



PHASE III
FINAL COMPARISON OF POTENTIAL SOURCES
COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK, N.W.T.

Prepared For:
GOVERNMENT OF THE NORTHWEST TERRITORIES
DEPARTMENT OF PUBLIC WORKS HIGHWAYS DIVISION
YELLOWKNIFE, N.W.T.

Prepared By:
Hardy BBT Limited
CALGARY, ALBERTA

May, 1987

CG14096

11/217



D003396



TABLE OF CONTENTS

		<u>Page</u>
1.0	INTRODUCTION	1
2.0	REVIEW OF STUDY	1
3.0	COMPARISON OF POTENTIAL SOURCES	8
	3.1 Embankment Material	8
	3.2 Surface Material	10
4.0	RECOMMENDED GRANULAR SOURCES	11



1.0 INTRODUCTION

The Highways Division of the G.N.W.T. Department of Public Works and Highways have commissioned a study to develop a granular management plan for the community of Tuktoyaktuk, N.W.T. The granular requirements have been defined as 400,000 m³ of embankment fill and 100,000 m³ of surface material over the next 20 years. The study is being conducted in four Phases and this report concludes Phase III.

This report briefly summarizes the previous Phases of the study, presents the process of elimination that has occurred, and summarizes the results of the Phase III investigation of Source 155. A concluding discussion is presented on the potential sources. Recommendations are made for the supply of both embankment and surface materials for the Tuktoyaktuk community.

2.0 REVIEW OF STUDY

The Phase I report reviewed all previous community and regional granular studies. The report identified 35 potential granular sources within 50 km of Tuktoyaktuk, plus Ya-Ya Lakes which is about 75 km away (see Table in Appendix "A"). Of these, 24 were considered good or favourable prospects for granular materials. The other 12 sources were considered unsuitable with respect to distance/access, quality/quantity and environmental considerations. During a July, 1986 community meeting, 6 of the good or favourable prospects were eliminated due to local concerns (Sources 156, 157, 159, 160, 161, & 169), as reported in the Phase I report dated July, 1986.



Air-photo interpretation in Phase II, identified numerous small potential granular sources within 10 to 20 km, southeast of the community. Field reconnaissance in September 1986, confirmed several small, shallow granular sources in the area, identified as Sources 181, 183 and 184 (Plate 1 in map pocket). It was proposed that a Phase III Field Investigation should explore these small deposits, Sources 181, 183 and 184 as well as Source 155 as the more attractive potential sources as yet unproven.

The relative economics were investigated for each of the potential sources still being considered following Phase II. It was decided at this stage to exclude any deposits greater than 30 km from Tuktoyaktuk unless good quality was already established or access was feasible by ice road. Also excluded were Sources 158 and 162 for the following reasons:

Source 158 (Offshore shoals)

Very limited data for these two shoals suggests sand with gravel near the surface. Permafrost may be present. Although not ruled out earlier in the study it has not been given serious consideration. This deposit is not recommended primarily because the water depth is shallow for dredging. Also there are problems associated with handling and stockpiling of dredged sands.

Source 162 (Tuk Harbour)

There are zones within this source that have fair quality granular material. The sediments dredged for the water storage reservoir may not have included the better quality



sand and gravel. Never-the-less, the majority of the material is marginal for road embankment. Given the problems of handling, stockpiling and draining dredged materials and the problems of compacting poorly graded materials, this deposit is not recommended.

The sources actually considered in the relative economic study and the relative costs obtained are summarized below. Refer to Appendix "B" for more details on the cost information received.

Embankment Material	Avg. Haul Cost, /m ³	Surface Material	Avg. Haul Cost, /m ³
181,183,184	\$28.00	168	\$ 33.00
177	30.50	155	29.70
155	31.50	Ya-Ya	32.00
211	29.00		

As indicated in Appendix "B", there was a wide range and some inconsistency in the prices submitted. It is not certain that contractors were quoting an all-inclusive price as requested. It is also suspected that contractors quoted high costs for unfamiliar sources. These factors reduce the reliability of the cost comparison, however, it is clear there is not a major difference between the deposits. The potential economical benefits of the closer Sources 181, 183 and 184 were largely offset by additional work involved in developing small sources.

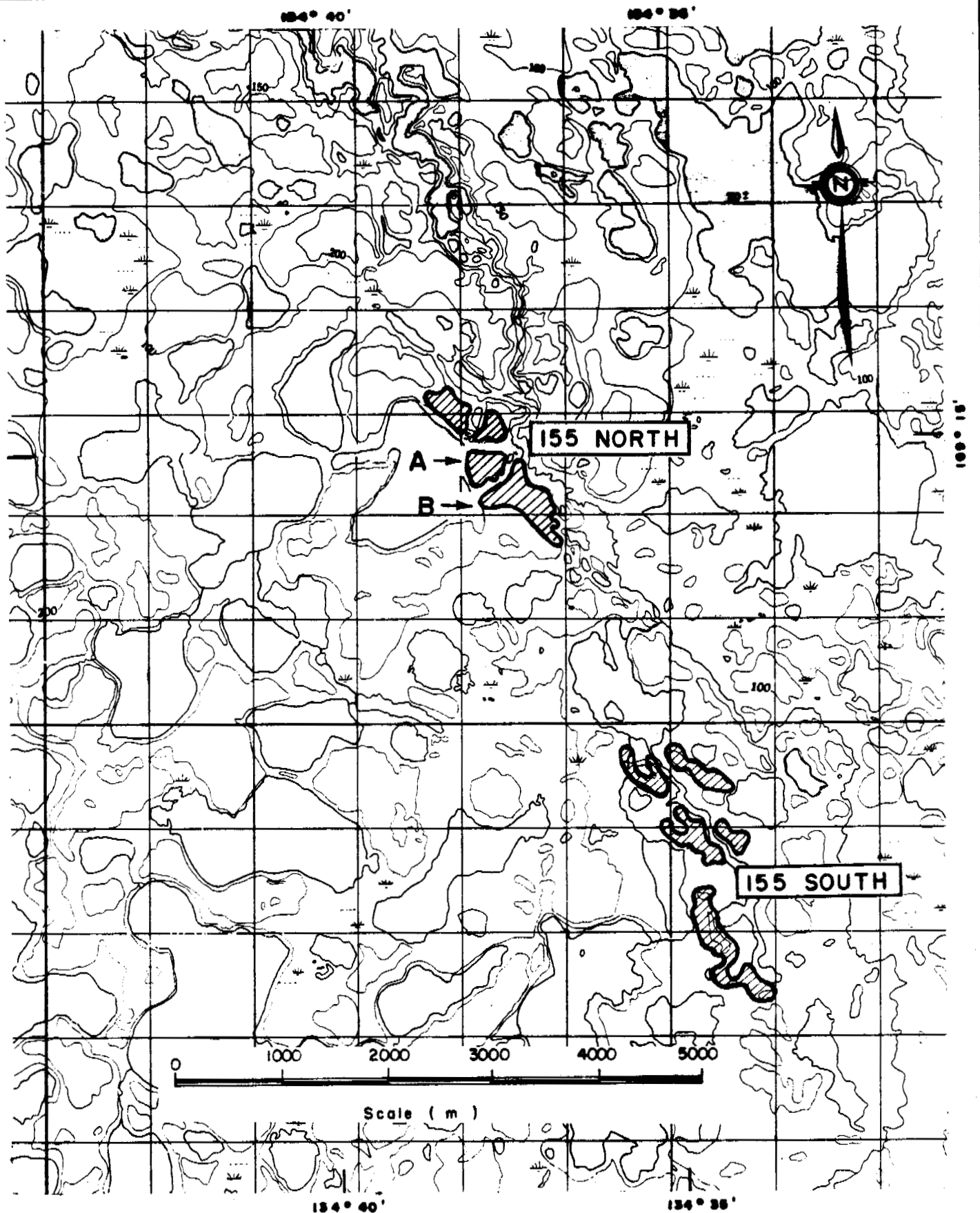


At a February 1987 community meeting it was agreed that there was not a strong economic benefit to favour the close deposits. It was also considered undesirable to have many small disturbed areas. Source 184 was not ruled out, however, it was not expected to be more desirable than Source 177. It was therefore decided to drill only Source 155 as a potential source for embankment and surface material for the community. A record of this February meeting is included in Appendix "C".

The Phase III drilling conducted in March 1987 has proven considerable quantities of fair to good granular material. The complete details of this investigation are reported separately. In summary, a 1 to 3 m layer of granular material has been proven over a total area in the order of 500,000 m². The volume of granular material is judged to be about 800,000 m³. It is expected that more granular materials exist in similar terrain features in the vicinity of those investigated.

The distribution of the various classes of material proven in each area of Source 155 (see Figure 1) are presented in Table 1. The classification used is based on a system used in regional studies by D.I.A.N.D. and is shown on Table 2.

Generally speaking, the Class 2 material is very good gravel and sand. Some of the gravel tested actually qualifies as Class 1 material and could be suitable for concrete aggregate. This better quality gravel is found more in the south deposit. Much of the north deposit is Class 3 material. This includes some well graded sand and gravel with a fairly high fines content that is suitable for surfacing material.



COMMUNITY GRANULAR MANAGEMENT PLAN
TUKTOYAKTUK , NWT

LOCATION OF DEPOSITS
155 NORTH AND 155 SOUTH

CG14096

FIGURE 1



Hardy BBT Limited
CONSULTING ENGINEERING & PROFESSIONAL SERVICES



TABLE 1

BORROW SOURCE 155
PROVEN QUANTITIES OF GRANULAR MATERIALS, m³

155 NORTH

Class 2	47,000
Class 3	312,000
Class 4	<u>29,000</u>
TOTAL (155 North)	388,000
TOTAL Class 2 and 3	359,000

155 SOUTH

Class 2	283,000
Class 3	219,000
Class 4	<u>13,000</u>
TOTAL (155 South)	515,000
TOTAL Class 2 and 3	502,000

TOTAL - SOURCE 155

Class 2	330,000
Class 3	531,000
Class 4	<u>42,000</u>
TOTAL	<u>903,000</u>
TOTAL CLASS 2 and 3	861,000

TABLE 2

TUKTOYAKTUK GRANULAR MANAGEMENT PLAN
CLASSIFICATION OF GRANULAR MATERIALS

Source Quality Description	General Description of Material	Minimum Technical Identification Parameters	Suggested Uses of Materials
(1) Excellent	Well graded gravels and sands suitable for use as aggregates with a minimum of processing. <5% fines	Petrographic Number - 160 max. Los Angeles Abrasion Loss - 35% max. Soundness Loss (Magnesium Sulphate) - 12% max. and meeting other requirements of CSA A23.1 - 1973	Portland Cement Concrete, Asphaltic Concrete, Masonry Sand, Concrete Block, Surface Treatment and Roofing Aggregate.
(2) Good	Graded sands and gravels with varying quantities of silt. <10% fines	Petrographic Number - 200 max. Los Angeles Abrasion Loss - 60% max. Fines greater than 10% passing the 200 sieve can be removed with minimum of processing	Granular base and subbase. Winter sand backfill for trenches and slabs. Pads for structures.
(3) Fair	Poorly graded sands and gravels with or without substantial silt content. <20% fines	Petrographic Number - 250 max. Can be processed to meet local frost susceptibility criteria	Granular subbase. General backfill material, pads for equipment.
(4) Poor	Poorly graded granular soils of high silt content, possibly containing very weak particles and deleterious materials. >20% fines	Nil	General non-structural fill.

NOTE: Based on classification developed by DIAND

Moisture content ideally <10%; if moisture content 10-20%; requires drying before use.



3.0 COMPARISON OF POTENTIAL SOURCES

At this stage of the study the potential sources still being considered are as follows:

<u>Embankment Material</u>	<u>Surface Material</u>
177	168
155	155
211	Ya-Ya

The following sections briefly discuss each of these sources. The complete details on these deposits are contained in the reports summarized in the List of Existing Reports at the end of this report. Section 4 presents the recommendations regarding the sources to consider for the community granular supply.

The potential concerns with high ice contents or massive ice at depth are common to most of the deposits and is not expected to be a deciding factor between deposits. This matter will be discussed in more detail in a subsequent source development plan.

3.1 EMBANKMENT MATERIAL

Source 177

This deposit contains fair quality sand with some gravel. It has been considered as a reasonable source for embankment material for some time. Much of the deposit contains high moisture contents. Therefore it is probably



hard bonded below the active layer. Being predominantly a sand with considerable silt (5 to 32%) it may not drain readily. This source is not given prime consideration.

Source 155

There is much fair to good quality granular material in this deposit. Most of the sand and the poorly graded gravels would be quite suitable for embankment fill. Moisture contents tend to increase with depth and deeper deposits may be too hard bonded for excavation. There is some massive ice beneath the south deposit. A surface layer in the order of 1 m thick could probably be removed quite easily in a first season of development with another similar thickness removed after allowing for drainage in the new active layer.

Source 211

The northern portion of this deposit has been worked recently and proved to be almost pure sand with very little gravel. More recent drilling for DIAND (EBA 1986) has proven some well graded sand with some gravel, however, the majority of the material is a fine uniform sand. Moisture contents are high at depth with frequent massive ice. Excavation of the top 1.5 m is considered feasible in a first season and this would yield most of the probable gravelly material (211A and F). Some more sand material should be extractable following thaw and drainage.



3.2 SURFACE MATERIAL

The characteristics of a road surface material are a well graded gravel with 15 to 20% fines to act as a binder. This is contrary to the usual requirements for granular materials which would tend to favour clean gravel. With reference to the classification system (Table 2), road surface material is actually a well graded Class 3 or a dirty Class 2 material.

Source 168

There is a considerable quantity of good to excellent gravel at this source. The fines content is, however, reported to be particularly low (1 - 2%; BBT, 1983). This material is therefore not suitable as surface material and could be conserved for more demanding requirements such as aggregate or structural fills not requiring trafficability. (Exploitation of this source this past winter will have revealed more specific information on this source and re-appraisal may be warranted.)

Source 155

There is a reasonable quantity of gravelly sands and sandy gravels which contain the desired fines content in the 155 north deposit. The south deposit tends to be cleaner and coarser and, while it is excellent material, it is not suitable for surfacing.



Ya-Ya Lakes

This source has been the prime source for quality gravel in the region for many years. It is generally too clean for surface material and usually requires mixing with finer soils. An objective of this study is to find an alternate to this distant source.

4.0

RECOMMENDED GRANULAR SOURCES

Source 155 constitutes one of the best sources of granular material to be investigated and proven in recent years. While the 860,000 m³ of fair to good granular material proven in Source 155 could all be used to meet the Tuktoyaktuk requirements, it may not be the best use of some of the resources. It is recommended that all of Source 155 North be developed for community use. Access to Source 155 North from Tyktoyaktuk would comprise about 40 km by ice-road and about 5 km over land. Source 155 South, which is generally superior-quality for embankment material, is not recommended for development at this time.

The majority of 155 North (A and B) is Class 3 material, the remainder being Class 2 and 4. Approximately 70%, or 200,000 m³, of the Class 3 material is considered suitable for surface grade and about 30% is embankment material. It is therefore recommended that all of Source 155 North be developed and that the material best suited for surface grade be selectively processed (screening and/or crushing) and stock-piled for that use. The majority of the remaining material could be used as pit-run for embankment material. The Class 4 material included in Areas A and B should be



suitable for embankment fill as silt contents are only marginally greater than 20% and the materials will undoubtedly become mixed with cleaner material.

Source 155 North, Areas A and B (see Figure 1) could provide up to the following amounts, based on Table 1.

	Available	Required
Surface Material	100,000 m ³	100,000 m ³
Embankment Material	288,000 m ³	400,000 m ³

Therefore, Source 155 North is unable to provide all of the embankment fill requirements.

The majority of Source 155 south is Class 2 material. There are local areas where the material drops to Class 3 or 4 due to poor gradation (lacking of sand sizes) or high fines content. There is, however, insufficient concentration of the Class 3 material to provide the remaining embankment material required. All of the Class 2 material in the 155 south deposits is low in fines (4 - 9%) and are not suitable for surface grade. Locally Class 1 material exists and with some limited screening/crushing and washing, concrete aggregate could be processed. It is recommended that Source 155 South should be reserved for structural fills and possibly aggregate.

If it is agreed to leave the Source 155 South material for other use, then the remainder of the embankment material may have to be obtained from Sources 211 or 177. On the other



hand, future drilling in the area of Source 155 will undoubtedly prove more embankment fill material in which case maybe all the requirements can be provided by 155.

The choice between Sources 211 and 177 would favour 177 for quality since there is generally more gravel. Most of 211 is very low in gravel except for some fine gravel near the surface, and localized patches of well graded sand and gravel.


With respect to Phase IV of the Study, it is expected that a development plan would be prepared for Source 155. However, it will have to be confirmed to what extent 155 would be designated for the community supply and what materials should or should not be extracted for that purpose.

Respectfully submitted

HARDY BBT LIMITED

Per: 

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


Reviewed by:

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



LIST OF EXISTING REPORTS

BBT Geotechnical Consultants (1983). Granular Materials Evaluation, Deposits 168 and 211, Tuktoyaktuk Area, N.W.T. Department of Indian Affairs and Northern Development.

EBA Engineering Consultants Ltd. (1975). Ya-Ya Granular Resources Study. Arctic Petroleum Operators Association (APOA) Calgary. 2 Volumes.

EBA Engineering Consultants Ltd. (1983). Granular Resource Development and Management Plan, Tuktoyaktuk, N.W.T. Indian and Northern Affairs Canada.

EBA Engineering Consultants Ltd. (1986). Granular Resource Evaluation, Richards Island, N.W.T. Indian and Northern Affairs Canada.

Hardy Associates (1978) Ltd. (1986). Interim Report - Phase I, Community Granular Management Plan, Tuktoyaktuk, N.W.T., G.N.W.T. Department of Public Works and Highways.

Hardy BBT Limited (1986). Interim Report - Phase II, Field Reconnaissance, Community Granular Management Plan, Tuktoyaktuk, N.W.T. G.N.W.T. Department of Public Works and Highways.

Hardy BBT Limited (1987). Interim Report - Phase II, Field Investigation of Source 155, Community Granular Management Plan, Tuktoyaktuk, N.W.T. G.N.W.T. Department of Public Works and Highways.

Hardy BBT Limited (1987). Final Comparison of Potential Granular Sources, Community Granular Management Plan, Tuktoyaktuk, N.W.T. G.N.W.T. Department of Public Works and Highways.

Public Works Canada, Western Region (1981). Geotechnical Investigation, Mile 970 to Mile 1059 Mackenzie Highway (Combined Data 1976 - 1980), Volumes I, II and III.

Rampton, V.N. and M. Bouchard (1975). Surficial Geology of Tuktoyaktuk, District of Mackenzie Geological Survey of Canada, Paper 74 - 53.



Ripley Klohn and Leonoff International Ltd. (1973). Stage II Community Granular Materials Inventory - Tuktoyaktuk. Department of Indian Affairs and Northern Development.

Ripley, Klohn and Leonoff International Ltd. (1973). Stage II Granular Materials Inventory: Zones I, II and III (3 volumes). Department of Indian Affairs and Northern Development.

Terrain Analysis and Mapping Services Ltd. (1976). Ya-Ya Lakes Esker Complex, Site Development and Restoration Plan. Department of Indian Affairs and Northern Development.

Thurber Consultants Ltd. (1979). Airphoto Interpretation, Terrain Analysis, Tuktoyaktuk N.W.T. Government of the Northwest Territories, Town Planning and Lands Division.

Thurber Consultants Ltd. (1981). Tuktoyaktuk Water Reservoir, Geotechnical Report No. 1: Borrow Source and Site Investigations. E.P.E.C. Consulting Western Ltd.

TABLE 1: SUMMARY OF POTENTIAL BORROW SOURCE INFORMATION (CONTINUED)

DEPOSIT DESCRIPTION						BORROW PIT DEVELOPMENT CRITERIA						
BORROW SOURCE NUMBER	MATERIAL TYPE	MATERIAL QUALITY	LANDFORM	ICE CONTENT	SURFACE DRAINAGE	ESTIMATED VOLUME (M ³)	ESTIMATED RECOVERY DEPTH (M)	OVERBURDEN THICKNESS (M)	ACCESS	ENVIRONMENTAL CONSIDERATIONS	DATA QUALITY RELIABILITY	OVERALL ASSESSMENT
304	Gravel and sand (GW)	Fair to good. General fill	Small eskers	Low	Well drained.	35,000	1.5	0.3 - 1.8	Undeveloped. Winter road. 34 km	No major concerns	Poor	Unsuitable Prospect
164	Sand (mc) and thin gravel beds	Fair to good. General fill	Glaciofluvial outwash plain	Low/medium, some massive ice	Well/moderately well drained. 20-30 m relief	2.6 x 10 ⁶	3.0	0.3	Undeveloped. Winter road. 35 km	No major concerns	Poor	Favourable Prospect
171	Sand and gravel (SW-GW)	Fair to good. General fill	Glaciofluvial outwash + kame complex	Low, some massive ice	Well/moderately well drained. 30 m relief	1.5 x 10 ⁶	6.0	0 - 2.0	Undeveloped. Winter road. 36 km	No major concerns	Fair	Favourable Prospect
172	Sand (fmc) minor gravel	Fair. General fill	Glaciofluvial outwash or Kame complex	Low/medium, some massive ice	Moderately well drained. 21 m relief	900,000	4.6	0.9 - 3.0	Undeveloped. Winter road. 36 km	Siltation of lakes	Fair to Good	Favourable Prospect
214	Sand (f) silty (SP)	Poor to fair. General fill only	Alluvial terrace	Medium some massive ice	Well drained. 22 m relief	300,000	0.6	0 - 0.6	Undeveloped. Winter ice road, Summer barge. 36 km	Siltation of river	Poor	Unsuitable Prospect
24A	Sand and gravel, trace of silt	Fair. General fill	Kames on Glaciofluvial outwash plain	Low/medium, some massive ice	Well drained. 6-30 m relief	150,000	up to 6.0	0 - 4.0	Undeveloped. Winter road. 40 km	No major concerns	Fair to Good	Unsuitable Prospect
24B	Silt and clay with sand and gravel	Poor. Unsuitable	Kames on Glaciofluvial outwash plain	Medium, some massive ice	Moderately well drained. 6-30 m relief	Minor amount	-	-	Undeveloped. Winter road. 43 km	Siltation of lakes	Fair	Unsuitable Prospect
174	Gravel and sand (GP)	Fair to good. General fill to aggregate	Kames on Glaciofluvial outwash plain	Low	Well drained. 25 m relief	3 x 10 ⁶	2.0	0 - 1.2	Undeveloped. Winter road. 44 km	No major concerns	Poor	Favourable Prospect
173	Sand and gravel (SW-GW)	Fair to good. General fill to aggregate	Kames on Glaciofluvial outwash plain	Low to high	Well drained.	500,000	up to 9.0	0 - 0.6	Undeveloped. Winter road. 45 km	No major concerns	Poor to fair	Favourable Prospect

TABLE 1: SUMMARY OF POTENTIAL BORROW SOURCE INFORMATION (CONTINUED)

DEPOSIT DESCRIPTION						BORROW PIT DEVELOPMENT CRITERIA						
BORROW SOURCE NUMBER	MATERIAL TYPE	MATERIAL QUALITY	LANDFORM	ICE CONTENT	SURFACE DRAINAGE	ESTIMATED VOLUME (M ³)	ESTIMATED RECOVERY DEPTH (M)	OVERBURDEN THICKNESS (M)	ACCESS	ENVIRONMENTAL CONSIDERATIONS	DATA QUALITY RELIABILITY	OVERALL ASSESSMENT
23	Sand and gravel trace silt	Fair. General fill	Kames on Glaciofluvial outwash plain	Medium, some massive ice	Moderately well drained 6-30 m relief	Significant amount	-	4.5-6.0	Undeveloped. Winter road. 45 km	Siltation of Lakes	Fair	Unsuitable Prospect
23A	Sand and gravel trace silt	Fair. General fill	Kames on Glaciofluvial outwash plain	Medium, some massive ice	Moderately well drained 6-30 m relief	Significant amount	-	5.0	Undeveloped. Winter road. 45 km	Siltation of lakes	Fair	Unsuitable Prospect
213	Sand (f) some silt	Poor. Marginal general fill	Alluvial/ Glaciofluvial terrace	Medium	Well drained. 5 - 20 m relief	300,000	1.5	0-0.6	Undeveloped. Winter ice road, Summer barge. 47 km	Siltation of River	Poor	Unsuitable Prospect
211	Sand (fmc) some gravel (SP)	Fair. General fill only	Esker	Low/medium, some massive ice	Well drained. 15 m relief	500,000 to 865,000	up to 2.0	0 - 0.3	Partially developed. Winter ice road. 50 km	No major concerns	Good	Good Prospect
208	Sand, some silt (SM)	Poor. Unsuitable	Glaciofluvial /Alluvial terrace	Medium to high, massive ice	Well drained.	-	-	-	Undeveloped. Winter ice road. 50 km	No major concerns	Poor	Unsuitable Prospect
215	Sand and gravel	Fair. General fill, possible aggregate	Glaciofluvial delta	Medium, some massive ice	Well drained. 22 m relief	23,000	1.2	2.0	Undeveloped. Winter ice road, summer barge. 50 km	Siltation of river	Poor	Unsuitable Prospect
175	Sand (fm) and local gravel	Fair to good. General fill	Glaciofluvial outwash	Low/medium some massive ice	Moderately well drained. 15-25 m relief.	1.5 x 10 ⁶	6.0	0 - 2.0	Undeveloped. Winter road. 50 km	No major concerns	Poor	Favourable Prospect
151	Gravel and sand (GW)	Fair to Good. General fill to aggregate	Glaciofluvial outwash	Medium	Well drained.	500,000	1.5 - 3.0	0 - 0.3	Undeveloped. Winter road, summer barge. 50 km	Siltation of lakes	Poor	Favourable Prospect
Ya Ya Lakes	Sand and gravel (SW-GW)	Good. General fill to aggregate	Esker-Kame complex	Low to medium, some massive ice	Well drained. 7-40 m relief	9.8 x 10 ⁶	5.0-15.0	0.6	Partially developed. Winter ice road. 75 km	Siltation of lakes	Good	Good Prospect

**TABLE A****Embankment Material - Total Requirements Approx. 400,000 m³ over 20 years**

Deposit Number	Material Type	Estimated Overburden Thickness (m)	Estimated Recovery Depth (m)	Estimated Total Volume (m ³)	Price Per m ³ Avg. Total Haul 50,000 m ³ per season (\$) (individual prices)
181	Sand, some gravel	0-0.6	1.0	187,000	28.00 ^d /- (25/31/-)
183	Sand, some gravel	0-0.6	1.0	71,000	28.00/- (25/31/-1)
184	Sand, some gravel	0-0.6	1.0	200,000	28.00/- (25/31/-)
177	Sand, some gravel	0-1.5	4.6	2 x 10 ⁶	30.50/36.33 ^e (36/25/48)
155	Sand, some gravel	0-0.6	1.0-2.0	1.1 x 10 ⁶	31.50/35.00 (36/27/42)
211	Sand, some gravel	0-0.3	2.0	500,000 to 865,000	29.00/30.33 (29/29/33)

NOTES:

- (a) Prices requested from three contractors: Storr and Sons, and North Star Trucking of Inuvik and E. Gruben's Transport Ltd. of Tuktoyaktuk.
- (b) One contractor declined to provide prices for 181, 183 and 184.
- (c) The very large range of prices for a given deposit reduces the reliability for the comparison, however, for each contractor the relative cost for the various deposits is indicative.
- (d) The average cost shown here and in the text is based on the two contractors who provided prices for all six deposits.
- (e) The average cost shown here is for the three prices received and is considered a reasonable relative cost indication between 177, 155, & 211.

TABLE BSurface Material - Total Requirements Approx. 100,000 m³ over 20 years

Deposit Number	Material Type	Estimated Overburden Thickness (m)	Estimated Recovery Depth (m)	Estimated Total Volume (m ³)	Price Per m ³ Avg. Total Haul 50,000 m ³ per season (\$) (individual prices)
168	Sand and gravel	0-1.5	1.5 - 7.5	350,000 to 500,000	33.00 ^d (35/27/37)
155	Sand and gravel	0-0.6	1.5	475,000	29.67 (30/27/32)
YaYa Lakes	Sand and gravel	0-0.6	5.0 -15.0	9.8 x 10 ⁶	32.00 (33/38/25)

NOTES:

- (a) Prices requested from three contractors: Storr and Sons, and North Star Trucking of Inuvik and E. Gruben's Transport Ltd. of Tuktoyaktuk.
- (b) The very large range of prices for a given deposit reduces the reliability for the comparison, however, for each contractor the relative cost for the various deposits is indicative.
- (c) One price given for Ya-Ya Lakes is quite inconsistent with the others rendering Table B less reliable.
- (d) Average cost of the three prices received given here and in the text.



Hardy BBT Limited

CONSULTING ENGINEERING & PROFESSIONAL SERVICES

CG14096

February 18, 1987

Government of the Northwest Territories
Department of Public Works and Highways
Yellowknife, N.W.T.
X1A 2L9

Attention: Mr. Peter Morris, Head
Community Programs

Dear Peter

Re: Summary of Tuktoyaktuk Meeting
February 11, 1987

Attached is a summary of the major points discussed and agreed upon at the recent meeting in Tuktoyaktuk. If you do not concur with this record of the meeting please provide your comments at your earliest convenience.

Yours truly,

HARDY BBT LTD.

Per:

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

AH/rb

11/25

c.c. N. Mosley
R. Annas
J. Carpenter
E. Dillon
R. Newmark
V. Ruzicka
V. Steen
W. Younkin



TUKTOYAKTUK GRANULAR MANAGEMENT PLAN

SUMMARY OF MEETING

FEBRUARY 11, 1987

ILA OFFICE, TUKTOYAKTUK

1. The meeting was opened with a brief summary of the results of the study to date. A series of new potential granular deposits, #181, 183 and 184, have been identified along an arc extending from Source 161 towards Source 177, see Plate 1, attached. The complete list of deposits still being considered during Phase II of the study were: 162, 160, 161, 158, 181, 183 (169), 184, 177, 168, 167, 155, 163, 211 and YaYa Lakes. However, the sources that are being given prime consideration are: 181, 183, 184, 177, 168, 155, and 211.

The potential deposits 181, 183 and 184, range in size from very small to moderate. In presenting these deposits for consideration, as potential alternates to Sources 177, and 211, two limitations are recognized:

- a) Small deposits could result in greater terrain disturbance compared to a preferred single large source.
- b) The relatively greater costs of working small deposits may offset the shorter haul distance.

The prime objective of the study is to determine a source for granular material that all parties concerned can agree upon. Therefore the meeting was called to obtain a concensus from all parties prior to proceeding with the next phase - drilling.



2. A review and slide presentation were given by Dr. Walt Younkin, regarding the reclamation (revegetation) potential of exposed granular surface. The success can depend largely on some relatively simple, inexpensive techniques used during site restoration as well as using proven seed species and fertilizer mixtures. The potential for some thermokarsting in a reclaimed borrow source is unavoidable. The grass cover will not prevent this, however, the surface will appear less scarred and will be more stable.

3. A survey of costs to haul gravel from various sources did not indicate a large economic benefit in developing the closer deposits (181, 183 and 184). The prime reason given by the contractors was the additional work involved in developing small deposits. Source 184 was considered more attractive given that it was a larger source, however, the distance was not much less than Source 177. The quality at Source 184 is expected to be variable.

4. A portion of Source 155 is proposed as the prime potential source for surface gravel. Some good quality gravel has already been pushed up on one terrace. This could be an economic alternate to Ya Ya Lakes and #168. Source 155 is the only relatively unexplored gravel source in the area.

5. There are several ridges in the 155 area, and many of them are expected to be mostly sand. It is proposed that some of these ridges could possibly provide the embankment material for Tuktoyaktuk, as an alternate to Sources 177 and 211.



6. Based on the foregoing information and discussion, the following decisions were made with respect to drilling in March 1987:
- There should be no investigation in Sources 181 and 183.
 - Since Source 184 is so remote compared to the preferred Source 155, it would be cost prohibitive to mobilize the drill there as well as to 155.
 - Source 155 should be drilled as a potential prime source for both surface gravel and embankment fill.
7. It was confirmed that permission would not be granted to extract any material from Sources 160 and 161 during the process of reclamation of the presently disturbed areas.
8. Actual reclamation of Sources 160 and 161 as well as any further development of "Source C" are considered outside of the scope of this study.
9. The drilling of Source 155 will proceed in the latter part of March and it is hoped that permission can be granted expeditiously.

Prepared by:

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

Hardy BBT Limited