

# Unit title: Laboratory Management

Unit code: **L/601/0222**

Level: **5**

Credit value: **15**

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## Aim

This unit enables learners to gain an understanding of the organisation of different types of laboratory and compare the processes associated with their management.

## Unit abstract

Many learners studying at this level will either have supervisory duties or may move into such a role in the future. This unit examines typical responsibilities of laboratory managers. Types of laboratories considered include contract analytical laboratories, project laboratories supporting innovation in and efficiency of a manufacturing process, quality control laboratories associated with manufacturing, and educational laboratories.

Management roles within these laboratories vary widely. With contract analysis, the emphasis is on providing accurate, accredited and legally defensible results. Project laboratories may carry out pilot studies on how products or production processes may be altered. By focusing on quality control they ensure that products made and supplied have properties within the tolerances specified by the customer. They may also test raw materials to ensure that they are processed into products of the correct quality. Laboratories in education may support learning or have a research focus, as in many universities. All laboratory managers need to ensure that their staff are trained appropriately and understand the tasks they have to perform. They have to ensure that the laboratory is fully resourced and that due regard is given to health and safety. They are also likely to have specific skills, for example expertise in carrying out particular procedures correctly, the ability to work to a project brief and knowledge of statistics and systems.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand the typical duties of laboratory managers in different types of laboratory
- 2 Understand aspects of laboratory organisation
- 3 Understand how laboratories comply with health and safety legislation
- 4 Understand features of managing a quality system.

## Unit content

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### 1 Understand the typical duties of laboratory managers in different types of laboratory

*Functions of a contract analytical laboratory:* production of high quality data; working for a client; low cost; accuracy; reproducibility; traceability; importance of booking in samples; barcoding; legally defensible data; part of an accreditation scheme; ability to respond to customer needs; assessing the quality of data; reporting and discussing results; examples of types of analysis performed by contract laboratories eg oil, food, forensic samples, medical samples, soil, water; possible duties of a laboratory manager in the context of a contract analytical laboratory

*Role of an industrial project laboratory:* product innovation; investigation of aspects of the operation of a manufacturing plant; producing materials on a pilot scale; project management; importance of timescale; deadlines depending on the project; record keeping – may be non-standard; reporting in a number of formats; possible duties of a laboratory manager in the context of an industrial project laboratory

*Role of a quality control laboratory:* sampling techniques; storage; testing raw materials; testing product; results within given tolerances for different grades of product; reporting results to production staff; testing product during production and after production; possible duties of a laboratory manager in the context of a quality control laboratory

*How an educational laboratory may differ:* less likely to use standard protocols/methods; may support research; may support learner's learning; fewer routine activities; possible duties of a laboratory manager in an educational laboratory in comparison to those of other laboratory managers

### 2 Understand aspects of laboratory organisation

*Sources of reference:* equipment manuals; staff training records; company policies; staff intranet; CLEAPSS material for school/college technicians

*Purchasing:* lists of approved suppliers; budget; internal order forms; ordering procedures; need for signatures on orders; approved suppliers; the need to obtain quotes

*Stock control systems:* inventories of chemicals and other consumables; equipment lists; receiving stock; checking stock; storing stock; stock rotation; stock taking; maintaining records; control of stationery; special storage eg refrigeration, vented storage

*Laboratory design:* purpose of laboratory; special features relating to purpose; space needed by individuals; water; gas; electricity; sinks; waste; safety features eg extraction, safety shower, solvent sink; lighting; sample entry; space occupied by equipment; areas for writing/use of computer; storage for eg glassware, chemicals, stationery, labels, waste, samples; work surfaces

### 3 Understand how laboratories comply with health and safety legislation

*Legislation:* Health and Safety at Work Act (1974); duties of employers; duties of employees

*Regulations:* eg the Management of Health and Safety at Work Regulations (1999), COSHH Regulations (2002), Workplace (Health, Safety and Welfare) Regulations (1992); approved codes of practice; guidance

*Responsibilities of laboratory managers:* management of health and safety eg provision/maintenance of safe systems of work, risk assessment, training, enforcing local laboratory rules, health and safety policy, first aid provision, accident/incident and near miss reporting, health and safety systems, audits, housekeeping

### 4 Understand features of managing a quality system

*Company policies:* functions eg health and safety, data management, reporting, customer service, training

*Standard operating procedures:* procedures eg testing; calibration, assessing data, reporting; consequences of not following standard procedures

*Staff training:* accreditation requirements; minimisation of random error; training record; being trained to approved standard; self-confidence; pride

*Data management:* unique sample numbers; sample entry; paper-based systems; computer-based systems; LIMS; back up; worksheets; hard back notebooks; signatures; initialling of errors; results; reports; traceability; training records; standard procedures; calibration records; inventories of equipment and materials; internal quality checks; external quality checks eg details of inter-laboratory testing, accreditation information and records

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> On successful completion of this unit a learner will:	<b>Assessment criteria for pass</b> The learner can:
LO1 Understand the typical duties of laboratory managers in different types of laboratory	1.1 explain how a laboratory manager may contribute to the functions of a contract analytical laboratory 1.2 explain how a laboratory manager supports the role of an industrial project laboratory 1.3 explain how a laboratory manager may facilitate the smooth running of a quality control laboratory 1.4 discuss how the role of an educational laboratory manager may differ from that of an industrial laboratory manager
LO2 Understand aspects of laboratory organisation	2.1 evaluate commonly used sources of reference on laboratory management 2.2 investigate key areas for consideration when purchasing equipment and consumables 2.3 explain the operation of a stock control system 2.4 discuss features of laboratory design
LO3 Understand how laboratories comply with health and safety legislation	3.1 explain the duties of employers and employees under the Health and Safety at Work Act (1974) 3.2 investigate regulations which are relevant to working in laboratories 3.3 explain typical responsibilities of a laboratory manager in terms of managing health and safety
LO4 Understand features of managing a quality system	4.1 discuss the function of company policies 4.2 analyse the importance of following standard procedures 4.3 justify the need for staff training 4.4 review how data are managed in the laboratory

## Guidance

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### Links

This unit has particular links with the following units within this qualification:

- *Unit reference number F/601/0220: Analysis of Scientific Data and Information*
- *Unit reference number F/601/0301: Quality Assurance and Quality Control*

This unit also links with the following NOS:

- *NVQ L4 Laboratory and Associated Technical Activities (LATA).*

### Essential requirements

#### Delivery

Literature on laboratory organisation and management is limited. The best resource is the experience of trained laboratory technicians and managers. Where learners are working in laboratories, they should discuss the different functions and roles of their laboratories. Learners who do not work in laboratories must have the opportunity to visit laboratories and/or talk to staff working in a range of laboratories. Where access to a range of laboratories is difficult to obtain, tutors could prepare case study material for learners to use. Learners must be encouraged to discuss features of laboratories that they know well and to evaluate whether the laboratory design is fit for purpose.

There are several excellent textbooks dealing with health and safety legislation. The Health and Safety Executive publishes many free leaflets. Learners must become familiar with the nature of health and safety legislation in general and then think of how it is applied to a laboratory. Again, there is scope for specialist input from health and safety managers and health and safety representatives.

Learning outcome 4 requires understanding of a quality system. Learners may use general information about quality systems and the use of standard procedures to support these systems.

#### Assessment

For learning outcome 1, learners could research the work that different types of laboratories carry out. This would make use of visits and case studies. Learners can then explain typical duties of managers in each type of laboratory or explain duties common to all functions and analyse specific differences in roles.

For learning outcome 2, learners must make use of information from their workplace, visits, guest speakers and centre technicians. Learners could design an ideal laboratory or alternatively they could present a plan of a laboratory that they know and discuss its design and features.

Learners have more reference material to use in approaching learning outcome 3. More-able learners will be able to contextualise general information to the laboratory setting and to envisage the role of the laboratory manager.

For learning outcome 4, tutors should give learners a realistic scenario such as a picture of a failing laboratory and then for learners to explain how using a quality system would enable the laboratory to succeed.

## **Resources**

Case study material relating to a variety of laboratories is essential. Learners should have the opportunity to use the centre technicians as a resource. Library resources on health and safety are important as is access to the internet.

## **Employer engagement and vocational contexts**

Learners must engage with common practice used in industrial and educational laboratories. This could be through visits, guest speakers, case studies or discussion with other learners.