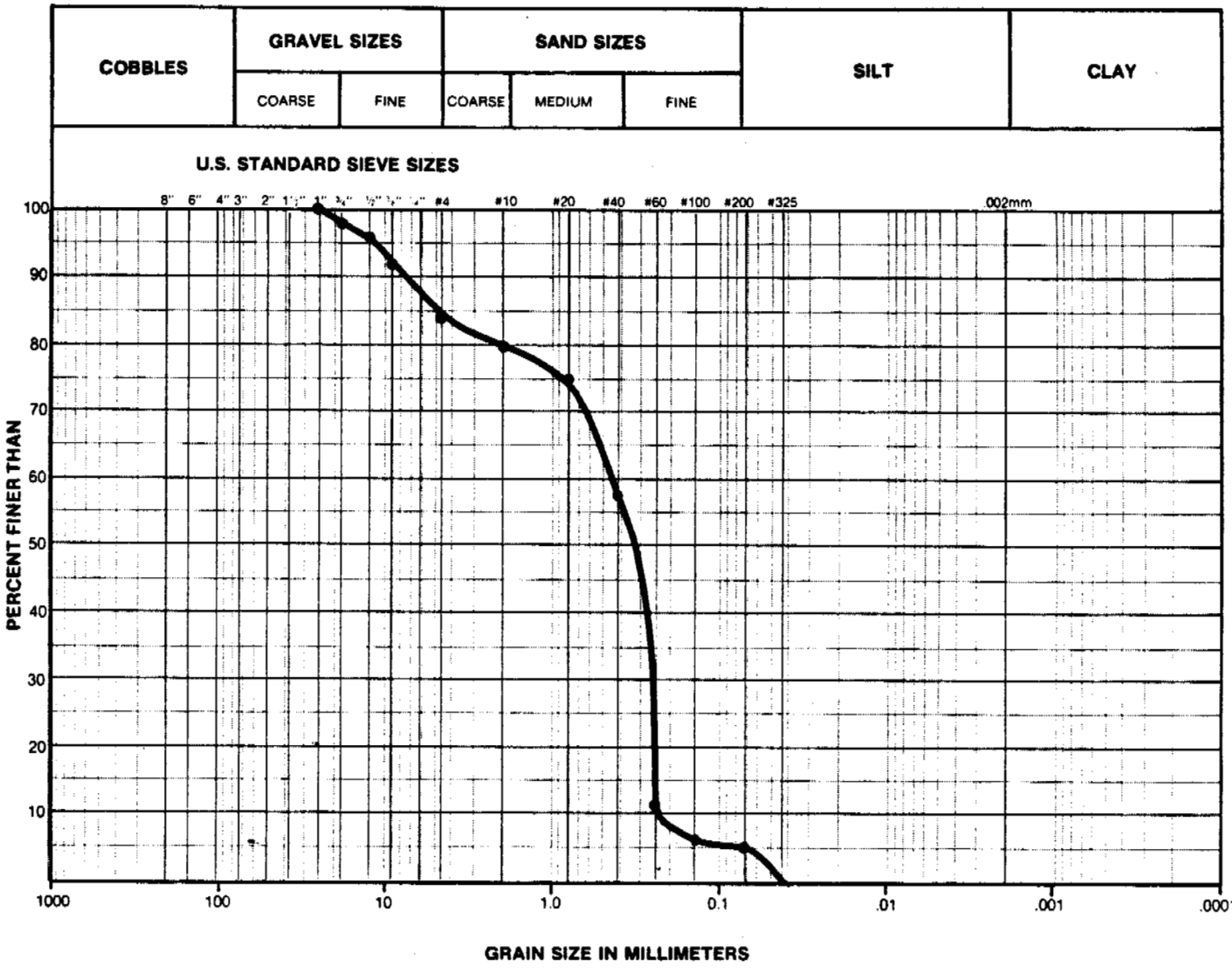
SUMMARY

D_{10} =	mm	GRAVEL	26 %
D_{30} =	mm	SAND	72 %
D_{60} =	mm	SILT	2 %
C_U =	mm	CLAY	%
C_C =	mm		

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP183-6	SAMPLE: A1
DEPTH:	0.2 - 0.8 m
TECHNICIAN: L.R.	DATE: 01/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

D_{10} =	mm	GRAVEL 16	%
D_{30} =	mm	SAND 79	%
D_{60} =	mm	SILT 5	%
C_U =	mm	CLAY	%
C_C =	mm		

HARDY ASSOCIATES (1978) LTD.
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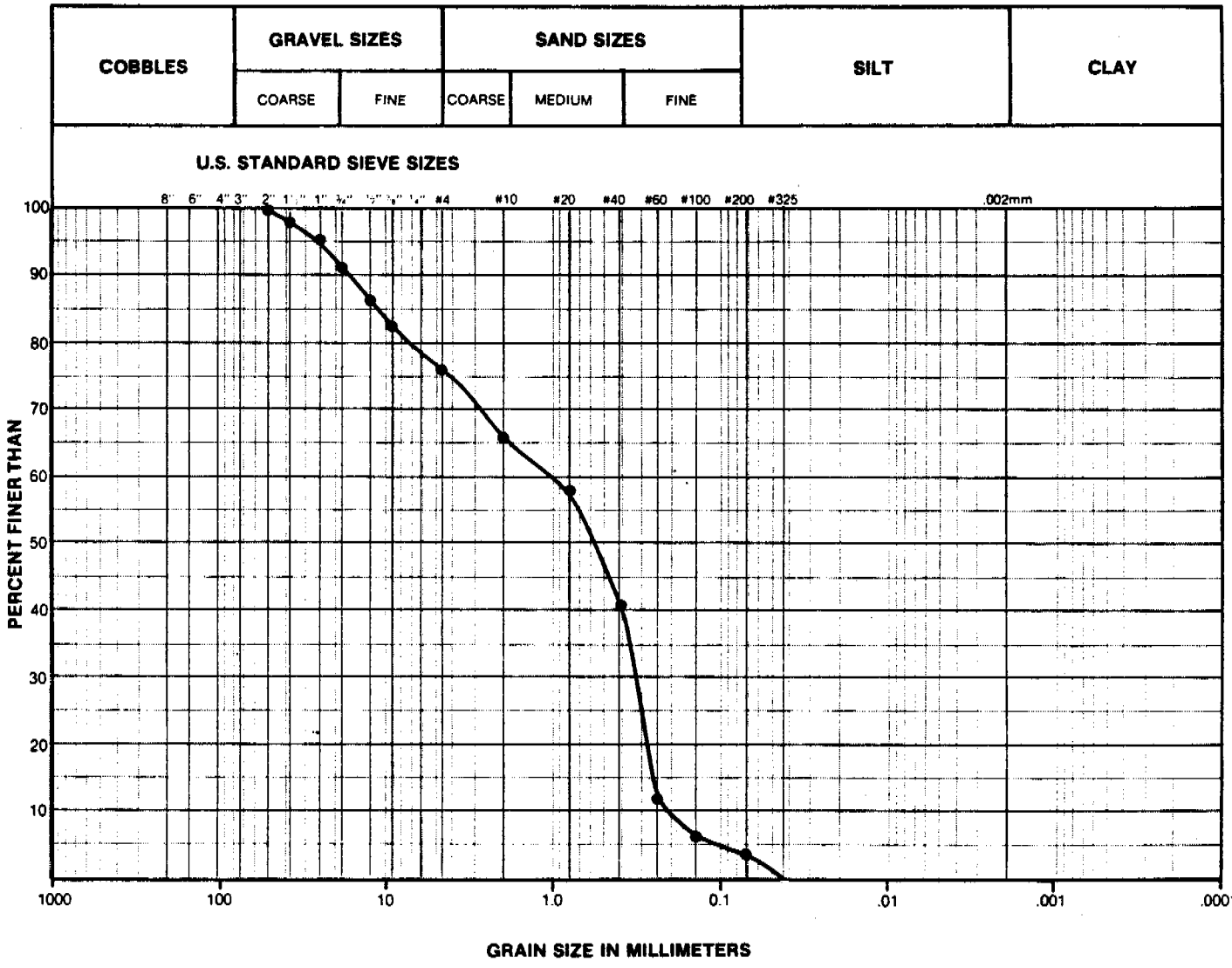
GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP169-1	SAMPLE: A1
DEPTH:	0.6 - 1.2 m
TECHNICIAN: L.R.	DATE: 15/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

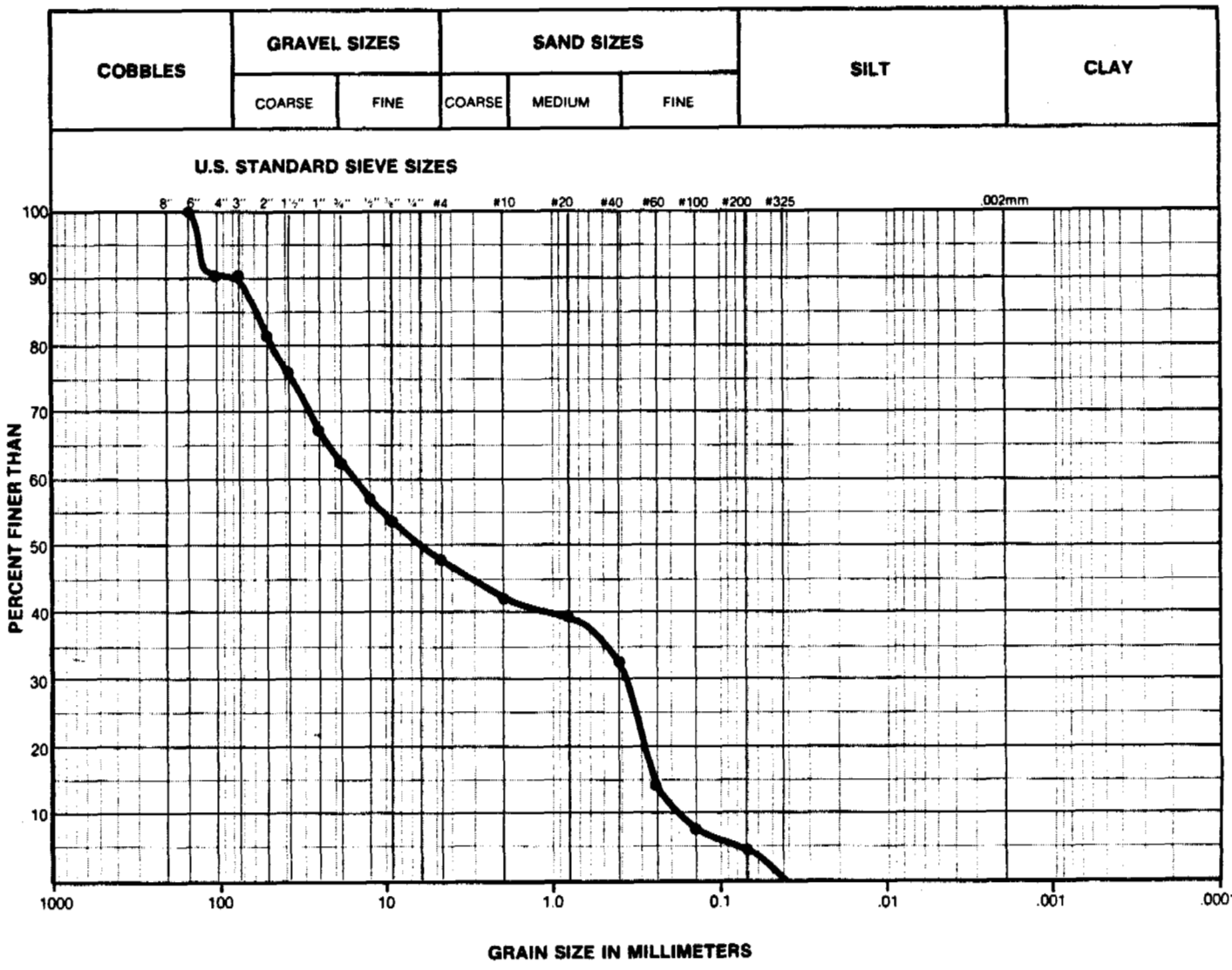
SUMMARY

D_{10} =	mm	GRAVEL 24	%
D_{30} =	mm	SAND 72	%
D_{60} =	mm	SILT 4	%
C_U =	mm	CLAY	%
C_C =	mm		

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP169-2	SAMPLE: A1
DEPTH:	0.2 - 0.7 m
TECHNICIAN: L.R.	DATE: 01/10/86



REMARKS: GP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

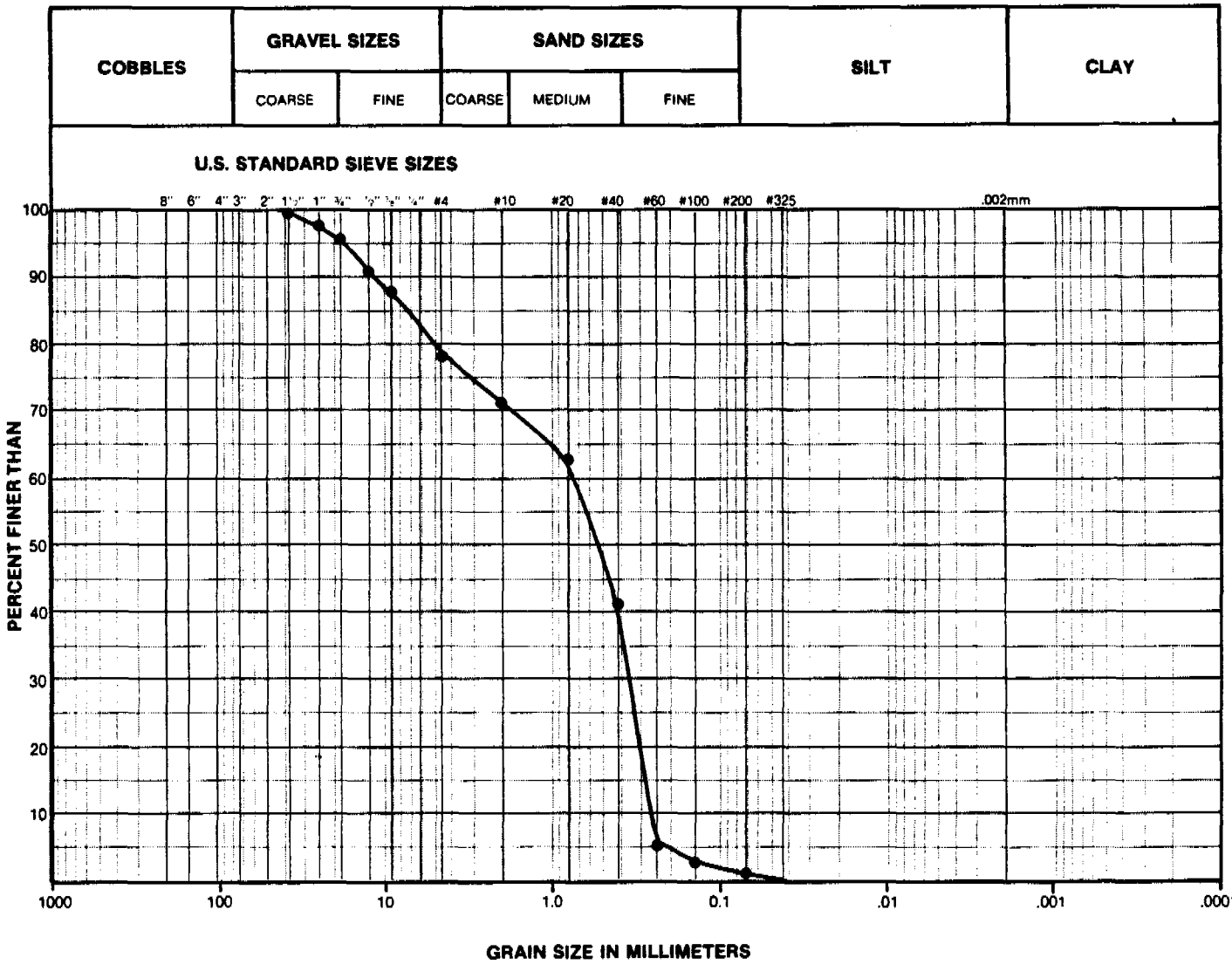
D_{10} =	mm	GRAVEL 52	%
D_{30} =	mm	SAND 43	%
D_{60} =	mm	SILT 5	%
C_U =	mm	CLAY	%
C_C =	mm		

Plate C20

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP184-2	SAMPLE: A1
DEPTH:	0.2 - 0.6 m
TECHNICIAN: L.R.	DATE: 09/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

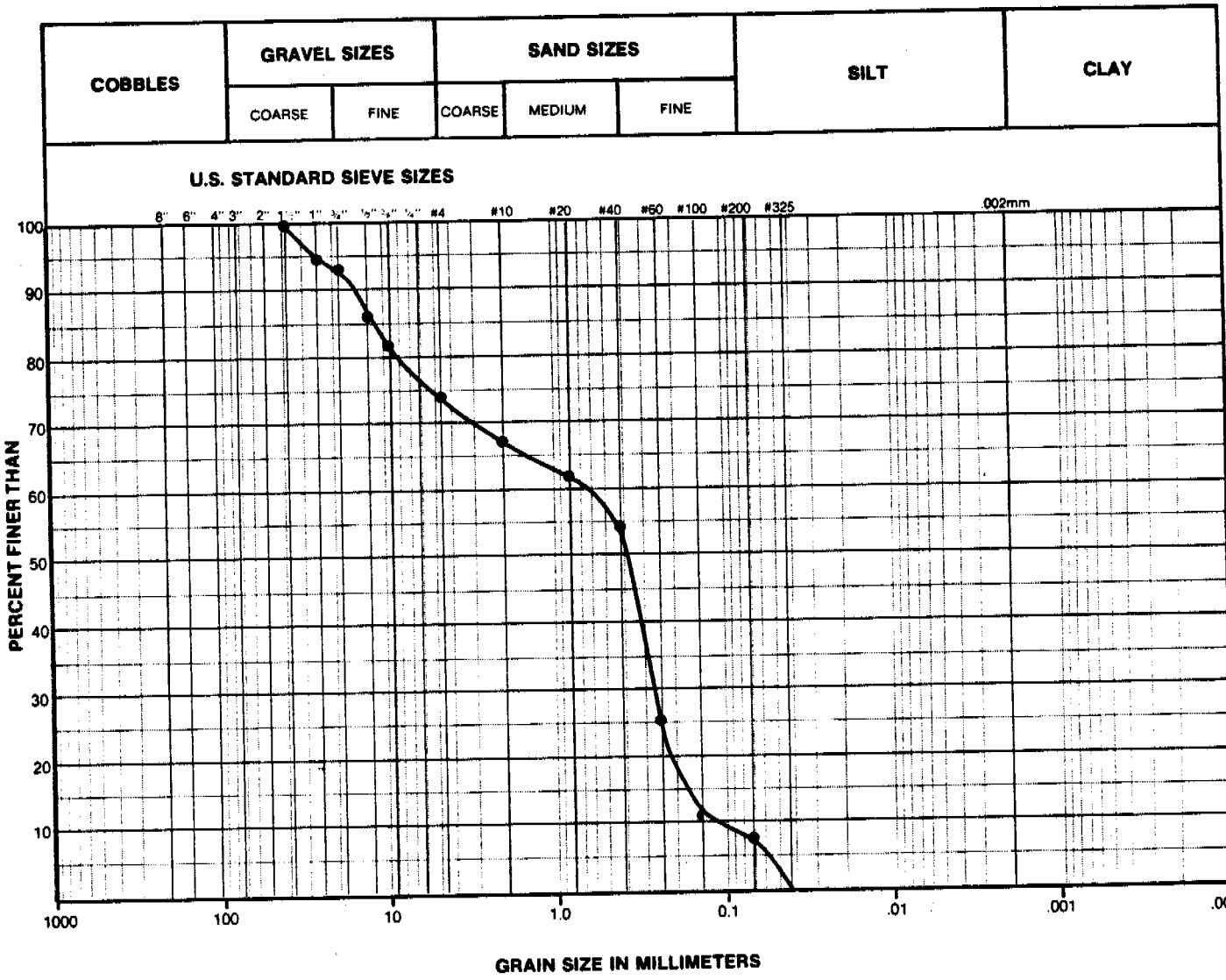
D_{10} =	mm	GRAVEL 21	%
D_{30} =	mm	SAND 77	%
D_{60} =	mm	SILT 2	%
C_U =	mm	CLAY	%
C_C =	mm		

Plate C21

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP184-3	SAMPLE: A1
DEPTH:	0.2 - 0.6 m
TECHNICIAN: L.R.	DATE: 03/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

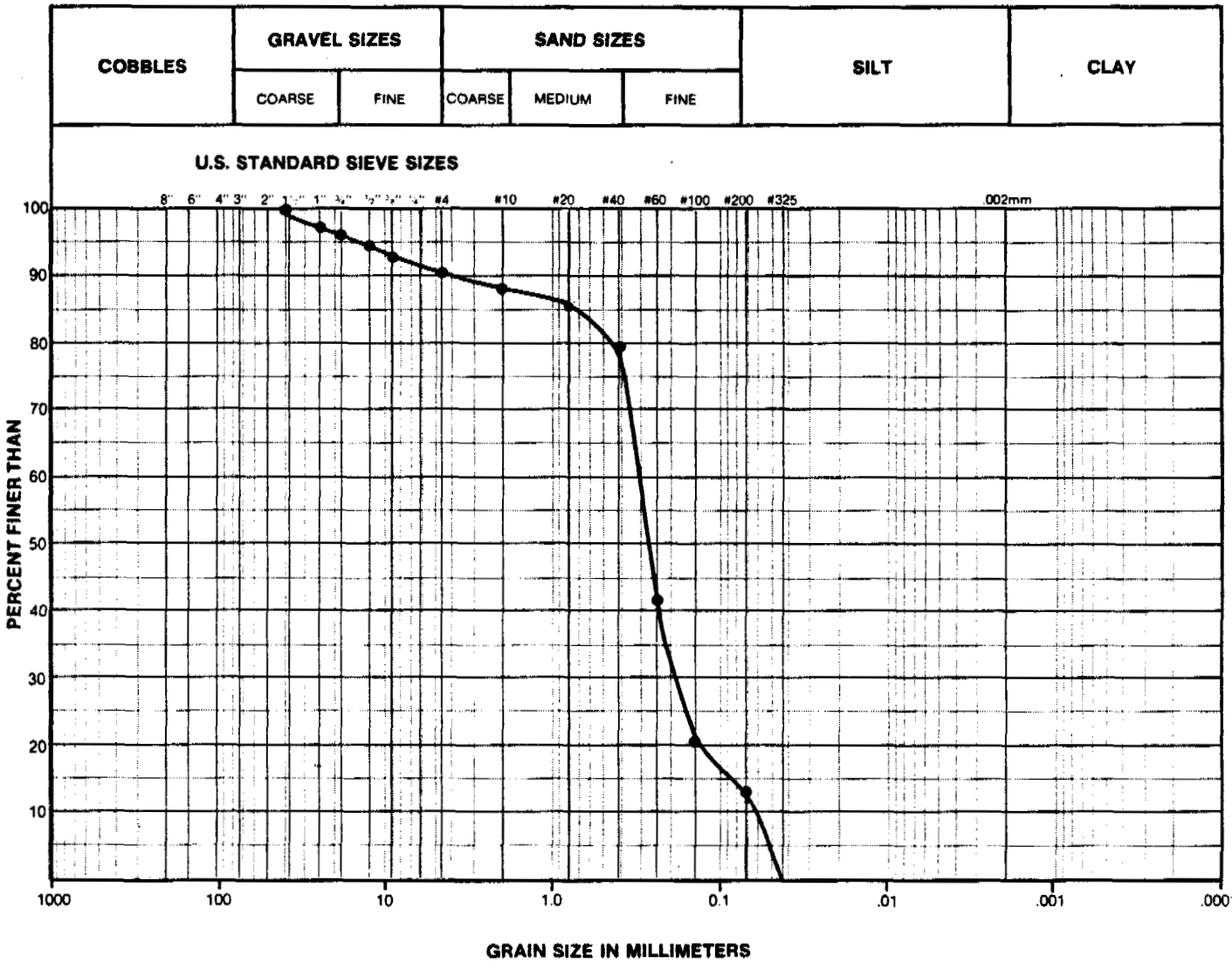
D_{10} =	mm	GRAVEL	26 %
D_{30} =	mm	SAND	67 %
D_{60} =	mm	SILT	7 %
C_U =	mm	CLAY	%
C_C =	mm		

Plate C22

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP184-5	SAMPLE: A1
DEPTH:	0.2 - 0.6 m
TECHNICIAN: L.R.	DATE: 03/10/86



REMARKS: SM

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

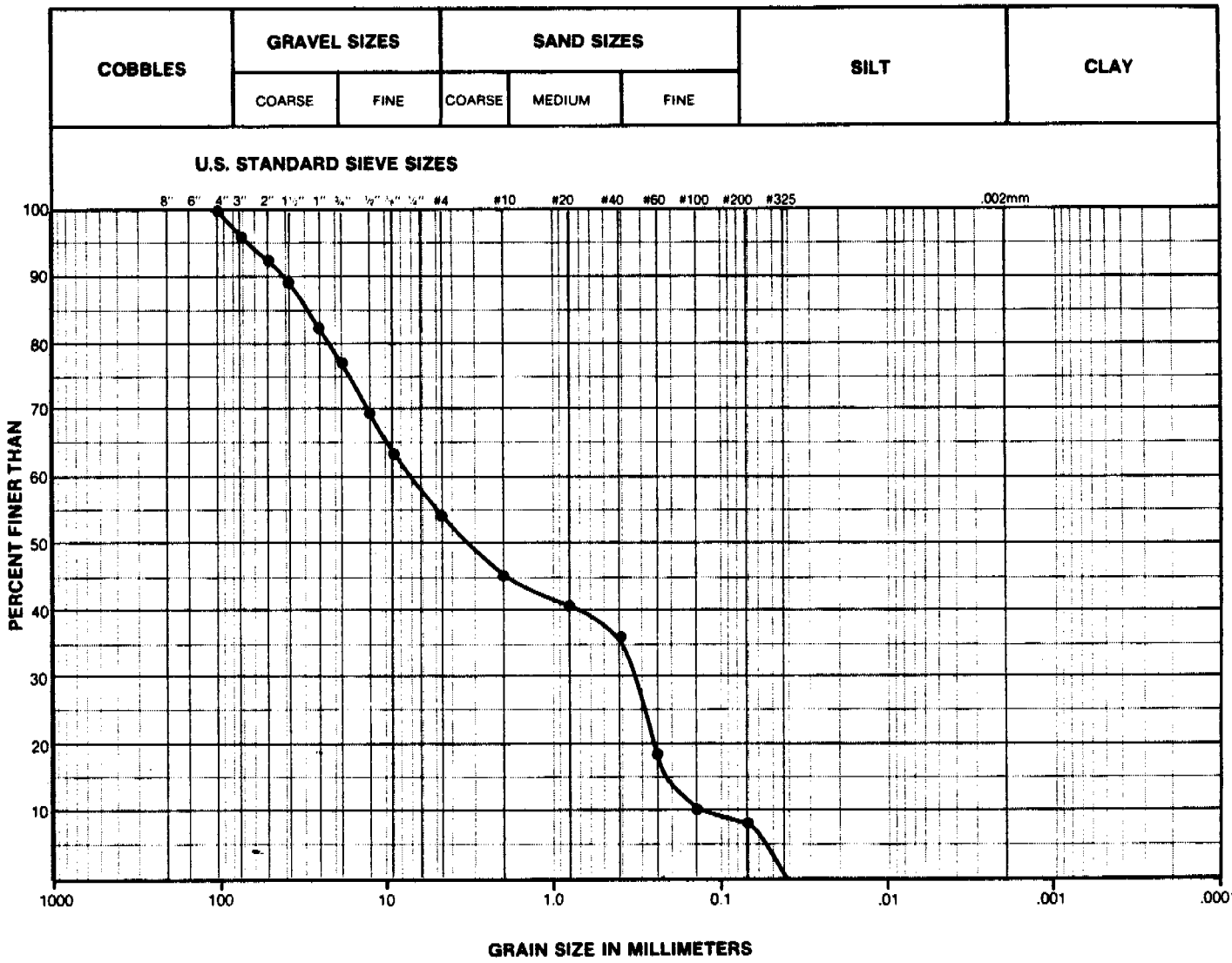
SUMMARY

D_{10} =	mm	GRAVEL 10	%
D_{30} =	mm	SAND 77	%
D_{60} =	mm	SILT 13	%
C_U =	mm	CLAY	%
C_C =	mm		

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP184-6	SAMPLE: A1
DEPTH:	0.3 - 0.8 m
TECHNICIAN: L.R.	DATE: 09/10/86



REMARKS: GP-SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

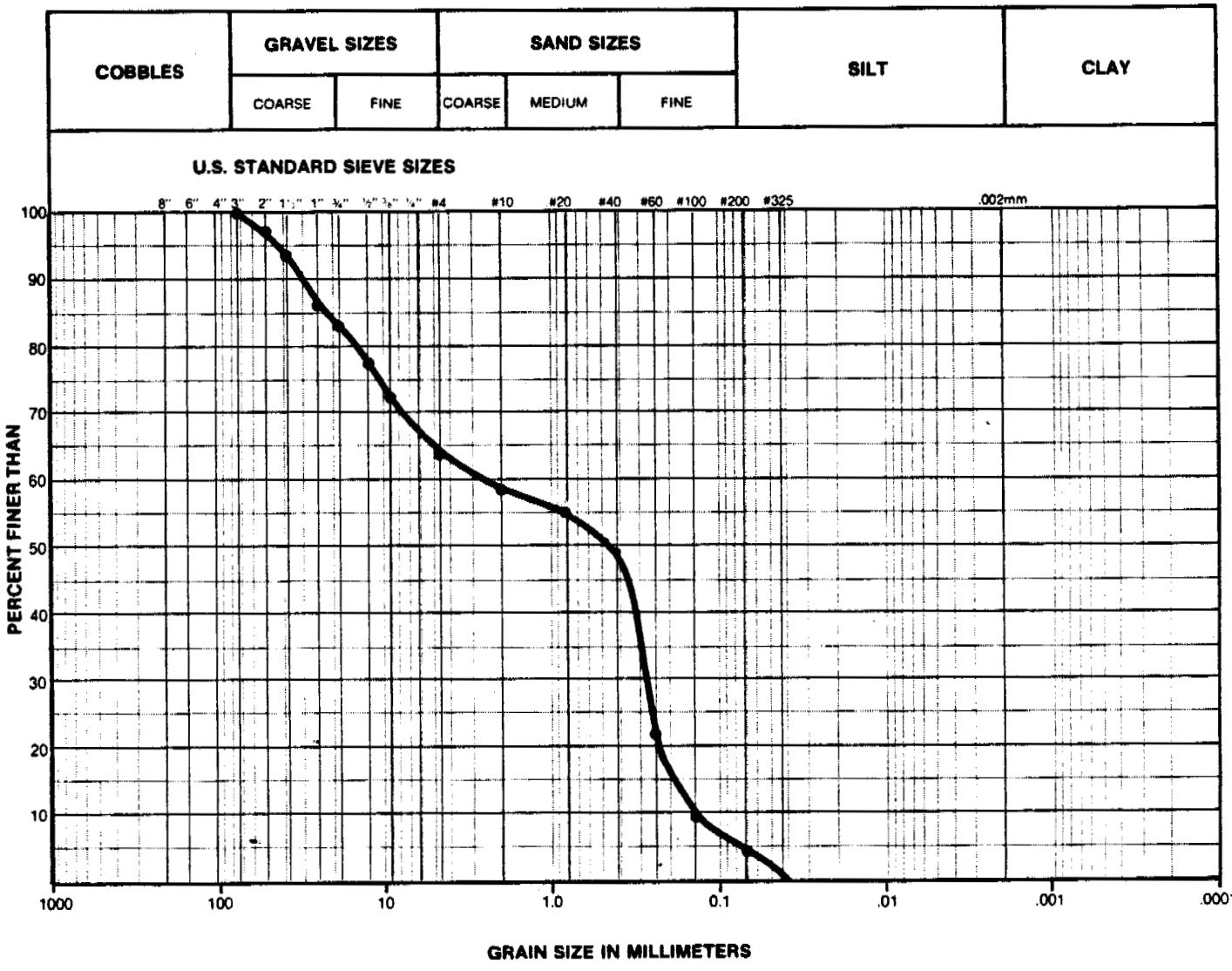
SUMMARY

D_{10} =	mm	GRAVEL	46 %
D_{30} =	mm	SAND	46 %
D_{60} =	mm	SILT	8 %
C_U =	mm	CLAY	%
C_C =	mm		

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP184-7	SAMPLE: A2
DEPTH:	0.5 - 0.7 m
TECHNICIAN: L.R.	DATE: 01/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

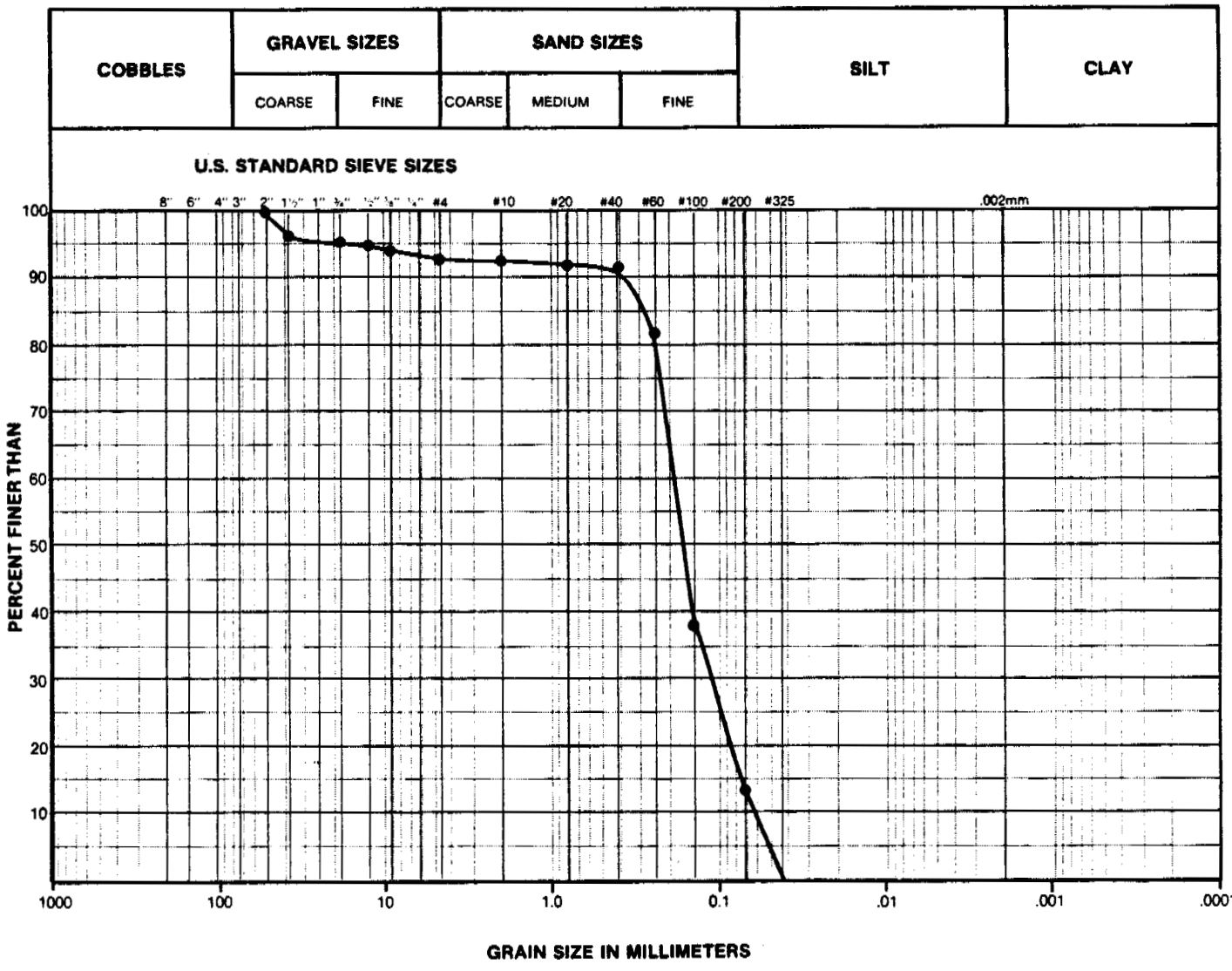
SUMMARY

D_{10} =	mm	GRAVEL	36 %
D_{30} =	mm	SAND	59 %
D_{60} =	mm	SILT	5 %
C_U =	mm	CLAY	%
C_C =	mm		

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP155-2	SAMPLE: A1
DEPTH:	0.2 - 0.5 m
TECHNICIAN: L.R.	DATE: 06/10/86



REMARKS: SM

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

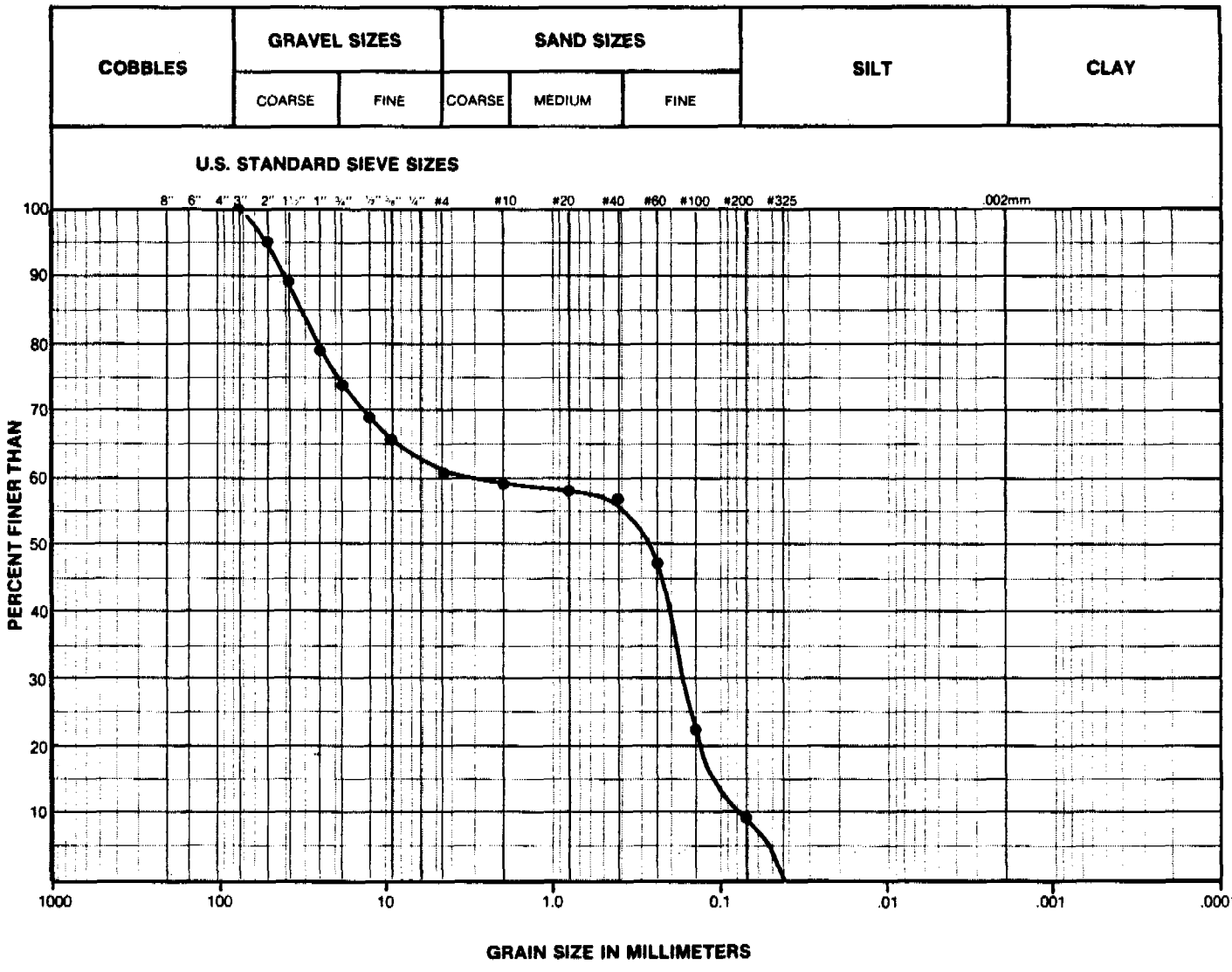
SUMMARY

D_{10} =	mm	GRAVEL	6 %
D_{30} =	mm	SAND	80 %
D_{60} =	mm	SILT	14 %
C_U =	mm	CLAY	%
C_C =	mm		

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP155-2	SAMPLE: A2
DEPTH:	0.7 - 0.9 m
TECHNICIAN: L.R.	DATE: 09/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

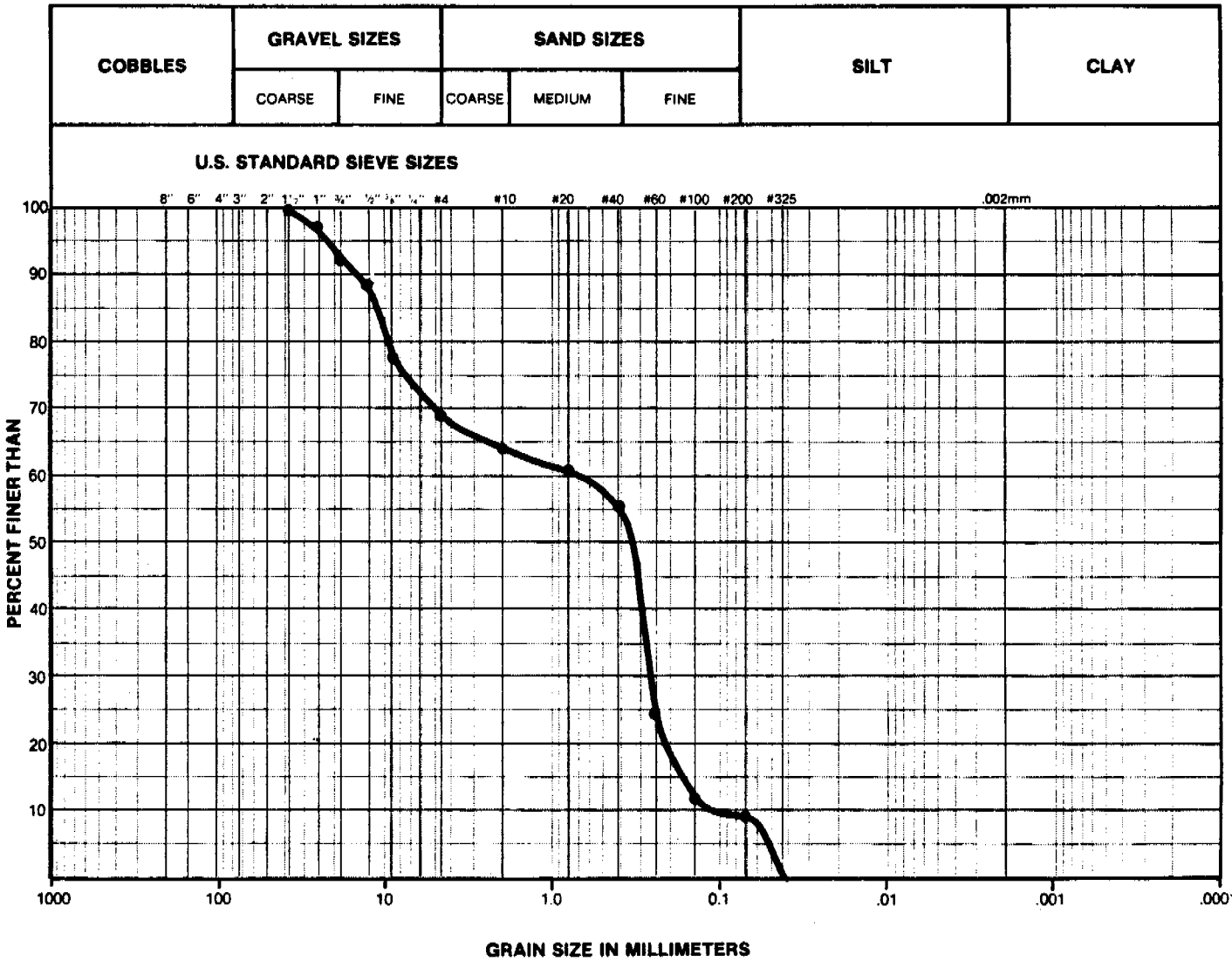
D_{10} =	mm	GRAVEL 38	%
D_{30} =	mm	SAND 53	%
D_{60} =	mm	SILT 9	%
C_U =	mm	CLAY	%
C_C =	mm		

Plate C27

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP155-4	SAMPLE: A2
DEPTH:	0.5 - 0.8 m
TECHNICIAN: L.R.	DATE: 01/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

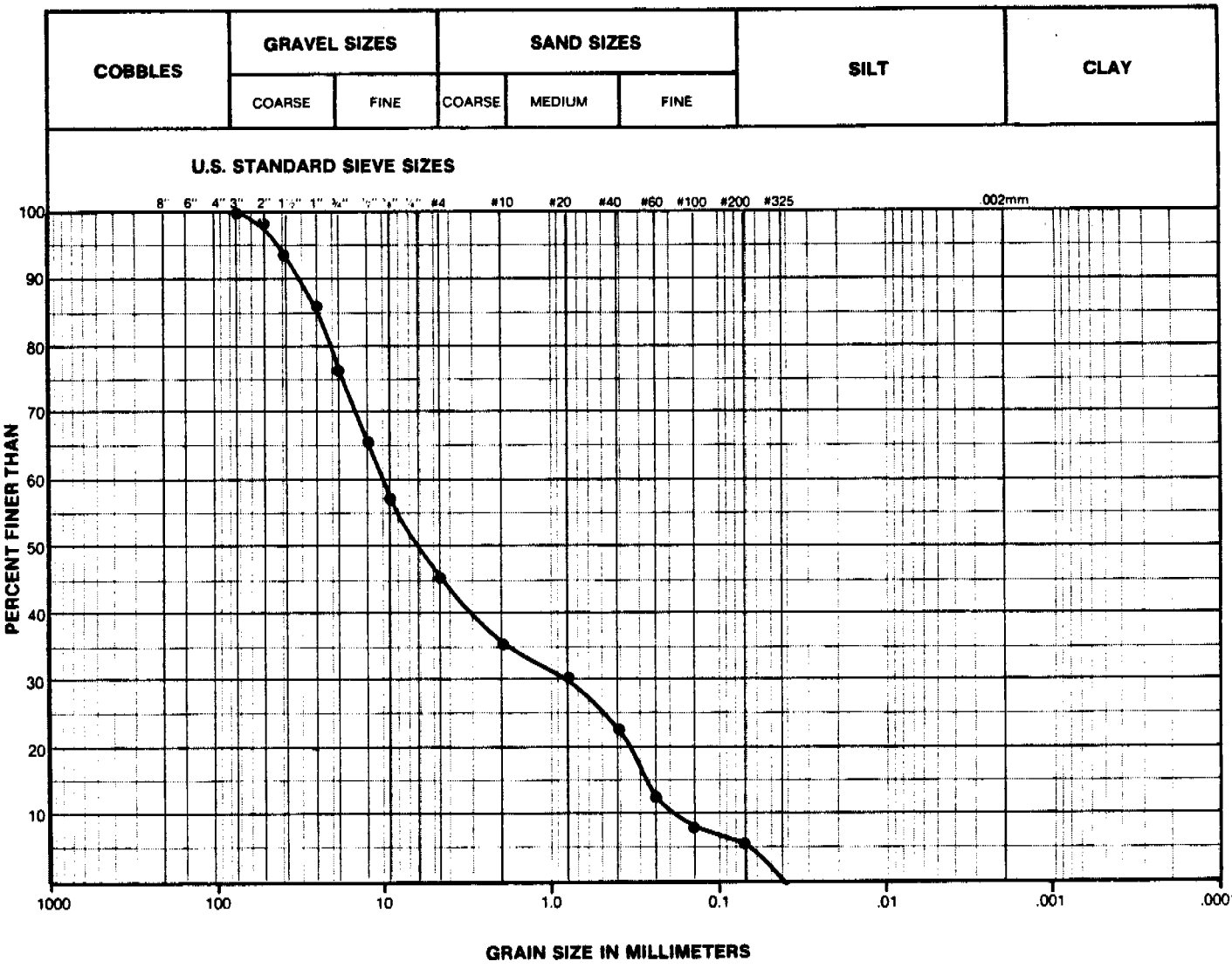
SUMMARY

D_{10} =	mm	GRAVEL	31 %
D_{30} =	mm	SAND	60 %
D_{60} =	mm	SILT	9 %
C_U =	mm	CLAY	%
C_C =	mm		

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP155-5	SAMPLE: A1
DEPTH:	0 - 0.4 m
TECHNICIAN: L.R.	DATE: 15/10/86



REMARKS: GP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

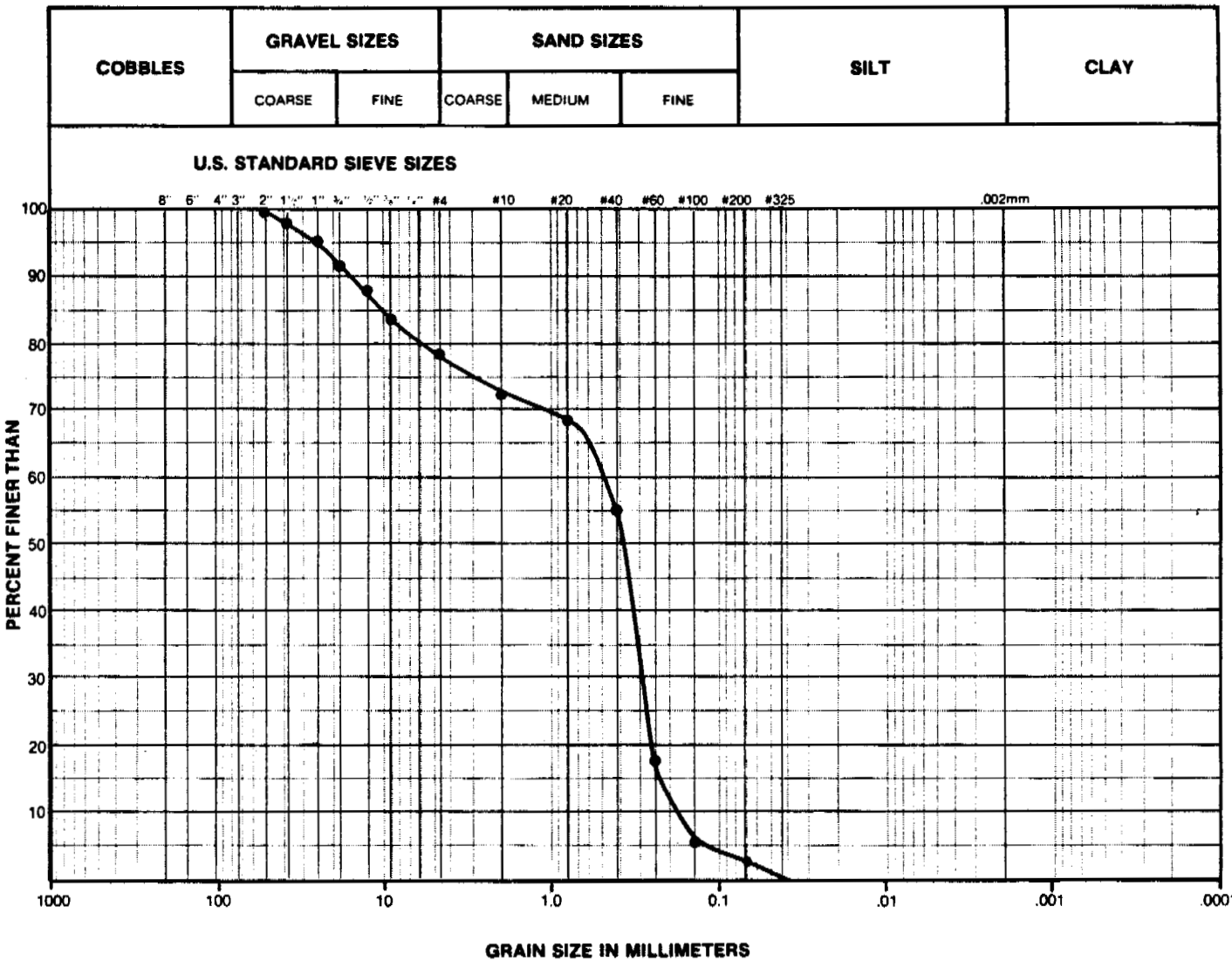
SUMMARY

D_{10} =	mm	GRAVEL 54	%
D_{30} =	mm	SAND 40	%
D_{60} =	mm	SILT 6	%
C_U =	mm	CLAY	%
C_C =	mm		

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP163-1	SAMPLE: A1
DEPTH:	0.3 - 1.3 m
TECHNICIAN: L.R.	DATE: 15/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

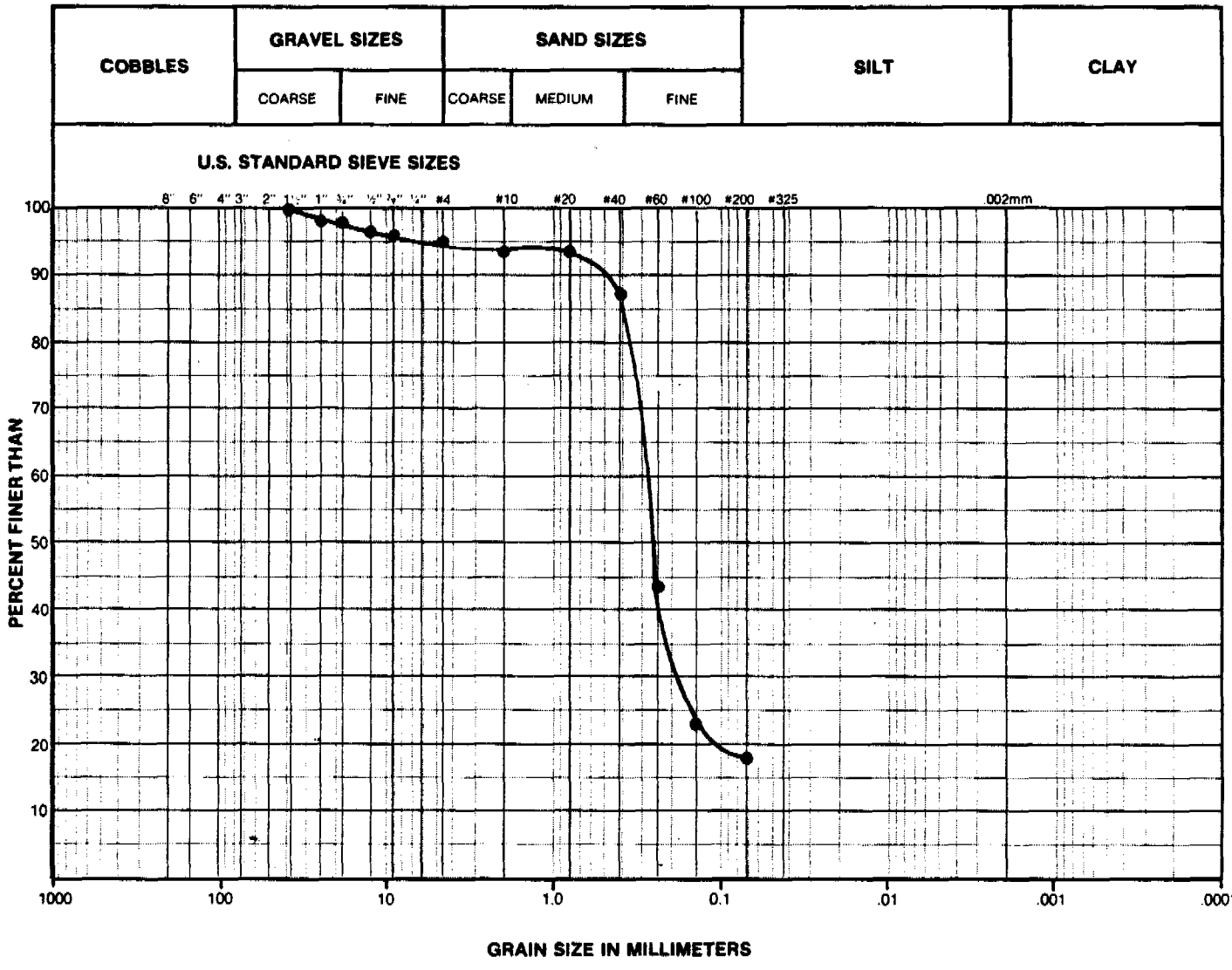
D_{10} =	mm	GRAVEL	22 %
D_{30} =	mm	SAND	75 %
D_{60} =	mm	SILT	3 %
C_U =	mm	CLAY	%
C_C =	mm		

Plate C30

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP163-2	SAMPLE: A1
DEPTH:	0.4 - 0.7 m
TECHNICIAN: L.R.	DATE: 01/10/86



REMARKS: SM

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

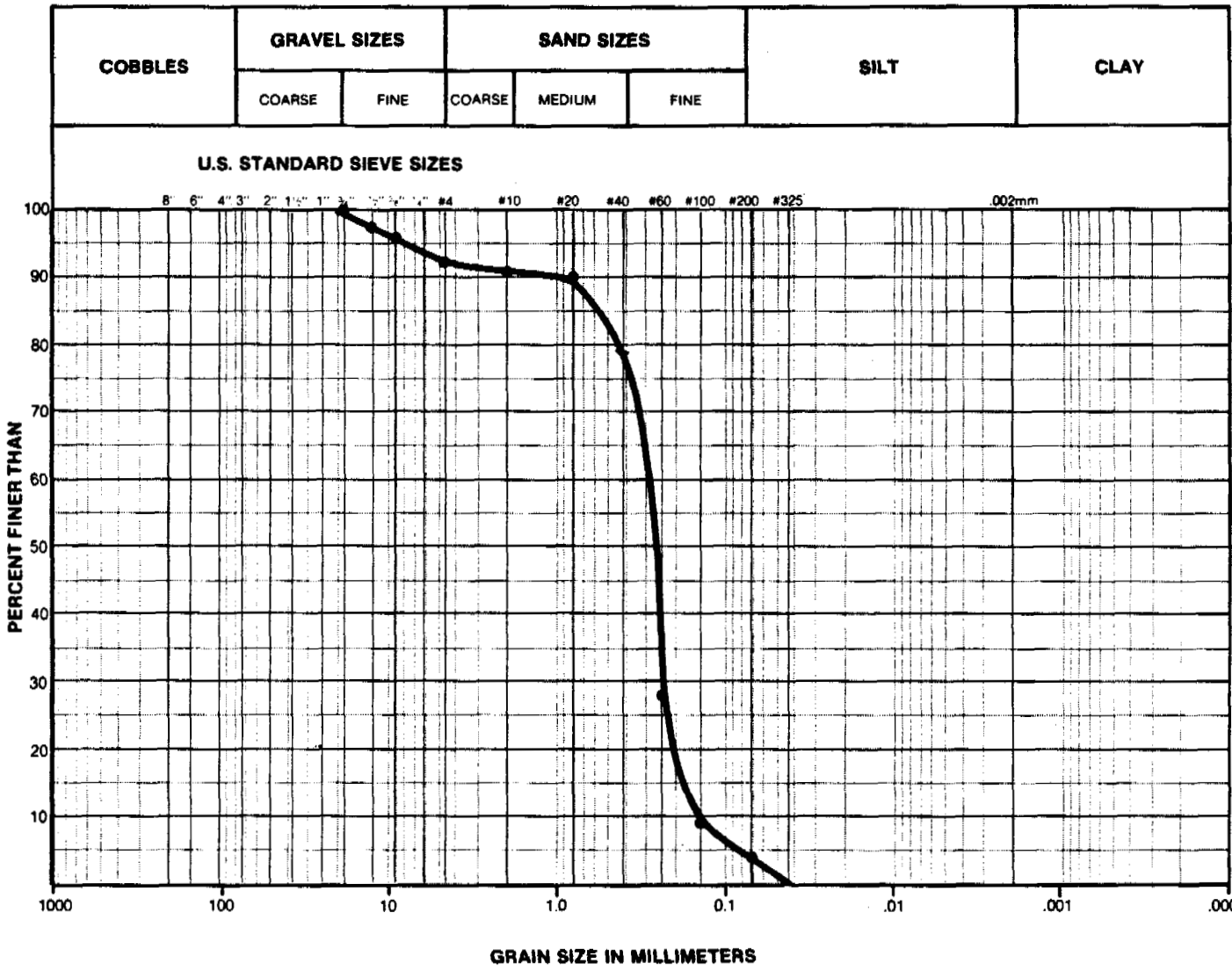
SUMMARY

D_{10} =	mm	GRAVEL	6 %
D_{30} =	mm	SAND	76 %
D_{60} =	mm	SILT	18 %
C_U =	mm	CLAY	%
C_C =	mm		

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

CLIENT:	GNWT
PROJECT NUMBER:	CG14096
LAB. NUMBER:	
LOCATION:	Tuktoyaktuk
HOLE: TP163-3	SAMPLE: A1
DEPTH:	0.3 - 0.9 m
TECHNICIAN: L.R.	DATE: 01/10/86



REMARKS: SP

NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

SUMMARY

D_{10} =	mm	GRAVEL	6 %
D_{30} =	mm	SAND	90 %
D_{60} =	mm	SILT	4 %
C_U =	mm	CLAY	%
C_C =	mm		

PETROGRAPHIC ANALYSIS
(Coarse Aggregate)

TEST PIT: 181-16A, SAMPLE: A2, DEPTH: 0.5-1.0 m, PN = 105

Rock Type	Classification	Total Weighted Composition %
Crystalline	Good	2.4
Quartzite		3.9
Quartzite/Sandstone		66.0
Slate		13.5
Carbonate		4.1
Conglomerate		1.1
Sandstone		7.8
Sandstone	Fair	0.9
Sandstone	Poor	0.1
Volcanic		0.2
		100%

Comments: Excellent quality for concrete aggregate

PETROGRAPHIC ANALYSIS
(Coarse Aggregate)

TEST PIT: 169-1, SAMPLE: A1, DEPTH: 0.6-1.2 m, PN = 190

Rock Type	Classification	Total Weighted Composition %
Crystalline	Good	4.4
Quartzite		53.4
Sandstone/Siltstone		6.8
Slate		10.4
Conglomerate		0.5
Shale/Siltstone	Fair	5.4
Sandstone/Siltstone		13.2
Sandstone	Poor	5.9
		100%

Comments: Poor quality for concrete aggregate

PETROGRAPHIC ANALYSIS
(Coarse Aggregate)

TEST PIT: 184-6, SAMPLE: A1, DEPTH: 0.3-0.8 m, PN = 114

Rock Type	Classification	Total Weighted Composition %
Crystalline	Good	7.0
Sandstone (quartzose)		64.1
Slate/Siltstone/Shale		11.8
Quartzite		4.8
Carbonate		3.9
Conglomerate		0.6
Sandstone/Siltstone		1.0
Shale	Fair	0.2
Sandstone/Siltstone		6.5
Carbonate		0.1
		100%

Comments: Good quality for concrete aggregate

PETROGRAPHIC ANALYSIS
(Coarse Aggregate)

TEST PIT: 155-5, SAMPLE: A1, DEPTH: 0-0.4 m, PN = 101

Rock Type	Classification	Total Weighted Composition %
Crystalline	Good	3.5
Quartzite		4.2
Sandstone (quartzose)		76.1
Slate		9.9
Carbonate		2.6
Sandstone		3.3
Sandstone	Fair	0.4
		100%

Comments: Excellent quality for concrete aggregate

PETROGRAPHIC ANALYSIS
(Coarse Aggregate)

TEST PIT: 163-1, SAMPLE: A1, DEPTH: 0.3-1.3 m, PN = 110

Rock Type	Classification	Total Weighted Composition %
Crystalline	Good	4.0
Quartzite		10.6
Quartzite/Sandstone		32.0
Sandstone		29.4
Slate		17.9
Carbonate		3.2
Conglomerate		0.1
Carbonate	Fair	0.4
Siltstone/Sandstone		1.8
Chert	Deleterious	0.4
Sandstone/Siltstone		0.2
		100%

Comments: Good to excellent quality for concrete aggregate

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

TECHNICAL REPORT

To: Government of Northwest Territories
Department of Public Works
Highways Diivsion
Yellowknife, N.W.T.
X1A 2L9

FILE 4195-CG-14096
DATE November 13, 1986
CLIENT P.O. -
C.C. -

PROJECT: Community Granular Management Plan - Tuktoyaktuk N.W.T.

SUBJECT: Physical Tests of Aggregate

Sample Identification	Coarse Aggregate (+4.75 mm) Specific Gravity Bulk	SSD	Absorption %	Fine Aggregate (-4.75 mm) Organic Impurities Color Test
Pit 184 184-6 A1 0.3-0.8 m	2.59	2.62	1.21	#4

Comments: Tests performed in accordance with the following standards:

(1) Specific Gravity and Absorption (Coarse Aggregate) ASTM C127.
(2) Organic Impurities - Color Test (Fine Aggregate) ASTM C40.

Hardy BBT Limited

Per: K. W. Gillingwater, C.E.T.,
Senior Supervisor

KWG:dw

Plate C38

PAGE OF

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

LOS ANGELES ABRASION TEST REPORT

TO: Government of Northwest Territories
Department of Public Works
Highways Division
Yellowknife, N.W.T.
X1A 2L9

OFFICE: Calgary
PROJECT NO.: 4195-CG-14096
DATE: November 13, 1986
CC: -

PROJECT Community Granular Management Plan - Tuktoyaktuk N.W.T.

Test Holes 184-2-A1, 184-3-A1, - Composite Sample for Test
SOURCE 184-5-A2, 184-6-A1 TYPE OF SAMPLE Coarse Aggregate SAMPLED BY Client

DATE SAMPLED Oct./86 DATE RECEIVED Oct. 22/86 DATE TESTED Oct. 31/86

MATERIAL GRADING: "A"

ACTUAL SIEVE SIZES	AMOUNT	
— 1 1/2"38.1 mm + 1" (25.0 mm)	1249.7	g
— 1" 25.0 mm + 3/4"(19.0 mm)	1250.0	g
— 3/4" 19.0 mm+ 1/2"(12.5 mm)	1249.7	g
— 1/2" 12.5 mm+ 3/8"(9.5 mm)	1249.6	g
	TOTAL SAMPLE 4999.1	g
NO. OF REVOLUTIONS 500		
NO. OF SPHERES 12	TOTAL SAMPLE 4999.1	g
WT. OF SPHERES 4994.4 g	+ # 12 MATERIAL AFTER 4103.8	g
	- # 12 MATERIAL AFTER 895.3	g

LOSS = $\frac{\text{TOTAL SAMPLE} - \#12}{\text{TOTAL SAMPLE}} \times 100 = \frac{4999.1 - 4103.8}{4999.1} \times 100 = \frac{895.3}{4999.1} \times 100 = 17.9$ %

COMMENTS: Test performed in accordance with ASTM C131.
Clay lump deposits were present throughout the size fractions.

TECHNICIAN R.L.D. REPORT CERTIFIED R. W. Dallimore, CET.

HT53-81/06

Plate C39

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

SOUNDNESS OF AGGREGATE
SULPHATE TEST REPORT

FILE: 4195-CG-14096
DATE: November 13, 1986
CLIENT P.O.: -
C.C.: -

TO: Government of Northwest Territories
Department of Public Works
Highways Division
Yellowknife, N.W.T.
X1A 2L9

PROJECT Community Granular Management Plan - Tuktoyaktuk N.W.T.
Test Holes 184-2-A1, 184-3-A1, 184-5-A2, - Composite Sample for Test.
SOURCE 184-6-A1 TYPE OF SAMPLE Coarse Aggregate SAMPLED BY Client
DATE SAMPLED Oct./86 DATE RECEIVED Oct. 22/86 DATE TESTED Nov. 5/86

SOLUTION Magnesium Sulphate NUMBER OF CYCLES 5

COARSE AGGREGATE				FINE AGGREGATE			
SIEVE SIZE		ORIGINAL GRADING PERCENT	AVERAGE PERCENT LOSS	SIEVE SIZE		ORIGINAL GRADING PERCENT	WEIGHED AVERAGE PERCENT LOSS
PASSING	RETAINED			PASSING	RETAINED		
4 IN.	2 IN.	12.6	0.08*	3/8 IN.	NO. 4		
2 IN.	1 - ½ IN.	7.2	0.04*	NO. 4	NO. 8		
1 - ½ IN.	1 IN.	13.0	0.08	NO. 8	NO. 16		
1 IN.	¾ IN.	10.4	0.03	NO. 16	NO. 30		
¾ IN.	½ IN.	18.7	0.84	NO. 30	NO. 50		
½ IN.	3/8 IN.	13.3	1.15	NO. 50	NO. 100		
3/8 IN.	NO. 4 IN.	24.8	0.48	NO. 100			
TOTALS		100.0	2.70	TOTALS			

SIZE FRACTION	NO. PARTICLES		QUALITATIVE EXAMINATION OF PLUS ¾" MATERIAL
3" - 2"	ORIGINAL	-	-
	FINAL	-	-
2" - 1½"	ORIGINAL	-	-
	FINAL	-	-
1½" - 1"	ORIGINAL	20	-
	FINAL	20	Some cracking and flaking was observed.
1" - ¾"	ORIGINAL	27	-
	FINAL	27	Some cracking and flaking was observed.

COMMENTS: *Weighted average percent loss adjustment as per testing requirement.
Clay lump deposits were present throughout the size fractions.

REPORT CERTIFIED [signature], CET TECHNICIAN R.L.D.

TESTED IN ACCORDANCE WITH ASTM C88

Plate C40

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

TECHNICAL REPORT

To: Government of Northwest Territories
Department of Public Works
Highways Division
Yellowknife, N.W.T.
X1A 2L9

FILE 4195-CG-14096
DATE November 13, 1986
CLIENT P.O. -
C.C. -

PROJECT: Community Granular Management Plan - Tuktoyaktuk N.W.T.

SUBJECT: Physical Tests of Aggregate

Sample Identification	Coarse Aggregate (+4.75 mm) Specific Gravity Bulk	SSD	Absorption %	Fine Aggregate (-4.75 mm) Organic Impurities Color Test
Pit 155 155-5 A1 0-0.4 m	2.58	2.61	1.17	#5

Comments: Tests performed in accordance with the following standards:

(1) Specific Gravity and Absorption (Coarse Aggregate) ASTM C127.
(2) Organic Impurities - Color Test (Fine Aggregate) ASTM C40.

Hardy BBT Limited

Per:

K. W. Gillingwater, C.E.T.,
Senior Supervisor

KWG:dw

Plate C41

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

LOS ANGELES ABRASION TEST REPORT

TO: Government of Northwest Territories
Department of Public Works
Highways Division
Yellowknife, N.W.T.
X1A 2L9

OFFICE: Calgary
PROJECT NO.: 4195-CG-14096
DATE: November 13, 1986
CC: -

PROJECT Community Granular Management Plan - Tuktoyaktuk N.W.T.

SOURCE 155 Pit (155-5 A1 0-0.4 m) TYPE OF SAMPLE Coarse Aggregate SAMPLED BY Client

DATE SAMPLED Oct. 18/86 DATE RECEIVED Oct. 22/86 DATE TESTED Oct. 31/86

MATERIAL GRADING: "A"

ACTUAL SIEVE SIZES	AMOUNT
1 1/2" (38.1mm) ↓ 1" (25.0mm)	1250.2 g
1" (25.0mm) ↓ 3/4" (19.0mm)	1250.4 g
3/4" (19.0mm) ↓ 1/2" (12.5mm)	1250.8 g
1/2" (12.5mm) ↓ 3/8" (9.5mm)	1248.5 g
	TOTAL SAMPLE 4999.9 g
NO. OF REVOLUTIONS 500	
NO. OF SPHERES 12	TOTAL SAMPLE 4999.9 g
WT. OF SPHERES 4994.4 g	+ # 12 MATERIAL AFTER 4130.4 g
	- # 12 MATERIAL AFTER 869.5 g

LOSS = $\frac{\text{TOTAL SAMPLE} - \#12}{\text{TOTAL SAMPLE}} \times 100 = \frac{4999.9 - 4130.4}{4999.9} \times 100 = \frac{869.5}{4999.9} \times 100 = 17.4$ %

COMMENTS: Test performed in accordance with A.S.T.M. C131.
Clay lump deposits were found present throughout the size fractions.

TECHNICIAN R.L.D. REPORT CERTIFIED W. D. Hardy, P.Eng.

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

SOUNDNESS OF AGGREGATE
SULPHATE TEST REPORT

FILE: 4195-CG-14096
DATE: November 13, 1986
CLIENT P.O.:-
C.C.: -

TO: Government of Northwest Territories
Department of Public Works
Highways Division
Yellowknife, N.W.T.
X1A 2L9

PROJECT Community Granular Management Plan - Tuktoyaktuk N.W.T.
Test Holes 155-2-A2-0.7-0.9 m ,
155-4-A1-0.1-0.3 m, 155-4-A2-0.5-0.8 m, - Composite Sample
SOURCE 155-5-A1-0.7-0.9 m TYPE OF SAMPLE Coarse Aggregate SAMPLED BY Client
DATE SAMPLED Oct./86 DATE RECEIVED Oct. 22/86 DATE TESTED Oct. 31/86

SOLUTION Magnesium Sulphate NUMBER OF CYCLES 5

COARSE AGGREGATE				FINE AGGREGATE			
SIEVE SIZE		ORIGINAL GRADING PERCENT	AVERAGE PERCENT LOSS	SIEVE SIZE		ORIGINAL GRADING PERCENT	WEIGHED AVERAGE PERCENT LOSS
PASSING	RETAINED			PASSING	RETAINED		
3 IN.	2 IN.	5.4	0.01*	3/8 IN.	NO. 4		
2 IN.	1 - ½ IN.	9.7	0.01*	NO. 4	NO. 8		
1 - ½ IN.	1 IN.	15.9	0.02	NO. 8	NO. 16		
1 IN.	¾ IN.	16.5	0.07	NO. 16	NO. 30		
¾ IN.	½ IN.	18.7	0.63	NO. 30	NO. 50		
½ IN.	3/8 IN.	13.7	0.94	NO. 50	NO. 100		
3/8 IN.	NO. 4 IN.	20.1	1.96	NO. 100			
TOTALS		100.0	3.64	TOTALS			

SIZE FRACTION	NO. PARTICLES	QUALITATIVE EXAMINATION OF PLUS ¾" MATERIAL
3" - 2"	ORIGINAL -	-
	FINAL -	-
2" - 1½"	ORIGINAL -	-
	FINAL -	-
1½" - 1"	ORIGINAL 19	-
	FINAL 19	Some cracking was observed.
1" - ¾"	ORIGINAL 24	-
	FINAL 24	Some cracking was observed.

COMMENTS: *Weighted average percent loss adjustment as per testing requirement.
Clay lump deposits were present throughout the size fractions.

REPORT CERTIFIED [signature], CET TECHNICIAN R.L.D.

TESTED IN ACCORDANCE WITH ASTM C88

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

TECHNICAL REPORT

To: Government of Northwest Territories
Department of Public Works
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Yellowknife, N.W.T.
X1A 2L9

FILE 4195-CG-14096
DATE November 13, 1986
CLIENT P.O. -
C.C. -

PROJECT: Community Granular Management Plan - Tuktoyaktuk N.W.T.

SUBJECT: Physical Tests of Aggregate

Sample Identification	Coarse Aggregate (+4.75 mm) Specific Gravity Bulk	SSD	Absorption %	Fine Aggregate (-4.75 mm) Organic Impurities Color Test
Pit 163 161-1 A1 0.3-1.3 m	2.59	2.63	1.31	#2.5

Comments: Tests performed in accordance with the following standards:

(1) Specific Gravity and Absorption (Coarse Aggregate) ASTM C127
(2) Organic Impurities - Color Test (Fine Aggregate) ASTM C40.

Hardy BBT Limited

Per: K. W. Gillingwater

K. W. Gillingwater, C.E.T.,
Senior Supervisor

KWG:dw