Project risk management for international petroleum exploration and development ventures

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Project Risk Management
for International Petroleum Exploration and Development Ventures

by

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Abstract

A survey of senior managers of Canadian-based oil companies identifies risk management strategies associated with undertaking international exploration and development ventures. An extensive literature review and an in-depth case study of Petro-Canada's Tinhert project supplement the survey.

International projects are subject to new and often-unforeseen risks compared with the familiar realm of Canadian activities. These new risks are identified, and risk management advice is consolidated from the management survey, literature review, and case study.

Cultural difference combined with managing relations with the host-country national oil company is the risk most frequently cited by senior managers. Other project risks covered are project selection; data access; political and business risks; project leadership and organisation; environmental, health and safety (EH&S) and security risks; technical risk; and senior management support.

Perceptions of risk appear significantly influenced by personal experience, and a comprehensive risk register is recommended to ensure identification and management of a broader range of risks.
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# Table of Contents

Abstract ........................................................................................................................................ iii

Acknowledgments ....................................................................................................................... iv

Table of Contents ........................................................................................................................ v

Abbreviations and Nomenclature ............................................................................................... ix

Chapter 1 Introduction .................................................................................................................. 1
  1.1 Overview ................................................................................................................................ 1
  1.2 International versus Domestic Projects .................................................................................. 3
  1.3 Why this study is needed .......................................................................................................... 3
  1.4 Thesis Focus ............................................................................................................................. 6
  1.5 Where to Find What You're Looking For ............................................................................... 7

Chapter 2 Methodology ................................................................................................................ 8
  2.1 Basic Research Question ......................................................................................................... 8
  2.2 Selection of the Appropriate Research Methodology .............................................................. 8
  2.3 Methodology for the Tinrhet (Algeria) Project Case Study ..................................................... 10
  2.4 Methodology for the Literature Survey ................................................................................... 16
  2.5 Methodology for the Interviews on Industry Practices ............................................................ 16
  2.6 Consolidation of Literature, Case Study, and Expert Interviews ........................................... 20

Chapter 3 Summary of Tinrhet Project ........................................................................................ 22
  3.1 Project Scope and Purpose ....................................................................................................... 24
  3.2 Information Risk Encountered ............................................................................................... 24
  3.3 Technical Risks ....................................................................................................................... 25
  3.4 Partner Relations Issues ......................................................................................................... 26
  3.5 Security Considerations .......................................................................................................... 27
  3.6 Business Risks ......................................................................................................................... 28
  3.7 Organizational Considerations ............................................................................................... 29
  3.8 Contracting Issues ................................................................................................................... 30
  3.9 Identification of Risks by Stakeholders ................................................................................... 32
  3.10 Chapter Summary ................................................................................................................... 35
Chapter 4 Results of Literature Search

4.1 Overview

4.2 Project Selection, Growth Options and Strategies

4.3 Political Risk

4.4 Business Risks

4.5 Mitigation of Investment Losses (Financing and Insurance)

4.6 Cultural Gaps

4.7 Technical Risk and Its Quantification

4.8 Organization

4.9 Environmental Risk

4.10 Understanding the Host-Country Landscape

4.11 Petroleum Agreements and Due Diligence

4.12 Applying Project Risk Management, and Risk Management Tools

4.13 Summary of Literature Review

Chapter 5 Results of Expert Interviews

5.1 Summary Chart

5.2 Author's Observations on the Data

5.3 Summary of Expert Interviews

Chapter 6 Synthesis and Discussion

6.1 Project Selection and Data Phase

6.2 Technical Risk

6.3 Environmental, Health, Safety, and Security

6.4 Political and Economic

6.5 NOC/Government Relations and Cultural Differences

6.6 Senior Management and Investor Support

6.7 Project Organization and Leadership

Chapter 7 Conclusions

References

Appendix A: The Tinrhert Project Story—The Path to First Oil

1. Country and Tinrhert Facts

4. Start-up and Data Phase (1993-94) ................................................................. 213
5. First Well (TM-103) and Start of Seismic Program (1994-95) .................... 220
8. Agreements on Transportation and Lifting, and Other Wells (1996) ....... 242
9. Operations (1996 and later) ............................................................................ 251
Appendix B: Survey of Algeria Asset Team Performance .................................. 254
   Methodology ..................................................................................................... 254
   Results ............................................................................................................. 254
Appendix C: Expert Interviews ........................................................................... 264
   1. Experts Interviewed ...................................................................................... 264
   2. Interview Process ........................................................................................ 264
   3. Outline of Subjects Covered During Expert Interviews ............................ 265
   4. Raw Data .................................................................................................... 266
Appendix D: Algeria Asset Team Norms ............................................................. 298
Appendix E: Ideas for a Risk Management Toolbox ........................................... 301
List of Figures and Tables

Figures
Figure 3.0  Location of Tinrhert (Algeria) Project
Figure 4.12  De-Ath’s Wheel of Fortune
Figure 5.1  Categorization of Issues Identified by Experts

Tables
Table 4.8.2  Differences Between Asset Based and Functional Management Systems
Table 4.8.6a  Evolution of Project Management Paradigms
Table 4.8.6b  Evolution of the Project Manager
Table 3.9a  Identification of Tinrhert Risks by Stakeholders
Table 3.9b  Author’s (Retrospective) View of Tinrhert Risks
Table 3.9c  Risk Elements Extracted from the Tinrhert Project
Table C-1:  List of Experts Interviewed
Abbreviations and Nomenclature

- DPI is discounted profitability index.
- EH&S is environmental, health, and safety.
- EMV is expected monetary value.
- Expatriate refers to an individual who does not come from the host country. In this thesis, this would typically mean a Canadian working internationally.
- E&D is exploration and development.
- E&P is exploration and production.
- G&A is general administrative.
- HCF is hydrocarbon chance factor.
- Home Country and Domestic refer to Canada.
- Host Country refers to the country in which the petroleum accumulation lies.
- IRR is internal rate of return.
- JOA is a joint operating agreement.
- NGO is a non-governmental organization.
- NOC is the national oil company of the host country, but may also refer to the appropriate government ministry charged with the affairs of foreign oil companies (e.g. ministry of energy).
- NPV is net present value.
- OECD is the Organization for Economic Co-operation and Development.
- Oil Companies means both oil companies and gas companies, in this case the Canadian/foreign company.
- PSC is a production-sharing contract. This is the most common form of contract entered into between oil companies and NOCs, and spells out the rights and obligations of both parties (e.g. work obligation, fiscal terms, etc.).
- Resident Manager is the most senior representative of the oil company in the host country.
- $ is US$ unless otherwise specified.
Chapter 1  Introduction

This chapter provides the following:

- an introduction to the subject matter;
- a discussion of what this study is trying to achieve and the niche it fills;
- a brief overview of the approach used
- suggestions to the reader if reviewing the entire report seems to onerous a task.

1.1 Overview

The allure for Canadian-based oil companies to expand their exploration and development activities into the international arena is easy to fathom—the Western Canadian basin is a fiercely competitive environment, where the conventional oil and gas pools being discovered continue to get smaller. Most hydrocarbon regions of the world are much less explored, and offer the potential for new and larger conventional opportunities, where the advanced technologies to access the difficult reservoirs in Western Canada can be applied.

Creating petroleum production internationally through exploration and development is a significant undertaking. A typical international petroleum exploration and development project runs for several years and costs tens to hundreds of millions of dollars, and must deal with the risks associated with each of the following partial list of activities, which provide an idea as to the challenge:

- selecting a country and a region in which to undertake a project;
- getting enough data on a region and doing an objective analysis to ensure the chosen region has sufficient potential, has a suitable risk profile, and fits with the company’s strengths and skills. Most countries have far less open access to data than Western Canada;
- marketing the competencies of the oil company to the NOC/government to gain access to land bids or negotiations, finding out who to do business with—since it’s not always apparent, determining what contracts and
agreements need to be entered into, and breaking through the communications and cultural barriers to reach an effective agreement that makes sense for both parties under a variety of outcomes;

• ensuring senior management and/or investor understanding of the project risks, and getting them to provide the necessary visible support to make things happen in the country;

• developing familiarity with the key technical and operational elements and risks in a new environment and with (typically) only partial data. What are all the things along the way that can impede profitability? Who controls the marketing and infrastructure?

• managing relations with the host national oil company or regulatory body. There can be elements within these organizations that do not welcome the presence of foreign companies, and these bodies will often have different corporate cultures and business (or political) drivers than the oil company;

• conducting in-country drilling, seismic and development operations with a blend of foreign and host-country contractors, and trying to maintain appropriate environmental, health, and safety protocols;

• getting any discovered hydrocarbons to market, and ensuring that the revenue can be repatriated;

• managing technical complexity that requires multi-disciplinary teams;

• keeping a project team aligned and cohesive, even though members may be spread over vast distances, and across many time zones;

• handling numerous other external issues; and

• ensuring that the expectations of stakeholders are managed such that support is sustained through the multi-year duration needed to execute this kind of project. Senior management or investors may not have a good understanding of the differences (or inefficiencies) associated with working outside of the Western Canadian environment.

A more detailed overview is contained in Section 4.1
1.2 *International versus Domestic Projects*

The international dimension introduces risks that are not present in a domestic venture. The greatest differences when going from a domestic to an international project are:

- information risk—greater difficulty accessing data before committing to a project;
- unfamiliar political and business risks;
- security risks, on occasion;
- regulatory and partner risk—working with National Oil Companies and foreign governments across language barriers and cultural barriers—both business and social culture;
- risk of insufficient or diminishing project support—as there is typically less management and investor familiarity with the challenges; and
- organizational risk—coordinating project teams across vast distances—and often time zones, with increased project complexity.

However, if the social and business cultures and state of economic development are similar between the home country and the host country, many of the risks discussed in this study would be reduced to that of a typical project in the home country. For example, although working in the U.S. could be considered international work from a Canadian perspective, the environment is not sufficiently different to be the target of the advice and conclusions offered here. But the issues discussed in this study would be familiar to any oil company from an OECD country undertaking international projects in a developing nation. Other resource industries would probably also recognize the project risk management issues addressed here. At the most general level, so might many companies doing business outside the oil and gas industry, but perhaps not to the same degree.

1.3 *Why this study is needed*

Canadian oil companies have invested billions of dollars in international
petroleum projects, with $1 billion in financing in 1996 alone (Layzell, 1998), yet there currently exists no thorough compilation of the risks associated with these ventures.

These projects are highly complex, integrating significant technical, business, political, cultural, and organizational challenges. Changing the project location from domestic to international introduces dimensions of risk that will be unfamiliar to project managers of domestic ventures. This study emphasizes the differences.

Important decisions can be made by default by the investor or manager when the risks are not fully understood. It has been my observation that international ventures often fail for reasons that were not anticipated by the participants, but could have been.

The goals for this study are to fill the following gaps in the published literature:

- a comprehensive review of the major sources of risk for companies undertaking international exploration and development ventures in the petroleum industry. The underlying assumption is that awareness enables these risks to be managed; and
- recommended practices based on a review of the available literature and a survey of industry practitioners.

There are three primary sources of information for this thesis:

- a case study of Petro-Canada’s Tinhert project in Algeria. The study is limited to the time period 1989-1996, with the project goal being first oil production for Petro-Canada—a project exceeding $50 million in capital cost (Chapter 3);
- a literature survey of risk management for international petroleum projects (Chapter 4); and
- an interview based survey of senior managers of Canadian-based oil
companies to ascertain their perception and management of risks in international projects (Chapter 5).

The methodology employed in this study forms Chapter 2.

This study expands the body of knowledge in the domain of project risk management of international petroleum ventures in a number of ways:

- by documenting the wisdom of experienced practitioners in a field where little has been published;
- by creating a detailed account of a project in this field for possible use in future research; and
- by showing that NOC/government relations and cross-cultural issues are the most frequently cited risks. This is a first in the field.

This study allows new practitioners to gain an overall understanding of the subject matter and an idea of the key issues. For experienced practitioners, it provides a framework within which to put their experience and a rigorous list to check their risk management efforts against. It can also serve as a starting point for the inquiries of future researchers.

The preceding paragraphs summarize the research purpose from an outside viewpoint. As author, I had some personal objectives as well. Having worked on a fascinating and rewarding project in Tinrhert (Algeria) for several years, I felt it would be worthwhile to share the experience, as our project team dealt with a number of issues and risks that other practitioners would also be exposed to. My analysis of Petro-Canada's Tinrhert (Algeria) project served as the starting point for a more general review of risk for international ventures. Part of my fascination with the Algeria project centred on the various organizational models that were used during the project life, and the Tinrhert team effectiveness survey and the extensiveness of the literature review of project organization reflect this interest.
1.4 Thesis Focus

A project hierarchy model allows consideration of international petroleum exploration and development projects on a number of levels. For a typical international project, a number of individual sub-projects can be considered at a component level, such as:

- the installation of a gas compressor station or oil gathering centre;
- the drilling of a well; or
- seismic acquisition.

Each of these components could be considered a project in its own right. Alternatively, several component projects could be grouped, as in the case of a field development, which would then include most or all of the components listed above. Finally, at the primary project level, the scope might involve first selecting, then acquiring and negotiating rights to an area, undertaking exploration for and/or development of oil or gas fields that appear attractive, and finally, producing any such fields.

The focus of this thesis is the risk of the primary (or overall) project, as well as those aspects of the sub-projects that are emphasized by working internationally.

From the point of view of project risk management associated with Canadian oil companies doing international work, the emphasis will be on doing actual exploration and development, rather than growth through acquisitions.

The University of Calgary Project Management web-site home page captures the essence of several project risk management issues as follows:

- most risk management decisions are irreversibly made in the early stages of project development. Some, at least, are made by default;
- organizations can successfully implement many projects, but often it is the wrong project that is implemented! and
- market risks, financing, technology, environmental, safety, and many other (risk) categories exist; however little research has been done in the area of
effective management of any of these risks. What has been done has generally focused on the project implementation phase (Hartman, 1998).

These comments are taken to heart in this thesis, with considerable emphasis on risks that can be evaluated prior to a project commitment being made.

1.5 Where to Find What You're Looking For

If you're a member of Petro-Canada's Algeria team, then Appendix A will probably interest you the most—or perhaps the survey of team effectiveness found in Appendix B.

If you are a researcher looking for further work, the synthesis section (Chapter 6) has much to offer in terms of additional research topics.

If you are a new practitioner, I recommend the literature survey (Chapter 4) for a general introduction of the topic, and the synthesis and discussion section (Chapter 6) for the key recommendations.

If you are presently practicing, I suggest Chapter 7 for more detailed coverage of the subject matter.
Chapter 2    Methodology

This chapter discusses the research methodology applied to each of the phases of the study (Tinrhet case study, literature review, expert interviews, and data synthesis). This includes a review of the sources and reliability of the data, the analysis method, and biases.

2.1 Basic Research Question

What are the major risks and keys to success in managing international exploration and development ventures in the petroleum industry?

2.2 Selection of the Appropriate Research Methodology

The following discussion of how the research methodology was chosen for this thesis uses the ideas contained in recent work by Creswell (1998) as its basis.

At the most basic level, there are two different traditions of research inquiry, namely quantitative and qualitative research. In quantitative research, the focus is on only a few variables, and a large number of cases. The converse is true in qualitative research—the focus is on a large number of variables in a few select cases.

Given its complexity, project risk management for international exploration and development ventures contains a large number of variables that are better suited to the tradition of qualitative inquiry. The diverse responses to the various interview questions confirmed the choice of methods. There were many different risk variables identified by practitioners, and each practitioner had their own individual experience, and perception, of risk. My interest in an overview of all the key risks required the consideration of a large number of variables, and consequently the qualitative research approach.

Within the domain of qualitative inquiry, there are five basic types of research:
• a **biographical study**, which is the study of an individual;

• a **phenomenological study** that describes the meaning of a lived experience shared by a number of individuals;

• a **grounded theory study**, that attempts to generate a theory based on a particular situation;

• an **ethnography study**, that examines the behaviour of a social or cultural group; and

• a **case study**, that looks at a case or cases from multiple perspectives over time.

The review of Petro-Canada's Tinhert (Algeria) project was most suited to the case study format. It could be conducted as an in-depth study using multiple sources. These sources included weekly reports, trip reports, memos, letters, discussions with colleagues, numerous surveys, a narrative on the origins of the project, and my own recollections. The detailed methodology for this case study is discussed below (Section 2.5).

Arising from the case study were a number of risk categories. These were expanded upon through ideas gleaned in an extensive literature search, and discussion with my research advisor, Francis Hartman. The final phase of the thesis work involved determining the current industry practices in terms of acknowledging and managing the risks. The individuals most likely to be knowledgeable in how the industry is managing the risks are the decision-makers themselves—namely the senior managers who have undertaken and been responsible for these ventures. An interview process was put together to gather their experience.

The question arises as to how to categorize the phase of research that captures the experience of senior managers for dealing with risk. I was more interested in the practices that managers were pursuing based on the accumulation of their experiences with a *number* of projects, rather than the details of a single project.
(which they might be more reluctant to discuss for reasons of confidentiality, and less useful). A grounded theory approach would be to:

- conduct the interviews until no new risks were identified (i.e. saturate the category);
- code the results;
- organize them rigorously; and
- develop hypotheses from the data.

The end result would be the emergence of a theory.

In the end, my approach to the expert interviews was only loosely based on grounded theory methodology, and was more like "content analysis" than anything. I had no particular expectation of a theory emerging from the interviews. I felt that the exhaustive gathering and sorting of information through the case study, literature search, and interviews would in itself be highly useful in helping practitioners and investors to understand and manage risk, and perhaps provide future researchers with a starting point for their own inquiries.

2.3 **Methodology for the Tinrhert (Algeria) Project Case Study**

*Deliverables*

The deliverables at the completion of the case study were:

- a list of key risks to serve as a starting point for the remainder of the research effort;
- a detailed account of a project that could provide new practitioners with insight as to the stages of such a project, and the challenges that might be encountered;
- a summary of a project that could provide other researchers with a source of material over a wide range of topics; and
- a written summary of achievements for participants and team members of the Algeria project.
What the Case Study Covers

The project case history is a sequential review of a number of phases of Petro-Canada's Tinhert project—from its inception as a project and through its transition to an ongoing operational (non-project) status.

The phases of the project encountered (many of them overlapping) during the review period included:

- project selection (1989-1991);
- (production sharing) contract negotiations and approvals (1991-1994);
- start-up and data phase (1993-1994);
- first drilling and start of seismic program (1994-1995);
- development approvals (1994-1996);
- development phase (1995-1996);
- agreements on transportation, lifting, and other wells (1996); and
- start-up of operations (1996+).

In each phase, the following aspects are reviewed:

- the objectives of the phase;
- the organizational style used to manage the project;
- the state of partner relations;
- the quality of information at hand with which to make decisions;
- how contracting was done;
- how security was managed; and
- what the main business and the technical risks were.

The development phases refer to the first field in Tinhert (called Tamadanet) brought on production by Petro-Canada. The development pattern is currently being repeated with other discoveries—each one a project in its own right.

Sampling Strategy

The sampling strategy employed for the case study was both typical and
intensive. In terms of Canadian oil companies venturing internationally, the Tinrhert project might be considered typical in that it contained a significant exploration component, contained challenges through a variety of external issues, and employed a group of people with varied levels of international experience. My long-term affiliation with the project allowed me to conduct an extensive review through access to both people and records that an outsider could not have readily achieved.

Sources of Data

My access to data was essentially unlimited. It included all weekly reports, trip reports, security reports, political and economic analyses, contracts, presentations, financial and budget information, strategic and tactical documents, operating standards, contingency plans, memos, letters, technical documents, discussions with colleagues, numerous surveys, a narrative on the origins of the project that I had written previously (unpublished), and my own recollections. The objectivity with which this data is handled is discussed later in this section.

The resulting case review offers the following:

- substantial depth from a large quantity of available material;
- a view from multiple disciplines, including geologists, geophysicists, reservoir engineers, production engineers, facilities engineers, drilling and production operations specialists, managers, economists, human resources professionals, resident managers, finance and administration managers and staff, legal, risk management, security;
- a view from multiple levels in the organization, including executive, management, and staff levels;
- a view from both head office and the administrative and operational offices in the host-country; and
- my own experience through many years of association with the project.
In addition to the material already existing and available, two sets of interviews, or surveys, of Petro-Canada personnel were conducted specifically for this thesis. The interviews were conducted both in Algeria and Calgary, and depending on circumstances, were conducted either in person, by telephone, or by transmitting forms and narrative by facsimile or e-mail. I knew all the people interviewed. These two surveys were as follows:

- the first survey was a review of what stakeholders felt the major project risks to be. This served as the starting point for the industry-wide literature review on managing risks for international petroleum exploration and development ventures. All eight senior personnel with more than two years of experience on the project were approached. Six responded positively, and completed a survey form, the results of which are included in Section 3.10; and
- the second survey was of the organizational effectiveness of the project team as it moved through different management structures and styles, and was targeted at the two departments supporting the Algeria Asset Team that would have an idea of how the team was working. The intention was to get a reasonably informed "outsiders" view of the team performance over time. Eight people in these two departments were familiar with the team and were surveyed by e-mail (100 per cent response rate), with their involvement covering the period 1993 to 1997. This survey is combined with the literature review to provide some observations regarding the effectiveness of various organizational models to managing international exploration and development projects.

**Analysis and Credibility**

The data analysis of the case study involved the following steps:

1. Reviewing the summary material describing the project.
2. Breaking down the project history into a number of logical phases.
3. Breaking each phase into its significant dimensions.
4. Pulling together additional detailed material for each phase and dimension.
5. Adjusting the phases and dimensions as dictated by the amount of relevant
material.
6. Conducting the interviews and surveys to determine stakeholder views.
7. Reflecting on the patterns emerging from the narrative, with a view to extending the description of the sequence of events to include an interpretation of what the causes were for some of the problems and successes.
8. Writing up the case study in a readable form.
9. Submitting the narrative to the project team for review.

The review by team members in Step 9 ensured that there were no factual errors or major omissions in the case study, and at the same time provided valuable feedback on my reflections of Step 7. I believe the substantial feedback received from other project participants on this theme indicates their level of reflection as to origins of the various problems and successes that the team encountered. The reflection and search for patterns was the most time consuming part of preparing the case study.

I was permitted by Petro-Canada to use all information associated with the project under the conditions that I not disclose material covered by confidentiality agreements and not damage Petro-Canada’s reputation through my efforts. At no time did either of these conditions conflict with the narrative I wished to present.

Positive factors relating to the credibility of the case study include:
- prolonged engagement (in-depth personal experience);
- unlimited access to data and personnel;
- trust established with the stakeholders based on familiarity and shared experience; and
- review of results by project stakeholders.

The discussion of potential biases follows.
The Author as Research Instrument

My extensive involvement in the project presented both an advantage in terms of access to information, and a potential risk in terms of pre-conceived notion and bias. I believe that I have taken full advantage of the access to information to present an in-depth account of the experiences of the Algeria Asset Team. Dealing with biases is more problematic, and self-analysis of one's own biases even more so.

The essential biases that I was conscious of when starting the case study were related to the team's organization effectiveness and my perception that the project team's accomplishments were significant. Frankly, I believed that the self-directed team structure employed early in the project life was excellent, and was sorry to see it change. I also thought that the project was a significant success.

To overcome these biases, a survey of objective (yet informed) stakeholders was undertaken to ensure that these observers would provide the conclusions as to organizational effectiveness, as well as project success. In addition, significant emphasis was placed on organizational effectiveness in the literature survey to determine the experiences and ideas of others.

I believe that the evolution in my thinking regarding organizational effectiveness and project success during the course of writing the thesis is the most compelling evidence that the conclusions are reasonably free of researcher bias. My conclusions are different from my pre-conceived notions.

In terms of personal stakes, my greatest vested interest was to produce something useful that I would be able to use on future projects, and that would also be useful to Petro-Canada and industry in general. Other than these considerations of utility, effectiveness, and quality, I have no vested interest in the conclusions of this work.
2.4 Methodology for the Literature Survey

The literature survey was conducted using a variety of media, including:

- Internet searches using a number of search engines;
- books;
- periodicals;
- company reports;
- conference proceedings;
- published theses;
- course notes;
- commercial material; and
- interviews with specialists on particular topics, particularly in areas where I did not have the basic knowledge needed to do more specific research (e.g. insurance).

Perspectives included:

- academic versus practitioner expertise;
- petroleum and non-petroleum sources; and
- specialist depth on individual risks versus generalist knowledge.

The approach was to gather the relevant material to the matter at hand, with no intentional filters on the data.

2.5 Methodology for the Interviews on Industry Practices

Desired Outcome

The deliverables from the surveys of industry practice were:

- a complete listing of the risks identified by expert industry practitioners;
- an understanding of how the risks were being managed; and
- a basis for integrating these risks and risk management techniques with the findings from the Tinrhet project case study and the existing information published in the literature.
What the Research Covers

The research was open-ended. The starting point for each interview was to go through the risk categories identified from both the Tinrhert case study and the literature review. In addition to covering these risk categories, there were also open-ended questions allowing the interview subject to add his/her own risks to the lists. For each risk identified by the person being interviewed, mitigation and management techniques were sought. The general risk categories pursued were the following:

- project selection and data;
- technical risk;
- environmental, health, safety, and security;
- political and economic;
- NOC/government relationships and cultural differences;
- head-office and senior management support; and
- project organization and leadership.

In each of these categories, the following questions were asked:

- what do you think are the major risks and keys to success in this category?
- what do you think are the most common mistakes made by the industry in managing this risk? Why?
- what steps does your organization actually take to manage these risks? What do you think you should be doing?

A final question was asked as to whether any key risks had been overlooked.

Sampling Strategy

There are over 100 Canadian-based oil companies active internationally (Doig, 1998). Rather than pre-selecting the number of companies that should be represented in the interviews, the interviews were continued until no significant new material was uncovered—the technique of saturation. My approach to selecting companies was to start with people whom I knew and respected, and who would probably give me the benefit of their time and trust to undertake the
interview. I felt that gaining access and trust were key given the time and travel demands on senior personnel working internationally. This first interview group (numbering five people) provided the contacts necessary to achieve the remaining interviews (four additional people), at which point saturation was reached.

The resulting group represented a reasonable cross-section of industry (maximum variation sampling):

- individuals in large and small companies;
- individuals in companies whose activities range from mostly international to mostly domestic (Canadian);
- individuals who have success stories, as well as disaster stories (most people had both); and
- a variety of roles, such as the chairman of the board, investor, Calgary-based manager, host-country manager

Often the individual had experience with multiple companies and positions. In two instances, multiple perspectives on a given project or company were achieved.

\textbf{The Interview Environment}

Interviews were conducted in person in Calgary, in Algeria, and in transit. The interviews were conducted at Petro-Canada’s offices, the offices of the interview subject, as well as neutral sites like coffee shops. The primary consideration for the location and timing of the interview was the convenience of the person being interviewed. The individuals were sufficiently senior and pressed for time that I wanted to respect their preferences before any considerations of stage managing the interview environment. In retrospect, there was good material obtained from all the interviewees regardless of the setting. Notes were taken for each interview as to the location, date, atmosphere, and tone of the discussion.

There was a significant range of interview climates. The two extremes were a
30-minute high-speed free-form monologue by a high energy individual making
time between meetings and departure for an international flight and a thoughtful
and leisurely interview totaling six hours with another individual in a variety of
settings—all of them informal.

The raw data was kept confidential where requested. People were forthcoming
in their remarks once it was clear that I would present the information with
sufficient discretion so as not to cast a negative light on any of their colleagues or
companies (present or former).

**Analysis and Credibility**

The analysis of the interview material was undertaken in the following sequence:
- recording of information for each interview; basically capturing all the ideas
  expressed by the interviewees;
- open coding—or sorting of the information into categories. Given the analysis
  already done for the Tinrher case study as well as the literature survey this
  was a simple process, however one additional category was defined based
  on the results of the interviews;
- searching for trends within each category with a view to identifying underlying
  phenomena;
- searching for a story line; and
- synthesizing interview conclusions with the material from the Tinrher case
  study and the literature survey, and analysing and drawing conclusions
  regarding risk management techniques. This is discussed in Section 2.8.

The practitioners interviewed were all senior and experienced individuals, holding
significant responsibilities within their organizations currently, or having recently
held such a position (Table C-1).
The Author as Research Instrument

Unlike the Tinrhert case study, I had no preconceived ideas as to what would (or should) emerge from the interviews. Other than the identification of risk categories, I allowed the interviewees free reign to express their views on managing risk, and I attempted to limit my role to one of encouraging them to elaborate rather than concur with any particular view. Some of the interviews were largely free form, while others followed a structured sequence through the various risk categories. That I am aware of, I had no vested interest in the outcome of this work other than a desire to produce an accurate and useful product.

2.6 Consolidation of Literature, Case Study, and Expert Interviews

As discussed, the subject of project risk management for international petroleum ventures was viewed in three ways, namely:

- in depth from a specific project;
- in breadth from what is written in the literature; and
- from expert experience—accessing specific and current project management expertise as it is being applied in industry today.

The purpose of the consolidation was to have a coherent set of conclusions for all three data sources, and to put these into a common structure for more ready communication to a reader.

The categories of risk evolved through the process of conducting the study. During the initial phase of research for the Tinrhert project, the risks were grouped according to the risks actually encountered by the specific project. A wider net was cast for the literature survey based on suggestions from my research advisor, Francis Hartman. The categories of project selection and project leadership were added. Based on the additional information from the literature survey, some of the risk categories were combined to reduce overlap.
between categories (for example, combining NOC/government relations with cultural issues).

This final grouping of risks was carried through the consolidation phase, where the Tinrhert study, the literature review, and the expert interviews were combined.

A consolidation of the three perspectives was carried out in the Synthesis and Discussion Section (Chapter 6). During this, areas of agreement as well as difference were sought, and some ideas are put forth as to the sources of any differences. An effort was also made to point out any areas that may be worthy of additional inquiry by other researchers. For each conclusion, the source (expert, literature, or Tinrhert) was referenced to allow a sense of how widespread the findings were. There were no significant contradictions between the conclusions from these sources.
Chapter 3  Summary of Tinrhert Project

The following is a point-form summary of the Tinrhert project, condensed from the more detailed version contained in Appendix A. The summary starts with a review of the project purpose from the viewpoint of key stakeholders, discusses data risks, technical risks, partner relations, security issues, business risks, project organization, and contracting.

The Tinrhert project is located in eastern Algeria, along the Libyan border (Figure 3.0). Petro-Canada initiated the project in 1989 in the search for lower risk international opportunities to complement its remaining international investment portfolio. Tinrhert is the name applied to the permit, which covers an area of about 10,000 km². Tamadanet is the name of the first oil pool developed by Petro-Canada. There was significant existing production from the area—all operated by Sonatrach, the Algeria national oil company, but the last significant discovery on the block had been in 1973. Petro-Canada made a commitment to drill 5 exploration wells on the block over a 5 year period, and the opportunity to develop existing (small) discovered pools. The contract was signed in 1993, and this study covers the period 1989 to 1996, when the goal of first oil production was achieved.

This case study also served as the starting point for identifying the risks applied to other sections of the study—in particular the survey of project participants in Section 3.9. This is supplemented by my own (retrospective) view of the key risks along with a gap analysis.
Field Location
3.1 Project Scope and Purpose

The project was selected by Petro-Canada on the basis of best being able to meet corporate objectives. Previous international projects undertaken by Petro-Canada had failed, in part due to a lack of focus and staying power in any one area, and selecting high-risk projects. The goals of the Tinrhert project are defined from the perspective of the following major stakeholders, as follows:

Petro-Canada Goals

Petro-Canada’s goals for the project were to:

- quickly develop low-cost, light oil production outside of Canada;
- add additional reserves through lower risk exploration and development (a growth component of Petro-Canada’s investment portfolio); and
- to be profitable.

Sonatrach and the Algerian Government Goals

Sonatrach and the Algerian government’s goals for the project were to:

- influx of foreign capital to find and develop oil reserves;
- technology transfer to the oil industry; and
- development of cash-flow/reduction of debt.

Project (Asset) Team Goals

The Algeria Asset Team’s goals were to:

- create an exciting growth opportunity that will be rewarding to work on;
- to make a difference to the company; and
- create additional opportunities in Algeria and the surrounding region.

3.2 Information Risk Encountered

A number of information risks were encountered:

- technical information was not publicly available, but rather gained through slow administrative processes as well as personal relationships with
Sonatrach staff;

- acquisition and management of technical data were key project elements, and were under-resourced in the early phases of the project;
- knowledge is often used as power in Sonatrach/Algerian culture. You need to convince people to give up their information;
- Sonatrach approvals processes were not transparent or well understood by Petro-Canada; and
- Algerian government approval processes were still being developed, not transparent, nor well understood by Petro-Canada.

### 3.3 Technical Risks

The following technical risks were encountered:

- the prospectivity of the Tinrhert block was not well known prior to taking on the work commitment due to limited access to data, although the nature of the opportunity was clear—lower risk relative to typical wildcat exploration areas;
- a significant technical effort was made once data became available to identify opportunities for finding and developing petroleum;
- technical risk was reduced by inclusion of existing Sonatrach discoveries into the PSC—these discoveries had the potential to be developed, thus mitigating exploration risk;
- Tamadanet was identified early as an example of a Sonatrach discovery that could be developed, and the revenues from the success there should reduce Petro-Canada capital exposure;
- probabilistic analysis was used as a tool to understand the uncertainties in the resource size and quality;
- technical uncertainty surrounding a potential southern extension of Tamadanet contributed to strained relations between Sonatrach and Petro-Canada; and
- the ultimate success of the Tinrhert project depends on the outcome of exploration efforts, which inherently contains technical risk. The most significant exploration technical uncertainty in Tinrhert relates to seismic data.
3.4 Partner Relations Issues

The partner relations aspects of the project were as follows:

- allowing the entry of foreign oil companies into the energy industry was a major shift for the Algerian government. The change was not universally supported within Sonatrach;
- a joint Sonatrach and Petro-Canada management committee takes all major decisions for the project, and consensus is required to reach a decision;
- a lack of decision authority on the part of the Sonatrach representatives nominated to the management committee, plus conflicting demands on their time slowed major decisions early in the project;
- Petro-Canada and Sonatrach initially had little conflict in their relationship;
- Petro-Canada's success at Tamadanet was a high profile political problem for Sonatrach, by virtue of it having been a "Sonatrach" discovery, and Sonatrach senior management were scrutinized by the Ministry of Energy for having "given up" Tamadanet;
- a slower than expected approvals process for the first development (19 months actual versus three to nine months expected by Petro-Canada) strained Petro-Canada senior management patience;
- undertaking development activities while waiting for approvals mitigated project schedule impact. Both Petro-Canada and Sonatrach management supported this approach;
- the pace of the project was affected by a lack of precedents for foreign operators;
- different interpretations of operatorship and control of Tamadanet due to contract translation problems as well as internal Sonatrach differences, resulted in extended negotiations. The lack of resolution of these issues during the construction phase led to additional costs for re-work when conflicting visions of the development and standards emerged. The lack of a process for resolving disputes exacerbated these differences;
- Petro-Canada initially placed an emphasis on mitigating business and
technical risk through the development of Tamadanet, while Sonatrach was more interested in higher risk exploration. When Tamadanet showed a potential southern extension beyond the known field limits, Sonatrach would not agree to the work until their exploration objectives were met—additional attention on the Tamadanet area was politically untenable for Sonatrach. This caused a multi-year delay in additional field work;

- differences in social and business culture between Petro-Canada and Sonatrach were an obstacle to building trust more quickly. An example of this is Tamadanet South, at the technical level relating to seismic interpretation, and at the management level related to seeking common business objectives. Another example is that Sonatrach saw the contract as the starting point for negotiations. Petro-Canada saw it as the conclusion of negotiations;

- however, there are good examples where Sonatrach’s local experience and Petro-Canada’s know-how resulted in synergistic solutions to difficult problems.

3.5 Security Considerations

The following security considerations applied to the project:

- when Petro-Canada entered Algeria, there were no significant security issues;
- the security situation for Algerians deteriorated in 1992, for foreigners it deteriorated in October 1993;
- since 1992, about 100,000 people have been killed in the strife between the government and religious fundamentalists;
- security considerations limit the free movement of foreign personnel in Algeria;
- movement of expatriate staff in Algeria was done under police or military escort during suitable conditions, which can hinder effectiveness of staff at times;
- mitigation of security risks cost Petro-Canada up to $1 million per year in direct expenses;
- no near-terms resolution is expected of the Algerian conflict; and
• the remoteness of the field operations in the Sahara desert made the security situation manageable.

3.6 Business Risks

3.6.1 Currency

The following is an overview of the currency considerations:

- Algerian currency (Dinar) is non-convertible;
- Dinar has history of devaluation relative to major currencies;
- PSC protects Petro-Canada against Dinar devaluation by using US$ as the basis for cost recoveries; and
- the PSC protects Petro-Canada against non-convertibility by allowing Petro-Canada to export and sell oil on the international market.

3.6.2 Fiscal

The fiscal dimensions of the project were as follows:

- fiscal terms are set for the duration of the PSC and confirmed by ministerial decree;
- Sonatrach applied pressure on fiscal terms not explicit and clear under the PSC (e.g. transportation tariffs) to maximize their take relative to Petro-Canada; and
- unexpected taxes (for example on employee compensation) were encountered.

3.6.3 Import

The following considerations applied for importing materials:

- Algeria has a system of import restrictions and high tariffs; and
- materials for petroleum activities are exempt from tariffs under the terms of the PSC.

3.6.4 Banker's Ruin

The scope of the Algeria project was far too small, and the chance of repeated
failure too low to cause financial problems for Petro-Canada.

3.6.4 Expropriation

Expropriation issues were as follows:

- expropriation of oil industry assets happened previously in Algeria, however a repeat was not expected;
- no feasible insurance alternatives were found at the project commitment stage;
- Petro-Canada felt the most probable source of business risk was production interruption due to the security environment; and
- rapid payout at Tamadanet mitigated exposure.

3.7 Organizational Considerations

Organizational considerations were as follows:

- Petro-Canada employed a number of different organizational models during the life of the project;
- initial activities were undertaken using a functional organization;
- the majority of the project was run using a self-directed multi-disciplinary project team;
- the current structure employs a multi-disciplinary project team, but with a manager who has single point accountability. The functional side of the organization has also been made stronger;
- a survey was conducted amongst objective outside observers to assess team performance over time, and spanning different organizational models. Key observation were as follows:
  - team performance between 1993 and 1997 was least average, and usually well above average, regardless of organizational model;
  - the project team was perceived to be high performing initially, while using a self-led team model;
  - there was a sag in performance in during the middle of the project. This is generally attributed to lack of direction and difficulties in self-
managing the (now) larger team;
⇒ failure to set and meet realistic targets had a substantial impact on external perceptions of performance. The underlying stretch associated with the targets was not a sufficient mitigating factor in most peoples’ perception of performance;
⇒ the project team regained its reputation of high performance once a manager was assigned;
⇒ and there was no unanimous view on how to best structure the project, but most people feel that “how we work” is more important than “how we are structured.”;

• the survey referred to above was conducted amongst two departments supporting the Algeria Asset Team. The intention was to get a reasonably informed “outsiders” view of the team performance over time. Eight people were surveyed by e-mail (100 per cent response rate), with their involvement covering the period 1993 to 1997. An average score was calculated for each year from those people who were involved during that time period; and
• details of the survey are located in Appendix B.

3.8 Contracting Issues
Contracting issues were very significant during the Tinrhert project:
• the PSC requires the use of host-country services when competitive;
• most high technology equipment was sourced from outside Algeria;
• all major contracting decisions were made at the (joint) management committee level;
• contracting has gone fairly well for all areas of the project other than the production facilities; and
• the construction of the facilities at Tamadanet was made difficult by:
  ⇒ differences in design standards between Sonatrach and Petro-Canada;
  ⇒ uncertain role definitions for personnel, partially due to unresolved operatorship; and
  ⇒ the use of the facilities construction as the forum in which the operatorship
issue would be debated.
### 3.9 Identification of Risks by Stakeholders

A survey of the Tinrhert project stakeholders was carried out to capture the perceived risks. The stakeholders were all Petro-Canada employees involved with the Tinrhert project, and were associated with the project for a minimum of two years. The results of the survey are consolidated on the next page.

#### Table 3.9a: Identification of Tinrhert Risks by Stakeholders

<table>
<thead>
<tr>
<th>Name</th>
<th>Gary Bruce</th>
<th>Roger McMachan</th>
<th>Kees Visser</th>
<th>John Ridsdel</th>
<th>Dave Dearborn</th>
<th>Amit Mehta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>VP</td>
<td>Director - Operations</td>
<td>Director - Exploration</td>
<td>Resident Manager</td>
<td>Geologist</td>
<td>Geophysicist</td>
</tr>
<tr>
<td>Location</td>
<td>Calgary</td>
<td>Calgary, Tinrhert Algeria</td>
<td>Calgary, Tinrhert Algeria</td>
<td>Algeria</td>
<td>Calgary</td>
<td>Calgary</td>
</tr>
<tr>
<td>1</td>
<td>Technical - data quality and availability</td>
<td>Nationalization</td>
<td>Partner Relations</td>
<td>Political profile of project</td>
<td>Petro-Canada organization</td>
<td>Technical data quality</td>
</tr>
<tr>
<td>2</td>
<td>Lack of knowledge around Algerian regulations, approvals, standards</td>
<td>Unilateral change in contract</td>
<td>Proper technical analysis prior to signing/commitment</td>
<td>New processes unresolved within Algeria</td>
<td>Partner Relations</td>
<td>Technical data quantity</td>
</tr>
<tr>
<td>3</td>
<td>Cultural differences</td>
<td>Technical risk</td>
<td>Erosion of rights and value due to imprecise contract</td>
<td>Political risk (government change)</td>
<td>Security</td>
<td>Technical interpretation uncertainty</td>
</tr>
<tr>
<td>4</td>
<td>Political - expropriation</td>
<td>Security</td>
<td>Management attention span - impatience and short attention span leading to limited resources</td>
<td>Security</td>
<td>Algerian Government</td>
<td>Project resourcing</td>
</tr>
<tr>
<td>5</td>
<td>Political - security</td>
<td>Petro-Canada outlook - project understanding</td>
<td>Environmental (climate, geography, infrastructure)</td>
<td>Team processes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Post-contractual opportunistic behaviour</td>
<td>Change in economic orientation from centrally planned to market economy incomplete</td>
<td>Operating processes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Project funding</td>
<td>Petro-Canada Strategy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Now that I have hindsight, here are what I see the risks as having been...

### Table 3.9b: Author’s (Retrospective) View of Tinrhert Risks

<table>
<thead>
<tr>
<th>PHASE</th>
<th>EXPECTATION</th>
<th>ACTUAL</th>
<th>GAP</th>
<th>RISK (GENERIC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Project Selection</td>
<td>Identify “best” block of land, based on Petro-Canada criteria of low risk and adequate value.</td>
<td>Tinrhert</td>
<td>Avoided Ghadames basin to North, where large discoveries were made</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Corporate metrics (risk aversion) and corporate will</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Technical evaluation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data access</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Connections to right people</td>
</tr>
<tr>
<td>II</td>
<td>PSC Negotiation and Approvals</td>
<td>Fair, fiscal terms</td>
<td>Many surprises from Sonatrach during negotiations</td>
<td>Inclusion of Sonatrach discoveries in contract created difficult precedent.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Land area and work plan defined</td>
<td>Negotiations and ratification slower than expected</td>
<td>Cultural differences slowed negotiations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negotiations concluded in 2 year timeframe</td>
<td></td>
<td>Political profile of project</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ratification within 3 months</td>
<td></td>
<td>Cultural differences</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Managing corporate expectations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Contract mistakes and oversights have long term implications</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Repatriation and currency risks</td>
</tr>
<tr>
<td>III</td>
<td>Start-up and Data-gathering</td>
<td>Build administrative capacity in-country</td>
<td>Office situation unsettled for six months</td>
<td>Security situation deteriorated. Sonatrach lacked capacity to find and organize data in short time-frame.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Get all relevant technical data</td>
<td>Data trickled out</td>
<td>Security</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data access</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Petro-Canada organizational and experience</td>
</tr>
<tr>
<td>IV</td>
<td>First field operations: drilling and seismic</td>
<td>Obtain approvals for spending significant funds</td>
<td>Met or exceeded all expectations</td>
<td>Lack of in-country operational experience.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manage business and political risks</td>
<td></td>
<td>Financial exposure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Building operational capacity in-country</td>
<td></td>
<td>Security</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Succeed technically and operationally</td>
<td></td>
<td>Partner relations and alignment</td>
</tr>
<tr>
<td>V</td>
<td>Development Approvals</td>
<td>Agreement reached May, 1996</td>
<td>Project had high and negative profile with Algeria</td>
<td>Lack of in-country operational experience.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Proceeded with project based on partial approvals</td>
<td>Development approvals process not clearly understood</td>
<td>Financial exposure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Petro-Canada management expectations unfilled</td>
<td></td>
<td>Security</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Partner relations and alignment</td>
</tr>
<tr>
<td>VI</td>
<td>Development</td>
<td>Acquire 3D seismic</td>
<td>Conflict about control of development</td>
<td>Adequate control of project</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Build production facilities</td>
<td>Conflict about standards to apply</td>
<td>Common understanding of operatorship</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drill development wells</td>
<td></td>
<td>Unclear processes for resolving differences</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Security</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Exposure of significant funds in politically difficult situation</td>
</tr>
<tr>
<td>VII</td>
<td>Other Agreements</td>
<td>Complete transportation agreement</td>
<td>Only interim transportation and lifting agreements achieved</td>
<td>Lack of closure on transportation costs and production allocations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete production allocation agreement</td>
<td>Inequitable well drilled at TM-106 due to lack of understanding of Algerian system</td>
<td>Spent $3 million unnecessarily on TM-106 because of implications of how development plan was submitted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drill TM-106</td>
<td>Sonatrach blocked drilling of Tamadanel South well</td>
<td>Lack of business precedents for type of activity contemplated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drill Tamadanel South</td>
<td></td>
<td>Not fully understanding regulatory processes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Political profile of Tamadanel South</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Conflicting priorities between partners (Sonatrach for exploration, Petro-Canada for production)</td>
</tr>
<tr>
<td>VIII</td>
<td>Operations</td>
<td>Operate Tamadanel production</td>
<td>First year of production:</td>
<td>Cultural differences</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- no lost-time accidents</td>
<td>Integrating operating standards</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- higher than expected operations efficiency</td>
<td>Security</td>
</tr>
</tbody>
</table>
Table 3.9c: Risk Elements Extracted from the Tinrhert Project

<table>
<thead>
<tr>
<th>Category</th>
<th>Risk Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Selection and Data</strong></td>
<td>• availability</td>
</tr>
<tr>
<td></td>
<td>• quality</td>
</tr>
<tr>
<td></td>
<td>• access prior to making financial commitment.</td>
</tr>
<tr>
<td><strong>Cultural differences</strong></td>
<td>• time, money, language</td>
</tr>
<tr>
<td></td>
<td>• business culture</td>
</tr>
<tr>
<td></td>
<td>• communication styles</td>
</tr>
<tr>
<td></td>
<td>• etc., etc.</td>
</tr>
<tr>
<td><strong>Environmental</strong></td>
<td>• climate</td>
</tr>
<tr>
<td></td>
<td>• geography</td>
</tr>
<tr>
<td></td>
<td>• Infrastructure</td>
</tr>
<tr>
<td><strong>Political and Economic</strong></td>
<td>• government stability</td>
</tr>
<tr>
<td></td>
<td>• changes in economic systems</td>
</tr>
<tr>
<td></td>
<td>• existence/precedence of necessary approval processes</td>
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3.10 Chapter Summary

The Tinhert project is the kind of project for which risk management best practices are sought in this study. A company based in an OECD country undertook it in a developing nation. It is an exploration and development project. Organizational and leadership issues were a factor in project delivery. The organizational structure was changed several times during the project—from a functional organization during the project selection phase, to a self-directed team during the project development and project execution phases, to traditionally led matrix structure for project start-up and operations. These changes were largely the consequence of Petro-Canada-wide changes. The project required the ongoing involvement and support of senior management. Project support and funding was often on a well-by-well basis, in part because the Tinhert project did not fit readily into Petro-Canada’s strategy or senior management experience. Environmental, health, safety, and particularly security issues were important. At times, security considerations strongly affected how the project was delivered, limiting the placement of Petro-Canada personnel in Algeria when significant benefits would have come from a greater presence. Project selection was driven in part by a desire for lower technical-risk prospects, and the technical success ratio of exploration wells has indeed been high, though the reserves have been small—unfortunately this also meant ultimately missing out on the huge new discoveries in the nearby Ghadames (Berkine) basin. The business and social cultures of Petro-Canada and Sonatrach, and Canada and Algeria are significantly different, and created misunderstanding and even suspicion at times—particularly when the interests of the partners regarding project priorities were not aligned. Data acquisition was difficult, and under-resourced—it took several years to get the necessary technical data to a stage where the entire block could be interpreted.

In spite of these challenges, the project team was successful in putting on-stream a new development in Algeria in record time, while creating a number of
precedent agreements together with Sonatrach. Petro-Canada and Sonatrach are now negotiating a billion-dollar development project in the Tinrhert block based on previous efforts and success.

The duration of the project (8+ years) presented fewer problems than could have been the case. Management support was an issue for such an extended period, but continuity of key personnel on the part of Petro-Canada and Sonatrach helped mitigate loss of knowledge through the evolution of the project.

The risks identified by the project participants, plus suggestions from Francis Hartman, formed the basis for the literature review.
Chapter 4 Results of Literature Search

This section starts with a basic overview of the particular project environment in order to make the study accessible to readers outside the oil and gas industry. Then, general trends and short-comings of current approaches are reviewed, followed by a discussion highlighting the relevance of risk management to the topic at hand. Finally, the various risks specific risks are identified.

4.1 Overview

4.1.1 Risk Management in International Petroleum Projects

The notion of a corporation trying its skills in a new environment as a mechanism for growth and increased profits is nothing new. Although risk and uncertainty are present in most projects of any significance, a new environment usually implies greater uncertainty, as well as a different mix of key success drivers, and requires a correspondingly greater effort to understand the associated risks.

Turner (1992) defined a project as “an endeavor in which human, material and financial resources are organized in a novel way, to undertake a unique scope of work of given specification, within constraints of cost and time, so as to achieve unitary beneficial change, through the delivery of quantified and qualitative objectives.” A more concise definition (Juran, 1989) is: “a problem scheduled for solution—a specific mission to be carried out.”

Within the context of undertaking an international petroleum exploration/development project, these definitions are an excellent fit. This type of project would typically occur in a geologically, and therefore technically, unique area, with unique contractual terms, and rife with partner, data, environmental, logistical, cultural, and market issues. Within the constraints of contract duration and (corporate) budget, the goal of the project is typically to find/develop/produce petroleum reserves in an economically optimum way, while meeting standards
for corporate profitability and conduct, and meeting host-country expectations so as to provide a stream of future opportunities.

A number of issues differentiate international ventures from domestic ventures. External issues (such as regulatory framework, cultural arena, political and security situation, data availability, partner, environmental, etc.) are accentuated and less well known in a new arena than in the familiar domestic environment. Even the technical context within which explorationists (for example) might conduct their work is different. Quick and Buck (1983) explain how larger international land holdings and associated work commitments mean that exploration strategies need to be defined in advance of actually exploring. The environment of higher risk and uncertainty is compounded by higher costs, so technical risk issues spill over into business issues, even to the extent of impacting a company’s viability if the risks are too high, and exposures too large.

The hallmarks of international petroleum ventures are often high uncertainty and high complexity—a project management challenge.

Some of the most difficult challenges of international exploration (Bogle, 1996) are:

- longer time frames than domestically due to longer negotiations and less developed infrastructure;
- more difficult fiscal regimes;
- intense competition for the most desirable areas—smaller companies generally cannot compete with the major oil companies here; and
- developing a proper strategy (Bogle recommends geographical focus).

A typical exploration or development project might have the following characteristics:

- after some screening work to identify available acreage, and with access to only a limited amount of data, a company will enter into negotiations (or bid
on) a block of land. The size of a block might typically be in the thousands of square kilometres;

- the ensuing negotiation between the state's representative and the oil company will often determine the minimum work commitment that the company must undertake within a specified period, as well as the fiscal regime. Usually only a portion of the fiscal terms will be negotiable, with the rest being predetermined. The negotiations can take as long as several years;

- with the subsequent signing of the contract, the remaining available technical data is released to the company. Obtaining the necessary data can be a long and tortuous process, taking one to two years or longer;

- this data is then interpreted, and new data might be acquired through additional field work, such as the acquisition of seismic data to map the subsurface topography in search of hydrocarbon traps, or to better define existing hydrocarbon discoveries;

- for exploration, the potential hydrocarbon traps are then drilled to test for hydrocarbons. Exploration work is typically high risk, with success rates usually less than 30 per cent, and often as low as five to ten per cent in newer areas. Most exploratory wells are dry!

- for exploration activities to become profitable, the discoveries (or successes) need to be sufficiently profitable to pay for the failures;

- this project type is different in degree from typical construction projects. Construction projects are margin based and are geared to satisfy the specifications of the owner. In international petroleum exploration projects, there are more likely to be a few successful and profitable projects and numerous smaller failures, and the specifications of the government (owner) are fairly limited, leaving the onus on the investing company to make the appropriate choices in terms of program design and performance;

- after some further appraisal work, an exploration discovery moves to the development phase, which includes the drilling of production and injection wells, and the construction of surface facilities (separators, pipelines, storage
tanks, etc.). Although less frequent, there are times when existing discoveries are offered for development to foreign companies. Because they are lower risk, and do not carry the burden of unsuccessful exploration projects, fiscal terms on development projects tend to be tougher than for exploration lands offering no guarantee of hydrocarbons;

* with the development of a discovery, a production period of (typically) 10 to 30 years follows. The revenues from the sales of the hydrocarbon are used to pay the state and the oil company; and

* there is a world market for oil, since oil is an easily transported commodity. Gas tends to serve regional markets, as it is more costly to transport. Some parts of the world lack a gas market, so gas discoveries can be difficult to commercialize.

4.1.2 International Trends and Shortcomings of Current Approaches

Some observers (Patek and Bulte, 1996) believe that the traditional methods of managing risk and uncertainty in petroleum exploration are no longer sufficient. A study (McKinsey, 1994) of the performance of upstream (exploration and development) investments by 29 large U.S. companies between 1982 and 1992 showed these investments actually resulted in a $270 billion destruction of shareholder value. Although some of the investment losses stem from petroleum prices coming in below expectations, returns were less than the cost of capital even when the price stabilized after 1986. This is true for Canadian, American, and European oil companies.

In the Canadian petroleum industry, the trend (Layzell, 1998) has been following that of the U.S.—namely that as the Western Canadian petroleum province matures, and the lowest cost opportunities are exploited, the remaining conventional prizes (measured in terms of reserve potential) left to be found and developed continue to diminish in size. In Canada, the typical exploration discovery now yields less than 200,000 barrels of recoverable oil reserves, down from 12 million barrels in 1960 (the average new pool size in the world has also
dropped, but is currently still up at 12 million barrels). Canada is a sufficiently mature resource that it has more wells drilled than all of Europe, Africa, and the Middle East combined for less than one per cent of the resource potential (Johnston 1998).

The highly developed infrastructure in mature provinces creates an environment where smaller companies (often with lower G&A burdens, and with less technological sophistication than the larger companies) can thrive, and drops the barriers to entry to the business to low levels. For larger companies, it is often not economically efficient to use their technological advantage on small pools that have limited revenue potential. Squeezed by low commodity price, reduced opportunity size, and intense competition from numerous smaller competitors, more and more large and mid-sized companies are looking to the international arena for growth, while reducing their interest in mature basins (often by selling to smaller operators that do not carry the strategic costs of developing new basins or play types).

The increased investment in the international industry is reflected in the following statistics:

- between 1988 and 1996 upstream investment increased from $20 to 25 billion in Canada and the U.S. (20 per cent increase), while investment outside Canada and the U.S. went from $18 to 39 billion (115 per cent increase) (Patek and Bulte, 1996);
- between 1995 and 1997, total Canadian petroleum financing for international activities increased 475 per cent to CAN$ 920 million, doubling its share to 11 per cent of the Canadian petroleum financing total;
- Canadian-owned international crude oil and liquids production has almost doubled from 255,000 barrels per day in 1995 to 485,000 barrels per day in 1997 (Layzell, 1998);
- there are currently a total of 103 Canadian-based oil companies working internationally (outside of Canada and the United States), plus numerous
others from the petroleum service sector, although only 23 of these companies have achieved production; and

- almost all the senior Canadian oil companies either have international activities, or are themselves an international arm of a foreign owned company (Layzell, 1998).

In addition to the limited number of domestic opportunities, motivators to move into the international realm that have been present since the mid-1980s include:

- improving contract terms and the liberalization of investment legislation in foreign countries;
- the opening of previously closed petroleum provinces (e.g. Former Soviet Union, South America); and
- privatization of former state oil companies (e.g. YPF Argentina) (Wasteneys, 1997a, and Cope, 1997).

Areas that have opened to international investors in the past several years include Eastern Europe, the Former Soviet Union, Venezuela, Onshore China, Mongolia, Peru, Myanmar, Cambodia, Vietnam, Cuba, and Brazil (Doig, 1998).

Profitability in the international arena is by no means assured, however. National oil companies (as opposed to publicly traded international oil companies) now have a 75 per cent share of upstream profits, versus 50 per cent in 1970 (Murphy et al, 1997), and the 10 largest national oil companies control more than 70 per cent of the world's reserves. Additionally, since the 1950s, government take as a share of operating cash flow have risen from 50 per cent to more than 85 per cent today. Using the assumption of $10/bbl in operating revenue, this reduces an oil company's share from $5/bbl to only $1.50/bbl. In the past, major international oil companies were the only source combining large amounts of capital, technical sophistication, and project integration and management expertise. Today, however, the increasing amount of technology and project management skills inherent in oil-field service companies, combined with increasing flexibility from the equity markets allows smaller oil companies as well as service companies to undertake significant projects in the international domain.
(also Desmarest, 1997). The result is increased competition in the international arena.

Some of the countries opening up to foreign involvement for the first time are actually extremely difficult places to operate for either political or logistical reasons (Wasteneys, 1997a). Additionally, the increased number of competitors has resulted in the occasional rollback of attractive fiscal terms. In regions where the industry is not yet fully open to foreign investment, the projects on offer tend to be those that are the most technically challenging and capital intensive (e.g. Russia, Algeria).

Moving internationally also introduces additional “external issues” to a project environment. Host-country stakeholders can weigh subjective success factors in tune with host-country customs or political interests more than the quantitative performance measures emphasized in North America (Simkoko, 1992). This is an issue since many international oil ventures will have a significant presence from host-country partners (often the national oil companies).

The challenges may be best summed up as follows (Wasteneys, 1997a):

Worldwide opportunities for exploration and production ventures are more abundant today than ever before. Regions and countries previously closed to foreign petroleum companies now welcome foreign investment in their upstream sectors. An increasing number of companies are involved in or considering upstream projects outside their home countries.

The risks, problems, and issues peculiar to foreign E&P have always been numerous and today are perhaps more critical than ever to the success of any program of foreign investment. Companies whose foreign experience is limited, or whose strategy includes broadening their foreign focus to include areas previously avoided or ignored, should give careful consideration to the specific risks and issues. A carefully structured approach to the development of a portfolio of such opportunities, taking real risks and expected rewards into account, is the only prudent way to approach new or expanded foreign activity.

4.1.3 Why Risk Management is Relevant

Using Chapman and Ward’s (1997) definition of project risk as “the implications of the existence of significant uncertainty about the level of project performance
achievable," and the source of risk as "any factor that can affect project performance, the outcome of which has both an uncertain and significant impact on project performance," it is easy to understand why undertaking an international petroleum venture is rife with risk, and a natural area of application of risk management techniques. The significant complexity of international petroleum ventures adds to the project risk management challenge. In the petroleum industry, risks and uncertainty are both the cause of financial loss, as well as the source of significant financial gain. It stands to reason that maximizing the understanding of key uncertainties helps an investing company to become involved in the right projects, as well as to make the most of the projects that are undertaken. As Chapman and Ward wrote, "Where uncertainty presents potential future threats or opportunities, proactive planning and risk management seek to modify the future incidence and quality of threats or opportunities and their possible impact on project performance."

Project risk management has significant potential use at key decision points within a project life cycle. In many projects, and clearly for most international petroleum ventures, there are a series of key decision points at which an understanding of risk is required to determine whether, and how, to take the project to the next stage. Understanding uncertainty and risk would seem to be essential components of these decisions.

Another important aspect of risk management and the quantification of uncertainty is to force management to appreciate the differences between targets, expected values, and commitments, with respect to costs, durations, and performance measures (Chapman and Ward, 1997). This was apparently a central concern when BP International introduced risk management processes in the mid-1970s, and is also a clear lesson in Tinrher case study included as part of this thesis.

Other advice for implementation of risk management processes (Krantz and
Turner 1997) is as follows:

Only by following through from analysis to management action can the benefits of risk analysis be achieved. Faithful adherence to a sound risk and rewards review, analysis and reporting process delivers reliable information. The effective translation of that information into actions whose effects can be monitored, and for which there are personal accountabilities, is where the analytical process becomes a management process. This translation poses the greatest challenge to organizations wishing to introduce structured project risk management.

4.2 Project Selection, Growth Options and Strategies

4.2.1 Growth Strategies

Alternative growth strategies (Downey, 1996) available to upstream oil companies are to:

1. Be a land company.
2. Purchase other companies.
3. Purchase assets.
4. Be an exploration or production company.

Downey's focus was on (U.S.) domestic activity, but is a useful starting point for looking at international strategies.

The first option (a land company) involves acquiring land in areas of industry activity in the hopes of having a pool discovered on adjacent lands that extends onto the land company's acreage. This deals well with the issue of managing exploration risk (since other companies incur it) and has been the source of many oil industry success stories in North America. This approach is not suited to most international arenas because unlike in North America, land cannot typically be leased without a significant exploration work commitment. In other words, you can't buy land cheaply as an option to be exercised in the event of a nearby success. Also, the size of land parcels in international is typically measured in the thousands of square kilometers as opposed to a square mile or less in North America, which substantially reduces the chance of having competitors' discoveries overlapping onto your own acreage.
Option two, buying other companies, is a surer path to growth, but is difficult to do profitably. Downey suggests the following explanation for this: "When you buy a publicly listed company, its stock valuation reflects the discounted present value opinion of thousands of shareholders, including the management. For you to buy the company, you need to value the company more highly than anyone else in the market place does (or you can't purchase it) and you must be correct in your valuation (or you won't make money because you will have paid more than it is worth). Since a large component of the asset's value often resides in the expertise of the staff, the difficulties encountered in integrating the two corporate cultures can lead to staff attrition and erosion in value. Downey's conclusion is that most takeovers do more to satisfy corporate egos than shareholders. This view is supported in a number of articles appearing in the Economist magazine in January, 1999. Sixty-one per cent of corporate acquisitions were found to be unsuccessful in a survey by the McKinsey & Company Corporate Leadership Centre. An internal Petro-Canada study (Kostachuk, 1997) shows that several factors weigh against acquisition as a mechanism for growth: the large up-front capital needed to make a large corporate acquisition—and the associated risks of commodity prices and expropriation. Advantages of an acquisition in the international arena are that it can clear a number of the hurdles that go with New Ventures—namely learning the technical and political landscape of new countries (assuming the staff comes with the acquisition).

Option three, purchasing assets, is viewed by Downey as difficult to do profitably unless you are the only bidder. At property auctions, the combination of uncertainty around the true value (given the uncertain nature of oil industry data that forms the basis of the evaluation) and the number of bidders, leads to situations where the high bidder is almost certainly the company that overvalued the property. Capen et al (1971) expound on the basis for this phenomenon showing that the more competitors you have, the more you have to overbid to win. Petro-Canada's survey (Kostachuk, 1997) of Canadian oil company track
records for investing internationally showed the purchase of producing assets to be the second best method for establishing an international presence, with Chauvco's Argentina experience cited as a positive example. The same survey, however, provides cautions about the risks associated with (non-producing) reserve acquisitions, as these have a combination of high commodity price and technical risk.

Talisman Energy Inc. is an example of a Canadian oil company that has adopted the acquisition approach to growing internationally (Bogle, 1996), with three acquisitions totaling CAN$ 2.6 billion to gain a presence in the North Sea and Indonesia. The focus for Talisman is proven hydrocarbon basins with developed infrastructure, where the pool sizes are too small to be of interest to the majors, but still large enough for smaller and cost-effective oil companies to be profitable. Talisman is relying on new ideas, new technologies, cost reduction, and a will to get smaller projects done as the source of opportunity.

Option four, exploring for and developing properties, is the traditional method by which non-national oil companies have grown, both domestically and internationally, and might be considered "doing things the hard way." This method has the disadvantage of having substantial technical risk, and may require several attempts before success is achieved—only one in seven exploration ventures in the Petro-Canada survey resulted in production. Additionally, growth through exploration requires long cycle times, and therefore considerable patience. The offsetting advantages of lowest capital exposure and a gradual investment of resources as technical expertise in a region grows result in this option providing the lowest finding, development, and operating cost of Canadian companies in the Petro-Canada survey. Bogle (1996) suggests that in countries where there is a well established major company that has a strongly advantaged or monopoly presence (better land position, better data position, better relationships, control of infrastructure), growth through exploration would be difficult.
From the point of view of project risk management associated with Canadian oil companies, this thesis will focus on projects arising from "doing things the hard way"—find land, negotiate terms, explore until a discovery is achieved, and develop and produce that discovery.

Kostachuk argues that the approach used by most Canadian-based companies in the Western Canada Sedimentary Basin is equally valid when going international—namely focusing on a core area after the study of a firm's own strengths and the attractiveness of the opportunity areas for potential, profitability, risk, and investment requirements. Knowledge of a core area allows a greater understanding of risks, and therefore an increased effectiveness of investments.

There appears to be a cultural difference in how oil companies manage their entry strategies. Van Driel (1999) observes that while North American companies look at opportunities first when entering a country, Southern European companies establish relationships first, and let the opportunities evolve from there.

4.2.2 Opportunity Types

In terms of the scale of opportunities using exploration and development as a model for growth, Wasteneys (1997a) categorizes the projects available in the world into four types:

1. **Giant fields** that are usually burdened with one or more of the following:
   - heavy government fiscal take;
   - significant geological risk (low chance of success);
   - significant technological risk (e.g. expensive deepwater developments) that has a tendency to increase costs and uncertainty (Megill, 1988);
   - or large political and economic risk.

These types of projects are best suited to major companies that have the
financial and technical strength to manage the associated challenges and risk.

2. **String of Pearls**—a number of smaller fields that are uneconomic or insignificant on their own, but when taken together add up to something both significant and profitable.

3. **Field rehabilitation**—new investment in an older field to increase hydrocarbon recoveries. These projects entail less geologic risk, but typically carry more engineering and cost risk, and are often less profitable than a new exploration discovery of similar size. The contracts associated with field rehabilitation projects can become complex in terms of defining what is base and incremental production, as well as assigning environmental liabilities.

4. **Marginal field contracts**—are like field rehabilitation projects, but they are for previously discovered and undeveloped fields. These fields are typically smaller or more difficult to produce, and thus require a cost-effective approach to development, often with little margin for error. Options on several of these fields were included in Petro-Canada's Tinrhert Block, which is the subject of the attached case study.

Van Meurs (1997) indicates that a number of aspects of the fiscal system can impact both the project risk and growth strategies:

- signature bonuses (up-front payments upon the signing of the contract) can add significant risk to exploration projects by increasing the amount of money exposed prior to success;

- tax consolidation between currently producing properties and new exploration ventures allows profitable exploration to occur at higher activity and risk levels. The greater the tax consolidation that is allowed, the better;

- companies can be advantaged or disadvantaged from a tax standpoint depending on their home base. The taxable income of affiliates of Canadian, German, and Japanese companies cannot be consolidated for tax purposes, unlike their counterparts in the U.S., France, and UK, for example. Double taxation can also be an issue (e.g. Revenue Canada does not recognize that
host-government fiscal take under PSCs is a tax rather than a royalty);
- depreciation schedules for capital investments versus acquisition of petroleum properties can skew the preferred entry strategy into a country; and
- the government fiscal take can be skewed to either front-end loaded systems or back end loaded systems. A fiscal system that allows the timely recovery of petroleum investment by a company can reduce the risk of that investment.

In addition to evaluating the technical and political/business risks in project selection, consideration should include the location of the markets for the oil or gas, and the associated infrastructure that may need to be built to bring the product to market (i.e. is the company willing to invest in pipelines and gas plants. Are associated downstream investments desired or required? (Wasteneys, 1997a).

4.2.3 Project Fit with Corporate Competencies

A number of authors (Wasteneys 1997a, Murphy 1997, Knights and Kennel 1997) have concluded that the future of the international industry will be more niche focused. With the rising levels of competition, the greater demands of host countries, and the increasing powers and sophistication of national oil companies, companies venturing internationally will need show a competitive advantage in the arenas in which they wish to compete.

To compete in the proper niche, a company will need to:
- know what part of the value chain it is particularly good at, its particular strengths and limitations;
- select projects that fit this niche, and market these skills to the licensing authority;
- construct the project organization to take full advantage of these strengths; and
- master the art of risk analysis and portfolio management to select appropriate projects, and to truly manage risk and to extract the
highest value from the portfolio.

Distinguishing characteristics may set a company apart from the competition in the eyes of the licensing authority during the project selection phase might include:

- particular technical expertise or access to technology;
- operating expertise in specific environments (e.g. deepwater, arctic, environmentally sensitive);
- marginal field expertise;
- size and financial resources;
- proven success elsewhere (particularly internationally);
- a reputation for honoring commitments;
- nationality (can help Canadian companies in some parts of the world), or culture; and
- experience with technology transfer, etc. (Wasteneys, 1997a).

Additionally, Wasteneys (1997a) suggests that company strategy be used to determine the regions in which to invest. Companies looking to create a substantial long term presence in a new value centre may wish to focus on the geological attractiveness of an area to ensure that the resource base exists to support growth. Companies looking for a source of exported crude for their downstream business may need to focus on marketing issues and the style of contract being offered by various countries.

For companies that want to be operators, some of the skills necessary to be an operator internationally include:

- the ability to generate prospects (for exploration blocks);
- the capacity to manage operations in technically and logistically challenging areas;
- cost control and audit procedures specifically designed or adapted for foreign operations;
sufficient organizational depth to staff key positions in foreign operations with competent personnel; and

- sufficient discipline and analytical ability to identify the exit point in a project, when further investment is not justified (Wasteneys, 1997a).

In terms of how the corporate vision is reflected in the project portfolio, the view of participants at the Hedberg conference on risk management in international petroleum ventures (Mackay, 1996) was as follows:

Vision leads to corporate goals and objectives, and then strategies. Goals are then achieved through portfolio management. Management of the portfolio is best done in a hierarchical manner; that is, a corporate board manages a portfolio of teams, and the teams manage a portfolio of projects. Each level is broadly accountable for its predicted performance, but the projects themselves are managed at the lowest level possible. Changes to the portfolio are made at the lowest level, conditional on the proposed substitution meeting or exceeding the value of the project being replaced.

*It would be interesting to know what percentage of companies actually does this (or does this well). My suspicion is that few do, although I do not have any research to support this.*

### 4.3 Political Risk

#### 4.3.1 Understanding Political Risk from the Perspective of an Oil Company

The scope within which political risk is reviewed here includes:

- expropriation, unilateral changes to contract terms, or imposition of restrictions on currency repatriation;
- regulatory uncertainty or poorly functioning legal systems;
- corruption;
- civic instability and security risks;
- international sanctions;
- litigation; and
- adverse impacts on a company’s reputation, resulting in part from boycotts or pressure from NGOs.
Successful petroleum investments have a high degree of asset specificity, meaning that the investment is largely immobile in the host country. The risk is therefore greater than for mobile investments, such as textiles, where a factory can be moved to another jurisdiction at little cost.

Political risk has been defined in a number of ways—a narrow definition of political risk is "the chance that an investor will experience unfavourable economic consequences due to unilateral sovereign abrogation of contract terms by the host nation. The origin of the abrogation could be legislative, executive, judicial, popular revolt, or combinations thereof (Proehl, 1993). It could involve a change in the relationship between a firm operating in a foreign country and that country's government. It may also arise from the deterioration in political relations between the governments of two firms engaged in an international transaction (Kerr and Perdikis, 1995).

For a foreign investor, this type of political risk is present when sufficiently powerful elements of a host country believe that the activities of a foreign company are not in the host-country's economic interest. Investors can have a difficult time seeing risks to their projects because they are not seeing the project from the perspective of the host-country economic interests, or the host-country motivations (Proehl, 1993). Although there is a good correlation between fiscal take and geological prospectivity, political risk appears (interestingly) to have no influence of the contract terms that companies are willing to negotiate, except in extreme situations (Van Meurs, 1997).

Proehl suggests that the outcome of the political risk assessment should be probabilistic evaluations that can be used in expected monetary value (EMV) calculations and proposes a methodology for predicting political risk based on measures of economic instability. Fontaine (1990) provides an example of how the oil industry uses public attitudes to foreign investment and economic freedom to gauge political and investment risk. His assertion is that the basis for political
risk is the national psyche and historical views on individual liberties. Fontaine's view is consistent with that of Proehl, namely that the basis for political risk is the public's perception of the project and its circumstances. Johnston (1998) shares this view and reminds us that "government officials do their negotiating on a stage that is viewed by other government agencies; the ruler; dictator; or prime minister; the citizenry; and the press. They are usually under a great deal of pressure and have substantial political context within which they must make decisions."

Wasteneys (1997a) reflects on the importance of ensuring that the project is in the host-country interest in his suggestions for adding the following elements to any bid that will "let the government justify publicly any contract it enters into with a foreign company":

- having government or national oil company participation in the project;
- staffing the operation with host-country nationals rather than expatriates;
- training of host-country nationals; and
- making altruistic infrastructure investments such as schools (or subsidy of teachers' salaries), hospitals (or providing supplies to clinics), water supply—all in conjunction with host-country authorities, and done on a low-key basis.

Nairne indicates that the recent move towards private deals (as opposed to sovereign arrangements) has broadened the political risks to which a company may be exposed, while claims due to catastrophic events such as outright expropriation have declined. Increasingly prevalent are risk events such as:

- creeping expropriation (e.g. unilateral changes in concession terms);
- host-country conflicts (religious or ethnic in nature) or external precipitants (e.g. internationally sponsored litigation); and
- imposition of restrictions on currency repatriation.

Kielmas (1996) indicates that politicians and other groups are targeting multinational corporations and their employees to gain publicity for their cause
and to protest the corporations' involvement with controversial governments. Kielmas points out the recent economic liberalization sweeping the world has led to a number of new political risks:

- increased freedom of information has highlighted government corruption, and makes government (and its foreign partners by association) open to criticism;
- insurgents in places like Colombia have discovered that kidnapping and extortion are excellent revenue generators. Kroll (1996) indicates that oil companies operating internationally are a preferred target for security threats as they are wealthy and can also carry symbolic significance. A list of the most common threats includes pipeline sabotage, bombings, mortar or rocket attacks on installations, kidnappings, armed assaults, murders, and extortion. Granger Telecom, a British Company, is currently being sued after four of its employees were killed in a grisly fashion in Chechnya (Economist, 1999-11-20); and
- political activists are finding foreign multi-nationals more responsive to criticism than the host government in places such as Nigeria and Myanmar.

NGOs are playing an ever larger role in terms of shaping the behaviour of governments and companies (Economist, 1998-12-05). Behaviour that is adversely perceived by NGOs can result in consumer boycotts, lawsuits, pressure on host governments, and adverse publicity resulting in lower employee morale or difficulty in hiring high-calibre recruits. NGOs formerly focussed on pressuring governments, now they focus more on commercial organizations (Cope, 1997).

Sanctions are another dimension of political risk arising from participation in the oil industry of some nations. There are a number of countries (e.g. Iran, Iraq, Cuba) under sanction, and trade and investment in those countries carries some restrictions and, possibly, punitive measures against investing companies by governments hostile to the regimes of those countries. Examples of punitive measures and a discussion of the U.S. sanctions on Iran and Libya in particular
are provided by Cova (1996). Cope (1997) cites the International Herald Tribune reporting 60 separate laws or executive orders in the U.S. authorizing sanctions. U.S. sanctions impacted the directors of Canada's Sherritt International, who were refused entry to the U.S. as a result of their Cuban investments. As the political circumstances underpinning sanctions can change rapidly, it is recommended that investors obtain the most recent information (available from Canada's External Affairs) prior to committing investment.

Travel risks are a particular concern to companies and employees with international business. Business travelers face more risks than a typical tourist, and advice abounds on how to mitigate it (Procon, 1998).

4.3.2 Examples and Trends

In-country Risks

The public attitudes of a host country are often evident in its political discourse. Proehl (1993) documents how public sentiments towards foreign involvement in the Chilean copper industry were reflected in the positions of political parties. Some Indian states have taken a protectionist (and populist) approach to foreign investment, with Enron's on-again/off-again power generation project in the state of Maharaja often cited as an example. This is in contrast to Gabon's attempts to woo foreign oil companies through the publication of the advantages to investing in Gabon (Meye M'Ondo, 1993).

As Canadians, we may think of ourselves as always having provided a reasonably politically stable climate for foreign investment. Our relatively recent experience with the National Energy Program of 1982 should serve as a reminder that we too have a history of punitive fiscal policies to reduce foreign involvement in our oil industry, and that these policies drew significant political support from Canadians, particularly in Central Canada. Pane cites in 1991 that many oil company political analysts feared that prospective Canadian regulatory and tax changes were more likely to hurt than to help investment by foreign firms.
Wells (1997) indicates that there has been a substantial shift in political risk over the last 20 years, with his survey turning up only 12 incidents of outright expropriation between 1981 and 1992, compared to 83 in 1975 alone. The move away from outright expropriation comes with a decline in countries choosing centrally planned economic models, and an increasingly held view that foreign investment is a source of exports and jobs. Associated with this economic liberalization has come greater democracy, and greater competition from host-country firms. The desire of governments to shelter host-country firms (or suppliers), often after foreign investment has taken place, is a significant new area of political risk. Often the host-country firm has strong political connections, as well as public support.

Barrera-Rey (1992) also cites Colombia's Piedemont fields as an example of how a protracted public dispute between the government and BP over the nature of the fields has resulted in public opinion entering into the equation and, for the moment, effectively precluding a financially viable solution for BP.

Shirley (1997c) discusses the legal and political roadblocks that have prevented the world's second richest hydrocarbon area (Russia) from receiving investment from foreign oil companies. The lack of a clear legal framework is compounded by a negative political attitude towards foreign investors—the basis for most political risk. Shirley quotes Ray Leonard, vice president of Amoco Kazakhstan as saying: "The major roadblock is the tax and legal system. Those must be reformed to make investments profitable even for Russian companies." In Leonard's view, the Russians would rather develop the nation's natural resources themselves. "The Russian oil industry is sophisticated and quite capable from a technical standpoint. Foreign companies are viewed as needed mainly for the capital they bring to the table. The best opportunities for foreign companies are those requiring a level of investment and technology beyond the reach of Russian companies. The only major projects that have been approved so far in
Russia are in the Sakhalin region off the East Coast in the sea of Okhotsk, where the capital exposure and technological risks are tremendous." Sjoman (1996) echoes the importance of Russian attitudes and cultures in the evaluation of political risks stating that Russian companies believe they can develop oil from their own fields, except for the largest and most technologically complex projects.

Even large companies can shy away from regions where the required infrastructure costs are large, and the geopolitical climate too uncertain, such as the region surrounding the Caspian Sea, where the U.S., Russia, Turkey, and China all have geo-political cards to play (Cope, 1997).

The fallout from political risk in a country can be direct security risks. Kielmas (1996) provides the following view of security pressures faced by companies working in Algeria:

In 1992 in Algeria, the opposition Islamic fundamentalist party (FIS), said all companies investing in the country after January of that year would have their contracts rescinded if the opposition came to political power. The FIS was banned after a military coup in 1992. Since then, the country has been embroiled in a civil war that has killed more than 50,000 people.

But these threats have not stopped foreign companies investing in Algeria. Nor has the country’s escalating violence and civil war put off the companies. Foreign oil company executives, whom the armed opposition groups have threatened to kill, have been able to conduct their business away from the Algerian capital, Algiers. The Algerian government ensured they could attend meetings with government representatives in Hassi Messaoud, about 5000 km away from the capital and away from the violence, or at home in their own corporate headquarters. The Algerian government has recently decided that all meeting with foreign oil investors must take place in the capital. The Algerian government is forcing executives to go there. They have stopped representatives from the state oil company from traveling abroad and so all the meetings must be held in Algiers. The government is doing this to demonstrate an atmosphere of security to the world...and the management groups of many oil companies have decided to invest there anyway.

The Algeria security situation is discussed in more detail in Section 3.5 and Appendix A as part of the case study. Jenkins included Algeria in his list of the 10 riskiest countries in the world for oil companies (1996).

Nation (1997) laments the number of countries racked by violence, “which raises
the risks far beyond the possible rewards," citing Cambodia as an example, and lists Nigeria, Myanmar, and Papua New Guinea as politically unstable.

Geopolitics of Energy (Barrera-Rey, 1997) offers Colombia as an example of a nation whose resource attractiveness is overshadowed by the political and business risks and associated violence to the degree that Colombia has had to improve contract terms to try and keep foreign investors interested. Even this measure has not been entirely successful.

Corruption can come in different shapes:
- minor bureaucrats who want their palms greased;
- con artists; and
- the "Swiss Bank Account" of corrupt officials (Cope, 1997).

The first is quite common, and may mean a small payment to avoid a delay for a particular service. Some companies use an agent who understands the accepted practices in the host country to handle these types of issues. Not all companies use agents, and accept delays instead. Con artists, who misrepresent their influence and demand cash to solve problems are best dealt with through thorough cross-referencing with the competent authority (Cope, 1997). The payment of bribes to officials to influence decisions has just been made a criminal offense in a convention signed by the Organization for Economic Co-operation and Development (OECD), and is not recommended under any circumstances.

However, not all the experiences or trends are negative. The ranks of newly liberalizing countries are numerous. Shirley (1997a) provides an example of how Brazil is joining the ranks of the South American countries who are opening up their previously restricted petroleum lands to privatization and foreign investment. It quotes Dirceau Abraho, the manager of the BrasPetro New Ventures group as saying "Countries all over the world are joining the global economy, and Brazil is making changes to compete on the world market. The petroleum industry is
certainly not the only part of the Brazilian economy experiencing privatization. The government no longer views protectionism as a workable policy—Brazilian industries should be competitive in the world marketplace." Brazil is also proposing laws that would establish a National Petroleum Agency, a regulatory body that would oversee oil industry activities. This had been less necessary when all the activities were undertaken by an entity of the state (Petrobras)—a situation similar to that in Algeria.

Shirley (1997b) highlights Venezuela’s success in attracting private foreign investment into the oil industry. President Rafael Caldera’s initiative to move the nation’s economy to more of a free market orientation was so successful that a single bid round in July 1995 attracted $2.17 billion in bids, more than double the amount expected by PDVSA, Venezuela’s state oil company. Industry’s perception of the political climate in Venezuela is favourable. Shirley quotes Paul Appel of Phillips Petroleum as saying “PDVSA realizes that it needs capital and manpower to reach its 10-year production goals and the State Company has done an excellent job paving the way for private investment in Venezuela’s oil industry.”

World Oil’s August 1992 review of South America is headlined “Big finds can negate political aggravation,” suggested that if companies were sufficiently nimble to navigate the squabbles between competing political factions and special interests, the rewards could be substantial. Colombia’s giant Cusiana discovery was cited as an example of the kind of incentive that keeps companies exploring in a politically difficult environment.

**Domestic Risks**

Political or other problems in the country of operation can also lead to pressure in an international company’s home country, as the following examples show:

- Shell’s public relations disaster with the execution of dissident Ken Saro-Wiwa in Nigeria in 1995;
• UNOCAL faced lawsuits because their activity in Myanmar was seen as supporting a government and its human rights abuses (Massachusetts blacklisted 150 companies for their involvement in Myanmar in 1996);

• BP faced lawsuits for alleged environmental and human rights abuses in its Colombian operations. In addition, a British Member of the European Parliament (MEP) publicly accused BP of providing the army with intelligence identifying individuals linked to guerrilla groups who subsequently disappeared (Markwick, 1997);

• In November, 1998, an 11-member coalition asked the Canadian government to curtail or limit Talisman Energy's work in the Sudan due to governmental human rights abuses in that country. The coalition included the Canadian Labour Congress, United Church of Canada and a number of other high-profile organizations (Slobodian, 1998). This is now leading to potential action by the Canadian government against Talisman (Foster, 1999);

• In 1996 Amoco, BP, Chevron, Mobil, Texaco, and UNOCAL were the subject of boycotts as a result of their activities (Jenkins 1996);

• Petro-Canada was subject to public criticism in 1991-92 for its exploration activities in Myanmar, even though its involvement preceded the worst of the regime's undemocratic abuses, and makes a significant effort to act as an ethical investor; and

• Richard Hardman is quoted as saying that Amerada Hess decided not to invest in Nigeria because it "did not want to risk it's reputation" (Cope, 1997).

4.3.3 Assessing, Avoiding, and Mitigating Political Risk

Business risks and political risks are often intertwined. To assess political risk for a project, the following list of criteria can provide a starting point:

• contracts won through competitive tender are less exposed to accusations of bribery;

• privatization, particularly of sensitive industries, have increased risk;

• if political connections were needed to secure a contract, then that contract may only last as long as the politician is in place;
crucial imported goods are less vulnerable than goods that can be provided locally;
• large, long-term investments are more vulnerable to changes in political climate, particularly when the investments are not mobile;
• if the contract provides very high returns, it can become vulnerable; and
• have all the stakeholders (official and unofficial) been identified? (Markwick, 1997).

Markwick recommends having an analysis of political risk done independently to ensure its objectivity.

Placer Dome (CP, 1998), Canada's second largest gold miner, recently secured $800 million worth of insurance to cover it from political risk in developing countries. The target of the insurance is protection against changes in government policy that might result in expropriation or tax discrimination, with a secondary goal of insurance against insurrection or war. A worldwide consortium of insurers provided the insurance.

Advice on political and business risks is available commercially, with a number of consulting agencies, such as Petro-Consultants, providing country evaluations. If the economic strength of the government is vital to a project's future, a proxy source of information might be found in the ratings given to government bonds by firms such as Standards and Poors (Kerr and Perdikis, 1995).

Wasteneys (1997a) lists a number of key questions that a company should be asking itself with respect to political risk:
• how stable has the country been historically, and how stable is the current regime?
• how stable have the terms of petroleum contracts been over time, and to what extent have they been respected by the host government?
• to what extent have taxes and other fiscal terms grown more onerous over time?
• if exports rely on a pipeline that crosses a neighboring country, are the relations with that country reasonably good?
• is the acreage in which the company is interested the subject of a boundary dispute with another country? and
• are personal and operational security serious problems, either in the country or in the company's specific area of interest? If so, can these be controlled or reduced to a manageable level?

Wells (1997) also offers advice in identifying projects that are less likely to be politically risky:
• projects that control their export markets;
• projects in which the investor offers a technological advantage; and
• projects in which the investor is less visible to the general public.

In addition to the remedy of risk avoidance, there are a number of mitigation measures available to companies with respect to political risk. As many of these solutions are similar to those for business risks, these are dealt with in the Business Risks section dealing with Financing and Insurance.

4.4 Business Risks

Pane (1991) uses the definition of business risk to include those elements of value creation that are at risk. Within the confines of this study, business risk includes price, currency, and (non-environmental) regulatory risk.

Rolens (1996) details some of the regulatory risks, such as managed production (government control), limits on export routes, and boundary disputes. He suggests day-to-day assessment of business risks, as well as the quantification of business exposures for inclusion in economic evaluations. Amoco uses a business risk group to assess contract and fiscal terms, political risk, security, economics, and competition. Rolens also provides an example of how a hypothetical international investment opportunity would be scrutinized.
Currency risk is a major element in the risk profile of projects in a number of countries (Kerr and Perdikis 1995, Wasteneys 1997a). It becomes an issue when the currency of a host nation is not freely convertible or difficult to acquire, or when revenues or cost recoveries are tied to host-country expenditures in a currency exposed to exchange rate fluctuations. The latter problem is magnified when there is a significant time lag between expenditures and subsequent revenues. Governments may choose to avoid a freely convertible currency for a variety of political or economic reasons. Examples of currency risk might include cost recovery tied to a host-country non-convertible currency, or sales to a host-country market in host-country currency, with prices not closely tied to the world market price of crude. This is often the case for gas or electricity generating projects. Mechanisms for managing foreign exchange risks for convertible currencies include using foreign currency accounts, forward exchange contracts, borrowing foreign currency, or hedging currency on futures markets.

Uncertainty in finding the right entity with which to negotiate and form partnerships is another less apparent business risk. This is less problematic in established petroleum provinces with a history of foreign involvement, whereas Russia provides numerous examples of such difficulties (Petro-Canada’s activity there is one of them). There were numerous Russian organizations representing themselves as the sole legitimate contact for foreign companies wanting to do business, but none had the authority to deliver its (necessary) component of the bargain.

Auchinleck (1996) advises dealing directly with official bodies where possible, and avoiding political relationships.

One of the major risks in petroleum ventures centres around the world price of crude oil. This is felt by practitioners to be the most significant business risk (Mackay, 1996). Coffin (1997) outlines risk management strategies for removing
some of the uncertainty in revenues by hedging prices. Although commodity price uncertainty is one of the most significant variables in the petroleum industry, it is not particular to international ventures, and price risk management through hedging (for example) is commonly practiced by those companies that choose to participate. For example, crude oil futures have been traded on the New York Mercantile Exchange since 1983, and options since 1986. Burke (1996) presents a review of the various mechanisms for managing price risk available on the NYMEX. As such, hedging is not covered in this thesis.

One method for managing price risk in the international arena involves the contract structure. PSCs with a low royalty rate and no ceiling on repatriation can stabilize revenues even if oil prices drop. This is because costs are recovered from successful discoveries regardless of oil price, and only profits are at risk.

Because of differing storage, transportation, distribution, and burning characteristics, the business risks associated with gas can be different from oil (Pane, 1991). Although profitability in general is determined by the relationship between costs and the schedule of market prices over time, for oil the costs are related to where it is found, and prices are related to the worldwide supply and demand. Gas prices, on the other hand, have been capped by both oil prices (consumers can often switch to oil) and regional gluts of gas supply relative to demand. Gas pricing is usually regionalised because it is much more expensive to transport gas than oil. Wasteneys (1997a) reports that it used to be a business disaster for a company to discover natural gas in a developing nation, as there was usually no host-country market, or prices were controlled at such a low level as to make profitability difficult. Now, however, with the construction of low cost gas-fired electrical power generation plants (typically at one-third the cost per kilowatt of capacity of new hydroelectric plants), natural gas demand in developing nations is soaring. When exploring in a gas-prone area, Wasteney's recommends evaluating the host-country market and regulatory framework for
gas as well as electricity prior to committing investment.

Dealing with price uncertainty is commonplace in the petroleum industry. Major investment decisions would typically include assessments of the price sensitivity of the project, by calculating the EMV at a number of different sales prices, and calculating the price at which the project becomes uneconomic. Omitting these basic steps is done at the peril of the investor, and examples abound of companies that have faltered as a result hydrocarbon prices not meeting expectations (Oberly, 1996).

Taking a view of oil prices since 1980, Pane (1988) showed that crude prices have had long-term stability, and been relatively flat. This will be of little comfort, however, to those who either missed opportunities or bankrupted their companies when shorter-term price-swings dominated investment decisions. A prime example is 1974 to 1982 when prices rose from a few dollars per barrel to over $40, before crashing below $15 per barrel in 1986, and even lower in 1998.

Williams (1997) relates how in 1981, with gas prices as high as $10 per mcf, companies were investing large sums to explore in exotic and expensive regions in the search for a scarce and valuable commodity. But the 1986 price drop changed the nature of gas exploration to lower price environments.

A clever approach to dealing with an unfavourable economic or business environment is presented by Leslie and Michaels (1997). Based on experience at British Petroleum, they recommend looking at a negative economic situation, whether due to high costs, low product prices, or whatever, and determining what the price is for delaying the major project investment to some future date. This has the effect of paying for a "real option" to undertake the project at some future date, when business, fiscal, price, or technical changes have created a more favourable economic climate. In the international realm, this becomes feasible if rights to a property can be maintained over a longer period of time—which is not
possible in some circumstances.

Often, investment in an international venture requires striking a contract with the national oil company or a regulatory body such as the energy ministry. Typically, prior to obtaining revenue from such a venture, significant capital investment is required on the part of the investing company prior to finding hydrocarbons. Once the hydrocarbons are identified, an additional investment is required to develop the discovery. These investments are highly asset specific and immobile. Assuming a rational investor whose desire is always to make the best "go-forward" economic decision, an unscrupulous regulatory body or national oil company may choose to benefit in the short-term by changing the contract once the investment is sunk. This problem is accentuated when the legal system is ineffectual or politicized. The investing company will then be faced with the unpleasant choice of abandoning its investment and discovered petroleum reserves, or accepting less profit than initially envisaged by the contract. This type of deliberate contract negotiation is known as "post contractual opportunistic behaviour" (Kerr and Perdikis, 1995).

Kerr and Perdikis also provide an excellent review of international commercial dispute settlement, which is summarized below. Disputes between contracting parties can arise for a number of reasons, including when contracts do not cover a situation that arises, or when there is a difference in contract interpretation. If the two contracting parties are unable to arrive at a resolution of the differences in private, then the issue goes to a disinterested third party. This may be a mediator, an arbitrator, or the courts. The first two remedies are typically arranged through the private sector. Mediation and arbitration are a mechanism for reducing the cost of disputes through the use of a less onerous process. Firms that choose these methods are willing to give up some rigour in the court process in exchange for a more cost-effective and timely resolution mechanism. Arbitration of a complex case typically takes less than six weeks, while an equivalent case can take three years in the courts. Additionally, arbitrators and
mediators are usually chosen for their particular technical expertise, and the active role that can be played by mediators and arbitrators allows them to call in appropriate experts easily and efficiently. Due to their selection process, mediation and arbitration are also perceived to provide a less politicized outcome than relying on the courts of one nation or the other. Usually an arbitration panel is formed constituting one representative chosen by each party, and the arbitrators in-turn choose the remainder of the panel. Mediation and arbitration are also far less public than a court process. It is possible for one party or the other to refuse to bide by the outcome of mediation and arbitration since these processes are not backed by the same powers of the state as the courts are, but this is rarely done due to the risk of loss of reputation.

Mediation/conciliation is often used as a first step on the path to arbitration. Mediation is an attempt by a third party to facilitate a mutually acceptable solution to differences between the parties. This is a useful mechanism to improve communication, resolve misunderstanding, and allow face-saving solutions to emerge.

International arbitration has become the norm for firms doing business with national companies in former command economies. This is because commercial law is often insufficiently developed in the host country to provide protection to firms from national bias and arbitrary decisions. Kerr and Perdikis believe that the monopoly exerted by legislators and jurists over the litigation process may preclude a cost-effective court process, while the choice of arbitration procedures and institutions ensures competitiveness in the arbitration and mediation process. Permanent international arbitration institutions have been set up as a result of the high demand. Examples include various Chambers of Commerce (e.g. Zurich and Stockholm), the Chartered Institute of Arbitrators (UK), the American Arbitration Association (US.), the International Centre For Settlement of Investment Disputes between States and Nationals (World Bank), the Netherlands Arbitration Institute, and the London Court of Arbitration. The most
A prominent organization offering international arbitration services is the International Chamber of Commerce. It is not uncommon for contracts to specify an arbitration clause that references the applicable laws (e.g., which country's) under which the dispute will be resolved, the location where the dispute will be settled, the language of the arbitration, and the arbitration procedures.

Within the contract that is entered into by the NOC/government and the foreign company, there are a number of fiscal provisions outside the normally quoted statistics. Johnston (1998) details these as follows:

- data purchase/cost fees;
- social sphere development costs (written or unwritten);
- host-country office requirement;
- surface rentals;
- training fees and scholarship funds;
- customs duties, or customs exemptions that fail to show up;
- cumbersome visa requirements;
- domestic market obligations (i.e., selling a portion of the production to the host-country market at a discount or into non-convertible currency);
- mandatory currency conversions;
- unusually low procurement ceilings;
- hiring requirements;
- hostile audits;
- government cost recovery;
- excessive government pipeline tariffs;
- price cap formulas;
- short loss carry forward periods;
- performance bonds;
- value added taxes or goods and services taxes;
- reinvestment obligations;
- asset-based taxes;
• inefficient allocation mechanisms (slow indecisive awards);
• unrealistic permitting and impact statements;
• oppressive government controls; and
• contract official language (other than English).

Other items that could be added to Johnston's list are:

• the use of obstruction by officials in the country to force decisions contrary to the oil-company's interests;
• the enlistment of oil companies in projects that relate more to the vision of a senior official than to efficient and profitable investment;
• forced adherence to unwritten work practices that drive up costs; and
• an unworkable arbitration clause.

The most common method for mitigating business risks in the petroleum industry is by spreading it—that is, taking a smaller share of a number of projects rather than a large share in a single project. Seeking partners can be an uncomfortable undertaking if not done well. Wasteneys (1997a) recommends:

• choosing a partner with a good understanding of, and interest in, working internationally. If not, the risk is getting bogged down in explanations of why things don't work "like they do at home";
• finding a partner with adequate financial strength to avoid insolvency and/or constant budget problems;
• adding a competent and experienced host-country partner with a good reputation, if such a company exists;
• providing the insurance for all partners to avoid shortcomings in case of an incident; and
• not reducing working interest below 25 per cent if you are the operator, as this will be viewed as a lack of commitment by the government and partners.

Financial strength and insurance are not particular to international, but the other elements are certainly accentuated when moving away from the domestic environment.
In many international business ventures, there are risks associated with the transfer of goods and money between the buyer and seller of goods (this happens at the sub-project level in international exploration and development). For example, when the business involves exporting equipment to a buyer, how does the selling party ensure that payment will be made once the goods are sent without securing payment in advance? And how does the purchasing party ensure that goods will be delivered after money has been paid? These risks are accentuated for one-time transactions—in other words when the relationship between the buyer and seller has no future value (Kerr and Perdikis, 1995). The common methods of managing these risks include using letters of credit or documentary collections. These involve using third parties (typically banks) to ensure that the buyer has adequate funds, and to transfer those funds when the documentary evidence of the goods transaction are received. A number of references explain these in detail (Band of Montreal, 1994) (Kerr and Perdikis, 1995). In most international petroleum ventures, payment for produced hydrocarbons comes not from the state or national oil company, but from third party buyers of repute, so these risks are less prevalent than for typical international transactions.

4.5 Mitigation of Investment Losses (Financing and Insurance)

4.5.1 Types of Coverage Available

For most companies, an international exploration and development project constitutes a major investment. Managing the business impacts of technical risk (such as the risk of drilling wells that find no hydrocarbons) is generally done by corporations through partnering and diversification of investments in a number of areas (as discussed above), or by investors who have holdings in a number of companies.

Wells (1997) suggests that alliances amongst a variety of participants is another way of spreading risk, although he cautions that each alliance partner may be burdened with a different aspect of the investment risk, resulting in internal
conflict as members respond differently to threats.

Other ways to spread risk (Wells, 1997) include:
- making money in related operations (e.g. be a fuel supplier rather than just a plant builder);
- involving strong international interests, such as multi-lateral financial institutions;
- seeking a defensible process for negotiating entry (win-win for all parties);
- looking for innovative forms of agreement (that provide profits, for example, but do not involve the more sensitive issue of ownership); and
- seeking sensible methods of dispute resolution, where the cost of the process does not unduly deter its use.

There are a number of risks that can be managed through insurance. The following information is provided by Coe (1998) except where noted. Insurance coverage is available in the following forms:
- liability, blowout, and property damage insurance;
- kidnapping/ransom insurance;
- pollution/environmental insurance;
- business interruption insurance (revenue replacement);
- political risk insurance:
  - confiscation, nationalization, expropriation, deprivation;
  - and terrorism.
- contract frustration insurance when dealing with government organizations:
  - non-payment, contract repudiation, non-delivery of goods;
  - currency issues;
  - and unfair calling of on-demand bonds;
- foreign workers disability insurance (e.g. for Canadians working abroad who are no longer covered by the Workers Compensation Board);
- employers liability;
- non-owned aviation;
- marine cargo insurance;
- insurance against crime;
- fiduciary insurance (e.g. to cover against a bad host-country partner skimming funds); and
- directors and officers liability insurance (to protect against lawsuits from shareholders, etc.).

Kidnapping insurance is usually taken out even when the financial exposure to a firm is not large, since this type of insurance usually brings with it the associated capability and skills to deal with a kidnapping situation, as well as providing expertise on avoiding these kinds of crises. Kidnap insurance is generally inexpensive, as it is almost never used, and provides a "sleep-easy" for oil company executives. It is typically an add-on to basic insurance, and the expertise would come from firms such as Control Risk and Pinkerton through their association with insurance companies.

Revenue interruption coverage can be extended to cover infrastructure problems (such as pipelines on which a company is reliant), although this generally takes effect only after some considerable downtime (e.g. 30 days for large plants). As always, the price of this insurance is commensurably high with potentially large payouts, and corporate track records (e.g. refinery reliability). The premiums can be mitigated by a high deductible.

Environmental insurance can take a variety of forms. Environmental damage to another's property is usually part of the liability policy. For example, environmental damage from well operations is usually a part of, or an add-on to blowout coverage. Site clean-up insurance is available, as is insurance when buying properties with uncertain environmental liabilities, as long as the property comes with an associated environmental audit.
For almost all companies, property damage insurance (e.g. for offices, production facilities), liability insurance, and blow-out coverage form an integral part of the basic insurance regardless of the location of a company’s activities. The decision to further insure against political risk would be made based on:

- how much of a company’s portfolio is invested in a given country;
- the degree of risk; and
- the cost relative to the benefit.

The decisions would involve the expertise of not only risk managers, but also economists, security, and political analysts (MacDonald, 1998).

Coe (1998) estimates that about half the Canadian-based oil companies carry some form of political insurance coverage, with mid-sized companies the most likely to seek coverage. Small companies often have difficulty justifying the high premiums, and large companies can consider self-insuring as an option. Basic political risk insurance would cover confiscation, nationalization, expropriation, and deprivation, but more comprehensive coverage is available. Political risk insurance has become more popular and widely available, and the market has grown to the point that most insurers will now offer comparable products that can be tailored to the individual needs of a corporation. It can be extended to cover contract frustration as well as investments beyond physical property—for example to cover the investment or purchase price. The growth in the market between 1992 and 1997 has led most major insurance syndicates to increase several-fold its coverage limits per investment and per country. Some insurance brokers now have divisions to deal specifically with political risk (Brownlees, 1997).

The high price of political risk insurance is due to the size of the potential payout, and can easily add up to over half of a company’s insurance bill. For companies with a significant amount of their money invested in an international petroleum project however, the insurance can actually be a cost saving even if never used. This is because a number of investors (such as pension funds) are willing to
accept lower yields on bonds if their investments are insured against political risk, and the differential in bond yield can exceed the cost of the insurance. In other circumstances, the presence of political risk insurance can make the difference in successfully obtaining investment. Confidentiality agreements with an insurance company are often extended to investors to allow this to happen.

A recent well-publicized example of a Canadian company insuring against political decisions like expropriation or discrimination on a tax basis in a foreign location is Placer Dome, which is active in South America, Australia, Papua New Guinea, Africa, and Russia (Calgary Herald, 1998).

The number of insurance products is continuing to increase—a recent addition to the portfolio is private coverage against war on land.

4.5.2 Sources of Insurance

Insurance can be found through a number of mechanisms, including:

- privately placed insurance;
- export credit agencies (Canada's Export Development Corporation (EDC) for example); and
- multi-lateral agencies such as the World Bank—in particular the Multi-lateral Investment Guarantee Agency (MIGA).

Armstrong (1996) provides an excellent summary of the types of assistance available through multilateral groups such as World Bank agencies, regional banks, export credit agencies, and others. This assistance comes in the form of investment, guarantees, and insurance, and uses investment products such as loans, equity, quasi equity, and assistance in mobilizing funds. Additional references covering this subject include efforts by Razavi (1996) and the Economist Intelligence Unit (1994).

Traditionally, export credit and multilateral agencies were the primary source of political risk insurance (Brownlees, 1997) since they had the advantages of
providing longer periods of coverage, government influence on host countries, and zero weighted risk (financing banks need not allocate risk capital if backed by these agencies).

Private placements are providing the majority of insurance coverage today however, since they provide significantly greater flexibility than is available from public insurers. The significantly larger capital pool now available (e.g. through Lloyds of London) is allowing private insurers to provide a price competitive and flexible insurance package. For political risk coverage, private insurers are now able to provide the long term coverage (up to 12 years) needed to overcome the limitations of a year-by-year policy—namely escalating rates as a foreseeable political crisis approaches. Five-year coverage is now typically available for contract frustration, and 10 years for confiscation. The increased capacity and policy periods are available due to (amongst other things) better underwriting results, more accurate exposure information, and heightened demand (Coe, 1998, and Brownlees, 1997).

Export credit agencies may restrict their coverage to projects:
- with contracts that conform to certain international standards;
- that are limited to certain types of risks;
- that do not exceed a certain size, or; and
- that contain enough national content (e.g. Canada's EDC looks for Canadian content).

It is now quite common to see cooperative efforts between private insurers, export credit agencies, and multilateral insurers. The former provides significantly increased capacity and flexibility, while the latter provide the kind of influence needed to minimize risks (Markwick 1997). Private insurers also provided bridge financing while oil companies wait for public sector insurers to process insurance requests.
The World Bank limits its financial support to the development phase of upstream projects. Mayorga-Alba and Smith (1993) believe that this is partially in response to resistance by international oil companies. These authors indicate that the companies’ prevailing view was that in displacing private capital from the exploration realm, the Bank’s involvement (through its International Bank of Reconstruction and Development—IBRD arm) would distort normal market behaviour, which would otherwise adequately balance all the risks when making investment decisions. The International Finance Corporation (IFC) arm of the World Bank does provide some financing for projects as well, although its $50 million per year average investment between 1983 and 1993 is less than 0.1 per cent of upstream petroleum industry investment. A sister agency, the MIGA, provides political insurance against risks due to currency transfer, war, breach of contract, and civil disturbance.

Bell and Ball (1996) show that some innovative financing does occur, as with the $310 million raised for an offshore development in Angola. The financing was provided by banks and was secured by the lifting agreement between BP Oil International, and Sonangol (Angola).

Another source of risk mitigation is through the selection of projects that have short payouts. By minimizing the period of time that a company has a net financial investment in a country, the probability of a significant financial loss can be correspondingly reduced.

### 4.6 Cultural Gaps

Human communication is imprecise even in the best of circumstances, namely between people of the same culture and who know each other well. The scope for miscommunication and misunderstanding is increased many-fold when working across cultures, as is usually the case when Canadian oil companies venture internationally. Some of the cross cultural issues to be managed in international ventures include:
- creating a proper perspective for cultural differences (ethnocentrism, stereotyping, etc.);
- different styles of communication (speaking directly vs. obtusely);
- levels of formality;
- perspectives on time (rigid versus flexible);
- role of personal relationships in the business arrangements; and
- focus on hierarchy, etc. (Rutherford, 1998).

The cultural impacts of managing globally have been extensively documented (Harris, 1991). Culture not only impacts communication, but also negotiations, organizational culture and management roles, protocol, and teamwork. Culture changes regionally, within regions, and between corporations.

Desmarests (1997) indicates that the experience of TOTAL, one of the largest international oil companies, is that it is now common to be operating in the unsettling legal environment that requires cooperating with National Oil Companies coming from different cultures. This means that TOTAL has had to become both more risk-accepting, and put greater emphasis on accepting differences.

Haryott and Shih (1998) provide commentary regarding the competitive advantages to be gained by understanding the culture of the target country. China is cited as an example where practices common to the rest of the world may not necessarily be in place. One cultural key to success in China is patience. For example, the first meeting with a potential Chinese partner (regulatory or business) is usually used only to become acquainted, and to launch what will hopefully become a long-term relationship. Dining, in the form of the Chinese banquet is seen as an extension of the relationship-building exercise. One of the main pitfalls when doing business in China is making contact with the wrong people—this is common due to the large Chinese bureaucracies.
Markwick (1997) indicates that differences in business/cultural practices can be rooted in structural differences between countries. For example, in an economy without properly functional legal institutions that serve as protection when dealing with unknown potential partners in a large marketplace, company executives must rely on personal relationships to resolve contractual problems. The proper functioning of legal institutions in Canada allows business to be conducted with far less extensive relationship building.

Schneider (1998) summarizes that cultural differences can play a key role in all aspects of international activities, including purchasing and shipping. When moving equipment to another country, it should not be surprising that different rules and regulation may be in place in the host country. Inattention to small details can cause delays for weeks or months in clearing goods through customs.

As a way of helping companies and countries deal with cultural risks, cross-cultural consultants offer a number of services (Rutherford, 1998), such as:

- relocation training for expatriates and families;
- cultural orientation for short term business travelers;
- inter-cultural training for in-house staff; and
- Canadian business orientation for in-coming foreign nationals.

### 4.7 Technical Risk and Its Quantification

#### 4.7.1 Types of Technical Risk

Exploration and development projects are fraught with technical risks. Examples include:

- exploration risk, or hydrocarbon chance factor. This is the risk that a potential sub-surface trap identified by the explorationist does not contain any hydrocarbons. Typical success ratios for exploration ventures may be in the five to thirty-five per cent range (depending on whether it is a new play type or
an extension of an existing producing play) (White, 1987), with the balance of the outcomes resulting in a complete loss of the investment. If the benchmark for success is finding hydrocarbons, then most exploration ventures fail!

- uncertainty in reserves size:
  - are the reserves large enough to cover the delineation, development, and operating costs?
  - how much work do you need to do, and how much money do you need to spend, before you have the answer to this question?

- reserves quality and costs:
  - might you discover gas, conventional oil, or heavy oil, and do all these commodities have commercial value in the country?
  - does the reservoir have sufficient permeability, continuity, and thickness to be depleted using an economic number of wells?
  - do the fluids have a particular characteristic that makes them prohibitively expensive to produce (e.g. acid gas).

- technological risks. For example using exotic technologies to access or recover hydrocarbons.

Mackay (1996) indicates that the hydrocarbon chance factor is generally evaluated by breaking it down into four or five constituent components that reflect the underlying petroleum systems (namely trap, source, seal, and reservoir). It is typical for practitioners to be overconfident in their predictions of success rates and reserve sizes (also Brookman, 1997). Companies often use formal programs to track results and feed them back to their divisions as a means of improving predictive capabilities. Author’s comment: this is proving successful in Petro-Canada’s Southern Business Unit, where actual results align well with predictions, and was also cited as a valuable process within Exxon by Snow (2000).

Uncertainty in reserve size within discovered hydrocarbon pools often originates
from geological uncertainty. Geological uncertainty, in-turn, exists because information about the reservoirs, in which the hydrocarbons accumulate, comes from only a small sampling of the reservoir itself. A key technology focus within oil companies is to reduce the reserve uncertainty, or at least to understand and quantify the uncertainty. An example is the use of geostatistical models to take the geologist's understanding of the depositional environment of the reservoirs, and combine this with geophysical information measured at surface and geological information derived from the wells. Williams (1996b) quotes Dr. Amiel David, of First Union Corp., on matters relating to technological progress and understanding hydrocarbon accumulations:

"Our whole industry is moving very quickly on the technological side. Seismic evaluation has improved greatly, and we have new aerial survey methods as well. We also have made mechanical hardware improvements—we now commonly drill horizontal wells and use equipment like coiled tubing. Logging and completion procedures have gotten better, and we have developed new computer algorithms for reserve evaluations. We're also applying geostatistical analysis, a mathematical technique than can better define reserves underground."

Improved technology and work methods have had a substantial impact on costs and efficiencies in both exploration and development. Pradas (1996) credits technological advances and better methods of data integration between technical disciplines. This has contributed to:

- a doubling of exploration success ratios;
- a 30 per cent reduction in drilling costs;
- a reduction in cycle time from discovery to first production from nine to three and one-half years; and
- in Norway, a reduction in operating costs from $6.68 per barrel to $2.10 per barrel between 1975 and 1996.

This view is confirmed by other authors: technological advances and increased geological knowledge is credited by Grace (1997) with reversing the decline in discovery rates worldwide, and MacKay's (1997) observation of increased drilling success ratios from 1:6 to 1:3. The reduction of technical risk through improved technology, although fascinating, is such an expansive subject that it cannot be
done justice within the scope of this thesis.

4.7.2 Acceptance of Technical Risk

Walls and Dyer (1996) show that risk-taking is an essential element of corporate exploration performance, and postulated that there should be an appropriate risk propensity for the size of a given firm. Inappropriate risk taking is associated with either lower economic returns and/or financial distress. In other words, a firm should be eager to take on riskier high EMV projects, but not to the point to which they become hazardous to the firm's health. Their survey results confirmed this postulation, showing that firms with moderate risk tolerance levels demonstrate significantly higher returns than firms with either higher or lower levels of risk tolerance (for firms of similar size). The survey also showed that greater wealth leads to a willingness to take on riskier projects.

In a survey of 26 integrated and independent exploration firms over a three year period, Walls and Dyer (1996) determined a positive correlation between risk propensity and company size (bigger companies take larger risks). Exploration opportunities most frequently undertaken by companies exist in two types: lower risk with lower reward, and higher risk with higher reward. Other combinations of risk and reward: high risk—low reward projects are not interesting due to low EMV, while low risk—high reward opportunities are rare. While EMV yield is a guide for maximizing long-term returns, it does not consider the amount of capital being exposed to loss. Although market theory contends that corporations should be investing purely on an EMV basis, and that investors in the market will spread their risks by investing in more than one company, Hackett (1985) observes that most managers consider not only the shareholders, but also themselves, employees, suppliers, customers, and communities in their investment decisions. In other words, managers do not want to put their companies out of business pursuing a high EMV project that has a high likelihood of failing and bringing the company down with it. This may be exacerbated as an unintended consequence of decentralizing decisions and the associated risk.
management process into smaller organizational units (MacKay, 1996). From a market perspective, safeguarding the survival of the company can be explained as rational investment behaviour (as opposed to purely selfish behaviour) if the integrity of an organization is deemed to have value. Greenwald and Stiglitz (1990) showed that using a utility function of expected profits minus expected bankruptcy costs leads to decisions consistent with those determined by maximizing a risk-averse utility function.

Recent thinking, summarized by Ormand and Duggan (1999) as well as Ball and Savage (1999a) indicates that management should also concern itself with portfolio risk diversification because external financing is more expensive than internally generated funds. Ormand and Duggan provide a technique that employs “semi-standard deviation” as a measure of risk for finding the portfolio balance that minimizes risk for a given rate of return. Ball and Savage use the “mean expected loss,” and provide downloadable software (1999b) that allows portfolio optimization within Microsoft Excel.

Schuyler's survey (1997) indicates that some companies show risk aversion even when only one per cent of their net worth is exposed, which some theorists have suggested is too risk averse by a factor of 15 or 20. De’Ath (1997) notes that many companies have been driven to the less profitable portfolio of low-risk, low reward portfolios by the desires of commercial managers to meet short-term financial goals and avoid taking risks that have a strong probability of not working out.

The nature of the exploration part of the exploration and development business is to undertake a number of ventures, most of which will be failures (no oil or gas being discovered) until a sufficiently large find is made that offsets the previous failures. The most common method of spreading risks in this environment is scaling the size of the individual investments to the size of the corporation. This is necessary to avoid “gamblers ruin”—the notion of going bankrupt because
your pockets are not deep enough to get you through a spell of bad luck.

One way to minimize the relative risk is to create a larger corporation through mergers or acquisitions. This is cited as one of the reasons for merging by Jon Bromley (Haines, 1997), the chairman of Pioneer Natural Resources, a firm created by the merger of two smaller firms. The ability to manage risk through increased size was cited as a reason for merging between BP and Amoco, and between Exxon and Mobil.

A more common method for minimizing technical risk is to take a smaller share in a larger number of projects. Consideration of individual exploration projects as constituting a "program," Quick and Buck (1983) suggest calculating a "dilution factor" to determine what share of projects a company can handle given its financial resources and the size and risk of the projects being undertaken. They also provide an additional method for minimizing the chance of financial ruin by "knowing when to get out," and provide a numerical method for determining this point.

There is a requirement for improvement in managing petroleum investments. McKinsey (1994) studied the performance of upstream investments by 29 large U.S. companies between 1982 and 1992. These investments actually resulted in $270 billion in value destruction, much of it in exploration. Patek and Bulte (NZPCP, March 1996) explain that the traditional methods of managing risk and uncertainty in petroleum exploration were by holding a diversified portfolio, but this alone did not seem sufficient in an environment of intense competition coupled with inherent geological unpredictability.

4.7.3 Imprecise Technical Knowledge (Risk Assessment)

Data Uncertainty and Technical Risk Quantification

Insufficient access to data is one of the primary "technical" risks, and easily overlooked by a new entrant to the world of international exploration and
development. Companies operating in Western Canada have the luxury of public data access through Alberta's Energy Utilities Board records. Companies moving into the international arena will find data more difficult to come by and slow to retrieve, and will realize that project selection usually has to be made using incomplete data sets. De'ath (1997) notes that in far too many countries access to data is difficult or extremely expensive, and believes it to be counterproductive to a country's desire for increased levels of exploration financial investment.

The development and implementation of an integrated risk assessment methodology at Petro-Canada Resources to evaluate petroleum projects was summarized by Cutten et al (1993). The main elements of the investment allocation process described are:

- a conceptual phase, in which a determination is made (in conjunction with senior management) of what is "in scope" for the analysis. Tools used in this phase include force-field diagrams, decision triangles, alternative tables, and influence diagrams;
- an analytical phase, to determine a base case and a range of possible outcomes. Elements of the analytical phase include hydrocarbon risk and volume assessment, production forecasting and cost estimating, and economic analysis. Tools used in this phase include tornado diagrams, and decision triangles;
- a communication phase, where the key results are communicated. These results include value creating measures (such as net present value (NPV) and discounted profitability index (DPI)), survival measures (such as payout and maximum capital exposure), competitive measures (such as supply costs and earnings measures), and technical measures (such as reserve additions and hydrocarbon chance factors); and
- a learning phase, whereby actual results are compared to expectations.

Alexander and Lohr (1998) provide a list of recommendations based on their 30 years of experience in using risk analysis.
Several classic texts exist on petroleum exploration risk analysis, such as Newendorp (1975), and Megill (1988), and classic papers by Capen that cover these risks in detail. Decision Tree and Monte Carlo analysis of key business and technical inputs are commonly used in the petroleum industry to determine project economics indicators. This applies to development projects (Ridley, 1999) as well as exploration.

Allardyce and Pottinger (1984) present a systematic review of technical and technological risks associated with the Arctic Pilot Project. This scheme to develop gas in the harsh environments of Canada's Northern Archipelago, involved pipeline construction in perma-frost, shipping out hydrocarbons year-round through the ice of the Northwest Passage, and shipping in large barge-mounted process and storage units. Their view was that in order for project management to effectively deal with such a large and technically complex project, a methodology that included all the major risks would be necessary. The technical complexity and diversity of the project resulted in a partnership proposal that allowed a number of technically competent and specialized firms to manage various dimensions and risks of the project. These partners included a pipeline company, a shipping company, and an upstream petroleum company. Although the economic criteria used to measure risk were fairly simplified (internal rate of return was the only measure used), the analysis systematically looked at uncertainties in capital costs, operating costs, timing, inflation, prices, and production rates to determine overall project attractiveness. Using a project breakdown structure, probability distributions were calculated for all pertinent input data. The inputs came from studies done during the first four years of the Arctic Pilot Project review. Using a project specific economic model and a Monte Carlo simulator package, a distribution of economic outputs was determined, allowing the risk of financial loss to be calculated on the combination of sub-projects using their respective risk studies as input. This systematic process of evaluating risks and value ranges is now common in the oil industry, as the
requisite software and hardware has become inexpensive and readily available. Petro-Canada now does this type of analysis routinely, selecting either Decision Tree (D-Tree, Merak) or Monte Carlo (@Risk, Palisade Corp) software for the analysis.

Decision-making and Portfolio Management

For making investment decisions, sophisticated numerical methods and statistical techniques are readily available to the petroleum investor. Galli et al (1999) provide a comparison of option pricing, decision trees, and Monte Carlo techniques for evaluating oil projects. Lencioni (1996) provides an example of using Monte Carlo techniques for assessing reserves uncertainty in Kazakhstan. Filho (1994) outlines how BrasPetro, the Brazilian state oil company, uses EMV distributions and an understanding of investor risk tolerance to maximize investor satisfaction, through the application of portfolio theory and utility theory. These theories allow that risks can be managed through project diversification, and that the size of the project relative to the investors wealth will impact how much risk the investor is willing to take on. These elements are quantified at BrasPetro, allowing a numerical assessment of the portfolio. Since investments with high expected returns and high potential also carry higher risks, portfolio theory can be used using to locate the efficient frontier that maximizes return for an investor who is not risk indifferent. Portfolio theory has been well summarized in the literature (Markowitz 1997, Quick and Buck 1983). Companies can fall into the trap of operating at an inappropriately conservative risk threshold—one defined on a business unit scale rather than on the scale of the corporation as a whole (Maureau, 1996).

Classic portfolio theory indicates that the reward provided by an opportunity would be equal to its EMV and the risk is equal to the standard deviation. Davidson and Murthy (1995) suggest that although this is a theoretically sound approach, it is of little use in an exploration and development setting. The suggested reason is the limits imposed by its level of abstraction, by real world
budget dynamics, and by the varied fuzziness of the data on opportunities. Instead, they recommend keeping the spirit of the classic theory, but use a different set of measures: risk measured using the ratio of expected NPV to the 80 per cent confidence interval of NPV, and reward defined as expected NPV divided by the present value of expected maximum exposure after tax.

Wasteneys (1997a) recommends those companies with large asset portfolios and ambitious budgets consider evaluating the following relevant criteria as part of a portfolio management system:

- growth potential based on geological province;
- market criteria;
- economic evaluations based on a variety of field sizes;
- creditability of host-country taxes in the company’s home country;
- pricing of petroleum, both for sale and for tax and royalty calculations;
- ability to repatriate profits;
- freedom from exchange controls;
- availability of transportation and export infrastructure for production from the contract area;
- existence and attractiveness of a host-country market for gas and gas derivatives;
- opportunities for private sector generation and sale of electrical power;
- currency risk; and
- political risk.

De’Ath (1997) lists these risks along with others, and cautions against too much effort in terms of quantification, suggesting instead that qualitative risk analysis is a better screening tool, with numerical efforts being limited, and focus put on key issues only. Mackay (1996) agrees, indicating that although it is known by industry that investment behaviours are too risk averse, and methods for formal quantification of risk aversion are reasonably well known, companies are generally unwilling to implement a formal process. This is because
Implementation of an effective process would require significant effort, and the outcomes would be weakened by accuracy of the inputs—including bias in risk analysis.

Schuyler (1997) undertook a survey of companies to determine the state of their evaluation processes, and found a number of weaknesses:

- custom evaluation models lacked a careful second-person check of the calculation model integrity;
- companies report limited or irregular use of project post-audits; and
- communications between senior management and evaluations staff was insufficient to provide a clear understanding of decision criteria, resulting in unnecessary work on doomed projects.

### 4.8 Organization

#### 4.8.1 Overview

The organizational challenges in an international exploration and development project are incremental to those of an equivalent domestic project, although many of the risks are common. The basic challenges are compounded as follows:

- integrating technically and operationally complex elements from a wide group of specialists (e.g. geologists, geophysicists, reservoir engineers, drilling personnel, production personnel, lawyers, EH&S specialists, and accountants) is compounded by the (typically) greater unfamiliarity with the region in which the project is being undertaken;
- involving partners and governments at appropriate levels of decision-making is compounded by the (typically) larger numbers of stakeholders, and the more active role that these stakeholders play in routine decision-making; and
- overcoming communication challenges between experts and stakeholders is often compounded by geographic, time zone, language, and cultural distances.
My organizational findings from the literature are usually not specific to the international project environment, but rather serve as a backdrop to the interview results of Chapter 5 that are specific to the international environment. As such, the reader can consider this section as fairly general information.

What are the organizational risks identified in the literature?
- sub-optimal use of human resources—people who are not fully engaged and/or working efficiently;
- poor decision-making—due to partial information, or to not considering all the relevant issues and stakeholder views and impacts; and
- improper alignment of behaviours and activities to corporate priorities and risk preferences.

To manage an international project, the organizational forms under consideration might include the following dimensions:

1. Functional:
   - a purely functional organization;
   - a multi-disciplinary project organization;
   - a blend of the above, such as a matrix organization.

   The issues being balanced here are the increased technical excellence of a functional organization versus the increased flexibility and focus of a multi-disciplinary project organization.

2. The degree of management control (Hackman, 1986):
   - management controlled;
   - self managed;
   - self-designing; or
   - self-governing.

   The issues being balanced here include greater employee engagement in projects versus more direct management control.

3. Leadership style within the project team
4. Location of project staff and decision makers:
   - in-country organizations;
   - full control in the host-country;
   - full control from head-office; or
   - a blend of the above.

The issues being balanced here include the lower cost and greater support network available at head office versus better integration with operational and political/partner issues in the host country.

4.8.2 Functional

The historical organizational standard for large American, Canadian, and North Sea exploration and production companies was a "functional" organization. This meant a separate management structure for each of the components in the petroleum value chain (e.g. operations, petroleum engineering, exploration, geological services, facilities engineering, environmental, health, and safety). This created an environment where each of the functional organizations made good functional decisions, but on a project basis it was difficult to make the optimal tradeoffs between the various functional considerations. For example, some excellent reservoir engineering work might be undertaken on a project, that if considered in the context of the entire project, was not a key driver of value, and would not be a key decision-making component. This could occur because each functional organization tends to focus on its functional issues, and accountability for the performance of the asset as a whole can be blurred. "Asset based" organizations, on the other hand, are focused more holistically on the asset and what is relevant at any given phase, and usually have clearer accountabilities. An asset manager, or the team itself, generally have clear accountability for the asset, have wide ranging authority across functional lines, and can therefore emphasize the appropriate work in any given situation.

Parums (1997) suggests that the rapid change away from "functional" exploration and production organizations towards "asset based" ones has helped deliver
enormous improvements in upstream profitability through delayering, cost transparency, team integration and alliancing with external providers. This is likely the means by which the better data integration cited by Pradas' (1996) was achieved, resulting in reduced costs and success rates.

Desmarests (1997) indicates that to remain competitive in increasingly difficult environments and with increasingly complex projects requires the ability to undertake rapid risk assessment and quick evaluations, and that this can only be done with small, reactive, multi-disciplinary teams. TOTAL's experience is that traditional hierarchical functional systems are not up to this challenge.

Davidson and Murthy (1995) also favour the use of multi-disciplinary teams as the fundamental organizational building block, supported by appropriate information system resources. Their feeling is also that flexibility and innovation are key to asset team success.

Parums (1997) characterizes an asset-based organization as follows:

- an asset is either a single pool or entity, or a grouping of entities that share some commonality like geographic area, facility, etc.;
- the asset organization is made as self-sufficient as reasonably possible to allow it to control the means needed to achieve success, including (typically) operations, geological, geophysical, and engineering functions, amongst others;
- the asset organization is then measured against the success of the asset performance, given that it now has adequate control to deliver the success the corporation is looking for;
- the resulting organization is then generally results-focused, rather than rules-focused, and the tendency will be to neglect centralized policies, procedures, and management systems;
- typically centralized support systems will tend to be integrated into the asset-based structures, and those that remain will often have to compete with
external service providers, as the internally centralized groups may (at least initially) have difficulty providing cost-effective services with appropriate customer service orientation;

- as the various asset teams focus on their individual projects, each of which has a different scope and set of problems, their performance orientation will cause them to drop processes that are not felt to contribute to asset performance; and

- there is the potential for diverging priorities between individual asset organizations and the company as a whole in areas such as public relations and environmental performance. The asset organization's desire to meet its performance goals creates the risk of consequences far beyond the area of activity, and impacts the corporation as a whole.

Parums summarized the differences between functional and asset-based management systems as follows:

<table>
<thead>
<tr>
<th>Table 4.8.2: Differences Between Asset Based and Functional Management Systems</th>
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<tbody>
<tr>
<td><strong>Functional</strong></td>
</tr>
<tr>
<td>More standardization</td>
</tr>
<tr>
<td>Central policies and systems</td>
</tr>
<tr>
<td>Expertise centralized</td>
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<td>Process oriented</td>
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Parums' recommendations regarding the move to asset-based structures are:

- centralized groups should retain a service rather than policing function;

- find ways of managing corporate-wide risks, such as environmental management, by including them in the performance measures of the asset organization; and

- avoid risks such as finance-based management leading to short term thinking, sub-optimizing reputation issues, erosion of leading edge skills and awareness, and loosening of checks and balances.
Cutten et al (1993) also discuss the challenge of keeping professionals current in their disciplines when moving to a multi-disciplinary team structure from a functional environment, as information flow tends to become business unit rather than functionally based.

Wellins et al (1991) recommend a service orientation for any remaining centralized groups, as opposed to a policing function. In self-directed teams with no formal leader, it is suggested that the team appoint a key contact person to manage each interface with a support group or supplier that is not formally represented on the team.

*My own observation is that asset-based teams provide a tremendous advantage in terms of effectiveness because a multi-disciplinary approach is required to determine what the key drivers are for a given project, and as a consequence people know where to focus their efforts. The increased communication between disciplines often allows problems to be solved before they arise, or to be solved quickly.*

### 4.8.3 Degree of Management Control

A variety of organizational models exists along the continuum between management control and employee influence. Hackman (1976) differentiates these organizational models as follows:

1. Manager-led teams (which are the traditional organizational structure in exploration and production).
2. Self-managed teams having discretion over work methods, task allocation and scheduling, group performance tracking and feedback.
3. Self-designing (or leading) teams having the additional responsibility of determining the scope of their work, and challenging the methods by which work will be done.
4. Self-governing units that establish their own objectives, direction, methods
etc. These are most commonly found in corporate boards of directors, worker cooperatives, and sole proprietorships.

Participative teams (such as quality circles) would fall somewhere between manager-led teams and self-managed teams on this control continuum—employees are encouraged to provide suggestions, and management makes the decisions. The notion of “suggestion involvement” (Eccles, 1993) is pervasive in many Japanese firms—Hitachi averages one formal suggestion per employee per week, and the vast majority of these suggestions are decided either by the first level supervisor, the employees team, or the individual employees may take the action themselves.

The classic characteristics of a self-directed team (Kezsbom, 1993) (Brunner, 1993) are:

- they are empowered to share various management and leadership duties;
- they plan, control, and improve their own work processes;
- they often create their own schedules and review their performance as a group;
- they set their own goals and review their own work;
- they are involved in budget preparation and coordinate work with other departments;
- they usually order materials, keep inventories, and deal with suppliers; and
- they frequently are responsible for acquiring any new training they might need.

A good test of the degree of empowerment is how much employees can decide what they do rather than just how they do it, and what happens when employees want to do things with which management disagrees (Eccles, 1993).

Manz (1992) believes that the pressures of international competition will force companies to use their human resources in the most efficient way possible to
meet the frustrated needs of their changing work force, and to have adaptable organizations to meet rapidly changing environments. Manz believes that properly implemented self-leading teams can answer all of these challenges and cites Hackman and Oldham's work (1975) as showing that self-managing work team members tend to experience enriched jobs and an increased focus on the success of the group as a whole.

Eccles (1993) states that the drive to more empowered teams needs to be based on corporate self-interest rather than heroic motives, and that there may be varying degrees of empowerment suitable to different levels in the organization. More empowered employees require a correspondingly higher level of information, business, and team skills. Eccles suggests that operational staff may be most suited for "suggestion involvement," technical and supervisory staff most suited to "self management"—deciding how their own jobs should be done and senior management is best suited for "self leadership"—deciding what jobs should be done. Eccles also suggests that high involvement teams are not an unmitigated success for a variety of reasons. As an extreme example, although employees may feel flattered at being asked to advise the chief executive officer about the firm's strategy, it is unrealistic to expect them to have the knowledge or the interest to get too deeply involved in these wider corporate issues. Employees tend to be more interested in what affects them directly, not what is going on in other departments.

Manz (1992) cites Walton's (1985) clarification of two types of organizational management strategies, differentiated as follows:

- control approach:
  - rules and procedures;
  - hierarchy and clearly differentiated status;
  - fixed job definitions
  - set minimum standards; and
  - little delegation of authority or information to lower levels in the
organization.

- commitment approach:
  - shared values and goals;
  - flexible job definitions;
  - dynamic standards;
  - minimum status differentials; and
  - flat organization with minimum status differentials.

In either approach, peer pressure, professional values, and social values provide an additional framework that exerts a degree of control over behaviour.

### 4.8.4 Recommendations for Success

Greater worker involvement in decision-making is believed by Manz (1992) to have the subtle but powerful effect that workers reap the intrinsic rewards built into the task as a result of increased ownership, purpose, and control, rather than relying on externally administered rewards. Vroom and Yetton (1973) showed that greater employee influence in setting goals and objectives resulted in greater acceptance of the ultimate goals and the standards necessary to complete the work. Other authors (Wellins, Byham, and Wilson, 1991) have summarized similar conclusions of previous work, including findings of:

- higher productivity and job satisfaction amongst coal miners given greater control of their jobs;
- reductions in production costs of 25 per cent in a car assembly plant when going to a team approach; and
- that plants designed with socio-technical methods and self-directed work teams are on average 30-50 per cent more productive than their conventional counterparts.

The authors do, however, caution that the move to more empowered teams usually goes hand-in-hand with changes to work flow, increased training, new production or quality processes, etc., so it can be difficult to attribute these productivity improvements to empowered teams alone. The belief of the authors is that employee empowerment and the energy that comes with feelings of
ownership are necessary prerequisites for continuous improvement.

Kezsbom (1993) believes the key to success is taking advantage of the following principles:
- those closest to the work know best how to plan and improve their jobs;
- most employees want to own their jobs and make valuable contributions to the effectiveness of the organization; and
- teams provide possibilities for empowerment not available to individual employees.

Manz (1992) provides an excellent summary of contingency factors affecting the degree of success of more self-managing teams:
- a highly participative system will have more difficulty taking hold if enough workers have a low need for autonomy;
- workers must possess sufficient cognitive conceptual skill to effectively participate in broader decisions; and
- under autonomous conditions, workers must be more self-motivated;
- creative, ambiguous, and varied/custom work or work in dynamic environments is more suited to self-management than is routine work.

Thamhain (1993) undertook a field study of 74 self-directed project teams, and identified a number of barriers to their success:
- not valuing diversity of team members and devaluing unfamiliar perspectives (his emphasis was cross-functional, but couldn’t it just as easily apply cross culturally?);
- in matrix organizations, the role conflict from serving multiple leaders;
- power struggles when different authority levels are represented on a team (managers on a team may presume to have greater authority than regular staff); and
- group think, manifested by intolerance of both internal and external challenges to the team's direction and activities, with the result of stifling
creativity.

Thamhain found the following key requirements for effective team management almost unanimous in his survey:

- clarity of assignment, not only initially, but also through the engagement of new team members in a key task that will create visibility and responsibility;
- assistance in problem solving, both from within the team, and outside the team;
- creation of a proper team environment that inspires trust and promotes professional integrity, as well as recognition of individual skills and achievements; and
- skilled project leadership, that creates an environment of high concern for people and the work, fosters personal motivation and enthusiasm for the project, and creates open and effective communication channels.

Additional elements that aided success were:

- clear organization: with the more organic nature of a self-directed team, responsibilities, accountabilities, and interfaces need to be spelled out; and
- senior management support and leadership.

Thamhain found that the conditions conducive to multi-functional cooperation, involvement, information sharing, and professional stimulation also lead to:

- high ability to cope with changes;
- reduced cycle times;
- quality work;
- effective resource utilization; and
- high levels of innovative team performance.

While empowering teams creates the environment for greater flexibility and innovation, there is an associated issue with ensuring adequate organizational controls. Inadequate management controls can also result in significant corporate losses. Simons (1995) summarizes a number of recent examples.

- Standard Chartered Bank—banned from trading due to improper share support scheme;
Kidder Peabody & Co—$350 million loss;
Sears Roebuck and Company—$60 million loss; and
the recent demise of Barings Bank due to inadequate controls on its traders.
Simons suggests that the key in an empowered company is to replace some of
the traditional diagnostic controls (surveillance, lots of progress reports, etc.) with
three new levers:
- instilling a belief system (to inspire and promote commitment to an
  organization's core values);
- boundary systems (that spell out what is not allowed, rather than stifling
  innovation by spelling out how things should be done); and
- interactive control systems (regular face-to-face meetings with subordinates
  to discuss issues that management feels are most important to success).

Simons provides the following additional advice:
- strict controls are still desired when standardization is critical for efficiency
  and yield (e.g. assembly line) or when there is significant financial risk (e.g.
  casino), or when quality and safety cannot be compromised (e.g. nuclear
  power plant);
- people generally want to do the right thing, but the resulting over-enthusiasm
  for meeting targets might tempt them to breach a corporate core value.
  Boundaries are especially important where the firm's good reputation is an
  important competitive asset; and
- in small companies, informal contact between senior management and
  employees (such as traveling or taking meals together) often inadvertently
  results in ensuring that belief systems, boundary systems, and interactive
  control systems are effective.

The literature also suggests that the typical size for a self-directed team is
between six and twelve people, with the ideal size in the lower end of that range
Brunner (1993) suggests that networked computer systems, collaborative work flow, and mutually accessible distributed databases make it possible to work in team-based organizations in situations where it would have been too difficult previously. Brunner’s ideal for an enterprise is that it be self-managed, process-oriented, and piloted by principle-centred leadership.

4.8.5 Examples

Harding (1996) highlights the importance of having a high degree of understanding of the entire asset in order to successfully plan future investments, as so many factors can influence the life cycle value of the investment. Multi-disciplinary teams are uniquely suited to this type of evaluation, as key information comes from a wide range of disciplines. Also, a wide range of skills is necessary to plot and execute the optimal course, and these skills need to be coordinated with a high degree of communication. Often the complexity of the problem is daunting, and critical factors can be ignored or set aside because of lack of information, and a lack of appreciation of criticality. The level of uncertainty around reservoir and asset performance throughout the planning stage is typical of international petroleum investments, and needs to be addressed within the plan. Interdisciplinary communication is thus key to ensuring that uncertainty in the geological and geophysical inputs to the development are reflected in (for example) the sizing of production facilities. Harding suggests the following considerations when optimizing the life cycle value of a petroleum development:

- reservoir definition and behaviour;
- operability;
- flexibility;
- opportunities for future business;
- manning philosophy;
- maintenance regime;
- equipment selection;
- capital versus operating cost trade offs;
• projected oil price;
• de-commissioning provisions;
• extending productive life;
• environmental safeguards; and
• political stability.

To enshrine all these kinds of considerations with the life cycle value decision, Harding recommends that the following key features (amongst others) be embodied within the decision process:
• collaboration as part of team building;
• support for open communication;
• decision processes accessible to, and understood by, team members as well as users;
• making use of all skills and disciplines;
• using probabilistic, rather than deterministic, methods;
• acceptance of input from many sources;
• measurement of outcomes;
• avoidance of a need for detail;
• providing a focus on what the major uncertainties are; and
• avoidance of hasty conclusions.

Harding relates the following story of successful implementation of asset planning:

The asset team planned to achieve a discovery to production time not previously seen in the North Sea for an asset of this size, and a life cycle cost well below the industry norm. This demanded considerable attention to the decision-making on the total life of the field. Clearly, in the time available detailed analysis could not take place. The answer was a process similar to what is described above, with regular updates by the team.

This case study is more relevant to the theme of this paper than any other
because it clearly demonstrates the potential benefits of life cycle decision-making in terms of shorter times to market, and to lower life cycle investment costs to the corporation. There are many lessons to be learnt from the experience, some of which are summarized below.

A feature was the high level of uncertainty that had to be managed, and the asset team was clearly focused on their role in managing the risks and uncertainty. There was also a recognition that, whilst all effort was directed towards meeting the original targets, this might not be possible, and was not regarded as a failure. Management of the risks became of much greater significance to protect the value identified, and to maximize it. Nevertheless, the success lay in setting original targets, which would ensure that, whatever the outcome, the team would achieve a life cycle value well beyond what might have been expected by traditional methods.

Harding cites the following key lessons (amongst others) from the case study:

- early introduction of the process was necessary;
- the most value is created when all the disciplines are represented, and everyone is committed to the process;
- top management support and championship is essential; and
- rising above detail to deal with the big issues can be difficult for some individuals, but is necessary for success.

These lessons are similar to the experience of Petro-Canada's Algeria Asset Team (Chapter 3 and Appendix A). One additional observation from the Tinrhert project is that a company employing less traditional organizational models may find themselves doing a lot of explaining to partners about how decisions are being made. SONATRACH had a large functional and hierarchically managed organization during a time when Petro-Canada was experimenting with self-directed cross-functional teams.

Wade (1998) presents a case study of a Phillips asset team (the E-Team),
tracing a six year period in which a transition was made from a functional reporting structure, through a pilot team, to full implementation of the asset team concept. The change was a notable success, in that production volumes were increased, operating costs reduced, and growth strategies developed. Wade believes that the increase in performance was due to a misalignment of effort within the functionally built organization. In other words, although each functional discipline was optimizing its own efforts, it lacked a comprehensive perspective of the business the asset team was managing, and discouraged the crossing of functional lines. The collective responsibility for the performance of the asset, encouraged by the multi-disciplinary approach, created "an explosion of communication and creative thinking" on the part of the asset team, as well as an acute sense of ownership. The key recommendations arising from the E-Team's experience are that:

- timely, objective, and accurate performance monitoring was necessary. Developing these performance measures forced a team review of the key success factors, and the frequency with which they needed to be monitored. The process aligned the objectives with the activities of the team, even down to the field level. The E-Team actually developed its own project tracking system;
- allowing the asset team to develop its own business plan resulted in a dramatic shift in the way the team viewed its fields and its role in developing them. Planning improved when the team changed to an asset management system;
- the most important step for the team was to take full responsibility for each project;
- the team was dependent on each member's skills and expertise;
- do not assume that every team member has bought into the team concept;
- limit team membership to those who are 100 per cent dedicated to the asset (five or six members will function efficiently when compared with a team of 10 or 20 members);
- develop a team charter; and
- elect a leader/spokesman on a rotational basis, who can serve as an interface with management as well as serve as a facilitator.

4.8.6 Leadership Style within the Project Team

With the multi-disciplinary asset team concept having been so successful recently, the logical next question is what type of leadership and control structures are appropriate for these teams? The most obvious options are to have an "asset manager" or to have a "self-directed asset team." The single point accountability and responsibilities of an asset manager are probably self-evident to most readers, however an explanation of self-directed teams probably warrants some additional clarification. Within a self-directed asset team, individual members continue in their normal functional roles, but take on (collectively) the additional management responsibilities of planning, scheduling, project decision-making across functional boundaries, goal setting, budget preparation, conflict resolution, and in some cases staffing (Kezsborn, 1993). Petro-Canada's Algeria Asset Team followed self-directed type of organizational structure for a number of years. This style of organization has been used in a variety of industries, including aircraft manufacturing (Ayas, 1996).

Williams (1997e) suggests that as projects get larger and require a number of asset sub-teams, the concept of a purely self-directed team runs into difficulty, particularly from a risk management perspective. He concludes that in such circumstances:

- empowerment and risk management begin to compete with each other, and that attempting to implement both philosophies leaves the project risk manager with dissonance;
- project risk management frameworks should inform project sub-teams about likely cross-impacts of planned actions (a communications process is needed); and
- to manage actions that cross impact sub-teams, management should adopt
an "accommodation" style of management that uses reflection and adaptation.

Eccles (1993) suggests that even in empowered teams there is a management responsibility to deal with boundary issues, service level dilemmas, allocation of resources, leadership, judgment, rule making, and corporate governance.

Manz (1992) elaborated on the concept of the self-designing unit, calling it a self-leading team. In such a team, members have greater influence in strategic processes and higher-level management decision-making (the decisions about what the team should be doing), as well as a continuous improvement mind-set that goes beyond adhering to existing standards like a self-managed team. Manz believes that the two key determinants of whether a team is self-leading are whether the group has a leader, and if so, the influence of the team in the selection of the leader, and the direct influence exerted by the team in determining its purpose.

Wellins et al (1991) found that of the self-directed teams with formal leaders, 49 per cent had permanent leaders, and 51 per cent were rotated. Of the rotational leaders, most were elected, and had tenures ranging from 3 to 12 months. It was noted that not all employees had the interest or the skills to function as team leaders.

Hameri (1997) suggests that the role, main tasks, and other activities of project management change between the conceptual and the execution phases of the project. In the execution phase, Hameri suggests using a more democratic approach to foster a constructive and creative atmosphere across organizations and between geographically distributed team members. A more goal-directed approach with stricter management controls is suggested during the execution phase.
Thamhain's survey (1993) found that the managerial style of project leaders and their superiors was the strongest single factor in team performance.

In terms of the role of the project manager, Kezsbom (1993) argues that management style is more pivotal than ever, although the nature of the role is changing. Given the complexity of the oil industry, particularly one burdened with the additional intricacies of a foreign environment, no one person can have the knowledge, skills, or time to implement a project optimally without some kind of team approach. Kezsbom describes the changing paradigms of project management as follows:

Table 4.8.6a: Evolution of Project Management Paradigms

<table>
<thead>
<tr>
<th>Past Project Management Paradigm</th>
<th>Revised Project Management Paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td>The project manager was a technical expert</td>
<td>Employees are experts possessing unique technical skills and knowledge</td>
</tr>
<tr>
<td>The project manager should make all final decisions</td>
<td>Controls are minimized or set collectively</td>
</tr>
<tr>
<td>The project manager defines what and how it will be done</td>
<td>Employees participate in defining how work should be done</td>
</tr>
<tr>
<td>The organization is structured hierarchically</td>
<td>Employees participate in setting and interpreting group goals</td>
</tr>
<tr>
<td>Teams are formed when needed</td>
<td>Organization structures are flatter</td>
</tr>
<tr>
<td>The focus is on specialization</td>
<td>The organization is customer driven</td>
</tr>
<tr>
<td>The work force is homogenous</td>
<td>The work force is diverse</td>
</tr>
<tr>
<td>Change is normal</td>
<td></td>
</tr>
</tbody>
</table>

The associated change in prototypical project manager is as follows:
<table>
<thead>
<tr>
<th>Project Manager of the 1980s</th>
<th>Project Manager of the 1990s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better educated</td>
<td>Facilitator</td>
</tr>
<tr>
<td>More open, friendly, people oriented</td>
<td>Skilled at helping groups solve problems</td>
</tr>
<tr>
<td>Better listeners</td>
<td>Encourage participation in decisions and plans</td>
</tr>
<tr>
<td>Quality conscious</td>
<td>Understand how to coach, motivate, and inspire</td>
</tr>
<tr>
<td>Receptive to ideas of others</td>
<td>Know how to get people to focus</td>
</tr>
<tr>
<td>More participative</td>
<td>No longer the “expert”</td>
</tr>
<tr>
<td>More involved in two-way communication</td>
<td>Work to get resources for the team, a “Boundary Spanner”</td>
</tr>
<tr>
<td>More caring, empathetic</td>
<td></td>
</tr>
<tr>
<td>Allow more independence</td>
<td></td>
</tr>
<tr>
<td>Encourage cross functional communication</td>
<td></td>
</tr>
</tbody>
</table>

### 4.8.7 Location/Centralization

Edwards (1997) interviewed Bruce Laurie of British Gas Procurement Services to discuss the central-local balance of power. This is emphasized in international ventures, since not only can departments be split along organization lines, but splits can also be exaggerated along geographical lines, with departments located continents, and many time zones, apart. In procurement, the balance between centralized control of a function/service versus localized control in self-sustaining business units is struck by evaluating the following factors:

- cost advantages of large-scale purchasing by a centralized function;
- responsiveness of purchases made locally; and
- meeting the needs of in-country purchasing requirements and politics.

Laurie’s suggestion is to use standard policies throughout the world, but use local procedures that are sensitive to the market realities in the country in which you are working.

Hameri (1997) reviewed project management strategies for technologically complex long-term global one-of-a-kind projects. He suggests that exploitation of
modern communication technologies provide global projects with the means to tackle collaboration barriers stemming from geographically distant partners, but that regular face-to-face meetings are still needed regardless of the organizational structure. This conclusion is also supported by research being undertaken at the University of Calgary (Hartman, 2000b).

Schneider (1998) suggests that for many international operations, a combination of air freight and fast clearance through customs has a total cost far below the alternative of keeping large inventories in-country, particularly given the common problem of asserting ownership over goods if trying to re-export surplus materials. The value of surplus goods is often only 10 per cent of the initial purchase price. The culture within purchasing departments is often to "look for a good deal," but since international operations are so often time constrained, the loss of flexibility and the more difficult delivery times associated with "deals" often have a substantially higher total cost to the project.

4.8.8 Other Organizational Considerations

Desmarest (1997) indicates that profound changes have taken place to working methods in the exploration and production industry in the past 10 years, including the relationship between operating companies and service companies. This change has extended to the creation of long-term service relationships between oil companies and suppliers, but the additional association between oil industry professionals and service companies has created a competence on the part of these associations that can rival that of oil companies. Desmarest cites India and Russia as examples where governments consider turning to these "associations" rather than oil companies for the development of oil projects. A number of papers have been written describing the alliancing experience in the petroleum industry (Farrell, 1995, 1996). It appears that cost savings are achievable if alliances are used for the right projects.

4.8.9 Making Changes

Eccles (1993) highlights a number of barriers to organizational change towards a
more empowered environment. Changing the power structures of organizations creates uncertainty and fear. Typical attitudes might be:

- senior management still needs to be persuaded;
- middle management is wary and skeptical;
- team leaders are enthused (could this be their way up the corporate ladder?); and
- employees are prepared to take part, but are not transformed in their perspective.

The attitudes are different from the top to the bottom of the organization. Eccles suggests a staged approach to greater employee empowerment (i.e. walk before you run), with some logical stages being:

- start with a suggestion system;
- introduce a continuous improvement mind-set; and
- let senior management adopt greater empowerment from the top down—have the CEO empower senior management, then when they're comfortable with the system, move it to the middle management and team leader level, and finally to employees.

A staged approach has the benefit of minimizing false starts and being smaller in scale, and the process may highlight the notion that different degrees of empowerment are appropriate at different levels in the organization.

To implement process change within an organization, Goldthorpe (1994) suggests following the classical Shewhart cycle of plan-do-check-act. The principles of project management need to be applied to ensure effective overseeing of the goals, resources, costs, and schedules. Goldthorpe also states that a 1987 project undertaken by the Software Engineering Institute at Carnegie Mellon University (for the U.S. Air Force to guide the selection of software development contractors) led to a model of process management that has gained wide acceptance in the software industry, and that has particular suitability for the exploration and development processes. This is because exploration and development processes are iterative, with work being repeated at
each phase of the value chain as more data becomes available (geological interpretations, for example). Each stage of this iterative process lends itself to the following six process steps:

- customer communication (to establish deliverables and open lines of communication);
- risk assessment (to identify and assess risks and feasibility);
- planning;
- execution/implementation;
- internal Review; and
- customer evaluation.

Wellins (1991) suggests the following requirements for effective team development:

- commitment to the team;
- trust amongst team members;
- a clearly understood purpose;
- frequent and clear communication, and mechanisms understood by all;
- valuing and soliciting involvement; and
- the demonstration of a process orientation through the use of problem-solving tools, regular meetings with agendas and minutes, and clearly defined conflict resolution mechanisms.

Although derived independently, these points are in clear evidence amongst Petro-Canada’s Algeria Team Norms (Appendix D)

4.9 Environmental Risk

Barrymore (1996) states that hydrocarbons may have uniquely hazardous characteristics that expand the number of stakeholders in control of the exploration and development process to include both the government and the wider community. Barrymore points out that the level of public concern can be high enough that public policy and statutes invalidate contracts entered into by oil companies, even in a country with a legal history rooted in common law and
equity. Additionally, there has been a trend of converging environmental regulations throughout the world.

Within the western world, environmental, health, and safety issues are a legitimate component of the corporate business decision-making framework (Wallace, 1996). Wallace suggests that in some international arenas, such as the Former Soviet Union, the standard western decision-making model will be found lacking, as some of the basic information is hidden, the rule of law is not established, and the rules of the game are ever changing.

Armstrong (1996) states that international petroleum exploration and production companies are encountering increasing demands for higher environmental performance. In many countries, environmental regulations are found at international, national, regional, and local levels. International laws tend to be “soft,” and consist of understandings reached at international conferences, as well as guidelines issued by industry associations. International treaties and conventions can at times impose legally binding obligations on governments. Major multilateral development institutions such as the World Bank can impose environmental standards on borrowing countries.

Megill, in his popular book Exploration Economics (1988), indicates that one of the key cost components subject to change (and therefore risk) is environmental regulation. In the United States, for example, Megill cites that the most significant negative change in the investment climate is due to pervasive environmental regulation, particularly at the Federal level. Most countries in the world have much less stringent environmental rules, and there should be an awareness on the part of investors that these types of rules have typically changed in the past. In the United States, the petroleum industry was basically unregulated until the 1930s when the discovery of significant reserves required regulations to prevent the waste of petroleum. Wasteneys (1997b) recommends assuming that environmental safeguards in any part of the world will soon come
up to North American and Western European standards, and conducting operations accordingly. During a typical field life of 20 years, it would not be hard to imagine a tightening of environmental rules between the initial development of the field and the ultimate abandonment, at which time a clean up would normally be necessary.

Wasteneys also believes that the long-term success of a project can depend on the environmental safeguards applied, including as how well they are documented. To save millions of dollars in potential claims, he suggests conducting a thorough and well-documented environmental baseline study—in conjunction with the government, if possible—prior to launching field operations, and following this with a similar review at the end of operations.

Abbott (1996) provides an example of how working in an environmentally and culturally sensitive area in a foreign country can provide adverse publicity for even the most environmentally responsible operators, and suggests:
- gathering information on these issues prior to committing to investments;
- adhering to internal policies and international standards when host-country environmental rules are underdeveloped;
- developing a communications plan for the proposed host-country activities;
- not shying away from public forums held in the proper locations to get a sense of the local issues; and
- applying judgments based on ethical principles, and including local groups in the decisions that affect them the most.

Walde and Kolo (1998) summarize the use of environmental rules as a pretense for expropriating investments. The conclusion of the authors is that there are instances of governments and NGOs being accused of using environmental rules as a disguise for protectionism, and cites the cases of three American companies active in Canada and Mexico—Ethyl, Metalclad, and Myers. Although there can be economic loss to investors due to rule changes, Walde and Kolo suggest that
the application of such environmental regulations:

- need to be supported by new scientific evidence if made soon after contracts are signed;
- need to be non-discriminatory;
- need to be the most reasonable measures to achieve the stated environmental goal; and
- should not contradict pledges made by the government to investors.

Parums (1997) suggests that there is an inherent risk in "Asset based" organizations of short-cuts to implementing the company's environmental principles. However, based on BP Exploration's recent experience these hurdles can be overcome. He also found that enhanced environmental performance can actually be achieved—largely through liberating the talents and energies of the work force.

4.10 Understanding the Host-Country Landscape

Wasteneys (1997b) provides an excellent summary on how to become more knowledgeable about the country in which you are about to do business. His recommendations include:

- contacting a host-country law firm to get legal and regulatory advice, and introductions to key players in the host-country industry;
- visiting the host-country branch office of your customary accounting firm for financial and tax information. Key issues may include revenue repatriation, double taxation, and tax advantages of using host-country companies;
- making contact with the petroleum ministry and/or national oil company as appropriate:
  - as a courtesy;
  - to meet people and allow people to meet you;
  - to introduce your company;
  - to determine what opportunities and opportunity types are available, and to make your interest known;
to determine the process for securing acreage; and
⇒ to obtain a model contract(s).

• meeting those individuals responsible for the regulatory environment, if different from the petroleum ministry and/or national oil company;

• talking to the environment ministry about current and proposed legislation

• meeting the commercial officer of your embassy for general information and advice, as well as to learn what assistance is available, and to inform the embassy of your activities;

• visiting the host-country representatives of oil field service companies, as they have an intimate knowledge of operating in-country;

• retaining a reputable international security consultant if there are serious in-country security issues; and

• using the host-country expatriate community to determine the host-country standards for housing, schooling, etc., as the happiness of your expatriate staff is an important element of success.

4.11 Petroleum Agreements and Due Diligence

Bretzloff and Todesco (1998) have created a superb due diligence checklist, as well as a summary of typical petroleum agreements entered into between the NOC/government and oil company. Some of their insights are offered in a condensed form below. I recommend the full paper to all practitioners in the field.

There are three types of contractual structures:

• production sharing agreements (PSC or PSA);

• concession or license agreements; and

• risk or risk service agreements.

The current reality is that most agreements today are a blend of these three, and the distinctions are now largely academic.

The key relevant features of diligence can be broken down into three main
components: contractual due diligence, structural due diligence, and legal due diligence (both in the host-country as well as in other countries). An abbreviated version of their due diligence list is presented as follows:

**Contractual Due Diligence**

1. Does the party with whom you are negotiating have the right to grant you all the terms under discussion, or are some of these under the authority of another ministry or agency?

2. To what hydrocarbons does the agreement grant rights? Does a production permit retain rights for other geological horizons in the same vertical plane?

3. What are the permit periods, and how are they affected by ongoing operational activities or outstanding approvals?

4. What is the interplay between the minimum commitment in work and dollar terms? What happens if one is met, and the other isn’t? Can the commitments be moved around? Can the government oblige a company to do more than the minimum? If minimum depths are specified, are there geological or operational considerations that would mitigate the depth commitment?

5. If ownership of property and equipment transfers to the NOC/government as part of the agreement, is the oil company assured of its free and full use through the term of the agreement? What happens to leased equipment?

6. By what means is the oil company assured of accessing hard currency for any production? Are there any timing issues associated with the transaction? What is the method for valuing the production (price and valuation point)? What is the point of custody transfer? Consider including a sample calculation of the money flow in the agreement. This can clear up a number of misunderstandings.

7. If there is a commerciality test for proposed developments, what are the terms of the test? If there is an element of subjectivity, which party makes the election?

8. How are contracts awarded? To what degree might they favour host-country
contractors? Are any of these contractors not arms length? Is bidding needed even for small value contracts?

9. How is production regulated? What is the vulnerability to OPEC quotas?

10. What are the state/NOC back-in rights? What are the timeframes for the decision? How does this affect voting rights? What is the recourse if the state/NOC is a truant partner?

11. What is the mechanism for resolving disputes? How is this mechanism triggered?

12. What is the ring fencing used in the agreement?

**Structural Due Diligence**

Structural due diligence relates to agreements entered into other than the primary PSC, for example joint operating agreements (JOAs), farmout agreements, lifting procedures, accounting procedures, etc. The following commonly overlooked issues identified by Bretzloff and Todesco include:

- each party’s right to cost recovery, if funding is disproportionate;
- financial limits on farm-in commitments;
- and misalignment of tax interests between partners, for example if the parties are in different jurisdictions.

**Legal Due Diligence**

If the petroleum agreement (or PSC) does not have the force of law, laws outside of the petroleum agreement can regulate the operator’s activities. This brings a number of additional challenges with it, such as the legal capacity of the party you are negotiating with to discharge their obligations under the agreement (or PSC). Other questions include environmental issues, transportation, boundary disputes, host-country labour laws, and customs legislation.

Foreign country due diligence relates to looking at the laws of other countries that have legislation (boycotts, etc.) designed to restrict activity in the host country.
4.12 Applying Project Risk Management, and Risk Management Tools

The following four paragraphs summarize some of Chapman and Ward's (1997) work on the application of project risk management.

Project risk management is a universally applied activity based on common sense, relevant knowledge, experience, and instinct, and is usually applied in an unstructured fashion. A body of knowledge has been developed in recent years to facilitate a more structured approach to managing project risks. Many of the currently used risk management concepts were developed for large energy projects, and the risks being managed were related to technical issues. Project Risk Management was then used to evaluate the risks of a number of other significant projects outside the energy sector in the 1980s, allowing the understanding of which elements of risk management were portable, and which weren't.

The risk management process should be integral to project management, in the same way as planning resources, building teams, and quality management. Thus, the basic rules that apply to project management apply to the risk management process as well.

In terms of applying risk management techniques, a balance is needed between the application of proactive and reactive techniques, with pro-active contingency planning supporting reactive crisis management. The balance between the two is determined by cost-effectiveness. One example of this is when a key individual is being fully utilized in a key project phase—this often means that during this phase peoples' time is worth many times their salary, and removal of this individual for a risk management exercise may not be the most effective use of their time.

Managing risk is also important from the perspective of managing a project team.
If, for example, a project team becomes immersed in nothing but threats, the ensuing doom and gloom can destroy the project.

A more specific set of risks to be evaluated for the petroleum industry are summarized by De'ath (1997), which he entitles the "wheel of fortune" (Figure 4.12). This is both an excellent checklist and a starting point for a project manager or team to evaluate the attractiveness of a project, and to understand and compile a listing of the inherent risks, perhaps as part of a risk register.
Figure 4.12  Wheel of fortune, to compute opportunity signature, allows qualitative approach to risk perception.
Krantz and Turner (1997) summarize the introduction of a formal risk management process into a large international energy service provider (Brown and Root Energy Services). The six principles underlying their approach to risk management were:

- risk management builds on existing sound practice (don't add new bureaucracy—build on what is there);
- procedures must neither be over-prescriptive nor too loose;
- risk processes must only be mandated selectively as appropriate (only use it where risk to the business warrants it);
- senior management buy-in is essential;
- ownership of the process and its application should be separated; and
- pilot applications will encourage buy-in and provide models for training and reference.

Seven steps were used to introduce risk management practices into Brown and Root Energy Services:

- establishing objectives and needs (Brown and Root Energy Services' goal was to apply a more structured thinking to managing uncertainty in capital investment and projects). Missed opportunities were felt to be as much of a threat as conventional risks;
- reviewing existing management environment and arrangements. (e.g. are logical decision points already built into the project review and approval process?);
- modifying culture and/or organization where necessary;
- developing a risk management process and procedures (Brown and Root Energy Services developed a business uncertainty register);
- selecting techniques, tools, and practitioners;
- conducting pilot applications; and
- training all levels of staff.

Energy service providers can be differentiated from oil operating companies in that they typically do not have an equity stake in the project. Their goals for a
project are thus more short-term focused, and they do not participate in the exploration phase of projects, which typically hold the greatest part of the technical risk. Brown and Root Energy Services' interest in risk management was heightened by their decision to participate as an equity partner alongside oil companies in a number of ventures.

Krantz and Turner's one overriding message for implementation of risk management processes is as follows:

Only by following through from analysis to management action can the benefits of risk analysis be achieved. Faithful adherence to a sound risk and rewards review, analysis, and reporting process delivers reliable information. The effective translation of that information into actions whose effects can be monitored, and for which there are personal accountabilities, is where the analytical process becomes a management process. This translation poses the greatest challenge to organizations wishing to introduce structured project risk management.

Williams (1994) summarizes the main elements of a project risk register, a centralized written summary of the risks associated with a given project, along with the following details:

- a description of the risk;
- its likelihood of occurrence;
- who is impacted by the risk?
- who is responsible for managing the risk?
- what is the potential impact of the risk?
- what actions are needed to reduce the risk?
- what actions are needed to mitigate the impact of the risk? and
- to what degree can the risk be transferred to another party (contractually)?

The purpose of the risk register is to assemble a body of knowledge that can be shared by project participants, as well as to formalize the necessary action required to reduce or mitigate risk. Krantz and Turner's (1997) risk register
included the following additions:

- the date of the information in the register;
- the potential for influence of the risk; and
- the related assumptions behind the risk.

Krantz and Turner also used a "Business Uncertainty Matrix"—a plot of the likelihood of the risk occurring versus the severity of the impact—a common Total Loss Management tool used to identify those risks that can be influenced or controlled. The decision of what tools to use to measure or understand risk for various stages of the project was determined by a scoring process that examined the suitability of three types of tools to the decision-making needs:

- influence-mapping based tools, useful in problem definition and understanding (e.g. influence diagram to determine dependency relationships and identify data needs);
- activity network-based tools that focus on schedule (e.g. PERT, CPM); and
- spreadsheet-based tools, to quantify costs and value (e.g. Monte Carlo economics).

The project group did qualitative analyses, while specialists undertook quantitative analyses.

For joint ventures, Krantz and Turner outlined a "Controllability versus Ownership Matrix," to highlight any misalignment between ownership of a risk, and the ability to influence an outcome. This tool is used to create better agreements with project partners.

### 4.13 Summary of Literature Review

Larger companies in particular can be driven to undertaking international petroleum projects by the maturity of the hydrocarbon basins in their home country. Ever-smaller discoveries and a well developed infrastructure lower barriers to entry and create numerous small and lean competitors that erode the technological and scale advantages that larger companies have. Investment by North American companies internationally doubled between 1988 and 1996, as
previously closed countries open up for foreign oil and gas investment. Many Canadian oil and gas companies state international production as a goal, but few have achieved it. There are many new challenges that arise by taking petroleum projects international, such as:

- larger reserves and permit sizes are offset by a tougher fiscal take;
- getting permits often requires more time and relies more heavily on the development of relationships;
- NOC/governments often get more involved in decision making on specific projects—authority over the project can be less well defined and authority less easily exercised;
- political and economic risks will be less familiar;
- project teams will now become more diverse, and spread further apart than before; and
- the crucial information needed to determine what area and project best suits a company's niche and strategy is more difficult to acquire internationally—the AEUB database that most Canadian companies access for their domestic activities is remarkable in the world.

Not only are there a number of new risks, but the international arena is very competitive as well, and a company needs new competencies, and an understanding of what international niche it can excel in.

The diversity of unfamiliar issues calls for a structured approach to managing project risk. There is nothing comprehensive in the literature that deals with the project risk management for international oil and gas ventures, although two are closer than the rest. De’Ath (1997) provides a helpful list and framework for identifying project risks, but the coverage does not extend to NOC/government relations, for example, nor does it provide much advice on managing the individual risks. Wasteneys (1997) provides excellent advice on project selection and preparation for work abroad, but his material is also not of great detail and has only limited advice in the cross-cultural and NOC/government relations realm. This study builds on their efforts not only by adding detail, but also by
identifying relevant literature, documenting a case study in detail, and collecting the advice of a number of experts.
Chapter 5  Results of Expert Interviews

The following is an analysis and summary of nine interviews conducted with experts in the chosen field of research. The raw data is organized in Appendix C, and practitioners are encouraged to review these more detailed comments, as it is in this detail that much of the wisdom related to managing risk in international petroleum ventures is contained. The names and titles of the experts are listed in Table C-1.

Except where noted, this chapter is a summary of the comments made by the experts, rather than of my own thoughts—which are in Chapter 6. I have tried to be true to the words and ideas presented by those I interviewed.

5.1 Summary Chart

The chart that follows on the next page displays the number of comments provided by experts during the interviews. A few observations can be drawn from the simple quantification that the chart provides:

- the combined category of NOC/Government Relations and Cultural Differences received the most responses in terms of identified key risks, advice to manage the risks, and common mistakes made by industry;
- the interviews were conducted sequentially as represented on the chart. The peak in the category of NOC/government relations was an exception to the general trend of fewer responses within each category as the interview progressed. The general trend may be an artifact of time limits imposed on the interview process;
- the least amount of advice was in solving the issues in the category of head office senior management / investor support; and
- industry managers saw the fewest risks and mistakes in the category of project organization and leadership, but had lots of advice to offer.

**Figure 5.1: Categorization of Issues Identified by Experts**

![Chart showing categorization of issues]

**5.2 Author's Observations on the Data**

Other observations that arise from the data (outside of the chart) are:

- small and large Canadian companies have a different set of issues around support for the project. In larger companies the concern is around senior management (i.e. at the vice-presidential level or higher) experience in international ventures and making sure that senior management is visible in the host country. In smaller companies, the executives are more likely to be intimately involved in the project, and overcoming this gap is less of a concern;

- small and large companies have similar issues around longer-term support for
the project. In small companies, this often depends on their continued ability to raise capital, while in larger companies, project support is more likely to come via budget allocation from senior management;

- larger companies were more vocal in their opposition to bribes as a way of doing business;
- there was a good diversity of opinion on the individual key risks. What one person saw as crucial, another could see as unimportant. The difference was often traceable to a person’s technical background or work experience. Examples of this difference include security issues as a source of risk—which is seen as important by those working in Algeria or Sudan, but not by someone working in Tunisia. Cost was a critical issue to one individual with a project engineering background, while another person with a geological background thought it was unimportant;
- Russia evoked a unique set of responses relative to any other region, and its extreme political, economic, and business risks seem to be particular;
- the most often repeated piece of advice was “do your homework!” It would appear that many problems can be avoided with adequate effort and diligence to secure the right information;
- the use of risk registers or other formal tabulations (or checklists) of risks is limited. Only one company indicated their use of this practice, and even there it was not rigorous. A more common practice is to use the experience of the project team and management to identify risks in an informal way;
- there was some recognition that uncertainty and change created opportunities as well as threats, but this was infrequently volunteered (only four instances). Missed opportunities were only cited as a key risk once!

5.3 **Summary of Expert Interviews**

This represents a consolidation of the experts’ comments captured in section 5.2. As indicated in the earlier discussion on methodology, I have attempted to keep these comments (and their consolidation) as free of my own biases and interpretations as possible—my interpretations appear in Chapter 6.
Project Selection and Data Phase

The key comments within the project selection and data phase are as follows:

- a company needs a good understanding of the size of project it can undertake, the risk it can tolerate, and the interaction between these two parameters. Gambler's ruin becomes a risk when the company has insufficient staying power to absorb the costs of a number of dry holes (don't rely on your last $100,000 for a drilling success. A signed contract has value—get partners when it is signed if the project is still too large or risky. These should all be part of a clearly defined and supported corporate strategy;

- one of the most frequent traps is committing to a country or project without doing proper homework beforehand, only to be subsequently disappointed when some detail that was not considered leads to project failure. Focussing on a single project too early is a common mistake. Senior management boldness or strategy has little impact on reservoir or hydrocarbon quality, hydrocarbon chance factors, infrastructure and market access etc. There are many "small things" that can make a venture unprofitable, so ensure the proper multi-disciplinary breadth of analysis, and depth of analysis, before committing;

- senior management needs good channels of communication to the project team during the selection phase to minimize wasted effort and ensure team and project alignment to the company;

- there is no substitute for thorough homework, and this requires time and resources. Information can come from public sources, embassies, service companies, other operators, industry leaders, government departments, consultants, a host-country law firm, a host-country accounting firm, etc. Do not rely on only one source of information. Learn the rules of the game before you put your money down. Do due diligence. The large amount of homework that needs to be done implies a need for focus;

- project advocacy by participants or "champions" can be a major challenge if not properly managed through independent review of, or participation in, the
evaluation. Advocacy can result in investment in the wrong project, as well as inflated expectations on the part of senior management;

- accessing data in the early phases of the project is critical, difficult and requires significant effort;
- before committing to a project, have a good understanding of what the project's risks are likely to be;
- consider managing some of your risks through a staged investment, with clearly defined decision points at which the whole project can be reconsidered (including canceling the project if necessary);
- have a good understanding of the flow of money under the contract, that the project can or will actually be profitable, and what your level of control will be. The outcome should be hard currency or an internationally marketable commodity;
- have experienced and competent people put your contract together; and
- early establishment of positive relations and alignment between the oil company and the NOC/government is one approach used to increase the chance that a good project will emerge from the discussions.

**Technical Risk**

The key comments within the technical risk category are as follows:

- hydrocarbon chance factors and reserves uncertainty are the most frequently mentioned technical risks. There are well-established (although insufficiently used) methods for evaluating these risks. These evaluations should be independently verified, or done to a rigorous standard;
- costs are typically underestimated. Reasons for this may include a lack of understanding of how the host-country service industry works, hidden costs, lack of an operating infrastructure for new entrants, or new areas without a track record. Cost management is important. Remember that some contractors rely on cost overruns to make their money. This can be curtailed through careful management of the contract—smaller oil companies may be more vulnerable to this;
technological developments can substantially improve project economics by reducing costs or adding reserves, but if the project requires cutting-edge technology to be successful, then the remaining risks (business, hydrocarbon chance factors, economic, etc.) need to be lower, given the multiplicative nature of risk;

project teams and their management should have an understanding that Canadian industry works efficiently, and that this efficiency does not necessarily exist in the host country. The expectation should be that things will go slower than in Canada. Teams are advised to have two schedules: one that is aggressive and that the team should struggle daily to achieve; and another that is shared with senior management and investors reflecting the time frames typical for the host country;

don't let the beauty of the business strategy overwhelm the technical risk considerations inherent in the project. If senior management ignores the technical risk, it doesn't mean it will go away;

in many international arenas, a greater degree of logistical effort, advance preparation, and contingency planning is required;

knowledge is a key aspect of technical risk mitigation. This typically involves maximizing your data, employing capable people, and focussing—in other words building knowledge in a core area. Sometimes a single, possibly obscure, technical parameter can make the project unprofitable. Companies with technical experience limited to their domestic environment may be blind to unfamiliar technical risks. Do your homework;

other measures to limit technical risk include spreading investment over more projects by taking a smaller working interest, ensuring that follow-up opportunities can be exploited if there is a success, negotiating (or renegotiating) fiscal terms, staged investment, staying with exploration opportunities that have a reasonable chance of success (20 per cent or higher), or staying with development or optimization opportunities; and

in a portfolio with some measure of technical risk, the successful projects can only pay for the failures if contracts allow sufficient profit from the successful
projects.

Environmental, Health, Safety, and Security

The key comments within the environmental, health, safety, and security category are as follows:

- Canadian companies generally do an excellent job of managing EH&S risks. The standards in Canada are high, and the programs and processes export well. An area to watch is ensuring sub-contractor compliance to standards, and ensuring adequate training of host-country staff;

- companies are more likely to face pressure from NGOs and investors than from host-country governments, although that may change. If you are not the operator, make sure you have confidence in the operator to manage these issues;

- some countries have real and specific security threats, either as a result of kidnapping and crime, or civil strife. Each requires a slightly different approach. The risks need to be managed through a combination of staff selection and training, insurance, contingency planning, security audits, information gathering and dissemination, security procedures, and sometimes operational capability. Some of the threats to a project in a difficult security environment come from within the company. This includes disproportionate senior management, investor, or staff fear of an incident, and can lead to operational paralysis, or may scare away skilled employees needed on the project. The key is to find the right balance between this paralysis and the mentality of invincibility that may develop in people who are continually exposed to the situation. Individuals should always have the right to say no to travel;

- every host country has its specific list of inappropriate or offensive behaviours. Although it is rare that these have a severe impact on the project, they can be easily managed through appropriate education;

- a site visit and environmental baseline can go a long way towards managing environmental risk;
- through understanding, the geographical and the climatic these factors can be managed. Only in the most extreme environments are these a major factor in the project; and
- do your homework, and all these issues should be manageable.

**Political and Economic**

- nationalization is out of favour, represents a remote risk, and can be insured against. If political risk is still felt to be too high, diversification (investing in more than one country) is a useful technique. Alternatively, "compensation in the event of nationalization" clauses can be negotiated. If important segments of society or the administration have negative attitudes to foreign investment in general, this can be a much greater risk to the particular project or type of investment being contemplated. These attitudes, along with expected future trends, should be understood prior to investing in a country. This information, while imprecise, is readily available;
- a good method of protecting an investment from political risk is to ensure that the contract ensures a win-win outcome regardless of the price environment or the size of the discovery. This protects all parties from external criticism. Governments and National Oil Companies need to be seen within the host country to be looking out for the national interest, which may be perceived to be creating activity and jobs. Another option is to have a powerful partner. Also, small acts of local philanthropy can go a long way if done in concert with host-country agencies;
- having a project with a significant political profile has both drawbacks and benefits. The key drawback is that high profile projects can become "political footballs" if construed as being against the public interest or if awarded in less than transparent ways. The benefits are clear if the high profile comes from the application of a new technology, or if there is no political opposition to the project, as roadblocks to the progress of the project will then be more easily removed;
- commodity price represents a significant risk, but is not unique to the
international environment. The structure of contracts in many countries is amenable to softening the impact of prices, for example by giving priority to cost recovery in the revenue stream. Robust economics are also good protection. Small companies will sometimes be unable to raise equity capital, and will need to rely on their cashflow for survival. Small companies need to have a survival plan in place to make it through a tough price environment, such as the ability to reduce loan payments over a period of time;

- if the fiscal arrangement depends on the current government administration, and the longevity of that administration is at risk, then your project economics are at risk. Staying out of politics, and building discrete bridges with a variety of groups may be the best defense if a change in administration would threaten the project;
- a proper hydrocarbon law and an international arbitration procedure are a starting point for mitigating political risk;
- embargoes may be in place against investment in a variety of countries. Often these are put in place by other governments (typically the United States), and are worth understanding fully before investing. The Canadian government (External Affairs) is a good source for this information;
- if investing in controversial areas or projects, let your conscience be your guide
- do your homework. Most of these risks can be managed if properly understood; and
- political and economic change can provide opportunities as well as threats.

NOC/Government Relations and Cultural Differences

The key comments within NOC/government relations and cultural differences are as follows:

- conducting business as we would in Canada, and then getting frustrated when it doesn't work out the same way is a common frustration. The reality is that the business culture in the host country may be different than in Canada and North America. A common difference is that the more impersonal
Canadian style of doing business that is often centred around communication by facsimile, e-mail, and phone, and between people who barely know each other, is less effective internationally. In most countries, people are influenced because they know and trust you, and development of the necessary relationships with these people is essential at all levels of the organization, in particular at the senior level. "Business and friendship is all mixed up like a salad." Building and continually maintaining these relations is also a good way to understand if any of the power brokers have concerns with your project, and may be a source of other project opportunities. Do not underestimate the importance of trust, which will be gained through respectable actions and face-to-face contact with the people that need to be influenced. Short-cuts to the necessary relationships include hiring people who already have experience and a good reputation in the country, finding a trustworthy and reputable host-country partner, or doing a lot of homework and talking to government and industry. Prior to sending off a difficult letter, an important courtesy is to have a verbal dialogue with the intended recipients first so as not to catch them off guard;

- overcoming cultural differences and misunderstandings through building relationships requires the right attitude. "Our common humanity exceeds our differences. People smile. They want to feed their families. The key to overcoming cultural differences is to be sensitive to what the differences are, and not cause offense." Exercise good manners, and honour host-country protocol. Experiencing a different culture should be seen as a bonus of working internationally;

- sources of misunderstanding include language differences and language barriers, such as degrees of directness, or wrong words, and the interpretation of behaviours through Canadian eyes and values, and vice versa. Selection of personnel who have the ability to work in a foreign environment is a good way to reduce unpleasant surprises. Good communication requires concerted effort, and language and cultural training for expatriate and host-country staff is typically a good investment. Use
interpreters where there is a risk of miscommunication;

- other differences in business culture may include a different set of assumptions about what the priorities are when making key decisions. Examples include the time value of money, discount rates, reserve additions versus cash flow, and employment. It is easy to take the priorities for granted, and then get frustrated when things don't work out. Be patient and find a way around the problem. Each party needs to feel they are winning with the success of the project. Decision-making may differ as well, with different degrees of bureaucracy, technocracy, or hierarchy. Each party should have some understanding of the other's processes, through formal training if necessary;

- good alignment of goals between the oil company and the NOC/government can override cultural problems;

- as Canadians, we are accustomed to decisions being made within a formal and statutory way, with the backing of government and the courts. In many host countries, the approval processes are less precisely defined, and there may be more overlapping or competing jurisdictions. It is a common mistake to misunderstanding how decisions are made and the importance of non-statutory processes;

- contracts may be viewed less rigidly than in our North American law-based business system. Although the contract is therefore often only a starting point for negotiations, it is still important to have a good contract with clear meanings in all languages. Hire a good host-country law and accounting firm, ensure that you are working with high quality translations, and assign negotiations staff who is familiar with the type of contract being negotiated. Companies should expect to be negotiating constantly, even after the contract is signed. Some innovative ideas include negotiating intent-based contracts with lots of built-in conciliation rather than trying to cover every eventuality, negotiating milestone-based contract (the clock starts when the data is received), and setting time limits for approval processes;

- post-contractual opportunistic behaviour can be a problem in many countries.
Do not underestimate the powers of obstruction, either to change major decisions, or to erode value to the foreign contractor. This becomes difficult to manage when the holder of the mineral rights displays the behaviour. In his case, leverage is limited to the relationships already built, the reputation of the mineral rights holder, the skill of the staff, the utility of the arbitration clause, and the ability to redirect investment. If opportunistic behaviour is common in a country, then some extra profit needs to be negotiated into the contract to cushion the erosion, and a mitigation plan is needed. Smaller companies can be more vulnerable to opportunistic behaviour, and may require a strong ally to solve problems. Using the host-country legal system may not be effective if it is more political than legal, and if it does not operate in a timely fashion;

- host-country National Oil Companies and governments demand varying levels of direct control over a project. Understand the cost of this in terms of time, money, and effort, and decide if you can live with it, or if you have some room to negotiate;

- the general view is that avoiding bribes is in the long-term best interests of a project and oil company. This view is reinforced by the OECD convention. It is worth understanding the common practices of the host country, and having a plan to work around any temptation to take shortcuts by bribing. “Buying someone a text book is fine. Taking someone shopping is not.” Funneling money through agents should not be necessary; and

- partners can be difficult whether you work in Canada or internationally.

**Senior Management and Investor Support**

The key comments within senior management and investor support are as follows:

- ongoing senior management and investor support is essential for the success of an international project;

- the active involvement of senior management is needed to remove roadblocks at the most senior levels in the host country. Asking senior
management to solve a problem with someone they have never met is far less effective than asking them to solve a problem with someone that they have previously met and built a rapport with. Small and medium-sized companies are more successful at involving their senior people. Having senior management travel to the host country has the additional benefit of allowing them to experience the challenges of working in the host-country environment;

- doing a poor job of managing the expectations of investors or senior management is a common problem. The sources of the gap between expectations and reality include: advocacy on the part of the project team; insufficient homework on the part of the project team as to what constitute reasonable time-lines, costs, or levels of control for working in the host-country; and a lack of senior management experience with the international environment. As senior management and investors are the source of money and talent to the project, failure to meet or manage expectations is dangerous to the project;

- there appears to be too much "bravado without knowledge" in the industry. A disregard at the senior management level for the technical risks and realities, as well as inexperience with the complexity of the international environment appears to be a not infrequent source of disaster. A symptom of this would be uninformed knee-jerk decision-making; and

- familiarity on the part of senior management with international business, both from the standpoint of understanding the barriers, and recognizing that international projects are usually not a source of short term results is an important element of success.

**Project Organization and Leadership**

The key comments within project organization and leadership are as follows:

- a significant amount of money will flow through the host-country office at a great distance from the discipline of the head-office environment. Dishonest expatriate staff can cost the company a lot of money. Mitigating these risks
requires increased rigor in the host-country office procedures, good stewardship practices, and trustworthy people;

- there appears to be an almost unlimited potential for misunderstanding between head office and the host-country office that can result in unhealthy behaviour (this appears to be due to two rational groups each working with different information (largely as a result of insufficient or imperfect communication), drawing logical, but different, conclusions. Mistrust builds quickly over large distances—Author’s observation from the Tnrhert project. Also — mistrust is proportional to the square of the distance between the head-office and the field — Hartman, 2000a). The additional project and risk dimensions introduced by working internationally means that the host-country office and NOC/government perspectives need to be an integral part of the decision-making. This is a common shortcoming of how projects are managed, usually resulting in an isolated and misunderstood host-country office;

- remedies for improving communication between the head office and host-country office include swapping out personnel between the two offices on a regular basis, utilizing available communication technologies such as e-mail and satellite phones, ensuring weekly conference calls between project participants regardless of where they happen to be on that day, and including both offices in the decision-making, i.e. consensus approach. Use quick meetings to solve problems right away. Have head-office staff visit the country to build relationships and improve understanding within the project team;

- to minimize conflict, clearly delineate the functions and responsibilities of the various offices. The host-country office, and the resident manager, should be given a reasonable amount of autonomy, and selected and supported accordingly. In particular, operational and security issues should remain within the authority of a levelheaded resident manager, as should communication with partners in close proximity to the host-country office;

- technical work is typically done in head office, unless the activity level in the
host country has reached critical mass, or there is a fiscal incentive to do the work in the host country. Keeping the technical staff at head office is less expensive, and usually more productive;

- to shorten the learning curve, a project team should include personnel who have international experience host-country staff, and expatriates who know the area. Not everyone has the cross-cultural skills to work internationally;

- For drilling operations in particular, the highest levels of skill and experience are a necessity, even if this means having two expatriate staff on site; and

- partners, whether they are the national oil company, a foreign company, or a host-country firm, usually have valuable knowledge, experience, and insights. Finding a way to include these views in the decision-making will not only improve the quality of the decisions, but also their acceptance by partners.
Chapter 6  Synthesis and Discussion

This section consolidates and discusses the 3 phases of research contained in the previous chapters: Chapter 3—the Tinrhert project case study, Chapter 4—the literature survey, and Chapter 5—the expert interviews. Each of the seven risk dimensions is dealt with in-turn, and the major risk elements within each risk dimension are split out. The seven dimensions of risk, again, are:

- project selection and data phase;
- technical risk;
- environmental, health, safety, and security;
- political and economic;
- NOC/government relations and cultural differences;
- senior management and investor support; and
- project organization and leadership.

A number of recommendation and pitfalls are provided for each of the 21 risk elements—and the source of each is indicated with an E (for expert interviews), L (for the literature review) or a T (for the Tinrhert Case Study).

In addition, I have provided some commentary and ideas for further research, where appropriate.

6.1  Project Selection and Data Phase

Risk #1:  Doing the Wrong Project (as opposed to doing the project wrong)

Recommendations (Do’s)

The following are the recommended practices:

- have a vision for the role international projects will play within the company’s strategy (L);
• understand the company’s core competencies, the niche that it will be exploiting internationally, and select a project that fits that niche (L)

• select projects that are appropriate for the company’s risk tolerance and financial strength. Reduce the working interest share in a project if it is too risky to handle alone (E, L, T);

• have a good process in place to properly evaluate projects (E):
  - the evaluation should have sufficient breadth (cross functional) and depth (detail) (also T); and
  - use multiple sources of information.

• do the homework. This is the time when you can most influence the project (L, E):
  - learn the rules of the game (in the chosen region) before you commit; and
  - understand the risks.

• being knowledgeable requires focus on an area (T, E);

• international exploration is a needle-in-the-hay-stack business. Make sure to have good communication within the organization so you don’t miss the opportunities (E); and

• sophisticated tools are available for making investment decisions across a portfolio of opportunities. There is no consensus in the literature about the usefulness of this sophistication (L).

Pitfalls (Don’ts)

The following are the key pitfalls to avoid:

• having only a vague view of the role of the international activity within the oil company portfolio, wasting time chasing projects that have little chance of approval (L, E, T), or having subsequent difficulty aligning the oil company’s priorities with those of the host country (T). Mitigate this through early communication or well-defined decision criteria (L);

• not understanding how an oil company’s core competencies translate into the international environment, and the corresponding project type that should be sought (L);
selecting projects of inappropriate risk or size (risking gambler's ruin, or limiting the risk profile to that which suits the business unit rather than the oil company as a whole) (E, L). Corporate performance is adversely impacted by staying with inappropriately low risk projects given a company's size. This is driven by managers' desire to avoid failure (L);

- biased evaluations due to project advocacy resulting in poor investment decisions, or inflated management/investor expectations (E);

- lack of real evaluations due to a "grand strategy" overwhelming the realities (often technical) of the project under consideration. Large reserves do not always translate into profit (E);

- selecting a project too early (E):
  - without looking at alternatives;
  - not understanding all the key dimensions of the project (missing key details that will cost you later, or perhaps preclude success for the project); and
  - not fully understanding exactly how you're going to make money. And

- missed opportunities can be a source of risk (L, E).

**Author's Comments and Ideas for Further Research**

Project selection was identified as a risk in all three sources (literature, expert interviews, case studies), albeit each with a slightly different perspective and emphasis. The literature emphasizes corporate and financial strategy (niche, risk tolerance, and financial capability). The expert interviews emphasized sufficient understanding of all aspects of the project to allow the unsuitable opportunities to be screened out, and ensuring an unbiased evaluation. And the Tinrht Case Study emphasized the problems that could arise when the host country has a different expectation for the project priorities than the oil company. Significant effort was required to structure, and present, the project in a fashion that met the needs of the major stakeholders, each of whom had different requirements that had to be met for the project to be approved.
There is infrequent discussion about *missed opportunities* as a source of risk, even though having good processes in place to seek out and develop good projects seems, to me, to be essential. Perhaps this is not emphasized because there is never a shortage of projects in which to become involved.

There is a dilemma in project selection for new entrants. You need sufficient knowledge of an area to make an informed decision—implying focus—yet a major risk is committing to a project too soon, allowing focus. This can be overcome by identifying a region or country first using superficial analysis, and then devoting lots of resources to evaluating a few projects in detail.

**Risk #2: Analysis is Done with Poor or Limited Data**

There are typically two aspects to the issue of data. The first is getting sufficient data to make a reasonable decision about embarking on the project. The second is getting access to all the necessary data after the deal is signed! Neither should be taken for granted.

Technical data is usually incomplete, as good quality data from previous operators may be lost or unavailable.

**Recommendations (Do’s)**

The following are the recommended practices:

- build relationships with the data custodians early to enhance data access (T, E);
- allow enough time and resources to gather the necessary data (T);
- a host-country national is often the best person for getting access to data after the deal is signed (E); and
- look for multiple sources of data (E, L, T).

**Pitfalls (Don’ts)**

The following are the key pitfalls to avoid:

- inadequate skill sets, inadequate resourcing, and underestimating the amount
of time and effort needed to get data. A common response to the question “What data do you have?” is “What data do you need?” There is a problem even identifying what data exists (E, T);

- assuming data will be as accessible as it is at home, and not understanding the process or snags in getting it. Insufficient data is a key contributor to technical risk (T, L); and
- forgetting that in many countries “information is power”, and data can be jealously guarded (T).

**Author’s Comments and Ideas for Further Research**

There is little published on the issue of accessing data, even though this is a critical success factor for international projects. De’Ath’s (1997) paper is the only one I came across that mentioned it. However, in an internal Petro-Canada project review data management issues were identified as the most significant shortcoming in implementing the initial technical work.

I believe that limiting access to data also limits competition, and that host countries do not fully reap the benefits of market competition as a result. Instead, capital is spent inefficiently—investment decisions made on incomplete data, and the barriers for new entrants remain unnecessarily high—reducing competition. It would be interesting to study the relationship between the degree of competition and the difficulty in accessing technical data.

**Risk #3: Ineffective Entry to New Areas**

**Recommendations (Do’s)**

The following are the recommended practices:

- decide what growth strategy is most appropriate for the company (exploration, field rehabilitation, buying properties, buying companies) (L);
- consider partnering in new areas with more experienced operators (E, L);
- recognize that knowledge is a key currency early in the entry process. Mitigate this through doing the homework, employing people with experience
internationally, talking to existing operators and suppliers, NOC/government officials, host-country legal and accounting firms. You need more than computer knowledge—you need human knowledge (people with experience) (E);

- manage expectations of management/investors appropriately regarding timelines and difficulties that will likely be encountered in the host country (E, T);
- walk the lease (E);
- stage the commitments and investments while you build knowledge and confidence (E, T);
- get low cost entry to an area, learn the business, build from there (E);
- recognize that value is created when a deal is signed. This is a good time to seek partners and extract some value (E);
- have competent and experienced people put the contract together (E); and
- consider the tax implications of the oil company's home country (L, T).

**Pitfalls (Don’ts)**

The following are the key pitfalls to avoid:

- insufficient homework resulting in nasty surprises that could have been dealt with earlier (E); and
- irrational bidding (E).

**Author's Comments and Ideas for Further Research**

One of the most interesting observations about entry strategies was made by Driel (1999) who remarked that North American companies focus on opportunities when entering a country, while Southern European companies establish relationships first, and let opportunities evolve from there. It would be interesting to see which approach works best in various parts of the world.

Since most of the advice in this category comes from the expert interviews, this may be one of those categories in which the subject matter is learned through hard-won experience!
6.2 **Technical Risk**

Risk #1: **Misjudging Hydrocarbon Chance Factors, Reserves, and Reservoir Quality**

**Background**

Hydrocarbon chance factors apply to exploration activities, and refer to the probability of hydrocarbons being discovered when a well is drilled. In a typical exploration well, the expected outcome is a dry hole! Having a good understanding of the hydrocarbon chance factor is a prerequisite to determining whether the cost and risk are worth the potential rewards (EMV calculation).

Reserves are a measure of the amount of hydrocarbon that will be recovered over the life of the oil or gas pool.

Reservoir (and hydrocarbon) quality can impact the amount of effort (and cost) needed to extract, transport, and process the hydrocarbons, the amount of the hydrocarbon that will actually be recovered, and the sales price of (and market availability for) the hydrocarbon.

**Recommendations (Do's)**

The following are the recommended practices:

- apply a formal, clearly defined process for evaluating and quantifying hydrocarbon chance factors and reserves uncertainty. Hydrocarbon chance factor is typically broken down into four or five constituent parts for analysis (E, L);
- apply consistent and objective scrutiny to evaluations put forward by project teams. Large companies often use global risk teams to benchmark opportunities. Smaller companies can use expertise resident within their companies (a technical expert or senior manager), since one person can scrutinize all the opportunities (E, L);
• conduct project post-audits to improve predictive capability (L);
• one way to improve the odds of success is by having good people do the work (E);
• get all the data you can (old reports, etc.), and include it in the decision-making (E, T);
• manage technical risk through focus; building knowledge in a core area (E);
• recognize that even the most rigorous technical analysis is still uncertain. That is the nature of the business (L); and
• some companies limit their exploration activities to prospects with a greater than 20 per cent chance of success (E, L).

**Pitfalls (Don’ts)**

The following are the key pitfalls to avoid:
• it is typical for reserves and chance factors to be over-estimated (L, E);
• project champion providing subjective rather than objective analyses (E);
• overlooking a subtle but critical technical parameter that has a substantial impact on costs or reserves (e.g., permeability distribution in the reservoir, thixotropic oil properties). Sometimes a single technical ‘detail’ can destroy the project profitability (E);
• poor technical work, particularly by smaller oil companies. Very localized technical knowledge in the home country may not prepare an oil company for the technical risks in the host country (E); and
• working with insufficient data (L, T).

**Author’s Comments and Ideas for Further Research**

This is an area in which much has been published, but follow-through requires effort on the part of the technical team, and discipline on the part of management to use the process rather than resorting to “hunch-based” decision-making.
Risk #2: Underestimating Costs (and Durations)

Recommendations (Do's)

The following are the recommended practices:

- in a strongly competitive environment with low barriers to entry (this is where small companies typically operate), companies must be ‘best in class’ from a cost perspective. This requires diligence in cost control and contract management (E);
- the business relationship between an oil company and the contractor may be different than in the home country. Take the time to understand how this relationship works in the host country (know the value of a handshake, or a contract) (E);
- plan on a higher level of supervision than you would in Canada (E);
- develop contingency plans, as the necessary services may not be readily available (E);
- do the homework—talk to all the established players. Source the in-country expertise that is available (E, T); and
- use two schedules—one to set expectations for external stakeholders, the other for the project team. The reality is that there will be unforeseen delays that will make you slip towards a longer time frame, even though you’re striving for the shorter one (T).

Pitfalls (Don’ts)

The following are the key pitfalls to avoid:

- not understanding how the host-country service industry works (E);
- missing hidden costs (E);
- lack of an operating infrastructure for new entrants (E);
- not understanding that in some countries the contractors rely on cost overruns to make their money (E);
- lack of contingency planning (spares, etc.,) causing long and costly delays (E); and
overlooking the immaturity of approval processes in newly opened areas. (T).

**Author's Comments and Ideas for Further Research**

Interestingly, project costs are usually less significant from a project profitability standpoint than are reserves, commodity prices, and contract structure. Perhaps it remains a strong focus because it is something that can be controlled more easily than many other parameters, particularly once the project has been chosen and the contract negotiated.

I also wonder if part of the reason for the underestimation of costs doesn't tie back to project advocacy, plus basic human optimism in the face of limited data.

**Risk #3: Not Understanding the Impact of New Technology**

**Recommendations (Do's)**

The following are the recommended practices:

- new technology can provide an upside—creating opportunity. Properties can be purchased or pursued (particularly larger, long-life, higher cost projects) based on their value under the current technological level. Future technological advances can present an upside from a reserve, risk, or cost perspective (E, L); and
- if the technological risk is high, make sure the other risks are lower to compensate (given the multiplicative nature of risk) (E).

**Pitfalls (Don’ts)**

The following are the key pitfalls to avoid:

- don’t try out new technology in a difficult foreign environment first (E); and
- underestimate the logistical and planning effort needed to implement technologically difficult projects (E).

**Author's Comments and Ideas for Further Research**

As technological advance is hard to predict, paying a premium for opportunities
with technological upside is for those with vision, and deep pockets! Maybe this is one of those "tie-breakers" when choosing between two different opportunities.

6.3 Environmental, Health, Safety, and Security

There is a trend of converging environmental regulations worldwide to achieve the highest standards. Precise environmental legislation can be hard to come by in many countries, as it exists at various jurisdictional levels, is often not explicit, and is not static.

Risk #1: Maintaining EH&S Standards

Recommendations (Do's)

The following are the recommended practices:

- Canadian companies generally do an excellent job of managing EH&S risks, as the Canadian standards are high, and the processes and policies seem to export well. An area to watch is ensuring sub-contractor compliance to standards, and ensuring adequate training of host-country staff (E);
- work to a high standard—if it isn't required yet, it probably soon will be. Let your conscience be your guide (E, L);
- if someone else is the operator, make sure they are capable of managing these issues, as everyone's reputation is on the line (E);
- a site visit and the establishment and documentation of an environmental baseline can go a long way towards providing protection from potential future accusations (E, L, T);
- allow for appropriate consultation and communication with key stakeholders (L); and
- use closer supervision of higher risk activities (E).

Pitfalls (Don'ts)

The following are the key pitfalls to avoid:

- lack of a documented baseline that exposes a company to litigation or politically motivated accusations (E, L).
Author's Comments and Ideas for Further Research

Might this be an area where solid ethical standards and common sense are the best guide?

Risk #2: Security

Significant security risks are limited to specific countries, and each of these countries has its own issues. In these difficult countries:

Recommendations (Do's)

The following are the recommended practices:

- select staff who have the maturity to behave appropriately in difficult environments, and educate them as to the do's and don'ts (E, T);
- use insurance coverage as a means of accessing the appropriate skills in the event of hostage or other security crises (E, L);
- use information/intelligence to avoid security situations (E, T);
- have systems in place (security audits, contingency plans, security procedures) to manage security issues (E, T);
- retain a reputable international security consultant if there are serious in-country security issues (L, T);
- leave the in-country manager with the final say on security issues (E, T); and
- do the homework—all these issues are manageable (E).

Pitfalls (Don'ts)

The following are the key pitfalls to avoid:

- paralysis from over-attention to, or fearfulness of, security issues (E, T);
- ignoring security issues either through ignorance, or familiarity (constant exposure to the risk induces sense of invincibility (E); and
- individuals exhibiting offensive behaviours in the host country and becoming a preferred target (E).

Author's Comments and Ideas for Further Research are:

Security risks can impose additional costs in both direct (hiring guards) and
indirect (reducing staff mobility) ways. Even in difficult security environments, it is possible to conduct operations given appropriate systems and measures.

6.4 Political and Economic

Risk #1: Expropriation, Unilateral Changes to Contract Terms

Nationalization is out of favour and represents a remote risk. Unilateral changes to contract terms represent a greater risk. The greatest risk to a contract originates from negative attitudes amongst the host-country stakeholders towards the investment. Petroleum investments are basically immobile once they have been made, which makes them more vulnerable to changed contract terms relative to some other types of investments.

Recommendations (Do's)

The following are the recommended practices:

- if you want comfort around the remote risk of nationalization, you can insure against it (you can also insure against contract frustration). This is suitable mainly for mid-sized companies that are too small to self-insure (E, L);
- involve strong international interests as partners in the project, such as multi-lateral institutions (L);
- gain an understanding of the stakeholder attitudes towards the investment. This is often evident from the political discourse of a nation, as well as past trends (E, L);
- ensure that the contract is win-win under a variety of potential outcomes (price as well as reserve size). Governments and National Oil Companies need to be seen in the host country to be looking out for the national interest (E, L);
- small acts of local philanthropy, hiring host-country staff, and having a good host-country partner can go a long way in terms of building host-country goodwill, and making the project defensible by the host government (E, L);
- if the project is perceived to be in the national interest, a high profile can
remove roadblocks. The application of new technology is a favourable way to attract attention to a project (E);

- transparent competition provides good protection against future accusations of impropriety in controversial projects (L);
- a proper hydrocarbons law and a good arbitration clause are a good start for protecting investments (E, L, T);
- controlling the export market of your product reduces the risks (L, T);
- quantify the potential adverse impact of political risk, and include them in the project evaluation. Consider having this analysis done independently to ensure objectivity (L); and
- a quick payout is good insurance against changing rules (E, L, T).

**Pitfalls (Don’ts)**

The following are the key pitfalls to avoid:

- if the project is not perceived to be in the national interest, a high profile can cause problems and delays (E, T);
- if the fiscal arrangement depends on the current government administration, and the longevity of the administration is at risk, then the project is at risk (E);
- not understanding the project from the perspective of the host-country economic interests (L);
- not being aligned with a host-country company can carry the risk that the government will, at some point, change the rules to favour host-country competitors (L);
- “post-contractual opportunistic behaviour.” The rules change so that on a go-forward basis the project remains economic, but on a full-cycle basis becomes a big money loser (L).

**Author’s Comments and Ideas for Further Research**

Interestingly, while there is a good correlation between a project’s technical attributes and the government fiscal take, the political situation seems to have little bearing on fiscal take, except in extreme situations (L).
There is a huge amount of good advice here for oil companies—big wins at low cost. My suspicion, however, is that little of it is actually applied consistently. It would make for some interesting research.

Risk #2: Embargoes and Sanctions

Trade and investment in some countries is subject to sanctions by governments hostile to the regimes of those countries. Investment there carries some restrictions and the threat of punitive actions against investing companies.

Recommendations (Do's)

The following are the recommended practices:

- understand the embargoes that are in place prior to investing (E); and
- do the homework and avoid surprises. Political circumstances underpinning sanctions can change rapidly. The Canadian government (External Affairs) is an excellent source of information in this regard (E, L).

Pitfalls (Don'ts)

The following are the key pitfalls to avoid:

- the export of the product passes through other countries that may choose to shut off the flow of oil (L); and
- the project is on disputed land (L).

Risk #3: Loss of Reputation

Increased freedom of information, and higher public attention to political and human rights issues makes companies increasingly vulnerable to criticism at home. NGOs have significantly increased clout and sophistication when it comes to applying pressure on companies doing business with unsavoury governments. This clout can take the form of consumer boycotts, lawsuits, adverse publicity, lowering staff morale, and creating difficulty in hiring high quality personnel.
Recommendations (Do’s)

The following is the recommended practice:
- let your conscience be your guide (E, T).

Risk #4: Commodity Prices

Commodity prices represent a significant risk, but are not unique to the international scene.

Recommendations (Do’s)

The following are the recommended practices:
- use the contractual framework to your advantage, where possible. This might involve giving priority to cost recovery in the revenue stream (E, L, T);
- If you are a small company, have a survival plan in place to make it through a tough price environment (e.g., retain the ability to reduce loan payments for a period of time). Small companies may, at times, be unable to raise equity capital, and will need to rely on their cashflow for survival (E);
- commodity hedging can serve to level the impact of price swings (L);
- because gas is generally more expensive to transport than oil, its markets tend to be more local, and subject to the host-country economic conditions and currency fluctuations. The potential to generate electricity makes gas a viable commodity in some markets and worthy of evaluation (L);
- evaluate the impact of price uncertainty when assessing project economics. At what price does the project become non-viable (L, T)? And
- evaluate the cost of delaying projects that are currently uneconomic due to unfavourable pricing or capital requirements. This creates an ‘option’ that might be exercised in the future under more favourable circumstances (L).

Author's Comments and Ideas for Further Research are:

Investment in gas projects is increasing, and dealing with the associated political and economic and political risks will be a ‘growth area’ for study. In areas where the rule of law is firmly established, and exchange rates are stable this may be
an easy decision. Elsewhere—look out!

Risk #5: Host-Country Financial Health

Recommendations (Do's)
The following are the recommended practices:

- change is a source of opportunity as well as risk (E)
- if the economic health of the government is vital to a project’s future, a proxy assessment of the government’s financial health might be its bond ratings (L); and
- currency risk becomes an issue when the host-country currency is not freely convertible or the exchange rate is volatile, and revenues or expenditures are tied to that currency. Sales of oil or gas to international markets at world prices mitigate this risk, as does accounting in a foreign hard currency (L, T).

6.5 NOC/Government Relations and Cultural Differences

The following risks all have one thing in common: they relate to the erroneous transplanting of experience and expectations from the home-country environment to the host-country environment.

Risk #1: Poor Communication

Since an oil company needs to coordinate with either an national oil company or host-country government (I’ll lump them together as NOC for brevity), it helps when you understand each other’s communications style!

Recommendations (Do's)
The following are the recommended practices:

- the Canadian reliance on impersonal communications (facsimile, e-mail, and phone) is less effective internationally (E, T);
- in most countries, the basis for doing business is personal trust, which is developed through personal contact and relationships (E, T);
- a short cut to creating the necessary relationships is hiring someone who has
already established them, or finding a reputable host-country partner (E);
• prior to sending a difficult letter, have a dialogue with the intended recipient first so as not to catch them off guard (E, T);
• recognize that cultural differences include language, negotiation style, organizational culture, and protocol around hierarchy and team work (L, T);
• hire a good host-country law firm that knows the ropes, and work from good quality translations (E, T);
• use interpreters when there is a risk of miscommunication (E);
• provide language and cross-cultural training for expatriate and host-country staff (E, T);
• consider including host-country staff in both the host-country office as well as the head office to improve communications (T); and
• partners (of all kinds) usually have valuable knowledge, insights, and experience. Finding a way to include these views in the decision process improves not only the quality of the decisions, but also their acceptance by partners (E, T).

Pitfalls (Don’ts)
The following are the key pitfalls to avoid:
• underestimating the importance of trust (E, T); and
• missing important messages, or having your own messages misunderstood. This can be due to language differences, or differences in communication style (directness, body language) (E, L, T).

Author’s Comments and Ideas for Further Research
“Our common humanity exceeds our differences. People smile. They want to feed their families. The key to overcoming cultural differences is to be sensitive to what the differences are, and not cause offense.” (Quote from expert interview.)

Risk #2: Limited Level of Project Control
How much control does an oil company have? What are the levers for exercising
control? How much is a contract worth? Can you use the legal system effectively to enforce the contract? What is the regulatory process? What are the rules (E)?

As Canadians, we are somewhat accustomed to rights and obligations being somewhat clearly defined under contracts and under law. Host-country processes are often far less clear or rigid (E, T).

**Recommendations (Do's)**

The following are the recommended practices:

- National Oil Companies and governments demand varying levels of direct control over a project. Understand what the impacts are likely to be in terms of time, money, and effort, and decide whether you can live with it (E, T);
- recognize that approval processes may be poorly defined, and that there may be overlapping jurisdictions (E, T). The body officially designated to make decisions may have no actual authority in practice (T);
- ensure that the contract is clear in all languages, and has the same meaning! (E, T);
- recognize that in some countries, the contract is only the starting point for negotiations (E, T);
- the contract spells out some of the rules of control and influence. To put the contract together, use personnel experienced in the specific contract type to put the contract together (E);
- try putting principles and an easy (and binding) conciliation process into the contract rather than spelling everything out in tremendous detail, if both parties are amenable to this (E);
- do not underestimate the powers of obstruction to change major decisions or to erode value for the oil company (E, T);
- when the source of post-contractual opportunistic behaviour is the NOC, recourse is limited to relationships already built, the reputation of the NOC, the skill of the staff, the utility of the arbitration clause, and the ability of the oil
company to redirect investment (E);

- make sure you have an effective international arbitration clause (E, L, T);
- relationships built early (before problems arise) and at all levels of the organization, but especially senior levels, as these relationships are the best way to overcome problems later in the contract (E, T, L); and
- if you know that the NOC will be clawing back profits under the contract (from the NOC's reputation), then make sure you have an allowance for that in the economic evaluation (E, T).

Pitfalls (Don'ts)
The following are the key pitfalls to avoid:

- the oil company not understanding how decisions are made, and pinning hopes on more formal and statutory processes than actually exists (E, T);
- not understanding the importance of non-statutory processes (E);
- using bribes to influence outcomes. This is not in an oil-company's long term best interests, and is unlawful under OECD convention (E); and
- forgetting that there are difficult partners in the home country as well (E).

Risk #3: Differing Priorities

Recommendations (Do's)
The following are the recommended practices:

- ensure mutual understanding of goals between the NOC and oil company (E, T);
- make sure each party has some understanding of the decision process of the other (through training, if necessary) (E);
- be patient, and find a way around problems (E);
- both parties need to feel they are succeeding for the project to be a success (E); and
- understand that time is less of an issue in some cultures (e.g. an NOCs business culture) (L, T).
Pitfalls (Don'ts) are:
The following are the key pitfalls to avoid:

- assuming that the decision criteria are the same for the NOC as for the oil company. For example, the NOC may focus on reserve additions and employment, while the oil company may focus on rates of return and present value (E); and

- assuming that there is uniform support for oil company activities within the government and NOC. If the involvement of foreign firms is recent, for example, there may still be pockets of opposition (T).

Author's Comments and Ideas for Further Research
In general, this category of risk (NOC/government relations and cultural differences) drew overwhelming response from the expert practitioners, and somewhat less coverage in the project management literature. Might this be because the concepts are simple, but the implementation difficult?

6.6 Senior Management and Investor Support
Ongoing senior management and investor support is essential for the success of an international project. This support is seen in terms of resourcing the project (people and capital) and involvement in removing roadblocks.

Risk #1: Lack of Support, or the Wrong Kind of Support

Recommendations (Do's)
The following are the recommended practices:

- senior management has an essential role in removing roadblocks in the host country through their ties to senior officials in the host country. Build these relationships early (E);

- have senior management travel to the host country to gain a greater appreciation of the host-country environment (E);

- do the homework to ensure that you can manage expectations appropriately (E, T); and
• involve senior executives with some understanding of the international business (E, T).

**Pitfalls (Don’ts)**

The following are the key pitfalls to avoid:

• poorly managed expectations regarding level of control, timing, bureaucratic delays, and extra costs (E); and

• bravado without knowledge on the part of executives—a disregard for the technical realities and risks, as well as the complexity of the international environment. A symptom of this is uninformed decision-making (E).

### 6.7 Project Organization and Leadership

**Risk #1: Misunderstanding Between Head-office and the Host-Country Office**

There appears to be almost unlimited potential for misunderstanding between the head office and the host-country office of an oil company, and this can result in unhealthy behaviour. This appears to be the result of two groups, each operating rationally, but on the basis of different information and assumptions, and coming to differing conclusions.

**Recommendations (Do’s)**

The following are the recommended practices:

• the additional complexity of international projects means that the host-country office (and its understanding of the NOC/government perspective) needs to be an integral part of the decision-making (E, T);

• set up regular communications between host-country and head offices, and encourage frequent phone calls, e-mails, and data exchange (E, T);

• a weekly conference call for providing status updates and making decisions should involve all the major offices and senior team members (T);

• have head-office staff visit the host-country to build relationships and improve understanding within the project team (E, T);
clearly delineate the functions and the responsibilities of the various offices (E);

- the resident manager should be given a reasonable amount of autonomy, and should be selected and supported accordingly. Responsibilities should include security and communication with partners in close proximity with the host-country office (E); and

- technical work should be done in the head office as this is less expensive, unless the activity level in the host country has reached critical mass (E).

**Pitfalls (Don’ts)**

The following are the key pitfalls to avoid:

- ending up with an isolated and mis-understood resident manager as a result of poor communication processes (E);

- mis-informed decision-making (i.e. decisions made without considering one or more of the key perspectives of the project) (E); and

- competition between the head office and host-country office—frustration mounts to the point where the host-country office is trying to do the technical work, and head-office is trying to manage partner relations on its own (E).

**Author's Comments and Ideas for Further Research**

I did not come across much in the literature on this topic, but think it worthy of research and documentation.

**Risk #2: Staff Missing Key Skills for International Work**

**Recommendations (Do’s)**

The following are the recommended practices:

- the project team should include people with international experience, host-country staff, and expatriates who know the area (E);

- not everyone has the cross-cultural skills needed to work internationally (T, E); and

- select the staff carefully, and with consideration of the environment in which
they will have to work. Assess family readiness when the assignment involves relocating families to a foreign country (T).

**Pitfalls (Don’ts)**

The following is the key pitfall to avoid:

- a dishonest expatriate who takes advantage of all the cash flowing through the host-country office (E).

**Risk #3: Inappropriate Organization**

The organizational challenges in an international exploration and development project are varied. To name a few: integrating technically and operationally complex elements from a wide group of specialists, involving partners and government at appropriate levels of decision-making, and overcoming communication challenges between experts and stakeholders separated by geographic, time zone, language, and cultural distances.

What are the risks?

- sub-optimal use of human resources—people who are not both fully engaged and working efficiently;
- poor decision-making—due to partial information, or to not considering all the relevant issues and stakeholder views and impacts; and
- and improper alignment of behaviours and activities to corporate priorities and risk preferences.

To deal with these risks, the organizational choices fall within the dimensions of functional versus project versus matrix organizations, degrees of management control (management controlled, self managed, self-designing, self governing), leadership styles within the team, and location of project staff and decision makers.

**Recommendations (Do’s)**

The following are the recommended practices:
- pure functional organizations have difficulty providing the kind of nimbleness needed to handle most international opportunities (nimbleness meaning flexibility of approach and delivering short cycle times) (L, T);
- functional organizations do a poor job of eliminating unnecessary work—integrated project teams are better at seeing which work is essential, and which can be dispensed with (L, T);
- during the early stage of developing and negotiating opportunities, self-managing project teams have the advantage of greater creativity and flexibility, and the high degree of project ownership this structure fosters (L, T);
- as projects become operational, and project teams grow in size, greater management structure is useful in overcoming the unwieldy consensus process associated with large teams, and the operational issues that require real-time management (L, T);
- international project teams are usually staffed with senior and experienced personnel. A leadership style that engages and involves these people in decision-making will get the most out of the project team's capability (L, T);
- to set up self-managed teams, the individuals on the team need to have correspondingly high business and team skills, as well as access to information (L);
- clear corporate goals, deliverables, and standards still need to be specified by senior management (L);
- create a clear set of team norms that sets out decision and communication processes, as well as roles and responsibilities (L, T);
- ensure that new team members have adequate orientation to the team norms, particularly in self-managed teams (L, T);
- for self-managed teams to work, some of the traditional diagnostic controls (such as surveillance) need to be replaced. Instill a belief system consistent with the company's core values, set clear boundaries that spell out what is not permitted, and hold regular face-to-face meetings between the team and management to discuss progress on issues that management feels are key to success (L);
international projects are typically complex. Communication using a “web” style—in which information passes freely and readily between all project team members has advantages over the “centralized” style of communication, where all information goes to one individual. Typically, there is so much going on that one decision-maker cannot be involved in everything, particularly given the requirement for travel (E);

• self managed teams larger than 6-12 people tend to be unwieldy (L); and

• vision leads to corporate goals and objectives, and then strategies. Goals are then achieved through portfolio management........Management of the portfolio is best done in a hierarchical manner; that is, a corporate board manages a portfolio of teams, and the teams manage a portfolio of projects. Each level is broadly accountable for its predicted performance, but the projects themselves are managed at the lowest level possible. Changes to the portfolio are made at the lowest level, conditional on the proposed substitution meeting or exceeding the value of the project being replaced (L) (see note on further research, below).

Pitfalls (Don’ts)
The following are the key pitfalls to avoid:

• compromising company reputation because autonomous project teams get over-zealous (L);

• poor distribution of information leading to poor decision-making (L);

• staying with a self-managed team structure once the team has become too large and unwieldy (L); and

• having an unclear management style—people don’t know how decisions are really made (T).

Author’s Comments and Ideas for Further Research
As per the note in the Hedberg conference recommendations above regarding the appropriate level for managing portfolios, it would be interesting to know what percentage of companies actually does this (or does this well).
My suspicion is that few do, although I do not have any research to support this.

There was no advice nor issues forthcoming from the expert interviews in this regard other than advising which tasks should be delegated to the host-country office, and which to retain in the head office. My guess is that if the expert managers interviewed were aware of any issues in this respect, they would have already implemented the appropriate changes!
Chapter 7 Conclusions

This study addresses project risk management for Canadian oil companies undertaking international ventures. Although Canadian companies have been investing billions of dollars in international petroleum projects, there has not been a thorough compilation of the risks associated with these ventures. This study fills that gap by combining a detailed evaluation of an international project, a literature survey of key risks, and interviews with expert practitioners. The results have been documented and categorized in seven major areas, comprising: project selection and data; technical risk; environmental, health, safety, and security; political and economic; NOC/Government relations and cultural differences; senior management and investor support; and project organization and leadership.

A list of recommendations and pitfalls was developed that provides a new practitioner with a framework in which to understand and start managing risk, or an expert practitioner with increased awareness of, or practical advice in dealing with, specific risks. As such, this study can serve as a reasonably comprehensive guide to the practitioner.

Additionally, this study expands the body of knowledge in the domain of project risk management of international petroleum ventures in a number of ways:

- primarily, by documenting the wisdom of experienced practitioners in a field where little has been published;
- also, by creating a detailed account of a project in this field for possible use in future research;
- by creating an extensive list of references for the enthusiastic researcher; and,
- finally, by showing that NOC/government relations and cross-cultural issues are the most frequently cited risks. This is a first in the field.
The specific findings and recommendations for managing the risks are summarized by risk category as follows:

**Project Selection and Data Phase**

1. Although you're doing a great job of managing the risks in the project you’ve got, you didn't pick the right project.
   *Understand your company’s niche, considering skills, knowledge, and financial strength, and find a project where that niche is applicable. Do your homework, get the data, and involve the right people in the evaluation. This is where you have the most leverage.*

2. You end up picking the project while you have limited access to data, and have nasty subsequent surprises. Once you get full permission to access data, it still takes years for it to be in your hands, and you’re still making decisions with partial data sets.
   *Recognize that data will be much harder to come by than in Canada, allow enough time and resources to gather the necessary data, build the necessary relationships with the data custodians.*

3. You get into a new area and don’t know your way around, don’t know the rules of the game, don’t know the key players, and spend a lot of money learning things the hard way.
   *Knowledge implies focus. If you’re new to an area, either partner with someone more experienced, get low cost entry and build slowly, or spend time and money to build knowledge (hiring experienced personnel). There are multiple sources of data—use them all (competitors, government, service companies, legal and accounting firms, etc.). Do your homework.*

**Technical**

4. Your exploration success rates end up lower than you thought, the reserves are smaller, and the reservoirs are of lower quality, even though the data was there to provide a proper range of predicted outcomes.
Minimize surprises by having a formal, clearly defined hydrocarbon evaluation process that includes benchmarking, independent scrutiny, and post-audits. Technical familiarity with a region helps.

5. The project costs more, and takes longer than you thought.
Understand the rules of the owner/contractor game, and what is available in the host country in terms of infrastructure and services (and their price). Understand the approval processes, and their durations. Strive to meet a tighter target than what you promise others. Plan for increased supervision for some tasks.

6. New technology changes the value of properties, and you didn't foresee it (and you missed the boat).
Recognize that long-life reserves can provide future opportunities. Analyze the cost of deferring marginal projects in terms of an "option" to develop it in the future when prices are higher or costs are lower. If technological risks are high, make sure other risks are low to compensate.

Environmental, Health, Safety, and Security

7. Although you're striving for high EH&S standards, it's not happening on the ground, and NGOs are on your case.
Educate your host-country staff and your contractors as to your expectations. Set high standards, since regulations will probably become more restrictive. Let your conscience and good judgement be your guide.

8. Your Board of Directors constantly frets about the security of your in-country employees, or even worse, you have a security incident.
Select the right people when working in a difficult security environment. Have systems in place to avoid potential issues, and deal with real issues (security audits, contingency plans, insurance, and security procedures).
Political and Economic

9. The value you negotiated under the contract turns out to be difficult to realize, as your interpretation of the contract does not seem to be carrying the day. 

*Know your partner’s reputation. Ensure that the contract is win-win over a large variety of potential outcomes. Be seen to be a good operator. Build good relationships early. Have an effective international arbitration clause.*

10. Your executives can’t travel to the U.S. anymore because of sanctions.

*Do your homework through Foreign Affairs and International Trade. Let your conscience be your guide.*

11. The regime with which you negotiated the deal is engaging in human rights violations, and your own government’s minister of foreign affairs wants to set up a meeting.

*Know the value of your reputation, and let your conscience be your guide.*

12. The oil price has dropped by half, and now you’re losing money with every barrel you produce.

*Structure your contract, and your financing, for flexibility to allow for changes in commodity prices.*

13. You’re selling your oil for a fixed price in a currency that has just been devaluated.

*If your market is something other than the world oil market and price, know what the differences are, and understand the impacts of fluctuations in exchange rate or host-country government financial health. For greatest protection, your accounting, cost recovery, and markets should be in a freely convertible stable currency like the US dollar.*

NOC/Government Relations and Cultural Differences

14. The NOC thinks of you as greedy capitalist exploiters of the national jewels,
and you think of the NOC as a bureaucratic weight that reduces project efficiency.

Recognize and overcome cultural barriers (differences in language, negotiation style, organizational culture, and protocol around hierarchy). Build personal and corporate relationships and understanding both ways. Trust is the key. Make sure you understand each other.

15. You find that you don't have half the control of the project you thought you did, and costs and schedule are headed in the wrong direction.

Do your homework about the level of control you are likely to have and manage expectations accordingly. Negotiate a good contract, and keep negotiating all the time. Have an effective international arbitration clause.

16. Your management committee must make a consensus decision, but the consensus is that you don't agree on what to do because you have different priorities.

Take time to understand each other's goals. Be patient and find a way around problems. Remember that for the project to succeed both parties must also feel they are winning with the success of the project.

Senior Management and Investor Support

17. You need senior management intervention to solve an in-country problem at the highest level, but your senior management has never met their NOC counterpart.

Have senior management involved early, and travelling to the host-country. Relationships need to be in place for when problems arise.

18. The project isn't delivering according to expectations, and management has run out of patience.

Do your homework, and communicate your learnings to senior management. Get them into the host country so they can understand the issues and
environment.

Project Organization and Leadership

19. Your head office personnel think that the host-country personnel are idiots, and the host-country personnel say the feeling is mutual. Set up frequent and formal communications, such as a conference call weekly meeting. Encourage informal discussion. Disseminate information freely so each side is working from the same information (technology makes this fairly simple now). Clearly define responsibilities.

20. Some of your expatriate staff are going nuts because “things aren’t working the way they should be—like at home.” Select people who have the right temperament and outlook for the job, and give them some training and support.

Project Organization and Leadership

21. People on the project know that bad decisions are being made, but don’t feel part of the process, and stand aside while disasters are in the making. Considering that most international staff are senior, and that international projects are complex, set up multi-disciplinary teams with considerable autonomy, particularly in the project selection phase when innovation and project ownership by multiple experts is beneficial.

Experienced practitioners will probably recognize that any one of these risks can be sufficient to spell failure for a project, and those familiar with the University of Calgary’s research on S.M.A.R.T. project management techniques might consider these as evidence that this approach applies readily to international petroleum projects (Hartman, 2000b).

Surprisingly, there was almost no contradiction in the conclusions between the three research approaches in this study in terms of identifying and managing risk.
Rather, the case study, the literature review, and the expert interviews provided complementary or overlapping results. The differences were only in emphasis. The literature had much to say on numerical methods for quantifying risk, managing portfolios, and in team effectiveness issues. The expert interviews showed an emphasis on cultural differences and managing the partner relationship, while the Tinrhert case study focussed on data, organizational, partner, and security issues.

My view on this is as follows:

- the literature emphasizes quantifying risk and managing portfolios as this is intellectually challenging, lending itself to sophisticated solutions that combine, amongst other things: economic theory, numerical methods like Monte-Carlo, portfolio theory, and investor risk tolerance to suggest corporate strategies;
- expert practitioners are less enamoured with numerical sophistication. This may be partly a question of understanding, but I suspect it is also related to pragmatic skepticism of the quality of the numbers that feed these models, i.e. the tools have become better than the raw data going in, and data (or data quality) is now the limiting factor;
- expert practitioners were most interested in managing partner relations as a risk, possibly because of the importance and the difficulty in doing this well, and the number of times they (as senior managers) would need to get involved in resolving these issues. Although devilishly difficult to execute well, from an academic point of view the concepts of managing partner relations are quite simple. The Tinrhert project team also experienced substantial partner challenges;
- organizational issues received considerable coverage in the Tinrhert project as well as the literature. The Tinrhert project organizational issues stemmed from experimentation with a variety of organizational models during the project life, and the animated debate within and outside of the team associated with changes in the model over time. The literature available on
organizational issues is enormous because the field spans far more than just international petroleum ventures. Expert practitioners were less interested in this topic, perhaps believing that if there were any issues in how they were managing, they would have done something about them! And

- the Tinrhert project team put the greatest emphasis on data. Most of the people interviewed had substantial "on-the-ground" experience as part of a technical process that included gathering and analyzing data, and the project team felt it did not handle this as well as it could have. From an academic viewpoint, again, the concepts are simple, and once the point is made there isn't much more stimulating stuff to be written.

How do we know that the findings are credible? Their credibility arises from:

- the quality of the source material (structured interviews of expert practitioners and unlimited access to data for the Tinrhert project);
- my 10-year engagement in the field of international petroleum;
- the consistency in the data for identifying and managing risk from a variety of research approaches, as discussed above; and
- the substantiation of the findings through reviews—on the Tinrhert project summary from Tinrhert project team members and from the expert practitioners on the conclusion from the expert interviews.

There are threads of advice that run through many of the main risks identified in this study:

- find win-win solutions with the NOC/Government;
- work hard to get good information, both technical and of the softer variety. Know what you're getting into. Do your homework;
- use the information as input to good analysis and decision processes;
- communicate reasonable expectations to stakeholders;
- build the necessary relationships and trust;
- hire capable people, and involve them in a clearly defined way; and
- let your conscience be your guide.
In terms of application to other international projects, my speculation is that these threads (and perhaps even many of the more specific risks) would also apply to international projects outside the petroleum industry, although perhaps in a different way, or with a different emphasis.

In addition to creating a summary of advice, this study resulted in a quantified analysis of where the expert practitioners saw the major risks. The highest ranking was in the category of NOC/Government Relations and Cultural Differences. This scored highest in terms of risks identified and advice given, and shared the highest score in terms of mistakes made.

What are the limitations of this study? Although most of the recommendations related to managing risk come from multiple sources, some of the recommendations come from a single source and are, as such, less rigorously grounded. Also, the chosen field of this study is so broad that here is always more information that could be reviewed and included. That this study exceeds 300 pages in length is a testament to this dilemma. This study also uses Canadian oil companies as a focus, and as the perspective from which the thesis is written. I was unsuccessful in getting the NOC/government perspective in a formal interview.

Do these learnings apply elsewhere? My contention is that these conclusions apply to a large degree to any oil company based in the developed world seeking to do business in a developing nation, particularly where there are significant cultural differences. The risk categories of project selection and data phase, technical risk, EH&S and security, politics and economics, NOC/Government relations and cultural differences, senior management and investor support, and project organization and leadership would all be familiar. Other resource industries would probably also recognize the project risk management issues addressed in this study. At the most general level, so might many companies doing business outside the oil and gas industry, but less so. Within the oil and
gas industry, however, if social and business cultures and degree of development were similar between the home country and the host country, many of these risks would be reduced to that of a typical project in the home country.

Upon review of the collective information from all three sources, the single biggest change I would recommend to oil companies is to start applying a project risk register to international ventures. The nature of this highly complex business is that any one of many individual risks can spell failure for a project. Each risk needs to be identified and managed. Additionally, people tend to manage risk based on their own experiences and background. Entering a new area implies new risks that have not yet been experienced by decision-makers. A project risk register would help identify the risks and force discussion of risk management measures. Petro-Canada's next major project proposed for Algeria is called the Tinrhert Regional Gas Project, which, if launched, would be by far the largest project yet undertaken by Petro-Canada internationally. If this project moves forward, I will be assisting the project team in assembling the project's risk register.

In terms of further inquiry by other researchers, a number of questions arose during this study that I have not seen investigated. These are detailed in Chapter 6, but a few are worthy of special note. These include:

- how does the level of data released by a regulatory body affect industry? This could be measured in terms of investment efficiency, degree of competition, levels of activity, government revenues, and industry profitability;
- how does the entry strategy chosen by a company affect the success of the project? Do relationship-based approaches work better than opportunity-based approaches? Also,
- I would be interested to see some research on managing what appears to be an almost unlimited potential for misunderstanding between the host-country and head offices
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Appendix A: The Tinrhert Project Story—The Path to First Oil

1. **Country and Tinrhert Facts**

   The following is some basic data to provide the reader with some context:
   
   - Algeria is the second largest country in Africa;
   - the population is approximately 25 million;
   - there is a high population growth rate, and significant unemployment;
   - the primary religion is Islam;
   - the primary language is Arabic, although French is common amongst the well educated, and the Berber minority also have their own language;
   - the primary export is petroleum, which accounts for 95 per cent of foreign exchange earnings;
   - the economy is largely *centrally planned* (as opposed to free market), although some liberalization is taking place;
   - there has been significant political and social violence since 1992;
   - Tinrhert is the name of permit awarded to Petro-Canada by Sonatrach and the Ministry. It is in the eastern part of the country along the Libyan border, and covers around 10,000 km2; and
   - Tamadanet is the name of the first oil pool developed by Petro-Canada.


   **Objectives**

   The key objective for the project selection phase was to find an appropriate Block (acreage) that met a number of criteria. These criteria were clarified as part of Petro-Canada’s “Strategy for International” in 1990. The strategy document used a number of criteria to rank countries, including:
   - availability of petroleum mineral rights (land);
   - suitability to Petro-Canada niche;
   - level of infrastructure;
possibility of finding “big prizes”; proximity to known accumulations of oil; and attractiveness of fiscal regime.

Algeria was one of the chosen countries in this ranking, and was robust through a variety of weightings using Kepner-Tregoe methodology.

The project selection phase had two main elements:

- determining which country to explore in; and
- determining where in that country to explore.

Prior to 1990, Petro-Canada had been unsuccessful in exploring for the “high-risk, high-reward” type of prospects. Algeria was deliberately chosen by Petro-Canada as a result of its lower technical risk profile relative to other comparable opportunities.

**Petro-Canada Organization**

During this project selection phase, the Algeria project was handled like all other Petro-Canada international projects. The organizational style was that of a functional organization of the typical command and control type. Geological, geophysical, and land services were provided within the International group, while most other services were requested from other functional groups within the Petro-Canada organization. Within the geological and geophysical function, there was a “New Ventures” group that was looking at Algeria as well as other opportunities.

**Partner Relations**

Algeria was starting to open up again to allow the involvement of foreign oil companies in their energy industry through joint ventures with Sonatrach, the Algerian national oil company. Since the nationalization of the entire oil industry in 1971, Sonatrach and its affiliates did the exploration and development almost exclusively. This included national drilling and seismic companies. People within Sonatrach expressed a variety of views on the entry of foreigners into the oil
industry.

Some welcomed it as a much-needed investment of new capital and new ideas into the country. Since nationalization, there had been few new exploration discoveries, and reduced oil prices meant that the country could no longer afford the investment needed to sustain the industry, which accounts for 95 per cent of the foreign exchange earnings of the country.

Others in Sonatrach and in Algerian political circles saw it as the giving away of the "national jewels" to money-hungry capitalist foreigners (AAT, 1996).

Quality of Information

One of the major differences between working on a typical international oil project versus a Canadian-based oil project is the amount and quality of information. In Canada, the vast majority of information is gathered and held by the government or government agencies such as the Alberta Energy Utilities Board (AEUB), and issued to any interested party for a nominal fee. Algeria's data situation is typical of most countries of the world—the data exists, but:

- is not centrally organized in a way that makes it readily available;
- not available due to improper archiving; or
- the NOC or government withholds the information for use as leverage or power.

Only once the contract with the foreign partner has been signed does data become fully available, and even then it takes significant time and effort to secure. Ultimately, it took Petro-Canada about four years to gather the data for the Tinrhert Block (covering a few hundred wells and more than 10,000 km of seismic data). Even today, data arrives intermittently that was not forthcoming initially.

When scoping various investment opportunities around the world, the following information was available to Petro-Canada:

- country rankings from commercially available databases;
the experience of Petro-Canada personnel;

- the specific opportunities known to Petro-Canada personnel based on opportunities reviewed; and
- experience gleaned from discussions with peers in the industry.

Once Algeria was chosen as a country with potential, a small project team started to look at the various geological basins in Algeria, and selected the Ghadames and Illizi basins as most prospective (criteria used included the number of present day oil discoveries, number of reservoirs, and risk factors such as the presence of source rock and seal). After examining data in the two basins, the Illizi basin was chosen using the additional criteria of geographic accessibility/infrastructure and indications of known structures.

The Tinrhert area was chosen after three technical visits in 1990, and was formed by combining parts of four separate blocks, including all of 239 plus parts of 234, 240 and 244. The agreement of Sonatrach to this significant acreage (and more than one block) was encouraging to the project team.

**Work Contracts**

There were few external contracts awarded during the project selection phase. There were a number of studies purchased that gave general country overviews (Economist Country Profiles, Petro-Consultant reports on typical costs and reserve sizes, Robertson Research reports on Algerian oil pool characteristics).

**Personal Security**

There was limited political violence in Algeria during the 1989-1991 time frame, although 1988 saw demonstrations and civil unrest. The travel precautions prescribed by Petro-Canada related to:

- personal hygiene and food; and
- avoiding being the target of theft.

**Business and Technical Risks**

Business risk in the international oil industry arises from either
a) **Technical/exploration risk**

An exploration success rate for a typical $5 million exploration well might be 10 per cent. A one-well exploration program in a country, plus the associated seismic program, technical interpretations, and office costs can easily add up to $20 million. With only a 10 per cent chance of success, how can you avoid gamblers ruin (the notion that repeated risky investments cause you to go bankrupt before winning) and end up with the positive expected end result?

Initially (1985-1990), Petro-Canada approached the technical risk element of the international business by getting involved in a large number of ventures, usually (but not always) by sharing the risks and costs with other companies. These ventures were almost always high risk. With Algeria, there was a shift in this strategy to a lower risk project, with the knowledge that the rewards might be more modest as well. The key risk for Tinrhert was not that Petro-Canada wouldn't find any oil, but that the pool sizes might be too small to be profitable.

The limited amount of technical data available prior to the signing of the PSC made the understanding of technical risks more difficult—in other words, there was no assurance of technical success. The inclusion of existing Sonatrach discoveries in the PSC did minimize technical risk, even though it was understood that these would likely be marginal discoveries.

b) **Risk of confiscation of property**

All countries pose business and political risks when it comes to the oil industry. These risks were reviewed at a high level for the countries under consideration for Petro-Canada involvement.

Algeria has a previous record of nationalization. The oil industry was
nationalized in the late 1960s. The business and political risks in Algeria were studied, but the anticipated early cash-flow profile limited the amount of exposure in the country at any one time. There was a high level of interest in Algeria by many foreign oil companies in spite of the previous nationalization.

Petro-Canada’s analysis of Algeria was that the likelihood of nationalization was remote.

c) Risk of changing business terms

This risk relates to the rules or laws within the country being changed once an oil company has had success, or to reflect a different set of political realities within the country. For companies that have made investment under a previous and different set of assumptions, this is typically unwelcome when the change is adverse.

Another business risk relates to the interpretation of the contract by Sonatrach.

In Algeria, the PSC terms have the force of law, meaning that Sonatrach alone does not have power to impose its terms on Petro-Canada, but that a change of law is needed. This provides some additional stability for the fiscal terms.


Objectives

With Tinrhert identified as a project area of interest, the next step was to conclude an agreement with Sonatrach on the scope of the work and the applicable fiscal terms. This contract would need to be passed into law by the Algerian government. Also, approvals would be required within Petro-Canada, up to the level of the Board of Directors. The PSC defines the contractual
relationship under which Petro-Canada operates in Algeria, and is an original document (i.e. negotiated sentence by sentence) over 100 pages long.

**Petro-Canada organization**

In 1992, Petro-Canada changed the organizational style to that of self-directed asset teams. This coincided with a strategic decision to exit the business of international exploration. The full-time geological and geophysical staff dedicated to Algeria was laid off in the reorganization, and only part-time geological and geophysical, engineering, and negotiations staff were left to wrap up the remaining international projects. This created a challenge to the not-yet-approved Tinrhert project: to be something more than just another international exploration venture if it was to survive.

Three key factors allowed the Tinrhert project to survive the change in Petro-Canada’s international strategy:

- the Tinrhert Block had the potential for development and pool optimization opportunities (in addition to exploration), if these could be negotiated with Sonatrach. This is discussed further under partner relations;
- the Algeria Asset Team believed that Tinrhert was a good opportunity for Petro-Canada, and people on the team made a personal commitment to seeing the project succeed in spite of the obstacles (internal and external);
- Petro-Canada management was willing to consider the opportunity, even though it was not an easy fit into the corporate strategy.

Only one member of the newly formed Algeria Asset Team had experience with working in self-directed asset teams.

The management team of the Frontiers and International department was similarly inexperienced with the notion of self-directed teams. The Algeria Asset Team relied on the limited experience available within the group, the available
literature, and occasional Human Resource guidance to evolve into a team recognized for superior performance during this phase of the project. A set of team norms was developed that provided for expectations of team members. In April 1993, these included some of the following elements:

- a statement as to the fundamental principles of the asset team;
- discussion of who was a member;
- discussion of the role of the team;
- discussion of the decision-making process;
- discussion of the conflict resolution process;
- role of individual team members; and
- communication processes.

These processes were used by the team up until April 1996, when Petro-Canada reorganized.

**Partner Relations**

The negotiation of the PSC brought to light some of the cultural differences between Sonatrach and Petro-Canada. These included differences not only in social culture, but also business and corporate cultures. Some of these differences included:

**Time**

In Canada, people have a strong sense that lost time is lost money. In Algeria, the person who is in a hurry is less able to conclude a favourable agreement. The PSC negotiations took three years to complete.

**Negotiating Tactics:**

In Canada, there is a certain set of negotiating tactics that would be found acceptable. The Algerian culture allows a far greater variety of tactics to be employed. A simple example might be to make a concession to get something you really want, only to deny having made the concession at the next meeting. A
handshake deal that Petro-Canada thought was concluded in 1990 would be substantially modified (largely by Sonatrach) before the negotiations were concluded in 1993.

**Profit:**

The business culture in a reforming, centrally-planned economy differs substantially from that of a capitalist corporation even that of a "newly capitalist" one such as Petro-Canada's. This was evidenced in the fiscal negotiations on a separate project in Algeria called 'El Gassi', in which the fiscal negotiations on the proposed project fell apart because it was felt to be too profitable for the foreign contractor. Centrally-planned economies respond better to paying someone their costs and a margin, as opposed to allowing the market to determine the appropriate price for goods and services. Evidence of Sonatrach's mind-set of allowing a certain return emerged during the El Gassi negotiations, when Petro-Canada was told by Sonatrach what the limit of their rate of return was allowed to be (essentially a risk transfer, with a cap on potential profits).

At the end of the negotiation period, Petro-Canada negotiators felt that the Algerians had negotiated shrewdly to ensure that their slice of the pie was maximized, but that the negotiating style precluded making the pie larger for both companies. (Dunkley, 1994). This is because the negotiations were not open enough to allow the exploration of innovative win-win scenarios for both companies. Instead, the discussions focused on zero-sum discussions as to who got what share. One explanation of this might be that Sonatrach's corporate culture is more rigid than that of Petro-Canada. As such, it does not allow for flexibility and initiative on the part of staff below a senior level. It could be argued that the Sonatrach negotiators were not empowered to be, or rewarded for being, innovative.

Contact between the two companies during the negotiation phase was generally
at a junior management level, with only an occasional exchange amongst the executives of the two companies. The exception to this was a visit by the chairman and CEO of Petro-Canada to Algeria in 1991. The occasion of this visit was used by the Algeria Asset Team to encourage Sonatrach to consider the inclusion of development opportunities in the contract. The inclusion of these assets ended up being critical to the ultimate approval of the project within Petro-Canada.

Sonatrach's key objective for the PSC was for Petro-Canada to undertake exploration in the Tinrhert Block. For the PSC to be approved within Petro-Canada, it needed to be shown that the project could be pursued on the basis of delineation/development/optimization opportunities, and the five well exploration program was considered as a secondary opportunity. The PSC, when completed, was constructed to ensure pursuit of both exploration and delineation/development opportunities, but the differences in priorities between Petro-Canada and Sonatrach would remain an issue.

**Quality of Information**

Information was still difficult for Petro-Canada to obtain during the PSC negotiation phase. Petro-Canada’s objectives were to find out as much as possible about the Tinrhert area in order to assure that the Block had sufficient reserves potential. Additionally, Petro-Canada wanted to ensure that the path from an oil or gas discovery through to the sale of the product in the market place (which is how Petro-Canada is compensated) was clear of obstacles.

When the PSC discussions were completed in 1993, there were no foreign companies operating production in Algeria. Sonatrach operated all the production in the country.

At the end of the negotiating period, there remained a number of unanswered or only partially addressed questions:
the tariff structure for the transportation of petroleum to market;
the conditions under which gas would be marketed;
the degree to which Sonatrach would use their role in the management committee (including veto power) to influence decision-making, since Petro-Canada was providing all the capital during any exploration and delineation activities;
the amount, quality, and availability of technical data in, and especially around, the project area; and
and the approvals process and time-frame for the PSC itself, as well as for the development of any oil pools that would subsequently be proposed to bring oil or gas on production.

The answers to these questions were sought during the negotiations period, but were not forthcoming for a variety of reasons. Sonatrach was new to dealing with these issues, and had not completely resolved how they wanted to deal with them. For example, in Canada, petroleum producers deal with transportation (pipeline) companies at arms-length. There is a legislated process by which tariff rates are determined, and these are widely known. Precise measurements of product are made to ensure that the interests of parties are looked after. In Algeria, Sonatrach not only produces hydrocarbons, but also transports and sells it. The boundaries between these usually competing interests are less clear than what would be common when a carrier transports oil for another party.

Regarding approval processes, Sonatrach was reluctant to divulge the workings of their system, which made it difficult to be an active participant in providing the right information to the right place, or to predict the time frames and results for agreements.

I believe that "information as power" is widely used both by and within Sonatrach as part of their business culture.
One outcome of this is that after the signing of the PSC in April 1993, its ratification by the government took an additional 11 months—about twice as long as predicted by the project team.

**Work Contracts**

Very little work was contracted out during the negotiations phase. Exceptions to this were a study of the geology by a consultant and, significantly, the contracting of an Algerian legal firm to provide in-country counsel.

**Personal Security**

The personal security issues during the negotiations phase were limited, and of the same nature as during the (prior) project definition phase.

**Business and Technical Risks**

_a) Technical, usually exploration risk_

Additional information became available during the negotiations that allowed a better understanding of the technical risks in the block. A review of the historical exploration success rates showed them to be quite high.

_b) Risk of confiscation of property_

A bloodless coup occurred in January 1992 while Algeria Asset Team members were in Algeria. The coup was in response to an election victory by the opposition Islamic fundamentalist party (FIS). Although the economic policies of the regime did not change visibly in regard to the oil industry, there were concerns that a fundamentalist victory would not be as receptive to foreign companies doing business in Algeria. Both the socialist/nationalist forces and the fundamentalist forces were less supportive of foreign business interests. Neither group was calling for a confiscation of foreign property, however.
4. **Start-up and Data Phase (1993-94)**

**Objectives and Overlaps**

The objectives of this phase were to:

- obtain the technical information needed to determine the locations for seismic and drilling activities (this is where the bulk of the Petro-Canada’s PSC work obligation lies);
- assess the petroleum reserve potential of the Tinrhert area; and
- start to build an operational capability in-country (communications networks, offices, contacts, bank accounts, etc.).

The Algerian government still had not approved the PSC, but Sonatrach allowed the data to be released regardless.

Also, the data phase has not yet ended and there is still data being gathered from Algeria at the time of writing. In the 1993-94 time frame, however, data-gathering was one of the primary objectives.

**Petro-Canada Organization**

The signing of the PSC by Petro-Canada and Sonatrach marked a rapid expansion of the asset team. New members added included a resident manager, a finance and administration manager (both Algeria-based), a drilling superintendent, a facilities/project engineer, and several of the part-time team members became full-time. This brought the number of full-time team members to about 10, with an extended team of about another 10 people.

For the staffing of the project, a decision was taken to fill the most senior positions with Petro-Canada personnel, while hiring host-country staff for the non-supervisory administrative jobs. The Algerians hired were quite junior, which had the benefit of simplifying their learning of how foreign companies do business, however the lack of senior Algerians who had a working knowledge of
the Sonatrach organization placed a lot of reliance on our in-country advisors.

There was also an expansion of the team norms to reflect the new circumstances of the project, and the norms provided a focal point for both discussion of new ideas, as well as alignment of new members into the culture of the team.

One of the early challenges to the asset team concept occurred when a member of the management team wanted to continue to manage the project under traditional command and control lines. Strong commitment by the Algeria Asset Team members to the team concept and to the project itself allowed them to reject this, and the team was a more closely-knit unit as a result.

Another development during the data phase was the allocation of members of the management team to each of the major projects to serve a coaching function to the asset team, and liaise between the asset team and business team.

Efforts at team-building and increasing team effectiveness included:
- Meyers Briggs analysis
- and "Teamworks" assessment of team strengths and weaknesses

The Algeria Asset Team also convened the first annual strategy sessions, at which the goals and plans for the following year were prepared.

**Partner Relations**

The relations with Sonatrach during this phase were cordial. Sonatrach agreed that all expenses incurred during this phase would be cost recoverable, even though the government had not yet ratified the PSC.

One of the key challenges for both partners was learning how to work together on the management committee, including what decisions could be Petro-Canada's alone, where Sonatrach wanted input, and what level of formality was required when taking a decision. In general terms, it was determined that
Sonatrach preferred minuted decisions to informal ones.

It became evident that although Sonatrach had management committee representatives from a number of different departments, that not all stakeholder groups within Sonatrach were represented. For example of this was when accounting issues or marketing issues came up, the Sonatrach side of the management committee was unable to speak to these issues at the meetings.

The Sonatrach management committee representatives were only involved part-time with Petro-Canada. They attempted to act as a liaison between Petro-Canada and various Sonatrach departments, but had limited success due to the barriers between the various functional groups within Sonatrach, as well as their other job responsibilities outside the Petro-Canada management committee.

Petro-Canada Resources’ president and vice-president were in attendance at the signing of the PSC in April 1993. During the data phase and project start-up, there were no additional contacts at the executive level between the two companies until 1995.

**Quality of Information**

The majority of the technical information needed to undertake the project was found in six locations in Algeria:

- a field office at Ohanet;
- three core storage areas (Hassi Messaoud, In-Amenas, and Boumerdes); and
- files in the Exploration and Production offices (Cote Rouge and Hydra).

Initial attempts at copying and capturing information involved meeting with individuals to find what data existed, getting approvals for specific data from the “Data Control” department of Sonatrach (if the information was exploration related), and getting informal approvals for all other information. Much of the information resided in people’s offices.
Sonatrach was reluctant to share anything beyond the raw data. This made access to internal studies and evaluations difficult. Sonatrach departments that were not directly involved in the PSC discussions (e.g. the research group at Sonatrach's Centre de Recherche et Développement) were more reluctant to provide information to Petro-Canada, as this consumed some of their limited resources.

Much of the drilling and seismic activity in the Tinrhert area preceded the revolutionary war with France, and some of this data no longer existed in Algeria.

Petro-Canada initially did the data-gathering and copying alone, while trying to find an organization that would do this on a commercial basis.

The amount of technical data that was available in the Tinrhert area was quite high, and the slow rate of data transfer meant that decisions on the seismic program would be made before all the relevant data was available (see next section).

A number of meetings were held with various departments in Sonatrach to determine what the interaction with these groups would be, and to gain an understanding of the workings of Algerian systems. Some progress was made in this area, but Sonatrach's inexperience at dealing with foreign operators meant that a number of questions remained unresolved.

Discussions were also held with foreign companies working in Algeria in the oil sector. The sense of community that exists within the oil industry made these discussions a rewarding source of information in the areas of importing and transporting materials, housing and office availability, and labour law.

Examples of questions that could not be answered during this phase included:

- transportation tariffs;
marketing methods;
the availability of the Sonatrach infrastructure for use by Petro-Canada in the Tinrhert area (this is a remote area of the Sahara desert, where Sonatrach owned most of the existing infrastructure—i.e., there were no hotels or restaurants); and
and the process and time frame for getting developments approved.

Work Contracts
This was not a capital-intensive phase of the project. Most of the effort went into setting up the systems that would be needed to carry out the project. Examples include:
importing and expediting;
transportation within the country;
security and political intelligence reports;
administrative help in the office;
accounting;
computer support; and
and data copying and shipping.
Petro-Canada benefited from the experience of three team members who had been involved in other international projects when setting up the office in Algeria.

A retainer type of contract was used for importing, expediting, security, accounting, and computer support.

A fee for service was used for in-country transportation, and data copying and shipping.

Administrative staff was hired locally.

Security and cost considerations led to the location of expatriate families in France, while the expatriates themselves commuted between France and
Algeria. There were also some risks identified in contracting high quality office space in Algeria. The landlords often wanted foreign currency deposited into foreign bank accounts to deal with currency convertibility and tax issues. This type of contract was not welcomed by Petro-Canada, and the office ended up being rented space in a hotel that did not present these problems.

**Personal Security**

Prior to October 1993, there were a significant number of attacks on military and police targets, and corresponding retaliations against fundamentalist sympathizers. Foreigners were exempt. Within this environment, the Algeria Asset Team felt it could conduct a significant amount of its business in Algiers by bringing in the people needed to do the job at the appropriate time. For example, during the start of the data collection phase in April 1993, technical team members went to Algiers for periods of up to three months to visit site locations and start the flow of data.

This changed when the GIA, one of the extremist groups, started targeting foreigners for assassination. This turn of events changed the operating mode to one of only having expatriate staff in Algeria when absolutely necessary. Trips to Sonatrach offices and installations became more difficult and less frequent because of the security risks.

The risks were limited to the northern, populated part of Algeria. In the largely unpopulated Sahara desert in southern Algeria, there have been few, if any, security incidents. Although Petro-Canada required a presence in Algiers (in the North) for interaction with government and personnel people, the Tinrhert block and all the associated Petro-Canada operational activities are in the south, in a more secure environment.

Petro-Canada’s approach to security management in the North was based on a philosophy of keeping a low profile, staying in guarded compounds, keeping
movements unpredictable, and having good security information. Specifically, this meant:

- keeping personnel in a secure place (the guarded hotel);
- restricting movement outside the hotel;
- not traveling according to a routine;
- establishing a variety of sources for security information;
- maintaining evacuation plans in a high state of readiness; and
- providing pre-travel security briefings to all project personnel, including contractors.

**Business and Technical Risks**

The major technical risks for the project have been identified as Petro-Canada's ability to find petroleum reserves (exploration risk), and getting the information needed to understand what the block potential was. The technical team in Algeria, led by the geophysicist, identified an attractive structure that had a high probability of success soon after receiving the data in that region. This structure already had a successful well in a shallow horizon. The identification of this prospect provided comfort that the Tinrhert block would have the petroleum potential to be able to cover the costs committed to it.

The letter provided by Sonatrach ensured recoverability of costs during this phase (while awaiting government approvals) and minimized the business risk during this phase of the project.

The increasing security problems posed a business risk in that they raised the possibility of interrupted operations due to civil war, or that the government might fall. Advice as to the probability of a change in government was sought using political intelligence reports.

Discussion started within Petro-Canada as to whether divesting a share of the project through a “farm-out” might not be a good way to mitigate risk. The option
was debated in some detail during the next two phases.

5. **First Well (TM-103) and Start of Seismic Program (1994-95)**

**Objectives**

This phase of the project reviews the steps between the identification of a drillable structure during the data phase in May/June 1993 and the drilling and completion of the first exploratory well in August 1994. The major elements included:

- getting the appropriate approvals within Petro-Canada;
- determining how to deal with the risking of larger amounts of capital (U.S. $5.5 million) than in the previous phase;
- securing funding from Petro-Canada;
- getting Sonatrach approvals; and
- creating an operational capability in Tinrhet to allow the drilling of the well.

A parallel activity involved the start-up of the exploration seismic program that was being undertaken to identify subsequent exploration well locations.

**Petro-Canada Organization**

The Algeria Asset Team structure continued during this phase. The essence of the team norms remained unchanged, but additional details were added to define communication and decision-making channels during the drilling phase. These were necessary, as the drilling of a well requires real-time decision capability on a 24-hour basis. As the team continued to expand (approximately 20 members during this phase), there was also a need to delegate more decision-making down to the level of individuals and sub-teams.

One of the most commonly discussed team issues was the question of who was on the team, and who was not (i.e., who was to be involved in making the team decisions). Rather than assigning names, which was felt to be too static and
divisive, the Algeria Asset Team adopted the philosophy that team members were those who needed to be involved at that particular phase of the project. Members needed to decide for themselves whether their involvement was appropriate. Any problems would be managed by exception.

Another observation occurred as real-time decision-making became necessary. Decisions made far away suddenly seemed less rational to a distant observer, even though the people making the decision were known to be competent. The realization was that people were operating from different data-sets, and the lack of some key facts to a distant observer made a rational decision seem less so.

**Partner Relations**

The Sonatrach representatives to the management committee were first level supervisors. On a number of issues such as rig selection and well locations, the representatives did not feel that they had the authority to take a decision without consulting with higher levels of Sonatrach management. Although Sonatrach sells approximately $20 billion dollars worth of petroleum products every year, the specifics around rig selection can still require vice-presidential consultation within Sonatrach.

Since Sonatrach employees are reluctant to discuss the limits of their authority (the usual line is "I'm the one to talk to if you need a decision"), this learning was gathered through trial and error. The key decision-maker at Sonatrach during this phase was the Vice-President Exploration, and the Petro-Canada Resident Manager proceeded to build communications channels with this individual.

There was also a partner issue with the selection of the first well location. The proposed location (TM-103) was to test the Ordovician—a deep (as yet undrilled) horizon in the Tamadanet structure, while a shallower horizon (the F6) had already tested oil in an earlier (1962) Sonatrach well. Sonatrach's stated interest in contracting with Petro-Canada via the PSC was to promote exploration, and
they saw this as more of a delineation well. Petro-Canada had the additional interest of getting to first oil production as soon as possible, both as a way of managing capital exposures (having revenue to offset expenditures) as well as using the demonstration of success as a means of justifying additional investment.

The management committee was able to agree on the drilling of TM-103, although Sonatrach made it known it would not concur with a next location that included a delineation/development component—Sonatrach was more interested in pure exploration.

The most difficult part of the management committee deliberations for the first well had to do with the selection of drilling contractors. Drilling contracts are usually let on a day-rate basis. An Algerian and a foreign contractor each submitted a competitive bid. The edge went to the foreign contractor when a Kepner-Tregoe analysis was done for the overall drilling project (including safety, technical quality, and so on in the analysis). Sonatrach was more familiar with a bid-price approach, and also favoured using Algerian contractors whenever possible. The management committee ended up settling on the foreign contractor after much discussion.

Another problem faced by the Algeria Asset Team during this phase was a delay in government approval of the PSC. Although work being undertaken in advance of governmental approvals, with Sonatrach's agreement, there remained continued uncertainty as to when field operations would be allowed to start.

There was an excellent demonstration of cooperation during the planning of testing operations for the well involving a late-night conference call between Petro-Canada Calgary-based technical staff, Petro-Canada Algeria-based staff, Sonatrach technical and supervisory personnel, and Algerian Ministry personnel. This resulted in Sonatrach's experience in the area being meshed with Petro-
Canada expertise to result in an improved testing program.

With regards to the seismic program, there was also a good working relationship between Petro-Canada and Sonatrach, and this allowed for the work program to be approved by the technical and management committees without any problems.

Quality of Information

**TM-103 Well**

The TM-103 well was drilled on the basis of detailed information in the area around the Tamadanet structure, but only partial information about the Tinrhet permit as a whole. Although this was not the technically ideal approach (which would have been to gather all the information possible before undertaking operations), it was a risk taken to address business needs.

The TM-103 well was an operational success in most aspects, and things were generally smooth through the drilling, testing, and completion of the shallower (oil bearing F6) interval.

There were problems encountered during the deepening of the well to the Ordovician horizon in that the drilling bits were not suitable for the hard quartzose sandstones encountered. The learning from this was captured in the well review. This problem might have been minimized through additional investigation of the few wells in the area that had been drilled to this depth.

The key to the technical and commercial success of the F6 depended on finding the formation sufficiently structurally high to avoid the oil-water contact. These risks are generally mitigated through the acquisition of additional seismic, however the business priorities plus the determination that the substantial majority of the technical risks would not be resolved by seismic resulted in no additional seismic being acquired. In any case, the well was drilled and resulted
in a significant success (a test rate of 850 m³/day of oil), and the formation depth came in very close to prognosis.

The well was also a success in the deeper Ordovician formation, with gas discovered in a 200 m thick interval.

From a "quality of information" basis, the well results were significant because they proved the existence of additional petroleum reserves in the Tinrhert block that could be exploited by Petro-Canada.

**Seismic**

The first phase of the Petro-Canada exploration seismic program was to add 780 km of seismic to the 10,000 km of data that existed in the Tinrhert area. The existing data was of varying vintage and quality, and not entirely consistent, which made it difficult to mesh. This data was reviewed in paper form, but time constraints meant that not all data was reprocessed prior to the placement of new seismic lines. The difficulty and delays of capturing data from Algeria meant that the $5 million seismic program was expedited for business reasons before all the existing data was understood. This was done consciously, as the PSC is of a limited duration (5 years) during the first phase.

**Work Contracts**

**Drilling**

A significant number of contracts were let in conjunction with the $5 million TM-103 well. These contracts related mainly to drilling materials and services. These bids were evaluated jointly by the drilling and materials management staff assigned to the project, and approved by the Algeria Asset Team and Sonatrach.
**Seismic**

The seismic program was initially bid on a day-rate basis. As with the drilling rig contract, there was considerable discussion around the award of the contractor between an Algerian and a foreign contractor. Ultimately the award went to the Algerian contractor, largely on the basis of a far superior bid price. A leap of faith was required on the part of the Algeria Asset Team technical personnel that this contractor could do the job effectively. After selection of the contractor, additional discussions ensued that converted the contract from day-rate to lump sum.

Overall, Petro-Canada was pleased with the performance of the seismic contractor. One notable exception was the 6-week strike that the seismic contractor faced, shutting down seismic operations during a key time for Petro-Canada.

**Personal Security**

This phase marked the start of significant operations in the Tinrhert area of the Sahara desert. There had not been any security incidents in this, or any other southern region of Algeria, and no threat was apparent. The drilling operations proceeded without specific protection from the Algerian military. No military presence was requested by Petro-Canada for its operations, largely because the concern that a military guard might attract attention to operations and that formal protection was no guarantee of safety.

The killing of foreigners and Algerians escalated during this time period. By June 1994, around the time the TM-103 well was started, 57 foreigners had been killed in Algeria.

**Business and Technical Risks**

The risks to Petro-Canada during this phase of the project increased as a result of an additional $10 million investment (half for exploration seismic, and half for
the TM-103 well). The major business risks involved:

- possible loss of investment due to government instability (although this was felt to be unlikely); and
- and the technical risk that the information from the well or the seismic would be disappointing.

Methods to mitigate the political/business risk were investigated, including insurance through the Canadian government (EDC), private insurers, and the World Bank. The private sources of insurance were prohibitively expensive (and dried up at the critical moment), while the Canadian Government and the World Bank did not have programs to cover exploration expenditures.

A method considered for covering political/business as well as technical risk was partnering (farm-out). This involves inviting another company to earn an interest in the project by having them pay a disproportionate share of the costs during a defined period. This received considerable debate within Petro-Canada when the decision to drill the TM-103 well was taken. The decision on whether to farm-out involves balancing the benefit of:

- keeping the whole project and associated rewards; and
- with the benefits of mitigating downside (risk) and leveraging assets during times of limited capital.

It was the view of the Algeria Asset Team that the chance of success at TM-103 was fairly high, and Petro-Canada management decided that the exposure was minimal. Petro-Canada drilled the TM-103 well at 100 per cent working interest, and was rewarded with a successful well in both the Devonian and Ordovician.


**Objectives**

The purpose of this phase was to build on the successful results from the TM-103 well by obtaining approvals for production from the Tamadanet field. The
near-term business environment in Algeria supported only the development of the oil reserves in the Devonian (the Ordovician gas discovery required substantial additional investment for delineation, and the process for marketing and transportation of gas was not yet defined for foreign companies). The first stage in the process was the creation of a development plan, along with economic, technical, and risk assessments. Approvals were sought from Petro-Canada for the funding, from Sonatrach for concurrence with the development plan, and from the Ministry (by Sonatrach) for the declaration of commerciality and exploitation permit. The Tamadanet project is a small (by international standards) five-well development. The investment required for the development of the field was estimated to be $45 million.

**Petro-Canada Organization**

The Algeria Asset Team membership was largely stable during this phase of the project, as were the team norms. There were, however, three different “coaches” assigned in succession to the project from the management team during this phase. This did not disrupt the project, although there was some effort required on the part of the Algeria Asset Team to bring the new coach up to speed on the project issues.

The most remarkable accomplishment by the Algeria Asset Team during this phase was the preparation of a development plan draft within six weeks of the completion of the TM-103 well.

**Partner Relations**

Partner relations were the most important part of this phase of the project. Not only did Sonatrach and the management committee need to approve the development plan, but Sonatrach was also required to prepare the application to the Ministry of Energy for the declaration of commerciality, and to the Ministry and Government for the exploitation permit, which required the signature of the Prime Minister. Complicating this was that Petro-Canada’s primary relationship during this phase was to be with the Sonatrach’s production department,
whereas it had previously been with the exploration department.

From the date of the first submission of the development plan by Petro-Canada to the management committee, to the granting of the exploitation permit by the government covered a period of about 19 months. The Algeria Asset Team had expected a duration of only three to nine months. This same (optimistic, as it turned out) time estimate was forwarded to Petro-Canada’s management, with no “padding”.

To mitigate schedule impacts, Sonatrach and Petro-Canada management approved the commissioning of fabrication, construction, development 3D seismic and drilling activities on the development prior to the granting of final permits (although no production was to be allowed).

Petro-Canada did not expect the approvals to take nearly as long as they did. The length of the approval process was due to:

- the proposed development by a foreign operator of an old discovery had no precedent in Algeria, and the inclusion of this type of business opportunity in the PSC did not have unanimous support within Sonatrach and the government;
- the low development costs for the field provided very high rates of return, which were not conventional in a socialist economy, and caused additional scrutiny of the project by the government. Ironically, these estimated (high) rates of return were associated with a level of field reserves that did not materialize;
- Sonatrach was responsible for the development applications to the government, but did not have people purely dedicated to the Tamadanet project, and had other priorities; and
- a lack of understanding of the approvals process (or steps within it) by Petro-Canada, and a corresponding inability to expedite them.
With the completion of the production facilities and the drilling of the development wells in early 1996, the exploitation permit required for production was still not in hand. Given Petro-Canada expectations of a much earlier approval, there was considerable pressure on both the Algeria Asset Team as well as Petro-Canada Management to start production from the field. As milestone dates were passed without production coming on, Petro-Canada did all in its power (which was limited) to influence Sonatrach and the government to expedite the process. The delay frayed goodwill between Petro-Canada and Sonatrach as well as reduced the credibility of the Algeria Asset Team (in terms of being able to deliver promises). These issues were also intertwined with some development issues, which are discussed in the next phase.

Approvals were finally granted on May 30th, 1996, and production started the next day.

**Quality of Information**

Petro-Canada’s understanding of the development planning process was limited. For example, it did not understand that the Prime Minister’s signature was needed prior to getting on production until a year after the first submission of the development plan.

Sonatrach was non-disclosing about the processes involved. Even in forums such as a one-on-one discussion during an informal luncheon, a senior Sonatrach manager in the department responsible for the development process was not willing to even discuss it. There was no documentation available to Petro-Canada about the process. The exact reason for the secrecy is not clear, although it is my opinion that ownership of the development process was a turf issue for Sonatrach, which was unwilling to be bypassed by having applications going directly from foreign companies to the government. Additionally I believe that some of these processes were being developed on the fly.
Another example of lack of understanding of the development process was around the use of reservoir simulation. Reservoir simulation is a numerical (computer) tool for estimating reservoir performance. In the estimate of Petro-Canada, this tool was not of significant benefit in understanding and predicting performance at this stage of the Tamadanet reservoir. Instead, Petro-Canada preferred to use simpler methods such as basing forecasts on the performance of offset analogue reservoirs. It took about three months before Petro-Canada understood that Sonatrach required a reservoir simulation model (with this realization, and after discussion of input parameters with the partner, it took only another three days to complete the work).

The one project that Petro-Canada looked to as a precedent for the development process was that of a large Italian oil company (AGIP). Unfortunately, the AGIP project was of a scale 10 to 20 times larger than Tamadanet, and their (contractually required) solution of creating a new jointly-staffed company with Sonatrach to carry out the development seemed out of proportion for Tamadanet. This meant that their processes were different from what Petro-Canada was to encounter, and the time frames for a large project such as AGIP’s were expected to be much longer than what Petro-Canada was expecting.

After several failed attempts by Petro-Canada at putting together the right documentation for Sonatrach, Sonatrach issued a guideline (table of contents) for what the submission should look like. It was also clarified that the documentation should all be in French rather than English. The final version of the documentation was submitted to Sonatrach by Petro-Canada in April 1995, more than six months after the initial submission. This was in spite of Petro-Canada staff making this its highest priority task.

**Work Contracts**

No significant activity occurred as part of this phase.
Personal Security

The development approval phase, particularly in late 1994 and early 1995 coincided with a peak in terrorist activity. This limited Petro-Canada's ability to meet with Sonatrach representatives and peers at a critical time. It had been Petro-Canada's plan to work jointly on the development plan with Sonatrach in Algiers, but the security situation made this untenable (it is also difficult to get Sonatrach people out of Algeria for an extended period). A management committee meeting to expedite the development approvals was canceled as a result of the security situation. Algerian extremists hijacked an Air France flight from Algiers to Paris on December 24th killing foreign passengers, seven days after the same flight was used by the Petro-Canada technical team to meet with Sonatrach on development issues. Much of the necessary correspondence took place by telephone, but this is a limiting form of communication when both parties are using their second language (French) over poor quality long distance phone lines.

Business and Technical Risks

Petro-Canada carried out a technical assessment of reserves potential for the pool, using Monte Carlo statistics to determine the probability distribution. This exercise had also been carried out prior to the drilling of the TM-103 well. The results showed a wide range of uncertainty (a factor of four) between the minimum and maximum reserve values, but as the minimum reserves were still double what was needed to make the project an economic success, the project received strong endorsement from a technical perspective.

The low project costs and high well productivities provided a high revenue-to-cost ratio, with the project paying out in less than two years.

When looking at the business risks, the combination of rapid pay-out and limited capital exposure (when taken as a proportion of Petro-Canada's budget and financial capability) was sufficiently encouraging for Petro-Canada management
to support the financing of the project in its entirety. Additionally, in looking at the potential for loss as a function of the political and security situation, it was Petro-Canada's assessment that although there was a significant risk of revenue delay, the risk of outright expropriation was quite limited.

Methods of mitigating the exposure that were considered by Petro-Canada included:

- farmout;
- World Bank equity participation;
- insurance of investment; and
- insurance of revenue stream.

Farmout and World Bank equity participation were rejected because of the high profitability of the venture, and more importantly the notion of being able to keep ownership of all the additional oil reserves from Tamadanet. The insurance of the capital investment was covered by Petro-Canada's regular insurance. The revenue stream was difficult and expensive to insure, and given Petro-Canada's analysis that the risk was more of a deferral of revenue rather than an ultimate loss in revenue, insurance of the revenue stream was not felt to be worthwhile. As a result, Petro-Canada decided to assume the sole risk for project 7.


Objectives

The major elements of the development phase included the acquisition of 3D seismic over the Tamadanet pool, the drilling of three planned (horizontal) development wells, the installation of surface facilities and camp, and the creation of an organization to accomplish all of the above.
Organization

The Algeria Asset Team organizational style remained intact during this phase (non-hierarchical, self-directed team). The most significant challenges to the team approach during this phase related to keeping efficient and meaningful discussions for such a large (20+) group. One of the key elements that made this possible was that the individuals on the team were experienced in their jobs.

Given the additional in-country activities ongoing during this phase related to the development, Petro-Canada added two expatriates to the Algiers office (an operations and an exploration director). The hiring method used was to:

- select a staffing team of four people that included a peer from Calgary, the business team coach, the functional leader (manager), the Algeria resident manager, and a human resource representative;
- have the staffing team define the job requirements, and obtain approval from the asset and management team;
- post the job internally to Petro-Canada;
- narrow the application to a few interview candidates; and
- conduct interviews (using the targeted selection method) and select a preferred candidate.

This was a highly successful process in terms of both getting well-qualified candidates into the jobs, and giving them the support to succeed from a wide variety of people.

The two new directors were given a coordinating role for related in-country activities, as well as a liaison role with Sonatrach. For security reasons, the families were located in France, while these two expatriates were based in Algiers (commuting weekly to France). This was a similar arrangement to that of the existing expatriates (resident manager and director of finance and administration).
Partner Relations and Quality of Information

Design Specifications

The previously discussed development approvals phase had been marked by Petro-Canada's only partial understanding of Sonatrach and government processes, of significant political obstacles caused by the profile of the project, and by many delays and much repeated work. That the process eventually achieved success was the result of significant effort (above and beyond the call of duty) by many people in both Canada and Algeria, and on the part of all parties—Sonatrach, the ministry, and Petro-Canada. All of these themes were carried forward into the development phase itself with the added complication of significant expenditures and operational activities ongoing (as opposed to purely paper processes).

During the design phase, significant effort was made by the Petro-Canada facilities engineer to determine the nature and extent of regulations and design codes (including environmental and safety), as well as to establish Sonatrach contacts with whom to work and get concurrence on the proposed designs. Unfortunately, efforts through the management committee as well as informal contacts were not successful in establishing formal points of contact for these technical questions. The communication gap was exacerbated by a difficult security situation that hindered travel to Algiers to meet with Sonatrach personnel at key times.

The lack of early formal approvals meant that designs were still being debated after the installation had been completed, forcing some modifications after the fact to meet Sonatrach requirements. Government equipment specifications were not known until two months after the start of fabrication. An additional complication was that design standards in Algeria are largely based on "accepted Sonatrach practice" rather than government regulation. Since Sonatrach is a government organization, and had in the past become somewhat self-regulating,
the distinction between "regulations" and "Sonatrach practice" was no longer clear. In addition, a number of these practices had their origin from many years previous, when the French dominated and regulated the industry in the 1950s and 1960s. Petro-Canada was reluctant to accept unwritten Sonatrach practice when they resulted in significant additional expenditure, and when they came late and affected the timeliness of the project itself. Unexpected Sonatrach design practices added approximately $700,000 to the cost to the facilities, while rework due to lack of early alignment between Petro-Canada and Sonatrach added $100,000. These two items totaled 10 per cent of the ultimate total facilities cost of $8 million.

An example that portrays this lack of coordination is the fire-fighting system. Sonatrach's engineering division (ENC) did not initially provide regulations or guidelines for Algeria despite Petro-Canada requests, but offered to provide a design by July 1995. When this was not forthcoming, Petro-Canada designed the fire-fighting system according to Canadian standards. ENC eventually provided some of its design standards in February 1996, showing that a typical Sonatrach fire-fighting system design for a facility with oil shipping tanks (like Tamadanet) was equivalent to a Canadian refinery standard (i.e. very high). Sonatrach suspected Petro-Canada of trying to short-change safety, while Petro-Canada was reluctant to proceed with the installation of heavy-duty equipment that it would not expect its operations staff to use. For this scale of fire-fighting in a remote area, Petro-Canada's philosophy would be to let the fire die out on its own rather than risk lives fighting it. This became a stumbling block between the companies, with Sonatrach insisting that the higher level of fire-fighting equipment be installed prior to agreeing to a start-up of the facility. This was difficult to comply with, as the lead time for installation of a 5000 bbl water storage tank was far longer than Petro-Canada's expectation as to when first production was to occur. The fire water tank was in service by the end of May 1996.
The exploitation permit was granted immediately after Petro-Canada completed the changes that Sonatrach requested to the fire-fighting system. Perhaps this was a coincidence.

Hodgkinson (1997) provides the following observations on differences in business culture:

- Petro-Canada is profit driven, and time is money;
- Sonatrach is interested in reserves, and unaccustomed to profit as the key driver in decision-making;
- Sonatrach has bright and capable people immobilized within a difficult bureaucratic structure; and
- "face" is key—always leave a face-saving exit for a compromise to work.

**Back-in**

Another example of misunderstanding between the partners was Sonatrach's election to back-in. Sonatrach had a contractual right under the PSC to back in on 30 per cent of the development by electing to pay 30 per cent of the development costs. Throughout the development planning phase, Sonatrach indicated to Petro-Canada that they would not be interested in backing in. Therefore, Sonatrach's decision to ultimately exercise its clear right under the PSC to participate in a 30 per cent share of the development was a source of disappointment to Petro-Canada, and resulted in a fruitless effort on the part of Petro-Canada to convince Sonatrach not to back-in. This in-turn caused hard feelings at Sonatrach executive levels.

**Joint Operations**

Operatorship of the Tamadanet development became a major source of contention amongst the parties in the middle of 1995. The PSC clearly stated that Petro-Canada was to be operator during the exploration and development phases, but that in the event that Sonatrach opted to back-in, the two companies
would undertake to put together a joint operating agreement. In the English text, this alludes to a standard joint operating agreement (JOA) of the kind that would be entered into between project partners, but which does not question the operatorship of the lead partner (in this case Petro-Canada). In the French text, however, which is the official version of the PSC, the JOA mentioned seemed to be more in the spirit of finding ways to work jointly together.

After having assumed that it would be the sole operator, Petro-Canada now discovered that Sonatrach had in mind the notion of a jointly staffed organization that would undertake the development and operations independently of either company. This surprise for Petro-Canada occurred in the midst of the development and construction phase, and was likely an outcome of Sonatrach’s production department’s sudden keen awareness of, and interest in, the project. The change in outlook towards operatorship is an indication of how Sonatrach personnel were not unanimous in how the project would be developed and operated, reflecting perhaps some of the organizational gaps between Sonatrach’s exploration and production departments (Ridsdel, 1996).

The impact was most significantly felt on the construction, where decisions now required the simultaneous approval of representatives of both companies. This proved to be awkward, as there was limited alignment between either the companies’, or the assigned individuals’, objectives. An example of differences in corporate alignment include Sonatrach’s desire to maximize the share of expenditures going to host-country contractors, since they could be paid in the host-country (non-convertible) currency, the Algerian Dinar, as opposed to foreign contractors who wanted payment in hard currency. This resulted in reversing awarded contracts, while negotiations with (new) host-country contractors started. Petro-Canada’s objectives, in contrast, were to start production as soon a possible, while considering minimizing costs as a secondary objective, and being indifferent to expenditures in Dinars. An example of problems from mis-aligned personal objectives included the stated philosophy
of the (usually absent) construction co-manager from Sonatrach—namely that when doing a project in Algeria, it should be done the Sonatrach way—something that he was privy to, but which was not written down. Although Sonatrach provided a construction co-manager, this individual did not have the authority within the Sonatrach organization to make many decisions, and with the arrival of more senior Sonatrach managers or inspectors on-site, the direction given to the construction staff changed. This resulted in significant conflict at the field level, with frustrated personnel trying to make sense of contradictory instructions (Hodgkinson, 1996).

Additionally, there was no agreement that defined the new "joint organization," which meant that there were no defined mechanisms for resolving disputes. These disputes were largely resolved in the traditional way, with the party that was in no hurry to succeed out-waiting the party that was in a greater hurry, until getting the desired results.

**Sonatrach Payment**

Sonatrach is obligated under the PSC to pay for its 30 per cent share of all development costs. As the majority of the development costs were in foreign currency, Sonatrach was invoiced by Petro-Canada for the balance owed. Regrettably, Sonatrach has difficulty in accessing hard currency without pre-planning, and was not willing (or able) to pay its share of the hard currency development expenditures. These debts were outstanding until 1998.

These issues all served to further fray the relations between the two companies, and meant that the Algeria Asset Team had trouble delivering its promises and meeting expectations raised to Petro-Canada senior management. It is a tribute to the tenacity of the Petro-Canada personnel in Algeria that the construction of the Tamadanet facility was only three months behind at the completion of the development phase on what at the outset was an aggressive schedule.
addition, part of this three-month delay was Petro-Canada senior management's decision to delay shipment of some pre-fabricated skids. Credit also goes to a number of Sonatrach stakeholders, particularly the host-country operations group, for their support during a difficult time.

Work Contracts

There were four types of contracts awarded during the development phase, totaling about $30 million, in the areas of seismic acquisition, drilling, production facilities, and construction.

Drilling (about $15 million)

There were no issues in the award of the drilling contracts between Petro-Canada and Sonatrach, and the contracting strategy was the same as for TM-103, with about 90 per cent of the awards going to foreign contractors. This was not problematic for Sonatrach, as only three horizontal wells had been attempted previously in Algeria, and none of them was a complete success, so the perceived skill level of foreign contractors was seen as a benefit.

3D Seismic (about $1.5 million)

This was another example of new technology being introduced to Algeria. This was the first large-scale 3D program in the country, and Petro-Canada and Sonatrach elected to use a host-country contractor for the work. Since the host-country contractor was eager to acquire this technology, a competitive price was bid for the job, and all parties came out ahead. This seismic acquisition program was lumped together with the exploration seismic bid, and as such, shared the same contracting strategy (started as a day-rate job, and turned into lump-sum).

Facilities and Camp (about $5 million)

The majority of these jobs were bid on a lump-sum basis (engineering, procurement, and fabrication), while installation and construction was split out due to most of the bidders' lack of infrastructure in Algeria, and Sonatrach's desire to expend Dinars using host-country contractors. In the instance of the construction contract, Sonatrach's insistence on the use of a specific host-country contractor (as opposed to the low-bid foreign contractor) resulted in
higher costs ($200,000) and lost time (6 weeks).

**Construction** (about $4 million)

Construction contracts were generally let on a lump-sum basis to host-country contractors. The civil contracts were initially awarded on a unit rate, but converted to an hourly rate with a second contractor when the first contractor defaulted.

**Security**

By 1995, the operational aspects of security became much more difficult. With the incursion of security problems closer to the desert (Ghardaia), the Algerian government insisted that all foreigners have military escort for their movements in the South. A military guard was established on-site, and any movements by foreigners required a military escort. Regrettably, with a near civil war going on in parts of Algeria, the posting of higher quality troops in remote desert areas (in which there had not been any attacks) did not come as a priority to the Algerian military. The discipline level of the troops was such that escorts were at times difficult to obtain, preventing necessary travel, and the military guard helped themselves to whatever materials they thought was appropriate. The poor discipline caused some Petro-Canada staff to feel insufficiently secure, and there was some attrition from the project team as a result. After several high level appeals by Petro-Canada and Sonatrach, the situation was rectified late in 1996 with the stationing of a more disciplined military group.

In addition to hampering the movement of personnel in the South, the security situation also increased the project costs by about $1 million per year. These costs are related to providing room and board to the military, building defensive berms around the drilling locations, and the hiring of security consultants.

**Business and Technical Risks**

**Technical Risks**

If the Tamadanet field was located in Canada, the technical risks would be considered minimal. Horizontal wells and 3D seismic are used routinely in
Western Canada, and the facilities and pipelines would be subject to only relatively benign fluids (i.e. nothing sour). The location of the oil pool under the Sahara desert added a measure of technical risk, since the experience in that region with 3D seismic and horizontal wells was almost non-existent. For the wells, some necessary equipment (and expertise) needed to be imported, and the support infrastructure was limited insofar as the availability of replacement materials and equipment. This was to some degree mitigated by having spare parts on-site. The F6 formation had never been the target of a horizontal well, and so its behaviour during drilling was unknown. It turned out that the formation was very abrasive, and there were insufficient drill bits on-site to replace the ones being worn down, resulting in sub-optimal drilling progress for the first well.

The process of drilling horizontal wells requires a high degree of integration amongst personnel of different companies, as well as clear lines of communications and decision-making. In this regard, the project was successful, and the performance of the wells exceeded expectations, although costs were 15 per cent over budget. Some of the milestone achievements of the first horizontal Tamadanet well included:

- longest horizontal section drilled in Algeria (by a significant margin)
- only horizontal well in Algeria in the F6
- and first horizontal well in Algeria to successfully achieve prognosed length.

In spite of the success of this first well, a review was conducted that resulted in 211 recommendations and learnings captured for use in the second horizontal well, which was even more successful.

The 3D seismic program was an unqualified success operationally. The host-country contractor, with support from foreign consultants and Petro-Canada, was successful in acquiring the needed seismic data. As the purpose of the 3D seismic was to inform the location and orientation decision for the horizontal wells, the Tamadanet project depended on a successful outcome from the 3D program. The key risks were contractor inexperience with 3D seismic, and
Petro-Canada inexperience in seismic acquisition in Algeria. Measures taken to mitigate the risk included bringing key contractor personnel to Canada for classroom and field training prior to the program, as well as involving Sonatrach and the Algerian geophysical contractor in the design of the acquisition program.

One of the questions Petro-Canada wanted to resolve using the seismic was the existence of a structural high in the northern part of the Tamadanet field. The results from the older Sonatrach seismic data were ambiguous in this regard. The reserves in the northern part of the field depended on this structural high. Unfortunately the ambiguity of the seismic turned out to be a function of the reservoir rather than on the quality of the older seismic data, and the ambiguity could only be resolved through the drilling of a well. This well (TM-106) showed the northern structural high to be absent, and the well has been converted to a water injection well, which is, in any case, a necessary part of the development. Although the TM-106 well is part of the Tamadanet development, the associated contractual and partner issues fit better into the discussion in the next section on Transportation, Lifting, and Other Wells.

8. Agreements on Transportation and Lifting, and Other Wells (1996)

Objectives
The objectives of this phase were to conclude the necessary agreements with Sonatrach to bring oil to market, as well as to reach agreement on the drilling of the TM-106 and Tamadanet South wells. TM-106, as discussed above, was a higher risk well on the northern flank of the pool, while Tamadanet South is a well to test the southern extension of the pool outside the Tamadanet exploitation area.

Organization
Petro-Canada moved away from self-directed teams towards more of a
traditional manager-led organization, while maintaining the multi-disciplinary nature of the project team. Formal leadership in the organization was reinforced along both functional and business lines, while the team consensus decision-making approach fell out of favour. This change was brought about by a desire within Petro-Canada to pinpoint accountability to one person when there was a problem, as well as a recognition that some of the asset teams were not functioning properly. For the Algeria project, this meant the appointment of a manager who had decision authority over all business and performance issues, while an array of functional managers became responsible for technical quality.

This change allowed for a simpler resolution of problems for which there had not been any clearly assigned responsibility, but had the downside of project team members handing over to management the ownership of much of the project, and diminishing their circle of concern.

**Partner Relations**

**Marketing**

Since Petro-Canada had no experience in marketing oil in Europe, which is the usual market for Algerian crude, an agreement was reached with AGIP, the only other foreign operator of petroleum production in Algeria. By having AGIP market the crude on Petro-Canada's behalf, Petro-Canada was able to lift its crude more frequently at the port (given Petro-Canada's otherwise relatively small production volume compared to the capacity of a tanker). Petro-Canada was also able to take advantage of AGIP's expertise in the area of European crude oil marketing.

**Transportation**

Sonatrach operates the transportation (pipeline) network in Algeria, and tariffs for transporting crude from the field to the export terminal are set by government regulation. The escalation clause for the pipeline tariffs to account for inflation
and currency depreciation is flawed (depending on your perspective), and "double inflates." This means that at the historical rates of inflation in Algeria, the pipeline tariff grows exponentially over time, and could equal the price of oil in 20 years time if historical trends in currency depreciation continue.

This issue was recognized and analyzed by Petro-Canada and other operators in 1992-93, when the current tariff law was put in place. Sonatrach indicated at that time that it was working with the government to correct the mistake, but as of the end of 1998, this had not been totally resolved. This remains a potential threat to the profitability of all petroleum producers in Algeria. As a mitigative measure, Petro-Canada was successful in securing, in writing from Sonatrach, a fixed tariff that Sonatrach would charge Petro-Canada for the transport of Tamadanet crude, and that this tariff would be maintained at the current level until a revised ministerial decree was issued. This was obtained in April 1996, one month prior to production start-up.

**Lifting**

The formula for calculating the volumes of crude that Petro-Canada was entitled to lift at the port each month is spelled out in the PSC. Unfortunately, the calculation is somewhat complex, and although Petro-Canada felt that the methodology was clear, Sonatrach took a different interpretation of the PSC. This has had the impact of reducing Petro-Canada's lifted volume by about 10 per cent from what it expected in the first year, pending outcome of these issues. Some of the differing interpretations appear to be a result of Sonatrach's desire to homogenize the lifting process with various operators (in spite of differences in PSCs), while others would appear to be the result of either genuine differences of opinion or, perhaps, opportunistic behaviour on Sonatrach's part. Negotiations to solve the differences have been underway since April 1996.
Repatriation and Currency Risks

At the time of negotiating the PSC (1990-93), the risk presented by Algeria’s non-convertible currency was identified by Petro-Canada. Amongst the concerns was a government-imposed exchange rate that resulted in host-country costs being artificially high for those who have a need to convert foreign currency to pay for Algerian services (i.e., foreign oil companies). This exchange rate between the Algerian Dinar and other currencies is also open to significant fluctuations, with Algerian history being one of continual downward revaluation of the currency since 1989 (the 1989 exchange rate was 6.50 Dinars/$, in 1996 it was 55 Dinars/$). To mitigate the currency risk, Petro-Canada won the contractual right to use the U.S. dollar as the basis for its accounting system. This was important, because one of the primary elements in the formula determining Petro-Canada’s share of the oil is the recovery of historical costs. If these costs had been based on Dinars rather than dollars, then using the historical depreciation trend as a basis, Petro-Canada would only recover a small fraction of its initial expenditures (88 per cent loss after seven years).

Repatriation is also a common risk in international contracts—the danger is that a company will not be able to export its profits back to the parent company, but will instead be forced to keep (and/or invest) its money in-country. Petro-Canada mitigated this risk by ensuring that it would be allowed to take its share of the revenue in the form of crude oil at the port, which it could then sell as it pleased using a price determined by the world market.

Tamadanet South Well

At Tamadanet, Petro-Canada had taken a discovery made in 1961 that Sonatrach did not think worth developing, and turned it into a quick success. This may have forced some elements of the Sonatrach organization to answer awkward questions as to why this resource had not been developed earlier, and even more importantly, why foreigners were given access to it. With the
acquisition of the 3D seismic for the development of Tamadanet, additional information regarding the extent of the pool became known. The initial interpretations of the seismic were that there was a good chance of a southern extension of Tamadanet beyond the previously estimated pool boundaries. Naturally, Petro-Canada was eager to exploit this possibility. Within Sonatrach, however, the news had negative political ramifications. It was rumoured the Algerian government investigated Sonatrach for wrong-doing in this regard, and found there had been none (confidential, 1996).

While Petro-Canada had been able to move quickly on its first development at Tamadanet, the exploration work cycle took much longer. To do the exploration work properly, Petro-Canada had to gather all the available data, including reprocessing the existing seismic, prior to shooting a new exploration seismic program, and this in-turn was a prerequisite to drilling exploration wells.

As a result, Petro-Canada was ready to delineate the southern extension of Tamadanet before it was ready to drill its first exploration well. The differences in priorities for the two companies discussed in the earlier section on the negotiation of the PSC (Sonatrach having exploration as a priority, Petro-Canada having early cash flow as a priority) became an issue with Petro-Canada's proposal to drill Tamadanet South.

Sonatrach became concerned that Petro-Canada was not making sufficient progress on the exploration, and it became politically difficult for Sonatrach to approve additional work on an extension at Tamadanet without seeing more progress on exploration first.

Once Sonatrach had aired its objections, an additional complication arose: technical work by Petro-Canada on the Tamadanet 3D seismic showed that (unlike the initial interpretation) Tamadanet South might be on a separate structure, which could make it a legitimate exploration target. The co-incidence
in timing of this new seismic interpretation with Sonatrach’s desire to see Petro-Canada focus on exploration could have been fortuitous for both companies, but there was insufficient trust between the two companies for the new interpretation to be taken at face value. Some Sonatrach personnel felt that the reinterpretation of the seismic had been manipulated by Petro-Canada to convince Sonatrach to approve the drilling of the Tamadanet South well. The author was present during the Petro-Canada technical discussions, and can attest that the Petro-Canada technical interpretations at Tamadanet South were honest, and not an attempt to manipulate, but the appearance of manipulation was definitely there. In any case, Sonatrach did not approve the drilling of Tamadanet South.

Another issue between the two companies on Tamadanet South was the fiscal status of the location, since exploration locations have a more advantaged fiscal treatment than development locations. Petro-Canada offered concessions to Sonatrach in this regard in exchange for rapid approvals, but this was to no avail.

The Tamadanet South location was not approved by Sonatrach until 1998, a three-year lapse since the Tamadanet South potential was first identified. The well encountered new and separate, but modest, oil discovery.

**TM-106**

As mentioned, the existence of a structural high in the northern part of the Tamadanet field could not be resolved from the seismic, and could only be resolved by drilling. Petro-Canada assessed the technical risk associated with the location, and determined what volume of oil would need to be present in the North to justify the expense. Using a decision tree to balance the risks and net present values (NPV) of a range of possible outcomes, it was determined that a favourable oil-water contact was required in the pool to justify the well. Although the oil-water contact could be determined by drilling the well, it could probably also be determined without the drilling by taking some measurements at another
well (TM-101)—although the results would not be available for several months.

Petro-Canada and Sonatrach had some lively discussions on how to proceed with TM-106. Petro-Canada wanted to undertake the technical work at TM-101 before drilling TM-106, and utilize the drilling rig at Tamadanet South. Sonatrach did not have confidence that results from TM-101 would be reliable, and wanted to proceed with the drilling of TM-106 immediately. The difference in viewpoints was settled quite simply when Sonatrach indicated that it would take action to substantially delay the granting of the exploitation permit for the Tamadanet field if TM-106 were not drilled immediately, and Petro-Canada did not feel it could refuse. Sonatrach explained that the inclusion of the TM-106 well (and its associated reserves) in the development plan meant that the well needed to be drilled unless a revised development plan was submitted and approved first.

In return, Sonatrach's representatives to the management committee agreed to the drilling of Tamadanet South later in 1996.

The well (TM-106) was drilled and showed the northern structural high to be absent, and the well has been converted to a water injection well. The approval to drill Tamadanet South was subsequently rescinded.

**Quality of Information**

The major issues related to transportation, lifting, and the drilling of the Tamadanet South and TM-106 wells all have a common theme in that Petro-Canada was unable to sufficiently understand the partner and regulatory environment in Algeria. The causes of this relate to the project being only the second foreign oil field development approved in Algeria, and that Sonatrach, and Algeria, were still formulating their policies as the development pushed ahead. Another is the secretive corporate culture at Sonatrach, with the added Algerian social/business culture in which information is used as a lever for power.
Petro-Canada was unable to establish the combination of understanding, good will, and trust needed to overcome these hurdles, although this is not to suggest that any other foreign operator in Algeria has fared better. The rapid delivery of the Tamadanet project suggests that a lot of things were done right.

Had Petro-Canada’s level of understanding of the Algerian and partner environment been higher, the following issues may have been mitigated:

- Petro-Canada may have left TM-106 out of the initial development plan, when it became known during the development planning process that there was a chance that the well would not be drilled.
- More sensitivity could have been shown by Petro-Canada regarding the timing of Tamadanet South, but more importantly the information could have been passed to Sonatrach in a way that suited Sonatrach’s internal needs.
- A clear resolution of the transportation tariff and lifting agreements would have increased Petro-Canada’s confidence in the business environment in Algeria; and
- Costs could have been reduced by up to $3.5 million due to less rig stand-by costs, and the possibility that TM-106 would not have needed to be drilled.

**Work Contracts**

The most interesting contracts during this phase were the drilling contracts. Significant planning and scheduling issues arose in the drilling operations as a result of the uncertainty in well approvals by Sonatrach. In Algeria, there are significant mobilization and rig upgrade costs associated with changing drilling contractors (perhaps $500,000), while the cost of having a drilling rig on stand-by waiting for decisions is $10,000 to $25,000 per day. The discussion of the issues between Sonatrach and Petro-Canada surrounding Tamadanet South, TM-106, the planned measurements at TM-101 (which also required a rig—one had arrived on site and was on stand-by) all occurred in April 1996, and an additional exploration well was also being prepared for drilling. For a time, Petro-Canada and Sonatrach did not know whether they would need two rigs or none at all.
Although the delays between the partners reaching agreement did cost money, a good relationship between Petro-Canada and its drilling contractor, as well as between Sonatrach and the drilling contractor on TM-101, allowed the damage to be minimized. Petro-Canada has continued to use the same drilling contractor since that time.

**Business and Technical Risks**

**Business Risks**

The primary business risks during this phase were:
- the lack of knowledge about the regulatory and partner environment that can impact costs, schedule, and relationships;
- the potential for unlimited escalation of pipeline tariffs;
- unclear terms for the lifting of crude oil;
- damage to good relationship with drilling contractors; and
- and post-contract opportunistic behaviour. This may form an element of points one to three, above.

**Technical Risks**

The major technical risks during this phase related to the TM-106 and Tamadanet South wells. This risk was largely structural, and partially due to the oil-water contact. All possible mitigative measures were taken on the technical issues (3D seismic), however Petro-Canada paid a high price in terms the relationships with Sonatrach by sharing results of the technical work with Sonatrach as soon as they became known. In retrospect, presenting a polished and final product to the partner in such a way that it would fit with the partner’s needs may have been better received.

The drilling of TM-106 was carried out before all the technical data was available (didn’t wait for results of TM-101) at Sonatrach’s urging, but this could also have been mitigated by presenting the final product in a way that fit the partner’s needs.

**Objectives**

The objectives of the operations phase were to produce the Tamadanet field in an efficient method (maximize production reliability and minimize cost).

**Organization**

Using Sonatrach's desire for a joint operation, an 'exploitation committee' was set up to oversee the production of the Tamadanet field. The exploitation committee was comprised of a representative from each company who would take decisions in unanimity. This was a management-level group, and field operations were under the direction of a field-level supervisor and assistant supervisor. Eight operations people, as well as a number of administrative staff reported to the supervisors. The operators were Sonatrach employees, while the supervisory positions would rotate between Sonatrach and Petro-Canada every two years.

Within Petro-Canada, the project continued to be managed using single-point accountability as a priority. This resulted in greater efficiency in decision-making, but the style of communication used became more centralized (single point contact) versus dispersed (web model). Undesirable symptoms associated with this change included less cohesion between groups and more difficulty in taking action when the key decision maker was inaccessible.

**Partner Relations**

The Operations relationships between Petro-Canada and Sonatrach was good. The Sonatrach representative on the exploitation committee handpicked the Sonatrach candidates for the organization and took their performance and contributions personally. Although there are differences in expectations and standards, there appears to be a desire on the part of the Sonatrach personnel to do well and to learn and improve, and on the part of the Petro-Canada personnel to take advantage of Sonatrach's experience, and recognize the differences in
cultures (Ayache, 1996).

In addition to the operational aspect of the exploitation committee, technical and business support to the operations are also undertaken under the umbrella of the exploitation committee. The provision of business services has been fairly uneventful, while the provision of facilities engineering support has been left largely to the lead of Petro-Canada personnel.

**Work Contracts**

The awarding of contracts has been largely uneventful, with unanimous support by Petro-Canada and Sonatrach representatives for the award of all work (facilities contract awards are the exception). This work is spread amongst Algerian and foreign companies, as well as Sonatrach departments on occasion (mainly laboratory work). The administrative processes that allow these approvals and expenditures to take place are still being refined at the time of writing. One of the surprises at the end of 1996 was the submission of invoices by Sonatrach for their costs in 1996 related to the provision of infrastructure in the Tamadanet area. Provisions for joint audits are still being developed.

**Security**

A potentially significant development early in 1997 was the plan by Sonatrach to provide their own company security staff to replace a part of the military guard in the Tinrhert area. This opened the possibility of reducing risks associated with a less disciplined military presence. This situation is still evolving at the time of writing.

Meanwhile, the high level of violence continued in the rest of Algeria, and an estimated 100,000 people had been killed since the outbreak of the violence in 1992. The security protocol for Petro-Canada activities remained tight and restrictive but, to date, has provided adequate protection as evidenced by a lack of casualties amongst Petro-Canada staff or contractors.
Business and Technical Risks

Business Risks—Cost Control
As mentioned previously, the unexpected arrival of large numbers of invoices from Sonatrach for infrastructure underlined some of the challenges in controlling costs. In the future, this will be mitigated through clarification of procedures and/or the availability of precedents to understand and control costs.

Business Risks—Revenue
In the first nine months of production, Petro-Canada was able to repatriate $20 million, which amounts to about half of its investment in the Tamadanet project. This has the effect of mitigating risks related to the business and political environment. The project paid out in late 1998.

Operational Risks—Environmental, Health, and Safety
Petro-Canada had no previous experience in international production operations. To support the development of the operational skills and practices needed to minimize losses, Petro-Canada implemented a Total Loss Management program for all its staff in Algeria, with expertise provided by Canadian-based, internal Petro-Canada consultants. A favourable report was produced, and a list of action/improvement items was generated.

Technical Risks—Production Performance
There were some surprises in the production performance of the wells. Although all the oil flow rates met expectations, the arrival of formation water has been surprising. Two of the wells have exceeded expectations and have not seen any water, while the third well disappointingly produced far more water than expected. Subsequent regional work identifies water movement along fault planes as a likely source of water.
Appendix B: Survey of Algeria Asset Team Performance

Methodology

This survey was conducted amongst two departments supporting the Algeria Asset Team. The intention was to get a reasonably informed "outsiders" view of the team performance over time. Eight people were surveyed by e-mail (100 per cent response rate), with their involvement covering the period 1993 to 1997. An average score was calculated for each year from those people who were involved during that time period. The questions below were as asked during the survey, and the comments received follow are essentially unedited.

Results

1) In terms of team PERFORMANCE, meaning the ability of the team to get the job done effectively, how would you rate the Algeria Asset Team in the time you were involved with it, compared to other teams you have seen in action?

<table>
<thead>
<tr>
<th>Year</th>
<th>Best</th>
<th>Average</th>
<th>Worst</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>1994</td>
<td>1</td>
<td>2</td>
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<td>1996</td>
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<td>2</td>
<td>3</td>
</tr>
<tr>
<td>1997</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Comments (chronologically)

- the Algeria Asset Team was one of the strongest teams within Petro-Canada's asset team structure. Although Petro-Canada's expectations vs. results of the Algerian drilling program was not as positive as projected (I will address this below), the Algeria Asset Team met most of the schedule and
milestones within budget and with conditions that are far more difficult than in a Western Canadian scenario (e.g., risk, geography, culture, remoteness). Team members were committed and flexible, and the past work has led to new and different business approaches for Petro-Canada in Northern Africa. The Algeria Asset Team are pioneers for Petro-Canada as far as the Northern African theatre is concerned and all team members conducted their affairs in a professional and business-like manner.

- over the long term, I would rate the Algeria team highly, given the rather extraordinary conditions under which the team has been compelled to function.

In the early time frame (say, 1993) I would suggest that measuring its effectiveness would probably have been improper, as the team was devoting substantial efforts at developing team norms and the processes it would follow in getting established. Part of this may have been due to differing opinions between and among the team members as to who would do what, and when. My sense of it was that the team, in an attempt to be democratic, may have reduced its initial effectiveness by having too much involvement by all of its members in every decision.

Let me give you an analogy—it seemed to me to be a bit like a hockey team in which specific roles are not clearly understood/defined by and for the teammates. If everyone is "chasing the puck," they're not going to be as effective as a team in which positions and roles are clearer to the players. Sorting out those roles takes time, and the team had to devote a fair bit of energy to resolving this. A few years later, the team, by all appearances, has achieved this. By the way, I don't think that this is in any way negative—I think the work done to establish the framework is one of the key components in deriving the success the team has achieved.

- based on my observations I would say that the team's heart was in the right place, but it had too many stakeholders, each one having a pseudo veto. This resulted in long decision-making efforts and the required performance to be successful was constrained. It was successful in spite of itself!
it was a fairly effective team but definitely had some difficulties making decisions, which I believe, were structural. If you look at performance in terms of meeting targets there was some struggle as not all targets were met.

I have worked with a few teams within the company that I would rate as higher performing, but there are only a few. I have seen this team work very effectively together to get the job done. Overall, I look at 1997 performance measures for the team and it seems performance was met and exceeded in some areas.

I can say that in my nearly 13 years experience at Petro-Canada, in the upstream, downstream and corporate, I have yet to come across a team that seems as well organized and focused on stated objectives, with a bent for follow-up and adjustment.

2) In terms of team EFFECTIVENESS, meaning the ability of the team to work together and be more than the sum of its parts, how would you rate the Algeria Asset Team in the time you were involved with it compared to other teams you have seen in action?

Ratings Results

<table>
<thead>
<tr>
<th>Year</th>
<th>Best</th>
<th>Average</th>
<th>Worst</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>1-2</td>
<td>3-4</td>
<td>5-6</td>
</tr>
<tr>
<td>1994</td>
<td>1-2</td>
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<tr>
<td>1997</td>
<td>1-2</td>
<td>3-4</td>
<td>5-6</td>
</tr>
</tbody>
</table>

Comments (chronologically)

- when I was involved in the team development process of the Algeria Asset Team, there was strong evidence of progress made relative to key team effectiveness components necessary to build and sustain a high performance,
which include:

⇒ alignment around a common goal & vision (i.e., develop Petro-

Canada's Algerian assets in a cost-effective, value-added manner and

create a foothold in the North African oil and gas theatre)

⇒ high level of individual and team commitment (doing what it takes to
deliver a successful development)

⇒ shared leadership (we are all leaders regardless of "position")

⇒ participatory decision-making (input into the direction)

⇒ and good internal communication systems (well attended and effective
planning & stewardship meetings/communication forums)

• I thought the team made good workplans and implemented them well

• let me answer the question from a slightly different point of view. I think the
team certainly attached great value to working together and to achieving
synergies amongst its members, within a corporation that was more
hierarchical and less team-focused than many. In breaking new ground that
way, you probably had a tougher time of it than the teams that have followed.
It's tough to pioneer things. To a large degree, some of the things that are
taken for granted in teams in 1998 were radical concepts in 1993

• this self-managed team became too large, allowed too many distractions to
reduce its productivity, and was less than the sum of its parts. In fairness, it
was a novel attempt and we need to acknowledge that lot of team dynamic
information was obtained and has been used in many parts of the upstream
world. We needed to push the boundaries and this was achieved by the
Algeria Team

• I thought the team was pretty effective with a high level of communication
both in the work that was required, who was to do it, and team members
performance. I think the team did a good job here

• I have observed the team work extremely effectively in a number of different
situations. I believe that they are one of the better at Petro-Canada and some
structural changes and clarification on roles and responsibilities will help to
make this team the best
the weekly meetings allow the team to share information while at the same
time providing a focus for ensuring that different perspectives on an issue are
considered and incorporated into options for action, which leads to more
effective performance. Other groups I've observed within the corporation
often hoard information to a select few, discount the potential inputs of key
people within the group, and undermine potential synergies, thereby
shortchanging group effectiveness.

3) How do you feel the performance level was influenced by the
organizational structure of the team (self-directed vs. traditionally
managed)?

Comments (chronologically)

- in my opinion, organization structure and organizational behaviour are
  intimately related—let me expand on this for a moment before I address this
  question.

  You can have a traditional approach (e.g., hierarchy) with very traditional
  behaviours (chain of command, various levels of approval required,
  centralized decision-making). One might think of a militaristic model where
even tactical decision-making is from the top, there is clear control, and
creative problem-solving is left to a very few leaders who are often very
conservative.

  You can also have a traditional approach with self-directed behaviours.
This model looks and feels like working in a responsible relationship where
people's professional opinions are trusted, input is valued, decision-making is
shared, and yet there is accountability of leadership to ensure they deliver
desired results of a given investment. The real difference between this model
and the one described above is that team leadership is focused very much on
connecting the work to the long-term vision (assuming there is one). In this
model, if leadership gets too involved in the tactical implementation (e.g., nuts
and bolts), then an opportunity is missed—where leadership energy could be
invested into the overall strategy as opposed to tactical implementation.

If you follow the logic I propose here, there can be four different models (1. traditional structure & traditional behaviours, 2. traditional structure & self-directed team behaviours, 3. Self-directed team structure & traditional behaviours, 4. self-directed team structure & self-directed team behaviours). You can probably get a feel for what models three & four might look like.

Now to address the question. The Algeria Asset Team did not have a clear team model in which to work in (or from). In fact, there were probably two or three of the models described above at play given any particular time segment. There can be no doubt that the team model changed when R.A. came in as Algeria Asset Team lead. The model also changed when results did not meet expectations—which is natural because most organizations pull the "traditional approach" lever when there are problems or issues rather than working through the root cause—organizations assume it is the structure (or lack of) which is the problem or real issue.

Thus, my hypothesis is that Petro-Canada did not know how they wanted the Algeria Asset Team to work—they only knew the results they wanted from the investment and risk exposure. Once these results were suspect, leadership then got involved in the structure which shifted the focus from "how do we get more value out of the investment" to "how do we fix the structure which is the cause of some of the problems." My contention is that structure does not produce team results (although it can become a barrier) and that team behaviours are more important because they tell us how teams are working (or not).

The Algeria Asset Team started with excitement about a new prospect and worked very hard to make an exploration/development concept a reality. This is very much a creative process backed up by good data and some risk taking—the non-traditional structure at that time enhanced the behaviours of "damn the torpedoes—we are going to make this happen because it is a good investment." There were significant technical/political/geographic challenges and the Algeria Asset Team did a marvelous job of overcoming these
challenges within the self-directed structure at the time.

However, when the results were not as good as expected (or as originally sold) then there was significant pressure to look at structure with a filter of traditional behaviours. This, I believe, is where/when things began to change. If the results were better than expected, there would have be very little pressure to change the "self-directed" nature of the Algeria Asset Team and it might have become a model and benchmark for other Petro-Canada asset teams. If Algeria was a booming success today (and it still may be) we would be asked to speak at meetings and conferences about how the self-directed asset team structure enhanced the team's ability to pay off big time in an international oil play. It would be like CANOXY's luck in Yemen—once they found significant commercial reserves everyone was asking them how they did it. I guess what I am saying is success breeds success—regardless of, or despite, organizational structure. Yet, how people exhibit successful behaviours will sustain organizational performance in the long-term. This, in my mind, is the key to success. It is not so much structure as it is behaviours because behaviours are independent of structure—behaviours are more or less a reflection of "how we work"

- I felt that the Algeria Asset Team was one of the teams that adapted best to the self-managed concept. A couple of other teams I was on did a very poor job at this, and appeared to be begging for a leader. One difficulty I had with the accomplishments of the team was on the value sharing side of things, where it appeared to me that the team was into self-immolation when it came to setting targets which affected their compensation. The one that comes to mind was the date of production start-up that was hostage to Algerian timetables. Another thing that troubled me a little was the length of time required to build up a drillable prospect inventory. I wish we had drilled HIM and TMLS a couple of years ago. Would we have, if they had been identified sooner? However, I don't believe this had anything to do with "self-directed" versus "traditionally-managed" approach
- in a sense, you have to interpret the team's growth over an extended time
frame, and weigh the expectations accordingly. My views of the team were mixed at the time—I certainly appreciated what the team was trying to accomplish, but I had an overall sense that, in seeking consensus, the team ran the risk at arriving at decisions that "regressed to the mean." By this, I felt that the particular self-directed structure at that time implied that the team would be prone to resisting contrary information. For example, I perceived (perhaps wrongly), that by tabling a dissenting opinion on a subject, I was seen to be challenging the internal norms of the team. Again, this is an evolutionary thing, as the team inevitably broadens its view as it becomes more coherent.

At any rate, performance is relative. My own opinion is that the team would not have been nearly as effective in the long term had it been traditionally managed. Furthermore, there are real benefits to the organization as a whole that accrue from giving a group enough latitude to try something new

- it appeared that there was a high degree of individual accountability and responsibility arising of the structure that likely led to excellent/good performance.

- over and above my previous comments, I would add one more effect that needs to be considered. The team had a strained relationship with the international management team (G.B.'s direct reports), and the on-site management team (based in France). This resulted in a hybrid of self-directed and traditional which was never truly mapped out, understood or exploited. From my perspective, too many people had the R (responsibility) and not enough had the A (accountability).

- compared to the present situation I would see the team as more effective now. There is a greater focus on meeting targets and having clarity regarding the business direction is what is required.

I have some personal views around self-directed teams and have had some personal and professional experience with them. For a time, the HR team was self-directed without any formal leader. The work got done but the
team did not focus on the longer term, larger pieces of work that could have added great value. Instead we kept up with the daily operations, fought fires, and got direction from each of the VPs and business teams we worked for. We were also not connected to the upstream leadership, and so were often not involved in decisions where we should have been. When we did get a formal leader we got direction, purpose, standardization and integration that is really helpful to our business in that rework and time wasted is now at a minimum.

I have also had an experience with a self-directed team that "blew up." They were responsible for defining the work, assigning tasks, hiring, firing, etc. They had a number of performance issues that they could not resolve, work was assigned inappropriately, the staffing levels were not managed properly, etc. yet they would say that they had lots of team effectiveness but the basics were not there.

I think either structure will work depending upon how it is set up and the business direction is clear. A traditional structure is often easier as it is one point of contact but it can be difficult for the people to adapt to if the team has had the latitude of being self-managed

- again, I have only worked with this team after the manager was put in place; however, I look to team performance measures to determine how well a team has performed during a given year. In reviewing the performance measure for this team, it appears that 1997 was the first year where all goals were met or exceeded. In prior years the goals were not met. This indicates that the traditionally-managed team has improved the performance level of the team. I see this team applying a great deal of the teamwork philosophy and actions in their work, and my experience has been that a team can enjoy all of the benefits of a "team" and a manager can enhance to the group through a focus on strategy, deliverables and performance management

- different managerial structures are appropriate for different businesses, different types of employees, and different phases in the business cycle or product life cycle. Petroleum and petroleum products are mature products in
most areas of the world, especially if viewed globally. The industry itself is also mature with large barriers to entry including large capital requirements, technology that is generally standardized but complicated to understand, and therefore requires highly-skilled and specialized labour—engineers, geologists, geophysicists, economists, etc. The parts of the business that generate earnings from established existing operations— refineries, service stations, gas plants, and pipelines—lend themselves well to a simple hierarchy with established procedures. Other parts of the business that deal with new opportunities and a lot of professional or semi-professional staff (such as exploration and exploitation) work better with a less rigid structure. This recognizes that the team's mission is to put together a new jigsaw puzzle where each member can influence the end picture.

All this explanation is preamble to saying that the "self-directed" structure is more appropriate for the exploration and exploitation business in new areas of the world (for Petro-Canada) than a "traditional" structure, if by traditional you mean the simple hierarchical, rules- and procedure-driven structure better suited to running an ongoing gas plant operation.
Appendix C: Expert Interviews

1. Experts Interviewed

Table C-1: List of Experts Interviewed

<table>
<thead>
<tr>
<th>Name</th>
<th>Title and Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simon Hatfield</td>
<td>Ex-Chauvco Sr. VP Exploration and Production, now Principle, Hatfield Consulting group</td>
</tr>
<tr>
<td>Bob Halpin</td>
<td>Pacific Tiger, President</td>
</tr>
<tr>
<td>Derek Evoy</td>
<td>Petro-Canada, Manager, International</td>
</tr>
<tr>
<td>John't Hart</td>
<td>Talisman Energy, Manager International Exploration</td>
</tr>
<tr>
<td>Jeff Brookman</td>
<td>Ex-Scimitar Hydrocarbons, CEO</td>
</tr>
<tr>
<td>Said Arrata</td>
<td>Centurion Energy Inc., President and CEO</td>
</tr>
<tr>
<td>Roger McMechan</td>
<td>Petro-Canada, Resident Manager</td>
</tr>
<tr>
<td>Matthew Heysel</td>
<td>Yorkton Securities, VP Oil and Gas Group</td>
</tr>
<tr>
<td>Peter Ffolkes Jones</td>
<td>Redwood Energy Ltd., President and CEO</td>
</tr>
</tbody>
</table>

2. Interview Process

The following was the pre-interview process information disclosed to the experts:

- confidentiality of source and specific examples will be maintained;
- the following questions will be asked in each category:
  1. What do you think the major risks and keys to success are in this category?
  2. What do you think are the most common mistakes made in the industry in managing this risk? Why?
  3. What steps does your organization actually take to manage these risks? What do you think you should be doing?
- the final question will be to ask if any key risks have been missed; and
- the compilation of the results will serve as the basis for outlining risk management options, as well as summarizing the keys to success.
3. **Outline of Subjects Covered During Expert Interviews**

<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Examples</th>
</tr>
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</table>
| **Project Selection and Data**                     | • availability and quality of technical data prior to making financial commitment  
|                                                    | • knowledge of country and industry                                     
|                                                    | • quality of decision-making                                             
|                                                    | • selecting the right kind of project.                                  |
| **Technical Risk**                                 | • hydrocarbon chance factors                                             
|                                                    | • reserves uncertainty                                                  
|                                                    | • cost uncertainty                                                      
|                                                    | • technological risk.                                                   |
| **Environmental, Health, Safety, and Security**    | • occupational health and safety                                         
|                                                    | • behaviour of personnel                                                
|                                                    | • kidnapping, assassination, crime                                       
|                                                    | • environmental legislation                                             
|                                                    | • climate, geography                                                    |
| **Political and Economic**                         | • government stability                                                  
|                                                    | • political profile of project                                           
|                                                    | • ability of economic system to accommodate project                     
|                                                    | • existence/precedence of necessary approval processes                  
|                                                    | • receptiveness to foreign participation, nationalization               
|                                                    | • business environment                                                  |
| **NOC/government relationships and Cultural differences** | • control                                                                
|                                                    | • opportunistic behaviour                                               
|                                                    | • contract (e.g. PSC) interpretation and sanctity                        
|                                                    | • partner experience with necessary processes                           
|                                                    | • differences in corporate/business culture                              
|                                                    | • differences in social culture (time, money, language, communication styles) 
|                                                    | • dependence on individual relations.                                   |
| **Head-office and Senior Management support**      | • management understanding of external issues and project environment    
|                                                    | • ability to provide high-profile support                               
|                                                    | • resourcing and commitment over longer time-frames needed              
|                                                    | • unrealistic expectations                                              |
| **Project Organization and Leadership**            | • communication across time-zones and geographic barriers               
|                                                    | • self-directed teams, matrix organizations, pure                       |
4. Raw Data

The following are comments made by the expert practitioners. These have been sorted by category, but are essentially unedited other than to omit names and specific references to companies. Duplicate responses by more than one expert were retained to allow the determination of the frequency of particular responses. The comments are paraphrased except when in quotations. The source of the quotations is omitted in compliance with the representations of anonymity I made to the experts prior to the interviews.

4.1 Comments Made That Do Not Readily Fit Into a Category

The following comments did not readily fit into a category:

- many Canadian companies have spent money internationally, but only about 10 per cent have achieved production. Finding petroleum is difficult, as is developing and marketing it;
- in Canada over the last several years, the competition has been intense—too much money chasing too few opportunities, spending $2 to make $1. This is the impetus for going internationally;
- there is an impetus for Canadian petroleum companies to start looking outside of the Western Canadian sedimentary basin—the resources remaining have shrunk to the point where people need to start looking elsewhere. Companies are looking to be the low-cost operator and finder of petroleum—it doesn't matter where the resources are; and
- use of risk check-lists is limited (only Talisman).

4.2 Project Selection and Data

This section includes:

- availability and quality of technical data prior to making financial commitment;
- knowledge of country and industry;
- quality of decision-making; and
and selection of the right kind of project.

Key Risks

The interviewees identified the following key risks:

- gambler's ruin is a key risk. Are you a large enough company to handle the risks you are taking on? Should you be looking at lower cost or lower risk areas, such as development projects? The elephant hunting should be left to the majors (i.e. high cost and high risk);
- if you are taking on a development project, you need to consider the geopolitical risks, the fiscal risks, and the technical risks;
- when moving to an unfamiliar environment, looking only at the upside potential, without understanding the downside risks;
- insufficient effort on gaining a technical understanding of the project—moving ahead based on business logic alone (e.g. Middle East fractured carbonates);
- inadequacy of technical data (good quality data from previous operators lost or unavailable). This is typically neglect rather than conspiracy;
- the objectivity of analyses of opportunities decreases when the evaluation is done far from the head-office setting;
- the hidden barriers to entry in the industry, such as existing participants monopolizing government contacts and infrastructure;
- inadequate knowledge of country;
- inadequate knowledge of laws that manage the hydrocarbons sector;
- costs are a big unknown at this stage;
- advocacy and resulting blindness by project champions;
- hasty project selection in response to pressure to show results quickly;
- inadequate resourcing and skill sets to identify the key data—committing to projects before the appropriate specialty expertise is applied to make sure there are no fatal flaws in the project;
- not spending enough time choosing a project, focussing on a single opportunity too soon;
- decision-making is usually based on limited data;
market and infrastructure access;
proceeding on the false assumption that large reserves are an assurance of profit, without understanding the contract;
if you are in Russia, truth in data has emerged as a recent issue (e.g. substitution of logs);
if you are in Russia, have you thought about checking for nuclear tests having been done in some areas to stimulate production?;
early data access and quality; and
ensuring you have adequate infrastructure (with capacity) and markets.

Risk Management Advice
The interviewees provided the following advice:
some of the value in developing existing reserves may be disguised by unattractive fiscal terms. Therefore, new fiscal terms may need to be negotiated to allow the development of the resource, creating a win-win situation for both government and oil company;
another opportunity type is to apply new technology that makes previously uneconomic (and undeveloped) fields attractive;
choosing a project that allows the follow-up of a successful play with a number of additional prospects allows the law of averages to work. These follow-up prospects may be lower since the play concept is proven, and therefore better understood;
do the technical homework. Understand any differences between the play type you are pursuing, and the existing pools;
undertake lots of discussion with existing operators and service companies;
assess the competition for the project you want to pursue. Do you have a chance of being selected?
country and industry information is readily available if the effort is made to research it;
project selection and data analysis needs to be done in a head-office environment. It will be more objective, rational, undistracted, and weighed
against other opportunities;
• have someone on the ground build relationships with the data custodians. Other data will come to light through good will rather than the contract. Data-gathering requires dogged detective work. Go to other operators' offices, no matter where. Often a host-country national, particularly an NOC employee, can do this better than an expatriate. Experienced companies are more likely to do this than are new entrants;
• do the homework on the country and the rules of the game. Talk to industry leaders, government departments. Go to the top person, and work down;
• go to operating companies to see how their projects have worked out;
• manage expectations within the oil company about how business will be done, prior to starting the project;
• avoid areas that don't meet the oil company's basic requirements in terms of fiscal attractiveness, and hard currency and/or market access;
• ask how the money will get out of the host-country, and what the infrastructure and marketing costs are;
• seek host-country advice on legal, accounting, and business practices;
• seek agreements with minimal and staged/phased commitments, as well as clearly defined and understood exit points;
• early iteration between the project team and senior management to ensure the project is appropriate. This good system of communication is required before time is wasted and advocacy is built up;
• clearly defined objectives/strategy from senior management;
• work on obtaining reasonable management expectations through a good exchange of views;
• access a broad range of skills to ensure that all aspects of the project are scrutinized;
• allow adequate resources, skills, and time to do a good job and look at a broad suite of opportunities;
• use project vetting by of independent evaluators to minimize advocacy;
• understand how many jurisdictions can block access to markets and
infrastructure;
• ensure that threshold reserves and prospect sizes match up;
• ensure access to hard currency or the commodity itself for sale on the open market;
• walk the lease;
• good relationships lead to good projects, and are the single most important factor in managing future risks such as regulatory, infrastructure, political, etc.;
• a lot of value is created when the contract is signed. At this point, it is possible to seek partners or financing to capture some of the value;
• do your homework;
• be knowledgeable—this implies focus;
• find projects that are a fit to company size;
• ensure that the fundamentals are there. Learn to say no to projects and terms that do not fit the bill;
• understand the receptiveness to foreign participation and as well as the nationalization risk prior to going in;
• have competent and experienced people put the contract together;
• do due diligence;
• data access is getting easier all the time due to communications technology;
• look for all the data you can, and use multiple sources where you can;
• acreage has value—if you don’t have money, then get partners rather than relinquishing; and
• consider the costs and timelines associated with projects, given the infrastructure and market situation.

Common Mistakes

The interviewees identified the following common mistakes:
• improper technical assessment prior to committing to investment;
• frequent inadequacy of technical data such as wells, seismic, and production is overridden by the potential of the business opportunity;
• underestimating the amount of effort needed to get data. A common response to the question “What data do you have?” is “What data do you need?” In other words, there is a problem even identifying what data exists;
• insufficient due diligence on key issues that affect the project;
• not having shared buy-in by stakeholders, including senior management to ensure that projects meet the goals of the corporation;
• inadequate understanding of fiscal/tax implications;
• irrational bidding;
• inadequate homework before diving in (e.g. knowing how you are going to get the money out);
• grabbing acreage as a consequence of impatience for activity, without doing a thorough evaluation that includes all the elements that can affect the economics; and
• international projects generate long-term value, growth, and reserves. For short-term returns, stay domestic.

4.3 Technical Risk

This section includes:
• hydrocarbon chance factors (HCFs);
• reserves uncertainty;
• cost uncertainty; and
• technological risk.

Key Risks

The interviewees identified the following key risks:
• gambler’s ruin is a key risk;
• hydrocarbon chance factors are very important in exploration;
• poorly understood technical parameter that has a substantial impact on costs or reserves (e.g. permeability distribution, thixotropic oil properties);
• project champions providing a subjective, rather than objective, analysis
• cost estimates are almost invariably too low. Sources of cost overruns can
include lack of understanding of how host-country service industry works, hidden costs, lack of an operating infrastructure for new entrants (e.g. transportation and storage infrastructure), new areas without a track record for timing and costs, lack of basic diagnostic tools;

- business drivers overwhelming the technical realities, then the technical comes back to haunt the project (a company is especially vulnerable if senior management does not have a technical background);

- cost overruns;
- costs;
- exploration risk;
- most exploration wells are dry holes;
- technical risk can be the greatest project risk;
- HCF and reserves uncertainty are key risks;
- cost is less important and can be managed. Often the fiscal system compensates for higher costs; and

- HCF and reserve size.

**Risk Management Advice**

The interviewees provided the following advice:

- recovery factors and reserves tend to improve over time, as the resource is exploited;

- for small companies to be successful in a difficult business climate, they need to be first-in-class from a cost perspective. This means cutting costs in an intelligent way;

- technological risk can be an upside—creating opportunity. Properties can be purchased or pursued based on their value under the current technological level. Future technological advances can present upside from a recovery factor or cost perspective;

- some companies use global risk teams to ensure even treatment of risks amongst opportunities;

- use independent assessment to overcome "champions' bias," or have a
rigorous process. HCFs and reserves assessment processes are well established, but too seldom used;

- some companies avoid drilling any prospects with less than a 20 per cent HCF;
- for a given play type, can you improve the odds (i.e. reduce the technical risk) through better information, or increasing the size of the opportunity base to allow the law of averages to work?
- don't try out new technology in a foreign environment first. Try it at home. An example is the application of new Canadian technology in Argentina. The host-country nationals were not always compatible with Canadian tools and personnel. Some operators go to the extreme of importing everything needed for the job, including all tools and personnel;
- Industry generally does a good job once all the technical data is received and interpreted;
- do the homework and talk to all the established players. Source the in-country experience that is available;
- don't get locked into high fixed costs;
- cost overruns are common, and may result from differences in business practices. Contractors may rely on overruns to make their money. Avoid this through tight contracts, well-defined scopes of work, tight inspection and quality assurance. You cannot do business on a handshake like in Canada;
- higher costs and delays in operations should be understood and planned for. Contingency plans are required, as the necessary services are not always on call;
- compared with Canada, closer supervision is required for operations (e.g. have two supervisors on the rig);
- people get insecure about operating conditions and can drive up costs—having too many expats results in high fixed costs. It may be better to under-staff initially and then respond to need, rather than “showing up with an ‘army’”;
- less mature and therefore higher risk basins are the likely source of large
opportunities;
- look for regions of lower well density. Get all the data you can (old reports, etc.) and make a decision from that data;
- if the technical risk is high, don’t take a higher interest than you can handle. Dispose of the rest, on a promoted basis if you can;
- if the technical risk is too high, consider renegotiating the fiscal terms;
- many risks, particularly technical risks, can be managed through a proper deal structure, such as staging the deal;
- for most companies, anything less than a 20 per cent HCF is unacceptable technical risk;
- if technological risk is higher, others must be lower to compensate (multiplicative nature of risk);
- technologically challenging projects can be difficult to support from a logistics and planning point of view;
- manage technical risk through focus. Build knowledge in a core area;
- improve the odds by having good people do good work;
- consider technical risk as a key component in the project selection phase;
- maximize the data. Sometimes a single technical “detail” can destroy the entire project;
- spread the risks in a way that is appropriate for the company size;
- international exploration is a “needle in the haystack” business. Make sure you have good communication within the organization so you don’t miss the opportunities;
- get low cost entry into an areas, learn the business, build from there;
- know where not to go;
- stay objective;
- as a new entrant, partner with an existing operator;
- you need to develop human knowledge of an area, in spite of computers; and
- don’t settle for rate-of-return limited contracts on projects with risk. One or two “upside successes” are needed to pay for all the rest of the unsuccessful
projects.

**Common Mistakes**

The interviewees identified the following common mistakes:

- small companies are lax in how they do business—not diligent in cost control and contract management;
- insufficient understanding of the technical risks;
- poor technical work, especially by smaller North American companies. Very localized technical knowledge by (especially U.S.) smaller companies can lead to an oversight of the other crucial technical risks; and
- insufficient homework.

**4.4 Environmental, Health, Safety, and Security**

This section includes:

- occupational health and safety;
- behaviour of personnel;
- kidnapping, assassination, crime;
- environmental legislation; and
- climate, geography.

**Key Risks**

The interviewees identified the following key risks:

- personal security (kidnapping, etc.) in some specific countries such as Colombia;
- climate and geography are becoming more important as industry activity moves towards more remote and difficult areas;
- problems for companies arise more often as a result NGO pressure and ethical investment funds rather than host-country pressure, such as from environmental groups. If problems arise, they are most likely to be the result of the actions of sub-contractors;
- Canadian companies manage these issues well;
the senior person in the country can be held responsible for corporate performance, for example in environmental matters, and subject to jail if there is a serious problem;
these can be reasonably managed;
host-country staff applying inadequate EH&S practices;
operations hampered by security threats (country specific);
security threats scaring off quality people (as employees, contractors) (country specific);
security risk scaring investors/NGOs/executives/directors—worried someone will be killed (country specific);
inappropriate behaviour of personnel;
in some locations, security risks can be critical (e.g. Sudan, Algeria);
these are area specific;
personal security needs to be watched carefully and, in some countries, people with a certain level of courage and discipline will be needed combined with a good security protocol;
environmental, safety, kidnapping, climate, geography are usually fairly easily managed;
personal security as a result of random violence (Nigeria, Colombia); and
political violence (Algeria).

Risk Management Advice
The interviewees provided the following advice:
these risks are often country specific;
inexperienced personnel in some environments need briefings, and/or the accompaniment of someone more experienced. Generally only extremely offensive behaviour (insensitivity to host-country customs) causes problems that have financial and relationship costs. This is generally well-managed;
the process of documenting and distributing briefing material for travelers provides a good forum for ensuring that security issues are addressed as part
of a formal plan;

- North American companies tend to be socially and environmentally conscious—this consciousness is increasing in other parts of the world, and increase costs and risks;

- EH&S risks are handled well by Canadian companies—their Canadian procedures are more than adequate (relative to host-country standards), and travel well;

- Increasing environmental consciousness will require greater contingency planning, scenario analysis, training, education, prevention and a greater need to train host-country personnel in these matters. By increasing awareness, there will, however, be a short-term increase in costs;

- Personal security (kidnapping, etc.)—it is prudent to make insurance provisions;

- To promote good behaviour on the part of personnel, training, setting a good example, and incentive programs are helpful;

- To ensure suitability of personnel and their families prior to departure for foreign assignments, consider a professional assessment. Large companies tend to be better at this;

- Climate and geography concerns are manageable (for a price), with sufficient on-site surveys and planning to gain host-country knowledge. This can apply to both offshore (e.g. sea states) and onshore (e.g. topography and environmental sensitivities);

- If involved in a project as a non-operator, select a reputable partner as operator who will maintain good EH&S standards;

- Do the homework;

- Do thorough contingency planning to cover potential problems and test these plans regularly (a dry run). Do due diligence on this;

- Ensure proper contracts are in place to keep costs in hand;

- Keep U.S. cash and open airplane tickets available for if things go wrong. In case of a serious traffic accident, for example, a temporary absence might allow for a cooling off period;
• conduct site visits to understand terrain, roads, and infrastructure;
• conduct business to either the company or the host-country standard, whichever is higher;
• conduct independent audits of health and safety practices;
• conduct an environmental base-line study to safeguard against future legal/political problems;
• on security issues, find the right balance between paralysis and indifference;
• have clear lines of communication;
• prepare contingency plans (e.g. evacuation);
• provide travel and security briefings prior to departure;
• access good information about the security situation (security and political consultants, other operators, host-country contacts, embassy);
• conduct security audits;
• have security advisors on site (country specific);
• allow people to say "no" to travel in difficult security environments;
• encourage frequent communication by in-country staff with their families to reduce anxiety—otherwise head-office security people get burdened.;
• "if you can think of anything more you should be doing, then do it";
• if security situations arise, stick with your plan. Don't let the panic of the moment change the plan that was developed under cooler circumstances.;
• get kidnapping insurance;
• Canadian companies have a good environmental track record, and usually take their good practices with them;
• where security conditions are difficult, consider military protection, training, security firms, and be selective about who you send;
• Canadian environmental standards are high, and have prevented Canadian companies from encountering major problems;
• environmental considerations are growing in importance;
• random violence requires large sums of money to defend against;
• for political violence, the government can often be counted on for assistance.
This risk is more predictable and manageable than random violence;

- security is a visceral issue for most people, when things get 'heavy', and each of us will have a different reaction. The team making the security decisions needs to have both an in-country component to provide the best information as well as a head-office component to ensure a rational assessment of the situation. Security is a rational business. One organization (Eurocopter) uses a model of a "control group" on security issues reporting to their executive board. This is led by a senior individual who has lots of experience but is not 'climbing the corporate ladder', and this is also a good model for other large corporations; and

- The Canadian embassy is a good source of information, and a support in the case of an actual evacuation. You need a good liaison with them.

**Common Mistakes**

The interviewees identified the following common mistakes:

- EHS&S risks can be overrated in peoples' minds, with a disproportionate concern to security. This may be due to how media covers events, and can deter people from travelling;

- paralysis based on perceived threat;

- ignoring security issues, complacency by expatriates; and

- these issues can never be taken too seriously.

**4.5 Political and Economic**

This section includes:

- government stability;
- political profile of project;
- ability of economic system to accommodate project;
- existence/precedence of necessary approval processes;
- receptiveness to foreign participation, nationalization; and
- business environment.
Key Risks

The interviewees identified the following key risks:

- government stability can be a key risk in some countries. Nationalization appears to be out of favour;
- price instability;
- over-leveraging the company on the assumption that prices will remain high;
- Russia appears to be an almost unique case of a country in which the fiscal and regulatory environment is sufficiently chaotic to preclude sensible investment;
- if the fiscal arrangement depends on the current government administration and that administration is at risk, then the project economics are at risk;
- nationalization is unlikely these days;
- fiscal stability, changing contractual terms;
- a project that has a political profile and relies on the support of a single individual;
- commodity price;
- exchange rates;
- market and infrastructure access;
- changeability of contract terms;
- embargoes;
- price;
- high barriers to investment;
- bad attitude to foreign investment—misconstruing it as the rape and pillage of national treasures. Russia is a prime example of this;
- country attitude to foreign investment in the areas of adequate experience accepting foreign investment, effectiveness/types of contracts, lack of consensus on how to treat foreign investors, and inconsistent signals and policy;
- popularity of investment in the host-country; and
- public relations in the home country from NGOs), for example, as a result of
dealing with a corrupt government.

Risk Management Advice

The interviewees provided the following advice:

- many of these risks are country specific;
- many of these risks are controllable;
- create a contract that is fair over a variety of price environments—can the project handle a low price environment?
- balance the risks (e.g. if political risk is high, offset it with lower costs, higher rewards, smaller working interest);
- in many countries, the business environment may be difficult, but model contracts can sometimes be ignored to create something that works;
- have a plan in place if things go bad (e.g. reduce loan payments for a period of time), and look for low cost capital such as bonds, junk bonds, multi-lateral loans;
- for small companies, expect that there will be times when you will be unable to raise equity capital;
- there is lots of available information on government stability. The main issue is whether a new government will honour the existing contract. History is often a good indicator of this. The Canadian government has excellent analyses of these and other in-country issues;
- where there is a risk of a change in instability, some discrete bridge building with both the incumbent and the opposition might be prudent;
- some countries allow “economic stability” terms to be included in the contract;
- run sensitivities to price;
- there was contradictory advice as to whether a high profile was good for a project;
- dictatorships are unpleasant, but often stable and therefore more predictable (a valuable characteristic for a project with significant capital investment);
- ensure you have access to hard currency in exchange for you product, or that you can sell the product directly on the international market to avoid currency
risks;
- make sure the agreement doesn’t depend on just one individual or group, if that group may not be in power for the duration of the project;
- access reports and information frequently;
- avoid, mitigate, understand, and diversify;
- do not interfere with host-country politics;
- build resiliency into contract to mitigate commodity risks;
- ensuring reasonable profitability at all levels of success creates a win-win situation for both parties, regardless of outcome (not too much profit for big pools, not too little for small pools);
- keep a low project profile;
- don’t take on such a big project that you become a political target;
- a large project in a country can create positive political interference if it is well regarded;
- consider a portfolio of investments in different areas (but balance this with spreading your resources too thinly);
- make contracts hard to change—give them the force of law;
- political risk insurance is less common, but also used, for example, to calm investors;
- “our philosophy is that there are no countries that are out of bounds from a political risk perspective. Countries are open for business, and nationalization appears to be out of fashion”;
- sometimes powerful partners can ease the political risk. The Chinese oil company in Sudan is an example—no one will mess with the Chinese;
- in the current business environment, small and medium-sized companies cannot raise capital to fund international ventures;
- do the homework before you get in;
- think of opportunity as well, if the business climate might improve;
- mitigate risk by having a project that can pay out quickly;
- the most important thing is to do the homework;
• "Let your conscience be your guide" when investing in countries or projects that may be controversial and impact your company’s image; and
• don’t hedge against low prices, rather have robust economics going in.

**Common Mistakes**

The interviewees identified the following common mistakes:

• forgetting about the large number of national staff that you need to hire (e.g. Hurricane Hydrocarbons in Kazakhstan); and
• forgetting that price cycles in the business can swing both ways.

4.6 **NOC/Government Relationships and Cultural Differences**

This section includes:

• control;
• opportunistic behaviour;
• contract (e.g. PSC) interpretation and sanctity;
• partner experience with necessary processes;
• differences in corporate/business culture;
• differences in social culture (time, money, language, communication styles);
  and
• dependence on individual relations.

**Key Risks**

The interviewees identified the following key risks:

• dealing with “rascals” is a greater risk for small companies, who may be tempted to pay bribes, and will be stranded if there is a change in the “players”;
• understand what the circumstances related to payoffs and bribes are, and have a plan to work around it (e.g. Nigeria);
• control is a key risk for smaller companies;
• opportunistic behaviour is common and inevitable in some places;
• not understanding the host-country decision-making process and players;
underestimating the powers of obstruction;
not understanding what people mean when they are communicating (varying degrees of directness can be appropriate);
underestimating the importance of personal relationships;
understanding the differences between corporate/business cultures;
poorly negotiated PSCs (that do not allow sufficient profit, that don't allow sufficient time to exploit success, that are poorly translated and have a different meaning);
poor rapport with the host-country populace, with the result that you can't get things done;
underestimating the impact of cultural differences, taking things for granted;
misunderstandings due to cultural differences resulting in poor decision-making and frustration. This can include language differences and language barriers such as degrees of directness or using the wrong words;
cultural barriers make senior management involvement more difficult, and can affect project support;
attrition of Canadian values and methods to the host-country system;
communication barriers hinder interviewing of national staff;
do not bribe;
post-contractual opportunistic behaviour by someone who controls the resource, often through obstruction and value erosion (sometimes one to achieve the other);
misunderstanding each other's corporate hierarchies;
different motivators/drivers for key decisions (e.g. discount rate, social discount rate, reserve additions versus cashflow);
when the national oil company controls everything, their external image may be the only leverage you have;
my attitude to cultural differences is that our common humanity exceeds our differences. People smile, they want to feed their families—we have so much in common. The key to overcoming cultural differences is to be sensitive to
what the differences are, and not cause offense;
- bureaucracy/technocracy as a barrier to getting things done;
- different priorities and corporate/business cultures leading to conflict;
- non-arms-length relationships between owners and contractors;
- inexperienced people due to quotas on host-country staff;
- cultural differences are one of the bonuses of working internationally. You can find common ground with people, and learn interesting approaches to doing things; and
- slow approval;
- insufficient alignment of the project with NOC/government goals.

Risk Management Advice

The interviewees provided the following advice:
- if you are a smaller company, you need some powerful allies to solve problems;
- “draw a line in the sand, control your own destiny”—this means making sure you have adequate control over the project;
- negotiating the PSC can be time consuming and difficult. Once it is negotiated, throw it away, and keep negotiating;
- mitigate opportunistic behaviour by surrounding yourself with people you can trust, and not allowing yourself to be pushed around. You should have a mitigation plan in place for this;
- individual relations with decision-makers are key to the success of a project. Who really has approval authority? As Canadians, we put too much weight on established/formal government—and not enough weight on regions/locals. We expect law and order to prevail;
- cultural differences can be overcome. There is more than one way of doing things. Consider incentive programs, mission statements, etc. to improve alignment of objectives;
- understand the host-country decision-making and approval processes, as well as jurisdictions. These are often not done by statute, and may not be clear
(overlapping and competing jurisdictions);

- some of the newer OECD legislation will make it difficult to do business in some countries, particularly in the Middle East, where significant net profit payments to agents are commonplace;
- the judicial system can be a political system. Need right political relations;
- understand the host-country system. Check out your project with all the power brokers, don't make enemies;
- mitigate against nationalization by specifying a "compensation in the event of nationalization" clause;
- build protection against unfair treatment by specifying arbitration by an impartial body;
- can also mitigate political profile of project by partnering with the national oil company, even if it is not required;
- some countries are not yet unanimous in their openness to foreign participation, and opponents can obstruct the project. Host-country partners are the most skilled at working around these problems (e.g. a host-country engineering firm);
- a common reason that companies fail internationally is that they fail to help the host-country/NOC. If the NOC has a problem, make it your problem and help to solve it;
- hire enough people with in-country experience to understand how business is done;
- control issues vary around the world. The U.S., for example, is easy and clear to work in. Some countries have much tougher reputation (e.g. Algeria);
- when negotiating, involve people who are experienced in the particular contact type under discussion. There is too much "bravado without knowledge" in the industry;
- find out from other operators how they have managed their relationships;
- expect differences in how business is done. Delivery and costs might not be what you expected. "Yes, but I gave you that quote last month!";
- personal trust and friendship are important. The relationship needs to be
nurtured and not neglected;
- the rules of the game are not explicitly defined. Find them out;
- hire locals and expatriates who know the area;
- do your homework;
- allow all stakeholders to save face—pay respects to all;
- work with government to understand the system. In Tunisia, for example, there are 17 agencies to approve production start-up;
- business and friendship is all mixed up like a salad;
- establish relationships;
- control may be an important issue, but there may be nothing you can do about it;
- secure a host-country partner who has established relationships and knows the ropes;
- cultivate individual relationships. Invite families. Allow personal relationships to act as the bridge to overcome hurdles;
- honour host-country customs and avoid behaving poorly. Exercise good manners, don't be loud and aggressive;
- use an experienced host-country lawyer for translation of PSC to ensure no confusion over the meaning of what is being negotiated;
- learn protocol;
- be known personally, entertain people you need to know, give small token gifts to show thoughtfulness. Work hard to retain confidence and respectability;
- as your first step in the country, pay the necessary courtesy visits;
- patience is crucial, otherwise you will be a victim of the waiting game;
- recognize that any government needs to be seen by its people to be creating activity and jobs;
- if there is a sensitive discussion to be had, have a verbal dialogue first, so that people are not caught off guard when the letter arrives. Plant ideas, allow the NOC/government to make them theirs;
• small gestures of local philanthropy can go a long way if done in concert with host-country authorities;
• things don’t happen the same way as in Canada. Never lose your patience or your temper;
• manage your expectations downward when it comes to foreign activities, particularly during Ramadan, and help others manage theirs;
• don’t make promises about project timeframes without full consideration of the host-country timeframes;
• dedicate time and effort to resolve communication issues and misunderstandings;
• provide language training to as wide a group as possible to improve communications. Also hire secondees and host-country staff to break down the communication barriers;
• provide cross-cultural training, including for senior decision-makers;
• have ready and accessible some arbitration/conciliation devices to resolve misunderstandings, and reduce the taboo associated with accessing conciliation processes as much as possible;
• use interpreters where there is a risk of misunderstanding;
• be honest, true, and fair in all dealings. It can be disarming, even in countries where a high level of suspicion is the norm, and builds trust and allies;
• be open minded about differences and use the best of both cultures (don’t just work in one or the other);
• negotiate milestone-based contractual terms rather than just temporal where possible (e.g. the clock on the contract starts ticking when the data is received), and set limits for approval processes;
• consider writing intent-based contracts that don’t cover every eventuality, and build in lots of conciliation;
• educate your counterparts on how you make decisions (e.g. Petro-Canada’s evaluations guidelines course). Try to be transparent to the NOC/government so that you are understood, and don’t keep secrets;
• be culturally aware and sensitive;
build personal relationships;

good relationships lead to good projects, and are the single most important factor in managing future risk (regulatory, infrastructure, political, etc.). An investor can design his own projects once the relationships with the right individual(s) are in place;

if you are relying on a host-country individual to manage your operations, choose someone who has the qualities of honesty, business acumen, and an excellent reputation in the country (reputation is more important than existing power). You need someone who knows his way around the country, and can make things happen. Don't underestimate the effect of reverse culture-shock—the adjustment to working with or for a western company;

in many countries, decisions are made through a network of people who have influence—and a personal relationship with each other built on past experience;

don't bribe, but rather build good relations with people—perhaps starting with only a small project to build up trust;

the best way to build a relationship is to invite someone over to your house, to have coffee, etc. These opportunities shouldn't be missed;

once the relationship is established, it still needs to be cultivated. Everyone involved needs to feel they are winning with the success of the project;

the contact will determine how you work together. The key parts appear to be the accounting annex and the host-country hires/decision-making sections. This will determine the relationship;

make sure there is a proper hydrocarbon law in place, as well as international arbitration procedures;

all these issues can be managed;

do your homework;

build relationships;

if you have partners, make sure they are trustworthy. Failing that, at least know when they are being dishonest;

partners are a problem whether you work internationally or domestically;
• you can find a way to make things work with sufficient patience, frequent communication;
• I have worked for decades in international, but have never been involved in a payoff. Buying someone a textbook is o.k., taking someone shopping is not;
• payoffs may appear to be a short-term fix, but they cause long-term problems;
• don’t funnel through agents—it's not necessary;
• it is worthwhile differentiating between personal relationships and corporate relationships. Personal relationships can be adversely affected by cultural differences, and may cause irritation (even severe irritation). The more important relationship is that between an oil company and the NOC/government. If an oil company’s activities are aligned with the NOC/government goals, this resulting corporate relationship will override the cultural difficulties arising in personal relationships;
• a successful strategy (used by AGIP, for example) is to build corporate relationships by aligning the company with the NOC/government goals. If done sufficiently well, this can secure good cooperation during the project; and
• cultural differences can be mitigated by cross-cultural training and personnel selection.

Common Mistakes
The interviewees identified the following common mistakes:
• not understanding how decisions are made, and underestimating the importance of non-statutory processes;
• conducting business exactly as we would in Canada, and then getting frustrated when it doesn’t work the same way;
• overlooking the establishment of relationships—carry on doing business like in Canada. Exporting Canadian business arrogance;
• arrogant perceptions coming into the country;
• displaying bad manners and not respecting the host-country ways; overly aggressive behaviour;
• taking shortcuts by bribing officials;
• bribing, rather than building good relations;
• If it's not the same as in Texas, then the host country must change;
• North America has fairly anonymous business dealings. Elsewhere it is relationship-based; and
• payoffs are a big mistake. It can be tempting for smaller companies or the service sector.

4.7 Head-office and Senior Management support

This section includes:
• management understanding of external issues and project environment;
• ability to provide high profile support;
• resourcing and commitment over longer time frames needed; and
• unrealistic expectations.

Key Risks

The interviewees identified the following key risks:
• poor management/investor understanding of external environment;
• senior executives who have limited knowledge, and are simply “swashbucklers”;
• confusion about chains of command within the organization, up to the highest levels (e.g., a mixed private and public company);
• there is almost unlimited potential for misunderstanding between head office and the host-country office;
• head office not giving sufficient credibility to host-country knowledge and issues, as a result of different contexts and data;
• unrealistic expectations on project timelines and resource requirements;
• resident manager can feel isolated and misunderstood;
• inability to provide high profile support;
• unrealistic expectations, especially regarding timing. Investors have a way of getting upset when their expectations are not met;
- not listening to host-country office, orders flowing in one direction only;
- not considering host-country partner requirements in head office decision-making;
- uninformed executive decisions (e.g., knee-jerk reactions);
- lack of executive understanding of the project environment;
- expectation mis-aligned with what the project can deliver;
- cultural sensitivity is particularly important for senior management. An example was given where a breach of protocol by a visiting CEO offended the host-country energy minister, souring the business relationship significantly, and jeopardizing the future of the (small) company;
- if senior management are going to get involved (and it's much better if they are), they need to be there and show their face—to visit the key people, and to make sure that the relationships are there to solve problems as they arise;
- insufficient senior management understanding of international environment;
- top-down decision-making that overrides technical foundation;
- impatience and inexperience in the international environment on the part of senior management;
- manage expectations;
- make senior management comfortable with the host-country environment by exposing them to the people, business culture, etc. There may be prejudices/preconceptions that need to be overcome, and senior management needs to feel sufficiently comfortable that they can deal with the people there and be successful;
- longevity of senior management support; and
- being driven by a desire for short-term results, something that is rarely seen internationally.

**Risk Management Advice**

The interviewees provided the following advice:

- unrealistic management expectations are a function of poor management understanding;
• swap out people regularly;
• have executives visit frequently. This is done better by small and medium sized companies than large companies;
• understand that Canadian industry works efficiently, and that this efficiency does not necessarily exist internationally. There can be tremendous complexity in the host-country environment;
• expect that things will go slower. Build in “fudge-factors” based on experience, while carrying a different, aggressive internal target. Push like mad all the time, on a daily basis, to meet the target, or nothing will happen. Take nothing for granted;
• engage your senior management in the project by having them travel to the host country (touch, taste, and experience frustrations);
• you need good management to be successful;
• have some level of international experience amongst your senior management;
• need desire and leadership from senior management to be successful;
• you need to be patient to stay the course;
• avoiding the temptation to leave a country when the initial efforts are disappointing can allow a company to apply its understanding of the environment and create/be exposed to other opportunities;
• success in international requires patience and perseverance;
• ensure management has realistic expectations. Temper advocacy by the project team with realism; and
• don’t put all you “international eggs” in one basket. Have a portfolio instead.

Common Mistakes

The interviewees identified the following common mistakes:

• premature withdrawal from a country; and
• the “grass is greener syndrome.” This means thinking that things are better wherever you’re not working. “Flirting is fun, marriage takes work.”
4.8 Project Organization and Leadership

This section includes:

- communication across time-zones and geographic barriers;
- self-directed teams, matrix organizations, pure project organization, functional organization; and
- project leadership style.

The interviewees made the following observations:

**Key Risks**

The interviewees identified the following key risks:

- adequate controls (e.g. basic things like budget overrun procedures);
- inadequate communication between project participants;
- power struggles within the organization;
- poor delegation;
- gaps between the head and host-country offices are endemic due to the different environments, and can result in unhealthy behaviour;
- insufficient autonomy for host-country office;
- bunker mentality (us and them) between host-country office and head office; and
- lack of trust between head office and host-country office.

**Risk Management Advice**

The interviewees provided the following advice:

- the world is getting smaller—take advantage of tools such as e-mail and satellite phones to keep personnel in communication with each other;
- use quick meetings to solve problems right away;
- do the technical work in the head office, unless the project is sufficiently large or the contract structure provides adequate incentives, such as cost recoveries, for doing the work in the host country. Moving technical staff to the host-country office results in a reduction in energy, as distance from
executives increases, and outside temperature increases;

- clearly delineate the functions and responsibilities between the host-country and head office;
- proper delegation of authority requires good stewardship (cost, schedule, and control);
- you need to have people you can trust. A dishonest expatriate is a recipe to lose a lot of money;
- put a dollar limit to the contracts you enter into. Understand the host-country "sharp" practices;
- have more rigorous procedures than in head office;
- need clear authorities for the resident manager, who needs to be selected and supported accordingly;
- give everyone and every team clear job responsibilities. Keep technical people in a single organization;
- make communication a priority. Have a conference call to coordinate activity once a week, no matter what the location of the participants. This reduces mistakes;
- hire locals and expatriates who know the area;
- you need personnel with international experience, including several international projects, as well as an international posting;
- do project design in Calgary. If sufficient technical expertise exists in the host country, do the work there, otherwise in Calgary;
- use western supervisors for drilling operations, particularly for directional drilling;
- sensible, well documented, and standardized systems and processes at the head-office and host-country office will reduce misunderstandings between them. Examples include monthly reports, accounting procedures, security guidelines and procedures. An international operations manual can be a great help if it spells out who does what;
- ensure all project participants have spent some time in country, to build relationships and understanding within the project team;
• the project scope is widened through the international dimension, as there is a need to input the host-country context into the decision-making;
• communication between Calgary, host-country office, and NOC/government is crucial. There are lots of communication tools and systems available—use them (e.g. e-mail, personal contact);
• ensure delegation of decision authority on security issues to a level headed host-country manager, who has the ability to laugh at tough situations, and does not overreact;
• do all the technical work in Calgary or regional technical office;
• smaller, independent groups with greater autonomy have been the most successful in my experience;
• allow the host-country personnel a reasonable level of autonomy;
• allow partners a strong say (you get good input that way);
• link partner to host-country office when in physical proximity;
• the right partners based in host-country region can be a strength;
• education is an excellent way to build bridges to the partner organization;
• do your technical work in the home office rather than in the host country for reasons of cost-effectiveness and productivity;
• have project continuity as much as possible, even from the resource drawn in from outside the team;
• ultimate accountability needs to remain at head office. Otherwise there is a danger of disconnects, a too high potential for a host-country “project owner” being mis-aligned with the corporate objectives;
• with the right project, organization, and people, you can work anywhere;
• a way to overcome the bunker mentality is to have staff all in a single location, somewhere close to the project site, to allow the team approach to work. This may be a costly undertaking requiring innovative compensation schemes or a large project. Putting all staff in head office requires too much travel and will burn out staff;
• joint decision-making and open communication are the key to ensuring trust. This is the key aspect of relations between the host office and head office;
autocratic decision-making fuels suspicion that is greatly aggravated by distance. Making decisions by consensus is an excellent trust-building tool. A clear division of responsibilities increases work efficiency and understanding. In normal circumstances, the technical work would be the responsibility of the head office technical team, the operational/implementation responsibility would lie with the host-country office, and strategy would be led by the head office, but developed through consultation with the host-country office.

Common Mistakes
The interviewees identified the following common mistake:

- a lack of "hands-on" involvement in the project by the decision-makers.

Organizational Styles Personally Experienced
The interviewees had experience with the following organizational structures:

- All kinds of organizational styles. I believe that some kind of matrix organization is needed (functional leader and project leader). Pure project organizations have trouble adequately leveraging specialty skill sets;
- chaos, executive autocrat, single point decision-making, disorganized;
- functional, in a small company environment. Bring in help on a project-by-project basis;
- just about all kinds; and
- functional, pure project, matrix. I prefer the pure project organization that can draw specialist resources from the organization as needed. There would be no functional accountability, and the project manager could hire and fire staff.
Appendix D: Algeria Asset Team Norms

1. Asset Team Norms

The success of the asset team to date is based on teamwork. An attempt has been made in this document to ensure that the principles of shared leadership, open communications, as well as team and individual empowerment continue.

Upcoming challenges to the team norms include:
- the addition of new team members;
- geographical spread (Algiers, Calgary, field); and
- real time pressures on the decision-making process.

2. Composition of the Algeria Asset Team

- the asset team consists of all the technical, administrative, and operations staff both in Algeria and Calgary;
- project management skills are part of the asset team;
- the resident manager is a member of the asset team, and not the head of the asset team; and
- it is the responsibility of those team members who spend most of their time on the project to ensure that all team members are properly involved.

3. Role of the Algeria Asset Team

The purpose of the asset team is to create opportunities and manage Petro-Canada's interests in Algeria to ensure early cashflows and maximum value.

This involves the following:
- responsibility and accountability for all work in Algeria and Calgary;
- responsibility for planning, coordinating, executing and measuring all work;
- responsibility for communication of asset team plans, activities, issues and results to all stakeholders (Business team, suppliers, and within Algeria Asset
• responsibility and accountability for decisions made within the approved workplan and budget;
• authority to make spending decisions and to award contracts within the limits of the plan (spending limits to be negotiated with the business team); and
• the asset team is a partner with the business team and functional staffing teams in the staffing of the asset team, including developing criteria for and selection of additional team members.

4. Decision-making Process
• all asset team members have an equal say in the decisions of the team;
• decisions are made by consensus (meaning everyone is willing to live with the decision), or the asset team may choose to delegate decision authority to an individual(s);
• every team member leads and coordinates the work in their area of expertise, as well as any other issues delegated by the asset team;
• individuals are answerable to the asset team for authority delegated to them, and the asset team as a whole is responsible for all decisions made; and
• there are no organizational hierarchies within the team.

5. Conflict Resolution Process
• open and rational approach to be used;
• use a neutral facilitator, get all ideas on the table, and get consensus; and
• everyone will be fully heard.

6. Role of Individual Team Members
• this detailed the individual job roles; and
• project management skills were identified as coming from within the Algeria Asset Team, including planning, scheduling, coordinating, and measuring.
7. **Direction from the Business Team**
- provides business strategy development and business direction;
- responsible for approval and stewarding of implementation plan (monthly?);
- will negotiate performance measures with the asset team and follow-up to check on performance;
- responsible for providing resources to the asset team, including funding;
- jointly responsible for staffing decisions with asset team; and
- provides coaching of individual team members, including career development and training support.

8. **Communication**
- the open sharing of information is a team norm. Communication between the asset team and any members of the business team is unrestricted. Communication will not be used as a control tool;
- an important tool for communication of project activities with the Business team and the extended team are the weekly report. Any team member has the right to include any items in the report. Reports go to all asset team members and any interested business team members;
- once the team is spread between Algeria and Calgary, a weekly phone call between all team members will be scheduled to ensure a coordinated effort; and
- the advantages of many open and unrestricted lines of communication are felt to offset the advantages of restricting communication for the Algeria project. This is achieved by reaching common understanding on key issues through the weekly report and meetings, as well as the obligation of each team member to share the results of their communications with others.

These norms were intact and used throughout the project until first oil was achieved.
Appendix E: Ideas for a Risk Management Toolbox

General Tools

- alignment for long term projects—S.M.A.R.T.
- De'ATH pie chart.

Project Selection and Data Phase

- advice listing from the “21 points” in the thesis
- reference to Wasteneys.

Technical Risk

- a methodology for systematically addressing technical risk and uncertainty, benchmarked to historical results (reference list: Capen, Cutten)
- portfolio management spreadsheet.

EH&S and Security

- close work with insurance companies to provide an independent assessment of political, security, and business risks
- advice listing from the “21 points” in the thesis
- key reference.

Political and Economic

- close work with insurance companies to provide an independent assessment of political, security, and business risks
- key reference
- advice listing from the “21 points” in the thesis.

NOC/Government Relations and Cultural Differences

- language training
- cultural training
- reference to Bretzloff
• advice listing from the "21 points" in the thesis.

Senior Management and Investor Support
• advice listing from the "21 points" in the thesis.

Project Organization and Leadership
• advice listing from the "21 points" in the thesis
• team effectiveness tools identified in ENCI 691 (Section 6).