

SQA Advanced Unit specification

General information for centres

Unit title: Pollution and Waste Management: An Introduction

Unit code: HW9J 47

Unit purpose: This unit is intended to introduce the candidate to man-made pollution and waste issues in a non-agricultural context and assess the effectiveness of ways of mitigating these. On completion of the unit the candidate should be able to:

- 1 describe the sources and effects of pollution on the environment
- 2 explain the key principles of pollution control
- 3 describe the key principles involved in waste management
- 4 assess the effectiveness of a system for dealing with pollution and waste problems in a specific context

Credit points and level: 1 SQA 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 National 1 to Doctorates.*

Recommended prior knowledge and skills: Entry is at the discretion of the centre. Although there is no specialist prior knowledge required it would be beneficial if the candidate had at least two scientific, technical or environmental subjects at SCQF level 6 or equivalent, or substantial relevant work experience.

Core skills: There may be opportunities to gather evidence towards the core skills component Written Communication of the core skill *Communication*, the core skills component of ‘work with others in a group to analyse, plan and complete an activity’ of the core skill *Working with Others*, and the core skills components Critical Thinking and Reviewing and Evaluating of the core skill *Problem Solving*; all of which are at SCQF level 6 in this unit. There is, however, 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: Suggested methods for this unit are two separate instruments of assessment: a combination of short answer and extended response questions to assess Outcomes 1 and 3, and an assignment or short case study to assess Outcomes 2 and 4.

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SQA Advanced Unit Specification: statement of standards

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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

Describe the sources and effects of pollution on the environment

Knowledge and/or skills

- ◆ Sources of pollutants
- ◆ Effects of pollutants on the environment
- ◆ Quantifying polluting potential

Evidence requirements

Candidates will need to provide evidence to demonstrate their knowledge and/or skills by showing that they can describe:

- ◆ a minimum of three common sources of pollutants
- ◆ the effects of at least three pollutants on the environment
- ◆ a minimum of three of the principal parameters used in the measurement of polluting potential

Assessment guidelines

This outcome could be assessed by means of a closed-book, supervised assessment task using short and extended response questioning. It is recommended that this assessment be combined with the assessment for Outcome 3 as the Outcomes are related and of a similar format. A maximum time of one hour is suggested for the combined assessment.

Outcome 2

Explain the key principles of pollution control

Knowledge and/or skills

- ◆ Pollution risk assessment
- ◆ Principles of pollution control
- ◆ Legislative framework for pollution control

Evidence requirements

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

- ◆ conduct a risk assessment of a given situation with the potential to pollute. This must include identification of pollution hazards, an evaluation of the likelihood of a pollution problem occurring and an assessment of the possible consequences.
- ◆ explain at least four measures which could minimise the risk of pollution in the given situation
- ◆ outline the principal piece of anti-pollution legislation of relevance to the given situation

Assessment guidelines

This outcome could be assessed by means of a report, produced under open-book, unsupervised conditions. It is recommended that this assessment be combined with the assessment for Outcome 4 as the outcomes are related and of a similar format. A combined report of 1,200 words or equivalent would be sufficient to generate the required evidence.

Outcome 3

Describe the key principles involved in waste management

Knowledge and/or skills

- ◆ Types of waste
- ◆ Legislative framework for waste
- ◆ Waste hierarchy
- ◆ Principles of recycling
- ◆ Waste disposal

Evidence requirements

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

- ◆ define the broad categories that are used to classify different types of waste
- ◆ identify at least two important pieces of legislation to control waste
- ◆ describe the five steps in the waste hierarchy
- ◆ describe three main principles of recycling
- ◆ describe the two principal options for waste disposal, alongside potential environmental consequences of each

Assessment guidelines

This outcome could be assessed by means of a closed-book, supervised assessment task using short and extended-response questioning. It is recommended that this assessment be combined with the assessment for Outcome 1 as the Outcomes are related and of a similar format. A maximum time of one hour is suggested for the combined assessment.

Outcome 4

Assess the effectiveness of a system for dealing with pollution and waste problems in a specific context

Knowledge and/or skills

- ◆ Waste and pollution audit
- ◆ Pollution control and waste management measures

Evidence requirements

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

- ◆ conduct a waste and pollution audit for a given situation. Included in the audit will be details of pollution emissions and waste, an assessment of risks, and details of relevant pollution and waste legislation
- ◆ evaluate both existing or potential pollution control and waste management measures for the given situation and provide suggestions for minimising waste, pollution and risks in the future

Assessment guidelines

This outcome could be assessed by means of a report, produced under open-book, unsupervised conditions, on a given waste producing situation. It is recommended that this assessment be combined with the assessment for Outcome 2 as the outcomes are related and of a similar format. A combined report of 1,200 words or equivalent would be sufficient to generate the required evidence. It is suggested that emphasis and importance is placed on the gathering and logical consideration of relevant factors, rather than the conclusion itself.

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Administrative information

Unit code:	HW9J 47
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Version	Description of change	Date

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SQA Advanced Unit Specification: support notes

Unit title: Pollution and Waste Management: An Introduction

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 intended context of this unit is a small to medium-scale non-agricultural enterprise in the UK.

The first part of the unit looks at pollution and waste in general: common sources, effects on the environment and how pollution and waste can be controlled. In the second part of the unit, a given situation is investigated and assessed for the effectiveness of systems for dealing with pollution and waste problems.

Outcome 1 provides an overview of common pollutants and their sources. This may include emissions from combustion plant, transport systems, typical manufacturing processes, residential and commercial buildings etc. The parameters used to quantify polluting potential (masses and volumes, concentrations, biochemical oxygen demand (BOD), suspended solids (SS), bacterial count) are discussed alongside the effect of the various pollutants on the environment: the soil, water and the atmosphere.

Outcome 2 begins by looking at pollution risk assessment. This involves identifying pollution hazards, the risk of a pollution event occurring, and the possible consequences. This leads on to consideration of the principles of pollution control and in particular the order in which pollution control measures should be applied, with avoidance of pollution to be considered first, followed by minimisation, engineering controls and a brief look at treatment methods. All this will be set in the context of the current legislative framework. It may be worthwhile to link this in with the delivery of Outcome 4, discussed below.

Outcome 3 moves on to the closely related issue of waste. How waste is classified is fundamental to the legislative situation, so this is covered before looking at the concept, and feasibility, of zero waste. This leads to consideration of the waste hierarchy and investigation of some of the issues surrounding recycling (for example: the need to “design-in” recycling from the start, waste segregation, importance of markets for recycled materials), and the environmental consequences of waste disposal (non-sustainability of landfill, groundwater pollution, atmospheric emissions, alternatives to landfill).

Outcome 4 is a synthesis of the preceding content. This involves scrutiny of either a real or fictitious situation that produces waste and pollution. After assessing the current waste and pollution outputs, existing or potential pollution control and waste management strategies are explored and evaluated. This part of the unit would be best delivered in a more candidate-centred style than the generic material covered earlier, ideally with the situation under investigation from an area of vocational or personal interest to the candidates.

Guidance on the delivery and assessment of this unit

This unit is best delivered using a variety of methods and media. There is a large amount of resource material on waste and pollution available, but much of it is industry-specific, so it is important that what is used is clearly relevant to the context of the unit, which will depend on the interests of the candidate group. If a real situation is used for Outcome 4, a visit to the site would be especially valuable in helping the candidates appreciate the issues involved.

The assessment for Outcomes 1 and 3 could be a closed-book, supervised assessment task. It is suggested that it could take the form of a combination of short answer and extended response questions. Outcomes 2 and 4 could be assessed by means of a report, of approximately 1200 words or equivalent, that audits the pollution emissions and waste from the chosen situation, assesses the risks and outlines the relevant pollution and waste legislation. The report should discuss and evaluate existing or possible future measures to minimise emissions and waste. It would be beneficial for the scenario examined to be as realistic as possible; but the importance of the exercise is to ensure that the relevant issues are considered in a logical and balanced fashion, rather than to obtain a 'correct' answer.

Opportunities for developing core skills

There may be opportunities to gather evidence towards the core skills component Written Communication of the core skill *Communication*, the core skill *Working with Others* and the core skills components Critical Thinking and Reviewing and Evaluating of the core skill *Problem Solving*; all of which are at SCQF level 6 in this unit. There is, however, no automatic certification of core skills or core skills components. Outcomes 2 and 4 have opportunities to develop both components of the core skill of *Problem Solving* as this outcome involves the candidates conducting a pollution risk assessment and audit. This will most likely be done in a group, so involve development of the core skill of *Working with Others*, and will require the production of a report, thus further developing the *Communication* (potentially Written or Oral Communication).

Open learning

This unit could be delivered by distance learning. However, it would require planning by the centre to ensure the sufficiency and authenticity of candidate evidence. Arrangements would have to be made to ensure that the assessments for Outcomes 1 and 3 are delivered in a supervised environment under controlled conditions. One possibility would be the use of on-line assessment.

General information for candidates

Unit title: Pollution and Waste Management: An Introduction

The linked issues of pollution and waste are fundamental to the ability of man to survive and thrive on the planet in a sustainable way. This unit will introduce you to the sources and effects of pollution and the principles involved in its minimisation and control. Waste and its management will be similarly investigated. This unit aims to equip you with not just the knowledge and skills required to understand the issues involved with pollution and waste, but to enable you to propose and evaluate ways of minimising the problems.

The unit begins by looking at common sources of pollution, how polluting potential is measured and the effects of pollution on the environment. It covers pollution risk assessment, the principles of pollution control and the legislative framework relevant to pollution.

Waste and its effective management are investigated. Underpinning these is the classification of waste types, leading on to the important concept of the waste hierarchy. The principles behind recycling are looked at, as are the environmental issues of waste disposal.

Finally, you will examine a situation with both waste and pollution issues. You will identify these and evaluate ways that the pollution and waste outputs can be minimised.

This unit will normally be delivered in a classroom environment but with at least one site visit, ideally the situation used for the pollution risk assessment and audit.

There are opportunities for you to develop core skills in the unit. Conducting the risk assessment and undertaking a waste audit will require *Problem Solving* skills and, where required, producing a report will require application of *Communication* skills.

Suggested methods of assessment for this unit are a combination of short answer and extended response questions to assess Outcomes 1 and 3 and an assignment or short case study to assess Outcomes 2 and 4.