

-SQA- SCOTTISH QUALIFICATIONS AUTHORITY

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION

GENERAL INFORMATION

-Module Number- 3320016

-Session-1996-97

-Superclass- RF

-Title- INTRODUCTION TO OILFIELD GEOPHYSICS

-DESCRIPTION-

GENERAL COMPETENCE FOR UNIT: This module will enable the student to acquire a knowledge of hydrocarbon characteristics and rock characteristics/structures that can make up an oil reservoir.

OUTCOMES

1. explain the basic principles of geology;
2. describe the accepted theory of oil formation and hydrocarbon characteristics;
3. describe the basic reservoir types, rock characteristics and reservoir flow.

CREDIT VALUE: 0.5 NC Credit

ACCESS STATEMENT: No formal entry qualifications are required for this module.

For further information contact: Committee and Administration Unit, SQA, Hanover House, 24 Douglas Street, Glasgow G2 7NQ.

Additional copies of this unit may be purchased from SQA (Sales and Despatch section). At the time of publication, the cost is £1.50 (minimum order £5.00).

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION

STATEMENT OF STANDARDS

UNIT NUMBER: 3320016

UNIT TITLE: INTRODUCTION TO OILFIELD GEOPHYSICS

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

OUTCOME

1. EXPLAIN THE BASIC PRINCIPLES OF GEOLOGY

PERFORMANCE CRITERIA

- (a) The explanation of the formation of the three basic rock types is correct.
- (b) The explanation of geological era's is correct in terms of progression and timescale.
- (c) The description of the basic mechanism of faulting is correct.

RANGE STATEMENT

Basic rock types: Igneous; sedimentary; metamorphic.

EVIDENCE REQUIREMENTS

Oral/written evidence is required to show that the candidate can describe the major forces behind the formation of rock and rock strata.

OUTCOME

2. DESCRIBE THE ACCEPTED THEORY OF OIL FORMATION AND HYDROCARBON CHARACTERISTICS

PERFORMANCE CRITERIA

- (a) The description of the conditions necessary for oil or gas to form is correct.
- (b) The description of the process of oil formation from plankton is correct.
- (c) The description of the possible constituents and characteristics of hydrocarbons present in reservoirs is correct.

RANGE STATEMENT

Conditions: effect of heat; pressure; time; lack of oxygen.

EVIDENCE REQUIREMENTS

Oral/written evidence is required to show that the candidate can describe the conditions and processes necessary for oil or gas to form, and describe oil characteristics/contaminants.

OUTCOME

- 3. DESCRIBE THE BASIC RESERVOIR TYPES, ROCK CHARACTERISTICS AND RESERVOIR FLOW

PERFORMANCE CRITERIA

- (a) The description of what is necessary for a reservoir to contain oil/gas is correct.
- (b) The explanation of the effect of porosity and permeability on a reservoirs volume and flow is correct.
- (c) The description of basic reservoir drives is correct.

RANGE STATEMENT

The range for this outcome is fully specified within the performance criteria.

EVIDENCE REQUIREMENTS

Oral/written evidence is required to show that the candidate can describe and explain the fundamentals of the basic reservoir types, rock characteristics and reservoir flow.

ASSESSMENT

In order to achieve this unit, candidates are required to present sufficient evidence that they have met all the performance criteria for each outcome within the range specified. Details of these requirements are given for each outcome. The assessment instruments used should follow the general guidance offered by the SQA assessment model and an integrative approach to assessment is encouraged. (See references at the end of support notes).

Accurate records should be made of the assessment instruments used showing how evidence is generated for each outcome and giving marking schemes

and/or checklists, etc. Records of candidates' achievements should be kept. These records will be available for external verification.

SPECIAL NEEDS

In certain cases, modified outcomes and range statements can be proposed for certification. See references at end of support notes.

© Copyright SQA 1996

Please note that this publication may be reproduced in whole or in part for educational purposes provided that:

- (i) no profit is derived from the reproduction;
- (ii) if reproduced in part, the source is acknowledged.

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION**SUPPORT NOTES****UNIT NUMBER:** 3320016**UNIT TITLE:** INTRODUCTION TO OILFIELD GEOPHYSICS

SUPPORT NOTES: This part of the unit specification is offered as guidance. None of the sections of the support notes is mandatory.

NOTIONAL DESIGN LENGTH: SQA allocates a notional design length to a unit on the basis of time estimated for achievement of the stated standards by a candidate whose starting point is as described in the access statement. The notional design length for this unit is 20 hours. The use of notional design length for programme design and timetabling is advisory only.

PURPOSE The purpose of this unit is to enable candidates to understand how a reservoir is formed, the types and nature of oil and gas reservoirs and to understand the characteristics and nature of hydrocarbons found in reservoirs. It is aimed at those who have no knowledge of geology (oilfield or otherwise) and may lead into more advanced units such as 'Introduction to Oilfield Production'.

SQA publishes summaries of NC units for easy reference, publicity purposes, centre handbooks, etc. The summary statement for this unit is as follows:

This module will give candidates an introduction to the basic principles of Geology used in oil exploration. Candidates will be able to explain the characteristics of hydrocarbons and describe the rock characteristics and structures that can make up an oil reservoir.

CONTENT/CONTEXT Corresponding to Outcomes 1-3:

1. The explanation of the formation of igneous, sedimentary and metamorphic rock should include rock cycle and the Law of Superposition. How rock strata is laid down and basically identified. Basic fault types and the effect of plate tectonics on faulting.
2. The effect of heat, pressure, time and lack of Oxygen on the formation of hydrocarbons. API units for density, meaning of WOR, GOR, wax. What is meant by sweet or sour oil. The basic contaminants of oil and gas.
3. Reservoir formation rocks such as sandstone and limestone; effect of caprock; source of the oil for the reservoir. Basic reservoir types, anticlines and fault traps, rock porosity/permeability. Basic volume calculations taking account of porosity WOR, GOR and recovery factor. Reservoir drives to include gas cap drive, water drive and combination

drive and their effects on the reservoirs GOR and WOR over time. The effects of permeability on reservoir flow.

A system approach is advocated in which the formation of oil, its migration to a reservoir and the forces that produce hydrocarbons from a reservoir are seen as logical steps. The timescale of the formation of oil should be emphasised as should the volumes that are associated with a normal size reservoir (basic reservoir calculations should be done in order to bring this to the attention of the candidates).

The unit should provide opportunities to:

- see a variety of fault types
- see the basic reservoir types
- handle rock samples
- see different types of oil

APPROACHES TO GENERATING EVIDENCE The teaching approach should be mainly student centred with the tutor/trainer playing an advisory role and providing specialised instruction where and when required.

Labs/workshops should be incorporated into the teaching of the module when and where appropriate.

Techniques which cannot be demonstrated should be covered by site visits, videos, slides, rock and oil samples.

Students should be presented with information, drawings and diagrams of the processes described.

There should be scope for the utilisation of skills acquired previously or within parallel skills modules.

This module should be taught using oilfield units as well as SI units.

ASSESSMENT PROCEDURES Outcome 1 can be assessed in short answer questions.

Outcomes 2 and 3 can be taught and assessed simultaneously in the form of worksheets and short answer questions.

PROGRESSION This module could be used as part of a grouping of NC modules which might provide entry to HNC and HND level awards, in engineering or related subjects.

RECOGNITION Many SQA NC units are recognised for entry/recruitment purposes. For up-to-date information see the SQA guide 'Recognised Groupings of National Certificate Modules'.

REFERENCES

1. Guide to unit writing. (A018).
2. For a fuller discussion on assessment issues, please refer to SQA's Guide to Assessment. (B005).
3. Procedures for special needs statements are set out in SQA's guide 'Candidates with Special Needs'. (B006).
4. Information for centres on SQA's operating procedures is contained in SQA's Guide to Procedures. (F009).
5. For details of other SQA publications, please consult SQA's publications list. (X037).

© Copyright SQA 1996

Please note that this publication may be reproduced in whole or in part for educational purposes provided that:

- (i) no profit is derived from the reproduction;
- (ii) if reproduced in part, the source is acknowledged.