

SUBMISSION
BY
DEPARTMENT OF INDIAN AFFAIRS AND
NORTHERN DEVELOPMENT
REGARDING
REVISED NORTHERN OIL AND GAS ACTION PLAN

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February, 1985



DIAND NOGAP PROGRAM

DOLLAR REQUIREMENTS BY INDIVIDUAL PROJECTS

Project Requirements		1985/86	1986/87	1987/88
		-----	-----	-----
A.1	NOGAP Secretariat	221.5*	264*	170
A.2	Northern Participation	67	67	67
A.4	Granular Resources Inventory	420	420	420
A.5	Physical Environment: Processes & Impacts	210	222	250
A.7	Offshore Environmental Ecosystems Monitoring	360*	360*	258*
A.8	Disturbance of Marine Mammals	108	112	152
A.11	Deterrence and Treatment of Wildlife	0	95	70
A.12	Contaminants, Tainting, Quality and Food Species	92	140	120
A.13	Impacts of Oil and Gas Activities on Caribou	60	90	90
A.17	Surface and Subsurface Disturbances	72	100	100
A.21	Onshore Environmental Monitoring	120	(190)	230
A.20	Hydrocarbon Activities: Marine Research	295	245	165
DIAND TOTAL		2025.5	2305	2092

*This includes supplemental funding approved by the NOGAP Secretariat and Committee of Coordinators in February 1985 for the amounts of \$160K, \$160K and \$58K for fiscal years 1985/86, 1986/87 and 1987/88 respectively for Project A7; and \$51.5K and \$94K for 1985/86 and 1986/87 for Project A1.

DIAND NOGAP PROGRAM

PY REQUIREMENTS BY INDIVIDUAL PROJECTS

Project Requirements (Person Years)		1985/86	1986/87	1987/88
A.1	NOGAP Secretariat	2	2	2
A.2	Northern Participation	1	1	1
A.4	Granular Resources Inventory	1	2	1
A.5	Physical Environment: Processes & Impacts			
A.7	Offshore Environmental Ecosystems Monitoring			
A.8	Disturbance of Marine Mammals			
A.11	Deterrence & Treatment of Wildlife	2	2	2
A.12	Contaminants, Tainting, Quality of Food Species			
A.13	Impacts of Oil and Gas Activities on Caribou			
A.17	Surface and Subsurface Disturbances			
A.21	Onshore Environmental Monitoring			
A.20	Hydrocarbon Activities: Marine Research	1	1	1
DIAND	Total	7	8	7

(iii)

DIAND NOGAP PROGRAM

DOLLAR REQUIREMENTS/BY ORGANIZATIONAL DISCIPLINE

PROJECTS REQUIREMENTS (\$1000s 84/85 dollars)	1985/86	1986/87	1987/88
SARB Secretariat	221.5	264	170
Socio-Economic	67	67	67
Land Management	420	420	420
Water Resources	295	245	165
Environmental Protection	1022	1309	1270
DIAND TOTAL	1974	2211	2092

PERSON YEAR REQUIREMENTS/BY ORGANIZATIONAL DISCIPLINE

PROJECT REQUIREMENTS (Person Years)	1985/86	1986/87	1987/88
SARB Secretariat	2	2	2
Socio-Economic	1	1	1
Land Management	1	2	1
Water Resources	1	1	1
Environmental Protection	2	2	2
DIAND TOTAL	7	8	7

DIAND REVISED NOGAP SUBMISSION

GENERAL BRIEF OVERVIEW

The November 1984 reduction in the NOGAP budget necessitated a redesign of the DIAND NOGAP program to accommodate both a 35% reduction in resources and changes to the NOGAP priorities and criteria (See NOGAP Manual, December 1984). The present report contains redrafted project descriptions and corresponding resource allocations requested for the three fiscal years 1985/86 to 1987/88.

Projects have been designed following a reassessment of priorities which has occurred since the original TB submission. Some of the more important considerations have been: 1) industrial initiatives and developments including new and imminent proposals (i.e. Polar Gas Pipeline submission of 1984); 2) the Beaufort Sea Hearings, the following Report of the Beaufort Environmental Assessment Panel and the subsequent responses to the Panel Report from DIAND and other agencies and finally 3) the research and monitoring programs which have recently been initiated and/or completed through funding from NOGAP, ESRF, PERD and elsewhere.

Recognizing the present fiscal restraint the program has also been redesigned with a somewhat narrower geographic range, with emphasis generally towards the Beaufort Production zone (onshore and offshore) and a secondary emphasis on the Mackenzie Pipeline route.

Virtually all projects have been changed through the replanning exercise. Several projects have been deleted entirely while others have been combined or reduced in scope to accommodate the 35% reduction in DIAND NOGAP funding. A brief summary follows:

Summary of DIAND Project Changes and Deletions

A1 NOGAP Secretariat (Reduced)

Person years reduced from three to two per year. Senior planning co-ordinator (SM) and an environmental advisor (REM 1) have been appointed. The duties of the third PY (socio-economic advisor) have been assumed by the senior planning co-ordinator and through other means in order to keep the NOGAP Secretariat resource requirements to a minimum.

A2 Northern Participation (Retained/Merged)

This project now incorporates some of the duties, goals and objectives of the deleted Project A3.

A3 Adaptation to Wage Economy (Deleted/Merged)

Aspects of this project have been combined into project A2 Northern Participation which remains as the only socio-economic projects within the DIAND NOGAP program. The duties of the PY originally requested in A3 will be carried out in part through A2, by existing directorate staff and on a contractual basis as appropriate.

A4 Granular Resources Inventory and Management (Reduced)

Person years reduced from two per year to one in 1985/86 and 1987/88 and two in 1986/87. Resources for three years reduced by 37%. The shortfall will be met through a) use of in-house expertise; b) supplementing through A base and Industry funding; and c) heavier emphasis and funding in the first field season (1984/85).

A5 Physical Environment: Process and Impacts (Reduced)

Combined person year requirements for Projects A5-A18 and A21 have been reduced from three to two per year for the Northern Environment Directorate. The extra work load will be absorbed internally by existing staff. Resources for the next three years of this project (A5) have been reduced by 28%. This will reduce the ability to address concerns of a geotechnical/engineering design nature in areas outside of the Beaufort Production Zone and Pipeline right of way.

A6 Regional Terrestrial Environment (Deleted/merged in part with A21)

This project originally had some emphasis on the arctic islands and the N.W. Passage Tanker route (i.e. Cameron Island, Melville Island). It has been deleted and replaced by project A21 Onshore Environmental Monitoring and Research Program which addresses the Mackenzie Valley and Beaufort Coast. The latter recognizes the changes in NOGAP priorities and is now viewed as a priority project for DIAND Environment.

A7 Offshore Environmental Ecosystem Monitoring (Retained intact)

This project was retained as one of highest priority to the Environment Branch of DIAND. The resources have been increased by 35% through approval of supplementary funds by the NOGAP Secretariat and Committee of Co-ordinators (February, 1985).

A8 Disturbance of Marine Mammals by Industrial Activity (Reduced)

This project is reduced in funding by 18% for the fiscal years 1985/86-1987/88. This will reduce the ability to address concerns along the shipping route in the Eastern Arctic.

A9 Modelling Impacts on Mammals (Deleted)

This was a relatively modest project emphasizing marine mammals and the linkages between industry and various trophic levels. In accommodating the funding cut, it has been deleted in favour of more direct impact research (see A8, A12).

A10 Artificial Island, Ice Breakup (Deleted)

Although this project has been deleted, DIAND retains an interest in this area particularly in response to community concerns. This type of research could best be carried out co-operatively with AES (DOE) and DFO and may possibly be re-emphasized through the Beaufort Environmental Monitoring Program (see A7).

A11 Deterrence and Treatment of Oil Contaminated Marine Wildlife

(Reduced)

This project has been delayed by one year to 1986/87. Resources have been reduced by 60% and the scope has also been reduced. Birds are no longer being considered. It is expected that DOE with their expertise in this area will consider the issue of oil fouled birds.

A12 Contaminants, Tainting and Quality of Marine Food Species
(Merging of A12, A14 and A15)

Contaminants, Marine Food Species, Hydrocarbon Tainting and Hydrocarbon Bioaccumulation have been merged into this single project A12. The research areas have some similarities and in some cases are complementary. More cost effective subprojects can be initiated recognizing the dovetailing of such research initiatives.

A13 Impacts of Oil and Gas Activities on Caribou (Reduced)

The project has been updated and merged with DOE and YTG caribou projects. The DIAND contribution for the next three years has been reduced by 51%. This integrated approach will be more efficient and cost effective.

A14 Hydrocarbon Tainting (Merged with A12)

A15 Hydrocarbon Bioaccumulation (Merged with A12)

A16 Stream Crossing Design (Deleted)

The project was deleted recognizing that some similar research will be undertaken through EPS (DOE), DFO and DIAND through the Norman Wells Pipeline Monitoring Program.

A17 Surface and Subsurface Disturbances (Merging of A17 and A18)

Terrain Disturbance and Ground Thermal Regimes have been merged into A17. The research areas are in part complementary and could possibly be done concurrently.

A18 Ground Thermal Regimes (Merged with A17)

A19 Water Policy Development. (Deleted)

The project has been deleted. The work originally designated for the 1 PY requested will be carried out by existing personnel and completed through contract as required. A small amount of resources from project A20 Hydrocarbon Marine Research and Management will be used towards the objectives of A19 in 1985/86.

A20 Hydrocarbon Activities; Marine Research and Management (Reduced)

Only one of the two PY's/year originally requested will be retained. The resources for the three years have been reduced by 16%. A proportion of the resources in 1985/86 will also be directed towards the original objectives of Project A19.

A21 Onshore Environmental Ecosystem Monitoring (New)

This project replaces project A6 and as such retains some of the objectives of A6. It is modelled, however, on the Beaufort Environmental Monitoring Program (BEMP as described in Project A7). It will provide the focus and direction for DIAND environmental research and monitoring related to onshore production and transportation of hydrocarbons.

February 1985

DIAND NOGAP PROGRAM

DETAILED DESCRIPTIONS

OF

REVISED PROJECTS

NOTE:

- 1) Several projects have been combined into re-drafted project descriptions. These include:

Projects A2 and A3	combined as A2 Northern Participation
Projects A12, A14 and A15	combined as A12 Contaminants, Tainting and Quality of Food Species
Projects A17 and A18	combined as A17 Surface and Subsurface Disturbances
Project A21	new project containing some aspects of A6, now Onshore Environmental Monitoring
- 2) Other Projects have been deleted entirely. These include:

A6	Regional Terrestrial Environment
A9	Modelling Impacts of Industry on Large Mammals
A10	Effect of Artificial Islands on Ice Breakup
A16	Stream Crossing Design
A19	Water Policy Development
- 3) All other project descriptions have been modified to varying degrees.

DIAND Contact

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(819) 997-9621

NOGAP PROJECT DESCRIPTION

1. Project Title & No.: A.1 NOGAP Secretariat (1984/85-1990/91)
2. Project Manager: R. Rodger
NOGAP Secretariat
(819) 997-0880
3. Objectives:
 - 1) To coordinate, evaluate and monitor project proposals, project implementation and the use of approved funds for the Northern Oil and Gas Action Program (NOGAP).
 - 2) To advise the Senior Policy Committee, Northern Resource Development Projects (SPC/NRDP) on the policy and planning bases of NOGAP, the program content and progress made through the program in helping governments prepare for major hydrocarbon development by 1990-91.
4. Brief Background and Description:

NOGAP is derived from the northern hydrocarbon development strategy, approved by Cabinet in 1982, which has two facets:

- 1) implementation of a federal/territorial coordinated and accelerated socio-economic, environmental and technical research and planning program to support government regulatory, policy and program responsibilities and achieve a state of preparedness for northern hydrocarbon production (i.e., NOGAP); and
- 2) allowing northern hydrocarbon production, when it occurs, to proceed in a phased manner by initially developing proven commercial reserves on a small-scale demonstration basis, subject to normal regulatory and review processes.

Cabinet approved NOGAP as a seven-year (1984-85 to 1990-91), \$130 million program in February 1984. Treasury Board approved \$72.265 million and 232 person-years for the first four years in May 1984. Funding was reduced by 43 per cent (plus related person-years) for years 2, 3 and 4 in November 1984 as part of the government's economic initiatives (a reduction from \$55.6 million to \$31.6 million).

The majority of NOGAP projects are environmental (DOE, DFO, EMR, INAC, National Museum of Man, territorial governments); socio-economic work is also being done by GNWT and YTG, and technical marine transportation work by Transport Canada.

Cabinet's 1982 decision also required that the Minister of IAND ensure that a process be established to coordinate and evaluate government planning and research undertaken to increase preparatory efforts for northern hydrocarbon development. The NOGAP Secretariat is a response to that directive.

5. Subprojects: Not applicable.
6. Need for Study: Not applicable.

7. Relationship to Other Programs:

Hydrocarbon research and planning activities are also funded through the "A" base of departments and special funds such as ESRF and Energy R&D, each allocating funds according to specific criteria and priorities. The Secretariat liaises with other relevant programs and organizations to ensure that the "gaps" being funded are real, and to avoid duplication and overlaps in planning and research activities.

8. Major Milestones/Outputs:

The terms of reference defined by the SPC/NRDP for the NOGAP Secretariat summarize the major activities which it must undertake annually:

- 1) Administering the NOGAP coordinating process and providing services to support the SPC/NRDP in relation to NOGAP;
- 2) Using input from the NOGAP Committee of Coordinators and others, as required, to:
 - a) prepare discussion papers on policy and program-emphasis matters for consideration by the SPC/NRDP;
 - b) prepare such omnibus Treasury Board submissions as are required;
 - c) coordinate and regularize the inclusion of NOGAP resources in departmental MYOPS and Main Estimates; and
 - d) formulate proposals for division of the budget between program areas and projects.

9. NOGAP Resource Requirements (\$84-85, 000s):

	<u>85-86</u>	<u>86-87</u>	<u>87-88</u>
PYs	2	2	2
Salary/Benefits	131	131	131
O&M	90.5	133	39
Capital	-	-	-
Total \$	221.5	264	170

10. PY Justification:

Three person-years were approved for the NOGAP Secretariat for 1984-85 to 1987-88 as part of TB Decision 793171 of May 17, 1984 because NOGAP constituted a new, previously unfunded activity. These PYs were to be used for a senior planning coordinator, an environmental advisor and a socio-economic advisor, proposed for classification at the SM, PC-4 and ES-5 levels respectively. Since then the senior planning coordinator position has been classified as proposed and staffed.

Because of the reduction in NOGAP funding in November 1984, it has been decided to staff only the environmental advisor position, at the SE-REM-1 level. This position is required because of the preponderance of projects requiring environmental expertise to coordinate, monitor and evaluate them successfully and the need for a financial coordinator.

The duties which were to be undertaken by the socio-economic advisor have been assumed by the senior planning coordinator and other means in order to keep Secretariat resource requirements to a minimum.

NOGAP PROJECT DESCRIPTION

1. Project Title: A2 Northern Participation (merging of original A2 and A3*) (1984/85-1990/91)
-

2. Project Manager: R.P. Sterling

Northern Economic Planning Directorate
Socio-Economic Agreements
and Native Economy Division
(819) 997-0440

3. Objectives:
-

1. To promote northern participation in employment, training and business opportunities created by northern hydrocarbon projects;
2. To determine the requirements (terms and conditions) for any negotiated northern benefits package;
3. To evaluate wage employment policies and practices which can be used to minimize adverse negative impacts on traditional lifestyles in order to encourage greater native participation in the labour force.
4. To implement the BEARP socio-economic recommendations that constitute additional undertakings on the part of DIAND, such as the annual updating of socio-economic portion of the Information Survey, the expansion of the role of the Beaufort Sea Coordinator's Office, should it be warranted by development activity.

4. Brief Background and Description:
-

Research efforts will focus on Beaufort Sea hydrocarbon development projects and the Beaufort Sea region. Research will be directed at assessing the impacts of such projects on the human, particularly native, and business resources of the region, with emphasis on potential industry requirements for these resources and with particular reference to the recommendations made by the BEARP; investigating alternate means of promoting employment, training and

*(NOTE: Revised description reflects a compilation of previously approved projects A2 and A3. In light of the November, 1984 budget cut, project A3 (1 PY and \$53K) have been offered up for 1986/87 to 1990/91.)

business opportunities in the projects for northern and native people in the region; assessing the impact and effectiveness of existing Canada Benefits Plans for exploration activities in the region with respect to planning for the development and production phase of the projects; determining the economic, social and cultural requirements of the northern and native people in the region and identifying the means to meet those requirements. The research will be conducted in consultation with appropriate government departments and agencies, both territorial governments, industry, Beaufort Sea DIZ Society and appropriate business and native associations. The BEARP socio-economic recommendations that are incremental to current DIAND activities and programs will be implemented in the most practical and cost efficient manner with the advice and recommendations of other departments and agencies as appropriate, the territorial governments, appropriate DIZ societies and industry.

5. Subprojects for 1984/85:

Not applicable.

6. Need for Study in Terms of:

a) Departmental Mandate:

While the territorial governments have shared responsibility with CEIC for the delivery of employment and training programs and with DRIE for the delivery of business development programs, the DIAND minister has residual responsibility regarding socio-economic concerns, including employment, training and business opportunities with specific responsibility for the native people of the North. In order for the Minister to effectively implement his mandate in this area, this research is essential to bring activities related to northern benefits into a framework related to overall social, cultural and economic objectives. The research is consistent with the national objective in the North to provide a higher standard of living, quality of life and equality of opportunity for northern residents by methods which are compatible with their own preferences and aspirations.

b) Preparedness for Decision-Making on
Northern Hydrocarbon Development Proposals

The research will ensure that the Department continues to have the capability to take the lead role in the analysis of the circumstances in the North, the identification of the special measures required to create opportunities for Northerners, particularly natives, and to see that these opportunities are realized while negative impacts are minimized. In addition, greater expertise on the part of DIAND is needed in the areas of regional needs and concerns and mechanisms to meet those needs as well as the capacity to monitor and respond to what happens so that corrective action is not delayed. The anticipated benefits of the research will be to maximize northern benefits in Beaufort Sea hydrocarbon development projects, to minimize adverse impacts, to achieve a greater acceptance of development activity and to provide a sound basis for greater native involvement in economic and social development issues.

7. Relationship to Other NOGAP Projects:

The only other socio-economic projects under NOGAP will be conducted by the territorial governments and are of an operational nature. Effective consultation with appropriate territorial officials will ensure a coordinated research program.

8. Major Milestones/Output:

Delays in staffing have been experienced due to government staff freeze and reduction in NOGAP funding.

1. Analyses of specific project proposal and the development of appropriate project approval terms and conditions will be dependent on the initiative and timing of the proponents.
2. Assessment of effectiveness of existing Canada Benefits Plans - December 1985.
3. Preparation of strategy to implement BEARP socio-economic recommendations - December 1986.

4. Implementation of BEARP socio-economic recommendations in consultation with other interested parties - June 1987.
5. Report on economic, social and cultural requirements of northern and native people and means to meet these requirements - June 1988.
6. Report on alternative means of promoting opportunities for northern and native people - March 1989.

9. NOGAP Resource Requirements

	85/86	86/87	87/88
PY's	1	1	1
Salary	42	42	42
O&M	25	25	25
Total	67	67	67

11. Other Funding:

Current A base resources

	85/86	86/87	87/88
PY's	.38	.38	.38
Salary	14	14	14
O&M	5	5	5
Total	19	19	19

12. Person-Year Justification:

Without requested person-year, DIAND's ability to play the lead role in the socio-economic aspects of northern hydrocarbon development projects will be compromised. The department will not be in a position to thoroughly anticipate the effects of such projects, nor to provide sound guidance to both government and industry on the achievement of maximum benefits for Northern residents. The incumbent will strengthen DIAND's analytical capability and expertise with respect to implementing and achieving federal policies and objectives. In addition, the individual will directly influence the optimal achievement of benefits for northern residents particularly natives in terms of employment, training

February, 1985

NOGAP PROJECT DESCRIPTION

1. Project Title: A.4 GRANULAR RESOURCES INVENTORY AND MANAGEMENT
----- PROGRAM (1984/85-1988/89)

2. Project Manager: Chris Cuddy
----- Northern Renewable Resources Directorate
Land Management Division
(819) 997-0780

3. Objectives:

- 1) To ensure that adequate geotechnical and hydrographic information is available to support the Department's granular resources management program related to Hydrocarbon Development.
- 2) To provide detailed information on the location, type, quantities and qualities of each borrow source in the Beaufort Sea Region as is required to support conservation and utilization strategies and policies being developed under the Territorial Quarrying Regulations, Public Lands Grants Act and Regulations, and the proposed Territorial Land Pits and Quarry Regulations.

4. Brief Background and Description:

Background:

Phase I: In cooperation with industry, the Regional Overview Study of the Beaufort Sea Area has evaluated the supply/demand situation for granular resources and has identified information gaps and areas of concern for immediate action. The main finding has been that proven gravel reserves fall short of the long term demand and therefore that conservative management coupled with searches for new sources is required.

Description:

Phase II: This project will ensure the development of a regional granular inventory for the Beaufort Region. To accomplish this the following annual work is required:

- 1) determination of potential depositional sites according to hydrographic profiles
- 2) bathymetric, geophysical and environmental programs in areas of poor coverage
- 3) determination of the environmental consequences, before and after the exploitation of these sites
- 4) groundtruthing of these potential sites through field geophysical and geotechnical programs
- 5) correlation of geophysical, geological, hydrographic and geotechnical data to identify parameters distinctive to each deposit.

5. Subprojects:

N/A See Report to NOGAP Secretariat entitled: "DIAND NOGAP Subprojects for 1984/85"

6. Need of Study in terms of:

a) Departmental Mandate:

To manage the north's non-renewable resources from both onshore and offshore perspectives, a management program for the granular resources required by northern operators is mandatory. The information is required to properly administer the Public Lands Grants Act; the Territorial Quarrying Regulations, and the proposed Territorial Pits and Quarry Regulations. The granular materials data base will be used by industry to reduce island construction costs through utilization of better quality materials and reduced haul distance. Also, island designs can be made safer.

The goal of the Beaufort Regional granular material management plan is to acquire an understanding of the offshore granular resources similar to that which has been developed over the last decade for onshore sources. Identification of offshore sources will take some pressure off the onshore deposits.

b) Preparedness for Decision-Making:

The inventory program will support the development of new and amended policies for offshore and onshore land management related to harbour siting and developments, leasing of lands for production facilities and utilization of borrow material.

Three major operators in the Beaufort Sea - Dome, Esso, Gulf - have estimated a requirement of 700,000,000 cubic meters of granular material for major Beaufort Hydrocarbon Development. Approximately 5% would be gravel (35,000,000 cubic meters). Proven exploitable reserves constitute less than 1/3 of the anticipated total long term gravel requirements. Proven gravel reserves are not identified and must be addressed. The hydrocarbon industry has current annual requirements for 5 to 10 million cubic meters of sand and gravel for artificial island construction.

It is readily apparent that the Government does not presently have sufficient knowledge of this finite resource for management and conservation, or to effect its use with minimal environmental impact.

7. Relationship to Other NOGAP Projects:

This work will be supplemental to the ongoing programs of Energy, Mines and Resources (GSC) with regard to broad identification of regional subsea surficial geology, and to the site specific investigations of industry. Information from both those sources will be used in this program. Overlaps and redundancies will be avoided through the co-ordination of the work by DIAND.

8. Major Milestone:

1985/86

- 1) Final analysis of data from "Geophysical and Geotechnical Surveys of Herschel Basin".
- 2) Release of report on "Soils Investigation at Phillips Bay and King Point".
- 3) Release of report on "Granular Resources in Herschel Basin".
- 4) Initiate field work on granular resources of Issigak area, North of Pelly Island.

1986/87

- 1) Release of preliminary finding from Issigak.
- 2) Continuation of Issigak field program.
- 3) Assess requirement to conduct granular resource investigations around specific communities (see below).

1987/88

- 1) Dependant on results of finding from Herschel Basin and Issigak, initiate field work on 3rd area of priority: offshore of Pullen Island.
- 2) Initiate field survey of sand resources onshore at Richards Island.
- 3) Initiate granular resource investigation into areas surrounding communities such as Inuvik, Arctic Red River, Fort Good Hope. Issue addressed will be competing requirements between pipeline construction and community public use.

9. NOGAP Resource Requirements:

(\$000, \$84/85)

	85/86	86/87	87/88
PYs	1	2	1
Salaries	59	111	59
O&M	361	309	361
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Total	420	420	420

10. PY Justification:

One PY at Headquarters is required to administer the project - identify granular material study requirements; to draft the terms of reference of inventory and management studies; to evaluate study proposals; as the scientific authority, to ensure compliance with contract specifications; to develop granular management systems; and to recommend policy positions on granular material management including revenue collection, site and project controls and legislation.

A term PY (86/87) is required by the DIAND NWT lands office to develop regional policies and procedures on the implementation of granular management plans and the new quarrying regulations. Furthermore this term PY is required to recommend granular material inventory studies including terms of reference and possible northern contractors; to assist in the evaluation of contract proposals; to oversee contractors field investigations; to conduct and report on small scale field studies; to provide advice on the geotechnical aspects and implications of hydrocarbon development activities as they relate to the application of the Territorial Quarrying Regulations; and assists Land Resources staff with respect to environmental assessment of various hydrocarbon related projects such as roads, airports, islands and harbours.

11. Other Funding:

In 1984/85, DIAND granular resource work has been matched through logistical and financial support from Industry. It is anticipated that this will continue through the life of the project. Support may also continue to be provided by A base, and EMR.

12. Priority:

This work falls under the First Priority "initial work". The high granular resource demand forecast by industry emphasizes the necessity for the Department to take immediate steps to manage this resource.

The information obtained will allow DIAND to manage the offshore granular resources in an efficient and responsible manner by providing the background data required to impose controls on allocation and use of borrow materials. The long term aspects of this information need will be reflected in the application of this information to the development of new policies and amendments of existing policies for onshore and offshore land management.

13. Criteria Met:

This project meets all six criteria listed in the NOGAP Manual (12/84).

NOGAP PROJECT DESCRIPTION

1. **Project Title:** A5 **PHYSICAL ENVIRONMENT: PROCESS AND IMPACTS**

(1984/85-1990/91)
2. **Project Manager:** F. McFarland

Northern Environmental Protection Directorate
Terrestrial Environment Division
(819) 997-9621
3. **Objectives:**

 - (1) To identify and address those information deficiencies critical to the understanding of physical processes and of their interactions with proposed engineering methods and industrial developments.
 - (2) To provide detailed advice on the most technically and environmentally acceptable siting of shorebased and other terrestrial facilities including support bases, harbour structures, production systems and pipelines.
 - (3) To ensure effective government regulation of proposed engineering methods for industrial development by carrying out geotechnical, hydrological, meteorological and climatological studies of proposed large scale hydrocarbon development.
4. **Brief Background and Description:**

Background:

Ongoing and proposed industrial activity in the Canadian Arctic, particularly hydrocarbon exploration and production development, has created a demand for detailed technical advice on the siting and design of shorebased facilities, including support bases, harbour structures, production systems, and pipelines. The existing level of knowledge is inadequate for sound technical evaluation of development proposals and engineering designs. Some of the more urgent near term requirements are: the magnitude and variability of coastal erosion; nearshore profile adjustment; sediment transport; nearshore physical hazards; potential oil spill impacts and the development of engineering stability of structures.

Description:

Since most of the exploration occurring in the Canadian Arctic is presently concentrated in the Beaufort Sea, emphasis in the initial years of the project will be coastal zone morphology and dynamics in relation to harbours, shore bases, sub-sea pipelines and nearshore development in this area. The influences of wave processes, ice scouring, erosion and sedimentation rates will be monitored to understand shoreline changes in the vicinity of industrial development sites.

Existing information gathered from aerial photography and published literature will be supplemented by ground truthing to establish the sedimentary regime, the shallow water and coastal morphology, the isostatic stability and the climatic and meteorological information on conditions prevailing on the area of potential development. Research will also include monitoring of ground temperature variations adjacent to shore based structures. Techniques will include real time temperature profiles via appropriate techniques of direct and remote sensing. Such research will be expanded to the pipeline corridor if and when appropriate. This may also be extended to concerns related to the formation and response of ice to various engineering designs intended to protect offshore structures from ice forces.

Arctic development research funds in general (i.e. from proponents, PERD, ESRF) will be largely directed towards the efficiency and applicability of existing and proposed engineering techniques to the arctic environment.

This type of research must be paralleled by studies of the potential environmental impacts of alternative sites and alternative engineering designs. The present project is therefore designed to ensure effective Government regulation of proposed engineering methods through technical advice on the location and design of shorebased facilities.

5. Subprojects:

N/A See Report to the NOGAP Secretariat; "DIAND NOGAP Subprojects for 1984/85".

6. Need for Study

(a) Department Mandate:

Effective government preparedness and regulation related to the potential environmental hazards or advantages of engineering developments common to all aspects of hydrocarbon development in the North rests largely with DIAND. Knowledge acquired through these projects will influence the administration of the Public Lands Grants Act, Territorial Lands Act, the Arctic Water Pollution Prevention Act, Oil and Gas Production and Conservation Act, and the Canada Oil and Gas Act.

(b) Preparedness for Decision-Making on
Northern Hydrocarbon Development Proposals:

Government's ability to respond to innovative engineering techniques and to proposed development sites relies on the maintenance of an up-to-date body of knowledge to address the environmental benefits and/or hazards. This NOGAP project will ensure that DIAND will have access to physical environmental information required to effectively and efficiently regulate hydrocarbon development.

7. Relationship to Other NOGAP Projects:

The information provided will be of use to EMR in the conduct of their NOGAP D1 Project entitled "Northern Geotechnical Research Program: Beaufort Sea Coastal Zone Geotechniques". DOE and DFO will also be interested in studies pertaining to ice regimes in the Beaufort Sea, while EMR will continue to be consulted and/or involved in all subprojects dealing with coastal erosion and the sediment regime of other waters flowing in the Beaufort Sea.

8. Major Milestones/Outputs:

1985/86

- 1) Release report (in conjunction with EMR) on mapping of shorezone characteristics and coastal change.
- 2) Release model of sediment transport on Beaufort coastline.
- 3) Continue surveys of coastal transport on Beaufort coastline; sites to be determined by port development proposal(s).
- 4) Examine completeness of existing information relating to Norman Wells monitoring studies. Identify potential geotechnical and hydrological information needs with the view to possible expansion of research in this area.

1986/87

- 1) Release reports of 1985 field season.
- 2) Continue field work on coastal erosion in relation to siting port facilities.
- 3) Initiate pipeline corridor related research. Emphasis on engineering design with respect to hydrological and permafrost considerations.

1987-88

- 1) Release reports from 1986 field season.
- 2) Complete analysis of all available data on coastal instability, erosion and sediment transport for the Beaufort Sea and if appropriate, continue.
- 3) Continue pipeline corridor related geotechnical field program.
- 3) Make recommendations on siting of industry related harbour facilities.

9. NOGAP Resource Requirements:

(\$000; \$84/85)

	85/86	86/87	87/88
PYs	%	*	%
Salaries	25	25	25
O&M	185	197	225
	---	---	---
Total	210	222	250

10. PY Justification

This PY justification is applicable to the two NOGAP positions accorded to the Northern Environment Directorate of DIAND. The 2 individuals will be responsible for 8 DIAND Projects; A5, A7, A8, A11, A12, A13, A17 and A21. One individual will also act as the DIAND NOGAP Co-ordinator.

The original NOGAP submission to Treasury Board requested a total of approximately 3 PY's per year (2.7, 3.2 and 2.9 from 1985/86 to 1987/88) for the Northern Environment Branch, DIAND. The allocation was specified by the approximate work increment necessary to plan and administer each of 13 projects totalling approximately \$1.6 Million/year and PY's were defined on that basis (i.e. 0.5 for project A5; Regional Physical Assessment etc.). At that time no PY was requested specifically for NOGAP co-ordination. The resulting work load involved in originating, facilitating and administering the 28 subprojects initiated to date in 1984/85 has been considerable.

Also, the DIAND NOGAP co-ordination duties similar to those required by the co-ordinators of other participating Departments are, and will continue to be, undertaken by a person hired under 1 of the 2 remaining Northern Environment NOGAP positions. His duties will involve co-ordination of DIAND NOGAP as well as acting directly as scientific authority on marine related projects. The second individual will assume similar responsibilities for all terrestrial based research projects. The anticipated work load as related to specific projects follows:

DIAND Northern Environment Directorate PY Requirements

	Approximate PY load/year (1985/86-1988-89)
i) DIAND Departmental Co-ordinator	1.0
ii) Marine Environment	
A7 Offshore Environmental Ecosystems Monitoring	0.4
A8 Disturbance of Marine Mammals	0.2
A11 Deterrence and Treatment of Marine Wildlife	0.1
A12 Contaminants, Tainting of Food Species	0.2
iii) Terrestrial Environment	
A5 Physical Environment Process and Impacts	0.4
A13 Impacts of Oil and Gas on Caribou	0.2
A17 Surface and Subsurface Disturbances	0.2
A21 Onshore Environmental Monitoring	0.3
TOTAL REQUIREMENTS	3.0
TOTAL REQUESTED	2.0

DIAND Northern Environment is, therefore, requesting only 2.0 NOGAP PY's. The apparent shortfall of 1 PY will be absorbed by making use of in-house expertise. This is considered appropriate given the present hiring restraint and the necessity of substantive replanning of the NOGAP program. DIAND's environmental NOGAP program would be severely compromised, if any less than 2 PY's were made available through NOGAP.

Position (1) has been staffed since July, 1984; position (2) will be staffed in February, 1985. The two positions are:

- 1) Departmental NOGAP Coordinator (secondary role as Marine specialists).
- 2) Terrestrial Environment Specialist.

Duties are to be:

- a) plans, organizes and controls the conduct of multidisciplinary, DIAND administered, scientific research projects under NOGAP;
- b) serves as project officer/scientific authority on NOGAP research projects investigating the impact of oil and gas exploration on the northern environment (marine and terrestrial for positions 1 and 2 respectively);
- c) represents the department and NOGAP in a variety of contacts with officials of other federal departments, territorial governments, private industry, universities, native organizations and the general public (lead role for position 1);
- d) provides expert disciplinary advice to the NOGAP secretariat as and when required.

The resources required for both positions will be approximately \$123K in salaries and incidentals and \$30K in travel, for a total of \$153/year for fiscal years 1985/86 to 1988/89. The resources will be taken proportionately from each of the 8 Environmental Directorate NOGAP projects.

11. Other Funding:

N/A Research in 1984 was conducted in cooperation with EMR and to some degree, with DIAND NOGAP Project A4. It is anticipated that such coordinated programs will continue to varying degrees (dependant on sub-project) throughout the duration of this project.

12. Priority:

The work to be sponsored by this study falls within the first category "Initial Work" in that it consists of first-order protection, prevention and delineation. By designing effective regulations for pioneering engineering options, government is ensuring not only operational safety but also environmental protection.

13. Criteria Met:

The project meets all six criteria listed in the NOGAP Manual (12/84)

February, 1985

NOGAP PROJECT DESCRIPTION

1. Project Title: A7 OFFSHORE ENVIRONMENTAL ECOSYSTEMS MONITORING

(1984/85-1990/91)
2. Project Manager: D. Stone

Northern Environmental Protection Directorate
Marine Environment Division
(819) 997-0044
3. Objectives:

 1. To provide DIAND with a comprehensive planning and review program for environmental research and monitoring to accompany offshore industrial activities in the Beaufort..
 2. To provide a functional audit, which continuously evaluates whether research and monitoring proposed, and results obtained are addressing the most useful variables for detecting and anticipating environmental impacts.
 3. To provide the research related to monitoring and essential for progressive development of the Beaufort Monitoring Program and necessary for the iterative evaluation of the effectiveness of monitoring and mitigative measures.

4. Brief Background and Description:

Although environmental assessments of industrial development are always multidisciplinary, in most cases little effort is directed at development of a co-ordinated interdisciplinary approach to monitoring. As a result, important information required to make predictions of impacts encompassing more than one discipline is often overlooked. Alternately research efforts are often duplicated.

The present project is an integrative, interdisciplinary and adaptive approach to developing and managing environmental ecosystem monitoring. The system including technical workshops forces discipline specialists (government, industry, university and consultants) to view their area of interest in the context of the whole system; environmental and industrial. It also allows all knowledge to be integrated at the beginning, rather than at the end of development/environment assessment. Finally, it is cost effective by making maximum use of all data existing and collected, and by minimizing overlaps and the collection of inappropriate information.

In 1983, DIAND and DOE initiated the Beaufort Environmental Monitoring Program (BEMP) with bridge funding from DSS. NOGAP (DIAND) with DOE support has continued the support for this project. The BEMP program is to provide the technical basis for the design,

operation and evaluation of a comprehensive and defensible environmental research and monitoring program to accompany hydrocarbon development in the Beaufort Sea relative to the regulatory responsibilities of the sponsoring departments. In the recent Beaufort EARP report (FEARO 1984), the need for research and monitoring programs to accompany phased oil and gas development in the region was emphasized. The panel commended DIAND and DOE on their initiative in sponsoring BEMP.

As stated in the BEMP review of past activities and current research and monitoring programs (January, 1985), monitoring is defined as a test of an impact hypothesis designed to (a) measure environmental impacts and (b) analyze cause-effect relationships. Research is defined as a test of a process hypothesis, or baseline measurements required to increase fundamental knowledge regarding the biophysical environment.

There are two main thrusts to the project:

1. To continue the Beaufort Environmental Monitoring Project (BEMP) which relies on an iterative workshop/impact hypothesis testing approach to develop and manage an environmental ecosystems monitoring program.
2. To further develop the Beaufort Monitoring Program by completing the offshore research which is identified by BEMP as being critical to adequately develop a monitoring program for the Beaufort Sea and to allow effective Government preparedness.

6. Need for Study in terms of:

(a) Department Mandate:

To effectively implement resource management programs and to regulate the Arctic offshore development through the Arctic Waters Pollution Prevention Act, Oil and Gas Production and Conservation Act and Canada Oil and Gas Act.

(b) Preparedness for Decision-Making on Northern Hydrocarbon Development Proposals:

The project, by virtue of being interdisciplinary and involving representation from specialists from the scientific community, government and industry, will provide a sound base for co-ordination of research and monitoring activities. It will help direct the limited amount of environmental funds towards the most critical and practical areas and it will ensure that data obtained (in past and future studies) is used and distributed. Because of the comprehensive nature and board representation, the project will avoid duplication of a research. Finally, it will demand that information is collected in a manner and a time frae which is of maximum use for environmental decision-making and informed regulation of industrial activities.

7. Relationship to Other NOGAP Projects:

DIAND and DOE have jointly initiated BEMP in part with NOGAP funds. The hypotheses examined and the resulting research and monitoring programs will be of relevance to DFO, DOE, DIAND and other Departments planning offshore research under the NOGAP program. Such a program, effectively managed, will maximize the returns of relevant and practical information possible through environmental research funds (NOGAP and others) available over the next several years.

8. Major Milestones/Outputs:

a) BEMP Program Management (Resources approximately \$130K/year)

- Spring/85. . Review and editing of draft report of research and monitoring recommendations from participants of February, 1985 workshop. Publication of 2nd Beaufort Environmental Monitoring Report.
- Summer/85. . Implementation of BEMP supportive research (see (b)).
- Fall/85. . Separate technical BEMP workshop specifically addressing resource harvesting of Beaufort marine resources. Designed to complement Mackenzie Environmental Monitoring Program.
- Winter/85. . Planning and technical meetings in preparation for 3rd workshop.
 - . Preparation of report on new research and monitoring projects initiated in 1985/86.
 - . Complete week long workshop involving approximately 50 discipline specialists and resource managers. Purpose - to further develop BEMP by re-assessing hypotheses in light of new research results obtained through NOGAP and elsewhere.

1986-1988 To continue on an annual basis

b) Implementation of BEMP Recommendations (Resources - approximately 45K/year core program plus \$160K/year granted from supplemental funding in decision by NOGAP Secretariat and Committee of Coordinators in February, 1985).

The following is a sample list of research and monitoring recommendations from the 1984 BEMP report. The list outlines the issues and types of subprojects which will be carried out under this project. To be subproject-specific on the next 4 years of funding would pre-empt the recommendations of BEMP and undermine the iterative value of the entire BEMP approach.

Bowhead Whales:

Research: Distribution of food supply; acoustical behaviour monitoring methods.

Monitoring: Annual distribution, ambient noise monitoring.

White Whales:

Research: Factors controlling distribution in Beaufort Bays.

Monitoring: Regional land fast ice extent, breakup.

Ringed Seals:

Research: Ice cover versus seal distribution.

Monitoring: Icebreaker traffic/ice regime in Amundsen Gulf,
Remote sensing of birth lairs.

Polar Bears:

Monitoring: Polar bear monitoring and deterrent programs continued and expanded.

Two of the most appealing features of the Beaufort Environmental Monitoring Program are as follows:

- a) All proposed research and monitoring is directed towards impact hypotheses which link components of the Beaufort Production Scenario to features of the environment about which people are concerned. Each hypothesis receives a critical and ongoing evaluation by an interdisciplinary team of specialists before any research on monitoring recommendations are made.
- b) The process is dynamic. The impact hypotheses evolve in parallel and in response to the development and changing plans for Beaufort Sea production. Therefore the proposed research and monitoring remains realistic and relevant, keeping pace with the changing industrial scenario. Furthermore, the research and monitoring needs are continually re-evaluated according to the results of ongoing and completed studies.

The cost of the dynamic nature of BEMP is a difficulty in predicting exactly what resources will be required to study which hypothesis or hypothesis linkage. The results from one study may eliminate the need for further research, or may open up new areas of concern. In addition, changes in the development scenario may make a hypothesis redundant, but could again give birth to another. It is important that the project is able to capitalize on the advantages of its dynamic nature by ensuring that resources are available to fund BEMP recommendations as they evolve.

Further rationale and background on BEMP is provided in section 14: Relationship between the Beaufort Environmental Monitoring Project, the Mackenzie Environmental Monitoring Project and NOGAP.

9. NOGAP Resource Requirements

(\$000s; \$84/85)

	85/86	86/87	87/88
PYs	*	*.	*.
Salaries	25	25	25
O&M	335	335	233
	---	---	---
Total	360	360	258

This amount includes supplemental funds approved by the NOGAP Secretariat and Committee of Co-ordinators for the amount of \$160K, \$160K and \$58K for 1985/86, 86/87 and 87/88 respectively.

10. *See Project A5, Section 10, PY justification

11. Other Funding

- 1) Management of BEMP will continue to be co-sponsored by DOE; contributing approximately 12K/year.
- 2) The Implementation of BEMP recommendations in 1984/85 was partly funded by several agencies and funds including DIAND A-base, NOGAP of other agencies, ESRF, etc. This will continue throughout BEMP on a project-specific basis.

12. This project falls primarily under First Priority "initial work" in that outputs of the Monitoring Process will be utilized immediately to formulate the direction of environmental research and monitoring. In another sense the project will be of a "longer term" nature by virtue of the fact that some of the recommendations implemented under this project will be longer term monitoring programs.

13. Criteria Met:

This Project meets all 6 criteria listed in the NOGAP Manual (12/84).

14. Consequences of Nil Funding

Without a co-ordinated approach to offshore ecosystems, Government-regulated agencies including DIAND, will continue with a relatively fragmentary, ad hoc, and "crisis response" approach to environmental research and monitoring. Studies will often be initiated following a perceived environmental impact, or without considering a planned approach based on sound ecological information. Much of the research will be effectively wasted by: the results being poorly distributed; unsuitable for bridging interdiscipline boundaries; or inappropriately designed for practical implementation in resource management and the regulation of Arctic offshore development.

15. Relationship between the Beaufort Environmental Monitoring Project, Mackenzie Environmental Monitoring Project and NOGAP.

Overview

There are two basic cornerstones to the DIAND NOGAP program which will continue to provide the direction as to the specific research and monitoring subprojects which will be initiated over the duration of NOGAP. The first, the Beaufort Environmental Monitoring Program (BEMP; NOGAP Project A7) will direct work in the offshore environment while the Mackenzie Environmental Monitoring Program (MEMP; NOGAP Project A21) will direct onshore research. The area of focus in both Programs, as in the NOGAP program, is the Beaufort oil and gas production zone (NOGAP Priority 1). The other area of focus for MEMP is the Mackenzie Pipeline Route (NOGAP Priority 2).

The offshore program (BEMP) was initiated in 1983. In this timely manner, the research and monitoring recommendations from the first year of BEMP were implemented to a large measure through 1984/85 NOGAP resources (to be discussed in detail later). The onshore program (MEMP) has followed on the success and the obvious and direct applicability of the offshore program. MEMP under DIAND lead with the full support and co-sponsorship of DOE, DFO and the Territorial Governments, will begin in February 1985. It will provide the technical basis for the design, operation and evaluation of an environmental monitoring program to accompany hydrocarbon development in the onshore Beaufort and the Mackenzie Valley relative to the regulatory responsibilities of the sponsoring departments.

The obvious importance and application of both these Monitoring Programs to NOGAP must be emphasized. In the recent Final Report of the Beaufort Sea Environmental Assessment Panel (PEARO 1984) the need for research and monitoring programs to accompany phased oil and gas development in the region was emphasized. In this regard, the Panel commended DIAND and DOE on their initiative in sponsoring the BEMP. BEMP (and in the near future MEMP) remains the most effective tool available by which Government funded arctic oil and gas research can be effectively prioritized, monitored and critiqued on a continuing basis.

As an example, there were 16 subprojects funded by DIAND NOGAP resources in 1984/85 which were initiated in some measure as a response to BEMP recommendations. For perspective, it must be stated that BEMP was not the sole impetus for research direction and some subprojects (i.e. Geotechniques, Coastal Processes) were initiated largely independent of BEMP. Even more resources were actually committed to BEMP recommendations when considering co-funding contributions from NOGAP funds of other agencies, A-base, ESRF, etc.

Not all BEMP research and monitoring recommendations could be implemented in 1984/85. The NOGAP program this year did, however, make a very substantive contribution through applying the 1984/85 funds towards the areas which were deemed most approachable and productive by the group of interdisciplinary specialists present at BEMP. NOGAP funds in the future will undoubtedly be directed towards one or more of the subjects which were not addressed in 1984. As well, the February 1985 BEMP workshop will incorporate the results of this year's work to reassess the research and monitoring priorities. NOGAP must be responsive to this iterative process. The now limited resources available within NOGAP will be best utilized by closely linking NOGAP with the best available tools for determining research and monitoring priorities, BEMP and MEMP.

NOGAP PROJECT DESCRIPTION

1. Project Title: A8 DISTURBANCE OF MARINE MAMMALS BY INDUSTRIAL
----- ACTIVITY (1984/85-1990/91)
2. Project Manager: R. Hurst
----- Northern Environmental Protection Directorate
Marine Environment Division
(819) 997-9621
3. Objectives:

 1. To assess the influence of Arctic marine shipping and offshore hydrocarbon development on marine mammals of value to native harvesting or of international significance.
 2. To be able to respond to Inuit concerns about the fate of marine mammals, and the impact on traditional renewable resource harvesting.
 3. To provide information to determine the suitability of various transport modes, shipping routes and timing of offshore industrial activities.
4. Brief Background and Description:

The issue of ship traffic and marine mammals was identified as the major environmental concern during the Arctic Pilot Project debates of 1981 and 1982. The concern for possible impacts of underwater noise retained a high profile in the Beaufort Sea EARP hearings and subsequent panel report (1984). Virtually no relevant information has been collected in the intervening period since APP. Notable exceptions are studies initiated by DIAND in Lancaster Sound in 1982, 83 and 84. These studies suggest that beluga and narwhal in the Eastern Canadian Arctic exhibit a "fear avoidance" response to icebreaking shipping at unexpectedly long distances. Similarly, there is some indication that ice regimes may be altered, which could influence the movement of whales and potentially affect Inuit hunter harvest and safety. The results form a strong base on which to address the question of disturbance of marine mammals by Industrial Activity.

Bowhead whales have a high profile due to their endangered and International status. Virtually the entire western bowhead population summers in the Canadian Beaufort Sea. Systematic surveys supported by Industry since 1980 suggest that the Canadian offshore Industrial zone has been used by bowhead to a very limited extent in the past three years as compared to concentrated use in 1980 and 1981. The major unresolved question relates to the factors determining bowhead distribution; (i.e. natural oceanographic

phenomenon versus exclusion caused by industrially generated disturbance). U.S. government counterparts (Minerals Management Services, National Marine Fisheries Service) as well as the American oil industry have sponsored considerable bowhead whale research which has been incorporated into legislation and decisions on offshore drilling seasons etc. Concern remains as to the behaviour of this migratory species while in Canadian waters.

Finally, the Beaufort Environmental Monitoring Program (BEMP, see Project A7) has identified specific research and monitoring programs designed to determine the impact of offshore industrial activity on species such as bowhead, beluga whales and seals. BEMP will continue to act as the focus for DIAND in identifying priorities and subproject design.

5. Subproject:

Not applicable. See Report to NOGAP Secretariat entitled "DIAND NOGAP Subprojects for 1984/85".

6. Need for Study in terms of:

a) Departmental Mandate

The contentious issue of marine mammal and vessel interactions is one with broad implications and relevance to several government agencies. Responsibility is shared through legislation such as the Arctic Waters Pollution Prevention Act (DOT, DIAND, EMR) and the Fisheries Act (DFO) and through committees such as the Environmental Advisory Committee on Arctic Marine Transportation (DOE, DFO, DOT, EMR, DIAND and others). The Lancaster Sound ship/whale studies were recognized as important to the mandate of several agencies and although coordinated by DIAND, also received considerable financial and logistical support from DOT as well as DOE and Industry. The information required will be of use to DIAND in its administration of the Arctic Waters Pollution Prevention Act, its regulations and conditions pertaining to the Oil and Gas Production and Conservation Act, and its responsibility to native communities.

b) Preparedness for Decision-Making

This information is required for incorporation into decisions on:

- . the suitability of various transport scenarios
- . specific ship routing approvals (timing, location)
- . effective response to Inuit concerns regarding the fate of traditional renewable resource harvesting

7. Relationship to Other NOGAP Projects

The DFO vessel/mammal interactions research program will be complementary to the present DIAND project. While DFO has an interest in the biology and management of marine mammals, DIAND has a responsibility for protecting species harvested by natives. This is particularly true when a potential impact exists due to industrial activity promoted by DIAND.

Information obtained in this project will be of use to DFO in the conduct of their Study B-1 "Effects of vessel noise and traffic on Arctic Marine Mammals" and B-2 "Critical Marine Habitat". This information will also be relevant to other DIAND research of offshore environmental ecosystems monitoring (A7) and to DOT (E7).

8. Major Milestone/Outputs:

1985/86

- 1) Publish Report "Application of a Photogrammetric Technique to Examine the Longer Term Response of Bowhead Whales to Offshore Industrial Activities".
- 2) Publish Report "Spring Icebreaking Operations of the Ship M.V. Arctic and Concurrent Inuit Hunting in Admiralty Inlet, Baffin Island".
- 3) Publish Report "Reactions of Beluga Whales and Narwhal to Ship Traffic and Ice-Breaking Along Ice Edges in the Eastern Canadian High Arctic: 1982-1984.
- 4) Publish Report "Underice Radiated Measurements of the Icebreaker 'CCGS John A. MacDonald' in Baffin Bay and Lancaster Sound, June, 1983".
- 5) Contribute to field work on natural versus industrial factors determining bowhead whale distribution. Specifics to be determined by results of above, BEMP workshop and ESRF Bowhead Feasibility Study.

1986/87

- 1) Publish reports from 1985-86 field season.
- 2) Continue to contribute to study on natural versus industrial factors determining bowhead whale distribution.
- 3) If advisable on results from Eastern Arctic whale/ship research and BEMP, continue study on sound transmission in arctic waters - potential impact on beluga whales.

1987/88

1) Publish Reports from 1986/87 field season.

2) Evaluate results of bowhead research; if advisable continue field support of factors determining distribution of bowhead whales to determine practicality of using remote sensing techniques for predicting bowhead whale distribution.

3) Apply results of sound transmission/whale behaviour research, if practical towards recommendations to EACAMT, DOT, etc.

Note that the Beaufort Environmental Monitoring Program (BEMP) will provide guidance on the specific critical sub-projects required in any particular year. This could influence the milestones above, with part of the resources being shifted to other relevant areas such as icebreaking shipping and the subsequent impacts on seals and/or narwhal.

9. NOGAP Resource Requirements:

(\$000; \$84/85)

	85/86	86/87	87/88
PYs	•	•	•
Salaries	18	12	12
O&M	90	100	140
	---	---	---
Total	108	112	152

10. PY Justification:

*See Project A5, Section 10 for explanation of PY allocation.

11. Other Funding: N/A

12. Priority

The work to be undertaken under this project falls within the second priority of "longer term work" which will provide information required to ensure that government is in a position to make decisions about permitting and regulating hydrocarbon production activities. Decisions will relate to specific ship routing approvals (timing, location) and suitability of various transport scenarios.

13. Criteria Met

The project meets all six criteria listed in the NOGAP manual (12/84).

NOGAP PROJECT DESCRIPTION,

1. Project Title: A-11 DETERRENCE AND TREATMENT OF OIL CONTAMINATED
----- MARINE WILDLIFE (1986/87-1989/90)

2. Project Manager: D. Stone
----- Marine Environment Division
Northern Environmental Protection Directorate
(819) 997-0044

3. Objectives:

1. To develop deterrence techniques that will encourage marine mammals, including polar bears, to avoid oil contaminated habitats.
2. To assess the need for and the content of a practical response program to treat accidentally oiled mammals in key areas identified as vulnerable habitats.
3. To develop an Action Plan for opportunistic monitoring of the effects of oil spills on arctic marine mammals to obtain the maximum amount of usable information in the event of further accidental oil discharges.

4. Brief Background and Description:

Background:

One of the greatest concerns with oilspills in the Arctic is the impact on birds and diving mammals using the contaminated water surface. The problem is probably most critical at times of partial ice cover when spilled oil and marine wildlife may be concentrated together. Oil coating has been demonstrated to cause death in birds and polar bears. The limited information that is presently available with respect to the effect of oil on seals and whales is inconclusive.

There are 4 options available to minimize potential impacts from oil spills. In order of priority these are:

- 1) reduce the risks of an accidental spill;
 - 2) contain the oil in the smallest area possible and remove it as quickly as possible from the water surface;
 - 3) deter or distract animals away from the contaminated area;
- and
- 4) treat animals following contact with oil.

This project is directed at the last two options.

Description:

In controlled and field trials, innovative techniques will be tested to determine their effectiveness in distracting, scaring and deterring marine mammals (including polar bears) from contacting oil covered waters or shorelines.

A second thrust of this project will be to determine cleaning methods for arctic and subarctic weather conditions. In vitro tests will rely on chemical and mechanical removal of oil from fouled seal and polar bear pelts, etc. A logistics response manual summarizing recommended capture, cleanup, treatment and release techniques will be devised, building on a draft oil spill response plan generated out of a 1980 DIAND funded research program on polar bears.

The final emphasis is on the development of an Action Plan for monitoring the effects of oil spills on marine mammals and arises out of the recognition that such effects have seldom been observed in the Arctic. DIAND has taken part in many experimental investigations into the effects of oil on marine fauna (e.g. EAMES, BIOS). However without a comprehensive action plan designed to gain usable oil effects data on an opportunistic basis, very important 'real world' information will be missed.

5. N/A

6. Need for Study:

a) Department's Mandate:

Since the species considered are a traditional and economic renewable resource which form a focus for deliberations with Inuit on the impact of hydrocarbon development, DIAND must meet the needs for information preparedness. Real or perceived changes in marine mammal numbers or distribution will have an impact on Inuit settlements, compensation, etc.

b) Preparedness for Decision Making:

There is a clear need for deterrents and for methods of clean-up and treatment of oil covered mammals. Development and testing of such methods on arctic animals is necessary to assess the scope of impacts and the effectiveness of planned mitigation measures. The government, including DIAND, is responsible for the provision of informed guidance to and regulation of industry activities to ensure the implementation of effective and practical oilspill contingency plans.

Results from this study will also provide action to longstanding expectations of Inuit and the general public for specific oilspill response techniques and facilities. The need for proper contingency planning, with the attendant capacity for attaining opportunistic information, was stressed during the Beaufort Sea Environmental Hearings.

7. Relationship to Other NOGAP Projects:

The information provided will be of use to DIAND NOGAP projects A7, A8 and GNWT NOGAP Projects H-12, H-15, H-17 on wildlife management and environmental protection.

8. Major Milestones:

1985/86

Obtain formal review of an Action Plan for the deterrence and treatment of polar bears in the event of contact with crude oil. This review will include input from industry and the relevant regulatory agencies on a draft plan generated as a result of the oil/polar bear research funded by DIAND in 1980.

1986/87

- 1) Begin implementation of the action plan recommendations through the assembly and storage of the necessary deterrent and treatment equipment.
- 2) Investigate the feasibility of expanding the plan to allow for
 - a) opportunistic collection of information on the behaviour of bears during and following contact with oil;
 - b) opportunistic collection of information on the effects of oil contact on other species of marine mammals (seals and whales).

1987/88

- 1) Incorporate the oil spill response plan with comprehensive oil spill contingency plans.
- 2) Seek Interagency/Industry agreement as to the most effective and logistically appealing response package for all potentially impacted species.

9. **NOGAP Resource Requirements:**

(\$000's; \$84/85)

	85/86	86/87	87/88
	-----	-----	-----
PYs	*	*	*
Salaries	-	6	6
O&M	-	89	64
	---	---	---
Total	0	95	70

10. **PY Justification:**

*See Project A5, Section 10 for explanation of PY allocation.

11. **Other Funding:** N/A

12. **Priority:**

This work falls under First Priority "initial work" in that outputs of the project will be of immediate use in the preparation of oil spill contingency plans.

13. **Criteria Met:**

The project meets all six criteria listed in the NOGAP Manual (12/84).

NOGAP PROJECT DESCRIPTION

1. Project Title: A12 CONTAMINANTS, TAINTING AND QUALITY OF FOOD

SPECIES (merging of original projects
A.12, A.14, A.15) (1984/85-1990/91)
2. Project Manager: D. Stone

Northern Environmental Protection Directorate
Marine Environment Division
(819) 997-0044
3. Objectives:

 1. To estimate the impact of oil and gas activities on those species which are of importance to the survival of higher trophic levels harvested by northerners by:
 - 1) determining the role, availability, preferred habitats and potential for disruption of key food species by oil and gas activities and their ultimate impacts on large mammals and birds
 - 2) determining the potential for tainting by hydrocarbon in the flesh of selected marine organisms and by assessing other effects of hydrocarbon resource development on traditional food species
 - 3) defining the mechanisms, rates and sites of bioaccumulation of hydrocarbons in the most sensitive links of the food chains in sensitive habitats or areas critical to renewable resources.
4. Brief Background and Description:

Background:

The development of hydrocarbon resources and of other industrial activities in the Canadian Arctic may have a negative impact on the traditional food sources of the northerners. Marine fish and mammals are an important part of the native peoples traditional way of life and constitute an economic renewable resource. Concern has already been expressed that certain fish species both in the Hay River and Fort Good Hope areas in the NWT are tainted and unpalatable for native residents. The impact of hydrocarbon development in the use of marine fishes and mammals as a traditional food source is of concern and must be addressed by the department.

Description:

This project will determine the role, availability, preferred habitat and potential for disruption of key harvested species in marine and freshwater habitats by oil and gas related activities.

Levels of contaminations in lower trophic levels, the mechanisms and rates of uptake and residence times and impacts of these contaminants of the quality and availability of these food sources will be examined.

During the first years of the project emphasis will be placed on marine species. Although the impacts of industrial activities on freshwater species were to be addressed in later years, the recent report of potential tainting of broad whitefish from Ft. Good Hope may require special attention.

The laboratory work sponsored during the initial years of the project will be validated whenever possible by opportunistic field verification in sensitive areas; that is in coastal areas where ports of hydrocarbon transport and/or processing facilities may be proposed.

5. N/A. See Report to DIAND Secretariat on DIAND NOGAP Subprojects for 1984/85.

6. Need for Study in terms of:

(a) Department Mandate:

Information on the presence of chemical contaminants throughout the food chain and their effects on the quality of food species is important in setting standards for production of waste management as regulated by DIAND under the AWPPA for marine species, and under other legislation such as the Territorial Lands Act and the Public Lands Grants Act which regulate the discharge of contaminants on land.

Accidental spills and long term, low dose exposure due to slow leakage may result in tainting of harvestable food sources. Rulings on compensation for loss of these resources or settlement of land claims issues will rely on information such as those provided by this project.

(b) Preparedness for Decision-Making:

Government preparedness must be developed to ensure adequate identification of impacts. It must also ensure that appropriate measures are available to minimize deterioration of sensitive habitat or unacceptable damage to lower trophic levels on which the higher, harvested organisms depend. Decisions will be necessary on such issues as the use and composition of drilling muds and the site locations of ocean and land dump sites.

7. Relationship to Other NOGAP Projects:

This project will be undertaken in consultation with DFO and DOE and will be complementary to the DFO (NOGAP) project B.11. "Quantification of ecological relationships" and to the DFO (NOGAP) project B.3. "Critical Marine Habitats". It will also have relevance to the Environmental Protection Service (DOE) and COGLA.

8. Major Milestones:

1985/86

- 1) Release report (with DFO) on study of arctic cod and its importance in Arctic Food chains.
- 2) Release report on contaminants in a geographic survey of key marine species - emphasis on arctic cod, arctic char.
- 3) Initiate laboratory analysis of hydrocarbon in flesh of fish in the vicinity of the Norman Wells oil field.
- 4) Contingent upon the results reported in (2); expand baseline data gathering for petroleum hydrocarbon burdens in key marine species in sensitive areas.

1986/87

- 1) Release reports from 1985/86 season.
- 2) Initiate tainting study, in accordance with ESRF recommendations and using taste panel approach for harvested species of fish.
- 3) Continue, if initial results warrant such, laboratory analysis of hydrocarbons in fish in the vicinity of Norman Wells.
- 4) Initiate study on the rate of accumulation and residence time of major contaminants identified by ESRF and NOGAP fish tainting studies.

1987/89

- 1) Release reports from previous season.
- 2) Continue bioaccumulation research.
- 3) Continue tainting study, if appropriate.

February, 1985

NOGAP PROJECT DESCRIPTION

1. Project Title: IMPACTS OF OIL AND GAS-RELATED ACTIVITIES ON CARIBOU -
----- NOGAP REF. A13, C9 AND G16. (1984/85-1990/91)

2. Project Managers:

Subproject 1: R. Farnell
(Objective 1) Wildlife Branch
Department of Renewable Resources
Government of Yukon
Box 2703
Whitehorse, Yukon
(403) 667-5465

Subproject 2: F. McFarland
(Objective 2) Northern Environmental Protection Directorate
Terrestrial Environment Division
Department of Indian Affairs and
Northern Development
Ottawa, Ontario K1A 0H4
(819) 997-9621

Subproject 3: D. Russell
(Objectives 3 and 4) Canadian Wildlife Service
Environment Canada
204 Range Road
Whitehorse, Yukon Y1A 4Y4
(403) 668-2285

3. Objectives:

1. To correlate herd status change coincident with disturbance and provide data needed for decision-making process.
 - 1a. To obtain sex and age composition, population size and harvest data.
 - 1b. To review, analyze and tabulate population data from past research conducted on the Porcupine Herd from 1977-1982.
2. To evaluate caribou range utilization in the vicinity of major linear developments and to monitor the effects of increased levels of hydrocarbon development and other related activities on caribou herds in the N.W.T. and Yukon. In particular, to document the reaction of caribou to vehicle traffic, aircraft and other human activities in the vicinity of hydrocarbon and related activities such as quarry and harbour development in the North Slope.

Spring is a critical time for caribou in that food is limiting and energy and mineral reserves are at a yearly low. During the summer months these animals must fatten for the long winter. Both time periods are critical for the well-being of caribou. An adequate data base is not in place to determine critical summer habitats nor to characterize and determine the importance of critical insect relief areas. As well, reasons for the formation and maintenance of the large summer aggregations in July are not well understood. Existing data bases on spring migration and spring bull range use must be augmented also in order to prepare for hydrocarbon development activities.

The Problem: Beaufort Sea exploration and development have potential detrimental effects on the Porcupine caribou herd due to:

- increased vehicular traffic
 - on the Dempster Highway,
 - on new access road to port from Dempster,
 - on road to inland quarry site;
- aircraft overflights;
- increased access to hunters.

Effects will impact on caribou by:

- direct mortality;
- disruption of movement routes;
- displacement from certain habitats;
- increased energy expenditure and decreased energy intake due to harrassment.

The Project: The present project will provide field information on all aspects of the potential and actual impact and give government managers and industry planners an opportunity to explore and test the consequences of alternative screnarios via the collation of existing information into a simulation modelling format.

The proposal reflects the immediate need for information as development facilities with potential for impact on caribou are required at both the exploration and development phases. Information provided will be used in the policy development, planning and monitoring of these facilities. Since the information is required in the near term, the limited A-base funds presently available in CWS, although almost totally committed to this project, must be augmented for the project to proceed.

Moreover, the information gathered is applicable to many aspects of development such as pipeline construction, quarry and associated road use, formation and operation of a northern Yukon National Park and the flexibility built into the simulation modelling exercise will allow readily available output on as yet unexpected development scenarios. Since the project will be co-ordinated with Alaskan biologists, the results can also be incorporated into the impact assessment process presently being conducted on seismic activity in the Alaska Arctic Wildlife Refuge.

5. Subprojects:

N/A. Refer to project managers for individual descriptions of 1984/85 subprojects.

6. Need for Study:

a) Departmental Mandate:

1) YUKON MANDATE: This study would assist YTG in meeting its responsibilities for management of the Porcupine Caribou Herd, particularly with respect to maintaining appropriate levels of harvest.

2) FEDERAL MANDATE: This study would assist DIAND in meeting its responsibilities with respect to maintaining appropriate levels of applied environmental research and to ensure that effective terms and conditions pertaining to land use permits are developed and for the enforcement of relevant regulations under the Territorial Lands Act, Land Titles Act and Public Lands Grants Act. As well, the study would assist DOE in managing of the new Northern Yukon National Park, in participating in Wildlife Councils established under the Inuvialuit Land Claims settlement and in negotiating an international agreement on the management of the Porcupine Caribou Herd.

b) Preparedness for Decision-Making:

By providing data on reproduction, extrapolated natural mortality rates, changes in population size, herd movements and range use, effects of human disturbance can be tested with supportable conclusions. To undertake mitigative measures or predict future impacts of increased activities along the Dempster Highway, and to manage and plan for the construction of similar highways or ports it is critical that DIAND further its understanding of the impacts of industrial activity on caribou habits and movements.

The recent Beaufort Sea Environmental Assessment Review Panel concluded that "both the impact assessment and the development of management activities cannot be more precise or effective until more information is available on the Porcupine caribou herd". The report goes on to recommend that,

the Government of Canada provide full financial support to the Canadian Wildlife Service of the Department of the Environment and the Department of Renewable Resources of the Government of Yukon to undertake the following to allow design of effective mitigation and monitoring programs:

- a) specific research related to the reaction of caribou to vehicle traffic and to overflight of jet aircraft;

- b) specific research on the Yukon North Slope caribou range ecology, particularly summer ecology, including the importance of insect relief habitat; and
- c) computer simulation modelling of caribou population dynamics.

Objectives 2, 3 and 4 of this joint YTG-DIAND-CWS project, therefore, are a direct response to the BEARP recommendations and the results of the project will put in place appropriate information and expertise to ensure minimal impacts on the integrity of the Porcupine caribou herd.

7. Relationship to Other NOGAP Projects:

Subproject 1 (Objective 1) addresses the population dynamics of the Porcupine Caribou Herd, particularly the effects of hunting. The primary client is YTG who manages the herd.

Subprojects 2 and 3 (Objectives 2 and 3) address needs of the Government of Canada for preparedness for northern hydrocarbon production. The primary clients are DIAND (land use) and industry (design of monitoring and mitigative measures).

Subproject 3 (Objective 4) is of interest to both federal and territorial governments. There is no overlap between the federal and YTG proposals because they address different needs and respond to different clients. The studies will be closely co-ordinated.

8. Major Milestones:

----- 1. Porcupine Caribou Herd management:

1984-85 reports on status of the herd

1985-86/1986-87 Porcupine herd size shall be estimated and sex and age composition counts made. The harvest from all Canadian users will be estimated. A natural mortality study near completion will augment this work. Results shall be published annually in technical reports.

2. Effects of linear developments and hydrocarbon development facilities:

1984-85 . publication of Proceedings of the First North American Caribou Workshop

1985-86 planning for disturbance research
 . contribution (\$15K) to DOE project C8 on caribou migration to complete work initiated in 1984

1986-87 first field season, progress report

1987-88 final field season, final report, final recommendations

3a. Spring bull range use:

1984-85 report from initial field season
1985-86 monitoring via radio-collared animals, progress report
1986-87 second ground field season, initiate final report
1987-88 complete final report, final recommendations

3b. Summer critical habitat:

1984-85 first field season, progress report
1985-86 second field season, progress report
1986-87 final field season, initiate final report
1987-88 final report, final recommendations

4. Computer simulation modelling:

1984-85 develop facility, initiate concept plan
1985-86 develop models
1986-87 further refine models, initiate testing
1987-88 further testing, final report and recommendations

9. NOGAP Requirements:

(\$000's; \$1984/85)

Subproject 1 (YTG):

	1985-86	1986-87	1987-88
PY	-	-	-
Salary	-	-	-
O&M	38	34	-
Capital	-	-	-
	---	---	---
Total	38	34	-

Subproject 2 (DIAND):

	1985-86	1986-87	1987-88
PY	*	*	*
Salary	12	12	12
O&M	48	78	78
	---	---	---
Total	60	90	90

Subproject 2 (DOE):

	1985-86	1986-87	1987-88
PY	1.0	1.0	1.0
Salary	42	42	42
O&M	98	103	51
Capital	15	-	-
	---	---	---
Total	155	145	93

10. PY Justification:

Subproject 3: Presently, only one person-year is available within CWS for Porcupine caribou work (Objectives 3 and 4). The work outlined in objectives of this proposal will require three field assistants during the field season with one technician to be kept on through the fiscal year to assist in data analysis, conduct ongoing aerial surveys and prepared for subsequent fieldwork. From the point of view of personal safety, the research cannot be conducted by a single individual. The present CWS person-year will be kept busy supervising the fieldwork, completing progress reports and developing the simulation models. Without the technical assistance and international co-operation will suffer, progress reports cannot be completed and the modelling will not proceed in the timeframe required. This single person-year request is minimal given it is assumed that two summer students can be used and some of the work will be contracted out to the University of Alaska.

Subproject 2: *For DIAND PY justification; see project A5, Section 10.

11. Other Funding: (\$000)

Subproject 1 (YTG Caribou Program):

1985-86

PY	-
Salary	-
O&M "P"	133
Capital	-
Total	133

Subproject 3 (CWS Caribou Program):

CWS will continue to allot A-base funds towards the project. Because of fiscal reductions within DOE, the amount of these A-base funds is not known at this time.

12. Priorities:

Although the priorities attributed to some of this work might be "longer term", the efforts are not limited to the collection of baseline data in anticipation of regulatory needs. Objectives 3 and 4 are concerned with first protection and prevention measures. In anticipation of the Kiewit development, baseline data on critical habitat and utilization time is required to develop environmental guidelines and criteria. Similarly the objective is to develop a model which will allow for better focussing of data collection and ensure the development of environmentally safe prevention measures and guidelines.

13. Criteria Met:

This project meets all six criteria listed in the NOGAP Manual (12/84).

February, 1985

NOGAP PROJECT DESCRIPTION

1. **Project Title:** A17 SURFACE AND SUBSURFACE DISTURBANCES INDUCED BY

OIL AND GAS ACTIVITIES
(Merging of original projects A.17, A.18)
(1984/85-1990/91)
2. **Project Manager:** F. McFarland

Northern Environmental Protection Directorate
Territorial Environment Division
(819) 997-9621
3. **Objectives:**

 1. To obtain a better understanding of changes in the nature of surface and subsurface soils related to construction and transportation activities associated with oil and gas developments. Through the study of the nature of terrain disturbance by a number of construction activities, the best operating practices and techniques for rehabilitation of disturbed areas will be determined.
 2. To obtain a better understanding of the changes in thermal regimes induced by construction in permafrost rich terrain. Studies of the effects of ground thermal regimes will address the problem of the altered stability of frozen soil material and of their overlying structures.
4. **Brief Background and Description:**

The project can be subdivided into surface impacts of oil and gas construction activities and subsurface impacts or disturbances. The main thrust of the program during the first few years will be to address the key issues related to pipeline construction, e.g. pipeline access roads and the pipeline routes and main production areas. Drawing on existing results from the Mackenzie Delta and the Keewatin, terrain use by vehicles will be evaluated in light of the potential for optimal terrain rehabilitation.

Monitoring of changes in thermal regimes beneath coastal and terrestrial structures will yield information on the rate of permafrost degradation and the related effect on structure stability.

5. Subprojects for 1984/85:

Not applicable. See Report to NOGAP Secretariat on DIAND NOGAP Sub-projects for 1984/85.

6. Need for Study in terms of:

(a) Department Mandate:

The information is required by DIAND to support regulations issued under land management responsibilities and the Territorial Lands Act. It may also have a bearing on the recommended conditions to be applied to the implementation of the Canada Oil and Gas Act and the Oil and Gas Production and Conservation Act for oil and gas developments in the Territories.

(b) Preparedness for Decision-Making on Northern Hydrocarbon Development Proposals:

DIAND requires this information to regulate the type, season and routing of vehicle use and construction activity in both onshore and offshore industrial developments. Needless industry expenditures and potential environmental damage can be avoided with this information and Land Use Permits can be tailored to specific situations. The project will also make maximum use of a prototype pipeline design (Norman Wells) to obtain information and experience useful in adaptation to large scale pipeline transportation of oil. It is therefore important to permit effective management of the design, construction and routes of future oil and gas pipelines.

7. Relationship to Other NOGAP Projects:

Information yielded by A.17 will be of use to DIAND Project A5 and DOE's NOGAP C.20 "Study of sensitivities of specific land vegetation complexes".

8. Major Milestones/Outputs:

1985/86

- 1) Release of preliminary report on the "Ground Thermal Regime in the Vicinity of the Norman Wells Pipeline and Associated Structures".
- 2) Release of Report on "Evaluation of Rehabilitation of Northern Reclamation Sites" following the field evaluation of many industrial disturbed site with a view to such factors as site stabilization and recovery of vegetation.
- 3) Preparation of a "Rehabilitation Manual" incorporating the findings of the above evaluation, and other relevant site-rehabilitation experiments.

1986/87

- 1) Publish report(s) from 1985/86 season.
- 2) Continue contribution to Norman Wells Pipeline Monitoring Program with emphasis on monitoring the ground thermal regime.

1987/88

- 1) Publish report from 1986/87 field season.
- 2) Continue contribution to Norman Wells Pipeline Monitoring, ground thermal regimes.

9. NOGAP Resource Requirements Over Project Life:

(\$000's; \$84/85)

	85/86	86/87	87/88
PYs	•	•	•
Salaries	12	12	12
O&M	60	88	88
	---	---	---
Total	72	100	100

10. *See Project A.5, Section 10 for explanation of PY allocation.

11. Other Funding: Not Applicable.

12. Priority:

The work which is related to surface disturbance falls within the first priority of "initial work" in that it will produce a practical field manual which will be of immediate use to arctic land operators. The pipeline thermal regime research is of a "longer term" nature, in that pipeline monitoring will provide information required to ensure preparedness with respect to regulating future pipeline construction.

13. Criteria Met:

This project meets all six criteria listed in the NOGAP Manual (12/84).

February, 1985

NOGAP PROJECT DESCRIPTION

1. Project Title: A.20 HYDROCARBON ACTIVITIES; MARINE RESEARCH AND

MANAGEMENT (1984/85-1990/91)
2. Project Manager: A. Cullen

Water Resources Division,
Arctic Waters Section
Yellowknife, N.W.T.
(403) 920-8250
3. Objectives:

 1. To provide the scientific research necessary to design novel techniques for treatment or disposal of petroleum hydrocarbons and related contaminants.
 2. To assist in the development of Departmental offshore policies that will dictate the establishment of regulations under the Arctic Waters Pollution Prevention Act, and the development of environmental operating conditions.
4. Brief Background and Description:

Background:

One of the major roles of the department as a regulatory agency is to assess and predict the impact of oil and gas developments on the arctic marine environment.

The accelerated activity of hydrocarbon related industries and the design of novel techniques and drilling materials require that existing regulatory procedures be updated. This project will allow those regulators with direct responsibility through the Arctic Waters Pollution Prevention Act and the Public Lands Grants Act, with the research required to update the environmental regulatory framework.

Description:

The project can be subdivided into three broad research venues.

 - i) to provide regulators with a compilation of baseline information of chemical and physical characteristics of established and potential development sites;
 - ii) to provide studies designed to accompany new or anticipated industrial initiatives in drilling technology and operational activity;
 - iii) to provide programs to translate research findings into appropriate regulatory terms and conditions.

5. Subprojects:

N/A. See report to NOGAP Secretariat on the "DIAND NOGAP Sub-project descriptions for 84/85".

6. Need for Study:

a) Departmental Mandate:

These types of baseline information are required to predict and assess the impact of oil and gas developments on arctic shelf areas and waters of the Beaufort. The information will be used by regulators to evaluate and review Environmental Operating Conditions as applied to industrial operations in the offshore arctic, and to develop policies under the Arctic Waters Pollution Prevention Act and the Public Lands Grants Act. While DOE and DFO are responsible for ensuring protection of the environment, DIAND has the legislative responsibility of managing water use while minimizing environmental impacts.

b) Preparedness for Decision Making:

Through indepth exploratory and field research it will be possible to further develop water quality standards for management of water use and waste disposal.

7. Relationship to Other NOGAP Projects:

Results of this project will be relevant to Project A7 and A5. The information made available in these reports will also be of assistance to Interdepartmental groups such as AWAC and IERC and may as such have relevance to other NOGAP projects related to regulation of offshore Industrial activities.

8. Major Milestones:

1985/86

- 1) Review and release of the two volumes of the Arctic Marine Methods Manual.
- 2) Review and release of final report on the estimation of oxygen demand by oil based mud cuttings.
- 3) Review of final statistical analysis of baseline data (water and sediment quality) from the Beaufort Sea Shore Base Monitoring Program for 1982/83.
- 4) Continuation of the field portion of the Beaufort Sea Shore Base Monitoring Program if results from 1982-84 data indicates need for further work.
- 5) Completion of work on the Incineration of Oil Based Drilling Muds and submission of final report.

- 6) Possible initiation of a monitoring program to study the physical impacts of the discharge of oil based contaminated cuttings into the Arctic marine environment.
- 7) Development of policies to update and improve the regulatory processes imposed by a variety of federal Departments on the northern hydrocarbon development industry, with particular attention to revision of the Arctic Waters Pollution Prevention Act.
- 8) Initiate review of existing information to develop the best means of estimating the physiological cost of oil exposure to lower trophic levels. Emphasis will be on determining the significance of measurable indicators of oil-induced stress.

1986/87

Some or all of these subprojects may be continued for more than the one year outlined above. Several projects however are designed to critically evaluate existing sampling methods and programs with the understanding that subprojects may be drastically redesigned or discontinued.

- 1) Initiate a study of the sediment transport from artificial islands, the abandonment of artificial islands and the disbursement of the contaminated sediments from offshore industrial sites.
- 2) Begin exercise to analyze subsurface coastal sediments of the Beaufort Sea based on Public Lands Grants Act leases. The contractor will be required to review and map all existing information related to known sources of natural and/or industrially contaminated coastal sediments.
- 3) If study 8 (1985-86) is successful, work will begin on the determination of the biological significance of oil exposure to key target species important to northern regulators.
- 4) Review final report on the oil based drilling mud monitoring program and continue if required.

1987/88

-
- 1) Review of final report on the transport of sediments from artificial islands.
 - 2) Continuation, if required, of the coastal sediment contaminants mapping exercise.
 - 3) Continuation, if required, of the study on the significance of oil induced stress on target species.

9. NOGAP Resource Requirements:

(\$000's; \$1984/85)

	85/86	86/87	87/88
PYs	1	1	1
Salaries	56	56	56
O&M	239	189	109
	---	---	---
Total	295	245	165

10. PY Justification:

The Arctic Waters regional office is currently limited to providing the review necessary to prepare EOC's without longer term research or indepth follow-up of the effectiveness of these EOC's. An additional PY will provide essential scientific research and technical support for developing new methodologies and an updated information basis with which to evaluate offshore projects.

In the original TB approved NOGAP program 2 PY's were approved for DIAND's Arctic Waters. Only one PY has been retained in this revised program. A minimum of 1 PY is required to administrate the several NOGAP subprojects listed here and to fully carry out the mandate for management of water use and water disposal provided by the A.W.P.P.A. Duties will include administering the NOGAP budget by planning organizing and supervising the specialized studies required to ensure environmental management and protection under the AWPPA; and to use the results to determine and formulate the environmental terms and operating conditions (EOC's).

11. Other Funding: Not Applicable.

12. Priorities:

This work should be considered under both the first priority category of "Initial Work" and the 2nd priority "longer term work". The results obtained from the policy and regulation evaluation and the proposed research will result in the updating of existing guidelines and development of new environmental guidelines.

13. Criteria Met:

The project meets all six criteria listed in the NOGAP Manual (12/84).

February, 1985

NOGAP PROJECT DESCRIPTION

1. Project Title: A.21 ONSHORE ENVIRONMENTAL MONITORING AND RESEARCH

PROGRAM (1985/86-1990/91)
(New Program)
2. Project Manager: F. McFarland

Terrestrial Environment Division
Northern Environmental Protection Directorate
(819) 997-9621
3. Objectives:

 1. To develop (on an iterative basis) an environmental monitoring and research program to address the potential environmental impacts associated with a) the production and onshore transportation of hydrocarbons and b) the related activities including increased exploration and onshore facilities.
 2. To provide the research information which is related to monitoring, essential for progressive development of the Onshore Environmental Monitoring Program, and necessary for the continual evaluation of the effectiveness of monitoring and mitigative measures.
4. Brief Background and Description:

Many proposals to ship gas south from the Beaufort Sea through the Mackenzie Valley or along the Dempster Highway have been or are being proposed. These have included Canadian Arctic Gas Pipeline, Foothills Maple Leaf, Foothills Dempster Lateral and the recent (1984) Polar Gas proposal. A concept proposal to ship oil south by pipeline was submitted to Government in 1982 by the three major operators in Beaufort Sea-Mackenzie Delta. A recent re-appraisal of NOGAP scenarios and criteria for selection of projects recognized the high priority for research in the Beaufort production zone and the proposed Mackenzie Valley pipeline route (NOGAP manual, Dec. 1984).

Extensive technical and public reviews to assess these proposals (Berger 1977, NEB 1978, BEARP, 1984) identified issues and information deficiencies with respect to research and monitoring programs proposed by both government and proponents. The BEARP, however, recognized and praised the use of an adaptive environmental assessment and management process in the offshore BEMP program initiated by DIAND and DOE (See Panel Report and this submission NOGAP Project A.7). The present program will utilize a comparable process for the onshore Beaufort and Mackenzie Valley. The program presently has the support of DOE, DFO and GNWT.

The monitoring and research program will be designed to:

- a) address the potential environmental impacts associated with industrial activities including those impacts affecting wildlife management, renewable resource harvesting and environmental conservation;
- b) provide environmental and renewable resource management agencies with the necessary practical information to provide acceptable levels of environmental protection;
- c) be supported with a full scientific and technical justification for the monitoring and research needs identified.

5. Subprojects for 1984/85

NA Note, however, that partial funding for the initial stages of this onshore monitoring program has been provided by NOGAP Project A.6 Regional Terrestrial Environment. A.6 has since been deleted. See Report to NOGAP Secretariat on DIAND NOGAP Subprojects for 1984/85.

6. Need for Study in terms of

a) Departmental Mandate

To effectively implement management programs and to regulate onshore Arctic development under the Territorial Lands Act, the Public Lands Grants Act and the Oil and Gas Production Act.

b) Preparedness for Decision-Making

The program will facilitate effective environmental screening of industrial proposals for such developments as shore bases, gathering systems and pipelines including those projects submitted (i.e. Polar Gas, Kiewit) and proposed. It will also ensure that the limited environmental funds will be directed towards the most critical, practical and useful information for environmental decision making and regulation.

7. Relationship to Other NOGAP Projects

Other agencies involved in this program (on a participating and co-sponsoring basis) include DOE, DFO and the Territorial Governments. The resulting research and monitoring projects will, therefore, be of direct relevance to DIAND NOGAP research planning as well as that of other agencies. The project will also have a bearing on DIAND NOGAP projects A.5, A.7, A.13 and A.17.

8. Major Milestones/Outputs

There are two distinct segments of this project to which resources will be applied: a) Project Management including all workshops, technical meetings, report preparation and publication and; b) Implementation of the actual research and monitoring recommendations.

The approximate split in DIAND NOGAP resources (\$000's, \$84/85) will be as follows:

	1985/86	1986/87	1987/88
a) Project Management	102	50	90
b) Implementation of Recommendations	0	122	122
Total O&M	102	172	212

The anticipated schedule follows.

1984/85

March/1985

First interdisciplinary workshop to be held in Yellowknife. Workshop will generate first-cut preliminary draft of research and monitoring recommendations. This will be funded by 1984/85 NOGAP resources.

1985/86

Spring-Summer/1985

Separate technical meetings of discipline specialist to further refine and develop hypotheses generated at preliminary workshop.

Fall/1985

Separate meeting addressing resource harvesting. Designed to be held in consort with, and complementary to, Beaufort Environmental Monitoring Program (BEMP).

Second comprehensive workshop.

Winter/1985

Preparation and release of 1st report of MEMP, complete with specific research and monitoring recommendations.

1986/87

Implementation of MEMP research and monitoring recommendations.

.Continuation of project management (workshops, meetings) at a reduced level.

1987/88

This process is designed to continue on an annual iterative basis.

It is anticipated that there will be no actual implementation of recommendations through NOGAP funds until 1986/87. The extent of the workshops and technical meetings anticipated for that, the second year of MEMP, will be reduced. Resources required for Project Management in 1986/87 have been reduced accordingly. In the third year (1988/89) there will be a renewed emphasis on project management (workshops and technical meetings) in an effort to revisit all impact hypotheses in light of the new information acquired from research and monitoring studies. To be project-specific as to the work to be initiated under b) implementation of recommendations would pre-empt the recommendations of MEMP and undermine the iterative value of the entire approach.

For more rationale of the need for flexibility of future sub-projects see Section 15 and NOGAP Project Description A7.

9. NOGAP Resource Requirements

(\$000's; \$84/85)

	85/86	86/87	87/88
PYs	*.	*	*.
Salaries	18	18	18
O&M	102	172	212
	---	---	---
Total	120	190	230

10. *See Project A.5, Section 10 for explanation of PYs.

11. Other Funding

-
- 1) Management of MEMP will be co-sponsored by DOE, DFO and the Territorial Governments, although DIAND will continue to bear the major financial responsibility. DOE is expected to contribute approximately \$35K/year from their NOGAP funds.
 - 2) It is anticipated that like BEMP, the implementation of MEMP recommendations will be partly funded through DIAND A-base and by the other participating agencies.

12. This project falls primarily under First Priority "initial work" in that outputs of the Monitoring Process will be utilized immediately to formulate the direction of environmental research and monitoring. In another sense the project will be in part of a "longer term" nature by virtue of the fact that some of the recommendations implemented under this project will be longer term monitoring programs.

13. Criteria Met:

This Project meets all 6 criteria listed in the NOGAP Manual (12/84).

14. Consequences of Nil Funding:

Without a co-ordinated approach to offshore ecosystems, Government-regulated agencies including DIAND, will continue with a relatively fragmentary, ad hoc, and "crisis response" approach to environmental research and monitoring. Studies will often be initiated following a perceived environmental impact, or without considering a planned approach based on sound ecological information. Much of the research will be effectively wasted by: the results being poorly distributed; unsuitable for bridging interdisciplinary boundaries; or inappropriately designed for practical implementation in resource management and the regulation of Arctic offshore development.

15. Relationship between the Beaufort Environmental Monitoring Project, Mackenzie Environmental Monitoring Project and NOGAP.

Overview

There are two basic cornerstones to the DIAND NOGAP program which will continue to provide the direction as to the specific research and monitoring subprojects which will be initiated over the duration of NOGAP. The first, the Beaufort Environmental Monitoring Program (BEMP; NOGAP Project A7) will direct work in the offshore environment while the Mackenzie Environmental Monitoring Program (MEMP; NOGAP Project A21) will direct onshore research. The area of focus in both Programs, as in the NOGAP program, is the Beaufort oil and gas production zone (NOGAP Priority 1). The other area of focus for MEMP is the Mackenzie Pipeline Route (NOGAP Priority 2).

The offshore program (BEMP) was initiated in 1983. In this timely manner, the research and monitoring recommendations from the first year of BEMP were implemented to a large measure through 1984/85 NOGAP resources (to be discussed in detail later). The onshore program (MEMP) has followed on the success and the obvious and direct applicability to the offshore program. MEMP under DIAND lead with the full support and co-sponsorship of DOE, DFO and the Territorial Governments, will begin in February 1985. It will provide the technical basis for the design, operation and evaluation of an environmental monitoring program to accompany hydrocarbon development on the onshore Beaufort and the Mackenzie Valley relative to the regulatory responsibilities of the sponsoring departments.

The obvious importance and application of both these Monitoring Programs to NOGAP must be emphasized. In the recent Final Report of the Beaufort Sea Environmental Assessment Panel (FEARO 1984) the need for research and monitoring programs to accompany phased oil and gas development in the region was emphasized. In this regard, the Panel commended DIAND and DOE on their initiative in sponsoring the BEMP. BEMP (and in the near future MEMP) remains the most effective tool available by which Government funded arctic oil and gas research can be effectively prioritized, monitored and critiqued on a continuing basis.