# Joint Rig Committee Well Review Guideline

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Joint Rig Committee Well Review Guideline

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**Introduction**

This Guideline has been prepared to provide Underwriters with a tiered approach to Well Review, with an aim to assist the Underwriter in the identification of an appropriate level of technical review to support risk selection decisions and ongoing risk management.

The review process should also be seen as an opportunity to add further value to an Insured’s drilling programme through engagement of independent well reviewers.

All Well Reviews are to be executed in line with the following principles:

* well design is fit for purpose, and has been subject to thorough internal and independent review, with modifications and deviations managed via a rigorous MOC process;
* drilling rig and associated drilling and well control equipment is suitable for the well to be drilled, third party verified, and operating within rated capacity;
* appropriate procedures are in place that are consistently applied, and subject to audit;
* competent persons are employed across the well-life cycle, in well-supported organisations, with clarity of accountability and responsibility;
* emergency contingency measures are in-place, and subject to regular exercise to demonstrate effectiveness to mitigate an event.

A four tier approach is provided as described below, which should be considered along with the Well Review Process Flowchart on page 5.

**Tiers 2, 3 and 4 may be warranted reviews, and if so, would be subject to the requirements of the JRC Well Review Warranty Endorsement (JR2018/012A).**

**Tier 1 Underwriter Level Review**

Provides the opportunity to ask a set of basic questions of the Assured, focused on Well Integrity, using a generic *People, Procedure, Plant* approach. This tier of review is equally applicable to both single wells and wider consideration of an Assured’s approach to drilling wells & well integrity. Guidance is provided as to how questions should be interpreted which may need in-house technical support. Quality of, and confidence in the assessed response, should in turn prompt the Underwriter to consider further Tiers as deemed necessary.

*A sample Well Information Template is also provided in Appendix A, which provides guidance as to the extent of technical descriptive information that ideally should be captured for a given insured well.*

**Tier 2 Standard Well Review**

Where the review is expected to be a desk review of requested information. This tier is aimed at a single well review, and would be conducted by a recognised Well Review Surveyor. There is limited expected need for extended discussion between the Well Review Surveyor and the Operator/Insured, where the focus is on the physical well design and well control guidelines within the Drilling Programme.

**Tier 3 Enhanced Well Review**

Where increased risk features have been identified, and a more comprehensive review is deemed needed, over and above that required for a Tier 2. This tier of review is also aimed at a single well review, and would be conducted by a recognised Well Review Surveyor. The review would still be expected to be conducted at a desk level, although a higher degree of Operator/Assured contact is expected.

**Tier 4** **Corporate Well Risk Engineering Survey**

Such a review should be selected where value is seen in having a more detailed overview of an Assureds approach to Well Design, Well Engineering, Drilling Operations, and should ideally be conducted at a Corporate Drilling organisation level, taking account of Reservoir Engineering, Well Engineering & Well Operations, with further desk review of key documents and possible option as required/practical of a well ‘site’ visit.

This tier review should be seen as a Well Life Cycle Review, and would be conducted by either a recognised Well Review Surveyor, or an experienced Risk Engineer.

A Tier 4 Review is aimed at giving the Underwriter confidence at a corporate level as to the assureds approach to ensuring Well Integrity and Control, across a wide insured well portfolio, and may prompt the need for further Tier 2 & 3 reviews for higher risk individual wells.

Underwriters may be constrained by both available fee and time when considering the appropriate level of intervention, and as such early engagement with assured is encouraged.

**Well Review Process Flowchart**

**Tier 1 - ISP**

Is the information both sufficient and acceptable for risk management purposes?

**Yes**

Potential to Invoke Well Review Warranty Endorsement

**Tier 4 - Corporate**

**No**

Decision regarding Tier level

**Tier 2 Standard &/or**

**Tier 3 Enhanced**

**Yes**

Findings acceptable?

If applicable, is the Warranty Endorsement satisfied?

Proceed with Cover

Select named well(s)

Insured complies with recommendations pre-spud

**No**

**Tier 1 - Initial Screening Process (ISP)**

This document has been prepared to assist the Underwriter when in discussion with broker and Assured to gain a better understanding of the robustness of approach taken with regards to Well Integrity throughout the well-life cycle, **albeit acknowledging the Underwriter’s primary focus is in respect to new wells or re-entered producing wells**, and likely the main use of this ISP. Questions posed below, whilst reasonably generic, cover the key areas of expected controls (barriers) of procedure (process), people and plant (rig and equipment). Guidance Notes are provided *overleaf* to further assist in reviewing and assessing the adequacy of response. The document is intended as an initial guide only, and should not necessarily be seen as a substitute or alternative to engagement and more detailed review by a well engineer or experienced risk engineer. Appropriate technical interpretation of answers should however allow the Underwriter to either proceed with confidence with the assureds approach to drilling activity, or provide justification for adopting an additional layer of assurance by invoking the need for either Tier 2/3 warranted Well Reviews or a wider Tier 4 Corporate Wells Risk Engineering Survey.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Exploration/Appraisal/Development/HPHT wells** *(Guidance Notes on page7)* | **Production/Work-over wells** *(Guidance Notes on page 8)* | **Plugged & Abandoned wells/Suspended wells** *(Guidance Notes on page10)* |
| **Procedure***(Appropriate procedures in-place, consistently applied, and subject to audit)* | 1. Has the Well Plan been developed in-line with ‘Basis of Well Design’ procedure? *Provide copy of Well Plan*
2. Are there ‘in-house’ Control of Well procedures? Provide *copy.*
3. Has well plan been verified by a third party? *provide copy of the verification procedure*
4. Provide details of technical assurance process, and management of change.
5. Describe well operations contingency measures.
 | 1. Has the Well Plan been developed in-line with ‘Basis of Well Design’ procedure? *Provide copy of Well Plan (work-over wells only).*
2. Are there ‘in-house’ well (and equipment) integrity assurance and operating procedures? P*rovide copy*
3. Has the well plan been verified by a third party? P*rovide copy of the verification procedure (Work-over wells only).*
4. Has the well and well equipment integrity been tested as per operational procedure?
5. Provide details of technical assurance process, and management of change.
6. Describe well operations contingency measures.
 | 1. Has the Well Plan been developed in-line with ‘Basis of Well Design’ procedure? *Provide copy of Well Plan*
2. Are there ‘in-house’ P&A of well procedures? P*rovide copy*
3. Has the well plan been verified by a third party? P*rovide copy of the verification procedure*
4. Has P& A activity been performed as per recognized regulatory requirements? e.g.: H&SE, BSEE, PSA
5. Describe well operations contingency measures.
 |
| **People***(Competent persons in a well-supported organization, with clarity of accountability and responsibility)* | 1. Provide details of company Wells Department, contractors and key service providers.
2. Describe competency, training and certification requirement of key positions.
3. Describe the command structure for emergency response including blow-out.
 | 1. Provide details of company Wells Department, contractors and key service providers.
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2. Describe competency, training and certification requirement of key positions.
3. Describe the command structure for emergency response including blow-out.
 |
| **Plant / Equipment***(Fit for purpose, third party verified equipment, operating in an environment of managed modifications)* | 1. Is the proposed rig fit for purpose – specification and integrity?
2. Describe verification, test and maintenance procedures of well control equipment.
3. Date of last 3rd party condition survey performed? *Provide copy*
 | 1. Is the proposed rig/equipment fit for purpose – specification and integrity?
2. Describe verification, test and maintenance procedures of well control equipment.
3. Describe the well integrity management of wells, including testing and monitoring.
 | 1. Is the proposed rig fit for purpose – specification and integrity?
2. Describe verification, test and maintenance procedures of well control equipment
3. Date of last 3rd party condition survey performed? P*rovide copy*
 |

**Guidance Notes – Well Review ISP**

Evidence should be provided for the following:

**Exploration/Appraisal/Development/HPHT Wells:**

**Procedure**

1. Well plans that have been developed in line with internal Well Engineering guidelines that have clarity in both casing and tubing design, cement and mud programmes, supported by clear material procurement specifications, and well delivery process.
2. Well plans that clearly identify all risks, including remote locations, extreme well bore conditions, extreme depth if offshore, proximity to environmentally sensitive areas.
3. Well plans that have been developed and reviewed in conjunction with key contractors (i.e. rig Operator) and service providers (cementing providers, specialist drilling contractors etc.).
4. Process to convert Well Plan into clear ‘drill floor’ daily procedures and as necessary detail approved procedures for critical operations.
5. Clarity of barrier design and requirement at all stages of operation, i.e. 2 independent barriers tested in direction of flow (if possible).
6. Formal DWOP and CWOP to be conducted prior to spudding and completion.
7. Well Control Procedures that are controlled and subject to regular update.
8. Internal Well Design and Well Control guidelines/procedures written recognizing best practice (and in some cases mandatory) international standards such as , Oil & Gas UK Well Life Cycle Integrity Guidelines, NORSOK D10, API RP 53 etc.
9. Either mandatory or voluntary well review by a regulator and/or independent third party.
10. A technical assurance process that provides clarity over dispensation (i.e. deviation from standard/company procedure), and a strict management of change process for both pre and post spud changes.
11. Review of drilling summary reports of previous wells (offset) and lessons captured in Well Plan.
12. Lessons learned from previous incidents being captured in generic and well specific procedures and all relevant personnel are informed.
13. Details of contingency measures, supported by Blowout and Environmental Risk Assessments, and Relief Well Panning.
14. Details of SIMOPS procedures and bridging documents as appropriate.
15. Details of planned emergency response exercise and verification that will take place prior to and during well operations.
16. As appropriate, confirm wellhead/integrated platform wells and topsides process shut-in and blown down as per HSE SPC/TECH/OSD 21 – The Safe Approach, Set-Up and Departure of Jack-Up Rigs to Fixed Installation, else demonstrate risk is mitigated to an ALARP level.
17. Weather contingency planning and watch zone definition (*for offshore wells*).

**People**

1. Fully populated Operator Wells Department organization charts, identifying responsible person(s) for drilling activity, and/or contractual arrangements with expert third parties.
2. Identified TA (s).
3. Fully populated contractor (rig operator) and key service providers’ organization.
4. A clear command structure is in place together with individual authority to shut the well during a well control incident.
5. Well Control certification for well design and operations personnel (Operator and contractors).
6. Clear competency and training certification requirements for key positions.
7. Key personnel having specific job experience (e.g. ultra-deep-water drilling, HPHT, managed pressure drilling etc.)
8. Command structure and control procedures in place after a well control occurred, including contingent strategies with respect to vessels and equipment.

**Plant (Rig/Equipment)**

1. Rig(s) that have been subject to third party verification/integrity audit with respect to derrick, drilling equipment and well control equipment.
2. Offshore Rigs (MODUs), confirm classed by an IACS member society with classification valid (for duration of the contract/insurance policy) with no conditions of class.
3. Offshore Rigs to have a Safety Case (or equivalent), with joint Safety Case when drilling over a fixed platform.
4. That all well control system equipment is compliant with inspection requirements, properly maintained and is capable of shutting in the well during emergency operations.
5. BOPs are reviewed to ensure that they can perform their designated function with operational integrity confirmed.
6. ROV hot stabs are function tested and checked to ensure capability of actuating the BOP.
7. Where jack-up rigs used - verification that a SSA has been performed and compliant with ISO 19905-1 or SNAME T&RB 5-5.
8. Where moored floating rig used – verification that a SSA has been performed and compliant with ISO 19905-3 or equivalent.
9. Where floating dynamically positioned rigs used - Rig DP Class – 1, 2 or 3? List current system faults / de-rating if any. Watch circles as percentage of depth for riser disconnection.
10. For deep water wells, confirmation that the hydraulic system is of “equal strength” to support the shear rams (for deep water wells).
11. Has the bridging document or gap analysis been performed between the contractor’s and the Operator’s safety and management procedures?
12. Confirm shear rams are capable of shearing drill collars, HWDP.
13. Contingency plans in place for rotating storm locations.

**Production/Work-Over Wells:**

**Procedure (well plans related to work-over wells)**

1. Well plans that have been developed in line with internal Well Engineering guidelines clearly defining primary barriers.
2. Well plans that clearly identify all risks, including remote locations, extreme well bore conditions, extreme depth if offshore, proximity to environmentally sensitive areas.
3. Well plans that have been developed and reviewed in conjunction with key contractors (i.e. rig Operator) and service providers (cementing providers, specialist drilling contractors etc.).
4. Process to convert Well Plan into clear ‘drill floor’ daily procedures and as necessary detail approved procedures for critical operations
5. Clarity of barrier design and requirement at all stages of operation, i.e. 2 independent barriers tested in direction of flow (if possible).
6. Well Control Procedures that are controlled and subject to regular update.
7. Internal Well Design and Well Control guidelines/procedures written recognizing best practice (and in some cases mandatory) international standards such as , Oil & Gas UK Well Life Cycle Integrity Guidelines, NORSOK D10, API RP 53 etc.
8. Either mandatory or voluntary well review by a regulator and/or independent third party.
9. Details of SIMOPS procedures and bridging documents as appropriate.
10. As appropriate, confirm wellhead/integrated platform wells and topsides process shut-in and blown down as per HSE SPC/TECH/OSD 21 – The Safe Approach, Set-Up and Departure of Jack-Up Rigs to Fixed Installation, else demonstrate risk is mitigated to an ALARP level.

**For Production wells**

1. A technical assurance process that provides clarity over dispensation (i.e. deviation from standard/company procedure), and a strict management of change process.
2. Details of WIMS, including condition monitoring, routine inspection and maintenance and testing of wells, Xmas tree, wellhead valves, downhole safety valve and related equipment.
3. Details of the annulus management including monitoring of well annuli and reassessment of MAASP.
4. Lessons learned from previous incidents being captured in generic and well specific procedures and all relevant personnel are informed.
5. Details of contingency measures, supported by Blowout and Environmental Risk Assessments.
6. Details of planned emergency response exercise and verification that will take place prior to and during well operations.

**People**

1. Fully populated Operator Wells/Production Department organization charts, identifying responsible person(s) for drilling activity, well integrity and/or contractual arrangements with expert third parties.
2. Identified TA (s).
3. Fully populated contractor (rig operator) and key service providers organisation
4. A clear command structure is in place together with individual authority to shut the well during a well control incident.
5. Well control certification for well design and operations personnel (Operator and contractors) personnel.
6. Clear competency and training certification requirements for key positions.
7. Key personnel having specific job experience (e.g.: ultra-deep-water drilling, HPHT, managed pressure drilling etc.)
8. Command structure and control procedures in place after a well control incident occurred, including contingent strategies with respect to vessels and equipment.

**Plant (Rig/Equipment)**

1. Rig(s) that have been subject to third party verification/integrity audit with respect to derrick, drilling equipment and well control equipment.
2. Offshore Rigs (MODUs), confirm classed by an IACS member society with classification valid (for duration of the contract/insurance policy) with no conditions of class.
3. Offshore Rigs to have a Safety Case (or equivalent), with joint Safety Case when drilling over a fixed platform.
4. That all well control system equipment is compliant with inspection requirements, properly maintained and is capable of shutting in the well during emergency operations.
5. BOPs are reviewed to ensure that they can perform their designated function with operational integrity confirmed.
6. ROV hot stabs are function tested and checked to ensure capability of actuating the BOP.
7. Where jack-up rigs used - verification that a SSA has been performed and compliant with ISO 19905-1 or SNAME T&RB 5-5.
8. Where moored floating rig used – verification that a SSA has been performed and compliant with ISO 19905-3 or equivalent.
9. Where dynamically positioned floating rigs used - Rig DP Class – 1, 2 or 3? List current system faults / de-rating if any. Watch circles as percentage of depth for riser disconnection.
10. For deep water wells, confirmation that the hydraulic system is of “equal strength” to support the shear rams (for deep water wells).
11. Has the bridging document or gap analysis been performed between the contractor’s and the Operator’s safety and management procedures?
12. Confirm shear rams are capable of shearing drill collars, HWDP.
13. Contingency plans in place for rotating storm locations.

**Plugged & Abandoned (P&A) Wells/Suspended Wells:**

**Procedure**

1. Well plans that have been developed in line with internal Well Engineering guidelines that has clarity in both casing and tubing design, barrier design.
2. Well plans that clearly identify all risks, including remote locations, extreme well bore conditions, extreme depth if offshore, proximity to environmentally sensitive areas.
3. Well plans that have been developed and reviewed in conjunction with key contractors (i.e. rig Operator) and service providers (cementing providers, specialist drilling contractors etc.).
4. Process to convert Well Plan into clear ‘drill floor’ daily procedures and as necessary detail approved procedures for critical operations.
5. Well P&A Procedures that are controlled and subject to regular update.
6. Internal Well P&A guidelines/procedures written recognizing best practice (and in some cases mandatory) international standards such as, Oil & Gas UK Well Life Cycle Integrity Guidelines, Oil and Gas UK Well Abandonment Guidelines, NORSOK D10 etc.
7. Either mandatory or voluntary well review by a regulator and/or independent third party.
8. A technical assurance process that provides clarity over dispensation (i.e. deviation from standard/company procedure), and a strict management of change process.
9. Review of the history of the well production including any abnormal pressure build ups etc.
10. Lessons learned from previous incidents being captured in generic and well specific procedures and all relevant personnel are informed.
11. Details of contingency measures, supported by Blowout and Environmental Risk Assessments.
12. Details of SIMOPS procedures as appropriate.
13. Details of planned emergency response exercise and verification that will take place prior to and during well operations.
14. As appropriate, confirm wellhead/integrated platform wells and topsides process shut-in and blown down as per HSE SPC/TECH/OSD 21 – The Safe Approach, Set-Up and Departure of Jack-Up Rigs to Fixed Installation, else demonstrate risk is mitigated to an ALARP level.

**People**

1. Fully populated Operator Wells/Production Department organization charts, identifying responsible person(s) for drilling activity, and/or contractual arrangements with expert third parties.
2. Identified TA(s).
3. Fully populated contractor (rig operator) and key service providers’ organization.
4. A clear command structure is in place together with individual authority to shut the well during a well control incident.
5. Well control certification for well design and operations personnel (Operator and contractors) personnel.
6. Clear competency and training certification requirements for key positions.
7. Key personnel having specific job experience relative to task.
8. Command structure and control procedures in place after a well control incident occurred, including contingent strategies with respect to vessels and equipment.

**Plant (Rig/Equipment)**

1. Rig(s) that have been subject to third party verification/integrity audit with respect to derrick, drilling equipment and well control equipment.
2. Offshore Rigs (MODUs), confirm classed by an IACS member society with classification valid (for duration of the contract/insurance policy) with no conditions of class.
3. Offshore Rigs to have a Safety Case (or equivalent), with joint Safety Case when drilling over a fixed platform.
4. That all well control system equipment is compliant with inspection requirements, properly maintained and is capable of shutting in the well during emergency operations.
5. BOPs are reviewed to ensure that they can perform their designated function with operational integrity confirmed.
6. ROV hot stabs are function tested and checked to ensure capability of actuating the BOP.
7. Where jack-up rigs used - verification that a SSA has been performed and compliant with ISO 19905-1 or SNAME T&RB 5-5.
8. Where moored floating rig used – verification that a SSA has been performed and compliant with ISO 19905-3 or equivalent.
9. Where dynamically positioned floating rigs used - Rig DP Class – 1, 2 or 3? List current system faults / de-rating if any. Watch circles as percentage of depth for riser disconnection.
10. For deep water wells, confirmation that the hydraulic system is of “equal strength” to support the shear rams (for deep water wells).
11. Has the bridging document or gap analysis been performed between the contractor’s and the Operator’s safety and management procedures?
12. Confirm shear rams are capable of shearing drill collars, HWDP.
13. Contingency plans in place for rotating storm locations.

# Tier 2 & Tier 3 - JRC Well Review Code of Practice (COP)

This Code of Practice (COP) and associated Tier 2 and Tier 3 Scopes of Work (SOW) establish agreed standards for Well Review Surveyors while conducting Tier 2 and Tier 3 Well Reviews.

It has the following objectives, to:

* clarify the role of the Well Review Surveyor in performing Well Reviews of the drilling/workover operations; and
* define the minimum information required by the Well Review Surveyor to perform the review; and
* define lines of communication between the Contract Leader(s) and Well Review Surveyor; and
* outline the criteria for reporting on the findings of the assessment and making of recommendations arising out of Well Review Surveying activities; and
* establish report guidelines through a tiered approach.

Nothing in this COP shall relieve any party of any legal obligations existing in the absence of this document and nothing contained in this COP shall take precedence over any provisions of any policy.

**Role of the Well Review Surveyor**

The fundamental objective of the Well Review Surveyor is to make reasonable endeavours to ensure that the risks associated with the planned well operations which the Well Review Surveyor is appointed to review are reduced to ALARP in accordance with industry best practice.

The Well Review Surveyor shall:

* provide a quote for performing the review in accordance with this COP and agreed review Tier prior to commencing the work; and
* provide a signed copy of their agreement to adhere to this COP to the incumbent Broker prior to taking receipt of the Assured’s information relating to the well; and
* appoint only personnel who are demonstrably competent, in terms of qualifications and experience, to perform the review/approval activity being undertaken; and
* upon request, provide particulars of the experience of the key personnel to be engaged by the surveyor; and
* notify Underwriters of statements on any conflicts of interest (in the absence of a statement it will be assumed that no conflict of interest exists); and
* maintain the Assured’s information in strict confidence, which shall not be disclosed or used for any other purpose other than for discussions relating to the insurance placement between the Assured, the incumbent Broker and Underwriter(s); and
* issue the report to contain as a minimum the information stipulated in the Scope of Work; and
* advise Contract Leader(s) where the Well Review Surveyor has identified a situation or circumstance that the Well Review Surveyor considers causes the agreed Tier of review and scope of work contained herein to need to be revised in order to reduce risks to an acceptable level; and
* be satisfied, so far as is possible, that the well operations are planned in accordance with the guiding principles as stated in the Introduction of this Guideline, with specific reference to:
1. identifying the potential hazards in relation to Control Of Well (Blowout and Underground Blowout) based on the available data with due cognisance of possibilities that may exist in the absence of data;
2. implementation of a robust well design to ensure prudent management of the potential hazards;
3. employing good equipment (within their rated capacity), appropriately qualified personnel and good drilling, workover and intervention policies and operating standards;
4. ensuring control and contingency measures are planned to enable efficient management of an occurrence with a view to minimising exposure to Underwriters.
* advise on significant modifications and problems as advised by the Assured.

**Role of the Assured**

The Assured shall:

* provide reasonable access to data, information and as necessary personnel to the Well Review Surveyor to allow them to carry out the necessary work
* provide the Well Review Surveyor with a point of contact for the Contract Leader(s) (lead underwriter(s)) and an appropriate point of contact in the Assured’s organisation to assist with resolution of queries
* formally acknowledge receipt of all recommendations arising from the review
* maintain a record of their compliance with, and deviations from such recommendations
* obtain written approval from the Well Review Surveyor for any such deviations(s)
* advise the Well Review Surveyor and Contract Leader(s) of any significant modifications made after the completion of the Insurance Well Review to well design, well programme, procedures, organisation and contingency planning within 72 hours of the significant modification
* advise the Well Review Surveyor and Contract Leader(s) of any significant problems incurred after commencement of drilling within 72 hours of the significant problem. Such a problem should be advised irrespective of its need for well design or procedural modification.

**Role of the Underwriters**

The Contract Leader(s) (lead underwriter(s)) shall:

* agree to the appointment of the Well Review Surveyor prior to inception; and
* determine the required Tier of review; and
* make available relevant applicable policy terms and conditions including, in particular, any warranty provisions or conditions precedent; and
* make available identity and contact details (including telephone, e–mail, fax and out of normal business hours numbers) of the nominated Contract Leader(s) to receive communications from the Well Review Surveyor.

**Guidance Notes – Well Review Tier 2 & Tier 3 SOW**

This document contains the Scope of Work (SOW) intended to be used with the JRC Well Review Warranty Endorsement (JR2018/012A) which shall stipulate the required Tier of review.

The Scope of Work, defined as the information to be contained in the Well Review, shall be executed in line with the agreed Tier review required:

* **Tier 2**

Standard Well Review, where the review is expected to be a desk review of requested information, with limited expected need for discussion between the Drilling Well Review Surveyor and the Assured, where the focus is on the physical well design, and well control guidelines within the Drilling Programme

* **Tier 3**

Enhanced Well Review, where increased risk features have been identified, and a more comprehensive review is deemed needed, over and above that required for a Tier 2

Underwriters may wish to elect to stipulate a Tier 3 review when the following physical risk features are present:

Shallow Gas/Shallow Water Flows CO2 Reservoirs/Storage/Flood

HP/HT & XHPHT Gas Storage Wells

Deepwater High ppm/% H2S/CO2 present

High AFE Underbalanced drilling

Hurricane/Typhoon/Rotating Storm Areas Mud Cap Drilling

Remote Areas – e.g. Arctic MPD (all variants)

Geothermal Wells Relief Wells

Coal Bed Methane Drilling Drilling with Casing

Sub-Salt Drilling High/total mud loss potential

Additionally, if the Contract Leader(s) have concerns about the well in respect to the following areas, they may wish also elect to stipulate a Tier 3 Review:

* client loss record;
* new or relatively inexperienced client
* new or relatively inexperienced drilling contractor;
* unfamiliar operating area;
* unusual coverages.

**Tier 2 – Standard Well Review SOW**

The Well Review Surveyor’s report on the well design shall include as a minimum:

1. The name of the individual performing the review.
2. Executive Summary
3. The information detailed in in the below Core Information Review.
4. A summary of the well proposals including main hazards and breakdown of AFE.
5. An assessment of the hazards, associated with the well, and the ‘as-found’ quality of controls in place to eliminate/mitigate the hazards. This should be reported using an appropriate and transparent evidence based grading, providing a clear expert opinion on inherent and residual risk. Comment on the tolerance of the well design to variation in ‘as found’ conditions should be provided, i.e. plan on high case pore pressure and low leak off test. Evidence should be provided as to extent and adequacy of seismic, geophysical and geotechnical data to support well location and well design.
6. An assessment of the adequacy of the rig and equipment, well design and operational personnel to address the hazards.
7. Appropriate warranted recommendations. **Any recommendations issued for the Assured’s Implementation should be targeted to reduce risk and worded in a clear and explicit manner, and whether the recommendation has been implemented or not should be capable of being objectively verified**.

The recommendations shall include an implementation deadline (typically pre-spud), agreed by Underwriters. While these recommendations form conditions within this Policy, it is expressly understood that any lack of adherence or compliance with these recommendations shall give grounds for Underwriters to avoid a claim where such lack of adherence or compliance is relevant or contributory to a loss.

Such warranted Recommendations should be made on a by-exception basis and ideally avoid the use of generic good practice recommendations, with an emphasis on the Well Review Surveyor seeking out evidence as part of the review to ensure good practice is embedded in the design and procedures. They should not be seen as a substitute for deficiencies in the review process, or absence of communication or solicited verification with the Assured.

The Well Review Surveyor shall also encourage the use of best practice by making separate Advisory Recommendations, which would not be warranted.

If the Assured has provided insufficient information to perform a comprehensive review or the Well Review Surveyor’s questions/requests for information remain pending, then the Well Review Surveyor shall make this clear in his report to Underwriters and outline the potential implications of the omissions.

1. Overall Conclusion, with an emphasis on evidence based expert opinion.

**Core Information Review**

The following information should form the body of the Well Review Report:

1. Well Name.
2. Type of Well (e.g. Development, Appraisal, Exploration, Wildcat, etc.) and AFE cost.
3. Operator – Name of the company actually operating the well, if different from the Broker’s client.
4. Details of partners as appropriate, and their level of engagement with regard to the well design and execution.
5. Details of regulatory environment and regulator competence, as appropriate.
6. Location of planned well (s) – Offshore/Onshore: Country, State/County/Province. Including details of drill site access, and supply points proximity. Identified sea-bed objects or anomalies.
7. Details of adjacent structures and operations (as applicable for offshore activity) – To include details of well-head platform, integrated drilling/production platform, and other structures within 500 m of drilling rig.
8. Well (s) Description and Objectives – Whether a vertical or directional well, and the geologic objectives/targets of the well.
9. Details of adjacent wells and anti-collision techniques to be deployed.
10. Details of SIMOPS procedures and bridging documents as appropriate.
11. Barrier Policy – Details of barrier policy during all stages of drilling, including temporary abandonment.
12. Batch Drilling – Details of approach and precautions taken if batch drilling
13. Forecast Subsurface Conditions – To include details of prognosed formation pressures, formation temperature, fluid type, vertical depth, estimated thickness and anticipated drilling hazards (lost circulation, high temperature formations, high pressure formations, H2S, CO2, faults etc.) of all flow-capable intervals. Full prognosed lithological column.
14. Offset Well Data – Other wells used to develop drilling plan and their proximity to the planned well, including offset formation and breakdown pressures. Any data on offset well LOT and FIT. Information on any well control incidents on offset wells.
15. Drilling Problems and Hazards – Hole section by hole section identifying the drilling procedures to be used, maximum length of open whole section, the potential drilling hazards and the steps to be taken to eliminate/mitigate these hazards. Comment should be provided on expected soil stability, well bore stability, pore pressure, overbalance and **adequacy of ‘drilling window’**. Contingency casing arrangements to be provided.
16. Casing Design – Basis for the casing design, including design factors used in design calculations (Collapse, Burst, Axial and Tri-axial). Materials and specifications of the casing strings to be run including grade, weight and connections. Life of well consideration and suitability of materials. Conductor support strength adequacy. Kick tolerance calculations and planned casing pressure tests.
17. Drilling Fluids – Outline of the drilling fluids programme to be used, hole section by hole section. Mud system to be used (e.g. water based polymer or synthetic oil based) including minimum/maximum anticipated mud properties. Plans for dealing with lost circulation, and minimum weight material location stock.
18. Cementing Programme – Details of the cementing and testing procedures to be used for each casing string (e.g. Inner string, Single stage, Two stage cement jobs), including slurry densities, and planned top of cement for each casing string. In addition, in the case of surface conductors/casing strings whether there are plans for a ‘top job’ if cement returns are not noted at surface. Adequacy of centraliser programme should be commented on.
19. Completions Programme (as applicable/available) – Detailed description of completions programme, equipment and materials suitability for conditions and life of well, tested barriers available, fluids programme (i.e. mud displacement) installation sequence and verification before BOP removal and Xmas tree installation, artificial lift installation.
20. Well Testing – Detailed description of any planned DST/Well test(s) to be carried out and procedures to be followed, barriers available and details of simulation activities (if any), involvement of OIM if drilling over, from or adjacent to producing assets, and ability to ESD well from producing assets.
21. Well Control Equipment – Detailed specifications and pressure rating of the well control equipment to be used in hole section by hole section, including planned ‘soak-tests’ pressure tests (and test pressures), functional tests or rams and all safety systems the frequency / schedule additional pressure tests.
22. Relief Well Modelling - Well specific or field generic relief well modelling in accordance with Oil & Gas UK Guidelines for Relief Well Planning, current edition or similar. To include prediction of flowrates, fluid types, relief well configuration and minimum rig specification associated with a blowout from any flow capable zone identified in the geological prognosis.
23. Drilling Rig – Detailed specification of the drilling rig to be used for the drilling operation, including ratings for the derrick, substructures, draw works, mud pumps and BOP equipment.
24. Senior Field Operations Supervisors – CV’s/Resumes of the Senior Field Operations Supervisors, Drilling Contractor, Mud Engineering Contractor, Mud Logging Service Provider, Cementing Contractor - with comments on experience of contractor in area.

**Tier 3 – Enhanced Review SOW**

A Tier 3 Review should be undertaken on the basis of an enhanced review, which includes all the requirements of a Tier 2 Review, plus additional information and assessment to provide the Contract Leader(s) with an increased level of confidence that the well in question can be drilled safety taking into account the increased level of risk that has caused a Tier 3 Review to be requested.

A Tier 3 Review is intended to not only seek out increased levels of information, above those required for Tier 2, but is intended to go beyond a design review of the well, and focus on both adequacy of procedures and people.

Recommendations arising from a Tier 3 Review should be made and managed along the lines as captured for a Tier 2 Review. Likewise, in regard to the information provided and reviewed, if the Assured has provided insufficient information to perform a comprehensive review or the Well Review Surveyor’s questions/requests for information remain pending, and then the Well Review Surveyor shall make this clear in his report to Underwriters and outline the potential implications of the omissions.

A Tier 3 Review demands access to greater amounts of information, and probably likely more interaction with the Assured. The timing and duration of the Review, in advance of well-spudding, should be carefully considered, to ensure that sufficient opportunity is available to implement recommendations.

**Tier 3 - Additional Hazard Features to be Assessed**

If the well has any of the following characteristics then the issues as indicated below shall be investigated and reported upon including an evidence based opinion on risk and as necessary recommendations.

**Shallow Gas / Shallow Water Flows**

* Area history with respect to Shallow Gas/Shallow Water Flows
* Shallow Seismic Survey Results
* Pilot Holes
* Operational Procedures and Practices

**HPHT (>10,000 psi & >300 deg. F), XHPHT (>27,000 ft. BML, >350 deg. F, >24,500 psi)**

(*N.B. Underwriters may wish to choose a more conservative ‘or’ approach*)

* Testing of HPHT elastomers at surface
* Cementing (temperature prediction, cement handling – Cement QA/QC and minimisation of contaminants, ability to seal and bond in the long term especially with H2S and/or CO2 present))
* Electronic equipment (resistance of components especially batteries to temperature)
* Risk reduction

**Deepwater Issues (>1.000 ft. water depth)**

* Marine Riser management – watch circles, emergency disconnect, unplanned disconnect procedures
* Gas in Riser procedures
* Hydrate and wax management
* Severe weather contingency planning (hurricane / typhoon / loop current etc.)
* Marine riser drilling margin/dual gradient drilling
* Adherence to recognised good practice guidelines – i.e. IADC

**High AFE**

* Reasons for High AFE

**Hurricane/Typhoon/Cyclone/Other Rotating Storm Areas**

* Detailed risk assessment
* Riser management procedures/protocols
* Hurricane/Typhoon Operations Management
* Decision criteria - evacuation proposals/procedures
* Contingency planning

**Remote Areas**

* Contingency/Cost/Considerations relating to materials and contaminated mud handling
* Contingency/Cost/Considerations relating to Mobilisation of Rig to area if required

**Geothermal Wells**

* Volcanic/Hydrothermal eruptive and earthquake history the of area
* Flash zone location
* Temperature, Contaminants (H2S, CO2 etc.) and Corrosivity of fluids
* Casing Design for corrosive fluids
* Potential well scaling issues addressed (during Operations)

**Coal Bed Methane Drilling**

* Protection of near-surface aquifers

**Sub-Salt Drilling**

* Cement/Sealant integrity across salt formations
* Deformation of salt over long term
* Casing design for external forces of salt over long term

**CO~~2~~ reservoirs/storage/flood**

* Suitability of BOP Elastomers
* Well design to deal with Corrosive Fluids

**Gas Storage Wells**

* Isolation of reservoir and positive confirmation of isolation

**H2S/CO2**

* BOP elastomeric and metallurgic requirements
* Mud and cementing requirements
* Rig Safety equipment requirements
* Changes required to Well Control management Policies

**Under balanced Drilling**

* Rotating head operating limits
* Risk Assessment/Contingency planning

**Mud Cap / Managed Pressure Drilling**

* Operational requirements and monitoring
* Experience of MPD service company
* Design of MPD process, including HAZOP & Safety Critical Instrument assessment

**Relief Wells**

* Review of blow-out contingency plans
* Relief well planning
* Root cause analysis/Lessons learnt
* Location risks
* Likelihood of success
* Availability/response time of capable drilling units

**Drilling with Casing**

* Prior experience with the technology

**High/Total Mud Loss Potential**

* Details of zones of concern
* Identified control, contingency and recovery measures

**Tier 3 Additional Reporting Requirements**

The following provides detail on additional reporting requirements for a Tier 3 Review, over and above that for a Tier 2 Review.

**General**

The report shall also include comments on the following:

* General experience of drilling, specific experience of drilling in relevant country/area (including a statement on any blow-out information publicly available or provided by the Assured )
* Local Populations, Local Industries, Transportation Infrastructure, Climate & Natural Perils, Site Hazards, General Terrain, Soft Muds, Unstable Ground.
* Specific experience of drilling in relevant country/area (including a statement on any blow-out information publicly available or provided by the Assured )
* Drilling experience in Country/Areas especially Country/Area overview with respect to well control incidents if available.

**Risk Factors**

The report shall also include an assessment of the following:

* Climate and Natural Perils (Meteorological & Oceanographic)

**Operating Policies, Standards, Procedures and Management Systems**

The report shall also include comments on the following:

* Drilling Policies and Standard Operational Procedures
* Local Regulatory Regime/Government Relations
* Adequacy of bridging documents - clarity of responsibility and accountability
* Corporate Competence
* Well Design Organisation
* Well Execution Organisation
* Well Execution Competence – including evidence of enhanced Well Control training beyond IWCF/IADC minimum requirements, including simulator training and ‘as-team’ training
* ‘Barrier’ verification, understanding, awareness and communication
* Communication of Well Programme into drill floor daily plans
* Rig & Equipment Maintenance
* Supply/Support Infrastructure
* Rig & Equipment Inspection/Verification
* Supervision of Contractors
* Risk Assessment during Well Design process
* Risk Assessment during Well Operations process
* Management of Change (Well Design and Operational)
* Identified TA (s)
* Lessons Learned Process

**Contractors (Experience, Drilling Culture and Quality)**

The report shall also include comments on the following:

* Drilling Contractor (Crew Qualification – Local Content)
* Mud Engineering Contractors
* Mud Logging Contractors
* Cementing Contractors
* Specialist Service Providers – MPD etc.
* Incentive Schemes
* Regional Skills Factors/Local Content
* Contractual provisions re Liability

**Description and Comments on Drilling and Well Control Equipment**

The report shall also include comments on the following:

* Rig Audit Protocols, Recent Audits
* Drill String QA/QC Management – Washout Experience
* Casing Quality Management
* Cement & Mud Quality Management

**Well Control**

The report shall also include comments on the following:

* Well Control Method (Drillers/Wait and Weight)
* Kick Drills/Early Kick detection systems
* Well Control Emergency Plans
* Relief Well Planning
* Environmental Impact Contingency Plans
* Contractual arrangements with Third Party Specialists
* Factors affecting Cost of Control – remoteness, weather limitations, material supply limitations, contaminated mud handling limitations, rig availability etc.

**Well Operations**

The report should also include comments on the following:

* Daily Reporting
* Barrier Monitoring
* Rig Moves – Location Approvals (Third Party, MWS for Offshore Wells), refer also to JR2016/012 – JRC Rig Move COP & SOW

**Tier 4 – Corporate Well Risk Engineering Survey**

This section provides the details on reporting requirements for a Tier 4 Review and is intended to be used with the JRC Well Review Warranty Endorsement (JR2018/012A) which shall stipulate the required Tier of review.

If underwriters decide to instruct a Corporate Wells Risk Engineering Survey instead of, or prior to Tier 2 or 3 review, the Corporate Wells Risk Engineering Survey shall follow a defined scope and the report should identify clear recommendations that are deemed critical rather than making generic statements.

A Corporate Well Risk Engineering Survey is by definition focused on risk management systems and procedures, and as such it may be appropriate for such work to be conducted by an experienced Energy Risk Engineer and/or a recognized Well Review Surveyor.

The lead surveyor shall ensure that the following key areas are commented on/verified (but not limited to), in line with the principles as stated in the Introduction to this Guideline:

**General Details and Well Characteristics**

* Detailing the summary of the risk together with key basic details of well portfolio such as: reservoir characteristics, measured depth, formation pressure, JV partners, type of well, location etc., as listed in Tier 1.

**Well Control Procedures**

* Evidence of a clear and logical well control procedure that is regularly updated by senior drilling engineers and classed as a controlled document.
* Internal Well Design and Well Control guidelines/procedures written recognizing best practice (and in some cases mandatory) international standards such as , Oil & Gas UK Well Life Cycle Integrity Guidelines, NORSOK D10, API RP 53 etc.
* Company Well Control procedures integrated into the Well Plan and Well Delivery Process.

**Well Design and Execution Process**

* Design basis used to design wells.
* Ensure selections of wells were designed as per the basis of design and report any deviation.
* Well design that has been fully risk assessed, and captured in a clear and comprehensive Well Plan, with detail of approach to casing and mud programmes
* Evidence of well approval process, including internal, Operator (if different), contractors and service providers and independent third parties.
* A technical assurance process that provides clarity over dispensation (i.e. deviation from standard/company procedure), and a strict management of change process.
* Use of DWOP and CWOP risk assessment and verification exercises.
* Drilling Operations Procedures
* Evidence of a clear process for translating a well plan into drill floor ‘friendly’ daily plans and procedures, with particular focus on high risk and well integrity critical tasks.

**Well Integrity Management System (WIMS)**

* Evidence of an effective WIMS in place and clearly being followed by the operator.
* Details of Well Integrity Assurance including condition monitoring, routine inspection and maintenance and testing of wells, Xmas tree, wellhead valves, downhole safety valve and related equipment.
* A technical assurance process that provides clarity over dispensation (i.e. deviation from standard/company procedure), and a strict management of change process.
* Details of the annulus management including monitoring of well annuli and reassessment of MAASP.
* Details of conductor and casing strength management.
* Details of ageing asset, life extension and end-of-life programmes for wells.
* Details of plug and abandon procedures and programmes

**People**

* Fully populated Operator Wells/Production Department organization charts, identifying responsible person(s) for drilling activity, and/or contractual arrangements with expert third parties.
* Identified TA(s)
* Fully populated contractor (rig operator) and key service provider(s) organization.
* Well control certification for well design and operations personnel (Operator and contractors) personnel.
* Clear competency and training certification requirements for key positions.
* Key personnel having specific job experience (e.g.: ultra-deep-water drilling, HPHT, managed pressure drilling etc.).
* Command structure and control procedures in place after a well control incident has occurred, including contingent strategies with respect to vessels and equipment.

**Safety management**

* A clear command structure is in place together with individual authority to shut the well during a well control incident.
* All key personnel are trained and accredited by either IWCF or IADC.
* Ensure a gap analysis is performed between the contractor and the operator procedures, and bridging documents developed and available.
* Company culture of root cause analysis of all major incidents, and lessons learned from other third party losses.

**Rig/Equipment**

* Rig(s) that have been subject to third party verification/integrity audit
* Offshore Rigs (MODUs), classed by an IACS member society, with classification valid (for duration of the contract/insurance policy) with no conditions of class.
* Offshore Rigs to have a Safety Case (or equivalent).
* Ensure a rigorous inspection and maintenance system in place and all KPI’s are monitored.
* That all well control system equipment is compliant with inspection requirements, properly maintained and is capable of shutting in the well during emergency operations.
* HAZOP on drilling package, including integration with all third party equipment
* BOP/Xmas tree is reviewed to ensure that they can perform their designated function.
* ROV hot stabs are function tested and checked to ensure capability of actuating the BOP.
* Where jack-up rigs used - verification that a SSA performed and compliant with ISO 19905-1 or SNAME T&RB 5-5.
* Where moored floating rig used – verification that a SSA been performed and compliant with ISO 19905-3 or equivalent.
* For dynamically positioned floating rigs, Rig DP Class – 1, 2 or 3 List current system faults / de-rating if any. Watch circles in metres and also as percentage of depth for riser disconnection.
* For deep water wells, confirmation that the hydraulic system is of “equal strength” to support the shear rams.
* Has the bridging document or gap analysis been performed between the contractor’s and the operator’s safety and management procedures?
* Casing quality management
* Cement & mud quality management

**Contractors**

* Contractor pre-qualification process
* List all the contractors, including: rig contractor, drilling fluids, directional drilling, MPD, cementing, casing while drilling, logging seabed survey, well testing, completions, shallow gas etc. and their experience levels including percentage of local workforce that are experience level.
* Ensure contractors IWCF/IADC certified.
* Review the loss record of rig contractor
* Local content requirement
* Contractor performance monitoring.

**Training & Competence of Rig Crews (including simulation) & Service Providers.**

* Evidence of “high reliability” operations team with individual competence and failsafe operational management system.
* Active supervision at all levels with adequate support.
* Evidence of rig crew training as a team.
* Evidence of human factors engineering, particularly with regard to drill floor ergonomics and HMI.
* Evidence of training in safety critical systems (including barrier verification and understanding).
* Review the experience of senior field operations supervisors such as: drilling superintendent, drilling supervisor, mud and cementing contractor etc.
* Ensure that key personnel possess a job specific experience e.g.: direction drilling, MPD, HPHT etc.
* Well Control and Emergency Response
* Review of well control methods and ensure all exercises are undertaken as per well control procedures.
* Establish whether there are any early kick detection systems.
* Well control emergency plans including, Well control, Making well Safe, Relief well planning and methods.
* Environmental impact contingency plans; including remoteness, weather limitations, material availability, rig availability etc.
* Contractual arrangements with third party specialists.
* Ensure adequate passive and active fire protection and fighting systems are in place.

**Audit**

* Details of internal/third party and contractor/service provider audits, together with evidence of managed actions to closure.

**Establish an EML and PML scenarios**

* Detail of well programme costs.
* Demonstrate a considered and systematic approach to possible loss scenario development.
* Details of assured developed plans and costs – relief well planning
* EML and PML scenarios should be backed up with real examples and a clear logic.
* Provide detail of costs and assumptions used to develop EML and PML scenarios.

**Risk Improvement Recommendations**

* Any recommendations issued for the Assured’s Implementation should be targeted to reduce risk and worded in a clear and explicit manner and whether the recommendation has been implemented or not should be capable of being objectively verified.
* All recommendations shall have a clear and appropriate time frame to implement corrective measures.

# Glossary

AFE Authorised for Expenditure

ALARP As Low As Reasonably Practicable

API American Petroleum Institute

BML Below Mud Line

BOP Blow Out Preventer

BSEE Bureau of Safety and Environment Enforcement

COP Code of Practice

CWOP Completing Well on Paper

DP Dynamic Positioning

DST Drill Stem Test

DWOP Drilling Well on Paper

EML Estimated Maximum Loss

ESD Emergency Shutdown

FIT Formation Integrity Test

HAZOP Hazard and Operability

HMI Human Machine interface

HPHT High Pressure High Temperature

H&SE Health & Safety Executive (UK)

HWDP Heavy-weight drill pipe

IACS International Association of Classification Societies

IADC International Association of Drilling Contractors

ISP Initial Screening Process

IWCF International Well Control Forum

JRC Joint Rig Committee

KPI Key Performance Indicator

LOT Leak-off Test

MAASP Maximum Allowable Annulus Surface Pressure

MD Measured Depth

MOC Management of Change

MODU Mobile Offshore Drilling Unit

MPD Managed Pressure Drilling

MWS Marine Warranty Survey (or Surveyor)

NORSOK Norsk Sokkels Konkuranseposisjon

OIM Offshore Installation Manager

P&A Plug & Abandon

PML Probable Maximum Loss

PSA Petroleum Safety Authority

QA Quality Assurance

QC Quality Control

ROV Remote Operated Vehicle

TA Technical Authority

TVD True Vertical Depth

SIMOPS Simultaneous Operations

SOW Scope of Work

SSA Site Specific Assessment

WIMS Well Integrity Management System

XHPHT Extra High Pressure High Temperature

**Appendix A Well Information Template**

The following is a summary of technical information that should ideally be available to support a Tier 1 assessment. The first fourteen fields have been identified as minimum desired information and the other nine fields were identified as useful information that would allow engineers to assess the risk levels effectively.

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|

| **Tier 1 Information requirement** |
| --- |
| **Item No** | **Well Parameters** | **Comments** |
| 1 | Well Name |   |   |
| 2 | Location  | Onshore/Offshore |   |
| Country |   |
| Latitude:  |   |
| Longitude: |   |
| 3 | Type of Well | HPHT |   |
| Exploratory/Wild Cat |   |
| Appraisal/Development |   |
| Production/Injection |   |
| Workover |   |
| Shut-in |   |
| Perm P&A |   |
| 4 | Nature of well | Oil |   |
| Gas |   |
| Condensate |   |
| Geothermal |  |
| Storage |   |
| Injection |   |
| 5 | Maximum Bottom Hole Pressure (psi) |   |   |
| 6 | Maximum Temperature > 300°F (150oC) (yes/no) |   |   |
| 7 | Water Depth (m) |   |   |
| 8 | AFE (including cost breakdown, dry and completed holes, day rates & mob/demob costs |   |   |
| 9 | Drilling Depth (ft.) | Vertical depth (TVD) |   |
| Measured depth (MD) |   |
| 10 | Operators Details (JV partners) |   |   |
| 11 | Type of Drilling Method | Conventional Drilling  |   |
| Under balanced |   |
| Managed Pressure Drilling |   |
| Fracking |   |
| 12 | Contractors | Drilling |   |
| Cementing |   |
| Fluid Management |   |
| Casing |   |
| 13 | Sour Gas Content | H2S (ppm/%) |   |
| CO2 (ppm/%) |   |
| 14 | Rig Type & Name | Name |   |
| Type |   |
|  |  |  |  |

 |
| **Tier 1 Information requirement (Additional Information)** |
| **Item No** | **Well Parameters** | **Comments** |
| 15 | Confirmation that well operations personnel – drillers, tool pushers, company men – maintain valid IWCF well control certification |   |   |
| 16 | Offset well data and the distance from the target well. |   |   |
| 17 | NatCat | Cyclone / rotating storm exposure  |   |
| 10yr return wave height and wind speed at location  |   |
| Ocean current exposure e.g. LOOP current in GOM |   |
| Earthquake hazard (onshore only) |   |
| Earthquake hazard (offshore jack-up and near shore activity) |  |
| Electric storms/lightning |   |
| 18 | Sub-surface hazard exposure | Shallow gas |   |
| H2S level |   |
| CO2 level |   |
| Hydrates |   |
| Shallow water flows |   |
| Loss of circulation zones |   |
| HPHT well |   |
| Extended reach well  |   |
| 19 | Pore pressure/Fracture Gradient/Mud weight diagram for the well. |   |   |
| 20 | Emergency response and Contingency plans | Fire |   |
| Well Control |   |
| Earthquake |   |
| Re-drill |   |
| Emergency shut-down |   |
| 21 | If floating MODU – moored or DP?If Rig dynamic positioned, Class – 1, 2 or 3? List current system faults / de-rating if any. Watch circles as percentage of depth for riser disconnection?  |   |   |
| 22 | Kick detection methods  | Early warning systems |   |
| 23 | Confirmation that all well control system equipment, both surface and subsea, is examined to ensure that it has been properly maintained and is capable of shutting in the well during emergency operations | Integrity of the well control Equipment |   |