

Northern Affairs Program

Granular Resources; valuable,

but finite resources:

Their Inventory and Management



D001694

NORTHERN AFFAIRS PROGRAM:

GRANULAR RESOURCES;

VALUABLE, BUT FINITE RESOURCES:

THEIR INVENTORY AND MANAGEMENT.

POLICY AND PROGRAM PLAN

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- perhaps now is a good time to EVALUATE where the program has gone - what has made a val. contribution to goals and what didn't work - ALSO - what

POLICY AND PROGRAM PLAN

Still needs to be done in the context of what has been done.

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Audience - Directors & Chiefs
Purpose to describe the program.

GRANULAR RESOURCES; VALUABLE, BUT FINITE RESOURCES:
THEIR INVENTORY AND MANAGEMENT

POLICY AND PROGRAM PLAN

GOAL: Wise management of a scarce resource that is essential for northern development.

BACKGROUND: *This section assumes that the reader is familiar with Granular & its problems in the north. Don't assume why is the north special i.e. greater than vds. red. Use where expand*
Surficial earth materials, such as gravel, sand, clay and rock suitable for use in construction are generally considered to be resources only when there is a local demand for their usage. However, in the North, where great quantities of construction materials are required due to the presence of muskeg and permafrost, where the absence of transportation networks limits access to sources of supply, and where remoteness limits the use of alternative engineering and construction methods that require less or poorer quality earth fill, granular materials can become strategic resources in terms of their necessity for any northern development.

There are presently shortages of high quality materials in many regions of the North, and new sources are being sought. *define why needed*
Management of granular resources is therefore essential to ensure the effective utilization of known sources and conservation of materials for use in future northern development projects. *sustainable development*

Detailed inventories are critical to the effective management of the limited resources of high quality materials. The vastness of the North and the high cost of field activities have prevented the development of a complete inventory of surficial resources. As a result, it has been necessary to adopt a systematic, phased approach to granular material inventory and there is an ongoing requirement for updating of inventories of supply on the basis of forecast demands for the various types of granular materials. *function*

Over the past 15 years, inventory work has addressed the materials required for transportation infrastructure, for artificial islands for oil and gas production and for community and industrial demands. Emphasis has been placed on problem resolution, especially in areas where potential multi-user conflicts may arise due to the demands of pipeline and highway construction or land claim settlements. An extensive body of information on terrestrial granular resources has been collected already for the major transportation corridors in both Territories, particularly the Mackenzie Valley corridor, and for the Beaufort coastal region. *doesn't say what we mean*

The existing granular resource reports and maps have been underutilized due to the difficulties involved in manually locating, searching, manipulating, displaying and updating the available information. Further, since the original data was of highly

variable age and quality and was presented frequently in a non-standardized format, misinterpretation of the information was possible, unless analysis was undertaken by geotechnical specialists. As a result, there has been needless and costly duplication of effort (studies of same areas), waste of valuable resources (e.g. use of the YaYa gravels for artificial island construction), and failure to ensure low cost supplies for public use (Inuvialuit Final Agreement). Environmental damage resulting from the unnecessary proliferation of borrow sources, and civil litigation over borrow on the Dempster Highway are also a direct result of an inadequate granular inventory and management plan.

Prior to 1984, there was essentially no inventory information that could be used to manage offshore granular resources in the Beaufort Sea. Between 1983 and 1986, one-half of the proven resources in the Issigak borrow area, which contained the only significant deposit of high quality granular material in the central Beaufort, were removed and used primarily for island fill. Industry has indicated that the inadequacy of the inventory led to the salvaging of borrow from the Minuk berm, with the subsequent exposure of contaminated material.

While industry has undertaken site-specific offshore granular resource investigation work since the mid-1970's, the absence of an inventory has resulted in considerable duplication of effort, much of which was publicly financed under Petroleum Incentives Program (PIP). More significantly, the failure of the Nerlerk sand berm (with a PIP cost of \$89M) could have been avoided if adequate information on the location, quality and quantity of offshore granular resources had been available. It is estimated that 20-30% of the artificial islands constructed in the Beaufort Sea have experienced some degree of failure, and inadequate knowledge of borrow material quality was likely a factor in many cases (e.g. Nerlerk, Issungnak, Molikpaq). While island stability is itself a design issue, it is clear that a more comprehensive inventory of higher quality offshore granular resources is needed before artificial islands that will perform safely for their production life can be built.

STRATEGY:

Effective management of granular resources requires a detailed inventory of existing granular materials supply, up-to-date forecasts of potential demands for granular materials, management plans, adequately trained resource managers and appropriate legislation pertaining to granular materials.

a) Inventory Requirements:

The present approach to granular resources inventory acknowledges that it is not practical to evaluate all potential resources fully. In recent years, inventory work has concentrated on the task of compiling, standardizing,

*why is this
"a waste"*

*explain
why using
YaYa gravels
was a waste.*

*ie. YaYa gravels
are worse?*

*Considered a higher
quality aggregate
which is necessary
for some types of
construction such as
islands but not
necessary for other islands?*

don't understand

*what exactly
cost \$89M
- the construction
- site studies?*

*Update
Nerlerk
info.*

*(- pit development)
plans
we should be
oversen by local
governments.*

summarizing, and analyzing the available information from previous granular resource studies, and identifying significant gaps in information for several critical areas. This has required the co-operation of other departments and governments and industry to obtain access to their data, much of which is proprietary. These parties recognize also the value of this approach, and in return, have increased expectations for an inventory that readily provides current detailed information on the location, type, quality and quantity of material and additional work requirements for each source.

Access to the existing inventory data will be achieved through computerized databases. The resulting ability to undertake more timely, thorough and detailed analysis of the granular resources on the basis of revised demand forecasts, and to overlay other geographic data such as land claims selections and pipeline or highway corridors will enable management planning to minimize potential multi-use conflicts and ensure an equitable sharing of this resource between public and private interests. This system will also facilitate the efficient transfer of granular resource data, in a more usable form, to the Territorial government and to native organizations, as part of devolution and the implementation of land claims settlements.

*Update - give details on database
ie # of records
- what information the database provides
(deposit location, geotech. data, geophys. data)*

While there remains a requirement to obtain additional new field information on offshore granular resources (under NOGAP or some other program) and on deposits to be reserved for public use on Inuvialuit lands (under the IFA Implementation programme), the main objective of the DIAND granular inventory is to develop, maintain and update the databases so that effective management of these resources is possible. It is expected that the granular inventory being developed will encourage and assist industry granular investigation work for both local and major privately-sponsored projects. DIAND regional offices and the territorial governments will continue to undertake field work to maintain and update local inventories of materials for communities and infrastructure.

Expand for all claims

b) Demand Forecasts

Accurate and up-to-date forecasts of future demands for granular materials are required for resources management. These forecasts are based on the anticipated needs of communities, transportation and other infrastructure, and any major public or private projects for each five-year interval during a 20-year forecast period. This procedure ensures adequate longer-term supplies, and minimizes the effort required to update demand forecasts.

Why 20 years

Public demands generally consist of routine maintenance and upgrading, which can generally be predicted relatively

of what

accurately in most communities based on historical usage, and capital projects, which are commonly projected for only a five-year period. Proposals for major northern development projects are renowned for the political and economic uncertainty of their fruition. Further difficulties in forecasting are often introduced by changes in the scale and timing of major projects and by the results of technological change and improved engineering design capability. In most major projects requiring large amounts of granular materials, the demands for each type of material will not be known with accuracy until engineering design is essentially complete.

Because of the above uncertainties, the forecasting of 20-year demand should be undertaken at least every five years, as specified, for example, in the Inuvialuit Final Agreement, and in conjunction with the preparation of granular resource management plans. The co-operation of the territorial governments and industry is essential to the success of demand forecasting. The need for periodic updating of demands for several critical areas means that there is an ongoing requirement for demand forecasting.

c) Management Planning:

Wise management of granular resources can be achieved through the development and implementation of management plans. Management planning requires knowledge of the available resources (inventories), anticipation of potential demands for resources (demand forecasts), identification of potential shortages of materials (supply-demand analysis), allocation of resources to ensure effective utilization and conservation of remaining supplies (resource administration), inspection and monitoring of extraction operations, and abandonment planning to minimize the environmental disturbance caused by granular resource exploitation.

This should be at the beginning of "Strategy"

Plans will be completed on a priority basis according to material shortages. Updating of management plans is necessary as new sources are identified or proven up, as known resources are used, and as demands change. Management plans developed for one set of boundaries will not be valid after changes in administrative arrangements. Northern Program regional officers and the territorial governments both contribute extensively in the planning process and have a critical role in their successful implementation.

d) Education:

The successful implementation of granular resource management plans requires that resource managers, and users and the public be aware of the need for management ^{during} resource extraction, ^{to insure} conservation of materials and protection of the environment. As native land claims are settled in the North

there is also an increasing need to ensure that native groups and communities become familiar with granular inventory and management techniques. DIAND's overall responsibility for northern land resources demands that the Department take a leading role in providing education on granular resources. Resource administrators and pit inspectors, among others, must therefore be familiar with the content and usage of resource inventories, demand forecasts and management plans. Normally, these people are not trained as specialists in granular materials and are dependant on DIAND headquarters' expertise for advice and guidance.

The current approach to the provision of training is to present the various elements of granular resources inventory and management planning in clear, non-technical terms and to provide backup specialist advice. This involves the following basic questions: what are granular resources? how are they formed? how are potential granular sources identified? how does one ^{evaluate, estimate} ~~inventory~~ granular (supply) and assess quality? why are they needed? who uses granular materials? what are they used for? what is involved in granular resource development? what are the impacts of extraction and development? what options are available if supply is short? what is involved in management planning? The DIAND HQ granular resources programme provides educational tools and geotechnical advice to assist in the training of resource managers and to aid them in their subsequent education of potential granular resource users.

This is what should be in report.

In what way?
e) Legislation

method the same as we have now or have there been changes?
The existing Territorial Quarrying Regulations are now outdated for the effective management of granular resources which are or will be required for large scale northern development projects. Draft Territorial Lands and Public Lands Pits and Quarries Regulations prepared in the early 1980's were intended to deal more effectively with both onshore and offshore resources. Included in the proposed amendments is the provision to request information needed to assess applications. This should reduce the requirement for future government-sponsored field work on granular inventories. Finalization of the proposed new regulations has subsequently been delayed because of the need to address several fundamental issues.

more effective than what?

The issues of potential alternative management regimes, the suitability of proposed royalties and the enforcement capability of the existing enabling legislation will be evaluated prior to further review of the draft regulations. EMR's proposed Canada Offshore Mineral Resources Development Act (COMRDA) for administration of unconsolidated seabed resources in all offshore areas of Canada and the proposed Canada Laws Offshore Application Act are being considered as potential alternatives to the present Public Lands Grants

Act. ^{what} This strategy also addresses the possible fragmentation of granular resource management regimes as a result of land claims settlements, devolution and division of the territories.

1988/89 PROGRAMME:

Funding for granular resource inventory and management work has been provided, in recent years, from three sources, each of which has a specific goal. These are listed below with 1988/89 funding levels:

NOGAP A4 Project	\$250K - not yet approved
Lands A-Base	55K
Implementation of IFA	130K

The NOGAP A4 Project was intended to ensure that granular resource information is available in preparation for northern hydrocarbon development and to provide the detailed information on sources needed for their effective management. The Project has necessarily focussed primarily on the development of an offshore granular resources inventory for the Beaufort Sea. A proposed three year extension of the A4 Project was approved early in 1988 by the Minister as part of a proposal to continue NOGAP. Cabinet approval of the NOGAP extension has been delayed until policy reserves are replenished.

A-Base funding has been significantly reduced in recent years since the Regional offices are now undertaking routine terrestrial inventory work, which is required primarily to address potential multi-user conflicts in individual communities. The residual requirement for HQ A-Base work relates to inter-Regional granular resource issues (e.g. Dempster Highway), methods and tools for granular resource inventory and management (e.g. granular databases, training aids), and other geotechnical issues as requested by the Regions.

Specific funding has been allocated also under the IFA Implementation Program to the completion of granular inventories for the Inuvialuit Settlement Lands. TB approval for the extension of the granular inventory task until 1993/94 was received in 1987.

The current year programme is outlined below by strategy items and funding sources. Budgeted funds are indicated also, where applicable.

Inventory:

NOGAP: A4-24 - Marine Geophysical Survey	- \$160K
A4-25 - Survey Positioning	- 45K
A4-26 - Marine Resistivity Survey	- 45K

	\$250K

All of the above studies are part of a major field programme to obtain the geophysical data that is necessary for the offshore granular resources inventory. The delays in approval of funding have forced cancellation of the proposed 1988/89 NOGAP A4 programme.

A-Base:	Dempster corridor	\$10K
	Digitizing	10K
	Alaska Highway	30K
	Concrete Aggregates	5K

		\$55K

*So what
was done*

*for 1988/89 NOGAP
funding?*

The Dempster corridor study, initiated in late 1987/88 and completed in early 1988/89, involved the compilation of a database of granular resource information to determine if the available data was sufficient for preparation of management plans. Recommendations regarding additional inventory work, that may possibly be funded by Yukon Highways, are presently under review. Additional information is needed before management plans can be prepared.

*can I
see these
recommendations
please.*

The proposed Digitizing study will involve the preparation of databases of geographic information for the Beaufort Sea and Mackenzie Valley corridor. The Beaufort Sea information is needed for planning of the field programmes which will complete the offshore granular inventory. The Mackenzie Valley database will be used in assessments of pipeline borrow requirements and native land claims selections. These spatial databases will be used ultimately in supply-demand analyses and preparation of management plans for these areas.

The proposed Alaska Highway study will involve the compilation of a database like that completed for the Dempster corridor. The extent and quality of existing granular information for this area is unknown and therefore effective management planning is currently impossible.

The concrete aggregate study, initiated in 1986/87 under NOGAP, will be completed with A-Base funding in 1988/89. This study has involved long-term testing of the suitability of material from selected sources near the Beaufort Sea coast for use in Arctic marine concrete. The results of this study are needed for preparation of management plans for the Beaufort Region since it may be necessary to dedicate a specific source to concrete aggregate production.

IFA Implementation: Drilling Program \$109K

The proposed drilling programme is part of the approved extension of the Inuvialuit granular inventory. It is intended to update the existing reconnaissance-level inventory and provide detailed

information on the quantity and quality of materials in selected granular deposits on Inuvialuit lands. This information is needed for the establishment of reserves of supply for public use, as required under the Inuvialuit Final Agreement.

Education:

(A-Base: Videotape Presentation - \$30K

This project will involve the preparation of a videotape presentation, entitled "Understanding Granular Resources", that is intended to familiarize the Inuvialuit communities with the methods by which granular materials are inventoried, analysed and wisely managed. It is anticipated that an improved understanding of granular resources in the communities will aid both the ILA and DIAND in fulfilling their obligations under the IFA. The videotape will likely be able to serve a similar purpose with other land claims settlements.

Copies forwarded to regional offices to pass on to IFA / northern clients.

Region: Course - "Quarry Management/Granular Materials Assessment"

Q. This was funded by HQ A Base, spent by NWT Regional Office?

This course, which is being prepared by the NWT Region, is intended to provide training on granular materials for land use inspectors. The Region has requested input to the course to familiarize the participants with HQ granular resource inventory and management activities.

Regions put on course (Bob prepared a talk for this.)

Management Planning:

Implementation: Inuvialuit Settlement Reserves \$21K

This study, initiated in 1987/88, has determined the environmental, cultural and economic effects of granular resource development for public use of selected deposits on Inuvialuit lands. By identifying and responding to community concerns, it is expected that the results of this planning process will be generally acceptable to the communities and that the reserves required by the IFA will be established.

Hardy Study 7.4.

Legislation:

Comparison of Alternative Granular Management Regimes

This proposed in-house study will involve the identification of the strengths and weaknesses of the various granular management regimes adopted by the provinces and other countries that utilize offshore granular resources. The fundamental question of the most appropriate management regime must be addressed before revised regulations or alternative legislation such as the proposed Canada Offshore Mineral Resources Development Act (COMRDA) can be implemented.

Table comparing Ontario to what we're doing.

Co-op student following this up, should get report soon.

*Where is this?
Considering plans with 155, a new version of this may be a good idea!*

What became of this?

What "concrete" has come out of this in terms of Reports? Decisions?

What has become of this?

POLICY AND PROGRAM PLAN (Continued)

THE FUTURE:

The proposed extension of the NOGAP A4 Project will allow completion of the offshore granular resources inventory within three years of its approval. The Inuvialuit granular inventory programme is scheduled for completion by 1993/94. Computerized databases of granular resources information on other terrestrial deposits ^{will continue to be updated as required and as further data is collected.} will be completed over the next few years. In the meantime, user-friendly menus will be developed and training will be provided for Regional personnel. The intention is to provide granular resource data to resource managers in a form that is accessible, usable, transferable and easily updated as an aid to efficient management.

~~With the completion of~~ ^{when} the granular resource inventory for each critical area of significant resource demands, management plans ~~will~~ be prepared in co-operation with Regional personnel.

~~can~~ ^{places a need on other stuff to be done 1st.} Finally, an appropriate regulatory regime for granular materials will be established to enable wise management of this important resource.

What exactly does this mean? legislation/acts?
what is STATUS of present regulations?

Where do we presently stand as far as having database updated & easily maintainable

Bob

Where does your work w/ claims fit into this?

Rewrite to reflect -9-

Changes changes in funding status &

focus of programme.

a new forecast for

What's happening along these lines?

is completely updated and is an easily maintainable state,

Ongoing revisions to New Pits & Quarry Reg's.

What is yearly or bi/annual cost of this?

POLICY AND PROGRAM PLAN

APPENDIX A

BIBLIOGRAPHY

Granular Materials
Bibliography*

Pemcan Services "72". 1972. Granular Materials Inventory: Fort Good Hope Community Study. 96 pages, Glossary, Bibliography.

28-2-02 Pemcan Services "72". 1972. Granular Materials Inventory: Fort Norman Community Study Area. 244 pages, Glossary, Bibliography.

Pemcan Services "72". 1972. Granular Materials Inventory: Intercommunity Study Area, Fort Norman to Norman Wells. 240 pages, Glossary, Bibliography.

Pemcan Services "72". 1972. Granular Materials Inventory: Fort Simpson Community Study Area. 155 pages, Glossary, Bibliography.

Pemcan Services "72". 1972. Granular Materials Inventory: Summary, Fort Simpson to Fort Good Hope. 102 pages, Glossary, Bibliography.

Pemcan Services "72". 1972. Granular Materials Inventory: Intercommunity Study Area, Fort Simpson to Wrigley. 393 pages, Glossary, Bibliography.

Pemcan Services "72". 1972. Granular Materials Inventory: Norman Wells Community Study Area. 187 pages, Glossary, Bibliography.

Pemcan Services "72". 1972. Granular Materials Inventory: Wrigley Community Study Area. 170 pages, Glossary, Bibliography.

Pemcan Services "72". 1972. Granular Materials Inventory: Intercommunity Study Area, Wrigley to Fort Norman.

- Volume I - 246 pages, Glossary, Bibliography.

- Volume 2 - 300 pages, borehole data.

Ripley, Klohn and Leonoff International Ltd. 1973. Granular Materials Inventory - Zone I. 65 pages, Maps, Tables.

28-2-03 Ripley, Klohn and Leonoff International Ltd. 1973. Granular Materials Inventory - Zone II. 330 pages, Maps, Tables.

Ripley, Klohn and Leonoff International Ltd. 1973. Granular Materials Inventory - Zone III. 360 pages, Maps, Tables.

Ripley, Klohn and Leonoff International Ltd. 1973. Granular Materials Inventory - Zone IV, V, VI. 196 pages, Maps, Tables.

Ripley, Klohn and Leonoff International Ltd. 1973. Community Granular Materials Inventory - Inuvik. 110 pages, Maps, Tables.

* All Reports prepared for Indian and Northern Affairs Canada, except as noted.

Ripley, Klohn and Leonoff International Ltd. 1973. Community Granular Materials Inventory - Fort McPherson. 78 pages, Maps, Tables.

28-2-03 Ripley, Klohn and Leonoff International Ltd. 1973. Community Granular Materials Inventory - Arctic Red River. 115 pages, Maps, Tables.

Ripley, Klohn and Leonoff International Ltd. 1973. Community Granular Materials Inventory - Tuktoyaktuk. 162 pages, Maps, Tables.

Ripley, Klohn and Leonoff International Ltd. 1974. Community Granular Materials Inventory - Hay River, 281 pages, Maps, Tables.

28-2-07 EBA Engineering Consultants Ltd. 1974. Mackenzie Highway Geotechnical Evaluation. Volumes I-XXIII, Maps, Appendices, Tables, Figures.

28-2-04 EBA Engineering Consultants Ltd. F.F. Slaney and Company Limited. 1974. Granular Materials Inventory Stage III.

Volume I - general report, 116 pages, Appendices, Tables

Volume II - South-half sites: 1001-1053, 1055-1060, 369 pages

Volume III - North-half sites: 1054, 1055, 1060-1110, 330 pages

Volume IV - North half sites: 1111-1156, 341 pages.

28-1-07 Klohn Leonoff Consultants Ltd. 1974. Granular Materials Inventory - Parsons Lake. Report to Gulf Oil Canada Ltd. Appendices, Source Sites.

Slaney, F.F. and Company Ltd. 1974. Granular Materials Inventory -

? 28-1-06 Mackenzie Bay : Preliminary Environmental Impact Assessment. Report to

* 28-2-06-1 Imperial Oil Ltd. 135 pages, Appendices, Tables.

? 28-1-03 DIAND - Mackenzie Highway Environmental Working Group. 1975. Granular
* 28-2-08 Materials Inventory - Mackenzie River Valley. 14 pages, Maps, Charts.

28-2-10 Owen, E.B., 1975. Assessment of Certain Granular Material Deposits at Hay River. 15 pages, Maps.

Owen, E.B., 1975. Potential demand for Pits and Quarries along the C.A.G.P.L. route. 20 pages.

28-2-06-1 EBA Engineering Consultants Ltd. 1975. Ya-Ya Granular Resources Study.

- Volume I, 29 pages, Appendices (unpaged)

28-2-06-2 - Volume II, Appendix D, borehole logs (unpaged).

R.M. Hardy and Associates Ltd. 1976. Geotechnical Field Studies at Taglu, NWT. 153 pages, Appendices (unpaged).

R.M. Hardy and Associates Ltd. 1976. 1976 Geotechnical Survey - Parsons Lake. 71 pages, Figures, Appendix.

28-1-06? Gentile, D.J. and Zaturnecky, J.W. 1976. Field Survey of Potential Rip-Rap Quarry Sites in the Campbell Lake Area. Report to Imperial Oil Limited. 25 pages, Attachment.

- 28-2-06 EBA Engineering Consultants Ltd. 1976. Evaluation of Potential Rock Quarries - Rocky Hill - Campbell Lake Area. 82 pages, Appendices (unpaged) Drawings.
- 28-2-12 R.M. Hardy and Associates Ltd., Terrain Analysis and Mapping Services Ltd. 1976. Granular Materials Inventory - Yukon Coastal Plain and Adjacent Areas. 500 pages, Appendices (unpaged).
- Archer, Cathro and Associates Ltd. 1977. An Inventory of Existing Gravel Pits along Major Highways and Communities in the Yukon Territory (16 volumes).
- 28-2-09 R.M. Hardy and Associates Ltd. 1977. Granular Materials Inventory - Tuktoyaktuk. 35 pages, deposit reports.
- 28-2-09 R.M. Hardy and Associates Ltd. 1977. Preliminary Report 1977 Granular Materials Inventory - Tuktoyaktuk. 20 pages, Appendix (unpaged). Phase II - Geophysical Data Acquisition. 1977. 13 pages.
- 28-2-10 Bird and Hale Ltd. 1977. Granular Materials Assessment: Pine Point Highway, Hay River. An Assessment of Aggregate Deposits at Miles 12, 21, 26, and 31, Pine Point Highway. 210 pages, Appendices.
- 28-2-11 EBA Engineering Consultants Ltd., and F.F. Slaney and Company Ltd. 1978. Granular Materials Inventory - Haines Road and Haines - Kluane Section of the Alaska Highway.
Volume I - Source Assessment Summaries kilometre post HR 151 to HR 178
52 pages, descriptions.
Volume II - Source Assessment Summaries kilometre post HR 178 to AH 1664
150 pages, descriptions.
- ?
28-2-09 R.M. Hardy and Associates Ltd. 1978. Geophysical Evaluation of Granular Material Resources - Tuktoyaktuk Harbour. 49 pages, Appendices (unpaged).
- 28-2-10? Bird and Hale Ltd. 1978. Granular Materials Assessment: Pine Point Highway, Hay River - An Assessment of Aggregate Deposits at Miles 12 and 17, Pine Point Highway. 153 pages, Appendices.
- 28-2-09 Hardy Associates (1978) Ltd. 1979. Granular Materials Inventory - Phase III, Tuktoyaktuk Harbour. 55 pages, Appendices (unpaged).
- 28-2-09 Hardy Associates (1978) Ltd. 1980. Granular Materials Inventory - Tuktoyaktuk, Sources 160 and 161. 44 pages, Appendices.
- 28-2-06-2 Cook, R.D. 1980. Granular Materials Inventory - Liard Highway. Report to Public Works Canada. Appendices (unpaged).
- BBT Geotechnical Consultants Ltd., GVM Geological Consultants Ltd. Terrain Analysis and Mapping Services Ltd. 1983. Granular Materials Evaluation-Deposits 168 and 211, Tuktoyaktuk Area, NWT. 45 pages, Tables, Appendices.

- 28-2-17 EBA Engineering Consultants Ltd. 1983. Evaluation of Potential Sources of Quarry Rock for Marine Structures in the Beaufort Sea Region. 15 pages, References, Appendix.
- 28- EBA Engineering Consultants Ltd. 1983. Granular Resource Development and Management Plan - Tuktoyaktuk. 45 pages, References, Appendices (unpaged).
- 28-3-02 EBA Engineering Consultants Ltd. 1984. 1984 Offshore Geotechnical Site Investigation - Herschel Sill Sites, Yukon Territory. (NOGAP A4-02). 20 pages, Appendices A-B (unpaged)
- 28-3-01 M.J. O'Connor and Associates Ltd. 1985. Surficial Geology and Granular Materials: Southeast of Herschel Island. (NOGAP A4-01).
- Volume 1 - 146 pages
- Volume 2 - Appendices A-E (unpaged)
- 28-3-08 Hardy Associates (1978) Ltd. 1986. Evaluation of Granular Resources Potential - Lower Mackenzie Valley. (NOGAP A4-08). 49 pages, Bibliography, Appendices A-C (unpaged)
- 28-3-03 M.J. O'Connor and Associates Ltd. 1986. Investigation of Subsurface Conditions at King Point, Yukon. (NOGAP A4-03)
- Volume 1 - 163 pages
- Volume 2 - Appendices A-H (unpaged)
- 28-3-05 Meagher, L.J. 1986. Overview of Granular Resource Potential for the Western Beaufort (Yukon) Continental Shelf. (NOGAP A4-05). 97 pages, Enclosures.
- 28-3-04 Challenger Surveys and Services Ltd. 1986. Analysis of Bathymetric Data, Western Beaufort (Yukon) Continental Shelf. (NOGAP A4-04). 45 pages, Appendix (unpaged), Enclosure.
- 1FA
28-4-02 Hardy Associates (1978) Ltd. 1986. Interim Report - Phase I - Community Granular Management Plan - Tuktoyaktuk. Report to Government of the Northwest Territories, Public Works. 13 pages, Appendices (unpaged).
- 1FA
28-4-02 Hardy BBT Ltd. 1986. Interim Report - Phase II - Field Reconnaissance - Community Granular Management Plan - Tuktoyaktuk. Report to the Government of the Northwest Territories, Public Works. 24 pages, Appendices (unpaged).
- 28-3-07 EBA Engineering Consultants Ltd. 1986. Granular Resources Evaluation - Richards Island, N.W.T. (NOGAP A4-07). 32 pages, Appendices A-J (unpaged).
- 28-3-17 Strong, E.C. and Semple J.-M. 1987. The Digitization of Morphologic and Sedimentologic Data for the Coast of Byam Martin Channel, Northwest Territories. (NOGAP A4-17). 19 pages, Appendices, Maps (unpaged).

- 28-3-06 EBA Engineering Consultants Ltd. 1987. Synthesis and Interpretation of Bathymetric, Geophysical and Geotechnical Data from the Issigak Borrow Block. (NOGAP A4-06). 42 pages, References - 4 pages, Tables, Figures (unpaged)
- 28-3-10 EBA Engineering Consultants Ltd. 1987. An Evaluation of the Feasibility of Developing Granular Borrow from the Bed of the Mackenzie River. (NOGAP A4-10). 66 pages, References - 17 pages, Tables, Figures, Drawings, Appendices A-C (unpaged).
- 1FA
28-4-02 Hardy BBT Ltd. 1987. Phase III - Final Comparison of Potential Sources - Community Granular Management Plan - Tuktoyaktuk. Report to Government of the Northwest Territories, Public Works. 15 pages, Appendices (unpaged).
- 1FA
28-4-02 Hardy BBT Ltd. 1987. Interim Report - Phase III - Winter Drilling Program - Deposit 155. Community Granular Management Plan - Tuktoyaktuk. Report to Government of the Northwest Territories, Public Works. 24 pages, Figures, Appendices (unpaged).
- 28-3-12 Golder Associates Ltd. 1987. Beaufort Region Quarry Rock Study. (NOGAP A4-12). 60 pages, Appendix I; Supplementary Volume of Supporting Documents.
- 28-3-16 H.R. Seismic Interpretation Services Inc. 1987. Interpretation and Synthesis of High Resolution Reflection Seismic Data from the Banks Island Borrow Area. (NOGAP A4-16). 65 pages, Figures, Plates (unpaged).
- 28-3-14 MacGregor, M.H. and Ruffell, J.P. 1987. A Database Application for Geotechnical Data Acquisition and Management. Proceedings, 1st Canadian Symposium on Microcomputer Applications in Geotechnique, Regina. (NOGAP A4-14). 8 pages.
- 28-3-18 Thurber Consultants Ltd. 1987. Granular Resources Management Strategy - South Slave Region. (NOGAP A4-18).
- Volume 1 - 83 pages
- Volume 2 - Appendices A-H (unpaged).
- 28-3-12 Golder Associates Ltd. 1988. Beaufort Region Quarry Rock Study: Supplementary Report. (NOGAP A4-12). 7 pages, Tables, Supporting Documents (unpaged).
- 28-3-15 McElhanney Geosurveys Ltd. 1988. Compilation and Cataloguing of Beaufort Bathymetric and High Resolution Shallow Geophysical Survey Data. (NOGAP A4-15). 30 pages.
- 28-3-09 Klohn Leonoff Ltd. 1988. Western Beaufort Region Concrete Aggregate Study. (NOGAP A4-09). 58 pages, Appendices I-XI (unpaged).

- 28- ? EBA Engineering Consultants Ltd. 1988. Summary of Granular Resources Data for the Upper Mackenzie Valley. Fort Providence to Norman Wells.
- Volume I - 32 pages, Tables Figures, Appendices (unpaged).
- Volume II - Summary of Prospective Source Data (unpaged).

28-4-01 EBA Engineering Consultants Ltd. 1988. Inuvialuit Settlement Sand and Gravel Inventory and Recommendations for Development - Tuktoyaktuk, Inuvik, Aklavik, Holman Paulatuk, Sachs Harbour. (Six volumes).

28-3-09 Klohn Leonoff Ltd. 1988. Western Beaufort Region Concrete Aggregate Study: Addendum Report, Phase 2 - Elaboration of Original Study. (NOGAP A4-09). 7 pages, Attachment.

28-3-22 EBA Engineering Consultants Ltd. 1988. Beaufort Sea Geotechnical Database. (NOGAP A4-22).
- Volume I - Final report, 12 pages, Tables, Figures, Appendices A-B (unpaged).

- Volumes II - III: Borehole Logs for the Beaufort Sea (unpaged).
- Volumes IV, V, VI, VII, VIII,

EBA Engineering Consultants Ltd. 1988. Granular Resources Database - Dempster Highway Corridor YT/NWT. 11 pages, Appendices (unpaged).

? EBA Engineering Consultants Ltd. 1988. Dempster Highway Granular Sources.

- Volume I - Borehole Log Database, Test Hole Logs for Sources - kilometre 1.1 to kilometre 190.3. 328 pages.
- Volume II - Borehole Log Database, Test Hole Logs for Sources - kilometre 194.7 to kilometre 715.4. 289 pages.

NOGAP A4-11
Challenger Surveys and Services Ltd., 1988 Computer-Based Analysis of Digital Bathymetric Data, Beaufort Sea (NOGAP A4-11); Final Report 148p., Refs. (11x17)

POLICY AND PROGRAM PLAN

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A-Base

funding allocated to the performance of ongoing duties and responsibilities of the department.

Abandonment plans

proposed site restoration activities upon temporary or permanent abandonment of the granular source. In the case of temporary abandonment, this would involve cleanup and drainage and erosion control. For permanent abandonment, plans should include recontouring, overburden and topsoil replacement and revegetation.

Arctic marine concrete

concrete that is designed to withstand exposure to freezing temperatures and salt water for use in offshore facilities in the Beaufort Sea.

Artificial island

a man-made island, typically constructed of fine sand dredged from the seabed and used temporarily to explore or develop subsea hydrocarbons. In some cases, the dredged sand extends to the surface and must be protected with coarse gravel and armour stone; whereas other islands involve a removable structure that is placed on a shallow sand berm.

Canada Laws Offshore Application Act

proposed legislation that would extend to the offshore areas of Canada those laws of general application that pertain currently to the onshore.

Canada Offshore Mineral Resources Development Act

proposed legislation for controlling the exploration and development of seabed mineral resources in offshore areas adjacent to Canada.

Community demands

the projected requirements for all types of granular materials for use in a community. This would not include the requirements for major regional projects.

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Concrete aggregate

granular material that meets the specifications for use in concrete. It should consist of clean, hard, strong and durable particles that are free of deleterious chemicals or coatings of fine grained particles that may affect the hydration and bonding of the cement paste.

Construction materials

materials whose engineering properties make them suitable for use in construction (e.g. earth fills). This includes the full range of granular material types as well as other materials such as clays for use in fluid retention pond liners and boulders or armour stone for use as erosion protection.

Cultural concerns

potential impacts of granular resource development relating to aesthetics, traditional usage of the site for recreation and hunting, trapping and fishing and the possible presence of archeological sites. Since granular deposits may be the only well-drained sites in many portions of the Western Arctic, there is a significant potential for conflict between resource development and traditional use of the land.

Demand

known and projected future requirements for granular resources by all public and private concerns.

Dempster corridor

the area extending approximately eight kilometres on either side of the Dempster Highway, and including much of the right of way of the Dempster lateral of the proposed Alaska Highway natural gas pipeline.

Deposit

arbitrarily, a natural occurrence of material of sufficient extent and suitable composition to allow its exploitation. Technically, the material has been laid down or placed by natural processes and has a similar composition or geologic origin.

Devolution

the process of transferral of work, responsibility and power from the federal government to the territorial and regional bodies

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Digitizing

the process of converting hard-copy (paper) records to digital form to permit their storage, retrieval and manipulation by computers. More commonly used to indicate the conversion of mapped information to digital form by tracing with an electronic cursor device that records position or by optical scanning.

Drilling program

in the context of granular materials, a field program involving the subsurface exploration and sampling of potential granular deposits with any type of drill or auger rig for geotechnical evaluation.

Economic concerns

includes distance from granular deposits to markets, costs of gaining access and costs of development. Restriction of development of appropriate sources can have a major impact on the cost and availability of granular materials and subsequently on the improvement of services in remote communities.

Environmental concerns

potential impacts of granular resource development relating to the disturbance or destruction of wildlife and their habitat, drainage and erosion problems and thawing of massive ice bodies.

Extraction operations

activities associated with the taking of material from its undisturbed location.

Field investigation

any field program to obtain first hand information on surface and subsurface conditions (ground-truthing) at potential sources of granular materials. This may include reconnaissance surveys, geophysical surveys, test excavations and/or drilling programs.

Forecast demand (20-year, 5-year)

the determination of possible future needs for granular materials for a specified period of time (usually 5, 10, or 20 years) based on the estimated requirements of any planned, proposed and/or speculated construction projects in a given area or region.

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Geophysical data

information obtained by geologic exploration using instruments that measure and record seismic or electrical phenomena or gravitational, magnetic or thermal properties of the earth. Seismic and electrical geophysical methods are useful in granular resource exploration. Although it is generally necessary to obtain direct observation of subsurface conditions to confirm geophysical interpretations, most geophysical methods provide more frequent or continuous measurements that can be used to extrapolate between test holes.

Granular resources

materials that are commonly known as sands and gravel. Technically granular materials include natural sizing from silts through sands and gravels to cobbles, but the term is more commonly used to describe any natural mixtures of soil particles that contain a significant portion of sand and gravel sizes and that could be used as a construction material.

High-quality materials

typically a mixture of approximately equal portions of sand and gravel size particles with little or no fine grained material and suitable for a specified use with little or no processing.

IFA Implementation Program

a federally-funded program to implement the Inuvialuit Final Agreement. The program is intended to promote a smooth transfer of responsibility for management of the Western Arctic lands that were transferred to the Inuvialuit and of their natural resources. The program is divided into a number of Tasks. Task 7, Sand and Gravel Inventories, provides assistance to the Inuvialuit in the preparation of granular resource inventories and management plans for the six communities in the Western Arctic region.

Inspection

the close examination of previous or ongoing granular resource development activities to confirm existing information on granular deposits, to determine the amount and type of materials being removed, to estimate the remaining resources and to ensure compliance with operating terms and conditions and regulations. At present, inspectors are trained primarily to undertake the latter (compliance) task.

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Inuvialuit Final Agreement

the agreement between the native people of the Western Arctic and Canada that transferred ownership of selected lands to the Inuvialuit.

Inuvialuit Settlement Region

the land areas of the Western Arctic in which the Inuvialuit were granted interest under the Inuvialuit Final Agreement.

Inventory

the search for and documentation of viable and accessible granular materials to provide safe, assured sources for public use. It includes the identification and mapping of potential new deposits through the interpretation of aerial photography, field verification through ground reconnaissance, geophysical surveys, test pitting, geotechnical drilling, testing and geotechnical evaluation, and the preparation of databases of granular resource supply information.

Island fill

the material that forms the bulk of an artificial island. This does not include any higher quality material used as shore protection, but would include any material used to fill the core of a removable structure.

Island stability

the ability of the artificial island to withstand the loading of its own mass and surface exploration activities and the impact of waves and floating ice.

Issigak borrow area

an area, located about 20 km northwest of Pelly Island, in which seabed granular materials have been identified. This is the main source of higher quality offshore granular materials used in the construction of artificial islands in the western portion of the Canadian Beaufort Sea.

Issungnak

this was the first artificial island built in deep waters (20 m) in the Canadian Beaufort Sea.

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Land claim settlements

any agreements between native peoples and Canada concerning the ownership of and other interests in lands claimed by the native peoples.

Land claims

pertains to the interests of native peoples in lands traditionally used by them and their ancestors

Land selections

the identification of the lands in which the native peoples have an interest and those for which they wish to obtain legal title.

Local demand

the projected requirements for all types of granular materials within a small area, usually around a community, for normal growth and development of the area. The requirements of any large regional projects in the area would be included.

Local supply

the availability of all types of granular materials within a small area, usually surrounding a community, that are readily accessible and suitable for development.

Management plan

the analysis of supply and forecast demand, determination of probable development scenarios and competition for resources, area planning and dedication of specific sources and materials to specified uses, and site specific environmental evaluation and site planning of individual sources for removal of materials and restoration.

Management regimes

granular resources in northern Canada are considered to be part of the surface estate and their ownership and responsibility for their management is transferred with land title. In some other legislations, sand and gravel are considered to be minerals and their ownership and management is part of mineral rights, and separate from surface rights.

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Minuk berm

the island fill at this location was partially contaminated with oil-based fluids used in hydrocarbon exploration drilling.

Molikpaq

a reusable hydrocarbon exploration structure developed by Gulf Canada. Sand fill is placed in the core of the structure to increase the structural stability of the artificial island.

Monitoring

the observation and reporting of granular resource development activities, particularly in regard to adherence to permitted operating terms and conditions and compliance with existing regulations. Under the existing regulations, these activities are undertaken by a person designated as the inspector.

Nerlerk sand berm

this large berm, which was built over two construction seasons with relatively fine grained sands, was irreparably damaged by a series of slope failures before it could be occupied. The cause of failure is not known yet, but there is now reluctance to use similar materials for island fill.

Offshore resources

resources that are located on or near the seabed, beyond the low-tide mark.

Petroleum Incentives Program

a federal government program during the late 1970's and early 1980's that provided incentives for exploration in frontier regions.

Pits and Quarries Regulations

draft regulations proposed under the Territorial Lands Act and the Public Lands Grants Act and intended to update the existing Territorial Quarrying Regulations and to apply to the offshore.

Potential resources

the quantity of materials whose existence and extent are inferred on the basis of limited direct information or are merely

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speculated on the basis of limited indirect evidence. Additional investigation is needed to determine a reliable source volume.

Proven resources

the quantity of materials whose occurrence, distribution, thickness and quality is supported with a high degree of confidence by ground-truth information such as drilling, test pitting, and/or exposed stratigraphic sections. The information pertaining to test holes is usually extrapolated to a radius of about 50 m around the hole, with adjustments applied by assessing landform type and anticipated or known deposit homogeneity.

Public demands

the requirement for granular materials for use in publicly funded capital or maintenance and upgrading projects. In the case of the Inuvialuit inventory program, this definition has been expanded tentatively to include demands for other projects, regardless of funding source, that are considered to be of direct benefit to the public (e.g. airstrips or all-weather access roads), and demands for small quantities by individuals.

Public Lands Grants Act

lands that belong to Her Majesty in right of Canada, or of which the Government of Canada has the power to dispose where there is no other provision in the law. Land-related activities in the Beaufort Sea are controlled under this act.

Reconnaissance

a general examination or survey of an area with reference to its main features, usually as a preliminary stage to a more detailed investigation. This normally includes aerial and ground examination and hand excavation of shallow test pits.

Reserves

supplies of granular materials on Inuvialuit lands that are to be reserved by the Inuvialuit for public community needs in accordance with the Inuvialuit Final Agreement.

Seabed resources

any natural materials on the seabed or near its surface occurring such that their exploitation is currently or potentially feasible. In the context of granular materials, this refers to sand and gravel that is at the seabed or covered by thin soft sediments and near the potential market.

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Spatial database

a quantity of digital information on the geographic location and spatial extent of mapped granular resources that can be searched, sorted, retrieved and plotted using a computer.

Supply

the quantity and quality of all types of granular material in any given area or region.

Supply-demand analysis

the analysis of short and/or long term demands for all and/or specific types of granular materials within a given area or region in relation to the known supplies of these materials, and the identification of any surpluses or shortages in supply.

Surficial resources

any natural material at or near the surface that may be recovered using conventional surface excavating equipment. This includes granular materials and other materials used for construction such as topsoil, clay and bedrock.

Terrestrial resources

resources that are located on land, as opposed to offshore resources.

Territorial Lands Act

the existing legislation controlling lands in the Northwest Territories and the Yukon Territory that belong to Her Majesty in right of Canada, or of which the Government of Canada has the power to dispose.

Territorial Quarrying Regulations

the existing regulations pursuant to the Territorial Lands Act dealing with the management of granular resources on Territorial Lands.

YaYa gravels

the coarse grained granular materials contained in or recovered from the large esker complex near YaYa Lake on southern Richards Island. The large deposits at YaYa Lake provide much of the

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higher quality granular materials used in the Mackenzie Delta.

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APPENDIX C

GRANULAR RESOURCE PROVISIONS
IN LAND CLAIMS AGREEMENTS

INUVIALUIT FINAL AGREEMENT

Sand and Gravel

7. (27) With respect to sand and gravel on Inuvialuit lands, as a first priority the Inuvialuit shall reserve supplies of sand and gravel of appropriate quality and within reasonable transport distances on Inuvialuit lands in order to meet public community needs in the Western Arctic Region and in Inuvik, based on reasonable 20 year forecasts of the volumes required from Inuvialuit lands. The forecasts shall be prepared jointly by the Inuvialuit and the appropriate levels of government on the basis of community estimates of requirements, and shall be revised from time to time as required but, in any event, not less frequently than once every five years.

7. (28) As a second priority, the Inuvialuit shall reserve adequate supplies of sand and gravel of appropriate quality on Inuvialuit lands for the direct private and corporate needs of the Inuvialuit and not for sale, based on reasonable 20 year forecasts of required volumes prepared by the Inuvialuit Land Administration.

7. (29) As a third priority, the Inuvialuit shall make available sand and gravel for any project approved by an appropriate governmental agency.

7. (30) The Inuvialuit and the appropriate level of government may jointly identify certain zones within the Western Arctic Region including, for greater certainty, Inuvialuit lands, where sand and gravel may not be removed, or may not be removed during certain periods of the year, for environmental reasons or because of other conflicting uses of such land.

7. (31) For greater certainty, the sand and gravel deposits within Inuvialuit lands, known collectively as the Ya Ya Lakes eskers, shall be dedicated to sand and gravel development, subject to normal pit development, restoration measures and laws of general application.

7. (32) The right to remove sand and gravel from Inuvialuit lands requires a licence or concession obtained from the Inuvialuit Land Administration. A licence or concession may stipulate the required payment of a royalty to the Inuvialuit Land Administration, not exceeding \$0.75 per cubic yard multiplied by b/a where "a" means the Gross National Product of Canada in current dollars for the year 1982 and "b" means the Gross National Product of Canada in current dollars for the year previous to the year in which the royalties are being charged.

7. (33) For the purposes of subsection (32):

(a) a licence is a non-exclusive right to remove a certain volume of sand and gravel for a specific purpose during a period not exceeding one year from a specific sand and gravel pit; and

(b) a concession is the exclusive right to explore, develop and produce sand and gravel from an area for a period specified in the concession.

7. (34) A licence or concession may stipulate payments to cover reasonable administrative costs and, where they are applicable and justified, reasonable land reclamation costs in relation to the sand and gravel deposit for which the licence or concession has been granted.

7. (35) In granting a licence, the Inuvialuit Land Administration shall, to the extent of its legal capability, ensure that sand and gravel is made available to interested parties at reasonable prices.

7. (36) Before issuing a licence, the Inuvialuit Land Administration shall require the applicant to establish that the proposed project has been approved by the appropriate level of government and that a contract has been awarded.

7. (37) Notwithstanding subsection (36), the Inuvialuit Land Administration shall, subject to reasonable rules of pit management, issue a licence to any person for personal use in amounts not exceeding 50 cubic yards annually.

7. (38) Any concession granted by the Inuvialuit Land Administration to the Inuvialuit Development Corporation (IDC) shall contain the specific provision that the IDC shall make sand and gravel available at reasonable prices to interested parties bearing in mind the priorities set out in subsections (27) to (29). Reasonable prices shall not exceed levels that would result in a rate of return in excess of 20%, after tax, on the capital employed by the holder in his sand and gravel business.

7. (39) The rate of return referred to in subsection (38) shall be determined in accordance with generally acceptable accounting principles on the basis of actual data for past years and reasonable forecasts for future years with the aim of averaging the rate of return over the life of the concession. For the purpose of determining reasonable prices, the concession holder shall not take into account any general annual overhead and management costs in excess of 15% of total costs.

7. (40) Any concession referred to in subsection (38) shall establish that the IDC maintains for inspection by the Inuvialuit Land Administration and the appropriate government officials the necessary financial records related to the royalty payments, profits and rate of return of the operations.

7. (41) Where the Minister is of the opinion that the IDC, under a concession, is providing sand and gravel in an unreliable or inefficient manner or at excessive prices, he may notify the Inuvialuit Land Administration in writing whereupon it shall terminate the concession and offer it on a competitive bid basis. Neither Canada, the concession holder nor any third party shall have any right, claim or recourse against the Inuvialuit arising from alleged damage or loss resulting from such termination.

7.(42) The provisions of this Agreement respecting sand and gravel, except subsection (41), are subject to the arbitration process set out in section 18.

COUNCIL FOR YUKON INDIANS
Sub-agreement

7.0 Quarries

- 7.1 Sites within Settlement Lands for the supply of sand, gravel, clay and other construction materials required for road construction and maintenance, and other public works, shall be identified by Government within one year of each Yukon First Nation Final Agreement and the use of such sites and materials shall not require the agreement of or compensation to the affected Yukon First Nation Designated Organization.
- 7.2 Yukon First Nation Designated Organizations shall allow sand, gravel, clay and other construction materials to be removed from sites on Settlement Lands which have not been identified pursuant to paragraph 7.1 and used for public purposes, if no alternative site is available in the surrounding area and upon such reasonable terms and conditions as may be agreed including fair and reasonable compensation for any such material use.
- 7.3 If the Yukon First Nation Designated Organization and the party wishing to use such materials do not reach agreement within a reasonable time under paragraph 7.2, either party may refer the matter to the Surface Rights Board.
- 7.4 Immediately upon termination of the use of the sites identified pursuant to paragraphs 7.1 and 7.2, if required by the affected Yukon First Nation Designated Organization, the party using the site shall ensure that restoration work is undertaken in accordance with commonly accepted land use standards and procedures including, as appropriate, clean up, drainage and erosion control, recontouring, overburden replacement and revegetation, so that the site will blend in with local landscape and vegetation.

DENE/METIS AGREEMENT IN PRINCIPLE
Sub-agreement

24 SAND AND GRAVEL

- 24.1.1 (a) The Dene/Metis shall provide supplies of, and access to, sand, gravel, clay and other like construction materials on Dene/Metis lands if, in the opinion of the Land and Water Management Board, no alternative source of supply is reasonably available in the surrounding area.
- (b) The Dene/Metis are entitled to fair and reasonable compensation for any materials supplied under (a).
- (c) If any person or government, and the Dene/Metis, do not agree on any terms or conditions respecting the supply of, or access to, materials under (a), the person or government seeking the supply or access may refer the matter to the Land and Water Management Board which shall decide all matters between the parties including the question of priorities between the Dene/Metis and other users. The decision of the Board shall be final and binding on the parties except for judicial review as in the case of an arbitrator's decision under this agreement.
- (d) The Board may establish rules and procedures for the carrying out of this chapter.

TUNGA VIK FEDERATION OF NUNAVUT
Sub-agreement

TITLE TO INUIT LANDS

1.2 Inuit Title

1.2.1 Inuit settlement lands may be held in two forms, either:

- (a) fee simple; or
- (b) fee simple saving and except the mines and minerals whether solid, liquid or gaseous that may be found to exist within, upon or under such lands together with the right to work the same.

1.2.2 Where Inuit hold title under subsection 1.2.1 (b), they shall have the right to all construction stone, sand and gravel, limestone, marble, gypsum, shale, clay, volcanic ash, earth, soil and diatonaceous earth, ochre, marl, peat, utkuhighak and hananguagahaq.

1.2.3 Notwithstanding paragraph 1.2.2, should government require sand and gravel and other like construction materials from Inuit lands for public purposes, government must obtain the consent of the DIO. In the event that consent is not granted, government may apply to the Surface Rights Tribunal for an entry order to remove such materials. An entry order may be granted only where the Surface Rights Tribunal determines that:

- (a) the materials are required for public purposes;
- (b) no alternative supply is reasonably available;

If an Entry Order is granted, government shall pay the DIO for the materials in accordance with a formula to be set out in the Agreement-in-Principle, and any entry fee required by legislation. Terms and conditions of access and compensation for access shall be determined by the Surface Rights Tribunal in accordance with 9.7.31 of the provisions on entry and access to Inuit lands. The entry order shall include terms and conditions to minimize the damage and interference with Inuit use and shall provide that government rehabilitate the site.