



Controlling Exposures to prevent occupational lung disease in the construction industry

Specialist Plant Operative

HAZARDS AND RISKS

Specialist plant operatives using excavators, bulldozers, graders, loaders, dumper trucks and piling/drilling machinery etc. to carry out demolition, excavate or move construction materials and waste about site can be exposed to many different harmful substances.

Dusts

Dust is generated when moving materials around constructions sites, as well as during piling and drilling operations. Dust inside the driver cabs can dry out and become airborne when disturbed. The risk may be greater on derelict or contaminated land sites where hazardous substances such as asbestos, silica, toxic metals and organic matter, such as animal droppings, may be present.

Gases, fumes and vapours

Operation of plant and machinery can result in exposure to high levels of diesel engine exhaust emissions (DEEEs), particularly in confined spaces. Gases and vapours may arise where work involves disturbance of sludges. Work in confined spaces such as drainage or sewer structures (particularly on derelict sites) might also result in exposure to gases such as hydrogen sulphide.

Risks to health

Breathing in these hazardous dusts, gases and vapours can cause serious, debilitating, irreversible, life-limiting, and, in some cases, fatal illnesses, which include lung cancer, pulmonary fibrosis (eg. asbestosis/silicosis), asthma, pulmonary oedema and chronic obstructive pulmonary disease (COPD). DEEEs contain a complex mix of gaseous components and particulates. DEEEs may cause respiratory tract irritation and have also been linked to long term increased risk of lung cancer. Asbestos causes over 5000 work-related deaths each year in the UK and over 500 UK construction workers die annually due to exposure to silica dust.

CONTROL OPTIONS

Control measures

As there are so many airborne pollutants to which a plant operator may be exposed, it is vitally important that COSHH assessments are completed for all activities to identify the significant risks and appropriate control measures. The findings should be communicated to ensure that they are understood by any worker who may be at risk. A qualified Occupational Hygienist can assist with the COSHH assessment, to help to identify exposures to hazardous substances,

CONTROL OPTIONS

advise on the level of exposure risk and select the appropriate control measures – particularly where work is carried out on contaminated land or derelict sites. These measures should be task specific, and developed following a hierarchy of control which should start with preventative measures, followed by engineering controls and working methods and then consider PPE as a last resort. [See HSE: A step by step guide to COSHH assessment:

www.hse.gov.uk/pubns/priced/hsg97.pdf for further guidance.]

Elimination/prevention

- In general, plan work so that operatives are located away from plant or tasks that generate dust; remote operation of plant is preferable.

DEEEs

- Substitute diesel plant for safer alternative eg. electric motors.
- Warm up diesel engines outside before entering confined areas, and do not leave engines idling.
- Ensure good engine maintenance.

Engineering controls

Dusts

- Rock drills, piling rigs etc. should feature integrated water dust suppression systems.
- Local exhaust ventilation (LEV) should be used to extract airborne dust before it can be breathed in. The most effective types of LEV are generally those that are integrated into plant.

DEEEs

- Fit catalysts/particulate traps to vehicle exhausts.

General

- Use exhaust extraction to remove fumes to a safe place outside.
- Ventilated, closed cabs are one of the most effective measures for lowering exposures.

Safe working methods

DEEEs

- All working areas must be well ventilated, particularly where diesel plant or internal combustion engines (e.g.; on compressors or generators) operate.

PPE

PPE should be a last resort control measure as it has to be worn properly all of the time, and it does not "fail safe". It needs to be carefully selected to ensure it provides adequate protection. Tight fitting respiratory protective equipment (RPE) must be face fit tested to ensure that it affords the anticipated level of protection for each individual.

Dust

- Minimise the height through which deposited materials fall to reduce the dustiness of a job – particularly during windy conditions.
- Apply water to cutting/drilling work, and on dusty thoroughfares over which vehicles travel.
- Dustless cleaning techniques such as vacuuming of cabs and wet cleaning of plant should be used; avoid using compressed air to clean dust from plant or personal work-wear.
- A high standard of internal cab cleanliness is important to prevent accumulation of dust which can be breathed in when disturbed. During work on contaminated sites entry to and from a cab may need to be restricted to a "clean" zone to prevent contamination. Seats should feature an impermeable cover to prevent dust penetration and facilitate cleaning.

MANAGING THE RISK

Training & communication, supervision, maintenance & testing of controls and air monitoring* are all vital aspects of managing the risk, in addition to health surveillance which can be a requirement in certain circumstances.

See our introductory *Respiratory Health Hazards in Construction Fact Sheet Series: Overview* for more information about what things to consider and implement.

Air monitoring*

Air monitoring is a specialist activity. It may be needed as part of a COSHH assessment, as a periodic check on control effectiveness and to assess compliance with relevant WELs, or where there has been a failure in a control (for example if a worker reports respiratory symptoms). A qualified Occupational Hygienist can ensure it is carried out in a way that provides meaningful and helpful results.

The decision to undertake exposure monitoring should be made in accordance with HSE's monitoring strategies outlined in HSG173. In some situation, qualitative or semi-quantitative methods may be suitable. See also COSHH regulation 10 ACOP which details when exposure monitoring is necessary or unnecessary.

Also, see HSE leaflet G409, Exposure measurement: Air sampling. www.hse.gov.uk/pubns/guidance/g409.pdf

Further information

Other BOHS fact sheets in this series cover specific construction trades, associated respiratory health risks and appropriate control options.

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WORKPLACE EXPOSURE LIMITS (WELs) & EXPOSURE LEVELS

Agent or substance	Control/Exposure Limit	Exposure Levels
Silica - RCS (respirable crystalline)	0.1 mg/m ³ (8 hour TWA)	Most work on or near ACMs must be carried out by an HSE licensed contractor. There is HSE guidance* for removing areas of textured coating containing asbestos which is non-licensed work. All Party Parliamentary Group for Respiratory Health (which is an informal, cross-party group formed by MPs and Members of the House of Lords) published a report named "Silica- the next asbestos". This recommends that the WEL for RCS is reduced to 0.05 mg.m-3 as this would be in line with the recommended exposure standard from the Scientific Committee on Occupational Exposure Limits proposed in 2003.
H2S	5 ppm (8 hour TWA) 10 ppm 15-min STEL	
Construction Dust		These levels are not workplace exposure limit but the level at which the dust becomes defined as a 'hazardous substance' and so it subject to the COSHH regulations. This does not apply to substances listed in Table 3.2 of part 3 of Annex VI of the CLP Regulation, substances specified with an indication of danger e.g. very toxic, toxic, harmful, corrosive or irritant, or substances for which the HSE has an approved WEL.
DEEEs		An overall WEL is not set of DEEE. Although the European Commission is considering 0.05 mg/m ³ for elemental carbon which represents the particulate fraction or 'soot' component of DEEE (which is thought to link to the ill-health effects due to PAH absorption onto the soot). The WEL for gaseous components are as follows: carbon monoxide 20 ppm 8hr-TWA and 100 ppm 15-min STEL, nitrogen monoxide 2 ppm 8hr-TWA, nitrogen dioxide 0.5 ppm 8hr-TWA and 1 ppm 15-min STEL.

Further information

Many of these commonly found hazardous substances have workplace exposure limits (WELs) [see HSE's Workplace Exposure Limits EH40/2005: www.hse.gov.uk/pubns/priced/eh40.pdf]

The risk of respiratory ill health depends on the frequency, duration and level of exposures. Levels of exposure can vary according to the composition materials (eg. different types of stone contain different amounts of silica), and be affected by site conditions, weather conditions, working methods and human factors such as training and supervision. An operative's exposure to hazardous substances could regularly exceed WELs if controls are inadequate and good practices are not observed.

- *For removing small areas of textured coating containing asbestos: Asbestos Essentials: Removing textured coating from a small area: www.hse.gov.uk/pubns/guidance/a28.pdf*
- Other BOHS fact sheets in this series cover specific construction trades, and their associated respiratory health risks and appropriate control options.
- HSE: Control of diesel engine exhaust emissions in the workplace: www.hse.gov.uk/pubns/priced/hsg187.pdf
- Hazardous Substances: www.hse.gov.uk/construction/healthrisks/hazardous-substances/harmful-micro-organisms/other-diseases.htm
- Control exposure to hazardous dust: www.hse.gov.uk/research/rrpdf/rr1126.pdf
- HSE Essentials: Asbestos: www.hse.gov.uk/asbestos/essentials
- COSHH Essentials: Silica - RCS: www.hse.gov.uk/coshh/essentials/direct-advice/construction-silica.htm
- Working with sewage: guidance for employers: www.hse.gov.uk/pubns/indg198.pdf