EXHIBIT # 94
WIT: ____

Document No.	GP 10-35
Applicability	Group
Date	18th November 2008

GP 10-35

Well Operations

Group Practice

BP GROUP
ENGINEERING TECHNICAL PRACTICES

Introduction

The introduction to this ETP mirrors section 20 of the revised DWOP.

All Well Operations activity [redacted] conform to Engineering Technical Practice GP 10-35 – Well Operations

1 General

1.1 The Well Engineering Authority is accountable for appointing relevant technical authorities for delivery of well integrity and assurance throughout the complete lifecycle of each well.

1.2 The Well Engineering Authority [redacted] provide assurance that all professional, supervisory, operational and maintenance staff involved in well activity are competent to do so.

1.3 The management and deployment of all intervention hardware (Pressure Control Equipment) [redacted] be controlled.

1.4 SPUs [redacted] develop a written philosophy for tubing and annuli management over full well life cycle.

1.5 SPUs [redacted] develop process for the derivation and revision of formal Maximum Allowable Annulus Surface Pressure (MAASP) and Maximum Allowable Operating Surface Pressure (MAOSP) values and in some cases minimal allowable pressure recognising that annular fluids can change over time.

1.6 SPUs [redacted] develop a written philosophy for tree and wellhead operations, maintenance, inspection and testing procedures over full well life cycle and establish and maintain service records.

1.7 A downhole safety valve (DHSV) [redacted] be fitted below the seabed as a minimum, in every offshore platform well capable of naturally flowing hydrocarbons to surface. Acceptable leak rates [redacted] be defined in the SPU well integrity procedures in line with requirement 7.6 of the ETP. Failed DHSVs [redacted] be replaced or substituted by an item which provides an equivalent level of well integrity in a safe and timely manner based on proper risk assessment and as deemed appropriate by the Well Engineering Authority.

1.8 SPUs [redacted] develop a fit for purpose DHSV maintenance and testing programme when a DHSV is fitted.

2 Well Intervention

2.1 Prior to the commencement of any well intervention operations, the location [redacted] be inspected to ensure it is safe for personnel and equipment during the planned operations.

2.2 Personnel and equipment [redacted] be protected from exposed runs of wireline or coiled tubing and from any voids created by the removal of deck hatches and floor gratings.

2.3 During the period of well intervention, a single person [redacted] be designated responsible for the well intervention operation.

2.4 Clear emergency shutdown procedures [redacted] be in place, with which all drilling and well operations personnel are familiar.

2.5 All equipment subject to operational loading (sheaves, units etc) [redacted] be load path certified and securely fastened or anchored to withstand the maximum expected forces during the operation of that equipment.

2.6 An assessment [redacted] be made to determine if a wellhead/tree bending stress analysis is required depending on the nature of the well and subsequent well operations.

3 Well Intervention Operations

3.1 On production wells fitted with more than one tubing string all strings should be shut in during wireline rig-ups. Once rigged-up and tested, the other strings may be opened up until such time as the operations are complete and the equipment required to be rigged-down.

3.2 A recently calibrated and tested pressure relief valve of sufficient capacity, or an alternate safety mechanism, [redacted] be included in the surface hook up on the fluid discharge line on any temporary or permanent pumping system that is capable of exceeding pressure ratings of any connected equipment.

3.3 A record of every wireline and coiled tubing toolstring (naming items, providing lengths, outside diameter thread type, fish neck sizes and any other salient points) [redacted] be made prior to running in hole. This record [redacted] be available at the wellsite throughout the time the toolstring is downhole.

3.4 Prior to the commencement of any well intervention operation, the swab valve turns to open and close [redacted] be physically checked and noted.

3.5 If any well safety valve is held open by a temporary local control unit, that unit [redacted] never be left unattended.

3.6 Pressures in the tubing and annuli [redacted] be regularly monitored and recorded during all well operational activities.

4 Fishing

4.1 On completion of every well operation any tools or part of tools left downhole [redacted] be accurately recorded and reported.

4.2 The configuration of BOPs in the rig up should be sufficient to close on both the fishing wire and the fished wire.

4.3 The lower BOP(s) should be fitted with rams and guides suitable for the fished wire.

5 Coiled Tubing Operations

5.1 BOPE [redacted] be fully function and pressure tested upon installation and every seven (7) days, after any BOPE changes or CT change out unless documented stump tests can be provided by the service provider where as a shell test of BOPE [redacted] be required upon installation to confirm connection integrity.

5.2 On any perforated well where a coiled tubing BHA is worked on bottom or where the coiled tubing is to be run without check valves, shear-seal BOPs [redacted] be installed, to give a reasonable expectation that once cut, the coiled tubing will drop to regain control of the tree valves. When shear-seal BOPs are employed, all connections between them and the tree or wellhead [redacted] be flanged and double valve isolated, thereby excluding elastomers from connections beneath these BOPs.

5.3 Shear seal and shear ram preventers [redacted] be capable of shearing the coil and any lines within it, at all pressures up to the preventer's maximum anticipated working pressure. When lower shear seal preventers are equipped with single needle valve pressure equalising capability, the valve [redacted] be replaced with a plug.

5.4 To ensure that it will always be possible to unlatch the riser from a subsea well, the lower riser assembly [redacted] be capable of severing coiled tubing of the maximum wall thickness to be used as well as any wireline or control lines contained within, and provide a seal.

5.5 A choke manifold containing at least two adjustable chokes [redacted] be installed, unless the normal production flowline is used through the tree and production manifold. In this case, the single production choke is sufficient.

5.6 Unless pressure deployment is used, the lubricator [redacted] be of sufficient length to contain the BHA between the swab valve and the pack-off or between the downhole lubricator valves, where fitted, and pack-off

5.7 Dual flapper check valves [redacted] be run above the BHA on all strings unless the planned operation precludes their use. When not utilised, the programme or local standard operating practice should refer to a detailed and current assessment of risks, mitigations and contingency responses.

5.8 When elastomer seals are used they [redacted] be made of a material intended for exposure to prevailing wellbore conditions.

5.9 The vapour pressure and flash point [redacted] be known for all potentially flammable fluids. Special precautions should be in place.

5.10 Remaining coil tubing fatigue life [redacted] be known and monitored prior to and during each job. A coil replacement philosophy should be in place commensurate with operating conditions. The position of all welds and the fluid exposure history [redacted] be documented for each reel of tubing.

5.11 All coiled tubing operations [redacted] not exceed the maximum operating tension loads of 80% and operating compression loads of 70% of minimum yield strengths for coiled tubing string used.

Foreword

This is the second issue of Engineering Technical Practice (ETP) BP GP 10-35. This Group Practice (GP) is based on parts of the *BP Drilling and Well Operations Policy* (BPA-D-001), and, for the subject matter covered herein, supersedes that document.

This ETP sets out the basic well operational requirements in specific terms, particularly in relation to Accountability, Well Operations, Well Intervention, Well Annuli Management, Tree & Wellhead Management and DHSV Management. This ETP [redacted] be used as a basis for all well operational activity as it defines the minimum requirements in terms of the six elements.

Each Business Unit [redacted] develop, implement and maintain a Well Operational Management System that recognises the individual BU well hazards and risks and is designed to meet the Group HSE Standard "Integrity Management".

Table of Contents

1. Scope

This GP provides guidance on the critical aspects of well activity that need to be considered when developing documents that will be used to control and monitor Well Operational Activity. It defines the elements required to implement a well operational management system that provides assurance within the context of the IM Standard.

Well Operational Activity is deemed to embrace all well day to day activities, well intervention, well monitoring, well recording, well equipment testing activities from handover of new well to its final abandonment (but not the actual abandonment).

2. Normative references

The following normative documents contain requirements that, through reference in this text, constitute requirements of this technical practice. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this technical practice are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

BP

GP 10-10	Well Control

3. Terms and definitions

For the purposes of this GP, the following terms and definitions apply:

Competent

Competent is the state of being properly qualified. Competencies are the requisite abilities or qualities people need to be effective in their jobs and meet expectations of employment. They are a combination of knowledge, skills, behaviours and aptitude that produce good performance in relation to completing tasks expected in employment.

Hydrates

Gas hydrates are crystalline compounds that form when water and suitably sized gas molecules are brought together under favourable conditions, usually at low temperatures and elevated pressures. Gas hydrates could form in numerous hydrocarbon production operations, causing serious operational and safety concerns.

Pressure Control Equipment

Pressure Control Equipment is any equipment that has been added to the tree or wellhead that extends the pressure containing envelope of that well e.g. lubricator, riser, stuffing box, grease head, wireline BOP, steel hose, etc.

Well Handover

A well handover is defined as the point at which the ability to influence or control the state of a well or well equipment moves from one party to another.

Well Integrity

Well Integrity is an outcome of good well operational practice. Well integrity is delivered through proper management of day to day well activities and the recording and reporting of these activities and other important well parameters.

Well Intervention

Well intervention is any activity that involves the breaking of the pressure containing envelope of the well. Well intervention may also be applied to any pumping operation that involves introducing a fluid that is not normally seen by the well on a day to day basis.

Well Operations

Well operations is a term used to describe any and every activity, described in this Group Practice, carried out on a well.

Well Operations Management System

The Well Operations Management System is the process used by an SPU to provide the tools for the delivery of this Group Practice.

4. Symbols and abbreviations

For the purpose of this document the following symbols and abbreviations apply:

ADHSV	Annular Down Hole Safety Valve
API RP	American Petroleum Institute - Recommended Practice
BHA	Bottom Hole Assembly
BOP	Blow Out Preventer
CoL	Competency on Line
DHSV	Down Hole Safety Valve
ETP	Engineering Technical Practice
MAASP	Maximum Allowable Annulus Surface Pressure
MOASP	Maximum Operating Annulus Surface Pressure
OEM	Original Equipment Manufacturer
PCE	Pressure Control Equipment
RACI	Responsible, Accountable, Consulted, Informed

5. Objectives of this GP on well operations

To ensure all well operational activities from handover of new well to its abandonment are carried out in a safe and controlled manner.

6. Organisation

6.1. Management accountability

The provision of integrity management is a line responsibility and BUs [redacted] clearly identify the roles and responsibilities of the personnel who are accountable for delivering the necessary safety and integrity performance in the wells arena.

6.2. Management delegation

The management of each BU [redacted] delegate the responsibility and technical authority for the correct application of this GP and ensure that competent personnel and resources are available to develop, deliver and operate their Well Operational Management System.

6.3. Risk assessment

a. A risk assessment of well hazards and threats [redacted] be performed on each facility or field in order to identify the risks across the complete range of well operational activity.

   1. Risk is defined as the combination of the likelihood and the consequence.
   2. The assessment should consider the type of potential failure e.g. catastrophic versus leak versus gradual loss of efficiency/operability. Consideration of interaction with other well activities is required.
   3. The consequences of failure [redacted] be evaluated from the perspective of at least four criteria: safety, environment, economic and reputation.

b. The risk assessment study should involve the input from a multi-disciplined team, with team members representing, as a minimum, the following groups or disciplines;

   1. Operations
   2. Petroleum Engineering
   3. Drilling & Completions
   4. Reservoir Engineering

c. The Well Operations Risk Assessment should conform to the BU standard risk assessment process whenever possible.

7. Well operations

7.1. Accountability

The provision of Integrity Management is a line responsibility and all SPUs [redacted] clearly identify the roles/responsibilities of the personnel that are accountable for delivering the necessary safety/integrity performance in relation to Well Operations

7.1.1. Definition and scope

An individual, holding a leadership position, [redacted] be appointed as a Single Point of Accountability for delivery of well integrity and assurance throughout the complete lifecycle of each well. This role [redacted] provide assurance that all professional, supervisory, operational and maintenance staff involved in well activity are competent to do so.

The proposed minimum standard of having one individual accountable for the delivery of well integrity and assurance is designed to ensure that wells are included within an IM System and accountability for the well stock is clear at all times.

Broadly defined, "competent" is the state of being properly qualified. In the context of this GP, competencies are the requisite abilities or qualities people – both BP and Contractor – need, to be effective in their jobs and meet the Company's expectations including those related to IM. They are a combination of knowledge, skills, behaviours, and aptitude that produce good performance; the ability to carry out tasks to the standards expected in employment. These standards may include statutory requirements and industry standards in addition to Company standards such as CoL and operating and maintenance procedures.

Although it seems obvious that people should be "qualified" to perform the primary tasks associated with their employment, the scope of the necessary knowledge base, including the impact of decisions on integrity of both equipment and procedures, is perhaps less clear. It is important for personnel to understand the impact of decisions, to "know what they don't know" and know how and when to involve specialized expertise. This is certainly the case with IM because of many of its specialized skills.

Each Asset should generate a RACI chart that clearly defines who is responsible for appropriate elements of this ETP.

All BP well operations personnel, and personnel acting on behalf of BP, who sign off on well intervention programmes, and any wellsite leaders acting on behalf of BP who may take control of well activities (such as subsea engineers and service unit operators) [redacted] have a valid and recognized well control certificate.

7.2. Well operations

7.2.1. Minimum requirement

BUs [redacted] identify and assess the risks that may arise during well operations:

- Drive 'inherently safe principles' and consider full life cycle risks for the wells
- Produce written procedures for critical operational tasks.

7.2.2. Definition and scope

Many of the documents that will be used to manage operational well integrity will be stand-alone documents under other Elements of this GP. Whilst the other, stand alone, document will be referenced from within a "Well Operating Procedures" this document should only deal with day-to-day operations of the well.

The Risk Assessment required (6.3.) [redacted] determine the Well Operations topics to be included within this element. As an aid to ensuring the Risk Assessment is comprehensive the following subjects [redacted] be considered as history has deemed them to be worthy of further examination.

It should be noted that this is not an exhaustive list and other topics emanating from the Risk Assessment [redacted] be added as appropriate.

7.2.3. Well handover process

It is vital to that adequate arrangements are in place to ensure that when the Operatorship of any well is handed over from one operating entity to another, suitable and sufficient arrangements are in place to ensure that competent management of the well, based on all the relevant information, is continued. Four handover scenarios that should be addressed:

1. New or Existing Well – Drilling to Operations
2. Existing Well – Operations to Drilling to Operations
3. Existing Well – Operations to Well Service
4. Existing Well – Well Service to Operations

7.2.4. Well start up and shutdown procedures

The impact of well start up and shut down will vary from field to field but this is an area that [redacted] be given careful consideration. Such procedures should also consider well start up in way of the speed of beaning up wells and the impact of this activity on sand production.

In addition mention of the impact of start up and shut down on annulus pressures [redacted] be made. Operations staff, charged with well start up and shut down should receive formal training with regard to annulus fluid expansion. These comments should explain the possible thermal effect of bringing on a producer and the reason for the same effect when shutting in an injector.

Whilst it is not envisaged that any mention of valve manipulation is made in such a document it may be considered worthwhile as a training statement. For example it may be useful to detail the way a well is to be shut down for the following operations:

- Shut in choke
- Shut in flow wing valve
- Shut in upper master valve

A gate valve should only be used to shut in a well in an emergency.

7.2.5. Wellhead movement parameters

In some cases where high wellhead temperatures and/or subsidence may be encountered it may be useful to have some reference to wellhead growth or drop and their acceptable limits. Within such a document monitoring and recording systems for wellhead growth should be laid out.

7.2.6. Scale control

Early recognition of a need for scale control is essential to maintaining well integrity. If left too long the build up of scale could prohibit well intervention activity and in extreme cases seriously curtail tree valve operation. If the need for scale control is established procedures, developed by appropriately skilled individuals, should be made available to those involved in day to day well operations.

Wells are a dynamic segment of the plant. The dynamic nature of the flowing characteristic of a well requires that regular checks on its scaling tendencies should be established.

7.2.7. Corrosion / erosion management

A strategy should be developed for corrosion/erosion management. If strategy requires, procedures should be developed by appropriately skilled individuals, should be made available to those involved in day to day well operations.

Wells are a dynamic segment of the plant. The dynamic nature of the flowing characteristic of a well requires that regular checks on its corrosion/erosion tendencies should be established.

7.2.8. Sand management

If the need for sand management is established, procedures, developed by appropriately skilled individuals, should be made available to those involved in day to day well operations.

Wells are a dynamic segment of the plant. The dynamic nature of the flowing characteristic of a well requires that regular checks on its sand production tendencies should be established.

7.2.9. Hydrate prevention

Many SPUs do not suffer from hydrates but where there is a propensity for hydrates their formation can create major problems. For this reason it is important that processes and procedures should be in place to prevent their formation. It is also important to include procedures with which to remediate the formation of hydrates.

7.3. Well intervention

7.3.1. Minimum requirement:

SPU's [redacted] identify and assess the risks that may arise during well intervention activity:

- A written procedure [redacted] be available for every well intervention. (These may be held within a Well Services Manual.)
- The management and deployment of all intervention hardware (Pressure Control Equipment) [redacted] be controlled in by way of regular inspection, testing all of which is documented.

7.3.2. Definition and scope

Well intervention operations are potentially hazardous. Well intervention activity [redacted] follow acceptable codes of practice; which set standards, establish optimum methods, provide guidance and information to avoid and minimise potential problems. From such a foundation the cross flow of information then allows operational techniques to be developed based on careful analysis.

Areas and systems such as PCE (Pressure Control Equipment) and steel hose (Chiksan), not immediately associated with well integrity, should also be covered in a well intervention programme or manual. It is vitally important to recognise the impact well intervention PCE and steel hose systems may have on well integrity.

The Risk Assessment required (6.3.) [redacted] determine the Well Intervention topics to be included within this element. As an aid to ensuring the Risk Assessment is comprehensive the following subjects [redacted] be considered as history has deemed them to be worthy of further examination.

It should be noted that this is not an exhaustive list and other topics emanating from the Risk Assessment [redacted] be added as appropriate.

7.3.3. Well service operating procedures

Much of what is required to satisfy this Element may be included within a Well Service Operations Manual. If such a document is produced it [redacted] lay out how a BU would organise its well intervention activity and carry out its routine interventions. Such a document would act as a repository for new interventions and new techniques. If such a document is not deemed to be feasible every well intervention [redacted] follow a written programme agreed by all interested parties.

7.3.4. Reporting procedures

Reporting of well intervention activity is absolutely paramount to maintaining well integrity. It is through the reporting of ALL well intervention activity that the status of any BU well can be ascertained. Reporting procedures, standards and its importance in regard to well integrity [redacted] be made quite clear to all individuals involved in a BUs well intervention activity.

7.3.5. Record keeping

Without records the best reporting procedures and standards will not prevent the information from being lost. It is important that those involved in dealing with well intervention reports [redacted] have appropriate record keeping procedures to follow.

7.3.6. PCE (Pressure control equipment) for dry trees

Arguably the control and deployment of PCE is the most critical well intervention activity. It is crucial that procedures for the management and deployment of all types of PCE are clearly defined and readily available.

As the complexity of well intervention activity increases the loads being transferred through the riser have been seen to increase. As part of a PCE deployment process, where appropriate, mention of how to ensure that the riser is not overloaded [redacted] be made.

7.3.7. Contingency plans

When planning any well intervention activity the possibility of failure [redacted] be considered. Contingency plans and tooling requirements need to be described so as to raise the awareness of the contingency expectations.

7.3.8. Well Intervention

1. Prior to the commencement of any well intervention operations, the location [redacted] be inspected to ensure it is safe for personnel and equipment during the planned operations.
2. Personnel and equipment [redacted] be protected from exposed runs of wireline or coiled tubing and from any voids created by the removal of deck hatches and floor gratings.
3. During the period of well intervention, a single person [redacted] be designated responsible for the well intervention operation.
4. Clear emergency shutdown procedures [redacted] be in place, with which all drilling and well operations personnel are familiar.
5. All equipment subject to operational loading (sheaves, units etc) [redacted] be load path certified and securely fastened or anchored to withstand the maximum expected forces during the operation of that equipment.
6. An assessment [redacted] be made to determine if a wellhead/tree bending stress analysis is required based on the nature of the well and subsequent well intervention.

7.3.9. Well Intervention Operations

1. On production wells fitted with more than one tubing string all strings should be shut in during wireline rig-ups. Once rigged-up and tested, the other strings may be opened up until such time as the operations are complete and the equipment required to be rigged-down.
2. A recently calibrated and tested pressure relief valve of sufficient capacity, or an alternate safety mechanism, [redacted] be included in the surface hook up on the fluid discharge line on

any temporary or permanent pumping system that is capable of exceeding pressure ratings of any connected equipment.

3. A record of every wireline and coiled tubing toolstring (naming items, providing lengths, outside diameter thread type, fish neck sizes and any other salient points) [redacted] be made prior to running in hole. This record [redacted] be available at the wellsite throughout the time the toolstring is downhole.
4. Prior to the commencement of any well intervention operation, the swab valve turns to open and close [redacted] be physically checked and noted.
5. If any well safety valve is held open by a temporary local control unit, that unit [redacted] never be left unattended. (Lock out caps, even of the fusible type, should not be used on any tree valves.)
6. Pressures in the tubing and annuli [redacted] be regularly monitored and recorded during all well intervention operations.

7.3.10. Fishing

1. On completion of every well operation any tools or part of tools left downhole [redacted] be accurately recorded and reported.
2. The configuration of BOPs in the rig up should be sufficient to close on both the fishing wire and the fished wire.
3. The lower BOP(s) should be fitted with rams and guides suitable for the fished wire.

7.3.11. Coiled Tubing Operations

1. BOPE [redacted] be fully function and pressure tested upon installation and every seven (7) days, after any BOPE changes or CT change out unless documented stump tests can be provided by the service provider where as a shell test of BOPE [redacted] be required upon installation to confirm connection integrity.
2. On any perforated well where a coiled tubing BHA is worked on bottom or where the coiled tubing is to be run without check valves, shear-seal BOPs [redacted] be installed, to give a reasonable expectation that once cut, the coiled tubing will drop to regain control of the tree valves. When shear-seal BOPs are employed, all connections between them and the tree or wellhead [redacted] be flanged and double valve isolated, thereby excluding elastomers from connections beneath these BOPs.
3. Shear seal and shear ram preventers [redacted] be capable of shearing the coil and any lines within it, at all pressures up to the preventer's maximum anticipated working pressure. When lower shear seal preventers are equipped with single needle valve pressure equalising capability, the valve [redacted] be replaced with a plug.
4. To ensure that it will always be possible to unlatch the riser from a subsea well, the lower riser assembly [redacted] be capable of severing coiled tubing of the maximum wall thickness to be used as well as any wireline or control lines contained within, and provide a seal.
5. A choke manifold containing at least two adjustable chokes [redacted] be installed, unless the normal production flowline is used through the tree and production manifold. In this case, the single production choke is sufficient.
6. Unless pressure deployment is used, the lubricator [redacted] be of sufficient length to contain the BHA between the swab valve and the pack-off or between the downhole lubricator valve, where fitted, and the pack off.

7. Dual flapper check valves [redacted] be run above the BHA on all strings unless the planned operation precludes their use. When not utilised, the programme or local standard operating practice should refer to a detailed and current assessment of risks, mitigations and contingency responses.
8. When elastomer seals are used they [redacted] be made of a material intended for exposure to prevailing wellbore conditions.
9. The vapour pressure and flash point [redacted] be known for all potentially flammable fluids. Special precautions should be in place.
10. Remaining coil tubing fatigue life [redacted] be known and monitored prior to and during each job. A coil replacement philosophy should be in place commensurate with operating conditions. The position of all welds and the fluid exposure history [redacted] be documented for each reel of tubing.
11. All coiled tubing operations [redacted] not exceed the maximum operating tension loads of 80% and operating compression loads of 70% of minimum yield strengths for coiled tubing string used.

7.4. Annuli management

7.4.1. Minimum requirement

SPU [redacted] develop appropriate engineering standards and documents to provide:

- Written philosophy for tubing and annuli management over full well life cycle
- The design philosophy and pressure management principles
- Derivation of formal MAASP values and in some cases minimal allowable pressure
- A process for revising MAASP values
- Guidance on the derivation of formal MOASP values.
- A description of responsibilities related to this Element of the GP
- A description of the system used to record all annuli data.

7.4.2. Definition and scope

Monitoring, recording and reviewing annulus pressure data is a key element to ensuring well integrity. A formally approved tubing and annuli management document [redacted] provide the means of fulfilling this requirement on all SPU's production and injection wells.

A design philosophy should be recorded so as to ensure that all well operating parameters are clearly understood and actions, such as calliper surveys, are taken to meet those expectations.

Included within such a programme should be accountabilities and responsibilities that clearly lay out expectations in relation to monitoring and recording. This section should detail actions to be taken when pressures change e.g. reporting anomalies and bleeding off annuli.

The Risk Assessment required (6.3.) [redacted] determine the Annuli Management topics to be included within this element. As an aid to ensuring the Risk Assessment is comprehensive the following subjects [redacted] be considered as history has deemed them to be worthy of further examination.

It should be noted that this is not an exhaustive list and other topics emanating from the Risk Assessment [redacted] be added as appropriate.

7.4.3. Pressure monitoring

Annuli pressures [redacted] be monitored on a regular basis as deemed appropriate. Pressure monitoring and recording procedures need to be clearly understood. Further the importance of this activity need to be clearly understood along with some knowledge of the mechanics of what happens within the well envelopes. This knowledge would allow those monitoring the various SPU annuli to raise an alarm should anomalies arise.

7.4.4. Pressure limits

Annuli pressure limits [redacted] be clearly stated and understood. This may be helped by defining the various MAASPs (Maximum Allowable Annulus Surface Pressure) and further how they have been derived. The provision of a MOASP (Maximum Operating Annulus Surface Pressure) may be useful in providing buffer between the equipment maximum and an operating maximum.

7.4.5. Pressure management

The importance of the pressure limits should be clearly defined and understood. There may well be times when an annulus pressure may fall outside of these parameters. It would be of benefit to have some process with which to manage such occasions.

Sub sea wells [redacted] have annulus pressure management strategy and this strategy [redacted] be clearly defined and available.

7.4.6. Equipment knowledge

A document providing training and information should be available for those charged with monitoring the annuli and can be critical in terms of response to the various signals from a well.

7.4.7. Cuttings injection

Cuttings injection wells have their own design characteristics and these need to be understood and accounted for. Excessive injection can result in the following hazard effects:

- Drilling hazard for new wells
- Breach in surface formations
- Erosion of casing and wellhead components

7.4.8. Cap rock integrity

In some cases the importance of the casing shoe within a cap rock is not fully understood i.e. where any flow past the shoe may effect salt. It is vital that in cases where this is critical some formal documentation exists. Cap rock integrity is an issue in some gas re-injection schemes. Where this risk exists a formal procedure should be in place to mitigate against any risks.

7.5. Tree and wellhead management

7.5.1. Minimum requirement:

BU [redacted] identify risks associated with their trees and wellheads so as to provide:

- Written philosophy for tree and wellhead operations over full well life cycle
- A fit for purpose testing programmes
- A fit for purpose maintenance programme
- A fit for purpose inspection programmes

- Written, maintenance, inspection and testing procedures
- Fit for purpose records

7.5.2. Definition and scope

The mechanical integrity of the tree and wellhead may be defined as the assurance of fitness for service throughout its life cycle by maintenance, testing, inspection and repair so as to maintain the equipment in a condition consistent with the original design and or to a fitness for service criteria.

It is important to identify the life cycle risks associated with the tree and wellheads so as to instigate a fit for purpose maintenance, testing, inspection and repair programme. Such a programme should be based on past experience and production profiles to ensure that all risks are controlled. It is likely that the type of programme will vary from area to area. The OEM (Original Equipment Manufacturer) should be consulted to ensure that their experience is taken into account.

History, in some locations, has shown the consequence of not adhering to the specified testing and maintenance schedule. There [redacted] be a system in place to manage any lack of adherence to the set routines.

The Risk Assessment required (see section 6.3.) [redacted] determine all the tree/wellhead topics to be included within this element. As an aid to ensuring the Risk Assessment is comprehensive the following subjects [redacted] be considered as history has deemed them to be worthy of further examination.

It should be noted that this is not an exhaustive list and other topics emanating from the Risk Assessment [redacted] be added as appropriate.

7.5.3. Fit-for-Purpose testing programme

The condition of every tree and wellhead, within the BU, [redacted] be known. The only way of obtaining this information is thorough scheduled testing programme. It is important to understand the purpose of the tree and wellhead testing programme and ensure that it is fit for that purpose. Such written documents [redacted] be made known and readily available to all operations staff who deal with operational wells.

API RP 14H should be considered the baseline performance criteria for tree and wellhead valves that shut off hydrocarbon flow. A BU should clearly state reasons for allowing performance of tree valves for hydrocarbon wells capable of natural flow to surface on offshore, manned platform to be less than the requirements set API RP 14H.

7.5.4. Fit-for-Purpose maintenance programme

To supplement the testing programme a maintenance programme [redacted] be implemented. In its simplest form this programme should contain the required regular greasing programme. If appropriate it may go further and provide the details on valve repairs. Such written documents [redacted] be made known and readily available to all operations staff.

7.5.5. Equipment knowledge

Where appropriate a document providing training and information for those charged with operating the trees should be provided as an aid to understanding trees and wellheads. Included in this area should be an explanation on wellhead annulus-to-annulus seal technology to provide an understanding, where appropriate, of how to maintain and test these seals.

7.5.6. Reporting and record keeping

As stated in 7.5.3 the condition of every tree and wellhead, within the BU, [redacted] be known. Reporting all the activities that are carried out on trees and wellheads to maintain integrity achieve this. This process may be used to optimise greasing and other repairs by providing indicative test results.

The importance of reliable records is paramount to maintaining tree and wellheads in a fit for purpose condition. Further records of this activity allow the condition of any piece of equipment to be known and monitored throughout its life. Such a history should permit both changes in equipment specification and programmes to ensure that any changes are well founded and follow an appropriate MOC process.

7.6. DHSV and ADHSV management

A downhole safety valve (DHSV) [redacted] be fitted below the seabed as a minimum, in every offshore platform well capable of naturally flowing hydrocarbons to surface. Acceptable leak rates [redacted] be defined in the BU well integrity procedures. Failed DHSVs [redacted] be replaced or substituted by an item which provides an equivalent level of well integrity in a safe and timely manner, and as defined in the BU's field operating standards.

An SPU should clearly state reasons for allowing leak rates for DHSVs on offshore to exceed the requirements set in API RP 14B or by their local regulatory body.

7.6.1. Minimum requirement:

Where DHSV (Down Hole Safety Valve) and ADHSVs (Annulus Down Hole Safety Valve) are deemed appropriate a BU [redacted] identify appropriate tools that will:

- Consider full life cycle risks for the wells
- Define fit for purpose maintenance and testing programmes
- Produce written, operational, testing and maintenance procedures
- Provide fit for purpose records

7.6.2. Definition and scope

A formal DHSV & ADHSV testing programme [redacted] be developed to take account of full life cycle risks to all wells where downhole valves are deemed necessary. Such a testing programme should commence on production start up accepting that the testing regime may well change with time dependent on operating experience.

Downhole valve operating procedures should be included within testing programme documents where it would be of benefit. Such an inclusion may be of benefit to those individuals tasked with the day-to-day control and operation of Asset wells. The life of any downhole valve can be extended dramatically through proper operation.

Proper reporting and record keeping is of paramount importance in determining performance and proposing changes and improvement to downhole valves testing regimes and designs. A record of testing and the results [redacted] be kept to provide a comprehensive audit trail of well integrity activity and are an essential part of IM.

7.6.3. Downhole valve procedures

It is vital that DHSVs (Down Hole Safety Valves) are operated safely and in line with good operating practice. Their life and through them the life of any well may be curtailed through inappropriate usage. As fields deplete, operation procedures [redacted] be reviewed and procedures adjusted accordingly. Individuals charged with operating the BU wells [redacted] be provided with guidance on how to operate their SPU DHSVs.

7.6.4. Fit-for-Purpose testing programme

In the interests of well integrity it is vital that the condition of every DHSV, within the SPU, is known. The only way of obtaining this information is through a scheduled testing programme. It is important to understand the purpose of the DHSV programme and ensure that it is fit for that purpose.

Valves should not be slam tested without consideration of expected life cycle.

7.6.5. Reporting and record keeping

It is vital in supporting well integrity that the condition of every DHSV, ADHSV and/or any gaslift valve check valves, within the BU, [redacted] be known. Reporting and recording the activities that are carried out to maintain integrity achieve this.

Revision History

Existing Clause	Revision	Date
Intro 3.1	Deleted - Duplication of Clause 15.4.5 in DWOP	22nd October 2008
Intro 3.2	Deleted - Duplication of Clause 15.4.1 in DWOP	22nd October 2008
Intro 6.1	Deleted - Duplication of Clause 15.5.1 in DWOP	22nd October 2008
Intro 6.2	Revised wording	22nd October 2008
Intro 6.12	Revised wording	22nd October 2008
2.	Include Normative reference to GP10-10 well Control	22nd October 2008
3.	Include Terms and Definitions	22nd October 2008
4.	Include additional abbreviatons	22nd October 2008
7.3.9	Deleted - Duplication of Clause 15.4.5 & 15.4.1 in DWOP	22nd October 2008
7.3.12.1	Deleted - Duplication of Clause 15.5.1 in DWOP	22nd October 2008
7.3.12.2	Revised wording	22nd October 2008
7.3.12.12	Revised wording	22nd October 2008
7.4.7	Inserted additional bullet point	22nd October 2008
7.6	Insert word 'platform' in first sentence.	22nd October 2008
Whole Document	Clause numbers corrected following above revisions	22nd October 2008