

8 → D. Longlitz

NORTHERN OIL AND GAS ACTION PROGRAM
(NOGAP)

PROJECT DESCRIPTIONS
FOR

1985-86 to 1987-88

COMPILED BY THE NOGAP SECRETARIAT
NORTHERN RESOURCES AND ECONOMIC DEVELOPMENT BRANCH
INDIAN AND NORTHERN AFFAIRS CANADA

MARCH 1985



D001096

Forward

This volume contains the project descriptions for the replanned Northern Oil and Gas Action Program from 1985-86 to 1987-88. This program was approved by the NOGAP Committee of Coordinators and the Senior Policy Committee, Northern Resource Development Projects in February 1985.

The volume was prepared to support a Treasury Board submission concerning the replanned program and to use as a reference by NOGAP participants.

It is arranged with a section for each participant, in the following order:

- Indian and Northern Affairs Canada
- Fisheries and Oceans
- Environment Canada
- Energy, Mines and Resources
- Transport Canada
- National Museums of Canada
- Agriculture Canada
- Government of Yukon Territory
- Government of the Northwest Territories.

Within each section, projects for federal departments are grouped by planning element, while projects for the territorial governments are grouped by department. Each section begins with a table indicating the projects for 1985-86 to 1987-88 by NOGAP project number and title, the currently proposed duration of the project (in brackets), whether it is to be undertaken in-house and/or by contract, and the dollar (\$85-86) and person-year amounts, as approved by the Senior Policy Committee.

THIS VOLUME HAS BEEN PREPARED FOR INTERNAL USE WITHIN THE FEDERAL AND TERRITORIAL GOVERNMENTS.



SUMMARY OF NOGAP RESOURCES, 1985-86 TO 1987-88

(\$1985-86, K)

DEPT./GOVNT.	P.E./TERRIT.DEPT.	1985-86		1986-87		1987-88	
		\$	P-Ys	\$	P-Ys	\$	P-Ys
INAC	EP&D	69	1	69	1	69	1
	RRM&EP	1750	4	1990	5	1868	4
	NRRM*	228	2	270	2	176	2
INAC TOTAL		2047	7	2329	8	2113	7
DFO	NWT&I	1315	3.6	1301	5	849	5
	OSS	1513	5.5	1510	9	1626	8
DFO TOTAL		2828	9.1	2811	14	2475	13
EC	EPS	409		380		235	
	ECS	554	2	567	2	589	2
	AES	362	2	274	2	204	2
EC TOTAL		1325	4	1221	4	1028	4
EMR	GS	688	3	1030	3	1166	3
EMR TOTAL		688	3	1030	3	1166	3
TC	I&NO	965	10	358	3	426	3
TC TOTAL		965	10	358	3	426	3
NMC	NMM	352	4	352	4	352	4
NMC TOTAL		352	4	352	4	352	4
AC	FR&TS	47		48		49	
AC TOTAL		47		48		49	
YTG	C&TS			102			
	Ed.	65		72		72	
	Ec. Dev.	327		409		243	
	R. Resources	295		139		5	
	Tourism	144		100		92	
YTG TOTAL		831		822		412	
GNWT	ED&T			58.4		89.8	
	EMR Sec.	118.06		95		95.6	
	Health	19.44		64.5		44.1	
	J&PS	88		163		14	
	L.Govn't.	515		539.5		392	
	R. Resources	823.5		727.6		523.5	
	S. Services	453		398		509	
GNWT TOTAL		2017		2046		1668	
NOGAP TOTAL		11,100	37.1	11,017	36	9,689	34

*The Non-Renewable Resources Management Planning Element includes contributions to the YTG and GNWT. These funds are shown in this table under the YTG and GNWT.



INDIAN AND NORTHERN AFFAIRS CANADA

(\$1985-86, K)

PROJECT NO., TITLE AND PROPOSED DURATION	1985-86		1986-87		1987-88	
	\$	P-Ys	\$	P-Ys	\$	P-Ys
<u>PE: Economic Planning and Development</u>						
A.2 Northern Participation (1984/85-1990/91); In-house	69	1	69	1	69	1
<u>PE: Renewable Resource Management and Environmental Protection</u>						
A.4 Granular Resources Inventory and Management Program (1984/85-1988/89); In-house and contract.	423	1	426	2	423	1
A.5 Physical Environment: Process and Impacts (1984/85-1990/91); Contract.	211	2*	223	2*	251	2*
A.7 Offshore Environmental Ecosystems Monitoring (BEMP) (1984/85-1990/91); In-house and Contract.	361	*	361	*	259	*
A.8 Disturbance of Marine Mammals by Industrial Activity (1984/85-1990/91); Contract.	109	*	113	*	153	*
A.11 Deterrence and Treatment of Oil Contaminated Marine Wildlife (1986/87-1989/90); Contract.			95	*	70	*
A.12 Contaminants, Tainting and Quality of Food Species (1984/85-1990/91); Contract.	93	*	141	*	121	*
A.13 Impacts of Oil and Gas- Related Activities on Caribou. (1984/85-1990/91); Contract.	61	*	91	*	91	*
A.17 Surface and Subsurface Disturbances Induced by Oil and Gas Activities (1984/85-1990/91); Contract.	73	*	101	*	101	*

*2 PYs responsible for A5, 7, 8, 11, 12, 13, 17 and 21.

PROJECT NO., TITLE AND PROPOSED DURATION		1985-86		1986-87		1987-88	
		\$	P-Ys	\$	P-Ys	\$	P-Ys
A.20	Hydrocarbon Activities: Marine Research and Management (1984/85-1990/91); Contract.	298	1	248	1	168	1
A.21	Onshore Environmental Monitoring and Research Program (MEMP) (1985/86-1990/91); Contract.	121	*	191	*	231	*
<u>PE: Non-Renewable Resources Management</u>							
A.1	NOGAP Secretariat (1984/85-1990/91); In-house.	228	2	270	2	176	2
INAC TOTAL		2047	7	329	8	2113	7

NOGAP PROJECT DESCRIPTION

1. Project Title: A.2 NORTHERN PARTICIPATION (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:
 - To promote northern participation in employment, training and business opportunities created by northern hydrocarbon projects;
 - To determine the requirements (terms and conditions) for any negotiated northern benefits package;
 - 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.
 - To implement the BEARP socio-economic recommendations that constitute additional undertakings on the part of INAC, 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 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 INAC 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 territorials governments, appropriate DIZ societies and industry.

5. Subprojects: None.

6. Need for Study:

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 INAC 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 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 INAC 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/Outputs:

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):

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
PYs	1	1	1
Salary	44	44	44
O&M	25	25	25
	<hr/>	<hr/>	<hr/>
Total	69	69	69

10. Other Funding:

Current A-base resources:

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
PYs	.38	.38	.38
Salary	14	14	14
O&M	5	5	5
	<hr/>	<hr/>	<hr/>
Total	19	19	19

11. Person-Year Justification:

Without the requested person-year, INAC'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 INAC'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 and business opportunities.

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:

Not available.

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; \$85/86):

	85/86	86/87	87/88
PYS	1	2	1
Salaries	62	117	62
O&M	<u>361</u>	<u>309</u>	<u>361</u>
Total	423	426	423

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.

February, 1985

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: Not available.

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; \$85/86):

	85/86	86/87	87/88
PYs	•	•	•
Salaries	26	26	26
O&M	<u>185</u>	<u>197</u>	<u>225</u>
Total	211	223	251

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 26 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

	<u>Approximate PY load/year (1985/86-1988-89)</u>
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 March, 1985. The two positions are:

- 1) Departmental NOGAP Coordinator (secondary role as Marine specialist).
- 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.

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 in decision by Senior Policy Committee, 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 traffice/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 13.

9. NOGAP Resource Requirements (\$000s; \$85/86):

	85/86	86/87	87/88
PYS	*	*	*
Salaries	26	26	26
O&M	<u>335</u>	<u>335</u>	<u>233</u>
Total	361	361	259

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. PY justification:

*See Project A5, Section 10.

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. 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.

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

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 (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.

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.

February, 1985

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. Subprojects: Not available.

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; \$85/86):

	85/86	86/87	87/88
PYs	*	*	*
Salaries	19	13	13
O&M	<u>90</u>	<u>100</u>	<u>140</u>
Total	109	113	153

10. PY Justification:

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

11. Other Funding: N/A

February, 1985

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. Subprojects: Not available.

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; \$85/86)

	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

February, 1985

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. Subprojects: Not available.

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.

9. NOGAP Resource Requirements (\$000's; \$85/86):

	85/86	86/87	87/88
PYS	*	*	*
Salaries	14	14	14
O&M	<u>79</u>	<u>127</u>	<u>107</u>
Total	93	141	121

10. PY Justification:

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

February, 1985

NOGAP PROJECT DESCRIPTION

1. Project Title: A13, C9 AND G16 IMPACTS OF OIL AND GAS-RELATED ACTIVITIES ON CARIBOU (1984/85-1990/91)
2. Project Managers:
 - Subproject 1:
(Objective 1) N. Barichello, Wildlife Branch, Department of Renewable Resources, Government of Yukon, Box 2703, Whitehorse, Yukon, (403) 667-5465.
 - Subproject 2:
(Objective 2) F. McFarland, Northern Environmental Protection Directorate, Terrestrial Environment Division, Department of Indian Affairs and Northern Development Ottawa, Ontario K1A 0H4, (819) 997-9621.
 - Subproject 3:
(Objectives 3 and 4) D. Russell, 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, including (a) obtaining sex and age composition, population size and harvest data, and (b) reviewing, analyzing and tabulating population data from past research conducted on the Porcupine herd from 1977 to 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.
 3. To determine Porcupine caribou critical habitat and critical time periods in relationship to hydrocarbon development in northern Yukon by identifying critical habitats and the significance of spring staging areas for bulls, and (b) identifying and determining the significance of critical insect relief areas for the herd on its summer range.
 4. To provide the additional knowledge and information necessary to accommodate hydrocarbon developments by avoiding or minimizing the effects on caribou, and to collate existing and ongoing data into a simulation modelling framework to enable researchers and managers to better explore and evaluate the effects of hydrocarbon development on the caribou.

4. Brief Background and Description:

Increased hydrocarbon activities (seismic exploration, new access, pipelines and production facilities) and other activities such as aircraft traffic, which are related to the Mackenzie Delta-Beaufort Sea hydrocarbon developments, may potentially affect the caribou population and caribou utilization of certain habitats. Studies are required to assess and monitor the potential impacts and to design appropriate mitigative measures to minimize environmental impacts. As well, information will be required by the proposed Porcupine Caribou Management Board.

The Development: Shorebases have been identified as an integral part of the exploration and development phase of Beaufort Sea oil and gas activities. For the western Beaufort the only physically and economically viable locations identified are King Point and Stokes Point, Yukon. Likely support facilities associated with port establishment include road access to the Dempster Highway, significant increase in traffic on the Dempster, inland quarry site, associated road and traffic, and frequent aircraft overflights.

The Resource: The Porcupine caribou herd is a large international migratory barren ground herd that utilizes the development area in spring and summer. The herd constitutes the primary wildlife food resource for numerous native communities in the N.W.T., Yukon and Alaska. As such, the fate and well-being of the herd has been a prime concern in the negotiation of three land claims agreements, a major impetus in the formation of a northern Yukon National Park, and the focus of attempts for an international agreement for more than a decade.

Spring is a critical time for caribou in that food is limited 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 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 a new access road to the port from the Dempster and on a road to an inland quarry site; aircraft overflights; and the increased access of hunters. Effects will impact on the caribou by direct mortality, disruption of movement routes, displacement from certain habitats, increased energy expenditure and decreased energy intake due to harassment.

The Project: This project will provide field information on all aspects of the potential and actual impacts and give government managers and industry planners an opportunity to explore and test the consequences of alternative scenarios 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, and formation and operation of a northern Yukon National Park. 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: Not available.

6. Need for Study:

a) Mandate:

Yukon: 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.

Federal: This study would assist DIAND in meeting its responsibilities for maintaining appropriate levels of applied environmental research, for ensuring that effective terms and conditions pertaining to land use permits are developed and for enforcing relevant regulations under the Territorial Lands Act, Land Titles Act and Public Lands Grants Act. The study would assist DOE in managing 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 on Hydrocarbon Development:

By providing data on reproduction, extrapolated natural mortality rates, changes in population size, herd movements and range use, the effects of human disturbance can be tested with supportable conclusions. To undertake mitigation 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 BEARP Panel report 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 recommends 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 are a direct response to the BEARP recommendations. 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 the 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 (YTG):

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 (DIAND):

1984-85 - publication of Proceedings of the First North American Caribou Workshop.
1985-86 - planning for disturbance research.
 completion of migration 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 (DOE):

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

3b. Summer critical habitat DOE):

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 (DOE):

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 Resource Requirements (\$000's; \$1985/86):

	<u>1985-86</u>	<u>1986-87</u>	<u>1987-88</u>
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Subproject 1 (YTG):

O&M	38	34	-
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Subproject 2 (DIAND):

PY	*	*	*
Salary	13	13	13
O&M	<u>48</u>	<u>78</u>	<u>78</u>
Total	61	91	91

Subproject 3 (DOE):

PY	1.0	1.0	1.0
Salary	44	44	44
O&M	98	103	51
Capital	<u>15</u>	<u>-</u>	<u>-</u>
Total	157	147	95

10. PY Justification:

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

Subproject 3: Presently only one PY is available within CWS for Porcupine caribou work. The work outlined in objectives 3 and 4 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 prepare 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, international cooperation will suffer, progress reports cannot be completed and the modelling will not proceed in the timeframe required. This single PY request is minimal, given that it is assumed that two summer students can be used and that some of the work will be contracted out to the University of Alaska.

11. Other Funding: (\$000)Subproject 1 (YTG):

<u>1985-86</u>

O&M (Proposed)	133
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Subproject 3 (DOE): CWS will continue to allot A-base funds to the project. Because of fiscal reductions within DOE, the amount of these A-base funds is not known as of February 1985.

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: Not available.

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; \$85/86):

	85/86	86/87	87/88
PYs	•	•	*
Salaries	13	13	13
O&M	60	88	88
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Total	73	101	101

10. PY Justification:

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

11. Other Funding: Not Applicable.

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: Not available.

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; \$1985/86):

	85/86	86/87	87/88
PYs	1	1	1
Salaries	59	59	59
O&M	239	189	109
	---	---	---
Total	298	248	168

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.

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.

Partial funding for the initial stages of this onshore monitoring program has been provided by NOGAP Project A.6 Regional Terrestrial Environment, which has since been terminated.

5. Subprojects for 1984/85: Not available.

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, \$85/86) will be as follows:

	1985/86	1986/87	1987/88
a) Project Management	102	50	90
b) Implementation of Recommendations	<u>0</u>	<u>122</u>	<u>122</u>
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 14 and NOGAP Project Description A7.

9. NOGAP Resource Requirements (\$000's; \$85/86):

	85/86	86/87	87/88
PYS	*	*	*
Salaries	19	19	19
O&M	<u>102</u>	<u>172</u>	<u>212</u>
Total	121	191	231

10. P.Y. Justification: *See Project A.5, Section 10 for explanation of P.Ys.

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. Consequences of Nil Funding:

Without a co-ordinated approach to offshore ecosystems, Government-related 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.

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

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.

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	137	137	137
O&M	91	133	39
Capital	-	-	-
Total \$	228	270	176

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.

FISHERIES AND OCEANS

(\$1985-86, K)

PROJECT NO., TITLE AND PROPOSED DURATION	1985-86		1986-87		1987-88	
	\$	P-Ys	\$	P-Ys	\$	P-Ys
PE: NWT and Inland						
B.1 Effects of Vessel Noise and Traffic on Arctic Marine Mammals (1984/85-1987/88); In-house and Contract.	406	0.6	509	2	119	2
B.2 Critical Estuarine and Marine Habitats of the Canadian Arctic Coastal Shelf (1984/85-1988/89); In-house and Contract.	608	2	516	2	603	2
B.3 Critical Western Arctic Freshwater Habitats (1984/85-1988/89); In-house and Contract.	301	1	276	1	127	1
PE: Ocean Science and Surveys						
B.4 Hydrography, Northwest Passage (1984/85-1985/86); In-house and Contract.	811	1				
B.5 Hydrography, Mackenzie River (1984/85-1986/87); Contract.	419	1	508	1		
B.6 Beaufort Sea Oceanography (1985/86-1990/91); In-house and Contract.	52	1	830*	6*	1380*	6*
			*subject to further approval			
B.7 Arctic Oceanographic Data (1984/85-1990/91); In-house.	30		30		30	
B.8 Beaufort Sea Waves (1984/85-1990/91); In-house.	77	1	64	1	138	1
B.9 Under-Ice Biota (wrap-up of original B.9) (1984/85-1985/86); In-house.	26	0.5				
B.10 Eastern Arctic Physics (wrap-up of original B. 10); (1984/85-1985/86); In-house.	20					
B.11 Departmental NOGAP Coordination (1984/85-1990/91); In-house.	78	1	78	1	78	1
DFO TOTAL	2828	9.1	2811	14	2475	13

NOGAP PROJECT DESCRIPTION1. Project Designation:

B.1: Effects of vessel noise and traffic on Arctic marine mammals
(1984/5 - 1987/8)

2. Project Manager:

J.W. Clayton
Research Scientist
Freshwater and Arctic Research Directorate
Canada Department of Fisheries & Oceans
501 University Crescent,
Winnipeg, Manitoba, R3T 2N6
(204) 949-5166

3. Project Objectives:

In general, to enhance the Department's capability to provide effective, timely, and credible scientific advice regarding the interaction between Arctic marine mammal populations and hydrocarbon development, production and transportation. This will be achieved, with NOGAP support, by pursuing the following objectives:

1. To develop expertise and ongoing capability within DFO in respect to Arctic marine mammal bioacoustics and behaviour.
2. To identify and evaluate the effects of noise generated by ice-breaking vessels on Arctic marine mammals.
3. To identify and evaluate the effects of heavy-vessel traffic on Arctic marine mammals and their sea-ice habitats.
4. To document the distribution, abundance, and movements of key Arctic marine mammals in potentially impacted habitats.

4. Project Background & Description:

The effect of vessel noise and traffic on Arctic marine mammals is a contentious issue, characterized by a dearth of knowledge but with considerable prospects for substantial impacts. Development of oil and gas in the Arctic will lead to increased service traffic, additional to any transport per se of hydrocarbons in the Beaufort Sea and through the Northwest Passage.

The Lancaster Sound Green Paper estimated three ship passages per day year-round by the year 2000. The Arctic Pilot Project alone would have an LNG carrier moving through the Passage every 12 days. Concern has been expressed by Inuit, Greenlanders, government scientists, environmental groups and industry that surface activity and underwater noise generated by Class 10 tankers and/or other heavy vessels will affect marine mammals' behavioural patterns and migratory routes. Changes in these would, among other things, affect hunting success and the economies of remote Arctic

communities. Marine mammal harvesting is a very important aspect of traditional Arctic lifestyles. Several recent workshops in North America have identified substantial information gaps in this field. There is immediate need to undertake basic research to address these information gaps, in order to provide a scientific basis for impact prediction and regulatory input.

While some expertise exists in industry and more is being developed, DFO has only just initiated an investigation in the area of marine mammal bioacoustics. This investigation uses bioacoustics to study marine mammal population ecology and behaviour. While DFO is expanding its activities to address critical considerations in this area, a directed bioacoustics program would greatly enhance the ability of the department to assess potential vessel/marine mammal interactions and to advise credibly and effectively on this matter.

This Project incorporates a number of investigations to address some of the recommendations of the Final Report of the Environmental Assessment Panel on Beaufort Sea Hydrocarbon Production and Transportation (supported by both DIAND and DFO) regarding the effects of hydrocarbon development and transportation on Arctic marine mammals.

5. Subprojects:

Subproject B.1.1. Beaufort Sea inshore/offshore beluga surveys

Contact: J.I. Strong (204)949-3392, and G. Yaremchuk (204) 949-5156, Freshwater Institute, Winnipeg.

This subproject will address Beaufort Sea Panel Recommendation 38:

38. The Department of Fisheries and Oceans undertake research programs on beluga whales to develop effective monitoring and mitigation programs.

Objectives of this subproject include the following:

- a) To document beluga distribution and abundance.
- b) To document the population structure of visible beluga (adults/juveniles/calves).
- c) To document changes in surface water temperature, and investigate its relationship to beluga numbers and distribution.
- d) To document gross movements of beluga.
- e) To relate beluga movement to industrial and hunting activity.

Subproject B.1.1. Description:

The annual migrations and attendant hunting of beluga whales in the Mackenzie estuary, and the potential effects of vessel traffic on these activities, have long been of concern to native hunters and to DFO. This subproject will collect data by aerial survey techniques so as to extend previous investigations and thereby attain the objectives outlined above. The emphasis will be on generating quantitative whale

survey data, and on assessing these data (along with concurrent environmental parameters: wind, water temperature, salinity, distance from shore, etc.), all in the context of industrial activity, and taking account of the biological characteristics of the whales themselves.

Subproject B.1.2. Ringed seal behaviour and ecology.

Contacts: M. Kingsley, Freshwater Institute, Winnipeg, (204) 949-5057; T. Smith, Arctic Biological Station, Ste. Anne-de-Bellevue, (514) 457-3660.

This subproject will address Beaufort Sea Panel Recommendations 31 and 36:

31. The effects of icebreaking on ice regimes be further studied by the Proponents and the Government of Canada, and that these two studies include field research and monitoring during the Two-Tanker Stage.

36. The Department of Fisheries and Oceans conduct the research programs necessary to:

- a) identify distribution of seals along the proposed tanker route and
- b) determine the effects of icebreaking on seal behaviour and mortality, including the loss of pups due to flooding of dens.

Objectives of this subproject include the following:

- a) To clarify the site tenacity, distribution, and mother-pup bonding of ringed seals in their sea-ice habitat, and the influence of vessel noise on these behaviour patterns.
- b) To clarify the relation between seal productivity and sea-ice type, with a view to predicting impacts on seals of changes in the characteristics of sea ice produced by ice-breaking activities.
- c) To clarify the ecology, distribution and abundance of seals in the Beaufort Sea. These activities will complement investigations of polar bears in the Beaufort Sea, which are also supported through NOGAP.

Subproject B.1.2. Description:

The ringed seal is vital to those Arctic peoples who maintain a traditional hunting culture. Ringed seals are also the primary prey of polar bears. The life cycle of the ringed seal begins in a birth lair under snow cover over the fast sea ice. These birth lairs include a hole for access to the sea and are clearly vulnerable to icebreaking activity. The establishment of breathing holes and birth lairs is also influenced by ice type and it is expected that extensive and repetitive ice breaking will produce changes in the sea ice itself. This subproject will collect on-ice observations of ringed seal behaviour and ecology as well as aerial surveys of ringed seal abundance and distribution, in an attempt to address quantitatively the objectives listed above. These investigations will extend and complement previous studies of ringed seal biology, and the results will be used to predict and mitigate effects of vessel traffic detrimental to these animals.

Subproject B.1.3. Marine mammal bioacoustics and behaviour.

Contact: J. Clayton, Freshwater Institute, Winnipeg, (204) 949-5166.

This subproject will address the following Beaufort Sea Panel Recommendations:

46. The Department of Fisheries and Oceans undertake research on the behavioural response of marine mammals to the sounds produced by ice-breaking ships in Arctic waters.

47. The Department of Fisheries and Oceans undertake research on the extent to which vocal communication and echo location used by marine mammals are masked or otherwise interfered with by ship-produced sounds, and the effects of such interference on the mammals.

48. The Department of Fisheries and Oceans undertake research on the extent of any acute and sub-acute physiological responses resulting from ship-produced sound.

Objectives of this subproject include the following:

- a) To clarify the relationship of vocalization characteristics to behaviour of whales and pinnipeds.
- b) To determine the behavioural and distributional responses of whales and pinnipeds to vessel noise at ice edges, in broken ice, and in open water.
- c) To determine behavioural and distributional response of whales and pinnipeds to vessel traffic.*
- d) To evaluate and quantify changes in distribution and productivity of marine mammals resulting from vessel traffic.*

*Note: These objectives have time horizons of at least 10 years. In the current NOGAP plan it will be possible only to develop baseline knowledge to underpin longer-term pursuit of these targets. Progress will depend upon extension of support beyond the current NOGAP time frame, and also upon the rate of industrial development.

Subproject B.1.3. Description:

Bioacoustics is an important aspect of the biology of Arctic sea mammals, and an aspect that is simply not being adequately addressed by DFO at present. It is also a widespread concern of various groups (such as international environmentalists and native Canadian hunters) that the high noise levels anticipated from Arctic ice-breaking vessels will be very disruptive to sea mammals. This subproject is meant to address these concerns by recruiting a competent and qualified marine mammal bioacoustics scientist and a research assistant to execute basic and applied research. The investigations pursued by this small "core group", both in-house and through contracts, will make a start at working towards the objectives listed above.

6. Need for Project, in terms of:

a) Departmental mandate (conservation and management of marine mammal populations):

This Project will strengthen the DFO position regarding a key aspect of marine mammal biology, namely bioacoustics. It will also significantly enhance DFO ability to advise on the potential effects of vessel noise and traffic on two very important Arctic marine mammal species, namely ringed seals and beluga whales. As well, it will complement and strengthen the scientific basis of the DFO management program for the Mackenzie beluga whale stock which may already be affected to some degree by shipping in support of Beaufort Sea hydrocarbon exploration and development.

b) Preparedness for decision-making on northern hydrocarbon proposals:

This Project will significantly enhance the DFO capability to advise credibly and effectively on the regulation of vessel traffic, ice-breaking activity and noise emissions from vessels and other industrial sources, in the context of their impact on marine mammals.

As noted in the subproject descriptions (Section 5 above), this Project will enhance DFO capability to address several of the Beaufort Sea Panel Recommendations (31, 36, 37, 38, 46, 47, and 48).

7. Relationship of Project to other NOGAP Projects:

a) DIAND projects

This Project will be complementary to DIAND's NOGAP projects. For DFO, the perspective and rationale relates to responsibility for the management and allocation of seal and whale resources, including their protection from developmental impacts. The DIAND role is complementary to DFO's, namely to regulate hydrocarbon development, including the assessment and minimization of deleterious impacts.

b) Oceanography projects

Data from NOGAP oceanographic projects will be integrated with this Project in order to clarify the relationships between oceanographic conditions and marine mammal distribution, migration and abundance patterns.

c) Polar bear projects.

Data from NOGAP polar bear studies will be complementary to this Project, and will be integrated to clarify relationships between ringed seals and polar bears. Attempts will also be made to integrate ringed seal and polar bear projects in respect to data collection and field activities.

8. Major Milestones/Outputs, by Subproject:1985/86

- a) Beaufort Sea beluga surveys.
 - Conduct aerial surveys for distribution and abundance.
 - Analyse survey data.
- b) Ringed seal ecology and behaviour.
 - Continue investigations in Barrow Strait area initiated in 1984/85.
- c) Marine mammal acoustics and behaviour.
 - Recruit principal investigator and support staff.
 - Plan subproject investigation.
 - Acquire necessary equipment.
 - Conduct limited field investigations.

1986/87

- a) Beaufort Sea beluga surveys.
 - Conduct aerial surveys for distribution and abundance.
 - Analyse survey data.
 - Prepare final reports.
- b) Ringed seal ecology and behaviour.
 - Continue field investigations in Barrow Strait and Beaufort Sea.
 - Analyse field data.

1986/87

- c) Marine mammal acoustics and behaviour.
 - Conduct full program of field investigations.
 - Analyse observational data.

1987/88

- a) Ringed seal ecology and behaviour.
 - Complete final reports.
- b) Marine mammal acoustics and behaviour.
 - Conduct field investigations.
 - Analyse data.
 - Prepare final reports.

9. Three-Year Resource Requirements (\$\$ are x 1000, basis 1985/86):

Subproject	Resource category	NOGAP			A-Base (annual)
		1985/86	1986/87	1987/88	
B.1.1	PYs	0	0	0	0.7
	Salaries/Benefits	0	0	0	28
	O&M (includes contracts)	150	150	0	10
	Capital	0	0	0	0
	Total \$	150	150	0	38
B.1.2	PYs	0	0	0	0.7
	Salaries/Benefits	0	0	0	28
	O&M (includes contracts)	85	90	0	17
	Capital	15	10	0	9
	Total \$	100	100	0	54
B.1.3	PYs	0.6	2.0	2.0	0.5
	Salaries/Benefits	26	84	84	20
	O&M (includes contracts)	40	135	35	0
	Capital	90	40	0	0
	Total \$	156	259	119	20
Project Totals	Salaries/Benefits	26	84	84	76
	O&M (includes contracts)	275	375	35	27
	Capital	105	50	0	9
	Total \$	406	509	119	112
	Total PY's	0.6	2.0	2.0	1.9

10. NOGAP PY Justification:

A major objective of this Project is to develop expertise within DFO to credibly advise on matters regarding the effects of industrial and vessel noise on marine mammals. The minimal staffing requirement consists of a bioacoustic scientist and a full-time professional assistant. These personnel will conduct a small research program and will act as scientific authority on specific contracts. Two PY's will be deployed as follows:

- a) One Research Scientist (SE-RES).
 - Subproject leader and bioacoustician.
 - The "in-house expert".
- b) One professional level assistant (BI or PC).
 - Expert technical support for the Research Scientist.
 - The "expert's assistant".

NOGAP PROJECT DESCRIPTION1. Project Designation:

B.2: Critical estuarine and marine habitats of the Canadian Arctic Coastal Shelf (1984/85-1988/89)

2. Project Manager: Michael J. Lawrence
Arctic Resource Assessment Section
Department of Fisheries and Oceans
501 University Crescent
Winnipeg, Manitoba R3T 2N6
(204) 949-5222

3. Project Objectives:

1. To identify estuarine and marine habitats of significance to fish on the Beaufort Shelf, and to Arctic cod in the Northwest Passage by:
 - a) determining present and historic temporal and spatial distribution and abundance of demersal and pelagic fish species,
 - b) determining temporal and spatial distribution and abundance of ichthyoplankton on the Beaufort Shelf and in areas of the Northwest Passage, and
 - c) compiling and appraising existing marine and estuarine data.
2. To characterize these habitats in terms of biotic community composition and abiotic parameters by:
 - a) determining the importance of primary production vs. allochthonous production across the Mackenzie estuary into the marine zone,
 - b) determining the temporal and spatial distribution and abundance of zooplankton species occurring on the Beaufort Shelf,
 - c) measuring the chemical and physical properties of the water on the Shelf and relating these characteristics to fish, zooplankton and phytoplankton distribution and abundance and to sea-surface phenomena as measured by NOAA satellite imagery, and
 - d) determining temporal and spatial distribution and abundance of benthic macro-invertebrates through analysis of historic and present data.
3. To elucidate ecosystem processes and pathways in these habitats in terms appropriate to backgrounding the assessment of sensitivity and vulnerability of estuarine and marine fish and their habitats to hydrocarbon production and transportation from the Beaufort Shelf by:

- a) determining feeding habits of pelagic and demersal fishes of the Beaufort Shelf and of Arctic cod of the Northwest Passage, and estimating the degree of food resource partitioning as an indication of natural levels of environmental stress,
 - b) initiating baseline biological monitoring of the invertebrate populations of typical "fiord-type" harbours of the coastal zone of the Beaufort Sea,
 - c) determining the migratory behaviour and species-environment relationships of coregonid fishes that utilize the coastal regions of the Yukon North Slope, and
 - d) developing estimates of the distribution, abundance and productivity of Arctic cod (or other pivotal fish species in the Arctic marine food chain) and interpreting this knowledge in the context of species' vulnerability to the impacts of hydrocarbon production.
4. To compile and appraise existing Arctic estuarine and marine data on physics, chemistry and selected biological parameters by:
- a) searching out data sets,
 - b) describing the data sets, including production of maps of sampling locations,
 - c) assessing the quality of the data and rating them,
 - d) setting up an interactive data base system and computer archive of data descriptions,
 - e) establishing and maintaining a library of data sets and reports, and
 - f) ensuring that data produced in NOGAP projects meet the criteria for the highest quality rating.

4. Project Background and Description:

Production of hydrocarbons and ensuing transportation pose major concerns for Arctic marine and estuarine biota. In order to minimize potential development:biota interactions it is necessary to know where ecologically important and sensitive fish and fish habitat occur on the Beaufort Shelf and in the NW Passage so that DFO can contribute credibly to development of strategies and route selection. Furthermore, DFO needs to know why these animals occur in these critical areas; to provide an understanding of biota vulnerability, to provide a basis for determining species sensitivity to a variety of development perturbations, and to provide advice on countermeasures. Finally, the knowledge gained by long-term detailed fisheries ecology studies in the Arctic will support not only these objectives but will provide a comprehensive and scientifically valid basis for effective long-term monitoring. This will enable regulatory and scientific agencies to distinguish effects caused by industrial disturbance from those due to background/natural sources and variability.

5. Subprojects:Subproject B.2.1. Beaufort Shelf fish habitat research

Contact: M. Lawrence/L. deMarch, Freshwater Institute, Winnipeg,
(204)949-5222

Description:

Fish species abundance and distribution will be determined primarily through the use of trawls, gillnets and (subsequently) hydroacoustic techniques on a seasonal basis (early open-water, late open-water, late winter).

In association with fish sampling sites, in situ measurements of salinity, temperature, depth, and possibly in situ fluorescence will be made. Samples will be collected for phosphorus, nitrate, silicon, oxygen, chlorophyll, zooplankton, phytoplankton and ichthyoplankton species and numbers, suspended solids, primary production, light extinction, inorganic carbon, macro-benthic community composition and abundance.

Fish will be caught in both open-water and through the ice in conjunction with benthic and zooplankton sampling. Stomach contents will be preserved for subsequent quantitative and qualitative analyses. Principal prey for each fish species in each major habitat type (as determined by depth, substrate and other hydrodynamic features of the shelf) will be determined and discussed in relation to food availability. Food resource partitioning among fish species in each area will be analyzed (after Tyler 1978) and assessments made of the strength or weakness of prey-partitioning to assess the influence of location and season on the predator-prey overlap among the fish species. Distribution and abundance data for major (and/or selected) species and species assemblages will be compiled and mapped each year in relation to distributional parameters (depth, temperature, productivity, salinity, Chl a). Primary production in the study area will be performed in-house. Dr. T.R. Parson's research regarding allochthonous vs. primary production in the estuary will be supported by this subproject.

Subproject B.2.2. Fisheries research vessel operation, Beaufort Sea

Contact: M. Lawrence, Freshwater Institute, Winnipeg,
(204)949-5222

Description:

This subproject will provide for chartering and operating the sea-going platform essential to the conduct of subproject B.2.1. Costs are on the basis of negotiating a 3-year contract.

Subproject B.2.3. Nearshore benthic monitoring, Beaufort Shelf

Contact: M. Lawrence, Freshwater Institute, Winnipeg,
(204)949-5222

Description:

Van Veen grabs and 2-inch corers will be used to sample the macrofauna and meiofauna respectively. A random-stratified sampling strategy will be employed at locations with a similar mud-type substrate, with minimum bottom slope, at depths of 3-5 m, 10-12 m and 15-20 m. Measurements will be made of sedimentation rates, salinity, temperature, sediment texture and organic content of substrates, in an effort to determine factors influencing species abundance and biomass. Size measurements will be made of predominant species of the macrobenthos. C, N and P determinations will be performed on collected sediments. Water column measurements will include determinations of Chl a, total particulate concentrations, and analysis of particulate and dissolved C, N and P.

Sampling will be performed in February/March of each year and in August of each year at the 10-12 m depth stratum. In the second year (August 1986 and February/March 1987) SCUBA techniques will be used for direct (cf. remote) sampling of the benthos. The efficiency and sampling biases introduced by the Van-Veen grab will be analyzed.

Subproject B.2.4 Yukon North Slope fish habitat assessment

Contact: W. Bond, Freshwater Institute, Winnipeg, (204)949-5092

Description:

This subproject will develop information on the significance of Yukon nearshore habitats to marine and anadromous fishes. The requirement for improving this data base is seen as urgent in view of current industrial development scenarios for the area. The 1985/86 study will focus on Phillips Bay, an area lying between Stokes Point and King Point and thought to be important to fish.

Fish will be captured by seines and gillnets through the open-water period. Water temperatures will be recorded at each sampling site and water samples taken for salinity analysis.

Subproject B.2.5. Arctic cod distribution, abundance and vulnerability to perturbation

Contact: R. Crawford, Freshwater Institute, Winnipeg,
(204)949-3776

Description:

Determine the distribution and abundance of Arctic cod in various habitat types at various seasons and during various phases of its life cycle, by hydroacoustic monitoring, by mid-water trawling, and by sampling with plankton nets.

Delimit the Arctic cod spawning season and identify spawning locations by sampling through the ice.

Provide Arctic cod production estimates for energetics modelling. Commence work in the Resolute area, and later extend to other parts of the Archipelago, and also to the Beaufort Sea.

Subproject B.2.6. Arctic data compilation and appraisal

Contact: L. de March, Freshwater Institute, Winnipeg,
(204-949-5186)

Description:

The Arctic Data Compilation and Appraisal Project (ADCAP) was started in 1979 by the Institute of Ocean Sciences with the search, collection, scrutiny, cataloguing and computer archiving of data descriptions on ocean currents, sea temperatures, salinities and water levels in the Beaufort Sea region. With the support of the Freshwater Institute (A-Base and NOGAP) as well as some financial support from DIAND and EM&R, ADCAP has inventoried all descriptions of nutrients, hydrocarbons, trace metals, chlorophyll, oxygen, suspended particulates, whales, seals, zoobenthos, marine and anadromous fish in one or more of: the Beaufort Sea, Northwest Passage, Sverdrup Basin, Queen Elizabeth Islands, Canada Basin and Baffin Bay.

To date approximately \$1 million has been spent on this project, primarily from internal DFO funding, mostly through contracts to private industry. It was originally planned to expand the program to freshwater systems along the Beaufort Sea coast and the Mackenzie drainage, and to update catalogues until at least 1988 based on anticipated funding of \$200 K annually. Present NOGAP funding will support continuation of that work.

6. Need for Project, in terms of:a) Departmental mandate:

The Department's mandate to manage fisheries derives from the Constitution Act (1867) and the Department of Fisheries and Oceans Act (1979), and includes responsibility for fish, shellfish, marine mammals and their habitats. In fulfilling this mandate the Department undertakes research on fish and their habitats, resource assessment and allocation, and fish habitat protection.

Fish and marine mammal resources and their habitats are protected from the effects of man-made disturbances primarily in accordance with Sections 20, 28, 30, 31 and 33 of the Fisheries Act. Specifically the destruction of fish and marine mammal habitat is protected under Section 31; the deposit of deleterious substances in waters frequented by fish is prohibited under Section 33.

b) Preparedness for decision-making on northern hydrocarbon proposals:

The Beaufort Environmental Assessment and Review Panel in its Recommendations and Suggestions to the Ministers (DOE and DIAND) recommended that in order for the government to be prepared for decision making:

- i) "...the Department of Fisheries and Oceans, as part of an Arctic coastal and estuarine fisheries research and management program, identify and study fish habitats within the Beaufort Sea coastal area, and fish species which could be sensitive to oil and gas production and transportation to develop effective monitoring and mitigation programs."
- ii) "...the Proponents complete sensitivity mapping of all areas potentially affected by oil spills in the production zone and along transportation routes before any transportation of oil takes place." (Note that although this onus is on the proponents, they will necessarily come to DFO for information.)

Further, it was stated in the report to the Ministers that:

- i) "DFO ... should establish research and monitoring programs which can assess the extent of any long-term impacts of dredging on critical biological resources in the Beaufort Sea region".
- ii) "Questions were raised about whether a causeway at King Point would restrict nearshore movement of fish. The Panel considers this to be a problem requiring research and proper design".
- iii) "The Panel believes that DFO should expand the data inventory in areas designated for imminent development".
- iv) "The Panel concludes that existing wildlife habitat inventory programs should be further supported by the relevant government agencies. The Proponents should recognize sensitive and important habitats identified by ... DFO ... as areas which require either avoidance or special mitigative measures".
- v) "The Panel concludes that there is a need for a better understanding of the physical and biological processes in Arctic environments in general and the Beaufort Sea in particular."
- vi) "The Panel concludes that basic, ecological research into planktonic, benthic, and epontic species should be carried out as a component of the recommended coastal fisheries research program."

7. Relationship of Project to other NOGAP Projects:

- a) Efforts will be coordinated with Project B.3 towards the achievement of that Project's Objectives 3, 4, 7, 8 and 10.
- b) Efforts will be coordinated with Project B.6, although the difference in timing of these Projects renders joint-venture studies difficult. Information on important fish habitat that is identified from Project B.2 will be available to the B.6 investigators for study planning.
- c) This Project will provide important input to DIAND's studies of contaminant baseline levels in fish.

Planning for research in all other NOGAP projects can make use of the Data Compilations (ADCAP subproject B.2.6) to determine sampling sites, and to choose suitable methodology to ensure that data sets are intercomparable and of the highest quality. Data sets from NOGAP Projects will be integrated into ADCAP to assure their quality and allow easy accessibility.

8. Major Milestones/Outputs, by Year:

1985/86

- 1. Complete second early-open-water ichthyoplankton and oceanographic survey in conjunction with satellite oceanography (B.2.1).
- 2. Sail fisheries research vessel from west coast to Tuktoyaktuk (B.2.2).
- 3. Complete second late-open water ichthyoplankton fisheries and oceanographic survey in conjunction with satellite oceanography (B.2.1).
- 4. Complete second annual open-water stratified sampling for fish-feeding habits study (including benthic macro-invertebrate collections) and perform analysis to determine predator-prey relationships (B.2.1).
- 5. Complete first season's work on primary production vs. allochthonous production across the estuary (B.2.1).
- 6. Conduct winter fisheries and oceanographic expedition and analyze fish species - environment relationships (B.2.1).
- 7. Report on distribution and abundance (seasonal and spatial) of fish species in the Beaufort Shelf (B.2.1).
- 8. Establish camp on Yukon North Slope; initiate first-year study of fish movements and habitat utilization (B.2.4).
- 9. Complete second annual wintertime benthic sampling in the nearshore (B.2.3).

10. Evaluate hydroacoustic equipment and develop sub-ice survey techniques (B.2.5).
11. Undertake preliminary survey of Arctic cod abundance and distribution in the Resolute Bay area and collect samples for subsequent ichthyological examination (B.2.5).
12. Develop hydroacoustic survey data analysis programs (B.2.5).
13. Collect and examine ichthyoplankton samples in the Resolute Bay and Beaufort Sea areas for occurrence and characteristics of Arctic cod young-of-the-year (B.2.5 and B.2.1).
14. Data compilation and appraisal (B.2.6):
 - Appraise Beaufort Sea seal data.
 - Appraise Northwest Passage whale data.
 - Appraise Northwest Passage fish data.
 - Publish three data catalogues, above.
 - Publish Beaufort Sea fish data catalogue.
 - Update computer files.

1986/87:

1. Complete third early-open-water ichthyoplankton and oceanographic survey (including satellite oceanography (B.2.1)).
2. Complete third late-open-water ichthyoplankton fisheries and oceanographic survey (B.2.1).
3. Complete third annual open-water stratified sampling for fish feeding habits study (including benthic macro-invertebrate collections) and perform analysis to determine predator-prey relationships (B.2.1).
4. Continue work towards modelling production in the estuary, examining importance of allochthonous sources vs. primary production of food material (B.2.1).
5. Conduct second winter fisheries and oceanographic expedition, and analyze fish species environmental relationships (B.2.1).
6. Complete second report on seasonal and spatial distribution and abundance of fish species in the Beaufort Sea (B.2.1).
7. Conduct second-year field-study of fish migrations and habitat utilization along the Yukon North Slope (B.2.4).
8. Complete third annual wintertime benthic sampling in the nearshore (B.2.3).
9. Expand hydroacoustic survey geographically in Barrow Strait, Beaufort Sea and Lancaster Sound (B.2.5).

10. Continue surveys of Arctic cod abundance and distribution in the Resolute Bay area. Expand surveys to Beaufort Sea (B.2.5).
11. Data compilation and appraisal (B.2.6):
 - Update Beaufort Sea physics data catalogue.
 - Update Beaufort Sea chemistry data catalogue.
 - Update computer files.

1987/88:

1. Complete fourth early-open-water ichthyoplankton and oceanographic survey (B.2.1).
2. Complete fourth late-open-water ichthyoplankton fisheries and oceanographic survey (B.2.1).
3. Complete fourth annual open-water stratified sampling for fish feeding habits study (including benthic macro-invertebrate collections) and perform analysis to determine predator-prey relationships (B.2.1).
4. Test production model(s) for the Beaufort Shelf (B.2.1).
5. Conduct third winter fisheries/oceanographic study (B.2.1).
6. Conduct third-year field-study along the Yukon North Slope; investigating fish migratory behaviour in relation to salinity, temperature, fish age, etc. (B.2.4).
7. Complete fourth annual wintertime benthic sampling in the nearshore (B.2.3).
8. Continue hydroacoustic survey in Beaufort Sea to estimate Arctic cod abundance and distribution (B.2.5 and B.2.1). Develop production estimates.
9. Data compilation and appraisal (B.2.6):
 - Update Beaufort Sea fish and whales data catalogues.
 - Update computer files.

9. Three-Year Resource Requirements (\$\$ are x 1000, basis 1985/86):

Subproject	Resource category	NOGAP			A-Base (annual)
		1985/86	1986/87	1987/88	
B.2.1	PY's	1.5	1.5	1.5	1.5
	Salaries/Benefits	47.25	47.25	47.25	70
	O&M (includes contracts)	105	50	145	40
	Capital	0	5	0	1
	Total \$	152.25	102.25	192.25	111
B.2.2	PY's	0.0	0.0	0.0	0.1
	Salaries/Benefits	0	0	0	4
	O&M (includes contracts)	225	215	225	24
	Capital	0	0	0	0
	Total \$	225	215	225	28
B.2.3	PY's	0.5	0.5	0.5	1.2
	Salaries/Benefits	15.75	15.75	15.75	40
	O&M (includes contracts)	50	25	45	0
	Capital	0	0	0	0
	Total \$	65.75	40.75	60.75	40
B.2.4	PY's	0.0	0.0	0.0	2.0
	Salaries/Benefits	0	0	0	75
	O&M (includes contracts)	55	53	70	0
	Capital	0	0	5	1
	Total \$	55	53	75	76
B.2.5	PY's	0.0	0.0	0.0	2.0
	Salaries/Benefits	0	0	0	60
	O&M (includes contracts)	30	5	20	20
	Capital	0	50	0	0
	Total \$	30	55	20	80
B.2.6	PY's	0.0	0.0	0.0	0.5*
	Salaries/Benefits	0	0	0	25*
	O&M (includes contracts)	80	50	30	40**
	Capital	0	0	0	10**
	Total \$	80	50	30	75
Project totals	Salaries/Benefits	63	63	63	274
	O&M (includes contracts)	545	398	535	124
	Capital	0	55	5	12
	Total \$	608	516	603	410
	Total PY's	2.0	2.0	2.0	7.3

*Western Region and Institute of Ocean Sciences in collaboration.

**Institute of Ocean Sciences exclusively.

10. NOGAP PY Justification:

At present seven in-house PY's are committed (by DFO Western Region) to Project B.2.:

- B.2.1 1.5 PY (1.3 BI plus 0.2 technical support)
- B.2.2 0.1 PY (Biologist)
- B.2.3 1.2 PY (0.6 BI plus 0.6 technical support)
- B.2.4 2.0 PY (1 BI plus 1 technical support)
- B.2.5 2.0 PY (1 RES plus 1 technical support)
- B.2.6 0.2 PY (Biologist)

It is necessary to increase the in-house biological and technical capability to manage, conduct and oversee a variety of tasks incorporated in subprojects B.2.1 and B.2.3. At present the efficient execution of these subprojects is jeopardized by the limitations imposed by insufficient staff.

Our requirement is for one full-time biologist specializing in the design and conduct of programs for sampling fish and invertebrate populations. Responsibilities would include the design of a stratified random-sampling program for the Beaufort Shelf specifically, and for selecting appropriate statistical packages for data analysis, hypothesis-testing, and data management and presentation. The person would also be responsible for on-board sampling of trawl catches.

A full-time technician is essential to provide field and laboratory support to the NOGAP biologist.

NOGAP PROJECT DESCRIPTION1. Project Designation:

B.3: Critical Western Arctic freshwater habitats (1984/85-1988/89)

2. Project Manager: Dennis G. Wright
Arctic Resource Assessment Section
Department of Fisheries and Oceans
501 University Crescent
Winnipeg, Manitoba R3T 2N6
(204) 949-5204

3. Project Objectives:

In general, to enhance the Department's capability to provide effective, timely, and credible scientific advice in respect to potential perturbation of critical Western Arctic freshwater fish habitats in relation to hydrocarbon development, production, and transportation. This will be achieved, with NOGAP support, by defining the physical, chemical, and biological aspects of these habitats critical to the migration, growth, survival, reproduction, and stock integrity of fish. Broad whitefish (Coregonus nasus) will be used as the indicator species and the focus of research.

The specific objectives of this Project and its attendant subprojects, in respect to the lower Mackenzie River, Mackenzie Delta, nearshore Beaufort Sea, and Tuktoyaktuk Peninsula are:

1. To locate specific spawning grounds of broad whitefish.
2. To determine the presence of and geographical limits of genetic stocks of broad whitefish on the basis of spatial distributions within spawning seasons, and temporal distributions between spawning years and at a single location within a given year.
3. To identify migration corridors critical to the dispersal of broad whitefish larvae.
4. To identify the overwintering locations of broad whitefish.
5. To identify the migration corridors and the timing of migrations of spawning and non-spawning adult broad whitefish between spawning, feeding and overwintering areas.
6. To develop and test a limnology-fisheries model of habitat function for lakes and channels critical to juvenile and adult whitefish feeding and survival.

7. To establish the quantitative contribution of various potential feeding areas to the total bioenergy flow of broad whitefish populations.
8. To characterize the temporal and spatial extent of nearshore freshwater dispersal corridors for young broad whitefish along the Tuktoyaktuk Peninsula.
9. To determine the salinity tolerance of critical dispersal phases of young broad whitefish.
10. To characterize the genetic stock affinities of migratory, summering, and wintering populations of juvenile and adult broad whitefish.

4. Project Background and Description:

During the Federal Environmental Assessment and Review Process Hearings on Beaufort Sea Hydrocarbon Production and Transportation, both the proponents and the intervenors commented specifically on the deficient life history information for freshwater and anadromous fish (including timing of migrations, routes travelled, and measures for the protection of spawning and rearing areas); and also on the current incomplete knowledge about the basic productivity and determining characteristics of freshwater habitats. The main driving impetus for NOGAP studies in this regard is the prospect of pipeline(s), onshore production facilities, and associated development in the Mackenzie corridor. This Project encompasses a number of investigations to address some of the recommendations of the Final Report of the Environmental Assessment and Review Panel regarding the identification and characterization of critical freshwater habitat in this area.

5. Subprojects:

Subproject B.3.1. Spawning, migration, overwintering, and dispersal of broad whitefish

Contact: K. Chang-Kue, Freshwater Institute, Winnipeg, (204)949-5223

Objectives of this subproject include the following:

- a) to locate specific spawning grounds of broad whitefish;
- b) to identify the overwintering habitats of broad whitefish in the lower Mackenzie River and Delta;
- c) to identify the migration corridors and the timing of migrations of spawning and non-spawning adult broad whitefish between spawning, feeding and overwintering areas;
- d) to identify migration corridors critical to the dispersal of broad whitefish larvae.

Description:

Broad whitefish will be captured from pre-spawning and spawning aggregations, fitted with radio tags, and tracked along migration corridors to spawning and overwintering areas. Broad whitefish will be captured when moving out of summer areas on the Tuktoyaktuk Peninsula, fitted with radio tags and tracked to aggregation areas in the Mackenzie Delta. Larval whitefish will be captured within the Mackenzie Delta and nearshore Beaufort Sea using trawl and seine nets to determine their numerical, spatial and temporal distributions.

Subproject B.3.2. Broad whitefish genetics: stock separation

Contact: J. Reist, Freshwater Institute, Winnipeg, (204)-949-5032

Objectives of this subproject include the following:

- a) to determine the presence of and geographical limits of genetic stocks of broad whitefish on the basis of spatial distributions within spawning seasons, and temporal distributions between spawning years and at a single location within a given year;
- b) to characterize the genetic stock affinities of migratory, summering and overwintering populations of juvenile and adult broad whitefish.

Description:

Broad whitefish will be collected from spawning populations in appropriate watersheds both within and adjacent to the study area for morphometric, morphologic and electrophoretic analysis to determine the genetics and discreteness of stocks for various spawning aggregations.

Subproject B.3.3. Chemical and biological characterization of broad whitefish habitats within the Mackenzie Delta, nearshore Beaufort Sea, and Tuktoyaktuk Peninsula.

Contacts: R. Bodaly, and R. Hecky, Freshwater Institute, Winnipeg, (204)949-5218/5217

Objectives of this subproject include the following:

- a) to develop and test a fisheries-limnology model of habitat function for lakes and channels critical to juvenile and adult whitefish feeding and survival;
- b) to establish the quantitative contribution of various potential feeding areas to the total bioenergy flow of broad whitefish populations.
- c) to identify and quantify environmental and biotic gradients in Mackenzie Delta lakes of significance to the fishery resource.

Description:

Phytoplankton productivity, macrophyte production and river inputs will be examined to determine the relative productivity within Mackenzie Delta and Tuktoyaktuk Peninsula lakes. The physical characteristics of lakes of the Delta and Tuktoyaktuk Peninsula will be established using satellite and aerial imagery. Studies will be conducted to establish the quantitative contribution of various potential feeding areas within the broad study area in relation to the total bioenergy flow of the broad whitefish population. The information collected will be synthesized to develop and test a limnology-fisheries model of lacustrine and riverine habitats critical to juvenile and adult feeding and survival of the indicator species (broad whitefish), and of freshwater/anadromous fish in general within the study area.

Subproject B.3.4. Salinity preference/tolerance of migratory larval and juvenile broad whitefish, and the impact of oil upon salinity acclimation.

Contacts: B.G.E. deMarch, and W.L. Lockhart, Freshwater Institute, Winnipeg, (204)949-5213/7113.

Objectives of this subproject include the following:

- a) to explain and predict juvenile and adult whitefish migration patterns in dispersal corridors in relation to salinity patterns by conducting laboratory experiments on survivorship, behavioural and physiological aspects of salinity tolerance and adaptation.
- b) to determine the effect of crude oil exposure on young broad whitefish acclimating to changing salinity.

Description:

In year 1 (Phase I), young broad whitefish will be collected on their downstream migration near the confluence of the East Channel of the Mackenzie River and Kugmallit Bay, and transported to a field laboratory for bioassay to determine salinity tolerance and/or preference. In year 2 (Phase II), additional young broad whitefish will be stressed by exposure to crude oil, and the effect of this on the acclimation of the fish to changing salinity will be documented. The study (Phases I & II) will quantify physical/chemical habitat requirements/tolerances of young broad whitefish during dispersal from the Mackenzie River Delta to rearing and feeding areas in freshwater systems along the Tuktoyaktuk Peninsula, and the effect that oil might have on this dispersal.

6. Need for Project, in terms of:a) Departmental mandate:

Under Section 31 of the Fisheries Act it is stated that "no person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat". In order for the Department of Fisheries and Oceans to exercise its mandate to protect important fish habitat from perturbation it is necessary to know what constitutes such habitat and to understand its physical, chemical, and biological attributes.

b) Preparedness for decision-making on northern hydrocarbon proposals:

The Federal Environmental Assessment Review Office, in the Final Report of its Panel on Beaufort Sea Hydrocarbon Production and Transportation, noted that the distribution and importance of freshwater fish habitat in the Beaufort Sea area was not well known. The Panel recommended that, in order to be able to address these concerns, the Department of Fisheries and Oceans undertake a research and management program to identify and study fish habitats within the Beaufort Sea area, and fish species which could be sensitive to oil and gas production and transportation. In addition the Panel supported research on the ecology of coastal lakes and streams, particularly on the Tuktoyaktuk Peninsula.

7. Relationship of Project to other NOGAP Projects:

The subprojects identified have been integrated into the overall B.3 Project to address the stated objectives. In addition, Project B.3 will be integrated with Project B.2, the delineation of important marine and estuarine habitats within the Beaufort Sea area.

8. Major Milestones/Outputs, by Year:1985/86

1. Complete laboratory processing of 1983 and 1984 samples of spawning broad whitefish for genetic distinctness (Objective 2).
2. Obtain samples of larval, juvenile and adult fish from summering and wintering populations (Objectives 7 and 10).
3. Analyse data on broad whitefish radio tracking (Objectives 1,4 and 5).
4. Continue tracking of previously radio-tagged fish (Objectives 4, 5).
5. Radio-tag fish from the downstream run of a Tuktoyaktuk Peninsula lake/stream system. Follow these fish to overwintering areas (Objectives 4 and 5).

6. Execute field work on primary production, macrophyte production and nutrient budgeting of Mackenzie Delta and Tuktoyaktuk Peninsula lakes (Objectives 6 and 7).
7. Analyse satellite and aerial imagery of Delta and Tuktoyaktuk lakes (Objective 6).
8. Analyse fish samples (see Objective 2 above) for isotope ratios and elemental composition (Objective 7). Collect and analyse food sources for isotope ratios (Objectives 6 and 7).
9. Execute field work on larval fish dispersal and abundance, and on the existence of a nearshore freshwater dispersal corridor (Objectives 3 and 8).
10. Initiate laboratory studies on larval salinity tolerances (Objective 9).

1986/87:

1. Analyse data for broad whitefish genetic stock distinctness. Complete final report on these studies by March 1987 (Objective 2).
2. Process and analyse data on genetic affinities of larval, juvenile and adult summering and wintering populations. Complete final report (Objective 10).
3. Track broad whitefish pre-spawners tagged with time-delay tags in September 1985 (in April-June 1986; optional, depending on success of previous year's work: Objectives 4 and 5).
4. Radio-tag fish from a Tuktoyaktuk peninsula stream in July 1986, and track late-summer/early-fall migrations (Objectives 4 and 5).
5. Analyse study data on fish radio-tracking (Objectives 1, 4 and 5).
6. Execute second year of field work on Delta and Tuktoyaktuk lake productivity and limnology (Objective 6).
7. Execute final field collection of specimens (fish and fish food organisms). Complete final isotope and elemental composition analysis work (Objectives 6 and 7). Complete submodel of carbon utilization and pathways to fish (Objective 7).
8. Continue field work on larval fish dispersal and nearshore freshwater corridor (Objectives 3 and 8).
9. Initiate studies on the effect of exposure to crude oil on acclimation of young broad whitefish to changing salinity.

1. Prepare reports on radio-tagging work (Objectives 1, 4 and 5).
2. Prepare reports on Delta and Tuktoyaktuk lakes limnology-fisheries model of habitat function, and on quantitative contribution of feeding areas to the total bioenergy flow of broad whitefish (Objectives 6, 7).
3. Finish data analysis and reporting on larval dispersal and nearshore dispersal corridor (Objectives 3 and 8).
4. Finish data analysis and reporting on larval salinity tolerance work, if executed (Objective 9).
5. Complete necessary field work.

9. Three-year Resource Requirements (\$\$ are x 1000, basis 1985/86):

Subproject	Resource category	NOGAP			A-Base (annual)
		1985/86	1986/87	1987/88	
B.3.1	PYs	0	0	0	2
	Salaries/Benefits	0	0	0	78
	O&M (includes contracts)	59	50	35	5
	Capital	5	2	0	0
	Total \$	64	52	35	83
B.3.2	PYs	.33	1	0	0
	Salaries/Benefits	10	31	0	0
	O&M (includes contracts)	49	40	0	0
	Capital	5	0	0	0
	Total \$	64	71	0	0
B.3.3	PYs	.67	0	1	3
	Salaries/Benefits	16	0	26	90
	O&M (includes contracts)	137	125	53	10
	Capital	10	15	3	0
	Total \$	163	140	82	100
B.3.4	PYs	0	0	0	1
	Salaries/Benefits	0	0	0	35
	O&M (includes contracts)	10	13	10	0
	Capital	0	0	0	0
	Total \$	10	13	10	35
Project totals	Salaries/Benefits	26	31	26	241
	O&M (includes contracts)	255	228	98	15
	Capital	20	17	3	0
	Total \$	301	276	127	256
Total PY's		1.0	1.0	1.0	6.0

10. NOGAP PY Justification:

1 PY will provide technical assistance to a research scientist (who is currently without such assistance), and will contribute to continued stock separation/genetics research after the post-doctoral fellowship of the scientist currently leading that research expires in December 1985.

February, 1985

NOGAP PROJECT DESCRIPTION

1. Project Title: B4 Hydrography, NW Passage
(1984/85-1985/86)
2. Project Manager: S. B. MacPhee, Director General, Canadian Hydrographic Service, Room 209, 615 Booth Street, Ottawa, Ontario. K1A 0E6
Tel. No. 995-4413
3. Objectives: To provide suitable navigational charts and related publications prior to Beaufort Sea hydrocarbon production.
4. Brief Background: Some areas in the NW Passage and adjacent waterways have not been surveyed to modern standards. In some cases, charts are based on data obtained from reconnaissance surveys. These charts must therefore be used with caution. In many cases, tidal and current data are also lacking.
5. Subprojects: Subprojects will be developed by the Canadian Hydrographic Service well in advance of the beginning of each fiscal year.
6. Need for Study: The Canadian Hydrographic Service has the statutory authority under the British North America Act, the Canada Shipping Act and the Fisheries and Oceans Act to carry out hydrographic surveys and produce nautical charts in the interests of safety of navigation.
7. Relationship to other NOGAP projects

The CHS projects have a relationship with those of DOT, particularly in the area of Navigation Systems. The projects also interact, to some extent with oceanographic projects of OSS, DFO.
8. Milestones

The completion of surveys in the vicinity of the Bent Horn project and the production of updated charts resulting from those surveys in 1985/86; the acquisition of better tide and current information in 1985/86. In 1988/89 to 1990/91 data will be collected and charts will be improved throughout the NW passage.

9. Proposed NOGAP Resource Requirements (000s, \$85-86)

	<u>1985/86</u>
PY	1
SAL	42
O&M	769
CAP	0
<u>TOTAL</u>	<u>811</u>

10. PY Justification:

Required to monitor survey and charting contracts.

11. Other Funding:

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>	<u>88/89</u>	<u>89/90</u>	<u>90/91</u>
A Base	6600	6600	6600	6600	6600	6600
OERD	2243	2609(P)	2619(P)	2615(P)	2615(P)	
AMTRD	1017	984(P)				

February, 1985

NOGAP PROJECT DESCRIPTION

1. Project Title: Hydrography, MacKenzie River B5
(1984/85-1986/87)
2. Project Manager: S. B. MacPhee, Director General, Canadian Hydrographic Service, Room 209, 615 Booth Street, Ottawa, Ontario. K1A 0E6
Tel. No. 995-4413
3. Objectives: To provide adequate charts and related publications of the MacKenzie River in anticipation of Beaufort Sea hydrocarbon exploitation.
4. Brief Background: Surveys have not taken place on the MacKenzie River for several years. The river is subject to change due to siltation, flooding and dredging. Surveys to produce more accurate charts are required in support of increased traffic resulting from possible pipeline construction.
5. Subprojects: Nil at this time.
6. Need for Study: The Canadian Hydrographic Service has the statutory authority under the British North America Act, the Canada Shipping Act and the Fisheries and Oceans Act to carry out hydrographic surveys and produce nautical charts in the interest of safety to navigation. The possibility of using a pipeline to transport hydrocarbons through the MacKenzie valley will mean a heavy increase in barge traffic and a demand for up-to-date charts.
7. Relationship to other NOGAP projects

The hydrographic survey and charting project has a strong relationship to projects of DOT in the aids to navigation area.
8. Milestones

The establishment of good horizontal control and the acquisition of good shoreline plots throughout the MacKenzie system and the production of new charts in the MacKenzie Delta area.

9. Proposed NOGAP Requirements (1985-1986 \$1000's)

	85/86	86/87	87/88
PY's	1	1	
Salaries	7	7	
O&M	382	471	
TOTAL	419	508	

10. PY justification:

Required to monitor survey and charting contracts.

11. Other Funding Nil

February, 1985

NOGAP PROJECT DESCRIPTION

1. Project Title: NOGAP Project No.: B.6 Beaufort Sea Oceanography (1985/86-1990/91)
2. Project Manager: R.A. Lake
Institute of Ocean Sciences
Sidney, B.C. V8L 4B2
(604) 656-8280
3. Objectives: To provide through an integrated program an understanding of the oceanographic processes related to the Mackenzie River Plume on the Beaufort Sea shelf. The program addresses nutrient replenishment, transfer of primary production to the zooplankton and coupling between the benthos and pelagic food chain; primary measurements of hydrocarbons and metals; physical transport and mixing processes.
4. Brief Background: An understanding of the oceanography of the Beaufort Sea Shelf is essential to the design of production facilities and regional environmental management. The region was studied during the Beaufort Sea program of the mid-1970s but the increasing likelihood of production requires a much improved and more detailed understanding than currently exists. Existing programs are limited primarily to ice/ocean interaction studies.
5. Subprojects: As presently supported the project can only sustain a limited research project which will focus on oceanographic processes related to the Mackenzie River plume. This will be a single integrated project with a coordinated contribution from the fields of physics, chemistry and biology utilizing common logistic support.
6. Need for Study:
 - (a) Department Mandate. The provision of oceanographic information to facilitate the safe and environmentally sound management and development of resources in and beneath the marine environment.
 - (b) Preparedness for Decision Making on Northern Hydrocarbon Development Proposals. The outputs from the integrated oceanographic program will directly support:
 - decision making with respect to development plans for Beaufort Sea Oil;
 - oil spill contingency planning and response;

- design criteria for offshore production facilities and coastal infrastructure;
- Federal Ice Information Services;
- design of future monitoring systems;
- regional planning processes;
- a response to the Beaufort Sea Hydrocarbon Production and Transportation EARP recommendation (No. 29) that DFO investigate the fate of hydrocarbons, trace metals and hazardous substances in the Beaufort Sea; and
- a response to the Beaufort Sea EARP recognition of the need for multidisciplinary research in the Mackenzie Delta, particularly in the field of ecology (ref. 6.9.5.7) and marine chemistry research relating to naturally occurring hydrocarbons (ref. 6.9.5.1).

DFO is the government source of expertise and information on Beaufort Sea oceanography to other government departments and industry.

Information is provided to DOE for ocean dumping and ice services, DIAND for the Beaufort Sea Planning Commission, the Arctic Waters Pollution Prevention Act and land use planning, DOT for the Arctic Waters Pollution Prevention Act, and COGLA for the Canadian Oil and Gas Act and Oil and Gas Production and Conservation Act.

7. Relationship to Other NOGAP Projects:

This integrated Beaufort Sea Oceanographic program is multi-discipline (physics, biology and chemistry). Work will be coordinated with Fisheries research wherever possible. The sharing of logistic support facilities such as laboratories, ships and equipment will also occur.

8. Major Milestones/Output:

- 1985/86: Acquire ecologist. Consult with clients, determine detailed objectives and prepare an action plan.
- 1986/87: Acquire staff, project planning, initiation of contracts, and preparation for field work.
- 1987/89: Collection of data. Major field work from ice during spring and from ship during summer. Analysis and interpretation of data.

1989/91: Completion of field work. Analysis and interpretation of data. Preparation and publishing of scientific reports and papers.

9. NOGAP Resource Requirements Over Project Life: (\$85/86, K\$)

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
PYs	1	6	6
Sal	42	235	235
O&M	10	445	1,000
Cap	0	150	145
Total	52	830*	1,380*

10. PY Justification

This project requires expertise from the fields of Physics, Chemistry and Ecology. The Ecology Division at the Institute of Ocean Sciences has no existing arctic capability and requires a minimum of one scientist beginning in 1985 to manage the ecology component of work to be done under contract. Similarly, the Chemistry Division has no arctic program but has some arctic expertise. A minimum number of PYs must be provided to utilize state-of-the-art expertise and unique laboratory facilities at the Institute to meet objectives without jeopardizing other programs. The Physics Division has arctic expertise which is involved in several externally funded (Transport R&T, O.E.R.D.) and A-base projects which, although a minimal number of external term PYs are provided, must be supported largely with in-house PYs. Only one or two PYs can be diverted to NOGAP without jeopardizing other programs. These PYs would supervise staff hired for the NOGAP program to ensure that expert knowledge and specialized arctic technical expertise is available to the NOGAP project. NOGAP PYs would be in part utilized to cover the existing work load of in-house PYs so utilized. In general, the maximum possible amount of work would be contracted out. Six NOGAP (term) PYs are requested to be utilized as follows:

- 1) Senior scientist - ecology: manages ecological component to be done under contract. 1 PY.
- 2) Senior scientist - chemistry: coordinating and executing the sampling/analytical work, data interpretation and publication; manage contracts. 1 PY.
- 3) Hydrocarbon specialist: collection and laboratory analysis of uncontaminated hydrocarbon samples, data interpretation and publication. 1 PY.

*Conditional on approval of funding during NOGAP annual review.

- 4) Senior scientist - physics: coordinating and participation in project planning, field program, data analysis and publication; manage contracts. 1 PY.
- 5) Technical support: support field sampling and laboratory analysis of oceanographic parameters (salinity, temperature, oxygen, nutrients, metals, hydrocarbons); computing and data workup. 2 PYs.

11. (Other Funding): (\$84/85, K\$)

A-base: (Arctic shelf research; support OERD, Trans R&D)

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
PYs	16	16	16
Sal	640	640	640
O&M	540	540	540
Cap	75	75	75
Total	1,255	1,255	1,255

Transport R&D: (Northwest Passage research - physics)

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
PYs	2	4	4
Sal	70	140	140
O&M	514	400	470
Cap	100	180	225
Total	684	720	835

OERD:

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
PYs	3	3	3
Sal	112	112	112
O&M	428	478	390
Cap	180	90	90
Total	720	680	592

Relevant O.E.R.D. Projects:

- 67107 Arctic Oceanography (data compilation and appraisal)
- 67113 Ice/Ocean Interaction
- 67114 Beaufort Sea Ice Movement
- 67125 Sea Ice Studies (oceanographic instrument development)
- 67136 Predicting Ice Breakup (application of acoustic technology)

"Other funding" covers related research which complements but does not duplicate NOGAP projects. All funding is proposed, not committed.

ATTACHMENT TO PROJECT B.6BEAUFORT SEA PANEL RECOMMENDATIONS AND RELEVANCE
TO THE BEAUFORT SEA OCEANOGRAPHY PROJECT (B.S.O.P.)

The detailed planning to be conducted during 1985/6 will take into account the following recommendations of the Panel:

- #3 - improve and validate oilspill trajectory models
 - BSOP will provide relevant coastal current data and hydrocarbon baseline data
- #4 - sensitivity mapping re - oil spills
 - BSOP will contribute via #3
- #5 - minimum standards for oil spill cleanup
 - BSOP will provide information on physical operating conditions
- #6 - formal review of oil spill contingency plan
 - BSOP will provide DFO expertise to participate on formal reviews
- #8 - fund research on oil spill cleanup, equipment and research on behaviour, detection and effects of oil spills
 - BSOP will provide relevant information for Beaufort coast
- #26 - discharge of formation water subject to government standards
 - BSOP provides basis for DFO input into setting of standards and monitoring
- #27 - integrated hazardous and toxic chemicals management strategy
 - BSOP provides scientific basis for developing strategy
- #28 - regulatory review of proponent's contingency plan for toxic and hazardous chemicals
 - BSOP provides for DFO expertise to input into regulatory review
- #29 - design program to determine fate of hydrocarbon, trace metals, etc.
 - BSOP will implement for Beaufort coast
- #30, 31, 33
 - research on influence of artificial islands and icebreaking on ice regime
 - new research projects needed but BSOP will contribute
 - BSOP supports/complements DFO ice studies via OERD aimed at developing ice forecasting capability
- #37, 38, 39
 - research into marine mammals
 - BSOP provides supporting oceanographic data

- #40 - research on fish habitat
 - BSOP provides supporting data
- #54, 55
 - Beaufort Sea Coordinator's office
 - BSOP allows DFO to report on research and monitoring, e.g., regarding standards for monitoring
- #60 - fifteen-year program of accelerated research
 - BSOP is a start on the Beaufort
- #70 - funds now to develop social and environmental monitoring
 - BSOP will provide scientific basis for design

Para. 6.3.2

- research and monitoring regarding - long-term impacts of dredging
 - BSOP contributes

Para. 6.8.3

- DFO should expand data inventory in areas designated for imminent development
 - BSOP implements

Para. 6.9.5.2

- research on impacts of oil spills on micro and macro fauna
 - BSOP will contribute
 - B.9 would have contributed

Para. 6.9.5.1

- research on physical and chemical (oceanographic) processes in Arctic and in Beaufort (e.g. ice regime, hydrocarbons)
 - BSOP contributes

K.B. Yuen
NOGAP Coordinator
February 18, 1985

NOGAP PROJECT DESCRIPTION

1. Project Title: Arctic Oceanographic Data Management (1984/85-1990/91)
NOGAP Project NO.: B-7
2. Project Manager: P.-A. Bolduc.
#1202-200 Kent Street,
Ottawa, Ontario.
990-0231
3. Objectives: Main - To develop adequate management for oceanographic data collected in the Arctic.

Sub - To develop procedures for processing, validation, quality control, storage, retrieval and generation of data products/analyses to meet client demands.
4. Project Description: Management of oceanographic data, including on-going analysis and assessment of existing data for production and transportation areas, new data from enhanced programs, and assessment and analysis of industry data.
5. Subprojects: N/A
6. Need for Study: Oceanographic data for Arctic regions are being generated from a variety of sources, new and existing in-house and other government programs, industry programs, etc. The need for these data, analyses and data products is increasing in response to design requirements for production facilities, environmental assessments, route planning for Arctic shipping, etc. Moreover, under the new Canada Oil and Gas Act and related oceanographic guidelines issued by COGLA, OSS is responsible for advising industry on oceanographic data collection and also for reviewing, assessing and storing such data. The volume of incoming data is increasing, necessitating increased effort by the Marine Environmental Data Service. The new data to be derived from the new programs in the Beaufort will require timely processing as well as integration, leading to new publications and atlases. These products will be of benefit to the regulatory agencies and will also be pre-requisite to regional planning processes. They will also provide a baseline against which developmental impacts can be monitored and assessed. The demand for timely data products is expected to increase as agencies devote priority attention to the problems of Arctic development, but some effort is required to interpret and translate scientific data into formats appropriate for resource management and decision making. It is estimated that less than 30% of the Beaufort Sea data is available in a form to permit its use in studies and decision making.

The clientele consists of regulatory agencies, private industry, and researchers. Essentially, all sectors making decisions or doing research based on physical, chemical, and biological data in the Arctic will benefit.

7. Relationship to other NOGAP projects:

The data management function will be coordinated with the other data management functions arising from:

- Beaufort Sea Oceanography - Project B-6

8. Major Milestones:

- 1985-86 (1) Acquire and quality control edit the next most urgent ten data sets.
 (2) Assess the requirements of users for data retrievals and products, and implement the necessary software.
- 1986-87 (1) Acquire and quality control edit the next most urgent ten data sets.
 (2) Process and make available data reports and present as appropriate to the identified requirements.
- 1987-88 (1) Review the status, goals and priorities of the program in terms of what has been achieved, and adjust plans as necessary. The remainder of the program will depend on the review.

9. NOGAP Resource requirements (000s, \$85-86):

	85-86	86-87	87-88
PY	0	0	0
Salary	0	0	0
O&M	30	30	30
Capital	0	0	0
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Total	30	30	30

10. PY Justification: No PY has been provided for this NOGAP project.

11. Other funding: A-Base

	85-86	86-87	87-88
PY	3	3	3
Salary	80	80	80
O&M	20	20	20
	----	----	----
Total	100	100	100

NOGAP PROJECT DESCRIPTION

1. Project Title: Beaufort Sea Waves (1984/85-1990/91)
NOGAP Project NO.: B-8
2. Project Manager: J.R. Wilson
#1202-200 Kent Street,
Ottawa, Ontario.
990-0264
3. Objectives: To accelerate the acquisition and the development of wave climate data and knowledge of the Beaufort Sea.
4. Project Description: Acquisition and operation of five buoys equipped for satellite data transmission to increase coverage of data. Evaluation of limitations of present knowledge of Beaufort Sea wave climate and wave hindcast technology. Development of the necessary state-of-the-art hindcast and wave climate information to meet the requirements for design of structures, islands and facilities.
5. Subprojects: N/A
6. Need for Study: Major questions are arising with respect to the integrity of current methods for the construction of artificial islands for exploration. There is emerging, despite industry's optimism, the possibility of underscour and overtopping of the concrete caissons by waves, which could lead to island failure. The integrity of these islands from a human and environmental safety point of view is of prime importance because production platforms could take this form. Accurate wave climate is required for safe design and optimum engineering costs. This requires many years of measurements to reduce the uncertainty, along with the use of proven hindcast technology to determine the necessary statistics.

In the recent sinking of the Ocean Ranger at Hibernia, wave buoys were in operation. However, when the rig sank, the data aboard were also lost. The use of satellite buoys would ensure the immediate transfer of data and wave spectra to a data centre, regardless of the fate of the recorder. Since the location of buoys would no longer be limited by drilling rig location, geographic coverage would improve substantially.

Much effort has been and continues to be devoted to the evaluation and development of wave climate knowledge and hindcast technology at Hibernia and Sable Island. No similar effort is in progress for the Beaufort Sea, and resources are not available to undertake this additional work. The Hibernia and Sable Island wave hindcast technology is not directly applicable to the Beaufort Sea due to the very different geographic and meteorological conditions in the Beaufort. This difference in conditions is due to such features as shallow water, the ice edge, and the fact that storm profiles are quite different in the Beaufort Sea.

Clientele for this program includes the regulatory agencies, COGLA and Transport Canada. Other clientele would include the oil industry and their contractors. Researchers into the fundamental properties of sea waves and wave generation in the presence of ice would also benefit.

7. Relationship to other NOGAP projects: N/A

8. Major Milestones:

- 1985-86 (1) Operate two satellite reporting wave stations at appropriate locations in the Beaufort Sea to collect wave data for the ice-free part of the year.
- (2) Assemble all available wave hindcasts and wave measurements for the area and begin the development and assesment of wave design parameters and the accuracy with which they can be specified.
- 1986-87 (1) Operate two satellite reporting wave stations in the Beaufort Sea.
- (2) Develops requirements for more sophisticated modelling and hindcasts as necessary to fill gaps and meet the needs of design.
- 1987-88 (1) Review the status, goals and priorities of the program in terms of what has been achieved, and adjust plans as necessary. The remainder of the program will depend on the review.

9. NOGAP Resource requirements (000s, \$85-86):

	85-86	86-87	87-88
PY	1	1	1
Salary	42	42	42
O&M	35	22	35
Capital	0	0	61
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Total	77	64	138

10. PY Justification: No in-house expertise exists to perform scientific evaluation of studies done by industry, draw together the results of industry and government research and data gathering and develops overviews of the state of knowledge and shortfalls therein in relation to Beaufort Sea wave climate and develops projects to address these shortfalls.

11. Other funding: A-Base

	85-86	86-87	87-88
PY	.5	.5	.5
Salary	15	15	15
O&M	26	13	13
	----	----	----
Total	41	28	28

NOGAP PROJECT PROPOSAL

1. Project Title: B.9. Under-Ice Biota (1984/85-1985/86)
(Wrap-up of original project B.9, Non-Summer Ecology)
2. Project Manager: Dr. Trevor Platt,
Marine Ecology Laboratory,
Department of Fisheries and Oceans,
P.O. Box 1006,
Dartmouth, Nova Scotia.
B2Y 4A2
(902) 426-3793

3. Objectives:

With the impending termination of NOGAP Project No. B9 (Non-summer Ecology), it will be important to satisfactorily conclude research undertaken to date on the role of under-ice biota in the ecology of Arctic systems. The specific objectives of this project are:

- (a) to complete analyses of investigations and samples already initiated and collected;
- (b) to summarize, assess and analyse results;
- (c) to prepare technical report for DIAND on the accomplishments of the project with respect to the original objectives;
- (d) to publish results in scientific journal or other medium if warranted.

4. Description:

The work will involve laboratory analyses of specimens and samples; collation, tabulation and statistical analyses of data; bibliographic survey and analyses of the published literature; preparation of manuscripts.

5. Need for Study:

In all the Arctic scenarios except the overland pipeline there is the possibility of an oil spill under sea ice. It is known that during winter, algae embedded in the ice, near its under surface, grow vigorously and build up dense population. These algae are released and undergo a second burst of productivity when the ice breaks up in spring. Almost certainly, these algae are at the base of the food chain that makes the ice edge so attractive to populations of fish and mammals. In the Antarctic, it is estimated that ice algae account for 25% of the primary biological production. Up to now, the occurrence of ice algae in the Arctic has been well documented, but very little is known of their reactions to light, nutrients and temperature. Without knowledge it is not possible to make good, useful predictions about the effects of ice-breaking tankers and under-ice oil spills on marine productivity.

6. Relationship to other NOGAP Projects:

This project concludes the research on the role of under-ice biota previously conducted under NOGAP Project B.9 (Non-summer ecology).

7. Milestones:

1985/86 - analyse samples, data and literature
 - prepare technical report to DIAND
 - publish results in open literature

8. Resource Requirements (000s, \$85-86)

	<u>1984/85</u>
PY	0.5
SAL	15
O&M	11
CAP	<u>0</u>
<u>TOTAL</u>	26

9. Person-Year Requirements:

The work represents a new area of highly specialized research for which experience is not available in the private sector. Therefore an in-house scientific professional working closely with other BIO researchers is required: SE-RES To meet the objectives of the project.

10. Current A-Base Resources:

These resources comprise direct program costs and ship support (which amounts to approximately 50% of both PY's and dollars), but exclude administrative overhead; salary costs are included.

NOGAP PROJECT PROPOSAL

1. **Project Title:** Extension of B.10, Eastern Arctic Physics
(1984/85-1885/86)
2. **Project Manager:** C.K. Ross,
Atlantic Oceanographic Laboratory,
Bedford Institute of Oceanography,
Dartmouth, Nova Scotia.
B2Y 4A2
(902) 426-3146
3. **Objectives:**

To recover current meter moorings in Baffin Bay.
4. **Background and Description:**

In 1984, current meters were deployed in Baffin Bay as part of a multiyear strategy. However, due to the NOGAP budget cuts, the Eastern Arctic physics project will be terminated after 1984/5. Funds (\$20K) are required for the recovery of those instruments in 1985.
5. **Subprojects:** None
6. **Need for Project:**

The equipment that has been deployed is a capital investment that should be recovered. More importantly, there will be one year's data that will contribute to further understanding of water movements in Baffin Bay.
7. **Relationship to other NOGAP Projects:**

This is a one-shot effort to terminate B.10, Eastern Arctic Physics. The data itself will be a contribution to a new proposal on data analysis, as an extension of project B.7, Ocean Data Management.
8. **Milestones:**

Summer of 1985 - recovery of current meters
9. **Proposed NOGAP Resource Requirements**

1985/6 only: \$20K O&M
10. **PY Justification:** N/A
11. **Other Funding:** None

DFO NOGAP Project Description 1984/85 - 1990/91

1. Project Title: B.11 Departmental Coordination
2. Project Manager: K.B. Yuen,
Ocean Science and Surveys,
Department of Fisheries and Oceans
200 Kent Street, 12th floor,
Ottawa, Ontario, K1A 0H3
(613) 990-0311

3. Objectives:

To provide coordination, planning, review and financial monitoring of DFO's NOGAP Program;
To provide advice and support to Senior Management on NOGAP matters;
To participate in interdepartmental management process for NOGAP;
To develop DFO policy and to contribute to Federal policy, respecting NOGAP and phased development.

4. Background and Description:

Within DFO, NOGAP projects are implemented within the line management framework. The DFO Coordinator reports directly to the line ADM's of OSS and P&FF and is responsible for overall coordination, planning, recommendations on priorities and allocations. Other aspects include the development of a DFO program evaluation framework, participation on the Federal NOGAP management framework and general advice to Senior Management. Further planning and development is also needed on policy related to NOGAP (eg. Northern Land Use Planning) and phased development in the North, consultative mechanisms with clients and mechanisms to enhance delivery of service. Towards this end, a DFO Coordination Team has been established and planning mechanisms will include periodic workshops for planning and review.

5. Subprojects: None

6. Need for Project:

The project is an essential component of the overall management of the DFO NOGAP program. DFO projects involve many disciplines, regional establishments and line organizations. Coordination is needed to develop a holistic and strategically coherent DFO approach. Coordination is also needed to optimize scientific and logistic linkages amongst DFO activities. A Coordinator cum "project manager" is needed to ensure optimum program effectiveness for long-term planning, participation in the Committee of Coordinators and liaison with other agencies and clients. Since phased development is only a concept at this stage, detailed policy development is an important tool for translating scientific results into specific policies and regulations, as well as a tool for strategic program planning and evaluation.

7. Relationship to other NOGAP projects

The project integrates all DFO projects and provides good liaison with other agencies.

8. Milestones

Coordination will be a continuing function. During year 1, priority will be placed on getting the program underway, establishing a DFO Coordination Team, designing a planning and reporting system, identifying and resolving interproject scientific and logistic linkages, developing a program evaluation and management framework, and developing consultation and delivery mechanisms respecting clients. During the later stages, priority will be given to publication of results and their application to management and regulatory processes. Near the end of the planning period, planning would shift from earlier research emphasis towards design and implementation of monitoring systems and operational information systems, and responses to new priorities (eg. new problems, new geographic areas).

Major efforts with respect to policy development and strategic planning will proceed but the timing will depend upon initiatives and decisions made elsewhere by SPC, DIAND, DFO, DOE, EACAMT, DOT, COGLA and others. In the immediate future, the highest priorities are strategic planning and prioritization of research requirements, evaluation of the BEARP recommendations, a comprehensive Arctic marine policy, an Arctic marine conservation policy, and inputs into NLUP.

9. NOGAP Resources Requirements (1985-1986 \$1000's)

	85/86	86/87	87/88
PY's	1	1	1
Salaries	58	58	58
O&M	20	20	20
TOTAL	78	78	78

10. PY justification:

It is necessary to carry out overall management and policy development on an inhouse basis, in close relationship to other planning w.r.t. Arctic development, offshore drilling, marine transportation and energy R&D.

ENVIRONMENT CANADA

(\$1985-86, K)

PROJECT NO., TITLE AND PROPOSED DURATION		1985-86		1986-87		1987-88	
		\$	P-Ys	\$	P-Ys	\$	P-Ys
<u>PE: Environmental Protection Service</u>							
C.1	Northern Marine Pipeline Control Technology (1985/86-1986/87); Contract.	50		50			
C.2	Criteria for the Control and Monitoring of Petroleum Development Impacts on the Mackenzie River (1984/85-1986/87); Contract.	132		130		95	
C.3	Point Source Impact Monitoring Techniques - Marine Benthic Environment (1985/86-1987/88); In-house and Contract.	90		85		55	
C.4	Ocean Dumpsite Designation for Solid and Contaminated Wastes (1984/85-1987/88); Contract.	40		40		55	
C.6	Beaufort Atlas: Background Information for Implementing Marine Oilspill Counter-measures (1984/85-1987/88); Contract.	97		75		30	
<u>PE: Environmental Conservation Service</u>							
C.7	Migratory Bird Disturbance, Assessment and Management (1984/85-1987/88); In-house and Contract.	208	1	265	1	284	1
C.8	Peary Caribou Management (1984/85-1985/86); In-house.	38					
C.9	Impacts of Oil and Gas-Related Activities on Caribou (1984/85-1987/88); In-house.	157	1	147	1	95	1

PROJECT NO., TITLE AND PROPOSED DURATION	1985-86		1986-87		1987-88	
	\$	P-Ys	\$	P-Ys	\$	P-Ys
C.10 Hydrologic Mapping Data Base (1984/85-1985/86); Contract.	17					
C.11-1 Mackenzie Delta Channel Stability (1986/87-1987/88); In-house.			30		60	
C.21 Corporate Projects (1984/85-1987/88); In-house.	134		125		150	
<u>PE: Atmospheric Environment Service</u>						
C.16 Beaufort Sea Forecasting Techniques (1984/85-1987/88); In-house.	23		23		23	
C.17 Beaufort Sea Specialized Data Base (1984/85-1987/88); In-house.	153		61		31	
C.18 Beaufort Wind Climatologies (1984/85-1987/88); In-house.	82	1	82	1	82	1
C.19 Beaufort Sea Atmospheric Dispersion Characteristics (1984/85-1987/88); In-house.	104	1	108	1	68	1
EC TOTAL	1325	4	1221	4	1028	4

February 1985

NOGAP PROJECT DESCRIPTION

1. Project Title: C.1 NORTHERN MARINE PIPELINE CONTROL TECHNOLOGY
1985/86-1986/87)
2. Program Manager: R.S. Howarth, Environmental Protection Service, NWT District, P.O. Box 370, Yellowknife, N.W.T., X1A 2N3, (403) 873-3456.

Scientific Authority: C. Wachmann, Environmental Protection Service, Industrial Programs Branch, Ottawa, Ontario, K1A 1C8, (819) 997-1612.

3. Objectives:

To identify and assess the potential environmental problems and impacts of marine pipelines in the Beaufort Sea.

To recommend appropriate technology measures to mitigate environmental impacts of marine pipeline construction and operation in the Beaufort Sea.

4. Background and Description:

Submissions for the environmental assessment of offshore oil and gas resource development projects have been made for the Beaufort Sea area. At the environmental assessment hearings it became apparent that major environmental impacts may result during construction and operation of the offshore trunk and gathering pipeline systems. It also became apparent that key information was not available on which to base assessment and environmental advice and that effective measures for environmental protection could therefore not be developed.

Further discussions between Headquarters and the Regions (in particular the Atlantic, Western & Northern, and Pacific and Yukon Regions) as well as other government agencies (including EMR, COGLA, DIAND, DFO, FEARO and NEB) underlined the need to establish a sound knowledge base on marine pipelines. As a result, a 5-year proposal was submitted to the Panel of Energy R and D (PERD) and approved. Because of subsequent cutbacks in PERD, this funding was withdrawn. For NOGAP funding, the project has been recast to focus on northern marine pipelines over a two-year period.

5. Subprojects: None foreseen.

6. Need for Study:

This study is consistent with EPS's objective to promote environmentally sound technology and safe operations in northern resource exploration and development activities. It will provide environmental information and advice on the design and construction of northern marine pipelines, and cost-effective mitigation measures to protect the natural environment.

This project will enable EPS to address recommendation 78 of the Beaufort Environmental Assessment and Review Panel:

"the responsible government agencies, through contract if necessary, acquire expertise of the highest calibre, where it is not now present, to evaluate designs, construction techniques and operating procedures proposed by the Proponents and new to these agencies."

7. Relationship to Other Projects:

There are no directly related NOGAP projects. There are, however, DFO and EMR Beaufort Sea oceanographic and geotechnical projects which should provide supporting information.

8. Major Milestones/Outputs:

1985/86

- Acquire relevant published information on marine pipeline construction control technology through literature survey, contacts with industry and other suitable sources.
- Evaluate current technology in the construction and operation of marine pipelines.
- Identify the environmental concerns related to the construction of marine pipelines in other geographic locations of the world.
- Identify the environmental implications of accident or system malfunction, including those through failure of associated activities such as power supply.
- Identify information gaps and recommend options for addressing them.
- Prepare progress and summary reports.

1986/87

- Identify and evaluate applicable mitigation technology that can be utilized to provide solutions to potential environmental impacts of marine pipeline construction and operation in the Beaufort Sea.
- Recommend technology and procedures to mitigate the environmental impacts of marine pipeline construction and operation in the Beaufort Sea.
- Final report.

9. NOGAP Resource Requirements Over Project Life (\$85-86):

	<u>1985/86</u>	<u>1986/87</u>
O&M	\$50.0K	\$50.0K

10. Other Funding: Nil.

February 1985

NOGAP PROJECT DESCRIPTION

1. Project Title: C.2 CRITERIA FOR THE CONTROL AND MONITORING OF PETROLEUM DEVELOPMENT IMPACTS ON THE MACKENZIE RIVER (1984/85-1986/87)
2. Project Manager: David Sutherland, Senior Water Pollution Biologist, Environmental Protection Service, NWT District Office, P.O. Box 370, Yellowknife, N.W.T., X1A 2N3, (403) 873-3456.
3. Objectives:

Main Objectives:

To provide the NWT Water Board, COGLA and the Environmental Protection Service with effective criteria for protecting valued aquatic resources released from the impacts of contaminants from petroleum developments.

To produce recommendations on the most effective methods for monitoring the impacts on the Mackenzie River of contaminants released from petroleum developments.

Sub-Objectives:

To develop methods for monitoring petroleum hydrocarbons in the water and sediment of the Mackenzie River.

To establish a baseline on petroleum hydrocarbon and metal concentrations in water and sediment upstream and downstream of the Norman Wells oilfield development.

To identify the environmental pathways of petroleum hydrocarbons and metals from such sources as the Norman Wells refined and natural oil seeps.

To determine the impacts of petroleum hydrocarbons and metals from anthropogenic sources at Norman Wells on fish and other aquatic biota (e.g. toxicity, bioaccumulation and fish tainting).

4. Background and Description

The Norman Wells oil field is the first and only oil field in Canada north of 60° and is presently undergoing a major expansion. Expansion of the field involves drilling production wells from artificial islands, installing an underwater pipeline gathering system, constructing and operating a Central Processing Unit and constructing a pipeline to Alberta. It is probable that additional oil fields and gas fields in the lower Mackenzie Valley and Mackenzie Delta areas will be brought into production in the short to medium term (Polar Gas proposal; Esso pipeline proposal). Environment Canada has advocated a small scale, phased approach to hydrocarbon development in the north, particularly in relation to production from Mackenzie Delta and Beaufort Sea fields, so that impacts can be understood and controlled. The Norman Wells oilfield is the first phase of that process.

Hydrocarbons may enter the Mackenzie River from pipeline ruptures or leaks as well as from refinery discharges. Concerns focus on the sources and pathways of hydrocarbons and their effects on the domestic fishery. Local communities on the Mackenzie River have complained of fish tainting and have expressed concerns about the quality of water from the river. The expression of these concerns has increased the urgency for regulators to determine the effectiveness of present measures to control the impacts of petroleum developments.

Regulatory agencies such as Indian and Northern Affairs and the Environmental Protection Service have not yet carried out assessments of the effects of petroleum hydrocarbons and metals from the Norman Wells refinery. Such assessments require identification of the partitioning of these contaminants into water, sediment and fish through abiotic pathways. The methods for effectively monitoring these impacts must also be evaluated through a combination of field and laboratory approaches.

The results of an evaluation of the fate and behaviour of petroleum hydrocarbons and other contaminants in an aquatic ecosystem such as the Mackenzie River will form the basis for establishing appropriate criteria for regulatory controls, and for monitoring the lethal and sub-lethal effects (including tainting) of contaminants on fish. These criteria will enable regulatory agencies to set effective controls on petroleum developments, and to re-evaluate these controls through effective monitoring programs.

5. Subprojects:

a) Title: C.2-1 Baseline Monitoring of Petroleum Hydrocarbons in the Mackenzie River

b) Contact: Brian Olding, Water Quality Branch, Inland Waters Directorate, P.O. Box 2970, Yellowknife, N.W.T., X1A 2R2, (403) 920-8516.

c) Estimated Cost:

<u>NOGAP</u>	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
O&M	30.0K	30.0K	15.0K
Capital	<u>2.0</u>	<u>-</u>	<u>-</u>
DOE Total	<u>32.0K</u>	<u>30.0K</u>	<u>15.0K</u>
<u>GNWT (H.17-4)</u>	<u>35.0K</u>	<u>25.0K</u>	<u>35.0K</u>
Total NOGAP	57.0K	55.0K	40.0K
<hr/>			
<u>A-Base</u>	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
PY	1.07	1.07	.22
O&M	30.0K-60.0K	30.0K-60.0K	9.7K
Capital	<u>2.0</u>	<u>-</u>	<u>-</u>
Total A-Base	<u>32.0K-62.0K</u>	<u>30.0K-60.0K</u>	<u>15.0K</u>

d) Description:

Hydrocarbons have not yet been included in the Inland Waters Directorate's (IWD) water quality monitoring network on the Mackenzie River. Therefore, there is no water quality baseline with which to assess the magnitude of increases in contaminant levels resulting from the Norman Wells oilfield development, or from future petroleum developments.

Through establishment of a baseline, and through subsequent monitoring of petroleum hydrocarbons in water and sediment, increases in hydrocarbon loading from individual developments, or from a number of municipal or industrial sources can be detected in the Mackenzie River. The results of water and sediment monitoring can be used by regulatory agencies as an early warning of impacts to aquatic resources, and as an indication of the need to re-evaluate existing regulatory controls and waste treatment technologies.

6. Need for Study:

Fulfillment of the main objectives of the project will allow:

- a) licencing agencies such as the NWT Water Board to set controls on waste disposal from petroleum developments which are effective in controlling unacceptable impacts to aquatic resources;
- b) regulatory agencies such as INAC and EPS to monitor the impacts of petroleum developments by focussing on those chemical and biological pathways critical to assessing impacts on valued aquatic resources; and
- c) EPS to fulfill its responsibilities to prepare for petroleum development on the Mackenzie River, as identified in BEARP Recommendations 29, 55, 61 and 74.

7. Relationship to Other NOGAP Projects: None.8. Major Milestones/Outputs1985/86

- Sampling will be carried out in the river using the most cost effective methods and parameters identified in the recommendations from 84/85.
- A preliminary report will be produced detailing and evaluating the concentrations of selected parameters in water, sediment and biota.

1986/87

- Based on the 84/85 project strategy, and the results of field sampling in 85/86, a further field program to sample and analyse water, sediment, and biota will be carried out.
- A laboratory program will be undertaken to study the toxicity, bioaccumulation potential and tainting potential of key parameters from crude oil and the refinery effluents.

- A final report will be produced, detailing and evaluating the concentrations of selected parameters in water, sediment and biota.
- A report will be produced detailing the toxicity and bioaccumulation potential of the key parameters assessed.

1987/88

- A conceptual model of contaminants pathways will be developed and verified using the existing data base.
- Toxicity and bioaccumulation testing will be carried out to fill information gaps and/or clarify conclusions from 86/87.
- A report will be produced, detailing and evaluating the concentrations of selected parameters in water, sediment and biota. The report will also draw conclusions regarding toxicity, bioaccumulation and tainting, as well as conclusions about the impacts of the oilfield development on the MacKenzie River ecosystem.
- Criteria for effective monitoring of hydrocarbon developments will be produced.

9. NOGAP Resource Requirements over the Project Life (\$85-86):

(This resource summary includes the sub-project.)

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
O&M	130.0K	130.0K	95.0K
Capital	2.0K	--	--
Total	<u>132.0K</u>	<u>130.0K</u>	<u>95.0K</u>

10. Other Funding: See subproject C.1-1 (section 5) above.

February 1985

NOGAP PROJECT DESCRIPTION

1. Project Title: C.3 POINT SOURCE IMPACT MONITORING TECHNIQUES - MARINE BENTHIC ENVIRONMENT (1984/85-1987/88)

2. Project Manager: Russel Shearer, Senior Environmental Biologist, Environmental Protection Service, NWT District Office, P.O. Box 370, Yellowknife, N.W.T., X1A 2N3, (403) 873-3456.

3. Objective:

To test monitoring strategies and parameters recommended in the Arctic Marine Methods Guide (bioaccumulation, toxicity and benthic community structure) and to determine whether or not they should be included in regulatory monitoring guidelines.

4. Background and Description:

Problem: Government regulators are not receiving timely feedback on the effectiveness of regulatory controls related to marine environmental protection.

Solution: Site-specific impact monitoring should be carried out regularly in order to assess the appropriateness of regulatory controls. Impact monitoring, if it is to be useful to regulatory decision-making, must be both effective (sensitive but not overly costly) and standardized. The development of guidelines for monitoring in benthic environments will result in more effective and realistic regulatory controls.

EPS has developed a strong consultative and advisory role on regulatory and environmental review committees dealing with hydrocarbon development in the Mackenzie Delta and Beaufort Sea areas. To support this EPS role and to standardize site-specific regulatory monitoring in the benthic marine environment, EPS/NWT has coordinated the development of a comprehensive Arctic Marine Methods Guide, has undertaken monitoring programs in Tuk Harbour, Hutchison Bay and McKinley Bay in cooperation with industry, DIAND, EMR and DFO, and has funded a study of contaminants on artificial islands. The development of site-specific regulatory monitoring guidelines, however, demands a detailed assessment of the applicability of certain monitoring techniques and designs to the Beaufort Sea situation.

5. Subprojects: None foreseen.

6. Need for Study:

- a) Monitoring is required to ensure that site specific regulatory controls related to environmental protection are effective. Monitoring programs need to be consistent so that the data generated between programs are compatible. The monitoring programs also need to be sensitive enough to detect impacts without being overly costly.

- b) Monitoring is required to determine localized impacts on sediment geochemistry and benthic communities as a result of (1) the development and operation of shorebases (e.g., Tuk Harbour, McKinley Bay, King Point and Herschel Island); and (2) the development and operation of production facilities (which would most likely be located initially at the Amauligak, Tarsiut, West Atkinson and Taglu fields).
- c) Benthic organisms and sediments reflect an integrated and early response to impacts. In inshore areas such as Tuk Harbour, McKinley Bay, the Mackenzie Delta and King Point, the benthic organisms also represent an important food source for birds and fish. This project is designed to ascertain if bioaccumulation, toxicity and benthic community structure can be used to effectively detect subtle and localized impacts in the Beaufort Sea environment.
- d) An essential step in the process of developing site-specific regulatory monitoring guidelines is the testing of methods. This project will test the methods for benthic community assessment, as well as toxicity and bioaccumulation, which are recommended in the Arctic Marine Methods Guide.
- e) EPS provides advice to regulatory agencies on environmental conditions to be attached to permits issued under the authority of the Canada Oil and Gas Production and Conservation Act, Canada Oil and Gas Act, Arctic Waters Pollution Prevention Act, Public Lands Grant Act, and Navigable Waters Protection Act through the Arctic Waters Advisory Committee (AWAC) and the Resource Management Environment Committee (RMEC). EPS is directly responsible for conditions attached to permits issued under the Ocean Dumping Control Act, and is responsible for regulatory monitoring under Section 33 of the Fisheries Act.
- f) This project will enable EPS to address recommendations 29, 55, 57, and 60 from the BEARP report, and Hypothesis 19 from the BEMP recommendations.
- g) Guidelines for regulatory monitoring programs in the nearshore Beaufort Sea will be required in 1987/88, by which time it is expected that Gulf and Esso will have tabled proposals for production.

7. Relationship to Other Projects:

This project is interrelated with a PERD project (Environmental Studies Design Criteria) and A-Base initiatives aimed at developing monitoring guidelines. The PERD project will examine natural variability in sediment physical and chemical parameters and derive an optimum level of sample replication for impact detection. This NOGAP project will evaluate methods from the Arctic Marine Methods Guide for toxicity testing, bioaccumulation analysis, and benthic community studies, in order to assess their effectiveness (sensitivity vs. cost) in detecting impacts, and will recommend methods and study designs for inclusion in guidelines. Guidelines will be produced using A-Base resources and the conclusions from the PERD and NOGAP studies.

A linkage also exists between this project and DFO's B.2-3 (Nearshore Benthic Monitoring). Specifically, taxonomic and quantitative benthic data generated by B.2-3 with respect to Pauline Cove and Tuktoyaktuk Harbour will be mutually utilized to support the work undertaken through this project. Correspondingly, the results of the bioaccumulation and toxicity analysis under C.3 will be employed as part of DFO's interpretation of benthic variability.

8. Major Milestones/Outputs:

Most of the work on this project will be carried out by private consultants under contract. Biological sample collection will be undertaken by EPS staff.

1985/86

- Existing data on contaminants from oil and gas activities in the Beaufort Sea will be reviewed and specific contaminants will be selected for bioaccumulation and toxicity studies.
- Initial toxicity and uptake tests will be conducted.
- Biological samples will be collected in areas identified in 6(b) and analyzed for body burdens and benthic community structure. The data set will be used to determine spatial variability and will be the first of 3 data sets to assess temporal variability. Three years of data are considered a minimum to obtain an estimate of variability from year to year.
- Output: A progress report will be produced detailing the results of the toxicity and uptake tests, and providing preliminary estimates of natural variability in body burdens and benthic community structure.

1986/87

- The full program to evaluate toxicity and bioaccumulation tests in the lab and in the field will be implemented.
- Biological samples will be collected in areas identified in 6(b), and analyzed for body burdens and benthic community structure in order to confirm estimates of spatial variability, and to obtain the second data set to estimate variability from year to year.
- Output: A progress report will be produced detailing the results of the toxicity and bioaccumulation tests, and providing estimates of both spatial and temporal variability in body burdens and benthic community structure.

1987/88

- The program to evaluate toxicity and bioaccumulation tests in the lab and in the field will be completed.
- Biological samples will be collected to obtain the third data set to establish temporal variability in body burdens and benthic community structure.

- Output: Recommendations will be made on methods which are effective (sensitivity and cost) for site specific regulatory monitoring.

9. NOGAP Resource Requirements over Project Life (\$85-86):

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
O&M	80.0K	80.0K	50.0K
Capital	10.0K	5.0K	5.0K
Total	<u>90.0K</u>	<u>85.0K</u>	<u>55.0K</u>

Capital funding is required to purchase field and laboratory equipment for the study, and to enable EPS to subsequently carry out monitoring using the methods recommended.

10. Other Funding:

<u>Source</u>	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
PERD	50.0K	70.0K	70.0K
A-Base O&M	5.0K	5.0K	5.0K
A-Base PY	0.2PY	0.2PY	0.2PY
	<u>55.0K(0.2)</u>	<u>75.0K(0.2)</u>	<u>75.0K(0.2)</u>

1. Project Title: C.4 OCEAN DUMP SITE DESIGNATION FOR SOLID AND CONTAMINATED WASTES (1984/85-1987/88)

2. Project Manager: Russel Shearer
Senior Environmental Biologist
EPS/NWT District Office
P.O. Box 370, Yellowknife
Northwest Territories
X1A 2N3
(403) 873-3456

3. Objectives:

- i) To evaluate criteria for designating (an) ocean dump site(s) in the Beaufort Sea for solid and contaminated wastes from hydrocarbon exploration and production;
- ii) To screen potential sites and identify information gaps.
- iii) To make recommendations to the Regional Ocean Dumping Advisory Committee on dump site designation, and dumping criteria/guidelines; and,
- iv) To collect baseline information at a designated site, to design a follow-up monitoring program, and to initiate a pilot scale dumping program in cooperation with industry.

4. Background and Description

i) Issue:

Increased hydrocarbon activity in the Beaufort Sea-Mackenzie Delta area has led to the generation of solid and contaminated wastes and the need for adequate solid waste management. To date, the disposal of solid wastes (e.g. scrap metal) has either been handled on a case-by-case basis without proper planning, or has been deferred. Other wastes such as contaminated drilling muds and cuttings, caustic substances, and coal dust have been stored on site. Cost effective waste management options which also protect environmental quality are required to handle increasing volumes that will be associated with hydrocarbon development.

ii) Problem:

The ocean disposal of wastes has been considered by both industry and communities as a viable waste management option. Industry has requested that the ocean disposal issue be resolved and that sites be designated. Communities have also expressed concern that an effective waste management strategy be developed and put into place. Applications for disposal at sea, however, have been deferred pending resolution of disposal options. There is, therefore, a need to evaluate the criteria for designating ocean dump sites in the Beaufort Sea, and to follow through with the selection of sites and the establishment of dumping criteria and guidelines.

iii) Work Completed to Date:

EPS has completed a study which investigated the feasibility of designating ocean dump sites for solids in the Beaufort Sea. EPS has also sponsored a workshop to discuss dumpsite designation criteria with representatives from industry and government, and has published the proceedings of that workshop.

iv) Work to be completed in 1984/85:

A preliminary analysis of the types of material for which disposal may be required, the logistics for disposal at different sites, the location of sites with respect to environmentally sensitive areas, and the physical environment at proposed sites will be examined. Recommendations for designation of one or more dump sites will be made and a program to monitor pilot scale dumping will be designated.

v) Work Which Remains to be Done:

Solid Wastes (1985-6):

In association with a baseline monitoring program to measure impacts, a pilot scale waste dumping project will be carried out with industry.

Contaminated Wastes (1986-8):

Ocean dump site designation criteria need to be established for contaminated wastes in consultation with industry, government, and the public. The potential for environmental impacts at proposed sites also needs to be examined. Dump site(s) will then be designated based on these criteria and the assessment of potential impacts. A program to monitor pilot scale dumping will be designated and pilot-scale dumping will be monitored.

5. Subprojects:

There are no subprojects associated with this study.

6. Need for Study:

There is a need to answer the following questions before an ocean dumpsite can be designated:

- i) Is ocean disposal of solid wastes an environmentally acceptable option?;
- ii) Is ocean disposal of solid wastes at an environmentally acceptable site an economically viable option?;
- iii) What are the preferred locations for ocean dumpsites?;
- iv) What are the likely effects of ocean dumping at a designated disposal site?

Answers to these questions are necessary to enable Environment Canada to meet its obligation to effectively administer the Ocean Dumping Control Act. When this project is completed, managers in industry will have a clear understanding of the options available to them with respect to the ocean disposal of solid wastes.

7. Relationship to Other Projects

This project is part of the overall objective of EPS to encourage the development of a comprehensive waste management strategy for the north.

8. Major Milestones/Outputs

The work will be carried out by private consultants under contract.

1985/86 - the pre-dump portion of the pilot-scale monitoring program designed in 1984/85 will be carried out. A suitable vessel will be chartered and video side-scan sonar records will be obtained to characterize the site and verify that it is not associated with sensitive habitat. The benthic community will be characterized to allow for assessment of the effects of subsequent substrate modification from dumping solid wastes. Initial post-dump monitoring will be carried out by the proponent and subsequent monitoring will take place in 1988-89.

9. NOGAP Resource Requirements (\$85-86):

	85/86	86/87	87/88
O&M	_____	_____	_____
	40.0K	40.0K	55.0K

10. Other Funding

	85/86
O&M	_____
Ocean Dumping Research Fund	12.5K

1. Project Title: C.6 A BEAUFORT ATLAS: BACKGROUND INFORMATION FOR IMPLEMENTING MARINE OILSPILL COUNTERMEASURES (1984/85-1987/88)

2. Project Manager: R. S. Howarth
Manager Environmental Engineering
P.O. Box 370
Environmental Protection Service
Yellowknife, N.W.T.
X1A 2N3
Tel: (403) 873-3456

Scientific Authority: David C. Tilden
Petroleum Environmental Specialist
Environmental Protection Service
P.O. Box 370
Yellowknife, N.W.T.
X1A 2N3
Tel: (403) 873-3456

3. Need for Project:

- i) There is a need to condense currently existing environmental data and information into a concise fieldguide or atlas.
- ii) There is a need to increase public awareness and understanding of the environmental features of the Beaufort Sea which influence the implementation of oilspill countermeasures.
- iii) Government administrators, regulators and inspectors require a authoritative reference to assist them in the conduct of their duties (e.g. reviewing drilling program approvals, developing environmental operating conditions, assessing contingency plans, responding to spill events, evaluating OPCA permits, PLGA leases and the risks or potential impacts of spills from a variety of exploration and development activities).
- iv) Hands-on spill response personnel from the joint industry/government Beaufort Sea Co-op require a concise reference guide which will provide them with practical operations-oriented information (e.g. logistical constraints, water depths, expected breakup/freezup dates, locations of critical habitats, ice cover, etc.).
- v) A number of BEARP recommendations stress the need for continuing research and development in the field of oil spill countermeasures by industry and government. The development of a Beaufort Atlas would be consistent with these recommendations.

4. Objective:

To produce an atlas of background environmental data and information pertinent to the implementation of marine oil spill countermeasures in the Beaufort Sea.

5. Project Background & Description:

There exists a plethora of environmental data and information which has been generated over the past decade as a result of Beaufort Sea exploration and development. Industry, government and the public have all experienced "information overload" in this respect. Much of this data and knowledge, however, is relevant to the development and implementation of oil spill countermeasures. The Environmental Protection Service has a responsibility to foster awareness, development and implementation of state-of-the-art oil spill countermeasures in Arctic Seas. There exists, therefore, a pressing need to review, collate and condense all the known information important to countermeasures implementation into a singular, authoritative reference atlas. Examples of previous initiatives in this field include:

- i) "Beaufort Sea and the Quest for Oil Series", summary reports of the Beaufort Sea Project, 1977, DFO (i.e. Birds & Marine Mammals, Oil Ice & Climate Change, Oil Spill Countermeasures and Crude Oil in Cold Water). An excellent series of overview documents but now out of date by almost a decade and based largely upon pre-exploration phase research.
- ii) "An Arctic Atlas: Background Information on the Development of Marine Oilspill Countermeasures", AMOP, EPS 1978. Largely out of date by almost a decade and contains information on a scale too large to be of much value on a site-specific, operations-oriented basis.
- iii) "Shoreline Oil Spill Protection & Cleanup Strategies: Southern Beaufort Sea", by B.W. Worbits, 1979. An excellent site-specific document but restricted solely to open water conditions of the southern Beaufort sea shoreline (i.e. does not cover offshore or oil-in-ice scenarios). The publication is also somewhat dated.

A Beaufort Atlas will be operationally oriented towards hands-on spill response. It will be designed to provide concise coverage of important environmental considerations which influence the development, selection and implementation of countermeasure plans. A properly designed Beaufort Atlas will permit quick and ready reference to determine, for example:

- expected sea-states.
- predominant wind directions.
- ice breakup and freezeup dates.
- expected timing of oil appearance on ice during melt season.
- shoreline types & processes.
- the location of vulnerable or sensitive biological habitats and the seasonal presence and distribution of important biological species.
- the location, timing and patterns of traditional resource harvesting activities.
- available operating season for conducting cleanups on ice, shorelines or open waters (e.g. for aircraft, heavy equipment, marine response craft, etc.).

The study area for the Atlas will encompass the Canadian Beaufort, which includes that portion of the Beaufort Sea bounded on the North by 75°N latitude, on the west by 141°W longitude, on the east by Banks and Victoria Islands, and on the south by the coastline of the Northwest and Yukon Territories.

The Beaufort Atlas will be written in simple, non-technical language, insofar as is possible, in order to appeal to, and be understood, by the widest possible audience. It will feature numerous charts, graphs, maps, overlays, illustrations and photographic reproductions to clearly depict the subject matter covered.

The Atlas is to follow a "field guide" format with tabular dividers for ready reference. It will be bound with a high quality metal or plastic coated metal ring-coil binding. The cover will be of a durable, flexible plastic (similar to the Worbets Manual). The contractor will produce and submit one high quality master copy suitable for photo mechanical reproduction (i.e., employ PMT 1/2 tones) and 50 high quality copies of the Atlas at the conclusion of the contract.

6. Subproject:

- a) Title: C.6-1 Behaviour of Oil in Icy Waters
- b) Contact: M.F. Fingas, Head, Chemistry and Physics Section, Environmental Emergencies Technology Division, EPS, Ottawa, Ontario, K1A 1C8, (613) 998-9622.
- c) Objective: To determine the behaviour of oil in support of workable oil spill trajectory models under three conditions involving icy waters: on freezing water; under or with snow; and among broken ice. Process equations reflecting the mechanics and physics of ice behaviour and suitable for direct application to oilspill trajectory models will be developed during sequential years for each of the above circumstances.
- d) Background and Description: Five items of information are necessary for the construction of an operational oil spill model in arctic water: process formulae, wind data, current data, and ice movement data. Open water processes are understood well enough to construct effective models. However, for ice-infested waters, the basic processes affecting behaviour of oil are not well understood. These processes are thought to remove the integrity of a slick completely under some conditions.

Three processes will be studied, as described below:

- 1. The fate of oil in situations where water is freezing, either on open water or in leads. Previous experience has shown that oil slicks may form small particles and thus cannot be recovered as a slick. In addition, in one case where this was observed to occur, the particles were widely scattered and cleanup was impossible.
- 2. The fate of oil among broken ice or leads. No work has been done on weathering or dispersion of oil in these situations versus open water; however, in the case of the Kurdistan spill a significant volume of oil was exposed to such an environment and events (particularization, scattering, etc.) occurred which largely affected cleanup measures.

3. The fate of oil under and with snow. In two spills that have occurred in such situations, the oil was ultimately in the form of particles similar to above. Oil spilled on ice or perculating from under ice may be covered or mixed with snow. The fate of this oil should be understood and modelled.

e) Major Milestones/Outputs:

- 1985/6 - Report on oil behaviour in freezing water, including process formulae.
 1986/7 - Report on oil under or with snow, including process formulae.
 1987/8 - Report on oil among broken ice, including process formulae.

f) Estimated Cost (\$85-86):

	<u>85-86</u>	<u>86-87</u>	<u>87-88</u>
O&M	47,000	48,000*	49,000*

- * The confirmation of this project will be considered through annual NOGAP planning reviews.

g) Other Funding:

<u>Source*</u>	<u>85-86</u>	<u>86-87</u>	<u>87-88</u>
AMOP (EPS-Salaries)	10,000	10,000	10,000
Industry	10,000	10,000	10,000

*These funds are the equivalent in person years and use of expertise and are not cash contributions.

7. Major Milestones/Outputs (see subproject for its milestones):

1985/86

- Complete major literature search and assessment of new data and information generated over the last decade. Commence assessment of new data and information generated over the last decade. Commence compilation of useful data and information.
- Progress reports throughout year.
- At year end, provide summary report of findings and a detailed format for the atlas.
- Identify any remaining information gaps.

1986/87

- Compile, condense and synthesize all relevant information/data into final atlas format.
- Produce detailed charts, maps, overlays, illustrations and photographic reproductions.

- Submit final master copy and fifty high quality reproduction of final atlas
- Progress reports throughout year.

8. NOGAP Resource Requirements over Project Life (\$85-86):

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
O&M	97.0K	75.0K*	30.0K*

*As noted above, funding for subproject C.6-1 of 48K in 86-87 and 49K in 87-88 is to be confirmed during annual NOGAP project reviews.

9. Other Funding: None.

NOGAP PROJECT PROPOSAL

1. Project Title: C.7 Migratory Bird Disturbance, Assessment and Management (1984/85-1987/88)
2. Project Manager: A. Goodman
Canadian Wildlife Service
#1000, 9942 - 108 Street
Edmonton, Alberta T5K 2J5
(403) 420-2517
3. Objectives:

To prepare for Beaufort Sea hydrocarbon development by:

- developing guidelines for aircraft and other sources of industrial disturbance that will protect snow geese during susceptible phases of their life cycles;
- determining waterfowl use of wetlands and key habitats along potential pipeline routes in the lower Mackenzie Valley and delta;
- compiling site specific information for planning, mitigation and monitoring on the distribution and abundance of migratory birds.

4. Background:

Several hundred thousand migrating, nesting and moulting ducks, geese, swans, shorebirds, loons and other migratory birds inhabit areas where they could be affected by Beaufort Sea hydrocarbon development. The significance of various species and populations regionally, nationally and internationally; their susceptibility to disturbance; the effects of industrial impacts on their population dynamics and habitats; and mitigation measures to conserve migratory bird resources must be determined as part of government's preparedness to deal with northern hydrocarbon development.

The migratory bird resources that are found near the Beaufort Sea present a complex variety of potential restraints on balanced development. Restrictive habitat requirements, and seasonal concentrations into a few areas by some species pose potential threats to flyway, national and even continental populations. Other species are scarce and may be threatened with Rare and Endangered status.

5. Subprojects:

C.7-1 Disturbance Studies of Snow Geese

Dr. T. W. Barry
Canadian Wildlife Service
#1000, 9942- 108 Street
Edmonton, Alberta T5K 2J5
(403) 420-2525

Resources:

<u>NOGAP</u>	1985/6	1986/7	1987/8
PY	0	0	0
Salary/benefit	0	0	0
O&M	102K	113K	119K
Capital	7K	0	0
<hr/>			
Total	109K	113K	119K
<hr/>			
<u>Other</u>			
CWS(A Base) PY	0.7	0.7	0.7
Salary 35K	35K	35K	35K
Industry (O&M)	up to 50K	up to 50K	up to 50K

Description:

Objectives: The objectives of this subproject are: to quantify the effects of aircraft and other disturbances on arctic geese during different phases of their life cycle; to determine the relative importance of auditory and visual stimuli as disturbance factors; and to investigate the possibilities of habituation to the disturbance sources. Realistic operating guidelines can then be developed to protect birds from disturbance during susceptible phases of their life cycles.

Brief Description (1984-5): During the first year's work reaction of geese to specific types of aircraft and helicopter disturbance was documented during pre-flight and staging phases. Test and control sites have been selected for future studies and an inventory of types of aircraft, boats and heavy equipment most likely to cause disturbance in the region has been completed. Methodology for field studies is being developed. Preliminary results have already been used to develop guidelines for Yukon coast harbour and airstrip development and for the Taglu step-out well.

Need for Study: DOE has an obligation under the Migratory Bird Convention (Treaty) Act to manage and conserve migratory bird resources. There are four Migratory Birds Sanctuaries in the Mackenzie Delta-Beaufort Sea Region. Over 500,000 geese which are of economic and cultural importance locally, nationally, and internationally, nest, stage, molt, and migrate through the region. Among the waterfowl, geese are the most disturbed by aircraft, boats, and heavy equipment.

Milestones/outputs:

- 1985/86 - Tests on nesting and brood rearing geese will be made using various equipment and flight levels. Report on results by March 1986.
- 1986/87 - Tests on spring staging and pre-nesting geese will be done, as well as on fall staging geese. Report on results by March 1987.
- 1987/88 - All tests on phases of life cycles by species will be completed. Guidelines for aircraft and marine operators will be prepared by 30 March 1988 in order to mitigate disturbance to geese.

C.7-2 Waterfowl Surveys: Mackenzie Valley and delta pipeline routes

Peter Boothroyd
 Canadian Wildlife Service
 501 University Crescent
 Winnipeg, Manitoba R3T 2N6
 (204) 949-5261

Resources:

<u>NOGAP</u>	1985/6	1986/7	1987/8
O&M	11K	11K	12K
	—	—	—
Total	11K	11K	12K
<u>Other</u>			
CWS PY	.25	.25	.25
Salary	10K	10K	10K

Description:

Objectives: The objective of this subproject is: to determine waterfowl use of wetlands and identify key habitats located along the proposed pipeline route from Norman Wells to Richards Island, including the Parsons Lake Polar Gas lateral.

Brief Description: The pipeline routes proposed by Polar Gas (gas pipeline) and Esso Resources (oil pipeline) could pass through areas important to waterfowl during spring migration, for breeding and moulting, and/or during fall migration. These routes generally follow the one proposed originally by Canadian Arctic Gas Pipeline Limited (CAGPL). The Canadian Wildlife Service conducted aerial surveys of the CAGPL route in 1973. However, conclusions on the possible effects of the pipeline on waterfowl cannot be drawn on the basis of only one year's data.

Present plans call for clearing and site preparation work for the Polar Gas pipeline to begin in the fall of 1987 with pipeline construction beginning in the fall of 1988. No time schedule has yet been set for an oil pipeline. There is, therefore, an opportunity to collect further baseline data on waterfowl use along the pipeline route during three field seasons.

Need for Study: By conducting surveys of waterfowl use along the proposed pipeline routes, CWS will be better able to identify possible impacts of activities associated with pipeline construction and operation. In addition, CWS will be able to identify key habitat areas and provide advice on measures to be adopted for minimizing disruption of waterfowl and habitat along the potential pipeline routes.

Milestones/Outputs:

1985/86 - Progress report (March 1986) containing a summary of survey results, preliminary identification of key habitats and preliminary assessment of potential impacts.

1986/87 - Progress report (March 1987) containing a summary of survey results, identification of key habitats, assessment of potential impacts and identification of mitigative measures.

1987/88 - Project report (March 1988) containing a summary of survey results, a refinement of key habitat identification and recommended mitigation measures.

C.7-3 Site-Specific Surveys of habitat, and distribution and abundance

Dr. R. Edwards
Canadian Wildlife Service
#1000, 9942 - 108 Street
Edmonton, Alberta T5K 2J5
(403) 420-2517

Resources:

<u>NOGAP</u>	1985/6	1986/7	1987/8
PY	1.0	1.0	1.0
Salary/benefit	31K	37K	39K
O&M	41K	90K	109K
Capital	16K	14K	5K
	—	—	—
Total	88K	141K	153K
 <u>Other</u>			
CWS PY	1.1	1.1	1.1
Salary	50K	50K	50K
O&M	8.5K	8.5K	8.5K

Description:

Objectives: To develop a readily available, site specific information source which can be used to identify the most sensitive migratory bird use areas along the Beaufort Sea coastline, the migratory bird resources near primary industrial development sites; and the most important offshore bird concentration areas in the event of an oilspill or proposed disturbance by industrial activity.

Brief Description: A readily available information base is required to provide information on which quick decisions regarding coastal protection can be made in the event of an environmental emergency caused by an oil spill. This information will help decide which areas should be protected by booms, which areas may be suited to the use of detergents to help disperse oil, which areas should be cleaned mechanically and which areas need not be cleaned. In addition the information will be used to develop recommendations to minimize the impacts of industrial developments on the most sensitive coastal bird habitat and on those sites that are most likely to be affected by industrial activity.

Need for Study: Impacts from hydrocarbon developments will come from oil spilled at sea and washing ashore and from the effects of the infrastructure developments (pipelines, roadways, compressor stations, gas plants, storage sites, etc.).

During the past year of this NOGAP funded project, a systematic search of existing published information has been undertaken to extract pertinent data describing bird use and habitat of the Beaufort Sea coastal area. These data are currently being plotted on to a series of maps and at the same time, data gaps along the coast and up to 50+km offshore are being identified. It is intended to fill these data gaps in future years and to prioritize the coastline with respect to its sensitivity to oil pollution and hydrocarbon development activities.

The number of birds which use a particular area varies from one year to the next and therefore several years of data are required. With this information in a summarized form and clearly depicted on a series of maps, decisions can be readily made in the event of an oilspill. In addition, the maps will prove useful in recommending mitigation to offset disturbance caused by onshore construction and operations.

Milestones/Outputs:

- 1985/86 - field studies designed and conducted to fill most severe data gaps.
 - results of field studies incorporated into maps and documents.
 - report on offshore bird concentration areas by March 1986.
- 1986/87 - field studies designed and conducted to fill most severe data gaps.
 - results of field studies incorporated into maps and documents.
 - revised report on above in addition to sensitivity of primary bird habitats along the coastline by March 1987.
- 1987/88 - field studies designed and conducted to fill most severe data gaps.
 - results of field studies incorporated into maps and documents.
 - revised report on above as well as sensitivity of bird resources near primary industrial development sites along coastline by March 1988.

6.1 Departmental Mandate:

The Canadian Wildlife Service is responsible, under the Migratory Birds Convention Act, for ensuring protection of key migratory bird habitats and the maintenance of migratory bird populations for future generations.

6.2 Preparedness for Decision-Making:

Beaufort Sea hydrocarbon production will bring massive increases in equipment, facilities and personnel during construction and operation phases, both offshore and on land. DOE must be in a position to provide environmental advice to industry and regulatory agencies regarding final design of the Beaufort Sea development, including alignment of pipelines, highways, aircraft flight corridors, and other linear facilities; siting of shore-based facilities and offshore developments; and location of land based facilities, such as pumping and compressor stations, airports, tank farms, supply depots, work camps, etc.. In addition, environmental advice during emergency situations involving oilspills must be readily available.

Federal government agencies are required to ensure that projects and proposals which they sponsor are reviewed for environmental impacts and that mitigative measures are applied to reduce adverse impacts to an acceptable level. CWS is required to advise other federal agencies on effects of developments on migratory birds, to recommend mitigation, and to monitor impacts.

Although there is considerable information available on northern migratory birds, there remain specific information needs which have not yet been filled. In particular, there is little information available on effects of disturbance on the more than 500,000 geese found in the area and the distribution and abundance of waterfowl and other migratory birds or their key habitats along proposed pipeline routes in the Mackenzie Valley and delta and along the Beaufort Sea coastline.

7. Relationship to Other NOGAP Projects:

These migratory bird studies are part of the overall concern for the effects of Beaufort Sea development on wildlife, fishes and marine mammals. Government preparedness for decision-making depends on support from migratory bird studies as they pertain to planning, siting, regulatory approvals, mitigation and monitoring.

8. Major Milestones:

See subprojects above.

9. Proposed NOGAP Resources (\$85-86):

	1985/6	1986/7	1987/8
PY	1.0	1.0	1.0
Salary/benefits	31K	37K	39K
O&M	154K	214K	240K
Capital	23K	14K	5K
<hr/>			
Total	208K (1.0)	265K (1.0)	284K (1.0)

10. P-Y Justification:

The Canadian Wildlife Service person-year resources applied to northern projects are quite insufficient to undertake the additional work in preparation for development of Beaufort Sea hydrocarbons.

The person-year resources above will ensure that a minimum level of continuity is maintained for nonstandardized work, that minimum standards for crew safety will be maintained during field work and that work requiring close supervision through a master-servant relationship will be performed satisfactorily and efficiently.

11. Other Funding:

See subprojects above.

NOGAP PROJECT DESCRIPTION

1. Project Title: C.8 CARIBOU MIGRATION (INTER-ISLAND MOVEMENTS OF PEARY CARIBOU ACROSS PRINCE OF WALES STRAIT BETWEEN BANKS AND VICTORIA ISLANDS) (1984/85-1985/86)

2. Project Manager: Frank Miller
Address: Canadian Wildlife Service
Western & Northern Region
#1000, 9942 - 108 Street
Edmonton, Alberta
T5K 2J5
Telephone No.: (403) 435-7246

3. Objectives:
Main Objective: To provide sound biological advice on the possible mitigative measures necessary to prevent man-induced, detrimental, possibly irrevocable, impacts on inter-island populations of Peary caribou.

Sub-objectives: 1985-86
 1. Investigate the extent and magnitude of inter-island movements of Peary caribou across Prince of Wales Strait.
 2. Investigate the seasonal distributions of the Peary caribou in the inter-island population(s) using sea ice crossings on Prince of Wales Strait.
 3. Gain insight into if and how shipping through Prince of Wales Strait would prevent, disrupt, or displace inter-island movements of Peary caribou between Banks and Victoria islands.
 4. Gain insight into if and how onshore developments and activities especially linear structures would interfere with the integrity of inter-island population(s) of Peary caribou that range between Banks and Victoria islands, NWT.
 5. To provide baseline information on the ongoing process of wildlife-energy development related potential conflicts in the Canadian North.

4. Brief Background and Description:

Canadian Wildlife Service has documented two centres of inter-island populations of Peary caribou in other parts of the Arctic: (1) western

Queen Elizabeth islands - Melville-Eglinton-Prince Patrick islands complex (Miller, Russell, and Gunn 1977a, 1977b); and (2) Prince of Wales Island-Somerset Island-Boothia Peninsula complex (Miller and Gunn 1978, 1980; Miller and Kilian 1980, 1981). It now appears that Peary caribou have perpetuated seasonal inter-island movements in response to limited forage availability and, thus, have found more favourable foraging by moving between islands than by remaining on any one island (Miller, Edmunds, and Gunn 1982). The need for such movements is especially great during late gestation, calving, and early postcalving, when snow and ice conditions can severely restrict forage availability (Miller, Edmunds, and Gunn (1982).

The existence of caribou calving and summering areas on northwestern Banks Island and information from native hunters about springtime sea ice crossings of Prince of Wales Strait by caribou from Victoria Island suggest that those caribou that calve and summer on southeastern Banks Island are an inter-island population that winters on Victoria Island. Therefore, shipping activities through Prince of Wales Strait or linear developments (pipelines, haul roads, etc.) on eastern Banks Island or western Victoria Island have the potential for preventing those seasonal inter-island movements; or disrupting or displacing that inter-island population of Peary caribou.

Thus, the potential effects of shipping through Prince of Wales Strait or linear developments on eastern Banks Island or western Victoria Island could be detrimental and possibly irrevocable to the well-being of the Peary caribou under consideration for the following reasons.

- (1) Such man-induced activities could prevent, interrupt, or disrupt intra- and inter-island movements and migrations to traditional seasonal ranges (that may often provide critical habitat for survival).
- (2) Such man-induced activities could prevent, interrupt, or disrupt movements to or from traditional calving, postcalving, and rutting areas.
- (3) Such man-induced activities could prevent, interrupt, or disrupt daily feeding activities.
- (4) Such man-induced activities could prevent, interrupt, or disrupt restocking of islands or portions of islands after they have undergone severe losses of Peary caribou due to environmental man-induced stresses.
- (5) Such man-induced activities could reduce the genetic plasticity and long-term survivability of the population by restricting free movements and thus gene flow.

The study design would utilize aerial and ground searching techniques to obtain and evaluate evidence for inter-island population(s) of Peary caribou seasonally crossing the sea ice of Prince of Wales Strait to maintain traditional annual cycles of range use and life history phases. The principle period of study would be springtime (May-June) and the secondary period would be autumn (late October-mid-November).

Time Frame (field work 1985-86)

1985 - Most of the effort would be devoted to searching for evidence of inter-island movements by Peary caribou across Prince of Wales Strait and determining the frequency and magnitude of those movements, if any, with only some effort given to delineating coastal range use by Peary caribou.

5. Subprojects for F.Y.: n.a.6. Need for Study:a. Department Mandate:

Canadian Wildlife Act (C.21, 3(c) & 9)

Endangered Wildlife - The Peary caribou has been recognized as a 'Threatened' form of wildlife in Canada (the Peary caribou is currently unique to Canada, having died out in Greenland) based on Canadian Wildlife Service report to the Canadian Committee on the Status of Endangered Wildlife in Canada (Gunn, Miller, and Thomas, COSEWIC, 1979).

Wildlife upon which native peoples are dependent for a food supply.

- b. Preparedness for Decision-making on Northern Hydrocarbon Development Proposals:
 - 1b. Without this study DOE cannot provide sound biological, expert scientific advice on the potential impacts or possible necessary mitigative measures regarding Peary caribou to federal and territorial agencies, industry, communities, and the public in support of environmental impact assessment.
 - 2b. Without this study DOE cannot provide sound biological advice regarding Peary caribou in the area relative to how to advance safe northern development, while preserving environmental quality.
 - 3b. Without this study DOE cannot provide baseline information and predictive capability indicator evaluations for Peary caribou in the area.

There is a need to carry out monitoring and ongoing baseline studies to identify and predict changes that could significantly alter the well-being of Peary caribou in the Canadian Arctic. Effective monitoring procedures and indicators must be developed for Peary caribou to (1) assess potential effects of tanker traffic through normally ice-bound waters on inter-island movements; and (2) assess potential effects of man's onshore developments especially linear structures such as pipelines, haul roads, etc. and maintenance activities on habitat availability.

Peary caribou have evolved under a system of post-glacial inter-island recolonization. Their traditional winter and summer ranges, calving, and rutting areas are usually geographically separated and require seasonal movements (migrations) intra- and/or inter-island to reach them. In addition, when snow and ice conditions reduce forage availability, Peary caribou will make forced movements, either intra- or inter-island.

Current concepts of the roles of leadership and socialization in disseminating experience within a population strongly suggest that the unfavourable contact of even a relatively few dominant caribou of a population with a man-made obstruction or man-caused event could affect the subsequent movements of many caribou.

Thus, the work is necessary to determine if an inter-island population of Peary caribou exists that winters on Victoria Island and calves and summers on Banks Island to allow DOE to provide sound biological advice on possible mitigative measures. The study would also provide baseline information on the ongoing process of wildlife-energy development related potential conflicts in the Canadian North.

7. Relationship to Other NOGAP Projects:

This study will provide biological information that will not be obtained by any other NOGAP project and which is necessary for a better understanding of the potential impact of industrial developments in the North; and, thus, is necessary for sound decision-making on northern hydrocarbon development proposals.

This project will proceed in close coordination and in support of two NOGAP projects by the Northwest Territories: (H.15-3) Banks Island Caribou Management Plan and (H.16-2) Census of Muskox and Peary Caribou Populations. This final year of the project will contribute significantly to the information base regarding the movement of caribou across Prince of Wales Strait as a viable in management planning and population estimates.

8. Major Milestones/outputs 1984-85^a

(1) March 31, 1986 - Canadian Wildlife Service report on 1985 findings.

^aLogistics for this study were mainly carried out in 1984, report submitted.

9. NOGAP Resource Requirements Over Project Life (current \$000s):*

	85-86 ^b
PYs	0
O&M	34
Capital	4
Total	38*

*DIAND will provide an additional \$15K O&M support from project A.13

^bAll expenditures in 1985-86, out of necessity, must be prior to supplementary estimates.

10. P-Y Justification: N.A.

11. Other Funding ("P" = currently proposed but not committed):

<u>Source</u>	<u>85-86</u>	<u>86-87</u>	<u>87-88</u>	<u>88-89</u>
Canadian Wildlife Service	20.0"P"	22.0"P"	24.0"P"	10.0"P"
	30.3 ^a	30.3 ^a	30.3 ^a	30.3 ^a
Polar Continental Shelf Project	70.0"P"	77.0P"P	85.0"P"	30.0"P"

February, 1985

NOGAP PROJECT DESCRIPTION

1. Project Title: A13, C9 AND G16 IMPACTS OF OIL AND GAS-RELATED ACTIVITIES ON CARIBOU (1984/85-1990/91)
2. Project Managers:
 - Subproject 1:
(Objective 1) N. Barichello, Wildlife Branch, Department of Renewable Resources, Government of Yukon, Box 2703, Whitehorse, Yukon, (403) 667-5465.
 - Subproject 2:
(Objective 2) F. McFarland, Northern Environmental Protection Directorate, Terrestrial Environment Division, Department of Indian Affairs and Northern Development Ottawa, Ontario K1A 0H4, (819) 997-9621.
 - Subproject 3:
(Objectives 3 and 4) D. Russell, 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, including (a) obtaining sex and age composition, population size and harvest data, and (b) reviewing, analyzing and tabulating population data from past research conducted on the Porcupine herd from 1977 to 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.
 3. To determine Porcupine caribou critical habitat and critical time periods in relationship to hydrocarbon development in northern Yukon by identifying critical habitats and the significance of spring staging areas for bulls, and (b) identifying and determining the significance of critical insect relief areas for the herd on its summer range.
 4. To provide the additional knowledge and information necessary to accommodate hydrocarbon developments by avoiding or minimizing the effects on caribou, and to collate existing and ongoing data into a simulation modelling framework to enable researchers and managers to better explore and evaluate the effects of hydrocarbon development on the caribou.

4. Brief Background and Description:

Increased hydrocarbon activities (seismic exploration, new access, pipelines and production facilities) and other activities such as aircraft traffic, which are related to the Mackenzie Delta-Beaufort Sea hydrocarbon developments, may potentially affect the caribou population and caribou utilization of certain habitats. Studies are required to assess and monitor the potential impacts and to design appropriate mitigative measures to minimize environmental impacts. As well, information will be required by the proposed Porcupine Caribou Management Board.

The Development: Shorebases have been identified as an integral part of the exploration and development phase of Beaufort Sea oil and gas activities. For the western Beaufort the only physically and economically viable locations identified are King Point and Stokes Point, Yukon. Likely support facilities associated with port establishment include road access to the Dempster Highway, significant increase in traffic on the Dempster, inland quarry site, associated road and traffic, and frequent aircraft overflights.

The Resource: The Porcupine caribou herd is a large international migratory barren ground herd that utilizes the development area in spring and summer. The herd constitutes the primary wildlife food resource for numerous native communities in the N.W.T., Yukon and Alaska. As such, the fate and well-being of the herd has been a prime concern in the negotiation of three land claims agreements, a major impetus in the formation of a northern Yukon National Park, and the focus of attempts for an international agreement for more than a decade.

Spring is a critical time for caribou in that food is limited 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 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 a new access road to the port from the Dempster and on a road to an inland quarry site; aircraft overflights; and the increased access of hunters. Effects will impact on the caribou by direct mortality, disruption of movement routes, displacement from certain habitats, increased energy expenditure and decreased energy intake due to harassment.

The Project: This project will provide field information on all aspects of the potential and actual impacts and give government managers and industry planners an opportunity to explore and test the consequences of alternative scenarios 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, and formation and operation of a northern Yukon National Park. 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: Not available.

6. Need for Study:

a) Mandate:

Yukon: 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.

Federal: This study would assist DIAND in meeting its responsibilities for maintaining appropriate levels of applied environmental research, for ensuring that effective terms and conditions pertaining to land use permits are developed and for enforcing relevant regulations under the Territorial Lands Act, Land Titles Act and Public Lands Grants Act. The study would assist DOE in managing 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 on Hydrocarbon Development:

By providing data on reproduction, extrapolated natural mortality rates, changes in population size, herd movements and range use, the effects of human disturbance can be tested with supportable conclusions. To undertake mitigation 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 BEARP Panel report 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 recommends 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 are a direct response to the BEARP recommendations. 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 the 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 (YTG):

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 (DIAND):

1984-85 - publication of Proceedings of the First North American Caribou Workshop.
1985-86 - planning for disturbance research.
 completion of migration 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 (DOE):

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

3b. Summer critical habitat DOE):

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 (DOE):

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 Resource Requirements (\$000's; \$1985/86):

	<u>1985-86</u>	<u>1986-87</u>	<u>1987-88</u>
Subproject 1 (YTG):			
O&M	38	34	-
Subproject 2 (DIAND):			
PY	*	*	*
Salary	13	13	13
O&M	<u>48</u>	<u>78</u>	<u>78</u>
Total	61	91	91
Subproject 3 (DOE):			
PY	1.0	1.0	1.0
Salary	44	44	44
O&M	98	103	51
Capital	<u>15</u>	<u>-</u>	<u>-</u>
Total	157	147	95

10. PY Justification:

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

Subproject 3: Presently only one PY is available within CWS for Porcupine caribou work. The work outlined in objectives 3 and 4 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 prepare 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, international cooperation will suffer, progress reports cannot be completed and the modelling will not proceed in the timeframe required. This single PY request is minimal, given that it is assumed that two summer students can be used and that some of the work will be contracted out to the University of Alaska.

11. Other Funding: (\$000)

Subproject 1 (YTG):

<u>1985-86</u>
O&M (Proposed)
133

Subproject 3 (DOE): CWS will continue to allot A-base funds to the project. Because of fiscal reductions within DOE, the amount of these A-base funds is not known as of February 1985.

February 1985

NOGAP PROJECT DESCRIPTION

1. Title and No.: C.10 HYDROLOGIC MAPPING DATA BASE (1984/85-1985/86)
2. Project Manager: J.H. Wedel, Inland Waters Directorate, P.O. Box 2970, Yellowknife, N.W.T., X1A 2R2, (403) 920-8503.

3. Objective:

To publish and distribute hydrologic data base maps and associated bibliographic materials compiled for twelve 1:250 000 NTS Map Sheets for the lower Mackenzie River Valley from Richards Island to Great Bear River.

4. Background:

In 1984/85, project C.10 spent 50K on a contract to Western Ecological Services Ltd. of Victoria, B.C. to prepare 12 camera-ready maps, similar in format to the Northern Land Use Information Series. The follow-up contract under Project C.10 was deferred to accommodate funding reductions. The work relates directly to the first NOGAP development scenario priority.

5. Need for Study:

The hydrologic base maps will provide the scientific community with a spatially distributed data base from which to identify further research needs as they relate to oil and gas gathering and transmission pipelines in the Mackenzie Valley. The existing, scientific literature base is so voluminous that a clear perception of what is already known requires lengthy searches. These maps will address that problem.

6. Relationships to Other Programs:

It is expected that the maps will be widely used by the successors to the Norman Wells Research and Monitoring Group, Land Use Planning Committees, INAC Water Resources, the Water Board, COPE and the Dene Nation, resource companies, consultants, DFO and IWD's own staff.

7. Milestones:

- a) Let printing contract by January 1, 1986.
- b) Distribute maps in March, 1986.

8. NOGAP Resource Requirements (\$85-86):

	<u>85-86</u>
O & M	\$17.0K

9. Other Funding: Nil.

C40

1. Title: Mackenzie Delta Channel Stability (1986-7/1987-8)
2. Project No.: C.11-1
3. Manager: M. Lapointe
NHRI
Place Vincent Massey
Hull, Quebec Phone (819) 997-2605

3. Objectives:

- a) To achieve understanding of the dynamic aspects of channel bathymetry, especially those aspects related to the genesis of exceptionally large scour holes at bend apices of small channels, holes in order of magnitude greater than the average depth, and to the genesis of unique hole and mound features found within the thalwig of major channels.
- b) To monitor shear stresses at channel boundaries in order to gain understanding of channel-forming flow processes as it relates to channel dynamics and the design of pipeline crossings.

4. Background:

Previous work has documented channel movement from analysis of recurrent photography coupled with on-site research for selected portions of the Mackenzie Delta. These studies identified aspects of channel bathymetry in the Delta channels whose dynamics are unknown.

Research into the identified aspects of Delta channel dynamics will be vital input into the design of pipeline crossings for the oil and gas gathering facilities in the Delta region, a priority 1 issue with NOGAP. It also follows that knowledge of these dynamic fluviogeomorphologic processes will be invaluable in environmental assessment of industry proposals.

5. Need for Study:

Since research results will be in the public domain, the information will be of use to everyone involved; industry, COPE, OGDs, and the general public, but especially to IWD experts who will be involved in assessment and monitoring activities related to pipeline movement of hydrocarbons out of the Delta.

6. Relationship to other Programs:

Are closely related to hydrologic and stream-crossing data but will address specifically the unique dimensions found on Mackenzie Delta channels.

7. Milestones:

1. Annual study reports by end of fiscal.

8. NOGAP Resource Requirements (\$85-86):

	<u>1986/87</u>	<u>1987/88</u>
PY	0	0
O&M	30K	60K

9. Other Funding:

This program is multi-year, NHRI, A-base research activity which receives support from Polar Continental Shelf Project. NOGAP funding will be used to enhance the research level.

NOGAP PROJECT DESCRIPTION

1. Project Title: C.16 Beaufort Sea Forecasting Techniques
(Sea state forecast model) (1984/85-1987/88)
2. Project Manager: E.C. Jarvis
Address, Tel. No.: Atmospheric Environment Service
4905 Dufferin St.
Downsview, Ontario
(416) 667-4811

3. Objectives:

To proceed toward a capability for automatically-produced sea state forecasts for supporting Beaufort Sea hydrocarbon development by adapting wind-wave and storm surge forecast models for potential application as operational forecast models in southern Beaufort Sea.

4. Brief Background and Description:

The proposed work will be an application and calibration to the Beaufort Sea methodologies developed for more general application.

Adaptation of sea state forecast models developed for Atlantic Ocean and inland waters to the north.

5. Subprojects Foreseen:

N.A.

6. Need for Study in terms of:

- (a) Department Mandate: NOGAP project directly supports AES national mandate for provision of weather and sea state services.
- (b) Preparedness for/Decision-making on Northern Hydrocarbon Development Proposals: The NOGAP program provides the only existing opportunity for state-of-the-art forecast techniques being developed to be extended, modified and adapted specifically to support hydrocarbon development in the Beaufort Sea and to support environmental protection of the Beaufort Sea from risks of hydrocarbon development.

7. Relationship to Other NOGAP Projects (and other special programs):

Potential for products developed by this project to be used to support Project C.17 (Easeline Data). This NOGAP Project utilizes the results of PERD and Arctic Marine Transportation R&D projects by applying forecasting techniques R&D to the Beaufort region.

8. Major Milestones/outputs:

1. Testing of storm surge model for southern Beaufort Sea (1985-86).
2. Evaluation of parametric wind-wave forecast system for southern Beaufort Sea (1985-86).
3. Adaptation of spectral lakewave forecast model for southern Beaufort Sea (1985-86).
4. Implementation of state-of-the-art wave and storm surge forecast system (1986-8).

9. NOGAP Resource Requirements (\$85-86, 000s):

	<u>85-86</u>	<u>86-87</u>	<u>87-88</u>
PYs	0	0	0
O&M	23	23	23
Capital	0	0	0

10. P-Y Justification: Nil11. Other Funding (\$84-85, 000s):

	<u>85-86</u>	<u>86-87</u>	<u>87-88</u>
PERD	410(1.5)	450(1.5)	450(1.5)
AMT	220(2)	220(2)	220(2)
TOTAL	630(3.5)	670(3.5)	670(3.5)

February 1985

NOGAP PROJECT DESCRIPTION

1. Project Title: C.17 BEAUFORT SEA SPECIALIZED DATA BASE (1984/85-1987-88)
2. Project Manager: Neil Parker, Atmospheric Environment Service, 6325 - 103 Street, Edmonton, Alberta, T6H 5H6, (403) 437-1250.

3. Objectives:

Main Objectives:

- To establish automatic weather stations at four sites along the southern shores of the Beaufort Sea and western sections of the Northwest Passage (King Point - 1985, Herschel Island - 1986, Pelly Island - 1986 and Passage Point - 1987).
- To produce a preliminary analysis of data.

Subobjectives:

- To have real time meteorological information available for distribution on national and/or international teletype circuits in support of the provision of weather warnings and production of routine forecasts.
- To produce an analysis of data obtained from the initial King Point site by the end of 1985-86.

4. Background and Description:

As early as 1977, proposals had been made to install automatic weather stations to give meteorological support to construction projects related to hydrocarbon production and transportation. As originally envisaged in 1983, NOGAP Project C.17 would have seen seven automatic weather stations installed around the Beaufort Sea and along the western portions of the Northwest Passage.

Using approved 1984/85 NOGAP funds, Atmospheric Environment Service, Western Region, has inspected and marked seven potential sites. Land use application procedures have been initiated with governments of the Yukon and Northwest Territories and COPE. Approved funds have been committed for the purchase of sufficient hardware to establish four stations.

5. Subprojects: None foreseen.

6. Need for Study:

- a) Departmental Mandate:

The July 1983 discussion paper "Environment Canada and the North" states that "Environment Canada will promote environmentally sound technology and safe operations in northern resource exploration and development activities, in transportation and other infrastructure systems, and in community development programs". In order to fulfill

this mandate Environment Canada is "a Forecaster and Climate Advisor responsible for providing meteorological, ice and sea- state forecasts and climate advice to safeguard human life and property, and environmental values in northern industrial and transportation operations".

b) Departmental Mandate and the Current Scenario:

DOE through AES, provides routine public, aviation and marine forecasts. A meteorological observation network is maintained to support these programs. However, the density and station location is not adequate to support the type of activity expected in the Beaufort Sea, associated development areas and transportation corridors.

In order for the Department to fulfill the above mandate, it is proposed that the existing meteorological observational network be augmented by establishing automatic weather stations at sites selected to support onshore and nearshore activity related to present and projected Beaufort Sea hydrocarbon production and transportation. Resulting data and studies will assist in providing the Department of Environment with the necessary information to ensure that Government can accurately assess and judiciously regulate the various projects and effectively respond to environmental emergencies. The proposed network of automatic weather stations will provide data as follows:

King Point Site (Climate Information) - The debate as to whether and where to establish a multi-user port to support Beaufort Sea offshore hydrocarbon activities continues. King Point is situated at the outflow of the Babbage River valley between meteorological stations located at the DEWLine sites of Shingle Point and Komakuk Beach. Significant, but as yet undocumented, wind anomalies are known to exist in this area. Accurate climatological information will ensure that any development can be undertaken in a manner that will help to minimize not only the impact of the project on the environment but the impact of the environment on the project.

Herschel Island Site (Weather Forecasts and Warnings)

Development on the Yukon coast will produce a requirement for timely and accurate meteorological forecasts and warnings to ensure that shore based and near shore activities proceed in an environmentally safe and efficient manner. Real time information is also required to support mitigative measures should an environmental emergency occur. The existing government funded network does not provide the detailed information required; however, the proposed Herschel Island site will help to fulfill this requirement.

Pelly Island and Herschel Island Sites (Production and Transportation Support) - The southern Beaufort Sea is subject to rapid development of small but often intense weather systems. Early detection and prediction depends on a dense data gathering network. Drilling platforms supplement the existing network; however, they represent reports of opportunity, are limited by a short summer season, and as such are not a reliable source of meteorological information. In addition, wind information obtained from such sites is frequently not representative of surface conditions. With production scheduled to start in the near future it is essential that a meteorological network

be established that will allow constant monitoring during critical phases of the operation. Pelly Island represents a land-based site that will, in addition to the Herschel Island site, help to complete the network. Information gathered from such a site will also be available for use in either oil spill or air trajectory models.

Passage Point (Synoptic and Climate Information) - In data-sparse areas such as the Canadian arctic, sufficient network density is required to provide adequate delineation of synoptic scale storms. However, weather systems of significant intensity, but of small horizontal dimension, may move through the existing network relatively undetected. A significant data gap exists in the southwestern Arctic archipelago. AES experience in operating the Beaufort Weather Office has shown that an additional pressure observation station is required on northern Banks Island in order to give adequate definition of pressure gradients over the Beaufort Sea. Data from this site will improve the forecast lead time and accuracy of weather warnings in the southern Beaufort Sea when the weather-sensitive operational phase commences in the proposed production area. The automatic station proposed for Passage Point will fulfill the dual role of supporting forecast services in the southern Beaufort in addition to providing a source of climate data from the western section of the Northwest Passage.

c) Preparedness for Decision-Making on Hydrocarbon Development

- i) During its review of the Beaufort Sea EARP panel report, the Beaufort Sea Team designated the Atmospheric Environment Service as having a lead role to play in the implementation of recommendations 3, 30 and 33. With respect to Recommendation 3, any trajectory model requires initialization data. The three stations proposed for the Beaufort Sea area will go far toward providing the data required for development and validation of oil spill trajectory models.

With respect to Recommendation 33, the preceding discussion has shown the need of an enhanced data gathering network in order to develop a weather, ice and hazard detection system. Data from the proposed network will also be available to assist other departments in their response to the EARP recommendations; i.e., the effects of ice breaking on the landfast ice regime (recommendation 31).

- ii) Data originating from this NOGAP project will aid industry in determining optimum design criteria, provide improved warning of hazardous climatic conditions, and aid governments in evaluating, assessing and setting regulations for hydrocarbon development, production and transportation.

7. Relationship to Other NOGAP Projects:

Other AES NOGAP projects such as the Development of Beaufort Sea Forecasting Techniques, New Shore and Transportation Route Climatologies and Air Quality Studies would benefit from this proposal. Improved climatologies of the Yukon coast and Mackenzie Delta will aid biological studies, while improved understanding of near shore wind patterns will aid in studying surface currents and related marine studies.

8. Major Milestones:1985/86

- order and take delivery of three data collection platforms,
- install one automatic weather station at King Point,
- establish procedures to have data routinely placed in the AES climatological archives,
- undertake a preliminary analysis of King Point data.

1986/87

- install one automatic weather station at Herschel Island,
- install one automatic weather station at Pelly Island,
- preliminary analysis of data collected at King Point,
- order and take delivery of additional data collection platform.

1987/88

- install one automatic weather station at Passage Point,
- update analysis of King Point data and commence analysis of data from other sites.

9. NOGAP Resource Requirements (\$85-86):

Installation costs for these sites has been kept low by having Western Region Data Acquisition perform the majority of the work. The costs of the actual stations and all installation costs are included under capital. Future inspection and/or repairs are shown as O&M.

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
O&M	27K	7K	12K
Capital	<u>126K</u>	<u>54K</u>	<u>19K</u>
Total	153K	61K	31K

10. Other Funding: Nil.

February 1985

NOGAP PROJECT DESCRIPTION

1. Project Title: C.18 BEAUFORT WIND CLIMATOLOGIES (1984/85-1987/88)
2. Project Manager: J.B. Maxwell, Superintendent, Arctic Meteorology Section, Canadian Climate Centre, 4905 Dufferin Street, Downsview, Ontario, M3H 5T4, (416) 667-4550.
3. Objectives:
 - i) to select appropriate surface wind data set(s) for use in the Beaufort Sea area;
 - ii) to develop a Beaufort wind climatology targeted to offshore hydrocarbon concerns;
 - iii) to develop wind-derived climatologies such as waves, structural icing and wind chill which are dependent on (i).

4. Background

Existing climatologies of the Beaufort Sea, particularly those portions of them dealing with wind and wind-related elements are unsatisfactory for meeting the specific needs of the offshore hydrocarbon industry. Problems of data sparsity, representativeness and differing observing techniques are at the root of this. Since the existing climatologies first appeared, there have been considerable advances in actual offshore data collection and in methods of synthesizing surface wind data. At this time it is now appropriate to evaluate the various wind data sets and wind derivation methods available, select the most appropriate data set(s) and apply adjustments as necessary.

5. Subprojects

To meet the newly-defined objectives, work in 1985-86 would focus on the work begun on comparison of wind data set(s) in the previous year as well as complete remaining work on the climate related offshore energy bibliography.

6. Need for Study

- a) Departmental Mandate: DOE, through AES, has the mandate to provide climate services and advice to safeguard human life and property, and environmental values in northern industrial and transportation operations.
- b) Preparedness: At present, climate-related decisions on engineering design for offshore platforms, and siting and design of port and other coastal facilities (all part of northern hydrocarbon development proposals) are based on unsatisfactory climate guidance. In-depth, up-to-date, objective evaluations of the wind climate of the nearshore Beaufort area and related transportation routes necessary for such decisions are not generally available. This reflects on AES' credibility in the decision-making process.

7. Relationship to Other NOGAP Projects:

This project would complement other AES NOGAP projects, particularly the Development of Beaufort Sea Forecasting Techniques and the Beaufort Sea Specialized Data Base.

8. Major Milestones:

- 1985-86 - complete selection and development of wind data set(s);
- complete climate-related energy bibliography.
- 1986-87 - complete wind climatology;
- complete evaluation of existing wind-related elements climatologies (waves, structural icing, wind chill, etc).
- 1987-88 - complete revised wind-related element climatologies as needed.

9. NOGAP Resource Requirements (\$85-86):

	<u>1985/86</u>	<u>1986/87</u>	<u>1987/88</u>
PYs	1.0	1.0	1.0
Salary	46	46	46
O&M	26	26	26
Capital	<u>10</u>	<u>10</u>	<u>10</u>
Total	82(1.0)	82(1.0)	82(1.0)

10. PY Justification:

The nature of the work proposed requires both a specialized expertise and a need to work extensively with the AES national climatological archive data, with AES computer personnel, facilities and software; and with AES climatologists. While some of the work can be done under contract, it is important that a PY be provided so that an expert can work on an in-house basis as follows: 85/86 - evaluate the results of various wind intercomparison studies and develop the final wind data set to be used for climatology development; 86/87 and 87/88 - evaluate existing wind-related element climatologies.

Without a PY, an increase in O&M of 70K p.a. would be required but completion of all presently envisaged work could not be guaranteed and the desirability of developing in-house expertise will not be met.

11. Other Funding: Nil.

NOGAP PROJECT DESCRIPTION

1. Project Title: C.19 BEAUFORT SEA ATMOSPHERIC DISPERSION CHARACTERISTICS (1984/85-1987/88).

2. Project Manager: Dr. F.H. Fanaki, Air Quality and Inter-Environmental Research Branch, Atmospheric Environment Service, 4905 Dufferin Street, Downsview, Ontario, M3H 5T4, (416) 667-4786.

3. Objectives:

To develop data base of atmospheric parameters related to air quality such as mixing height, stability and ventilation for environmental assessment application in the Beaufort Region.

To develop and evaluate enhanced techniques for air quality impact assessment with specific applicability to pipeline construction and drilling operation in the Beaufort Region.

To provide information on the mechanisms of dispersion for environmental assessment applications.

To produce an analysis of the collected data at the end of each fiscal year.

4. Brief Background and Current Status:

Assessment of the environmental impact of emissions to the atmosphere in the Canadian North is currently based upon empirical techniques developed for temperate regions and thus is very uncertain. In addition, local atmospheric data required for air quality simulation modelling are lacking. Interpolation of climatological data is risky and subject to errors because general solutions may not apply to specific sites. This project is designed to overcome these difficulties for the Beaufort Region.

The CBC tower at Inuvik was examined and found to be suitable for this project. The approved 1984/85 NOGAP funds for this project have been used to instrument the tower with the calibrated meteorological sensors. The use of the tower by AES, AROT, has been approved by CBC and a written agreement between the two parties has been signed. Approved funds have been committed for the upcoming field study at Inuvik to augment the tower data and to examine dispersion of pollutants under Arctic conditions.

5. Subprojects Foreseen:

C.19-1 Inuvik Tower (1985/86-1987/88)

Contact: Dr. F.H. Fanaki

Estimated Cost: 85/86: 20K O&M, 5K 0 CAP; 86/87: 20K O&M; 87/88: 22K O&M.

Brief Description:

85/86: Operation of the 6-level Meteorological tower. Analysis of data to determine stability, mixing height, ventilation and chill factor.

86/87: Operation of the Inuvik Meteorological Tower and analysis of data.

87/88: Operation of the Inuvik Meteorological Tower, data analysis publication.

C.19-2 Summer Beaufort Field Study (1985/86)

Contact: Dr. F.H. Fanaki

Estimated Cost: 45K O&M

Brief Description: Field study to verify Inuvik tower data and to examine coastline effects on air dispersion models during Arctic summer conditions.

C.19-3 Winter Coastline Field Study (1986/87)

Contact: Dr. F.H. Fanaki

Estimated Cost: 55K O&M

Brief Description: Field study to extend the tower data to the coastline and to examine coastline effects on the air quality models during winter conditions.

C.19-4 Arctic Air Quality Model (1987/88)

Contact: Dr. F.H. Fanaki

Estimated Cost: 10K O&M

Brief Description: Examine all sets of turbulence and dispersion data collected over the past two years. Establish values of pollution dispersion coefficients to the hydrocarbon study area and for meteorological conditions appropriate to the Arctic. Use the data to establish air quality models that apply to the hydrocarbon study in the Beaufort Region.

6. Need for Study:

- a) Departmental Mandate: See Departmental Strategic Plan 1984-89, p.11, Section 2 (Environmental Information); p. 17, Section 7 (improved e.a. of major developments in the north); p. 23, Section 4 (support of environmentally sound development re offshore oil and gas exploration and development).

The DOE Strategic Plan 1987-1989 (pg. 22) states that "the Atmospheric Environment Service (AES) has the primary responsibility for providing weather, climate, sea-state, ice and air quality services for the safety of Canadians, the security of their property, improvement of the national economy and the maintenance and enhancement of environmental quality". Also, the area north of the 60th parallel, because of its "environmental uniqueness and sensitivity", is a priority area of DOE concern.

- b) Preparedness for/Decision-making on Hydrocarbon Development Proposals: Beaufort EIA and the Beaufort Environmental Monitoring Project neglected important aspects of air quality such as (1) inappropriateness of gross techniques (AES was able to show the potential for site specific exceedance of NO₂ objective), (2) critical nature of meteorological conditions, (3) potential emissions from pipelines pumping stations, gas/oil processing for local use, heavy gas spills, oil-slick burning, etc., (4) potential for transboundary transport and (5) emissions of other than criteria pollutants.

Increased activity in the Beaufort/Mackenzie delta areas will have a dramatic effect on the environments of these two areas. To fulfill its mandate, the Department must initiate and conduct research oriented/data gathering programs tailored to meet the needs generated by the expansion of hydrocarbon development in the north.

7. Relationship to Other NOGAP Projects:

The data sets obtained from the operation of the 100 meter tower and the supportive field studies would benefit other AES NOGAP projects such as the Beaufort Sea Forecasting Techniques and the Tanker Route Climatologies. The data will also augment that obtained by the Beaufort Sea Specialized Data Base project (C.17) by providing an indepth, continuous record of mesoscale meteorological parameters within the prime study area (Mackenzie Delta/Beaufort Coast).

8. Major Milestones/Outputs:

85-86 - Summer Field Study
 - Tower Data Report
 - Development of Process Parameterization

86-87 - Winter Coastline Field Study
 - Summer Field Study Report
 - Updated Tower Data Report

87-88 - Winter Coastline Field Study Report
 - Updated Tower Data Report
 - Development of Air Quality Arctic Model.

9. NOGAP Resource Requirements (\$85-86):

	<u>85-86</u>	<u>86-87</u>	<u>87-88</u>
PYs	1.0	1.0	1.0
Salary/Benefits	31	33	36
O&M	68	75	32
Capital	<u>5</u>	<u>0</u>	<u>0</u>
Total	104(1.0)	108(1.0)	68(1.0)

10. PY Justification:

One PY is requested from FY 85-86 onwards for the Beaufort Sea Air Quality Program. This individual will be responsible for conducting analyses of special data gathered (routine data analysis will be contracted) and for planning and participating in special studies, and managing the contracted research component. This NOGAP activity cannot be effectively conducted without this PY. The possibility of contracting out all NOGAP activities as an alternative to a PY is severely limited by the contract monitoring load already being experienced by the scientific staff of the Branch. If no PY was forthcoming, it is doubtful if the money could be effectively used and there would be substantial program delays. The Beaufort Region Air Quality model would probably be delayed by one year.

11. Other Funding: Nil.

NOGAP PROJECT DESCRIPTION

1. Project Title and Number: C.21 Corporate Projects (1984/85-1987/88)
2. Project Manager: W. D. Brakel
Environment Canada
804, 9942 - 108 Street
Edmonton, Alberta T5K 2J5: (403) 420-2554
3. Objectives:
 1. To carry out corporate (i.e. multi-Service and departmental) preparations for northern hydrocarbon development through DOE Services, and with other resource management and regulatory agencies.
 2. To promote the integration of cooperative approaches to environmental preparations for hydrocarbon development.
 3. To respond directly to corporate environmental problem-solving needs arising in preparation for expanding hydrocarbon development in the Beaufort Sea region.
4. Background:

Corporate needs arising from hydrocarbon development involve four Services and two regions within Environment Canada. Two Regional Directors General are responsible for resolving corporate issues and undertaking corporate programs in the Northwest Territories and Yukon respectively. This responsibility includes specialized analyses to develop departmental positions and the introduction of innovative cross-disciplinary projects as part of departmental preparations for hydrocarbon development.
5. Subprojects: N.A.
6. Need for Study:
 - a) Other projects are a direct extension of the particular mandates and expertise of individual Services and Directorates with Environment Canada. In each case these projects represent the incremental application of a specific technical capability. In total, these efforts make a significant contribution to fulfilling the many Acts, and responsibilities for regulations, management, research, service and advice that are assigned to the various Services and Directorates with Environment Canada.

This department, in addition to its many parts, also has the mandate as the federal department with primary responsibility for the preservation and enhancement of environmental quality. Meeting this responsibility requires a pulling together of individual sectors of expertise within the department and undertaking cooperative initiatives with other environmental management and regulatory agencies. The purpose of this project is to meet this second set of responsibilities.

- b) Efficient and effective preparations for hydrocarbon development by Environment Canada depends on the ability to identify problems and seek solutions on a departmental or corporate basis. Being able to move beyond the realm of specialized interests and perceptions within Services is a complementary and necessary addition to their scientific and technical expertise. The ability to also combine this expertise in order to address issues that are common to several disciplines will also make a critical contributor to environmental decision-making for northern hydrocarbon development.

7. Relationship to Other Projects:

This project includes provisions for DOE support to and participation in the Beaufort Environmental Monitoring Project (BEMP) through Project A.7: Offshore Environmental Ecosystems Monitoring. This is a continuation of a joint project that was lauded by the Beaufort Environmental Assessment Panel as a preparation for hydrocarbon development.

The Mackenzie Environmental Monitoring Project (MEMP) is a land based counterpart to the project above. Co-sponsored by three federal departments, this initiative is part of Project A.21: Onshore Environmental Monitoring and Research.

The Bent Horn Project by Panarctic is the most recent hydrocarbon production project in the north and the first to ship oil eastward through Lancaster Sound. The Environmental Advisory Committee Arctic Marine Transportation (EACAMT) will examine the research needs and opportunities, jointly with DIAND and DFO support, as an overview to marine related hydrocarbon projects over the longer term.

8. Major Milestones/Outputs:

- 1985-6 - DOE contribution to and participation by appropriate scientific and technical specialists in Beaufort Environmental Monitoring and Mackenzie Environmental Monitoring Projects (BEMP and MEMP).
 - Completion of Environmental Advisory Committee Arctic Marine Transportation analysis of research needs and opportunities.
 - Report on corporate projects undertaken.
- 1986-7 - Support to BEMP and MEMP.
 - Report on corporate projects undertaken.
- 1987-8 - Support to BEMP and MEMP.
 - Report on corporate projects undertaken.

9. NOGAP Resource Requirements (\$85-86):

<u>Operating and Maintenance</u>	<u>1985-6</u>	<u>1986-7</u>	<u>1987-8</u>
Pacific & Yukon Region	30	30	30
Western & Northern Region	24	35	60
BEMP DIAND (A.7) & DOE	15	15	15
MEMP DIAND (A.21) & DOE	45	45	45
EACAMT	20		
	<hr/>	<hr/>	<hr/>
TOTAL	134K	125K	150K

10. PY Justification: N.A.11. Other Funding: N.A.



D1

ENERGY, MINES AND RESOURCES

(\$1985-86, K)

PROJECT NO., TITLE AND PROPOSED DURATION	1985-86		1986-87		1987-88	
	\$	P-Ys	\$	P-Ys	\$	P-Ys
<u>PE: Geological Surveys</u>						
D.1 Beaufort Sea Coastal Zone Geotechnics (1984/85-1990/91); In-house and Contract.	467	2	504	2	554	2
D.2 Arctic Island Channel Geotechnics (1984/85-1990/91); In-house and Contract.	221	1	526	1	612	1
EMR TOTAL	688	3	1030	3	1166	3

February 1985

NOGAP PROJECT PROPOSAL1. Project Title

NOGAP PROJECT D-1

Coastal Zone Geotechnics, Beaufort Sea (1984/85-1990/91)

2. Project Manager

Dr. D.L. Forbes (interim), Atlantic Geoscience Centre, Geological Survey of Canada, P.O. Box 1006, Dartmouth, Nova Scotia, B2Y 4A2. (Note: Dr. Forbes has other full-time duties and will be replaced as soon as possible by a project leader hired to manage this NOGAP project. Phone number (902) 426-7736.

3. ObjectivesGeneral:

Through geological and geotechnical research on the processes taking place along the permafrost coasts of the Beaufort Sea and on the materials and permafrost features of the coast, to provide public information concerning the coastal zone as required by government for land use site planning and regulation and as required by industry, in the design of facilities and activities.

Specific:

1. To provide an understanding of the rates and processes of coastline change to predict the impact of proposed development.
2. To provide a knowledge base concerning the nearshore bottom materials which will be crossed or excavated or built-on in the course of development.
3. To provide a knowledge base concerning the onshore geological (rock and soil) materials adjacent to the coast and the associated permafrost conditions, that relate to the rate of coastal retreat and the foundation conditions encountered by onshore coastal engineering works.
4. To provide a knowledge of ice, tide, wave and surge regimes in the coastal zone, as they affect coastal stability and interact with man-made structures.
5. To demonstrate the effects of man-made features on the natural coastal environment.

4. Background and Description

Background (Rationale): The Coastal Zone Geotechnical activity will involve research into the little-understood processes taking place on the Beaufort Sea coastline - an environment of unstable permafrost soils and

high marine erosion and deposition. These processes will fundamentally influence the location and design of supply and service installations and landfall sites (both pipeline and tanker) for delivery of Beaufort hydrocarbon resources.

Hydrocarbon production development scenarios for the Beaufort Sea, whether expansive or protracted, be they pipeline or tanker oriented, require significant shore based facilities along the Beaufort coast. These facilities include support bases, production systems, pipeline approaches, etc. According to the Environmental Impact Statement submitted by Esso, Gulf and Dome, sites at Tuktoyaktuk, McKinley Bay, King Point, Stokes Point, North Point and several other locations are being considered for development. At present there is no technical basis available to assess the impact of such development at these sites or the adjacent coastal areas; no basis for assessing the long term engineering stability of structures in the zone and no means of evaluating the relative merits of one site over another or even identifying additional sites also suitable for development but satisfying the government's perspective. For example, the technical data base needed to support the decision making process related to Stokes Point development is not in place. It is the intent of this project to provide the geological and geotechnical knowledge and understanding of the coast necessary for timely policy and regulatory decision making.

Direct outputs of the project will be published scientific reports and maps showing coastal conditions and demonstrating the engineering hazards, constraints, and land use implications of these conditions and of man made disturbances. This information will be made available as soon as possible for use of industry in planning and designing their activities and for use of governmental planning and regulatory agencies. The project will not provide all the answers to problems but will provide a core of federal expertise capable of identifying the problem and reviewing industry's proposed solutions. Thus an important "use" is the provision of expert advice to government and expert contact and consultation with industry and its consultants.

Description

A scientist will be hired by the Atlantic Geoscience Centre to manage this project. This person will contract to the private sector and universities much of the data acquisition (field work), analyses, and interpretation of results but some of the work will be done "in-house", particularly to avoid conflict of interest where industry confidential data are used and to maintain Federal Government expertise.

Those parts of the work involving Objective No. 3 will be implemented through Sub-project D-1-A by the Terrain Sciences Division, GSC (see Section 5).

Investigations to be undertaken will include the following:

Objective 1 (Coastline Change)

- a) shoreline retreat to identify and assess coastal areas undergoing active erosion (greater than 10m/yr in some places) or rapid shoaling;
- b) longshore sediment transport: to identify active coastal processes determining directions and orders of magnitude of longshore transport to evaluate the upstream and downstream impact of specific site development;
- c) shore-normal sediment transport: to identify the amount of adjustment in coastal profiles resulting from sediment transport, coastal erosion, and resulting thermal changes.

Objective 2 (Nearshore Bottom Materials)

- a) sediment properties: distribution of sediment types and geotechnical characteristics along the coastal zone (rapid lateral variations in bearing capacity must be considered);
- b) differential thaw settlement: the distribution and performance of permafrost-affected sediments under the thaw conditions needs evaluation, particularly in areas where significant massive ice is known to occur;
- c) construction materials: assess the distribution of sand and gravel along the coastal zone and the effect of dredging and redeposition of this material on the coast.

Objective 3 (Onshore Materials and Permafrost)

See Sub-project A

Objective 4 (Sea and Sea Ice)

- (a) effect of ice, tide, wave and surge regimes on the coast.

Objective 5 (Impact of Human Activity)

- a) Impact of a variety of man-made features on the natural coastal environment.

Investigations 1a-c, 2b and 4 all involve changes that take place over many years and are dependent on the physical environment. They, therefore, require periodic monitoring and the pace of investigation is dependent on annual climate.

Investigations 2a and 2c are area specific and can be approached by systematic sequential surveys. However, field costs can be substantially reduced by inter-agency cooperation, so that any detailed area-by-area plan is subject to change dependent on annual climate.

5. Subproject

- a) Title: NOGAP Project D-1A - Beaufort Sea Coastal Zone Geotechnics: Onshore Materials and Permafrost
- b) Contact: J.A. Heginbottom, Terrain Sciences Division, Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario, K1A OE8, Telephone 993-6093.
- c) Cost (\$; PY): The NOGAP resources assigned to this subproject will vary from year to year. Resources for 1985-86 are projected as \$21,000 and 1 PY.
- d) Description

See attachment

6. Need for Study

The project will provide fundamental knowledge and regional information concerning the characteristics of the coastline of the Beaufort Sea and on the little-understood processes modifying the coastline - an environment of unstable permafrost soils, high marine erosion and deposition. These coastal characteristics and processes will fundamentally influence the location and design of supply and service installations and land fall sites for production and delivery of Beaufort hydrocarbon resources.

Departmental Mandate

A general governmental requirement for the information arising from this project is inherent EMR responsibilities concerning petroleum supply, policies concerning frontier energy, and regulation of petroleum industry activity on Canada lands. In this context, one of the objectives of the Geological Survey of Canada is to provide, to the Department, basic geoscience information on geological constraints and hazards to resource development both onshore and offshore.

Preparedness for Decision-making on Northern Hydrocarbon Proposals

Proposals for hydrocarbon related development in the Beaufort Sea have created a demand for general and site specific information on coastal stability, sediment dynamics, and nearshore geotechnical properties. The existing information base has proved insufficient to provide definitive answers to requests for advice. This is particularly so because the general information does not provide adequate framework within which to evaluate site specific data. For example, government scientists have been unable to provide estimates of longshore sediment transport rates at the proposed King Point port site, due to lack of regional information on inshore wave climate and nearshore sediment properties. They are also unable to provide advice on stability of nearshore

materials underlying a proposed pipeline landing route without a general understanding of nearshore adjustments to coastal erosion (quite apart from detailed site-specific geotechnical data).

7. Relationship to Other NOGAP Projects:

DIAND expanded activity project A5 (Physical Environmental Assessment) addresses similar objectives (in part), with subprojects on coastal processes in relation to proposed and existing shoreline facilities and on shoreline stability adjacent to industry facilities. Although close collaboration has occurred and is proposed between the two projects, the evident focus on development sites in the DIAND project contrasts with the requirement for more general information emphasized in this (EMR) project proposal.

8. Major Milestones/Outputs (by fiscal year, numbered)

1985-86

1. Release low level video coverage of Beaufort Coast (Obj. 1,4).
2. Release reports completed 31 March 1985 on (a) synthesis of existing information and preliminary mapping of shore zone characteristics and coastline change (Obj. 1, 2, 3); (b) Numerical modelling of wave conditions and sediment transport at 7 sites (Obj. 1, 4).
3. Initiate shallow seismic and sidescan surveys in part of study area (Obj. 2).
4. Carry out sediment transport experiment at a selected site (Obj. 1, 4).
5. Carry out surveys of coastal erosion and beach sedimentation to ground truth photo/video interpretations (Obj. 1, 2).

1986-87

1. Release reports on 1985-86 field work.
2. Ground truth seismic/sidescan work either from ship or through ice.
3. Extend seismic/sidescan surveys to other parts of the study area.
4. Evaluate and continue sediment transport experiment.
5. Complete numerical modelling of 1985 transport experiment for calibration of earlier model results.
6. Continue surveys of coastal erosion and beach sedimentation.

1987-88

1. Release reports of 1986-87 field work.
2. Ground seismic/sidescan work.
3. Extend seismic/sidescan surveys to any important areas not yet covered.
4. Evaluate necessity for further sediment transport experiment work; if necessary, continue.
5. Re-do low level video and/or vertical photography of Beaufort coast.
6. Continue surveys of coastal erosion and beach sedimentation.

1988-89

1. Release reports of 1987-88 field work.
 2. Complete synthesis of nearshore seismic/sidescan and ground truth surveys completed to date (Obj. 2).
 3. Undertake surveys to plug any major mapping data gaps (Obj. 2).
 4. Complete synthesis of information on coastal changes, materials, and processes (Obj. 1, 2, 3).
 5. Update mapping of coastline changes and shore zone characteristics (Obj. 1, 2, 4).
 6. Evaluate impact of man-made features in the coastal zone.
 7. Assess status and future of project.
9. Proposed NOGAP Resource Requirements Over Project Life (000s\$ 1985-86)- includes subproject A

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
PYs	2	2	2
Salary/Benefits	77	88	94
O&M	360	390	440
Capital	30	26	20
Total	467 (2)	504 (2)	554 (2)

10. Other Funding

No specific funds identified against this project other than NOGAP. The following services are supplied through GSC A-base: supervision, involvement of scientific specialists, administration, data handling, use of laboratories and technicians, field instruments and equipment; publication of reports.

11. PY Justification

This project is to proceed at the same level as that approved by Treasury Board on May 17, 1984 (TB 793171) and therefore continues to require the 2 person-years approved for the project at that time.

The first person-year (as approved in May 1984) will be used to recruit the scientific manager of the project. This person will plan and organize the project, serve as scientific authority for contracts with industry and universities and implement or oversee the smaller but essential in-house components of the project. An industrial contractor would be inappropriate because of the requirement to manage government contracts and to use industry-confidential data. The existing three in-house coastal scientists are completely occupied elsewhere and cannot be made available to run this project, as clearly demonstrated by experience with this project to date (see "description").

The second person-year, originally intended for a technician, is now seen as essential to cover the permafrost specialist who will implement Subproject D-1A (Onshore Materials and Permafrost). This job also cannot be undertaken by an industry contractor because it involves contract supervision and use of confidential data.

February 1985

NOGAP Project D-1, Subproject A - Beaufort Sea Coastal Zone
Geotechnics: Onshore Materials and Permafrost (1984/85-1990/91)

DESCRIPTION

Objectives

To provide geological and geotechnical information in the terrestrial portion of the Beaufort Sea coastal zone, including information on the surface deposits and landforms; the sub-surface geological materials, including permafrost and ground ice conditions; and active geomorphological processes, so as to assist in the orderly development, siting, design and construction of shore facilities related to the production of hydrocarbons in the Beaufort Sea region.

Method

The approach used will be as follows:

1. Identification and collation of all existing geological, geocryological, geotechnical and geomorphological information available. The information will be compiled by means of maps, reports and a data base, at appropriate scales and level of detail.
2. Identification of knowledge gaps.
3. The collection of information by means of field work (in-house or contract), data collection and modelling to fill such knowledge gaps.
4. The presentation of the summarized information by means of maps, reports and a computerized data base.

These steps will be applied in sequence in the following sectors: I - King Point to McKinley Bay, II - King Point to Yukon/Alaska boundary and McKinley Bay to Cape Bathurst, and III - Amundsen Gulf and Banks Island. Completion of the work in all sectors is anticipated by 1989-90.

Milestones

1985-86	Sector I, steps 1-2	1988-89	Sector II, step 4
1986-87	Sector I, step 3		Sector III, step 3
	Sector II, steps 1-2	1989-90	Sector III, steps 3-4
1987-88	Sector I, step 4		
	Sector II, step 3	1990	Publication of formal report
	Sector III, steps 1-2		

February 1985

NOGAP PROJECT PROPOSAL1. Project Title

NOGAP PROJECT D-2
Arctic Island Channel Geotechnics (1984/85-1990/91)

2. Project Manager

Brian MacLean, Atlantic Geoscience Centre, Geological Survey of Canada, P.O. Box 1006, Dartmouth, N.S., B2Y 4A2, Phone 426-3703

3. Objective

General

Through integrated geological, geophysical, and geotechnical research and surveys of seabed conditions and sediments in selected test areas in Arctic Island Channels, and through development of technology for conducting these investigations, to provide preliminary public information on seabed instability and other geological seabed conditions and hazards, as required by government in planning, regulation and environmental monitoring and by the petroleum industry in design of facilities and activities.*

Specific:

1. To develop, test, and evaluate new or modified technology for characterizing and mapping near-surface seafloor materials and their structures from the sea ice or from "leads" in the ice.
2. To provide, for selected test areas, information (including maps) of sea-floor morphology, geotechnical and textural characteristics of sediments on and beneath the seafloor, dynamic processes affecting the seabed, and sediment history.
3. To identify geological factors affecting coastal and seabed pollution by oil that may be spilled from tankers.
4. To identify geological constraints and hazards in Arctic Island Channels, that may affect petroleum transportation, production, or exploration.

4. Background and Description

Background:

The Arctic Channels Geotechnics project will provide geological and geotechnical information about the material and processes beneath

*as a result of budget reduction, the scope of this project has been substantially reduced but the general objective is retained.

Arctic Island Channels and along their shores. These materials and processes will profoundly affect engineering and other activities within the channels, relating both to tankers and to seabed or coastal structures, whether involving Beaufort Sea oil or production and transport of high Arctic oil. Little is currently known by government or by industry about these geological materials and processes beneath the dominantly ice-covered waters of the channels, yet such information is critical to safe and cost-effective engineering design, for effective regulation of industry activity, and for environmental protection.

Contribution of this Project:

As originally proposed this project was expected not only to overcome the technological questions of how to obtain the required observations, measurements, samples and profiles in ice-covered waters but also to provide systematically collected and interpreted information on the character, distribution and local variability of seabed materials and processes in some sizeable areas of importance for petroleum development and transportation. Under the anticipated reduced budgeting, the intent of the project will remain but the scale of the work will be reduced. Thus, geographic areas of work will be reduced in size; outputs will consist only of preliminary reconnaissance data amplified by detail in small test areas. Technology development and testing will be an essential component but will have to be of reduced scope and directed to low-budget items.

Description

The project will be planned and managed by scientists of GSC in consultation with interested industry and government bodies (e.g. APOA, Panarctic, COGLA, DIAND). Much of the work will be contracted out, but the field work will largely be organized and implemented "in house" because of the lack of precedents for this work and high logistic cost. Various GSC specialists will be involved. The one person-year is required for a specialist technologist who will provide dedicated and ongoing practical expertise in the field and in data handling.

Investigations will include experimental through-ice shallow seismic profiling; through-ice sampling, coring, photography, etc. of the seabed and development of methodology for this work; experimental profiling with side scan and shallow seismic in "leads" during the summer, development and testing of geotechnical equipment for through-ice work; demonstration and test area surveys with multiple techniques; and possibly, more-standard shipboard surveys using an icebreaker.

Direct outputs of the work will be published scientific reports and maps, made available for use by government and industry as soon as possible. The project cannot be expected to provide final answers: rather it will yield initial indications of the seabed character and procedures for investigation of particular problems. Thus, important "uses" will be expertise, experience, and technology for use by government, industry and consultants.

5. Subproject

None

6. Need for Study

See "background" section.

Departmental Mandate

A general governmental requirement for the information arising from this project is inherent in EMR responsibilities concerning petroleum supply, policies concerning frontier energy, and regulation of petroleum industry activity on Canada Lands. In this context, one of the objectives of the Geological Survey of Canada is to provide, to the Department, basic geoscience information on geological constraints and hazards to resource development and transportation both onshore and offshore.

Preparedness for decision-making on Northern Hydrocarbon Proposals

Proposals for tanker transport of Beaufort sea oil eastward through the Northwest Passage, and the development of Arctic oil and gas that will inevitably follow from any decision in favour of tankering of oil in the Northwest Passage, will create an immediate demand for general and site-specific information on seabed and coastal stability, sediment dynamics, ice scour, and geotechnical properties of geological materials. Existing information of this nature is minimal, and effective methods for obtaining the information beneath the sea-ice cover are not in place. This project is designed to begin the process of developing reliable methods and technology adapted to the varied conditions in the channels at different seasons of the year, and for determining in general terms the nature and distribution of conditions posing potential constraints and hazards to petroleum industry activity. A number of years of research and surveys will be required (as an example, similar work was started in the Beaufort Sea in 1970).

7. Relationship to other NOGAP Projects

There is no direct relationship or interface with other NOGAP projects although MOT tanker research has similarities in purpose.

8. Major Milestones/Outputs

1985-86

1. April-May. Spring field program to obtain grab samples, short core and seabed photography in Byam Martin Channel. Approximately 60 stations over a grid pattern. Experiment with through-the-ice seismic reflection data (Jim Hunter) using small charges as sound source in approaches to Bent Horn to obtain information on sediment thickness and shallow stratigraphy. If successful an attempt will be made to expand the program into Byam Martin Channel.

2. June. Report on the evaluation of through-the-ice technology.
3. July. Tentative summer field program if funds available. Emphasis will be on definition of seabed features and experimentation with Zodiac mounted, helicopter portable shallow seismic and sidescan systems in leads.
4. December. Preliminary report of seafloor sediment type, physical properties and relative rates of sedimentation.
5. March, 1986. Preliminary model of sedimentary processes and seabed dynamics if adequate funds to complete sample analyses are available and to do acoustic profiling.

1986-87

1. April. Complete planning of 1986 field programs.
2. Possible spring program to acquire acoustic data in selected otherwise inaccessible areas, if Hunter's 1985 experimental through-the-ice technique proves successful.
3. July. Summer field program to extend 1985 summer program if that undertaken or to initiate trials of acoustic systems in leads if not done in 1985. Emphasis on acquisition of acoustic data and geotechnical data plus some calibration sampling. Trials of portable geotechnical equipment e.g. dynamic penetrometer.
4. July-September. Possible shipboard program off a Canadian Icebreaker.
5. December. Complete analysis of sample and acoustic data obtained in field work to date. Review of work and plans for 1987-88. Preparation of draft paper for publication.

1987-88

1. Expansion of field program in areas of high priority with emphasis on further understanding present day processes and sediment properties and the nature severity of geological and geotechnical constraints to development.
2. Development and testing of geotechnical tools and new acoustic techniques. Possibly collect long piston cores in areas where thicker sediment section to further ground-truthing acoustic data and to provide additional in depth sedimentological and geotechnical data.
3. Expansion of programs on Canadian Icebreakers to research vessels working in relevant areas.

9. Proposed NOGAP Resource Requirements Over Project Life (000s\$ 1985-86)

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
PYs	1	1	1
Salary/Benefits	36	40	44
O&M	175	336	538
Capital	<u>10</u>	<u>50</u>	<u>30</u>
Total	221 (1)	526 (1)	612 (1)

10. Other Funding

No specific funds identified against this project other than NOGAP. The following services are provided through GSC A-base: supervision, management; involvement of scientific specialists; contract management; administration; data handling systems; use of laboratories and technicians; field instruments and equipment; publication of reports. Specialized logistics will be provided by PCSP at cost. Shiptime will be taken from GSC allocation by DFO.

11. Person-Year Justification

The present proposal for 1 person-year is half that approved for this project by Treasury Board on May 17, 1984. It represents only a very small part of the person-time that will be involved in this project from GSC A-base, contracts, and logistic contributions from other government organizations.

The one person-year is required to hire a technician who will be the only person dedicated full time to this project and who will be responsible for the field and laboratory aspects of the project. This person must have the expertise in acoustic technology required to carry out the acoustic profiling that is an essential part of the technology development and surveys. An experienced, practical field-oriented technical expert with Arctic experience is an essential prerequisite for implementation of the project and supervision of contractors.

TRANSPORT CANADA

(\$1985-86, K)

PROJECT NO., TITLE AND PROPOSED DURATION	1985-86		1986-87		1987-88	
	\$	P-Ys	\$	P-Ys	\$	P-Ys
<u>PE: Icebreaking and Arctic Operations</u>						
E.1 Arctic Standby Nav aids Power Development (1984/85-1985/86); Contract.	42					
E.4 Shipborne Ice Detection Systems Assessment (1987/88-1988/89); Contract.					80	
E.5 Studies to Assess and Develop Arctic Navigation Systems:						
E.5-3 Evaluation of Ice Imaging Radiometer (1984/85-1985/86); Contract.	52.5					
E.5-4 Arctic Tanker Loading and Mooring (1984/85-1986/87); Contract.	22		80			
E.5-6 Northern Port Assessment (1985/86-1988/89); In-house..	84.5		75		75	
E.5-8 Navigation Support Systems (1986/87-1988/89); Contract.			128.75	1	150	1
E.7 Ship-Produced Noise Studies (1987/88-1988/89); Contract.					46.75	
E.9 Updating Ship Construction Regulations:						
E.9-5 Fibre Optic Data System (1985/86); Contract.	50					
E.10 Northern Organization (1984/85-1985/86); In-house..	674.9	9				
E.11 Termopol (1985/86-1988/89); In-house.	40.6	1	71.25	2	71.25	2
TC TOTAL	965	10	358	3	426	3

NOGAP PROJECT DESCRIPTION, 1984/85 - 1985/86

1. Project Title: E.1 ARCTIC STANDBY NAVAIDS POWER DEVELOPMENT
2. Project Manager: M. C. Armstrong
Aids and Waterways Branch
(613) 992-5376

3. Objectives:

To develop a standby power source^{which} would provide Arctic mariners with a more reliable navigation system and consequently improve safety by a considerable margin.

4. Brief Background and Description:

The need for research and development on reliable stand alone power supplies for Arctic navigational aids has been recognized for some time. Faced with an increase in Arctic marine traffic, it is essential that demonstrably reliable navigation aids power supplies be identified for future deployment.

Preliminary studies and some shop testing have been carried out of contender power sources within the range and type needed for Arctic operation. A system design will be produced for the most promising of these contender power supplies. After a period of plant testing the system will be installed at a selected test site in the High Arctic for a period of operational evaluation.

5. Subprojects:

N/A

6. Need for Study in terms of:

- (a) Department Mandate:

Transport (Coast Guard) has the mandate to provide Aids to Navigation in Canadian Waters. Continuous, reliable operation of powered Aids in Arctic conditions is a technical problem in meeting the mandate.

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

Powered Aids in the Arctic are installed each summer season and removed as the icebreakers leave; year-round transportation requires we begin to solve the problems of assured operation and continuous availability of the aids that mark the channels.

7. Relationship to Other NOGAP Projects:

No other NOGAP projects are related, the mandate for Aids to Navigation is specific to Transport.

8. Major Milestones/Outputs:

1. Field tested power supplies for deployment or further development.
2. Technical reports.
3. Spin-offs for aids to navigation on Southern Canada.

Although this project is mission related, it carries a high potential for industrial spin-off. A proven power generating system for this uniquely harsh operating environment would have application to the Canadian communications sector and would also have export potential.

Selection of power system type and range	August 31, 1984
Completion of preliminary design	September 30, 1984
Contract placement	November 30, 1984
Completion plant tests	March 31, 1985
Selection of test site and installation	August 30, 1985
Completion of test period and report	September 30, 1986

9. NOGAP Resource Requirements: (\$85-86, K)

	84/85	85/86	86/87	87/88	88/89
PYs	0.5	-	-	-	-
O&M	147	42	-	-	-

10. Other Funding:

N/A

11. PY Allocation:

None requested.

NOGAP PROJECT DESCRIPTION, 1987/88 - 1988/89

1. Project Title: E.4 SHIPBORNE ICE DETECTION SYSTEMS ASSESSMENT

2. Project Manager: Ian Marr,
Coast Guard Northern
(613) 993-6985

3. Objectives:

To develop and maintain the technical capability to regulate, set standards and specify shipborne equipment and ice detection systems.

4. Brief Background and Description:

Industrial suppliers of equipment and offshore operators and developers are developing new technologies to close the gap between current ice detection recording and reporting systems, and the real time and predictive capability required for Arctic navigation year round.

Such equipment includes both self-sufficient sensors/readouts, and ship based helo systems, as well as equipment to interact with satellite and airborne systems. The development and assessment of this type of technical equipment will ensure that Arctic ships will use the best equipment available thus reducing the risk of accidents and environment damage. Ice detection from the ship's bridge includes the need to determine not only ice presence and thickness, but the age of ice flows, the keel depths of ridges, the close-in patterns of leads, all to facilitate navigation of the ships.

Some developments are international and satellite-based, some are domestic and local. Coast Guard is challenged to develop technology and assess it for its own icebreakers, to respond to Canadian requests for joint ventures (field trials) and developmental R&D, and to industry's requests for upgraded standards and systems for the ships they propose.

A series of specific projects over the years, responding to a range of opportunities and needs, is required to maintain a level of development in this area. Field trials, equipment developments in the market place, satellite developments will be used to advantage but cannot be scheduled precisely in advance. Coast Guard is the recipient of many proposals in this field, since industry sees the Coast Guard as providing platforms (icebreaker) for field trials and since the Coast Guard professional assessment fosters commercial benefit to the manufacturer.

5. Subprojects: Not applicable.

6. Need for Study:

E5

(a) Mandate:

Coast Guard is responsible for the safety of shipping in the North and ice detection and avoidance is the critical environmental factor. Considerable advancement of systems, equipment, and bridge read-out capability is required before safe transits of Arctic ships are assured.

(b) Preparedness:

The Beaufort EARP and other assessments of Arctic development stress the need for studies in this area, in advance of pilot and full scale projects.

7. Relationships to Other NOGAP Projects:

The relationship to other projects is complementary in that ice studies are baseline work to understand resistance, strength etc., while ice detection and reporting systems on ships use the baseline information, interpret it for the ship operator and facilitate optimum routing.

8. Major Milestone/Outputs:

This project comprises a series of studies that are iterative in response to external developments (satellite systems) as well as domestic (new equipments, specific needs).

The progression of work is:

- A. Preliminary research.
- B. Comparative study of a short list of existing and proposed systems.
- C. Field testing, different systems, areas, times, vessel sizes.
- D. Cost effectiveness assessment of tested systems.
- E. Progress reports, recommendations.
- F. Amendments to regulations and implementation.

9. NOGAP Resource Requirements: (\$85-86, K)

	<u>84/85</u>	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>	<u>88/89</u>
PYs	-	-	-	-	-
O&M	-	-	-	80	150

10. Other Funding:

Supplementary funding may be sought in Arctic Marine R&D program, when specific field trials exceed proposed budgets.

NOGAP PROJECT DESCRIPTION, 1984/85 - 1985/86

1. Project Title: E.5-3 EVALUATION OF ICE IMAGING RADIOMETER
2. Project Manager: A. Mountain
Fleet Systems, Coast Guard
(613) 992-0816

3. Objectives:

Enhancement of marine safety: To test and further develop one of the proposed technologies that will assist ship officers in the tactical navigation through varying ice conditions.

4. Brief Background and Description:

Background: Aircraft and satellite borne passive microwave radiometers allow for clear distinction to be made between multi-year and first year ice and clear water. The imagery, which can be produced in real time, is easily interpreted. As the angle of incidence is decreased the discrimination of the various ice forms and water is reduced; no work has been undertaken to assess the value of low incidence angle data and whether or not a ship-borne system with a relative low angle of incidence could provide adequate all weather navigational data.

Description of Work: Evaluation of a radiometer for shipboard will be phased. Phase I: An initial evaluation.

Under AES direction and through existing contracts PhD Associates will develop systems configurations and software required to assess a 37 GHZ passive microwave radiometer for shipboard use. The radiometer will be loaned by Aerojet, and will be mounted on a programmable dual axis movable platform for testing at a Thousand Island location, and subsequent vessel tests if warranted. AES will be responsible for all loan agreements and the conducting of field trials.

PhD Associates will assemble the equipment for AES to conduct experimental work, and develop the hardware configuration and software for the interpretation and on line display of the recorded data.

To assist in ground truthing of data, AES will purchase a dielectric probe which will be used to assess the moisture content of any snow cover.

Depending upon the outcome of field trials, in the Thousand Islands, Central Region will be approached to allow vessel trials to be carried out.

AES under separate funding and contract will task a consultant, other than PhD Associates, to aid in the process of data reduction and analysis. (The expected cost of this work is \$50,000 fund from AES sources.)

Future phases of the work will be developed subject to the successful outcome of Phase I.

5. Subprojects:

N/A

6. Need for Study in terms of:

(a) Department Mandate:

Transport (Coast Guard) has responsibility for regulating the ships bridge equipment that ensures safe navigation.

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

Lead time is short in developing improved technologies for navigation in ice.

7. Relationship to Other NOGAP Projects:

This project complements those that are directed at ice characteristics in that shipborne instrumentation must be developed to coincide with, and portray the analyzed ice information available.

8. Major Milestone/Outputs:

A report on the operational feasibility and usefulness of a passive microwave radiometer as a ship-borne navigational tool.

Project approval	October 30, 1984
Contract amended	November 30, 1984
Field trials complete	March 31, 1985
System evaluation complete	June 31, 1985

9. NOGAP Resource Requirements: (\$85-86, K)

	84/85	85/86	86/87	87/88	88/89
PYs	-	-	-	-	-
O&M	100	52.5	(110)	-	-

To be requested later; possible PERD.

10. Other Funding:

N/A

11. PY Allocation:

N/A

1. Project Title: E.5-4 ARCTIC TANKER LOADING AND MOORING
2. Project Manager: J. Grinstead
Manager, Arctic Ship Safety
Coast Guard Northern
(613) 995-4771

3. Objectives:

To provide CCG with basic information which will enable the Department to respond to requests for Port assessments in the Arctic, in accordance with the Departmental Mandate to attend to the provision of a safe and efficient transportation system.

4. Brief Background and Description:

Background

The concept of loading Arctic tankers from exposed terminals in the Arctic Offshore has been the subject of many recent studies. The experience gained by Canmar in the operation of Arctic mobile drilling caissons and in studies performed during 1983 clearly indicated that an approach by vessels to an exposed terminal production facility during the winter is feasible. Studies have also indicated that the best mooring technique is to couple the bow of the tanker directly to the production facility and to use a high speed loading system to improve the efficiency of the overall transportation system. However, to date, sufficient work has not been undertaken to evaluate and verify these findings.

Description of Work

The study will be conducted in a series of project tasks. Each task will consider one of the key areas of the study and provide information required to conduct further tasks. These tasks are:

- (a) To define the environmental conditions which would apply to the loading of tankers from exposed terminals in Arctic conditions.
- (b) To study the initial approach of the tankers to within 100 metres of the facility using a previously developed ice simulation computer model. The model will allow for examination of the manoeuvrability of the tanker in various ice conditions.
- (c) To study the final approach of tankers and to specifically study the dynamic effects between tanker and terminal just prior to the tanker being fully moored and while fully moored. Procedures for mooring the tankers will be studied and specified.

- (d) To specify the high speed loading system to be installed within the terminal and the tanker's associated cargo handling system. Mooring equipment will also be specified in this task and the overall system costs will be estimated. Also, rapid shutdown equipment and procedures will be developed to ensure that the crude oil does not spill.
- (e) To conduct a detailed assessment of downtime which will consider not only ice conditions but also open water conditions. The implications of downtime at the terminal will be considered in conjunction with the impact which this downtime will have upon the remainder of the tanker fleet and support fleet.
- (f) To monitor icebreaker operations, representative of prototype tanker movements, in order to assess the feasibility of proposed approach manoeuvre concepts.

Typical scenarios, representing production structures in the Canadian Beaufort Sea, with water depths in the 20 to 60m range, will be studied. Typical geometric layouts will also be considered. The results of these studies will provide the base from which data can be extrapolated for application to structures in other areas.

5. Subprojects:

N/A

6. Needs for Study:

(a) Mandate

Coast Guard has a mandate to conduct TERMPOL studies of port projects submitted for review. Coast Guard leads the assessment of the terminal design, pollution potential, shipping route, ship and dock interface and loading facilities.

(b) Preparedness

Considerable work is required to optimize port design in the Arctic. An improved understanding of the topics listed is required in time to improve the guidelines and prepare for further detailed TERMPOL assessments.

7. Relationship to Other NOGAP Projects:

There is an indirect relationship to DIAND's regional studies of Northern coastlines for port siting, i.e. to Project A.5. This Coast Guard project relates to work done after the first screening of port locations.

There is a complementary relationship to Coast Guard's project E.5-6.

8. Major Milestones/Outputs:

Reports documenting techniques, procedures, data and results, conclusion and recommendations. Draft Report September 30, 1985. Phase I Final Report October 31, 1985. Phase II to be determined.

Information derived from the study will be of benefit to Canadian industrial manufacturers and suppliers of equipment utilized in Arctic offshore tanker loading facilities.

9. NOGAP Resource Requirements: (\$85-86, K)

	<u>84/85</u>	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>	<u>88/89</u>
PYs					
O&M	87	22	80	-	-

10. Other Funding:

<u>Source</u>	<u>84/85</u>	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>	<u>88/89</u>
Energy R&D	-	50	-	-	-
DSS	-	80	-	-	-

11. PY Allocation:

Nil.

NOGAP PROJECT DESCRIPTION, 1985/86 - 1988/89

1. Project Title: E.5-6 NORTHERN PORT ASSESSMENT STUDY

2. Project Manager: Ian Marr
NOGAP Co-ordinator
Coast Guard Northern
(613) 993-6985

3. Objectives:

Coast Guard participation in an assessment of Northern Port requirements that encompasses several optional sites/ports configurations, and to carry out preliminary assessments in conjunction with other departments and to provide advice on the shipping safety aspects of sites under construction.

4. Brief Background and Description:

Background:

Coast Guard Northern is working with (Ports and Harbours (DOT)) DIAND, Northern Government, other departments, on problems of port siting in the Arctic. The most urgent consideration is determining Port location and configuration options on the Yukon coast. The shipping needs related to a rock quarry proposal (Peter Kiewit & Sons) and those of a marine and drilling operation may need to be met at one environmentally precarious, ice infested site along an unprotected coast.

Description of Work:

- (a) An analysis of the shipping requirements (season, draft, loading manoeuvring, wintering, fuelling, anchoring, breakout).
- (b) An analysis of the port design parameters (water depth, shore access, ice protection, dock, fuel storage, environmental protection, on site support).
- (c) A review and assessment of available and new, relevant site specific information.
- (d) An outline of work to be done, for a Termpol-type assessment.
- (e) If required, a contracted Termpol-type assessment on a broader basis, of several sites.

5. Subprojects:

N/A

6. Need for Study in terms of:

(a) Department Mandate:

Coast Guard has a mandate to accept submissions for TERMPOL (terminal/pollution) review, and to organize large interdepartmental committee reviews of the safety technical and environmental risks of port designs and ship access routes.

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

Considerable work is needed to ensure government has adequate guidelines and adequate understanding of Arctic port construction to carry out effective TERMPOL assessments.

7. Relationship to Other NOGAP Projects:

This project complements E.4

8. Major Milestones/Outputs:

July 31, 1985 and each month end thereafter would be milestones for progress reports.

9. NOGAP Resource Requirements: (\$85-86, K)

	84/85	85/86	86/87	87/88	88/89
PYs	-	-	-	-	-
O&M	-	84.5	75	75	120

10. Other Funding:

<u>Source</u>	84/85	85/86	86/87	87/88	88/89
Arctic R&D	-	200	150	-	-

11. PY Allocation:

None requested.

NOGAP PROJECT DESCRIPTION, 1986/87 - 1988/89

1. Project Title: E.5-8 NAVIGATION SUPPORT SYSTEMS

2. Project Manager: Ian Marr
Coast Guard Northern
(613) 995-7412

3. Objectives:

To provide Coast Guard with the background, knowledge and field trial experience to evaluate, recommend on, and to regulate the use of effective navigational support systems on ships.

4. Brief Background and Description:

An overall concern in regard to safe navigation of ships in the Arctic is the identification, development and regularization of effective bridge equipment that fosters safe tactical navigation. Proponents of projects with transportation as elements indicate that their Arctic Class ships will meet the highest standards required by Coast Guard for bridge equipment. Coast Guard is expected to judge what those standards should be, and what equipment meets them. In advance, judgements are required as to the availability at various points in the future of useful satellite coverage for ice reconnaissance, communication and position fixing. Bridge instrumentation must be optimal for interaction with available external systems.

In view of reduced R&D funding, Coast Guard is waiting until further developments occur in related fields, particularly satellites, in order to focus the remaining funds in the most promising areas.

5. Subprojects:

These will be defined in the first year of this long term project, after the assessment study results are complete.

6. Needs for Study:

(a) Mandate

Coast Guard has a mandate to regulate and enforce the equipment required for safe navigation of ships.

(b) Preparedness

Long lead times are required (and may not be available) for the process of analysis through standard setting for navigation systems.

7. Relationship to Other NOGAP Projects:

This project has a complementary relationship to the other projects in the E.5 (Arctic Navigation Systems) group of projects. This is the series of studies that assess the external developments and responds to Canadian industrial technologies that may meet the need.

8. Major Milestones/Outputs:

- (a) Assessment of current technologies and satellite proposals.
- (b) Identification and testing of likely navigational equipment that provides an improved capability or capacity.
- (c) Joint venture, field trials, shop tests to assess proposed equipment on an opportunity basis.
- (d) Reassessment in 1987-88 of the components of what is considered a system solution.
- (e) Development and consultation on proposed new standards.

9. NOGAP Resource Requirements: (\$85-86, K)

	<u>86/87</u>	<u>87/88</u>
PYs	1	1
Salary	60	60
O&M	71.75	93
Total	131.75 (1)	153 (1)

10. Other Funding:

None approved.

11. PY Allocation:

Nil.

1. Project Title: E.7 SHIP-PRODUCED NOISE STUDIES

2. Project Manager: Ian Marr
Coast Guard Northern
(613) 993-6985

3. Objectives:

- (1) To determine the extent, characteristics and range of ship-produced noise for various ship classes.
- (2) To draft design standards and operating restrictions, if proven necessary, to reduce the environmental impact of ship noise.

4. Brief Background and Description:

Ship produced noise is deemed by many Northerners to be the second important ship related concern, after oil spills. Little work has been done on quiet ship design for cargo carrying icebreaking ships and the objective conflicts with the power and strength objectives in general ship design concepts. While noise impact studies on sea mammals, etc., are undertaken, it is necessary to ensure the noise profile, operating mode and design of ship and propeller are carefully related in order to determine the important parameters that can be improved. It is now necessary to wait until work in the "mammal" area catches up to the work done on the "vessel" area.

5. Subprojects:

To be determined as initial studies are analyzed.

6. Need for Study in terms of:

(a) Department Mandate:

Coast Guard, under the AWPPA has an extended mandate for environmental impacts of ships, and its Arctic Shipping Control Authority is expected to respond with improved control measures where risks are perceived.

(b) Preparedness:

Important work has been done on a very limited scale on ship noise impacts, but the questions have been highlighted without any agreement on the conclusions, let alone the practical solutions. Very few field trial results of large ships are available for correlation, and even one important project per year may not close the gap in time.

7. Relationship to Other NOGAP Projects:

Several NOGAP projects, such as DFO's B.1 have a strong correlation. Transport's role is to carry the share of such work that relates to the ship, leaving the environmental aspects to other experts.

8. Major Milestones/Outputs:

- A. Assessment and tabulation of useful results of ship and noise impact studies.
- B. Design and solicitation of partners for demonstration ship noise studies, related to each new ship design, operating theatre of significance.
- C. Accumulation and correlation of results.
- D. Development of broad guidelines for ship noise reduction wherein strength and effective ship operation are not unduly impeded.
- E. Depending on accumulated impact study results, draft design parameters for ships, carry out simulation studies, and produce regulations.

9. NOGAP Resource Requirements: (\$85-86, K)

	84/85	85/86	86/87	87/88	88/89
PYs	-	-	-	-	-
O&M	-	-	-	46.75	120

10. Other Funding:

Nil

11. PY Allocation:

Nil

E17
NOGAP PROJECT DESCRIPTION, 1985/86

1. Project Title: E.9-5 FIBRE OPTIC DATA SYSTEM
2. Project Manager: William McCloy
Coast Guard Northern
(613) 995-4771

(Note: This is a TDC project, with a minor Coast Guard Northern contribution.)

3. Objectives:

To evaluate the contribution fibre optics technology can make to ship design, construction and operation.

To assess the technical benefits, constraints and regulatory requirements flowing from the development and use of this technology as it relates to "Arctic" class vessels.

4. Brief Background and Description:

It is expected that fibre optics could play a significant role in future shipboard wiring installations. This technology could facilitate engine room automation and remote control in an electrically noisy and a harsh physical environment. However, much more information and some shipboard testing will be required before taking the decision to replace copper wire with fibre optics cable on major new ships such as icebreakers or Arctic tankers. To date, little is known about the behaviour of optical fibres in a salt water environment, and the practical problems which will be encountered in using this technology onboard ships. Also, specifications and standards are needed for the installation of fibre optics cables on ships.

The proposed project will allow Focal Marine Limited to gather relevant information pertaining to the use of fibre optic onboard ships, and the potential technical problems which must be addressed if this technology is to gain acceptance from the marine transportation industry.

5. Subprojects:

N/A

6. Need for Study in terms of:

- (a) Department Mandate:

Transports' Transport Development Centre is funding the major share of this work under their mandate for technology development, Coast Guard is funding a share under their mandate for Arctic ship standards and regulatory development.

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

Systems for instrumentation and for operation of large sophisticated Arctic ships are such that improved information transmission systems are required. This technology should precede the design and construction of the next generation of such ships.

7. Relationship to Other NOGAP Projects:

There is a direct relationship to another Transport program, as indicated. The TDC has the lead responsibility and Coast Guard is a participant.

8. Major Milestones/Outputs:

Phase A - Design Engineering
B - Electronics Package Demonstration
C - Fibre Optics System Integration
D - Installation
E - Sea Trials
F - Reports, analysis, standards

(Full details available)

9. NOGAP Resource Requirements: (\$85-86,K)

	84/85	85/86	86/87	87/88	88/89
PYs	-	-	-	-	-
O&M	-	50	-	-	-

10. Other Funding:

Total project is \$425,000, the balance is supported by Transport Development Centre.

11. PY Allocation:

N/A

E19
NOGAP PROJECT DESCRIPTION

1. Project Title: E.10 NORTHERN ORGANIZATION (1984/85- 1985/86)
E.11 TERMPOL (1985/86 - 1987/88)
2. Project Manager: Carol Stephenson
Director, Coast Guard Northern
(613) 995-7412
3. Objectives:
 - (a) To develop within Coast Guard a Northern Region, in accordance with a 5-phase plan designed to pull together the resources and responsibilities for providing service to shipping across the Arctic Region.
 - (b) Within NOGAP, to develop and implement the resources (PYs and dollars) that have been approved as a contribution to the early years of the Northern Region development group.
 - (c) To maintain the capability to respond to additional TERMPOL requests from development in the Arctic and the heightened environmental concerns for the area.
4. Brief Background and Description:

A five phase plan has been developed which will allow the new Directorate to develop into a fully operational Arctic Region by 1989 despite the fact that plans for the first two phases have been slowed by late resourcing. This would then be followed by a headquarters relocation in the North to coincide with year-round shipping in Arctic waters.

The initial infusion of person-years and financial resources was provided by the Polar Icebreaker Project Group. Subsequently, through DIAND's Cabinet Papers on Northern Oil and Gas, three Cabinet Envelope Committees have twice given policy approval to the Northern Region, among other initiatives related to preparing for Arctic developments.

The role, objective, policies and strategies of this Region when established will be similar to those of current Coast Guard Regions, however certain functions will of necessity be unique to the northern environment.

The Northern Directorate has been developed by resources contributed from other programs of Coast Guard, beginning with the project team for the Polar 8 icebreaker. To that group have been added a Ship Safety group, Navigation Systems, NORDREG and Program divisions. Major projects

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include Arctic Marine R&D (\$2 million per year), NOGAP R&D (\$200K), the responsibility for the Arctic Shipping Control Authority, and lead responsibility for regulatory updating of the ship standards under the Arctic Waters Pollution Prevention Act.

"TERMPOL Code" is short for "Code of Recommended Standards for the Prevention of Pollution for Marine Transportation Systems and Related Assessment Procedures". The Code's recommended standards and guidelines apply to proposed bulk oil, chemical, liquified natural gas (LNG) and liquified petroleum gas (LPG) marine terminal systems. A marine terminal system is arbitrarily defined in this Code to mean the ship's berth, its approaches from seaward and related port or terminal infrastructures. The TERMPOL Code focuses on a specified design ship's selected route through one, or more, Canadian coastal regions to the site of the proposed terminal's ship berth. The intent of the TERMPOL Code is to identify and to ameliorate, if possible, those elements of a proposal which could, in certain circumstances, threaten the integrity of the design ship's hull and its cargo containment system and, consequently, the marine environment in the vicinity of the design ship while it is navigating through Canadian waters. The Code also applies to cargo transfer operations alongside the proposed terminal and to the terminal's ship oriented safety services. Coast Guard is responsible for forming and chairing an interdepartmental committee that responds to a proponents' request for a TERMPOL.

5. Subprojects:

N/A.

6. Need for Study:

N/A.

7. Relationship to Other Programs:

Transport is receiving only an initial contribution of PYS from NOGAP towards the Northern Region and TERMPOL development. Other Coast Guard programs are contributing, and resources are drawn from Transport's Arctic Marine R&D program. The Polar icebreaker program is a separately funded part of the Branch. Transport is seeking A-Base resources from Treasury Board in the MYOP to pick up on the NOGAP resources when those lapse.

8. Major Milestones/Outputs:

A fully developed 5-phase program is available in support of the Northern Region Development. Within the share of the program carried under NOGAP, the milestones are:

1985/86:

Full implementation of the responsibilities related to the requested resources, which are Director's responsibilities for the Northern Branch, Ship Safety, Arctic R&D responsibilities, Programming and Admin functions, Navigation Systems responsibilities, NORDREG (vessel traffic management in the north).

1986-87 onward:

The TERMPOL PY's in addition to managing the R&D and ports-related studies proposed under NOGAP and Arctic Marine R&D, take responsibility in the Northern Region development group for the TERMPOL Code and its adaptation and application to Arctic Port site proposals. As various port sites are proposed for assessment, the Coast Guard-led assessment teams are developed and guided by these incumbents. They also provide the marine technical assessment of the ship, the route, ship movements and loading at the port site, cargo handling, the assessment of ship-produced environmental impacts.

9. NOGAP Resource Requirement (\$85-86 K):

	<u>85-86</u>	<u>86-87</u>	<u>87-88</u>
<u>Northern Org.</u>			
PYs	9		
Salary	449		
O&M	<u>225</u>		
TOTAL	674(9)		
<u>TERMPOL</u>			
PYs	1	2	2
Salary	<u>40</u>	<u>71.25</u>	<u>71.25</u>
TOTAL	40(1)	71.25(2)	71.25(2)

10. PY Justification:

Coast Guard Northern has been established using a mix of PYs from existing internal sources and sources such as NOGAP and Arctic Marine R&D which lapse at various points along the development plan. At present, the Northern Region has fifteen (15) people on staff, but with only one PY officially established in the A-Base. NOGAP resources have been a major source of PYs in 1984/85 (11 PYs) and they are the major source for 1985/86.

The PYs were approved by Treasury Board on May 17, 1984 (TB 793171) and are restated here at the same level as approved at that time. Full justification in the form of organization charts, MYOP submissions, outlines for each position, time allocation within each position description, and the background of policy approvals and the 5-year development plan for Northern Region are available, and have been provided to the DIAND Coordinator.

F1

NATIONAL MUSEUMS OF CANADA

(\$1985-86, K)

PROJECT NO., TITLE AND PROPOSED DURATION	1985-86		1986-87		1987-88	
	\$	P-Ys	\$	P-Ys	\$	P-Ys
<u>PE: National Museum of Man</u>						
F.1 Northern Hydrocarbon Archaeology (1984/85-1990/91); In-house.	352	4	352	4	352	4
<hr/>						
NMM TOTAL	352	4	352	4	352	4

February 1985

NOGAP PROJECT DESCRIPTION1. PROJECT NUMBER AND TITLE:

F1 - NORTHERN HYDROCARBON ARCHAEOLOGY: A COORDINATED ATTEMPT AT DEVELOPING AN INTEGRATED ARCHAEOLOGICAL RESOURCE MANAGEMENT SYSTEM WITHIN THE NOGAP AREA. (1984-85 to 1990-91).

2. PROJECT MANAGER:

Mailing address:
Jacques Cinq-Mars
Archaeological Survey of Canada
National Museum of Man
OTTAWA, Ontario
K1A 0M8

Workplace:
241 Cité des Jeunes
Asticou Center
Block 1100
AYLMER, Québec
Tel. no.: 997-8173

3. OBJECTIVES:

To increase multi-levelled data base and expertise required to interpret, evaluate, preserve and protect as efficiently and as rapidly as possible, and in a coordinated fashion, a complex set of very fragile, non-renewable archaeological resources that are known or expected from the NOGAP area.

4. BACKGROUND AND DESCRIPTION:

The resources under consideration consist of both prehistoric and early historic material remains (archaeological sites and specimens in their geological/paleoecological contexts) representing in many instances the only documents that can be used to reconstruct and understand early and more recent traditional human adaptations in Northwestern Canada, and the history of the predecessors and ancestors of the populations presently living and interacting within the confines of the NOGAP area, namely the Inuit, the Dene, the Metis, and the Euro-Canadians.

For instance, on the basis of studies carried out to date at the periphery of the NOGAP area, it is clear that portions of the northern Yukon coastal area as well as of the Mackenzie delta could well yield evidence pertaining to the early phases of the peopling of the New World. Also, existing archaeological evidence from the general area under consideration can allow us to note the importance of segments of the coastal zones in our growing understanding of early migrations and adaptational shifts of prehistoric Inuit populations. Similarly, some of the more interior regions of the NOGAP area are or will be of prime importance for the deciphering of Athapaskan (Dene) prehistory and of its changing interface with that of the Inuit. Finally, we can also stress the value of these resources in our understanding of the great cultural changes that resulted from the early contacts between local

native populations and early Euro-Canadian groups and individuals.

In summary, then, what is presently known of the archaeology of this vast region is indicative of great potential for further research. Recent archaeological studies can also be used to demonstrate that both known and yet to be discovered archaeological resources are very sensitive to many forms of modern industrial development. When disturbed in the course of implementing the latter, most archaeological remains are totally destroyed or sustain such severe impacts that they become virtually meaningless assemblages. Therefore, there is an urgent need to formulate and implement a long term programme that will serve to evaluate and mitigate rationally the eventual impact of future industrial activities on the archaeology of the area under discussion.

The project will have three areas of concentration:

a) Acceleration of archaeological data gathering and multi-levelled interpretation through field inventories, impact assessment surveys, tests-excavations, laboratory processing, curatorial treatment, conservation (when required), and analyses. These functions are to be carried out with respect to selected portions of the NOGAP area, with special emphasis on the regions covered by the redefined development scenarios. This particular sub-objective also incorporates a scientific and general public information component inasmuch as the intrinsic value of archaeological resources can only become a useable reality through interpretation, integration into a larger body of historical knowledge, and dissemination.

b) Initiation, gradual implementation and evaluation of archaeological research and management mechanisms, procedures and guidelines designed to facilitate both planning and mitigation requirements. Most of these activities will draw heavily upon the field/lab work in terms of resource evaluation, priority setting, scheduling, etc. They will be developed in close coordination and collaboration with agencies responsible for archaeology and cultural resource management (Y.T.G. and G.N.W.T.) and for various land-use planning and environmental protection activities (federal and territorial). This approach will provide us with the means to better articulate and integrate most archaeological resource management requirements with those of the latter agencies. (See below, no. 7).

c) As per the approved terms of our earlier NOGAP submissions, the project also incorporates as an essential component a study and analysis of policy requirements in the field of archaeological heritage protection in areas of federal jurisdiction. This long-term activity is in response to the present lack of an integrated/coherent federal policy on such matters, and is an essential ingredient in the successful implementation of the NOGAP archaeology project.

5. SUB-PROJECTS:

None.

6. NEED FOR STUDY:

- a) Department mandate. - The ASC-NMM-NMC's mandate includes responsibility for archaeology in areas of federal jurisdiction (excluding National Parks), review of permit and license applications to carry out archaeological work in these same areas, evaluation of the scientific quality of such work, and a repository function for archaeological collections and associated documentation that result from such activities.
- b) Preparedness. - The ASC-NMM-NMC has long been recognized as the lead agency in the field of archaeological research and resource management in most areas of federal jurisdiction, especially for areas North of 60° where, for several years, it has supported the complementary efforts of the territorial agencies. In the face of on-going explorations and planned development in the NOGAP area, the resulting information and expertise can thus be used as the basis for the creation of a more formal archaeological resource management approach that is (will be) urgently required if the government is to ensure the short and long-term protection, preservation, and interpretation of a vast and complex array of non-renewable resources (sites and specimens) that are of importance to our understanding of the prehistory and early history of a vast portion of Canada.

7. RELATIONSHIPS TO OTHER NOGAP PROJECTS:

The ASC-NMM NOGAP archaeology project has been defined and developed in close coordination with representatives of the territorial agencies locally responsible for archaeological resource management (Yukon Heritage Branch, Y.T.G., and Prince of Wales Northern Heritage Centre, G.N.W.T.). The latter have agreed that the ASC-NMM should serve as the lead agency in the complex process of supporting, reporting upon, advising upon and/or implementing various aspects of the planned, coordinated archaeological research and resource management package, which includes this project and NOGAP projects G.18 and H.32.

Federal agencies responsible for land-use planning, and environmental conservation and protection have also been extensively consulted in the preparation of this project which ultimately will serve to generate, among other things, various types and levels of information that are needed for land-use planning, environmental protection, and northern conservation purposes.

8. MAJOR MILESTONES/OUTPUT:

1985-86:

- Production of initial archaeological resource management information manual.
- Initial regional/sub-regional field inventories. (Specific study areas are being determined, in collaboration with the pertinent territorial agencies, on the basis of research/management priorities).

- Draft papers on archaeological research/resource management requirements workshops (held in 1984-85).
- Report(s) on field/management activities and developments.

1986-87:

- Continuation of areal inventories and tests-excavations of selected sites.
- Formalization of guidelines and procedures (in coordination with pertinent agencies).
- Report(s) on field/management activities and developments.

1987-88:

- Continuation of areal inventories and tests-excavations of selected sites.
- Continuation of work towards the development and testing of archaeological resource management mechanisms.
- Elaboration of selection criteria/priorities for purpose of mitigation.
- Report(s) on field/management activities and developments.

It should be noted that due to the context of the present exercise, the afore-mentioned only deals with a fraction of the expected output of a project that has been planned, developed and approved on the basis of a 7 year life span.

9. PROPOSED NOGAP RESOURCE REQUIREMENTS (1985-86 K\$):

	85-86	86-87	87-88
PYs	(4)	(4)	(4)
Salaries	120	120	120
O & M	226	226	226
Capital	6	6	6
	—	—	—
Totals	352	352	352

10. P.Y. JUSTIFICATION:

The P.Y. requirements are presently limited to four (4) individuals: two (2) researchers, one (1) research assistant, and one (1) secretary. These requirements are considered essential for the successful pursuit

of our objectives over the entire life of the project, and it is clear that any further staff reduction will seriously jeopardize both overall and specific objectives of the project. In other words, they correspond to the minimum number of persons required if:

- (a) the level of archaeological research/management expertise of ASC-NMM is to be effectively increased over a period of a few years;
- (b) the inter-agency coordination in both field and management contexts is to be kept operationally efficient;
- (c) field activities (in-house as well as through contracts) are to be carried out in an efficient and accelerated fashion;
- (d) data processing and multi-levelled reporting is to be kept at a credible level;
- (e) the project itself is to be managed according to the standards put forward by the NOGAP secretariat and through other government agencies;
- (f) a functional and acceptable federal archaeological resource management/policy package is to result from the present project.

11. OTHER FUNDING:

Since NOGAP represents an augmentation of existing activities, the ASC-NMM contributes to the project in the following fashion:

- P.Y.: .5 (Project coordination and management)
- .5 (Research and management staff input: in the field, in the lab, and in response to the needs of the Interdepartmental Committee for Archaeology)
- 1.0 (Scientific records and Sites records)
- 2.0 (Curatorial section)

\$: Approximately \$150,000 of ASC-NMM's budget.

This basic or maintenance contribution of ASC-NMM is essential for the successful implementation of the project. This support will remain at this level or will be increased - in part because of the ASC-NMM responsibility as repository of most national archaeological collections - in response to the success of the various NOGAP field investigations over the entire life of the project.

AGRICULTURE CANADA

(\$1985-86, K)

PROJECT NO., TITLE AND PROPOSED DURATION	1985-86	1986-87	1987-88
	\$ P-Ys	\$ P-Ys	\$ P-Ys
<u>PE: Forest Research and</u> <u>Technical Services</u>			
C.20 Thermal Effects of Soil and Vegetation Disturbances (1984/85-1987/88); Contract.	47	48	49
AGRICULTURE TOTAL	47	48	49

NOGAP PROJECT PROPOSAL1. Project Title:

Thermal Effects of Soil and Vegetation Disturbances

NOGAP Project No.:

Vegetation C.20

2. Project Manager:

S.C. Zoltai
Canadian Forestry Service
Northern Forest Research Centre
5320 - 122 Street
Edmonton, Alberta T6H 3S5
Tel. (403) 435-7304

3. Objectives:

The main objective of these studies is to construct and test an empirically-based model that would enable land managers or project planners to predict the short- or long-term environmental consequences of development activities occurring within the open subarctic forest ecosystem (taiga) that typify the Mackenzie Valley and Delta.

1) Specifically the model would be developed upon the outcome of a detailed monitoring of controlled experimental studies designed to manipulate simulated disturbances that would be expected to occur as a result of the land-based activities associated with northern hydrocarbon developments.

2) The second, equally important objective is to test under controlled field conditions, several rehabilitation/revegetation treatments to determine their relative merit as techniques for re-establishing stable permafrost regimes and retarding erosion. Based upon the short- and long-term outcome of these tests recommendations as to the appropriateness of these practices will be made available to land managers, planners and regulators.

Sub-objectives:

1985-86

1) The initial effects of tree removal and surface excavation would be quantitatively determined (e.g. surface subsidence due to ground ice melting, surface erosion resulting from gully development, soil temperature and moisture increases, vegetation alterations reflected by species composition, vigour and cover, etc.);

2) On- and off-site sources of plant propagules would be quantified in the first year to determine the potential for native plant revegetation of the site;

3) Detailed micro-site description would be completed (e.g. micro-relief mapping, microclimate (atmospheric and soil) monitoring, horizontal and vertical soil properties, etc.);

4) Several experimental treatments would be imposed on the disturbed area to determine which is the most effective at short-term stabilization of the surface subsidence and erosion associated with the simulated disturbance;

5) Baseline descriptions of characteristics on disturbed and undisturbed sites would be incorporated into an ecosystem model. The model will be tested with the first year's data to determine if the nature and type of data are appropriate and to identify any gaps to be filled.

1986-85

1) On the basis of the quantitative model developed from the previous year's results the second year's data would be used to perfect its short-term prediction capabilities;

2) Results from the various experimental treatments will be evaluated on the basis of their effectiveness on the mitigation of the environmental impacts of the simulated disturbances;

3) New experimental treatments that would be defined by the outcome of the first year's results would be initiated and incorporated into the environmental monitoring program.

1987-88

1) In the third year the short-term predictive capabilities of the model will be better refined and have greater precision since a larger amount of data will be available to be incorporated into the model.

2) The results of 3 full years of responses to the experimental treatments will enable their evaluation as to their effectiveness in the control of surface subsidence and erosion as well as the re-establishment of the site's biological function within the forest system.

4. Background and Description:

Any land based developments in the Mackenzie/Yukon area will affect the extensive zone of open forested areas that are found between tundra and boreal forest ecosystems. There is a distinct lack of information about responses to development related disturbances and little research has been conducted into the performance of specific mitigative/rehabilitation measures. Indeed no testing has been

completed that provides land managers with a scientific basis for evaluating specific rehabilitation techniques. This is despite the fact that it is highly desirable to be able to predict both the short- and long-term outcome of the various development/rehabilitation scenarios available to project proponents.

These studies will evaluate the major environmental components and provide the quantitative data necessary for the development of a reliable model with predictive capabilities. Components to be incorporated include: soil characteristics as they affect vegetation and permafrost; permafrost characteristics as they affect soils and vegetation; soil and atmospheric microclimate as they affect vegetation and permafrost; vegetation as it affects microclimate, soils and permafrost; time as it affects the response to initial disturbances over short- and long-term time frames.

Monitoring programs in the past have been relatively passive. This research program will actively involve the manipulation of rehabilitation treatments as the need arises and will therefore be continually manipulating the system to produce the most desirable outcome. These alterations will then be fed back into the model and their outcome assessed.

During 1985 the study site was selected and initial environmental descriptions completed. Soil and atmospheric microclimatic data are presently being continuously recorded. Soil, vegetation and permafrost studies have yielded data that provide an initial site description. Land use permits have been granted and site facilities have been planned.

5. Subprojects Foreseen:

None.

6. Need for Study:

a) Department Mandate:

Ensuring that the integrity of the terrain and the productivity of disturbed surfaces are maintained fall within the general mandate of the Department of Environment.

b) Preparedness:

Within DOE, expertise on terrain-vegetation interactions is presently based on the personal experience of a very few individuals. An empirically based model, however, can be applied by less experienced persons, obtaining a technically sound evaluation of a complex system. This study would provide a sound prediction of consequences of different kinds of disturbances within the western subarctic region by collecting limited local data of the key parameters.

7. Relationship to other NOGAP Projects:

None to NOGAP projects.

Relationship to Norman Wells Research and Monitoring Program:

1. Thermal Regime and Ground Stability (EMR)
2. Revegetation (DIAND)

These Studies are reactive in nature by monitoring the behaviour of terrain and vegetation after a disturbance. The proposed study would treat vegetation and terrain as an interactive unit, with pre- and post-disturbance performance of a subarctic forest on icy terrain.

8. Major Outputs

The initial model designed to be tested after the first season's results will be crude but improvements and refinements will improve its status each year. By the third year it is expected that its predictive capability can be sufficiently accurate to be reliable on at least a short-term basis and be useful for long-term predictions but with less resolution. With the completion of each year's studies the outcome of specific rehabilitation/revegetation experiments will be summarized. These data will be used to test and refine the model as well as be available to those wishing to develop rational programs in recently disturbed terrain.

1985 - 86

1) Produce an evaluation of the simulated disturbance, the experimental treatments and the initial results of the monitoring program;

2) Produce the initial tested model with the data that have been collected over the first year.

1986 - 87

1) Provide the updated model that has been refined with new data;

2) An evaluation of the performance of old and newly installed experimental treatments.

1987 - 88

1) Provide the model that is based upon 3 years of experimental and monitored results that will have reliability in the short-term prediction of the outcome of specific rehabilitation/revegetation treatments.

2) Provide the 3-year evaluation of specific experimental treatments and give the assessment of their short-term performance in the form of a set of recommendations that can be followed in future land-based hydrocarbon development activities.

9. Proposed NOGAP Resource Requirements over project life (K, 85-86)

	85-86	86-87	87-88
PYs	-	-	-
Salary/Benefits	-	-	-
O&M Capital	47	48	49
TOTAL	47	48	49

10. P-Y Justification:

No PYs are required as project will be handled on contract.

11. Other Funding:

None.

Contractor (University of Alberta) is willing to commit limited funds and PYs to this project.

GOVERNMENT OF YUKON

PROJECT NO., TITLE AND PROPOSED DURATION	1985-86	1986-87	1987-88
	\$	\$	\$
<u>Department of Community and Transportation Services</u>			
G.9 Community Impact Analysis, 1984/85 and 1986/87; In-house and Contract.		102	
<u>Department of Education (Libraries and Archives)</u>			
G.2 Beaufort Hydrocarbon Information Acquisition and Processing (1984/85-1988/89); In-house.	65	72	72
<u>Department of Economic Development</u>			
G.1 Beaufort Hydrocarbon Coordination (1984/85-1990/91); In-house.	91	124	114
G.3 Data Development in Relation to Beaufort Hydrocarbon Development Requirements (1984/85-1988/89); In-house.	129	129	129
G.4 North Slope Transportation Options Study (1984/85-1985/86); Contract.	25		
G.5 Labour Accommodations Study (1986/87); Contract.		74	
G.7 Identification of Yukon Business Opportunities from Beaufort Hydrocarbon Development Activities (1984/85-1986/87); Contract.	82	82	
<u>Department of Renewable Resources</u>			
G.10 Herschel Island Territorial Park Planning (1984/85-1986/87); In-house.	165	100	
G.13 Polar Bear Maternity Denning Investigation (184/85-1985/86); In-house.	21		
G.14 North Coast Dall Sheep Investigation (1984/85-1985/86); In-house.	42		

PROJECT NO., TITLE AND PROPOSED DURATION		<u>1985-86</u>	<u>1986-87</u>	<u>1987-88</u>
		\$	\$	\$
G.15	Economic Harvest Potential and Management of Arctic Fox in Yukon (1984/85-1985/86).	13		
G.16	Impacts of Oil and Gas-Related Activities on Caribou (1984/85-1986/87); In-house.	38	34	
G.17	Raptor Management Plan for the Yukon North Slope (1984/85-1987/88); In-house.	16	5	5
<u>Department of Tourism</u>				
G.18	North Coast Heritage Research and Protection (1984/85-1988/89); In-house, possibly some contract.	144	100	92
YTG TOTAL		831	822	412

NOGAP No. G-9
February, 1985

Project Title: COMMUNITY IMPACT ANALYSIS
1984/85 & 1986/87

Project Manager: Mark Hambridge
Community Planning Advisor
Department of Community and Transportation
Services
Government of Yukon
Box 2703,
Whitehorse, Y. T.
Y1A 2C6

Telephone: (403) 667-5306

Objectives:

This study will examine the effect of Beaufort development on the physical infrastructure of existing Yukon communities:

- to assess the readiness of the physical infrastructure of Yukon communities to absorb development;
- to determine what urban infrastructure is needed under the various development scenarios;
- to prepare an outline programme and budget of land development and infrastructure construction needed to meet community needs.

Background:

By reviewing the status of the existing infrastructure in all Yukon communities to assess its capability to accept new or increased development related to hydrocarbon production,

The study will:

1. set basic standards of infrastructure and service in Yukon communities.
2. test communities to see if they meet prescribed standards.
3. assess the cost of bringing communities up to standard.
4. establish the impact on communities of Beaufort development under demonstration phased scenarios.
5. project the incremental infrastructure required to meet anticipated impacts.
6. implement infrastructure improvements.

Need for Study:(a) Mandate:

The Department of Community and Transportation Services is responsible for effective land use planning for rural and urban communities.

(b) Preparedness for Decision-Making:

A population build up in various Yukon communities, as a result of Beaufort development, could strain existing land resources and infrastructure resulting in distorted land prices and service breakdowns. Without an assessment of the adequacy of existing facilities, a projection of needs cannot be prepared. Not carrying out these studies will prevent the Government of Yukon from planning wisely and budgeting logically for future development and making proper provision for the growth of Yukon communities.

Relationship to Other NOGAP Projects:

The Labour Accommodation Study is closely related to this project, since the potential of a new community on the Beaufort could result in 'no impact' on Yukon communities. Conversely, a fly-in rotation could have a significant impact on existing communities.

Major Milestones/Outputs:

Items 1 through 3, completed in 1984/85 will result in a report setting standards established by the Government of Yukon and the communities.

Information relevant to item 4 will be available by 1986. The final stages of the project will be carried out in 1986/87.

NOGAP Funding Requirements:

	<u>85/86</u>	<u>86/87</u>
P.Y.	---	---
O. & M.	---	\$102,000
Capital	---	---
Total	---	\$102,000

Other Funding:

None.

NOGAP No. G-2
February, 1985

Project Title: BEAUFORT HYDROCARBON -
INFORMATION ACQUISITION AND PROCESSING
1984/85 - 1988/89

Project Manager: Patricia Norton
Beaufort Sea Librarian
Libraries and Archives
Government of Yukon
Box 2703
Whitehorse, Yukon,
Y1A 2C6

Objectives:

- (1) to acquire, catalogue and make available research reports and other literature related to Northern Hydrocarbon development particularly the Beaufort Sea area, as it impacts on the Yukon.
- (2) To develop an updateable annotated bibliography of Beaufort Sea material for use by researchers.

Background and Description:

The project involves the identification, acquisition and processing of material related to Northern Hydrocarbon Development. Identification of material is accomplished by searching relevant bibliographies, literature, data bases and on-site visits. Acquisition of material is accomplished through purchase, donation or inter-library loan. Once the material has been processed and catalogued, it is readily accessible to researchers. A major aspect of this project is the development of an annotated bibliography, which will be updated on a regular basis.

Our priorities will be limited to the following:

- Priority #1: hydrocarbon development in the Beaufort Sea as it pertains only to Yukon.
- Priority #2: hydrocarbon development in the Beaufort Sea area as it pertains to Yukon and the Northwest Territories only.
- Priority #3: hydrocarbon development in the Beaufort Sea area as it impacts on the Yukon, Northwest Territories, the Canadian North and Northern Alaska.

Need for Study:a) Mandate:

The Department of Education, Libraries and Archives Branch is responsible for the collection, maintenance and the provision of resource materials for use by the general public.

b) Preparedness for Decision-Making:

During the Alaska Highway Natural Gas Pipeline hearing process, the Yukon Archives provided access to all kinds of scientific, social and economic information. Consequently, the archives activities expanded beyond the range traditionally associated with archives to the point where the Yukon Archives assumed the role of a Yukon Information Centre. As a result of this, the Yukon Archives has continued to acquire and make available current scientific material in addition to historical collections. As a Yukon Information Centre, the archives has the potential for being the central reference point for all those concerned with change and development in the Beaufort Sea area. Since hydrocarbon development affects every facet of life in the Beaufort, the Yukon Archives intends to acquire all information pertaining to this area.

This project will provide ready access to current and retrospective information concerning all aspects of hydrocarbon development, for researchers, members of the business community and the general public. Considering the increasing interest in hydrocarbon development in the Beaufort Sea area, it is anticipated that government officials, local researchers and special interest groups will use the archives for researching briefs in preparation for presenting position papers and public hearing submissions in addition to subsequent research on development proposals and activities. This information will be particularly useful for government departments, such as Renewable Resources, Economic Development and Tourism, Community Affairs and Transportation and the Executive Council Office.

Relationship to other NOGAP Projects:

The archives collection will be available for researchers in various government departments. Those departments who are administering NOGAP projects will be contacted to determine methods of acquainting them with the resources housed in the Yukon Archives and to familiarize the archives with departmental collections and information needs. In addition to the production of an annotated bibliography of Beaufort Sea material housed in the archives Library, a list of recent acquisitions will be circulated interdepartmentally to aid in current awareness for those departments. Consideration is also being given to the circulation of a list of duplicate titles acquired by the Yukon Archives. A reciprocal inter-departmental system of information exchange regarding new acquisitions or duplicate material would greatly benefit all departments concerned with hydrocarbon development in the Beaufort Sea area.

Major Milestones/Outputs:

Since the project is still in its infancy, there is very little in the way of statistics or reports to put forth at the present, other than the fact that there are almost 1000 titles in the collection to date. This Northern Hydrocarbon project will ultimately generate a substantial comprehensive, annotated bibliography of all related material held within this library. This updateable bibliography, will be made available to government departments and the public. The circulation of acquisition lists will also assist government departments with an interest in Northern Hydrocarbon development.

NOGAP Funding Requirements:

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
PYs	1.5	1.0	2.0
O & M	\$65,000	\$72,000	\$72,000
(incl. salaries)	(35,000)	(40,000)	(40,000)
Capital	<u>---</u>	<u>---</u>	<u>---</u>
Total	\$65,000	\$72,000	\$72,000

Other Funding:

None.

NOGAP No. G-1
February, 1985

Project Title: BEAUFORT HYDROCARBON COORDINATION
1984/85 - 1990/1991

Project Manager: Bruce Demchuk
Policy, Planning and Research Branch
Department of Economic Development & Tourism
Government of Yukon
Box 2703
Whitehorse, Y. T.
Y1A 2C6

Telephone: (403) 667-5737

Objectives:

The goals of this project are:

- (1) to ensure that when required, the Yukon Government can issue a coordinated response from all interested departments on matters related to northern hydrocarbon development in and adjacent to the Yukon. The legislated mandate under the Yukon Act and Acts related to its socio-economic and wildlife responsibilities will be considered in the context of these responses;
- (2) to facilitate an inter and intra governmental flow of information, and;
- (3) to provide a comprehensive and timely review and assessment of hydrocarbon related research, reports, hearings and development proposals.

Background:

This project will involve the following:

- (a) co-ordination of priorities, research plans and policy regarding northern hydrocarbon development;
- (b) monitoring and evaluating company activities as these relate to the Yukon and monitoring the progress of Yukon Government research and programs;
- (c) liaison with departments in the Yukon Government, the Federal Government and with the Government of the Northwest Territories;

(d) presentations to and working liaison with

- (1) Yukon communities
- (2) the business sector
- (3) special interest groups, and;
- (4) representatives of the major operators

Need for Study:

(a) Mandate:

The Major Projects Branch has the responsibilities in the Yukon Government for:

the co-ordination of Yukon Government activities related to Beaufort Sea development and other major hydrocarbon projects.

(b) Preparedness for Decision-Making:

Yukon's ability to respond effectively to hydrocarbon development activities is constrained by the limited resources that can be dedicated to hydrocarbon projects. With an expansion in exploration work, several development proposals for Yukon's North Slope and the consequent necessity to formulate socio-economic and wildlife programs, it is critically important for the Yukon Government to obtain the resources necessary to increase its work on oil and gas issues and to coordinate its activities in an integrated, systematic and timely manner.

Relationship to Other NOGAP Projects:

Central coordination of Yukon Government activities regarding northern hydrocarbon development will ensure an integrated approach across departments within the government in the collection of data and in the development of policies and management regimes related to oil and gas activities. It will ensure that Yukon's research efforts will be complementary to, and not overlapping with those of other agencies working under related legislative mandates. It will also conform to the streamlined, centralized review process called for repeatedly during the Beaufort EIS hearings.

Major Milestones/Outputs:

It is not possible to include a timetable for major outputs as reports and policy will be prepared as required. The first output however will be the Yukon Government response to recommendations made in the Beaufort Environmental Assessment Review Panel report.

NOGAP Funding Requirements:

	<u>85/86</u>	<u>86/87</u>	<u>87/87</u>
P.Y.	1.5	1.5	1.5
O. & M.	\$ 91,000	\$124,000	\$114,000
Capital	<u>---</u>	<u>---</u>	<u>---</u>
Total	\$ 91,000	\$124,000	\$114,000

Other Funding:

None.

NOGAP No. G-3
February, 1985

Project Title: DATA DEVELOPMENT IN RELATION
TO BEAUFORT HYDROCARBON DEVELOPMENT
REQUIREMENTS
1984/85 - 1988/89

Project Manager: Glenn Grant
Director, Statistical Services
Department of Economic Development & Tourism
Government of Yukon
Box 2703
Whitehorse, Yukon
Y1A 2C6

Telephone: (403) 667-5463

Objectives:

The objective of this project is to systematically develop the statistical data base required to monitor and document hydrocarbon development in Yukon.

Background:

Currently, the essential data required for responsible decision-making and policy formation is not available to the Government of Yukon or to the general public, especially industry, affected by hydrocarbon development. Although the population in the Yukon is small there exists a minimum threshold of government services for that population. To be responsive to the demands of large-scale hydrocarbon development, an efficient statistical and data development program must be in place. In order to achieve the above objective the following activities must be undertaken:

1. Develop methodologies suitable for small area data development.
2. Initiate data development projects which contribute to the overall statistical data base related to hydrocarbon development for the Government of Yukon.
3. Develop a base line data set prior to hydrocarbon development.
4. Systematically provide an information data bank for access by government, private sector and general public interests.

Need for Study:(a) Mandate:

The mandate of the Department of Economic Development includes that of the provision of Statistical Services for Yukon.

(b) Preparedness:

To responsibly monitor and evaluate the impacts of Beaufort hydrocarbon activities on the Yukon, we must be prepared to deliver the information required for policy formation by our government.

Further, the Yukon Government must also be prepared to provide industry with data which they require in their planning process and with which they have come to rely on government to provide.

In the absence of this data, all users, industry planners, and policy makers, will be at a distinct disadvantage with respect to Beaufort hydrocarbon development.

Relationship to Other NOGAP Projects:

This project will be related to the other NOGAP projects in Yukon in so much as it will develop data used by other activities. Specifically all socio-economic research will require the information developed by this project. Whether the benefits are from the consolidation and availability of data or from the newly developed data all other research projects will ultimately gain by our activities.

Major Milestones/Outputs:1985/86

- i) Statistical Profile - this document will provide a base line reference document for the Yukon;
- ii) Development of a public dissemination strategy for statistical data;
- iii) Collection and input of family allowance data pertaining to children. Development of programs to provide useful information from this data;
- iv) Collection and input of Revenue Canada data pertaining to individual income.

v) Design and development of programs for the collection of:

- energy statistics
- justice and crime statistics
- labour force statistics
- social assistance statistics
- alcohol data

1986/87/88

- i) Implementation of programs and methodologies for the collection of statistics noted in v) above. A yearly report will summarize activities in each of the statistical areas reviewed.

NOGAP Funding Requirements:

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
P.Y.'s	3	3	3
O & M			
salaries	120,000	120,000	120,000
travel	4,000	4,000	4,000
expenses	5,000	5,000	5,000
Capital	<u>--</u>	<u>--</u>	<u>--</u>
Total	129,000	129,000	129,000

Other Funding

None.

NOGAP No. G-4
February, 1985

Project Title: NORTH SLOPE TRANSPORTATION
OPTION STUDY
1984/85 - 1985/86

Project Manager: Rob McWilliam
Director
Policy, Planning and Research Branch
Department of Economic Development and Tourism
P. O. Box 2703
Whitehorse, Yukon
Y1A 2C6

Telephone No: (403) 667-5461

Objectives:

- (1) To evaluate the transportation costs, availability, seasonality, and other factors associated with alternative transportation routes, modes, and carriers for transporting goods and people to the proposed port development at King Pt. on Yukon's North Slope.
- (2) To identify the routes, mode, etc. which offer the best combination of costs, seasonality, and availability advantages from the perspective of the users of the port facilities.
- (3) To assess the impact on the most cost effective route to the King Pt. facilities, if the Government of Yukon were to construct an all-weather road from the Dempster Highway to King Pt.
- (4) To identify initiatives which could be taken by the Federal and Yukon Territorial Governments to enhance the advantages of Whitehorse as a trans-shipment, supply, and worker rotation centre.

Background:

Since the inception of exploration activity in the Beaufort Sea region, the vast majority of goods and services to the Beaufort Sea project have been transhipped through the MacKenzie River system. Moreover, a large proportion of the workers on the Beaufort Sea projects have originated from southern centres and have been flown directly to Tuktoyaktuk by a 737 aircraft. At the present time, the Beaufort Sea oil companies rotate only a small proportion of their workforce in and out of Whitehorse and less than \$5 million in goods and services are purchased annually from Yukon businesses. There is a good possibility in the near future that a major port facility could be built at King Pt. on Yukon's North Slope. The purpose of this study would be to assess the extent to which

Yukoners could obtain major benefits from the development of these projects on the North Slope. There are many individuals who indicate that it is highly likely that the majority of goods and services to the North Slope project would still be transhipped via the Mackenzie River system with Inuvik being the major regional supply centre. In addition, these individuals feel that there is a large possibility that southerners will take the majority of jobs available at these projects utilizing a rotating shift operation from southern Canada.

The Yukon Government view is that the transportation cost differentials among routes are minimal and that any disadvantages associated with Whitehorse would be offset by faster delivery times and the convenience of year-round transportation systems. Moreover, certain officials of oil companies have expressed the view that transportation costs should not be the major constraint to the use of Whitehorse as a supply or worker rotation centre for developments at King Pt.

The study will undertake the following:

1. The decision has been made to cancel the use of the first year funds for this project. There are two studies which will essentially provide the same information as proposed in this study. "A Study of the Economic Viability of a Yukon-Based Regional Air Service" by Foster Research and the "Western Arctic Transportation Study" (in progress) will provide the information required in the first year.
2. The final reports of these studies will be reviewed in 1985/86. Deficiencies, when referring to Yukon concerns, will be identified and work will be undertaken in this project to address those deficiencies. A final report will augment the above studies from a Yukon perspective.

Consideration of the above reports will include a review of the following elements:

- the modes and costs of transporting goods and workers to the north coast from Whitehorse--which would be considered as a major supply centre.
- an assessment of establishing a jet air service between Vancouver-Whitehorse-Inuvik.
- the measures the Yukon Government could implement to enhance the benefits of Beaufort hydrocarbon development from a Yukon perspective.

Need for Study:(a) Mandate:

The Department of Economic Development & Tourism is responsible for the initiation, assessment and encouragement of economic development activities which will benefit Yukoners.

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

There is major discussion at the present time about the desirability in establishing facilities on Yukon's North Slope of hydrocarbon developments in the Beaufort Sea/Prudhoe Bay area. These decisions must come before March 31, 1986 if the proposed developers are to be given permission to develop those properties. As such, it is essential for Government of Yukon to be aware of the potential social and economic impacts associated with these projects prior to making a decision as to whether or not to continue support of developments on the North Slope.

Relationship to Other NOGAP Projects:

This project is undertaken in conjunction with the Labour Accommodations Study and the Impact Assessment of Industrial Development on the North Slope.

Major Milestones/Outputs:

It is expected that this study will be completed by March 31, 1986. There is expected to be a draft report ready some time prior to March 15, 1986 at which time the consultants will be discussing with the steering committee the results of the study.

NOGAP Funding Requirements:

	<u>85/86</u>
P.Y.	\$ 20,000
O. & M.	<u>5,000</u>
	\$ 25,000

Other Funding:

N/A

This proposal is a modification of the Air Transportation Options Study (G-4) previously approved and the Analysis of Road Access Options to the North Slope (G-8).

NOGAP No. G-5
February, 1985

Project Title: LABOUR ACCOMMODATIONS STUDY
1986/87

Project Manager: Rob McWilliam
Director
Policy, Planning and Research Branch
Department of Economic Development &
Tourism
Box 2703
Whitehorse, Y. T.
Y1A 2C6

Telephone: (403) 667-5461

Objectives:

The object of this study is to assess and contrast the social and economic viability of establishing a permanent community on Yukon's North Coast to service the oil and gas industry and the viability of fly-in/fly-out rotation from various Yukon communities.

Background:

It is Yukon Government policy that workers in development projects should be based, wherever possible, in existing Yukon communities, and rotated between the community and work-site. The establishment of new, single-industry towns is strongly discouraged, except under exceptional circumstances.

The reasons for this policy are various.

First, the economic stability and financial viability of existing communities are enhanced if residents can continue to live there rather than have to relocate to the project area in order to take advantage of employment opportunities. By encouraging employment, a rotating shift operation would bring about greater benefits for Yukoners.

Second, by retaining their residents, communities can maintain their social stability.

Third, the value added to Yukon's economy if employees recruited in the South relocate to communities in Yukon would be much greater than if these employees commuted directly from the South to the project area.

Fourth, the costs of building a new community would be very high, both in terms of capital and operating costs and in terms of the opportunity costs associated with leaving existing infrastructure under-utilized. As the life expectancy of a resource project is not known with certainty, there is also a risk that government may not recoup its investment in infrastructure and facilities in a new

resource-based community.

Costs and benefits will be evaluated against the following scenarios:

- pipeline transportation mode;
- tanker transportation mode;
- deep water port plus sand quarry operation.

The study will focus on:

- estimation of probable size of workforce plus dependents under different scenarios;
- estimation of costs of a number of rotating shift options from different Yukon communities.
- determination of costs of additional infrastructure and services need in existing communities to service workforce plus dependents;
- determination of costs of establishing and maintaining a new community on the North Coast;
- determination of revenues to government from establishing a new community;
- evaluation of costs and benefits of different options.

Need for Study:

a) Mandate

The Yukon Government; Department of Economic Development and Tourism is responsible for promoting the expansion and development of the Yukon economy.

b) Preparedness for Decision-Making

In the Beaufort area, there are several large projects that are imminent. A new community may become desirable. A deep-water port and sand quarry operation are presently being considered. The costs of rotating a large workforce could become prohibitive, whilst a large regional workforce could provide a sufficiently broad tax base to enable a new community to be largely self-sustaining once the initial capital investment has been made. The Yukon Government would then consider funding at least a portion of the necessary townsite facilities and services. A new town could accommodate a range of functions other than service to the petroleum exploration industry, for example government activities, education and training, mineral exploration, tourism. Creation of a range of work opportunities could stabilize an otherwise highly mobile workforce. In short the many parameters determining the costs and benefits of a new townsite versus fly-in, fly-out are not known. A study is

therefore necessary to determine these parameters. The study will be the basis upon which the Yukon Government can evaluate its policy options as regards labour accommodation.

Relationship to Other NOGAP Projects:

This study is related to the Community Impact Analysis project. Results obtained here could affect if or where a new community on the north slope would be established.

Major Outputs:

As yet no go-ahead has been issued for either a deep-water port or a sand quarry operation. The environmental issues involved mean that approval is not likely for some time. In any case it will be a few years before the workforce would be large enough to support a community. Therefore this study is not immediately necessary. It should be done after the socio-economic impact assessment of industrial development and the air transportation studies.

NOGAP Funding Requirements:

	<u>84/85</u>	<u>85/86</u>	<u>86/87</u>
P.Y.	---	---	---
O. & M.	---	---	\$74,000
Capital	---	---	---
Total..	---	---	\$74,000

Other Funding:

None.

NOGAP No. G-7
February, 1985

Project Title: IDENTIFICATION OF YUKON
BUSINESS OPPORTUNITIES FROM
BEAUFORT HYDROCARBON DEVELOPMENT
ACTIVITIES
1984/85 - 1986/87

Project Manager: Rob McWilliam
Director
Policy, Planning and Research Branch
Department of Economic Development & Tourism
P.O. Box 2703
Whitehorse, Yukon
Y1A 2C6

Telephone No. (403) 667-5461

Objectives:

The objectives of the study are to:

- (1) identify the segments of the Beaufort/Prudhoe Bay market where existing Yukon companies may compete successfully.
- (2) identify areas for joint venture capability.
- (3) determine what if any market segments where Yukon has a competitive capability but no firms are in existence.
- (4) develop methods to enhance capability for Yukon businesses to take advantage of potential opportunities in the Beaufort Sea/Prudhoe Bay areas.

Background:

The project would entail hiring a marketing research firm to undertake a comprehensive analysis of the Beaufort Sea/Prudhoe Bay operations in order to identify business opportunities for Yukon companies and to determine methods for increasing Yukon's participation in the Beaufort Sea over the next five years.

Need for Study:

(a) Mandate:

The Department of Economic Development and Tourism of Government of Yukon has a specific mandate to increase business development opportunities for Yukon companies within the Territory. The Beaufort Sea oil and gas developments, along with the possibilities of Prudhoe Bay development, indicate a potential of tens of millions of dollars in business revenue which could be accrued to Yukon

businesses through exploitation of the potential of the Beaufort Sea/Prudhoe Bay regions. The role of the Government of Yukon to determine the areas for potential opportunity by Yukon businesses, make Yukon businesses aware of these potentials and to encourage business development activities.

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

By undertaking this study, Government of Yukon will be in a strong position to determine the areas of potential expansion by Yukon businesses into the Beaufort Sea/Prudhoe Bay area. This information will be vital to ensure that Yukon businesses obtain a reasonable share of the large opportunities which are opening up in the Beaufort Sea/Prudhoe Bay areas.

Relationship to Other NOGAP Projects:

There is a project entitled "Northern Enterprise Study" conducted by the Environmental Studies Revolving Fund. The ESRF project will be complimentary to the above work described for NOGAP. Information generated in the Northern Enterprise Study will serve as a broad base for northern opportunities from which the NOGAP work can identify specific Yukon opportunities in the second and third year.

Major Milestones/Outputs:

Phase I: MARKET RESEARCH STUDY

The consultants will undertake a study to determine the complete range of goods and services required in the Beaufort Sea, by the various companies, to identify who is presently supplying the service and their business characteristics and to determine the areas where Yukon-based firms will have a competitive advantage.

Phase II: SUPPLY POTENTIAL

On the basis of the market research the consultants will have determined the areas where Yukon businesses have potential to supply operators. In Phase II they will determine the extent to which Yukon companies have penetrated these markets, outline areas where increased market penetration is possible and enunciate reasons why businesses have not taken advantage of their opportunities to date.

Phase III: MARKETING STRATEGY

In Phase III the consultants will devise and implement a marketing strategy to maximize the potential of Yukon companies to take advantage of opportunities. The strategy will consist of a program to educate Yukon businesses on Beaufort Sea operations, to provide advice and information on who to contact and how to approach companies, to develop a standardized marketing program that Yukon

businesses can adapt to their own business, and to arrange joint ventures.

TIMING

Phase II	March 1985 to September 1985
Phase III	September 1985 to March 1987

NOGAP Funding Requirements:

	<u>85/86</u>	<u>86/87</u>
P.Y.	---	---
O. & M.	\$ 82,000	\$ 82,000
Capital	---	---
Total..	\$ 82,000	\$ 82,000

Other Funding:

None.

NOGAP No. G-10
February, 1985

Project Title: HERSCHEL ISLAND TERRITORIAL
 PARK PLANNING
 1984/85 - 1986/87

Project Manager: Al Hodgson
 Chief Research and Planning
 Lands, Parks and Resources Branch
 Department of Renewable Resources
 Yukon Government
 Box 2703
 Whitehorse, Yukon
 Y1A 2C6

Telephone: (403) 667-5281

Objectives:

- (1) To determine background resource information which is available for Herschel Island, and from this, to identify requirements (if any) for resource inventories needed to support the management plan preparation.
- (2) To undertake resource inventories required for management plan preparation.
- (3) To prepare a management plan for Herschel Island Territorial Park.

Brief Background:

Herschel Island is an important historic area in the Yukon. It's heritage significance extends back at least 6,000 years with evidences of prehistoric Eskimoid cultures. Herschel Settlement in Pauline Cove was the main centre for steamwhaling at the turn of the century and was a northern base for early missionary and police activities.

Section 12(16) of the Inuvialuit Final Agreement establishes a Territorial Park on Herschel Island. In accordance with this section, the Yukon Government has proceeded with requests for the transfer of land from DIAND. This will lead to the formal establishment of the Park under the Yukon Parks Act.

The assembly of background resources information and the management plan itself should provide adequate information and guidelines for any development activities required in the Pauline Cove area.

Need for Study:(a) Mandate:

The Yukon Parks Act gives the Department of Renewable Resources the mandate to undertake resource inventories, prepare environmental impact statements and prepare management plans for Territorial Parks.

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

Present plans by a number of companies for hydrocarbon exploration and development in the Beaufort Sea make it extremely important to plan for any development activities which may take place in Pauline Cove within the Territorial Park. The current use of Pauline Cove as an over wintering base by Gulf for its exploration ship emphasizes the urgency for management plans to be prepared.

Relationship to Other NOGAP Projects:

It is anticipated that this project will be able to utilize wildlife information obtained from those projects being undertaken on Yukon North Coast area.

This project will be working in co-operation with the Department of Economics and Tourism, Heritage Resources Branch with the project for historic archaeology and restoration of historic buildings in Herschel Settlement.

Major Milestones/Outputs:1985/86

Individual reports and maps by discipline for any inventories required. Preliminary evaluation based on bibliographic reviews undertaken by November 1984 indicate that the following types of inventories are required:

- i) detailed soil and soil process information in and around Herschel Settlement;
- ii) general soil information for entire Island (1:25,000 scale);
- iii) vegetation/habitat information;
- iv) prehistoric archaeological sites inventory;
- v) aquatic-fisheries information will assist restoration of historic buildings by identifying and recommending construction techniques suitable for soils in the area of Herschel Settlement. In recommending location and/or methods

of improving land strip, and recommending methods of stabilizing gravesites.

1986/87

Management Plan which will define the type of park, zoning within park, policies and guidelines for all activities anticipated to occur in the Park. It also includes public reviews at various stages of preparation of the management plan. The public review will include consultation with native people as required by the Inuvialuit Fund Agreement and CYI Agreement-in-Principle.

NOGAP Resource Requirements (\$1984/85):

	<u>85/86</u>	<u>86/87</u>
P.Y.s	2.5	1.0
O. & M. (salaries portion)	\$165,000 (96,000)	\$50,000 (35,000)
Capital	<u>---</u>	<u>\$ 50,000</u>
Total	\$165,000	\$100,000

Other Funding:

None.

NOGAP No. G-13
February, 1985

Project Title: POLAR BEAR MATERNITY
DENNING INVESTIGATION
1984/85 - 1985/86

Project Manager: B.L. Smith, Fish and Wildlife Branch
Yukon Department of Renewable Resources
Box 2703
Whitehorse, Yukon
Y1A 2C6

Telephone: (403) 667-5177

Objectives:

- (1) To delineate onshore polar bear maternity denning areas on the Yukon coastline.
- (2) To determine the proportion of female polar bears in the Beaufort Sea population that den onshore vs offshore.
- (3) To determine female polar bear survivorship.
- (4) To compliment ongoing studies currently being undertaken by the U.S. Fish & Wildlife Service and the G.N.W.T. Department of Renewable Resources.

Background:

Female polar bears giving birth to cubs, den in November and emerge in March. These females and their small offspring are particularly vulnerable to industrial disturbance when denning is near industrial camps. Denning on Herschel Island and the mainland Coast east to Stokes Point is well documented. The extent of denning on coastal Yukon and N.E. Alaska and offshore is being investigated in this co-operative study with the N.W.T. Government, U.S. Fish and Wildlife Service, and Canadian Wildlife Service.

Need for Study:

(a) Mandate:

To provide for the management, conservation, protection and utilization of Yukon Fish and Wildlife.

(b) Preparedness:

This study is required to evaluate and investigate the impact of industrial development on Yukon's coastline and offshore shipping routes. Specifically knowledge of denning area locations and proportions of the Beaufort Sea population denning in each area will permit precise evaluation of alternative locations for

shipping lanes, ports and on shore developments.

Relationship to Other NOGAP Projects:

Bear related projects in this area proposed by the Yukon Government include a program to reduce the potential for bear human interactions. Work in this study will be complimentary to GNWT project H-13.

Major Milestones/Outputs:

A final progress report will be prepared containing the data results from this study.

The information here will be used in a larger report jointly published by the Yukon Government, the N.W.T. Government and the U.S. Fish and Game Branch.

NOGAP funding Requirements:

	<u>85/86</u>
P.Y.	---
O. & M.	\$21,000
Capital	---
Total...	\$21,000

Other Funding:

None.

NOGAP No. G-14
February, 1985

Project Title: NORTH COAST DALL SHEEP INVESTIGATION
1984/85 - 1985/86

Project Manager: Norman Barichello
Wildlife Management Branch
Department of Renewable Resources
Government of Yukon
Box 2703,
Whitehorse, Y. T.
Y1A 2C6

Telephone: (403) 667-5849

Objectives:

To investigate populations of dall sheep in the North Richardson and British Mountains:

- (a) To determine abundance, and population structure
- (b) To determine seasonal range use patterns
- (c) to catalogue and map critical areas (winter ranges, licks and lambing sites)
- (d) to identify important movement corridors

Background and Description:

Dall sheep are found in two areas near the Yukon's north coast; west of the Firth River in the British Mountains and in the vicinity of Rat Pass in the northern Richardson Mountains. Little is known of these populations.

The impact on sheep of northern oil and gas development depends largely on the direction of the development. The greatest concern is the development of an overland transport route through the northern mountains north of the Dempster Highway. Dall sheep centres of habitations, the locations of traditional special-use (critical) areas and the locations of important migration corridors are not entirely known. Development of such an overland route may result in habitat destruction, sheep disturbance and relocation to inferior areas, or disturbance and overharvest due to improved access into the area. Sheep in these mountains are the northernmost sheep populations in Canada. They live under severe environmental conditions, and therefore are particularly sensitive to northern development.

To accomplish the objectives the following will be undertaken:

- | | | |
|---------|-------|---------------------------------------------|
| 1984/85 | (i) | complete count and classification |
| | (ii) | estimate of productivity |
| | (iii) | seasonal use - lambing, summer, late winter |

- (iv) identification of lambing cliffs, winter ranges
- 1985/86 (i) identification of movement corridors
- (ii) estimate of survivorship

Need for Study:

(a) Mandate:

The Department of Renewable Resources has the mandate is to manage sheep populations and provide input into decisions regarding land-use activity.

(b) Preparedness for Decision-Making:

Once the above information has been collected and compiled, the Yukon Government can prepare a management plan protecting the north coast Dall Sheep. This will allow control of hunting activities and for the mitigation of negative impacts resulting from Beaufort hydrocarbon activities.

Relationship to Other NOGAP Projects:

None.

Major Milestones/Outputs:

1985/86: Final report

NOGAP Funding Requirements:

	<u>85/86</u>
P.Y.	1.0
O. & M.	\$42,000
Capital	<u>---</u>
Total	\$42,000

Other Funding:

	<u>85/86</u>
Polar Shelf	p \$10,000

NOGAP No. G-15
February, 1985

Project Title: ECONOMIC HARVEST POTENTIAL
AND MANAGEMENT OF ARCTIC FOX
IN YUKON
1984/85 - 1985/86

Project Manager: Brian Slough
Wildlife Management Biologist (Furbearers)
Fish and Wildlife Branch
Yukon Department of Renewable Resources
Box 2703
Whitehorse, Y. T.
Y1A 2C6

Telephone: (403) 667-5767

Objectives:

- (1) To identify present arctic fox populations, habitats (including denning sites) and harvest utilization
- (2) Determine harvest potential and management scenarios in conjunction with proposed developments in Yukon's Beaufort Sea Region

Background:

The North Slope, north of the British and Richardson Mountains is essentially unknown in terms of furbearer populations and habitat potential. Six species: wolves, red fox, arctic fox, ermine, muskrat and wolverine, are known to occur on the coast, with arctic fox being most abundant and most heavily utilized by arctic trappers.

Inuit from Aklavik and Inuvik regularly trap from several locations including Herschel, the D.E.W. Line sites at Komakuk Beach, Stokes Point and Shingle Point and several traditional locations.

The present harvest of arctic fox is unknown as all are taken by N.W.T. trappers and are exported with N.W.T. export permits, not identifiable to a Yukon harvest. Mandatory Yukon fur harvest declaration forms are sent to N.W.T. Wildlife Service offices in Ft. McPherson, Aklavik and Inuvik, however, cooperation from this agency and from trappers is poor. A complete census of trappers and their arctic fox harvest will be undertaken by interviewing trappers in the Yukon North Slope area and adjacent N.W.T. communities.

A number of arctic fox dens were located and mapped during the study of furbearers associated with proposed pipeline routes in the Yukon Territory and Mackenzie River Valley, 1971 (Arctic Gas,

Biol. Rep. Ser. Vol. 8). These dens will be resurveyed and new dens will be located to compare the population status with that of 1971 and to develop a reproducible index of fox abundance.

Need for Study:

(a) Mandate:

The Yukon Department of Renewable Resources is responsible for the management of furbearers and for the administration of trapping in the Territory.

(b) Preparedness for Decision-Making:

The potential work force on Beaufort Sea projects includes potential trappers, in particular trappers resident in Inuvik, Aklavik and Tuktoyaktuk, who are presently qualified to trap in the North Slope Group Trapping Area (Yukon). Many will utilize the opportunity of circumstance to trap arctic fox in the Yukon for economic, recreational and traditional (social) reasons. The fur harvest must be monitored and managed on a sustained yield basis in order to provide this "benefit" to native employees on a continuing basis.

Relationship to Other NOGAP Projects:

N/A

Major Milestones/Outputs:

1985/86	1985 Den Survey Report
1986	Final Report and Management Recommendations

NOGAP Funding Requirements over Project Life:

	<u>1985/86</u>
P.Y.s	0.5
O. & M.	\$13,000.00
Capital	---
	<hr/>
	\$13,000.00

Other Funding:

None.

February, 1985

NOGAP PROJECT DESCRIPTION

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

2. Project Managers:

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

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

Subproject 3: D. Russell, Canadian Wildlife Service,
(Objectives 3 Environment Canada, 204 Range Road,
and 4) 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, including (a) obtaining sex and age composition, population size and harvest data, and (b) reviewing, analyzing and tabulating population data from past research conducted on the Porcupine herd from 1977 to 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.
3. To determine Porcupine caribou critical habitat and critical time periods in relationship to hydrocarbon development in northern Yukon by identifying critical habitats and the significance of spring staging areas for bulls, and (b) identifying and determining the significance of critical insect relief areas for the herd on its summer range.
4. To provide the additional knowledge and information necessary to accommodate hydrocarbon developments by avoiding or minimizing the effects on caribou, and to collate existing and ongoing data into a simulation modelling framework to enable researchers and managers to better explore and evaluate the effects of hydrocarbon development on the caribou.

4. Brief Background and Description:

Increased hydrocarbon activities (seismic exploration, new access, pipelines and production facilities) and other activities such as aircraft traffic, which are related to the Mackenzie Delta-Beaufort Sea hydrocarbon developments, may potentially affect the caribou population and caribou utilization of certain habitats. Studies are required to assess and monitor the potential impacts and to design appropriate mitigative measures to minimize environmental impacts. As well, information will be required by the proposed Porcupine Caribou Management Board.

The Development: Shorebases have been identified as an integral part of the exploration and development phase of Beaufort Sea oil and gas activities. For the western Beaufort the only physically and economically viable locations identified are King Point and Stokes Point, Yukon. Likely support facilities associated with port establishment include road access to the Dempster Highway, significant increase in traffic on the Dempster, inland quarry site, associated road and traffic, and frequent aircraft overflights.

The Resource: The Porcupine caribou herd is a large international migratory barren ground herd that utilizes the development area in spring and summer. The herd constitutes the primary wildlife food resource for numerous native communities in the N.W.T., Yukon and Alaska. As such, the fate and well-being of the herd has been a prime concern in the negotiation of three land claims agreements, a major impetus in the formation of a northern Yukon National Park, and the focus of attempts for an international agreement for more than a decade.

Spring is a critical time for caribou in that food is limited 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 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 a new access road to the port from the Dempster and on a road to an inland quarry site; aircraft overflights; and the increased access of hunters. Effects will impact on the caribou by direct mortality, disruption of movement routes, displacement from certain habitats, increased energy expenditure and decreased energy intake due to harassment.

The Project: This project will provide field information on all aspects of the potential and actual impacts and give government managers and industry planners an opportunity to explore and test the consequences of alternative scenarios 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, and formation and operation of a northern Yukon National Park. 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: Not available.

6. Need for Study:

a) Mandate:

Yukon: 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.

Federal: This study would assist DIAND in meeting its responsibilities for maintaining appropriate levels of applied environmental research, for ensuring that effective terms and conditions pertaining to land use permits are developed and for enforcing relevant regulations under the Territorial Lands Act, Land Titles Act and Public Lands Grants Act. The study would assist DOE in managing 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 on Hydrocarbon Development:

By providing data on reproduction, extrapolated natural mortality rates, changes in population size, herd movements and range use, the effects of human disturbance can be tested with supportable conclusions. To undertake mitigation 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 BEARP Panel report 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 recommends 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 are a direct response to the BEARP recommendations. 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 the 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.

NOGAP No. G-17
February, 1985

Project Title: RAPTOR MANAGEMENT PLAN
 YUKON NORTH SLOPE
 1984/85 - 1987/88

Project Manager: D. Mossop
 Senior Biologist - Small Game
 Department of Renewable Resources
 Government of Yukon
 Box 2703,
 Whitehorse, Yukon
 Y1A 2C6

Telephone: (403) 667-5766

Objectives:

Based on the completion of a raptor inventory, management strategies for gyrfalcon and arctic peregrine falcon populations will be designed and implemented before Beaufort hydrocarbon production activities begin. These strategies will prevent the unnecessary decline in populations and the commercial exploitation from poaching which could result from increased human activities.

Background and Description:

The Yukon north coast contains one of the world's largest populations of large falcons, particularly gyrfalcons. However the size of the arctic peregrine population is much lower than historical levels.

North coast developments related to Beaufort hydrocarbon activities will cause an influx of people and an increase in land use.

With an increase in people and development activities, raptors could be disturbed causing a decline in the populations in some areas. Further their economic value has caused some losses from poaching. This would be expected to increase as more people enter the north coast area.

The management strategy will be developed from the following:

1. Completion of an inventory of large falcons and eagles begun in 1974 (80% complete).
2. Effects of the peregrine reintroduction project must be supported with population and prey monitoring.
3. Interpretive material for tourist industry development in the north Yukon will be designed and produced.

b) Preparedness for/Decision-Making on Hydrocarbon Development:

By providing data on reproduction, extrapolated natural mortality rates, changes in population size, herd movements and range use, the effects of human disturbance can be tested with supportable conclusions. To undertake mitigation 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.

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Subproject 3 (Objective 4) is of interest to both the 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 (YTG):

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 (DIAND):

1984-85 - publication of Proceedings of the First North American Caribou Workshop.
1985-86 - planning for disturbance research.
completion of migration 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 (DOE):

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

3b. Summer critical habitat DOE):

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 (DOE):

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 Resource Requirements (\$000's; \$1985/86):

	<u>1985-86</u>	<u>1986-87</u>	<u>1987-88</u>
Subproject 1 (YTG):			
O&M	38	34	-
Subproject 2 (DIAND):			
PY	*	*	*
Salary	13	13	13
O&M	<u>48</u>	<u>78</u>	<u>78</u>
Total	61	91	91
Subproject 3 (DOE):			
PY	1.0	1.0	1.0
Salary	44	44	44
O&M	98	103	51
Capital	<u>15</u>	<u>-</u>	<u>-</u>
Total	157	147	95

10. PY Justification:

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

Subproject 3: Presently only one PY is available within CWS for Porcupine caribou work. The work outlined in objectives 3 and 4 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 prepare 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, international cooperation will suffer, progress reports cannot be completed and the modelling will not proceed in the timeframe required. This single PY request is minimal, given that it is assumed that two summer students can be used and that some of the work will be contracted out to the University of Alaska.

11. Other Funding: (\$000)

Subproject 1 (YTG):

	<u>1985-86</u>
O&M (Proposed)	133

Subproject 3 (DOE): CWS will continue to allot A-base funds to the project. Because of fiscal reductions within DOE, the amount of these A-base funds is not known as of February 1985.

NOGAP No. G-17
February, 1985

Project Title: RAPTOR MANAGEMENT PLAN
YUKON NORTH SLOPE
1984/85 - 1987/88

Project Manager: D. Mossop
Senior Biologist - Small Game
Department of Renewable Resources
Government of Yukon
Box 2703,
Whitehorse, Yukon
Y1A 2C6

Telephone: (403) 667-5766

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2. Effects of the peregrine reintroduction project must be supported with population and prey monitoring.
3. Interpretive material for tourist industry development in the north Yukon will be designed and produced.

Need for Study:(a) Mandate

The Yukon Government Department of Renewable Resources is responsible for the management of raptor populations in the Yukon.

(b) Preparedness for Decision-Making

The management strategies produced at the conclusion of this project will allow for the proper protection of raptor populations against development disturbance and poaching.

Further, when conditions allow, the management plan will develop the economic harvest of these populations.

Relationship to other NOGAP:

Logistics are shared with Caribou, Arctic Fox and Herschel Island projects.

Products:

- a) January of each year, an interim report on raptor inventory and the development of a management plan.
- b) Final report - 1988.

NOGAP Funding:

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
P.Y.	---	---	---
O & M	\$16,000	\$5,000	\$5,000
Capital	Nil	Nil	Nil

Other Funding:

Y.T.G.	\$12,000	\$12,000
Polar Continental Shelf	\$15,000	\$15,000

NOGAP No. G-18
February, 1985

Project Title: NORTH COAST HERITAGE
RESEARCH AND PROTECTION
1984/85 - 1988/89

Project Manager: B. Dale Perry, Director
Heritage Branch
Department of Economic Development &
Tourism
Box 2703
Whitehorse, Yukon
Y1A 2C6

Telephone: (403) 667-5363

Objectives:

1. To develop meaningful, effective and efficient policies, guidelines and procedures for the protection and necessary mitigation of significant heritage resources in the North Yukon coastal area.
2. To record and salvage, using government and industry resources those sites of importance which will be unavoidably destroyed in the exploration and/or production phases of hydrocarbon development.

Background:

Yukon's heritage resources, both archaeological and historic, are of vital importance to the cultural understanding and reconstruction of the Canadian Northwest. Ancient man's entrance to the Americas passed through Yukon's north slope and, thus buried archaeological deposits in the region have national and international importance and significance.

Documented human occupation in the Yukon spans the past 20,000 years at a minimum, indeed, further research may demonstrate an even greater antiquity. Current research and migration theories point to northern Yukon as a most exciting and important area to search for and understand the beginnings of ancient man on this continent. Research on later prehistoric Indian and Inuit occupations of the north slope and coastline indicates that Yukon has much to offer in establishing chronologies and cultural patterns for these populations in Canada's north. Important, also, are the historic remains in evidence along the entire north coast, and in particular, on Herschel Island.

Little policy work has been undertaken that would allow government to make informed assessments or decisions respecting Yukon's northern heritage resources.

Working in close cooperation with the Archaeological Survey of Canada, this project will document the heritage resources extant along the

north coast and Herschel Island and identify those areas and sites deemed to be significant in furthering our understanding of early northern cultural patterns and adaptation.

The objectives will be accomplished according to the following methodologies:

1. An evaluation of all previous research conducted in the study area will be undertaken to ensure copies of all relevant documents and materials are available in Yukon;
2. From the above work, a comprehensive data base of archaeological and historical sites on Yukon's north coast and Herschel Island with particular emphasis in all areas being identified for shore-based hydrocarbon developments will be compiled;
3. The data base will be assessed to provide realistic estimates of heritage resource values;
4. A monitoring program will be conducted reviewing:
 - onsite major hydrocarbon developments, and;
 - the effectiveness of heritage protection policies, plans and procedures, and;
5. Results of the research conducted will be made available to the professional community, hydrocarbon developers and the general public.

Need for Study:

(a) Mandate:

As a result of an authorizing letter, written by the Hon. Jake Epp in 1979, the Government of Yukon has the responsibility for administering the Archaeological Sites Regulations issued under the Yukon Act. The Government of Yukon, therefore, is the regulating authority for all archaeological research conducted in Yukon.

The major goal of the Heritage Branch is to "develop, enhance and transmit, for the benefit of all Yukoners and visitors, an appreciation and understanding of Yukon's vast heritage and cultural resources and achievements, and through effective management and development to preserve these resources for present and future generations".

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

General and site-specific surveys and assessments, and heritage policy and procedures development is urgently required

if governments are to be in a position of evaluating environmental and heritage impacts of northern hydrocarbon development. Since hydrocarbon exploration and specific project proposals are now being advanced, it is imperative that heritage resources are considered at the earliest possible time.

The research information gathered will allow for the formulation of concise and realistic resource protection and mitigation policies and measures, preparedness for current and future hydrocarbon development.

Relationship to Other NOGAP Projects:

This project is being planned and will be carried out in close co-operation with the Archaeological Survey of Canada, National Museums of Canada.

Major Milestones/Outputs:

The first two years of the project will concentrate on assembling and assessing the data base, and will include site and area surveys and test excavations. Also at this time, heritage resource protection policies and procedures will be formulated and put into place. Work in the following years will emphasize salvage excavation of sites, based on site specific hydrocarbon development plans. Monitoring of land-altering hydrocarbon activities will be ongoing throughout the life of the project.

For 1985/86, two three-person crews will conduct survey and assessment on the north coast and Herschel Island. The field season is planned to be approximately two and one-half months long. During the fall and winter, results will be analyzed and protection policies and mechanisms will be formulated.

NOGAP Funding Requirements:

	<u>85/86</u>	<u>86/87</u>	<u>87/88</u>
P.Y.	3.5	2.0	2.0
O. & M.	\$144,000	\$100,000	\$ 92,000
Capital	---	---	---
Total	\$144,000	\$100,000	\$ 92,000

Other Funding

Nil. Department of Economic Development and Tourism will supply office and laboratory space and general supervision of the project.

GOVERNMENT OF THE NORTHWEST TERRITORIES

<u>PROJECT NO., TITLE AND PROPOSED DURATION</u>		<u>1985-86</u>	<u>1986-87</u>	<u>1987-88</u>
		\$	\$	\$
<u>Department of Economic Development and Tourism</u>				
H.28	Business Directory Profile and Surveys Related to Hydrocarbon Activity (1986/87-1988/89); In-house.		58.4	58.4
H.29	Labour Force and Occupational Manpower Study within Hydrocarbon Development Impact Area (1987/88-1989/90); In-house.			31.4
<u>Energy, Mines and Resources Secretariat</u>				
H.1	GNWT NOGAP Coordinator (1984/85-1990/91); In-house.	68	68	68
H.8	Socio-Economic Monitoring System, Northern Hydrocarbon Development (1984/85-1987/88); Contract.	50.06	27	27.6
<u>Department of Health</u>				
H.24	Community Health Status Profiles Within Hydrocarbon Development Impact Zones (1985/86-1988/89); In-house.	19.44	28	28
H.25	Assessment and Planning for Health Care Services within Hydrocarbon Development Impact Zone (1986/87-1989/90); In-house.		36.5	16.1
<u>Department of Justice and Public Services</u>				
H.19	Industrial Safety for Hydrocarbon Development (1986/87-1987/88); In-house.		38	14
H.31	Impact on Legal System Resulting from Hydrocarbon Development (1985/86-1986/87); Contract.	47	35	
H.32	Training Northerners in Archaeological Techniques (1985/86-1986/87); In-house	41	41	
H.35	Impact on Consumer Services as a Result of Hydrocarbon Development (1986/87); Contract.		49	

PROJECT NO., TITLE AND PROPOSED DURATION		1985-86 \$	1986-87 \$	1987-88 \$
<u>Department of Local Government</u>				
H.2	Funds for Tuktoyaktuk and Inuvik Councils to Identify Impacts and Plan for Development (1984/85-1990/91); In-house (municipalities).	241	343	276
H.6	Municipal Organization, Services and Infrastructure Impact Planning (1984/85-1990/91); In-house, Contract.	110	107	116
H.7	Policy on the Financing of Municipal Infrastructure and Land Servicing for Rapidly Growing Communities (1984/85-1986/87); Contract.	164	89.5	
<u>Department of Renewable Resources</u>				
H.4	Renewable Resources Hydrocarbon Development Impact and Planning Guidelines (1984/85-1987/88); Contract.	80.9	80.9	80.9
H.12	Effects of Hydrocarbon Development on the Harvesting of Wildlife (1984/85-1988/89); In-house and Contract.	121.4	121.4	121.4
H.13	Deterrent Studies for Hydrocarbon Development Impact Area (1984/85-1986/87); In-house and Contract.	59.1	59.1	
H.15	Wildlife Management Plans for Species Affected by Hydrocarbon Development (1985/86-1987/88); In-house.	46.6	46.6	46.6
H.16	Renewable Resources Baseline Information for Wildlife Populations Affected by Hydrocarbon Development (1985/86-1988/89); In-house.	478.2	382.3	237.3
H.17	Environmental Protection and Monitoring of Hydrocarbon Development Areas (1985/86-1987/88); Contract.	37.3	37.3	37.3
<u>Department of Social Services</u>				
H.3	Beaufort Delta Social Impact Baseline Data Study (1984/85-1990/91); In-house.	453	398	509
GNWT TOTAL		2017	2046	1668

H3
NOGAP NO: H28
Revised January 1985

1. **PROJECT TITLE:** Business Directory, Profile and Surveys Related to Hydrocarbon Activity
(1986/87 to 1988/89)
NOGAP PROJECT NO: H28
2. **DEPARTMENTAL COORDINATOR:** Robert Trudeau, Senior Advisor
Policy and Planning, Economic Development and Tourism, GNWT, YK
873-7386
PROJECT MANAGER: Shakir Alwarid, Chief,
Business Development, Economic Development and Tourism, GNWT, YK
873-7229
ADDRESS:
TELEPHONE NO.:
3. **OBJECTIVES:**

To provide a central directory to assist northern businesses in identifying business opportunities related to hydrocarbon activities and in locating prospective markets.

To quantify the demand for government funded business assistance programs and services for economic planning and statistical purposes.

To assist resource companies and their contractors in utilizing local businesses.
4. **BRIEF DESCRIPTION OF PROJECT:**

This project is an expansion of the Business Assistance and Development Program of the Government of the Northwest Territories and will provide specific information to quantify projected demand & monitor current business opportunities. Baseline data on existing businesses and their capabilities will be collected and businesses opportunities, created by the impact of resource development, will be matched with existing capabilities. Establishment of new businesses will then be considered to meet the need.

This will entail surveying all active northern business enterprises in the NWT with particular emphasis on business opportunities related to resource development activity. Sectoral and community specific surveys will also be completed for more detailed information.

Among the information presented will be the name and address of the firm, industrial sector, number of employees, year established and a description of services offered. As the data in the business directory will be computerized, this will facilitate the dissemination of information useful for business planning purposes.
5. **SUBPROJECTS FOR F.Y.:** None

6. NEED FOR STUDY:

- a) Departmental Mandate:
The Government of the NWT supports the creation and maintenance of business enterprises and employment opportunities in the NWT. The Department of Economic Development and Tourism has the responsibility of stimulating economic activity in all sectors of the economy with due consideration given to community aspirations.
- b) Preparedness for Decision Making:
Evidence presented before the Beaufort Sea EARP clearly indicated that increased northern business activity resulted from hydrocarbon exploration and development stage activities. An expanded northern business directory will facilitate the matching of northern business capabilities with resource industry demand. This will increase the level of northern business participation and promote the maintenance of northern businesses in the longer term.

7. RELATIONSHIP TO OTHER NOGAP PROJECTS:

This project may be viewed as a separate project which is designed to assist northern businesses through the provision of information on business capabilities. It may be viewed as indirectly relating to H8, Socio-economic Monitoring System.

8. MAJOR MILESTONES/OUTPUTS:

- | | | |
|---------|----|-----------------------------------------|
| 1986/87 | 1. | Identify data gathering requirements. |
| | 2. | Gather data through survey. |
| | 3. | Publish and distribute directory. |
| 1987/88 | 4. | Update directory. |
| to | 5. | Monitor use by business and government. |
| 1988/89 | | |

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (1985-86 000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	0	0	1	1	2	-	-
Salary	0	0	27.4	27.4	57.3	-	-
O & M	0	0	27.3	27.3	57.3	-	-
Capital	-	-	-	-	-	-	-
Other *	0	0	3.7	3.7	8.0	-	-
TOTAL	0	0	58.4	58.4	122.6	-	-

* 6 1/2% Administration Fee

10. OTHER FUNDING:

No additional funding is projected at this time.

NOGAP NO: H29
Revised January 1985

1. PROJECT TITLE: Labour Force and Occupational
Manpower Study within Hydrocarbon
Development Impact Area
(1987/88 to 1989/90)
NOGAP PROJECT NO: H29
2. DEPARTMENTAL COORDINATOR: Robert Trudeau, Senior Advisor
Policy and Planning, Economic
ADDRESS: Development and Tourism, GNWT, YK
TELEPHONE NO.: 873-7386
PROJECT MANAGER: As above
TELEPHONE NO.:

3. OBJECTIVES:

To provide labour market information and facilitate the provision of counselling services to assist individuals in making decisions to support their career opportunities and employment prospects.

To facilitate the provision of consultative and advisory services to assist business and prospective employers in staffing, training and manpower related areas.

To identify the expected labour market conditions during the short-term in which territorial employment programs will have to operate.

To assess the full spectrum of labour market needs in the Northwest Territories in terms of the existing and anticipated supply and demand for labour.

To provide suggested labour market priorities and strategies (targeted groups, geographic areas, industry, occupations) and their subsequent evaluation.

To assess the ancillary effects of employment, such as social adjustment and personal problems.

To facilitate the development of manpower plans to address wage and working conditions, employment benefits, counselling, employment opportunities for northerners, accommodation of northern life-styles.

To monitor the effectiveness of placement services in the proper matching of people and jobs and supplement the federal government's services in communities not adequately serviced.

To facilitate the determination of training needs, identification of trainees, allocation of both federal and territorial spaces in institutions and the actual selection and referral of trainees.

To facilitate the development of long-term Territorial wide training programs and strategies.

4. **BRIEF DESCRIPTION OF PROJECT:**

This activity is necessary to develop baseline data on an employment profile of the NWT. Accurate labour force (demand and supply) and occupational data is essential for manpower planning, impact prediction and assessment. This project will assist both proponents of the resource project as well as NWT residents in matching jobs with people.

This project will entail an annual labour force "supply" survey of all participants in the regional labour force with updating continuously. Included in the survey will be work history, education, skill level, and training requirements. Also, a labour force "demand" survey will be undertaken and coordinated with the business survey.

5. **SUB-PROJECTS FOR F.Y.: Nil**

6. **NEED FOR STUDY:**

a) **Departmental Mandate**

The GNWT plays a major role in ensuring the maximization of employment and training opportunities for northern residents from resource development projects. The Beaufort Sea development is viewed as a major opportunity to further the development of the labour force, to provide wage employment, and to transfer skills to NWT residents.

b) **Preparedness for Decision Making**

The lack of a labour force and occupational manpower study and reliable information on the labour market restricts the access of the northern labour force to employment opportunities. This study is essential to ascertain the preparedness of the labour force to participate in hydrocarbon activities.

7. **RELATIONSHIP TO OTHER NOGAP PROJECTS:**

This project is indirectly related to H8, Socio-economic Monitoring System. However, the design and purpose of this project differ from H8 to the extent that integration of the two is not possible.

In addition, the "demand" portion of the survey will be coordinated with H28, Business Directory, Profile and Surveys.

8. MAJOR MILESTONES/OUTPUTS:

- | | | |
|---------|----|-------------------------------------------------|
| 1987/88 | 1. | Design survey |
| | 2. | Solicit feedback from Regional Offices and CEIC |
| 1988/89 | 3. | Undertake study and produce report |
| 1989/90 | 4. | Update survey |

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (1985-86 000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	0	0	0	0.5	0.5	0.5	-
Salary	0	0	0	13.7	14.4	14.4	-
O & M	0	0	0	15.7	16.5	31.4	-
Capital	-	-	-	-	-	-	-
Other *	0	0	0	2.0	2.1	3.2	-
TOTAL	0	0	0	31.4	33.0	49.0	-

* 6 1/2% Administration Fee

10. OTHER FUNDING: Nil

1. **PROJECT TITLE:** GNWT NOGAP Coordinator
(1984/85 to 1990/90)

NOGAP PROJECT NO: H1
2. **DEPARTMENTAL COORDINATOR:** Margaret McGee
ADDRESS: Hydrocarbon Coordinator
Energy, Mines and Resources Secretariat
Government NWT, Yellowknife, N.W.T.

TELEPHONE NO.: (403) 920-8944

PROJECT MANAGER: As above
3. **OBJECTIVES:**
 - Establish a process and structure to coordinate and manage GNWT departmental and regional involvement in the seven year NOGAP socio-economic, environmental and technical planning and research program
 - Support government responsibilities to ensure GNWT's preparedness to deal with northern hydrocarbon production in the early 1990's.
4. **BRIEF DESCRIPTION OF PROJECT:**

Establishment of a position and procedures to coordinate GNWT's participation in NOGAP over the seven year period by monitoring and evaluating program implementation and operations; providing to GNWT and DIAND NOGAP Secretariat regular summaries and reports on the status of the GNWT NOGAP projects, the application of approved funds and the identification of ongoing requirements; providing counselling and guidance to GNWT departmental coordinators and project managers as required.
5. **SUBPROJECTS FOR F.Y.:** Not applicable
6. **NEED FOR STUDY:**
 - a) **Department Mandate:**
 - pursuant to Cabinet request, Treasury Board approvals and DIAND established coordinating process for the northern hydrocarbon planning strategy; the GNWT's mandate and responsibility for design and implementation of social, economic and environmental policies and programs for the NWT and in line with the GNWT Resource Development Policy.

b) Preparedness for Decision Making: ^{H9}

- To ensure coordination of all GNWT NOGAP projects and the provision of information, advice and recommendations critical to effective decision making in northern hydro-carbon proposals
- To coordinate and evaluate GNWT priorities and submission for program and funding requests to Treasury Board and support effective GNWT involvement for inclusion in annual Cabinet submissions.

7. RELATIONSHIP TO OTHER NOGAP PROJECTS:

The establishment of a Coordinator ensures maximum participation of GNWT departments in the management of all GNWT NOGAP projects through counselling, guidance and evaluation, and the avoidance of overlap of projects.

8. MAJOR MILESTONES/OUTPUTS:

- | | | |
|---------|----|---------------------------------------------------------------------------------|
| 1985/86 | 1. | Submission of quarterly and annual financial and project status reports |
| to | | |
| 1990/91 | 2. | Annual submissions to GNWT Executive Council and FMB, and to DIAND Secretariat |
| | 3. | Updating reconfirmation of projects and funding requirements for following year |
| | 4. | Annual summary reports |

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (1985-86 000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Salary	19.0	45.0	45.0	45.0	45.0	45.0	45.0
O & M	44.6	18.6	18.6	18.6	18.6	18.6	18.6
Capital	-	-	-	-	-	-	-
Other *	4.4	4.4	4.4	4.4	4.4	4.4	4.4
TOTAL	68.0	68.0	68.0	68.0	68.0	68.0	68.0

* 6 1/2% Administration Fee

10. OTHER FUNDING:

No additional funding is projected at this time.

1. **PROJECT TITLE:** "Socio-Economic Monitoring System - Northern Hydrocarbon Development. (1984/85 to 1987/88)
NOGAP PROJECT NO: H8
2. **DEPARTMENTAL COORDINATOR:** Gay Kennedy
ADDRESS: Project Assessment Coordinator,
Energy, Mines and Resources Secretariat
Government NWT, Yellowknife, N.W.T.
TELEPHONE NO.: (403) 873-7735
PROJECT MANAGER: As above

3. **OBJECTIVES:**

To make recommendations on how best to organize, centralize and systematize data systems for optimum effectiveness in socio-economic monitoring for the Beaufort-Mackenzie Delta area.

To make GNWT, Federal and community and industry data more useful and accessible.

To implement a monitoring system on a pilot project basis in order to determine the usefulness of a central Beaufort database.

4. **BRIEF DESCRIPTION OF PROJECT:**

Project will include:

- the determination and publication of indicators list
- evaluation of the indicators
- community consultation to develop community based indicators and to improve data for use by local organizations
- regular publication of indicators will be undertaken

Evaluation and publication of the indicators and identification of required resources to implement the program will complete the pilot project.

5. **SUBPROJECTS FOR F.Y.:** Not applicable

6. **NEED FOR STUDY:**

Departmental Mandate

- a) The Resource Development Policy of the GNWT states that over-all economic, social and environmental implications are judged to result in net benefits to people of the NWT and that monitoring is the process used to evaluate the achievement and determine modifications.

At present the lack of consolidated and comprehensive data about key socio-economic issues for the Beaufort makes review and monitoring activities almost impossible. Socio-economic data about the Beaufort region needs to be organized and made accessible.

Preparedness for Decision-Making

- b) Industry and government program planning and implementation is dependent on the availability of useful data. There is a clearly recognized need to develop a consolidated data base service for use in assessment and review monitoring. The large number of information sources and users requires the careful development of a data services system.

7. RELATIONSHIP TO OTHER NOGAP PROJECTS:

This project should produce results that are useful to every agency concerned with socio-economic aspects of Beaufort activity and will provide for more informed decision making.

8. MAJOR MILESTONES/OUTPUTS:

- | | |
|---------|--------------------------------------------------------------------------------------------------------|
| 1985/86 | 1. addition of specific community based indicators |
| | 2. projected uses identification for indicators and monitoring |
| | 3. regular publication of indicators |
| 1986/87 | 4. regular publication of indicators |
| | 5. identification of resource requirements |
| | 6. evaluation activities on usefulness of indicators |
| 1987/88 | 7. establishment of formal agreements among agencies regarding the provision of data base arrangements |
| | 8. regular publication of indicators |

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (1985-86 000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
O & M		18.4		46.81		25.2	25.8
Capital							
Other *	4.6	3.25	1.8	1.8			
TOTAL	68.0	50.06	27.0	27.6			

* 6 1/2% Administration Fee

10. OTHER FUNDING: Nil

1. PROJECT TITLE: Community Health Status Profiles
within Hydrocarbon Development Impact
Zones
(1985/86 to 1988/89)
2. NOGAP PROJECT NO: H24
DEPARTMENTAL COORDINATOR: Elaine Berthelet
Chief, Programs and Standards
ADDRESS: GNWT Health, Yellowknife
TELEPHONE NO.: 873-7711
- PROJECT MANAGER: Barbara Round
Coordinator, Family Life Education
ADDRESS: GNWT Health, Yellowknife
TELEPHONE NO.: 873-7711

3. OBJECTIVES:

To establish a community health status baseline, and collect ongoing data to determine health service needs of communities directly or indirectly involved in hydrocarbon development.

Sub-objectives

1. Design collection, compilation and evaluation tools
2. Gather baseline data on physical and emotional health status of community residents
3. Set up continuing information retrieval system
4. Epidemiological analysis of data to:
 - measure changes in community health status as hydrocarbon development proceeds
 - define baseline needs assessment as basis for health services planning
5. Focus on sexually transmitted diseases, increased demand for detox services, and mental illness.

4. BRIEF DESCRIPTION OF PROJECT:

This project is designed to determine:

- a) present community health concerns and needs, and the extent to which these are being met
- b) changes in these needs as development proceeds
- c) community responses to developmental impact, and
- d) prerequisites for expansion/change to the health care delivery system for the impacted communities of: Inuvik, Tuktoyaktuk, Paulatuk, Sachs Harbour, Holman Island, Coppermine, Aklavik, Arctic Red River, Fort McPherson, Fort Norman, Fort Franklin, and Fort Good Hope.

5. SUBPROJECTS FOR F.Y.: None

6. NEED FOR STUDY:

a) Departmental Mandate:

Under the Constitution, provision of health care has been designated as a provincial/territorial responsibility. The Public Health Ordinance assigns responsibility for the "prevention and mitigation of disease and the promotion and preservation of health in the Territories," including "the control and prevention of communicable diseases."

"Epidemiological review of medical services used by N.W.T. residents" is mandated within the 1984/85 Program Objectives for the Department of Health.

b) Preparedness for Decision Making:

Experience in some communities has already indicated a sharp increase in sexually transmitted diseases, teen, and unwanted pregnancies, alcohol related problems and mental illness directly related to a sudden influx of personnel and money into the area. These are indices of maladaptive behaviours of the community. Social implications of these problems on the traditional lifestyles and families are huge. Adequate support services to deal with the problems, and preventative programs to anticipate and deter the negative effects of development on the community are imperative. Failure to provide these may impact on the willingness of northern peoples to participate in hydrocarbon projects. It would also have direct implications in terms of employee sick time, and performance levels.

While a significant amount of data is present, it needs to be compiled, organized and established as baseline data. Some gaps need to be filled to present a complete picture. A solid data base will allow ongoing assessment and definition of health trends as development proceeds.

7. RELATIONSHIP TO OTHER NOGAP PROJECTS:

This study will relate to the Social Impact Baseline Data Study, H3. Liaison between the two projects can lead to development of service delivery programs which are complementary, and provide maximum benefit to the communities involved.

This study is prerequisite to the second Department of Health project H25, Assessment and Planning for Health Care and Detox Services in Hydrocarbon Impact Zones.

8. MAJOR MILESTONES/OUTPUTS:

1985/86	Identification of indices Collection of presently available data Development of information collection system and mechanism for community input and reaction
1986/87	Development of ongoing information correlation, and review process Review of community needs Conferencing with planners of project H25, and School Health and Family Life Programs
1987/88	Implementation of educational/family life programs Continued data collection Review community perceptions

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (1985-86 000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	-	.5	.4	.4	.4	-	-
O & M	-	14.12	26.3	26.3	28.0	-	-
Capital	-	4.0	-	-	-	-	-
Other	-	1.32	1.7	1.7	1.9	-	-
TOTAL	-	19.44	28.0	28.0	29.9	-	-

10. OTHER FUNDING:

No additional funding is projected at this time.

H15
NOGAP NO: H25
Revised January 1985

1. PROJECT TITLE: Assessment and Planning for Health Care and Detox Services within Hydrocarbon Development Impact Zones (1986/87 to 1989/90)
2. NOGAP PROJECT NO: H25
DEPARTMENTAL COORDINATOR: Elaine Berthelet
Chief, Programs and Standards
ADDRESS: GNWT Health, Yellowknife
TELEPHONE NO.: 873-7711

PROJECT MANAGER: to be appointed
ADDRESS:
TELEPHONE NO.:

3. OBJECTIVES:

To utilize community health profiles to assess present and projected health care needs within the Impact Zone.

To utilize community input to evaluate local health concerns within the context of cultural requirements.

To correlate community health profiles with information specific to alcohol taken from Social Services Baseline Data Study to assess present and projected needs for detox facilities.

4. BRIEF DESCRIPTION OF PROJECT:

Conferencing with the epidemiologist will assist in interpretation of the needs identified in the community health profile and the Baseline Data Study, specifically related to alcohol, and projection of health requirements. These will be examined in light of community input. Recognizing that the hydrocarbon impact zone communities of Inuvik, Tuktoyaktuk, Paulatuk, Sachs Harbour, Holman Island, Coppermine, Aklavik, Arctic Red River, Fort McPherson, Fort Norman, Fort Franklin, and Fort Good Hope will undergo very rapid social and cultural transitions due to the sudden influx of money, jobs, transient personnel, etc., it will be extremely important to incorporate native concerns.

Strategies must then be developed to increase the capacity of the department to respond quickly to evolving health needs in the impact areas, beginning in the pre-production phase. This will involve planning for optional usage of existing facilities, personnel and programs, and fiscal planning for anticipated changes and additions.

Long range plans must be developed, incorporating the short term objectives.

Implementation of the initial phases of expansion of services may be piloted in two (2) communities as part of a demonstration project: e.g. use of para professionals or other innovative techniques not now provided by the department. Communities to be defined based on findings resulting from Project H24, Community Health Profile.

5. SUBPROJECTS FOR F.Y.: None

6. NEED FOR STUDY:

- a) Departmental Mandate:
Under the Canadian Constitution and Public Health, Mental Health, Medicare and THIS Ordinances, the Department of Health is responsible for services and programs to control and prevent disease conditions.
- b) Preparedness for Decision Making:
Rapid change in lifestyle and anticipated increase in health problems such as sexually transmitted diseases, alcohol abuse, mental health problems and other related conditions makes it imperative that short and long range planning for health services be developed.

The degree of success of short term solutions in maintaining community health through the transition period may well influence community perceptions of the desirability of hydrocarbon development, and will set precedent for other communities.

7. RELATIONSHIP TO OTHER NOGAP PROJECTS:

This project is based on the Community Health Status Profiles, H24, in cooperation with portions of the Social Impact Baseline Study, H3.

Long and short range planning must be done in a manner complimentary to that of Social Services planning project, H3.

8. MAJOR MILESTONES/OUTPUTS:

- | | |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1986/87 | <ul style="list-style-type: none"> 1. Correlation and interpretation of data from community profile portion of Baseline Study specifically related to alcohol. 2. Projections of health care and detox needs - short term and long term 3. Strategies developed to increase departmental capacity for short term planning |
| 1987/88 | <ul style="list-style-type: none"> 4. Development of plans for long term and short term provision of service <ul style="list-style-type: none"> - financial scenario - personnel projections - program planning 5. Supervision of two pilot projects in selected communities |

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (1985-86 000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	0	0	.6	.3	-	-	-
O & M	0	0	34.3	15.1	20.6	20.6	-
Capital	-	-	-	-	-	-	-
Other *	0	0	2.2	1.0	1.4	1.4	-
TOTAL	0	0	36.5	16.1	22.0	22.0	-

* 6 1/2% Administration Fee

10. OTHER FUNDING:

No additional funding is projected at this time.

1. **PROJECT TITLE:** Industrial Safety for Hydrocarbon Development
(1986/87 to 1987/88)

NOGAP PROJECT NO: H19

2. **DEPARTMENTAL COORDINATOR:** R.A. Robinson, Chief
ADDRESS: Safety Division, Justice & Public Services, GNWT, Yellowknife, NWT
TELEPHONE NO.: (403) 873-7996

PROJECT MANAGER: As Above

3. **OBJECTIVES:**

To determine the extent of fire safety preparedness in the communities of Tuktoyaktuk, Inuvik, Aklavik, Arctic Red River, Fort McPherson, Fort Good Hope, Fort Norman, Fort Franklin and Norman Wells and all other communities which may be covered by the Tanker Route.

To determine code compliance ammendments and the acceptability of electrical material to deal with the heightened safety measures required in impacted communities.

To identify problem areas in the role of native safety officers when dealing with Occupational Health and Safety and thereby determine future training needs.

4. **BRIEF DESCRIPTION OF PROJECT:**

The project will provide data and evidence as to the adequacy of the Safety Division staff, equipment and material for the extended responsiblity for occupational safety and safety inspection in hydrocarbon impacted communities. This information will in turn permit the department to design and implement a training program for native safety officers and inspection staff.

5. **SUBPROJECTS FOR F.Y.:** Not applicable.

6. **NEED FOR STUDY:**

Departmental Mandate

- Safety Ordinance and Regulations
- Fire Safety Ordinance and Regulations
- Petroleum Products Ordinance
- Electrical Protection Ordinance and Regulations
- Civil Emergency Measures Ordinance

Preparedness for Decision-making

Preparatory steps will be completed for the hiring and training of indigenous people of the north to serve as safety officers and inspectors for fire, safety, electrical and gas within the impacted communities.

Code compliance amendments and material and equipment needs will be identified preparatory to the impact of hydrocarbon development.

7. **RELATIONSHIP TO OTHER NOGAP PROJECTS:**

This project is partially dependent on project No. H31, Impact on Legal System. This engineer will be required to work closely with the legal project.

8. **MAJOR MILESTONES/OUTPUTS:**

- | | | |
|---------|----|---------------------------------------------------------------------------------|
| 1986/87 | 1. | Assessment of volunteer community fire fighters. |
| | 2. | Determine code compliance amendments and acceptability of electrical materials. |
| | 3. | Document training requirements for inspection staff. |
| 1987/88 | 4. | Determine role and training needs of northern native safety officers. |

9. **NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (85-86, \$000's):**

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	-	-	-	-	-	-	-
O & M	-	-	35.66	13.0	-	-	-
Capital	-	-	-	-	-	-	-
Other	-	-	2.34	1.0	-	-	-
TOTAL	-	-	38.0	14.0	-	-	-

10. **OTHER FUNDING:** Nil

NOGAP NO: H31
Revised January 1985

1. **PROJECT TITLE:** Impact on Legal System Resulting from Hydrocarbon Development (1985/86 to 1986/87)

NOGAP PROJECT NO: H31
2. **DEPARTMENTAL COORDINATOR:** R.A. Robinson, Chief
ADDRESS: Safety Division, Justice & Public Services, GNWT, Yellowknife, NWT
TELEPHONE NO.: (403) 873-7430

PROJECT MANAGER: Brian M. Smith, Chief, Legal Division
Justice and Public Services
Government NWT, Yellowknife, NWT
(403) 873-7437
3. **OBJECTIVES:**

To determine the impact of the influx of workers as a result of development on the legal system of the Northwest Territories.

To determine the impact of development on total government as it relates to legal requirements.

To determine the impact of legal systems in the post development period,

To determine legislative charges required to insure citizens rights are met.
4. **BRIEF DESCRIPTION OF PROJECT:**

A professional researcher with a legal background will conduct research and analyse statistics gathered in areas where similar development has taken place. The researcher will have to compile statistics on court sittings, the types of cases appearing before the courts, the amount of legal aid assistance and the involvement of government in legal actions. Consultation will be necessary with other agencies such as the RCMP to determine their plans and to develop recommendations for the post development period.
5. **SUBPROJECTS FOR F.Y.:** Not applicable.

6. NEED FOR STUDY:

Departmental Mandate

- NWT Act
- All Ordinances of the NWT

Preparedness for Decision-making

The NWT Act provides that the GNWT is responsible for the administration of justice in the NWT. The GNWT will likely be moving into the development of its own Territorial Police Force as well as assuming responsibilities for the prosecution function of both Criminal Code and Territorial Offences. A review of all Ordinances will be required, especially those dealing with Human Rights and safety in order to answer to hydrocarbon development impact.

7. RELATIONSHIP TO OTHER NOGAP PROJECTS:

This project will relate to project H19 dealing with public safety for hydrocarbon development.

8. MAJOR MILESTONES/OUTPUTS:

- | | | |
|--------------------|----|---------------------------------------------------------------------------------------------------|
| 1985/86 | 1. | Initiation of research on the impact of development on the legal system. |
| | 2. | Preparation of interim report |
| 1986/87 | 3. | Continuation of research and preparation of report. |
| 1987/88 to 1990/91 | 4. | Assessment of research report and development of recommendations to meet post-development period. |

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (85-86, \$000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	-	-	-	-	-	-	-
O & M	-	44.0	32.9	-	-	-	-
Capital	-	-	-	-	-	-	-
Other	-	3.0	2.1	-	-	-	-
TOTAL	-	47.0	35.0	-	-	-	-

10. OTHER FUNDING: Nil

NOGAP NO: H32
Revised January 1985

1. **PROJECT TITLE:** Training Northerners in Archaeological Techniques.
(1985/86 to 1986/87)

NOGAP PROJECT NO: H32

2. **DEPARTMENTAL COORDINATOR:** R.A. Robinson, Chief
ADDRESS: Safety Division, Justice & Public Services, GNWT, Yellowknife, NWT
TELEPHONE NO.: (403) 873-7430

PROJECT MANAGER: Charles D. Arnold, Senior Archaeologist
Prince of Wales Northern Heritage Cent.
Justice and Public Services
Government NWT, Yellowknife, NWT
(403) 873-7551

3. **OBJECTIVES:**

The main objective will be to devise, test and evaluate a program for training resident northerners in archaeological field procedures. This will minimize the number of extra-territorial archaeologists needed to carry out archaeological requirements arising from hydrocarbon development in the Beaufort Sea.

A secondary objective of the field training program is to accumulate baseline information within the development area which will assist in planning for archaeological site protection.

4. **BRIEF DESCRIPTION OF PROJECT:**

Archaeological fieldwork will be conducted over two successive field seasons at locations within the hydrocarbon development and transportation area. Northern residents will be employed, and techniques to provide hands-on experience in archaeological site identification, reconnaissance and excavation procedures will be developed, evaluated and refined.

5. **SUBPROJECTS FOR F.Y.:** Not applicable.

6. NEED FOR STUDY:

Departmental Mandate

- Historical Resources Ordinance
- Territorial Land Use Regulations

This legislation requires that archaeological work be undertaken prior to land-based development.

- - Northwest Territories Archaeological Sites Regulations

These Regulations specify that all archaeological work in the Northwest Territories must be conducted under permit. Archaeologists Permits are issued by the Prince of Wales Northern Heritage Centre, and only to qualified investigators hiring appropriately trained personnel.

Preparedness for Decision-making

At present, there are few people in the NWT who have appropriate training which will allow them to participate in archaeological investigations. Failure to provide training programs will mean that the majority of people undertaking the necessary archaeological fieldwork will be hired from outside the NWT, further alienating northerners from this aspect of their cultural heritage.

7. RELATIONSHIP TO OTHER NOGAP PROJECTS:

This project is closely tied to NOGAP Project FI as the Archaeological Survey of Canada - National Museum of Man is co-ordinating the various aspects of the planned archaeological resource management package. Identification of requirements for archaeological site protection is being undertaken by the federal department, which will collect base-line information and devise guidelines for archaeological site protection in the development area, in co-operation with the Prince of Wales Northern Heritage Centre.

8. MAJOR MILESTONES/OUTPUTS:

- | | | |
|---------|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1985/86 | 1. | Test training program through archaeological survey and excavations. |
| | 2. | Evaluation and modification of training program. |
| 1986/87 | 3. | Further testing of training program through archaeological survey and excavations. |
| | 4. | Further evaluation and modification of training program. |
| 1987/88 | 5. | Include field training program in terms of reference for archaeological projects arising from hydrocarbon related development in the Beaufort Sea Hydrocarbon Development Area. |

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (85-86, \$000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	-	-	-	-	-	-	-
O & M	-	38.3	38.3	-	-	-	-
Capital	-	-	-	-	-	-	-
Other	-	2.7	2.7	-	-	-	-
TOTAL	-	41.0	41.0	-	-	-	-

10. OTHER FUNDING: Nil

NOGAP NO: H35
Revised January 1985

1. **PROJECT TITLE:** Impact on Consumer Services as a Result of Hydrocarbon Development (1986/87)
NOGAP PROJECT NO: H35
2. **DEPARTMENTAL COORDINATOR:** R.A. Robinson, Chief
ADDRESS: Safety Division, Justice & Public Services, GNWT, Yellowknife, NWT
TELEPHONE NO.: (403) 873-7430

PROJECT MANAGER: Shirley Stevenson, Chief, Consumer Services
Justice and Public Services
Government NWT, Yellowknife, NWT
(403) 920-8055
3. **OBJECTIVES:**

The provision of adequate and effective consumer protection and information services. To study the requirements for regulation of businesses; insurance (agents, adjusters, etc.); vendors, direct sellers and collection agents; (medical) professionals; and lotteries; and to investigate methods to ensure community preparedness for anticipated increases in consumer and landlord/tenant problems due to hydrocarbon development.
4. **BRIEF DESCRIPTION OF PROJECT:**

Conduct research and gather statistics in other known areas (eg. Alaska) for purposes of licensing requirements.

Analysis and evaluation of existing services and facilities in communities.

Conduct research into community response to development. ie. increase in consumer and landlord/tenant problems.

Preparation of report outlining requirements; and development of recommendations to meet needs during post-development period.
5. **SUBPROJECTS FOR F.Y.:** Not applicable.

Departmental Mandate

- Business Licence Ordinance
- Insurance Ordinance
- Consumer Protection Ordinance
- Medical Profession Ordinance
- Dental Profession Ordinance
- Pharmacy Ordinance
- Veterinary Profession Ordinance
- Psychologists Ordinance
- Ophthalmic Medical Assistance Ordinance
- Dental Mechanics Ordinance
- Optometrist Ordinance
- Lotteries Ordinance
- Landlord and Tenant Ordinance

The Department has the mandate to administer and enforce licensing requirements of all of the above Ordinances, as well as to mediate in consumer complaint matters, and landlord/tenant disputes.

Preparedness for Decision-making

Adequate and effective consumer protection is the basis for regulation of persons as required by the legislation listed above and will guarantee community preparedness and available information to northern businesses and agencies affected by the hydrocarbon development.

7. RELATIONSHIP TO OTHER NOGAP PROJECTS:

As development proceeds, requirement for consumer services, particularly in regulated areas, such as licensing of businesses and professionals, will be immediate, as opposed to long term. Provision of consumer education and complaint-handling services will extend over the longer term.

8. MAJOR MILESTONES/OUTPUTS:

- | | |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1986/87 | <ol style="list-style-type: none">1. Six month period of time to conduct research and gather statistics for purposes of licensing and other regulatory requirements. Statistics and regulations to be available as a report.2. Six month period for research into community response to development, ie. increase in consumer and landlord/tenant problems. Report of results.3. Development of recommendations to meet needs during post-development period. Listed recommendations to form basis of report. |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (85-86, \$000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	-	-	-	-	-	-	-
O & M	-	-	46	-	-	-	-
Capital	-	-	-	-	-	-	-
Other	-	-	3	-	-	-	-
TOTAL	-	-	49	-	-	-	-

10. OTHER FUNDING: Nil

1. **PROJECT TITLE:** Funds for Tuktoyaktuk and Inuvik Councils to Identify Impacts and Plan for Development.
(1984/85 to 1990/91)

NOGAP PROJECT NO: H2

2. **DEPARTMENTAL COORDINATOR:** Gary Vanderhaden
ADDRESS: Senior Policy Advisor
Department of Local Government
Government NWT, Yellowknife, N.W.T.
TELEPHONE NO.: (403) 873-7232

PROJECT MANAGER: Charles McGee
ADDRESS: Regional Superintendent
Department of Local Government
Government NWT, Yellowknife, N.W.T.
TELEPHONE NO.: (403) 979-7120

3. **OBJECTIVES:**

To permit the Hamlet of Tuktoyaktuk and the Town of Inuvik to adequately and effectively prepare for and deal with the municipal impacts resulting from Beaufort hydrocarbon development, by providing their Councils with the resources and expertise required to assess hydrocarbon development proposals, identify potential impacts on community structures and services, identify and plan for required additional infrastructure, modify community development plans, and prepare management strategies to deal with impacts.

4. **BRIEF DESCRIPTION OF PROJECT:**

Funds will be provided to the Hamlet of Tuktoyaktuk and the Town of Inuvik to permit each Council to retain a Community Development Co-ordinator to provide professional expertise in the analysis of northern hydrocarbon development proposals, the identification of community impacts, and the supervision of municipal organizational and planning studies and general development plan amendments to prepare the Councils and their staff to effectively manage and control impacts. Additional funding will be provided to permit the conduct of such special studies as defined by the Councils, which could include:

- an organizational study to examine how the municipality should best be organized in light of expanded responsibilities and staff levels. Community growth and expansion will bring with it a requirement for additional services, new staff, improved administrative procedures, and streamlined handling of issues at the Council level. This study will permit changes to keep pace with development.

- legislative review to identify regulatory authorities, regimes and mechanisms which will permit the Councils to better control and channel community growth and expansion resulting from hydrocarbon development.

- a study to identify indicators and establish mechanisms and procedures to permit Councils to conduct ongoing monitoring of municipal impacts and to provide them with a sound information base for decision-making on impact management.

- an updating and revision of community land use and general development plans in light of potential development impacts.

- a study to define additional required infrastructure and to establish plans for financing and timing of infrastructure development.

5. SUBPROJECTS FOR F.Y.:

H2-1 a) TITLE: Funding for Inuvik
 b) CONTACT: Charles McGee
 c) Estimated Cost:

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
Development Coordinator (Salary & Benefits)	- 68.0	- 68.0	- 68.0	- 68.0	- 68.0	- 68.0	- 68.0
Support O&M and Capital	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Development Studies	36.0	35.0	50.0	63.0	35.0	55.0	35.0
Organization Study			45.0				
TOTAL	114.0	113.0	173.0	141.0	113.0	133.0	133.0

OTHER FUNDING: Nil

d) BRIEF DESCRIPTION:

See description under Section 4 above. Description and milestones for both Inuvik and Tuktoyaktuk are the same, however this subproject breakdown is provided to demonstrate the specific allocation of project funding for Inuvik.

H2-2 a) TITLE: H30
 b) CONTACT: Funding for Tuktoyaktuk
 c) ESTIMATED COST: Charles McGee

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
Development Coordinator (Salary & Benefits)	-	-	-	-	-	-	-
Support O&M and Capital	68.0	68.0	68.0	68.0	68.0	68.0	68.0
Development Studies	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Organization Study	37.1	34.3	39.7	39.1	33.4	33.0	53.0
TOTAL	30.0						
	115.1	112.3	147.7	117.1	111.4	111.0	111.0

OTHER FUNDING: Nil

d) BRIEF DESCRIPTION:

See description under Section 4 above. Description and milestones for both Tuktoyaktuk and Inuvik are the same, however this subproject breakdown is provided to demonstrate the specific allocation of project funding for Tuktoyaktuk.

6. NEED FOR STUDY:

- a) Legislation determining mandate:
 Municipal Ordinance
 Planning Ordinance
 Department Establishment Policy
 Capital Standards and Criteria

As incorporated municipalities, the Town of Inuvik and the Hamlet of Tuktoyaktuk have the mandate and the responsibility to conduct community planning and to provide municipal services within their boundaries. The Department of Local Government has a responsibility to ensure that these municipalities have adequate resources to effectively discharge their responsibilities, in keeping with its overall mandate to develop strong and responsible local governments. In the Hamlet of Tuktoyaktuk the Department is directly responsible for the provision of planning advisory services and of required municipal infrastructure.

- b) These two communities will ^{H31} experience the greatest direct impact from hydrocarbon development in the Beaufort area. The Beaufort Environmental Impact Statement anticipates that Tuktoyaktuk could grow from 750 persons to 1200 persons to 10,000 in 1990 and 20,000 by the year 2,000. Exploration activities have already had considerable impact on both communities, and hydrocarbon production will introduce significant additional expansion and service demands. Neither the Councils nor the Department has the resources that are necessary to plan for the municipal impacts that will result from this type of growth.

In its submission to the Beaufort Sea Environmental Assessment Panel, the Department stated that strong, effective and responsible community governments are one of the keys to the successful management of community impacts that will result from Beaufort development. It was further stated that both the Department and community governments required sufficient lead time and the necessary financial resources and professional expertise to properly plan for and manage the impacts of such development. The NOGAP submission was specifically referenced with the statement that "this funding is absolutely essential if local governments are expected to play a strong and responsible role in managing Beaufort development" (Department of Local Government, Statement to Beaufort Sea Environmental Assessment Panel, October 1983, p. 12). This identified need was acknowledged by the Panel in its Report and Recommendations, in recommending funding for NOGAP (recommendation 60) and in the following paragraph from Section 5.10.4, Community Participation:

"The GNWT is attempting to strengthen local governments to prepare them better for managing current social, economic and community problems. The Panel commends the GNWT's efforts to strengthen local government processes and local control over the planning and conduct of local services. If this is to be effective, the communities must be given the necessary legislative, human and financial resources. The Panel believes this is essential in order to give communities added experience and the confidence to deal with future problems."

This project will provide funds directly to the municipal governments of Tuktoyaktuk and Inuvik. This is essential to ensure that the Councils will be able to adequately prepare for and effectively participate in decision-making on hydrocarbon development proposals. This is the only project which will provide funds directly to these key municipal governments to ensure they can discharge their governmental responsibilities to identify, plan for, and manage the impacts of hydrocarbon development on municipal structures and operations.

7. RELATIONSHIP TO OTHER NOGAP PROJECTS:

This project is highly interdependent with Project H6, Municipal Organization, Service and Infrastructure Impact Planning. This project will provide the Inuvik Regional office of the Department of Local Government with the capability to advise, support, and monitor the activities carried out by the municipal governments of Tuktoyaktuk and Inuvik under this project.

There is also a strong interrelationship with Projects H7, Policy on the Financing of Municipal Infrastructure and Land Servicing for Rapidly Growing Communities, in that these will clearly establish GNWT policy regarding the financing and provision of municipal infrastructure and thus provide the policy base necessary to the formulation and implementation of municipal plans through this project.

8. MAJOR MILESTONES/OUTPUTS:

- | | |
|---------|---------------------------------------------------------------------------------------------------|
| 1985/86 | 1. Community Operations Indicators and Database Outline |
| | 2. Initial Recommendations on Required Municipal Initiatives: Policies, Regulations, and Programs |
| 1986/87 | 3. Community Operations Database Compilation and Establishment of Monitoring Sources/Mechanisms |
| | 4. Municipal Organization Study |
| 1987/88 | 5. Municipal Impact Assessment |
| to | |
| 1990/91 | 6. Community Plan Update |
| | 7. Municipal Physical Development Plans and Infrastructure Strategies |
| | 8. Final Recommendations for Municipal Programs and Services Development and Delivery |

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (85-86, \$000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	-	-	-	-	-	-	-
O & M	229.1	225.3	320.7	258.1	224.4	244.0	244.0
Capital	-	-	-	-	-	-	-
Other*	15.9	15.7	22.3	17.9	15.6	17.0	17.0
TOTAL	245.0	241.0	343.0	276.0	240.0	261.0	261.0

* 6 1/2% Administration Fee

10. OTHER FUNDING: Nil

1. PROJECT TITLE: Municipal Organization, Services and Infrastructure Impact Planning (1984/85 to 1990/91)

NOGAP PROJECT NO: H6

2. DEPARTMENTAL COORDINATOR: Gary Vanderhaden
ADDRESS: Senior Policy Advisor
Department of Local Government
Government NWT, Yellowknife, N.W.T.
TELEPHONE NO.: (403) 873-7232

PROJECT MANAGER: Charles McGee
ADDRESS: Regional Superintendent
Department of Local Government
Government NWT, Yellowknife, N.W.T.
TELEPHONE NO.: (403) 979-7120

3. OBJECTIVES:

To enable the Department of Local Government and Community Councils of Inuvik, Tuktoyaktuk, Aklavik, Sachs Harbour, Paulatuk, Coppermine, Holman, Fort McPherson, Arctic Red River, Fort Good Hope, and Norman Wells in the Beaufort and Mackenzie Delta area to assess municipal impacts based on the approved NOGAP development scenarios, to prepare plans for municipal infrastructure and services, and to prepare municipal organization and management plans to ensure preparedness for hydrocarbon development.

To provide the Department of Local Government with the resources and expertise to:

- a) develop and deliver municipal information programs to ensure community councils and their staff have the opportunity to obtain the procedural and technical knowledge necessary to undertake effective management of community impacts resulting from Beaufort hydrocarbon development;
- b) provide professional and technical advice and assistance to community governments in the Beaufort and Mackenzie Delta areas to enable them to participate effectively in decision making on Northern hydrocarbon development proposals and to identify, plan for, and manage the community impacts resulting from hydrocarbon development;
- c) identify and plan for impacts on Departmental program delivery and to identify legislative, policy, and program initiatives required to ensure community governments will have the authority and resources necessary to effectively manage impacts through the implementation of management, regulatory, and infrastructure plans.

4. BRIEF DESCRIPTION OF PROJECT:

A specialist position will be established in the Inuvik Regional Office of the Department of Local Government to ensure that both the Department and community governments in the Beaufort-Mackenzie Delta area can adequately assess and respond to proposals for northern hydrocarbon development.

This position would act as the Departmental liaison with the Development Coordinators retained by the Councils of Tuktoyaktuk and Inuvik through Project H2, and would act directly as the Development Coordinator for the Councils of the other Beaufort and Delta communities affected (Sachs Harbour, Paulatuk, Coppermine, Holman, Aklavik, Fort McPherson, Arctic Red River, Fort Good Hope, and Norman Wells) where the establishment of separate funding and full person years could not be justified. The project includes the identification and completion of specific studies requiring specialist professional expertise (eg. development plan amendments, regulatory by-law development, infrastructure demand surveys and design parameters) and the acquisition and establishment of a microcomputer-based infrastructure and operations database system.

Activities will include:

- preparing and conducting information sessions for Councillors and staff of community governments using case studies as to how hydrocarbon development can affect community government operations, the authorities and resources (legislative, regulatory, financial, human) available to Council in addressing impacts, and the possible management strategies to prepare for and deal with community impacts;
- carrying out research to provide data on community infrastructure and operations required for effective programs and services monitoring and development, and to establish a computerized system for ongoing data collection, compilation and reporting;
- identifying and forecasting community impacts resulting from current and proposed hydrocarbon development based on the approved NOGAP development scenarios;
- identifying and forecasting impacts on the delivery of departmental programs to the communities and recommending required departmental initiatives;
- liaising with community governments on a frequent and ongoing basis to provide professional expertise on development impact assessment and management.
- preparing in conjunction with community governments plans for municipal organization, services, and infrastructure to regulate, manage and respond to community impacts resulting from hydrocarbon development scenarios.

5. SUBPROJECTS FOR F.Y.: Not applicable.

- a) Legislation determining mandate:
Municipal Ordinance
Planning Ordinance
Capital Standards and Criteria

With the exception of the Town of Inuvik, the communities which will be directly affected by hydrocarbon development in the Beaufort Area are non-tax based municipalities or unincorporated settlements. Their Councils do not have the administrative or professional capability to undertake effective impact assessment, planning and management. The Department of Local Government has an overall mandate to ensure effective administration and delivery of municipal-type services in these communities, including the planning and provision of municipal infrastructure, and at the same time to develop strong and responsible local governments by increasing the knowledge, skills, decision making capabilities, and overall authority of Community Councils and their staff.

- b) This project is needed to ensure that the Inuvik Regional Office of the Department of Local Government can adequately respond to the increasing needs of the communities for professional advice and assistance in assessing northern hydrocarbon development proposals and planning for and managing impacts on community government structure and organization, physical community infrastructure, and service delivery.

In its submission to the Beaufort Sea Environmental Assessment Panel, the Department stated that strong, effective and responsible community governments are one of the keys to the successful management of community impacts that will result from Beaufort development. It was further stated that both the Department and community governments required sufficient lead time and the necessary financial resources and professional expertise to properly plan for and manage the impacts of such development. The NOGAP submission was specifically referenced with the statement that "this funding is absolutely essential if local governments are expected to play a strong and responsible role in managing Beaufort development" (Department of Local Government, Statement to the Beaufort Sea Environmental Assessment Panel, October 1983, p.12). This identified need was acknowledged by the Panel in its Report and Recommendations, in recommending funding for NOGAP (recommendation 60) and in the following paragraph from Section 5.10.4, Community participation:

H36

"The GNWT is attempting to strengthen local governments to prepare them better for managing current social, economic and community problems. The Panel commends the GNWT's efforts to strengthen local government processes and local control over the planning and conduct of local services. If this is to be effective, the communities must be given the necessary legislative, human and financial resources. The Panel believes this is essential in order to give communities added experience and the confidence to deal with future problems."

This project will ensure that both the Department and the community governments are prepared to discharge their responsibilities in such areas as community planning, land development, water and sanitation systems and services, and general community administration in a timely and efficient way in response to hydrocarbon development impacts. This preparedness is essential to the mitigation of potentially adverse impacts and to the successful participation of community residents in decision making on development proposals.

7. RELATIONSHIP TO OTHER NOCAP PROJECTS:

This project is highly interdependent with Project H2, Funds for Tuktoyaktuk and Inuvik Councils to Identify Impacts and Plan for Development, in that this project will provide departmental support, liaison and coordination with these Councils to maximize their utilization of the resources available to them through Project H2.

There is also a strong interrelationship with Project H7, Policy on the Financing of Municipal Infrastructure and Land Servicing for Rapidly Growing Communities, in that this will provide the policy base necessary to the formulation and implementation of community development plans through this project.

8. MAJOR MILESTONES/OUTPUTS:

1985/86	<ol style="list-style-type: none">1. Community Operations Database Outline: Identification of Operational Indicators2. Establishment of Computerized System for Database Compilation and Reporting3. Preparation of Resource Materials for Community Council Information Sessions
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- 1986/87
4. Information Sessions for Community Councils and Staff
 5. Community Operations Database Collection
 6. Initial Recommendations on Required Departmental Initiatives
- 1987/88 to 1990/91
7. Community Specific Impact Assessment
 8. Community - Specific Physical Development Plans and Infrastructure Strategies
 9. Community - Specific Organizational, Regulatory and Service Delivery Strategies
 10. Final Recommendations for Departmental Program Development and Delivery

In addition to the above, there will be frequent and ongoing consultations with Community Councils and their staff on specific development issues as they arise. These will be documented in an Annual Report and summarized in a Final Report on project termination.

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (85-86, \$000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	0.5	1.0	1.0	1.0	1.0	1.0	1.0
O & M	20.0	92.8	100.0	108.5	104.7	112.2	112.2
Capital	16.5	-	-	-	-	-	-
Other	2.5	7.2	7.0	7.5	7.3	7.8	7.8
TOTAL	39.0	110.0	107.0	116.0	112.0	120.0	120.0

10. OTHER FUNDING: Nil

1. **PROJECT TITLE:** Policy on the Financing of Municipal Infrastructure and Land Servicing for Rapidly Growing Communities (1984/85 to 1986/87)

NOGAP PROJECT NO: H7
2. **DEPARTMENTAL COORDINATOR:** Gary Vanderhaden
ADDRESS: Senior Policy Advisor
Department of Local Government
Government NWT, Yellowknife, N.W.T.
TELEPHONE NO.: (403) 873-7232

PROJECT MANAGER: As Above
3. **OBJECTIVES:**

To develop policy on the financing of municipal infrastructure and serviced land requirements, in existing communities of Inuvik, Tuktoyaktuk, Sachs Harbour, Paulatuk, Coppermine, Holman Island, Aklavik, Fort McPherson and Arctic Red River, resulting from rapid growth related to Beaufort resource development.
4. **BRIEF DESCRIPTION OF PROJECT:**

A consultant will be engaged by the Department of Local Government in Yellowknife to identify, assess and recommend on appropriate policy options for financing expanded municipal infrastructure requirements and related requirements for serviced land in existing Beaufort communities facing major impacts from resource development. In conducting this study, the consultant shall:
 - identify the overall nature and scope of requirements for additional municipal infrastructure and serviced land in existing Beaufort communities as a result of resource developments under the approved NOGAP development scenarios.
 - examine relevant policies, legislation and programs of other Canadian and northern jurisdictions for financing resource development related expansion of municipal infrastructure and land servicing.
 - examine and recommend on appropriate government/industry cost and tax-sharing arrangements.
 - obtain input on the study recommendations from municipal, settlement and band councils and other interested bodies in the Beaufort Sea Region.
5. **SUBPROJECTS FOR F.Y.:** Not applicable.

Department mandate:

- Planning Ordinance
- Municipal Ordinance
- Area Development Ordinance
- Taxation Ordinance

Preparedness for decision-making:

Communities in the Beaufort Sea Region are facing major resource development projects and therefore will be confronted with the problems of providing an expanded municipal infrastructure base (including new roads, upgraded water and sanitation systems, and public recreational facilities) in compressed periods of time before influxes of new workers and residents. In tax-based municipalities this infrastructure will be required before a sufficient industrial tax base can be generated to finance the infrastructure. This time lag problem will be compounded further if the industrial tax bases are located outside the municipalities while the new workers and residents reside within the municipalities. In non tax based municipalities the GNWT has limited resources to finance capital projects that will be required in settlements and hamlets impacted by resource development.

Rapid population growth in Beaufort communities such as Inuvik and Tuktoyaktuk as a consequence of hydrocarbon development will also produce extraordinary and substantial requirements for the provision of serviced residential, commercial and industrial lots, including lots to accommodate major new municipal infrastructure. The GNWT has had limited experience, resources and success in developing subdivisions in major-growth communities.

Without clear policy direction, hydrocarbon development in the Beaufort communities may be expected to generate shortages, rapid increase in land prices and the rise of squatter communities.

This project is essential to identify effective policy instruments for government and municipalities and other Beaufort communities to finance the extraordinary infrastructure and land servicing requirements stemming from anticipated population growth in Beaufort communities facing hydrocarbon developments.

The report of the Environmental Assessment Panel on Beaufort Sea Hydrocarbon Production and Transportation noted, for example, that the GNWT has had to divert capital funding from other communities where funding is needed. The Panel noted the need for the upgrading of municipal infrastructure and serviced land to acceptable standards before the start of hydrocarbon development.

7. RELATIONSHIP TO OTHER NOGAP PROJECTS:

Findings from this project will contribute to the success of Projects H2 (Inuvik and Tuktoyaktuk Impact and Planning Studies) and H6 (Municipal Organization, Service and Infrastructure Impact Planning) by providing overall GNWT/Federal policy direction for municipal infrastructure and land development in the Beaufort region.

8. MAJOR MILESTONES/OUTPUTS:

- 1985/86
1. Identify social, economic and fiscal and other criteria against which to assess options for financing the provision of municipal infrastructure and serviced land in response to Beaufort hydrocarbon development.
 2. Identify alternative processes and sources for planning and financing rapid municipal infrastructure expansion in existing communities.
 3. Assess alternative strategies in terms of:
 - socio-economic criteria
 - fiscal viability
 - GNWT policies, legislation and positions
 - Federal government policies, legislation and positions
 - positions of community, band and regional councils and Beaufort interest groups.
 - positions of the resource industry
- 1986/87
4. Recommend preferred policies for financing municipal infrastructure expansion in existing Beaufort communities.

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (85-86, \$000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	-	-	-	-	-	-	-
O & M	10	154.0	84.0	-	-	-	-
Capital	-	-	-	-	-	-	-
Other	.65	10.0	5.5	-	-	-	-
TOTAL	10.65	164.0	89.5				

1. PROJECT TITLE: Renewable Resources Hydrocarbon Development Impact and Planning Guidelines
(1984/85 to 1987/88)

NOGAP PROJECT NO: H4
2. DEPARTMENTAL COORDINATOR: Bob Bell,
ADDRESS: Chief, Wildlife Management,
Department of Renewable Resources
Government NWT, Yellowknife, N.W.T.

TELEPHONE NO.: (403) 873-7411

PROJECT MANAGER: John Donihee,
ADDRESS: Chief, Environmental Planning and
Assessment,
Department of Renewable Resources,
Government NWT, Yellowknife, N.W.T.

TELEPHONE NO.: (403) 873-7768
3. OBJECTIVES:
 - a) Main Objectives - Long Term:

To develop an integrated system for planning, predictive impact assessment and management of renewable resources in the event of hydrocarbon development.

To develop a policy and decision making framework based on specific criteria with regards to land use and protection of defined renewable resource options.

To complete comparative studies of other northern areas undergoing development, and case studies in the NWT, so as to develop management programs and mitigation guidelines to protect and enhance renewable resource development options.
 - b) Sub-Objectives - Short Term:

To review, compile and where necessary, develop and extend the GNWT policy framework for land use planning and protection in the NOGAP areas.

To identify significant areas for wildlife under GNWT jurisdiction in the NOGAP area and where necessary, develop preliminary guidelines for their protection and management.

To compile comparative reviews of development impacts on renewable resource economies in other northern jurisdictions.

To complete a BEMP type exercise, on land, for NOGAP areas.

To complete case studies of development effects on harvesting activities in selected areas in the Northwest Territories.

4. BRIEF DESCRIPTION OF PROJECT:

This activity is required to expand the GNWT's policy base and decision-making criteria related to environmental management issues. Policy guidelines and criteria specifically directed at the use of land and renewable resources are essential before management programs, which protect and enhance harvesting opportunities can be implemented.

This project will ensure that existing information is compiled and analyzed for decision-making and will contribute to more effective information collection in our other NOGAP projects. A comparative analysis of other development experiences and the present development activities will result in a definition of the management problems we face and in an identification of systematic approaches to management and protection.

This study will produce a framework for environmental management of issues associated with Beaufort Sea Oil and Gas development.

5. SUBPROJECTS FOR F.Y.:

H4-1

- a) TITLE: Important Wildlife Areas
- b) CONTACT: Paul Gray, Supervisor, Habitat Management
- c) ESTIMATED COST: 1985/86 - \$15,000.00

d) BRIEF DESCRIPTION:

Important areas for wildlife were identified in 1984/85. Further work is required to assign relative priority for those in the NOGAP area and to develop management and protection guidelines for these areas.

H4-2

- a) TITLE: GNWT Policy Framework for Land Use in Beaufort
- b) CONTACT: Ron Livingston, Planning Coordinator, Environmental Planning and Assessment
- c) ESTIMATED COST: 1985/86 - \$20,000

d) BRIEF DESCRIPTION:

Compilation of GNWT policies for land use management, identification of gaps and drafting of comprehensive policy framework based on GNWT mandate for renewable resource protection.

- H4-3 a) TITLE: Environmental Monitoring Program
b) CONTACT: John Donihee, Chief, Environmental Planning and Assessment
c) ESTIMATED COST: 1985/86 - \$30,000
1986/87 - \$18,000
1987/88 - \$18,000

d) BRIEF DESCRIPTION:

A systematic analysis of impact hypotheses based on the valued ecosystem components concept which should clarify need for further research and monitoring of land based development activities in the Beaufort and upper Mackenzie areas. This is a cooperative effort with DIAND, DFO and DOE. Monitoring to validate impact hypotheses will be an ongoing requirement.

- H4-4 a) TITLE: Review and Comparative Analysis of Development Impacts on Renewable Resource Economy and Case Studies in the Northwest Territories
b) CONTACT: Heather Myers, Analyst, Environmental Planning and Assessment
c) ESTIMATED COST: 1985/86 - \$11,000
1986/87 - \$35,000
1987/88 - \$35,000

d) BRIEF DESCRIPTION:

Review of developments in Alaska, Quebec and northern provinces to determine, specifically, impacts on traditional economies, compilation, review of mitigation strategies and analysis of effectiveness. Funding reductions have delayed major case study effort until 1986/87. Literature reviews, preparation and planning will be undertaken on a limited basis only in 1985/86.

- H4-5 a) TITLE: Guidelines for Protection of Renewable Resource Options and Mitigation of Hydrocarbon Development Impacts
b) CONTACT: John Donihee, Chief, Environmental Planning and Assessment
c) ESTIMATED COST: 1986/87 - \$23,000
1987/88 - \$23,000

d) BRIEF DESCRIPTION:

This project will build on the results of policy work, of the environmental monitoring system and of the comparative work by producing a more specific set of guidelines for protecting renewable resource options in the face of hydrocarbon development. It will also incorporate results of habitat and wildlife management planning project H15 as it becomes available.

6. **NEED FOR STUDY:**

Departmental Mandate

The Department is responsible for wildlife management, environmental protection and is GNWT lead agency for land use planning and conservation. Very high priority is attached to renewable resource development as an option to be maintained in face of non-renewable resource development for social, cultural and economic reasons.

Preparedness for Decision-Making

The project is an essential component to governmental preparedness for development. A consistent policy framework must be in place prior to commitment of large amounts of money for research and inventory work. Other projects will contribute to development of a specific set of guidelines for protection of renewable resources by 1987/88.

7. **RELATIONSHIP TO OTHER NOGAP PROJECTS:**

Subproject H4-3, is cooperative with other agencies receiving NOGAP funding. Other subprojects are specific to departmental mandate and role on behalf of GNWT.

Subproject H4-5, will incorporate results of habitat and wildlife management plans being developed in project H15.

8. **MAJOR MILESTONES/OUTPUTS:**

1985/86	H4-1	Report - Relative priority of areas and management guidelines
	H4-2	Policy for NOGAP areas
	H4-3	Environmental monitoring workshops
	H4-4	Plan and approach for case studies for next two years

1986/87		
Subproject	H4-1	(completed)
	H4-2	(completed)
	H4-3	Monitoring workshop report, field monitoring of impact hypotheses
	H4-4	Progress report on case studies
	H4-5	Progress report on guidelines work

1987/88		
Subproject	H4-1	(completed)
	H4-2	(completed)
	H4-3	Field monitoring of impact hypotheses
	H4-4	Report on case studies
	H4-5	Final guidelines report

9. NOCAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (85-86, \$000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	-	-	-	-	-	-	-
O & M	102.0	76.0	76.0	76.0	-	-	-
Capital	-	-	-	-	-	-	-
Other	7.0	4.9	4.9	4.9	-	-	-
TOTAL	109.0	80.9	80.9	80.9			

10. OTHER FUNDING: Nil

NOGAP NO: H12
Revised January 1985

1. **PROJECT TITLE:** Effects of Hydrocarbon Development on Harvesting of Wildlife (1984/85 to 1988/89)

NOGAP PROJECT NO: H12
2. **DEPARTMENTAL COORDINATOR:** Bob Bell,
ADDRESS: Chief, Wildlife Management,
Department of Renewable Resources
Government NWT, Yellowknife, N.W.T.

TELEPHONE NO.: (403) 873-7411

PROJECT MANAGER: Ron Graf,
ADDRESS: Biologist, Wildlife Management,
Department of Renewable Resources,
Government NWT, Yellowknife, N.W.T.

TELEPHONE NO.: (403) 873-7778

3. **OBJECTIVES:**

Main Objectives - Long Term:

To conduct a study which will provide an accurate picture of the current use of wildlife (including mammals, birds, and fish) by the communities from Fort McPherson south to Jean Marie River. To enable the Hunters and Trappers to deal more effectively with the indirect effects of hydrocarbon development on harvesting. The study will gather information on the harvested wildlife for each community by species, kill location, date, sex and if possible, age. (A similar study will be conducted in the Beaufort communities which will include harvest of marine mammals, bird, and fish, as a result of the COPE Implementation budget.)

Sub-Objectives - Short Term:

To provide a final summary of historical harvesting levels of all communities in the Western Arctic.
To establish the organizational and functional framework which will allow an ongoing, cooperative harvest study.
To provide greater involvement of users in gathering data and reaching wildlife management decisions.

4. **BRIEF DESCRIPTION OF PROJECT:**

Data will be collected monthly in each community by a local field-worker on all numbers of each species, location of kills, and some breakdown of the sex and age of the harvested animals. The data is then forwarded to a regional native office where the native organization will analyse the information and prepare summary reports. The operation of the studies shall be directed by a Steering Committee made up of Territorial and Federal government experts and native representatives.

5. SUBPROJECTS FOR F.Y.: Nil

6. NEED FOR STUDY:

a) Departmental Mandate:

The Department of Renewable Resources, Government of the N.W.T., has the mandate to manage all wildlife in the Northwest Territories via the federal NWT Act and enacted through the NWT Wildlife Ordinance and Regulations. The data from this study shall be shared with those federal departments who also have a mandate in the area and who will be represented on the Steering Committee, namely, DOE, DFO and DIAND.

b) Preparedness for Decision-making:

One of the major impacts of development always considered is the socio-economic changes which could occur. Wildlife harvesting is extremely important to the people in the impact zones, both culturally and economically. It is the indirect effects of development which will most affect harvesting, e.g. more and better equipment for hunting as a result of employment, rotational employment effects on seasonal hunting, increased demand for by-products, increased demand by residents and non-residents for access. We must know current harvest levels before development proceeds any further if we are to realistically manage wildlife for the benefit of all current and future users.

7. RELATIONSHIP TO OTHER NOGAP PROJECTS:

Good harvest statistics provide data which in combination with our information from the Department's Baseline Studies (H16) are required to exercise good management. Harvest data will be of major importance to prepare the species management plans (H15) and to assist projects proposed by other departments, eg., Social Services Base Study (H3), Socio-economic Monitoring System (H8) and Boom/Bust Cycles (H9). In addition, this data shall directly influence land use planning and implementation of Conservation Strategy both joint projects of the Territorial and Federal Governments. Data for animals harvested from the Porcupine caribou herd and the Richardson Mountain Dall's sheep population shall be provided to the Yukon Government to support their NOGAP projects G16 and G14, respectively.

8. MAJOR MILESTONES/OUTPUTS:

- | | | |
|---------|----|--------------------------------------|
| 1986/87 | 1. | Continue to collect data |
| | 2. | Produce a first annual report |
| | 3. | Produce an initial evaluation report |
| 1987/88 | 4. | Continue to collect data |
| | 5. | Produce another annual report |
| 1988/89 | 6. | Continue to collect data |
| | 7. | Produce another annual report |
| | 8. | Produce an indepth evaluation report |

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (85-86, \$000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	-	-	-	-	-	-	-
O & M	-	77.6	114.0	114.0	-	114.0	119.7
Capital	-	-	-	-	-	-	-
Other*	-5.4	7.4	7.4	7.4	7.7	-	-
TOTAL	83.0	121.4	121.4	121.4	127.4		

*6 1/2% Administration Fee

10. OTHER FUNDING:

None is available to cover proposed communities, however, we hope to cover the Beaufort area communities through the COPE Implementation budget, thereby covering all the communities affected by development.

1. PROJECT TITLE: Deterrent Studies for Hydrocarbon Development Impact Area (1984/85 to 1986/87)
NOGAP PROJECT NO: H13
2. DEPARTMENTAL COORDINATOR: Bob Bell,
ADDRESS: Chief, Wildlife Management,
Department of Renewable Resources
Government NWT, Yellowknife, N.W.T.
TELEPHONE NO.: (403) 873-7411
PROJECT MANAGER: Paul Gray,
ADDRESS: Supervisor, Habitat Management,
Department of Renewable Resources,
Government NWT, Yellowknife, N.W.T.
TELEPHONE NO.: (403) 873-7765

3. OBJECTIVES:

Bear Detection and Deterrent Techniques

1. Train industrial workers and others on the use of detection and deterrent techniques in order to minimize or eliminate man-bear conflicts during development and production periods.
2. Continue development of techniques for detecting and deterring bears where their presence is hazardous.

Grizzly Bear Habitat Use

1. Determine grizzly bear habitat use on Richards Island and Tuktoyaktuk peninsula in relation to ongoing hydrocarbon activity to minimize future conflicts with development.

Raptors

1. Identify and assess management techniques to mitigate disturbance to raptors from development activities.

4. BRIEF DESCRIPTION OF PROJECT:

Deterrent studies and public education regarding man/wildlife conflicts for polar bear, grizzly bear and raptors are required as such conflicts are occurring during the exploration phase. These wildlife species are threatened and in the case of man/bear conflicts, human safety is a major concern as well as the potential reduction of bear populations in the Beaufort Region.

Grizzly bears are intolerant of human intrusion on their range. Polar bears, on the other hand, are curious and investigate new activities in their areas. Protection of these species requires development and testing of detection and deterrent mechanisms to keep men and bears apart. During the last three years several promising detection and deterrent mechanisms have been developed, however, feasibility studies to determine their efficiency and effectiveness have not been completed.

Another technique to minimize conflicts of bears and raptors with development activities is to keep development facilities and activities away from important feeding and denning/nesting habitat. Airphoto analysis and ground truthing will be completed to identify these habitats and their seasonal use within the development zone.

Educational materials on the characteristics of these species and the use of detection and deterrent techniques are required to inform companies working within the development zones. These will be developed and provided to industry to minimize potential impacts on polar bear, grizzly bear and raptors.

5. SUBPROJECTS FOR F.Y.:

- H13-1 a) TITLE: Detection and Deterrent training manual
b) CONTACT: Paul Gray
c) ESTIMATED COST: \$7,800 Per Annum
d) BRIEF DESCRIPTION:
A training package consisting of a manual and associated films will be completed. This material is designed to train persons, who are likely to come into contact with bears, on the use of detection and deterrent techniques. The package will be tested and implemented.
- H13-2 a) TITLE: Detection and deterrent techniques
b) CONTACT: Paul Gray
c) ESTIMATED COST: \$16,000 Per Annum
d) BRIEF DESCRIPTION:
Field trials will be conducted on polar bears at Cape Churchill, Manitoba to test newly developed deterrent ammunition and to refine detection techniques. Field trials may also be conducted with black bears at Norman Wells, NWT.
- H13-3 a) TITLE: Grizzly bear habitat use
b) CONTACT: Paul Gray
c) ESTIMATED COST: \$30,700 Per Annum
d) BRIEF DESCRIPTION:
Fifteen grizzly bears on Richards Island and Tuktoyaktuk peninsula will be radio-collared. Grizzly bears are intolerant of human intrusion on their range. The movements of the bears will be monitored in relation to habitat use and ongoing development activities.
- H13-4 a) TITLE: Potential raptor mitigative techniques
b) CONTACT: Paul Gray
c) ESTIMATED COST: \$1,000 Per Annum
d) BRIEF DESCRIPTION:
Relevant literature will be reviewed to summarize concerns and identify management techniques to minimize man/raptor interactions caused by development activities.

6. NEED FOR STUDY:

Departmental Mandate

Through the NWT Act and the Wildlife Ordinance, the Department's mandate to manage wildlife extends to mitigating impacts of development on wildlife habitat and wildlife. This includes development of techniques to minimize man/bear conflicts and man/raptor interactions. The information from these studies is vital to carry out our mandate responsibilities.

Preparedness for Decision-making

The studies will guide decision making with respect to siting of facilities and timing of activities as well as suggesting methods to mitigate impacts of development on polar, grizzly and black bears, and raptors.

7. RELATIONSHIP TO OTHER NOGAP PROJECTS:

No overlap or conflict with other NOGAP projects exists. The information on grizzly bear and raptor habitat will be incorporated into wildlife management plans designed for the development zone (H15) and will assist in development of guidelines and criteria for Land Use Planning. The NWT raptor inventory complements raptor inventory proposed by Yukon Territorial Government (NOGAP G17). Cooperation with and relay of information on bear detection and deterrent techniques to Yukon territorial government will continue. The NWT bear detection and deterrent training manual will be designed specifically for the NWT and its unique man/bear problems.

8. MAJOR MILESTONES/OUTPUTS:

- | | | |
|---------|----|------------------------------------------------------------------------------------------------------------------------------------|
| 1985/86 | 1. | Testing and implementation of bear detection and deterrent training program |
| | 2. | Investigation of new detection and deterrent techniques on polar and black bears |
| | 3. | Compile report of techniques to mitigate man/raptor interactions |
| | 4. | Initial delineation of grizzly bear feeding and denning habitat in relation to development activities. Report will be compiled |
| 1986/87 | 5. | Continue implementation of bear detection and deterrent training program and provide evaluation report of first year |
| | 6. | Continue program to delineate grizzly bear feeding, denning habitat in relation to development activities and prepare final report |
| | 7. | Continue investigation and testing of bear detection and deterrent techniques and compile final report. |

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (85-86, \$000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's		1.0	1.0	-	-	-	-
Salary	-	35.0	35.0	-	-	-	-
O & M	77.6	15.5	15.5	-	-	-	-
Capital	-	5.0	5.0	-	-	-	-
Other	5.4	3.6	3.6	-	-	-	-
TOTAL	83.0	59.1	59.1	-	-	-	-

10. OTHER FUNDING: Nil

H53
NOGAP NO: H15
Revised January 1985

1. PROJECT TITLE: Wildlife Management Plans for Species
Affected by Hydrocarbon Development
(1985/86 to 1987/88)

NOGAP PROJECT NO: H15

2. DEPARTMENTAL COORDINATOR: Bob Bell,
ADDRESS: Chief, Wildlife Management,
Department of Renewable Resources
Government NWT, Yellowknife, N.W.T.
TELEPHONE NO.: (403) 873-7411

PROJECT MANAGER: Kevin Lloyd/Paul Gray
ADDRESS: Renewable Resources, Government NWT
Yellowknife, NWT
TELEPHONE NO.: (403) 873-7769/873-7765

3. OBJECTIVES:

Main Objectives - Long Term:

To produce wildlife management plans for economically and culturally important wildlife species which may be affected by hydrocarbon development in the Beaufort region. These plans will include delineation of important wildlife habitat in Beaufort region and will be used to develop policy guidelines to minimize impacts on wildlife habitat from land uses related to development.

Sub-Objectives - Short Term:

To produce management plans for Bluenose caribou and wolf; Banks Island Peary caribou and muskox; Beaufort Sea polar bears; Richards Island and Tuktoyaktuk grizzly bear; raptors within development zones; moose in Mackenzie Valley and delta; and furbearers in Mackenzie Delta and Valley.

To ensure results from NOGAP Project No. H16 are incorporated into appropriate species management plans.

To outline management of potential impacts from hydrocarbon development for each wildlife species.

To identify important wildlife habitat within each species management plan.

4. BRIEF DESCRIPTION OF PROJECT:

Potential impacts to many wildlife species were identified by the Department during the review of the Environmental Impact Statement produced by Dome, Gulf and Esso for the Beaufort Sea EARP hearings. Caribou, muskox, polar bear, grizzly bear, raptors, moose and furbearers are all culturally and economically important species to residents within the proposed development zones. These species provide domestic meat and clothing and form the basis of the renewable resource economy.

Wildlife management plans will be developed which identify important wildlife habitat; which outline management of potential impacts from hydrocarbon development for each wildlife species; and which present options for the Department to encourage and maintain the renewable resource economy as an alternative to the wage economy. In addition, wildlife management plans will support the implementation of the conservation strategy; provide information to support land use planning; and will be used to develop policy guidelines to minimize impacts on wildlife species from development.

Wildlife management plans will be reviewed in consultation with hunters and trappers in Beaufort Sea and Mackenzie Valley communities to allow residents to have a stronger role in wildlife resource planning and decision-making.

5. SUBPROJECTS:

- H15-1 a) TITLE: Bluenose caribou and wolf management plans
b) CONTACT (Project Manager): Kevin Lloyd/Paul Gray
c) ESTIMATED COST: 1985/86 - \$12,000
1986/87 - \$13,000
d) BRIEF DESCRIPTION:

The Bluenose barrenground caribou herd is a major meat source for six communities in the Beaufort Sea and Mackenzie Valley (Paulatuk, Tuktoyaktuk, Inuvik, Fort Good Hope, Fort Norman, Norman Wells). In the face of predicted increases in demand for caribou meat and byproducts as Beaufort region human population increases, a management plan will outline strategies to maintain the herd and to protect the communities' interests. In addition, the plan will outline mitigative methods to minimize encroachment of development activities on the summer and winter range and calving grounds; include management strategies for wolves which are the other major predator of the herd; and encourage the commercial use of caribou by industry in order to enhance and maintain the renewable resource economy.

- H15-2 a) TITLE: Banks Island muskox management plan
b) CONTACT (Project Manager): Kevin Lloyd/Paul Gray
c) ESTIMATED COST: 1985/86 - \$5,000
1986/87 - \$5,000
d) BRIEF DESCRIPTION:

Muskox are a protected species. Recent increases in numbers on Banks Island have resulted in economic gain to residents of several Beaufort communities through sales of meat, hides and sport hunts. Predicted changes in the human population in the Beaufort region are expected to increase demand for muskox meat and byproducts. This increased demand must be managed to ensure the viability of muskox populations on Banks Island and to result in more opportunities within the renewable resource economy. In addition, muskox populations tend to fluctuate dramatically as snow conditions control access to winter forage. A management plan will provide alternative strategies to cope with increased demand should a crash in muskox populations occur.

- H15-3 a) TITLE: Banks Island Peary caribou management plan
b) CONTACT (Project Manager): Kevin Lloyd/Paul Gray
c) ESTIMATED COST: 1985/86 - \$3,000
1986/87 - \$3,000
1987/88 - \$6,200
d) BRIEF DESCRIPTION:

Presently, commercial exploitation of Peary caribou on Banks Island is limited. However, this is expected to change with increased hydrocarbon development. A management plan will outline strategies to maintain the caribou population; protect interests of Beaufort Sea residents; guide commercial use of Peary caribou; and suggest alternatives should environmental factors cause a dramatic reduction in population. This subproject is linked to Department of Environment Project C8 Caribou Migration.

- H15-4 a) TITLE: Beaufort Sea polar bear management plan
b) CONTACT (Project Manager): Kevin Lloyd/Paul Gray
c) ESTIMATED COST: 1985/86 - \$8,000
1986/87 - \$8,000

d) BRIEF DESCRIPTION:

Polar bears are a threatened species. An international agreement charges the Department to conserve polar bears and their habitat. Predicted impacts from development include man/bear conflicts; potential loss or alteration of sea ice habitat through vessel traffic; loss of polar bears from contact with oil spills; and a decrease in polar bear productivity if the ringed seal population is affected. A management plan for all NWT polar bears has been drafted, however, this will be tailored to include management responses to hydrocarbon development in the Beaufort region.

H15-5 a) TITLE: Richards Island and Tuktoyaktuk grizzly bear management plan,
NOGAP PROJECT NO: H15

b) CONTACT (Project Manager): Kevin Lloyd/Paul Gray

c) ESTIMATED COST: 1985/86 - \$3,000
1986/87 - \$3,000
1987/88 - \$14,200

d) BRIEF DESCRIPTION:

Grizzly bear are a threatened species and intolerant of human intrusion on their range. A management plan will outline mitigative measures to minimize potential conflict of development activities with grizzly bears and their habitat and to present strategies to manage the expected increase in demand to hunt barrenground grizzly bear.

H15-6 a) TITLE: Mackenzie Delta and valley raptor management plan.
NOGAP PROJECT NO: H15

b) CONTACT (Project Manager): Kevin Lloyd/Paul Gray

c) ESTIMATED COST: 1985/86 - \$6,000
1986/87 - \$6,000

d) BRIEF DESCRIPTION:

The peregrine falcon population within this region accounts for 60 percent of the known birds of this endangered species. Protection of nesting and feeding sites from development activities is imperative to maintain the population. Methods to mitigate impacts to falcons and other raptors are available. A management plan will provide strategies to minimize impacts from hydrocarbon development on raptors.

- H15-7 a) TITLE: Mackenzie delta and valley moose management plan.
 NOGAP PROJECT NO: H15
 b) CONTACT (Project Manager): Kevin Lloyd/Paul Gray
 c) ESTIMATED COST: 1985/86 - \$3,800
 1986/86 - \$3,800
 1987/88 - \$13,200
 d) BRIEF DESCRIPTION:
- Moose provide meat and clothing to all Mackenzie delta and valley residents. Expected impacts from hydrocarbon development include some alteration of habitat and increased access which could lead to localized overharvesting. A management plan which identifies important habitat; responds to the needs of Mackenzie delta and valley residents for moose; and minimizes predicted impacts to moose; will be developed.
- H15-8 a) TITLE: Mackenzie delta and valley furbearer management plan.
 NOGAP PROJECT NO: H15
 b) CONTACT (Project Manager): Kevin Lloyd/Paul Gray
 c) ESTIMATED COST: 1985/86 - \$3,000
 1986/87 - \$2,800
 1987/88 - \$10,200
 d) BRIEF DESCRIPTION:
- Furbearers are an important source of cash to residents of Mackenzie delta and valley communities. Predicted impacts from hydrocarbon development include some alteration of habitat and increased access which could lead to localized overharvesting. A management plan which provides options to minimize impacts from development to furbearers and seeks to insure the viability of this component of the renewable resource economy as an alternative to wage economy will be developed.

6. NEED FOR STUDY:

Departmental Mandate

Through the NWT Act and the Wildlife Ordinance, the Department has the mandate to manage all wildlife. Management plans which outline responses to predicted impacts from hydrocarbon development on wildlife species ensure that the Department will be prepared and capable of fulfilling its mandate in the Beaufort region.

Preparedness for Decision-making

The existence of species management plans will assist the Department to make decisions on northern hydrocarbon development proposals and to recommend terms and conditions to minimize impacts. The plans will provide information required by the Land Use Planning process to develop land use plans.

7. RELATIONSHIP TO OTHER NOGAP PROJECTS:

Results from NOGAP Project No. H16 are required to complete various portions of the species management plans. Policy guidelines for terms and conditions to minimize and regulate impacts will be developed through NOGAP Project No. H4. These guidelines will assist the formulation of management responses to impacts from hydrocarbon development on wildlife species. Important wildlife habitat identified through NOGAP Project H4 will be integrated into the species management plans.

8. MAJOR MILESTONES/OUTPUTS:

- | | | |
|---------|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1985/86 | 1. | Complete identification of important wildlife habitat for culturally and economically important wildlife species in the three development zones. |
| | 2. | Gather background information required for each species management plan. |
| 1986/87 | 3. | Produce drafts of management plans for Banks Island muskox, Beaufort Sea polar bears, Mackenzie delta and valley raptors and Bluenose caribou herd |
| | 4. | Complete consultation with hunters and trappers in Beaufort Sea and Mackenzie Valley communities on draft management plans |
| 1987/88 | 5. | Finalize drafts of above management plans |
| | 6. | Complete management plans for Banks Island Peary caribou; Richards Island and Tuktoyaktuk grizzly bear; Mackenzie Delta and valley moose; and, Mackenzie delta and valley furbearers |
| | 7. | Conduct consultation with hunters and trappers in Beaufort Sea and Mackenzie Valley communities on four remaining management plans |

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (85-86, \$000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's*		1.0	1.0	1.0		-	-
Salary	-	41.4	41.4	41.4	-	-	-
O & M	-	2.4	2.4	2.4	-	-	-
Capital	-	-	-	-	-	-	-
Other	-	2.8	2.8	2.8	-	-	-
TOTAL			46.6	46.6		46.6	-

10. OTHER FUNDING: Nil

1. PROJECT TITLE: Renewable Resources Baseline
Information for Wildlife Populations
Affected by Hydrocarbon Development
(1985/86 to 1988/89)

NOGAP PROJECT NO: H16

2. DEPARTMENTAL COORDINATOR: Bob Bell,
ADDRESS: Chief, Wildlife Management,
Department of Renewable Resources
Government NWT, Yellowknife, N.W.T.
TELEPHONE NO.: (403) 873-7411

PROJECT MANAGER: Same as above
ADDRESS:
TELEPHONE NO.:

3. OBJECTIVES:

To complete the baseline data available on the population dynamics and habitat requirements of Bluenose barren ground caribou, Banks Island muskox, Beaufort Sea grizzly bear and polar bear and raptors which is required to assess and manage potential impact of hydrocarbon development.

Long Term:

To assess and manage potential impacts and changes in demand for and use of renewable resources which result from development, the Department needs:

To develop reliable population data including total population size, recruitment, and mortality;

To identify habitat requirements of wildlife populations which will be impacted by development activities;

To develop an understanding of factors causing natural variability of wildlife populations.

Short Term:

To conduct a postcalving census of bluenose caribou herd and to obtain recruitment data to determine how much additional harvest the herd can sustain should demand for caribou meat and byproducts increase because of development;

To delineate subpopulations of muskox on Banks Island;

To investigate the relationship between snow conditions and winter survival of muskox;

To census muskox populations on Banks Island, east of Tuktoyaktuk and south of Paulatuk, which are harvested by residents within the development zone;

To update a population estimate of grizzly bears on Richards Island and Tuktoyaktuk Peninsula where exploration activity has occurred since the last population estimate in 1977;

To delineate polar bear subpopulations in the Beaufort Region;

To update estimates of population size and recruitment of polar bears in the Beaufort Sea Region, which are harvested by residents in the development zone;

To correlate distribution of polar bears with ringed seal distribution, ice types and ongoing exploration activity in the Beaufort Sea Region;

To develop and field test a technique to delineate raptor nesting and feeding habitat from airphotos or satellite imagery;

To inventory raptor nests and habitat within proposed development zones to minimize conflict with future facility siting and development activities.

4. BRIEF DESCRIPTION OF PROJECT:

Caribou, muskox, grizzly bear, polar bear and raptors are of significant cultural and economic value to the residents of communities in the Beaufort Sea Region. This project will provide information needed to develop management programs to maintain wildlife population sizes, productivity and habitat requirements and to assist the Department's efforts to maintain the renewable resource use economy as an alternative to the wage economy. Studies will require consultation with the communities and hunters and trappers will participate in field work.

5. SUBPROJECTS FOR F.Y.:

- H16-1 a) TITLE: Population dynamics of Bluenose caribou herd
 b) CONTACT: Doug Heard
 c) ESTIMATED COST: 1985/86 - \$120,000
 d) BRIEF DESCRIPTION:

Thirty radio-collars will be attached to Bluenose caribou in October 1985 and fall recruitment data will be collected. The radio-collars will assist location of caribou when testing methods to obtain recruitment data and to compare winter range use with proposed development zone. A monitoring flight in June 1986 will delineate boundaries of the calving ground. Postcalving aggregations will be monitored through radio-collared caribou and the photo census technique will be tested in July 1986. Spring recruitment counts and the postcalving census technique will again be tested in 1987/88 and 1988/89.

- H16-2 a) TITLE: Census of muskox and Peary caribou populations which are harvested by residents within the development zone.
 b) CONTACT: Kent Jingfors
 c) ESTIMATED COST: 1985/86 - \$75,000

d) BRIEF DESCRIPTION:

Muskox and Peary caribou, which are harvested by residents in Beaufort communities, will be censused in June 1985 on Banks Island. Twenty muskox on Banks Island will be radio-collared to determine boundaries of subpopulations. Monitoring of radio-collars will be combined with polar bear radio-collar monitoring project. Snow conditions on muskox and caribou winter range will be assessed and recruitment counts of muskox and caribou will be obtained in spring 1986 and 1987. Censuses of muskox populations near Tuktoyaktuk and Paulatuk will occur in 1986/87 and 1987/88. This sub-project is linked to Department of Environment Project C8, Caribou Migration.

- H16-3 a) TITLE: Impact of development activities on grizzly bears on Richards Island and Tuktoyaktuk peninsula.
 b) CONTACT: Kent Jingfors
 c) ESTIMATED COST: 1985/86 - \$27,010
 d) BRIEF DESCRIPTION:

The last population estimate of grizzly bears on Richards Island and Tuktoyaktuk peninsula was 79 resident bears in 1977. Since then, considerable exploration activity has occurred in that region. This subproject proposes to tag all grizzly bears in this area in May 1985 to determine whether the population size has changed. Tagging will continue in 1986/87 and 1987/88.

- H16-4 a) TITLE: Comparison of population size, recruitment and movements of Beaufort Sea polar bears with 1977 data and ongoing exploration activities.
 b) CONTACT: Ray Schweinsburg
 c) ESTIMATED COST: 1985/86 - \$180,000
 d) BRIEF DESCRIPTION:

The Beaufort area is monitored monthly to determine the locations of 40 radio-collared, female polar bears. An additional 30 bears will be radio-collared to determine overlap between western and eastern Beaufort Sea Bears. This work is carried out in cooperation with U.S. Fish and Wildlife Service, Canadian Wildlife Service and Yukon Government. Movements will be related to current development activity. A mark/recapture project between 1985-89 will provide a population estimate and recruitment rates of eastern and western Beaufort Sea bears. Three years of data are required before population size can be reasonably estimated. The last estimates of population size and recruitment rate were obtained in 1977. The relationship among polar bear population size, recruitment rates, ringed seal distribution, ice types and exploration activity will be investigated in a cooperative effort with DOE and DFO.

- H16-5 a) TITLE: Raptor nest and habitat inventory within development zone.
 b) CONTACT: Bob Bromley
 c) ESTIMATED COST: \$47,000

d) BRIEF DESCRIPTION:

Presently, raptor nest and habitat is inventoried by searching along water bodies. Development of a technique to delineate raptor nesting and feeding habitat will greatly minimize costs of inventorying these sites within development zones. Inventory of raptor nests and habitat within proposed development zones will occur in 1986/87, 1987/88 and 1988/89. These data are required to minimize conflict with future facility siting and development activities.

6. NEED FOR STUDY:

Departmental Mandate

Through the NWT Act and the Wildlife Ordinance, the primary mandate of the Department is to manage the wildlife species of the NWT. The development of hydrocarbon resources in the Beaufort region will cause impacts to several culturally and economically important wildlife species. The Department's foremost goal is to maintain the renewable resource economy. Information on the population status, mortality factors, distribution and habitat of wildlife species is required to assess impacts, propose management programs and determine harvest restrictions. Without these data, the Department cannot fulfill its primary mandate or goal in the face of proposed development in the Beaufort Sea region.

Preparedness for Decision-Making

Data on population status, distribution and habitat are required for the Department to assess potential impacts on wildlife species from hydrocarbon development proposals and to make decision about the development proposals. In addition, predevelopment knowledge of distribution and habitat requirements of wildlife species will facilitate planning by Industry for facility siting and timing of development activities.

7. RELATIONSHIP TO OTHER NOGAP PROJECTS:

The data generated by these studies are required to complete the wildlife management plans outlined in NOGAP Project H15. In addition, these projects will contribute valuable information needed for Land Use Planning and future environmental impact assessment. Subproject H16-4 is part of a cooperative study with Yukon Government, U.S. Fish and Wildlife Service and Canadian Wildlife Service. Subproject H16-3 will share logistical support with NOGAP Project No. H13-3.

8. MAJOR MILESTONES/OUTPUTS:

1985/86

1. Fall and spring recruitment data for Bluenose caribou herd will be collected and methods will be tested
2. Extent of winter range of Bluenose caribou herd will be compared to proposed development zone

3. Population estimate of muskox and Peary caribou on Banks Island will be obtained
4. Snow conditions on muskox and Peary caribou range on Banks Island will be assessed
5. Fall recruitment rate of muskox on Banks Island will be determined
6. Initial population estimate of grizzly bear on Richards Island and Tuktoyaktuk peninsula will be obtained
7. Movements of polar bears in Beaufort region will be documented in relation to ice types and exploration activity
8. Mark/recapture study of polar bears in Beaufort region will begin. Initial recruitment rate will be determined
9. Technique to delineate raptor nest and feeding habitat will be developed

1986/87

10. Technique to obtain a photo census of postcalving aggregations of the Bluenose caribou herd will be tested
11. Extent of Bluenose calving ground will be documented
12. Initial delineation of subpopulations of muskox on Banks Island will be determined
13. Snow conditions on winter range of muskox and Peary caribou on Banks Island will be assessed
14. Recruitment data for Banks Island muskox will be collected
15. Muskox population near Tuktoyaktuk will be censused
16. Grizzly Bear population estimate for Richards Island and Tuktoyaktuk peninsula will be refined
17. Movements of polar bears in Beaufort region will be compared to ice types and exploration activity
18. Second year of mark/recapture study of polar bears in Beaufort region
19. Raptor nesting and feeding habitat in onshore production zone will be inventoried

1987/88

20. Technique to obtain a photo census of postcalving aggregations of Bluenose caribou herd will be tested
21. Extent of calving ground and winter range of Bluenose caribou herd will be documented
22. Spring recruitment rate of Bluenose caribou herd will be obtained
23. Management zones for muskox on Banks Island will be determined from delineation of subpopulations
24. Snow conditions on winter range of muskox and Peary caribou on Banks Island will be assessed

25. Recruitment data for muskox on Banks Island will be collected.
26. Muskox populations near Paulatuk will be censused
27. Final grizzly bear population estimate for Richards Island and Tuktoyaktuk peninsula will be obtained
28. Initial population estimate of polar bears in Beaufort region will be determined
29. Raptor nesting and feeding habitat in development transportation zone up the Mackenzie Valley will be inventoried

1988/89

30. Extent of calving ground and winter range of Bluenose caribou herd will be compared to proposed development zones
31. Second population estimate of polar bears in Beaufort region will be determined
32. Raptor nesting and feeding habitat in control area adjacent to development zones will be inventoried

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (85-86, \$000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	-	-	-	-	-	-	-
O & M	-	449.0	359.0	222.8	266.7	-	-
Capital	-	-	-	-	-	-	-
Other*	-	29.2	23.3	14.5	17.3	-	-
TOTAL		478.2	382.3	237.3	284.0		
Caribou		120.0	120.0	23.4	47.2		
Muskox		75.0	63.1	55.0	-		
Grizzly		27.0	27.0	19.0	27.3		
Polar Bear		180.0	117.5	94.0	147.0		
Raptors		47.0	31.4	31.4	45.2		

* 6 1/2% Administration Fee

10. OTHER FUNDING: Nil

H65
NOGAP NO: H17
Revised January 1985

1. PROJECT TITLE: Environmental Protection and Monitoring
of Hydrocarbon Development Areas
(1985/86 to 1987/88)

NOGAP PROJECT NO: H17

2. DEPARTMENTAL COORDINATOR: Bob Bell,
ADDRESS: Chief, Wildlife Management,
Department of Renewable Resources
Government NWT, Yellowknife, N.W.T.
TELEPHONE NO.: (403) 873-7411

PROJECT MANAGER: Lorne James, Pollution Control Eng.
ADDRESS: Renewable Resources, Government NWT
Yellowknife, NWT
TELEPHONE NO.: (403) 873-7178

3. OBJECTIVES:

Main Objectives - Long Term:

To promote environmental protection measures appropriate to municipal areas through development of community spill contingency plans and a spill response training manual for community residents.

To investigate and assess bulk petroleum and chemical storage sites within Beaufort Sea communities in relation to the Environmental Protection Ordinance.

To establish baseline information on water quality in the vicinity of Beaufort Sea communities.

Sub-Objectives - Short Term:

To develop and implement a spill response training manual for use by Beaufort Sea communities.

To inventory spill response equipment accessible to Beaufort Sea communities.

To develop spill contingency plans for each Beaufort Sea community.

To ensure that trained personnel exist within each Beaufort Sea community who can implement community spill contingency plans.

4. BRIEF DESCRIPTION OF PROJECT:

Through regulatory requirements, Industry must be prepared to respond to environmental emergencies such as chemical or hydrocarbon spills and to invoke monitoring programs. However, Beaufort Sea and Mackenzie Valley communities are ill prepared to undertake environmental protection and have little information on present environmental quality.

Spill incidents are occurring more frequently within and near municipal areas as a result of the increase in type and volume of products used by Industry, the growing population and changing lifestyle in the Beaufort and Mackenzie Valley communities brought about by industrial activity. Responsible community members need a clear understanding of environmental impacts associated with spills and through this project will be provided with the technical knowledge and equipment to provide a timely and effective response to minimize these impacts.

Water quality near municipal areas will be assessed and will provide a baseline from which changes can be monitored as development activities in the Beaufort region increase.

5. SUBPROJECTS:

H17-1 a) TITLE: Spill containment and cleanup manual

b) CONTACT (Project Manager): Lorne James

c) ESTIMATED COST: 1985/86 - \$17,500

d) BRIEF DESCRIPTION:

A manual to provide training in spill containment and cleanup techniques in the Beaufort Sea communities will be developed. It will be designed specifically for personnel with limited technical training and with limited non-technical spill response equipment. If additional funds are obtained, a hands-on training course will be conducted.

H17-2 a) TITLE: Community spill response contingency plan

b) CONTACT (Project Manager): Lorne James

c) ESTIMATED COST: 1985/86 - \$17,500

1986/87 - \$17,500

d) BRIEF DESCRIPTION:

Spill response contingency plans will be developed for each Beaufort community. Volume I (to be produced in 1985-86) will provide basic spill response procedures which include reporting procedures, spill containment techniques, areas of responsibility and safety considerations. Volume II (to be produced in 1986-87) will provide a compendium of spill response equipment, trained personnel within each Beaufort Sea community and disposal and burn sites.

- H17-3 a) TITLE: General Environmental Protection
 b) CONTACT (Project Manager): Lorne James
 c) ESTIMATED COST: 1986/87 - \$17,500
 d) BRIEF DESCRIPTION:

Petroleum and chemical storage sites within the Beaufort communities will be investigated to determine potential hazards to the environment and public safety. The condition of dykes around storage sites as well as handling and disposal of chemicals will be evaluated. Recommendations for remedial action where required will be made.

- H17-4 a) TITLE: Monitoring of water quality.
 b) CONTACT (Project Manager): Lorne James
 c) ESTIMATED COST: 1987/88 - \$35,000
 d) BRIEF DESCRIPTION:

This sub-project is linked to INAC project A20, Hydrocarbon Research/Management and Department of Environment Project C2, Fresh Water Impacts.

The latter project will determine the fate of hydrocarbons, organic particulates, heavy metals and particle size distribution. Support of the study by G.N.W.T.'s Department of Renewable Resources will extend the sampling program to include sampling of water quality monitoring techniques that may be applied to hydrocarbon development.

6. NEED FOR STUDY:

- a) Departmental Mandate

The Department of Renewable Resources has the mandate to implement environmental protection programs within communities through the Environmental Protection Ordinance. Through the Ordinance, the Department is responsible for spill response and for monitoring quality of environment within communities.

- b) Preparedness for Decision-making

Ongoing hydrocarbon development activities have increased the rate of petroleum and chemical spills within Beaufort communities. Spill contingency plans and response manuals where available have not met the needs of community based spills. Adequate environmental protection is often not present at petroleum and chemical storage sites. The Department believes that these situations should be corrected and that a baseline for water quality near communities should be established before further hydrocarbon development proceeds.

7. RELATIONSHIP TO OTHER NOGAP PROJECTS:

Subproject H17-4 is a cooperative program involving DOE and DIAND. Other subprojects do not overlap or conflict with other NOGAP projects.

8. MAJOR MILESTONES/OUTPUTS:

- | | | |
|---------|----|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1985/86 | 1. | Spill containment and cleanup training manual to be completed and implementation begun |
| | 2. | Community spill response contingency plans to be completed |
| | 3. | Water quality sampling program initiated |
| 1986/87 | 4. | Inventory of spill response equipment, trained personnel and burning and disposal sites to be completed |
| | 5. | All chemical and petroleum storage sites in Beaufort communities will have been inspected and assessed and remedial actions will have been recommended |
| 1987/88 | 6. | Baseline for water quality at Beaufort communities will be established. |

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (85-86, \$000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	-	-	-	-	-	-	-
O & M	-	35.0	35.0	35.0	-	-	-
Capital	-	-	-	-	-	-	-
Other	-	2.3	2.3	2.3	-	-	-
TOTAL	-	37.3	37.3	37.3	-	-	-

10. OTHER FUNDING: Nil

H69
NOGAP NO: H3
Revised January 1985

1. PROJECT TITLE: Beaufort Delta Social Impact Baseline
Data Study (1984/85 to 1990/91)

NOGAP PROJECT NO: H3

2. DEPARTMENTAL COORDINATOR: Bronwyn Watters
ADDRESS: Department of Social Services
Government NWT, Yellowknife, NWT
TELEPHONE NO.: (403) 873-7455

PROJECT MANAGER: Doug Durst, Department of Social
Services, Inuvik Region
Government NWT, Inuvik, NWT
(403) 979-7222

3. OBJECTIVES:

To build and strengthen community resources to enable each community to identify and deal with the issues affecting them.

To determine the changing needs of the Department of Social Services program development and delivery in the Beaufort/MacKenzie Region and specifically in the impacted communities of: - Inuvik, Tuktoyaktuk, Paulatuk, Sachs Harbour, Aklavik, Arctic Red River and Fort McPherson.

To determine the most effective method of delivery of statutory and preventive services to each community.

To develop a master plan to meet the proven needs.

4. BRIEF DESCRIPTION OF PROJECT:

This is a base planning project. While baseline data of social change is available for Financial Assistance, Children in Care, Persons in Correctional Centres, on Probation or Parole, other indicators e.g. Mental Health, Alcohol and Drug Use etc. are not available. These must be identified and data collected. The collection of baseline data which is long overdue will therefore be part of a process to meet the project objectives and will be accomplished by:

Assessing the Department of Social Services' ability to respond to the impacts of development including; requirements for staff and staff training, in changing legislation, requirements for modified systems and requirement for program changes.

Producing information, to be made available to community groups and community councils, to enable them to participate more fully in defining and analyzing impacts.

Assessing the ability of impacted communities to handle effects of development.

Developing indices of social change in communities including effects of substance abuse, effects of wage employment, effects of rotation and shift work.

Producing information that will assist in monitoring these effects.

Establishing baseline data using those indices.

Gathering data on an ongoing basis.

Identifying other required research and planning required.

It is anticipated that as this work proceeds, further research and planning requirements will become evident. As resource development proceeds through its various stages, needs will change in communities as they undergo development and change. The NOGAP exercise calls for a target date of government preparedness by the 1990s but impacts on communities and people are already underway. It is therefore essential to develop a strong base immediately and to develop methods of assessing, and reacting to change.

The work will be carried out by term staff and consultants. Staff will work with senior regional Social Services' staff and Community Social Services workers and also draw on a variety of community input in identifying needs and planning services.

This information will be available to community groups and other departments. A Steering Committee made up of community and organizational representatives has been formed.

This project is designed to determine:

- the changing needs for Social Services program development and delivery in each impacted community and in the region as a whole;
- the most effective method of delivering statutory and preventive services to each community;
- a master plan for meeting those needs

Further it is designed to build on and strengthen community resources for identifying and dealing with issues affecting them.

5. SUBPROJECTS FOR F.Y.:

H3-1 a) TITLE: Research to Develop a Training Program for Social Workers

b) CONTACT: Bronwyn Watters

c) OBJECTIVES: To define training requirements for Social Services personnel working in the oil and gas environment.

To determine methods for delivery of training.

d) BRIEF DESCRIPTION:

A report is to be prepared that:

- outlines the training needs of CSSW's (Community Social Services Workers in the Beaufort Region.
- proposes and evaluates solutions to the training needs.

The following activities should form part of the study:

- description and analysis of training needs of CSSW's in the Beaufort Region.
- analysis of existing training opportunities in communities impacted by hydrocarbon development.
- evaluation of the role of the Department of Social Services in the training of CSSW's
- development, delivery and evaluation of training modules in pilot communities.
- recommendations for further training delivery.

This project will be directly related to the base study in that it will develop an operational solution to some of the problems that are identified.

e) MAJOR MILESTONES/OUTPUT

- | | |
|---------|---------------------------------------------------------|
| YEAR | 1. Preliminary report |
| 1984/85 | 2. Record current information |
| | 3. Set Criteria for additional information |
| | 4. Gather and edit additional information |
| | 5. Produce distribution list and distribute information |
| | 6. Report needs assessment. |

H3-2 a) TITLE: Effects of Wage Employment on Family Structure

b) CONTACT: Bronwyn Watters

c) OBJECTIVES: To determine the effects of wage employment on family structure in Beaufort Area.

To assess the effects and devise appropriate solutions.

d) BRIEF DESCRIPTION:

Using data from the base study, single out and prioritize those factors of increased dependency on the wage economy.

Develop the appropriate program strategies in response to the isolated factors.

The residents of the Beaufort Area accustomed to a traditional way of life and non-wage economy require assistance in dealing with the rapid introduction of a wage economy.

This project will be directly related to the base study in that it will develop an operational solution to some of the problems that are identified.

This study will follow the guidelines established by the steering committee and look to it for further direction.

e) MAJOR MILESTONES/OUTPUT

- | | |
|--------|--------------------------------------------|
| YEAR 1 | 1. Preliminary report |
| | 2. Record current information |
| | 3. Set Criteria for additional information |
| | 4. Gather and edit additional information |

H3-3 a) TITLE: Effects of Rotation on Families and Workers in the Beaufort Area.

b) CONTACT: Bronwyn Watters

c) OBJECTIVES: To determine the effects of rotation on families and workers in the Beaufort Area.

To assess the effects and devise appropriate solutions.

d) BRIEF DESCRIPTION:

Using data from the base study single out and prioritize thoses factors of significance with respect to rotation and its impact on families and workers.

Develop the appropriate program strategies in response to the isolated factors.

To liase as necessary with the ESRF study group.

This project will be directly related to the base study in that it will develop an operational solution to some of the problems that are identified.

This study will follow the guidelines established by the steering committee and look to it for further direction.

e) MAJOR MILESTONES/OUTPUT

- | | |
|---------|-------------------------------|
| YEAR | 1. Preliminary report |
| 1984/85 | 2. Record current information |
| | 3. Report needs assessment |

- H3-4 a) TITLE: Effects of Increased Substance Abuse on Families and Workers in the Beaufort Area.
- b) CONTACT: Bronwyn Watters
- c) OBJECTIVES: To determine the effects of increased substance abuse on Families and Workers in the Beaufort Area.

To assess the effects and devise appropriate solutions.

d) BRIEF DESCRIPTION:

Using data from the base study single out and prioritize those factors relating to substance abuse and its impact on families and workers in the Beaufort Area.

Develop the appropriate program strategies in response to the isolated factors.

This project will be directly related to the base study in that it will develop an operational solution to some of the problems that are identified.

This study will follow the guidelines established by the steering committee and look to it for further direction.

e) MAJOR MILESTONES/OUTPUT

YEAR	1. Preliminary report
1	2. Record current information
	3. Report needs assessment

6. NEED FOR STUDY:

Departmental Mandate

- Canada Assistance Plan Act
- Child Welfare Ordinance
- Social Assistance Ordinance
- NWT Ordinance
- Corrections Ordinance
- Young Offenders Act and Ordinance

The mandate of the department includes the following:

- To promote, improve and preserve the social well being of Territorial residents;
- To develop integrated and coordinated systems of Social Services consistent with known and anticipated needs of Territorial residents.

Preparedness for Decision-Making

In order to fulfill this mandate as preparedness for decision making in impacted communities, it is essential to obtain baseline data on which programs can be based, needs projected and services developed. With inadequate data it is impossible to conduct realistic planning or undertake realistic decision making.

This project is an essential first step in the development of preparedness.

7. RELATIONSHIP TO OTHER NOGAP PROJECTS:

This study provides information to other NOGAP monitoring projects. It will provide the basic data necessary for other studies, monitoring and development of service delivery programs, and for an analysis of the long term needs of northern communities.

8. MAJOR MILESTONES/OUTPUTS:

- | | | |
|---------|-----|------------------------------------------------------------------------------------------------------|
| 1985/86 | 3. | Development of long term study process |
| | 4. | Review of communities perceptions |
| | 5. | Development of proposal for collection of data on community by community basis |
| 1986/87 | 6. | Identify community issues |
| 1987/88 | 7. | Implement programs for dealing with these |
| | 8. | Identify requirements for integration and modification of departmental plan for delivery of services |
| 1988.89 | 9. | Identify other research and planning requirements |
| to | 10. | Identify short term services delivery plan |
| 1990/91 | | modifications to meet changing needs |
| | 11. | Identify long term services delivery plan |
| | 12. | Research projects to be developed and conducted within this mandate. |

* Reports produced by this research will provide information on indices to community groups, councils, industry, government and researchers to assist with effective research and monitoring.

Reports produced by this research will enable the Department to provide well defined data for research and information.

9. NOGAP RESOURCE REQUIREMENTS OVER PROJECT LIFE (85-86, \$000's):

	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
PY's	1.5	3.5	2.5	3.5	4	4	1.5
Salary	75.0	52.0	-	-	-	-	-
O & M	111.6	358.05	323.5	427.3	567.5	562.9	228.1
Capital	20.0	13.5	-	-	-	-	-
Other	14.4	29.45	22.5	29.7	39.5	39.1	15.9
TOTAL	221.0	453.0	346.0	457.0	607.0	602.0	244.0

10. OTHER FUNDING: Nil