# 6 LABOUR REQUIREMENTS

This chapter describes the labour requirements for different components of the White Rose Project. The availability of Newfoundland residents and Canadians to work on the Project is also assessed.

Husky Oil believes that growth in Newfoundland's offshore oil industry must evolve in a way that will eventually result in continuous work for Newfoundland residents, in engineering, fabrication and operations. This can be achieved if proven and cost-effective advancing technologies are readily adopted, leading to a cross-section of labour expertise familiar with production scenarios that offer the greatest possibility of being repeated in the future. By training a workforce that can best respond to "most likely" demands, quality of work will accrue through experience, and a procurement chain that supports their activities can be forged. The status quo wherein local industry, procurement and design continuously gears up and winds down as projects pass through the development stage, must give way to a new vision of a *sustained* petroleum economy.

## 6.1 Management, Engineering, Procurement and Administrative Support

The management, engineering and procurement aspects of an offshore development project are substantial, and figure prominently in discussions of Canada-Newfoundland benefits.

Person-hours expended by management, engineering, procurement and administrative support functions are typically included in project implementation as opposed to design. It is the design portion of the engineering effort - the actual decision-making activities of the engineering process - that requires careful consideration. The newly acquired skills that accrue from direct participation in the design and coordination of an offshore project offer tangible benefits to the local design community in terms of newly acquired expertise. Only a sustained petroleum economy will keep this expertise in the region.

Husky Oil endorses the Offshore Petroleum Engineering Task Force Report (OPETF) (1999) recommendation that:

> *"In the short term, the local consulting engineering community and the oil and gas industry focus on enhancing the existing capability to carry out "front-end" project-related engineering work (conceptual engineering, feasibility studies and preliminary engineering), and supporting Hibernia and Terra Nova production. Establishment of a full capability in the Province to execute this work would better position the local engineering community to participate in detailed engineering phases of offshore projects, both for add-on and stand-alone projects.*

*For future stand-alone projects, the oil and gas industry and the local consulting engineering community ensure that overall project management and engineering decision-making are located in the Province."*

Husky has awarded its FEED component for subsea engineering to KSLO, based in St. John's. This group performed the production screening analysis/concept engineering for White Rose, completed in April 2000, out of their offices in St. John's. This represents the first time such key work has been performed in Newfoundland and Labrador. Estimates of the labour requirements for management, engineering, procurement and administrative support to be expended within the Husky Oil organization during design and construction are presented in Table 6.1-1.

**Table 6.1-1 Labour Demand, Husky Integrated Management Team (IMT)**

| NOC Code | NOC Unit Group Title | Labour (Person-hours)* | Percentage of Total Labour Effort (%) |
|---|---|---|---|
| 0811 | Primary Production Manager | 10,800 | 3.64 |
| 0111 | Financial Managers | 54,000 | 18.18 |
| 1111 | Accounting | 43,200 | 14.55 |
| 1121 | Human Resources | 10,800 | 3.64 |
| 1215 | Supervisors (Logistics) | 21,600 | 7.27 |
| 1225 | Purchasing Agents and Officers | 10,800 | 3.64 |
| 1214 | Secretaries (Administrative Support) | 16,200 | 5.45 |
| 2100 | Engineers | 108,000 | 36.36 |
| 8222 | Supervisors, Oil and Gas Drilling and Services | 21,600 | 7.27 |
| **TOTALS** | | **297,000** | **100** |
| * Based on three-year design and construction period. | | | |

In addition, it is estimated that management, engineering, procurement and administrative support to be expended by major contractors will total 755,000 person hours, including 184,000 person hours of project management.

## 6.2 Hull Fabrication

As discussed previously in Section 5.2, current infrastructure and capability at fabrication sites throughout eastern Canada is insufficient to undertake the construction of major steel hull components. Previous studies have estimated that approximately 3.0 million hours is required for fabrication of an FPSO. However, at that time, only a limited number of FPSOs had been constructed worldwide, and design technologies were still rapidly evolving. In addition, the Norwegian NORSOK and British CRINE initiatives to reduce costs associated with offshore engineering and fabrication, were just beginning.

In recent years, many contractors have become very familiar with FPSO technology, to the point where it is generally regarded to be the preferred option for cost-effective offshore development. Numerous international companies such as Maersk, Navion and Bluewater now offer turnkey solutions based on FPSO technology. The average construction time for a newbuild FPSO project is now less than 30 months. It is estimated that the White Rose FPSO hull construction will require approximately 1.2 million person hours of labour.

Previous experience with steel semi-submersible projects has resulted in projections of 1.0 to 1.5 million person-hours for their fabrication. Recently, there has not been a substantial demand for semi-submersible production platforms in the Northern Hemisphere, and it is reasonable to assume that the labour projections have reduced somewhat, but not substantially.

Saga Petroleum's *Snorre B*, a steel semi-submersible scheduled to come on stream in August 2001, with production rates of 17,488 $m^3$ of oil per day, is one recent exception to the popularity of FPSOs. This is largely based, however, on the fact that a storage tanker will not be required, as the processed product will be sent to the Statfjord B platform for storage and export. This aspect of the development serves to make the semi-submersible production platform an economically attractive option for further Snorre field production (Saga Petroleum 1998).

## 6.3 Turret Fabrication

Depending upon various aspects of the disconnect design, mooring requirements, and the quantity of risers and umbilicals to be accommodated, the manufacture of an internal turret system will require approximately 680,000 person hours of labour including engineering and project management.

## 6.4 Topsides Module Fabrication

Husky Oil has reviewed data for a number of offshore fabrication projects. This analysis indicates that hours of work associated with the fabrication of topsides modules would generally be expected to range as follows:

| Activity | Person-hours per tonne |
|---|---|
| Labour – direct and indirect | 175-225 |
| Management and Supervision | 25-75 |

On this basis, and assuming a total White Rose topsides design weight of some 7,300 tonnes, White Rose will generate 1.4 to 2.2 million hours of topsides fabrication work.

The topsides fabrication component of the facilities represents the largest labour requirement of the development. Using NOC category codes, the level of effort among the various major skilled trades can be projected (Table 6.4-1).

**Table 6.4-1 Labour Demand for Topsides Module Fabrication**

| NOC Code | NOC Unit Group Title | Labour (Person-hours) | Percentage of Total Labour Effort (%) |
|---|---|---|---|
| 7231 | Machinists and Machining and Tooling Inspectors | 26,280 | 1.80 |
| 7242 | Industrial Electricians | 332,150 | 22.75 |
| 7252 | Pipefitters | 464,280 | 31.80 |
| 7261 | Sheet Metal Workers | 6,570 | 0.45 |
| 7262 | Boilermakers | 13,140 | 0.90 |
| 7263 | Structural Metal and Platework Fabricators and Fitters | 199,290 | 13.65 |
| 7265 | Welders | 332,150 | 22.75 |
| 7293 | Insulators | 26,280 | 1.80 |
| 9496 | Painters and Coaters | 59,860 | 4.10 |
| **TOTALS** | | **1,460,000** | **100.00** |

## 6.5 On-shore/At-shore Hook-Up and Commissioning

The actual physical work associated with hook-up (crane loading and unloading, installation of modules on the weatherdeck, piping, electrical, and instrumentation connections), and finishing (paint, coatings, insulation, drop protection, etc.) signals the commencement of a much more intensive commissioning process, which requires the involvement and expertise of discipline-specific commissioning specialists, operations engineers and technical personnel, and vendor representatives. Using an array of pre-established protocols under strictly controlled conditions, they will perform:

- inspection, testing, mechanical completion, quality control checks;
- calibration;
- simulated start-up;
- equipment preservation; and
- status tagging.

Hook-up and commissioning activities for White Rose are estimated to take approximately 43 weeks and will commence almost immediately upon the arrival of the FPSO. This concurs with earlier estimates provided by Petro-Canada both in the original Development Application (Petro-Canada 1996) and in their subsequent Supplement (Petro-Canada 1997). Labour effort breakdown by major skilled trade is indicated in Table 6.5-1.

**Table 6.5-1 Labour Demand for On-shore Hook-up**

| NOC Code | NOC Unit Group Title | Labour (Person-hours) | Percentage of Total Labour Effort (%) |
|---|---|---|---|
| 7231 | Machinists and Machining and Tooling Inspectors | 2,500 | 0.55 |
| 7242 | Industrial Electricians | 200,000 | 44.45 |
| 7252 | Pipefitters | 165,000 | 36.65 |
| 7261 | Sheet Metal Workers | 500 | 0.10 |
| 7263 | Structural Metal and Platework Fabricators and Fitters | 20,500 | 4.55 |
| 7265 | Welders | 46,000 | 10.25 |
| 7293 | Insulators | 2,000 | 0.45 |
| 9496 | Painters and Coaters | 13,500 | 3.00 |
| **TOTALS** | | **450,000** | **100.00** |

Engineers, inspectors and technicians involved in commissioning will add considerably to the labour effort at the hook-up site during the commissioning period. Many will have already been working on the project in previous design and inspection capacities. Others, such as offshore and on-shore operations personnel, will represent a permanent position throughout the field life of the project. Still others will come from a transient core of international expertise devoted to platform commissioning work. This multi-discipline, multi-interest, effort may represent approximately 175,000 person-hours.

## 6.6 Offshore Installation

The offshore installation component of the project will be relatively brief compared to the intensive planning and engineering that will take place a year or more in advance of the FPSO or semi-submersible production platform locating on the field. As indicated in Section 4.6, various short duration tasks will be performed at different times, in preparation for the vessel hook-up, including:

- surveying;
- anchoring and/or pile installation;
- setting out mooring lines;
- inspection and testing; and
- placing and securing the lower disconnect portion of the turret (FPSO scenario only; reference to the riser buoy).

The Terra Nova Project has demonstrated that although the work associated with offshore installation will likely be performed by experienced international maritime companies, the prospects for Newfoundland and Canadian marine workers gaining employment on the vessels required are favourable. The vessel *Maxita*, used to install the moorings and concrete riser bases, employed 83

personnel on board, 40 percent of whom were residents of the province or other parts of Canada. The *Arctic Kalvik*, used to deploy the Terra Nova riser buoy, employed 30 personnel on board, 65 percent of whom were residents of Newfoundland and other Canadians (Terra Nova 1999a).

The labour component for this phase of the project will be largely split between engineers (NOC 2100) and technicians (NOC 2200) working both on-shore and offshore, together with commercial divers (NOC 7382), marine deck crews (NOC 7433) and engine room crews (NOC 7434). The engineering and technical aspect will require approximately 20,000 person-hours and the marine operations will demand approximately 32,000 hours.

### 6.7 Production Drilling

Drilling of the production and injection wells will commence prior to the installation of the production vessel and continue until the entire drilling program of up to 18 to 25 wells (up to 11 of which will be injection) is completed. These wells will each take 50 to 80 days to drill and complete, depending on depth drilled. Assuming an average drill time of 65 days, and the use of a single semi-submersible MODU, this field development drilling program would last approximately 4.5 years.

Despite the fact that these drill rigs have not been fabricated in Canada, and are owned and leased by world-wide drilling contractors, the hiring and deploying of Newfoundland residents for both drilling and marine crews has been considerable. This is attributable to a combination of factors:

- there is a long history of exploratory drilling operations off the coast of Newfoundland (since the mid-1960s);
- post-secondary institutions have placed considerable emphasis on training individuals for offshore employment, and have kept pace with evolving technologies in their course offerings;
- many residents of Newfoundland have availed themselves of post-secondary education for the offshore sector, and have garnered many years of practical experience in western Canada and abroad; and
- the collapse of groundfish stocks offshore has contributed to the availability of highly skilled marine personnel in the province.

The number of wells required to economically deplete the White Rose field currently ranges from up to 18 to 25. At an average of approximately 65 days per well, and with the 75-person crew working a 12-hour shift, it can be estimated that the total offshore labour for White Rose production drilling will range from 1.05 million to 1.46 million person-hours. The NOC breakdown for labour for up to 18 and 25 wells is indicated in Table 6.7-1.

## Table 6.7-1 Labour Demands for Production Drilling

| NOC Code | NOC Unit Group Title | Labour (Person-hours) 18 wells | Labour (Person-hours) 25 wells | Percentage of Total Labour Effort (%) |
|---|---|---|---|---|
| 1475 | Radio Operators | 28,000 | 39,000 | 2.67 |
| 2100 | Engineers | 42,000 | 58,500 | 4.00 |
| 2114 | Forecasters | 28,000 | 39,000 | 2.67 |
| 2232 | Mechanical Engineering Technician | 42,000 | 58,500 | 4.00 |
| 2243 | Instrument Technicians | 28,000 | 39,000 | 2.67 |
| 2273 | Deck Officers | 28,000 | 39,000 | 2.67 |
| 2274 | Engineer Officers | 28,000 | 39,000 | 2.67 |
| 3234 | Medics | 14,000 | 19,500 | 1.33 |
| 6641 | Food Service | 168,000 | 233,500 | 16.00 |
| 6661 | Light Duty Cleaners | 56,000 | 78,000 | 5.33 |
| 7242 | Industrial Electricians | 28,000 | 39,000 | 2.67 |
| 7433 | Deck Crew | 56,000 | 78,000 | 5.33 |
| 7434 | Engine Room / Marine Crew | 56,000 | 78,000 | 5.33 |
| 7371 | Crane Operators | 14,000 | 19,500 | 1.33 |
| 8222 | Supervisors, Oil & Gas Drilling | 28,000 | 39,000 | 2.67 |
| 8232 | Well Drillers, Testers | 210,000 | 292,000 | 20.00 |
| 8412 | Drilling Workers | 28,000 | 39,000 | 2.67 |
| 8615 | Drill Workers, Labourers | 154,000 | 214,000 | 14.66 |
| 9232 | Petroleum, Gas and Chemical Process Operators | 14,000 | 19,500 | 1.33 |
| **TOTALS** | | **1,050,000** | **1,461,000** | **100.00** |

## 6.8 Subsea Fabrication and Installation

Labour demands associated with subsea equipment can be subdivided into two main aspects; fabrication of field-specific templates and manifolds, and installation offshore. As suggested previously, the former holds considerable potential for the employment of Newfoundland residents. Based on a projection of subsea design demands similar to those of the Terra Nova project, the labour demands by NOC unit can be predicted as shown on Table 6.8-1.

**Table 6.8-1 Labour Demands for Subsea Template and Manifold Fabrication**

| NOC Code | NOC Unit Group Title | Labour (Person-hours) | Percentage of Total Labour Effort (%) |
|---|---|---|---|
| 0016 | Senior Manager | 7,500 | 1.10 |
| 0711 | Construction Manager | 15,000 | 2.20 |
| 1111 | Accounting | 6,800 | 1.00 |
| 1214 | Secretaries (Administrative Support) | 15,000 | 2.20 |
| 1215 | Supervisors (Logistics) | 15,000 | 2.20 |
| 1225 | Purchasing Agents and Officers | 15,000 | 2.20 |
| 2100 | Engineers | 59,000 | 8.70 |
| 2261 | Nondestructive Testers and Inspectors | 15,000 | 2.20 |
| 7214 | Supervisors, Metal Forming, Shaping and Erecting | 29,000 | 4.30 |
| 7231 | Machinists and Machining and Tooling Inspectors | 110,000 | 16.30 |
| 7242 | Industrial Electricians | 15,000 | 2.20 |
| 7252 | Pipefitters | 66,000 | 9.80 |
| 7265 | Welders | 80,000 | 11.90 |
| 7263 | Structural Metal and Platework Fabricators & Fitters | 58,700 | 8.70 |
| 9496 | Painters and Coaters | 169,000 | 25.00 |
| **TOTALS** | | **676,000** | **100.00** |

Detailed design of White Rose field depletion strategies could lead to changes in the number of wells required. The overall labour demand would be adjusted accordingly.

Subsea installation will demand on-shore engineering and experienced offshore crews from the international market, although these crews may have a significant number of Newfoundland residents. The *Queen of the Netherlands*, used to excavate glory holes for the Terra Nova Project over a three to four-month period, for example, had a large domestic contingent: of the 40 personnel on board, 40 percent were residents of Newfoundland and other Canadians (Terra Nova 1999b).

The labour component for this phase of the project will, similar to offshore installation work, be largely split between engineers (NOC 2100) and technicians (NOC 2200) working both on-shore and offshore, together with commercial divers (NOC 7382), marine deck crews (NOC 7433) and engine room crews (NOC 7434). The engineering and technical aspect will require approximately 60,000 person-hours and the marine operations will demand approximately 90,000 person-hours.

## 6.9 Operations/Production

The following labour breakdown for FPSO or semi-submersible operations/production phase of the White Rose Project assumes a 12-year field depletion plan with little or no multi-tasking among the personnel. Predicted production vessel labour demand is shown in Table 6.9-1.

### Table 6.9-1 Production Vessel Labour Demand

| NOC Code | NOC Unit Group Title | Labour (Person-hours) | Percentage of Total Labour Effort (%) |
|---|---|---|---|
| 1215 | Supervisors (Logistics) | 52,560 | 2.17 |
| 1475 | Radio Operators | 105,120 | 4.35 |
| 2114 | Forecasters | 105,120 | 4.35 |
| 2232 | Mechanical Engineering Technician | 52,560 | 2.17 |
| 2243 | Instrument Technicians | 210,240 | 8.70 |
| 2273 | Deck Officers | 52,560 | 2.17 |
| 3234 | Medics | 52,560 | 2.17 |
| 6641 | Food Service | 315,360 | 13.04 |
| 6661 | Light Duty Cleaners | 157,680 | 6.52 |
| 7216 | Contractors and Supervisors (Maintenance) | 52,560 | 2.17 |
| 7242 | Industrial Electricians | 157,680 | 6.52 |
| 7252 | Pipefitters | 52,560 | 2.17 |
| 7265 | Welders | 52,560 | 2.17 |
| 7433 | Deck Crew | 210,240 | 8.70 |
| 7434 | Engine Room / Marine Crew | 105,120 | 4.35 |
| 7371 | Crane Operators | 52,560 | 2.17 |
| 8222 | Supervisors, Oil & Gas Drilling | 315,360 | 13.04 |
| 9232 | Petroleum, Gas and Chemical Process Operators | 315,360 | 13.04 |
| **TOTALS** | | **2,417,760** | **100.00** |

Both the FPSO and semi-submersible production options require up to three support vessels. The labour demand for these vessels, based on the 12-year field depletion plan, is presented in Table 6.9-2.

**Table 6.9-2 Supply and Standby Vessel Labour Demand**

| NOC Code | NOC Unit Group Title | Labour (Person-hours) | Percentage of Total Labour Effort (%) |
|---|---|---|---|
| 2273 | Deck Officers | 144,000 | 20.00 |
| 2274 | Engineer Officers | 144,000 | 20.00 |
| 6641 | Food Service | 144,000 | 20.00 |
| 7433 | Deck Crew | 144,000 | 20.00 |
| 7434 | Engine Room Crew | 144,000 | 20.00 |
| **TOTALS** | | **720,000** | **100.00** |

Based on the White Rose demand on helicopter services, an additional two pilots (NOC 2271), two helicopter mechanics (NOC 2244) and one baggage/freight handler (NOC 7437) would be required in St. John's, creating an approximate 72,000 additional person-hours over the life of the field.

Finally, both a semi-submersible option and an FPSO would typically require the services of shuttle tankers over the life of the field. The semi-submersible would also require a storage tanker permanently moored approximately 2 km away from the semi-submersible. A tanker crew will generally consist of a master, three mates, a chief engineer, three engineers, one electrical officer, four general-purpose seapersons, four general purpose engine room assistants, a chief cook, second cook, and a ship's clerk. The labour demand for tanker crews, based on an approximate 12-year life-of-field projection, is presented in Table 6.9-3.

**Table 6.9-3 Tanker Labour Demand**

| NOC Code | NOC Unit Group Title | FPSO: Labour (Person-hours) | Semi: Labour (Person-hours) | Percentage of Total Labour Effort (%) |
|---|---|---|---|---|
| 1413 | Records and Files Clerk | 48,000 | 72,000 | 5.00 |
| 2273 | Deck Officers | 192,000 | 288,000 | 20.00 |
| 2274 | Engineer Officers | 192,000 | 288,000 | 20.00 |
| 6641 | Food Service | 96,000 | 144,000 | 10.00 |
| 7242 | Industrial Electricians | 48,000 | 72,000 | 5.00 |
| 7433 | Deck Crew | 192,000 | 288,000 | 20.00 |
| 7434 | Engine Room Crew | 192,000 | 288,000 | 20.00 |
| **TOTALS** | | **960,000** | **1,440,000** | **100.00** |

In addition to the above, there will be an on-shore support requirement. Estimates of the labour requirements for management, engineering, procurement and administrative support during production are presented in Table 6.9-4.

**Table 6.9-4 Labour Demand for Onshore Support**

| NOC Code | NOC Unit Group Title | Labour (Person-hours)* | Percentage of Total Labour Effort (%) |
|---|---|---|---|
| 0811 | Primary Production Manager | 43,200 | 3.85 |
| 0111 | Financial Managers | 21,600 | 1.92 |
| 1111 | Accounting | 172,800 | 15.38 |
| 1121 | Human Resources | 43,200 | 3.85 |
| 1215 | Supervisors (Logistics) | 86,400 | 7.69 |
| 1225 | Purchasing Agents and Officers | 43,200 | 3.85 |
| 1214 | Secretaries (Administrative Support) | 64,800 | 5.77 |
| 1475 | Radio Operators | 43,200 | 3.85 |
| 2100 | Engineers | 432,000 | 38.46 |
| 7371 | Crane Operators | 21,600 | 1.92 |
| 7611 | Construction Trades Helpers and Labourers | 64,800 | 5.77 |
| 8222 | Supervisors, Oil and Gas Drilling and Services | 86,400 | 7.69 |
| **TOTALS** | | **1,123,200** | **100** |
| * Based on 12-year production. | | | |

## 6.10 Labour Requirements Summary

A summary of project labour requirements for the major work components, as described above, is presented in Table 6.10-1. It also identifies the potential location of work for each component. The following will be critical factors in determining the amount of work performed in any specific area:

- successful competitive bidding;
- labour and skills availability;
- the effect of competing major projects; and
- stable and equitable labour relations.

**Table 6.10-1 Total Labour Requirements**

| Work Component | Total Person-Hours | % | Potential Work Location | | |
|---|---|---|---|---|---|
| | | | NF | CAN | INT |
| Management, etc. | 1,052,000 | 8.60 | X | X | X |
| Hull Fabrication | 1,200,000 | 9.81 | | | X |
| Turret Fabrication | 680,000 | 5.56 | X | X | X |
| Topsides Fabrication | 1,460,000 | 11.93 | X | X | X |
| Hook-Up and Commissioning | 625,000 | 5.11 | X | X | |
| Offshore Installation | 52,000 | 0.42 | X | | |
| Production Drilling | 1,050,000 | 8.58 | X | | |
| Subsea | 826,000 | 6.75 | X | X | X |
| Operations/Production | 5,293,000 | 43.25 | X | | |
| **TOTALS** | **12,238,000** | **100.00** | | | |

## 6.11 Labour Supply

### 6.11.1 Introduction

The potential for Canadian and Newfoundland involvement in the White Rose project may be constrained by labour capability and capacity. If appropriately skilled and experienced workers are not available, whether because they do not exist, are otherwise engaged, and/or cannot be trained in time, the work will necessarily go to non-Newfoundland and non-Canadian workers.

There is a high level of awareness, within the federal government, provincial government, industry, and training institutions, of the need to plan and prepare for future labour requirements. This is reflected in such reports as: 'Offshore Petroleum Engineering Task Force Report' (OPETF 1999) and 'Estimation of Direct Human Resource Requirements, Offshore Exploration and Production, Newfoundland and Nova Scotia' (CAPP 1999). The Government of Newfoundland and Labrador has also recently completed draft reports on the exploration and production labour supply and related training. The Newfoundland Department of Human Resources and Employment is in the process of developing a construction labour supply database to assist all stakeholders in planning for major projects.

Memorial University and the College of the North Atlantic in Newfoundland, and similar institutions elsewhere in Atlantic Canada, are involved in many of these studies. They, as well as private colleges and unions, are paying close attention and responding to such reports and developments in the oil industry. For example, Memorial University has recently developed an ambitious new strategy to become a centre of excellence for oil-related education, training and R&D, with the Faculty of Engineering and Department of Earth Sciences playing major roles. Memorial University's Fisheries and Marine Institute and the College of the North Atlantic are involved in similar, ongoing, planning processes.

These reports and training institution responses indicate that, assuming there is no critical overlap between White Rose and other major projects (see Section 6.10.5), there will be no substantial shortage of Newfoundland labour able to work on the Project, although it should be noted these analyses sometimes do not evaluate skill levels and experience. The rest of this section provides further discussion of this topic related to development and operations activity. This includes a separate discussion of the ability to respond to engineering requirements.

### 6.11.2 Development

The ability to meet labour requirements for construction, fabrication and related activities builds on the description of labour requirements, with separate discussion of topsides module fabrication, on-shore/at-shore hook-up, offshore installation and subsea fabrication and installation (see Sections 6.4 to 6.6 and 6.8). Production drilling requirements are included in the discussion of operations (Section 6.10.3). The

assessment is based on the peak labour requirements for each of the NOC occupational categories identified.

Census of Canada 1996 labour force and employment data and February 2000 HRDC data on the numbers of active Employment Insurance claimants for each NOC category are presented in Table 6.11-1. This provides a baseline against which the current and potential availability of Newfoundland workers in Newfoundland has been assessed, with the potential availability being based on the current and likely future capacity of the training institutions. On the basis of this assessment, it is concluded that most positions could potentially be filled by Newfoundland residents and returning Newfoundland workers, with the exceptions discussed below. Conditions dictating the success of local staffing initiatives include the successful competitive bidding by Canadian and Newfoundland facilities, competition for workers from other major projects, successful recruitment efforts by project contractors, and a stable and equitable labour relations environment.

**Table 6.11-1 Development Labour Force and Employment Data by NOC Category**

| NOC Code | NOC Unit Group Title | Total - Labour Force Activity[1] | Labour Force[2] | Employed | Unemployed | EI Claims |
|---|---|---|---|---|---|---|
| 0016 | Senior Manager | 260 | 235 | 235 | 0 | 16 |
| 0711 | Construction Manager | 560 | 520 | 470 | 50 | 93 |
| 1111 | Accounting | 1,160 | 1,140 | 1,105 | 35 | 76 |
| 1214 | Secretary (Admin Support) | 370 | 340 | 325 | 15 | 28 |
| 1215 | Logistics | 240 | 210 | 195 | 20 | 38 |
| 1225 | Purchasing | 160 | 160 | 165 | 0 | 34 |
| 1413 | Document Control | 400 | 375 | 325 | 50 | 30 |
| 2243 | Instrument Technicians | 145 | 150 | 130 | 15 | 26 |
| 2261 | Inspectors NDT | 15 | 15 | 10 | 0 | 23 |
| 7214 | Supervisors, Metal Forming, Shaping and Erecting | 145 | 140 | 100 | 40 | 77 |
| 7216 | Contractors and Supervisors, Maintenance | 240 | 240 | 225 | 15 | 25 |
| 7231 | Machinists and Machining and Tooling Inspectors | 155 | 145 | 115 | 30 | 0 |
| 7242 | Industrial Electricians | 790 | 755 | 680 | 80 | 170 |
| 7261 | Sheet Metal Workers | 235 | 225 | 140 | 85 | 156 |
| 7263 | Structural/Plate Fabricators | 285 | 240 | 115 | 125 | 121 |
| 7293 | Insulators | 95 | 90 | 85 | 0 | 100 |
| 7371 | Crane Operators | 230 | 210 | 160 | 50 | 102 |
| 9496 | Painters and Coaters | 220 | 205 | 140 | 65 | 44 |

[1] The Total Labour Force Activity includes all persons in the occupational category.

[2] The Labour Force are those within the occupational category who are either in, or actively seeking, employment.

### 6.11.3 Production

Estimates of human resource requirements for offshore exploration and production, including production drilling, are provided in CAPP (1999). Under the moderate case scenario, which applies given the development of White Rose in addition to Hibernia and Terra Nova, the total Newfoundland requirement increases from 1,101 in 2000 to 1,591 in 2004 and stabilizes for the rest of the decade. This represents a total new requirement of 490 workers. Total regional (Newfoundland and Nova Scotia) requirements under the moderate case scenario rise steadily from 1,880 in 2000 to 2,899 in 2009, an increase of 1,019 workers over nine years. The report notes that these modest increases result, in part, from different projects sharing vessels and onshore management personnel.

The 1996 Census of Canada labour force and employment data and February 2000 HRDC data on the numbers of active Employment Insurance claimants is presented in Table 6.11-2 for each NOC category. Discussions with government officials and representatives of industry and educational institutions indicate that, given the existing supply of such workers, together with the ability and willingness of training institutions to respond to expected demands, there should be no significant difficulties in meeting these requirements.

**Table 6.11-2 Production Labour Force and Employment Data by NOC Category**

| NOC Code | NOC Unit Group Title | Total - Labour Force Activity[1] | Labour Force[2] | Employed | Unemployed | EI Claims |
|---|---|---|---|---|---|---|
| 1111 | Accounting | 1,160 | 1,140 | 1,105 | 35 | 76 |
| 1214 | Secretary (Admin Support) | 370 | 340 | 325 | 15 | 28 |
| 1215 | Logistics | 240 | 210 | 195 | 20 | 38 |
| 1225 | Purchasing | 160 | 160 | 165 | 0 | 34 |
| 1413 | Document Control | 400 | 375 | 325 | 50 | 30 |
| 1475 | Radio Operators | 345 | 310 | 285 | 20 | 66 |
| 2114 | Forecasters | 20 | 20 | 20 | 0 | 1 |
| 2232 | Maintenance | 85 | 80 | 65 | 10 | 26 |
| 2243 | Instrument Technicians | 145 | 150 | 130 | 15 | 26 |
| 2244 | Aircraft Mechanics | 55 | 50 | 45 | 0 | 14 |
| 2271 | Air Pilots | 155 | 155 | 150 | 0 | 59 |
| 2273 | Deck Officers | 465 | 420 | 365 | 55 | 143 |
| 2274 | Engineer Officers | 320 | 305 | 290 | 15 | 63 |
| 3234 | Medics | 290 | 270 | 235 | 35 | 75 |
| 6641 | Food Service | 2,740 | 2,225 | 1,800 | 425 | 164 |
| 6661 | Cleaners | 2,450 | 1,985 | 1,580 | 400 | 455 |
| 7242 | Industrial Electricians | 790 | 755 | 680 | 80 | 170 |
| 7371 | Crane Operators | 230 | 210 | 160 | 50 | 102 |
| 7382 | Commercial Divers | 100 | 105 | 75 | 30 | 41 |
| 7433 | Deck Crew | 950 | 890 | 595 | 290 | 526 |

| NOC Code | NOC Unit Group Title | Total - Labour Force Activity[1] | Labour Force[2] | Employed | Unemployed | EI Claims |
|---|---|---|---|---|---|---|
| 7434 | Engine Room Crew | 145 | 125 | 100 | 25 | 69 |
| 7437 | Baggage/Freight Handler | 430 | 415 | 370 | 45 | 48 |
| 8222 | Supervisor Oil & Gas Drilling | 45 | 40 | 30 | 0 | 5 |
| 8232 | Well Drillers/Servicers/Testers | 80 | 75 | 50 | 20 | 46 |
| 8412 | Drilling Workers | 40 | 25 | 10 | 10 | 30 |
| 8615 | Drilling Servicing | 220 | 190 | 95 | 95 | 103 |
| 9232 | Process Operators | 95 | 90 | 85 | 0 | 25 |

[1] The Total Labour Force Activity includes all persons in the occupational category.

[2] The Labour Force are those within the occupational category who are either in, or actively seeking, employment.

### 6.11.4 Engineering

The Offshore Petroleum Engineering Task Force 1999 indicates that:

> "*The current capability is also sufficient to form the nucleus of the project team for one additional major project (in addition to Hibernia and Terra Nova), such as the development of the White Rose or Hebron field. However, further significant staffing up would be required. This could be provided, to some extent, by combining the resources that already exist in consulting engineering firms and other industries locally, but it would still be necessary to bring in some personnel from other petroleum centres world-wide. Some stand-alone components… could still be engineered elsewhere, even though the project is managed and the engineering executed locally…(however, this is) current practice in the industry no matter where the main project engineering is located*."

It goes on to note that Newfoundland has established a strong educational environment to support offshore engineering, and to recommend expanded engineering and technology programs MUN and the College of the North Atlantic in order to meet future demand. As has been described above, Memorial University and the College are actively responding to such recommendations.

Given the current capacity and institutional responses, it is expected that Newfoundland will be able to provide considerable engineering support to meet White Rose-related positions in the future.

### 6.11.5 Effects of Major Projects

The potential for Canadian and Newfoundland involvement in the White Rose Project construction and operations activity may be constrained by industrial and labour capability and capacity. If suitable infrastructure and other industrial capacity are not available, whether because they do not exist, are otherwise engaged or cannot be developed in time, the work will necessarily take place outside

Newfoundland and/or Canada. Similarly, if suitably skilled workers do not exist, are otherwise engaged, and/or cannot be trained in time, the work will go to non-Newfoundland and non-Canadian workers.

The assessment of industrial and labour capacity must therefore take into account not only existing resources and how they might be increased or enhanced, but also other demands on them. Other major construction projects may draw on the same industrial capacity and workers as will White Rose development activity.

In Newfoundland, for example, major potential projects include the Terra Nova oilfield development project, the Voisey's Bay mine/mill, the Voisey's Bay processing facility, the Churchill River Power Project and, perhaps, the Hebron development. The potential interactions between each of these projects and the White Rose Project are determined by the project characteristics including, critically, their timing. These characteristics are, in most cases, highly uncertain. However, consultation with government and industry sources suggests the following:

- Terra Nova – As is discussed elsewhere, the White Rose and Terra Nova oilfield projects will use a large range of identical or similar industrial and labour capacity. However, given current Terra Nova project timing, there should be little or no overlap in these demands, because Terra Nova activity will be ending just prior to White Rose starting. Indeed, one of the great merits of the White Rose project is that, if current project timelines are achieved, it may provide continuity in the use of these resources, minimizing booms and lulls in activity.

- Voisey's Bay – The $1.7 billion Voisey's Bay mine/mill, on the North Labrador Coast, and the associated $1.5 billion processing facility, proposed for Argentia on the west side of the Avalon Peninsula, are currently on hold. Were they to proceed, they would require some specialist mining and minerals processing capabilities, however, they would also draw on some construction facilities and labour that might be used for the White Rose Project. Thus, for example, the mill could be made up of modules that could be built in Bull Arm. However, it currently appears unlikely that work on the Voisey's Bay projects will start before 2003 and hence, no demand conflicts are anticipated.

- Churchill River Power Project – This $6 billion to $7 billion project could see the construction of dams and dykes to divert the Romaine River, the Gull Island Dam, powerhouse and switchyard on the Churchill River, and associated power-lines. There is ongoing consideration of a dam at Muskrat Falls, but the economics are not yet proven, and a transmission line to the island is uncertain due to financing problems. It may employ, at peak (likely the third year of construction), 2,500 to 5,000 workers. A large part of the work will involve dam construction, which employs concrete construction equipment and skills quite different from those construction resources required by White Rose. Furthermore, while other work might draw on common industrial and labour capacity to that required for White Rose, it currently appears unlikely that work on the Churchill River Power Project will start before 2004 and hence, no demand conflicts are anticipated.

- Hebron – The proponents of this offshore oilfield development project have yet to indicate that they wish to proceed, and hence, it seems likely that there would only be resource conflicts with the latter stages of White Rose. Such overlap is likely to be minor; indeed, if the proponents do decide to proceed, it may provide continuity of demand for facilities and labour after the end of White Rose work.

There are few other major projects in the Maritimes. The most recent Atlantic Provinces Economic Council Major Projects Inventory identifies only three projects that are greater than low probability projects, have a capital value of $500 million or more, and are expected to extend into the White Rose construction period. They are:

- Scotian Shelf Development - Further development on the shelf to 2007 is seen as being worth approximately $750 million. Such development is regarded as being of high probability.

- Natural Gas Distribution - This $600 million to $1100 million project in Nova Scotia is seen as being of medium to high probability for the period to 2004. It would generate between 1,500 and 2,300 construction jobs.

- Strait Area Petro-Chemical Plant – This medium to low probability $600 million project would see the construction of an ethylene/polyethylene plant, with work completed by 2002. It would require 1,500 construction workers.

This analysis suggests that, given the current White Rose schedule, there will be only limited conflicts between industrial and labour requirements of White Rose and those of other major projects. However, this would change were there to be substantial delay in the start of White Rose work. This could result in a lull in resource demands between current project and White Rose construction, which might lead to some loss of capacity (as, for example, Newfoundland fabrication workers move to other projects in Newfoundland or elsewhere in Canada). It may result in construction work on White Rose occurring coincident with that on one or more of these other major projects. This would produce a 'boom' in activity that might well exceed local capacity, resulting in a loss of industrial and employment benefits to Newfoundland and, perhaps, Canada.

There will similarly be other demands on infrastructure and labour required for operations. Hibernia, Terra Nova, White Rose, together with any subsequent fields, will all need the same or similar shore-base facilities and related industrial and labour support. This is not viewed as problematic, given that such demand provides longer-term employment opportunities, justifying investments in infrastructure, training, etc. This conclusion was supported by the White Rose Pre-Development Application Filing consultation, where neither key informants nor the general public expressed concern about the ability to meet these requirements. In terms of infrastructure, for example, both the St. John's Port Corporation and St. John's International Airport Authority are currently expanding facilities in advance of new oil-

related demand (while there are also supply base options in Bay Bulls), and St. John's, Mount Pearl and Paradise are actively responding to potential further demand for industrial space.

Similarly, there is a high level of awareness, within the federal government, provincial government, industry and training institutions of the need to plan and prepare for future labour requirements. This is reflected in such reports as:

- Estimation of Direct Human Resource Requirements, Offshore Exploration and Production, Newfoundland and Nova Scotia (CAPP 1999) - This provides demand forecasts for base, moderate and high case scenarios, identifying the requirements for some 50 NOC occupations involved in exploration and production.

- OPETF 1999 - This uses the same base, moderate and high scenarios to identify future requirements for engineering companies and trained personnel in Newfoundland. It also makes a number of recommendations as to how the industry, government and training institutions should respond to these requirements.

As has been noted above, MUN, the College of the North Atlantic and private colleges in Newfoundland, and similar institutions elsewhere in Atlantic Canada, are paying close attention to, and responding to, such reports and developments in the oil industry.