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ENVIRONMENTAL IMPACT ASSESSMENT

AND THE NEED

FOR ENVIRONMENTAL MONITORING

by

C

BRUCE GEOFFREY RIGBY, B.A.

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A thesis submitted to the Faculty of Graduate
Studies and Research in partial fulfillment of
the requirements for the degree of Master of
Arts in Geography

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FOR ENVIRONMENTAL MONITORING"

submitted by Bruce Geoffrey Rigby, B.A. Honours
in partial fulfilment of the requirements for
the degree of Master of Arts.

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ABSTRACT

The Federal Environmental Assessment and Review Process has been in place in Canada since 1973. In this time, little study has taken place to determine what effects the assessment process has had on the performance of projects. The Eastern Arctic South Davis Strait drilling program is used as a case study to determine whether the lack of evident measurable negative impact is due to the environmental assessment, good project design, pure chance or some combination of the three.

In this analysis, what becomes evident is that to evaluate the performance of a project, a timely, organized, and rigorous method of collecting information on projects is required. Through a synthesis of evidence collected mainly through interviews, the need for a project monitoring program is established. A general framework for environmental monitoring is proposed that includes such necessary elements as: goals, timing, spatial characteristics, considerations for inclusion in a monitoring program, and criteria for a monitoring body.

PREFACE

The author is indebted to Dr. M.W. Smith who supervised this thesis and to Dr. T.P. Wilkinson, who acted as a sounding board for countless incomplete ideas.

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LIST OF ABBREVIATIONS

B.O.P.	Blow-out Preventer
B.R.I.A.	Baffin Regional Inuit Association
C.A.R.C.	Canadian Arctic Resources Committee
D.E.W. Line	Distant Early Warning Line
D.I.A.N.D.	Department of Indian Affairs and Northern Development
E.A.M.E.S.	Eastern Arctic Marine Environmental Studies
E.A.P.	Environmental Assessment Panel
E.A.R.P.	Environmental Assessment and Review Process
E.I.A.	Environmental Impact Assessment
E.I.S.	Environmental Impact Statement
E.M.R.	Energy, Mines and Resources
E.P.S.	Environmental Protection Service
F.E.A.R.O.	Federal Environmental Assessment Review Office
G.N.W.T.	Government of the Northwest Territories
I.E.E.	Initial Environmental Evaluation

CHAPTER 1

THESIS OBJECTIVES AND LIMITATIONS

1.1 Introduction

Environmental Impact Assessment is a process intended to minimize negative impacts and maximize benefits associated with resource development projects. Its purpose is to "ensure that potential effects of proposed actions are taken into account before irrevocable decisions are made." (Banff E.I.A. Seminar, 1980).

• The ultimate success of Environmental Impact Assessment (EIA) rests in its ability to identify and mitigate those negative impacts associated with development projects. In recent years the assessment process has come to include not only the environmental and economic impacts and benefits, but also the social impacts and benefits of projects.

In Canada, research into EIA has for the most part been directed toward the development of the process and the modelling of impacts. Great effort is being focussed by government and industry on streamlining the process while analysis of the effectiveness of the EIA process appears to have been side-stepped.

White (1972) considered it a remarkable aspect of natural resource management that immense amounts of money and time are spent on plan preparation while pitifully small amounts are committed to finding out what happened after the plans were adopted. (Day et al., 1977).

In addition, in a report to the Federal Minister of the Environment

by the Environmental Assessment Panel on the Eastern Arctic Drilling Proposal, the following recommendation was made:

The Federal Environmental Assessment Review Office should institute a follow-up mechanism to evaluate and report on the degree to which the Panel's conclusions and recommendations have been accepted and acted upon. (EAP, 1978: 44).

What is required at present is some indication of whether or not the EIA process is effective. One way to obtain this indication is to examine a project which has undergone an assessment, and so determine what effect the EIA process has had on the performance of the project. The main purpose of this thesis is to establish the need for a project, environmental monitoring program and to develop a framework to carry out environmental monitoring that will complement the Federal Environmental Assessment and Review Process.¹

A secondary objective is to evaluate whether or not the recommendations of the assessment panel involved in the Eastern Arctic Drilling project in southern Davis Strait² have been acted upon and if so, what effect the recommendations have had on the ensuing performance of the project. In particular, the following specific issues are addressed:

1. whether or not the conclusions and recommendations were

¹ The reader is referred to the Appendix for a description of the Environmental Assessment and Review Process.

² The special focus of this paper is on projects which have passed through the Environmental Assessment and Review Process (EARP). This process is administered by the Federal Environmental Review Office (FEARO) of the Department of the Environment. The choice of case studies is therefore limited. In fact, only two projects lend themselves to project evaluation: the Shakwak Highway project and the Eastern Arctic-South Davis Strait Exploratory Drilling project. Since the Shakwak project is currently under examination, and funding was available for an examination of the Davis Strait project, the Davis Strait project was selected.

actually acted upon;

2. how the actions contained in the conclusions and recommendations were performed;
3. whether or not the conclusions and recommendations were necessary in light of the project's history; and
4. if there has been any environmental change as a result of the project.

In business, the action of evaluating a project's performance is known as an audit: "An adjustment and settling of accounts." (Funk and Wagnalls Standard College Dictionary). In EIA, many involved in the process use the term "post-audit". The choice of the term "post-audit" is unfortunate, for it acts to confuse two distinct actions: environmental surveillance and environmental monitoring/project evaluation.

Environmental surveillance deals with the enforcement of environmental regulations and contract specifications, backed with the threat of possible litigation. Environmental monitoring/project evaluation on the other hand, is the act of determining whether or not impacts were predicted, whether or not mitigative measures worked, what effect a project has had on the environment, and so forth. It is the latter that this thesis addresses.

This thesis is best described as an "evaluation of an assessment." Using the panel report as a starting point, work begins by determining the conditions or "climate" under which the panel report is rendered.

Evaluation of the EIA process ideally requires two elements. Firstly, in an ideal situation it is necessary to examine the actual site of a project to obtain an indication of the performance of the project and its effects on the environment. All that remains of the Davis Strait case study site is a cement plug in 350 metres of water, 120 km from shore; and as there has not yet been a major accident,

no post-project environmental data exist. Consequently this approach is not feasible for the present study. Secondly, it is necessary to collect information through interviews of government and industry officials and the public. This approach fulfills the objectives for research.

Figure 1.1 outlines the methodology used in this study and four areas where information can be collected to analyse the issues set forth earlier. It should be noted that these are also four areas from which information is assembled to allow the assessment panel to come to a decision on whether it is in the interest of society for the project to go ahead in the form presented by the proponent.

Although it does not directly enter this paper, a similar assessment, Regional Clearance for Exploratory Drilling in Lancaster Sound, was studied to gain insight on how northern residents were affected by an assessment and how they felt they could best be involved in an environmental monitoring program. The method used in this research will be expanded upon in Chapter 3.

1.2 Study Limitations

There are a number of limitations which this study has to contend with. Probably the largest limitation of the study is the fact that virtually every group surveyed has a different operating definition of the environment and as a result has a different understanding of Environmental Impact Assessment. One group's definition of the environment is restricted to just the physical environment, while others have varying combinations of physical, social and economic components. As far as the author is concerned, the term environment includes all of the above factors.

Secondly, as in most cases, the study is limited by self-imposed time limits. As frequently happens, the topic chosen for study was

Figure 1.1

METHOD OF STUDY

larger, with more implications, than expected, and therefore constraints of time and money affected the execution of the original research concept.

Thirdly, because a large portion of the study is made up of interviews conducted with people in the field, bias on the part of the researcher may have affected interpretation of comments received.

Fourthly, the study was limited by poor weather conditions which persisted in Frobisher Bay during the period of visit. As a result, a proposed examination of the Brevoort Island shore-base could not be conducted.

Finally, the study is limited by the way in which sometimes it takes on a trial-and-error quality as different ways are attempted to obtain information about the case study. It is hoped that in the future, the results of this trial-and-error method will aid in giving a better focus to other studies.

CHAPTER 2

THE CASE STUDY

2.1 Introduction

The case study chosen for this research is the Eastern Arctic-South Davis Strait Drilling project. The assessment performed by a panel supported by the Federal Environmental Assessment Review Office in 1978 was to provide regional clearance for exploratory drilling proposed by three companies: Canada-Cities Service Ltd., Imperial Oil Ltd. (now Esso Resources Canada) and Aquitaine Company of Canada. Figure 2.1 shows the area reviewed by the panel. The project was referred to FEARO by the Department of Indian and Northern Affairs when it was determined that there might be significant unknown environmental impacts.

In their proposal the three companies stated:

Drilling would take place during open water season in depths ranging to 6,000 ft. utilizing dynamically positioned drillships or semi-submersible drilling platforms. (EAP, 1978: 11)

For the purposes of this research only the performance of one company's project is examined in detail. This is the Aquitaine Company's project undertaken in 1979 and 1980.

2.2 The Project

2.2.1 Justification of Demand

In the environmental assessment report, the proponents state that

there are three major reasons to justify the demand for exploratory drilling in the Eastern Arctic. The first reason is simply Canada's increasing energy requirements and the need for security of supply, particularly if that security could be guaranteed through domestic development. Aside from the fact that geologic surveys show that possible oil reserves existed, the point is raised that with regard to supply to major markets, oil production in the Eastern Arctic would facilitate movement of oil to markets east of the Ottawa Valley line, which depend heavily on imported foreign oil.

Secondly, the proponent justifies the project as a way to satisfy the federal government's "need to know" policy with regard to the north. The case is put forward that exploratory drilling would satisfy not only the need for up-to-date environmental information but also the need to know what amounts and types of energy reserves exist in the north.

Finally, the proponents state that maintenance of oil exploratory permits, "... requires the operator to continually undertake increasing acreage work obligations during the permit term," (E.I.S., 1978: 2-6); the only way to satisfy the requirements would be through a drilling program. Associated with this is the amount of lead time required to secure an "operational window" for development to take place.

2.2.2 Project Logistics

Aquitaine Hekja 0-71 well was located in the Davis Strait area offshore Baffin Island in 350 metres of water. The well was 1700 km. from the nearest suitable Canadian supply port, St. John's, Newfoundland, 120 km. from Brevoort Island and 240 km. from Frobisher Bay. (Westergard, 1981C: 3) (Figure 2.2)

Drilling took place on an ocean-going, self-supporting drillship named the Ben Ocean Lancer. The ship was also supported by two supply

FIGURE 2.1

Source: Report of the Environmental Assessment Panel, 1979.

FIGURE 2.2

LOGISTICS SETTING

10

Source: Airframe Co.

vessels which delivered cargoes of fresh water and fuel and also towed icebergs. The supplies were brought in from St. John's, Newfoundland.

The drillship was positioned using automatic thrusters connected to an on-board computer which constantly acquired meteorological and seastate information as well as the signals coming from subsurface acoustic beacons. Drilling on the bottom was accomplished using a riser package containing the drilling mechanism and the control cable which was attached to the Blow-out Preventer (BOP) and the monitoring systems. The drillship was capable of moving in a cone, 8° off the well hole before it was necessary to disconnect the riser (see Figure 2.3).

The shore support base for both the Esso drilling program in 1979, and the Aquitaine drilling in 1979 and 1980, was located approximately 120 km from Hekja 0-71 on Brevoort Island. The site, a former D.E.W. line station, was capable of supplying fresh water from a small lake, and was used as a stop-over base for crew changes as well as an operations centre. Little development of the site was required, as most of the facilities only needed up-grading. Some examples of existing facilities were: a landing strip requiring only an up-grading of lighting, a well-protected harbour, a 225,000 gallon welded tank, recently inspected, and many other facilities (see Figure 2.4). Twin Otter aircraft linked the shorebase with Frobisher Bay and two helicopters were available to move men and equipment to the drillship.

Frobisher Bay had been examined for use as a supply port but was rejected because:

No major machine shops or mechanical facilities exist beyond the automotive levels. Fuel storage capacity is only sufficient for local requirements and no marine refueling facilities are available. Facilities are not available to supply the large volumes of water (fresh) required for drilling fluids. (E.I.S., 1978: 3-3)

It was therefore decided to use St. John's as the supply port and to

DRILLSHIP STATIONKEEPING

Source. Aquitaine Co.

FIGURE 2.4

BREVOORT ISLAND SHOREBASE N.W.T.

use Frobisher Bay to supply the more variable and immediate needs of the project.

Aside from local persons hired for the drilling project, workers were brought in by commercial jet service to Frobisher Bay and then taken to Brevoort shorebase by Twin Otter. Personnel were not resident in Frobisher Bay unless bad weather precluded immediate transit to shorebase and as a result contact between the workers and the community was limited.

Figure 2.5 shows the percentage time distribution of activities taking place during the 212 days of project operation in the 1979, 1980 seasons.

2.3 The Physical Environment

● 2.3.1 Ocean Conditions

Hekja 0-71 was located off the southeast tip of Baffin Island where it was under the influence of two ocean currents.

In general terms, Baffin water flows down the east coast of Baffin Island where it meets Hudson Strait water pulsing out Hudson Strait with each tide. This current generally runs in on the north side of Hudson Strait and out on the north (sic) side. (D.I.S., 1973 4.1-15)

The currents have two possible effects with regard to the performance of a drillship. Firstly, the positioning of the drillship in relation to the subsurface well is affected by the timing, speed and frequency of ocean currents. If currents are too strong then it might not be possible to maintain a drillship within the required 8° cone of centre from the well. Secondly, with the southeasterly currents along Baffin Island, come icebergs brought from calving glaciers along the coast of Greenland and Ellesmere Island. The term "iceberg alley" has been used by many authors to describe this current which runs down

Figure 2.5

HEKJA 0-71

TIME DISTRIBUTION

Operation	1979		1980		1979/1980	
	Hours	%	Hours	%	Hours	%
Drilling	410	14.29	620	27.96	1030 3/4	20.26
W.O. Weather	419 1/2	14.63	105 3/4	4.77	525 1/4	10.32
Repairs	239	8.33	214	9.64	453	8.90
Tripping	250	8.72	195 1/2	8.78	445 1/2	8.76
Moving	199 1/4	6.95	204 1/4	9.20	403 1/2	7.93
Loading/Unloading	257 1/4	8.97	132	5.95	389 1/4	7.65
Casing/Cementing	177 1/2	6.19	9	0	177 1/2	3.49
Reaming/Under Reaming	134 1/2	4.69	29	1.31	163 1/2	3.21
Geological Cir. Logs L.O.T.	63	2.20	99 1/2	4.49	162 1/2	3.19
Stucking-Fishing	101 1/2	3.56	42 1/2	1.91	144	2.83
Testing	0	0.00	135 1/2	6.10	135 1/2	2.66
Test BOP's	64 1/2	2.25	70 1/2	3.18	135	2.65
Run BOP's	60	2.09	73	3.30	133	2.61
W.O. - Ice and Iceberg	111	3.87	8	0.36	119	2.34
Suspension - Abandon	28	0.98	85	3.83	113	2.22
Positioning - Re-entry	91	3.17	13	0.59	104	2.05
Circulation	58	2.02	36 3/4	1.65	94 3/4	1.86
Pick Up/Lay Down Drill String	64 1/2	2.25	27	1.22	91 1/2	1.80
Operation Related to WOW-WOI	46	1.60	26 3/4	1.20	72 3/4	1.43
Coring	26 1/2	0.92	45 1/2	2.05	72	1.42
Deviation Survey	22 1/2	0.78	23 1/4	1.05	45 3/4	0.90
Drill Out Cement - Test Casing	17	0.59	24	1.08	41	0.81
Diving	16 1/2	0.57	0	0	16 1/2	0.32
Rig Maintenance	3	0.10	8 1/2	0.38	11 1/2	0.23
Mud Preparation	8	0.28	0	0	8	0.16
Total	2368 Hours		2220 Hours		5088 Hours	
	119 1/2 Days		92 1/2 Days		212 Days	

W.O. Weather = Waiting Out Weather

Stucking/Fishing = Removal of objects from drill hole

Source: Aquitaine Co.

past the east coast of Labrador. This directly affects the operation of any drillship in this region. (see Figure 2.6).

2.3.2 Seastate

The term seastate refers to the actual physical state of the ocean at a particular place. Included in the term are such things as wave heights, water conditions and ice conditions.

The western Davis Strait is covered for up to 7-8 months of the year with ice coverage varying markedly from year to year. The ice has cleared at the Hekja-071 location as early as late June and as late as mid-August depending on the season. The ice will start to cover the location as early as late October or as late as early December. This means that the open water season can be as short as 11 weeks or as long as 23 weeks. Consequently, the amount of drilling that can be done is very limited and uncertain.
(Westergard, 1981C: 5)

At Hekja 0-71 it was determined that the average wave height was 1.2 metres. (E.I.S., 1978: 41-3) Winds increase as the drilling season progresses, and increased wave height could affect the amount of "downtime" on the rig. "Wave heights ranging from 2 to 5 metres can persist for many hours to interrupt some drilling operations ... it appears that the duration of major storms is relatively short. For example, storms with waves greater than 7 metres last about one day and never longer than about three days." (E.I.S., 1978: 4.1-4)

2.3.3 Atmospheric Conditions

The area is affected mostly by cold Arctic air flows coming from west and north-west. Atmospheric conditions of particular importance to the drilling operation are windspeed, temperature and visibility. "Mean wind speeds increase each month from around ten knots in July to twenty knots in November. (E.I.S. 1978: 4.1-4)

Note: 1 knot is approx. 1.8 km h^{-1} or 0.5 m s^{-1}

Figure 2.6

ICEBERG ORIGINS & DRIFT PATTERNS

17

Source Aquitaine Co

Visibility from the ship can be reduced by fog which frequently occurs over open water in the Arctic. During foggy periods, small chunks of ice called growlers or bergy bits, not detectable by radar, can pose as great a danger as large icebergs. In high winds and low visibility, these small chunks "get lost" between ocean swells, and unless evasive action is taken they can inflict severe damage if they make contact with the ship.

When temperatures are below -2°C and winds are above 17 knots, superstructure icing results. This dramatically reduces the stability of a drillship by making it top-heavy. As a result, valuable time is lost in removal of the ice and drilling operations are hindered.

2.3.4 Coastal Environments

The requirement of the assessment that the proponents study the coastal environment originates from the possible consequences of the project rather than as a requirement for the project itself. An exploratory well has little known effect on a coastal environment except in the event of a blowout. Operation of the rig is strictly controlled by government regulations such as the Arctic Waters Pollution Prevention Act and as far as is known, there is little likelihood of a noticeable effect on the wildlife environment if proper rig management is enforced.

In the event of a blowout, or spill from the sinking of the drillship, clean-up crews would have to contend with a shoreline that is composed of 90 percent exposed bedrock, half of which is at an angle of greater than 35° (After Barry *et al*, 1977: 8). Of all the wildlife in the area, the greatest effect of an accident would be felt by the Thick-billed Murre, the most abundant nesting bird in the region, which, after completing its nesting, migrates to its winter feeding grounds. During migration, the birds are flightless and must swim to these areas in large groups. They are, therefore, vulnerable to oil spills or disturbance by supply ships.

The area of Hekja 0-71 is also populated by many forms of marine mammals such as ringed, hooded and harp seals; walrus; polar bear; and many species of whales, one of which, the Bowhead, is an endangered species.

2.4 Social/Economic Conditions of the Area

The greatest potential impact of the project resulting from accident, interference by outsiders, or indirectly through changing animal populations would be on the communities of Frobisher Bay, Allen Island, Pangnirtung, Lake Harbour, Broughton Island. Of these, the closest to the project are Frobisher Bay, Allen Island and Pangnirtung.

Frobisher Bay, the regional centre for the Eastern Arctic, is not heavily dependent on ocean resources for its livelihood. The community would however be affected by the large numbers of workers passing through, potential local employment, and the amount of supplies purchased in the community. Associated with Frobisher Bay is the outpost camp of Allen Island, established to allow the Inuit population to pursue traditional occupations. The community is heavily dependent on renewable resources, particularly from the ocean, and would possibly be affected by an accidental spill from the project. According to Kemp (1971), "marine mammals provide up to 83% of the caloric intake of communities still largely dependent on hunting." (MacLaren Atlantic, 1978: 2.1)

The community of Pangnirtung, located on Cumberland Sound, is also heavily dependent on renewable resources for local consumption and commercial sale. The community also acts as a starting and finishing point for visitors to Auyuittuq National Park. The community could possibly be affected either by disturbance of local animal populations or by a blowout or spill.

2.5 Special Concerns

The report of the Environmental Assessment Panel to the Minister

of the Environment outlines what are considered to be the issues of prime importance associated with the proposed project. These issues are identified by the proponent in the E.I.S., by the public and public intervenors at the hearings, and by the technical experts called by the panel. The identification of these issues is of particular importance to the recommendations of the panel and the decision of the Minister. Therefore, in terms of a project evaluation, the performance and success of the project and subsequent environmental impact rests on the proper identification of all special concerns.

The issues of special concern identified in the case study fall into three major categories: Blowout and subsequent effects on the environment, operational practices and monitoring, and prediction of the physical environment.

In the first case the panel is concerned with the probability of a blowout occurring, and the fate of the oil after a blowout. Of particular concern is the effects of the oil on bird, fish and mammal populations in the area. Secondly, the panel expresses concern about the quality of operational practices and waste management used in the project. The panel notes that "some two-thirds of all blowouts have been attributed to human error." (EAP, 1978: 28). Involved in the day-to-day operation of the project are matters such as: level of training and communication between the workers; the disposal of project wastes; and a reliable ice alert system. Finally, the panel notes concern with issues relating to the monitoring of the project and "monitoring and prediction of the physical environment" for: weather, waves, currents and icebergs which play an important role in the performance of the project and in future projects.¹ (EAP, 1978: 41).

¹The focus of the concern is an improvement of baseline knowledge in the project area to allow for better prediction of the environmental processes in operation. These improved prediction capabilities would aid in design of spill contingency plans.

In addition, the panel is also concerned with contingency planning in the event of an accident, local involvement in the project and a monitoring of how well the panel's recommendations are followed.

It was the purpose of the first two chapters to establish the goals and objectives of this thesis and to acquaint the reader with the setting, logistics, and issues of the case study. In the next two chapters, the methodology used in the research is described, and an attempt is made to determine what effect the environmental assessment had on the performance of the case study.

CHAPTER 3

METHODS

Little has been published in Canada on environmental monitoring and project evaluation (Day et al 1977, Munn 1979); consequently guidance in developing a monitoring method is derived from a methodology developed by the Environmental Impact Assessment group at the University of Aberdeen. This group attempts to use a system to quantify the accuracy of predicted environmental impacts and the success of mitigative measures related to North Sea oil development (Bissett, n.d.a., Bissett, n.d.b.) The methodology used by the Aberdeen group is the first known attempt to follow-up in depth on large scale development projects. The group's methods concentrate on numerical precision of the predicted impacts.

In Canada on the other hand, we are not capable yet of addressing the numerical aspects of predicted physical impacts (though social and economic impacts fare better), as most projects or developments occur in frontier regions where little or no baseline environmental data is available. As a result we dwell more on assessment process development than on precision of predictions. In a sense, the EIA process is an attempt to try to make sure that the issues surrounding a project have at least been addressed as well as predict, quantitatively, physical environmental impacts.

In essence, exploratory drilling is the same everywhere in the world, if there is no accident. However, in northern Canada, the potential

impact of an accident may prove to be greater, as without sufficient baseline data and a well-described, "steady-state" environmental condition, it becomes difficult to determine with any precision what environmental impacts are likely to occur.

We are faced not only with projects in frontier areas where we have little verified baseline data, but also with projects which cover large geographical areas, comprising many different environments. Obvious examples are the proposed Arctic Pilot Project and the Beaufort Sea Project. Even though it can be argued that the potential impacts of these projects are site-specific, because they pass through many different environments, the amount of baseline information required to assess the project increases. As well, the likelihood of problems with accurate impact prediction increases.

The good performance of a project may be the result of chance, good design, or the actions of the panel, or some combination of these; but without an evaluation of the role each has played, we will never know the reason for success. Through a program which monitors the project during its implementation, operation and after it's completion, an indication of how well negative impacts were predicted and mitigated can be obtained.

In this research it was not possible to obtain quantitative information for analysis. All that is available is an indication of the project's performance from the opinions and observations of the various "players" involved in the project. Even if quantitative information existed, it would still be important to acquire people's opinions on the project. By examining the case study, and addressing the previously stated four issues (page 2), it is hoped that some indication of the project's performance and the possible reasons for the performance will be achieved.

The most difficult aspect of this study was not the actual data collection but rather trying to determine the most appropriate

point at which to start a project evaluation. After careful consideration, it was decided that the logical place to start is with the report produced by the environmental assessment panel because in this document the panel outlines the regional setting of the project, specific conditions pertinent to the area, predicted impacts and proposed actions required to mitigate expected potential negative impacts. The panel's report is the end result of the assessment process as it now runs.¹ The directions taken during the research work for this paper are shown in Figure 1.1.

To try to reconstruct the conditions or "climate" under which the panel's decision was made, it was necessary to refer to documents and transcripts which formed the basis for the decision. It is also from this documentation that baseline conditions for predicted impacts can be established. The decision and mitigative measures for this project are almost three years old, and since that time technology has changed considerably. The effective use of this increased level of technology in improving the assessment process through the evaluation of past projects is dependent on a thorough understanding of the state-of-the-art at the time of the project. If present day technology is used to assess a past project without this understanding, evaluation of the process will always generate negative views of the process since hindsight is always 20-20. A good example of this is the problem Aquitaine had with internal waves during the 1979 season. This will be dealt with in Chapter 4.

Once a sufficient level of understanding of the documentation was achieved, an attempt was made to contact panel members to get a more complete picture of the case study (only three members were available).

In obtaining a comprehensive overview of the case study and the issues surrounding it, it is necessary to consult many different sources. Due to the self-imposed time limit, any aspects of the case study which are extremely technical in nature are avoided. The time

¹The panel submits its report to the Minister of the Environment for his decision.

that would be required to obtain a competent level of understanding of some of these issues, such as toxic drilling muds, falls beyond the limits set for this study. Ideally a team of six or seven people with knowledge in appropriate technical areas would allow for a more complete analysis.

The four areas presented in Figure 1.1: government, industry, public concerns and the physical site, are areas in which information on the performance of the project is potentially available. It should be evident that three of the areas involve opinion and observation while the fourth, the physical site, could provide physical evidence on the performance of the project. Even though little site information is available, description of the physical site is presented for completeness as in an ideal situation the majority of information on a project's performance should be drawn from this source.

Government

A survey of government departments such as DIAND, EMR, Environment, Fisheries and Oceans, and the territorial government was made to determine what monitoring and follow up if any is being conducted. Associated with this are the questions of what standards of performance, and which government regulations, were imposed on the project under study.

Secondly, sixteen persons in both the territorial and federal governments were contacted to determine if there were any issues which were not covered during the assessment, and yet should have been. This added to the overview of the case study.

Thirdly, government officials were consulted for their opinions on the need for project monitoring and evaluation, for possible areas of focus in these reviews, and the role they felt their department or agency should play in such reviews (see Bibliography).

Industry

Two weeks were spent at the Aquitaine Company of Canada head office reviewing project files and interviewing the five persons available who had responsibility for the project. These interviews included persons who directly supervised Hekja 0-71, as these people best know the physical operation of the project and what effect if any, the panel's recommendations had on the operation of the project.

Included in the twenty reports made available were the project engineering reports. These reports examine problems which occurred during drilling and the immediate on-site mitigative measures which are not specifically covered in the environmental assessment. Also, the project monitoring and evaluation reports were made available. It is worth noting here that the access allowed to the company's files and reports was free and unrestricted, including access to financial reports which give information on the financial commitment of the company to monitoring and follow-up, and research associated with the project.

Even though company employees best understand the operation of the project, it is necessary to get external criticism as the "company line" may enter the responses, if only subconsciously. Also, this information needs be co-ordinated with other information on the project from official sources on topics with broader implications.

While in Calgary, the opportunity to visit the head offices of other major oil companies working in the north such as Dome, ESSO, PetroCanada and Gulf, was used to conduct a survey to see which companies are currently involved in developing and/or administering monitoring and project evaluation programs. This also included discussion on the need for such reviews, the issue of who should pay, and the question of who should be responsible for them.

Public Concerns

Under the heading of public concerns are grouped four components for review: public interest groups, the media, and citizen reaction in both projected oil supply and delivery areas of both Frobisher Bay and Pond Inlet.

A visit was made to Pond Inlet¹ to talk to community members who have been involved in a "no-go" environmental assessment decision (Lancaster Sound) to determine:

- i) how the assessment affected the community;
- ii) how community members would approach future assessments;
- iii) if community members felt there was a need for monitoring and follow-up and if so;
- iv) how they felt local people could best be involved.

In attempting to determine the success of the Aquitaine project, some of the citizens of Frobisher Bay were interviewed for their reactions. The assumption is that those who would notice and understand the implications of possible impacts best, whether positive or negative, are those living and working in the area of the project. As exploratory drilling is generally a short-term, site-specific activity with little physical impact except in the event of an accident, the most immediately visible effects would be in the social and economic environment of the local people.

To acquire an alternative source of information, a visit was made to the offices of the C.B.C. Northern Service and the Nunatsiag News. Any information available on the case study particularly relating to events during and after the project's implementation was sought.

¹ Also of interest in Pond Inlet, was a visit to the Baffin Island Oil Spill project at Cape Hatt to view some of the oil spill clean-up methods being tested for Arctic waters by a joint government-industry group.

Finally, five public interest groups were approached as sources of information from "organized" public. The local groups chosen for input were: the Natsiq Advisory Committee, the Baffin Regional Inuit Association, the Frobisher Bay and Pangnirtung Hunters and Trappers Associations, and one national group, the Canadian Arctic Resources Committee. Of particular interest are the views of the Natsiq Advisory Committee which was set up specifically to monitor the Aquitaine and Esso projects.

The Physical Site

Physical evidence on the performance of a project might be obtained from observation of the environment. The case study undertaken did not lend itself well to the collection of numerical data neither during nor after the drilling project. The only physical evidence remaining of the project is the condition of the shorebase at Brevoort Island. As inclement weather precluded an examination of the shorebase, conclusions on its condition are drawn from interviews conducted with persons who had visited the site since the end of drilling operations. Which components of the physical site should be monitored, and how baseline data should be collected in an exploratory drilling project to allow some indication of whether or not environmental change is taking place is considered in the fifth chapter.

CHAPTER 4

EVALUATION OF EIA EFFECTS ON THE PROJECT

4.1 Introduction

Through an analysis of information collected through interviews, and from Aquitaine and government reports, it is the purpose of this chapter to evaluate the effects of the EIA process on the drilling project. Since, aside from project engineering reports, there are virtually no quantitative results on the impact of the project, the evidence collected cannot be subjected to any form of statistical testing.

However, the Aquitaine drilling program as of yet, has had no evident measurable impact on the physical environment, (since there has been no blow-out). Whether this is due to chance, good design or to use of mitigative actions required by the environmental assessment is unclear.

The environmental assessment process should address issues related to the project that were overlooked in the design of the project, as well as a public examination of potential impacts. By addressing the four specific issues previously stated in chapter one and through information collected in interviews, it is argued that some indication can be obtained of whether or not the absence of any measurable impact is a result of the environmental assessment. The issues are:

1. whether or not the conclusions and recommendations of the panel were acted upon;
2. how the actions contained in the conclusions and recommendations were performed;
3. whether or not the panel's conclusions and recommendations were necessary in light of the project's history; and

4. if there has been any environmental change as a result of the project.

In evaluating the case study, the conclusions and recommendations of the assessment panel will be used as a framework for analysis.

4.2 Panel Recommendations

In total, the environmental assessment panel submitted twenty-one conclusions and recommendations in granting regional clearance for exploratory drilling. (Table 4.1) All are general in nature. Only four are grouped under the heading of "Conditions for Acceptability of the project." These recommendations related to monitoring and prediction of the physical environment, industry contingency plans, government contingency plans and government plans for increasing compensation and liability. Under the heading of "Other Recommendations" and "Supplementary Recommendations", there were six items which related directly to the operation of the project.

Issue 1 How many of these recommendations were capable of being acted upon?

Of the twenty-one conclusions and recommendations, only ten related directly to the operation of the project (8a-d,9a,9b,9c,9e,9f,10a); among these, only two of the four "conditions for acceptability" and six other recommendations were directed to the proponent's role in the project (Table 4.2).

It is not possible to define which of the ten recommendations are actually mitigative measures in the true sense of the term, that is, measures taken to avoid possible negative impacts. Although an attempt was made to address the issues of potential negative impact, the actions required by the recommendations are in fact part of good project design, and attended to by the company as part of normal operations in such environments.

Included in the other eleven conclusions and recommendations are

Table 4.1

Summary of Panel's Conclusions and Recommendations

1. The Panel concluded that the probability of a major blowout is low, even though it was considered to be the most important factor in deciding acceptability.
2. The fate of oil in the event of a major oil well blowout (description of movement.)
3. Effects of oil in the event of a major oil well blowout (predicted impact on wildlife - not major)
4. Existing regulatory mechanisms and codes of good practices are adequate to ensure safe and environmentally sound operation.
5. Iceberg scour not an important factor.
6. Land claims not within mandate of the panel.
7. The risk of the project is acceptable.
8. Conditions for Acceptability of the Project.
 - a. Monitoring and Prediction - Physical Environment
 - b. Industry Contingency Plan
 - c. Government Contingency Plan
 - d. Compensation and Liability
9. Other Recommendations
 - a. Continuing Environmental Studies by Proponent.
 - b. A Mechanism for Compensation and Liability needed.
 - c. The need for Iceberg Prediction by Proponent.
 - d. Energy Policy Tax Incentives and Exploratory Permits.
 - e. Employment of Local People.
 - f. Public Information by Proponent should be continued.
10. Supplementary Conclusions and Recommendations
 - a. A follow-up mechanism should be implemented.
 - b. Endorsement of Proponent's information effort.
 - c. Use of federal funding to help public intervenors in future.
 - d. Future Panels should recognize the time required to translate reports into native languages.

Table 4.2

Conclusions and RecommendationsACTIONConditions for Acceptability

8a The panel requires of the proponent a real-time monitoring and prediction system for the physical environment.	Yes
8b The panel requires of the proponent a detailed oil spill contingency plan to be tested prior to drilling.	Yes
8c The panel required the government also to have an oil spill contingency plan in place.	Yes, to some degree
8d The responsible government agency must give consideration to increasing the limits of liability of a proponent for damage and cleanup costs, where existing levels of compensation may not be commensurate with present day values.	Yes, to some degree

Other Recommendations

9a The panel recommended that existing consultative measures between government and industry be improved to determine the extent of further environmental studies. These studies would be used to improve contingency planning and resource management.	Yes, to some degree
9b The government should develop some mechanism to deal with compensation for damages and clean up costs.	Yes, to some degree
9c The panel recommends that the proponent give <u>consideration</u> (emphasis added) to establishing an iceberg prediction system.	Yes
9e As many southern Baffin Island residents as <u>feasible</u> (emphasis added) should be employed.	Yes
9f The proponent should continue its public information program.	Yes
10a "The Federal Environmental Assessment Review Office should institute a follow-up mechanism to evaluate and report on the degree to which the Panel's conclusions and recommendations have been acted accepted and acted upon." (EAP, 1979: 44).	Yes

statements on the amount of risk involved in the project and the effects of a blow-out, which, since an accident has not yet occurred, has not affected the operation of the project. Those conclusions and recommendations of the panel not directly addressing the operation of the project are related to topics such as government land claims policy, tax incentive policy, and issues revolving around future projects.

Issue 2 How were the actions contained in the conclusions and recommendations performed?

Even though it is suggested that none of the panel's ten recommendations are mitigative measures in the true sense of the term, each of the ten relating to the operation of the project will be examined to determine what action was taken on each.

8a The panel requires of the proponent a real-time monitoring and prediction system for the physical environment.

During the years of operation, 1979 and 1980, the Aquitaine Company states that the Baffin-Labrador Group, of which it is part, spent \$1.233 million and \$2.232 million respectively on the collection of engineering and environmental information which did not include contributions to on-going industry monitoring programs such as the Eastern Arctic Marine Environmental Studies program. (EAMES) (Westergard, 1981b). In 1979, the Baffin-Labrador Group undertook studies on ocean currents, tidal velocities, weather forecasting-verification and possible problems, and iceberg drift predictions (Westergard, 1981b). In 1980, studies were performed on such things as iceberg clearance of the Blowout Preventor, weather forecasting systems, environmental observations and iceberg towing (Westergard, 1981b).

An incident which occurred in 1979 persuaded Aquitaine to design a monitoring system for rip currents and internal waves. According to Hodgins and Westergard (1981), "Internal waves occur within subsurface layers in the ocean that are stratified because of temperature and salinity variations." In essence, internal waves are wave-trains within

wave-trains. Further, Hodgins and Westergard (1981) state that "the near-surface current speed increased (at the time of an internal wave) up to two knots in two to three minutes." It is proposed that these rip currents and internal waves are a result of tidal fluctuations and associated freshwater pulse from Hudson Strait. (Hodgins and Westergard, 1981).

As mentioned in chapter two, a dynamically positioned drillship is susceptible to large deflections off-centre, the allowable limit being 8° . Deflections are potentially dangerous, depending on the stage of drilling or testing. For example, if a rip current is experienced at the time when strong formation pressures are encountered, it may not be possible to accommodate both the increased pressures and the movement due to the rip current.

The question of ocean currents was covered at the assessment, but the issue of rip currents and internal waves was unknown to Aquitaine or, it seems, the panel at the time of the assessment. It should be noted that the lack of consideration of rip currents is neither the fault of the proponent nor the panel. Technology at the time of assessment was such that data collection systems could not record internal waves. In fact, internal waves were only first discovered in the Gulf of Thailand about the time of the assessment (Westergard, 1982). It is in cases such as this that it is necessary to have an understanding of the level of technology at the time of the assessment.

The monitoring and prediction system developed by Aquitaine (Hodgins and Westergard, 1981), allows for ample time for the captain to take appropriate action depending on the size and direction of the rip currents. The system proved so successful that its design is being adopted by PetroCanada (Westergard, 1981a).

8b The panel required of the proponent a detailed oil spill contingency plan to be tested prior to drilling.

There are two aspects of the company's oil spill contingency plan.

The oil spill contingency plan designed by industry incorporates both environmental and worker-related accidents. The spill plan includes simulation of various scenarios, the location of available clean-up and containment machinery, and industry personnel who could be contacted if required (Aquitaine, 1979b). Areas of potential detrimental impact are identified using seasonal/sensitivity mapping including consideration of shoreline conditions, ice conditions, surface currents, wind patterns and accessibility (Barry et al, 1977).

The second aspect of the plan involves a special communications network linking Calgary with all operative areas. The priority given lines of communication depends on the severity and time span involved in the potential accident. The system was tested before the commencement of drilling (Aquitaine, 1979b).

8c As a condition for acceptability, the panel required the government also to have an oil spill contingency plan in place.

It is unclear to what degree this recommendation was acted upon. The only information that was available deals with present day technology and proposed legislation (Bill C-48), as follows.

As shown in Figure 4.1, the Canadian Arctic is covered by three regional oil spill contingency plans. In 1980, a working group produced an Interim Contingency plan for Arctic Seas which was adapted from a plan developed for the Beaufort Sea. The plan is to be implemented only in the event that industry can not take care of the spill itself. It is a safe assumption that the priorities of the present interim plan are similar to those of the plan at the time of the Davis Strait drilling program. The priorities of the government response are:

1. safety of life;
2. stopping the spill;
3. minimizing the impact of the spill on the life of the residents in the area;

FIGURE 11

4. limiting the impact on sensitive areas;
5. informing the public; and
6. support to long range research.

(Intergovernmental Contingency Plan Working Group, 1980:38).

The cost of the current interim spill plan (at the time of writing) is to be paid for by the various participating government departments until some formula of costing including industry can be established. (Intergovernmental Contingency Plan Working Group, 1980:38).

Figure 4.2 outlines the various responsibilities in the event of a spill.

The six levels shown on the bottom of the figure relate to timing and spill size.

- 8d "The responsible government agency must give consideration to increasing the limits of liability of a proponent for damages and clean-up costs, where existing levels for compensation may not be commensurate with present day values." (EAP, 1978:42)

The author was unable to discover whether or not the recommendation was acted upon at the time of the project. According to government sources interviewed, the action was considered at the time of the project (Ruel, 1982). The point is that the liability has been increased under the Arctic Waters Pollution Prevention Act.

According to Aquitaine, the levels of compensation and liability imposed on the company were raised between the 1979 and 1980 seasons. Whether this was a result of the panel's recommendations is unclear. (Westergard, 1982)

- 9a The panel recommended that existing consultative measures between government and industry be improved to determine the extent of further environmental studies. These studies would be used to improve contingency planning and resource management in subsequent proposals.

Again, it is unclear to what degree this recommendation was acted upon. According to Westergard (1982) and Ruel (1982), the statement is really too general to be evaluated. It was stated that some communication did take place, but as there is no documentation, the results of the consultation are not evident.

From: Interim Government Contingency Plan For Major Oil Spills in Arctic Seas, p 22

Since no studies are being performed by either the territorial or federal government, beyond those required under government regulations, it appears that no substantive action on this recommendation occurred. The only groups to undertake continuing environmental studies are the companies. These studies, because of the lack of a framework to perform environmental monitoring and follow-up, could not be co-ordinated by the company to achieve the best results possible. Studies undertaken by the companies included wildlife observation from the Drillship area, socio-economic reports, and an attempt to sponsor a coastal wildlife study (Stemp, 1980, Maclaren Marex, 1979, Aquitaine, 1979a, Aquitaine 1980b).

The coastal wildlife study sponsored by Aquitaine and Esso ran into some difficulty as the local people hired to count shoreline wildlife were also harvesting the wildlife. The problem seemed to be a result of lack of communication or a misunderstanding between the companies and those hired. The author could not determine what data could be obtained from these studies and if they were used to improve contingency planning.

9b The government should develop some mechanism to deal with compensation for damages and clean-up costs.

Again, little evidence is available to make a conclusive statement on how this recommendation was acted upon. Issues relating to compensation for damages and clean-up costs should be contained in oil spill contingency plans. The point was made by those interviewed in government that something similar to the panel's recommendation exists in Bill C-48, which, however, is yet to be proclaimed.

Where a spill or any discharge, emission or escape of oil or gas that is authorized under subsection 19(4) occurs in any area to which this Act applies, a) the person ... is liable, without proof of fault or negligence, up to any applicable limit of liability, for:

- (i) all actual loss or damage incurred by any person as a result of the spill, and
 - (ii) the costs and expenses reasonably incurred by Her Majesty in right of Canada or any other person taking any action or measure in relation to the spill
- (Bill C-48, 19(2))

This however does not mean that concrete action was not taken at the time of the project. (Ruel, 1982)

- 9c The Panel recommends that the Proponent give consideration to the development of an operational prediction system for iceberg movement in the vicinity of the drillship.
(EAP, 1978:43)

The Baffin-Labrador Group, of which Aquitaine is a member, spent approximately \$138,000 on studies relating to an iceberg prediction system during the project (Westergard, 1981b). These studies included consideration of iceberg towing, iceberg trajectory analysis and studies relating iceberg monitoring to concurrent environmental observations.

In a report entitled Davis Strait E.I.S. Review Follow-up (1978) the iceberg prediction system was presented. The system is based on four alert zones:

1. A disconnect zone - based on a distance of 0.5 nautical miles from the vessel (defined by radar). If an iceberg were in this zone, the riser package would be disconnected.
2. A red alert zone - from 0.5 nautical miles to 10 nautical miles from the vessel. If an iceberg, either free or under tow, were in this zone, all operations would cease and work to secure the well would begin.
3. A yellow alert zone - from 10 nautical miles to four hours drift time away. In this zone an attempt to tow the iceberg would be made and no operation would be started or continued which could not be stopped in sufficient time to secure the well.
4. A green alert zone - an area defined by radar identification or by sighting under good visibility. Towing would be at the discretion of the observer.
(Paraphrased from Esso Resources, 1978).

According to the Engineering Reports, the system appears to have operated without major problems. "Over the two seasons, the total down time due to ice and icebergs was 120 hours (2.3% of the total operations time) with the majority of this time spent waiting for the location to clear of ice in 1979. In 1979, there were 140 icebergs

tracked within radar range of the drillship while in 1980, there were only 45 icebergs tracked. The largest iceberg deflected was 12 million tons although the average size was 1½ million tons." (Westergard, 1981c)

9e As many southern Baffin Island residents as feasible should be employed.

In 1979, Esso Resources Ltd. and Aquitaine Co. hired a total of 31 local people out of a total 124 applications. Workers came from the communities of Frobisher Bay, Pangnirtung, Lake Harbour, Allen Island and Cape Dorset. The companies calculated that the retention rate was 74% i.e. 23 of the thirty-one persons hired completed their job assignments. (Aquitaine, 1979a) In 1980, 26 job positions were filled by local residents, with 19 of the 26 completing their job assignments. Twenty-two of the workers had previous employment with the drilling program in 1979. The following positions were filled:

- 1 Employment-Information Officer
- 1 Secretary
- 2 Bear Monitors
- 2 Camp Attendants
- 2 Shippers/Receivers
- 2 Rampman
- 6 Roustabouts
- 6 Seamen
- 4 Kitchen Helpers

In termination interviews, boredom is given as a reason for much of the drop-out of employees. (Aquitaine, 1979a, 1980b).

From the evidence of job training programs, and hiring policy, it is concluded that the proponents fulfilled the requirements of the panel's recommendation. (Aquitaine, 1980b:4-10) What may be useful in future, is to examine the effects of paid employment on native society in conjunction with the hiring programs.

9f The proponent should continue a public information program.

The proponent attempted a number of different methods to try to

fulfill this recommendation. They were:

- a) hold community information meetings;
- b) establish an information office;
- c) publish a newsletter as part of the Nunatsiaq News;
- d) conduct tours of the drillship for local representatives; and
- e) sponsor an independent monitoring committee.

Of the five major actions taken, the first four are more or less self-explanatory. The fifth deals with the sponsoring of an independent monitoring body made up of representatives of the local communities. The Natsiq Advisory Committee was established in July of 1979 and consisted then of four representatives from each of Allen Island, Lake Harbour, Pangnirtung and Frobisher Bay. The committee was later expanded to include a member of the Economic Section of the Territorial Government and a member of the Department of Indian Affairs and Northern Development. The guidelines of the committee are:

- 1. to ensure the continuation of a high level of communication between companies and communities,
- 2. to review and evaluate the socio-economic impact caused by drilling,
- 3. to review the employment and training program and make recommendations if necessary, and
- 4. to generate a written report regarding the season's activities. (Aquitaine, 1979a:6).

There was a great variation in the issues considered by the Committee: e.g. investigation of complaints of low flying aircraft, the hiring policy concerning local people, identification of benefits of the drilling operations in the communities. The year-end reports of the Committee are extremely positive in nature, so much so, that it has led some to state that the Committee is just a "puppet" public relations organization of the Aquitaine Company. For example, local groups, such as the Baffin Regional Inuit Association and the Hunters and Trappers Associations, felt that the Natsiq Committee did not really solicit much public participation in assessing many of the issues they covered (Donaldson, 1981, Frobisher Bay and Pangnirtung H.T.A., 1981, McRury,

1981).

In September of 1981, the author was invited to attend a committee meeting in Frobisher Bay. Topics covered at the meeting were:

1. observed changes in the physical/social environment since the 1980 program,
2. guidelines for future wildlife observation studies by local residents,
3. Aquitaine seismic survey,
4. public information meetings, and
5. the Canadian Development Corporation takeover of Aquitaine.

Members felt that there was no real control by Aquitaine of the committee, although the company does pay all the bills of the committee. Committee members stated that there was indeed some degree of public involvement, although, as in the south, apathy does exist.

The activity of the committee is evidence that the proponent has sincerely tried to fulfill the panel's recommendation.

10a The Federal Environmental Assessment Review Office should institute a follow-up mechanism to evaluate and report on the degree to which the Panel's conclusions and recommendations have been accepted and acted upon." (EAP, 1978:44)

In terms of a follow-up procedure, the present research represents the first attempt to address this recommendation. Since funding for this research was provided by FEARO, it is hoped that the efforts in this research will serve at least partially to fulfill this recommendation. At present no other review of the assessment by FEARO is known.

A seeming imbalance in information from government and industry on action taken on the recommendations of the panel exists. This reflects the fact that information was made more readily available from industry officials than from government officials. Editorial bias has not been

introduced to favour one source or the other.

Issue 3 Were the conclusions and recommendations necessary?

In answering this question it should be noted that the word necessary has two implications. It can be said that most of the recommendations, as outlined in Table 4.1, are necessary to protect the environment. From the point of view of the panel, all twenty-one recommendations are necessary, since it is assumed that unless the obvious requirements are stated, a proponent would tend only to take those actions which suited their best interests.

Second, it is clear that even though the recommendations may be necessary to protect the environment, those directed at the proponent dealing with the design and operation of the project can be seen as redundant, as it was in the company's interest of good design to undertake the required actions (Worbets, 1981, Westergard, 1981a). In particular, this applies to the two recommendations 8a and b (Table 4.1, 4.2) "required" of the proponent for acceptability of the project.

Four of the ten recommendations outlined in Table 4.2 are directed at government departments and agencies, two of which needed government action to meet the "Conditions for Acceptability of the project." (8c, 8d). Industry officials state that it is unfair to delay a project because various government departments and agencies cannot meet "Conditions" imposed on them. On the other hand, the impression gained by the author was that, in government circles, tension is created by the recommendations of an assessment panel when various departments are prompted to review certain actions or policies. However, it is the purpose of the assessment to predict, and propose mitigative measures for negative impacts. It is the duty of the panel to assess where possible deficiencies in the project may occur and recommend for their correction. Whether the deficiencies are on the part of the proponent or the government can be viewed as irrelevant. What matters from the panel's viewpoint is the effect of the project on the environment.

Some examples of those recommendations directed at the proponent which might be considered redundant, were: to hire local people; to predict iceberg movement; to inform the public; and to have in place an oil spill contingency plan.

It is unclear whether or not any of the recommendations directed at government regarding the operation of the project may be seen as redundant. Other than the actions which took place to satisfy the regulatory functions of the various government departments, little comment could be solicited on the results of the panel's recommendations. Thus it would seem that in this case that the recommendations directed at government are necessary, if only as a public reminder, but yield little in terms of direct action at the time of the project or of subsequent activity.

Issue 4 Was there any indication of environmental change as a result of the project?

As stated previously, it is difficult to determine environmental change as a result of the project when there is not a pre-project environmental condition to use as a baseline. Only a few attempts have been made to monitor "remote" projects such as offshore exploratory drilling, as in the North Sea (Cowell, 1978, Westaway, 1977).

With regard to the Aquitaine project, other than environmental surveillance required to fulfill government regulations, no on-going monitoring or follow-up evaluation was undertaken by any government department, territorial or federal, of either physical or socio-economic conditions. Even though environmental surveillance is part of an ideal monitoring program, by itself, the amount which can be learned about a project is limited. Environmental monitoring will be addressed in the next chapter. With the limited amount of quantitative data available from environmental surveillance, there is no real basis even to attempt to determine environmental change as a result of the project.

The environmental assessment panel attempted to identify areas of potential impact associated with the project. The majority of the potential impacts examined are associated with a major accident (blowout). As this has not yet happened, no predicted impacts can be examined. What follows then is a brief review of what might be considered as potential impacts on the environment as a result of the operation of the project, most of which were addressed in the course of the assessment, though not specifically mentioned in the final recommendations.

In terms of potential impacts on the environment, Westaway (1977) suggests that impacts other than an accident may occur through introducing potentially toxic drilling muds into the surrounding area and through emissions of sulfur dioxide from the flaring of the well.¹ Concern was expressed during the assessment that the noise and fumes of the drillship would disturb the various animals which inhabit the area. Wildlife observers² on the drillship and support vessels noticed no lack of wildlife.

With respect to Environmental Impact, Akeshoo Nowdluk noted that, despite a multitude of flights of both fixed wing and helicopters in the vicinity of Brevoort and Allen Island, Caribou are as numerous as at any time in the past. (Aquitaine file on 30 Oct. 1979, Natsiq Meeting: 4)

According to the Pangnirtung Hunters and Trappers Association, the total number of sea mammals is going down. This is difficult to verify as no records are kept, and no other group has documented this. It seems that since the project is of such a high profile and people still have little understanding of its operation, any negative changes which

¹ According to the Summary Report of the 1980 Environmental Operating Conditions, there was a minor accidental discharge of 79,000 litres of undiluted drilling mud when a worker turned the wrong valve. The consequences of such an accident to the environment are unknown.

² In fact, one might say that the wildlife hindered the operation of the drillship. On August 25, 1979 a walrus took up temporary residence in the moon pool of the drillship. Attempts to remove the walrus were not successful as it returned to stay for another 24 hours. Finally ... "presumably hungry or bored, it disappeared." (Native Press, Nov. 5, 1979)

may have occurred are perceived to be a result of the project and the company's activities. Whether this is actually the case with regard to sea mammals is difficult to substantiate.

It is difficult to assess emotional reaction to a project. Another example of this problem is the concern expressed by local HTA's about the appearance of a great number of fuel caches along the Baffin Island coast. These caches were automatically attributed to the drilling project and anger was directed at the company. Local residents brought their concern to the Natsiq Committee for investigation. Upon investigation, it turned out that the caches belonged not to Aquitaine but to the Canadian Wildlife Service.

Apart from an accident, the greatest impact of a development project is on the local residents, i.e. on the socio-economic environment. These impacts can be positive or negative. According to reporters at the Nunatsiag News, the Aquitaine Company was very responsible in the way it carried out its business in the community. This they attributed as much to the persons controlling the program as to the company. The greatest potential for impact on the socio-economic environment comes from the great numbers of workers moving through the area, and from the money paid in salaries to local workers and in patronizing local businesses. The money spent in the project area was as follows:

	<u>For Goods and Services</u>	<u>Employment</u>
1979	\$550,000	\$230,451 (Aquit and Esso)
1980	\$750,000	\$139,208

The money spent on goods and services includes air services, expediting and freight handling, laundry, accommodation, meals, office rentals and equipment repairs. The money paid to local workers was not just to residents of Frobisher Bay but to other communities as well. According to the Natsiq Advisory Committee, "many young people have benefited from training opportunities and in monetary matters from the drilling operations" (Natsiq Committee, 1981).

The impact of transient workers on the community of Frobisher Bay seems to have been minimal. The company's policy was that the workers should move through the community in one day, with little interaction. People interviewed recall no incidents. A concern was brought to the Natsiq Committee that because of the increased traffic on NORDAIR flights, local residents were having difficulty obtaining seats. When the community investigated this concern, no evidence could be found of any problem (Natsiq Meeting, 30 October 1979).

As in southern communities, there are also disadvantages which result from a project such as this. With a general increase in the wage level of the community, the potential for alcohol and social problems increases. The Baffin Regional Inuit Association is concerned about this possibility and believes that it should be studied as future projects are developed in the area.

Another concern discussed during the assessment was the condition in which the shorebase would be left after abandonment. Due to bad weather, it was not possible to visit the shorebase. The base has been on loan to the Bedford Institute to carry out oceanographic studies since the cessation of drilling operations. From all indications it was handed over in a proper condition.

4.3 Summary

From the evidence presented in this chapter, it is still unclear whether the lack of measurable negative impact is a result of the influence of the environmental assessment. Also, it is unclear how the assessment has contributed to the many positive social and economic impacts of the project.

It is questionable in some cases, possibly due to extremely general wording, as to what degree the panel's recommendations were followed, particularly in relation to those recommendations directed

to government departments and agencies.

The controversy over the effectiveness of EIA seems to revolve around how each group perceives the purpose of the assessment. Even though the panel felt that all the conclusions and recommendations were necessary to protect the environment, some of the recommendations were redundant, as it was in the interest of good design for the company to carry them out.

Although the panel recommended that there be monitoring and follow-up of the project, no major continuing programs were undertaken by either industry or government. As a result, the opportunity to learn how the project affected the environment (or vice versa) was not fully utilized. The assessment concentrated almost completely on the issues surrounding a blow-out. Even though a blow-out has yet to happen, the lack of any continuing monitoring program could reduce the ability to respond to such an emergency.

It is therefore proposed that to improve the design of subsequent projects, and the usefulness of the EIA process in limiting the negative impacts associated with these projects, some systematic method of project environmental monitoring is required. In the next chapter, the author will suggest a general framework for carrying out environmental monitoring.

CHAPTER 5

A FRAMEWORK FOR ENVIRONMENTAL MONITORING

5.1 Introduction

Though this paper so far has tried to evaluate to what degree the lack of measurable impact in the case study was due to chance, good design or the environmental assessment, the experience gained has led the author to believe that project evaluation cannot be divorced from an environmental monitoring program. It was evident in chapter 4 that no clear definition of the reasons for the lack of measurable impact can be obtained by using data collected solely through interviews. It is therefore the purpose of this chapter to suggest ways that future on-going environmental monitoring of projects may be accomplished.

At this time, it is useful to review what is meant by environmental monitoring. To many, monitoring is defined as a regulatory policing to ensure that projects are complying with environmental regulations and contract specifications. However, to those involved in project-specific studies, this is not environmental monitoring but rather environmental surveillance. As outlined in Chapter One, while surveillance implies inspection, monitoring consists of the collection of data, allowing for an evaluation of the positive as well as the negative effects of the project on the environment (or vice versa), the evaluation of whether or not predicted impacts occurred, a determination of how the assessment process can be altered to improve the integrity of future projects, and a better understanding of the environment.

Ideally, the results of environmental surveillance can be used as part of an environmental monitoring program.

During the interviews conducted with industry officials, government officials, public interest groups and northern residents of Pond Inlet and Frobisher Bay, the following questions were asked with regard to environmental monitoring:

1. Is it necessary?
2. Who should be doing it?
3. Who should pay for it?
4. What should be included?

To the second and third questions, government and industry officials suggested that it was the other group's responsibility. From this common ground the variation in the responses increased. What follows are some of the more salient points raised during the interviews:

1. All groups stated that it would be useful to have some method of determining the mistakes and successes of large development projects.
2. There exists at present no suitable mechanism for undertaking such a program.
3. Any body undertaking the program would have to be independent of the control of the pro-development government departments such as DIAND and EMR and of industry.
4. Participation of northern residents in a meaningful way is vital to the program's success.
5. Industry groups should not have to assume the total costs for a program.
6. Northern residents with a grade school level of education could carry out the mechanics of a monitoring program if properly trained and supervised. (The reader is referred to the experience of the Arctic Research Establishment. (Steltner, 1981)).
7. An environmental monitoring program needs to be co-ordinated with on-going environmental studies.

8. Monitoring and evaluation should be scientifically rigorous.
9. Funding for a monitoring program should be made available without pre-conditions on its use and on the direction of research.
10. Many varying suggestions were made during the interviews on what should be included in environmental monitoring.

5.2 Benefits of Project Monitoring

If we assume that the goals and objectives of environmental monitoring are similar to those expressed earlier in the definition of the term, then the benefits of a properly administered monitoring program are manifold, accruing to industry, government and to society, locally and Canada-wide.

As it stands now, Environmental Impact Assessment is an attempt to assess the positive and negative impacts of a project before development. Once a panel's decision is rendered, little further study occurs to allow for an indication of whether or not predicted impacts occurred or to determine if the issues and studies brought forward during the assessment were germane to the project.¹ There is a risk that the lack of follow-up may increase the costs and dangers of future projects, as it may be assumed, perhaps erroneously, that project planning techniques have been successful.

The present requirement for intensive short-term studies, when not followed up with continuing governmental research, contributes little towards the ultimate goal of rational management of Canadian renewable resources. Indeed, crash studies may actually be counter-productive to the achievement of that goal if they delude decision makers into believing that coherent resource management policies may be implemented from such a data base.

(Stirling, I., Wallace, R., Glazier, G., 1979:5)

Baker (1981) states that the possible reasons why monitoring is not a government priority are the loss of interest once a project has been approved and an impression that the mechanisms for monitoring

¹In both the Shikwak Highway Project and the Boundary Bay Airport Expansion, Monitoring Committees were established to review the implementation of the projects as identified in the assessment.

are already in place. The latter is perhaps a result of confusion between what is surveillance and what is monitoring.

The co-ordination of project-specific environmental studies would be a major benefit of a properly administered monitoring program. Even though programs such as EAMES and the Beaufort Sea Research Project exist to improve knowledge of the environment, little co-ordination between government, industry and private groups exists in studies relating specifically to the operation of projects.

A monitoring program should help to determine those studies that are not germane to the environmental assessment or operation of the project, as well as those studies that are necessary but have been overlooked, such as, (in the case study) rip-current studies or the effects of the project on the socio-economic environment.

The Science Council of Canada report on Northern Science Policy (1977) recommended that there be a "comprehensive and balanced assessment and monitoring of large and small projects." (Science Council of Canada, 1977:50). This, the Council suggested, should be used to improve future northern development policy. As well, Beanlands (1981) suggests that:

The success of a monitoring program depends on (1) the ability to respond rapidly to monitoring data in altering the project and (2) the use of that information in subsequent projects. (Beanlands, 1981a: App. 4)

Monitoring of projects which have undergone environmental assessment would also allow for the verification of baseline studies through repetition of the studies, and an improvement of impact prediction capabilities by studying the occurrence (or lack) of predicted impacts and by determining if this was due to chance, good design, or mitigative measures proposed during the assessment. Simply put, we are not learning from mistakes or from successes because no group has yet determined

what they are.

5.3 Timing

At the beginning of this research it was assumed that the best point to commence project evaluation would be with the panel's report to the Minister of the Environment. The panel's report represents the culmination of the assessment process as it now stands, and should identify the specific concerns over the project along with the panel's recommendations on mitigating anticipated impacts. Unfortunately, as has been noted, the majority of the conclusions and recommendations in the case study addressed the event of an accident, which has yet to happen. It is unclear in light of the history of the project, how useful the remaining recommendations were to the operation of the project, since it was in the interest of good design to carry out most of them.

To help avoid in the future the problem created by the content of this panel's report, the author feels that an environmental monitoring program should start at the initial evaluation stage of the project. (See Figure 5.1). This is also suggested for two other reasons. Firstly, during the period of baseline data collection, by considering what monitoring should take place, studies can be designed so that they can be repeated throughout the project. A recent example is in the guidelines for the Beaufort Sea Project, in which the panel asked the proponent to describe what monitoring should take place. (Beaufort Sea Environmental Assessment Panel, 1981: 34).

Secondly, it is important to design the monitoring program to run hand-in-hand with baseline data collection because an assessment of change implies an understanding of a normal or steady-state environmental condition. It is difficult to try to go back and assemble information on the conditions that existed before the assessment.

By starting the monitoring at the initial evaluation stage, it will become easier to determine what environmental change, if any, has taken place as a result of the project. Without a systematic method of monitoring, the benefits of evaluating projects will be reduced.

5.4 What should be included in an environmental monitoring program?

According to Beanlands (1981a), in establishing a monitoring program it is important before beginning to outline the duration of the program and the size of the area of the project under study, and to establish a more scientific basis for collecting data. Obviously the nature of the project and the nature of the site determine which specific factors should be included in environmental monitoring. According to Bankes and Thompson (1980), environmental monitoring takes on a much different guise in a frontier setting than in an urban environment. For example, in a frontier setting more time in a monitoring program is spent identifying and filling information gaps than in a more urban environment. This is because detailed information in frontier regions only is available where government or industry activity creates a demand for up-to-date information.

The nature of the present case study restricted the application of environmental monitoring. Little consideration in the assessment was given to potential impacts on the environment (either positive or negative) as a result of support operations or routine drilling operations. Those potential impacts which were assessed, such as bird and mammal migration paths and aircraft and shorebase operation, were anticipated to have minimal impact. The monitoring and follow-up performed by the proponent in these areas, in the author's opinion, lacked focus, due to the lack of monitoring framework. This could also be said to be true to some degree of the involvement of the Natsiq Advisory Committee. It is suggested that before a project is begun, it is necessary to identify what factors to monitor, when they are to be monitored and how they are to be monitored. This includes factors for both the physical and socio-economic environment.

Figure 5.1

SCHEMATIC DIAGRAM OF THE FEDERAL ENVIRONMENTAL ASSESSMENT AND REVIEW PROCESS

Commence Environmental Monitoring

Cowell (1978), in an article on ecological monitoring, suggests what should be considered in a survey design:

- a) all sampling must be statistically acceptable and amenable to independent analysis;
 - b) the number of species selected should be limited to those normally present; and
 - c) a reference site should be chosen and monitored to allow some background situation for comparison.
- (Cowell, 1978: 279)

Subsequently, Cowell states that reference sites should as far as possible be biologically matched to primary sites; and as the basic ecology of sites can vary due to local natural changes it may be necessary to have several reference sites. Data collected from these sites can then be analysed using ~~several~~ computer data handling techniques such as association analysis, reciprocal averaging and euclidean distance and similarity techniques. (Cowell, 1978: 280-281).

In future environmental monitoring of development projects, it would seem that more attention should be paid to monitoring a few significant factors of the project's environment rather than a large number. In other words, it is better to start with a well defined, smaller program and be successful than to attempt to develop an all-inclusive monitoring program.

The potential success of a project environmental monitoring program rests in the level of co-operation that those performing the monitoring receive from industry, government and public interest groups. In this study, it was found particularly useful to be able to approach these various groups freely. It has been suggested by some, that those performing surveillance on projects would be best suited to carry out environmental monitoring, so as to avoid duplication of effort. This might seem logical. However, since surveillance groups are from various government departments, and are responsible for punitive action in the event that regulations are not followed, it is unlikely, simple due to interpersonal relations, that they would receive the co-operation

required to run a successful monitoring program.

Most of what has been written on environmental monitoring such as Westaway (1977), Cowell (1978), Beanlands (1981), deals with ecological monitoring. What has become evident is that little has been done to co-ordinate monitoring of the physical environment with the monitoring of socio-economic conditions. Such co-ordination is extremely important, particularly where the population is economically dependent on local wildlife sources. Harvesting studies such as those being conducted by Donaldson⁷ would play an important role in environmental monitoring.

In designing a monitoring program to include socio-economic conditions, it is suggested that the local people of the affected area must be involved. In a northern setting where cultural differences may create problems in data collection, the support of local community leaders and groups will improve not only the quantity but the quality of information available.

It is also suggested that there be no pre-conditions imposed on the funding for environmental monitoring programs which could prejudice, even indirectly, the outcome of the program. Such relationships allow research to proceed without concern for a particular direction of research. As well, the researcher is allowed a greater degree of freedom in writing conclusions, rather than feeling obligated to toe a particular line.

5.5 Suggestions for a mechanism of environmental monitoring

Who would be best suited to undertake an environmental monitoring program? Two suggestions are offered from information collected during interviews on who should undertake project monitoring.

⁷Under contract to the Baffin Regional Inuit Association, J. Donaldson is attempting to catalogue and analyse which animals and in what numbers are being harvested by the hunters of Baffin Island.

In an ideal situation, environmental monitoring would be applied to all major projects in Canada, both in the north and south. In this research, only major oil and gas projects in the north have been considered.

It has been suggested previously in this chapter that as different government departments are involved in environmental surveillance, and as there are potential problems in a policing group undertaking a co-operative monitoring program, that some other group might be best suited to co-ordinate environmental monitoring.

First, it might seem logical that the Environmental Protection Service of Environment Canada, in its role as "environmental advocate" would be best suited in the existing government structure, to co-ordinate a program of environmental monitoring. A difficulty arises, however, in that Environment Canada has little mandate above the sixtieth parallel. Control north of 60° presently rests with DIAND and EMR except with reference to the Arctic Waters Pollution Prevention Act and the Migratory Birds Act.

An alternative to E.P.S. could perhaps be the establishment of an independent body. In the interviews conducted it was suggested that an independent body could be created to design an environmental monitoring program, and to monitor and evaluate development projects for their effects on the environment (holistic definition) and to help co-ordinate associated research. It is suggested that funding for such a body could come from the federal government; a matching government-industry fund, or from the Environmental Studies Revolving Fund in the yet to be proclaimed Bill C-48.

It is not the objective of this thesis to answer conclusively the questions of who and how with regard to environmental monitoring. These questions would be best left to someone in the field of political science or administrative or management studies. The purpose of posing

these two questions during the research was to obtain some indication of how each group perceived the scope of environmental monitoring. It was hoped this would give some framework to what each group would include in an environmental monitoring program.

5.6 A General Framework for Environmental Monitoring

Through an examination of the case study, and through information collected during interviews on the subject of environmental monitoring, it is possible to draw together a general framework for environmental monitoring.

Goals:

1. To determine if there was environmental impact as a result of a project;
2. To assess whether or not predicted impacts occurred;
3. To assess whether or not mitigative measures worked;
4. To promote a better understanding of the environment;
5. To help change project design, if necessary, to adapt to a more clearly understood environmental condition; and
6. To improve the design and operation of future projects by determining the mistakes and successes of past projects.

Timing:

1. Design of an environmental monitoring program should begin at the same time as collection of baseline data for the initial environmental evaluation.
2. The length of time to be spent monitoring the environment should be specified prior to instituting the project, but should be able to be adjusted as conditions require. Bissett (n.d.a) suggests the time period should be at least two years, after completion of the project.

Spatial Characteristics

Before instituting a program, a project area should be defined so as to include both the physical and socio-economic environments. It should be recognized that area covered by the two may not always be the same and

the area affected will vary according to the nature of the project.

Considerations for Inclusion in a Monitoring Program:

1. As much as possible, data analysis must be independently reproducible;
2. Consideration should be given to the selection of a control of reference site;
3. According to the nature of the project, environmental indicators should be chosen. e.g. certain key flora and fauna species;
4. Equal consideration should be given both to the socio-economic and physical environments;
5. Co-ordination must take place with on-going environmental studies such as EAMES to eliminate duplication;
6. Information from bodies undertaking environmental surveillance should be included in the project evaluation;
7. As many local people as possible, should be included in the activity of monitoring as well as in advising what items should be monitored;
8. Projects north and south of the sixtieth parallel should be monitored;
9. All information collected should be made public;
10. Studies undertaken while monitoring a project should not be restricted primarily to quantitative data collection, but should include the views and opinions of those participating in, or affected by, the project.

Criteria for the Monitoring Body:

1. Whatever body undertakes the co-ordination of an environmental monitoring program should be independent of pro-development groups such as DIAND, EMR or industry;
2. Funding should be available without any pre-conditions;
3. The body should be free to consult any organization which may provide information on a project or a project's environment;
4. Funding should come from both government and industry sources;
5. Universities should be involved to some degree, as it is from these institutions that future project designers and planners are drawn;

6. The body should be seen as a co-operative organization and should stress the positive as much as the negative impacts of a project.

It is obvious that the framework described here is incomplete. What is required is discussion and further study on the nature, content and format of environmental monitoring before a trial program can be attempted. In the next chapter suggestions for further study will be made.

CONCLUSIONS AND RECOMMENDATIONS

FOR FURTHER STUDY

Environmental Impact Assessment is a process intended to predict and minimize negative impacts and to maximize benefits associated with resource development projects. The process has been active in Canada for almost ten years.

The usefulness of EIA is frequently questioned by industry and public interest groups, though they concede that it is the only avenue available for public participation. The value or strength of the process rests in its ability to predict and mitigate negative impacts associated with projects, rather than in how many projects are accepted or turned down. However, without some systematic mechanism to evaluate the accuracy of predicted impacts and the usefulness of the proposed mitigative measures there is a danger that society will be lulled into a false sense of security in assuming that all the important aspects of a project have been adequately addressed.

The evaluation of projects using an assessment panel's report as a basis will not guarantee that it will become evident whether or not the lack of any measurable negative impact was a result of chance, good design, the environmental assessment, or a combination of the three. In examining the monitoring and follow-up which took place in the case study, it was apparent that to evaluate successfully the performance of projects what is required is co-operation between government, industry and local groups in monitoring; and earlier consideration of the issues surrounding the monitoring of the project. Environmental monitoring of projects is one way in which both future project designs and the usefulness of the EIA process can be improved.

All groups approached felt that environmental monitoring would provide a valuable function in the performance of future projects. The framework for environmental monitoring presented here is incomplete.

Further research is required to develop the framework into a more viable addition to the EIA process. Four areas for further study that will have immediate results in completing the framework are:

1. It is suggested that study be given to a more current development project, such as the Beaufort Sea Project, so that areas and settings for environmental monitoring can be identified and followed through.
2. Through open discussion it is suggested that effort be focussed on developing a general framework for environmental monitoring by assembling already existing expertise.
3. It is suggested that the appropriate groups should attempt to develop some mechanism to carry out environmental monitoring.
4. Study should be given to ways in which socio-economic and physical environmental information can be co-ordinated in the monitoring of development projects.

APPENDIX

Summary of the Canadian EIA Process

The Federal Environmental Assessment and Review Process (EARP) was established by a cabinet memorandum in December of 1973. The memorandum set forth a mechanism by which the Federal Environmental Assessment Review Office (FEARO) would assess and report to the Minister of the Environment on proposed projects which could have possible adverse environmental effects. The terms of reference for EARP include all projects using federal lands or those sponsored by federal agencies.

The federal assessment process has three distinct phases: the Environmental Impact Statement (EIS), the assessment hearings, and the Panel's decision and recommendations (see following schematic).

Before being referred to FEARO, the proponent of a development project submits an outline and design for the project to the government department which has jurisdiction over the project. The concerned government department then determines, through an Initial Environmental Evaluation (IEE), whether or not unknown or significant environmental impacts exist. If this is the case, the project is referred to FEARO for assessment.

In the first stage of the assessment process, the proponent of a development project prepares an EIS for the project. The guidelines for this EIS are established by the assessment panel through discussion with concerned government departments and FEARO.

Under the federal system, the assessment panel frequently consists

of five knowledgeable members drawn from fields pertinent to the project under consideration. On past panels, at least one member was from FEARO, frequently as chairman. Recently though, commencing with the Beaufort Sea Project, FEARO personnel have not been included on the panel, except in an advisory role of secretary.

Generally, the EIS must contain: a definition of demand for the project, alternative sites of construction for the project, alternatives to construction, the potential impacts of the project, and the proposed mitigative measures. The EIS is then circulated to concerned government departments and to the general public for reaction.

The second stage comprises public hearings held before the assembled panel, which receives evidence put forward by the proponent and the public on the viability of the project. Through the use of a panel knowledgeable in various pertinent fields, major areas of concern such as ecology, engineering, social issues and so forth can be covered. Each panel also has the power to call expert witnesses to comment on the proposal. At the hearings, which are based on the adversarial system, the proponent states his case and is then "cross-examined" by public intervenors and members of the general public. Evidence is also frequently given in support of the project by concerned citizens.

In the third stage, after all positions have been made clear, the review panel weighs the evidence put forward at the hearings, and then makes recommendations to the Minister of the Environment, either to approve the project as is, to reject the project, or to approve the project under specified conditions. Once the panel renders its report to the Minister for his decision, the EIA process in effect ceases.

SCHEMATIC DIAGRAM OF THE FEDERAL ENVIRONMENTAL ASSESSMENT AND REVIEW PROCESS

Source: FEARO

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