SQA Advanced Unit Specification

General information for centres

Unit title: Oilfield Drilling Techniques and Operations

Unit code: HV9H 48

Unit purpose: On completion of the Unit the candidate should be able to understand the significance of wellbore hydraulics and abnormal influxes, and methods for controlling them. The Unit also involves investigating complex oilfield drilling operations.

On completion of the Unit the candidate should be able to:

1 Use routine calculations for wellbore hydraulics.
2 Techniques required to identify and control abnormal well influxes (kicks) are described correctly.
3 Investigate complex oilfield drilling operations.

Credit points and level: 1 SQA Credit at SCQF level 8: (8 SCQF credit points at SCQF level 8*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from National 1 to Doctorates*.

Recommended prior knowledge and skills: Entry to this is Unit should take place after completion of HV4N 47 *Oilfield Drilling Techniques and Operations: An Introduction*.

Core Skills: There are opportunities to develop the Core Skills of *Communication, Information Technology, Problem Solving* and *Numeracy* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Context for delivery: If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

Assessment: Assessment for Outcome 1 of this Unit will be by successful completion of a case study. Outcome 2 will be assessed by a case study. Outcome 3 will be assessed by means of an investigative assignment.

Unit specification: statement of standards

Unit title: Oilfield Drilling Techniques and Operations

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The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Use routine calculations for wellbore hydraulics

Knowledge and/or Skills

- Pressure losses in circulating systems
- Equivalent circulating density
- Surge and swab pressures

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- understands significance and consequences of pressure losses
- knows significance of pressure increases
- can demonstrate application of standard formulae

Assessment Guidelines

Candidates must demonstrate knowledge and understanding by the successful completion of a case study that tests two of the Knowledge and/or Skills elements.

Outcome 2

Techniques required to identify and control abnormal well influxes (kicks) are described correctly

Knowledge and/or Skills

- Reasons for abnormal fluid influx
- Indications that an influx has occurred
- Well pressure control methods

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- describe the reasons contributing to abnormal fluid influx
- justify from given data that an abnormal fluid influx has occurred
- calculate from given data the kill mud weight required to control a specific influx
- describe one standard method used to control a specific influx

Assessment Guidelines

Candidates must demonstrate knowledge and understanding by the successful completion of a case study that tests one of the first two Knowledge and/or Skills bullet points and bullet point three.

Outcome 3

Investigate complex oilfield drilling operations

Knowledge and/or Skills

- Wellbore surveying
- Fishing and milling
- Coring
- Directional drilling
- Horizontal drilling

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can identify and justify the use of the equipment required to carry out drilling operations:

- wellbore surveying
- fishing and milling
- coring
- directional drilling
- horizontal drilling

Assessment Guidelines

Candidates must demonstrate knowledge and understanding by undertaking an assignment that assesses three from the five Knowledge and/or Skills elements. This assignment should be completed within a specified allocated time.

Administrative information

Unit code: HV9H 48

Unit title: Oilfield Drilling Techniques and Operations

Superclass category: YB

Original date of publication: November 2017

Version: 01

History of changes:

Version	Description of change	Date

Source: SQA

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of SQA Advanced Qualifications.

FURTHER INFORMATION: Call SQA's Customer Contact Centre on 44 (0) 141 500 5030 or 0345 279 1000. Alternatively, complete our Centre Feedback Form.

Unit specification: support notes

Unit title: Oilfield Drilling Techniques and Operations

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

This Unit is a mandatory/optional Unit within SQA Advanced Petroleum Engineering. It is designed to provide candidates with an understanding of the significance of wellbore hydraulics and abnormal influxes, and methods for controlling them. The Unit also involves investigating **complex oilfield drilling operations**.

Outcome 1

This Outcome is intended to introduce candidates to the calculations required in the evaluation of wellbore hydraulics. It is anticipated that pressure losses in circulating systems would be dealt with and equivalent circulating density and surge and swap pressures introduced.

Outcome 2

In this Outcome it is anticipated that the reasons for abnormal fluid influx occurring would include the following:

- abnormal pressured formation
- lost circulation
- sudden loss of circulating pressure
- hole filling when pulling pipe during a trip
- swabbing

The reasons for influxes occurring would be dealt with also. These would include:

- flowing well
- pit gain
- drilling breaks
- gas cut mud
- gas kicks
- shows of oil or salt water in mud
- reduced circulating pressure

Well pressure control methods would include calculation of gas densities and kill mud weight, and would involve descriptions of Drillers and Wait and Weight methods of well control.

Outcome 3

This Outcome will introduce the basic concepts of and equipment used in:

- wellbore surveying
- fishing and milling
- coring
- directional drilling
- horizontal drilling

The introduction of these concepts is not intended to be in depth but to a sufficient level to allow the candidate to obtain sufficient information to gain a basic understanding of the concepts involved. The candidate would be expected to submit a written report based on the investigation of three of the above bullet points chosen by the lecturer. The other two bullet point items should be covered by lectures, discussions etc.

Candidates should be given a list of sources to allow the assignment to be completed successfully. These sources might include texts, journals, websites/Internet, and company literature.

Guidance on the delivery and assessment of this Unit

This Unit will probably be delivered as part of a Group Award designed to provide candidates with technical knowledge and skills for employment in the petroleum engineering industries.

While the use of case study material is particularly recommended for both learning and teaching components of this Unit, other suggested teaching and learning methods for this Unit could include: the use of visual aids, information communication technology, group lectures and discussion, practical demonstrations, question and answer sessions, directed study, industrial/site visits.

Formative work for this Unit could include group discussion and role play emphasising workplace health and safety issues and events specific to petroleum engineering. Such an approach could be beneficial to those candidates without industrial experience.

Assessment strategies for this Unit will include:

Outcome 1

Assessment for this Outcome is by means of a case study.

Outcome 2

Assessment for this Outcome is by means of a case study.

Outcome 3

Assessment for this Outcome is by means of an investigative assignment.

Opportunities for developing Core Skills

There are opportunities to develop the Core Skills of *Communication, Information Technology, Problem Solving* and *Numeracy*, at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components. This SCQF level 8 Unit deals with complex information covering a range of complex drilling techniques and operations, which will require candidates to access a wide range of resources to support their learning. This will involve reading and interpreting information from textbooks as well as online resources. These learning, teaching approaches as well as the requirement for the assessment to contain some extended response questions will allow candidates to develop their *Information Technology* and *Problem Solving* skills at SCQF level 6. The fact that much of the information will be in graphical form and that calculations will have to be carried out will ensure that candidates will be developing *Numeracy* at SCQF level 6.

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance. A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes.

Equality and inclusion

This Unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website www.sqa.org.uk/assessmentarrangements.

General information for candidates

Unit title: Oilfield Drilling Techniques and Operations

This Unit is about providing candidates with an understanding of the significance of wellbore hydraulics and abnormal influxes, and methods for controlling them. The Unit also involves investigating complex oilfield drilling operations.

Before undertaking this Unit it is expected that you already have knowledge and experience of *Oilfield Drilling Techniques and Operations: An Introduction.*

You will gain knowledge and understanding of the following:

Outcome 1

This Outcome introduces and understanding of the significance and consequences of pressure losses and increases.

You will also be asked to demonstrate an application of standard formulae in calculation of pressure losses and increases in a circulating system, and to identify and control abnormal well influxes (kicks).

Outcome 2

This Outcome introduces candidates to the techniques required to identify and control abnormal well influxes (kicks).

Outcome 3

This Outcome introduces you to the following operational concepts: wellbore surveying, fishing and milling, coring, directional and horizontal drilling.

Assessments for this Unit are likely to take the form of successful completion of case studies for Outcomes 1 and 2 and an investigative assignment for Outcome 3.