A Framework for Best Practice Environmental Impact Assessment Follow-up: A Case Study of the Ekati Diamond Mine, Canada

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Abstract

Environmental Impact Assessment (EIA) is broadly defined as a systematic process that proactively examines the potential consequences of development actions. As a planning process, the longer-term objective of EIA is to contribute to sustainable development of the environment. EIA cannot meet its sustainability objective without a systematic follow-up program. Notwithstanding the benefits of a follow-up program, there is little guidance for best practices. The problem is that follow-up programs are not widely implemented in EIA and the lessons learned from experience have not been documented. This research explores the principles and characteristics of best-practice follow-up in an attempt to identify the lessons learned and issues raised from experiences in Canada's mining resource sector. A normative framework for doing follow-up is developed from the literature using these principles.

Based on document analysis and semi-structured interviews, a case study of the Ekati Diamond Mine, Canada's first diamond mine, is evaluated based on the best practice principles, which advocate actions for success. The Ekati mine is meeting requirements in the best practice principles, as established in the best practice framework, which is outlined in part, in licenses obtained by Ekati. This is exemplified in BHPB's, use of hypothesis in impact prediction. However, there are normative principles and elements that are left out in Broken Hill Proprietary Billiton Ekati's follow-up programs. For example, there is some concern about the level to which local knowledge has been incorporated and the level to which monitoring of socio-economic elements is being carried out.

Based on Ekati's experience, a number of new lessons emerge to inform the framework on best practice follow-up namely, that there is need for mandatory, non-ephemeral legislation on follow-up, that baseline data needs to be repeatedly collected after projects have started operations and that there is a need for firmer requirements if proponents are to exercise serious commitment to public involvement.

Acknowledgements

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List of Abbreviations

AEMP	Aquatic Effects Monitoring Program
BACI	Before After Control Impact
BEEM	Biophysical Effects Monitoring Program
BHPB	Broken Hill Proprietary Billiton
CCEM	Canadian Council for Environmental Ministers
CEAA	Canadian Environmental Assessment Agency/Ac Committee of the
COSEWIC	Status of Endangered Wildlife in Canada
DFO	Department of Fisheries and Oceans
DIAND	Department of Indian Affairs and Northern Development
DOE	United States Department of Energy
EIA	Environmental Impact Assessment
EARP	Environmental Assessment Review Process
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
FEARO	Federal Environmental Assessment and Review Office
GIS	Geographical Information Systems
GNWT	Government of the Northwest Territories
HSEC	Health, Safety, Environment and Community Policy
IEC	Independent Environmental Checkers
IEMA	Independent Environmental Monitoring Agency
INAC	Indian and Northern Affairs, Canada
ISO 14000	International Organization For Standardization Series For Environmental Management
MAELS	Maximum Allowable Effects Levels
MVEIRB	Mackenzie Valley Environmental Impact Review Board
MVLWB	Mackenzie Valley Land and Water Board
MVRMA	Mackenzie Valley Resource Management Act
NEPA	National Environmental Protection Agency
NRCAN	Natural Resources Canada
NWT	Northwest Territories
OEMP	Operational Environmental Management Plans
RA	Responsible Authorities
RWED	Resources, Wildlife and Economic development
SEEM	Socio-economic Effects Monitoring Program
VECS	Valued Ecosystem Components
WEMP	Wildlife Effects Monitoring Program

CHAPTER I

RESEARCH INTRODUCTION

1.0 Introduction

In 1998 when the Federal Commissioner of the Environment and Sustainable Development tabled his annual report, Chapter 6 (*Environmental Assessment: A Critical Tool for Sustainable Development*) offered a number of observations on environmental impact assessment (EIA), notably the value and importance of follow-up, problems related to its implementation, and deficiencies in practice and documentation of follow-up results (Storey and Noble, 2004). Under the *Canadian Environmental Assessment Act*, Section 2 (CEAA, 2002), follow-up is defined as a program for verifying the accuracy of impact predictions and determining the effectiveness of the mitigation measures that were identified in the EIA to manage potentially negative environmental impacts. Thus, follow-up is an indispensable part of any EIA system in that follow-up ensures that EIA actually works to protect the environment and achieve its intended objectives (Baker and Dobos, 2001; Hui, 2000; Storey and Noble, 2004).

Notwithstanding the importance of follow-up in EIA, little documentation exists that clearly outlines the guidelines for effective follow-up design and implementation (Noble and Storey, 2004; Wlordaczyk, 2000; Wlordaczyk, 2004). Ideally, this should be available from experience where practitioners and experts record new found knowledge and already existing information. Effective follow-up requires a clear rationale and theory with guidance on how to properly design and implement follow-up programs (Noble and Storey, 2004). Furthermore, Noble and Storey (2004) argue that follow-up should form an integral part of any EIA system, and thus follow-up programs require consideration at the outset of any EIA process. Experience from past and current EIA indicates that identifying these principles and characteristics is vital to advancing the current state-of-practice. Documentation would provide new information, understanding and the basis from which new approaches could be designed (Mitchell, 1997).

1.1 Research Objectives

Considering this lack of guidance for follow-up practice, this research poses two questions:

- what is 'best'-practice follow-up, and;
- what lessons can be learned from recent practice follow-up implementation?

The purposes of this research are thus to: a) develop a normative framework for best-practice EIA follow-up design and implementation, and b) to evaluate recent-practice follow-up activities in Canada's northern mining resource sector. This will be accomplished through two underlying research objectives.

The first objective, which develops the theoretical and conceptual foundations of this research, is to identify the principles and characteristics that define 'best'-practice EIA follow-up. This objective will consist of the following sub-objectives, to:

i) examine the notion and value of follow-up in EIA. The research focuses on comprehensive EIAs rather than screening level EIAs, as the former are more encompassing.
ii) identify the current state-of-practice of follow-up in Canadian federal EIA;
iii) develop a normative framework outlining the key principles and characteristics of best-practice follow-up which will serve as the basis for evaluating recent practice[1].

The second research objective is to apply the normative framework to evaluate the Broken Hill Proprietary Billiton Ltd. (BHPB)'s Ekati Mine EIA process's follow-up design and implementation. This objective will consist of the following sub-objectives, to:

i) provide an overview of the Ekati mine project;
ii) discuss the nature of the EIA system and its specific goals and objectives;
iii) evaluate the effectiveness of the EIA process in terms of facilitating best-practice follow-up design and implementation;
iv) identify lessons learned from the Ekati mine experience to improve future EIA follow-up practices.

[1] This objective is based in part on Storey and Noble's (2004) investigation of frameworks for follow-up implementation in Canada's energy sector, supported by the Canadian Environmental Assessment Agency.

Upon completion of this research, a framework will be presented to facilitate the design and implementation of 'better-practice' follow-up programs and to evaluate the effectiveness of existing EIA systems in facilitating follow-up actions. This will assist in identifying the barriers to follow-up design and implementation and contribute to the necessary measures to address those barriers. Composition of the normative framework with lessons learned from recent practice in Canada's mining sector will provide the necessary guidance for future follow-up program design and implementation in other sectors in Canada and abroad.

1.2 Historical Overview of Environmental Impact Assessment

Environmental Impact Assessment was introduced to Canada in 1973 through the Federal Environmental Assessment and Review Process. While there is no universally accepted formal definition of EIA, it is broadly defined as a systematic process that proactively examines the consequences of development actions (Morrison-Saunders *et al.*, 2001; Shopley and Fuggle., 1984). Glasson *et al.* (1994) and Lawrence (1997) define EIA as an aid to decision-making; providing a systematic examination of the environmental implications of a proposed action and alternatives before a decision is taken.

The EIA process involves a number of sequential steps, including a preliminary review or screening process to determine whether an environmental assessment is required; a scoping process to identify issues and alternatives; and the selection of relevant parameters for describing and evaluating the affected environmental components (Barrow, 1997) (Fig. 1.1).

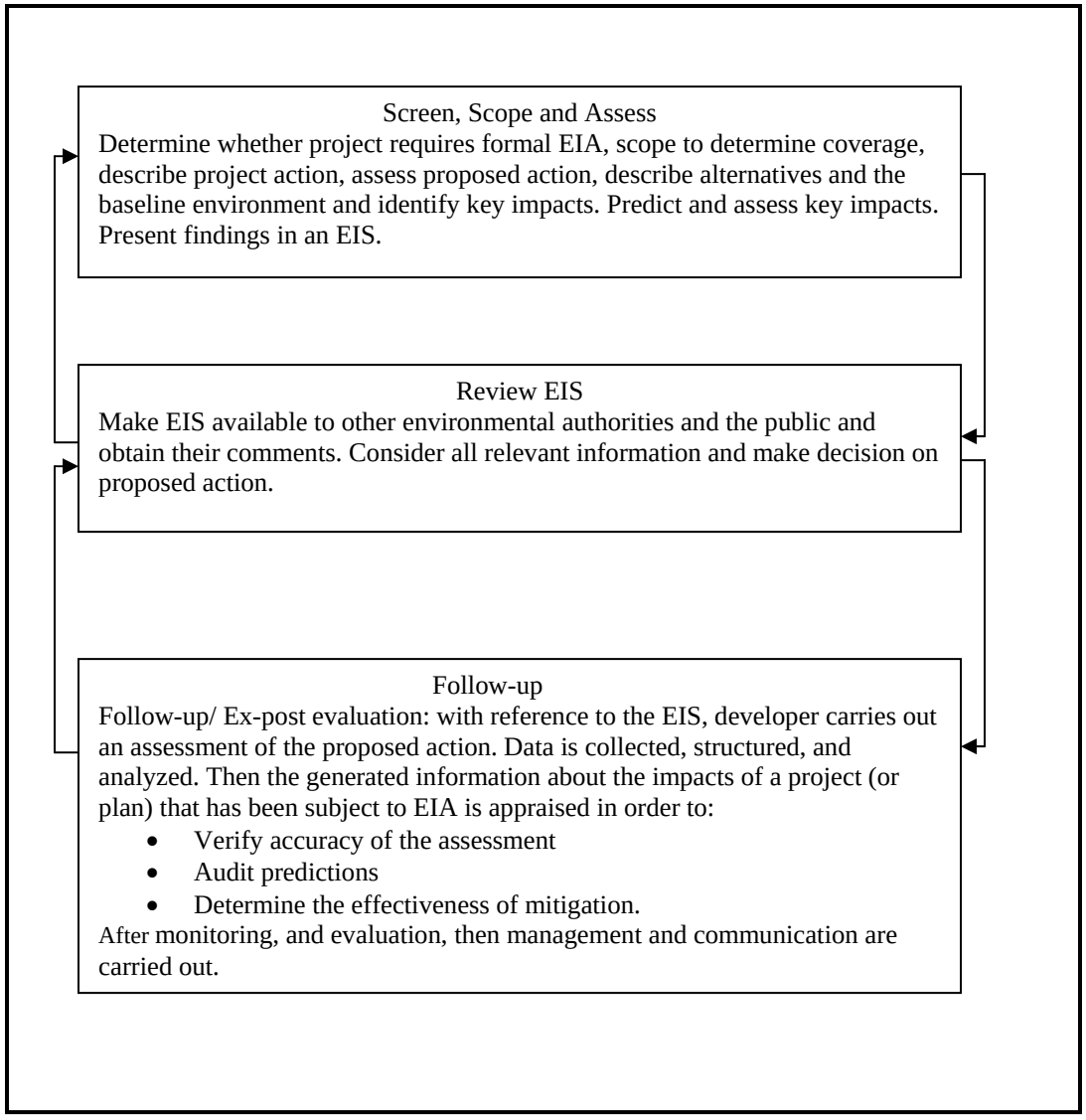

Figure 1.1: Generic EIA Process.
Sources: Adapted from; Arts et al., 2001; Barrow, 1997; CEAA 1992; Glasson et al. 1994, Meijer and van Vliet, 2000.

Practitioners obtain baseline data on each of the selected parameters by collecting existing information and surveying and sampling for additional information. Analysis of these findings and description of proposed project alternatives in relation to the environmental components follow. Prediction and evaluation of potential impacts of the project on the components and the recommendation of mitigation measures to avoid or minimize potentially adverse impacts of the projects, bring the EIA process to a close.

Monitoring (a composite part of follow-up) may be carried out, but implementation and decisions concerning implementation style rest with the relative authority (Glasson *et al*., 1994).

In short, EIA aids the formulation of development action and, ideally, is used as an instrument in support of sustainable development (Gibson, 2002). Section 4(b)(1) of the *Canadian Environmental Assessment Act* (Department of Justice 2004) for example, states as one of the purposes of the Act:

> "To encourage responsible authorities to take actions that promote the sustainable development of the environment."

Thus, EIA is seen as a process that can contribute to the sustainable development of the environment through improved assessment and decision-making. This characteristic underscores the need to develop and include follow-up implementation in EIA.

1.2.1 Development of EIA

EIA was first introduced in the United States in reaction to the need for federal government agencies and industries' accountability for the impacts of development on the environment (Barrow, 1997). As an environmental management tool, EIA was first formally established in 1969 through the US National Environmental Policy Act (NEPA) (Glasson *et al*.,1994; Mitchell, 1997; Ortolano and Shepherd, 1995). From NEPA, a more systematic process of environmental decision-making facilitated accountability (Barrow, 1997). Arts *et al.* (2000) explain that the original reason for developing EIA was to limit unexpected and adverse consequences of decision-making. It was based on the idea that with more information and systematic analysis, more rational decisions concerning project developments could be made.

Notwithstanding the pioneer EIA process that originated in the United States, Canada rejected the broadly scoped American model for legislating EIA. Rather, in 1972 the Canadian Cabinet, by way of Cabinet directive, required that all new projects initiated by the federal government be screened for potential environmental impacts. An Order-In-

Council was approved the following year which covered a wide range of federal projects and which also included projects funded by federal government agencies.

The period of 1974 to 1977 is recognized as a watermark in Canadian EIA, when Justice Thomas Berger, while leading the panel of the Mackenzie Valley Pipeline Inquiry, set an international standard for critical and cross-cultural public impact assessment. In that same year, various departments within the federal government carried out negotiations that resulted in the refining of Canada's federal Environmental Assessment and Review Process (EARP) and, in 1979, the EARP process was subsequently amended and registered as a Guideline Order under the *Government Organization Act* (Gibson, 2002). This move to make EIA a more rigorous process was further strengthened by the establishment of the Federal Environmental Assessment and Review Office (FEARO) (see Barrow, 1997) to develop guidelines for impact assessment, to oversee impact assessments, and to advance EIA in Canada through research and publications.

Because of the failure of the Guidelines Order to compel commitment from federal authorities to undertake and manage EIAs, a paper "Reforming federal environmental assessment: a discussion paper" was tabled through FEARO. According to this paper, the environmental assessment process could be strengthened by broadening its scope. It was also argued in this paper that follow-up processes be implemented as part of the environmental processes for ensuring the monitoring of project decisions *ex-post* (Gibson, 2002). While the FEARO paper recommended measures that would potentially strengthen EIA, it failed to demand that these measures be legislated.

This issue of EIA legislation was eventually settled by the emergence of a controversy in a development project in south-eastern Saskatchewan. The developers of the Rafferty-Alameda Dam project received consent to proceed with development through the *International Rivers Improvement Act* (Gibson, 2002; Shpyth, 1991). However, this license was challenged in federal court which ruled that the Guidelines Order was legally binding and directed that the Minister of the Environment carry out a federal environmental assessment of the Rafferty-Alameda Dam project. This ruling was upheld by the Court of Appeal in 1990 and the Supreme Court of Canada in 1992 (Gibson, 2002; Shpyth, 1991). The effect was that the Guidelines Order had the force of

law and implementation became mandatory. Efforts to legislate the EIA process began, and in June of 1990 the federal government introduced a bill to establish the *Canadian Environmental Assessment Act*. The *Act*, including a set of key regulations governing its application received Royal Assent in 1992 and proclaimed in force in 1995.

The regulation provided for two 5-year reviews. Bill C-19 was introduced in March 2001 to amend the Act. Improvements proposed within Bill C-19 included increased public participation and attempts to improve decision making. More important to this research, Bill C-19 was instrumental in advocating increased attention to follow-up and monitoring. In its march towards becoming law, the bill was brought before the House of Commons Standing Committee on the Environment and Sustainable Development. The proposed amendments received Royal Assent on June 11, 2003 and came into force on October 30, 2003 (CEAA, 2004). The changes were intended to:

- make the process more certain, predictable and timely;
- promote high-quality assessments (which includes strengthening the role of follow-up); and
- increase opportunities for meaningful public participation.

1.2.2 Follow-up

Arts *et al*. (2001:175) define follow-up as 'the collection of activities undertaken during the *post*-decision stages of the EIA to monitor, evaluate, manage and communicate the environmental outcomes that occur' in order to provide for feedback and comparison to the Environmental Impact Statement (EIS). In this way, follow-up closes the loop in the EIA process (Fig. 1.2).

Storey and Noble (2004) raise concern that CEAA's (See 1.0) two components concerned that these two components do not adequately address the full scope of follow-up.

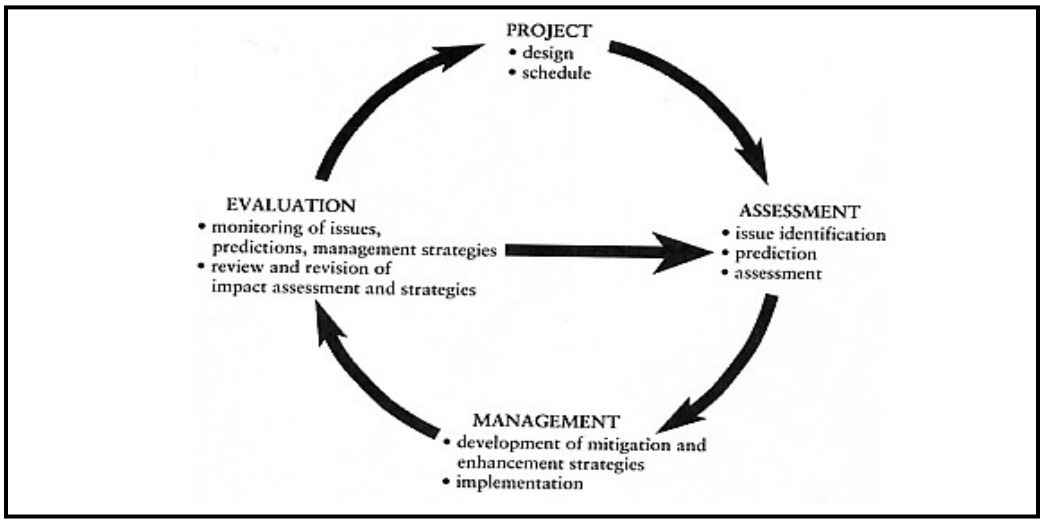

Figure 1.2. Environmental assessment and planning cycle (Storey, 1995: 310)

In respect to the first of the CEAA required elements, for example, not all environmental effects must be predicted. In many cases it is recognized in EIA that outcomes or project impacts should not exceed specified thresholds, in which case management practices, the determination of appropriate threshold levels and monitoring become the focus of attention (Storey and Noble, 2004).

1.2.3 Current research and practice

In Canada, and elsewhere (for example, Europe and US), attention has focused primarily on the need for and benefits of follow-up, but not on best-practices and the lessons learned from experiences (Glasson *et al*. 1994; Morris and Therivel, 1995). Research attention on follow-up is largely piecemeal, which reflects the attitude of practitioners in its implementation; for example monitoring and auditing have been 'add on' approaches in many EIAs (Morris and Therivel, 1995; Marshall, 2001). Improvement of future practice will also require that we document the lessons we are learning now.

1.2.4 Need for better practice frameworks

Follow-up is the element that can transform EIA from a static to a dynamic process: the missing link between EIA and project implementation (Arts *et al*.,2001; Bailey 2001; Wlodarczyk, 2000. The federal Minister of the Environment advocates follow-up as "an

essential component of an effective environmental assessment process," (CEAA, 2004). . Included amongst the Minister's amendments is the recognition of the need to strengthen the EIA follow-up process. Under paragraph 37(1) (a) section (5) of the *Act*, it is recommended that the results of follow-up programs be used to improve the quality of environmental assessments. Recognizing the importance of follow-up activities in the sustainable development of the environment, and in compliance with the recommendations of the Minister of Environment, CEAA's *Agenda for Research and Development* for 2002-2003 recognizes the need to improve the effectiveness of follow-up programs.

This can be achieved through focus on systematic best practice methodology for future follow-up in EIA (Storey and Noble, 2004). The need to make follow-up programs more efficient and more effective is consistent with CEAA requirements.

It is here where the proposed research will make a practical contribution to improving follow-up through evaluating recent practice and identifying transferable learning opportunities.

1.3 Theoretical and Conceptual Perspectives

This research is exploratory and seeks to build on the existing body of follow-up knowledge. The theory in the study is not explicit; rather this study is inductive- drawing conclusions from the elements and principles proposed in the body of literature on how to do good EIA follow-up. I use 'explicit' as did Schwandt (1993), that is to say this research, like many qualitative studies, does not begin from pure observation, but from a prior conceptual structure built from method and theory (Wathern, 1988).

Resource and environmental management in practice is often less than successful. This is particularly the case when managers and practitioners are attempting to deal with complex, multi-dimensional problems such as those captured by EIA. In his book *Barriers to a Better Environment,* Trudgill (1990) proposes a six-part framework identifying a series of barriers or issues that stand in the way of effectively addressing environmental problems. These include agreement, knowledge, technology, economic, political, and social barriers. The types of environmental issues with which Trudgill was concerned primarily included rainforest destruction and acid rain and not necessarily

issues related to environmental management design and program implementation. However, we stand to gain considerable insight from Trudgill's framework in cases where environmental management practices, including follow-up, have been less than successful.

1.4. Thesis Structure

This thesis is presented in 5 chapters with the introductory chapter as Chapter 1. Chapter 2 provides a discussion and overview of EIA follow-up, including its role in environmental management. The normative framework for best practice of EIA follow-up derived from literature is also presented here. Chapter 3 outlines the methods used in this research and a background to the case study, including its relevance to the research question. Chapter 4 presents a discussion of the case study results, followed by conclusions and recommendations in Chapter 5.

CHAPTER 2
ENVIRONMENTAL IMPACT ASSESSMENT FOLLOW-UP

2.0 Introduction

In its role As an environmental management tool, EIA must implement processes for confirming the existence of forecasted impacts and controlling the harmful effects of those that do actually occur (Canada, 1992a). Thus, impact studies should include a consideration of the need for and requirements of follow-up (Wlordarczyk, 2000). EIA follow-up is vital to the entire assessment process because it provides information about the consequences of an activity and oversees that development and management requirements have been met (Arts *et al*., 2001). Guidance for good practice EIA follow-up, however, has not been streamlined and has been addressed on very few occasions (Baxter *et al*., 2001; Ortolano and Shepherd, 1995). Crucial questions regarding follow-up are still being raised; for example, there is a contention that follow-up or post-project analyses are only necessary for major projects with potentially significant impacts (United Nations, 1990). Significant impacts are those whose effects will exert changes on the environment such that they warrant attention. The question remains regarding how confident implementers can be that whatever improvement measures have been approved are working and that resources are not being mis-allocated. Current developments and examples of good practice need to be consolidated to evolve best-practice in the follow-up arena. This chapter will first discuss the notion and value of follow-up in environmental assessment and provide an overview of the current state of practice in Canadian federal EIA. This will be followed by a discussion of the fundamental principles and the development of a normative framework to facilitate the design of best-practice follow-up programs.

2.1 Notion and Value of follow-up

2.1.1 Definition

'Follow-up' has been used as an umbrella term for various EIA activities including: monitoring; auditing; *ex post* evaluation; post-decision analysis; and post-decision management. While there is no single definition for follow-up, it is generally concerned

with the post-decision stage of a project or plan as it relates to the various components of the project life-cycle after the consent decision for development action has been taken (Arts *et al.*, 2000). The pre-decision stage of EIA incorporates procedures that occur prior to project implementation as outlined earlier in this text. EIA follow-up is related to activities in the post-decision stage of a project or plan (Arts *et al.*, 2001). Arts *et al.* (2000: 2) state that follow-up includes:

> The collection of data, the structuring and analysis of this data and the appraisal of the generated information about the impacts of a project (or plan) that has been subject to EIA. It also involves decision-making on remedial action and communication of the results of this process.

The term is used in this research in relation to individual plans or projects subject to EIA, and not to the evaluation of (general) EIA systems. In this sense, follow-up is comprised of four key activities (Arts *et al.*, 2000: 177):

1. Monitoring: the collection of data and comparison with standards, prescriptions and expectations;
2. Evaluation: the appraisal of the conformance with standards, predictions or expectations as well as the environmental performance of the activity;
3. Management: making decisions and taking appropriate action in response to issues arising from monitoring and evaluation activities; and,
4. Communication: informing the stakeholders as well as the general public about the results of the EIA follow-up. Stakeholders are included as they are directly affected; for example resident communities around BHPB. The general public needs to be informed for learning purposes.

2.1.2 Types of Follow-up

Follow-up implementation takes different shapes and forms and mainly depends on the objectives of each individual program. Follow-up may also involve different types of assessment in one single program.

Monitoring

Monitoring is defined as the collection of data with the aim of providing information on the characteristics and/or functioning of environmental variables (Arts *et al*., 2001; Bisset and Tomlinson, 1988; Everitt, 1991; Morrison-Saunders *et al*., 2003). These data are measured to arrive at informed conclusions about the nature of the environmental variables of concern. For this purpose, monitoring usually consists of a program of repetitive observation, measurement and recording of environmental variables and operation parameters over a period of time for a defined purpose; in the case of early warning systems it may include evaluation of the monitoring data (Bisset and Tomlinson, 1988). More specific types of monitoring include baseline monitoring, which involves monitoring the state of the environment and its components before project or program implementation is assessed, and monitoring for compliance, as illustrated by the Canadian Department of National Defense (DND) [2] policy on low-level flying operations in Labrador, Canada (Young,1999a).

Auditing

Auditing involves an objective examination and comparison of observations with pre-defined criteria to facilitate management or to determine compliance (Arts *et al*., 2001; Bisset and Tomlinson, 1988; Storey and Noble, 2004). Observations are compared with a set of criteria (such as standards, predictions or expectations) periodically, and results are then compiled and assessed. While monitoring is a continuous exercise, auditing is a single or periodic event. In industry-based environmental management systems, for example, auditing serves as a self-regulator of the activity's own stated environmental policy; in this way auditing checks and balances the standards set for a development activity; for example ISO 14000 environmental management system series. Scientific approaches to EIA audits are identifiable by their extensive, quantitative inventory of baseline or pre-project conditions (Bailey *et al.*,

[2] The DND operates a national follow-up program whose aim is to minimize potential environmental or other hazards stemming from low-level flying and military flight training activities. The approach used by the DND is to have an effective process conducted in a scientific manner to verify that all flying activity is conducted in compliance with DND flying orders. The general state of the environment in areas subject to low-level flying operations is established by a third type of monitoring, simply known as area wide or regional environmental monitoring.

1990; Bisset and Tomlinson, 1988), including predictions in the form of null hypotheses expressed as spatial extent, time of occurrence, and probability or significance of impacts (Curtis and Epp, 1999; Sadler, 1987; Sadler, 1996; Wilson, 1998).

Evaluation

Evaluation is a term used in planning and policy for the generic process of gathering, structuring, analysing and appraising information and involves value-judgments (Arts *et al*., 2000; United Nations,1990). Unlike auditing, evaluation often relates to subjective policy-oriented judgments rather then purely scientific and technical analyses. *Ex ante* evaluation (for instance, an EIS) focuses on the preparation phase of the planning cycle, including problem analysis, formulation of project goals, and development and pre-selection of alternatives. *Ex post* evaluation concerns the appraisal of a policy, plan or project, which has been or is currently being implemented (Arts *et al*., 2001), and typically involves an evaluation of the activities and situations that follow a particular decision.

Post-decision analysis

Post-decision analysis refers to a wide range of activities (Fig 2.1) that can occur after a decision has been made and the implementation of a project has commenced (Arts *et al*., 2001). Post-decision analysis serves to operationalize the implementation of all measures developed in the pre-decision stage (regulatory, mitigating, environmental agreements) while integrating a follow-up system that will ensure compliance with these measures and an evaluation of their effectiveness (Arts *et al*., 2001). Sometimes this particular term has been used to refer to the same activities that encompass follow-up (e.g. United Nations, 1990). The main difference with follow-up is that follow-up in all its activities and programs strictly follows a regimen of verifying impacts predicted and examining how well harmful effects are being controlled and averted. Post-decision analysis is a part of the follow-up may concern itself with other issues other than effects and mitigation as mentioned here.

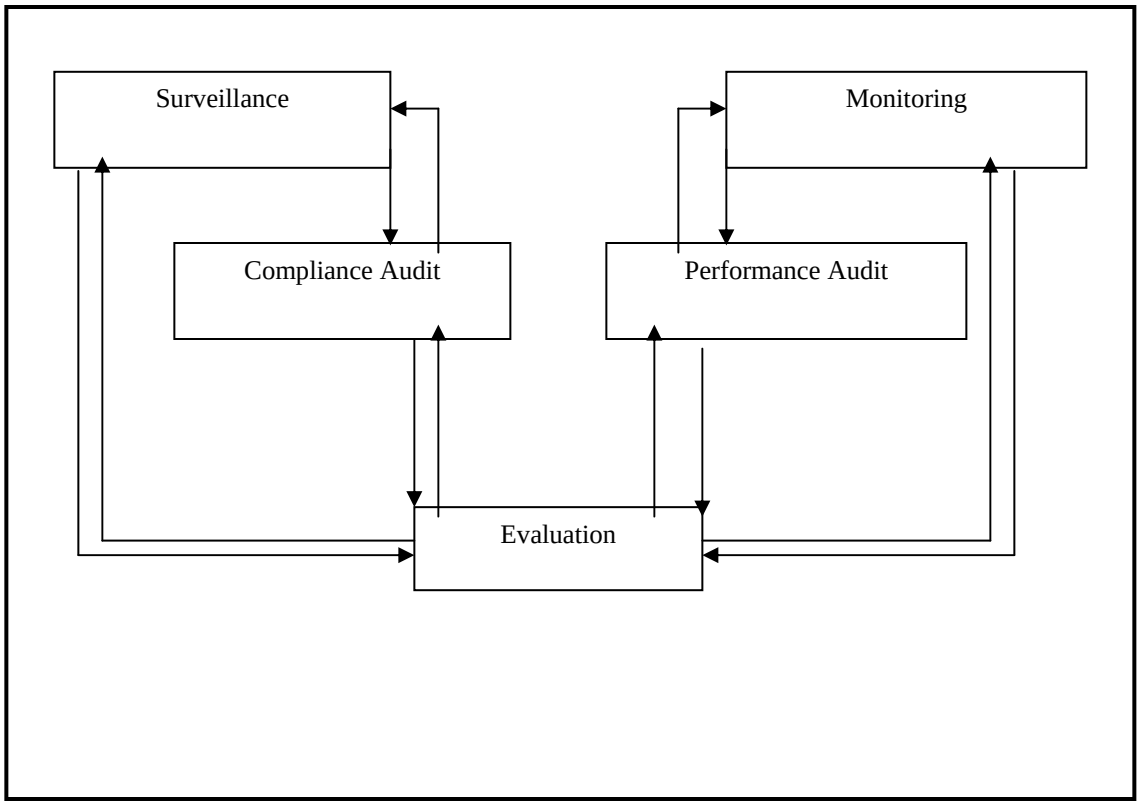

Figure 2.1. Generalized model of post-decision analysis activities (Source: Adapted from Sadler, 1988).

Other categorizations of follow-up programs similarly illustrate that in the temporal sense, follow-up analyzes post implementation activities and examines predictive accuracy while from the perspective of its functions, follow-up analyzes effectiveness of mitigation measures (Storey and Noble, 2004). These are summarized below in Table 2.1.

Table 2.1. Follow-up categories from temporal and functional perspectives

Inspection	On-site regular checking for compliance with agreed upon procedures.
Regulatory permitting	Site-specific regulatory permits granted when developers meet conditions for maintenance and renewal of these permits. These conditions monitor changes from the development.
Experimental monitoring	Systematic research questions test specific hypothesis to generate information. Not site – specific.
Ambient environmental quality	Monitors the effects of the project on its surrounding environment using baseline data from site and control sites.
Performance auditing	Measures a program's performance in respect to established goals or objectives, and is usually socio-economic in nature, (Compare with compliance auditing which measures adherence to regulations, agreements and legislation).
Monitoring of agreements	Agreements between project proponents and affected groups focus on impact benefits and track changes in population, housing and other infrastructure demands in order to assign costs associated with the project
Monitoring for management	Applies to high profile projects with uncertain outcomes and tracks changes in a range of environmental, economic and social variables.
Cumulative effects monitoring	Tracks the accumulated effects of developments within a particular region and is best achieved by an organization mandated with monitoring responsibilities.

Source: Adapted from Storey and Noble, 2004: 10.

2.1.3 Role and Value of EIA follow-up

EIA is intended to provide decision makers with information concerning the environmental impacts of development on the environment. For this information to be dependable, it must be verified (Shpyth, 1991). Similarly, the responsible parties (the proponent and/or competent authorities) have a starting point for implementing mitigation measures and preventative measures for the negative effects. The feedback obtained from follow-up programs is important for the improvement of EIA which currently can best be described as weak and not realized to its full potential (Arts *et al.*, 2000; The United Nations, 1990; Greene and Wright, 1990). If EIA is to be seen as a

tool for better environmental planning and management, then follow-up must be included as a vital component. Follow-up is an indispensable part of any EIA system in that follow-up ensures that EIA actually works to protect the environment and achieve its intended objectives (Baker and Dobos, 2001; Hui, 2000; Storey and Noble, 2004). The United Nations (1990), for example, observed that post project analyses are useful in ensuring or facilitating the implementation of development activity in accordance with the terms set forth by the environmental assessment process.

Follow-up involves monitoring project consequences, evaluating results and incorporating mitigation measures from the beginning of the project if these measures are to be effective (United Nations, 1990). One strength of this approach is that resources are more efficiently used in the principle of "monitor, evaluate and manage." Great value lies in the reiterative feedback during the project implementation stage (United Nations, 1990: 2).

The United Nations (1990: 3) summarizes the usefulness of EIA follow-up on four principles:

1. in monitoring compliance with the agreed conditions set out in construction permits and operating licenses;
2. to review predicted environmental impacts for proper management of risk and uncertainties;
3. determining the accuracy of past impact predictions and the effectiveness of mitigation measures in order to transfer this experience to future activities of the same type; and,
4. in reviewing the effectiveness of environmental management for the activity.

Improving the quality of environmental assessments requires first of all that EIA be done early enough to influence project decisions (Ortolano and Shepherd, 1995) and second, that data from follow-up be prepared in a way that it can be integrated into project operations. One of the problems that has plagued EIA is that it is not carefully integrated into the planning process (Ortolano and Shepherd, 1995; Marshall *et al*., 2001). EIA should be applied as early as possible (Shpyth, 1991) and follow-up, as a system of checks and balances, should commence as the assessment unfolds to generate

data and ensure the results of assessment are incorporated into the project design and management. Having the right data to achieve this means that major decisions affecting follow-up are made prior to the EIS (Ortolano and Shepherd, 1995).

An important measure of environmental impact assessment success is the extent to which it achieves its goals for environmental protection and management (Morrison-Saunders and Bailey, 2000). Examination of environmental impacts signals to practitioners which impacts need mitigation. In this regard, follow-up affords opportunity for practitioners to look back at the impacts predicted and the mitigation measures suggested to ascertain accuracy and effectiveness so that appropriate action can be taken (Table 2.2). Follow-up, identified as environmental auditing and monitoring programs in some literature, is important to verify that the environmental predictions and assumptions are valid and to monitor the actual environmental performance of projects. Follow-up ensures impacts are mitigated before breaching established criteria, to capture cumulative environmental impacts, and to guarantee that mitigation measures are properly and timely implemented (Hui, 2000). Hence the follow-up process should naturally be incorporated in every EIA and at all stages of the project life cycle. A project's Life Cycle is linked to EIA follow-up by the "cradle-to-grave" concept and method which evaluates environmental effects holistically. Similar to a life cycle assessment, follow-up analyzes the entire cycle of a proposed project (Mitchell, 1997). In this way, EIA is a cyclical activity, with feedback and interaction between various steps being critical for improving EIA practice.

2.2 Background and Current State of Practice

Monitoring and follow-up, together with scoping, evaluation of significance and review of reports have been identified as one of the four key areas which, if improved, can potentially increase the effectiveness of EIA (Wlodarczyk, 2000). However, while the importance of follow-up is widely recognized (e.g. Arts *et al*., 2000; Austin, 2000; Environment Canada, 1999a; Environment Canada, 2003; Jesus, 2000; Morrison-Saunders and Bailey, 2001), follow-up has not been satisfactorily implemented in EIA practice (Austin, 2000; Hui, 2000) and has yet to be recognized as an integral part of the EIA process (Marshall, 2001).

Table 2.2: The role of follow-up

• Provide information about the consequences of an activity (for instance, conformance with EIS predictions or environmental performance of the activity) • Check compliance with implementation requirements.
• Enhance scientific knowledge about environmental systems, cause and effect relationships, mitigation measures, and construction techniques.
• Improve the quality of the methods and the techniques used in EIA, and make it more cost-effective.
• Improve public awareness about the actual effects of development projects on the environment, thereby legitimizing the consent decision and justifying the continuation of the activity.
• Maintain some decision making flexibility by affording explicit opportunities to intervene in developments when changes in the activity, or in socio-political environment warrant (that is an adaptive management approach).

Source: Arts et al., 2001: 177

In Canada, EIA is currently legislated by the *Act* (CEAA, 2004) and is enforced by the Canadian Environmental Assessment Agency. While agreeing that some measure of progress has been achieved in EIA, there are also several shortcomings. Follow-up processes have been hampered by weaknesses in laws. For example, in 1998 Gartner Lee Ltd. noted in retrospect, that before the EARP Guideline Order was repealed and the Canadian Environmental Assessment Act passed. The Guideline Order contained a gap in failing to explicitly address follow-up. That said, there is need for understanding of the follow-up process itself and the set of concerns it is intended to protect. Current problems with EIA follow-up largely stem from the applicability of laws concerning EIA when it comes to practice (Mitchell, 1997). The literature is growing with suggestions, but a consolidated profile of these requirements and details of management roles and responsibilities are still missing, while a veritable hindrance to effective permitting and enforcement of follow-up requirements is yet to be overcome. The problem is that attention has largely focused on the pre-decision stages of impact assessment with post-decision analyses receiving much less attention (Arts *et al.*, 2001). Wlodarczyk (2000) notes that understanding among practitioners of what EIA follow-up is and what it entails has been cloudy at best. Some have interpreted follow-up strictly as the application of mitigation measures suggested in the EIA report. The result is that prediction accuracy is not being confirmed nor is the effectiveness of improvement measures being determined. When EIA is carried out and impacts are predicted, the

nature of these impacts is determined in relation to whether mitigation will be implemented (See Figue 1.1). Key impacts for example, are those that exceed specified thresholds. Wlodarczyk (2000: 2) outlines succinctly that practitioners do not know:

- how to decide whether a follow-up program is necessary or not;
- who is responsible for paying for the follow-up;
- how roles and responsibilities should be shared among the players;
- what should go into the design of the follow-up program;
- what to do with inaccurate predictions and ineffective mitigation measures; or
- how and to what extent to involve the affected public.

The need to improve the effectiveness of EIA follow-up programs was included in the Canadian Environmental Assessment Agency's (CEAA) research and development priorities for 2002-2003 (CEAA, 2002; Noble and Storey, 2004). The *Act* as an enforcement instrument requires environmental assessment programs to verify the accuracy of impact predictions and measure the effectiveness of impact mitigation in the design of future EIA programs, but does not go further to demand effective follow-up programs.

Greene and Wright (1990) observed that sections of federal departments and agencies have established procedures for implementing follow-up programs strengthened by two factors: a need for regulation of assessments and through encouragement by the Guidelines Order. That the public's confidence in government decision making would likely be bolstered was the third factor. Federal departments must have also realized that EIA follow-up would enhance environmental and resource management processes. Examination of the findings of environmental assessments were also likely to have in the long term, cost-saving implications as efforts were focused on real problems versus predicted impacts (Greene and Wright, 1990; Storey, 1995).

Federal EIA in Canada has not been without struggle. O'Reilly (1996: 4) informs us that "for more than 25 years now, the federal government has required northern development projects to carry out environmental assessments." O'Reilly (1996) further notes that the 1973-1977 Berger Inquiry played a role in elevating EIA's standards as mentioned elsewhere in this text, but that these standards appear to be moving backward

in practice. The federal government has in the past appointed panels to review the environmental and socio-economic effects of proposed projects. These assessments are carried out in accordance with existing terms of reference. Usually, the federal government will determine the acceptability of a project based on how well the project's effects are predictable and mitigable which means that the fereal government will consider projects where effects are not clear problematic. One approach used to address adverse social effects, for example, is the use of government and proponent policies and programs. Here, panels will recommend federal approval for projects subject to a number of conditions, including the requirement for annual reports on the results of project environmental and socio-economic monitoring programs.

In the past, federal assessments have been carried out where potential adverse environmental effects are unknown and where there is strong public concern. This is best exemplified by the Voisey's Bay Mine and Mill Assessment carried out by a Joint Panel under CEAA. The resident communities of the Inuit were concerned as caribou which were predicted to undergo significant impacts, are an important part of their diet (Storey and Noble, 2004). Under the Canadian federal environmental assessment system, the responsible minister will recommend the federal assessment and forward the issue to the Minister of the Environment who appoints a review panel. In 1998, the Office of the Commissioner for the Environment and Sustainable Development investigated a number of recent federal project EIAs and reported that 25 percent of follow-up programs are not required as a condition of project approval (Office of the Commissioner of the Environment and Sustainable Development, 1999). Just as Noble and Storey (2001) concluded about the state-of-practice of strategic environmental assessment, federal EIA and follow-up will not advance before we have first established an appropriate framework and set of guiding principles to facilitate its design and implementation (Hulett and Diab, 2002; Noble, 2000).

2.3 Normative Principles for Best Practice

The specific approach to follow-up practice and methodology vary from case to case and depend on the project and the environmental and socioeconomic contexts. However, based on a review of the literature, a number of elements or principles can be

identified that seem to facilitate best practice follow-up. Best practice refers to the most ideal and needful in EIA follow-up, or simply put - the best way of doing things (Storey and Noble, 2004). Best practice is essentially about choices –selecting the highest quality options in decisions and applying these using the best techniques available for optimum results. Best practice is also about agreeing on the procedural requirements of the EIA and follow-up processes. Best practice follow-up requires a clear rationale and theory with guidance on how to properly design and implement effective follow-up programs (Storey and Noble, 2004).

The following sections develop a framework that suggests the fundamentals for optimum returns in terms of environmental management through EIA follow-up. The principles presented in this framework, drawn from literature, are not the only standard but rather a beginning to the common foundations of best practice. Study methodology used to arrive at conclusions are also discussed in depth. CEAA (2002) recognizes the need to improve the effectiveness of follow-up, as this will help in determining:

- the purpose and objectives of monitoring and follow-up within the context of environmental assessment;
- when a follow-up program is warranted;
- the key elements of a follow-up program; and
- the activities and institutional design characteristics required to support follow-up.

Based on a review of recent follow-up and EIA-related literature, five main principles necessary for best-practice EIA follow-up emerge. These are depicted in Figure 2.2, discussed in the following sections, and include:

1. Legislation and guidance
2. A results-oriented approach
3. A learning-oriented approach
4. Integration
5. Institutional commitment and accountability

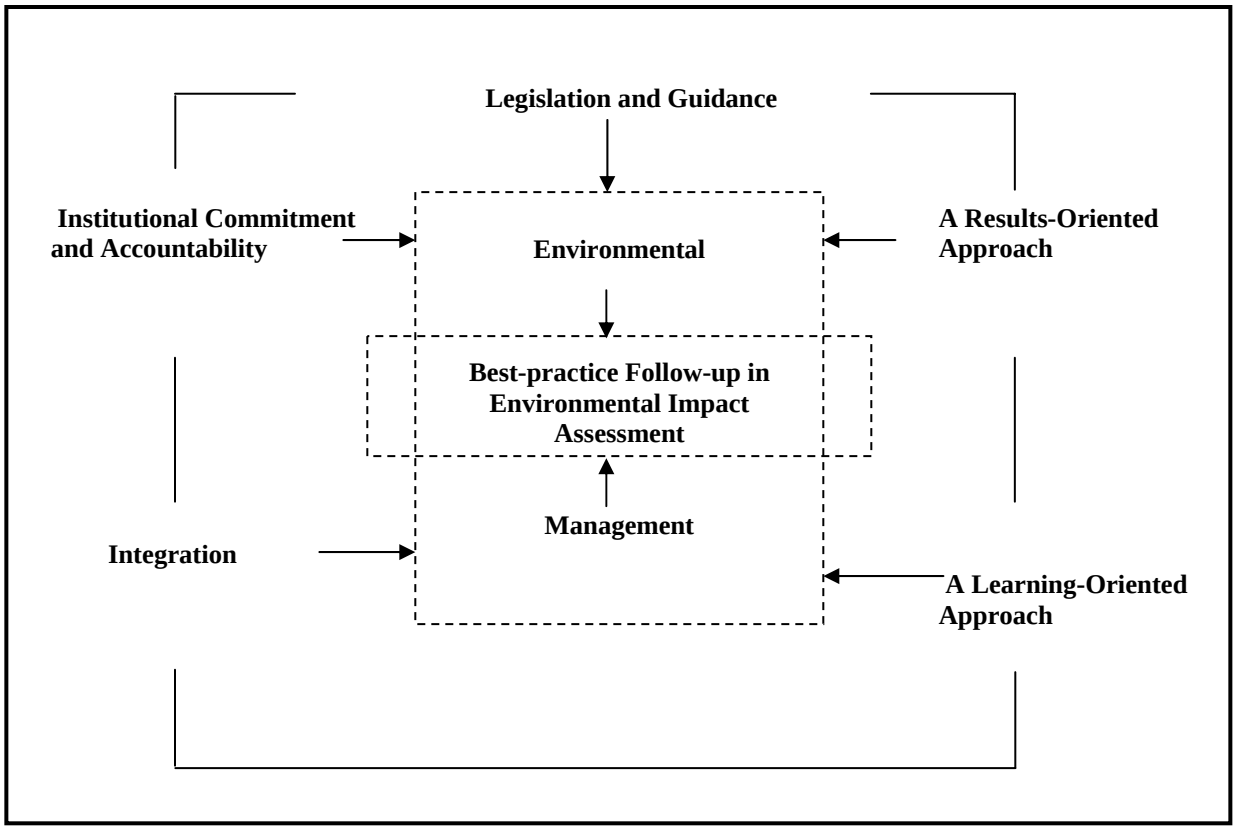

Figure 2.2: The Principles as components of best practice EIA follow-up. *Source: Researcher's concept*

2.3.1. Principle # 1: Legislation and Guidance

Legislation and guidance advocates formalization of EIA and follow-up by regulations and mandatory requirements (Ortolano and Shepherd, 1995). Legislation is important to influence decision-making processes in EIA. For example, the US National Environmental Policy Act of 1969 has influenced significantly both federal projects and federal agencies and the decision making processes of other political jurisdictions. US states have programs calling for EIAs and the states or provinces of Canada, Brazil and Australia have similarly established their own formal EIA requirements in addition to national level programs. Morrison-Saunders *et al.* (2003) add that guidance from self-regulatory initiatives of the proponents and industry-led initiatives may also be incorporated into follow-up functions. Legislation and guidance will contribute to best practice follow-up programs when the following criteria are addressed:

i) Mandatory requirements

ii) Legislation that sufficiently covers the scope of follow-up

iii) Availability of procedural guidelines to practitioners.

i) Mandatory Requirement

A fundamental issue identified in the literature is the need for a mandatory requirement that proponents undertake follow-up activities (Glasson *et al*., 1994; Mitchell, 1997). The main value for legislation and guidance is its coercive power- the ability to require proponents and other stakeholders like government departments to carry out EIA follow-up and maintaining standards. This obligation is a condition that may be executed, for example, in the form of licenses, permits or certificates (Humphries, 1999).

The fact whether follow-up is mandatory or voluntary will determine whether or not the proponents or developers will carry out follow-up and how effectively they will do so (CEAA, 2002; 2003; Holling, 1978). While ISO certitification is being widely adopted, in environmental management (ISO 2005) their primary goal in industry has been to be ensure quality of product for end user. Consumers may take longer to appreciate quality when it comes to the environment therefore entrenchment of ISOs as determinants of environment quality is slow. In this sense, legislation remains as most important for ensuring quality environmental management. Legislation demands a dedicated effort from the responsible authority in enforcing the respective regulations (Wong Man Kee, 2000). Without legislation, one of the perennial problems in EIA occurs when the decision on whether follow-up is required for a proposed project is left to either the responsible authorities or environmental agencies (Ortolano and Shepherd, 1995). EIA processes require a legislative framework designed for environmental protection, conservation and management (Sadar, 1999). Ideally, these legislative frameworks create formal, obligatory procedural arrangements to improve EIA administration (Shpyth, 1991). Similarly, with follow-up programs, when the decision to implement is left to the authority responsible for deciding on the project there will be situations in which the exercise is not conducted even though the environmental impacts of proposed projects are significant. For example, in the Commonwealth of Australia between 1975 and 1985 fewer than 10 EISs per year were mandatory – making up only

4 percent of the proposed programs (Ortolano and Shepherd, 1995). In the absence of mandatory procedures, developers may not be persuaded that continuous monitoring and follow-up is in their interest (Glasson *et al*., 1994) and hence the need for legislation that makes follow-up an obligation to every developer and proponent.

All stages of impact assessments should be based in law, and this is legislation that is not only specific, but also mandatory and enforceable (Mitchell, 1997). The role of legislation is to provide a mechanism to ensure that follow-up is implemented at the right time and that implementation is based on the agreed procedures and conditions. Legislation for EIA follow-up then, consists of two additional elements: coverage of the scope of follow-up, and provision of implementation guidance for practitioners.

ii) Legislation that Sufficiently Covers the Scope of Follow-up

No single universally applicable methodology for EIA has been identified because of varying situations, time and budget (Ortolano and Shepherd, 1995); consequently, the scope of follow-up will also vary from project to project. EIA follow-up scope spans the elements of the environment: biophysical, social, cultural and economic. Thus, in making decisions about follow-up it is critical that we explicitly define the scale and scope of the process (Austin, 2000). Follow-up operates within a larger policy framework that takes into account the interrelationships between environmental quality and social equity. Legislation should be able to direct if not specify that all projects follow-up on all issues or aspects that relate to the nature of the particular development. Current requirements for follow-up in Canada are narrow in scope, and in practice often fail to address a number of important issues. For example, in the Rafferty-Alameda and Oldman Dams the legislation in place did not have requirements that environmental consequences be fully considered and that mitigation measures are laid out before commitments to the projects were made (Shpyth, 1991). Little seems to have changed since, notwithstanding recent revisions to the *Act* (See section 2.2).

Generally, EIA follow-up practice may be followed through from three angles (Sadler, 1988; Wlordaczyk, 2000) (Table 2.3): first, evaluation to determine the capability of impact prediction and mitigation methods; second, measurement of the effectiveness of administrative procedures used for the assessment; and third, assessment

of the utility of the process for decision making by demonstrating that the process produced sound, relevant and focused information on actual project effects (Sadler, 1988). Legislation that sufficiently covers the scope of follow-up is important for best practice and to ensure that all mitigation measures are implemented and that all affected dimensions of the environment are included in the follow-up (Arts *et al.* 2000; Baker and Dobos, 2001; Environment Canada, 1999b; Mitchell, 1997; Noble and Storey, 2004). Current legislation appears to be lacking in this way, for example, both CEAA and the US NEPA fail to delineate the scope of follow-up (Austin, 2000).

Table 2.3. Three perspectives of follow-up analysis

Type of Follow-up Research	Elements of Analysis
1. Technical Scientific	Adequacy of Baseline studies and pre-project monitoring
2. Procedural/Administrative	Accuracy of impact predictions Suitability of mitigation measures
3.Structural/decision making	Efficiency of guidelines for EIA Fairness of public involvement measures Degree of co-ordination of roles and responsibilities Utility of process for decision making Implications for development

Source: Sadler, 1988: 133

Illustrating the scope of follow-up, the Hibernia Offshore Oil Platform Construction Project (1985), Newfoundland, Canada, exemplifies, at least in principle, follow-up programs implemented before the *Act* that have acknowledged the importance of monitoring not only biophysical elements but also other elements of the human environment (Storey and Noble, 2004). The Hibernia Project established management programs to monitor effects of its operations on biophysical and socio-economic elements, including quality of life. However, the socioeconomic monitoring program was far from successful, coming to an end less than two years after its establishment

because total employment generated was over predicted 215 % in the first year. In the peak year, Hibernia under predicted total employment by 44%.

Legislation is important to fully include all elements and reverse the current narrow focus on biophysical effects in follow-up activities (Ortolano and Shepherd, 1995). Consistent with the definition of 'environment' under the current *Act*, the scope of follow-up should span biophysical, social and economic effects of developments, including:

> (*a*) land, water and air, including all layers of the atmosphere,
>
> (*b*) all organic and inorganic matter and living organisms, and
>
> (*c*) the interacting natural systems that include health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes by aboriginal persons, or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance (CEAA, 2003b: 2).

iii) Availability of Procedural Guidelines to Practitioners

Practitioners require access to clear, relevant and achievable procedural guidelines for follow-up implementation (Young, 1999b). Responsibilities for follow-up should be well-understood and a system to ensure accountability and to set requirements to undertake follow-up activity established (Mitchell, 1997; Pigeon, 1999).
Glasson *et al*. (1994) argue that the nature of expectations and responsibilities placed on proponents and governments needs to be clarified and highlighted. Guidelines not only ensure that follow-up programs achieve their ends, but are also pertinent to gauging the proponent's commitment to the responsibilities placed on them. Researchers and practitioners, who develop guidelines based on their experiences and investigations, need a solid legislative base to be able to do so (Shpyth, 1991), and require practical methodologies for follow-up to achieve its goals (Glasson *et al.*, 1994). Federal authorities need to include follow-up terms and conditions in relevant authorizations, licenses, permits and approvals.

2.3.2 Principle # 2: A Results-Oriented Approach

A results-oriented approach is a system of program implementation that focuses on the achievement of set goals. EIAs have had far less influence than was originally hoped (Ortolano and Shepherd, 1995), and follow-up needs to be organized so that EIA becomes more productive. Further to its role in forecasting and evaluating the impacts of a proposed project and its alternatives, EIA should also be able to force a 'hard look', where practitioners analyze projects and issues raised in the assessment and follow-up in detail (Ortolano and Shepherd, 1995). This means that comprehensiveness (where the follow-up program covers the range of elements that need to be addressed) and rigor (where the program is implemented with strict adherence to standards) are ever present ensuring that all important aspects of the project and the environment are addressed, and actions are precedented by carefully reflected decisions (Diduck and Sinclair, 2002; O'Reilly, 1996). Gartner Lee Limited (1999) advise that all follow-up monitoring programs need to be described at a conceptual level within the EIS (i.e. prior to EIA submission and review by stakeholders and decision-makers), and should include the following information:

- a statement of the objectives of the monitoring and adaptive management program. Adaptive management systematically implements management actions and improves them by learning from the outcomes.
- preliminary schedules for collection of data by project phase (e.g., pre-construction, operations, decommissioning and post-closure);
- a preliminary listing of the subjects and parameters to be monitored, frequency and geographic locations/extent of monitoring, and justification of the geographic locations/extent;
- recommended reporting mechanisms;
- possible roles of independent experts, Aboriginal groups, government agencies, communities, renewable resource users in monitoring programs;
- any joint monitoring and adaptive management programs established for the purposes of cumulative effects management; and
- approaches to assess the effectiveness of monitoring programs, mitigation measures, and/or to determine the need to implement contingency mitigation.

Gartner Lee Ltd (1999) strongly recommend that all project proponents be required to prepare a comprehensive and consolidated listing of all follow-up programs to be implemented, the success of which depends on the following elements:

i) a clear statement of goals and objectives;
ii) balance of timing when determining follow-up program design;
iii) establishment of baseline data pre-project;
iv) maintenance of continuous and consistent data collection; and
v) adoption of a hypothesis-driven scientific approach to impact prediction.

i) A Clear Statement of Goals and Objectives

Clarification of the need for and importance of follow-up facilitates the carrying out of actions relevant to the achievement of desired ends. An explicit and agreed-upon set of objectives for any follow-up program is fundamental to its success (Glasson *et al.*, 1994). A viable follow-up program is characterized by a plan, effective process management and a clear rationale for monitoring (Sadar, 1999).

Best practice follow-up means that requirements for the achievement of desired ends are recognized and well-understood (Table 2.4). To the extent possible, the project and its objectives should be well-defined at the outset (Bisset and Tomlinson, 1988; Environment Canada, 1999), and the objectives for follow-up clearly established before project implementation. Proponents provide structure and resources for continued monitoring to ensure that impacts were realistically estimated, and that mitigative measures are effective. Clarifying goals and objectives requires that implementers develop an understanding of the need for and core elements of a monitoring and follow-up program and identify appropriate terms of reference and/or steering mechanisms. The core elements and terms of reference bring the relevant disciplines into the assessment process in a timely fashion (Ortolano and Shepherd 1995; Shpyth, 1991). This requires that impact predictions are stated in such a way that they can be followed-up and verified.

One question that arises from this is whether environmental effects must be predicted (Storey and Noble, 2004). In many cases it is recognized in EIA that

outcomes or project impacts should not exceed specific thresholds, in which case management practices determining appropriate levels and monitoring become the focus of attention. This approach requires a clear identification of goals and objectives. For example, maximum allowable effects levels (MAELs) were used in the biophysical environmental effects program as part of the Hibernia Offshore Oil Platform construction environmental assessment program (Noble and Storey, 2004). Hibernia's biophysical environmental effects monitoring program (BEEM) used baseline data to impose and check limits of effects on the marine environment. Impact statements as null hypotheses were developed for each chosen variable in this environment, including a statement that impacts of platform construction and operation would not move beyond specified maximum allowable effects levels. The BEEM program was successful, contrary to the project's socio-economic effects environmental monitoring program (SEEM), which failed after only a short few years of operation due, in part, to the lack of specified follow-up goals and objectives for the program in general and for the affected socio-economic components in particular (Noble and Storey, 2004).

Table 2.4. Examples of Follow-up Objectives

Audit Objectives for the South-central US Coal Mines ▪ Scientific- to check the accuracy of predictions and to explain errors and improve predictive modeling capabilities, so that methods used in future EIAs will be more valid. ▪ Management –to assess the success of mitigation in reducing impacts, so that decisions made about future actions can be more effective. Follow-up provides an 'early warning' of unexpected changes and an opportunity for the various parties at interest to respond before significant, adverse, environmental, social and other project-induced changes occur.

Sources: Adapted from Storey and Noble, 2004; Wilson, 1998.

ii) Balance of Timing when Determining Follow-up Program Design

Commitment to the value of follow-up is a positive attitude towards the process and is necessary if the program is to exhibit effectiveness, adaptability and flexibility (Storey and Noble, 2004). Just as environmental assessment must occur early in the planning process for it to be successful (CEAA, 2002; Shpyth, 1991), developers and proponents should commit financial and human resources to the follow-up process and monitoring

at the outset of the project. (i.e. financial accountability, human resources, engineering design and project scheduling). This means that follow-up programs need to be considered early in the EIA through the identification of key environmental indicators during the scoping phase. However, the intricate details of the follow-up program, including specific sampling protocols, and spatial, and temporal attributes should be developed at a time when project design, schedules, and other project factors, have been more precisely defined (Noble and Storey, 2004).

iii) Establishment of Baseline Data Pre-project

EIA processes involve the collection of data to assess the condition and value of the baseline environment and understand the condition of the existing system prior to project development. Baseline information includes the establishment of both the present and future state of the environment, in the absence of the project, taking into account changes induced by natural events and other human activities other than the project (Denis, 1999; Glasson *et al.,* 1994; Morris and Therivel, 1995). Baseline data are necessary in follow-up processes to analyze such changes and monitor these components during and after project development (Eades, 1999; Morris and Therivel, 1995). With baseline data, developers and follow-up administrators compare those data with data obtained after project commencement and confirm that changes induced by the project development have or have not occurred and may use control sites for this.

iv) Maintenance of Continuous and Consistent Data Collection

Authority over data collection has implications for program efficiency, timeliness and credibility (Storey and Noble, 2004). To achieve follow-up objectives, data collection, analysis and reporting are maintained and completed in a timely fashion to allow those using the results to make prompt post-project responses. For environmental management, failure to deliver results in a timely fashion can affect the credibility of the program and those responsible for it (Couch, 2002). Shpyth (1991) concurs that efficiency is closely linked with timing and thus requires that knowledge is updated regularly with each session or season building on the previous one (Humphries, 1999). The responsible authority for follow-up needs to ensure there is consistency in the

approach to project follow-up and monitoring in order to obtain useful data. For example, in 1991 a federal-provincial environmental assessment panel was convened to examine a number of uranium mine project assessments in Northern Saskatchewan, specifically to examine the environmental, health, and socio-economic impacts of uranium mining activities. Cameco's Rabbit Lake Uranium Mine was one of the projects assessed. The environmental assessment panel found that data on the impacts of radionuclides on the environment had been collected by the project proponent in the 1970s and through the 1980s. The problem noted by the Panel was that collection methods in these two periods varied and methods for testing of radionuclides were not uniform. Thus, notwithstanding two decades of monitoring, this inconsistency compelled discarding of the data and raised doubts as to the effectiveness of the environmental protection measures (Storey and Noble, 2004).

v) Adoption of a Hypothesis-Driven Scientific Approach to Impact Prediction

Deductive science has the capacity to increase objectivity in environmental assessment (Curtis and Epp, 1999), and its usefulness should be extended to follow-up stages. Follow-up commonly aims to check the accuracy of predictions and to explain errors scientifically, in order to strengthen future EIAs. In cases where impacts are predicted in EIAs, Curtis and Epp (1999) and Noble and Storey (2004) argue that EIA prediction should be based on hypotheses that facilitate a scientific approach to verification and follow-up. Deductive science falsifies choices and determines whether the alternatives chosen were the least falsifiable. As it is the function of the follow-up process to ensure that environmental management and project operation decisions chosen are the preferred options, application of hypotheses will strengthen the deductively, derived information base (Curtis and Epp, 1999).

Hypothetico-deductive scientific procedures provide technically accurate recurrent baseline information for verification of predictive accuracy (Curtis and Epp, 1999). This allows follow-up programs to conduct rigorous testing of alternatives chosen in the EIA process and of predictions and mitigation measures suggested or already implemented (CARC, 2002; Kormansky, 1998). Site or management options are then treated as alternatives and the environmental and social effects of each alternative are predicted.

Experts use equivalent data and attempt to falsify each prediction. This practice provides a linkage between sound, consistent, predictive science and the follow-up process (Wilson, 1998). In general, the provision of high quality, consistent scientific information is the single greatest contribution to follow-up and monitoring processes (Kormansky, 1998). An hypothesis-driven approach is necessary in determining the nature of project impacts whether negative, beneficial, or mixed and can be used to facilitate socioeconomic follow-up programs. For example, in the Voisey's Bay mine and mill project, Labrador, the environmental assessment panel report suggests that predictions are best based on hypotheses (Storey and Noble, 2004). The Voisey's Bay EIS identified caribou as an important ecosystem component. Hypotheses were thus put forward about expected human effects on caribou- such as vehicle collisions, and management measures to control harmful effects were suggested. The project utilized modeling techniques to state levels above which management would make certain that caribou are not harmed by vehicles, noise, contaminants or visual disturbances.

Using hypotheses to anticipate effects on project surroundings enables EIA implementers to better verify impact predictions. For example, in the Hibernia Oil Platform Construction Project (Storey and Noble, 2004) a null hypothesis was set to determine whether the specified objectives, goals or targets had been achieved. The null hypothesis for each measured variable stated that project activities will not change the concentration or degree of the variable to that which exceeds a specified MAEL. Survey data on marine variables in Hibernia's development area were collected as part of the EIA process that provided both a baseline for subsequent monitoring activity and information for determining various monitoring criteria and variables. The role of follow-up includes availing information on the actual impacts of implementing a project or program, to determine the need for alternatives and plan in detail future project decisions (IAIA, 2002). Follow-up requires specified goals and objectives and in the context of impact prediction, this means that such predictions are based on specified targets or thresholds.

When impacts are predicted, they need to be based on hypotheses; however, as mentioned previously, not all impacts need to be predicted as in some cases levels of acceptable change can be specified. Targets may also be used. Whereas thresholds are

things we do not want to exceed, and usually refer to negative impacts, targets are things we do wish to achieve. Therefore targets are what practitioners aim to achieve in managing impacts whilst thresholds are what practitioners check to not exceed. While they too usually refer to environmental factors (e.g. zero emissions levels), they can also refer to positive impacts and are used on both biophysical and socio-economic effects. For example, a project target may be to employ 40 percent of the local labor force. Typically EIAs focus on the negative issues, and more attention is needed on setting targets and objectives for maximizing positive impacts (i.e. project contributions).

2.3.3 Principle # 3: A Learning-Oriented Approach

Follow-up implementation allows developers to obtain information about the effects of the proposed activity on the environment (Arts *et al.,* 2001), as well as gain insight into the nature and characteristics of various components of the physical and socio-economic surrounding. This aspect of follow-up assists in better management of the environment and requires the following components:

i) maintenance of continuous reporting;
ii) establishment and maintenance of a public registry of follow-up databases and results; and
iii) application of local knowledge in the follow-up process. This is knowledge from local communities.

i) Maintenance of Continuous Reporting

Open and regular reporting is necessary in monitoring and follow-up to maintain consistent data important to detect changes in the variables under scrutiny (Glasson *et al.*, 1994). When reporting, an assessment panel's recommendations need to be clear, detailed, and include terms and conditions to minimize environmental costs and maximize economic benefits. The panel retains independent expertise to assist it in reviewing the complex information submitted by the company and interveners (Couch 2002; Shpyth, 1991). Maintaining on-going monitoring and reporting entails keeping data from monitoring and auditing current and accurate (Environment Canada, 1999c). This calls for continuous testing of data and carrying out monitoring which is cyclical

and synchronized with the lifetime of the project. On-going monitoring and reporting require that the proponent have an environmental monitoring program or environmental management plan in place.

ii) Establishment and Maintenance of a Public Registry of Follow-Up Databases and Results

Public documentation means that a wider audience is reached, and establishes a higher capacity for adaptation by other managers and is thus important for learning from experiences (Environment Canada, 1999c). Adequate access to data means that the results of the EIA are integrated into a broader legislative framework designed for environmental protection, conservation and management. Public documentation and accessibility are representative of the readiness to share with potential beneficiaries. For example: schools, conservationists, professionals, both local and international (Shpyth, 1991). Diduck and Sinclair (2002) suggest that those carrying out follow-up avail results in a central location and that those results are presented in a non-technical, discourse. Hence, the mandate of warehousing information is on proponents and independent watchdogs –both of which are actively involved in follow-up. To maintain a public registry, EIA follow-up results should be consolidated into a 'live' or real time (ongoing), comprehensive socioeconomic and biophysical database. Regularly updating data requires quick and prompt inclusion of 'breaking news' information (Au, 2001). Maximizing the learning value of follow-up programs requires organized channels for distributing these data and that the data are organized into a project or environmental inventory (Environment Canada, 1999; The Mackenzie Valley Environmental Review Board, 1999).

These instructional devices are also important in persuading decision-makers and the public that follow-up programs serve an essential function in ensuring that significant adverse environmental effects are being mitigated (Environment Canada, 1999). Where Aboriginal communities are stakeholders, the CARC (2002) suggests that EIS reports be provided in Aboriginal languages.

iii) Application of Local Knowledge in the Follow-up Process

Traditional Knowledge, TK, or local knowledge is knowledge developed and used by local communities in environmental management, and which these communities view as their intellectual property (Couch, 2002; Peters, 2003). TEK, a part of local knowledge is a valuable resource in follow-up programs, as it contributes to research and management by providing unique and useful information on the natural history of project sites (Peters, 2003). Local knowledge belonging to traditional communities is mainly preserved in oral histories. It is expected that proponents will make an effort to collect and facilitate the collection of traditional knowledge, relative to the proposed development. O'Reilly's (1996) view is that proponents work with local communities to integrate traditional knowledge into the follow-up program and accord these sources of information full and equal consideration in relation to western science for the purposes of the improvement of follow-up processes. Couch (2002) warns that traditional knowledge cannot be dismissed as irrelevant because local people use it as their point of reference.

Local communities' public consultation and participation are necessary, as they present an opportunity to draw local resource management methods from the community (Shpyth, 1991; The Mackenzie Valley Environmental Impact Review Board, 1999). Carrying out interviews, applying observation techniques and other forms of experiments can be used to draw from this knowledge. Traditional knowledge may be applied through the involvement of resident communities in defining the scope of the follow-up and determining the collection and interpretation of monitoring data (The Mackenzie Valley Environmental Impact Review Board, 1999). Since this knowledge is their own innovation, local communities must themselves document and publish their knowledge to be used in EIAs in media available to the public (O'Reilly, 1996).

2.3.4 Principle # 4: An Integrated Approach

An integrated approach to follow-up requires that environmental managers consider impacts at local, national and global scales and closely monitor environmental implications of projects, policies and programs on social, cultural and economic terms

(Mitchell, 1997). Consideration of global scales makes is especially important for learning. Investigating the interrelationships among these aspects involves consideration of the cumulative effects of the development and to achieve this goal, developers must clarify which variables they will monitor in the post-decision analysis and consolidate the input gathered from the public (Denis, 2000). As a final measure towards integration, follow-up implementers need to consider and manage as an integrated whole all elements that make up the environment through an ecosystems approach. Effective EIA follow-up would need to consider the following factors for integration:

i) identification of key variables for monitoring; and
ii) adoption of an ecosystems approach towards project management.

i) Identification of Key Variables for Monitoring

Monitoring processes measure and record the physical, social and economic variables associated with the development impacts (Glasson *et al*., 1994). Proponents include in their monitoring and auditing programs social, economic, biophysical, and cumulative effects monitoring components to obtain information on the characteristics and functioning of these variables over time and space. Follow-up program implementers need to establish the characteristics of 'indicators' and at the same time the extent to which the spatial and temporal scales of these environmental elements are significant. These indicators function to mark or identify effects on the environment and are essential in enabling follow-up implementers to determine which impacts actually happened and which can be verified. In EIA, indicators show practitioners that projects are indeed exerting change on the surroundings. The Hibernia BEEM program again, shows several reasons why certain indicators were selected for monitoring. Noble and Macharia (2004) report that the Hibernia Management and Development Company (HMDC) established a multi-year (1991-1996) program to monitor the effects of the Hibernia Gravity Base Structure (GBS) construction site on the marine environment. Hibernia's environment management committee decided to collect survey data on several marine elements such as oxygenase levels and gill deformity in the fish species. Monitoring as an early-warning system identifies the variables that need to be managed

as a result of project effects, thereby allowing managers to take remedial actions before it is too late by facilitating the adoption of mitigation measures (Glasson *et al*., 1994).

Denis (2000) emphasizes the importance of identifying the environmental components to be monitored. The problem, however, is that social and economic variables are rarely considered. For example, in the Confederation Bridge project, involving a bridge construction project linking Cape Tormentine, New Brunswick to Borden, Prince Edward Island, only the biophysical components were considered in the EIA follow-up, in spite of the fact that socioeconomic impacts of the project, notably the displacement of ferry workers, were predicted in the EIS to be dire (Storey and Noble, 2004). It is important that follow-up programs monitor elements that are of significance to the resident communities which are identified during project scoping, public participation sessions, or during consultation with local experts. Audit programs may allay public concerns about the effects of a particular activity or project leading to improved public acceptance of proposals (Morrison Saunders and Bailey, 2000). Austin (2000) also suggests enlisting the help of local experts in identifying issues that require monitoring.

ii) Adoption of an Ecosystems Approach Towards Project Management

Integration in follow-up programs calls for the adoption of an ecosystems approach in project management to ensure that the follow-up program, however long and however many parts, is carried out as a single whole. The ecosystem approach considers and manages all elements that makeup the environment as an integrated whole and its value lies in its consideration of the broad implications of projects (Mitchell, 1997). The ecosystem approach goes beyond the project and takes care that all aspects of the proposed project and all the aspects of the regional environment likely to be affected are considered (Couch, 2002). The Convention on Biological Diversity (2005) describes a the ecosystem approach as

> A strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential process, functions and interactions among organisms and their environment. It recognizes that

humans, with their cultural diversity, are an integral component of ecosystems.

In the past, follow-up has concentrated on the biophysical elements of the assessment with the result that other aspects of the environment, particularly those beyond the specific project site and life cycle, have been undervalued (Denis and Senecal, 1999). The geographic and temporal scopes of the monitoring program are critical components of the ecosystem approach. Program implementers recognize that effects are not limited to the immediate project site or time frame but may create broader cumulative or synergistic change.

A systematic comprehensive approach helps foster effective follow-up studies because environments are made up of component parts, linked one to the other (Mitchell, 1997; Shpyth, 1991). For example, Hydro-Quebec's La Grande project monitored effects on fish communities, water quality, caribou, coastal eelgrass beds, and the evolution of the biomass of benthic organisms in the Robert-Bourassa reservoir. Hydro-Québec also monitored the changes that would occur on the resident communities' subsistence and culture as a result of project-induced changes to these components (Schetagne, 1999). Practitioners can apply scientific data to confirm that the inclusion of ecosystem perspectives can produce real benefits and demonstrate the merits and demerits of approaches chosen in carrying out projects (Kormansky, 1998; O'Reilly, 1996). A fully integrated follow-up program proves whether deleterious impacts on ecosystem integrity, human health and the quality of life, anticipated, either exist or not and that they have been effectively managed.

2.3.5 Principle # 5: Institutional Commitment and Accountability

Commitment and accountability are necessary on the part of proponents and responsible authorities if the EIA and the project are to achieve their intended results (Shpyth, 1991). For instance, the results of Hydro-Québec's follow-up program are highly credible because of the quality of the science employed, and the fact that the studies were peer reviewed (Lascelles, 1999). Commitment means that responsible parties display obligation towards the successful completion of the project in all its aspects. Accountability demands that parties responsible for follow-up carry out actions

that are in the best interest of the project environment and represents the willingness on the part of developers and authorities to bear the responsibility of ensuring that follow-up programs achieve their intended objectives. As outlined below, follow-up will require clear identification of those responsible for paying for program costs; definition of the roles and responsibilities of the developer and government authorities in relation to post-decision analysis of project impacts (Environment Canada, 1999); and that developers who are transparent ensure the participation of the resident public and an independent checker in their monitoring programs. In brief, these requirements can be listed as:

i) definition and clarification of financial responsibility;
ii) definition of proponent and government roles;
iii) appointment of an independent environmental checker; and
iv) addressing of public and stakeholder concerns.

i) Definition and Clarification of Financial Responsibility

The role of follow-up guidance is to clearly stipulate the party with the obligation to pay for follow-up. Defining financial responsibility for the follow-up contributes to a successful follow-up program as financial responsibility demands commitment. It is desirable that cost sharing be carried out between the provincial and federal governments and the proponents for corporate-public projects (Pigeon, 1999). For private projects, proponents meet the bulk of the cost while governments may meet costs such as sending and paying for inspectors. For any venture to achieve its intended objectives, sufficient funding is a pre-requisite (Glasson *et al*., 1994). The US Environmental Protection Act, for example, has clearly stipulated the irreversible and irretrievable commitments of resources involved in the implementation of the proposed action (Austin, 2000).

ii) Definition of Proponent and Government Roles

Government involvement lends credence to the EIA and follow-up program. Governments and responsible authorities are guardians or trustees of public resources

and have capacity to offer guidance to proponents. To achieve best practice of EIA follow-up, the coordinated role of the federal government needs to be investigated. It is agreed that due to diverse nature of programs and plans, these roles will vary and hence the need for investigation before consensus. First we need to examine the merit in clarifying the roles and responsibilities of federal authorities in contributing to the success of follow-up programs mandated by the federal cabinet (Environment Canada, 1999b). Proponents and decision makers face difficult problems when the system of responsibilities among federal authorities for specific environmental assessments is fragmentary.

Clarifying the roles and responsibilities of federal authorities in supporting follow-up programs mandated by the federal cabinet is also important for organizational efficiency, timeliness, accountability and continuity (Storey and Noble, 2004). This occurs early in the project life cycle. Storey and Noble (2004) explain that this requires efforts to enhance the understanding of roles and establishing a system that compels accountability. Clarification also requires a simple and direct organizational structure, including well-developed communications channels among all interested parties. This ensures that the program work is carried out efficiently on various components in the EIS or project environmental management documents. The McArthur River uranium mine project in the Athabasca Basin, Northern Saskatchewan is an example of the lack of coordination and responsibility created problems in follow-up and monitoring programs. When the joint Federal-Provincial Panel on Uranium Mining Developments in northern Saskatchewan assessed McArthur's follow-up programs, they found that the follow-up program structure had weak liaison and coordination between government and the proponent. This problem could have been forestalled had their been active coordination of the follow-up programs (Noble and Macharia, 2004).

iii) Appointment of an Independent Environmental Checker

An Independent Environmental Checker (IEC) plays the role of balancing the interests of stakeholders. As a matter of accountability, IECs check the works carried out and the data collected by the environmental team responsible for the actual monitoring and audit works for the development project (O'Reilly, 1996). IECs have no

profit interest in the project they are serving and function to verify and certify that mitigation measures are fully and properly implemented as recommended in the EIA report (Pigeon, 1999). The checker covers issues which are normally not part of licensed terms and conditions and bears the responsibility of providing a visible record of the commitments of the company to carry out environmental monitoring programs to prevent and mitigate environmental impacts.

IECs are in some cases referred to as independent monitoring agencies and offer a system of checks and balances for government, proponents, and the public for the continuing assurance that significant progress is being made on both the environmental agreements and impact benefit agreements before final approval for permits for new operations are given. IECs ensure that progress is achieved to protect key environmentally significant areas and components. For example, protection of the surrounding marine and coastal environments was identified by public participation as a significant factor in the Confederation Bridge construction project. Under permit conditions, an Environment Committee was set up by Public Works Canada (PWC) whose members included the project developer and a number of federal and provincial authorities (Public Works and Government Services Canada, 2004). Their responsibilities included review and acceptance of the developer's Environmental Management Plan (EMP) and all its components. Similarly, the Kemess South Gold/Copper Mine Project located in north central BC and licensed to mine gold and copper deposits at a location about 300 kilometers northwest of Mackenzie, established what was called the Northeast Mine Development Review Committee (NEMDRC). This panel coordinated the review of applications for permits, licenses, and approvals as project development proceeded and the ongoing monitoring, and reporting on assessments (Wlordaczyk, 2000). To be effective, the independent body requires legal empowerment to harmonize existing monitoring functions, identify and remedy gaps in monitoring capability, and give equal consideration to TK of the Aboriginal peoples (Arts *et al.*, 2000; CARC, 2002; Hui, 2000). Shpyth (1991) and Couch (2002) conclude that the need for an independent watchdog for follow-up programs is exigent because of its characteristic non-affiliation to project initiators and financial beneficiaries; essential

if the needs of project beneficiaries, communities and the environment are all to be considered.

iv) Addressing of Public and Stakeholder Concerns

To cultivate public support for the project and diminish the threat of litigation from a disgruntled public, stakeholder concerns and viewpoints need to be considered in making both project and follow-up decisions. Experts and assessment panels should proffer recommendations and remedial actions that assist in allaying the fears and concerns of stakeholders and accord all parties fair and equal treatment. This is different from integrating local knowledge because it requires consideration of diverse public or resident community's concerns (Austin, 2000). Integrating local knowledge involves adoption of local communities' intellectual property. To achieve this, the practitioners include a wide range of follow-up activities that feature extensive public participation in the follow-up and assessment program. To demonstrate that all interested parties deserve an opportunity to participate effectively, the 1989 Arizona Glen Canyon Dam project, for example, involved 12 different public groups of cooperators which included seven American Indian tribes (Austin, 2000).

Developers should provide constant feedback to communities (Austin, 2000) and provide access for all affected parties to relevant information and to technical and scientific advice (Shpyth, 1991). Developers need to ensure there is an atmosphere such that the affected parties participate in good faith. The EIA and follow-up processes must be seen to be fair and equitable by the general public, thus follow-up should not only include the public, but also verify their concerns are being incorporated into project plans and operations. In allaying public fears and winning public support, the commitment and accountability principle gives responsible parties opportunity to prove that certain concerns have been quite manageable. The problem with public participation in EIA, however, is that it often occurs too late to be incorporated into planning for project impacts and alternatives (Ortolano and Shepherd, 1995), and is rarely incorporated in post-project assessment.

Government commitment and accountability for the public stakes in any project is represented by government's attitude towards public involvement in the management of

the environment. For example, the formation of an independent monitoring organization is an important measure of its commitment to EIA and follow-up (Gibson, 2002). Moreover, governments and proponents must not reduce public involvement to public relations. For example, public involvement within the current CEAA process simply allows citizens to be informed and to influence the scope of an EIA (Gibson, 2002). There is little provision for post-project decision involvement. On the proponent's part, there is a need to increase the opportunities for public involvement such that by the time the follow-up processes occur decision makers have not already foreclosed particular courses of action or valued system components to monitor (Ortolano and Shepherd, 1995).

2.4 Summary: Follow-Up Concept, Practice, and Principles

Follow-up is intended to manage impacts identified in the EIA and is frequently being designed to facilitate environmental management actions. Practitioners are using EISs to find out information gaps and then implement follow-up studies to fill these gaps. Ross (2003a) reports that follow-up studies are only necessary for impacts that are 'important' or impacts for which implementers have little or no information. This signifies the importance of identifying the valued ecosystem components and then short listing those that can actually be verified or have actually been impacted for follow-up. AQEI (2003) state that follow-up's objective is to 'critically examine the efficiency of impact prediction methods and mitigation measures as well as look at the role environmental follow-ups play.' As the driving forces for follow-up, research is stressing focus on a number of principles for successful follow-up (Table 2.5). Morrison-Saunders *et al*. (2003), for example, suggest that proponent commitment, public involvement, and resource allocation are amongst key factors in building effective programs.

Table 2.5. Principles and criteria for case study analysis

PRINCIPLES AND CRITERIA				
Legislation and Guidance	**A Results-Oriented Approach**	**A Learning – Oriented Approach**	**Integration**	**Commitment and Accountability**
Mandatory requirement	A clear statement of goals and objectives	On-going monitoring and reporting	Key variables for monitoring identified	Clarified financial responsibility
Scope of follow-up covered by legislation	Appropriate timing of follow-up program determination	Public registry available	An ecosystems approach	Government and proponent roles clearly established
Procedural guidelines available for practitioners	Collection of baseline data	Integration of local knowledge		Independent environmental checker
	Continuous and consistent data collection			Public/ stakeholder concerns considered in design and implementation
	Hypotheses for impact prediction			

Sources: Literature review from this study

The following chapter discusses the methods used in this study to answer the research questions, the strengths of these methods, and the challenges that the researcher encountered.

CHAPTER 3
RESEARCH METHODS

3.0 Introduction

This study used a combination of methods and techniques; literature reviews of recent EIA follow-up case studies; content analysis of EIA documents and legislation, and semi-structured interviews with government officials, EIA practitioners, and individuals involved in EIA and follow-up activity. The first phase of the research involved the development of a normative framework outlining the principles necessary to facilitate best-practice EIA follow-up design and implementation using an extensive review of related literature. This formed the basis of Chapter 2. In the second phase of the research, the study evaluated recent-practice follow-up activities in Canada's Northern mining resource sector, with BHPB's Ekati Diamond Mine as the case under investigation. The following sections evaluate and explain the Ekati Diamond Mine case study, its background and relevance, and describe the data collection and analysis methodology used to address the research questions.

3.1 Case Study Background: BHPB Ekati Diamond Mine Project

The lack of effective follow-up implementation is a serious deficiency in current EIA practice. Follow-up is "the paradox of EIA" insofar as the need for follow-up; follow-up is essential, yet it is rarely done or rarely done well (Morris and Therivel, 1995; Sadler 1987). That said, there have been important developments in recent years, particularly with regard to EEM associated with projects in Canada's mineral sectors, notably the Ekati mine project (Storey and Noble, 2004). Many observers have touted the Ekati project as a trendsetter for how future developers in the Canadian North will carry out EIA follow-up (Couch, 2002; Kwiatowski and Ooi, 2003).

The Ekati Diamond Mine, Canada's first diamond mine, was formed from collaboration between BHPB Diamonds Inc. part of the BHP Billiton Group (the world's largest diversified resources company), and Charles E. Fipke and Dr. Stewart E. Blusson, exploring geologists who are credited with finding the diamond-kimberlites (BHP Billiton, 2004). Fipke and Blusson carried out exhaustive exploration of the Northwest Territories and finally found the diamond bearing kimberlites in 1991 at Point Lake, eventually leading to the discovery of dozens of new kimberlite pipes in the Lac

de Gras area of the Northwest Territories of Canada (The Mining Industry, 2002; Aurias, 2002) (Fig 3.1)[3]. The total mineral claim block for Ekati is 344,000 hectares. Mine construction commenced in 1997 and the mine was fully operational in October of 1998.

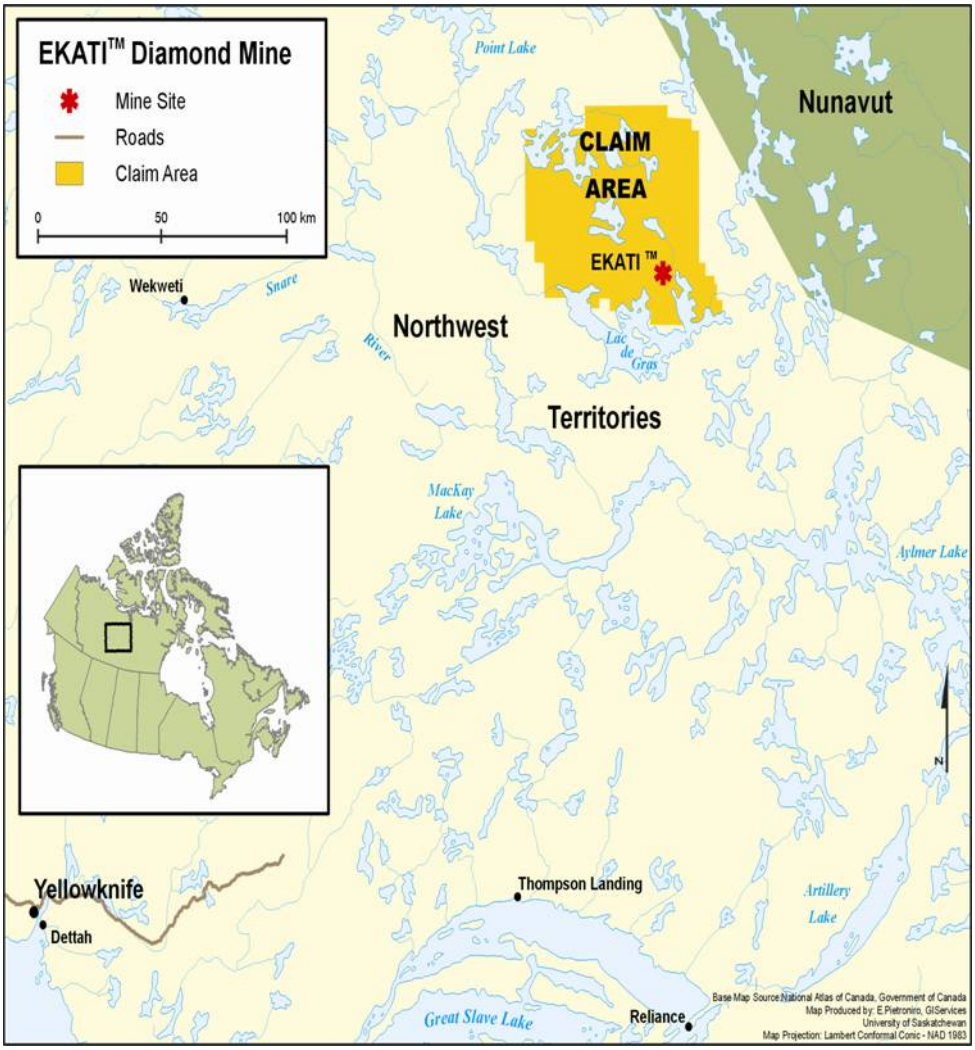

Figure 3.1 Location map of the Ekati mine site

Lac de Gras kimberlites are similar to those of South Africa and Russia, and are overlain by small lakes. Eight kimberlite pipes are being developed with two more undergoing feasibility studies (The Mining Industry, 2002; Aurias, 2002). Follow-up at the Ekati mine is on-going; that is to say, follow-up program implementation does not

[3] The project is a joint venture between BHP Diamonds Inc (51%) and the Blackwater Group (49%). Blackwater Group is composed of Dia Met Minerals Limited, Charles Fipke , the Canadian geologist who originally discovered diamonds and his prospecting partner, geologist Dr. Stewart Blusson. Blackwater's shares are as follows: Dia Met Minerals (29%), Fipke and Blusson each 10%. Beginning October 2001, BHP Billiton acquired Dia Met Minerals Limited and the shares are as follows: BHP Billiton Diamonds Inc, 80% and Fipke and Blusson retain their 10% for each.

imply that a project has been decommissioned. In this regard, the Ekati mine project is a timely case study in that it will provide both an opportunity for an investigation of the quality of the EIA follow-up process and allow opportunity for process improvement. The Canadian federal *Act* applies indirectly to the operation of the Ekati project, through the Mackenzie Valley Resource Management Act MVRMA, and thus gives opportunity in this study to explore national regulations and policy in terms of impact assessment.

The mining mega-project is the largest industrial employer in the territory; projected to mine $12 billion worth of diamonds and generate revenue for both the territorial and federal governments estimated at $2.5 billion, including an increase to the total NWT mining wage bill by over 50% (BHP Billiton, 2004). This scale of operation, the impact on the region's economy, and the potential to set standards for further developments within the region give the project significance (Mulvihill and Baker, 2001). Mega-projects in the North need to possess enough investment power and experience to manage the risks (to the environment) involved (Bone, 2000). Indeed, the North is an attractive location for any type of EIA research in that during the past sixty years a 'new' Canadian North has emerged. Resource industry has emerged dominant in the northern economy; native self-government and land claims issues are being intensely debated, and industrial pollution is at the top of the agenda for environmentalists, making the North an interesting mix for research (Bone, 1992).

In particular, the Ekati mine case study presents an innovative approach to follow-up and monitoring in terms of the development of an Independent Environmental Monitoring Agency (IEMA). An environmental agreement among the federal government, the Government of the Northwest Territories and BHPB established the IEMA to oversee the implementation of environmental management activities of BHPB at the diamond mine (CARC, 2002).

3.1.1. Physical and socioeconomic setting of the Ekati Diamond Mine

The Northwest Territories are part of the Territorial North, Canada's largest region (Bone, 2000). Aboriginal peoples make up almost half of the population of the northern territories. Bone (2000) outlines some features of the territorial north, namely:

- it is a cold environment characterized by permafrost;
- more than one-third of the population lives in Whitehorse and Yellowknife with others living in small towns and villages;

- the territorial North has the smallest population of all the six Geographic regions of Canada[4];
- the economy is two-pronged - a resource economy, described as the driving force behind the Territory's economy, and an employment economy (Economy initiated and sustained by presence of ventures that create employment opportunities);
- comprehensive land-claim agreements signed by the Aboriginal peoples provide both cash and land; and
- the northern territories are currently marked by a new political geography which recognizes the Aboriginal Peoples.

These characteristics are the hallmark of a fragile and delicate biophysical and socioeconomic environment. The operators of the mine concede that the geographic area in which they are located is one of the most sensitive in the world (Aurias, 2002; The Website for the Mining Industry, 2003), giving good reason to investigate the effects of the project activities on this environment and measures taken to protect it.

3.1.2 Ekati Diamond Mine and Resource Development in the Northwest Territories

As part of the territorial North, the Northwest Territories economy is characterized by long distances from world markets, resource development that is driven by external demand, limiting of the development of these resources by the physical geography, and an economy that is sensitive to fluctuations in world prices for its resources (Bone, 2000). Bone further observes that multinationals have replaced explorers who sought the North's wealth beginning at the sixteenth century. As a multinational corporation, BHPB opened North America's first commercial diamond mine in Canada's north raising hopes of a better life for communities in the region and offering opportunity to balance the economic, environmental and cultural interests of the people. Among the significant resources of the region, the mine operates near a migration route of caribou which is the main source of traditional food for native populations living in the sub-arctic (Economy-Canada, 2003).

[4] Bone (2000: 9) presents Canada in six large-scale geographic regions defined by perceptions from Canadians themselves, the regions' political nature, use of statistical data, and the notion of a sense of place: Ontario, Quebec, British Columbia, Western Canada, Atlantic Canada, and the Territorial North.

3.2 Case Study Analysis: Application of the Principles

3.2.1 The nature and value of a case study approach

This research adopts a descriptive and prescriptive approach (Mitchell, 1989), in which the researcher analyzes and evaluates BHPB Ekati's EIA follow-up program as a case study to make recommendations for follow-up practices in general. The use of a case study is appropriate because it provides a context within which the structure of EIA follow-up can be investigated (Gartner Lee Ltd, 1998; Gomm e*t al*., 2000; Yin, 1989). Yin says that "a case study will help the understanding of complex phenomena (in this case, issues surrounding EIA follow-up practice) as case study investigations retain the holistic and meaningful characteristics of real life events." Yin (1989: 23) elaborates that a case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context when the boundaries between phenomenon and context are not clearly evident, and in which multiple sources of evidence are used.

Morrison-Saunders *et al*. (2003), Ross *et al.* (2001), Wlodarczyk (2000), and the United Nations (1990), report that case study research has been applied in the evaluation of EIA follow-up. Storey and Noble (2004) similarly applied case studies in their examination of the role of follow-up under the federal *Act.* The use of a case study provides opportunity for an applied perspective Ekati's case will be examined in implementing its EIA follow-up programs and cross-examined against the requirements for follow-up developed in Chapter 2. In doing so, this study will identify aspects of the project's follow-up program that are favorable for follow-up design in other geographical areas of Canada and abroad.

3.2.2 Data Sources and Procedure

Two principle sources of data are used in this research: project-related documents and interviews (Table 3.1). Using these data, BHPB Ekati's Diamond Mine EIA follow-up program is cross-examined against the principles and elements developed in the normative framework in Chapter 2 (see Table 2.5). The objectives of this study as outlined in Chapter 1, are the basis for developing interview and document analysis questions. From the normative framework, questions are formulated to assess Ekati's

Table 3.1. Document analysis and interviews: General strengths and limitations for these methods
Sources: Benjafield, 1994; Kirk and Miller, 1986; Kumar, 1996; Nielsen, 1990; Silverman, 2001.

Document analysis

- Organizational project documents (web-based, or CD format, email texts or paper text)
- Government documents (web-based, or CD format, email texts or paper text)

Advantages:

- Accessible at a time convenient to the researcher –an unobtrusive source of information.
- Not dependent on access or ethical constraints.
- Data are thoughtful, in that participants (sources of information, researchers and authors of the information) have given attention to compiling (pre-meditated therefore a boon to reliability)
- Written evidence saved the researcher the time and expense of transcribing
- Relevance and effect- Texts influence how we see the world and the people in it and how we act.

Limitations:

- The need to sift through the unwanted information-one must decide which information within the documents is to be perused and which is not

Interviews

- In-person interview, email interview, telephone interviews [5]

Advantages:

- Participants provided historical information
- Researcher was allowed control over the line of questioning
- Informants snowballed further sources of information, by suggestion and presenting them to the researcher
- Tape-recording enabled researcher to obtain the language and words of participants (information is unadulterated)

Limitations:

- Provided "indirect" information filtered through the views of the respondents.
- Researcher's presence may bias responses
- People are not equally articulate and perceptive

Sources: Benjafield, 1994; Kirk and Miller, 1986; Kumar, 1996; Nielsen, 1990; Silverman, 2001.

EIA follow-up program. The questions are designed to find answers that would provide an overview of the geography of the Ekati mine project, predicted environmental

[5] It is recognized hat there are relative advantages and disadvantages to in-person versus telephone interviews. Perhaps most notable is that in-person interviews provide the researcher with an opportunity to observe 'body language' (e.g. comfort level) when the interviewee responds to a question. However, this is perhaps much less applicable/valuable to this research because of the nature of the research questions and the objectives of this study.

impacts, mitigation measures, and outline the characteristics of BHPB Ekati's EIA including its effectiveness in the design and implementation of follow-up. Problems and opportunities in Ekati's EIA follow-up are also identified. The EIA follow-up literature was used to establish how many principles are included in the best practice framework, and hence the number and scope of questions and data requirements.

3.2.3 Document Analysis

"Documentary information is almost always needed in case studies" (Yin, 1989: 85; Crang, 2000: 10) and documents are the main source of information for this study. That is, interviews are less important to this study than the written documents. Silverman (2001) explains that document analysis involves evaluating textual/word material (or images) that have become recorded without the intervention of a researcher (Gartner Lee, 1998; Shpyth, 1991; Tashakkori and Teddlie, 1998). In this research, data collected from texts were cross-examined for verification of facts against data from interviews and vice versa. Document analysis emerged as the most important source as it tended to yield more detailed information than interviewing and represented primary material, information directly from the people and situation under study. For example, water licenses for the BHPB Ekati project are detailed and succinct; as are comments from the communities collected during the project public hearings.

Selection

Documents specific to the Ekati project and research questions were selected and analyzed. For example, the water licenses contain requirements and information for carrying out follow-up on aquatic environments, details of which are part of this investigation. It was imperative to determine which documents were most relevant. The documents in Table 3.2 are all documents that contain information on Ekati's follow-up programs.

Table 3.2. Documents evaluated in data collection and analysis*.

- NWT Diamonds Project, Environmental Impact Statement, July 1995+
- Sable, Pigeon and Beartooth Kimberlite Pipes EIS April 2000 –BHPB*
- Ekati Diamond Mine EIR April 2003 -BHPB
- BHP Ekati Diamond Mine Environmental Agreement -BHPB
- BHP Ekati Diamond Mine Fish Habitat Compensation Agreement -BHPB, GNWT and Canada
- Water Licenses MV20001L2-0008; and N7L-1616 Mackenzie Valley Land and Water Board
- The Agency Annual Report 2002-2003- The Independent Environmental Monitoring Agency
- Recommendations to Proponents and Governments - The Independent Environmental Monitoring Agency
- BHP Billiton. *About the Mine*. http://ekati.bhpbilliton.com/aboutMine.asp- -BHPB
- BHPB Annual report on Northern Spending
- BHPB Inc. Annual Report on Northern and Aboriginal Employment
- Socio-Economic Agreement btw BHPB and GNWT Oct 22, 1996

* Full descriptions available under 'References' section.

+ EIAs are one-time only while follow-up is continuous- BHPB start and end dates for its EIA are not specified within its documents but EIA was carried out beginning 1994 and follow-up started after releases of the July 1995 EIS. Emerging follow-up data is contained in Environmental Impact Reports released every three years beginning April 30th 2000 (July 1995 Executive Summary and follow-up calls to the IEMA).

BHPB's case study was analyzed in detail (Bryman, 1988; Lang and Heiss, 1998; Neuman, 1994). Data were sought that described BHPB's EIA follow-up in terms of the best practice principles. Analysis of texts from BHPB Ekati Diamond Mines project documents commenced by examining the table of contents and document reference sections for evidence of the principles and then examining those areas of the text in greater detail based on the criteria of the first principle in the framework. Analysis sought answers for the questions posed; for each element and questions therein. A cross examination of the questions posed against the document reports searched for detailed descriptions of the characteristics and procedures employed in BHPB Ekati's EIA follow-up programs. Facts and conclusions regarding each question were reached depending on the consistency of documented data (the same with interviews) (Yin, 2000). Documents were evaluated for follow-up actions and the structure within which these actions are carried out.

Questions that were 'factual', such as the start and end date of a particular activity. Such as the licensing requirements for a specific operation, were only answered from

documents and not posed in interviews. For example, the following question was only answered from BHPB Ekati EIS documents.

> Do follow-up database and results available cover the entire lifetime of the EIA follow-up program?
> If not, give the periods that are not available
> Year/Month/Day from [____/____/____] to [____/____/____]
>
> State the total period for which follow-up data is not available

Determining which questions warranted corroboration and which did not was a challenge. The reason is that there existed a thin line between factual unequivocal information and information that required discussion and more than one viewpoint. As illustrated above (in explanation), the capacity for uncontestable answers was the criteria for determining 'factual' questions. This strategy is drawn from the interpretive nature of this study and of qualitative studies (Creswell 2003). This strategy allows the researcher to draw conclusions through personal lens. In this case, 'factual' means that there is no likelihood of ambiguity nor debate in the answer (See above example). Document analysis required sifting of information and careful collection of data. Most documents were voluminous and answers to questions had to be picked carefully even after relevant sections had been selected from the sifting.

3.2.4 Semi-structured interviews:

Purpose

Interviews were conducted in two principal modes: face-to-face and over the telephone. When requested, or when an appropriate interview time could not be scheduled, participants were given an opportunity to respond by email, but any subsequent follow-up for further inquiry into a participant's response was carried out by telephone. Given that the participants involved are dispersed across Canada, it was only possible, due to financial and time constraints, to carry out face-to-face interviews with those respondents based in Saskatoon and Calgary. It was important to interview a selected number of key informants face-to-face in order to first, confirm the normative framework, second, obtain useful suggestions for who would be additional key interviewees, and third, to identify relevant project documents for evaluation.

Discussions were organized around a pre-designed set of topics identified in the normative framework (Lounsbury and Aldrich, 1979) (see Table 2.5 and Appendix 1).

For each topic, the investigator asked a pre-determined set of questions from the semi-structured schedules using the same wording and order of questions as specified in that interview schedule (See Appendix). Semi-structured interviews allowed open-ended answers, a strategy that is important in geographic research (Lounsbury and Aldrich, 1979) as it affords the researcher an opportunity to ask for the facts of the matter as well as for the respondent's opinion about events (Yin, 1989). Respondents had an opportunity to have their questions clarified by the interviewer while they could expound on responses thus eliminating ambiguity. Semi-structured interviews were useful in seeking general information concerning EIA follow-up and second, because the interviews were directed to selected individuals who possessed information about the Ekati project that was not commonly known to others (Lounsbury and Aldrich, 1979). Data recording is discussed in section 3.2.5

Selection

The interviewee selection process was critical as it determined whether those with potentially the most relevant information were identified. Respondents were selected on the basis of their association with the Ekati Diamond Mine, their expertise, occupation, and included respondents involved with the Ekati BHPB Diamond Mine project, assessment management and regulation and whether or not they are of Aboriginal ancestry (Table 3.3). This same basis determined who would be sked what questions. These characteristics were used to determine the kind of information respondents could potentially provide. Project related documents provided names of initial interviewees while the researcher's Graduate Advisory Committee suggested others. The first batch of respondents suggested additional informants through a snowballing process. As names of potential respondents were received, their contact address, experience and professional qualification were listed in a table. Listing helped to ensure that all questions based on the normative framework were covered and that there were interviewees to crosscheck the information collected from the document analysis for each principle and criteria identified in the framework (Tashakkori and Teddlie, 1998).

Table 3.3. Organizations and departments from which interviewees were drawn and number of persons interviewed

Group	Number Contacted	Number participated
IEMA	2	2
Aboriginal Community Representaives	2	1
Experts and Private Practitioners	11	8
Government Representatives	2	(Federal 1; GNWT1) 2
BHPB's project EIA follow-up personnel	3	0
	Total contacted 2 0	Total participated 13 (65%)

Translation of interview guides into local aboriginal languages was not necessary in this case, as the study interviewed Aboriginal community representatives in political and management positions directly involved with Ekati who were fluent in English. Based on the lead of Tashakkori and Teddlie (1998), Shpyth (1991), and Gartner Lee Ltd (1998), interviews were used to supplement and confirm data from the textual analysis. Interviewees in a few cases also provided answers and information about criteria that the documents did not provide. Between the interviews and document analysis, data were gathered that answered the questions in the research in detail.

There was no probabilistic sampling of respondents for several reasons; firstly, respondents interviewed were those believed to be most reliable for the kind of information required and were not selected from the totality of a population but from an inventory of key players in the Canadian follow-up arena and BHPB EIA follow-up programs personnel. Due to this fact, no group relevant to the objectives of this study was omitted. Secondly, number of informants interviewed, (13) sufficed as experts were available from the same pool i.e. the names suggested from different sources were the same names. Thirdly, the research addresses a very specific aspect of EIA which further narrowed the pool of potential respondents to those knowledgeable in follow-up (see Yin, 1989: 89). Thirdly, the use of a case study narrowed potential respondents to those who would be able to provide the finer details concerning BHPB Ekati's Diamond Mines EIA follow-up. In all, 13 individuals were interviewed. This number of respondents sufficed also because for the purposes of this research; first, because responses were obtained for the questions in the interview schedules and second, because questions were posed to more than one respondent where variable answers were

possible and depending on the availability of respondents linked to that particular question (See Appendices and Table A.1). The confidence and the reliability of these respondents were also enhanced by the fact that most of these respondents could be termed the 'most important' because their names appeared in key project documents, and were suggested several times by other respondents and by members of the researcher's Graduate Advisory Committee. At the point where the researcher felt that the number of informants was enough, that is to say, all key groups of project players and direct interests were included, a table was drawn up of each respondent, their professional qualifications and relationship with the Ekati BHPB Diamond Mine and the kind of information they provided. In order to ensure that enough data were gathered to address all questions posed and to cover each element in the framework, information gathered was recorded, tracked and examined as interviews progressed. (See section 3.2.5). The point at which no new knowledge was being obtained was determined at selection of documents and interviewees where the researcher made judgments about both information contained in documents and capacity of interviewees to give information relevant to the research question.

The researcher does not perceive any bias or potential bias in the fact that only one-two members of some groups (see Table 3.3) were interviewed while several members from another were. This is because of two reasons; first, the nature of study and its objectives required fewer of these interviewees. Second, experts and practitioners are most in number because they represent the widest experience or their pool is largest. With the IEMA for example, there are 7 directors and only two staff members so its pool of respondents is much smaller compared to that of experts and practitioners.
In summary, each way of doing interviews had its own merit. Email and telephone interviews increased access to respondents as transport costs were eliminated. Though once cannot read facial expressions, such input was not relevant to this research. Email, telephone and face-to-face interviews all provided an opportunity for both researcher and interviewee to clarify their question or answer respectively.

Administration

Each respondent received a personalized consent form endorsed by the University's Ethic's Board. Consent forms were sent by email; respondents returned the signed forms by fax. To cater to each individual respondent, interview schedules included a reminder note that questions asked were in relation to BHPB's Ekati Diamond mines.

For other respondents, whose input touched on the follow-up process and who did not have to respond specifically about the Ekati experience, a note was attached to the interview schedules reminding them that they were at liberty to quote other experiences and that the questions were posed with the general follow-up process in mind.

All questions were built from best practice follow-up literature; however not all questions were posed in the interviews. As mentioned earlier, questions requiring factual, unequivocal information required no corroboration from interviews and were only answered through document analysis. Questions were arranged from principles to subsets of elements and then allocated to individual respondents (See Appendices).

A standardized protocol was observed in the interview discussions in order to ensure adequacy of measurement in data collection. Such a protocol provided stimulus conditions in the interviews (Silverman, 2001) so that the integrity of the responses was not compromised. Equalizing the respondents' environment across the board means that the researcher did not express surprise or disapproval for any response. The researcher also avoided giving impromptu explanations or questions, and skipping certain questions in the particular respondents interview schedule as doing this would have posed the risk of bias (Silverman, 2001).

The composition of document analysis and interviews is summarized in Table 3.4 based on the criteria presented in the normative framework. Interviewees were asked an average of fifteen (15) questions. All interview questions could not be posed to each interviewee because of the Ethics Board's time limits, the volume or total number of interview questions, and the nature of questions versus interviewees' capacity to answer. A 'parent' interview schedule was developed from the initial list of one hundred eighty questions. Individuals were, in certain cases, asked different questions depending on the nature of their involvement with the project (e.g. government regulator versus project consultant). A note was attached to each interview schedule that the respondent was not required to provide responses to all questions, but to those only within their ability. The benefit of this strategy was to allow a choice of questions where the respondent would pick those issues s/he was best able to answer. This also ensured that answers were obtained only from the most able respondents.

Table 3.4. The normative framework and data sources

Principle	**Sources of Evidence/Information**			
	Criteria	**Main Sources**		**Complementary Sources**
		EIS and other project documents	**EIA Panel and IEMA documents**	**Interview and number of interviewees (supplementary Information)**
LEGISLATION AND GUIDANCE	Mandatory Requirement	**A**	**A**	1-Government representative 2- Expert and practitioner
	Coverage of Scope	**A**	**A**	4-Experts and practitioners 1-Government representative
	Procedural Guidelines	**A**	**A**	3-Experts and practitioners 1-Government representative
A RESULTS-ORIENTED APPROACH	Statement of Goals	**A**	**A**	4-Experts and practitioners 1-Government representative 2-IEMA
	Determine Programs early	**A**	**A**	5-Experts and practitioners 1-Government representative
	Baseline Data Pre-project	**A**	**A**	3-Experts and practitioners 1-Government representative 2-IEMA
	Consistent data Collection	**A**	**A**	3-Experts and practitioners
	Hypothesized Predictions	**A**	**A**	1-Expert/ practitioner 1-Government representative
A LEARNING-ORIENTED APPROACH	On-Going Monitoring	**A**	**A**	4-Experts and practitioners
	Public Registry	**A**	**A**	2-Experts and practitioners
	Local Knowledge	**A**	**A**	1-Government representative 1 Expert/ practitioner 1-Aboriginal community representative
AN INTEGRATED APPROACH	Key Variables	**A**	**A**	4-Experts and practitioners 2-IEMA
	Ecosystems Approach	**A**	**A**	4-Experts and practitioners
INSTITUTIONAL COMMITMENT	Financial Responsibility	**A**	**A**	1-Expert/ practitioner
	Roles	**A**	**A**	4-Experts and practitioners
	Independent Checker	**A**	**A**	3-Experts and Practitioner
	Stakeholder Concerns	**A**	**A**	3 Experts and Practitioner 1-Aboriginal Community Representative

All documents provided information answering questions for each criterion. (**A**) represents the fact that primary sources were used for all the principles.

All questions were sent to participants two weeks prior to face-to-face or telephone interviews so that interviewees could peruse the document beforehand (Lounsbury and Aldrich, 1979). Follow-up calls and emails were important for cogitating responses and to know what areas needed to be clarified from the initial interview. Sometimes the follow-up was not necessary and initial responses sufficed. For those individuals who chose to respond to the initial interview questions by email only, they were followed up with a brief telephone discussion after perusing the responses (Yin, 1989). Follow-up discussions were necessary for clarifying grey areas for both the researcher and respondent, and were timed to be briefer than the average initial interview, which lasted approximately forty-five minutes.

Some participants did more than give answers pertaining to the research questions, and identified subsequent informants for the research. Due to their experience, these participants were able to assist in the design and refinement of the inquiry (see Creswell, 2003). Professionals not involved with the Ekati Diamond Mines were probed for their knowledge and questions were asked bearing in mind that these particular respondents were not necessarily familiar with the Ekati experience, but would enrich the best practice framework developed from the literature.

Inadvertently, a large number of respondents were authors of the literature on EIA follow-up practice informing this research. All face-to-face interviews were tape recorded. There were no instances when tapes had to be turned off because the interviewee felt that the conversation was sensitive. Interviews were transcribed using an EIA-type checklist where specific characteristics of the EIA process were examined according to the normative criteria.

Affected communities were represented in this study through project documents, specifically the EIS July 1995 and the EIR April 2003 where their concerns raised at public hearings and statements submitted to the project review panel have been published (see Silverman, 2001: 92). It was at these public hearings where community representatives came forward and lent their voice to the issues surrounding BHPB Ekati Diamond Mine. In addition, there was one interviewee who was also a member of one of those communities affected by the project. Since a framework identifying the necessary principles for implementing successful EIA follow-up is the focus of this study and not necessarily the experiences of the communities or their perceptions of project impacts

per se, discussions with community members at the grassroots was not necessary nor would such discussions lend much to the objectives of this study.

Some respondents, notably BHPB Ekati environmental managers, declined to be interviewed despite repeated appeals and suggestions for alternatives. BHPB as proponents were considered key to this research because they possess first-hand and detailed information about environment management at Ekati. Questions prepared for this group were the same for the IEMA, and IEMA answered them.

3.2.5 Data Analysis

While conducting interviews, interview notes were taken verbatim, and audiotape recording done during the one-on-one sessions (Creswell, 2003). Notes were also taken during audiotape interviews as back-up (Creswell, 2003). Data recording procedures for interview responses were planned to be as systematic as possible. To ensure that minute details from response journals, audio recorder and email-based responses were not missed, the researcher set about in a methodical plan, the goal being to ensure thoroughness and regularity. For example, sometimes respondents offered advice on data availability or sought clarification before responding to the interview questions. Such information was recorded in the diary for future reference. As responses were recorded, names of respondents were documented in a list at the beginning of the raw data text. As respondents provided their responses to the interview, these were promptly recorded in an interview notebook.

One danger signal was the temptation to report everything in the records journal (Silverman, 2001). The researcher strove to control this threat through strict adherence to one hour interview time limits. In the same vein, careful note taking required that the researcher not overlook the research focus, which would interfere with systematic analysis. The challenge was balancing this threat against the need to ensure that nothing was left to chance by recording even those interview responses that may have appeared far-fetched in relation to the research, frivolous or given off-handedly to ascertain whether they were important or not; for example, when a respondent sent extra material for perusal after an interview. This was also assured by the use of different sources of data (Yin, 1999).

Data were described in preparation for analysis in order to find the meaning behind the information acquired from the inquiry process (Creswell, 2003); beginning with

categorizing results from respondents and documents based on the five principles, and then based on the criteria. Yin (1989) explains that this is important to bring the evidence to some order prior to the actual analysis. Data were then analyzed for themes and categories. That is, analysis mainly involved developing a case description and then interpretation of the meaning of these descriptions, based on the principles and elements in the best-practice framework which are the themes and categories in this research (Neuman, 1994; Yin, 1989). Transcribing is important in identifying subtle responses from respondents and is crucial in noting people's activities, and in noting apparently trivial but often crucial pauses, overlaps or body movements (Silverman, 2001). However, these activities do not portend any significance to the goals of this research and hence transcribing did not include these intricate details (Silverman, 2001). Analysis involved continual reflection about the document data, asking analytic questions, and taking notes throughout the study (Creswell, 2003), then cross-checking with responses from interviews and vice-versa in relation to the research question and criteria contained within the normative framework.

3.3 Strengths and Limitations

All research is in danger of being colored by the researcher's personal values and interests. The use of a "predetermined" normative framework can exacerbate this bias. However, in this research, the building of a best-practice framework is not threatened by this feature, chiefly because of its unemotional and professional-oriented nature, compared to say, race, gender or class-based studies (Creswell, 2003). The study does still address this potential threat by incorporating interview discussions and a case study experiment to cross-examine and test the best-practice framework (Morrison-Saunders *et al*.; 2003; Yin, 1999).

Good qualitative research calls for an awareness of the limitations of the methods (Silverman, 2001). A few errors were committed on the part of the researcher at the beginning of the data collection exercise. The first two or three respondents complained that the questions were too many (in these instances, the average one hour interview was still adhered to). This was quickly adjusted. The researcher distributed questions among all the subsequent respondents so that the average remained at fifteen questions for each respondent. An increase in the speed of response was directly attributed to this downscaling. Moreover, though it was believed that an average of 80 questions would

be reasonable for the entire thesis, including both interviews and document analysis - the study answered 180 as the researcher had to cover the entirety of the best practice framework suggested in the literature.

As illustrated in Table 3.3, it was the intention of the researcher to discuss the nature of the Ekati BHPB EIA follow-up with BHPB's management; however, this was not possible. BHPB EIA follow-up management simply declined to avail themselves for an interview even though they were considered crucial to this research. A recent change in management structure for Ekati's follow-up program did not help this situation. However, the researcher is confident that results were not affected because:

1. The study still interviewed insiders- people hired to do follow-up and environment management for BHPB Ekati, and the IEMA who had first hand information on BHPB's EIA follow-up program. These interviewees,– consultants involved with the development of the projects follow-up program, and the IEMA watchdog provided similar information.
2. BHPB Ekati management were notified about interviews as early as anybody else and gave numerous promises that they would avail themselves, but in the end did not participate. BHPB management were eager to send EIA documents to the researcher which elaborated actions of BHPB Ekati in follow-up and environmental management. However, both good and bad points surrounding the follow-up project at Ekati were discussed by interviewees and the researcher was still able to draw favorable and unfavorable conclusions about the project from the documents analyzed.

The following chapter presents the results and analysis of the data collected from document analysis and semi-structured interviews.

CHAPTER 4
ANALYSIS: BHPB EKATI'S EIA FOLLOW-UP PROGRAMS

4.0 Introduction

This chapter presents a description of EIA follow-up programs initiated at BHPB Ekati's Diamond Mine. This description represents answers to the research questions, and corresponds to questions in the parent interview and document analyses schedule. The information was obtained from interviews and the documents analyzed, as discussed in Chapter 3. Chapter 4 presents the results of the application of the normative framework developed in Chapter 2, and is organized according to the principles presented in that framework. BHPB's follow-up programs are broad and it is neither possible within this thesis to cover all of the programs nor cover any one in detail; thus, examples from the programs are used to discuss the findings.

These programs followed-up on the results of the EIA carried out on the first set of kimberlite pipes after a long process of reviews and recommendations from various government departments, beginning September, 1996. For the second set of kimberlite pipes, however, EIA was commenced when BHPB Ekati applied for leases to mine in April, 1999. The Northwest Territories (NWT) Water Board forwarded BHPB Ekati to the Mackenzie Valley Environmental Impact Review Board (MVEIRB) for an environmental assessment. BHPB Ekati's EIA follow-up programs commenced December, 1999. As exemplified by the Caribou Management Plan and the Wolverine Management Plan, BHPB's follow-up is incorporated within what BHPB terms monitoring and management programs and includes components of the environment discussed later in this chapter.

The initial Environmental Impact Statement was released 1995. BHPB's follow-up of its environmental impact assessment report is termed 'monitoring' and includes activities that make up follow-up (See Chapter 2 Sec 2.1.0). Monitoring in the Environmental Agreement for the BHPB Ekati Diamond Mine Project and the Fish Habitat Compensation Agreement encompasses environmental assessment and activities that make up follow-up on the EIA such as evaluation and management of aquatic effects. BHPB's follow-up to the EIS is encapsulated within BHPB's environmental

management program. BHPB have used 'monitoring' to refer to follow-up activities. In this thesis, this term 'monitoring' is replaced with 'follow-up' to avoid ambiguity, and where used in this thesis, 'monitoring' implies one of the activities that comprise follow-up in EIA (others are evaluation, management and communication), and is not synonymous with follow-up.

4.1 Principle # 1: Legislation and Guidance

Several pieces of legislation guide the implementation of BHPB Ekati's EIA follow-up program. BHPB Ekati's self-regulatory initiatives and company policy also contribute to follow-up program implementation. Instruments that have required and guided the implementation of follow-up programs have shaped BHPB's Ekati follow-up. The following is an examination of the legislation and guidance principle, its criteria in the best-practice framework, and how they are functioning in BHPB's follow-up programs.

4.1.1 Mandatory requirement

Criteria:

Best-practice follow-up is based on mandatory requirements for its implementation. There is need for requirements that demand follow-up program implementation and dictate procedure with penalties for non-compliance.

Observations:

Specific legislation and requirements that obligate the BHPB Ekati Mine project to carry out follow-up include:

- BHPB's Ekati Diamond Mine's Environmental Agreement signed between Canada, the Government of the Northwest Territories (GNWT), and BHPB Diamonds Inc. January 6th 1997
- Fish Habitat Compensation Agreement signed between Canada, the Government of the GNWT, and BHPB Diamonds Inc. December 17th, 1996
- EARP guidelines of January, 1995
- The Mackenzie Valley Resource Management Act (MVRMA)
- Canadian Environmental Assessment Act

- BHPB's health, safety, environment and community policy (HSEC)
- Water License MV20001L2-0008 and Water License N7L-1616 (pursuant to the *Northwest Territories Waters Act*).
- Surface leases/ Land use permits MV2001X0071 and MC2001X0072
- Sable and Pigeon Land use permits MV2001x0071 and MV2001x0072

The *Agency Annual Report* 2002-2003 and interviews with GNWT and Federal government representatives show that these requirements for follow-up are enforced by a number of regulatory agencies, including:

- The Department of Fisheries and Oceans (DFO): reviews Fish Habitat Compensation Fund-reviews potential effects on fish and fish habitat
- The Mackenzie Valley Land and Water Board (MVLWB): reviews applications for licenses
- Environment Canada: reviews Air Quality Program and Wastewater Treatment Programs
- GNWT'S Resources Wildlife, and Economic Development, RWED: reviews Air Quality Programs and Wastewater Treatment Programs
- Indian and Northern Affairs, Canada, (INAC): provides full time diamond mine inspectors

BHPB's EIS reports that follow-up studies on terrestrial environments are not well covered by specific federal regulations or territorial/provincial regulations, especially when compared to fisheries and water quality; although practitioners note that newer mines are better regulated compared to mines commissioned twenty years ago. Environmental Agreements have been conceived as a solution to fill this gap. BHPB's Ekati Diamond Mine's Environmental Agreement was signed January 6th 1997 between Canada, the GNWT, and BHPB as a legally binding agreement for project-related environmental matters. This is exemplified by environmental agreements which are useful where legal requirements for water effects monitoring programs, habitat reclamation, impacts on air quality, and contaminants that may be released by projects, are missing or inadequate. BHPB Ekati's Environmental Agreement has encompassed all elements of the environment in follow-up programs and has gone beyond the

immediate time frame of BHPB's existence to include environmental management post-closure. The Environmental Agreement imposes legally binding requirements for BHPB's operations and places mandatory requirements for follow-up on BHPB Ekati on top of specific regulations.

The government of Canada, the GNWT and BHPB entered into this agreement to require that BHPB ensure that requirements related to environmental management were clearly addressed. One of the requirements in the Environmental Agreement is that an annual report on the impacts of the project be prepared each April 30th beginning in 2000. The Environmental Agreement requires that all information and data from the environmental monitoring programs be reported and a list and abstracts of all environmental programs and plans, be included. As stated in the Environmental Agreement, the Minister for Indian and Northern Affairs, Canada (formerly Department of Indian Affairs and Northern Development) has the power to require that BHPB should "address satisfactorily deficiencies described" within the plans and programs(Environmental Agreement, Article V). The Environmental Agreement requires that annual reports include proof that amelioration measures for impacts have been taken or complied with. A Fish Habitat Compensation Agreement was also signed between Canada, the GNWT, and BHPB Diamonds Inc, December 17th 1996, which imposes conditions on BHPB as to how to compensate for affected fish habitats.

EARP guidelines, replaced by the Canadian Environmental Assessment Act proclaimed in force in January 1995, apply to projects within federal jurisdiction which may have significant effects on the environment, including BHPB Ekati Diamond Mine Project. Usually, the regulators of a particular project or the Responsible Authorities (RA) determine what the follow-up program should entail. CEAA's guidelines require screening to identify potential environmental and socio-economic impacts, but do not outline requirements for the follow-up to these assessments or specify how follow-up should be carried out. Although activities carried out in follow-up programs are required by licensing conditions, follow-up is not explicitly demanded[6].

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[6]CEAA compels regulators to require follow-up studies as needed but does not compel anybody to actually do follow-up. Follow-up is also now required under CEAA 2003 for projects undergoing comprehensive study Environmental Assessments

According to the *Canadian Environmental Assessment Act* Section 5 (c) and (d), an environmental assessment of a project is required before a federal authority exercises one of the following powers or performs one of the following duties or functions in respect of a project, namely, where

> a federal authority has the administration of federal lands and sells, leases or otherwise disposes of those lands or any interests in those lands, or transfers the administration and control of those lands or interests to Her Majesty in right of a province, for the purpose of enabling the project to be carried out in whole or in part; or under a provision prescribed pursuant to paragraph 59(*f*), issues a permit or license, grants an approval or takes any other action for the purpose of enabling the project to be carried out in whole or in part.

The *Act*, as pointed out earlier, does not normally apply in the Mackenzie Valley, where BHPB is located, unless under special circumstances, rather it is administrated through the MVRMA. In addition, it is important to note that although BHPB's Ekati, predates passing of the *Act* itself; BHPB's assessment was carried out in the 'spirit' of CEAA (Ross, 2003).

The MVRMA was established by the federal government to devolve responsibility in environment and natural resource matters to the people of the North, while increasing decision-making participation (See sec 3.1). The MVRMA established co-management bodies for two settlement areas: the Sahtu Dene and Gwich'in. The MVRMA also establishes the MVLWB, mandated to issue land use and water permits in those areas in the Mackenzie Valley where comprehensive Land Claims are not in place. The MVRMA requires that implementers do follow-up on issues that are *important* and those which developers are 'uncertain' about. BHPB carried out environmental monitoring as part of company policy and to fulfill requirements set out in licenses and permits, some of which are issued by the MVLWB (Table 4.1).

Federal and territorial governments play the role of regulating requirements for EIA follow-up programs as signatories to the Environmental Agreement for the BHPB Ekati Diamond Mines. The Environmental Agreement laid out requirements for, among other things, Environmental Management Plans that include: Air Quality Management Plans, Materials Management Plans, Wildlife Management Plans, (which encompass among others, grizzly, caribou and the effects of esker disturbance on wildlife), Traffic

Management Plans, Water Management Plans, Quarry Management Plans, and Environmental Monitoring Programs (including among others, quality control and assurance programs and, detailed environmental mitigation measures). Elements being followed up are specified in the Environmental Agreement. As reported earlier, specifics include the Minister having the power to require that environmental management be carried out to his/her satisfaction.

Table 4.1: Licenses and permits that require BHPB to carry out follow-up.

License/Permit	Issuer	Follow-up Requirements
Water License MV20001L2-0008	Mackenzie Valley Land and Water Board	Among other requirements, a description of the sampling program, statistical design criteria
Water License N7L-1616	Northwest Territories Water Board	Among other requirements, a description of the sampling program, statistical design criteria
Surface leases/ Land use permits MV2001X0071 and MC2001X0072	Mackenzie Valley Land and Water Board	Among other requirements, BHPB shall ensure there is no disturbance to archaeological, historical or burial sites and expand the Wildlife Effects Program to include the Pigeon Area.
The Environmental Agreement	Signed between Canada (Indian and Northern Affairs Canada,) GNWT (Resources, Wildlife and Economic Development) and BHPB	Among other requirements, carry out follow-up to ensure that respect and protection of land, water, wildlife and the land-based economy
Fisheries Authorization	Signed between Canada (Department of Fisheries and Oceans) and BHPB	Among other requirements, follow-up on effects to ensure that altered habitats are compensated for.
Sable and Pigeon Land use permits MV2001x0071 and MV2001x0072	Mackenzie Valley Land and Water Board	Among other requirements, minimize damage to fish and wildlife habitat, minimize disturbance to wildlife
Approval under Navigable Waters Protection Act	Department of Fisheries and Oceans	Among other requirements, follow-up to ensure that construction material and debris are not allowed to become waterborne.
Authorization for Works or Undertakings Affecting Fish Habitat	Department of Fisheries and Oceans	Among other requirements, census of fish populations, water quality at Kodiak lake.

Source: Official IEMA website. http://www.monitoringagency.net/

BHPB's HSEC policy also contributes to requirements for follow-up. This corporation-wide environmental policy focuses on the use of evolving science where BHPB take advantage of newer forms of science, and the consideration of the welfare of affected communities. The HSEC policy states that BHPB will develop, implement and maintain environmental management systems that identify, assess and manage risks to the environment (BHPB Ekati EIR April, 2003).

Requirements which the BHPB Ekati project has to meet in its EIA follow-up programs are enforced by the Minister for INAC and his designates. Because the Ekati project is on territorial lands, INAC is responsible for 96% of the lands and resources, except wildlife and forests which are now under the control of the GNWT. INAC inspectors visit the mine site to ensure that requirements are enforced and the IEMA [7],reviews and comments on monitoring and management plans and their results (Ross, 2003b).

Discussion:

Legislation and regulation covering BHPB influence responsibility and guidelines for follow-up actions. Regulatory agencies present a structure of supervisory responsibility over BHPB's follow-up programs, however there is need for close liaison and networking between these regulatory agencies for a more complete picture of how they oversee follow-up. The current structure is not sufficient; follow-up is not mandatory for Ekati for all aspects of the project-particularly socio-economic elements such as employment and communities' livelihoods. Moreover, follow-up is 'suggested' and is only necessary for ensuring continued licensing.

Section 16 (d) of the *Canadian Environmental Assessment Act* stipulates that all screenings, all comprehensive studies of projects, and review panels shall include "measures that are technically and economically feasible and those that would mitigate significant adverse environmental impacts of projects." These requirements form the link between EIA and follow-up programs, as follow-up determines that mitigation

[7] There have been other instances of panels that have overseen environmental management but their outfits have been largely different than IEMA's. NATO's Low level flying in Labrador for example, had

measures are actually technically and economically feasible. However, other aspects that comprise follow-up are not specified in federal legislation. This nature of regulation or the lack thereof translates to ineffective follow-up programs, or to no follow-up at all in many industry and federal projects. For BHPB, such a situation compelled the enactment of the project Environmental Agreement to clarify ambiguities and fill gaps about EIA and follow-up requirements.

Amendments to legislation should firmly require follow-up, but in such a manner as to take account of the diversity of EIA and follow-up situations in private, public-corporate and government projects.

4.1.2 Legislation and Guidance that Sufficiently Covers the Scope of Follow-up

Criteria:

Legislation should be able to direct if not specify that all projects follow-up on all issues or aspects that relate to the nature of the particular development. For effective environmental management, follow-up scope spans the entire environment: biophysical, social, cultural and economic.

Observations:

Documents that guide the scope of BHPB's follow-up include the BHPB Ekati Diamond Mine Environmental Agreement and the Fisheries authorizations. The BHPB Environmental Agreement guides the process and timing of follow-up programs while HSEC Policy (Table 4.2) provides guidelines for the implementation of socio-economic programs. The July 1995 EIS reports that public scoping meetings were convened to determine BHPB's follow-up scope. The BHPB Environmental Assessment Panel under the then Federal EARP - now the Canadian Environmental Assessment Act (Table 4.3) – served to ensure that this scope was adhered to.[8]

Water licenses as detailed in the EIS April 2003 require a description of how the results of these follow-up programs will be incorporated in BHPB Ekati's overall adaptive environmental management strategies. The Water Licenses MV20001L2-0008

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an agency, but not as a watchdog or as an overseer; the Institute for Environmental Monitoring and Research's role was research.

[8] Requirements under the newly enacted CEAA do not apply to BHPB; BHPB is only required to implement requirements drawn up under the EARP.

and N7L-1616 outline actions necessary for follow-up of water environments. Water License MV20001L2-0008 gives guidelines on the timing of follow-up procedure for the Aquatic Environments follow-up programs (AEMP) and Water License N7L-1616 gives guidelines on the timing of follow-up procedure for the Water Effects Monitoring programs at Ekati.

CEAA defines “Environment” in section 2 (1) b (see chapter 2 (ii) of this thesis). As indicated in the April 2003 EIR, BHPB Ekati have implemented follow-up programs in response to these requirements: the Aquatic Effects Monitoring Program, the Air Quality Monitoring Program, the Wildlife Effects Monitoring Program, WEMPS, the Archaeological Management Program, and the HSEC Policy Program.

Table 4.2: BHPB's Health, Safety, Environment and Community, HSEC Policy

At BHP Billiton, we are committed to sustainable development. Health, safety, environment and community responsibilities are integral to the way we do business.
We commit to continual improvement in our performance, efficient use of natural resources and aspire to zero harm to people and the environment.

Wherever we operate we will:

1. Develop, implement and maintain management systems for health, safety, environment and the community that are consistent with internationally recognized standards and enable us to:
    - identify, assess and manage risks to employees, contractors, the environment and communities
    - strive to achieve leading industry practice
    - meet and, where appropriate, exceed applicable legal and other requirements
    - set and achieve targets that include reducing and preventing pollution
    - develop our people and provide resources to meet our targets
    - support the fundamental human rights of employees, contractors and the communities in which we operate
    - respect the traditional rights of indigenous peoples
    - care for the environment and value cultural heritage
    - advise on the responsible use of our products.
2. Seek opportunities to share our success by:
    - working with communities to contribute to social infrastructure needs through the development and use of appropriate skills and technologies
    - developing partnerships that focus on creating sustainable value for everyone.
3. Communicate with, and engage, employees, contractors, business partners, suppliers, customers, visitors and communities to:
    - build relationships based on honesty, openness, mutual trust and involvement
    - share responsibility for meeting the requirements of this Policy.
    - review regularly and report publicly our progress and ensure this policy remains relevant to the needs of our stakeholders. We will be successful when we achieve our targets toward our goal of zero harm and are valued by the communities in which we work.

Source: BHPB Ekati EIR April, 2003: iv

Table 4.3**:** Section 16 (1) of CEAA: Factors to be considered in follow-up

16 (1) Every screening or comprehensive study of a project and every mediation or assessment by a review panel shall include a consideration of the following factors:
(a) the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project *(b)* the significance of the effects referred to in paragraph (*a*), *(c)* comments from the public that are received in accordance with this Act and the regulations; *(d)* measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project; and *(e)* any other matter relevant to the screening, comprehensive study, mediation or assessment by a review panel
Additional factors
(2) In addition to the factors set out in project and every mediation or assessment by a review panel shall include a consideration of the following factors:
(a) the purpose of the project; *(b)* alternative means of carrying out the project that are technically and economically feasible and the environmental effects of any such alternative means; *(c)* the need for, and the requirements of, any follow-up program in respect of the project; and *(d)* the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future.
Determination of factors
(3) The scope of the factors to be taken into consideration pursuant to paragraphs (1)(*a*), (*b*) and (*d*) and (2)(*b*), (*c*) and (*d*) shall be determined *(a)* by the responsible authority; or *(b)* where a project is referred to a mediator or a review panel, by the Minister, after consulting the responsible authority, when fixing the terms of reference of the mediation or review panel.
Obligations /Factors not included
(4) An environmental assessment of a project is not required to include a consideration of the environmental effects that could result from carrying out the project in response to a national emergency for which special temporary measures are taken under the *Emergencies Act*.

Source: CEAA, 1992b.

On the follow-up of aspects unique to a project, Section 16. (1) *(a)* of *the Canadian Environmental Assessment Act* which applies to projects outside the Mackenzie Valley, states:

> Every screening or comprehensive study of a project and every mediation or assessment by a review panel shall include a consideration of the following factors: *(a)* the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out; *(b)* the significance of the effects referred to in paragraph (*a*).

The statement encompasses the possibility that projects will have effects that are unique and not common to other development projects in terms of location or type of development or any other factor that may create an uncommon experience with effects. This guideline, although not specific to the follow-up sections of environmental assessments, covers the environmental assessment program of which follow-up is part and is an indication of the importance of using legislation to eliminate the likelihood of certain effects not being addressed.

Discussion:

BHPB's follow-up program is heavily dependent on the Environmental Agreement and its internal policies, licenses and permits to shape its follow-up programs. Still, the way is not clear for the implementers and there is need for a consolidated piece of legislation covering EIA follow-up scope. BHPB have deposited a security bond with the government for the costs of cleanup after closure in 2015. The details of BHPB's post-operative cleanup are being currently prepared in the Abandonment and Reclamation Plan (A & RP) subject to approval by the IEMA.

Under the *Act,*the definition of follow-up is as unclear and as ambiguous as follow-up scope, and 'follow-up' has been interpreted to mean different things to various participants in the EIA process (Gartner Lee Ltd, 1999). Practitioners believe follow-up includes only routine monitoring activities as identified by the proponent or the RA. Follow-up lifetime is just as unclear, and therefore application of follow-up duration varies and is by no means adequate. Current requirements under legislation are open-ended about the limits of the follow-up programs, but implementers must ensure that all of the significant impact predictions can be followed up with post-implementation monitoring. BHPB, in the Environmental Impact Report (2003), report that they followed-up on elements which are of greatest importance to stakeholders (Table 4.4),

and those that had the greatest likelihood of adverse affects from mining activities. More specifically, they were chosen depending on:

- ecological significance,
- societal value,
- conservation status,
- state of knowledge, and
- sensitivity to stressors.

Table 4.4: Elements that are followed up at BHPB Ekati. These are also VECs which determine scope, goals, and objectives of BHPB Ekati's EIA follow-up programs and are used to assess and document environmental change.

- ambient water, including quality, hydrology, lake and stream ecology and ground water
- wildlife including caribou and bears, wolverine: wilderness value, low population density, low reproductive capacity, and sensitivity to disturbance.
- archeological site investigations and reclamation including revegetation success, soil suitability, and the diversity and density of plants
- esker disturbances
- vegetation including the loss of habitats
- permafrost
- climate at the permanent camp
- ambient air quality and stationary emission sources.
- air quality and climate
- snow surveys
- traditional knowledge
- particulate matter (roads, blasting)

Source: BHPB Ekati EIR April, 2003: 22; April 2000: 110 and Environmental Agreement, Article vii

Considering the scope covered by BHPB's follow-up programs, instruments and bodies that impose mandatory requirements on BHPB (See Tables 4.1 and 4.2) are sufficient for this project and these arrangements, and even though fragmentary, are effective in enforcing follow-up insofar as the scope of follow-up is currently established under legislation. Gartner Lee Ltd. (1999) note that in the case where a project induces large-scale environmental change or affects a sensitive environment a follow-up program's spatial and elemental scope could be quite complex, involving elements that address a number of environmental components over extended periods of time. In BHPB's case, environmental management plans and programs include environmental monitoring programs which cover the scope of follow-up of EIA

activities. BHPB report in their April 2003 EIR that the HSEC policy contributes to the tracking of socio-economic effects of the project. As part of sharing of their success with surrounding communities, this policy follows- up on, for example, development of social programs such as alcoholism awareness programs for use by these communities. However, in BHPB's statements on elements they are following-up on in the same EIS, socioeconomic elements are not included (See Table 4.4).

BHPB's follow-up is done on the effects of the mining operations on the pit groundwater, water quality, lake biology, wildlife, wildlife habitat, stream biology, hydrology, reclamation, vegetation, permafrost, and climate. BHPB's Environmental Agreement encompasses all elements of the biophysical environment and has gone beyond the immediate time frame of BHPB's existence to include environmental management post-closure. However**,** there is an obvious lack of socioeconomic elements in the Environmental Agreement. This is due in large part to the fact that under current legislation follow-up of socioeconomic effects is only an indirect requirement (Noble and Storey, 2004).

4.1.3 Availability of Procedural Guidelines to Practitioners

Criteria:

Practitioners need access to clear, relevant and achievable procedural guidelines for follow-up implementation which goes hand in hand with a lucid understanding of responsibility by practitioners.

Observations:

It appears that guidance for carrying out EIA follow-up is mostly on a sectoral basis. As pointed out before, the BHPB Ekati Diamond Mine EIS is a directional tool for the follow-up programs, while BHPB's Environmental Agreement explicitly calls for follow-up to the EIS.

The BHPB Diamond Mine Environmental Assessment Panel in May 1995 issued 'Final Guidelines for the Preparation of an EIS' (Table 4.5). In the July 1995 EIS Report on the Environmental Setting, five principles and over forty elements within these principles were required in the report by this Panel, established by the Government

of Canada pursuant to the Environmental Assessment and Review Process Guidelines Order. BHPB'S EIS was prepared in reference to these requirements.

Table 4.5: Final Guidelines for the Preparation of an EIS

1. EIS Overview
    - Study strategy and method
    - Traditional Knowledge
    - EIS presentation and conformity with guidelines
    - EIS Summary
    - Introduction
2. The project setting regional context
    - Land claims
    - Regulatory Environment
3. Project Description and overview
    - Management plans
    - Commitment and policies
4. Environmental assessment boundaries
5. Methods
    - Physical Setting
    - Biological Setting
    - Socio-Economic Setting
    - Cumulative Effects-Boundary Definition
6. Description of the existing environment
    - Biological Setting
    - Socio-Economic Setting
    - Cumulative Effects-Boundary Definition
7. Physical Environment
    - Geology
    - Permafrost
    - Ground Instability
    - Hydrology Water Quality
    - Sediment Quality
    - Air quality
    - Climate
    - Other components

Source: EIS July1995 Volume 111-Environmental Management: xiv

In addition, follow-up guidelines in BHPB Ekati's mine project are specified in the water Licenses 1616 and 0008 (Tables 4.6 and 4.7; and See sec 4.1.2) while the Environmental Impact Report 2003 shows that the Wildlife Management plans elaborate how to track and control effects on wildlife affected by BHPB Ekati's operations and that the Environmental Agreement for BHPB Ekati Diamond Mines operations specifies some guidelines for follow-up implementation.

Table 4.6: Water License MV20001L2-0008: Guidelines/Requirements for the Aquatic Environments follow-up programs (AEMP); and Water License N7L-1616: the Water Effects Monitoring programs at Ekati

BHPB follow-up programs must include:

- Objectives of the follow-up program which must be clearly identifiable
- A description of the area to be monitored including maps. The maps include all sampling and control sites and the overall predicted zone of influence of the project.
- An evaluation of existing baseline data, the identification of additional baseline data required to support an effective follow-up program. A description of how the additional information is going to be collected should be included.
- A description of the sampling program which will be conducted throughout the project to achieve the objectives of the follow-up program. The variables, sample media, monitoring protocols and Quality Assurance/ Quality Control QA/QC Procedures.
- Statistical design criteria, including a description of sampling frequencies for each parameter that ensures both accurate characterization of short-term variability and the collection of sufficient data to establish long-term trends
- A description of procedures to analyze and interpret data collected.
- A description of the evaluation criteria for the follow-up program, including a description of strategies to modify and refine the program.
- A description of how the results of this follow-up program will be incorporated in BHPB Ekati's overall adaptive environmental management strategies.
- The QA/QC procedures must ensure that any future changes in future protocols will be adjusted precisely to initial monitoring protocols and data sets so that continuity, consistency, validity, applicability of follow-up results are maintained.
- Explicitly described measures that will be taken to identify and address information deficiencies.

Source: Official IEMA website. http://www.monitoringagency.net/

Table 4.7 The Scope of the BHPB Ekati Diamond Mine's Aquatic Effects (AEMP) and Water Effects Monitoring Programs as provided by the water licenses MV20001L2-0008 and N7L-1616.

a)The follow-up programs shall include process for measuring Project-related effects in water quality, sediment quality, transport and deposition; surface and shallow groundwater flow regimes, fish (On License 0008 , includes fish habitats as defined by the *Fisheries Act*) migration routes and lake recharge rates, retention times and dilution factors; structure, abundance and productivity of phytoplankton, littoral periphyton, zooplankton, benthic micro invertebrates and fish communities and; contaminant levels in fish tissues and indicators of fish health; b) The establishment of sufficient control sites (license 0008 specifically requires three sites) outside the immediate zone of influence of mining operations and associated activities to provide the necessary information on reference conditions including a detailed rationale for site selection; an assessment of adequacy of baseline data for representing development conditions, and an appraisal of the representatives of each site(s) (license 0008 requires appraisal of the adequacy of each site). c) The establishment of sufficient monitoring sites within the zone of influence. d) A description of the procedures that will be used to minimize the effects of the Water EMP program on fish populations. e) A description of the approaches to be used to annually evaluate and adjust the AEMP e) A description of the procedures that will be used to assess the accuracy of BHPB Ekati Diamond Mines' impact predictions and to evaluate the effectiveness of their mitigation measures. f) A detailed description of how the data collected in the Water EMP program will be used to identify the need for additional mitigation strategies to minimize the impacts of the Project.

Source: Official IEMA website. http://www.monitoringagency.net/

Interview data from private practitioners revealed that the MVLWB contributes guidelines for land use which applies to BHPB Ekati Diamond Mine, while Environment Canada advises the MVLWB. Health Canada, DIAND and NRCAN also provide guidelines applicable to the follow-up programs that the MVLWB oversees.

Discussion:

Specific action requirements in the instruments mentioned above are clear; however, there is need for clarification of the responsibilities of the RAs. For example, the wording of the *Act* regarding follow-up responsibility creates ambiguity resulting in confusion among federal authorities as to the role of an RA in the absence of follow-up related regulations. According to Section 38 of the *Act*, where an RA takes a course of action pursuant to section 20(1) (a) or 37(1) (a),

> ‘it shall, *in accordance with any regulations made for that purpose*, design any follow-up program that it considers appropriate for the project and arrange for the implementation of that program’.
>
> In addition, an RA shall, in accordance with any regulations made for that purpose, advise the public of:
>
> 1. its course of action in relation to the project;
> 2. any mitigation measures to be implemented for the adverse environmental effects of the project;
> 3. the extent to which the recommendations set out in any report submitted by a mediator or a review panel have been adopted and the reasons for not having adopted any of those recommendations;
> 4. any follow-up program designed for the project; and
> 5. any results of any follow-up program.

Some federal authorities understand that this section comes into force when a regulation requiring follow-up is in place and therefore, are not designing or implementing follow-up. There is also ambiguity with the word ‘appropriate’ and this is why the proposed best practice framework calls for clear detailing of actions and responsibilities.

One of CEAA’s Operational Policy Statements, (OPS) on the other hand, provides a start, for general follow-up issues (Table 4.8), but agencies and departments need to develop guidelines that are specific to their own areas of concern and not rely completely on the Policy Statement guidelines. CEAA, in the OPS, simply provided a guide to the roles of players and outlined points to be considered in the preparation of a follow-up program. These guidelines only released in 2004, are yet to be widely adopted in follow-up programs.

Table 4.8: Follow-up guidelines from CEAA's Operational Policy Statements

1. What is the primary purpose of the program? Is it to verify the accuracy of the predictions on the type and extent, and severity of environmental effects that may occur? Is it to verify that mitigation measures are effective and adequate?
2. Based on the purpose of the program, what should be measured? How? When? Where? How often?
3. Will the proposed measurement techniques be able to distinguish between changes resulting from the project and changes resulting from other factors?
4. Will the proposed measurement techniques provide answers that are within the accuracy required for the primary purpose for which the information is being collected?
5. How long should the program continue?
6. Is the information being collected in the most efficient manner possible?
7. Are the relative roles of the proponent, RA, expert Federal Agencies, and other agencies clear in relation to the program?
8. How will the results be disseminated?

Source: CEAA, 1992

Requirements from Health Canada, DIAND and NRCAN are effective but need tightening and consistency. For example BHPB's EIR April 2003 indicates that BHPB Ekati's follow-up program is guided by effluent standards on License N7L-1616, but a different set of standards exists in license MV20001L2-0008 concerning the BHPB Expansion Program (Sable, Pigeon and Beartooth). These licenses do set out clear guidelines and requirements to be implemented in the follow-up programs on the water environments but lack consistency. Requirements are mandatory whereas guidelines are not, but are necessary and important as beacons for actions.

Gartner Lee Ltd. (1999) say that besides not having guidelines on how to carry out follow-up, practitioners lack resources to implement follow-up. For federal projects, departmental resources do not include funding and qualified staff. Gartner Lee Ltd. (1999) go on to say that it is even more difficult to obtain funding for EIA and follow-up programs that are long-term. The above procedural guidelines are from BHPB'S experience, feasible and achievable. The water licenses have again contributed

significantly to follow-up of predicted effects and environmental management. Concern remains with coverage of socio-economic aspects and the clarity of available guidelines.

4.2 Principle # 2: A Results-Oriented Approach

The Environmental Impact report released 2003 reveals that BHPB Ekati Diamond Mine has achieved biophysical environmental management goals, guided by clear objectives set at the outset of the follow-up programs. Baseline data that described the project setting before operations at the BHPB Ekati Mine began were significant, by providing background for environmental conditions that were required in the EIA and follow-up programs. Careful planning meant that follow-up programs were designed in such a way that informed management actions could be implemented.

4.2.1 A Clear Statement of Goals and Objectives

Criteria:

Clarification of the need for and importance of follow-up facilitates desirable actions. An explicit and agreed-upon set of objectives for any follow-up program is fundamental to its success.

Observations:

BHPB EIA follow-up goals and objectives were identified during the initial EIA at the time of signing the Environmental Agreement, and are succinctly laid out in structure and procedure in the EIR released April 2003 (One such example, 'water' is illustrated in Table 4.9). Other components of BHPB's follow-up program are laid out in four distinct sections of the report, namely:

- air- focusing on climate and ambient air quality;
- land - focusing on permafrost, vegetation, reclamation and wildlife;
- water- focusing on hydrology, water quality and biota (Table 4.9);and

socioeconomics- focusing on direct NWT employment, and purchase of goods and services in the NWT.

Table 4.9: The structure of the Water Monitoring Plan

Position: The Water Monitoring Plan is part of the Aquatic life and Hydrology follow-up programs Structure: Two components: **1.** Environmental monitoring measuring the biotic, abiotic, and physical parameters on aquatic life, water quality and hydrology **2.** Operational monitoring which measures water control aspects of project activities. Goal: Provide data for monitoring a range of water management parameters for all phases of the BHPB's Diamond project. Strategy: Frequent monitoring of water above and below sites to identify and assess potential impacts from mine activities. Water flows around monitoring sites and receiving environment will also be frequently monitored.

Source: BHPB Ekati EIR April, 2003: 23

The April 2003 EIR shows that BHPB's EIA follow-up program determines whether the goals outlined in the environmental monitoring program were achieved. The objectives of BHPB's monitoring programs are:

- Ensure and maintain compliance with government guidelines and permit/ license requirements (regulatory compliance).
- Evaluate the effectiveness of mitigation actions - For example, in the case of the construction of a culvert at Pigeon to avoid disturbance of fish habitats, IEMA assessed the success of this effort and concluded that it created more problems by blocking a natural corridor used by caribou.
- Monitor natural cyclic changes.

- Measurement of operational performance, monitoring natural changes, as well as those caused by the project (environmental effects monitoring).[9]
- Continuously reduce uncertainty (the Wildlife Effects Management Program)
- Determine the environmental effects of mining activity (the Wildlife Effects Management Program)
- Triggering response and mitigation to unexpected adverse effects.
- Determine the accuracy of predicted environmental impacts of the mining project (Table 4.10).

Within the broad follow-up objectives, each monitoring program has its own set of specific objectives: for example, to ensure that effluent discharge at the containment pond is within a specified threshold, having no negative effect on migrating caribou. Notwithstanding the examples in Table 4.10, the researcher was informed in interviews with the IEMA that BHPB's follow-up objectives were initially broadly defined but fine-tuned as the project unfolded. The EIS shows that goals and objectives for the follow-up program were guided primarily by license requirements, regulatory instruments, the Environmental Agreement and BHPB Ekati's self-regulatory initiatives and the Environmental Impact Statement (1995). For example, there were predicted effects on landscape disturbance with mitigative measures involving restoring the land to productivity, re-establishing physical landforms to safe conditions and protecting water resources. In one mitigation technique, bundles of vegetation and soil (tundra plugs), were to be transplanted to depressions and near protective boulders. Growth of the vegetation has been monitored consistently.

[9] The construction of the culvert crossing at Pigeon stream along the new Sable haul road is an example of a challenge that regulators and BHPB faced. The culvert was designed in a way to avoid disturbing fish habitat but this created problems of potentially blocking movement corridors for caribou. This is a failure in the objective of minimizing terrestrial and aquatic impacts.

Table 4.10: Predicted biophysical and socio-economic impacts and their accuracy

Predicted Impacts	**Observed Effects 2000-2002**
Negligible residual effects on air quality from fuel combustion	Low emission of gases; no acid deposition
Risks to caribou from eating contaminated plants (Some plants grow on processed kimberlite)	No danger to caribou
Negligible residual effects on air quality from fugitive dust	Annual TSP concentration at Ekati affected by vehicular traffic
Negligible modification to terrain and permafrost	Negligible effects from most activities
Negligible loss of vegetation cover	Habitat loss is approx. 57% of what was predicted
Alteration of groundwater flow	No detectable effects on overall hydrologic system
Drainage alteration	Changes in the surface drainage patterns in the Koala watershed due to the Panda Diversion Channel
Employ 650 to 850 people in each full year	Currently employs an average 650 people
Generate annual revenues of $400 million to $500 million.	BHPB is generating annual revenues of $300

Source: Agency Annual report; 203-2004; areaminera ;*BHPB Ekati EIR April, 2003: 86 and interviews*

Discussion:

Each of BHPB's follow-up sections include a monitoring plan for the area, and a description of the parameters, methods, locations, and frequency of monitoring directs program implementers towards program ends.

However, in interviews, IEMA were of the view that for BHPB Ekati the 'Statement of Purpose' in the Environmental Agreement is voluminous and EIA follow-up program goals and objectives are not easily implemented - the goals and objectives should have

been in checklist form for clarity. Goals represent general aims while the objectives represent the finer details of what BHPB set out to achieve. For its part, the Environmental Agreement only states that BHPB need to monitor caribou, for example. IEMA are of the view that this directive could have been clearer, goals are broad and there is a lot of expectation that mitigation will work out well despite the fact that there are no details associated with the specific requirements. IEMA say that BHPB's follow-up goals and objectives need to be specific and results-based; criteria need to be set out if possible.

From interviews with follow-up experts and the IEMA, the researcher learned that BHPB's Diamond Mine Project follow-up goal is to meet license requirements and to have no effect or contain effects within specified thresholds on the surrounding environment. BHPB's environmental policy goals include the achievement of high standards of environmental management during the course of BHPB's operations.

Environmental management plans aim to preserve ecosystem integrity and prevent and mitigate environmental effects and to report on the longer term impacts. BHPB have clarified in the EIR (April 2003) what they consider to be impacts and hence the focus of follow-up:

> An effect on a VEC that adversely affects the utility or viability of that VEC. For instance, decreased oxygen levels in lakes will at a certain level and/or at a certain time, kill fish. Similarly, an increase in particles in the water (suspended solids) 'that inhibits light penetration can reduce the productivity of plants that depend on that light. Building a road can result in caribou dying in vehicle collisions.

BHPB state that the 'effects' they are following–up are defined as:

> …a change to a VEC due to human activities. For instance, building a road can change caribou migration routes. An effect is not necessarily a negative impact; an effect may be neutral, or even positive. For instance, a change in caribou migration routes may not adversely impact the caribou. Replacing one fisheries habitat with another may enhance the fishery.

Those implementing BHPB Ekati's EIA follow-up program are guided by three distinct approaches to these objectives; environmental, operational and socioeconomic, and follow-up experts and practitioners informed the researcher that goals and objectives set in-house are not generally problematic to implement. Also delineating the ends of

follow-up programs, VECs determine the value and validity of a follow-up program. Decisions on what aspects of the project environment are VECs (See Table 4.4) and which are not helped delineate follow-up goals and objectives on the principle that not all aspects of the environment need to be monitored all the time, or everywhere. That being said, these practices do not hold true for socio-economic follow-up which, in comparison to the biophysical effects, lack any sort of objectives-driven approach. Overall however, IEMA are of the opinion that BHPB is successful achieving those goals and objectives that are set out for the follow-up programs (Table 4.11).

Table 4.11: Examples of ways in which BHPB Ekati has achieved follow-up objectives

Impact Elevated Levels of chemicals from a nearby storage facility found in Kodiak Lake. *Amelioration* Chemicals were moved and the storage pad dug up and removed. *Impact* Ducks were covered in oil around the place where oily soil and water are kept. *Amelioration* Area was surrounded by wire and flagging tape to scare the birds. As well the area was drained more often. *Impact* Wolverine were scavenging in the garbage. *Amelioration* Garbage management was changed to decrease the number of wolverine visiting the garbage site. *Impact* On water and wildlife. *Amelioration* Aquatic and Wildlife monitoring programs are regularly based on monitoring results from previous seasons. *Impact* Disturbance on land - loss of vegetation due to construction of camp infrastructure *Amelioration* Transplanting tundra plugs in depressions or near protective boulders, transplanting sprigs of aquatic grasses along channels and stream banks; planting of willow cuttings and bundles in stream channels, growing seedlings in green houses, and transplanting at the mine site, and collecting and sowing native seedlings. *Impact* Lake dewatering and stream diversion will result in the harmful alteration and destruction of fish habitat in the lakes and streams. *Amelioration* Compensation through habitat creation and enhancement through the diversion channel constructed to divert water from Panda Lake to Kodiak Lake.

Source: BHPB Ekati EIR April, 2003

One example raised by IEMA during interviews was BHPB's objective to eliminate kitchen garbage from the project site as wolverine were feeding on the waste. As a

mitigatory measure, BHPB put skirting around buildings so that animals could not get under the kitchen area and ensured waste from bag lunches ended up incinerated and not in the landfill where the smell would attract animals. Regular surveys of the dump are carried out and an employee education program is in place to spread awareness on the importance of proper disposal. BHPB releases annual reports which explore whether these effects are significant, positive or negative. Tracking and verification is guided by cross-reference to the 1995 EIS, April 2003 EIR, regulatory and negotiated agreements, and BHPB's OEMP. Cross-referencing ensures that follow-up programs include operations that accomplish stated goals and objectives.

Concerns expressed by affected communities are said to be considered in follow-up implementation during the annual meetings and workshops. Experts interviewed believe that a series of follow-ups both shorter term and longer-term would increase the capacity to track and verify actual impacts. Shorter term follow-ups may be within longer term follow-programs where they focus on a specific VEC. Both hypotheses and MAELs are used in BHPB's follow-up programs. For example, BHPB applied statistical tests on lakes potentially affected by BHPB's mine development. Using BACI tests as hypotheses on aquatic effects, implementers found that affected lakes, which are the parameters in this case, behave in the same fashion as the control lakes and their parameters. MAELS were used in the setting of ammonia standards on and around misery pits, one of the pits where diamonds are harvested. Similarly, MAELS were also used for water effluents, like copper concentrations.

4.2.2. Balance of Timing when Determining Follow-up Program Design

Criteria:

Follow-up programs need to be conceptualized, and considered early in the EIA through the identification of key environmental indicators during the scoping phase. However, the intricate details of the follow-up program, including specific sampling frames, spatial, and temporal attributes should be developed at a time when project design and schedules have been more precisely defined.

Observations:

As discussed in earlier sections of this chapter, BHPB's follow-up programs have been fashioned after, and implemented through, license requirements and environmental

management programs. As experts interviewed revealed, the stage at which follow-up programs are determined depends on the design/issues; it could be at the baseline study or later after permitting has taken place (issue dependent). The situation is no different for BHPB. Section 5, 2 (i) of the *Act* says, in relation to the time when an Environmental Impact Assessment is planned;

> '…the federal authority shall ensure that an environmental assessment of the project is conducted as early as is practicable in the planning stages of the project and before irrevocable decisions are made.'

The broad principles which included BHPB's Environmental Monitoring Programs' mandate (Table 4.12) for the follow-up agreement were established at the signing of the Environmental Agreement and the Fish Habitat Compensation Agreement, whose details were agreed upon as the project and environment management unfolded. As suggested under this principle of balanced timing, the constituents of the follow-up program should be proposed during the EIA phase (before a decision is made). For example, in light of IEMA's important role in BHPB Ekati's follow-up programs, budget allocations and design for the IEMA were set forth in the Environmental Agreement signed January 1997. This represents one way in which BHPB Ekati's follow-up programs were accounted for from the beginning, in financial and human resource terms. Many aspects essential to the follow-up program were drawn up in the Environmental Agreement which preceded operations at the Ekati Mine.

In the Agreement, in which an ecosystem approach to monitoring is recommended, reporting, accountability and budgeting for the follow-up programs are also laid out. Determination of follow-up priorities in the Environmental Agreement occurred at the same time as VECs were identified in the period leading to January 1996; as pointed earlier, this Agreement preceded all mine project operations and environmental management at the mine site.

Table 4.12: BHPB Ekati Environmental Monitoring Programs' mandate

- Measure compliance with regulatory requirements;
- Determine the environmental effects of the project;
- Test impact predictions and;
- Measure the performance of operations and effectiveness of impact mitigation
- Continuously reduce uncertainty (the Water EMP)
- Determine environmental effects of mining activity (the Water EMP)

Source: BHPB Ekati EIR April, 2003: 22

When necessary, follow-up programs are revised and improved. As a contribution to timely design of impending programs, technical workshops were held every February but are now held every three years give a good opportunity for reviewing findings and making changes to the follow-up programs**.**

Discussion:

BHPB have met this criterion for designing and building follow-up programs. BHPB prepared early financially, as information relevant to the carrying out of follow-up actions emerged**.** BHPB follow-up programs reflect balanced timing of their design as they were recognized in the planning process, yet built up as actions to be taken became clearer. The Environmental Agreement played a crucial role in that it was an opportunity for those involved to discuss significant factors that needed to be considered in EIA follow-up at Ekati. Follow-up programs at Ekati have benefited from regular review during annual workshops which involved all stakeholders. These workshops, represent continual building up and refinement of follow-up programs.

4.2.3 Establishment of Baseline Data Pre-project

Criteria:

Baseline data are necessary in follow-up processes to assess and analyze the condition and value of the existing environment. This information is important for understanding the existing system prior to project development and for monitoring these components during and after project development.

Observations:

Data from interview discussions with EIA experts revealed that the EIA process requires the proponent to collect sufficient baseline information to describe the existing environment, provide accurate inputs for impact predictions and any assessment models, and provide a baseline (i.e. pre-development conditions) for comparison of actual project effects revealed through monitoring programs. The usefulness of baseline studies depreciates with time as a project proceeds, and it is therefore important to have on-going data in both the 'impact area' and 'control area'. The control area is a region within the project area acts as a balancing point. Follow-up practitioners establish areas that enable them to assess and determine the nature and level of changes in the impact area through comparison. The baseline environment study considers all elements of the environment that have the potential to be altered or affected by project operations. BHPB Ekati prepared for the EIA and follow-up programs by collecting data for the baseline environment sufficient to document natural variability impacts and changes over and above natural variability. For BHPB, it was important that the baseline studies reveal and document the status of the environment before the mining project was initiated. BHPB baseline studies sought to be encompassing enough so that there was sufficient description of the environment (Table 4.13). This included, for example, baseline wildlife studies (BHPB 1995).

Discussion:

Baseline studies and impact predictions are directly connected, and in BHPB Ekati's experience information in the literature and information gathered from local people was used to predict impacts and to develop mitigation measures so that residual impacts could be assessed.

Table 4.13. The Baseline Environment at Ekati

Carnivore and Herbivore species
Caribou, grizzly bears, wolves (three active wolf dens observed around the mine area in 2002), wolverine (numbers unknown crude estimate; 700-800 bears- surveys have been aborted due to harsh weather), wildlife habitat (muskoxen, muskrat push-ups and red foxes and Arctic foxes are excluded from the follow-up programs). Bathurst caribou with an estimated herd of 350, 000 in 2002 is the largest of the caribou herd.

Fish and Aquatic organisms
Lake trout, arctic grayling, round whitefish, burbot, longnose suckers, benthic invertebrates, Slimy sculpin.

Birds
Ptarmigans, Raptors (birds of prey) include bald and golden eagles, owls, hawks, peregrine falcons

Vegetation
The project setting is 100 kilometers above the treeline. Stunted shrubs and grass tussocks dominate the uplands while tall shrubs such as willows and scrub birch occupy depressions. Sedge willow varieties and water sedges grow on the wetlands.

Land history
BHPB Claim block is within the Dene and the Inuit land claim area. No permanent human settlement within the project claim blocks. The Dogrib Treaty 11 Band, which represents the communities of Wha Ti, Snare Lake, Rae Lakes and Rae-Edzo considers the Lac de Gras area as crucial to their continued existence as a people. The Yellowknives are negotiating with the federal government to have their treaty rights and entitlements recognized, including acknowledgment of their land rights in the project area.

Geology
The mine site is located within the geological region known as the Slave Geological Province

Source: Consolidated from the July 1995 EIS: Volume 11- Environmental Setting

The EIS included a report baseline studies. Baseline studies reported among other things, that grizzly, listed as an endangered species by the Committee of the Status of Endangered Wildlife in Canada (COSEWIC), and Bathurst Caribou elicited the most social concern from the community regarding the effects of the project. The studies also reported that arctic fish species are of limited species diversity with slow growth rates and late reproductive maturity and that the project claim block is within the Dene and the Inuit land claim area. This is an area marked by a majority Aboriginal population and that the economy is based on hunting and fishing and also on wages. This information is among a large data store that BHPB have relied on for their follow-up studies.

IEMA (2003) report that BHPB is reducing effects of the mine on grizzly and fish by changing its operations where there are grizzlies to ensure that grizzlies go through the area without harm. IEMA however assert that there are likely to be cumulative effects on grizzly bears that BHPB need to follow-up on.

BHPB also continue to follow-up on the effects of the mine on water and fish. Follow-up involves taking measurements in lakes and streams near the mine and then comparing with water not affected by the mine (control area). IEMA report that the mining activities change the quality of water but water and fish have so far not been affected.

Problems have, however, been predicted from follow-up experts concerned that BHPB did not and have not collected data for comparison over a practical period of time. However, Mulvihill and Baker (2001) observed that BHPB's baseline data were collected over only a single field season (1995- 1996). Considering that environments change over different seasons, a one-time collection of environment information will likely mean that predictions for changes will be inaccurate. The authors' concern is that the period of time for collection is not sufficient for data that would mark natural variability. Traditional Ecological Knowledge would contribute a longer term perspective to baseline studies.

4.2.4 Maintenance of Continuous and Consistent Data Collection

Criteria:

Timing, frequency and regularity of data collection determine follow-up efficiency; as these factors influence the credibility of follow-up data and consequently actions carried out in the follow-up programs.

***Observations*:**

BHPB follow-up programs started after release of the Environmental Impact Statement (1995). BHPB Ekati's monitoring of effects is expected to go on for about ten years after the mine has been decommissioned. This means that data collection for follow-up will continue long after the mine has stopped operating. Frequency of updating data has direct implications for the success of the follow-up program, as new impacts and new developments are identified over time. For example, on Snake Lake radionuclides were identified early in the course of continuous monitoring processes.

Experts in follow-up stated that it is important to identify such an impact quickly as potentially serious environmental damage may be caused.

By upholding the Environmental Impact Statement, regulatory and negotiated agreements, the OEMP, and community concerns as the key reference documents for baseline conditions and as the bases for follow-up at BHPB Ekati, BHPB ensure consistency in data collection. These are addressed for example, within the Aquatic Effects Monitoring Program and include re-evaluation and refinement of the monitoring parameters, the number of monitoring locations, and sampling frequency.
During each Annual Environment Workshop, BHPB Ekati provides opportunity for discussing the previous year's Aquatic Effects Monitoring Program, the Wildlife Effects Monitoring Program, and Air Quality and Reclamation programs. Stakeholders and responsible authorities are involved in these discussions. In the Aquatic Effects Monitoring Program for example, the MVLWB is responsible for approval of recommended changes to the follow-up programs. In this way, frequency, methods and equipment used in follow-up are checked and balanced on an annual basis. Consistency is maintained in the monitoring programs in terms of action, timing of data collection or implementation, targets (Tables 4.14 and 4.15), VECS and requirements. For in depth data collection BHPB have chosen sites close to the mine site, and others that are further from the mine site serve as control sites.

Discussion:

BHPB's data collection is regular and continuous and the establishment of specific programs for collecting data for different environmental components. For example, the Aquatic Effects Monitoring Program establishes structure for quality data collection. BHPB have attempted to retain consistency by reference to established agreements, monitoring control stations at distances from the site and through regular discussion and cross examination among stakeholders.

BHPB consider the importance of maintaining the same documents as bases for their monitoring program. Because of the attention to these standards and uniformity of actions, monitoring schedules are maintained and contribute to success through achievement of desired ends and results. Part of the success is the break down of monitoring into specific issue as shown in Tables 4.14 and 4.15. Frequency differs as shown in Table 4.15, as some VECs may require monthly and others yearly monitoring,

but no matter the frequency consistency is upheld through regularity of implementing monitoring phases.

Discussion and evaluation of the performance of already implemented follow-up actions ensures that inconsistencies are identified and deliberated among stakeholders and best alternatives chosen.

Table 4.14. Data collected in BHPB Ekati Mine's monitoring programs

Baseline monitoring (not a follow-up program but a start-up program) Scent stations collect wolverine fur for DNA sampling
Air Quality Monitoring Snow surveys, Vegetation studies, to determine the spatial extent of air emissions, climate (air temperature, wind speed and direction, relative humidity, and precipitation)
Aquatic Effects Monitoring Specific effects monitoring (SEM) address particular issues that require more detailed assessments, restricted in spatial and temporal extent, for example, investigations into effects of the treatment of sewage disposal into Kodiak Lake and monitoring of the Panda Diversion Channel to assess its utilization. The Surveillance Network Program (SNP) provides an early warning system to detect exceedances in effluent quality requirements and includes monitoring water in the Long Lake containment Facility (LLCF) for license standards.
Wildlife Effects Monitoring Caribou, grizzly bears, wolves, wolverine, breeding birds are the VECs. Data are collected on activities that may affect wildlife; the design and layout of roads, traffic frequency, blasting, general disturbances, habitat loss and wildlife human interactions. The current wildlife study area (study area is approximately 1600 km2). Boundaries of data collection are roughly Exeter Lake to the west, Lac du Sauvage to the east, Lac de Gras to the south, and Sable Lake to the north. The northern boundary of the study area includes the Sable Lake area, where exploration will occur. Data are collected to assess whether the presence of mines exerts unnatural stress on the caribou. Data are collected on feeding, movement, and nursing behavior of the caribou. Also tracks, den and faeces of grizzly are being monitored.
Archaeological Management Program Impacts on archaeological resources. Measurements also include location, characteristics and threats to these sites.

Sources: BHPB Ekati EIRs April, 2002: 18; 2003: 22

Table 4.15. The nature of data collection

Follow-up Program	Objectives	Parameters	Sampling Frequency and Timing
Air Quality Monitoring	• Measure compliance with regulatory requirements; • Determine any environmental impacts; • Test impact predictions; • Measure the performance of operations, and the effectiveness of mitigation measures.	Total suspended particulate concentrations	Once in 2000, 2001 and 2002. Next data collections scheduled for 2004. Regularity of data collection more important than frequency.
Aquatic Effects Monitoring	• Use early-warning procedures to anticipate any project-related impacts such that they can be controlled through appropriate mitigative measures • Determine, quantify and assess the environmental significance of any project-related impacts such that they can be remediated. • Understanding natural events (e.g., climate) and phenomena (e.g., floods), and the relationships among these, which may influence biota and • determining trends and natural ranges in the abundances of VECs. Determining the effects of management changes, testing predictions used in mitigation.	Water Quality (ph, TSS, etc) Physical Limnology Sediment Quality Phytoplankton Zooplankton Lake Benthos Fish Community Fish Habitat	Annual and Seasonal bases/Yearly and Every Summer, Some every winter. Programs run for a period of time; may be weeks or months in order to collect Data that answers monitoring questions.
Wildlife Effects Monitoring	Test predictive effects of mining activities on wildlife behavior, distribution, and movement to implement mitigation measures	Wildlife, valued ecosystem components: Caribou, grizzly bear, wolf, wolverine	Caribou continuously monitored prior to and after blasts, predicted impacts followed up monthly
Archaeological Management Program	Test predictive effects of mining activities on locations that contain physical evidence of past human activity or use.	Locating sites, measuring archeological characteristics, Carrying out systematic data recovery,	

Source: BHPB Ekati EIR April 2003: 22

As mentioned, it is apparent that BHPB has not consistently involved stakeholders in project discussions which raises concerns that since meetings gauge performance and ensure consistency, then consistency and standards must have been compromised.

4.2.5 Adoption of a Hypothesis-Driven Scientific Approach to Impact Prediction

Criteria:

When impacts are predicted in EIA, an hypothesis-driven approach is necessary to facilitate verification of impact predictions in follow-up both in the biophysical and socio-economic environments.

Observations:

Hypotheses are useful as early warning systems and enable BHPB to demonstrate beyond a reasonable level whether an impact has actually happened as predicted (Table 4.16). Both null and alternate hypotheses are used, where the null hypotheses stated that no relationship or difference exists between the project induced and natural change activity and any difference observed could materialize as a result of chance (Lang and Heiss, 1998: 83). Use of multiple hypothesis is a strategy to offer sampling frequency opportunity that meets the needs of compliance monitoring for BHPB's licenses and permits.

Interviews with the IEMA revealed that BHPB used BACI to hypothesize effects on lakes and streams in the AEMP. For example, in one hypothesis, the years 1994-1995 before the project began were representative of the preproject/baseline period while 2003 was identified as the post-baseline period.

The major hypothesis tested in the BACI analysis was:

H_o = There was no difference among lakes/streams, period (Before/After), and no lake/stream x period interaction.

BACI tests obtained results through measurement and laboratory analysis of parameters and using analysis of variance. In a second example, BHPB's aquatic effects follow-up program, hypotheses were formulated to test potential sources of variation in the measured impact variables including:

a. conditions before versus after the start of project operations;
b. identification of specific affected components such as lake or stream); and

c. the time of sampling, nested within the before and after periods of project operations.

Table 4.16. Examples of hypotheses in the wildlife and water follow-up programs

HYPOTHESES & NULL HYPOTHESES	ALTERNATE HYPOTHESES #1	IMPLEMENTATION PLAN & TECHNIQUE	VARIABLES/ CONSTANTS
No caribou will be killed or injured by vehicle collisions each year. WEMP	None	Monitor wildlife injuries, mortalities and other incidences, use controls	Insect harassment, group size and type/habitat type
Disturbance from the mine will not affect caribou behavior. WEMP	The number of Caribou will be positively related to increasing distance from the mine	Systematic and unbounded aerial surveys to determine abundance, direction of movement and group composition. Surveys stratified in time according to northern and southern migration	Abundance, direction of movement and group composition
Major haul roads will not act as barriers to migrating caribou. WEMP	None	Comparison of historic trails with current and post-construction travel routes And post-construction trails	Group size, group composition, directional movement, habitat type, road features, location

Source: BHPB Ekati EIRs April, 2000: 20; 2003: 24

Samples for verifying impact hypotheses were obtained from several points within lakes and testing of the null hypotheses followed where selected variables were analyzed using statistical measures, such as analysis of variance.

Hypotheses clarified what impacts could be expected and in what form. In the Wildlife Effects Monitoring Plan for instance, impact hypotheses correctly formulated early in the development allow for well designed baseline studies and monitoring

programs (BHPB Ekati EIR April, 2003). In discussions experts noted , that hypotheses may work in the opposite way too, by failing to detect the high level of confidence desired.

An alternative to the use of hypotheses in predicting impacts at BHPB is 'Trend Analysis' or use of threshold values. In the case of arsenic levels, for example, threshold levels a re determined as the yardstick in measuring actual levels of the element arsenic in aquatic environments near the mine site and in determining the need for mitigatory actions. As a side note, levels were found to fall above those set by the Canadian Council for Environment Ministers (CCEM).

Discussion:

BHPB's use of hypotheses to forecast and test effects is a strong component of effective follow-up. In addition, use of hypotheses enables BHPB's environmental managers to carefully consider not only what elements can be affected but in what way and to what degree. BHPB has used hypotheses to put environmental management actions in place and in this way are successfully mitigating potential harm to wildlife and aquatic resources around the mine site. Such an approach has, however, not been adopted to test predicted socio-economic effects, a component, argued by Noble and Storey (2004), that is necessary if socioeconomic effects are to be given due consideration in follow-up practice.

4. 3 Principle # 3: A Learning-Oriented Approach

Interview responses from follow-up experts, practitioners and government indicate that monitoring and evaluation of the data collected in the monitoring process are important and necessary for developing and testing hypotheses (United Nations, 1990). Continuous monitoring is useful for compliance monitoring purposes when there is a continuous discharge to the environment (e.g. stack or water discharge emissions). Moreover, EIA experts said in interviews that continuous monitoring is necessary to facilitate learning and improved environmental management measures and future EIA practices.

The following aspects of lessons from follow-up program implementation can be adopted or learned through active programs such as the following (Diduck, 2004):

1. Passive public information techniques such as news conferences or websites.

2. Active public information techniques where learing occurs through platforms such as expert panels.
3. A group technique where learning is occurs through informal meetings, mail, telephone and internet surveys or workshops.

4.3.1 Maintenance of Continuous Reporting

Criteria:

Open and regular reporting is necessary in monitoring and follow-up to maintain consistent, current and accurate data important to detect changes in the variables under scrutiny.

Observations:

BHPB Ekati audit follow-up programs and impact management strategies for this reason, and to assess whether BHPB is in compliance and to gauge the soundness of follow-up activities. Maintaining continuous reporting is closely related to maintaining continuous and consistent data collection, and the yet these two elements stand alone as contributing requirements for high quality follow-up program implementation.

Publicly, EIA and follow-up data at BHPB are assessed and reported for reviewing information for follow-up studies and for building consensus. More specifically, EIA follow-up audits of monitoring programs and impact management:

i) Assess whether the company is in compliance.

ii) Assess the soundness of monitoring activities. Public forum are also significant for achieving transparency and accountability as a third party can check selectivity and bias in reporting. In some follow-up instances, BHPB hires consultants as third parties for higher confidence as compared to a report prepared in-house.

BHPB data reporting are in fact the mandate of the IEMA (Table 4.17).

The Environmental Agreement requires that BHPB prepare and submit reports every April 30th including:

(i) compliance reports with respect to the Water License, the Surface Leases, the Land Use Permits and other Regulatory Instruments;

(ii) results and findings of studies and research conducted in the preceding year;

(iii) results and findings of environmental monitoring programs.

Table 4.17: IEMA's mandate for follow-up data auditing and reporting

Review and comment on the design of monitoring and management plans and the results of these activities Keep Aboriginal peoples and the public informed about Agency activities and findings; Write an Annual Report with recommendations that require the response of BHPB and/or government

Source: Official IEMA website. http://www.monitoringagency.net

(iv) summary of operational activities during the Reporting Year;

(v) actions taken or planned to address impacts or compliance problems which are set out in the Annual Report;

(vi) summary of operational activities for the next Reporting Year; and

(vii) lists and abstracts of all Environmental Plans and Programs.

According to Article V of the Environmental Agreement, annual preparation of reports has contributed to the success of BHPB Ekati EIA follow-up programs because of the opportunity for early disclosure and discussion of problems on a regular, continuous and even basis. The Environmental Agreement also requires that BHPB prepare annual reports in consultation with the Minister for Indian and Northern Affairs, the GNWT and that these reports are available to the Monitoring Agency, the GNWT, and the Aboriginal Peoples. IEMA and the Aboriginal peoples have authority with the Environmental Agreement to demand that the Minister for Indian and Northern Affairs, ensure BHPB satisfy their interests in their reporting. IEMA and the Aboriginal people's power to vet reports is critical in ensuring quality and clarity. The requirement that BHPB prepare an Environmental Impact Report every three years and submit a comprehensive report to the Minister, the GNWT, the Monitoring Agency and the Aboriginal Peoples contributes to continuous production of follow-up information.

On the question of data monitoring and reporting in public forums, EIA and follow-up experts stated that "During the life of the project there is an absolute need for a public forum to voice concern or contentment about the project and environmental management". Article V of the Environmental Agreement requires that BHPB avail the Annual and Environmental Impact reports to the public, including arranging for public meetings to discuss the reports. Respondents involved with BHPB's EIA and follow-up

programs stated that public forum ensures that data monitoring and reporting are open and transparent. Regulators who do not have capacity for technical review, hire consultants as independent peer reviewers to carry out data collection as some measure of security against biased reporting compared to a report prepared in-house. The same interviews revealed that in readiness for reporting, follow-up programs should describe the instrumentation used, sampling methods, times, and the quality assurance/ control, (QA/QC) procedures that were followed. Reporting and perusal by concerned and interested parties in BHPB's follow-up programs determine for example, whether use of sampling intensity (number of samples) will lead to a fairly precise assessment of the monitoring parameters.

***Discussion*:**

In interview discussions, practitioners involved in BHPB's follow-up programs reported that data accuracy means there is no systematic bias in data collection and that data are collected with minimal sampling errors. As an example of important information from the follow-up program that has been reported to stakeholders and the public, BHPB maintained data superiority in reporting by:

- Making sure that protocol (laid-out procedure) was adhered to (See sec 4.2.4). BHPB follow-up programs describe the instrumentation used, sampling methods, times, and the quality assurance/quality control procedures that were followed.
- Maintaining Sampling Intensity that yield a fairly precise assessment of the monitoring parameters. For example: phytoplankton in lakes require 3-4 samples per water body. If a parameter changes a few times, one needs less samples, while one will need more samples for a highly variable parameter.
- BHPB maintain a good system, of data management, properly tabulated data, proofed and archived. Proofing guards against error in entering of data.

Follow-up data and findings are availed to the IEMA, BHPB's environmental management watchdog who in turn make it accessible to the public. From interviews with community members, experts and practitioners involved in BHPB's follow-up program, and government representatives, BHPB follow-up data are and have been available from the beginning through the IEMA website**.** This is an important factor in

maintaining transparency and facilitating learning for all stakeholders involved in the project. When those concerned and those interested are aware of the details surrounding follow-up then judgments can be made about transparency, accountability, and the level of success attributable to the program. Information on what needs to be done for that project and other projects is then available.

4.3.2 Establishment and Maintenance of a Public Registry of Follow-up Databases and Results

Criteria:

Continuous reporting (see sec 4.3.1*)* obligates the developer to constantly share information so that the public and stakeholders can gauge the quality of the follow-up programs and learn from actions implemented and their outcomes. Proponents also need to publish this information, most importantly, a public registry of issues surrounding the follow-up program and its results, obtainable by anyone who wishes for their own use.

Observations:

As required in Article V of the Ekati Diamond Mine EIA, follow-up results are made available to the public that cover the scope and lifetime of the project. This element is closely related to ensuring that information coming from follow-up programs is constantly and reasonably available to anyone who may require it (see sec 4.3.1).

The Environmental Impact Reports 2000 and 2003 provide information and results about the environmental effects of the project. BHPB report in the April 2003 Environmental Impact Report that results of the Aquatic Effects Monitoring Program for example, are reported annually and there is provision for rapid dissemination of information to decision-makers. Stakeholder Technical Workshops were held yearly every February to review findings and to make any necessary changes to the monitoring programs.

The IEMA contributes to the understanding of BHPB's activities by Aboriginal people as stakeholders. The IEMA go between the BHPB and the Aboriginals people and explain to BHPB the concerns of each group to the other. IEMA, are however concerned that February workshops have not been receiving Aboriginal input effectively. Moreover, in November 2003, BHPB changed the annual February workshops to a once every three years event. IEMA has recommended that BHPB

provide pamphlets and CDs containing the workshop proceedings and report in the Agency Annual Report and that BHPB establish and maintain a web-site be maintained where reference documents, correspondence inventories and photos of the BHPB Ekati project can be viewed. In this way, the public has an accessible repository of all environmental information linked to the BHPB Ekati project.

Discussion:

BHPB are meeting standards for ensuring that there is a central archive for follow-up information. Information is available from the IEMA (see secs. 4.5.2 and 4.5.3) and interested parties can obtain the most current information about the follow-up program operations easily and quickly.

However, it is especially unacceptable that the annual forum for Aboriginal people to discuss their concerns with project administrators, has been abandoned by BHPB. Fortunately, the IEMA have been working to ensure that these meetings continue. BHPB need to avail CDs of project operations at the three year workshops, and need to set up monitoring websites so that the public have information to look up when implementing their own follow-up programs. Clearly, there is much to be done concerning the availability of a public registry for practitioners.

4.3.3 Application of Local Knowledge in the Follow-up Process

Criteria:

Local knowledge taps into and puts to use information from resident communities; this information is unique, different from scientifically founded knowledge and its roots are the resident community. Local knowledge is specific to the management of resources within the project site, hence it should complement scientific knowledge in follow-up programs.

Observations:

The Ekati Diamond Mine Environmental Impact Report 2003 describes Local Knowledge as follows:

> "The entire spectrum of Aboriginal knowledge has been described as Traditional Knowledge. Aboriginal concepts of natural history are referred to as Traditional Ecological Knowledge."

BHPB explain that their use of traditional knowledge in environmental management takes several forms (Environmental Impact Report 2003):

• Factual knowledge about the environment based on empirical and generalized observations;

• Factual knowledge about the past and current use of the environment;

• Culturally based value statements about proper and appropriate behavior with respect to the environment, and about human health and well-being; and,

• The framework of the traditional knowledge system itself.

The Environmental Agreement signed between BHPB and the federal and territorial governments requires that BHPB use traditional knowledge in the management of the effects of its operations on the environment. The same document reports that BHPB are funding projects that collect, interpret and apply traditional knowledge in environmental management (Environmental Agreement) BHPB also provides training, for example the development and use of GIS systems for monitoring, and organizes site tours to community elders and community members. The Kitikmeot Hunters and Trappers Association are building a GIS-based land use screening tool to be used in preliminary environmental screening (Environmental Impact Report 2003). IEMA, in their 2002-2003 Annual Report note that development of its long-term capacity is important if the Aboriginal peoples are to be able to continue monitoring BHPB's activities.

BHPB is further tapping into the community's knowledge from Aboriginal mine employees and contractors. Parties involved in the production and collection of local knowledge in the BHP Ekati EIA and follow-up program include the Dogrib Treaty II Wildlife Committee; Akaitcho Treaty 8 Land and Environment Committees, Chiefs and Councils, and the Kitikmeot Inuit Association. These groups were identified by Ekati because they practice traditional land use activities, occupy the BHPB claim block, and live downstream where aquatic waters are affected by BHPB operations.

Dogrib Treaty 11 completed a traditional plant study on part of the BHPB mineral claim block, applying Traditional Ecological Knowledge to biodiversity research; the Lutsel K'e Dene First Nation and North Slave Metis Alliance each developed a GIS-based traditional land use inventory of their traditional territory. These two are examples of BHPB's efforts to integrate and harmonize traditional and scientific

knowledge. That said, experts interviewed on the use of local knowledge observed that 'satisfactory harmony hasn't been achieved'.

***Discussion*:**

Experts interviewed and the IEMA report that, notwithstanding BHPB's claims, the actual use of local knowledge is not to a level acceptable to the ABoiginal communities and experts involved. In their Annual Report 2002-2003 [page 7], IEMA expressed concern that the integration of local knowledge into BHPB environmental management and follow-up program is not sufficient and needs improvement. Follow-up experts interviewed add that local knowledge can sometimes differ between Aboriginal groups. Groups that have differing knowledge views are suspicious about the political agendas of other groups (i.e. is this traditional knowledge or politics?), which has often stalled BHPB's progress in applying traditional knowledge to follow-up. Moreover, the local knowledge at Ekati, as in many cases, is undocumented, unclassified and unstructured.

On one hand, BHPB displays efforts of inculcating local knowledge; on the other hand Aboriginals and other observers complain that too little is being done to harness this knowledge. The latter is one of the problems that the use of local knowledge in BHPB's follow-up programs is facing.

4.4 Principle # 4: An Integrated Approach

An integrated approach takes into consideration that there are separate contributing factors to follow-up programs but which are intertwined and at some point must become one whole. This involves identifying variables or indicators that should be the focus of follow-up, as well as the characteristics of 'indicators' and their spatial and temporal scale.

4.4.1 Identification of Key Variables for Monitoring

Criteria:

It is imperative that program managers identify elements that need to be managed as a result of project effects. This requires identifying indicators and criteria that can actually be monitored, followed-up, or verified.

Observations:

IEMA's 2002-2003 Agency Annual Report indicated that BHPB is following-up on animal and bird species, specifically; (Table 4.18), caribou, grizzly bears, wolves, wolverine, ptarmigan, sparrows, sandpipers, and falcon. IEMA's report noted that these have been identified as important to the people of the north. Their value to the local communities and their current status were used to determine whether these animals and birds were tagged as VECS for monitoring purposes. For example, foxes in the project areas are not VECs. Practitioners involved in BHPB's follow-up said that foxes are 'common' and their numbers indicate that foxes are not under threat. Aquatics followed–up include fish, water, sediment, small plants, small animals and bugs while the Environmental Agreement states that for socio-economic indicators, the land-based economy, a socio-economic indicator, was to be monitored.

Identification of variables for monitoring is important because IEMA as a watchdog is able to keep track of the accuracy with which these elements are followed-up and managed. For example, IEMA in their 2002-2003 Agency Annual Report expressed concern that the number of different species of water fleas (food for fish) declined and that BHPB have responded by increasing the number of studies on zooplanktons. In order to identify key variables for monitoring BHPB also funded the West Kitikmeot Slave Study; and affected communities were able to access this funding to do community-based research.

Table 4.18: Some VECS and why they need to be followed-up

Caribou – Mining activities could potentially influence caribou numbers, distribution, group composition, movement and behavior around the mine during northern migration and during post calving.
Grizzly Bear – The sensitivity of this species to human encroachment has been well documented in other areas of North America, the hypothesis is that this is likely to be the case at Ekati.
Wolverine – As for grizzly bears, the wolverine has been shown to be sensitive to human encroachment. Wolverine are not as abundant as foxes are.
Upland breeding birds – Breeding birds were thought to be indicators of small and otherwise undetectable changes in close proximity to the mine sites.
Raptors – Raptors are also known to be highly sensitive to human disturbance particularly during breeding.

Sources: Study Interviews and Agency Annual Report 2002-2003

***Discussion*:**

BHPB's identification and isolation of the key variables aided the correct formulation of well designed baseline studies and monitoring programs. Because BHPB have concentrated only on VECs in following-up on biophysical components, their follow-up programs have capacity to keep track of these components. BHPB have done well to take into account in their follow-up programs elements of the environment that various stakeholders have labeled significant. Although several 'indicators' or variables were selected for monitoring socioeconomic effects, IEMA report that most were relatively broad and not able to be closely tied with specific project change. Noble and Storey (2004) examined BHPB's list of indicators and noted that the list included socio-economic variables such as health and wellness that were too broad to measure the effects of BHPB's project on the local community as they were based on territorial data. A major limitation of BHPB's monitoring program was the resolution of the variables and indicators used for monitoring socioeconomic effects.

4.4.2 Adoption of an Ecosystems Approach towards Project Management

Criteria:

The ecosystems approach is a management perspective that connects elements that make up the environment as an integrated whole. The value of the Ecosystems Approach lies in its consideration of the broad implications of projects to ensure that the valued ecosystem components of project surroundings are accounted for. This perspective is born of the recognition that effects from environmental elements are not only linked but are also not limited to the immediate project site or time frame and may trigger broader cumulative or synergistic change.

***Observations*:**

An ecosystem approach to follow-up ensures that hypotheses are developed that take into consideration all sources of potential effects, pathways and key receptors (i.e. VECs); direct, indirect and cumulative effects. IEMA have recommended that BHPB should strive to cover both aquatic and terrestrial environments in its assessments and management of impacts (Agency Annual Report 2003-2003).

Private consultants to BHPB's environmental management programs and follow-up experts differed in their definitions of the 'ecosystems approach', though all agreed on

what the approach essentially entails. One EIA follow-up practitioner interviewed said that an ecosystems approach represents a holistic interpretation of the natural world and is useful in environmental management because environmental managers consider the web-like interconnections among the many components of ecosystems. The BHPB EIS (July 1995: 22) described the ecosystems approach as (Compare with the Convention n Biodiversity's definition sec 2.3.4):

> A holistic manner of considering the diverse, web-like interconnections among the many components of ecosystems. It does not simplistically view the world as a diverse assemblage of populations, species, communities or environments, but acknowledges that all of these are intrinsically connected, although to varying degrees.

On the principle in action, the EIR 2003 reported that BHPB in its follow-up programs is continuously expanding the geographic scope of its monitoring program. For example, the EIR (2003: 16) states:

> New aquatic monitoring locations at Ross Lake, Ross Lake outflow stream, and Ulu Lake in the Horseshoe Watershed (Sable Pipe) will be added to the AEMP in 2004 at the request of the IEMA (Report 62 – Appendix B). Baseline monitoring, if necessary, is expected to continue in 2003 in the Sable area. Within the Koala Watershed, the addition of monitoring stations in Leslie Lake has been recommended (Report 68 – Appendix B), and winter lake water quality monitoring was formally incorporated into both the AEMP and future baseline data collection efforts starting in winter 2002.

Scent stations to track movement of wolverine have also been established as far as Daring Lake (EIR 2003 page 17), while in air quality monitoring BHPB appear to be expanding the scope of assessment and follow-up similarly, in 2002, snow survey samples were extended from the project site to the site surrounding the Panda Diversion channel. In spite of these efforts, BHPB's follow-up scope is not clearly stated, and BHPB do not indicate how far beyond local project environment they intend to carry out EIA follow-up. In the July 1995 EIS, [76/728], BHPB report their efforts to cover in their assessment characteristics and linkages of ecosystems that are potentially affected by the Project. BHPB's ecosystem approach to environmental assessment involves three steps:

1. At first, several key ecological concepts identified by the Environmental Assessment Panel for the Project are discussed within the context of environmental impact assessment.
2. Secondly, the approach used in the actual impact assessment is then rationalized within this conceptual framework.
3. Finally, the general characteristics of the terrestrial and aquatic ecosystems of the study area are briefly described, as \are their major linkages with each other and with humans.
4. The first three demonstrations of BHPB's application of the Ecosystem Approach above are largely biophysical. However, BHPB have also included community programs such as drug abuse awareness programs which is a socio-economic factor.

BHPB follow-up programs therefore reflect an ecosystems approach in consideration of both the direct and indirect consequences of potential changes, at various spatial and temporal scales, as well as attention to implications for both human welfare and that of natural, ecological values. BHPB's follow-up programs in using Aboriginal local knowledge, acknowledge that the ecosystems approach is embodied in Aboriginal culture. The July EIS (1995: 30) quotes Darrell Beaulieu, Chief of the Yellowknives Dene Band in expressing:

> Anything that happens in our territory is not just environmental in nature, it impacts our culture, economy, (and) spiritual relationship with the land.

The report goes on to say that that the Dene object to the separation of biological, physical and socioeconomic environments in efforts to assess the impacts of industry on their lands. The EIS quotes a community member, in a presentation to the Environmental Assessment Panel (1995), stating that the Dene believe that such a distinction "makes it difficult to appreciate how closely they are integrated in the Dene way of life" .

Judging from the normative framework, BHPB Ekati Diamond Mine's EIA follow-up program is realizing the intended benefits of this approach, as evidenced by the environmental management and preservation of different elements of the project setting including wildlife, the biophysical resources and aspects of the Aboriginals socio-

economic and cultural way of life. Despite this evidence, EIA experts in interviews asserted that an ecosystem approach is for resource management, and that the BHPB Ekati EIA follow-up is 'project management'. These respondents are of the view that the whole notion of an ecosystem approach is wrongly placed, because BHPB are not responsible for managing wildlife resources, or water systems; this is the mandate of government departments and maintain that there is no evidence of an ecosystem approach in BHPB's follow-up programs.

Discussion:

Judging from the criteria in the normative framework for best practice EIA follow-up, certain elements of the ecosystem approach are evident in BHPB's follow-up and other environmental management programs, for example the consideration of effects on terrestrial and aquatic systems. IEMA and government representatives who have been deeply involved with BHPB's follow-up program stated that the ecosystem approach has been used by BHPB and one practitioner said that 'the ecosystem approach is an appropriate one for Ekati'. This is the debate within data collected for this element. This study acknowledges these differing views and the question whether the ecosystems approach is too large a mandate for a single project; and that it is only possible within government policies, and plans. The conclusion is that this is an issue that requires further exploration.

4.5. Principle # 5: Institutional Commitment and Accountability

Financial, administrative and informational structures are provided for in BHPB's follow-up program, and include the consideration of local public concerns associated with the project. The appointment through the BHPB Environmental Agreement of the IEMA has also contributed to balancing of stakeholders' concerns and increased monitoring and regulation of BHPB's environmental management endeavors, including EIA follow-up.

4.5.1 *Definition and Clarification of Financial Responsibility*

Criteria:

Follow-up programs like other parts of any project assessment require funding for operations. Financial resources need to be set aside early in the project planning process. Parties with the obligation to pay for the follow-up, usually the proponent and sometimes governments, will naturally be committed to see that the ends of the programs are achieved.

Observations:

The Environmental Agreement requirements for BHPB imply responsibility for environmental management programs, including financial. For example, in its contribution to follow-up of environmental assessment and other environmental management programs, Indian and Northern Affairs Canada, is sending inspectors to the BHPB mine and is financially responsible for this operation (Agency Annual Report 2002-2003 page 23). Some private consultants to BHPB's environmental management said that financial responsibility for the BHPB Ekati follow-up programs was determined when applying for the license to operate; this was the beginning of the preparation for the follow-up program. BHPB is currently paying for the follow-up programs, while many follow-up operations carried out by responsible authorities, such as monthly inspection by INAC, are paid for by those authorities.

Discussion:

BHPB is responsible for the costs of follow-up programs, including funding the IEMA, funding projects that involve Aboriginal stakeholders, paying follow-up experts for projects not carried out in-house, and hiring staff for follow-up programs to name a few. Had BHPB not been prepared to fund these programs, follow-up of EIA would not have been possible given the vast array of expertise required, massive amounts of data and large distances that must be covered. However, funding is not sufficient for meetings and workshops particularly those where discussions involving Aboriginals are concerned. The IEMA have since taken responsibility for these workshops and are using funds at their disposal to organize. Follow-up experts in interviews said though, that the GNWT is funding one socio-economic effects discussion forum.

4.5.2 Definition of Proponent and Government Roles

Criteria:

A clear outline and understanding of division of responsibility contribute to organizational efficiency, timeliness, accountability and continuity in follow-up programs.

Observations:

Interview responses from follow-up experts, government representatives and the IEMA show that follow-up programs must be conceptualized at the initial level by the project proponent during the EIA process; and developed as more information relevant to their structure unfolds. Proponents should propose the regulatory, contractual or other instrument to be used to ensure follow-up is implemented and specify which authorizations, licenses, permits, certificates of approval, or other regulatory mechanisms should be included as a condition of approval. This should include all federal, provincial, territorial, First Nation and local government regulatory mechanisms. In BHPB Ekati's case, roles and responsibilities are set out in the environmental agreement. BHPB carries out internal audits and governments carry out monitoring and inspections, for example, water license, surface lease and fisheries authorizations. IEMA review monitoring programs, environmental management plans, designs of the programs, and report to the public (oversight). However, IEMA does not actually conduct the monitoring themselves. Actions and responsibilities of the proponent, BHPB, as pointed out earlier, are dictated by various permits and licenses, authorizations and leases (Agency Annual Report 2002-2003) (Table 4.19).

The Environmental Agreement over the Ekati Diamond mine is explicit about the IEMA's follow-up role. The Fish Habitat Compensation Agreement documents BHPB's obligations with respect to compensating for impacted fish habitat.

Table 4.19: Defining Roles and Responsibilities: BHPB's Regulators

Regulator	**Mandate**
IEMA	reviews, reports makes recommendations
Mackenzie Valley Boards	Renewing Water License applications, ensure it retains staff and expertise for rigorous and undelayed approval of licenses
Indian and Northern Affairs Canada (formerly the Department of Indian Affairs and Northern Development) INAC	Provides full time diamond mine inspectors Site inspections are useful for monitoring effects Continuous participation in the Ekati Diamond mine environmental issues
Department of Fisheries and Oceans, DFO	Requires BHPB to carry out detailed *fish out* studies on fish communities, Ensures that results of these fish studies are used to better understand the impact of future impacts Participate in discussions on the consultation processes for the Fish Habitat Compensation Authorization and future fish habitat alteration authorizations. Ensure that the Fish Habitat Compensation Fund is contributing to actual fish habitat restoration
Inter-Agency Coordinating Team, IACT (made up of the Regulators, BHPB and IEMA)	(set up for the Ekati Project) Regular communications venue and liaison - Meet monthly to discuss issues of common interest Provide continuity especially in light of regular staff turn-over in participating agencies Identify early; technical issues to be addressed in license applications and renewals Include, Aboriginal peoples in this liaison group
Government of Northwest Territories, GNWT	Resources and Wildlife, Economic Development reviews environmental monitoring and management at Ekati, for example, air quality monitoring. RWED has made efforts to improve monitoring without compromising the integrity of its inspections

Source: Adapted from the Agency Annual Report 2002-2003 Full Version.

The Fish Habitat Compensation Agreement directs DFO to regulate BHPB's activities. As mentioned earlier in section 4.1.1 MVRMA was established by two land claim agreements; the Sahtu Dene and Metis Comprehensive Land Claim Agreement and the Gwich'in Dene/Metis Comprehensive Land Claim Agreement.

Under the MVRMA, the MVEIRB and the EARP Guidelines Order define roles for the players in Ekati's follow-up programs. The land claim agreements described above require the establishment of land use planning boards and land and water boards for the named settlement areas and require an establishment of an environmental impact review board for the Mackenzie Valley, the site for BHPB's Ekati Diamond project.

Discussion:

BHPB continues to support the IEMA financially and also support data collection efforts and actions. BHPB is also meeting its obligations including licensing and permitting requirements without which the project would not be allowed to continue. It is on this basis that follow-up actions expected of BHPB have been implemented. There are areas however where BHPB is said to be neglecting its responsibility. Although BHPB cite shortages of resources as a hindrance to implementation of programs, public participation is one area where BHPB are not performing as expected or desired by stakeholders. Success in BHPB's follow-up programs is attributed to the IEMA and other groups such as the Inter Agency Coordination Team who have fulfilled their mandates well.

4.5.3 Appointment of an Independent Environmental Checker

Criteria:

An IEC, a panel with no profit interest in the particular project, is required to balance the interests of all parties involved. IECs are important to successful EIA follow-up because they heighten follow-up program credibility and therefore accountability, when for example, independent experts are employed in the design of the various follow-up stages (United Nations, 1990).

Observations:

The Environmental Agreement signed between BHPB, the Federal government of Canada, and the Government of the Northwest Territories is a legally binding agreement. It provides for project-related environmental matters in addition to such matters governed by legislation, regulations and regulatory instruments and for the establishment of and the identification of the roles of an independent monitoring agency. Interviewees representing Aboriginal community interests revealed that apart from the Environmental

Agreement, no legislation provided for the establishment of the Independent Environmental Monitoring Agency and that IEMA came into existence because:
1. There was a strong push to create a monitoring body from the proponent, and government (INAC might have been involved).
2. People do not trust the government to take care of the public interest
3. The government lacked capacity to do what the IEMA is mandated to do
4. The government lacked political will (to do N. 3 on their own).

According to the IEMA website, the Agency consists of seven members and seven directors. Each member has appointed a director to the board which meets several times each year. The following members make up the IEMA:

- Kitikmeot Inuit Association
- North Slave Metis Alliance
- Dogrib Treaty 11 Council
- Akaitcho Treaty 8
- BHPB Diamonds
- Government of Canada
- Government of the Northwest Territories

IEMA employ two staff members whose duties include managing and carrying out environmental data analysis. Staff also assist board of directors in preparation of technical papers in information management, communication and are responsible for administrative services.

Arts *et al.* (2001), outline the IEMA's responsibilities as follows (Table 4.20 and compare with Table 4.17–*IEMA's mandate for follow-up auditing and reporting*):

- IEMA reviews and comments on BHPB Ekati Diamond Mine's monitoring and management plans and their results;

- IEMA participates in regulatory processes directly related to environmental matters involving the mine, its impacts and cumulative effects;

- IEMA is involved in the consolidation of local knowledge from the Aboriginal communities for use by BHPB Ekati Diamond Mines' EIA and follow-up programs. This is a way of monitoring and encouraging the integration of local knowledge:
- IEMA is responsible for disseminating information to the four Aboriginal groups and the rest of the public on BHPB's activities and findings;
- IEMA prepares a report annually recommending actions to BHPB and the government (recommendation requires the response of BHPB and the government).
- IEMA brings the concerns of the Aboriginal peoples and the general public to the Ekati Diamond Mine management.
- IEMA keeps the Aboriginal peoples and the public informed bout its activities and findings.

Table 4.20: What IEMA is doing to meet its mandate

Participates in technical workshops involving environmental management at the Ekati mine. Meets and corresponds regularly with BHPB and regulators about environmental issues at Ekati Reviews and comments on regulatory approvals sought by BHPB on that relate to matters Reports to Aboriginal organizations and the public at large Maintains a publicly accessible library of all materials regarding environmental management at Ekati

Source: Official IEMA website. http://www.monitoringagency.net

IEMA states that its mandate is part of BHPB's biophysical and socio-economic environment management and improvement. As an independent body, IEMA has been instrumental in protecting the interests of all stakeholders and players in the BHPB Ekati follow-up programs. Board members do not represent any group's interests but have a common mandate.

As set out in the Environmental Agreement, budgets provided by territorial and federal governments will in the first two years of the BHPB project provide funding, and thereafter, BHPB will support IEMA. Respondents say that
it is an uphill task for the watchdog to negotiate funding from BHPB and are

"Not sure that this is the best arrangement".

Discussion:

The IEMA is an independent environmental checker for BHPB and its mandate includes all of the principles suggested in the best practice framework. IEMA has been particularly instrumental in the success of EIA follow-up and other environmental management programs at Ekati as proven by the fact that they are carrying out their mandate (Ross, 2004) (See Table 4.20 and discussion in 'Observations' above). However, the literature lacks a prescription of how independent environmental checkers should be tailored to fit smaller projects. The literature is silent on how the magnitude of a project is commensurate with structure and size of an IEC and this is discussed in the final chapter of this thesis.

Including proponents as monitors is done through their choosing a director to sit in the IEC. It is important that proponents contribute to monitoring and management especially because they have first-hand information on monitoring programs.

4.5.4 Addressing of Public/Stakeholder Concerns

Criteria:

Proponents need to deliberate with stakeholders. Deliberation allows parties to decide which issues are pertinent, which are urgent and which are feasible, and subsequently to implement agreed procedures.

Observations:

BHPB's HSEC Policy (Environmental Impact Report April 2003) is a platform for BHPB to communicate with stakeholders in ensuring that the diamond project considers their welfare. The HSEC policy aims to

> Communicate with, and engage, employees, contractors, business partners, suppliers, customers, visitors and communities in order to build relationships based on honesty, openness, mutual trust and involvement; and share responsibility for meeting the requirements of this Policy.

In addition, the Executive Summary for the EIS, stated that BHPB identified elements of the environment that the Aboriginal people consider valuable. Land, water and the caribou herd for example, are valued ecosystem components in BHPB's EIA and

follow-up programs, and their isolation is a beginning step to address Aboriginal concerns that these VECS be managed and preserved.

As stakeholders, the governments of Canada and the NWT, and the Aboriginal peoples were part of a five-year study to gather baseline environment data, and information on the relationship between bio-physical, socio-economic and cultural environments (BHPB July 1995 EIS).

As mentioned, Aboriginal ways of managing the environment are incorporated in BHPB's EIA follow-up programs where BHPB fund community-led baseline gathering programs, although not to stakeholders' satisfaction. Follow-up programs are considering the impact on Aboriginal lands claims and BHPB has instituted a policy of inclusion with its consultation program for all the Aboriginal communities that might be affected by its operations. However, the IEMA raised concerns that constructive criticism from Aboriginals, for example, the Aboriginals' discontent with BHPB's use of their local knowledge, is not being documented. Affected Aboriginal people have also expressed dissatisfaction with the way developers in general have treated them as documented in the EIS (Volume IV: page 242):

"In the past, there have been a lot of activities on the land but no benefit to or consultation with the Dogrib. Today we know what is going on- we want Dogrib involvement- we want a plan to work together…"

Discussion:

Respondents report that in the BHPB EIA and follow-up programs, public involvement began at the time EIA was commenced. Yet BHPB is not clear about when it begun to incorporate public and stakeholder concerns in their follow-up programs. Respondents interviewed in this study, notably follow-up practitioners, experts and community representatives indicate that Aboriginal peoples are expressing dissatisfaction with BHPB's public involvement programs. The respondents are of the opinion that public involvement is "very limited and affected communities do not have resources to be involved on an on-going basis, so rely on IEMA to do that." For example, follow-up experts and community representatives described community involvement in data collection and monitoring programs as "only minimal" - and only through the

representation of the IEMA. The IEMA particularly is not convinced that BHPB have a sincere desire to address Aboriginal concerns and state that BHPB should make efforts including public sentiments in addition simply to "meeting license agreements and requirements by the Environmental Agreement for the BHPB Ekati Diamond mine and other regulations." The IEMA says that "BHPB are only doing enough to keep them through licensing procedures."

4.6 Conclusions

It is evident from the findings outlined in this chapter that the principles and elements suggested in the best-practice framework are intertwined and will not function well when the principles are independent of one another. From BHPB's case study, successful adoption of one element requires adoption of another, such as the appointment of the IEMA and in accounting for stakeholders views are accounted for. One issue that emerges is the reluctance of BHPB to invest in public concerns- BHPB has reduced yearly workshops, which discuss the progress and the way forward for environmental management and follow-up, to every three years.
The IEMA provides an "insider's view", of the follow-up programs at BHPB. From the findings presented in this chapter, it is apparent that without the IEMA, follow-up and environmental management at BHPB would either be conducted in-house, or not done at all.

The apparent neglect of socio-economic indicators, especially in the outline of its follow-up goals and objectives weakens BHPB's follow-up programs. Although BHPB started off well by identifying socio-economic indicators, no follow-up actions are evident. Moreover, reports about the situation surrounding the monitoring of these components are missing. That being said, BHPB through compulsion, from mostly licenses, permits and the environmental agreement, has achieved more than a modest measure of success at following up on predicted environmental impacts. These successes support the literature on best practice in EIA follow-up, but at the same time raise issues that require further exploration. These are discussed further in the final chapter.

CHAPTER 5
CONCLUSIONS AND THE BEST-PRACTICE FRAMEWORK

5.0 Introduction

This Chapter summarizes the key findings from literature reviewed, discussions with study participants, case related documents and case study analysis. Conclusions on BHPB Ekati's follow-up programs and the lessons that could benefit future practice are then presented. This section also presents a brief discussion of areas related to the research questions that require further research.

5.1. Legislation and Guidance

Various gaps exist in regulations and legislation on EIA follow-up which challenge effective implementation of follow-up programs. When assessment panels make recommendations, these are not binding because parties targeted by these recommendations such as governments may or may not accept them. However, the literature (Gartner Lee Limited 1999; Glasson *et al*., 1994; Mitchell, 1997) emphasizes that in legislation, effective legal mechanisms are required, and governments and industry need to develop environmental policies and practices that deal with the relevant issues. Mandatory requirements have a direct relationship with quality of the EIA follow-up (CEAA, 2004; Holling, 1978). From the findings of this research it is exigent to define projects that do require follow-up and those that do not.

Requirements for follow-up placed on BHPB seem to be working well. In BHPB' s case, imposing requirements for carrying out follow-up is more important than whether regulations and legislation for carrying follow-up conditions are sectoral or consolidated. Clarification and streamlining is obviously needed, but a number of legal instruments may have to apply to particular follow-up projects. This is exemplified by BHPB's case where decision making power has been devolved from the *Act* to the regional Mackenzie Valley Resource Management Act. However, the question still remains as to whether a consolidated piece of legislation is necessary. There is debate as to whether requirements under license and permits need to be absorbed within federal legislation explicitly, such as CEAA especially because for other projects, instruments that are requiring follow-up actions for BHPB will not apply. Therefore, the danger of the

sectoral legislation not being sufficient resurfaces once there are different projects other than BHPB Ekati and different locations.

Follow-up expert interviewees advised that proponents should propose the regulatory, contractual or other instruments be used to ensure follow-up is implemented where a regulatory mechanism is not available for a particular follow-up program element or other monitoring commitment. As exemplified by BHPB Ekati, Environmental Agreements have been used as a mechanism to ensure mitigation and follow-up is implemented in some jurisdictions (e.g. NWT). Environmental Agreements provide the best mechanism to assure governments and the various parties to the EA that project proponents will implement their commitments to environmental monitoring and adaptive management. This is clearly the case with BHPB whose comprehensive Environmental Agreement has clarified roles, important for follow-up. What is required is that clarification of roles and responsibilities for various players in a follow-up program be contained in mandatory legislation, that is structured and less ephemeral than an Environmental Agreement; and which defines the type of projects that it covers.

Gartner Lee Ltd. (1999) caution that that the nature and content of Environmental Agreements must be well defined, deliberated and negotiated during the EIA process so that an "Agreement in Principle" can be entered into evidence for consideration by parties to the EIA. Such a process would benefit the EIA and follow-up processes.

Regarding IECs, no legislation encourages appointment of independent watchdogs. Effective environmental management requires a comprehensive and mature or well-developed environmental regulatory regime. Similarly, effective management of social and economic issues associated with economic growth and decline within follow-up programs, requires the cooperative and coordinated action of various stakeholders; and independent watchdogs are important for this coordination factor. As is evident from the literature, IECs need solid financial backing for the length of their mandate and are constituted by representatives of each party. From this study's interviewees and authors such as Gartner Lee Ltd. (1999), it emerges specifically that, the duties of IECs are or should be:

- To serve as the principle forum for communications between stakeholders

- To promote adherence to the purpose, objectives and principles of the agreement;
- To assist with avoidance and resolution of conflicts;
- To make decisions on general issues relating to the agreement or on specific issues specified in the agreement;
- To monitor the implementation of the agreement and the compliance of parties to their respective obligations (rather than being watchdogs over the project itself, they are watchdogs over the agreement);
- To appoint special committees or to carry out specific tasks (e.g. effects monitoring, research, information management); and
- To prepare reports and/or other information (e.g. newsletters, advertisements, press releases, etc.) regarding the Agreements.

From this study's findings (See Chapter 4), BHPB's IEMA is performing all of these tasks, which are key to successful environmental management for EIA and follow-up programs, except they do not appoint special committees.

5.2 Results-Oriented Approach

Follow-up practitioners and experts interviewed in this study noted that follow-up programs are typically inadequately defined within an environmental assessment and as such, do not provide confidence that monitoring will be adequate. These experts concurred with the best practice framework that all follow-up monitoring programs need to be described at a conceptual level within the EIA documents (i.e. prior to EIA submission and review by stakeholders and decision-makers), but include the all pertinent information; clear objectives, and parameters to be monitored and evaluated, roles of all players, schedules and procedures (Glasson *et al.,* 1994; Sadar, 1999). BHPB Ekati has focused on achieving the ends set out for the follow-up programs. BHPB's outline of the financial and biophysical goals and objectives that they intend to achieve in their EIA follow-up programs addresses all variables identified as significant by the stakeholders. As is encouraged by follow-up researchers in the literature, BHPB started by drafting broad objectives for their follow-up program and as significant elements were identified, and as implementation actions were set in place, the finer details of the follow-up programs were determined.

Follow-up is part of EIA, which means it should be determined during the EIA process and not left to permitting stages. The normative framework developed from the literature suggests for example, that follow-up programs should be designed early (CEAA, 2002; Shpyth, 1991) which gives the impression that the entire program should be designed at the beginning of development projects. Other researchers (Storey and Noble, 2004) have clarified that the foundation for the follow-up programs, the framework, can be prepared early but it is neither practicable nor possible to design follow-up programs without insight into how project operations are likely to unfold as this determines the character of the follow-up programs.

In order to achieve the set goals for their follow-up programs, best practice requires that BHPB Ekati establish baseline data that comprehensively describes the conditions of the project setting (Glasson *et al.* 1994; Morris and Therivel, 1995). Such data are useful for forecasting changes from the proposed project and other factors. The literature suggests that the EIA follow-up process requires the proponent to collect sufficient baseline information to describe the existing environment, provide accurate inputs for impact predictions and any assessment models; and provide a baseline (i.e. pre-development conditions) for comparison of actual project effects revealed through monitoring programs. Mulvihill and Baker (2001) have criticized BHPB's baseline studies as inadequate and have said that BHPB collected data over a single field season and therefore impact predictions cannot be accurate against such data. Since follow-up programs verify accuracy of predicted impacts and the success of amelioration efforts, one season's data are not accurate enough for repeated or prolonged use and also limit capacity for learning. BHPB's baseline data casts doubts on the capacity to prevent harmful effects to the bio-physical and socio-economic environments through follow-up.

The literature cautioned that EIA practitioners must recognize that describing the environment is not merely creating an inventory of biophysical and socio-economic features. Project proponents need to ensure that all relevant environmental factors are included in baseline studies, and sift out those aspects that have little or no relevance to the anticipated environmental effects. Proponents need to collect enough data (and collect appropriately) if predictions are to be made with a reasonable degree of certainty and to support a robust follow-up program. Using these baseline data, hypothesis driven approaches can be applied to the impact prediction-follow-up process (Curtis and

Epp, 1999; Storey and Noble, 2004). The United Nations (1990) advocate the development of hypotheses for follow-up programs. They are non-committal on the type of hypotheses that are best, but argue that the type of hypotheses will depend greatly on the nature of the post-decision analysis program, i.e. use of either null or positive hypothesis depends on the nature of the assessment. Hypotheses testing may take either the form of comparing impacts with predictions or with standards, or they may be measured on the basis of how well the environmental management system worked. BHPB has used hypotheses to anticipate potential effects on the environment. Hypotheses in the form of BACI tests, trend analyses and graphical analyses have produced accurate evaluation of project effects on the surrounding biophysical environment and are therefore important in terms of a results-oriented approach.

5. 3 Learning-Oriented Approach

Follow-up programs yield information important for the management of the project site and surroundings (Arts *et al.* 2001), and contributes knowledge for future practice. For changes to be detected in time, VECs need to be continuously monitored and information shared through reporting. For BHPB, Ekati, the activities of the IEMA are important in this regard, and both proponent and IEC can support continuous and efficient monitoring and data collection by annual preparation of reports. Acknowledging that there has been dissatisfaction with amount and timing of baseline data which follow-up data depends on, for BHPB, follow-up data has been availed through IEMA. This has been done in a timely fashion, and in an easily accessible format, such as a public registry, to facilitate learning and improvement in follow-up and environmental management methods.

BHPB need to maintain a public registry for data that avails current follow-up program information online and in real time (Au, 2001; Shpyth, 1991). This way, information is easily accessible to all and is shared for learning and improvement.

The literature also advocates the use of local people's knowledge which brings a unique perspective for problem solving. It is often specialized to fit that location's character (Peters, 2003), and acknowledges of the value local people attach to their knowledge. BHPB is using local knowledge for their follow-up programs, but observers and Aboriginal communities are of the opinion that BHPB's use and consideration of

local knowledge is either not enough, or minimal, and follow-up programs could benefit more from this knowledge. Local knowledge holders should be consulted or involved in follow-up programs, especially those involved in and aware of potential effects on traditional land uses activities. Very importantly, this knowledge will neither be fully accessible nor usable unless its owners prepare and package their knowledge for adoption by proponents in follow-up programs.

5.4 An Integrated Approach

The environment is made up of many factors and elements, tangible and intangible which are separate yet linked. Factors that make up follow-up programs and their interconnections need to be integrated (Environment Canada, 1999; Mitchell, 1997). Because of the complexity and vastness of environmental factors, follow-up implementers need to identify those that are most important for managing to avoid wasting resources. Implementers are required to design projects that take into account these factors' interdependencies such as the ecosystem approach. As mentioned earlier, in IEMA's view, BHPB has determined which elements are valuable to the surrounding environment and have applied the ecosystem approach in environmental management, however, this perspective is not shred by some follow-up experts involved with BHPB.

5.5 Institutional Commitment and Accountability

The best practice framework developed form the literature stresses the crucial nature of defining the roles and responsibilities of the various participants (Environment Canada, 1999; Storey and Noble, 2004), and lists a number of stakeholders in the follow-up program: government, scientific and technical advisers and the public. Proponents are responsible for the detailed development of the follow-up program and design the project preconstruction, construction, operation and abandonment phases with the participation of other players. Independent experts are included in this role because of the issue of credibility.

Lascelles, (1999), and Shpyth (1991), advocate commitment and accountability if set goals are to be realized. BHPB have followed up on the EIA carried out for their project through Environmental management and monitoring programs. Success has

been achieved in some aspects notably biophysical, such as the reconstruction of roads that had blocked caribou migration routes. However, BHPB's commitment is questionable when it comes displaying financial responsibility for public involvement programs. The public involvement process in BHPB Ekati's management program is unsatisfactory according to affected communities and observers. Pigeon, (1999), suggests sharing of the financial burden between governments and proponents which hasn't yet happened.

Best practice dictates that proponents should be responsible for the implementation of project-specific follow-up programs and all stakeholders must be given the opportunity to participate in the design of follow-up programs. This can include participation in data collection, interpretation and review of follow-up program results. BHPB Ekati's follow-up programs have attempted to implement regular review of follow-up program findings through IEMA, which is commendable. However, public involvement programs have not achieved full success as exemplified by the aborting of a community-involvement program that was funded by the GNWT. Interviews revealed that observers have criticized BHPB's public involvement efforts as 'mere window-dressing'.

5. 6 Outstanding and Emerging Issues

Issues have emerged from this study that require future research attention. Firstly, this study has raised the question of whether the ecosystem approach is possible within a single project setting. IEMA is confident that BHPB Ekati follow-up programs have used this approach and this study's findings agree based on the best practice framework. However, one expert involved in BHPB's follow-up asserts that the ecosystem approach is only possible within a large scale geographical area that would make up an ecosystem and can only be implemented under government department mandate due to its scope, and therefore, cannot be said to be implemented by a project like BHPB's. This needs to be clarified to settle the question of using the approach at all stages of follow-up.

Secondly, there is need to investigate how IECs fit into smaller projects by clarifying when IECs are necessary and what their mandates are. Since BHPB Ekati's follow-up has not effectively demonstrated follow-up of socio-economic components of the

environment, further research is required to clarify how socio-economic components should be defined and monitored in best practice.

Instruments regulating BHPB' s follow-up appear to be sufficient except that they contain neither concrete requirements for follow-up, nor requirements for reporting on effects on the socio-economic components of the environment. These legal requirements are fragmentary, that is not contained in one piece of legislation on follow-up. There remains the question of whether a consolidated piece of legislation is the solution for other projects in different locations and different instruments. CEAA need changes to require follow-up instead of directing regulators to determine where EIA and follow-up are required. This could come with the provisions and criteria where projects which do not require EIA and follow-up are describe succinctly and in detail. Mandatory requirement would include consideration of the different scenarios (such as budget and project size) that project feature and which determine nature of EIA and follow-up. Compliance is ensured through licensing and renewal of these licenses and permits. Inspection also ensures compliance.

Based on the literature and the lessons emerging from Ekati, at least three issues emerge that deserve immediate attention in EIA research and development. Firstly, the ecosystem approach has raised debate between practitioners and researchers- whether this is indeed possible within the confines of a single project or is only possible from the larger government management of resources perspective (See sec 2.3.4 [ii] and sec 4.4.2).

Secondly, policy issues regarding follow-up implementation need to be further examined especially on IECs. There are gaps on how the magnitude of project is commensurate with structure and size of an IEC as the literature does not prescribe how IECs should be tailored to fit smaller projects. Thirdly, since the case study does not reveal much about how to undertake best practice follow-up of socio-economic components of the environment, future research needs to look into this issue.

5.7 The Best-practice Framework

Cashmore (2004) observed that EIA is seen by most as a process that puts scientific knowledge into practical application. Cashmore asserts that EIA application models take either of two forms: the analytical science model and the environmental design

model. The analytical model is based on the principle that scientific method provides the foundation for EIA theory and practice and the environmental design model depends on a critique of the effectiveness and efficiency of procedural EIA.

As discussed below, lessons from Ekati are incorporated into the initial framework developed at the outset of this research, yielding the refined and tested best-practice framework which like Cashmore's environmental design model presents administrative, financial, and operational procedures for carrying out follow-up (Table 5.1).

Ekati's case reiterates the need for more solid ephemeral instrument for legislating follow-up. Legislation acting on Ekati's EIA follow-up is fragmentary. Other legislation is required that specifically advocates follow-up to EIA and that requires follow-up for projects no matter their location.

Table 5.1 The Best-Practice Framework

LEGISLATION AND GUIDANCE	**A RESULTS-ORIENTED APPROACH**	**A LEARNING-ORIENTED APPROACH**	**INTEGRATION**	**INSTITUTIONAL COMMITMENT**
Mandatory requirement **mandatory, non-ephemeral instrument needed* **W**	A clear statement of goals and objectives **proponent should prepare a consolidated and comprehensive listing of all follow-up programs* **W**	On-going monitoring and reporting **W**	Key variables for monitoring identified **W**	clarified financial responsibility **W**
Scope of follow-up covered by legislation **Z**	Appropriate timing of follow-up program determination **X**	Public registry available **W**	An ecosystems approach **?**	Government and proponent roles clearly established **X**
Procedural guidelines available for practitioners **Y**	Collection of baseline data ** baseline data collection should be ongoing* **X**	Integration of local knowledge **X**		Independent environmental checker **V**
	Continuous and consistent data collection **W**			Public/ stakeholder concerns considered in design **Firmer requirement on serious commitment to public involvement* **X**
	Hypotheses for impact prediction **V**			

Source: Best-practice framework from the literature and case study analysis

Legend

* Lessons learned from case study and elements/principles altered or improved

V-Satisfactory To Good

W-Satisfactory, But Room for Improvement

X-Poorly Done

Y-Criterion Evidenced, But Not Done/Implementation Not Per Normative Framework

Z-Not Done/Nonexistent

? –Not Sufficient Evidence/Conflicting Evidence between Sources advocated by normative framework

Table 5.1 shows descriptions of how well BHPB has done as per the best practice framework. These are not ratings. Like Blood types A or B for example, the letters do not represent a scale such as academic grading A-F. Instead, the letters represent descriptions which are explained in the legend.

5.8 Synthesis: Findings from the literature and lessons from Ekati

Two questions are raised at the outset of this research:

What is best practice follow-up?

What lessons can be learned form recent practice follow-up implementation?

To answer these questions, a normative framework for best practice follow-up was identified based on a review of EIA follow-up literature and applied to assess the follow-up activities of BHPB Ekati Diamond Mine. BHPB's follow-up activities have included actions outlined in the normative framework but at the same time, have left out important elements of best practice. One problem that is evident at Ekati is the emphasis on the biophysical elements of the environment, a neglect of socio-economic elements in follow-up programs.

This shortfall at BHPB underlines the importance of clearer application of principles and requirements (e.g. criteria) for socio-economic follow-up. Overall, BHPB Ekati's follow-up is a good effort in terms of best practice from the literature and reveals additional elements that should be included in the best practice framework. BHPB Ekati's lessons are already being adopted on neighboring mines. For example, by early 2005, consulations had begun between mine operators of BHPB and the Diavik mine to form a regional environmental checker. This idea arose from the recognition of IEMA's contribution to environmental management and a desire to extend such benefits to similar projects in the region. BHPB Ekati's EIA follow-up verifies that the principles suggested for best-practice in the literature actually work and is effectively managing the project effects on the environment. The literature advocates regulation, planning for funding, outlining objectives for the follow-up programs and appointment of an IEC for the achievement of follow-up program ends. At BHPB, one of the reasons that follow-up programs are effective (See examples of achievements in Table 4.12) is the structure

of regulators (See sec 4.1.1). This lineup of supervisors encompasses and set standards for follow-up and environmental management. From Ekati's case, we learn the importance of proponents to prepare a consolidated and comprehensive listing of all follow-up programs. At the same time, firmer requirements for serious commitment of proponents to public involvement in EIA follow-up programs wills strengthen practice by ensuring that public interests are deliberated and acted upon.

However, there are also practices by BHPB that should be avoided in future while certain principles suggested by literature are not practicable. The normative framework is valuable in suggesting, integrating and consolidating actions from research literature that contribute to the achievement of ends in EIA follow-up. Follow-up programs have not been defined before, in terms of procedure. This framework is developed for this purpose besides ensuring that practice is successful.

Screening assessments, unlike comprehensive EIAs, are carried out to narrow the scope of subsequent site investigations and assessment activities (US, DOE, 2005). Practitioners will be able to implement the best practice principles in screening assessments at stages where they are applicable, i.e., stages similar to those in comprehensive assessments. It is expected that verifying findings of screening assessments will require these principles for success just as they will in comprehensive EIAs.

The best practice framework attempts to address the problem of carrying out *ad hoc* EIA follow-up programs and suggests standard practice. This framework is only a beginning step towards best practice in EIA follow-up and no doubt subsequent research is going to improve up on it. EIA follow-up practice will likely evolve and it is important to research new and emerging literature to see its contributions to best practice in EIA follow-up.

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Appendices

Interview schedule parent document

Sarah Macharia

A FRAMEWORK FOR BEST PRACTICE EIA FOLLOW-UP: A CASE STUDY OF THE EKATI DIAMOND MINES

NB:

- **The alphabetized choices in questions were not posed to interviewees. They are retained in the 'parent document' for the sake of data analysis.**
- **Some questions read differently in individual interview schedule than they do in 'parent document' with certain respondents. These questions were tailored to suit particular respondent without prejudice, leading or altering the meaning.**
- **Number in bold at end of a question represents number of respondents to whom question was asked and who responded to the interview.**
- **All questions have been used to answer the research question. Not all questions have been posed in interviews.**

NOTE: You may choose not to or you may not be able to answer some questions – but I am asking just in case.

LEGISLATION AND GUIDANCE

Legislation and guidance advocates formalization of EIA and follow-up by regulations and mandatory requirements.

Mandatory requirement

1. What legislation guided the implementation of EIA follow-up for the BHP Ekati project? Choose as many as apply. **2**
    a. Provincial legislation.
    b. Federal legislation.
    c. Company policy or self-regulatory initiatives.
    d. Industry-led initiatives (E.g. Environmental Management Systems, EMS).
    e. Other. (Name and describe).

OR

Are there follow-up permits/licenses that require monitoring? Explain their requirements under: **3**

    f. Industry-led initiatives (E.g. Environmental Management Systems, EMS).
    g. Other. (Name and describe).

2. What are the requirements under these legislations?
    h. Industry-led initiatives (E.g. Environmental Management Systems, EMS).
    i. Other. (Name and describe).
3. Were the requirements fulfilled? If so, to what extent did the BHP fulfill these requirements? **3**
    j. Industry-led initiatives (E.g. Environmental Management Systems, EMS).
    k. Other. (Name and describe).
4. To what extent did the federal/ provincial authorities fulfill these requirements?

5. Are these legislations mandatory? **2**
6. What does the legislation require in terms of :
    a. Follow-up timing?
    b. Follow-up procedure?
7. To what extent are these aspects of the legislation enforceable, that is, what mechanisms within the law compel the responsible parties to implement the EIA follow-up and its various stages? **3**
8. What authorities enforce these requirements/legislations? **4**

OR

9. Are these legislations voluntary? If voluntary, who made the decision that the EIA and follow-up was required? What factors influenced the decision to implement a voluntary EIA follow-up program?
10. Are there any BHP Ekati company policies and regulations that guided the implementation of the EIA follow-up?
11. What are the requirements under these company policies?

Were the requirements fulfilled? If so, to what extent did the BHP Ekati fulfill these requirements?

Legislation that Sufficiently Covers the Scope of Follow-up

12. What should be followed up? **5**
13. What stages/aspects of the EIA follow-up were covered/guided by the legislation? Explain the requirements associated with each aspect.

Give name/title of legislation and where found.

14. Do current requirements under CEAA cover the scope of follow-up? **2**

15. What components are being followed-up at Ekati? Are these within or in addition to current CEAA requirements? **3**

16. "Environment" means the components of the earth, and includes biophysical; social; cultural and; economic elements of our surroundings. How well does the follow-up legislation span the following elements of the environment in terms of scale and scope:

    l. land, water and air, including all layers of the atmosphere,

    m. all organic and inorganic matter and living organisms, and

    n. the interacting natural systems that include health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes by aboriginal persons,

    o. or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

17. Does the legislation specify prediction of impacts on these elements? Does it specify identification and implementation of measures to deter, reduce, correct or compensate for the key adverse impacts on these elements, and to enhance the positive ones? **1 [10 INTEVIEW QUESTIONS]**

18. How do these requirements affect the quality of the EIA follow-up?

19. What aspects of the EIA follow-up did not have requirements under legislation? **1**

20. How does the absence of legislative requirements affect the quality of the EIA follow-up?

21. Does the guiding legislation have provisions/ requirements for elements unique to the project? Explain.
22. Does this legislation demand long term commitment? Is their a long-term period of time specified for the lifetime of follow-up programs? If so, how long should follow-up lifetime be? **5**
    p. As long as the project exists.
    q. During the lifetime of the project and after it is decommissioned
    r. Not specified
    s. Other. (Explain).
23. Does the legislation impose requirements for an ecosystem approach which considers and manages all elements that makeup the environment as an integrated whole and which considers the broad implications of a project? **4**
24. If not, what approach does the legislation require for follow-up programs?

Avail Procedural Guidelines to Practitioners

25. Are guidelines for EIA follow-up implementation available to the practitioners/ implementers/ developers? Are these sufficient? **3**

26. How effective/useful are these guidelines? How can they be improved? **3**

OR

27. Are guidelines available to facilitate the development/ implementation of follow-up sufficient? **1**
28. Do implementers/ developers have capacity to meet the requirements of these guidelines?

Would you say that these guidelines are entrenched within a solid legislative base? Explain.

OR

29. Are these guidelines from CEAA, industry, or are they project specific? **3**

30. In what form of authorizations are these guidelines available?

    a. Permits –Give name/ title and source/where found for each guideline. Describe the requirements under this guideline.
    b. Licenses- Give name/ title and source/where found for each guideline. Describe the requirements under this guideline.
    c. Approvals- Give name/ title and source/where found for each guideline. Describe the requirements under this guideline.
    d. Other- Give name/ title and source/where found for each guideline. Describe the requirements under this guideline.
    e. Under each guideline, state whether requirements for EIA follow-up implementation are clear to the implementers?

A RESULTS-ORIENTED APPROACH

A Clear Statement of Goals and Objectives

31. How were the follow-up program goals and objectives arrived at?

32. At what stage of the BHPB EIA were the follow-up goals and objectives determined? **3**

33. Are these goals and objectives guided by: **3**

a. Provincial/Federal Legislation?/ In what way and how far does the GNWT guide the goals and objectives of the BHPB Ekati's EIA follow-up program?
b. Company Policy or self-regulatory initiatives?
c. Industry-led initiatives (e.g. EMS, Environmental Management Systems)?
d. Other. (Name and explain).

34. Are these goals and objectives stated in a way that implementers are able to understand and implement them? Was there any ambiguity/confusion with the stated goals and objectives? Explain. **3**
35. State the goal of the BHP Ekati EIA follow-up program.

State the objectives of the BHP Ekati EIA follow-up program. Are they being realized? Please elaborate. **3 [20 INTERVIEW QUESTIONS]**

36. Explain the value and validity of the goals and objectives. **1**
37. Explain the ways in which the follow-up goals and objectives have been achieved.
38. Discuss follow-up goals and objectives in terms of capacity to be tracked and verified. **5**
39. How were project impacts stated/predicted? Are hypotheses being used or are predictions based on thresholds or maximum allowable effect levels (MAELS)? **4**
40. What impacts were stated? How many were stated? **2**
41. Were mitigation goals stated for all impacts? Are these goals being achieved? **2**
42. What is the value of implementing mitigation measures to the environment and the community? **1**
43. Were cause-effect relationships identified in predictions? **2**

Balance of Timing in Determining Follow-up Programs

44. Describe the EIA follow-up design:**1**

    a. Financial responsibility/ Describe the structure and resources that were/are in place for the follow-up program. Who provided for these resources?

    b. Human resources

    c. Technical resources/engineering design

    d. Project scheduling

    e. Other

45. When was the program for follow-up determined in relation to the EIA? **4**

46. Why was the follow-up program determined at this stage?**4 [30 INTERVIEW QUESTIONS]**

47. What valued environmental components (VECs) were identified in BHP's Ekati EIA?

48. Was the follow-up program schedule determined in relation to these VECs?

49. Explain the timing of VEC identification and the timing of follow-up priorities. **3**

50. If not the VECs, what elements were the focus of the follow-up design and operation? **2**

51. Explain the benefits and problems associated with the timing of determining the follow-up program and its priorities. **3**

Establishment of Baseline Data Pre-project

52. Describe the condition of the BHP Ekati mining area prior to project operation.

53. Were baseline studies of the BHP Ekati mining areas carried out? Were these studies sufficient? **2**

54. Who carried out the baseline studies?

55. When were these baseline studies carried out? **2**

56. Year/Month/Day from [____/_____/_____] to [_____/_____/____]

57. What aspects of the environment were included in these studies?

58. What changes were predicted to occur with project operations?

Which ones were confirmed to have occurred? **1**

59. What changes were predicted to occur with other human activities other than the project? Which ones were confirmed to have occurred? **1**

60. Explain other outcome of the baseline studies.

61. Were there standards for collecting and analyzing baseline data? **3**

62. How useful are baseline studies in making impact predictions and hence aiding follow-up in achieving program ends? How useful are these studies in managing project impacts? **3**

Maintain Continuous and Consistent Data Collection

63. Discuss data collection in relation to the follow-up program. **2 [40 INTERVIEW QUESTIONS]**

64. Did data collection go on as long as the follow-up project?

65. Give the timeline of the follow-up project:

Year/Month/Day Begun [____/_____/_____] Completed

[_____/_____/_____] Or Ongoing.

66. Give the timeline of the data collection exercise:

Year/Month/Day Begun [___ _ /_____/_____] Completed

[_____/_____/____] Or Ongoing.

67. How often are data updated? **2**

OR

68. How often are data updated in the mining industry follow-up? **2**

69. How did this frequency affect the efficiency/success of the follow-up program?**2**

70. Was the schedule (frequency, methods, equipment) for the data collection uniform throughout?

71. Describe the data collection schedule.

72. Was the schedule consistent?

73. Why was the schedule constant?

74. How did this consistency affect the reliability of the data collected? How did this consistency affect the success of the follow-up program?

Or

75. Was the schedule varied?

76. How was this schedule varied?

77. Why was the schedule varied?

78. How did this variation affect the reliability of the data collected? How did this variation affect the success of the follow-up program?

79. Discuss the basis on which to measure change VECs (Valued Ecosystem Components) and how this basis should be clarified from the outset of the project. **1**

80. What is the relationship between a clear basis for measuring changes on VECs and follow-up programs that achieve their ends?

Adopt a Hypothesis-Driven Scientific Approach to Impact Prediction

81. Was a hypothesis-driven approach used in impact prediction?

82. Describe the procedure.

83. Why was the hypothesis-driven approach used? What benefits did this approach lend the impact-prediction-follow-up process? **1**

84. What other approach was used other than/in addition to the deductive science approach in impact prediction? **1**

85. Describe this approach **1**

86. Why was this approach used? What benefits did this approach lend the impact-prediction-follow-up process? **2**

A LEARNING-ORIENTED APPROACH

Maintain On-Going Monitoring and Reporting

87. Describe the data auditing and reporting procedure. **1 [50 INTERVIEW QUESTIONS]**

88. Was auditing of monitoring data and reporting continuous?

89. Give the timeline of the follow-up project:

Year/Month/Day Begun [____/_____/_____] Completed

[_____/_____/____] Or Ongoing.

90. Give the timeline of the data auditing and reporting exercise:

Year/Month/Day Begun [____/_____/_____] Completed

[_____/_____/____] Or Ongoing.

91. How often were data audited and reported? **1**

92. Who was responsible for data collection?

93. How did this frequency affect the efficiency/success of the follow-up program?

94. In what kind of panel sessions/ public forums is data monitored and reported? **1**

95. Describe the assessment Panel's role in ensuring that the data reported was tested and representative of the stakeholders' views and interests. **2**

96. Was this goal achieved in BHP's Ekati EIA follow-up program?

97. Describe the benefits of continuous monitoring on environmental conservation and preservation goals in follow-up programs. **1**

98. Discuss the quality of the data in terms of accuracy. **3**

99. Are monitoring program and impact management strategies audited? For what purpose? **2**

100. Discuss efforts to ensure that these auditing, monitoring and reporting are open and transparent. **2**

101. What is the quality of the monitoring data in terms of clarity and detail? **3**

102. Describe the benefits of continuous monitoring on project and environment goals in follow-up programs.**2**

Establish and Maintain a Public Registry of Follow-Up Databases and Results

103. Does a public registry for the BHP Ekati EIA follow-up database and results exist?

104. If so, give the name and describe the scope of the database and registry in terms of biophysical, socio-cultural and economic facets of the environment. **1[60 INTERVIEW QUESTIONS]**

105. Name and describe locations (geographic) and formats (print/electronic/audio/video) where these are available and accessible.

106. Name the languages in which the database and registry are available and accessible.

107. Who are the target audience for these databases? **1**

108. Do the database and results available cover the entire lifetime of the EIA follow-up program?

109. If not, give the periods that are not available

Year/Month/Day from [____/_____/_____] to [_____/_____/____]

110. State the total period for which follow-up data is not available:

weeks [_____] months [_____] years [_____]

111. Were/Are the results of the EIA follow-up/database integrated into a broader legislative framework designed for environmental protection, conservation and management?

112. Describe the process of updating the database and keeping it current. **1**

113. If so, what are the (potential) benefits of this effort? **1**

114. If no database/public registry exists give reasons.

115. What is the consequence of the absence of a database? **1**

Apply Local Knowledge in the Follow-up Process

116. How is local knowledge identified from Western scientific knowledge? **3**

117. Is local traditional knowledge being used in the BHP Ekati EIA follow-up process? **3**

118. In what ways was it used? **1**

119. Describe the process of collecting and consolidating local knowledge in the BHPB Ekati mine project. **2**

120. Name the parties involved in the production and collection of local knowledge in the BHP Ekati EIA and follow-up program and their professional/ traditional offices. How were these groups identified? **4**

121. Give the timeline of the follow-up project:

Year/Month/Day Begun [___ _ /_____/_____] Completed

[_____/_____/____] Or Ongoing.

122. Give the timeline of the traditional knowledge collection process:

123. Year/Month/Day Begun [___ _ /_____/_____] Completed

124. [_____/_____/____] Or Ongoing.

125. From which Aboriginal groups was local knowledge used? Name the groups and their geographical locations (where possible give both Aboriginal and English names). **3 [70 INTERVIEW QUESTIONS]**

126. Describe ways in which the traditional knowledge proved useful in the BHP Ekati EIA follow-up process. **3**

127. How is the use of the traditional knowledge being harmonized with that of Western scientific knowledge? **4**

128. Choose one.

a. Traditional knowledge was accorded equal importance with Western scientific knowledge in the BHP Ekati EIA follow-up program. Explain.

b. Traditional knowledge was accorded more importance than Western scientific knowledge in the BHP Ekati EIA follow-up program. Explain.

c. Traditional knowledge was accorded less importance than Western scientific knowledge in the BHP Ekati EIA follow-up program. Explain.

129. Describe problems/difficulties encountered with the use of traditional knowledge including collection, interpretation, and application. **4**

AN INTEGRATED APPROACH

Identify Key Variables for Monitoring

130. What key variables were identified for monitoring in the BHP Ekati EIA follow-up program?/ Why were these key variables/VECs chosen and what is their significance? /Having in mind the key variables that are being followed up at the, BHPB Ekati Diamond Mine, why were these key variables/VECs chosen for follow-up to Ekati's BHPB EIA and what is their significance? **4**

131. Why were these variables chosen? List each variable and its significance.

132. Describe the role of the proponents and the local community in determining key variables for monitoring. **5**

133. How did identification and isolation of the key variables contribute to the success of the EIA follow-up program? Choose as many as apply.**2**

a. Monitoring as an early-warning system identified the variables that need to be managed as a result of project effects and allowed managers to take remedial actions before it is too late.
b. Facilitated adoption of mitigation measures.
c. By identifying elements that are of significance to the resident communities, public concerns about the effects of a particular activity or project were solved leading to improved public acceptance of proposals
d. Other (Explain).

Adopt an Ecosystems Approach towards Project Management

134. Did the BHP Ekati EIA follow-up program use an ecosystem approach? Describe the elements and characteristics of this approach. Choose as many as apply. **3**

a. To arrive at the important facets to be included in the ecosystem approach, public information was carefully analyzed
b. A technical review carried out to identify important factors of the environment.
c. Other elements and characteristics. Explain.

135. Why was this approach chosen? Choose as many as apply. **3**

a. To prove whether deleterious impacts on ecosystem integrity, human health and the quality of life, anticipated, either exist or not and that they have been prevented.
b. To facilitate consideration of the broad implications of projects.
c. To determine benefits of the project on the socio-economic dimension of resident communities.
d. Other reasons. Explain.

136. Are the intended benefits of the ecosystems approach being realized? Explain.**1**

137. How far beyond local project environment are environmental and socioeconomic effects being monitored? **1 [80 INTERVIEW QUESTIONS]**

138. If not the ecosystems approach, which approach was used? Give name and description.

139. Why was this approach chosen?

140. Were the intended benefits of the alternative approach realized? Explain. **1**

141. Is the follow-up program monitoring the linkages between environmental effects and socio economic impacts? **1**

142. In choosing the alternative approach:

a. The ecosystems approach was considered but not adopted. Explain.
b. The ecosystems approach was not considered at all/ Proponent was not aware of the ecosystems approach. Explain.
c. Both the alternative and the ecosystems approach were used. Describe this mixed approach.

INSTITUTIONAL COMMITMENT AND ACCOUNTABILITY

Define and Clarify Financial Responsibility

143. Who is responsible for paying for the BHP Ekati EIA and follow-up program? **1**

State the party (provincial/federal authority/BHP/other) in the BHP Ekati EIA follow-up who paid for:

a. The assessment Panel. Explain why this party was responsible for paying.

b. Interveners/ Independent Checker. Explain why this party was responsible for paying.

c. Other human resources. Explain why this party was responsible for paying.

d. Technical resources. Explain why this party was responsible for paying.

e. Other (Explain). Explain why this party was responsible for paying.

144. Choose as many as apply: Was this stipulated by: **1**

a. Legislation?

b. Company Policy or self-regulatory initiatives?

c. Industry-led initiative (e.g. Environmental Management Systems, EMS)?

145. When was financial responsibility determined? Choose which ever applies.

a. At the outset of the follow-up program/Early in the follow-up program

Why at this stage? What was the effect of making this decision at this stage on the follow-up program outcome?

b. After follow-up program priorities had been determined.

Why at this stage? What was the effect of making this decision at this stage on the follow-up program outcome?

c. Long after follow-up program had been determined and commenced.

Why at this stage? What was the effect of making this decision at this stage on the follow-up program outcome?

146. Choose as many as apply. Financial responsibility was:

a. Spelt out clearly. Describe the consequences of this on the success of the follow-up program.
b. Ambiguous. Describe the consequences of this on the success of the follow-up program.
c. Haphazardly arrived at. Describe the consequences of this on the success of the follow-up program.
d. Systematically determined. Describe the consequences of this on the success of the follow-up program.

147. Name and briefly describe this legislation and/or policy including sections under which the legislation may be found.

148. Financial responsibility in the follow-up program is stipulated for:

a. The assessment Panel
b. Interveners/ Independent Checker
c. Other human resources
d. Technical resources
e. Other (Explain).

Define Roles for the Proponents and Governments

149. Were the roles and responsibilities of the federal/provincial government and the proponent defined in the BHP Ekati EIA follow-up?

150. Describe the roles and responsibilities stated and which parties have been named as responsible. **3**

151. Describe the communication and liaison channel between these parties. **1**

152. Are these parties meeting their responsibilities? **1**

153. In which legislation/company policy or self-regulatory initiatives are these roles stipulated? State legislation/ policy and section where found. **4**

154. Choose whichever applies. Are these legislation/policy: **3**

a. Clear? Explain

b. Ambiguous? Explain.

c. Other description. Explain

155. Describe the effects of these stipulations on: **4 [90 INTERVIEW QUESTIONS]**

a. Follow-up program organizational efficiency.

b. Follow-up program timeliness.

c. Follow-up program accountability.

d. Follow-up program continuity.

e. Other aspects of the follow-up program. Name and describe.

156. Apart from legislation and company policy, what other efforts/sources can you name for attempting to clarify the roles of parties in follow-up programs?

Appoint an Independent Environmental Checker

157. Name any IEC involved with the BHP Ekati EIA and follow-up program.

158. What factors led to the appointment of this Panel? **1**

159. Is there any legislation that encouraged the appointment of this IEC? **1** Name and describe the legislation/company policy and give sections under which this legislation/policy may be found. **2**

160. Describe the make-up of this IEC in terms of personnel (names and title), their qualification and individual responsibilities within this IEC.

161. How do these independent watchdogs contribute to project/ environment/socioeconomic management/ improvement? Please give examples. **2**

OR

162. How has the IEMA contributed to project/ environment/socioeconomic management/ improvement? Please give examples. **1**

OR

163. What are the implications of appointing the IEMA on balancing the interests of stakeholders?

OR

164. Describe the overall responsibilities of this checker. Choose as many as apply:

a. Oversaw the works carried out.
b. Checked data collected by the environmental team responsible for the actual monitoring.
c. Audited works carried out at the site.
d. Verified and certified that mitigation measures were fully and properly implemented as recommended in the EIA report.
e. Covered issues which are normally not part of licensed terms and conditions.
f. Bore the responsibility of providing a visible record of the commitments of the company to carry out environmental monitoring programs (to prevent and mitigate environmental impacts).

g. Where necessary, also negotiated with Aboriginal communities affected by the project to ensure that the Aboriginal communities benefit from resource projects which occur in their backyard.

h. Offered a system of checks and balances for the government of Canada for the continuing assurance that significant progress was being made on both the environmental agreement and impact benefit agreements before final approval to proceed with the project was given.

i. Ensured that progress was achieved on a territory-wide strategy to protect key environmentally significant areas.

j. Responsibilities included review and acceptance of the developer's Environmental Management Plan (EMP) and all its components

k. Coordinated the review of applications for permits, licenses, approvals, etc., as project development proceeded; and the ongoing monitoring, and reporting on assessments.

165. Give the lifetime of this checker in relation to the BHP Ekati EIA follow-up program.

Timeline of BHP Ekati EIA follow-up program:

Year/Month/Day Begun [___ _ /_____/_____] Completed

[_____/_____/____] Or Ongoing.

166. Give the timeline of this IEC:

Year/Month/Day Appointed [___ _ /_____/_____] Dissolved

[_____/_____/____] Or still carrying out its mandate.

167. Answer Yes or No and elaborate whether this IEC was legally empowered to:

a. Harmonize existing monitoring functions; Elaborate.

b. Identify and remedy gaps in monitoring capability; Elaborate.

c. Give equal consideration to the TEK (traditional ecological knowledge) of the Aboriginal peoples; Elaborate.

168. How does this empowerment/ lack of empowerment affect the effectiveness and abilities of the IEC?

169. Would you say that this IEC:

a. Was unaffiliated to project initiators and financial beneficiaries/Independent? Explain.

b. Was affiliated to project initiators and financial beneficiaries? Explain.

170. How does this relationship to project initiators and financial beneficiaries of the IEC affect the IEC's effectiveness and abilities?

171. What forms of support are expected from project proponents towards these watchdogs? **2**

Address Public/Stakeholder Concerns

172. Describe the public/stakeholder involvement in the BHP Ekati EIA follow-up program. Choose as many as apply. **4**

c. Involved various fora to collect public views. Describe.

d. Involved the provision of access for all affected parties to relevant information and to technical and scientific advice. Describe.

e. The atmosphere was such that the affected parties participated in good faith. Elaborate.

f. Stakeholder concerns were being incorporated into project plans and operations and decisions were made because of the public/stakeholders' recommendations and not in spite of them. Elaborate.

g. Other. Explain.

173. What factors led to the involvement of the public in the EIA follow-up process? Choose as many as apply. **3**

a. The threat of litigation from a disgruntled public.

b. The principle that stakeholder concerns and viewpoints need to be considered in making project decisions.

c. The need to allay the fears and concerns of stakeholders.

d. The principle of according all parties fair and equal treatment.

e. The principle that all interested parties deserve an opportunity to participate effectively.

174. Choose one; When public involvement commenced in relation to the BHP Ekati EIA follow-up program:

a. Decision makers had already decided on a particular course of action. Explain.

b. Decision makers had not decided on a course of action. Explain.

c. Other. Explain.

175. Give the timeline of BHP Ekati EIA follow-up program:

Year/Month/Day Begun [____/_____/_____] Completed [_____/_____/____] Or Ongoing.

176. If the public are involved in the follow-up program, when did their involvement commence? **3**

OR

177. Give the timeline of the public participation programs

Year/Month/Day Begun [____/_____/_____] Ended

[_____/_____/____] / Still carrying out its mandate.

178. How does this timeline affect the goals of the public involvement program? **3**

[100 INTERVIEW QUESTIONS]

179. Discuss project decisions in terms of incorporating the public's opinion. **4**

180. How committed would you say the BHP Ekati proponent and authorities are to: **4 [TOTAL: 102 INTERVIEW QUESTIONS]**

Public involvement

Public involvement in follow-up

Choose as many as apply.

a. Proponents offered proof of their dedication to ongoing public consultation and education which illustrates that decision makers took public concerns seriously. Explain.
b. Federal/cabinet and provincial decisions on their part displayed respect for panel recommendations. Explain.
c. Other. (Elaborate).

Table A.1[1]. Number of respondents per question.

Principle	Question Number	Number of Interviewees	Who these Interviewees were	Posed in both Document Analysis and Interviews (I) Posed in Documents only (D)
Legislation and Guidance	1.	5	Experts and private practitioners, Government Representatives	I
	2.			D
	3.			D
	4.			D
	5.	2	Experts and private practitioners, Government Representative	I
	6.	4	IEMA, Experts and private practitioners, Government representative	I
	7.	3	Experts and private practitioners, Government representative	I
	8.	4	Experts and private practitioners, Government representative	I
	9.			D
	10.			D
	11.			D

Table A.1 [1] is a demonstration of how questions were allocated to individuals. These are all questions used in the study and represent hw one can measure the principles and elements in the normative framework. Questions 2, 4, 6,9,10, and 11 for example, were answered based solely on the document analysis.

	12.	5	Experts and private practitioners, Government representative	I
	13.			D
	14.	2	Expert/private practitioner, Government representative	I
	15.	3	Experts and private practitioners, Government representative	I
	16.			D
	17.	1	Expert/private practitioners	I
	18.			D
	19.	1	Expert/private practitioners	I
	20.			I
	21.			D
	22.	5	Experts and private practitioners, Government representatives	I
	23.	4	IEMA, Experts and private practitioners Government representative	I
	24.			D
	25.	3	Experts and private practitioners, Government representative	I
	26.	3	Experts and private practitioners, Government representative	I

	27.	1	Expert/private practitioners,	I
	28.			D
	29.	3	Experts and private practitioners, Government representative	I
	30.			D
A Results-oriented approach	31.			D
	32.	3	IEMA, Expert/private practitioners	I
	33.	3	IEMA, Government representative	I
	34.	3	IEMA, Government Representative	I
	35.	3	IEMA, Government Representative	I
	36.	1	Expert/private practitioners	I
	37.			D
	38.	5	IEMA, Experts and private practitioners	I
	39.	4	IEMA, Experts and private practitioners	I
	40.	2	IEMA	I
	41.	2	IEMA	I
	42.	1	Expert/private practitioners	I
	43.	2	IEMA	I
	44.	1	Expert/private practitioner	I

	45.	4	Experts and private practitioners	I
	46.	4	Experts and private practitioners	I
	47.			D
	48.			D
	49.	3	Experts and private practitioners	I
	50.	2	Experts and private practitioners	I
	51.	3	Experts and private practitioners	I
	52.			D
	53.	2	IEMA, Government, representative	I
	54.			D
	55.	2	IEMA	I
	56.			D
	57.			D
	58.	1	Expert/private practitioner	I
	59.	1	Expert/private practitioner	I
	60.			D
	61.	3	Experts and private practitioners	I
	62.	3	Experts and private practitioners, Government representative	I

	63.	2	Experts and private practitioners	I
	64.			D
	65.	1	IEMA, Experts and private practitioners	I
	66.			D
	67.			D
	68.	2	Experts and private practitioners	I
	69.	2	Experts and private practitioners	I
	70.			D
	71.			D
	72.			D
	73.			D
	74.			D
	75.			D
	76.			D
	77.			D
	78.			D
	79.	1	Expert/private practitioner	I
	80.	1	Expert/private practitioner	I
	81.			D
	82.			D
	83.	1	Expert/private practitioner	I

	84.	1	Expert/private practitioner	I
	85.	1	Expert/private practitioner	D
	86.	2	Experts and private practitioners	I
A Learning-oriented Approach	87.	1	Experts and private practitioners	I
	88.			D
	89.			D
	90.			D
	91.	1	Expert/private practitioners	I
	92.			D
	93.			D
	94.	1	Expert/private practitioners	I
	95.	2	Experts and private practitioners	I
	96.			D
	97.	1	IEMA, Aboriginal community representatives Experts and private practitioners, Government regulators	I
	98.	3	IEMA, Aboriginal community representatives Experts and private practitioners, Government regulators	I
	99.	2	IEMA, Aboriginal community representatives Experts and private	I

			practitioners, Government regulators	
	100.	2	IEMA, Aboriginal community representatives Experts and private practitioners, Government regulators	I
	101.	3	IEMA, Aboriginal community representatives Experts and private practitioners, Government regulators	I
	102.	2	IEMA, Aboriginal community representatives Experts and private practitioners, Government regulators	I
	103.			D
	104.	1	Expert/private practitioner	I
	105.			D
	106.			D
	107.	1	Expert/private practitioner	I
	108.			D
	109.			D
	110.			D
	111.			D
	112.	1	Expert/private practitioner	I

	113.	1	Expert/private practitioner	I
	114.			D
	115.	1	Expert/private practitioner	I
	116.	3	IEMA, Experts and private practitioners	I
	117.	3	IEMA, Experts and private practitioners	I
	118.	2	IEMA	I
	119.	2	IEMA, Aboriginal community representatives	I
	120.	4	IEMA, Aboriginal community representatives, Experts and private practitioners	I
	121.			D
	122.			D
	123.			
	124.			D
	125.	3	IEMA, Aboriginal community representative, Experts and private practitioners	I
	126.	3	IEMA, Experts and private practitioners	I
	127.	4	IEMA, Aboriginal community representative, Experts and private practitioners	

	128.			D
	129.	4	IEMA, Aboriginal community representative, Experts and private practitioners	I
An Integrated Approach	130.	4	IEMA, Experts and private practitioners	I
	131.			D
	132.	5	IEMA, Experts and private practitioners	I
	133.	2	Experts and private practitioners	I
	134.	3	Expert/and private practitioners	I
	135.	3	Experts and private practitioners	I
	136.	1	Expert/private practitioner	I
	137.	1	Experts and private practitioners	I
	138.			D
	139.			D
	140.	1	Experts and private practitioners	I
	141.	1	Experts and private practitioners	I
	142.			D
Institutional Commitment and Accountability	143.	1	Expert/private practitioner	I
	144.	1	Expert/private practitioner	I

	145.			D
	146.			D
	147.			D
	148.			D
	149.			D
	150.	3	Experts and private practitioners	I
	151.	1	Experts/ private practitioners	I
	152.	1	IEMA, Aboriginal community representatives Experts and private practitioners ,Government regulators,	I
	153.	4	Experts and private practitioners	I
	154.			D
	155.			D
	156.			D
	157.			D
	158.	1	Expert/ private practitioner	I
	159.	3	Experts and private practitioners	I
	160.			D
	161.	2	Experts and private practitioners	I
	162.	1	Experts and private practitioners ,	I

	163.			D
	164.			D
	165.			D
	166.			D
	167.			D
	168.			D
	169.			D
	170.			D
	171.	3	Experts and private practitioners	I
	172.	4	Aboriginal community representative, Experts and private practitioners	I
	173.	3	Experts and private practitioners	I
	174.			D
	175.			D
	176.	3	Experts and private practitioners	I
	177.			D
	178.			D
	179.	4	Aboriginal community representative, Experts and private practitioners	I
	180.	4	Aboriginal community representative, Experts and private practitioners	I

Total questions posed in interviews: 102
Average number of questions per individual respondent: 15
Total number of study questions including those answered only by documents: 180