Title	Managing offshore shift work and fatigue risk		
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Introduction

There is an established link between fatigue and reduced cognitive functions such as slower reactions, ability to process information, memory lapses, absent-minded slips and lack of attention. This can result in adverse consequences such as accidents and injuries as well as having an impact on health; shift workers can experience gastro-intestinal disturbance, can develop sleeping disorders, may resort to sedatives or stimulants and can also experience social and domestic issues as a result of their working hours. There is a possible association with many health problems such as breast cancer, cardiovascular disease and diabetes.

This Offshore Information Sheet replaces OIS 7/2008 Guidance for managing shift work and fatigue offshore and OIS 08/2008 Policy on working hours offshore which are now withdrawn.

Background

This sheet provides advice on good practice for managing shift work, and associated fatigue risk, in the offshore industry. It is intended to supplement HSE's generic guidance (HSG256) on shift work and fatigue risk by providing emergent knowledge and sector specific information to support the UK offshore sector in fatigue risk management. Guidance provided by industry bodies such as the International Petroleum Industry Environmental Conservation Association (IPIECA), the International Association of Oil and Gas Producers (IOGP), the Energy Institute (EI) and Step Change provide detail on how to effectively manage fatigue risk and this is referred to in the following sections.

One of the key characteristics that separate the UK offshore sector from other employment sectors is the nature of the shift working arrangements. Typically, these involve an uninterrupted duty period (or tour) of 14 consecutive shifts of 12 hours each (excluding any additional overtime worked), followed by 14 days of rest resulting in an equal ratio of work and rest. Tours may be worked as consecutive days, consecutive nights, or a combination of the two with a mid-tour "roll-over" shift. Industry-wide guidelines (such as those referenced later in this guidance) for the UK offshore oil and gas sector normally limit offshore trips to 21 consecutive days, or 150% of a standard trip, after which a shore break

of at least one third of the offshore work period must be taken. With the documented authorisation of the offshore installation manager (OIM), and subject to fitness to work the extended period, the offshore work duration can be extended to a maximum of 24 consecutive days, which must be followed by at least 8 days leave. More recently, some operators have moved to adopt a standard 21-day schedule in order to reduce operational costs. 21-day tours enable an overall reduction of helicopter flights, offshore transit time and extend onshore leave periods, which for some workers may outweigh the disadvantages of longer tours.

Concerns have been raised regarding the possible effects of fatigue and performance impairment especially during the later stages of the 21-day tour period. Current research evidence does not suggest that significant performance impairments are associated with 14-day periods of day work offshore. The situation in relation to an extended regular 21-day offshore tour, however, is far more uncertain. The available evidence does not allow clear conclusions to be drawn about whether working regular 21-day tours poses significant health and safety risks. There are a number of areas of particular concern for personnel on 21-day tours. These include issues such as extended working hours, overtime, alternating shift schedules (swing shifts/short change), fatigue towards the end of the tour and the possibility of injuries / accidents. These issues may be exacerbated on older installations due to layout (access restrictions, multi-level accommodation, lack of lifts etc.) and those installations with higher than average age workforces. 21-day tours may therefore require both a more extensive evaluation of risks and the operation of more stringent monitoring systems and measures (e.g. more rest breaks (with access to a quiet area, cover, lighting and adaptation procedures) to reduce the exposure to fatigue risks.

The U.S. Chemical Safety and Hazard Investigation Board report into the Drilling Rig Explosion and Fire at the Macondo Well (2010) referred to the lack of consideration of sleep science as part of decisions to extend tours to 21-days. Despite there being limited research on performance impacts resulting from offshore 21-day tours, general sleep science shows detrimental performance effects increase as periods of consecutive shift work increases. The investigators concluded that, while there was insufficient information to identify a causal connection to the blow out, the facts raise sufficient concern for the offshore industry to address fatigue as a safety issue. The associated risks should therefore be assessed and appropriate measures introduced to eliminate, reduce or control them where relevant.

Fatigue Risk Management System

Like every other safety critical operational decision, the choice of shift working patterns and tour length are under management control and subject to risk assessment and a risk based decision process. This is likely to be an analysis of alternatives against defined objectives with the chosen alternative being the option that reduces the risks so far as is reasonably practicable.

Fatigue risk management should be integrated into the safety management system and considered and controlled in much the same way as other risks (e.g. by using a likelihood and consequence risk matrix). A system-based approach enables different controls to be evaluated and facilitates continuous monitoring and improvement.

Policy

Effective management of the risks associated with shift work requires a clear policy and associated procedures for managing shift-working arrangements as part of a safety management system; it should be based on good practice and made specific to the company's operations. The policy should detail the corporate management of risk (e.g. planning of work schedules) and the reactive management of risk (e.g. management of emergent conditions that impact working hours and fatigue). To be meaningful, this must consider not just the hours of work but also the work that is being undertaken. The Energy Institute has produced guidance for developing a Fatigue Risk Management Plan, the four key principles of which are that it should be:

1. Customised to the operation for which it is developed
2. Based on assessed risk and evidence
3. Built on the principle of shared responsibility
4. Integrated into existing management systems

Issues which should be addressed in a policy on working hours offshore, include the acceptance of the relevance of human factors in health, safety and welfare.

- Recognition of the effects of fatigue on the performance of individuals and on the implications this may have for their health and safety, and the need to ensure good quality rest periods.
- Identification of the working time factors which are specific to the company, installation and occupation. These may include travel aspects, tour length, shift patterns and changeover routines, staffing levels, organisational structures, work practices, work activity, rest periods, facilities for rest and recreation and effects of upsets such as bad weather or operational problems.
- Adoption of criteria defining acceptable norms and the extent of permissible deviations, including any compensating mechanisms such as extra rest.
- Contingency plans for unusual situations, such as the failure of personnel to turn up to relieve those currently at work, or unexpected process problems.
- Systems to monitor and record factors related to working time including, where appropriate, records of hours worked, shift patterns, etc.
- Provision of information to employees on potential health and safety problems and on the precautions to be taken.
- Adequate consideration of human factors in the design of operational procedures and in incident investigation.

Site specific policy vs multi-site policy

It is difficult to demonstrate a legal justification for operating different maximum working hours on different installations. The legal requirement is to reduce risks to as low as is reasonably practicable (ALARP) and, in practice, achieving this arrangement should be consistent from installation to installation. Any deviation would require an explanation as to why it is safe to work a certain period on one installation and unsafe on another. This is separate from the normal working day, which may be eight hours on one site and 12 on another. This is about the maximum number of hours worked and how that is controlled.

Single policy for all workers vs role specific policies

Workload can vary significantly from one task or role to another, both in terms of mental and also physical demands. Highly physical work such as on the drill floor will be limited by physical exhaustion whereas managerial roles such as the Offshore Installation Manager (OIM) are likely to be limited by mental fatigue. There are a range of specialist roles, e.g. wireline, which may combine both. However, it is not sustainable to argue that hours on the drill floor must be limited and those of specialists and managers need not. Tiredness at managerial (or specialist) level in safety critical roles is a major hazard risk. It is also not sustainable to say that manual work while tired is dangerous but managing and taking decisions about that work while tired is safe.

Corporate management of risk (e.g. planning of work schedules)

The normal operation of an installation should not rely on the working of overtime. It is recognised that, due to the remote nature of offshore installations or bed space limitations, overtime working may be necessary on some occasions. It is important that this is monitored and suitable controls are in place. Based on research into hours worked and human performance, the following controls would be examples of good practice:

- A normal limit of 12 hours work in any one shift or any period of 24 hours.
- No overtime beyond 12 hours without a risk-based judgement and decision by a supervisor. This judgement should be informed by a face to face conversation with the employee to confirm their mental and physical capacities. Ideally the decision, and the reason for the decision, should be recorded.
- Overtime on consecutive shifts should be avoided as far as possible, but where necessary should be subject to a risk-based judgement and decision by a supervisor.
- Application of an absolute limit to hours worked in any one shift or any period of 24 hours (14 hours would be considered good practice).

Some installations on the UK Continental Shelf are already operating in accordance with these practices. There are a number of installations that track hours on a daily basis and have in place a “no overtime” policy. These are well run, safe and profitable installations

operated by competitive oil companies; as a result HSE sees no barrier to the wider adoption of such polices.

Where tours extend beyond 14-day periods of work, the duty holder must be in a position to demonstrate that the significant risks have been identified, evaluated and are being managed appropriately.

Assessing risk from operator fatigue

The Energy Institute (EI), International Petroleum Industry Environmental Conservation Association (IPIECA), and the International Association of Oil and Gas Producers (IOGP) have provided guidance on how to assess the risks from operator fatigue.

The reactive management of risk (e.g. management of emergent conditions that impact working hours and fatigue) needs to consider:

- Whether the risk is ALARP and it is essential for staff to work
- The level of individual fatigue risk (subjective assessment of alertness, hours of prior sleep and hours awake)
- The duty risk (when the work will take place and what are the operational risks)
- The task risk (what they will be required to do, the sensitivity of the task to fatigue and barriers against fatigue risk)
- The mitigation measures required for all circumstances and how they will be achieved

The guidance documents referred to above have tools that can be adapted by the dutyholder to make informed judgements.

Relevant legal requirements

The Health and Safety at Work etc. Act 1974 places duties on all employers to ensure, so far as is reasonably practicable, the health, safety and welfare of their employees. The Act also requires employers to ensure, so far as is reasonably practicable, that people not in their employment are not exposed to risks to their health and safety. These duties fall on installation operators, installation owners, contractors and other offshore employers, and apply to risks relating to working time.

The Management of Health and Safety at Work Regulations 1999 require all employers to assess the risks to the health and safety of their employees, and of any others who may be affected by their operations. Working time should be taken into account in this assessment of risk.

The Offshore Installations (Offshore Safety Directive) (Safety Case etc.) Regulations 2015 require installation operators and owners to demonstrate that their management systems are adequate to ensure that the relevant statutory provisions for the health and safety of

employees and others will be complied with. The legal requirements include those for the control of risks relating to working time.

The Working Time Regulations 1998 as they apply to the offshore sector require companies to record working hours, to provide adequate records, including records of hours worked. This information will be needed by employers to monitor and ensure compliance with their own policies.

Action

The advice contained in this sheet and the IPIECA / OGP and EI documents should be used when evaluating shift work offshore, when planning to implement changes, or investigating concerns that relate to current working practices where tiredness or fatigue could be a factor.

References

Managing Fatigue in the Workplace. A guide for oil and gas industry supervisors and occupational health practitioners OGP Report Number 392 IOGP & IPIECA 2007

Offshore working time in relation to performance, health and safety. A review of current practice and evidence Research Report RR772 HSE Books 2010

OIM Guidance for Offshore Rota and Rest Periods Step Change in Safety 2012 www.stepchangeinsafety.net

Performance indicators for fatigue risk management systems. Guidance document for the oil and gas industry OGP Report Number 488 IOGP & IPIECA 2012

Assessing risks from operator fatigue. Guidance document for the oil and gas industry OGP Report Number 492 IOGP & IPIECA 2014

Managing fatigue using a fatigue risk management plan (FRMP) Energy Institute 2014

Implications from a change in tour and leave from 2-2 to 3-3 Report number R15070 TNO 2015

Drilling rig explosion and fire at the Macondo Well investigation report Volume 3 Report No. 2010-10-I-OS U.S. Chemical Safety and Hazard Investigation Board 2016

Tackling work-related stress using the Management Standards approach WBK1 HSE 2017

The Offshore Installations (Offshore Safety Directive) (Safety Case etc.) Regulations 2015 Guidance on Regulations L154 HSE Books 2015

Managing for Health and Safety HSG256 HSE Books 2013

Annex

The following are specific questions to consider as part of your fatigue risk management approach.

Does your organisation have documented procedures in relation to how shift work is organised?

Is guidance provided on your working schedules and shift work? It could include advice on:

- Sleep/rest strategies to promote adjustment to shift work.
- Monitoring of personal performance
- Diet and caffeine use.
- Travel arrangements at start and end of the tour.
- Working environment, e.g. are there high light levels in work and recreation areas? Is there a total blackout of personal accommodation rooms during daylight? Are shift workers segregated from each other, and from recreational and process noise?
- Are cabins and work schedules designed to allow sleep to be uninterrupted by call outs, either of individuals, or those with whom they share a cabin?

Do organisational processes for task risk assessment of work planning include human fatigue as a hazard?

Do organisational procedures enable excessive fatigue or tiredness to be raised by workers in a timely manner?

To what extent have the major hazard consequences of human error been included in fatigue related risk assessment?

Known hazards of offshore shift work include:

- Early starts before 6 am.
- Overtime beyond the 12 hour shift.
- Off duty call outs.
- Excessively long offshore tour without onshore breaks.
- Long periods of attention.
- Failure to provide back-up for "no-shows" or sickness absence.
- Tasks with low error tolerance combined with high consequences for that error.
- Shift and fatigue related safety critical tasks not identified or risk assessed.
- Tasks with continuous high attention or vigilance levels such as process monitoring or watch keeping.
- Tasks with high physical demands.

- Long journey times prior to travel offshore and commencing shift on arrival at the installation
- Late arrival offshore due to delays and having to start nightshift without a rest period
- Room sharing with strangers on the same shift and different sleep patterns.
- People working outside the Vantage recorded areas and not having rest before being sent offshore.
- Contractors not giving their workers suitable rest periods when onshore, such as back to back trips or being required to work during leave time onshore.

Do your performance indicators reflect aspects of the impact of shift work on health and safety?

Is fatigue included in incident investigation procedures?

Are there systems to identify individuals working excessive hours even when this is without management approval, for example through swapping shifts?

Have concerns from the workforce on fatigue been raised with management through Safety Reps and committees or at management meetings?

Useful performance indicators and measures of fatigue include:

- The amount of overtime worked.
- The use of sleep medication.
- The extent that incident and accident investigations refer to fatigue.
- The extent that near miss reports refer to fatigue or tiredness.
- A record of previous fatigue or work-load related complaints.
- The willingness of the management and supervision to take action in response to fatigue related issues.

Do internal audits include any shift work, fatigue or working hours elements?