

The Effects of Offshore Employment in the Petroleum Industry: a Cross-National Perspective

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EXECUTIVE SUMMARY

This report describes the findings of a study of offshore employment that was undertaken for the Minerals Management Service (MMS). It was designed to complement other MMS studies by providing detailed information on the effects of offshore employment in the petroleum industry and the options for managing them. The research was largely based on a review of approximately 90 papers and reports about commute employment, but also benefited from key informant interviews and an international workshop.

Most offshore oil workers spend extended periods, often one or more weeks, at their workplace – usually a production platform or a mobile drilling rig. They then leave to live at home onshore for a non-work period that is also commonly one or more weeks. The offshore accommodations, recreational facilities and food are provided by their employer, which also provides transportation between the workplace and some onshore ‘pick-up point’, commonly a heliport. This work system is variously called ‘commute’, ‘fly-in’, ‘fly-in/fly-out’, ‘FIFO’ or ‘long-distance commute’ employment. It was originally developed to meet the needs of the offshore oil industry because daily commuting was not feasible and no ‘local’ workforce or permanent full-time accommodations was available. The oil industry also uses this system for some onshore operations such as gas fields in the Australian interior and major platform construction projects.

This employment system should not be seen as inherently problematic – like all other systems, it offers advantages and disadvantages for workers, those with responsibility for health and safety, training and other employment-related concerns, and for employees’ families and the communities and regions in which they live. This report discusses some of the more important of these effects in two interrelated categories: human resources and family issues, and community and regional issues. The focus throughout is the social effects of commuting, with the economic effects and management concerns only discussed in connection with the effects on workers, families and the communities in which they live.

It is important to note that there are important limitations to the literature on offshore employment. For example, research has focused on large operations and companies, fixed work schedules and married male workers. The data used are often limited, qualitative and anecdotal, and where quantitative research has been undertaken, different variables often confound each other and make it impossible to separate cause and effect. Furthermore, some important studies are old and particular to specific operations and temporal and geographic contexts, and it is not clear to how far their findings and conclusions are still relevant or can be generalized to other settings. This problem is exacerbated by the rapid pace of change both in the oil industry and in the attitudes and expectations of workers and their spouses.

Offshore employment has implications for a wide variety of interrelated work and family life issues. These include the effects on: health and safety; the employment of women, minorities and older workers; and family life.

Health and Safety: There are a number of health and safety issues associated with offshore work. They include those relating to: operating in a hazardous environment; the remoteness of the operations; the hazardous nature of the commute; the use of extended shifts and rotations; and the stressful nature of the commute system.

Employment of Women, Minorities and Older Workers: The offshore workplace and commute system raise particular issues respecting the employment of women, minorities and older workers. Management approaches, human resource policies and the social environment of the workplace, including the accommodations, are important intervening variables.

Family Life: Married individuals form the majority of commute workers in almost all industries and regions. From the outset, people writing about the work system have tended to problematize its effects on workers and families, with little consideration of potential advantages or the dynamics of work/family relationships. One of the reasons for this is that commute workers often believe there are high levels of marital discord among their colleagues. However, while research has shown that commute operations have somewhat higher proportions of separated and divorced workers than do conventional ones, it is not

clear that this is a direct consequence of the work system. In some cases, these workplaces seem to attract separated and divorced employees.

This is not to deny that offshore work presents challenges to family relationships and may contribute to separation and divorce. However, it is important to assess this in the context of an understanding of the range of advantages and disadvantages that the system can present and a consideration of the dynamics of work/families relationships. The main potential advantages and disadvantages, as identified by workers and members of their families, are: income from offshore work; secondary and family employment; separation of work and family life; access to services and facilities; independence and decision-making; inappropriate worker behavior; family separation; and isolation from and within the community. However, these advantages and disadvantages are not always experienced in the same ways and to the same degree. The main factors underlying such variations appear to be differences in the availability of alternative employment, the work environment and workers' experience of it, the regularity and security of employment, family members' experience and expectations of family life, and workers' and spouses' perceptions of the impacts on the family.

Offshore employment also has a number of related effects on the communities and regions where the workers live and employers do business, including the effects on: residential patterns, expenditures, non-commute employment, local investment, community life and social and recreational services.

Residential Patterns: The spatial distribution of the workers' homes is a critical factor in the location and nature of these issues. The commute schedule and transportation arrangements can give workers and their families considerable flexibility as to where they live. Depending largely on the schedule, transportation systems and employee preferences, they may live close to, or distant from, the workplace. Generally speaking, the dispersal is greatest when the rotation is long, when the company provides transportation between the workplace and multiple 'pick-up' points, and when the employer defrays a major part of the commute costs.

Expenditures: Most offshore workers have relatively high incomes. Wage rates are often high, and these are commonly combined with long hours of work and considerable amounts of overtime. Furthermore, these workers generally have few expenses or opportunities to spend money while at the workplace. As a result, they generally also have high disposable incomes. Their expenditure patterns, including payment of local and state taxes, are largely dependent on where they live, and can make a significant contribution to the economy of those communities and regions.

Non-Commute Employment: Some offshore employees have secondary paid work while in their home communities. This may include the use of their oil industry work skills (for example, electricians and welders will also use these capabilities in their secondary, home community, employment) and/or involvement in traditional local farming or fishing activity. In the latter case, offshore oil labor and incomes can help sustain the local primary sector.

Community Life and Social and Recreational Services: Offshore work removes some citizens from communities on a part-time basis. This affects their ability to participate in, and contribute to, formal and informal social events and networks and poses particular challenges for those responsible for or involved with providing those services.

Employer initiatives in such areas as work schedules, accommodations, transportation, communications, hiring, orientation, counseling and family policies and services can optimize the effects of the offshore employment in respect of all of the above issues. Regulatory authorities, trade unions, local government agencies, community groups and others, including the workers and families themselves, may also have an important role to play.

Work Schedules: Offshore schedules commonly bring together a roster with shift work, likely involving the use of extended workdays. Where regular rosters are used, they vary for different types of workers, different employers and in different parts of the world, and they change over time. However, increasing numbers of personnel have very irregular schedules, or are 'on-call', depending on operational

requirements. Twelve-hour shifts are the norm, although some may be on other schedules or on-call 24 hours a day. Some positions normally only require day work, but most involve day and night shifts.

The information on the effects of work schedules is often unclear or inconsistent. However, a review of the literature on the effects on stress, health and safety on North Sea offshore petroleum installations concludes that the long hours worked raise serious questions about cumulative fatigue, reduced performance and impaired well-being among offshore management personnel. Onshore research indicates that prolonged shift work may have cumulative adverse effects on sleep patterns and health, not accounted for solely by increasing age. However, the pattern at commute operations can be more complicated, with workers involved in round-the-clock activities being exposed not only to extended shifts and demanding work, but also to the need for adjustment to day/night shift changes.

The scheduling of shifts poses particular difficulties offshore as rotation patterns are constrained by the transportation schedules and limited availability of accommodations. Lastly, there is clear evidence that, where employees work both day and night shifts during a period offshore, mid-rotation shift changes have a variety of negative effects. However, offshore personnel involved in such a pattern strongly prefer to work nights and then days, because it allows them to go on leave at the end of each tour adjusted to a normal circadian cycle.

Accommodations: There is evidence that location, size, and type of rigs and platforms are associated with psychosocial outcomes among offshore personnel. However, while these findings can be attributed in part to the fact that newer platforms have improved design standards, recreational facilities, accommodations, emergency alarm systems and escape equipment, they do not allow causal interpretation because new installations can attract highly motivated and adaptable personnel, contributing to the favorable responses by employees on these newer platforms.

Offshore workers are exposed to physical stressors such as noise, vibration, poor lighting and ventilation, confined living accommodations and workspace, and adverse weather conditions. Ratings of noise and other environmental stressors correlate with measures of psychological well-being, but the perceived workload may mediate these relationships. Overall though, the physical and social environment of the accommodations seems to make an important contribution to the quality of life and stress-levels of workers. Two factors appeared to be particularly important: privacy and recreational facilities; in the former case, privacy is seen as a key element in coping with the extended work schedule and isolated setting, with shared accommodation placing a strain on workers in this regard.

The design of accommodations, together with policies respecting room allocations and the like, are all important. However, there is evidence that the overall social environment is of particular significance when it comes to worker stress. This encompasses aspects of all of the above, but is also an independent reflection of the management approach and includes the need, especially given longer rosters, for the workers to create a 'home' offshore. Separating work and non-work life at the workplace, in so far as it is possible, is also important.

Transportation: Transportation arrangements have two major effects on employees and their families. First, transportation schedules can be inconvenient from worker and family perspectives, and disruptions can delay the worker's arrival home and departure to the workplace, creating stress for all family members. Second, safety concerns related to helicopter travel are a major cause of stress in harsh and deep-water environments, such as are found in the North Sea and Atlantic Canada, with implications for both the worker and his or her family. A range of measures that can help optimize these effects on workers and their families.

Communications: Difficulties communicating between the workplace and home can cause offshore workers and their families considerable stress. However, there have been major improvements in communications in the last few years. Workers and families value the new high-quality, low-cost and confidential links; whether or not they are used with any frequency; their availability reduces tensions because family members know the links can be used if the circumstances warrant.

Hiring and Orientation: There is obvious merit in screening out job applicants who would find offshore work highly problematic, and providing an effective orientation program to newly-hired employees, and some companies think these factors are important in selecting employees. For example, some prefer to hire people with previous experience of unconventional work schedules or young unmarried or recently married workers. However, it may be difficult to screen personnel for the possession of qualities that would suggest they can adapt to offshore employment.

Counseling: Offshore work challenges employees and their families in various ways and leads some to experience psychosocial problems. Most workers and family members deal with these problems themselves, or use informal coping strategies. However, research indicates that offshore workers derive only limited social support from other workers, and while their spouses and friends may also serve as onshore confidantes, the spatial dispersal of workers' homes may limit this option. Increasing numbers of employers use a more comprehensive and effective approach, employee assistance programs.

Family Policies and Services: There is plenty of evidence that the home life problems of many commute workers are in reality work problems, and that domestic problems have reciprocal effects in the workplace. The worker brings home work-related concerns and stress, and the commute system generates its own tensions in domestic and personal life. These tensions are in turn brought back to the workplace, where they may affect productivity, safety, retention and other management concerns. Married commute workers see the family life impacts as being the primary determinant of satisfaction with the system.

The research on commute employment indicates the types of responses and interventions that may be appropriate in addressing the challenges for family life. They may broadly be placed in four categories: those that improve the compatibility of the work organization and family life; those that improve the compatibility of the work culture and home life; those that improve self-selection during hiring and help new-hires and their families get used to a new work pattern; and, those that provide assistance, perhaps through a counseling program or support group, to employees and family members requiring them.

In conclusion, as was noted above, offshore employment should not be seen as inherently problematic. It offers both advantages and disadvantages for workers, their families and their communities, as well as for others with responsibility for health, safety, training and other employment-related concerns. The challenge is to recognize these effects and implement policies and practices that address them. From an industry perspective, there is evidence that the benefits – from such things as increased employee retention and productivity, and reduced accident rates – can be considerable, and the costs modest.

However, that said, the literature reviewed for this project contains little systematic information about response initiatives and their success. As a result, it was not possible to identify or allocate responsibilities respecting best practices. Instead, there is a need for further research if the effects of offshore work are to be fully understood and related best practices identified.

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Appendix 1 Participants: Commute Employment Workshop

1.0 INTRODUCTION

1.1 Offshore Employment and Commute Work Systems

The first offshore oil wells were drilled in the late 19th Century, but such activity was rare until after the Second World War. It then saw rapid growth in the Gulf of Mexico starting in the 1950s and in the North Sea starting in the 1960s. The technologies developed in these regions facilitated the spread of offshore oil activity to a number of other 'frontier regions', and by 1993 the United Nations International Labor Office (ILO) estimated the total global offshore oil and gas workforce had reached about a quarter of a million people (ILO 1993:11).

The ILO data showed the United States to have the world's largest, as well as the oldest, offshore industry. The first offshore drilling occurred in very shallow coastal waters in California in 1886. Oil production in Louisiana and Texas, which first developed early in the twentieth century, moved into the adjacent Gulf waters in 1938 with production from the Creole field, located in nine feet of water a mile off the Louisiana coast (Gramling 1996:33-44). Offshore activity in California and especially the Gulf expanded rapidly in the late 1940s and 1950s, and by the early 1990s, the ILO estimated the US had 37,500 company and contractor offshore personnel. The latest Minerals Management Service estimate (Zatarain, *pers. com.* 2000) is that there are 39,945 persons directly involved in offshore activity; however, this excludes workers on supply and support vessels, but includes a few onshore employees. Many of these US offshore employees work on the thousands of small near-shore platforms and rigs in the Gulf, with many workers commuting on a daily basis, using crewboats or airboats (Broom, *pers. com.* 2000). However, the recent trend is to larger deep-water projects.

Other nations with large offshore sectors in 1993 included the United Kingdom (33,000 employees, including the crew of mobile units and support vessels) and Norway (19,000, including contractors). Parkes (1998) quotes UK data showing that the workforce averaged about 30,000 personnel during the mid-1990s, a slight decline from the ILO figure. On the other hand, she also quotes a Norwegian figure (approximately 25,000 employees) that is considerably larger than the ILO's estimate. Activity started with gas exploration and development in the southern North Sea, and moved on to oil and gas fields in the northern North Sea and, most recently, the West of Shetlands area. The distances from the shore and the harsh North Sea and Northeast Atlantic environments have resulted in the use of relatively large and complex facilities. While North Sea activity initially involved mostly US companies, personnel, technologies and practices, it evolved in response to the local environmental, regulatory and socio-economic contexts. In some cases, in a reverse technology transfer, North Sea approaches and technologies are being adopted for new US deep-water activities.

The ILO report found that some developing countries have significant offshore oil labor forces. For example, it was estimated that India had approximately 9,350 offshore workers, including contract staff, China had about 5,200, Qatar had 1400 directly employed and Trinidad and Tobago had 550 operator personnel. There has also been a spread of activity to such other developed, developing and less-developed jurisdictions as Angola, Australia, Brazil, Canada, Indonesia, Mexico, Nigeria and Thailand. The offshore oil industry is truly global, with many of the same companies, and senior and specialist personnel, being involved in activity in different parts of the world.

Most offshore oil workers spend extended periods, often one or more weeks, at their workplace – usually a production platform or a mobile drilling rig. They then leave the workplace and return to shore to live at home with their families, if any, for a non-work period that is also commonly one or more weeks. The offshore accommodations, recreational facilities and food are provided by the employer, which commonly also provides or pays for some or all of the costs of transportation between the workplace and worker's home community.

This work system is variously called 'commute', 'fly-in', 'fly-in/fly-out', 'FIFO' or 'long-distance commute' employment; the first of these terms is used in the rest of this report. It was originally developed to meet the needs of the offshore oil industry because daily commuting was not feasible and no 'local' workforce

or permanent full-time accommodations was available¹. It is now also used by the mining industry and by other land-based and marine activities in remote and/or hazardous environments, in situations where the local labor force cannot meet industry needs, and where the work schedule makes a daily commute impractical.

The oil industry also uses this system for some onshore operations. For example, about 1000 production workers commute to gas fields in the Cooper Basin in Southeastern Australia. Commute systems have been used for major oil industry construction projects. In one example, most of the labor force building the Hibernia production platform at a green-field coastal site in Newfoundland, Canada, alternated between living in a well-equipped 3500-person construction camp and in their home communities.

Smaller numbers of workers are involved in commute work in other industries including, most notably, mining. A 1996 survey finding that about 3000 miners working at 14 Canadian commute operations (Community Resource Services Ltd. 1996). There are also several thousand commute miners in Australia. A 1991 survey estimated 4215 workers were employed at 26 commute-based mines in Western Australia (Department of Mines 1991:6). The total has increased rapidly since then; by 2000 there were 48 such operations (Anaconda 2000), with others planned, and it has been estimated that more than 40% of the state's direct metal-mining workforce commute (Storey 2001a). There are also commute mines elsewhere in Australia, and in Alaska (where the Red Dog mine employs about 380 people), Colombia, Chile, Brazil and Papua - New Guinea (Hogan and Berry 2000:653; ILO 1995:19; McLean and Hemsley 1994). Other users of this work system include fishing, marine transportation, hydroelectric power generation and the military.

1.2 Research Objectives, Scope and Methodology

This project was designed to complement other Minerals Management Service (MMS) studies by providing detailed information on the effects of offshore employment and the options for managing them, with an emphasis on operations in deep water and hazardous environments. Such employment clearly has a range of effects on the nearly forty thousand US citizens who work in the US OCS, others who work offshore in foreign jurisdictions, the approximately quarter of a million offshore workers around the world, and their families and communities.

The commute system used at most offshore operations differs from traditional work systems principally because of the distinctive pattern of presence in, and absences from, the place-of-work and place-of-residence. Other characteristics, such as the extended workday and shift arrangements, while important, are not unique to this type of employment. Other work arrangements may have some, but not all, of these characteristics. As such the commute system gives rise to some issues that are unique and others that are shared with other systems.

Offshore employment is not inherently problematic. Like all other work systems, it offers both advantages and disadvantages for workers, as well as for others with responsibility for health, safety, training and other employment-related concerns. It also has implications, which can again be positive or negative, for employees' families and the communities and regions in which they live. Some of the more important of these issues are discussed in this report in two interrelated categories: human resources and family issues, and community and regional issues.

The focus throughout is the social effects of commuting. The economic effects (for instance, in terms of the purchasing patterns of commute operations) and management concerns (for example, safety, retention and productivity) are only discussed in connection with the effects on workers, families and the communities in which they live. However, it has been shown that the above issues are of direct relevance to the oil and mining industries. In particular, safety, retention and productivity are linked to the characteristics of the work system and management approaches and human resources policies that take the characteristics and effects of the commute system into account can be highly cost-effective.

¹ On the original development of this work system in the oil industry, in the Gulf of Mexico, see Gramling (1996:74).

The research saw the initial preparation of a bibliography on commute employment, its effects and their management. It covers offshore employment in the US, Canada, the United Kingdom, Norway and other jurisdictions, as well as commute employment in the mining industry; it includes over 200 books, papers and reports and has been incorporated into the Minerals Management Service socio-economic bibliography.

This report provides a summary and discussion of the use of commute employment and its effects, as revealed by the literature, key informants and professional knowledge of the principal investigators. It benefited greatly from a review workshop held at the New Orleans Airport Hilton Hotel, New Orleans, Louisiana, December 7th and 8th 2000. This was attended by 19 regulators, consultants, academics and industry representatives drawn from the US, Canada, England and Scotland (Appendix 1). A draft of this report was distributed to all participants two weeks prior to the workshop, and formed the basis of the agenda, which also included presentations on ongoing research in Arizona, Oxford and Aberdeen. These presentations and workshop discussions demonstrated, not least, the similarities between research findings and offshore employment issues in the Gulf of Mexico, the North Sea and Atlantic Canada.

The research also drew on input received from a wide range of oil industry informants interviewed in Houston and New Orleans in August 2001. These interviews sought to provide a more detailed understanding of offshore petroleum operations in the Gulf of Mexico, responding to the limited literature on this topic.

1.3 Research Constraints

It is important to note that there are some important lacunae, biases and constraints in the literature that forms the basis of most of this report. In particular, most studies of the effects of commute work examine:

- commute employment in the North Sea offshore oil industry, and the North American and Australian oil and mining industries, with little information about its use in the former Soviet Bloc and developing countries such as Angola, Brazil, China and Nigeria;
- larger, long-life operations and permanent long-term employees, with little information on small, short-term and near-shore operations and contractor personnel;
- regular employment schedules, rather than irregular and 'call-out' work;
- the effects on white heterosexual male workers and their families, with little study of unmarried, female, homosexual, ethnic and native employees and their families, or of the effects on extended, blended and other family forms; and
- current workers and their families, rather than those who have for various reasons quit commute employment.

The data used in the research reviewed are often limited and commonly qualitative or anecdotal. Where quantitative research has been undertaken, different variables may confound each other and make it impossible to separate cause and effect. Studies not uncommonly also fail to distinguish between the situations and experiences of different groups of employees in any one setting, or the differences between work on rigs, platforms and supply vessels.

Some important studies are also old and particular to specific operations and temporal and geographic contexts. It is not clear to what degree their findings and conclusions are still relevant or can be generalized to other settings. This problem may be exacerbated by the rapid pace of change in both the oil industry and in the attitudes and expectations of workers and their spouses.

In the former case, new technologies (e.g. deepwater production systems, long-range helicopters, automated drilling systems, directional drilling and sub-sea completions) have changed the industry's modes of operation and labor requirements. This is especially the case in the Gulf of Mexico, given the

slow shift from myriad small near-shore operations to larger deep-water projects. At the same time, new business arrangements (e.g. corporate mergers and downsizing), cost-reduction initiatives (e.g. the UK Cost Reduction for the New Era (CRINE) initiative, and its Norwegian counterpart, NORSOK) and associated practices (e.g. multi-skilling, the use of flexible teams, asset sharing and contracting) have changed the nature of offshore work worldwide. Not least, there has been: a reduction in crews and the total offshore labor requirements; a fragmentation of work teams, a casualization of the labor force through an increased use of contractor personnel and flexible, irregular and 'call-out' work schedules; and, an intensification of work activity and pressures.²

At the same time, the characteristics, experiences and expectations of younger workers and spouses, both generally and with respect to offshore work and family life, are different from workers and spouses in their late 40s and 50s. There is evidence that younger offshore employees, described by McGuire (*pers. com.* 2000) as 'new outlookers' as compared to the 'old school' workers, primarily define themselves in terms of their personal and family, rather than work, lives. Exacerbated by the changes in business arrangements and practices, this has led to a decline in loyalty by and to employers. These younger couples also more commonly share domestic responsibilities, including decision-making, and female spouses are more likely to want and hold paid employment.

Lastly, it had originally been intended that this report would serve as a best practice guide. However, there is also a paucity of best practices information in the literature. Most of the discussion is of commute logistics (schedules, transportation arrangements, etc.) and the effects of such work on workers, families and others. Some material, such as Parkes and Clark's comparison of 2/2³ and 3/3 rotations (Parkes and Clark 1997), also examines the differential effects of system alternatives. However, there is little systematic information about initiatives designed to optimize the system's effects.

Part of the problem is that the commute system increases the importance of issues that are of little concern *re* conventional work arrangements. Involving as it does the alternating absence and presence of one spouse and parent from the home, it challenges families, employers, governments and others to think about and respond to the relationships between paid employment and families. These have not traditionally been areas of concern to the industry and regulators, and this is reflected in the limited availability of data and analysis relating to these issues.

For example, while the employee databases of oil companies contacted contain considerable amounts of conventional management information (e.g., about seniority, years of service and rates of remuneration), they contain little information on such things as the numbers and ages of children. Similarly, regulatory authorities, including those concerned with occupational health and safety, have traditionally been more concerned with such 'hard' safety issues as permitting and protective clothing than with human factors considerations. As a result, they too know little about the numbers and characteristics of, let alone the effects on, offshore employees and their families and communities.

1.4 Report Format

Following this introductory section, Sections 2 and 3 review and discuss the social issues arising from offshore employment. Section 2 reviews human resources and family issues and Section 3 discusses community and regional issues. Section 4 then examines responses to these issues, which are divided into seven major groups dealing with: work schedules; accommodations; transportation; communications; hiring and orientation; counseling; and family policies and services. The final section (Section 5) provides a review of the findings and makes a number of recommendations with regard to research requirements.

² This is consistent with broader economic and employment trends; see, for example, Sennett (1998:22-27) on the growth in flexible capitalism and the flexible work-place, and their effects. Sennett notes that while flexible capitalism has many apparent benefits for corporations, it also corrodes trust, loyalty and mutual commitment.

³ Throughout this report, regular rotation patterns are expressed in terms of the numbers of weeks spent at the workplace followed by the number spent away from it; for example, in this case, the employee spends two weeks at each.

2.0 HUMAN RESOURCES AND FAMILY ISSUES

Commute work has implications for a wide variety of interrelated work and family life issues. These include the effects on: health and safety; the employment of women, minorities and older workers; and family life. Each of these is discussed below.

2.1 Health and Safety

An ILO Working Paper (1995) provides a typology of the health and safety issues associated with commute work. They include those relating to operating in a hazardous environment, because the physical environment can be dangerous to individual workers or threaten the integrity and safety of the whole operation, while the difficulties of operating in such places may place workers in close proximity to hazardous processes. The remoteness of commute operations may also limit or delay access to emergency services, and limit regulatory and union access⁴, with potential health and safety consequences.

The other health and safety issues identified arise directly from the work system itself. These include the use of extended shifts and rotations, and what may be a hazardous and stressful commute. In the first case, all commute operations require employees to spend extended periods at the workplace working long (usually 11 or 12-hour) shifts, perhaps including night shifts, split shifts and overtime. This raises safety issues related to both fatigue, resulting from the combined effects of the shifts and rosters, and the exchange of safety-related information between managers, supervisors and workers on different work schedule⁵. Lastly, a number of aspects of the work system may be stressful, including the social environment of the workplace as a 'total institution' (Goffman 1968) and the separation of the worker from his or her home, family and community.

Commute operations commonly use helicopters, often operating in challenging physical environments. Where this is the case, helicopters are generally perceived to be relatively unsafe, and hence can be a source of stress. There have been numerous helicopter accidents associated with offshore operations, with the world's worst such accident, off the Shetland Islands in 1986, killing 45 oil workers and flight crew (Woolfson, Foster and Beck 1996:105).

Parkes (1998) reviewed the literature on psychosocial aspects of stress, health and safety on North Sea oil installations. She notes how the industry has been subject to widespread change during the 1990s, including organizational re-structuring, downsizing and increased safety regulation, and that this has consequences for stress and health and safety among offshore personnel. She finds that:

Few studies directly compare onshore and offshore populations; the available data suggest that, relative to their onshore counterparts, offshore personnel experience greater anxiety, more sleep problems, and higher workload. Within the offshore population, objective factors (e.g. size, age, and type of installation, work patterns, and occupational differences), subjective work perceptions (job characteristics, perceived risk, job insecurity, and work/family interaction), individual differences (age and personality), and health behaviors (smoking, alcohol use, and diet), and all play significant roles in relation to health and safety outcomes. However, much of the research in stress and health offshore has methodological limitations, and does not allow causal interpretation. The need for prospective studies of the long-term mental and physical health of offshore personnel, and for research in several specific areas is noted (Parkes 1998, i).

⁴ For recent discussion of the constraints commute work poses for unionization in the Gulf of Mexico offshore oil industry, see Gramling (1996:78-80) and James (2000:45-46). On the UK North Sea, see Woolfson, Foster and Beck (1996:437-440); however, despite these constraints and in contrast with the US, more than half of all UK offshore oil worker safety representatives are unionized personnel (Miles, *pers. com.*, 2000)

⁵ On the challenges this poses for Offshore Installation Managers and other offshore employees, see Flin, Slaven and Carnegie (1996:49-51) and Burnett and Tait (1996:118), respectively.

However, while offshore workers generally experience more sleep problems, when Parkes (1993) looked at onshore and offshore oil and gas personnel workers who worked night shifts, she found that the former reported shorter night-shift sleep durations than the latter. In subsequent research using a larger sample size, Parkes and Byron (2001:96) found that onshore personnel averaged 5.7 hours sleep a night, while offshore workers averaged 6.6 hours. Job satisfaction was also disproportionately low among the onshore shift workers. Parkes and Byron attribute these findings, in part, to the fact that 'offshore personnel live and work in a remote setting that routinely operates round-the-clock, whereas onshore personnel return to a normal diurnal lifestyle after each shift' (104).

Specific health and safety concerns are discussed in greater detail, in the context of response options, below.

2.2 Employment of Women, Minorities and Older Workers

The commute workplace and system raise particular issues respecting the employment of women, minorities and older workers. Management approaches, human resource policies and the social environment of the workplace, including the accommodations, are important intervening variables.

Women have long been a minority, and concentrated in 'traditional' women's occupations, at offshore petroleum and commute mining operations. Surveys of the petroleum commute labor forces in the North Sea, Canada and Australia show that overall only 0.1% to 5% are women, although the number working in the Norwegian workforce has seen slow increase (ILO 1995:20). Hellesøy (1985:21) found that women comprised 17% of workers on the Statfjord platforms, while Parkes (1998) cites more recent data that show that 3% of United Kingdom workers, but 16% of those in Norwegian waters, are women. Mearns and Wagstaff (1996:249) note that, while only 2% of the applicants to work on Norske Shell's Draugen platform were women, they made up 13% of new recruits and occupied such positions as production manager, computer operator, electrician, administrative assistant, radio operator and nurse. No data available on women's participation in the US offshore workforce, but informants indicate that the numbers are small. For example, it is estimated that only about 2% of Shell workers in the Gulf of Mexico are women.

Women are also in a minority at commute mines. A survey of 14 Canadian mines found that they had a mean of 11% women employees, with a range from 2% to 19% (Community Resource Services Ltd. 1996). Seven Australian mines had a mean of 14%, and a range of 7% to 18%, women workers (ILO 1995:20).

In terms of occupational groups, Karlsen and Rattner (1989:11) found that over half of Norwegian women working offshore are in catering, while at a sample of Australian offshore petroleum operations, women held 19% of administrative, 11% of catering and cleaning, but only 0.5% of extraction and processing, positions (Shrimpton and Storey 1991b:6). A more recent study of 15 offshore oil and gas operations (Australian Mines and Metals Association 1998) found that women held 25% of administrative positions but only 0.2% of extraction and processing jobs. However, women have been Offshore Installation Managers on both the Frigg and Ekofisk fields. In the Canadian mining industry, female workers were concentrated in traditional occupations, including secretarial, cleaning and catering work, with 26% in administration and 40% in 'other' work; however, 19% were in mill production and 10% in the mine itself (Community Resource Services Ltd. 1996).

A wide variety of factors explain the variations in the numbers of women working offshore and, especially, the differences between the United Kingdom (UK) and Norwegian sectors of the North Sea. They include industrial, workplace and national cultures and the associated regulatory regime (Lewis, Porter and Shrimpton 1988). Operating and contracting companies are noted for a culture that is unsupportive of women in non-traditional occupations. Exploration rigs in particular have been described as having hard-driving, 'macho', work cultures, with the effects of this amplified by the fact that the employees work and live together in close quarters (Fuchs, Cake and Wright 1983:96-106).

In this connection, Storey et al. (1989) found Canadian rig operating company representatives were much more concerned about women's and family life issues than were their US counterparts. Similarly, the contrast between the numbers and occupations of women working in the UK and Norwegian offshore generally reflects differences in company and national cultures. In the latter regard Moore (1985:211) notes that the UK offshore 'is immediately identifiable as a rather traditional British male work culture', and more recently Collinson (1998:320-321) found 'the independent male breadwinner and dependent female homemaker... embedded in many (UK sector workers') discourses and practices'; in contrast, the Norwegian culture is reflected in their application of equal opportunities legislation to offshore workplaces. Lastly, there are difficulties accommodating women on small inshore rigs and platforms in the Gulf of Mexico; these commonly have a small number of cabins, with considerable sharing of cabins and bathroom facilities.

The above-noted barriers constrain the hiring and retention of women. However, as is discussed below, a number of managers and others involved with commute operations have noted the advantages to the company of having women at the workplace, while diverse workforces are also thought to reduce the contrast between the cultures of the workplace and home.

There are few data on the participation of African Americans active on the US OCS, although key informants interviewed indicated that they comprise 15% to 25% of the total labor force in the Gulf of Mexico. There are also very small numbers of Hispanic workers employed in the Gulf. In regards to other minorities, a survey of Australian offshore operations found that aborigines made up only 0.3% of the workforce, although Canada's Beaufort Sea exploration employed significant numbers of residents of some native communities (Hobart 1989:32). Approximately 18% of the labor force at Canadian commute mines is aboriginal, with a high of 42%. At Red Dog, Cominco's mining operation in Alaska 191 (51%) of the 1993 labor force were aboriginal shareholders (McLean and Hensley 1994). However, aboriginal workers only make up 2% of the labor force at a sample of Australian mines (ILO 1995:24).

When it comes to the age distribution of commute workers, Parkes (1998) cites studies that indicate 70% of United Kingdom offshore workers are in the 30 to 50 year age range. However, over the last 30 years, the North Sea oil and gas industry has shifted from a new to a mature industry, with associated changes in the age profile. More generally, offshore and other commute workforces increased rapidly during the 1970s and 1980s and these workers are now aging. In the oil industry, this trend has been accentuated by economic changes that have limited recruitment and reduced the opportunities for offshore personnel to transfer onshore. Recruitment has also been reduced by fluctuations in employment opportunities (with the more recently hired being the first to be laid-off), alternative onshore opportunities, limited onshore/offshore wage differentials and the poor image of the industry in the eyes of school-leavers, especially compared to high-technology companies. These aging and succession problems are seen as presenting challenges from a health and safety perspective and respecting employee motivation.

2.3 Family Life

Reflecting the middle-aged character of much of most offshore labor forces, married individuals form the majority of commute workers in almost all industries and regions. They comprised 61% of the labor force of British and Dutch offshore petroleum operations in the mid-1980s, with 32% single (never married) and 6% widowed, divorced or separated (Sutherland and Cooper 1986:125). The equivalent statistics for exploration workers in Newfoundland in the early 1980s were 55%, 37% and 8% respectively (Fuchs, Cake and Wright 1983). These are similar to the figures for Australian offshore workers in the early 1990s (Shrimpton and Storey 1991b, 6), although the more recent Australian Mines and Metals Association study (AMMA 1998) found 68% of workers at 15 offshore operations were married, 17% single and 18.5% widowed, separated or divorced. The higher proportion of married workers in Europe and Australia likely reflects the older and more mature nature of the industry in those regions; further support for this hypothesis comes from the higher proportion of married workers (67%) on Norway's Statfjord production platforms, which also has a high proportion (10%) of separated/divorced workers compared to the above examples (Hellesøy 1985:101).

Approximately 67% of the Canadian commute mine labor force is married, with a further 27% single (never married) and 6% widowed or divorced. These figures show some differences from the 1981 Canadian metal mines labor force (76%, 21% and 3% respectively) (Canada 1984), with commute mines having more single, and widowed, divorced and separated, workers. A lower percentage (55%) of Australian commute mine workers are married, while the percentages of single, widowed, divorced and separated, are more than twice the Canadian figures. This is reflected in the high levels of Australian concern about the effects of commute work on married life, which may be a result of the numbers of operations using long asymmetrical work schedules (see below).

The surveys of Newfoundland rig workers and spouses (Storey et al. 1989) found that married workers had lived together for an average of nine years, with the oil worker having been employed offshore for five of them. Only 16% did not have children at home, with the rest having an average of 1.75 children, with a mean age of eight years, at home. A survey of workers at two Canadian commute mines (Key Lake, Saskatchewan, with a 1/1 roster, and Polaris, Northwest Territories, with, at that time, a 9/3 schedule) found that married workers had been living together for 12 and 15 years respectively. The Polaris workers, however, had slightly fewer children: 25% had no children, and the others had an average of 1.6 children at home, compared to 23% and 1.7 in the case of the Key Lake personnel (Storey and Shrimpton 1989:180).

From the outset, people writing about the work system have problematized its effects on workers and families, with little consideration of potential advantages or the dynamics of work/family relationships. Indeed, some early writers (e.g., Douglas 1984:17) assumed that most commute workers would be single as a result of the system's supposed incompatibility with family life. Others drew on the earlier literature on military families, including analyses of the effects of absences of submariners (e.g., Beckman 1976, and Isay 1968), with the latter concluding that some wives who failed to adapt suffered from a 'submariner's wives syndrome'. In the late 1970s a group based at the Institute of Medical Sociology, Aberdeen, sought to confirm and investigate the dimensions of an 'intermittent husband syndrome' which Dr. Ken Morrice, a consultant psychiatrist, believed characterized the behavior of many offshore oil workers' wives (Morrice and Taylor 1978). As recently as 1991 Forsyth and Gauthier noted 'the near universal finding from (our) research... that non-traditional work scheduling is problematic for families' (Forsyth and Gauthier 1991:197).

One of the reasons for this assumption is that commute workers often believe there are high levels of marital discord among their colleagues. This has been expressed as a particular concern at Australian commute operations and appears to be reflected in data such as was collected by the 1998 Australian Mines and Metals Association study of 15 oil and gas and 19 mining operations, which found that 18.5% and 12% respectively were widowed, separated or divorced (Australian Mines and Metals Association 1998:44). However, cause and effect relationships are not easily determined. These workplaces are 'total institutions' where employees spend large amounts of time working and living together. Rumor and gossip are rife, with much of it focussing on personal relationships. But while research has shown that commute operations have somewhat higher proportions of separated and divorced workers than do conventional ones, it is not clear that this is a direct consequence of the work system. In some cases, a 'foreign legion syndrome' seems to play a role, with this type of work attracting separated and divorced employees. For example, while 6.5% of Key Lake miners were divorced or separated, only 4% had divorced or separated subsequent to starting work at the mine and only half of these held the commute system wholly or partly responsible (Storey and Shrimpton 1989:167-169).

This is not to deny that commuting work presents challenges to family relationships and indeed may, in some cases, contribute to separation and divorce. However, it is important to assess this in the context of an understanding of the range of advantages and disadvantages that the system can present and consideration of the dynamics of work/families relationships. A number of analyses (Morrice et al. (1985); Clark et al. (1985a and b); and Storey et al. (1989)) have failed to find evidence of the 'intermittent husband syndrome,' and they and subsequent studies have not presented a uniformly negative picture of family effects. They instead demonstrate the complexities of these relationships, and show that commute work is largely positive for many families and has positive aspects for most.

The main potential advantages and disadvantages, as identified by workers and members of their families, are summarized below, based on Shrimpton and Storey (1991c)⁶. However it is important to recognize that different families and family members experience and react to them in different ways. Furthermore, these experiences and reactions may change over the course of the family life cycle.

Income from Commute Work

Incomes from offshore employment vary greatly. In most places, as in the UK sector of the North Sea, they receive higher than average earnings (Collinson 1998:307) although in some places, such as rural areas around the Gulf of Mexico, this may largely be a reflection of the low incomes associated with most onshore work. Highly skilled workers may receive very high incomes, based on high wages rates, long hours of work and considerable amounts of overtime. However, most less-skilled workers have much lower wage rates, irregular work-hours and receive no overtime payments. The terms and conditions of employment commonly also commonly vary between operator and contractor, and union and non-union, personnel.

The disposable incomes of commute workers also benefit from the fact that they generally have few expenses or opportunities to spend money during their periods at the workplace (for example, all meals and laundry service are normally provided *gratis* by the employer). This is especially the case in the offshore oil and gas industry, since virtually all platforms and rigs (unlike many commute mining and onshore petroleum camps) are 'dry', with no opportunity to buy alcohol. As a result, commute workers generally have relatively high disposable incomes; however, there is very little information on the expenditure patterns of commute workers and families.

Secondary and Family Employment

As is also discussed below, commute work allows workers to hold second jobs, although the absences from home mean that this work must have a flexible schedule, with self-employment being common. Some commute workers' spouses also have paid jobs, and they may see the system as advantageous because it permits them to live in larger urban centers that can provide a greater range of employment opportunities. As discussed in McKee, Galilee and Mauthner (2000:10), such forms of employment are scarce in some, especially rural and bedroom communities. In one case, women have 'to travel the twenty miles into Aberdeen to find suitable work... the inconvenience and costs in doing so would undoubtedly put (off) a lot of women travelling such a distance, particularly as they had primary responsibility for looking after the children'.

Such paid employment is often described as being a constructive use of the time when the spouse is away and of maintaining an independent existence, although childcare requirements may constrain employment options and choices during some parts of the family life-cycle. The employment patterns of commute spouses are distinctive, with large numbers in temporary, replacement, and self-employment, reflecting the desire of couples to reconcile their schedules. However, this is seldom possible when the offshore worker has an irregular schedule, and the spouses of such workers are least likely to take paid employment (McKee, *pers. com.* 2000). Lastly, in the Gulf of Mexico the spouses' choice of work may be strongly influenced by a concern that the family have access to employment benefits, and especially health benefits, given the cyclical patterns of employment that have characterized the offshore oil industry (Austin, *pers. com.* 2000).

Separation of Work and Family Life

Some, especially managerial and professional, commute workers value the opportunity to separate the worlds of work and family. The latter can be 'out of sight and out of mind' during periods at work, while

⁶It should be noted that there has been little study of these issues from the perspectives of commute workers' children, although this topic is currently being addressed by a study of the oil and gas industry in Scotland (see, for example, Mauthner, Maclean and McKee, 2000).

the time at home normally sees a total escape from work concerns and relationships. In the words of one UK platform worker, "It's like having two separate lives. That's a very good thing here, we never talk about our personal lives at all" (Collinson 1998:308). Most workers and spouses also value the opportunity the extended periods of 'quality time' at home provide for shared recreational and other interests; for some these times are 'periodic honeymoons'. Furthermore, many male commute workers express pleasure at being able to spend long periods with children, although this may take the form of camping trips and similar outings, rather than day-to-day child-care.

Collinson's interviews with 98 workers on UK platforms found that 'most male and female respondents valued the economic and temporal compensations of offshore work. These comments from a driller were typical: "The attraction out here is the two weeks off. The thought of nine to five is not very appealing"' (1998:307). Similarly, a secretary on another platform commented, "I'm only doing this job for the time off and the money. When I first started, being the first female secretary was a real buzz. If people ask now I just say there's nowhere else I could get two weeks off a month." (308) In a survey of 214 workers at 41 Australian commute mines, Jenkins (1997) found that they thought 'quality time with family and friends' the biggest single advantage of the work system.

Access to Services and Facilities

Commuting work allows workers and their families some, and often considerable, choice of residential location (see Section 3.1). Some families choose to live in urban centers, primarily because they provide a wider range of services and facilities available for use by the worker (when away from the workplace) and his or her family members. (Others, especially in the Southern US, prefer to stay near family and friends in smaller rural communities.) The long periods at home also facilitate participation in leisure pursuits which require such periods (e.g. wilderness hiking and foreign travel) or for which access to facilities (such as golf courses and tennis courts) may be difficult during peak evening and weekend hours.

Independence and Decision-Making

This work system affords the spouses of commute workers considerable independence, but while this is valued by many of them, it may be necessary to 'learn to be independent' and spouses and commute workers often find this independence problematic. Decision-making is often a central concern in this, especially as it relates to parenting. In most two-parent families, such decisions are made jointly or by the male parent. The periodic absence of the commuting spouse (usually the male) disrupts this, especially when a crisis or other development requires a rapid decision. The spouse at home may make the decision herself or himself, perhaps in consultation with their partner, a friend or a relative. The net effect, though, is an adjustment and/or renegotiations of decision-making, which may be problematic for one or both spouses. For example, one Newfoundland offshore worker's spouse has noted how "when he's away I have to look after the whole family for a month. Then, when he comes back, I've got to drop being boss. That creates conflict sometimes." (Fuchs, Cake and Wright 1983:122) Problems commonly relate to inconsistencies in child discipline, with one or other parent being thought to be too lenient⁷.

Inappropriate Worker Behavior

To the degree that the workplace environment and culture at commute operations are non-familial, workers may have difficulty adjusting between it and home life. This can be reflected in inappropriate behavior when they bring home workplace standards of language, noisiness, untidiness, inconsiderateness and authoritarian decision-making.

⁷ See James (2000:24) for discussion of this issue in New Iberia, Louisiana.

Family Separation

The absence of the commuting worker commonly creates feelings of loneliness for all concerned, and this is especially the case at the time of major holidays such as Thanksgiving, Christmas, New Years, and such family events as birthdays, anniversaries and graduations. For the Australian commute miners surveyed by Jenkins (1997) 'absence from family and friends' was the main disadvantage of the system.

Isolation from and within the Community

The periodic absence of workers from their homes also limits their participation in community activities. This includes both activities requiring regular attendance (e.g. team sports, church groups and membership of a local council, school board or a service club) and occasional community events and festivities.

The system may also isolate commute workers' spouses in and from the communities they live in, especially where there is a wide dispersion and low density of oil workers. For example, Solheim has described high levels of social isolation among the wives of Norwegian offshore workers: "The period of absence [of the commuting worker] is characterized by isolation and lack of social contact. This is most pronounced in rural communities, where... it is the family rather than the individual which is the core of the social network... With the exception of very close kin, many rural women state that they cannot normally visit friends and neighbors when their husbands are away, unless the other woman is alone too" (1988:155-6). However, while these impacts are very clear to the wife, and have effects on the community as a whole, they may not be widely recognized or understood by other members of the community (especially when few commute workers live there).

The degree of isolation within the community may also be a function of attitudes towards oil workers and their families. For example, there appear to be differences in community perceptions of oilfield work in Southern Louisiana and Northeast Scotland. In the former case reference is sometimes made to 'oilfield trash' (see James 2000:11-15). These attitudes are likely a reaction to an influx of non-locals seeking offshore employment, especially in the early days of such activity, and they may result in oil workers and their families being marginalized from the rest of the community. In Northeast Scotland, Galilee (2000) and others have shown that oil workers are generally respected and valued members of the community, many of them locally hired.

The above potential advantages and disadvantages are not always experienced in the same ways and to the same degree. The studies of families involved in Newfoundland offshore oil exploration (Storey et al. 1989) and Canadian commute mining work (Storey and Shrimpton 1989) have shown that there are very large variations in workers' and spouses' reactions to the system and its impacts on their lives.

Overall, most workers and spouses are generally positive about the system and its impacts. The main measure of reactions used in the above studies were vignettes describing hypothetical individuals with negative, neutral and positive responses to the system and its impacts. About three-quarters of the oil workers, the mineworkers, and the mineworkers' spouses, self-identified most closely with the positive figure. A smaller proportion, but still more than half, of oil workers' spouses felt they were most like the positive vignette. Other questionnaire and interview data show that, for some of these individuals, the system was making a very positive contribution to their lives and family relationships. This was particularly the case with the supply boat workers and their spouses (Storey et al. 1989; Storey and Shrimpton 1989).

However, while many workers and spouses responded positively, almost all of them also felt some level of self-identification with the negative vignette figure, while about one-fifth of the oil and mine workers identified most strongly with it. Other questionnaire and interview data show that some offshore rig workers in particular felt almost wholly negatively about the impacts of the work on their lives. And, compared with the offshore workers, their spouses (mostly women) were significantly more likely to self-identify with the negative vignette (Storey et al. 1989; Storey and Shrimpton 1989).

Various factors related to work and family seem to underlie these variations in reactions. They may be summarized as being differences: in the availability of alternative employment; in the work environment and workers' experience of it; in the regularity and security of employment; in family members' experience and expectations of family life; and between workers' and spouses' perceptions of the impacts on the family. In the last case, it has been suggested that parental perceptions of the effects on children may be particularly important (Mauthner, *pers. com.* 2001).

Alternative Employment Opportunities

As is noted above, almost all research into the effects of commute work on families is based on examination of families that have 'survived,' and perhaps adjusted to or learned to cope with, the system. Others will have quit such work because of its negative aspects. However, there are differences in the degree to which this is possible. For example, very high unemployment in rural areas of Newfoundland and Louisiana makes it difficult for people to leave jobs that pay well, whatever its negative impacts. Certainly, some of the Newfoundland rig workers and spouses who had been involved with the system for more than ten years still felt very negatively about it. This is a problem which families in many parts of the world confront; some Canadian miners describe the work and its income as the 'golden handcuffs,' while in Australia this is known as 'driller's disease'.

Work Environment and Experience

The Newfoundland offshore oil employment study (Storey et al. 1989) showed the role that the work environment and workers' experience of it could play in determining reactions to commuting. As was noted above, the supply boat crew reacted much more positively to it, even though they were on a longer (4/4 vs 3/3) schedule. The great majority of them primarily self-identified with the positive vignette, and only one supply boat worker identifying with each of the neutral and negative responses. In contrast, 37% of the rig workers self-identified most strongly with the negative vignette. And while the spouses were generally much more ambivalent about the impacts, supply boat workers' spouses more commonly self-identified with the positive vignette than did rig workers spouses, mirroring their husbands' reactions.

Adjectival checklists confirm the patterns revealed by the vignettes; both workers and spouses used mostly positive and few negative adjectives to describe their mood when the worker was onshore, while the pattern was reversed when describing feelings during the periods offshore. The average mood swing was smaller for supply boat workers and spouses than for those involved with rig work, and the offshore workers generally experienced smaller mood swings than did the spouses.

Other survey and interview data showed that these differences in the reactions to rig and supply boat work were largely a consequence of the differences between the workplaces as physical and social environments, and between the workers' levels of experience of those environments. In the former case, the supply boats were generally seen as less alienating, more familiar and more familial work places than the rigs. Supply boat crew were commonly former trawler crew, often drawn from one or two rural communities, sometimes related to each other, and who generally respected and had a positive relationship with "the skipper" and other crew. Workers and families also had opportunities to spend time together on these vessels when they were in harbor.

In contrast, Hellesøy (1985), Heen (1988) and others have shown that rig and platform crews are divided into a number of work groups, often from different cultures, working different schedules, and with different, and sometimes conflicting, priorities. The increased use of contract labor in the early 1990s saw a widening of inequalities respecting accommodations, transportation and other arrangements, leading one chaplain ministering to the UK North Sea offshore labor force to describe the contrast between operator and contract personnel as "industrial apartheid" (Collinson 1998:311)⁸. As described by Burnett

⁸However, Parkes and Clark (1997:82) argue that some companies and installations have subsequently made deliberate attempts to reduce such distinctions, and interviews in Houston and New Orleans suggest that some contractor workers essentially function, and are treated, as operator employees.

and Tait (1996:119-120) and others, the industry has long had, and largely continues to have, an individualistic, hierarchical and highly authoritarian work culture. This is especially the case on exploration rigs. Fuchs, Cake and Wright (1983:71-106) recount the cultural conflicts experienced by Newfoundland rig workers in the early 1980s, and the tensions and feelings of alienation they produced. In the words of one of the interviewees for the Newfoundland family life study (Storey et al. 1989): "it's not like going to work any more, it's like going to war."

In addition, the experience in the North Sea and Atlantic Canada is that far fewer rig and platform than supply boat workers have marine experience. They are typically onshore industrial workers with neither the aspirations nor training to be seamen. As a consequence, the physical as well as the social environment is commonly alien and a source of tension. In questionnaires and interviews, safety was often described as a particular concern. Newfoundland rig workers wrote that: "money doesn't mean much on a stormy night in February" and, when asked to provide advice to a hypothetical friend considering offshore petroleum employment, "never go offshore because it isn't meant for humans" (Lewis, Shrimpton and Storey 1988:168).

It should however be noted that the above discussion is primarily based on ethnographies of offshore oil workplaces that are from the early to mid 1980s. Subsequent changes in both offshore technologies and business practices are likely to have affected the work environment. For example, more recent rigs and platforms provide better accommodations and recreation facilities. However, increased contracting and cost-reduction strategies have also reduced job security and increased the number of employers involved in any operation, although the labor force may also include some workers with considerable experience of offshore work.

It has also been suggested that the problems 'landsmen' experience working in a marine environment are diminished for workers on large fixed production platforms, which provide a much more stable work environment. However, this is not the case for those working on Floating Production Storage and Offloading vessels (FPSOs). This increasingly popular production option uses facilities that are based on, and behave like, conventional ships. More so than even semi-submersible rigs, they roll, pitch and 'weathervane' in response to wave and wind action, and there is evidence that even seasoned production workers find this problematic. Some Norwegian FPSO operators have responded to this by only hiring crew with marine experience (Miles, *pers. com.* 2000).

Employment Irregularity and Insecurity

Many offshore workers and their families experience considerable employment irregularity and insecurity. For example, James (2000:21) has made clear that the problems with commute work for workers and families in New Iberia, Louisiana, can in part be attributed to being 'on-call', as is the case for many offshore employees, or insecurity in respect of offshore oil work in recent times. The potential effects of being 'on-call' are summarized thus by a contractor employee:

There is NO schedule. That was the problem. I had no schedule. And the strange thing is, uh, you get used to it. It normalizes and you forget you have options... I didn't have a life, and I woke up one day without a wife, alienated from my kids, and I said: 'Gee, you haven't had much of a life at all.' (James 2000:30)

In respect of work insecurity, James quotes a production operator:

If I've had problems when I'm at work, I try not to bring them home with me, but sometimes I can't help it. I take out my frustrations on (my wife)... I can control part of it, but I might just snap for no reason and start hollering. We've gone through several restructuring plans, or whatever they want to call it, which is just a common way of saying 'I'm going to lay you off'. It's a fancy way of saying that, which I weathered three or four of them. You get aggravated (James 2000:14).

Cost-reduction initiatives have likely had similar effects in the North Sea and elsewhere. For example, Collinson (1998:309-312) described at length, on the basis of research on two UK sector platforms, the problems of on-call and contract work. This included: difficulties in making plans and getting mortgages; tensions resulting from income insecurity, limited health and vacation benefits; and the uncertainties associated with the 'NRB' system and 'bumping' from flights. Supervisors will write the initials 'NRB', standing for Not Required Back, on an employee's work report when they do not want to see him or her work again on that rig or platform, and is therefore tantamount to a dismissal. Bumping occurs when workers have to give up their helicopter seat for a higher-priority individual or freight, thus delaying the workers' return home.

Expectations of Family Life

The reactions of family members to commute work also often reflect their normative models of family life including, in particular, relationships between it and employment. This was demonstrated by study of the labor mobility of miners living in Leaf Rapids, a small town in Northern Manitoba (Shrimpton and Storey 1991a). A questionnaire survey asked about preferences given a hypothetical choice between moving to employment in another small mining town or at a commute operation. Most of those expressing an unequivocal preference for the first option explained this in terms of the superiority of small towns from a family life perspective. However, most of those preferring the commute option also did so because they thought it better for the family.

Other questionnaire and interview data show that this reflected differing normative concepts of family life. Those favoring the small town option held to a male-breadwinner model of the family, with the husband and principal earner being home every night and easily accessible to care for the wife and children. These workers commonly disliked the commute option because it would make it impossible to have a 'normal' family life. Those preferring the commute option generally held to a more consensual and egalitarian family model, emphasized the benefits for the family of living in a larger community and the merits of periodic extended periods of 'quality time' with families.

In part, these differences reflected the respondents' past experience of family life. Those responding negatively to the commute option mostly had many years experience of family and community life in Leaf Rapids, came from mining families and had been raised in one or more such towns. Conversely, there is evidence that commute work is much more acceptable for those with previous experience of unconventional work schedules and those who establish a family subsequent to, or at the same time as, involvement with commute work. The last allows the new family to develop its modes of operation around the unconventional schedule.

Workers and Spouses

The above differences in work environments, experience and opportunities, and in expectations of family life, are often common to, and hence reflected in the reactions of, both spouses. Indeed, there is a clear reciprocal process at work here, as is evident in analyses of stress associated with offshore oil employment. These show that the home life problems of many workers are in reality work problems, that domestic problems have impacts in the workplace, and that these interact. The worker brings home work-related fatigue, concerns and stress, the alternating presences and absences generate their own tensions in domestic and personal life, and the time at home may therefore compound, rather than resolve, the tensions. They are then brought back to the workplace, where isolation further amplifies the problem.⁹ An early major study of the North Sea oil industry concluded that 'family-related job dissatisfaction ultimately leads to reduced mental well-being, physiological ill health and possibly increased vulnerability to accidents. In organizational terms it results in poor performance and reduced productivity' (Sutherland and Cooper 1986:44).

⁹ This reciprocal process of 'work - non-work conflict' has been conceptualized in detail by Frone and others (see, for example, Frone, Yardley and Markel, 1997, and Frone, Russell and Cooper, 1992 and 1997).

Conversely, 'job-related family dissatisfaction' can have a range of consequences for all family members, and levels of satisfaction with the commute system are normally communicated between and shared by husbands and wives. However, there are also patterns of difference in the reactions of workers and spouses, with the Newfoundland exploration activity study showing the spouses to be more likely to be ambivalent or negative about the impacts of commute work, and to experience larger mood swings. The work pattern generally seems to be less problematic for the commute workers.

In part, this seems to be because family life issues are of less concern to them. For example, while the Newfoundland study questionnaires and interview schedules were designed to focus on the relationship between work and the family, male respondents responded mainly about the work itself and especially safety and pay. When asked what advice they would give a hypothetical married friend who was taking an offshore job, all but two respondents only discussed the work itself. The impacts on other family members were rarely acknowledged by such men who, while listing some of the adjustments needed as a result of their intermittent absence, saw them as incumbent on the spouse and children. The women and children were expected to adjust to the returning worker, rather than vice versa (Lewis, Shrimpton and Storey 1988:171).

These low levels of concern about the impacts on the spouse and children were mirrored in joint interviews with workers and spouses. A number of the men expressed amazement when their wives described how the schedule affected their lives, whether in terms of issues and concerns or their emotional responses to these. Reciprocally, many wives had only very vague ideas about the lives of their husbands between the times when they left home and when they returned. To the degree that this is the case, or that these workers are unwilling to confront or deal with the situation, no attempt will be made at amelioration. Instead, it is left to the spouses to adjust to or cope with the system.

The underlying point here is that most commute workers do not see, and are uncomprehending of, the two social realities at home; that when he (or, rarely, she) is present and that when absent¹⁰. The family at home has to deal with the changes between them on a periodic and ongoing basis in a single setting: 'In a certain sense the wife is also commuting back and forth between a single and a married state; a shift which entails different forms of behavior, different social networks and activities, and different values' (Solheim 1988:159).

The Newfoundland study identified three ways in which workers' wives dealt with these shifts:

Some women seem simply to "carry-on", trying wherever possible to prevent... spousal absence from interfering with their routines and concerns, perhaps with the support of a close friend or relative. A second option is to try to "do everything" during the period the spouse is away, including all aspects of "his" role which require attention; many of these women then go "into reverse" on their partners' return - passing back to him the various duties and responsibilities which in their view are rightly and properly his. The third option is to place life "on hold", to minimize all activities and concerns during the husband's period offshore in order to activate them fully when the spouse is at home (Lewis, Shrimpton and Storey 1988:186).

However, these patterns are by no means distinct and simple:

The woman's internal conflicts cannot be separated from those of her spouse, or from those that may be present within the family as a whole. She may, therefore, be pulled in several directions at once by forces that vary in strength and persistence. This is not to deny that other members of the family are placed under similar strains, but the evidence suggests that it is the female spouse/mother who is most active in conflict management of various kinds. Of course, we know that this is a feature of wives in many family

¹⁰An exception here is multi-generational oil families in the Gulf of Mexico, where offshore workers may have experienced the effects at home when growing up as the child of a commuting father (Austin, *pers. com.*, 2000).

settings within our culture... [but] we argue here that it is particularly marked (Lewis, Shrimpton and Storey 1988:186).

Children also experience similar changes between the family with the offshore worker present and absent. They too have to move between different worlds, modes of being, rules and ways in which family time is spent. The ways in which children react depend on their age, personality and adaptability (Mauthner, *pers. com.* 2001).

The fact that the spouse of a commute worker is a part-time single parent has also been recognized by Forsyth and Gramling. Using a construction of reality approach, they argue this leads to the exclusion of the commuting worker from the 'traditional' nuclear family because 'it becomes impossible to maintain the absent member's active role in the construction process.' However, they too argue that new interaction patterns are available, which 'while quite different from the "traditional" nuclear family, are patterns of adaptation rather than pathology' (Forsyth and Gramling 1987:57).

Forsyth and Gauthier (1991) extend this analysis, developing a typology of six adaptations/familial structures among two-parent Louisiana oil families: alternate authority, marginal father, contingent authority, conflict, replacement father and egalitarian. However, as was noted above, they conclude that working offshore is always problematic for families. In particular, they identify difficulties related to: disagreements with the rules associated with the chosen strategy, dissatisfaction resulting from the strategy being imposed by the power of one family member, and a failure to agree on a strategy. They believe these problems are exacerbated by the limitations the schedule places on opportunities for negotiation (198-199).

It should again be noted that there are two further options available to families that find impacts of the work pattern highly problematic. The first is for the commute worker to give up his or her job but, as has been seen, this can be problematic in areas with high unemployment rates. There may be few alternative employment opportunities, and most may involve a loss of income and status. The second option is for one or other partner to quit the relationship; however, as has been noted above, there is little evidence in support of the common view that commute employment results in large numbers of separations and divorces.

3.0 COMMUNITY AND REGIONAL ISSUES

The system also has a number of related effects on the communities and regions where the workers live and employers do business. These include the effects on: residential patterns, expenditures, non-commute employment, local investment, community life and social and recreational services. Each of these is discussed below.

3.1 Residential Patterns

The spatial distribution of the workers' homes is a critical factor in the location and nature of these issues. The commute schedule and transportation arrangements (especially in the mining industry, where multiple pick-up points are more common) can give workers and their families considerable flexibility as to where they live. Depending largely on the schedule, transportation systems and employee preferences, they may live close to, or distant from, the workplace.

This section is based on a review of the literature on this issue (Shrimpton 1994) that examined studies of the petroleum industry in Louisiana (Gramling and Brabant 1984; Centaur Associates 1986), Scotland (Grampian Regional Council 1992), Norway (Aase 1990), Newfoundland (Fuchs, Cake and Wright 1983; Storey et al. 1989) and Australia (Storey and Shrimpton 1991). It also reviewed the residential patterns of commute miners in Canada (Storey and Shrimpton 1989) and Australia (Stedman 1991; Storey and Shrimpton 1991). It concluded that the residential patterns of commute workers reflect the specifics of the system used.

Generally speaking, the dispersal is greatest when the rotation is long, when the company provides transportation between the workplace and multiple 'pick-up' points, and when the employer defrays a major part of the commute costs. These may vary, especially in the petroleum industry, with the seniority of the employee. For example, senior managers and drilling crew may work longer rosters and be flown to and from their homes far from the workplace. Such personnel may commute from homes in the United States to operations in other parts of the world.

However, extreme distributions need not be limited to senior employees. For example, workers at the Polaris mine in Canada's Northwest Territories, with its relatively long roster (9/3 at that time) and the employer paying for commute travel to and from any airport in Canada, have their homes in virtually every part of the nation, while some live as far away as the Caribbean, Venezuela and England.

These patterns mean that, while there are some concentrations of offshore petroleum commute workers (e.g. in East St. Mary Parish, Louisiana, and in the Aberdeen area, Scotland) and commute mine workers (e.g. in Saskatoon, Saskatchewan, and Perth, Western Australia), many workers live a considerable distance from others at the same operation or even in the same industry. In the former case, living in a center of commute activity gives workers increased job flexibility in that they may be able to move from work at one commute operation to work at another without having to change their residential location.

Commute employment may also be used to sustain a rural lifestyle. For example, some Gulf of Mexico offshore oil workers use offshore oil employment to continue to live in rural communities in depressed economic areas, sometimes far from the coast. This has contributed to cultural continuity, "because (commute work) does not interrupt the local fabric to the very great extent that industrialization that is... factory-based would do to a society.... People didn't have to all move to Baton Rouge (to get the jobs offshore)... they are still in their same communities" (quoted in Freudenburg and Gramling 1994:42). Similar patterns have been observed in Newfoundland (Fuchs, Cake and Wright 1983), and a number of remote and aboriginal communities involved in the mining industry (Hobart 1989), although in the latter case this is often a result of government and company policies rather than individual initiative.

However, there is evidence that the commute system may also encourage workers and their families to change where they live. For example, Storey et al. (1989) found that one-fifth of Newfoundland exploration study respondents (workers and spouses, contacted independently) had moved since the start of work offshore, albeit with only 8% of all workers and 3% of all spouses attributing the move to the

work. These migration effects can be more dramatic in the mining industry, where multiple pick-up points are common. For example, as of 1987, 54% of the Polaris mine workers who had been hired in Northern Canada had subsequently relocated to the South (Storey and Shrimpton 1989:43). In this and other cases, hiring policies designed to benefit northern and peripheral centers were largely counter-productive, confounded by commute arrangements which allow the commonly well-educated 'northern hires' to relocate to southern metropolitan regions. This benefits these regions but causes proportionately greater losses of income and capabilities from northern communities (see Shrimpton and Storey 1992; McBain 1995, McLean and Hensley 1994).

The review of the demographic implications of commute work (Shrimpton 1994) found that a number of economic factors had prompted such relocation: seeking commute employment, maximizing employment opportunities for other family members, reducing commute times and costs and reducing living costs. There were also a number of social factors: moving to a better physical environment, moving to a different social milieu (mostly moves between urban and rural settings), improving access to community services and leisure opportunities, moving to be closer to family and friends and moving because of increasing family exclusivity. The last, as identified by Solheim (1988), sees workers and their spouses progressively withdraw from community into family life as a result of commute work.

It is likely that the dispersion of workers' places of residence has increased over time. The last twenty years have seen relative declines in transportation and communications costs, and hence the costs of living at considerable distances from the workplace and pick-up points. Furthermore, the Gulf of Mexico and North Sea have seen an increase in deep water operations using longer rosters, permitting a yet wider dispersion of workers' places of residence. However, for the reasons outlined above, they may also lead to the further development of concentrations of workers in centers of commute activity and hence employment choice.

3.2 Expenditures

The expenditure patterns of offshore workers, including payment of local and state taxes, are largely dependent on where they live, and can make a significant contribution to the economy of those communities and regions. However, as was discussed above, they may be at a considerable distance from the workplace. Thus, for example, 1984 data on employment in Louisiana's offshore oil and gas industry showed that, of a total of 21,847 person-years of employment, 2167 (10%) went to residents of other states. If this is multiplied by the average income for all jobs directly related to offshore activities, the total loss of wages and salaries to other states is about \$70 million (Gramling 1989:60). This is in fact likely to be an underestimate given that out-of-state workers commonly have higher than average incomes. Furthermore, as was noted above, a number of factors suggest an increasing dispersion of workers' places of residence.

It should also be noted that some commute workers take advantage of the extended periods away from the workplace to spend relatively large amounts on travel and recreational activity. In particular, some single workers, young couples without children and older 'empty-nest' couples engage in considerable amounts of recreational travel, spending significant amounts away from their home communities and regions, reducing local and regional economic benefits.

However, there are some exceptions to this pattern of dispersed expenditures. For example, McLean and Hensley (1994) report that the Red Dog mine brings substantial economic benefits to Alaska, in part because it is a joint venture with the local Inupiat Eskimo community. The local benefits from the operation included, every year, about \$5 million in wages, \$9.8 million in payments to a larger area membership, royalties of \$3 million (1992) and payments to the Northwest Arctic Borough of \$2 million.

3.3 Non-Commute Employment

Some commute workers have secondary paid employment while in their home communities. This may include the use of their commute employment skills (for example, electricians and welders at commute operations will also use these capabilities in their secondary, home community, employment) and/or involvement in traditional local farming or fishing activity. However, there is only limited information about secondary non-commute employment because much of this work is undertaken on an informal basis, as part of the underground economy, with the income undeclared so as to avoid taxes.

There is evidence that the likelihood of engaging in secondary paid employment increases with the proportion of time spent at home. Thus, for example, Aase (1990:13) found that '19% of the households [of Norwegian platform workers, who spend only four weeks in eleven offshore] run some sort of private business in addition to wage labor in the North Sea.' However, only 10% of Newfoundland exploration workers, on a 3/3 schedule, engaged in such secondary work (Storey and Shrimpton 1989), while only 3% of Polaris mine workers, who after travel is included only spent three and a half weeks at home for every eight at the mine, did so.

The numbers with second jobs may also be a function of the worker's skills and experience and the amount and type of work available locally, especially when the latter calls for periodic bouts of labor. For example, commute work has been shown to complement agricultural activity, in both the petroleum (Aase 1990:16) and mining (Storey and Shrimpton 1989; Dunlop, *pers. com.* 1991) industries. In Saskatchewan, as in Western Australia, commute mining has been described as 'a *de facto* agricultural support program,' since mine workers can contribute both capital and periodic labor to help support family farms. However, in many cases, this contribution to the family farm or other family business does not take the form of paid employment. Similarly, some workers spend some of their time at home in hunting, fishing, collecting firewood for home heating and other activities, either to help supplement the household income (see, for example, Fuchs, Cake and Wright 1983:126-127, and Hobart 1989:32) or, through sales to others, contribute to it.

There is also evidence that the employment patterns of the spouses of commute workers are distinctive. Some see paid employment as a constructive use of time and a means of maintaining an independent existence, while for others, and especially parents, the partner's absence is a constraint on taking employment. Furthermore, the desire of many couples to maximize the compatibility of their work schedules often sees commute workers' spouses seeking work that has a flexible schedule; i.e. part-time, temporary, supply or self-employed work (Storey and Shrimpton 1989, Solberg 1988).

In preliminary analysis of a small (N=156) sample of UK North Sea oil workers' spouses, that is biased towards those of 'white collar' employees, Parkes and Carnell found that 36.5% were not in paid employment, 40.4% worked part-time, and 23.1% worked full-time. These are similar to the figures for married women in general in the UK labor force, with about 34% not in paid work, 44% in part-time work and 22% in full-time work (Lewis, *pers. com.* 2000). While 32.2% of those in part-time work reported their hours were flexible, this was only the case for 16.7% of those working full-time. The presence of children in the home was a major factor in employment decisions; whereas 63.2% of those with no children worked full-time, only 17.5% of those with children did so. Those who did not hold paid jobs mostly indicated that this was for family reasons and to be with their partner, while those in employment cited career and financial reasons (Parkes, *pers. com.* 2001).

3.4 Local Investment

Some commute employees invest their earnings and time onshore in setting up new, typically small, family businesses. This form of entrepreneurship can make a valuable contribution to the local economy. For example, about half of Norwegian offshore oil households which had set up businesses had done so in the agriculture sector, while a quarter were in retailing and the rest in personal services, transportation, engineering and small-scale manufacturing (Aase 1990). This is commonly an extension of commute workers' secondary employment, involving the use of the same skills employed in their commute work.

Offshore incomes can also provide 'venture capital' to start and develop these business, with the periods onshore also allowing the commute workers to invest his or her 'sweat equity' during these crucial initial years. For some young workers, commute work is seen as a short-term venture employment strategy designed to 'set them up' by establishing a non-commute business. However, little is known about how many seek to do this or what proportion of them escape the 'golden handcuffs' associated with high commute work incomes (Shrimpton 1994:73).

3.5 Community Life and Social and Recreational Services

As has been discussed above, commute work removes some citizens from communities on a part-time basis. This affects their ability to participate in, and contribute to, formal and informal social events and networks and poses particular challenges for those responsible for or involved with providing those services.

Workers may not be able to participate in activities which require regular attendance, such as team sports, jury duty, and meetings of church groups, local government councils and committees, school boards and business groups. They may also be absent from occasional local or community events, such as parent-teacher meetings, school graduation ceremonies and church fetes. For example, James (2000:29) quotes an offshore oil worker living in New Iberia, Louisiana, who is on a 2/2 schedule:

You don't get a whole lot of softball dads or t-ball dads or whatever, with that scheduling. It's so hard to do. My little girl is in the girls' basketball league. There's no way I could help coach that. I could help when I come in but, you see, that's one other thing, they try to throw into that 14 days. Your schedule is pretty full as it is.

Depending on the numbers of local residents involved in such work, community groups or organizations will first need to appreciate the problems and then find locally appropriate ways to address them to try to retain commute workers, and sometimes also their families, as active community participants. This is neither easy, nor always successful. In Kalgoorlie, Western Australia, for example, much of the younger male labor force is engaged in mining, with many involved in commute work or locally based extended workday operations. These time constraints have resulted in difficulties in finding sufficient players for local Australian Rules football teams. No immediate solution to the problem has been found (Storey, 2001b).

As was discussed above, research into the implications of commute work for health and safety, including employee assistance program referral information, also indicate that commute work generates particular types of demands for a wide variety of counseling and health care services. These data primarily focus on the commute workers, but research into the effects on their spouses and children also suggest particular patterns of demand.

4.0 RESPONSES TO COMMUTE EMPLOYMENT ISSUES

4.1 Introduction

It is clear that employer initiatives in such areas as work schedules, accommodations, transportation, communications, hiring, orientation, counseling and family policies and services can optimize the effects of the offshore and other commute employment in respect of all of the above issues. Regulatory authorities, trade unions, local government agencies, community groups and others, including the workers and families themselves, may also have an important role to play. Such optimization can have benefits for employers, workers, their families, their communities and, more generally, local society. These are discussed in detail below.

4.2 Work Schedules

The work schedule at commute operations commonly brings together a roster arrangement, whereby employees work one or more weeks and then have a similar period at home, with shift work, likely involving the use of extended work days. However, as has been discussed above, the oil industry in particular has seen an increase in the number of workers on irregular or 'call-out' schedules. This section of the report discusses these different schedules, their effects, and employee and family preferences, primarily based on Parkes (1998).

Roster and Shift Arrangements

Where regular rosters or rotations are used by the oil industry, they vary for different types of workers, different employers and in different parts of the world, and change over time. The stay offshore is commonly a multiple of seven days, with 7, 14 and 21 being most common, but workers involved in offshore construction and hook-up work extended and irregular schedules, while contract and other personnel who provide short-term specialist assistance have very irregular schedules, or are 'on-call', depending on operational requirements. Cost reduction initiatives have seen a widespread trend to longer and more irregular roster patterns.

Most workers with a regular roster are on a symmetrical pattern; that is, they spend the same number of days away from, as at, the offshore workplace. For example, Parkes and Clark (1997) found that 72% of a sample of UK offshore workers was on a 2/2 schedule, 14% on a 3/3 pattern and 10% on 'equal sixes' (five 2/2 rosters followed by six weeks of vacation). Only 5% were on an asymmetrical pattern (2-3). However, most workers in the Norwegian, Danish and Dutch offshore, where labor legislation which conforms to the European Social Charter limits the number of hours that can be worked in a year¹¹, are on asymmetrical rosters. They work two-week periods of work offshore, alternated with periods of three and then four weeks away from the workplace.

In the case of both symmetrical and asymmetrical patterns, it would be a mistake to equate the non-work period with time at home, since some of it is taken up with the work-related commute to and from the offshore. This can be especially the case for those workers commuting internationally. Installations in particularly remote locations tend to use longer rotations; the International Labor Office give examples of US nationals working 4/4 in Asia, and Europeans and Filipinos working 6/6 and 3 months on/2 months off, respectively, in Nigeria (ILO 1993, quoted in Slaven, Stewart and Flin 1996).

A variety of rotations are used at commute mines. A 1996 inventory found the majority of Canadian mines using the shorter patterns, with a 1/1 schedule (i.e. seven days at the mine, followed by seven away from it) being the most common, worked by 45% of all commute miners. The 2/2 pattern had shown recent growth, and accounted for 36% of the commute workforce. Very short rotations (4/3 days and 5/2 days, mostly used by management personnel) also seemed to be increasing, while longer and asymmetrical rotations were in decline (Community Resource Services Ltd. 1996)

¹¹ The UK implemented this 1993 Directive (93/104/EC) in November 1998, but has exempted offshore workplaces until August 2003.

The longest Canadian rotation is used by an operation that is exceptional in many ways. Polaris, a lead/zinc mine on Little Cornwallis Island in the High Arctic, is the most northerly base metals mine in the world. As was noted above, its workers have their homes in all regions of Canada, with a few commuting on an international basis. This is made possible by the transportation policies (the company provides a chartered shuttle between the mine and Resolute, on nearby Cornwallis Island, and pays air travel costs between there and any commercial airport in Canada) and the long, asymmetric, rotation. The longest pattern at Polaris (in fact there is considerable flexibility) now involves eight weeks at the mine and three or four at home.

Growth in commute mining in Australia has been even more recent and dramatic; some 64 mines are known to have opened since 1980, more than 50 of them since 1987 (Storey 2001a). A range of different rotation patterns is used between and in different mines, but data are not available on the numbers using the various patterns. However, unlike Canada, asymmetrical schedules are the norm, with most employees spending longer at the workplace than away from it. Of 35 operating mines for which work pattern data were available, only twelve use a symmetrical system (seven using 1/1 and six using 2/2) for all or some of their labor force. (However, this includes the huge Argyle diamond mine, where the over eight hundred workers are on 1/1 or 2/2 rotations.) The most common patterns are 2/1 and 3/1.

Some Australian mines use highly asymmetrical patterns, primarily for contractor rather than operator personnel. A 1991 survey found seven using a 6/1 pattern, and two each using 7/1 and 13/1 schedules. These work/non-work ratios of 6/1, 7/1 and 13/1 compared with ratios of only 2/1 and 3/1 at Canadian mines with asymmetrical patterns (Storey and Shrimpton 1991). There have been serious concerns that Australian contracting companies, in Western Australia in particular, have been significantly extending the work schedule of their employees. In a notice to mine managers in June 1996, the State Mining Engineer for Western Australia pointed out that mine managers, as principal employers would, under Duty of Care regulations, have to be able to justify allowing their contractor's employees to work twelve hours per day on extended work cycles, in some cases up to thirteen weeks on and one off (Storey, 2001b).

Canada and Australia, given their large unpopulated areas and important minerals sectors, are the largest global users of commute mining. The United States has one mine (Red Dog) operating, and others planned or under development, in Alaska. Red Dog uses a 4/2 schedule, combined with liberal leave policy, in order to facilitate the maintenance of subsistence lifestyles by the Inupiat eskimo workers (McLean and Hensley 1994). The only other US commute operation is a sulphur mine in Louisiana; this is interesting primarily because it is located offshore and functions in essentially identical fashion to nearby oil platforms. However, both its managers and workers regard themselves as being in the mining industry, with its distinctive management and work cultures.

Commute mines have also been identified in Columbia, Chile, Indonesia and Papua-New Guinea. Very little is known about the distribution of the places of residence of the workers at these mines, or other aspects of their operations. However, there is evidence of different rotation and transportation policies being used for 'locals' and 'expats', with the latter spending extended periods in a major regional city or their country of origin. Such a system is also used for the expatriate management personnel at third world mines that do not otherwise use a commute system.

Twelve hour shifts are the norm in the oil industry, although some specialized employees may be on other schedules or on-call 24 hours a day, and some UK North Sea construction workers are reported to consistently work 15-hour days (Oil Industry Liaison Committee 1991). Collinson (1998:311) indicates that some UK contract employees work longer hours than are prescribed by management so as to protect their income and employment. Parkes and Clark (1997) found that nearly 40% of UK offshore personnel report working more hours than the standard week, with 13.8% (mostly management personnel) reporting in excess of 100 hours of work in seven days.

While some positions (especially on Gulf of Mexico production platforms, where there are generally few workers on night-shift) normally only require work during a day shift, others involve day and night shifts; in the case of fourteen day and longer work patterns there is commonly a mid-rotation split shift when employees change from night to day shifts, or vice versa. Similarly, most Canadian, Australian and United States commute mines use extended, commonly 11 or 12-hour, workdays. Shift work is common, although the numbers working night and, especially, split shifts appears to be less than in the oil industry.

Health and Safety Effects

There is a large literature on shift arrangements, health and safety. Offshore oil and mining operations are only two of many work settings using extended and changing shifts, and the findings of that research are applicable in terms of the implications of different shift patterns and arrangements. What is unique about commute work is the combination of these shifts with commute patterns. In this connection, it is interesting that a Saskatchewan commute uranium mine had a significantly higher rate of employee assistance program use than did a non-commute potash mine, even though both used 12-hour shifts. The rates of use were particularly high in respect of sleep and emotional problems (Coates 1991).

Despite the diversity of commute patterns, Parkes (1998:9) notes that:

almost all the existing literature on health and psychosocial factors among North Sea personnel, relates to individuals working 2/2 schedules; only rarely have different offshore work/leave patterns been compared in terms of the health and performance of personnel. One such study, carried out on drilling rigs in the Caspian Sea (Alekperov, Melkumyan and Zamchalov 1988), examined the physiological effects of work/leave patterns; on the basis of the results the authors recommended one-week, rather than two-week, work/rest cycles.

Parkes and Clark (1997) also found that personnel working a 3/3 schedule were significantly less satisfied with their work/leave pattern than those working a 2/2 schedule, and an anticipated change from 2/2 to 3/3 schedules was perceived very negatively by those concerned. Interviews with workers' wives revealed unease about a 3/3 pattern, although this topic was only one of a number of issues of concern to them. However, a small proportion of workers (mostly on drilling rigs) preferred the longer work/leave cycle¹², and data from a pilot study provided no clear evidence of adverse effects on mood and sleep of a third week offshore.

Shrimpton and Storey (1993:12) found that a majority (52%) of Newfoundland exploratory rig crew, working a 3/3 pattern, would prefer a shorter rotation. However, only 6% of supply boat crew and 14% of their spouses wanted a shorter rotation, despite the fact that they worked a 4/4 schedule.¹³ This likely reflects difference in the labor force, work and work cultures. The rig crew, most of whom had only a relatively short-term involvement in the industry or other marine occupations, viewed the rigs as alien, individualistic, hierarchical and authoritarian workplaces. The supply boat crew, in contrast, were mostly long-term marine crew with a positive, familial, relationship with fellow workers and 'the skipper'. Their time loading and unloading in harbor also facilitated contact with family and friends.

Canadian commute mining research (Storey and Shrimpton 1989) found that, given a choice, 76% of married Key Lake mine workers wanted to continue on the current 1/1 schedule. Only 18% wanted a shorter schedule and 6% a longer one. Workers spouses were even more likely to want the current schedule; that was the preference of 89% of respondents, with only 9% and 2% respectively wanting a shorter or longer roster. However, 60% of Polaris workers wanted a roster shorter than the 9/3 pattern then in effect. (It should be noted that respondents were only asked about changes to the work pattern, with no change in the total number of days worked per year.)

¹²One reason for such a preference is that workers and their families on a 3/3 schedule can take two-week vacation packages during their periods onshore (Parkes, *pers. com.*, 2000).

¹³This contrasts with James' finding, on the basis of research in New Iberia, Louisiana, that 'the longer schedules – 28-and-28 (days) in particular – are much more disruptive of families' (James, 2000:28).

However, while there has been little systematic research into the effects of an irregular or flexible schedule, the evidence that is available indicates that it is the most unpopular pattern of all. For example, a study of 20 UK offshore workers concluded that those on uncertain schedules were the most negative group, given “their lack of control over their personal and professional lives” (Mauthner, *pers. com.* 2000). Similarly, James (2000:29) describes how this schedule is the “most problematic of all... for a worker’s involvement in home and community.”

The uncertainty and conditions associated with some contract work can also be highly problematic. Collinson (1998:321) describes how many North Sea contract workers he surveyed acknowledged that the economic and time-space pressures of offshore employment had:

considerable negative consequences for their ‘free-time’ and the quality of their onshore relationships. On the platforms asymmetrical power relations and various inequalities subordinated contract workers. Their lack of stable employment, sickness benefit, holiday provision and employment protection, the practices of ‘NRB’ and ‘bumping,’ the working of longer hours and shifts than formally prescribed and the absence of platform privacy all had significant effects on workers’ lives, both offshore and onshore.

However, Parkes and Clark (1997:81-82) found few differences between the psychosocial survey responses of UK North Sea operating company and contractor personnel, with the latter in fact being less pessimistic about future job prospects. Parkes and Clark (1997:82) believe this reflects in the structure of offshore employment in the mid-1990s, because:

the transfer of a significant proportion of those who were previously operator personnel to contracting companies, and the tendency to impose work conditions on operating company personnel that are less favorable than they enjoyed previously, has had the effect of eroding differences between the two groups. In addition, some companies and installations have made deliberate attempts to reduce distinctions between the two groups in order to promote effective teamwork.

Parkes (1998) provides a comprehensive review of the literature on the effects of commute work on stress, health and safety on North Sea offshore petroleum installations. This includes examination of the evidence as to the effects of long work hours in conventional work settings. For example, she reports that Proctor et al. (1996) found that, controlling for possible confounding variables, overtime hours predicted impaired performance on several tests of attention and visual-motor skills:

The results showed that 20 hours overtime (i.e. a total of 60 hours work in seven days) gave rise to substantial performance decrements, ranging from 94% for the various tasks examined. Furthermore, measures of negative mood were directly related to overtime hours and to the number of consecutive days worked. These findings should be seen in the context of the standard 84-hour week worked offshore (Parkes 1998).

She concludes that these long hours raise serious questions about cumulative fatigue, reduced performance and impaired well-being among offshore management personnel.

Parkes (1998) also discusses the health effects of shift work, and notes that onshore research indicates that prolonged shift work over a period of years appears to have cumulative adverse effects on sleep patterns and health, not accounted for solely by increasing age. However, the pattern at commute operations can be more complicated, with workers involved in round-the-clock activities (e.g. production, maintenance, and drilling) being exposed not only to extended shifts and demanding work, but also to the need for adjustment to day/night shift changes. The scheduling of shifts poses particular difficulties offshore as rotation patterns are constrained by the transportation schedules and limited availability of accommodations.

The most common pattern in the North Sea sees a shift change at the mid-point of the two-week period offshore, with night work usually being scheduled for the first week.

Consequently, personnel have to adapt to night work on arrival offshore, and to re-adjust back to day work after seven night shifts, in some cases with no more than five hours break between the last night shift and the first day shift. A potentially more favorable pattern in which shift rotation takes place on alternate tours (either 14 days or 14 nights being worked on any one tour), although successfully implemented on some installations, has not been widely adopted in the UK sector.¹⁴

Lauridsen et al. (1991) used a wide range of self-report health indicators, including measures of sleep disturbance, use of sleeping medication, headaches, muscular tension, and stomach problems, to examine the health implications of North Sea shift patterns. Shift patterns involving rotation tended to show a poorer profile on the health-related measures than non-rotating patterns, the least favored rotation pattern being 00.00 – 12.00/12.00 – 24.00. Many of the personnel working this pattern experienced problems associated with the demanding circadian adjustment required. A recent study of offshore personnel (Parkes and Clark 1997¹⁵) compared day work and day/night rotating shift work in terms of minor health problems, taking into account the fact that work patterns tend to be confounded with job types (e.g. production and drilling often involve rotating shifts, whereas other jobs, e.g. administration, typically involve only day work); sleep disturbance and gastric problems were found to be predicted by day/night shift work, but not by job type, whereas the opposite was true of musculo-skeletal problems and headaches.

However, health is not the only important aspect of shift scheduling; alertness and performance are equally crucial issues. The effects of shift rotation on mood and cognitive performance (reaction time, memory, and reasoning) changes over the offshore work cycle have also been examined. In this study (Parkes, Clark and Payne-Cook 1997), personnel were assessed (using computer-based tests) three times during each of nine 12-hour shifts spaced over the two-week period. The shift rotation conditions examined were 14 days, 14 nights, 7 days followed by 7 nights, and 7 nights followed by 7 days. Consistent with other data (Lauridsen et al. 1991), shift patterns that involved a mid-cycle shift-change showed significantly poorer profiles of subjective alertness, sleep, and performance during the second week as compared with the corresponding 'fixed-shift' (i.e. 14 days or 14 nights) patterns.

Further evidence of the effects of shift rotation among offshore personnel comes from a recent study in which levels of excreted melatonin were compared over a two-week day-shift sequence and a two-week night shift sequence (Barnes et al. 1998). The results showed that adjustment to night work occurred within the first week, but the authors note the potential for increased accident risk during this adaptation period. The implications for shift schedules that impose a mid-cycle shift change, thus requiring further circadian adaptation at the end of the first week, are clear. From a health and safety viewpoint, therefore, a strong argument can be made for implementing 'fixed-shift' rotation patterns; however, offshore personnel strongly prefer the 7 nights/ 7 days pattern, which allows them to go on leave adjusted to a normal circadian cycle at the end of each tour (Parkes 1998:8-9).

¹⁴This is in large part because workers would rather adjust their sleep patterns at the workplace than upon their return home, where it is disruptive of their social and family life (Miles, *pers. com.*, 2000).

¹⁵See Parkes, 1999, for a fuller discussion of this research.

Changes in Work Schedules

Some employers have modified work patterns over time. Most cases cited in the literature have seen reductions in rotation durations; for example, Alvarez (1986:28) notes that Shell Expro UK cut back their pattern from 2/2 to 1/1 in response to evidence that accident rates increased after ten days. Sutherland and Cooper (1986:15) report that Dutch government legislation led to a change from 4/4 to 2/2 patterns. Similarly, most Gulf of Mexico production workers changed from a 2/1 to a 1/1 pattern in the mid-1970s, followed by drilling workers in the early 1980s. However, as has been noted above, some UK operators have moved from a 2/2 to a 3/3 pattern, while the Gulf of Mexico has seen the adoption of increasing roster lengths (Austin, *pers. com.* 2001) associated with the shift to larger deep-water operations. This has included Shell Oil, which originally used a 2/2 pattern for deep-water platforms, but in 1998 adopted it for all platforms, including ones previously using a 1/1 schedule. Such increases in roster lengths are commonly associated with cost reduction initiatives.

The trend at commute mines has been to reduce roster lengths. Surveys of Canadian and Australian mining industry human resources personnel identified various examples of reductions because 'the 12/9 (day) pattern was too long and... a possible cause of injuries,' because superintendents 'found 2 weeks away was too long for them to feel they had effective control of their area' and 'because the cycle was too long and provided too many admin difficulties' (Shrimpton and Storey, 1991b:13).

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In her study of a Queensland, Australia, mine where contractor employees were working a 4/1 schedule, Beach found that fatigue from the long roster was a major source of physical and emotional conflict. Miners and their wives identified this as a difficulty that had to be managed when the miner returned home. Both groups also expected that this conflict would result in miners quitting the work (Beach 2000:132). Clearly many workers did so, as the company reported a 1999 turnover rate of 120%. A subsequent reduction of the roster to 3/1, albeit in combination with other organizational changes, saw the turnover fall to 20% in 2000. The company is now considering a further reduction to a 2/1 schedule (Storey 2001a).

Reductions in rotation lengths are not without their costs, both for employers and workers. Transportation costs increase for the former group. For the latter, more time is spent travelling; this is seen as wasted time and, as is described above, air (and especially helicopter) transportation is a major source of stress in some regions.¹⁶ Furthermore, a shorter rotation means more partings and reunions, which have been shown to be stressful for all family members. It may also mean that a greater proportion of the period at home is spent recovering from the combined effects of the work and commute.¹⁷ However, it is not clear to what degree the greater frequency of contact reduces these stresses, counter-balancing the increased numbers of partings and reunions.

On the other hand, as was seen above (Section 3.1), longer rotations encourage longer commute distances and time, increasing travel-related fatigue. For example, even in the mid-1980s, Centaur Associates (1986) found that 9.9% of workers employed off the State of Louisiana lived in another state, and Gramling (1980) noted that the offshore workers working out of St. Mary Parish lived in 18 different states. Gramling and Brabant (1986) found that only 30% of a sample of Gulf of Mexico workers lived

¹⁶ Workers may also see their incomes fall, if there is a reduction in the total work-hours. In the case of the Queensland mine referred to above, while a roster reduction from 4/1 to 3/1 was almost universally welcomed by workers, a survey found that almost equal numbers were for and against a further change to 2/1, with those against it concerned about the income loss (Storey, 2001).

¹⁷ See also James (2000:28-29) on the relative advantages and disadvantages of different schedules, from the perspective of Louisiana workers and family members.

within 100 miles of their pick-up point, with 11.5% living more than 500 miles away. Preliminary analysis found that 20% of a sample of UK offshore workers spent more than five hours getting between their homes and the heliport, with 3% spending more than ten hours (Parkes, *pers. com.* 2000). This, combined with the helicopter travel time and the often early hours at which such travel starts, means that many workers are very fatigued when they arrive at the workplace and when they return to their homes. In the case of workers who drive home from the heliport, this increases safety concerns.

In response to concerns about the work schedule, some mine managers modify performance requirements rather than the work schedule. For example, the manager of a Canadian mine using a 1/1 pattern argued that even with that short roster 'you have to start scheduling the work differently because you know and experience that you get mentally drained... you put your main emphasis in the (early) days because... your fifth, sixth and seventh days see (productivity) getting rapidly down.' Particularly difficult and dangerous tasks were scheduled for times when attention levels were thought to be high (Storey and Shrimpton 1989:88). At the other extreme of roster length, the original manager at Polaris (with its notional 9/3 schedule) attributed its very good safety record to his open-door, non-'hard-driving', management style.

4.3 Accommodations

Parkes (1998:7), in her review of the literature on stress, health and safety on North Sea installations, finds evidence that location, size, and type of rigs and platforms are associated with psychosocial outcomes among offshore personnel. For example, Sutherland (1993) reports that Southern North Sea facilities (as compared with those in the more remote Central and Northern sectors), fixed platforms (as compared with rigs) and smaller installations, are associated with more favorable mental health. Iversen et al. (1986) find that the age of installations is also related to satisfaction among offshore employees, with personnel working on the newest of the three Staffjord platforms reporting greater satisfaction than those on the older ones. Parkes concludes that, while these findings can be attributed in part to the fact that newer platforms have improved design standards, recreational facilities, accommodations, emergency alarm systems and escape equipment (the last two of which may reduce anxiety), they do not allow causal interpretation because new installations can attract highly motivated and adaptable personnel, contributing to the favorable responses by employees on these newer platforms.

Parkes goes on to observe that:

Interpreting findings from univariate analyses poses further problems if the predictor variables are correlated; for example, recently-commissioned platforms tend to be smaller than those designed in the 1980s, thus potentially confounding age and size. Multivariate methods in which installation size, age, and type are examined simultaneously allow more precise interpretation. One such analysis (Parkes and Clark 1997), based on data from male offshore personnel (N=1462), showed that physical installation characteristics were significant independent predictors of perceived stressors, and health- and safety-related outcomes. On production installations, age and size were significant related to satisfaction with safety measures, newer/larger installations being more favorable than older/smaller ones. Platform age was also significant in relation to physical stressor scores (older platforms having higher levels of physical environment stressors), while platform size predicted perceived workload, levels being higher on larger platforms than on smaller ones. However, in general, the physical characteristics of installations accounted for less variance in outcome than psychosocial factors (Parkes 1998:7).

Parkes (1998) also notes that offshore workers are exposed to physical stressors such as noise, vibration, poor lighting and/or ventilation, confined living accommodation and workspace, and adverse weather conditions. Ratings of noise and other environmental stressors correlate with measures of psychological well-being and that the perceived workload may mediate these relationships. However, the extent of exposure to adverse physical conditions differs across occupational groups, with construction and drilling crew reporting the highest exposure levels. Parkes and Clark (1997) found that exposure to

physical stressors partially explained the incidence of minor health problems, especially headaches, in different job groups. Physical stressor ratings also varied with job level, with those in the higher grades reporting less exposure than those in basic grades. In particular, managers generally worked in office accommodation were removed from the physical stressors experienced by operating personnel.

Qualitative research into commute operations in the petroleum and mining industries led the authors on an ILO working paper (1995:56) to conclude that the physical and social environment of the accommodations can make an important contribution to the quality of life and stress-levels of workers. Two factors appeared to be particularly important: privacy and recreational facilities. In the former case, privacy was seen as a key element in coping with the extended work schedule and isolated setting, with shared accommodation placing a strain on workers in this regard. Offshore cabins are normally small and sharing is not uncommon; on older rigs and platforms this may see four-berth cabins and, in times of peak labor requirements, 'hot-bunking'. Commute mines more commonly allow each worker his or her own room, either while at the workplace or (at mines using asymmetrical rosters) at all times.¹⁸

The Health and Safety Executive *Offshore Installations and Wells (Design and Construction, etc) Regulations 1996*, which came into effect in 1999, address a number of these issues in respect of UK installations. They require that there be: no overcrowding; reasonable privacy and comfort; sufficient showers, washing facilities and lavatories; and, adequate space for workers to store their clothes. They also state that it is desirable to have double-occupancy cabins with toilet and shower facilities shared between two cabins, and a maximum of double occupancy at all times, including when there are peak labor requirements. 'Hot-bunking'¹⁹ and six-person cabins are prohibited; however, the regulations regarding accommodations design and occupancy are otherwise flexible in that exceptions may be made for older installations.

Accommodations arrangements may vary between classes of workers. For example, construction and other contract workers may be allocated inferior rooms, often containing six or more bunks. Collinson (1998:318-319) notes that the contractor accommodations on one of the two UK sector platforms he studied in the early 1990s were nicknamed 'skid-row' because of their dilapidated state. In contrast, a company production worker noted that he was 'lucky, I have a cabin to myself so I can relax and cut myself off', while senior managers had the additional advantages of their own television and telephone. Privacy may also have a gender dimension: Collinson also notes that, in interviews with UK platform workers, 'while men complained about the lack of privacy in the cabins, women were much more concerned about the lack of privacy in the male-dominated public spaces of the platform'²⁰ (320).

The increased privacy provided by having one's own room can, however, reduce off-duty social interaction between workers. This can be exacerbated when employees have televisions in their cabins. One Norwegian Offshore Installation Manager countered this, and improved the social atmosphere on Statoil's Statfjord A platform, by installing a bar which served only non-alcoholic drinks (Flin 1996:77). However, space constraints mean that the provision of active and passive facilities offshore is usually limited, especially on rigs and older platforms, and Collinson (1998:318) notes that production workers have preferential access to facilities on some platforms. As discussed above, modern platforms may have more and better facilities, including cinemas, gymnasium, weight rooms and saunas. Commute mines are able to provide better recreation facilities, and there is also normally an opportunity for workers to spend time away from the mine site (for instance, fishing or canoeing on local lakes and ponds). Some mines offer baseball diamonds, tennis courts, swimming pools, running tracks, golf courses and cricket/football fields.

However, the recreation facilities are necessarily much more limited in the case of small platforms. For example, the Gulf of Mexico contains large numbers of near-shore operations with single-figure crewing.

¹⁸Recent European Union regulations require that even construction camps provide each worker his or her own room, equipped with an en suite toilet, shower and sink. (Arnalds, *pers. com.*, 2000)

¹⁹Hot-bunking is also forbidden by the US Coast Guard regulations governing mobile units.

²⁰This is consistent with the findings of research into the experiences of women working at a Newfoundland oil platform construction site work-camp, who described the accommodations as 'a refuge' from the male-dominated public areas (Grzetic, Shrimpton and Skipton, 1996:39-46)

Such platforms commonly provide only a television, VCR, exercise bicycle and weights, and perhaps table tennis or a pool table. They also seldom have dedicated catering crew, with the workers expected to share catering and cleaning responsibilities. These small platforms commonly engender close social relationships among the crew; however, any tensions can be highly problematic since there is limited scope for isolating oneself from other workers.

There are differences between oil and mining industry operations in respect of the availability of alcohol. With very few exceptions, the oil industry forbids alcohol at its offshore operations, with its possession being grounds for immediate dismissal. Some Canadian commute mines and the Red Dog mine in Alaska have the same policy; however other Canadian commute mines, and all Australian commute operations (including onshore gas fields), allow alcohol in the private possession of employees and/or restricted to a bar. Such bars are commonly operated by worker social clubs, have set hours, a per-person quota and serve only wine and beer.

There has been little study of the joint effects of commute work and alcohol. Certainly, a ban or strict controls on workplace alcohol consumption increases the contrasts between the work and home/community cultures. Such contrasts are seen as problematic in that some workers have difficulty adjusting from one to the other, with negative consequences for workers and their families. Sutherland and Cooper (1986:309) concluded that 'problems with alcohol in connection with the transition from the last onshore period to work period' are an important stressor for offshore oil workers. There is also evidence of offshore workers engaging in drinking 'binges' upon return ashore (e.g., Aitken and McCance 1982 and Collinson 1998:317) which may be more harmful than more consistent moderate consumption. It is reported that some workers who have worked two weeks of night shifts offshore use excessive drinking when they arrive onshore as a means to 'kick' their bodies to a normal circadian cycle (Miles, *pers. com.* 2000).

While the design of accommodations, together with policies respecting room allocations, alcohol and the like are important, there is evidence that the overall social environment is of particular significance when it comes to worker stress. This encompasses aspects of all of the above, but is also an independent reflection of the management approach to the accommodations and related arrangements. This includes the need, especially given longer rosters, for the workers to create a 'home' at the work site. At the Polaris mine, with its original 9/3 and later 8/4 patterns and harsh Arctic location, this includes attempting to provide single room accommodations, encouraging the employment of couples (who are provided adjacent, linked, rooms), allowing workers to personalize their rooms and have small pets, and giving workers (through the social club) a say in all decisions relating to life in the mine accommodations.

Separating work and non-work life at the workplace, in so far as it is possible, is important. A clear separation of work from accommodations areas, and interior decoration that differentiates the latter from the functionality of the former, encourages this. However, the social environment is also a function of the overall work culture and the full range of management approaches and personnel policies.

4.4 Transportation

While there are or have been commute operations using boats, buses and hovercraft, with crew-boats being used for many near-shore operations in the Gulf of Mexico, most remote petroleum and mining industry operations use air transportation, with the former commonly using helicopters. While some companies have their own transportation system (for example, Taylor Energy of New Orleans operates its own helicopters, and Echo Bay Mines owned and operated a Boeing 727 to service the Lupin mine in Canada's Northwest Territories), some or all of these requirements are usually contracted.

Transportation arrangements have two major effects on employees and their families. First, transportation schedules can be inconvenient from a family perspective, and disruptions can delay the worker's arrival home and departure to the workplace, creating stress for all family members. Second, in the case of harsh environments and remote locations, safety concerns related to helicopter travel are commonly a major cause of employee stress, with implications for both the worker and his or her family.

Transportation schedules, delays and disruptions can also be a considerable concern to workers and their families. Parkes and Clark (1997:29) note that inconvenient crew change times can be disruptive. Storey et al. (1989:151) found that delays and the 'bumping' of workers because of other passenger or freight requirements were a particular stressor for employees and their families, whether they affected the departure or arrival.²¹ This requires that companies and their transportation contractors provide prompt and accurate information about travel delays.

While helicopter travel appears to be largely unproblematic for most Gulf of Mexico workers, British and Norwegian research has shown it to be a significant stressor in the North Sea, sometimes leading to workers quitting the industry (Sutherland and Cooper 1986:138; Hellesøy 1985:119). Sutherland and Cooper (1991:58) found that helicopter-related concerns were three of the top ten sources of stress for a sample of North Sea workers. These were: landing and taking off in poor weather, increased numbers of mechanical failures on helicopters, and flying in poor weather. Normal government safety regulations address the need for safe movement of personnel between commute operations and their home communities. In the case of helicopters flying over water, these may include requirements to wear life jackets or survival suits, and crew and passengers may have to undertake related training, including a simulated helicopter ditching. These requirements can themselves be stressful and there may be a need to provide counseling and information to reduce stress levels.

4.5 Communications

Difficulties communicating between the workplace and home can cause commute workers and their families considerable stress. Petroleum industry policies with respect to this vary by company, location and type of activity. At one extreme, drilling companies may ban personal communications at times when commercial confidentiality is a priority. Employers may also allow different levels of access to different communications technologies, with levels of confidentiality varying according to the location of the telephone and the system used (e.g. the telephone may be in a semi-public location, and ship-to-shore links can easily be heard on other radios). Some links, especially at international locations, are expensive, and differential ease and cost of access by different classes of worker can cause considerable resentment. Lastly, in some cases only worker-initiated calls are permitted, denying other family members the opportunity of initiating contact. This 'one-sided communication' has been noted as a particular problem (Parkes and Clark 1997:30), with spouses onshore feeling that important decisions are delayed or impeded by having to wait for the commute worker to call or return home.

However, there have been major improvements in communications in the last few years. For example, North Sea production workers commonly have unlimited use of links with their homes, using a telephone located in their cabin or e-mail²². Preliminary analysis of surveys of a small sample of UK sector workers and spouses indicated that 65% were in daily contact. In more than half of the cases, either partner could initiate this contact, while in nearly half the cases both partners had email access (Parkes, *pers. com.* 2000). In the Gulf of Mexico, it is not uncommon for children and teachers to fax or e-mail homework and school reports to offshore parents (Austin, *pers. com.* 2000), and there is a limited experimental use of Internet video. However, the use of e-mail varies with the age of workers and hence their familiarity and comfort with the technology. The increased capabilities and reduced cost of mobile phones provides another communications option for some workers, although this is limited in some settings by fire safety concerns related to battery-powered devices. Workers and families value such high-quality, low-cost and confidential links whether or not they are used with any frequency; their availability reduces tensions because family members know the links can be used if circumstances warrant.

²¹ Collinson (1998:316) indicates that this problem was intensified for some UK North Sea contract employees, who received a lower flight priority than operator personnel and might not be paid for waiting time resulting from delays

²² Some offshore production platforms, remote mines and commute construction sites are making an increased provision of internet links which workers can use for both personal communications and to access training sites and programs.

4.6 Hiring and Orientation

There is obvious merit in screening out job applicants who would find commute work highly problematic and providing effective an effective orientation program to newly hired employees. Indeed, Lightfoot (1990:1) believes the success of commute systems is 'dependent on the resources committed to, and the sophistication of, the recruitment process.' Certainly, some oil and mining companies think these factors are important in selecting employees. Some prefer to hire people with previous experience of unconventional work schedules or young unmarried or newly married workers. For example, there is a history of hiring individuals with a military background for work in the UK sector of the North Sea (Alvarez 1986, 28), while Santos is reported to favor young men with a naval background in hiring for their commute onshore gas operations in Eastern Australia (Lightfoot 1990:28). However, overall, Slaven concludes that 'it is difficult to screen personnel for the possession of qualities which would suggest a propensity for adaptability to (the offshore work pattern and environment)' (1996:13).

As was mentioned above, researchers have noted the advantages of having women in the commute workforce, and some companies (especially in the mining industry) make special attempts to hire and retain them. For example, Polaris mine sought to hire couples and female employees, while for John Willson, former President and CEO of Placer Dome, a major gold-mining company, 'the industry's acceptance of, first, female workers and, second, working partners' (i.e. couples working together at commute operations) 'has been a great success. The presence of women has enhanced all aspects of life at remote mines, improving morale, safety, productivity, cleanliness and language, and opening up a whole new qualified labor force' (Willson 1991:13).

Many oil companies now seek to facilitate the hiring and retention of women, both onshore and offshore. For example, Statoil has set a goal of 20% women's participation in management positions, and 50% candidates in management competitions, by the end of 2000 (Women in Resource Development 2000:2). Heen (1988:81) notes the benefits of having women offshore: 'the positive effect on the social environment of having women on platforms is considerable... (it) "normalizes" the atmosphere and this also lessens the differences between onshore and offshore life, which in turn makes the transitions between these two periods easier, lessening the degree of psychological change and making commuting somewhat less of a burden... Women have also (through their influence) had an impact on the material quality of the work environment'. However, it is reported that some workers' wives have concerns about having women offshore.

Given the particular implications of commute work for all family members, it has been recommended that hiring and orientation involve both the potential workers and their immediate family members. Some companies involve other family members and include discussion of the family life impacts in the recruitment process. Sutherland and Cooper conclude that it is important for companies that 'screening... identify mental well-being and include an assessment of issues such as "social support" and stability of home/family background. It is... necessary to consider the individual's suitability in terms of the interactive product of private and career worlds' (1986:7). Storey et al. (1989:153) found that such programs, 'are very favorably described by respondents to our surveys...(they) serve not only to provide information but foster good employee morale...(and) dispel myths about offshore work and thereby better prepare the worker and his or her family for what is to come.'

4.7 Counseling

As has been noted above, offshore work challenges employees and their families in various ways and leads some to experience psychosocial problems. Most will deal with these problems themselves or use informal coping strategies. However, North Sea research indicates that offshore workers derive only limited social support from other workers: 'In one study, 8% of workers on large platforms reported that a source of stress was "not having anyone to talk to". Service company personnel who travel to different platforms and rigs can feel especially isolated and lonely on unfamiliar installations where they do not feel part of the crew' (Flin 1996:77).

Male workers are likely to confide in any female colleagues and, in particular, health professionals. The latter group commonly considers such informal counseling to be one of the largest consumers of their time. In this connection, Flin (1996:79-80) notes that 'since offshore rig medics are often the first to detect or to be told of an employee's problems, then they should be provided with appropriate training in counseling. They are very conscious of their support role and are already involved in physical health promotion campaigns on their installations.'

The spouses and close friends of commute workers may also serve as onshore confidantes, although the spatial dispersal and social exclusivity of commute workers may limit this option. Offshore and industrial chaplains may provide additional assistance. Offshore chaplains are found in the UK and Atlantic Canada and are primarily concerned with the spiritual life of offshore employees. They commonly perform christenings, weddings and funerals for workers and their families, and they periodically visit and hold religious services on platforms, rigs and flotels. Industrial chaplains work at many types of workplace, including commute operations, in Australia. They are charged with addressing both the spiritual and psychological needs of workers and receive training appropriate to them both.

There are formal counseling procedures at some commute operations. For example, the Lupin Mine in Canada's Northwest Territories had a referral system to local social workers and support groups, although there are no clear policies regarding eligibility for financial assistance in accessing help. Increasing numbers of companies use a more comprehensive approach, in the form of employee assistance programs (EAPs). These were first developed in North America to provide employees and their families confidential access to a range of emotional, marital, financial and alcohol and drug related counseling services.

Most UK sector operators, and some in the Gulf of Mexico, now have such programs. In deciding to introduce one in 1989, Mobil North Sea recognized 'ample evidence of unique stress factors which can effect psychological well-being and potentially therefore mental health...(and which also represent) a potential threat to performance and productivity as well as to mental health and safety.' It also concluded that these concerns could not be addressed through the existing occupational health and safety system since 'few doctors or medics are trained in counseling skills, and employees may be reluctant to confess their anxieties to company staff in case they are deemed unfit to be offshore or in employ'. Mobil North Sea found its EAP both effective and 'excellent value for money' (Cooper 1991:211-212). Chevron and Conoco not only use their EAPs for routine counseling, but also for critical incident debriefing following an emergency (Flin 1996:80). Employee assistance programs can also have the incidental merit of providing a measure of fluctuations in the psychological well-being of the labor force.

However, all of this requires that employees be familiar with and willing to avail of such programs. This may not be the case with certain employers and in some cultures. For example, according to James (2000:14), a New Iberia, Louisiana, family counselor 'thought that few workers knew their health plan included counseling, and even if they did, he doubted many of them would seek help.' The use of such a program will be particularly low if there is doubt about its confidentiality.

4.8 Family Policies and Services

As has been described above, there is clear evidence both that the home life problems of many commute workers are in reality work problems, and that domestic problems have reciprocal effects in the workplace. The worker brings home work-related concerns and stress, and the commute system generates its own tensions in domestic and personal life. These tensions are in turn brought back to the workplace, where they may affect productivity, safety, retention and other management concerns. Furthermore, married commute workers certainly see the family life impacts as being the primary determinant of satisfaction with the system (see Shrimpton and Storey 1987; Lewis, Porter and Shrimpton 1988).

In reviewing this issue, Mearns and Wagstaff (1996:252) concluded that:

It would appear that insufficient research has been directed at understanding the work/home interface for long distance commuters in general and offshore workers in particular... The work/home interface provides a major source of stress for the offshore workforce. Management therefore has a responsibility to understand and manage this aspect of offshore workers' lives. Without understanding and appropriate management support such stresses and strains may impact workers' performance offshore.

However, the research on commute employment indicates the types of responses and interventions that may be appropriate in addressing the challenges for family life. Drawing on many of the responses and interventions already described above, they may broadly be placed in four categories (based on Shrimpton and Storey 1991c:42-43):

- Those that improve the compatibility of the work organization and family life. This includes such things as improved telecommunications and transportation arrangements between work and home, and optimizing the rotation pattern from a family life perspective. As is discussed above, this includes providing cheap, inexpensive and confidential phone links, prompt, accurate, information about travel delays, and clear and generous policies respecting emergency leaves and transportation arrangements in the case of family crises.
- Those that improve the compatibility of the work culture and home life. This involves making the workplace and accommodations more familial and less alienating, thereby decreasing the contrast between the two, and includes changes to both the physical and social environment. This includes: the hiring of women, minorities and couples and otherwise making the commute workforce representative of the population as a whole; special arrangements to keep the family together at major holidays; social events for families where there is a concentration of workers' homes; and, when feasible, site visits so that family members are familiar with the work setting.
- Those that improve self-selection during hiring and help new-hires and their families get used to a new work pattern. Despite the types of initiatives described above, there will always be families that find a particular commute schedule or commute work in general highly problematic. Many effects, positive and negative, are not immediately apparent and appropriate education and orientation initiatives help family members know what to expect, allowing them to make a better informed decision as to whether to take the job. Such initiatives also reduce the stress new-hires and their families experience in dealing with the new, alien, work pattern, help them identify and understand the positive and negative effects, and let them know how others have dealt with the latter.
- Those that provide assistance, perhaps through an EAP, other counseling program, or support group, to employees and family members requiring them. This includes self-help groups, such as the UK Offshore Women's Link Support (OWLS) that has as its prime objective 'the relief of distress for family members and friends of offshore workers who have fallen victim to tragedies, accidents or any other situation in their work or domestic life'. It operates a telephone help-line and organizes education days for wives to visit onshore facilities to give them insight into, and understanding of, the environment in which their husbands are employed (Mearns and Wagstaff 1996:251). Most spouses have only a very limited understanding of their partners' workplace and work life, and learning about them commonly reduces anxieties associated with this unknown environment.

McKee, Mauthner and McLean (2000) have examined oil industry employers' perspectives on 'family friendly' policies and practices. They report a heightened awareness of family issues, reflected in initiatives in such areas as day care, workplace nurseries, enhanced maternity and parental leaves, and concentrated work-weeks, although there are inter-company variations in willingness to adopt family friendly initiatives. Industry and corporate image concerns, new EU and UK legislation, increased numbers of female managers and examples from international parent companies are seen as drivers of this interest. However, none of this discussion specifically examines issues related to commute employment.

5.0 CONCLUSION

5.1 Introduction

Offshore oil employment has long been of interest to academics and others, primarily because it is seen as challenging relative to 'normal' work systems. In particular, considerable attention has been paid to the effects on family life, given the periodic absences of the worker. In studying this, as in looking at other aspects, much of the research has assumed the system is inherently problematic, with work-related tensions leading to conflict, the emergence of psychiatric syndromes, separations, divorces and the like. For example, Collinson (1998:306) concludes that 'research in the UK oil industry has focused on the turbulent effects of offshore work on families and on the high levels of alcohol consumed by offshore workers during their two weeks at home.'²³ Such discussion often explicitly or implicitly contrasts offshore work with 'traditional' or 'normal' work patterns.

However, 'normal' work patterns are now in fact relatively uncommon, given the increasing prevalence of compressed work schedules, shift-work, part-time work and self-employment in all industries. Just as there is now a great diversity in family forms, so there is a range of work systems that further calls into question the assumption that any one of them is 'normal', let alone 'ideal'. Each has its own mix of advantages and disadvantages, which may be particular to different individuals or families. For example, while some see self-employment as problematic because the hours of work are 'uncertain', others find it beneficial because of its 'flexibility'. Part-time work and compressed workweeks are disruptive for some, while others value them because they provide larger blocks of time for family or other interests. Lastly, as was seen from the Leaf Rapids study, different types of family may each prefer two very different work systems primarily for family life reasons.

Such preferences are seldom either absolute or fixed for all time. In the former case, most people are ambivalent about different work patterns. In the latter case, families and their preferences change as they move through the family life cycle or for other reasons. They are dynamic entities that are constantly adjusting and adapting to, or coping with, changes in family, work and broader social circumstances. This includes periodic re-evaluations of the balance of advantages and disadvantages received from the employment held by the different family members. Furthermore, the values and priorities of today's young families are often quite different from those of earlier generations; for example, McGuire's (*pers. com.* 2000) 'new outlookers' differ from 'old school' workers in terms of the ways they define themselves, the place of work in their lives, their loyalty to employers, and gender roles.

This suggests that commute work in general, and particular work schedules, will suit some individuals and families better at some, but not necessarily all, times. It also suggests there is an ongoing pattern of adjustment, adaptation and coping as individuals and families seek to optimize their work and family circumstances. However, these are not very profound or useful conclusions since they are valid with respect to all work systems. What is important, instead, is that those involved with the commute work system used by the offshore oil industry recognize and respond to its general and particular effects. The challenge in this is that commute work makes more explicit and central the work-family relationship and requires all stakeholders, and especially employers, to recognize and respond to it.

The literature cited in this report also suggests that it is exogenous change that presents the greatest challenges. For example, most Leaf Rapids families reacted very negatively to the thought that they might have to move from living in a small mining town to commute work. Similarly, Shell's Gulf of Mexico workers were very unhappy when some were required to change from a 1/1 to 2/2 schedule, and UK North Sea workers and spouses strongly objected when they had to change from a 2/2 to a 3/3 rotation. Such change is problematic both because it is imposed, with the worker and family having little or no

²³Collinson's paper itself reinforces this problematization of offshore employment. For example, the section on onshore leisure (317-318) only contains discussion of the problems offshore work poses re alcohol abuse and maintaining onshore social relationships.

participation in the decision, and because it threatens the *status quo*, the patterns of personal and family behaviors and relationships that have been built up around the existing work arrangements. The latter interpretation is supported by the evidence that, all other things being equal, it is newly-married couples who cope best with commute work, presumably because they construct their family life around the work pattern, rather than having to change some pre-existent behaviors.

Offshore workers and their families also have difficulty anticipating the effects of change. For example, as was discussed above, a shift to offshore work can provide blocks of time for parenting or to engage in recreational activity, while moving from a 2/2 to a 3/3 pattern means that less time is spent in travel, fewer helicopter journeys, fewer partings and reunions, and larger blocks of time for vacations and other family activities. However, as with all changes in work pattern, it is difficult for those involved to anticipate the full range of such effects, both positive and negative. An informed choice requires a timely availability of accurate information about the change and its prospective effects; however, the logical provider of such information, the employer, commonly is unaware of this requirement or believes it is beyond its mandate.

If change, and especially exogenous change, can be problematic, so all the more so can its extreme form, uncertainty. As has been described above, worker morale has been undermined by recent industry-driven changes in offshore operations, with mergers, cost-reduction initiatives, multi-skilling, flexible work, crew reductions, the fragmentation of work teams and, in particular, an increased use of contract personnel and irregular and call-out schedules. The threat of such changes creates an environment of uncertainty, and contract work and irregular schedules make it a day-to-day reality for many workers and families.

5.2 Limitations of the Literature

This research identified a large literature related to the social effects of offshore employment, and responses to the issues arising. However, the relevance of most of these studies to present circumstances is unclear, given the complexity and dynamic nature of offshore employment, its social context, and its consequences. As has been discussed above, most major studies of offshore workplaces and their effects were completed in the 1980s. Since that time, new technologies have changed the industry's modes of operation and labor requirements. This is especially the case in the Gulf of Mexico, given the slow shift from myriad small near-shore operations to larger deep-water projects. At the same time, new business arrangements and practices have profoundly changed the nature and effects of offshore work. In particular, contracting and flexible work arrangements appear to be having very negative effects on some workers and families.

Furthermore, much primary research consists of case studies that are dated and allow little understanding of the complexity and evolution of issues and industry practice in particular settings. Any synthesis of issues is further limited by the fact that most studies examine particular demographic groups, activity types and locations. For example, there has been limited research into the effects on single workers or minorities, little attention has been paid to the differences between exploration, development, operations and decommissioning activity, and not much is known about commute work in developing countries. There has, generally, been very limited longitudinal analysis.

In some cases, the literature is suggestive of best practice responses to the effects of offshore employment. For example, while the information on work schedules is often unclear or inconsistent, there is compelling evidence that mid-rotation shift changes have a variety of negative effects. There is also obvious merit in improving accommodations arrangements, upgrading onshore/offshore transportation and communications systems, ensuring hiring and orientation directly address personal and family life concerns, and implementing effective counseling and other family policies and services. However, the literature generally contains only limited amounts of systematic information about response initiatives and their success.

5.3 Research Requirements

Because of these limitations of the literature on offshore employment, this project has not, as was originally planned, been able to provide a comprehensive identification and description of best practices and responsibilities for them. Instead, this final section of the report describes a range of research requirements if the effects of offshore work are to be fully understood and best practices identified and implemented.

The literature does provide insights into the options for implementing best practices, with there being both a scope and a need for action on the part of industry, governments, organized labor, professional associations and the community, and for self-help. It also indicates that the beneficiaries of such initiatives include workers, families, governments and, not least, the oil industry; in respect of the last, it is clear that best practice responses can increase employee retention, safety and productivity, and that the costs are commonly modest. As such, the research described below would both allow a better understanding of offshore employment and assist the oil industry, governments, workers, families and others in optimizing, in an efficient, timely and cost-effective manner, the effects of offshore employment.

These research topics are not mutually exclusive, but may overlap, not least because difficulties in getting access to the offshore labor force may constrain the design of particular studies. These workplaces are often remote and have an increasingly wide range of employers. In the former case, the limited availability of accommodations and transportation facilities, allied to safety concerns, commonly limit access, while identifying (let alone contacting) the labor force at any facility now usually requires the cooperation of large numbers of operating, contracting and sub-contracting companies.

In the case of most of these topics, no indication is provided as to the appropriate jurisdiction or jurisdictions for any study. However, this review and, in particular, the December 2000 New Orleans workshop, have indicated the merits of international comparative research, and every effort should be made to encourage further such work. It should also be noted that in almost all cases there is a need for longitudinal studies so as to identify trends and throw light on causal processes.

Labor Force Demography. There is a need for secondary, and in some cases primary, data on the offshore labor forces in major jurisdictions. Variables of interest include age, gender, race, marital status, family structure, numbers and ages of children at home, years of commute work experience, occupation, employment-status, income, commute schedules and place of residence.

Offshore Workplace Ethnographies. Most ethnographies of offshore workplaces are from the early 1980s. Given the rapid pace of change in industry technologies and business practices, as well as in the offshore labor force and their values and expectations, there is a need for further such research. This should give separate consideration to: drilling rigs, fixed production facilities and FPSOs; the size and age of facilities; different work schedules; and the experience of company and contractor personnel, male and female workers, and offshore workers and, where married, their families. There is a particular need for such research in the US OCS given that there have been no such ethnographies in this, the world's largest offshore sector; and any current understanding of these workplaces and related issues largely comes from onshore research or is inferred from studies in other jurisdictions. This may be particularly inappropriate to the myriad platforms with small, often single number, crews.

The Effects of Offshore Work on Minorities. There has been little study of the effects of commute work on unmarried, homosexual, ethnic and aboriginal employees and their families, or extended, blended and other family forms. Research is needed to investigate the effects on these groups. Special attention might be paid to the experiences of the small numbers of Hispanic workers in the Gulf of Mexico, given that many view the hiring of more such workers as critical to addressing current labor shortages.

The Effects of Offshore Work on Women Employees. While there is a considerable literature on women working offshore, most of these studies come from the 1980s and are based on very small samples. There have been major industry and social changes since that time, and there are more women working

offshore in some jurisdictions. As a result, there is a need for new study of the particular issues women face at the workplace and in reconciling their work and family lives.

The Effects of Irregular Schedules. Call-out and other irregular work schedules are increasingly common, and unpopular with workers and their families, and they have been subject to very little systematic study. There is a need for studies of this phenomenon and its effects. Research methods might include key informant interviews to establish the employers using it and the types of work involved, the trends in its use, and the reasons it is increasingly common. Such interviews could also serve to investigate the effects of its use, and possible responses, from the employers' perspectives. Employee and family surveys are needed to establish the effects on them and possible responses.

The Effects of Contract Employment. Like irregular schedules, contract employment is increasingly common, and has been the subject of little study. There is need for research into it and its effects. Such research might use key informant interviews to find out about its use, effects and possible responses, from the employers' perspectives, while employee and family surveys could establish their views as to effects and possible responses.

Differences between FPSOs and Fixed Platforms. There is evidence that, relative to fixed platforms, the work environment on FPSOs provides a specific set of human factors challenges. In particular, a ship-based workplace is much more subject to wave, wind and other environmental effects. Given this, there is a need for studies of the human factors-related effects of the introduction of FPSOs. Such studies might use interviews or surveys of workers, including some who have transferred to FPSOs from fixed platforms, and the families of married workers. An issue of particular interest is the appropriate training and prior experience of FPSO crew.

Gulf of Mexico Labor Mobility. The last few years have seen an increasing use of deep-water platforms in the Gulf of Mexico. These provide a very different work environment from the types of platform that have historically dominated operations in the region. This raises questions about ability and willingness of the existing labor force to move to work on these new platforms, and the consequences of such a change for them and, where married, their families. The main research tool in any research might again be interviews or surveys of workers, including some who have transferred from conventional to deep-water facilities, and with members of the families of married workers.

Best Practices: Regulator, Oil Company and Contractor Perspectives. This report has shown the paucity of systematic information on government approaches and regulations, and industry policies and practices, respecting responses. There is a need to address this with the main goal of identifying best practice responses from an industry perspective. The issues investigated should include work schedules, accommodations, transportation, communications, hiring, orientation, counseling and family policies and services. Specific consideration should be given to recent and likely changes in industry technologies and business practices, since they are known to influence requirements and options with respect to these issues. The research should also seek to collect information on the costs and benefits of such practices.

Best Practices: Employee and Family Perspectives. It is also highly desirable that best practices be assessed from the perspectives of offshore employees and their family members, probably through interviews and focus groups that would see a structured discussion of offshore work and related issues and best practices.

Accommodations Design and Policies. There is evidence that the offshore accommodations design and policies have significant effects on workers. Accommodations-related regulations commonly also cause problems and costs for companies transferring mobile equipment (e.g. drilling rigs and floating production platforms) between jurisdictions, when different regulatory standards require the modification of the accommodations design and/or arrangements. Such research should use structured interviews of selected key informants to collect and analyze information about the design of offshore accommodations and related regulations and policies. This might lead to a small international workshop on best practice design regulations, policies and practices respecting accommodations issues.

Offshore Employment in Underdeveloped and Developing Countries. While a number of such countries, including Angola, Brazil, China, India, Nigeria and Thailand, are known to have large numbers of offshore oil workers, little is known about their numbers, characteristics and working conditions, or the effects on their lives, families and communities. These issues are of international concern given the global nature of the industry, with many of the operators and contracting companies, and some of the labor force, likely to be based in the US and other major economic powers.

Research Workshops. It was clear to the New Orleans workshop participants that there would be great value in holding further such international meetings on a regular basis. They should again bring together regulators, consultants, academics and industry representatives from various jurisdictions, preferably including Norway given that country's different onshore culture and regulatory approaches. Such workshops should discuss emerging issues, new and ongoing research, data availability and requirements, and other offshore employment topics. Each might also focus on one or two particular issues identified, in advance, as being of special interest. One option would be to hold such workshops in conjunction with the Society of Petroleum Engineers' biennial international conferences on Health, Safety and Environment in Exploration and Production. These have increasingly been concerned with human factors and community issues.

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APPENDIX 1

**Participants:
Commute Employment Workshop**

**PARTICIPANTS:
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The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.



The Minerals Management Service Mission

As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.



Moreover, in working to meet its responsibilities, the Offshore Minerals Management Program administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The MMS Minerals Revenue Management meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

The MMS strives to fulfil its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.