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BEAUFORT-DELTA OIL PROJECT LIMITED

PRELIMINARY

BORROW SOURCE STUDY

MACKENZIE VALLEY CORRIDOR

VOL I

MAP BD1 to BD4

Prepared for:

BEAUFORT-DELTA OIL PROJECT LIMITED

By

TECHMAN LTD.



D003408

(April - 1976)

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May 3, 1976

Our File TM 140

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Attention: Mr. H.S. Chapman,  
Geotechnical Coordinator

## Re: Preliminary Borrow Source Study

We are pleased to submit herewith two (2) copies of our "Preliminary Borrow Source Study" which has been prepared according to a revised terms of reference established during meetings between Beaufort-Delta and Techman on March 15, 1976 and confirmed by letter from Beaufort-Delta on April 6, 1976.

The report is submitted in four (4) volumes, namely:

Volume I Map BD1 to BD4  
Volume II Map BD5 to BD8  
Volume III Map BD9 to BD12  
Volume IV Map BD13 to BD17

Volume I contains a text section outlining the scope and methodology used in the study, followed by a section which sets forth recommendations for updating and finalizing the report. The remaining part of Volume I and all of Volumes II, III and IV consist of summaries of the individual borrow sites which were evaluated during the study. Work print copies of the maps are included at the back of each section following the respective site summaries. During the course of the study 791 potential borrow sources were evaluated, summarized and presented on the map work sheets at a scale of 1:125,000.

(Cont'd.)

Mr. G.M. Durham, Manager, Design -2-  
Attention: Mr. H.S. Chapman,  
Geotechnical Coordinator

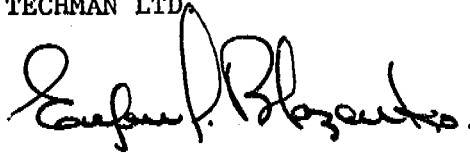
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May 3, 1976

We wish to express our appreciation to Beaufort-Delta for the opportunity to undertake this preliminary study and look forward to providing additional input on subsequent stages when required. Please contact the undersigned or Mr. F.D. McCosh if you have any questions pertaining to the report.

Yours very truly,

TECHMAN LTD.



Eugene J. Blazenko, P. Geol.  
Manager, Environmental/Geotechnical  
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EJB:jm  
Encls. (2)

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SITE SUMMARIES (Cont'd)

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## INTRODUCTION

Beaufort-Delta Oil Project Limited, in planning an oil pipeline project in the North, commissioned Techman Ltd. in December, 1975 to undertake a study of identified borrow source reserves in the Mackenzie Valley corridor extending from the Beaufort Sea to the 60th parallel. The borrow source study was to consist of a compilation, review, assessment and summarization of all available information related to known borrow sources within a reasonable range of the 28 km (17.5 mi.) oil pipeline corridor established by Beaufort-Delta Oil Project Limited. The inventory produced from this study is to be utilized in the preliminary design phase of the pipeline as well as being employed in studies related with construction, procurement and logistics.

The report is separated into SCOPE, METHODOLOGY, DISCUSSION AND RECOMMENDATIONS, REFERENCES and EXPLANATION OF TERMS AND SYMBOLS. The SCOPE section presents the Terms of Reference of the borrow source study and a table which summarizes the sources of information incorporated in the study. The METHODOLOGY section outlines the investigative procedure and includes a discussion on the corridor maps which cover the study area and the individual Site Summaries which were prepared for each potential borrow source. A discussion on allocation of borrow sources is also included in this section. The DISCUSSION AND RECOMMENDATIONS section reviews future requirements and additions to the borrow source study. A complete list of reports integrated into the study is presented in the REFERENCES section. The EXPLANATION OF TERMS AND SYMBOLS section discusses the terms and symbols used to summarize field investigation results and subsequent laboratory testing. In particular, the section presents the soil description system employed in the report. The SITE SUMMARIES section includes an assessment and summarization of specific parameters for each borrow source.

The seventeen (17) corridor maps illustrating the location and depicting the quality of all borrow sources on respective map sheets are included in a pocket at the back of each group of Site Summaries.

SCOPE

The original Terms of Reference for the study were outlined in The Statement of Work for Major Task #05, Sub-Task #02 as received from Mr. H.S. Chapman in the letter dated February 10, 1976. The presentation of the initial report was to include the following:

- i) A set of National Topographic Survey Maps at a scale of 1:125,000 illustrating the location of each borrow source and identifying the quality of the available borrow materials by code.
- ii) A tabulation of borrow reserves with a brief evaluation of each source.
- iii) A concise summary of pertinent parameters for each borrow source including a reference to original source of information.

The specific parameters to be documented in the individual Site Summaries are as follows:

- a) Location of borrow material;
- b) Perimeter, area and thickness;
- c) Quality of material including grain size, range and percentage of the soil constituents;
- d) Material description, based on Unified Soil Classification System;
- e) Material reserves, calculated in cubic yards and classified as proven, probable and possible;
- f) Gravels will be considered as prime deposits; erosional talus materials as secondary deposits; quarry sites as tertiary deposits;
- g) Identification of deposits that have been partially or totally allocated to other projects;

- h) Quantities of each deposit that are allocated and reserved for specific purposes or projects;
- i) Quantities of each deposit that have not been allocated but may have to be shared with other projects;
- j) Quantity available to the oil pipeline;
- k) Access route to oil pipeline;
- l) Method of transportation from source to corridor.

The initial report was to be completed by March 31, 1976. Review and updating of the initial report was to be completed by July 31, 1976.

The original scope of work was revised by Beaufort-Delta Oil Project Limited in February and March, 1976 and included the following revisions:

1. Reduce the map presentation to preliminary copies of the working drawings, consisting of a set of 17-70 x 99 km (44 x 62 mi.) corridor maps covering the study area.
2. Exclude the tabulated evaluation of borrow source reserves.
3. Eliminate the review and updating of the initial report which was to be done between March 31, 1976 and July 31, 1976.
4. Incorporate only readily available information on borrow materials.
5. Extend the completion date from March 31, 1976 to April 30, 1976.

The borrow source study produced under these revised terms of reference represents an initial inventory of potential borrow sources in the study area.

Approximately 800 potential borrow sources were evaluated within the study area which covers a 70 km (44 mi.) wide strip from the 60th

parallel along the proposed pipeline corridor and extending out into the Beaufort Sea. The total sites from specific sources of information is summarized in Table I. Totals listed under the columns entitled "GSC" (Geological Survey of Canada), "CAGSL" (Canadian Arctic Gas Study Limited) and "DPW" (Department of Public Works, Canada) represent borrow sources which are in addition to the sources outlined in the Department of Indian Affairs and Northern Development, Canada (DIAND) Granular Materials Inventory and have been specifically delineated by these agencies.

TABLE 1

SUMMARY OF SOURCES

SOURCE MAP NO.	DIAND	GSC	CAGSL	DPW	OTHER	TOTAL
BD1					12	12
BD2	31	3	1		3	38
BD3	35	14	3	2	6	60
BD4	38	18		2		58
BD5	34	42	1	3		80
BD6	26	11		11		48
BD7	37	30		3		70
BD8	30	4	2			36
BD9	46	4				50
BD10	46	10	1			57
BD11	61	16				77
BD12	46	19	1			66
BD13	34	15	1			50
BD14	19	6				25
BD15	14	13	1			28
BD16		22				22
BD17		14				14
TOTAL	497	241	11	21	21	791

## METHODOLOGY

The investigative procedure initially entailed a compilation of all existing data from government sponsored and industry-oriented construction material investigations to identify all known potential borrow sources within the study area. The sources included Geological Survey of Canada reports, DIAND's Granular Material Inventory of the Mackenzie Valley, pipeline route investigations, DPW right-of-way geotechnical investigations, and offshore borrow source investigations.

Following compilation of the existing data a thorough and critical assessment of each potential borrow source was carried out. Individual summaries documenting site specific parameters were prepared and the borrow sites were outlined on a set of corridor maps produced from enlargements of National Topographic Survey (1:250,000) maps.

### Corridor Maps

A set of 17 maps illustrating the location, site outline and material quality of the borrow sources in the study area were prepared. Site numbers, as discussed in the next section were assigned to each source. The quality of the available borrow material was indicated on the map using a color code. Sources containing non-granular materials were left uncolored. An abbreviated material quality classification is presented in the map legend because of limited space. The complete classification is presented in the Methodology section of the report. The maps were numbered consecutively from north to south with the most northerly map numbered "BD1". Match lines were established in the overlap area between adjacent maps to facilitate the correct geographical orientation from map to map. In addition no duplication of borrow sources on adjacent maps resulted because only the sites located between the match lines were illustrated on each map.



### Site Summaries

A brief and concise summary documenting the following parameters when available, was prepared for each borrow source:

1. SITE NUMBER. A unique numbering system was developed to allow quick and easy reference to the source location. Sources were numbered in a general north to south direction commencing at the north end of each map. Sources incorporated into the study following the initial numbering were numbered consecutively from the last number on the map regardless of geographical location. The site numbers consisted of two parts: 1) a map reference and 2) a site reference unique for that map (e.g. BD3-17 is the 17th most southerly site on Map number BD3). The site numbers were followed by the material quality of the source in parenthesis.
2. REFERENCE. Each borrow source was correlated back to the original source of information. Where sites are investigated by two or more organizations additional references were given. A reference to the Geological Survey of Canada reports were omitted if specific site investigations were carried out by a consultant.
3. MATERIAL QUALITY. The quality of the available granular material and/or bedrock was assessed according to its suitability as a construction material.

The material quality classification presented in this report was developed by DIAND and is meeting with growing acceptance from other agencies involved in similar studies. The classification was slightly modified to include a non-granular material classification. Sites categorized as Class NG were investigated by consultants because of indications of possible granular materials but were found to contain only material that was unsuitable for construction

purposes. The modified material quality classification is as follows:

Granular Material

Class 1, Excellent quality material consisting of well graded, medium-grained gravel suitable for concrete aggregate, with a minimum of processing.

Class 2, Good quality material generally consisting of fine to medium-grained, well graded sandy gravel with varying quantities of silt occurring either as narrow interbeds or dispersed throughout the material. The frequent occurrence of deleterious materials such as weathered stones or shale fragments may negate its use as concrete aggregate. This material will provide good quality embankment fill for pipeline berms and building pads; base and surface course aggregates; or possible production of concrete aggregates with extensive processing.

Class 3, Fair quality material consisting generally of poorly graded, silty, gravelly sand. This material will provide fair quality general fill.

Class 4, Poor quality material consisting generally of fine-grained, poorly graded silty sand with minor gravel. These deposits usually contain minimal quantities of sand and gravel, are very thin, or are overlain by extensive thicknesses of overburden. Fine-grained dune sand is included in this category. These materials are considered unsuitable for construction except as marginal fill.

Non-Granular Material

Class NG, Nongranular material unsuitable for construction

purposes.

Bedrock

Class R1, Limestone and dolomite which would be suitable for manufacturing various types of construction aggregates.

Class R2, Shale and siltstone with small varying quantities of limestone and dolomite which could be exploited only for fair quality general fill useful primarily in the construction of sub-grades. This category also includes talus slopes containing a mixture of limestone, dolomite and shale blocks and fragments.

4. MATERIAL DESCRIPTION. A summary of the physical characteristics of the available granular materials was given which included material type, Unified Soil Classification Group Symbol, maximum grain size, moisture content and occurrence of massive ground ice. The granular materials were described in accordance with Section 2.3 in the Terms and Symbols Section of the Report. Moisture contents were classified as:
  - a) LOW for less than 5% moisture;
  - b) MEDIUM for 5% to 15% moisture;
  - c) HIGH for greater than 15% moisture.
5. OVERBURDEN TYPE AND THICKNESS.
6. DEPTH OF ACTIVE LAYER. Where test pitting was carried out the depth of the active layer was taken as the depth of shallowest portion of the unfrozen pit. If no site specific information was available the minimum depth was estimated from the regional trends.

7. RESERVES. The quantity of useable granular material within a source area was assessed and quantified, on the basis of the following criteria.

- a) Proven Reserves: consists of a volume of granular material which has been investigated by drill holes and/or hand dug test pits to such an extent that a reliable estimate of both quality and quantity of material can be determined with confidence. Only the actual thickness of granular material sampled is included in the calculation of this value. The areal extent is determined after an assessment of the source based on homogeneity of deposit(s), ice content, drainage conditions and topography is made.
- b) Probable Reserves: consists of a volume of granular material which has been partially sampled by drilling or hand dug test pits extensively enough to make a reasonable forecast of the available reserves but still requires additional investigation to determine a reliable estimate. The probable reserves are determined by projecting over the entire source area the known parameters used to determine proven reserves while adjustments are made for quantity of granular deposits, drainage conditions and erratic nature of some sources.
- c) Possible Reserves: consists of the volume of granular material from sources which have only been assessed by air photo interpretation and aerial reconnaissance. The quantity also includes the volume of granular material within the maximum limits of more extensively investigated deposits. The outer limits of a borrow is determined following an assessment of the physical features of the site and surrounding area.

The limits of bedrock sources cannot physically be defined. Therefore potential quarry sites essentially represent an unexhaustible

source of bedrock materials for construction use. Consequently all bedrock reserves were assessed as unlimited.

8. MINIMUM HAUL DISTANCE. The minimum haul distance is defined as the minimum distance between the source and the border of the  $4\frac{1}{2}$  km (2.8 mi.) pipeline corridor. The location of the  $4\frac{1}{2}$  km (2.8 mi.) pipeline corridor was not available to include this information in the report. However the heading was included so that this information may be incorporated in the inventory in the future.
9. METHOD OF EXCAVATION. Recommendations on the most efficient method of development and exploitation which would minimize terrain disturbance were included.
10. SITE DESCRIPTION. A summary of site specific features including geomorphology, geographical location, drainage, vegetative cover, thickness, area and perimeter of the granular materials, a reference to the National Topographic Service (1:250,000) map on which the borrow source is contained and the Universal Transverse Mercator (UTM) zone and coordinates of the source were specified.

The thickness documented in this section was based on the evaluation of the physical features of the deposit and represents the maximum recoverable thickness of useable granular material.

All areas were planimetered from aerial photographs or NTS topographic maps. The gross area was adjusted for the presence of lakes and rivers and the intermittent occurrence of the deposit within the borrow source.

The perimeters were measured from aerial photographs or NTS topographic maps using a map wheel. All areas, perimeters and thicknesses were calculated to two significant figures.

11. SITE INVESTIGATION. The extent of drilling and test pitting conducted within the borrow area was catalogued to allow the evaluation of the reliability and level of confidence of the data presented in the summaries.
12. ASSESSMENT. Each borrow source was assessed with respect to quality and quantity of available borrow materials, location, access, physical characteristics of the site, development procedures and allocation. In addition the environmental sensitivity of the site was assessed.

A rating of each site in terms of suitability for development, non-development or possible development of recoverable granular and/or bedrock materials was performed. Sites which required additional field work to determine the actual quality and quantity of the borrow materials were rated as "may be suitable for development". Sites containing only non-granular materials or sites contained within environmentally sensitive areas, such as critical wildlife areas or within and/or immediately adjacent to an active water course, were rated as "not suitable for development". All other sites were rated as "suitable for development".

Potential borrow sources which were investigated by consultants but were found to contain only non-granular material are documented in this report to ensure that these sites are not examined further. As these sites will not be considered for development only the following parameters were documented in the site summaries: reference, material quality, material classification, type and location of deposit, vegetation, drainage, map and UTM reference, extent of site investigation and unsuitability for development.

The available information pertaining to borrow sources delineated specifically by the Geological Survey of Canada did not include data on all the

parameters to be documented. Therefore an abbreviated site summary was adopted for these particular sites which excluded the following parameters: maximum size and moisture content, overburden type and thickness, depth of active layer, method of excavation, vegetation and drainage. No drilling or test pitting was carried out by the GSC therefore the Site Investigation heading was omitted from the site summaries. In addition the Minimum Haul Distance heading was omitted because most GSC sources cover such a vast extent that specific borrow sites will have to be delineated before an access route can be determined.

In addition, where borrow sources originally outlined by the GSC were further investigated in detail by consultants, only the specific source areas outlined by the consultant were evaluated in the report.

The published GSC values for average thickness, area and available volumes of each borrow source were used in the report because site specific data was not available to allow re-evaluation of the dimensional parameters. Where GSC deposits were sub-divided in the report because of geographical location or size, the appropriate fraction of the dimensional parameters were calculated and documented in the respective borrow source summaries.

Bedrock indicated on GSC maps and overlays was not included in the report because of the extensive coverage of these potential sources e.g. the entire McConnell Range. A detailed investigation should be carried out in these areas to delineate specific borrow sources.

Past highway construction experience has shown that dry, frozen glacial tills can be used as marginal fills. Therefore the useable tills in the near-surface bedrock pits located by Public Works, Canada along the proposed Mackenzie Highway have been classified as Class 4 to indicate

their possible construction value. Where both till and shale are indicated as borrow materials, the extensive thickness of the overlying till may eliminate the site as a bedrock source alone. Only borrow sources which were recommended for development by Public Works, Canada were evaluated. Available volumes of borrow material were considered to be unlimited.

Offshore borrow sources, although essentially investigated for use in construction of offshore islands, were assessed in the report in a similar manner to the onshore sites. However, other criteria were considered by the consultants when outlining an area for development. These criteria included the limits of the dredging equipment such as water depth, overburden thickness and the grain size distribution, grading, thickness and continuity of the borrow deposit. In addition, a criteria based on the acceptability for hydraulic transport and placement was established.

#### Allocation

A partial investigation of government agencies and energy resource firms having a potential demand for borrow materials in the Mackenzie Valley was carried out. Available information indicates that no specific allocation of granular and/or bedrock borrow materials has been made to any potential user with the exception of borrow sources already developed for either oil exploration, community development or highway construction as noted in the appropriate summaries. However, some agencies have expressed preference for specific borrow sources. The preference for the borrow sites was based on a number of parameters related to environmental concerns, economics, logistics and construction considerations.

Table 2 presents a list of borrow sources CAGSL has shown preference



towards in the Pipeline Related Borrow Study prepared by Northern Engineering Services Company Limited (NESCL) in 1974. Where large quantities of borrow were needed an alternative borrow site was selected. Each preferred or alternative borrow site is cross-referenced in the table to the site number in this borrow source study. In addition, the quantity of borrow material required from each source for construction of the gas pipeline is tabulated.

Table 3 presents a list of potential till and near-surface bedrock sources which were recommended for development by Public Works, Canada for construction of the Mackenzie Highway north of Fort Good Hope. This list was tabulated from information presented in Public Works, Canada report on Geotechnical Investigation Mile 725 to Mile 936 Mackenzie Highway. Volumes of bedrock or till required from specific borrow sources for construction of the highway were not available. However, the gravel requirements for surfacing along this portion of the Mackenzie Highway was estimated at 3,400 tons per mile as stated in a letter dated January 9, 1976 from F.E. Kimball, Project Manager, N.W.T. Roads for Public Works, Canada.

Imperial Oil Limited has investigated a number of potential offshore borrow sources for use in construction of man-made drilling islands. Two specific sources, the Pelly Pit (BD1-06(3)) and the Inmerk Pit (BD1-08(3)) have already been developed for this use.

A detailed granular material investigation in the Parsons Lake area was carried out for Gulf Oil Limited to determine the availability and suitability of sand and gravel sources for use in the proposed gas field development in that area.

TABLE 2

CANADIAN ARCTIC GAS STUDY LIMITED  
PREFERRED BORROW AREAS ALONG CANADIAN ROUTE

BD SITE NO.	CAGSL BORROW AREA NO.	REQUIRED VOLUME (x10 <sup>3</sup> yd.)
BD2-12	GM135	2
BD2-23	3	118.6
BD2-27	GM134	291
BD2-37	10	118.6
BD3-02	GM133	24
BD3-09	GM132	565
BD3-13	GM136	2
BD3-44	GM137	364
BD3-47	GM138	320
BD3-52	GM4	208.2
BD3-53	GM5	151
BD3-54	GM39	320
BD4-05	DPW	320
BD5-47	GM10	1,880
BD5-48	300*	1,880
BD5-64	GM117	2
BD5-74	303	119.1
BD6-02	306	106.5
BD6-11	308	640
BD6-19	319	69.3
BD6-35	321	111
BD7-10	GM14	480
BD7-24	326*	480
BD7-33	328	119.2

\*Alternative Source

TABLE 2 (Cont'd.)

BD SITE NO.	CAGSL BORROW AREA NO.	REQUIRED VOLUME (x10 <sup>3</sup> yd.)
BD7-52	FGH3*	244
BD7-53	FGH2	244
BD7-59	FGH7	47
BD7-62	P315	47
BD8-02	P319	370
BD8-29	P289	630
BD8-30	P291*	630
BD8-35	374	84.4
BD8-36	374A	84.4
BD9-04	413	187.7
BD9-06	NW15*	175
BD9-11	NW4	175
BD9-29	P279	57.7
BD9-34	P271	330
BD9-45	P266*	330
BD9-46	P262	76.5
BD10-55	150BH	450
BD11-10	P242	49.8
BD11-20	P226	2
BD11-24	P227	49.8
BD11-41	P213	96
BD11-51	P199	615
BD11-63	P197	615
BD11-73	P191	75.8
BD12-09	P183	60
BD12-18	P174*	520
BD12-24	P170	520
BD12-40	P159	115.5
BD12-59	W5	164.4
BD12-65	GM119	2

\*Alternative Source

TABLE 2 (Cont'd.)

BD SITE NO.	CAGSL BORROW AREA NO.	REQUIRED VOLUME (x10 <sup>3</sup> yd.)
BD13-13	P152	118.6
BD13-18	P146	420
BD13-21	P143*	420
BD13-33	P139	108
BD13-50	GM120	2
BD14-10	P118	1,010
BD14-07	P124*	1,010
BD15-28	GM122	2

\*Alternative Source

TABLE 3

PUBLIC WORKS, CANADA  
PREFERRED BORROW PITS ALONG THE MACKENZIE HIGHWAY  
NORTH OF FORT GOOD HOPE

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<u>BD SITE NO.</u>	<u>DPW BORROW PIT NO.</u>
BD5-30 (R2)	B-62,
BD5-33 (R2)	B-50, B-52
BD5-47 (3)	B-80, B-81
BD5-60 (3,R2)	B-105
BD5-77 (R2,4)	B-108
BD5-78 (R2,4)	B-99
BD5-79 (R2)	B-58, B-59
BD6-11 (3)	B-127
BD6-38 (R2,4)	B-160
BD6-39 (R2,4)	B-156
BD6-40 (R2,4)	B-150
BD6-41 (R2)	B-152
BD6-42 (R2,4)	B-149
BD6-43 (R2,4)	B-140
BD6-44 (4)	B-129
BD6-45 (3)	B-126
BD6-46 (4)	B-139
BD6-47 (R2)	B-123
BD6-48 (R2,4)	B-116
BD7-68 (R2,4)	B-189
BD7-69 (R2,4)	B-172
BD7-70 (R2)	B-169

### DISCUSSION AND RECOMMENDATIONS

This borrow source study has provided a thorough initial inventory of known granular material sources along the Mackenzie Valley in the vicinity of the Beaufort-Delta Corridor. However, the study was limited by the reduced scope of work and additional effort is required to produce a complete inventory.

The present form of the borrow source study does not facilitate finalized reproduction of the maps. Therefore, the need to complete the originally proposed format before the initiation of the design and construction planning phases is required. The complete presentation would include a set of base maps complete with overlays illustrating the borrow sources, the pipeline corridor and the other proposed or existing transportation networks within the Mackenzie Valley, a tabulated summary of site specific information and a complete set of individual borrow source summaries.

Access to the pipeline corridor from individual borrow sources should be assessed in close liason with the design and construction phases of the oil pipeline project, when a  $4\frac{1}{2}$  km (2.8 mi.) pipeline corridor is established. The assessment should evaluate logistics, economics and construction considerations.

A more detail evaluation of available information on bedrock in the study area could yield additional secondary and tertiary borrow sources. An assessment of exposed and near surface bedrock should be performed particularly in areas along the oil pipeline corridor where natural-occurring granular materials are scarce. This approach was taken during the DIAND Granular Materials Inventory but should not be considered as final.

A more intensive search for additional information related to borrow source investigations is required. In particular, review and updating of the inventory to include information contained in more recent and future government and industry-oriented borrow studies should be carried out. A comprehensive review of industry and community preferences toward specific borrow sources should also be performed during the updating.

Borrow material shortages may become even more critical as other projects move from feasibility into design and construction and as specific borrow sources are selected for development. Therefore it is imperative that a continual assessment of available quantities of granular and bedrock material be performed. A balance sheet tabulating the supplies and demands of various qualities of construction materials should be maintained for each corridor map covering the pipeline route. In this way, material available for the oil pipeline project can readily be determined. Where deficiencies are noted, the borrow source study should be expanded to areas adjacent to the present study area. Additional maps adjacent to the corridor maps which contain borrow material deficiencies should be prepared. A set of individual summaries and a tabulated assessment of the borrow sources similar to the format proposed for the initial study should be produced for each of these adjacent maps.

Before construction of the oil pipeline can commence many additional studies involving borrow materials will be required. Detailed examination of preferred borrow pits, evaluation of specific material for aggregates, and determination of excavation procedure must be completed before construction is commenced. Perhaps the area which has received the least attention to date is the compilation of borrow source development guidelines. These guidelines if developed would act as a framework upon which site-specific excavation procedures should be formed. The development of these guidelines will require technical input from a wide range of engineering disciplines including civil, geotechnical, environmental and

construction as well as expertise in the fields of materials handling and specification writing. A multidisiplinary consulting group will be required to handle all the aspects of this task.

In Summary, ongoing evaluation of criteria for design concepts and construction purposes for the oil pipeline should include the following to supplement the existing borrow source inventory:

1. Completion of the report presentation including finalization of maps and overlays and preparation of tabulated summaries.
2. Evaluation of individual access routes in close liason with design and construction phases.
3. Assessment of existing available data to delineate additional bedrock sources particularly in granular material deficient areas.
4. Compilation and assessment of more recent and future borrow related investigations.
5. Review industry and community preferences toward specific borrow sources.
6. Evaulation of the availability of various construction materials to the oil pipeline. The evaluation would include preparation of material balance sheets for each sector of the pipeline corridor.
7. Assessment of borrow sources adjacent to the present study area where borrow material deficiencies are noted.
8. Formulation of borrow pit development guidelines.



REFERENCES

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## EXPLANATION OF TERMS AND SYMBOLS

### 1. General

The terms and symbols used on the test hole logs to summarize the results of the field investigation and of subsequent laboratory testing are described in detail below and are illustrated in the appended exhibit test hole log (Plate 1).

General information, such as test hole number, test hole location, and rig type is noted in the lower portion of the test hole log. Detailed sub-surface information observed at each test hole location and laboratory test data, are presented in columnar form on the test hole log. Each column used is described in detail below using the reference numbers shown on the appended blank test hole log (Plate 2).

It should be noted that the soil type, stratigraphic boundaries, and in situ conditions have been established only at the test hole location and that they are not necessarily representative of subsurface conditions elsewhere across the site.

Columns 1 and 13: Depth: The depth of test hole below existing ground surface is shown in these columns.

Column 2: Soil Group Symbol: A soil classification symbol in accordance with a modification of the Unified Soil Classification System<sup>1</sup> is noted in this column. A definition of each Group Symbol is given in Table 1 "Soil Classification System".

Column 3: Soil Graphic Log: Soil strata are depicted graphically in accordance with the "Graphic Symbol" column of Table 1 "Soil Classification System".

- Column 4:            Description: A detailed engineering description of each soil stratum encountered is noted in this column. This description is given in accordance with the criteria outlined in Section 2.3 "Soil Description". A description of the ground ice is included in this column according to the NRC procedures<sup>2</sup> which are explained in Section 2.4 "NRC Ice Type". The depths to ground water level, seepage, and the interface between different soil strata are indicated in this column. The interface between soil strata is shown as a single continuous line. A broken line indicates a change in soil type where the location of the interface between the strata is uncertain or inferred. A double line at the bottom of the test hole log indicates "Refusal" which may be defined as "further penetration was not possible with the equipment used".
- Column 5:            Ice Graphic Log: The various types of ground ice are depicted graphically according to Table 2 "Ground Ice Classification".
- Column 6:            NRC Ice Type: (Visual Ice %): Abbreviated symbols for the forms of ground ice are noted in this column. A description of the NRC classification<sup>2</sup> is contained in Section 2.4 "NRC Ice Type", and in Table 2 "Ground Ice Classification". The volume of ground ice is estimated visually and expressed as a percentage of the total volume of soil and ice.
- Column 7:            Laboratory Test Data: The results of laboratory determinations of water content, Atterberg limits and dry density are plotted against depth. These are described in Section 2.5 "Test Data Summary".

- Column 8:        Other Test Data: Test data additional to those represented in Column 7 are noted in this column at the appropriate depth. The symbols used to represent the more common engineering laboratory tests are given in Section 2.5 "Test Data Summary". The results of specialized testing are also indicated in this column using an abbreviated written form.
- Column 9:        Sample Type and Number: The type and reference number of each sample attempted, whether it was recovered or lost, are recorded at the appropriate depth. The system used is described in Section 2.1 "Soil Sample Data".
- Column 10:       Sample Condition: The condition of each sample, whether it was recovered or lost, is recorded against depth. A description of the graphic representation and abbreviations used is given in Section 2.1 "Soil Sample Data".
- Column 11:       Core Run and % Recovery: The length of core recovered is expressed as a percentage of the total length attempted. The depths to the top and bottom of the core run are recorded as described in Section 2.2 "Core Data".
- Column 12:       Core Condition: The condition of the core, or segments of the core, is assessed visually and assigned a rating of I to V. The ratings and nomenclature used are given in Section 2.2 "Core Data".

Column 14:        Remarks: Additional pertinent information and comments such as in situ drilling conditions, sampling criteria, and instruments installed are noted in this column.

## 2.    Description Details

The various terms, symbols, and abbreviations are discussed in detail to facilitate interpretation and understanding of the data presented on the test hole logs.

### 2.1   Soil Sample Data

#### (a)   Sample Type and Number (Column 9)

Each sample attempted, whether it is recovered or lost, is assigned a reference number. The series of soil samples from each test hole is numbered in a sequentially increasing numerical order with increasing depth below ground surface.

The type of sample attempted is indicated using one of the following letters:

- A    Auger sample
- B    Bulk sample
- C    Core sample
- D    Drive sample (thick-walled tube, unless otherwise noted)
- P    Pitcher tube sample
- R    Block sample
- S    Split spoon standard penetrometer sample
- U    Tube sample (thin-walled unless otherwise noted)
- W    Wash or Air Return sample
- X    Other samples



The sample type and number are recorded at the appropriate depth on the test hole log.

Example: Sample A2: - designates the second sample attempted in the test hole. This sample was taken off an auger.

(B) Sample Condition (Column 10)

The condition of each sample attempted is designated by one of the following symbols at the appropriate depth interval:



undisturbed



disturbed



not recovered

2.2 Core Data

The details relating to length of core attempted and the percentage of core recovered are presented as follows:

(a) Core Run and % Recovery (Column 11)

The length of core attempted is shown by recording the top and bottom depth measurements for each core run. The recovered core length is expressed as a percentage of the total core run attempted.

(b) Core Condition (Column 12):

The condition of each core, or segments of core recovered, together with any unrecovered portions of the core, are recorded. The nomenclature in the following table is used to describe the conditions of the core:

### Condition of Soil Cores

<u>Rating</u>	<u>Recovered Condition</u>	<u>Disturbance or Remolding</u>	<u>Suitability For Testing</u>
I	Excellent	Negligible	Representative
II	Good	Slight	Representative
III	Fair	Considerable	Use Judgment
IV	Poor	Complete	Equivalent to Disturbed Samples
V	No recovery	-	-

#### 2.3 Soil Description (Column 4)

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

##### 2.3.1 Soil Description System

The following properties are described for a comprehensive soil classification system:

Grain size distribution or plasticity, colour, moisture, sensitivity, structure, foreign materials, and consistency or strength.

The soil in each stratum is described on the test hole logs using the Unified Soil Classification System<sup>1</sup> modified slightly so that an inorganic clay of "medium plasticity" is recognized. Selected adjectives are used to define the actual or estimated percentage range by weight of the various components. The use of the modifying adjectives is similar to a system developed by D.M. Burmister<sup>3</sup>.

The identification of soil components and fractions is defined by the Modified Unified Soil Classification System which classifies soils into three major divisions:

Coarse-grained soils - gravel and sand  
Fine-grained soils - silt and clay  
Highly organic soils - peat

Classification of soils is based on the grain size distribution of that portion of the soil smaller than the 3-inch U.S. Standard sieve size.

Soils with 50 percent or more of the components coarser than the No. 200 U.S. Standard sieve size (0.074 mm) are described as COARSE-GRAINED (or granular) soils. Coarse-grained soils (gravel and sand) are classified by grain size distribution and are subdivided into coarse and fine gravel, and coarse, medium, and fine sand.

Soils with 50 percent or more of the components finer than the No. 200 sieve size are described as FINE-GRAINED soils. These may be cohesive or non-cohesive. Note that for visual classification the No. 200 sieve size is about the smallest size of particle that can be distinguished individually by the unaided eye.

Fine-grained soils (silt and clay) are classified by behaviour on the basis of the liquid limit and plasticity index of the fraction finer than the No. 40 U.S. Standard sieve size. The boundaries defining the fine-grained soil groups are shown on the Plasticity Chart in Table 1 "Soil Classification System". The Plasticity Chart is also used to determine the behaviour of the fines content of coarse-grained soils.

Particle size and shape are usually described for coarse-grained soils, and plasticity is usually described for fine-grained soils. An exception to this rule applies when describing glacial till, then plasticity, particle size, and shape are all included in the description.

The principal component of the fraction of the soil passing the 3-inch U.S. Standard sieve size is shown capitalized on the test hole logs.

The proportions by weight of the minor components are defined according to the following descriptors:

<u>Descriptor</u>	<u>Proportion</u>
"and"	50 to 35 percent
"some"	35 to 20 percent
"little"	20 to 10 percent
"trace"	10 to 1 percent

The descriptors used must not contradict the classification by the Modified Unified Soil Classification System.

The terms given above are used to define proportions by weight of granular components, but they may also be used to define the proportion of minor components of fine-grained material, according to the subdivisions of the Plasticity Chart, Table 1 "Soil Classification System". The adjectives are not used to subdivide a principal fine-grained component. The modifier "y" or "ey" (i.e. SILT, clayey) is used when the liquid limit and plasticity index plot close to the "A-line" on the Plasticity Chart.

Peat and other highly organic soils are classified under the Group Symbol "Pt". Peat may be categorized and described using the Radforth Classification System.<sup>4</sup>

The soil is described first by identifying the principal component, followed by the minor components in order of decreasing proportion by weight. This is followed by other significant identifying features such as plasticity, colour, moisture, structure, and strength.

### 2.3.2 Typical Example of a Complete Soil Description

"CLAY, silty, little medium sand, trace coarse gravel, medium plasticity, yellow-brown", describes a yellow-brown fine-grained silty clay soil containing 50 percent or more of components finer than the No. 200 U.S. Standard sieve size with minor components of sand and gravel. The fraction passing the No. 40 U.S. Standard sieve size plots above, and close to the "A-line" on the Plasticity Chart. The soil contains between 10 percent and 20 percent of sand particles generally in the size range No. 10 to No. 40 (i.e. finer than the No. 10 Standard sieve size and larger than the No. 40 Standard sieve size) and between 1 percent and 10 percent of gravel in the size range 3/4 inch to 3 inch. The identifying feature "medium plasticity" indicates that the liquid limit plots between 30 and 50 on the Plasticity Chart. Such a soil is classified as CI by the Modified Unified Soil Classification System.

### 2.3.3 Typical Examples of the Use of Modifiers and Descriptors

#### (a) Fine-grained soil with a minor coarse-grained component:

"CLAY, silty, some fine sand", describes a fine-grained soil having a fines content in excess of 50 percent (i.e. 50% of material finer than the No. 200 U.S. Standard sieve size), which plots above the "A-line", on the Plasticity Chart, with a liquid limit less than 50 on the Plasticity Chart, and has a minor component of fine sand.

"CLAY, some silt, some fine sand", would not be used as the fines are classified by behaviour (plasticity) and not by particle size. Such a soil would be classified as CI or CL according to the Unified Soil Classification System.

(b) Coarse-grained soil with minor fine-grained component:

"GRAVEL, fine, some silty clay", describes a coarse-grained soil with a minor component of fines, which has a liquid limit and plasticity index that plot above and close to the "A-line" on the Plasticity Chart. Such a soil is classified as GC by the Unified Soil Classification System.

"SAND, some silt," is correct in that "silt" in this case is a minor component of non-plastic fines which plot below the A-line on the Plasticity Chart.

#### 2.3.4 Glacial Till

The term "glacial till" is in widespread use in present engineering practice, however, because it is a mode of deposition, there is no provision in the Unified Soil Classification System for this term.

The term "till" is used on the test hole logs in its most general form, which has been defined by ASTM Designation D 653 as:

"A material deposited by glaciation, usually composed of a wide range of particle sizes, which has not been subjected to the sorting action of water."<sup>5</sup>

Glacial till is described on the test hole logs as "TILL", followed by the principal soil component also capitalized.

Example: "TILL, CLAY, silty, little fine gravel, low plastic, rust-brown--".

A loose, soft, or slightly stratified deposit believed to be transported or reworked material of glacial deposition, or of uncertain glacial origin, is described as "till-like" at the end of the soil description.

Example: "CLAY, silty, little fine gravel, low plastic, rust-brown, till-like."

#### 2.3.5 Fill

"Fill" is material placed by artificial means, whether or not its placement was controlled.

It is described on the test hole logs as "FILL", followed by the principal soil component also capitalized.

Example: "FILL, SILT, clayey, some fine gravel".

Well-compacted fill, placed some considerable time before the test hole investigation, may be difficult to distinguish from natural material unless the history of the site is known. Such material is indicated as "FILL?" on the test hole logs.

#### 2.4 NRC Ice Type and Estimated Visual Ice (Column 6)

Ground ice is divided by the NRC system on the basis of examination by the unaided eye into the three major categories shown below. A complete description of this system is contained in the NRC "Guide to a Field Description of Permafrost for Engineering Purposes".<sup>2</sup>

##### 2.4.1 Ground Ice Classification Categories

Non-visible ice	N
Visible ice less than one inch thick	V
Visible ice greater than one inch thick	ICE or ICE + soil type

Table 2 "Ground Ice Classification" shows the various types of ground ice recognized by the NRC classification system. Graphic symbols for ground ice have been devised to complement the graphic soil log.

Frozen soils in the N group may, on close examination, indicate presence of ice within the voids of the material by crystalline reflections or by a sheen on fractured or trimmed surfaces. The impression received by the unaided eye, however, is that the ice does not occupy space in excess of the original voids in the soil. Excess ice in the N group can be identified by use of a hand magnifying lens, or by placing some frozen soil in a small jar, allowing it to melt and observing the supernatant water. To the unaided eye, ice in frozen soils in the V group appears to occupy space in excess of the original voids in the soils.

The volume of ground ice can be described quantitatively in two ways. "Excess ice" is the volume of supernatant water expressed as a percentage of the total volume of the thawed soil and water. This quantity is often referred to as "excess moisture". "Visual ice" is the estimated volume of segregated ice discernible by eye in the frozen sample and is expressed as a percentage of the total volume of the frozen soil. By these definitions the quantity "excess ice" and "visual ice" are not necessarily the same for a given frozen soil. Care is taken when estimating the volume of ice coatings on granular material (Vc). The ice is usually obvious, giving the impression of "excess ice", which may not necessarily be the case.

#### 2.4.2 Ice Description Terminology

The following terminology used in Column 4 "Description" has been generally taken from Table II of the NRC Guide.<sup>2</sup>



"Well-bonded" signifies that the soil particles are strongly held together by the ice and that the frozen soil possesses relatively high resistance to chipping or breaking.

"Poorly-bonded" signifies that the soil particles are weakly held together by the ice that the frozen soil possesses poor resistance to chipping or breaking.

"Friable" denotes extremely weak bonds between soil particles. The material is easily broken up.

The symbols "UF" or "F" may be used in the Column 6. "UF" is added to indicate unfrozen zones in areas of generally frozen ground and also to avoid possible errors of omission. "F" is used in certain cases along with the corresponding graphic representation for "Undifferentiated" permafrost or frozen active layer soils. It may be used:

- (i) Where temperature sensors (thermistors) have been installed which indicate that the formation temperature is below 0°C but the material in the field has the texture of unfrozen material.
- (ii) Where temperature sensors have not been installed but the soil temperature is suspected to be below 0°C. The soil is deformable because of the high unfrozen water content but is neither "friable" nor "bonded".
- (iii) Where the soil is known to be frozen but, due to circumstances beyond field control, the ice type cannot be determined because of grinding or temporary thawing of the material by the drilling operation.

"Ice Coatings on Particles" are discernible layers of ice found on or below the larger soil particles in a frozen soil mass. They are associated sometimes with hoarfrost crystals that have grown into voids produced by the freezing action.

"Ice Crystal" is a very small individual ice particle visible in the face of a soil mass. Crystals may be present alone or in combination with other ice formations.

"Clear Ice" is transparent and contains only a moderate number of air bubbles.

"Cloudy Ice" is relatively opaque due to entrained air bubbles or other reasons, but is essentially sound and non-pervious.

"Porous Ice" contains numerous voids, usually interconnected, and generally results from melting at air bubbles or along crystal interfaces, from presence of salt or other materials in the water, or from the freezing of saturated snow; though porous, the mass retains its structural unity.

"Candled Ice" is ice that has rotted or otherwise formed into long columnar crystals very loosely bonded together.

"Granular Ice" is composed of coarse, more or less equidimensional ice crystals weakly bonded together.

"Ice Lenses" are lenticular ice formations in soil occurring essentially parallel to each other, generally normal to the direction of heat loss and commonly in repeated layers.

"Ice Segregation" is the growth of ice as distinct lenses, layers, veins, and masses in soils, commonly but not always oriented normally to direction of heat loss.

- (iv) Where, for reasons of economy or expediency, the hole was neither logged nor sampled, e.g. where instrumentation is installed adjacent to a previous test hole and soil stratigraphy is known to an acceptable degree.

## 2.5 Test Data Summary

### (a) Test Data (Column 7)

The results of laboratory determinations of water content, together with Atterberg limits, and dry density (dry unit weight) are plotted symbolically against depth in this column.

Water content is determined in accordance with ASTM Designation D 2216, "Standard Method of Laboratory Determination of Moisture Content of Soil".<sup>5</sup> The water content of highly organic material is determined by similar procedure except that the material is oven-dried to constant weight at 85°C instead of 105°C.<sup>6</sup>

Liquid limit and plastic limit are determined in accordance with ASTM Designations D 423 and D 424, respectively.<sup>5</sup>

In situ density is determined from the weights and volumes of intact samples, and is usually reported as "dry density" which is the weight of soil solids per unit volume.

### (b) Other Test Data (Column 8)

Tests and test data other than, or additional to, those shown in column 7 are indicated in column 8.

The more common engineering tests are denoted using the following symbols:

$\gamma$	dry unit weight
$D_{10}$	grain size at 10% passing
$D_{30}$	grain size at 30% passing
$D_{60}$	grain size at 60% passing
C	consolidation
$C_c$	coefficient of curvature $(D_{30})^2 / D_{10} \times D_{60}$
$C_u$	coefficient of uniformity $D_{60} / D_{10}$
$G_s$	specific gravity of soil solids
H	hydrometer analysis
k	permeability
MA	mechanical analysis (sieve analysis)
N	the penetration resistance, ie. the number of blows required for the second and third 6-inches of penetration during a Standard Penetration Test (SPT) in accordance with ASTM Designation D 1586. (see also SPT).
NP	non-plastic
OC	organic content
pp	pocket penetrometer
P200	percent passing the No. 200 sieve size
Q	triaxial test
q	unconfined compressive strength
S	shear test
$SO_4$	water soluble sulphate
SPT	standard penetration test (blow counts for 6-inches, 12-inches 18-inches penetration are shown sequentially)
TC	thaw consolidation
w	water content
$W_L, W_P, I_P$	liquid limit, plastic limit, and plasticity index respectively.


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# TEST HOLE LOG

DEPTH (FT)	SOIL GROUP SYMBOL	SOIL GRAPHIC LOG	DESCRIPTION	ICE GRAPHIC LOG	NRC ICE TYPE VISUAL ICE %	LABORATORY TEST DATA						OTHER TEST DATA	SAMPLE TYPE & No.	SAMPLE CONDITION	CORE RUN & % RECOVERY	CORE CONDITION	DEPTH (FT)	REMARKS
						▲ Dry density (pcf)	○ Water content %	Plastic limit		Liquid limit								
0			PEAT, black (Cat. 10)		40	60	80	100	120	140	▲	458.85						
0.5			SILT, (organic) some fine sand, low to non plastic, dark brown, saturated.		0	20	40	60	80	100	○							
2	DL																	
4			CLAY, silty, some fine sand, low plasticity, brown.									27-17-10						
4.3																		
6	CL																	
7.8			SILT, trace coarse sand, non plastic.															
8	NL																	
10			TILL, CLAY, silty, little coarse sand, trace coarse gravel, medium plasticity, brown, pebbles subangular to 1½" stiff.															
12	CI																	
14			GRAVEL, clayey, pebbles to 2½", subangular.															
15.4	GC		End of hole Refusal															

LOGGED BY				PROJECT				EXHIBIT LOG				TEST HOLE No.	
CHND				ELEVATION				 NORTHERN ENGINEERING SERVICES COMPANY LIMITED CALGARY, ALBERTA ENGINEERS LTD.				102	
DRAWN BY				PIPE MILEAGE									
CHND				AIR TEMP									
METHOD				FINISH: D M Y TIME:				CANADIAN ARCTIC GAS STUDY LIMITED				SHEET 1 OF 1	

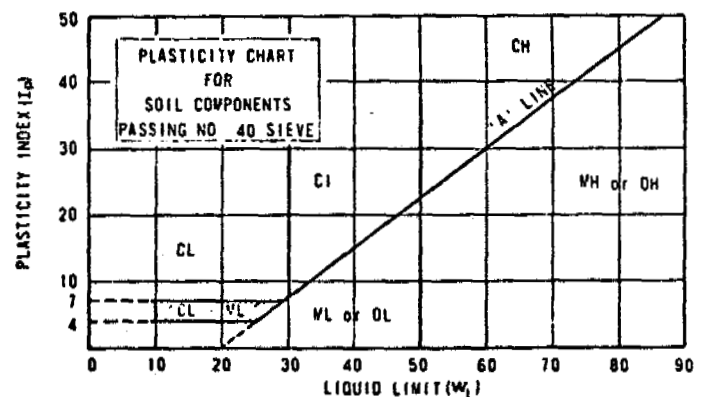
# TEST HOLE LOG

# PLATE 3

# SOIL CLASSIFICATION SYSTEM

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

SOIL COMPONENTS			
FRACTION	U.S. STANDARD SIEVE SIZE		DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS
	PASSING	RETAINED	PERCENT
GRAVEL			DESCRIPTOR
coarse	3 inch	3/4 inch	50 - 35
fine	3/4 inch	No. 4	and
SAND			35 - 20
			some
			20 - 10
			little
SILT (non plastic) or CLAY (plastic)			10 - 1
			trace
OVERSIZE MATERIAL			
Rounded or subrounded		Not rounded	
CURBLES 3 inch to 8 inch		ROCK FRAGMENTS > 3 inch	
BOULDERS > 8 inch		ROCKS > 1 cubic yard in volume	



- ALL SIEVE SIZES MENTIONED ON THIS CHART ARE U.S. STANDARD A S T M E 11
- BOUNDARY CLASSIFICATIONS POSSESSING CHARACTERISTICS OF TWO GROUPS ARE GIVEN COMBINED GROUP SYMBOLS. e.g. GH-GC IS A WELL-GRADED GRAVEL SAND MIXTURE WITH CLAY BINDER BETWEEN 5, AND 12
- TOUGHNESS AND DRY STRENGTH INCREASE WITH INCREASING PLASTICITY INDEX WHEN COMPARING SOILS AT EQUAL LIQUID LIMIT



NORTHERN ENGINEERING SERVICES  
COMPANY LIMITED  
CALGARY, ALBERTA  
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CANADIAN ARCTIC GAS STUDY LIMITED

TABLE

1



TABLE 2

## GROUND ICE CLASSIFICATION

Category	Group Symbol	Subgroup Symbol	Graphic Symbol	Description
		F		Undifferentiated
Non-visible Ice	N	Nf		Poorly bonded or friable frozen soil
		Nbn		Well bonded frozen soil with no excess ice
		Nbe		Well bonded frozen soil with excess ice. Free water present when sample thawed
Visible Ice less than one inch thick	V	Vx		Individual ice crystals or inclusions
		Vc		Ice coatings on particles
		Vr		Random or irregularly oriented ice formations
		Vs		Stratified or distinctly oriented ice formations
Visible Ice greater than one inch thick	ICE	ICE + soil type		Ice greater than one inch thick with soil inclusions
		ICE		Ice greater than one inch thick without soil inclusions

SITE BD1-01(3)

REFERENCE: Drill hole 5A; Report to Imperial Oil Limited, 1970 Bottom Sampling Program South Coast of Beaufort Sea, Mackenzie Bay to Liverpool Bay Northwest Territories; Golder, Brauner & Associates Ltd., July, 1970.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand, little gravel.

OVERBURDEN: Clayey silt; 670 cm (22 ft.)  
Water; 880 cm (29 ft.)

RESERVES: Not determined.

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Dredge material from sea floor.

SITE DESCRIPTION: Sea bottom sediments located approximately 72 km (45 mi.) north of Garry Island.  
  
Thickness: 2.1 m (7 ft.)  
Area: Not determined  
Perimeter: Not determined  
  
Map Reference: NTS 107C, W $\frac{1}{2}$ , Mackenzie Delta  
  
UTM Reference: Zone 8; 468,500E 7,785,000N

SITE INVESTIGATION: 1 drill hole.

ASSESSMENT: May be suitable for development as a source of general fill for drilling island construction but will require additional field investigation to delineate the limits of the deposit. The source is probably located too far away from the mainland to be useful as a source of granular materials for the pipeline.  
  
Access is by barge in the summer.

SITE BD1-02(4)

REFERENCE: Hooper Island, North Area, Beaufort Sea Drilling Program Winter 1975, Imperial Oil Ltd.; EBA Engineering Consultants Ltd., December, 1975.

MATERIAL QUALITY: Class 4, Poor quality material suitable only for marginal fill.

MATERIAL DESCRIPTION: Sand, trace silt fine grained (SP-SM).

OVERBURDEN: Silt and clay; 4 m (13 ft.) to 7 m (22 ft.);  
Water and ice; 5 m (17 ft.).

RESERVES: Proven 4,000,000 cu.m ( 5,000,000 cu.yd.)  
Probable 10,000,000 cu.m (15,000,000 cu.yd.)  
Possible 25,000,000 cu.m (30,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Dredge material from sea floor after stripping off overburden. Material must be stockpiled and drained if it is to be used for pipeline construction.

SITE DESCRIPTION: Relic outwash plain below the sea floor immediately north of Hooper Island.

Thickness: 12 m (40 ft.)  
Area: 2,000,000 sq.m (21,000,000 sq.ft.)  
Perimeter: 6,100 m (20,000 ft.)

Map Reference: NTS 107C, W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 553,000E 7,733,000N

SITE INVESTIGATION: 3 drill holes.

ASSESSMENT: Suitable for development but requires additional drilling to determine limits of borrow source and the nature and variability of the overburden.

Access is by truck in the winter across the ice or by barge in the summer.

SITE BD1-03(3)

REFERENCE: Results of a Shallow Profiling Program  
Conducted to the North of Richards Island,  
Imperial Oil Ltd., PEMCAN SERVICES, October  
1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for  
general fill.

MATERIAL DESCRIPTION: Sand and gravel.

OVERBURDEN: Not determined.

RESERVES: Not determined.

MINIMUM HAUL DISTANCE:

SITE DESCRIPTION: Older deltaic sediments below the sea floor  
immediately adjacent to the northwestern shore  
of Hooper Island.

Thickness: not determined  
Area: 390,000 sq.m (4,000,000 sq.ft.)  
Perimeter: 4,600 m (15,000 ft.)

Map Reference: NTS 107C, W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 501,500E 7,732,000N

SITE INVESTIGATION: None.

ASSESSMENT: May be suitable for development but will require  
additional field investigation to determine  
quantity and quality of granular materials.

Access is by barge in the summer or truck in the  
winter across the ice.

The source area is environmentally sensitive as  
it lies within a critical waterfowl breeding  
area.

SITE BDI-04(NG)

REFERENCE: Site #1, Soils Engineering Report Beaufort Sea, Area NW of Richards Island, Imperial Oil Ltd., Cook, Pickering and Doyle Ltd., 1973.

MATERIAL CLASS: Class NG, Non-granular material not suitable for construction purposes.

MATERIAL DESCRIPTION: Silt and clay, little sand; High moisture content.

SITE DESCRIPTION: Sea bottom sediments located approximately 8 km (5 mi.) east of Hooper Island.

Map Reference: NTS 107, W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 492,500E 7,730,000N

ASSESSMENT: Material is not suitable for construction purposes.

The source lies within a critical sea-bird nesting and feeding area.

SITE BD1-05(4)

REFERENCE: Pelly Island (West) Region, Beaufort Sea Drilling Program Winter 1975, Imperial Oil Ltd.; EBA Engineering Consultants Ltd., December, 1975.

MATERIAL QUALITY: Class 4, Poor quality material suitable only for marginal fill.

MATERIAL DESCRIPTION: Sand, little silt, very fine grained (SP-SM); Maximum size #10 sieve; High moisture content; Frozen below 17 m (57 ft.).

OVERBURDEN: Silt and clay; 11 m (37 ft.)  
Water and ice; 4.5 m (15 ft.)

RESERVES: Proven 1,500,000 cu.m ( 2,000,000 cu.yd.)  
Probable 15,000,000 cu.m ( 20,000,000 cu.yd.)  
Possible 75,000,000 cu.m (100,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Dredge material from sea floor after stripping off overburden. Material must be drained if it is to be used for pipeline construction.

SITE DESCRIPTION: Glaciofluvial sand deposit underlying recent deltaic sediments located immediately north of Pelly Island.

Thickness: 1.5 m (5 ft.)  
Area: 8,100,000 sq.m (88,000,000 sq.ft.)  
Perimeter: 8,500 m (28,000 ft.)

Map Reference: NTS 107C, W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 481,000E 7,726,000N

SITE INVESTIGATION: 3 drill holes.

ASSESSMENT: May be suitable for development as a source of marginal fill but requires further drilling to delineate limits of deposit and determine quality of available granular materials.

Access is by barge in the summer or by truck across the ice in the winter.

The source is environmentally sensitive as it lies within a critical breeding and molting area for whistling swans. The area is utilized between mid-May and mid-July.

SITE BD1-06(3)

REFERENCE: Pelly Pit, Beaufort Sea Drilling Program Winter 1975, Imperial Oil Limited; EBA Engineering Consultants Ltd., December, 1975.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

OVERBURDEN: Silt.

RESERVES: Information not available.

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Dredge material from sea floor after stripping off overburden.

SITE DESCRIPTION: Buried beach deposit located immediately north of the Pelly Island Spit.

Map Reference: NTS 107C, W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 488,000E 7,724,500N

SITE INVESTIGATION: Information not available.

ASSESSMENT

Suitable for continued development as a source of general fill but the source is environmentally sensitive.

Access is by truck in the winter across the ice or by barge in the summer.

SITE BD1-07(3)

REFERENCE: Report on 1972 Drilling Program at the Delta of the Mackenzie River Northwest Territories, Imperial Oil Ltd., Swan Wooster Engineering Co. Ltd., May, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable only for general fill.

MATERIAL DESCRIPTION: Gravel and sand (SW).

OVERBURDEN: Silt to clayey silt; 210 cm (7 ft.) to 335 cm (11 ft.)  
Water; 275 cm (9 ft.)

RESERVES: Proven 2,000,000 cu.m ( 2,500,000 cu.ft.)  
Probable 10,000,000 cu.m (15,000,000 cu.ft.)  
Possible 10,000,000 cu.m (15,000,000 cu.ft.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Dredge material from sea floor. Silt overburden may be stripped first or silt, sand and gravel can be dredged at the same time.

SITE DESCRIPTION: Sea bottom sediments in the Mackenzie Delta in a bay surrounded by Richards Island, Kendall Island, Pelly Island and Hooper Island. The area is generally centered at 135°W longitude and south of 69°40' latitude. It encompasses a water area of 120 square miles. Only one deposit of granular material was located in the northwest quadrant of this large area. All data presented refers only to this small source area located approximately 3 km (2 mi.) west of Pelly Island Spit.

Thickness: 3 m (10 ft.)  
Area: 830,000 sq.m (9,000,000 sq.ft.)  
Perimeter: 3,700 m (12,000 ft.)

Map Reference: NTS 107C, W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 491,600E 7,724,200N

SITE INVESTIGATION: 43 drill holes.

ASSESSMENT: Suitable for development although site is environmentally sensitive.

Access is by barge in the summer or across the ice in the winter.



SITE BD1-07(3)

The source lies within a critical sea-bird nesting area which is utilized between mid-May and mid-July.

SITE BD1-08(3)

REFERENCE: Immerk Pit, Beaufort Sea Drilling Program  
Winter 1975, Imperial Oil Ltd.; EBA Engineering  
Consultants Ltd., December, 1975.

MATERIAL QUALITY: Class 3, Fair quality material suitable for  
general fill.

MATERIAL DESCRIPTION: Sand and gravel.

OVERBURDEN: Silt.

RESERVES: Information not available.

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Dredge material from sea floor after stripping  
off overburden.

SITE DESCRIPTION: Possible buried beach located immediately north  
east of the east end of Pelly Island Spit.

Map Reference: NTS 107C, W<sup>1</sup>/<sub>2</sub>, Mackenzie Delta

UTM Reference: Zone 8; 491,000E 7,723,800N

SITE INVESTIGATION: Information not available.

ASSESSMENT: Suitable for continued development as a source  
of general fill although site is environmentally  
sensitive.

Access is by truck across the ice in the winter  
or by barge in the summer.

The source lies within a critical sea-bird  
nesting and feeding area.

The site was previously developed as a source of  
material for use in construction of the Immerk  
artificial drilling island.

SITE BD1-09(3)

REFERENCE: Results of a Shallow Profiling Program  
Conducted to the North of Richards Island,  
Imperial Oil Ltd., PEMCAN SERVICES, October  
1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for  
general fill.

MATERIAL DESCRIPTION: Sand and gravel.

OVERBURDEN: Silt; 300 cm (10 ft.)  
Water; 300 cm (10 ft.)

RESERVES: Possible 1,000,000 cu.m (1,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Dredge material from sea floor.

SITE DESCRIPTION: Older deltaic sediments below the sea floor  
and shoals which are probably the product  
of natural island erosion, located adjacent  
to the eastern tip of Pelly Island.

Thickness: 1.5 m (5 ft.)  
Area: 740,000 sq.m (8,000,000 sq.ft.)  
Perimeter: 9,100 m (30,000 ft.)

Map Reference: NTS 107C, W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 491,500E 7,723,000N

SITE INVESTIGATION: None.

ASSESSMENT: May be suitable for development but will require  
additional field investigation to determine  
quantity and quality of granular materials. The  
source area is environmentally sensitive as it  
is located within a critical sea-bird nesting  
and feeding area.

Access is by barge in the summer or by truck in  
the winter.

SITE BD1-10(NG)

REFERENCE:

Site #4, Soils Engineering Report Beaufort Sea, Area NW of Richards Island, Imperial Oil Ltd., Cook, Pickering and Doyle Ltd., 1973.

MATERIAL QUALITY:

Class NG, Non-granular material not suitable for construction purposes.

MATERIAL DESCRIPTION:

Silt and clay.

SITE DESCRIPTION:

Sea bottom sediments located approximately 29 km (18 mi.) west of Pelly Island.

Map Reference: NTS 117D, Herschel Island

UTM Reference: Zone 8; 448,500E 7,720,000N

SITE INVESTIGATION:

2 drill holes.

ASSESSMENT:

Material is not suitable for construction purposes.

SITE BD1-11(3)

REFERENCE: Garry Island (North) Region, Beaufort Sea  
Drilling Program Winter 1975, Imperial Oil Ltd.,  
EBA Engineering Consultants Ltd., December, 1975.

MATERIAL QUALITY: Class 3, Fair quality material suitable for  
general fill.

MATERIAL DESCRIPTION: Sand and gravel, some silt (GM-SM);  
Maximum size 3.8 cm (1½ in.).

OVERBURDEN: Silt; 12 m (30 ft.) to 17 m (55 ft.)  
Water; 3.5 m (11 ft.)

RESERVES: Proven 4,000,000 cu.m ( 5,000,000 cu.yd.)  
Probable 7,500,000 cu.m (10,000,000 cu.yd.)  
Possible 10,000,000 cu.m (15,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Dredge material from sea floor after stripping  
off overburden. Material must be drained if it  
is to be used for pipeline construction.

SITE DESCRIPTION: Sand and gravel beach or lag deposit situated  
between overlying recent deltaic silts and  
underlying recent deltaic silts and underlying  
glacial till, located in the Beaufort Sea  
immediately north of the western tip of Garry  
Island.

Thickness: 3 m (10 ft.)  
Area: 3,700,000 sq.m (40,000,000 sq.ft.)  
Perimeter: 7,700 m (25,000 ft.)

Map Reference: NTS 107C, W½, Mackenzie Delta

UTM Reference: Zone 8; 468,000E 7,712,000N

SITE INVESTIGATION: 21 drill holes.

ASSESSMENT: Not suitable for development because granular  
materials are too deep and too thin for dredging.  
Additional drilling between source area and  
Garry Island should be carried out to investigate  
probability of shallower beach deposits as sus-  
pected from drilling results.

Access is by barge in the summer or by truck  
across the ice in the winter.

SITE BD1-12(3)

REFERENCE:

Garry Island Borrow Area 113, Beaufort Sea  
Drilling Program Winter 1974, Imperial Oil  
Ltd., EBA Engineering Consultants Ltd.,  
December, 1975.

MATERIAL QUALITY:

Class 4, Poor quality material suitable only  
for marginal fill.

Class 3, Fair quality material suitable for  
general fill.

MATERIAL DESCRIPTION:

Sand and silt (SM);  
Gravel and sand (GW);  
High moisture content;  
The sands overlie and underlie the gravel bodies;  
Many thin gravel lenses occur throughout the  
borrow area.

OVERBURDEN:

Silt; 60 cm (2 ft.) to 200 cm (6.5 ft.)  
Water and ice; 245 cm (8 ft.)

RESERVES:\*

Proven	750,000 cu.m (1,000,000 cu.yd.)
Probable	1,500,000 cu.m (2,000,000 cu.yd.)
Possible	1,500,000 cu.m (2,000,000 cu.yd.)

\*Based on Class 4 material of which approximately 15% of the volume may be  
Class 3 gravels.

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION:

Dredge material from sea floor after stripping  
off overburden. Material must be stockpiled  
and drained if it is to be used for pipeline  
construction.

SITE DESCRIPTION:

Thin buried beach or spit deposit located west  
of Garry Island spit (north side).

Thickness: 2 m (6.5 ft.)

Area: 750,000 sq.m (8,000,000 sq.ft.)

Perimeter: 4,000 m (13,000 ft.)

Map Reference: NTS 107C, W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 472,000E 7,712,500N

SITE INVESTIGATION:

68 drill holes.

ASSESSMENT:

Not suitable for development. An attempt was  
made to exploit the deposit and it was determined  
that the deposit was too thin to dredge without

SITE BD1-12(3)

excessive overburden contamination. The source is also environmentally sensitive.

Access is by truck in the winter across the ice or by barge in the summer.

The source lies partially within a critical waterfowl breeding area.

SITE BD2-01(4)

REFERENCE: Prospect No. 30, Gravel Inventory Survey  
Richards Island and Adjacent Area, APOA  
Project 42; J.D. Mollard and Associates Ltd.,  
October, 1972.

MATERIAL QUALITY: Class 4, Poor quality material suitable only  
for marginal fill.

MATERIAL DESCRIPTION: Sand, fine to medium grained (SP).

OVERBURDEN: Not determined.

RESERVES: Possible 450,000 cu.m (600,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXCAVATION: Rip and doze.

SITE DESCRIPTION: Spit forming easterly extension of Hooper Island.  
Vegetation: None.  
Thickness: 2.7 m (9 ft.)  
Area: 500,000 cu.m (5,400,000 sq.ft.)  
Perimeter: 9,800 m (32,000 ft.)  
Map Reference: NTS 107C W $\frac{1}{2}$ , Mackenzie Delta  
UTM Reference: Zone 8; 508,500E 7,732,000N

SITE INVESTIGATION: None.

ASSESSMENT: Suitable for development as a source of marginal  
fill although the site exhibits high environmental  
sensitivity.  
Access is by truck in the winter across the ice  
or by barge in the summer.



SITE BD2-38(NG)

REFERENCE:

Big Horn Point Prospective Borrow Area; Imperial Oil Ltd., Preliminary Geotechnical Evaluation Beaufort Gas Development, Richards Island, N.W.T., EBA Engineering Consultants Ltd., 1975.

MATERIAL CLASS:

Class NG, Non-granular material unsuitable for construction purposes.

MATERIAL DESCRIPTION:

Sand and silt.

SITE DESCRIPTION:

Recent alluvial deposits situated below the Harry Channel adjacent to Big Horn Point.

Map Reference: NTS 107C, E<sub>1</sub>, Mackenzie Delta

UTM Reference: Zone 8; 505,000E 7,698,000N

SITE INVESTIGATION:

23 drill holes.

ASSESSMENT:

Not suitable for development because available granular materials are within an active channel in the Mackenzie Delta region, overburden depth is extensive and the material is of very marginal quality.

However, material of acceptable quality for hydraulic fill is available but is overlain by extensive overburden. Marginal quality hydraulic fill which has less overburden may be considered acceptable if allowed to drain before use.

The source borders on two critical waterfowl breeding, staging and molting areas.

SITE BD2-02(NG)

REFERENCE:

Hooper Island, East Area, Beaufort Sea Drilling Program Winter 1975, Imperial Oil Ltd., EBA Engineering Consultants Ltd., December, 1975.

MATERIAL QUALITY:

Class NG, Non-granular material unsuitable for construction purposes.

MATERIAL DESCRIPTION:

Silt (ML).

SITE DESCRIPTION:

Sea bottom sediments off the east end of the Hooper Island Spit.

Map Reference: NTS 107C, W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 513,500E 7,730,500N

SITE INVESTIGATION:

7 drill holes.

ASSESSMENT:

Material is not suitable for construction purposes.

SITE BD2-03(3)

REFERENCE: Deposit (b); Area X, DIAND Granular Resource Inventory; Mackenzie Delta NTS 107C, W $\frac{1}{2}$ , Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

RESERVES: Possible 1,500,000 cu.m (2,000,000 cu.yd.)

SITE DESCRIPTION: Lacustrine thermokarst basin located on the northwestern tip of Garry Island in the Beaufort Sea.

Thickness: 9 m (30 ft.)  
Area: 180,000 sq.m (2,000,000 sq.ft.)  
Perimeter: 3,000 m (10,000 ft.)

Map Reference: NTS 107C, W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 469,000E 7,711,000N

ASSESSMENT: Suitable for developemnt although the site exhibits high environmental sensitivity.

Access is by truck in the winter across the ice or by barge in the summer.

The source lies within a critical waterfowl breeding area.

SITE BD2-04(3)

REFERENCE: Deposit (a), Area IX, DIAND Granular Resource Inventory; Mackenzie Delta. NTS 107C, W $\frac{1}{2}$ , Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

RESERVES: Possible 55,000,000 cu.m (75,000,000 cu.yd.)

SITE DESCRIPTION: Glaciofluvial outwash plain on Garry Island in the Beaufort Sea.

Thickness: 15 m (50 ft.)  
Area: 7,100,000 sq.m (76,000,000 sq.ft.)  
Perimeter: 9,100 m (30,000 ft.)

Map Reference: NTS 107C, W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 474,000E 7,709,000N

ASSESSMENT: Suitable for development although site exhibits high environmental sensitivity.

Access is by truck in the winter across the ice or by barge in the summer.

The source lies within a critical waterfowl breeding area.

SITE BD2-05(NG)

REFERENCE: Source 210A, Zone II, Stage II DIAND Granular Materials Inventory; Ripley Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class N.G., Non granular material unsuitable for construction requirements.

MATERIAL DESCRIPTION: Sand and silt (SM);  
High moisture content;  
Ice lenses at .3 m ( 1.0 ft.):  
Massive ice at .9m to 2.4 m (3 ft to 8 ft.)

DEPTH OF ACTIVE LAYER: 30 cm (1 ft.)+

SITE DESCRIPTION: Glaciofluvial terrace located at north end of Umiak Lake about 48.3 km (30 mi.) north at Tununuk Point.

Vegetation: moss, and lichen with dwarf birch and willow about 46 cm (18 in.).

Drainage: good on elevated areas.

Map Reference: NTS 107C E $\frac{1}{2}$ , Mackenzie Delta

UMT Reference: Zone 8; 524,300E 7,702,400N

SITE INVESTIGATION: 2 drill holes

ASSESSMENT: Not suitable for development because material is non-granular and the ice content is very high.

SITE BD2-06(NG)

REFERENCE: Source 208A, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class NG; Non-granular material not suitable for construction purposes.

MATERIAL DESCRIPTION: Sand, some silt (SM);  
High moisture content.

DEPTH OF ACTIVE LAYER: 30.5 cm + (1 ft.)

SITE DESCRIPTION: Terrace remnant located 1.2 km (3/4 mi.) east of Umiak Lake and 48.3 km (30 mi.) north of Tununuk Point.

Vegetation: moss, lichen and dwarf birch and willow to about 45.7 cm (18 in.).

Drainage: over the elevated features is good.

Map Reference: NTS 107C E<sub>2</sub>, Mackenzie Delta

UTM Reference: Zone 8; 527,000E 7,700,000N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: The material is not suitable for construction requirements.

The source is located outside the 28 km (17.5 mi.) pipeline corridor.

SITE BD2-07(3)

REFERENCE: Source 206, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand, some silt, trace gravel (SM);  
Maximum grain size 7.6 cm (3 in.);  
Low to high moisture content;  
Massive ice below 150 cm (5 ft.);  
Ice lenses 120 cm (4 ft.) to 180 cm (6 ft.)

OVERBURDEN: Silt and peat; 45 cm (1.5 ft.)

DEPTH OF ACTIVE LAYER: 120 cm (4 ft.)+

RESERVES: Proven 200,000 cu.m ( 250,000 cu.yd.)  
Probable 1,000,000 cu.m (1,500,000 cu.yd.)  
Possible 2,000,000 cu.m (2,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, doze, stockpile, thaw and drain. Stockpile overburden away from drainage courses.

SITE DESCRIPTION: Irregular, rounded ridges possibly esker remnants, located at the northeast end of Denis Lake, about 43.4 km (27 mi.) north Tununuk Point.

Vegetation: moss, lichen, with scattered dwarf birch and willow about 60 cm (2 ft.) high.

Drainage: good on the ridges; adjacent low lying areas are thermokarstic.

Thickness: 2.4 m (8 ft.)  
Area: 1,700,000 sq.m (18,000,000 sq.ft.)  
Perimeter: 15,000 m (50,000 ft.)

Map Reference: NTS 107C W½, Mackenzie Delta

UTM Reference: Zone 8; 520,700E 7,696,900N

SITE INVESTIGATION: 6 drill holes, 4 test pits

ASSESSMENT: Suitable for development as a source of fair quality material for general fill. The material is highly variable in the deposit ranging from clean gravels to silty sand.

SITE BD2-07(3)

The source is located outside of the 28 km (17.5 mi.) pipeline corridor.

Accessible only during the winter months by trucking across the lakes and tundra. The source is within the Mackenzie Reindeer Grazing Reserve and is important to many waterfowl.



SITE BD2-08(NG)

REFERENCE: Source 205A, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class N.G., Non granular material unsuitable for construction purposes.

MATERIAL DESCRIPTION: Silt and sand, trace gravel (ML).

DEPTH OF ACTIVE LAYER: 30 cm (1 ft.)+

SITE DESCRIPTION: Kame remnants located west of Denis Lagoon about 40.2 km (25 mi.) north of Tununuk Point.

Vegetation: moss, lichen and some dwarf birch and willow to a height of 90 cm (3 ft.).

Drainage: good.

Map Reference: NTS 107 C W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 510,600E 7,694,400N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Not suitable for development. The material is non-granular.

The source is located within the 28 km (17.5 mi.) pipeline corridor.

SITE BD2-09(3)

REFERENCE: Source 207, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand, trace gravel (SP);  
Maximum grain size to 4 cm (1½ in.);  
Medium to high moisture content;  
Massive ice below 229 cm (7.5 ft);  
Ice lenses throughout 46 cm (1.5 ft.).

OVERBURDEN: Peat and silt; 46 cm (1.5 ft.)

DEPTH OF ACTIVE LAYER: 90 cm + (3 ft.)

RESERVES: Proven 150,000 cu.m (200,000 cu.yd)  
Probable 500,000 cu.m (700,000 cu.yd)  
Possible 1,000,000 cu.m (1,500,000 cu.yd)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, doze, stockpile, thaw and drain. Stockpile overburden away from drainage courses. Disturbances of low lying ground around ridges should be kept minimal.

SITE DESCRIPTION: Kame-esker complex on east shore of Denis Lake about 38.6 km (24 mi) north of Tununuk Point.

Vegetation: moss, lichen and dwarf shrubs as high as 61 cm (2 ft.).

Drainage: Good on the ridges.

Thickness: 2.4 m (8.0 ft.)  
Area: 660,000 sq.m (7,100,000 sq.ft.)  
Perimeter: 6,400 m (21,000 ft.)

Map Reference: NTS 107C W½, Mackenzie Delta

UTM Reference: Zone 8; 519,200E 7,691,900N

SITE INVESTIGATION: 5 drill holes, 3 test pits.

ASSESSMENT: Suitable for development as a source of fair quality material. The materials in place are highly variable in quality ranging from clean

SITE BD2-09(3)

gravels to silty sands.

The source is located outside the 28 km (17.5 mi.) pipeline corridor.

Accessible only by truck over a winter road to the east channel of the Mackenzie River; then either by truck in winter or barge in summer.

SITE BD2-10(2)

REFERENCE: Source 211, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 2, Good quality material suitable for embankment fill; base course and surface aggregates.

MATERIAL DESCRIPTION: Sand, little gravel (SW);  
Sand, trace gravel, some silt (SM);  
Maximum size to 7.6 cm (3 in.);  
Moisture content is low; increasing to high with depth.  
Ice lens below 1.2 m (4 ft.)

OVERBURDEN: Peat and silt; 8 cm ( $\frac{1}{2}$  ft.)

DEPTH OF ACTIVE LAYER: 120 cm (4 ft.)

RESERVES: Proven 150,000 cu.m (250,000 cu.yd.)  
Probable 750,000 cu.m (1,000,000 cu.yd.)  
Possible 2,500,000 cu.m (3,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain.

SITE DESCRIPTION: Esker along southern and eastern shores of Willow Lake about 40.2 km (25 mi.) northeast of Tununuk Point.

Vegetation: thin to non-existent; moss and dwarf shrubs.

Drainage: Good.

Thickness: 6.1 m (20 ft.)  
Area: 760,000 sq.m (8,100,000 sq.ft.)  
Perimeter: 17,000 m (56,000 ft.)

Map Reference: NTS 107C E $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 530,000E 7,690,000N

SITE INVESTIGATION: 4 drill holes, 5 test pits.

ASSESSMENT: Suitable for development although further drilling required to identify best materials. The clean gravel near the surface of the deposit may be suitable for production of concrete aggregates with a minimum of processing.

SITE BD2-10(2)

A winter access road approximately 8 km (5 mi.) link the source to the east channel of the Mackenzie River.

Access roads should avoid low lying areas because of the likelihood of thermokarsting if the organic ground cover is disturbed.

SITE BD2-11(4)

REFERENCE: Source 202A, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 4, Poor quality material suitable for marginal fill.

MATERIAL DESCRIPTION: Sand, trace silt (SP);  
Maximum size approximately .9 cm (3/8 in.);  
Medium moisture content.

OVERBURDEN: Organic silt; 91 cm (3 ft.)

DEPTH OF ACTIVE LAYER: 30 cm (1 ft.)

RESERVES: Proven 100,000 cu.m ( 150,000 cu.yd.)  
Probable 1,000,000 cu.m (1,500,000 cu.yd.)  
Possible 1,000,000 cu.m (1,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Materials along beaches are the only economically feasible areas to be exploited because of prevalent ground ice and thick overburden.

SITE DESCRIPTION: Elevated remnant of an ancient delta, located 37 km (23 mi.) northwest of Tununuk Point and 6.4 km (4 mi.) west of Camp Farewell.

Vegetation: moss and lichen, with considerable dwarf birch and willow.

Drainage: good.

Thickness: 3.7 m (12 ft.)  
Area: 340,000 sq.m (3,700,000 sq.ft.)  
Perimeter: 5,500 m (18,000 ft.)

Map Reference: NTS 107C W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 493,400E 7,689,000N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Not suitable for development because the site lies within the Kendall Island Bird sanctuary.

The source is located within the 28 km (17.5 mi.) pipeline corridor but can be reached only during winter by trucking over the lakes and channels of the Delta.

SITE BD2-12(4)

REFERENCE: Source 203A, Zone II, Stage II DIAND Granular Material Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 4, Poor quality material suitable for marginal fill.

MATERIAL DESCRIPTION: Sand; trace silt (SP);  
Manimum size approx. .9 cm (3/8 in.);  
Medium moisture content.

OVERBURDEN: Organic silt; 61 cm (2 ft.)

DEPTH OF ACTIVE LAYER: Undetermined

RESERVES: Proven 50,000 cu.m (65,000 cu.yd)  
Probable 5,000,000 cu.m (6,500,000 cu.yd)  
Possible 8,000,000 cu.m (10,000,000 cu.yd)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: The material along the beaches are the only economically feasible areas to be exploited because of prevalent ground ice and thick overburden.

SITE DESCRIPTION: The source is an elevated remnant of an ancient delta with an associated beach which is located 40.2 km (25 mi) northwest of Tununuk Point and 11.3 km (7 mi) west of camp Farewell.

Vegetation: moss and lichen, with considerable dwarf birch and willow.

Drainage: good.

Thickness: 3 m (10 ft.)  
Area: 27,000,000 sq.m (29,000,000 sq.ft.)  
Perimeter: 16,000 m (54,000 ft.)

Map Reference: NTS 107C W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 497,000E 7,688,500N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Not suitable for development because the site is within the Kendall Island Bird Sanctuary.

The source is located within the 28km (17.5 mi.) pipeline corridor but can be reached during

SITE BD2-12(4)

winter by truck over the lakes and channels of  
the Delta.



SITE BD2-13(4)

REFERENCE: Source 200A, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 4, Poor quality material suitable for marginal fill.

MATERIAL DESCRIPTION: Sand, trace gravel (SP);  
Maximum size 2.5 cm (1 in.);  
Medium moisture content.

OVERBURDEN: Organic silt; 60 to 75 cm (2 to 2½ ft.)

DEPTH OF ACTIVE LAYER: 30 cm (1 ft.)+

RESERVES: Proven 35,000 cu.m ( 45,000 cu.yd.)  
Probable 1,500,000 cu.m (2,500,000 cu.yd.)  
Possible 2,000,000 cu.m (3,000,000 cu.yd.)

SITE DESCRIPTION: Beach and delta deposit 35 km (22 mi.) northwest of Tununuk Point and 8 km (5 mi.) west of Camp Farewell.

Vegetation: moss, lichen, grasses and dwarf shrubs 91 m (3 ft.) high.

Drainage: good.

Thickness: 6.1 m (20 ft.)  
Area: 350,000 sq.m (3,800,000 sq.ft.)  
Perimeter: 3,200 m (11,000 ft.)

Map Reference: NTS 107C W½, Mackenzie Delta

UTM Reference: Zone 8; 495,000E 7,685,000N

SITE INVESTIGATION: 2 test pits, 1 pit face.

ASSESSMENT: Not suitable for development because source is within the Kendall Island Bird Sanctuary.

SITE BD2-14(3)

REFERENCE: Deposit (a); Area VI; DIAND Granular Resource Inventory; Mackenzie Delta W $\frac{1}{2}$  NTS 107C, Geological Survey of Canada, July, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel and sand.

RESERVES: Possible 25,000,000 cu.m (30,000,000 cu.yd.)

SITE DESCRIPTION: Glaciofluvial deposit, 30 km (19 mi.) north of Tununuk Pt.

Thickness: 15 m (50 ft.)  
Area: 2,120,000 sq.m (22,800,000 sq.ft.)  
Perimeter: 8,700 m (28,600 ft.)

Map Reference: NTS 107C W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 518,000E 7,686,500N

ASSESSMENT: Suitable for development as a source of general fill.

Truck access in the winter.

SITE BD2-15(4)

REFERENCE: Source 213, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 4, Poor quality material suitable for marginal fill.

MATERIAL DESCRIPTION: Sand, trace silt, fine (SP);  
Low moisture content.

OVERBURDEN: Organic silt; 0 to 61 cm (0 to 2 ft.)

DEPTH OF ACTIVE LAYER: 61 cm (2 ft.)+

RESERVES: Proven 250,000 cu.m ( 300,000 cu.yd.)  
Probable 1,000,000 cu.m (1,500,000 cu.yd.)  
Possible 6,000,000 cu.m (7,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, doze, stockpile, thaw and drain. Avoid excavation near the river banks to minimize subsequent instability and siltation.

SITE DESCRIPTION: Glaciofluvial terrace remnants on the east channel of the Mackenzie River, 38.6 km (24 mi.) northeast of Tununuk Point.

Vegetation: surface of terrace has tufts of grass with dwarf birch and willow. Steeper banks are bare with some grass and shrubs.

Drainage: good.

Thickness: 9 m (30 ft.)  
Area: 950,000 sq.m (10,000,000 sq.ft.)  
Perimeter: 6,900 m (23,000 ft.)

Map Reference: NTS 107C E $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 535,000E 7,686,000N

SITE INVESTIGATION: 2 test pits, 1 pit face.

ASSESSMENT: Suitable for development for very marginal fill material, to be used in local projects.

Accessible by barge in summer and by truck in winter.

SITE BD2-16(4)

REFERENCE: Source 214, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 4, Poor quality material suitable for marginal fill.

MATERIAL DESCRIPTION: Sand, trace silt (SP);  
Low moisture content.

OVERBURDEN: Organic silt; 15 cm ( $\frac{1}{2}$  ft.)

DEPTH OF ACTIVE LAYER: 91 cm (3 ft.)+

RESERVES: Proven 50,000 cu.m ( 65,000 cu.yd.)  
Probable 500,000 cu.m ( 650,000 cu.yd.)  
Possible 6,000,000 cu.m (7,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, doze, stockpile, thaw and drain. Avoid excavation near river banks to prevent subsequent instability and siltation.

SITE DESCRIPTION: Terrace remnant on the east bank of the east channel of the Mackenzie River about 42 km (26 mi.) northeast of Tununuk Point.

Vegetation: generally moss lichen with scattered dwarf shrubs.

Drainage: good.

Thickness: 9 m (30 ft.)  
Area: 640,000 sq.m (6,900,000 sq.ft.)  
Perimeter: 3,400 m (11,000 ft.)

Map Reference: NTS 107C E $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 542,100E 7,684,100N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Suitable for development for local projects on a low priority basis due to fineness of sand.

Accessible by barge in summer or by truck in winter.

SITE BD2-17(3)

REFERENCE: Source 215, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel, trace silt (SW);  
Maximum size 7.6 cm (3 in.).

OVERBURDEN: Peat and silty sand; 180 cm (6 ft.) +

DEPTH OF ACTIVE LAYER: Undetermined.

RESERVES: Proven 25,000 cu. m (30,000 cu.yd.)  
Probable 80,000 cu. m (100,000 cu.yd.)  
Possible 300,000 cu. m (400,000 cu.yd.)

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. Stockpiles of ice rich silt and granular material must be located carefully to avoid siltation of the river. Excavation should be kept away from riverbank to prevent instability and silting.

SITE DESCRIPTION: Isolated ancient delta remnant on the east bank of the east channel of the Mackenzie River, about 34 km (21 mi.) northeast of Tununuk Point.

Vegetation: thin to non-existent; moss, lichen and scattered dwarf shrubs.

Drainage: good.

Thickness: 9 m (30 ft.)  
Area: 33,000 sq.m (360,000 sq.ft.)  
Perimeter: 1,100 m (3,800 ft.)

Map Reference: NTS 107C E $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 532,200E 7,681,400N

SITE INVESTIGATION: 1 pit face.

ASSESSMENT: Probably unsuitable for development because of extensive depth of overburden. Additional field drilling or test pitting is required to delineate inplace materials.

The Mackenzie River provides access to the source by barge during the summer and truck route would provide access during the winter.

SITE BD2-18(3)

REFERENCE: Source 212, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973,

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand, little gravel (SW);  
Maximum size to 2.5 cm (1 in.);  
Moisture content is low in gravels, high in silty sand;  
Massive ice below 2.1 m (7 ft.).

OVERBURDEN: Peat and silt; 30 cm (1ft.)

DEPTH OF ACTIVE LAYER: 76.2 cm (2.5 ft.)+

RESERVES: Proven 85,000 cu.m ( 100,000 cu.yd.)  
Probable 600,000 cu.m ( 750,000 cu.yd.)  
Possible 2,000,000 cu.m (2,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, doze and stockpile.

SITE DESCRIPTION: Outwash remnant located 3.2 km (2 mi.) northwest of Lousy Point and 30 km (19 mi.) northeast of Tununuk Point.

Vegetation: southern exposure has heavy moss and dwarf shrubs 45 cm (1.5 ft.).

Drainage: good.

Thickness: 3.0 m (10 ft.)  
Area: 630,000 sq.m (6,800,000 sq.ft.)  
Perimeter: 4,800 m (16,000 ft.)

Map Reference: NTS 107C E½, Mackenzie Delta

UTM Reference: Zone 8; 527,200E 7,682,500N

SITE INVESTIGATION: 1 drill hole, 3 test pits.

ASSESSMENT: Suitable for development for local use. However, more drilling is required to delineate the area containing the best material.

A carefully planned winter road 4.0 km (2.5 mi.) would link the source to the east channel of the Mackenzie Delta.

SITE BD2-19(3)

REFERENCE: Source 218, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand, little gravel (SW);  
Maximum size to 2.5 cm (1 in.);  
Low moisture content.

OVERBURDEN: Peat and silt; 30 cm (1 ft.)

DEPTH OF ACTIVE LAYER: 106 cm (3.5 ft.)

RESERVES: Proven 65,000 cu.m (85,000 cu.yd.)  
Probable 650,000 cu.m (850,000 cu.yd.)  
Possible 5,000,000 cu.m (6,500,000 cu.yd.)

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. Massive ground ice on slopes should not be exposed to prevent siltation of adjacent lakes.

SITE DESCRIPTION: Glacial outwash at the north end of a lake about 29 km (18 mi.) northeast of Tununuk Point.

Vegetation: thin to non-existent; moss, lichen and dwarf shrubs.

Drainage: good,

Thickness: 9 m (30 ft.)  
Area: 600,000 sq.m. (6,500,000 sq.ft.)  
Perimeter: 5,200 m (17,000 ft.)

Map Reference: NTS 107C E½, Mackenzie Delta

UTM Reference: Zone 8; 521,800E 7,683,000N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Suitable for development for use as general fill in projects.

The site is only accessible by truck during the winter months. The Mackenzie River east channel is 8 km (5 mi.) away.

SITE BD2-20(4)

REFERENCE: Source 201A, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 4, Poor quality material suitable for marginal fill.

MATERIAL DESCRIPTION: Sand, trace gravel, trace silt (SP);  
Maximum size approximately 1.9 cm (3/4 in.);  
Medium moisture content;  
Permafrost encountered at .3 m (1 ft.).

OVERBURDEN: Peat and silt; approximately 1.0 m (3 ft.)

DEPTH OF ACTIVE LAYER: Minimum depth of frozen material 30 cm (1 ft.)+

RESERVES: Proven 2,500,000 cu.m ( 3,000,000 cu.yd.)  
Probable 25,000,000 cu.m (30,000,000 cu.yd.)  
Possible 30,000,000 cu.m (35,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: The material along the beaches are the only economically, feasible areas to be exploited because of prevalent ground ice and thick overburden.

SITE DESCRIPTION: The source is an elevated remnant of an ancient delta plain separated into 4 parts by erosion channels, together with an associated beach located 32.2 km (20 mi.) northwest of Tununuk Point and 6.4 km (4 mi.) southwest of Camp Farewell.

Vegetation: primarily moss and lichen with considerable dwarf birch and willow.

Drainage: good, although adjacent low lying ground is almost surrounded by lakes & channels.

Thickness: 5,2 m (17 ft.)  
Area: 5,400,000 sq.m (58,000,000 sq.ft.)  
Perimeter: 22,000 m (72,000 ft.)

Map Reference: NTS 107C W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 497,000E 7,680,000N

SITE INVESTIGATION: 6 test pits.



SITE BD2-20(4)

ASSESSMENT:

Not suitable for development because the site lies within the Kendall Island Bird Sanctuary.

SITE BD2-21(2)

REFERENCE: Source 219, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 2, Good quality material suitable for embankment fill, base course and surface aggregate.

MATERIAL DESCRIPTION: Gravel and sand, trace silt (GW);  
Sand and gravel, trace silt (SW);  
Maximum size to 2.5 cm (1 in.);  
Medium to high moisture content;  
Massive ice below 1.7 m (5.5 ft.)

OVERBURDEN: Peat and silt; 30 cm (1 ft.)

DEPTH OF ACTIVE LAYER: 106.7 cm (3.5 ft.)

RESERVES: Proven 1,500,000 cu.m (1,500,000 cu.yd.)  
Probable 15,000,000 cu.m (15,000,000 cu.yd.)  
Possible 20,000,000 cu.m (25,000,000 cu.yd.)

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. Do not strip ice rich areas of silt. Stockpiles and stripping should be placed carefully to avoid siltation of YaYa Lake and streams. Selected areas can be developed without ripping during the summer.

SITE DESCRIPTION: Glaciofluvial, flat topped ridge, possibly a crevasse filling near the north end of YaYa Lake about 22.5 km (14 mi.) north of Tununuk Point.

Vegetation: thin to non-existent; moss and scattered shrubs.

Drainage: good.

Thickness: 5.8 m (19 ft.)  
Area: 3,200,00 sq.m (35,000,000 sq.ft.)  
Perimeter: 16,000 m (53,000 ft.)

Map Reference: NTS 107C W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 517,300E 7,678,200N

SITE INVESTIGATION: 5 drill holes, 2 test pits.

ASSESSMENT: Suitable for development as a source of granular material for most construction requirements. Areas of exposed gravel should be exploited first. However, extensive field drilling should be under-

SITE BD2-21(2)

taken to delineate the source area in greater detail and ensure better development plans.

The site is accessible by truck during the winter or by barge along the YaYa Lakes. Only a short access road is required from the site to YaYa Lakes.

SITE BD2-22(3)

REFERENCE: Source 216, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand, little gravel, trace silt (SW);  
Maximum size to 3.8 cm (1½ in.);  
Low to medium moisture content;  
Ice lenses at .30 cm (1 ft.)  
Massive ice below 5 m (15 ft.)

OVERBURDEN: Peat and organic silt; 30 cm (1 ft.)

DEPTH OF ACTIVE LAYER: 107 cm (3.5 ft.)

RESERVES: Proven 100,000 cu. m (150,000 cu.yd.)  
Probable 400,000 cu. m (500,000 cu.yd.)  
Possible 1,500,000 cu. m (2,000,000 cu.yd.)

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. Small volumes of selected material may be processed by screening for better quality construction materials.

SITE DESCRIPTION: Kame and esker remnants about 27.4 km (17 mi.) northeast of Tununuk Point.

Vegetation: thin to non-existent; moss, lichen and scattered dwarf shrubs.

Drainage: good to fair.

Thickness: 4.6 m (15 ft.)  
Area: 420,000 sq. m (4,500,000 sq.ft.)  
Perimeter: 5,500 m (18,000 ft.)

Map Reference: NTS 107C E½, Mackenzie Delta

UTM Reference: Zone 8; 527,100E 7,677,000N

SITE INVESTIGATION: 7 drill holes, 3 test pits.

ASSESSMENT: Suitable for development but due to its erratic nature the specific areas of quality material for excavation must be further delineated by field drilling.

A winter road of about 1.6 km (1 mi.) would link this source to the east channel of the Mackenzie River.

SITE BD2-23(3)

REFERENCE: Source 217, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand, trace gravel (SW);  
Maximum size to 2.5 cm (1 in.);  
Moisture content low;  
Massive ice at shallow depths.

OVERBURDEN: Peat and organic silt to 15 cm (6 in.)

DEPTH OF ACTIVE LAYER: 76 cm (2.5 ft.)

RESERVES:	Proven	6,500 cu.m	(8,500 cu.yd.)
	Probable	120,000 cu.m	(150,000 cu.yd.)
	Possible	1,200,000 cu.m	(1,500,000 cu.yd.)

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. Only the low ice content material near the surface should be excavated. Avoid disturbance of adjacent low lying ground to prevent thermokarsting.

SITE DESCRIPTION: Esker about 30.6 km (19 mi.) northeast of Tununuk Point.

Vegetation: thin to non-existent; moss and grass.

Drainage: good.

Thickness: 7.6 m (25 ft.)

Area: 280,000 sq.m (3,000,000 sq.ft.)

Perimeter: 4,600 m (15,000 ft.)

Map Reference: NTS 107C E<sub>2</sub>, Mackenzie Delta

UTM Reference: Zone 8; 523,200E 7,675,700N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Suitable for development in local projects only.

Accessible by truck during the winter.

SITE BD2-24(3)

REFERENCE: Source 220, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand, some gravel (SW);  
Maximum size to 38 cm (1½ in.);  
Low to medium moisture content;  
Ice lenses at .3 m (1 ft.);  
Massive ice below 2.1 m (7 ft.).

OVERBURDEN: Organic silt; 30 cm (1 ft.)

DEPTH OF ACTIVE LAYER: 91.4 cm (3 ft.)

RESERVES: Proven 50,000 cu.m ( 65,000 cu.yd.)  
Probable 650,000 cu.m ( 850,000 cu.yd.)  
Possible 2,000,000 cu.m (2,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, doze, stockpile, thaw and drain. Areas of ice rich silt should be excavated and stockpiles should be carefully located to prevent siltation of Yaya Lake and streams.

SITE DESCRIPTION: Group of ridges, either eskers or crevasse fillings, on the east side of Yaya Lake about 19.3 km (12 miles) north of Tununuk Point.

Vegetation: thin to non-existent moss and dwarf shrubs.

Drainage: good

Thickness: 3.3 m (11 ft.)  
Area: 710,000 sq.m (7,600,000 sq.ft.)  
Perimeter: 12,000 m (39,000 ft.)

Map Reference: NTS 107C W½, Mackenzie Delta

UTM Reference: Zone 8; 516,100E 7,673,300N

SITE INVESTIGATION: 6 drill holes, 1 test pit.

ASSESSMENT: Suitable for development. The erratic nature of the deposit dictates that additional drilling should be done before selective excavation of the

SITE BD2-24(3)

material in this source is undertaken.

Access to the site is limited to trucks during the winter or by small barge along the YaYa Lakes during the summer.

SITE BD2-25(3)

REFERENCE: Source 227, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand, some gravel, trace silt (SW);  
Maximum size to 3.8 cm (1½ in.);  
Medium moisture content;  
Ice lenses near surface;  
Massive ice below .9 m (3 ft.)

OVERBURDEN: Peat and silt; 0 to 60 cm (0 to 2 ft.)

DEPTH OF ACTIVE LAYER: 121.9 cm (4 ft.)

RESERVES: Proven 150,000 cu.m (200,000 cu.yd.)  
Probable 1,500,000 cu.m (2,000,000 cu.yd.)  
Possible 2,500,000 cu.m (3,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. Prevent siltation of YaYa Lake and adjacent drainage system due to poorly located stockpiles of frozen material and massive ground ice exposed on slopes.

SITE DESCRIPTION: Kame field on the west side of YaYa Lake about 12.9 km (8 mi.) north of Tununuk Point.

Vegetation: thin to non-existent; moss and scattered shrubs.

Drainage: good on individual kames.

Thickness: 6.1 m (14 ft.)  
Area: 2,000,000 sq.m (22,000,000 sq.ft.)  
Perimeter: 24,000 m (78,000 ft.)

Map Reference: NTS 107C W½, Mackenzie Delta

UTM Reference: Zone 8; 510,000E 7,669,000N

SITE INVESTIGATION: 7 drill holes, 2 test pits.

ASSESSMENT: Suitable for development. The material is widely scattered and variable in quality and may be suitable only for local projects.

The area is accessible by trucks in the winter



SITE BD2-25(3)

and by barge through the YaYa Lakes to other points in the Delta during the summer.

Detailed field drilling would be required prior to development of any areas for granular materials.

SITE BD2-26(NG)

REFERENCE: Source 221A, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Kohn and Leonoff, 1973.

MATERIAL QUALITY: Class N.G., Non-granular material unsuitable for construction purposes.

MATERIAL DESCRIPTION: Sand and silt, (SM);  
Medium moisture content;  
Massive ice below 1.2 m (4 ft.)

DEPTH OF ACTIVE LAYER: 91.4 cm (3 ft.)+

MINIMUM HAUL DISTANCE:

SITE DESCRIPTION: Kame field on the east side of YaYa Lake about 4.8 km (3 mi.) north of Tununuk Point.

Vegetation: thin to non-existent moss and dwarf shrubs.

Drainage: good.

Map Reference: NTS 107C W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 513,700E 7,668,500N

SITE INVESTIGATION: 3 drill holes, 3 test pits.

ASSESSMENT: Not suitable for development because of non-granular material and massive ice.

SITE BD2-27(2)

REFERENCE: Source 222, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 2, Good quality material suitable for general fill, base and surface course aggregates.

MATERIAL DESCRIPTION: Sand, some gravel, trace silt (SW-SP);  
Maximum size to 2.5 cm (1 in.);  
Medium moisture content;  
Massive ice common below 8.2 m (27 ft.).

OVERBURDEN: Peat and silt; 0 to 170 cm (0 to 5.5 ft.)

DEPTH OF ACTIVE LAYER: 61 cm (2 ft.)+

RESERVES: Proven 3,000,000 cu.m ( 4,000,000 cu.yd.)  
Probable 7,000,000 cu.m (10,000,000 cu.yd.)  
Possible 25,000,000 cu.m (35,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. Avoid exposure of ground ice on steep riverbank slope. Locate stockpiles carefully, to prevent siltation of adjacent streams and river.

SITE DESCRIPTION: Terrace and bar remnants at Swimming Point, about 16.1 km (10 mi.) northeast of Tununuk Point.

Vegetation: thin to dense, moss and scattered dwarf shrubs.

Drainage: good.

Thickness: 9.2 m (30 ft.)  
Area: 2,800,000 sq.m (30,000,000 sq.ft.)  
Perimeter: 19,000 m (64,000 ft.)

Map Reference: NTS 107C E $\frac{1}{2}$  and W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 522,600E 7,667,400N

SITE INVESTIGATION: 5 drill holes, 2 test pits.

ASSESSMENT: Suitable for large scale development for production of most construction aggregate requirements. Additional extensive field drilling should be carried out because of the indicated variability of material.

SITE BD2-27(2)

The main barge and truck route serving the Delta provide summer and winter access to the source. Gulf Oil Ltd.'s Swimming Point camp is located on this site.

SITE BD2-28(2)

REFERENCE: Source 225, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Kohn and Leonoff, 1973.

MATERIAL QUALITY: Class 2, Good quality material suitable for embankment fill, base and surface course aggregates.

MATERIAL DESCRIPTION: Sand and gravel, trace silt (SW);  
Maximum size to 7.6 cm (3 in.);  
Low to medium moisture content;  
Massive ice below 2.1 m (7 ft.).

OVERBURDEN: Peat and silt; 0 to 90 cm (0 to 3 ft.)

DEPTH OF ACTIVE LAYER: 76.2 (2½ ft.)

RESERVES: Proven 75,000 cu.m ( 100,000 cu.yd.)  
Probable 150,000 cu.m ( 200,000 cu.yd.)  
Possible 750,000 cu.m (1,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. Prevent silting of natural drainage channels from stockpiles of frozen material or exposed massive ground ice.

SITE DESCRIPTION: Esker adjacent to south shore of YaYa Lake about 11.3 km (7 mi.) north of Tununuk Point.

Vegetation: non-existent to thin, moss and dwarf shrub in small patches.

Drainage: Good.

Thickness: 1.8 m (6 ft.)  
Area: 410,000 sq.m (4,400,000 sq.ft.)  
Perimeter: 7,300 m (24,000 ft.)

Map Reference: NTS 107C W½, Mackenzie Delta

UTM Reference: Zone 8; 510,000E 7,665,200N

SITE INVESTIGATION: 2 drill holes, 2 test pits.

ASSESSMENT: Suitable for development but due to erratic nature of deposit further field investigation is required.

SITE BD2-28(2)

Accessible by barge in summer and truck in winter.

SITE BD2-29(1)

REFERENCE: Source 224, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 1, Excellent quality material suitable for concrete aggregate.

MATERIAL DESCRIPTION: Gravel and sand (GW);  
Maximum size to 7.6 cm (3 in.).

OVERBURDEN: Peat and silt, 0 to 61 cm (0 to 2 ft.)

DEPTH OF ACTIVE LAYER: Not determined

RESERVES: Proven 85,000 cu.m ( 100,000 cu.yd.)  
Probable 1,500,000 cu.m (2,000,000 cu.yd.)  
Possible 3,500,000 cu.m (4,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. Exposure of massive ground ice and location of stockpile frozen material should be carefully managed to prevent siltation of YaYa Lake and streams.

SITE DESCRIPTION: Esker, the western extension of Source 223, with some kames on the south shore of YaYa Lake 11.3 km (7 mi.) north of Tununuk Point.

Vegetation: non-existent to thin, moss and dwarf shrub on the flanks of the ridges.

Drainage: good.

Thickness: 9.1 m (30 ft.)  
Area: 610,000 sq.m (6,600,000 sq.ft.)  
Perimeter: 8,500 m (28,000 ft.)

Map Reference: NTS 107C W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 512,200E 7,665,200N

SITE INVESTIGATION: 2 pit faces.

ASSESSMENT: Suitable for development as a source of most construction aggregate requirements. Crushing and screening operations should be considered to minimize wastage of material and to produce higher quality aggregates.

SITE BD2-29(1)

Winter roads provide access to Swimming Point and Tununuk. Access in the summer can be provided by barges on YaYa lakes and to other points in the Delta.

The area is currently being exploited by a number of independent oil companies for their aggregate requirements in the Mackenzie Delta.

An extensive field drilling program was conducted on this site in 1975 to evaluate in detail the availability of granular materials. (Note: The report was unavailable for review at this time).



SITE BD2-30(1)

REFERENCE: Source 223, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 1, Excellent quality material suitable for concrete aggregate.

MATERIAL DESCRIPTION: Gravel and sand (GW);  
Maximum size to 7.6 cm (3 in.);  
Low moisture content;  
Massive ice indicated at depth (polygonal ground).

OVERBURDEN Peat and silt, less than 30 cm (1 ft.)

DEPTH OF ACTIVE LAYER: 91.4 cm (3 ft.)+

RESERVES    Proven        2,500,000 cu.m ( 3,500,000 cu.yd.)  
             Probable     4,000,000 cu.m ( 5,000,000 cu.yd.)  
             Possible     9,000,000 cu.m (10,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. Surficial gravels can be excavated without ripping. Exposures of massive ice and location of stockpiles of frozen material should be carefully managed to prevent siltation of YaYa Lake.

SITE DESCRIPTION: Esker - kame complex lying between the east channel of the Mackenzie River and YaYa Lake about 11.3 km (7 mi.) north of Tununuk Point.

Vegetation: non-existent to thin, moss and dwarf shrubs along the flanks of the ridges.

Drainage: Good.

Thickness: 9.1 m (30 ft.)  
Area: 1,200,000 sq.m (13,000,000 sq.ft.)  
Perimeter: 13,000 m (42,000 ft.)

Map Reference: NTS 107C W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 515,000E 7,665,200N

SITE INVESTIGATION: 2 drill holes, 2 test pits.

ASSESSMENT: Suitable for development as a source of most construction aggregate requirements. Crushing and screening plants should be used to minimize

SITE BD2-30(1)

the wastage during the production of aggregates. This source represents one of the few deposits on Richards Island of such high quality of material.

The deposit is accessible by truck during the winter to such areas as Swimming Point, Tununuk Point and the East Channel of the Mackenzie River. The deposit is accessible by barge through the YaYa Lakes and onto Tununuk Point and hence onto major barging routes in the Mackenzie Delta.

This deposit is being currently exploited by various industries operating on Richards Island.

A detailed field drilling program was carried out in 1975 to assess the total availability of granular material resources from this site.

(Note: The report for this investigation has not been made available to this study at this time.)

SITE BD2-31(3)

REFERENCE: Source 226, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand, some gravel, trace silt (SM);  
Gravel and sand (GW);  
Medium moisture content;  
Ice lenses possible at shallow depths;  
Massive ice below 1.8 m (6 ft.).

OVERBURDEN: Peat and silt, 61 cm (2 ft.)

DEPTH OF ACTIVE LAYER: 91.4 cm (3 ft.)+

RESERVES: Proven 250,000 cu.m ( 300,000 cu.yd.)  
Probable 1,000,000 cu.m (1,500,000 cu.yd.)  
Possible 1,500,000 cu.m (2,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile thaw and drain. Protect natural drainage system from siltation due to melting of exposed massive ground ice and poorly located stockpiles of frozen material.

SITE DESCRIPTION: Esker - kame complex 9.7 km (6 mi.) northwest of Tununuk Point.

Vegetation: non-existent to thin, moss, grass and some small dwarf shrubs.

Drainage: fair to good.

Thickness: 5.2 m (17 ft.)  
Area: 420,000 sq.m (4,500,000 sq.ft.)  
Perimeter: 7,800 m (26,000 ft.)

Map Reference: NTS 107C W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 508,200E 7,663,300N

SITE INVESTIGATION: 4 drill holes, 3 test pits.

ASSESSMENT: Suitable for development. Due to the erratic nature of the deposit a detailed field investigation is required to define the areas of suitable material..

SITE BD2-31(3)

Barge in summer and truck in winter provide  
access.

SITE BD2-32(3)

REFERENCE: Source 303, Zone III, Stage II, DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel, trace silt (SW);  
Gravel and sand, trace silt (GP);  
Content variable;  
Moisture content low to high;  
Massive ground ice 6.3 m (21 ft.).

OVERBURDEN: Organic silt & peat 30 cm (0 to 1 ft.)

DEPTH OF ACTIVE LAYER: 75 cm (2.5 ft.)

RESERVES: Proven 10,000,000 cu.m (15,000,000 cu.yd.)  
Probable 7,000,000 cu.m (10,000,000 cu.yd.)  
Possible 4,500,000 cu.m ( 5,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Materials within the active layer can be excavated by conventional means. Below this layer and above the massive ground ice the material should be ripped, stockpiled, drained and thawed before shipping. The granular materials should be excavated to full depth to minimize disturbance of the area.

SITE DESCRIPTION: Three terrace remnants on the east bank of the Mackenzie River about 10 km (6 mi.) north-east of Tununuk Point.

Vegetation: thin cover of moss and grass and some dwarf shrubs 30 cm (1 ft.) to 90 cm (3 ft.) high.

Drainage: good.

Thickness: 6 m (20 ft.)  
Area: 1,900,000 sq.m (20,000,000 sq.ft.)  
Perimeter: 13,000 m (42,000 ft.)

Map Reference: NTS 107C W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 518,200E 7,622,000N

SITE INVESTIGATION: 4 drill holes, 4 test pits.

ASSESSMENT:

Suitable for development as a source of general fill. The material is highly variable in places.

The source is located within the 28 km (17.5 mi.) pipeline corridor and is accessible over land by truck only in the winter. The source is adjacent to the Mackenzie River which is accessible by truck in the winter and barge in the summer.

SITE BD2-33(1)

REFERENCE: Source 302, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 1, Excellent quality material suitable for concrete aggregate and minimum processing.

MATERIAL DESCRIPTION: Gravel and sand, some silt (GW-GM);  
Maximum size about 2.5 cm (1 in.);  
Moisture content low to medium;  
Massive ice intercepted at 2 m (6.5 ft.) and 4 m (13 ft.)

OVERBURDEN: Silty organics; less than 15 cm ( $\frac{1}{2}$  ft.)

DEPTH OF ACTIVE LAYER: 90 cm (3 ft.)+

RESERVES: Proven 400,000 cu.m ( 500,000 cu.yd.)  
Probable 1,000,000 cu.m (1,500,000 cu.yd.)  
Possible 1,000,000 cu.m (1,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain.

SITE DESCRIPTION: Glaciofluvial terrace adjacent to the east channel of the Mackenzie River, approximately 3 miles northeast of Tununuk Point.

Vegetation: sparse, consisting mostly of moss and dwarf shrubs up to 60 cm (2 ft.) high.

Drainage: good because of topography.

Thickness: 3 m (10 ft.)  
Area: 400,000 sq.m (4,400,000 sq.ft.)  
Perimeter: 12,000 m (38,000 ft.)

Map Reference NTS 107C W $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 516,600E 7,657,700N

SITE INVESTIGATION: 2 drill holes, 1 test pit.

ASSESSMENT: Suitable for development. A study into minimizing wildlife disturbance will probably be required.

The source is located within the 28 km (17.5 mi.) pipeline corridor. Access is by snow roads dur-

SITE BD2-33(1)

ing the winter. Ready access is possible by the Mackenzie River which would allow access to the delta by barge in the summer and truck in the winter.



SITE BD2-34(2)

REFERENCE: Source 204, Zone II, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 2, Good quality material suitable for general fill and/or concrete, and asphalt aggregate with extensive processing.

MATERIAL DESCRIPTION: Sand and gravel, trace of silt (SW);  
Maximum grain size to 3.8 cm (1½ in.);  
Low to medium moisture content;  
Massive ice below 244 cm (8 ft.).

OVERBURDEN: Peat and silt; 0 to 60 cm (0 to 2 ft.)

DEPTH OF ACTIVE LAYER: 76.2 cm + (2.5 ft.)

RESERVES: Proven 95,000 cu.m (150,000 cu.yd)  
Probable 950,000 cu.m (1,500,000 cu.yd)  
Possible 2,500,000 cu.m (3,000,000 cu.yd)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Doze, stockpile or load directly into trucks.  
Ripping, thawing and draining not considered necessary. Exposures of massive ground ice must be avoided.

SITE DESCRIPTION: Remnant of a fluvial terrace along the western bank of the east channel of the Mackenzie River at Tununuk Point.

Vegetation: moss lichen: scattered dwarf shrubs to about 120 cm (4 ft.) high and some small spruce.

Drainage: generally good.

Thickness: 3.7 m (12 ft.)  
Area: 630,000 sq.m (6,800,000 sq.ft.)  
Perimeter: 6,900 m (23,000 ft.)

Map Reference: NTS 107C W½, Mackenzie Delta

UTM Reference: Zone 8; 508,200E 7,663,200N

SITE INVESTIGATION: 1 drill hole, 2 test pits.

ASSESSMENT: Suitable for development for local requirements for granular materials. Imperial Oil Ltd's base camp and airstrip occupies the southern half of the source.

SITE BD2-34(2)

The source is located within the 28 km (17.5 mi.) pipeline corridor.

Access is by truck in the winter and by barge in the summer.

The source lies within an important waterfowl breeding area, Mackenzie Reindeer Grazing Reserve, and archaeological site.

The site has been partially developed for local use.

SITE BD2-35(3)

REFERENCE: Source 301, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel, little silt (SM);  
Gravel and sand, little silt (GW-GM);  
Highly variable;  
Moisture content medium to extremely high;  
Massive ice at 30 cm (1.0 ft.) and 4 m (30 ft.).

OVERBURDEN: Silt, organic; 30 cm (1 ft.) to 120 cm (4 ft.)

DEPTH OF ACTIVE LAYER: 120 cm (3 ft.)+

RESERVES: Proven 500,000 cu.m ( 700,000 cu.yd.)  
Probable 2,500,000 cu.m (3,500,000 cu.yd.)  
Possible 4,000,000 cu.m (5,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: The active layer can be excavated by conventional means in the summer. High ice content silty overburden must be stripped and left to thaw. The frozen material below 120 cm (4 ft.) must be ripped, stockpiled, thawed and drained.

SITE DESCRIPTION: Terrace remnant adjacent to the East Channel of the Mackenzie River about 3 km (2 mi.) southeast of Tununuk Point.

Vegetation: thin to non-existent with the upper portions of the gravel areas bare.

Drainage: good.

Thickness: 3 m (10 ft.)  
Area: 700,000 sq.m (9,100,000 sq.ft.)  
Perimeter 12,000 m (38,000 ft.)

Map Reference: NTS 107B W<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 519,800E 7,652,200N

SITE INVESTIGATION: 4 drill holes, 2 test pits.

ASSESSMENT: Suitable for development as source of general fill. The source is located next to the west-

SITE BD2-35(3)

ern border of the pipeline corridor and immediately adjacent to the Mackenzie River where access by barge in the summer and truck in the winter is feasible.

The source is located within the Mackenzie Delta critical wildlife region.

SITE BD2-36(NG)

REFERENCE: Site 300A, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class N.G. Non granular material not suitable for construction.

MATERIAL DESCRIPTION: Silt and sand, trace gravel (SM);  
Maximum size up to 4 cm (1½ in.);  
Moisture content is medium to high;  
Ice from 46 cm (1.5 ft.) to 4.3 m (14 ft.).

SITE DESCRIPTION: Terrace remnant adjacent to the Mackenzie River  
5 miles southeast of Tununuk.

Vegetation: sparse cover of upland dwarf shrub  
and sphagnum bogs.

Drainage: good.

Map Reference: NTS 107B W½, Aklavik

UTM Reference: Zone 8; 536,800E 7,641,400N

SITTIGATION: 2 drill holes, 2 test pits.

ASSESSMENT: Material are not suitable for construction purposes.

SITE BD2-37 (4)

REFERENCE: Borrow Area 10, Main Canadian Route; CAGSL Pipeline Related Borrow Studies; Northern Engineering Services Co. Ltd., 1974.

MATERIAL QUALITY: Class 4, Poor quality material suitable only for marginal fill.

MATERIAL DESCRIPTION: Sand; medium moisture content.

OVERBURDEN: Topsoil and Silt; 60 cm (2 ft.) to 300 cm (10 ft.).

RESERVES: Possible 25,000,000 cu. m. (30,000,000 cu.yd.).

MINIMUM HAUL DISTANCE:

SITE DESCRIPTION: Outwash plain located on the east bank of the Mackenzie River, 16 km (10 mi.) northeast of Tununuk Point.

Drainage: Fair to good

Thickness: 30 m (100 ft.)

Area: 770,000 sq m (8,300,000 sq ft.)

Perimeter: 4,100 m (14,000 ft.)

Map Reference: NTS 107C E<sub>2</sub>, Mackenzie Delta

UTM Reference: Zone 8; 526,000E 7,664,000N

SITE INVESTIGATION: None

ASSESSMENT: Suitable for development as a source of marginal fill.

Access is by truck in the winter across flat, thermokarst terrain characterized by numerous lakes. Access along the adjacent Mackenzie River is possible by truck in the winter or by barge in the summer.

Selected by CAGSL as primary borrow site for right-of-way material.

SITE BD3-01(2)

REFERENCE:

Source 306, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY:

Class 2, Good quality material suitable for embankment fill, base and surface course aggregate.

MATERIAL DESCRIPTION:

Gravel and sand (GP);  
Maximum size 1.9 cm (3/4 in.);  
Low to medium moisture content;  
Massive ice encountered at 3.3 m (11 ft.).

OVERBURDEN:

Topsoil and silt; 45 cm (1.5 ft.)

DEPTH OF ACTIVE LAYER:

90 cm (3 ft.)+

RESERVES: Proven  
Probable  
Possible

50,000 cu.m	(60,000 cu.yd.)
1,000,000 cu.m	(1,200,000 cu.yd.)
3,000,000 cu.m	(5,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION:

Rip, doze, stockpile, thaw and drain. Each small source should be excavated completely before another source of similar material is opened up. Screening to remove oversize would be required if material is used for aggregate production should be kept to a minimum, in order to limit the disturbance of the thermal regime at depth.

SITE DESCRIPTION:

Many small kames in an outwash plain located about 6 km (4 mi.) west of Eskimo Lakes and 42 km (26 mi.) south of Tuktoyaktuk.

Vegetation: tops of kames are bare, although the lower slopes and flat ground below are covered with light moss and some dwarf shrubs to 90 cm (3 ft.) high.

Drainage: good.

Thickness: 2 m (5 ft.)  
Area: 2,100,000 sq m (25,000,000 sq ft.)  
Perimeter: 15,000 m (50,000 ft.)

Map Reference: NTS 107B W<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 565,500E 7,661,500N

SITE BD3-01(2)

SITE INVESTIGATION:

3 drill holes, 2 test pits.

ASSESSMENT:

Suitable for development on a limited scale as a source of general fill.

The source is located well outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat, thermokarst terrain. During recent years, some light access roads have been built to Parsons Lake from Tuktoyaktuk and from Swimming Point. The power transmission line leading to Tuktoyaktuk passes through this source.

The source lies within the fawning grounds of the Reindeer Herd which is a critical area between December 1 and May 15.



SITE BD3-02(3)

REFERENCE: Source 307, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel and sand, trace silt (GW-GM);  
Maximum size 7.5 cm (3 in.);  
Massive ice at 1.5 m (5 ft.);  
Medium moisture content.

OVERBURDEN: Organic silt; 0 to 75 cm (2.5 ft.)

DEPTH OF ACTIVE LAYER: 60 cm (2 ft.)

RESERVES: Proven 30,000 cu.m (40,000 cu.yd.)  
Probable 300,000 cu.m (400,000 cu.yd.)  
Possible 650,000 cu.m (850,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: The material must be ripped, stockpiled, thawed and drained. Exposed areas should be kept to a minimum and one kame or hillock should be completely excavated before another is stripped.

SITE DESCRIPTION: A series of small kames on an outwash plain located approximately 8 km (5 mi.) east of Eskimo Lakes and approximately 54 km (34 mi.) south of Tuktoyaktuk.

Vegetation: kames are bare; the flatter adjacent ground sparsely covered with moss, grass and dwarf shrubs.

Drainage: good on individual hillocks.

Thickness: 4 m (13 ft.)  
Area: 170,000 sq m (1,800,000 sq ft.)  
Perimeter: 10,000 m (33,000 ft.)

Map Reference: NTS 107C E $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 562,700E 7,656,500N

SITE INVESTIGATION: 3 drill holes, 1 test pit.

ASSESSMENT: Suitable for development on a limited scale as

SITE BD3-02(3)

a source of general fill for local projects. The kames are limited in size and are variable in nature.

The source is located outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across thermally sensitive terrain characterized by numerous lakes. Existing winter roads from Tuktoyaktuk and from Swimming Point and a power transmission line from Tuktoyaktuk pass close to the source area.

The source lies within the fawning grounds of the Reindeer Herd which is a critical area between December 1, and May 15.

SITE BD3-03(3)

REFERENCE: Source 308, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel, and sand, trace silt; (GW-GP,SP); Maximum size 7.5 cm (3 in.); Very low moisture content.

OVERBURDEN: Organic silt; 0 to 60 cm (2 ft.)

DEPTH OF ACTIVE LAYER: 90 cm (3 ft.)

RESERVES: Proven 5,000 cu.m (7,000 cu.yd.)  
Probable 300,000 cu.m (400,000 cu.yd.)  
Possible 1,500,000 cu.m (2,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain.

SITE DESCRIPTION: Terrace remnants and kames located approximately 11 km (7 mi.) west of Eskimo Lakes and approximately 51 km (32 mi.) south of Tuktoyaktuk.

Vegetation: very thin to non-existent, consisting of moss, grass and dwarf shrubs 30 cm (1 ft.) to 90 cm (3 ft.) high.

Drainage: good.

Thickness: 7 m (23 ft.)  
Area: 250,000 sq m (2,600,000 sq ft.)  
Perimeter: 5,500 m (18,000 ft.)

Map Reference: NTS 107C E<sub>2</sub>, Mackenzie Delta

UTM Reference: Zone 8, 560,000E 7,657,500N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Suitable for development as a source of general fill for small local projects. The materials exhibit potential for use in concrete and asphalt.

The source is located outside the 28 km

SITE BD3-03(3)

(17.5 mi.) pipeline corridor. Access is by truck in the winter across flat, thermally sensitive terrain characterized by numerous lakes. Existing winter roads from Tuktoyaktuk or Swimming Point and a power transmission line to Tuktoyaktuk pass close to the source.

The source is located on the border of the fawning grounds of the Reindeer Herd which is a critical area between December 1, and May 15.

SITE BD3-04(4)

REFERENCE: Source 310A, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 4, Poor quality material unsuitable for construction except as marginal fill.

MATERIAL DESCRIPTION: Sand and silt, trace gravel;  
Moisture content low in surficial sand layer;  
Massive ice lenses in silt.

OVERBURDEN: Organic peaty silt; 30 cm (1 ft.)

DEPTH OF ACTIVE LAYER: 120 cm (4 ft.)+

RESERVES: Proven 55,000 cu.m (70,000 cu.yd.)  
Probable 550,000 cu.m (700,000 cu.yd.)  
Possible 5,500,000 cu.m (7,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, thaw, stockpile and drain.

SITE DESCRIPTION: Several kames and an esker located about 5 km (3 mi.) northwest of Parsons Lake and 60 km (36 mi.) south west of Tuktoyaktuk.

Vegetation: Thin growth of moss, grass and some dwarf shrubs up to 60 cm (2 ft.) high.

Drainage: good.

Thickness: 7.6 m (25 ft.)  
Area: 1,200,000 sq.m (12,600,000 sq ft.)  
Perimeter: 7,500 m (25,000 ft.)

Map Reference: NTS 107C E $\frac{1}{2}$ , Mackenzie Delta

UTM Reference: Zone 8; 547,000E 7,656,500N

SITE DESCRIPTION: 2 drill holes, 2 test pits.

ASSESSMENT: Not suitable for development because of very poor quality material and massive ice at shallow depths.

Located immediately adjacent to the 28 km (17.5 mi.) pipeline corridor. Access must be by truck over winter roads.

SITE BD3-05(2)

REFERENCE: Source 309, Zone 111, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.  
Source 5,6,10 and 11, Gulf Oil Canada Limited, Granular Materials Inventory; Parsons Lake N.W.T., Klohn Leonoff Consultants Ltd., October, 1974.

MATERIAL QUALITY: Class 2, Good quality material suitable for embankment fill, base and surface course aggregates.

MATERIAL DESCRIPTION: Gravel and sand (GW);  
Sand and gravel, trace silt (SW-SM);  
Maximum size to 20 cm (8 in.);  
Medium moisture content;  
Massive ice was encountered at 2.7 m (9 ft.).

OVERBURDEN: Moss, silt and silty sand 0 to 240 cm (8 ft.)

DEPTH OF ACTIVE LAYER: 45 cm (1.5 ft.)+

RESERVES: Proven 350,000 cu.m (450,000 cu.yd.)  
Probable 1,000,000 cu.m (1,500,000 cu.yd.)  
Possible 4,000,000 cu.m (5,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip and stockpile, thaw and drain. The number of pits developed at one time should be restricted to minimize environmental problems.

SITE DESCRIPTION: Kame field at the northeast corner of Parsons Lake, located approximately 56 km (35 mi.) south of Tuktoyaktuk.

Vegetation: bare on top of kames; moss, grass and occasional dwarf shrubs on lower areas.

Drainage: good

Thickness: 20 m (65 ft.)  
Area: 250,000 sq. m (2,700,000 sq. ft.)  
Perimeter: 15,000 m (48,900 ft.)

Map Reference: NTS 107B W<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 559,900E, 7,653,000N

SITE INVESTIGATION: 28 drill holes, 4 test pits.

SITE BD3-05(2)

ASSESSMENT: .

Suitable for development on a large scale subject to a favourable environmental assessment. Two areas in the southern portion of the source which were extensively drilled are not recommended for development on a large scale because of ice-rich materials and very poor quality. Also thick overburden, massive ground ice and variability of materials limits the feasibility of development.

The source is located outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat, thermally sensitive terrain. Winter roads from Tuktoyaktuk and Swimming Point and a powerline from Tuktoyaktuk pass near the site. The proposed all weather highway will probably pass close to the source.

The source lies within the fawning grounds of the Reindeer Herd which is particularly critical between December 1st and May 15.

The source has been developed to a very limited extent for oil and gas exploration in the area.

SITE BD3-06(3)

REFERENCE: Deposit a; Area XII DIAND Granular Resource Inventory; Aklavik NTS 107B E<sub>1/2</sub>, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

SITE DESCRIPTION: Glaciofluvial deposit exhibiting thermokarst features, located adjacent to Parsons Lake.

Map Reference: NTS 107B E<sub>1/2</sub>, Aklavik

UTM Reference: Zone 8; 549,000 E 7,652,500N

ASSESSMENT: Suitable for development.

The source is located adjacent to the western boundary of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat, thermokarst terrain.



SITE BD3-07(3)

REFERENCE: Source 321, Zone III , Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand, little gravel trace silt (SP);  
Low moisture content and no massive ice in top 1.2 m (4 ft.);  
Maximum size 2.5 cm (1 in.).

OVERBURDEN: Silt; 0 to 60 cm (0 to 2 ft.)

DEPTH OF ACTIVE LAYER: 107 cm (3.5 ft.)+

RESERVES: Proven 200,000 cu.m (230,000 cu.yd.)  
Probable 2,000,000 cu.m (2,500,000 cu.yd.)  
Possible 3,700,000 cu.m (5,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOF OF EXTRACTION: The material must be ripped. Because of under-terminated ice contents the need to stockpile and thaw is unknown. A substantial berm should be left between the excavation and all streams to avoid disturbance of the natural drainage system. Massive ice should not be exposed, particularly, on slopes where thawing could result in sloughing.

SITE DESCRIPTION: Outwash area on the east slope of the Caribou hills, west of Parsons Lake, 69 km (43 mi.) north of Inuvik.

Vegetation: thin to non-existent. Most gravel ridges are exposed.

Drainage: good.

Thickness: 6 m (20 ft.)  
Area: 1,600,000 sq m (18,000,000 sq ft.)  
Perimeter: 5,500 m (18,000 ft.)

Map Reference: NTS 107B W $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 542,300E 7,651,000N

SITE INVESTIGATION: 1 test pit.

SITE BD3-07(3)

ASSESSMENT:

Suitable for development as a source of general fill for local projects.

The source is located adjacent to the eastern boundary of the 28 km (17.5 mi.) pipeline corridor and at present access is only possible by truck during the winter. A road constructed southwest around the north end of the Caribou Hills would link the source to the Mackenzie River which is accessible by truck in the winter and barge in the summer. The route bypasses a large source of excellent material (Source I-407) which has been reserved for the use of Inuvik.

Field drilling is required prior to any development consideration at this site.

SITE BD3-08(3)

REFERENCE: Source 320, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand, trace gravel, little silt (SM);  
Sand, some gravel, trace silt (SP);  
Maximum size 1.9 cm (3/4 in.);  
Medium moisture content in the sand and gravel;  
Massive ice at 2.1 m (7 ft.) and 8.3 m (27 ft.).

OVERBURDEN: Silt or silty sand; 0 to 1.5 m (0 to 5 ft.)

DEPTH OF ACTIVE LAYER: 75 cm (2.5 ft.)

RESERVES: Proven 80,000 cu.m (100,000 cu.yd.)  
Probable 400,000 cu.m (500,000 cu.yd.)  
Possible 1,200,000 cu.m (1,600,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: The thick silty overburden must be ripped and thawed. The sand and gravel contains massive ice and must be ripped, stockpiled, thawed and drained. Large areas of ground ice must not be exposed on sloping surface in order to prevent sloughing. Stockpiles must not drain directly into natural drainage system.

SITE DESCRIPTION: Kame field 6 km (4 mi.) north of Wolverine Lakes, 70 km (44 mi.) north of Inuvik.

Vegetation: thin to non-existent on the upper portion of the Kame hillocks.

Drainage: good on individual kames. Localized depressions and lakes.

Thickness: 3.0 m (10 ft.)  
Area: 810,000 sq m (8,730,000 sq ft.)  
Perimeter: 14,000 m (45,000 ft.)

Map Reference: NTS 107B W<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 533,800E 7,691,300N

SITE INVESTIGATION: 4 drill holes, 1 test pit.

SITE ED3-08(3)

ASSESSMENT:

This site is a poor prospect because of its high silt contents and massive ground ice at shallow depths.

The source is located just inside the eastern boundary of the 28 km (17.5 mi.) pipeline corridor and at present is only accessible during the winter by truck. A road constructed southeast around the north end of the Caribou Hill Reserve would link the source to the Mackenzie River which is accessible in summer by barge or in winter by truck. This route passes near a large deposit of excellent quality material (source I-407) which is reserved for the use of Inuvik.

Selective harvesting of materials may produce some good to excellent quality material with a minimum of processing.

Extensive field drilling is required before materials are exploited.

SITE BD3-09(2)

REFERENCE: Source 319, Zone III, DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 2, Good quality material suitable for embankment fill, base course, surface course and concrete aggregate.

MATERIAL DESCRIPTION: Sand and gravel, trace silt (SP);  
Gravel and sand (GW);  
Maximum size to 6.5 cm (2.5 in.);  
Medium moisture content;  
Massive ice below 2 m (6.5 ft.).

OVERBURDEN: Moss and silt; 0 to 60 cm (2 ft.)

DEPTH OF ACTIVE LAYER: 90 cm (3 ft.)+

RESERVES: Proven 350,000 cu.m (450,000 cu.yd.)  
Probable 500,000 cu.m (650,000 cu.yd.)  
Possible 1,000,000 cu.m (1,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain selected kame deposits exposing a minimum area at one time to limit thermal disturbance. To prevent sloughing large areas of ground ice must not be exposed on sloping ground. Stockpiles must be located so that they will not drain directly into the natural drainage system.

SITE DESCRIPTION: Large kame field north of Wolverine Lakes, 64 km (40 mi.) north of Inuvik.

Vegetation: thin to non-existent with the upper portions of the gravel areas bare. The cover consists of moss, grass and dwarf shrubs.

Drainage: good on individual kames because of topography.

Thickness: 3 m (10 ft.)  
Area: 170,000 sq m (1,800,000 sq. ft.)  
Perimeter: 20,000 m (65,000 ft.)

Map Reference: NTS 107B E<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 535,500E 7,646,700N

SITE INVESTIGATION: 6 drill holes, 1 test pit.

SITE BD3-09(2)

ASSESSMENT:

Suitable for development but its location may limit its use to local projects. The material is suitable for general fill, road construction and as aggregate for concrete and asphalt construction.

The source is located near the center of the 28 km (17.5 mi.) pipeline corridor, and at present is only accessible by truck during the winter. A road constructed around the north end of Caribou Hills Reserves would link the source to the Mackenzie River which is accessible by truck in the winter and barge in the summer. The route passes a large source of excellent material (Source I-407) which is reserved for the use of Inuvik.

Extensive field drilling would be required to delineate the kame hillocks to be exploited for granular material use.

SITE BD3-10(3)

REFERENCE: Deposit (a), Area XI DIAND Granular Resource Inventory; Aklavik NTS 107B E<sub>1</sub>, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel and sand.

RESERVES: Possible 350,000,000 cu.m (450,000,000 cu. yd.)

SITE DESCRIPTION: Glaciofluvial deposit situated between Parsons Lake and Eskimo Lakes.

Thickness: 15 m (50 ft.)  
Area: 23,000,000 sq m (260,000,000 sq ft.)  
Perimeter: 58,000 m (190,000 ft.)

Map Reference: NTS 107B E<sub>1</sub>, Aklavik

UTM Reference: Zone 8; 562,500E 7,647,200N

ASSESSMENT: May be suitable for development although the site is environmentally sensitive.

The source is located outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter. Two winter roads have been in service near the source, one from Tuktoyaktuk and one from Swimming Point. The power transmission line to Tuktoyaktuk also passes close to the source. The source lies within the permanent fawning grounds of the Reindeer Herd which is a critical area between December 1, and May 15. Siltation of natural drainage must be prevented.

SITE BD3-11(2)

REFERENCE:

Source 312, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

Sources 3,4,8, and 9, Gulf Oil Canada, Granular Materials Inventory Parsons Lake N.W.T., Klohn and Leonoff Consultants Ltd., October, 1974.

MATERIAL QUALITY:

Class 2, Good quality material suitable for embankment fill, base and surface course aggregate or concrete aggregate.

MATERIAL DESCRIPTION:

Gravel and sand, trace silt (SW);  
Sand, little gravel, trace silt (SP-SM);  
Medium to high moisture content.

OVERBURDEN:

Topsoil; 30 cm (1 ft.)

DEPTH OF ACTIVE LAYER:

60 cm (2 ft.)+

RESERVES:

Proven	4,000,000 cu.m ( 5,000,000 cu.yd.)
Probable	4,500,000 cu.m ( 6,000,000 cu.yd.)
Possible	10,000,000 cu.m (15,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION:

Rip, stockpile, thaw and drain. Large areas of ground ice must not be exposed on slopes to prevent sloughing. Siltation of both stream and lake must be avoided possibly by directing drainage through a series of sedimentation ponds.

SITE DESCRIPTION:

Several terraces located northwest of Bonnieville Point about 58 km (36 mi.) north of Inuvik.

Vegetation: thin cover of moss and grass with isolated dwarf shrubs to 90 cm (3 ft.) high.

Drainage: good.

Thickness: 6 m (20 ft.)

Area: 1,800,000 sq. m (20,000,000 sq.ft.)

Perimeter: 7,800 m (26,000 ft.)

Map Reference: NTS 107B E½, Aklavik

UTM Reference: Zone 8; 560,800E 7,693,000N

SITE INVESTIGATION:

156 drill holes, 3 test pits.



SITE BD3-11(2)

ASSESSMENT:

The source contains 5 areas which were extensively drilled during the study for Gulf Oil and are assessed separately.

<u>Source No.</u>	<u>Approximate Location</u>	<u>Assessment</u>
3	center of western half	Suitable for development.
4	southern center	Suitable for development, however overburden is thick and only a limited volume of useable material is available.
7	southwestern corner	Suitable for development but requires additional drilling to determine quantity of available material.
8	eastern half	Not suitable for development because of the limited volume of available granular material. Extensive stripping is required.
9	southwestern corner	Not suitable for development due to overburden thickness and the relatively thin underlying gravel stratum.

The material from sites recommended for development can be used for most construction requirements. Screening and crushing may be required to remove oversize material for concrete and asphalt aggregates. Blending sand may be required for production of high quality concrete aggregates.

The source is located outside the eastern border of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over flat, thermokarst terrain. During the summer months, access by barge to all points on Eskimo Lakes is possible.

The source lies within the permanent fawning ground of the Reindeer Herd which is a critical area between December 1, and May 15.

SITE BD3-12(4)

REFERENCE: Source 311, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 4, Poor quality material suitable only for marginal fill.

MATERIAL DESCRIPTION: Sand, trace silt (SP); Medium to high moisture content.

OVERBURDEN: None

DEPTH OF ACTIVE LAYER: 210 cm (7 ft.)+

RESERVES: Proven 250,000 cu.m (300,000 cu.yd.)  
Probable 400,000 cu.m (550,000 cu.yd.)  
Possible 9,000,000 cu.m (11,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Doze unfrozen material along the toe of the slope. Siltation of the adjacent lake must be avoided.

SITE DESCRIPTION: Bank adjacent to Eskimo Lakes, located approximately 6 km (4 mi.) northwest of Bonnieville point and 61 km (38 mi.) southeast of Inuvik.

Vegetation: thick moss and dwarf shrubs 1.3 m (4 ft.) to 1.5 m (5 ft.) high. Banks along the lake are bare.

Drainage: good

Thickness: 11 m (35 ft.)  
Area: 1,100,000 sq m (12,000,000 sq ft.)  
Perimeter: 13,000 m (44,000 ft.)

Map Reference: NTS 107B, E $\frac{1}{2}$  Aklavik

UTM Reference: Zone 8; 569,200E 7,642,600N

SITE INVESTIGATION: 2 test pits.

ASSESSMENT: May be suitable for development on a limited scale as a source of marginal fill for local projects subject to a favourable environmental study of the development procedures.

The source is located outside the 28 km (17.5 mi.)

SITE BD3-12(4)

pipeline corridor. Access is by truck in the winter across flat thermokarst terrain. Access along the adjacent Eskimo Lakes is possible by barge in the summer and truck in the winter.

The source is located within the permanent fawning ground of the Reindeer Herd which is critical between December 1, and May 15,

SITE BD3-13(2)

REFERENCE: Source 315, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 2, Good quality material suitable for embankment fill, base and surface course aggregate.

MATERIAL DESCRIPTION: Sand and gravel, trace silt (SW);  
Gravel and sand, trace silt (GW-GM);  
Maximum size to 1.9 cm (3/4 in.);  
Low to medium moisture content;  
Massive ice encountered at 5 m (16 ft.).

OVERBURDEN: Topsoil; 45 cm (1.5 ft.)

DEPTH OF ACTIVE LAYER: 75 cm (2.5 ft.)+

RESERVES: Proven 3,000,000 cu.m (4,000,000 cu.yd.)  
Probable 10,000,000 cu.m (15,000,000 cu.yd.)  
Possible 10,000,000 cu.m (15,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, doze, thaw and drain. The source consists of several deposits that should be excavated one at a time. A substantial berm should be left between the stream and the excavation to ensure stability of the stream bed. No excavation should be carried out in the stream bed. Siltation of adjacent streams and lakes must be avoided.

SITE DESCRIPTION: Stream bisected outwash located about 6 km (4 mi.) southwest of Parsons Lake and 60 km (37 mi.) north of Inuvik.

Vegetation: mainly bare with thin moss, lichen and dwarf shrubs in some areas.

Drainage: good

Thickness: 9 m (30 ft.)  
Area: 2,600,000 sq m (28,000,000 sq ft.)  
Perimeter: 14,000 m (46,000 ft.)

Map Reference: NTS 107B E<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 544,600E 7,642,200N

SITE BD3-13(2)

SITE INVESTIGATION:

4 drill holes, 1 test pit.

ASSESSMENT:

Suitable for development as a source of material for general fill, road construction, and concrete and asphalt aggregate. The gravel requires further testing before being used in high quality concrete.

The source is located within the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter. Barge transportation along the east channel of the Mackenzie River could be used if a road is constructed westward about 24 km (15 mi.).

SITE BD3-14(3)

REFERENCE: Source 318, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel, trace silt (SP-SM);  
Gravel and sand (GW-GM);  
Maximum size to 7.5 cm (3 in.);  
Medium moisture content;  
Massive ice encountered below 3 m (9.5 ft.).

OVERBURDEN: Topsoil; 30 cm (1 ft.)

DEPTH OF ACTIVE LAYER: 30 cm (1 ft.)+

RESERVES: Proven 250,000 cu.m (350,000 cu.yd.)  
Probable 2,500,000 cu.m (3,500,000 cu.yd.)  
Possible 5,500,000 cu.m (7,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. Probably substantial strata of massive ice will have to be removed. Large areas of ground ice must not be exposed on sloping ground, to prevent sloughing. The area exposed at one time should be minimized in order to limit thermal disturbance. Surficial waste materials must not drain directly into the natural drainage system.

SITE DESCRIPTION: Outwash area and a redeposited alluvial fan located adjacent to Wolverine Lakes about 61 km (38 mi.) north of Inuvik.

Vegetation: thin to non-existent with upper portions of the gravel deposits bare; ground cover consists of moss, lichen and dwarf shrubs.

Drainage: good because of topography.

Thickness: 2.5 m (8 ft.)  
Area: 2,200,000 sq m (23,000,000 sq ft.)  
Perimeter: 9,400 m (31,000 ft.)

Map Reference: NTS 107B W $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 536,300E 7,641,400N

SITE BD3-14(3)

SITE INVESTIGATION:

1 drill hole, 2 test pits.

ASSESSMENT:

The fan deposit is suitable for development as a source of material for general fill or road construction. The outwash section is not recommended for development because of inferior quality of available material.

The source is located near the center of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat to gently sloping thermokarst terrain. A road constructed around the north end of the Caribou Hills Reserve would link the source to the Mackenzie River which is accessible by truck in the winter or by barge in the summer. The route passes a large source of excellent material (BD3-16) which is reserved for the use of Inuvik.

SITE BD3-15(2)

REFERENCE: Source 326, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUAKITY Class 2, Good quality material suitable for embankment fill, base course and surface aggregate.

MATERIAL DESCRIPTION: Sand and gravel, trace silt (SW);  
Maximum size 4.0 cm (1.5 in.);  
Medium moisture content;  
Ice lenses at 1.5 m (4.5 ft.) and massive ice common below 5.0 m (16 ft.).

OVERBURDEN: Silt; 15 cm (6 in.) to 60 cm (2 ft.)

DEPTH OF ACTIVE LAYER: 60 cm (2 ft.)+

RESERVES: Proven 6,500,000 cu.m (10,000,000 cu.yd.)  
Probable 17,000,000 cu.m (20,000,000 cu.yd.)  
Possible 30,000,000 cu.m (37,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. Excavate on the top surface of the deposit to avoid thermokarsting of the surrounding slopes. Excavate in one single operation.

SITE DESCRIPTION: Elevated remnant of the delta plain 1.6 km (1 mi.) east of the Mackenzie Delta and 27 km (17 mi.) northwest of Reindeer Station.

Vegetation: thin to non-existent; moss, lichen, dwarf shrubs in exposed areas; spruce trees in valleys.

Drainage: good. Localized ponds.

Thickness: 12.0 m (40 ft.)  
Area: 4,700,000 sq m (50,000,000 sq ft.)  
Perimeter: 29,000m (95,000 ft.)

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8, 521,600E 7,632,000N

SITE INVESTIGATION: 6 drill holes, 3 test pits.

ASSESSMENT: Suitable for development as a source of general



SITE BD3-15(2)

fill, road material and fine aggregate. Contingent on a favourable environmental study.

The source is located near the western border of the 28 km (17.5 mi.) pipeline corridor. An all weather road would link the source to the adjacent Mackenzie River which is accessible by barge in the summer and truck in the winter.

The source lies within the critical Mackenzie Delta wildlife region.

The predominance of chert may negate the source for concrete aggregates.

SITE BD3-16(1)

REFERENCE: Source I-407, DIAND Granular Materials Inventory; Inuvik, Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 1, Excellent quality material suitable for concrete aggregate with a minimum of processing.

MATERIAL DESCRIPTION: Gravel and sand (GW-GM);  
Sand, some gravel (SW);  
Maximum size 4 cm (1½ in.);  
Medium moisture content;  
Ice lenses at 2.7 m (9 ft.).

OVERBURDEN: Peat and silt; 30 to 150 cm (1 to 5 ft.)

DEPTH OF ACTIVE LAYER: Undetermined.

RESERVES: Proven 1,500,000 cu.m (2,000,000 cu.yd.)  
Probable 3,000,000 cu.m (3,000,000 cu.yd.)  
Possible 11,000,000 cu.m (15,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: The material can be dozed into piles ready for use. Development should be concentrated in one area to minimize surface disturbance.

SITE DESCRIPTION: The source consists of a terrace remnant about 61 km (38 mi.) by air northwest of Inuvik.

Vegetation: stunted white spruce in gullies. Intermittent moss and dwarf shrubs on exposed slopes.

Drainage: good.

Thickness: 12.2 m (40 ft.)  
Area: 920,000 sq m (9,900,000 sq ft.)  
Perimeter: 11,000 m (35,000 ft.)

Map Reference: NTS 107B E½, Aklavik

UTM Reference: Zone 8; 522,900E 7,637,700N

SITE INVESTIGATION: 4 drill holes, 1 pit face.

ASSESSMENT: Suitable for development as a source of excellent quality material.

The source is located adjacent to the western

SITE BD3-16(1)

border of the 28 km (17.5 mi.) pipeline corridor and immediately adjacent to the Mackenzie River which is accessible by barge in the summer and truck in the winter.

The source is located within the critical Mackenzie Delta wildlife region and the Mackenzie Reindeer grazing Reserve.

SITE BD3-17(3)

REFERENCE: Deposit (b), Area X DIAND Granular Resource Inventory; Aklavik NTS 107B E<sub>2</sub>, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

RESERVES: Possible 100,000,000 cu. m (150,000,000 cu.yd.)

SITE DESCRIPTION: Hummocky glaciofluvial deposit 10 km (6 mi.) south of Parsons Lake.

Thickness: 9.1 m (30 ft.)  
Area: 12,000,000 sq m (140,000,000 sq ft.)  
Perimeter: 9,500 m (31,000 ft.)

Map Reference: NTS 107B E<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 568,000E 7,633,700N

ASSESSMENT: May be suitable for development although the site is environmentally sensitive.

The source is located outside the 28 km (17.5mi.) pipeline corridor. Access is by truck in the snow across ice roads in the winter. Barge access to all points along the adjacent Eskimo Lakes is possible in the summer.

Contamination of Eskimo Lakes must be prevented. The source lies within the permanent fawning grounds of the Reindeer Herd which is a critical area between December 1, and May 15.

SITE BD3-18(4)

REFERENCE: Source 313, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 4, Poor quality material suitable only for marginal fill.

MATERIAL DESCRIPTION: Sand, trace silt (SP-SM);  
High moisture content;  
Massive ice encountered at 75 cm (2.5 ft.).

OVERBURDEN: Topsoil, silt and clay; 90 cm (3 ft.)

DEPTH OF ACTIVE LAYER: 30 cm (1 ft.)+

RESERVES: Proven 7,500 cu.m (10,000 cu.yd.)  
Probable 45,000 cu.m (60,000 cu.yd.)  
Possible 5,500,000 cu.m (7,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Doze material in the banks adjacent to lake.  
Siltation of the lake from excavation of unfrozen material or from thawing and sloughing of the bank after exposure should be avoided.

SITE DESCRIPTION: Glaciofluvial outwash superimposed on coastal plain at Bonnieville Point on the west side of Eskimo Lakes, 56 km (35 mi.) north of Inuvik.

Vegetation: moss and grass with some dwarf shrubs about 30 cm (1 ft.) high, banks adjacent to the lake are bare.

Drainage: good

Thickness: 4.5 m (15 ft.)  
Area: 1,100,000 sq m (13,000,000 sq ft.)  
Perimeter: 8,000 m (26,000 ft.)

Map Reference: NTS 107B e $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 562,700E 7,638,000N

SITE INVESTIGATION: 5 drill holes.

ASSESSMENT: Suitable for limited development, removing only a portion of the unfrozen material at the toe of the banks.

SITE BD3-18(4)

The top surface should not be disturbed because of high ice content and the possibility of severe thermal erosion on this prominent point. Removal of material from the banks must be approved by the Canadian Wildlife Service and the Fisheries Branch and detailed environmental study would be required.

The source is located outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat, thermokarst terrain or across Eskimo Lakes on the ice. Summer access by barge is possible to all points along the Eskimo Lakes.

The source is located within the permanent fawning ground of the Reindeer Herd which is an especially critical area between December 1, and May 15.

SITE BD3-19(3)

REFERENCE: Source 327, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel, some sand, trace silt (GW-GM);  
Maximum size to 1.9 cm (3/4 in.);  
Low moisture content;  
Massive ice encountered at 75 cm (2.5 ft.).

OVERBURDEN: Topsoil and silt; 30 cm (1 ft.) to 210 cm (7 ft.)

DEPTH OF ACTIVE LAYER: 60 cm (2 ft.)+

RESERVES: Proven 350,000 cu.m (500,000 cu.yd.)  
Probable 7,500,000 cu.m (10,000,000 cu.yd.)  
Possible 15,000,000 cu.m (20,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: The overlying ice-rich silt must be ripped before excavation of the underlying gravels. Disposal of the large volume of overburden may present a serious problem. The gravel can probably be excavated and hauled at once at any time of the year. Special siltation measures will be required to prevent contamination of Eskimo Lakes.

SITE DESCRIPTION: Glaciofluvial complex on the southwest shore of Eskimo Lakes, 51 km (32 mi.) north of Inuvik.

Vegetation: moss and lichen with scattered dwarf shrubs.

Drainage: good.

Thickness: 4.5 m (15 ft.)  
Area: 4,200,000 sq m (45,000,000 sq ft.)  
Perimeter: 12,000 m (41,000 ft.)

Map Reference: NTS 107B E<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 560,000E 7,635,000N

SITE INVESTIGATION: 4 drill holes.

SITE BD3-19(3)

ASSESSMENT:

Suitable for small scale development as a source of general fill for local projects. An environmental study will be required before development can proceed.

The source is located on the eastern border of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over flat, thermokarst terrain. Access to all points along the adjacent Eskimo Lakes is possible by barge in the summer or truck across the ice in the winter.

The source is located within the permanent fawning grounds of the Reindeer Herd which is a critical area between December 1, and May 15.



SITE BD3-20(3)

REFERENCE:

Deposit (b), Area X DIAND Granular Resource Inventory; Aklavik NTS 107B E<sub>1</sub>, Geological Survey of Canada, 1972.

Prospect 22, Gravel Inventory Survey, Richards Island and Adjacent Areas, APOA Project 42; J. D. Mollard and Associates Limited, October, 1972.

MATERIAL QUALITY:

Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION:

Sand and gravel.

RESERVES: Possible

55,000,000 cu.m (75,000,000 cu.yd.)

SITE DESCRIPTION:

A glaciofluvial deposit forming a lake in southern arm of Eskimo Lakes.

Thickness: 9 m (30 ft.)

Area: 6,000,000 sq m (66,000,000 sq ft.)

Perimeter: 8,800 m (29,000 ft.)

Map Reference: NTS 107B E<sub>1</sub>, Aklavik

UTM Reference: Zone 8; 563,300E 7,634,400N

ASSESSMENT:

May be suitable for development although the site is environmentally sensitive.

The source is located just outside the eastern border of the 28 km (17.5 mi.) pipeline corridor. Access will be difficult because deposit is situated on an island in the Eskimo Lakes. Access will be best during the winter by truck across the ice and snow roads. Barge access in the summer to all points on Eskimo Lakes will also be possible.

Contamination of Eskimo Lakes must be prevented. The source lies within the permanent fawning grounds of the Reindeer Herd which is a critical area and is utilized between December 1, and May 15.

SITE BD3-21(2)

REFERENCE: Source 324A, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 2, Good quality material suitable for embankment fill, base course surface aggregate or concrete aggregate.

MATERIAL DESCRIPTION: Gravel and sand, trace silt (GW-GM);  
Sand and gravel (SW);  
Maximum size 7.5 cm (3 in.);  
Low to medium moisture content.

OVERBURDEN: Topsoil and silt; 0 to 150 cm (0 to 5 ft.)

DEPTH OF ACTIVE LAYER: 120 cm (4 ft.)+

RESERVES: Possible 35,000,000 cu.m (45,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: A small scale operation could excavate material easily at the toe of the slope. A larger operation would require excavation along benches at intermediate levels on the slope.

SITE DESCRIPTION: Probably a tertiary delta deposit on the west slope of the Caribou Hills, 54 km (34 mi.) northwest of Inuvik.

Vegetation: exposed slopes are partly bare, partly covered with moss and dwarf shrubs. The upland area is largely grass, with some dwarf shrubs.

Drainage: good.

Thickness: 15 m (50 ft.)  
Area: 2,300,000 sq m (27,000,000 sq ft.)  
Perimeter: 10,000 m (33,000 ft.)

Map Reference: NTS 107B W $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 525,500E 7,634,200N

SITE INVESTIGATION: None

ASSESSMENT: Not suitable for development because it is located within the proposed Caribou Hills reserve.

SITE BD3-21(2)

The source is located near the western boundary of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter or by barge in the summer along the adjacent Mackenzie River.

SITE BD3-22(4)

REFERENCE: Source 322, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Kohn and Leonoff, 1973.

MATERIAL QUALITY: Class 4, Poor quality material suitable only for marginal fill.

MATERIAL DESCRIPTION: Sand, some gravel and silt (SM);  
Maximum size to 7.5 cm (3 in.);  
Medium moisture content;  
Massive ice near surface overlying sand in southern terrace.

OVERBURDEN: Topsoil and silt; 0 to 60 cm (0 to 2 ft.)

DEPTH OF ACTIVE LAYER: 60 cm (2 ft.)

RESERVES: Proven 350,000 cu.m (500,000 cu.yd.)  
Probable 2,000,000 cu.m (2,500,000 cu.yd.)  
Possible 7,500,000 cu.m (10,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. Stockpiled material must not drain directly into the natural drainage system. Large areas of ground ice must not be exposed on sloping ground in order to prevent sloughing. The area exposed at one time should be minimized to limit the thermal disturbance to the ground ice at depth.

SITE DESCRIPTION: Two terraces on the Caribou Hills, west of the valley between Peter and Wolverine Lakes, 54 km (34 mi.) northwest of Inuvik.

Vegetation: thin to non-existent, with much of the gravel exposed at the surface; ground cover consists of moss, lichen and scattered dwarf shrubs.

Drainage: good.

Thickness: 6 m (20 ft.)  
Area: 1,200,000 sq m (13,000,000 sq ft.)  
Perimeter: 6,400 m (21,000 ft.)

Map Reference: NTS 107B, W $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 529,500E 7,633,200N

SITE BD3-22(4)

SITE INVESTIGATION:

4 drill holes, 2 test pits.

ASSESSMENT:

The northern terrace is suitable for development as a source of general fill for local projects. The material is marginal in quality and the source is erratic in nature and probably difficult to develop and restore. The southern terrace is not recommended for development because of high ice content.

The source is located in the western portion of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat to gently sloping thermokarst terrain. A road constructed northwest around the north end of the Caribou Hills Reserve would link the source to the Mackenzie River which is accessible by truck in the winter or by barge in the summer. The route passes a large source of excellent material (BD3-16) reserved for the use of Inuvik.

SITE BD3-23(2)

REFERENCE: Source 323A, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 2, Good quality material suitable for embankment fill, base and surface course aggregate.

MATERIAL DESCRIPTION: Gravel and sand, trace silt (GW-GM); Sand and gravel (SW); Maximum size to 7.5 cm (3 in.); Low to medium moisture content.

OVERBURDEN: Topsoil; silt 0 to 150 cm (0 to 5 ft.)

DEPTH OF ACTIVE LAYER: 120 cm (4 ft.)+

RESERVES: Proven 10,000 cu.m (15,000 cu.yd.)  
Probable 1,000,000 cu.m (1,500,000 cu.yd.)  
Possible 45,000,000 cu.m (60,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: A small scale operation could excavate material easily at the toe of the slope. A larger operation would require excavation along benches at intermediate levels on the slope.

SITE DESCRIPTION: Probably a Tertiary delta deposit on the west slope of the Caribou Hills 54 km (34 mi.) northwest of Inuvik.

Vegetation: exposed slopes are partly bare, partly covered with moss and dwarf shrubs. The upland area is largely grass, with some dwarf shrubs.

Drainage: good.

Thickness: 15 m (50 ft.)  
Area: 3,100,000 sq m (33,000,000 sq ft.)  
Perimeter: 12,000 m (41,000 ft.)

Map Reference: NTS 107B W $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 526,000E 7,631,200N

SITE INVESTIGATION: 6 test pits.

SITE BD3-23(2)

ASSESSMENT:

Not suitable for development because it is located within the proposed Caribou Hills reserve.

The source is located near the western border of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter or by barge in the summer along the adjacent Mackenzie River.

SITE BD3-24(3)

REFERENCE: Source 317, Zone III, Stage I DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel, trace silt (SP);  
Maximum size to 7.5 cm (3 in.);  
High to medium moisture content;  
Massive ice encountered near surface and at depth.

OVERBURDEN: Topsoil, silt and ice; 0 to 1.7 m (5.5 ft.)

DEPTH OF ACTIVE LAYER: 60 cm (2 ft.)+

RESERVES: Proven 450,000 cu.m (600,000 cu.yd.)  
Probable 1,500,000 cu.m (2,000,000 cu.yd.)  
Possible 3,000,000 cu.m (4,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. A blanket of granular material 60 cm (2 ft.) thick should be left in place over the massive ground ice within the deposit. A substantial berm or dyke of frozen ground should be left at the downhill side of all excavations to minimize slope instability.

SITE DESCRIPTION : Kame field and secondary outwash area at Peter Lake, located approximately 50 km (31 mi.) northwest of Inuvik.

Vegetation: thin to non-existent with some areas covered with moss and scattered shrubs.

Drainage: good.

Thickness: 3 m (10 ft.)  
Area: 940,000 sq m (9,900,000 sq ft.)  
Perimeter: 7,500 m (25,000 ft.)

Map Reference: NTS 107B W<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 533,400E 7,631,800N

SITE INVESTIGATION: 5 drill holes



SITE BD3-24(3)

ASSESSMENT:

The kame field is not suitable for development because of the erratic nature of the deposit, the presence of massive ground ice at shallow depth which will result in slope instability.

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

The high percentage of soft sandstone makes this gravel unsuitable for use in concrete or asphalt construction.

The source is located within the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat to gently sloping thermokarst terrain. A road constructed around the north end of Caribou Hills Reserve would link the source to the Mackenzie River which is accessible by truck in the winter and barge in the summer.

SITE BD3-25(3)

REFERENCE: Source 316, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel, trace silt (SW-SM);  
Maximum size to 7.5 cm (3 in.);  
Low to medium moisture content;  
Ice encountered near surface in silty material.

OVERBURDEN: Topsoil; 30 cm (1 ft.)

DEPTH OF ACTIVE LAYER: 60 cm (2 ft.)+

RESERVES: Proven 650,000 cu.m (850,000 cu.yd.)  
Probable 3,000,000 cu.m (4,000,000 cu.yd.)  
Possible 10,000,000 cu.m (15,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip and doze; probably to full depth of deposit. Silty overburden must be ripped. The upper 3 m (10 ft.) of sand and gravel exposed on the slopes can be immediately developed and exploited. The deeper material would have to be stockpiled, thawed and drained before shipping.

SITE DESCRIPTION: Glaciofluvial outwash remnant east of Peter Lake, 50 km (31 mi.) northwest of Inuvik.

Vegetation: Thin cover of moss and dwarf shrubs.

Drainage: good.

Thickness: 9 m (30 ft.)  
Area: 1,800,000 sq m (19,000,000 sq ft.)  
Perimeter: 11,000 m (36,000 ft.)

Map Reference: NTS 107B E<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 535,600 7,630,600

SITE INVESTIGATION: 7 drill holes, 1 test pit.

ASSESSMENT : Suitable for development as a source of material for general fill and road construction for local projects.

SITE BD3-25(3)

The source is located inside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over flat, thermokarst terrain.

SITE BD3-26(3)

REFERENCE: Deposit (c); Area VIII DIAND Granular Resource Inventory, Aklavik NTS 107B E<sub>1/2</sub>, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel

RESERVES: Possible 50,000,000 cu. m (65,000,000 cu.yd.)

SITE DESCRIPTION: Hummocky glaciofluvial deposit located approximately 3 km (2 mi.) south of Eskimo Lakes.

Thickness: 9 m (30 ft.)  
Area: 4,000,000 sq m (43,000,000 sq ft.)  
Perimeter: 7,900 m (26,000 ft.)

Map Reference: NTS 107B E<sub>1/2</sub>, Aklavik

UTM Reference: Zone 8; 577,000E 7,631,000N

ASSESSMENT: May be suitable for development although the source is environmentally sensitive.

The source is located outside the 28 km (17.5m.) pipeline corridor. Access is by truck in the winter across flat, thermokarst terrain characterized by numerous lakes of all sizes.

The source is located within the permanent fawning grounds for the Reindeer Herd which is considered a critical area.

SITE BD3-27(3)

REFERENCE: Deposit (a); Area VIII DIAND Granular Resource Inventory; Aklavik NTS 107B E $\frac{1}{2}$ , Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

RESERVES: Possible 300,000,000 cu.m (400,000,000 cu.yd.)

SITE DESCRIPTION: Hummocky glaciofluvial plain exhibiting thermokarst features, situated 51 km (32 mi.) east of Reindeer Depot.

Thickness: 9.1 m (30 ft.)  
Area: 32,000,000 sq m (340,000,000 sq ft.)  
Perimeter: 48,000 m (160,000 ft.)

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 586,000E 7,631,000N

ASSESSMENT: May be suitable for development although the site is environmentally sensitive.

The source is located well outside the 28 km (17.5 mi.) pipeline corridor. Access to the pipeline is by truck in the winter on snow roads and ice roads (across Eskimo Lake). Access to points along Eskimo Lakes is possible by barge in the summer.

The source lies within the permanent fawning grounds of the winter range of the Reindeer Herd which are critical wildlife areas.

SITE BD3-28(3)

REFERENCE:

Deposit (c); Area X DIAND Granular Resource Inventory; Aklavik NTS 107B E $\frac{1}{2}$ , Geological Survey of Canada, 1972.

Prospect 50; Gravel Inventory Survey, Richards Island and Adjacent Areas, APOA Project 42; J. D. Mollard and Associates, October, 1972.

MATERIAL QUALITY:

Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION:

Sand and gravel.

RESERVES: Possible

40,000,000 cu.m (50,000,000 cu.yd.)

SITE DESCRIPTION:

Glaciofluvial plain, adjacent to Eskimo Lakes, 35 km (22 mi.) east of Reindeer Depot.

Thickness: 9.1 m (30 ft.)

Area: 4,500,000 m (50,000,000 sq ft.)

Perimeter: 9,500 m (31,000 ft.)

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 570,000E 7,630,000N

ASSESSMENT:

May be suitable for development although the site is environmentally sensitive.

The source is located adjacent to the eastern border of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat thermokarst terrain. Access to points along the Eskimo Lakes is possible by barge in the summer.

The source lies within the permanent fawning grounds of the Reindeer Herd which is considered to be a critical area.

SITE BD3-29(3)

REFERENCE: Source 325, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel and sand, trace silt (GW);  
Maximum size to 1.9 cm (3/4 in.);  
Medium moisture content;  
Massive ice encountered at 2.1 m (7 ft.).

OVERBURDEN: Peat, topsoil and silt; 30 cm (1 ft.) to 140 cm (4.5 ft.);

DEPTH OF ACTIVE LAYER: 60 cm (2 ft.)

RESERVES: Proven 600,000 cu.m (800,000 cu.yd.)  
Probable 6,000,000 cu.m (8,000,000 cu.yd.)  
Possible 25,000,000 cu.m (30,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. Large low lying areas should not be exposed because of rapid deterioration of underlying ice-rich silts. A large berm must be left between the excavation and the natural drainage channels to avoid siltation.

SITE DESCRIPTION: Glaciofluvial terrace on the southwest shore of Eskimo Lakes, 48 km (30 mi.) north of Inuvik.

Vegetation: moss and grass and some dwarf shrubs to 30 cm (1 ft.)

Drainage: generally good.

Thickness: 6.1 m (20 ft.)  
Area: 4,100,000 sq m (44,000,000 sq ft.)  
Perimeter: 11,000 m (35,000 ft.)

Map Reference: NTS 107B E<sub>1</sub>, Aklavik

UTM Reference: Zone 8; 563,000E 7,628,400N

SITE INVESTIGATION: 4 drill holes

SITE BD3-29(3)

ASSESSMENT:

Suitable for development although quality of deposit is erratic. An environmental study is required before development.

The source is located near the eastern border of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat, thermokarst terrain. Access to all points on the adjacent Eskimo Lakes is possible by barge in the summer or by truck in the winter across ice.

The source is located within the fawning grounds of the Reindeer Herd which is critical between December 1 st and May 15.



SITE BD3-30(3)

REFERENCE: Source 314, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel (SW);  
Maximum size 7.5 cm (3 in.);  
Low moisture content;

OVERBURDEN: Topsoil and silt; 30 cm (1 ft.)

DEPTH OF ACTIVE LAYER: 60 cm (2 ft.)+

RESERVES: Proven 30,000 cu.m (40,000 cu.yd.)  
Probable 3,000,000 cu.m (4,000,000 cu.yd.)  
Possible 30,000,000 cu.m (40,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, doze, thaw and drain. The banks of the adjacent stream must not be disturbed by leaving a berm or dyke between the stream and the excavation. The area exposed at any time should be kept to a minimum, to minimize the disturbance of the thermal regime at depth.

SITE DESCRIPTION: Post-glacial fluvial terraces about 1.5 km (1 mi.) west of Eskimo Lakes.

Vegetation: moss, lichen and scattered dwarf shrubs. Spruce 12 m (40 ft.) high, are present in gullies and valleys.

Drainage: good

Thickness: 9 m (30 ft.)  
Area: 2,600,000 sq m (28,000,000 sq ft.)  
Perimeter: 14,000 m (46,000 ft.)

Map Reference: NTS 107B E<sub>1</sub>, Aklavik

UTM Reference: Zone 8; 544,600E 7,642,200N

SITE INVESTIGATION: 3 test pits.

ASSESSMENT: Suitable for development as a source of general fill but siltation of adjacent streams must be

SITE BD3-30(3)

avoided. An environmental study will probably be required to determine the method of development which is the least disturbing to wildlife.

The source is located adjacent to the eastern border of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over flat, thermokarst terrain or on ice across Eskimo Lakes. Summer access to points along the Eskimo Lakes is possible by barge in the summer.

The source lies within the permanent fawning grounds of the Reindeer Herd which is an especially critical wildlife area between December 1, and May 15,

SITE BD3-31(NG)

REFERENCE: Source 328A, Zone III, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class NG, Non-granular material unsuitable for construction purposes.

MATERIAL DESCRIPTION: Silt, trace sand, trace clay (ML);  
High moisture content;  
Massive ice just below surface.

DEPTH OF ACTIVE LAYER: 15 cm ( $\frac{1}{2}$  ft.)

SITE DESCRIPTION: Glaciofluvial and morainal deposit located on the southwest shore of Eskimo Lakes, 45 km (28 mi.) northeast of Inuvik.

Vegetation: moss, lichen and scattered dwarf shrubs.

Drainage: fair.

Map Reference: NTS 107B W $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 571,700E 7,621,500N

SITE INVESTIGATION: 5 drill holes

ASSESSMENT: Material is not suitable for construction purposes.

SITE BD3-32(3)

REFERENCE: Deposit (a), Area X DIAND Granular Resource Inventory; Aklavik NTS 107B E $\frac{1}{2}$ , Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel

RESERVES: Possible 100,000,000 cu.m (150,000,000 cu.yd.)

SITE DESCRIPTION: Hummocky glaciofluvial deposit 38 km (24 mi.) east of Reindeer Depot.

Thickness: 9.1 m (30 ft.)  
Area: 12,000,000 sq m (140,000,000 sq ft.)  
Perimeter: 24,000 m (80,000 ft.)

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 576,000E 7,625,000N

ASSESSMENT: May be suitable for development although the site is environmentally sensitive.

The source is located outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck over snow roads and across Eskimo Lakes on ice roads. Access to points along Eskimo Lakes is possible by barge in the summer.

The source lies within the permanent fawning grounds of the Reindeer Herd which is a critical area between December 1, and May 15. Contamination of Eskimo Lakes must be prevented.

SITE BD3-33(3)

REFERENCE: Deposit (a); Area XV DIAND Granular Resource Inventory; Aklavik NTS 107B E $\frac{1}{2}$ , Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION Sand and gravel.

RESERVES: Possible 180,000,000 cu.m (250,000,000 cu.yd.)

SITE DESCRIPTION: Rolling glaciofluvial outwash deposit, located approximately 29 km (18 mi.) southeast of Reindeer Depot.

Thickness: 15 m (50 ft.)  
Area: 16,000,000 sq m (170,000,000 sq ft.)  
Perimeter: 46,000 m (150,000 ft.)

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 562,000E 7,610,500N

ASSESSMENT: Suitable for development.

The source is located near the center of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat thermokarst terrain.

SITE BD3-34(2)

REFERENCE: Deposit (c); Area XV DIAND Granular Resource Inventory; Aklavik NTS 107B E $\frac{1}{2}$ , Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 2, Good quality material suitable for embankment fill, base and surface course aggregates.

MATERIAL DESCRIPTION: Sand and gravel.

RESERVES: Possible 25,000,000 cu.m (35,000,000 cu.yd.)

SITE DESCRIPTION: Glaciofluvial outwash plain located immediately adjacent to the north end of Noel Lake.

Thickness: 15 m (50 ft.)  
Area: 2,100,000 sq m (22,000,000 sq ft.)  
Perimeter: 4,600 m (15,000 ft.)

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 557,000E 7,607,500N

ASSESSMENT: Suitable for development.

The source is located near the center of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat, thermokarst terrain.

SITE BD3-35(3)

REFERENCE: Deposit (a); Area XVI DIAND Granular Resource Inventory; Aklavik NTS 107B E<sub>2</sub>, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Undifferentiated sand and gravel.

RESERVES: Possible 10,000,000 cu. m (15,000,000 cu.yd.)

SITE DESCRIPTION: Glaciofluvial deposit 24 km (15 mi.) SSW of Reindeer Depot.

Thickness: 12 m (40 ft.)  
Area: 1,200,000 sq m (13,000,000 sq ft.)  
Perimeter: 3,200 m (10,400 ft.)

Map Reference: NTS 107B E<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 551,000E 7,602,000N

ASSESSMENT: Suitable for development.

The source is located within the 28 km (17.5 mi.) Pipeline corridor. Access is by truck in the winter over flat to rolling thermokarst terrain.

SITE BD3-36(3)

REFERENCE: Deposit (a) and (b); Area VI DIAND Granular Resource Inventory; Aklavik NTS 107B E<sub>2</sub>, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel.

RESERVES: Possible 25,000,000 cu.m (35,000,000 cu.yd.)

SITE DESCRIPTION: Glaciofluvial plain 3 mi west of Sitidgi Lake.  
Thickness: 15 m (50 ft.)  
Area: 2,100,000 sq m (23,000,000 sq ft.)  
Perimeter: 2,400 m (7,800 ft.)

Map Reference: NTS 107B E<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 608,500E 7,606,000N

ASSESSMENT: May be suitable for development although the site is environmentally sensitive.

The source is located well outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat thermokarst terrain. Sitidgi Lake must be either crossed or bypassed to reach the pipeline route.

The source lies within the winter range of the Reindeer Herd, which is a critical area from December 1, to April 1.



SITE BD3-37(3)

REFERENCE: Deposit (c); Area V DIAND Granular Resource Inventory; Aklavik NTS 107B E<sub>2</sub>, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel

RESERVES: Possible 2,500,000 cu.m (3,000,000 cu.yd.)

SITE DESCRIPTION: Fluvial terrace immediately adjacent to the eastern edge of Sitidgi Lake.

Thickness: 6.1 m (20 ft.)  
Area: 290,000 sq m (3,100,000 sq ft.)  
Perimeter: 1,600 m (5,200 ft.)

Map Reference: NTS 107B E<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 602,000E 7,605,200N

ASSESSMENT: May be suitable for development although the site is environmentally sensitive.

The source is located well outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter on ice roads across Sitidgi Lake.

The source lies within the winter range of the Reindeer Herd which is a critical area from December 1, to April 1.

SITE BD3-38(3)

REFERENCE: Deposit (e); Area V DIAND Granular Resource Inventory; Aklavik NTS 107B E $\frac{1}{2}$ , Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

SITE DESCRIPTION: A series of esker ridges immediately adjacent to the southeast shore of Sitidgi Lake.

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 590,000E 7,597,000N

ASSESSMENT: May be suitable for development although the site is environmentally sensitive.

The source is located well outside the 28 km 17.5 mi.) pipeline corridor. Access is by truck in the winter across flat thermokarst terrain.

The source lies within the winter range of the Reindeer Herd which is considered a critical area and is utilized between December 1, and April 1.

SITE BD3-39(4)

REFERENCE: Source I-401A, Inuvik, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 4, Poor quality material suitable only for marginal fill.

MATERIAL DESCRIPTION: Sand, some gravel, some silt (SM);  
Silt, some gravel, some sand (ML);  
Medium to high moisture content;  
Massive ice encountered 3.9 m (13 ft.).

OVERBURDEN: Topsoil and silt; 30 cm (1 ft.) to 210 cm (6 ft.);

DEPTH OF ACTIVE LAYER: 75 cm (2.5 ft.)

RESERVES: Proven 20,000 cu.m (25,000 cu.yd.)  
Probable 250,000 cu.m (300,000 cu.yd.)  
Possible 750,000 cu.m (900,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, doze, thaw and drain.

SITE DESCRIPTION: A group of small kames in morainal terrain about 10 km (6 mi.) north of Inuvik.

Vegetation: dense ground cover of moss and some dwarf shrubs.

Drainage: good

Thickness: 3.6 m (12 ft.)  
Area: 270,000 sq m (2,700,000 sq ft.)  
Perimeter: 5,700 m (19,000 ft.)

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 552,500E 7,592,000N

SITE INVESTIGATION: 6 drill holes, 6 test pits.

ASSESSMENT: Not suitable for development because of poor quality material and the presence of massive ground ice.

The source lies just outside the western boundary of the 28 km (17.5 mi.) pipeline corridor. Access

SITE BD3-39(4)

is possible along the adjacent Mackenzie River by truck in the winter or by barge in the summer following construction of a short all-weather access road. A summer access road could be extended about 5 km (3 mi.) to link the source directly to Inuvik.

SITE BD3-40(3)

REFERENCE: Source 452, Zone IV, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel (SW-SM);  
Gravel and sand (GM);  
Maximum size 7.6 cm (3 in.).

OVERBURDEN: Topsoil and silt 30 cm (1 ft.) to 60 cm (2 ft.)

DEPTH OF ACTIVE LAYER: 60 cm (2 ft.)+

RESERVES: Proven 200,000 cu.m (250,000 cu.yd.)  
Probable 350,000 cu.m (450,000 cu.yd.)  
Possible 4,500,000 cu.m (5,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain.

SITE DESCRIPTION: Several disconnected esker remnants located 42 km (26 mi.) by air east of Inuvik.

Vegetation: upland dwarf shrubs with some white spruce and aspens to 9 m (30 ft.)

Drainage: good

Thickness: 7.5 m (25 ft.)  
Area: 570,000 sq m (6,200,000 sq ft.)  
Perimeter: 5,700 m (19,000 ft.)

Map Reference: NTS 107B E<sub>1</sub>, Aklavik

UTM Reference: Zone 8; 593,600E 7,586,500N

SITE INVESTIGATION: 4 test pits.

ASSESSMENT: Suitable for development after the limits of the proposed pit have been delineated by further field drilling. Source may require a detailed assessment as it lies within the winter range of the Mackenzie Reindeer Herd. The source is located just within the eastern borders of the 28 km (17.5 mi.) pipeline corridor. Access is only feasible during the winter. A

SITE BD3-40(3)

road 27 km (17 mi.) long across flat thermokarst terrain is required to link the source to the Dempster Highway.

SITE BD3-41(4)

REFERENCE: Source 451, Zone IV, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 4, Poor quality material suitable only for marginal fill.

MATERIAL DESCRIPTION: Sand, little silt (SM);  
Maximum size to 3.9 cm (1.5 in.);  
Medium moisture content.

OVERBURDEN: Topsoil and silt; 30 cm (1 ft.) to 90 cm (3 ft.)

DEPTH OF ACTIVE LAYER: 90 cm (3 ft.)

RESERVES: Proven 15,000 cu.m (20,000 cu.yd.)  
Probable 30,000 cu.m (40,000 cu.yd.)  
Possible 250,000 cu.m (300,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain

SITE DESCRIPTION: Two small eskers located approximately 39 km (24 mi.) east of Inuvik.

Vegetation: white spruce to 9 m (30 ft.)

Drainage: good

Thickness: 4.5 m (15 ft.)  
Area: 50,000 sq m (540,000 sq ft.)  
Perimeter: 1,800 m (6,000 ft.)

Map Reference: NTS 107B E<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 589,600E 7,852,500N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Not suitable for development except for a nearby project. Additional drilling is required to delineate the proposed borrow pit limits. An environmental study may be required before any site development because the source lies within the winter range of the Mackenzie Reindeer Herd. The source is located within the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat, thermokarst terrain. A road

SITE BD3-41(4)

21 km (13 mi.) long would be required to link  
the source to the Dempster Highway.



SITE BD3-42(3)

REFERENCE: Source 450, Zone IV, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand, little gravel, little silt (SW-SM);  
Maximum size 3.9 cm (1.5 in.);  
Medium moisture content;  
Ice lensing observed below 90 cm (3 ft.).

OVERBURDEN: Topsoil and silt; 30 cm (1 ft.) to 90 cm (3 ft.)

DEPTH OF ACTIVE LAYER: 60 cm (2 ft.)+

RESERVES: Proven 15,000 cu.m (20,000 cu.yd.)  
Probable 150,000 cu.m (200,000 cu.yd.)  
Possible 3,500,000 cu.m (4,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. The full depth should be excavated in one operation to minimize environmental disturbance.

SITE DESCRIPTION: Two discontinuous esker ridges located 18 km (11 mi.) east of the Dempster Highway and 32 km (20 mi.) by air east of Inuvik.

Vegetation: white spruce to 7.5 m (25 ft.) high on the eskers; on flat areas, transitional to black spruce about 6 m (20 ft.) high in sphagnum bogs.

Drainage: good

Thickness: 9 m (30 ft.)  
Area: 370,000 sq m (4,000,000 sq ft.)  
Perimeter: 9,600 m (32,000 ft.)

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 586,500E 7,581,600N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Suitable for development as a source of general fill but requires additional drilling to delineate the areas of suitable fill material.

SITE BD3-42(3)

An environmental study will probably be necessary to determine the effect of the development on the Mackenzie Reindeer Herd.

The source is located within the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat, thermokarst terrain.

SITE BD3-43(3)

REFERENCE: Source I-406, Inuvik, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION Gravel, some sand (GW-GM);  
Sand, little gravel (SW-SM);  
Maximum size 6.4 cm (2.5 in.).

OVERBURDEN: Topsoil and silt; 0 to 60 cm (2 ft.)

DEPTH OF ACTIVE LAYER: 105 cm (3.5 ft.)

RESERVES: Proven 4,500 cu.m (6,000 cu.yd.)  
Probable 45,000 cu.m (60,000 cu.yd.)  
Possible 250,000 cu.m (300,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. The full depth of the esker may be excavated. The disturbed and exposed areas should be kept small in order to minimize the disruption of frozen ground. Siltation of the adjacent stream must be avoided.

SITE DESCRIPTION: Esker ridge located about 21 km (13 mi.) by air east of Inuvik.

Vegetation: upland dwarf spruce, aspen, white spruce and white birch to 9 m (30 ft.) high.

Drainage: good

Thickness: 4.6 m (15 ft.)  
Area: 50,000 sq m (540,000 sq ft.)  
Perimeter: 2,300 m (7,500 ft.)

Map Reference: NTS 107B E<sub>1</sub>, Aklavik

UTM Reference: Zone 8; 573,000E 7,582,300N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Suitable for development although volume of available material is small and the cost of transportation over the winter road may be prohibitive.

SITE BD3-43(3)

The source is located near the center of the 28 km (17.5 mi.) pipeline corridor. Access is by winter road from the Dempster Highway at the north end of Campbell Lake, a distance of about 10 km (7 mi.)

SITE BD3-44(3)

REFERENCE: Source I-400, Inuvik, Stage I DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand, some gravel, some silt (SM);  
Maximum size to 15 cm (6 in.);  
Medium to high moisture content;  
Massive ice encountered at 210 cm (7 ft.), ice lenses at 90 cm (3 ft.).

OVERBURDEN: Topsoil silt and ice; 30 cm (1 ft.) to 210 cm (7 ft.).

DEPTH OF ACTIVE LAYER: 60 cm (3 ft.)

RESERVES: Proven 20,000 cu.m (25,000 cu.yd.)  
Probable 250,000 cu.m (300,000 cu.yd.)  
Possible 850,000 cu.m (1,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. A clean-up and restoration of already depleted areas should be carried out before further development of the source. Excavation in the source should be concentrated into one area, to minimize the overall disturbance.

SITE DESCRIPTION: Glaciofluvial outwash area 1.5 km (1 mi.) south of Inuvik.

Vegetation: primarily sphagnum moss with scattered black spruce to 6 m (20 ft.) high.

Drainage: satisfactory, except for ponding where pits have been dug below the level of the stream.

Thickness: 3.5 m (12 ft.)  
Area: 480,000 sq m (5,200,000 sq ft.)  
Perimeter: 3,000 m (9,800 ft.)

Map Reference: NTS 107B E<sub>1</sub>, Aklavik

UTM Reference: Zone 8; 554,000E 7,582,700N

SITE INVESTIGATION: 9 drill holes, 1 test pit

SITE BD3-44(3)

ASSESSMENT:

Suitable for continued development as a source of general fill but requires management to minimize material wasteage and to restore depleted areas.

The source is located adjacent to the western border of the 28 km (17.5 mi.) pipeline corridor. Year round access to Inuvik and the Dempster Highway is assured.

The area has been developed for the supply of granular material to the community of Inuvik.

SITE BD3-45(R2)

REFERENCE: Mile 965.8 Borrow Pit, Mackenzie Highway,  
Department of Public Works, Canada.

MATERIAL QUALITY: Class R-2, Bedrock suitable for fair quality  
general fill in sub-grades.

MATERIAL DESCRIPTION: Soft grey shale.

OVERBURDEN: 300 cm (10 ft.)

RESERVES: Possible Unlimited

SITE DESCRIPTION: Shallow bedrock pit located approximately 8 km  
(5 mi.) southeast of Inuvik.

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 560,500E 7,579,300N

ASSESSMENT: Suitable for development.

The source is located outside the 28 km (17.5 mi.)  
pipeline corridor. All-weather access is  
provided by the Mackenzie Highway which passes  
close to the source. Off-highway access is by  
truck in the winter over flat, thermokarst  
terrain.

The source was previously developed as a source  
of sub-grade material for construction of the  
Mackenzie Highway.

SITE BD3-46(R1)

REFERENCE: Source I-403, Inuvik, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class R-1, Bedrock suitable for the manufacture of concrete aggregate.

MATERIAL DESCRIPTION: Limestone, hard, dense layered.

OVERBURDEN: Silt 0 to 90 cm (3 ft.)

DEPTH OF ACTIVE LAYER: Not determined.

RESERVES: Possible Unlimited.

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Drill and blast.

SITE DESCRIPTION: Bedrock quarry located 18 km (11 mi.) southeast of Inuvik.

Vegetation: scattered aspen and white spruce to 6 m (20 ft.) high.

Drainage: good

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 569,000E 7,578,100N

SITE INVESTIGATION: 1 pit face.

ASSESSMENT: Suitable for continued development as a source of general fill in the pit run condition. The production of aggregate for concrete or asphalt construction will require crushing and screening.

The source is located adjacent to the western border of the 28 km (17.5 mi.) pipeline corridor. All-weather access is provided along the Dempster Highway off highway access is across flat, thermo-karst terrain.

The source lies within about 2.5 km (1.5 mi.) north of the habitat for peregrine falcon which is considered a critical wildlife area. The source was previously developed by a contractor working on the Dempster Highway.



SITE BD3-47(4)

REFERENCE: Source I-405A, Inuvik, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 4, Poor quality material suitable only for marginal fill.

MATERIAL DESCRIPTION: Sand and silt (SM);  
High moisture content.

OVERBURDEN: Topsoil and silt; 30 cm (1 ft.) to 120 cm (4 ft.)

DEPTH OF ACTIVE LAYER: 60 cm (2 ft.)+

RESERVES: Proven 2,000,000 cu.m (3,000,000 cu.yd.)  
Probable 7,500,000 cu.m (9,500,000 cu.yd.)  
Possible 15,000,000 cu.m (20,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, drain, thaw and dry.

SITE DESCRIPTION: Kames, terraces, small kames and eskers about 27 km (17 mi.) ESE of Inuvik.

Vegetation: scattered white spruce and aspen to 6 m (20 ft.) high, with heavy moss and dwarf shrubs.

Drainage: good.

Thickness: 9 m (30 ft.)  
Area: 1,600,000 sq m (17,000,000 sq ft.)  
Perimeter: 14,000 m (46,000 ft.)

Map Reference: NTS 107B W<sub>1</sub>, Aklavik

UTM Reference: Zone 8; 579,300E 7,578,200N

SITE INVESTIGATION: 3 drill holes

ASSESSMENT: Not suitable for development due to poor quality and high ice content.  
The source is located near the center of the 28 km (17.5 mi.) pipeline corridor. Access is by winter road from the Dempster Highway 10 km (6 mi.) away.

SITE BD3-48(R2)

REFERENCE: Source I-404, Inuvik, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class R-2, Bedrock suitable for fair quality general fill in sub-grades.

MATERIAL DESCRIPTION: Sandstone, soft, poorly cemented, thin-bedded, decomposes in water.

OVERBURDEN: Topsoil and silt 0 to 90 cm (3 ft.)

DEPTH OF ACTIVE LAYER: Not determined

RESERVES: Possible Unlimited.

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: The material can probably be ripped with a large ripper.

SITE DESCRIPTION: Bedrock exposure located 6 km (4 mi.) east of Inuvik airport and 16 km (10 mi.) by air south-east of the community of Inuvik.

Vegetation: scattered white spruce and aspen to 6 m (20 ft.) high.

Drainage: excellent

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 568,500E 7,576,200N

SITE INVESTIGATION: 1 pit face.

ASSESSMENT: Suitable for continued development. The source is located adjacent to the western boundary of the 28 km (17.5 mi.) pipeline corridor. All-weather access is available along the adjacent Dempster Highway, Off-highway access is by truck in the winter across flat, thermokarst terrain. The source lies just outside the borders of both a habitat of the peregrine falcon and a proposed reserve of the International Biological Programme. Both are considered critical wildlife areas.

SITE BD3-49(R2)

REFERENCE: Source I-402, Inuvik, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class R-2, Bedrock suitable for general fill in sub-grades.

MATERIAL DESCRIPTION: Shale, hard, dense, fractured, with bands of limestone.

OVERBURDEN: Minimal

DEPTH OF ACTIVE LAYER: Not determined.

RESERVES: Possible Unlimited

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Generally the material can be ripped but some blasting may be required.

SITE DESCRIPTION: Bedrock exposure located 1.5 km (1 mi.) west of Inuvik airport.

Vegetation: birch and spruce with shrubs and moss.

Drainage: good as long as the excavation remains above the surrounding ground.

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 560,400E 7,577,300N

SITE INVESTIGATION: 2 drill holes, 1 pit face.

ASSESSMENT: Suitable for development as a source of general fill or base course aggregate. If washed, screened and crushed the shale can be used as coarse aggregate for concrete or asphalt mixes.

The source is located outside the western boundary of the 28 km (17.5 mi.) pipeline corridor. Year-round access to Inuvik and along the Dempster Highway is assured by gravel road to the airport.

The area lies within 3/4 km ( $\frac{1}{2}$  mi.) of a critical habitat of the peregrine falcon. The area also

SITE BD3-49(R2)

lies on the northern border of a proposed reserve under the International Biological Programme, an area valued for its rare diversity of plant life.

SITE BD3-50(3)

REFERENCE: Deposit (a); Area II DIAND Granular Resource Inventory; Aklavik NTS 107B E<sub>1/2</sub>, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel, some silt.

RESERVES: Possible 10,000,000 cu.m (15,000,000 cu.yd.)

SITE DESCRIPTION: Glaciofluvial terrace adjacent to the northeast end of Campbell Lake.

Thickness: 9 m (30 ft.)  
Area: 1,500,000 sq m (16,000,000 sq ft.)  
Perimeter: 5,700 m (19,000 ft.)

Map Reference: NTS 107B E<sub>1/2</sub>, Aklavik

UTM Reference: Zone 8; 572,500E 7,572,000N

ASSESSMENT: Suitable for development.

The source is located within the 28 km (17.5 mi.) pipeline corridor. All weather access is provided along the Dempster Highway which passes close to the source. Off-highway access is by truck in the winter across flat, thermokarst terrain.

SITE BD3-51(3)

REFERENCE: Source 453, Zone IV, Stage II DIAND Granular Materials Inventory; Ripley, Klohn and Leonoff, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand, some gravel (SW);  
Sand, trace gravel (SP);  
Low to medium moisture content;  
Maximum size to 3.9 cm (1.5 in.).

OVERBURDEN: Topsoil 0 to 60 cm (2 ft.)

DEPTH OF ACTIVE LAYER: 120 cm (4 ft.)

RESERVES: Proven 1,500 cu.m (2,000 cu.yd.)  
Probable 15,000 cu.m (20,000 cu.yd.)  
Possible 75,000 cu.m (100,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Doze and stockpile

SITE DESCRIPTION: Small kames located adjacent to the Dempster Highway approximately 22 km (14 mi.) by air south-east of Inuvik.

Vegetation: Transitional between black spruce and sphagnum bogs.

Drainage: good

Thickness: 6 m (20 ft.)  
Area: 27,000 sq m (290,000 sq ft.)  
Perimeter: 1,800 m (6,000 ft.)

Map Reference: NTS 107B E<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 570,600E 7,570,200N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Suitable for continued development. The small remaining volume does not warrant a reservation for specified use.  
The source is located adjacent to the western border of the 28 km (17.5 mi.) pipeline corridor. All weather access is provided along the adjacent

SITE BD3-51(3)

Dempster Highway. Off-highway access is by truck in the winter across flat, thermokarst terrain.

The source lies within a proposed reserve of the International Biological Programme.

The source has been extensively developed for the construction of the Dempster highway.

SITE BD3-52(R2)

REFERENCE: Borrow Area GM4 Main Canadian Route, CAGSL Pipeline Related Borrow Studies; Northern Engineering Services Co. Ltd., 1974.

MATERIAL QUALITY: Class R2, Bedrock suitable for fair quality general fill in sub-grades.

MATERIAL DESCRIPTION: Sandstone, siltstone and conglomerate, poorly consolidated;  
Medium to high moisture content.

OVERBURDEN: Topsoil and silt 0 to 210 cm (7 ft.)

RESERVES: Possible Unlimited.

MINIMUM HAUL DISTANCE:

SITE DESCRIPTION: Bedrock ridges located approximately 16 km (10 mi.) north of Noel Lake.

Drainage: good to surrounding terrain

Map Reference: NTS 107B E<sub>1</sub>, Aklavik

UTM Reference: Zone 8; 551,000E 7,622,000N

SITE INVESTIGATION: None

ASSESSMENT: Suitable for development as a source of general fill.

The source is located near the center of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat to rolling, thermokarst terrain.

Selected by CAGSL as a primary borrow site for right-of-way material.



SITE BD3-53(3)

REFERENCE: Borrow Area GM5 Main Canadian Route, CAGSL Pipeline Related Borrow Studies; Northern Engineering Services Co. Ltd., 1974.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel;  
Medium moisture content.

OVERBURDEN: Topsoil and silt; 30 cm (1 ft.) to 150 cm (5 ft.)

RESERVES: Possible 1,000,000 cu. m (1,500,000 cu.yd)+

MINIMUM HAUL DISTANCE:

SITE DESCRIPTION: Outwash plain located approximately 5 km (3 mi.) north of Noel Lake.

Drainage: good

Thickness: 6+ m (20+ft.)  
Area: 170,000 sq m (1,800,000 sq ft.)  
Perimeter: 3,000 m (10,000 ft.)

Map Reference: NTS 107B E<sub>1</sub>, Aklavik

UTM Reference: Zone 8; 559,000E 7,600,500N

SITE INVESTIGATION: None

ASSESSMENT: Suitable for development as a source of general fill.

The source is located near the center of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over flat to gently rolling, thermokarst terrain.

Selected by CAGSL as a primary source of right-of-way material.

SITE BD3-54(3)

REFERENCE: Borrow Area GM39 Main Canadian Route, CAGSL Studies; Northern Engineering Services Co. Ltd., 1974.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel;  
Medium moisture content.

OVERBURDEN: Topsoil and silt; 0 to 30 cm (1 ft.)

RESERVES: Possible 250,000 cu.m (350,000 cu.yd.)

MINIMUM HAUL DISTANCE:

SITE DESCRIPTION: Kame terrace located immediately east of the northern tip of Campbell Lake.

Drainage: good to surrounding terrain.

Thickness: 6 m (20 ft.)  
Area: 45,000 sq m (480,000 sq ft.)  
Perimeter: 850 m (2,800 ft.)

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 573,500E 7,575,000N

SITE INVESTIGATION: None

ASSESSMENT: Suitable for development as a source of general fill.

The source is located within the 28 km (17.5 mi.) pipeline corridor. Off-highway access is by truck in the winter across flat, thermokarst terrain. All-weather access is provided by the adjacent Dempster Highway.

Selected by CAGSL as a primary source of material for construction of a facility.

SITE BD3-55(R2)

REFERENCE: Inuvik Area, Bedrock Sources of Highway Materials Inuvik to Tuktoyaktuk Highway, DPW; Terrain Analysis and Mapping Services Ltd., October, 1975.

MATERIAL QUALITY: Class R-2, Bedrock suitable for fair quality general fill in sub-grades.

MATERIAL DESCRIPTION: Shale

OVERBURDEN: Till, colluvium and alluvium 0 to 300 cm (10 ft.)

RESERVES: Possible Unlimited

MINIMUM HAUL DISTANCE:

SITE DESCRIPTION: Benches adjacent to canyons or escarpments located immediately northwest of Inuvik.

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 553,000E 7,587,000N

SITE INVESTIGATION: None

ASSESSMENT: Suitable for development as a source of fair quality general fill. However, drilling should be carried adjacent to the rims of the canyons to determine the thickness and ice content of the overburden.

Siltation of the adjacent small creeks should be avoided although these creeks are presently carrying sediment from shallow failures.

The source is located adjacent to the western border of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across locally irregular terrain and flat, thermokarst terrain to the east.

SITE BD3-56(R2)

REFERENCE: Noell Lake Area, Bedrock Sources of Highway Materials, Inuvik to Tuktoyaktuk Highway, DPW; Terrain Analysis and Mapping Services Ltd., October, 1975.

MATERIAL QUALITY: Class R-2, Bedrock suitable for fair quality general fill in sub-grades.

MATERIAL DESCRIPTION: Shale, relatively fissile; possible siltstone and sandstone layers and bentonite beds.

OVERBURDEN: Till, colluvium and alluvium; 0 to 300 cm (10 ft.)

RESERVES: Possible Unlimited

MINIMUM HAUL DISTANCE:

SITE DESCRIPTION: Near surface bedrock forming hills located immediately south of Noell Lake.

Map Reference: NTS 107B E<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 557,500E 7,595,500N

SITE INVESTIGATION: None

ASSESSMENT: Suitable for development as a source of fair quality general fill. However, drilling should be carried out to determine the exact nature and the ice content of the shallow bedrock.

Siltation of Noell Lake or the larger lake immediately south of it should be avoided.

The source is located within the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across rolling, thermokarst terrain.

SITE BD3-57(R2)

REFERENCE: Douglas Creek Area, Bedrock Sources of Highway Materials, Inuvik to Tuktoyaktuk Highway, DPW; Terrain Analysis and Mapping Services Ltd., October, 1975.

MATERIAL QUALITY: Class R-2, Bedrock suitable for fair quality general fill in sub-grades.

MATERIAL DESCRIPTION: Shale, with possible bentonite beds.

OVERBURDEN: Till, colluvium and alluvium; 0 to 300 cm (10 ft.)

RESERVES: Possible Unlimited.

MINIMUM HAUL DISTANCE:

SITE DESCRIPTION: Narrow canyon and adjacent flanks of the Douglas Creek on the east banks of the Mackenzie River.

Map Reference: NTS 107B E<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 550,000E 7,608,000N

SITE INVESTIGATION: None

ASSESSMENT: Suitable for development as a source of fair quality general fill. Drilling in flank areas should be carried out to determine overburden thickness. In addition, drilling and trenching should be carried out along the rim of Douglas Creek canyon to determine the nature of the upper shale and its ice content.

Siltation of the Douglas Creek should be avoided although any sediment that might escape into Douglas Creek would not greatly affect the turbidity of the creek.

The source is located within the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over flat, thermokarst terrain.

SITE BD3-58(R2)

REFERENCE: Eastern Caribou Hills Area, Bedrock Sources of Highway Materials, Inuvik to Tuktoyaktuk highway, DPW, Terrain Analysis and Mapping Services Ltd., October, 1975.

MATERIAL CLASS: Class R2, Bedrock suitable for fair quality general fill in sub-grades.

MATERIAL DESCRIPTION: Sandstone, unconsolidated or weakly consolidated, with interbedded clayey beds; low ice content.

OVERBURDEN: Till, colluvium and alluvium; 0 to 300 cm (10 ft.)

RESERVES: Possible Unlimited.

MINIMUM HAUL DISTANCE:

SITE DESCRIPTION: Escarpments forming rims of glacial meltwater spillways and the immediately adjacent uplands. The source area is located west of Whale Point on the Eskimo Lakes.

Map Reference: NTS 107B, E<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 560,000E 7,625,000N

SITE INVESTIGATION: None

ASSESSMENT: Suitable for development as a source of fair quality general fill. However, drilling in the upland areas adjacent to the escarpments is required to determine the thickness of the overburden and the characteristics of the Tertiary bedrock. Finer grained borrow material may be available in the western portion of the source area where overburden may be thinner.

Siltation of the adjacent streams should be minimized. However most eroded material reaching the stream would be sand which would only temporarily increase the turbidity of these small streams and would rapidly settle out if the sediment reached a lake.

The source is located just within the eastern border of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over rolling thermokarst terrain.

SITE BD3-59(2)

REFERENCE: Source 1, Parsons Lake N.W.T., Gulf Oil Canada Ltd., Granular Materials Inventory; Klohn and Leonoff Consultants Ltd., October, 1974.

MATERIAL CLASS: Class 2, Good quality material suitable for embankment fill, base course, surface aggregate and concrete aggregate.

MATERIAL DESCRIPTION: Gravel and sand, trace silt, trace cobbles, variable (GW-SW);  
Interbeds of ice-rich silt and fine sand from 30 cm (1 ft.) to 180 cm (6 ft.) thick in gravel;  
Maximum size greater than 20 cm (8 in.);  
Moisture content in gravel is low to medium.

OVERBURDEN: Eastern and Central Sector - Organic silt and peat; 0 to 210 cm (7 ft.).  
Ice; 0 to 170 cm (5.5 ft.)  
Western Sector - Organic silt and peat; 0 to 90 cm (3 ft.).  
Ice; 0 to 300 cm (10 ft.).

DEPTH OF ACTIVE LAYER: 25 cm ( $\frac{1}{2}$  ft.)+

RESERVES: Proven 200,000 cu.m (250,000 cu.yd.)  
Probable 200,000 cu.m (250,000 cu.yd.)  
Possible 200,000 cu.m (250,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXCAVATION: Rip and doze, stockpiling to thaw and drain material may be considered before placing material in the field.

The area exposed at any time should be kept to a minimum in order to prevent thermal erosion. The side slopes should be cut to about  $1\frac{1}{2}$ :1 slope (horizontal to vertical).

Development should proceed inland from the river-bank from east to west across the source. A berm or dyke, and likely retaining ponds, will be required on the inactive flood plain between the stream and the southern boundary of the source. These structures will stop drainage and melt water from entering the stream. Particular care in the operation is required to avoid siltation of the stream since it flows directly into Eskimo Lakes. Surficial waste piles must not be allowed to drain directly into natural drainage courses.

**SITE BD3-59(3)**

**SITE DESCRIPTION:**

River terrace located 5 km (3 mi.) southeast of Parsons Lake and 8 km (5 mi.) west of Eskimo Lakes.

**Vegetation:** sparsely vegetated in east and central part; heavily vegetated with scrub brush in west part.

**Drainage:** well drained although two small lakes occur immediately to the north.

**Thickness:** 2.5 m (8 ft.)

**Area:** 200,000 sq.m (2,200,000 sq.ft.)

**Perimeter:** 3,200 m (10,500 ft.)

**Map Reference:** NTS 107B, E<sub>4</sub>, Aklavik

**UTM Reference:** Zone 8; 557,000 E 7,640,700

**SITE INVESTIGATION:**

60 drill holes, 1 bank exposure.

**ASSESSMENT:**

Suitable for development on a large scale to provide good quality fill for construction of roadways, air strips or for general site work. This source can provide coarse and fine aggregates suitable for use in concrete with processing.

The source is located outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat, thermokarst terrain characterized by numerous small lakes, ponds and bogs. The power transmission line to Tuktoyaktuk passes near the site.



SITE BD3-60(3)

REFERENCE: Source 2, Parsons Lake N.W.T., Gulf Oil Canada Ltd., Granular Materials Inventory; Klohn and Leonoff Consultants Ltd., October, 1974.

MATERIAL CLASS: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel, some sand, trace silt, trace cobbles (GW-SW);  
Maximum size to 15 cm (6 in.);  
Moisture content in gravel stratum is medium.

OVERBURDEN: Organic silt, sand, peat and ice; 15 cm ( $\frac{1}{2}$  ft.) to 240 cm (8 ft.)

DEPTH OF ACTIVE LAYER: 30 cm (1 ft.)+

RESERVES:	Proven	700,000 cu. m (900,000 cu.yd.)
	Probable	700,000 cu. m (900,000 cu.yd.)
	Possible	700,000 cu. m (900,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip and doze. Stockpiling to thaw and drain frozen gravels should be considered. Sand materials will definitely require stockpiling to thaw and drain.

A berm or dyke and possibly retention ponds will be required between the pit area and adjacent stream or lakes. Development of source should be carefully planned and controlled in order that the source be efficiently utilized. Surface waste material should be stockpiled along the north side of the source to prevent drainage water reaching the stream.

SITE DESCRIPTION: River terrace located 5 km (3 mi.) southeast of Parsons Lake and 8 km (5 mi.) west of Eskimo Lakes.

Vegetation: sparsely vegetated.

Drainage: poorly drained in north central part of terrace.

Thickness: 2.5 m (8 ft.)  
Area: 280,000 sq m (3,100,000 sq ft.)  
Perimeter: 2,300 m (7,400 ft.)

SITE BD3-60(3)

Map Reference: NTS 107B, E<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 558,000E 7,641,000N

SITE INVESTIGATION:

35 drill holes.

ASSESSMENT:

Suitable for development probably after depletion of adjacent western end of terrace. This would confine the operation to one locality rather than disturbing another source area. The material is suitable for general fill for construction of roadways, airstrips or plant sites.

The source is located outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat, thermokarst terrain characterized by numerous lakes, ponds, and bogs.

SITE BD4-01(2)

REFERENCE:

Deposit (f), Area IV DIAND Granular Resource Inventory; Aklavik NTS 107B E<sub>1/2</sub>, Geological Survey of Canada, 1972.

MATERIAL QUALITY:

Class 2, Good quality material suitable for embankment fill, base and surface course aggregate.

MATERIAL DESCRIPTION:

Gravel.

RESERVES: Possible

7,500,000 cu.m (10,000,000 cu.yd.)

SITE DESCRIPTION:

Glaciofluvial terrace located approximately 6 km (4 mi.) southeast of the southern tip of Sitidgi Lake.

Thickness: 6 m (20 ft.)

Area: 1,900,000 sq m (21,000,000 sq ft.)

Perimeter: 4,900 m (16,000 ft.)

Map Reference: NTS 107B E<sub>1/2</sub>, Aklavik

UTM Reference: Zone 8; 598,500E 7,584,500N

ASSESSMENT:

Suitable for development.

The source is located adjacent to the eastern border of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat terrain exhibiting thermokarst features.

SITE BD4-02(3)

REFERENCE: Deposit (a) Area IV DIAND Granular Resource Inventory; Aklavik NTS 107B, E $\frac{1}{2}$  Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

RESERVES: Possible 10,000,000 cu m (15,000,000 cu.yd.)

SITE DESCRIPTION: Glaciofluvial terrace and plain located 11 km (7 mi.) southeast of the southern tip of Sitidgi Lake.

Thickness: 6 m (20 ft.)  
Area: 2,100,000 sq m (23,000,000 sq ft.)  
Perimeter: 8,600 m (28,000 ft.)

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 603,000E 7,582,000N

ASSESSMENT: Suitable for development.

The source is located outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over flat, thermokarst terrain.

SITE BD4-03(3)

REFERENCE: Deposit (b); Area IV DIAND Granular Resource Inventory; Aklavik NTS 107B E $\frac{1}{2}$ , Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

RESERVES: Possible 5,000 cu m (7,000 cu yd.)

SITE DESCRIPTION: Esker ridges located approximately 13 km (8 mi.) south of Sitidgi Lake.

Thickness: 6 m (20 ft.)  
Area: 1,300,000 sq m (14,000,000 sq ft.)  
Perimeter: 4,200 m (14,000 ft.)

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 586,200E 7,577,000N

ASSESSMENT: May be suitable for development although very minimal quantity of granular materials are available from this source.

The source is located inside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat to gently sloping thermokarst terrain.

SITE BD4-04(3)

REFERENCE:

Deposit (d); Area IV DIAND Granular Resource Inventory; Aklavik NTS 107B E $\frac{1}{2}$ , Aklavik, Geological Survey of Canada, 1972.

MATERIAL QUALITY:

Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION:

Sand or gravel, locally silty.

RESERVES: Possible

10,000,000 cu.m (15,000,000 cu.yd.)

SITE DESCRIPTION:

Glaciofluvial terrace and plain located 22 km (14 mi.) southeast of the southern tip of Sitidgi Lake.

Thickness: 6 m (20 ft.)

Area: 2,100,000 sq m (23,000,000 sq ft.)

Perimeter: 11,000 m (35,000 ft.)

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 600,000E 7,570,000N

ASSESSMENT:

Suitable for development.

The source is located outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over flat thermokarst terrain.

SITE BD4-05(R2)

REFERENCE: Mile 947 Borrow Pit, Mackenzie Highway; Department of Public Works, Canada.

MATERIAL QUALITY: Class R-2, Bedrock suitable for fair quality general fill in sub-grades.

MATERIAL DESCRIPTION: Soft, thinly bedded shales with occasional thin bands of sandstone.

OVERBURDEN: 240 cm (8 ft.)

RESERVES: Possible Unlimited.

SITE DESCRIPTION: Shallow bedrock borrow pit located approximately 24 km (15 mi.) northwest of Caribou Lake.

Map Reference: NTS 107N E<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 566,000E 7,562,500N

ASSESSMENT: Suitable for continued development.

The source is located outside the 28 km (17.5 mi.) Pipeline corridor. All-weather access is provided by the Mackenzie Highway which passes close to the source. Off highway access is by truck in the winter over flat, thermokarst terrain.

The source was previously developed as a source of sub-grade material for construction of the Mackenzie Highway.

SITE BD4-06(R2)

REFERENCE: Site 1155, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class R-2, bedrock suitable for fair quality general fill.

MATERIAL DESCRIPTION: Shale and siltstone.

OVERBURDEN: Clayey silt; 275 cm (9 ft.)

DEPTH OF ACTIVE LAYER: At surface.

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Blast and quarry.

DITE DESCRIPTION: Bedrock deposit situated 14 km (9 mi.) north of Caribou Lake.

Drainage: Fair.

Map Reference: NTS 107B, Aklavik

UTM Reference: Zone 8; 586,900E 7,560,000N

SITE INVESTIGATION: 2 drill holes.

ASSESSMENT: Suitable for development, although the overburden is deep and ice rich.

The source lies within the 28 km (17.5 mi.) pipeline corridor. The access is by truck in the winter across thermally sensitive terrain.

The source lies within the critical winter range of the Reindeer Herd which is utilized between December 1st and April 1st.



SITE BD4-07 (NG)

REFERENCE: Site 1154, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class N.G., Non-granular material not suitable for construction purposes.

MATERIAL DESCRIPTION: Variable from clayey gravel to silt and sand (GC-ML);  
Maximum size greater than 3.8 cm (1.5 in.);  
Very high moisture content.

DEPTH OF ACTIVE LAYER: 45 cm (1.5 ft.)+

SITE DESCRIPTION: Extensive kame complex situated 4 km (2.5 mi.) north of North Caribou Lake.

Vegetation: dense shrubs, herbs and sedge in marsh; dense spruce and tamarack.

Drainage: poor.

Map Reference: NTS 107B, Aklavik

UTM Reference: Zone 8; 595,500E 7,562,000N

SITE INVESTIGATION: 1 drill hole, 2 test pits.

ASSESSMENT: Material is not suitable for construction purposes

SITE BD4-08(NG)

REFERENCE: Source No. 458A, Zone IV DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class NG, Non-granular material unsuitable for construction purposes.

MATERIAL DESCRIPTION: Silt and sand (ML);  
High moisture content.

DEPTH OF ACTIVE LAYER: 1 m (3.5 ft.)

SITE DESCRIPTION: Esker about 1.5 km (2.5 mi.) long, located 11 km (18 mi.) by air south of Inuvik and adjacent to the Dempster Highway.

Vegetation: white spruce and some aspen to 6 m (20 ft.) high.

Drainage: good.

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 564,500E 7,558,000N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Material is not suitable for construction purposes.

SITE BD4-09(R2)

REFERENCE: Mile 941 Borrow Pit, Mackenzie Highway, Department of Public Works, Canada.

MATERIAL QUALITY: Class R-2, Bedrock suitable for fair quality general fill in sub-grades.

MATERIAL DESCRIPTION: Soft, thinly bedded shales with occasional thin bands of sandstone.

OVERBURDEN: 300 cm (10 ft.)

RESERVES: Possible Unlimited

SITE DESCRIPTION: Shallow bedrock pit located approximately 22 km (14 mi.) ENE of Caribou Lake.

Map Reference: NTS 107B E<sub>2</sub>, Aklavik

UTM Reference: Zone 8; 564,000E 7,554,000N

ASSESSMENT: Suitable for continued development.

The source is located outside the 28 km (17.5 mi.) pipeline corridor. All-weather access is provided by the Mackenzie Highway which passes close to the source. Off highway access is by truck in the winter over flat, thermokarst terrain.

The source was previously developed as a source of sub-grade material for construction of the Mackenzie Highway.

SITE BD4-10(3)

REFERENCE: Deposit (a); Area II DIAND Granular Resource Inventory; Alkavik NTS 107B E<sub>2</sub>, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel and silt.

RESERVES: Possible 20,000,000 cu.m (25,000,000 cu.yd.)

SITE DESCRIPTION: Flood plain, paralleling unnamed river located approximately 14 km (9 mi.) west of Caribou Lake.

Thickness: 3 m (10 ft.)  
Area: 12,000,000 sq m (120,000,000 sq ft.)  
Perimeter: 29,000 m (96,000 ft.)

Map Reference: NTS 107B E<sub>2</sub>, Alkavik

UTM Reference: Zone 8; 566,000E 7,550,000N

ASSESSMENT: Not suitable for development because of the available granular materials located within or adjacent to the active stream channel.

The source is located well outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat thermokarst terrain.

SITE BD4-11(NG)

REFERENCE: Site 1156A, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class NG, Non-granular material not suitable for construction purposes.

MATERIAL DESCRIPTION: Silt and sand with occasional gravel;

DEPTH OF ACTIVE LAYER: 90 cm (3 ft.)

SITE DESCRIPTION: Deposit located 9 km (5½ mi.) north northwest of the north shore of Caribou Lake.

Map Reference: NTS 107B, Aklavik

UTM Reference: Zone 8; 585,000E 7,554,000N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Material is not suitable for construction purposes

SITE BD4-12(3)

REFERENCE: Site 1153, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel, some silt (SM-GM);  
Maximum size greater than 7.6 cm (3 in.);  
Medium moisture content.

OVERBURDEN: Moss and clay; 90 cm (3 ft.)

DEPTH OF ACTIVE LAYER: 90 cm (3 ft.)

RESERVES: Proven 100,000 cu.m (150,000 cu.yd.)  
Probable 2,000,000 cu.m (3,000,000 cu.yd.)  
Possible 2,500,000 cu.m (3,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain. Winter operation required. Buffer zones are recommended to protect adjacent lake shorelines.

SITE DESCRIPTION: Kame complex with numerous small lakes situated along shore of the Lost Reindeer Lakes, 3 km (2 mi.) east of North Caribou Lake.

Vegetation: tree cover sparse, brush cover dense.

Drainage: poor, marshy.

Thickness: 6.1 m (20 ft.)  
Area: 900,000 sq.m (9,700,000 sq.ft.)  
Perimeter: 4,800 m (16,000 ft.)

Map Reference: NTS 107B, Aklavik

UTM Reference: Zone 8; 600,000E 7,557,000N

SITE INVESTIGATION: 2 test pits.

ASSESSMENT: Suitable for development in local projects.

The site lies near the center of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across hilly, thermally

SITE BD4-12(3)

sensitive terrain and numerous lakes.

The site lies within the critical winter range of the Reindeer Herd which is utilized between December 1st and April 1st.

SITE BD4-13(3)

REFERENCE: Site 1152, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel, trace to some silt (GP-GM); Maximum size greater than 3.8 cm (1.5 in.); High moisture content.

OVERBURDEN: Peat and silt; 0 to 335 cm (11 ft.)

DEPTH OF ACTIVE LAYER: 30 cm (1 ft.)+

RESERVES: Proven 150,000 cu.m (200,000 cu.yd.)  
Probable 3,000,000 cu.m (4,000,000 cu.yd.)  
Possible 5,000,000 cu.m (6,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip and blast; stockpile, thaw and drain. Winter operations necessary. Buffer zones recommended to protect shorelines of adjacent lakes.

SITE DESCRIPTION: Complex of relatively large kames located along the west shore of the Lost Reindeer Lakes.

Vegetation: sparse black spruce and tamarack.

Drainage: upland areas well drained; poorly drained kettles.

Thickness: 7.6 m (25 ft.)  
Area: 1,300,000 sq.m (14,000,000 sq.ft.)  
Perimeter: 5,000 m (17,000 ft.)

Map Reference: NTS 107B, Aklavik

UTM Reference: Zone 8; 602,000E 7,554,600N

SITE INVESTIGATION: 1 drill hole, 2 test pits.

ASSESSMENT: Suitable for development contingent on detailed environmental evaluation.

The source is located near the center of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over hilly, thermally



SITE BD4-13(3)

sensitive terrain and numerous lakes.

The site lies within the critical winter range of the Reindeer Herd which is utilized between December 1st and April 1st.

SITE BD4-14(3)

REFERENCE: Deposit (b), Area III DIAND Granular Resource Inventory; Aklavik NTS 107B, E $\frac{1}{2}$  Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

RESERVES: Possible 25,000,000 cu.m (35,000,000 cu.yd.)

SITE DESCRIPTION: Glaciofluvial plain and hummocky glaciofluvial deposit located approximately 13 km (8 mi.) northeast of Caribou Lake.

Thickness: 11 m (35 ft.)  
Area: 3,000,000 sq m (33,000,000 sq ft.)  
Perimeter: 6,300 m (21,000 ft.)

Map Reference: NTS 107B E $\frac{1}{2}$ , Aklavik

UTM Reference: Zone 8; 605,500E 7,550,000N

ASSESSMENT: Suitable for development.

The source is located near the center of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat thermokarst terrain characterized by numerous lakes.

SITE BD4-15(4)

REFERENCE: Site 1150A, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 4, Poor to fair quality material suitable for marginal fill.

MATERIAL DESCRIPTION: Sand, trace gravel, trace silt (SP-SM); Maximum size 1.9 cm (3/4 in.); Medium to high moisture content.

OVERBURDEN: Moss; 15 cm (6 in.)

DEPTH OF ACTIVE LAYER: 180 cm (6 ft.)+

METHOD OF EXTRACTION: Rip, doze, stockpile, thaw and drain; siltation controls are recommended.

SITE DESCRIPTION: Esker-kame complex situated 21 km (13 mi.) north west of Tenlen Lake.

Vegetation: dense shrub, herbs and sedges in marsh; dense spruce and tamarack.

Drainage: good.

Map Reference: NTS 107A, Crossley Lakes

UTM Reference: Zone 9; 394,000E 7,550,000N

SITE INVESTIGATION: 1 drill hole, 1 test pit.

ASSESSMENT: Suitable for development for use in local projects only. Extensive field drilling is required to delineate areas of exploitable materials.

The source is located just outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over hilly and thermally sensitive terrain.

SITE BD4-16(NG)

REFERENCE: Site 1149A, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class NG, Non-granular material, not suitable for construction purposes.

MATERIAL DESCRIPTION: Clay.

SITE DESCRIPTION: Deposit located 18 km (11 mi.) south southwest of Hyndman Lake.

Map Reference: NTS 107A, Crossley Lakes

UTM Reference: Zone 9; 396,600E 7,553,600N

SITE INVESTIGATION 1 drill hole, 1 test pit.

ASSESSMENT: Material is not suitable for construction purposes.

SITE BD4-17(3)

REFERENCE: Site 1146, Volume IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel, little silt (SM);  
Maximum size greater than 1.9 cm (3/4 in.);  
Medium moisture content.

OVERBURDEN: Peat; 45 cm (1.5 ft.)

DEPTH OF ACTIVE LAYER: 45 cm (1.5 ft.)+

RESERVES: Proven 200,000 cu.m ( 300,000 cu.yd.)  
Probable 10,000,000 cu.m (15,000,000 cu.yd.)  
Possible 20,000,000 cu.m (30,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, doze, stockpile, thaw and drain. Blasting may be required because of shallow permafrost.

SITE DESCRIPTION: Outwash deposit situated 5 km (3 mi.) northwest of Fish Trap Lake.

Vegetation: moderately dense spruce.

Drainage: high areas well drained, low areas marshy.

Thickness: 5 m (16 ft.)  
Area: 4,900,000 sq.m (53,000,000 sq.ft.)  
Perimeter: 14,000 m (47,000 ft.)

Map Reference: NTS 107B, Aklavik; 106N, Arctic Red River

UTM Reference: Zone 8; 63,000E 7,546,000N

SITE INVESTIGATION: 1 drill hole, 1 test pit.

ASSESSMENT: Suitable for development. The site is located near the center of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across thermally sensitive and hilly terrain.

SITE BD4-18(3)

REFERENCE: Site 1147, Volume IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel and sand, some silt, variable sand content (GP-SM);  
Maximum size to 7.6 cm (3 in.);  
Medium moisture content.

OVERBURDEN: Peat and organic silt; 0 to 60 cm (2 ft.)

DEPTH OF ACTIVE LAYER: 180 cm (6 ft.)+

RESERVES: Proven 2,000,000 cu.m ( 2,500,000 cu.yd.)  
Probable 10,000,000 cu.m (15,000,000 cu.yd.)  
Possible 25,000,000 cu.m (30,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Blast, stockpile, thaw and drain.

SITE DESCRIPTION: Large outwash deposit situated 26 km (16 mi.) northwest of Tenlen Lake.

Vegetation: sparse to dense blackspruce and brush.

Drainage: good.

Thickness: 5 m (16 ft.)  
Area: 6,100,000 sq.m (66,000,000 sq.ft.)  
Perimeter: 12,000 m (40,000 ft.)

Map Reference: NTS 106-0, Travaillant Lake;  
107A Crossley Lakes

UTM Reference: Zone 9; 388,000E 7,547,000N

SITE INVESTIGATION: 2 drill holes, 2 test pits.

ASSESSMENT: Good prospect for development. The source is located adjacent to the western boundary of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over hilly and thermally sensitive terrain.

SITE BD4-19(3)

REFERENCE: Site 1148, Volume IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel and sand, little to some silt (GM-SM); Numerous cobbles.

OVERBURDEN: Moss; 15 cm ( $\frac{1}{2}$  ft.)

DEPTH OF ACTIVE LAYER: 90 cm (3 ft.)+

RESERVES:   Proven       15,000 cu.m ( 20,000 cu.yd.)  
          Probable   1,500,000 cu.m (2,000,000 cu.yd.)  
          Possible   6,500,000 cu.m (8,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip and doze. Siltation controls and buffer zones are recommended.

SITE DESCRIPTION: Small thin outwash remnants located 24 km (15 mi.) northwest of Tenlen Lake.

Vegetation: dense black spruce, shrubs, herbs and sedges.

Drainage: fair.

Thickness: 3.0 m (10 ft.)  
Area: 3,500,000 sq.m (38,000,000 sq.ft.)  
Perimeter: 19,000 m (62,000 ft.)

Map Reference: NTS 106-0, Travaillant Lake; 107A; Crossley Lakes

UTM Reference: Zone 9; 400,000E 7,546,400N

SITE INVESTIGATION: 2 test pits.

ASSESSMENTS: Suitable for development. Extensive field drilling is required to delineate areas of exploitable material.

Since haul distances are long and access is difficult across hilly, thermally sensitive terrain, this deposit may only be suitable for local projects.

SITE BD4-20(4)

REFERENCE: Site 1145a, Volume IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 4, Poor quality material suitable only for marginal fill.

MATERIAL DESCRIPTION: Silt to sand and gravel, with silt, variable; Maximum size 7.6 cm (3 in.); Low moisture content.

OVERBURDEN: Peat and silt; 60 cm (2 ft.)

DEPTH OF ACTIVE LAYER: 45 cm (1.5 ft.)+

RESERVES:   Proven           20,000 cu.m ( 25,000 cu.yd.)  
          Probable       400,000 cu.m ( 500,000 cu.yd.)  
          Possible      5,500,000 cu.m (7,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, thaw and drain.

SITE DESCRIPTION: Large kame complex situated 3 km (2 mi.) east of Hill Lake.  
  
Thickness: 4.6 m (15 ft.)  
Area: 1,200,000 sq. m (14,000,000 sq ft.)  
  
Map Reference: 106N, Arctic Red River  
  
UTM Reference: Zone 8; 8,607,000E 7,544,400N

SITE INVESTIGATION: 1 drill hole, 2 test pits.

ASSESSMENT: Not suitable for development because of variable quantity of poor quality materials.  
  
The site is situated within the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over hilly, thermally sensitive terrain.  
  
May be suitable for small local projects although extensive field drilling would be required to delineate pockets of suitable granular materials.



SITE BD4-21(3)

REFERENCE: Deposit (c), Area IX DIAND Granular Resource Inventory; Travaillant Lake NTS 106-0, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

RESERVES: Possible 15,000 cu.m (20,000 cu.yd.)

SITE DESCRIPTION: Two small esker ridges located approximately 16 km (10 mi.) northwest of Tenlen Lake.

Thickness: 3 m (10 ft.)

Area: 28,000 sq m (300,000 sq ft.)

Perimeter: 3,400 m (11,000 ft.)

Map Reference: NTS 106-0, Travaillant Lake.

UTM Reference: Zone 9; 397,500E 7,542,000N

ASSESSMENT: May be suitable for development although quantity of granular material available is minimal.

The source is located within the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat to rolling, thermokarst terrain.

SITE BD4-22(2)

REFERENCE: Site 1138, Volume IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants Ltd., 1973.

MATERIAL QUALITY: Class 2, Good quality material suitable for embankment fills, base course, surface aggregate; or concrete aggregate with extensive processing.

MATERIAL DESCRIPTION: Sand and gravel, varying silt content (GW-GM).

OVERBURDEN: Peat and silt 0 to 60 cm (2 ft.)

DEPTH OF ACTIVE LAYER: 260 cm (8.5 ft.)

RESERVES: Possible 4,000,000 cu.m (5,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, doze, thaw and drain. Frozen gravel may have to be blasted.

SITE DESCRIPTION: Extensive outwash plain dissected by old stream channels and is situated 18 km (11 mi.) north of Travaillant Lake.

Vegetation: sparse to dense aspen, bush alder, spruce, tamarack and willow.

Drainage: good.

Thickness: 4.6 m (15 ft.)

Area: 950,000 sq.m (10,000,000 sq.ft.)

Perimeter: 12,000 m (38,000 ft.)

Map Reference: NTS 106-0, Travaillant Lake  
NTS 106N, Arctic Red River

UTM Reference: Zone 9; 380,000E 7,537,000N

SITE INVESTIGATION: Nil.

ASSESSMENT: Suitable for development but requires additional field work to determine quality and quantity of granular materials.

The source lies with the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter and will be difficult because of hilly and thermally sensitive terrain.

SITE BD4-23(3)

REFERENCE: Deposit (b), Area VIII DIAND Granular Resource Inventory; Travaillant Lake NTS 106-0, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill;

MATERIAL DESCRIPTION: Gravel, little sand and silt.

RESERVES: Possible 1,500,000 cu.m (2,000,000 cu.yd.)

SITE DESCRIPTION: Glacilofluvial terrace located approximately 22 km (14 mi.) north of Travaillant Lake.

Thickness: 4.5 m (15 ft.)  
Area: 310,000 sq m (3,300,000 sq ft.)  
Perimeter: 3,400 m (11,000 ft.)

Map Reference: NTS 106-0, Travaillant Lake.

UTM Reference: Zone 9; 385,200E 7,539,500N

ASSESSMENT: May be suitable for development although quantities of available granular materials are minimal.

The source is located within the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat, thermokarst terrain characterized by numerous large lakes.

SITE BD4-24(3)

REFERENCE: Deposit (a) and (c), Area VIII DIAND Granular Resource Inventory; Travaillant Lake NTS 106-0 Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

RESERVES: Possible 30,000,000 cu.m (40,000,000 cu.yd.)

SITE DESCRIPTION: Channelled glaciofluvial terraces and hummocky glaciofluvial deposits located approximately 17 km (11 mi.) north of Travaillant Lake.

Thickness: 12 m (40 ft.)

Area: 3,300,000 sq m (35,000,000 sq ft.)

Perimeter: 30,000 m (100,000 ft.)

Map Reference: NTS 106-0, Travaillant Lake.

UTM Reference: Zone 9; 391,000E 7,535,000N

ASSESSMENT: Suitable for development.

The source is located near the center of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over flat thermokarst terrain characterized by numerous lakes.

SITE BD4-25(3)

REFERENCE: Deposit (b), Area IX DIAND Granular Resource Inventory; Travaillant Lake NTS 106-0, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

RESERVES: Possible 2,000,000 cu.m (2,500,000 cu.yd.)

SITE DESCRIPTION: Glaciofluvial terrace located approximately 10 km (6 mi. ) northwest of Tenlen Lake.

Thickness: 12 m (40 ft.)  
Area: 210,000 sq m (2,200,000 sq ft.)  
Perimeter: 2,400 m (8,000 ft.)

Map Reference: NTS 106-0, Travaillant Lake.

UTM Reference: Zone 9; 402,500E 7,537,000N

ASSESSMENT: May be suitable for development although quantities of granular material available are minimal.

The source is located inside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across rolling to flat, thermokarst terrain characterized by numerous large lakes.

SITE BD4-26(4)

REFERENCE: Site 1144, Volume IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 4, Poor quality material suitable for marginal fill.

MATERIAL DESCRIPTION: Gravel and sand, some silt (GM);  
Maximum size 3.8 cm (1½ in.);  
Medium moisture content.

OVERBURDEN: Silt and clay; 60 cm (2 ft.)

DEPTH OF ACTIVE LAYER: 90 cm (3 ft.)+

RESERVES: Proven 20,000 cu.m ( 25,000 cu.yd.)  
Probable 400,000 cu.m ( 500,000 cu.yd.)  
Possible 5,500,000 cu.m (7,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, stockpile, drain and thaw. Buffer zones recommended.

SITE DESCRIPTION: Large kame - kame terrace complex situated between High Point Lake and Otter Lake.

Vegetation: dense brush and stunted birch and spruce.

Drainage: poor.

Thickness: 4.6 m (15 ft.)  
Area: 10,000,000 sq. m (14,000,000 sq. ft.)  
Perimeter: 7,300 m (24,000 ft.)

Map Reference: NTS 106N, Arctic Red River

UTM Reference: Zone 8; 606,600E 7,534,400N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Suitable for development for local projects. The source is located outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across hilly, thermally sensitive terrain and numerous lakes.

SITE BD4-27(NG)

REFERENCE: Site 1142a, Volume IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class N.G., Non granular material not suitable for construction requirements.

MATERIAL DESCRIPTION: Silt and sand;  
Maximum size 7.6 cm (3 in.);  
Low moisture content.

DEPTH OF ACTIVE LAYER: 90 cm (3 ft.)+

SITE DESCRIPTION: Small kame complex located 1.6 km (1 mi.) south-east of Fish Lake.

Vegetation: dense shrubs, herbs and sedges to dense black spruce, tamarack and alder. Willow adjacent to water courses.

Map Reference: NTS 106N, Arctic Red River

UTM Reference: Zone 8; 618,800E 7,536,900N

SITE INVESTIGATION: 1 test pit

ASSESSMENT: Material is not suitable for construction requirements.

SITE BD4-28(3)

REFERENCE: Deposit (a), Area VIII DIAND Granular Resource Inventory; Travaillant Lake NTS 106-0, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

RESERVES: Possible 2,000,000 cu.m (2,500,000 cu.yd.)

SITE DESCRIPTION: Hummocky glaciofluvial deposit located approximately 21 km (13 mi.) north of Travaillant Lake.

Thickness: 12 m (40 ft.)  
Area: 210,000 sq m (2,200,000 sq ft.)  
Perimeter: 3,700 m (12,000 ft.)

Map Reference: NTS 106-0, Travaillant Lake.

UTM Reference: Zone 9; 377,500E 7,537,000N

ASSESSMENT: May be suitable for development although quantity of available granular materials are minimal.

The source is located adjacent to the western boundary of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat, thermokarst terrain.



SITE BD4-29(NG)

REFERENCE: Site 1140A, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class NG, Non-granular material not suitable for construction purposes.

MATERIAL DESCRIPTION: Clay, some silt.

DEPTH OF ACTIVE LAYER: 30 cm (1 ft.)+

SITE DESCRIPTION: Fossil lake bottom situated 19 km (12 mi.) north of Travaillant Lake.

Vegetation: Treeless with dense shrubs, herbs and sedges; dense spruce, and tamarack.

Drainage: fair.

Map Reference: NTS 106-0, Travaillant Lake.

UTM Reference: Zone 9; 376,900E 7,934,900N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Material not suitable for engineering construction uses.

SITE BD4-30(2)

REFERENCE: Site 1141, Volume IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 2, Good quality material suitable for embankment fill, base course and surface aggregate.

MATERIAL DESCRIPTION: Sand and gravel, trace silt (GW-GM); Maximum size, greater than 2.5 cm (1 in.).

OVERBURDEN: Moss: 15 cm ( $\frac{1}{2}$  ft.)

DEPTH OF ACTIVE LAYER: 60 cm (2 ft.)+

RESERVES:   Proven           20,000 cu.m ( 25,000 cu.yd.)  
          Probable       400,000 cu.m ( 500,000 cu.yd.)  
          Possible      4,000,000 cu.m (5,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip and doze.

SITE DESCRIPTION: Low outwash deposit situated 19 km (12 mi.) north of Travaillant Lake.

Vegetation: dense shrubs, herbs and sedges; dense spruce and tamarack.

Drainage: poor, swampy.

Thickness: 4.6 m (15 ft.)  
Area: 860,000 sq.m (9,200,000 sq.ft.)  
Perimeter: 3,700 m (12,000 ft.)

Map Reference: NTS 106N, Arctic Red River

UTM Reference: Zone 8, 376,500E 7,534,900N

SITE INVESTIGATION: 1 test pit

ASSESSMENT: Suitable for development. The source lies within the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over hilly and thermally sensitive terrain.

SITE BD4-31(R2)

REFERENCE: Site 1139, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class R-2, bedrock suitable for fair quality general fill.

MATERIAL DESCRIPTION: Shale.

DEPTH OF ACTIVE LAYER: Not determined.

MINIMUM HAUL DISTANCE:

SITE DESCRIPTION: Bedrock outcrop 6 km (4 mi.) north of Crossing Creek Lake.

Map Reference: NTS 106-0, Travaillant Lake.  
NTS 106N, Arctic Red River

UTM Reference: Zone 8; 626,000E 7,532,000N

SITE INVESTIGATION: Nil.

ASSESSMENT: Not suitable for development because of better quality materials that are located in adjacent sources.

The source is located within the 28 km (17.5mi.) pipeline corridor. Access is by truck in the winter across hilly and thermally sensitive terrain.

SITE BD4-32(2)

REFERENCE: Site 1137, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 2, good quality material suitable for embankment fill; base course and surface aggregate.

MATERIAL DESCRIPTION: Gravel and sand; little silt and clay (GW-SW); variable from kame to kame; Maximum size greater than 2.5 cm (1 in.); Medium moisture content.

OVERBURDEN: Moss; 15 cm (6 in.)

DEPTH OF ACTIVE LAYER: 90 cm (3 ft.)+

RESERVES: Proven 7,000 cu.m (9,000 cu.yd.)  
Probable 150,000 cu.m (200,000 cu.yd.)  
Possible 1,000,000 cu.m (1,500,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip and doze. Winter operations will be necessary because of access limitations.

SITE DESCRIPTION: Two small kame complexes situated 15 km (9.5 mi.) north of Travaillant Lake.  
Vegetation: dense spruce.  
Drainage: good.  
Thickness: 6.1 m (20 ft.)  
Area: 370,000 sq.m (3,900,000 sq.ft.)  
Perimeter: 7,100 m (23,000 ft.)  
Map Reference: NTS 106-0, Travaillant Lake.  
UTM Reference: Zone 9; 380,000E 7,531,000N

SITE INVESTIGATION: 2 test pits.

ASSESSMENT: Suitable for development for local needs.  
The source is situated near the centre of the 28 km (17.5 mi.) pipeline corridor.  
Access is by truck in the winter and will be

SITE BD4-32(2)

difficult because of hilly and thermally sensitive terrain.

Haul distances to existing and proposed facilities are very long.

SITE BD4-33(3)

REFERENCE: Deposit (c); Area VIII DIAND Granular Resource Inventory; Travaillant Lake NTS 106-0, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

RESERVES: Possible 7,500,000 cu.m (10,000,000 cu.yd.)

SITE DESCRIPTION: Channelled glaciofluvial terraces located approximately 13 km (8 mi.) north of Travaillant Lake.

Thickness: 12 m (40 ft.)  
Area: 1,000,000 sq m (11,000,000 sq ft.)  
Perimeter: 13,000 m (35,000 ft.)

Map Reference: NTS 106-0, Travaillant Lake.

UTM Reference: Zone 9; 384,000E 7,530,000N

ASSESSMENT: Suitable for development.

The source is located near the western border of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat Thermokarst terrain characterized by numerous lakes.

SITE BD4-34 (NG)

REFERENCE: Site 1122A, Vol IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class NG, non-granular material not suitable for construction purposes.

MATERIAL DESCRIPTION: Silt, clayey sand (ML-SC); Medium to very high moisture content.

DEPTH OF ACTIVE LAYER: 3.9 m (13 ft.)+

SITE DESCRIPTION: Deposit is located between High Point Lake and Point Lake.

Vegetation: dense shrubs, black spruce and tamarack.

Drainage: fair.

Map Reference: NTS 106N, Arctic Red River

UTM Reference: Zone 8; 607,000E 7,529,200N

SITE INVESTIGATION: 1 drill hole, 2 test pits.

ASSESSMENT: Not suitable for engineering uses.

SITE BD4-35(3)

REFERENCE: Site 1127, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel and sand, some silt (GM);  
Low to medium moisture content;  
Maximum size to 7.5 cm (3 in.)

OVERBURDEN: Moss; 15 cm (6 in.)

DEPTH OF ACTIVE LAYER: 6.3 m (21 ft.)

RESERVES: Proven 1,400,000 cu.m (1,900,000 cu.yd.)  
Probable 5,000,000 cu.m (8,000,000 cu.yd.)  
Possible 12,000,000 cu.m (17,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip and doze. Buffer zones, siltation control and winter operations are recommended.

SITE DESCRIPTION: Complex of outwash, kames and eskers 4 km (2.5 mi.) northwest of Tregnantchies Lake.

Vegetation: sparse spruce, tamarack, aspen and birch; dense alder and willow along streams and lake shores.

Drainage: good.

Thickness: 7.9 m (26 ft.)  
Area: 2,100,000 sq.m (23,000,000 sq.ft.)  
Perimeter: 8,900 m (29,000 ft.)

Map Reference: NTS 106N, Arctic Red River

UTM Reference: Zone 8; 619,800E 7,526,600N

SITE INVESTIGATION: 1 drill hole, 2 test pits.

ASSESSMENT: Suitable for development.

The source lies outside the 28 km (17.5 mi.) pipeline corridor. Access is expected to be difficult and should be along winter roads because of thermally sensitive and hilly terrain.



SITE BD4-35(3)

This site is a long haul distance from proposed facilities.

SITE BD4-36(2)

REFERENCE: Site 1138, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 2, Good quality material suitable for embankment fills, base course, surface aggregate; or concrete aggregate with extensive processing.

MATERIAL DESCRIPTION: Sand and gravel, varying silt content (GW-GM); Maximum size greater than 3.2 cm (1½ in.); Low to medium moisture content.

OVERBURDEN: Peat, silt; 0 to 60 cm ( 2 ft.)

DEPTH OF ACTIVE LAYER: 260 cm (8.5 ft.)

RESERVES: Proven 2,000,000 cu.m (2,500,000 cu.yd.)  
Probable 15,000,000 cu.m (20,000,000 cu.yd.)  
Possible 25,000,000 cu.m (35,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, doze, thaw and drain. Frozen gravel may have to be blasted.

SITE DESCRIPTION: Extensive outwash deposit which has been dissected by old stream channels and is situated 18 km (11 mi.) north of Travaillant Lake.

Vegetation: sparse to dense; aspen, bush, alder, spruce, tamarack and willow.

Drainage: good.

Thickness: 4.6 m (15 ft.)  
Area: 6,500,000 sq.m (70,000,000 sq.ft.)  
Perimeter: 37,000 m (120,000 ft.)

Map Reference: NTS 106-O, Travaillant Lake  
NTS 106N, Arctic Red River

UTM Reference: Zone 9; 380,000E 7,537,000N

SITE INVESTIGATION: 2 drill holes, 5 test pits.

ASSESSMENT: Suitable for development.

The source lies within the 28 km (17.5 mi.) pipeline corridor.

SITE BD4-36(2)

Access is by truck in the winter and will be difficult because of hilly and thermally sensitive terrain.

SITE BD4-37(R2)

REFERENCE: Site 1128, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class R-2, rock suitable for general fill.

MATERIAL DESCRIPTION: Shale.

OVERBURDEN: Clayey silt; 3.6 m (12 ft.)

DEPTH OF ACTIVE LAYER: Just below the surface.

MINIMUM HAUL DISTANCE:

METHOD OF EXCAVATION: Elast and quarry. Siltation control may be required.

SITE DESCRIPTION: Bedrock site situated 2.4 km (1.5 mi.) north of Crossing Creek Lake.

Vegetation: dense shrub, herbs and sedges in marshes; scattered spruce and tamarack.

Drainage: good.

Map Reference: NTS 106N, Arctic Red River

UTM Reference: Zone 8;

SITE INVESTIGATION: 1 drill hole.

ASSESSMENT: Not suitable for development because of thick overburden and long haulage distances unless material storages are critical.

The source is located outside the 28 km (17.5 mi.) pipeline corridor.

Access is by truck in the winter over hilly and thermally sensitive terrain.

SITE BD4-38(NG)

REFERENCE: Site 1130A, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class NG, Non-granular material not suitable for construction purposes.

MATERIAL DESCRIPTION: Silty clay (CL).

DEPTH OF ACTIVE LAYER: 60 cm (2 ft.) +

SITE DESCRIPTION: Deposit located 8 km (5 mi.) north of Travaillant Lake.

Map Reference: NTS 106-0, Travaillant Lake

UTM Reference: Zone 9; 382,000E 7,525,000N

SITE INVESTIGATION: 3 test pits.

ASSESSMENT: Material not suitable for engineering construction uses.

SITE BD4-39(NG)

REFERENCE: Site 1131A, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class NG, non-granular material, not suitable for construction purposes.

MATERIAL DESCRIPTION: Pockets of gravel and sand with some silt; sand and silt with trace gravel; material is highly variable.  
Maximum size to 7.6 cm (3 in.);  
Low to high moisture content;

DEPTH OF ACTIVE LAYER: 60 cm (2 ft.)+

SITE DESCRIPTION: Large deltaic feature composed of glacial till situated approximately 14 km (9 mi.) northeast of Travaillant Lake.

Vegetation: spruce, tamarack and shrub; dwarf shrubs and grasses on dry slopes.

Drainage: good

Map Reference: NTS 106-0, Travaillant Lake.

UTM Reference: Zone 9; 394,500E 7,525,000N

SITE INVESTIGATION: 1 drill hole, 2 test pits.

ASSESSMENT: Not suitable for development because of very poor quality material. May be considered for local uses if material requirements are critical.

The source is located near the centre of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across hilly and thermally sensitive terrain.

SITE BD4-40(2)

REFERENCE: Site 1121, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 2, good quality material suitable for embankment fill, base and surface course aggregate.

MATERIAL DESCRIPTION: Gravel and sand, some silt (GM); Maximum size is 7.6 cm (3 in.); Medium moisture content.

OVERBURDEN: Organic silt, peat and moss; less than 30 cm (1 ft.)

DEPTH OF ACTIVE LAYER: 3.6 m (12 ft.)+

RESERVES: Proven 250,000 cu.m (350,000 cu.yd.)  
Probable 25,000,000 cu.m (35,000,000 cu.yd.)  
Possible 55,000,000 cu.m (70,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip and doze.

SITE DESCRIPTION: Large outwash deposit located between Point Lake and Sunny Lake.

Vegetation: dense willow and birch.

Drainage: good, localized depressions and lakes.

Thickness: 6.1 m (20 ft.)  
Area: 9,500,000 sq.m (100,000,000 sq.ft.)  
Perimeter: 20,000 m (65,000 ft.)

Map Reference: NTS 106N, Arctic Red River

UTM Reference: Zone 8; 604,000E 7,526,000N

SITE INVESTIGATION: 2 drill holes, 2 test pits.

ASSESSMENT: Suitable for development although long haul distances are required to proposed facilities.

The source is located well outside the 28 km (17.5 mi.) pipeline corridor.

Access is by truck in the winter across thermally sensitive terrain.

SITE BD4-41(2)

REFERENCE: Site 1123, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 2, good quality material suitable for embankment fill, base course and surface aggregate.

MATERIAL DESCRIPTION: Gravel, sandy, trace silt (GM);  
Maximum size to 7.6 cm (3 in.);  
Low moisture content.

OVERBURDEN: Peat; 45 cm (1.5 ft.)

DEPTH OF ACTIVE LAYER: 2.7 m (9 ft.)+

RESERVES: Proven 900,000 cu.m (1,200,000 cu.yd.)  
Probable 9,000,000 cu.m (11,000,000 cu.yd.)  
Possible 13,000,000 cu.m (16,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip and doze. Shoreline buffers, siltation controls and winter operations are recommended.

SITE DESCRIPTION: Extensive outwash deposit along the north shore of Point Lake.

Vegetation: sparse cover of aspen, spruce, birch and alder.

Drainage: good.

Thickness: 4.5 m (15 ft.)  
Area: 5,800,000 sq.m (62,000,000 sq.ft.)  
Perimeter: 17,000 m (56,000 ft.)

Map Reference: NTS 106N, Arctic Red River

UTM Reference: Zone 8; 609,000E 7,525,500N

SITE INVESTIGATION: 2 drill holes, 2 test pits.

ASSESSMENT: Suitable for development.

The source lies outside the 28 km (17.5 mi.) pipeline corridor. Access is not difficult but crosses thermally sensitive terrain and is restricted to winter operations.



SITE BD4-41(2)

Material suitable for concrete aggregate may  
be processed from this site.

SITE BD4-42(3)

REFERENCE: Site 1124A, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel, some silt (GM-SM);  
Maximum size to 3.7 cm (1.5 in.);  
Medium moisture content.

OVERBURDEN: Peat, silt and clay; 90 cm (0 to 3 ft.)

DEPTH OF ACTIVE LAYER: 60 cm (2 ft.)+

RESERVES: Proven 800,000 cu.m (1,000,000 cu.yd.)  
Probable 3,500,000 cu.m (4,500,000 cu.yd.)  
Possible 10,000,000 cu.m (15,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip, doze, thaw and drain. Buffer zones, siltation controls, fish migration provisions, and winter operations are recommended.

SITE DESCRIPTION: Part of an extensive outwash deposit situated between Sandy Lake and Point Lake.

Vegetation: sparse tree cover.

Drainage: poor.

Thickness: 3.7 m (12 ft.)  
Area: 3,600,000 sq.m (39,000,000 sq.ft.)  
Perimeter: 9,400 m (31,000 ft.)

Map Reference: NTS 106N, Arctic Red River

UTM Reference: Zone 8; 612,500E 7,523,600N

SITE INVESTIGATION: 2 drill holes, 2 test pits.

ASSESSMENT: Not suitable for development because of long haul distance, relatively difficult access and the thin layer of borrow material (high stripping ratio).

The source is located outside the 28 km (17.5 mi.) pipeline corridor. Access is relatively difficult

SITE BD4-42(3)

because of hilly and thermally sensitive terrain. Access must be by truck in the winter.

SITE BD4-43(3)

REFERENCE: Site 1125, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel and sand, some silt (GM);  
Maximum size to 5 cm (2 in.);  
Low moisture content.

OVERBURDEN: Moss; 15 cm ( $\frac{1}{2}$  ft.)

DEPTH OF ACTIVE LAYER: 60 cm (2 ft.)+

RESERVES: Proven 20,000 cu.m (25,000 cu.yd.)  
Probable 400,000 cu.m (500,000 cu.yd.)  
Possible 4,000,000 cu.m. (5,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip and doze. Siltation control, shore line buffer zones and winter operations are recommended.

SITE DESCRIPTION: Part of an extensive outwash deposit situated along the south shore of Sandy Lake.

Vegetation: spruce, tamarack, aspen; dwarf shrubs on dry slopes; dense willow and alder along streams.

Drainage: good.

Thickness: 4.6 m (15 ft.)  
Area: 840,000 sq. m (9,000,000 sq. ft.)  
Perimeter: 5,000 m (17,000 ft.)

Map Reference: NTS 106N, Arctic Red River

UTM Reference: Zone 8; 614,000E 7,522,400N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Suitable for development.

The source is located outside the 28 km (17.5 mi.) pipeline corridor. Access is difficult because of hilly and thermally sensitive terrain and is

SITE BD4-43(3)

by truck in the winter.

SITE BD4-44(3)

REFERENCE:

Deposit (a), Area V DIAND Granular Resource Inventory; Arctic Red River NTS 106N, Geological Survey of Canada, 1972.

MATERIAL QUALITY:

Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION:

Sand and gravel;

RESERVES: Possible

35,000,000 cu.m (45,000,000 cu.yd.)

SITE DESCRIPTION:

Glaciofluvial plain located adjacent to the eastern end of Sandy Lake.

Thickness: 11 m (36 ft.)

Area: 3,800,000 sq m (41,000,000 sq ft.)

Perimeter: 18,000 m (60,000 ft.)

Map Reference: NTS 106N, Arctic Red River.

UTM Reference: Zone 8; 620,000E 7,521,500N

ASSESSMENT:

Suitable for development.

The source is located inside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across rolling to flat thermokarst terrain characterized by numerous large lakes.

SITE BD4-45(NG)

REFERENCE:

Site 1129A, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY:

Class NG, Non-granular material not suitable for construction purposes.

MATERIAL DESCRIPTION:

Clay, silty, medium plaster, trace of fine sand (CI);

DEPTH OF ACTIVE LAYER:

90 cm (3ft.)+

SITE DESCRIPTION:

Deposit located 4 km (2.5 mi.) north northwest of the confluence of Travaillant Lake and Travaillant River.

Drainage: fair

Map Reference: NTS 106-0, Travaillant Lake.

UTM Reference: Zone 9; 377,500E 7,521,000N

SITE INVESTIGATION:

1 drill hole, 1 test pit.

ASSESSMENT:

Material is not suitable for engineering construction use.

SITE BD4-46(2)

REFERENCE: Site 1120, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 2, good quality material suitable for embankment fill, base course and surface aggregate.

MATERIAL DESCRIPTION: Sand and gravel, some silt (GM);  
Maximum grain size to 5 cm (2 in.);  
Medium moisture content.

OVERBURDEN: Peat, silt and clay; 60 cm (2 ft.)

DEPTH OF ACTIVE LAYER: 210 cm (7 ft.)+

RESERVES: Proven 350,000 cu.m (450,000 cu.yd.)  
Probable 2,000,000 cu.m (2,500,000 cu.yd.)  
Possible 2,500,000 cu.m (3,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip and doze. Siltation controls are recommended.

SITE DESCRIPTION: Outwash deposit along the northwest shore of Lower Overflow Lake.

Vegetation: brush and sparse black spruce.

Drainage: well drained site.

Thickness: 3.0 m (10 ft.)  
Area: 1,600,000 sq.m (18,000,000 sq.ft.)  
Perimeter: 1,100 m (31,000 ft.)

Map Reference: 106N, Arctic Red River

UTM Reference: Zone 8; 605,200E 7,519,400N

SITE INVESTIGATION: 1 drill hole, 1 test pit.

ASSESSMENT: Suitable for development although haulage distance may be long from planned facility.

The source is located well outside the 28 km (17.5 mi.) pipeline corridor. Access is across thermally sensitive and hilly terrain, therefore



SITE BD4-46(2)

only winter access by truck is possible.

Selective excavation may yield material suitable for processing into concrete aggregate by crushing, screening and washing.

The site has a high environmental sensitivity and adjacent terrain is thermally sensitive.

SITE BD4-47(2)

REFERENCE: Site 1126A, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 2, Good quality material suitable for embankment fill, base course, surface aggregate.

MATERIAL DESCRIPTION: Sand and gravel, trace silt (GW-GM);  
Maximum size greater than 2.5 cm (1 in.);  
Low moisture content.

OVERBURDEN: Moss and Peat; 15 cm ( $\frac{1}{2}$ ft.)

DEPTH OF ACTIVE LAYER: 90 cm (3 ft.)+

RESERVES: Proven 3,500 cu.m (4,500 cu.yd.)  
Probable 35,000 cu.m (45,000 cu.yd.)  
Possible 150,000 cu.m (200,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip and doze. Siltation controls, buffer zones and winter operations are recommended.

SITE DESCRIPTION: Scattered small eskers.

Vegetation: treeless with dense shrubs, herbs and sedges in marshes; black spruce and tamarack; dense alder and willow along water courses.

Drainage: good.

Thickness: 3.0 m (10 ft.)  
Area: 94,000 sq.m (1,000,000 sq.ft.)  
Perimeter: 5,700 m (19,000 ft.)

Map Reference: NTS 106N, Arctic Red River

UTM Reference: Zone 8; 617,900E 7,520,400N

SITE INVESTIGATION: 2 test pits

ASSESSMENT: Not suitable for development because of long haul distance and small volume of material. Access to the small, scattered deposit is difficult.

The source is located outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across hilly and thermally sensitive terrain.

SITE BD4-48(3)

REFERENCE: Deposit (c); Area V DIAND Granular Resource Inventory; Arctic Red River NTS 106N, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

RESERVES: Possible 20,000,000 cu.m (25,000,000 cu.yd.)

SITE DESCRIPTION: Rolling glaciofluvial deposit located approximately 16 km (10 mi.) west of the northern tip of Travaillant Lake.

Thickness: 11 m (36 ft.)  
Area: 2,000,000 sq m (22,000,000 sq ft.)

Map Reference: NTS 106N, Arctic Red River

UTM Reference: Zone 8; 618,000E 7,518,500N

ASSESSMENT: Suitable for development.

The source is located adjacent to the western border of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat terrain exhibiting slight thermokarst features. Numerous large lakes must be either crossed or bypassed.

SITE BD4-49(3)

REFERENCE: Deposit (a); Area V DIAND Granular Resource Inventory; Arctic Red River NTS 106N, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel, some sand, trace silt and clay.

RESERVES: Possible 35,000,000 cu.m (45,000,000 cu.yd.)

SITE DESCRIPTION: Glaciofluvial plain located approximately 19 km (12 mi.) west of the northern end of Travaillant Lake.

Thickness: 11 m (36 ft.)  
Area: 3,800,000 sq m (41,000,000 sq ft.)  
Perimeter: 17,000 m (55,000 ft.)

Map Reference: NTS 106N, Arctic Red River

UTM Reference: Zone 8; 614,000E 7,516,000N

ASSESSMENT: Suitable for development.

The source is located outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across rolling to flat thermokarst terrain. Numerous large lakes must be crossed or bypassed.

SITE BD4-50(3)

REFERENCE: Deposit (d); Area V DIAND Granular Resource Inventory; Arctic Red River NTS 106N, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand.

RESERVES: Possible 4,500,000 cu.m (6,000,000 cu.yd.)

SITE DESCRIPTION: Rolling glaciofluvial deposit located approximately 11 km (7 mi.) west of the north end of Travaillant Lake.

Thickness: 11 m (36 ft.)  
Area: 520,000 sq m (5,600,000 sq ft.)  
Perimeter: 4,900 m (16,000 ft.)

Map Reference: NTS 106N, Arctic Red River

UTM Reference: Zone 8; 620,500E 7,513,000N

ASSESSMENT: Suitable for development.

The source is located outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across rolling to flat thermokarst terrain. Numerous large lakes must be crossed or bypassed.

SITE BD4-51(3)

REFERENCE: Deposit (d), Area VI DIAND Granular Resource Inventory; Travaillant Lake NTS 106-0, Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel.

RESERVES: Possible 1,000,000 cu.m (1,500,000 cu.yd.)

SITE DESCRIPTION: Glaciofluvial deposit located adjacent to the eastern border of Travaillant Lake.

Thickness: 6 m (20 ft.)

Area: 210,000 sq m (2,500,000 sq ft.)

Perimeter: 6,100 m (20,000 ft.)

Map Reference: NTS 106-0, Travaillant Lake.

UTM Reference: Zone 9; 389,000E 7,517,000N

ASSESSMENT: Suitable for development.

The source is located outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across flat to rolling thermokarst terrain.

SITE BD4-52(R2)

REFERENCE: Site 1099, Volume III, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class R-2, Bedrock suitable for fair quality general fill.

MATERIAL DESCRIPTION: Siltstone, weathered and fractured.

OVERBURDEN: Silt; 120 cm (4 ft.)+

DEPTH OF ACTIVE LAYER: Undetermined.

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Blast and quarry.

SITE DESCRIPTION: Bedrock deposit located 1.6 km (1 mi.) northeast of Travaillant Lake.

Vegetation: dense tree cover.

Drainage: good.

Map Reference: NTS 106-0, Travaillant Lake

UTM Reference: Zone 9; 388,800E 7,515,200N

SITE INVESTIGATION: 1 drill hole

ASSESSMENT: Fair to poor prospect for development because of difficult access.

Access would be by truck only, in the winter across thermally sensitive terrain. Considerable clearing of trees and stripping of overburden would be required before this deposit could be developed. The site is located adjacent to the eastern boundary of the 28 km (17.5 mi.) pipeline corridor.

SITE BD4-53(3)

REFERENCE: Site 1102, Vol. III, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Gravel and sand, some silt (GM-SM);  
Maximum size to 7.8 cm (3 in.);  
Medium moisture content in granular materials.

OVERBURDEN: Peat and organic silt; 15 cm ( $\frac{1}{2}$  ft.)

DEPTH OF ACTIVE LAYER: 160 cm (5 ft.)+

RESERVES: Proven 30,000 cu.m (40,000 cu.yd.)  
Probable 500,000 cu.m (650,000 cu.yd.)  
Possible 2,500,000 cu.m (3,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip and doze. Buffer zones and siltation control recommended to protect shoreline.

SITE DESCRIPTION: Scattered complex of small kames located 1.6 km (1 mi.) south of the west bay of Jiggle Lake.

Vegetation: dense spruce.

Drainage: good.

Thickness: 6.1 m (20 ft.)  
Area: 770,000 sq.m (8,300,000 sq.ft.)  
Perimeter: 8,400 m (24,000 ft.)

Map Reference: NTS 106N, Arctic Red River

UTM Reference: Zone 8; 620,000E 7,506,800N

SITE INVESTIGATION: 2 drill holes.

ASSESSMENT: May be suitable for development. Access is difficult because of rolling landforms and thermally sensitive terrain.



SITE BD4-54(4)

REFERENCE: DIAND Granular Resource Inventory; Arctic Red River NTS 106N Geological Survey of Canada, 1972.

MATERIAL QUALITY: Class 4, Poor quality material suitable for marginal fill.

MATERIAL DESCRIPTION: Silt, sand and gravel mixture, (glacial till).

RESERVES: Possible 2,000,000 cu.m (2,500,000 cu.yd.)

SITE DESCRIPTION: Hummocky morainal sheet located approximately 5 km (3 mi.) west of the south end of Travaillant Lake.

Thickness: 9 m (30 ft.)  
Area: 12,000,000 sq m (125,000,000 sq ft.)  
Perimeter: 25,000 m (81,000 ft.)

Map Reference: NTS 106N, Arctic Red River

UTM Reference: Zone 8; 625,000E 7,506,000N

ASSESSMENT: May be suitable for development although only 1% to 3% of source is useable.

SITE BD4-55(2)

REFERENCE: Site 1101, Vol. III, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 2, Good quality material suitable for embankment fill, base course and surface aggregate.

MATERIAL DESCRIPTION: Gravel, some sand and silt (GM);  
Maximum size to 7.8 cm (3 in.);  
Medium moisture content;

OVERBURDEN: 15 cm ( $\frac{1}{2}$  ft.)

DEPTH OF ACTIVE LAYER: 90 cm (3 ft.)

RESERVES: Proven 30,000 cu.m (40,000 cu.yd.)  
Probable 650,000 cu.m (800,000 cu.yd.)  
Possible 4,000,000 cu.m (5,000,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip and doze. Buffer zones and siltation controls will be required to prevent siltation of lowland areas.

SITE DESCRIPTION: Intermittant outwash and kame deposit located at the eastern tip of Jiggle Lake.

Vegetation: dense spruce.

Drainage: good into adjacent Jiggle Lake.

Thickness: 4.6 m (15 ft.)  
Area: 1,100,000 sq.m (12,000,000 sq.ft.)  
Perimeter: 9,400 m (31,000 ft.)

Map Reference: NTS 106N, Arctic Red River  
NTS 106-O, Travaillant Lake

UTM Reference: Zone 8; 627,000E 7,508,000N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Suitable for development. The source is located well outside the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter across thermally sensitive terrain.

SITE BD4-56(R2)

REFERENCE: Site 1100, Volume III, Stage III DIAND Granular Materials Inventory, EBA Engineering Consultants. 1973.

MATERIAL QUALITY: Class R-2, Bedrock suitable for fair quality general fill.

MATERIAL DESCRIPTION: Shale, soft to hard; Medium moisture content.

OVERBURDEN: Clay; 180 cm (6 ft.)

DEPTH OF ACTIVE LAYER: Undetermined.

RESERVES: Possible Unlimited.

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Blast and quarry. Buffer zones recommended.

SITE DESCRIPTION: Bedrock deposit located 5 km (3 mi.) southwest of Travaillant Lake and 6 km (4 mi.) southeast of Jiggle Lake.

Vegetation: thick sedge, shrub and herbs in marsh; dense black spruce on high ground.

Drainage: good.

Map Reference: NTS 106N, Arctic Red River, 106-0 Travaillant Lake

UTM Reference: Zone 9; 374,000E 7,503,500N

SITE INVESTIGATION: 1 drill hole

ASSESSMENT: Possible prospect as a source of quarried material. Prior to development the source will have to be investigated in detail. Areas with exposed outcrops would be attractive for potential quarry location.

Access is by truck in the winter across thermally sensitive ground. The source is located well outside the 28 km (17.5 mi.) pipeline corridor.

SITE BD4-57(R2)

REFERENCE: Site 1151A, Vol. IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class R-2, bedrock suitable for fair quality general fill.

MATERIAL DESCRIPTION: Shale;  
High moisture content.

OVERBURDEN: Silt and till; 580 cm (19 ft.)

DEPTH OF ACTIVE LAYER: 15 cm (6 in.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Quarry and blast. Buffer zones and seasonal operations may be required.

SITE DESCRIPTION: Bedrock deposit situated adjacent to the Lost Reindeer Lakes.

Drainage: poor

Map Reference: NTS 107B, Aklavik

UTM Reference: Zone 8; 587,200E 7,559,200N

SITE INVESTIGATION: 1 drill hole

ASSESSMENT: Not suitable for development because of thick overburden.

The source lies near the center of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over hilly, thermally sensitive terrain and numerous lakes.

The source lies within the critical winter range of the Reindeer Herd which is utilized between December 1st and April 1st.

SITE BD4-58(3)

REFERENCE: Site D143a, Volume IV, Stage III DIAND Granular Materials Inventory; EBA Engineering Consultants, 1973.

MATERIAL QUALITY: Class 3, Fair quality material suitable for general fill.

MATERIAL DESCRIPTION: Sand and gravel, trace silt (GP-GM);  
Maximum size 7.6 cm (3 in.);  
Low moisture content.

OVERBURDEN: Moss; 15 cm ( $\frac{1}{2}$  ft.).

DEPTH OF ACTIVE LAYER: 90 cm (3 ft.)+.

RESERVES: Proven 2,500 cu.m (3,000 cu.yd.)  
Probable 15,000 cu.m (20,000 cu.yd.)  
Possible 100,000 cu.m (150,000 cu.yd.)

MINIMUM HAUL DISTANCE:

METHOD OF EXTRACTION: Rip and doze.

SITE DESCRIPTION: Small isolated kame situated 1.6 km (7 mi.) north of Point Lake.  
  
Vegetation: dense.  
  
Drainage: good.  
  
Thickness: 6.1 m (20 ft.)  
Area: 42,000 sq.m (450,000 sq.ft.)  
Perimeter: 900 m (3,000 ft.)  
  
Map Reference: NTS 106N, Arctic Red River  
  
UTM Reference: Zone 8; 610,600E 7,535,300N

SITE INVESTIGATION: 1 test pit.

ASSESSMENT: Not suitable for development except as a source for a small local project. The haul distances are long and necessitates the crossing of thermally sensitive terrain.  
  
The source is situated adjacent to the border of the 28 km (17.5 mi.) pipeline corridor. Access is by truck in the winter over hilly and sensitive terrain.