Guidance on the management and maintenance of the integrity of structures, equipment and systems taken out of service on either a temporary or permanent basis in the upstream oil and gas industry

GUIDANCE ON THE MANAGEMENT AND MAINTENANCE OF THE INTEGRITY OF STRUCTURES, EQUIPMENT AND SYSTEMS TAKEN OUT OF SERVICE ON EITHER A TEMPORARY OR PERMANENT BASIS IN THE UPSTREAM OIL AND GAS INDUSTRY

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INTRODUCTION AND SCOPE

This document presents a good practice guideline for the effective management and maintenance of the integrity of equipment and systems taken out of service and their related structures, on either a temporary or permanent basis, in the upstream oil and gas industry.

Adopting a high level view of typical equipment found in the upstream oil and gas industry, specific isolation and preservation measures are outlined, including instances where connections to live equipment may be required.

Based on a collation of good practice and equipment manufacturer recommended procedures, this document aims to address typical situations that are likely to arise; however, appropriate risk assessments based on contextual requirements need to be undertaken to fully determine the applicability of the outlined good practices to the specific situation.

The scope, range and depth of the document has been based on field experiences of the compilation team and may correspondingly be worthy of some revision and updating. This should be performed as additional experiences of upstream mothballing are gained.

1 INTRODUCTION – THE ISSUE

The upstream oil and gas operating companies are faced with challenging decisions with equipment that is not in full-time use or has no or little reserve requirement.

With operating costs ever on the increase and crude oil prices low or uncertain, making the decision to withdraw systems or parts of systems to take them out of service and mothball them is not to be made lightly.

When and how best to make the decisions for taking equipment out of service while ensuring that the equipment is appropriately preserved for return-to-service, with minimum cost or risk of degradation of performance when restarted.

1.1 THE DECISION

The decision to take a part of a system or component from service will be driven by:

- the equipment availability (i.e. little used or depended upon);
- the cost and practicability of keeping that equipment in service;
- avoidance of additional investment;
- the risk to regularity with that part no longer available for service, and
- any safety critical system interdependencies of the system or component.

1.2 THE METHOD

The method of withdrawal from service and the technical approach to preservation will be driven by:

- the estimated time the system or component is expected to be out of service;
- the need to retain residual net present value (NPV) of the system or component, and
- any regulatory requirements that need to be met during the process of withdrawal from service.

1.3 PRESERVATION MAINTENANCE

The approach to preservation maintenance for a particular part of a system or component of a system is dependent upon:

- what that part of a system or component is;
- what type of product the system or component was used on when last in service;
- what the notice for being brought back into service is, and
- any regulatory requirements that need to be met during the performance of the preservation maintenance.

2 BACKGROUND

2.1 REGULATORY DRIVE VIA REPORTED RESULTS FROM HSE'S KP3/KP4 PROGRAMME – FOCUS ON ALE PERSPECTIVES FOR ONGOING MANAGEMENT

2.1.1 The Health and Safety Executive (HSE) key programme 3 – asset integrity

The HSE has maintained the focus on asset integrity over the years and in 2007 issued the key performace 3 (KP3) review which revisited the appraisal of asset integrity management of offshore installations on the United Kingdom Continental Shelf (UKCS).

The findings of the three-year inspection initiative revealed significant issues regarding the maintenance of safety-critical systems used in major accident hazard control in the industry.

Overall, the review found that the industry had allocated considerable resource and effort to improve offshore assets and compliance with relevant standards, and that the offshore industry leadership has responded well. There was evidence of good progress in addressing the issues identified by the KP3 work.

The review also found that the work is by no means complete, and continued effort is necessary to sustain the momentum of improvement initiatives, so that facilities are not allowed to degrade to the extent identified in the 2007 KP3 report.

The review highlights that offshore safety and the security of UK energy supply depend on successful management of oil and gas asset integrity. It is therefore essential that the fluctuating economic environment should not slow progress on management approaches to achieve and sustain the improvements KP3 emphasised as necessary.

The KP3 report raised significant concerns and set some challenges for the industry. The KP3 report was accepted as valid by the UK offshore oil and gas industry.

This report therefore sets out the background for the requirement to maintain asset integrity standards when setting out to mothball equipment

2.1.2 Key performance 4 (KP4) ageing and life extension programme

This report communicates the results and recommendations of the Ageing and Life Extension Key Programme (KP4) carried out between 2011 and 2013 by HSE's Energy Division.

The report noted that about half of the fixed platforms are approaching or exceeding their originally anticipated field life. There are potentially significant future challenges to be met associated with the prospect of some installations operating beyond their original cessation of production date.

It also noted that management of ageing requires a good understanding of the condition of safety critical elements (SCEs), how that condition is changing over time and carrying out maintenance in a timely manner to minimise risk of major accidents.

From the perspective of this guidance, this should also include the mothballed equipment.

The KP4 Report also found that there was a range of areas where ageing and life extension (ALE) management was developing well, plus areas where extra focus is required.

2.1.3 Host country guidance notes

The reference documents (KP3 and KP4) are the HSE's principal documents for this purpose applicable to the UKCS.

Where companies are operating in countries other than the UK, then the equivalent documents from the applicable authorities should be sought and referred to.

2.1.4 Opportunity to demonstrate self-regulation in industry in an agreed core area of concern

To correct an area where no clear guidance currently exists, the development of this document as an independent guidance note other than the HSE KP4, will indicate to the HSE that the upstream oil and gas industry is seeking to address the issues surrounding ALE responsibly.

The preparation of this document is also an indication that the industry is seeking to provide further guidance to operators to undertake mothballing responsibility and with due consideration to SCEs.

2.2 DIFFERENT TYPES OF MOTHBALLED EQUIPMENT AND LEVELS OF NON-REGULAR SERVICE

Upstream oil and gas operators have, since operations began, been selectively adding, modifying or removing equipment or components from systems. This has been performed with varying levels of Control of Change, with levels of success and some known failures.

Individual upstream operators have performed these modifications under the umbrella of their own permit-to-work (PTW) procedures, Control of Change procedures and other own company guidelines.

This guidance will endeavour to identify the types of systems, parts of systems, equipment or components that are likely to be withdrawn from service for mothballing, and provide guidance as to how that could be best undertaken with due consideration for the prevailing circumstances.

2.3 DESCRIPTION AND GUIDANCE AS TO HOW EACH MOTHBALLING PROCESS SHOULD BE IMPLEMENTED

Note: This section is based on an ideal world situation. In reality, a number of practical constraints may exist. Where such constraints exist on individual upstream facilities they should be identified and managed.

The process of withdrawal from service for each identified system, parts of systems, equipment, or components will be addressed from first principles in the following main steps:

– The decision to withdraw systems, parts of systems, equipment or components together with the risk-based principles employed to derive that decision.
– The methodology for withdrawal from service. This will set out the service conditions that will best favour the systems, parts of systems, equipment or components for withdrawal and the follow-on preservation maintenance. This methodology may be

variable depending upon how long that equipment is planned to be removed from service for and the required notice for return to service.

- Once withdrawn from service, how that system, parts of systems, equipment or components have the long-term isolation (LTI) applied to it. As a part of that isolation process it may be appropriate to establish a boundary isolation (BI) that would enable the mothballed equipment to be appropriately monitored and maintained while protected from live processes.
- The mothballing process will be described in principle for each identified system, parts of systems, equipment or components. This will set out how it is taken from a condition where service fluids/conditions were present to one where preservation fluids/conditions replace them.
- The preservation maintenance approach for each system, parts of systems, equipment or components will be identified. This will be a combination of selected vendor recommendations, established operational and trade practices. This will also depend upon the project period of time for which the item is intended to be preserved.
- Any mothballing process should be undertaken with due recognition to limiting the potential difficulties in returning the equipment to service.