Risk Assessment Guide:

Industrial-emission monitoring

The first publication of this document was created by the STA Health and Safety task group in 1997, it has since been recognised by the Environment Agency and implemented into the MCERTS scheme. It has also been adopted by a number of countries in Europe and around the world. However, the document is based on the requirements of UK health and safety legislation.

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Version 14 – August 2017

Record of amendments

Version	Amendment	Date
7	Section 2: Clarification of when a risk assessment is to be carried out inserted on page 6.	February 04
7	Section 4.1; page 13, reference to HSGN 017 platform inspection added.	February 04
7	Section 4.1; page 14, Space/ size requirements for platforms brought in line with EA guidance.	
7	Section 4.1: box text on page 15 modified to included new STA guidance document HSGN0017	February 04
7	Section 4.2; page 17, Falling objects during lifting/ lowering guidance note number changed	February 04
7	Section 4.3; page 19, text box updated and addition of STA guidance note HSGN015.	February 04
7	Section 4.7; page 23, Control Measures STA guidance note updated	February 04
7	Section 4.8; page 24, New section added on noise	February 04
7	Section 7.4; page 37, Wind chill factor updated to include positive temperatures and limited to 30 MPH	February 04
7	Section 7; page 39, text box updated to include STA guidance note HSGN018	February 04
7	Appendix – All drawings updated to take into account recommendations for platform size, monorail attachments and sample ports.	February 04
8	Book revised to take into account Work at Heights Regulations	April 2005
9	Various minor adjustments to take into account revised STA guidance.	October 2006
10	Chapter 3. Page 9 and 10. Remove confined space as a site hazard and replace in Chapter 5 on Chemical Hazards at the Stack	March 2008
10	All Chapters. Update and amend Further Information sections	March 2008
10	Chapter 4 Section 4.1 Page 11. Update statistics on fatalities	March 2008
10	Chapter 4 Section 4.8 Page 27 Update Noise Exposure Limits	March 2008
10	Chapter 5 Section 5.1 Page 29 Change references to occupational exposure limits to Workplace Exposure Limits	March 2008
10	Chapter 5 Insert text on confined space	March 2008
10	Chapter 7 Section 7.7 Page 41 Amend working day recommended maxima to 12 hours and include reference to Working Time Regulations, specifying a recommended maximum 48 hour week.	March 2008
11	Various minor adjustments to take into account revised STA and EA guidance.	August 2009
11	Appendix 2 added “Useful links.”	August 2009
12	Section 1 – Introduction bolstered to include legal perspective and glossary of terms and definitions.	June 2012
12	Section 2 - expanded to include more detail on risk assessment and application of control measures.	June 2012
12	Section 2 - expanded to include more detail on emergency planning	June 2012

12	Section 3 – General site hazards expanded to include extra examples of hazards, reference to DSEAR, RIDDOR and coverage of safe systems of work.	June 2012
12	Section 4.1 – Further guidance on use of platform inspection records, prior-to-use checks and a reference to BS EN 15259:2007.	June 2012
12	Section 5.2 – expanded to include reference to Material Safety Data Sheets (MSDS) and Registration, Evaluation, Authorisation and restriction of Chemicals (REACH).	June 2012
13	Section 1 – updated with new accident data and extended to include 'six-pack' regulations.	October 2015
13	Section 3 – extended to include more coverage of DSEAR including description of dangerous substances.	October 2015
13	Section 4.1 – references to BS EN 15259:2007 included in main text.	October 2015
13	Section 4.1 - significant extra guidance on plans for emergency and rescue added.	October 2015
13	Section 4.7 – significant extra guidance on use of compressed gas cylinders added.	October 2015
13	Section 5.2 – extra information on REACH regulations added.	October 2015
13	References to all STA guidance notes amended to reflect the new system document classification which was introduced by the STA in 2013.	October 2015
14	Section 4 – Amended to reflect the clarification received from the HSE about their classification of permanent platforms with respect to the Work at Height Regulations and Health and Safety at Work Act. Sundry other minor amendments also made throughout the document at this time.	May 2017

1. INTRODUCTION

Legal Perspective

Each year in the UK, approximately 150 people are killed at work and several hundred thousand more are injured or suffer ill-health as a result of workplace activities. In the year 2013/14, it is estimated that 28.2 million workings days were lost due to work-related illness and workplace injury which cost the UK economy over £14 billion. In the UK, it is the job of the Health and Safety Executive (HSE) to prevent people being killed, injured or made ill by work. A key piece of legislation in the UK is the Health and Safety at Work etc. Act (HSW Act) 1974. This is an Enabling Act which means that further laws (known as Regulations) can be made without the need to pass another Act of Parliament. There are now many Regulations which support the HSW Act. A group of six regulations was introduced on 1 January 1993, popularly known as 'the six pack'. These are:

- The Management of Health and Safety at Work Regulations
- The Display Screen Equipment Regulations
- The Manual Handling Operations Regulations
- The Personal Protective Equipment at Work Regulations
- The Provision and Use of Work Equipment Regulations
- The Workplace Health, Safety and Welfare Regulations

These regulations implement various European Directives on health and safety and also clarify how employers must comply with their duties under the Health and Safety at Work Act 1974.

The HSE has produced Approved Codes of Practice (ACOPs) for many of these Regulations which give more details on the requirements of the Regulations. The HSE also publishes a range of further legal and best practice guidance which is available online.

The HSW Act places many duties on employers and employees but essentially you have to ensure the health and safety of yourself and others who may be affected by what you do or do not do. It applies to all work activities and premises and everyone at work has responsibilities under it. In general, the HSW Act requires people to do what is '*reasonably practicable'* to ensure health and safety.

One example of more recent regulation is the Management of Health and Safety Regulations 1999. These also apply to every work place and, among other things, require all risks to be assessed and controlled. Failure to provide evidence of risk assessment can result in regulatory action.

Some requirements of HSW Act 1974 are set out below:

Employers' Duties

- Provide safe plant and systems of work.
- Provide safe use, handling, transport and storage.
- Provision of information, instruction, training and supervision.
- Provide safe place of work, access and egress.
- Provide safe working environment; adequate welfare.
- Produce written safety policy (>5 employees).
- Arrange for consultation with safety representatives.

Employees' Duties

- Take reasonable care for the H&S of themselves and others.
- Co-operate with the employer and others to enable them to fulfil their obligations.

Some requirements of Management of Health and Safety at Work Regulations 1999 Act 1974 are set out below:

Employers' Duties

- Produce suitable and sufficient written risk assessment.
- Ensure proper planning, organisation, control, monitoring and review of H&S measures.
- Ensure competent persons are employed.
- Prepare emergency procedures.
- Provide adequate information, instruction, training and supervision.
- Consider risks to young persons and new/expectant mothers.

Employees' Duties

- Use equipment or substances in accordance with training or as instructed.
- Report any serious or imminent danger.
- Report any shortcomings in H&S arrangements.

Some terms and definitions

Health - protection from illness in workplace.

Safety - protection from physical injury.

Welfare - facilities to maintain health and well-being.

Occupational ill-health - Caused or triggered by workplace activities.

Accident - unplanned event that results in injury or ill health of people or damage or loss to property, plant, materials or the environment (HSE).

Near miss - incident that could have resulted in an accident.

Dangerous occurrence - near miss which could have resulted in serious injury or loss of life.

Hazard - potential of a substance, person, activity or process to cause harm.

Risk - likelihood of a substance, person, activity or process to cause harm.

Control measure - actions taken to reduce risk.

Residual risk - risk remaining once controls have been adopted.

PPE – Personal Protective Equipment.

Stack-emissions monitoring is an inherently hazardous occupation. There are many hazards associated with carrying out a stack-emissions test in process industry. The basic principles of good health and safety practice must be applied. In particular, ***a risk assessment must be carried out before starting work.*** Keep the risk assessment in your job file – in the unfortunate event of an accident or other event, it will be needed.

Note: The Environment Agency Mcerts scheme stipulates that a risk assessment shall be carried out at the 'site review' stage (ie well in advance of the monitoring work being carried out). This is to allow sufficient time for any changes in sampling facilities to be made if necessary.

This guidance booklet describes each of the most prominent hazards in turn. The factors that affect the risk of an accident from each hazard are listed and control measures are suggested which may be used to reduce the risk to an acceptable level.

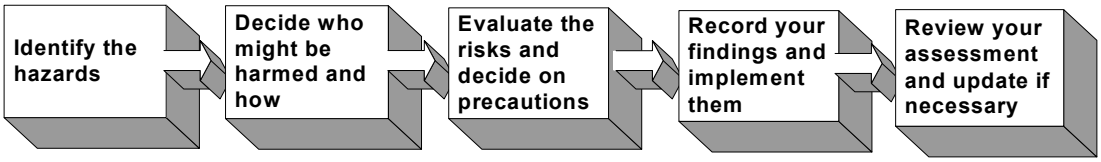
*Note: The HSE has produced a guidance book **Essentials of Health and Safety at Work**. (ISBN 978 0 7176 6179 4). This publication is available to download from www.hse.gov.uk and is recommended as a useful reference source to augment this STA guidance booklet.*

The STA recommends that, as a minimum, the routine hazards described in this booklet should be included in your risk assessment. But remember: this is not an all-encompassing list and there may be other hazards. Every site is different.

2. THE BASICS OF RISK ASSESSMENT

The Risk Assessment Process

The fundamental stages can be summarised as:



The risk assessment is the basic foundation of safe working on stacks. It's very important to understand what we mean by hazard and risk:

Hazard	The substance's or physical situation's inherent **potential** to cause harm.
Risk	An estimation of the **likelihood** of that potential being realised, within a specified period or in specified circumstances, and the consequence.

Using a very simple example to illustrate this, sunshine poses a health hazard (sunburn). But the corresponding risk of harm would be very low if the work was carried out in winter. Another example is working at height which is always hazardous; however, the risk can be reduced to an acceptable level by the implementation of appropriate control measures.

So, the risk assessment must start out by identifying the hazards you will face, who will be affected and then make a judgement on what the risk will be (i.e. the *likelihood* of an accident) in light of all the relevant factors. If the risk is not acceptable, then additional ***control measures*** must be put in place to reduce the risk to an acceptable level. Only then should you start work.

Control measures can be:

- **Collective** - such as engineering measures (e.g. a self-closing gate to reduce the risk of falls from the platform) and procedural measures (e.g. permit-to-work systems; safety induction training provided by the operator); or
- **Personal** – using personal protective equipment (PPE) (e.g. safety goggles to reduce the risk of eye injury when opening access ports).

For many hazards there will be a choice of control measures that could be implemented. The first consideration should always be to investigate the possibility of removing the hazard altogether (for example by elimination or substitution). If that is not possible, **collective** control measures should ***always*** be considered before **personal** control measures. Some of the reasons for this are that collective control measures are usually easier to use, require less training and maintenance and protect all users. Conversely, personal control measures often require more training and maintenance; they require the worker to use them (and use them properly) and, even then, only protect the user. Personal measures should be used to reduce the risk further only when collective control measures fail to reduce the risk as low as reasonably practicable. PPE shall not be the control measure of first choice.

The Form of the Risk Assessment

Risk assessments are made mandatory by the Management of Health and Safety at Work Regulations 1999 and also other regulations (e.g. COSHH, Work at Height Regulations). These regulations state that the risk assessment should be *suitable and sufficient.* A risk assessment may be considered suitable and sufficient if it includes the following:

- Identifies significant hazards and risks.
- Identifies who is at risk
- Identifies measures to comply with any statutory provisions.
- Is appropriate to the nature of work.
- Remains valid over a reasonable period of time.
- Identifies the risks arising from the work.
- Includes a level of detail proportionate to risk.
- Is recorded.

Generic-type risk assessments are not usually suitable for stack-emission monitoring work as the hazards will vary from site to site and over time. A separate risk assessment must be carried out at every location on each site. It is important that all relevant aspects are included and that all necessary information is obtained. Accordingly, a structured approach can be useful to help ensure that the wide variety of hazards is covered; as such, the use of pro-forma risk assessment sheets can be beneficial. The STA example of a risk assessment summary form is available on the Source Testing Association website at www.S-T-A.org. It should be emphasised that this is an example only, and will not cover all hazards at all sites and will not be appropriate in every case. Organisations should use a risk assessment format that is suitable for their specific needs.

In general, a qualitative risk assessment approach is used[*] by stack-emission monitoring organisations, whereby the severity of the hazard is considered together with the likelihood of occurrence to obtain an estimate of the risk of injury. The risk can be described in several ways: some assessors classify the risks as “high”, “medium” or “low”. However the STA prefers the classification of risks as either “negligible”, “as low as reasonably practicable” (ALARP), or “unacceptably high”. The logic here is that if it is reasonably practicable to reduce the risk further, it

[*] The quantitative risk assessment approach is not the most common approach for stack-emission monitoring health and safety risk assessments; although it is recognised that some organisations favour this type of method.

should be done. Not to reduce the risk further when it is reasonably practicable to do so, is unacceptable.

It is important to remember that the assessment should be of the risks as they are at the time that the risk assessment is performed - not as you think they will be after any necessary control measures are put in place. The risk assessment should be repeated or revised once the control measures have been implemented. It is important to ensure that the risk assessment is reviewed at regular intervals and at least every day, before work commences or in the case of a change in work location. These are often referred to as 'tool-box' checks and focus on the aspects of the risk assessment which are most likely to have changed since the previous risk assessment – for example, weather, personnel, process conditions etc. This 'dynamic' approach to risk assessment is necessary to take account of hazards which may be variable with time.

Who Does What?

The Management of Health and Safety at Work Regulations 1999 place a duty on employers to have a safety policy and to carry out risk assessments. So both the stack-emissions organisation *and* the client (usually the operator) have a responsibility to carry out a risk assessment. If work is being carried out directly for a regulator; the organisation, the operator *and* the regulator all have responsibilities[*] in this regard. In practice, if you are an MCERTS certified person, you will be best placed to assess the risks to you and others during the monitoring work you do on site – don't be tempted to leave the workplace risk assessment to someone else. For example, as part of being certified as competent under the MCERTS scheme, you will have

[*] The HSE has advised the STA that for the purposes of the Health & Safety at Work Act, the monitoring organisation has a direct duty of care towards its own staff conducting the monitoring, and the process operator has a duty of care towards all persons working on the site, including the monitoring organisation.

successfully completed an appropriate safety and risk assessment training course.

Note: The MCERTS scheme for manual stack-emission monitoring makes it mandatory for risk assessments to be approved by someone qualified to MCERTS Level 2.

The risk assessment should not be confused with the platform inspection. The latter should be carried out by the employer (i.e. the site operator) using a competent person. These platform inspections are **not** carried out by the monitoring team. However, it is necessary to see a platform inspection report (or other evidence that the platform is acceptable for use) to be able to properly conduct the risk assessment. Your risk assessment will **not** be suitable and sufficient if you have not considered this issue.

However, the person using a platform should also perform their own check 'prior-to-use' check. This is not a formal inspection but should take account of factors such as:

- Ladders: are they secure, with no bolts missing, and free from corrosion and grease?
- Handrails: Are they secure, with no bolts missing and free from corrosion?
- Floor plates: are they fixed securely with no bolts missing and free from corrosion?
- Access hatches: are they closed when not in use?

…and When?

For a new client, a site visit will be necessary to properly assess the risks. This gives the site operator time to implement any control measures that you find are necessary.

Note: The Environment Agency Mcerts scheme stipulates that a risk assessment shall be carried out at the 'site review' stage (ie well in advance of the monitoring work being carried out). This is to allow sufficient time for any changes in sampling facilities to be made if necessary.

For sites with which you are familiar, a separate reconnaissance visit *may* not be necessary but you must *still* carry out a risk assessment before you start work. It is important that this risk assessment is carried out at the start of *every* monitoring campaign at the site, even if you have visited the site frequently

before. This is a good discipline because it focuses the team's attention on safety as the first issue to address on site, and it reduces the possibility of the staff becoming complacent after several visits because they feel they know all the issues.

The risk assessment must be carried out at the start of each campaign and should be reviewed at least daily or following a change in location and before starting work. However, it is important to note that there are some hazards, such as weather conditions, which can change rapidly and, therefore, risks might need to be re-assessed at more frequent intervals.

Monitoring work shall only commence when the risk assessment has been completed and the control measures have been implemented to the satisfaction of the competent person carrying out the risk assessment (normally the monitoring Team Leader, MCERTS Level 2). The risk assessment shall be communicated by the Team Leader to, and signed by, other members of the monitoring team before work commences and whenever the risk assessment is revised.

Getting the Operator Involved

On arrival at the site, you should ask the site operator to demonstrate that the platform and access/egress are acceptable – for example by producing a platform inspection report for the stack(s) you will be working on. Check that the platform inspection report has been carried out within the time period specified and check that it states that the platform is safe to work on. Take the evidence into account when making your risk assessment or your insurance cover could be invalidated. If no evidence such as a platform inspection report is available for work at height, **do not proceed with the work.**

The STA recommends that when you have completed your risk assessment you should brief the operator's representative on the findings. This will give the operator the opportunity to raise any additional issues of concern or site activities that may affect you, and to comment on the findings of the assessment and the control measures you have decided will be necessary. If the operator has any comments, you will wish to consider these and assess whether they can be incorporated into the assessment

and its findings: they may reduce the risk further (which is fine), or hinder the reduction of risk (which is not).

Some of the control measures you require may need to be put in place by the operator. Get the operator's confirmation that these have been completed, before you start work.

When you have finished the site work, make any relevant comments on the risk assessment based on any lessons learned. This will be useful for the next visit.

The Layout of this Booklet

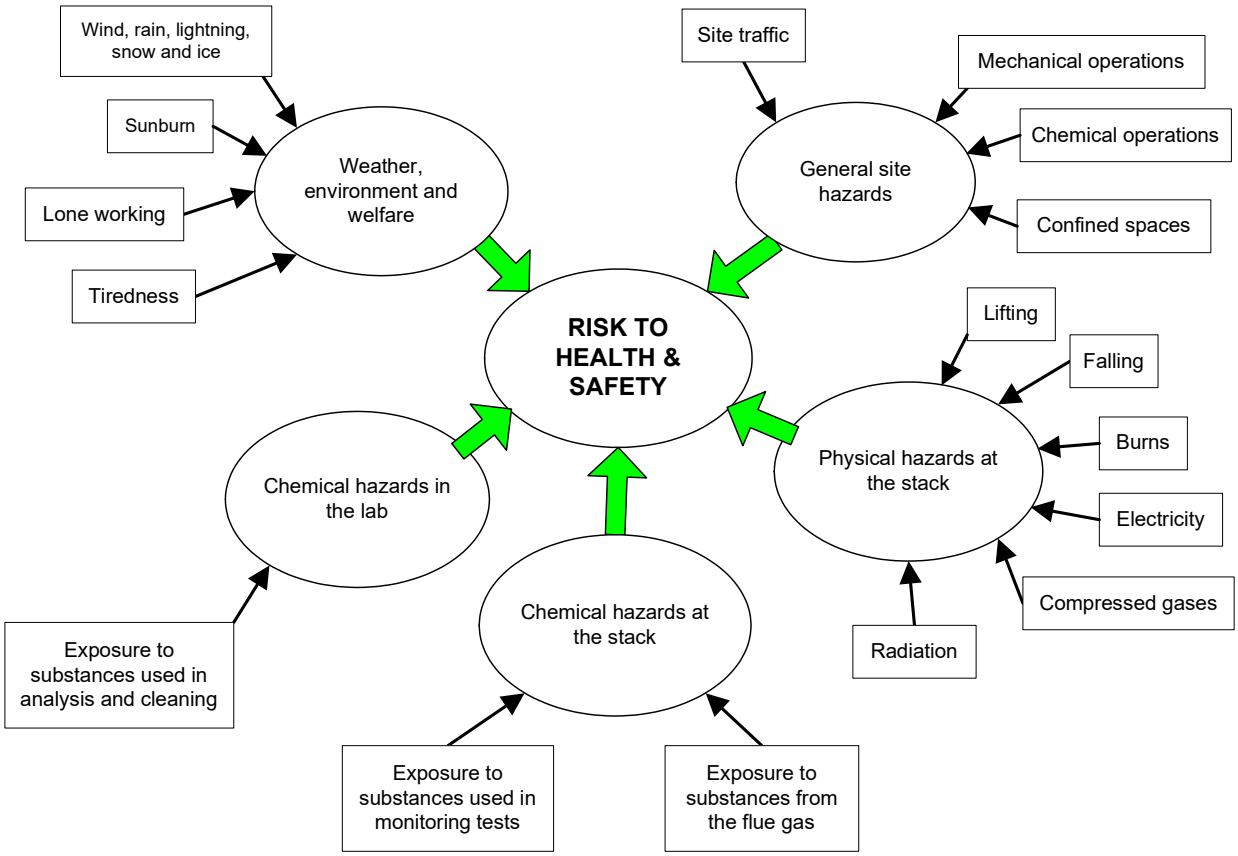
The following sections describe each of the most prominent hazards in turn, grouped together in five main categories:

- general site hazards.
- physical hazards at the stack.
- chemical hazards at the stack.
- chemical hazards in the laboratory.
- weather, environment and welfare.

Important factors affecting the risk are highlighted, together with some control measures that may be used to reduce the risk to an acceptable level.

It is recommended that this guidance, together with other relevant guidance, is consulted as part of the risk assessment process. However, safety management is a fast-evolving subject and new or revised guidance and legislation appears frequently. All parties involved in stack-emission monitoring should ensure they take account of the most recent developments.

Figure 1 Some prominent hazards associated with stack-emission monitoring



3. GENERAL SITE HAZARDS

Each site has its own specific set of hazards. These might include:

Site traffic hazards

The movement of vehicles around site is a hazard. The sampling team may be in unfamiliar surroundings and they may be working on a temporary access platform, the existence of which is not known to the site drivers.

Mechanical operations hazards

The mechanical aspects of the process can be hazardous. For example, the sampling workplace or access route may be in, or near, large moving machinery (eg presses or cranes).

Chemical operations hazards

Chemical processes are often hazardous. This includes the product stream and waste streams (e.g. stack gas releases, fugitive emissions, liquid discharges).

Infection hazards

Some processes can give rise to biological hazards such as;

- Medical waste – hepatitis
- Sewage treatment processes – Leptospirosis/Weil's disease
- Cooling Towers/Air-conditioning systems – Legionnaires disease

Climatic conditions

The climatic conditions on site can be hazards in themselves (e.g. temperature extremes) but can also increase the risk from other hazards (e.g. high wind increases the risk of a fall, cold/wet weather increases the risk of dropping equipment). Weather and the environment are covered in more detail in Section 7.

Fire and explosion hazards

At many sites, particularly in the organics and petrochemicals industry sectors, there are fire and explosion hazards. These are covered by The Dangerous Substances and Explosive

Atmospheres Regulations 2002 (DSEAR). Dangerous substances are any substances used or present at work that could, if not properly controlled, cause harm to people as a result of a fire or explosion or corrosion of metal. They can be found in many workplaces and include such things as solvents, paints, varnishes, flammable gases such as liquid petroleum gas (LPG), dusts from machining and sanding operations, dusts from foodstuffs, pressurised gases and substances corrosive to metal.

DSEAR includes a requirement to undertake a risk assessment relating to explosive atmospheres and to employ suitable safety management systems to ensure that an adequate level of explosion safety is maintained. There is also a requirement to conduct area classification (zone 0, 1 or 2) and to define locations of hazardous areas in the workplace.

Note: The definition of a hazardous area is *'any place in which an explosive atmosphere may occur in sufficient quantities to require special precautions to protect the health and safety of the workers concerned is deemed to be hazardous'.*

Control Measures

The importance of induction training and permit-to-work systems cannot be over-emphasised. Procedures for first-aid on site and emergency evacuation procedures must be generated. These will vary greatly between sites. It is essential that you fully understand the permit-to-work system, procedures for first-aid, and emergency evacuation procedures for the ***site in question***. If you are unsure of any of these aspects, they must be clarified before starting work.

You must comply with any control measures that the site operator puts in place, e.g. site speed limits, use of PAT-tested or ATEX-rated equipment.

Work must only start work at the monitoring position if weather and environmental conditions are safe and stable.

Most accidents are multi-causal and, as such, an integrated approach to risk management is needed. Mistakes cannot always be eliminated entirely, therefore it is important that the workplace is made safe even if a mistake is made. Making the workplace safe includes providing instructions, procedures, training and supervision to encourage people to work safely, as well as taking account of the

nature of the task, timing issues (eg weekend or night work) and providing appropriate PPE. A permit-to-work might be thought of as a specialised type of safe system of work.

The HSW Act requires ‘safe systems of work’ but does not go into detail. Guidance on what this means in practice has been produced by the HSE in their publication *Essentials of Health and Safety at Work*. The reader is encouraged to consult this document for further information. The reader’s attention is also drawn to the requirements of the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR). These regulations place duties on employers, the self-employed and people in control of work premises (the ‘Responsible Person’) to report serious workplace accidents, occupational diseases and specified dangerous occurrences and near misses. See links below for more information.

STA guidance

STA HGO-005 Safety Passports

STA HS 1057-00 Example Risk Assessment

Further information

Management of Health and Safety at Work Regulations 1999.

Workplace (Health, Safety and Welfare) Regulations 1992 and accompanying Code of Practice.

Essentials of Health and Safety at Work. HSE ISBN 978 0 7176 6179 4indg 370 dsear (HSE)

www.hse.gov.uk/riddor/

4. PHYSICAL HAZARDS AT THE STACK

4.1 Hazard: working at height

This is a major hazard in stack testing. A large proportion of fatal injuries to workers are caused by falls from heights, and there have been examples of fatalities resulting from falls during stack emission monitoring. The risks of injury from falling from height are so serious that a high standard of protection is required to reduce the risk of falling to as low as reasonably practicable.

The employer must ensure that the workplace and access meet all current legislative requirements, are maintained to a safe standard and have been inspected by a competent person. Under the Workplace Regulations and Health and Safety at Work Act, a safe place of work must be provided by the process operator, but under the Work at Height (WAH) Regulations there are some specific duties that fall on employers when they engage people in activities which requires work at heights.

Sampling from any elevated workplaces, whether platforms, roofs or the tops of arrestment equipment, vessels and other ducts is unacceptable unless they have been inspected and assessed as being suitable. Further information concerning the requirements for platforms is available in the WAH Regulations, EA Technical Guidance Note M1, BS EN 15259 and STA Guidance Note: *Inspection of Permanent Elevated Work Platforms WAH 001.*

Mobile elevated work platforms are usually inappropriate for the majority of stack emissions monitoring work. Sampling from ladders is always unacceptable. Further guidance on these issues is available in EA Technical Guidance Note M1.

Factors affecting the risk

- To some extent, the height at which the stack monitoring is to be carried out is a risk factor. The Work at Height Regulations apply to work in *any* place, including a place above or below ground level, where, if measures required by those regulations were not taken, a person could fall a distance liable to cause personal injury ie there is no minimum height.

- The type of surface, objects or substances onto or into which a person could fall.
- The structural stability, strength, integrity and condition of the sampling platform.
- The size of the sampling platform.
- Provision of suitable safeguards to prevent falls, e.g. railings, self-closing gates.
- Environmental conditions (e.g. wind, rain, ice) at the work location.
- The adequacy and suitability of the means of access/egress to the sampling location.
- The means by which equipment will be lifted to the platform.

Unless suitable control measures are taken, the risk of injury or death will be unacceptably high. The risks must be reduced to as low as is reasonably practicable through the identification and application of appropriate control measures.

Hierarchy of Control Measures

The WAH Regulations require the employer to avoid carrying out work at height where reasonably practicable. However, if it **has to** be carried out, then he must take appropriate measures to prevent falls by:

i. firstly, taking the appropriate measures to prevent falls, preferably by working from an "existing place of work" (best thought of as anywhere where you do not need to use any extra work equipment to prevent a fall, i.e. a safe and fully protected place); or if this is not possible

ii. using work systems comprising the most suitable work equipment, instructions and training.

'Work equipment' can include relevant machinery, tools, appliances, apparatus, installations, guard rails, barriers, working platforms, collective fall arrestment devices (e.g. net or airbag), and personal fall protection systems (e.g. ropes, harnesses, lanyards, fall arrestors). Collective control measures **must** be given priority over personal protection measures.

Where work equipment is to be used as the safety measure(s), the hierarchy is:

a) use work equipment to prevent a fall (e.g. guard rails, or work restraint); then,
b) use work equipment to minimise the distance of the fall and its consequences (e.g. erection of nets, fall-arrest PPE); then,
c) use work equipment to minimise the consequences of a fall (e.g. an airbag, or wear a lifejacket if working at height over water – it is not just the fall impact that needs to be considered); then,
d) use work equipment that does none of the above (e.g. ladders, hop-ups, etc.) but minimise the risk of any fall occurring through appropriate measures (e.g. supervision and training, etc.).

finally, an emergency rescue plan must be established – that does not rely on the emergency services.

Further Guidance on Collective "Work Equipment"

- ***Platform stability, strength, integrity, condition and inspection***

  Platform design and construction – All platforms, whether temporary or permanent must be fit for purpose* and in particular must be of suitable dimensions and capable of supporting the required load.

  Temporary platforms – the WAH Regulations (Schedule 3) place specific requirements on strength and stability calculations for scaffold, assembly, use, dismantling and marking/labelling. Compliance with these requirements is mandatory.

  Temporary platforms must be tied or supported to a permanent structure to prevent collapse or overturning. They must meet the requirements stated in the monitoring standard (if present) and must be of suitable dimensions and capable of supporting the load required to fulfil the measurement objective (ref: BS EN 15259, s6.2.3.1).

* A number of CEN standards (eg EN 15259) have been published which give guidance on access and platforms and a British Standard exists covering permanent access.

Temporary platforms must be inspected and assessed by a competent person as required by the Work at Height Regulations. Monitoring teams should ask to see evidence of the inspection and assessment. A properly completed and dated “Scafftag” is one means of demonstrating and recording this inspection. Double-check yourself that the inspection tag covers the load category suitable for your work – this would normally be ‘heavy duty’, but could be a lower rating depending on requirements of a particular job.

Permanent platforms

Note: During the summer of 2016, lengthy correspondence took place between the Health and Safety Executive, the Environment Agency and the Source Testing Association concerning the issue of platform inspections. During the course of this process, it became clear that the HSE regards permanent platforms (erected for the purpose of conducting stack-emission monitoring) as being classed as ‘existing places of work’ because they form part of the fabric of the building or structure. As such, they would not be considered to be pieces of ‘work equipment’ as defined by the Work at Height Regulations (2005) and, therefore, the regulation of these platforms would be covered primarily under the Health and Safety at Work etc. Act (1974, Section 4). However, the HSE would still expect duty holders to instigate and maintain an inspection regime which is both reasonable and proportionate.

The STA considers that the general guidance contained within this document concerning the conduct and frequency of inspections for permanent platforms remains valid.

It is important to understand that stack-emissions monitoring may require platforms that can support up to six people and up to 300 kg of equipment.

The structural integrity and condition of permanently installed platforms (and any supports and attachments) must be inspected and assessed by a competent person.

For post-1995 permanent platforms, an initial design assessment may have been carried out under the Construction (Design and Management) Regulations 1994, (now 2007) which should address whether the platform is fit for purpose. If not, the operator should arrange for a survey to be carried out by a competent person to establish its current integrity and condition. This 'baseline' survey will then recommend the extent and frequency of subsequent periodic, routine inspections that will also include the effects of weathering, corrosion and damage. The frequency of inspection and the comprehensiveness of the inspection shall be commensurate with the risk of failure and the risk of serious injury. For example, a steel platform at great height and in a corrosive atmosphere may require a more frequent and thorough inspection than a platform in a benign atmosphere.

Monitoring teams should ask to see evidence of the inspection and assessment before they ascend to the work area. They should record the fact that an appropriate inspection record is available as part of their own risk assessment procedure. The STA also recommends that stack testers perform their own prior-to-use check. This might include a visual observation of ladders, gantries and platforms to check for signs of damage or corrosion, presence of grease on ladder rungs etc. (see section 2).

- ***Required features for all platforms***

  Platform safety features - schematics of platform requirements are given in Environment Agency Technical Guidance Note M1 *Sampling requirements for stack emissions monitoring.* These diagrams should be referred to in conjunction with the following requirements.

Note: Environment Agency Technical Guidance Note M1 contains many references to BS EN 15259:2007 'Measurement of Stationary Source Emissions - Requirements for the measurement sections and sites and for the measurement objective, plan and report'. The reader is strongly advised to have access to both documents.

The platform shall be provided with guard-rails and toe-boards meeting the requirements of Schedule 2 of the WAH Regulations. The top guard rail shall be at least 950 mm* above the edge and an intermediate guard rail shall be positioned so that the gap does not exceed 470 mm. STA guidance is that toe-boards (also called kickboards) should be approximately 0.25 m high.

There is also a practical requirement that the tops of handrails should be far enough below the centre line of the access ports so that they do not interfere with the insertion and removal of the sampling apparatus. Though the 125mm minimum quoted in standards is adequate for Pitots and simple sample probes, a clearance of 500mm is required to allow access with more complex sampling trains having back-end sample collection.

Where the selected sample plane is located in a horizontal section of a large rectangular duct, and where some of the sample points are positioned above a convenient and safe working height (nominally 1.75 m maximum for sample probe handling), it will be necessary to provide a dual level sampling platform of adequate design or facilities to suspend sampling equipment from a monorail system so that sampling staff can carry out the full range of sampling requirements in a safe and satisfactory manner. Removable chains, trap doors or self-closing gates shall be used at the platform to prevent workers falling through access hatches or ladder wells.

The platform shall have suitable weather protection for personnel and equipment. The platform shall not accumulate free-standing water: if necessary, drainage is to be provided.

Space/size requirements for platforms - these are given in Environment Agency Technical Guidance Note M1 *Sampling Requirements for stack emissions monitoring.* For example, the minimum platform depth in front of the access port shall be internal diameter of the duct (plus wall thickness) plus 1.5m. Where the details of sampling equipment are not known, or

* For existing guard-rails, the requirement is at least 910 mm. Previous STA guidance required for a top railing height of 1000 mm and so should meet this requirement.

may change, the general rules given in M1 should be adhered to.

It is very important that equipment must be kept within the confines of the platform at all times i.e. not extending over or outside of the handrails.

Further Guidance on Personal 'Work Equipment'

The WAH Regulations (Schedule 5) place strict limitations on when personal fall protection systems can be used, and by whom. Specific requirements are given for fall arrest systems, work restraint systems, work positioning systems and rope access and positioning techniques.

Personal fall protection systems should only be used when a risk assessment has demonstrated that work can be carried out safely and that the risk of falling cannot be reduced to as low as reasonably practicable by collective work equipment. A personal fall protection system must be suitable and sufficient (and regularly inspected to show this), and the user must have received adequate training.

There are two types of harness: an arrestment harness designed to catch you, and a restraint harness designed to stop you falling in the first place. The HSE has advised us that the type suitable for use when carrying out lifting-up of equipment, etc. is a restraint harness. The STA is of the view that if the sampling location is so risky that a harness needs to be worn **during actual sampling**, or that an arrestment harness needs to be worn, then the risk of injury to our members outweighs the potential environmental benefits of the monitoring data and therefore the work should not proceed. However, it is acknowledged that undertaking an emergency recovery of an individual who is wearing a harness can be easier as this will often provide an attachment point for the rescue team. STA Guidance Note HGE-002 gives some further information on PPE.

Other Issues Concerning Work Platforms

Planning, supervision and competence

The WAH Regulations require the employer to ensure that work performed at height is properly planned, appropriately

supervised and carried out in a way that is, as far as is reasonably practicable, safe. This includes selection of equipment, procedures for emergencies and rescue, and due consideration of adverse weather conditions. The WAH Regulations also require the employer to ensure that competent persons carry out all activities (including organisation, planning, supervision and inspection).

Essential services and facilities at the workplace

- The sampling position shall have artificial lighting (if needed) and shall be well ventilated. Single phase, 110 volt (preferably centre-tapped) electrical power of a suitable current shall be provided by means of a suitable number of outdoor waterproof sockets at the platform. Water, drainage and compressed air shall be supplied if requested by the sampling team.
- Lifting equipment is required for the raising and lowering of apparatus where access to the sampling platform is by vertical or steeply inclined ladders or stairs. In all such cases, the lifting equipment (e.g. hoists) and attachments must be installed, inspected and maintained by the site operator (see Appendix, Figure 4). Inspections of lifting equipment should be undertaken at least once every twelve months and records should be kept for two years.
- If a US EPA Method 5 type sampling train is to be used, the platform may need to be fitted with suspension points to enable the use of a sampling monorail (see Appendix, Figure 1 & 2). The STA recommends this approach to reduce risks associated with manual handling.
- The platform or workplace shall be, as far as possible, free from obstructions that would hamper the sampling effort.
- Protection from the elements will usually be required for an outdoor sampling position.
- An additional access port or hole to vent sample air back into the duct may be necessary if the flue gas presents an exposure hazard.

Planning for Emergencies and Rescue

The Work at Height Regulations requires that there is a workable plan in place for emergencies and rescue. This plan should take account of, and be proportionate to, the attendant risks at each specific location where work at height is carried out.

The HSE Work at Height Brief Guide stipulates that; '*you must plan for emergencies and rescue, e.g. agree a set procedure for evacuation. Think about foreseeable situations and make sure employees know the emergency procedures. Don't just rely entirely on the emergency services for rescue in your plan'*.

The plan should be a joint effort between the site and also the teams or personnel working at height. Procedures will vary between sites depending on a variety of parameters, such as height of work, means of access, duration of task and the type of site. Each site should have an emergency plan which is based on the actual risks specific to that site.

So, companies cannot simply rely on the Emergency Services without having any other plan. It may be that the Emergency Services could cope with a rescue from height from a site in some cases; however this should be discussed with them to ensure that this is the case. Fire & Rescue services have local liaison officers who can be contacted to discuss these issues. The outcome of these discussions could influence what action needs to go into the site plan.

For example, a major industrial site might have a well-developed Site Emergency Response Plan, which details site evacuation and assembly procedures, contact procedures for the emergency services and lists responsibilities and contact numbers of key personnel, such as qualified first-aiders. The plan might also contain instructions covering the set-up of control rooms and include contact details for utility suppliers. Other items might include a chemical inventory, isolation procedures, spillage and other environmental procedures, as well as check lists and forms to be completed as required.

However, whilst it is acknowledged that the above scenario might be appropriate for a major industrial site it may be exceed that which is required for smaller sites. Accordingly, it is vital that the plan is produced as part of the site-specific risk assessment procedure.

When considering the personnel working at height, such as the sampling team, it is vital that they discuss the plan before commencing work to make sure they are comfortable with it and also to make the site aware of their work activities and locations. This is important as the site may have overlooked these activities as part of their plan, focusing on the everyday tasks of their own employees. The sampling team may also consider the use of harnesses. As well as being used for fall prevention these can be used to lower casualties with designed kits by trained staff. It is easier to rescue an individual with a harness on as this will often provide an attachment point.

Consideration should be given to the circumstances in which the casualty should be stabilised in-situ (normally the preferred option) and those circumstances where rescue or evacuation would be necessary. For example, a worker who has fainted on a sample platform should be attended to in-situ because any attempts to move the casualty might increase the risks of further injury. However, a worker who falls and is suspended above ground would need to be rescued rapidly. The guidance published by the Work at Height Safety Association (Technical Guidance Note № 5) is a useful source of further information. A distinction is made between the terms ‘rescue’ and ‘evacuation’. Rescue typically involves the recovery of a casualty by a third party (either remotely or directly) whereas evacuation is typically effected by the stranded user to escape from a remote location.

Of particular importance is the need to ensure reliable communication such that help can be made available promptly. It is also noted that the provision and availability of First-Aid should be considered with specific reference to the particular requirements necessary when working at height.

The means of access/egress must be safe at all times. All workers need to be made aware of the arrangements for emergency evacuation.

In summary it is important that the following are considered when devising an emergency plan:

- Risk assessment to consider what could happen, could people be trapped at heights, for example. This could vary depending on the nature of the site.
- Plan could depend on size of site
- May be appropriate to rely on emergency services – but must liaise with them first – do not just assume that you can rely on them alone.
- Fire & Rescue have local liaison officers who are happy to attend site for discussions.
- The emergency services might include ‘High Line Rescue Teams’ and ‘Ambulance Service Heart Teams’ but they could be located some distance away.
- If there is no immediate risk to life – leave alone and call Emergency Services.
- It can be easier to rescue people who are wearing a harness.

It is important to note that the issues outlined above must be considered by the site, and staff going on to site, as part of a risk assessment. This is because, if there is an incident and the emergency services are called, it would be reported to the HSE. If it is found that they were not considered, or that if no plan was in place, then prosecutions could follow.

STA guidance

STA HGO-008 Platform Inspection Questionnaire

STA HGE-008 Suitability of MEWPs relating to stack-emission monitoring

Further information

Environment Agency Technical Guidance Note M1 *Sampling requirements for stack emissions monitoring*

BS EN 15259:2007 *Measurement of Stationary Source Emissions - Requirements for the measurement sections and sites and for the measurement objective, plan and report.*

Work at Height Regulations 2005

Work at Height Regulations 2005 (as amended) – a brief guide HSE (indg401, rev2, Jan 2014)

BS 4211:2005 Specification for permanently fixed ladders

The Work at Height Safety Association, Technical Guidance Note № 5. Guidance on rescue during work at height.

Work at Height Awareness Syllabus, Advisory Committee on Work at Height Training (ACWAHT).

BS 8454 - Code of Practice for delivery of training and education for work at height and rescue.

4.2 Hazard: Falling Objects and Danger Areas

This hazard occurs because of objects potentially falling from the platform itself and also during lifting and lowering of equipment. The risks of injury from falling objects can be serious. Many fatalities are caused each year in the UK workplace by falling objects.

Factors affecting the risk

- *Falling objects from platforms* – the risk of falling objects is increased when working on grid floors.
- *Falling objects from platforms* - temporary working platforms can have gaps between scaffold planks.
- *Falling objects from platforms* – the risk is increased if the platform does not conform to the requirements for kickboards/ toe boards.
- *Falling objects during lifting/lowering* - there can be a large amount of unwieldy equipment to lift into awkward positions. The weight of the equipment and the height it needs to be lifted affect the risk of injury.
- *Falling objects during lifting/lowering* - the effects of cold, wind and rain increase the risk.
- *Falling objects during lifting/lowering* - the risk of falling objects is increased if there is lack of adequate provision for lifting equipment or space that leads to snagging and objects falling.

Unless suitable control measures are put in place, the risk of injury may be unacceptably high. The risks must be reduced to as low as is reasonably practicable through the identification and application of appropriate control measures. Examples are listed below.

Control Measures

The WAH Regulations contain specific provisions relating to falling objects and the resulting danger areas. Amongst these are requirements for the employer, as far as is reasonably practicable, to:

i. firstly, prevent the fall of objects; then

ii. prevent a person being struck by a falling object.

Danger areas (exclusion zones) must be clearly indicated and, where reasonably practicable, equipped with devices preventing unauthorised entry.

The Lifting Operations and Lifting Equipment Regulations 1998 (LOLER) apply. These cover, amongst other things, periodic checking of equipment, record keeping and visual checks before use. You should ensure that staff are suitably trained and competent in lifting and lowering operations. Consult STA Health Safety Guidance Note HGE-004 and HGE-005 for further guidance.

Some recommended control measures are:

- *Falling objects from platforms* – elevated platforms must have toe boards.
- *Falling objects from platforms* – Any gaps in the floor should be filled in (e.g. with mesh) where equipment or tools could fall and endanger people below.
- *Falling objects from platforms* – The area below the access and working platform should be designated a hazardous area. Restrict access to appropriate personnel. Use *Danger Working Overhead* signs and a physical barrier if possible. It is advisable that the exclusion zone extends beyond the 'footprint' of the platform because if an object is dropped it might strike obstructions as it falls and ricochet in unpredictable ways.
- *Falling objects during lifting/lowering* - all elevated working platforms must have a secure lifting point (see Appendix, Figure 4). Ensure any temporary platform cannot topple over when equipment is hoisted up.
- *Falling objects during lifting/lowering* - use a safe lifting system of work. Two people should be used in all lifts. Ensure no one is directly underneath the lifting point during a lift.

- *Falling objects during lifting/lowering* - ensure that the loads do not exceed the safe working load (SWL) of the hoist or support. Ensure the lifting equipment is in serviceable condition. STA

guidance HGE-005 gives an example of an inspection report record.

- *Falling objects during lifting/lowering* - PPE: Hard hats and protective footwear should be used. STA Guidance Note HGE-002 gives some further information on PPE.

STA guidance

STA guidance HGE-004, *LOLER Regulations*

STA guidance HGE-005, *LOLER Inspection Reports*

Further information

The Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)

4.3 Hazard: Manual handling

The preparation and demobilisation for stack-emissions testing usually requires a considerable degree of manual handling of sometimes heavy equipment such as gas cylinders, control boxes, etc. Such activities are subject to the Manual Handling Regulations 1992. An outline of the requirements is given in STA *Health & Safety Bulletin*, No.3, July 2001. It should be noted that there is a specific legal requirement to carry out a manual-handling risk assessment for tasks that cannot be eliminated or avoided and could result in injury.

Factors affecting the risk

Guidance on the Manual Handling Regulations issued in 1998, includes comprehensive advice on the assessment of manual-handling risks. Reference should be made to that document. However, major factors affecting the risk of injury are:

- The weight of the object.
- The shape and size of the object.
- The distance to be moved through.

- The physical capability of the employee to handle the load.
- The extent of manual-handling training the employee has received.

Control Measures

Examples of control measures that may be employed for stack monitoring are:

Engineering controls – consider if it is possible to mechanise the task, e.g. using hoists for lifting.

Procedural controls – ergonomic design is important, e.g. storage of equipment at a height that eliminates it being lifted from, or to, floor height. Training in safe-lifting procedures is essential. Management should ensure that staff employed to carry out such work are physically capable of carrying it out without injury.

Personal Protective Equipment (PPE) – safety shoes/ boots should always be worn. Protective gloves may be needed for sharp or rough objects. Back supports are sometimes used as PPE for lifting: however, these are not a substitute for controlling the risk at source and they may encourage lifting beyond a person's normal safe limits.

Guideline limits for lifting have been set at 25kg for a man and 16kg for a woman.

STA guidance

STA Guidance HGE-007, *Manual handling*

Further information

HSE INDG143 Rev 2 Getting to grips with Manual Handling

HSE INDG383 Manual Handling assessment charts

Manual Handling Operations Regulations 1992

4.4 Hazard: electricity

A considerable amount of electrical equipment is used during stack-emission monitoring – sometimes in quite adverse

environments, e.g. rain, dust or surrounded by lots of bare metal. The risks of injury from personnel receiving an electric shock, especially on a high platform, can be serious.

Factors affecting the risk

- Portable electrical equipment may be used in cramped spaces with a lot of bare metal.
- The design of probe-heating elements can increase the risk.
- Rain or water ingress can increase the risk.
- The site power supplies can be unreliable in terms of both stability of supply and type and suitability of socket.
- Some site plant may itself pose an electric-shock hazard, e.g. electrostatic precipitators.

Unless suitable control measures are taken the risk of injury can be ***HIGH***. The risks must be reduced to as low as reasonably practicable, using appropriate control measures.

Control measures

The Electricity at Work Regulations 1989 apply to electrical equipment and instruments used for stack monitoring. The Regulations cover, amongst other things, equipment inspections (e.g. portable appliance 'PAT' testing) and visual checks before use. You should consult STA Health Safety Guidance Note HGE-003 for further guidance on electrical supplies. Some other control measures are:

- The site operator must ensure the provision of a power supply that is stable and safe with a suitable number of outdoor, waterproof sockets at the sampling location (platform or other workplace).
- The voltage on the equipment should be 110V, via an isolating centre earth transformer. Do not use 240V equipment on sampling platforms.
- Have your electrical equipment regularly inspected and PAT-tested by a competent person.
- Regularly check electrical equipment yourself between PAT-tests. For example, visually check casings, leads, cables and plugs.

- Protection devices such as Residual Current Devices (RCDs) should be used at the point of power.
- Trailing leads should be highly visible and should be protected from process operations.
- Take extreme care when manoeuvring probes, Pitot tubes, etc. in the vicinity of live power lines which may be overhead. For example, do not sample too close to electrostatic precipitators or power supplies for overhead cranes.
- Hot gases can conduct electricity quite well and can lead to shocks downstream if sampling too close. When sampling after ESPs ensure that the equipment is suitably earthed using earthing straps.

STA guidance

STA Guidance HGE-003, *Understanding Electrical Supplies*

Further information

HSG107, *Maintaining portable and transportable electrical equipment* (2004)

HSE INDG231 Electrical Safety and you 2005

4.5 Hazard: High temperatures

Hot flue gases and hot duct work and equipment can cause serious burns.

Factors affecting the risk

- The temperature of the flue gas.
- Flue gas under high positive pressure.
- Whether the hot surfaces are lagged or guarded.
- Manipulating unwieldy equipment.
- The amount of space available on the working platform.

Control measures

- Find out the temperature and pressure of the flue gas before the visit.
- Use PPE appropriate for the risk, e.g. protective gloves and covered forearms. Eye protection should **always** be worn.
- Loosen ports slowly.
- Sufficient staff should be available to safely handle the equipment.
- The platform should be large enough to safely accommodate the equipment.

4.6 Hazard: ionising radiation

There is potential for exposure to ionising radiation whilst working on stacks at some specific types of site. This applies only to a small number of specialised processes. These are specifically authorised to emit radioactive substances to air and generally have their own radiological protection supervisor. In the event that an STA member organisation is invited to carry out stack-emission monitoring from these plant, it is recommended that the risks from radiation and necessary control measures are assessed in close co-operation with the site operator and under the guidance of the radiological protection supervisor.

4.7 Hazard: compressed gases

It is very common to use compressed gases in stack-emission monitoring. The hazards and risks can be explosion, fire, rapid acceleration, manual handling and toxicity. Here we deal only with explosion, fire and manual handling. The toxicity is a chemical hazard and will be dealt with in the next section.

Factors affecting the risk

- How the gas cylinders are transported
- How the gas cylinders are secured/stored
- Staff training (including manual handling)
- Regulators, valves, valve outlets and pressure lines can be very vulnerable (especially if damaged)

Control measures

Some of the control measures used when using/transporting gas cylinders are:

- Store in an area which avoids extremes of temperature.
- Stow cylinders securely, normally in the vertical position, to prevent them moving or falling.
- Disconnect regulators and pressure lines from cylinders whenever reasonably practicable.
- If necessary, fit suitable protective valve caps and covers to cylinders before transporting.
- Ensure the cylinders are clearly marked to show their contents and hazards.
- Transport properly (see below)
- Move properly (use cylinder trolley)
- Check for leaks (especially if flammable eg hydrogen)
- Do not use thread tape or jointing compounds
- Do not open valves fully (moderate torque)
- Turn off after use (moderate torque)
- Position outside buildings if possible
- Ensure good ventilation (especially when changing)
- Cover gauge glass when opening valve

Regulators on compressed gas cylinders require specific considerations for example:-

- Maintenance/functional checks (annually)
- Consider safe working life (usually 5 years)
- Ensure correct thread type
- Perform prior-to-use checks such as:
    - Regulator - inspected, not overdue for replacement, suitable for inlet/outlet pressure, check for damage, leaks etc.
    - Correct type (eg flame arrestor required?)
    - Inlet clean and undamaged

- Gauge eg glass in good condition, reads zero

- Remember regulators control pressure not flow
- Never use thread adaptors

Some of the control measures used in manual handling of gas cylinders are:

- Wear appropriate gloves, footwear, eye protection
- Do not use valves and caps for lifting cylinders unless they have been designed and manufactured for this purpose.
- Use suitable cradles, slings, clamps, etc. when lifting cylinders with a hoist or crane. Do not lift using the forks of a fork-lift truck unless adequate precautions are taken to prevent them from falling.
- Use correct hand-holds eg valve guard or gripping point
- Use correct PPE (check Safety Data Sheet, SDS)
- Use a *suitable* cylinder trolley (size, restraints)
- Check the route eg:-
    - Stairways
    - Lifts (do not travel with gas unless breathable air)
- Physical capability (bend knees, hold close to body)
- *Never* roll or drop
- ***Never*** unscrew, loosen or remove main valve
- Do not move with regulators attached (close main valve)
- 'Churn' only small distances

Some of the control measures for using gas cylinders at the monitoring position are:

- Use in vertical position unless specifically designed to be used otherwise.
- Securely restrain cylinders to prevent them falling.
- Close cylinder valve and replace dust cap (where provided) when not in use.

- Before connecting the cylinder to pipework/equipment, make sure the regulator and pipework are suitable for the type and pressure of gas being used and are in good condition.

Transport of compressed gases

STA Health Safety Guidance Note HGA-002 describes regulations applying to transport of chemicals. Considerations include:

- Compliance with Carriage of Dangerous Goods/ADR Regs if appropriate.
- Minimum requirements
  - Training in hazards, safe handling, emergency procedures
  - Open vehicles or well ventilated (do not transport toxic gases in closed vehicles)
  - Carry fire extinguisher
- Ensure valves are closed and cylinders are properly restrained
  - Labels legible
  - Documentary details may be useful eg Transport Emergency (TREM) cards.
  - Specific provisions may be required if **Threshold Quantity** is exceeded (check)
- BCGA Leaflet L1 (Rev5, 2015) contains more information.

STA guidance

STA HGA-002 The application of carriage of dangerous goods regulations relating to stack testing operations

STA HGE-001 Transportation and handling of gas cylinders

4.8 Hazard: Noise

Significant noise exposure can occur during stack-emission monitoring. Impact noises such as rapping mechanisms on electrostatic precipitators and bag filtration plant are particular examples of noises that may significantly exceed the 87dB exposure limit level or the Peak Sound Pressure of 140 dB. The lower action level of 80dB can be exceeded by continual

exposure to the equipment a stack-emissions monitoring team might take to site. Equipment such as US EPA Method 5 type pumps and heated head pumps are examples of equipment that can become noisy and to which personnel might be exposed for extended periods of time.

Control Measures

- Identify the workers at risk from hearing damage (so you can prepare an action plan to control noise exposure).
- Determine the daily noise exposure ($L_{ep,d}$) of workers.
- Identify additional information to comply with legislation e.g. whether noise control measures or hearing protection are needed, and, if so, where and what type. In cases where employees are likely to be exposed to the second or peak action level or above, it is required that, as far as reasonably practicable, exposure must be reduced in ways other than by providing hearing protection. It should be noted that wearing hearing protection can make verbal communication difficult and also increases the risk of not hearing alarms or site traffic. Noise reduction measures should always be preferred to the wearing of hearing protection.

STA guidance

STA guidance HGE-006 Protection against noise during stack-emission monitoring.

Further Information

HSE INDG362 Guidance for employers on the control of noise at work Regulations 2005

HSE IND 363 Protect your hearing or lose it! (2007)

5. CHEMICAL HAZARDS AT THE STACK

5.1 Hazard: flue gases

This is a major hazard in stack-emission monitoring. Unless the process operator has made you aware of the nature of the stack gas, the specific hazard will be unknown. There is no way to assess the risk of an unknown hazard so such stacks should be regarded as a high risk and appropriate control measures taken to reduce the risk.

The hazards may arise from the chemical nature of the flue gas or from the fact that its oxygen level is depleted. There may also be rapid changes in the nature of the flue gas which affect these factors and its toxicity. The temperature or pressure of the flue gas can also be a hazard. Process or waste gas from other sources can wash over the platform area. The consequences of personnel being overcome by fumes from flue gas, especially on a high platform, are very serious.

Factors affecting the risk

- There may be little or no information available on the nature of the flue gas.
- The concentrations of hazardous chemicals in the flue gas can be orders of magnitude higher than any workplace exposure limit (WEL).
- Flue gas may be under high positive pressure, which increases the risk of exposure.
- The temperature of the flue gas might increase the risk of secondary chemical reactions.
- Sampling requires that access is gained to the chimney stack, duct or flue. This may be at two or three points around the stack.
- The sample ports may be a wide variety of shapes and sizes. Good seals may be difficult.
- Extractive sampling equipment may exhaust toxic vapours into the workplace, increasing the risk of exposure.
- Ventilation efficiency at the workplace will have an important effect on exposure risk. On certain sites, the monitoring location may be in areas that can be classified as confined spaces, as

defined by the Confined Space Regulations 1997. This may include mobile laboratories and vehicles in which the monitoring equipment may be placed when sampling.

- The sampling location may have a very restricted escape route, which may prolong exposure in an emergency.

Unless suitable control measures are taken, the risk of injury will be unacceptably high. It is advisable to treat all unknown flue gases as high risk. The risks must be reduced to as low as is reasonably practicable by appropriate control measures.

Control measures

There is a specific legal requirement under the COSHH Regulations for the 'employer' to make an assessment of the risks to health from hazardous substances and implement measures to control exposure to them. You should consult STA Health Safety Guidance Note HGA-001 for further guidance on chemical exposure risks. Some other control measures are:

- Obtain information on the physical and chemical nature of the flue gas *before* sampling. The STA has a data-collection sheet *Exposure to Hazardous Stack Gases During Sampling* which can be sent to operators to complete. This sheet is available on the STA website. Once you have this information you should next assess the risk of exposure.
- Check whether there has been any process change from the last visit that could alter the expected stack gas concentrations.
- Ensure that the operator has provided adequate ventilation for the sampling location. This is a specific requirement contained in Environment Agency Technical Guidance Note M1. The STA generally recommends that no sampling is carried out in confined spaces. The HSE has produced guidance on work in confined spaces. The relevance to stack-emission monitoring has been discussed in STA *Health & Safety Bulletin,* Issue 2, February 2001. The STA recommends that, generally, members should not carry out work in confined spaces, unless they have been specifically trained in such working and have suitable control measures in place to reduce the risk to an acceptable level.
- Sample ports should be closed firmly when not in use.

- The probe used should be a good fit with the dimensions and design of sample port.
- If the flue gas is hazardous, warning signs should be placed on or near the sample ports.
- Where the exhaust from the sampling equipment creates an unacceptable risk of exposure, vent it remotely or back into the stack via another port.
- If necessary, monitor the exposure of the sampling team and use alarm devices, e.g. personal SO_2 alarms and CO alarms.
- There should be a good system of liaison between the sampling team and the process operator. If there are any variations expected in the flue gas due to process changes then the sampling team must be kept informed.
- There may need to be a system for emergency communication between the samplers and other personnel.
- Personal Protective Equipment (PPE) – the following hierarchy of exposure prevention should be applied: exposure prevention> engineering control measures> procedural control measures> PPE. This hierarchy of control measures must be applied on the basis of minimising risk, not cost, i.e. if exposure can be prevented or minimised by moving the sampling position or installing ventilation, then this should be done in preference to using breathing apparatus (BA) or other respiratory protection equipment (RPE) even if it costs more. The STA does not endorse carrying out any stack monitoring work where it is necessary to use BA. In such situations, the risk of personal injury outweighs the environmental benefit that may be gained from sampling. Some kinds of breathing apparatus may be appropriate as an escape precaution, but as with all PPE, personnel must be trained in their use. STA Guidance Note HGE-002 gives some further information. Rigorous maintenance and inspection of the equipment and refresher training for its use is also necessary.
- Health surveillance may be necessary for some monitoring organisations. For example, the monitoring organisation should assess whether it is appropriate to give blood tests if its staff could experience significant exposure on lead sites.

5.2 Hazard: Chemical substances used during stack monitoring

Whereas it is sometimes difficult to get information on the hazardous nature of the stack gas, all STA members should have a detailed knowledge of the hazards posed by any substances (e.g. chemical reagents and gases) utilised in the apparatus which is used in stack-emission monitoring work. The hazards are not just confined to substances that are toxic by inhalation; substances that are corrosive can be a hazard to the skin and eyes too.

Factors affecting the risk

- The toxicity/corrosive nature of the substances used.
- Whether the substance is contained or used in the open.
- The actual work activity you are performing, e.g. pouring an acid.
- Frequency and duration of the work.
- Ventilation efficiency.
- Personal protection used.

Control measures

The COSHH Regulations require the employer to make an assessment of the risks to health from hazardous substances and implement measures to control exposure to them. For work as complex and high-risk as stack monitoring, this assessment should be documented. An ideal place for this is in a safety section in the organisation's written technical procedure for the test. Safety data sheets (SDS) have been a well-accepted and effective method for the provision to downstream users of information on chemical substances and mixtures in the EU. Most buyers (either importers or distributors or downstream users) in EU will request a copy of SDS when they buy chemicals. Other countries such as USA have used Material Safety Data Sheets (MSDS), which are very similar to SDS in terms of format and contents.

Suppliers of chemical reagents have to produce (Material) Safety Data Sheets (MSDS or SDS). These documents help provide

information such as handling and storage arrangements as well as any mandatory PPE requirements. This information is necessary in order to produce a thorough COSHH assessment.

Another, more recent, piece of relevant regulation is 'REACH' which is a European Union regulation concerning the Registration, Evaluation, Authorisation and restriction of Chemicals. It came into force on 1 June 2007 and replaced a number of European Directives and Regulations with a single system. When it is finally implemented fully (June 2018) REACH will apply to substances manufactured or imported into the EU in quantities of 1 tonne or more per year. Amongst other things, REACH aims to provide a high level of protection to human health and the environment making the people who place chemicals on the market (e.g. manufacturers and importers)responsible for understanding and managing the risks associated with their use. In the UK, REACH operates alongside COSHH.

The REACH regulations state that for substances that are sold in quantities of more than 10 tonnes per year and are classified as dangerous, *exposure scenarios* describing how a substance can be safely handled to control exposures to both human health and the environment shall be added to the SDS, forming extended safety data sheets (eSDS). This new SDS/eSDS is known as **'**REACH SDS**'.**

'Exposure Scenario' means the set of conditions, including operational conditions and risk management measures, that describe how the substance is manufactured or used during its life-cycle and how the manufacturer or importer controls, or recommends downstream users to control, exposures of humans and the environment.

There is a wealth of information covering REACH available on-line (including the HSE website).

You should consult STA Health Safety Guidance Note HGA-001 for further guidance on chemical exposure risks.

Some control measures are:

- Substitute hazardous substances in the test for less-hazardous substances where this is practicable. For example, substitute hazardous blue silica gel for less-harmful orange indicating gel.
- Reduce the amount of contact with the substances so far as is practicable.
- Carry out the test according to your work procedure, using the control measures specified.
- Ensure adequate ventilation.
- PPE: if other control measures cannot reduce exposure to an acceptable level, PPE may be required, e.g. protective gloves, goggles, respiratory protective equipment (RPE) suitable for the substances should be used. Personnel must be trained in the use of their PPE. STA Guidance Note HGE-002 gives some further information on PPE. Note that the SDS/eSDS may contain mandatory PPE requirements.

STA guidance

STA HGA-001 Chemical Exposure Risks During Stack Testing Operations

STA HGE-002 Personal Protective Equipment

STA HGO-004 Confined space regulations

STA HGO-006 Stack-gas exposure information sheet

STA HS 1058-00 Example COSHH Assessment

Further information

Personal Protective Equipment at Work Regulations 1992.

HSE INDG136 Rev 3 COSHH A brief guide to the regulations 2005

Confined Space Regulations 1997

HSE INDG258: *Safe Work in Confined Spaces* (1997)

HSE indg353 safety data sheets

HSE What is REACH?

http://www.hse.gov.uk/reach/whatisreach.htm

6. CHEMICAL HAZARDS IN THE LABORATORY

6.1 Hazard: substances used during cleaning and analysis

The risks associated with cleaning and analysis carried out in the laboratory are beyond the scope of this booklet, which focuses on site activity alone. There is a wealth of existing guidance on applying COSHH and other aspects of health and safety to laboratory work, and this should be referred to. In practice, much of the guidance given in the preceding Section 5.2 will apply.

Further information

COSHH in Laboratories, Version 4. Royal Society of Chemistry, 2008.

7. WEATHER, ENVIRONMENT AND WELFARE

7.1 Hazard: temperature extremes

The Workplace (Health, Safety and Welfare) Regulations 1992 and accompanying Approved Code of Practice (ACOP), provide a general set of minimum standards for thermal comfort in the workplace. However, these are not designed to cover those working in extremes of temperature outdoors or around processes. The risk assessment made under the Management of Health and Safety at Work Regulations 1999, should include the effects of heat, cold and humidity where appropriate. Note also that for elevated workplaces, the WAH Regulations specify that work should only be carried out where weather conditions do not jeopardise safety.

The hazards due to extreme cold include frostbite and hypothermia. Cold hands also make manual handing more hazardous and increase the risk of dropping equipment.

The hazards associated with hot environments are dehydration, heat exhaustion and fainting. In addition, metal surfaces and tools can become very hot to touch leading to the risk of skin burns. If radiant heat is present, e.g. in furnaces, rolling mills and glass manufacture, the eyes and skin may be affected.

Factors affecting the risk

- Time of year.
- The ambient temperature.
- Duration of the work.
- How exposed the working platform is, e.g. provision of shelter or refuge.
- Wind chill factor (see Section 7.4).
- The height of the working platform.
- Location: e.g. sampling positions are often located in the roof spaces above processes, where elevated temperatures may be encountered.
- Process: there are some processes, e.g. incineration, cremation and steel production, where the ambient temperature in the work space above the processes can reach as high as 40-50°C.
- Personal protection used
- The risk assessment must consider both the environment and the individual when calculating the risks involved, e.g. pregnant women tolerate heat less well and may more readily faint and be more liable to heat stress. It may be necessary to use medical screening to exclude high-risk individuals from working in very hot or very cold environments, for example employees whose physical capabilities might be impaired due to issues associated with :
- Age.
- Bodyweight.
- Skin conditions (eg in the case of radiant heat).
- Cardiovascular or renal disease.
- Peripheral vascular disease (Raynaud`s disease or 'white finger').

Control measures

Ideally, thermal comfort should be through building design and the incorporation of thermal insulation. However, this is often an impracticable solution for stack-emission monitoring work. Additional workplace controls may include:

- Controlling the source of heat/cold, e.g. by insulation.
- Separating the source from the person, e.g. by erecting barriers.
- Controlling the task, e.g. limiting workloads.
- Controlling ventilation in the workplace, e.g. through the use of fans or air conditioning.

If temperatures providing reasonable comfort in the working environment cannot be achieved, suitable protective clothing (e.g. warm clothing) and rest facilities should be provided. For extremes of cold, periods of exposure should be followed by adequate spells of rest in warm, well-ventilated rest areas. When working in hot environments, frequent rest periods should be taken in cool areas (particularly if strenuous work is involved) and cool drinks should be taken regularly. Rehydration fluids or even salt tablets may be considered necessary in extreme cases.

If radiant heat is present, tinted protective glasses may be needed.

The risk assessment should take all these factors into account to decide on a safe maximum working time for exposure to heat or cold.

7.2 Hazard: snow and ice

Snow and ice greatly increase the hazards of falls from height, and make manual handling more risky.

Factors affecting the risk

- The ambient temperature.
- The height of the working platform.
- How exposed the working platform is.
- Provision of shelter.
- Duration of the work.

Control measures

All the control measures applying to hazards that are worsened by cold, snow and ice (e.g. falls, manual handing) should be reassessed. More stringent control measures may be required than in the absence of cold, snow and ice. The most basic additional control measures are:

- Request shelter to be provided at the sampling location. Seek advice before lashing tarpaulins or sheeting to platforms as these can destabilise the structure on windy days.
- Do not work on platforms outside if there is snow or ice present.
- If possible, avoid starting work outside in conditions which make the onset of snow and ice likely.
- At low temperatures, where there is no snow or ice, use appropriate PPE, e.g. thermal workwear and gloves.

7.3 Hazard: sunburn

When working outside, the ultraviolet radiation in strong sunlight can lead to sunburn and sunstroke. The most serious long-term effect is an increased chance of skin cancer later in life.

Workplace factors affecting the risk

- Time of year of the work
- Duration of the work
- Location of the work
- The risk of sunburn is increased when the working area is surrounded by reflective surfaces, e.g. metal roofs.

Personal factors affecting the risk

Some people are more susceptible to burns and/or skin cancer than others. The HSE recommends you take particular care if you have:

- White skin - fair or freckled skin that doesn't tan easily is most at risk.
- Red or fair hair and light-coloured eyes.
- A large number of moles: over 100 in young people or over 50 in older people.

Control Measures

- Determine a safe maximum working time for exposure to heat or sunlight.
- Work in the shade if possible.
- Avoid working outside in the 3 or 4 hours around mid-day in summer when the sunlight is most intense.

- Wear clothing covering exposed skin.
- Use sunblock: this will give some protection – use an SPF rating of at least 15.
- Health surveillance: regularly check for skin abnormalities.

7.4 Hazard: winds

The risks due to wind include causing workers to lose their balance, causing objects to be blown from the work platform and causing ropes, cables and sheeting to whip about. Wind also makes verbal communication difficult even over short distances. Thus many of the hazards identified previously (e.g. falls from height, falling objects) are worsened by wind. Wind can therefore pose a serious risk of injury and a high standard of protection is often required to reduce the risk to as low as reasonably practicable.

Factors affecting the risk

- The strength of the wind
- The height of the working platform
- How exposed the working platform is
- Provision of shelter
- Personal protection used

Control measures

You must decide what a safe upper limit of wind speed is suitable for the sampling location, taking into account the height you are working and how exposed you are. The following are *guideline* criteria that have been found suitable in some general situations:

- Do not go up the stack if the ground wind speed exceeds 30 mph.
- If the wind speed up the stack exceeds 30 mph during sampling, stop work and come down if it is safe to do so.
- If it is not safe to come down, stay where you are and use a safety harness.

The wind speed can be measured using a hand-held anemometer or estimated from the Beaufort scale (e.g. trees bending). At 30 mph, light equipment will sway significantly when being hoisted.

The wind chill factor, see table below, must also be taken into account

		Temperature °C		
		10	4	-1
Wind Speed (MPH)	5	9	3	-3
	10	4	-2	-9
	15	2	-6	-13
	20	0	-8	-16
	25	-1	-9	-18
	30	-2	-11	-19

7.5 Hazard: rain

The hazard due to rain is that it increases the risk of many of the hazards identified previously (e.g. falls from height, electric shock).

Factors affecting the risk

- The strength of the rain
- The height of the working platform
- The presence of electrical equipment
- How exposed the working platform is
- Mud/dirt on the platform
- Provision of shelter

Control measures

All the control measures applying to the hazards worsened by the rain (e.g. falls, electric shock) should be reassessed if it begins to rain. More stringent control measures may be required than in dry conditions. The most basic additional control measures are:

- Request shelter to be provided at the sampling location but seek advice before lashing tarpaulins or sheeting to platforms as these can destabilise the structure on windy days.
- Do not work on platforms where dust can turn to mud. This is common at minerals sites.

7.6 Hazard: lightning

The hazards associated with lightning are burns, possibly fatal, from lightning strikes.

Control measures

- All outside work should be **stopped** during lightning storms. The team should come down from the stack if it is safe to do so. Sampling teams should keep abreast of weather forecasts and remain vigilant of changing weather conditions which might signify the potential for electrical storms.

7.7 Hazard: tiredness

The hazard associated with tiredness is that it increases the risk from many of the previously described hazards. In addition, driving whilst tired poses a serious risk.

Factors affecting the risk

- Duration of the work on site.
- Duration of the journey to/ from site.
- Amount of physical exertion.
- Other factors, e.g. heat exhaustion.
- Check presence of airbags for drivers and passengers in commercial vehicles and cars.

Control Measures

- Determine a safe maximum daily working time, to include site work and travelling. An example would be a normal maximum of 10 hours per day with occasional maxima of 12 hours.
- Take rest breaks
- Do not drive if you are unfit to do so. Some employers stipulate a maximum distance that can be driven in a day if a full day's work is also to be carried out. Rest breaks of at least one-quarter of an hour should be taken every 2 hours during a drive. Rotate drivers if possible.
- Design and cost the job to allow for the above.
- The requirements of the Working Time Regulations should be adhered to. Site teams should not work more than 48 hours per week.

7.8 Hazard: lone working

It is most unlikely that a risk assessment of stack-emission monitoring on a complex industrial process would conclude that lone working is safe. However, there *may* be occasions on less-complex, less-hazardous processes when undertaking straight-forward tasks where lone working is acceptable. It is also acknowledged that some types of worker (eg service engineers) might carry out site operations alone. The STA has issued separate guidance on the hazards, risks and safety control measures for lone working, HGO-002.

STA guidance

STA HGO-002 Lone Working

STA HGO-003 Working hours on site relating to stack-emission monitoring.

STA guidance HGO-007 Lightning strikes

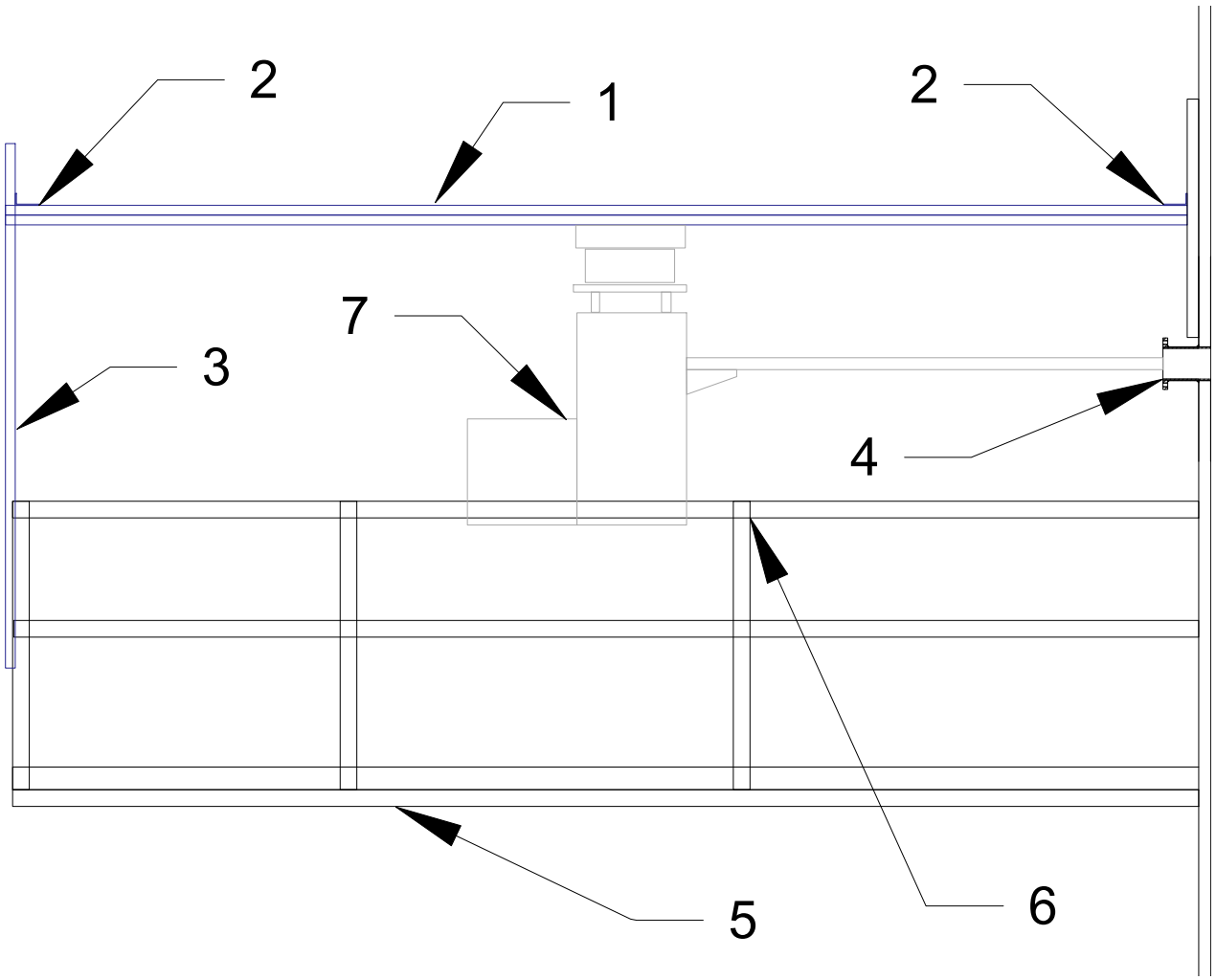
Further information

HSE INDG 337, *Sun Protection Advice for Employers of Outdoor Workers 2001*

HSE INDG147Rev 1 *Keep Your Top On – Health Risks from Working in the Sun* 1998

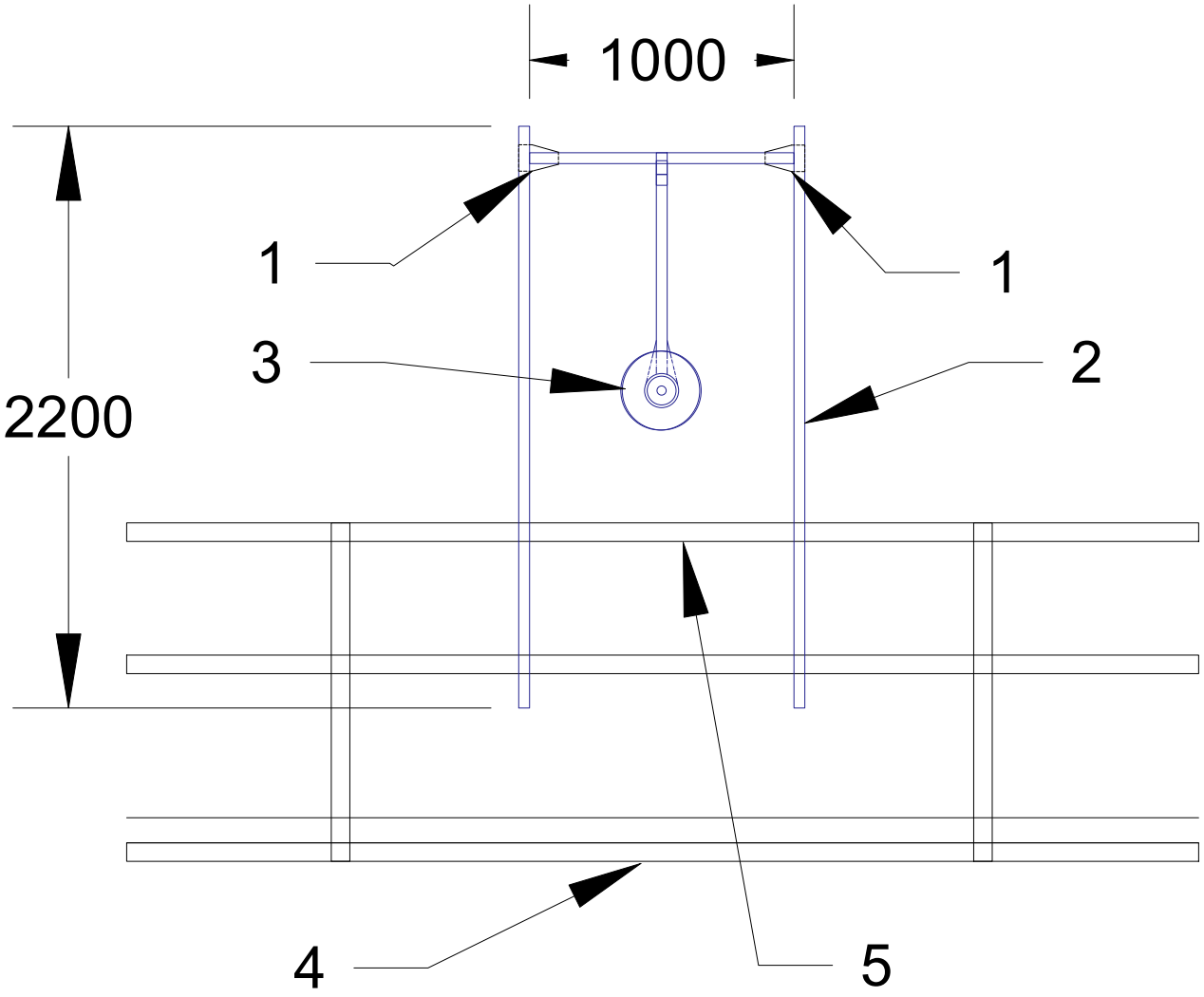
APPENDIX 1

Figure 1: Example of a monorail system



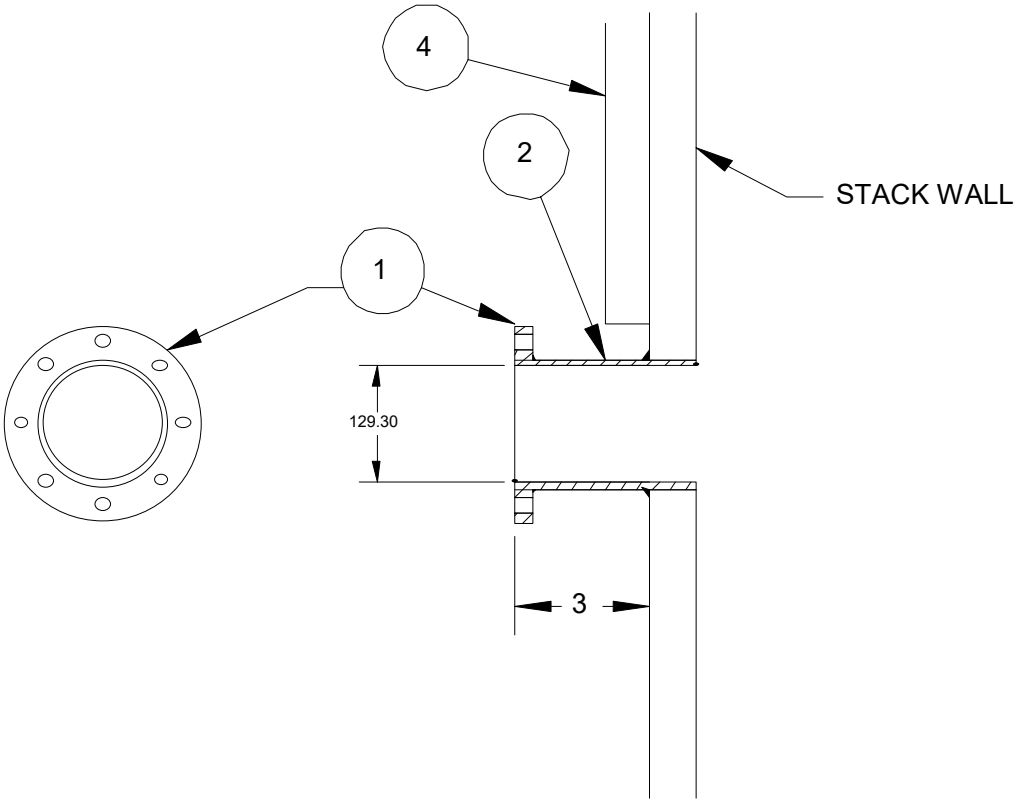
1. Monorail Unistrut P1001
2. L brackets Unistrut P2484
3. Unistrut H frame, refer figure 2
4. Standard 125 mm sample port, refer figure 3
5. Sampling platform, refer Environment Agency Guidance Note M1
6. Platform hand rail
7. Example of sample train

Figure 2: Monorail end view



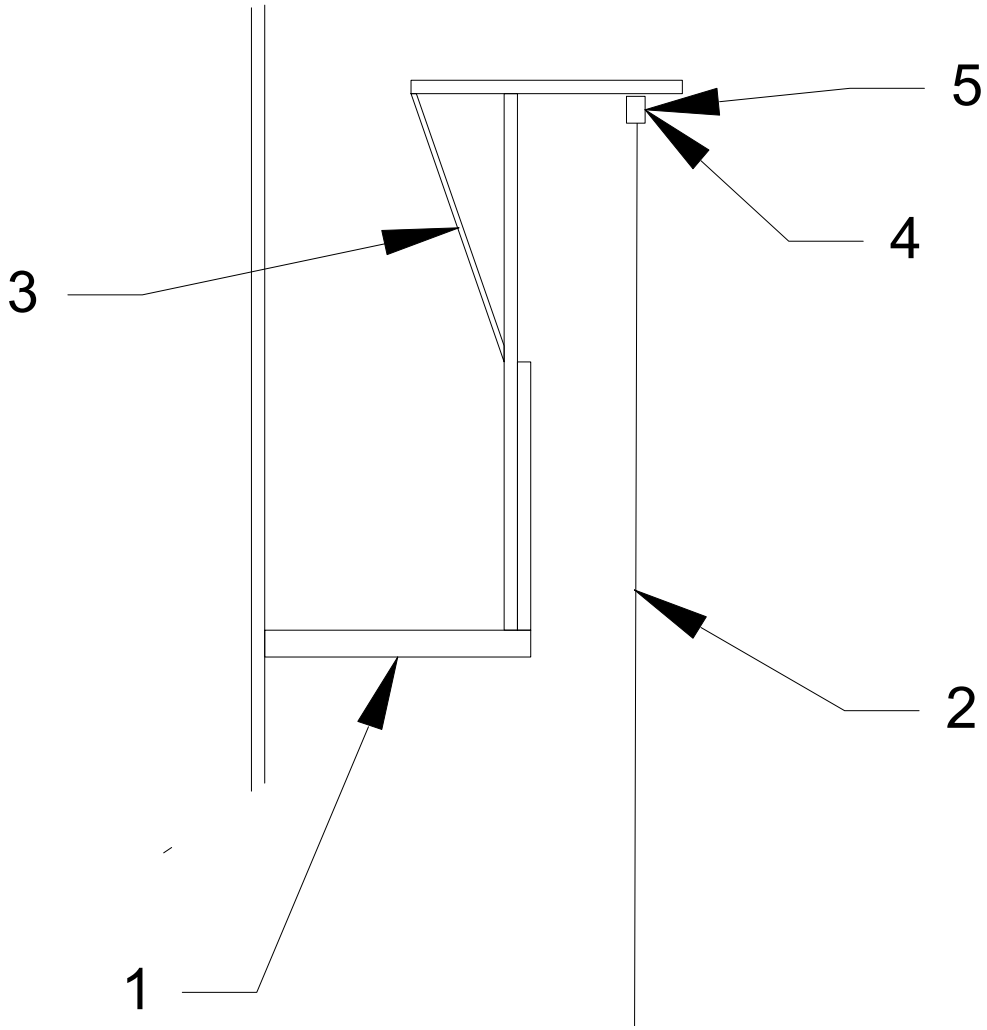
1. Bracket Unistrut P1358
2. Unistrut P1000
3. Standard sample port, refer figure 3
4. Sampling platform, refer Environment Agency Guidance Note M1
5. Platform hand rail

Figure 3: Standard 125mm Sample port



1. Flange BS10 –125mm (5”)
2. Pipe stub 125mm schedule 40
3. Pipe stub length should be a minimum of 75mm from the stack wall (recommended is 100mm)
4. Recommendation that 1000mm of Unistrut P1000 is fitted vertically on the centre line of the sample port for positioning of the monorail

Figure 4: Lifting point



1. Sampling platform, refer Environment Agency Guidance Note M1
2. The lifting point must be able to withstand a resultant force of at least 100kg.
3. The construction design of the lifting point is at the discretion of the engineer involved but should be able to conform to the specifications on this diagram.
4. Loop (minimum internal dimension - 20mm x 15mm) to which a karabiner with a rope and pulley system will be attached prior to sampling apparatus being hoisted and removed after sampling has taken place and all equipment has been lowered from the platform. It should therefore be easily accessible from the platform without having to reach over the edge of the handrail to such an extent that there is a risk of falling. The boom would ideally rotate.
5. Height of loop above the platform.

APPENDIX 2 - Useful Links

STA Health and Safety Guidance Note	Download from
HGA-002 The Application of the Carriage of Dangerous Goods Regulations Relating to Stack Testing Operations	www.s-t-a.org members area - guidance note – Health and Safety
HGA-001 Chemical Exposure Risks During Stack Testing Operations	www.s-t-a.org members area - guidance note – Health and Safety
HGE-001 Transportation and Handling of Gas Cylinders	www.s-t-a.org members area - guidance note – Health and Safety
HGE-002 Personal Protective Equipment	www.s-t-a.org members area - guidance note – Health and Safety
HGO-002 Lone Working	www.s-t-a.org members area - guidance note – Health and Safety
HGE-003 Understanding Electrical Supplies	www.s-t-a.org members area - guidance note – Health and Safety
HGO-003 Working hours on Site Relating to Stack-Emission Monitoring	www.s-t-a.org members area - guidance note – Health and Safety
HGE-004 LOLER Regulations	www.s-t-a.org members area - guidance note – Health and Safety
HGE-005 LOLER Regulations - Inspection Report	www.s-t-a.org members area - guidance note – Health and Safety
HGO-004 Confined Space Regulations	www.s-t-a.org members area - guidance note – Health and Safety
HGO-005 Safety Passport Scheme	www.s-t-a.org members area - guidance note – Health and Safety
HGO-006 Stack-gas exposure information sheet	www.s-t-a.org members area - guidance note – Health and Safety
HGE-006 Protection against noise during stack-emission monitoring	www.s-t-a.org members area - guidance note – Health and Safety
HGE-007 Manual Handling	www.s-t-a.org members area - guidance note – Health and Safety
HGO-007 Lightning strikes	www.s-t-a.org members area - guidance note – Health and Safety
HGE-008 Suitability of MEWPS relating to stack-emission monitoring	www.s-t-a.org members area - guidance note – Health and Safety
HGO-009 Guidance on Risk Assessment Forms	www.s-t-a.org members area - guidance note – Health and Safety
HGO-008 Platform Inspection Questionnaire	www.s-t-a.org members area - guidance note – Health and Safety
HS 1057-00 Example Risk Assessment	www.s-t-a.org members area - guidance note – Health and Safety
HS 1058-00 Example COSHH Assessment	www.s-t-a.org members area - guidance note – Health and Safety

Further information	Download from
HSG107, *Maintaining portable and transportable electrical equipment* (2004)	www.hsebooks.com/Books/product/product.asp?catalog_name=HSEBooks&category_name=&product_id=2858&cookie%5Ftest=1
HSE INDG136 Rev 3 COSHH A brief guide to the regulations 2005	www.hse.gov.uk/pubns/indg136.pdf
HSE INDG143 Rev 2 Getting to grips with Manual Handling	www.hse.gov.uk/pubns/indg143.pdf
HSE INDG147Rev 1 *Keep Your Top On – Health Risks from Working in the Sun* 1998	www.hse.gov.uk/pubns/indg147.pdf
HSE INDG231 Electrical Safety and you 2005	www.hse.gov.uk/pubns/indg231.pdf
HSE INDG258: *Safe Work in Confined Spaces* (1997)	www.hse.gov.uk/pubns/indg258.pdf
HSE INDG 337, *Sun Protection Advice for Employers of Outdoor Workers 2001*	www.hse.gov.uk/pubns/indg337.pdf
HSE INDG362 Guidance for employers on the control of noise at work Regulations 2005	www.hse.gov.uk/pubns/indg362.pdf
HSE IND 363 Protect your hearing or lose it! (2007)	www.hse.gov.uk/pubns/indg363.pdf
HSE INDG383 Manual Handling assessment charts	www.hse.gov.uk/pubns/indg383.pdf
Personal Protective Equipment at Work Regulations 1992	www.hse.gov.uk/pubns/indg174.pdf
Workplace (Health, Safety and Welfare) Regulations 1992 and accompanying Code of Practice.	www.hse.gov.uk/pubns/indg244.pdf
Management of Health and Safety at Work Regulations 1999.	www.hse.gov.uk/pubns/hsc13.pdf
BS 4211:2005 Specification for permanently fixed ladders	www.bsigroup.com/en/Shop/Publication-Detail/?pid=000000000030172432
Work at Height Regulations 2005	www.hse.gov.uk/pubns/indg401.pdf
Work at Height Regulations 2005 – operational circular OC 200/31	www.hse.gov.uk/foi/internalops/fod/oc/200-299/200_31.pdf
Environment Agency Technical Guidance Note M1 *Sampling requirements for stack- emissions monitoring (2006)*	publications.environment-agency.gov.uk/pdf/GEHO1105BJXX-e-e.pdf?lang=_e
Manual Handling Operations Regulations 1992	www.opsi.gov.uk/SI/si1992/Uksi_19922793_en_1.htm
The Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)	www.loler.org.uk/
Confined Space Regulations 1997	www.opsi.gov.uk/si/si1997/19971713.htm
Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR)	www.hse.gov.uk/riddor/
COSHH in Laboratories, Version 3. Royal Society of Chemistry, 2003	www.rsc.org/pdf/ehsc/coshhlabs.pdf

Notes

Notes

Web Site: www.s-t-a.org

About *us*

The STA exists to advance the science and practice of emissions monitoring and to promote safe working and high a quality of service to customers.

How *you* will benefit from membership

Whether you are a process operator, a regulator, a monitoring organisation, an instrument supplier, or a laboratory, you will benefit from joining the STA. We give you:

- a voice in monitoring matters at national (e.g. BS, MCERTS) and international (e.g. ISO, CEN) levels
- personal and professional development including training
- technical support and guidance
- the opportunity to take part in quality control initiatives, such as our Proficiency Testing (PT) scheme

Source Testing Association

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