



# **A study into Onshore and Offshore Based Rescue and Recovery (OBRR) helicopters**

Prepared by **Bomel Limited**  
for the Health and Safety Executive

**OFFSHORE TECHNOLOGY REPORT**  
**2001/039**



# **A study into Onshore and Offshore Based Rescue and Recovery (OBRR) helicopters**

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## SUMMARY

The work reported in this document was commissioned by the Health and Safety Executive, Offshore Division (OD5.5), to provide specialist advice on the factors to be considered when reviewing the role of helicopters in an offshore-based rescue and recovery (OBRR) role.

To complete the work, BOMEL has brought to bear specialist expertise in the following areas:

- Aviation / offshore management
- Offshore helicopter operations, and
- Helideck operations.

Also, during the preparation of this document, there has been a process of consultation with those bodies which play a functional role in regulating and setting standards for offshore helicopter and search and rescue (SAR) operations. These bodies include:

- Health and Safety Executive (HSE)
- Civil Aviation Authority (CAA)
- Maritime and Coastguard Agency (MCA)
- Royal Air Force Search and Rescue Training Unit (RAF SARTU)
- British Helicopter Advisory Board (BHAB)

The primary objective of the work is to provide a detailed review of the use of OBRR helicopters in support of oil and gas field operations on the United Kingdom Continental Shelf (UKCS). The review sets out to address, in a comprehensive manner, the routine and key factors that are likely to arise when planning to use helicopters in this particular role.

The principal areas of review relate to the following:

- Regulations and codes of practice: clarifying issues that arise from these various documents regarding the use of OBRR helicopters. This covers such areas as aviation, the offshore environment, and international SAR policy and guidelines.
- OBRR heliops management, covering safety management system (SMS) framework methodology, policy and operating procedures, training and competence, offshore crisis management, on-scene command and control, emergency scenarios, EER (Evacuation, Escape and Rescue) plans, asset knowledge and identification, survivor priorities, rescue times, back-up facilities, additional air traffic, operating constraints and contingencies, and rehearsals.
- Offshore facilities and equipment. As a result of the fact that OBRR helicopters will operate and remain for prolonged periods offshore, the facilities provided will require close attention. This part of the overall review covers facilities for permanently-based OBRR helicopters, installations and vessels helideck performance, available landing / winching sites, communications, meteorological forecasting, re-fuelling, personnel locator beacons and other search aids, and operating constraints.

- OBRR helicopters, equipment and operations. Key factors in OBRR helicopter operations include selection of appropriate aircraft, associated equipment and aircrew. There will be a number of specific requirements that demand consideration over and above those for normal offshore helicopter operations. This covers suitability of aircraft types for the role; helicopter performance standards and response times; communications, navigation and search aids; SAR role equipment; offshore alternates and diversion policies; operational considerations; aircraft fit-for-purpose issues; meteorological forecasting and flight planning; crew operating routines; aircraft maintenance programmes and field issues; and operating constraints.
- Factors relating to helicopter recovery and rescue operations. This involves a review of historical data related to helicopter operations incidents, principally in an SAR role. Other factors are also reviewed.

Throughout the document, what are judged to be acceptable operating standards that a Duty Holder could reasonably be expected to adopt are identified. In addition, what are referred to as “factors for consideration” by the Duty Holder are set out in the text of the report in bold italicised typeface. These factors are brought together, cross-reference to the main body of the text in which they appear, in Section 7.

An appendix, supporting a specific area in the main body of the text, is also provided.

It must be emphasised that the purpose of this document is not to compare the effectiveness of a system incorporating OBRR helicopters, with systems involving other modes of transport.

# 1. INTRODUCTION

## 1.1 BACKGROUND AND CONSULTATION

### 1.1.1 Background and Acknowledgement

The work reported in this document was commissioned by the Health and Safety Executive (HSE) Offshore Division (OD5.5) to provide specialist advice on the use of helicopters in an offshore-based rescue and recovery (OBRR) role.

To complete this work, BOMEL brought to bear specialist expertise in the following areas:

- Aviation / offshore management
- Offshore helicopter operations, and
- Helideck operations.

BOMEL acknowledges the valued contributions to this research project in these respects made by the following individuals.

- Mr. John Burt (John Burt Associates Limited, JBAL)
- Capt. David Cramp
- Air Vice Marshall John W Price CBE.

### 1.1.2 Consultation

During preparation of this document, there has been consultation with those bodies which play a functional role in regulating and setting standards for offshore helicopter and Search and Rescue (SAR) operations. These bodies include:

- Health and Safety Executive (HSE)
- Civil Aviation Authority (CAA)
- Maritime and Coastguard Agency (MCA) – HM Coastguard
- Ministry of Defence (MOD), Royal Air Force Search and Rescue Training Unit (RAF SARTU)
- British Helicopter Advisory Board (BHAB).

Their cooperation is gratefully acknowledged.

This approach was adopted because the project remit required the authors to identify and explain the “Factors for Consideration” as part of HSE’s enforcement role, in assessing OBRR helicopter operations.

In highlighting the “Factors for Consideration”, the report also focuses on the extensive consultations that should take place between the Duty Holder of an offshore installation and a contracted operator providing OBRR helicopters. It is important that this consultation process can be properly demonstrated by the stakeholders because there is clearly a need for close

liaison between the areas of aviation and offshore responsibility, and the specialist expertise required for ensuring successful operations.

## **1.2 PURPOSE AND SCOPE OF WORK**

### **1.2.1 Purpose**

The primary objective of this work is to provide a detailed review of arrangements for the use of OBRR helicopters in support of oil and gas field operations on the United Kingdom Continental Shelf (UKCS). The review sets out to address, in a comprehensive manner, the routine and key factors that are considered likely to arise when planning to use helicopters in this particular role.

### **1.2.2 Scope of Work**

The work was conducted in three Phases, as described below.

Phase 1 was wide-ranging and covered review of the relevant regulations and codes, literature covering a wide range of helicopter operational topics, and SAR equipment and techniques. The review also covered the overall management of an OBRR helicopter process. Phase 2 included consultation with regulatory bodies and industry associations, specifically CAA, MCA, RAF SARTU and BHAB, to assist with validating report input in specific topic areas and jurisdictions. Phase 3 was preparation of the report.

## **1.3 STRUCTURE OF THIS REPORT**

Throughout the report, the authors have identified what are judged to be acceptable operating standards that a Duty Holder could reasonably be expected to adopt. In addition, factors for consideration by the readership are set out in the text of the report in bold italicised typeface; the following is an example:

***CAP 437 is the acceptable standard for design and operations of helidecks on which OBRR helicopters will be based and those which they will operate to and from (e.g. an alternate OBRR base).***

**Section 2** of the report gives up-to-date information on the various regulatory requirements. It seeks to clarify issues that arise from the regulatory requirements with respect to the use of OBRR helicopters.

This is followed by sections dealing with the strategy and management of OBRR helicopter operations (**Section 3**); the facilities that need to be provided for OBRR helicopters whilst based offshore (**Section 4**); and performance and selection of the helicopters that are used (**Section 5**).

**Section 6** of the report looks at those factors that may have an effect on the success or failure of OBRR operations and makes some performance comparisons with existing methods. **Section 7** brings together all the factors for consideration.

## **2. LEGISLATION, REGULATION, CODES OF PRACTICE AND INDUSTRY GUIDELINES**

### **2.1 PREAMBLE**

This section of the report gives current (December 2000) information on the various regulatory requirements. It seeks to clarify issues that arise from the regulatory requirements with respect to the use of OBRR helicopters. Three areas have been considered in relation to regulations and codes of practice:

- Aviation
- The offshore environment, and
- International SAR policy and guidelines.

Three further subsections follow, dealing with each of these aspects.

### **2.2 AVIATION**

#### **2.2.1 HSE and CAA Relationship**

The operation of helicopters in an offshore environment is long-established on the UKCS. As a result, the regulatory environment is mature and therefore acknowledges the dual enforcement responsibilities of the CAA and HSE. Individual remits of the HSE and CAA, along with the interface between them, are promulgated through a Memorandum of Understanding (MOU).

The HSE / CAA MOU is primarily concerned with the safety of helicopters which take offshore workers to and from installations. These operations are generally regarded as public transport (non - scheduled) operations.

The MOU does not explicitly cover helicopters that may be used in an OBRR role and provides no advice regarding the use of SAR helicopters in support of offshore exploration and production operations. Both SAR and OBRR helicopters have similar functions and will operate in similar environments.

*The current offshore HSE / CAA MOU covers all generic areas of responsibility and interest, and is purposefully non-specific. Therefore, the MOU does not include remits and interfaces to cover OBRR helicopter type operations (and for that matter SAR helicopters).*

#### **2.2.2 Air Operator Certificate Holder**

Throughout this document, reference is made to the Air Operator Certificate (AOC) Holder. The AOC holder in this context is the offshore helicopter operator, the certificate being issued by the CAA.

*The AOC Holder is the Duty Holder in respect of helicopter operations. Additionally, the AOC Holder will be responsible for aviation aspects of OBRR helicopter operations associated with and/or conducted from the installation.*

### **2.2.3 Aviation Roles and Responsibilities**

These have been subdivided into:

- CAA
- AOC Holder
- BHAB

and their respective aviation roles and responsibilities are described below.

#### *a) Civil Aviation Authority*

Under the Civil Aviation Act 1982 [1], the CAA has statutory responsibility for regulating the airworthiness and operational safety (including passengers) of aircraft using UK airspace. Under this Act, CAA is responsible for operation of the Air Navigation Order (ANO) 2000 [2].

In 1999, CAA's Safety Regulation Group (SRG) first published generic guidance for the aviation industry on SMS Policy and Principles. The guidance was revised and published in May 2000 to simplify the requirements and to provide greater clarity in the definitions.

The aim of developing the aviation SMS is to manage all of the risks associated with aircraft production, maintenance and operation, with the exception of those health and safety risks that fall within the scope of the HSE. The objectives and principles set down are very similar to an offshore installation's SMS, however, the contents are specific to aviation operations.

Proper interfacing of an OBRR helicopter operators SMS with that of an offshore installation Duty Holder Offshore Helicopters Management System (OHMS) should provide well defined and structured management controls, procedures and a clear audit trail for both OBRR and public transport - non-scheduled flight operations.

In respect of UKCS offshore helicopter operations, CAA's enforcement responsibilities are primarily discharged by SRG through the Flight Operations Inspectorate (Helicopters) – (FOI(H)).

Regardless of the helicopter role in support of UKCS offshore operations, CAA have advised that they will apply the same rules to OBRR helicopters as they do to public transport (non-scheduled) and to SAR operations. These rules cover all matters to do with licensing, airworthiness, operations and training.

As a matter of policy the CAA have no interest in the commercial undertakings and relationships between the helicopter operators and installation Duty Holders. The CAA's viewpoint is that they will only consult with the AOC Holder on licensing, airworthiness, operations and appropriate training issues concerning the use of helicopters in the OBRR role.

*There are close similarities with HM Coastguard SAR operations and the offshore based SAR helicopters that have previously featured in UKCS offshore exploration and production operations (e.g. Shell Expro - Brent Field).*

*Any aviation issues concerning the use of OBRR helicopters will be handled directly by CAA in conjunction with the AOC Holder. All relevant offshore issues arising will fall to the HSE and the installation Duty Holder.*

*Although a relatively recent requirement by CAA SRG, the concept of an aviation company SMS [3] is consistent with HSE policies. The AOC holder and Duty Holder should therefore jointly consider the value of interfacing (not fully integrating) their management policies, operating systems, cross referencing SMS documentation and audit programmes to provide an OHMS for OBRR operations.*

*b) AOC Holder*

Responsibility for complying with aviation rules and regulations rests solely with the AOC Holder.

Where an established AOC Holder intends to operate helicopters in a new role (e.g. OBRR role), the AOC Holder is required to submit a Supplement to the Operations Manual to the CAA for them to accept the content. The Supplement then forms a part of the AOC, which is the “licence“ to perform the activities.

Essentially, this Supplement covers any additions or modifications to the Operations Manual that may be needed to specifically address licensing, airworthiness, technical, operational and training issues as a result of the change in aircraft operating role.

It is then for the AOC holder to operate in accordance with the Supplement and to demonstrate competence (part of which involves “track record” in relevant operations and activities), management and self-regulation to standards that satisfy the CAA.

*The installation Duty Holder needs to identify the AOC Holder(s) who will provide the helicopters for OBRR operations.*

*The nominated AOC Holder(s) should be licensed by the CAA to conduct offshore helicopter operations.*

*The CAA will expect an AOC Holder to submit, for CAA agreement, any modifications that are required as a Supplement to his Operations Manual to account for any additional licensing, airworthiness, training or operational considerations should the AOC Holder intend to undertake ‘new type’ operations (e.g. OBRR) under his existing Air Operators Certificate. Thereafter, the AOC Holder is required to demonstrate operating competence, management and self-regulation to standards that satisfy the Authority.*

c) *British Helicopter Advisory Board (BHAB)*

The BHAB Offshore Committee advises helicopter operators on good practice and operating standards for helicopters supporting offshore oil and gas activities on the UKCS. Since December 1998, BHAB Helideck Sub-Committee has assumed responsibility for inspecting offshore helidecks for compliance under the ANO [4 and 5] and for issuing Certificates of Acceptance.

*BHAB's main objective is to advise on promoting the use of helicopters. However, the Offshore Committee has advised that the helicopter company operating standards that will be applied to the 'new' OBRR role are currently under review, and the subject of discussion with the CAA. Any supplement to the AOC Holder's Operations Manual for OBRR operations, required by legislation and JAA guidance, would be in addition to those standards currently applied to normal public transport - non scheduled operations.*

*The installation helidecks and facilities nominated by the Duty Holder for OBRR helicopter operations should have valid and in-date BHAB Certificates of Acceptance.*

#### **2.2.4 Aviation Regulations, Codes, etc.**

Three documents are of importance in this respect:

- ANO – CAP (Civil Aviation Publication) 393 [4]
- Joint Aviation Requirements - JAR-OPS 3 [6]
- Offshore Helicopter Landing Areas - CAP437 [5]

a) *Air Navigation Order (ANO) - (CAP 393)*

Helicopters involved in offshore support activities are normally deemed to be public transport non-scheduled operations. The following is an extract from CAP 393 [4], which sets out the basic safety standards for public transport operations.

***“Public transport operator’s responsibilities***

34(1) The operator of an aircraft registered in the United Kingdom shall not permit the aircraft to fly for the purpose of public transport without first:

- (a) designating from among the flight crew a pilot to be the commander of the aircraft for the flight;
- (b) satisfying himself by every reasonable means that the aeronautical radio stations and the navigational aids serving the intended route or any planned diversion therefrom are adequate for the safe navigation of the aircraft; and
- (c) subject to subparagraph (2) hereof, satisfying himself by every reasonable means that every place (whether or not an aerodrome) at which it is intended to take off or land and any alternate place (whether or not an aerodrome) at which a landing may be made are suitable for the purpose and in particular that they will be adequately

manned and equipped at the time at which it is reasonably estimated such a take off or landing will be made (including such manning and equipment as may be prescribed) to ensure so far as practicable the safety of the aircraft and its passengers.

- (2) Without prejudice to any conditions imposed pursuant to Article 6 of this Order, the operator of an aircraft shall not be required for the purposes of this article to satisfy himself as to the adequacy of the fire-fighting, search, rescue or other services which are required only after the occurrence of an accident.”

***The ANO sets out basic safety standards that will apply to OBRR operations.***

***b) Joint Aviation Requirements - JAR-OPS 3 Commercial Air Transportation (Helicopters)***

The UK participates in the development and application of Joint Aviation Requirements (JARs) to regulate commercial air transport operations. JARs are recognised as an acceptable basis for showing compliance with national airworthiness codes. JAR-OPS 3 [6] is the principal JAR for helicopter operations. It has applied to any civil helicopter used for commercial air transportation in the UK since 1 August 1999. [Ref: JAR-OPS 3.001 (b)]. However, JAR-OPS 3 gives no requirements regarding the use of helicopters in an SAR role, whereas it covers the Helicopter Emergency Medical Service (HEMS) in detail.

In general terms, an operator shall not operate a helicopter for the purpose of commercial air transportation other than in accordance with JAR-OPS 3. [Ref: JAR-OPS 3.005(a)].

An Operations Manual [Ref: JAR-OPS 3.200] and Minimum Equipment List (MEL) [Ref: JAR-OPS 3.030] are fundamental requirements for operational compliance with JAR-OPS 3. Both documents are the sole responsibility of the AOC Holder.

***JAR-Ops 3 contains comprehensive and detailed helicopter operating requirements that have been agreed by the Civil Aviation Authorities of participating European Countries as a common standard to regulate commercial air transport operations.***

***In the context of Joint Airworthiness Requirements it is considered appropriate to view the role of an OBRR helicopter as an amalgam of commercial air transportation, SAR and HEMS. Therefore, full compliance with JAR-Ops 3 should be expected, subject to any variations specific to the OBRR role that have been imposed and approved by the CAA.***

***The relationship between the Air Navigation Order (ANO) and Joint Airworthiness Requirements (JAR) is, that the ANO sets out the basic safety standards for regulating UK public transport operations whereas JAR-Ops 3 provides comprehensive and detailed requirements which are recognised as an acceptable basis for showing compliance with national airworthiness codes.***

c) *Offshore Helicopter Landing Areas: A Guide To Criteria, Recommended Minimum Standards And Best Practice (CAP 437)*

CAP 437 [5] provides the minimum UK standards for offshore helideck design and includes some key operational requirements (see also Section 2.2.3(c)). It also provides the basis for BHAB helideck inspections. Compliance with these standards is a requirement for the BHAB to issue a helideck Certificate of Acceptance.

*CAP 437 is the acceptable standard for design and operations of helidecks on which OBRR helicopters will be based and those which they will operate to and from (e.g. an alternate OBRR base).*

## 2.2.5 Application of Aviation Regulations and Codes of Practice

Table 1 summarises the application of key aviation regulations and Codes of Practice with regard to OBRR helicopter operations.

**Table 1**  
**SUMMARY OF KEY AVIATION REGULATIONS AND CODES OF PRACTICE**

Regulation, Code or Requirement	Comments
<b>ANO (CAP 393)</b>	Full compliance by AOC Holder.
<b>JAR-OPS 3</b>	No requirements given on the specifics of SAR and OBRR type operations.
<b>CAP 437</b>	Full compliance, with a valid Certificate of Acceptance issued by BHAB for each nominated OBRR helideck.
<b>Operations Manual</b>	Basic AOC requirement. CAA approved Supplement for OBRR operations, as appropriate.
<b>Minimum Equipment List (MEL)</b>	Basic requirement for each aircraft type. Additional equipment appropriate to OBRR operations should be identified and listed. Approved by CAA.
<b>SMS</b>	Recent AOC Holder requirement. Policy and principles covered by CAA Guidance. May 2000.

## 2.3 THE OFFSHORE ENVIRONMENT

### 2.3.1 HSE, MCA, and Marine Accident Investigation Branch Relationship

The UKCS offshore regulatory regime is the responsibility of HSE, MCA and Marine Accident Investigation Branch (MAIB).

HSE's role with respect to marine operations offshore and the interfaces with MCA and MAIB are also promulgated through a MOU. However, on the specific issue of SAR activities relating to offshore operations (using marine and / or helicopter assets, etc.), the MOU is silent.

*The HSE / MCA / MAIB MOU does not include any reference to SAR activities (marine or helicopter assets) in support of offshore operations.*

### **2.3.2 Offshore Roles and Responsibilities – A Legislative Overview**

These have been divided into those relating to:

- HSE, and
- Offshore installation Duty Holder.

#### *a) Health and Safety Executive*

HSE is responsible for enforcing health and safety legislation offshore on and in connection with offshore installations and pipelines and other activities listed in the Application Outside Britain Order [22].

As the HSE and CAA have overlapping regulatory responsibilities it has been necessary to clarify who does what – particularly where both bodies need to be involved, e.g. accident investigation. This is achieved through their MOU (see section 2.2.1).

#### *b) Offshore Installation Duty Holder*

The Duty Holder has an overriding legal responsibility for compliance with the Health and Safety at Work etc. Act 1974 (HSWA) [13]. As Duty Holder he is responsible for providing a safe place of work. However, some of these responsibilities can be shared with contractors, but, ultimately, overall responsibility remains with the Duty Holder.

### **2.3.3 Offshore Legislation and Approved Codes of Practice (ACoPs)**

The principal references specific to offshore helicopter operations are summarised in the following subsections.

#### *a) HSWA [13]*

HSWA places a duty on installation owners and Duty Holders for the safety of the entire installation, including the helideck and helideck operations. In so doing, the regulations made under the Act require Duty Holders to ensure that the helideck operating environment is such that AOC Holders can discharge their statutory duty. Amongst other things, the Duty Holders have direct control over the physical characteristics of the helideck and surrounding environment, with the exception of the prevailing meteorological conditions.

#### *b) SCR [7]*

**Regulation 2(1)** - helicopter collision is defined as a Major Accident and OBRR helicopters should be treated no differently from public transport non-scheduled helicopters in respect of potential Major Accident hazards.

**Regulation 8** - the Duty Holder must demonstrate that potential Major Accident hazards and consequences are As Low As Reasonably Practicable (ALARP).

Within the framework of the SCR, the requirement exists to identify helicopter operating hazards and to evaluate the risks and consequences of those hazardous events. Where

appropriate, control measures must be established to reduce or manage the risks so they are kept ALARP.

Currently, helicopter operations risk assessment studies almost entirely focus on what the helicopter may do to an installation, and the transportation risks. The overall transportation risk is also covered. Full account should also be taken of the hazards and risks that an installation may pose to a helicopter and the personnel on board.

**Regulation 8[1]a** - Demonstrate Safety Management System (SMS).

Demonstrating that the management of helicopter operations is properly covered in Safety Cases requires a Duty Holder to set out his OHMS.

*c) MAR [9]*

MAR focuses on the appointment of competent people and the preparation of the arrangements and instructions required for helicopter operations.

**Regulation 8** - Personnel to co-operate with Helicopter Landing Officer (HLO).

There is a basic requirement for everyone to acknowledge the HLO appointment by the Duty Holder and to co-operate fully with him.

**Regulation 11** - Written instructions for helideck operations.

This covers the whole suite of heliops instructions to be promulgated and used for helideck operations. The minimum scope of procedural requirements is covered in the United Kingdom Offshore Operator's Association (UKOOA) Guidelines [15 and 16].

**Regulation 12(b)** - Effective communications.

Proper and effective internal, marine and aeronautical communications should be provided.

**Regulation 13** - Competent persons to be appointed and procedures and plant provided for safe helideck operations.

The appointment of competent HLOs, Helideck Assistants and Radio Operators is fundamental to safe helicopter operations offshore. Also there is a requirement that all the helicopter and helideck operations procedures are in place, along with all the necessary equipment.

**Regulation 14** - Collect and keep meteorological information.

There is a requirement to collect and keep records of meteorological and oceanographic (for mobile offshore drilling units MODU(s), and floating production, storage and offloading units FPSO(s)) information for assisting helicopter operations. This information is normally provided to the helicopter operators in a 'daily heliops report' format. However, increasing use is being made of 'on-line' meteorological and oceanographic data recording and transmission.

Regardless of the recording and reporting methods used there is a requirement for efficient record keeping and a specified retention policy.

**Regulation 19** - Clear installation identification.

Clear and unambiguous installation identification provides the helicopter pilot with a positive reference for locating the correct landing site and therefore plays a major part in preventing wrong deck landings.

*d) DCR [10]*

**Regulation 11** - This regulation requires Duty Holders to ensure that helicopter landing areas on installations are sufficient for helicopters to use safely in any weather conditions that permit helicopter operations. The design and construction is to be adequate for its purpose.

Over the past 20 years, in most cases, offshore helideck designs have changed little. There are two reasons for this:

- Helideck designers use CAP 437 [5] as their sole design guide.
- Designers receive little, if any, operational feedback on their designs.

Recent research has clearly shown that during design, the operability of helidecks is rarely closely examined and viewed from the operational helicopter pilot's perspective. [16 and 17]. This has led to over three quarters of UK helidecks incurring operational restrictions when they are commissioned and approved for flight operations [17].

*e) PFEER [8]*

The main thrust of PFEER in respect of helicopter operations is the preparation required to effectively handle helicopter accidents on the installation; and to apprehend emergencies on the installation; and to apprehend emergencies where the potential has been identified for using OBRR helicopters as a means for providing evacuation, rescue and recovery services in specific circumstances.

**Regulation 5** - Assessment

The regulation requires the duty holder to assess major accident hazards arising from fire and explosion events, which may require evacuation, escape and rescue, and identify appropriate arrangements for dealing with them. Such an assessment feeds into the safety case for the installation. Information from the assessment has to be recorded. The Duty Holder shall perform this assessment, and thereafter repeat as often as may be appropriate.

Appropriate standards of performance to be attained by anything provided for ensuring effective evacuation, escape, recovery and rescue, are to be established in this assessment. This will include helicopters used in the OBRR role.

**Regulation 6** - Preparation for emergencies.

This regulation requires the duty holder to prepare for emergencies and identifies a number of key areas to address. These include the command structure, the selection and competence of personnel to undertake emergency duties, and instruction and training for everyone on the installation regarding the appropriate action to take in an emergency.

In particular, on manned installations a sufficient number of competent persons shall be in attendance at the helicopter landing area during OBRR helicopter operations.

This requirement will include those situations where an OBRR helicopter deploys on a rescue and recovery mission from its host installation and where the helicopter arrives at a receptor installation with casualties / survivors. It may not always apply to installations where an emergency has occurred and OBRR helicopters are directly involved in rescue and recovery missions. Helideck manning, in these circumstances, will depend entirely upon the type and degree of emergency encountered.

**Regulation 7** - All emergency equipment to be available.

All fire / rescue equipment provided under Regulations 9, 12, 13 and 19 should be in their correct positions and readily available for use. Also, CAP 437 [5] specifies the minimum requirements that are acceptable to the CAA and BHAB.

**Regulation 8** – Emergency response plan

This regulation requires the duty holder to prepare an emergency response plan, which documents the organisation and arrangements for dealing with an emergency on the installation. It also requires duty holders to consult those who may become involved in emergency response.

Organisation and arrangements include the organisational structure for handling emergencies, including the chain of command, the roles and responsibilities of key people, communication arrangements, and the action to be taken in response to specific emergencies.

Where the potential has been identified for using OBRR helicopters as a means for providing evacuation, rescue and recovery assets in specific circumstances, full details of these services should form an integral part of the Emergency Response Plan.

**Regulation 19 (1)** - All equipment provided to be suitable for use.

Although PFEER is goal-setting, the minimum requirements for offshore helicopter operations are largely specified in CAP 437 [5].

Verification of the systems and equipment selected as suitable for use for helicopter operations should be a function of the installation design approval process. Subsequently, the installation maintenance programme should ensure that the equipment remains serviceable and readily available for use.

**Regulations 9, 12 and 13** - General requirements for prevention of fire and explosion.

See Regulation 19 (1) references to CAP 437 [5] and Verification process.

**Regulation 17** – Arrangements for recovery and rescue.

The regulation states:

“The duty holder shall ensure that effective arrangements are made, which include such arrangements with suitable persons beyond the installation, for –

- (a) recovery of persons following their evacuation or escape from the installation; and
- (b) rescue of persons near the installation; and
- (c) taking such persons to a place of safety,

and for the purposes of this regulation arrangements shall be regarded as being effective if they secure a good prospect of those persons being recovered, rescued, and taken to a place of safety.”

PFEER regulation 17 guidance (paragraph 165) defines rescue and recovery arrangements as:

“Recovery and Rescue arrangements are:-

- (i) facilities and services external to the installation, such as vessels, public sector and commercially provided search and rescue facilities;
- (ii) facilities on the installation such as installation-based fast rescue craft.”

The arrangements shall be regarded as being effective if they secure a good prospect (as defined in 2.3.2, above) of those persons being recovered, rescued and then taken to a place of safety. The scope covers incidents involving one person as well as multiple person incidents. The arrangements should cover adverse weather policies as well as rescue assets.

f) *UKOOA HELIDECK MANAGEMENT GUIDELINES [14]*

The UKOOA Guidelines for the Management of Offshore Helideck Operations is a Joint Industry Guide that sets out standards and requirements for design, maintenance and operation of offshore helidecks. It should be noted that these UKOOA Guidelines are referenced in the Guidance to Regulations (PFEER and MAR) published by HSE.

### **2.3.4 Application of Legislation, Codes of Practice and Industry Guidelines**

Table 2 summarises the application of key offshore regulations and Codes of Practice.

*As a minimum, OBRR helicopter operations should comply fully with the regulations and achieve good industry standards.*

**Table 2**  
**SUMMARY OF KEY OFFSHORE REGULATIONS AND CODES OF PRACTICE**

<b>Regulation, Guidance or Code</b>	<b>Comments</b>
<b>HSWA</b>	Full compliance.
<b>MAR</b>	Regs: 8, 11, 12(b), 13, 14 and 19
<b>DCR</b>	Reg: 11
<b>SCR</b>	Regs: 2(1), 8, 8(1)a
<b>PFEER</b>	Regs: 5, 6(1)c, 7, 9, 12, 13, 17 and 19(1)
<b>UKOOA Helideck Management Guidelines</b>	As a minimum, OBRR helicopter operations should achieve these good industry standards.

## **2.4 INTERNATIONAL SAR POLICY AND GUIDELINES**

### **2.4.1 International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual**

This three volume manual [19] was first published in 1998 by the International Civil Aviation Organisation (ICAO) and the International Maritime Organisation (IMO). The primary purpose of the Manual is to assist States in meeting their own SAR needs, and the obligations they have accepted under the Convention on Civil Aviation, the International Convention on Maritime Search and Rescue, and the International Convention for the Safety of Life at Sea (SOLAS). The Manual provides guidelines for a common aviation and marine approach to organising and providing SAR services.

The Manual is written with specific SAR duties in mind. The volumes are titled:

Volume I - Organisation and Management

Volume II - Mission Co-ordination

Volume III - Mobile Facilities.

### **2.4.2 UKCS SAR Policy**

As signatories to the ICAO and IMO Conventions, the UK is committed, through its appointed authorities, to provide national aeronautical and maritime cooperation, as well as cooperation with aeronautical and maritime authorities of neighbouring states. Additionally, signatories have to meet the standards laid down jointly by ICAO and IMO establishing economically effective SAR services, to promote harmonisation of aeronautical and maritime SAR services and to ensure that persons in distress will be assisted without regard to their locations, nationality or circumstances.

State authorities are encouraged to promote, where possible, harmonisation of aeronautical and maritime SAR services. The standards set out in the IAMSAR Manual [19] have been adopted by the UK Government. They are used by MCA and CAA as the standard to be

attained in providing UK SAR services. MOD also aim to achieve these standards for providing their military SAR services, and when assisting HM Coastguard with civilian incidents.

***When a Duty Holder employs OBRR helicopters in support of his offshore oil and gas operations he should co-operate fully with the national SAR agencies.***



## 3. OBRR HELIOPS MANAGEMENT

### 3.1 INTRODUCTION

It is entirely for a Duty Holder to decide if he wishes to use rescue and recovery helicopters and / or shuttle helicopters as part of an emergency response package to support offshore operations, providing the arrangements comply with regulations. The extent to which these aircraft are used, based either onshore or offshore, is also the Duty Holder's decision and will depend entirely on the numbers of installations to be covered and the oil and gas field locations.

There is a range of possible scenarios to be considered. For instance:

- A single offshore-based SAR / shuttle aircraft operation, covering a number of installations in an area (e.g. the previous Shell Brent area / Bell 212 arrangement).
- A multiple onshore and offshore-based OBRR helicopter operation covering a number of assets within various oil and gas fields located around the UKCS.
- There may be more than one Duty Holder separately providing OBRR helicopter cover in the same area or region (e.g. as happened with the previous Shell Brent and adjacent Statoil Statfjord arrangements), or could be provided by a shared service. This may increase or decrease the complexity of OBRR helicopter management arrangements.

*OBRR helicopters are not a new approach to commercially-provided search and rescue cover in oil and gas fields. Since the early 1980s, offshore based SAR helicopters have been used on the UKCS at:*

- *East Shetland Basin (Brent Area)*
- *Frigg (c.1985)*
- *Forties (c. 1984).*

*Although there are no offshore-based helicopters on the UKCS at present, they are currently in use in Norway. The aircraft are based on Frigg, Ekofisk, Statfjord, etc. and are generally designated for SAR operations, although they tend to operate in multi-role.*

*Onshore based helicopters are the norm for both HM Coastguard and military SAR coverage around the UK.*

*Helicopters are generally considered the preferred means for evacuating installations in the event of an emergency. This is in situations where time permits and the local weather and environmental conditions on and around an installation (e.g. large gas release, major conflagration, etc.) do not exclude helicopter operations.*

*Historically, HM Coastguard, military SAR and oil support (Public Transport) helicopters have been used successfully for offshore personnel evacuation many times when, in the early stages of a crisis, non-essential personnel are removed from an installation to a place of safety at another onshore or offshore location.*

*It should be recalled that evacuation is not normally part of the basic rescue and recovery aircraft role. However, if OBRR helicopters are stationed local to an incident then it is quite probable they would be used in an evacuation. In this event, it is important for the Duty Holder to ensure that field rescue and recovery priorities are not overlooked or degraded.*

*When looking at the various OBRR helicopter scenarios that may be encountered it is imperative that the heliops management system employed, for each case, be based on a consistent model.*

*There is an overriding need for the OHMS model to be sufficiently flexible to deal efficiently with a wide range of possible emergency events.*

## **3.2 SMS FRAMEWORK METHODOLOGY**

### **3.2.1 Key Elements Of Management System**

The key elements of any successful management system are likely to correspond to what might be interpreted as a generic model, set out for health and safety management, in HS(G)65 [15]. These are:

- Policy [and Objectives] setting
- Organising
- Planning and implementing
- Measuring performance
- Reviewing performance
- Auditing.

The auditing function has two-way information links with the other five functions, as well as a control link to reviewing performance (the last link in the sequential chain that starts with policy setting). Reviewing performance provides a feedback loop to the preceding four functions, thereby aiding performance development, developing techniques of planning, measuring and reviewing, and aiding organisational and policy development.

The policy function ensures that effective management policies and objectives are set that provide a clear direction for all those working within the management system.

The organising function ensures that an effective management structure, arrangements and resources are in place for delivering the policies and policy objectives. The arrangements are underpinned by effective personnel involvement and participation, and they are sustained by effective communication and the promotion of competence of all those working within the management system.

The planning function ensures that there is a planned and systematic approach to implementing the policies and achieving the policy objectives through an effective management system. The aim is to minimise risks. Risk assessments are used to determine priorities and to set objectives for eliminating hazards and reducing risks. Wherever possible risks are eliminated, but if they cannot they are minimised by the use of physical controls or, as a last resort, systems of work or personnel protective equipment (PPE). Performance standards are established and used for measuring achievement.

The measuring performance function ensures that performance against agreed standards is measured to reveal if, when and where improvement is needed. Proactive self-monitoring reveals how effectively the management system is functioning, reactive monitoring discovers why controls fail. The objectives of these two types of monitoring are to determine the immediate causes of sub-standard performance, and to identify underlying causes and the implications for the management system.

The auditing and reviewing performance functions enable all relevant experience to be learnt from and allow the lessons to be applied to the management system. There should be a systematic review of performance based on monitoring data and independent audits of the management system. There should be a strong commitment to continuous improvement involving the constant development of policies, objectives, systems and techniques of risk control. Performance should be assessed by reference to:

- Internal performance indicators, and
- External best-practice and benchmarking.

*The heliops management system should be based on the key elements of policy and objectives setting, organising, planning and implementing, measuring performance, reviewing performance, and auditing. Moreover, procedures and processes should be in place to enable each of these functions to be carried out.*

### **3.2.2 Planning And Implementing Through Risk Assessment**

According to HS(G)65 [15], risk assessment enters into the key elements of the management system through the planning and implementing function. Within this function management arrangements should be in place to organise, plan, control and monitor the design of risk control systems (RCSs), which in turn form the bases for ensuring that adequate workplace precautions are provided and maintained. The RCSs are needed as appropriate to the hazards arising from the activities and processes identified as being parts of the OBRR helicopter operation.

The planning process itself involves:

- Designing, developing and installing suitable management arrangements, RCSs and workplace precautions which are proportionate to the needs, hazards and risks of the helicopter operation, and
- Operating, maintaining and improving the system to suit changing needs and process hazards/risks.

The three complementary outputs from the planning process are likely to be:

- Plans (coupled to objectives) for developing, maintaining and improving the management system
- Specifications for management arrangements, RCSs and workplace precautions
- Performance standards for implementing the management system.

Risk-based concepts come into devising workplace precautions. The three basic stages in establishing these are:

- Hazard identification
- Risk assessment
- Risk control.

In this way, hazards are identified that can cause harm, the risks arising from the hazards are assessed, and suitable measures to deal with the risks are decided upon. The ways in which these stages are dealt with may vary. In the case of risk assessment, for example, reference may be made to specific legal limits or QRA may be used. Generally, risk will be the product of likelihood of occurrence and consequence. In the control of risks there is a preferred hierarchy of risk control principles [15]:

- Eliminate risks, by substituting the dangerous by the inherently less dangerous
- Combat risks, by engineering controls at source and giving collective protective measures priority
- Minimise risk, by suitable systems of working or PPE.

*The planning and implementing functions of the heliops management system should be underpinned by the used of risk-based approaches.*

*Notwithstanding the methodology employed by a Duty Holder, he should use some form of effective process to clearly demonstrate that good practices are employed and the risks resulting from the use of OBRR helicopters are acceptable. Attention should be paid to the value of using existing guidance and best practice.*

### **3.3 POLICY AND OPERATING PROCEDURES**

As a matter of course, a Duty Holder should have comprehensive policies and procedures in place for conducting routine offshore helicopter operations in common with, any other part of the business. A prudent Duty Holder will have a full OHMS in place.

The addition of OBRR helicopters to an otherwise routine helicopter transport operation will require additional provisions to be made within the Duty Holder's OHMS. This should include the interfaces between the Duty Holder, AOC holder and other service providers who form the OBRR helicopter infrastructure and supply services.

SCR Regulation 15A [10] requires the duty holder of an offshore installation to establish a verification scheme for the safety critical elements of the installation. Such safety critical

elements must be verified as suitable by an independent and competent person by means of a written verification scheme. The overall objective of the offshore verification scheme is to set in place independent and competent scrutiny of those parts of an installation, which are “critical to safety”, referred to in the SCR as safety critical elements (SCEs).

An Independent Competent Person (ICP) should be appointed to survey / audit the OBRR infrastructure, services, equipment and operations for and on behalf of the Duty Holder.

*The Duty Holder should clearly demonstrate that an OHMS, which also includes OBRR operations, is in place.*

*The management system should be effective.*

*An ICP should be appointed by the Duty Holder to survey / audit all aspects of OBRR helicopter operations.*

### **3.4 TRAINING AND COMPETENCE**

#### **3.4.1 Preamble**

This subsection addresses training and competence of the relevant personnel. Two groups are addressed:

- Onshore and offshore aviation team
- Onshore, installation and helideck team.

The first group will be AOC holder personnel, and the second Duty Holder personnel.

#### **3.4.2 Onshore and Offshore Aviation Team**

The sourcing, training and competence of OBRR aircrews and maintenance staff is a matter for the AOC holder and should be undertaken in accordance with the Operations manual approved by CAA. However, it is for the Duty Holder to satisfy himself that the AOC holder is providing personnel to a recognised and suitable standard for the operational role, in accordance with the company’s CAA approved Operations Manual. Useful guidance for this can be gained from HM Coastguard and MOD SAR requirements, which can feed into the OBRR requirements.

##### *a) HM Coastguard Requirements*

For HM Coastguard SAR helicopter operations, MCA specify (in contracts with civil helicopter operators) minimum training and competence standards that shall be met. The standards cover:

- Crew Experience
- Flying Training
- Ground Training.

Table 3 summarises this, and is taken from Training Directive, ANNEX B to OAN 32 [20].

MCA approves the crews nominated by the contractor for SAR duties, and audits the crews and records against MCA standards to ensure that specialist SAR role training is kept up to date. The training standards for aircrew are based on RAF SAR Crew Training standards (RAF Valley SAR School). MOD (RAF) has contracts with civil operators for providing crew training. Pilots appear to be in sufficient numbers, but it is understood that there is a shortage of crewmen (winchmen and winch operators).

*b) MOD SAR Requirements*

The need for experience is a major factor in RAF SAR operations, although the RAF find that it is sometimes easier to train new entrant aircrew rather than retrain those who come from other helicopter roles.

MOD SARTU courses entail a pre Sea King course of 15 hours of flying, of which 3.5 hours are devoted to mountain flying. The Sea King syllabus consists of 67.75 hours in the aircraft, and 48.5 hours on the simulator for pilots. The course, at the Sea King Operational Conversion Unit (OCU), lasts for 5 months. Graduates are then posted to Flights and immediately take their place on readiness rosters. Although the pilots are trained to first pilot standard, the decision on when a pilot should become a Captain is made by the Flight Commander. The importance of experience gained in the SAR role is the main factor.

Crewmen are given basic winching training of 56 hours. This is followed by further training at the Sea King OCU, where both the winchman and winch operator undergo 20 hours in a ground procedures trainer, followed by 91 hours in the aircraft for winch operators, and 75 hours for the winchman. Crewmen are also trained as paramedics.

**Table 3**  
**SUMMARY OF HM COASTGUARD SAR CREW TRAINING AND COMPETENCE**  
**REQUIREMENTS**

<b>CREW EXPERIENCE</b>	<b>CRITERIA</b>	<b>REMARKS</b>
<b>Captains</b>	<p>Total Hours - 2500</p> <p>Hours on Type - 250</p> <p>Previous military First Pilot SAR experience or Captain experience on a dedicated civil SAR unit is required.</p> <p>No Captains to become operational until they have achieved the minimum SAR role training requirements in the month prior to appointment.</p>	<p>Only aircrew of considerable (at least one year) previous maritime SAR experience are regarded as suitable.</p> <p>Aircrew are to be dedicated to SAR unit for a minimum period of 6 months.</p>
<b>Co-Pilots</b>	<p>Total Hours - 250</p> <p>Hours on Type - 50</p> <p>No Co-Pilots to become operational until they have achieved the minimum SAR role training requirements in the month prior to appointment.</p>	<p>Previous SAR experience is not mandatory.</p> <p>Aircrew are to be dedicated to SAR unit for a minimum period of 6 months.</p>

<b>CREW EXPERIENCE</b>	<b>CRITERIA</b>	<b>REMARKS</b>
<b>Winch Operator / Winchman</b>	<p>Previous military or civil experience on a dedicated SAR unit.</p> <p>Sufficient rear crew members to be trained to advanced first aid standards (RAF “Extended Immediate and Emergency Care” or equivalent) to ensure that at least one such qualified member is always carried on an operational flight.</p> <p>No rear crew members to become operational until they have achieved the minimum SAR role training requirements in the month prior to appointment.</p>	<p>Only aircrew of considerable (at least one year) previous maritime SAR experience (military or civil) are regarded as suitable.</p> <p>Aircrew are to be dedicated to SAR unit for a minimum period of 6 months.</p>

<b>FLYING TRAINING</b>	<b>CRITERIA</b>	<b>REMARKS</b>
<b>Training Hours Allowed</b>	<p>45 hours per month  Note: total training hours for each 24 hour SAR station.  No limits to operational hours flown</p>	<p>If, for any reason, monthly targets cannot be achieved, hours can be carried forward to next month. Quarterly training targets must be met.</p>
<b>Dry Winching</b>	<p>Single lifts / double lifts as required</p> <p>8 - Deck winching single / double lifts</p>	<p>To include 2 highline and 2 dummy stretcher lifts per rear crew member.</p>

FLYING TRAINING	CRITERIA	REMARKS
<b>Wet Winching</b>	<p>6 - Standard winching circuit to drum.</p> <p>2 - LN400 / 450 Overfly to drum / target.</p> <p>4 - Wet double lifts / drums.</p> <p>4 - Wet double lifts / drums.</p>	
<b>Night / Simulated</b>	<p>At least 1 hour general SAR training per crew to include all LN400 / 450 CRUISE and SAR coupled modes and to cover AMC positioning / winching.</p>	<p>From October to March this training should be conducted at night and not under simulated conditions.</p>
<b>General</b>	<p>3 - Radar to FLIR (Forward Looking Infra-Red) homing</p> <p>2 – Personnel Locator Beacon (PLB) homing</p> <p>2 - Air to Ship / target homing.</p> <p>2 - Cliff rescue techniques</p> <p>2 - Search techniques using onboard sensors.</p> <p>Night approaches to NATO ‘T’ or cross vehicle lights, as required.</p> <p>HEAVE-HO hoist. Recover inert load into aircraft.</p> <p>Emergencies / equipment malfunctions, as required.</p>	<p>Not applicable to OBRR</p> <p>Not applicable to OBRR. Suggest night landings on offshore installations as a substitute.</p> <p>1 per quarter.</p>

<b>GROUND TRAINING</b>	<b>CRITERIA</b>	<b>REMARKS</b>
<b>Aircraft Technical</b>	Covered during base / line / winch checks	SAR related.
<b>Documentation</b>	Study of CG1 and CG3 and relevant SAR publications	
<b>Medical Equipment</b>	Re-Familiarisation in use and purpose of the medical equipment carried in aircraft.	Conducted by a qualified medical practitioner or a qualified advanced first aider.

NOTE: Changes to the training schedule in the light of the dual winch facility will be made regarding periodicity of training on main, stand-by and heave-ho hoists in the near future.

All RAF SAR aircrew are given quarterly and annual checks. The composition of each check is not given in advance and may include any exercise or situation likely to be encountered operationally. Comprehensive records are maintained about all RAF SAR training undertaken, the results of check flights, etc. and are inspected to ensure that aircrew maintain role competency.

*c) The OBRR Requirements*

For OBRR helicopter operations, pilot and crewman training should be at least to the same standard as civilian HM Coastguard crews. Operating solely in the marine / offshore environment requires the ability for pilots to hover over the sea at night. In this situation the main problem is loss of spatial awareness. Intensive training is the key to this problem in order to avoid catastrophic failures.

Permanently offshore-based flight and maintenance crews will also require Offshore Medical Certificates and appropriate Offshore Survival training. Full Installation Induction Training will be required for the permanently based flight crews and maintainers.

The Maintenance Crew may also require HLO / Helideck Assistant (HDA) training and instruction in the use of the Duty Holder's offshore Permit to Work System. Work Permits may be needed for some items of helicopter maintenance.

Other offshore related training and competencies may be identified for the aviation team. These may include On-Scene Commander / Coordinator should it be determined there is a likelihood that the OBRR Commander may be delegated this role in the performance of his OBRR duties.

To obtain consistency with oil and gas industry norms, there is merit in looking closely at all training and competencies required for OBRR operations (both the aviation and offshore

teams) with a view to introducing a set of Offshore Petroleum Industry Training Organisation (OPITO) Training and Competency profiles for all the assigned individuals.

*Only fully trained and competent SAR helicopter pilots, crewmen and maintainers should be employed by the AOC holder for the intended OBRR operations and role.*

*Training and competence should form an integral part of the OHMS and, where appropriate, should meet OPITO standards.*

### **3.4.3 Onshore, Installation Management and Helideck Team**

Generally, it is expected that Duty Holder's onshore and installation management personnel, along with the assigned helideck teams, will be fully trained to OPITO competence standards and completely familiar with all aspects of routine offshore public transport helicopter operations. Therefore, the introduction of OBRR helicopter operations should not present significant problems.

However, there will be a need for the Duty Holder to provide the offshore operating personnel with an introduction to the OBRR helicopter concept along with the arrangements to be put in place. Training to OPITO competence standards or equivalent [18] will also be required for offshore personnel in the handling of survivors and casualties at a place of safety. Thereafter, a period of familiarisation with the new arrangements will be required for offshore management and the helideck crews. This can be achieved in conjunction with the AOC Holder's OBRR team assigned to the installation / field.

A critical area of OBRR operations will be the provision of accurate area, destination and alternate weather forecasts. This flight planning information for flights originating offshore may be obtained from an automatic weather station and / or observations. Where there is a reliance on observations, it is imperative that the personnel assigned to the offshore team are fully trained and competent in meteorological observation and forecasting.

*The duty holder should ensure that personnel at the place of safety are trained and competent in the handling of survivors and casualties.*

## **3.5 OFFSHORE CRISIS MANAGEMENT**

MCA have stated that although OBRR helicopters might be asked to assist in emergencies other than ones involving the installations they are designated to cover, it is fully understood by MCA that OBRR helicopters might not be available if their involvement reduces the safety cover of their designated installations.

*OBRR helicopter assets should not be seen, in any way, as an accretion to national SAR assets.*

*The Duty Holder is responsible for ensuring that a deployment of OBRR helicopters to non-oil related activities does not adversely affect the requirement to provide effective arrangements for rescue and recovery on installations.*

*Procedures should be in place for those occasions when an OBRR helicopter may leave its normal station in response to safety of life.*

### **3.6 ON-SCENE COMMAND AND CONTROL**

#### **3.6.1 Emergency Command and Control**

MCA (HM Coastguard) have stated that their co-ordination effort in the event of an emergency offshore would be no different with OBRR helicopters based in the area than currently with standby vessels (SBVs).

MCA should be kept fully informed of any evacuation, rescue and recovery activity, but would take no action unless an emergency escalated beyond the capabilities of local assets. In that case MCA would act as the co-ordinator.

To avoid MCA requesting resource information in the event, and at the time of an emergency, MCA would like as much information as possible about the operational use of OBRR helicopters. The information passed to MCA should include location, capability, serviceability and readiness states and it should be kept up to date.

*Clearly, early notification to the MCA of a potential emergency is essential. Management of the interfaces with MCA is an important aspect and needs to be addressed.*

*MCA see no change to current Coastguard command and control procedures during offshore emergencies where OBRR helicopters are used in lieu of SBVs.*

#### **3.6.2 On - Scene Commander / Coordinator**

MCA believe that the Offshore Installation Manager (OIM) of an installation should be the On - Scene Commander / Coordinator until additional resources are needed, or if the OIM's position is in any way compromised by the emergency. MCA would then appoint an On - Scene Commander / Coordinator.

The On - Scene Commander / Coordinator should be whoever is best-placed to direct, control and co-ordinate the assets involved. Potentially, the Captain of an OBRR helicopter could be appointed On - Scene Commander / Coordinator.

*The Duty Holder should have in place a procedure for OIMs to assume and to relinquish (to an MCA appointed person) the role of On - Scene Commander / Coordinator during an emergency.*

*The On - Scene Commander / Coordinator should act in his customary role.*

#### **3.6.3 Area Control (Aeronautical Radio Operator)**

Existing Standard Operating Procedures used by MCA SAR aviation assets to ensure no conflicts occur could easily be extended to cover any flying by OBRR helicopters. However,

there is a long-standing problem of getting information to installations about traffic in their vicinity in a timely manner.

In addition to each manned installation having a Very High Frequency (VHF) Amplitude Modulated (AM) radio to communicate with any inbound / outbound helicopters, there is normally a **flight following service** covering a number of adjacent installations to enable safe helicopter operations over a wider area. The frequency of the flight following service radio should be routinely monitored by an assigned area radio operator.

It is the flight following service that would be best-placed to co-ordinate any helicopter evacuation, rescue and recovery activity. It would have a wider picture of what is going on, and which and how many helicopters are in the area. This facility in the vicinity of the emergency should limit airborne activity (which could pose a proximity threat to evacuation, rescue and recovery missions) and provide contact with other assets that may be called upon to assist.

The installation where the evacuation or rescue and recovery mission has been initiated should automatically monitor any traffic and be prepared to take over any control responsibility, as necessary. This frequency would also be monitored by other OBRR assets.

Helicopters, other OBRR assets and the Installation, should also talk to each other and be able to monitor the maritime VHF Frequency Modulated (FM) frequencies. This will ensure any non-Installation vessel (merchantman, rig supply boats, etc.) will be contactable.

*In the event of an emergency what 'area control' provisions would be established between the Duty Holder, the AOC holder and HM Coastguard to ensure timely information exchange on air traffic in the vicinity.*

### **3.7 COVERAGE OF ALL CREDIBLE EMERGENCY (EER) SCENARIOS**

All EER scenarios that may be encountered during offshore operations should already be identified in a Duty Holder's Safety Case for an offshore installation (via a risk-based process as outlined in subsection 3.2). PFEER Regulations 5 and 8 require an assessment to be carried out and an emergency response plan to be in place.

If using OBRR helicopters as part of an integrated crisis management plan, the Duty Holder should ensure that in the Safety Case and emergency response plan all scenarios entailing the use of OBRR helicopters are identified and appropriate procedures included.

Scenarios may include:

- Rescue and recovery of a man overboard from an installation or vessel.
- Medical or casualty evacuation (life threatening condition) from an installation or vessel.
- Rescue and recovery of survivors from a vessel in distress (e.g. SBV, supply vessel, etc.).

- Rescue and recovery of survivors from a ditched helicopter.
- Planned partial or full evacuation of an installation.
- Emergency evacuation of an installation.

Consideration should be given to these events taking place both on and in the vicinity of the “host” installation. Also, the provision of similar rescue, recovery and evacuation aid that can be given to other installations within the operating range and capabilities of the OBRR helicopter should be addressed.

*Where OBRR helicopters are proposed as part of an integrated crisis management plan, the Duty Holder should, in preparing the Safety Case, ensure that all scenarios entailing the use of OBRR helicopters are identified and procedures included.*

*Proper consideration should be given, by the Duty Holder, to events taking place both on and in the vicinity of the “host” installation. Also if providing similar rescue, recovery and evacuation aid to other installations, this service must be within the operating range and capabilities of the OBRR helicopter.*

### **3.8 AVAILABILITY OF EER PLANS**

The duty holder is required to prepare EER plans, which document the organisation and arrangements for dealing with emergencies on the installation. There is also a requirement to consult those who may become involved in emergency response.

Organisation and arrangements include the organisational structure for handling emergencies, including the chain of command, the roles and responsibilities of key people, communication arrangements and the actions to be taken in response to specific emergencies.

The plans should cover all the arrangements and procedures, including alternates.

*Where OBRR helicopters are proposed as part of integrated crisis management, the Duty Holder should ensure that emergency response plans are in place for all the scenarios set down in the Safety Case.*

### **3.9 KNOWLEDGE OF ASSETS, THE OPERATING AREA AND WINCHING SITES**

Good general knowledge of an operating area and detailed information of the potential assets (to assist in emergencies) in and around installations, should already be part of a Duty Holder's existing emergency response set-up. On the UKCS this is normally a well-established routine. OBRR helicopters are assets that complement the Duty Holder's emergency response inventory. They should provide capacity and flexibility to deal with the range of scenarios identified in Subsection 3.7 above.

To gain maximum advantage when deploying OBRR helicopters, the AOC holder should make the Duty Holder fully aware of the potential for the selected helicopter to rescue and recover survivors using different techniques, and from a variety of locations (wet and dry). The range of flexibility of most helicopters embraces the ability to hover above a heaving vessel or a fixed structure to effect a winching using the rescue hoist, or to “touch down” onto a relatively firm, but stable structure, in order to allow survivors to directly board the helicopter. These manoeuvres will normally require great skill on the part of the flight crew, and can only be carried out if the immediate obstruction environment and environmental conditions do not jeopardise the safety of the helicopter and its crew.

In order to exploit this capability, Duty Holders, in conjunction with the AOC holder, should identify potential winching / “touch down” sites on installations and vessels operating locally which are served by an OBRR helicopter.

In the late 1980s UKOOA Aircraft Committee initiated an exercise to gather information about potential winching / “touch down” sites on installations and vessels. If this information is still available and current then it may be found useful to the Duty Holder.

The development of a database of OBRR helicopter assets, potential winching / “touch down” sites, alternate landing sites, and so on is an iterative process that should provide up-to-date information (preferably using an on-line PC based system) to those who need it when an emergency is declared. Recipients should include the On-Scene Commander / Coordinator, onshore crisis management team, the OBRR crews, HM Coastguard, and other appropriate agencies.

*The Duty Holder should acquire all relevant information about the OBRR operational area, airborne assets available in an emergency, potential winching / “touch down” sites, alternate landing sites, etc.*

*There should be a reliable system provided to give up-to-date information to the On-Scene Commander / Coordinator (OIM), onshore crisis management team, the OBRR crews, HM Coastguard, and other appropriate agencies.*

### **3.10 MINIMUM OBRR / SAR ASSETS IDENTIFIED FOR EER SCENARIOS**

For each emergency scenario that may be encountered on or near an offshore installation, in the assigned OBRR helicopter operating area (listed in Subsection 3.7), the minimum assets for evacuation, rescue and recovery should be identified and justified.

The minimum assets identified to apprehend each of the listed emergencies should be included in the crisis management plan along with appropriate procedures to manage the assets for maximum effect. This includes the “information system” outlined in Subsection 3.9 above.

*The minimum OBRR helicopter assets required for each emergency scenario listed in Subsection 3.7 identified and justified in contingency plans prepared by the Duty Holder.*

### **3.11 SURVIVOR PRIORITIES AND MEDICAL RESPONSE ISSUES**

Survivor priorities and medical response, in the event of any offshore emergency will largely be determined by the On-Scene Commander / Coordinator. These decisions will often be made in conjunction with the medical services available on the installation, the airborne OBRR paramedic and crisis management team onshore.

*The EER assessment will need to address survivor priorities and medical response.*

### **3.12 RESCUE TIMES FOR MAN OVER BOARD UP TO FULL CREW EVACUATION (MASS ESCAPE)**

The AOC holder will need to satisfy the Duty Holder that the OBRR helicopter response times for handling all the identified emergencies that may require an evacuation, rescue or recovery are acceptable.

The Duty Holder may also wish to consider including, in his Operations Manual, those measures to be used by offshore personnel to enhance their survival times in the event of an incident.

*The response times for OBRR helicopters used for handling identified emergencies should meet acceptable standards.*

### **3.13 BACK-UP FACILITIES IDENTIFIED FOR RE-LOCATING SURVIVORS**

Within the area of OBRR helicopter coverage, an emergency may occur where survivors and / or evacuees may have to be re-located. This may be due to:

- The OBRR host installation is compromised by an incident
- The OBRR host installation is unable to safely accommodate the numbers of survivors and / or evacuees.
- The OBRR host installation medical facilities may become overloaded.

It is therefore prudent for a Duty Holder to assess the options for re-locating survivors and / or evacuees and transferring them to a place of safety as part of an overall crisis management plan. Primary relocation options will be any adjacent installations in the OBRR operating area.

Unless the installation is near to shore, then this option should be a secondary consideration if it takes the OBRR helicopter away from the incident area for an appreciable period of time, and there is not another helicopter in the area that can assume the OBRR role.

*The Duty Holder should consider and identify alternative sites for re-locating survivors and / or evacuees in the event that the host OBRR installation is in any way compromised.*

### 3.14 ADDITIONAL AIRCRAFT TRAFFIC IN THE OPERATIONAL AREA FOR DRY TRANSFER

At the time of an incident other than during the night time quiet hours, it is reasonable to expect other air traffic to be in the area local to an incident. As an emergency unfolds, there will be a mixture of fixed and rotary-wing air traffic in the general area.

The fixed-wing air traffic will probably be limited to an RAF Nimrod scrambled when the incident has escalated to a high level, and incident control has been passed to HM Coastguard.

Rotary wing air traffic can include a Duty Holder's OBRR helicopter(s), military and HM Coastguard SAR helicopters, and other oilfield support helicopters.

The level of air traffic in an incident area will need to be properly identified and controlled in order to avoid conflicts occurring. This could be the risk of airprox (near miss) incidents or simply to call up additional assets. Both situations need to be adequately managed by an area flight following system the Duty Holder should have in place. This topic has been covered in Subsection 3.6.3.

Information regarding the number of and availability of additional helicopter assets (obtained from an area “flight following” system or directly notified by passing air traffic) should be constantly tracked and a “state board” automatically updated to enable the On-Scene Commander / Coordinator and the crisis management team to call in the assets as required. Doing so increases the options for survivor / evacuee re-location to a place of safety by helicopter, without having to take OBRR and SAR helicopter resources away from their primary role.

*The Duty Holder should have a system in place and plans available for tracking air traffic in the incident general area in order to call-up other airborne assets (public transport helicopters) for survivor / evacuee dry transfer, if required.*

*The responsibility for providing the On-Scene Commander / Coordinator with air traffic flight following information should be clearly established.*

### 3.15 OPERATING CONSTRAINTS

The Duty Holder will need to identify and justify any foreseeable operating constraints for an OBRR operation. This is in order to assess their impact on the probability of successfully rescuing and recovering a man-over-board, evacuating the installation (planned partial, planned full and emergency), and so on.

Constraints could arise because of:

- **Aircraft not available** - already on a task, unserviceable or not equipped for the task envisaged.
- **Crew availability** - out of duty time, not competent for the task envisaged.

- **Meteorological conditions** - wind and / or sea states and / or visibility out of limits for launching the aircraft and / or completing the mission successfully.
- **Diversion availability** - nominated diversions weathered-out, insufficient fuel and refuelling en-route not feasible.
- **Safe place available for survivors / evacuees** - is the safe place capable of handling the anticipated number of survivors / evacuees. Has it adequate medical support and facilities ?
- **Adverse helideck / installation environment** – fire, smoke, gas impeding helicopter operations.

In the event of an evacuation it may be necessary to consider a multi-staged approach: first to the nearest place of safety offshore irrespective of suitability, then to a more well-founded place (say, onshore).

*The Duty Holder should give full consideration to, and assess the impacts of potential operating constraints that may be encountered with OBRR helicopter operations.*

### **3.16 OPERATING CONTINGENCIES**

Having established the operating constraints that may arise with OBRR helicopter operations, the Duty Holder will then need to consider contingency plans to mitigate potential shortfalls to OBRR coverage.

Following the identification of operating constraints (Subsection 3.14) these should provide a set of “what if” questions. All these questions will require satisfactory answers prior to determining what contingency plans will need to be adopted.

For example: What would the Duty Holder do if the OBRR helicopter is unserviceable or away on a task ?

*The Duty Holder should fully acknowledge where and what operating constraints may arise with OBRR helicopter operations.*

*Contingency plans should be well-developed and firmly in place for those occasions when operating constraints preclude the use of the assigned OBRR helicopter for apprehending an emergency offshore.*

### **3.17 REHEARSALS**

It is assumed that rehearsal of the actions to be taken in the event of an offshore emergency are already featured in the Duty Holders Safety Case, in Emergency Procedures and the Crisis Management Plan. OBRR helicopter rehearsals will need to be included.

Also, a record of rehearsals and drills will need to be kept for the OBRR operations and a file maintained that lists identified deficiencies and the actions taken to remedy them.

OBRR rehearsals should be “no notice” and will generally be initiated and controlled by the OIM. There will also be occasions when a drill is initiated by an HSE Inspector, CAA Flight Operations Inspector, the Duty Holder Operations / Crisis Management team or an independent auditor.

Rehearsals can be used to provide OBRR crew training. However, other flying and role training (to retain OBRR crew currency, etc.) will be required outwith the rehearsal programme. MCA’s HM Coastguard SAR helicopter contracts allow 45 hours a month training for each 24 hour SAR Station.

***The Duty Holder, in conjunction with the AOC holder, should produce a firm programme of rehearsals and drills (without disclosing dates of execution) to ensure that all aspects of OBRR operations will be tested at suitable intervals.***



## **4. OFFSHORE FACILITIES AND EQUIPMENT**

### **4.1 PREAMBLE**

Historically, UKCS fixed and mobile offshore installations and some specialist vessels have included helideck facilities in their design in order to provide a landing area for helicopters supporting the offshore operation. Generally, these helidecks have provided acceptable safe landing areas for routine public transport - non scheduled helicopter operations.

The necessity for public transport helicopters to remain offshore for prolonged periods on a helideck has been rare. Short-stay situations do occur when aircraft have encountered a rapid deterioration in flying weather, or have developed a fault which requires a maintenance crew visit.

It is anticipated that OBRR helicopters will be required to operate and remain for prolonged periods offshore. As a result, the facilities provided by offshore installations require close scrutiny, to ensure that helicopter flight safety and installation safety are not compromised in any way.

### **4.2 FACILITIES FOR PERMANENTLY-BASED OBRR HELICOPTERS**

#### **4.2.1 Introduction**

In considering permanently basing and operating helicopters from an offshore installation located in a harsh marine environment, proper consideration needs to be given to the facilities that are required to accommodate the day-to-day needs of the aircraft, flight crew, maintenance crew and helideck operations team.

For the helicopter to operate efficiently as a rescue and recovery machine, it must remain in a serviceable condition, be ready to fly at very short notice, and ideally be protected from the elements when not in use.

For the flight crews to remain efficient for a rapid response to an emergency call-out they need to be properly accommodated, and have good facilities for flight preparation, with continuing access to accurate and up to date flight data and weather information.

Similarly, the maintenance team and helideck crew will require suitable and sufficient accommodation and, respectively, a reasonable working environment to routinely provide a serviceable aircraft and good, operable helideck facilities to launch and recover helicopters during an emergency response.

#### **4.2.2 Basic Helideck Facilities and Equipment**

As a basic offshore helideck facility, the structure and equipment should comply, as a minimum, with CAP 437 requirements [5].

If the OBRR requirement is for the helicopter to be positioned on the Safe Landing Area (SLA), ready to be started whenever there is other helicopter traffic in the area, then clearly, the OBRR helicopter must have its own “operating space” on the helideck. Therefore, the Base installation will have to be equipped with an extended helideck (effectively 2 SLAs) if there is a requirement for other helicopter traffic (from the beach) to land.

However, if the OBRR helicopter can be held at “stand-by”, or on a suitable adjacent helideck parking area, or in a hangar, then the SLA may be shared with other visiting helicopters, only if they are not shut-down.

#### **4.2.3 Additional Facilities for Permanently Offshore Based Helicopters**

Facilities for permanently based offshore OBRR helicopters are referenced in [*Ref: JAR-OPS 3.220 Subpart D and 3.295*] [6].

OBRR helicopters based offshore should be maintained at a constant state of readiness. It is assumed the level of maintenance to be carried out offshore will be confined to ‘First Line’ routine daily inspections and minor rectification / component replacements.

It is also assumed that, if an aircraft becomes unserviceable at any time, it will have a time limit imposed (say, less than one hour) during which time it must be brought to readiness state or replaced by a standby aircraft. If the readiness time limit is likely to be exceeded, this will impose severe restrictions on a helideck that does not have the space and facilities to park a replacement or visiting aircraft.

Therefore, the following provisions all need to be seriously considered and implemented to a satisfactory standard:

- 1) Adequate space for parking an OBRR helicopter, whilst leaving the SLA clear to launch and recover another aircraft of similar size and mass.
- 2) Adequate aircraft environmental protection.
- 3) Adequate ‘First Line’ maintenance arrangements (including lighting, weather protection and sufficient working space).
- 4) A continuous electrical power source (Rectifier) for aircraft starting and maintenance 28V (Volts) Direct Current (DC).
- 5) Adequate inventories, storage and easy access for ground and servicing equipment.
- 6) Adequate inventories, storage and easy access for tools, spares, and specialist oils and lubricants.

Failure to make adequate arrangements for the above items will almost certainly impinge on the ability to maintain good aircraft serviceability and readiness states.

*Proper arrangements should be provided on the nominated offshore installation to assist long term serviceability, readiness and availability of an OBRR helicopter.*

*An adequate parking / manoeuvring area adjacent to the SLA is considered a fundamental requirement for installation helidecks nominated for OBRR operations.*

*The need for a permanent hangar facility should be given proper consideration in order to provide the aircraft with adequate environmental protection. During winter months, if not kept in a hangar, the aircraft will be continuously exposed to the elements.*

*It is unlikely that standard aircraft covers and tiedown arrangements will prove sufficient to protect the aircraft from potential damage and deterioration of its structure, rotor blades and delicate internal equipment in extreme offshore weather conditions.*

*If providing a hangar facility on the installation, it is imperative to ensure (during design) that this can be done without infringing the obstruction free environment and / or degrading the existing aerodynamic performance of the helideck Safe Landing Area.*

*Helideck operability should re-established following any proposal for modifications in or adjacent to the area of the helideck.*

*Inventories of spare parts, tools, etc. should be established and provided at the offshore location by the AOC holder, in line with SAR aircraft “detachment from base” procedures.*

*The Duty Holder should make suitable provisions for the OBRR helicopter support inventories in a location where they can be secured and quarantined from other installation stores and activities.*

#### **4.2.4 Flight Crew, Maintenance Team and Helideck Crew Facilities**

It is assumed that the helideck crew already have facilities established for administering routine helicopter operations. The flight and maintenance crews will require adequate facilities to run the OBRR operations efficiently and effectively. These facilities are in addition to and should be separate from the heli-admin function. They will include:

- Operations / Flight Planning Room
- Communications
- Engineering Control
- Stores
- Flight and Maintenance crews' accommodation.

*a) Operations / Flight Planning Room*

There will need to be an adequate and convenient area set aside for the Flight Crews to set up an operations and flight planning facility. Apart from the furniture, there will need to be provisions for telephones, sending and receiving faxes and electronic information, aircraft / navigation / meteorological / operations document storage, storage lockers for flying kit and equipment, and so forth.

There will need to be facilities for displaying maps, charts and graphs, relevant local orders, meteorological printouts, and so forth. Additionally, sufficient cupboard space will be needed to house a library of technical documents such as Operations Manuals, Joint Aviation Requirement Publications (JAR Ops), CAPs, forms, etc.

*b) Communications*

There will be an overriding need for first-class communications to be provided. As a minimum, equipment for these communications should include:

- Sending and receiving faxes, telephone and Integrated Health Usage Monitoring System (IHUMS) and other electronic (computer) information to / from helicopter operators shore base, HM Coastguard, etc.
- Aero and Marine Band repeater sets.
- Intercom and / or PC based information system (readiness state) linked between Operations / Flight Planning Room, crew quarters (for stand-by pilots), Maintainers Room, OIM, Installation Control Room, Radio Operator, Meteorological Data provider and the HLO.
- Ability to call the onshore meteorological services (24 hours) and access to e.g. commercial meteorological services, (MIST).

*c) Engineering Control*

An area should be set aside for the OBRR helicopter maintainers to control their day-to-day engineering functions. In addition to furniture, there will need to be provisions for telephones, sending and receiving faxes and electronic information, aircraft engineering / operations document storage, storage lockers for working clothes and equipment, etc.

*d) Stores*

An area should be set aside for storage that can house the OBRR aircraft equipment, maintenance equipment, tools and spare parts. Ideally these storage areas should be located adjacent to the helicopter parking location.

Also, the stores should be easily secured and kept at temperature and humidity levels consistent with a proper aviation store (quarantine area) that is used for sensitive avionics equipment, aircraft spares, and so forth.

A drying area for flying and protective work clothing is also required.

e) *Flight and Maintenance crews accommodation*

Permanently offshore-based flight and maintenance crews will require adequate sleeping accommodation, messing and recreation facilities.

Ideally the flight crew sleeping accommodation on the installation should be as close to the OBRR Operations Room as possible, but segregated from other installation functions. It should be located in a quiet area of the accommodation, away from personnel traffic routes and other sources of disturbance that may affect pilot sleep patterns. It should be noted that operational flight crew rest periods are obligatory (see subsection 5.10.3).

*The Duty Holder, in conjunction with the AOC Holder, should make suitable provisions for accommodating the OBRR flight and maintenance crews and fully equip them for the intended operations.*

### **4.3 INSTALLATIONS AND VESSELS HELIDECK PERFORMANCE**

There are two key performance factors to consider when determining the suitability of a helideck intended for permanently-based OBRR operations:

- 1) Adequate space for the OBRR helideck operations (See subsection 4.2.2) and
- 2) Installation / vessel limitations list (IVLL) limitations.

IVLL limitations are the particular restrictions placed on helicopter operations for a particular helideck, as a result of:

- 1) Physical infringements of the SLA and / or obstruction-free sectors, caused by permanent or temporary structures and equipment.
- 2) Design deficiencies (identified from model testing) in the helideck aerodynamic performance (turbulence problems) and / or adverse installation thermal effects over and around the helideck.
- 3) Actual flight experience with pilot reports of workload and handling difficulties caused by turbulence and adverse temperature gradients on the approach and take-off sectors and over the helideck for a variety of wind velocities and directions.

The selected installation and helideck should have a BHAB Helideck Certificate of Acceptance without non-compliances, particularly any for infringements.

The helideck should also have no IVLL entries that may prove unacceptable to OBRR operations by inhibiting the launch and recovery of the helicopter when certain weather conditions or adverse platform processes (e.g. thermal effects) are present.

If considered necessary, the installation / helideck aerodynamic and thermal performance capabilities should be checked (by reference to model tests and further flight checks) in order to re-establish the validity of any potential or applied IVLL limitations.

The imperative is to ensure that helideck operability is at an acceptable level for OBRR operations.

*The nominated OBRR helideck should have no outstanding Offshore Helideck Inspection Report (OHIR) non-compliances and / or limitations applied that may compromise OBRR operations, at any time.*

*If there are deficiencies, actions must be in progress by the Duty Holder to obtain valid, in-date helideck certification.*

*Continuing action should be taken towards reducing the effects of any operating limitations (see IVLL entries) that may compromise OBRR helicopters, prior to commencement / continuation of the operations.*

#### **4.4 AVAILABLE LANDING / WINCHING SITES**

[Ref: CAP437. Chapter 9] [5].

“Never winch when you can land” is an unwritten rule that is generally applied in SAR flight operations. However, for the recovery of survivors from the sea there is no other option but to use a winch.

It is accepted that landing sites must be licensed for Public Transport operations. In the case of Public Transport - non-scheduled offshore operations, the helidecks are un-licensed, but subject to BHAB inspection and acceptance.

For SAR (and OBRR) operations, a licensed landing site or a BHAB accepted offshore helideck may not always be available. It will depend entirely on the situation encountered by an SAR (OBRR) flight crew at the time they arrive at an evacuation, rescue or recovery site and the on-site decisions taken by the Captain, in order to execute his humanitarian task. Having completed the SAR task the Captain should then revert to complying with normal flying rules.

*The AOC holder should identify for OBRR crews, all available landing sites (licensed and un-licensed) in the likely area of OBRR operations.*

*The Duty Holder, in conjunction with the AOC Holder, should give sufficient details of installation layouts (and a full set of up-to-date AERADS), in the likely area of OBRR operations, for flight crews to identify potential winching sites that may be used for personnel rescue and recovery in the event of being unable to land on a helideck.*

*The Duty Holder should furnish relevant details of attendant vessels operating in the area of OBRR coverage that may have designated winching areas and or sufficient clear deck space to effect a rescue / recovery by winch.*

## 4.5 COMMUNICATIONS

The installation should be equipped, in accordance with CAP 437 [5], to the highest standard of aeronautical communications.

The equipment will include aeronautical VHF (Traffic and Log) sets, a Non-Directional Beacon (NDB) and Helideck Crew portable VHF head sets, all used for routine helicopter communications.

The installation should also have radio equipment covering the HM Coastguard and Maritime frequencies. Repeaters should be provided in the OBRR Operations Room, if the Installation Radio Room is not close by and easily accessible.

*The Duty Holder, in conjunction with the AOC holder, should provide a full range and a high standard of communications for OBRR operations.*

## 4.6 METEOROLOGICAL FORECASTING

The installation should be equipped, in accordance with CAP 437 [5], with the highest standard of meteorological equipment.

Preferably, the equipment will be a fully integrated 'on-line' system with a PC terminal read-out facility, fed by a full suite of correctly positioned and calibrated sensors / instruments. As an alternative, if an on-line system is not available, then a fully trained and competent weather forecaster will be required to provide local meteorological readings and interpretation.

Included in the meteorological package should be instrumentation for the following:

- Wind speed
- Wind direction
- Air temperature
- Barometric pressure
- Visibility
- Cloudbase and cover
- Sea state.

Additionally, means of assessing and reporting area icing conditions and lightning potential are required.

The weather reports (forecast and actuals) should be provided to the flight crews to Meteorological Airfield Report (METAR) / Terminal Area Forecasts (TAF) standards.

A means for receiving comprehensive AREA weather forecasts required for OBRR operations, should be available to flight crews on the installation.

The Meteorological Office at Bracknell provides the offshore helicopter operators (Bristows and Scotia) with a meteorological service called 'MIST' as a matter of norm. This system supplies ACTUAL and FORECAST weather data over a 24 hour period.

Most installations in the North Sea have access to Weather Services (e.g. through a company called 'Ocean Routes').

*The Duty Holder, if necessary in conjunction with the AOC holder, shall provide a full range and a high standard of reliable meteorological equipment for OBRR operations.*

*The recording, interpretation and reporting (forecast and actuals) of local meteorological information for OBRR operations should be processed by a fully trained and competent person.*

#### **4.7 RE-FUELLING**

[Ref: CAP 437. Chapter 7, 8 and Annexe A to G] [5].

The installation must have a fully certified and serviceable fuelling facility in accordance with CAP 437 [5]. This should not present a problem on most fixed installations because they already have the facility for their routine public transport operations. There are no special fuelling requirements to accommodate OBRR operations.

However, it is likely that fuel uplift from the installation will increase as a result of the OBRR helicopter being on board. It would therefore be prudent for the Duty Holder to assess potential fuel usage with a view to either increasing fuel holdings on the installation and / or more frequent bunkering with 'tote' tanks.

*The installation should be able to store sufficient aviation fuel to supply the intended OBRR operations as well as routine public transport operations, particularly for the extended periods when it is not possible for vessels to offload supplies due to heavy seas.*

#### **4.8 PERSONNEL LOCATOR BEACONS AND OTHER SEARCH AIDS**

The provision of Personnel Locator Beacons (PLBs) is a relatively new procedure in the North Sea Offshore Industry. Some oil companies already provide PLBs for personnel on board their installations and when travelling on helicopters. In recent years, product development has seen PLBs emerge as a useful and reliable offshore safety aid.

PLBs are being used increasingly when personnel are exposed to risk of falling into the sea (over-side working). Also, they may be used where workers may be exposed to other situations (e.g. helicopter travel, when an installation evacuation is ordered, etc.) in which they may be forced to enter the water and may require rescue or recovery.

SAR aircraft are equipped with homers that can tune into the PLB frequency when the device is activated upon immersion in sea water.

A problem may arise for an OBRR crew, or any SAR crew for that matter, in determining search and recovery priorities when several individuals are in the water and several PLBs have been activated at the same time in an area. This problem is normally dealt with by homing onto the strongest signal first, and so on.

Other search aids that will considerably enhance the prospects of quick survivor rescue and recovery, particularly at night and in low visibility conditions, are high visibility light collars. These light collars are normally used in conjunction with PLBs. A light collar system is much more visible from a greater distance than the standard sea water activated lights, and has been successfully trialled, at sea, in conjunction with a HM Coastguard SAR helicopter. Further development of PLBs / light collars is required to integrate them into life jackets used offshore and on helicopters. This approach is considered to offer the best system for survivor location day or night.

***The Duty Holder should provide personnel with safety equipment designed to enhance the prospect of survivor rescue and recovery. The equipment should be fully trialled to establish its operational parameters and efficiency in use, particularly during recovery from the sea by helicopter.***

#### **4.9 OPERATING CONSTRAINTS**

OBRR helicopter operating constraints that should be considered by the Duty Holder and the AOC Holder can cover a wide range of topics when evaluating, in detail, the facilities that are to be provided offshore. Potential areas where constraints may occur due to lack of and/or inadequate facilities are:

- Helideck configuration and orientation
- Flight planning, communications and meteorological facilities
- Technical and maintenance facilities
- Flight and technical crew accommodation
- Human Factors - e.g. physical impairment (due to working in a hostile environment) that may affect the normal times for completing routine maintenance procedures.

***The Duty Holder in conjunction with the AOC Holder should consider and justify all the potential operating constraints that are likely to be encountered when setting up the facilities for supporting permanently offshore based OBRR helicopters.***



## **5. OBRR HELICOPTERS, EQUIPMENT AND OPERATIONS**

### **5.1 PREAMBLE**

The key to providing successful OBRR helicopter operations is the proper selection of aircraft, equipment and aircrew. Additionally, the operation of OBRR helicopters will cover a number of specific requirements that need to be considered and properly addressed over and above the management of normal offshore helicopter operations.

MCA set the performance standards for the SAR aspects of the HM Coastguard SAR operation; CAA cover the non - SAR aspects through normal aircrew licensing and airworthiness procedures. The contractor providing HM Coastguard helicopters, as holder of the AOC, is responsible for obtaining CAA agreement that crews are competent, except the SAR portion of the role, which is undertaken by MCA.

In considering aircraft selection, a good starting point is to identify a high performance, certified offshore public transport helicopter suitably equipped for OBRR / SAR operations.

*Decision-making processes for selection of suitable helicopters and setting the performance standards to be achieved for OBRR operations should clearly be undertaken by competent persons (e.g. jointly, by the Duty Holder in conjunction with helicopter operators who are contracted to provide these specialist rescue and recovery services).*

### **5.2 SUITABILITY OF AIRCRAFT TYPES FOR OBRR / SAR OPERATIONS**

#### **5.2.1 Introduction**

Historically, several types of helicopters have been used in the SAR role world-wide. On the UKCS, HM Coastguard and MOD currently use specific helicopter types in the SAR role. Civil variants of SAR helicopters on the UK Register are noted by \* in Table 4 below. When contracting HM Coastguard helicopters, MCA have a base specification for the aircraft types and equipment that can be employed on UKCS SAR operations.

The OBRR helicopter role has very close similarities to the HM Coastguard SAR helicopter role. Therefore it is reasonable to draw comparisons with helicopters currently used in the UK SAR role.

*The performance and capability of helicopters selected for the OBRR role should, at least, be equal to current UK Coastguard SAR helicopter specifications.*

#### **5.2.2 The Ideal OBRR Helicopter**

The ideal OBRR helicopter should be light, with a low Zero Fuel Weight (ZFW) with fuel efficient, powerful engines giving a high Maximum Take-Off Gross Weight (MTOGW), thus giving a high Disposable Load (DLd = MTOGW - ZFW).

The aircraft should also have a large cabin so that, with a high disposable load, it is able to accommodate a large number of passengers.

In the OBRR role, good single-engine hover performance is essential.

Also, if the helicopter has more than 2 main rotor blades, then having blade folding capability (mechanised, not manual) would be a distinct advantage for the purposes of offshore parking / hangarage.

### **5.2.3 Comparison of Helicopter Types**

Helicopter types suitable for OBRR operations will differ mainly in:

- Size
- Cabin capacity
- Power availability
- Lifting / winching capacity and suitability
- Range and Endurance
- Suitability with regard to limited space for offshore parking / hangarage
- Winching attributes.

Tables 4 and 5, below, give the basic performance data and the leading particulars for current types in use. The various factors listed above are discussed below.

### **5.2.4 Size**

Offshore installation helidecks are categorised by the diameter of the SLA (SLA = 'D' size) and total mass of a helicopter that can be safely landed on the structure. These basic dimensions dictate the size and weight of the largest helicopter that can be operated on the installation [5].

*When selecting a helicopter for OBRR operations, the size of the smallest helideck and its load-bearing characteristics, where landings are envisaged, will determine the size of the largest helicopter that can be landed.*

### **5.2.5 Cabin Capacity**

Consideration should be given to the number of personnel accommodated on the largest installation to be provided with cover by OBRR helicopters.

In the case of evacuation of an installation, or if significant numbers of personnel require recovery from the sea, cabin capacity in conjunction with task completion times needs to be considered.

It should be noted that seating is a general requirement for evacuations, whereas, ideally, survivors recovered from the sea should be accommodated on stretchers.

*There will be a minimum equipment fit to provide effective search, rescue and recovery techniques. Consequently, a certain amount of cabin space is needed for the additional equipment, plus sufficient space is required for survivors.*

**Table 4  
BASIC PERFORMANCE COMPARISON OF CURRENT AIRCRAFT TYPES**

A/C (aircraft) Type	MTOGW (lbs)	ZFW (lbs)	DLd (lbs)	Fuel Flow (lbs/Hr)	True Air Speed (TAS) (kts)	Max Fuel (lbs)	Gross Weight (GW) Hover (@ 12°C & 15kts)	Max. Hover Single Engine (S/E) OGE
Sikorsky S61N *	20,500	14,308	6,192	1,050	110	4,200	20,500	13,000
AS332 L	18,950	12,486	6,464	1,030	130	4,050	18,950	14,875
AS332 Mk2	20,500	13,115	7,385	1,100	140	3,745	20,500	16,090
Bell 212	11,200	7,904	3,296	660	100	1,400	11,200	
Bell 214 ST	17,500	11,812	5,688	860	125	3,200		
Sikorsky S76A+	10,800	7,512	3,288	630	145	1,850	10,800	7,200
Sikorsky S76C	11,700	7,700	4,000	630	145	1,850	11,300	?
AS 365 N2	9,365	6,390	2,975	615	135	2,070	9,365	6,500
EH101	32,178	19,836	12,342	1,763	150	7,053		
Sikorsky S92	25,200	15,800	9,400	1,100	140	4725	25,200	?

**Table 5  
COMPARISON OF LEADING PARTICULARS FOR CURRENT AIRCRAFT TYPES**

A/C Type	Overall Length 'D' (m)	Helideck allowable mass 't' Value (tonne)	Seats	Folding Blades	No. of Winches	Rotor Engage Limit (kts)	Proven UK SAR Record
Sikorsky S61N *	22.2	9.3	18	No	2	60 Steady 50 Gusting	Yes
AS332 L	18.7	8.6	18	No	2	65	No
AS332 Mk2	19.5	9.2	18	No	2	50/65**	No
Bell 212	17.46	5.1	12	N/A	1	40	Yes
Bell 214 ST	18.95	8.0	18	N/A	2	45	No
Sikorsky S76	16.0	5.3	12	No	1	40 Steady 50 Gusting	Yes, C+
AS 365 N2	13.68	4.3	11	No	?	50	Yes
EH101	22.8	15	30	No	?	?	No
Sikorsky S92	20.1	11.5	19	Yes	2	50	No

\*\* 50 now, soon to be 65

## 5.2.6 Power Availability

[Ref: JAR-OPS 3 Subparts G and H] [6].

Whenever possible, the helicopter commander will ensure that at any one time whilst airborne, the current manoeuvre is always within the capability of a single engine should one engine fail. This will always be acceptable in forward flight, but in the hover, the situation is critical.

In normal offshore commercial operations, (with the only two exceptions of immediately before landing and immediately after taking-off), at no time is the aircraft incapable of sustaining flight in the event of an engine failure. 'Engine failure' means that a twin engine helicopter is flying with one engine inoperative.

For landing, take-off and whilst in the hover, the helicopter derives a power-benefit from being close to the ground. This is called 'in-ground effect'.

For a winching exercise, the helicopter will be hovering at a height that would be outside ground effect (OGE) and it would therefore require proportionately more power. Therefore, when addressing the OBRR case it is to be assumed that all reference to hovering is 'out of ground effect'.

In the hover, unless there is some wind velocity (say >15 kts), winching presents substantial risk in the event of an engine failure. There are techniques currently employed by SAR crews that go a long way to reducing the risk of not 'flying away' from an engine failure, but nevertheless risks do exist. Some helicopter types are better than others at reducing the risk of exposure during an engine failure. Hovering favours low Outside Air Temperature (OAT) and high Wind Velocity (W/V) for better engine and rotor performance respectively. Normally, twin engine hover performance is not a problem, except in the extreme case of high OAT and little or no wind.

The other 'engine-failure' consideration is where the helicopter should go when an engine fails. If a public transport twin-engine helicopter en-route to an offshore installation suffers an engine failure then it may have to return to a land diversion. This is because the single - engine performance may not be sufficient for an approach and landing offshore. Therefore, the helicopter must always have sufficient fuel on board, at any time, to enable it to fly to the nearest suitable landing point. A 'suitable landing point' is dictated by the size of the landing area and the weather.

When an OBRR helicopter suffers a similar problem then, unless it has sufficient single-engine performance, it too must fly to an onshore alternate, thereby leaving the rescue and recovery area.

***The choice of helicopter for OBRR operations should place single-engine performance high on the list of important characteristics.***

### **5.2.7 Lifting / Winching Capacity And Suitability**

A helicopter crew start a winching exercise with the maximum single-engine (out of ground effect hover) gross weight in mind.

Winching survivors one at a time is not a problem at the start. However, once recovered, a survivor remains on board the helicopter whilst another survivor is recovered.

With each survivor the helicopter cabin fills up. Although the weight increases with each survivor recovered, the fuel consumed will probably compensate for the increasing payload. When there is no longer any room in the cabin, the survivors need to be offloaded and the recovery restarted with an empty helicopter.

*Helicopters with higher disposable load and greater cabin space will allow longer sustained winching periods at the recovery site.*

### **5.2.8 Winching Considerations**

When considering the suitability of various helicopter types for the OBRR role, a number of factors should be taken fully into account concerning efficient winching operations. They are:

- 1) Adequacy of the winch speed (approximately. 300 feet per minute)
- 2) The requirement for a cabin door with sufficient overall clear width so as to allow unencumbered winching to take place (3.2 feet / 98 cm).
- 3) Sufficient clearance from the winch centreline to any fore or aft obstructions (e.g. undercarriage sponson) that may prevent the easy recovery and manoeuvring of a stretcher (3.8 feet / 116cm).
- 4) Sufficient height from the cabin floor to the fully retracted winch hook position to allow a recovered person (in a strop) to enter the cabin at floor level without the need to reach up (5.5 feet / 167cm).

The figures in brackets given above are dimensions from the S61N helicopter in current UK SAR service. They are considered to be optimum.

### **5.2.9 Range And Endurance**

In addition to an engine failure, adverse weather conditions at the offshore location may well require a decision for a land diversion away from the area of operations.

The endurance of a helicopter is a product of fuel consumption against fuel load. Applying the Ground Speed gives the Range. However, there is also a requirement to maintain minimum contingency fuel reserves, which are NOT accountable when calculating the range and endurance.

Sometimes, as in the case with the Sikorsky S61 helicopter, maximum fuel loads can be critical for the mission. To reduce fuel load and increase survival capacity, fuel jettison can be used on this particular aircraft.

*Ordinarily, for an OBRR helicopter, range should not be a major factor.*

*However, in bad weather where there is a high probability that the helicopter, once airborne, would not be able to return to the installation from whence it came, consideration should be given to flying to a place where the weather is better and an approach and landing is possible. This scenario will require more fuel to be carried therefore greater helicopter weight and hence less disposable load.*

#### **5.2.10 Suitability With Regard To Limited Space For Offshore Parking / Hangarage**

Helicopters staying overnight or permanently-based offshore should be properly protected against the marine environment and weather. During winter months it is important to prevent the formation of ice on the airframe and rotor systems. Also, inadequate protection may give rise to systems faults arising during start-up and pre-flight checks (e.g. communication equipment).

Ideally, the helicopters should be hangared. Hangarage provides full protection and improves safety and the efficiency of engineers during servicing. Any hangar used to accommodate helicopters should ideally be wide enough to enclose the rotor blades, when deployed. Otherwise the blades will need to be folded in order to hangar the helicopter.

A 2-bladed helicopter is not a problem for hangarage, because the blades can be lined-up and stowed fore and aft, then the widest part of the aircraft is the fuselage.

On multi - bladed helicopters, if blade-folding is an option (as opposed to removal) then again, the fuselage will be the widest part of the aircraft. In this case the effort required to unfold the rotor blades is a very important time factor in preparing the helicopter for flight. If there is an automatic blade folding system (available on some non-civil helicopter types) then blade deployment time is short. If it is a manual task, then this takes considerable time and must be therefore be accounted for within the times set for getting the helicopter ready for flight and airborne.

*If there is ice present on the rotor blades, for instance, then an immediate take-off in response to an emergency will be impossible.*

*If a helicopter is hangared and it is required to immediately respond to a call-out, it should be able to be removed from the hangar and brought to readiness in a very short time.*

*It should be noted that current North Sea helicopter types do not have folding blade systems.*

*It follows that other helicopters should not be permitted to be “shut-down” on a helideck assigned to OBRR duty unless there is adequate provision for parking and the landing area can remain active, at all times.*

*Response times for OBRR helicopters must take full account of all the factors that may affect operational readiness state. This includes preparing the aircraft for flight, as well as crew readiness to get airborne.*

### **5.3 HELICOPTER PERFORMANCE STANDARDS AND RESPONSE TIMES IN VARIOUS WEATHER CONDITIONS**

#### **5.3.1 Performance Standards**

OBRR helicopter performance and operating standards are dictated by the AOC holders Operations Manual, the aircraft manufacturers manual, the navigation and role equipment fitted to the aircraft, location, and crew availability / ability to respond to an alert.

*The installation Duty Holder should set out the minimum performance standards to be met for OBRR helicopter operations.*

*The OBRR helicopter AOC holder should clearly be able to demonstrate that minimum performance standards can be achieved by the selected helicopter whether based onshore or offshore.*

#### **5.3.2 Response Times**

A response by an OBRR or SAR helicopter to an emergency call-out will be dependent on several factors that need to be taken into account by the flight crew. They will initially take guidance from the rules set out by the AOC holder in the Operations Manual. These rules will normally follow established criteria, although in the case of SAR type operations, there is little guidance on priority rules or weather minima to be obtained from CAA CAPs or from JAR-OPS.

##### *a) Priority Definitions*

Guidance needs to be provided by the AOC holder, in conjunction with the Duty Holder, on the conduct of OBRR operations. The basic criteria relate to:

- 1) The degree of urgency of the mission, and
- 2) The weather at the departure point and destination, if different.

In assessing the degree of urgency, priority definitions that have previously been agreed by MOD, HM Coastguard, UKOOA and BHAB members are:

- 1) **Distress** - A person's life is threatened if they are not provided with immediate assistance or rescue.
- 2) **Medi Rescue** - two levels of response as follows.

- **Immediate Casevac** - The immediate recovery of a person either following an accident or suffering a severe medical disorder requiring immediate medical attention without which there is a serious risk to life.
  - **Urgent Casevac** - the life of the individual is not in immediate danger although there may be a grave risk of loss of limbs, over an extended time period.
- 3) **Medivac** - the evacuation of an injured or sick person who requires medical attention, but whose condition is not life threatening, or there is no expectation of loss of limbs.

*b) The OBRR Case*

Each offshore incident where OBRR helicopters are to be deployed should be properly categorised by the On-Scene Commander / Coordinator using pre-agreed criteria. Categorisation, in some instances, may require the assistance of professional medical advice. Categorisation will assist the OBRR flight crew in determining the minimas to be used during flight planning for the mission. Table 6 provides currently-used Operations Manual (SAR Supplement) minima for S61N helicopters. It should be noted that the fully coupled SAR S61N is cleared to 40 feet Instrument Flight Rules (IFR) and there are no restrictions for distress and immediate casevac flights.

Table 7 provides a summary of estimated OBRR helicopter response time in minutes, for a range of weather conditions and scenarios. These estimates have been devised by a qualified S61N SAR Captain and are experience based. As all helicopter operations are dependent on weather conditions, the figures given may need to be modified. For instance, engaging and shutting down rotors depends on the wind velocity limits for the helicopter, but these can be exceeded at the Captains discretion.

It should be noted that the on-duty OBRR helicopter flight crew on the installation will not go to bed, so they are effectively kept at full readiness. Unlike onshore SAR flight crews who go home to bed after 9.00pm, the offshore OBRR flight crews will be kitted-up and prepared for a call-out on standby in the accommodation area.

***The installation Duty Holder, in conjunction with the AOC holder, should provide the Crisis Management Team and OBRR flight crews with guidance on mission priorities and minimas. Minimum response times to be met by OBRR helicopters, whether based on or offshore, should be laid down by the Duty Holder and should be designed to meet the goal-setting requirements laid down in PFEER regulations.***

**Table 6  
WEATHER MINIMA**

The fully coupled SAR S61N is cleared for flight down to 40 feet in IFR and there are no restrictions for Distress / Casevac Immediate flights. For Casevac Urgent flights the minima are as follows:

	<b>DISTRESS / IMMEDIATE CASEVAC</b>		<b>URGENT CASEVAC</b>	
<b>Flight Phase</b>	<b>Visibility</b>	<b>Cloud Base</b>	<b>Visibility</b>	<b>Cloudbase</b>
<b>WEATHER MINIMA - DAY</b>				
<b>Departure</b>	No Restrictions		No Restrictions	
<b>En-Route Visual Flight Rules (VFR)</b>	800 m	250 feet	500m or 1000m	400ft  300ft
<b>Search (Visual)</b>	400 m	>100 feet	600m	150ft
<b>Rescue</b>	Sufficient for hover reference	> 100 feet	600m	150ft
<b>WEATHER MINIMA - NIGHT</b>				
<b>Departure</b>	No Restrictions		No Restrictions	
<b>En-Route VFR</b>	1200m	350ft	1000m or 5km	1500ft  800ft
<b>Search (Visual)</b>	400m	>150ft	800m	200ft
<b>Rescue</b>	Sufficient for hover reference	>150ft	800m	200ft

In distress and Casevac Immediate situations only, the following apply to Non - Coupled aircraft.

<b>ONSHORE DESTINATION</b>		
	<b>Visibility</b>	<b>Cloudbase</b>
<b>Day</b>	300 metres	150 feet
<b>Night</b>	300 metres	150 feet

<b>OFFSHORE DESTINATION</b>		
	<b>Visibility</b>	<b>Cloudbase</b>
<b>Day and Night</b>	300 metres	100 feet
<b>LN450 equipped Bell 212</b>	200 metres	50 feet

**Table 7  
TYPICAL OBRR HELICOPTER RESPONSE TIMES (Minutes)**

<b>SCENARIO</b>	<b>A/C PARKED</b>	<b>BENIGN WEATHER (Up to Force 2)</b>	<b>MODERATE WEATHER (Force 3 to 6)</b>	<b>SEVERE WEATHER (Force 7 to 10)</b>
<b>Full Readiness State (Day)</b>	On helideck	15	15	15
<b>Full Readiness State (Night)</b>	On helideck	45	45	45
<b>Estimated Time to get Airborne (Day)</b>	On helideck / parking area	20	20	25 (Hangared)
<b>Estimated Time to get Airborne (Night)</b>	In hangar	35	35	40 (Hangared)

The following total time estimates are MIN / MAX from receiving an "ALERT".

<b>Estimated Time to Arrive at a Rescue Site one mile distant (Day / Night)</b>	Day – on helideck or parking area Night – in hangar	25/40	25/40	30/45
<b>Estimated Time to Arrive at a Rescue Site five miles distant (Day / Night)</b>	Day – on helideck or parking area Night – in hangar	30/45	30/45	40/55
<b>Estimated Time to Locate and Recover a Man over Board - within 500 metre zone</b>	Day – on helideck or parking area Night – in hangar	40/65	40/65	50/65
<b>Estimated Time to Locate and Recover 10 Survivors in Sea - within 500 metre zone</b>	Day – on helideck or parking area Night – in hangar	85/105	85/105	105/125

## **5.4 COMMUNICATIONS, NAVIGATION AND SEARCH AIDS**

### **5.4.1 Introduction**

High specification communications, navigation and search aids are fundamental to helicopters operating in a search, rescue and recovery role. As a result of considerable world-wide military and civil SAR operations, SAR aircraft equipment has evolved to a high degree of sophistication.

Table 8 lists the current SAR specialist equipment specification for helicopters contracted by HM Coastguard. The equipment is provided over and above that required by a public transport helicopter used for offshore work.

The table lists the equipment to be carried in the aircraft, except where noted. The lists also exclude the equipment carried by SAR crewmen as personal equipment. In addition, adequate spares and back-up equipment will be required.

*The specialist equipment specifications for OBRR helicopters should be at least the equivalent of HM Coastguard and RAF SAR requirements.*

*The aircraft equipment specification for OBRR (and SAR) helicopters should appear in the AOC holders Operations Manual.*

*Also a Minimum Equipment List (MEL) should be available and used by flight crews to ensure that specified go, no-go items are properly covered prior to embarking on a rescue and recovery mission.*

### **5.4.2 Communications**

[Ref: JAR-OPS3 Sub Part L] [6].

SAR helicopters (both military and HM Coastguard) carry a comprehensive communications fit that enables the flight crew to contact all of the agencies and resources involved in an incident.

Table 8 provides an outline specification for HM Coastguard contracted civil SAR helicopters. This equipment is considered the minimum level of equipment required for OBRR helicopter operations.

Notwithstanding the known difficulties in getting frequencies allocated by CAA, consideration should be given by the AOC holder to applying for a company frequency that would allow OBRR aircraft to operations room communications during missions. This additional level of communications would be extremely useful and at times, could be essential to the ongoing safety of a mission.

*The Duty Holder should specify to the AOC holder the need for a comprehensive communications fit for OBRR helicopter operations.*

*The OBRR helicopter communications fit should meet the minimum standard specified by HM Coastguard for civilian contracted SAR aircraft.*

### **5.4.3 Navigation Aids**

[Ref: JAR-Ops Sub Part L] [6].

SAR helicopters (both military and HM Coastguard) carry comprehensive navigation aids that enable the flight crew to operate the aircraft independently, and in extreme adverse weather conditions, when called to an emergency incident.

Navigation aids should include the following:

- VHF Omni-range (VOR) / Instrument Landing System (ILS) required for IFR onshore flying
- NDB for inter-installation navigation
- Global Positioning System (GPS) for general navigation and auto-search.

Table 8 provides an outline specification for HM Coastguard contracted civil SAR helicopters. This equipment is considered the minimum level of equipment required for OBRR helicopter operations. A navigation computer program will prove very useful for OBRR scenario planning. However, it is recommended that the Duty Holder and AOC Holder standardise on a specific program to be used for this purpose.

*The Duty Holder should specify to the AOC holder the need to fit comprehensive navigation equipment for OBRR helicopter operations. These should meet the minimum standard specified by HM Coastguard for civilian contracted SAR aircraft.*

### **5.4.4 Search Aids**

SAR helicopters (both military and HM Coastguard) are equipped to a high standard that enables the flight crew to operate the aircraft independently, day or night, and in extreme adverse weather conditions. They carry specialist search aids to locate and recover casualties / survivors from the sea when called to an emergency incident.

The search aids should include:

- Forward Looking Infra-Red (FLIR)
- Homer to receive survivor beacon transmissions
- Fully coupled 4 axis Auto Hover.

OBRR helicopters should be similarly equipped to a high standard, and be readily distinguishable from land, sea and air as OBRR helicopters. Table 8 provides an outline

specification for HM Coastguard contracted civil SAR helicopters. This equipment is considered the minimum level of equipment required for OBRR helicopter operations.

The RAF SAR helicopter flight crews are also equipped with Night Vision Goggles which are reported to be a most valuable search aid.

***The Duty Holder should specify to the AOC holder a comprehensive suite of search aids for OBRR helicopter operations.***

***These aids should meet the minimum standard specified by HM Coastguard for civilian contracted SAR aircraft.***

***The aircraft should be clearly identifiable from land, the sea and in the air, as an OBRR helicopter.***

## **5.5 ROLE-EQUIPMENT ON OBRR / SAR HELICOPTERS**

The current HM Coastguard S61N helicopter can be considered fully role-equipped for SAR operations. The equipment adds approximately 1,700lbs to a similar-type public transport helicopter.

Table 8 provides an outline role-equipment specification for HM Coastguard contracted civil SAR helicopters. This is considered the minimum level of equipment required for OBRR helicopter operations.

***The Duty Holder should specify to the AOC holder a comprehensive role-equipment fit for OBRR helicopter operations. This should meet the minimum standard specified by HM Coastguard for civilian contracted SAR aircraft.***

**Table 8**  
**SPECIFICATION FOR SAR HELICOPTERS (CONTRACTED BY HM COASTGUARD)**  
**INCLUDING SPECIALIST EQUIPMENT FITTED**

<b>AIRCRAFT SPECIFICATION</b>		
<b>EQUIPMENT ITEM</b>	<b>OUTLINE SPECIFICATION</b>	<b>PURPOSE / REMARKS</b>
<b>Airframe</b>	<p>Equivalent to a Sikorsky S-61N Mk II with an all weather, day / night capability in terms of endurance, capability and speed.</p> <p>With CAA Certificate of Airworthiness in the transport category and meet all the requirements for Class 7 offshore transport operations.</p> <p>Fitted with Flotation Equipment for ditching.</p> <p>Bubble Windows located at each side of the fuselage.</p>	<p>Full IMC capability for night SAR except in moderate icing conditions.</p> <p>An alternate aircraft with an equivalent or superior operational capability will be considered if it can fully meet the requirements of a wide range of tasks which may be encountered in a busy marine environment.</p>
<p><b>Airborne Equipment to include:</b></p> <p><b>Automatic Flight Control System</b></p> <p><b>Auto-Hover system</b></p>	<p>To permit the aircraft to make an approach to the hover at a height suitable for winching operations at night and in conditions of poor visibility, without the pilot requiring to refer to external visual references.</p>	<p>Operator to provide an undertaking that the auto-hover equipment shall be fully operational and CAA approved.</p>
<b>Fuel Jettison Facility</b>		<p>If available, OBRR helicopters can reduce their weight by jettisoning fuel and operate to MAUW for the ambient conditions. Use depends on task and diversions available.</p>
<b>Declared Operational Range</b>	<p>For 4 hours endurance without overload tanks.</p>	<p>Must be a least 200 nm from base, without refuelling.</p>

<b>SAR EQUIPMENT</b>		
<b>EQUIPMENT ITEM</b>	<b>OUTLINE SPECIFICATION</b>	<b>PURPOSE / REMARKS</b>
<b>Primary Rescue Hoist</b>	A permanently mounted, electronically powered, variable speed unit capable of lifting a load of at least 272 kgs (600 lbs) over a cable length at least 88.4 m (290 ft).	Winch speeds to be within the 0 to 0.76 m/s (150 ft/min) range. Winch to be fitted with a guillotine operable from the Winch Operator and Pilot's positions.
<b>Back-up Rescue Hoist</b>	Permanently mounted unit required with same load capability and cable length as primary hoist.	For use in the event of Primary Hoist failure. Must meet all UK CAA airworthiness requirements.
<b>External Lighting</b>	<p>Equipment as follows:</p> <ul style="list-style-type: none"> <li>• Dual landing / search lights, controllable in the vertical plane.</li> <li>• Dual rotatable landing / search lights controllable in azimuth and elevation.</li> <li>• Fixed dual winch area flood light.</li> <li>• Manually operated search light at winching position</li> <li>• Door mounted winch operator hand lamp</li> <li>• Rearward facing rotatable flood / search lights providing light to the tail rotor.</li> </ul>	<p>To facilitate search and rescue.</p> <p>For night confined area operations</p>
<b>Lifesaving Appliances:</b>		
<b>Dropable Liferafts</b>	Qty 3 - dropable liferafts, one with floating line, (one extra to aircraft equipment) of capacity commensurate with the size of the aircraft.	For permitting the dropping of 2 liferafts to survivors in the water.
<b>Pilot LSJ</b>	Qty 2 - Mk 28 fitted with SARBE BE 515 Radio Beacons.	

<b>SAR EQUIPMENT</b>		
<b>EQUIPMENT ITEM</b>	<b>OUTLINE SPECIFICATION</b>	<b>PURPOSE / REMARKS</b>
<b>Crewmen LSJ</b>	Qty 3 - Mk 15 fitted with SARBE BE 515 Radio Beacons.	Two with voice transceiver capability and one without for wet drill use only.
<b>Passenger LSJ</b>	Qty 14 - Mk 28.	Plus 12 in storage
<b>Passenger Immersion Suits</b>	Qty 6	Sufficient stocks to be held for maintenance turnaround.
<b>SAR Medical Pack and Miscellaneous Emergency Equipment</b>	See separate inventory lists in tables below.	

<b>AVIONICS</b>		
<b>EQUIPMENT ITEM</b>	<b>OUTLINE SPECIFICATION</b>	<b>PURPOSE / REMARKS</b>
<b>Communications Equipment for SAR Role.</b>	<p>Aero / Marine Radios:</p> <ul style="list-style-type: none"> <li>• Multi - Channel VHF (AM) Air Band</li> <li>• Multi - Channel VHF (FM) - Marine Band (156-174 MHz)</li> <li>• Multi Channel UHF (225-399.9 MHz)</li> <li>• Multi-Channel MF/HF with Double Side Band capacity (2-23 MHz)</li> <li>• Winchman's "Fit for Purpose" communications equipment.</li> </ul>	<p>To communicate with flight crew throughout the SAR operation. Presently there is no requirement for the equipment to be completely waterproofed. However, it should be made to withstand the hostile environment in which it is envisaged the winchman will operate.</p>

<b>AVIONICS</b>		
<b>EQUIPMENT ITEM</b>	<b>OUTLINE SPECIFICATION</b>	<b>PURPOSE / REMARKS</b>
<b>Homing Equipment</b>	Multi-frequency homing equipment on VHF(AM), VHF(FM) and UHF and homing equipment on HF to cover 500 and 2182 kHz.	
<b>Search Radar</b>	Range scales to cover the range band 0.5 to 40 nm and capable of displaying information from 9 Ghz transponders (SARTS).	Capable of detecting a liferaft at 0.5 nm and a medium sized vessel at 20 nm in moderate sea states (Wind Force 5).
<b>Thermal Imagery Equipment</b>	Forward Looking Infra-Red Ultra (FLIR 4000 Dual Sensor) camera with a video recording facility and associated display equipment.	Gyro stabilised system.
<b>Night Vision Equipment</b>	Helmet-mounted Night Vision Goggles (Litton BNVS NVGs)	One set to be provided for rear crew use.
<b>Navigation Equipment for SAR operations.</b>	<p>Area Navigation System is to include the provision of search patterns, moving waypoints, etc.</p> <p>In addition to a primary GPS receiver a second (standby) GPS receiver / system is required.</p> <p>Dual ADF installation covering MF and HF frequency bands.</p> <p>Electronic Horizontal Situation Indicator (EHSI)</p>	<p>System to have multi sensor inputs including Doppler, GPS and VOR/DME.</p> <p>Both GPS units to be B R-Nav compliant</p>

<b>MISCELLANEOUS EQUIPMENT</b>		
<b>EQUIPMENT ITEM</b>	<b>OUTLINE SPECIFICATION</b>	<b>PURPOSE / REMARKS</b>
<b>Electric Lead</b>		For use with Zenith refuelling pump. [Should not be required in OBRR role.]
<b>Cabin Sea Tray and Undermat</b>		Wet floor protection for cabin
<b>Passenger Immersion Suits</b>	Qty 6	Sufficient stocks to be held for maintenance turnaround.
<b>Bolt Croppers</b>	One pair	

<b>MISCELLANEOUS EQUIPMENT</b>		
<b>EQUIPMENT ITEM</b>	<b>OUTLINE SPECIFICATION</b>	<b>PURPOSE / REMARKS</b>
<b>Mobile Telephone</b>		For use on the ground only.
<b>Blackboard and Chalk</b>		For communicating with survivors, etc.
<b>Despatcher Harnesses</b>	Qty 2	For rear crew restraint.
<b>Single Lift Strops and Static Line</b>	Qty 3	
<b>Cabin Blinds</b>	As Required.	For FLIR monitor.
<b>Stretchers</b>	Qty 1 - Neil Robertson  Qty 1 - Fixed Frame  Qty 1 - Scoop Stretcher	With two blankets, valise and assault troop LSJ.  Lightweight unit fitted out as above.
<b>Flotation Radio Distress Beacon Buoys</b>	Qty 2 - Burndep SARBE BE369.	Dropable to Survivors.
<b>Double Lift Harnesses</b>	Qty 2 - with quick release boxes	
<b>Hand Held Lamp</b>	Qty 1 - 75 kW	
<b>Torches</b>	Qty 2 - Lantern Type	
<b>Hand Held Radios</b>	FM Marine Band	
<b>Verey Pistol</b>	Complete with range of cartridges	
<b>J Knife</b>		
<b>“Heave-Ho” Emergency Hoist</b>		
<b>Emergency Hook</b>		
<b>Strop</b>	7.5 feet.	
<b>Grabbit Hooks</b>	Qty 2	
<b>Equipment Bag</b>	Qty 1	For passing equipment to a vessel.
<b>Smoke and Flame Markers</b>	Qty 2	In addition to those supplied with LSJs and Liferrafts.
<b>Single Lift Rescue Strop</b>	Qty 3	
<b>Static Discharge Lines</b>	Qty 2	
<b>Fire Fighting Gloves</b>	One pair	
<b>Winching Gloves</b>	One pair	
<b>Aircrew Ration Pack</b>	Qty 1	
<b>Seat Strap Extensions</b>	Qty 2	
<b>Fire Axe</b>	Qty 1	
<b>Message Bag</b>	Qty 1	

<b>MISCELLANEOUS EQUIPMENT</b>		
<b>EQUIPMENT ITEM</b>	<b>OUTLINE SPECIFICATION</b>	<b>PURPOSE / REMARKS</b>
<b>Hi-Line Packs</b>	Qty 4. Plus qty 12 Hi-line lead weights	
<b>Nylon Rope</b>	100 feet.	
<b>Extension Strop</b>	Qty 1 - 8 feet.	
<b>Heat Pads</b>		
<b>“Piddle” Packs</b>	Qty 4	
<b>Neoprene Hood and Gloves</b>	Qty 2 sets.	
<b>Hi-Line and Weight</b>	Qty 1	For Training only
<b>Training Drum</b>		For Training only
<b>Grapnel</b>	Qty 1	For Training only
<b>SARBE BE375</b>	On 121.65 MHz	For Training only

<b>MEDICAL EQUIPMENT</b>		
<b>EQUIPMENT ITEM</b>	<b>OUTLINE SPECIFICATION</b>	<b>PURPOSE / REMARKS</b>
<b>Blood Pressure Monitor</b>	Qty 1 - Digital with printout (spec as per the NISSEI DS 175)	
<b>Body Bags</b>	Qty 2	
<b>Thermal Blankets</b>	Qty 2	
<b>“Doctors Use” Drug Selection</b>	One Box	
<b>Medical Headsets</b>	Qty 4	

<b>MEDICAL EQUIPMENT</b>		
<b>EQUIPMENT ITEM</b>	<b>OUTLINE SPECIFICATION</b>	<b>PURPOSE / REMARKS</b>
<b>Plasma Bag</b>	Comprising: <ul style="list-style-type: none"> <li>• Qty 2 Blood Administration sets</li> <li>• One Bottle of Hartmans Solution</li> <li>• Qty 4 Bottles of Haemacel 500 mls</li> <li>• One Bottle of Glucose 500 mls</li> <li>• Qty 4 Bottles of Sodium Chloride 500 mls</li> <li>• Qty 8 Canulae</li> <li>• Qty 5 Sterile Swabs</li> <li>• Qty 8 IV Dressing pads</li> <li>• Qty 2 Rolls of Tape</li> <li>• Qty 4 Ampual IV Water</li> </ul>	
<b>Airway Care and Analgesia Equipment</b>	Comprising: <ul style="list-style-type: none"> <li>• Suction Equipment</li> <li>• Qty 3 Airways, various sizes</li> <li>• Pneupac Comprehensive Instant Action Set - Model 2R, A162/Z32 and A2554/Z3</li> <li>• Pneupac Entonox Pack and Bottle</li> </ul>	With variable flow selector valve and bottle. 2 spare Oxygen Bottles.  2 spare Entonox Bottles

<b>MEDICAL EQUIPMENT</b>		
<b>EQUIPMENT ITEM</b>	<b>OUTLINE SPECIFICATION</b>	<b>PURPOSE / REMARKS</b>
<b>First Aid Packs</b>	Qty 2 required, comprising: <ul style="list-style-type: none"> <li>• Qty 1 Defibrillator</li> <li>• Seasickness tablets</li> <li>• Eye Anaesthetic</li> <li>• Qty 1 Laerdal Aspirator Bag and Mask</li> <li>• Qty 1 V Vac hand sucker</li> <li>• Qty 1 pair of Scissors</li> <li>• Qty 1 pair of Tweezers</li> <li>• Qty 1 Ambubag and Mask</li> <li>• Qty 2 Eye Wash</li> <li>• One Roll of Clingfilm and Oven Bags</li> <li>• Flamazine Burn Cream</li> <li>• Qty 12 Melolin Dressings</li> <li>• Qty 2 Bags of Sterile Water</li> <li>• Qty 2 Packs of Micropore Tape</li> </ul>	c/w First Aid Manual  With spare battery and drugs             For burns



<b>MEDICAL EQUIPMENT</b>		
<b>EQUIPMENT ITEM</b>	<b>OUTLINE SPECIFICATION</b>	<b>PURPOSE / REMARKS</b>
<b>First Aid Packs Cont'd</b>	<ul style="list-style-type: none"> <li>• Conforming Bandages</li> <li>• Qty 4 Eye Patches</li> <li>• Qty 1 Torch</li> </ul>	Varying sizes

<b>NAVIGATION EQUIPMENT</b>		
<b>EQUIPMENT ITEM</b>	<b>OUTLINE SPECIFICATION</b>	<b>PURPOSE / REMARKS</b>
<b>Aircraft Flight Library</b>	Qty 1	
<b>Admiralty Charts</b>	As required for operating area	
<b>Aeronautical Charts</b>	As required for operating area	
<b>Ordnance Survey Maps</b>	As required for operating area	Not required for OBRR operations
<b>Local Information Folder</b>		For OBRR operations to include IVLL, Offshore Route Guide, Aerads, etc.
<b>Minor Aerodrome Details</b>		Not required for OBRR operations
<b>Helicopter Landing Sites Directory</b>		See also Local Information Folder
<b>Note Pad</b>		
<b>Camera</b>	35mm SLR or Digital complete with Films, etc.	
<b>Parallel Rule</b>	Qty 1	
<b>Pair of Dividers</b>	Qty 1	
<b>Airtours Plotter</b>		
<b>Airtours Computer</b>		
<b>Douglas Protractor</b>		

## **5.6 OFFSHORE ALTERNATES AND DIVERSION POLICIES**

### **5.6.1 Introduction**

The subject of alternates and diversions should be covered in detail in the AOC holder's Operations Manual and should be set out to comply with the requirements in JAR-OPS 3.340 Subparts D and E [6]. Offshore alternates / diversion policies are covered by JAR-OPS 3.255 Subpart D and E [6].

There are three legal reasons for a diversion to be nominated. Two are for weather considerations and the other is for an engine-failure scenario. They are explained as follows:

- 1) There must be a take-off alternate within 1 hour of the departure location if the weather conditions are below minima.

- 2) In the situation that the weather conditions at the destination are forecast to be below the minima required for a visual approach and landing, and a missed approach would be a possibility.
- 3) In the event of an engine failure at any time en-route, and the helicopter cannot make a deliberate single - engine approach to the hover (helicopter too heavy / power insufficient), then, a diversion to a suitable landing site (a runway) should be considered.

### **5.6.2 Application**

In practical terms, in the event of an engine failure en-route to an offshore installation, what must be considered is whether the helicopter is capable of making an offshore single-engine approach and landing. If not, then a **suitable landing area**, presumably the closest, weather permitting, must be selected. In the case of Public Transport, this suitable landing area must be a licensed aerodrome or heliport.

It follows that on departure from onshore or offshore, the fuel consideration must include an onshore alternate, as necessary. A helicopter with single-engine hover capability, would only need to consider the bad weather scenario [Ref: JAR-OPS 3.255 Subpart D (Reference 5)] [6].

For OBRR helicopter operations an approved offshore alternate may be considered acceptable.

HM Coastguard SAR helicopters based around the UK operate at any time in response to a humanitarian “call-out”. Missions are therefore initiated without regard to whether airfields are open for routine flying operations and whether or not normal air traffic services are available.

With regard to HM Coastguard SAR, the use of alternates outside airfield / airport normal operating hours, is largely a matter of the Commander’s discretion. If during the mission planning phase it looks like a recovery to a different landing site (e.g. not the SAR base) is likely, then the HM Coastguard incident controller will organise refuelling and / or other services at the time required by the SAR helicopter.

*Adequate consideration should be given by the AOC holder to the alternates / diversion policy required for OBRR helicopter operations.*

## **5.7 OPERATIONAL CONSIDERATIONS FOR OBRR HELICOPTERS BASED ON MOBILE OR FIXED INSTALLATIONS**

### **5.7.1 Introduction**

There are two main flying concerns to address when choosing between a fixed and mobile installation as a base location for OBRR helicopters.

- 1) All helicopters have a pitch, roll and heave limitation, above which a take-off or landing cannot be made. The application of the limits to offshore helicopter operations are set out in the IVLL. The limits of roll, pitch and heave are listed for individual helicopter types, types of vessel and mobile installation, as well as day and night operations.
- 2) Limitations are imposed for starting and stopping rotor blades in strong wind conditions. These limitations are set by the aircraft manufacturer, for individual helicopters, and are to be found in the aircraft Operating Manual (see Table 5).

Helideck movement and operating limitations are covered in [JAR-OPS 3.430 Subpart E] [6].

### **5.7.2 Mobile Installations**

In harsh weather, pitch, roll and heave limitations will present a problem when flying to and from helidecks on mobile installations (e.g. FPSOs, Floatels, etc.).

With mobile installations (primarily vessels and FPSOs that weathervane) the wind limitation for rotor starting and stopping can be accommodated by moving the vessel if possible (and hence helideck) in relation to the wind direction. A vessel and helideck can be positioned to put the wind behind a structure such as a hangar, to reduce the effects of an otherwise strong wind.

### **5.7.3 Fixed Installations**

Fixed installation helidecks are not normally affected by motion limits.

However, the limitations imposed on helicopters for starting and stopping rotor blades in strong wind conditions can sometimes be exacerbated on the elevated helidecks found on most fixed installations. This is a problem that quite often arises because of unfavourable windflows across the helideck and is more associated with structure-induced turbulence.

*The Duty Holder should be able to clearly demonstrate that the base location for an OBRR helideck provides a stable, turbulence-free platform which will ensure high levels of helideck availability in a wide range of weather conditions and wind directions.*

*Although in the past OBRR-type helicopters (e.g. Brent SAR) have been successfully based on Floatels, it is most unlikely that availability from a mobile base can exceed that of a fixed installation which has a good helideck aerodynamic and thermal performance.*

*There are very limited data available to show the frequency of landings aborted because of Pitch, Roll and Heave. Some Mandatory Occurrence Reports (MORs) have been submitted that cite helidecks out of limits for landings and these relate mainly to vessels. However, there are more MORs citing turbulence and thermal problems.*

## **5.8 AIRCRAFT / EQUIPMENT CERTIFICATION / LICENCE ISSUES (FIT FOR PURPOSE)**

The AOC Holder is entirely responsible for ensuring that OBRR helicopters, their communications, navigation and role equipments are properly certified and licensed and, where appropriate, certification, licensing and / or inspection are not overdue.

The AOC Holder is also entirely responsible for ensuring that all flight crew members and maintainers assigned to OBRR helicopter operations are trained, competent, and are fully licensed, with appropriate currency, for the intended operations.

*The Duty Holder should confirm with the AOC Holder and have sight of up-to-date records clearly demonstrating that the aircraft, equipment, flight crews and maintainers are properly certified and licensed and, where appropriate, are not overdue certification, licensing and / or inspection.*

## **5.9 METEOROLOGICAL FORECASTING AND FLIGHT PLANNING**

Although weather limitations are stated in the AOC Holder's Operations Manual, it is at the Captain's discretion whether to fly or not. Much depends on the availability of diversions and diversion fuel carried, which again is at the Captain's discretion.

When considering weather limitations, the RAF SAR flight operations management stress the importance of having auto-hover capability. This permits safer flying when the weather conditions are below the regulatory minima. Nevertheless, Captains are expected to justify their decisions in this regard.

Notwithstanding the operational value of having enhanced automatic flight control systems, etc. installed and operative on the helicopter, the importance of proper flight planning and having accurate local and area weather information for an OBRR mission should not be underestimated.

The helicopter Commander should be freely allowed to make, and to justify, operational decisions based on good flight planning and quality weather information services.

*Flight planning and weather information services provided for OBRR helicopter operations, by the Duty Holder in conjunction with the AOC Holder, should be of a quality to ensure that the helicopter Commander may freely make, and justify, his operational decisions for committing or otherwise to a rescue and recovery mission.*

## 5.10 CREW OPERATING ROUTINES AND DUTY TIMES

### 5.10.1 Introduction

[Ref: JAR-OPS 3.310] [6].

The number of flight crew and maintainers that will be required to efficiently operate onshore and offshore-based OBRR operations will depend entirely on the number of helicopters used to provide the coverage specified by the Duty Holder. Generally, the AOC holder will determine the minimum numbers of crew and maintainers, per aircraft, depending on several factors such as operating location, 24 hour coverage, in-field maintenance requirements, and so on. These manning issues will be addressed in the Flight Operations Manual.

### 5.10.2 MCA Case

MCA is not directly involved in the HM Coastguard contracted SAR helicopter crew rostering, accommodation or recruitment. The contractor is solely responsible for these aspects and, in doing so, must meet CAA requirements about crew duty time, and the MCA requirements for specified readiness states.

### 5.10.3 RAF SAR Case

For MOD SAR crews there is an upper limit on the number of hours they fly per month. It equates to 850 hours single pilot, 1200 hours dual pilot per year. There is no conflict in this regard with the CAA standard.

MOD SAR crews are maintained at the following (regulated) readiness states.

READINESS STATE	MAXIMUM READINESS PERIOD	MAXIMUM FLYING TIME DURING READINESS PERIOD	MINIMUM REST PERIOD AFTER
15 minutes	14 hours	10 hours	8 hours (this can be at a readiness state of 45 minutes which is considered a rest period)

There are 4 to 5 crews per SAR flight, which gives an allowance for leave, detachments, and so on. Also, formed crews are not established; the categorisation and standardisation schemes allow for this.

### 5.10.4 OBRR Case

#### a) *Duty Hours and Rest Periods*

Crew duty hours and rest periods will be required to comply with JAR-Ops 3 [6] and the Operations Manual.

#### b) *Work cycles and Crew changes*

As a general rule, the AOC holder will probably fix on work cycles of 14 days on and 14 days off for flight and maintenance crew based offshore.

c) *Training and Drills*

On-duty flight and maintenance crews should be relieved from normal installation musters and boat drills. On these occasions they should automatically come to readiness to respond to an emergency and potentially relocate to an alternate location.

Consideration should also be given to exempting the resting crews from routine installation musters and boat drills. However, this may not be possible due to difficulties differentiating between an alarm for a drill and a real alarm.

*Clearly, the standards for OBRR crew readiness, flying duties and rest periods should meet a recognised standard and be clearly specified in the Operations Manual. In the UK this should, as a minimum, be the same as HM Coastguard SAR crews.*

*There should be sufficient numbers and type of personnel to provide 24hr, 365 days a year coverage. The total number of crews assigned should be consistent with the planned OBRR operations.*

*The issue of OBRR helicopter crews responses to platform alarms (for tests and drills) should be determined by the Duty Holder, with full consideration for both installation safety and OBRR operating priorities taken into account, and a policy agreed with the AOC holder.*

## **5.11 AIRCRAFT MAINTENANCE PROGRAMMES AND FIELD ISSUES**

### **5.11.1 Introduction**

Any helicopter assigned to an OBRR contract should have all anticipated long-term maintenance routines completed prior to entering service. Latest HM Coastguard figures show that 99.8% aircraft availability is being achieved.

The readiness states and the time allowed to replace unserviceable OBRR aircraft, whilst a contractual requirement between the Duty Holder and AOC holder, should be based on risk assessment.

### **5.11.2 Aircraft Maintenance Onshore and Offshore**

Engineering facilities provided to maintain aircraft at a main helicopter base location onshore are usually very well equipped and, generally, the manpower would be more than adequate to service aircraft in order to meet the helicopter operators flying commitments. The engineering and support services are generally designed to provide 24 hour cover (when needed) and to attend to all routine flightline inspections, fault diagnosis, un-scheduled component replacements (e.g. power units) and scheduled base maintenance cycles, etc (sometimes up to major aircraft and component refurbishment). Flightline inspections, scheduled maintenance and overhaul activities are well-defined in Aircraft Manuals and are routinely carried out under approved maintenance management programmes for different aircraft types.

Offshore, the facilities and manpower provided for OBRR helicopter maintenance and preparation for flight will probably be provided to a minimum level. However, the helicopter

must be maintained and operated to the same standards as it would be if it were based onshore. On an offshore installation, the location and physical constraints imposed by helidecks and the associated facilities will normally provide very limited accommodation for maintenance activities. Therefore, the arrangements put in place will simply not support much more than the field maintenance activities required for mission preparation and turnarounds.

For the above reasons, the planning for offshore maintenance on OBRR helicopters should be limited to those routine flightline inspections and activities required to prepare an aircraft for a flying mission and afterwards, to revert to standby with the aircraft in a serviceable condition. This will require assigned OBRR aircraft to have long major component lives, all long-term anticipated base maintenance routines completed and no outstanding items requiring rectification, prior to deployment offshore.

### **5.11.3 Unserviceable OBRR Helicopters Onshore and Offshore**

In the event of an OBRR helicopter not being available to meet the readiness state (e.g. as agreed contractually between the Duty Holder and AOC Holder), a replacement helicopter should be provided, at the designated installation, within one hour or less from the time of the unserviceability being declared. The back-up helicopter should be of equivalent specification and performance, CAA approved for both day and night, visual and IF operations and role equipped to the same standard as the primary aircraft.

As a guide, HM Coastguard do allow (contractually) a replacement aircraft to operate on standby, without auto-hover capability and standby hoist.

*Using risk assessment, the Duty Holder should calculate and justify a figure for helicopter availability to meet OBRR operational requirements. The derived figure should be specified to the AOC Holder and assurances obtained that the required availability can be achieved.*

*As a benchmark, the latest HM Coastguard figures show that 99.8% aircraft availability is being achieved with SAR helicopters. These aircraft are based onshore and stowed in hangars. OBRR helicopter availability will need to take into account of the aircraft being based offshore and whether or not it is hangared.*

*The AOC holder should supply helicopters for OBRR operations that have no outstanding or anticipated maintenance items or component replacements due.*

*In the event of an OBRR helicopter being unable to meet readiness state, the AOC Holder should demonstrate to the Duty Holder that they have the ability and resources to provide a replacement aircraft of similar specification and performance within one hour, or less, of the primary aircraft being declared unserviceable.*

## 5.12 OPERATING CONSTRAINTS

OBRR helicopter operating constraints should be properly considered and fully acknowledged by the Duty Holder and the AOC Holder.

When evaluating in detail the aircraft, the crews and operating requirements for helicopters that are permanently based on an installation and operating in a hostile offshore environment, potential constraints can cover a wide range of areas. Potential constraints may include:

- The helicopters performance in an OBRR role
- The suitability and serviceability of communications, navigation and role equipment for the OBRR role
- Crew rostering arrangements
- Timeliness of replacing unserviceable helicopters and equipment essential for the OBRR role
- Human Factors - e.g. physical impairment of the winchman due to extended winching operations (for multiple survivor winch recoveries) in a hostile environment. This may have an effect on the anticipated times for completing a multiple survivor rescue.

*The Duty Holder in conjunction with the AOC Holder should consider fully and justify all the potential operating constraints that are likely to be encountered when setting up and operating permanently-stationed OBRR helicopters.*

## **6. REVIEW OF PRINCIPAL FACTORS RELATING TO HELICOPTER RECOVERY AND RESCUE OPERATIONS**

### **6.1 HELICOPTER INCIDENT DATA**

#### **6.1.1 Preamble**

Fundamental to the review of a specific area of helicopter operations in support of offshore oil and gas operations, is the need to gain an insight into related problems that may have been experienced. This should permit a reasonable assessment to be made of the potential problem areas that may arise in the future.

Such an assessment, albeit a coarse one, can be achieved to some extent simply by reviewing MORs that are collected and collated by CAA Safety Data Department (SDD) and extracting relevant data.

Access to these summary incident reports was gained and the CAA SDD database interrogated for the following events:

- Adverse or poor weather conditions
- Harsh or hostile seas
- Winching or winchman
- Deck movement
- Search and Rescue.

The MORs obtained from CAA SDD were entered into the JBAL Helicopter Operations Database. The JBAL database currently contains over 200 occurrence reports relating to offshore helicopter operations worldwide, for the period 1968 to 2000. The reports mainly cover UKCS operations where 76 accidents are recorded (13 involving fatalities), 20 serious incidents and over 80 MORs (a fraction of the total MOR database). Since the Mandatory Occurrence Reporting scheme started in 1976, there have been many MORs submitted to CAA for all types of aviation activity. However, it has been generally accepted that in the earlier years a lot of the less serious offshore helicopter occurrences were filed in the operators own reporting system rather than submitted to CAA as MORs. In recent years this has changed and the MOR reporting is more open.

#### **6.1.2 Generic Events**

A series of reports were developed in order to make an appropriate assessment of the likely problems that may be encountered by helicopters operating in the OBRR role. An analysis of the available reports clearly shows there are a number of events that can occur regardless of the working role of a helicopter in an offshore environment, be it public transport - non scheduled, SAR or OBRR operations. Examples of these events include:

- Engine malfunctions and failures
- Aircraft and avionics system malfunctions and failures
- Bird strikes

- Inaccurate meteorological information
- Lightning strikes
- Human factors (e.g. pilot error).

Taken over the last 30 years or so, the frequency of these generic events tends to be relatively low. This could suggest that these occurrences will probably continue at a similar frequency in the future.

However, as helicopter mechanical and avionics technology has advanced over the years (e.g. IHUMS, and with more advanced machines and equipment introduced) the operational reliability and efficiency of helicopters has improved significantly. As a result the number of serious technical defects in recent years has significantly reduced, particularly those leading to catastrophic failures.

The number of events associated with adverse weather conditions (e.g. lightning strikes, hostile seas, etc.) and other natural causes (e.g. bird strikes) tend to follow patterns. These events are foreseeable and their patterns are generally well known. Therefore they are normally accounted for, where possible, by the aviators. There is no evidence to suggest these events occur other than infrequently and, by their very nature, the frequencies will probably remain largely unchanged.

The role of human factors is an issue that is always present in all aspects of aviation, as in other industries. Events recorded during flying, maintenance, ramp and helideck operations will, no doubt, continue to occur. However, nowadays, frequency of these occurrences is low in offshore helicopter operations, mainly because there are “checks and balances” in place (e.g. two pilot operations, prescribed flying and maintenance control procedures, etc.) to prevent incidents occurring. Initial and refresher training is also very intensive for the aviators in order to establish, and then to maintain, the necessary skills and competence. Engineering / maintenance skills and management training may be areas which deserve more scrutiny as the aeroplanes and equipment become more technically sophisticated and therefore more technically demanding, particularly when helicopters are to be operated in harsh, remote environments.

Occurrence reports for the above type of generic events have not been included in the report. The reports most relevant to SAR / OBRR helicopter operations are enclosed in Appendix E.

### **6.1.3 SAR-Related Events**

The following events have been recorded in accident / serious incident reports and MORs and relate specifically to SAR and similar type missions. The factors surrounding these events may have an effect on OBRR operations, for example:

- Equipment failures (e.g. rescue winch)
- Extreme weather conditions during missions
- Human factors (e.g. crew error, temporary loss of hover reference).

It should be noted that the frequency of each of these SAR type events is extremely small when compared with public transport - non scheduled operations for offshore support. This

can be accounted for by the small amount of actual mission time for SAR type flying in a marine environment.

SAR equipment failures do occur. However, the degree to which a mission may be compromised will depend on whether there are duplicated systems (e.g. primary and back-up winches fitted).

SAR incidents related to weather and other natural environmental effects will occur just as in any other type of helicopter operation. However, because SAR type helicopter missions are often undertaken when conditions are extreme, and generally at the operating minima, they pose their own unique problems for the helicopter and flight crews. It is here that demands on the skill and endurance of flight crews is at its highest, in order to complete a mission in as safe a manner as is possible.

Where human factor events in SAR are concerned it is generally recognised that during a humanitarian mission the SAR crew will often be operating near the extremes of helicopter and human performance, where margins for human error and equipment failures are extremely small. Hence the need for regular and exacting SAR crew training and testing in a whole range of SAR techniques. This specialist training is over and above the normal flying training to maintain currency.

Being very similar to SAR operations, similar operating conditions will apply to OBRR operations. Therefore, a similar level of expectation with respect to the risks and consequences should be applied.

***OBRR helicopter missions will, in many ways, be similar to that of SAR operations therefore similar risks should be contemplated by the AOC Holder and the Duty Holder.***

***The public transport - non scheduled element of OBRR operations will essentially be the same as routine offshore helicopter support operations. Here the risks and frequency of occurrences are well documented and should already be accounted for by the AOC Holder and Duty Holder.***

***There is some evidence in the Occurrence Reports to suggest there are elements of SAR operations that have incidence rates where attention should be focused. These are winch defects / failures and training incidents.***

***Equipment failures may have an effect on the ability to initiate and complete OBRR missions. The AOC Holder should therefore fully appraise the Duty Holder of the reliability of the selected aircraft / rescue systems and equipment.***

***OBRR task training as a component of the OBRR helicopter contract should not be significantly different to SAR (maritime) flying and task training. Normally, the risks associated with flying training are in the domain of the AOC Holder.***

***However, some OBRR training tasks will involve other offshore assets and personnel and will take place in the 500 metre zone. For this reason, the Duty Holder and AOC***

*Holder should, whilst developing OBRR operations training requirements and schedules, ensure that an adequate assessment of the training risks have been carried out, the findings properly documented and measures put in place to reduce unnecessary risks.*

## **6.2 PAST AND PROJECTED EER SUCCESS AND FAILURE RATES**

### **6.2.1 Past Success and Failure**

Sound evidence exists world-wide to clearly show that using helicopters in an offshore / marine emergency escape and rescue role is very successful.

Over the years, a wide variety of missions have been flown by a variety of helicopter types, sometimes in very poor weather conditions and arduous rescue circumstances.

The following factors have a great deal to do with the degree of mission success:

- Aircraft and role equipment selection
- Type and location of mission
- Crew training and competence
- Environmental conditions.

Failures have occurred, but these can usually be accounted for by shortfalls in one or a combination of the above factors. Helicopters, SAR role equipment, support services and flight crews do have limitations. Therefore, there may be times when, for a number of reasons, an OBRR helicopter may not be able to perform or satisfactorily complete a given task. The same is true for marine rescue and recovery assets.

For example:

- Weather conditions, smoke and/or fire impeding direct rescue access, etc.
- Physical obstructions at rescue site preventing the use of a helicopter
- Mechanical breakdown
- Tasks exceeding crew physical capability or competence.

As an example of the last point, the enquiry into the sinking of the Ro-Ro vessel MV Estonia in 1994 with 989 people on board, found, among other things, that all the helicopter crews involved in the rescue were seriously impeded by fatigue, particularly the winchmen. In this case, because the rescue of survivors from the Baltic was limited by rear crew member exhaustion, it has since been recommended that two winchmen, in addition to a winch operator, be carried on future missions where large numbers of survivors are expected.

### **6.2.2 Projected Success and Failure**

Strong leadership and good management of OBRR helicopter assets and resources with clear mission objectives should be a key part of any integrated Crisis Management Plan.

Modern SAR helicopters equipped with sophisticated flying, navigation and rescue aids are currently available and continue to be developed. These machines will be the source for the selection of an OBRR helicopter.

The key is to build on the lessons learnt from past SAR and similar operations whilst at the same time recognising the fundamental limitations of an SAR / OBRR helicopter and its potential operational shortfalls. For instance, the rear crew member fatigue problem highlighted during the Estonia incident may be something that needs to be considered when planning OBRR helicopter operations.

*To ensure a reasonable probability of success when planning OBRR helicopter operations, the Duty Holder in conjunction with the AOC Holder should:*

- 1) Ensure that a good, integrated Crisis Management Plan is in place with clear mission objectives for the OBRR helicopter assets and resources.*
- 2) Make an assessment of the probable maximum number of survivors that an OBRR helicopter will likely encounter and be expected to successfully recover. This will assist with determining the required number of OBRR helicopters and flight crew members for a given operational intent.*
- 3) Select a modern fully equipped SAR type helicopter capable of fully meeting the specified helicopter offshore / marine emergency escape and rescue role.*
- 4) Ensure that trained and competent flight crews and maintainers, sophisticated and well tested information services (e.g. weather forecasting, communications) etc., are provided to support the OBRR helicopter role.*
- 5) Build on the lessons learnt from past SAR and similar operations whilst at the same time fully recognising, and acknowledging, that there will be fundamental OBRR helicopter limitations to consider and potential operational shortfalls to mitigate.*

### **6.3 EFFECTS ON EER OF DEPLETED RESOURCES**

As a matter of course, the Duty Holders Crisis Management Plan will need flexibility to accommodate the potential for depleted emergency resources.

When an emergency is declared and then starts to escalate, the On-Scene Commander / Coordinator will commit his resources in the most appropriate manner to apprehend the emergency. Invariably this will mean that, if available in the area, OBRR helicopters will probably be committed at an early stage.

As with any other emergency resource, once committed to a task, the extent to which an OBRR helicopter can operate and provide emergency assistance automatically becomes limited. Therefore, should an OBRR helicopter be committed to a specific mission or become

unserviceable or inoperable for another reason, the airborne resources available to the On-Scene Commander / Coordinator will obviously become depleted.

The availability and operability of OBRR helicopter resources to the On-Scene Commander / Coordinator should be well understood by the Crisis Management Team. Also, when OBRR helicopters are committed to emergency tasks (or if other factors eliminate their use) then the full effects of depleted OBRR assets on the overall rescue and recovery effort should be recognised and contingency measures built in to the Crisis Management Plan.

***The Duty Holder should, as part of his Crisis Management Plan, fully document and promulgate the availability (immediate or otherwise) and operability (any restrictions) of OBRR helicopter assets. In addition, the full effects of depleted OBRR assets (for any reason) on overall rescue and recovery effort should be properly recognised and contingency measures built in to the Crisis Management Plan.***

#### **6.4 FURTHER CONSIDERATIONS**

The following are actions that should be given further consideration by HSE when reviewing the content of this Research Report.

- 1) The generic factors to consider in assessing Safety Cases advocating the use of OBRR helicopters have been set out as a comprehensive list of relevant topics. They are of necessity brief and, therefore, may require further detailed development to provide specific guidance to HSE Inspectors.
- 2) The benefits to installation safety management of using OBRR helicopters (in a secondary role) to assist with Collision Risk Management should be considered.

In conjunction with an installation based radar detection system (for locating and early warning of fugitive vessels), an OBRR helicopter could quickly be launched and travel over a fairly long range to a fugitive vessel and thus provide airborne surveillance, direct communications (using a loud hailer if necessary) and to monitor the vessels safe clearance away from installations.

## 7. SUMMARY OF FACTORS FOR CONSIDERATION

The following table brings together all the factors for consideration identified in the preceding text. These are listed alongside their context, referenced by the subsection in which they are found.

FACTORS FOR CONSIDERATION	SUBSECTION
<p>The current offshore HSE / CAA MOU covers all generic areas of responsibility and interest, and is purposefully non-specific. Therefore, the MOU does not include remits and interfaces to cover OBRR helicopter type operations (and for that matter SAR helicopters).</p>	<p>2.2.1 HSE and CAA Relationship</p>
<p>The AOC Holder is the Duty Holder in respect of helicopter operations. Additionally, the AOC Holder will be responsible for aviation aspects of OBRR helicopter operations associated with and/or conducted from the installation.</p>	<p>2.2.2 Air Operator Certificate Holder</p>
<p>There are close similarities with HM Coastguard SAR operations and the offshore based SAR helicopters that have previously featured in UKCS offshore exploration and production operations (e.g. Shell Expro - Brent Field).</p> <p>Any aviation issues concerning the use of OBRR helicopters will be handled directly by CAA in conjunction with the AOC Holder. All relevant offshore issues arising will fall to the HSE and the installation Duty Holder.</p> <p>Although a relatively recent requirement by CAA SRG, the concept of an aviation company SMS [3] is consistent with HSE policies. The AOC holder and Duty Holder should therefore jointly consider the value of interfacing (not fully integrating) their management policies, operating systems, cross referencing SMS documentation and audit programmes to provide an OHMS for OBRR operations.</p>	<p>2.2.3 Aviation Rules and Responsibilities a) Civil Aviation Authority</p>

FACTORS FOR CONSIDERATION	SUBSECTION
<p>The installation Duty Holder needs to identify the AOC Holder(s) who will provide the helicopters for OBRR operations.</p> <p>The nominated AOC Holder(s) should be licensed by the CAA to conduct offshore helicopter operations.</p> <p>The CAA will expect an AOC Holder to submit, for CAA agreement, any modifications that are required as a Supplement to his Operations Manual to account for any additional licensing, airworthiness, training or operational considerations should the AOC Holder intend to undertake ‘new type’ operations (e.g. OBRR) under his existing Air Operators Certificate. Thereafter, the AOC Holder is required to demonstrate operating competence, management and self-regulation to standards that satisfy the Authority.</p>	<p>2.2.3 Aviation Rules and Responsibilities AOC Holder</p> <p>b)</p>
<p>BHAB’s main objective is to advise on promoting the use of helicopters. However, the Offshore Committee has advised that the helicopter company operating standards that will be applied to the ‘new’ OBRR role are currently under review, and the subject of discussion with the CAA. Any supplement to the AOC Holder’s Operations Manual for OBRR operations, required by legislation and JAA guidance, would be in addition to those standards currently applied to normal public transport - non scheduled operations.</p> <p>The installation helidecks and facilities nominated by the Duty Holder for OBRR helicopter operations should have valid and in-date BHAB Certificates of Acceptance.</p>	<p>2.2.3 Aviation Rules and Responsibilities British Helicopter Advisory Board</p> <p>c)</p>
<p>The ANO sets out basic safety standards that will apply to OBRR operations.</p>	<p>2.2.4 Aviation Regulations, Codes, etc Air Navigation order (ANO) – (CAP 393)</p> <p>a)</p>

FACTORS FOR CONSIDERATION	SUBSECTION
<p>JAR-Ops 3 contains comprehensive and detailed helicopter operating requirements that have been agreed by the Civil Aviation Authorities of participating European Countries as a common standard to regulate commercial air transport operations.</p> <p>In the context of Joint Airworthiness Requirements it is considered appropriate to view the role of an OBRR helicopter as an amalgam of commercial air transportation, SAR and HEMS. Therefore, full compliance with JAR-Ops 3 should be expected, subject to any variations specific to the OBRR role that have been imposed and approved by the CAA.</p> <p>The relationship between the Air Navigation Order (ANO) and Joint Airworthiness Requirements (JAR) is, the ANO sets out the basic safety standards for regulating UK public transport operations whereas JAR-Ops 3 provides comprehensive and detailed requirements which are recognised as an acceptable basis for showing compliance with national airworthiness codes.</p>	<p>2.2.4 Aviation Rules, Codes, etc b) Joint Aviation Requirements – JAR OPS 3 Commercial Air Transportation (Helicopters)</p>
<p>CAP 437 is the minimum acceptable standard for design and operations of helidecks on which OBRR helicopters will be based and those which they will operate to and from (e.g. an alternate OBRR base).</p>	<p>2.2.4 Aviation Rules, Codes, etc c) Offshore Helicopter Landing Areas: A Guide to Criteria, Recommended Minimum Standards and Best Practice (CAP 437)</p>
<p>The HSE / MCA / MAIB MOU does not include any reference to SAR activities (marine or helicopter assets) in support of offshore operations.</p>	<p>2.3.1 HSE, MCA and Marine Accident Investigation Branch Relationship</p>
<p>As a minimum, OBRR helicopter operations should comply fully with the regulations and achieve good industry standards.</p>	<p>2.3.4 Application of Offshore Regulations and Codes of Practice</p>
<p>When a Duty Holder employs OBRR helicopters in support of his offshore oil and gas operations he should co-operate fully with the national SAR agencies.</p>	<p>2.4.2 UKCS SAR Policy</p>

FACTORS FOR CONSIDERATION	SUBSECTION
<p>OBRR helicopters are not a new approach to commercially-provided search and rescue cover in oil and gas fields. Since the early 1980s, offshore based SAR helicopters have been used on the UKCS at:</p> <ul style="list-style-type: none"> <li>• East Shetland Basin (Brent Area)</li> <li>• Frigg (c.1985)</li> <li>• Forties (c. 1984).</li> </ul> <p>Although there are no offshore-based helicopters on the UKCS at present, they are currently in use in Norway. The aircraft are based on Frigg, Ekofisk, Statfjord, etc. and are generally designated for SAR operations, although they tend to operate in multi-role.</p> <p>Onshore based helicopters are the norm for both HM Coastguard and military SAR coverage around the UK.</p> <p>Helicopters are generally considered the preferred means for evacuating installations in the event of an emergency. This is in situations where time permits and the local weather and environmental conditions on and around an installation (e.g. large gas release, major conflagration, etc.) do not exclude helicopter operations.</p> <p>Historically, HM Coastguard, military SAR and oil support (Public Transport) helicopters have been used successfully for offshore personnel evacuation many times when, in the early stages of a crisis, non-essential personnel are removed from an installation to a place of safety at another onshore or offshore location.</p> <p>It should be recalled that evacuation is not normally part of the basic rescue and recovery aircraft role. However, if OBRR helicopters are stationed local to an incident then it is quite probable they would be used in an evacuation. In this event, it is important for the Duty Holder to ensure that field rescue and recovery priorities are not overlooked or degraded.</p> <p>When looking at the various OBRR helicopter scenarios that may be encountered it is imperative that the heliops management system employed, for each case, be based on a consistent model.</p> <p>There is an overriding need for the OHMS model to be sufficiently flexible to deal efficiently with a wide range of possible emergency events.</p>	<p>3. OBRR Heliops Management</p> <p>3.1 Introduction</p>

FACTORS FOR CONSIDERATION	SUBSECTION
<p>The heliops management system should be based on the key elements of policy and objectives setting, organising, planning and implementing, measuring performance, reviewing performance, and auditing. Moreover, procedures and processes should be in place to enable each of these functions to be carried out.</p>	<p>3.2.1 Key Elements of Management System</p>
<p>The planning and implementing functions of the heliops management system should be underpinned by the used of risk-based approaches.</p> <p>Notwithstanding the methodology employed by a Duty Holder, he should use some form of effective process to clearly demonstrate that good practices are employed and the risks resulting from the use of OBRR helicopters are acceptable. Attention should be paid to the value of using existing guidance and best practice.</p>	<p>3.2.2 Planning and Implementing Through Risk Assessment</p>
<p>The Duty Holder should clearly demonstrate that an OHMS, which also includes OBRR operations, is in place.</p> <p>The management system should be effective.</p> <p>An ICP should be appointed by the Duty Holder to survey / audit all aspects of OBRR helicopter operations.</p>	<p>3.3 Policy and Operating Procedures</p>
<p>Only fully trained and competent SAR helicopter pilots, crewmen and maintainers should be employed by the AOC holder for the intended OBRR operations and role.</p> <p>Training and competence should form an integral part of the OHMS and, where appropriate, should meet OPITO standards.</p>	<p>3.4.2 Onshore and Offshore Aviation Team c) The OBRR Requirements</p>
<p>The duty holder should ensure that personnel at the place of safety are trained and competent in the handling of survivors and casualties.</p>	<p>3.4.3 Onshore, Installation Management and Helideck Team</p>

FACTORS FOR CONSIDERATION	SUBSECTION
<p>OBRR helicopter assets should not be seen, in any way, as an accretion to national SAR assets.</p> <p>The Duty Holder is responsible for ensuring that a deployment of OBRR helicopters to non-oil related activities does not adversely affect the requirement to provide effective arrangements for rescue and recovery on installations.</p> <p>Procedures should be in place for those occasions when an OBRR helicopter may leave its normal station in response to safety of life.</p>	<p>3.5 Offshore Crisis Management</p>
<p>Clearly, early notification to the MCA of a potential emergency is essential. Management of the interfaces with MCA is an important aspect and needs to be addressed.</p> <p>MCA see no change to current Coastguard command and control procedures during offshore emergencies where OBRR helicopters are used in lieu of SBVs.</p>	<p>3.6.1 Emergency Command and Control</p>
<p>The Duty Holder should have in place a procedure for OIMs to assume and to relinquish (to an MCA appointed person) the role of On - Scene Commander / coordinator during an emergency.</p> <p>The On - Scene Commander / coordinator should act in his customary role.</p>	<p>3.6.2 On-Scene Commander / Coordinator</p>
<p>In the event of an emergency what ‘area control’ provisions would be established between the Duty Holder, the AOC holder and HM Coastguard to ensure timely information exchange on air traffic in the vicinity.</p>	<p>3.6.3 Area Control (Aeronautical Radio Operator)</p>
<p>Where OBRR helicopters are proposed as part of an integrated crisis management plan, the Duty Holder should, in preparing the Safety Case, ensure that all scenarios entailing the use of OBRR helicopters are identified and procedures included.</p> <p>Proper consideration should be given, by the Duty Holder, to events taking place both on and in the vicinity of the “host” installation. Also if providing similar rescue, recovery and evacuation aid to other installations, this service must be within the operating range and capabilities of the OBRR helicopter.</p>	<p>3.7 Coverage of all Credible Emergency (EER) Scenarios</p>
<p>Where OBRR helicopters are proposed as part of integrated crisis management, the Duty Holder should ensure that emergency response plans are in place for all the scenarios set down in the Safety Case.</p>	<p>3.8 Availability of EER Plans</p>

FACTORS FOR CONSIDERATION	SUBSECTION
<p>The Duty Holder should acquire all relevant information about the OBRR operational area, airborne assets available in an emergency, potential winching / “touch down” sites, alternate landing sites, etc.</p> <p>There should be a reliable system provided to give up-to-date information to the On-Scene Commander / Coordinator (OIM), onshore crisis management team, the OBRR crews, HM Coastguard, and other appropriate agencies.</p>	<p>3.9 Knowledge of Assets, the Operating Area and Winching Sites</p>
<p>The minimum OBRR helicopter assets required for each emergency scenario listed in Subsection 3.7 identified and justified in contingency plans prepared by the Duty Holder.</p>	<p>3.10 Minimum OBRR / SAR Assets Identified for EER Scenarios</p>
<p>The EER assessment will need to address survivor priorities and medical response.</p>	<p>3.11 Survivor Priorities and Medical Response Issues</p>
<p>The response times for OBRR helicopters used for handling identified emergencies should meet acceptable standards.</p>	<p>3.12 Rescue Times for Man Over Board up to Full Crew Evacuation (Mass Escape)</p>
<p>The Duty Holder should consider and identify alternative sites for re-locating survivors and / or evacuees in the event that the host OBRR installation is in any way compromised.</p>	<p>3.13 Backup Facilities Identified for Re-locating Survivors</p>
<p>The Duty Holder should have a system in place and plans available for tracking air traffic in the incident general area in order to call-up other airborne assets (public transport helicopters) for survivor / evacuee dry transfer, if required.</p> <p>The responsibility for providing the On-Scene Commander / Coordinator with air traffic flight following information should be clearly established.</p>	<p>3.14 Additional Aircraft in the Operational Area for Dry Transfer</p>
<p>The Duty Holder should give full consideration to, and assess the impacts of potential operating constraints that may be encountered with OBRR helicopter operations.</p>	<p>3.15 Operating Constraints</p>

FACTORS FOR CONSIDERATION	SUBSECTION
<p>The Duty Holder should fully acknowledge where and what operating constraints may arise with OBRR helicopter operations.</p> <p>Contingency plans should be well-developed and firmly in place for those occasions when operating constraints preclude the use of the assigned OBRR helicopter for apprehending an emergency offshore.</p>	<p>3.16    Operating           Contingencies</p>
<p>The Duty Holder, in conjunction with the AOC holder, should produce a firm programme of rehearsals and drills (without disclosing dates of execution) to ensure that all aspects of OBRR operations will be tested at suitable intervals.</p>	<p>3.17    Rehearsals</p>

FACTORS FOR CONSIDERATION	SUBSECTION
<p>Proper arrangements should be provided on the nominated offshore installation to assist long term serviceability, readiness and availability of an OBRR helicopter.</p> <p>An adequate parking / manoeuvring area adjacent to the SLA is considered a fundamental requirement for installation helidecks nominated for OBRR operations.</p> <p>The need for a permanent hangar facility should be given proper consideration in order to provide the aircraft with adequate environmental protection. During winter months, if not kept in a hangar, the aircraft will be continuously exposed to the elements.</p> <p>It is unlikely that standard aircraft covers and tiedown arrangements will prove sufficient to protect the aircraft from potential damage and deterioration of its structure, rotor blades and delicate internal equipment in extreme offshore weather conditions.</p> <p>If providing a hangar facility on the installation, it is imperative to ensure (during design) that this can be done without infringing the obstruction free environment and / or degrading the existing aerodynamic performance of the helideck Safe Landing Area.</p> <p>Helideck operability should re-established following any proposal for modifications in or adjacent to the area of the helideck.</p> <p>Inventories of spare parts, tools, etc. should be established and provided at the offshore location by the AOC holder, in line with SAR aircraft “detachment from base” procedures.</p> <p>The Duty Holder should make suitable provisions for the OBRR helicopter support inventories in a location where they can be secured and quarantined from other installation stores and activities.</p>	<p>4.2.3 Additional Facilities for Permanently Based Offshore Helicopters</p>

FACTORS FOR CONSIDERATION	SUBSECTION
<p>The Duty Holder, in conjunction with the AOC Holder, should make suitable provisions for accommodating the OBRR flight and maintenance crews and fully equip them for the intended operations.</p>	<p>4.2.4 Flight Crew, Maintenance Team and Helicopter Crew Facilities e) Flight and Maintenance Crew Accommodation</p>
<p>The nominated OBRR helideck should have no outstanding Offshore Helideck Inspection Report (OHIR) non-compliances and / or limitations applied that may compromise OBRR operations, at any time.</p> <p>If there are deficiencies, actions must be in progress by the Duty Holder to obtain valid, in-date helideck certification.</p> <p>Continuing action should be taken towards reducing the effects of any operating limitations (see IVLL entries) that may compromise OBRR helicopters, prior to commencement / continuation of the operations.</p>	<p>4.3 Installations and Vessels Helideck Performance</p>
<p>The AOC holder should identify for OBRR crews, all available landing sites (licensed and un-licensed) in the likely area of OBRR operations.</p> <p>The Duty Holder, in conjunction with the AOC Holder, should give sufficient details of installation layouts (and a full set of up-to-date AERADS), in the likely area of OBRR operations, for flight crews to identify potential winching sites that may be used for personnel rescue and recovery in the event of being unable to land on a helideck.</p> <p>The Duty Holder should furnish relevant details of attendant vessels operating in the area of OBRR coverage that may have designated winching areas and or sufficient clear deck space to effect a rescue / recovery by winch.</p>	<p>4.4 Available Landing / Winching Sites</p>
<p>The Duty Holder, in conjunction with the AOC holder, should provide a full range and a high standard of communications for OBRR operations.</p>	<p>4.5 Communications</p>

FACTORS FOR CONSIDERATION	SUBSECTION	
<p>The Duty Holder, if necessary in conjunction with the AOC holder, shall provide a full range and a high standard of reliable meteorological equipment for OBRR operations.</p> <p>The recording, interpretation and reporting (forecast and actuals) of local meteorological information for OBRR operations should be processed by a fully trained and competent person.</p>	4.6	Meteorological Forecasting
<p>The installation should be able to store sufficient aviation fuel to supply the intended OBRR operations as well as routine public transport operations, particularly for the extended periods when it is not possible for vessels to offload supplies due to heavy seas.</p>	4.7	Re-fuelling
<p>The Duty Holder should provide personnel with safety equipment designed to enhance the prospect of survivor rescue and recovery. The equipment should be fully trialled to establish its operational parameters and efficiency in use, particularly during recovery from the sea by helicopter.</p>	4.8	Personal Locator Beacons and Other Search Aids
<p>The Duty Holder in conjunction with the AOC Holder should consider and justify all the potential operating constraints that are likely to be encountered when setting up the facilities for supporting permanently offshore based OBRR helicopters.</p>	4.9	Operating Constraints
<p>Decision-making processes for selection of suitable helicopters and setting the performance standards to be achieved for OBRR operations should clearly be undertaken by competent persons (e.g. jointly, by the Duty Holder in conjunction with helicopter operators who are contracted to provide these specialist rescue and recovery services).</p>	5.	OBRR Helicopters, Equipment and Operations
<p>The performance and capability of helicopters selected for the OBRR role should, at least, be equal to current UK Coastguard SAR helicopter specifications.</p>	5.1	Preamble
<p>When selecting a helicopter for OBRR operations, the size of the smallest helideck and its load-bearing characteristics, where landings are envisaged, will determine the size of the largest helicopter that can be landed.</p>	5.2	Suitability of Aircraft Types for OBRR/SAR Operations
<p>There will be a minimum equipment fit to provide effective search, rescue and recovery techniques. Consequently, a certain amount of cabin space is needed for the additional equipment, plus sufficient space is required for survivors.</p>	5.2.1	Introduction
<p>When selecting a helicopter for OBRR operations, the size of the smallest helideck and its load-bearing characteristics, where landings are envisaged, will determine the size of the largest helicopter that can be landed.</p>	5.2.4	Size
<p>There will be a minimum equipment fit to provide effective search, rescue and recovery techniques. Consequently, a certain amount of cabin space is needed for the additional equipment, plus sufficient space is required for survivors.</p>	5.2.5	Cabin Capacity

FACTORS FOR CONSIDERATION	SUBSECTION
<p>The choice of helicopter for OBRR operations should place single-engine performance high on the list of important characteristics.</p>	<p>5.2.6 Power Availability</p>
<p>Helicopters with higher disposable load and greater cabin space will allow longer sustained winching periods at the recovery site.</p>	<p>5.2.7 Lifting Winching / Capacity and Suitability</p>
<p>Ordinarily, for an OBRR helicopter, range should not be a major factor.</p> <p>However, in bad weather where there is a high probability that the helicopter, once airborne, would not be able to return to the installation from whence it came, consideration should be given to flying to a place where the weather is better and an approach and landing is possible. This scenario will require more fuel to be carried therefore greater helicopter weight and hence less disposable load.</p>	<p>5.2.9 Range and Endurance</p>
<p>If there is ice present on the rotor blades, for instance, then an immediate take-off in response to an emergency will be impossible.</p> <p>If a helicopter is hangared and it is required to immediately respond to a call-out, it should be able to be removed from the hangar and brought to readiness in a very short time.</p> <p>It should be noted that current North Sea helicopter types do not have folding blade systems.</p> <p>It follows that other helicopters should not be permitted to be “shut-down” on a helideck assigned to OBRR duty unless there is adequate provision for parking and the landing area can remain active, at all times.</p> <p>Response times for OBRR helicopters must take full account of all the factors that may affect operational readiness state. This includes preparing the aircraft for flight, as well as crew readiness to get airborne.</p>	<p>5.2.10 Suitability with Regard to Limited Space for Offshore Parking / Hangarage</p>
<p>The installation Duty Holder should set out the minimum performance standards to be met for OBRR helicopter operations.</p> <p>The OBRR helicopter AOC holder should clearly be able to demonstrate that minimum performance standards can be achieved by the selected helicopter whether based onshore or offshore.</p>	<p>5.3.1 Performance Standards</p>

FACTORS FOR CONSIDERATION	SUBSECTION
<p>The installation Duty Holder, in conjunction with the AOC holder, should provide the Crisis Management Team and OBRR flight crews with guidance on mission priorities and minimas. Minimum response times to be met by OBRR helicopters, whether based on or offshore, should be laid down by the Duty Holder and should be designed to meet the goal-setting requirements laid down in PFEER regulations.</p>	<p>5.3.2 Response Times b) The OBRR Case</p>
<p>The specialist equipment specifications for OBRR helicopters should be at least the equivalent of HM Coastguard and RAF SAR requirements.</p> <p>The aircraft equipment specification for OBRR (and SAR) helicopters should appear in the AOC holders Operations Manual.</p> <p>Also a Minimum Equipment List (MEL) should be available and used by flight crews to ensure that specified go, no-go items are properly covered prior to embarking on a rescue and recovery mission.</p>	<p>5.4 Communications, Navigation and Search Aids 5.4.1 Introduction</p>
<p>The Duty Holder should specify to the AOC holder the need for a comprehensive communications fit for OBRR helicopter operations.</p> <p>The OBRR helicopter communications fit should meet the minimum standard specified by HM Coastguard for civilian contracted SAR aircraft.</p>	<p>5.4.2 Communications</p>
<p>The Duty Holder should specify to the AOC holder the need to fit comprehensive navigation equipment for OBRR helicopter operations. These should meet the minimum standard specified by HM Coastguard for civilian contracted SAR aircraft.</p>	<p>5.4.3 Navigation Aids</p>
<p>The Duty Holder should specify to the AOC holder a comprehensive suite of search aids for OBRR helicopter operations.</p> <p>These aids should meet the minimum standard specified by HM Coastguard for civilian contracted SAR aircraft.</p> <p>The aircraft should be clearly identifiable from land, the sea and in the air, as an OBRR helicopter.</p>	<p>5.4.4 Search Aids</p>
<p>The Duty Holder should specify to the AOC holder a comprehensive role-equipment fit for OBRR helicopter operations. This should meet the minimum standard specified by HM Coastguard for civilian contracted SAR aircraft.</p>	<p>5.5 Role, Equipment on OBRR / SAR Helicopters</p>

FACTORS FOR CONSIDERATION	SUBSECTION	
<p>Adequate consideration should be given by the AOC holder to the alternates / diversion policy required for OBRR helicopter operations.</p>	5.6	Offshore Alternates and Diversion Policies
<p>The Duty Holder should be able to clearly demonstrate that the base location for an OBRR helideck provides a stable, turbulence-free platform which will ensure high levels of helideck availability in a wide range of weather conditions and wind directions.</p> <p>Although in the past OBRR-type helicopters (e.g. Brent SAR) have been successfully based on Floatels, it is most unlikely that availability from a mobile base can exceed that of a fixed installation which has a good helideck aerodynamic and thermal performance.</p> <p>There are very limited data available to show the frequency of landings aborted because of Pitch, Roll and Heave. Some Mandatory Occurrence Reports (MORs) have been submitted that cite helidecks out of limits for landings and these relate mainly to vessels. However, there are more MORs citing turbulence and thermal problems.</p>	5.6.2	Application
<p>The Duty Holder should confirm with the AOC Holder and have sight of up-to-date records clearly demonstrating that the aircraft, equipment, flight crews and maintainers are properly certified and licensed and, where appropriate, are not overdue certification, licensing and / or inspection.</p>	5.7.3	Fixed Installations
<p>Flight planning and weather information services provided for OBRR helicopter operations, by the Duty Holder in conjunction with the AOC Holder, should be of a quality to ensure that the helicopter Commander may freely make, and justify, his operational decisions for committing or otherwise to a rescue and recovery mission.</p>	5.8	Aircraft / Equipment Certification / Licence Issue (Fit for Purpose)
	5.9	Meteorological Forecasting and Flight Planning

FACTORS FOR CONSIDERATION	SUBSECTION
<p>Clearly, the standards for OBRR crew readiness, flying duties and rest periods should meet a recognised standard and be clearly specified in the Operations Manual. In the UK this should, as a minimum, be the same as HM Coastguard SAR crews.</p> <p>There should be sufficient numbers and type of personnel to provide 24hr, 365 days a year coverage. The total number of crews assigned should be consistent with the planned OBRR operations.</p> <p>The issue of OBRR helicopter crews responses to platform alarms (for tests and drills) should be determined by the Duty Holder, with full consideration for both installation safety and OBRR operating priorities taken into account, and a policy agreed with the AOC holder.</p>	<p>5.10.4 OBRR Case c) Training and Drills</p>
<p>Using risk assessment, the Duty Holder should calculate and justify a figure for helicopter availability to meet OBRR operational requirements. The derived figure should be specified to the AOC Holder and assurances obtained that the required availability can be achieved.</p> <p>As a benchmark, the latest HM Coastguard figures show that 99.8% aircraft availability is being achieved with SAR helicopters. These aircraft are based onshore and stowed in hangars. OBRR helicopter availability will need to take into account of the aircraft being based offshore and whether or not it is hangared.</p> <p>The AOC holder should supply helicopters for OBRR operations that have no outstanding or anticipated maintenance items or component replacements due.</p> <p>In the event of an OBRR helicopter being unable to meet readiness state, the AOC Holder should demonstrate to the Duty Holder that they have the ability and resources to provide a replacement aircraft of similar specification and performance within one hour, or less, of the primary aircraft being declared unserviceable.</p>	<p>5.11.3 Unserviceable OBRR Helicopters Offshore and Onshore</p>
<p>The Duty Holder in conjunction with the AOC Holder should consider fully and justify all the potential operating constraints that are likely to be encountered when setting up and operating permanently-stationed OBRR helicopters.</p>	<p>5.12 Operating Constraints</p>

FACTORS FOR CONSIDERATION	SUBSECTION
<p>OBRR helicopter missions will, in many ways, be similar to that of SAR operations therefore similar risks should be contemplated by the AOC Holder and the Duty Holder.</p> <p>The public transport - non scheduled element of OBRR operations will essentially be the same as routine offshore helicopter support operations. Here the risks and frequency of occurrences are well documented and should already be accounted for by the AOC Holder and Duty Holder.</p> <p>There is some evidence in the Occurrence Reports to suggest there are elements of SAR operations that have incidence rates where attention should be focused. These are winch defects / failures and training incidents.</p> <p>Equipment failures may have an effect on the ability to initiate and complete OBRR missions. The AOC Holder should therefore fully appraise the Duty Holder of the reliability of the selected aircraft / rescue systems and equipment.</p> <p>OBRR task training as a component of the OBRR helicopter contract should not be significantly different to SAR (maritime) flying and task training. Normally, the risks associated with flying training are in the domain of the AOC Holder.</p> <p>However, some OBRR training tasks will involve other offshore assets and personnel and will take place in the 500 metre zone. For this reason, the Duty Holder and AOC Holder should, whilst developing OBRR operations training requirements and schedules, ensure that an adequate assessment of the training risks have been carried out, the findings properly documented and measures put in place to reduce unnecessary risks.</p>	<p>6.1 Helicopter Incident Data</p> <p>6.1.3 SAR-Related Events</p>

FACTORS FOR CONSIDERATION	SUBSECTION
<p>To ensure a reasonable probability of success when planning OBRR helicopter operations, the Duty Holder in conjunction with the AOC Holder should:</p> <ol style="list-style-type: none"> <li>1) Ensure that a good, integrated Crisis Management Plan is in place with clear mission objectives for the OBRR helicopter assets and resources.</li> <li>2) Make an assessment of the probable maximum number of survivors that an OBRR helicopter will likely encounter and be expected to successfully recover. This will assist with determining the required number of OBRR helicopters and flight crew members for a given operational intent.</li> <li>3) Select a modern fully equipped SAR type helicopter capable of fully meeting the specified helicopter offshore / marine emergency escape and rescue role.</li> <li>4) Ensure that trained and competent flight crews and maintainers, sophisticated and well tested information services (e.g. weather forecasting, communications) etc., are provided to support the OBRR helicopter role.</li> <li>5) Build on the lessons learnt from past SAR and similar operations whilst at the same time fully recognising, and acknowledging, that there will be fundamental OBRR helicopter limitations to consider and potential operational shortfalls to mitigate.</li> </ol>	<p>6.2.2 Projected Success and Failure</p>
<p>The Duty Holder should, as part of his Crisis Management Plan, fully document and promulgate the availability (immediate or otherwise) and operability (any restrictions) of OBRR helicopter assets. In addition, the full effects of depleted OBRR assets (for any reason) on overall rescue and recovery effort should be properly recognised and contingency measures built in to the Crisis Management Plan.</p>	<p>6.3 Effects on EER of Depleted Resources</p>



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## 9. ABBREVIATIONS

AERADS	Commercially available aviation information system
A/C	Aircraft
ACOP	Approved Code of Practice
ALARP	As Low As Reasonably Practicable
AOC	Air Operator Certificate
AOGBO	The Health and Safety at Work, Etc. Act 1974 (Application Outside Great Britain) Order 1995
AM	Amplitude Modulated
ANO	Air Navigation Order
APS	Aircraft Prepared For Service (Empty Weight, No Pax)
BHAB	British Helicopter Advisory Board
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
DC	Direct Current
DCR	Offshore Installations and Wells (Design and Construction, Etc.) Regulations 1996
DLd	Disposable Load
EER	Evacuation, Escape and Rescue
EMS	Environmental Management System
FLIR	Forward-Looking Infra-Red
FM	Frequency Modulated
FOI(H)	Flight Operations Inspectorate (Helicopters)
FRC	Fast Rescue Craft
FPSO	Floating production, storage and offloading unit
GMDSS	Global Maritime Distress and Safety System
GN	Guidance Note
GPS	Global Positioning System
GW	Gross Weight
HDA	Helideck Assistant
HEMS	Helicopter Emergency Medical Services
HLO	Helicopter Landing Officer
HSE (OSD)	Health and Safety Executive - Offshore Division
HSWA	Health and Safety at Work, Etc. Act 1974
IAMSAR	International Aeronautical and Maritime Search And Rescue
ICAO	International Civil Aviation Organisation
ICP	Independent Competent Person
IFR	Instrument Flight Rules
IHUMS	Integrated Health Usage Monitoring System
ILS	Instrument Landing System
IMO	International Maritime Organisation
IMT	Inspection Management Team (HSE Function)
IVLL	Installation/Vessel Limitations List

JAR	Joint Aviation Requirement
JAR Ops	Joint Aviation Authority Publications
JBAL	John Burt Associates Limited
MAIB	Marine Accident Investigation Branch
MAR	Offshore Installations and Pipeline Works (Management And Administration) Regulations 1995
MCA	Maritime and Coastguard Agency
MEL	Minimum Equipment List
METAR	Meteorological Airfield Report
MHSWR	Management of Health and Safety at Work Regulations 1992
MIST	Commercial Meteorological Services
MOD	Ministry of Defence
MODU	Mobile Offshore Drilling Unit
MOR	Mandatory Occurrence Report
MOU	Memorandum of Understanding
MTOGW	Maximum Take-Off Gross Weight
NDB	Non-directional Beacon
OBRR	Offshore Based Rescue and Recovery
OAT	Outside Air Temperature
OCU	Operational Conversion Unit
OGE	Outside Ground Effect
OIM	Offshore Installation Manager
OHIR	Offshore Helideck Inspection Report
OHMS	Offshore Helicopter Management System
OPITO	Offshore Petroleum Industry Training Organisation
Pax	Passengers / Survivors
PFEER	Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995
PLB	Personnel Locator Beacons
PPE	Personal Protective Equipment
QMS	Quality Management System
QRA	Quantitative Risk Assessment
RCS	Risk Control System
SAR	Search and Rescue
SARTU	Search and Rescue Training Unit
SBV	Standby Vessel
SCE	Safety Critical Element
SCR	Offshore Installations (Safety Case) Regulations 1992
SDD	Safety Data Department
S/E	Single Engine
SLA	Safe Landing Area
SMS	Safety Management System
SOLAS	International Convention for the Safety of Life at Sea
SRG	Safety Regulation Group (CAA Division)
TAF	Terminal Area Forecast
TAS	True Airspeed

UKCS	United Kingdom Continental Shelf
UKOOA	United Kingdom Offshore Operator's Association
V	Volts
VFR	Visual Flight Rules
VHF	Very High Frequency
VOR	VHF Omni-range
W/V	Wind Velocity
ZFW	Zero Fuel Weight

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## **APPENDICES**



# APPENDIX A – MANDATORY OCCURRENCE REPORTS RELATING TO SAR OPERATIONS

## SAR and Related Incidents

07-Nov-00

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**Report No:** 17 **Year:** 1982

**Aircraft Type:** Bell 212 **Type of Flight:** Search & Rescue

**Incident Type:** Accident **Flight Phase:** Cruise

**Incident Site:** En-route over Sea **Operating Area:** UKCS

**Caused By:** A/C probably flew into sea on night SAR sortie.

**Primary Cause:** Pilot Error **Secondary Cause:** Not Known

**Failure Category:** A/C Ops

**Comments:** None.

**Report ID:** BHL Appendix 1

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**Report No:** 22 **Year:** 1983

**Aircraft Type:** Bell 212 **Type of Flight:** Training

**Incident Type:** Accident **Flight Phase:** Hover

**Incident Site:** Alongside Vessel **Operating Area:** UKCS

**Caused By:** During practice winching exercise, weighted hook became entangled with ships guard rail. Pilot lost control of the A/C which dived into sea alongside vessel.

**Primary Cause:** Pilot Error **Secondary Cause:** Loss of Control

**Failure Category:** A/C Ops

**Comments:** None. (See also BHL Appendix 1 - 25 November 1993).

**Report ID:** 8303708X

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**Report No:** 106 **Year:** 1986  
**Aircraft Type:** Eurocopter AS 332 **Type of Flight:** Winching  
**Incident Type:** Accident **Flight Phase:** Hover  
**Incident Site:** Within 500m Zone **Operating Area:** UKCS  
**Caused By:** During PAX transfer in windy conditions and fairly heavy seas, bow of submarine momentarily dipped under waves causing temporary loss of hover reference. A/C drifted so lift was snatched, injuring PAX.  
**Primary Cause:** Excess Vessel Motions **Secondary Cause:** Weather  
**Failure Category:** A/C Ops  
**Comments:** A/C drifted forward and backwards causing PAX snatch from conning tower. PAX sustained fractured pelvis.  
**Report ID:** 8603942C

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**Report No:** 34 **Year:** 1988  
**Aircraft Type:** Sikorsky S 61 **Type of Flight:** Search & Rescue  
**Incident Type:** Accident **Flight Phase:** Hover  
**Incident Site:** Alongside Vessel **Operating Area:** UKCS  
**Caused By:** Engaged in night time SAR rescue mission in fog when, during recovery from rearwards flight A/C suddenly began to loose height, struck the sea sideways on and overturned.  
**Primary Cause:** Pilot Error **Secondary Cause:** Weather  
**Failure Category:** A/C Ops  
**Comments:** None. (See also BHL Appendix 1 - 25 November 1993).  
**Report ID:** 8803491G

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**Report No:** 219 **Year:** 1996  
**Aircraft Type:** Sikorsky S 61 **Type of Flight:** Search & Rescue  
**Incident Type:** MOR **Flight Phase:** Landing  
**Incident Site:** Not Known **Operating Area:** UKCS  
**Caused By:** MRBs struck VHF & UHF homer aerials on forward cabin roof during landing on sloping ground whilst engaged in mountain rescue. P2 handling when droop stop contact felt. Landing rejected.  
**Primary Cause:** Pilot Error **Secondary Cause:** Other  
**Failure Category:** A/C Ops  
**Comments:** P1 took control, repositioned A/C and landing completed. Sortie continued without incident. At no time did crew notice anything untoward had occurred. Pockets on 4 MRBs found dented later on detailed inspection.  
**Report ID:** 9603197B

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**Report No:** 217 **Year:** 1997  
**Aircraft Type:** Sikorsky S 61 **Type of Flight:** Search & Rescue  
**Incident Type:** Accident **Flight Phase:** Hover  
**Incident Site:** Not Known **Operating Area:** UKCS  
**Caused By:** Main rotor blade strike during SAR mission. All blade tips damaged. A/C made forced landing in a field.  
**Primary Cause:** Pilot Error **Secondary Cause:** Not Known  
**Failure Category:** A/C Ops  
**Comments:** None.  
**Report ID:** 9704421X

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**Report No:** 216 **Year:** 1997

**Aircraft Type:** Eurocopter AS 332 **Type of Flight:** Winching

**Incident Type:** MOR **Flight Phase:** Hover

**Incident Site:** On Helideck **Operating Area:** UKCS

**Caused By:** Whilst lowering load of 270kg to helideck, two sharp jerks felt and main winch dropped approx. 2". Load safely deposited on helideck and A/C landed without further incident. Winch attachment brkt detached.

**Primary Cause:** Component Failure **Secondary Cause:** Not Known

**Failure Category:** A/C Maint

**Comments:** Winch lower attachment bracket found to have detached from airframe. All 4 securing bolts appeared stripped.

**Report ID:** 9705528X

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**Report No:** 200 **Year:** 1997

**Aircraft Type:** Sikorsky S 61 **Type of Flight:** Search & Rescue

**Incident Type:** Accident **Flight Phase:** Hover

**Incident Site:** Alongside Vessel **Operating Area:** UKCS

**Caused By:** While recovering crew from a ship in distress (engine failure, driven onto rocks by very strong winds), winchman was engulfed by a large wave and washed overboard. Last 2 crew had been lifted off by heli.

**Primary Cause:** Weather **Secondary Cause:** Other

**Failure Category:** A/C Ops

**Comments:** Winchman remained on deck whilst last 2 crew winched into heli. During this process very large waves over the vessel washed the winchman into the sea and repeatedly dashed him against the side of the ship.

**Report ID:** 199706022

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**Report No:** 214 **Year:** 1998

**Aircraft Type:** Sikorsky S 61 **Type of Flight:** Search & Rescue

**Incident Type:** MOR **Flight Phase:** Cruise

**Incident Site:** En-route over Sea **Operating Area:** UKCS

**Caused By:** Externally mounted FLIR camera became loose in flight due to one of three struts for camera mounting bracket becoming detached. Precautionary landing.

**Primary Cause:** Component Failure **Secondary Cause:** Other

**Failure Category:** A/C Maint

**Comments:** Threaded portion of mounting clevis found fractured internally. Other FLIR equipped A/C inspected & no similar defects found. Modified bracket and annual inspect / lube introduced.

**Report ID:** 9800937X

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**Report No:** 211 **Year:** 1998

**Aircraft Type:** Sikorsky S 61 **Type of Flight:** Training

**Incident Type:** MOR **Flight Phase:** Hover

**Incident Site:** Alongside Vessel **Operating Area:** UKCS

**Caused By:** A/C struck whip aerial on ships mast during SAR winch training sortie. Main rotor blade damaged.

**Primary Cause:** Pilot Error **Secondary Cause:** N/A

**Failure Category:** A/C Ops

**Comments:** Crew reminded of the necessity of maintaining safe margins when winching.

**Report ID:** 9806949G

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**Report No:** 210 **Year:** 1999  
**Aircraft Type:** Sikorsky S 61 **Type of Flight:** Search & Rescue  
**Incident Type:** MOR **Flight Phase:** Start-up  
**Incident Site:** Airport Apron **Operating Area:** UKCS

**Caused By:** Fire in Nr.2 engine bay on post-maintenance start for SAR call-out. Extinguished using ramp extinguisher. A/C shutdown. Paint scorched beneath Nr. 2 exhaust. Maintenance procedures not followed.

**Primary Cause:** Defective Maint **Secondary Cause:** Fire/Smoke

**Failure Category:** A/C Maint

**Comments:** Immediately prior to start-up for SAR call-out, engineers completing Nr. 2 engine 120hr fuel filter insp. Next step was eng. wash prior to start-up - not done. Due to urgency A/C towed out for engine start / leak check.

**Report ID:** 9901138G

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**Report No:** 209 **Year:** 1999  
**Aircraft Type:** Sikorsky S 61 **Type of Flight:** Training  
**Incident Type:** MOR **Flight Phase:** Hover  
**Incident Site:** Alongside Vessel **Operating Area:** UKCS

**Caused By:** Winch cable parted & winchman fell 35ft into sea during winch training sortie. Winchman recovered uninjured & A/C returned to base.

**Primary Cause:** Component Failure **Secondary Cause:** Total System Failure

**Failure Category:** A/C Design

**Comments:** During pre-flight winch check hook failed to pay out properly at first attempt. Cable and layering checked, no fault found. Further winch check OK. Sortie continued. Cable sheared due to being trapped on drum.

**Report ID:** 9900155A

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**Report No:** 208 **Year:** 1999

**Aircraft Type:** Eurocopter AS 332 **Type of Flight:** Winching

**Incident Type:** MOR **Flight Phase:** Hover

**Incident Site:** Alongside Vessel **Operating Area:** UKCS

**Caused By:** Winch cable defect. As hook was being winched back to A/C, after winching assistant had been lowered to deck of Maersk Rover, winch operator noted a kink in winch cable.

**Primary Cause:** Component Failure **Secondary Cause:** Not Known

**Failure Category:** A/C Maint

**Comments:** Cable pulled into cabin by hand and A/C shut down on rig. On inspection, the cable was seen to be flattened with several broken strands in area of kink.

**Report ID:** 9901468H

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**Report No:** 207 **Year:** 1999

**Aircraft Type:** Sikorsky S 61 **Type of Flight:** Training

**Incident Type:** MOR **Flight Phase:** Hover

**Incident Site:** Alongside Vessel **Operating Area:** UKCS

**Caused By:** Winchman injured leg on guard-rails of a ship during SAR training sortie. Moderate deck movement.

**Primary Cause:** Excess Vessel Motions **Secondary Cause:** Other

**Failure Category:** A/C Ops

**Comments:** Winchman suffered bruising to lower left leg.

**Report ID:** 9902344X

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**Report No:** 204 **Year:** 2000

**Aircraft Type:** Eurocopter AS 332 **Type of Flight:** Search & Rescue

**Incident Type:** MOR **Flight Phase:** Hover

**Incident Site:** Alongside Vessel **Operating Area:** UKCS

**Caused By:** Winch failure during SAR survivor hoisting from ship. Hand control mount ripped off inside of cabin door whilst survivor being winched onto deck caused winchman's upper body to pitch forward out of cabin.

**Primary Cause:** Component Failure **Secondary Cause:** Partial System Failure

**Failure Category:** A/C Maint

**Comments:** 2 attachment bolts had ripped out. Survivor recovered to ship's deck. Hand control recovered and taped to external frame. During subsequent transfers 'DOWN' switch became intermittent then failed.

**Report ID:** 200003989

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## Maintenance Incidents

07-Nov-00

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**Report No:** 202 **Year:** 2000  
**Aircraft Type:** Eurocopter AS 332 **Model:** L / L1  
**Incident Type:** MOR **Incident Site:** On Airfield  
**Flight Phase:** On Maintenance **Type of Flight:** N/A  
**Caused By:** Hoist cable attachment swaged ferrule insecure - signs of movement. Found on 3 mth insp. BHL say after similar incident (200003811) maint manual amended to check ferrule every 250 hoist operations.  
**Primary Cause:** Component Failure **Secondary Cause:** N/A  
**Comments:** Hoist cable PN709070 replaced. Had completed 125 cycles since new.  
**Failure Category:** A/C Maint **Report ID:** 200006985

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**Report No:** 203 **Year:** 2000  
**Aircraft Type:** Eurocopter AS 332 **Model:** L / L1  
**Incident Type:** MOR **Incident Site:** On Airfield  
**Flight Phase:** On Maintenance **Type of Flight:** N/A  
**Caused By:** Hoist cable ferrule displaced. During 250 cycle inspection hoist subjected to 405daN brake efficiency test, following which the cable swaged ferrule was found to have moved 0.16-0.2 mm.  
**Primary Cause:** Component Failure **Secondary Cause:** N/A  
**Comments:** Host cable PN 709070 had completed 200 cycles from new. Maintenance manual amendment raised to check for movement of swaged ferrule every 250 hoist operations.  
**Failure Category:** A/C Maint **Report ID:** 200003811

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## APPENDIX B - OFFSHORE TERMS AND DEFINITIONS

In undertaking this study it was considered, at the outset, vital to ensure that the key terms and definitions to be used throughout the report were clearly stated, consistent and understood. Prior to commencing the study it was apparent that confusion was sometimes caused by the use of incorrect terminology and terms being used out of context.

To avoid such confusion, definitions of terms used are given in the following. In the majority, the definitions used correspond to those in the main pieces of UK Legislation applying to offshore installations, namely:

- The Offshore Installations (Safety Case) Regulations 1992 (SCR) [7].
- The Offshore Installations (Prevention of Fire and Explosion, and Emergency Response) Regulations 1995 (PFEER) [8].
- The Offshore Installations and Pipeline Works (Management and Administration) Regulations 1995 (MAR) [9].
- The Offshore Installations and Wells (Design and Construction etc.) Regulations 1996 (DCR) [10].

Other definitions are given along with their related references, as appropriate. Text in quotation marks, thus "...", is taken from the reference cited. It should be noted that the definitions are listed alphabetically, not in order of priority.

**Competence** - having sufficient training and experience or knowledge and other qualities [*regulation 7(5) of Management of Health and Safety at Work Regulations 1999 (MHSWR)* [12] refers.].

**Control** - measures to monitor the extent of the emergency for the purposes of exercising managerial command and control [*PFEER regulation 12, guidance refers*].

**Duty Holder** means - in relation to a fixed installation, the operator, and in relation to a mobile installation, the owner [*MAR regulation 2(1) refers*].

**Emergency** means an emergency of a kind which can require evacuation, escape or rescue;" [*Ref: PFEER regulation 2*]. "An emergency includes any unexpected event of whatever nature with the potential to cause harm and to require the evacuation, escape and rescue of one or more persons from the installation." [*Ref: PFEER regulation 2, guidance*].

**Emergency Response** means action to safeguard the health and safety of persons on or near an installation in an emergency;" [*Ref: PFEER regulation 2*]. This covers action in response to potential major accidents, persons overboard, etc. [*PFEER regulation 2, guidance refers*].

**Environmental Conditions** means meteorological and oceanological conditions, and properties and configuration of the sea-bed and subsoil [*DCR regulation 2 refers*].

**“Evacuation** means the leaving of an installation and its vicinity, in an emergency, in a systematic manner and without directly entering the sea;” [*Ref: PFEER regulation 2*].  
“Successful evacuation will result in persons being transferred to a place of safety, by which is meant a safe onshore location, or a safe offshore location or vessel. Means of evacuation offer protection from the hazard, and have their own motive power to enable persons to move quickly away from the installation.” [*Ref: PFEER regulation 2, guidance*].

**“Escape** means the process of leaving the installation in an emergency when the evacuation system has failed; it may involve entering the sea directly and is a ‘last resort’ method of getting persons off the installation;” [*Ref: PFEER regulation 16, guidance*].

**“Good prospect of being recovered, rescued and taken to a place of safety** means arrangements designed to give a good probability - in all but the most severe storm conditions and sea states - of rescuing, recovering and taking to a place of safety persons who have to evacuate or escape from an installation, or who fall overboard or are involved in a helicopter ditching on take-off or landing;” [*Ref: PFEER regulation 17, guidance*].

**In all but the most severe storm conditions and sea states** - recognises the possibility of exceptional conditions during which recovery and rescue will not be possible and measures will need to be taken to reduce the likelihood of an event which requires evacuation, escape and rescue [*PFEER regulation 17 ACOP (Approved Code of Practice) refers*].

**“Installation Manager** means, in relation to an offshore installation, the person appointed for the purposes of [MAR] regulation 6(1)(a) who is for the time being in charge of it;” [*Ref: MAR regulation 2*].

**“Management System** means the organisation and arrangements established by a person for managing his undertaking.” [*Ref: SCR regulation 8*].

**“Means of Escape** cover items which assist with descent to the sea, such as davit-launched liferafts, chute systems, ladders, and individually controlled descent devices; and items in which personnel can float on reaching the sea, such as throw-over liferafts.” [*Ref: PFEER regulation 16, guidance*].

**“Mobile Installation** means an offshore installation (other than a floating production platform) which can be moved from place to place without major dismantling or modification, whether or not it has its own motive power;” [*Ref: MAR regulation 2*].

**OBRR Helicopter** - this term is used to accurately reflect the true purpose of an aircraft designated for onshore and offshore rescue and recovery duties. This definition also draws upon a term used in PFEER Reg 17 [8] concerning recovery and rescue arrangements. These arrangements can be provided by commercially provided search and rescue facilities as well as standby and other vessels.

**Offshore Installation** - a structure which is used while *standing or stationed* in relevant waters (e.g. the UKCS): for the exploitation or exploration of mineral resources by means of a well, for the storage of gas in or under the seabed or the recovery of said stored gas, for the conveyance of things by means of a pipeline, mainly used for the provision of accommodation for persons who work on or from a structure falling within any of the provisions of this paragraph. Note: this is a *summary of MAR regulation 3*. For the full version refer to the regulations.

“**Operator** in relation to a fixed installation means the person appointed by a concession owner to execute any function of organising or supervising any operation to be carried out by such installation or, where no such person has been appointed, the concession owner;” [Ref: *MAR regulation 2*].

“**Owner** in relation to a mobile installation means the person who controls the operation of the installation;” [Ref: *MAR regulation 2*].

“**Place of Safety** means an onshore or safe offshore location or vessel where medical treatment and other facilities for the care of survivors are available.” [Ref: *PFEER regulation 15, guidance*].

**Recovery and Rescue arrangements** - facilities and services external to the installation, and include standby and other vessels, public sector and commercially provided search and rescue facilities; facilities on the installation such as installation-based fast-rescue craft [PFEER regulation 17, guidance refers].

**Safety Critical Element** means “Any structure, plant, equipment, system (including computer software) or component part whose failure could cause or contribute substantially to a major accident is safety-critical, as is any which is intended to prevent or limit the effect of a major accident. The identification of an item as safety-critical should follow from the identification of major accident hazards required by regulation 8(1)(c).” (Guidance on amendments by DCR to SCR) [21].

**Sea States** means - the sea criterion and probable height of waves (including average and maximum) given in the Beaufort Scale of Wind Force (Ref: *The Marine Observer’s Handbook - Meteorological Office*) [11].

**Severe Storm Conditions** could mean, for example, storms registering above force 10 on the Beaufort Scale of Wind Force (Ref: *The Marine Observer’s Handbook - Meteorological Office*) [11].





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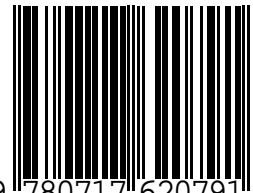
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