IWCF Operations Limited

IWCF Well Control in Design and Lifecycle Management Programme Guidance

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Document Revisions

Date	Version Number	Document Changes
August 2017	1.0	Initial Release
September 2023	2.0	Updates to programme • Name Change • Course Structure • Instructor Accreditation

1. Programme objectives

The IWCF Well Control in Design and Lifecycle Management (formerly Level 5) programme is recommended for experienced personnel that have a key role in well design and planning for well operations. The programme aims to:

- Recognise the impact that design, planning and programming can have on the construction phase and on well integrity assurance throughout the lifecycle of the well.
- Identify and specify well control actions that can be taken when working outside of the normal operating envelope.
- Ensure that engineers in office-based functions have well control competence to support rig/wellsite operations.

Achieving a certificate for this programme should become an aspiration for engineers, supervisors and managers working in key roles related to well construction, well interventions and managing well integrity.

2. Course structure

2.1. Class sizes

As this is an interactive, discussion-based course, class sizes shall not exceed 12 candidates.

2.2. Classroom course

The instructor-led classroom course must be a minimum of 28 hours.

The classroom course must cover:

- all nine compulsory topics, and
- between two and four optional topics.

The 28 hours does not include any pre-course exercises, the written assessment, or the case study project.

The course must include practical activities using table-top exercises and/or simulators. This is a key element of the course and must be used as a means of assessing candidates' understanding of the subject matter. For example, being able to identify actions to take when working outside of the normal operating envelope.

The course must also include information on recent well control/integrity events with a focus on lessons learned. Group discussion is another key element of the course, and the instructor should encourage candidates to share their own experiences.

2.3. Pre-course work

To be suitably prepared for an interactive discussion-based course, candidates must complete pre-course work separate from the 28-hour classroom course. This can be delivered either in a classroom, instructor-led online (virtual), or through self-paced e-learning. Pre-course work will ensure candidates begin the 28-hour classroom course with the required knowledge of well control and/or loss of well integrity.

2.4. Case study project

The case study project aims to assess that candidates can apply the concepts covered in the course. The project should be based on real-life events, but sensitive information can be removed.

See section 8 for more requirements relating to the case study project.

3. Candidate requirements

Before attending the course, candidates must meet the following pre-requisites.

- Knowledge in basic well design, planning and programming and/or well intervention gained through a combination of formal training and work experience.
- Understanding of well incidents/loss of well integrity, the causes and prevention methods.
- IWCF Level 2 (or higher) training and assessment (drilling well control or well intervention pressure control) or equivalent introductory course.
- An awareness of well operations crew resource management (WOCRM). As an option candidates may choose to complete the IWCF free online WOCRM course - https://www.iwcf.org/programmes/wocrm/.

Candidates that do not meet the above pre-requisites will not be suitably prepared for the classroom course and will struggle with the subject matter. Those without the required training or certificates can gain these as part of their pre-course work.

Ideally, candidates will have similar knowledge/experience so that they are able to take part in an interactive, discussion-based course with practical exercises.

The employer is responsible for ensuring candidates meet the programme entry requirements.

4. Instructor requirements

Instructors must demonstrate in-depth knowledge of the subject matter and have a well engineering background. The instructor must submit an application along with their CV together with relevant certificates to IWCF for review and approval.

It is not mandatory for instructors of this course to be accredited at IWCF Level 4. However, they must provide evidence of a relevant teaching qualification and/or teaching experience.

If you intend to use a subject matter expert (SME) to deliver any of the course content, you must indicate which topic they will teach and send a copy of their CV to IWCF for review and approval.

5. Accreditation

5.1. Applying for accreditation

To gain accreditation, the applicant must meet IWCF quality assurance requirements.

If the applicant is not currently an IWCF member, they must first apply for membership followed by primary centre accreditation (see AC-0136 Primary and Associate Centre Accreditation Application).

Applicants can apply to accredit this programme only.

The applicant must submit all training materials to IWCF and allow a minimum of 90 working days for IWCF to review the application.

5.2. Submission contents

The application submission must include the following.

- The course outline.
- The course syllabus that is based on topics listed within section 12 and follows the IWCF model template (see section 6).

- A minimum of three assessment questions for each syllabus topic for use in the IWCF question bank (see section 7).
- Details of the case study project (see section 8).
- Lesson plans for each individual lesson (minimum two hours each). These should include different training techniques such as:
    - PowerPoint presentations,
    - animations,
    - group discussion/group work,
    - written exercises,
    - practical exercises (table-top or simulation based), and/or
    - case studies and cause findings.

The application should also include an explanation of how the applicant will ensure that material is reviewed and updated every two years. This review must consider recent well control and loss of well integrity events.

Note:

- Exercises and any worked examples used in the training course must not be similar or identical to assessment questions used in the final written assessment.
- Use of the IWCF logo in training materials must follow CO-0010 Company Branding Guidelines.

5.3. Approval

Once IWCF approves the application, we will issue provisional accreditation. The applicant can expect their first IWCF Well Control in Design and Lifecycle Management course to be observed by an IWCF subject matter expert. Final accreditation will be gained only after IWCF confirm all requirements are met.

If you need further help with any part of the accreditation process, please contact: accreditation@iwcf.org

6. Syllabus Guidance

6.1. Testing understanding

IWCF expects candidates' knowledge and understanding of well control in design and lifecycle management to be developed so that they can competently perform their tasks to ensure well design can withstand loads through loss of well control and maintain well integrity assurance. It is insufficient for candidates on any level of course to be simply coached to pass an assessment.

> *"The quality of teaching must evolve to ensure learning objectives are met. Training should be taught according to the stipulated syllabus. It is not sufficient to base training on "test-similar" or "test-identical" exam questions to help facilitate personnel pass the written exam".* (IOGP Report 476, April 2023)

6.2. Structure of syllabus

6.2.1. Learning objectives

The learning objectives in the syllabus are based on the skills and knowledge required for this level. The use of the wording "learning objective" is in line with the IOGP Report 476. It is a broad overview statement of what the student will be taught during the course.

Demonstrated by the following example:

During the course students will gain an understanding of …how their decisions during the design phase will impact well control and well integrity assurance.

6.2.2. Learning outcome

Learning outcomes must be developed for each of the learning objectives contained in the syllabus. The outcomes indicate how each learning objective will be fulfilled with a detailed description of what a candidate will be able to do at the end of the course. These learning outcomes are the basis on which written assessment questions are developed.

Learning outcome example shown below:

By the end of the course candidates will be able to…

- *Identify the problem areas and solutions related to well control management*
- *Assess well control risks and demonstrate contingency planning during the well design and subsequent operations*
- *Describe the importance of well integrity throughout the well lifecycle.*

6.2.3. Syllabus division

The syllabus is divided into sections and categorised in line with IWCF Well Control in Design and Lifecycle Management guidance notes. Learning objectives and associated outcomes must be provided for all compulsory topics and optional topics included in the programme. Additional topics may be added.

The syllabus must align with the training materials.

6.2.4. Weighting

All learning outcomes have been given an equal weighting (or importance). This means teaching and assessment should cover each learning outcome equally. In the assessment, all questions will be allocated one point.

6.2.5. Assessment method

The IWCF Well Control in Design and Lifecycle Management course is based on:

- written assessment
- case study project report.

7. Assessment questions

Applicants must submit at least three distinctly different assessment questions for each topic (compulsory and chosen optional topics) for the IWCF question bank.

These questions must meet the following criteria.

- Align with PD-0019 IWCF Guidelines for Questions Writers and Reviewers
- Be written in the PD-0033 IWCF question template. This includes explanations for the correct and incorrect answer options, and grading analysis sheet text (the information candidates would see if they answered the question incorrectly).
- Relate to the syllabus topic and be of an appropriate complexity for an advanced course.

Our technical review team will then review the submitted questions and contact the applicant if they need further information. The review team may also make changes to questions to ensure they align with Plain English guidelines and that their format aligns with the IWCF question bank.

8. Case study project

A case study project proposal must be included in the accreditation application.

The case study must include several of the topics covered during the course and demonstrate that the candidate can apply key concepts such as barrier and risk management.

Please see two below examples.

- *A single well section plan including contingencies and emergency response.*
- *A plan to proactively manage well integrity risks during a specific phase of the well lifecycle.*

The proposal must include:

- a description of the project and how it is introduced in the class,
- the resources available to candidates/any guidelines for candidates,
- the report format, and
- the marking criteria.

Candidates can start the case study project during the classroom course but must complete it in their own time and submit it to the course provider within 14 days of the written assessment.

The course provider must then mark the candidate's completed case study report and then submit it to IWCF.

9. Written assessment

IWCF will administer and manage the written assessment.

Assessment Format	Assessment Duration	Number of Questions
Online	90 minutes	30

An independent invigilator will attend the online assessment.

Normal IWCF procedures will apply when arranging the assessment. The course provider must give 10 days' notice of the assessment date when scheduling the written assessment in FORUM.

10. Certification

Candidates will receive an eCert if they achieve a score of 70% or more for the case study project and 70% or more for the written assessment.

The eCert will state: "IWCF Well Control in Design and Lifecycle Management" programme.

If the candidate does not achieve the required score, IWCF re-sit rules apply to the written assessment. If the case study does not meet the standard, there will be an opportunity for rework and resubmission.

11. Repeat frequency/renewal

IWCF supports continuous learning and recommends that candidates attend suitable refresher training prior to recertification every five years.

12. Programme outline/content

IWCF has used information from IOGP Report 476 Appendix C (April 2023) to create a base for this programme.

Applicants must cover nine compulsory topics and between two and four optional topics.

IWCF encourages applicants to provide further contents and detail to ensure training meets current and future well planning requirements.

Within the 28-hour course, compulsory and optional topics must follow a ratio of 70:30 – 80:20.

Applicants can include other topics for their course if it is required for their candidates.

Any additional topics:

- must not replace any of the nine compulsory or two optional topics, and
- must be relevant to the programme and be approved by IWCF.

We will regularly review and update the below table when new knowledge and information becomes available.

Part 1 – based on IOGP Report 476 Appendix C (April 2023)

No	Title	Description	Requirement
1	Subsurface Impact	Basics of geology, the impact of rock behaviour on well control (for example, rock strength in relationship to wellbore pressures, the ratio of horizontal to vertical stress, pore pressure prediction)	Compulsory
2	Holistic Design	Holistic design for well control, including primary and secondary barrier elements and envelopes	Compulsory
3	Design Uncertainties	Uncertainties related to any of the inputs to the well design, construction, and operation processes. Include lifecycle considerations	Compulsory
4	Barrier Management	Barrier management including: a. recognising what constitutes a barrier b. instruction on barrier integrity assurance / verification c. barrier performance requirements and impact on well design d. barrier strategy needed to maintain the two-barrier philosophy e. human and organisational barriers and their impact on well control	Compulsory
5	Cement Integrity	Importance of annular cement integrity including: a. cement testing and the importance of testing cement designs at the correct temperature b. pipe centralisation c. impact of gas flow during and after cementing and how this may be mitigated d. how unstable wellbores can affect cement integrity e. impact of pressure testing (positive and negative) on cement sheath integrity	Compulsory
6	Verification Methods	Understand the need for and limitations of well integrity verification techniques and requirements for	Compulsory

		tubing, valves, Xmas Trees, wellheads, casing, cement, and formation integrities including: a. pressure verification assurance methods b. negative (or inflow) pressure testing c. electric log well integrity verification	
7	Dealing with Pressure Influx	Well design according to verification of integrity, including kick tolerance and other possible sources of pressure/hydrocarbon influx	Compulsory
8	Lifecycle Well Integrity	Well integrity monitoring in construction and throughout lifecycle including during intervention and abandonment	Compulsory
9	Risk Management	Risk management including: a. principles for assessing risk b. managing the risk through appropriate avoidance and mitigation measures using realistic probabilities (from industry data) of well control events c. managing risks associated with programme or design changes and how these risks should be properly managed (Management of Change - MOC) d. Developing risk reduction strategies	Compulsory
10	Human and Organisational Performance	Managing human and organisational performance in well operations for example: a. removing the potential for error/learning from incidents b. human factor limitations in particular recognising and dealing with anomalies c. use of drills as a means of learning from experience d. use of procedures for hazard identification e. allow for limitations during the operation including competency and awareness f. organisational issue in combatting well control	Optional
11	Corrosion Design and Material Selection	Well design to account for the management of corrosive well fluids and their compatibility with well components for continued integrity. Consider material selection for high-risk areas.	Optional
12	Well Maintenance	The importance of well maintenance, monitoring behaviour and formal regular well integrity testing	Optional
13	Well Integrity Assurance	How to manage failed integrity, repair, and post repair well integrity assurance including equipment redundancies and back-up equipment	Optional
14	Shallow Gas	Shallow gas surveying, offset well analysis during the well design phase and well design philosophies to manage shallow gas	Optional

15	Abandonment	Appropriate design and subsequent operations practices to ensure wells are suspended and/or abandoned in an appropriate manner	Optional
16	Tertiary Well Control	A short introduction of current tertiary well control techniques including: a. relief well drilling, interception, and associated relief well kill techniques b. capping technologies that are available and under development c. subsea containment technologies and techniques d. oil spill clean-up technologies that are available and under development	Optional
17	Other Lifecycle Considerations	Further lifecycle considerations in design for well control for example: a. casing load cases including for capping stack loads b. blowout and well kill simulations	Optional

Part 2 - IWCF recommends the below optional topics

No	Title	Description	Requirement
18	Well Planning Considerations	Engineering approach to geological concepts relevant to well control programme planning for example: a. Heat rates and stress domains b. Wellbore stress (formation vs wellbore pressure) c. Implications of FIT vs LOT and dealing with unexpected results from FIT-LOT and the impact on the well operations plan d. MAASP and dynamic pressure exposures, for example, when drilling or running casing e. Zonal isolation within the well barrier envelope	Optional
19	Barrier Integrity Assurance	Other barrier integrity assurance considerations, for example: a. rig and well control equipment selection b. safety critical elements and their associated performance standards	Optional
20	Regulatory Requirements	Discussion on local/regional regulatory requirements	Optional

13. Disclaimer

Due to the approach taken for the IWCF Well Control in Design and Lifecycle Management programme, IWCF takes no responsibility for the accuracy of the contents of the syllabus and the training given by the course provider. Nor does IWCF take any responsibility for consequences resulting in using such training in practice.

14. Reference

IOGP Report 476: Recommendations for enhancements to well control training, examination and certification.

Appendix A – Syllabus Template

Syllabus Category	Learning objective. The student will gain an understanding of:	Learning outcome. The student will be able to:

COMPULSORY TOPICS

Subsurface Impact		

Holistic Design		

Syllabus Category	Learning objective. The student will gain an understanding of:	Learning outcome. The student will be able to:

Compulsory Topics contd.

Design Uncertainties		

Barrier Management		

Syllabus Category	Learning objective. The student will gain an understanding of:	Learning outcome. The student will be able to:

Compulsory Topics contd.

Cement Integrity		

Verification Methods		

Syllabus Category	Learning objective. The student will gain an understanding of:	Learning outcome. The student will be able to:

Compulsory Topics contd.

Dealing with Pressure Influx		

Lifecycle Well Integrity		

Syllabus Category	Learning objective. The student will gain an understanding of:	Learning outcome. The student will be able to:

Compulsory Topics contd.

Risk Management		

Optional Topics

Human and Organisational Performance		

Syllabus Category	Learning objective. The student will gain an understanding of:	Learning outcome. The student will be able to:

Optional Topics contd.

Corrosion Design and Material Selection		

Well Maintenance		

Syllabus Category	Learning objective. The student will gain an understanding of:	Learning outcome. The student will be able to:

Optional Topics contd.

Well Integrity Assurance		

Shallow Gas		

Syllabus Category	Learning objective. The student will gain an understanding of:	Learning outcome. The student will be able to:

Optional Topics contd.

Abandonment		

Tertiary Well Control		

Syllabus Category	Learning objective. The student will gain an understanding of:	Learning outcome. The student will be able to:

Optional Topics contd.

Other Lifecycle Considerations		

Well Planning Considerations		

Syllabus Category	Learning objective. The student will gain an understanding of:	Learning outcome. The student will be able to:

Optional Topics contd.

Barrier Integrity Assurance		

Regulatory Requirements		

Syllabus Category	Learning objective. The student will gain an understanding of:	Learning outcome. The student will be able to:

Additional Topics

