



UNIT-4

Monitoring the Control of Exposure to Hazardous Substances

Learning Outcomes

By the end of this unit the learner will be able to:

- Understand the measures that can and should be taken to control exposure to hazardous substances
- Determine when it may be necessary to monitor exposure to hazardous substances in the workplace
- Discuss workplace exposure limits and biological monitoring guidance values and their applications

Unit 4

Monitoring the Control of Exposure to Hazardous Substances

Monitoring means measuring workers' exposures to named substances. Exposure may be by inhalation, by skin contact, or by swallowing.

Monitoring is required:

- To help select the right controls;
- Where substances present a serious health risk;
- To check that exposure limits are not exceeded and your control measures work well enough;
- To help choose the right amount of respiratory protection;
- To identify any need for health surveillance; and
- When an inspector has issued an enforcement notice that requires you to monitor exposure.

Air Monitoring

Air monitoring measures exposure by inhalation. It should take place on a busy day with the process running normally.

Personal samples only are valid for comparing with exposure limits:

- Full shift (12 hours) exposures should be compared with two-thirds of the 8-hour exposure limit.
- Exposures at raised pressures need expert interpretation.

When do you need to monitor?

Monitoring is appropriate:

- when you need to show compliance with a WEL (**W**orkplace **E**xposure **L**imit) or BMGV (**B**iological **M**onitoring **G**uidance **V**alue)
- when you need to show that control equipment or personal protective equipment is working well enough

Monitoring can also indicate the spread of contamination, eg surface wipes.

Screening, eg colorimetric detector tubes, meters, provides indicators of worker exposure only.

- Personal air monitoring measures how much of a substance the worker inhales.
- Biological monitoring measures how much of a substance has entered the body.

Workplace Exposure Limit

Many people are exposed to a variety of substances at work (eg chemicals, fumes, dusts, fibres) which can, under some circumstances, have a harmful effect on their health. These are called

'hazardous substances'. If exposure to a hazardous substance is not properly controlled it may cause ill health in a number of ways.

The substance may cause harm by:

- Too much being taken into the body through breathing;
- Being absorbed through the skin;
- Being swallowed; or
- Acting directly on the body at the point of contact, eg the skin.

Some illnesses caused by exposure to hazardous substances in the workplace (occupational diseases) may not appear until a long time after the first exposure. Therefore, it is important to know in advance how to protect the health of people working with hazardous substances and also of other people who may be affected by the work being carried out.

Workplace Exposure Limits (WELs)

WELs are British occupational exposure limits and are set in order to help protect the health of workers. WELs are concentrations of hazardous substances in the air, averaged over a specified period of time, referred to as a time-weighted average (TWA).

Two time periods are generally used:

- Long-term (8 hours); and
- Short-term (15 minutes).

Short-term exposure limits (STELs) are set to help prevent effects such as eye irritation, which may occur following exposure for a few minutes.

Biological Monitoring in the Workplace

What Does Your Employer Have To Do?

Many jobs involve using chemicals which can harm your health if they are not properly handled. Under the Control of Substances Hazardous to Health Regulations 1994 (COSHH) your employer has to look for the risks to your health from chemicals in the workplace. Your employer must make sure that your exposure to chemicals is either prevented, or properly controlled. To do this he or she may need to measure your amount of chemical exposure.

Biological Monitoring

Biological monitoring is recommended in cases where:

- Exposure control relies on the effectiveness of respirators;
- Exposure via the skin or ingestion could lead to adverse health;
- There is a measureable metabolite, preferably in urine or exhaled breath.
- Biological monitoring needs 'informed consent' – eg see form below.
- Biological monitoring is necessary for work with lead.

How should your rights as an individual be protected?

If you decide to take part in a biological monitoring programme your employer needs to obtain your agreement before you provide a sample. We recommend that this is done using a consent form. The consent form is an agreement between you and your employer to ensure that:

- you understand what the test results mean and what action might be taken on the basis of them;
- you can decide who has access to your result (for example, doctor, safety representative, health and safety manager);
- you can decide, for example, whether people see your individual result or whether your result is anonymous and pooled with other people's results;
- The sample you provide will only be analysed for the chemical (or breakdown products of it) that you are exposed to at work;
- The result of the test will not affect your conditions of employment.

We recommend that your employer involves an occupational doctor in the biological monitoring programme. As well as filling out the consent form you may also wish to discuss with an occupational doctor any risks that are associated with providing the sample, and any concerns over the interpretation of your results.

How can chemicals enter your body?

The main ways that chemicals can enter your body are:

- By breathing them in;
- By absorbing them through the skin; or
- By swallowing them. This can happen if your hands become contaminated at work and you do not wash them before eating, drinking or smoking.

If you are exposed to chemicals in the job you do, the most common way of finding out how much you are exposed to is to measure how much of the chemical is present in the air you breathe in. However, this does not tell you how much of the chemical has actually entered your body. In particular, it does not measure how much has entered your body through the skin or by swallowing. This is why we sometimes recommend biological monitoring for certain chemicals..

How can the amount of chemicals absorbed into your body be measured?

Biological monitoring can be used to indicate how much of a chemical has entered your body. It involves measuring the chemical you are exposed to at work (or what it breaks down into) in a sample of your breath, urine or blood. Which of these three samples is used depends on how the chemical you are exposed to is processed by your body. Biological monitoring is often used together with air monitoring.

Biological monitoring is especially useful when:

- There is likely significant absorption through the skin; and
- Control of your exposure depends on personal protective equipment and your employer needs to check it is protecting you.

Further Reading:

- ✓ *Monitoring for Health Hazards at Work 5th Edition, Kindle Edition by John Cherrie (Author), Sean Semple (Author), Marie Coggins (Author) ,2021*
- ✓ *Toxic Town: IBM, Pollution, and Industrial Risks by Peter C. Little ,2014*