



<b>Title</b>	<b>The Safe Approach, Set-up and Departure of Jack-up to Fixed Installations</b>		
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## Introduction

This information sheet provides guidance to duty holders of the matters to be considered, and precautions to be taken, when approaching to, setting-up and departing from a fixed installation using a jack-up rig. This guidance supersedes SPC/TECH/OSD/21, published in January 2003, which has been withdrawn.

This sheet considers the particular risk of operating a jack-up in close proximity to a fixed installation. For the purpose of this guidance, close proximity is where any unplanned movement of the jack-up while in, or near, its working position could result in collision with the host unit or subsea assets. This could be as a result of rapid and uncontrolled spud-can penetration or, in the case of a self-elevating lift-boat, the loss of position while manoeuvring on dynamic positioning (DP) to the working position.

Duty holders must consider major accident hazards involved with all operations involved in the rig-move from the moment the unit enters the 500 metre safety zone, till it is preloaded and elevated to its final position, and during the reverse operation while departing from the location.

## Background

HSE has undertaken a review of current practice regarding the precautions taken on a variety of fixed installations when conducting operations involving jack-ups in close proximity. For the purposes of this sheet, "approach" means from the time the mobile unit begins final movement into position at the fixed installation until at the final working position and, in the case of drilling units, the derrick has been skidded into position, with "departure" being the reverse operation.

In cases where there is a prolonged period between positioning the unit and skidding the derrick into final position, it may not be practicable to keep the host platform shutdown until after the skidding operation. In this case the duty holder must perform a separate risk assessment of the skidding operation with emphasis on measures to prevent collision or dropped objects onto live plant.

Precautions on the UKCS have included combinations of the following



- cessation of production until the jack-up is in position followed by concurrent drilling and production
- cessation of production until completion of drilling
- depressurising, with or without venting of the topsides plant and equipment
- shut-in of import/export pipelines (lines remain pressurised)
- venting of import/export pipelines
- ensuring only personnel who are essential to transit, jacking operations, and emergency response are present on the jack-up for transits in and between fields.
- additional risk reduction measures that would not have been in place during normal production operations

## Legal requirements

### Health and Safety at Work etc Act 1974 (HSWA)

HSWA sections 2 and 3 are relevant to defining the key legal obligations of the duty holder. In particular, the obligation of the duty holder is defined by a duty to provide and maintain plant and systems of work that are, so far as is reasonably practicable, safe and without risks to health (section 2), and the requirement for every employer to conduct their undertaking in such a way to ensure, so far as is reasonably practicable, that persons not in their employment who may be affected thereby are not thereby exposed to risks to their health and safety (section 3).

Application of sections 2 and 3 essentially requires employers to be able to show that they are taking all reasonably practicable measures based on estimating the disproportionality of sacrifice (cost) to risk reduction. In addition, **all reasonably foreseeable hazards** must be considered by employers to discharge their duty to comply with the Act.

### Management of Health and Safety at Work Regulations 1999 (MHSWR) Regulation 3

This regulation requires employers to make a suitable and sufficient assessment of the risks to the health and safety of their employees, and to persons not in their employment, arising from the conduct of their undertaking for the purpose of identifying the measures they need to take to comply with the requirements of the relevant statutory provisions. The risk assessment should identify how the risks arise and how they impact on those affected.

## Management of Health and Safety at Work Regulations 1999 (MHSWR) Regulation 5

This regulation requires every employer to make and give effect to such arrangements as are appropriate for the effective planning, organisation, control, monitoring, and review of the preventive and protective measures.

Application of regulations 3 and 5 means duty holders will identify the specific risks associated with their approach to and departure from a specific installation/location, and identify the required risk reduction measures. The monitoring and review of the arrangements will allow the duty holder to assess how effectively they are controlling the risks.

Further information can be found in the HSE publication [Managing for health and safety](#).

## The Offshore Installations (Offshore Safety Directive) (Safety Case etc.) Regulations 2015 (SCR15)

SCR15 requires a demonstration that the duty holder's management system will ensure compliance with the relevant statutory provisions (including HSWA sections 2 and 3), and that all hazards with the potential to cause a major accident have been identified, these risks evaluated and measures have been, or will be, taken to control those risks to ensure that the relevant statutory provisions will be complied with. Failure to comply with the accepted safety case is a breach of SCR15 regulation 28.

Further guidance on the management of major accident hazards and risk assessment is available in the HSE publication [The Offshore Installations \(Offshore Safety Directive\) \(Safety Case etc\) Regulations 2015. Guidance on Regulations L154](#).

The guidelines, however, do not cover the specific issue of topsides and riser de-pressurisation, or venting, during rig approach and departure operations.

## Pipelines Safety Regulations 1996

The regulations set the minimum requirements that a pipeline operator should meet to ensure adequate management of pipelines and compliance with the relevant statutory provisions. This regulation applies to all major accident hazard pipelines (MAHP) conveying dangerous fluids and non MAHP.

Regulation 15 – Damage to Pipelines, requires that no person shall cause damage to a pipeline as may give rise to a danger to persons.

## Risk assessment and ALARP demonstration

It is expected that all hazards for the approach, set-up and departure are systematically assessed, mitigation measures identified in the rig move procedure, and the residual risks demonstrated to be as low as reasonably practicable (ALARP) for every location. In addition to a site specific assessment for elevated operations in accordance with ISO 19905-1, duty holders must consider

major accident hazards involved with all operations from the moment the unit enters the 500 metre safety zone, until it is preloaded and elevated to the minimum airgap stipulated in the site specific assessment for elevated conditions and, in the case of drilling units, the drilling derrick is skidded into position, and vice versa for departure.

Duty holders must take into consideration the following hazards as a minimum, but not limited to

- plant operational status (e.g. production status – live or depressurised or decommissioned), amount of process inventory on the platform etc.
- proximity to live surface and subsurface assets (offshore installations, wellheads, pipelines, subsea isolation valves (SSIVs) etc.)
- properties of inventory (if any) on the platform (e.g. toxicity, pressure, flammability)
- location/presence of flares, risers
- inclement weather conditions during weather sensitive operations - such as rigmove operations, or in-water pre-loading etc. and available weather window during the time of the year
- rapid penetration and/or punch through of the spud can/legs identified in the leg penetration analysis
- potential for rack phase difference due to bathymetry, existing spudcan depressions, loss of hull trim/heel etc.
- seabed conditions that affect foundation integrity – debris, existing spud can impressions, scour
- complement consisting of non-essential personnel onboard the installation
- simultaneous operations (SIMOPs)
- human factors – organisational, job and individual factors that may affect a person's ability to perform safety and environmentally critical tasks
- dropped object on surface and subsea assets

## Factors affecting the level of risk during a jack-up approach, set up and departure

During the review of current practice, a study of previously accepted UK safety cases has demonstrated case specific levels of risk to assets, people and the environment, if a collision between the production installation and the approaching installation could result in the following

- hydrocarbon release caused by collision of the approaching installation resulting in loss of containment from the topsides process equipment, risers and pipelines

- toxic release caused by collision of the approaching installation resulting in loss of containment from the topsides process equipment, risers and pipelines
- during pre-loading, jacking up, down and cantilevering over the platform, the structural and/or foundation failure, jacking-system failure, or other failure which may lead to the collapse of some, or part, of the jack-up onto the installation

It should be noted the risk profile for each key stage of the operation may differ. For example, if during the time at location there has been no changes in rig position/elevation or scour seen at the seabed, the risk profile may be considered lower than when jacking up at the location for the first time.

## Operational condition of host platform

Should a duty holder be considering an approach and/or departure by a jack-up to an installation, the key issue is whether the risks are ALARP and not intolerable.

ALARP is demonstrated by ensuring that all reasonably practicable measures have been implemented, with due regard to the hierarchy of risk. This would usually result in the hydrocarbon risks being reduced by the platform ceasing production, this is based on the current practice in the UKCS and/or common industry practice for the operation under consideration.

However, it may be possible for the duty holder to argue for an option that results in a change to the risk profile in which some risks may increase (e.g. a live approach) in comparison with their current practice. This may be acceptable to HSE **providing the duty holder can successfully demonstrate that there are changed circumstances that justify adopting such an option, and provided that the new option has risks which are ALARP.**

When conducting quantitative risk assessments (QRA) it may be possible to show that the risks involved in conducting a live approach are lower, or equal to, the risk generated by shutting down and subsequent restart of production. An example of when this could be the case is when shutting in a production installation also results in shut down of dependent unattended satellite installations which will then require additional visits in order to restart them, thus generating additional risk.

It is not acceptable to move to an increased risk, i.e. non-ALARP situation, through the application of QRA and cost benefit analysis (CBA) arguments using implied cost to avert a fatality (ICAF) and cost per life saved (CPLS) ratios. Additional guidance on ALARP and CBA is available on [HSE's website](#).

## Pipelines

When planning jack-up operations, consideration should be given to the location of existing pipeline risers, pipelines and other subsea equipment in relation to the layout and safe operating limits of the Jack-up rig, including spud-can arrangements, anchor pattern, mooring lines, crane radii, lifting zones and safe lifting areas etc. In addition, other pipelines might exist which are not directly connected to the host platform but are in close proximity. In these scenarios, the duty

holder must carry out a detailed risk assessment on the potential impact of the jack-up operation and dropped objects on

- all subsea pipelines connected directly to the platform where the jack-up operation is being conducted
- pipelines within the radius of the operation of the jack-up rig which are not connected to the platform where the jack-up rig operation is being conducted
- consideration should also be given to location and protection of subsea isolation valves as it is possible for the valves to be located within the 500 metre safety zone

Additional considerations specific to pipelines are the emergency response arrangements for the jack-up rig in the event of a hydrocarbon release from a MAH pipeline.

## Human factors

Human factors refers to organisational, job and individual factors that may affect a person's ability to perform safety and environmentally critical tasks.

Duty holders should be able to demonstrate that human factors have been accounted for in their major accident hazard risk evaluation. This includes operations associated with the approach, set-up and departure of jack-up rigs to fixed installations.

To make this demonstration safety and environmentally critical tasks should be analysed to evaluate their feasibility, identify control measures and provide input into the design of procedures, training and interfaces between people and equipment.

## Persons on board (POB) limits

POB limits have been the subject of discussion between HSE and industry. Previous Oil & Gas UK Guidelines for the Safe Movement of Self-Elevating Offshore Installations (Jack-Ups) stated:

*“The jack-up should be downmanned to the minimum complement essential for the safe conduct of the jack-up move, including jacking operations.”*

Recent discussions have highlighted the risks associated with transit and jacking must also be weighed against the risks from helicopter transit. HSE's expectation is that during transit and jacking operations the installation POB should be limited to those personnel who are essential to the transit, jacking operation and emergency response only, unless the duty holder can demonstrate

1. The jacking operation and transit is of limited duration and can be completed in a single weather window, from the time of departure until the jack-up is at the stand-off location;

AND

2. The subsoil and seabed conditions present negligible risks to the jack-up. Risks of rapid spud can penetration or sliding into adjacent footprints should be assessed to be negligible.

Decisions on the level of crew present during such operations must not be based on the nature of the task the jack-up is going to complete once it has pre-loaded and jacked into its final position.

## Conclusion

Due to the nature of jack-up operations, and the proximity of the jack-up to the host installation, there are specific hazards which could result in collision between the jack-up and the host installation or subsea assets.

When assessing the risks for such an operation the duty holder should consider the controls in place to reduce the consequence of a collision to ALARP. This includes controls to prevent or limit hydrocarbon release, damage to subsea assets, damage to the structure of the jack-up and host installation, and minimising the number of persons who may be exposed to risk.

Current UK practice has shown that it is reasonably practicable for jack-up approach, set-up and departure operations to be done whilst shutting-in production from the wells and import/export from risers and pipelines on the installation being approached, and previous industry guidance recommended the jack-up is downmanned to the minimum required to safely perform jack-up operations.

HSE considers that the depressurisation and venting of the topsides and/or riser systems is the preferred inherently safe option during jack-up operations next to production platforms. However, this may not always be reasonably practicable due to configurations of the host installation. The duty holder must consider these options and demonstrate why they are not reasonably practicable. HSE will review each safety case on its own merits.

For new production installations the design must ensure that depressurisation and venting of the topsides can be safely undertaken.

Approach, set-up and departure, (or combinations thereof), to and/or from a live installation, may in specific circumstances be acceptable, but the duty holder would be required to provide a rigorous demonstration that changed circumstances apply, and that a detailed evaluation of all reasonably practicable risk reduction measures has been undertaken. Where the duty holder proposes a change to current practice, such as not shutting-in the plant, which involves additional risk, further reasonably practicable reduction measures would need to be identified and implemented, to control risks to ALARP.

Duty holders must be able to demonstrate how human factors have been accounted for in the performance of safety and environmentally critical tasks.

Personnel exposed to the risks of transit and jacking operations must be kept to the minimum required to perform those tasks, unless it can be demonstrated that the risk of additional, multiple helicopter flights to demob non-essential personnel outweighs the risk of remaining on the jack-up



due to the transit and jacking operation being of short duration, and the subsea and soil conditions at the fixed installation are good, i.e. the probability of rapid spud can penetration is negligible.

## Further information

For further information contact your designated Health and Safety Executive Inspection Management Team (IMT) Inspector