EBA Engineering Consultants Ltd.

Civil, Geotechnical and Materials Engineers

INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

INUVIK, N.W.T.

PREPARED FOR

INDIAN AND NORTHERN AFFAIRS
CANADA

APRIL 1987

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INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

INUVIK

REPORT SUBMITTED TO

INDIAN AND NORTHERN AFFAIRS CANADA

SUBMITTED BY

EBA ENGINEERING CONSULTANTS LTD.

0101-4575

APRIL, 1987

EXECUTIVE SUMMARY

This report presents the results of a study, conducted under the terms of the Inuvialuit Final Agreement, to determine the supply of granular materials and the 20-year demand for granular materials in the community of Inuvik. Development scenarios and recommendations designed to optimize the utilization of resources for the anticipated demand are presented.

In summary, the 20-year demand for granular materials in the community is nearly 7.6 million cubic metres. Ninety-eight percent of the demand is for projects of a speculative nature, such as construction of the Inuvik-Tuktoyaktuk highway andproduction of armour stone for large-scale offshore petroleum production facilities. The remainder of the demand is for local capital projects (70,200 cubic metres) and maintenance of community facilities (107,000 cubic metres).

Granular materials sufficient to meet the forecast demand are available in the Inuvik area. Rock, rock products and general fill are available on a year -round basis by all-weather roads; higher quality aggregates must be obtained at distant sources during the winter months. Certain bedrock sources have ready access to waterways, increasing their attractiveness for utilization in offshore projects.

Inuvik is a mature community that has been meeting its granular resource requirements adequately for many years. It is recommended that the community continue to obtain and manage its granular resources in the manner it has established.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

1.0 INTRODUCTION 6
1.1 Background 6
1.2 Project Authorization 7
1.3 Project Scope 7
2.0 EVALUATION OF GRANULAR RESOURCES 8
2.1 Classification 8
2.1.1 General 8
2.1.2 Class 1 9
2.1.3 Class 2 9
2.1.4 Class 3 9
2.1.5 Class 4 9
2.1.6 Class 5 9
2.1.7 Summary 10
2.2 Inventory 10
2.2.1 Proven 10
2.2.2 Probable 10
2.2.3 Prospective 10
3.0 SUPPLY OF GRANULAR RESOURCES 12
3.1 General 12
3.2 Inuvik 13
3.2.1 General 13
3.2.2 Class 1 14
3.2.3 Class 2 14
3.2.4 Class 3 15
3.2.5 Class 4 15
3.2.6 Class 5 16
4.0 DEMAND FOR GRANULAR RESOURCES 17
4.1 General 17
4.2 Inuvik 19
4.2.1 General 19
4.2.2 Class 1 20
4.2.4 Class 3 20
4.2.5 Class 4 20
4.2.5 Class 5 21
5.0 DEVELOPMENT SCENARIOS 22
5.1 Inuvik- Speculative Projects Included 22
5.1.1 General 22
5.1.2 Class 1 22
5.1.3 Class 2 22
5.1.4 Class 3 23
5.1.5 Class 4 23
5.1.6 Class 5 23
5.2 Inuvik- Speculative Projects Excluded 24
5.2.1 General 24
5.2.2 Class 1 25
5.2.3 Class 2 25
5.2.4 Class 3 25
5.2.5 Class 4 25

5.2.6 Class 5 26
6.0 BORROW SOURCE DEVELOPMENT RECOMMENDATIONS 27
6.1 General 27
6.2 Objectives 27
6.3 Pit Access 27
6.4 Pit Development 28
6.4.1 Site Preparation Work 28
6.4.2 Extraction Methods 28
6.4.3 Treatment of Massive Ice 29
6.4.4 Drainage Considerations 30
6.4.5 Waste Material 30
6.5 Restoration 31
6.6 Site Specific Development Plans 32
6.6.1 General 32
6.6.2 Source I400 32
6.6.3 Sources I402 and I403 33
6.6.4 Source I407 34
6.6.5 YaYa Lake 36
7.0 RECOMMENDATIONS 38
7.1 General 38
7.2 Source I403 38
7.3 Source I407 38
7.4 Sources 312 and 314 39

LIST OF TABLES

LIST OF FIGURES

REFERENCES

SUPPLY REFERENCES AND CROSS-REFERENCES

DEMAND APPENDIX

SUPPLY APPENDIX

1.0 INTRODUCTION

1.1 Background

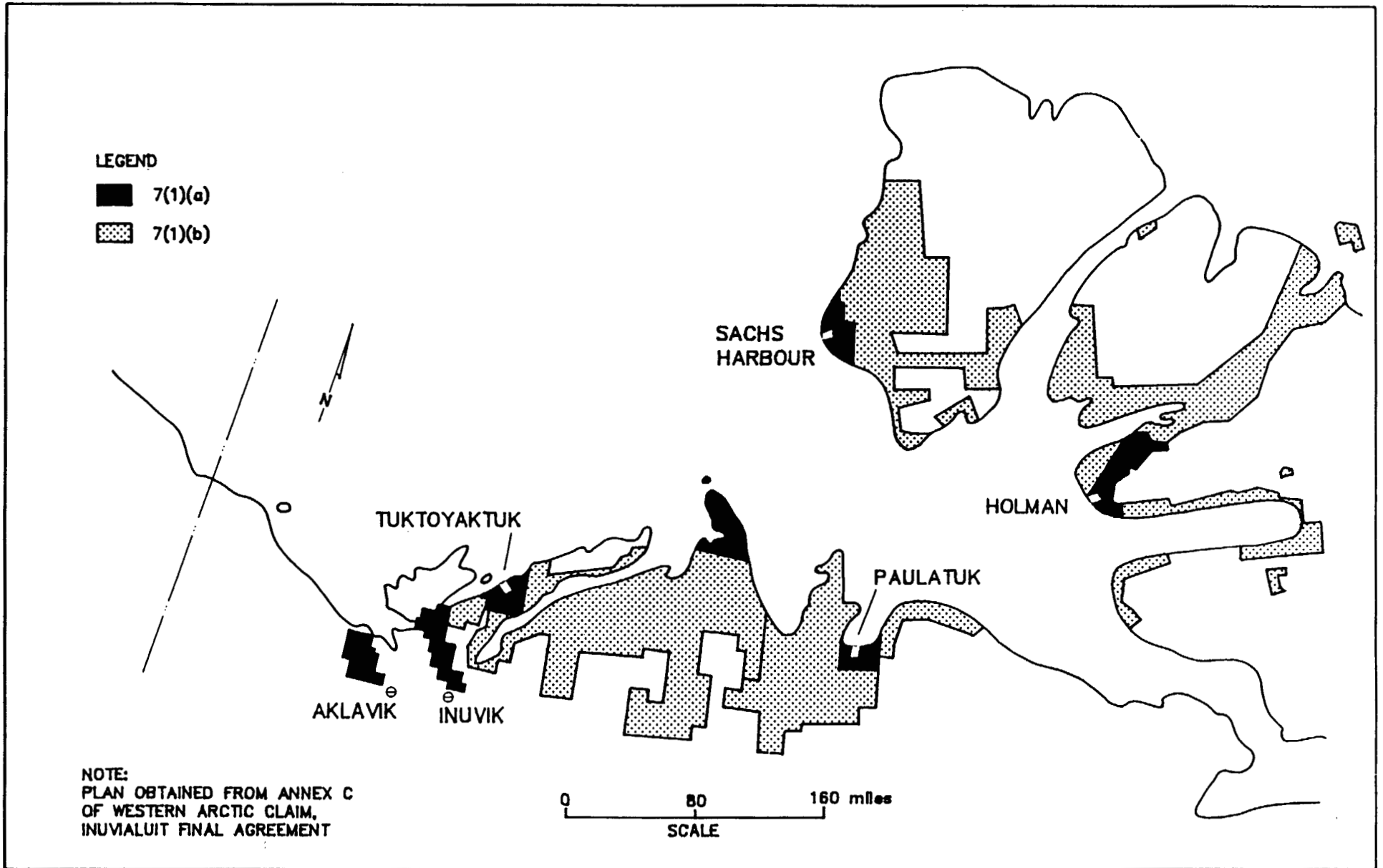
The Inuvialuit Final Agreement provided that Canada grant to the Inuvialuit, fee simple title to a land quantum of 90,650 square kilometres (35,000 square miles) in the Western Arctic Region. The Agreement further specified that the land be sub-divided into two categories, that with mineral rights and that without. For purposes of classification, the two categories have become known as 7(1)(a) and 7(1)(b) lands, respectively. The former includes 12,950 square kilometres (5,000 square miles) of lands; the latter 77,700 square kilometres (30,000 square miles). The 7(1)(a) lands are generally located adjacent to each of the six communities (Aklavik, Holman, Inuvik, Paulatuk, Sachs Harbour and Tuktoyaktuk, Figure 1) considered in the Final Agreement. The 7(1)(b) lands generally surround the 7(1)(a) lands and extend outward from the communities.

The Agreement recognized that most of the proven granular resources of acceptable quality within reasonable distance of the communities were located on Inuvialuit 7(1)(a) lands. In order to ensure that adequate reserves of granular material were maintained at a regulated cost, the Agreement granted control of the 7(1)(a) granular resources to the Inuvialuit, subject to certain provisions.

For purposes of the project described in this report, the provisions concern the supply of, and the demand for, granular resources. Under the terms of the provisions, the Inuvialuit agreed to maintain granular material reserves of appropriate quality sufficient to meet the projected 20-year demand as determined by the Inuvialuit Land Administration [ILA] and appropriate levels of government . The demand for granular materials was to be formed on the basis of estimates of requirements in each community.

In order to ensure that adequate supplies of sand and gravel of appropriate quality remained available within reasonable distance of the communities, the provisions stipulated that the supply of granular materials should be priorized according to end use as determined by the 20-year demand. The first priority was established as the need of the community, the second priority is the need of the Inuvialuit and the third priority is the need of others.

Indian and Northern Affairs Canada [INAC], on behalf of the ILA, has undertaken to develop a granular resources inventory and management plan to fulfill these initial



EBA Engineering Consultants Ltd.		PROJECT	GRANULAR RESOURCES INVENTORY AND MANAGEMENT PLAN
CLIENT	INDIAN AND NORTHERN AFFAIRS CANADA	TITLE	INUVIALUIT LANDS LOCATION PLAN WESTERN ARCTIC AGREEMENT
DATE 87/02/24	DWN EBR / CHKD BAB	JOB NO. 0101-4575	4575-001

obligations. This report presents the resource inventory as it is currently known together with certain development recommendations for the community of Inuvik.

1.2 Project Authorization

This study was authorized by Supply and Services Canada [SSC] through Contract No. 25ST.A7134-6-0014, awarded to EBA Engineering Consultants Ltd. [EBA]. The Scientific Advisor for the project was Mr. R. J. Gowan, Geotechnical Advisor for the Northern Renewable Resources Directorate of INAC.

1.3 Project Scope

The project scope, as defined by SSC and INAC in the contract, included the following:

a)Development of granular resource supply models for each of the six communities by examination of all existing reports describing granular material deposits.

b)Development of a granular resource demand model for each community through consultation with private and public sector users.

c)Development of a recommended resource development scenario for each community to ensure reserves are established according to the priorities outlined in the Inuvialuit Final Agreement.

d)Preparation of appropriate development recommendations for those sources with the best development prospects.

The following task was subsequently added to the project through a contract amendment:

e)Development of a geotechnical data base consisting of historic borehole information from the study area.

2.0 EVALUATION OF GRANULAR RESOURCES

2.1 Classification

2.1.1 General

A standard for the classification of granular borrow material does not exist within the study area. The first granular resource inventories in the region, carried out in the early 1970's, classified potential borrow material encountered during exploration according to the Unified Classification System [USC]. However, this general classification proved inadequate because there was no direct reference to the end use of the material.

Several years ago, the Government of the Northwest Territories [GNWT] initiated a classification system whereby potential granular borrow was graded according to its most suitable application. The territorial government's system provided the following five material groups:

- Concrete Aggregate [CA],
- Surfacing Material [SM],
- Base [B],
- Subbase [SB],
- Embankment [E] and
- Rip-Rap.

In 1983, INAC adopted a classification system similar to that presented in the draft Territorial Pits and Quarries Regulations that considered both the USC classification of the material as well as the most suitable end use. This system, modified by INAC, is the basis for all borrow material classification carried out under the current contract.

Materials at prospective borrow sources have been graded into one of the five following classes:

Class 1	Excellent Quality Material,
Class 2	Good Quality Material,
Class 3	Fair Quality Material,
Class 4	Poor Quality Material and
Class 5	Bedrock, Felsenmeer and Talus.

These abbreviated descriptions are elaborated upon in the following subsections of this report.

2.1.2 Class 1

Excellent quality material consisting of clean, well-graded, structurally-sound sands and gravels suitable for use as high quality surfacing materials, or as asphalt or concrete aggregate, with a minimum of processing.

2.1.3 Class 2

Good quality material generally consisting of well-graded sands and gravels with limited quantities of silt. This material will provide good quality base and surface course aggregates or structure-supporting fill. Production of concrete aggregate may be possible with extensive processing, except where deleterious materials are present.

2.1.4 Class 3

Fair quality material consisting generally of poorly-graded sands and gravels with or without substantial silt content. This material will provide fair quality general fill for roads, foundation pads or lay-down yards.

2.1.5 Class 4

Poor quality material generally consisting of silty, poorly-graded, fine-grained sand with minor gravel. These deposits may also contain weak particles and deleterious materials. These materials are considered suitable for marginal general (non-structural) fill.

2.1.6 Class 5

Bedrock of fair to good quality, felsenmeer or talus. Potentially excellent sources of construction material, ranging from general fill to concrete aggregate or building stone if quarried and processed. Also includes erosion control materials such as rip-rap or armour stone.

2.1.7 Summary

The five material classes presented above are summarized in Table 1. For reference purposes, the GNWT's classification system has been correlated in the table with the adopted INAC system.

TABLE 1 GRANULAR MATERIAL TYPES

MATERIAL DESCRIPTION	CLASS	POTENTIAL APPLICATIONS
Excellent quality material consisting of clean, well-graded, structurally-sound sands and gravel suitable for use as high-quality (e.g., runway or roof) surfacing materials, or as asphalt or concrete aggregate, with a minimum of processing.	1	Concrete Aggregate (CA), Surfacing Material (SM)
Good quality material generally consisting of well-graded sands and gravels with limited quantities of silt. This material will provide good quality base and surface course aggregates or structure-supporting fill. Production of concrete aggregates may be possible with extensive processing, except where deleterious materials are present.	2	Concrete Aggregate (CA), Surfacing Material (SM)
Fair quality material consisting generally of poorly-graded sands and gravels with or without substantial silt content. This material will provide fair quality general fill for roads, flexible foundation pads, or lay-down yards.	3	Base (B), Subbase (SB), Embankment (E)
Poor quality material generally consisting of silty, poorly-graded, fine-grained sand, with minor gravel. May also contain weak particles and deleterious materials and are considered suitable only for marginal, general (non-structural) fills.	4	Subbase (SB), Embankment (E)
Bedrock of fair to good quality, felsenmeer, or talus. Potentially excellent sources of construction material, ranging from general fill to concrete aggregate or building stone if quarried and processed. Also includes erosion control materials such as rip-rap or armour stone.	5	Rip-rap, or if processed properly, equivalent to Class 1 or any other class of material.

2.2 Inventory

The calculated volumes of the various types of granular materials available at the examined sources have been divided into various certainty levels, as detailed below. These definitions are consistent with those used by INAC.

2.2.1 Proven

A 'proven' volume is one whose occurrence, distribution, thickness and quality is supported by ground truth information such as geotechnical drilling, test pitting and/or exposed stratigraphic sections. Usually the thickness of material encountered in a borehole is extrapolated to a radius not exceeding 50 metres around the hole.

2.2.2 Probable

A 'probable' volume is one whose existence and extent is inferred on the basis of direct and indirect evidence, including topography, landform characteristics, airphoto interpretation, extrapolation of stratigraphy, geophysical data and/or limited sampling.

2.2.3 Prospective

A 'prospective' volume is one whose existence is suspected on the basis of limited direct evidence, such as airphoto interpretation and/or general geological considerations.

In the context of this project, the uncertainty associated with prospective volumes of granular material varies with the terrain conditions specific to the various communities. For instance, substantial amounts of bedrock are located northwest of the community of Aklavik. Since the bedrock has not been explored in detail, the volume of rock is considered to be prospective. Any exploration would likely result in the prospective volume becoming 'probable' or 'proven'. The situation is very different in the vicinity of Tuktoyaktuk, where granular materials are scarce and landforms are poorly defined. Features that contain 'prospective' volumes of material are often found during detailed investigation to contain little or no useable granular material.

3.0 SUPPLY OF GRANULAR RESOURCES

3.1 General

The amount of information available on the borrow sources in the vicinity of each community varies greatly. This is due in part to the historic level of activity in and around each community, but predominately to the relative supply of acceptable quality borrow within reasonable distance of the community.

Communities whose growth has not been significantly affected by northern petroleum exploration (ie. Holman, Paulatuk and Sachs Harbour) have little formal information regarding the location, size and quality of appropriate borrow sources. As the granular materials demand in general is modest and wholly generated by the community, there is little incentive to undertake borrow material studies provided adequate quantities for current needs exist adjacent to the community. The quality of the borrow materials may not meet desirable standards but this is usually offset by the convenient location. If the borrow performs poorly once in place, it is a simple matter to obtain more material and improve the deteriorating areas.

Communities whose recent growth can be partially attributed to northern petroleum exploration (Inuvik and Tuktoyaktuk) have greater requirements for granular resources. These requirements usually impact both the quality and quantity of borrow materials . Industrial developments usually require large volumes of higher quality material.

The extent of identification and investigation of granular material sources has depended upon local demand. Minimal information is available pertaining to borrow reserves in the vicinity of Holman, Paulatuk and Sachs Harbour. Transport Canada has conducted airphoto studies for the area adjacent to each community, but the results have not been confirmed by field evaluations. Information pertaining to borrow resources for Inuvik and Aklavik is available , however, extensive exploration work has not been undertaken because developed sources have been sufficient to meet the demands.

Tuktoyaktuk is a unique situation with respect to supply of granular materials Although Tuktoyaktuk has grown substantially over the past 10 years and petroleum resource activities have put unusual demands on granular material resources, semi-continuous granular resource exploration activities have generally failed to prove large deposits of quality material within a reasonable distance of the community.

The supply of granular resources for the six western Arctic communities was determined summarizing existing data from site investigations, airphoto interpretation and field reconnaissance of prospective sources. These estimates were made by combining the areal extent of the sources (aerial photography and field measurements) with the stratigraphy determined from test pits and boreholes within the source.

The accuracy of the estimates may not accurately reflect the true situation as detail is lacking for certain sources. Some sources have no ground truthing or very few boreholes and test pits and the depth to which the investigations were completed was often insufficient to reasonably represent the extent of the individual materials within a source. Testing of samples for moisture content or grain size analysis was not necessarily carried out consistently and so designation of a certain class of material to a particular source may be based only upon visual soil description.

Source-by-source descriptions and estimated material volumes are located in the Supply appendix. The following sections describe the supply of granular resources situated on or near 7(1)(a) and 7(1)(b) lands adjacent to the community of Tuktoyaktuk.

3.2 Inuvik

3.2.1 General

Inuvik is located at the base of the Caribou Hills at the eastern margin of the Mackenzie Delta. Granular materials available within the the delta are located on Richards Island, located 80 km NNW of Inuvik. Surficial sediments in the delta are composed of Quaternary fluvial, deltaic and estuarine sediments comprising clay, silt and sand. Coarser glacial sediment overlies the fluvial deposits located on the southern portion of the island Inuvik's high quality granular material requirement is frequently met with Class 2 material from the YaYa lLake pit located on the southern part of Richards Island and from the western flank of the Caribou Hills.

The Caribou Hills consist of poorly indurated conglomerates, quartzitic sandstones and mudstones, except in the vicinity of Inuvik, where the hills are composed of shales. A terrace remnant located on the western flank of the Hills supplies much of Inuvik's requirement for good quality fill.

The Rocky Hills, located 15 km SSE of Inuvik, comprise sandstones and dolomites. Several quarries are established in this area where crushed rock is produced as construction material where higher quality granular resources are required.

A description of the granular resources located within the community's region is presented in the following sections.

3.2.2 Class 1

Figure 4 shows that a relatively small portion of the available granular resources in the Inuvik area are Class 1 materials. Only Source 303 is considered to have any Class 1 material and the potential volume is 1,000,000 cubic metres (Table 7). Source 303 is located approximately 82 km NNW of Inuvik on the shore of the Mackenzie River and environmental constraints along with difficult access may limit the viability of this source as a primary source of Class 1 material.

3.2.3 Class 2

There is a significant volume of Class 2 material within the general Inuvik region (Figure 4). The total probable volume is estimated at 29,146,000 cubic metres and the prospective volume is 53,846,000 cubic metres. The largest single source of Class 2 material is Source 326 with approximately 5,000,000 cubic metres of probable and up to 17,800,000 cubic metres of prospective volume. Inuvik currently obtains a substantial portion of the required Class 2 material from Source I407)Kenaston Pit) , located 61 km NW of the community.. This source has a probable volume of 4,600,000 cubic metres and a prospective volume of 15,000,000 cubic metres. Other sources with substantial volumes within 7(1)(a) lands include 302, 303, 323A, 324a and YaYa Lake. Source 302 has approximately 1,140,000 cubic metres of probable volume: Source 303 has 530,000 cubic metres, Source 323A has 2,500,000 cubic metres and Source 324A has 1,500,000 cubic metres (Table 8). Following extensive exploration , YaYa Lake was predicted to contain a volume of 8,800,000 cubic metres. However, extensive extraction has occurred from YaYa Lake, thus the estimates are not current. All of the sources cited here are a minimum of 50 km distance from Inuvik and access must be by tundra/ice road in winter or barge in summer. Two of the sources (323 and 324A) are

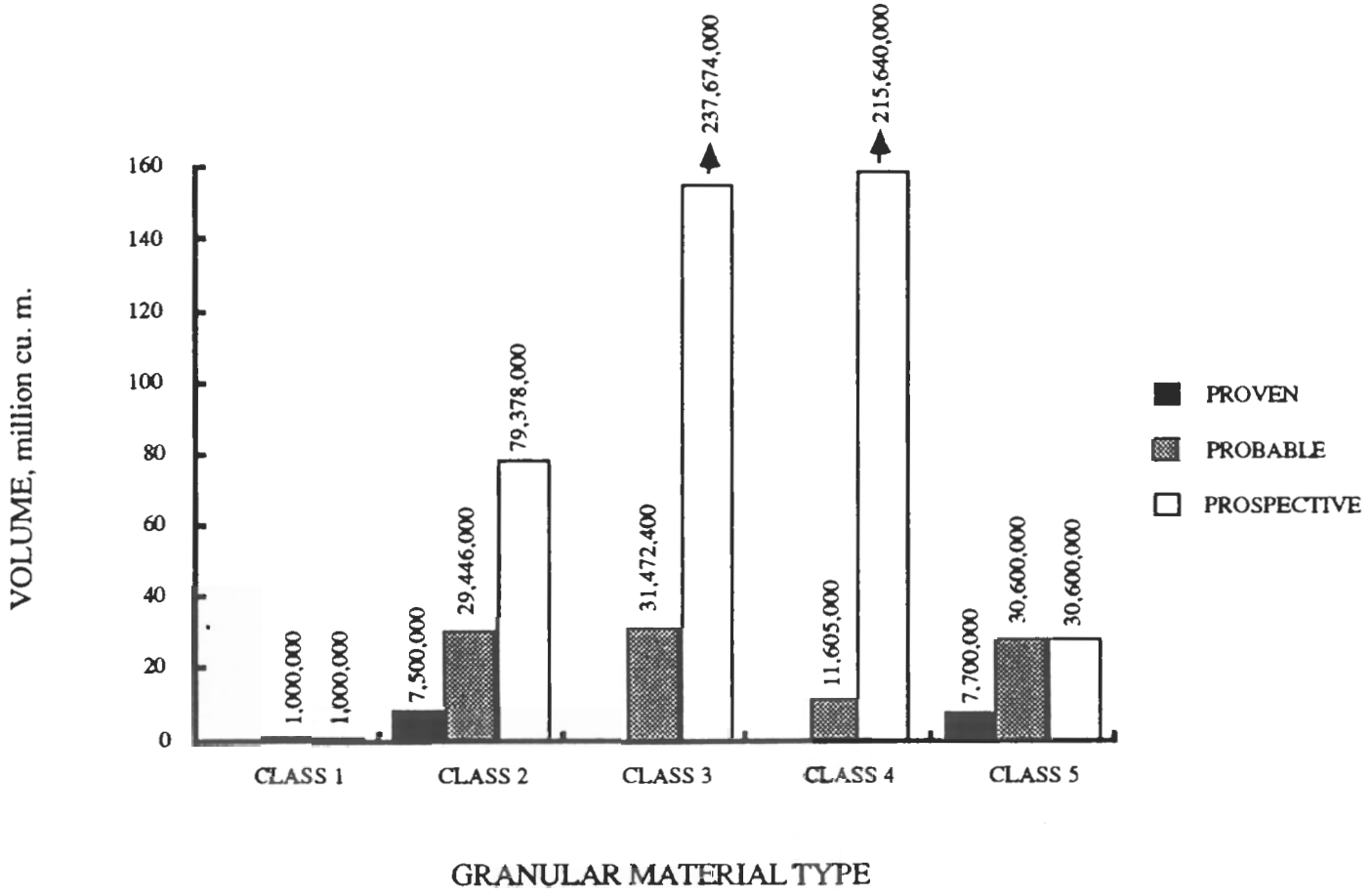


FIGURE 4 SUPPLY OF GRANULAR RESOURCES-INUVIK

TABLE 7 DISTANCE TO CLASS 1 GRANULAR RESOURCES-
INUVIK

SOURCE	DISTANCE (km)	PROVEN (cu. m.)	PROBABLE (cu. m.)	PROSPECTIVE (cu. m.)	CONSIDERATIONS
303	82		1,000,000	1,000,000	River environment, massive ground ice

TABLE 8 DISTANCE TO CLASS 2 GRANULAR RESOURCES-
INUVIK

SOURCE	DISTANCE (km)	PROVEN (cu. m.)	PROBABLE (cu. m.)	PROSPECTIVE (cu. m.)	CONSIDERATIONS
2.46	20			25,000	
2.45	25			25,000,000	Lake environment
323A	54		2,500,000	2,500,000	IBP
315	58		4,600,000	4,600,000	River environment, massive ground ice
318	61		1,500,000	1,500,000	Lake environment, massive ground ice
324A	61			1,500,000	IBP
I407	61		4,600,000	15,000,000	River environment
319	64		230,000	230,000	Difficult access, massive ground ice
326	65		5,000,000	17,800,000	River environment, massive ground ice
320	70		223,000	223,000	Massive ground ice
302	80		1,140,000	1,140,000	Massive ground ice
204	80		300,000	300,000	Massive ground ice
303	82		530,000	530,000	River environment, massive ground ice
YaYa	90	7,500,000	8,800,000	8,800,000	Extensive development has occurred
215	100		23,000	23,000	River environment

within a proposed International Biological Programme Area (IBP), and development may be restricted. A very small source, 215, is available within the 7(1)(b) lands approximately 100 km north of Inuvik, but the probable volume of Class 2 material is only about 23,000 cubic metres thus development of thus source is probably not economic.

3.2.4 Class 3

The volume of prospective Class 3 material is the largest of all materials available in the Inuvik region. Figure 4 shows that nearly 155,000 000 cubic metres may be realized. There is nearly 32,000,000 probable cubic metres. Fifteen of the twenty-eight sources considered in the Inuvik region have a supply of probable and prospective Class 3 material (Table 9). The largest single source of prospective Class 3 material within the Inuvik 7(1)(a) lands is Source 324A with nearly 46,000,000 cubic metres. Up to 1,500,000 cubic metres could be extracted annually from this source, yielding a source life of nearly thirty years. Probable volumes are in the order of 10,000,000 cubic metres. Source 324A, located 61 km NW of Inuvik is however, within a proposed IBP area. No proven resources have been determined at this source. The next largest prospective source is Source 323A, also within a proposed IBP area, with a volume of 43,510,000 cubic metres. Probable volumes of Class 3 material are approximately 9,000,000 cubic metres. Major volume sources in ordeer of descending size after these two are: 326,303,222, and 317. Overall there no proven resources of Class 3 material in the region.

3.2.5 Class 4

The total volume of probable Class 4 material in the Inuvik region is about 12,000,000 cubic metres. The prospective total is approximately 36,000,000 cubic metres (Figure 4). There are no proven sources of Class 4 material in the region. The largest single source of Class 4 material in the region is Source 322 with a total prospective volume of 9,600,000 cubic metres (Table 10). Source 322 is located within 7(1)(a) land approximately 55 km NW of Inuvik and within a proposed IBP area. An alternative source, closer to Inuvik and outside Inuvik ILA lands is I405A, located 27 km ESE of Inuvik and has a potential recoverable volume of 13,000,000 cubic metres of Class 4 material. Another source, 214, located in 7(1)(b) lands, 100 km north of Inuvik has a prospective

TABLE 9 DISTANCE TO CLASS 3 GRANULAR RESOURCES-
INUVIK

SOURCE	DISTANCE (km)	PROVEN (cu. m.)	PROBABLE (cu. m.)	PROSPECTIVE (cu. m.)	CONSIDERATIONS
I401A	10		750,000	1,020,000	Poor quality
I406	21		7,400	30,000	River environment
2.44	30			100,000,000	
316	50		765,000	765,000	River/lake environment
317	50		1,150,000	1,150,000	Lake environment, massive ground ice
323A	54		9,000,000	43,510,000	IBP
322	55		155,000	155,000	Massive ground ice, fair quality
324A	61			45,680,000	IBP
319	64		345,000	345,000	Massive ground ice
326	65		10,000,000	35,700,000	River environment, massive ground ice
321	69		765,000	765,000	Difficult access
320	70		892,000	892,000	Massive ground ice
303	82		1,320,000	1,320,000	River environment, massive ground ice
214	100		300,000	300,000	River environment
215	100		23,000	42,000	River environment
222	100		6,000,000	6,000,000	Thick overburden, massive ground ice

TABLE 10 DISTANCE TO CLASS 4 GRANULAR RESOURCES-
INUVIK

SOURCE	DISTANCE (km)	PROVEN (cu. m.)	PROBABLE (cu. m.)	PROSPECTIVE (cu. m.)	CONSIDERATIONS
I405A	27		4,000,000	13,000,000	Poor quality
2.43	28			180,000,000	
322	55		610,000	9,695,000	Massive ground ice, fair quality
319	64		575,000	575,000	Massive ground ice
300A	73		600,000	600,000	Poor quality
301	76		3,000,000	3,000,000	Massive ground ice
303	82		1,320,000	1,320,000	River environment, massive ground ice
214	100			5,950,000	River environment
222	100		1,500,000	1,500,000	Massive ground ice

TABLE 11 DISTANCE TO CLASS 5 GRANULAR RESOURCES-
INUVIK

SOURCE	DISTANCE (km)	PROVEN (cu. m.)	PROBABLE (cu. m.)	PROSPECTIVE (cu. m.)	CONSIDERATIONS
I402	10	4,600,000	4,600,000	4,600,000	Existing quarry
I404	16	500,000	500,000	500,000	Existing quarry
I403	18	2,000,000	2,000,000	2,000,000	Existing quarry
R28/29	20		20,000,000	20,000,000	River access
DPW Pit	22	600,000	3,500,000	3,500,000	Existing quarry

total volume of 5,950,000 cubic metres. Other sources within ILA lands that must be considered viable are 222,300A,301A and 303. Source 319, outside of the Inuvik ILA lands, 64 kn north of Inuvik , is another potential source.

3.2.6 Class 5

All of the sources of Class 5 material within the general Inuvik region are outside of ILA lands. The sources are close to Inuvik but are south and southeast of the town (Table 11). These sources include I402, I403, I404, and R28 and R29. Sources I402, I403, and I404 are quarries presently in use. Sources R28 and R29 are potentail sites for future quarries and have the largest potential volume ar 20,000 000 cubic metres. No detailed site investigations have been carried out here; as such no proven volumes are identified. Source I402 has proven volumes of 4,600,000 cubic metres; Source I403 has 2,000,000 cubic metres and Source I404 has 500,000 cubic metres. Access to the existing quarries is good while presently there is no access to Sources R28 and R29.

4.0 DEMAND FOR GRANULAR RESOURCES

4.1 General

The purpose of the demand model was to determine the requirements for granular materials within the study area for a period encompassing the next 20 years. The needs of the model required that a substantial amount of specific information be obtained. This information consisted of descriptions of proposed types of projects and end users of the granular material, as well as material type and volume requirements.

The first step in compilation of the demand model was the identification of individuals and groups likely to have granular material demands or, alternatively, be concerned with the use of granular materials in general. A list of potential respondents was prepared by identifying the various departments in all levels of government involved with civil-oriented community projects and by forming a list of contractors residing or prominent in each community. A questionnaire was then assembled and distributed.

The questionnaire was designed to determine the need for various quantities of selected types of granular materials and to indicate the end use of the material. The questionnaire recipient was also asked to indicate, if possible, the likely or preferred source of the granular materials for each project or material type. In an attempt to quantify the rate of granular material demand, information was requested to be submitted in four data blocks, each five years in length.

Shortly after submission of the questionnaires, two EBA representatives, Messrs. D. Hayley, P. Eng., and J. Carss, P. Eng., visited each project community, as well as Yellowknife and Cambridge Bay, to meet with recipients of the questionnaires and other representatives of the local community to discuss their specific requirements for granular materials. This not only provided direct contact with most of the users and regulators of granular materials but also permitted the EBA representatives to become familiar with local conditions regarding granular resources.

Recipients of the questionnaire who were not visited were contacted by telephone, where possible, to ensure that all possible input was obtained and to clarify any questions or ambiguities that developed regarding the information sought by the questionnaire. The data collected was then assembled into a computerized data base to facilitate data handling and interpretation.

A large number of respondents defined material quality in terms other than those in the INAC classification system that was outlined in the questionnaire. Table 1 presents the current interpretation of these various classes of required materials in light of the INAC classification system.

The process of data assimilation indicated that a project requiring granular materials could best be described as belonging to one of three categories: planned capital projects, speculative projects and maintenance. While the demand generated by all three project categories may be somewhat speculative, the 'speculative' projects category specifically refers to large scale projects that may or may not occur within the next 20 years. These projects usually involve a political decision and require a substantial committment of both funding and granular materials and typically involve projects such as airstrips, lengthy highways and construction of infrastructure for the production of oil and gas.

The total demand for granular materials in all of the Western Arctic communities is graphically presented in Figure 8. The total demand for granular materials for the years 1987 to 2007 has been estimated at 17.4 million cubic metres. Ninety-two percent of the demand (16 million cubic metres) is for projects that have been described as speculative, five percent of the demand (0.8 million cubic metres) has been indicated for planned capital projects and three percent of the demand (0.6 million cubic metres) has been designated for maintenance. Most of the demand is created by the various levels of government, with expansion of private industry requiring only three percent of the non-speculative capital project demand.

Despite the attempt of the questionnaire to determine the 20-year demand in 5-year blocks, most data received did not contain any specific 5-year information for non-speculative capital projects beyond 1991. The reasons for this occurrence appear to be two-fold: first, the Territorial Government uses an annually up-dated 5-year plan for budgeting capital expenditures; and second, most of the communities will acquire their basic facilities (ie. schools, nursing stations, government offices, etc.) within the next five years.

Projects designated as speculative appear to require 38 percent of the designated 16 million cubic metres within the next five years and 62 percent thereafter. This break-down is likely as speculative as the projects themselves, since it predominately reflects the desire for the project to occur in the near future. In contrast to the public/private split

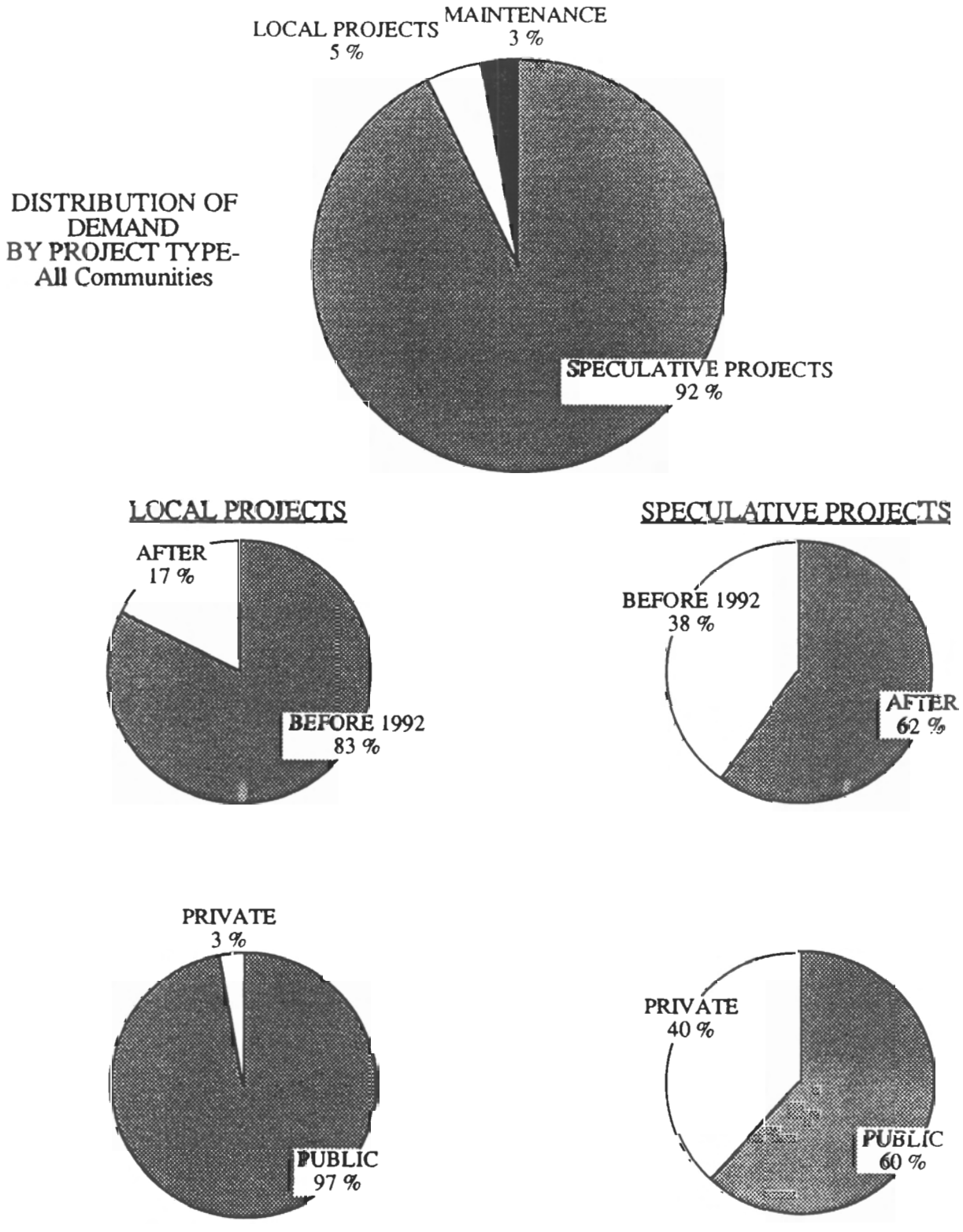


FIGURE 8 GRANULAR RESOURCES DEMAND SUMMARY- ALL COMMUNITIES

on local capital projects, private industry envisages requiring 40 percent (6.9 million cubic metres) of the total speculative demand.

The following subsections present and discuss the demand data collected. Granular material requirements for the projects identified within the area of the community are presented and summarized in the Demand appendix. Figures presenting the required volume of each class of material for Inuvik are contained in the following text.

4.2 Inuvik

4.2.1 General

Inuvik's 20- year granular material demand consists of 70,200 cubic metres for local capital projects, 107,000 cubic metres for maintenance and 7,400,000 cubic metres for speculative projects consisting of a proposed expansion of Esso's tank farm, the Inuvik portion of the proposed Inuvik-Tuktoyaktuk highway and production of rip-rap for offshore production facilities. All of the capital projects demand is required within the next five years, with most of the material required for public projects. A demand of only ten cubic metres has been identified for individual use, while private corporate use will require 1683 cubic metres. A summary of material demand by material class including speculative projects is presented in Figure 13; a cumulative summary of demand is contained in Figure 14. Figures 15 and 16 present the same information, excluding speculative projects, respectively.

North Star Service and Construction Ltd., one of the areas largest contractors, has identified an immediate 5-year demand of 55,000 cubic metres, based on their familiarity with the community. A substantial portion of this material would be for small public capital and maintenance projects; only a small amount would be for individual and private corporate use.

Inuvik is the only rate-based community investigated in this study. Because of this distinction, the civic government has a much greater responsibility in the planning of local projects. From the survey it is apparent that the mature state of Inuvik and the present economic climate combine to create a relatively low overall demand for granular materials. Speculative ventures such as the Inuvik-Tuktoyaktuk highway and the Mackenzie Valley Pipeline play a very important role in the growth of the community. If construction of a pipeline were to be

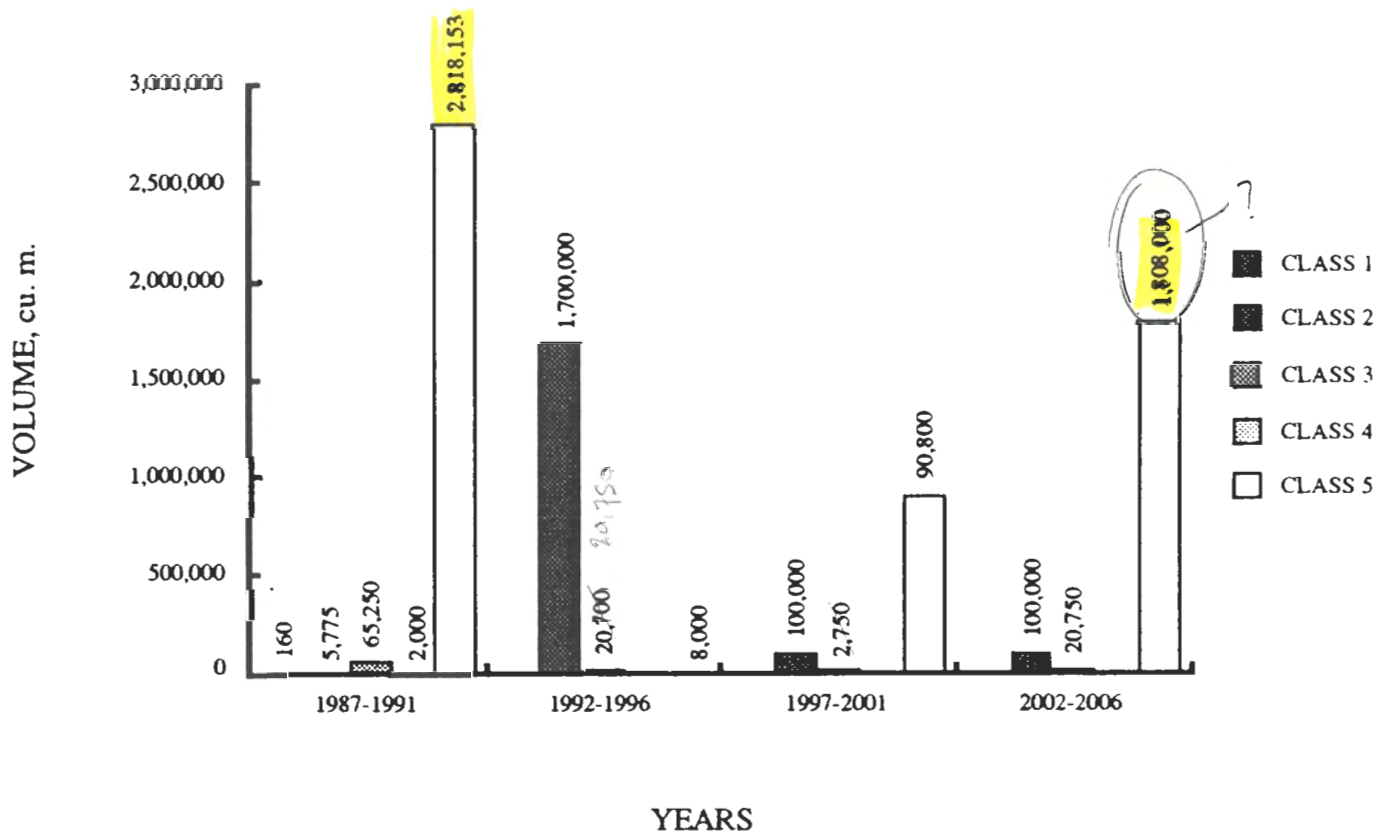


FIGURE 13 DEMAND FOR GRANULAR RESOURCES-INUVIK (WITH SPECULATIVE PROJECTS)

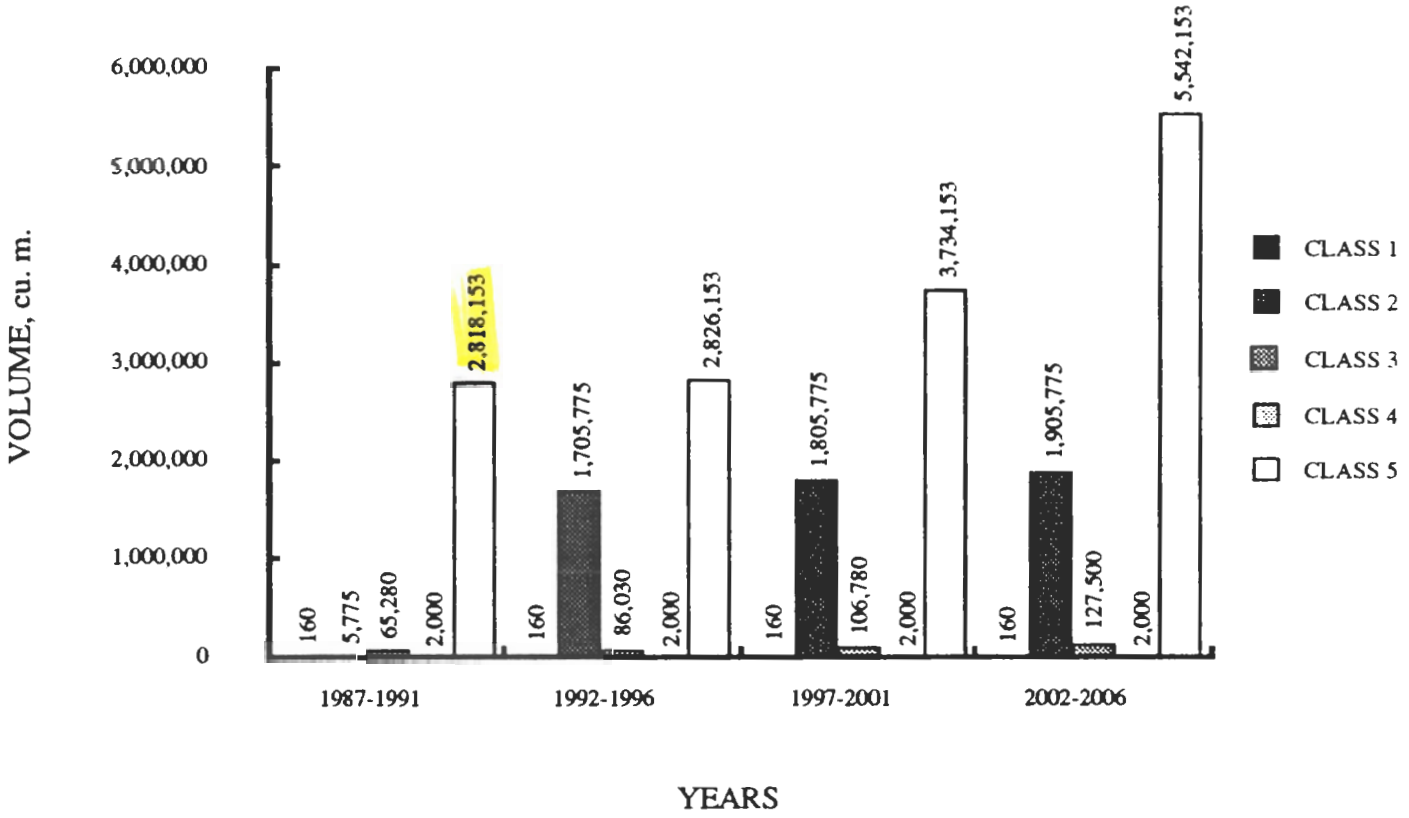


FIGURE 14 CUMULATIVE DEMAND FOR GRANULAR RESOURES-INUVIK (WITH SPECULATIVE PROJECTS)

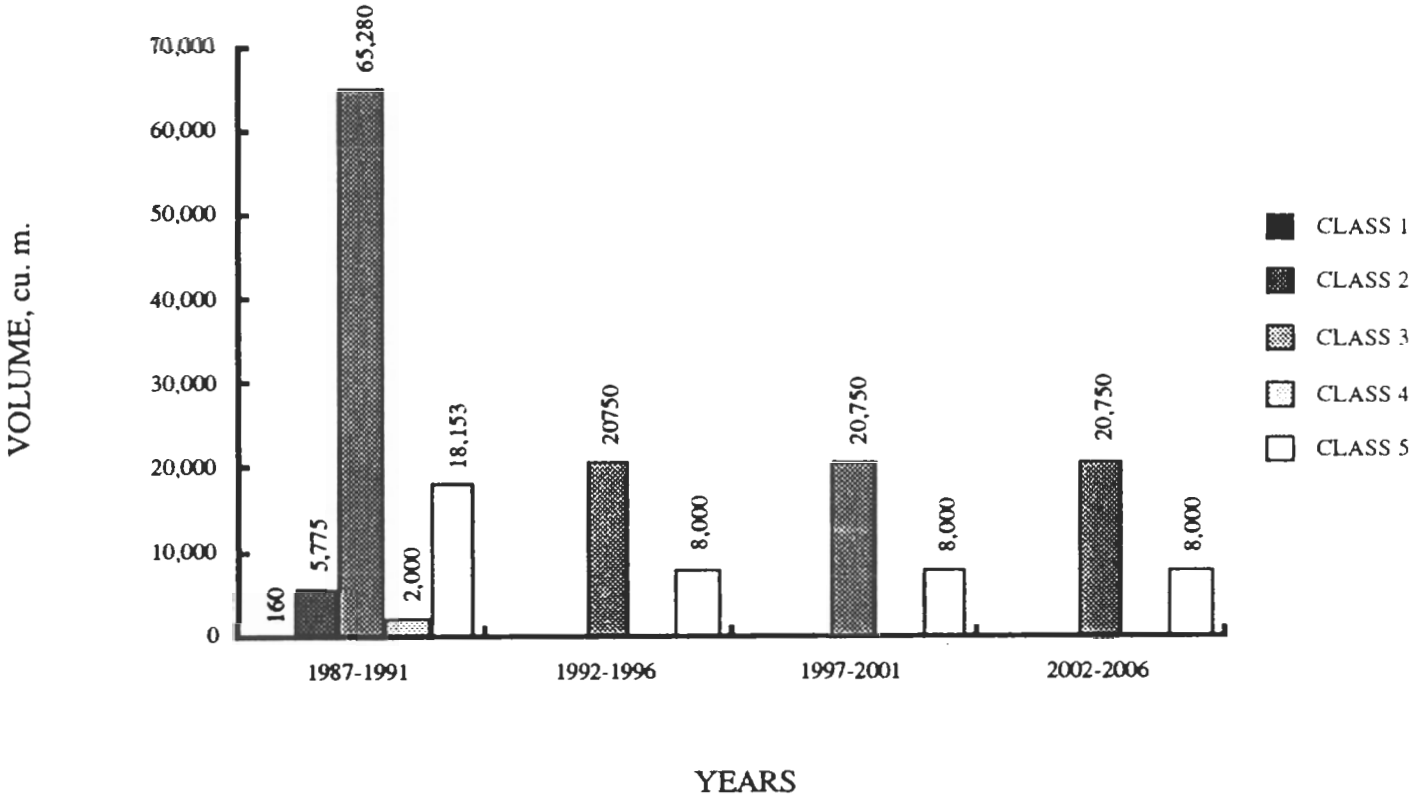


FIGURE 15 DEMAND FOR GRANULAR RESOURCES-
INUVIK (WITHOUT SPECULATIVE PROJECTS)

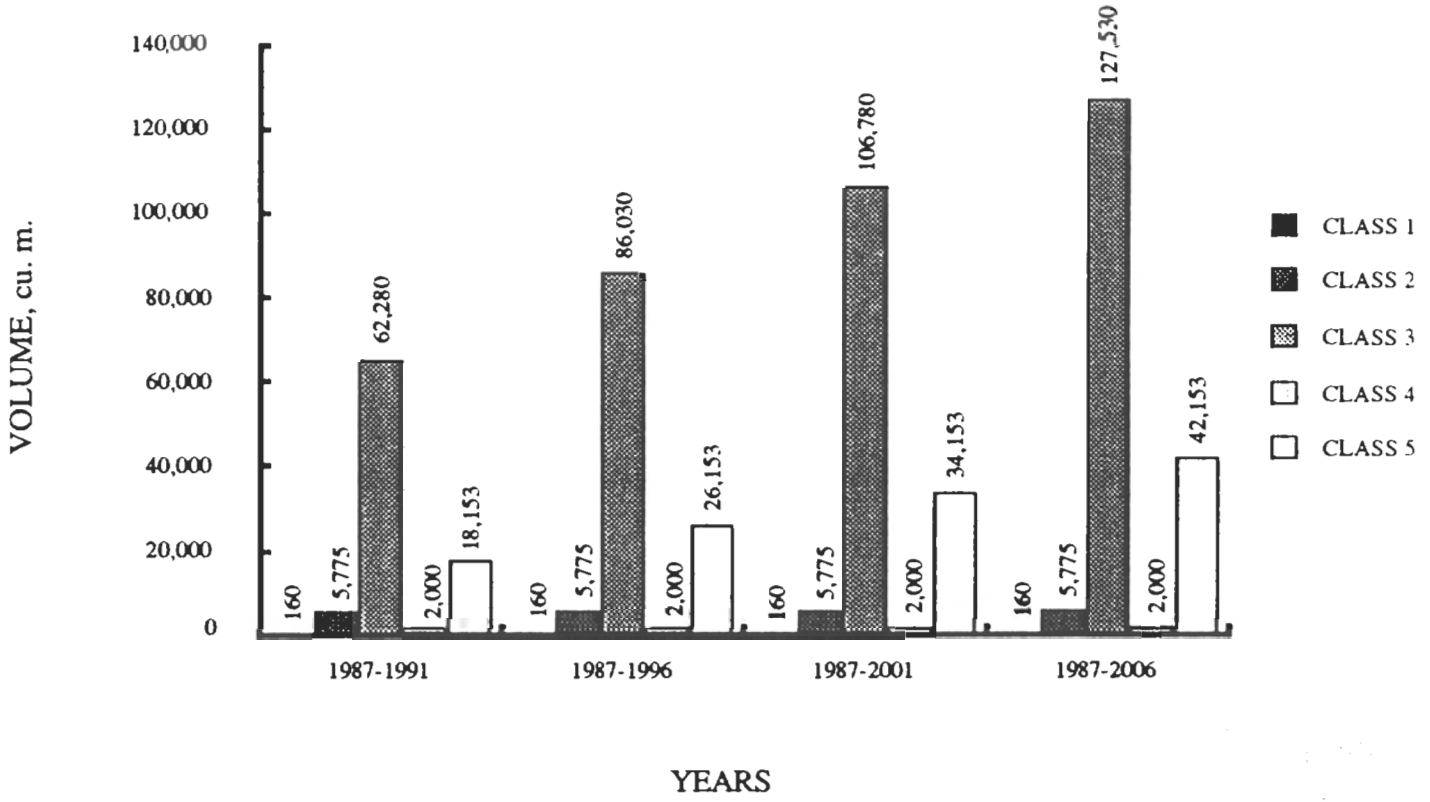


FIGURE 16 CUMULATIVE DEMAND FOR GRANULAR RESOURCES-INUVIK (WITHOUT SPECULATIVE PROJECTS)

initiated planners have projected that Inuvik's population could increase by an order of magnitude to about 25,000. This sudden community growth would create an extraordinary demand for granular materials that has not been accounted for in this study. Construction of the Inuvik-Tuktoyaktuk highway would not create a substantial demand through community growth, but would create a substantial demabd through the requirements for road fill and surfacing materials. The initiation of either project could be the impetus that would stimulate more demand by the communtiy for projects not identified in the survey

4.2.2 Class 1

Inuvik has generated a demand for 150 cubic metres of Class 1 material for the years between 1987 and 1991, inclusive. There have been no indicated requirements for any Class 1 material beyond 1991.

4.2.3 Class 2

The Class 2 granular material requirement is 1,960,000 cubic metres. This demand is split disproportionately between each of the four time periods, with a demand of 5775 cubic metres in the first five years, 1,7 million cubic metres in the second five years and 100,000 cubic metres in each of the last five year blocks. Demands over the last 15 years of the study period (1992 through 2006) are created by the proposed Tuktoyaktuk -Inuvik highway and therefore are considered speculative.

4.2.4 Class 3

Requirements for Class 3 material are 65,280 cubic metres for the years 1987 through 1991, with each of the the subsequent 5-year blocks requiring 20,750 cubic metres. The bulk of this demand is for material to be used for road maintenance and other general public projects

4.2.5 Class 4

Only 2,000 cubic metres of Class 4 granular material are required durin the first five years of the study period, with no apparent requirement for material of this

type in the subsequent years under study. The demand is generated by landscaping activities at Chuk Park.

4.2.5 Class 5

Slightly more than 5.5 million cubic metres of Class 5 material are required over the next 20 years. For the period 1987 to 1991, the demand is 2,818,153 cubic metres; from 1992 to 1996, 8,000 cubic metres; from 1997 to 2001, 908,000 cubic metres and from 2002 through 2007, 1,808,000 cubic metres. Most of the indicated demand is speculative in nature, with the demand for Class 5 material only 42,153 cubic metres, excluding the speculative projects.

The proposed Inuvik-Tuktoyaktuk highway would be responsible for generating a demand of 2.8 million cubic metres between 1987 and 1991. Erosion protectionmaterial for proposed oil and gass production facilities located in the Beaufort Sea accounts for a further 2.7 million cubic metres of Class 5 material.

5.0 DEVELOPMENT SCENARIOS

5.1 Inuvik- Speculative Projects Included

5.1.1 General

A substantial portion of Inuviks granular material is currently obtained from the Boot Lake pit, which is located on the southeast edge of the town. The material from this pit is only of fair quality, as it can cotain substantail amounts of fines (silt and clay), but has been used for construction of a large part of the town. Also used during town construction was shale from a pit located several kilometres southeast of the community; however, this material us of very poor quality and is no longer considered useful.

High quality granular material is available from two quarries located south of Inuvik. Currently in use are tthe Campbell Lake and Transport Canada quarries, which serve local and airstrip demands, respectively. Several other prospective quarry sites are present, but previous demands have not justified further development.

The granular resource development scenario propsed for Inuvik, considering all speculative projects ia summarized in Table 24 and discussed in the following sections.

5.1.2 Class 1

Inuvik has expressed only minimal demand for Class 1 granular material. The demand may be satisfied adequately by better sections of the YaYa Lake pit, the prominent supply of Class 2 material in the Inuvik area. Alternatively, processed Class 5 material from Source I403 (Campbell Lake Quarry) may be suitable for meeting the expressed requirement.

5.1.3 Class 2

The demand for Class 2 material in Inuvik proper is modest, occurs only over the first five years of the study period, and can adequately be provided for by the YaYa Lake source or by Source I407. Demands for Class 2 material in subsequent years are generated by a speculative project, the Inuvik -Tuktoyaktuk highway. Between 1992 and 1996, 1.7 million cubic metres of Class 2 granular

resource will be required for the portion of the highway extending from Inuvik to the vicinity of the Eskimo Lakes. There are limited reserves of all materials except Class 5 material in the Inuvik region and it is recommended that this rather substantial volume of material be acquired in the vicinity of Eskimo Lakes, specifically from Sources 312 and 314. This represents a long haul distance but no significant sources of Class 2 material occur between the Lakes and Inuvik.

Granular material requirements of the highway following construction are more modest, but will probably need to be obtained from 312 and 314 as well.

5.1.4 Class 3

Class 3 requirements are moderate, given the size of Inuvik. Speculative projects do not impose any additional demands to those expressed for local projects. Unfortunately Inuvik does not have any adjacent sources of Class 3 material. The closest pit is I407, located 61 km down-river from the town, with an alternative being the YaYa Lake development. Either of these sources should be able to adequately supply Inuvik's needs. The choice pit should be a function of the quantity to be hauled at a given time and the size of the operation extracting borrow.

5.1.5 Class 4

Inuvik has indicated a requirement for only 2,000 cubic metres of Class 4 granular material. It is recommended that this volume and any other low quality fill required, be obtained from t Source I400, the Boot Lake pit. This source has been considered depleted for several years but the town still manages to obtain material from it. Given the small demand for material of this type, I400 should continue in its role as the prominent source of Class 4 material in the area. Efforts should be made to 'clean-up' and recontour the pit during recovery of borrow in the future since the pit will eventually be abandoned.

5.1.6 Class 5

Substantial demand for Class 5 material exists both in the short and long term. Volumes required for local projects are modest compared to the volumes demanded by the speculative projects. These projects, consisting of construction of the proposed Inuvik -Tuktoyaktuk highway and production of material for

erosion protection projects associated with proposed offshore petroleum production facilities, require 2.8 and 2.7 million cubic metres of Class 5 material, respectively. The most prominent source of Class 5 borrow in the vicinity of Inuvik is the R28/29, bedrock exposure, located 20 km south of Inuvik and it is recommended that this source be developed as the major supply of borrow for large projects. Alternatively, large scale development could also occur at the DPW pit located 25 kilometres southeast of Inuvik and Source I403. The selection of the most appropriate alternative should be made on the basis of economics, available volume and material quality.

Local requirements, consisting of town-related small capital projects and maintenance projects and airstrip maintenance, should continue to be supplied from Source I403 (Campbell Lake Quarry) and Source I402 (the Transport Canada Quarry) , respectively.

5.2 Inuvik- Speculative Projects Excluded

5.2.1 General

A substantial portion of Inuviks granular material is currently obtained from the Boot Lake pit, which is located on the southeast edge of the town. The material from this pit is only of fair quality, as it can cotain substantail amounts of fines (silt and clay), but has been used for construction of a large part of the town. Also used during town construction was shale from a pit located several kilometres southeast of the community; however, this material us of very poor quality and is no longer considered useful.

High quality granular material is available from two quarries located south of Inuvik. Currently in use are tthe Campbell Lake and Transport Canada quarries, which serve local and airstrip demands, respectively. Several other prospective quarry sites are present, but previous demands have not justified further development.

The granular resource development scenario proposed for the community of Inuvik, considering only non-speculative projects, is presented in the following sections. The scenario is similar to that presented above for all projects and is presented in Table 25. Inuvik does not have sufficient reserves of all borrow

TABLE 24 GRANULAR RESOURCE UTILIZATION-
INUVIK
(With Speculative Projects)

MATERIAL		1987-1991	1992-1996	1997-2001	2002-2006
CLASS 1	Demand, cu. m.	160			
	Source(s)	YaYa			
CLASS 2	Demand, cu. m.	5,775	1,700,000	100,000	100,000
	Source(s)	YaYa/I407	312/314	312/314	312/314
CLASS 3	Demand, cu. m.	65,280	20,750	20,750	20,750
	Source(s)	YaYa/I407			
CLASS 4	Demand, cu. m.	2,000			
	Source(s)	I400			
CLASS 5	Demand, cu. m.	2,818,153	8,000	908,000	1,808,000
	Source(s)	R28/29/	I402	R28/29 (900,000)	R28/29 (1,800,000)
	Source(s)	I403/DPW (2,800,000)		I402 (8,000)	I402 (8,000)
	Source(s)	I402 (8,000)			
	Source(s)	I403 (10,153)			

NOTES:
1. Source I400 (the Boot Lake pit) has been considered to be depleted for a number of years, but the Town continues to obtain borrow material from it.
2. Source I402 is the Transport Canada pit, I403 is the Campbell Lake Quarry. Source R28/29 is recommended for production of material for erosion protection for offshore structures. Material required for construction of the Tuktoyaktuk-Inuvik highway can be obtained from Source R28/29, Source I403 or the DPW pit.
3. Class 2 material for construction of the Tuktoyaktuk-Inuvik highway will also be obtained from numerous small borrow sources along the route, but 312 and 314 offer the most substantial reserve of this type of material in the area.

TABLE 25 GRANULAR RESOURCE UTILIZATION-
INUVIK
(Without Speculative Projects)

MATERIAL		1987-1991	1992-1996	1997-2001	2002-2006
CLASS 1	Demand, cu. m.	160			
	Source(s)	YaYa			
CLASS 2	Demand, cu. m.	5,775			
	Source(s)	YaYa/I407			
CLASS 3	Demand, cu. m.	65,280	20,750	20,750	20,750
	Source(s)	YaYa/I407	YaYa/I407	YaYa/I407	YaYa/I407
CLASS 4	Demand, cu. m.	2,000			
	Source(s)	I400			
CLASS 5	Demand, cu. m.	18,153	8,000	8,000	8,000
	Source(s)	I402 (8000)	I402	I402	I402
	Source(s)	I403 (10,153)			

NOTES:
1. Source I400 (the Boot Lake pit) has been considered to be depleted for a number of years, but the Town continues to obtain borrow material from it.
2. Source I402 is the Transport Canada pit, I403 is the Campbell Lake Quarry.

materials except Class 5 within the immediate vicinity to substantially alter the proposed development scenario.

5.2.2 Class 1

Inuvik has expressed only minimal demand for Class 1 granular material. The demand may be satisfied adequately by better sections of the YaYa Lake pit, the prominent supply of Class 2 material in the Inuvik area. Alternatively, processed Class 5 material from Source I403 (Campbell Lake Quarry) may be suitable for meeting the expressed requirement.

5.2.3 Class 2

The demand for Class 2 material in Inuvik proper is modest, occurs only over the first five years of the study period, and can adequately be provided for by the YaYa Lake source or by Source I407. The actual source utilized at a given time should depend on economics and the total demand for both Class 1 and Class 2 material.

5.2.4 Class 3

Class 3 requirements are moderate, given the size of Inuvik. Speculative projects do not impose any additional demands to those expressed for local projects. The closest pit is I407, located 61 km north of the town, with an alternative being the YaYa Lake development. Either of these sources should be able to adequately supply Inuvik's needs. The choice pit should be a function of the quantity to be hauled at a given time and the size of the operation extracting borrow.

5.2.5 Class 4

Inuvik has indicated a requirement for only 2,000 cubic metres of Class 4 granular material. It is recommended that this volume and any other low quality fill required, be obtained from Source I400, the Boot Lake pit. This source has been considered depleted for several years but the town still manages to obtain material from it. Given the small demand for material of this type, I400 should continue in its role as the prominent source of Class 4 material in the area.

Efforts should be made to 'clean-up' and recontour the pit during recovery of borrow in the future since the pit will eventually be abandoned.

5.2.6 Class 5

Local requirements, consisting of town-related small capital and maintenance projects (10,153 cubic metres) and airstrip maintenance (8,000 cubic metres) should continue to be supplied from Source I403 (campbell Lake Quarry) and Source I402 (the Transport Canada Quarry), respectively.

6.0 BORROW SOURCE DEVELOPMENT RECOMMENDATIONS

6.1 General

The following sections present guidelines and recommendations for developing a management plan.

These recommendations have taken into consideration information presented in the Environmental Guidelines: Pits and Quarries Handbook (Indian and Northern Affairs Canada, 1983), and the draft Territorial Lands and Public Lands Pits and Quarries Regulations. The ILA currently do not have regulations governing pits and quarries, but generally follow the guidelines suggested in the above documents.

6.2 Objectives

Site-specific management plans must consider the requirements and constraints of regional borrow demand and availability. Each plan should ensure that economical recovery of quality granular materials is achieved at each pit while minimizing the adverse environmental impact. The environmental impact on the region can be minimized by restricting granular recovery operations to a select number of pits, realizing that maximum extraction from a pit will likely cause a slight rise in material cost. This cost increase must be weighed against the environmental costs associated with high grading the better drained surface materials. This local practice frequently results in numerous smaller pits being worked simultaneously or sequentially. Pit management plans should be developed primarily to maximize the utilization of limited resources and to minimize environmental disturbance.

6.3 Pit Access

Access to sources of granular material should be by the most economical, least environmentally damaging manner. Areas with granular resources located nearby (Inuvik, Holman, Paulatuk and Sachs Harbour) can access certain resources with all weather roads. Areas with distant resources (Aklavik and Tuktoyaktuk) can usually only obtain borrow in the winter by tundra/ice roads or in the summer by barge, if the sources are located adjacent to a waterway.

Summer operations would require construction of temporary access roads from the sources and docking facilities for barges. The construction of these facilities would

probably require large quantities of granular materials, and would significantly reduce the recoverable volumes.

6.4 Pit Development

6.4.1 Site Preparation Work

Site preparation should be conducted in advance of excavation to prevent contamination of granular materials. This preparation also should preferably be carried out in winter to minimize disturbance to the surrounding terrain. Snow should be cleared from both the area to be excavated and yard areas and placed so as to minimize subsequent pit infilling by drifting snow. Topsoil consisting of peat and organic soils, while typically scarce, should be stripped where possible and stockpiled or windrowed at the edges of the pit area. Windrows should be placed parallel to slope direction to prevent ponding of surface water during spring, or contamination of granular materials. Inorganic overburden materials should be stripped and placed in separate stockpiles or windrows, with similar consideration of drainage considerations. The stripped materials are to be reserved for reclamation purposes. Disturbed areas must be kept to a practical minimum.

6.4.2 Extraction Methods

Winter recovery operations will normally consist of the ripping of friable frozen granular material and pushing it into temporary windrows or stockpiles for loading. This type of extraction can be conducted with conventional equipment including bulldozers with rippers, loaders, and trucks. Poorly-bonded or friable granular material will usually be located near the surface of deposits that exhibit positive relief. If an insufficient volume of material cannot be obtained through ripping, blasting will be necessary.

Summer operations will typically consist of stripping and windrowing or stockpiling thawed layers of granular material with bulldozers, commencing when thaw has progressed about 0.5 m into the deposit. The cycle of operation is largely dependent on the rate of thawing, and the drainage considerations. This method allows potentially greater annual recovery by progressively increasing the amount of thawed material, and it may enhance drainage of the material in stockpiles or windrows.

Experience has shown that winter excavation of frozen stockpiles windrowed the previous summer, may be just as difficult as winter excavation directly from the borrow source unless the stock pile process results in a significant reduction in natural moisture content. Moisture reduction from 10 percent in situ to 5 percent in a stockpile has been achieved by use of conveyors during favourable summer conditions (Hayley and MacLeod, 1977). Frozen gravel stockpiles with a moisture content less than 5 percent are usually sufficiently friable for direct loading without ripping.

Drilling and blasting of frozen ground in the winter has proven cost effective for larger operations. The techniques developed and used extensively at Prudhoe Bay, Alaska, is to remove gravel in lifts 5.5 m thick, by drilling shot holes 6 m deep on a 3 m pattern. Load factors are typically 0.9 kg of ANFO explosive per cubic metre of gravel to create manageable size chunks. Typical specifications for Alaska winter construction restrict the size of frozen gravel chunks to 200 mm.

6.4.3 Treatment of Massive Ice

Logistical constraints caused by massive ice during summer development of YaYa Lake pit are described by Hayley and MacLeod (1977). Where practical, the extent of massive ice in a prospective deposit should be defined prior to pit development. The development plans should include methodology for coping with ice bodies as they are encountered.

Where practical, large bodies of massive ice should be avoided. Thin, or less extensive massive ice within the granular material at higher elevations should be excavated and wasted, or exposed to permit thawing during the summer months. Drainage must be considered with either method of disposal.

Relatively thin layers of massive ice at depth may be permitted to thaw provided all overlying recoverable granular materials are removed during one extraction season. Formation of thaw ponds as ice melts during the summer is inevitable in this situation. Appropriate measures must be taken to control drainage and to protect, and ensure access to, adjacent recoverable granular materials.

It may be desirable to identify and preserve thicker ice bodies at depth. If this material thaws it is likely to prevent recovery of adjacent materials, or result in

major disturbance of the surrounding areas. A minimum cover of 1.5 m of granular material should be left as insulation over massive ice to prevent excessive thawing. Criteria for establishing the minimum thickness of massive ice beds which should be preserved is influenced by topographic relief, thickness and extent of granular materials, and the effect of thaw ponds on surrounding terrain. Operators involved with large extraction operations may simply wish to excavate and waste the ice.

6.4.4 Drainage Considerations

Adequate drainage of pit areas must be maintained to ensure availability of recoverable granular material and to attain required annual extraction rates. Higher moisture contents inhibit thawing, increase excavation costs and reduce material quality. Small amounts of meltwater runoff from ice bonded and thinly ice-lensed granular materials could be allowed to seep into the surrounding terrain. Larger amounts of runoff, from thawing of large massive ice bodies, should be directed to retention ponds or sumps excavated in the pit floor. Where gravity drainage is possible, natural ponds or drainage ditches may be effective at removing water from the site. However, excavated ditches are generally ineffective in areas of high ice content.

It is essential that pit drainage facilities be maintained and updated frequently to ensure that moisture drains away from the working face, and that ponded runoff does not accumulate on recoverable granular material. Where thaw ponds are allowed to form by exposing buried massive ice, or where collection ponds are created, care should be taken to preserve and maintain access to adjacent recoverable granular materials. A development plan to adequately account for pit drainage is particularly important where summer extraction operations are employed.

6.4.5 Waste Material

All lenses of fine-grained material (silts and clays) found within the granular deposit, should be stripped and wasted. Waste material should be stockpiled near the stockpiled overburden for use in pit reclamation. Fine-grained waste material at depth will undoubtedly have high excess ice contents, hence it may be

advisable to construct a dyke of drier overburden around waste piles to prevent flow of thawed waste onto surrounding terrain or into pit areas.

6.5 Restoration

Restoration measures are required whether the pit is being abandoned temporarily or permanently. All worked areas should be cleaned of all debris, and graded to remove all topographic irregularities. Where abandonment is temporary, positive drainage away from existing faces and access routes must be provided by grading or by ditching to ensure the future recovery of remaining materials. Berms should be constructed at the top of pit faces, if necessary, to prevent surface runoff from entering the pit area.

Prior to permanent abandonment, the edges of worked areas or pit walls should be recontoured to blend into the surrounding terrain. All obstructions to natural drainage should be removed and any slopes graded to prevent runoff from channelling and downcutting. Since thaw ponds and lakes and massive ground ice are common in the Tuktoyaktuk area, flooding of pits is an acceptable, and frequently inevitable, method of restoration. Areas which are not likely to become flooded should be smoothly graded and covered with stockpiled overburden and organics.

Revegetation may be feasible in certain areas by redistributing stockpiled organic topsoil and peat over the graded slopes of areas unlikely to be flooded, and by seeding or allowing reinvasion of natural vegetation, depending on the nature of the site and the quality of the topsoil. Fine-grained overburden soils are generally adequate for surface reclamation, however, the amount of naturally-occurring topsoil is very limited at some sites. The fertility of these soils may require enrichment for revegetation.

6.6 Site Specific Development Plans

6.6.1 General

The site specfic development plans presented in the following report subsections pertain to selected sources that are prominent in the development scenario proposed for the community of Inuvik The level of detail presented for each source reflects the amount of information available for a particular deposit.

6.6.2 Source I400

Access

This source is located at the edge of the community and is accessible by an all-weather road on a year -round basis

Site Preparation

The site is substantially developed and is considered and is considered to be nearly depleted. Although further site preparation is unlikely, any such activities should be conducted in accordance with the recommendations presented in Section 6.4.1 of this report.

Extraction Methods

Extraction of granular material from the source is currently accomplished on an as-needed basis by excavating material that has been thawed and drained during the summer. It is recommended thast this practice continue.

Drainage Considerations

The pit floor should be graded where possible, to ensure gravity drainage of surface and melt water. Water should be collected and discharged in an

environmently acceptable manner. Good drainage enhances seasonal thaw and limits the ingress of water. As the subject source is located on several hill tops, drainage at the developed sites should be readily obtainable.

Treatment of Massive Ice

Massive ground ice may be encountered at the source. Depending on the extent and distribution of the ice, it may either be excavated and wasted or covered with an insulating blanket of granular material and left in place. More detailed information on dealing with ground ice is contained in Section 6.4.3 of this report.

Restoration

When the pits become partially exhausted, restoration can be undertaken concurrent with further borrow recovery. Restoration should be conducted in accordance with the recommendations presented in Section 6.5 of this report and should primarily consist of roughening the surface and contouring the abandoned areas of the pit to ensure adequate drainage occurs and that large volumes of water are not trapped within the pit area. Revegetation can be examined as pit abandonment proceeds.

6.6.3 Sources I402 and I403

Access

Quarry I402 is located at the west end of the airstrip near the Mackenzie River and Source I403 is situated at the edge of the Mackenzie/Dempster Highway several kilometres south of Inuvik. Both are accessible by all-weather roads on a year-round basis.

Site Preparation

The quarries are substantially developed and although further site preparation is unlikely, any such activities should be conducted in accordance with the recommendations presented in Section 6.4.1 of this report.

Extraction Methods

Extraction of granular construction material from the source is currently accomplished on an as-needed basis by drilling, blasting and excavating. It is recommended that this practice continue in accordance with the recommendations presented in a previously conducted quarry study for the area (EBA Engineering Consultants Ltd., 1976).

If armour stone is extracted from either quarry, it is suggested that the recommendations presented in EBA (1976) be examined in detail.

Drainage Considerations

The pit floor should be graded where possible, to ensure gravity drainage of surface and melt water. Water should be collected and discharged in an environmently acceptable manner. A pit slope of at least 1 percent is recommended.

Restoration

The final shape of a quarry is expected to be a clean, flat-bottomed site with steep benched sidewalls and a positive drainage system. The overall slope of the sidewalls should not exceed 45 degrees. Revegetation of the quarry floor is not considered practical although revegetation of the spoil areas can be considered.

6.6.4 Source I407

Access

These source is located at the edge of the Mackenzie River and is accessible only during the winter from the Inuvik-Tuktoyaktuk ice road.

Site Preparation

The site is only slightly developed and produces a small volume of material from the west facing slope. If the future demand remains consistent with the existing and past demand, large scale site preparation will likely be unecessary. However, in the event that extensive site preparation is required, activities

should be conducted in accordance with the recommendations presented in Section 6.4.1 of this report.

Extraction Methods

Extraction of granular material from the source is currently accomplished on an as-needed basis by excavating material that has thawed and drained during the summer. It is recommended that this practice continue unless the demand increases substantially.

Drainage Considerations

The pit floor should be graded where possible, to ensure gravity drainage of surface and melt water. Water should be collected and discharged in an environmently acceptable manner. Good drainage enhances seasonal thaw and limits the ingress of water.

Treatment of Massive Ice

Massive ground ice may be encountered at the source. Depending on the extent and distribution of the ice, it may either be excavated and wasted or covered with an insulating blanket of granular material and left in place. More detailed information on dealing with ground ice contained in Section 6.4.3 of this report should be considered.

Restoration

The pit is currently self-restoring fdor the volumes annually removed. However, if large-scale borrow material extraction occurs at the pit , restoration activities should be implemented.. Any restoration should be conducted in accordance with the recommendations presented in Section 6.5 of this report and should consist of contouring and roughening the abandoned areas of the pit to ensure adequate drainage occurs and that large volumes of water are no trapped within the pit area. Revegetation can be examined as pit abandonment activities proceed.

6.6.5 YaYa Lake

Access

The source is located at the south end of Richards Island and is accessible only during the winter from the Inuvik-Tuktoayaktuk ice road.

Site Preparation

The site has experienced substantial development over the past ten years, but annual demands currently placed on the deposit are small in comparison to the volumes removed for past heavy construction. A substantial amount of readily accessible granular material has been recovered and several large stockpiles remain in the pit area. Unless large scale development again occurs in the pit, additional site preparation will likely be unnecessary. Small scale granular material recovery activities will likely be able to obtain the required material from already stripped areas. In the event that extensive site preparation is required, activities should be conducted in accordance with the recommendations presented in Section 6.4.1 of this report.

Extraction Methods

Extraction of granular material from the source is currently accomplished on an as-needed basis by excavating material that has thawed and drained during the summer. If large volumes of granular material are required, ripping of frozen ground and temporary stockpiling will likely be necessary. In addition it is likely that some oversized material will be present in the granular material excavated. Implementation of a screening operation to remove unwanted sizes should be considered.

Drainage Considerations

The pit floor should be graded where possible, to ensure gravity drainage of surface and melt water. Water should be collected and discharged in an environmently acceptable manner. Good drainage enhances seasonal thaw and limits the ingress of water

Treatment of Massive Ice

Massive ground ice may be encountered at the source. Depending on the extent and distribution of the ice, it may either be excavated and wasted or covered with an insulating blanket of granular material and left in place. More detailed information on dealing with ground ice contained in Section 6.4.3 of this report should be considered.

Restoration

The pit is partially exhausted, and future restoration should be undertaken concurrent with further borrow recovery. Restoration should be conducted in accordance with the recommendations presented in Section 6.5 of this report and should primarily consist of roughening the surface and contouring the abandoned areas of the pit to ensure adequate drainage occurs and that large volumes of water are no trapped within the pit area. Alternatively, flooding of the abandoned pit areas is viable since a substantial number of lakes and thaw ponds are already present in the area. Revegetation can be considered as pit abandonment proceeds.

7.0 RECOMMENDATIONS

7.1 General

The recommendations contained in the following subsection pertain to additional work required to confirm the quantity and quality of granular resources contained in a source that is prominent in the development scenario proposed for the community of Inuvik and is presented with regard to all information collected and reviewed during the study.

In summary, the recommendation concerns the effort necessary to confirm the product available from bedrock sources and the volume and quality of material available from granular sources.

7.2 Source I403

Source I403 (Campbell Lake Quarry) constitutes a substantial source of dolomite bedrock. At present, material; from the source is primarily used for production of road surfacing material and at current and projected useage levels, the source will be functional for many years. However, if speculative projects such as production of erosion protection materials for offshore pertroleum production facilities occur, the source woud be evaluated in more detail to determine its potential to supply large volumes of large blocks.

It is recommended that this be accomplished through a geotechnical/geological drilling program to determine the volume and size of rock blocks that could be produced from this source.

7.3 Source I407

Source I407 is relatively unexplored although it supplies a substantial portion of Inuvik's Class 2 material. At present consumption rates the source should last for many years, but it is recommended that a limited geotechnical drilling program be undertaken at the site in an effort to determine and prove the volume and quantity of granular material that will likely be available from the deposit over the next 20 years.

7.4 Sources 312 and 314

Sources 312 and 314 will likely become important if construction of the Inuvik - Tuktoyaktuk highway is undertaken. If this occurs it is recommended that both of these sources of highway construction material; be investigated in detail in order to confirm the quality and quantity of granular material that may be obtained.

7.5 Sources R28/29

In the event that it becomes desirable to obtain large rock blocks from Source R28/29, the source should be evaluated with a geotechnical/geological drilling program designed to determine the volume and size of rock blocks that could be produced from the deposit

LIST OF TABLES

TABLE 1	GRANULAR MATERIAL TYPES
TABLE 7	DISTANCE TO CLASS 1 GRANULAR RESOURCES-INUVIK
TABLE 8	DISTANCE TO CLASS 2 GRANULAR RESOURCES-INUVIK
TABLE 9	DISTANCE TO CLASS 3 GRANULAR RESOURCES-INUVIK
TABLE 10	DISTANCE TO CLASS 4 GRANULAR RESOURCES-INUVIK
TABLE 11	DISTANCE TO CLASS 5 GRANULAR RESOURCES-INUVIK
TABLE 24	GRANULAR RESOURCE UTILIZATION-INUVIK (With Speculative Projects)
TABLE 25	GRANULAR RESOURCE UTILIZATION-INUVIK (. Without Speculative Projects)

LIST OF FIGURES

FIGURE 1	INUVIALUIT LANDS LOCATION PLAN - WESTERN ARCTIC AGREEMENT
FIGURE 4	SUPPLY OF GRANULAR RESOURCES- INUVIK
FIGURE 8	GRANULAR RESOURCES DEMAND SUMMARY- ALL COMMUNITIES
FIGURE 13	DEMAND FOR GRANULAR RESOURCES-INUVIK (With Speculative Projects)
FIGURE 14	CUMULATIVE DEMAND FOR GRANULAR RESOURCES-INUVIK (With Speculative Projects)
FIGURE 15	DEMAND FOR GRANULAR RESOURCES-INUVIK (Without Speculative Projects)
FIGURE 16	CUMULATIVE DEMAND FOR GRANULAR RESOURCES-INUVIK (Without Speculative Projects)

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151	RKL 1973, ZONE 1		
152A	RKL 1973, ZONE 1		
153	RKL 1973, ZONE 1	165	HARDY 1977
154	RKL 1973, ZONE 1	166	HARDY 1977
155	RKL 1973, ZONE 1	2.01	HARDY 1986
156	RKL 1973, ZONE 1	T108-112	RKL 1973, TUKTOYAKTUK
157	RKL 1973, ZONE 1	T100-103,150	RKL 1973, TUKTOYAKTUK
158	HARDY 1977	T104,106,107	RKL 1973, TUKTOYAKTUK
159	HARDY 1977	TUK HARBOUR, AIRSTRIP	EBA 1973
160/161	HARDY 1977	TUK HARBOUR, AIRSTRIP	EBA 1973
162	HARDY 1977		
163	HARDY 1977		
164	HARDY 1977		
165	HARDY 1977	153	RKL 1973, ZONE 1
166	HARDY 1977	154	RKL 1973, ZONE 1
167	HARDY 1977	T113	RKL 1973, TUKTOYAKTUK
168	HARDY 1977	168	BBT 1983
169	HARDY 1977	169	HARDY-BBT 1986
170	HARDY 1977		
171	HARDY 1977	25	DPW 1976
172	HARDY 1977	24, 24A, 24B	DPW 1976
173	HARDY 1977	23, 23A, 23B, 23C, 23D	DPW 1976
174	HARDY 1977		
175	HARDY 1977		

SOURCE NUMBER, TEXT REFERENCES AND CROSS REFERENCES, cont.

PRIMARY SOURCE NO. OR NAME AND TEXT REFERENCE		CROSS-REFERENCE SOURCE NO. OR NAME AND TEXT REFERENCE	
176	HARDY 1977		
177	HARDY 1977		
181	HARDY 1977		
183	HARDY 1977		
184	HARDY-BBT 1986		
211	BBT 1983	211	RKL 1973, ZONE 2
211E	EBA 1986		
214	BBT 1983	2.02	HARDY-BBT 1986
215	EBA 1986	2.03	HARDY-BBT 1986
216	RKL 1973, ZONE 2	216	EBA 1986
216S	EBA 1986		
217	RKL 1973, ZONE 2	217	EBA 1986
217E	EBA 1986		
218	RKL 1973, ZONE 2	218	EBA 1986
218N	EBA 1986		
219	EBA 1986	219	EBA 1986
222	EBA 1986	222	EBA 1976a
300A	RKL 1973, ZONE 3		
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302	RKL 1973, ZONE 3		
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305	RKL 1973, ZONE 3		
306	RKL 1973, ZONE 3		
307	RKL 1973, ZONE 3		

SOURCE NUMBER, TEXT REFERENCES AND CROSS REFERENCES, cont.

PRIMARY SOURCE NO. OR NAME AND TEXT REFERENCE		CROSS-REFERENCE SOURCE NO. OR NAME AND TEXT REFERENCE	
308	RKL 1973, ZONE 3		
309	RKL 1973, ZONE 3		
310A	RKL 1973, ZONE 3		
311	RKL 1973, ZONE 3		
312	RKL 1973, ZONE 3		
313	RKL 1973, ZONE 3		
314	RKL 1973, ZONE 3		
315	RKL 1973, ZONE 3		
316	RKL 1973, ZONE 3		
317	RKL 1973, ZONE 3	2.17	HARDY-BBT 1986
318	RKL 1973, ZONE 3		
319	RKL 1973, ZONE 3		
320	RKL 1973, ZONE 3		
321	RKL 1973, ZONE 3		
322	RKL 1973, ZONE 3	2.16	HARDY-BBT 1986
323A	RKL 1973, ZONE 3	2.15	HARDY-BBT 1986
324A	RKL 1973, ZONE 3	2.14	HARDY-BBT 1986
325	RKL 1973, ZONE 3	2.41	HARDY-BBT 1986
326	RKL 1973, ZONE 3	326A; 2.12	EBA 1976b, HARDY-BBT 1986
327	RKL 1973, ZONE 3	2.33	HARDY-BBT 1986
328A	RKL 1973, ZONE 3	2.39	HARDY-BBT 1986
I400	RKL 1973, ZONE 3		
I401A	RKL 1973, ZONE 3	2.47	
I402	RKL 1973, INUVIK		
I403	RKL 1973, INUVIK		

SOURCE NUMBER, TEXT REFERENCES AND CROSS REFERENCES, cont.

PRIMARY SOURCE NO. OR NAME AND TEXT REFERENCE		CROSS-REFERENCE SOURCE NO. OR NAME AND TEXT REFERENCE	
I404	RKL 1973, INUVIK		
I405A	RKL 1973, INUVIK		
I406	RKL 1973, INUVIK		
I407	RKL 1973, INUVIK	2.13	
455	RKL 1973. ZONE 4		
467	HARDY 1976		
456A	RKL 1973, ZONE 4		
457A	RKL 1973, ZONE 4		
463	HARDY 1976	R24	EBA 1983a
464	HARDY 1976	R25	EBA 1983a
468	HARDY 1976	R27	EBA 1983a
469	HARDY 1976	R26	EBA 1983a
PARSONS LK. 1	KLCL 1974		
PARSONS LK. 2	KLCL 1974		
PARSONS LK. 3	KLCL 1974		
PARSONS LK. 4	KLCL 1974		
PARSONS LK. 5	KLCL 1974		
PARSONS LK. 6	KLCL 1974		
PARSONS LK. 7	KLCL 1974		
PARSONS LK. 8	KLCL 1974		
PARSONS LK. 9	KLCL 1974		
PARSONS LK. 10	KLCL 1974		
PARSONS LK. 11	KLCL 1974		
R28/29	EBA 1976b	R28/29	EBA 1983a
YAYA	EBA 1975		

DEMAND SUMMARY

INUVIK

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES DEMAND SUMMARY
Inuvik

YEAR GROUP	PROJECT (₩ Denotes Speculative Project)	CATEGORY		VOLUME, cu.m.
1987-1991	AIRPORT OVERLAYS	PUBLIC		
			Class 1:	
			Class 2:	
			Class 3:	
			Class 4:	
			Class 5:	8,000
			TOTAL	8,000
1987-1991	HANGAR	PUBLIC		
			Class 1:	100
			Class 2:	600
			Class 3:	
			Class 4:	
			Class 5:	
			TOTAL	700
1987-1991	HOUSE	PUBLIC		
			Class 1:	10
			Class 2:	
			Class 3:	
			Class 4:	
			Class 5:	
			TOTAL	10
1987-1991	LANDSCAPING-CHUK PARK	PUBLIC		
			Class 1:	
			Class 2:	
			Class 3:	
			Class 4:	2,000
			Class 5:	
			TOTAL	2,000
1987-1991	LOT DEVELOPMENT	PUBLIC		
			Class 1:	
			Class 2:	
			Class 3:	2,500
			Class 4:	
			Class 5:	
			TOTAL	2,500
1987-1991	PRIVATE BUSINESS/HOMEOWNERS	OTHER		
			Class 1:	
			Class 2:	5,000
			Class 3:	40,000
			Class 4:	
			Class 5:	10,000
			TOTAL	55,000

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES DEMAND SUMMARY
Inuvik

YEAR GROUP	PROJECT (¥ Denotes Speculative Project)	CATEGORY		VOLUME, cu.m.
1987-1991	ROAD/GENERAL MAINTENANCE	PUBLIC		
			Class 1:	
			Class 2:	
			Class 3:	20,000
			Class 4:	
			Class 5:	
			TOTAL	20,000
1987-1991	SENIOR CITIZEN'S CARE FACILITY	PUBLIC		
			Class 1:	50
			Class 2:	175
			Class 3:	500
			Class 4:	
			Class 5:	
			TOTAL	725
1987-1991	YARD DEVELOPMENT	OTHER		
			Class 1:	
			Class 2:	
			Class 3:	1,530
			Class 4:	
			Class 5:	153
			TOTAL	1,683
1987-1991	YARD MAINTENANCE	OTHER		
			Class 1:	
			Class 2:	
			Class 3:	750
			Class 4:	
			Class 5:	
			TOTAL	750
1987-1991	¥INUVIK-TUKTOYAKTUK HIGHWAY	PUBLIC		
			Class 1:	
			Class 2:	
			Class 3:	
			Class 4:	
			Class 5:	2,800,000
			TOTAL	2,800,000
1992-1996	AIRFIELD MAINTENANCE	PUBLIC		
			Class 1:	
			Class 2:	
			Class 3:	
			Class 4:	
			Class 5:	8,000
			TOTAL	8,000

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES DEMAND SUMMARY
Inuvik

YEAR GROUP	PROJECT (W Denotes Speculative Project)	CATEGORY		VOLUME, cu.m.
1992-1996	ROAD/GENERAL MAINTENANCE	PUBLIC		
			Class 1:	
			Class 2:	
			Class 3:	20,000
			Class 4:	
			Class 5:	
			TOTAL	20,000
1992-1996	YARD MAINTENANCE	OTHER		
			Class 1:	
			Class 2:	
			Class 3:	750
			Class 4:	
			Class 5:	
			TOTAL	750
1992-1996	WINUVIK-TUKTOYAKTUK HIGHWAY	PUBLIC		
			Class 1:	
			Class 2:	1,700,000
			Class 3:	
			Class 4:	
			Class 5:	
			TOTAL	1,700,000
1997-2001	AIRFIELD MAINTENANCE	PUBLIC		
			Class 1:	
			Class 2:	
			Class 3:	
			Class 4:	
			Class 5:	8,000
			TOTAL	8,000
1997-2001	ROAD/GENERAL MAINTENANCE	PUBLIC		
			Class 1:	
			Class 2:	
			Class 3:	20,000
			Class 4:	
			Class 5:	
			TOTAL	20,000
1997-2001	YARD MAINTENANCE	OTHER		
			Class 1:	
			Class 2:	
			Class 3:	750
			Class 4:	
			Class 5:	
			TOTAL	750

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES DEMAND SUMMARY
Inuvik

YEAR GROUP	PROJECT (¥ Denotes Speculative Project)	CATEGORY		VOLUME, cu.m.
1997-2001	¥INUVIK-TUKTOYAKTUK HIGHWAY	PUBLIC		
			Class 1:	
			Class 2:	100,000
			Class 3:	
			Class 4:	
			Class 5:	
			TOTAL	100,000
1997-2001	¥OFFSHORE OIL: EROSION PROTECTION	OTHER		
			Class 1:	
			Class 2:	
			Class 3:	
			Class 4:	
			Class 5:	900,000
			TOTAL	900,000
2002-2006	AIRFIELD MAINTENANCE	PUBLIC		
			Class 1:	
			Class 2:	
			Class 3:	
			Class 4:	
			Class 5:	8,000
			TOTAL	8,000
2002-2006	ROAD/GENERAL MAINTENANCE	PUBLIC		
			Class 1:	
			Class 2:	
			Class 3:	20,000
			Class 4:	
			Class 5:	
			TOTAL	20,000
2002-2006	YARD MAINTENANCE	OTHER		
			Class 1:	
			Class 2:	
			Class 3:	750
			Class 4:	
			Class 5:	
			TOTAL	750
2002-2006	¥INUVIK-TUKTOYAKTUK HIGHWAY	PUBLIC		
			Class 1:	
			Class 2:	100,000
			Class 3:	
			Class 4:	
			Class 5:	
			TOTAL	100,000

SUPPLY SUMMARY

INUVIK

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 2.43

ILA 7(1)(b)

LOCATION: 28 km NE of Inuvik

REFERENCE(S): Hardy 1986

SETTING Unknown	**RELIEF** Unknown	**WINTER ACCESS** Tundra/ice road
LANDFORM Outwash plain	**CONTINUITY** Unknown	**SUMMER ACCESS** None
AREA 12 sq km	**DEVELOPMENT CONSTRAINTS** None discernible	

BOREHOLES (#) Unknown	**TEST PITS (#)** Unknown
MOIST. CON. (#) Unkown	**GRAINSIZE (#)** Unknown

	OVERBURDEN	GROUND ICE
TYPE:	Unknown	Unknown
EXTENT:	Unknown	Unknown
THICK.:	Unknown	Unknown

POTENTIAL VOLUME, cu. m.: Unknown **RECOVERABLE, cu.m:** 180,000,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3						
CLASS 4					18,000,000	180,000,000
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 2.44

LOCATION: 30 km NE of Inuvik

REFERENCE(S): Hardy 1986

SETTING
Unknown

LANDFORM
Glaciofluvial outwash

AREA
170,000 sq m

RELIEF
Unknown

CONTINUITY
Unknown

DEVELOPMENT CONSTRAINTS
Unknown

WINTER ACCESS
Tundra/ice road

SUMMER ACCESS
None

BOREHOLES (#)
Unknown

TEST PITS (#)
Unknown

MOIST. CON. (#)
Unknown

GRAINSIZE (#)
Unknown

	OVERBURDEN	GROUND ICE
TYPE:	Unknown	Unknown
EXTENT:	Unknown	Unknown
THICK.:	Unknown	Unknown

POTENTIAL VOLUME, cu. m.: Unknown **RECOVERABLE, cu.m:** 1,000,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3					250,000	1,000,000
CLASS 4						
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 2.45

LOCATION: 25 km NE of Inuvik

REFERENCE(S): Hardy 1986

SETTING
Unknown

RELIEF
Unknown

WINTER ACCESS
Tundra/ice road

LANDFORM
Glaciofluvial outwash

CONTINUITY
Unknown

SUMMER ACCESS
None

AREA
1.7 sq km

DEVELOPMENT CONSTRAINTS
Lake environment

BOREHOLES (#)
None

TEST PITS (#)
None

MOIST. CON. (#)
None

GRAINSIZE (#)
None

	OVERBURDEN	GROUND ICE
TYPE:	Unknown	Unknown
EXTENT:	Unknown	Unknown
THICK.:	Unknown	Unknown

POTENTIAL VOLUME, cu. m.: Unknown **RECOVERABLE, cu.m:** 25,000,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2					2,500,000	25,000,000
CLASS 3						
CLASS 4						
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 2.46

LOCATION: 20 km NE of Inuvik

REFERENCE(S): Hardy 1986

SETTING
Unknown

LANDFORM
Kames/crevasse filling

AREA
12,500 sq m

RELIEF
Unknown

CONTINUITY
Unknown

DEVELOPMENT CONSTRAINTS
None discernible

WINTER ACCESS
Tundra/ice road

SUMMER ACCESS
None

BOREHOLES (#)
Unknown

TEST PITS (#)
Unknown

MOIST. CON. (#)
Unknown

GRAINSIZE (#)
Unknown

	OVERBURDEN	GROUND ICE
TYPE:	Unknown	Unknown
EXTENT:	Unknown	Unknown
THICK.:	Unknown	Unknown

POTENTIAL VOLUME, cu. m.: Unknown **RECOVERABLE, cu.m:** 25,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3						
CLASS 4						25,000
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 204

ILA 7(1)(a)

LOCATION: 80 km NNW of Inuvik

REFERENCE(S): RKL 1973,Zone 2

SETTING Shore, Mackenzie R.	**RELIEF** Rolling	**WINTER ACCESS** Tundra/ice road
LANDFORM Terrace	**CONTINUITY** Continuous	**SUMMER ACCESS** Barge
AREA 420,000 sq m	**DEVELOPMENT CONSTRAINTS** River environment, massive ice	

BOREHOLES (#) 1	**TEST PITS (#)** 2
MOIST. CON. (#) 4	**GRAINSIZE (#)** 4

	OVERBURDEN	GROUND ICE
TYPE:	None	Massive
EXTENT:	-	Intermittent
THICK.:	-	Up to 7 m

POTENTIAL VOLUME, cu. m.: 300,000 **RECOVERABLE, cu.m:** 300,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2			150,000	300,000	150,000	300,000
CLASS 3						
CLASS 4						
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 214

ILA 7(1)(b)

LOCATION: 100 km N of Inuvik

REFERENCE(S): RKL 1973,Zone 2; H-BBT 1986

SETTING East bank of east channel	**RELIEF** Up to 23 metres arl	**WINTER ACCESS** Tundra/ice road
LANDFORM Terrace remnants	**CONTINUITY** Continuous	**SUMMER ACCESS** Barge
AREA 0.6 sq km	**DEVELOPMENT CONSTRAINTS** Waterfowl, river envir.	

BOREHOLES (#) None	**TEST PITS (#)** 1
MOIST. CON. (#) 1	**GRAINSIZE (#)** 1

	OVERBURDEN	GROUND ICE
TYPE:	Silt, organics	Massive
EXTENT:	Continous	Unknown
THICK.:	Up to 0.3 m	Unknown

POTENTIAL VOLUME, cu. m.: 6,250,000 **RECOVERABLE, cu.m:** 6,250,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3			300,000	300,000	300,000	300,000
CLASS 4					400,000	5,950,000
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 215

ILA 7(1)(b)

LOCATION: 100 km N of Inuvik

REFERENCE(S): RKL 1973,Zone 2; H-BBT 1986

SETTING East bank of east channel	**RELIEF** Up to 23 metres	**WINTER ACCESS** Tundra/ice road
LANDFORM Delta remnant	**CONTINUITY** Continuous	**SUMMER ACCESS** Barge
AREA 42,000 sq m	**DEVELOPMENT CONSTRAINTS** Waterfowl, river envir.	

BOREHOLES (#) None	**TEST PITS (#)** 1
MOIST. CON. (#) 1	**GRAINSIZE (#)** 1

	OVERBURDEN	GROUND ICE
TYPE:	Peat, some silt	Ice rich gravel
EXTENT:	Continous	Unknown
THICK.:	Up to 0.76 m	Unknown

POTENTIAL VOLUME, cu. m.: 65,000 **RECOVERABLE, cu.m:** 65,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2			23,000	23,000	23,000	23,000
CLASS 3			23,000	23,000	23,000	42,000
CLASS 4						
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 222

ILA 7(1)(a)

LOCATION: 100 km NW of Inuvik

REFERENCE(S): RKL 1973,Zone 2; EBA 1976

SETTING
River bank

LANDFORM
Terrace and bar remnants

AREA
3.5 sq km

RELIEF
10 to 15 m

CONTINUITY
5 sources

DEVELOPMENT CONSTRAINTS
Overburden, ice

WINTER ACCESS
Tundra/ice road

SUMMER ACCESS
Barge

BOREHOLES (#)
44

TEST PITS (#)
None

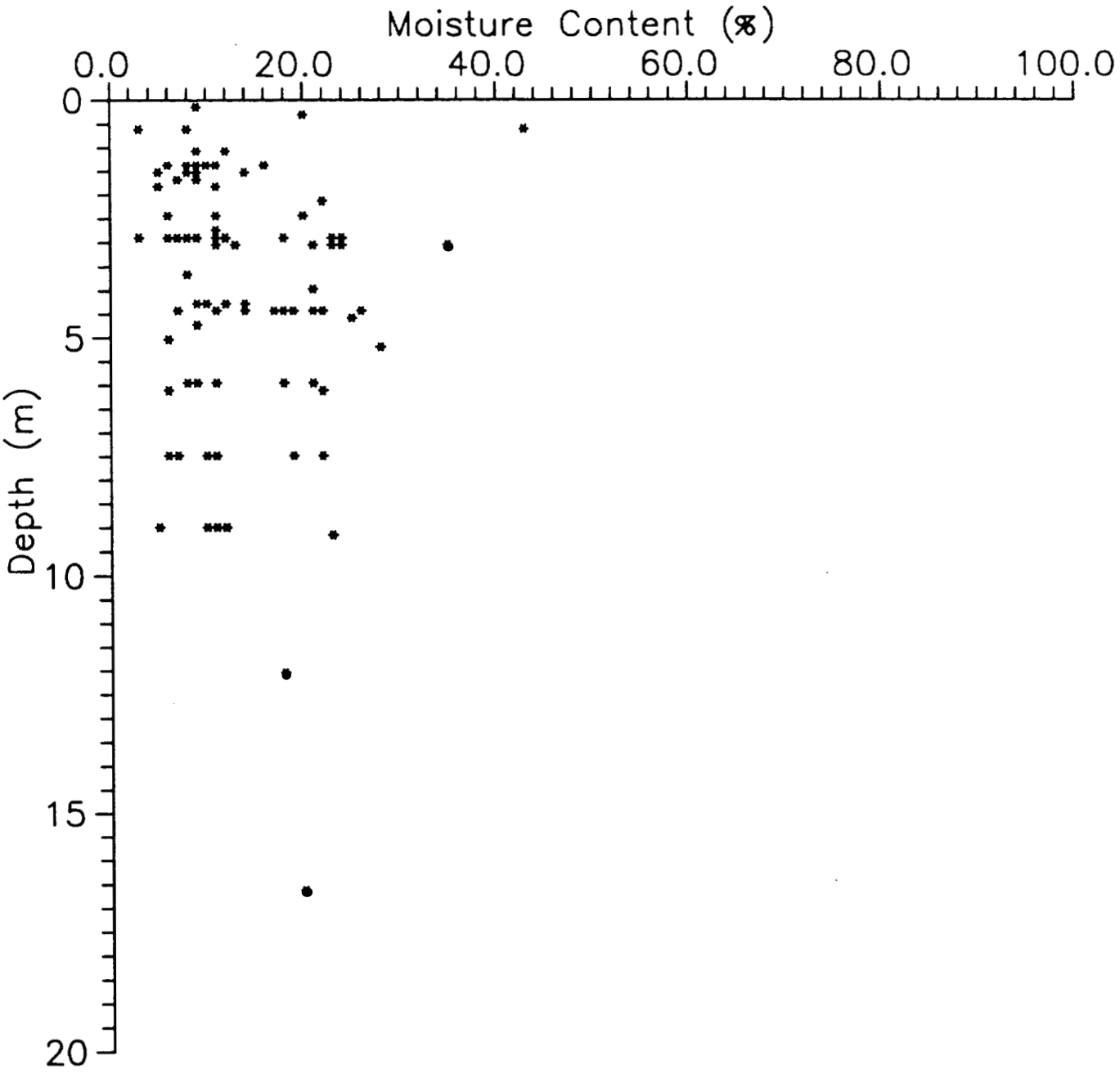
MOIST. CON. (#)
97

GRAINSIZE (#)
56

	OVERBURDEN	GROUND ICE
TYPE:	Peat, ice, organics	Excess, massive
EXTENT:	Intermittent	Intermittent
THICK.:	Up to 1.5 m	Lenses up to 3.0 m

POTENTIAL VOLUME, cu. m.: >7,500,000 **RECOVERABLE, cu.m:** 7,500,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3			1,200,000	6,000,000	1,200,000	6,000,000
CLASS 4			300,000	1,500,000	300,000	1,500,000
CLASS 5						



Indian and Northern Affairs Canada
Inuvialuit Land Administration
Source 222
Moisture Content vs. Depth

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 300A

ILA 7(1)(a)

LOCATION: 73 km NW of Inuvik

REFERENCE(S): RKL 1973,Zone 3

SETTING River terrace, east channel	**RELIEF** 60 metres	**WINTER ACCESS** Tundra/ice road
LANDFORM Terrace remnants and kames	**CONTINUITY** Continuous	**SUMMER ACCESS** Barge
AREA 0.5 to 1.6 sq km	**DEVELOPMENT CONSTRAINTS** Poor quality, envir., dist.	

BOREHOLES (#) 2	**TEST PITS (#)** 2
MOIST. CON. (#) 9	**GRAINSIZE (#)** 4

	OVERBURDEN	GROUND ICE
TYPE:	Silt, organics, ice	Excess
EXTENT:	Continous	All holes
THICK.:	Up to 4.3 m	Variable

POTENTIAL VOLUME, cu. m.: >>600,000 **RECOVERABLE, cu.m:** 600,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3						
CLASS 4			600,000	600,000	600,000	600,000
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 301

ILA 7(1)(a)

LOCATION: 76 km NW of Inuvik

REFERENCE(S): RKL 1973, Zone 3

SETTING
Hillocks, small streams

LANDFORM
Terrace remnants and kames

AREA
1.9 sq km

RELIEF
7 to 9 metres

CONTINUITY
2 terraces

DEVELOPMENT CONSTRAINTS
Fish and wildlife habitat

WINTER ACCESS
Tundra/ice road

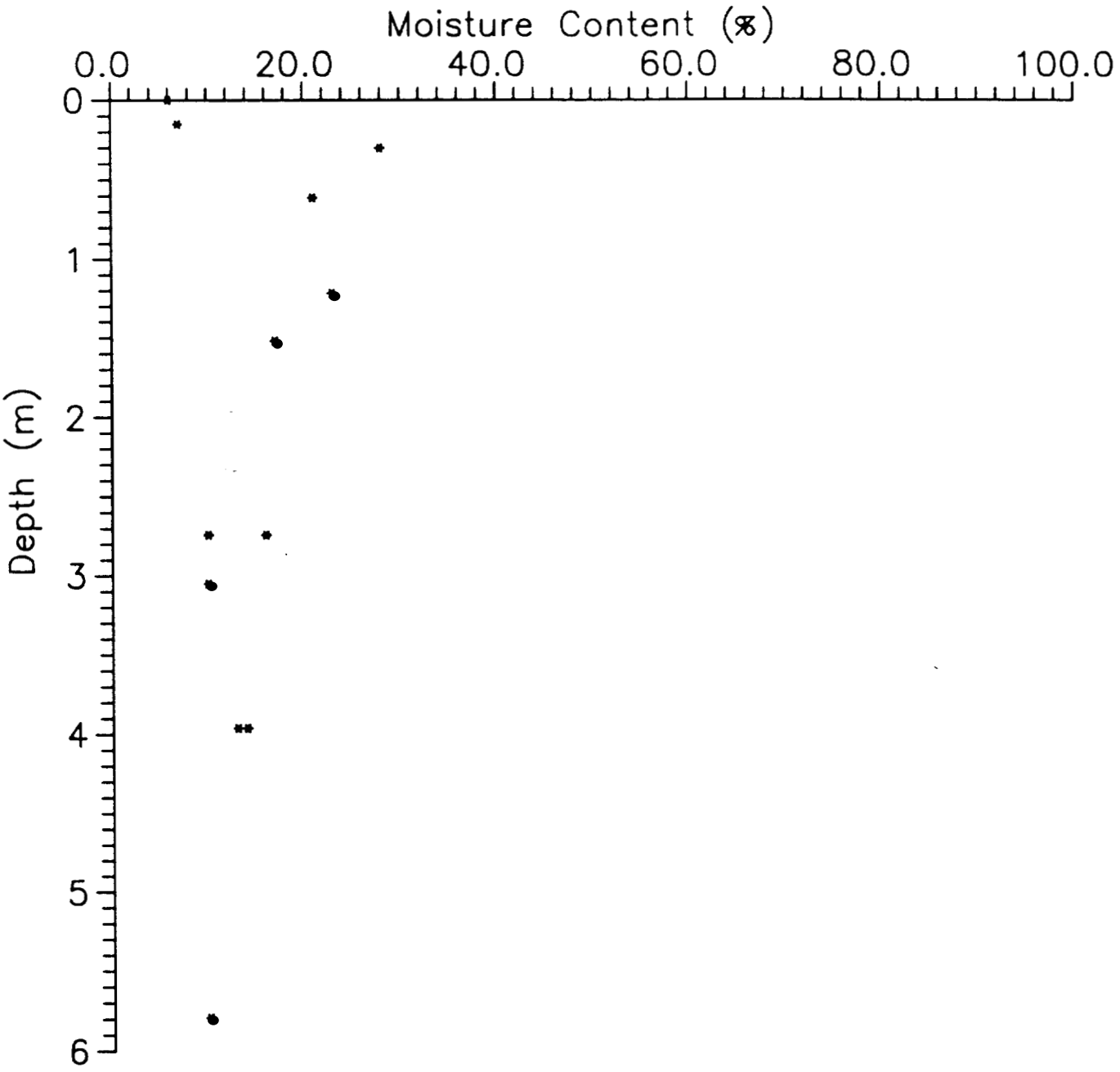
SUMMER ACCESS
Barge

BOREHOLES (#)	4
TEST PITS (#)	2
MOIST. CON. (#)	16
GRAINSIZE (#)	11

	OVERBURDEN	GROUND ICE
TYPE:	Peat, silt	Excess, massive
EXTENT:	All holes	Intermittent
THICK.:	Up to 1.0 m	Up to 2.4 m

POTENTIAL VOLUME, cu. m.: 3,000,000 RECOVERABLE, cu.m: 3,000,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3						
CLASS 4			1,000,000	3,000,000	1,000,000	3,000,000
CLASS 5						



Indian and Northern Affairs Canada
Inuvialuit Land Administration
Source 301
Moisture Content vs. Depth

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 302

ILA 7(1)(a)

LOCATION: 80 km NNW of Inuvik

REFERENCE(S): RKL 1973,Zone 3

SETTING
Adjacent to east channel

LANDFORM
Glaciofluvial terrace

AREA
0.45 sq km

RELIEF
15 metres

CONTINUITY
Continuous

DEVELOPMENT CONSTRAINTS
Fish and wildlife habitat

WINTER ACCESS
Tundra/ice road

SUMMER ACCESS
Barge

BOREHOLES (#)
2

TEST PITS (#)
1

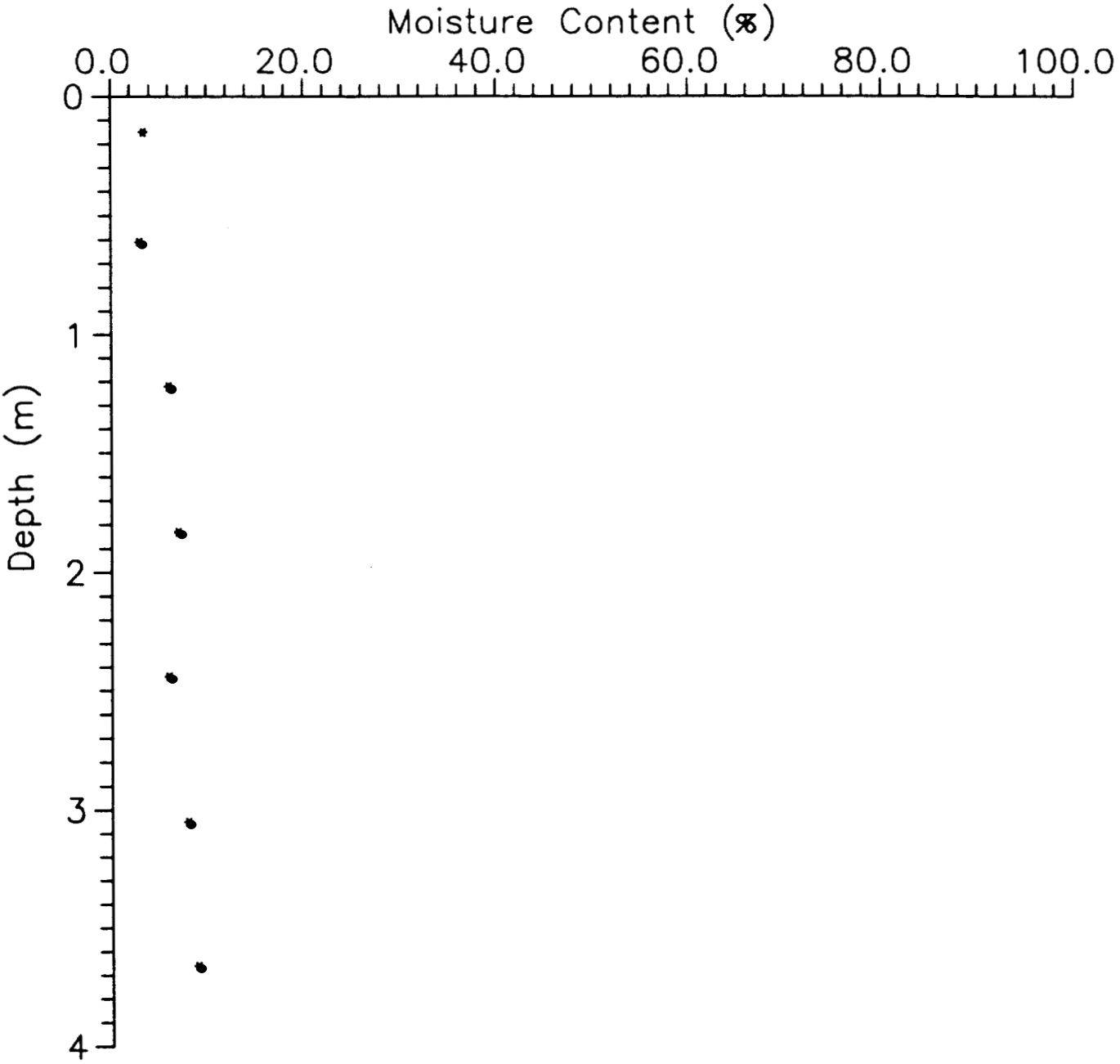
MOIST. CON. (#)
10

GRAINSIZE (#)
6

	OVERBURDEN	GROUND ICE
TYPE:	Organic silt	Massive, excess
EXTENT:	All holes	Intermittent
THICK.:	Up to 0.15 m	Up to 2.7 m

POTENTIAL VOLUME, cu. m.: >1,140,000 **RECOVERABLE, cu.m:** 1,140,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2			380,000	1,140,000	380,000	1,140,000
CLASS 3						
CLASS 4						
CLASS 5						



Indian and Northern Affairs Canada
Inuvialuit Land Administration
Source 302
Moisture Content vs. Depth

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 303

ILA 7(1)(a)

LOCATION: 82 km NNW of Inuvik

REFERENCE(S): RKL 1973,Zone 3; EBA 1976, H-BBT 1986

SETTING
East bank of east channel

LANDFORM
Terrace remnants and kames

AREA
0.5 to 2.5 sq km

RELIEF
8 to 15 metres

CONTINUITY
3 terraces

DEVELOPMENT CONSTRAINTS
River envir., wildlife

WINTER ACCESS
Tundra/ice road

SUMMER ACCESS
Barge

BOREHOLES (#)
46

TEST PITS (#)
4

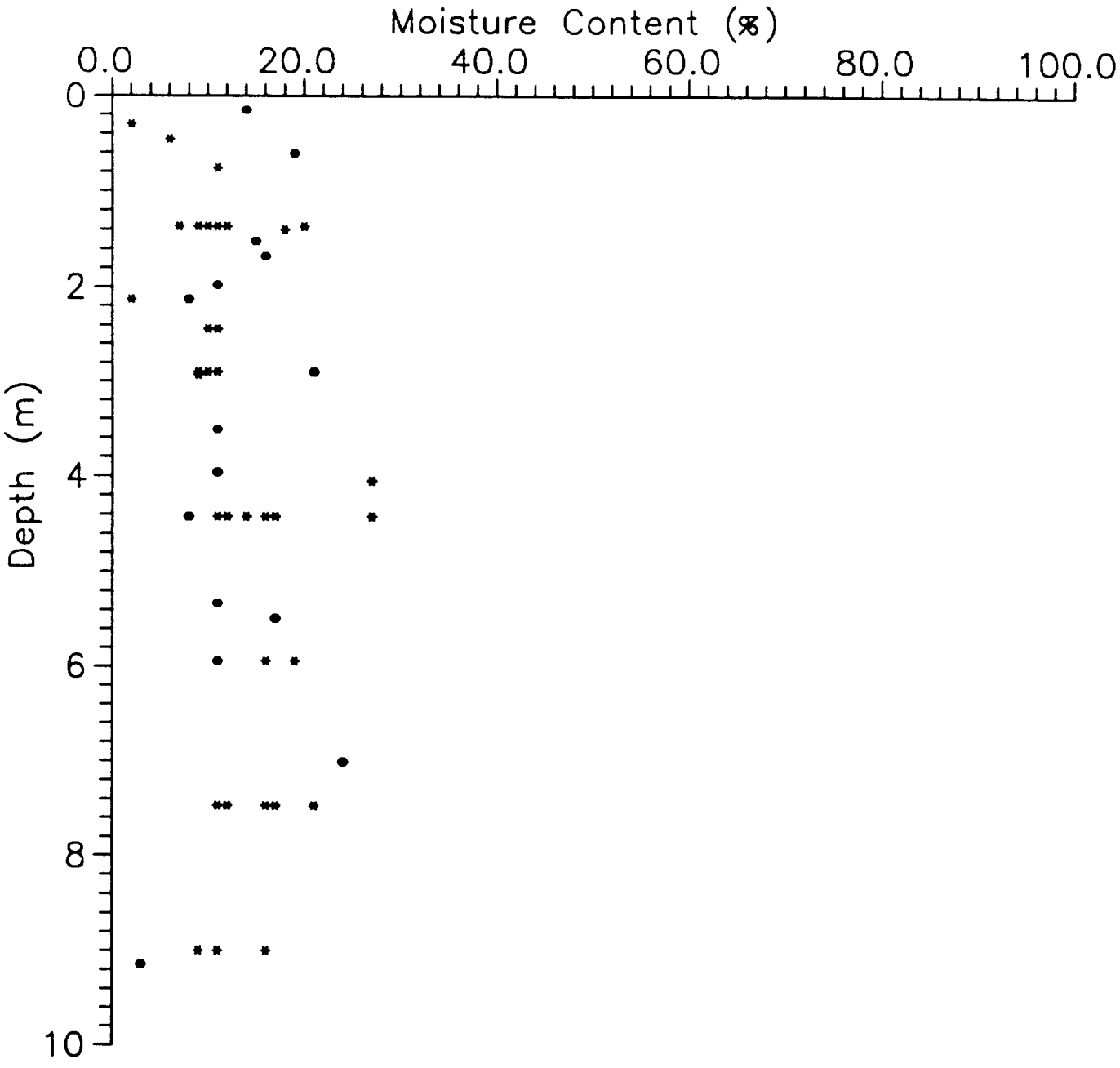
MOIST. CON. (#)
77

GRAINSIZE (#)
70

	OVERBURDEN	GROUND ICE
TYPE:	Peat, silt, ice	Massive, excess
EXTENT:	Intermittent	All holes
THICK.:	Up to 0.6 m	Up to 2.4 m

POTENTIAL VOLUME, cu. m.: 21,500,000 **RECOVERABLE, cu.m:** 21,500,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1			260,000	1,000,000	260,000	1,000,000
CLASS 2			130,000	530,000	130,000	530,000
CLASS 3			400,000	1,600,000	400,000	18,650,000
CLASS 4			330,000	1,320,000	330,000	1,320,000
CLASS 5						



Indian and Northern Affairs Canada
Inuvialuit Land Administration
Source 303
Moisture Content vs. Depth

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 315

LOCATION: 58 km N of Inuvik

REFERENCE(S): RKL 1973,Zone 3

SETTING
East slope, Caribou Hills

LANDFORM
Stream bisected outwash

AREA
6.4 sq km

RELIEF
Variable

CONTINUITY
6 fields

DEVELOPMENT CONSTRAINTS
Stream envir., wildlife

WINTER ACCESS
Tundra/ice road

SUMMER ACCESS
None

BOREHOLES (#)
4

TEST PITS (#)
1

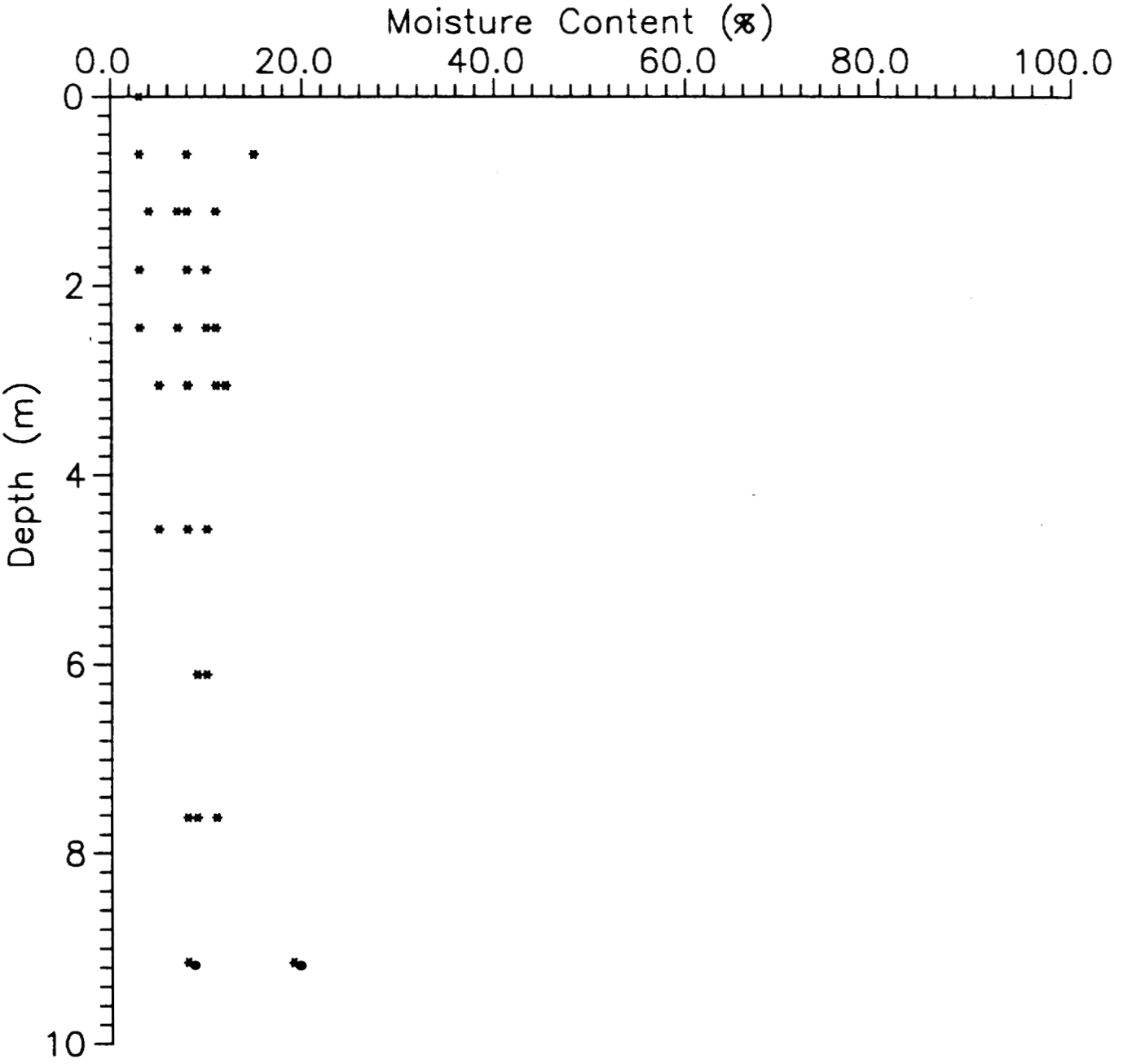
MOIST. CON. (#)
35

GRAINSIZE (#)
13

	OVERBURDEN	GROUND ICE
TYPE:	Silt, peat, organics	Excess, massive
EXTENT:	Intermittent	All holes
THICK.:	Up to 0.3 m	Up to 2.4 m

POTENTIAL VOLUME, cu. m.: >4,600,000 **RECOVERABLE, cu.m:** 4,600,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2			460,000	4,600,000	460,000	4,600,000
CLASS 3						
CLASS 4						
CLASS 5						



Indian and Northern Affairs Canada
Inuvialuit Land Administration
Source 315
Moisture Content vs. Depth

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 316

ILA 7(1)(a)

LOCATION: 50 km NW of Inuvik

REFERENCE(S): RKL 1973, Zone 3

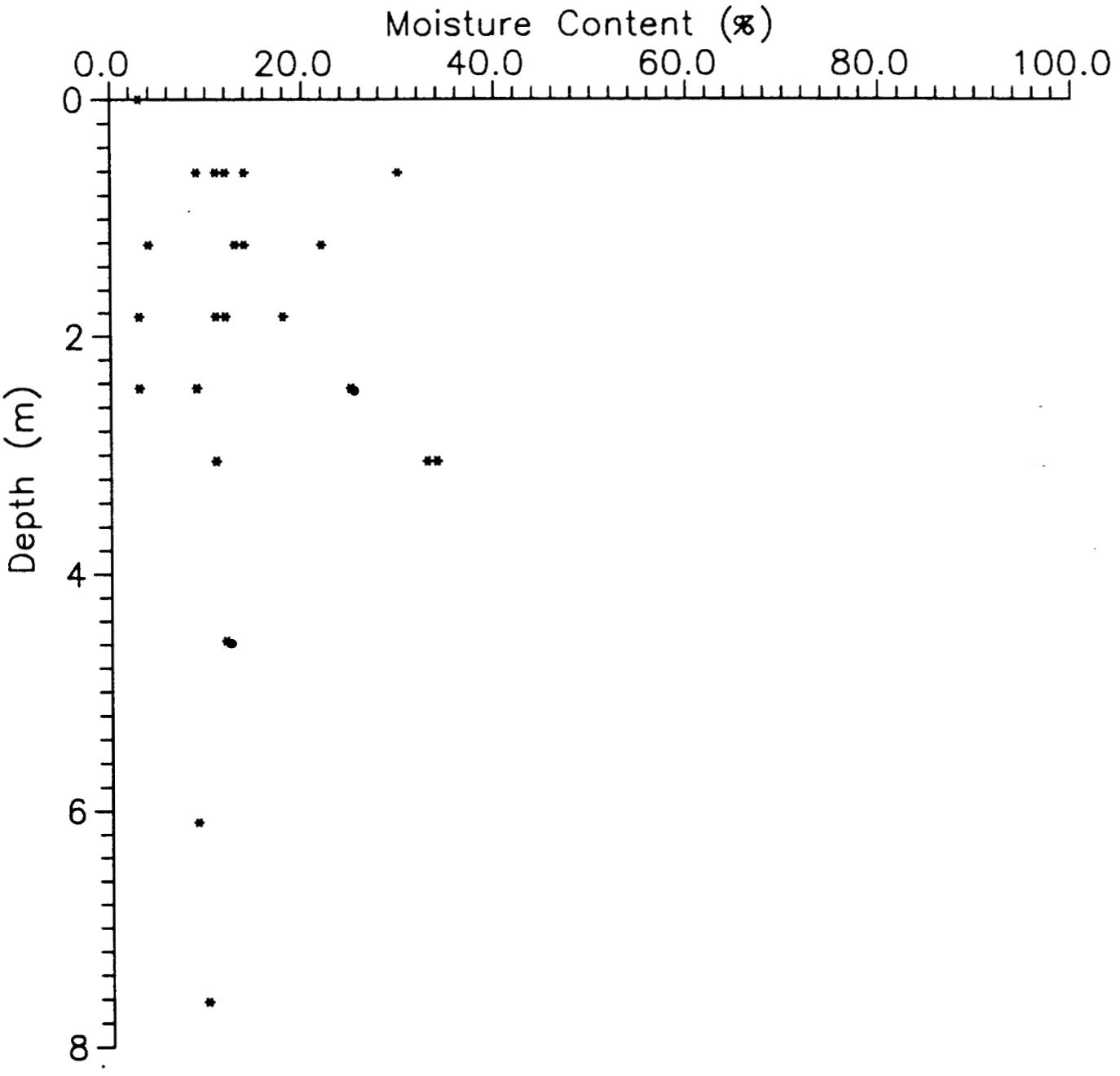
SETTING Spillway channel on slope	**RELIEF** Up to 45 metres	**WINTER ACCESS** Tundra/ice road
LANDFORM Glaciofluvial outwash	**CONTINUITY** Continuous	**SUMMER ACCESS** None
AREA 1.6 sq km	**DEVELOPMENT CONSTRAINTS** Lake, stream envir.	

BOREHOLES (#) 7	**TEST PITS (#)** 1
MOIST. CON. (#) 23	**GRAINSIZE (#)** 8

	OVERBURDEN	GROUND ICE
TYPE:	Silt, organics, ice	Excess, massive
EXTENT:	Intermittent	All holes
THICK.:	Up to 1.0 m	Variable

POTENTIAL VOLUME, cu. m.: >765,000 **RECOVERABLE, cu.m:** 765,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3			275,000	765,000	275,000	765,000
CLASS 4						
CLASS 5						



Indian and Northern Affairs Canada
Inuvialuit Land Administration
Source 316
Moisture Content vs. Depth

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 317

ILA 7(1)(a)

LOCATION: 50 km NW of Inuvik

REFERENCE(S): RKL 1973, Zone 3

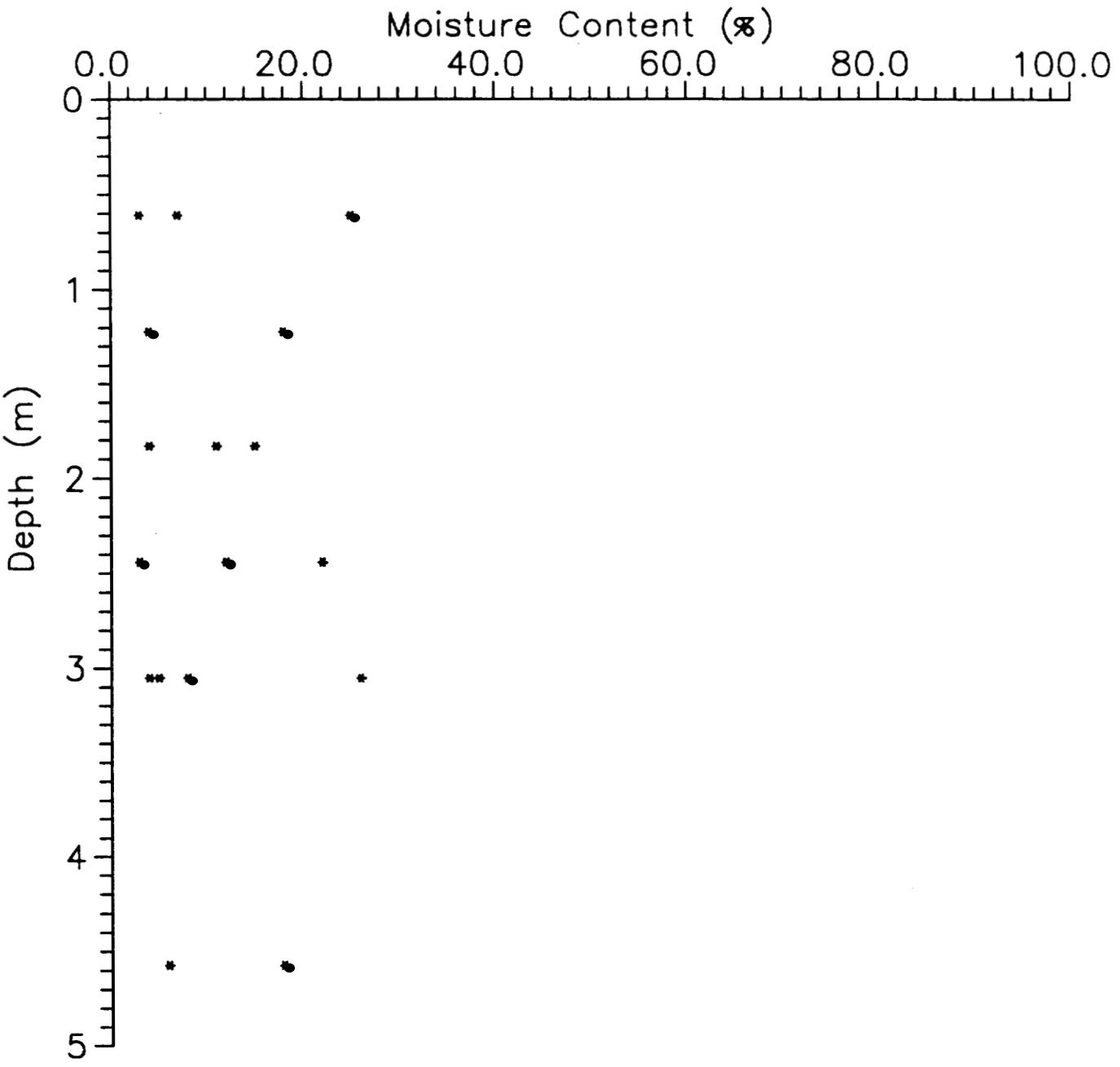
SETTING	RELIEF	WINTER ACCESS
Lakeshore envir.	Variable	Tundra/ice road
LANDFORM	**CONTINUITY**	**SUMMER ACCESS**
Kame field	3 fields	None
AREA	**DEVELOPMENT CONSTRAINTS**	
0.9 sq km	Environmental, ice	

BOREHOLES (#)	TEST PITS (#)
5	None
MOIST. CON. (#)	**GRAINSIZE (#)**
17	9

	OVERBURDEN	GROUND ICE
TYPE:	Silt, organics, ice	Excess, massive
EXTENT:	Continous	All holes
THICK.:	Up to 2.4 m	Up to 2.1 m

POTENTIAL VOLUME, cu. m.: >1,150,000 RECOVERABLE, cu.m: 1,150,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3			230,000	1,150,000	230,000	1,150,000
CLASS 4						
CLASS 5						



Indian and Northern Affairs Canada
Inuvialuit Land Administration
Source 317
Moisture Content vs. Depth

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 318

LOCATION: 61 km N of Inuvik

REFERENCE(S): RKL 1973,Zone 3

SETTING Lakeshore envir.	**RELIEF** Variable	**WINTER ACCESS** Tundra/ice road
LANDFORM Redeposited alluvial fan	**CONTINUITY** 2 fields	**SUMMER ACCESS** None
AREA 1.1 sq km	**DEVELOPMENT CONSTRAINTS** Quality, envir., distance	

BOREHOLES (#) 1	**TEST PITS (#)** 2
MOIST. CON. (#) 9	**GRAINSIZE (#)** 4

	OVERBURDEN	GROUND ICE
TYPE:	Silt, organics, ice	Massive, excess
EXTENT:	All holes	Intermittent
THICK.:	Up to 0.3 m	Lenses up to 1.0 m

POTENTIAL VOLUME, cu. m.: >1,500,000 **RECOVERABLE, cu.m:** 1,500,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2			150,000	1,500,000	150,000	1,500,000
CLASS 3						
CLASS 4						
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 319

LOCATION: 64 km N of Inuvik

REFERENCE(S): RKL 1973,Zone 3

SETTING
Gullies, ponds, lakes

RELIEF
Variable

WINTER ACCESS
Tundra/ice road

LANDFORM
Large kame field

CONTINUITY
Continuous

SUMMER ACCESS
None

AREA
Up to 20 sq km

DEVELOPMENT CONSTRAINTS
Access, ice, wildlife

BOREHOLES (#)
6

TEST PITS (#)
1

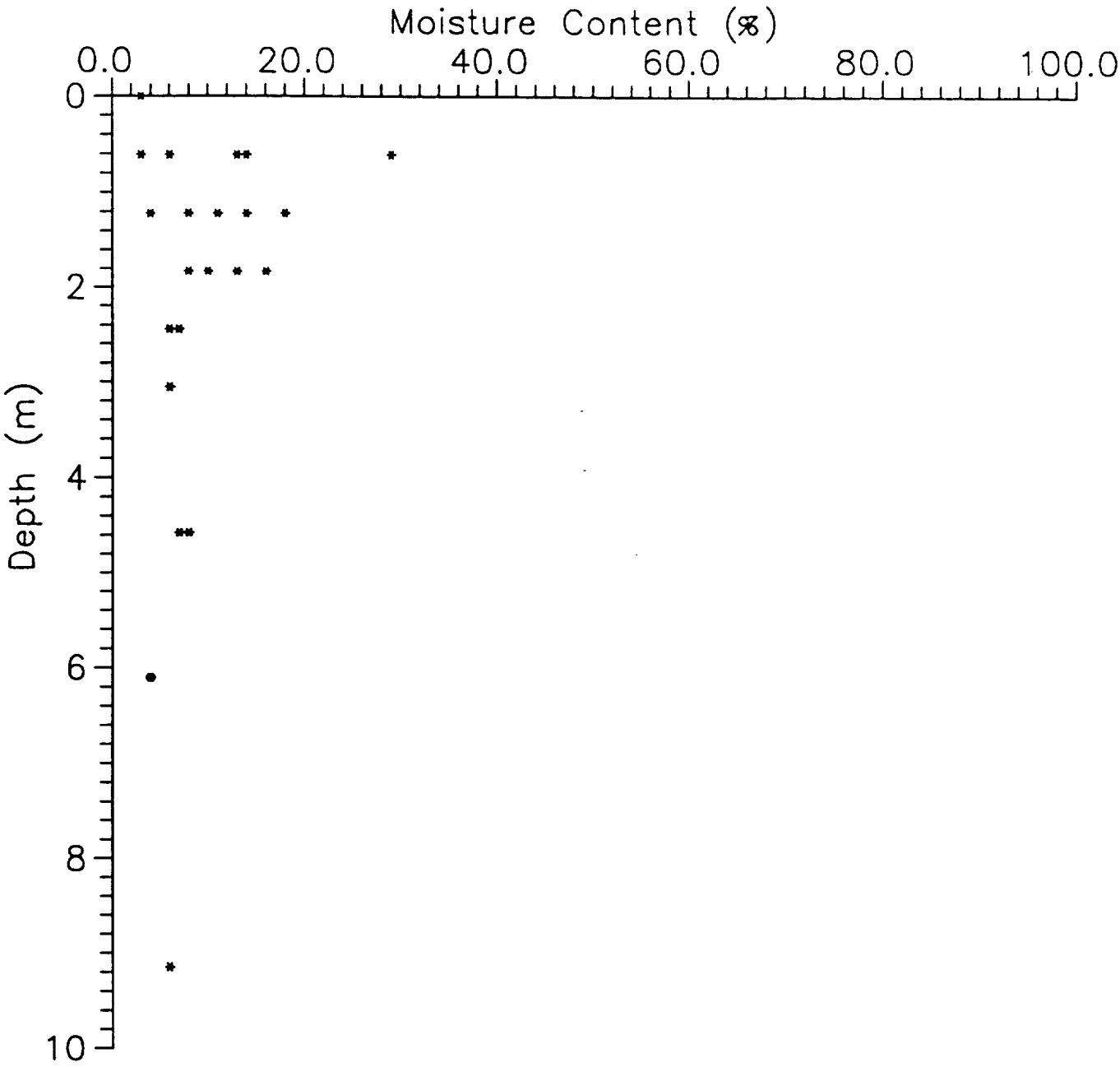
MOIST. CON. (#)
26

GRAINSIZE (#)
13

	OVERBURDEN	GROUND ICE
TYPE:	Tr. organic silt	Massive, excess
EXTENT:	All holes	All holes
THICK.:	Less than 0.15 m	Up to 2.1 m

POTENTIAL VOLUME, cu. m.: >1,150,000 **RECOVERABLE, cu.m:** 1,150,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2			230,000	230,000	230,000	230,000
CLASS 3			345,000	345,000	345,000	345,000
CLASS 4			575,000	575,000	575,000	575,000
CLASS 5						



Indian and Northern Affairs Canada
Inuvialuit Land Administration
Source 319
Moisture Content vs. Depth

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 320

LOCATION: 70 km N of Inuvik

REFERENCE(S): RKL 1973,Zone 3

SETTING
Hillocks, ridges, ponds

LANDFORM
Kame field

AREA
10 sq km

RELIEF
Irregular

CONTINUITY
Continuous

DEVELOPMENT CONSTRAINTS
Ice, silt, wildlife

WINTER ACCESS
Tundra/ice road

SUMMER ACCESS
None

BOREHOLES (#)
4

TEST PITS (#)
1

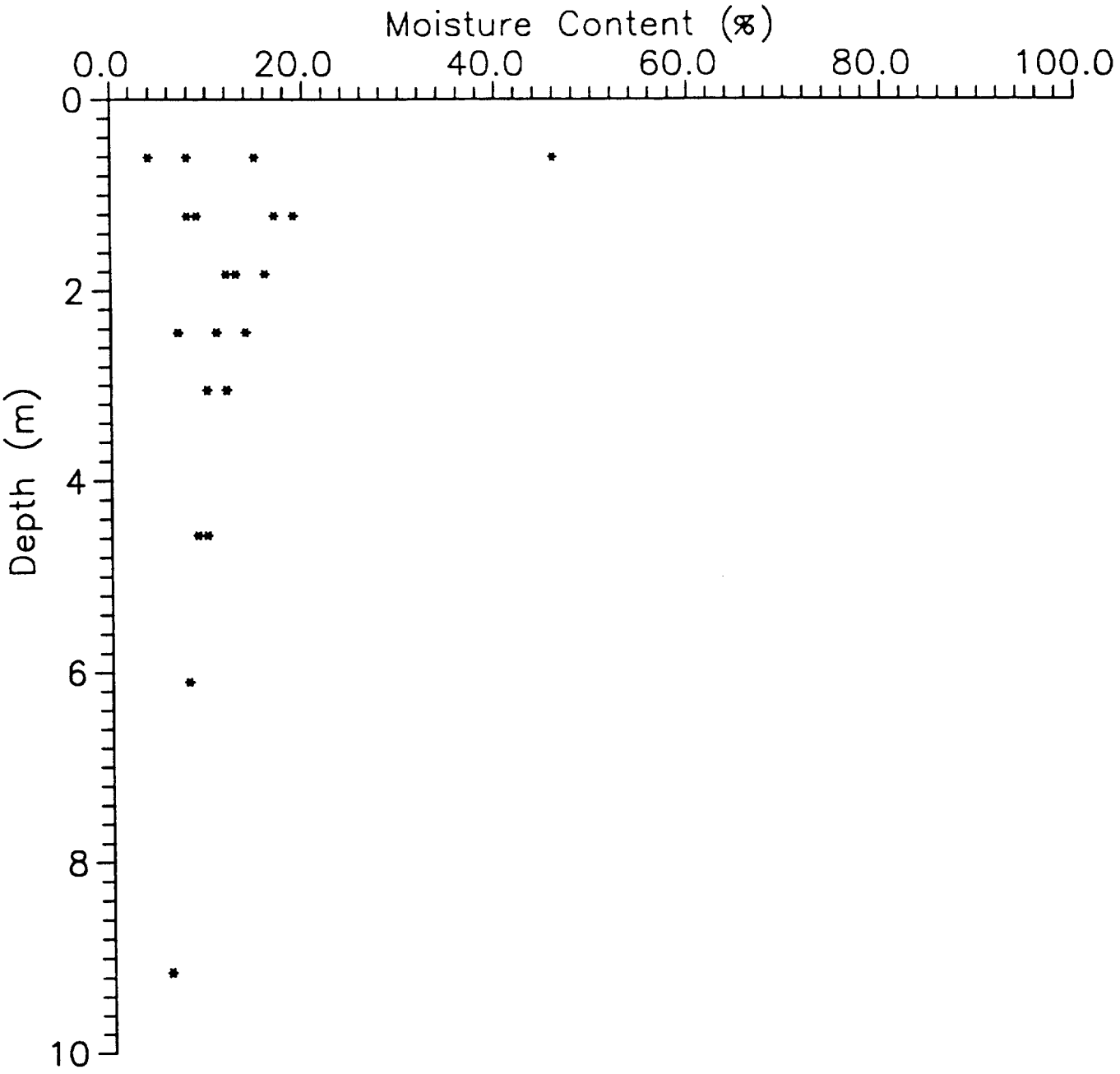
MOIST. CON. (#)
21

GRAINSIZE (#)
10

	OVERBURDEN	GROUND ICE
TYPE:	Silt, organics	Excess, massive
EXTENT:	All holes	All holes
THICK.:	Up to 0.3 m	Up to 2.4 m

POTENTIAL VOLUME, cu. m.: >>1,115,000 **RECOVERABLE, cu.m:** 1,115,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2			223,000	223,000	223,000	223,000
CLASS 3			892,000	892,000	892,000	892,000
CLASS 4						
CLASS 5						



Indian and Northern Affairs Canada
Inuvialuit Land Administration
Source 320
Moisture Content vs. Depth

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 321

LOCATION: 69 km N of Inuvik

REFERENCE(S): RKL 1973,Zone 3

SETTING East slope of Caribou Hills	**RELIEF** Variable	**WINTER ACCESS** Tundra/ice road
LANDFORM Glacial outwash	**CONTINUITY** Continuous	**SUMMER ACCESS** None
AREA 2 sq km	**DEVELOPMENT CONSTRAINTS** Access	

BOREHOLES (#) None	**TEST PITS (#)** 1
MOIST. CON. (#) 1	**GRAINSIZE (#)** 1

	OVERBURDEN	GROUND ICE
TYPE:	None	None
EXTENT:	-	-
THICK.:	-	-

POTENTIAL VOLUME, cu. m.: >765,000 **RECOVERABLE, cu.m:** 765,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3			765,000	765,000	765,000	765,000
CLASS 4						
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 322

ILA 7(1)(a)

LOCATION: 55 km NW of Inuvik

REFERENCE(S): RKL 1973,Zone 3; H-BBT 1986

SETTING
East slope, Caribou Hills

LANDFORM
Glaciofluvial terraces

AREA
1.4 sq km

RELIEF
Variable

CONTINUITY
2 fields

DEVELOPMENT CONSTRAINTS
Wildlife, ice, fair quality

WINTER ACCESS
Tundra/ice road

SUMMER ACCESS
None

BOREHOLES (#)
4

TEST PITS (#)
2

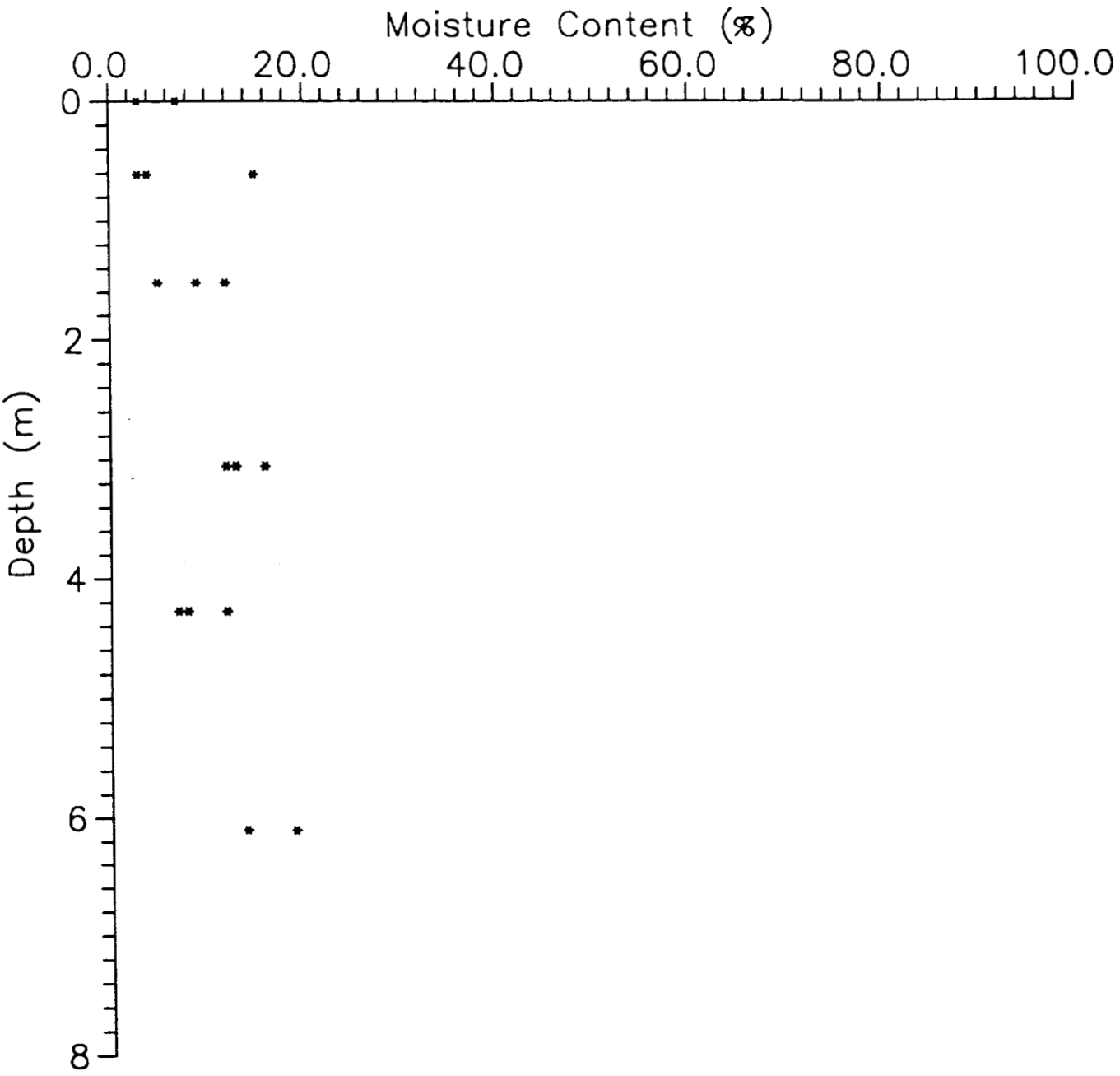
MOIST. CON. (#)
16

GRAINSIZE (#)
12

	OVERBURDEN	GROUND ICE
TYPE:	Silt, organics, ice	Massive, excess
EXTENT:	All holes	All holes
THICK.:	Up to 1.9 m	Up to 2.1 m

POTENTIAL VOLUME, cu. m.: 9,850,000 **RECOVERABLE, cu.m:** 9,850,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3			155,000	155,000	155,000	155,000
CLASS 4			610,000	610,000	610,000	9,695,000
CLASS 5						



Indian and Northern Affairs Canada
Inuvialuit Land Administration
Source 322
Moisture Content vs. Depth

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 323A

ILA 7(1)(a)

LOCATION: 54 km NW of Inuvik

REFERENCE(S): RKL 1973,Zone 3; H-BBT 1986

SETTING	RELIEF	WINTER ACCESS
Outer slope, Caribou Hills	Variable	Tundra/ice road
LANDFORM	**CONTINUITY**	**SUMMER ACCESS**
Tertiary delataic deposit	Continuous	None
AREA	**DEVELOPMENT CONSTRAINTS**	
7.8 sq km	IBP area	

BOREHOLES (#)	TEST PITS (#)
None	6
MOIST. CON. (#)	**GRAINSIZE (#)**
6	6

	OVERBURDEN	GROUND ICE
TYPE:	Silt, organics	Excess
EXTENT:	Intermittent	Intermittent
THICK.:	Up to 0.3 m	Variable

POTENTIAL VOLUME, cu. m.: 46,010,000 RECOVERABLE, cu.m: 46,010,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2			2,500,000	2,500,000	2,500,000	2,500,000
CLASS 3			2,500,000	9,000,000	2,500,000	43,510,000
CLASS 4						
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 324A

ILA 7(1)(a)

LOCATION: 61 km NW of Inuvik

REFERENCE(S): RKL 1973,Zone 3; H-BBT 1986

SETTING	RELIEF	WINTER ACCESS
West slope, Caribou Hills	Unknown	Tundra/ice road
LANDFORM	**CONTINUITY**	**SUMMER ACCESS**
Tertiary delataic deposit	Continuous	None
AREA	**DEVELOPMENT CONSTRAINTS**	
3.3 sq km	IBP area	

BOREHOLES (#)	TEST PITS (#)
None	None
MOIST. CON. (#)	**GRAINSIZE (#)**
None	None

	OVERBURDEN	GROUND ICE
TYPE:	Unknown	Unknown
EXTENT:	Unknown	Unknown
THICK.:	Unknown	Unknown

POTENTIAL VOLUME, cu. m.: 47,180,000 RECOVERABLE, cu.m: 47,180,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2					1,500,000	1,500,000
CLASS 3					1,500,000	45,680,000
CLASS 4						
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: 326

ILA 7(1)(a)

LOCATION: 65 km NW of Inuvik

REFERENCE(S): RKL 1973,Zone 3; EBA 1976, H-BBT 1986

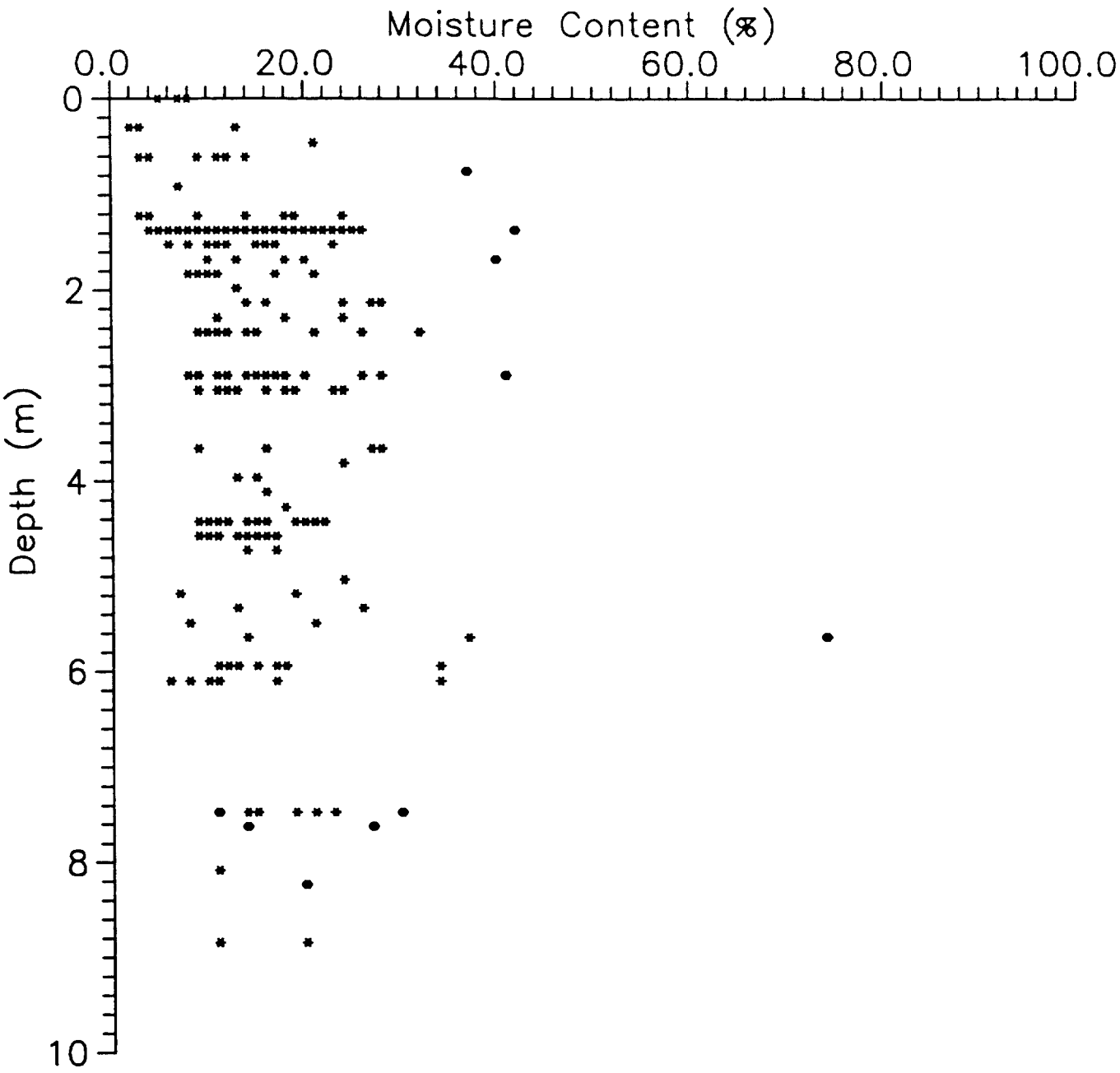
SETTING	RELIEF	WINTER ACCESS
East channel of MacKenzie R.	Variable, gullied	Tundra/ice road
LANDFORM	**CONTINUITY**	**SUMMER ACCESS**
Delta plain remnant	Continuous	Barge
AREA	**DEVELOPMENT CONSTRAINTS**	
7.7 sq km	Wildlife, river envir.	

BOREHOLES (#)	TEST PITS (#)
104	4
MOIST. CON. (#)	**GRAINSIZE (#)**
256	142

	OVERBURDEN	GROUND ICE
TYPE:	Peat, silt, till	Excess, massive
EXTENT:	Intermittent	Intermittent
THICK.:	Up to 3.0 m	Lenses up to 3.0 m

POTENTIAL VOLUME, cu. m.: 53,500,000 RECOVERABLE, cu.m: 53,500,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2			1,250,000	5,000,000	1,250,000	17,800,000
CLASS 3			2,500,000	10,000,000	2,500,000	35,700,000
CLASS 4						
CLASS 5						



Indian and Northern Affairs Canada
Inuvialuit Land Administration
Source 326
Moisture Content vs. Depth

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: DPW Pit

LOCATION: 22 km SE of Inuvik

REFERENCE(S): EBA 1976

SETTING	RELIEF	WINTER ACCESS
Cliff	60 m	Road
LANDFORM	**CONTINUITY**	**SUMMER ACCESS**
Rock outcrop	4 features	Road
AREA	**DEVELOPMENT CONSTRAINTS**	
275,000 sq m	None discernible, current quarry	

BOREHOLES (#)	TEST PITS (#)
-	Exposures
MOIST. CON. (#)	**GRAINSIZE (#)**
-	-

	OVERBURDEN	GROUND ICE
TYPE:	-	-
EXTENT:	-	-
THICK.:	-	-

POTENTIAL VOLUME, cu. m.: Unlimited RECOVERABLE, cu.m: 3,500,000

MATERIAL	PROVEN, cu.m.		PROBABLE, cu.m.		PROSPECTIVE, cu.m.	
	Annual	Total	Annual	Total	Annual	Total
CLASS 1						
CLASS 2						
CLASS 3						
CLASS 4						
CLASS 5	600,000	600,000	3,500,000	3,500,000	3,500,000	3,500,000

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: I400

ILA 7(1)(b)

LOCATION: 0 km E of Inuvik

REFERENCE(S): RKL 1973, Inuvik

SETTING	RELIEF	WINTER ACCESS
Caribou Hills, edge of town	Rolling, up to 15 m	Road
LANDFORM	**CONTINUITY**	**SUMMER ACCESS**
Glacofluvial outwash	Continuous	Road
AREA	**DEVELOPMENT CONSTRAINTS**	
280,000 sq m	Edge of town, nearly depleted	

BOREHOLES (#)	TEST PITS (#)
9	1
MOIST. CON. (#)	**GRAINSIZE (#)**
48	17

	OVERBURDEN	GROUND ICE
TYPE:	Unknown	Massive, lenses
EXTENT:	-	All Holes
THICK.:	-	Unknown

POTENTIAL VOLUME, cu. m.: Unknown RECOVERABLE, cu.m: Depleted ??

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3					0	0
CLASS 4						
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: I401A

LOCATION: 10 km N of Inuvik

REFERENCE(S): RKL 1973,Inuvik; H-BBT 1986

SETTING Hillocks bisected by streams	**RELIEF** 3 to 5 metres	**WINTER ACCESS** Tundra/ice road
LANDFORM Kame field	**CONTINUITY** 2 sources	**SUMMER ACCESS** None
AREA 1.1 sq km	**DEVELOPMENT CONSTRAINTS** Wildlife, poor quality	

BOREHOLES (#) 6	**TEST PITS (#)** 5
MOIST. CON. (#) 7	**GRAINSIZE (#)** 5

	OVERBURDEN	GROUND ICE
TYPE:	Silt, organics	Massive, excess
EXTENT:	All holes	Intermittent
THICK.:	Up to 0.76 m	Lenses up to 0.6 m

POTENTIAL VOLUME, cu. m.: 1,020,000 **RECOVERABLE, cu.m:** 1,020,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3			250,000	750,000	250,000	1,020,000
CLASS 4						
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: I402

LOCATION: 10 km S of Inuvik

REFERENCE(S): RKL 1973, Inuvik

SETTING Quarry	**RELIEF** 10 m	**WINTER ACCESS** Road
LANDFORM Bedrock outcrop	**CONTINUITY** Intermittent	**SUMMER ACCESS** Road
AREA 560,000 sq m	**DEVELOPMENT CONSTRAINTS** None discernible, Transport Canada pit	

BOREHOLES (#) 2	**TEST PITS (#)** 1 exposure
MOIST. CON. (#) None	**GRAINSIZE (#)** None

	OVERBURDEN	GROUND ICE
TYPE:	Silt, organics	None
EXTENT:	Intermittent	Intermittent
THICK.:	0.3 m	-

POTENTIAL VOLUME, cu. m.: 4,600,000 **RECOVERABLE, cu.m:** 4,600,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3						
CLASS 4						
CLASS 5	4,600,000	4,600,000	4,600,000	4,600,000	4,600,000	4,600,000

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: I403

LOCATION: 18 km SE of Inuvik

REFERENCE(S): RKL 1973, Inuvik

SETTING	RELIEF	WINTER ACCESS
Quarry	Irregular	Road
LANDFORM	**CONTINUITY**	**SUMMER ACCESS**
Bedrock outcrop	Continuous	Road
AREA	**DEVELOPMENT CONSTRAINTS**	
210,000 sq m	None discernible, Campbell Lake Quarry	

BOREHOLES (#)	TEST PITS (#)
None	1 exposure
MOIST. CON. (#)	**GRAINSIZE (#)**
None	None

	OVERBURDEN	GROUND ICE
TYPE:	None	None
EXTENT:	-	-
THICK.:	-	-

POTENTIAL VOLUME, cu. m.: >2,000,000 **RECOVERABLE, cu.m:** 2,000,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3						
CLASS 4						
CLASS 5	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: I404

LOCATION: 16 km SE of Inuvik

REFERENCE(S): RKL 1973, Inuvik

SETTING	RELIEF	WINTER ACCESS
Quarry	Irregular	Road
LANDFORM	**CONTINUITY**	**SUMMER ACCESS**
Bedrock outcrop	Continuous	Road
AREA	**DEVELOPMENT CONSTRAINTS**	
65,000 sq m	None	

BOREHOLES (#)	TEST PITS (#)
None	1 exposure
MOIST. CON. (#)	**GRAINSIZE (#)**
None	None

	OVERBURDEN	GROUND ICE
TYPE:	None	None
EXTENT:	-	-
THICK.:	-	-

POTENTIAL VOLUME, cu. m.: >500,000 RECOVERABLE, cu.m: 500,000

MATERIAL	PROVEN, cu.m.		PROBABLE, cu.m.		PROSPECTIVE, cu.m.	
	Annual	Total	Annual	Total	Annual	Total
CLASS 1						
CLASS 2						
CLASS 3						
CLASS 4						
CLASS 5	500,000	500,000	500,000	500,000	500,000	500,000

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: I405A

LOCATION: 27 km ESE of Inuvik

REFERENCE(S): RKL 1973, Inuvik

SETTING	RELIEF	WINTER ACCESS
Rolling hills	13 m	Tundra road
LANDFORM	**CONTINUITY**	**SUMMER ACCESS**
Kames, terraces, eskers	11 features	None
AREA	**DEVELOPMENT CONSTRAINTS**	
1.4 sq km	Distance, wildlife, poor quality	

BOREHOLES (#)	TEST PITS (#)
3	None
MOIST. CON. (#)	**GRAINSIZE (#)**
12	5

	OVERBURDEN	GROUND ICE
TYPE:	Silt, ice	Crystals
EXTENT:	All holes	-
THICK.:	Upto 1 m	-

POTENTIAL VOLUME, cu. m.: 13,000,000 **RECOVERABLE, cu.m:** 13,000,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3						
CLASS 4			650,000	4,000,000	2,100,000	13,000,000
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: I406

LOCATION: 21 m E of Inuvik

REFERENCE(S): RKL 1973, Inuvik

SETTING	RELIEF	WINTER ACCESS
Next to stream	4.5 m	Tundra/ice road
LANDFORM	**CONTINUITY**	**SUMMER ACCESS**
Esker ridge	Continuous	None
AREA	**DEVELOPMENT CONSTRAINTS**	
7,400 sq m	Wildlife, stream envir., small vol.	

BOREHOLES (#)	TEST PITS (#)
None	1
MOIST. CON. (#)	**GRAINSIZE (#)**
None	1

	OVERBURDEN	GROUND ICE
TYPE:	Peat and silt	None
EXTENT:	Unknown	All holes
THICK.:	150 mm	-

POTENTIAL VOLUME, cu. m.: 30,000 RECOVERABLE, cu.m: 30,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3			7,400	7,400	10,000	30,000
CLASS 4						
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: I407

ILA 7(1)(a)

LOCATION: 61 km NW of Inuvik

REFERENCE(S): RKL 1973,Inuvik; H-BBT 1986

SETTING	RELIEF	WINTER ACCESS
East slopes, Caribou Hills	Up to 60 metres	Ice road
LANDFORM	**CONTINUITY**	**SUMMER ACCESS**
Terrace remnant	2 sources	Barge
AREA	**DEVELOPMENT CONSTRAINTS**	
0.7 sq km	Critical wildlife, river environment	

BOREHOLES (#)	TEST PITS (#)
4	None
MOIST. CON. (#)	**GRAINSIZE (#)**
4	1

	OVERBURDEN	GROUND ICE
TYPE:	Silt, organics	Excess
EXTENT:	All holes	All Holes
THICK.:	Less than 0.3 m	Variable

POTENTIAL VOLUME, cu. m.: 15,000,000 RECOVERABLE, cu.m: 15,000,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2			300,000	4,600,000	300,000	15,000,000
CLASS 3						
CLASS 4						
CLASS 5						

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: R28 & 29

LOCATION: 20 km S of Inuvik

REFERENCE(S): EBA 1983,a; EBA 1976

SETTING
Near river hills

RELIEF
75 m

WINTER ACCESS
Tundra/ice road

LANDFORM
Cliffs and ridges

CONTINUITY
Continuous

SUMMER ACCESS
Barge on river

AREA
2.0 sq km

DEVELOPMENT CONSTRAINTS
None discernible

BOREHOLES (#)
None

TEST PITS (#)
None

MOIST. CON. (#)
None

GRAINSIZE (#)
None

	OVERBURDEN	GROUND ICE
TYPE:	Unknown	Unknown
EXTENT:	Unknown	Unknown
THICK.:	Unknown	Unknown

POTENTIAL VOLUME, cu. m.: >>20,000,000 **RECOVERABLE, cu.m:** >20,000,000

MATERIAL	PROVEN, cu.m. Annual	PROVEN, cu.m. Total	PROBABLE, cu.m. Annual	PROBABLE, cu.m. Total	PROSPECTIVE, cu.m. Annual	PROSPECTIVE, cu.m. Total
CLASS 1						
CLASS 2						
CLASS 3						
CLASS 4						
CLASS 5			20,000,000	20,000,000	20,000,000	20,000,000

INDIAN AND NORTHERN AFFAIRS CANADA
INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND RECOMMENDATIONS FOR DEVELOPMENT

GRANULAR RESOURCES SUPPLY SUMMARY
Inuvik

SOURCE: YaYa Lake

ILA 7(1)(b)

LOCATION: 90 km NW of Inuvik

REFERENCE(S): EBA 1975

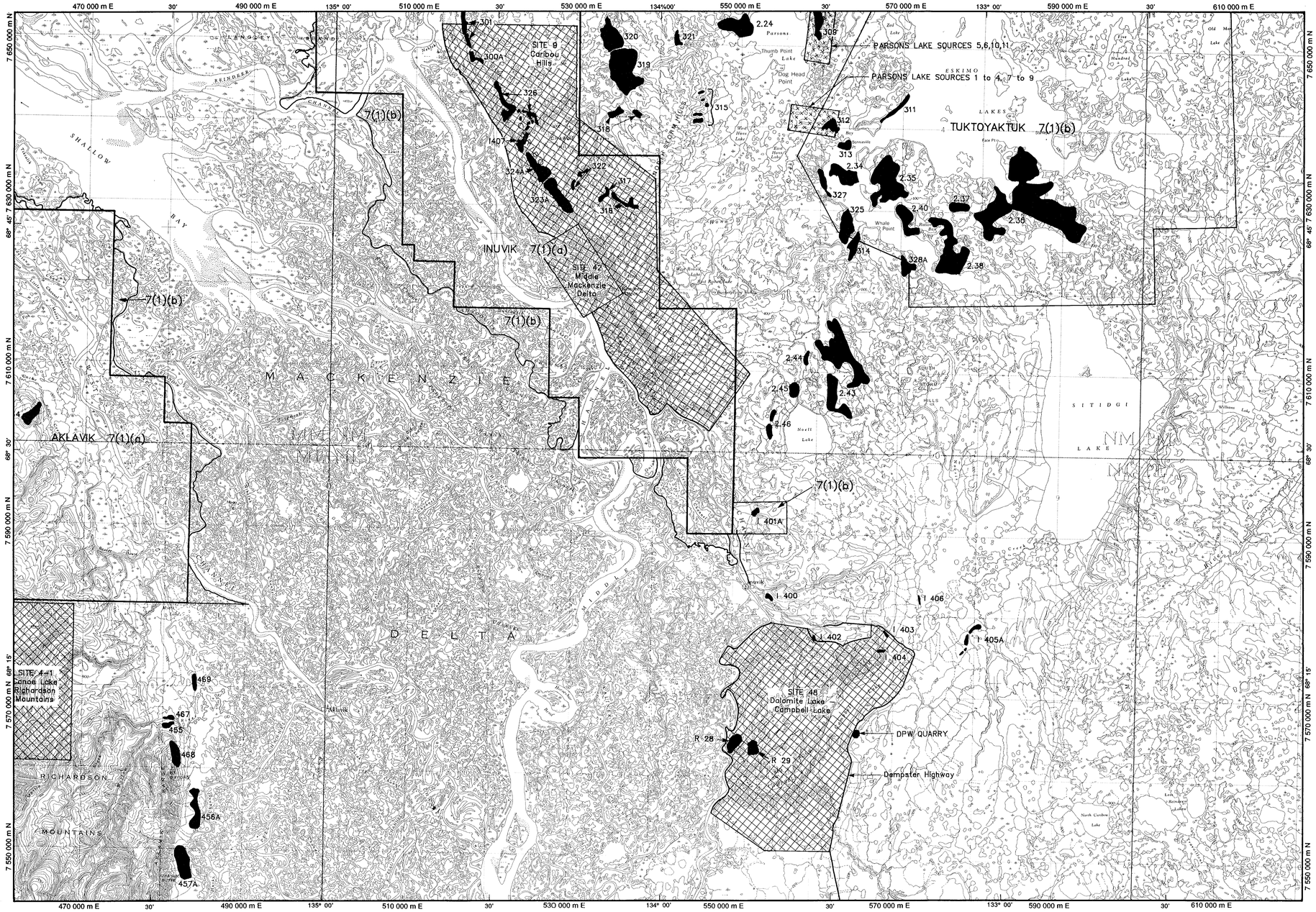
SETTING	RELIEF	WINTER ACCESS
Steep ridges	0 to 41 m	Tundra/ice road
LANDFORM	**CONTINUITY**	**SUMMER ACCESS**
Glaciofluv. esker/kame	Continuous	None
AREA	**DEVELOPMENT CONSTRAINTS**	
40 sq km	Currently developed, massive ice	

BOREHOLES (#)	TEST PITS (#)
299	None
MOIST. CON. (#)	**GRAINSIZE (#)**
420	331

	OVERBURDEN	GROUND ICE
TYPE:	Organics, silt	Massive
EXTENT:	Most areas	Some areas
THICK.:	Up to 4 m	Up to 17 m

POTENTIAL VOLUME, cu. m.: 12,900,000 **RECOVERABLE, cu.m:** 7,500,000

MATERIAL	PROVEN, cu.m.		PROBABLE, cu.m.		PROSPECTIVE, cu.m.	
	Annual	Total	Annual	Total	Annual	Total
CLASS 1						
CLASS 2	3,750,000	7,500,000	4,400,000	8,800,000	4,400,000	8,800,000
CLASS 3						
CLASS 4						
CLASS 5						



Scale 1:250 000 Échelle

Miles 5 0 5 10 15

Kilometres 5 0 5 10 15 20 25

7(1)(a) Lands Boundary

7(1)(b) Lands Boundary

Approximate Boundary of Granular Source

23 Granular Source Number

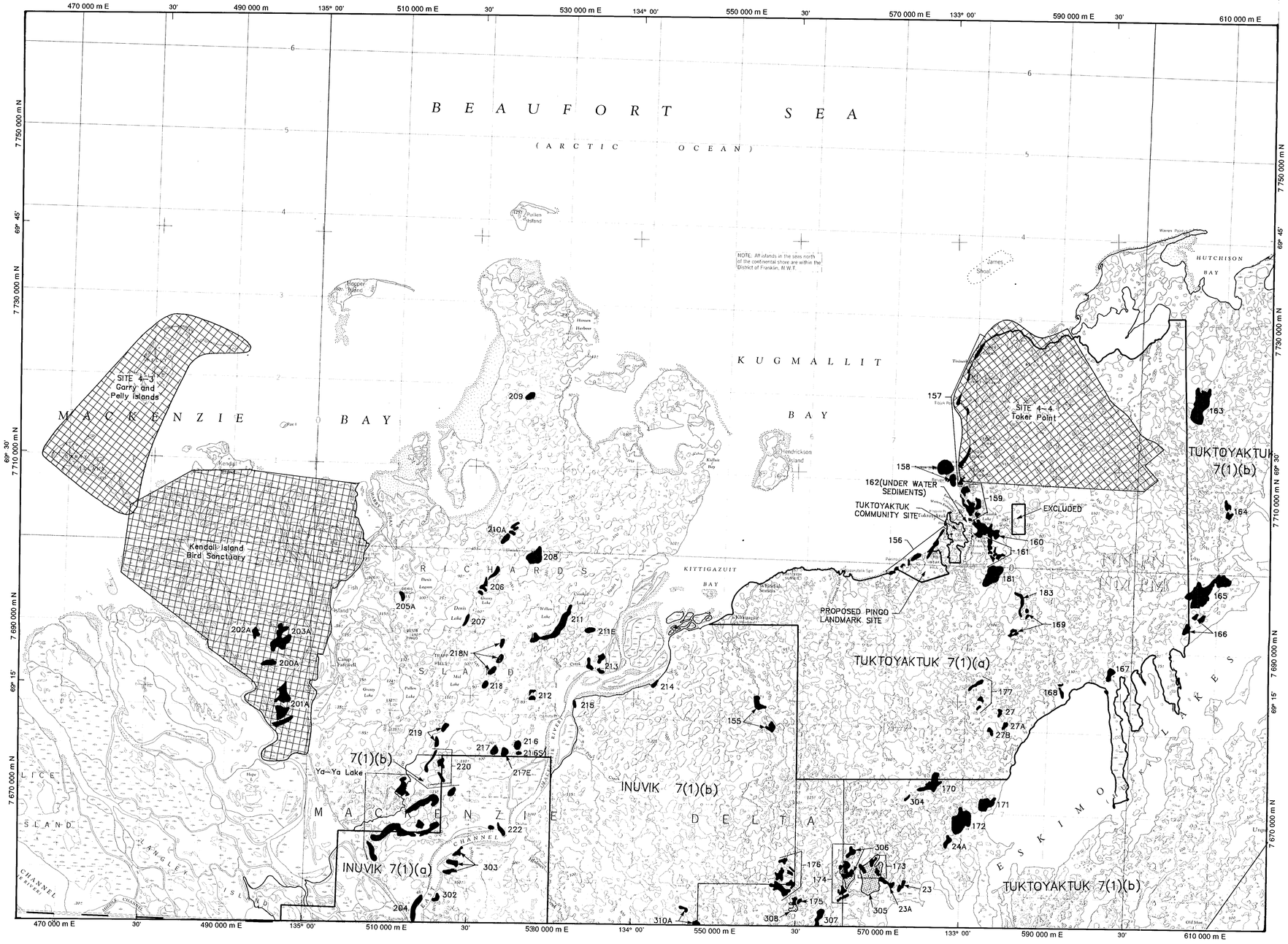
Proposed International Biological Program Area

ROADS / ROUTES:

hard surface - pavée		
loose surface - de gravier		
cart track - de terre		
trail - sentier		
deletions - suppressions		XXXXX

loose surface, all weather	de gravier, toute saison	less than 2 lanes / moins de 2 voies	2 lanes / 2 voies	dry weather / période sèche
hard surface, all weather	pavée, toute saison	more than 2 lanes / plus de 2 voies	2 lanes / 2 voies	less than 2 lanes / moins de 2 voies
loose surface, all weather	de gravier, toute saison	more than 2 lanes / plus de 2 voies	less than 2 lanes / moins de 2 voies	dry weather / période sèche
wagon, cart track	chemin de terre	more than 2 lanes / plus de 2 voies	less than 2 lanes / moins de 2 voies	primitive road / sentier ou portage
railway, normal gauge	chemin de fer, écartement normal	trail or portage / sentier ou portage		
depression contours	courbes de cuvette	opened / ouverte	multiple track / voies multiples	flagstop / arrêt	single track / voie unique	abandoned / désaffectée
spot elevation, in feet	repère de nivellement en pieds					2550
power transmission line	ligne de transport d'énergie					
spot elevation: precise, approximate	point coté: précis, approximatif					950 ± 950 ±
boundary monument	borne-frontière					
raised beaches	plages élevées					
depression contours	courbes de cuvette					
cliff or low relief	falaise ou relief peu accentué					
esker	esker					
pingo	buttes de terre					
building	bâtiment	intermittent stream	cours d'eau intermittent			
post office	bureau de poste	intermittent lake	lac intermittent			
church	église	rapids; falls	rapides; chute			
school	école	marsh or swamp	marais ou marécage			
astronomical monument	repère astronomique	string bogs	marais en chapelet			
R.C.M.P. detachment	poste de la G.R.C.	ice field or glacier	champ de glace ou glacier			
horizontal control point	point géodésique	tundra polygons	sols polygonaux			
lighthouse	phare	tundra ponds	étangs de toundra			
town	ville	landing ground	piste d'atterrissage			
village or settlement	village ou hameau					

EBA Engineering Consultants Ltd.	PROJECT: INUVIALUIT SETTLEMENT SAND AND GRAVEL INVENTORY AND MANAGEMENT PLAN	
CLIENT: INDIAN AND NORTHERN AFFAIRS CANADA	TITLE: GRANULAR DEPOSIT LOCATIONS INUVIK AND TUKTOYAKTUK DISTRICT OF MACKENZIE, N.W.T.	
DATE: 87/02/20	DWN.: EBR	CHKD.: BAB
DWG. NO.: 0101-4575-003		



Scale 1:250 000 Échelle

Miles 5 0 5 10 15

Kilometres 5 0 5 10 15 20 25

7(1)(a) Lands Boundary

7(1)(b) Lands Boundary

Approximate Boundary of Granular Source

23 Granular Source Number

Proposed International Biological Program Area

ROADS-ROUTES:

hard surface - pavée	
loose surface - de gravier	
cart track - de terre	
trail - sentier	
distinctions - suppressions	XXXXX

loose surface, all weather	de gravier, toute saison	less than 2 lanes moins de 2 voies	2 lanes 2 voies	less than 2 lanes moins de 2 voies	dry weather période sèche
hard surface, all weather	pavée, toute saison	less than 2 lanes moins de 2 voies	2 lanes 2 voies	less than 2 lanes moins de 2 voies	
loose surface, all weather	de gravier, toute saison	2 lanes or more 2 voies ou plus	less than 2 lanes moins de 2 voies	dry weather période sèche	
wagon, cart track	chemin de terre	trail or portage sentier ou portage			
railway, normal gauge	chemin de fer, écartement normal	station multiple track gare voies multiples	flagstop arrêt facultatif	single track voie unique	interchange correspondance
depression contours	courbes de cuvette				
spot elevation, in feet	repère de nivellement en pieds				
power transmission line	ligne de transport d'énergie				
spot elevation: precise, approximate	point coté: précis, approximatif				950 950 ?
boundary monument	borne frontière				
raised beaches	plages élevées				
depression contours	courbes de cuvettes				
cliff or low relief	falaise ou relief peu accentué				
esker	esker				
pingo	buttes de terre				
building	bâtiment	intermittent stream	cours d'eau intermittent		
post office	bureau de poste	intermittent lake	lac intermittent		
church	église	rapids; falls	rapides; chute		
school	école	marsh or swamp	marais ou marécage		
astronomical monument	repère astronomique	string bogs	marais en chapelet		
R.C.M.P. detachment	poste de la G.R.C.	ice field or glacier	champ de glace ou glacier		
horizontal control point	point géodésique	tundra polygons	sols polygonaux		
lighthouse	phare	tundra ponds	étangs de toundra		
town	ville	landing ground	piste d'atterrissage		
village or settlement	village ou hameau				

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