

HSE information sheet

Ageing semi-submersible installations

Offshore Information Sheet No 5/2007

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Introduction

This information sheet deals with the ageing processes that affect the structure of semi-submersible installations. Some of these processes will also apply to marine systems, although such systems may be replaced several times within the life of the structure. It replaces Safety Notice 1/03 (SN1/03) (issued May 2003) which has now been withdrawn.

Background

Fatigue and corrosion are hazards that are ever-present in a marine environment, and have been associated with the loss of a number of vessels worldwide. For semi-submersible installations, owners and operators usually rely on support from their classification societies and other contractors to ensure structural integrity. A summary of the arrangements for maintaining integrity so as to prevent major accidents is documented in the safety case for the installation.

The average age of semi-submersible installations operating on the United Kingdom continental shelf (UKCS) is high, with many exceeding their notional design life (typically 20 years) and some being around 30 years old. However, a mobile installation does not necessarily suffer degradation in direct proportion to its calendar life (unlike a fixed installation). Although the performance of many installations may be satisfactory at present, the ageing processes could result in rapid deterioration at some future time. HSE therefore believes that the arrangements for maintaining integrity should be reassessed periodically to take account of the ageing processes and to ensure that any deterioration in integrity is detected in good time.

HSE has been in discussion with a number of interested parties regarding the ongoing integrity of these installations, including the Norwegian Petroleum Directorate (NPD) and the major classification societies. HSE and NPD are seeking to adopt common objectives in dealing with this matter.

Actions

Duty holders should periodically reassess their arrangements that are used to maintain integrity, to take account of the effects of ageing processes. This is particularly important for installations beyond their notional design life. The Annex (see page 4) describes a number of measures that should be considered (if not already in place) when reassessing the arrangements. HSE believes that these measures (or other equally effective means) are good practice for the management of integrity for semi-submersible installations, and that duty holders should be able to explain what action they are taking.

Relevant legal requirements

The relevant legal requirement is:

- The Offshore Installations and Wells (Design and Construction, etc) Regulations 1996 - regulation 8

Further information

Any queries relating to this notice should be addressed to:

Health and Safety Executive
Hazardous Installations Directorate
Offshore Division

Lord Cullen House
Fraser Place
Aberdeen
AB25 3UB

Tel: 01224 252500
Fax: 01224 252648

Annex

Reassessment considerations for the integrity of ageing semi-submersible installations

1. Fatigue life calculated according to current rules and corrected for all increases in displacement caused by modifications.
2. Redundancy after loss of any brace analysed according to current analysis methods using hydrodynamic and structural shell models:
 - check for environmental loads with return period of one year
 - check for adequate remaining fatigue capacity in the damaged condition to allow for controlled demobilisation, controlled disconnection and tow
3. Physical agreement between the installation and as-built documentation and that:
 - later modifications are accounted for in analyses and calculations
 - local weld-ons and scallops do not reduce the fatigue life of the structure
 - local modifications do not impair weather and watertight integrity
4. Additional considerations and requirements with respect to inspection and maintenance due to extended life for marine systems such as:
 - weather and watertight closing appliances
 - systems for ballasting and stability
 - systems for mooring and positioning
 - related safety systems which depend on emergency power or hydraulics
5. Additional considerations and requirements with respect to inspection and maintenance due to extended life for the structure with respect to:
 - load-carrying structures, particularly fatigue, corrosion and thickness measurement
 - critical areas in addition to those required for class certification
 - leak detection systems
6. Use of information on past performance to inform the current arrangements and measures, including results from similar installations. This may require co-operation with other duty holders and classification societies.
7. Plans for replacement or repair due to ageing of load-carrying structures and marine systems.
8. Review of the effectiveness and reliability of the existing barriers preventing a catastrophic failure, and consideration of further measures that may be reasonably practicable.

9. Review of the effect of changes in knowledge concerning technology and environmental conditions that could influence existing barriers or make further measures reasonably practicable.

This information sheet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do