



Higher National Unit specification

General information for centres

Unit title: Petroleum Industry: Organisation, Products and Processes

Unit code: F811 34

Unit purpose: The purpose of this Unit is to give candidates an overview of the petroleum industry in respect of the organisation of the petroleum industry, the products produced by the industry and the processes through which those products are produced. This Unit has been designed primarily to provide candidates with broad knowledge and understanding of the petrochemical industry in a number of core business aspects to better prepare them for employment as a process/plant operator or technician.

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

- 1 Explain the Organisation of the Petroleum Industry.
- 2 Evaluate the products of the Petroleum Industry.
- 3 Explain the processes involved in the production and manufacture of petroleum products.

Credit points and level: 1HN credit at SCQF level 7: (8 SCQF credit points at SCQF level 7*)

**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 Access 1 to Doctorates.*

Recommended prior knowledge and skills: Access to this Unit is at the discretion of the centre.

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

Context for delivery: This Unit was developed as a mandatory Unit within the context of the HNC/D award in Petroleum Process Technology, Operations and Control. If this Unit is delivered as part of another 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: Outcomes 1, 2 and 3 may be assessed together or individually. Assessments should be composed of a suitable balance of short answer, restricted response and structured questions. Assessment must be carried out under controlled, closed-book, supervised conditions. Any single assessment event covering Outcomes 1, 2 and 3 should last no more than three hours.

Candidates must achieve all of the minimum evidence specified for each outcome in order to pass the Unit.

Higher National Unit specification: statement of standards

Unit title: Petroleum Industry: Organisation, Products and Processes

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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

Explain the organisation of the petroleum industry

Knowledge and/or Skills

- ◆ Exploration and production
- ◆ Refining and petrochemical manufacture
- ◆ Storage, transportation and distribution
- ◆ Employment categories
- ◆ Business environment

Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can explain the organisation of the petroleum industry encompassing the upstream and downstream sectors.

Evidence for this Outcome will be provided on a sample basis with candidates being required to provide evidence for three of the five Knowledge and/or Skills items. Assessment must be carried out under controlled, closed-book, supervised conditions.

Candidates will be required to provide evidence to demonstrate their Knowledge and/or Skills by showing they can explain:

- ◆ The organisation of exploration and production processes including the history and the different steps involved in the upstream and downstream parts of the industry.
- ◆ The organisation of the refining and manufacturing of petrochemicals from raw products and the need for these petrochemicals.
- ◆ The organisation of the storage and transportation of products including marine logistics and pipeline terminals.
- ◆ The organisation of the distribution of products including gas transport.
- ◆ The organisation of the different employment categories and define a typical production plant organisational structure.
- ◆ The fundamentals of petroleum economics.

Higher National Unit specification: statement of standards (cont)

Unit title: Petroleum Industry: Organisation, Products and Processes

Assessment Guidelines

Outcome 1 may be assessed separately with a planned duration of approximately one hour. Assessments could be composed of a suitable balance of short answer, restricted response and structured questions. Alternatively Outcome 1 may be assessed in conjunction with Outcome 2 and/or 3. Assessment must be carried out under controlled, closed-book, supervised conditions.

Outcome 2

Evaluate the products of the petroleum industry

Knowledge and/or Skills

- ◆ Raw products — crude oil and gas
- ◆ Refined products
- ◆ Petrochemicals
- ◆ Polymers
- ◆ Pharmaceuticals

Evidence Requirements

Candidates will need to provide evidence to demonstrate their knowledge and/or skills by showing that they can evaluate the products of the petroleum industry across the range of crude, refined and by-products.

Evidence for the Knowledge and/or Skills items in Outcome 1 will be assessed through sampling. Candidates will be assessed on three of the five items in the knowledge and skills list. Assessment must be carried out under controlled, closed-book, supervised conditions.

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

- ◆ Name and evaluate the raw products of crude oil and gas, including alkanes, alkenes and aromatics.
- ◆ Name and evaluate the different refined products including LPG, petrol, diesel, kerosene and bitumen.
- ◆ Name and evaluate the products of petrochemical processes, such as rubbers and pigments.
- ◆ Name and evaluate the products of the polymerisation reaction such as plastics, synthetic fibres and detergents.
- ◆ Name and evaluate the products of the petrochemical industry used in the pharmaceutical industry including diuretics, anti-bacterial and anti-inflammatory products.

Assessment Guidelines

Outcomes 2 may be assessed separately with a planned duration of approximately one hour. Assessments could be composed of a suitable balance of short answer, restricted response and structured questions. Alternatively Outcome 2 may be assessed in conjunction with Outcome 1 and/or 3. Assessment must be carried out under controlled, closed-book, supervised conditions.

Higher National Unit specification: statement of standards (cont)

Unit title: Petroleum Industry: Organisation, Products and Processes

Outcome 3

Explain the processes involved in the production and manufacture of petroleum products

Knowledge and/or Skills

- ◆ Geological surveying
- ◆ Drilling
- ◆ Well completions
- ◆ Extraction
- ◆ Separation
- ◆ Gas-to-liquid/liquid-to-gas
- ◆ Refining and treatment
- ◆ Production control
- ◆ Quality control

Evidence Requirements

Candidates will need to provide evidence to demonstrate their knowledge and/or skills by showing that they can explain the petroleum industry processes involved in the production of crude, refined and by-products.

Evidence for this outcome will be provided on a sample basis with candidates being required to provide evidence for five of the nine Knowledge and/or Skills items. Assessment must be carried out under controlled, closed-book, supervised conditions.

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

- ◆ Types of geological surveying including the different methods on and offshore.
- ◆ Types of drilling rig, its main components and the different types of well that may be drilled.
- ◆ Parts of a well completion and well casing.
- ◆ Main components of a Christmas tree.
- ◆ Main components of a three phase separator.
- ◆ The process of gas-to-liquid/liquid-to-gas for transportation.
- ◆ Refining processes and how the products of refining are treated.
- ◆ Control of separator parameters
- ◆ Laboratory tests conducted on a typical production plant, and describe the issue of corrosion in pipelines.

Assessment Guidelines

Outcome 3 may be assessed separately with a planned duration of approximately one hour. Assessments could be composed of a suitable balance of short answer, restricted response and structured questions. Assessment must be carried out under supervised exam conditions. Alternatively, Outcome 3 may be assessed in conjunction with Outcomes 1 and/or 2.

Administrative Information

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| Unit code: | F811 34 |
| Unit title: | Petroleum Industry: Organisation, Products and Processes |
| Superclass category: | YC |
| Original date of publication: | August 2009 |
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History of changes:

| Version | Description of change | Date |
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Higher National Unit specification: support notes

Unit title: Petroleum Industry: Organisation, Products and Processes

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

The Unit has been developed as part of the HNC/HND Petroleum Process Technology, Operations and Control. However this does not preclude the use of this Unit as a stand-alone Unit or to contribute to other HN awards where it is relevant and appropriate. This Unit has been designed primarily to provide candidates with a broad knowledge and understanding of the petrochemical industry in a number of core business aspects to better prepare them for employment as a process/plant operator or technician. A list of topics for each Outcome is given below.

Outcome 1: Candidates will be expected to explain the organisation of the petrochemical industry covering individual activities within the upstream and downstream segments of the industry. This would include:

- ◆ Exploration/geo-seismic surveying
- ◆ Drilling and well completions
- ◆ Top-side production
- ◆ Refining and petrochemical manufacture
- ◆ Storage, transportation and distribution
- ◆ Health, safety and the environment
- ◆ Business environment embracing petroleum economics and asset management
- ◆ International oil companies, oil services companies, contractor supply chain, commercial outlets for products

Outcome 2: Candidates should be able to describe the prime range of products of the petrochemical industry. This would include:

- ◆ Crude oil
- ◆ Raw natural gas
- ◆ Natural gas liquids (NGL), liquid petroleum gas (LPG), liquefied natural gas (LNG)
- ◆ Refined petroleum products — diesel, petrol, methane, butane, benzene, ethylene, propylene
- ◆ By-products — pharmaceuticals, plastics/polymers, rubber, foam, solvents, explosives, adhesives

Higher National Unit specification: support notes (cont)

Unit title: Petroleum Industry: Organisation, Products and Processes

Outcome 3: Candidates would be expected to describe the processes involved in the production and manufacture of petroleum products. This would include:

- ◆ Hydrocarbon exploration
- ◆ Drilling operations
- ◆ Well operations/logging/artificial lift
- ◆ Oil and gas separation, measurement and collection
- ◆ Gas processing and treatments
- ◆ Refining processes — distillation/fractioning/cracking
- ◆ Metering and sampling operations
- ◆ Process measurement and control operations
- ◆ Utility services
- ◆ Storage — production top side/refined products/points of distribution
- ◆ Transport — pipeline/road/sea

Guidance on the delivery and assessment of this Unit

This Unit was developed as a mandatory Unit within the context of the HNC/HND award in Petroleum Process Technology, Operations and Control. It may also be used as a stand-alone Unit.

This Unit will provide a sound general foundation for progression to more specialist Units within petrochemical process technology disciplines. As such, if this Unit is delivered as part of the HNC/HND award in Petroleum Process Technology, Operations and Control it is preferable if it were to be delivered at the beginning of the course to put the specialist Units in context of the industry organisation.

It is intended that the Unit be delivered in the broad context of the whole petrochemical industry, with a detailed focus given to a particular sector of the petrochemical industry relevant to the needs of the candidates.

The Unit lends itself to a variety of delivery modes that include lectures, tutorials, case studies, group discussions, research activities and industry visits. There are no requirements for practical work within this Unit. However, candidates should have access to information on petrochemical industry covering the scope of the learning embraced within the Unit Outcomes.

It is recommended that the Unit be delivered in the order in which the Outcomes are stated as this provides a logical progression through the topics of learning.

Outcomes 1, 2 and 3 may be assessed separately as one-hour assessments or together as a three hour assessment. Assessments could be composed of a suitable balance of short answer, restricted response and structured questions which should be carried out under controlled, supervised conditions. Centres may wish to use a case study in whole or part of the Unit for formative assessment, especially to enhance the learning and assessment experience focussing on the details of a particular sector of the petrochemical industry.

Higher National Unit specification: support notes (cont)

Unit title: Petroleum Industry: Organisation, Products and Processes

The single assessment should be carried out at the end of the delivery of the Unit. Separate individual assessments should be carried out at the end of the delivery of each Outcome.

It should be noted that the candidates must achieve all the minimum evidence specified for each Outcome in order to pass the Unit. Where sampling of knowledge and skills items is used for assessment, the sampling should be selected to meet the specific needs of the candidate cohort within the context of their current employment or progression goals.

Details on approaches to assessment are given under Evidence Requirements and Assessment guidelines under each Outcome in the Higher National Unit specification: Statement of Standards section. It is recommended that these sections be read carefully before proceeding with assessment of candidates.

Opportunities for developing Core Skills

There may be opportunities to develop the Core Skill of *Communication* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Open learning

This Unit could be delivered by distance learning, which may incorporate some degree of on-line support. With regard to assessment, planning would be required of the centre concerned to ensure the sufficiency and authenticity of candidate evidence. Arrangements would be required to be put in place to ensure that assessments were conducted under controlled, supervised conditions. Agreement would have to be made to ensure that a single assessment for the end test is delivered in a supervised environment under controlled conditions.

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website www.sqa.org.uk/assessmentarrangements

General information for candidates

Unit title: Petroleum Industry: Organisation, Products and Processes

This Unit has been designed to allow you to develop a broad foundation knowledge and understanding of the petrochemical industry that will contribute to your development as a within the petroleum industry as a process operations technician or a measurement and control technician within this industry. The vocational focus of this Unit combines the necessary blend of organisational aspects together with business issues such as an introduction to petroleum economics and the product range of this key industrial sector. A substantial component of this Unit provides an over view of the prime technological processes embraced within the petrochemical industry with knowledge of their applications in a safety and environmentally critical context.

The Unit comprises the following broad outcomes:

- 1 Explain the organisation of the petroleum industry.
- 2 Evaluate the products of the petroleum industry.
- 3 Explain the processes involved in the production and manufacture of petroleum products.

Within this Unit, you will also have opportunities to develop the transferable Core Skill of *Communication*, although this is not separately certificated.

Access to this Unit fully inclusive and at the discretion of your SQA approved delivery centre

This Unit can be delivered on a full-time, block release, open or blending learning, part-time day or part-time evening basis at the discretion of your SQA approved delivery centre. Learning and teaching methods may include lectures, tutorials, group work, and case studies. The use of flexible learning through on-line materials and methodologies may be used to supplement and support the learning that takes place in the delivery centre.

Formal assessment of this Unit may take the form of Outcomes 1, 2 and 3 assessed together or individually. Assessments will be in the form of short answer, restricted response and structured questions

Assessments will normally be conducted at the end of the delivery of each Outcome. Where assessments are combined, these may be conducted toward the end of the Unit. Assessment will be carried out under controlled, closed-book, supervised conditions.