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**OFFSHORE TECHNOLOGY
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**Hazard Management in
Structural Integrity - Vol 5**

Performance Standards

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**HAZARD MANAGEMENT IN
STRUCTURAL INTEGRITY - VOL 5:
PERFORMANCE STANDARDS
HSE Research Project Ref. P3599-5
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SUMMARY

This report presents findings related to the topic of performance standards which arose during research conducted for the Health and Safety Executive (HSE) in order to review how the offshore industry applies measures to manage structural integrity hazards. The complete study is described in 'Hazard Management in Structural Integrity' HSE Research Project ref. P3599-1 [Ref 1].

The report explains why performance standards are needed within the goal setting environment, summarises stated regulatory requirements for performance standards, and outlines some of the views of the offshore industry on the topic.

The conclusion of this report is that performance standards are an important part of the process of selecting measures to manage hazards, a view confirmed in the literature, the regulations and through interviews with a selection of representatives from the offshore industry.

The work described in this report was carried out between February and June 1998. This was prior to the revocation of SI/289 and the certification regime. Elsewhere in the report, therefore, the term 'certification body' is used.

This report is one of five reports produced by the study, the others being:

- OTO 98/148 'Hazard Management in Structural Integrity' [Ref 1]
- OTO 98/149 'Hazard Management in Structural Integrity: Summary Report' [Ref 2]
- OTO 98/150 'Hazard Management in Structural Integrity: Hazard Management Measures' [Ref 3].
- OTO 98/151 'Hazard Management in Structural Integrity: Inherent Safety' [Ref 4]

PERFORMANCE STANDARDS

1. INTRODUCTION

This report presents findings related to the topic of performance standards identified during research conducted for the Health and Safety Executive (HSE) in order to review how the offshore industry applies measures to manage structural integrity hazards. The complete study is described in 'Hazard Management in Structural Integrity' [Ref 1] and summarised in 'Hazard Management in Structural Integrity: Summary Report' [Ref 2]. Additional reports on the project cover hazard management measures 'Hazard Management in Structural Integrity: Hazard Management Measures' [Ref 3] and inherent safety, 'Hazard Management in Structural Integrity: Inherent Safety' [Ref 4].

Since Piper Alpha and the Cullen Report, there has been a move away from prescriptive regulation to a 'goal setting' environment within the offshore industry. Generally, this is believed by regulator and operator alike to have improved safety. The nature of 'goal setting' allows a diverse range of solutions to the problem of designing a system for extracting oil and gas which is both safe and economic. In the Safety Case the duty holder may present to the regulator a range of different solutions in order to meet this goal. These measures can include prevention and mitigation measures, and measures to protect people from the consequences of an accident.

2. WHY PERFORMANCE STANDARDS?

With prescriptive rules, performance standards would not be necessary - each duty holder would simply have to follow the rules that had been laid down. However, the goal setting approach requires some other form of indication of success. Performance standards provide a system of indicators which allow measurement of the successful achievement of the goals. They are essential as a means of communicating between disciplines. For example, the structure may not be designed sufficiently robustly if it is incorrectly assumed that vessel impact cannot occur. There may be conflicts between requirements, for example a requirement for a blast wall may conflict with the need to provide a clear escape route. If the maximum blast overpressure is not stated by the topsides discipline, the structural discipline cannot ensure the structure is sufficiently robust.

3. REGULATORY REQUIREMENTS

The guidance to the Safety Case Regulations [Ref 5] state that performance standards should be set for individual protective and preventive measures required at different stages of the lifecycle, and that the performance standards should link responsibilities to desired achievements, that is:

they should define who is responsible for what, when, and the results required to enable implementation to be monitored.

In the code of practice for the 'Protection of Fire and Explosion and Emergency Response of offshore installations' (PFEER) regulations [Ref 6] a performance standard is defined as:

a statement which can be expressed in qualitative or quantitative terms, of the performance required of a system, item of equipment, person or procedure, and which is used as the basis for managing the hazard, eg planning, measuring, control or audit - through the lifecycle of the installation.

These requirements have meant that performance standards are used increasingly within safety cases as a means of aiding demonstration of the requirements (see, for example, [Ref 7]).

Performance standards are not themselves defined in the regulations - it is for the duty holder to select appropriate measures. These are often derived from international and European standards, design codes, company specifications, and independent test programmes.

4. INDUSTRY VIEWS OF PERFORMANCE STANDARDS

The UK Offshore Operators Association (UKOOA) [Ref 8] refer both to the definition of performance standards from PFEER (given above) and to the guidance in 'Successful Health and Safety Management' (HS(G)65) [Ref 9]. HS(G)65 describes performance standards as:

...the basis for planning and measuring health and safety achievement... Performance standards link responsibilities to desired outputs and should specify who is responsible, for what and with what expected result.

A later UKOOA document [Ref 10] calls for the setting of performance standards for safety critical elements (SCE), where the performance standard:

...describes the essential requirements that the SCE should maintain throughout its working life. The performance standard itself should be reviewed and amended if necessary during the lifecycle.

This aspect of review of the performance standards set during the lifetime of an installation is an important one, and is reflected in statements made by interviewees regarding the importance of using inspection data to review suitable intervals for inspection [Ref 3, Section 2.2.5 'Inspection and monitoring methods and philosophies'].

BRES [Ref 11] draw on the definition of performance standards given in PFEER, but refine it to define three types of standard:

- Risk based: quantitative - specify levels of risk (individual, societal etc) which have to be specified. For example, 'individual risk to personnel on board should be less than 10^{-3} per year.'
- Scenario based: qualitative or quantitative - set an overall target or objective for management of a particular hazard or set of hazards. For example, for a given type of fire, establish probable values for fire intensity, duration and extent.
- System based: specify a level of performance or competence to be achieved by the system required to manage or respond to the hazard. For example, 'structural integrity must be maintained with deformations limited to values which will not cause further escalation.'

5. CONCLUSIONS

Performance standards are an important part of the process of selecting measures to manage hazards. This point came out strongly in both the literature, and in the interviews conducted. The importance placed by respondents on performance standards does suggest that new types of guidance document and standards are being used, ie away from a prescriptive checklist standard, towards documents which set out the performance to be met.

Evolving standards are becoming less prescriptive, incorporating a greater, though still implicit tendency towards the use of risk-based factors. Whilst this should ensure that an appropriate standard is met, it also allows designers a greater flexibility in the choice of any new methods in order to achieve them. Where required, standards can still be achieved using traditional methods.

6. REFERENCES

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