

**SOCIO-ECONOMIC BENEFITS  
FROM PETROLEUM INDUSTRY ACTIVITY IN  
NEWFOUNDLAND AND LABRADOR**

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Mark Shrimpton  
October 2003

## **DISCLAIMER**

Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author and do not necessarily reflect the views of the Petroleum Research Atlantic Canada or its members.

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## EXECUTIVE SUMMARY

Offshore petroleum activity in Newfoundland and Labrador started in 1963, and the first exploration well was drilled in 1966. Environmental challenges, jurisdictional conflicts and other factors meant that the industry developed slowly and with significant fluctuations in the scale of activity. The first commercial oilfield, Hibernia, was not discovered until 1979 and its development did not begin until 1990, with the first production in late 1997. A second field, Terra Nova, started development in 1998 and entered production in early 2002, and the development of a third, White Rose, is underway with a view to production in 2005. This forty-year history has seen the slow emergence of a new industry that is now having profound effects on the economy of Newfoundland and Labrador.

Newfoundland and Labrador has seen fluctuating levels of exploration, development and production activity. In the first case, the pace of exploration has varied in response to levels of success, changing oil prices and the availability of government support (especially the Petroleum Incentives Program), with peaks of seismic and drilling activity in the mid-1970s, mid-1980s and late 1990s. This exploration led to the discovery of the Hibernia, Terra Nova and White Rose oilfields in 1979, 1984 and 1988 respectively, but there have been no commercial finds in more than a decade.

The \$5.2 billion development of the Hibernia oilfield, including the construction of a concrete gravity based structure (GBS) and some topsides components at Bull Arm, Trinity Bay, started in 1990. The GBS and the topsides were mated in early 1997, and the complete platform was then towed to the field in time for first oil production in November 1997. In 1998, Petro-Canada decided to develop the Terra Nova field using a floating production storage and offloading (FPSO) vessel, with much of the topsides fabrication and installation occurring at Bull Arm. The FPSO arrived at the field in August 2001 and produced first oil in January 2002. The total Terra Nova pre-production capital expenditures were about \$2.8 billion. Work developing the third field, White Rose, started in 2002, with first oil expected in late 2005 or early 2006. The project has a total capital cost of \$2.35 billion, with Husky Energy spending almost \$2 billion prior to the start of production.

Based primarily on information about these oil and gas company expenditures and associated employment, the research shows that the industry has made a large direct contribution to the economy of Newfoundland and Labrador. For example, between 1999 and 2002, its total capital expenditures ranged between \$901 million and \$1375 million per annum. Operating expenditures amounted to varied between \$136 million and \$234 million and the total wages, salaries and benefits ranged between \$171 million and \$272 million. The person-years of employment increased from 2957 in 1999 to 3871 in 2000, but declined to 3328 by 2002. They are expected to increase again in 2003 and 2004, associated with peak White Rose development activity.

These figures relate solely to the direct petroleum industry activity. However, this involves purchases of goods and services, including business services, air and marine transportation, wholesaling, storage, and architectural, scientific and engineering services, from other industrial sectors in Newfoundland and Labrador. This leads to their employing additional workers and paying further wages, salaries and benefits.

When these indirect effects are included, the industry had an annual average direct and indirect Gross Domestic Product (GDP) impact of approximately \$1.4 billion, and directly and indirectly created about 8800 person-years of employment per annum, over the 1999 to 2002 period. The direct and indirect GDP effects peaked, at approximately \$2.0 billion, in 2002. However, direct and indirect employment impacts were lower (6900 person-years) due to the low level of development activity in 2002.

The data on direct and indirect impacts provide key inputs to the Newfoundland and Labrador Econometric Model (NALEM), which simulates the overall (i.e. direct, indirect and induced) effects of the petroleum industry on the Province's economy. In summary, the NALEM analysis found that, on average over the 1999 to 2002 period:

- The Province's GDP was \$1.9 billion (14.7%) higher as a result of the offshore petroleum industry;
- Personal incomes were \$696 million, or 6.0%, higher as a result of industry activity;
- Personal disposable incomes were \$545 million, or 5.8%, higher;
- This led to retail sales being \$264 million, or 5.7%, higher;
- The total employment was 13,900 greater than it would have been without the industry;
- The unemployment rate was 2.4 percentage points lower; and
- The Province's total population was 8000 larger, thanks to reduced out-migration and increased in-migration.

The Department of Finance has also calculated that in 2002 oil and gas production services represented about 15.3% of the provincial total direct GDP. This measure allows comparison with the GDP contributions of other sectors of the economy. For example, the 15.3% contribution is virtually the same as that of Finance, Insurance, Real Estate, and Renting and Leasing activity (15.2%). The contributions of some other sectors include: Health Care and Social Assistance (8.1%), Education Services (6.2%), Retail Trade (6.1%), Manufacturing (5.7%), and Agriculture, Forestry, Fishing and Hunting (3.3%).

Petroleum industry activity has resulted in, or contributed to, the development of a wide range of construction, fabrication, supply, service, education, training, and research and development infrastructure. Some of it is in use for oilfield operations, while these and other facilities are also being used for other oil and non-oil industry activity. The capital cost of these facilities was about \$1.2 billion. Building them has provided a major boost to the local construction industry, generating demands for materials and equipment, as well as engineering, project management and construction services. Furthermore, this infrastructure is important to petroleum companies considering further projects in Atlantic Canada. It reduces the cost, and

hence increases the likelihood, of such projects. It also increases Newfoundland and Labrador's participation in them, by increasing the Province's ability to be involved in construction and fabrication activities.

Petroleum industry infrastructure and activity has major impacts on some communities, especially in the St. John's metropolitan area. For example:

- Eighteen of the larger petroleum sector companies located in the City of St. John's occupy premises with a combined assessed value of \$50.8 millions, yielding about \$1.85 million (about 6% of the City's total) in business realty and occupancy tax.
- The City of Mount Pearl is the home of 95 businesses that are largely or solely engaged in petroleum industry work, and employ a total of over 900 workers. The assessed value of these businesses is about \$40 million, yielding about \$1.3 million in municipal tax a year, or approximately 7% of all tax revenue.
- The Town of Paradise is the home of fourteen businesses involved in the offshore petroleum industry. They paid over \$155,000 in business and property taxes in 2003, representing about 3% of all such taxes.

These municipal governments also benefit from the business taxes paid by the many stores, restaurants and other small businesses that are flourishing in part because of the petroleum industry, and the residential taxes paid by a minimum of 5000 to 6000 St. John's metropolitan area residents it employs.

Individuals and companies in Newfoundland and Labrador have also benefited from education and training resulting from the Province's petroleum industry. It is working at the technological frontier, seeking to find and produce oil and gas in a harsh environment and increasingly deep waters, using wells of record lengths and production systems of great complexity. This has required the development of new education and training programs and facilities at Memorial University, the Marine Institute, the College of the North Atlantic, and private training institutions. There has also been a rapid growth in cooperative education placements, scholarships and awards, and on-the-job training. This has produced a highly skilled local workforce, able to design, maintain and operate offshore systems in a safe and environmentally responsible manner. Local firms have also benefited from the expertise and experience they gained through involvement in the petroleum industry, and further increases in these capabilities and benefits can be expected.

In addition to education and training initiatives, a significant amount of petroleum industry research and development work is being done in Newfoundland and Labrador. Each year, operators, contractors, government agencies, industry groups and research organizations support or participate in a wide range of studies related to petroleum activities in Newfoundland and Labrador.

This includes work in such areas as: engineering and design (e.g., vessel design, mooring options); operational studies (e.g., seismic survey techniques, vessel offloading, safety equipment and procedures, ice detection and response); and environmental investigations (e.g., wave and current studies, beached bird surveys, fish habitat compensation).

This work, which has primarily occurred at Memorial University, the Marine Institute and the Institute for Marine Dynamics, helps sustain and further build the local research and development community, assisting it in serving local interests in the petroleum and other industries. It has also helped develop Newfoundland and Labrador as a center of excellence in such topics as cold oceans engineering, distance technologies and marine science.

The Newfoundland and Labrador companies currently involved in offshore petroleum-related work are extremely diverse in terms of type, size and origins. They include firms that are:

- pre-existent local companies which have expanded, due to offshore petroleum activity, largely through increased sales of their traditional good or service;
- pre-existent local companies which have expanded into new petroleum-related areas of activity, many of them through joint ventures and strategic alliances;
- local companies created in response to new offshore petroleum-related opportunities; and
- companies which are new to Newfoundland and Labrador, having been drawn here as a direct result of industry.

Case studies of 20 companies demonstrate that:

- The industry is a major generator of employment, salaries and wages for a wide range of companies.
- Work in the industry, with its demanding and constantly evolving technologies and business approaches, requires that companies provide their employees with high-quality training and upgrading.
- Industry-related work has led to major infrastructure development, such as at the Cow Head construction facility near Marystown and NEWDOCK fabrication and support facility in St. John's. Other examples, while more modest in size, have made important contributions to the capabilities and efficiency of the companies involved.
- The petroleum industry is very demanding in terms of business practices, especially in the areas of quality and reliability, requiring that local companies establish globally-competitive approaches to such things as bid preparation, quality assurance, quality control, documentation, tracking and accounting.
- While it is a very demanding industry, the rewards can be considerable, including the opportunity to work for other clients both inside and beyond the industry. Furthermore, links developed through relationships with the industry locally provide an invaluable means of marketing nationally and internationally.



- These changes to local companies have made them highly competitive, and the affect on their business cultures, attitudes, morale and ambition has caused them to compete with the best in the world.
- The above factors have helped companies to find work on other petroleum projects in Atlantic Canada and around the world, while a number of them to have also expanded into other sectors of the economy. As such, it has diversified these firms and the whole provincial economy.

In summary, the effects of the industry on Newfoundland and Labrador are large, widely distributed and long-term. It has made, and will continue to make, a very important contribution to the economy and society of Newfoundland and Labrador. Fortunately, however, it is by no means ‘the solution’ to the economic problems of the Province; having such a single saviour would lead to it being vulnerable to fluctuations in this one industry. Instead, the petroleum industry adds a new sector to, and thereby diversifies, the economy.

Furthermore, the industry is having a transforming effect. The new capabilities and ambitions they have created are not just applicable to the petroleum industry or in Newfoundland and Labrador or Canada. Exploration work, and work on the Hibernia, Terra Nova and White Rose projects, have made, and are continuing to make, local firms and individuals highly competitive. This has helped them get work on other petroleum projects, and on projects in other industries, locally, nationally or internationally. Similarly, while the new petroleum industry-related research, development, education and training infrastructure was put in place to support local petroleum activity, it is increasingly being used to undertake work for clients outside the Province and outside the industry, further developing and diversifying the economy of Newfoundland and Labrador.

## 1.0 INTRODUCTION

Offshore petroleum activity in Newfoundland and Labrador started in 1963, and the first exploration well was drilled in 1966. Environmental challenges, jurisdictional conflicts and other factors meant that the industry developed slowly and with significant fluctuations in the scale of activity. The first commercial discovery, the Hibernia oilfield, was not made until 1979 and its development did not begin until 1990, with the first oil production in late 1997. A second field, Terra Nova, started development in 1998 and entered production in early 2002, and the development of a third, White Rose, is underway with a view to production in late 2005 or early 2006. This forty-year history has seen the slow emergence of a new industry that is now having profound effects on the economy of Newfoundland and Labrador. This report seeks to identify and describe these effects, making people aware of the range and scale of benefits generated by the industry.

The above oilfields are out of sight to most people, hundreds of kilometers offshore. However, the loading, unloading and movement of supply boats and helicopters in St. John's Harbour and at the helibase at St. John's International Airport provide Newfoundlanders and Labradorians with some tangible evidence of exploration and operations activity. Seismic vessels, drilling rigs and other exotic vessels are also periodically seen in St. John's Harbour, Bay Bulls, Conception Bay and Marystown, and there is a regular movement of production activity-related tankers to and from the Newfoundland Transshipment Terminal at Arnold's Cove, Trinity Bay. There are also periods of large-scale petroleum industry construction activity in such places as the Marystown Shipyard and Cow Head Fabrication Facility, Placentia Bay, and Bull Arm Construction Site, Trinity Bay.

However, most of the effects of the industry are much less obvious. These include, for example:

- onshore support and logistics facilities and activities, such as those in industrial parks in Mount Pearl and Paradise;
- the St. John's offices of wide range of companies, large and small, that are supporting these operations;
- the emergence of a supply and service sector that is competing not only for local work, but in national and international markets;
- the offshore workforce, including those on the Hibernia platform, Terra Nova floating production storage and offloading (FPSO) vessel, supply boats and tankers, who live in communities across the Province;
- improved air connections, especially with Halifax, Calgary, England, Scotland and Norway;
- improved telecommunications, weather forecasting and search and rescue facilities and services;
- new offshore petroleum-related teaching and research programs at Memorial University and the College of the North Atlantic;
- Newfoundland and Labrador coop students working in petroleum industry offices in such places as St. John's, Calgary, Houston and Aberdeen;
- petroleum industry-related expenditures on travel, hotel accommodations and restaurants;

- community contributions, such as volunteer activity of industry personnel and petroleum companies' financial support of community programmes and events;
- oil royalties and taxes increasingly flowing to the provincial Treasury;
- income, property and other taxes paid by all these businesses and their employees to the federal, provincial and municipal governments; and
- the secondary effects of all this, as income and tax revenues circulate through the economy of the Province.

This report seeks to identify and describe some of these effects, documenting the wide range of Newfoundlanders and Labradorians who benefit, directly or indirectly, from offshore petroleum activity. It builds on earlier reports that examined the effects of Hibernia construction and operations activity (Community Resource Services Ltd. 1996; 1999) and uses information from a range of other government and industry sources.

The report makes clear not only the large scale and long-term nature of the economic effects of offshore petroleum activity, but also that there are a very wide range of benefits and beneficiaries. In particular, it is not only highly-skilled technicians and specialists, and the companies they work for, that are benefiting; industry expenditures are also creating employment and income for people working in construction, retailing, hospitality, education, tourism, the arts and numerous other industries. Yet others are deriving indirect benefits from the contribution the industry makes to municipal and the provincial finances, through taxes, revenues and reductions in some areas of public expenditure. Furthermore, while these effects are concentrated in Eastern Newfoundland, there are beneficiaries in all regions of the Province.

The report also documents the ways in which offshore petroleum activity is helping to transform the economy. Thanks to this relatively new industry, Newfoundland and Labrador citizens and companies have developed new capabilities that make them competitive in the oil and other industries. This is allowing them to succeed in getting work locally, across Canada and around the world. This effect extends beyond the petroleum industry and will long outlive it.

The next section of this report describes the **Context** in terms of the history of Newfoundland and Labrador's offshore petroleum industry, especially in respect of its economic impacts. It uses a range of government and industry information to track the growing scale and economic significance of the industry since 1963.

Section 3 provides a much more detailed description of **Economic Benefits, 1999 to 2002**. Based on industry oil production, expenditure and employment data for these years, it uses the provincial government's econometric model to calculate and describe the recent effects of the industry on such things as the Province's Gross Domestic Product, employment, unemployment rate, total incomes, retail sales and housing starts. This includes discussion of the fluctuations in these effects over the recent past.

Section 4 looks at some of the **Infrastructure** that has resulted from offshore petroleum activity. This includes industrial, training and research and development infrastructure. Based on secondary sources and key informant interviews, the report discusses how the Province has benefited from both building this infrastructure (through, for example, the employment of construction workers, engineers and architects) and having it in the Province. This includes the ways in which it is facilitating further petroleum industry and other activity, and the effects that some infrastructure has had on municipal revenues.

Section 5, **Education and Training** describes the ways the petroleum industry has increased local capabilities (e.g., those at Memorial University and the College of the North Atlantic) and provided opportunities for Newfoundlanders and Labradorians to learn from others, both while working locally and elsewhere. It summarizes the consequences of all this for local companies and people, and for the Province as a whole.

Section 6, **Research and Development** describes some of the research and development centres and programs available at Memorial University, the Marine Institute and elsewhere.

Section 7 examines the effects of all this on a selection of local **Companies**. This analysis is largely based on interviews held with a range of business-people whose companies have been directly or indirectly involved in the industry. This includes firms dealing directly with the major operating companies and contractors related to highly technical matters (e.g. Stratos Global, NEWDOCK and Oceanic Consulting). However, it also includes a number of other firms, some of small size, whose connection to industry is not so obvious or direct (e.g. Airport Plaza Hotel, Crocker Photography, Imprint Specialty Promotions and Clovelly Golf).

These case studies and other interviews make clear that upstream petroleum-related activity has made an important contribution to the bottom line of a wide variety of types and sizes of firm, allowing them to retain and in most cases hire personnel. It also shows that, more importantly, this has been accompanied by a transformation of these companies as they have expanded their capabilities, whether in terms of infrastructure development, technical capabilities, technology transfer, human resources, quality management, document control, accounting, bid preparation or other business capabilities. This has made these firms more competitive and innovative within the petroleum and other industries, and has allowed some of them to expand their work locally, nationally and internationally.

The last part of this report, Section 8, provides a brief review of the findings related to activity to date and discusses what can be expected in **The Future**. It focuses on the longer-term implications of further exploration, development and production, including its contribution to the economy of Newfoundland and Labrador.

## 2.0 CONTEXT

Evidence of potentially significant accumulations of hydrocarbons on the Grand Banks of Newfoundland was first detected by seismic surveys conducted in the early 1960s. The first exploration well was drilled offshore Newfoundland and Labrador in 1966, with total exploration expenditures in that year of \$4.8 million (C-NOPB 2003) (Figure 1).

Exploration activity and expenditures increased considerably in the early and mid-1970s. In 1974, the Organization of Petroleum Exporting Countries restricted crude oil production, causing oil prices to rise significantly. From 1971 to 1978 offshore oil-related expenditures in Newfoundland and Labrador averaged approximately \$33 million per year (C-NOPB 2003). The discovery of the Hibernia oilfield in 1979 and major world oil price increases in the late 1970s and early 1980s resulted in accelerated exploration activity and associated expenditures in the Province (Department of Finance 2003). In 1979 the total expenditures jumped to \$181 million, a four-fold increase from the previous year (C-NOPB 2003).

The benefits accruing to Newfoundland and Labrador also increased as a result of public policy initiatives. Until the late 1970s, exploration took place under a generally permissive regulatory environment; however, in 1977, new regulations under the provincial *Act Respecting Petroleum and Natural Gas* (Newfoundland 1977) introduced a much more interventionist approach, along the lines of what has been called the 'North Sea model' (House 1985: 47-53). The regulations gave business preference in undertaking offshore petroleum related work to locally-owned companies, with second preference going to companies with local offices. Employment preference was given to appropriately skilled Newfoundlanders and Labradorians.

Furthermore, in 1981 the federal government began subsidizing domestic oil exploration in order to lessen Canada's dependence on foreign sources. Almost \$2 billion in Petroleum Incentives Program (PIP) grants increased the pace of exploration activity off the coast of Newfoundland and Labrador between 1981 and 1986 (Department of Finance 2003). Offshore oil-related expenditures in the Province increased steadily from the late 1970s to mid-1980s, peaking at \$657 million in 1985 (C-NOPB 2003).

Exploration activity accounted for most of these expenditures, and a number of major fields were discovered, including White Rose, Terra Nova, Hebron-Ben Nevis, and several smaller finds (Department of Finance 2003). The 1970s and early 1980s also saw considerable exploration offshore Labrador, with expenditures peaking in 1982 at \$117 million (C-NOPB 2003). The early 1980s also saw the delineation and appraisal of the Hibernia field, and the government declared it a significant discovery in 1985.

The year 1985 also saw the signing of the *Atlantic Accord*, settling a longstanding federal/provincial dispute as to the ownership of offshore resources. It provided for joint management of the offshore through a Canada-Newfoundland Offshore Petroleum Board (C-NOPB), and included various provisions respecting benefits. First consideration was to be given to provincial providers of goods and services, where

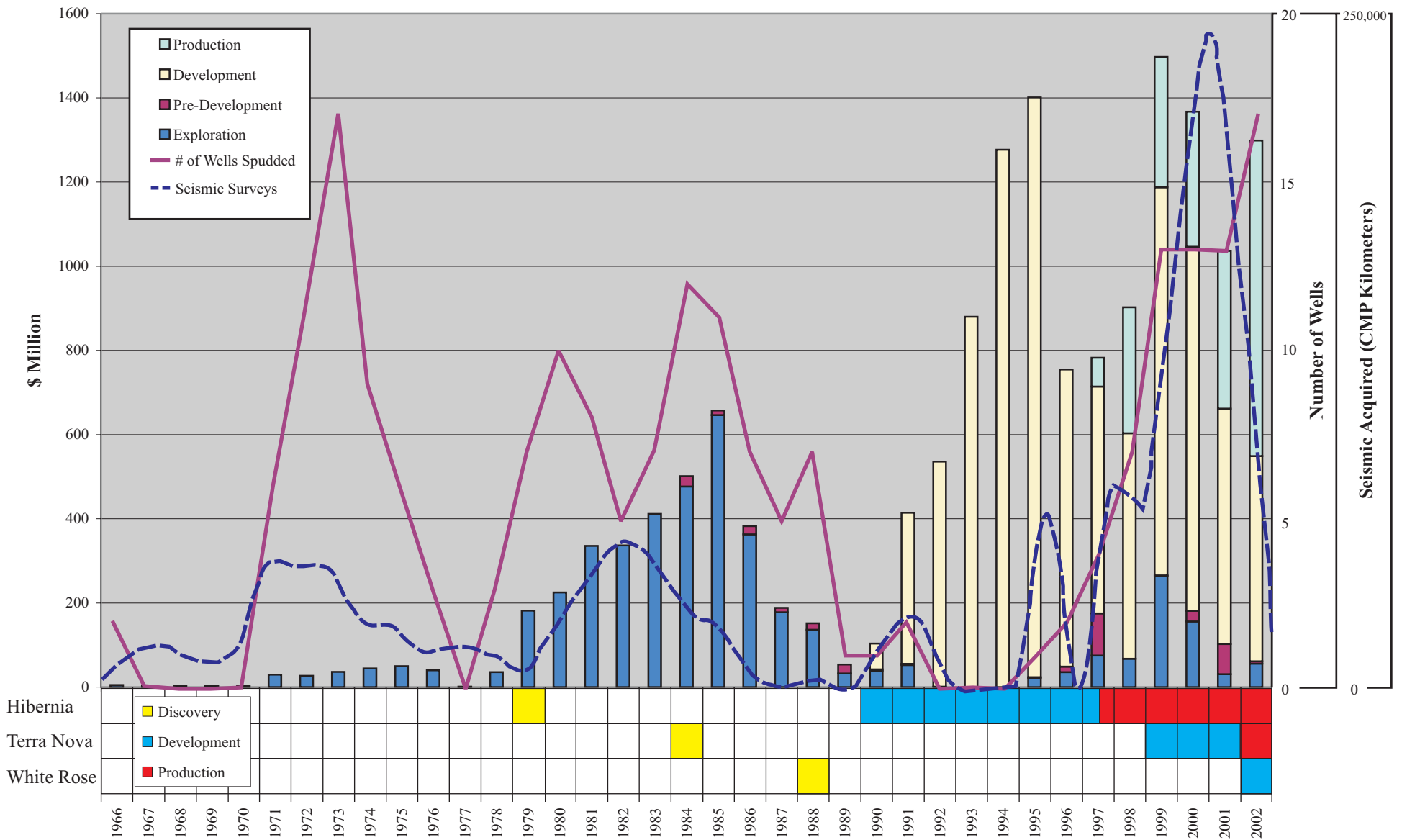
competitive in terms of market price, quality and delivery. Similarly, Newfoundlanders and Labradorians were to receive first consideration for employment and training. The proponents of major projects and some other activities were required to submit benefits plans in respect of the above, with the C-NOPB monitoring their effectiveness. The Atlantic Accord also established a \$300 million federal/provincial Offshore Development Fund to aid the Province's involvement in the industry through investments in infrastructure and training programs. (Shrimpton 1998)

However, offshore exploration activity declined in the late 1980s as oil prices fell and the PIP grants were discontinued, and they remained at a low level through the early 1990s as the industry focussed on the development of existing discoveries (Department of Finance 2003). For example, pre-development work continued on the Hibernia project. However, while the preferred design received government approval in 1986, there was still need for a development agreement, spelling out financial and taxation commitments, between the proponent (Mobil), its partners, and the federal and provincial governments. The final Project Agreement was signed in September 1990 and major contracts were immediately awarded for construction of the production platform.

These and other contracts sought to ensure that the Hibernia project met benefits commitments spelled out in the Project Agreement. These required that Canada receive 55 to 60% of the estimated \$5.2 billion pre-production expenditures, 65% of the \$10.0 billion operating expenditures, 13,000 (70% of the total) person-years of construction employment, and 20,000 person-years of production employment. Much of this was to occur in Newfoundland and Labrador, which was guaranteed employment on the concrete gravity base structure (GBS), one of the five topside modules, and other construction activity to a total of 10,000 person-years, as well as much of the production employment. These commitments were made in exchange for major financial support by the federal government. It agreed to pay 25% of construction costs to a total of \$1.04 billion and to provide loan guarantees.

Work at the Bull Arm Fabrication and Construction Site, Trinity Bay, commenced in October 1990. Dry-dock construction of the Hibernia GBS began in September 1992. The GBS, one of the main topside modules, and various smaller components were built at Bull Arm, with the other four modules transported there from Italy and South Korea for assembly (DME 2002). After the mating of the topsides and GBS at Bull Arm in early 1997, the platform was towed to and installed at its site on the Grand Banks in June of that year.

**Figure 1: Newfoundland and Labrador Offshore Activity and Area Expenditures (1966 to 2002)**



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Source: Canada-Newfoundland Offshore Petroleum Board

The development phase of the Hibernia project resulted in large-scale employment and business activity in Newfoundland and Labrador throughout the 1990s. All the commitments made in the Project Agreement were not only met, but exceeded, in some cases by a large margin. (Community Resource Services 1996)

Commercial production from the Hibernia field started in November 1997. Since October 1998 shipments of Hibernia crude have been transported by purpose-built shuttle tankers to the custom-built Newfoundland Transshipment Terminal at Whiffen Head, Placentia Bay, and from there to market by conventional tankers (DME 2002).

The Terra Nova field was discovered on the Grand Banks in 1984, and declared a significant discovery in 1985. Petro-Canada and its partners decided to proceed with the project in 1998. Unlike the Hibernia project, Terra Nova was developed without financial participation by either level of government. The economics of the project had to be sufficiently attractive to support the proponent's investment, and floating production, storage and offloading (FPSO) vessel technology was chosen as the most cost effective for the Terra Nova field. It was recognized from the outset that the most significant local benefits would be derived predominantly from its long-term operations, rather than the construction phase.

Dry-dock construction of the Terra Nova FPSO began in early 1999 in South Korea. In 1999 the quay at the Bull Arm construction site was extended to allow berthing of the FPSO. In 1999-2000 the Newfoundland Transshipment Terminal was also expanded to accommodate production from the Terra Nova field. The FPSO arrived at Bull Arm in May 2000, where outfitting, hook-up and commissioning of the vessel took place. The FPSO arrived at the field in August 2001 and started producing oil in January 2002 (DME 2002).

Total Terra Nova pre-production capital expenditures were \$2.8 billion, of which more than \$1 billion were incurred in Canada, including approximately \$800 million spent in Newfoundland and Labrador. A total of 19 million person-hours were worked on the project, including approximately 12 million person-hours in Newfoundland and Labrador. Development phase employment peaked in February 2001 with 2575 people working on the Project. During its first year of operations (2002), in excess of \$150 million was spent in the local economy, employing approximately 900 persons. Of this number, in excess of 700 persons were Newfoundland residents at the point of hire.

The White Rose oilfield was discovered in 1988. Its development started in 2002, and Husky Energy expects production to commence in late 2005 or early 2006, with the operating life of the field currently estimated at approximately 15 years. The capital cost of the project is estimated at \$2.35 billion, with almost \$2 billion expected to be spent prior to first oil (Department of Finance 2003).

Total White Rose expenditures in 2003 are expected to exceed \$600 million. Most of the major contracts have been awarded, including those for the construction of the hull, topsides and turret portions of the FPSO and the development of the subsea production systems. The construction of the topsides will be particularly



significant in terms of local benefits, with 80% of the employment associated with the engineering, fabrication and integration of these components planned to occur in Newfoundland and Labrador. Employment at Marystown and Cow Head, where most of this work will occur, reached about 650 positions at the end of September 2003, and is expected to reach over 700 positions by the end of 2003. As of the beginning of 2003, the engineering and design of the FPSO employed over 250 persons in St. John's (Department of Finance 2003).

Lastly, the pace of offshore exploration activity also picked up again in the mid-1990s, with extensive seismic surveys and a number of offshore drilling programs occurring since that time (Department of Finance 2003). Annual exploration expenditures from 1995 to 2001 averaged \$93 million, peaking at \$264 million in 1999 (C-NOPB 2003).

### 3.0 ECONOMIC BENEFITS, 1999 TO 2002

#### 3.1 Introduction

This section of the report provides a more detailed picture of the economic effects of offshore petroleum industry on the Province of Newfoundland and Labrador over the past few years. Specifically, it reviews the direct, indirect and induced effects for the years 1999 to 2002.

#### 3.2 Direct Impacts

The analysis of the total effects of the offshore industry for these years is based on information on its direct impacts (Table 1), established using information from Hibernia, Petro-Canada, Husky Energy, C-NOPB and Statistics Canada.

**Table 1 Direct Impacts of the Offshore Petroleum Industry**

	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>
<b>Capital Costs (\$ Millions)</b>				
Exploration	264	156	31	60
Development	923	890	532	470
Production	<u>188</u>	<u>181</u>	<u>338</u>	<u>518</u>
<b>Total</b>	<b>1,375</b>	<b>1,227</b>	<b>901</b>	<b>1,048</b>
<b>Employment (person years)</b>				
Development	1,083	1,976	1,508	400
Production & Services to Production (including Exploration)	<u>1,874</u>	<u>1,895</u>	<u>2,251</u>	<u>2,928</u>
<b>Total</b>	<b>2,957</b>	<b>3,871</b>	<b>3,759</b>	<b>3,328</b>
<b>Barrels of oil production (Millions)</b>	<b>36.4</b>	<b>52.8</b>	<b>54.3</b>	<b>104.3</b>
<b>Operating costs (\$ Millions)</b>	<b>148</b>	<b>140</b>	<b>136</b>	<b>234</b>
<b>Wages/salaries and employee benefits (\$ Millions)</b>				
Development	62	150	126	29
Production & Services to Production (including Exploration)	<u>121</u>	<u>122</u>	<u>145</u>	<u>201</u>
<b>Total</b>	<b>183</b>	<b>272</b>	<b>171</b>	<b>230</b>

These data can be divided into those related to production, which have shown a pattern of steady increase in their contribution to the provincial economy, and those on exploration and development activity, which have seen large fluctuations over time. In the former case, Hibernia production increased over the course of the period, as did Terra Nova production after it commenced in early 2002. In total, oil production increased from 36 million barrels in 1999 to 104 million in 2002, almost tripling. The capital costs associated with production have also grown rapidly, from \$188 million in 1999 to \$518 million in 2002. Production operating costs remained fairly constant at between \$135 and 150 million from 1999 to 2001, reflecting the fact that they essentially related to operation at a single platform, Hibernia. However, with the start of production at the Terra Nova FPSO in January 2002, operating costs jumped to \$234 million in that year.

There has also been a steady increase in production-related employment and wages, salaries and benefits. In the former case, there were 1874 person-years of employment (i.e., the equivalent of 1874 people working for the entire year, although there will in fact have been more people involved in any one year, albeit some of them for less than a complete year) in production activity in 1999. By 2002, this had grown to 2928 person-years, an increase of 56%. In parallel, the value of wages, salaries and benefits related to production grew from \$121 million in 1999 to \$201 million in 2002, an increase of 66%.

While production activity and its effects have grown steadily, the direct economic impacts of exploration and development activity have both fluctuated significantly. In the former case, the pace of exploration in any region of the world is always hostage to a number of variables, including oil prices, rig availability, and exploratory success. As has already been seen, the rate of exploration in Newfoundland and Labrador has fluctuated considerably, peaking in the early 1980s. During the period under examination here, the capital costs of exploration fell from a peak of \$264 million in 1999 to a low of \$31 million in 2001, recovering slightly to \$60 million in 2002.

There are similarly large changes in the value of development activity, and this involves the much larger numbers associated with major construction projects. The fluctuations reflect the fact that while Terra Nova construction peaked in 1999 and 2000, this work was completed in mid 2001, and development work on the White Rose oilfield did not become significant until 2003. As such, 2001 and especially 2002 saw a lull of activity between Newfoundland's second and third offshore oilfield development projects.

Thus, for example, the capital costs of development activity declined from about \$900 million in 1999 and 2000 to only \$532 million in 2001 and \$470 million in 2002. The labour requirements associated with development were lagged somewhat relative to the capital costs, peaking at 1976 person-years in 2000, but falling to 1508 and then 400 person-years in 2001 and 2002 respectively. Development-related wages, salaries and benefits similarly peaked at \$150 million in 2000 but fell to only \$29 million in 2002. However, they will have seen a large increase in 2003, given work on the White Rose construction project.

The relative importance of development activity as a component of the Newfoundland offshore petroleum industry is indicated by its share of all activity. This peaked in 2000, when development represented 73% of all capital costs, and 51% of all employment. By 2002, with Terra Nova construction complete and White Rose development only newly started and at a low level, it accounted for only 49% of capital costs and 12% of employment. As additional fields enter production the net effect of any future new development project may decline; for example, the White Rose project is somewhat smaller than Terra Nova, and will occur in the context of production activity, now related to two fields, that has seen a consistent pattern of increase. However, it should be noted that operations expenditures for existing fields will decline over time, as development drilling winds down and there are increased economies of scale in operations activity.

In looking at the total scale of activity over the 1999 to 2002 period, total expenditures (i.e. capital plus operating costs) peaked at \$1523 million in 1999, fell to \$1074 million in 2001, and then recovered to \$1282 million in 2002. The capital costs declined from \$1375 million in 1999 to \$901 million in 2001, but then increased to \$1048 million in 2002. The importance of development activity is such that the total employment, and the total value of wages, salaries and benefits, both peaked in 2000, at 3871 person-years and \$272 million respectively. There was a post-Terra Nova development decline thereafter, although the value of wages, salaries and benefits did increase from 2001 to 2002.

### **3.3 Indirect Impacts**

The above figures relate solely to the direct expenditures and employment by the petroleum industry. However, the expenditures involve purchases of goods and services from other industrial sectors in Newfoundland and Labrador, including business services, air and marine transportation, wholesaling, storage, and architectural, scientific and engineering services. This leads to their employing additional workers and paying further wages, salaries and benefits. The Newfoundland and Labrador Input-Output Model (NALIOM) was used to calculate the multiplier effects of this respecting employment, gross domestic product (GDP), and labour income.

Accounting for these indirect linkages resulted in average total annual direct and indirect real GDP impacts of approximately \$1.4 billion and an annual direct and indirect employment impact of about 8800 person-years. The direct and indirect GDP effects peaked (at approximately \$2.0 billion) in 2002 because oil production levels were very high. However, direct and indirect employment impacts were lower (6900 person-years) due to the low level of development activity in 2002.

### **3.4 Total Impacts**

The above data on direct and indirect economic impacts are key inputs to the Newfoundland and Labrador Econometric Model (NALEM) simulation of the overall effects of the petroleum industry on the economy of the Province. This provides measures of the total (i.e. direct, indirect and induced) effect of the industry

on a wide range of indicators, including GDP, employment, personal income, consumer spending and population change (Table 2).

**Table 2 Economic Impacts of the Offshore Petroleum Industry, 1999 - 2002**

<b>Table 2</b>					
<b>Economic Impacts of Offshore Oil Industry, 1999-2002</b>					
	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>average</u>
<b>Real Gross Domestic Product (\$1997)</b>	1,466	1,798	1,749	2,687	1,925
Share of Total (%)	12.1	14.0	13.5	19.1	14.7
<b>Personal Income (\$ Millions)</b>	477	878	855	573	696
Share of Total (%)	4.4	7.7	7.2	4.6	6.0
<b>Labour Income (\$ Millions)</b>	438	781	727	445	598
Share of Total (%)	7.5	12.4	11.1	6.4	9.4
<b>Other Income (\$ Millions)</b>	39	98	128	128	98
Share of Total (%)	0.8	1.9	2.4	2.3	1.9
<b>Disposable Income (\$ Millions)</b>	366	685	676	454	545
Share of Total (%)	4.2	7.4	7.0	4.5	5.8
<b>Retail Sales (\$ Millions)</b>	224	332	307	192	264
Share of Total (%)	5.3	7.3	6.2	3.8	5.7
<b>Housing Starts</b>	64	99	98	77	85
Share of Total (%)	4.7	6.8	5.5	3.2	5.1
<b>Employment ('000s)</b>	11.5	17.5	15.8	10.7	13.9
Share of Total (%)	5.6	8.6	7.5	5.0	6.7
<b>Labour Force ('000s)</b>	6.4	11.0	10.9	8.4	9.2
Share of Total (%)	2.6	4.5	4.3	3.3	3.7
<b>Unemployment Rate (%)</b>	-2.5	-3.3	-2.5	-1.4	-2.4
<b>Population ('000s)</b>	2.1	6.4	10.5	13.0	8.0
Share of Total (%)	0.4	1.2	2.0	2.4	1.5

Unsurprisingly, the overall pattern of change reflects that already observed with respect to the direct and indirect effects of the industry. That is to say, most variables reached peak values in 2000, when Terra Nova development activity was greatest, and they have since declined. They will increase again in 2003 and 2004 given the rapid increase in White Rose construction, but likely decline thereafter unless Hebron-Ben Nevis or other such development projects proceed in time. However, there are two exceptions to this pattern; the effect of the industry on the provincial GDP and population growth.

As has been widely publicized, the impact of oil activity on the provincial GDP has increased steadily. The NALEM analysis shows that the offshore oil industry was responsible for 12.1% of GDP in 1999, but this had risen to 19.1% by 2002. In fixed (1997) dollar terms, the contribution rose from \$1.466 billion in 1999 to \$2.687 billion in 2002, for an increase of 83%.<sup>1</sup>

The Department of Finance has also calculated that in 2002 oil and gas production services represented about 15.3% of the provincial total direct GDP. This measure allows comparison with the GDP contributions of other sectors of the economy. For example, this 15.3% contribution is virtually the same as that of Finance, Insurance, Real Estate, and Renting and Leasing activity (15.2%). Some other sample sectors and their contributions to the provincial GDP are Health Care and Social Assistance (8.1%), Education Services (6.2%), Retail Trade (6.1%), Manufacturing (including Seafood Processing and Packaging) (5.7%), and Agriculture, Forestry, Fishing and Hunting (3.3%).

However, it should be noted that much of the business income earned in the petroleum industry accrues to non-resident companies. This is the case with virtually all types of external investment in a small economy. As such, the scale of the effect on GDP is not reflected in the scale of that on other indicators.

The second exception to the pattern is with respect to the Province's population. The NALEM model indicates that, on average over the 1999 to 2002 period, the population was 8000, or 1.5%, larger than it would have been had there not been an offshore petroleum industry. This is because the industry both reduced the need for out-migration and attracted in-migration. The effect on the province's population is seen as increasing with time, from 0.4% in 1999 to 2.4% in 2002. The latter figure reflects an estimate that changes in migration led to the population being roughly 13,000 higher in 2002. However, it should be noted that it is difficult to model population impacts (which modeled in NALEM as a function of the difference in average wages and employment rates between Newfoundland and Canada) and there is a high margin of error associated with the estimated population impact.

All the other measures presented in Table 2, including all the income variables, peaked in 2000. Thus, while over the four years the industry was responsible for an average of 6.0% of personal income in the Province, this encompassed a range from 4.4% in 1999 to 7.7% in 2000, with a figure of 4.6% in 2002. Most of this was in the form of labour income, which was, on average, 9.4% greater because of oil activity over the four-year period. Disposable incomes (i.e., income after taxes, CPP and other deductions) were 5.8% higher on average, ranging between 4.2% and 7.3% higher in 1999 and 2000 respectively.

Reflecting the income increases, there has also been growth in retail sales and housing starts (the latter also being related to the population increases discussed above). On average, retail sales were \$264 million, or

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<sup>1</sup> Given the fact that the supply base, heliport, warehousing, engineering and management activities are concentrated in and around St. John's, it is unsurprising that the petroleum industry directly accounted for approximately 21% of the St. John's Census Metropolitan Area (CMA) GDP in 2002. (Department of Finance 2003).

5.7%, higher than they would have been without an offshore petroleum industry. This peaked at \$685 million (7.3%) in 2000, declined to \$192 million (3.8%) in 2002, and can be expected to have increased again in 2003 given White Rose development activity. Given the spatial pattern of oil industry activity, and the concentration of the retail sector in and around St. John's, it can be expected that the proportional effect on this sector has been greatest in Eastern Newfoundland and, in particular, the St. John's metropolitan area.

The pattern of the industry's contribution to housing starts in Newfoundland and Labrador is similar. It peaked at 99 units (6.8% of the total) in 2000, but declined to 77 units (3.2%) in 2002. The average for the period was 85 units (5.1% of all starts), making significant contributions to the housing construction sector, appliance and furniture sales, etc.. It is again to be expected that most of this new construction activity occurred in the St. John's metropolitan area.

The impacts of the industry on employment, the labour force and the unemployment rate, are clearly similar to one another. In each case, the largest effects were in 2000, when Terra Nova construction was at its peak. During that year, the direct, indirect and induced effect of the industry was to produce 17,500 jobs (8.6% of all employment), an 11,000-person (4.5%) growth in the labour force, and a 3.3 percentage point reduction in the unemployment rate. Over the 1999 to 2002 period, the average effects were a 13,900 (6.7%) increase in employment, a 9200 (3.7%) increase in the size of the labour force, and a 2.4 percentage point reduction in the unemployment rate.

Much of the employment associated with the industry is located in and around St. John's. For example, direct offshore petroleum-related employment in 2002 have been estimated at 1500 persons, or 1.7% of the CMA's total employment, and labour income from these jobs is estimated at over \$80 million. If indirect and induced activity is included, the total employment generated is estimated to be 5000 to 6000 persons. (Department of Finance 2003) However, the results of the macroeconomic analysis presented above suggest that these figures underestimate the effects on St. John's.

In summary, the offshore petroleum industry has clearly made a very major, and generally increasing, contribution to the economy of the Province of Newfoundland and Labrador. Construction activity related to the development of the Hibernia and Terra Nova fields has generated peaks in this contribution, and a similar peak will occur in 2003 and 2004 related to the development of the White Rose field. However, the relative size of such peaks will decrease in the short and medium terms as production-related expenditures and employment provide a more stable and consistent baseline level of petroleum industry activity, for example after White Rose enters production in 2005.

Exploration is a further, relatively small, contributor to the provincial economy. For example, the capital costs of exploration ranged from 3% to 19% of all such industry costs over the 1999 to 2002 period. However, as has been seen, exploration levels have been much higher in the past, and further exploration is necessary for there to be additional development projects and thus producing fields.



## **4.0 INFRASTRUCTURE**

The offshore oil and gas activity described above has resulted in, or contributed to, the development of a wide range of related infrastructure in Newfoundland and Labrador.

The Province has seen significant investments in the establishment and expansion of facilities used directly or indirectly for petroleum industry exploration, development and production work. This includes infrastructure that is used directly by operators and their contractors, such as construction and fabrication sites, transportation facilities, and office and industrial space. In addition, the supply of goods and services to the petroleum industry has required the development of new businesses and the expansion of existing enterprises and their infrastructure. There have also been requirements for new and expanded education and training and research and development facilities related to the petroleum industry (Sections 5 and 6).

A number of specific examples are discussed below, followed by a discussion of some of the economic impacts.

### **4.1 Construction Infrastructure**

The Bull Arm Fabrication and Construction Site is perhaps the best-known example of new infrastructure development in the Province as a result of the petroleum industry. Located on Trinity Bay, the Bull Arm yard was established in October 1990. The 1600 ha industrial facility had a total capital cost of approximately \$470 million. It was originally established, with assistance from the Offshore Development Fund, for the construction phase of the Hibernia project, which was completed in 1997. In 1999 the quay at Bull Arm was extended to accommodate the Terra Nova FPSO for outfitting, hook-up and commissioning work, which was completed in 2001. The yard is currently administered by the Bull Arm Site Corporation, which is aggressively pursuing additional work. In April 2003 it was announced that a group of Newfoundland and Labrador companies that had been awarded a construction contract for the White Rose project were leasing some of the Bull Arm Site for these fabrication activities.

The Marystown / Cow Head Fabrication Facility, owned and operated by Kiewit Offshore Services (KOS), is the largest shipbuilding and repair facility in the Province. Work at the yard has ranged from the construction and repair of fishing vessels to the commissioning, maintenance and decommissioning of offshore rigs. The Marystown Shipyard was originally established in the late 1960s. The Cow Head Oil Rig Servicing Facility was added in 1985. These facilities' involvement in Newfoundland and Labrador's offshore petroleum industry subsequently led to a \$40 million expansion to the Cow Head facility in the early 1990s. Recent work there has included the construction of major components of the Hibernia platform and related systems, building the specialized tugs used by the Newfoundland Transshipment Terminal, fabrication tasks related to the Terra Nova development, and work related to offshore exploration. The facility is currently being used by KOS for the construction, installation and commissioning of the topsides

for the FPSO for the White Rose project. Since acquiring the facility in 2001, KOS has invested approximately \$22 million in upgrading the Marystown Shipyard and Cow Head Fabrication Facility (see Section 7).

Other construction facilities that have been used during Hibernia, Terra Nova and White Rose construction work and for offshore exploration related work include the:

- Penney Energy Marine Terminal, Bay Bulls;
- NEWDOCK Fabrication Facility, St. John's;
- ASIL Fabrication Yard, Port aux Basques; and
- Turf Point Terminal, Flat Bay.

#### **4.2 Production Infrastructure and Services**

In addition to the above, a range of infrastructure has been developed for use for Hibernia, Terra Nova and prospective future production activity, and for on-going offshore exploration. This includes transportation, supply and storage, fabrication and other facilities.

For example, the Newfoundland Transshipment Terminal, located at Whiffen Head, Placentia Bay, started operation in 1998 as a year-round, storage and transshipment facility for crude oil from the Hibernia field. Oil is shipped to the terminal on dedicated purpose-built shuttle tankers, where it is temporarily held in storage tanks, and then taken to market on 'second-leg' tankers. The marine infrastructure includes a causeway, tug basin, approach trestle, jetty with berthing and two loading platforms with marine topside facilities (crude transfer and control system). Onshore infrastructure includes a tank farm, tank heating system, interconnecting flow-lines, supporting facilities, wastewater handling system and fire protection system. The initial farm consisted of three tanks, with a total capacity of 1.5 million barrels. In January 1999 it was announced that there would be an expansion to accommodate production from the Terra Nova field. This included the construction of a second tanker berth and two 500,000-barrel storage tanks with supporting infrastructure, and was completed in late 2000. The Newfoundland Transshipment Terminal currently has an estimated capital value of approximately \$275 million.

A number of other facilities have resulted from, and/or are regularly used by, the province's offshore oil and gas sector. Some examples include the:

- Cougar Helicopter Terminal (St. John's International Airport)
- Harvey and Company Offshore Supply Base (St. John's Harbour)
- NEWDOCK – Offshore Service, Dockyard and Fabrication Centre (St. John's Harbour)
- Pier 17 Redevelopment Project (St. John's Harbour)
- Schlumberger Canada Service Facility (Mount Pearl)

- Asco Warehouse Complex (Mount Pearl)
- Hibernia Training Simulator (St. John's Harbour)
- Baker Hughes Canada Service Facility (Mount Pearl)
- East Coast Tubulars Goods Facility (Paradise)
- Halliburton Operations Centre (Mount Pearl)

As a recent example of ongoing infrastructure development, in 2003 A. Harvey and Company Ltd. began an \$8 million dollar upgrade to its offshore supply base on St. John's Harbour. The project will more than double the firm's docking space, providing lay-down space for shipments of pipe for delivery offshore as well as other cargo. Scheduled for completion by the end of November 2003, the new facility is being developed to meet the long-term needs of the offshore industry (Baird 2003).

### **4.3 Education and Research**

The development of Newfoundland and Labrador's upstream petroleum industry has also been accompanied by the development or enhancement of an impressive array of education, training, research and development facilities, and associated world-class equipment. These have made a major contribution to petroleum-related and other education and training (Section 5) and research and development (Section 6). Some examples include:

#### Memorial University

- Centre for Earth Resources Research
- Centre for Cold Ocean Resources Engineering (C-CORE)
- Oil and Gas Development Partnership and associated facilities
- Computer-Aided Design Facility, Engineering
- C-CORE Geotechnical Modeling Centrifuge Facility
- Centre for Offshore and Remote Medicine and Telemedicine
- Institute for Marine Dynamics Wave Generating System

#### Marine Institute Centre for Marine Simulation

- Offshore Safety and Survival Centre (Conception Bay South)
- Southside Marine Base

#### College of the North Atlantic

- Petroleum Technology Training Program Equipment
- Petroleum Production Training Enhancement Project
- Drill Rig Operator Training Equipment

The Offshore Development Fund and other government programs supported the construction and equipping of a number of these facilities.

#### **4.4 Economic Impacts**

The Department of Finance has estimated that the development of Newfoundland and Labrador's petroleum industry has resulted in new onshore infrastructure in the Province worth \$1.2 billion (Department of Finance 2001). The construction of this infrastructure has provided considerable direct and indirect employment and business opportunities for the local construction industry, generating major demands for building materials and equipment, as well as engineering, project management and construction services. Construction activities related to the oil and gas extraction and mining industries comprise the largest component of non-residential construction investment in the Province, accounting for over 65 percent of the total in recent years (Department of Finance 2002). Using a rule of thumb that labour comprises 20% of all construction costs, work on petroleum industry-related infrastructure resulted in expenditures of approximately \$240 million in construction labour.

The establishment and expansion of such facilities helps to provide the infrastructure required for facilitating further growth in the Province's offshore petroleum industry and other aspects of the economy as a whole over the long-term. The presence of a range of petroleum-related construction, fabrication, supply, service, research and development infrastructure in the region will certainly be a key consideration for oil companies considering future work in Eastern Canada. This infrastructure reduces the cost, and hence increases the likelihood, of further offshore petroleum projects. It also increases Newfoundland and Labrador's participation in such projects, by increasing the Province's ability to be involved in construction, fabrication and support activities (see also Section 4).

As an example, as was seen earlier, the development of the Bull Arm yard during the Hibernia construction phase led to further work related to the Terra Nova and White Rose projects, and thus helped to deliver Newfoundland and Labrador benefits from these subsequent projects. The Bull Arm Site Corporation is now marketing the facility nationally and internationally for use on oil and non-oil-related fabrication work, the latter including contracts related to the Voisey's Bay nickel mine and mill project in Labrador. The presence of other related construction, transportation, supply and storage, research and training facilities in the Province will also likely increase the potential for further offshore petroleum and other work in Newfoundland and Labrador.

These facilities and other oil and gas related operations have benefited, and continue to benefit, a wide range of communities. They are major employers and generate significant business for companies that supply goods and services to them, and make a significant contribution to the tax base of the municipalities within which they are located.

For example, the City of Mount Pearl estimates that it is the home to 95 businesses that largely or solely do petroleum industry work, and employ a total of over 900 workers. The assessed value of these businesses is about \$40 million, yielding about \$1.3 million in municipal tax revenues a year. This represents approximately 22% of all the City's commercial tax revenues and 7% of all tax revenues.

The City of St. John's has benefited primarily from being the administrative, engineering, research and training centre, and the supply and helibase, for oil and gas activity. The Canada-Newfoundland Offshore Petroleum Board, the provincial Department of Mines and Energy, the Canadian Association of Petroleum Producers, the Newfoundland Ocean Industries Association (NOIA) and the City itself occupy significant office space for, and engage large numbers of workers engaged in, offshore oil and gas-related activity. As is clear from the sections on Education and Training (Section 5) and Research and Development (Section 6), the same is true of the Province's two main training and research and development institutions, Memorial University and the College of the North Atlantic.

In terms of the private sector, the range of companies in St. John's involved in the industry is illustrated by the company case studies (Section 7). In order to quantify the effects of their being in St. John's, 2002 assessment data were collected for the oil companies themselves and their largest contractors<sup>2</sup>. This led to the identification of eighteen different companies with premises in the City of St. John's, with a combined assessed value of \$50.8 millions. These properties yield about \$1.85 million (about 6% of the City's total) in business realty and occupancy tax.

A third community, the Town of Paradise, is adjacent to St. John's and Mount Pearl and the home to fourteen businesses involved in the offshore petroleum industry. They include CSI Fabricators, Canship-Ugland, New Trans Equipment Carriers, Steel Fab Ltd., Petroleum Transport, Coastal Supply, Drilling Logistics, Atlantic Crane, McNamara Ltd., Pennecon Ltd., Penney-Ugland, Weatherford, Coil & Associates and Grant Prideco. These companies paid over \$155,000 in business and property taxes in 2003, representing about 3% of the total.

These municipal governments also benefit from the business taxes paid by the many stores, restaurants and other small businesses that are flourishing in part because of the offshore petroleum industry and the residential taxes paid by the estimated 5000 to 6000 St. John's metropolitan area residents employed by the industry. (City of St. John's 2002) In the latter case, Fabian Clarke of Sutton Realty believes that the industry has had a 'substantial' effect on the St. John's real estate industry, and especially those companies and agents that have chosen to focus on its requirements. George Kirkland Sr. of Lansing Properties Inc. also indicates that industry has contributed to a boom in new construction and the demand for condominiums, although he noted that low mortgage rates are also an important factor in both.

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<sup>2</sup> Each of the main operators (Exxon-Mobil, Petro-Canada and Husky Energy) was asked to identify their 15 largest contractors, in terms of value. Duplicates, and companies located outside the City of St. John's, were then excluded.

## 5.0 EDUCATION AND TRAINING

Individuals and companies in Newfoundland and Labrador have also benefited from the education and training opportunities that have resulted from the Province's growing petroleum industry. It is working at the technological frontier, seeking to find and produce oil and gas in a harsh environment and increasingly deep waters, using wells of record lengths and production systems of great complexity. Industry-related training and employment have resulted in the development of a highly-skilled local workforce, able to design, maintain and operate these systems in a safe and environmentally responsible manner. Local firms have benefited from the expertise and experience they gained through involvement in the Province's petroleum industry. Further increases in these capabilities and benefits can be expected with its continued growth.

### 5.1 Institutions and Programs

Local educational institutions have played a key role in providing education and training related to the petroleum industry. Industry-specific and related professional and technical training programs are offered through Memorial University, the Marine Institute, the College of the North Atlantic, and private training institutions. The province's petroleum industry has in some cases resulted in the creation of new, industry-specific programs, while other, existing programs have benefited from increased enrolment as people prepare for possible industry-related employment.

Some examples of specific institutions and programs that provide education and training related to the offshore oil and gas sector and related industries include (Petroleum Industry Human Resource Committee 2001):

- Undergraduate and/or Graduate Degree programs at Memorial University,<sup>3</sup> including:
  - Engineering (Civil, Electrical, Computer, Mechanical, Ocean and Naval Architectural, and Offshore Oil and Gas);
  - Earth Sciences;
  - Oil and Gas Studies;
  - Physics and Physical Oceanography;
  - Marine Biology;
  - Maritime Studies; and
  - Technology

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<sup>3</sup> A number of these and other education programs are being coordinated and facilitated by Memorial's Oil and Gas Development Partnership (see Section 6.1)

- Diploma Programs at the Marine Institute of Memorial University, including:
  - Technology Programs (e.g., Nautical Science, Naval Architecture, Marine Engineering Systems Design, and Marine Environmental);
  - Trades Programs (e.g., Marine Diesel Mechanic, Offshore Structural Steel/Plate Fitter, Deckhand); and
  - Training Courses (e.g., Safety and Survival Training, Radio Operators, Firefighting and Recruitment, Marine First-Aid)
- Diploma Programs at the College of the North Atlantic, including:
  - Technology Programs (e.g., Petroleum, Civil, Electrical, Electronics, Geomatics, Industrial, and Mechanical Engineering, Environmental Technology); and
  - Industrial Trades Programs (e.g., Heavy Equipment Operation, Metal Fabrication, Welding, Pipe-Fitting; Electrical)
- Trades Programs at private training institutions in the Province (e.g., Welding, Drafting; Roughneck Training).

In several cases, oil companies and/or their contractors have formed partnerships with educational institutions in the province to develop local training programs and curriculum that meet their specific requirements. For example:

- The Hibernia Management and Development Company (HMDC) has worked closely with the Marine Institute's Offshore Safety and Survival Centre (OSSC) to ensure that related programs and offerings are fully appropriate and competitive. For example, the OSSC has conducted a Fire Team Refresher Training course and assessment of Hibernia employees as team leaders. In undertaking this training previously, it was necessary to import expertise from Scotland (Community Resource Services 1999).
- In 1999 Terra Nova made a contribution of over \$190,000 to fund the installation of a Kongsberg dynamic position simulator at the Marine Institute. This allowed the Marine Institute to provide the necessary training and upgrading of Terra Nova employees in this key area, and enabled the Marine Institute to offer the full range of dynamic positioning training to the petroleum and shipping industries at large.
- Maersk Contractors Newfoundland Limited (MCNL) recently awarded the Marine Institute a \$2.5 million contract to manage and execute the training program for White Rose FPSO operations personnel. Seventy-eight crew will begin training in late 2003 and continue until 2005 in such areas as marine safety, vessel operations, process simulation, maintenance and process operations. The training will be held at all three campuses of the Marine Institute and require approximately 6800 training days combining classroom demonstrations, in-water exercises and simulation scenarios.

By working with local education and training institutions, operators and contractors have been able to develop local programs that meet their specific needs, reduce training costs and develop local competencies.

## **5.2 Co-operative Education**

The petroleum industry provides co-operative education places to large numbers of Memorial University and College of the North Atlantic students. Thanks to the national and international nature of many of the companies involved, this include placements in such places as Calgary, Houston and Aberdeen. For example, during 2002, 289 Memorial University Faculty of Engineering and Applied Science and 59 Faculty of Business students, for a total of 348 students, received placements with companies undertaking petroleum-related work. Of these, 217 (62%) worked in Newfoundland and Labrador, 32 (9%) elsewhere in Canada and 99 (28%) outside Canada.

The numbers working in the petroleum industry have increased over time, from 247 in 2000 to 316 in 2001 and 348 in 2002, a 41% increase over three years. The rate of growth in the number of students getting work-term experience outside Newfoundland and Labrador has been even greater. In 2000, 20% of all Memorial University cooperative placements were international, and 6% elsewhere in Canada, but by 2002 this had risen to 28% and 9%, respectively. The total number of students working outside Canada rose from 50 in 2000 to 125 in 2002.

The breadth of experience received is indicated by the identity of some of the companies involved. For example, Faculty of Business students had placements with: Exxon-Mobil in Halifax; Chevron Canada and Chevron-Texaco in Calgary; Aker Oil and Gas Technology, London Offshore Consultants and XL Technology in the UK; Kongsberg Offshore and Kongsberg-Simrad in Norway; Siemens Demag Delaval, Smit International, Tevreden, EnergyWise, Checkmark Management Services and the Association of Suppliers in the Offshore Industry (IRO) in the Netherlands; and, Coflexip Stena Offshore in France.

The College of the North Atlantic has similarly placed large numbers of cooperative students in the petroleum industry. For example, in 2001 this included students studying Applied Business Information Technology (2 placements), Electrical Engineering (13), Electronics Engineering (2), Environmental Technology (6), Geomatics Engineering (13), Industrial Engineering (12), Mechanical (Manufacturing) Engineering (3), Petroleum Engineering (26) and Programmer Analyst (11). This included 19 placements in Alberta, 5 in the US and 4 in Scotland, with such companies as Exxon-Mobil, Schlumberger, Halliburton, Baker Hughes and Veritas.

In addition to the operators themselves, a number of local firms that provide services to the offshore petroleum industry recruit a large portion of their workforce from local educational institutions, as well as supporting the development and implementation of a range of related training programs and initiatives.



Cougar Helicopters, for example, is an important supporter of the College of the North Atlantic's aviation training program in Gander.

### **5.3 Scholarships and Other Awards**

A number of scholarship programs and other awards are provided or supported by petroleum operators, supply firms and contractors and related organizations and associations. These include a number of scholarships, awards programs and other initiatives, such as:

- The HMDC *Hibernia Scholarships*, awarded annually to students in Memorial University's Faculty of Engineering and Applied Science and the Faculty of Business Administration. Each year one scholarship is awarded to a male and one to a female in each of these disciplines.
- The NOIA *Hibernia Commemorative Scholarship Fund*, established in 1997. This fund offers an annual scholarship to a graduating high school student in Newfoundland and Labrador who is entering post-secondary studies and intending to pursue a petroleum-related career. The scholarship is supported by financial contributions from a number of oil and gas operators and related firms and organizations.
- The Petro-Canada *Olympic Torch Scholarship Fund* provides financial assistance to both athletes and coaches as they pursue full time education. Since the program's inception in 1989, 23 individuals from Nfld. have been awarded scholarships totaling \$74,000

Other scholarship programs include those established under the *Atlantic Accord Career Development Awards Program*, a scholarship fund administered by the provincial Department of Youth Services and Post Secondary Education, and the *Offshore Equity Grants Program*, which is designed to encourage women to consider a career in the offshore petroleum industry.

### **5.4 On-the-Job Training**

Offshore petroleum operators also play an important direct role in facilitating, supporting and delivering training related to the oil and gas activity. Employees of operating and major contracting companies commonly have tremendous personal development opportunities available to them while working in the industry.

Hibernia employees, for example, received an average of approximately five days' training in 1998. Excluding salary costs, Hibernia spent almost \$1.7 million, including \$1.4 million in Newfoundland and Labrador, on direct training. This included \$600,000 on emergency response and over \$300,000 on computer training (Community Resource Services 1999). As another example, Husky Energy currently has three on-the-job training programs. Two of them involve business systems knowledge transfer from Calgary to St.

John's for systems software. The third program is a web-based software program that provides staff members access to training modules on an as-needed basis.

Training is also an important part of Petro-Canada's operations. Training opportunities are diverse and varied, and range from continual training in safety and emergency readiness, information technology training, management and leadership programs and workshops, to the provision of assistance to employees to complete graduate degrees. On-the-job training is quite individual and job-specific, and all Petro-Canada employees complete an education and training assessment that provides the opportunity to identify and explore training requirements and targets.

A key focus area for the Terra Nova project in 2000 was the training of long-term operations employees in preparation for offshore operations. Approximately \$3 million in expenditures (including labour) were incurred on operations training, including in excess of \$1.3 million for emergency readiness training and over \$500,000 for regulatory training.

This emphasis on training is not limited to the main operating companies and contractors. As is described below (Section 7), work in the petroleum industry, with its cutting-edge and constantly evolving technologies and business approaches, requires that a wide range of local companies hire employees with appropriate technical and administrative capabilities and provide them with regular further training.

## 6.0 RESEARCH AND DEVELOPMENT

In addition to education and training programs and initiatives, a significant amount of innovative petroleum industry related research and development work is being done in Newfoundland and Labrador. Each year, operators, contractors, government agencies (such as the National Research Council and Department of Fisheries and Oceans), industry groups (such as CAPP and the Environmental Studies Research Funds) and research organizations (for example, PRAC) support or participate in a wide range of studies and experiments related to petroleum activities in the Newfoundland and Labrador. This includes work in such areas as:

- engineering and design (e.g., vessel design, mooring options),
- operational studies (e.g., seismic survey techniques, vessel offloading, safety equipment and procedures, ice detection and response), and
- environmental investigations (e.g., wave and current studies, beached bird surveys, fish habitat compensation).

These activities sustain and further build the local research and development community, assisting them in serving local interests in the petroleum and other industries. This includes such private-sector companies as Oceanic (see Section 7). These activities have also helped develop Newfoundland and Labrador as a center of excellence in cold oceans engineering, distance technologies and marine science.

Furthermore, as discussed previously (Section 4), offshore oil and gas activity has been accompanied by a significant growth in the Province's research and development infrastructure. Much of this new capacity was developed using funding from the Offshore Development Fund, established under the *Atlantic Accord* to help prepare Newfoundland and Labrador to take advantage of offshore petroleum development opportunities.

Examples of the main research and development centres and programs are described below.

### 6.1 Memorial University

#### *Centre for Cold Ocean Resources Engineering (C-CORE)*

- Applied engineering research institute at Memorial University
- Undertakes research that contributes to the economic development of Canada's marine resources
- Areas of expertise include: ice engineering, sub-sea sensing, marine robotics, offshore aviation, pipelines and other sub-sea structures, remote iceberg sensing, ice management, iceberg towing, ice/structure interaction, ice design characteristics of offshore structures, remote sensing, geophysics, centrifuge modeling, space systems, intelligent systems, geomechanics and acoustic sensing

- Has spun-off 12 marine high technology companies since its inception, including Northern Radar Systems, Instrumar, Canpolar East Inc., and CoreTec Inc.

#### *Centre for Earth Resources Research*

- Unit of Memorial University's Department of Earth Sciences
- Collaborates with industry and government on earth resources research activities
- Facilities and equipment made available to private sector and government at fair market cost
- Provides professional training

#### *Ocean Engineering Research Centre*

- Part of Memorial University's Faculty of Engineering and Applied Sciences
- Provides research and development and consulting services focused on offshore and ship-building activity
- Areas of expertise include: scale-model experiments, numeric modeling, software development, structural testing, sea-ice and ice-structure interaction, hydrodynamics, wave structure interaction, offshore structures and ocean monitoring and instrumentation research

#### *Centre for Offshore and Remote Medicine*

- Part of Memorial University's Faculty of Medicine
- Four part mandate
  - carry out research and development related to health aspects of offshore oil, marine, diving and other remote environmentally stressful or hazardous industries
  - provide resources for the development of these industries
  - develop and foster teaching and training for these industries
  - provide consulting services to industry and government
- Facilities include a hyperbaric facility with a 300m depth capacity
- Directs research efforts to medical concerns of industries operating at remote locations
- Fosters the development and delivery of programs in health, education and research

#### *Memorial University Oil and Gas Development Partnership*

The Oil and Gas Development Partnership (OGDP) was established in September 2000, but it was not until 2002, with the appointment of its first Executive Director, that the partnership became fully active. It was created to:

- Assist in developing Memorial University's oil and gas initiatives, ensuring its position as a source of high-quality research, training and education for industry and governments.
- Coordinate the petroleum-related activities of Memorial to ensure they meet the highest academic standards and the needs of industry and government.
- Develop effective long-term relationships with industry and government in order to understand and fully meet their requirements.
- Assist in changing Memorial's research and development paradigm. With the increased reliance on industry funding, the university will have to effectively and quickly meet the research needs of industry, and use such development research in a way that opens new opportunities for fundamental research.
- Develop outreach programs that keep the local community informed about university activities and global developments likely to affect the petroleum industry and hence the province.
- Help develop short technical courses for the continuing education of industry personnel.
- Develop effective long-term relationships with other international academic institutions to conduct joint research, share information, and promote faculty and student exchange.

The OGDP has already made some important steps, including:

- Developing a Master of Oil and Gas Studies Program. This one-year program is designed for high potential employees destined for executive positions in the industry and government. It will commence in 2004, providing an education in both technical and non-technical areas in the entire industry value chain.
- Creating the first of a series of short duration executive workshops. It is designed for petroleum industry managers and executives responsible for corporate sustainable development programs.
- Providing bi-monthly lectures on oil and gas related topics of public interest.
- Initiating short courses that will be offered to the industry in St. John's and at Memorial's UK campus at Harlow. The instructors will also be available to deliver in-house training programs.

Research and development is a key component of the OGDP. It focuses on six strategic areas:

- Basin studies of the Atlantic Margin, to better understand the basin architecture, the play types typical there, the critical risk elements in each play, and the hydrocarbon resource potential.
- Complex seismic asset extraction using ray theory, time-lapse seismic acquisition and data interpretation, and 3D reservoir simulation and well completion technology, so as to improve reservoir management, increase reserve extraction, and make development planning more efficient.
- Asset integrity management, including the identification of materials with improved corrosion resistance and techniques for non-destructive testing, with the view to having topside facilities purpose-built for the reservoir under consideration. Such topsides would have enhanced safety characteristics, be cheaper to build, and have clearly defined abandonment plans and reduced maintenance and operating costs.

- The design, construction and testing of ‘intelligent’ underwater vehicles for such uses as pipeline patrolling, inspection of drilling platforms and sub-sea production facilities, and environmental monitoring.
- The marine transportation, processing and storage of compressed natural gas so as to monetize ‘stranded’ gas in Atlantic Canada and elsewhere.
- Offshore health and safety, with an emphasis on evacuation/rescue systems and operational procedures.

Thus far, Memorial University has attracted funding for 20 new academic positions, including a number of chairs, in offshore oil and gas specialties:

- It has funded five new tenure track chairs, all directed at oil and gas activities, through the Canada Research Council.
- It has received about \$8.6 million from the Pan-Atlantic Petroleum Systems Consortium, which will fund an additional five tenure-track chairs: one each in instrumentation and control systems, basin studies, and geo-mechanics, and two in reservoir characterization and management.
- Terra Nova has funded the establishment of a Junior Research Chair in Ocean Environmental Risk Engineering<sup>4</sup>, a Chair in Asset Integrity Management, and a Chair for Women in Science and Engineering. The initial commitment for the first of these was \$250,000 (\$50,000 per year for five years), renewed in 2003 for a further five years, for a total commitment of \$500,000. Both the Asset Integrity Management Chair, which commenced in 2003, and the Chair for Women in Science and Engineering, established in 1997, saw funding commitments of \$50,000 per year for five-year terms.
- Husky Energy has provided \$2 million to establish the Husky Energy Chair in Oil and Gas Research, the first fully endowed chair at Memorial. The holder will study the use of seismic imaging to enhance the interpretation of reservoir porosity and permeability.

Lastly, Petro-Canada has contributed \$250,000 to Memorial’s *Opportunity Fund* to endow the Young Innovator Awards Program, to recognize, promote, and support outstanding young faculty researchers.

## 6.2 Marine Institute

### *Centre for Marine Simulation*

- Six marine simulation facilities
  - Ship bridge
  - Ballast and cargo control

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<sup>4</sup> Dr. Brian Veitch, a graduate of Memorial University, was appointed to this Chair in 1998. He has been successful in leveraging nearly \$5 million in research funding from industry and government agencies.

- Propulsion plant
- Navigation and blind pilotage
- Global maritime distress and safety system
- Dynamic positioning
- Provides 11 different courses
- Undertakes basic and applied research and development in ship automation, ice class vessel design, port and waterway design and behavioral studies

#### *Canadian Centre for Marine Communications*

- Identifies advanced communications technology with potential marine applications
- Assists industry to develop the technology into marine equipment and services
- Funded largely by the Government of Canada but beginning to receive royalties from research and development work

### **6.3 Institute for Marine Dynamics**

- Engineering research laboratory established by the National Research Council as Canada's national centre for ocean technology research and development
- Provides research and development on the performance of vessels and offshore structures in wind, ice, waves and currents
- Provides full scale and model tests of above and under sea vessels and structures
- Two main areas of research: 1) hydrodynamic investigations; 2) marine ice and arctic vessel research
- Facilities include: 76m ice tank; 200m clear water towing tank; model ocean basin; shallow-water maneuvering basin; variable-depth towing tank; and a cavitation tunnel.
- Has performed tests on the Hibernia platform and shuttle tankers, the Terra Nova floating production system and semi-submersible drilling rigs and platforms.

Source: Newfoundland Ocean Industries Association *et al.* (1999)

These programs and facilities form an important part of Newfoundland and Labrador's expanding research, development and training environment related to the offshore petroleum industry. While this is particularly strong in engineering and related activities, it is symptomatic of and contributes to a general expansion in the Province's knowledge economy.

## **7.0 COMPANIES**

A wide range of companies is directly involved in offshore oil and gas activity. For example, NOIA's membership includes 297 companies with operations in the Province. Yet other firms undertake subcontracts for them and for the major operating companies, helping spread the economic benefits through the business community. This section of the report describes some of the effects this involvement with the petroleum industry has had for them, largely based on case studies of a selection of Newfoundland and Labrador based companies (Appendix 2).

Upstream petroleum activity-related business has clearly made an important contribution to the bottom line of all these companies. Furthermore, it commonly allowed or required them to:

- hire new personnel;
- provide additional training to their personnel;
- acquire or build new offices, warehouses and other facilities;
- acquire new equipment and improve their technical capabilities; and
- improve their business practices in such areas as bid preparation, quality assurance and quality control, documentation, tracking and accounting.

In many cases, success in working for this very demanding industry has also increased their credibility and ambition, leading to their having success outside of the province and in other industrial sectors.

### **7.1 Types of Company**

The Newfoundland and Labrador companies currently involved in offshore petroleum-related work are extremely diverse in terms of type, size and origins. While it is understandable that many people assume that it is only larger, more sophisticated and technologically advanced companies have benefited from the petroleum industry, the reality is that it has a very broad requirement for goods and services. For example, the case study companies range from ones operating at the technological cutting edge in such areas as engineering, oceanographic research, seismic interpretation and information technology, to others engaged in more mundane but still critical activities, such as providing legal, transportation, accommodations, hospitality and photographic services.

Some are pre-existent Newfoundland companies that have expanded, due to the petroleum industry, either through increased sales of their existing good or service line, or by moving into new petroleum-related areas of activity. For example:



- P.F. Collins Customs Broker Ltd. was established in 1921 and can date its involvement with the petroleum industry to its providing brokerage services in support of scientific surveys in the early 1960s. Its involvement in exploratory drilling since it started in Newfoundland and Labrador in 1966 initiated the firm's expansion such that it now provides a range of professional services, including freight forwarding/logistics, project administration, ships agency, warehousing and distribution.
- M&M Engineering was incorporated in 1967. In 1987, it established a wholly owned subsidiary, M&M Offshore Limited, to provide specialized welding capabilities and servicing facilities and to manufacture tanks, silos, and other steel components. It was the first Newfoundland and Labrador contractor to work on the Hibernia construction project, and it has subsequently been involved in the Terra Nova and Newfoundland Transshipment Terminal projects.
- Oceans Limited was established to undertake general oceanographic work for the Canadian Coast Guard and the Department of Fisheries and Oceans. It began working for the petroleum industry, when it was awarded a Petro-Canada contract to undertake climate studies and extreme weather analysis in 1978. The company has subsequently moved into: site-specific, area and route forecasting; oceanographic field studies; environmental effects bio-monitoring; hyperbaric pressure testing; and, marine search and rescue research and development.
- G.J. Cahill and Company Limited was established in 1953 to undertake commercial and light industrial electrical contracting. In 1990 it bid electrical contracting work on the Hibernia construction site at Bull Arm, and since that time it has expanded into a range of petroleum industry electrical instrumentation and other activity.
- NewTrans Equipment Carriers was set up, in 1974, to move construction industry heavy equipment. Its first involvement in the petroleum industry was during the 1980s, when it was asked to move equipment related to exploratory drilling. It has gone on to provide a range of tractor, semi-dump and low-bed services to the industry, including shipping heavy-equipment and aggregates to the Hibernia construction site.
- NEWDOCK was created in 1997 by the Penney and Burry Groups, based on the assets of the Newfoundland Dockyard, which had opened in St. John's in 1886. The facilities and resources were divided between two divisions, Marine Services Operations, which pursued traditional opportunities, and Offshore Services Operations. The latter has provided the petroleum industry with fabrication services, maintenance and operations support, manifolds and subsea equipment, and rig maintenance, with the Terra Nova project carrying out an extensive program to promote and assist the successful transfer of manifold and template fabrication technology to NEWDOCK.

- The Marystown Shipyard was established in the late 1960s and has been involved in various ship construction and fabrication contracts re offshore petroleum activity. In April 2002 it was acquired by Kiewit Offshore Services (KOS) for use by the Aker Maritime Kiewit Contractors (AMKC) joint venture in fabricating and installing the topsides of the White Rose project floating production storage and offloading vessel.
- Hi Point Industries was incorporated in 1983 to develop an environmentally safe, all natural, oil absorbent for the containment of hydrocarbon spills. It uses peat from a bog at Bishop's Falls, in Central Newfoundland, which is harvested by a vacuum process, screened and heat treated to produce the 'Oclansorb' oil absorbent. The company's clients include the Hibernia Management and Development Company and Petro-Canada.
- Imprint Specialty Promotions was founded in 1979 as a buyer and producer of promotional goods and decorative wearables. It first became involved with the petroleum industry in the early 1980s and has designed promotional programs, and manufactured associated products, related to incentive awards, first oil celebrations and other milestones.
- Clovelly Golf, which operates courses in St. John's, started operations in 1997 and soon thereafter was providing group packages and tournaments for Hibernia employees. It has subsequently sold corporate memberships to the industry, and hosted tournaments and company functions, such as business meetings, dinners and socials. Its clients have included Petro-Canada, Husky and Halliburton.
- Crocker Photography, founded in 1974, first undertook petroleum industry work in the 1980s, for Gulf Oil. It has since provided photographic and video services to such companies as HMDC, ExxonMobil, Petro-Canada, Husky, Baker Hughes, PGS, Boskalis and Cougar Helicopters.
- The St. John's office of McInnes Cooper was established in 1994. It has become extensively involved in oil and gas activity, including in the areas of: acquisitions and divestitures of energy properties, financing rigs, supply and work vessels; importing foreign flag rigs and vessels; negotiating offshore agreements; appearances before regulatory agencies; and labour and employment law.
- City Hotels acquired the Airport Plaza in 1994, not least because company President Ted Howell, a former Hibernia employee, saw that it could meet industry requirements for a mid-market full service hotel, initially related to helicopter operations. It now provides: accommodations for crew changes and transitional workers; facilities and services for meetings, training space, conferences and public hearings; and, on- and off-site meal service.

Newfoundlanders and Labradorians have created other companies in response to new offshore petroleum-related opportunities. For example:

- Stratos Global was founded in 1985 largely to provide high frequency voice and vessel tracking services to companies involved in offshore oil and gas exploration. It has subsequently undertaken a wide range of work related to exploration, development and production activity in Newfoundland and Labrador, as well as expanding into work elsewhere and in other industrial sectors. Its head office is now in Bethesda, Maryland, and it has operational centres in St. John's, Aberdeen and Louisiana.
- Atlantic Offshore Medical Services was established to provide health care services to the Newfoundland and Labrador offshore petroleum industry. It was initially involved in exploration activity, but has subsequently provided services at the Hibernia construction site and related to Hibernia and Terra Nova production activity.
- Shearwater Geophysical was founded in 1991 to provide seismic consulting services in Newfoundland and Labrador. These currently include the processing of 2D exploration and well site data and the reprocessing of 3D data for well site evaluation. Its clients have included Pan Canadian (now EnCana), ExxonMobil, Husky, Petro-Canada and Shell Canada.
- Oceanic Consulting Corporation was created in 1997 out of an earlier initiative designed to use seven National Research Council, Memorial University, and Marine Institute facilities to undertake commercial marine hydrodynamic performance evaluation work, primarily related to offshore petroleum activity. It has undertaken increasing amounts of work on all three of Newfoundland and Labrador's oilfield development projects.

In some cases, the success of the above companies in the petroleum industry has been facilitated by joint ventures and strategic alliances. However, as the local oil and gas sector has expanded and matured, there has been a shift from using such arrangements as a means of entering the industry, to using them to improve efficiency in meeting local client needs and, increasingly, as a means of accessing other markets. Examples of such arrangements involving the case study companies include:

- Oceans Limited established a primary partnership with another local company, Provincial Airlines, which allows them to provide a range of oceanographic monitoring, weather forecasting and ice management services.
- NewTrans has a partnership with A. Harvey and Company Limited, which has various shorebase-related contracts with the petroleum industry.

- M&M Offshore has a manufacturing and servicing agreement with ABB Vetco-Gray Canada for Eastern Canada.
- In conjunction with G.J. Cahill, New Valve, Peacock and Seimens, M&M is also a partner in the Newfoundland Service Alliance, which provides the industry with a one-stop provider of various maintenance and fabrication services. The Alliance has been successful in securing fabrication, electrical, mechanical and instrumentation contracts for Hibernia.
- Atlantic Offshore Medical Services has formed a strategic affiliation with Nova Scotia-based Atlantic Offshore Medical Associates, whereby they operate independently but pool their resources to provide their clients a larger number of service providers, a greater range of expertise, and streamlined administrative services.

The importance of the petroleum industry to the case study companies varies greatly, and fluctuates with time. In some cases, successful involvement with the industry has led to a relative decline in its importance, because it led to success in getting contracts in other industrial sectors. In examples of the current importance of the industry:

- Dan Walker, of Oceanic Consulting, estimates that about half of the company's activity relates to petroleum industry applications.
- Work in the petroleum industry now accounts for about 25% of Stratos Global Corporation's business.
- The offshore oil industry accounts for about 40% of G.J. Cahill's business.
- Work on the White Rose project is currently responsible for the great majority of the work at the KOS shipyard and fabrication facilities in Marystown.

For other companies, the petroleum industry is a smaller but still very important market. For example, Ted Howell of City Hotels describes the industry as 'a critical part of our business,' not least because it is less seasonal than other markets, contributing to consistent occupancy rates. Fabian Clarke indicates that the industry has had a 'substantial' effect on those real estate companies and agents that have chosen to focus on its requirements, accounting for almost half of his business. Even Clovelly Golf estimates that about 25% of their membership is people who work in the petroleum industry, and it sponsors most of the club's major social and training functions.

## 7.2 Labour and Infrastructure Requirements

As has already been described in Section 3, the petroleum industry is a major generator of direct, indirect and induced employment. The case study companies provide further evidence of some of the direct effects:

- Stratos Global employs over 200 people at its operations centre in Donovan's Industrial Park, Mount Pearl, and accounting department in downtown St. John's. In total, it now has over 600 employees world-wide
- Employment levels at M&M are variable, in response to the number and size of contracts held. However, at times it has worked on a contract basis with more than 600 local trades-people.
- The level of employment at NEWDOCK is also variable, generally fluctuating between 150 and 350 people.
- As of the end of September 2003, the KOS facilities in Marystown were employing about 650 workers on the White Rose project, with an anticipated peak employment of 700 to 750.
- G.J. Cahill has about 75 staff and may employ, on a project basis, another 150 to 200 trades-people.
- McInnes Cooper, which was established in 1994 with a team of three lawyers, now has 23 lawyers (half of them undertaking oil and gas work) and over 20 support staff.
- Oceanic Consulting has 32 employees in its St. John's operations.
- Oceans Limited now employs 23 people in its St. John's office, and two in Halifax.
- Atlantic Offshore Medical Services currently employs 22 to 24 people in St. John's.
- Over a 20 year period, Imprint Specialty Promotions has expanded from its initial two employees to a current 14.
- NewTrans has expanded "considerably," including the hiring of several new drivers, as a result of petroleum industry activity.

As was discussed in Section 5, work in the industry, with its cutting-edge and constantly evolving technologies and business approaches, requires that companies hire appropriately skilled employees and provide them with regular training and upgrading. It is notable that this involves not only having the right

technical qualifications, but also being able to handle the pressures involved in working in the industry. For example:

- John Brake of M&M Offshore stressed the importance of a well-trained labour force and indicated that there was regular ‘in-house’ training. All trades-people must be precise, reliable and able to withstand ‘deadline pressure.’ Similarly, all management personnel must understand that “the offshore industry is very demanding and the work will involve long periods of working overtime.”
- Bernard Collins also noted that employees working in oil industry activity require specialized skill sets. P.F. Collins has embraced the necessity of maintaining employees that understand drilling and production technology, its components, and their application with respect to offshore exploration and development programs. Additionally, the knowledge and expertise of these associates must be globally available at any time day or night.
- Fred Cahill, of G.J. Cahill, indicated that petroleum industry requirements have led to them hiring, as part of their management team, a quality assurance manager, a safety officer, a human resources specialist and two information technology (IT) specialists. The IT specialists are required because of the industry’s rigorous standards respecting administration, accounting, estimating, documentation and communications.

In other examples of case study company training requirements, resulting from working in the offshore petroleum industry:

- KOS has spent “hundreds of thousands of dollars” on training its workers in Marystown, especially related to safety and computer skills.
- In response to petroleum industry requirements, NewTrans employees have been trained in transporting dangerous goods.
- Nurses working for Atlantic Offshore Medical Services receive special training to be able to respond to medical emergencies and trauma situations at remote offshore locations, and receive special certification from the Centre for Nursing Studies in Remote Occupational Nursing.
- Imprint Specialty Promotions has both brought in trainers, and sent its staff to the United States, to learn about new equipment.

Section 4 has already noted some of the more prominent examples of private-sector investment in infrastructure and equipment for work in the oil and gas sector. This includes major developments at Bull Arm, and in St. John’s, Mount Pearl and Arnold’s Cove. The company case studies provide other examples

which, while sometimes much more modest in size, have made important contributions to the capabilities and efficiency of the companies involved. These investments have both permitted them to work on local oil and gas projects, and contributed to their ability to bid on work in other parts of the world and in other industrial sectors. For instance:

- In order to meet the requirements of its petroleum industry and other clients, Stratos Global has invested in a wide range of satellite communications and related equipment.
- NEWDOCK has invested about \$10 million in infrastructure and specialized equipment. The latter includes sub-arc and automatic orbital welding machines, a digital horizontal boring machine, and CNC-controlled lathes and milling machines.
- KOS has invested about \$22 million in upgrading the Marystown Shipyard and Cow Head Fabrication Facilities. This has included improving the electrical, communications, painting and blasting capabilities.
- Shearwater Geophysical has invested more than \$400,000 in sophisticated computer hardware and software. This includes two SUN computers networked together with three PC workstations and a total of 500 gigabytes, and a 42 CPU PC Linux cluster with 1.8 terabytes of online disk access. Shearwater is presently working on programs to develop and commercialize several unique seismic processing applications with the Memorial University Seismic Imaging Consortium.

The need or opportunity to acquire new equipment is not limited to large and medium sized companies. For example, prompted largely by petroleum industry requirements, Crocker Photography invested in a high-end digital camera that has been important to its success in various markets. Similarly, oil and gas business prompted Oceans to acquire a range of highly sophisticated equipment, and Imprint Specialty Promotions to purchase a range of state-of-the-art equipment, including laser engravers, sandblasting glass etchers and a pad printer.

There have also been infrastructure investments related to offshore petroleum activity, which have both increased the capabilities of local companies and provided spin off benefits to the local construction industry. For example:

- NEWDOCK invested in a new subsea service hall, prefabrication shop, assembly/machine shop, pipe-testing shop, and blast and paint shop, in order to compete for petroleum industry work.
- The redevelopment of the Cow Head fabrication facility at Marystown included the construction of a new paint-hall, warehouse, blast shop and dock.

- As a result of oil and gas activity, NewTrans acquired a two-acre facility, including an office and workshop, in the St. Anne's Industrial Park, Paradise. It has expanded its fleet from six trucks and ten trailers, prior to working on the Hibernia project, to 15 trucks and 30 trailers today.
- As was described above, City Hotels acquired the Airport Plaza with a view to serving the offshore petroleum industry. However, this has required an investment of about \$3.6 millions in renovations and development.

### **7.3 Business Practices**

As has already been indicated, the petroleum industry is very demanding in terms of not only technical skills and equipment, but also business practices. This has required Newfoundland and Labrador based companies to establish world-class approaches to such things as bid preparation, quality assurance, quality control, document control, tracking, and accounting.

The petroleum industry's bidding requirements are seen as being particularly rigorous. Judith Bobbitt of Oceans Limited noted that they are much more demanding, and less subject to change, than those experienced when seeking government work. This required an initial learning process, leading to more efficient bidding processes and greater success. Representatives of P.F. Collins, Murray Industrial and M&M Engineering also stressed the demanding nature of oil industry bidding processes. John Brake of M&M Engineering described them as "labour intensive and time consuming," since all work must be fully documented, with all processes traceable such that any problems can immediately be investigated.

Quality assurance and control are of critical concern to the offshore petroleum industry, given safety and environmental concerns and the scale of the economic losses associated with even a short interruption of exploration, development or production activity. The demands of the industry have resulted in a number of case study companies becoming accredited to quality programs. For example:

- M&M Offshore is ISO 9000 compliant and in the process of being granted ISO 9002 accreditation. Its quality assurance/quality control (QA/QC) program meets the requirements of the Canadian Standards Association and that specified for the Hibernia project. The company's Quality Control Department monitors all work and ensures standards are met.
- Murray Industrial is the first company of its kind to become ISO 9000 registered, to provide the oil industry with the assurance associated with this accreditation. The company has also had to revise its accounting procedures so as to address the oil industry's requirement of certificates of compliance. Similarly, M&M Offshore has found that working for the industry has required it to hire a full-time chartered accountant and add other personnel during periods of peak activity.



- G.J. Cahill is ISO 9000-2000 certified, Atlantic Offshore Medical Services is an ISO 9001 registered company, and P.F. Collins has been registered as an ISO 9002 company since 1999. NEWDOCK became ISO 9002 registered in 1999 and meets or exceeds a range of Canadian Standards Association, Canadian Welding Bureau and other standards.
- KOS upgraded the QA/QC system at its Marystown operations such that they could meet the rigorous requirements related to the fabrication and assembly of offshore structures.

In other examples of changes to business practices:

- David Crosbie of Murray Industrial noted that good inventory management has been critical to the success of the company, given the needs of the petroleum industry and the fact that many of the goods they need have to be brought into the province.
- As a direct result of working in the industry, P.F. Collins has increased its marketing budget. It now has three employees working full-time in its Sales and Marketing department. The company has found it beneficial to attend tradeshow as well as contribute to other industry association events and conferences.
- G.J. Cahill networks and markets itself through a combination of tools including industry association memberships, national and international tradeshow, and advertising.
- NEWDOCK has recognized that it cannot depend solely on the local market, and identified the Gulf of Mexico as an area presenting major potential. It has marketed itself vigorously there through, among other things, tradeshow participation.
- City Hotels established a dedicated sales department in 1998 and has an aggressive marketing program that involves representation at local industry events and participation in trade shows in Newfoundland, Nova Scotia and Alberta. Networks and relationships with key players are seen as critical to success in selling to the petroleum industry.
- Fabian Clarke indicates that the Sutton Group has also recognized the critical importance of networking in establishing and maintaining business relationships with the petroleum industry. This has led to work for Husky, KOS, AMKC, Petro-Canada and a range of other such companies.

The above developments and successes have generally had very positive effects on the credibility and ambition of the case study companies. When they first investigated oil and gas related activity, many initially felt intimidated by that industry. However, they are now confident and, with every justification, exhibit a 'can-do' attitude. For example:

- While Murray Industrial personnel were initially intimidated by the size and complexity of the offshore petroleum industry, trade shows and seminars in Norway, Scotland and the United States gave company representatives the opportunity to learn more about its realities and overcome their reticence. Over time, according to David Murray, “the offshore industry has got to know us and we have proven what we can do for them.”
- Fred Cahill of G.J. Cahill notes that the company “took its lumps, but learned from these” as it developed an understanding of the petroleum industry and its requirements. The company’s managers are now very confident of their ability to compete in this and other industrial sectors.
- John Brake of M&M Offshore indicated company managers were initially intimidated and apprehensive, perhaps as a result of the ‘insularity’ of the Newfoundland and Labrador business community. With time though, not least as a result of learning from experience, they came to understand how the industry works and became confident that they can deliver what it requires.
- Similarly, Jim Cook noted that NewTrans’ culture has changed significantly as a result of working for the petroleum industry. While their personnel initially “felt intimidated and wondered if NewTrans had the capabilities to meet the demands of the industry,” it has now been clearly demonstrated that it does.
- Bernard Collins of P.F. Collins noted that, like many other Newfoundland-based businesses, his company has developed a ‘can-do’ attitude when dealing with the oil industry. This has increased its ability to compete with national brokerage firms.
- Prior to its acquisition by the Penney and Burry Groups in 1997, the Newfoundland Dockyard was run by a crown corporation and had a poor reputation for quality and productivity. Phil Kinsella is proud of the fact that it has now been transformed into a leading and very competitive international manufacturer of subsea templates and manifold components.
- Annette Furneaux of Imprint Specialty Promotions expresses her and her employees’ positive attitude when she says: “just because a project has never been attempted before, doesn’t mean we can’t do it.”

#### **7.4 Resultant Opportunities**

The combination of local work for the petroleum industry, and associated investments and developments, have helped these case study companies, and a wide range of other firms that have worked in the industry locally, to find business on other offshore petroleum projects in Nova Scotia and around the world. It has also allowed a number of them to expand their business in other industrial sectors. As such, it has diversified these companies and helped diversify the provincial economy. In some examples drawn from the case studies:

- By expanding its local services and corporate mergers, Stratos Global has become a major world player in the petroleum industry. It has also applied its capabilities outside the oil and gas sector, serving governments, the military, shipping, fishing, broadcasting, aeronautical, energy, mining, cruise, engineering/consulting, yachting, rural communications, humanitarian/disaster relief, resource exploration and recreational requirements.
- Oceanic Consulting has performed a wide range of international work for clients in the petroleum and other industries. In the former case, this includes the evaluation of the design of FPSOs for use off West Africa, supply and support vessels for use in Kazakhstan, and spar production platforms for use in the Gulf of Mexico. Its work in other sectors has included, most notably, its hull model testing of America's Cup winning yacht Alinghi. However, it has also included tug and barge testing, modelling the proposed hull form of patrol boats, and modelling the interactions between various structures and ice.
- G.J. Cahill now has a Nova Scotia office and it is currently working the Sable offshore gas project in Nova Scotia, including some activity in Houma, Louisiana. Thanks largely to its petroleum industry work and related relationships, the company has also worked on a pulp and paper project in Port Hawkesbury, Nova Scotia, and the Confederation Bridge project.
- In 2000, NEWDOCK won a \$1.5 million contract to fabricate nine subsea assemblies, for use on Shell Oil projects in the Gulf of Mexico, for FMC of Houston, Texas.
- Shearwater Geophysical has undertaken petroleum industry seismic interpretation work related to activity in Nova Scotia, Morocco, the China Sea and the Black Sea. It opened a Halifax office in December 2001 and is planning to open one in Calgary in the near future.
- Oceans Limited opened a Nova Scotia office in Halifax in September 2001 and (in partnership with Provincial Airlines) is already providing meteorological and environmental services to Marathon Canada for its deepwater exploration program. The companies were recently also awarded a five-year contract to provide meteorological monitoring, weather forecasting and related data management and reporting for the Sable offshore gas field.
- In August 2002, to assist its expansion into petroleum industry and other work in the Maritimes, Murray Industrial acquired 50% of W&A Moir Ltd., a Nova Scotia-based industrial supplier with offices in Nova Scotia and New Brunswick.
- P.F. Collins has undertaken a range of petroleum industry related consulting and importation work through its four offices in Atlantic Canada. This Newfoundland-based firm's global outreach has recently been demonstrated through operations involving Europe, Southern USA, and Western Canada.

Its close association with the oil industry has increased its profile substantially and contributed to further success respecting petroleum and non-petroleum related opportunities.

- Largely as a consequence of its success in meeting the needs of offshore oil and gas clients, Atlantic Offshore Medical Services has been awarded contracts to provide medical services to onshore industries and now has an office in Nova Scotia employing ten people.
- Through its petroleum industry work, and its related membership of the Newfoundland Ocean Industries Association, Crocker Photography has developed telecommunications, consulting and project management clients across Canada and in international markets.

Work on other oil and gas projects and on projects in other industries has generated new sources of revenue for these case study companies, and allowed them to develop yet further new expertise. It has also served to reduce the vulnerability of these and other companies, and the provincial economy as a whole, to cyclical fluctuations in local petroleum activity. As such, involvement in the offshore petroleum industry has served to diversify the economy of Newfoundland and Labrador in two ways; it has introduced a major new sector, and it has prompted oil and gas sector companies to expand into other sectors and markets

## 8.0 THE FUTURE

The analysis presented above demonstrates that the effects of the petroleum industry on Newfoundland and Labrador are large, long-term and widely distributed:

- **Large:** As has been seen, in the industry's capital and operational expenditures in Newfoundland and Labrador totalled about \$1.3 billion per year during the 1999 to 2002 period, with about 3500 Newfoundland and Labrador residents working directly for the industry. The effects on the economy as a whole are shown by the Department of Finance analysis. For example, on average over the 1999 to 2002 period, industry activity resulted in the Province's GDP being 15% higher, total employment 15% higher, retail sales 6% higher, and the Province's population 8000 larger.
- **Long-term:** The direct and spin-off effects of industry activity will last at least another 20 years. Indeed, experience in other parts of the world suggests that enhanced production technologies, and the use of current platforms to produce from other 'add-on' oilfields and pools, will mean that oil activity will continue to play an important role in the provincial economy well beyond this. In addition, there is increasing interest in developing gas reserves on the Grand Banks and in the Labrador Sea, and in possible gas-fields off the South Coast of Newfoundland.
- **Widely distributed:** It is not just highly-skilled and technical people who have benefited from the industry, but a variety of people throughout the economy and society. As is documented in the case studies, and quantified by the econometric analysis, the industry has generated jobs and wages in the housing industry, retailing, business services, education and tourism. For example, tourism has benefited not only directly from the expenditures of petroleum industry companies and their employees, but also from resultant improvements in transportation links and accommodations, and the further 'cosmopolitanization' of St. John's with the opening of new restaurants and stores, growth in the arts community, etc.

Furthermore, the above effects have not been limited to the St. John's region. Workers on platforms, rigs, supply vessels and tankers, and those employed at the Newfoundland Transshipment Terminal, Marystown Shipyard, Cow Head and Bull Arm, and for companies like Hi-Point, benefit directly from the industry. Others see the effects of secondary spending (for example, on tourism and recreation) and government spending (resulting from petroleum industry related taxes, royalties and reductions in public expenditures).

The industry's effects on the economy of Newfoundland and Labrador are still quite variable over time, reflecting development project-related fluctuations in the scale of activity. In the short and medium term, there will be some diminution in the relative size and importance of these fluctuations as the increased number of fields in production provides a larger base level of activity, although even this will diminish as

development drilling ends. However, there is still a clear and important need for new development projects such as Hebron-Ben Nevis, and this requires that there be new exploration activity and increased technological, business, regulatory and other efficiencies.

Clearly, the industry has made, and will continue to make, a very important contribution to the economy of Newfoundland and Labrador. Fortunately, however, it is by no means 'the solution' to its past and present problems; having such a single saviour would lead to the Province being vulnerable to fluctuations (for instance in oil prices) in this one industry. Instead, the petroleum industry adds a new sector to, and thereby serves to diversify, the Province's economy.

Furthermore, the industry is helping transform the economy. As has been seen above, the new company capabilities and ambitions resulting from competing in the industry are not just applicable to it or to doing business in Newfoundland and Labrador or Canada. Similarly, large numbers of Newfoundlanders and Labradorians have developed skills and capabilities that have broadened their career prospects and horizons. Working on Hibernia, Terra Nova, White Rose and other projects have made these firms and individuals highly competitive and helped them get work on other petroleum projects, and on projects in other industries, locally, nationally or internationally. As such the industry is causing changes beyond -- and which will outlast -- current petroleum projects.

Similarly, the new petroleum industry-related infrastructure and labour force are reducing the costs of further offshore petroleum projects, and thus increasing their likelihood and the potential Newfoundland and Labrador benefits. Furthermore, the new research, development, education and training capabilities are making the Province a centre of excellence and learning in a range of petroleum, marine and engineering-related issues. Again, while put in place to support local petroleum activity, these capabilities are increasingly being used to undertake work for clients outside of Newfoundland and Labrador and outside the petroleum industry, further developing and diversifying the provincial economy.

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**APPENDIX 1**

**THE MACROECONOMIC IMPACTS OF  
THE OFFSHORE OIL INDUSTRY  
ON THE ECONOMY OF  
NEWFOUNDLAND AND LABRADOR**

**Prepared for Community Resource Services Ltd.  
By Economic Research and Analysis Division  
(Economics and Statistics Branch)  
Department of Finance  
Government of Newfoundland and Labrador**

**Draft**

**July 4, 2003**

## **I Introduction**

The purpose of this study is to provide estimates of the overall economic impact that the offshore oil industry had on the provincial economy in terms of key indicators such as Gross Domestic Product (GDP), incomes, and employment for the period 1999 to 2002, as requested by Community Resource Services Ltd.

The following sections describe the economic models used in the analysis, the data used as input, and the approaches followed in applying the models. The paper ends with a presentation and discussion of the results. Because the oil industry is in expansion mode and is experiencing year-to-year fluctuations in development and production related activity, this impact assessment measured the effects or benefits of the offshore oil industry over four years and then looked at average impacts over the period.

## **II Economic Models**

Two Department of Finance models are used in combination in this impact assessment: NALEM (Newfoundland and Labrador Econometric Model) and NALIOM (Newfoundland and Labrador Input-Output Model).

NALEM is a detailed model of the relationships between key economic variables in the provincial economy and is used by the government of Newfoundland and Labrador for economic forecasting and to assess the economic impacts created by major development projects as well as government policy changes. Additional information is provided on page 2.

The NALIOM model simulates the relationships between commodity outputs and commodity inputs at an industry level under the assumption of linearity (i.e., that the proportion of factor inputs used per dollar of output remains constant). NALIOM provides estimates of the GDP, employment and labour income impacts for 727 types of commodity purchases distributed over 300 industries. The model's strength lies in its ability to capture backward linkages (i.e., indirect impacts that arise from the production of one industry's inputs by other industries, and, in turn, the production of inputs for those industries by their suppliers, etc.).

NALIOM is used in this study to obtain the indirect oil industry impacts. These indirect impacts are combined with the direct, or first round, impacts to be used as data input to NALEM. NALEM is able to capture the induced impacts (i.e., impacts related to the spending of workers who are directly or indirectly employed as a result of oil industry activity as well as impacts related to induced investment, housing construction, etc.). The direct, indirect and induced impacts are then summed to determine the total economic impacts of the offshore oil industry on the provincial economy.

## **A Brief Description of the Newfoundland and Labrador Econometric Model (NALEM)**

NALEM is a *macroeconomic* model of the economy in the sense that it is designed to capture the major and most important economic relationships in the provincial economy, and not the minute details of every aspect of economic activity. NALEM provides a representation of the current structure (i.e., basic economic relationships) of the provincial economy. As this structure changes (e.g., EI program changes, tax harmonization, collapse of the groundfishery, development of the oil and gas industry, etc.), the model is modified to capture the new or changed economic relationships.

NALEM contains over 370 mathematical equations and 600 data series which are designed to represent key aspects of the provincial economy, and to capture the relationship between certain socioeconomic variables. For example, the level of consumer spending is related to the level of income which consumers have at their disposal. Anything that affects consumers' disposable income (e.g., higher/lower income taxes, reduced EI benefits, job losses/gains, etc.) can be expected to have an impact on the level of consumer spending. Thus, certain NALEM equations are designed to measure or quantify (i.e., "*model*") the relationship between major categories of consumer spending and income levels, which in turn are linked to other variables in the model. For example, changes in consumer spending can in turn affect government revenues, employment levels, investment spending, and so on; NALEM is designed to capture these linkages.

NALEM is organized into 10 different sectors. Consumer spending, residential construction, business investment, government spending, exports, and imports comprise the six expenditure sectors essential to the determination of GDP and other key economic indicators. The remaining four sectors cover income and output, demographic and labour market activity, prices and wages, and government revenue. The government revenue sector deals with the revenues of all levels of government.

NALEM is used to produce annual forecasts for all of the main indicators of provincial economic activity including GDP, personal income, labour force, employment, consumer spending and exports. Forecasts for detailed components and determinants of the main economic indicators are also available. Forecasts of economic indicators that are largely determined by factors outside of the provincial economy (e.g., interest rates, exchange rates, certain commodity prices, etc.) are generally obtained from external sources such as national forecasting agencies.

NALEM has been in use since 1990 and is maintained by the Economic Research and Analysis Division.

### III Data Used as Input

Data from Statistics Canada as well as industry sources were used as direct inputs for the analysis. The highlights are summarized in the table below:

<b>Table 1</b>				
<b>Direct Impacts of Offshore Oil Industry</b>				
	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>
<b>Capital Costs (\$ Millions)</b>				
Exploration	264	156	31	60
Development	923	890	532	470
Production	<u>188</u>	<u>181</u>	<u>338</u>	<u>518</u>
<b>Total</b>	<b>1,375</b>	<b>1,227</b>	<b>901</b>	<b>1,048</b>
<b>Employment (person years)</b>				
Development	1,083	1,976	1,508	400
Production & Services to Production	<u>1,874</u>	<u>1,895</u>	<u>2,251</u>	<u>2,928</u>
<b>Total</b>	<b>2,957</b>	<b>3,871</b>	<b>3,759</b>	<b>3,328</b>
<b>Barrels of oil production (Millions)</b>				
	<b>36.4</b>	<b>52.8</b>	<b>54.3</b>	<b>104.3</b>
<b>Operating costs (\$ Millions)</b>				
	<b>148</b>	<b>140</b>	<b>136</b>	<b>234</b>
<b>Wages/salaries and employee benefits (\$ Millions)</b>				
Development	62	150	126	29
Production & Services to Production	<u>121</u>	<u>122</u>	<u>145</u>	<u>201</u>
<b>Total</b>	<b>183</b>	<b>272</b>	<b>171</b>	<b>230</b>

More detailed data were also provided concerning the types of spending by oil companies and the associated Newfoundland and Labrador content.

## **IV Model Simulations**

### **IV.1 Indirect Impacts from NALIOM**

To estimate the impacts on suppliers to the oil companies, the NALIOM was used to obtain multipliers for employment, GDP and labour income for specific business lines. The primary business lines included services incidental to mining and oil and gas; miscellaneous business services; air transport; water transport; wholesaling; storage; and architectural, scientific, and engineering services. Accounting for indirect linkages resulted in average annual direct and indirect real GDP impacts of roughly \$1.4 billion and an annual direct and indirect employment impact of roughly 8,800 person years. In the most recent year, 2002, direct and indirect GDP impacts were larger (\$2.0 billion) because oil production levels were very high. However, direct and indirect employment impacts were lower (6,900 person years) due to the low level of development activity in 2002. These are key inputs necessary for the NALEM model simulation.

### **IV.2 NALEM Simulation**

A model simulation of NALEM was used to obtain the total economic impacts of the offshore oil industry during the reference period, including the induced impacts. A model simulation was performed for the 1999-2002 period using both direct inputs and indirect impacts calculated from NALIOM. NALEM allowed the calculation of impacts on a broad array of indicators such as personal income, consumer spending, population, etc. that are not available from NALIOM.

## **V Macroeconomic Results**

The macroeconomic impacts that are presented at the end of this paper point to a substantial impact on the provincial economy. Real gross domestic product was, on average, roughly \$2.0 billion per year higher over the 1999 to 2002 period and \$2.7 billion in 2002 as a result of offshore oil activity. The oil industry and its indirect and induced impacts generated approximately 19% of the province's GDP in 2002. GDP represents the business and labour income earned within the geographic boundaries of the province. It should be noted, however, that much of the business income earned in the oil industry accrues to non-resident companies. This is the case with virtually all types of external investment in a small economy. Thus, business income directly related to the industry generally would not accrue to residents and therefore does not get reflected in the personal income impact. Personal income impacts reflect only income received by residents which in this study is comprised primarily of wages and salaries. Consequently, the personal income impact is smaller than the GDP impact.

Personal income was roughly \$700 million per year higher over the reference period as a result of the oil industry (6.0% of total personal income). It was somewhat lower in 2002 at \$573 million due to the fact that construction activity on the Terra Nova project ended the previous year and White Rose development activity had yet to ramp up. The income impacts mainly reflect the boost to labour income resulting from the oil industry's high wage jobs as well as labour income from spin-off employment (indirect and induced). Annual personal disposable income, which is personal income after payment of direct taxes (income tax, EI, CPP premiums), was on average \$550 million higher. Consumer spending on goods and services was consequently \$430 million higher. Retail sales (a component of consumer spending) were \$260 million higher.

The estimated annual employment impact averaged roughly 14,000 over the reference period (6.7% of total employment). On average, the unemployment rate was 2.4 percentage points lower. The decline in unemployment would have been greater except that increased employment and higher average wages encouraged more labour force participation. The rise in the labour force was about two-thirds as large as the gain in employment.

Population impacts are more difficult to model. Any increase in economic activity and employment in the province will tend to reduce out-migration and increase in-migration. Net migration is modelled in NALEM as a function of the difference in average wages and employment rates between Newfoundland and Canada. Both of these differences were smaller than they would have been in the absence of oil industry activity. Changes in migration led to a population that was roughly 13,000 higher in 2002. It should be noted, however, that since migration is a difficult variable to predict there is a high margin of error associated with the estimated population impact. A number of other indicators are affected by changes in population including the labour force, the unemployment rate and housing starts.

Despite the uncertainty surrounding population impacts, the analysis does show that offshore oil industry is making a substantial contribution to the Newfoundland and Labrador economy, particularly in relation to GDP and employment. This contribution will continue to grow in the coming years as the White Rose development phase is completed and production begins.

**Table 2**  
**Economic Impacts of Offshore Oil Industry, 1999-2002**

	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>average</u>
<b>Real Gross Domestic Product (\$1997)</b>	1,466	1,798	1,749	2,687	1,925
Share of Total (%)	12.1	14.0	13.5	19.1	14.7
<b>Personal Income (\$ Millions)</b>	477	878	855	573	696
Share of Total (%)	4.4	7.7	7.2	4.6	6.0
<b>Labour Income (\$ Millions)</b>	438	781	727	445	598
Share of Total (%)	7.5	12.4	11.1	6.4	9.4
<b>Other Income (\$ Millions)</b>	39	98	128	128	98
Share of Total (%)	0.8	1.9	2.4	2.3	1.9
<b>Disposable Income (\$ Millions)</b>	366	685	676	454	545
Share of Total (%)	4.2	7.4	7.0	4.5	5.8
<b>Retail Sales (\$ Millions)</b>	224	332	307	192	264
Share of Total (%)	5.3	7.3	6.2	3.8	5.7
<b>Housing Starts</b>	64	99	98	77	85
Share of Total (%)	4.7	6.8	5.5	3.2	5.1
<b>Employment ('000s)</b>	11.5	17.5	15.8	10.7	13.9
Share of Total (%)	5.6	8.6	7.5	5.0	6.7
<b>Labour Force ('000s)</b>	6.4	11.0	10.9	8.4	9.2
Share of Total (%)	2.6	4.5	4.3	3.3	3.7
<b>Unemployment Rate (%)</b>	-2.5	-3.3	-2.5	-1.4	-2.4
<b>Population ('000s)</b>	2.1	6.4	10.5	13.0	8.0
Share of Total (%)	0.4	1.2	2.0	2.4	1.5

**Table 3**  
**Economic Impacts of Offshore Oil Industry by Sector, 1999-2002**

	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>average</u>
<b>Real Gross Domestic Product (\$1997)</b>					
Development	477	353	283	96	302
Production Plus Services	989	1,445	1,466	2,591	1,623
Total	1,466	1,798	1,749	2,687	1,925
Share of Total (%)	12.1	14.0	13.5	19.1	14.7
<b>Personal Income (\$ Millions)</b>					
Development	367	786	748	292	548
Production + Services	110	92	107	281	147
Total	477	878	855	573	696
Share of Total (%)	4.4	7.7	7.2	4.6	6.0
<b>Labour Income (\$ Millions)</b>					
Development	337	699	636	227	475
Production + Services	101	82	91	218	123
Total	438	781	727	445	598
Share of Total (%)	7.5	12.4	11.1	6.4	9.4
<b>Other Income (\$ Millions)</b>					
Development	30	87	112	65	74
Production + Services	9	10	16	63	24
Total	39	98	128	128	98
Share of Total (%)	0.8	1.9	2.4	2.3	1.9
<b>Disposable Income (\$ Millions)</b>					
Development	281	613	592	232	430
Production + Services	85	72	84	222	116
Total	366	685	676	454	545
Share of Total (%)	4.2	7.4	7.0	4.5	5.8
<b>Retail Sales (\$ Millions)</b>					
Development	172	297	269	98	209
Production + Services	52	35	38	94	55
Total	224	332	307	192	264
Share of Total (%)	5.3	7.3	6.2	3.8	5.7
<b>Housing Starts</b>					
Development	49	89	86	39	66
Production + Services	15	10	12	38	19
Total	64	99	98	77	85
Share of Total (%)	4.7	6.8	5.5	3.2	5.1
<b>Employment ('000s)</b>					
Development	8.8	15.4	13.5	5.2	10.7
Production + Services	2.7	2.1	2.3	5.5	3.2
Total	11.5	17.5	15.8	10.7	13.9
Share of Total (%)	5.6	8.6	7.5	5.0	6.7
<b>Labour Force ('000s)</b>					
Development	4.9	9.7	9.3	4.1	7.0
Production + Services	1.5	1.3	1.6	4.3	2.2
Total	6.4	11.0	10.9	8.4	9.2
Share of Total (%)	2.6	4.5	4.3	3.3	3.7
<b>Unemployment Rate (%)</b>					
Development	-1.9	-2.9	-2.1	-0.7	-1.9
Production + Services	-0.6	-0.4	-0.4	-0.7	-0.5
Total	-2.5	-3.3	-2.5	-1.4	-2.4
<b>Population ('000s)</b>					
Development	1.6	5.6	8.9	6.3	5.6
Production + Services	0.5	0.8	1.6	6.7	2.4
Total	2.1	6.4	10.5	13.0	8.0
Share of Total (%)	0.4	1.2	2.0	2.4	1.5



## APPENDIX 2

### CASE STUDY COMPANIES

#### Aker Maritime Kiewit Contractors

Jim Lundrigan, Benefits Manager, P.O. Box 79, 7<sup>th</sup> Floor, Atlantic Place, 215 Water Street, St. John's, A1C 6C9, (709) 757-6664

[james.lundrigan@amkc.ca](mailto:james.lundrigan@amkc.ca)

#### Atlantic Offshore Medical Services

Laura O'Shea, Principal, 4 Victoria Street, St. John's, NL, (709) 722-4074

[laura@aoms.nf.net](mailto:laura@aoms.nf.net)

#### G.J. Cahill and Company Limited

Fred Cahill, P.Eng, President, 16 Mackey Place, P.O. Box 1674, St. John's, NL, A1C 5P5, (709) 368-2125

[fcahill@gjcahill.com](mailto:fcahill@gjcahill.com)

#### City Hotels

Ted Howell, President, and Celina Stoyles, Director of Sales, 210 Water Street, Suite 400, St. Johns, NL, A1C 1A9, (709) 722-3111

[thowell@cityhotels.ca](mailto:thowell@cityhotels.ca)

#### Clovelly Golf

Greg Healy, General Manager, P.O. Box 1045, St. John's, NL, A1C 5M3, (709) 722-9266

[ghealy@clovellygolf.com](mailto:ghealy@clovellygolf.com)

#### P.F. Collins Custom Brokers Limited

Bernard (Tanny) Collins, President, 162 Duckworth Street, P.O. Box 5514, St. John's, NL, (709) 726-7596

[bcollins@pfcollins.com](mailto:bcollins@pfcollins.com)

#### Crocker Photography

Bob Crocker, President, 342 Freshwater Road, P.O. Box 21162, St. John's, NL, A1A 5B2, (709) 722-4686

[bcrocker@nfld.com](mailto:bcrocker@nfld.com)

#### Hi-Point Industries (1991) Ltd.

Bill Butler, President, P.O. Box 779, Sunset Drive, Bishop's Falls, NL, A0H 1C0, (709) 258-6274

[oclansorb@nf.sympatico.ca](mailto:oclansorb@nf.sympatico.ca)

Imprint Specialty Promotions

Annette Furneaux, Vice President, 454 Water Street, St. John's, NL, A1C 5X3, (709) 579-9801

[imprint@nfld.net](mailto:imprint@nfld.net)

Lansing Properties Inc.

George Kirkland, Sr., Managing Director, 251 Empire Avenue, St. John's, NL, A1C 3H9, (709) 579-4233

[lansing@avint.net](mailto:lansing@avint.net)

M&M Engineering Ltd.

John Brake, President and CEO, 456 Logy Bay Road, St. John's, NL, P.O. Box 21189 (709) 753-8101

[jbrake@mmo.nf.ca](mailto:jbrake@mmo.nf.ca)

McInnes Cooper

Jim Thistle, 10 Fort William Place, P. O. Box 5939, St. John's, NL, A1C 5X4, (709) 722 8735,

[james.thistle@mcinnescooper.com](mailto:james.thistle@mcinnescooper.com)

Murray Industrial

David Crosbie, President, 50 Mundy Pond Road, P.O. Box 5730, St. John's, NL, (709) 754-4199

[dcrosbie@murrayindustrial.com](mailto:dcrosbie@murrayindustrial.com)

Newdock: St. John's Dockyard Limited

Phil Kinsella, Offshore Services Manager, 475 Water Street, St. John's, NL, (709) 758-6877

[phil.kinsella@newdock.nf.ca](mailto:phil.kinsella@newdock.nf.ca)

Newtrans Equipment Carriers Limited

Jim Cook, President, 13 St. Anne's Industrial Park, Paradise, NL, (709) 782-0659

[newtrans@newtrans.net](mailto:newtrans@newtrans.net)

Oceanic Consulting Corporation

Dan Walker, President, 95 Bonaventure Ave, St. John's, NL, A1B 4J8, (709) 722-9060

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Oceans Limited

Judith Bobbitt, President, 65A LeMarchant Road, St. John's, NL, A1C 2G9 (709) 753-5788

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Shearwater Geophysical Corporate, Chris J. Pike, President and CEO, 25 Pippy Place, St. John's, NL, A1B 3X2 (709) 754-1001

[cjpike@shearwatergeophysical.com](mailto:cjpike@shearwatergeophysical.com)

Stratos Global

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Sutton Realty

Fabian Clarke, 400 Elizabeth Avenue, St. John's, NL, A1B 1V2, (709) 726-6262

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