THE INSTITUTE OF PETROLEUM

GUIDELINES FOR THE ANALYSIS OF JACKUP AND FIXED PLATFORM WELL CONDUCTOR SYSTEMS

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FOREWORD

This Guideline has been prepared as a guide to safe practice for those concerned with offshore production, drilling, completion or workover well operations from fixed (seabed founded) platforms, and mobile jackup drilling units. It provides information and guidance on those issues that affect the overall structural strength, integrity and operability of such well systems. In this context the well systems include, or may include:

— conductor tubulars;
— surface casing string tubulars;
— surface Blow-out Preventers (BOPs), including flanges and other connections;
— surface xmas trees, including flanges and other connections;
— surface risers (i.e. those joining surface wellheads to surface BOPs).

Any of these items that are present, in the system of interest, are primary well structural components. The integrity of the entire well system is dependent upon their suitability for the particular application. It should be noted that issues associated with the design of casing strings for well systems are not addressed herein.

For the purposes of this Guideline, it should be noted that a variety of terms are employed which are in common usage in the oil and gas industry. Definitions for such terms are presented in Annex 2. The definitions in this Annex apply throughout this Guideline, irrespective of any other meaning that the words may have in other connection.

It should be noted that this Guideline provides a single reference source, for what has over the years become accepted practice in the design and analysis of jackup and fixed platform well conductor systems. Whilst some broad guidance is provided on typical systems which have been successfully used in the field, the guidance provided in this respect should be treated only as an indication of the types of system which **may** be suitable, for a particular application. It **should not** be construed that the indicative guidance provided in this respect can be taken as providing any level of assurance that a particular system will be acceptable in any given set of circumstances. Such assurance can only be derived by conducting appropriate analyses, utilising the methods and techniques described in this Guideline.

This Guideline has been produced in a United Kingdom Continental Shelf (UKCS) context, but the principles and recommendations have general relevance to similar operations elsewhere in the world. It is intended that this Guideline should be considered as a starting point, and general reference source for such operations. Definite recommendations are offered, but these should be applied according to each Well Operator's/Duty Holder's policies and experiences in the particular area of operation.

It is essential that Codes of Practice, Specifications, Standards, Recommended Practices, National Regulations and National Statutory Requirements that are referred to throughout this Guideline, are studied and applied as appropriate. Additionally, account should be taken of any Codes of Practice, Specifications, Standards,

Recommended Practices, National Statutory Requirements and Regulations that have been issued since this Guideline was published.

Research work is being continuously undertaken, to improve the level of understanding of many of the issues that are addressed in this Guideline. Users of this Guideline should ensure that they are aware of the results of such research, and apply any relevant findings in an appropriate manner.

It is stressed that the successful application of this or any other similar, Guideline depends upon the awareness and competence of the user. The intention is that a fully auditable trail of information should be produced for any analyses. Although the adoption of this Guideline should help to promote safe production, drilling and completion/workover operations, the Institute of Petroleum and their agents involved in its development cannot accept responsibility in any way for injury to personnel or damage to equipment, installations or property which may occur when this Guideline has been applied.

Comments and revisions

The contents of this Guideline have been peer reviewed. It is intended that these Guidelines will be revised when there are changes in related standards, industry practices or in the light of practical experience. Comments on the document are welcome with a view to incorporating improvement at the next issue. Comments should be in writing and addressed to:

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The contents of this Guideline were developed from input data supplied by a number of contributors, some of whom wished the data to be used on a non-attributable basis. The direction for the project was provided by a Technical Co-ordinator. Normally for such a study, a Steering Group of industry representatives would have been set up. However, because of the problems associated with data confidentiality and the increasing difficulty of getting busy people to commit to attending meetings, it was agreed that a Peer Review process would be used instead. The first draft of the document was therefore distributed to approximately 70 identified experts world-wide to ensure industry input and relevance. The comments received from this process were incorporated into this Guideline as appropriate.

The Institute of Petroleum gratefully acknowledges the contributions made by the following individuals, without whose invaluable work and dedication the project objectives would not have been achieved:

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USE OF THIS GUIDELINE

1.1 INTRODUCTION

This Guideline is intended to be used as a means of reviewing the acceptability, in a structural sense, of Well Conductor Systems for the following applications:

— mobile jackup operations;
— fixed platform operations including:
  - tieback wells;
  - wells drilled from the platform.

Guidance is also presented for the special case of fixed platform well systems that are worked upon by mobile jackup units, operating in cantilever mode, over the platform.

It is the explicit responsibility of users of this document to ensure that the guidance presented herein is applied in a manner that is consistent with, and relevant to, the particular circumstances being considered. Also, it is the responsibility of the Guideline user to ensure that any input data used in the analysis of Well Conductor Systems are valid, and are based on sound engineering principles. Data from Original Equipment Manufacturers (OEM) should be validated as necessary, to ensure that they are used in an appropriate manner.

A flowchart illustrating the way in which this Guideline is intended to be used is presented in Figure 1-1. Review of Figure 1-1 and Section 2 is recommended for those who are unfamiliar with the design and analysis of Well Conductor Systems.

The intention of this Guideline is to enable an auditable trail of information to be developed, for any structural analysis of relevant Well Conductor Systems. Consistent methods are included for presentation of results, the objective being to standardise where possible, the review of reports.

To achieve an auditable trail of information, it is necessary to fully document input data. The recording of input data has been addressed in this Guideline, by the provision of input data questionnaires. Annexes 3, 4 and 5 contain samples of relevant questionnaires for the various types of well operations that are covered by this Guideline.

It should be noted that structural integrity aspects of Well Conductor Systems fall within the scope of this Guideline. Multi-string analysis of such systems, for example to determine the amount of expansion that occurs in conductors and casings when they heat up under production conditions, or to predict the axial loading that occurs as a result of pressure testing internal casings, is not described in this Guideline. They are treated as input loading for the type of overall structural analyses described herein. Pile driving of conductors is not addressed in this document, other than to recognise that any fatigue loads (produced as a consequence of such driving) must be accounted for.

Particularly in High Pressure/ High Temperature (HP/HT) wells where long and heavy casing strings are commonly used, the issue of the axial capacity of Well Conductor Systems should be considered. This has not been of significant concern historically, provided good drilling/cementing or driving practices were applied in the field. There have been occasions where disturbance